

# A novel approach for load balancing in diverse distributed computing environment

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## ABSTRACT

Load balancing is a method to distribute a workload evenly in two or more system and resources, in order to get maximize throughput, optimal resource utilization, minimize the response time to avoid overload. Our distributed framework comprises of different types of resources with numerous selfish consumers that get computational tasks from clients and make the decision for allocating them to resources. Each consumer work autonomously, and they endeavors to assign the received tasks to the resources with the goal of optimize the completion time of its task. In order to maintain a balanced system there should be an equilibrium between these selfish consumers. The equilibrium is achieved by using a non-cooperative game called Nash equilibrium. The goal is to minimize mean time; to minimize the total execution time of tasks assigned to existing resources and minimize the inactive time of computing resources.

**KEY WORDS:** Diverse distributed Computing, load balancing, response time, Nash algorithm

## 1. INTRODUCTION

A distributed framework can be seen as a gathering of computing and communication resources shared by the active users. The purpose of load balancing is to enhance the performance of the system. Goal of the load balancing is to minimize the total execution time of tasks allotted to available resources in a distributed computing environment.

A load balancing technique could be best applied to minimize the inactive time of resources. Load balancing can be achieved either by co-operative and non-cooperative approach. In cooperative approach several decision makers collaborate in make the decisions such that each of them will function at its optimum. In non-cooperative approach decision makers that are not allowed to collaborate and each of them greedily optimizes its own response time autonomously of the others and they all eventually reach equilibrium.

**Related work:** The Existing work deals with the cooperative load balancing scheme and present the structure of the Nash Bargaining Solution. For this scheme an algorithm for computing Nash Bargaining Solution is inferred. We demonstrate that the fairness index is always using Nash Bargaining Solution i.e. that the allocation is reasonable to all jobs. At last, the performance of our cooperative scheme is compared with that of other existing works.

## 2. PROPOSED SYSTEM

The ultimate objective of the system is to minimize the idle time of computing resources. The system resides wisely in inactive state and acquires communication deferral to respond the event in distributed computing environment.

- The submission of tasks should be minimal for the first response. Optimal static load balancing method which decides the optimal load at each host system so as to minimize the mean response time.
- Improving the performance by achieving high degree of throughput as in cooperating process where the execution is dependent on other processes. The Effective utilization of resources in multiprocessors should accomplish the assigned task within the time.
- The workload is evenly distributed between the idle and busy users are the key challenge in this load balancing criteria.
- Static behavior of the system provides less overhead while allocation of resources Dynamic allocation focuses on present behavior that tend to changes accordingly over a periodic or discrete intervals of time.

The arrival rate of the consumers is a variant function where delay in communication channel is possible. We have to devise an algorithm that assumes all the entities arrive simultaneously at a time that exceeds normal distribution. The Principle advantage of distributed systems is scalability; a system should have capability to add additional components. In this case, we have to maintain best effort task realignment constraints for even load distribution. The multiple consumers not only make its own decision without taking account of their other consumer and perform its deliberated tasks over a predetermined set of resources but also attain the Nash equilibrium as stated in Non Co-operative Multiplayer game theory. The Crucial part of Load balancing scheme is to successive completion of tasks whatever may be the load is. (Transparency).

**Methodology adopted:** The methodologies adopted in this project to achieve the objectives are as follows:

- Here there are three modules the first module is the topology module deals with the arrangements of nodes or the peers in the distributed system.

- The second module is the client module. Here after entering the user name and password the client can login into login page. The client gives the request to peer (eg. any Jsp file or HTML files) as input. The Client gives the request to Peer where virtual server is running. The client always gives request to virtual server Peer. For HTML Parsing HTML file or JSP file is given as input. The Client always interacts with the virtual server Peer.
- The third module is peer module. Here After getting the request from client the peer will check the load .If load is under loaded means the peers itself handles the request and send to client. If the load is overloaded means it checks to DHT table to reassigned the load to other Peers. Then the server is reassigned to capable peers to handle the request. Thus the server is reassigned to peer node based on load.

When the computer is imbalanced, the objective of a load balancing algorithm is to figure out how to move virtual servers from overloaded nodes to light nodes .For balancing the load, the algorithm used in this project is NCO algorithm.

The algorithm work as follows:

- The virtual server peer will the check the load whether the load is minimum or maximum.
- If the load is minimum it produced response.
- If load is under loaded means the peers itself handles the request and send to client.
- If the load is overloaded means it checks to DHT table to reassigned the load to other Peers. Then the server is reassigned to capable peer nodes to handle the request. Similarly the server is reassigned to peer node based on load.
- The minimum balance load peer will give the response to client.
- Then the client will give the request where the virtual server is currently running.

In our project we are considering four nodes such as A, B, C, D. The node A and C performs operation as counting no. of html tags in the given html file or jsp file. The node B and D perform the operation as counting no. of body tags in the given html file or jsp file.

Consider if there are two files Y and Z having 15 lines and 1 lines respectively. And the processing speed of A node is 3000, B node is 3000, C node is 6000, D node is 6000 as given earlier ie. Static information is given to all the nodes.

When the client submit the file Y. The algorithm first check that the given file is appropriate then it counts the number of lines in the program. And then it calculates the expected execution time of the task (ET).

$$ET = \text{processing speed} * \text{number of lines (per second)}$$

After calculating the expected execution time then it assign the task to the node which is having minimum execution time by considering A and C node, the node A is having execution time 45sec and C is 90 sec. so the balancer assign to the node A.

Suppose if the node A is busy when the task is submitted by client. In that case the task is assigned to the node C. In that way load balancing is achieved by using the NCO algorithm.

**System design:** Our approach, which has been used to improve the efficiency by minimizing the traffic overhead using the NCO algorithm by efficiently using the resources with minimum time complexity. This approach explains three modules which are used for balancing the load efficiently by using NCO algorithm. The Topology Module is used to construct the topology for Peer to Peer Network. Ring Topology is used here. The Client Module is used for Logging inside and requesting the request to the peers. In Peer Module uses NCO algorithm to and table for efficiently allocating the resources and forwards the request to the Client module. The interaction will be between the where the load balancer is present and the Client module. If Peer module along with Algorithm completes the process. The following figure 1 clearly illustrate the architecture of the system and how the load will be balanced.

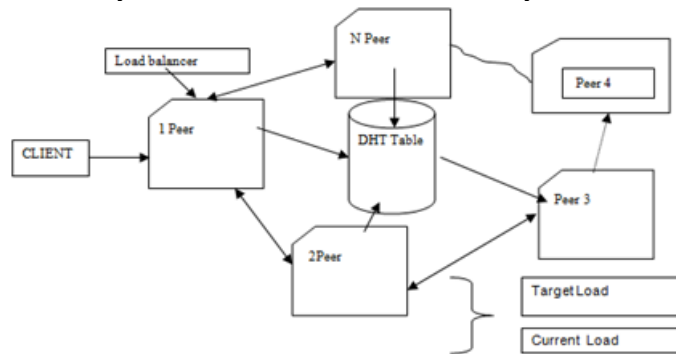


Figure.1. Architecture of Load balancing

### 3. CONCLUSION

Thus the algorithm for computationally concentrated tasks on a diverse distributed computing environment, defined the problem as a non-cooperative game with the intent of minimizing average response time of tasks in the framework. The algorithm has some main features. One is that it can be executed in a decentralized fashion as there are numerous consumers in the framework. To find the optimal load balancing, each resource consecutively updates its load balancing strategy based only on the local data and the system's load. So the overhead is moderately less than using dynamic data. Another feature is straightforward structure which is based on arithmetic formula.

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