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International Journal of Innovative Research in Computer Science and Engineering (IJIRCSE)
ISSN: 2394-6364, Volume – 3, Issue – 3. May 2018

ScientificWorkflow Executions In Cloud Environment By Using An Energy-Aware Resource Allocation Method

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Abstract **— Scientific workflows are often deployed across multiple cloud computing platforms due to their large-scale characteristic. This can be technically achieved by expanding a cloud platform. However, it is still a challenge to conduct scientific workflow executions in an energy-aware fashion across cloud platforms or even inside a cloud platform, since the cloud platform expansion will make the energy consumption a big concern. In this project first create a virtual machine. It is used allocated job to system. Then create a Brokers ID. Brokers are contain number of systems. It is used to send a job to free system. A system is busy means the brokers to shift the job to other system. Basically, we leverage the dynamic deployment of virtual machines for scientific workflow executions. Specifically, an energy consumption model is presented for applications deployed across cloud computing platforms, and a corresponding energy-aware resource allocation algorithm is proposed for virtual machine scheduling to accomplish scientific workflow executions. Experimental evaluation demonstrates that the proposed method is both effective and efficient**.

Keywords— *Energy consumption, Resource management, Cloud computing, Switches, Computational modeling, Monitoring, Virtual machining*

INTRODUCTION

Cloud computing is a latest technology which offers online computing resources, storage and permits users to organize applications with enhanced scalability, availability and fault tolerance. Cloud computing is about storing the data on remote servers instead of on own computers or other devices. This information can be retrieved using the internet with any device, everywhere in the world as long as that device can support cloud computing systems. The cloud computing system is comprised of a front-end, which is the client side and a back-end which is a collection of the servers and computers owned by a third party which stores the data. A central server which is a fragment of the back-end follows protocols and use.

Deployment models and service models:

The four deployment models present in cloud computing are:

A. Public cloud: In the public cloud, the cloud provider provides resources for free to the public. Any user can make use of the resources; it is unrestricted. The public cloud is connected to the public internet for anyone to leverage.

B. Private cloud: In a private cloud, the planning and provisioning of the cloud are operated and owned by the organization or the third party. Here the hosted services are provided to a restricted number of people or group of individuals.

C. Community cloud: These type of cloud infrastructures exists for special use by a group of users. These are a group of users who share a common mission or have specific regulatory requirements, and it may be managed by the third party or organizations.

D. Hybrid Cloud: Hybrid Cloud provides the best of above worlds. It is created by combining the benefit of different types of cloud (private cloud & public cloud). In these clouds, some of the resources are provided and managed by public cloud and others as a private cloud.

The three different service models present in cloud computing are:

A. Infrastructure as a Service (IaaS): IaaS model provides just the hardware and the network. It allows users to develop and install their operating system, software and run any application as per their needs on cloud hardware of their own choice.

B. Platform as a Service (PaaS): In PaaS model, an operating system, hardware, and network are provided to the

user. It enables users to build their applications on cloud making use of supplier specific tools and languages

C. Software as a Service (SaaS): In SaaS model, a prebuilt application together with any needed software, hardware, operating system and the network is provided to the user.

II.RELATEDWORK

In Cloud, virtual resources are allocated for effectively manage workload fluctuations, while providing Quality of Service (QoS) to the end users. The computing and network resources are limited and have to be efficiently shared among the users in virtualized way. In order to perform effective resource management, we need to consider the issues such as resource mapping, resource provisioning, resource allocation, resource adaption and resource scheduling. Resource adaptation is the capacity to adjust the resources dynamically to fulfill the requirements of the user. Resource provisioning is the allocation of a service provider's resources to a user. Resource scheduling is a timetable of events and resources. It determines when an activity should start or end, depending on duration, of predecessor activities, predecessor relationships, and resources allocated. Resource mapping is a correspondence between resources required by the users and resources available with the provider.

The authors of reference take proactive measures to the long-term, predictable periodical loads, use statistic and machine learning methods to analyze statistical data about load changes and system logs and built a performance model under long-term load patterns. Although the model provides decision support for global multi-objective optimum making on resources, evaluating the capacity of resources by the average working time required to complete each task exists biggish uncertain.

A.) EXECUTION OF HIGHER PRIORITY TASK

Here, creation of new VM for newly arrived task is avoided. It leads to resource contention between low and high priority tasks to access resources. The main contribution of its work is priority-based preemption policy that improves resource utilization in virtual environment.

B.) DYNAMIC RESOURCE ALLOCATION

Proposed algorithm dynamically responds to fluctuating workload through preempting the current running task having low priority with high priority task and if preemption is not possible because of same priority then by creating new VM from globally available resources. If global resources are not available, task will be placed in waiting queue. When appropriate VM becomes free that advanced reservation task will be selected from waiting queue and allocated for execution to that VM. They propose priority based algorithm, which considers multiple SLA parameter and resource allocation by preemption mechanism for high priority task execution by best effort job it will improve utilization in Cloud.

C.) DYNAMIC RESOURCE PROVISIONING

They present a scheduling heuristic considering multiple SLA objectives, such as amount of required CPU, network, bandwidth, and cost for deploying applications in Clouds. They present a local and global scheduling based on user's service request and also present novel method for high priority task. It is also beneficial for fault tolerance procedure in resource management. If a resource is going to get failed then it is immediately allocated with new resource for task. In this algorithm the priority of task is considered over cost and deadlines.

D.) DECISION MAKING APPROACH

Decision making approach in order to achieve energy-efficient allocation without VM migration. Authors contribute on VM migration while considering remaining time of running workloads. Optimum utilization is a main factor in order to provide energy-efficiency. Allocation of workload to an already active host will increase the optimum utilization rate instead of allocation the workload to a new server would be preferred. They considered not only history but also future demands and remaining time of running workloads.

III.PROBLEM STATEMENT

In our project there are the following problems are overcome based on the Enreal method (Energy Aware Resource Allocation)

- How to allocate resources to the particular tasks in cloud environment?
- How to overcome overheads when VMs create, terminate or switch tasks?
- Which order is followed in cloud environment for executing a given task ?

We aim to address the above mentioned issues by proposing an efficient resource allocation and task scheduling in Cloud.

The authors have proposed an efficient resource allocation and task scheduling for the cloud computing in which client job are categorize into small job, medium job and large job then dynamic selection of jobs are done to reduce the processing time and waiting time for the process in the queue. But as we investigated in this algorithm the client jobs are categorized in three queues so it will directly affect the switching time needed by the scheduler to switch from one job to another.

secondly in this algorithm dynamic selection of jobs from different queues is carried out which have the high probability that in each cycle scheduler can select the user process from short job queue tend to delay the several processes in medium or large queue and vice versa. Both factors tend to affects the energy consumption and job completion time in cloud environment.

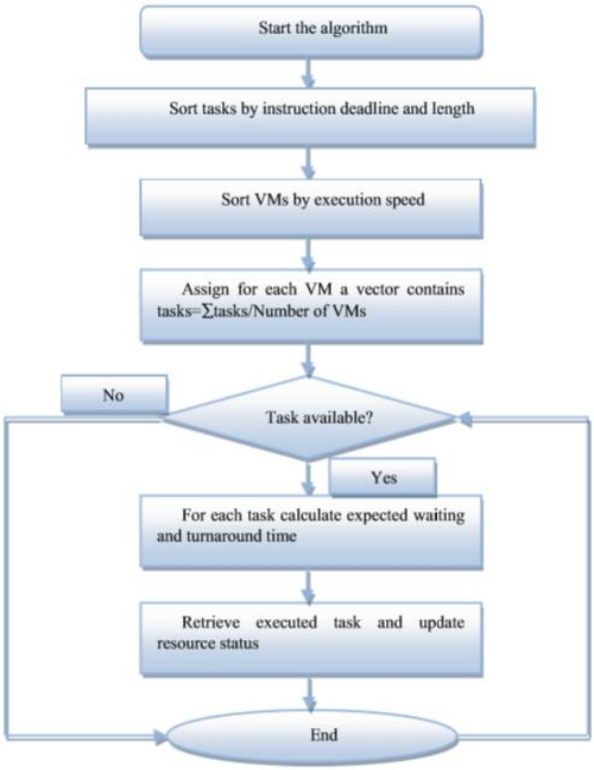
IV ENERGY AWARE RESOURCE PROVISIONING

Since, the primary requirement of such services are based on deadline constraints, several policies for provisioning of VMs and hosts are allocated in order to decrease energy consumption and miss rate of deadline by an increase in VMs density on hosts and switching the idle ones off. Here, VM are distributed among the hosts under the energy–aware resource allocation policy which try to reduce minimum number of active hosts. Here, resource allocation is claimed to be optimized in order to increase the acceptance rate of real time tasks through VM scaling and migration.

V.) PROPOSED SYSTEM

In the proposed system an Energy-aware Resource Allocation method, named EnReal, has been proposed, around virtual machines dynamic deployment for scientific workflow executions. An energy consumption model has been presented for the application across cloud computing platforms. An energy-aware resource allocation method has been designed for virtual machine allocation to support scientific workflow executions. Then we are introducing our new proposed method broker's id. It is used to connected VM and Cloud system. Resource can be allocated through the broker. Based on the threshold value job allocate to the virtual machine. If the job size is large then dynamically the job can allocate to the virtual machine with higher configuration system.

VI.) WORK FLOW



Algorithm:

Step 1: Accept Request from user.

Step 2: Sort tasks by instruction deadline and length based on the threshold value.

Step 3: Sort the virtual machines by execution speed and their configuration.

Step 4: If the resources are available then find appropriate virtual machines. Allocate a proper virtual machine according to requirements.

Step 5: Schedule virtual machines for execution and execute jobs using one of the two allocation techniques i.e. FCFS and SJF algorithms.

Step 6: After execution free that virtual machine and shut it down.

Step 7: If all the resources are allocated, then generate request to service provider.

Step 8: Request received by provider and process is requested.
Step 9: New Resources provided for computing

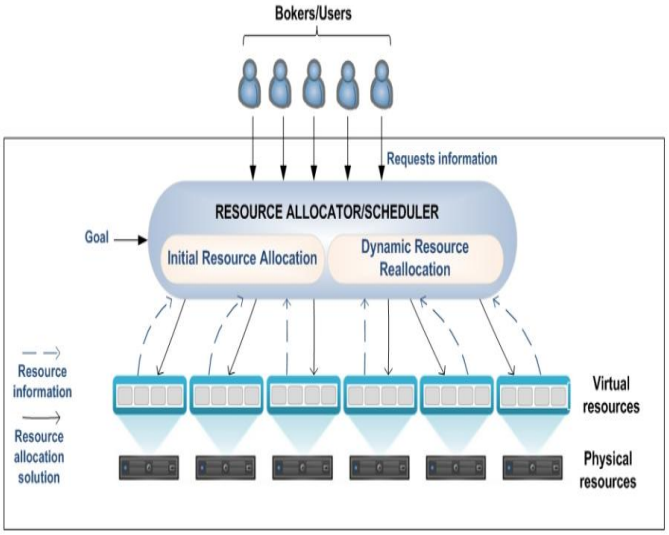
MODEL FRAMEWORK:

a virtual resource allocation model based on utility, but the paper only considered one dimension as the CPU. In our work we have carried on the expansion, modeling the problem of virtual cloud resource allocation mainly from the CPU, memory, and network bandwidth three dimensional. Assume that all physical machines (PM) are homogeneous, and can migrate VMs from one PM to another. The framework of EnReal model is composed of the local node controller and the global controller. The local node controller maximizes the local utility by allocating of CPU, memory, and network bandwidth dynamically. And the global controller maximizes the global utility through virtual machine migrations. In EnReal, we assume that a running virtual machine is associated with only one application.

ENERGY EFFICIENT RESOURCE ALLOCATION IN CLOUD:

Resource allocation or scheduling is one of the most important tasks in cloud computing. It consists in identifying and assigning resources to each incoming user request in such a way that the user requirements are met and specific goals of the cloud provider are satisfied. These goals could be optimizing energy consumption or cost optimizing, etc. Based on the resource information like resource usage and monitoring, the requests information and the Cloud provider goal, the resource allocator or scheduler finds out resource allocation solutions, see below Figure. Schedulers could just ensure the initial and static resource allocation after request arrival or ensure both static and dynamic resource allocation to manage resources in a continuous way and to further optimize and readjust the old requests. Below figure describe Resource

Allocation in Cloud Computing. The wider adoption of cloud computing and virtualization technologies has led to cluster sizes ranging from hundreds to thousands of nodes for mini and large data centers respectively. This evolution induces a tremendous rise of electricity consumption, escalating data center ownership costs and increasing carbon footprints. For these reasons, energy efficiency is becoming increasingly important for data centers and Clouds. Solving the problem of resource allocation in Cloud while maximizing energy efficiency is a very challenging issue. This problem is known as NP-hard and has been studied in the context of Cloud computing. The objective of this chapter is to review the existing literature regarding energy efficient resource allocation in Cloud. Different important dimensions will be considered in our literature study. These dimensions cover the type of the resource provisioning plan, the Cloud service model and also the static or dynamic solutions.



CONCLUSION:

Choosing right resource allocation method at the beginning is imperative to the success of complex implementations later. So far we studied about the various resource allocation algorithms. The proposed algorithm energy aware resource allocation method distribute multiple computers resource to achieve optimal resource utilization with minimum response time. Thus problems in existing algorithms are overcome in proposed method thus achieving increased resource utilization, minimum response time and maximum user satisfaction. Some of the strategies discussed above mainly focus on CPU, memory resources and improve some factors. Hence this survey paper will hopefully motivate future researchers to come up with smarter and secured optimal resource allocation algorithms and framework to strengthen the cloud computing paradigm.

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