International Journal of Engineering Sciences Paradigms and Researches (IJESPR)
Vol. 48, Issue 01, Quarter 01 (January-February-March 2019)
(An Indexed, Referred and Impact Factor Journal)
ISSN (Online): 2319-6564
www.ijesonline.com

Performance Analysis of VM Placement Algorithms by Considering CPU Consumption

Dr Mukesh Singla

Professor, SPGOI, Rohtak
mukesh27singla@yahoo.co.in

Publishing Date: March 05, 2019

Abstract

If the size of DCs is limited then execution is compromised, so to get full execution with less power utilization virtualization is utilized. There is diverse algorithm that diminishing the power utilization with the assistance of virtualization and energy proficient planning of virtual machines (VMs).To decrease the power utilization virtualization is utilized for cloud computing. The target to relocate the VM from one server to other is that to have ideal outcomes. So as to pick an opportunity to begin the relocation of VMs from a host, a heuristic for setting upper and lower use utilization is required. Two over-burden location strategies utilized as a part of proposed work are Inter quartile Range (IQR) and Local Regression (LR).After revelations of an over-burden have, the following stage is to pick the specific VMs to relocate from one host to the next. Three VM choice arrangements Minimum Migration Time (MMT), Random Choice Policy (RC) and Maximum Correlation strategy (MC) are executed. For assessing proposed algorithm simulator Cloud Sim is utilized to assess and look at the execution of proposed algorithm. Different VM placement algorithms are proposed. To analyze the effectiveness of proposed algorithm two parameters the power utilization and standard deviation of virtual machine migration are considered.

Keywords: *Cloud Computing, Cloud Computing Architecture, Virtual Machines, Local Regression, Minimum Migration Time.*

1. Introduction

Cloud computing depends on sharing of resources. Too, it enables associations to focus on their core businesses as opposed to investing energy and money on PC framework. Proponents likewise claim that cloud computing enables enterprises to get their applications up and running speedier, with enhanced manageability and less support, and empowers Information Technology (IT) teams to more rapidly adjust resources to meet fluctuating and flighty business request. Cloud suppliers ordinarily utilize a "pay as you go" model. This will prompt suddenly high charges if administrators don't adjust to the cloud pricing model [1]. In 2009, the accessibility of successful networks, minimal effort PCs and storage devices and additionally the widespread adoption of hardware virtualization, service-oriented architecture, and autonomic and utility computing prompted a development in cloud computing. Organizations can scale up as computing needs increment and afterward downsize again as requests diminish. In 2013, it was accounted for that cloud computing had turned into most requested service or efficacy because of the upsides of high processing power, cheap cost of services, elite, versatility, openness and in addition accessibility. Some cloud sellers are encountering growth rates of half every year, except being still in a phase of early stages, it has pitfalls that should be routed to make cloud computing services more dependable and easy to understand. Cloud symbol is regularly used to represent the web. Cloud computing is currently ordinarily used to portray the conveyance of programming, foundation and capacity benefits over the web. from different associations conveying administrations associated with their information, programming and other registering needs for their benefit, without the need to claim or run the typical physical equipment, (for example, servers) and programming, (for example, email) themselves Users of the cloud can maintain. Cloud computing gives the methods through which everything from registering energy to figuring foundation, applications and business procedures can be conveyed to you as an administration wherever and at whatever point you require them. It is the following stage in the advance of the web.

Fig1.1: General Architecture of Cloud Computing

1.1 Cloud Computing Architecture

Cloud architecture, the frameworks design of the software systems associated with the delivery of cloud computing, commonly includes different cloud parts communicating with each other over a loose coupling system, for example, messaging queue. Elastic stipulation infers insight in the utilization of tight or free coupling as connected to systems, for example, these and others.

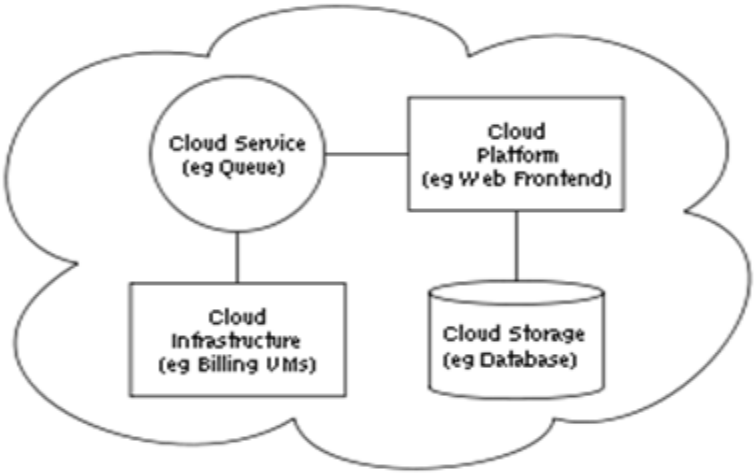

Fig 1.2: Cloud Computing Simple Architecture

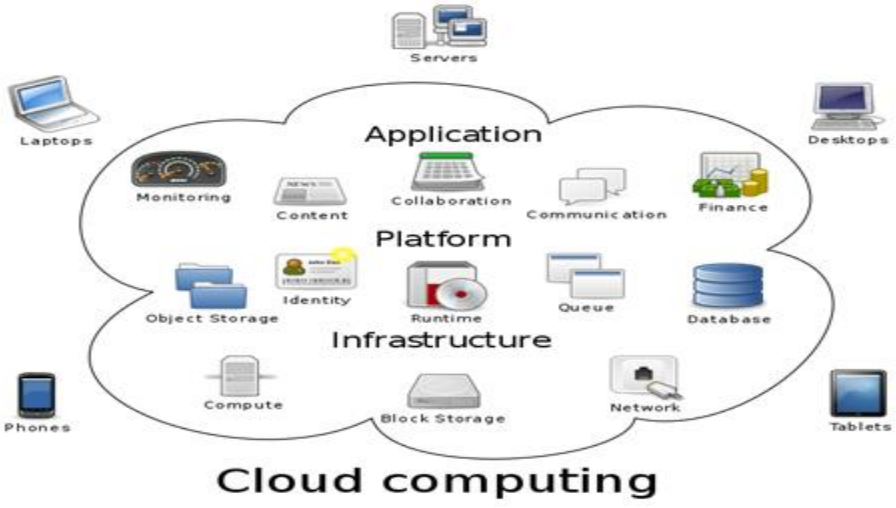

Fig 1.3: Cloud Computing Architecture [2]

2. RELATED WORK

As indicated by [5], in this objective is accomplished by powerfully allocating resources in view of usage examination and expectation. "Linear Predicting Method" (LPM) and "Flat Period Reservation-Reduced Method" (FPRRM) is utilized to get valuable data from the asset usage log, and make M/M/1 lining hypothesis foreseeing strategy have better reaction time and less energy-consuming. Test assessment performed on Cloud Sim cloud test system demonstrates that the proposed techniques can viably lessen the violation rate and energy-consuming in the cloud. As per [6] Cloud processing frameworks rent resources on request, pay-as-you-go basis, and multiplex numerous clients on the same physical foundation. Anyway the income of cloud computing is get influenced by different factors, for example, (Quality of Service) QOS limitations, Energy utilization and so on., Energy Aware Task Consolidation system is utilized to apportion the undertakings powerfully on virtual bunches which means to limit vitality utilization. This is accomplished by combining assignments on virtual groups by keeping the CPU usage beneath a pinnacle edge estimation of 70%. The undertaking combination is finished by utilizing best Fit system. The income of cloud supplier can be enhanced by expanding the benefit yielded by the approaching errand. The benefit can be expanded by apportioning the assignment to the suitable (Virtual Machine) VM which executes the task with least cost and without disregarding the QOS requirements. Benefit and Energy mindful Task Consolidation technique is proposed to assign the undertaking to the proper VM that returns more benefit and less energy utilization to the data center.

Assets in these frameworks can be broadly conveyed and the size of resources included can extend from a few servers to a whole datacenter. To integrate and make great utilization of resources at different scales, cloud computing needs proficient strategies to oversee them. Resource assignment is a standout amongst the most imperative and troublesome undertakings in Cloud frameworks. It is the task of spreading a limited gathering of assets over a client populace and it shapes the premise of present day financial matters [6] As per [7] the expanding interest for capacity, networking and computation has driven the heightening of extensive complex server farms, the gigantic server cultivates that run a significant number of the present Internet, monetary, business and business applications. A server farm can contain a huge number of servers and can use as much vitality as a little city. The enormous measures of algorithm control required to drive these server frameworks brings about numerous difficulties like energy utilization, outflow of greenhouse gases, reinforcements and recuperation issues, and so forth. The increasing expenses of oil and an unnatural weather change are a portion of the greatest difficulties of the present world. The exploration proposed in this paper examines how virtualization can be utilized to enhance the execution and energy proficiency of server farms. To demonstrate this work, Green Information Technology (IT) based system is produced to consistently and safely isolate server far energy utilization proportion, use proportion, workloads, and so on. The structure features the significance of actualizing green measurements like power use effectiveness (PUE) and data center effectiveness, and carbon emanation mini-computer to quantify the productivity of server farm as far as energy use and carbon dioxide (CO2) outflows. The structure depends on virtualization and cloud computing to expand the use proportion of as of now introduced servers from 10% to over half.

As indicated by [8] Cloud Computing there are numerous undertakings required to be executed by the accessible assets to accomplish best execution, diminish reaction time and use assets. There is a need of planning another undertaking booking algorithm that beat proper portion guide of assignment to accomplish these difficulties. As Load Balanced Min-Min Algorithm select the with least fruition time and doles out it to proper asset, it at some point improves make traverse and does not use resource successfully. The creator here speaks to investigation of assortment of undertaking planning algorithm and change of Load Balanced Min-Min (ELBMM) algorithm fir Static Meta-Task Scheduling .The adjusted algorithm is fabricated in view of far reaching investigation of the effect of Load Balanced Min-Min calculation for Static Meta-Task Scheduling in network processing. Upgraded Load adjusted Min-Min calculation (ELBMM) depends on Min-Min procedure and undertakings rescheduling to utilize the unutilized assets adequately .It select the task with most extreme consummation time and appoints it to proper asset to deliver better make traverse and use resource successfully [8]. As indicated by [9] Cloud Computing is another method of computing technology that can give an variety of services, to client's on-request. Cloud computing services prohibit the expenses of obtaining and keeping up the frameworks for its clients. It enables the clients to include remote servers for keep up their application and progressively scale resources in light of their needs. Cloud computing are becoming the major source of computing. The center thought of this condition is overseeing and scheduling the available resources to give service's needs. Servers in cloud might be physical or virtual machines got to over the system. Choosing machines for executing an undertaking in the cloud computing must be considered. They must be chosen by its status and submitted tasks properties to abuse the proficiency of the resources. Cloud task management is viewed as a NP hard advancement issue, and numerous meta-heuristic algorithm are appropriate to tackle it. Explores three conceivable methodologies proposed for dynamic undertaking planning for cloud computing. The three methodologies are having a place with the field of swarm insight that is utilized to discover answers for troublesome or unimaginable combinatorial issues. These methodologies are propelled by insect state conduct, the conduct of molecule swarm and bumble bee searching conduct. The fundamental objective is to give an assessment and similar investigation of these methodologies that are utilized to limit the makespan of a given undertakings set. Execution of the algorithm is simulated utilizing toolbox bundle of CloudSim. Algorithm has been compared with

each other and with the well-known existed algorithms for dynamic task scheduling problem [9].

3. PROPOSED WORK

The quality of the IaaS layer in cloud computing can be assessed by keeping in consideration of both power utilization and quality of service (QoS).We followed and did likewise to identify both under loaded and overloaded hosts and furthermore for VM selections.

3.1 Implementation

For assessing proposed algorithms test simulator CloudSim is utilized to assess and compare the execution of proposed algorithm. There are three VM Selection strategies

1) Minimum Migration time (MMT)
2) Maximum connection (MC)
3) Random determination (RS).

In the simulator there are two overload detection algorithms that set an upper threshold or predict the usage to mark a host as an overloaded one.

1) Adaptive Inter quartile Range (IQR): overload threshold is calculated dynamically using inter quartile range method

2) Local Regression (LR)

In order to make simulation based evaluation applicable, we ran our experiments using real life workload traces, a monitoring infrastructure for Planet Lab. These data could be accessed from github repository [https://github.com/beloglazov/planetlab-workload-traces]. In this data we have CPU utilization by more than a thousand virtual machines from servers located from five hundred different places all around the world.

4. RESULTS AND ANALYSIS

4.1 Performance Metrics

Multiple VM placement algorithms are proposed. To compare the effectiveness of planned algorithms two parameters the power utilization and standard deviation of virtual machine migration are taken into account. The result for power utilization and Standard deviation of VM Migration formed by proposed algorithms is given in table 4.1

Table 4.1 Performance Metrics

Criteria	Host		Vm		Vm Migration		Energy Consumption
	SD	Mean	SD	Mean	SD	Mean	
Inter Quartile Range Maximum Correlation	0.00406	0.00179	0.00908	0.00613	7.93	20.33	46.86
Inter Quartile Range Minimum Migration Time	0.00357	0.00151	0.00650	0.00596	7.89	17.62	47.85
Inter Quartile Range Minimum Utilization	0.00371	0.00164	0.00859	0.00826	8.02	20.38	49.32
Inter Quartile Range Random Selection	0.00389	0.00185	0.00746	0.00590	7.94	20.39	46.73
Local Regression Maximum Correlation	0.00472	0.00188	0.00429	0.00181	7.95	20.35	34.35
Local Regression Minimum Migration Time	0.00372	0.00136	0.00648	0.00339	7.70	16.60	35.37
Local Regression Minimum Utilization	0.00437	0.00136	0.00559	0.00352	8.11	20.06	35.38
Local Regression	0.00358	0.00122	0.00473	0.00213	8.03	20.06	34.13

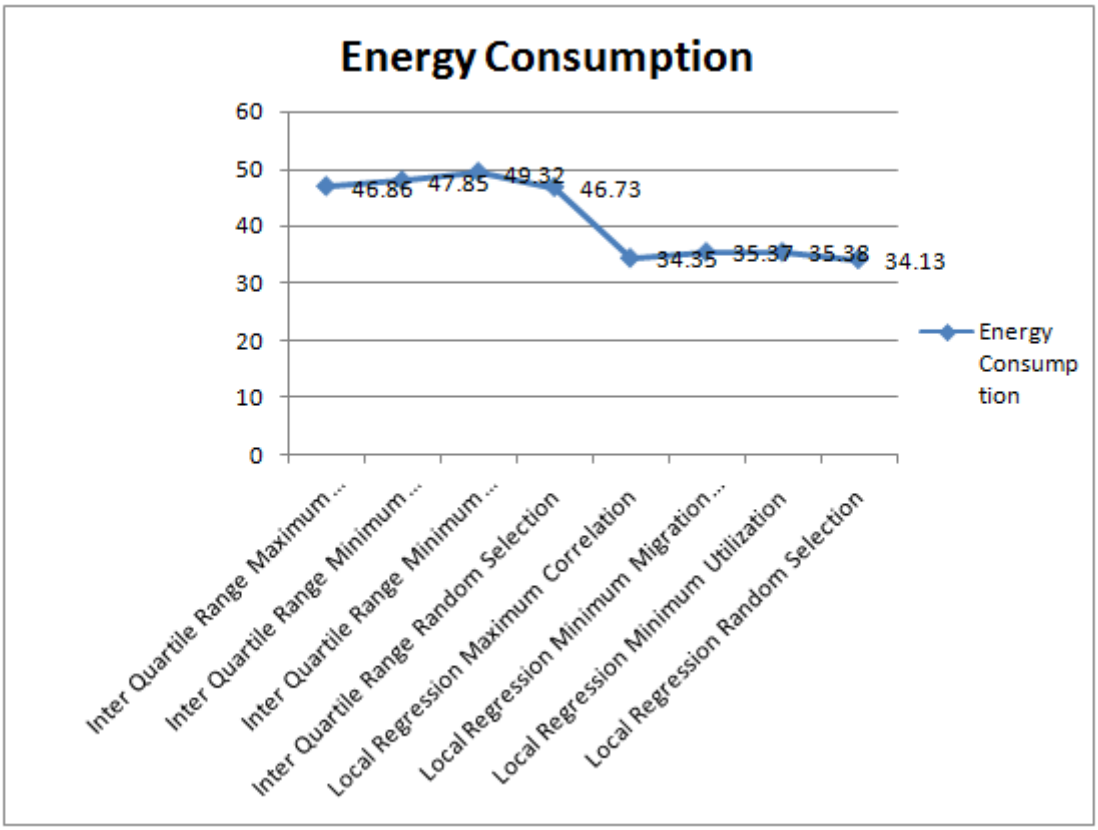

Figure 4.1: Energy Consumption of Proposed Algorithms

The result of power consumption is given in Figure 4.1. We can see that Local Regression Random Selection (LRRS)scored minimum energy consumption followed by Local Regression Maximum Correlation (LRMC)

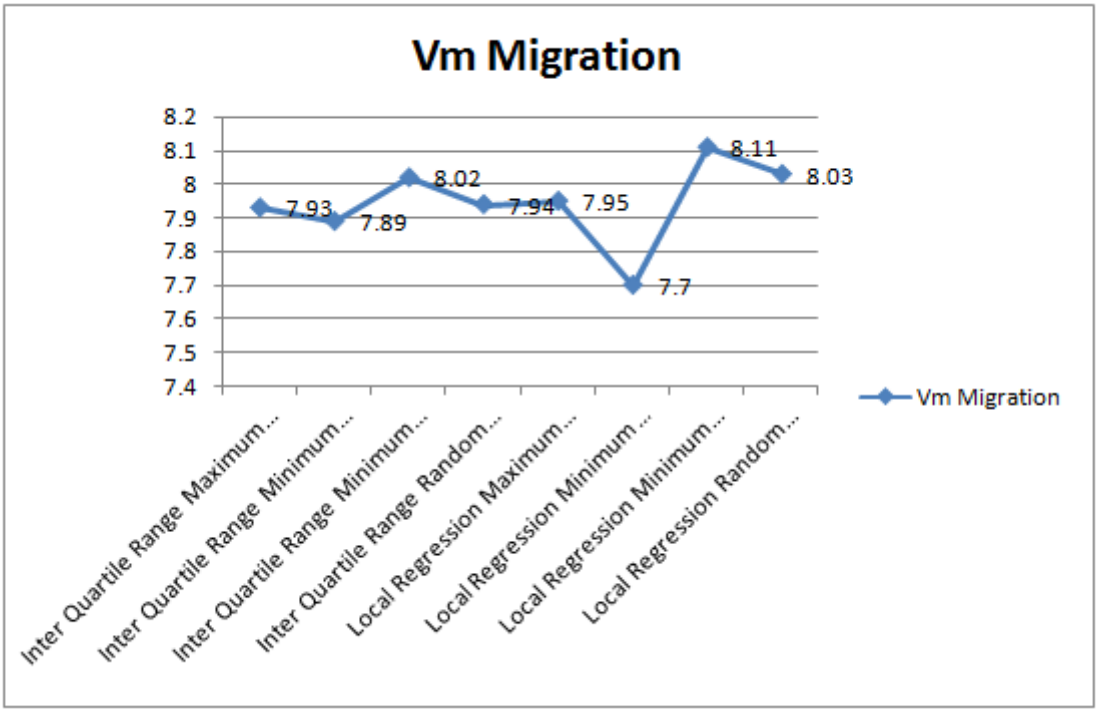

Figure 4.2: Standard deviation of VM migration of Proposed Algorithms

The result of standard deviation of VM migration is given in Figure 4.2. We can see that Local Regression Minimum Migration Time (LRMMT) scored minimum standard deviation followed by Inter Quartile Range Random Selection (IQRRS)

5. CONCLUSION AND FUTURE SCOPE

At the end of running all simulation, we find out which policy delivered agreeable outcomes, we can see that for power usage (LRRS) Local Regression Random Selection and (LRMC) Local Regression Maximum Correlation give great result, compared with rest of the policies; for performance degradation because of host migration (LRMMT) Local Regression Minimum Migration Time and (IQRRS) Inter Quartile Range Random Selection produced good outcome. From our outcome we additionally discover that local regression based algorithm equipped with the lowest migration time VM selection policy significantly outperforms other dynamic VM consolidation algorithms.

References

[1] Yuxiang Shi, "An Energy-Efficient Scheme for Cloud Resource Provisioning Based on CloudSim", 2011 IEEE International Conference on Cluster Computing, http://www.researchgate.net/publication/221201761
[2] Ms. A. Bharathi, Mrs. R. S. Mohana, Ms. A. Ushapriya,"Profit and Energy Aware Scheduling in Cloud Computing usingTaskConsolidation"2014
[3] MueenUddin, "Green Information Technology (IT) framework forenergy efficient data centers using virtualization", International Journal of Physical Sciences Vol. 7(13), pp. 2052 - 2065, 23 March, 2012
[4] Kokilavani T, Amalarethinam DD., "Load balanced min-min algorithm for static meta-task scheduling in grid computing", International Journal of Computer Applications. 2011 Apr;20(2):43-9.
[5] Elhady GF, Tawfeek MA."A comparative study into swarm intelligence algorithms for dynamic tasks scheduling in cloud computing",In2015 IEEE Seventh International Conference on Intelligent Computing and Information Systems (ICICIS) 2015 Dec 12 (pp. 362-369), IEEE.
[6] Fan G, Yu H, Chen L.. "A Formal Aspect-oriented Method for Modeling and Analyzing Adaptive Resource Scheduling in Cloud Computing"
[7] He H, Xu G, Pang S, Zhao Z. AMTS, "Adaptive multi-objective task scheduling strategy in cloud computing", China Communications. 2016 Apr;13(4):162-71.
[8] Liang H, Zhang Y, Du Y., "Dynamic Service Scheduling in Cloud Computing Using a Novel Hybrid Algorithm. Ine-Business Engineering (ICEBE), 2015 IEEE 12th International Conference on 2015 Oct 23 (pp. 257-262), IEEE.
[9] Wu J, Wang CY, Li JF. LA-Credit:, "A Load-Awareness Scheduling Algorithm for Xen Virtualized Platforms. InBig Data Security on Cloud (BigDataSecurity),", IEEE International Conference on High Performance and Smart Computing (HPSC), and IEEE International Conference on Intelligent Data and Security (IDS), 2016 IEEE 2nd International Conference on 2016 Apr 9 (pp. 234-239), IEEE.
[10] Chen LH, Wu EH, Hsieh MI, Horng JT, Chen GH., "Credit-based low latency packet scheduling algorithm for real-time applications.", In Communication, Networks and Satellite (ComNetSat), 2012 IEEE International Conference on 2012 Jul 12 (pp. 15-19),IEEE.
[11] Liu L, Zhai Y., "A Survey on Map Reduce Scheduling in Cloud Computing", In 2015 Fifth International Conference on Instrumentation and Measurement, Computer, Communication and Control (IMCCC) 2015 Sep 18 (pp. 1710-1715). IEEE