REVIEW: ENERGY CONSUMPTION IN SLA VIOLATION OF ST POLICY

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***Abstract*—** with the increasing growth of enormous data storage and computational demand, Green Cloud Computing is known to be a wide area and hot field for research. To capitalize different IT resources, an impressing and ultimate way has created by Cloud computing to virtualize data centers and server to form energy efficient. The IT resources consume enormous amounts of energy and power, which in turn creates shortage in energy and change in global climate. Therefore, there is a need of Green cloud computing which create solutions. So, that it cannot only make the IT resources energy efficient but also minimize the operational costs. To solve environment related issues in the IT field, Green IT is named to be an important step. It includes a enormous number of areas for example to give proper management of virtualization of servers, power, data centers design, eco-labeling, recycling methods, environment sustainability design and energy efficient resources etc. In this review paper. Firstly, a brief discussion on Cloud and Green computing then different technique of Green IT to minimize the energy consumption in cloud are discussed and reviewed. Based on the comparative analysis on Green-IT areas different research issues related to minimize the energy consumption in the cloud, Objectives of such areas are elaborated further.

***Keywords*—** Cloud Computing, Green Computing, Green IT, Energy consumption, SLA violation, and DVFS.

I. INTRODUCTION

In last few decades the day-to-day demand and usage of cloud computing in IT areas makes it compulsory to think towards the Green IT areas so that the energy and power can not only be minimized but can also be used for the purpose of recycling. Generally, Cloud exhibits the large amount of various data centers and servers to fulfill the huge amount of customers based on pay-per-use strategy. Such resources are spanned in large area and consume enormous amount of power for networking devices, monitors, cooling technologies and farms of servers etc [1]. Therefore to make these resources green by using Green technologies have become a primary purpose of various organization of both government as well as industries. Because of the environmental perspective, Green IT and to deal with IT related environment issues Green IT offers a large amount of methodologies and practices through some Green initiatives. The rest of this paper is categories as follows: In section 2, a brief introduction of Cloud computing is discussed. In section 3 basic concepts and principles of Green computing are discussed. In section 4, a complete review on Green IT areas for cloud computing to minimize the energy consumption in the cloud is discussed. In Section 5, a comparative study of Green IT areas for cloud computing to minimize the energy consumption in the cloud is elaborated. It also discusses various research issues and some significant results of this survey. Finally a concluding remark of this paper is given in last section.

II. CLOUD COMPUTING

A. introduction –

Cloud computing arise as a new computational model to replace the traditional computing model and fulfill the expanding demand for the resources, software and infrastructures. Cloud Computing is fully new computing model come up in the 21st century[2].Cloud computing is defined as delivery of services on demand in which shared resources, information, software and other devices are provided according to the client's needs at specific period of time[3].

Developing and maintaining on premise software consider a costly, complex, and risky task. All software requires an operating system, hardware, web servers and database. Once the requirements were provided, a group of developers had to find complex programming framework. Furthermore, a group of database, network and system management experts are required to keep everything up and running. Unavoidably, a business need would require a change to the software product, which would then begin a long structure, test, and redeployment cycle [4].

Big companies often needed particular facilities to house their data centers. Huge amounts of electricity also were needed to power the servers and the systems to keep them cool. Additionally, a backup site is needed to mirror the data centers to replace them in case of disaster.

NIST defines "Platform-as-a-Service" as the customer has the capability to deploy onto the cloud platform. Customer created or obtained applications using programming languages, services, APIs and tools provided by the provider. The customer does not handle or control the basic cloud infrastructure including servers, network, storage or operating systems, but has control over the deployed applications and perhaps setup settings for the application-hosting environment.

B. Services of Cloud Computing

Cloud is referred to a pool of Data centers on which various Services are deployed through Internet. Such services are broadly classified in 3 categories: SaaS (Software as a Service), PaaS (Platform as a Service) , IaaS (Infrastructure as a Service). In, SaaS service model, customers obtain the potential for accessing of application or service that is deploy on the cloud, for example, Salesforce.com.
In PaaS service model, customers obtain the potential for accessing platforms so they can deploy their applications and programming's in the cloud.
While in IaaS service model, consumers acquire the potential for controlling and managing the systems in provisions of storage, connectivity of network, applications and operating systems, but can't controlled their selves the infrastructure of cloud.
The other service model, such as CaaS (Communications as a Service) is known to be a subset of SaaS which is particularly related with market or industry and used to depict hosted services of IP telephony [5].

C. Deployment models of cloud computing

The deployment of cloud computing is varied based on the requirements and based on these requirements the deployment models can be categorized into four types such as Private Cloud, Public cloud, Community cloud and Hybrid cloud [5].These models are described as follows:

Private Cloud: It is deployed, controlled and maintained for a particular organization or a company.

Public Cloud: It is available for commercial basis which allows the users to deploy a service and build up the environment of cloud.

Community Cloud: It is utilized by number of organizations which are having common needs and interests.

Hybrid Cloud: It shows a various clouds with various types yet having the potentiality through their interfaces to permit and move applications or information between to each other cloud. It can be a combination of more than one clouds.

III. GREEN COMPUTING

The test set for this evaluation experiment watermark image randomly selected from the internet. Matlab 7.0 software This section define a brief discussion on origin, definitions, Green IT, applications of Green IT and need of Green IT as follows:

A. Origin

The Green Computing origin is begun in 1987, when the named "Our Common Future" report is innovated by the World Commission. It fundamentally expressed the thought regarding "sustainable development [6] [7]. In 1992, one consumer Energy Star plan is launched by the U.S Environmental Protection Agency (EPA) [8]. The purpose behind this is to minimize the consumption of energy it was primarily for PC products.

B. Definitions

Green cloud Computing refers the efficient utilization of computers and different technologies with respect to environment so that the primary goals such as energy efficient peripherals, improve the consumption of resources and electronic waste can be fulfilled. These goals won't just make the resources more efficient but also enhance the overall performance. In the technical way, the Green cloud Computing can have 2 aspects:

(i) For the purpose of software technology is to make such strategies that can increase the efficiency of program, energy and storage.

While (ii) In hardware aspect there is require of such technologies which can not only minimize the consumption of energy but also make it economically efficient with the help of recycling [9] [10].

C. Green IT

Green IT, is a development and proposal of new computing models that used to make the IT resources more energy efficient both in terms of cost and power. While using the IT resources there are number of key areas that should be taken care. The Primary key areas of Green IT are discussed further.

D. Application Areas of Green IT

Green IT spans a number of areas that are needed to be focused, such as:

i). Proper management of power

ii). Virtualization of servers

iii). Data centers Design

iv). Design of recycling methods

v). Eco-labeling for IT products

vi). Environment sustainability design

vii). Energy efficient resources

These areas are needed to be taken under consideration, while using the IT resources.

E. Need of Green IT for Cloud Computing

In modern world, where the servers and data center are remotely controlled under the Cloud Computing models there is a need of Green cloud Computing to make these energy more effective and economically reliable. While offering the Cloud services, the service provides should be guaranteed that they can provide energy effective services with economical cost. But the challenging and complex task is to lower the usage of energy of data centers. As data are developing exponentially, the Green Cloud computing having issues related to infrastructures for calculations that can not only minimize the consumption of energy but can also make the Cloud services reliable and economically efficient.

IV.LITERATURE REVIEW

Xu et al. [11] define virtual machine consolidation as a multi target optimization issue while minimizing SLA violation and energy consumption at the same time and an improved in genetic algorithm with fuzzy multi-target calculation for VM consolidation.

Anton et al. [12] have characterized principles and an architectural framework of Cloud computing for energy-aware and algorithms has created for mapping energy-aware of VM's they have use the idea of dynamic combination of virtual machine resource partitions.

The threshold is fixed in [12] for virtual machine consolidation isn't appropriate whereas virtual environment with different workloads. Subsequently, they [13] show that virtual machine consolidation for inconstancy of workloads. At that point they design novel adaptive heuristics approach for dynamic combination of virtual machines. Results exhibit that the selection and allocation algorithms save consumption of energy. Though, the SLA violation and energy consumption created by the framework has a scope of improvement. In this way, we propose another VM consolidation algorithm in CloudSim, which performs better.

Beloglazov et al. [14] have implemented heuristic approach like an energy aware resource allocation for virtual machine consolidation in CloudSim. They separate dynamic VM consolidation problem into four major steps. First of all they check if host is over-loaded or not. Second, if host is over-loaded, at that point it select at least one VM for relocation. Third, selected VM is placed (reallocate) to another suitable host. Finally they check if host is underutilized or not. When host is under-utilized they migrate all VM from host to another host and switched of host. Moreover, four distinctive VM allocation algorithms are presented to make a decision over used hosts, three VM selection algorithms are proposed to select VMs for migration and one VM placement algorithm to place selected VM to another host.

Zhibo Cao et al [15] have implemented SLA and energy aware algorithm for dynamic They proposed VM distribution to discover over used host in which they utilize mean and standard deviation with dynamic security parameter to discover usage of host at each time span. Also they proposed VM selection to select VM for migration from over stacked host. In VM selection they use positive correlation algorithm. The positive correlation indicates that two variable X and Y increase or decrease at the same time in most cases. Experiment shows that proposed algorithm perform better than existing one with respect to SLA but little worse performance with respect to energy consumption.

Pushtikant Malviya et al [16] have implemented an energy mindful resource allotment heuristic approach for virtual machines in Cloudsim. They utilize mean and standard deviation to discover upper limit of use to pass judgment on number of over used host. This strategy is used for re-arrangement of virtual machines in a cloud environment to save the power of data server.

Jing Huang et al [17] have proposed an energy and SLA mindful algorithm for reallocation of VM on other appropriate host. They proposed best fit host algorithm for reallocation of VM in which they use host which has highest predicted utilization without surpassing the over use limit after VM migration. Additionally they proposed best fit VM algorithm in which they use idea of dynamic programming 0-1 rucksack issue for each host. They assess the execution of calculation regarding vitality utilization, number of VM movement, number of rebooted has, number of host shutdowns and SLA infringement. Experiment demonstrates that proposed calculations are performed superior to existing ones as far as vitality utilization however minimal more regrettable as far as SLA violation caused by overloaded server.

Kusic et al. [9] have exhibited a energy and dynamic assets provisioning technique utilizing Limited Look-ahead Control (LLC) in heterogeneous virtualized condition. Anyway this technique isn't proper for infrastructure supplier as it dependent on application. Additionally algorithm complexity isn't appropriate for real scenario of cloud computing environment.

Vahora et al, [19] have analyzed the impact of VM size and network bandwidth on VM migration time and energy consumption of the source system. Variety in VM size and network bandwidth results a critical effect on vitality utilization of source framework during VM Live migration. Further we can decrease energy consumption and relocation time of subsystems by selecting VM with least memory size for relocation and expanded network transmission capacity. Aftereffects of this investigation would plan algorithm to enhance energy requirements in live migration of VMs. Live migration highlight of Virtualization has good potential to optimize energy efficiency during live relocation.

V. COMPARATIVE STUDY OF GREEN IT AREAS FOR CLOUD COMPUTING TO MINIMIZE THE ENERGY CONSUMPTION.

Three methodologies have been gone out to make cloud computing environments increasingly natural amicable. These methodologies have been gone for in the data centers under experimental conditions. The techniques are:

A. *Dynamic Voltage frequency scaling technique (DVFS*):- Every electronic circuitry will have an operating clock associated with it. The working frequency of this clock is adjusted so that the supply voltage is regulated. Thus, this strategy heavily relies upon the hardware and is not controllable according to the varying needs. The power savings are also low compared to other approaches. The power savings to cost incurred ratio is also low [20].

B Resource allocation or virtual machine migration techniques: - In a cloud computing environment, each physical machine hosts a number of virtual machines where upon the applications are run. These virtual machines can be exchanged over the hosts as indicated to the varying needs and available resources. The VM relocation strategy focusses on transferring VMs in such a way, so that the power increase is least. The most power efficient nodes are chosen and the VMs are exchanged crosswise over to them.

C Algorithmic approaches: - It has been experimentally discovered that an ideal server devours about 70% of the power used by a fully used server.

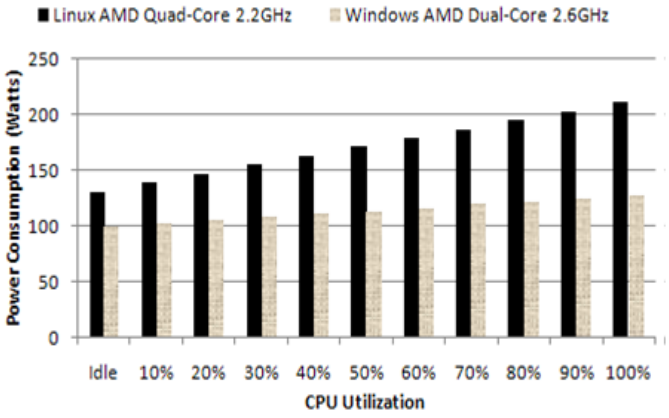

Fig 1: Power consumption under different workloads

Utilizing a neural network indicator, the green scheduling algorithms calculates first required dynamic workload at hand on the servers. Then superfluous servers are killed so as to minimize the various running servers, thus minimizing the energy use at the purposes of consumption to give benefits to all other levels. Also, several servers are added to help assure service-level agreement. The bottom line is to secure the environment and to decrease the total expense of ownership while guaranteeing quality of service.

VI. CONCLUSION

Now a day as large data storage and computational demand is growing. Green Cloud Computing is known to be a broad and suitable area for research. To take exploit different IT assets, Cloud computing has created an extreme and impressing way to virtualize servers and data centers and to make it energy efficient. It is nothing but known to be Green Cloud Computing. It focuses various areas such as power management, energy efficiency, virtualization of servers etc. In this paper a brief discussion on Cloud, Green Computing and comparative study of green it areas for cloud computing to minimize the energy consumption is given.

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VIII. BIOGRAPHIE

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