

Dynamic Server Provisioning Approach with Dynamic Content Application Server on Multitier Cluster over Heterogeneous Network

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Abstract - In Real-time application on the internet requires reliability and Quality-of-Service(QoS) on the network, but when the network grows then it is difficult to maintain reliability and Quality-of-Service just like the number of clients increases on the single tier cluster then the response time of server to client also increases which decreases the performance metrics of the network. So in this scenario provides challenges as maintaining performance metrics while increase in load on the server which provides us maintaining QoS in the network. For this problem we propose a model which is based on fuzzy controller which includes Fuzzification and Defuzzification in which we reduces the number of server by placing the multiple application server in multitier architecture so that performance metrics will be bounded to the particular network. And hence we propose dynamic server provisioning approach on multitier cluster with heterogeneous network.

Keywords – fuzzification, performance metrics, Quality-of-services, Reliability, Server Provisioning.

I. INTRODUCTION

A computer network is a collection of computers and other hardware components interconnected by communication channels that allow sharing of resources and information. In network process on client/server is able to send/receive data to/from in client/server which is remotely available over heterogeneous network. Computer interconnected through a communication medium for information interchange is called a computer network.

In E-commerce applications which are working on multitier that is web server, application server, and Database server, In which we have to utilise the resources and maintaining performance of server. Dynamic virtual resource allocation is the one of the critical problem to provide a quality of service to client this problem is mentioned in context of single tier servers of E-commerce application [3].

Dynamic server provisioning is a set of actions to prepare a server for appropriate actions required for data and software to utilize resources properly for network services which are required to serve the client [1].

Typical operations when provisioning a server are: select a server from a pool of available application servers, load, customize and configure the system and then change its parameters, Such as IP address to find heterogeneous

network and database resources to audit the performance of system. Server provisioning configures servers based on resource requirements. The use of a hardware or software component depends on the functionality of the server, such as ISP, VoIP, and Virtual Network.

II. PROBLEM DEFINITION

As the dynamic environment on internet application is increasing rapidly, so that it is also generating some issues related to the performance of the network. So that it is necessary to improve performance of network by providing end-to-end response time guarantee for dynamic response generated in multitier architecture [4].

To provide quality of service to the end user in multitier architecture we have to control its delay of response generated by each application server on each tier so that performance of network will be increased [5].

And another factor to improve quality of service to the end user by replacing queuing model-dependent approaches so that performance which is based on aggregation operation shall not be considered which is not effective to provide percentile based end to end response time guarantee in multitier architecture. Following are the problem observed while implementing system over the heterogeneous network.

- 1) Difficult to maintain server provisioning over heterogeneity network.
- 2) Difficult to maintain scalability and reliability over heterogeneous network.
- 3) While achieving QoS, which is also, depend on the different capabilities in terms of bandwidth, delay and forwarding capabilities.
- 4) QoS must be maintaining while provisioning to large no. of client.

III. CONTRIBUTIONS OF THIS PAPER

In this paper we paper we are showing the implementation efficient server provisioning approach based on the end-to-end resource allocation over heterogeneous network.

We design a system for server provisioning approach on heterogeneous network while maintaining scalability and reliability over network. And to minimize the no. of virtual servers for maintaining average response time.

IV. SYSTEM MODEL

To provide a server provisioning we have to describe a model which is based on fuzzy system. Fuzzy system can be used as optimization model as follows:

A. SELF-LEARNING FUZZY CONTROLLER

The block diagram of proposed self-learning fuzzy controller system is shown in figure.

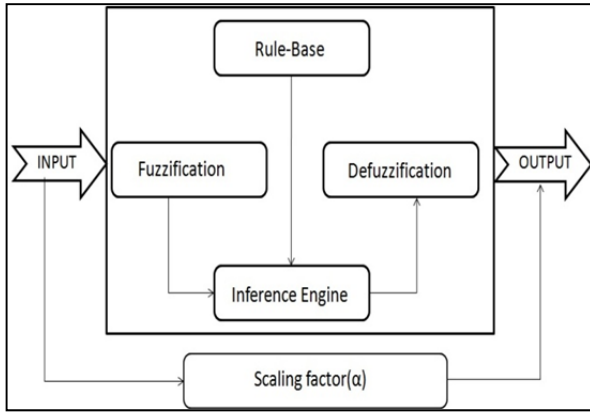


Fig. 1 Self- Learning Fuzzy Controller

The output of fuzzy controller is modified according to self-learning mechanism which is given as scaling factor controller (α). Fuzzy controller finds and reduces no. of servers to be allocated to each tier over heterogeneous network [7].

Algorithm:

- 1) Declare the linguistic variables and terms.
- 2) Construct a membership functions.
- 3) Construct a Rule-base.
- 4) Convert input data to fuzzy values using membership function (fuzzification).
- 5) Apply the rule base using inference engine.
- 6) Convert the output data to non-fuzzy values (Defuzzification).

B. SYSTEM ARCHITECTURE

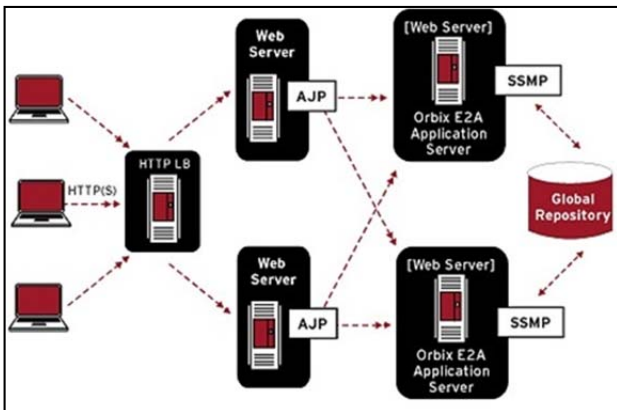


Fig. 2 System Architecture

V. EXPERIMENTAL EVALUATION

In this section we present the experimental setup followed by the results of our experimental evaluation.

A. EXPERIMENTAL SETUP

The control plane and servers is run on a dual core-processor 1GHZ machine with 1GB RAM. In this application we used 3-tier versions of server. The front tier and middle tier is java servlets that implements web server and application server logic respectively. Finally database server is based on the MySQL server 5.6.1 database.

B. EXPERIMENTAL RESULT

Total response time is calculated as the addition of web server (main), application server and database server at each tier in multitier cluster.

Request/Reply Parameters used for experimental result are as follows:

- a) Average Throughput
- b) Average round trip time(RTT)
- c) Average size of file.

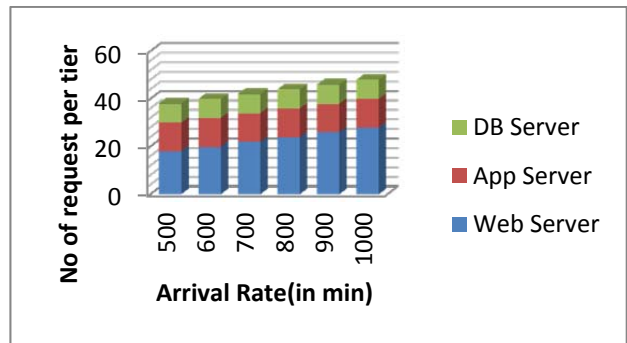


Fig. 3 Server allocation by 10%-50%-40% approach

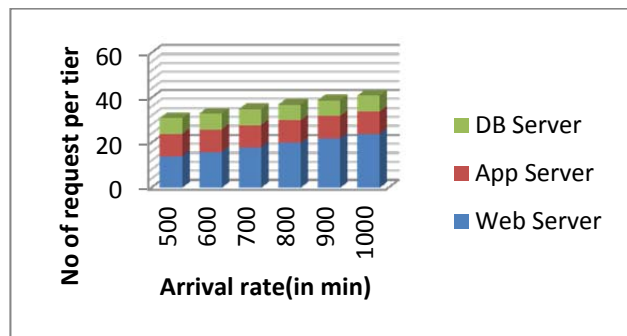


Fig. 4 Server allocation by balanced approach

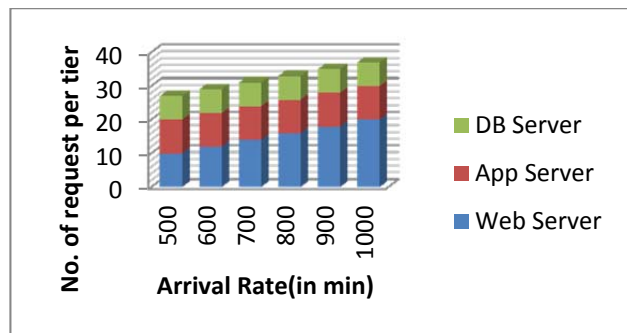


Fig. 5 Server allocation by Optimization approach

Client	Total Response(sec)	Total Response(sec)
C1	20	25
C2	22	29
C3	22	36
C4	26	40
C5	28	41
C6	30	43

Table 1: End- To-End Client Response Time

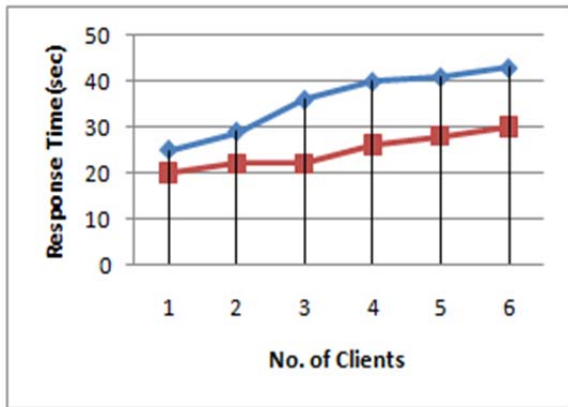


Fig. 6 Client End-to-End Response Time

VI. CONCLUSION

We are able to significantly reduce the no. of server allocated over heterogonous network on multitier architecture. And efficiently able to control reliability and scalability over network for long term processes. And also able to reduce End-to-End response time in multitier architecture over heterogeneous network. Scaling factor plays an important role to reduce end-to-end response time for client on multitier architecture. This application is able to handle large no. of client request over multitier architecture.

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