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Study on Energy Conservation Using DVFS in Cloud Environment

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Abstract: Cloud computing platform is one which would provide many services to the users and companies that is based on a pay. One of the important problem is facing by the client provider in these days to reduce large amount of energy conservation in the data center and also there are several reasons for wasting large amount of energy. hence these term of energy conservation is provide the high process to the system and in order to overcome this issues, where one of the most important technique is to reduce the energy conservation is the use of a such technique called dynamic voltage frequency in the help of green cloud computing is implemented to reduce the energy consumed in between the different job scheduling by various Virtual Machine. This paper proposes the method of job migrations from one virtual machine to other virtual machine with minimal power consumption in an efficient manner.

Key words: Cloud computing · DVFS · Green computing · Virtual machine

INTRODUCTION

Cloud computing is the major technology in computer industries today. Many companies migrate to these technologies due to reduction in maintenance cost. From the current cloud computing environment there are a number of applications that consists of millions of module, it serves as a high quantity productto the user and from the user it becomes more dynamic. This Cloud services allow individuals and businesses tothe use hardware and software that are managed bythe third parties at remote locations.

The most important term in cloud datacenters which provides service all over the world. This is the on demand service because it offers flexible resources allocation, migration and guaranteed services in pay as-you-use manner to public. In the current cloud environment there is large amount of energy conserved in datacenter. This project presents the dynamic job migration of virtual machines with the DVFS concept. Also the project satisfies the customer needs by delivering the service that consumes less energy.

Where the concept of migration is to be allocate in one particular virtual machine to reduce the wastage of energy and to provide within a particular time limit. Moreover, in this we integrate the concept called dynamic voltage frequency scaling in CPU utilization model that specifies the frequency to proceed each task to complete within the particular deadline. As well as with the concept of DVFS, total CPU utilization will be found and checked for migration of the job to multiple virtual machines or allocate the job to the single virtual machine.

The concept of dynamic voltage frequency scaling and the green cloud is provide such as a suitable computing factor. It also provides the huge amount of power and energy conservation to reduce the cost. And also the most important concept of green cloud to provide a several new system and computing model to provide many application with the help of reducing the energy conservation.

The term green computing is the better process to consume the less amount of energy in the host and where it provides the number of percentage to the datacenter [1], to save the power consumption and in the usage of a computer system it also provides the service easier and faster to complete the work within the time limit and also the computer hardware.

It provides the low power consumption using this green computing technique and several steps would be taken to provide the less amount of power consumption. Some of the approaches for green computing is about

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the data storage in the datacenter and also back up for the power consuming and it also associates with the less amount of energy that would be saved.

The use of green computing [2], also increases the improvement of energy consumed in the datacenters where it helps to control the power consumed by this technique of DVFS and green computing will help to save the huge amount of energy consuming in VM.

Related Works: Cloud computing methodology provides three different types of services, energy saving mainly deals with the infrastructure as a service. Etienne Le Sueur [3], These technique is commonly used in the power management where the processor of clock frequency is decreased to allow the reduction in voltage supply. These things reduces the power consumption and also it can lead to the significant of reduction in energy particularly for memory and workload. This technique is widely used to reduce energy consumed in varying processors by the voltage and frequency at a run time [4], the main purpose of reducing the energy efficiency and power during the various stages according to the workload and capacity. Where in some problem of these process is also designed by various level of frequency to provide the all system in stable to show the many term of reducing the energy conservation according to its runtime and also it provide the low power by doing the saved document particularly.

Lin gong [5], these paper is about saving the energy strategy concept. It is to develop the application to reduce and calculate the different frequency in CPU host. Here the data center is to maintain the different virtual machine andto reduce power. such energy saving in the green computing framework reduces the energy consumed in order to increase the performance of the quality of service, reliability, availability of the servers.Here it also mentions the two terms for this green cloud computing concept is cloud computing and platform computing.

The term cloud computing is a model where it enables the on demand process that shares some of the configurable methodology for computing resources in the application and the services

Next the term platform computing is based on the service oriented program for both private and public cloud where it proposes the window live and window azure concept of the energy saving approach.

Ashima Agarwal [6], the concept of migration in virtual machine is scheduled in particular process. In order to provide a such a progress to migrate. and it also create the large amount of availability to reduce the balancing

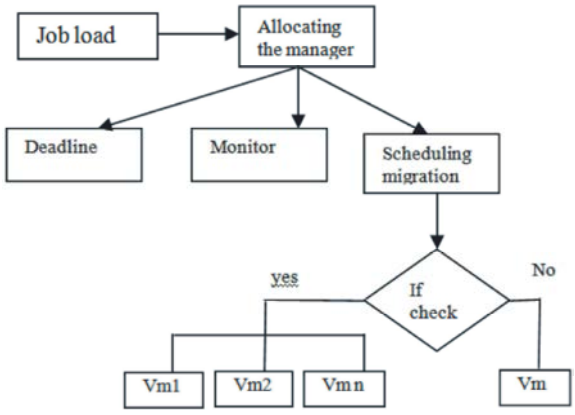

Fig. 1: Flowchart for proposed system

while we migrate the data from one particular vm to other as process hence it also a benefit to control all the data to be saved and copied respectively.

- Isolation- in virtual machine where the term of the such resources to provide a single system is also remain to finish the each other process and to separate such system is also available to run the application in several environment.
- Encapsulation-this term encapsulates the complete setup of hardware virtual resources where it is provide an operating system is to provide an application of the such package.the term encryption make the vm in portable and easy to manage. This helps in easy migration of the vm. Based these above techniques energy could be saved to a greater extent.

Proposed Using Flowchart: The aim of this flowchart is to provide a energy conservation to save the data from one vm to the other vm using the green cloud technique. And also provide the minimum amount of consuming energy and power saving is done using the techniques of green computing in order to reduce the frequency of CPU utilization in the different host system. Where the user submits the job length and execute the job in a speculated deadline.

Figure 1 represents the flow of the proposed system. Here the term deadline represents the maximum length of the job in execution time for which the algorithm checks the least frequency to calculate the time and job length. It majorly will depend on the job length to migrate either in one virtual machine or in several other virtual machines that consumes comparatively lesser amount of energy.

And finally it calculates the energy by taking the power consumption into consideration. In many cases, where the many level of energy is to be saved using the

migrating also be less., hence this job is migrated from one particular data to the other data that would consume less amount of energy consumption.

System Architecture: Systems Architecture which acts as an answer to the conceptual and practical troubles faced in the description and design of the complex systems. The structure and behavior of the entire system could be understood easily based on this pictorial representation. In a cloud platform, different users give different job request based on their need. The following architecture depicts the allocation of a virtual machine, with minimum number of servers based on the DVFS and green cloud computing technique.

Figure 2 represents the overall architecture of the entire work, the represents the methodology to allocate a perfect virtual machine for the requested job by the user. Different users of various domain gives their request about their need in the Infrastructure as a service i,e., storage, memory, CPU processing speed to the cloud service providers. Based on the request from the user the job length of various jobs are calculated and also the deadline is evaluated by the resource supervisor so as to keep in track of the time so that to complete the request. Then it is the job of the frequency calculator to check for the possible frequencies using the DVFS and green cloud computing methodology, which could help us in declaring whether we could migrate or migration not needed. Based on the obtained frequency the migration controller checks for the available virtual machines, if the obtained frequencies size is same of the available virtual machine, it is allocated in a single virtual machine else it initiates the migration and based on which the requested job has been allocated.

Implementation: Here the implementation is done with cloud sim tool in cloud computing infrastructure, this system helps in calculating the frequency to be used. It reduces the least frequency in datacenter with the help of cloud sim tool so that the job scheduled is migrated to a different virtual machine [7],

CPU utilization: % of computational load in differentjob scheduling to peak deadline specified.

CPU utilization: Ratio to calculate between the job length and MIPS (millions of instruction per second).

$$Energy\ consuming = \frac{idlepower}{total\ power}$$

Green cloud computing

$$G = frequency * time$$

where G is sum of frequency level and their time.

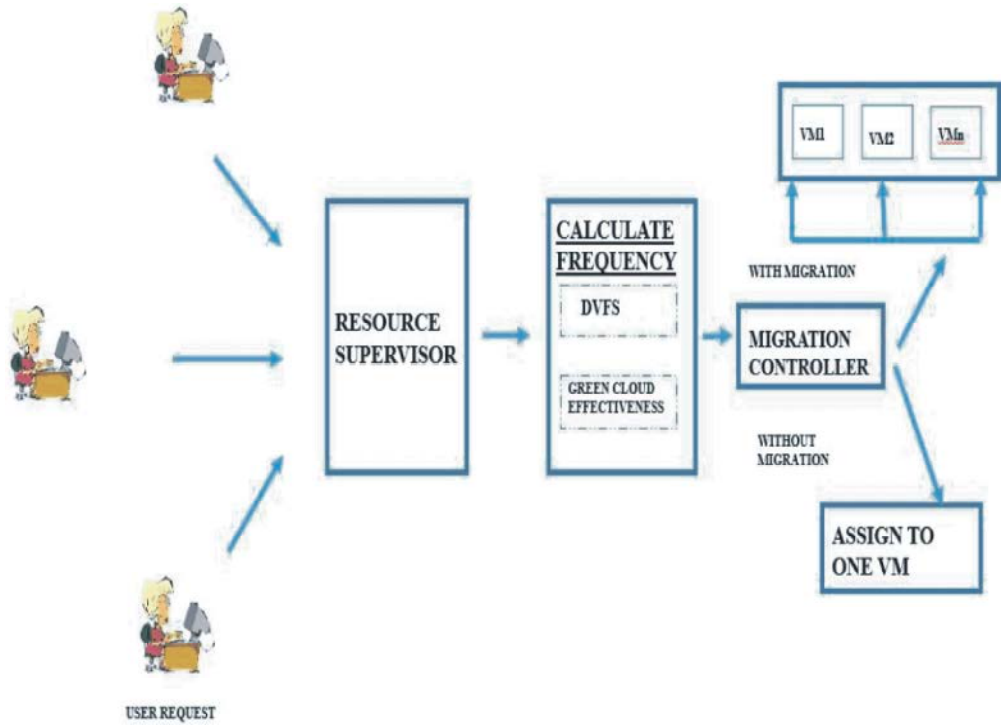

Fig. 2: System architecture

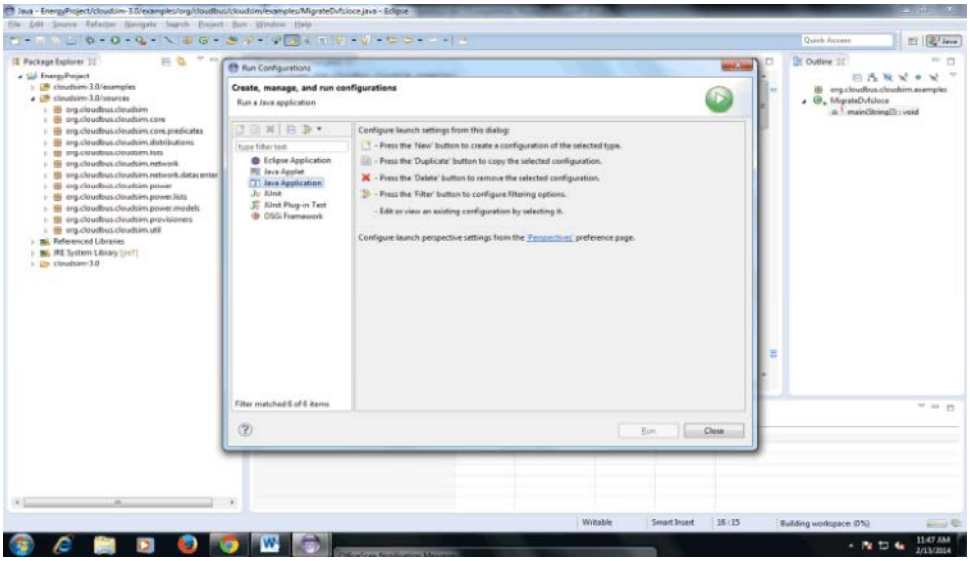

Figure 3: Cloud sim configuration

Fig. 3: Represents the cloud sim configuration.

Experimental Results: A user requests for a job to be done at the initial stage, based on the available resource and deadline priorities the resource supervisor forwards the request. Then the request and the available deadline frequency is calculated using DVFS and Green cloud processing separately, upon using both these techniques reduces the power to a certain extent but when it is used in a combinatorial form the performance is increased to a greater extent and the power consumed is also a comparatively lesser one.

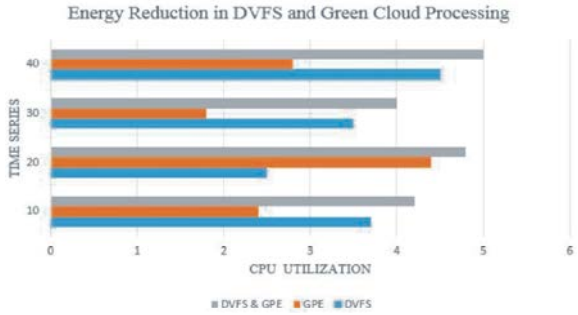

Fig. 4: Energy reductions in DVFS and green cloud processing.

Figure 4 depicts the comparison between all the three formats. This graph depicts that the energy that is reduced during the combination of DVFS and Green cloud processing is really less and it saves the situation of huge wastage of resources. This leads to a situation where energy is saved dynamically based on the current user request, the requests are given the user during the run time.

Conclusion and Future Work: This proposed paper reduces the energy consumed by the level of Dynamic Voltage and Frequency Scaling (DVFS) and green cloud computing techniques which reduces the total power consumption. This paper assigns different job scheduling to migrate in different virtual machine, the CPU utilization is calculated based on the frequency between the job length and deadline in an efficient manner. Still a better algorithm could be used in future so as to enable power saving without much wastage of resources in future.

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