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IMPLEMENTATION OF BFS AND LMM ALGORITHM FOR ENERGY AWARE SCHEDULING

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ABSTRACT: The cloud implementation has attracted many scientific, consumer and business application towards it due to its utility. Due to its flexibility and utility energy consumption had increased a lot and becomes critical worldwide problem. Many methodologies were developed over last few years to reduce the energy consumption of cloud data centers. The power Consumption for VMs is reduced through VM consolidation. In this project, the VM consolidation is achieved with the objective to reduce the energy consumption of cloud data centers while satisfying QoS requirements. Distributed architecture is proposed to perform dynamic VM consolidation to improve resource utilizations of VMs and to reduce their energy consumption. The Proposed algorithm is the hybrid algorithm that is the combination of Best Fit Scheduling (BFS) and Local Minimum Migration (LMM). In the proposed approach, the user tasks or workloads are initially allocated to VMs based on the Best Fit Scheduling (BFS) algorithm and Local Minimum Migration (LMM) is used for migration process, to reduce the energy by avoiding the use of an unused system and efficient usage of unused memory. This method monitorsthe state of virtual machines in all cloud locations center and it identifies the state virtual machines whether it is sleep, idle, or running (less or over) state. This combination of an algorithm will save energy in the cloud and improve the efficiency and quality of the cloud services.

Keywords: - [Cloud computing, green cloud, Best fit scheduling, Local minimum migration, Energy aware scheduling]

1. INTRODUCTION

Over the last few years, cloud computing has rapidly emerged as a successful concept for providing IT infrastructure, resources and services on a basis pay per use. The Cloud and virtualization technologies have led to the establishment of large-scale cloud data centers that provide required services. This evolution induces a terrific rise of electricity consumption, increasing data center ownership costs and carbon footprints. For these reasons, energy efficiency is becoming increasingly important for data centers and Cloud. The fact that electricity consumption is set to rise 76% from 2007 to 2030 with data centers contributing an important portion of this increase emphasizes the importance of reducing energy consumption in Clouds. According to the Gartner report, the average data center is estimated to consume as much energy as 25000 households, and according to McKinsey report, ‘The total estimated energy bill for data centers in 2010 is 11.5 billion and energy costs in a typical data center double every five years’. Face to this electronic waste and to this huge amount of energy used to power data centers, energy efficient data center solutions have become one of the greatest challenges. A major cause of energy inefficiency in data centers is the idle power wasted when resources are underused. In addition, the problem of low resources utilization, servers are permanently switched on even if they are not used and still consume up to 70% of their peak power. To address these problems, it is necessary to eliminate the power waste, to improve efficiency and to change the way resources are used. This can be done by designing energy-efficient resource allocation solutions at different Cloud levels.

The challenges, provided solutions need to scale in multiple dimensions and Cloud providers must also deal with the complex user’s requirements. Requested services are more complicated and complete since users need to deploy their own applications with the topology they choose and with having the control on both infrastructure and programs. This means combining the flexibility of IaaS and the use of PaaS within a single environment. As a result, the classic three layer model is changing and the combining of IaaS and PaaS is considered as natural development step in cloud computing. Cloud resource allocation solutions should be flexible enough to adapt to the evolving Cloud requirements and to deal with users requirements. This key dimension of cloud levels is essential for our research and to address it in depth.

It is a very challenging issue to solve the problem of resource allocation in Cloud in an energy efficiency way. In this thesis, the problem is addressed with its multiple facets and levels to provide not only a specific solution but also a generic and complete approach.

2. RELATED WORKS

In Enreal energy efficient model [16], an energy consumption model is proposed for the applications deployed across cloud computing platforms. Secondly, an energy-aware resource allocation method is proposed for virtual machine allocation supporting scientific workflow execution based on the energy consumption model. Finally, comprehensive experiments and simulations to demonstrate the effectiveness and efficiency of the proposed approach are conducted.

Dynamic Resource Allocation using Virtual Machines for Cloud Computing Environment [1] [15] system that uses virtualization technology to allocate data center resources dynamically based on application demands and support green computing by optimizing the number of servers in use. The concept of “skewness” is introduced to measure the unevenness in the multi-dimensional resource utilization of a server. Towards Pay-As-You-Consume Cloud Computing [2] to solve the unfairness caused by interference, a pay-as-you-consume pricing scheme is proposed, which charges users according to their effective resource consumption excluding interference. The main idea of the pay-as-you-use pricing scheme is a machine learning based prediction model of the relative cost of interference. Virtualized Clouds and Energy Aware Scheduling Using Earh [3][14]problem of scheduling a bag-of-tasks application, made of a collection of independent stochastic tasks with normal distributions of task execution times, on the platform with deadline and energy consumption budget constraints Energy optimization can be achieved by combining resources as per the current utilization. Meeting Deadlines of Scientific Workflows in Public Clouds with Tasks Replication [4] implementspossibleplans tocorrect delays caused by under estimation of tasks execution time or variations in the delivered performance of leased public Cloud resources. A dataflow-based scientific workflow composition framework [5] in which workflow constructs is fully compositional one with another. A new version of our VIEW system is implemented and conducted several case studies to validate our proposed techniques. Exploiting Dynamic Resource Allocation for Efficient Parallel Data Processing in Cloud-By Using Nephel's Algorithm [6].The processing frameworks which are currently used have been designed for static, homogeneous cluster setups and disregards the particular nature of a cloud. Accordingly, the allocated resources may be insufficient of the submitted job and unnecessarily increase processing time and cost. [10]Cloud Computing and Energy Efficiency Cloud as an Alternative to Green Computing [7]. Most consumers are already substantial users of cloud-supported services, including email, social media, online gaming, and many mobile applications. The cloud computing is considered as an alternative to conventional computing with growing use of clouds.

3. PROPOSED SYSTEM

The proposed system is the hybrid algorithm, which combines Best Fit Scheduling (BFS) with Local Minimum Migration (LMM).

BFS first sorts all user tasks by their requirement of resources in the decreasing order. Then, it starts with the user tasks that require the largest amount of resources. The BFS algorithm allocates user tasks in such a way that the unused capacity in the destination VMs is minimized. Thus, it selects a VM for which a number of available resources are closest to the requested amount of resources by the user tasks. Therefore, BFS algorithm provides an initial efficient allocation of user tasks. However, due to dynamic workloads, the resource utilizations of VMs continue to vary over time. Local Minimum Migration (LMM), this method monitors all the virtual machines in all cloud locations centre. It identifies the state virtual machines whether it is sleep, idle, or running (less or over) state. Also, checks number of tasks running and a number of tasks can able to run. When a virtual machine is considered overloaded or under loaded, tasks are migrated to/from one or more VMs from the nearby location cloud centres. Location based VM selection policy (algorithm) has to be applied to carry out the selection process

BFS is better while working with dynamic workloads, and schedule the best fit VM for the requested dynamic user tasks. It gives an allocation of fewer amounts of user tasks to the less capable VMs and more amounts of user tasks to the high capable VMs.

BFS Algorithm:

Input: T Tasks, v Virtual machines Result: Best Fit Placement strategy for n virtual machines For (i=0;i<T;i=i+1) do Sort T tasks in Decreasing order of utilization weights For (j=0;j<v;j=j+1) do If(requirement $(Task_i)$ <= capacity(VM_i) then Place Task $_i$into VM $_j$ break;

In migration, LMM is used to allocate the nearest machine which gives efficient migration and consume the minimum amount of energy, cost and time compare to the existing system.

LMM Algorithm:

Input Number of Tasks Allocate Tasks to available VMs For every specified time interval Execute underloaded detection Identify overloaded VMs and under loaded VMs.

Task is selected for migration from overloaded / under loaded VMs Task is moved to the required VMs Check for Idle VM and switch off the VM End

3.1 Resource Assumption and Task Analyze

For developing one cloud environment, have to analyze the requirements for the resources and the number of resources. In this module, the resource assumption takes place which means need to mention the number of resources and the resources configuration (Processor, RAM, Storage, Capacity, etc). Next work in this module is to analyze the task; the task from the user is analyzed and forward for the allocation process

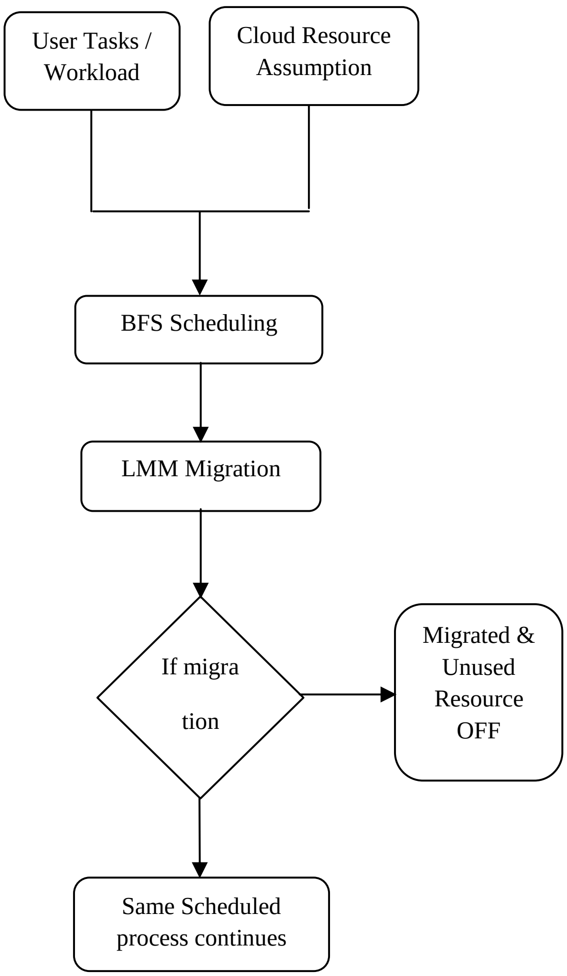

Figure 1- ARCHITECTURE DESIGN

3.2 Allocate resource for jobs

In this module, the resources are allocated for the user given jobs. The provider controls the provision of these computational resources and resources are allocated in an elastic way, according to consumers needs. To accommodate unpredicted demands on, the infrastructure is in a scalable and elastic way, the process of allocation and reallocation in Cloud Computing must be dynamic. The trust levels are given for each all resources and the user will give the task with the security demands to run the task in resources. Based on the user demanded security, the resources are allocated for each user jobs.

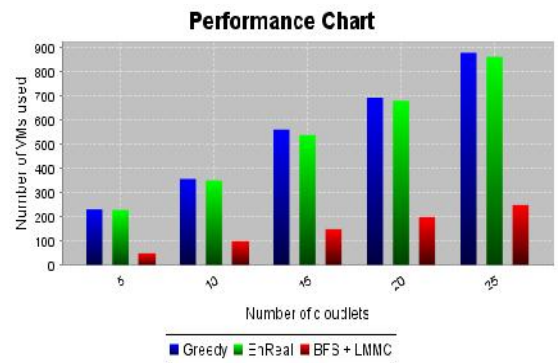

Figure 2 - PERFORMANCE CHART OF VM

3.3 Model Analyze for Migration

In this module, Model Analyze takes place for migration process, where what all the tasks to be migrated is analyzed. When a virtual machine is considered to be overloaded/under loaded, tasks are migrated to/from one or more VMs from the nearby location cloud centres. Location based VM selection policy has to be applied to carry out the selection process.

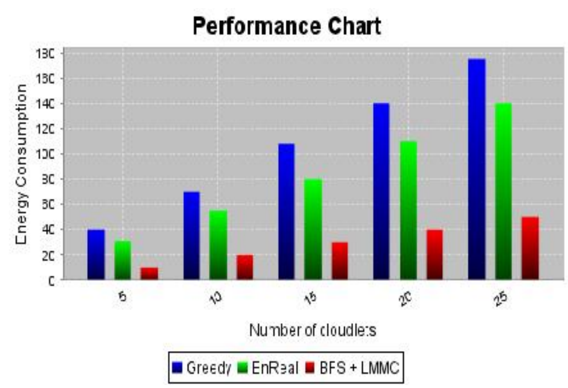

Figure 3 - ENERGY CONSUMPTION CHART

3.4 Migration of tasks

In this module, the tasks are migrated based on the analysis of the last module. Migration of tasks where number tasks are running and less number of migrations should be selected. The tasks are migrated from one VM to other VMs.

4. METHODOLOGY

This new method called Local Minimum Migration in Cloud (LMM).This method monitors all the virtual machines in all cloud locations centre. It identifies the state virtual machines whether it is sleep, idle or running (less or over) state. And also checks a number of tasks running and a number of tasks can able to run. The tasks are migrated to under loaded virtual machines. Location based VM selection policy algorithm has to be applied to carry out the selection process. Migration of tasks is carried where less number of tasks is running, that occupies extra energy and power consumption. Migration of Virtual machine tasks where more number tasks are running, which gives overhead to the system performance. Less number of migrations should be selected, to avoid more processing cost for the migration process. Migration of Virtual machine tasks is to reduce the user provisioning cost, by finishing the user'stasksintheirdeadline.

5. THE EXPERIMENTAL EVALUATION

Acomplete simulations and experiments are conducted to evaluate the perfor mance of the proposed energy-aware resource allocation method using BFS and LMM algorithm. The broadly used Cloud Simsimulatoris adopted as the cloud simulation environment for the experiments under chosen cloud scenarios. CloudSimprovides us a richhosts, VMsandCloudletsbasedon the and user-friendly GUI to do the proposed schedulingpolicies and plot the results graph. The numbers of characteristics of a small cloud data centre are defined. Tasks parameters are included to meet the user task requests and resources ie VM parameters are included with energy consumption details and its processing cost. Performance of proposed approach is evaluated against the greedy and Enreal algorithms

CONCLUSION

A cloud data centre consists of m heterogeneous VMs that have different resource capacities. Each VM is characterized by the amount of memory, network I/O and storage capacity. At any time, a cloud data center usually serves many concurrent users. Users submit their requirements for provisioning of VMs, which are allocated to the user tasks. In our proposed approach, the user tasks are allocated to VMs based on the Best Fit Scheduling (BFS) algorithm, which is one of the best-known methods for the bin-packing problem. BFS first sorts all VMs by the resource requirements in the decreasing order. Then, it starts with the VMs that require the largest amount of resources. The BFS algorithm allocates VMs in such a way that the unused capacity in the destination is minimized. Thus, it selects a VM for which a number of available resources are closest to the requested amount of resources by the user tasks. Therefore, BFS algorithm provides an initial efficient allocation of VMs. However, due to dynamic workloads, the resource utilizations of VMs continue to vary over time. In the proposed approach, the LMM algorithm is applied in order to adapt and optimize the task placement according to the requirement.

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