Load Balancing Model in Cloud Computing Environment

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Abstract— As organizations need to focus on maintaining their datacenter in order to store huge amount of data of their clients. So cloud computing is one of the greatest platform which provides storage of data in very lower cost to organizations and available for all time over the internet. But it has some critical issues like load management. Load Balancing approach is based on Cloud partitioning concept. Load balancing is the process of distributing load over the different nodes which provides good resource utilization when nodes are overloaded with job. In this approach, we are using model in which memory size of every partition will be checked linearly and for efficient retrieval of user's file, we use Bloom filter algorithm.

Keywords- *Bloom Filter, Cloud Computing, Load Balance, Partition.*
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I. INTRODUCTION

Cloud computing is the technology mainly designed for the purpose of storage of massive amount of data on the server from where the users can easily retrieve their data from any part of the world, only if the internet connection is available. Since the numbers of users are increasing day by day, therefore it is the need of the hour to balance the huge amount of data stored on the cloud server. Load balancing is actually the efficient method of forming an application server infrastructure. As application demand is increasing, various partitions can be added to maintain the data in different partitions so as to reduce the load over the cloud. Load balancing mainly aims at providing a minimum response time and to avoid overload on a single resource. To get a better balancing of the cloud, the partitions are checked for the availability of the space using the linear search algorithm and further the retrieval of the file can be done using the Bloom filter algorithm. The Bloom filter algorithm is mainly based on the hash function technique [1].

II. CLOUD COMPUTING ENVIRONMENT

Cloud computing is one of the important computing terminologies which provide the centralized storage of massive amount of data over the cloud by using various computing resources. Cloud itself acts as the space-provider for the storage of huge amount of data and it provides utilization of network resources. This data can be stored on multiple servers and thus cloud is nothing but a server. To better understand the concept of cloud computing, we can take the example of the email. As the client can access his/her email account from any part of the world where internet access is available. In the similar manner the cloud computing works.

A. Types of clouds

As per the need of the user, there are various types of the cloud [7]:

- Public Cloud: A public cloud can be accessed by a home user or small business owner with the availability of the internet connection.
- Private Cloud: A private cloud is essential for a specific group or organization and which limits access to just that group only.
- Community Cloud: When two or more organizations require similar cloud access, then they can make use of community cloud by sharing it among themselves
- Hybrid Cloud: When any organization requires to use multiple clouds to satisfy their organizational needs they can use combination of public, private, or community cloud which forms the hybrid cloud.

There are following services provided by the cloud providers such as:

- Software as a Service: In order to use any licensed software, an organization first needs to purchase that software. Software as a service becomes popular as shown in fig. a, it provides softwares to user on his/her demand. SAAS's pricing is based on monthly fee. So this service is beneficial for organization because it costs less than purchasing licensed software.
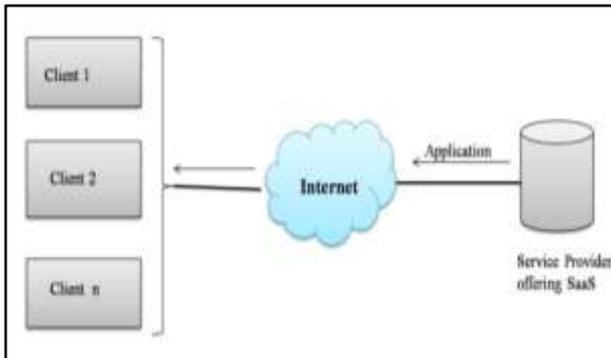
Figure: (a) SaaS provides an application or piece of software from the service provider

- Platform as a Service: A PaaS system is the extended version of the Software as a Service setup. As shown in fig. b, a PaaS provider gives subscribers an access to the components that are required by them to develop and operate applications over the internet.
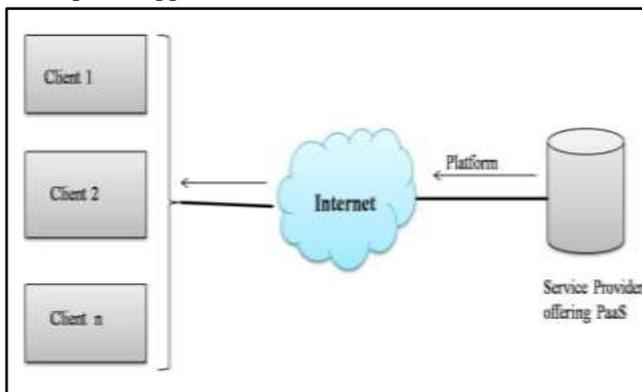
Figure: (b) PaaS allows clients to access a computing platform over a cloud computing solution

- Hardware as a Service: Organizations need to invest huge amount of money on hardware resources. Essential hardware like Scanners, servers and printers require huge investment and the expense of maintenance. This is why Haas come into existence. As shown fig. c, in HaaS, essential resources are provided by service provider for a monthly fee.
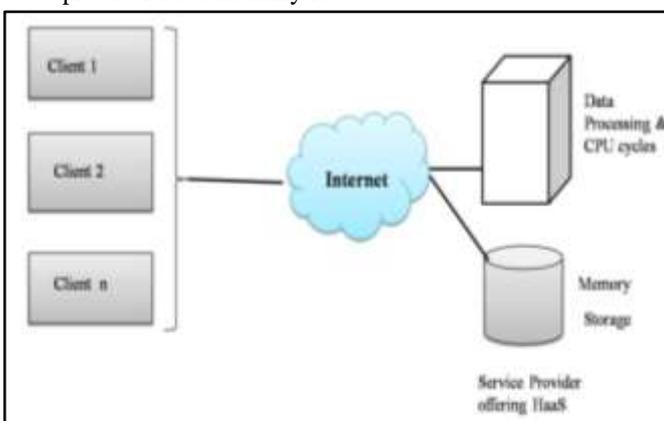
Figure: (c) HaaS allows service providers to rent hardware resources

III. EXISTING SYSTEM

In Existing system, when main server gets request for storage of file from user then main server store file in any of the server and doesn't maintain any record about file. i.e. in which server file has been stored. Hence fig d., shows how files are distributed across several servers [2].
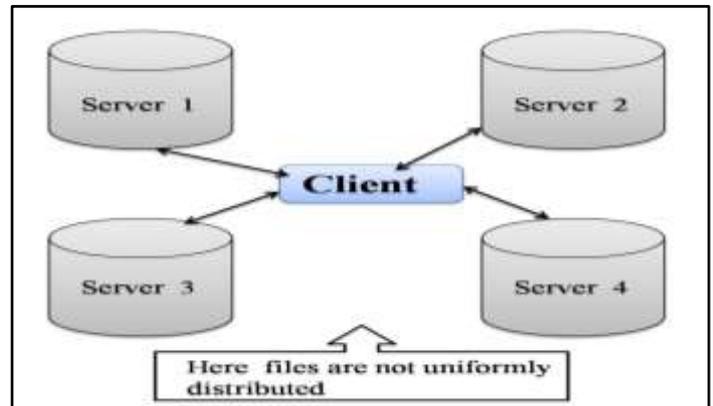
Figure: (d) Existing System

IV. SYSTEM MODEL

There are several cloud computing categories with this work focused on a private cloud. A large private cloud will include many nodes. Cloud partitioning is used to manage this large cloud [1].
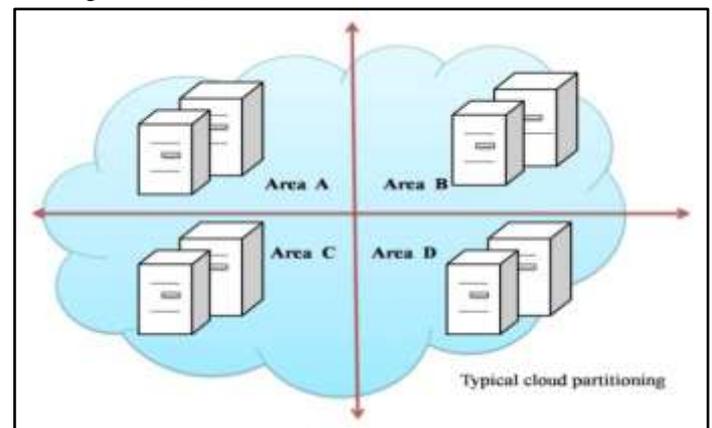
Figure: (e) Typical Cloud Partitions

The strategy of the load balancing is based on the cloud partitioning. In this, the cloud partitions are created and the balancing starts as: when the data arrives at the system, the main controller decides that which partition is capable of storing the data as per checking its space availability.

A. Main controller and balancers

Solution of balancing load is done by the Main controller. After storing data in suitable partition, Main controller communicates with all balancers to refresh status detail about all balancers [5]. The relationship between the balancers and the main controller is shown in fig. f

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Figure: (f) Relationship between main controller and Balancers

V.   IMPLEMENTATION

To develop the complete system model, JSP, Html has been used for programming application. For database requirement MySql has been used. For effective and user friendly development Eclipse development tool was employed.

A.   Algorithm

The algorithms which are used to design this model are linear search algorithm and the bloom filter algorithm. Linear search is used to check the memory size of the partitions to store the data and the bloom filter is used to retrieve the data from server.

- Linear search: Linear search is one of the sequential search methods. It involves comparing the items sequentially with the elements in the list. The searching is started from the beginning of the list and each element is examined till the end of the list.

- Bloom Filter Algorithm: The bloom filter consists of a bit vector of length m. An item is added to k different hash functions and the bits are set at the resulting positions. Sometimes the hash functions produce same position for two different numbers, so less than k positions may be set. The basic bloom filter supports two operations i.e. test and add. Test is used to check whether a given element is in the set or not.

If it returns false then the element is not present in the set. If it returns true then the element is probably present in the set.

Add operation simply adds an element in the set. Removal is not possible without introducing false negatives, but extensions to the bloom filter algorithm can be made to allow removal of element.

M bits are initially set to 0 and k- hash functions are there.

Add if F(X) =A, set S [A] =1.

0	0	0	0	0	1	0	0	0	0

0   1   2   4   5

m-1   m

VI.   FUTURE WORK

Considering the overall performance of the developed system, it can be stated that the developed mechanism of load balancing has produced better results for private cloud infrastructure. Although this is the predominant technology for industry, it still suffers from a number of limitations. Some important points are [1]:

- Cloud division: Cloud division is not a simple problem. The framework needs a proper cloud division methodology. In an area, the nodes may be far apart from each other in a cluster or there will be some clusters in the same geographic area that are still far apart. The division rule should be based on the geographic location.

- Find other load balance strategies that may provide better results in terms of efficient response time for users. In our strategy, we are comparing size of partitions linearly and uploading data on suitable partition.

VII.   CONCLUSION

Since the work stated in the paper is designed for the load balancing for the private cloud. To resolve the problem of balancing the load on the cloud, we have divided cloud into several partitions in which main server acts as a Main controller and other servers act as a balancers. Main controller manage load of data among balancers. The best searching algorithm is used to get the quick retrieval of the data from the cloud. The Bloom filter searching mechanism is used which uses the hash function to calculate the k value which is assigned to each of the document file encountered by the cloud server.

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