International Journal on Future Revolution in Computer Science & Communication Engineering
Volume: 4 Issue: 4
ISSN: 2454-4248
52 – 56

A Review on Various Energy Efficient Techniques in Cloud Environment

Isha Sharma[1], Varun Jasuja[2]

(1) Research Scholar, GNIT Mullana

(2) Assistant Professor, GNIT Mullana

ABSTRACT:-Cloud computing is web based mostly development and use of engineering. it is a mode of computing within which dynamically scalable and sometimes virtualized resources are provided as a service over the web. Users needn't have data of, experience in, or management over the technology infrastructure "in the cloud" that supports them. programming is one of the core steps to with efficiency exploit the capabilities of heterogeneous computing systems. On cloud computing platform, load equalisation of the whole system will be dynamically handled by using virtualization technology through that it becomes potential to remap virtual machine and physical resources in step with the modification in load. However, so as to boost performance, the virtual machines ought to totally utilize its resources and services by adapting to computing setting dynamically. The load balancing with correct allocation of resources should be bonded so as to boost resource utility and energy efficiency.

KEYWORDS:-Cloud computing, Load balancing, Virtual machine, Host, Datacentre, Datacentre Broker

*****

I. Introduction

A rising computing model within the computing field is known as cloud computing [1] and provides several benefits. Computing model has performed of scalability for needed cloud and therefore the virtualized resources are used as service on web [2]. CC is standard technology in networking field consisting of parallel computing, distributed computing, technologies of network storage, utility computing, load balance and virtualization etc. are combined with alternative completely different product [3]. CC functions on demand access of computing resource (configurable) by setting the package and hardware systems over knowledge center. The inexperienced computing is that the advanced version of cloud computing helps in high performance style, having efficiency in power consumption and with safe mode of operation [4]. CC possesses 3 service delivery models (SDM), such as: i. package as a service (SaaS): this enables users of cloud to access the provider's apps (PA) over the web. ii. Platform as a Service (PaaS): this enables users to deploy their apps on platform development that service supplier of cloud cloud (SPC) provides. iii. Infrastructure as a Service (IaaS): allows users to rent, storage, processing of network sapacity.

Flexibility	CC is flexible, due to its quicker capacity to update the software's and hardware's to keep technology update with user demands.
Savings	By CC IT personnel and capital expenditure can be reduced.
Reliability	CC allows business continuation and loss recovery by providing multiple data centers over the cloud.
Scalability	The load balance among all the users can be called out by CC using multiple hardware platforms.
Security	The data sensitivity centralization allows improving the security as data can be removed from user machine. Cloud providers provide all updated security to protect the data.
Maintenance	The centralized update for user's machines will help in maintenance.

Figure 1 Benefits of cloud computing

The data centers are accustomed host the cloud applications are commonly consuming huge quantity of power, that yields increment in operational price and additional emission of carbon dioxide for the setting [8, 9]. There are inexperienced computing technologies for cloud service problems, that helps to reduce the operational price and additionally the carbon impact on setting. several governments are specializing in the problems of carbon emission reduction, so the impact over climate hazardous is reduced [10]. Minimizing the usage of power in information center is that the difficult task and is that the complicated problems because the computing apps square measure growing with enormous information thus the load on the server additionally increasing that causes demand of additional disks to method in desired computation time. The inexperienced cloud computing is taking part in a significant role as business purpose of read, wherever the energy saving throughout resource allocation is taken into account for account. Hence, resource allocation should be done properly and additionally energy efficiency is ought to be achieved [11]. This paper aims with the survey on energy potency in cloud computing and additionally connected work on that. additionally, IT industries adoption of inexperienced cloud computing, statistics of energy efficiency in cloud computing is additionally mentioned.

Literature Review

Tesfatsion et.al [1] projected a management technique for datacenter wherever variety of VMs, C.P.U. frequency and variety of Cores are all taken into thought to enhance the energy potency. quantity of power consumption by the system is calculated by these management techniques and that they calculate the facility consumption as output for given inputs. A feedback controller is employed to optimally set up the system for energy potency.

Buyya et.al [2] presents challenges in cloud with relevancy energy and price whereas meeting SLAs. The paper focuses on the energy economical management of knowledge center resources for cloud. The paper discusses a) energy-efficient architectural principles for cloud management b) resource allocation and programming policies for energy economical cloud considering QoS and characteristics of power usage by devices and c) novel software package technology for cloud management. Cloudsim toolkit is employed for simulation.

Mueen Uddin et. al. [3] proposed a framework for big and complicated server plantations to own energy potency and low carbon dioxide emission to the setting. The framework consists of 5 phases so as to implement inexperienced information centers for cloud. The paper divided datacenter resources into completely different pools and applies inexperienced metrics like PUE, information center potency on those resources to live the performance of every resource severally and additionally uses virtualization technology for correct implementation of inexperienced IT information center.

R.K jena [4] had planned a TSCSA algorithmic program for energy consumption and create span related to the resources allotted ought to be taken into consideration. This paper focuses on task programming using organism choice algorithmic program (TSCSA) to optimize energy and time interval. The result obtained by TSCSA was simulated by associate open supply cloud platform (CloudSim). Finally, the results were compared to existing schemes.

Meenakshi Sharma et. al. [5] analyzed completely different VM load equalization algorithmic programs and developed a brand new algorithm in VM to realize higher interval, price and energy efficiency. The new load equalization algorithm finds the interval of the individual resources within the information center and sends ID of resource having low interval to the controller of knowledge center to assign job to the current resource and thus will increase the performance. Cloudsim is employed to implement this algorithmic program.

Fumiko Satoh et al has centered on drop-off the energy by suggests that of knowledge centers. For the longer term, the authors have developed a system on energy management for cloud by using operate of sensor management by victimization VM allocation tool. The planned system helped to cut back the consumption of energy in variety of knowledge centers and reducing carbon emissions energy. The results created square measure saving half-hour of the energy. The planned technique is not energy saving because it consumed energy and desires allocation tool for the virtual machines.

C. Belady has analyzed that if the information center energy bill is over the need of the user than the user is not at all alone. With this nature, the consumption of energy by information centers is additional and therefore the no reason of expectation for doing one thing however to grow. Energy consumption is additional as a result of during this, growth of method is very important.

Bhanu Priya et al planned metrics of cloud computing to create cloud inexperienced by suggests that of efficiency. variety of energy models is mentioned within the analysis for reducing the consumption of power CO2 emission for creating cloud greener. three factors are thought of within the survey, firstly, to create cloud greener be virtualization, secondly, distribution of labour load, and third, pay-per-use with self-service that is proved as reduction key for consumption of energy. The work doesn't offer associate applicable result to make cloud greener and self-service cut back the key consumption and make its speed slow in virtualization.

The communications between VMs consumes energy within the datacentre [6]. Reducing the network traffic between servers reduces energy consumption. The studies [6] [27] [28] [29] [30] consider the network traffic of the VMs placements to cut back the energy consumption.

Chuliang Weng et al has presented hybrid programming framework for the C.P.U. programming within the virtual machine monitor. 2 kinds of applications are high-throughput sort and coincident sort. Virtual machine sets coincident sort once majority of employment is coincident applications so as to cut back price of synchronization. Otherwise, it's set to high-throughput sort by default. Experiments and results show the framework and programming strategy is versatile to enhance performance of virtual machine. The analysis provides less correct results than different techniques and its puts result on the

 ISSN: 2454-4248
52 – 56

performance of cloud system and cut back the synchronization.

Krish has mentioned the idea of cloud computing at the side of major services of the clouds. It additionally discusses regarding the drawbacks and benefits of the cloud computing. The idea of ancient strategies for cloud computing is additionally mentioned.

VM migration technique is used to optimize programming. This focuses on transferring VMs between servers via the network. it's used as an answer for up energy potency, by consolidating the VMs on fewer physical servers [20] [21]. In each programming and VM migration strategies were used to cut back the energy consumed by servers. It planned the Energy-aware programming algorithmic program victimization Workload-aware Consolidation Technique (ESWCT). The algorithmic program aims to consolidate the VMs in minimum quantity of servers supported equalization the integrated resources (processor, memory and network bandwidth) that are shared at the same time among users in cloud data centers. It considers heterogeneous workloads of varied resource consumption characteristics. In [21], they propose an approach for VM placement and migration to deal with each over-utilized and under-utilized servers. within the VM placement, they applied a modification of the simplest work Decreasing algorithmic program known as Power Aware Best Work Decreasing (PABFD), to apportion a brand new request for a VM to a server that gives the smallest amount increase in power consumption caused by the allocation.

A power-aware programming algorithmic program is bestowed in [23]. It implements Dynamic Voltage Frequency Scaling (DVFS) technique, that is applied with variety of special processors that may to work at completely different voltage and frequency levels. It selects the suitable provide voltages and frequencies of process parts to reduce energy consumption while not violating the SLA, supported the VMs employment.

The study in [24] follows identical approach however they think about the SLA supported the task level (task deadline), and scaling solely the provision voltage. The programming algorithmic program applies Dynamic Voltage Scaling (DVS) to avoid wasting energy whereas testing the power of every scheduled task to fulfil its deadlines. They think about two DVS programming policies: one a space-shared policy and therefore the different a time-shared policy.

The study in [25] applied DVFS technique to seek out the best frequency for every task of a scientific advancement while not affecting its performance. A multi-step heuristic advancement programming algorithmic program is planned, specifically Energy-Aware Resource efficient workflow programming underneath point in time constraint (EARES-D).

Optimization technique		Study	Strategy	Performance measure	Simulation tool
Software technique	Server Energy	[2]	Utilizes MCC method to provides a balance between power consumption and SLA.	•Total energy consumption •SLA violation	CloudSim toolkit.
		[19]	Utilizes ACO meta-heuristic for VM placement.	•Energy consumption by a placement •Average execution time	They developed their own simulation toolkit.
		[11]	Applies VMs consolidation method by utilizing FF and BF bin packing.	•Number of utilized servers •Number of migrations	They developed their own simulation toolkit.
		[20]	Considers load balancing of physical resources in VMs placement. Migrates the VMs from lightly loaded servers to heavy loaded servers.	•Power consumption • Imbalance utilization value •Integrated resources utilization	CloudSim toolkit.
		[21]	Applies VMs consolidation method by utilizing PABFD based on bin packing problem. Prevents the servers to be fully utilized by maximum load threshold.	•Total energy consumption •Number of VM migrations. •SLA violation	CloudSim toolkit.
	Memory Energy	[22]	Propose BCSF and BNF policies.	•Energy consumption. •Waiting time in run queue •Elapsed time to schedule a virtual machine	MPSim simulator.
Hardware technique		[23]	Applies DVFS to provide a balance between power consumption and SLA.	•Energy consumption •SLA violation	CloudSim toolkit.
		[24]	Applies DVS to provide a balance between power consumption and tasks deadline.	•Energy consumption •Job acceptance ratio	GridSim toolkit.
		[25]	EARES-D utilizes DVFS to schedule DAG workflow based on earliest completion time for a workflow.	•Energy consumption •Resources utilization rate	CloudSim toolkit.
		[26]	Six different algorithms that aim to set the same optimal speed for all tasks in the server and increase its utilization under the deadline constraint.	•Energy consumption	NA.

II. Conclusion

Cloud computing has wide usage in world however it lacks with several problems and are addressed within the analysis gap, primarily the service responsibleness with energy potency. as a result of increased knowledge in today's world is additionally increasing the quality within the cloud computing as per energy consumption is concerned. several researchers are performing on the optimized energy efficiency technologies with higher scalability and responsibleness of cloud computing. This paper terminated that, there's additional study is needed over these problems. during this paper, the inexperienced IT Technology framework specific helps in reduction in greenhouse emission, energy efficiency improvement and additionally permits utilization and recycle. This framework additionally provides datacenter efficiency and carbonic acid gas emission measuring. the longer term scope is to optimize energy consumption and supply time interval guarantee by considering the performance parameter and additionally by increasing the info volume therefore on reduce the expenditure of cloud suppliers.

References

[1] S K Tesfatsion, E Wadbro, J Tordsson, "A combined frequency scaling and application elasticity approach for energy-efficient cloud computing", Sustainable Computing: Informatics and Systems, Volume 4, Issue 4, Dec 2014, pp 205-214, DOI: 10.1016/j.suscom.2014.08.007.

[2] Buyya, Rajkumar, Anton Beloglazov, Jemal Abawajy, "Energy-efficient management of data center resources for cloud computing: A vision, architectural elements, and open challenges", International Conference on Parallel and Distributed Processing Techniques and Applications, Las Vegas, USA, July 1215, 2010..

[3] Mueen Uddin, Azizah Abdul Rahman, "Energy efficiency and low carbon enabler green IT framework for data centers considering green metrics", Renewable and Sustainable Energy Reviews, Vol 16, Issue 6, pp 4078-4094, Aug 2012, DOI: 10.1016/j.rser.2012.03.014.

[4] R.K Jena, "Energy Efficient Task Scheduling in Cloud Environment", CPESE- 2017, Berlin, Germany.

[5] Meenakshi Sharma, Pankaj Sharma, "Performance Evaluation of Adaptive Virtual Machine Load Balancing Algorithm", International Journal of Advanced Computer Science and Applications, Vol 3, No 2, 2012, pp 86-88..

[6] Jain, M. Mishra, S. Kumar Peddoju and N. Jain. (2013), "Energy Efficient Computing-Green Cloud Computing", Proceedings of the International Conference of the Energy Efficient Technologies for Sustainability (ICEETS), Nagercoil.

[7] F. Satoh, H. Yanagisawa, H. Takahashi and T. Kushida. (2013), "Total Energy Management system for Cloud Computing", Proceedings of the IEEE International Conference of the Cloud Engineering (IC2E), Redwood City, CA.

[8] B. Priya, E. S. Pilli and R. C. Joshi. (2013), "A Survey on Energy and Power Consumption Models for Greener Cloud", Proceeding of the IEEE 3rd International Advance Computing Conference (IACC), Ghaziabad.

[9] Krish Jamsa (2013), "Cloud Computing", First India Edition, Jones and Bartlett India Pvt. Ltd., 978-93-80853-77-2.

[10] D. Cavdar and F. Alagoz, (Eds.). (2012), "A Survey of Research on Greening Data Centers", Proceedings of the IEEE Global Communications Conference (GLOBECOM); Anaheim, CA.

[11] T. Vinh T. Duy, Y. Sato and Y. Inoguchi. (2010), "Performance Evaluation of a Green Scheduling Algorithm for Energy Savings in Cloud Computing", Proceedings of the IEEE International Symposium of the Parallel & Distributed Processing, Workshops and Phd Forum (IPDPSW), Atlanta, GA.

[12] M. Devare, M. sheikhalishahi, L.Grandinetti (2010), "Prototype Implementation of Desktop cloud", by IOS press, Netherland, presented in Centraro International workshop on HPC, Grids and clouds.

[13] D. Kliazovich and P. Bouvry. (2010), "Green Cloud: A Packet-level Simulator of Energy-aware Cloud Computing Data Centers", Proceeding of the IEEE Global Telecommunications Conference (GLOBECOM), Miami, FL

[14] Gaurav Dhiman, Giacomo Marchetti, Tajana Rosing (2009), "vGreen: A System for Energy Efficient Computing in Virtualized Environments", in conference of ISLPED 2009 San Francisco, California, USA, 19-21.

[15] M. Devare, M. sheikhalishahi, L.Grandinetti (2009), "Virtualization: A Foundation for Cloud Computing", in International Journal of Networking and communication and Engineering.

[16] E. Feller, L. Rilling and C. Morin, "Energy-aware ant colony based workload placement in clouds," Proc. 2011 IEEE/ACM 12th Int. Conf. on Grid Computing, pp. 26–33.

[17] H. Li, J. Wang, J. Peng, J. Wang and T. Liu, "Energy-aware scheduling scheme using workload-aware consolidation technique in cloud data centres," Communications, China, vol. 10, no. 12, pp.114, 124, Dec. 2013. doi: 10.1109/CC.2013.6723884

[18] A. Beloglazov and R. Buyya, "Optimal online deterministic algorithms and adaptive heuristics for energy and performance efficient dynamic consolidation of virtual machines in cloud data centers," Concurrency and Computation: Practice and Experience, vol. 24, no. 13, pp. 1397– 1420,2012.

[19] J. Jang, M. Jeon, H. Kim, H. Jo, J. Kim and S . Maeng, "Energy reduction in consolidated servers through memory-aware virtual machine scheduling ," IEEE Trans . Comp., vol. 60, no. 4, pp. 552, 564, April 2011. doi: 10.1109/TC.2010.82d

[20] R. N. Calheiros, R. Ranjan, A. Beloglazov1, C. A. F. De Rose and R.Buyya, "CloudSim: A toolkit for modeling and simulation of cloud computing environment and evaluation of resource provisioning algorithms ," Software : Practice and Experience , vol. 41, no. 1, pp. 23–50, s1ozsnrccoi: 10.1109/TC.2010.82

[21] K. H. Kim and J. Kim, "Power aware scheduling of bag-of-tasks applications with deadline constraints on DVS-

 ISSN: 2454-4248
52 – 56

enabled clusters," CCGRID, vol. 7, pp. 541–548, May 2007.

[22] F. Cao and M. M. Zhu, "Energy efficient workflow job scheduling for green cloud," Proc. 2013 IEEE 27th Int. Symp. on Parallel and Distributed Processing Workshops and PhD Forum, pp. 2218–2221.

[23] L. M. Zhang, K. Li and Y.-Q. Zhang, "Green task scheduling algorithms with speeds optimization on heterogeneous cloud servers," Proc. of the 2010 IEEE/ACM Int. Conf. on Green Computing and Communications & Int. Conf. on Cyber, Physical and Social Computing, Washington, DC, USA, pp. 76–80

[24] K. H. Kim and J. Kim, "Power aware scheduling of bag-of-tasks applications with deadline constraints on DVS-enabled clusters," CCGRID, vol. 7, pp. 541–548, May 2007.

[25] F. Cao and M. M. Zhu, "Energy efficient workflow job scheduling for green cloud," Proc. 2013 IEEE 27th Int. Symp. on Parallel and Distributed Processing Workshops and PhD Forum, pp. 2218–2221.

[26] L. M. Zhang, K. Li and Y.-Q. Zhang, "Green task scheduling algorithms with speeds optimization on heterogeneous cloud servers," Proc. of the 2010 IEEE/ACM Int. Conf. on Green Computing and Communications & Int. Conf. on Cyber, Physical and Social Computing, Washington, DC, USA, pp. 76–80.