Survey on Load Balancing Methods Used to Handle Heavy Traffic in Web Application

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Abstract: **Load balancing technique is distributed the work equally into the number of nodes. This is used to allocate the workload to different server and provides service fast. The main goal is to balancing and schedule the load equality among the nodes suit that no nodes will be on should or under the situation. Load balancing is used to proper utilization of resources and better user satisfaction. The heavy traffic on sites or server we have to use the containerization. Containerization method is an OS level virtualization used for display and run different application without initiating an entire virtual machine for each app. Its means that when you want to execute some project on any machine, but many time to execute or run project on another machine then another does not support this app libraries we can again install this machine OS libraries. To avoid this problem we can use the containerization method. Containerization works with micro services and distributed application, as each container operates identify of other and uses minimal resource from the host. This paper contains different methods to resolve the complication of load balancing and task scheduling.**

Keywords: **containerization, docker, horizontal scaling, micro-services.**

1. Introduction

There is multiple request from the multiple client to access the site at same time that time this server goes down is called the heavy traffic on the site. Most of time particular sites will be loaded due to multiple request from clients to access the same site on same time. So there is load on server and server cannot able to provide services to all clients at a time. To avoid this problem we use load balancing technique. Load balancing is distributed the worked equally into the number of nodes Load balancing is used to proper utilization of resources and better user satisfaction. The two main type of methods provided by load balancing are static and dynamic. Containerization is the key technology that allows the simultaneous execution of diverse tasks and micro services over a shared hardware platform. To solve the first sub-problem different load balancing algorithms are there in the literature which we will discuss shortly.

A. Description of containerization

"Containerization" is a portable operating system level virtualization method which runs and deploy without initiating an entire machine for each app.

It means that when we want to execute same project on

difference OS then there is no need to install all the package which are required for run the entire project. That's why we use containerization to contain all the required material in it.

The most common app for containerization is docker, specifically it is the open source engine which is based on globally runtime environment.
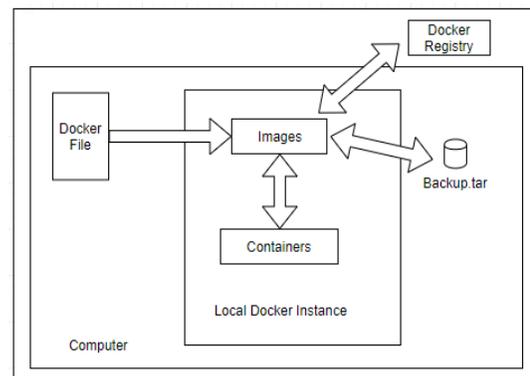

Fig. 1. Docker

Containerization works with micro services & distributed application as each container operates independently of other & uses minimal resources from the host

Advantages:
1. To reduce the cost due to damage or loss.
2. To overcome the labor costs due to the use automated materials handling equipments.
3. Containers can used to store temporary storage at ports with limited facilities.
4. Containerization provides the all package to related software.
5. Containerized data centers are usually sound proof and weather proof.

Disadvantages:
1. Containerized data centers do not have multiple built-in redundancies in place.
2. A single point of failure can take down a whole containerized data center.

2. Different types of load balancing algorithm

There are two main load balancing algorithm:
A. Static load balancing

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390

B. Dynamic load balancing algorithm

A. Static load balancing algorithm

In Static load balancing algorithm at the time of selection of node load can be distributed. It requires an earlier learning of system resources and the performance of the processor is determined at the start of the execution.
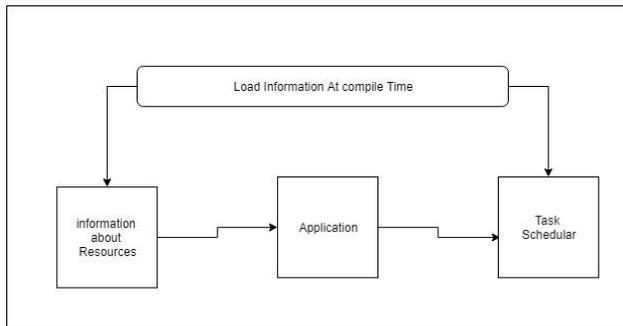

Fig. 2. Working of static load balancing algorithm

1) Round robin algorithm

This algorithm is the schedule load algorithm. In this algorithm the priority for less time is to the process. The processor will be distributed into the equally for each process. It means that same time allocated to each process because of that no one process can wait for the processor complete its execution. Processes are partitioned between all processor in such way that the work load between processer is distributed equally. This algorithm to provide the service at a compile time, each process will be executed with in a particular time slices.

2) Active clustering load balancing algorithm

Clustering is the part of the dynamic load balancing algorithm. This clustering technique will be used in this algorithm. In this algorithm similar nodes will be gathering and this similar nodes will be work in group. The algorithm works on the beginning of the nodes, then start the working to the neighbor node. Neighbor nodes properties will be similar then this nodes will be combine or to generate group. Clustering algorithm is also called as matchmaker. The matchmaker provides the efficiency for combine the nodes. The Active clustering follows the mathematical distance between two nodes, Euclidean distance to calculate.

3) Central load balancing decision model

This algorithm works on the process was executed, but execution time of the process will be consider. The main purpose of this algorithm threshold value will be there. Firstly all the process is divided between all processor. The threshold value is found or divided. Process are executed then consider the time of execution and execution time are compared with threshold value. Execution time of the process is smaller than threshold value, then process will be executed. Else processing time is greater than threshold value, then process will be terminate.

4) Min-Min load balancing algorithm

It starts with an arranging all unassigned tasks. First of all it found the minimum completion time for each task. Then it selects the task which has minimum completion time. After that execution time for all other tasks is redesigned for that machine. The fundamental issue of Min-Min algorithm is starvation.

5) Map reduced based entity resolution model

Map reduced based entity resolution model which are divided into two parts that is Map() and Reduce(). Map() function will be perform the sorting and cleaning with the Part() method. This Map() function to give the output on partition on the large datasets into the smaller dataset. Reduce() function perform to overloaded the parallel processing of the task using part() method.

B. Dynamic load balancing algorithm

Dynamic load balancing is a run time. Dynamic load balancing algorithm are used to handle the current request of client. The current situation will in multiple request then at that time to handle the situation dynamically this algorithm will be used.
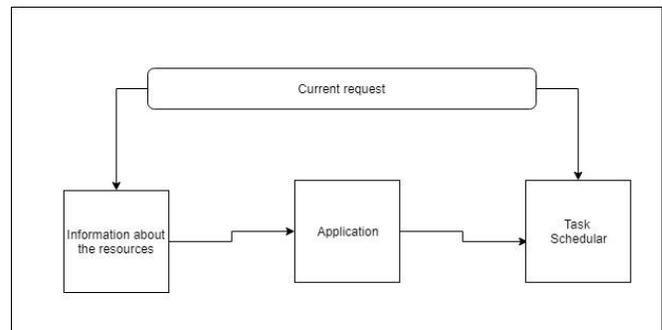

Fig. 3. Dynamic load balancing

1) Equally spread current execution algorithm

This algorithm will first check the priority of process then the size of the process execution time of process then load the process on the virtual machine. The load balancer spreads the load onto notable nodes, and thus it is called as spread spectrum technique.

2) Throttled load balancing algorithm

This algorithm to overcome the drawback of equally spread current algorithm. The load balancing is to finding the appropriate virtual machine. In this algorithm only one process can be run on a single virtual machine, utilizing this order, it allocates the desired work given by client to the fitting machine. The client will be request to the particular machine on the process size and they can access the machine. If no virtual machines are accessible to machine, queued the request.

3) Join-Ideal queue load balancing algorithm

Join-Ideal algorithm used on the large scale system. This is used in the distributed dispatcher by first load balancing the

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391

Table 1
Models advantages and disadvantages

S. No.	Topic	Short description	Advantages	Disadvantage
1	Round Robin	Processor will be distributed into the equally for each process.	Work load is distributed equally	Time for job processing is not considered
2	Active Clustering Load Balancing	similar nodes will be gathering and this similar nodes will be work in group	Load of server balanced efficiently	Poor performance in heterogeneous environment
3	Central Load Balancing Decision Model	It calculate the CPU speed base on threshold value	It is used in heterogeneous environment	fixed threshold value is given
4	Min-Min Load Balancing	Initially it begins with an organizing of all unassigned tasks	It is simple	Existing load is not considered on resource
5	Map Reduced Based Entity Resolution Model	Map reduced based entity resolution model which are divided into two parts that is Map() and Reduce().	Large dataset is divided into small dataset	More time is required

ideal processors, this processor will be across the dispatcher then to processor to reduce the average length or processor size at each processor. The main purpose of this algorithm is dynamically balancing the scalable web services. The disadvantages of this algorithm is that it is not scalable.

3. Conclusion

Load balancing not only handles the load on the server but also provides concurrent access to multiple request and also increase the performance of server. In this we discuss about dynamic and static load balancing algorithm based on containerization and docker to distribute the load efficiently among the instances of server. We also discuss concept of containerization and docker virtualization method used to deploy and run diffused application without initiating entire virtual machine for each app. And also discuss the advantages and disadvantages of containerization.

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