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Job Migration for Saving Optimizing in Cloud Data Center (Iaas)

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ABSTRACT

An energy saving technique can reduce the power consumed in datacenter for cloud computing. This paper focuses about Cloud, in order to provide different services for the Internet users on a pay-as-you-use basis. The Migration of job is done between virtual machines by considering the energy consumed as a crucial factor. The consumption is based on CPU, disk storage, network interfaces, etc. The proposed system uses modern techniques for reducing the energy consumption in CPU like DVFS with Live migration. The proposed model for live migration between virtual machines is done based on the energy consumed and their respective deadlines. The scheduled virtual machines of live migration are done. The proposed method of Migration with FCFS for the cloud datacenter along with job scheduling can efficiently increase resource utilization; hence, it can decrease the cost of running in data center.

Keywords: Cloud computing, DVFS, Job Scheduling, virtual machine, FCFS, Job Migration

1. INTRODUCTION

1.1. A Introduction on cloud computing

Cloud computing is an on-demand computing of resources, from application to data center over the Internet on a pay for use basis. Cloud computing offers different services. Cloud allows customers to scale up and down their resources based on their dynamic needs. It provides sharing and scalable on demand services.

The service models are Software as a Service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS). The IaaS model provides just the hardware and network services. The customer installs or develops its own operating systems, applications, storage, and software. Iaas is one of the major service models of cloud computing in datacenter, which provides services all over the world. This is an On demand service because it offers flexible resource allocation, migration and guaranteed services in pay as-you-use manner to public. In the current cloud environment huge amount of energy consumed at the datacenter.

Cloud computing is based on virtualization technology according to the user demand. We can classify the virtualization technology as follows, full virtualization, para virtualization, OS-Level virtualization. Physical server is known as host and the virtual server is known as guest. The virtual servers act like physical machines. Each type of virtualization technology uses a different approach to allocate physical server resources to virtual server needs.

Infrastructure as a service provides companies with computing resources including servers, networking, storage, and datacenter. This resource is used to allocate VM elasticity and server consolidation technique is used. Resource Management is the efficient & effective deployment and allocation of organization's resource.

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2. RESEARCH VIEW AND ANALYSIS

2.1. Energy Aware Migration Model

The energy aware migration model is designed in such a way that the operating frequency is determined based on the assigned workload for job migration strategies which save energy consumption in a datacenter.

The aim of this process is to use a virtual machine in such a manner that it will consume less amount of energy and also meets the deadline. The latest CPU can function in six levels of frequencies normally. It is based on the user requirement and the job to calculate the CPU frequency. Deadline represents the maximum time within which that job should complete its execution. The algorithm will check for the possible frequencies that can complete the job within that particular time limit, but the objective is to choose the minimum frequency that can satisfy the request as frequency is directly proportional to the energy consumed.

The job Length has to be calculated within the deadline. Check whether the job can be migrated to another virtual machine which will consume less energy. The total energy is calculated by taking into account the power consumption, both in the active and idle status of deployed VMs. In certain cases, the total energy consumed after migration would be more than that of without migration. The job is not migrated and instead run on the same virtual machine. Or else, the job is migrated to another virtual machine that consumes less energy.

The job is divided by using the technique in such a manner that the deadline is met and then allocated to the virtual machines. The virtual machine is started one after the other and execution is completed within the deadline.

2.2. CPU Utilization (Level of Frequency)

Selected CPU can work in six frequency levels; 1.596GHz, 1.729GHz, 1.862GHz, 1.996GHz, 2.128GHz and 2.261GHz. According to the concept of DVFS along with FCFS is used for implementing job migration. The frequency to be calculated differs in job length from one to another VM. The concept of DVFS along with FCFS is used for calculating average in CPU utilization.

This will be calculated by finding

VM utilization=Total requested MIPS/ total MIPS of the VM.

2.3. Frequency Calculation in Job Scheduling

A job arrives with the length of job that has been scheduled and assigned for deadline. If according to the concept of DVFS, time of executing the job in each of the frequencies differs from each one of them. The more the frequency less is the execution time.

Thus frequency is directly proportional to the energy and inversely proportional to the execution time. Based on this condition, the frequency to be taken by the processor is decided based on the actual workload along with the deadline. There may be more than one frequency that would complete the job in that time limit. The model will choose only the minimum frequency.

2.3.1. Execution times in each frequency

For example, a job length of 13500 would complete its execution in each of the frequency with respective time given. If it has a deadline of 3.3 then any one of the frequency 1.995, 2.128 and 2.261 can be selected, but the objective is to select the minimum frequency 1.995 so that it would be consuming lesser energy Analysis table 1.

Table 1
Execution Level of Frequency

Frequency	*Mips*	*Time*
1.596	3529	4.25
1.729	3823	3.92
1.862	4117	3.64
1.995	4411	3.40
2.128	4706	3.19
2.261	5000	3.00

2.4. Job Allocation for VM (Different Host)

The CPU utilization is low, it is checked whether the same job can be allocated to more than one virtual machine so that the total energy consumed is less than the energy consumed with time. If CPU utilization is high then the whole job is allocated to a single virtual machine and changes the MIPS for different level of job length. The Idle power consumed by both virtual machines has to be taken into consideration and the total energy consumed should be calculated accordingly.

The first equation is concerned with the total time of execution which includes the time of execution in VM1 and VM2. The second equation is the condition that the division of job is done in such a way that the whole job completes its execution. Now the job is divided in that percentage. The first part of the job is executed in VM1, after which the second part is executed in VM2. This result is the reduction in overall energy used.

3. EXISTING SYSTEM

The existing system of CPUs, Dynamic Voltage and Frequency Scaling is the power reduction technique used in a wide manner. DVFS is a hardware technology used to dynamically vary the processor frequency according to the governor policy and the workload.

The decision to change the frequency is commanded by the current processor's governor. Each governor has its own strategy to perform frequency scale. According to the configured policy, governor can decide to scale processor speed to a specific frequency, the highest or the lowest. Several governors can be implemented inside the OS kernel. The governor can make changes in frequency dynamically depending on the workload.

Resource allocation in critical problem.

1) High Energy Consumption.
2) High cost and non-security
3) Low performance scaling.

4. PROPOSED SYSTEM

The Proposed system is used to reduce energy consumption in data center and also to calculate the frequency for Different job processing. The users can complete their jobs within deadlines using algorithm of FCFS to calculate the frequency depending on job length and deadline. The proposed system is used to reduce Power Consumption with the help of Live Migration using FCFS in CPU Utilization for On Demand governor policy.

CPU based on the incoming job length and its deadline is calculated. The governor will check the best frequency for the job to complete within the deadline. Upon the estimation of frequency, user calculates CPU utilization based on the live migration with FCFS concept on the incoming job length and its deadline.

The process is to check which frequency is best for the job to complete within the deadline so that jobs are allocated to Different virtual machines. It takes multiple jobs to migrate in different Virtual Machine.

CPU Utilization is used to calculate job length within the deadline to consume energy. The proposed system proves that the migration done by FCFS reduces frequency in different VM for cloud by checking all the conditions; the job is allocated to the virtual machine(s). The virtual machines execute the job and at last the result is printed, which contains the energy consumption.

The proposed system is:

- The workload should be balanced between all the virtual machines. It automatically calculates ideal and Fulltime.
- Experimental validation provides accurate results.
- Reducing the power and find minimum frequency scaling.
- This process improves energy consumption in different data center.

The job manager executes the job given by the user. The job along with its deadline is given to the resource manager. The resource manager checks the corresponding frequency for the given job and the on demand governor's policy in turn checks whether there is a need for the migration of job. If migration has not occurred then, the job will be reloaded again

If migration occurs, then the CPU Utilization is calculated based upon FCFS algorithm. The FCFS algorithm is used to process the job in a First come First serve basis. The job which occurs first will be processed first. According to this algorithm the full power and idle power of each suitable frequency for each job will be calculated so that Virtual Machine can be allocated into the host. The CPU will be scheduled in such a way it reduces the total power consumed.

The System to be performed consumes energy and reduce the costs depends on the job service. The function is deployed in which both the frequency and time are calculated. It is focuses on consuming energy and time limit within the job execution.

5. RELATED WORKS

The CPU frequency scaling policies are used to evaluate Job length and period of time. It scales up and down the process scaling frequencies according to the current load and the predefined threshold (up and down), which leads to the non efficient load of energy.

The Live migration of virtual machine defines two techniques, process migration and FCFS Scheduling.

A) Process migration: This is a technique where the job migration has been implemented from one virtual machine to another. This reduces and calculates the frequency for the host in CPU Utilization.

B) FCFS Scheduling: It is the technique for scheduling job in QUEUE. Like First come First Serve for processing priority based on allocating the job to migrate in different host. This process executes between virtual machines to calculate the frequency.

C) Check for Migration: In this module it is checked whether same job can be allocated to more than one Virtual Machine if whole job is allocated to only a single Virtual Machine. If the condition is true then 3rd of job is migrated to another virtual machine

5.1. Frequency Calculation in FCFS

The Jobs will be allocated to different Virtual machines. This job will be put on FCFS queue and can be served in different job scheduling. If a job running in a single and multiple Virtual Instance, then power consumption will be high. Response time gets delayed.

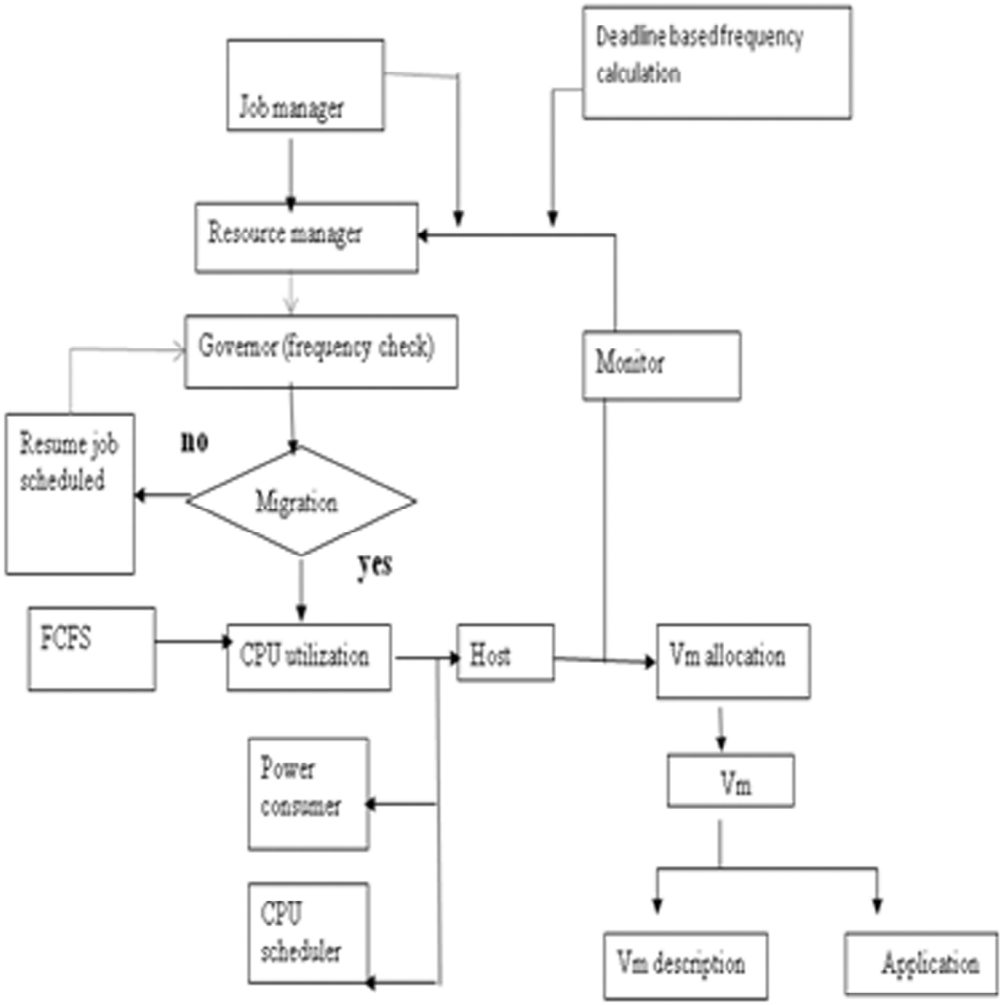

Figure 1: Overall System Architecture

This job will be executed in FCFS queue and can be served in Cloud Computing Environment. Job is split into small tasks and allocated to grid of running Virtual Instances. The memory for each Virtual Instance is monitored continuously to prevent overloading. A value will be checked with memory usage and if any Virtual Instance exceeds, it will be reported to Cloud Admin. The load another Virtual Instance which is assigned sleep or switch off state. This ensures uniform distribution of load among all the Virtual Instances that helps in preventing high memory usage with power consumption.

Here Frequency is calculated between ideal power and full power.

The Virtual machine is monitored continuously to prevent overloading. A threshold value will be checked with memory usage and if any Virtual Instance exceeds, it will be reported to Cloud Admin. Compared to other virtual instance, this virtual instance gets more power. For power saving in cloud, this job is split into small tasks and allocated to different Virtual Instances. Load balancing is achieved by assigning FCFS computing to load one to another Virtual machine.

6. EXPERIMENTAL RESULTS

The frequency to be calculated between job length and deadline in this paper, with FCFS algorithm, the less the frequency, less is the execution time. The frequency can be calculated by dividing the job length with the deadline. From the results, picking a least frequency, the total power is calculated with the formula.

$$TP = FP * JL/MIPS$$

Where TP is the Total Power; FP is the Full Power; JL is the Job Length and MIPS is the No of Instructions per Second. Say if, JL = 13200 and Deadline = 3.9 Hence the calculated frequency is 13.98. With comparison, the frequency is less with FCFS rather than DVFS.

Execution the frequency in total power it shows Table 2.

The total power consumed by the processor is the cumulative power consumption between idle power to full power and it depends on execution time.

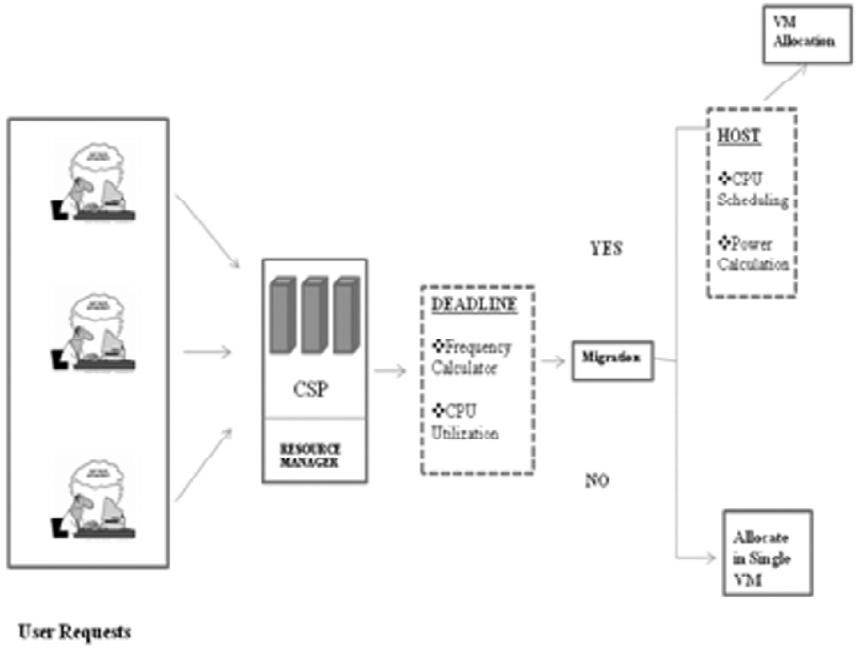

Figure 2: Job scheduling with migration

Table 2
Execution Time in Total Power

Frequency	Mips	Full Power	Idle Power
1.596	3529	3.74	0
1.729	3823	7.19	3.74
1.862	4117	10.4	7.19
1.995	4411	13.39	10.4
2.128	4706	16.2	13.39
2.261	5000	18.84	16.2

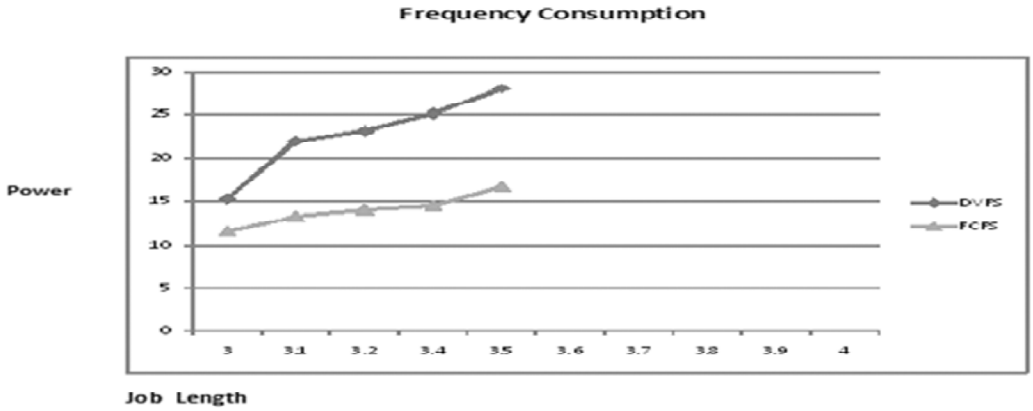

Figure 3: Frequency with Power consume

7. RESULTS

The experimental results using CloudSim, used the FCFS algorithm in order to reduce the power consumption in the better frequency. By using the concept of DVFS along with FCFS, when frequency increases, the power also increases. This frequency level can be calculated for a job with a length of 13200 and the deadline 3.9. So the energy consumed using DVFS is 15.22; using FCFS is 13.9. Hence the frequency calculated using DVFS along with FCFS is 13.9. The results show that energy efficiency using the FCFS with migration model is 13.98%. Hence the energy consumption is reduced.

8. CONCLUSION

The aim of this paper to reduce energy power consumed in datacenters by the use of live migration technique with the help of FCFS. The job is migrated from different virtual machines under the job scheduling constraint that is migrated in CPU host. It is completed within the stipulated deadline based on CPU utilization. Hence this project successfully reduces the power consumption in datacenter by using. This kind of testing can be performed in order to have positive results

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