

Cloud Computing Effect on Enterprises in Terms of Cost and Security

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Abstract: *Innovation is necessary for every technology changes. Many enterprises want to reduce their computing cost through the virtualization. So for reducing the cost of computing there is new technology called cloud computing. Cloud computing reduced the cost through reduced administration and infrastructure cost and improved the utilization. Cloud computing is known as the sum of SAAS (software as services) and utility computing. Cloud computing is at its initial stage and it is very new technology for the enterprises so many enterprises have doubt for adopting the cloud computing. This paper presents the cost and security issues for enterprises. In this paper I present the advantages and disadvantages of cloud computing in terms of cost and security for enterprises. In the end I found that cloud computing is better for small and medium sized enterprises in terms of cost and security as compared to large enterprises*

Keywords: cloud computing, cost, security, enterprises

1. Introduction

Cloud Computing has become one of the most talked about technologies in recent times And has got lots of attention from media as well as analysts because of the opportunities it is offering The cloud is a metaphor for the Internet and is an abstraction for the complex infrastructure it conceal The hardware and software in the data centers that provide those services. The services themselves have long been referred to as Software as a Service (SAAS). The data center hardware and software is what we will call a Cloud. When a Cloud is available in a pay-as-you-go manner to the general public and cloud is call it a Public Cloud; the service being sold is Utility Computing. We use the term Private Cloud to refer to internal data centers of a business or other organization, not made available to the general public. Thus, Cloud Computing is the sum of SAAS and Utility Computing, but does not include Private cloud

2. Cloud Computing Evolution

There has always been a debate about the evolution of Cloud Computing and the most important point in that is Grid Computing. Some people call Cloud Computing and Grid Computing the same phenomena while others call Cloud Computing an extension of Grid computing. So Cloud Computing is an evolution from the Grid Computing

<i>Grid Computing</i>	<i>Cloud Computing</i>
Allocation of multiple servers onto a single task or job	Virtualization of servers; one server to compute several tasks concurrently
Typically used for job execution, i.e. the execution of a program for a limited time	More frequently used to support long-running services
Expose high level of detail	Provide higher-level Abstractions

3. Data Security in Cloud

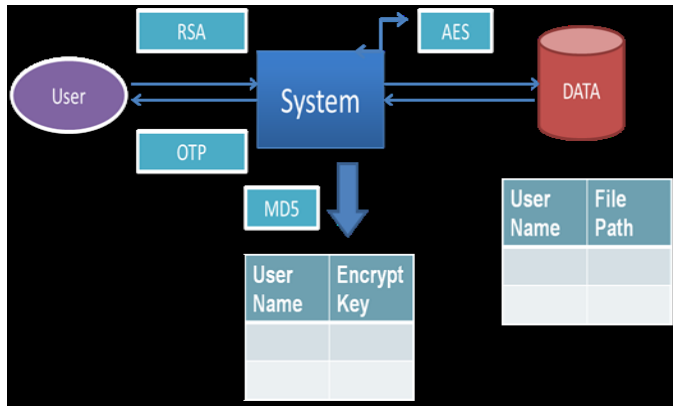
To understand the security issue in Cloud Computing, it is important to know the architecture of Cloud Computing. Once you know the architecture of Cloud Computing then it

becomes easier to understand the data security and privacy issues and also to figure them out. Mostly the security issues which arise in Cloud Computing are the result of users/enterprises lack of control on the physical infrastructure.

In our proposed model we have worked with the following security algorithms:

1. RSA algorithm for secured communication
2. AES for Secured file encryption
3. MD5 hashing for cover the tables from user
4. One time password for authentication

At present ensure security in cloud computing stand has become one of the most important concerns for the researchers. I have undertaken these problems in our research, to provide some solution correlated with security. I have proposed the following security model for cloud computing data storage shown in Figure. In this model, all the users irrespective of new or existing member, needs to pass through a secured channel which is connected to the main system computer. System server computer has relation with other data storage system. The data storage system can be servers or only storage devices. Here, each of the data storage devices can be thought as one or more servers in number. This means, there are no dedicated servers in cloud computing, rather all are independent servers and can be scaled as necessary with RSA algorithm using the user's private key. Similarly when the system receives an encrypted file from the user it will immediately decrypt it using its private key. As a result the communication becomes secured between the user and the system.



In the proposed security model one time password has been used for authenticating the user. The password is used to keep the user account secure and secret from the unauthorized user. But the user defined password can be compromised. To overcome this difficulty one time password is used in the proposed security model. Thus whenever a user login in the system, he/she will be provided with a new password for using it in the next login. This is usually provided by the system itself.

This password will be generated randomly. Each time a new password is created for a user, the previous password for that user will be erased from the system. New password will be updated for that particular user. A single password will be used for login only once. The password will be sent to the users authorized mail account. Therefore at a same time a check to determine the validity of the user is also performed. As a result only authorized user with a valid mail account will be able to connect to the cloud system. By this system, existence of unauthorized user or a user with an invalid mail account will be pointed out. The newly generated password is restored in the system after md5 hashing. The main purpose of MD5 hashing is that this method is a one way system and unbreakable. Therefore it will be difficult for an unauthorized or unknown party for retrieving the password for a selected user even if gained access to the system database after connecting with the system a user can upload or download the file(s). For the first time when connected with the system the user can only upload file(s).

After that users can both upload and download their files. When a file is uploaded by an user the system server encrypts the file using AES encryption algorithm. In the proposed security model 128 bit key is used for AES encryption. 192 bit or 256 bit can also be used for this purpose. Here the 128 bit key is generated randomly by the system server. A single key is used only once. That particular key is used for encrypting and decrypting a file of a user for that instance. This key is not further used in any instance later. The key is kept in the database table of the system server along with the user account name. Before inserting the user account name it is also hashed using md5 hashing.

This insures that unauthorized person cannot retrieve the key to decrypt a particular file for a particular user by simply gaining access and observing the database table of the system server. As a result the key for a particular file becomes hidden and safe. Again when the encrypted file is

uploaded for storing to the storage server, the path of the encrypted file along with synchronization between the database tables of main system server and the storage server. The encrypted files on the storage server are inserted not serially. We have developed a hash table for determining where to insert a file into the database table. Login into the main system is compulsory when a user wants to download a previously stored file. When the user selects a file to download, the system automatically retrieves the key for the requested file from the main system server. The system matches user account name saved in its database table with that saved in the storage server after hashing it using md5 hashing. The path of the encrypted file from the storage server is found by using the user account name and the hash table input for the requested file.

In this model, the encryption key for a particular file of a particular user is only known to the main system server. The path of the encrypted file is only known to the storage server which is only known to the main server. For this, the key as well as the encrypted file is hidden from the unauthorized persons. In this communication system when a file is sent from the main system server to the storage server it is already in its fully encrypted form. That's why there is no need to provide security in this communication channel. At last, we propose hardware encryption for making the databases fully secured from the attackers and other unauthorized persons.

Figure is the Pictorial representation of the proposed cloud security architecture. Here, single user and server represent n users and n servers.

An algorithm is developed, which is used for inserting the file in the main server (System), and in the database table where the encrypted file is kept. This is saturated from the system server for the cloud computing platform. In the system server, the file is inserted by maintaining the sequence. In file saving server, the file is inserted in a random order which becomes the output of the algorithm. The relations between the system server table and database server tables can be thought as disjoint sets the user account is kept and maintained in the database table on the storage server. Here user name is used for

4. Cloud Computing and Cost

4.1 Cloud Computing Cost Effect

As I have already mentioned that Cloud Computing is an evolution from the Grid Computing, so we can say that most of the enterprises moved from Grid to Cloud. Hence, now I will study as how the enterprises are affected after moving from Grid to Cloud. In other words, I will see what Grid Computing had and what Cloud Computing possesses now to help the economics of enterprise

4.2 Benefits

In a "Cloud Migration: A Case Study of Migrating an Enterprise IT System to IaaS", Khajeh-Hosseini et al. (2010a) talked about the third party cloud infrastructure .According to them if the third party cloud infrastructure is

introduced then it presents many opportunities for enterprises to improve the management of income and outgoings for both finance staff and customers. It also helps the easing of cash-flow management for finance staff as the cloud pricing model has minimal upfront cost and monthly billing and it also lessens the variability of expenditure on electricity. These are the benefits comparing to the in-house data center, as it can be costly to buy hardware and cash-flow can also be slow and difficult from clients. Along with that energy costs will also go down as you are not running your own data center and third party cloud will be responsible for that. The Cloud infrastructure is also very helpful for the finance department of the company to reduce the administrative burden. Third party cloud infrastructure solutions offer new pricing models, which help in managing income for customers, sales and marketing staff Khajeh - Hosseini et al. (2010a) concluded that Cloud Computing is a disruptive technology that is set to change how IT systems in enterprises are deployed because of its cheap, simple and scalable nature. Cloud Computing can be significantly cheaper in comparison to buying and maintaining in-house data center as it eliminates the support related issues because there is no physical infrastructure to maintain. However, there are many social-technical issues which enterprises need to consider before migrating to Cloud .In any enterprise, the low level administrative costs can be quite high as the departments are scattered through in the building, often far greater than raw hardware costs. By the help of cloud, enterprises can offload three kinds of low level administration. First is system infrastructure which includes hardware maintenance, spare parts, adding new machines and infrastructure software is taken care by cloud. Second, once the enterprises define the backup policy, cloud provider is responsible to execute it. Lastly, a single application is installed once and becomes available to all authorized users. Though the management of the application i.e. application support, upgrade issues and user management is not included as moving to cloud does not change much in these tasks. It is important to note that the low level costs can be sometimes higher than the total cost for the cloud service In conventional systems, system resource utilization is low, estimated at 15–20 % for data centers; other estimates are lower .There are many reasons for low utilization as managers usually tend to buy for near peak and future loads and thus do not use the whole capacity all the time. While to help in this matter Cloud Computing smoothes these effects across many customers and today may attain 40 % utilization. Server power is expensive because of processes like cooling and other overhead power consumptions. If combined together, they can be equal to the cost of one typical server used today. Cloud providers can do a lot better than typical server centers due to the better management of voltage conversions, cooler climates and better cooling, and lower electricity rates (cloud vendors tend to cluster near hydropower). Cloud providers are also usually located where real estate is cheap. Rosenthol et al. in their article “Cloud Computing: A new business paradigm for biomedical information sharing”, discussed about the three major cost drivers of biomedical enterprises and how these are affected by the Cloud Computing technology. They include system administration, idle capacity, and power usage and facilities.

5. Drawbacks

Mayur et al. (2008) investigates the Amazon data storage service S3 for scientific data thorough applications. According to them as S3 bundles at a single pricing method for all three data characteristics i.e. high stability high ease of use and fast access but most of applications do not need all bundles together. For example, archival storage; which needs durability but can survive with lower availability and access performance. Hence, it is suggested that S3 should provide services through a number of limited classes of service so that users can choose their desire durability/availability/access performance mix to better costs. Hence, the cost is higher with storage service group durability/availability/access performance together. In the report “Clearing the Air on Cloud Computing” by McKinsey & Co, they state that Cloud Computing can cost twice as much as in-house data centers. However, this is the issue only for large enterprises but small and medium sized enterprises are not affected by it and they get cost benefits. According to them” Cloud offerings currently are most attractive for small and medium-sized enterprises...and most customers of clouds are small businesses”. The reason for this is that the smaller companies don't have the option of developing themselves into giant data centers. Cost changeability is a key feature of Cloud Computing and when enterprises choose for cost clearness, scalability and cost changeability, a new challenge and opportunity arises

6. Conclusion

In this research work, I deal with the affects of Cloud Computing in the enterprises. The specific areas I researched during my study were cost and security. I have found that Cloud Computing is a very hot topic now days and many enterprises are interested in it. Most of the enterprises have idea about it but still there is confusion about the real definition of Cloud Computing. This is reasonable as this technology is in its newborn stage however, as it evolved from Grid Computing therefore, most of the enterprises which have used Grid Computing are better able to understand the term Cloud Computing. There is a confusion or deviation about the limitations of Cloud Computing as many enterprises and even cloud providers believe that private cloud is a part of Cloud Computing. However, in my research I have found that Cloud Computing is the sum of Software as a Service (SAAS) and Utility Computing, but does not include Private Cloud's. However, an important finding is that these benefits are for medium sized or small enterprises. The large enterprises can save their cost by building big data center due their demand and capital they have. In other words, private cloud is rather perfect for the large enterprises

7. Acknowledgment

Thanks to my Guide and family member who always support, help and guide me during my dissertation. Special thanks to my father who always support my innovative ideas.

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