ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijircce.com

Vol. 5, Issue 6, June 2017

A Heuristic Based SLA and Energy Efficient for Virtual Machine Allocation in Cloud Computing

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ABSTRACT: The virtualization core technology using cloud computing is faced number of virtual machine through physical machine. The cloud services accessible from anywhere at any portable device for utilizing their enormous services through the verification and validation access permission in cloud provider. The voluminous of data store in cloud every day. In particular growing of cloud users are increasing day by day. Cloud computing should need to handle scheduling process for reducing energy consumption of physical machine. To reducing physical machine energy describe at migrating in virtual machine by the scheduling. In a tremendous skill of energy consumption consider in cloud for virtual machine allocation for storing, accessing and retrieving data. The proposed heuristic approach label that workload reduce and energy saving in physical machine through by virtual machine scheduling and migration policy. The consumption of energy is reduced through by scheduling process. Here, the heuristic approach is deliberated for loading, allocating and migrating data into multiple virtual regions for scheduling via effective retrieving process on immediate response to the user as well as saving energy without fail to the physical machine.

KEYWORDS: Energy Consumption, VM migration, VM selection policy, Power aware Particle Swarm Optimization (PSO), Virtualization

I. INTRODUCTION

The growing technology of cloud environment provides the three types of services under pay-as-you-go model (PAGY) such services are Software as a service, Platform as a service and Infrastructure of a service. IBM Bluemix, Microsoft, Google and Face book are the most important cloud service providers. Many of the IT infrastructure people accessing the cloud services increasing rapidly. Due to vast electrical energy consumed then it increase the operating costs in the cloud environment. Therefore this is one of the critical tasks of research work. The on demands services of user requirements are increasing every year [1].

At present, technology of virtualization is use in the data center. It is the abstract layer of active host as physical machine. Virtualization allows accessing multiple resource allocation of physical machines. It is also meet with service level agreement. Bandwidth, CPU utilization, memory, storage resources are present in virtual machine that reduce the resource accessing time in physical machines [1, 2]. The cloud environment virtually provide platform for through the physical machine. In computing service all are handled in effective energy depends upon the cloud service provider.

In data center energy efficient Resource allocation process is one of main research work. Because the number of consumer using cloud resources via the virtual machine. Energy efficient technique divided into two types: static and dynamic Therefore managing time depends for variety of resource allocation with in response time of workload server using dynamic consolidation. On other hand, virtualization allows number of VMs to be executed on the same share hardware resources and same physical server. This enables VM consolidation process created for reduce the physical servers which is used maximum number of servers [3].

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In this article proposed work, utilize the combined approach as VM policy and heuristic optimization in order to overcome the background approaches. The core idea of this work is to reduce energy consumption, Quality of service, Sla violations and CPU utilization. The paper is organized as follows. Section II deals with related work of this research. Section III express with proposed work of energy efficient VM allocation. Section IV describes experimental results. Section V concludes the paper.

II. RELATED WORKS

In [4] proposed for to saving energy efficient for reducing idle virtual machine allocation. Here genetic algorithm and Dynamic Voltage Frequency Scaling (DVFS) Algorithm are used in combinable. The developed work dynamically analysis for DVFS. It gives less energy for workload sharing and zero percent of SLA violation metrics are fulfilled. The approach describe three different methods are used one is consist on single server and cluster, second is with avoiding SLA violation minimizing static and dynamic power requirements, finally reducing utilization of server all are handled in proper way for less energy. The author focus server energy consumption only here 5VM and 5PM all are assigned in single data center with the simulation results is performed by cloudsim toolkit.

The proposed [5] description of energy efficient heuristic algorithm is consider on VM placement and VM selection. Through the reducing energy in virtual machine come under three policies. They are potential growth policy, minimization of migrations policy, random choice policy all are allocated and migrated into the virtual machine. On demand virtualization based heuristic algorithm overcome four metrics for improve their performance. The metrics are aggregate energy of physical machine, percentage of SLA violation, number of virtual machine migrations, average SLA violation. Moreover the approach is providing for minimizing energy of data center.

To maximizing system efficiency used for two levels one is physical machine level and another one is controller level. Message number, controller service time and overall optimization all are evaluating better performance for to saving energy. Resource utilizations here denoted at CPU, processor and memory considering for energy consumption with applying limited number of reallocation. Then the simulation result is performed by CloudSim. Finally is suited for cloud environment in comparing to utilization technique [6].

Yongqiang Gao et a. [7] investigate the dynamic resource management scheme for service level agreement. The main objective is to achieve energy efficient and its meet SLA. The DVFS and server consolidation of scheme is presented with cluster configuration. In this scheme gives four features. First scheme leads to cost, second scheme leads to solid theoretical foundation, third method leads to compared to previous and final proposal used for minimizing energy consumption by heuristic algorithm such that best fit decreasing. Thus the experimental results achieve 50.3% compared with statistically provisioned case of SLA violations.

Fhimeh Farahnakian et al. [8] introduced virtual machine consolidation for energy efficient. The goal is to minimize energy with SLA violations and performance management using Reinforcement Learning. This scheme leads to Q-learning based on the agent. This result compared with previous consolidation methods in Cloudsim tool. In [], proposed VM scheduling for exact allocation migration technique. It considers metrics for energy consumption and migration cost. Exact allocation using Bin packing approach for allocating the virtual machine that time it reduce the power consumption. Then best fit method tries to allocate the exact VM. Finally, the migration method produces to achieve the feasible solution for VM consolidation. This experimental result shows better performance of existing method.

III. METHODOLOGY

The proposed heuristic approach is based on heuristic approach as power aware Particle Swarm Optimization, LR and MMT for reducing the energy consumption and SLA violations. The advantage of this method is reducing the space and time. The proposed approach follow that three different phases for effective energy saving : (1) To determining the overloaded host; (2) to migrate the selected VMs from the overloaded host; (3) Finally, find to allocate a job and migrate to the selected VMs from the overloaded host. The heuristic approach phases are following steps,

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A. Detection of overloaded host: To detect the overloaded host is using the Local Regression (LR) policy for deviation of the CPU utilization. The purpose of this phase is used to detect the overloaded host for migrate the VMs then it will go to the next phase.

B. VM selection: The VM selection policy is second phase of this approach. After finding out overloaded host, then to select the VMs for migrate from one to other host. The VM selection phase is using the selection policy as MMT(Minimum Migration Time) . This policy takes to allocate the other VMs when the selects VMs for migrate to require amount of time to finishing migration.

C. VM placement: The VM placement phase is using the heuristic approach as power aware Particle Swarm Optimization technique. It provides best optimal solution for VM placement. The bird flocking movement is taken this technique. This technique is used to reduce physical host and active the Virtual Machine. This features the velocity, encoding and velocity time.

D. Evaluate power model: The relationship between the resource utilization and power are assumed to CPU utilization. In equation (1) evaluate produce the total power consumption.

$$P(U_{cpu}(t)) = P_{idle} + (P_{max} - P_{idle})U_{cpu}(t) \quad (1)$$

$U_{cpu}(t)$:CPU utilization of power consumption at time t,
Pidle : minimum cpu utilization of power consumption,
Pmax : power consumption at maximum load.

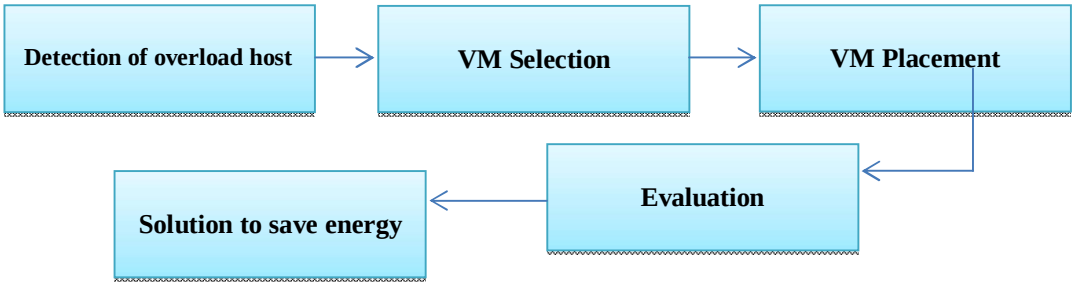

Figure1: Block diagram for proposed work

IV. EXPERIMENTAL RESULTS

The energy consumption word in the cloud computing describes lot more ter ms like physicl machine energy, virtaul machine energy, retriving energy, service energy, migrating energy, storage energy and usage energy. The proposed heuristic algorithm analysis on efective energy consumption for usage and storage factors. The uploading files are stored via the scheduling process and splitting that allocated memory for reducing energy consumptions. Theworkload can monitoring variety of place.

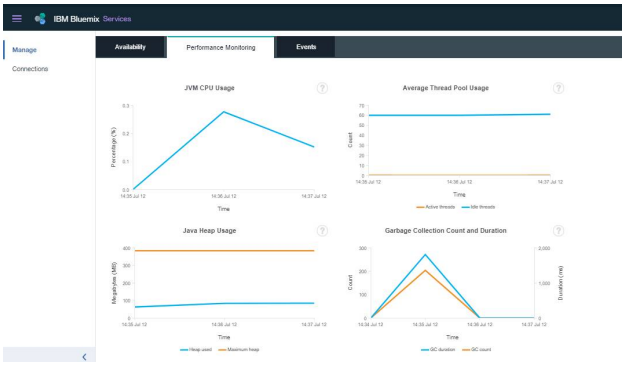

Figure 2: performance monitoring for uploading files

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The upload files can monitoring at CPU usage, Thread usage, heap usage, and Garbage collection usage all are calculated for allocating memory size and finally provide for availability in virtual machine alloction for storing a new files. In the availability of memory space are monitored for storing a new files and quick response time for existing files on server usage. The IBM bluemix offerd dynamic scheduling for reducing energy consumption in cloud workloads.

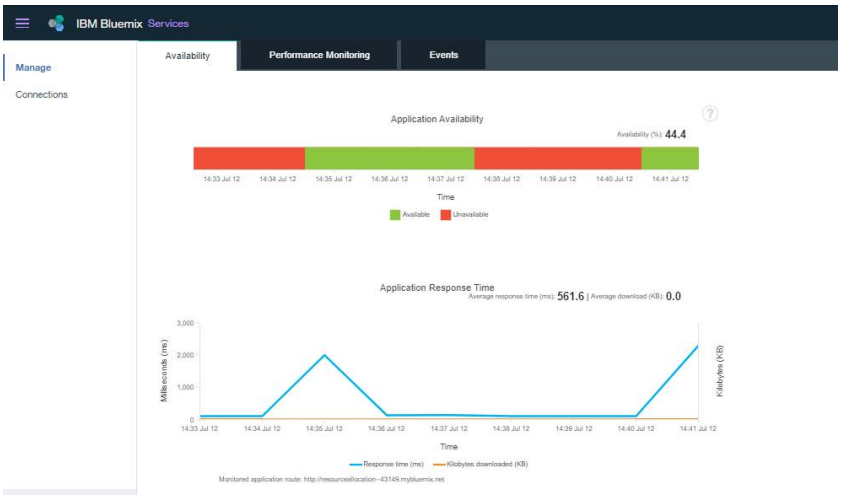

Figure 3: Availability and Response time for uploading files

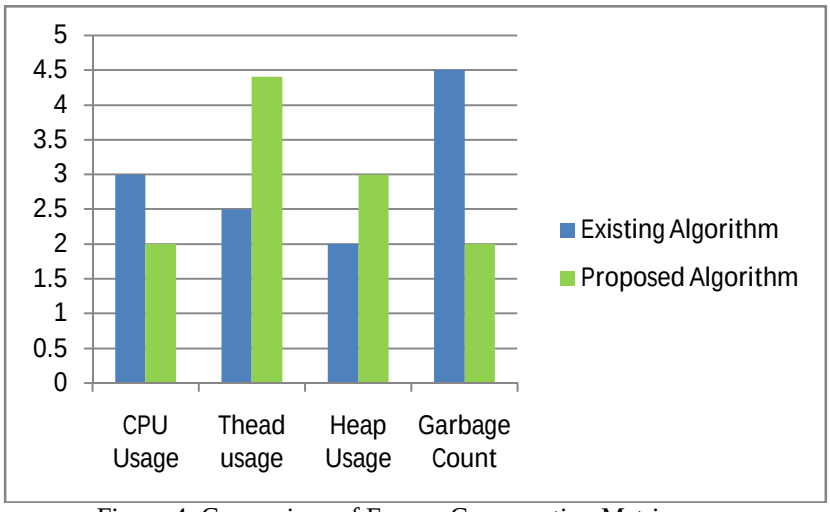

Figure 4: Comparison of Energy Consumption Metrics

V. CONCLUSION

Perspective of energy consumption in the cloud environment still faced critical issue because cloud is performs at high speed and constant internet connection. So overcome this situation here describe for effective energy consumption method with using dynamic platform providing Bluemix service. The scheduling processes on overloaded machine into virtual machine migration are automatically done by object storage. To comparing simulation tools it's give effective energy. Not only considering energy it also provide a complete implementation of a virtual machine functionalities like CPU, Thread, Garbage count, and Heap all are with minimum response time. The proposed heuristic algorithm gives better performance for comparing to standing algorithm.

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