

# A Novel Approach To Balance The Dynamic Load Using Task Allocation On Distributed Content Based Cluster Servers

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## ABSTRACT

To achieve a good balancing concept in an cluster servers, task allocation plays a important role. The aim of the paper is to minimize the execution time, produces better batch completion time (avoids delay in execution of a request) and improve load balancing at workstations. This also enable the system to adopt sudden arrival of large batch and to provide the equal treatment to all the processors .Here the tasks are batched and scheduled on the web clusters based on the content types to improve overall system performance. The aim of this paper is to optimize the execution time of a server, increasing reliability improving QOS and optimizing the system performance. These are achieved by carrying simulations on the proposed method.

**Keywords:** content based clusters, random walk search, and dynamic load balancing.

## I. INTRODUCTION

With the development of information and communication technologies. The distributed systems are more popular as the computing demand increases. A large scale distributed systems are required with a considerable amount of servers. For efficient use of distributed system it is important to allocate tasks to each node appropriately, if the tasks are allocated randomly, it is possible some nodes gets overloaded while other becomes idle, to avoid this an efficient dynamic load balancing using random walk search on content based distributed clusters are used

A distributed networks allows large scale resource sharing and system integration, clusters are attractive platforms for deploying applications at large scale for high performance. For the proper distribution of user requests, load balancing is required in the clustered environment. A load balancer uses a distribution logic to distribute the requests to a specific workstation on the clusters. Load balancing may classified into static and dynamic. In case of static load balancing, the decision regarding allotment of a task is known in advances. In case dynamic load balancing, the task allotment decisions are taken at runtime.

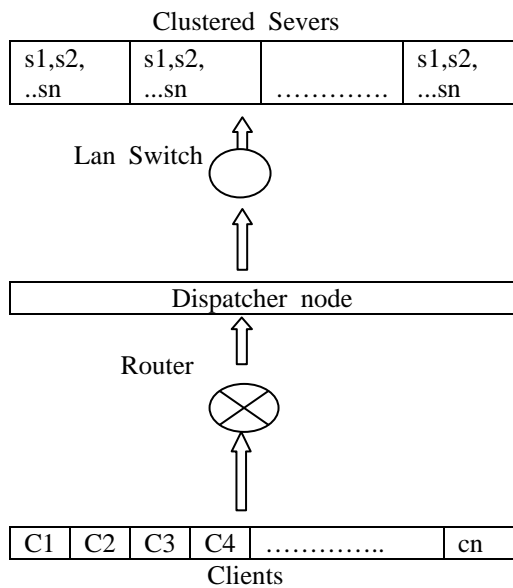
The rest of the paper is organized as follows: Section II describes the literature survey, section III describes the proposed system, and section IV describes the proposed algorithms. Section V illustrates the simulation result Section VI describes the conclusion.

## II. RELATED WORK

Because of fast development of internet, information retrieval rate is increases to cope up with this, recently cluster servers are used. Distributed task allocation problem is one of the general and critical problems in the cluster servers. Some people stated the task allocation based on the priority of the tasks using multi methods. The load balancing on content based cluster servers has been studied by many researchers. Alan. Massaru.

nakki[1]et.al present a load balancing solution to minimize the system response time considering the load status of web servers and network latencies. They stated that the load balance they can able carry by limiting the redirection rates to the servers. Manoj Kumar Singh et.al presents a concept to provide the adaptive optimal traffic distribution for dynamic condition of traffic matrix using nature based intelligence methods . He proposed the concept based on the load and fixed capacity of links, average delay for packet minimized. Jianhai shi et.al states that a strategy of distributed load balancing based on hybrid scheduling. Here Load scheduling includes two steps static allocation and dynamic scheduling the load. This concept is developed on land surface ecology disaster model. Xiao xu.et.al propose a method for content addressed network in order to achieve load balancing in the distributed web crawling peer to peer systems. Syed chhattan shah proposes a centralized resource allocation scheme that allocates dependent tasks among nodes in mobile ad hoc computation.

**III. PROPOSED WORK**



**A. Content based clusters.**

In this proposed model, all the clients send the requests messages to the Dispatcher. The cluster servers are formed based on the content types . The N number of cluster servers is interfaced to the dispatcher via a LAN switch. A router is used to pass the N number of client requests to the Dispatcher .The dispatcher stores all requests in its queue and frames a batch based on request type. The dispatcher dispatches batch of requests to leastly loaded cluster servers. The selected server in the cluster acts as a dispatcher2. The dispatcher2 uses random walk search method to find server load in the clusters. It performs distributing of this request to lightly loaded neighbour nodes and updates load status information to the dispatcher. The servers are sends the result back to client via LAN switch. This avoids the message congestion, reduces workload of a dispatcher node and improves response time.

**B. Random Walk Search**

To find workload on the clustered servers , a random walk search method is used , in this method the request is send to K random neighbours within the clusters. On receiving the request the neighbours then tries to match the request with its current status. If it has enough time to complete the task it then sends back an acknowledgement message to the sender. Otherwise it forwards the request to its K random neighbours.

**C. Dynamic Load Balancing**

Dynamic load balancing refers to process of improving performance of systems through distribution of work load / requests arriving from various clients to different servers. Let  $R_{req} = \{ R_1 , R_2, R_3, \dots R_n \}$  be the set of requests arriving to the systems. The goal of dynamic load balancing strategy in a cluster based

systems is to find a suitable server to serve the incoming requests without making the servers to be heavily loaded and their by enhancing the acceptance rate and reducing the starvation period. Finding a set of suitable cluster servers  $CS_i$  with response such that the incoming request  $\lambda \leq \alpha$ , where  $\alpha$  is the maximum threshold of the cluster server  $CS_i$

$$\sum_{i=1}^n CS_i (\lambda) \leq \alpha$$

#### IV PROPOSED ALGORITHMS

```

Step 1 : Collect user requests
Step2 : Call Dispatcher module()
        Forms batch based on request content type
        Calculate total execution time of the batch process
        Calls load balancing module ()
        Verifies the load on a cluster servers as minimum / maximum
Step 3 : Call local cluster server module()
        {
            If load on server  $s_i$ =minimum then
            Call random walk search ()
            Update load module table and response table
            Else
            Call cluster server2
            Else
            Request execution is rejected
        }
        Random walk search module()
        {
            If load on server  $S_{ij}$  = minimum then
            Allocate batch of tasks on that
            Else
            Allocate batch of tasks to next lightly loaded nearest neighbour
            Server  $S_{ij+1}$  or  $S_{ij-1}$ 
            Else
            Sending an error message to dispatcher module ()
        }

```

#### V SIMULATION RESULTS

The simulation of the proposed system was carried out in java. The simulation results illustrates the results of request servicing in batch mode method and without batch mode

**With Batch Mode**

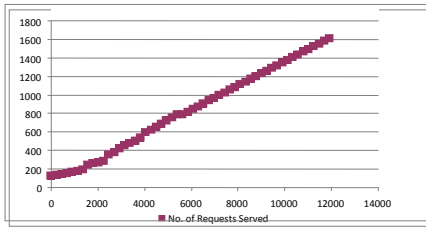


Fig1 No of request served on cluster server1

**Without Batch Mode**

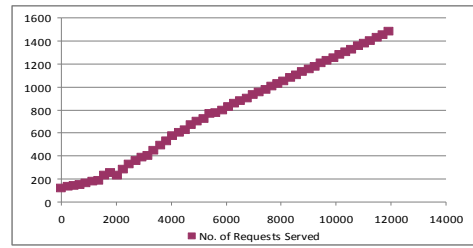


Fig5: No of Requests served on cluster server 1

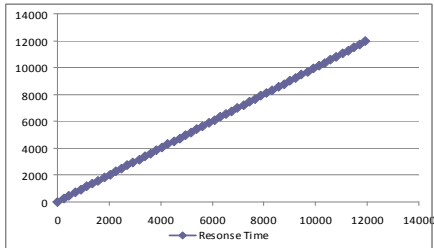


Fig 2: Response time of serving requests

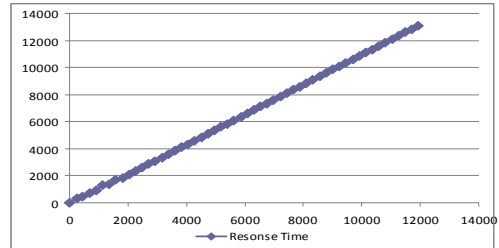


Fig 6: Response time of the serving request

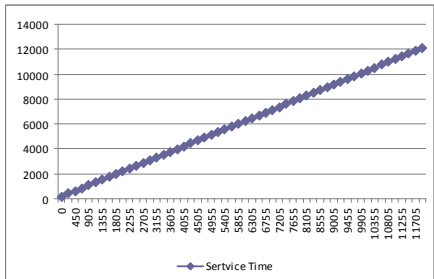


Fig 3: Service time of requests

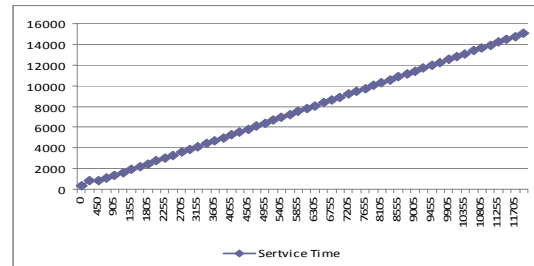


Fig 7: Service time of request

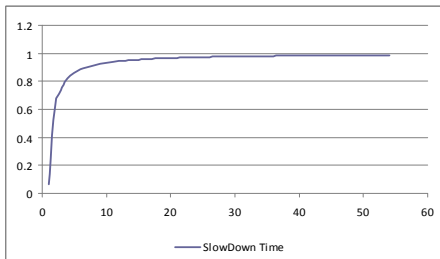


Fig 4: Slow down time of the requests

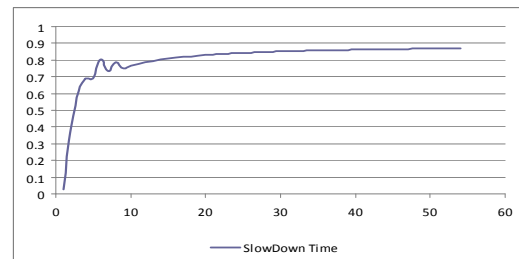


Fig 8: Slow down time of the request

The fig 1 and fig 2 illustrates the number of requests in batch mode made based on the category of the request messages and responses time of batch of request messages from the cluster server1. It shows that 49.7 % of requests are served in batch mode. The fig 3 and fig 4 depicts the cluster server1 takes 1.01 msecs to serve the group of requests and its slowdown time for request serving is 0.8msecs. The fig 5 and fig 6 illustrates that the request serving rate is 45.6% in an without batch method. The fig 7 and fig 8 illustrates that the total request serving rate is 1.15 msecs and slowdown time is 0.9msec.

**VI CONCLUSION**

In this paper, we proposed an a novel approach to balance the dynamic load using task allocation on distributed content based cluster servers .The results are shows that the request serving rate is increases up to 4% compare to the without batch method. Further the slowdown time of the request messages in batch method is decreases upto 0.1 % compare to the without batch method. It shows that our proposed method is good in improving the request serving rate.

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## REFERENCES

- [1] Barazandeh and I. Mortazavi. S.S two hierarchical “ Dynamic Load Balancing algorithms in Distributed Systems” Proceedings of 2009 second International Conference on Computer and Electrical engineering pp 516-521.
- [2] Chengchengs Guo,Zhi Xiong And Puliu Yan “ A Dynamic Load scheduling Algorithm for web Server “ in the proceedings of IEEE 2004, and pp 259-264.
- [3] Chih-chiang yang , Kun- Ting chen , Chien Chen, Jing-ying Chen “ Market –based Load Balancing for distributed Heterogeneous Multi –Resorce servers “ in the proceedings of 2009 15 th International Conference on Parallel and Distributed Systems. Pp 158-165.
- [4] He luo,Xiao-Jian hu, Xiao-Xuan Hu” Multi agent negotiation model for Distributed Task allocation “ in the proceedings of 2011 IEEE.
- [5] Hua-feng deng, yun - sheng liu, ying-yuan xiao. “ A novel algorithm for load balancing in distributed systems” proceedings of the 2007 eight ACIS International Conference on software engineering, Artificial Intelligence, Networking and parallel/distributed computing, pp 15-19.
- [6] Jorge E. Pezoa, Majeed h. Hayat , Zhuoyao wang, and Sagar Dhakal “ Optimal Task Reallocation in heterogeneous Distributed Computing Systems with age dependent Delay statistics” in the 2010 39<sup>th</sup> International conference on parallel processing.
- [7] Jianhui shi, Chunlei Meng , Lingli Ma “ The Strategy of distributed Load Balancing Based on Hybrid Scheduling “ in the 2011 fourth International Joint Conference on Computational Science and Optimization.
- [8] Katja gilly, Nigel Thomas , Carloss Juiz “ ScalableQOS content aware load balancing algorithm for a web Switch based on classical Policies “ in the proceedings of 22<sup>nd</sup> International conference on Advanced Information Networking and Applications pp 934-941.
- [9] Laiping Zhao, Yizhi Ren , And Kouichi Sakurai “ A Resource minimizing Scheduling Algorithm with Ensuring the deadline and reliability in Heterogeneous systems “ in the proceedings of 2011 International conference on advanced Information Networking And Applications pp 275-282.
- [10] Sina Z. Anaraki, Mehdi Kalantari “ Acceleration of distributed Minimax flow Optimization in Networks “ in the proceedings of 2011 IEEE.
- [11] Xiao Xu, Wei-Zhe Zhang , Hong –li zhang, Bin xing Fang, xin-ran liu “ A forwarding based Task Scheduling Algorithm for Distributed web Crawling over DHTs” in the 2009 15<sup>th</sup> International Conference on parallel and Distributed Systems.

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