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A Review Paper on Green Computing Using Energy Efficient Task Allocation Strategy in Cloud Environment

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Abstract— Green Cloud Computing" gives the benefits to the environment. Cloud computing delivered as a service pay-peruse basis. In traditional approach in the business organization, the investment for the requirement of this type of Service and moving up for up-gradation without any hassle is achievable and affordable. The data repository is the main part for one of their service from the data centers. This data centers are incorporated as a component of Cloud services in and are referred to as "Big Data". In this paper we have proposed a new power saving algorithm for reducing the heat dissipated by the datacenters in the IT industry. The proposed algorithm will be able to reduce the Carbon footprints and will provide the maximum savings to the client and the provider.

Keywords— Carbon footprints, cloud computing, virtual machine, cloudlets, DVFS, host, broker.

I. INTRODUCTION

The term Cloud refers as Network or Internet. In other words, Cloud is something, which is present at remote location. Cloud can provide services over network, i.e., on public networks or on private networks, i.e., WAN, VPN or LAN. Applications such as web conferencing, e-mail and customer relationship management (CRM), all run in cloud. Cloud Computing refers to configuring, accessing and manipulating the applications online. It offers online infrastructure, data storage, and application. It overcomes the platform dependency issues as there is no need install software's on our PCs. Hence, Cloud computing can be classified as a new paradigm for the dynamic provisioning of computing services supported by state-of-the-art data centers that usually employ Virtual Machine (VM) technologies for consolidation and environment isolation purposes. Many computing service providers including Microsoft, Google, Yahoo, and IBM are rapidly deploying data centers in various locations around the world to deliver Cloud computing services.

The cloud computing platform guarantees subscribes that it sticks to the service level agreement by providing resources as service and by needs. The number of online services—such as search, online gaming, social networks and video streaming— has exploded. Therefore, day by day subscribers' needs are increasing for computing resources and their needs have dynamic heterogeneity and platform irrelevance. Due to data locality issues and the demand for fast response times, resources are shared and if they are not properly distributed then it will result into resource wastage.

II. RELATED WORK

Yi-Ju Chiang et al. (2013) discussed that cloud computing is a new service model for sharing a pool of computing resources that can be rapidly accessed and released based on a converged infrastructure. In the past, an individual use or company can only use their own servers to manage application programs or store data. Thus it may cause the dilemma of complex management and burden in "own-and-use" patterns. To satisfy uncertain workloads and to be highly available for users anywhere at any time, providing more resources are required. Consequently, resource overprovisioning and redundancy are common situations in a traditional operating system. However, most electricity dependent facilities will inevitably suffer from idle times or under-utilized for some days or months since there usually have off-seasons caused by the nature of random arrivals.

Lucio et al. (2014) presents a hybrid optimization model that allows a cloud service provider to establish virtual machine (VM) placement strategies for its data centers in such a way that energy efficiency and network quality of service are jointly optimized. Usually, VM placement is an activity not fully integrated with network operations. As such, the VM placement strategy does not take into account the impact it produces on the network performance in terms of quality of service parameters such as packet losses and traffic delays. The proposed strategy allows cloud providers to reach a balance between the energy efficiency of their infrastructures and the network quality of service they offer to their customers.

Bharti Wadhwa et al. (2014) uses the carbon footprint rate of the datacenters in distributed cloud architecture and the concept of virtual machine allocation and migration for reducing the carbon emission and energy consumption in the federated cloud system. The proposed approach reduces the carbon dioxide emission and energy consumption of federated cloud datacenters as compared to the classical scheduling approach of round robin VM scheduling in federated cloud datacenters.

Fahimeh Farahnakian et al. (2015) investigated the effectiveness of VM and host resource utilization predictions in the VM consolidation task using real workload traces. The proposed approach provides substantial improvement over other heuristic algorithms in reducing energy consumption, number of VM migrations and number of SLA violations. Dynamic Virtual Machine (VM) consolidation is one of the most promising solutions to reduce energy consumption and improve resource utilization in data centers. Since VM consolidation problem is strictly NP-hard, many heuristic algorithms have been proposed to tackle the problem.

Sonika P Reddy et al. (2014) presented a system that handles real-time and non-real time tasks in an energy efficient method without compromising much on neither reliability nor performance. Of the three processors, two processors i.e. the first and second, handle real-time tasks, using earliest-Deadline-First (EDF) and Earliest-Deadline-Late (EDL) scheduling algorithms respectively. On the third processor, the non-real-time tasks are scheduled using the First Come First Served (FCFS) scheduling algorithm and the tasks are run at an energy efficient frequency. Our simulation results show significant energy savings compared to the existing Stand-by Sparing for Periodic Tasks (SSPT) for a few execution scenarios.

III. PROBLEM FORMULATION

The number of online services—such as search, social networks, online gaming and video streaming— has exploded. This has led to the construction of large-scale computing data centers consuming enormous amounts of electrical power. Despite of the improvements in energy efficiency of the hardware, overall energy consumption continues to grow due to increasing requirements for computing resources. So, we investigate heterogeneous workloads of various types of Cloud applications and develop algorithms for energy-efficient mixing and mapping of VMs to suitable Cloud resources in addition to dynamic consolidation of VM resource partitions.

So, the aim of the research work is to consolidate the load balancing with optimized energy conservation in an efficient way so that the resource utilization can be maximized and the energy consumption of the data center could be minimized that can further result in reducing global warming and hence assist in achieving Green Computing.

- The skewness factor is used to estimate the work assigned to the machines. This factor is used to find out the under loaded and overloaded virtual machines in the datacenter.
- Although some cloudlets (tasks) are bounded by time strategy but there is no requirement of running the CPU at 100% for these tasks. These type of tasks will execute in the same time frame even if the CPU runs at 50% of its total potential.
- CPU will keep on running at 100% capacity leading to the wastage of power consumption.
- There are more chances of CPU getting heated up which will lead to global warming and more chances of failure in the datacenter.

IV. OBJECTIVE

In cloud computing, load balancing is necessary to distribute the dynamic local workload across all the nodes. It helps to achieve reliability which depends on the way it handles the load by ensuring an efficient and fair allocation of every computing resource. Cloud load balancing helps to improve the overall cloud performance by minimizing resource consumption and avoids bottlenecks. Many load balancing schemes have been presented, but no one reduces the heat dissipation which decreases the reliability of hardware. The proposed algorithm can combines the Max-Min scheduling algorithm with DVFS (Dynamic Voltage and Frequency Scaling Technique) which provide ability of slowing down CPU clock speeds.

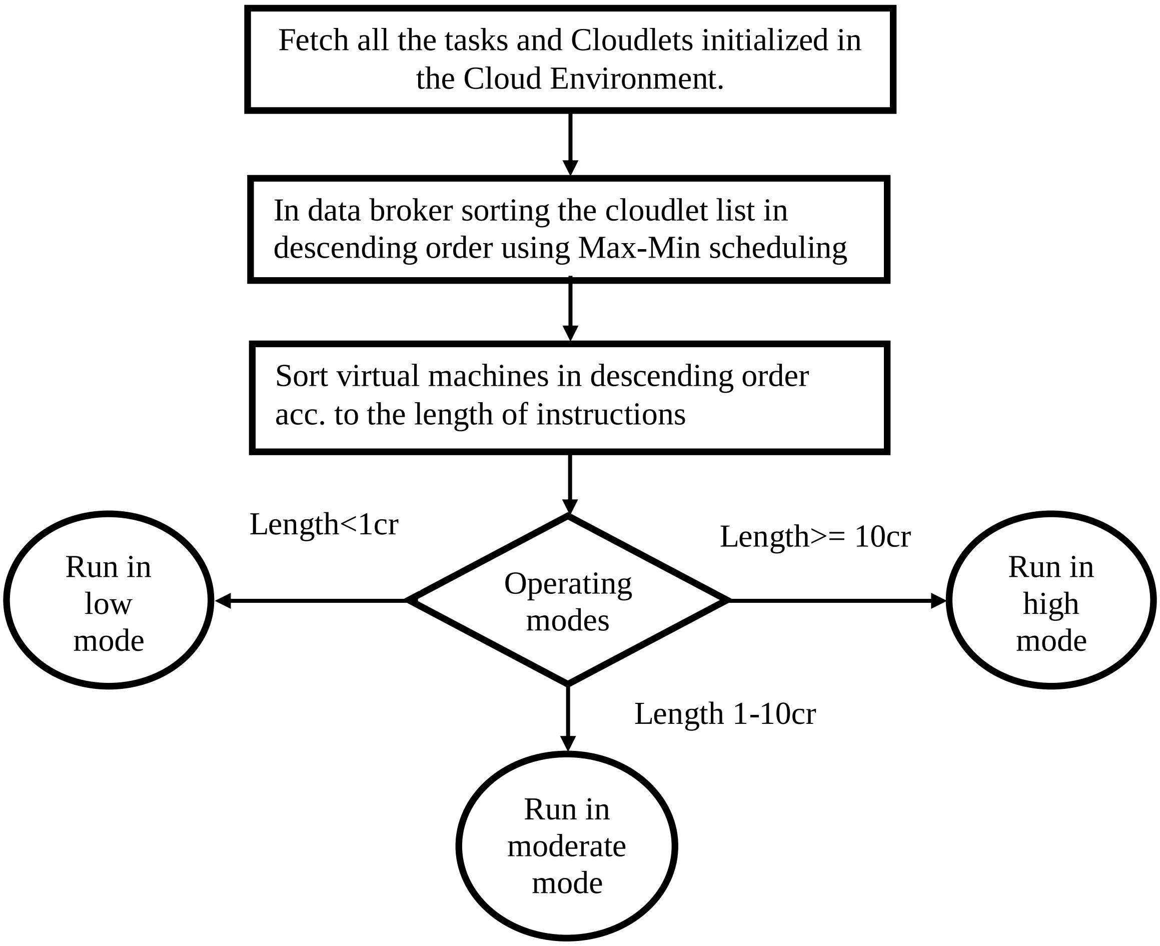
- To implement and study the performance of existing load balancing and power saving algorithms.
- To design the improved load balancing algorithm using Max-Min combined with DVFS (Dynamic Voltage and Frequency Scaling) power saving architecture.
- Different scaling options are available for Virtual Machines for handling different types of tasks.
- To reduce the overall energy consumption and CO_2 emissions.
- To reduce the overall cost of the client and the cloud provider.
- To develop the proposed algorithm and compare the performance of proposed algorithm with existing algorithm.

V. PROPOSED WORK

Dynamic Voltage and Frequency Scaling (DVFS) describes the use of two power saving techniques (dynamic frequency scaling and dynamic voltage scaling) used to save power in embedded systems including cell phones. This type of power saving is different from what most of us generally think about like standby or hibernate power states. All of these are useful of course. You can reduce the power consumed by your embedded system by lowering the frequency and/or voltage of the CPU and attached peripherals.

- All the tasks given by the user are fetched and are divided into 3 zones depending upon the length of their work.
- Zone A: It includes all those tasks that involve normal processing
- Zone B: This zone contains all those tasks that involve input/ output processing and hence require more CPU than zone A
- Zone C: This zone contains the multimedia jobs and these tasks require very high CPU than any other classes.
- All the virtual machines or we can say the resources will operate in 3 modes:
- Low Mode/ Basic Mode: The virtual machine will operate in low frequency mode and lesser amount of voltage will be supplied

- Medium Mode: Medium frequency and medium voltage is supplied
- High Mode: High frequency and higher amount of voltage is supplied.
- Assign all the tasks in zone A to the machines that are working in the basic mode or low mode.
- Assign all the tasks in Zone B to the machines that are working in the medium mode.
- The tasks of Zone C are assigned to the machines that are working in high mode (100% CPU utilization)



Flow Chart of Proposed Methodology

VI. IMPLEMENTATION TOOL

Implementation Language Java:

Java is a general-purpose computer programming language that is concurrent, class-based, object-oriented, and specifically designed to have as few implementation dependencies as possible. It is intended to let application developers "write once, run anywhere" (WORA), meaning that code that runs on one platform does not need to be recompiled to run on another. Java applications are typically compiled to bytecode [16] that can run on any Java virtual machine (JVM) regardless of computer architecture. Java is, as of 2014, one of the most popular programming languages in use, particularly for client-server web applications, with a reported 9 million developers.

Cloud Sim:

CloudSim is an extensible simulation toolkit that enables modeling and simulation of Cloud computing systems and application provisioning environments. The CloudSim toolkit supports both system and behavior modeling of Cloud system components such as data centers, virtual machines (VMs) and resource provisioning policies. It implements generic application provisioning techniques that can be extended with ease and limited effort. Currently, it supports modeling and simulation of C loud computing environments consisting of both single and internetworked Clouds (federation of Clouds). Moreover, it exposes custom interfaces for implementing policies and provisioning techniques for allocation of VMs under inter-networked Cloud computing scenarios. CloudSim offers the following novel features:

- Support for modeling and simulation of large-scale Cloud computing environments, including data centers, on a single physical computing node.
- A self-contained platform for modeling Clouds, service brokers, provisioning, and allocation policies.
- Support for simulation of network connections among the simulated system elements.
- Facility for simulation of federated Cloud environment that internetworks resources from both private and public domains, a feature critical for research studies related to Cloud-Bursts and automatic application scaling.
- Availability of a virtualization engine that aids in the creation and management of multiple, independent, and co-hosted virtualized services on a data center node.

VII. CONCLUSION

Green cloud Computing is the mechanism of implementing the policies to improve the efficiency of computing resources and reduce the carbon footprints released by the IT data centers. Cloud Infrastructure is the most important component in a cloud. It may consists tens of thousands of servers, network disks and devices, and typically serve millions of users globally. Such a large-scale data center will consume enormous amount of energy. In this paper, we have proposed a task efficient power saving algorithm in cloud environment. We will implementing the proposed methodology in the cloud sim simulator by creating different number of virtual machines and cloudlets. It will reduce the overall energy consumption and cost of using the cloud.

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