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A Review of Cloud Computing Security Issues

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Abstract:- Compute clouds are enormous server farms packed with computing power and storage space accessible through the Internet. Instead of having to manage one's own infrastructure to run applications, server time and storage space can be bought from an external service provider. From the customers' point of view the benefit behind this idea is to be able to dynamically adjust computing power up or down to meet the demand for that power at a particular moment. This kind of flexibility not only ensures that no costs are incurred by excess processing capacity, but also enables hardware infrastructure to scale up with business growth. But security is very big concern in the data sharing in the network. Same as in cloud computing data security is also a very sensitive matter. This paper discusses the concept of Cloud computing to achieve a complete definition of what a Cloud is and its security issues, More than 20 definitions have been studied allowing for the extraction of a consensus definition as well as a minimum definition containing the essential characteristics. This paper pays much attention to the security issues of Cloud computing.

I. INTRODUCTION

Computing is being transformed to a model consisting of services that are commoditized and delivered in a manner similar to traditional utilities such as water, electricity, gas, and telephony. In such a model, users access services based on their requirements without regard to where the services are hosted or how they are delivered. Several computing paradigms have promised to deliver this *utility computing* vision and these include cluster computing, Grid computing, and more recently *Cloud computing*.

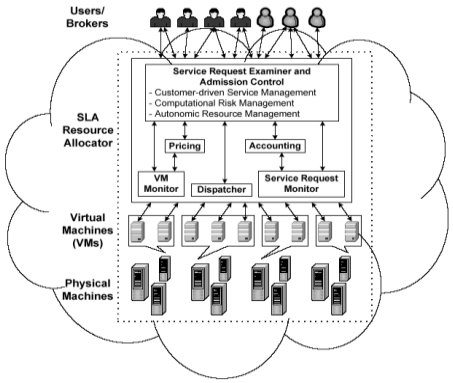

Fig1: Cloud Architecture

The latter term denotes the infrastructure as a "*Cloud*" from which businesses and users are able to access applications from anywhere in the world on demand. Thus, the computing world is rapidly transforming t towards developing software for millions to consume as a service, rather than to run on their individual computers. Figure 1 shows the high-level architecture for supporting market-oriented resource allocation in Data Centers and Clouds.

There are basically four main entities involved:

Users/Brokers: Users or brokers acting on their behalf submit service requests from anywhere in the world to the Data Center and Cloud to be processed.

SLA Resource Allocator: The SLA Resource Allocator acts as the interface between the Data Center/Cloud service provider and external users/brokers.

VMs: Multiple VMs can be started and stopped on-demand on a single physical machine to meet accepted service requests, hence providing maximum flexibility to configure various partitions of resources on the same physical machine to different specific requirements of service requests.

Physical Machines: The Data Center comprises multiple computing servers that provide resources to meet service demands.

II. ESSENTIAL CHARACTERISTICS OF CLOUD COMPUTING

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.

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).

3. 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.

4. Resource pooling: The provider's computing resources are pooled to serve multiple consumers using a multi-tenant model, with different physical and virtual resources dynamically assigned and reassigned 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

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datacenter). Examples of resources include storage, processing, memory, and network bandwidth.

5. Measured service: Cloud systems automatically control and optimize resource use by leveraging a metering capability1 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.

III. CLOUD COMPUTING MODELS

A) Service Models:

a. Software as a Service (SaaS): The applications are accessible from various client devices through either a thin client interface, such as a web browser (e.g., web-based email), or a program interface. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, storage, or even individual application capabilities, with the possible exception of limited user-specific application configuration settings.

b. Platform as a Service (PaaS): The capability provided to the consumer is to deploy onto the cloud infrastructure consumer-created or acquired applications created using programming languages, libraries, services, and tools supported by the provider. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, or storage, but has control over the deployed applications and possibly configuration settings for the application-hosting environment.

c. ***Infrastructure as a Service (IaaS):*** *T*he capability provided to the consumer is to provision processing, storage, networks, and other fundamental computing resources where the consumer is able to deploy and run arbitrary software, which can include operating systems and applications. The consumer does not manage or control the underlying cloud infrastructure but has control over operating systems, storage, and deployed applications; and possibly limited control of select networking components (e.g., host firewalls).

d. Network as a service (NaaS): a category of cloud services where the capability provided to the cloud service user is to use network/transport connectivity services and/or inter-cloud network connectivity services. NaaS involves the optimization of resource allocations by considering network and computing resources as a unified whole. Traditional NaaS services include flexible and extended VPN, and bandwidth on demand.

e. Data as a Service (DaaS): Data as a Service (DaaS), data services are similar to Software as a Service (SaaS) in that the information is stored in the cloud and is accessible by a wide range of systems and devices. Data services can eliminate redundancy and streamline costs by housing critical data in one location, enabling the data to be accessed and/or updated by multiple users while ensuring a single point for updates.

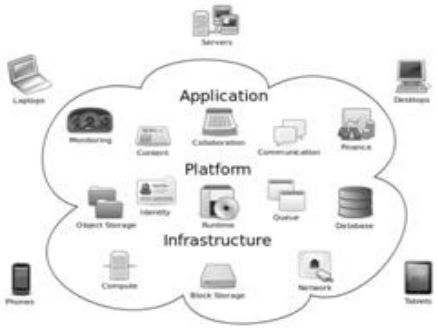

Fig 2: Cloud Computing

B) Deployment Models:

a. Private cloud: The cloud infrastructure is provisioned for exclusive use by a single organization comprising 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.

b. 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.

c. 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.

d. Hybrid cloud: The cloud infrastructure is a composition of two or more distinct cloud infrastructures (private, community, or public) that remain 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).

IV. SECURITY ISSUES

The security of corporate data in the "cloud" is difficult, as they provide different services like Software as a service (SaaS), Platform as a service (PaaS), Data as

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a service (DaaS) and Infrastructure as a service (IaaS). Each service has their own security issues [1].

Privileged user: access Sensitive data processed outside the enterprise brings with it an inherent level of risk, because outsourced services bypass the physical, logical and personnel controls IT shops exert over in-house programs.

Data recovery: Even if we don't know where your data is, a cloud provider should tell us what will happen to our data and service in case of a disaster.

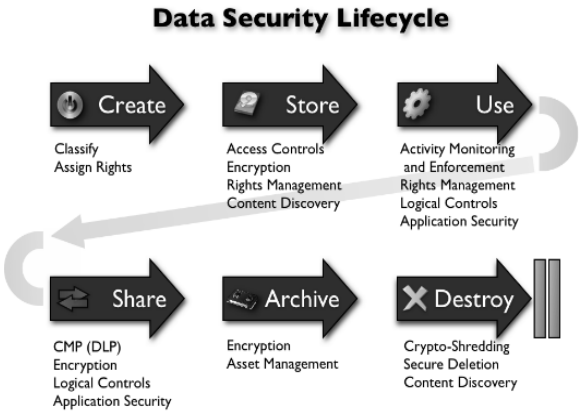

Fig 3: Data Security Model

Data security: Security refers to confidentiality, integrity and availability, which pose a major issue for cloud vendors. Confidentiality refers to who stores the encryption keys data from company A, stored in an encrypted format at company B must be kept secure from employees of B, thus the client company should own the encryption keys. Integrity refers that no common policies exist for approved data exchanges

Regulatory compliance: Customers are ultimately responsible for the security and integrity of their own data, even when it is held by a service provider. Traditional service providers are subjected to external audits and security certifications. Cloud computing providers who refuse to undergo this scrutiny are signaling that customers can only use them for the most trivial functions [2].

Data location: When users use the cloud, they probably won't know exactly where their data will be hosted. In fact, they might not even know what country it will be stored in. Service providers need to be asked if they will commit to storing and processing data in specific jurisdictions, and whether they will make a contractual commitment to obey local privacy requirements on behalf of their customers [9].

V. CONCLUSION

Cloud computing is a new technology widely studied in recent years. Now there are many cloud platforms both in industry and in academic circle. This paper discusses the concept of Cloud computing to achieve a complete definition of what a Cloud is and its security issues. These issues mentioned above will be the research hotspot of cloud computing. There is no doubt that cloud computing has a bright future.

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