BASIC INFORMATION ABOUT CLOUD COMPUTING RELATED TO MODERN SITUATION

BY

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ABSTRACT

Modern computing in the age of the Internet is quite a strange, remarkable thing. Cloud Computing is a technology that uses the internet and central remote servers to maintain data and applications. Cloud computing allows consumers and businesses to use applications without installation and access their personal files at any computer with internet access. This technology allows for much more efficient computing by centralizing data storage, processing and bandwidth. In cloud computing, the word cloud (also phrased as "the cloud") is used as a metaphor for "the Internet," so the phrase cloud computing means "a type of Internet-based computing," where different services such as servers, storage and applications are delivered to an organization's computers and devices through the Internet. Cloud computing is comparable to grid computing, a type of computing where unused processing cycles of all computers in a network are harnessed to solve problems too intensive for any stand-alone machine. Cloud computing is a general term for anything that involves delivering hosted services over the Internet. These services are broadly divided into three categories: Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS) and Software-as-a-Service (SaaS). A cloud can be private or public. A public cloud sells services to anyone on the Internet. A private cloud is a proprietary network or a data center that supplies hosted services to a limited number of people. Thus the author discussed the outline of Cloud computing in this article.

Keywords:Cloud Computing, Infrastructure-as-a-Service, Platform-as-a-Service, Software-as-a-Service, Public Cloud, Private Cloud, Cloud Servers.

INTRODUCTION

The current state of cloud computing rests on a strong internet backbone, but that isn't how it started or where it ends. The private cloud is now an important part of many business IT infrastructures, making elements like virtualization and service-oriented architecture even more important. If we look at the development of the cloud over the years, it is easier to see why the cloud is such an integral component of modern IT solutions. Cloud computing is all the rage. Cloud computing, often referred to as simply "the cloud," is the delivery of on-demand computing resources, everything from applications to data centers over the Internet on a pay-for-use basis.

1. Cloud computing

Cloud computing is computing in which large groups of remote servers are networked to allow centralized data storage and online access to computer services or resources. Clouds can be classified as public, private or hybrid.

Mell & Grance (2011) stated that cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. This cloud model is composed of five essential characteristics, three service models, and four deployment models.

Cloud computing comes into focus only when you think about what Information Technology always needs: a way to increase capacity or add capabilities on the fly without investing in new infrastructure, training new personnel, or licensing new software. Cloud computing encompasses

any subscription-based or pay-per-use service that, in real time over the Internet, extends Information Technology's existing capabilities (Knorr, 2008).

Cloud computing exhibits the following key characteristics:

- Agility
- Application programming interface
- Cost reductions claimed by cloud providers
- Device and location independence
- Maintenance of cloud computing applications is easier
- Productivity may be increased when multiple users can work on the same data
- Reliability
- Scalability and elasticity via dynamic
- Security can improve due to centralization of data

1.1 Essential Characteristics

The National Institute of Standards and Technology's (NIST, 2011) definition of cloud computing identifies five essential characteristics:

1.1.1 On-demand self-service

A consumer can unilaterally provision computing capabilities such as server time and network storage, as needed automatically without requiring human interaction with each service provider.

1.1.2 Broad network access

Capabilities are available over the network and accessed through standard mechanisms that promote use by heterogeneous thin or thick client platforms (e.g., mobile phones, tablets, laptops, and workstations).

1.1.3 Resource pooling

The provider's computing resources are pooled to serve multiple consumers using a multi-tenant model, with different physical and virtual resources assigned and reassigned dynamically according to consumer demand. There is a sense of location independence, in that the customer generally has no control or knowledge over the exact location of the provided resources but may be able to specify location at a higher level of abstraction (e.g., country, state, or datacenter). Examples of resources include storage, processing, memory, and network bandwidth.

1.1.4 Rapid elasticity

Capabilities can be elastically provisioned and released, in some cases automatically, to scale rapidly outward and inward commensurate with demand. To the consumer, the capabilities available for provisioning often appear to be unlimited and can be appropriated in any quantity at any time.

1.1.5 Measured service

Cloud systems automatically control and optimize resource use by leveraging a metering capability at some level of abstraction appropriate to the type of service (e.g., storage, processing, bandwidth, and active user accounts). Resource usage can be monitored, controlled, and reported, providing transparency for both the provider and consumer of the utilized service.

2. Deployment Models

According to Mell, & Grance (2011), there were four development models which are:

2.1 Private cloud

The cloud infrastructure is provisioned for exclusive use by a single organization comprising of multiple consumers (e.g., business units). It may be owned, managed, and operated by the organization, a third party, or some combination of them, and it may exist on or off premises.

2.2 Community cloud

The cloud infrastructure is provisioned for exclusive use by a specific community of consumers from organizations that have shared concerns (e.g., mission, security requirements, policy, and compliance considerations). It may be owned, managed, and operated by one or more of the organizations in the community, a third party, or some combination of them, and it may exist on or off premises.

2.3 Public cloud

The cloud infrastructure is provisioned for open use by the general public. It may be owned, managed, and operated by a business, academic, or government

organization, or some combination of them. It exists on the premises of the cloud provider.

2.4 Hybrid cloud

The cloud infrastructure is a composition of two or more distinct cloud infrastructures (private, community, or public) that remain as unique entities, but are bound together by standardized or proprietary technology that enables data and application portability (e.g., cloud bursting for load balancing between clouds).

3. How Cloud Computing Works

The goal of cloud computing is to apply traditional supercomputing, or high-performance computing power, normally used by military and research facilities, to perform tens of trillions of computations per second, in consumer-oriented applications such as financial portfolios, to deliver personalized information, to provide data storage or to power large, immersive computer games.

To do this, cloud computing uses networks of large groups of servers typically running low-cost consumer PC technology with specialized connections to spread data-processing chores across them. This shared IT infrastructure contains large pools of systems that are linked together. Often, virtualization techniques are used to maximize the power of cloud computing (Beal, 2014).

3.1 Advantages of using Public Cloud

For obvious reasons, public cloud is bound to offer a multitude of benefits for its users, which can be sensed by its ubiquitous demand. Some of the most important ones are mentioned here:

- Efficient storage and computing services
- Inexpensive, since all the virtual resources whether application, hardware or data are covered by the service provider.
- Allows easy connectivity to servers and information sharing.
- Assures appropriate use of resources as the users are required to pay only for the services they require.
- Highly reliable and redundant.
- Widespread availability irrespective of geographical precincts.
- Sets business people free from the hassles of buying, managing and maintaining all the virtual resources at their own end, the cloud server does it all.

Public cloud, in today's advanced workplace, empowers employees and enables them to become productive even when outside the office. The SaaS model ensures that corporations save on IT expenditures while delivering the flexibility of productivity software on the cloud (Abhishek Pande, 2012).

4. Cloud servers

Cloud computing providers offer their services according to several fundamental models. A cloud service has three distinct characteristics that differentiate it from traditional hosting. They are Software as a Service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS).

4.1 Software as a Service (SaaS)

Software as a Service (SaaS), describes any cloud service where consumers are able to access software applications over the internet. The applications are hosted in "the cloud" and can be used for a wide range of tasks for both individuals and organisations. Google, Twitter, Facebook and Flickr are all examples of SaaS, with users able to access the services via any internet enabled device. Enterprise users are able to use applications for a range of needs, including accounting and invoicing, tracking sales, planning, performance monitoring and communications (including webmail and instant messaging).

SaaS is often referred to as software-on-demand and utilising it is akin to renting software rather than buying it. With traditional software applications, you would purchase the software upfront as a package and then install it onto your computer. The software's licence may also limit the number of users and/or devices where the software can be deployed. Software as a Service users, however, subscribe to the software rather than purchasing it, usually on a monthly basis. Applications are purchased and used online with files saved in the cloud rather than on individual computers (Beal, 2014).

4.2 Platform as a Service (PaaS)

Platform as a Service, often simply referred to as PaaS, is a category of cloud computing that provides a platform and environment to allow developers to build applications and services over the internet. PaaS services are hosted in the cloud and accessed by users simply via their web browser. Platform as a Service allows users to create software applications using tools supplied by the provider. PaaS services can consist of preconfigured features that customers can subscribe to; they can choose to include the features that meet their requirements while discarding those that do not. Consequently, packages can vary from offering simple point-and-click frameworks where no client side hosting expertise is required to supply the infrastructure options for advanced development.

The infrastructure and applications are managed for customers and support is available. Services are constantly updated, with existing features upgraded and additional features added. PaaS providers can assist developers from the conception of their original ideas to the creation of applications, and through to testing and deployment. This is all achieved in a managed mechanism. As with most cloud offerings, PaaS services are generally paid for on a subscription basis with clients ultimately paying just for what they use. Clients also benefit from the economies of scale that arise from the sharing of the underlying physical infrastructure between users, and that results in lower costs (Margaret Rouse, 2010).

4.3 Infrastructure as a Service (IaaS)

Infrastructure as a Service (IaaS) is one of the three fundamental service models of cloud computing alongside Platform as a Service (PaaS) and Software as a Service (SaaS). As with all cloud computing services, it provides access to computing resource in a virtualised environment, "the Cloud", across a public connection, usually the internet. In the case of IaaS, the computing resource provided is specifically that of virtualised hardware, in other words, computing infrastructure. The definition includes such offerings as virtual server space, network connections, bandwidth, IP addresses and load balancers. Physically, the pool of hardware resource is pulled from a multitude of servers and networks usually distributed across numerous data centers, all of which the cloud provider is responsible for maintaining. The client, on the other hand, is given access to the virtualised components in order to build their own IT platforms.

In common with the other two forms of cloud hosting, IaaS can be utilised by enterprise customers to create cost effective and easily scalable IT solutions where the complexities and expenses of managing the underlying hardware are outsourced to the cloud provider. If the scale of a business customer's operations fluctuate, or they are looking to expand, they can tap into the cloud resource as and when they need it rather than purchase, install and integrate hardware themselves. Infrastructure as a service (IaaS) is a standardized, highly automated offering, where computer resources, complemented by storage and networking capabilities are owned and hosted by a service provider and offered to customers on-demand. Customers are able to self-provision this infrastructure, using a Web-based graphical user interface that serves as an IT operations management console for the overall environment. API (Application Program Interface) access to the infrastructure may also be offered as an option (David Mitchell, 2012).

5. Supporting Factors for Cloud Computing

- Advancement in processors
- Virtualization technology
- Distributed Storage
- Automated Management
- Broadband internet Access
- Fast and Inexpensive Servers

6. Cloud Computing as a software developer

Cloud Computing is an extension of distributed models of Software development and delivery. The software is composed of interoperable third party components. The execution happens in distributed manner on multiple computers. The ownership is distributed between multiple organizations. Generally, source code is not available for

third party components (Edge, 2013).

7. Technical Issues

7.1 Security

One of the significant technical hurdles that need to be overcome in order for cloud computing benefits to be realized is security. Reliability and security concerns in an organization might need mitigation and applications might need to be re-architected. Business perceptions of increased IT flexibility and effectiveness will have to be properly managed. In most of the cases, network security solutions are not properly architected to keep up with the movement required for cloud to deliver cost effective solutions. With their businesses' information and critical IT resources outside the firewall, customers worry about their vulnerability to attack.

7.2 Technical Hardware & Software Expertise

Users need equipment and resources to customize cloud computing services more relevant and more tailored to the needs of their businesses. Proper man-power is needed to develop the applications to suit a business's needs. The availability of the physical hardware and software components need to be ensured for realizing the benefits of cloud computing. According to Dion Hinchcliffe (2088), wider technical fluency and expertise in the selected cloud computing platforms, which tend to emphasize technologies such as Open Source or newer web-style programming languages and application models will have to be achieved.

8. Non-Technical Issues

Apart from the technical issues, there are several non-technical issues which require equal attention and need to be resolved. Some of the significant non-technical hurdles to the adoption of cloud computing services by large enterprises are financial, operational and organizational issues.

8.1 Financial Issues

According to Lublinsky (2009), "Clearing the Air on Cloud Computing", cloud computing can cost twice as much as in-house data centers. This poses a problem for large enterprises, but actually works to the advantage of small and midsize companies and businesses.

Conclusion

Today, with such cloud-based interconnection seldom in evidence, cloud computing might be more accurately described as "sky computing," with many isolated clouds of services which IT customers must plug into individually. Cloud computing is an attractive area, that makes it easier to deploy software and increase productivity. However, there are some technical and non-technical realities that make security somewhat difficult to deliver in a cloud. The cloud presents a number of new challenges in data security, privacy control, compliance, application integration and service quality. It can be expected that over the few years, these problems will be addressed. In general, cloud computing will act as an accelerator for enterprises, enabling them to innovate and compete more effectively. Under the recent financial situation, executives need to reorganize their strategies with cost-effective solutions. Thus in the modern situation, cloud computing provides a strong backbone for internet.

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