

# Survey on a New Approach of Energy Efficient Virtual Machine allocation in Cloud Computing

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**Abstract-** Rapid growth of the demand for computational power has led to the creation of large-scale data centers. They consume enormous amounts of electrical power resulting in high operational costs and carbon dioxide emissions. Moreover, modern rational costs and carbon dioxide emissions. Moreover, modern Cloud computing environments have to provide high Quality of Service (QoS) for their customers resulting in the necessity to deal with power-performance trade-off. So, better virtual machine allocation, CPU Power management is necessary. Scheduling of virtual machine in a way to optimize for energy saving and performance. This paper presents the different techniques to reduce energy consumption and proper allocation of virtual machine.

**Index Terms-**Energy Efficiency, SLA, Power Consumption, VM allocation.

## I. INTRODUCTION

Cloud computing offer on demand access to computational resources over the Internet. Cloud Computing provides an environment for users to access a pool of resources such as Applications, Development Environments, Virtual Machines and so on, by using network communication media to access computing resource. agreements between the providers and the consumers. Generally clouds give customers three levels of access: Software-as-a-Service (SaaS), Platform-as-a Service (PaaS), and Infrastructure-as-a-Service (IaaS). Regardless to the access type, the power consumption in the data centers grows linearly with the growth of the customer requirements. According to a cloud research done by International Data Corporation, spending on public IT cloud services reached \$47.4 billion in 2013.<sup>[8]</sup>

The rapid growth of cloud computing has increased the usage of computing utility around the world. As cloud computing delivers enormous amount of computing resources to users to meet their demands. With the enormous consumption of electrical energy at data center; results high emission of carbon dioxide and operating cost. This issue will be grown rapidly until efficient energy resource management related mechanisms will be adopted or proposed. To deal with the enormous energy consumption issue, it is crucial to purge inefficiencies and wastage of power consumption by computing nodes. To manage multiple applications in a green cloud environment at data center level creates the challenge for on-demand dynamic resource allocation<sup>[1]</sup>

## II. BACKGROUND THEORY

Green Cloud Computing in a simple way describes a facet of computing that is interested in reducing number of physical machines for performing computational tasks and improving energy efficiency. With the increase in usage of cloud service providers and their services, an exponential increase in the energy consumption in data centers is observed. This has lead to the increased generation of heat leading to the usage of cooling systems and large amount of electricity consumed by data centers. There is a need for energy efficient processing at data centers and power aware ways to place virtual machine (VM) requests into available computing servers to reduce energy consumption which has become a hot research subject. This survey explores the various energy efficient techniques of virtual machine

allocation and migration in a cloud environment.<sup>[10]</sup>

In data center has number of active physical machine and number of virtual machine by the clients. First received by the VM When the request form the client to access the physical resources and then that VM allocates the resources to the client based on the related constraints are presented. Energy consumption of data centers sources are considered with cooling system, storage, hardware, bandwidth and computing nodes. The energy consumption main thing is to saving the power consumption and to reduce the number of active physical machine using virtual machine.<sup>[10]</sup>

### III. LITERATURE SURVEY

Baljinder Kaur, Arvinder Kaur<sup>[1]</sup> proposed new energy aware Hybrid Algorithm for VM allocation which is also consider SLA parameters, response time, Throughput. The main focus is to provide an efficient resource allocation to achieve the green computations for data centers. The methodology is proposed that works for reducing energy consumption. In this hybrid Energy aware is compared with Minimization of migration(MM) algorithm .Results is the Hybrid Energy Aware algorithm provides less energy consumption with effective response time and throughput while meeting all considered SLA metrics. But , this paper does not provide other QoS parameter like cost or Security etc. Kriti Agrawa, Priyanka Tripathi<sup>[2]</sup> proposes the power aware artificial bee colony virtual machine allocation technique which can reduce the power consumption of datacenters and compared it with genetic algorithm power aware virtual machine allocation in private clouds. In this paper result show that the proposed algorithm artificial bee colony for energy aware virtual machine allocation produces better results than the existing genetic algorithm for power aware virtual machine allocation. The energy consumption of GA is approximately 115-120% higher than the ABC. Hence, It Conclude that this proposed methodology gives the better result.

Muhammad Anan and Nidal Nasser <sup>[3]</sup> proposed paper aim is to design and implement an energy efficient computing framework for green cloud datacenters that improves energy efficiency, reduces operational costs, and meets required Quality of

Service (QoS). A dynamic migration algorithm is proposed to minimize the cost of energy in consideration of SLAs. This approach utilizes one of the most promising technologies in the areas of server virtualization research area, namely Software Defined Networking (SDN) using Open Flow technology.

The proposed DMA algorithm on arranging the virtual machines in servers will lead to a higher utilization of datacenter's servers; Also, the algorithm can guarantee that most of the clients can receive acceptable service with a limited number of active servers.. Based on the achieved results, the feasibility of the DMA algorithm is proved .Using the new design of future networks, engineers can get more scalability and faster response times which is important to Virtual Machine System Product (VMSP). The main advantage of algorithm is wide applicability P.Aruna, S.V asantha <sup>[4]</sup> focus on to how can a cloud provider multiplexing their physical resources to cloud user to reduce the power consumption of the data centers. This paper, explored the particle swarm optimization algorithm for the virtual machine provisioning to make the cloud data centers as power efficient. Also discussed the power model for the servers, propose the power aware PSO algorithm for the virtual machine provisioning in the cloud. In the future, we would incorporate the PSO algorithm to the consolidation unit with this work. The disadvantage is that it does not provide other metrics like SLA violation, cost etc.

Anton Beloglazov and Rajkumar Buyya<sup>[5]</sup> Propose an efficient resource management policy for virtualized Cloud data center The objective of this paper is continuously consolidate leveraging live migration and switch off idle nodes to minimize power consumption, while providing required Quality of Service . this work proposed and evaluated heuristics for dynamic reallocation of VMs to minimize energy consumption, while providing reliable QoS. The obtained results show that the technique of dynamic reallocation of VMs and switching off the idle servers brings substantial energy savings and is applicable to real-world Cloud data centers. Disadvantages of this paper are that any calculation is not properly shown.

Ysstheen raprakash govindraj, Hector DuranLimon <sup>[6]</sup> propose a QoS aware load balancing and resource allocation framework for IaaS cloud providers. Our

framework includes VM life cycle parameters while energy consumption is minimized. includes service level agreement (SLA) parameters related to the Virtual Machine (VM) life cycle such as VM startup times. It include SLA parameters related to the Virtual Machine (VM) lifecycle, namely startup time, scale up time, and scale out time of VMs. These proposed models are going to be validated by testing the models in the cloud simulator environment CloudSim and comparing the simulation results with the actual measurements in a real cloud platform.

Shaden M. Allsmail, Heba A. Kurdi<sup>[7]</sup>. It optimizes Virtual Machines' (VMs') allocation and consolidation so as to improve resource utilization of running servers and the shutdown of idle servers. The proposed algorithm was evaluated and compared with two benchmarks DVFS (Dynamic Voltage Frequency Scaling) and ESWCT (Energy-aware Scheduling algorithm using Workload-aware Consolidation Technique). It combines the VMs in the minimum number of powerful servers and accordingly switches off inactive servers. And the experimental results show a significant improvement in reducing energy consumption and improving resource utilization. Disadvantages of this paper are that various SLA parameters are not considered.

ilksen Çağlar, Deniz Turgay Altılar<sup>[8]</sup>. proposed clustering based solution for VM migrations and consolidation in this paper. It show that the proposed best fit VM placement approach is energy efficient as compared to traditional VM placement approach. Clustering is done to group the servers into categories based on whether they have VMs running on it or not. Clustering is done to switch off the servers which do not have any VMs running on it. No. of VM Migrations are compared for traditional VM Migration approach (TVMM), and Best Fit based approach (BFVMM). It is observed experimentally that proposed best fit approach is better in terms of VM migrations, VM consolidations and energy consumption Disadvantage is that the proper calculation of results is not shown.

Nimisha Joy, K. Chandrasekaran, Binu. A<sup>[9]</sup> draws the attention on the various methods enforced on the cloud environment to make it more energy efficient. In this paper the general approaches on energy efficient cloud computing namely power and energy models and The major challenges in building a model for Energy efficient or Green Cloud is also being

discussed and works related to reduction of power and energy in field of cloud computing services are also being identified in this survey. This work gives the information on the various models and helps to pave a road map for a greener and energy efficient cloud. Also the role of SLAs in energy efficient cloud computing is being discussed briefly. Disadvantage of this paper is that it does not provide any algorithm for energy efficient cloud computing.

Mina Taheri and Nirwan Ansari<sup>[11]</sup> focus on the IaaS and SaaS providers and propose a power-aware algorithm for both IaaS and SaaS providers to jointly and optimally control the admission rate and allocate the resources. In this optimization model, try to maximize both providers' revenue while satisfying the QoS requirements of the clients. SaaS and IaaS providers compromise on a viable solution By applying the Stackelberg competition model. It works offline for SaaS providers to determine the maximum acceptable arrival rate of each class of services and the maximum number of required virtual machines for each class Neeraj Kumar Sharma and G. Ram Mohana Reddy<sup>[12]</sup> deals with the design of an energy efficient algorithm for optimized resources allocation at data center using combined approach of Dynamic Voltage Frequency Scaling (DVFS) and Genetic algorithm (GA). The performance of the proposed energy efficient algorithm is compared with DVFS. Experimental results demonstrate that the proposed hybrid energy efficient algorithm consumes 22.4% less energy over a specified workload with 0% SLA violation and increases the average resources utilization of datacenter by 0.6% on specified workload. Whole experiment is carried out in Cloudsim simulator environment. The Limitations of paper is: it considered server energy consumption only, but energy consumption of routers and switches is not taken into account.

Dan Liu, Xin Sui, Li Li<sup>[13]</sup> puts forward an algorithm that combines Genetic Algorithm (GA) with Simulated Annealing (SA) which lower the energy consumption of the cloud data center. The energy-efficient virtual machine placement algorithm primarily accomplishes the population initialization according to the virtual machine placement rule and crossover, variation and correction. Finally, filter the new population on the basis of the metropolis rule. Genetic simulated annealing algorithm has improved a lot in server's running amount, CPU utilization,

energy consumption and SLAV, so that the energy consumption in cloud data center decreased.

Giuseppe Portaluri, Davide Adami, Andrea Gabbrielli, Stefano Giordano, Michele Pagano<sup>[14]</sup> compares a set of Virtual Machine (VM) allocators for Cloud Data Centers (DCs) that perform the joint allocation of computing and network resources. here five different allocators for VMs in DCs that implement two different policies, BF and WF, and compared them with a FF allocator. For each available server, we choose the most power- efficient path minimizing the total transmission cost computed according to a realistic consumption model and results show that the Multi-Objective approach is able to allocate the greatest number of VMs on average having the narrowest distribution when WF is adopted.

Yashwant Singh Patel, Neetesh Mehrotra, Swapnil Sonar<sup>[15]</sup> discuss on various Cloud and Green computing is given then various application areas of Green IT are also considered here. In this paper a brief discussion on Cloud and Green Computing is given after that a year-wise review on Green IT areas for Cloud computing is represented. Also it is based on concern are of Green IT and different objectives. In study it is also observed that to sustain the natural resource, to provide green and cost efficiency, reduce carbon emissions, virtualization of servers and management of servers are very rare objectives

#### IV. CONCLUSION

As Increasing use of Cloud computing, more data centers are deploying throughout the world. So, Energy demand of electricity and power is also increased for use of VM allocation, task scheduling, migration etc. so more energy is wasted day by day. There are various algorithm is use for energy efficient virtual machine allocation. As per above all the survey paper show that how to allocate the virtual machine, resource allocation with more energy efficiency is described also that contain limitation of the papers as requirement.

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