

An Overview of Cloud Security Paradigm

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Abstract---Cloud computing has been a heart favorite topic for many researchers over the years. In contrast to traditional solutions in which the IT services are under proper physical logical and personnel controls, the cloud computing moves the application software and databases to the large data centers. In those centers the management of the data and services may not be fully trustworthy. This unique feature of cloud computing poses many new security challenges which have not been well understood. Cloud computing do not contain both the data and the on the users system so there is a need of data security. All the modern cloud service provider solve this problem by encryption and decryption techniques. In this paper, we investigate the basic problem of cloud computing security. We have proposed a survey of various models for cloud security.

I. INTRODUCTION

CLOUD computing is a new computing paradigm that is built on virtualization & parallel and distributed computing. It is a utility computing and has the service-oriented architecture. In the last several years, the cloud computing has emerged as one of the most influential paradigms in the IT industry. It has attracted extensive attention from both academia and industry. The cloud computing holds the promise of providing computing as the fifth utility [1] after the other four utilities water, gas, electricity, and telephone. The major benefits of cloud computing include reduced costs and capital expenditures, the increased operational efficiencies, high scalability, flexibility and so on. There are many service-oriented cloud computing models have been proposed. It includes Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS).

A number of commercial cloud computing systems have been built at different levels like - Amazon's EC2 [2], Amazon's S3 [3], and IBM's Blue Cloud [4] are IaaS systems. The Google App Engine [5] and Yahoo Pig are representative PaaS systems. The Google's Apps [6] and Salesforce's Customer Relation Management (CRM) System belong to SaaS systems. With all such cloud computing systems the enterprise users no longer need to invest in hardware or software systems or hire IT professionals to maintain these IT systems, in this way they save cost on IT infrastructure and human resources. Also the computing utilities provided by cloud computing are being offered at a relatively low price in a pay-as-you-use style. For example, the Amazon's S3 data storage service with 99.99% durability charges only \$0.06 to \$0.15 per gigabyte-month, on the other hand the traditional storage cost ranges from \$1.00 to \$3.50 per gigabyte-month according to Zetta Inc... One of the main security concerns is data security and privacy in cloud computing due to its Internet based data storage and management. Cloud users in the first place want to make sure that their data are kept confidential to outsiders. It includes the cloud provider and their potential

competitors. For example, a health care information system on a cloud is required to restrict access of protected medical records to eligible doctors and a customer relation management system running on a cloud may allow access of customer information to high-level executives of the company only.

In the traditional model of computing both data and software are fully contained on the user's computer. Whereas in cloud computing the user's computer may contain almost no software or data. Generally a minimal operating system and web browser and a display terminal for processes occurring on a network.

The cloud computing is based on five attributes shared resources, scalability, flexibility, pay as you go and self-provisioning of resources. It makes new advances in processors, disk storage, broadband Internet connection, also fast & inexpensive servers have combined to make the cloud a more compelling solution.

II. ARCHITECTURE OF CLOUD COMPUTING

A. Cloud Computing Service Models

- 1) Cloud Software as a Service (SaaS): Application and Information clouds, Use provider's applications over a network, cloud provider examples Salesforce.com, Google Apps.
- 2) Cloud Platform as a Service (PaaS): Development clouds, Deploy customer-created applications to a cloud, cloud provider examples Windows Azure, Google App Engine, Aptana Cloud.
- 3) Cloud Infrastructure as a Service (IaaS): Infrastructure clouds, Rent processing, storage, network capacity, and other fundamental computing resources, Dropbox, Amazon Web Services, Mozy, Akamai.

B. Cloud computing deployment models

- 1) The Private cloud: Enterprise owned or leased
- Community cloud: Shared infrastructure for specific community
- 2) The Public cloud: Sold to the public, mega-scale infrastructure
- 3) The Hybrid cloud: Composition of two or more clouds

C. Cloud computing sub-services models

- 1) IaaS: DataBase-as-a-Service DBaaS [12].
- 2) PaaS: Storage-as-a-Service STaaS
- 3) SaaS: Communications-as-a-Service (CaaS). CaaS is the delivery of an enterprise communications solution such as Voice over IP
- 4) SaaS: SECURITY-as-a-Service (SECaaS). SECaaS is the security of business networks and mobile networks through the Internet for events.
- 5) SaaS: Monitoring-as-a-Service (MaaS). MaaS refers to the delivery of second-tier infrastructure components, such as log management and asset tracking.

6) PaaS: Desktop-as-a-Service (DTaaS). DTaaS is the decoupling of a user's physical machine from the desktop and software he or she uses to work.

7) IaaS: Compute Capacity-as-a-Service (CCaaS). CCaaS is the provision of "raw" computing resource, typically used in the execution of mathematically complex models from either a single "supercomputer" resource or a large number of distributed computing resources where the task performs well.

III. CLOUD COMPUTING BENEFITS & DRAWBACKS

Lower computer costs, improved performance, reduced software costs, instant software updates, improved document format compatibility, unlimited storage capacity, device independence, and increased data reliability

Requires a constant Internet connection, does not work well with low-speed connections, can be slow, features might be limited, stored data might not be secure, and stored data can be lost.

IV. LITERATURE SURVEY

To secure data confidentiality and integrity, creating more reliable cloud computing environment has become the top priority. The work proposed by the authors [7] presents a novel data security model for cloud computing. This work introduces agents to data security module in order to provide more reliable services.

In comparison to traditional solutions [8], the Cloud computing transfers the application software and databases to the large data centers. So it is clear that the although this is a unique feature of cloud but it raises many new security challenges. Most of the clouds generally have single security architecture but have many customers with different demands. All the cloud service provider solves this problem by encrypting the data by using encryption algorithms. Authors [8] investigated the basic problem of cloud computing data security. They proposed a data security model of cloud computing based on the study of the cloud architecture. They improved data security model for cloud computing.

In article [9], cloud computing technology architecture and the cloud computing data security features are the first to be studied and considered then the cloud computing data security model has been analyzed. At end the realization of data security model has been done. This paper presents a multi-dimension architecture of three layers defense. Each of the three layer accomplishes its own job and combines with others to ensure data security in the cloud computing.

The work done in [10] put forward management ideas of user data classification and designed a cloud-based data security policy through user demand for data security protection. They ensured that the internal data is not spread to the public cloud through mechanisms like - strong authentication, sensitive information filtering, data evaluation classified, cloud computing security gateway strategy etc...

The authors [11] introduced a third party auditor (TPA) on behalf of the cloud client to verify the integrity of the dynamic data stored in the cloud.

Although the Cloud Computing is promising and efficient but there are many challenges for data security as there is no vicinity of the data for the Cloud user. To ensure the security of data from the unauthorized access [12] proposed a method by implementing RSA algorithm.

V. CONCLUSION

In this paper, we elaborated the concept of cloud computing paradigm. The cloud computing architecture is also discussed. Cloud computing has many advantages but it is observed that the cloud security is a vital issue. The data and application stored in the cloud are required to be stored from fake access. Some modern cloud security models have been discussed in brief.

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