

Implementation of Reliable Fault Tolerant Data Storage System over Cloud using Raid – 60

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Abstract— Cloud computing has emerged as an outstanding service delivery model. Almost all the organizations are switching to cloud in order to avoid the infrastructural cost and utilize the other benefits of the cloud services. As we know with benefits there come the issues, with tremendous increase in growth of technology, huge amount of data is being stored in cloud. Storage of data in cloud requires a high cost of adaptability in order to provide an efficient, reliable and fault tolerance data storage system. Currently fault tolerance is handled by service provider or customer, which is an ineffective way of handling the fault tolerance and lead to in efficient solution. Rather than handling the problem over the service provider or customer this paper deals with an effective and innovative way of handling the fault tolerance in cloud. In this paper we propose a high level approach by deploying the RAID-60 technology to service the fault tolerance problem in cloud.

Keywords—*Fault Tolerance, RAID-60, Reliability*

I. INTRODUCTION

Cloud Computing is utilizing computing as an on-demand service. Among available cloud services the storage services is of at most importance and the reason behind this is the ever increasing amount of data which outpace the storage capacity. This increase in the amount of data in cloud has increased the load over virtual machines as a result there arise the problem of fault tolerance.

Fault tolerance in cloud computing platforms is an essential issue that must be handled, to provide good performance [1] [3]. Reliability and fault tolerance is the major concern in the cloud storage nowadays. It is a very critical and urgently required task. A lot of research is undergoing in order to explore how clouds can provide fault tolerance for an application [2]. When virtual machines get over loaded with large number of processes then the processes are frequently like to fail due to lack of resources, resulting in lot of rework and displeasure for the users. To avoid the above failures and provide monetary profit, this paper addresses the problem of fault tolerance in cloud computing systems by incorporating RAID-60 technology over cloud. The remainder of this paper is organized as follows: In section 2 we describe the need of using the proposed model. Motivation of doing the research in discussed in section 3. Basic concept behind the model has been discussed in section 4 that actually explain how RAID 60 technique work, Section 5 explains the proposed work and discusses about the benefits that can be obtained after incorporating the proposed model. And we concluded in section 6 with a summary.

II. EASE OF USE

With the use of RAID-60 technology over cloud data storage system, the problem of fault tolerance will be minimized apart from this it will result in highly reliable data storage system that guarantee the availability of data along with faster access to the data. The model can recover the data automatically when one or two of the servers go down unexpectedly by using Raid -60 technologies over cloud.

III. MOTIVATION

To improve the performance of the cloud computing system there are various issues that need to be resolved. We focused our discussion to the fault tolerance because with the advancements in storage technology development of cloud based online storage have increased as a result the possibility of multiple disk failures in storage systems have also increased. Redundant Arrays of Inexpensive (or Independent) Disks (RAID) systems especially RAID-60 have received much more attention due to its capability to tolerate concurrent failures of any two disks at a time. So a model has been proposed that deploy RAID-60 technology over cloud in order to resolve the issue of fault tolerance and reliability.

IV. RAID 60

With the increasing possibility of disk failure in storage system, redundant array of independent disks have received more attention. This virtualization technology combines multiple physical storage devices into single storage device for increasing the performance of the disk drives and

provides redundancy in the data so that whenever failure occurs the data can be saved from the backup drive.

RAID-60 technology is the combination of RAID-0 and RAID-6 technology. It provides dual parity that allows high availability of data in the event of disk failure and provides good performance by striping the data across an array of disks. Figure 1 depicts the distribution of data in RAID -60 technology.

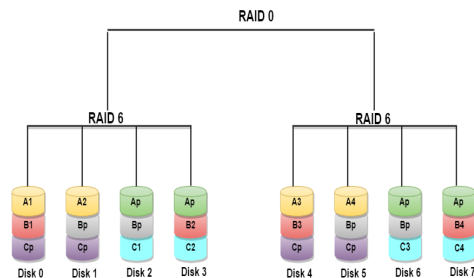


Fig.1 data distribution in RAID-60

Cloud applications impose the great challenge over cloud storage infrastructure [4,5]. Using RAID technology over cloud for storage is in current trend as it provides better storage along with redundancy, reliability and fault tolerance.

V. PROPOSED WORK

Nowadays, there has been extremely high demand for large scale online storage for clouds, life logs, and other applications. As a result a lot amount of important information is being stored over cloud server. If any server goes down all the critical data of the user will be lost. In order to avoid this situation there is a need to make the redundant copy of the data so that whenever any server goes down, the data can be recovered. With this there emerges the need to implement automatic fault tolerance in cloud environment. In order to do so, the cloud virtualized system architecture has been proposed and implemented using RAID-60. The application availability and reliability can be maintained by using the proposed model.

A. Availability

The services delivered by cloud suffer from single point of failure. This failure depends on many factors such as hardware, software or network failure.

In 2008, a case was found at Amazon, for 8 hours its storage service S3 goes down due to single bit error. To handle the above issue our proposed solution can be better, as it store same data on variable disk and hence provide the redundancy in the data and ultimately increase the availability.

B. Fault tolerance

Facing the need to store large amount of data and to satisfy many end-user needs, storage systems belonging to clouds face many potential failures. Moreover, keeping its consistency, replication, proper authentication and authorization etc., is getting more and more complex. The data using Raid -60 is highly fault tolerant as it can tolerate the data loss of atleast two data servers.

C. Reliability

It is achieved by the parity scheme, by enabling the application to retrieve data correctly even if some of the providers corrupt or lose the entrusted data.

To avoid the server break down issue and to increase the fault tolerance rate in cloud, many researches has been performed and many framework has been proposed, but no work has yet been done using RAID – 60 technologies.

This technology provides dual parity failure which increases the fault tolerance rate over cloud. With the dual parity and stripping approach the availability and reliability of the data is maintained to the maximum. The frame work of the proposed system is shown below in figure2.

To ensure high reliability and availability of the data over cloud various RAID technologies layers have been implemented and found to be useful but our proposed model incorporate the use of two layer simultaneously i.e. RAID - 6 and RAID- 0. The dual parity function in RAID-60 can adhere at most 2 server failures at a time.

The application availability and reliability can be maintained by using the proposed cloud virtualized system architecture as shown in Figure 2. Raid 60 technology is configured on the virtual machine to be used for fault tolerance. When one of the servers goes down unexpectedly, connection will automatically be redirected to the other server.

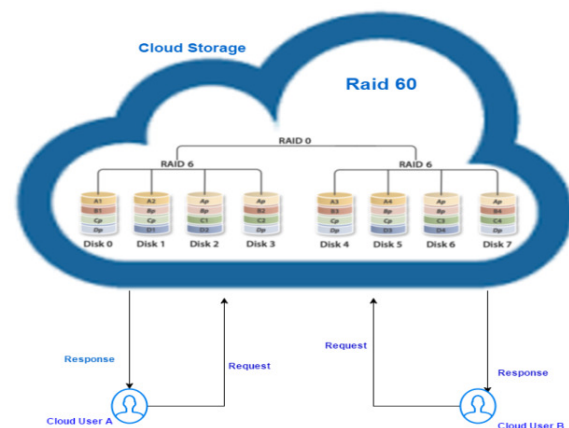


Fig.2. Proposed Framework

The model consists of user and client. The users are cloud clients who wish to store and access data in the cloud and client are the service provider.

The proposed model improves performance because each disk in a virtual disk has to handle the request. For example, in a two-disk virtual disk, each disk needs to provide only its requested data and the parity bit. The data is divided into consecutive segments or stripes that are written sequentially across the drives in the virtual disk. With this technology input – output load is balanced, as it distribute the load across many drives.

VI.CONCLUSION

Storing data in cloud using raid 60 is fairly recent, and has focused various maintenance issues. This paper focused the issue of reliability and fault tolerance over cloud and a model has been proposed that uses RAID 60 technology to overcome both of the problems. There still are many open research problems to work on in this field.

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REFERENCES

- [1]Tchana, A.; Broto, L.; Hagimont, D., "Approaches to cloud computing fault tolerance," International Conference on Computer, Information and Telecommunication Systems, 2012, pp.1-6.
- [2]Verma,A. Agarwal,N. and Goutam.D.,The performance evaluation of proactive fault tolerant scheme over cloud using Cloud Sim simulator, international conference on Application of Digital Information and Web Technologies,,2014, pp. 171- 176,
- [3]Amoon,M ,A Framework for Providing a Hybrid Fault Tolerance in Cloud Computing, science and information conference,2015, pp. 844-849.
- [4]www.storagesswitzerland.com/article:A_Better_Answer_th an_RAID_and_Replication_for_Cloud_Storage”,2013
- [5]”Fault Tolerance- Challenges, Techniques and Implementation in Cloud Computing”, International Journal of Computer Science,2012, Vol. 9,pp.1694-0814