A Study on Consolidation of Data Servers in Virtualized Cloud Atmosphere

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Abstract: *Energy consumption has been a main concern to the environment as the scale of cloud data centers become larger due to the ease of internet usage, storage and processing on cloud. As a consequence of establishment of large number of data centers, the energy consumption grows rapidly. Also they contribute in the energy consumed worldwide and consequently to the environmental drawbacks like carbon emission. Virtualization technologies provide the ability to transfer virtual machines between the physical machines using live VM migration in cloud computing. Dynamic server consolidation is an efficient way for energy conservation in cloud by decreasing the total number of active physical machines. Its objective is to keep the number of power on systems as low as possible and hence reduce the excessive power consumed by the idle physical servers. Several protocols, heuristic algorithms, constraints based algorithms, need and challenges in consolidation are the main part of this survey.*

INTRODUCTION

The key technology for cloud computing atmosphere is Virtualization. To create the various methods like VM migration, VM & Server Consolidation for energy economical computing for businesses and additionally united logical society is urged by the server farms that contains of process elements like Virtual Machines (VM), Physical Machines (PM) or host hubs that devour vast energy total amid calculation. The creating of various VMs (or virtual servers) on a solitary physical hub supply ascent to Virtual Condition.

Energy potency primarily implies that how effectively energy are often used or eaten by any virtualized datacenters giving cloud administrations. Energy potency expects to minimize the live of energy eaten to offer a group things and administrations while not corrupting the QoS conditions. This era of virtualized cloud computing paradigm has fully grown into a modern exploration space of interest. The need for energy potency is as a result of increment within the variety and also the span of the cloud server farms. To limit the tally of physical machines server consolidation is employed and also the issue of virtual machine placement is to induce ideal placement technique with each resource wastage and least power utilization. Numerous applications on an identical host machine will keep running by Server consolidation, and therefore it mainly helps in increasing the resource use of the servers and decreasing the energy prices.

In this paper we have a tendency to demonstrate a survey of this Energy economical virtual machine migration methods notably to suit the Cloud Computing environments. We have a tendency to provides a review of those systems and remark their strategies for productivity.

LITERATURE REVIEW

Various studies are allotted to explore the analysis performed within the field of energy economical VM migration. Intensive analysis work goes on to make the economic datacenter by maintaining energy-performance trade-off within the cloud surroundings. Completely different tools area unit used for conducting experiments on the ability aware datacenter. The infrastructure supplier nowadays is facing most difficult problems in Energy management in knowledge Centers. Completely different techniques area unit there for getting this goal which incorporates application programing, DVFS, storage synchronizations adjective threshold utilization, etc. in conjunction with this numerous resource allocation techniques area unit mentioned with work adjective models and memory reusing techniques [1]. For the most use of the resources and energy reduction VM placement issue was examined with focus. Idle server or servers in sleep mode will be shifted to avoid wasting energy consumption. Bee algorithmic rule with hierarchical cluster technique is employed to resolve Virtual machine placement drawback with a particular finish goal to decrease energy consumption in servers. Straightforward movement of Virtual Machine relocation and reduce within the network latency is supported by Cluster formation with the bee algorithmic rule [2]. Virtualization is a necessary issue to limit price caused to administer server farms and knowledge centers over the globe, in cloud computing. The upper price in operating knowledge centers is

attributable to energy utilization. we are able to accomplish saving by means of constant combination with live relocation of VMs hoping on the employment of the resources, virtual system topologies and heat condition of computation hubs [3]. "Virtual redundant machine" could be a framework that's created out of a number of recreated machines which may empty the heap once the information centers get over-burden, and therefore the plan is to propose this kind of system., thus the foremost challenges for load leveling mechanism are going to be consummated by the on top of system for attaining Virtual machine migration [4]. The VM placement issue is displayed into a multi-model improvement issue associate degreed given associate degree algorithmic rule to search out an optimum list of physical machine supported the model. Virtual machine migration algorithmic rule with versatile load adjusting is engaged by constant [5], associate degree economical VM migration set up that's supported of pre-copy approaches is projected. The projected migration technique is quick as there's no waiting time for the copy to be remodeled and so begin the VM by accustomed attach a number machines that reserves a duplicate of method knowledge of all VMs and taking call of supply destination for virtual machine migration rather than repetition the complete memory copy of the VM, the execution log is barely transferred, there by additional decreasing the quantity of data to be migrated and it's conjointly save energy compare the opposite migration technique [6]. A VM consolidation approach wherever each the current and future usage of resources is taken into thought is projected that uses a regression-based model to approximate the long run electronic equipment and memory utilization of VMs and PMs [7].

Energy Management in Cloud Data Centers

A significant issue in clouds is up the energy potency techniques as day by day the cloud users are increasing and also the cloud service suppliers are taking over with new technologies. The value of provision and cooling the information centers is assumed to be fifty three of the mixture operational consumption of

information centers. Therefore for infrastructure suppliers it's should to scale back energy consumption for giving higher facilities. Hence, the tip results aren't solely to stay up the Administration controls and SLA approaches however conjointly to chop down energy value. So, there's an excellent analysis occurring in coming up with energy economical information centers and that even have recently received extended attention. The matter within the coming up with of the information center has been studied below varied views given as:

- Energy-efficient hardware design
- Dynamic Voltage and Frequency Scaling (DVFS)
- Server consolidation
- Switching off unused nodes

The virtualization technique has become enticing since its several edges [6] like:

- Optimizing utilization of IT infrastructure
- Reducing price and management quality
- Reducing readying time
- Increasing flexibility.
- Hardware Independence
- No human intervention
- Reducing period of time

Application performance and energy potency could be a key issue all told the higher than ways, to take care of the info centers it's pricey further because it is threatening to the planet in varied viewpoints. the large measures of power is spent to regulate and to cool down varied servers expedited within these server farms that lead in the high vitality prices and stupendous carbon impressions outflow. Cloud specialist organizations ought to embrace measures to ensure that their overall revenue isn't faded to a fault thanks to high energy prices [1].

TABLE 1*Comparison of Different algorithms and the percentage of energy saved*

Algorithm	**ApproachUsed**	**Energy Saved**
Exact Virtual Machine Allocation	Extended Bin Packing	90% morethan Best-Fit formulation and heuristic algorithm
Provisionandrelocationcombination algorithms	Extended Bin-Packing and IntegerLinear Program (ILP)	95% morethan Best-Fit formulation and heuristic algorithm

Reducethe useof PMsby SortingVMs and PMs	Sortingapplied to SPMs andSVMs	29% more than Custom Round Robin Allocations
EnergyAwareMigrationAlgorithm	First Fitallocation	22% more than Dynamic Round Robin and Random ChoiceMethod
SortingVMs and PMs toMinimizethe useof PMs and ExecutingVMs with similar Execution Timeon Same PM	Sortingand Executing VMswith similar execution time on same PMs	30% more than Custom Round Robin Allocations
HoneyBeealgorithm with hierarchical clustering	Each cluster isconsidered as a single resource	20% morethan Honeybee
Energy-aware resource utilization (ERU)technique	Based on artificial beecolony(ABC) optimization	25%morethanFirst Fitdecreasing(FFD) and Ant Colonyoptimization (ACO)

CONCLUSION AND FUTURE WORK

Energy conservation is one among the most challenges in cloud infrastructure since the consumption of power in the data centers are increasing day by day because of increase in processing and computation etc., which ends in inflated cost. An efficient technique for energy conservation in cloud data centers is VM Consolidation, which helps to scale back the consumption of power by migrating VMs and consolidate them into less number of Physical servers. There are another ways in which for achieving the target like DVFS, application programming, OS migration, energy aware programming and resource allocation etc., which can be surveyed within the close to future.

REFERENCES

[1] Abid, M. R., Kaddouri, K., El Ouadghiri, M. D., &Benhaddou, D. (2018). Virtual Machines' Migration for Cloud Computing. CLOUDCOMPUTING 2018.

[2] Singh, R., Kahlon, D., & Singh, S. (2016). Comparitive Study of Virtual machine migration techniques and challenges in Post Copy live virtual machine migration. International Journal of Science and Research.

[3] Sekhar Jyothi, Jeba Getzi, Durga S. A Survey On Energy Efficient Server Consolidation Through Vm Live Migration 2012.

[4] S. M. AlIsmail and Heba A. Kurdi. "Green algorithm to reduce the energy consumption in cloud computing data centres." In 2016 SAI Computing Conference (SAI), 2016, pp. 557-561.

[5] Ajith Singh. N, M. Hemalatha. Cluster Based Bee Algorithm For Virtual Machine Placement In Cloud Data Centre 2013.

[6] Inderjit Singh Dhanoa, Dr. Sawtantar Singh Khurmi. Energy-Efficient Virtual Machine Live Migration in Cloud Data Centers 2014.

[7] Rukman Palta, Rubal Jeet. Load Balancing in the Cloud Computing Using Virtual Machine Migration Review 2014.

[8] Chengjiang Liu. A Load Balancing Aware Virtual Machine Live Migration Algorithm 2015.

[9] Navnit Kumar, Sachin Majithia. An Efficient Virtual Machine Migration Technique in Cloud Datacenter 2016.

[10] Farahnakian F, Pahikkala T, Liljeberg P, Plosila J, Hieu NT, Tenhunen H. Energy-aware VM Consolidation in cloud data centers using utilization prediction model, 2015.

[11] Soramichi Akiyama, Takahiro Hirofuchi, Ryousei Takano, Shinichi Honiden, "MiyakoDori: A Memory Reusing Mechanism for Dynamic VM Consolidation", Fifth International Conference on Cloud Computing, IEEE 2012

[12] Bing Wei, "A Novel Energy Optimized and Workload Adaptive Modeling for Live Migration", International Journal of Machine Learning and Computing, Vol. 2, No. 2, April 2012

[13] F Ghribi, Makhlouf Hadji and Djamal Zeghlache, "Energy Efficient VM Scheduling for Cloud Data Centers: Exact allocation and migration algorithms"

[14] Chonglin Gu, Hejiao Huang, and Xiaohua Jia," Power Metering For Virtual Machine In CloudComputing—Challenges And Opportunities", IEEE Access, Vol. 2, Sep 2014.

[15] AlShayeji, M. H., Abed, S. E., & Samrajesh, M. D. (2017). Energy Efficient Virtual Machine Migration Algorithm. Journal of Engineering Research.

[16] Sulaiman NAB, Masuda H (2014) Evaluation of a Secure Live Migration of Virtual Machines Using Ipsec Implementation In: 2014 IIAI 3rd International Conference on Advanced Applied Informatics.

[17] Fahimeh Farahnakian, Adnan Ashraf, Tapio Pahikkala, Pasi Liljeberg, Juha Plosila, Ivan Porres, AndHannu Tenhunen,"Using Ant Colony System To Consolidate Vms For Green Cloud Computing",IEEE Transactions On Services Computing, Vol. 8, No. 2, March/April 2015.

[18] Ching-Chi Lin, Anton Beloglazov and Rajkumar Buyya, "Energy efficient allocation of virtual machines in cloud data centers", in Proceedings of the IEEE/ACM International Conference on Cluster, Cloud and Grid Computing (CCGRID), pp. 577–578, may 2010.

[19] T. Wood, P. Shenoy, A. Venkataramani, and M. Yousif, "Sandpiper: Black-box and Gray-boxResource Management for Virtual Machines," Computer Networks, vol. 53, no. 17, pp. 2923–2938,2009.

[20] C. Ghribi, M. Hadji, and D. Zeghlache. "Energy Efficient VM Scheduling for Cloud Data Centers: Exact Allocation and Migration Algorithms." In 2013 13th IEEE/ACM International Sympotyisium on Cluster, Cloud, and Grid Computing, 2013.

[21] Y. Ding, Xiaolin Qin, Liang Liu, and Taochun Wang. "Energy efficient scheduling of virtual machines in cloud with deadline constraint." In Future Generation Computer Systems, vol. 50, 2015, pp. 62-74.