VOL. 10, NO. 10, JUNE 2015 ISSN 1819-6608
ARPN Journal of Engineering and Applied Sciences

www.arpnjournals.com

MULTI-TIER LOAD BALANCING IN PERVASIVE COMPUTING USING POWER MANAGING APPROACH

R. Vasanthi[1] and R. Prakash[2]
[1]Idhaya Engineering College for Women, Chinnasalem, India
[2]Vivekanada College of Engineering for Women, Trichengode, India
E-Mail: vasanti_me@yahoo.co.in

ABSTRACT

With their growing popularity in the today web services are faced with the deal of handling thousands of users requests every second, each requiring very fast responses. Existing work controls power and application-level performance separately and thus cannot simultaneously provide multi-tier web services between the different tiers. The present work fails to define the cost function over the time interval. Providing the solution for multi-tier web services, Hierarchy based Load Balancing Approach (HLBA) is used to model the association between the different tiers. Manage the cost function over the time interval using Power Managing Approach (PM) for overcoming the above issues. Performance of Hierarchy based Load Balancing Approach with Power Management (HLBA- PM) provides a more satisfaction to the users for today's multi-tier dynamic web services. Hierarchy based Load Balancing Approach with Power Management considers the problem of cost function and correlations between the different type of multi- tier.

Keywords: multi-tier web services, hierarchy based load balancing, pervasive computing, power management, service delivery.

INTRODUCTION

The rising popularity of portable devices provides us a result of current technical developments of anytime and anywhere in the present world. They arrange themselves in arbitrary and temporary network topologies changeable with time as the nodes shift or regulate their broadcast and reception parameters. At any point of time, depending on the nodes' positions, their transmitter-receiver reporting patterns and broadcast power levels, a merely arbitrary wireless connection exists between the nodes which are active in nature.

A cluster-level control architecture [1] Co-Con (Co-Cordinated control) that coordinates individual power and performance control loops for virtualized server clusters. To emulate the current practice in data centers, the power control loop changes hardware power states with no regard to the application-level performance. The performance control loop is then designed for each virtual machine to achieve the desired performance even when the system model varies significantly due to the impact of power control.

With the wide spread accessibility of the Internet, online services like search engines, social networks, e-commerce are becoming increasingly popular. These services have to contract with thousands of user requests every second, each of which requires very short response times, naturally, of few seconds for information sharing. A recent article [2] conveys that people visit websites less often if their response time is 250 ms more than that of a participant. Such serious requirements for today's web services compel service providers to stipulation thousands of servers to switch the huge number of client requests, along with using multi - tier web services techniques to professionally multiplex the requests among the servers.

This give rise to the need of load balancing the requirements across several servers in the multi–tier web services to ensure minimum response time to sender. Load balancing is an important problem in the multi- tier web services. The problem of distributed load balancing for heterogeneous multi-tier web services are offer with a web service in which the servers are organized into multiple tiers, each of which communicates only with the one following to it. In addition, all the servers in any exacting tier need not be homogeneous by forwarding the request to one server in a tier. It may not be functionally the same as forwarding the request to another server. HLBA- PM Technique attempts to solve the distributed load balancing problem for today's multi-tier dynamic web services. Developing a distributed load balancing algorithms can perform efficiently in all environments with low time and communication complexity, and are simple to deploy.

LITERATURE REVIEW

The present state of the art in of pervasive computing at scale (PeCS) [5] and emerge ahead to future directions. Multi-hop wireless networks can present flexible network infrastructures at a low cost. Nevertheless, most existing wireless networking solutions are planned for delay-insensitive applications thus resulting in poor performance when conduct delay-sensitive applications. Asolution that enables the nodes to separately decide their routing and broadcast power to maximize the network utility, in a dynamic environment [3]. Moreover, we use reinforcement-learning to discover the optimized policy when the dynamics are unknown. A selective-relay based cooperative spectrum sensing scheme [4], which is talented to control and decrease the

interfering from cognitive reporting users to primary user devoid of the dedicated channel.

The decode-and-forward helpful cellular system with spatial random users is investigated [6]. Under a sensible channel model including path loss, surveillance and multi path fading, the users are chosen as relays depending on their instantaneous SNR so that error propagation caused by discovery errors at the relays can be mitigated. The web services by simulating the web services using a simulation tool [7]. Simulation of Multi-Tier Queuing Architecture identifies the bottle neck resources.

Service Level Agreements (SLAs) are used to promise quality of service (QoS) between customers and service providers. A stochastic modelling [8] of a multi-tier architecture considering SLA for specific transactions. The model is parameterized with available performance testing data for a real web service, and with a testing environment having random and unknown external workloads of simultaneous execution.

The capacity of a multi-tier Web application varies considerably as the pattern of requests in the workload changes. A black-box method for capacity prediction [9] that first identifies workload patterns for a multi-tier Web application from access logs using unsupervised machine learning and then, based on those patterns, builds a model competent of predicting the application's capacity for any specific workload pattern.

To reduce the load occurrence in the different tiers of web services with the minimal cost function, a new technique named Multi-tier Load balancing in Pervasive Computing using Power Managing approach is used.

MULTI-TIER LOAD BALANCING IN PERVASIVE COMPUTING USING POWER MANAGING APPROACH

The architecture Diagram of the multi-tier Web Services with load balancing approach is shown in Figure-1.

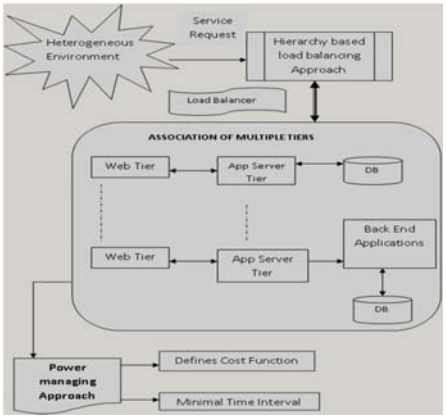

Figure-1. Architecture diagram of the Multi-tier Web Services with Load Balancing Approach.

Multi-tier Load Balancing Approach addresses the problem of distributed load balancing for the heterogeneous multi-tier web services. This problem can be portraying with a web service in which the servers are ordered into multiple tiers. Each of which communicates only with the one next to it. Additionally, all the servers in any meticulous tier of the multi-tier need not necessitate being homogeneous. Forwarding the request to one server in a tier may not be functionally the same as forwarding the request to another server. A load balancing algorithm which runs in a distributed manner is determined. This in turn imposes the constraint that our algorithm needs to efficiently utilize the server resources by minimizing (a) server inactive periods, and (b) contention at servers.

A finest centralized approach allocate the requests and converts the maximal response time to the minimal response time by processing the requests. Using simulation modules, the extended approaches with the finest scheduler are compared to model the multi-tier web services. Next intend is to develop a distributed multi-tier load balancing algorithm which can outperform the simpler conservatory. It strives to control the communication outline and request processing-time distributions typically for the multi-tier web services.

To determine the efficiency of Hierarchy based Load Balancing Approach algorithm comparison with all other approaches are done using situation response time and application throughput as the performance metrics.

HIERARCHY BASED LOAD BALANCING APPROACH

Hierarchy based Load Balancing Approach devise the problem in the circumstance of the heterogeneous multi-tier server architecture with processors as a front-end and data as back-end services.

Consider a multi-tier web service 'M' consisting of two sets of servers {F, B} where F denotes the set of all the front-end processing servers and B denotes the set of all the back-end data servers. Presume that each of these sets are partitioned into numerous subsets of servers called server cluster where

F=F1 F2 F3…. Fl

D=D1 D2 D3…. D k

Each server cluster consists of numerous servers which are functionally equivalent in the multi-tier web services. For a 'j' user request can be sent too much number of the servers in F j (B j). The deposits of servers are partitioned into different cluster of server group in order to represent the possible heterogeneity in server functionality of multiple-tier. Thus, a user request must be forwarded to every server cluster in each tier. Beside F and B, M consists of deposit of load balancers LB which receive the user requests. They are tasked with load balancing among server cluster in M.

We presume that the load balancing LB to each tier of the multi-tier web services is managed by multiple application server tiers. The servers of the multi-tier web services in LB are responsible for load balancing requests across servers in F. F are responsible for load balancing requests across servers in B. It is to be distinguished that a server in multi-tier is responsible to choose the next server only for the requests it receives.

Hierarchy LB Multi-Tier Algorithm

Input: Let A denote a multi-tier load balancing algorithm
Process: Hierarchy Hie-A working process
Step-1: Begin
Step-2: Suppose server 'SER' in multi-tier
Step-3: Send request by client tier
Step-4: SER process Fj requests
Step-5: Using 'A' Algorithm with Bj data tier
Step-6: Hierarchy based LB approach used
Step-7: Provide Hierarchy LB scheme in multi-tier
Step-8: End

Let A denote a multi-tier load balancing algorithm. The hierarchy LB model A, called Hie-A, works with a server 'SER'. The server receives a request in which server requests belong to LB or F j. Now, SER forward the request to every server cluster Yi (Y = F or B and j = 1 …. l or j = 1 ….. k, correspondingly). SER uses algorithm 'A' to select server where Yj request is to be forwarded to each j. The above description describes the hierarchy approach irrespective of which tier the server SER is in the multi-tier web services.

One of the problems linked with the load balancing approach in the multi-tier web services is that the servers are explored when a request arrives. This could lead to an enlargement in the response time of the request. To overcome this problem, a little enhancement is done to the load balancing approach by introducing the power managing model.

EXPERIMENTAL EVALUATION

The proposed Hierarchy based Load Balancing Approach with Power Management (HLBA- PM) Framework is implemented by using the Java platform. The proposed HLBA technique is efficiently designed for balancing the load in the multi-tier web servicing environment. The experiments were run on an Intel P-IV machine with 2 GB memory and 3 GHz dual processor CPU. The performance evaluation tests aimed at comparing the direct invocation of building API with interactions through Co-Con cluster level power control model and UCMCF. At set up, the HLBA-PM is analyzed and classified the associations of different types of tiers in the service environment. Watts, Stogatznewual network dataset, Lott-Bison Dominance dataset and Opportunity Activity Recognition Data Set are used in HLBA-PM model. Opportunity Activity Recognition Data Set is a multi-variate time series dataset for Human Activity Recognition from wearable, object, and ambient sensors are a devised to benchmark human activity recognition algorithms.

HLBA- PM efficiently analyzed the service requirements of the user and processed the service by discovering the users' needs in the multi-tier web services. After that, the suitable consistent service has been delivered to the user effectively. The proposed HLBA- PM contains two of operations such as the load balancing approach in the multi-tier web services and power managing approach in cloud environment to minimize the cost function over response time interval. The performance of the Hierarchy based Load Balancing Approach with Power Management (HLBA- PM) Model in pervasive computing is measured in terms of Cost Function ,Response Time and Multi-Tier Service Delivery Rate

RESULTS AND DISCUSSIONS

In this work, it is described that how efficiently multi-tier web services are modeled to associate the different tiers. The below Table and graph describes the performance of the Hierarchy based Load Balancing Approach with Power Management (HLBA- PM) Model in pervasive computing are compared with an Co-Con cluster level power control model and User Centric Middleware Component Framework (UCMCF).

The cost function is a function of input prices and output quantity of the power managing approach. It is evaluated across the time. The Table-1 describes the cost function generated based on the time by implementing Hierarchy based Load Balancing Approach with Power Management (HLBA- PM) Model are compared with Co-Con cluster level power control model and User Centric Middleware Component Framework (UCMCF).

Table-1. Time vs. cost function.

Time (s)	**Cost function**		
	Proposed HLBA- PM	**Co-Con method**	**UCMCF model**
600	2	10	22
1200	5	12	25
1800	6	15	28
2400	8	16	31
3000	12	19	35
3600	15	22	42
4200	18	23	53
4800	20	25	59
5400	21	28	66
6000	22	41	78

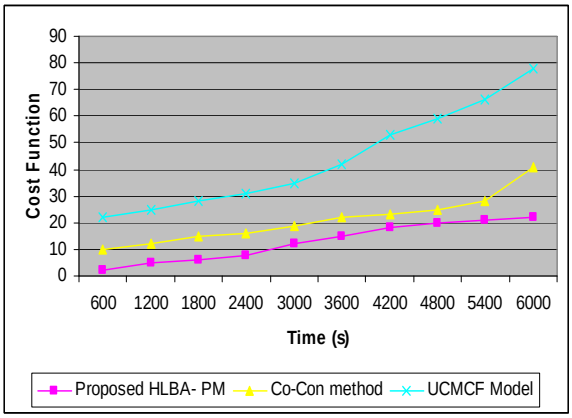

Figure-2. Time vs. cost function.

Figure-2 describes the cost function based on the time interval for performing the responses to the client from the server. The Power Management (PM) Model with cloud permit may use to minimize the cost function over the time interval. With the lesser cost function, this method achieves the better growth in providing the positive result. Hierarchy based Load Balancing Approach with Power Management (HLBA- PM) Model are compared with Co-Con cluster level power control model and User Centric Middleware Component Framework (UCMCF) for cost function and provides a variance of 30-40% low.

CONCLUSIONS

In this work, Hierarchy based Load Balancing Approach with Power Management (HLBA- PM) efficiently models the multi-tier web services associated with different tiers. Hierarchy based Load Balancing formulates the problem and provides algorithms using ideas existing distinct tier load balancing mechanisms. Provides the large-scale simulation results of these HLBA and cloud permit power managing model used to minimize the response time interval. Performance of Hierarchy based Load Balancing Approach with Power Management (HLBA- PM) provides a more satisfaction to the users for today's multi-tier dynamic web services which are measured in terms of multi- tier service delivery rate and response time. Standard data sets are taken from UCI repository to estimate the performance evaluation of the Hierarchy based Load Balancing Approach. Hierarchy based Load Balancing Approach with Power Management considers the problem of cost function and correlations between the different type of multi- tier. An analytical and empirical result outperforms 80 % well in HLBA-PM technique.

REFERENCES

[1] Xiaorui Wang.andYefu Wang. 2011. Coordinating Power Control and Performance Management for Virtualized Server Clusters. IEEE transactions on parallel and distributed systems. 22(2).

[2] Hwanyoung Jung. 2012. For impatient web user, an eye blink is just too long to wait,http://www.nytimes.com/2012/03/01/technology/impatient-webusers-flee-slow-loading-sites.html.

[3] Zhichu Lin and Mihaela van der Schaar. 2011. Autonomic and Distributed Joint Routing and Power Control for Delay-Sensitive Applications in Multi-Hop Wireless Networks. IEEE transactions on wireless communications. 10(1).

[4] YulongZou., Yu-Dong Yao and BaoyuZheng. 2011. A Selective-Relay Based Cooperative Spectrum Sensing Scheme without Dedicated Reporting Channels in Cognitive Radio Networks. IEEE transactions on wireless communications. 10(4).

[5] Diane J. Cook and Sajal K. Das. 2012. Pervasive Computing at Scale: Transforming the State of the Art. PeCS workshop.

[6] Hongzheng Wang., Shaodan Ma and Tung-Sang Ng. 2011. On Performance of Cooperative Communication Systems with Spatial Random Relays. IEEE Transactions on Communications. 59(4).

[7] Ch Ram Mohan Reddy, D EvangelinGeetha., KG Srinivasa., T V Suresh Kumar and K RajaniKanth. 2011. EARLY PERFORMANCE PREDICTION OF WEB SERVICES. International Journal on Web Service Computing (IJWSC). 2(3).

[8] Ricardo M. Czekster., Paulo Fernandes., Afonso Sales., Thais Webber and Avelino F. Zorzo. 2011. Stochastic model for QoS assessment in multi-tier web services. Elsevier Journal.

[9] Waheed Iqbal., Matthew N. Dailey and David Carrera. 2011. Black-Box Approach to Capacity Identification for Multi-Tier Applications Hosted on Virtualized Platforms. International Conference on Cloud and Service Computing.