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Computer Network Performance Evaluation based on Datarate and Number of Clients PerServer using OMNeT++ Simulation Environment

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Received: 9 December 2013 Accepted: 4 January 2014 Published: 15 January 2014

Abstract

We present the performance of Computer network using OMNeT++ network simulation framework and Nclient application module from INET framework for our experiment. Present paper is the study of how datarate in affecting the performance of Computer Network. Main aim of the study is to find out the best configuration network setup to get optimum Network throughput. The performance of the Network is measured in terms of throughput.

Index terms— OMNeT++, throughput, datarate, server, clients, network, simulation, performance evaluation.

1 Introduction

Year 2014 E omputer Networks have changed the human life at home and offices too. Innovations and improvements in the domain as well as related areas make various things possible which were never thought of the reality. Computer Networks make it all possible. As different network setups and different configurations are used by the organizations to make their networks functional. With the help of the study carried out in the current paper it is tested that what would be the best Network configuration to set up the efficient and effective network in the organization. The performance of the various Network configurations is measured using simulation environment. We preferred OMNeT++ (Objective Modular Network Testbed) object oriented modular discrete event network simulation framework with INET framework. There are two reasons why we proceed with this framework those are OMNeT++ is specifically suitable for modeling and simulation of discrete event approaches and another is OMNeT++ conveniently mapped into entities communicating by exchanges of messages. INET consists of several simulation application models. We use Nclients network application with basic HTTP network setup from INET to carry out our experiments. It consists of client server environment with variable number of clients.

2 C

Index Terms: OMNeT++, throughput, datarate, server, clients, network, simulation, performance evaluation.

-Author ?: Reader & Director,School of Computational Sciences, SRTMU, Nanded India. e-mail: s_khamitkar@yahoo.com managing the parallel connections can lead to significant performance gains.

Esma Yildirim -Tevfik Kosar in their Research Paper titled "End-to-End Data-Flow Parallelism for Throughput Optimization in High-Speed Networks" published in Journal of Grid Computing (2012) 10:395-418 proved that the end-to-end transfer throughput in high-speed networks could be improved dramatically by using data parallelism that takes into account the endsystem capacities such as the cpu load, disk access speed and NIC capacity over the nodes.

3 Research Methodology

We are using Simulation environment with OMNeT++ framework to carry out our experiment. We To measure the performance of the present network we use thruputMeter modules. This module is placed between TCP and TCPApp layer. We required two modules to collect result for incoming and outgoing traffic to the server. Our client and server are the StandardHost modules provided in the INET. We have modified the StandardHost with thruputMeter and modified structure of standardHost along with thruputMeter is show in figure 2 below. The result of the experiment is collected in excel file from the default .ans file. .ans file in OMNeT++ gives two types of results vector and scalar. Vector results are recording of time series data and scalar results are supposed to record a single value per simulation run. We have considered scalar result as avg. thruput for our analysis purpose, Throughput of both thruputMeter i.e. thruputFrom & thruputTo related to the server.

4 Result Analysis

Throughput values of the simulation experiment is collected in excel file. We have collected results at 10, 20, 30, 40, 50, 60, 70, 80, 90, 100 Mbps with 10, 20, 30?.?130, 140, 150 clients per server. Our result shows that throughput values for the server and to the server both maximum and minimum are at 10Mbps. Maximum throughput value form the server is 7074.765479 bps (bits per second) at 10Mbps with 150 clients on a server while minimum throughput value from the server is 642.7703018 bps at 10Mbps with 10 clients on a server. Throughput value to the server is maximum at 10Mbps with 130 clients on a server and the value is 1394.613963 bps while minimum value is 108.6925672 bps which is at 10Mbps with 10 clients on a server.

5 a) At Constant Datarate

We analyze the trend of throughput from the server by keeping datarate constant and changing the number of clients from 10 number of clients to 150 clients per server with the interval of 10 clients.

By analyzing the results of the experiments we can understand that average throughput from the server is increases with increase in the number of clients from 10 number of clients till 110 number of clients per server, it falls with 120 number of clients on a server. For remaining number of clients i.e 130, 140 and 150 number of clients on a server the throughput form the server is increases from 120clients to 130clients and it will be same for 150clients but shows down trend at 140clients. This trend of throughput from the server is same for all the datarate i.e. from 10Mbps to 100Mbps. Experimental readings shows that the highest throughput value from the server is with 150 clients on a server, it means at specific datarate if we increase the number of clients it will give the highest value at the maximum number of clients but at 100Mbps the highest throughput value is with 130 clients on a server. By analyzing the experimental readings for throughput to the server we came to know that throughput to the server is increasing with increase in the number of clients on a server at specific datarate. Maximum throughput to the server at each datarate interval withing the range of 10Mbps to 100Mbps is given with the 130 number of clients. iii. With 100 number of clients on a server we got maximum throughput from server at lowest datarate i.e. at 10Mbps and for remaining datarates it shows same level of throughput which is less than 10Mbps readings. iv. Throughput from server with number of clients 110 on a server shows lowest throughput value at 10Mbps it will increase bit more with 20Mbps and remain same at 30 and 40Mbps, for next interval i.e. at 50Mbps it increase more and remain same till last datarate interval i.e. at 100Mbps. v. Throughput from server for number of clients 120 on server shows the same level of throughput pattern at 10Mbps,20Mbps & 30Mbps at 40Mbps it show increase in the throughput and remain same for next interval reading from 50Mbps to 100Mbps. vi. Throughput from the server with 130 number of clients on a server gives maximum throughput value at 10Mbps & lowest at 20Mbps; bit increase is there at 30Mbps and remains same like the reading at 30Mbps for rest datarate intervals.

6 Conclusion

Analysis of the result shows that the performance of the network evaluated through throughput of the server shows that maximum © 2014 Global Journals Inc. (US) viii.

throughput from the server is with 150 clients on a server at 10Mbps datarate and minimum throughput is at 10Mbps with 10 number of clients. Through put value to the server is maximum at 10Mbps with number of clients 130 while minimum throughput is at 10Mbps with 10number of clients on a server. Throughput results from the server and to the server are varying on the basis of datarate changes and on the basis of network load interms of number of clients on the server. Year 2014 [1]

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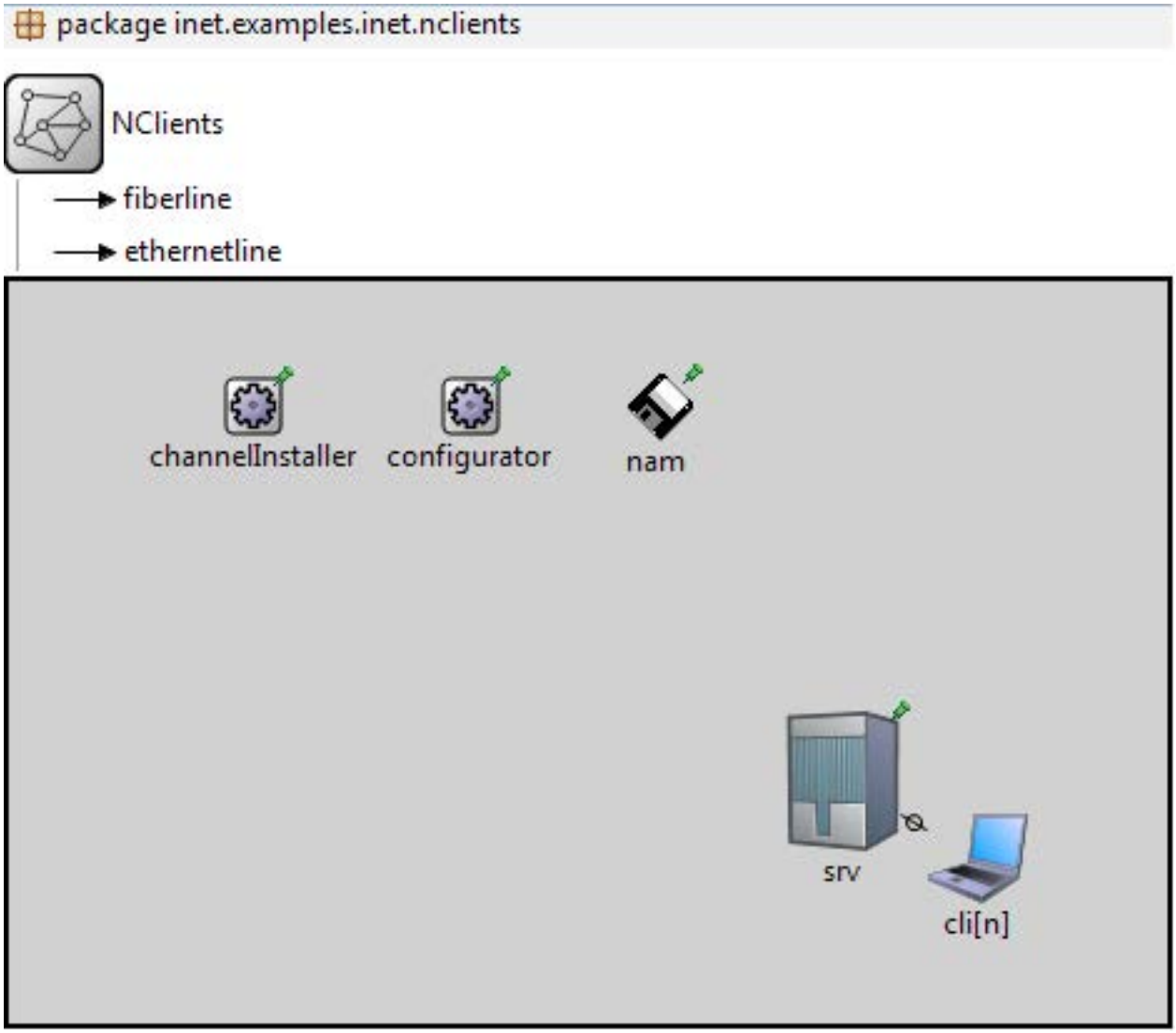
Figure 1: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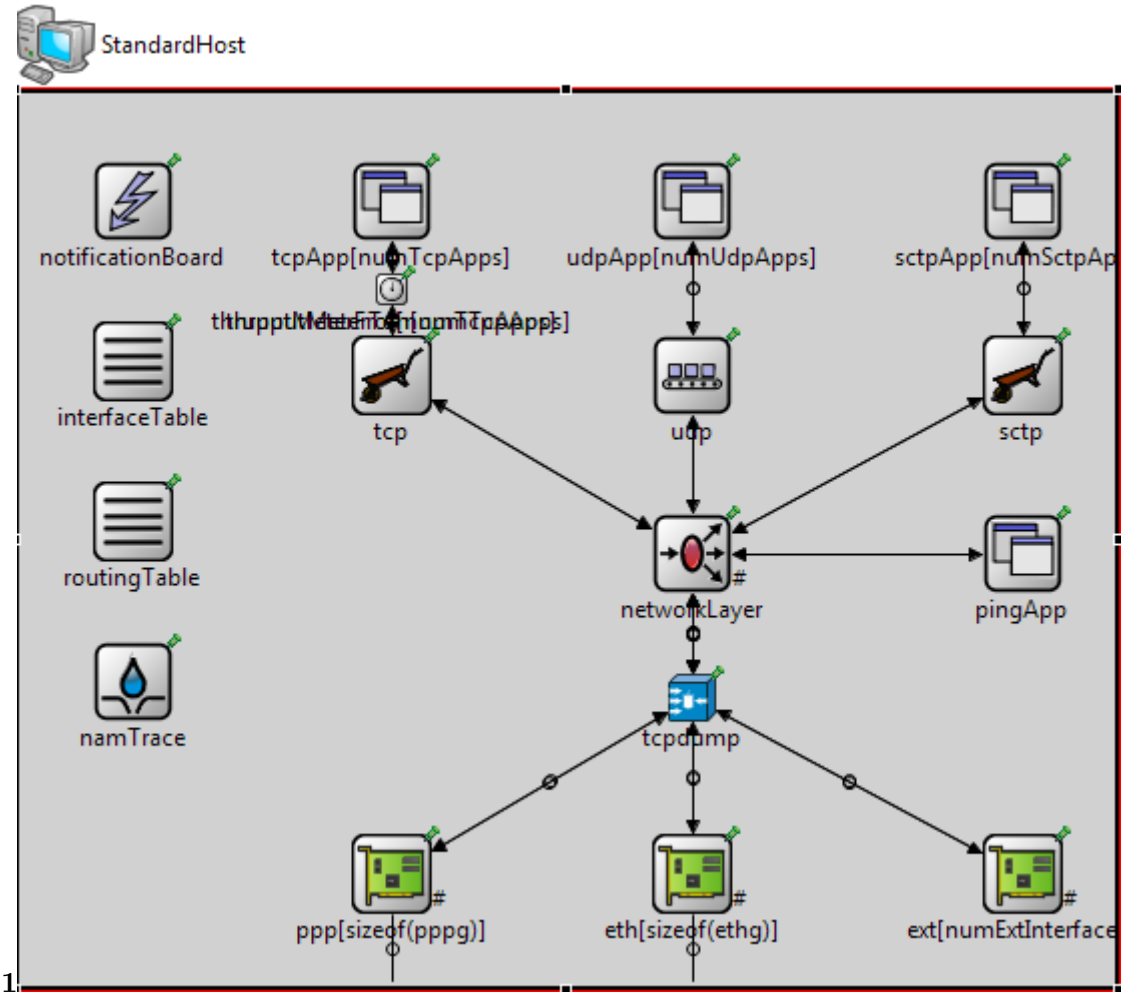

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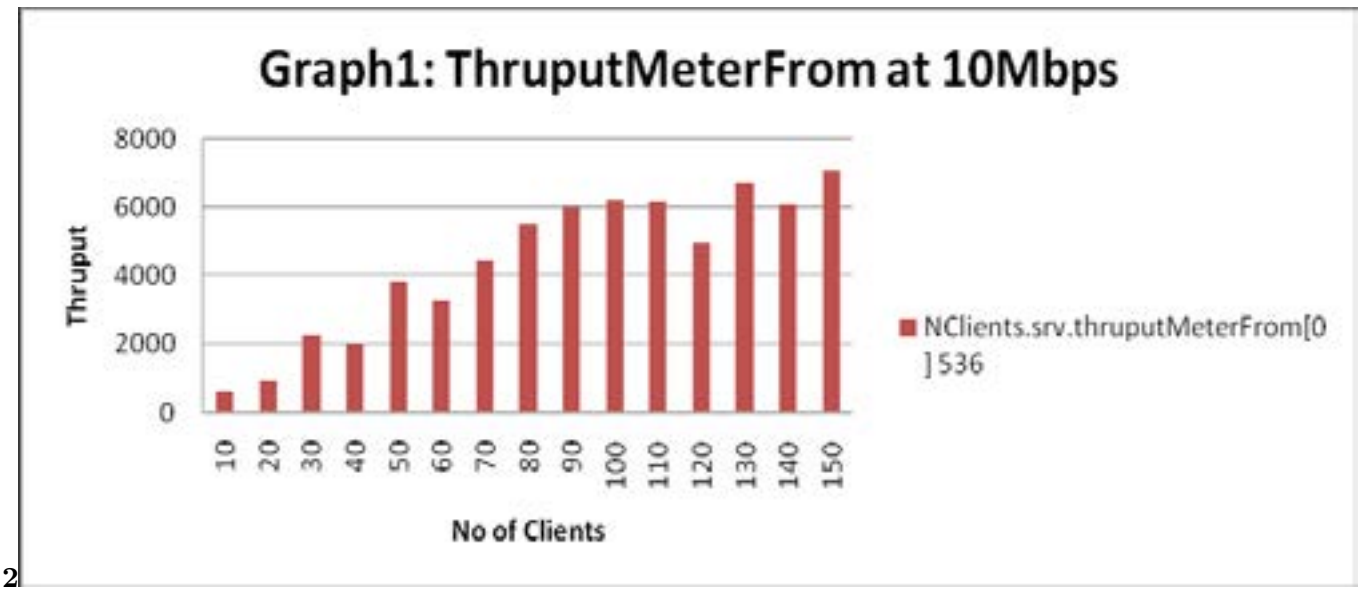

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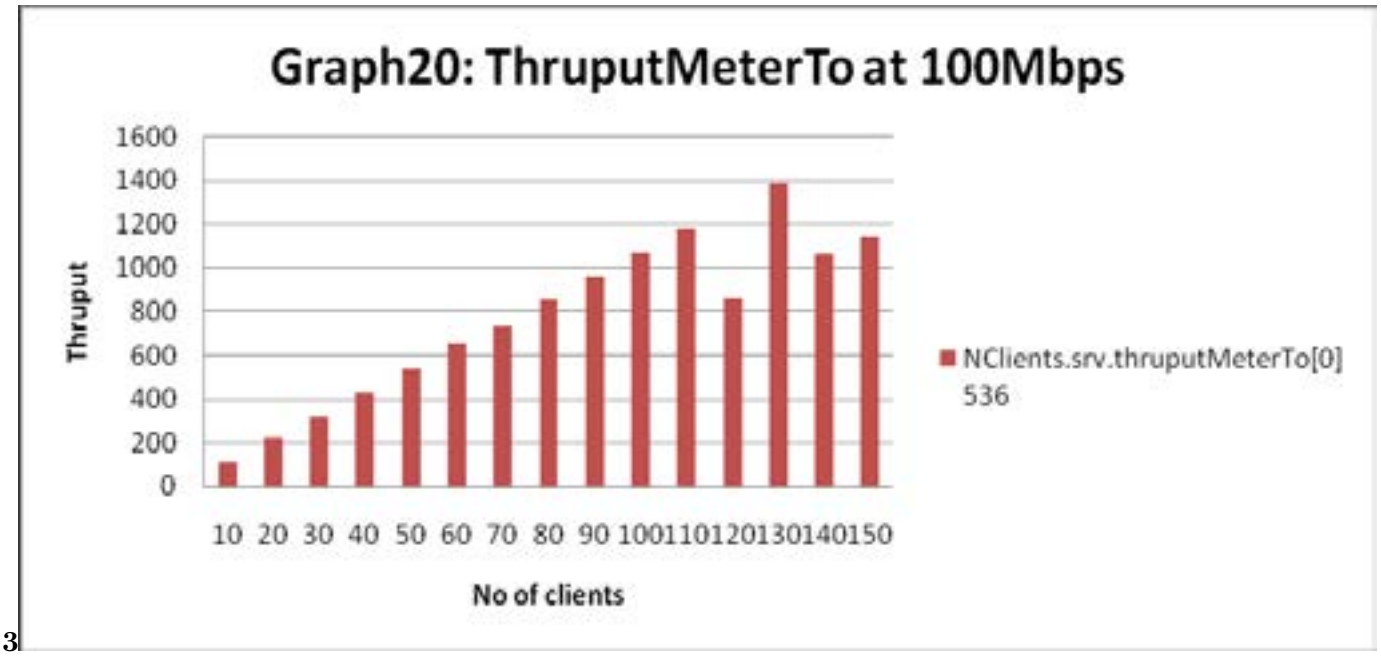

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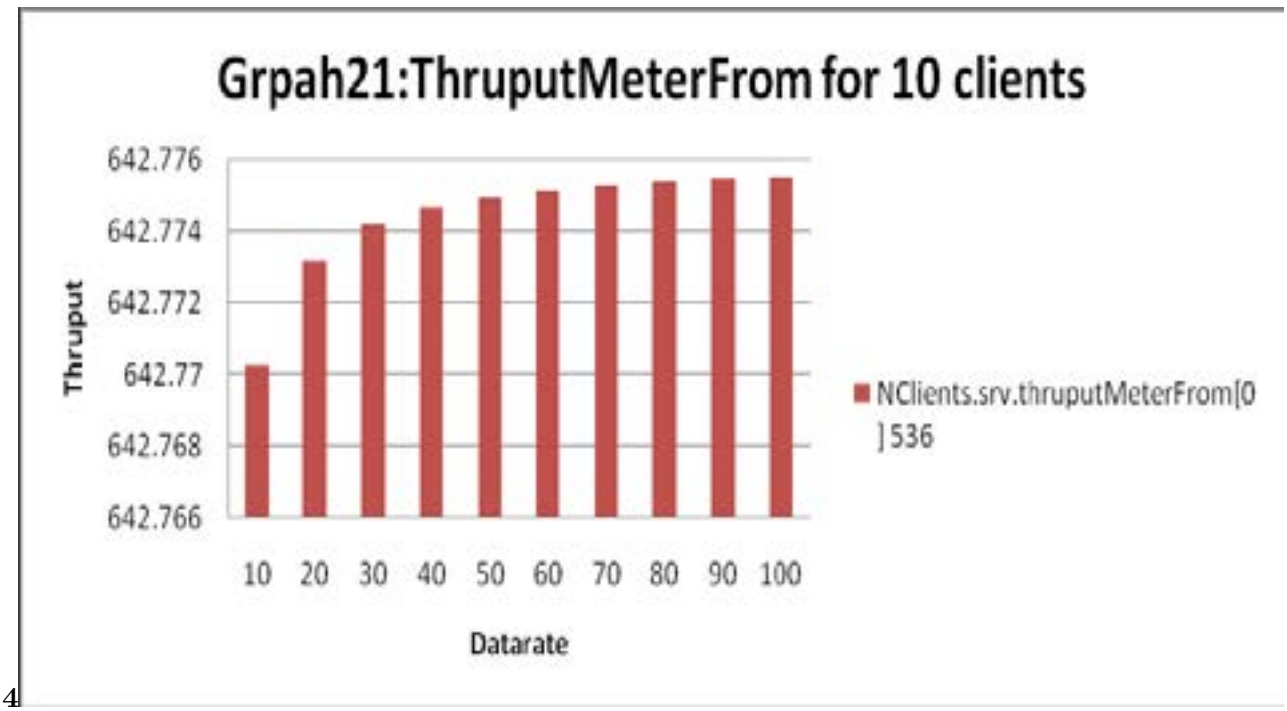

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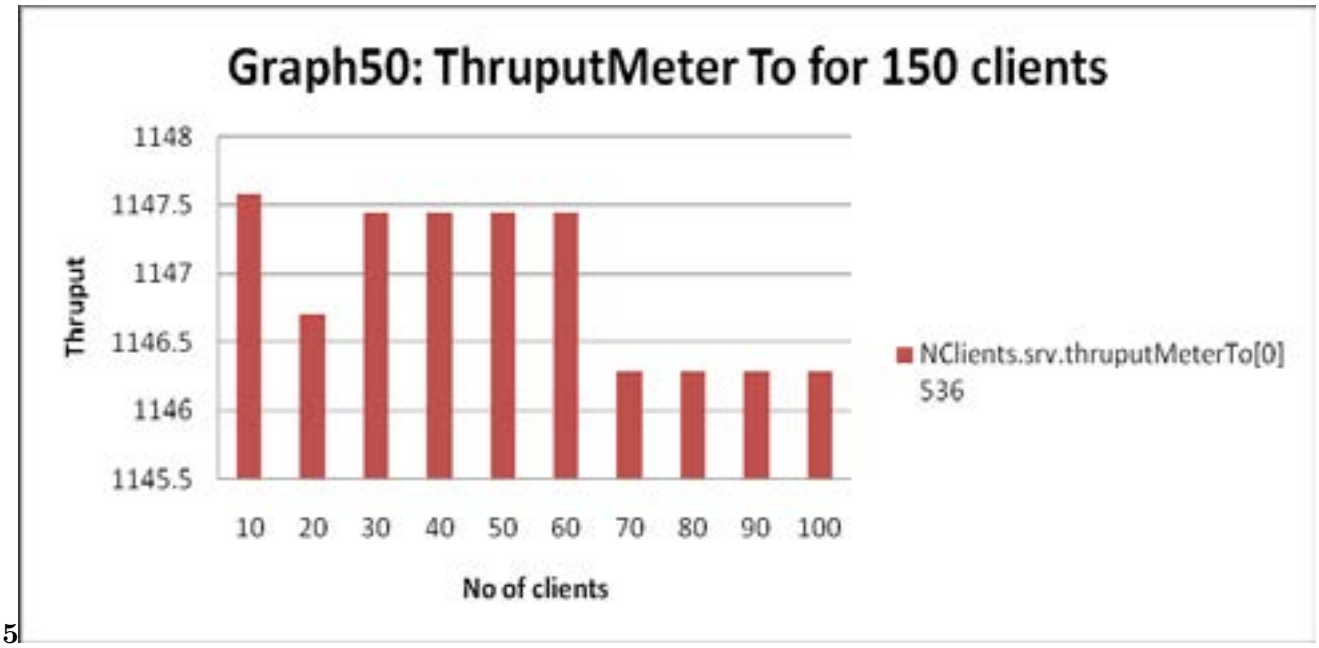

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Figure 7: Figure 5 :

.1 Acknowledgment

We are thankful to all the staff of School of Computational Sciences, SRTMU, Nanded for providing us the necessary guidance and facility to carry out present research.

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