# Energy Efficient Resource Load Balancing In Cloud Computing

**Adusumilli Sanjay, Putta Vijay Venkat Sai, Gogu Arun Kumar,T.Gunashekar, Sk. Hasane Ahammad**

***Abstract**: To reach the requirements of today's most challenging problems in optimization of various parameters are to be done. To right utilization of available resources is very important and there is a requirement in advancing the proper and less usage of energy by the virtual machines. The tasks are to be optimized from Virtual machines to physical machines. In the cloud computing system, there is a huge problem of Connecting with virtualization, dynamism and resources.[3] These are classified according to the requirement of resources and finding the proper virtual machine and further continuing in search of physical machine. Here the selected virtual machine can be released. The given algorithm decreases the consumption of energy by decreasing the working states of multiple physical machines and reduces the task rejection rate and make span. By using the Cloudsim simulator, the results are demonstrated.*

***Index Terms**: Active host set, Deadline of task, Host set, Taskset, VM types.*

## I. INTRODUCTION

Cloud has a huge flexibility and elasticity, which is low latency. It is a great area for research to get great information and usage flexibilities [1]. Many industries require the flexible cloud computing sources. The platforms are supported by a huge devices and data centers. Virtual physical clouds ae present in cloud environment. The word virtual machines is defines because they are the virtual resources in cloud network. When the virtual machines are mapped to different users, the resource management becomes more complex and the users of cloud may not be cooperative. To avoid such problems the cloud service provider follows a scheduling order to deliver the services. The difference between user and cloud service provider is defined as service level agreement.[2] There is a huge development in networking devices and energy efficient devices. An amount of one fourth of energy can be conserved through data centers which leads to a decrease in energy requirements. This energy consumption is a big problem which lead many cloud providers to change their thoughts towards energy conservation. The quality of these virtual machines should be good if not, there may be a huge consumption of energy. The main problem that is taken into consideration is allocating the vm's adaptively to physical machines in the data centers. There may be an undefined dynamic workload. This tells about the decisions of delivering decisions. The reallocations of virtual machines which are assigned to which physical machines which can be turned off when not required. These choicesare considered in order of reaching the goalof conservingpowerusage of the devicebydirecting the idle PMs by disabling them.[4] This answerthat the useful resourcesquander in the cloud gadget with the assistof virtualization process and well-organized allocationstrategy. The whole input work load of the datacenter is the limited number of duties whereevery single assignmentincludes,severalVirtual machines for implementation. In this paper, our goal is to givetheinputchallengefor the currentVirtual Machinein any other casecreates Virtual Machine,depending upon the taskand assigned the recently created Virtual Machine to a current host.Heterogeneous cloud sourcesand the insertionvalues of a cloud machineare modeled, and an energy ideaaid allotment of platform is brought to decrease the strengthusage of cloud informationareas [5]. Introduce a task dependent Virtual machine placement algorithm to decrease the electricityusage, reduce the make span of the system, and minimize the undertaking refusal rate.

An exploratorycontrastto prove the introducedsolutionby making use ofthe CloudSim as simulation framework.

## II. RELATED WORK

From a vast study, we have diagnosed two differentproblems to decrease the powerusage of the cloud system. different algorithms hadearlier been broughtshowing to the scheduling problem in cloud computing area.The DAG-based processes are arranged as graphsthe placenodes are linked throughcorners. In graphical representation, the node efficiencyindicatesresourcerequirements and edgeefficiency denotes required. The Virtual Machinedecision for a process is based on SLA, CSP and make span optimization and other optimizations. A dual requirement scheduling methodhad been introduced to schedulethe DAGbased applications to reducethe runtime and to maintain cost efficiency.[6] This experimental value indicates that the scheduler introduced is most effective to a method called the SQ. The dedicated work does notassurancethe most efficientresource usage. The approaches of virtual machines can be static or dynamic. The best outputs that can be extracted from the answer is maintaining balance of Central Processing Unit and MBA. In the above one virtual machine work on statedwork load and other works on unexpected load. ETVMC is an algorithm that is used to optimize various performance metrics. It helps the service providers

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to decrease the usage of energy and to decrease the task denying rate. It helps the cloud usages to reduce work on the cloud and financial tasks.

## III. PROBLEM STATEMENT

Consider there are MdefinedDiverse hosts in cloud, every host is in one state among the two following states i.e.., Either active state or in sleep state. Let all the host be at sleeping state at the start. There are K otherVM's differentiated depending upon the available sources like main memory, storage and processor. The tasks are differentiated depending upon the groups, similar tasks fit in similar virtual machines. All the data is contained in task manager [7]. Depending upon the requirements defined by task manager new virtual machines are created in some defined hosts. The sub optimal answer for the stated task problem with the point of optimized energy usage is the mainpoint.

## IV. SYSTEM MODEL AND ARCHITECTURE

In the following area, we will be using aorganizedplan that has Host,Virtual Machine and Task models in the cloud data center [7]. The cloud system will be having n number of Hosts h=($h_1$,$h_2$,$h_3$,…$h_n$).These all hosts are assorted in nature in terms of the assets capacity. Generally, user's request services through internet to cloud service provider. The task created in the cloud user's in the internet is taken as service request. User's request service from the CSP as shown in fig.

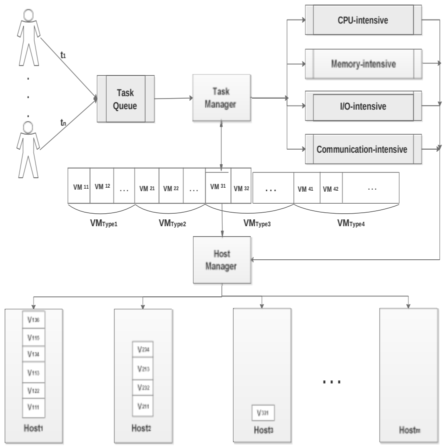


**Fig 1: Cloud system model**

As described from the above figure we can see that the user request will be taken as task (i.e.; heterogeneous in nature) will be sent to the Task Queue in which the task queue will be sending to Task Manager. In this task manager divides the tasks into four different types to map the tasks to virtual machines depending on the task type.
(CPU-intensive, Memory-intensive, I/O-intensive, Communication-intensive) are the four different types of tasks [8]. The task manager also knows the types of virtual machines that are present and its sub-type, within a VM type, a finite set of VM types are available in it.
There are four types of virtual machines:
VM $type_1$ :CPU-intensive tasks
VM $type_2$ :Memory-intensive tasks
VM $type_3$ :I/O-intensive tasks
VM $type_4$ :Communication-intensive tasks.
All the processes that are from the queues are sent to the host process definer [9]. The host processes definer will be having the entire data about the Virtual Machine types. In the process, the host manager is the one which is accountable in the making of VM toreach certain service level agreement.

At starting, all hosts will be in sleep. The host manager will select or choose the VM type depending on the variant of task and makes a virtual machine in the host where the power and make-span can be reduced. If any active hosts have enough availabilities for creation of the required Virtual Machines, then introduce the virtual machine first on the host that is active with less energy usage. Whereas if no host that is active can givesources for the creation of Virtual Machine, then the host manager will go to other host that is in the sleeping state and changes the status to the active state and create the Virtual Machine.

The dead line of the task is taken as theService Level Agreement [10]. The service sent to the cloud users is based on the deadline restriction. If the Service Level Agreement between the cloud users and cloud service provider permits to stay for a period to do the implementation of a new task. If there is no task present in local queue of a virtual machine, then virtual machine is removed from the host and resources are idle. Input Output intensive task is the which mainlystops for the file-system, database and network.

## V. ALGORITHM

Taskset: T
Deadline of task: D
Host set: H
VM types: Type of the virtual machine.
Need of resources and stipulations of tasks: RPTi
Limits of all stipulations of tasks: Central Processing Unit.
Active host set: AH
VM set: AV
Task: t
Task type TT

VM subtypes: VMtype1, VMtype2, VMtype3, Vmtype4
Sleep host set: SH.

**INPUT:**

T={t1,t2,….,tn}, D={d1,d2,…,dn}, H={Host1,Host2,…..,Hostm}, RPTi={Li,Di,Mi,IOi,λi}, CPU: {CL,CU},Deadline : {DL,DU}, Main memory : {ML,MU}, I/O : {IOL,IOU},Bandwidth : {BL,BU}, AH : {Ah1,Ah2,…Ahk}, AV : {Av11,Av12,….,Avp}, VM type={VMtype1,VMtype2,VMtype3,VMtype4},
VMtype1={VMtype11,VMtype22,…,VMtype1k},
VMtype2={VMtype21,VMtype22,….,VMtype2k},
VMtype3={VMtype31,VMtype32,…..,VMtype3k},
VMtype4={VMtype41,VMtype42,…..,VMtype4k}.

**OUTPUT:**
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*For i=1 to n do*
*TQ[i] <- RemoveMin(Ti)*
*Removein(Ti) will remove the task which has minimum di value.*
*End for*
*UC <- CU/DU*
*For each task ti ε T do*
*Ci <- Li/Di*
*Wci<- Ci/UC ,Wmi<- Mi/MU*
*Wioi<- Ioi/IOU ,Wλi<- λi/BU*
*Xi <- 1/Wci+Wmi+Wioi+Wλi*
*Wci = xi X Wci ,Wmi = xi X Wmi*
*Wioi = xi X Wioi ,Wλi= xi X Wλi*
*Max = {Wci,Wmi,Wioi,Wλi}*
*ti<- CPUintenseiffWci = Max*
*ti<- MemoryintensiveiffWmi = Max*
*ti ε IOintenseiffWioi = Max*
*ti ε Communication intensive iffWλi = Max*
*end for*
*for each task ti ε T do*
*for each host that is active Ahi ε AH do*
*for each VM AVij ε Ahi do*
*if AVij is idle then*
*Removethe sources of AVij to Ahi*
*end if*
*end for*
*end for*
*for each host that is active Ahi ε AH from Ahk to Ahi do*
*if Ahi is idle then*
*Change the host Ahi from idle to sleep state.*
*end if*
*end for*
*VM status = 0;*
*For each active host Ahi ε AH from Ahk to Ahi do*
*For each VM AVij ε Ahi do*
*If migration of AVij to AH – Ahi then*
*VM status = VM status + 1*
*Migirij<- selected host ID*
*End if*
*End for*
*If VM status == j-1 then*
*Relocate all VM's by implementingMigrij*
*Change the host Ahi from idle to sleep state*
*End if*
*End for*
*All VM subtypes are sorted within Virtual Machine type*
*For each VM subtype VMtypeTTi ε Virtual Machine typeTT do*
*If tis inVMtypeTTi then*
*Virtual Machine type <- VM typeTTi*
*End if*
*End for*
*For each Ahi ε AH do*
*If VM of VMtype is fit in Ahi then*
*Host <- Ahi*
*Stop*
*End if*
*End for*
*For each Shi ε SH do*
*If VM of VMtype is fit in Shi then*
*Host <- Shi*
*Transform state of Shi to active state*
*Stop*
*End if*
*End for*
*Allocate ti to VM deployed on host h*
*End for*
*Free VM's (). //Continuously checks for available free VM's.*
*Free Hosts. (). //Continuously checks for available free hosts.*

## VI. IMPLEMENTATION AND RESULTS

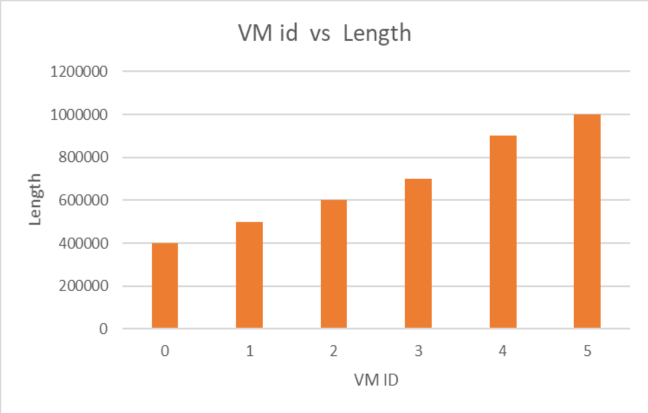


**Fig 2: VMid vs Length**

The above graph deals with the comparison of Virtual machine ID and the length of task. For the Virtual machine with id 0 is assigned with a task of length 400000. Considering the availability of five virtual machines, the length of the task is verified.

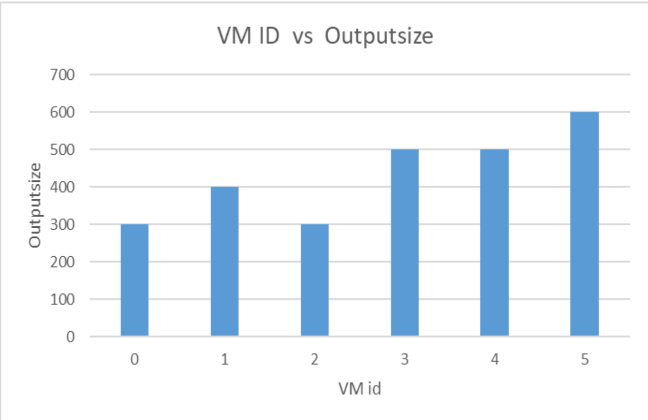


**Fig 3: VMid vs Outputsize**

The graph above deals with the Output size and the Virtual machine id. Each virtual machine with a different id has a different Output size. For virtual machine with id = 0, the output size is 300


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whereas the virtual machine with id 1 has the output size as 400.

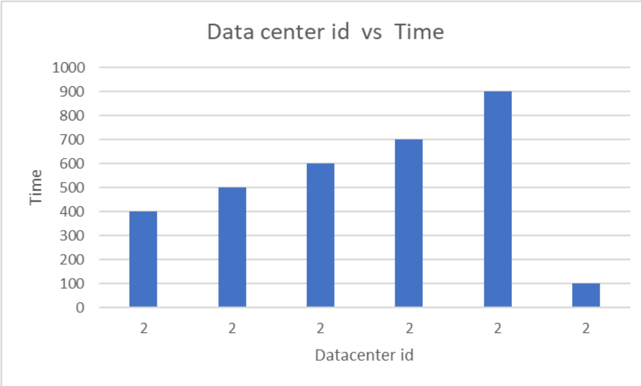


**Fig 4: Datacenter id vs Time**

This is representation of time required for the same datacenter with the same id. At an instant of task, the time for the data center is 400. At a different instant the time by the same datacenter is 900.

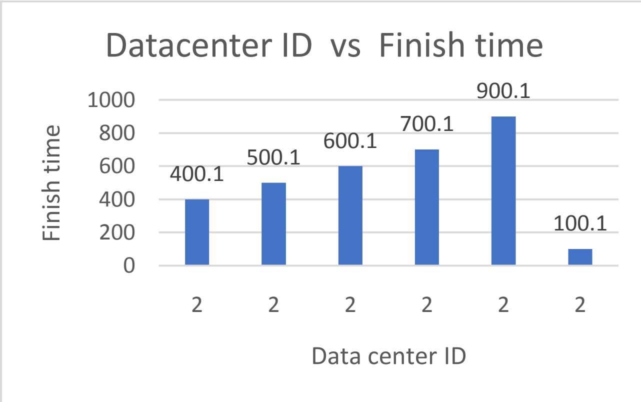


**Fig 5: Datacenter id vs Finish time**

This is the representation of finish time of the data center with id = 2. The same datacenter requires different finish time for different tasks. At some instants the finish time of the datacenter 2 is 400.1, whereas at some instant the finish time is 900.1 varying with the task.

## VII. CONCLUSION

The goal of this work is to implement the load balancing in virtual machines effectively, by implementing the ETVMC. The above graph results are recognized to be optimal when compared to previous results. The simulation of the work is done with cloudsim simulator. We found the results for resource requirement of the requests of service, they may vary dynamically during their service time. It has various comparisons with different virtual machines and a data center. The work load and the time consumption are compared in this work with virtual machines and datacenter.

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