

PREMIER STORAGE RESOURCES MODEL ON MULTI CLOUD DISASTER RECOVERY SERVICE

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Abstract: Cloud computing is one of the most trending technology which got on its wheels from the recent past. It serves in various ways like storage space, application provision, easy access etc. Its cost-efficiency and flexibility makes it the most appealing technology. But there are many issues which weakens its usage. Due to continuous increase in number of users and their data, the storage requirements also increase. One such thing we are concentrating is on the storage and backup related aspects. Here we are introducing a Premier Storage Resources Model which aims for finding the optimal cloud provider for user storage requests. And this model also provides backup at user premise rather than at cloud provider's premise. So whenever there is data loss it can be recovered easily and therefore disaster recovery service is also provided in this model. This also helps for easy migration to another cloud provider too. All this is possible through a Linux Box, which is nothing but a PC installed with Linux operating system.

Keywords: Storage, Backup, Optimal, Cloud Provider.

1. Introduction

Today we can find blocks and blocks of data being generated from every corner. We should have an effective tool to handle this huge data. We can proudly quote one such way is through cloud. Apart from them we have many challenges where cloud is answerable. Among them firstly globalization which implies that client located at any corner of the world can retrieve or access the services from cloud. Secondly aging data centers where there is need to update with new technology for effective usage. Thirdly applications are increasing at higher rate day by day but we do not have a sufficient number of data centers to deal with these growing applications and finally to set up huge servers and

to monitor or maintain them we require large numbers of both man and material power and as a result cost hikes to a greater extent. So cloud emerges as a solution to these.

The term Cloud alludes to a Network or Internet. It provides client a view that cloud is one, which is not present in their premises but at some remote area. Several applications run on clouds public or private interconnects. Cloud Computing [1] is a model for empowering universal, convenient, on-request access to a common pool of configurable processing assets like servers, storage-systems, applications and administrations that can be quickly provisioned and released with negligible administration exertion or organization collaboration. We can state for ease that cloud computing alludes to the computations like maintaining the hardware and software resources remotely.

We have three important and unique aspects which support cloud computing from other computing. They are four deployment-models, three service-models and five characteristics. Among them service models and characteristics plays a vital role.

1.1 Characteristics

On Demand Self Service [1] is one where clients get their services from cloud service provider whenever they needed with no human mediation.

Broad Network Access [1] is one which provides access to cloud services from any client platforms like laptops, desktops, mobiles etc.

Resource Pooling [1] is one where all the resources like compute, storage, network all pooled to serve multiple clients.

Rapid elasticity [1] which means the capacity to scale up the resources rapidly without any

interference in the services to meet the client needs. So to the consumer the cloud appears to be infinite.

Measured Service [1] is where a customer will be billed based on the resources requested by the customer. We can simply quote as Pay-Per-Use.

1.2 Service Models

SaaS: The full form of SaaS [1,3] is Software as a service. This can provide software to the customer over the internet. Based on the customer's request of resources the billing will be made. Based on the cost the customer pays the bill. Example: EMC Mozy.

IaaS: The abbreviation of IaaS [1,3] is Infrastructure as a service. This provides the infrastructure such as memory, computation and network system to the customer. The customer can deploy their own operating system etc. Example: Amazon elastic compute cloud (AEC2).

PaaS: The abbreviation of PaaS [1,3] is platform as a service. The cloud provider provides the Infrastructure, operating system and database for the creation of the applications or they can directly deploy their applications. Here the customer will be billed based on the resources requested by the customer. Example: Google app engine.

1.3 Benefits

Reduction in the information technology cost: The customer can save their money because the services like storage, operating system etc can be provided by the cloud. Therefore ongoing cost of a data centre can be reduced.

Business dexterity support: The cloud has an advantage of supporting the business agility i.e., it is easy to add the data into the cloud very easily. And by using the cloud services the required to provide and arrange the applications will be reduced from hours to minutes.

Elastic scaling: Based on the demand, a cloud can be scaled up as well as down.

High availability: Based on the customer requirement, the cloud computing has to confirm the availability and the accessibility of the application over the internet.

Reduced Storage Space: By using the cloud over internet, there is no need to have a server in the organization so that we can reduce the storage space and minimize the cost to complete the application.

1.4 Disadvantages

Security: This is the major concern for cloud computing. Because the cloud consists of the data from different organizations, there is a possibility for the data to be mixed. So this is the major concern for the cloud computing that has to be resolved.

Disaster recovery: There is no methodology for retaining of information when the data has lost. So this is also another concern for cloud computing. If the data has lost then there is methodology for the data backup in the personal computer easily.

2. Literature Survey

One of the major problems that is being faced these days with one of the new and trending technology i.e., cloud computing is that increase in growth of data that is being stored in cloud. So many storage handling techniques and at the same time backup techniques had emerged and reducing cost to the clients is also important. These are the main concerns in this paper.

Storage is a Computing resource where user needs to store his data. These are provided by cloud service provider especially in Infrastructure as a Service model. If storage is main concern here then following it is a backup issue. If our data loses due to any other means we need to have an additional copy of original data technically termed as backup. So recovering our data from loss is also done through disaster recovery as a service [4,9] schemes. These also should be employed by cloud provider effectively. The parameter which is affected here is the cost. One of the major goals of Cloud provider is optimal cost also. Apart from them we have many other concerns like security etc but those are not part of our paper.

For storage purposes generally user gives the data replicas to the nearest cloud provider or sometimes to the one which offers least prices [2]. But anyway this is burden for user and also not an efficient method. User may fail in this. So optimality is sometimes compromised. Now it the duty of cloud provider not only to store their clients data, but they will provide backup also at minimal cost [2]. So for backup cloud provider depends on other cloud providers (around three to four depending in the requirement), which acts as a trusted third party and provides disaster as a recovery service [4,6]. Not only that the RTO (Recovery Time Period) [9] should also be less.

Many optimal back up techniques like Full, Incremental and Differential backups are used internally by the cloud service providers. Meanwhile cost plays a vital role. Where ever possible the Cloud provider tries to reduce costs as such by sharing the backup servers [5]. And still to reduce this cost multi clouds can also share the backup. Thereby we can achieve optimal cost to some extent. These schemes are evaluated on a regular basis too.

3. Existing System

In the real scenario there would be a huge amount of data to be stored in any information. So they would prefer the cloud for storing the data. Our duty is just to give our data and pay accordingly as per the usage. This concept has reduced the burden of the user in terms of security and cost too. User is not aware of what is actually happening internally. When the data is stored in the cloud, there may be possibility of losing the data by different disasters. There would be a great loss to the company also. No one can stop those disasters not to happen. In order to avoid all these, the cloud provider should also include various backup techniques. Cloud Provider should also take effective steps in reducing costs.

One such system existing with all these is illustrated here.

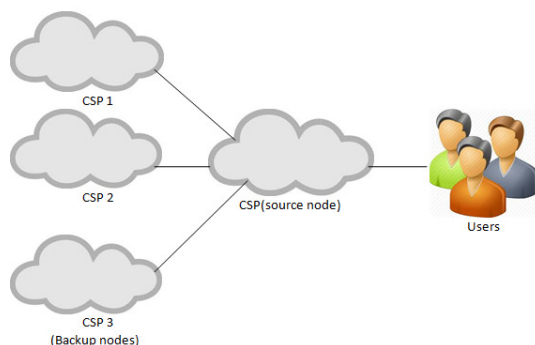


Figure 1. User interaction with CSP and CSP interaction with further CSP's

Client first interacts with the cloud service provider for providing storage resources. Then the cloud provider gives the bill plan according to the usage of the client. As mentioned earlier there may be a possibility of losing of the data from the cloud i.e. server. So the cloud provider would again become as a customer and communicates to some of the cloud providers (say three) and will come to

know the amount they would charge for the resources. Then he would select the cloud provider who will charge less for the resources (Say in the above diagram CSP 2 is optimal). So in this way both optimal CSP and backup is also provided in this system.



Figure 2. Cloud provider interaction with optimal one among the above three providers

So the cloud provider relies on another one which acts as a trusted third party provider. If data loses from the cloud provider he would rely upon this trusted third party provider [6]. Here sometimes the cloud provider which user interacts is treated as source node and this trusted provider can be referred as optimal backup node. The protocol used in this is Internet protocol. In short it is IP. It is a connection-less protocol. The data replicas from the clients will be sent in the form of packets from one-side i.e. source node to the other side i.e. backup node. Here user is totally aware of the interactions between source and backup nodes.

3.1 Disadvantages

1. When the data is shifted from one cloud to the other cloud there may be a possibility of redundancy. The word redundancy means there may be a possibility of storing same data multiple times.
2. By using the internet protocol there may be a possibility of losing the packets while transmitting the data from source to the destination.
3. The backup is present at cloud service providers premise rather than at client premise.
4. There will be increase in the prices due to backup services provided by separate or another cloud provider.
5. The communications among source node and backup node cloud providers is bit a complex one and so there may be compromise on the data security.

4. Proposed System

We are introducing a Premier storage resources model which finds the best cloud service provider for giving resources to their clients. This model consists of Linux Box [3,9] which actually reduces the work of the user. The working of this model can be depicted in three steps and they are as follows:

4.1 Step 1



Figure 3. User interaction with Linux Box

User first interacts with the Linux Box by stating its requirements like the storage needed in GB's for storing his or her data. Then Linux Box records its requirement and asks the user to wait for some time.

4.2 Step 2

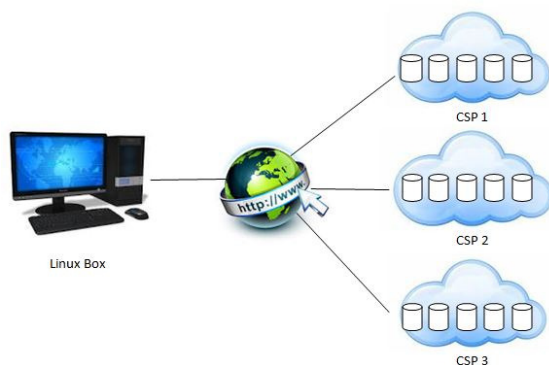


Figure 4. Finding optimal CSP by interacting with 3 CSP's

Now based on the user requirement Linux Box finds three cloud service providers (CSP) based on the distance. That is it finds the nearest cloud providers surrounding it. Now from the three selected providers it finds out the best provider by prioritising them based on the prices of the resources as requested by the user. In this way out of three we get the optimal cloud service provider. Now to this provider the Linux Box establishes a secure connection.

4.3 Step 3

After finding the optimal provider, it returns to the user and gives the payment details and asks the

user to send the data. Now Linux Box encrypts the data using stronger encryption techniques like AES [7,8], DES [7] etc. Then it sends encrypted data via internet to the optimal cloud provider for storage. The figure is shown below:

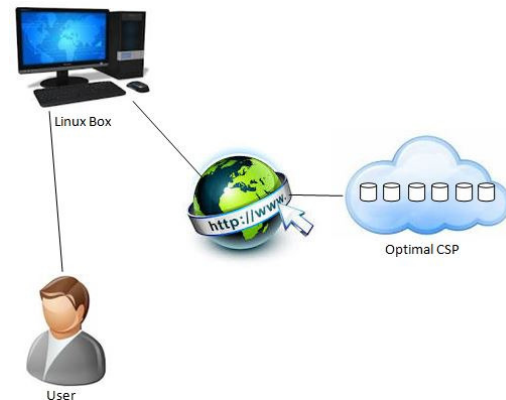


Figure 5. Storing the user data in optimal CSP by Linux Box

After finding the optimal provider, it returns to the user and gives the payment details and asks the user to send the data. Now Linux Box encrypts the data using stronger encryption techniques like AES [8] etc. Then it sends encrypted data via internet to the optimal cloud provider for storage.

4.4 Advantages

1. From the proposed system it is easy to move the data from one cloud provider to the other cloud provider because the cloud provider itself provides security rather than depending on other providers.
2. By using this method, it is easier to retrieve the data with minimal cost and minimal managing effort.
3. Here the backup is provided at client premise through the Linux Box rather than at cloud service provider premise. So users no need to depend on the provider if there is data loss. He can retrieve from Linux Box [3].
4. So there is no burden on user selecting for optimal cloud provider and taking care of backup issues. Here this work is done by the Linux Box.
5. Here the main advantage is using the Linux Box and its job is to do authentication, encryption, provides security and backup. The notable thing

here is all the above mentioned activities are done at the optimal price by the Linux Box.

6. Linux Box also acts as trusted third part to both the users and the cloud provider [6].

5. Conclusion

Here we are introducing a new system called as Linux Box which actually serves the user at the best. Through this proposed system optimal storage is provided based on the client's requirement by selecting the best cloud service provider and also for this system disaster recovery service is also provided and that to at the customers premise only. So these activities are performed by the Linux Box. Security to the data is also provided through encryption techniques [7,8] by the Linux Box. As storage, backup and security are the major concerns here, so our system handles these effectively. Definitely our system benefits the users.

References

- [1]P. Mell, and T. Grance, *The NIST Definition of Cloud Computing*, Vol.53, National Institute of Standards and Technology, 2009.
- [2]Xu Liu, Xiaoqiang Di, Jinqing Li, Hui Qi, Huamin Yang, and Ligang Cong, "Optimal Backup Strategy in Cloud Disaster Tolerance", In: *Proc. of International Conf. On Computer, Information and Telecommunication Systems (CITS)*, Kunming, China, 2016.
- [3]V. Javaraiah, "Backup for Cloud and Disaster Recovery for Consumers and SMBs", In: *Proc. of 5th IEEE International Conf. On Advanced Networks and Telecommunication Systems (ANTS)*, Bengaluru, India, 2011.
- [4] Inbaraj P, Abhinlal, Hall Plan Provisioning System For University Examinations, *International Innovative research journal of engineering and technology*, vol. 1, no.4, pp. 18-22, 2016
- [5]Y. Gu, D. Wang, and C. Liu, "DR-Cloud: Multi-cloud Based Disaster Recovery Service", *Tsinghua Science and Technology*, Vol.19, No.1, pp.13- 23, 2014.
- [6]H. Bo, Y. Sudo, and K. Hato, "Cost Reduction Evaluation of Sharing Backup Servers in Inter-cloud", In: *Proc. of 19th Asia-Pacific Conf. On Communications (APCC)*, Bali, Indonesia, 2013.
- [7]Syed Rizvi, Katie Cover, and Christopher Gates, "A Trusted Third-Party(TTP) based Encryption Scheme for Ensuring Data Confidentiality in Cloud Environment", *Procedia Computer Science*, Vol.36, pp.381-386, 2014.
- [8]Nimmi Gupta, "Implementation of Optimized DES Encryption Algorithm upto 4 Round on Spartan 3", *International Journal of Computer Technology and Electronics Engineering (IJCTEE)*, Vol.2, No.1, pp.82-86, 2012.
- [9]Gurpeet Singh, and Supriya, "A Study of Encryption Algorithms (RSA, DES, 3DES and AES) for Information Security", *International Journal of Computer Applications*, Vol.67, No.19, pp.33-38, 2013.
- [10]S. Suguna, and A. Suhasini, "Overview of Data Backup and Disaster Recovery in Cloud", In: *Proc. of International Conf. On Information Communication and Embedded Systems (ICICES)*, Chennai, India, 2014.

