iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 6 **Issue:** IV **Month of publication:** April 2018

DOI: http://doi.org/10.22214/ijraset.2018.4460

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 6 Issue IV, April 2018- Available at www.ijraset.com

Intelligence VM Allocation and Selection Policy based on Local Linear Regression (LR)

Shiva Aggarwal[1], Ms Bharti Chhabra[2], Dr. Amit Verma
[1]*M.Tech. Student, Computer Science Department, Chandigarh Engineering College, Landran, Mohali, India*
[2]*Assistant Professor, Computer Science Department Chandigarh Engineering College, Landran, Mohali, India*
[3]*Professor & Head, Computer Science Department Chandigarh Engineering College, Landran, Mohali, India*

Abstract: ***For Task assigning, we consider virtual machines as the resources or assets. Task assigning is done only if a client ask for and inward framework information call and inquiries. It turns into a difficult job when plenty of tasks are requested from users in cloud. Scheduling of resources can be arranged by more number of assignments in less time, critical job first, resources at low price or mixture of these three.. The existing model does not incorporates the concept of the task group aggregation (also known as task clustering) to segregate the tasks on the basis of their dependency. The dependent tasks can be grouped altogether to prepare the task chains which are scheduled sequentially, and in the parallel processing manner with other task groups belonging to the one task batch. In such way, the unnecessary burden can be reduced from the machines lying in the sleeping state to minimize the complexity of scheduling for processing of target task group (or cluster). In this paper, we have worked after tackling the issue of preparing the most extreme number of tasks consistently, which can upgrade the client fulfillment. Likewise the proposed demonstrate is gone for allocating the assets (VMs) with slightest resource load and decline rate for the errand pool. The virtual machine with most reduced probable load and least decline rate will convey high possibility to lowers the general time of task and to process it effectively that will likewise limits the measure of assignments in the waiting list. The proposed strategy comes about has been compared with the current models based on grouping method., which is coupled with the working time prediction in order to enable the parallel scheduling of the dependent and independent workflows. The proposed demonstrate comes about have turned out to be efficient in comparison with the current models for the cloud task processing. When the results are obtained, they are analyzed in term of Start time, Response time and Finish time. The results which are obtained after experimenting this model have also documented the efficiency of the system in task scheduling and task processing over the resources of cloud Many Users which have these services and are frequently using these services are generally using Cloud Computing. As indicated by a review of Trend Micro investigation numerous SMBs utilized these administrations however trusted that they were not utilizing any cloud administrations..***

Keywords: Dynamic Resource Allocation, VM allocation, VM selection, Job Assignment, Local Regression.

I. INTRODUCTION

A cloud foundation is the collection of programming and equipment assets that empowers all the fundamental qualities of the distributed computing. Cloud foundation contains physical layer and dynamic layer where the directing (Data spread) security techniques are combined. [25] The fundamental equipment assets are available in Physical layer which incorporates server, stockpiling and system parts. The abstraction layer incorporates the product sent over the physical which show the fundamental cloud attributes. Adroitly the abstraction layer is over the physical layer. Several authentication methods are utilized to create the secure cloud environment.

Despite the fact that the demand of distributed computing is expanding yet at the same time the huge amount of people doesn't have much comprehension of what the distributed computing is. This absence of learning or misconception help the myths or misguided judgment in regards to the usefulness of distributed computing. Indeed, even little and medium estimated organizations (SMBs) have different myths with respect to distributed computing some of them are talked about further:

1) *SMBs know they are utilizing the cloud*: SMBs believe that they will know when they are utilizing the cloud benefits however that is not the reality. Numerous SMBs doesn't even know that they are as of now utilizing cloud administrations for e.g. consider following:

a) E-message (Gmail, yahoo etc)

b) Websites (outside or inward gateways)
c) Online Networking Sites (face book, twitter etc)
d) Online profitability devices (office 365, Google applications)
e) Online stockpiling and reinforcement administrations (Drop box, Google drive and so forth)

2) *Paying for cloud administrations is more higher than purchasing equipment and programming:* Many still feel that paying for cloud administrations is costly than real purchasing the IT foundation. In any case, that isn't the situation, consider a situation where a private company when begun needs large amount of capital for the IT framework and when cost of resources is involved it turns out to be more costly which can't be managed purchase the independent ventures. Presently rather the cloud administrations won't make him/her proprietor of the foundation yet it can without much of a stretch give the administrations at moderate cost. Another advantage is that there is no compelling reason to stress over support of foundation which is the issue of CSP. Nonetheless, not for each situation the cloud administrations are less expensive. At the point when the administrations are required for longer periods and the business is having maintained necessities (which are sometimes the case) than cloud isn't such reasonable choice.
3) *Distributed computing make process slow which lowers efficiency and execution***:** This is essentially not genuine, Cloud computing requires a less assets like a straightforward web association. Despite the fact that the quicker is the association the better will be the administration. So a solid and typical speed web association is needed parcel more preparing power than one would ever manage the cost of by purchasing the costly framework**.** Likewise the mass information or enormous information of the client is currently dealt with on the cloud which builds the execution effectively and profoundly. In any case, where absence of nice web association than distributed computing is isn't valuable.
4) *Using individual gadgets to get to the cloud does not lead any chance:* Security is dependably a noteworthy concern distributed computing. Despite the fact that new security highlights are being included by cloud specialist co-ops yet at the same time there are numerous issues. Utilizing individual gadgets to get to cloud isn't totally protected. The classified information can be stolen, it can be hacked and human blunder likewise forces danger. For utilizing cloud more secure strategies ought to be utilized.
5) *Cloud service adapters have nothing to stress over:* Using cloud administrations are not stress less for purchasers too. They will not have to do much about support however that does not imply that buyer is absolutely free of keeping up their framework. The vehicular cloud fails in the various aspects of security or safety operations to take on the security loopholes. The primary concern is the web association; if the web association isn't up to the check at that point cloud isn't a choice. There are different explanations behind inaccessibility of administrations by cloud service providers like power blackouts, legitimate activities on specialist organizations or any natural disaster. There are a few examples when CSPs where prosecuted for copyright violations. Be that as it may, these are at times cases as more dependable organizations are in the Cloud administrations.
6) *One's information is less secure in cloud:* It isn't valid in all cases. For independent company starter cloud makes it simple to manage the cost of firewalls and security component which just huge organizations can get. Truly cloud makes framework more inclined to attack yet it additionally makes it simple to get high state of security. For example, the issue of less security arises in the sensor cloud networks where the sensors are largely prone to the various types of network violation which can be utilized to inject the malicious data into the cloud networks. Also the vehicular networks post the similar example while utilizing the cloud applications for the connectivity and management of the vehicular networks. Several kinds of attacks over the cloud networks can exploit the whole network by making it unavailable to the external world.

II. RELATED WORK

The authors have worked towards the new energy-aware task scheduling method for data-intensive applications in the cloud. In this method, first, the datasets and tasks are modeled as a binary tree by a data correlation clustering algorithm, in which both the data correlations generated from the initial datasets and that from the intermediate datasets have been considered. Hence, the amount of global data transmission can be reduced greatly, which are beneficial to the reduction of SLA violation rate. Second, a “Tree-to-Tree” task scheduling approach based on the calculation of Task Requirement Degree (TRD) is proposed, which can improve energy efficiency.

By optimizing the utilization of its computing resources and network bandwidth. Nidhi Bansal et. al. [33] The authors have worked upon the cost performance optimization based upon the QoS driven tasks scheduling in the cloud computing environments. The authors have focused upon the cost of the computing resources (virtual machines) to schedule the given pool of the tasks over the cloud computing model. The cost optimization has been performed over the QoS-task driven task scheduling mechanism, which did not encounter the cost optimization problem earlier. The authors have shown that the earlier QoS-driven task scheduling based studies has been considered the make span, latency and load balancing. Gaurang Patel et. al. [32] has worked upon the enhancement in the existing algorithm of Min-Min for the task scheduling on the cloud environment. The authors have proposed the use of active load balancing in processing the tasks over the cloud environments. The authors have proposed the new method for the efficient processing of tasks over the given cloud environment known as the enhanced load balancing min-min algo (ELBMM).The authors have recovered the major drawback of the existing model of min-min algo, where sometimes the make span and current utilization of resources is not properly considered and the tasks is scheduled over the slow resource which causes the latency. Weiwei Chen et. al. [34] has proposed the imbalanced metrics for the optimization of the task clustering on the scientific workflow data executions. The authors have examined the imbalanced nature of the task clustering during the runtime evaluation for the purpose of task clustering in depth. The authors have proposed the improvement to effectively evaluate the problem of the runtime task imbalance. The authors have proposed an horizontal and vertical method for the evaluation of series of task clustering for the widely used scientific workflows. Xu et. al [14 presented a load balancing portrayal for pubic cloud in view of the thought of cloud partitioning with a change method to pick distinctive methodologies for various conditions. Load adjusting in the cloud computing condition has an overwhelming effect on the execution. It fabricates cloud computing more efficient and improves user gratification. The calculation applies on the game theory to the heap adjusting ways to deal with increment in efficiency. Tan et. al [15] proposed another undertaking planning model in this paper. In the proposed show, creator upgrades the assignment execution time to translation both the activity running time and the asset use. In this way, a PSO- construct calculation is proposed based with respect to the model. In proposed calculation, creator enhanced the standard PSO, and presented a basic transformation methodology and a self-adjusting inactivity weight hone by characterizing the fitness values. The universal explore performance and convergence rate of the adaptive algorithm are accepted by the outcomes of the comparative demonstrations at the end of this paper. Nowadays, from both scheduling flexibility and application scale, there is much work should be done on the past studies.

III. EXPERIMENTAL DESIGN

The proposed work is based on local regression technique for VM allocation and multiple models for VM selection. The VM which is lightly loaded and less failure rate is preferred for scheduling task.

A. Algorithm 1: Steps of proposed work

1) The pheromones of all the VMs are initialized.
2) All the ants are placed at the beginning VMs arbitrarily..
3) Every arrangement picks the VM for the following task (Choose lightly loaded VM having less failure rate)
4) When a policy completes its assessment, update the local pheromone value
5) Check whether the solution is optimal a.go to Step 7,
6) Else
a) For non optimal solution, check whether all the ants have completed its tour.
b) For non completion

i. Go to step 3 c. Else

i. Go to step 8

7) Store the current optimal solution and update pheromone value globally in the table.
8) If all ants complete their tour then output best possible solution.

The model for Simple Linear Regression is given by

Y = □□□+ □□x, Here

a) Y →Dependent variable
b) X → Independent variable
c) □□□ Random error variable

d) □□ →y-intercept of the line y = □□□+ □□x

e) □□ →slope of line y = □□□+ □□x

In the model above and X are assumed to be correlated, i.e., linearly related, and thus the model function takes the form of a line, $Y = \square\square + \square\square X$. *X*. The regression model has been discussed for the local regression based VM allocation algorithm, which elaborates the overall working of the simple linear regression classifier for the test of validity of this hypothesis deciding the best VM for the processing of given set of data.

The simple linear classification revolves around the fitting of the equation with all of the independent variable and coefficients as the equation design. The final result is derived from the list of squared distances, which defines the real-time differences from the user data. The match with the best VM is selected by using the VM allocation and selection policy on the cloud environment.

B. Algorithm 2: Local Regression (LR) Algorithm

1) Perform pre-preparing venture to approve the obtained set of task group (job) and categorize all the groups(jobs) derived from user tasks on the VM allocator.

2) Prepare the VM bunch of information by including the group IDs comparing VMs within the given cluster in the cloud platform.

3) Run Local training on the VM set for the given cluster and restore the weight and inclination data for all VMs included.

4) Run Local Regression demonstrate by presenting the Normal or Gradient Equation to make feature data, group or bunch of information and the testing feature descriptor vector.

5) Restore the similar Local regression data.

6) Calculate the Local regression data and restore the decision logic.

7) Allocate all the VM accordingly to the decision logic retuned by the local regression.

8) Perform the jobs on the allocated VMs

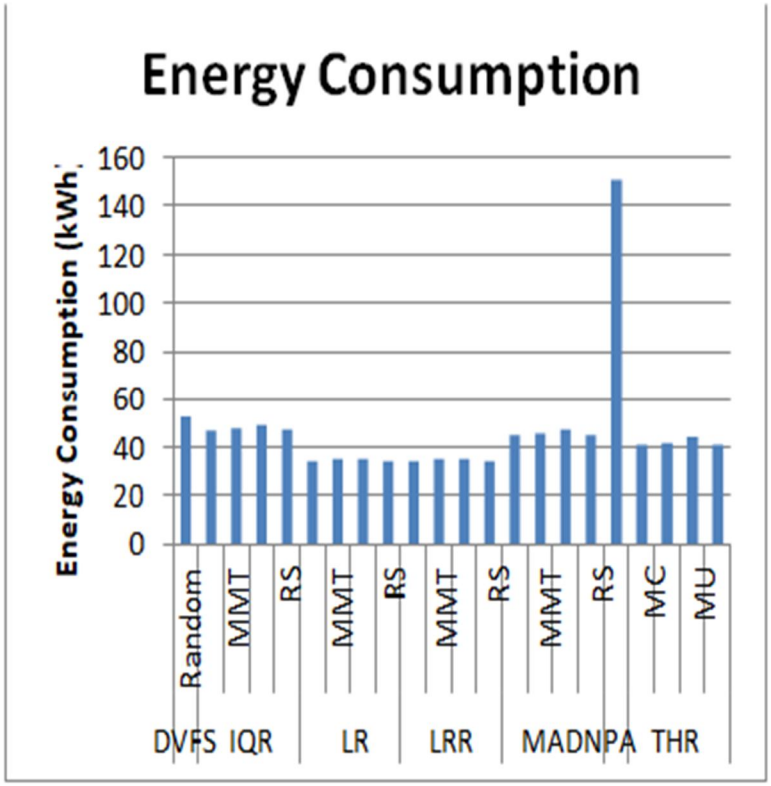


Figure 1: Energy Consumption of different VM Allocation models

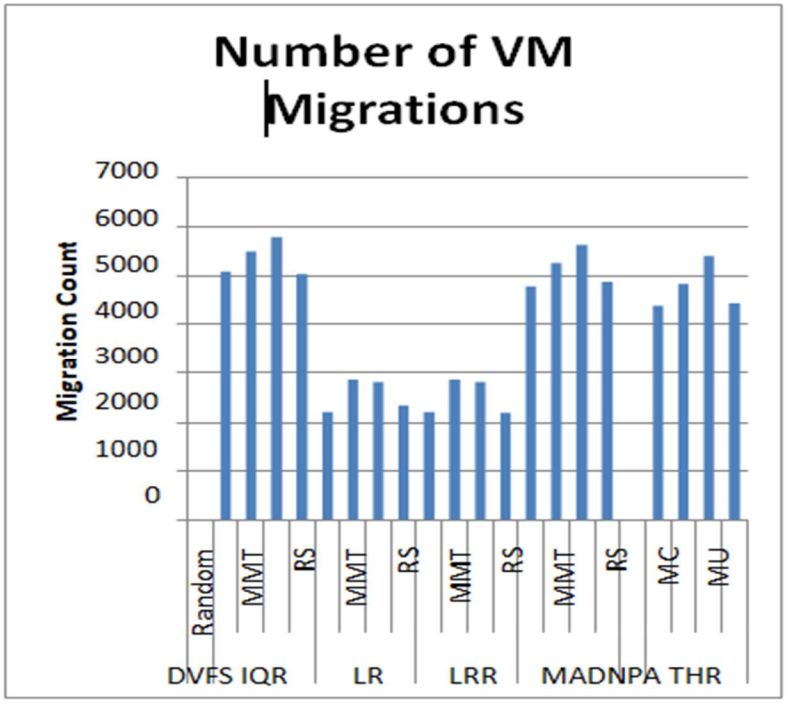


Figure 2: The Total Number of Virtual Machines (VM) Migrations in the Simulation under different Virtual Machines (VM) Allocation Models

In the figure 1 the energy consumption measures have been presented for all of the VM allocation methods tested under this research.

This is clearly visible from this graph, that the energy consumption has been recorded highest for the NPA, which has been followed by the DVFS, whereas the least energy consumption has been recorded for the LR and LRR schemes of VM allocation

.In the figure 2, the count of VM migrations has been displayed for the different VM allocations models. The VM allocation models are amalgamated with the different VM selection mechanisms. All of the VM allocations models are tested with all possible combinations with VM selections models. The figure 2 describes the number of VM migrations for all of the VM allocations models. This is visibly clear from this figure that the least number of VM migrations has been reported in the LR and LRR methods, when compared to the IQR, MAD and THR. The DVFS and NPA are not eligible to incorporate the VM migrations across the cloud infrastructure due to the limited functionality.

V. CONCLUSION

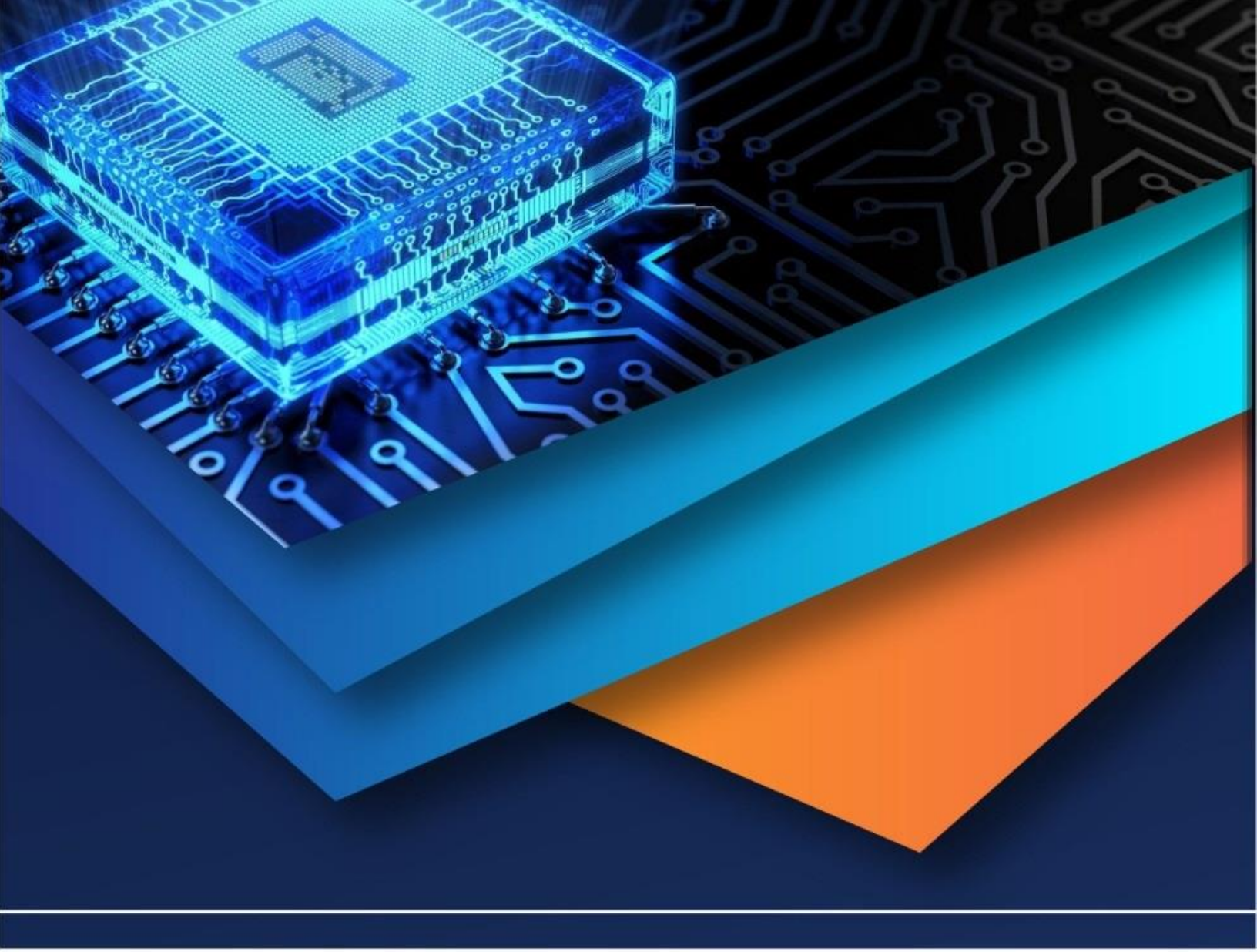
From all of the obtained results, the Overall Performance in case of the proposed model has been analyzed using the time and count based parameters along with statistical parameters are used for the purpose of performance evaluation from various aspects. The first evaluation of performance is based upon the energy consumption, which has been measured using kWh units. The maximum energy consumption has been observed in the NPA (150.68 kWh) and DVFS (52.98 kWh) models. The energy consumption has been recorded higher than other models, where the energy consumption is observed higher due to their random VM allocation and selection policy. Both of the schemes are based upon the random selection of VMs from the list of the VM jobs, while applying the allocation and selection methods. Both Inter Quartile Range (IQR) and Median Absolute Deviation (MAD) are the following contenders. These models, IQR (average 47.87 kWh) and MAD (average 45.73 kWh), are recorded considerably lower than NPA and DVFS. However the MAD based VM allocation & selection policies are slightly better than the IQR policies. The remaining VM allocation and selection policies include LR, LRR and THR, where the energy consumption average has been recorded 34.86 kWh, 34.85 kWh and 41.97 kWh respective. The average energy consumption of LRR is slightly lower than LR and considerably lower than THR. Hence, the LRR model can be declared the best model on the basis of energy consumption. In the case of time oriented results, the maximum time

before shutdown has been observed in the case of LR and LRR, whereas the LR has outperformed LRR by marginal difference. THR, MAD and IQR are recorded significantly lower than the proposed Linear Regression Model, which has outperformed the existing models of THR, MAD and IQR.

REFERNCES

[1] Wayne Jansen and Timothy Grance, "Guidelines on Security and Privacy in Public Cloud Computing," National Institute of Standards and Technology Gaithersburg, January 2011.
[2] "Gartner Highlights Five Attributes of Cloud Computing"[on-line] available from: http://www.gartner.com/newsroom/id/1035013 [0n13 Dec2013].
[3] Prerakmody "Cloud Computing" [on-line] available from: http://www.wordrandom.wordpress.com/2011/09/28/cloud- computing/ [on 9 jan 2015]
[4] L.M Vaquero., L. R Merino., J. Caceres and M. Lindner "A break in the clouds: towards a cloud definition," ACM SIGCOMM Computer Communication Review, vol.39, issue 1, pp. 50-55, 2008.
[5] Basic concept and terminology of cloud computing-[on- line] available from: http://whatiscloud.com [on 9 jan 2015]
[6] Anthony T.Velte, Toby J.Velte, Robert Elsenpeter, "Cloud Computing - A Practical Approach," Tata McGraw- Hill Edition (ISBN-13:978-0-07-068351-8)
[7] M Rahman, S. Iqbal, and J.Gao "Load Balancer as a service in Cloud Computing," IEEE 8th International Symposium on Service Oriented System Engineering, pp.204-211, April 2014
[8] A. Bala and I. Chana, "Fault Tolerance- Challenges, Techniques and Implementation in Cloud Computing," International Journal of Computer Science Issues, vol. 9, issue 1, 2012.
[9] "Cloud Computing: A delicate balance of risk and benefit" [0n-line] available from: http://www.zdnet.com/blog/hinchcliffe/eight-ways-that- cloud-computing-will-change- business/488 [10 Feb 2015
[10] A. S. Singh and S. Patel, "Fault Tolerance Mechanisms and its Implementation in Cloud Computing: A Review," International Journal of Advanced Research in Computer Science and Software Engineering, vol. 3, issue 12, 2013.
[11] Ali M. Alakeel, "A Guide to Dynamic Load Balancing in Distributed Computer Systems," International Journal of Computer Science and Network Security, vol.10, issue 6, June 2010.
[12] W. Zhao, P. M. Melliar Smith, and L.E. Moser, "Fault Tolerance Middleware for Cloud Computing," Proceedings of IEEE 3rd International Conference on Cloud Computing, USA pp 67-74, 2010.
[13] Dorigo M, Optimization, learning and natural algorithms. PhD thesis, Dipartimento di Elettronica, Politecnico di Milano, Italy, 1992 [in Italian].
[14] Gaochao Xu, Junjie Pang, and Xiaodong Fu "A Load Balancing Model Based on Cloud Partitioning for the Public Cloud," IEEE Transactions in Tsinghua Science and Technology, vol -18, issue 1, pp 34-39, 2013.
[15] Liu, Zhanghui, and X.Wang. "A PSO-based algorithm for load balancing in virtual machines of cloud computing environment," Advances in Swarm Intelligence, Springer Berlin, pp.142-147, 2012.
[16] K.Li, G.Xu, G. Zhao, Y. Dong, and D. Wang " Cloud Task scheduling based on Load Balancing Ant Colony Optimization," 6th IEEE Annual China Grid Conference , pp 3-9, 2011.
[17] Chang, Haihua, and X.Tang. "A load-balance based resource-scheduling algorithm under cloud computing environment," 9th International Conference on Web- based Learning, Springer, Berlin, pp. 85–90, 2011.
[18] S.Cavić, Vesna, and E. Kühn, "Self-Organized Load Balancing through Swarm Intelligence," In Next Generation Data Technologies for Collective Computational Intelligence, Springer, Berlin pp. 195-224, 2011.
[19] A. Jain and R. Singh, "An Innovative Approach of Ant Colony Optimization for Load Balancing Peer to Peer Grid Environment," IEEE International Conference of Issues and Challenges in Intelligent Computing Techniques , pp. 1-5, 2014.
[20] R. Chaukwale and S.S. Kamath, "A- Modified Ant Colony Optimization Algorithm with Load balancing for Job Shop Scheduling," 15th IEEE International Conference on Advanced Computing Technologies , pp. 1–5, 2013.
[21] S. Dam, G. Mandal, K. Dasgupta, and P. Dutta "An Ant Colony Based Load Balancing Strategy in Cloud Computing," In Advanced Computing, Networking and Informatics Springer, vol 2, pp. 403-413, 2014.
[22] S. K Goyal and M. Singh "Adaptive and Dynamic Load Balancing in Grid Using Ant Colony Optimization," International Journal of Engineering and Technology, vol. 4, issue 4, pp.167-174, 2012.
[23] S.K Dhurandher, M. S. Obaidat, P. Agarwal, A. Gupta, and P.Gupta, "A Cluster-Based Load Balancing Algorithm in Cloud Computing," IEEE International Conference on Communications, Sydney, pp.2921 – 2925, 2014
[24] V.S Kushwah, S. K Goyal and P. Narwariya, " A Survey on various fault tolerant approaches for cloud environment during Load balancing," International Journal of Computer Networking, Wireless and Mobile Communications, vol. 4, issue 6, pp. 25-34, 2014,
[25] N. Kumar, P. Sharma, V.Krishna, C.Gupta, K. P Singh, and R. Rastogi, "Load balancing of nodes in cloud using ant colony optimization," 14th IEEE International Conference on Computer Modelling and Simulation (UKSim) , pp. 3-8., 2012.
[26] R.Mishra and A. Jaiswal, "Ant colony Optimization: A Solution of Load balancing in Cloud," International Journal of Web & Semantic Technology, vol.3, issue 2, pp. 33-50 April 2012
[27] K.Dasgupta, B. Mondal, P. Dutta, J.K Mondal, S.Dam "A Genetic Algorithm (GA) based Load Balancing Strategy for Cloud Computing" Elesvier 1st International Conference on Computational Intelligent Modeling Techniques and Application, pp. 340–347, 2013.
[28] B. Mondal, K. Dasgupta, and P. Dutta, " Load Balancing in Cloud Computing using Stochastic Hill Climbing-A Soft Computing Approach," Elsevier 2nd International Conference on Computer Communication Control and Information Technology, pp. 783–789, 2012.

[29] R. N Calheiros, R. Ranjan A. Beloglazov, C. A. De Rose, & R. Buyya, "CloudSim: a toolkit for modeling and simulation of cloud computing environments and evaluation of resource provisioning algorithms," Software: Practice and Experience, vol.41, issue 1,pp. 23-50, 2011.
[30] Zhao, Qing, Congcong Xiong, Ce Yu, Chuanlei Zhang, and Xi Zhao. "A new energy-aware task scheduling method for data-intensive applications in the cloud." Journal of Network and Computer Applications 59 (2016): 14-27.
[31] Braekers, Kris, Richard F. Hartl, Sophie N. Parragh, and Fabien Tricoire. "A bi-objective home care scheduling problem: Analyzing the trade-off between costs and client inconvenience." European Journal of Operational Research248, no. 2 (2016): 428-443
[32] Patel, Gaurang, Rutvik Mehta, and Upendra Bhoi. "Enhanced Load Balanced Min-min Algorithm for Static Meta Task Scheduling in Cloud Computing."Procedia Computer Science 57 (2015): 545-553.
[33] Bansal, Nidhi, Amitab Maurya, Tarun Kumar, Manzeet Singh, and Shruti Bansal. "Cost performance of QoS Driven task scheduling in cloud computing." Procedia Computer Science 57 (2015): 126-130.
[34] Lin, Weiwei, Chen Liang, James Z. Wang, and Rajkumar Buyya. "Bandwidth-aware divisible task scheduling for cloud computing." Software: Practice and Experience 44, no. 2 (2014): 163-174.
[35] Beloglazov, Anton, Jemal Abawajy, and Rajkumar Buyya. "Energy-aware resource allocation heuristics for efficient management of data centers for cloud computing." Future generation computer systems 28, no.5 (2012): 755-768.
[36] Zaman, Sharrukh, and Daniel Grosu. "A combinatorial auction-based mechanism for dynamic VM provisioning and allocation in clouds." IEEE Transactions on Cloud Computing1, no. 2 (2013): 129-141.
[37] Zaman, Sharrukh, and Daniel Grosu. "Combinatorial auction-based dynamic vm provisioning and allocation in clouds." In Cloud Computing Technology and Science (CloudCom), 2011 IEEE Third International Conference on, pp. 107-114. IEEE, 2011.
[38] Cao, Zhibo, and Shoubin Dong. "Dynamic VM consolidation for energy-aware and SLA violation reduction in cloud Computing." In Parallel and Distributed Computing, Applications and Technologies (PDCAT), 2012 13th International Conference on, pp.363-369. IEEE, 2012.
[39] Kumar, Karthik, Jing Feng, Yamini Nimmagadda, and Yung-Hsiang Lu. "Resource allocation for real-time tasks using cloud computing." In Computer Communications and Networks (ICCCN),2011.
[40] Beloglazov, Anton, and Rajkumar Buyya. "Energy efficient allocation of virtual machines in cloud data centers." In Cluster, Cloud and Grid Computing (CCGrid), 2010 10th IEEE/ACM International Conference on, pp. 577-578. IEEE, 2010.
[41] Beloglazov, Anton, and Rajkumar Buyya. "Energy efficient resource management in virtualized cloud data centers." In Proceedings of the 2010 10th IEEE/ACM international conference on cluster, cloud and grid computing, pp. 826-831. IEEE Computer Society, 2010.
[42] Beloglazov, Anton, and Rajkumar Buyya. "Managing overloaded hosts for dynamic consolidation of virtual machines in cloud data centers under quality of service constraints." IEEE Transactions on Parallel and Distributed Systems 24, no. 7 (2013): 1366-1379.



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY