

PERFORMANCE ANALYSIS OF ROUND ROBIN LOAD BALANCING TECHNIQUE

¹Er. Raman Deep Mittal,²Er. Yogesh Kumar

¹Research Scholar,²Assistant Professor,

¹Computer Science Engineering,

¹Bhai Gurdas Institute of Engineering and Technology, Sangrur, India

Abstract—To improve the performance of a parallel and distributed network using load balancing i.e. redistribution of load among the processors is done. This paper presents a performance analysis of Round Robin load balancing technique which belongs to static load balancing. Results show the improved performance of the network by utilizing the proposed technique.

IndexTerms—Load balancing, Throughput, End to End Delay, CPU Utilization.(Keywords)

I. INTRODUCTION

The modern internet is a collection of interconnected networks of various systems that share resources. An ideal distributed system provides every node with equal responsibility, and nodes are similar in terms of resource and computational power. However in real world scenarios it is difficult to achieve it as such systems includes overhead of coordinating nodes, resulting in lower performance. Usually, distributed system consists of servers and clients and servers are more computational and resource powerful than clients. Typical examples of such systems are e-mail, instant messaging, e-commerce, etc.[1] Communications between two nodes happen through intermediate servers. Load balancing could be divided into two major categories: static load balancing algorithm and dynamic load balancing algorithm. Static Load Balancing: In a static load balancing algorithm while assigning tasks to the nodes it will not check the state and functionality of the node in previous tasks [1]. The process of assigning the tasks will be purely based on the system's prior knowledge on the properties and the capabilities of the node like processing power, storage capacity and memory availability. Even though the above listed properties of a node are considered before assigning a task they cannot adapt to the dynamic changes in the attributes and the allotted load on the node during runtime [2].

II. SERVER LOAD BALANCING

As its name indicates, server load balancing is load balancing of traffic among servers. The server load balancer is capable of determining that each server should not receive any new connections because the servers are offline and beyond the maximum allowed capacity respectively. The connections then are load-balanced using a simple round-robin algorithm so that each server receives an even load (or close to even load) of the incoming requests. The application that is being load-balanced may also require special treatment. Such as an e-commerce environment, the requirements might include these steps [5-6].

- All TCP connections to port from the same user should be sent to the same server.
- All subsequent connections to TCP port from the same user should be sent to the same server used for the previous port connections.

III. ROUND ROBIN TECHNIQUE

This is a static load balancing algorithm because before assigning a task to a node it will not take into account the previous state and functionality of that node[4]. To allocate the jobs the first node will be selected randomly and then the remaining nodes are allocated jobs in a round robin manner. This way of scheduling the load will create problems because while allocating the jobs one node may be heavily loaded and one may be lightly loaded irrespective of their capacity. To solve this inequality in load distribution "weighted round robin algorithm was proposed" in this algorithm every node will be assigned weights respective of their capacity then according to that measure the load will be assigned to the nodes [5]. Even though the load is distributed equally it is not possible to predict the execution time of a process. So, this algorithm is not suitable for efficient load balancing.

IV. SIMULATION AND RESULTS

1. **Figure 1** Network is simulated using OPNET® Modeler. It is an extensive and powerful simulation software tool with wide variety of capabilities. Networks is designed for the simulating the model and configuration statistics are applied on the whole model separately and the with regard to each individual scenario. Simulation is executed multiple times to obtain accurate results describe in each scenario. Figure 1 show the developed scenario for implementing the Round Robin technique for load balancing.

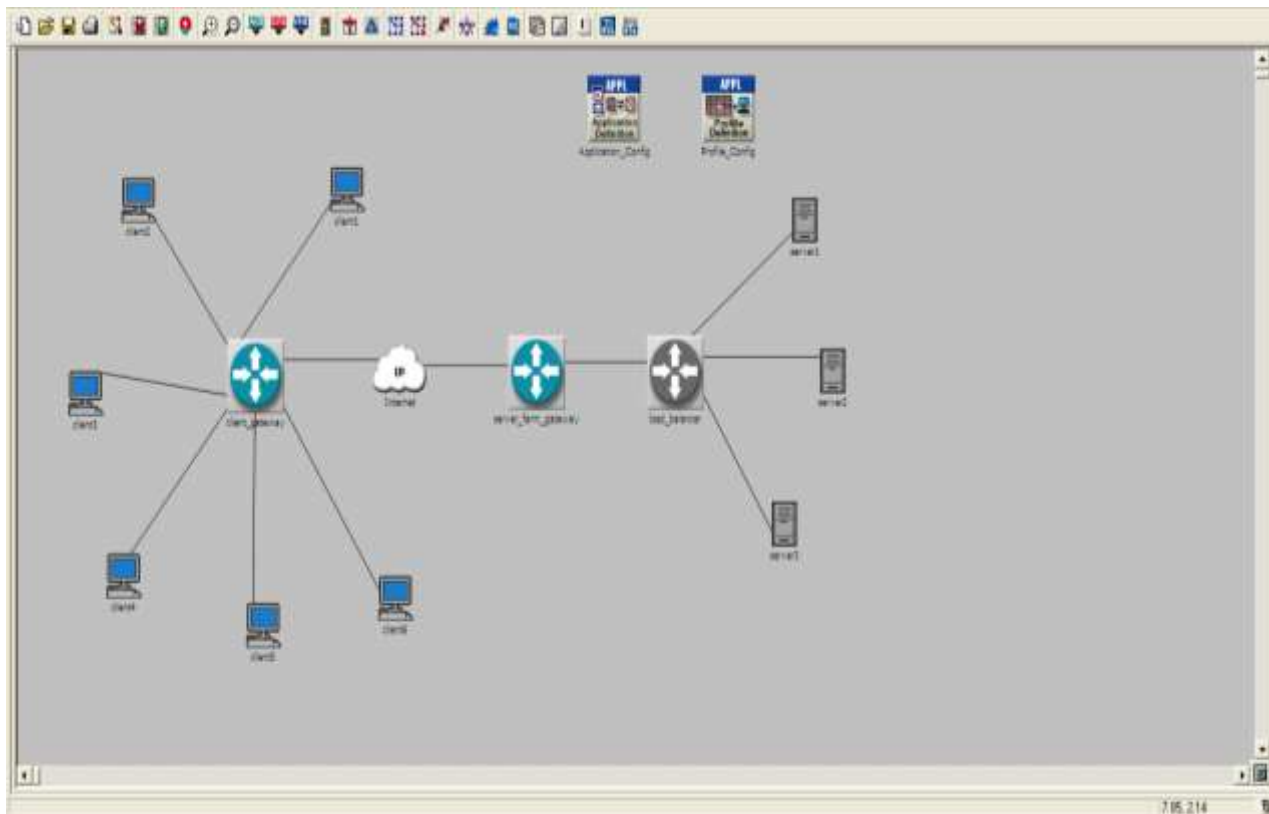


Fig. 1 Scenario developed to implement Load Balancer using Round Robin Technique

2. **Figure 2** CPU utilization is the proportion of the total existing processor cycles that are consumed by each process. If it's just computing some long-winded calculation, then what you are seeing is normal: the OS is dividing the available 100% of computing resources fairly between the processes that are asking for it. 99% means it just crunching numbers all the time without waiting. It's quite normal and actually sometimes that's what you want. The less it waits - the faster it will calculate the result.

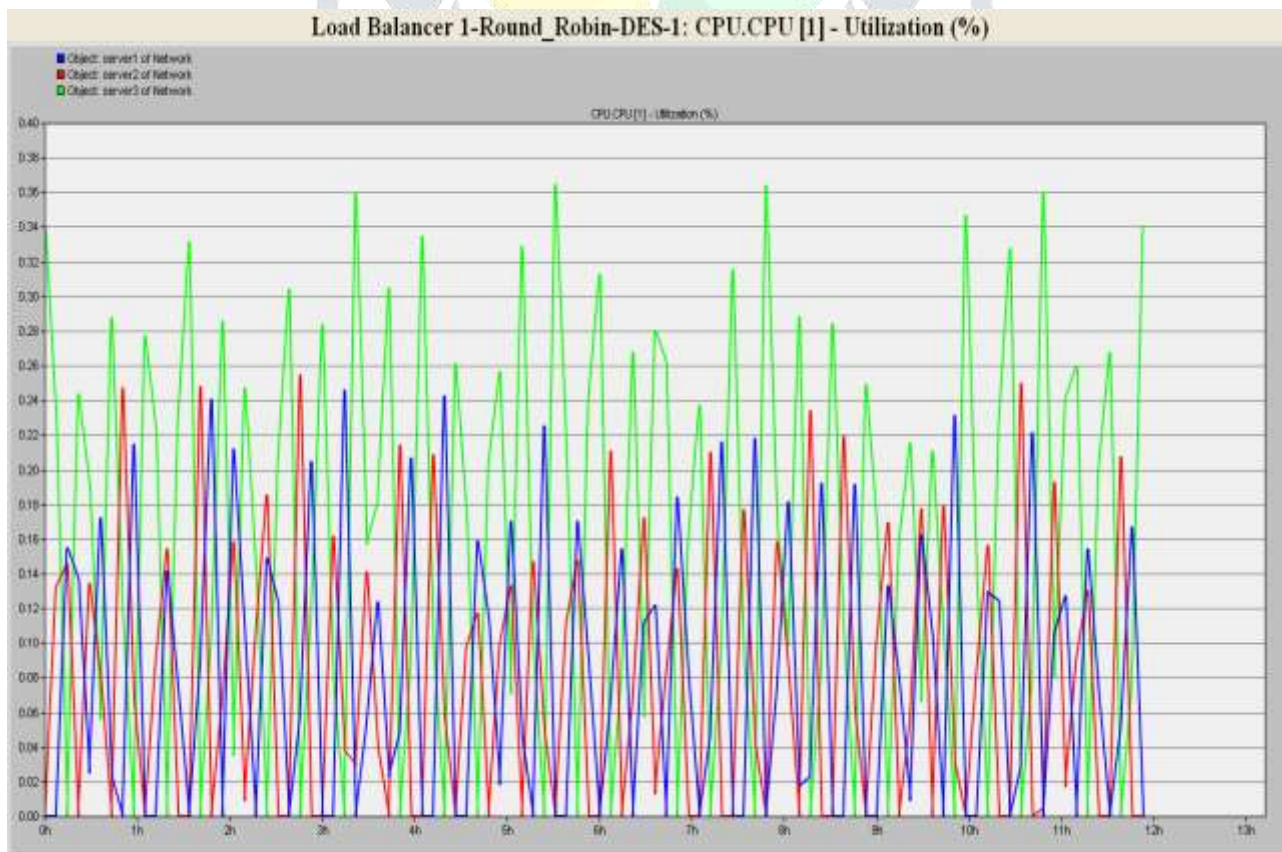


Fig. 2 Results Obtained for CPU Utilization for different Servers

3. **Figure 3** End to End delay is represented in milliseconds (or seconds). It depends on physical medium and associated propagation time and intermediate devices such as routers switches etc.

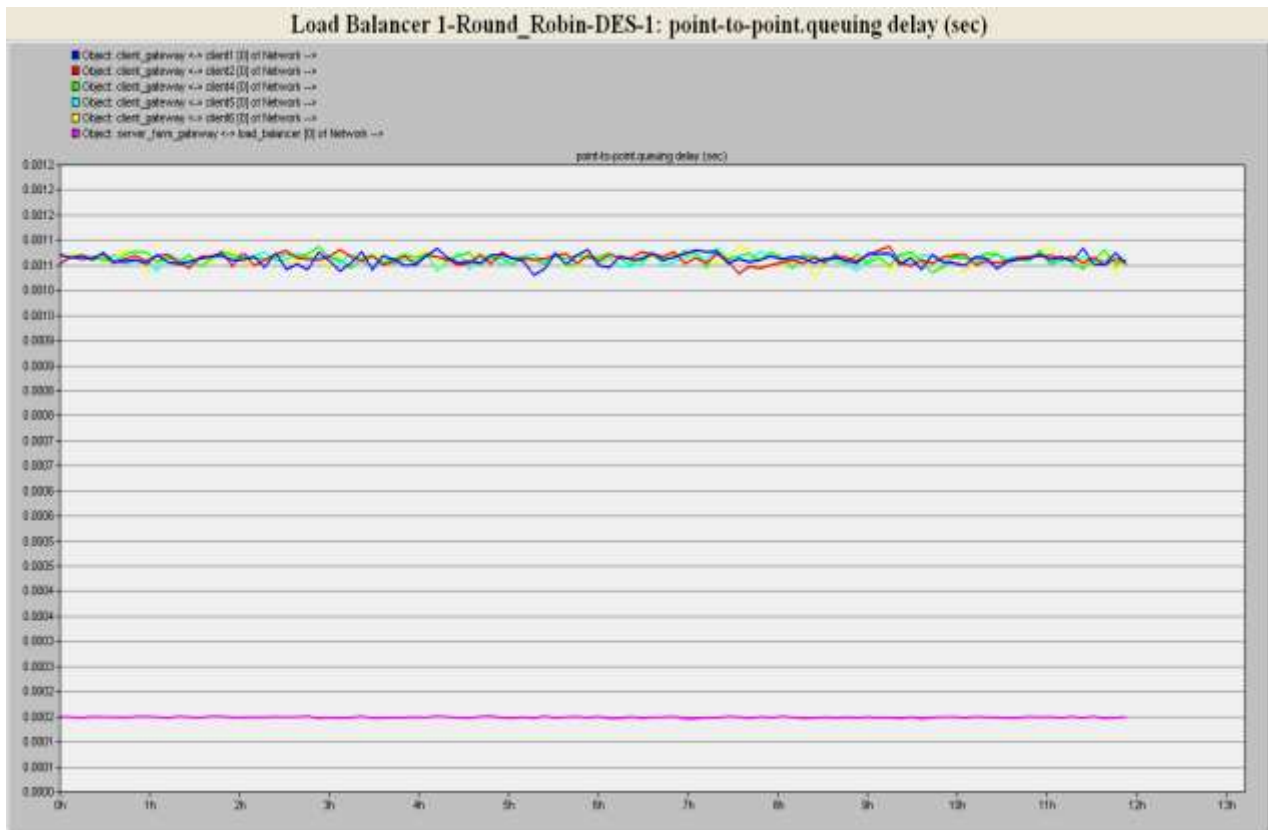
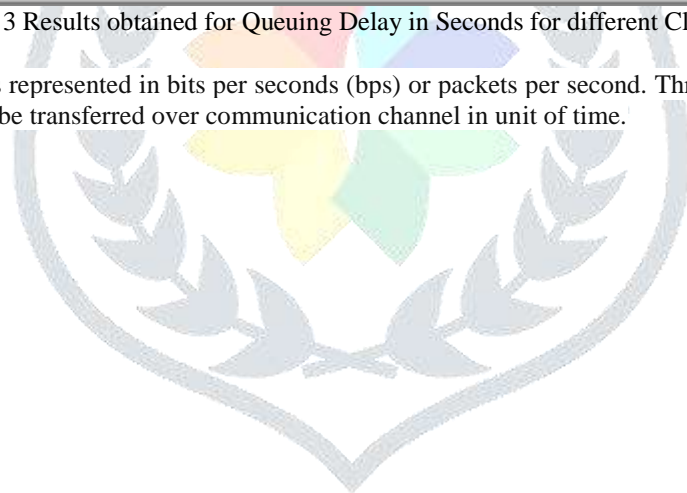


Fig. 3 Results obtained for Queuing Delay in Seconds for different Clients

4. **Figure 4** Throughput is represented in bits per seconds (bps) or packets per second. Throughput is defined as number of bits or packets that can be transferred over communication channel in unit of time.



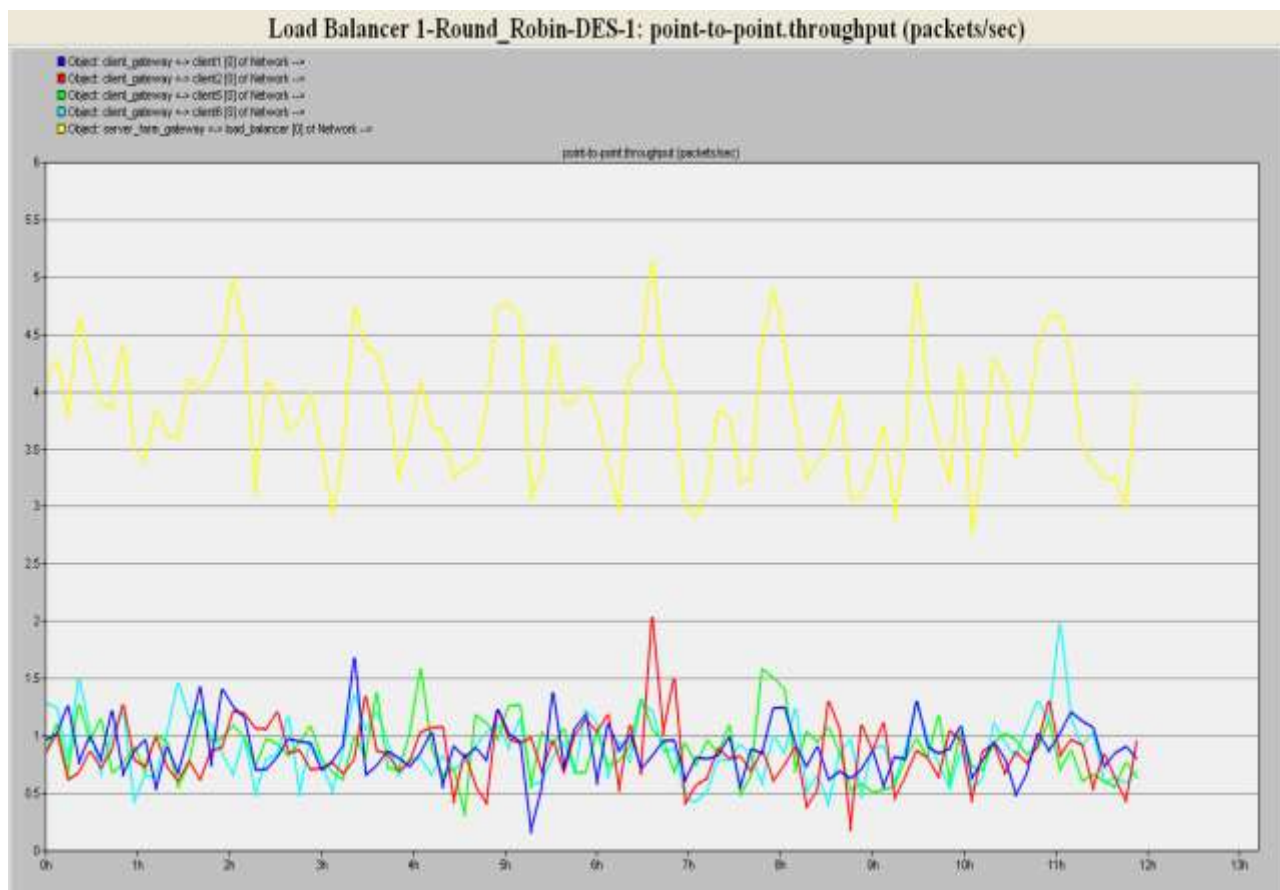


Fig. 4 Results obtained for throughput in packets per second for different clients.

V. ACKNOWLEDGMENT

This research examines the network load for with and without Load Balancer. In this study we have build a model of browsing operation for a HTTP and downloading for FTP application. Our analysis reveals that load balancer is useful to increase the performance of network as well as the efficiency of the network is improved. Different QOS parameters have such as end to end delay, throughput, and CPU utilization has been improved by using Round Robin load balancing technique.

REFERENCES

- [1] [1] V Krishna Reddy, Srikanth Reddy. A Survey of Various Task Scheduling Algorithms in Cloud Computing. i-manager's Journal on Computer Science (JCOM). 1(1). 2013.
- [2] [2] DivyaChaudhary, Rajender Singh Chhillar. A New Load Balancing Technique for Virtual Machine Cloud Computing Environment. International Journal of Computer Applications. 69(23): 0975 – 8887. 2013.
- [3] [3] YogeshChauhanand Shilpa Chauhan in “Performance Comparison of Server Load Distribution with FTP and HTTP”, International Journal of Computer Applications (0975 – 8887) Volume 57– No.3, November 2012.
- [4] [4] Dr. Mustafa ElGili Mustafa in “ Load Balancing Algorithms Round-Robin (RR), Least-Connection, And Least Loaded Efficiency”, GESJ: Computer Science and Telecommunications No.1(51) 2017.
- [5] [5] AdapaChandrakala, Gangu Dharma Raju& K S N Murthy in “Computer Network: Designing And Replication Of Load Balancing”, International Journal of Engineering, Science and Mathematics Vol. 6 Issue 8, (Special Issue) ISSN: 2320-0294, December 2017.
- [6] Kang Lu and Ting Xing in “A Cognitive Network Based Adaptive Load Balancing Algorithm For Emerging Technology Applications”, International Journal of Computer Science and Applications, Technomathematics Research Foundation Vol. 13, No. 1, pp. 31 – 41, 2016.