A LOAD BALANCING ALGORITHM FOR SELECTION OF COMPETENT SERVER IN CLOUD ENVIRONMENT BASED ON CAPACITY, LOAD AND ENERGY

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Abstract Load balancing is a process of proper distribution of the assigned tasks in different devices, so that the resources can be optimally utilized. Cloud computing is one of the most emerging in today's world of computing which shift the paradigm to "computing as a service". Cloud computing is totally a web based service, where multiple numbers of virtual servers which serve the users. So the tasks of sever should be distributed in such a manner so that they are being utilized optimally. Several load balancing algorithms are available there, we have mentioned some of them. We proposed simple load balancing algorithm considering the speed and load to a certain server.

Keywords : Cloud computing, load balancing , virtual server.

1. Introduction

Cloud computing is one of the most emerging technology in information technology domain. With the development of cloud computing paradigm of computing has totally changed which now actually transforms the computing as a service. Cloud provided efficient and flexible file storage [1]. According to the NIST cloud definition " Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction." [2]. Cloud computing is being defined with five essential characteristics: on demand self service , broad network access, resource pooling, rapid elasticity and measured services. Cloud computing service are classified in three major group: Software as a Service(SaaS), Platform as a Service(PaaS) and Infrastructure as a Service(IaaS). Figure 1 depicts the NIST cloud model in details.
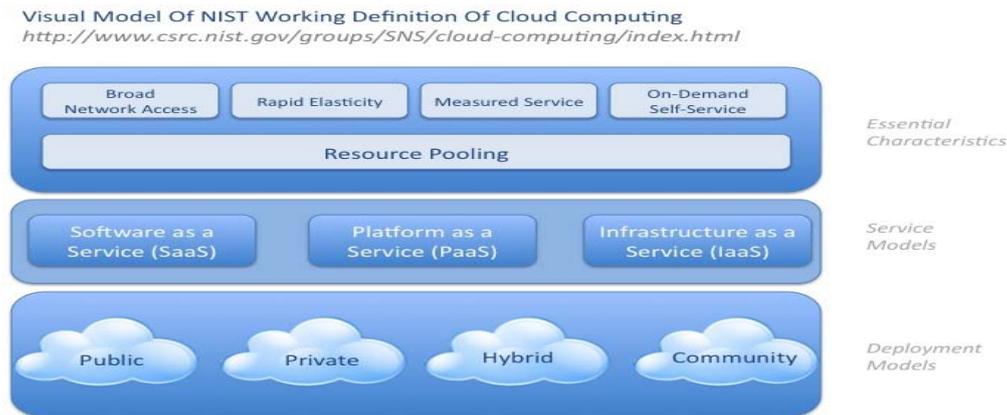
Fig. 1. NIST Cloud Model.

1.1 Load Balancing :

Load Balancing is the process of distributing or assigning of load in a balanced manner so that all the nodes (devices) are equally likely utilized depending on the capacity. Load balancing improves the response time also. Load balancing performs two major tasks : resource allocation and scheduling.[3

Resource Allocation :

Resource allocation is the process of mapping of resources on different components of cloud.[3]. The resource allocation process must endure that no node is overloaded or under loaded.

Task Scheduling :

Task scheduling is done just after the resource allocation , it actually provides multi programming capabilities.[3]

There are plenty of load balancing algorithm available in cloud domain, the efficiency and effectiveness of *those are needed to be measure. CloudSim is a simulation tool used for that.[4]*

1.1.1 Classification Load Balancing Algorithm

In cloud domain different load balancing algorithms are available. The algorithms are classified in to two categories :

Static Load Balancing : This type of load balancing algorithm dose not depends on current state but it depends on some predefined conditions.[5]

Dynamic Load Balancing: This type of load balancing algorithm depends on the current state.[5]

1.1.2 Existing Load Balancing Algorithm

Round Robin is a sampling based load balancing algorithm , where servers are chosen randomly.[6]. A new server based load balancing algorithm has proposed by M. Nakai et al. which reduces the response time by choosing the remotely closest server[7]. A genetic algorithm based load balancing that uses the previous and current data has been proposed by J. Hu et al. [8]. Central Load Balancing Policy for Virtual Machines (CLBVM) by A.Bhadani et al. is another very popular load balancing algorithm that improves the overall performance of the system.[9]. Y. Fang et al. [4] has proposed a two-level task scheduling mechanism that obtained high resource utilization.[10]. Obaid Bin Hassan, A Sarfaraz Ahmad has proposed a nature inspired decentralized load balancing algorithm that was based on Honey Bee Load Balancing.[11]. Monika Rathore et al, has proposed an improved version of Honey Bee Load Balancing that is randomized Honey Bee Load Balancing that guarantees that no nodes would keep idle.[12]. Throttled Load Balancing Algorithm is another algorithm where client first issue the request to the load balancer and then load balancer selects the virtual server.[13]. Enhanced equally distributed load balancing algorithm distributes the load symmetrically [6]. Yang Xu et al. developed a model to balance data distribution to improve cloud computing performance in data-intensive applications, such as distributed data mining.[14]

2.   Proposed Method

Balancing load is one of the crucial techniques in cloud computing environment. On the previous section we have discussed regarding different load balancing algorithm applied in cloud domain.

Through the proposed method we try to balance the load to different cloud servers depending upon the parameters of the current load of the server and the capacity (speed) of the server and the energy level of the server. If the most eligible sever is fully loaded then the next eligible server will be selected. When a new

task request is arrived, then which server will be chosen that decision is needed to be taken. Among the servers which are not completely loaded we consider the said parameter assigning weigh value to the parameters as:

Capacity (C):w1= 0.5

Current Load (CL): w2=0.3

Energy (E): w3=0.2

 We have followed an equation for selecting the most eligible server as:

 SEL (SERVER) = MAX(w1*C+ w2*E – w3*CL)   (1)

Algorithm:

1.   FOR (i: 1 to N)   // N=Total number of available server in the pool.

2.   IF(CL(SER$_i$)==MAX(C) || E(SER$_i$)==0)

3.   Continue

4.   ELSE

5.   SEL(SER$_i$)=MAX(SER$_i$ (w1*C+ w2*E – w3*CL))
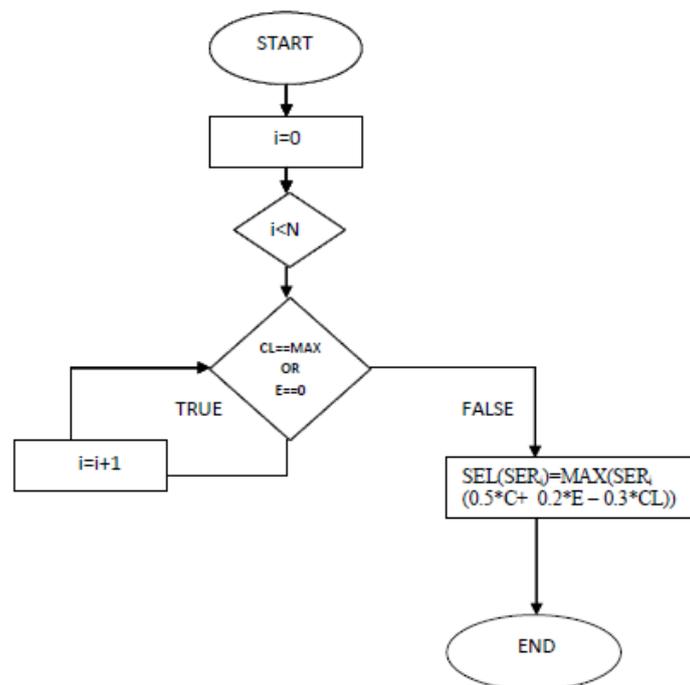
6.   END

Fig: 2 Work Flow Diagram of the Proposed Method

1. Test Result

Fig 3: Test result -I

Fig 4: Test result -II

2. Conclusion

Load balancing is a concept which is still under research. Everyday new frameworks, algorithms and models are being developed and existing models are updated. There is a vast scope for future enhancement. Through our proposed method we are trying to achieve load balancing to some extends depending upon parameters like capacity, current load and energy. We consider capacity and energy as direct proportional parameters and current load as the inverse proportional parameter for selection of servers.

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