

Load Balancing in Cloud Computing

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ABSTRACT:

Cloud computing is a On-Demand availability of IT resources or Computer resources like Storage, Networking, Hardwares etc. It is also accessible through the internet or accessible online. It provides the On-Demand resources pay as you go. We can observe surround us the Load on cloud is increasing day by day. To balance the load of cloud is really a big issue in today's days. With the help of Load balancing cloud applications can achieve the High availability of resources and reliability of resources. Load Balancing in cloud is the process that distributed the load across many servers. This technique is used to utilization of resources and to increase the performance of cloud. The Aim of this paper is to discuss about the concept of Load Balancing, existing techniques of load balancing- Static or Dynamic Load Balancing and how it can increase or maintain the performance of Cloud System.

KEYWORDS: Cloud computing, Load Balancing, Performance, Existing.

INTRODUCTION:

Cloud computing is changing the whole IT Industry and Computer Industry across the world. With the help of cloud computing every company is able to access the

internet and digital resources all over the world through connectivity. By using Cloud Computing users are able to access the applications and software easily from anywhere across the Globe.

Whenever you store the data and access the data over the Internet instead of your computer's hard drive, it is known as Cloud computing. Cloud computing is a technology uses the internet and remote servers to maintain data and applications. When numbers of computers are connected together and forming a cluster in the cloud, it may be possible that some of the node become overloaded because of the random request of services by the clients. Because of the unbalanced cluster the performance of cloud will get worst. Cloud Computing provides robust backup and recovery solutions that are hosted in cloud. It doesn't need to spend extra resources on homegrown disaster recovery. It also saves time during disaster recovery. Whenever Load Balancer need to balance the traffic over the sites or application, some condition are rising the high demand of Load Balancer or effective Load Balancing techniques. Effective load balancing result in Minimizing Resources, Scalability, flexibility, Environment Friendly, Security.

This Research paper presents a survey on the existing load balancing of Cloud Computing environments. The rest of this

paper is organized as follows. Section II Discuss about Cloud computing. Section III discusses about the Load Balancing and The need of Load Balancing. Section IV Performance and Benefits of Load Balancing in Cloud computing. In section V, Existing Load Balancing Techniques- Static Load Balancing and Dynamic Load Balancing.



Fig1.Cloud Computing

CLOUD COMPUTING:

Cloud computing is a on-demand premises of IT industries. It provides you resources as you paid. For example, Gmail and Google are best example of cloud computing. The users of Gmail can access the files and applications which are hosted by Google via internet from any devices. The data in the cloud is stored in different physical or virtual servers which are hosted by third – party service provider. The example of a cloud computing file storage provider is Google Drive, Amazon cloud Drive etc. There are two different types of Clouds- Public cloud and Private cloud.

Public Cloud– Public clouds supports multiple Customers, It supports Internet Connectivity. The Example of Public Cloud is Amazon Elastic Compute cloud (EC2).

Private Cloud- Private cloud just means a cloud or data center that is not publicly accessible. Public cloud is a fully virtualized

environment. The example of Public Cloud is Microsoft Azure, Google Cloud Platform etc.



Fig2.Public and Private Cloud

Public Cloud Architecture falls in Three services models. Common Service models include:

1.*SaaS (Software as a Service)*: Software as a service is based entirely on the internet and it is approach by which software provider host a combinations of servers, Database that can be accessed by user from connected devices. Example of SaaS is ERP, Email etc.

2.*IaaS (Infrastructure as a Service)*: It is a virtual platform on which required operating environment and Application are deployed. It also includes Storage as a Service offering. Example of IaaS is Google Compute Engine, Amazon Elastic Cloud.

3.*PaaS (Platform as a Service)*: It is a category of cloud computing that provides a environment and platform to allow developers to build services and applications over the internet . Example of PaaS is Windows/.Net, Linux/J2EE

LOAD BALANCING:

Load Balancing of Cloud is defined by the method of Splitting the workloads and compute the properties of Cloud computing. High performance level of task also can achieved by using this load

Balancing technique on low cost than traditional on-premises load Balancing technique. The workload means the total Processing time which it requires to execute all tasks assigned to the machine. Load balancing is one of the important factors to heighten the working performance of the cloud service provider. The benefits of distribution of workload include the Resource utilization and enhance the performance.

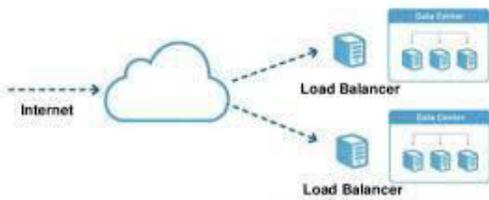


Fig3. Load Balancing Of Cloud.

Need/Goals of load Balancing

- 1-To Minimize Response time
- 2-To Maximize the Throughput
- 3-To Build the Fault Tolerance of System
- 4-To Enhance the Performance
- 5-Increase the users Satisfaction
- 6-To maintain the Stability of system
- 7-To Improve the Resource utilization ratio
- 8- Limited energy consumption
- 9- Reducing Carbon emission

BENEFITS OF LOAD BALANCING :

Some Benefits of Load balancing in Cloud computing and those Benefits are as follow:

1. *High-Availability* :- The Load Balancer automatically distributes the traffic across multiple nodes/targets– IP addresses, Amazon EC2 instances. Load Balancing can also Load balance across a Regions to

healthy targets in different Availability Zones.

2. *High Security* :- Load Balancer works with Virtual Private Network (VPN) to Provide robust security features and user-authentication features.

3. *Elasticity* :- Load Balancer is capable of handling rapid changes in network Traffic patterns, additionally deep integration with auto scaling ensures sufficient application capacity to meet varying levels of applications load.

4. *Flexibility* :- Load Balancer offers you Flexibility in how you virtualize your application targets, allowing you to host more applications on the same instance.

5. *Hybrid Load Balancing* :- Hybrid Load Balancing makes it easy to migrate, burst, or failover on premises application to the Cloud.

These are the benefits of Load Balancing on the Cloud computing.

EXISTING LOAD BALANCING TECHNIQUES:

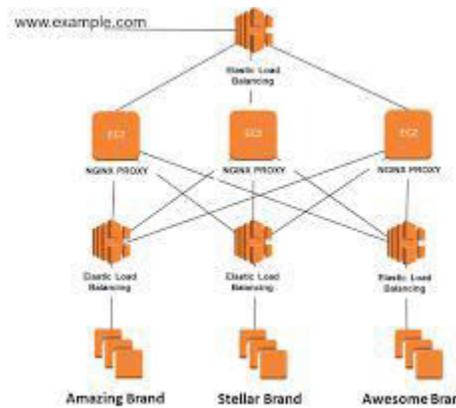


Fig4. AWS Load Balancing distributes the Load.

There are so many different Techniques and Algorithm that can be used to Load Balance client access request across the many servers.

The technique chosen is depending on the type of service or application. The existing techniques of Load Balancing are:-

- 1-Round Robin
- 2-Weighted Round Robin
- 3-Least Connection
- 4-Weighted Least Connection
- 5-Agent Based Adaptive Load Balancing
- 6-Chained Failover(Fixed weighted)
- 7-Weighted Response time
- 8-Source IP hash
- 9-Layer 7 Content Switching
- 10-Global Server Load Balancing (GSLB)
- 11-AD Group Based Traffic Steering
- 12-Software Defined Networking (SDN)

These are some techniques of Load Balancing But, Generally Load Balancing Algorithm are Classified in two categories :

- 1-Static Load Balancing Algorithm
- 2-Dynamic Load Balancing Algorithm

1.Static Load Balancing Algorithm:-

In static load Balancing algorithm the traffic load is divided among the servers and it is good for homogeneous and stable environment. Static algorithm are not so much flexible so that this algorithm is unable to consider the dynamic changes. Static Load Balancing Algorithm performs better in terms of complexity. There are some Static Load Balancing algorithm are:

- 1-Round Robin Load Balancing Algorithm
- 2-Weighted Round Robin Load Balancing Algorithm
- 3-Load Balancing Min-Min Algorithm
- 4-Max-Min Load Balancing Algorithm

-Round Robin Load Balancing Algorithm:

It works on the circular process. In this process there is no starvation. Whenever

the workload is equal then it response very fast. It chooses the first node on the random basis and other node in round robin way.

-Weighted Round Robin Load Balancing Algorithm :

This algorithm is based on the simple Round Robin load balancing method. In the weighted version, each server in the pool is given a static numerical weighting. In this algorithm, each node is assigned a weight and according to the values of the weights, jobs are distributed.

-Load Balancing Min-Min Algorithm:

In this algorithm the minimum value is selected which is the minimum time amongst all tasks on any resource. According to that minimum time, the task is then scheduled on the corresponding machine.

- Max-Min Load Balancing Algorithm:

In Max-Min Load Balancing Algorithm it is similar to the Min-Min algorithm

After finding the minimum time maximum value is selected which is the maximum time amongst all tasks on the resources. Then according to the maximum time, the task is scheduled on the corresponding machine

2. Dynamic Load Balancing Algorithm:-

Dynamic Load Balancing Algorithm provides better results in Heterogeneous and Dynamic environment and these algorithms are more flexible so that this algorithm is able to consider the dynamic changes. In this algorithm task is based on current state which will help to improve the performance of system. It is divided in two forms:

- 1-Distributed System
- 2-Non-Distributed System

1-Distributed System: The task of load balancing is distributed among all the nodes and if any node is fail in the system then it will not stop the functionality of system.

2-Non-Distributed System: In Non-Distributed System can be centralized or semi-distributed system. There are some algorithms in Dynamic Load Balancing Algorithm are:

- Biased Random Sampling Load Balancing Algorithm
- ANT COLONY Load Balancing Algorithm
- Honeybee Foraging Behavior Load Balancing Algorithm

1. Biased Random Sampling Load Balancing Algorithm: This algorithm is for the large network and also it is fully decentralized.

2. ANT COLONY Load Balancing Algorithm: In this algorithm ant selects a shortest path to reach the destination point. This algorithm is based on the behavior of real ants. Whenever the request is send then ant starts its movement. Ant checks at every movement that the node is overloaded or under loaded. If ant finds any overloaded node, it turns back. And if ant finds any under loaded node, it proceeds. It is also decentralized algorithm.

3. Honeybee Foraging Behavior Load Balancing Algorithm: It is Self-organizing, nature inspired algorithm. This algorithm is suitable for heterogeneous environment. In this algorithm performance will achieve when system size will increase.

CONCLUSION :

The underlying the concept of Load Balancing in Cloud Computing we discussed

various aspects of Load Balancing and Cloud Computing. We also have surveyed about Private cloud, public Cloud, Goals of Load Balancing, different existing techniques and algorithm of Load Balancing, Static and Dynamic Load Balancing algorithms. One of the biggest issues of cloud computing is load balancing because overloading of a system lead to poor performance which can make the technology unsuccessful so it always requires a efficient load balancing and resource utilization techniques and algorithm and our paper focuses on the various load balancing techniques. The goal of load balancing is to increase client satisfaction and increase the performance. In future will discuss about the static and dynamic algorithm in brief and will solve the load balancing problem in dynamic network.

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