A load balancing model based on Cloud partitioning

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Abstract
In modern days cloud computing is one of the largest platform which provides storage of data in very low cost and available for all time over the internet. But the cloud computing has more critical issue like Security, load balancing. Cloud computing enable ubiquitous access shared pools of configurable resources like networks, servers, applications, storage and services. Cloud computing allows users and enterprises with various computing capabilities to store and process data and provide many services. Cloud computing is minimal management effort, efficient and reliable.
Load balancing play an important role in distribution of workload across multiple resources like computers, CPUs, Network links. Load balancing aims to minimum resources use and maximum throughput. It improves performance, increase efficiency and reliability. Load balancing in cloud computing improve performance. Better load balancing in cloud computing gives user satisfaction. The algorithm applies to load balancing strategy to improve the efficiency in public cloud.

IndexTerms-Cloud computing, Load balancing, Security, Public Cloud.

I. INTRODUCTION

1.1 Cloud Computing

"In load balancing the Cloud computing enable ubiquitous access shared pools of configurable resources like networks, servers, applications, storage and services. that can be quickly makes available and free with minimum management efforts or service provider interaction". Cloud computing gives enhanced utilization of distributed resources over a huge data and they can access remotely through the network [2].

In cloud computing there are three service models 1. Iaas (Infrastructure as a service) 2.Paas (Platform as a service) 3.Saas (Software as a service).

Types of cloud:

1) Public
2) Private
3) Hybrid

1.2Load Balancing

Load Balancing is a method in which the workload distribute from resources of one node is transfer to particular resources of another node in a network without disturbing the recent task. A hardware load balancer is a dedicated piece of hardware. A hardware load balancer is running software which manages the load balancing. A standard way to scale web applications is by using a hardware-based load balancer [1]. The load balancer assumes the IP address of the web application, so all communication with the web application tap the load balancer rest. The load balancer is connected to one or more similar web servers in the back-end. Depending on the user session and the load on each web server, the load balancer send packets to different web servers for executing [6].

1.3 Google app Engine

Google App Engine is a platform as a service (PaaS) cloud computing platform for developing and hosting web applications in Google-managed data centers. Applications are sandboxed and run across multiple servers. App Engine provides automatic scaling for web applications-as the number of requests increases for an application, App Engine automatically assigns more resources for the web application to handle the extra demand [5].

II. Literature Survey

1. Load Balancing In Public Cloud, Feb 2014 (Shrikant M. Lanjewar, Susmit S. Surwade, Sachin P. Patil, Pratik S. Ghumatkar, Prof Y.B. GURAV):
In this paper discussion is on Load Balancing approach. Load balancing in the cloud computing environment has an important impact on the performance. Better load balancing makes cloud computing more efficient and improves user fulfillment. This paper introduces a good load balancing model for the public cloud based on the cloud partitioning concept with a switching mechanism to prefer different strategies for different situations. The algorithm applies the game theory to the load balancing strategy to improve the effectiveness in the public cloud environment.

2. A Survey on Load Balancing in Public Cloud, March 2014(V. V. DivyaBharathi, S. Nivedha, T. Priyanka, Asst. Prof Mrs. M. DayaKanimozhi Rani, M.E.,(Ph.D.)):

In this paper, load balancing model divides the public cloud into several cloud partitions using switch mechanism. The improved round robin algorithm and game theory concept is used to maintain load and provide better strategies through efficient job scheduling and resource allocation techniques as well.

3. Load Balancing in Public Cloud Using Partitioning Mechanism 2016(Sudhir A Shinde, Kapil N.Vhatkar):
Cloud computing is transforming computing paradigm that involves delivering application and services over the internet. Many of the underlying technology that are the foundation of cloud computing have existed for quite some time, Cloud computing involves provisioning of computing, networking and storage resource on demand providing these resource as metered services to the user in "in a pay you go" model. This paper introduces a better load balancing mechanism in a public cloud based on the cloud partitioning technique with a switch mechanism to choose different strategy for different situation.

4. A Comparative Study of different Load Balancing Algorithms for Cloud Computing, Feb 2017 (MehakChoudhary, Dr. Deepti Gupta, Dimple Chandra, Chitvan Gupta): Emerging era in the field of Information Technology is Cloud Computing which provides services to the users over the internet. It is a paid service which depends on the usage. The problem associated with this is load balancing which means to use minimum resources to improve the performance of the system. Load Balancing is the process of dynamically allocation the work load among nodes so that not even a single node would be heavily loaded.

5. A Comparative Study of Load Balancing Algorithms In Cloud Computing, April 2017(Aayushi Sharma, AnshiyaTabassum, G.L. Vasavi, ShreyaHegde, Madhu B.R):
Load balancing involves dividing the load equally so the throughput is high with less response time. Different algorithms have been proposed to give efficient load balancing which moves toward aim to improve the overall performance of the Cloud and gives the use more satisfying and efficient services. In this paper study the different types of load balancing techniques and make a comparative analysis amongst all the existing techniques.

III.SYSTEM ARCHITECTURE

3.1 Cloud partition

1. There are several cloud computing categories with this work focused on the public cloud.
2. A public cloud is based on the standard cloud computing model, with service provided by a service provider.
3. A huge public cloud will contain many nodes and the nodes in different geographical areas.
4. Cloud partitioning is used to manage this large cloud.

3.1.1 Main controller and balancing algorithm:

1. The load balancing approach is based on the cloud partitioning conception. After creating the cloud partitions, the load balancing then starts when a job get there at the system, with the main controller make a decision which cloud partition should receive the job.
2. The partition load balancer then decides how to assign the jobs to the nodes. When the load status of a cloud partition is normal, this partitioning can be accomplished locally.
3. If the cloud partition load status is not normal, this job should be transferred to another partition. The load balance solution is done by the main controller and the balancer algorithm.
4. The main controller remaining allocated jobs to the suitable cloud partition and then communicates with the balancers in each partition to refresh this status information.
5. Since the main controller deals with information for each partition, smaller data sets will lead to the higher processing rates.
6. The balancers in each partition collect the status information from every node and then decide the right strategy to allocate the jobs.

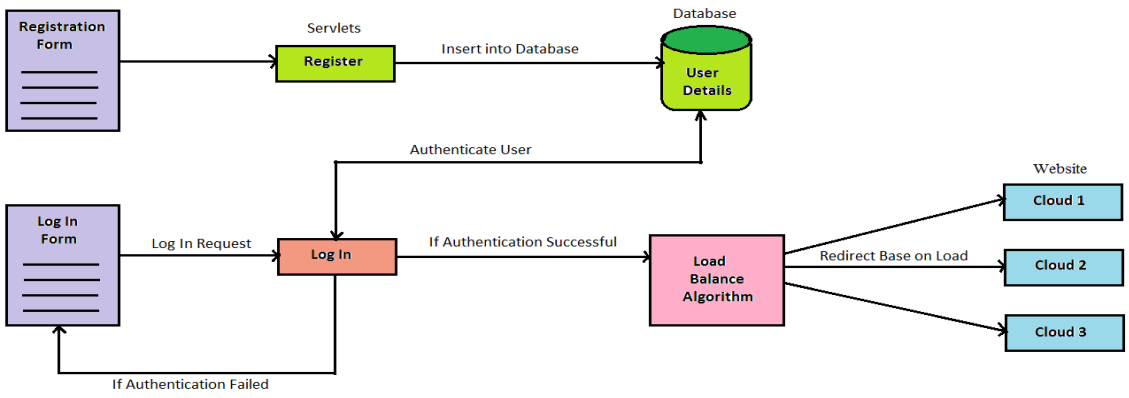

Fig. 3.1: Architecture of data flow

3.1.2 Database

1. Database stores the all information of registered users.
2. It also maintains the log In, Log out information.
3. The Google spread Sheet used for maintaining the information.

3.1.3 Register, Log In, Log Out

1. For any demands of user Log In required for access the information.
2. And before Log In user should Registered in database.
3. For termination Log Out the session.

3.1.4 Website and Users

1. Website hosts on different cloud partitions.
2. The number of user can Log In through website and access the information.

3.2 Honey Bee Algorithm

1. If cloud has no load then it's in Ideal state.
2. If cloud has limited load or load should not more than capacity then it's in Normal state.
3. If requests exceed the capacity of cloud then it's in overloaded state.
4. In honey bee algorithm, it checks the status of cloud. If cloud's status ideal then all requests goes to ideal cloud till it not overload. After that it proceeds to next cloud.
5. A colony of honey bee can extend itself over long distances as to find many food sources such as flower patches and then these bees' harvests nectar or pollen from these sources.
6. A small fraction of the colony finds the environment looking for new flower patches. When food source is encountered the scout bees go in the field surrounding the hive and check for quality beneficial.
7. When they return to the hive, the scouts collect the food harvested. There is an area in the hive called as the "dance floor", where waggle dance is performed by the bees that found a very beneficial food. Through the waggle dance a scout bee passes the location of its search to idle observer, which helps by the flower patch[3].

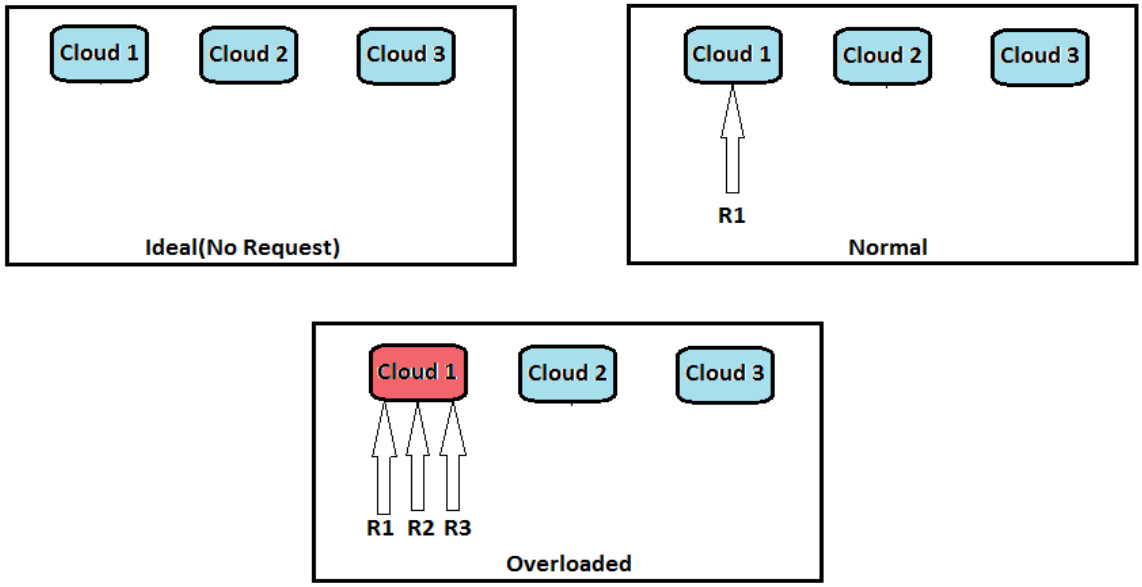

Fig. 3.2: Honey Bee

8. Here the period of the dance is according to the scout's rating of the food source, to produce the best rated flower patches more foragers get recruited.
9. When dance is finished, the scout come back to the food source it found to see more food. Till the food is beneficial, food sources will be posted by the scouts when they return to their hive.
10. Foragers who are recruited newly may waggle dance as well, which will step-up the recruitment for highly profitable flower patches. This autocatalytic progression will go on to find most favorable flower patches.

3.4 Round Robin Algorithm:

1. Round Robin Load balancing allows you to distribute client requests across multiple clouds.
2. It works sequentially.
3. Cloud -1 receives the first request.
4. Cloud -2 receives the second request.
5. Cloud -3 receives the third request.

6. When cloud-N receives the Nth request, the round robin routine repeats, and the next request is sent to cloud-1, then cloud-2, then cloud-3, all over again.
7. If cloud has no load then it's in Ideal state.
8. If cloud has limited load or load should not more than capacity then it's in Normal state.
9. If requests exceed the capacity of cloud then it's in overloaded state [4].

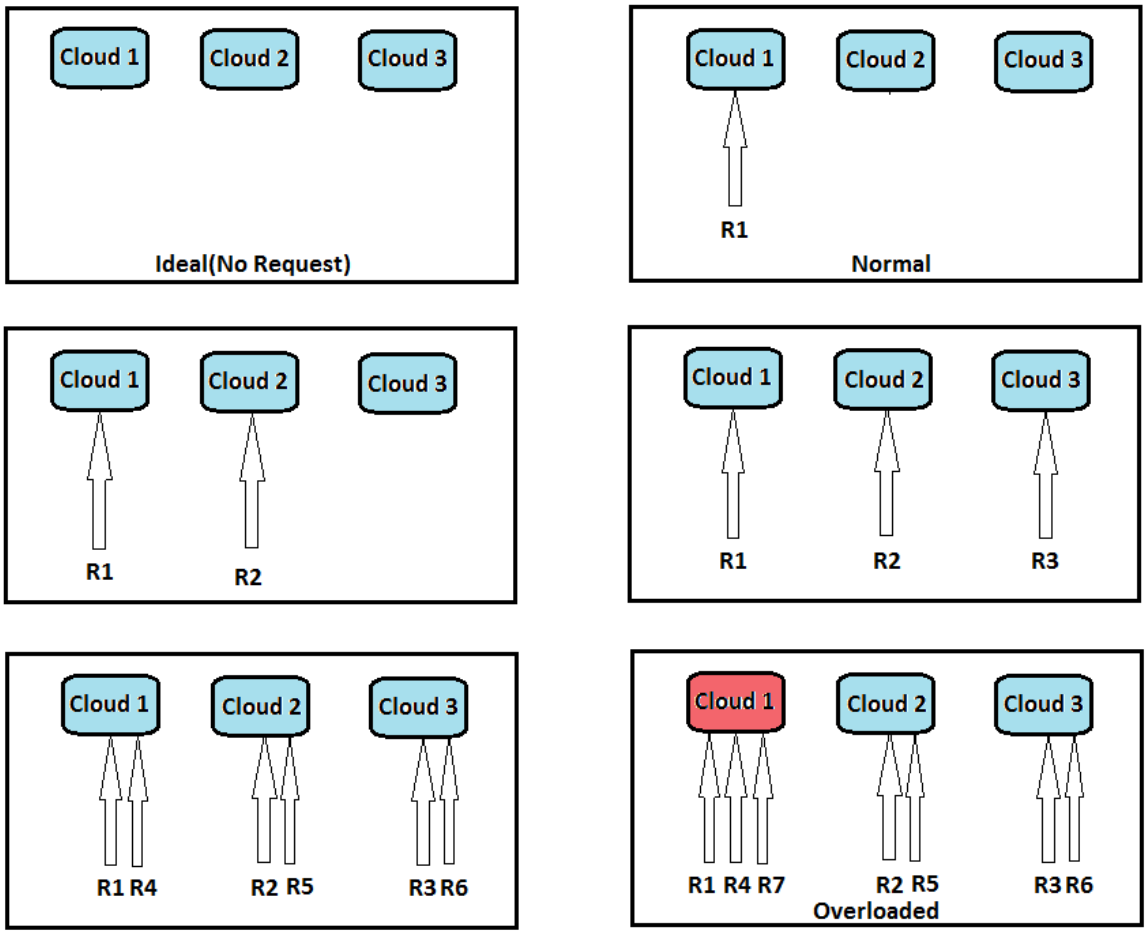

Fig. 3.3: Round Robin

3.5 Round Robin + Honey Bee Algorithm (Proposed algorithm)

1. If cloud has no load then it's in Ideal state.
2. If cloud has limited load or load should not more than capacity then it's in Normal state.
3. If requests exceed the capacity of cloud then it goes in overloaded state.
4. This algorithm is combination of advantages of Round Robin and Honey bee.
5. As shown in figure, the clouds in ideal state.
6. Request R1 goes to cloud-1, R2 goes to cloud-2, R3 goes to cloud-3, R4 goes to cloud-1 in this way it follow the round robin algorithm.
7. R3 gets logout and cloud-3 becomes ideal then next request R5 goes to cloud-3 according to Honey bee algorithm.
8. Requests R1 and R2 log out the session and cloud-2 becomes ideal state. Then next request R6 goes to cloud-2.
9. Algorithm checks the status of clouds, if it is equal load on all clouds or all clouds in ideal state then its reset the algorithm and starts again from round robin and so on.
10. In this way cloud load balancing done by proposed algorithm.

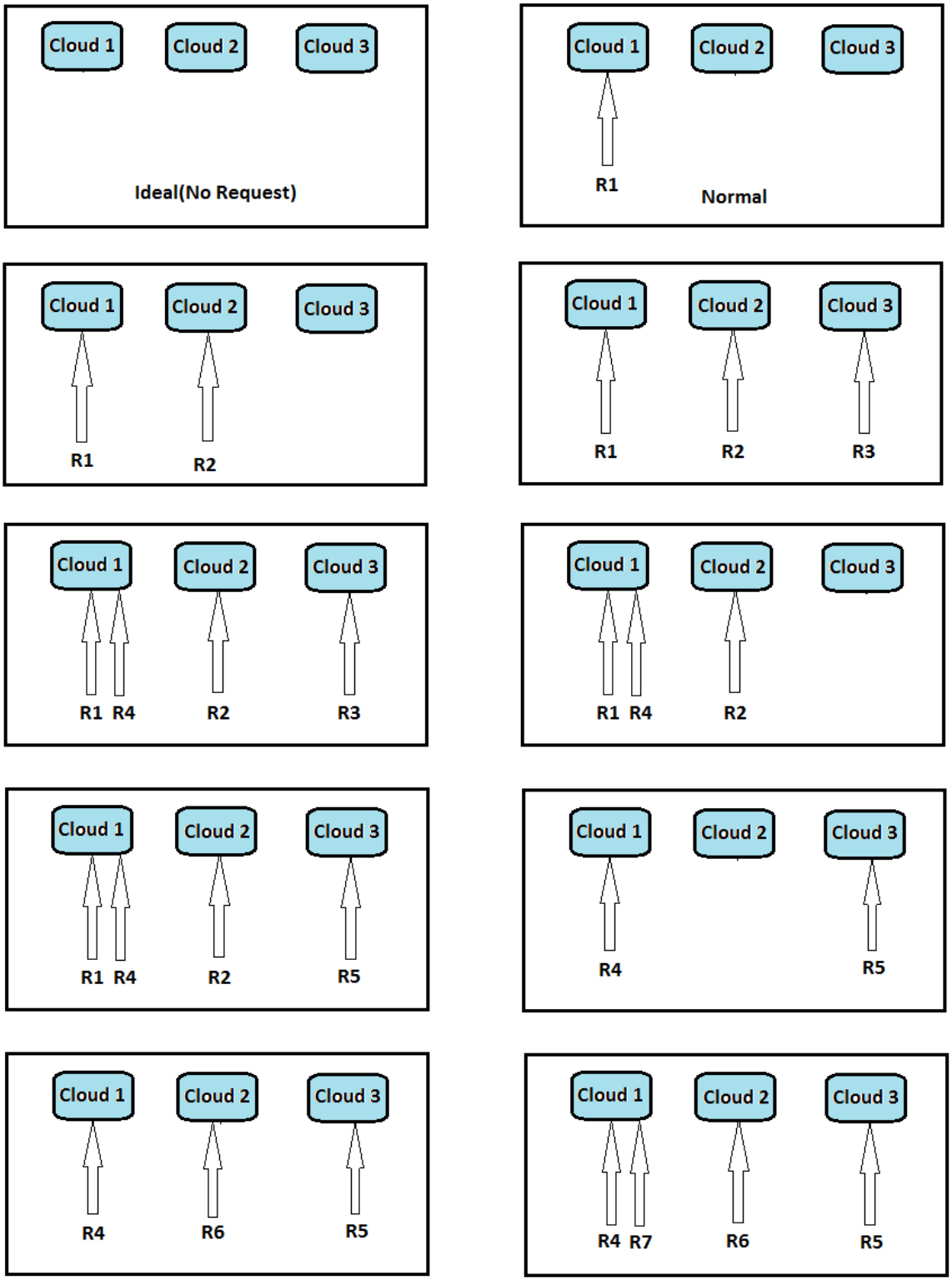

Fig. 3.4: Combination of Round Robin and Honey Bee

IV. MATHEMATICAL MODEL

4.1Compute Load Degree

Inputs:

The static parameters include the number of CPU's, the CPU processing speeds. Dynamic parameters the network bandwidth.

Process:

Define a load parameter set: F= F1,F2…Fm. with each the total number of the parameters.

Output:

Idle or Normal Or Overloaded.

V. CONCLUSION

The problem of load balancing in distributed environment is directly related to the allocation of tasks among resources available in the system. The distributed system must have mechanism to deal with faults while providing efficient and reliable services to its end users. Using this model we overcome the problem of server unavailable to user it partitioning the cloud and using the algorithm to redirect the user to available server. In future we divide the cloud in number of partition to balancing the load.

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