

LOAD BALANCING ALGORITHMS IN CLOUD COMPUTING: AN OVERVIEW

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Abstract: Due to various advancement technologies and new discovery IT sector it is mainly a necessary thing to work with the framework of environment which reduces cost, manpower and resource efficient. Nowadays each and every day which we are accessing is in need of storage which has to be kept without any cost of storage devices. For that purpose the technology has introduced a concept called Cloud Computing. Cloud Computing is also a form of computing. The Cloud receives many requests from the all over data centres with a high power of consumption. It has issues with the resource allocation, utilization and Load Balancing and any more.

Keywords: *Load Balancing, Cloud Computing, Distributed Computing.*

1. INTRODUCTION:

Cloud could be a computing model that refers to each of the applications derived as services over the web, hardware and system software. The Cloud Computing is treated with high potential paradigm for the applications over the net. It uses giant knowledge center with effective servers that hosts internet applications and services. The cloud is also a side of grid computing. The Architecture of Cloud Computing consists of Client Interface, Internet, Management, Security, Service, Cloud Runtime, Storage; infrastructure is shown in the fig 1.1 which has both the front end as well as back end. It provides different types of services to registered users as net services. So the users don't have to be compelled to invest in computing infrastructure. By using the Cloud Computing it offers less amount of cost, Easy access of data, Flexibility, Security Testing, and Logging Facility.

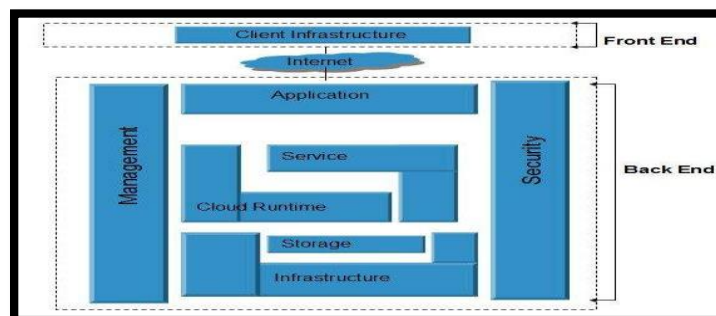


Fig 1.1 Cloud Computing Architecture

In Cloud Computing there are four common deployment models that are based on the quality and availability. The Client he/she can choose their preferred type of deployment which suits for their working environment .A Deployment model of an organization is shown in the fig 1.2.

- Private Cloud
- Public Cloud
- Hybrid Cloud
- Community Cloud

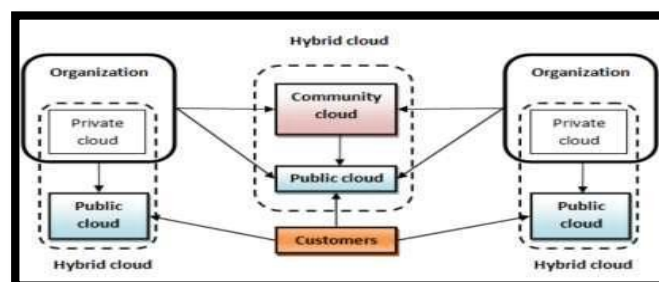


Fig 1.2 Cloud Deployment Models

The Characteristics of Cloud Computing:

- On demand services
- Elasticity
- Multi tenancy
- Pay- Per- Usage

The major challenges in Cloud Computing:

- Resource allocation
- Security
- Efficient means of Load Balancing
- Scheduling
- Storage, Authorization

2. CLOUD COMPUTING SERVICES:

The Cloud Computing service of delivery models is dividing into three models. The three service models are:

2.1 Software as a Service (SaaS)

- It could give the services that are based on demand.

2.2 Platform as a Service (PaaS)

- It could be able to rent the hardware, Operating System, Storage and network capability on the web.

2.3 Infrastructure as a Service (IaaS)

- It allows the cloud providers to use and build their infrastructure over the internet itself.

3. LOAD BALANCING IN CLOUD COMPUTING:

The Load Balancing method is used to allocate the workloads and their respective resources with one or more servers. It also makes the assurance that each and every computing of resources is distributed efficiently and it prevents from the failure of resources. In the area of Cloud Computing, the main role of Load Balancing is to check the efficiency of the performance in computing which are occurring in the cloud environment. Load Balancing helps to attain the higher amount of gratification with proper resource allocation as well as its utilization. One of the challenging issues in Cloud Computing is dividing the work dynamically to the resources is shown in the fig 1.3.

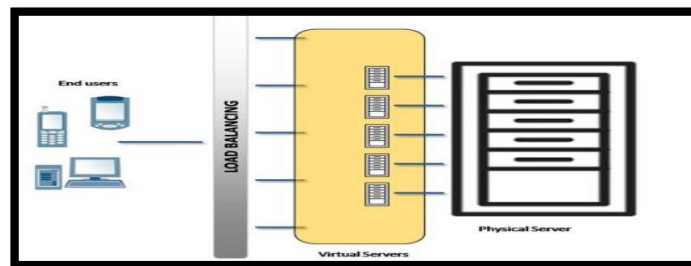


Fig 1.3 Load Balancing in Cloud Computing

4. CLASSIFICATION OF LOAD BALANCING:

There are two types of Load Balancing Algorithms which is based up on the System Load and Technology where they are also called as Static Load Balancing and Dynamic Load Balancing are shown in the fig 1.4.

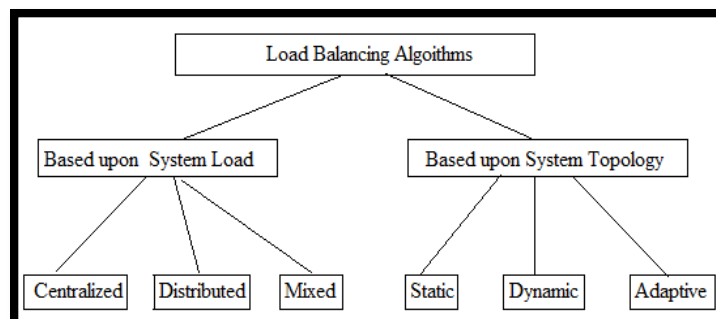


Fig 1.4 Classification of Load Balancing Algorithms

4.1 STATIC LOAD BALANCING:

The static Load Balancing is defined in designing or implementation of the system. This Algorithm is used for stable and homogenous type of environment which results in greater efficiency. Its process is based on the prior knowledge of nodes capability and properties. This type of algorithm cannot adopt any changes in the load during the runtime.

4.2 DYNAMIC LOAD BALANCING:

This Algorithm is used for dynamic and heterogeneous type of environment. This type of algorithm will assign the tasks and it may dynamically change or reassign or reallocate the tasks to the nodes which are based on the attributes. It results in more accuracy along with more efficiency of balancing the load works. The Dynamic Load Balancing Algorithms are:

4.2.1 ANT COLONY OPTIMIZATION:

In this algorithm, when an requested is started the ant will proceeds in forward path by visiting the one node one after the another to check whether all the nodes are overloaded or not and then it will records the data in the particular node.

4.2.2 HONEY BEE FORAGING:

In this algorithm, the cloud has heterogeneous types of data which are mean to maintain the balanced load across the cloud environment. It fully works based upon the priority of the works which is been loaded in the Cloud.

4.2.3 BIASED RANDOM SAMPLING:

In this algorithm, When a task is given the in-degree is reduced and then it is increased when the particular type of job gets executed.

4.2.4 ACTIVE CLUSTERING:

In this algorithm, a clustering type of nodes will works together and then their performance is achieved by making the clustering among the nodes.

5. EXISTING LOAD BALANCING ALGORITHMS

There are many models to balance the load that are available in cloud computing. Some of the Existing Load Balancing Algorithms of both the Static and Dynamic Load Balancing algorithms are given below:

5.1 ROUND ROBIN:

In this algorithm, it will sort the procedure planning that is unique and it is used by the CPU by the means of time slices.

5.2 OLB (OPPORTUNISTIC LOAD BALANCING):

In this algorithm, it will randomly assign the task or events to the nodes in general.

5.3 MAP REDUCE:

In this algorithm, It is used analyze the large sets of data.

5.4 MIN-MIN:

In this algorithm, it will estimate the minimum time taken to complete the entire nodes task and it also estimates the expected time taken to compute a particular task.

5.5 MAX- MIN:

In this algorithm, it is similar like MIN-MIN. After finding the minimum completion of time by the nodes to get execute, then the maximum values is chosen.

6. NEED OF LOAD BALANCING:

The main need of using the Load Balancing algorithm is to find whether the load of works in resource nodes is properly allocated with their maximum and minimum usage of resource utilization. It is used to check the loads at the nodes are overloaded or under loaded. The main goals of Load Balancing algorithms are as follows:

- Maximum respond
- Proper throughput is achieved
- Efficiency in workloads
- It eliminates the overload
- It gives maximum response time

7. METRICS OF LOAD BALANCING ALGORITHMS:

In Load Balancing there are many parameters which are used to define them by their qualitative and quantitative aspects of judging their performance level in the cloud environment are as follows:

7.1 THROUGHPUT:

The total number of tasks that has been completed during their execution of load is called throughput.

7.2 PERFORMANCE:

It is generally used to test or check the system efficiency.

7.3 RESPONSE TIME:

The Time taken for distributing a system, which executes a specific type of Load Balancing algorithm to respond them back.

7.4 MIGRATION TIME:

The time taken to move the tasks from one system to the other system is called migration time.

7.5 FAULT TOLERANCE:

The capability to perform correctly in conditions of failure at any node in the system.

8. LOAD BALANCING ISSUES AND CHALLENGES:

There are many issues and challenges that are faced in load balancing but some of the major sectors plays a vital role in balancing the loads are such as Complexity, Type of Loads, Spatial distribution of Nodes and Algorithm type

9. CONCLUSION:

Load Balancing is one of the important issues in Cloud Computing. Load Balancing is required to distribute the load evenly to all the nodes. Overloading of the load works to the system will results poor performance. To have a efficient resource utilization Load Balancing algorithm is required. When the system is overloaded with more number of works it will automatically results in poor performance and then it leads to inefficiency. This paper mainly focuses on Load Balancing techniques and their different types of parameters with their existing Load Balancing Algorithms were also discussed.

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