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Task Based Virtual Machine Placement in Cloud

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***Abstract:** Cloud computing offers many advantages by optimizing various parameters to meet the complex requirements. Some of the problems of cloud computing are utilization of resources and less energy consumption. More research and resources heterogeneity complicates the consolidation problem inside cloud architecture. VM placement refers to an ideal mapping of a task to virtual machines (VM) and virtual machines to physical machines (PM). The task-based VM placement algorithm is introduced in this research work. Here tasks are divided in accordance with their requirements, and then search for appropriate VM, again searching for appropriate PM, where selected VM could be sent. The algorithm decreases the use of resources by devaluation of the number of dynamic PMs while further decreases the rate of dismissal of make span and assignment. CloudSim test System is used to evaluate our algorithm in this research work. The outcomes of this implementation show the effectiveness of some current algorithms such as Round robin and Shortest Job First (SJF) algorithms.*

***Keywords:** Cloud Computing, CloudSim, energy consumption, VM Placement*

I. INTRODUCTION

One of cloud computing's most growing advancements is its ease of access, distinct and unique applicability, leaving clients drawn to its functionality. This provides customers with readiness to dynamically scale the equipment. Running models in cloud are listed as Software as a Service (SaaS), Infrastructure as a Service (IaaS) and Platform as a Service (PaaS). Cloud computing allows users to use computing assets from cloud data centers, rather than maintaining the infrastructure. Cloud computing, for instance, claims virtualization within which infrastructure resources of one or more computer systems are divided into different circumstances of execution called Virtual Machines (VM). Each VM is separated from one another and can also function as a perfect system for implementing the client applications. Many of the cloud's advantages arise from the heterogeneity of the properties, using new methods of virtualization that allow asset utilization to be developed, and the required energy use [3]. Mapping could be done physically when there are finite resources within the data center but when the properties are enormous, physical mapping becomes complicated and impractical. That's why we use the VM placement method at the start or run time. Virtual machine placement is the mapping of jobs to virtual machines and VMs to physical machines. Using structured energy resources within the data centers is a hard job. Because of the high demand of numerous cloud administrati ons, data centers are constantly developing around the world Increased use of data centers results in high energy consumption, increased CO2 emissions and expansion within the data center's working price.

To minimize consumption, we use a common strategy to improve the efficiency of a data center, which is called VM Situation strategy [4]. It will be used to compare the number of active servers with the current value of VMs and to keep the remaining servers in less regulated standalone modes. Nearly every IT business requires support from the realistic stages of cloud computing, supported by millions of physical host machines distributed in various data centers. The cloud computing architecture is assisted by methods of virtualization that manually manage cloud assets. The virtual cloud architecture enlarges the output as well as the framework's scalability. Virtual devices are referred to as VMs within the cloud system. The VMs graphed different customer conditions for performing input tasks. In reality, resource management is harder when resources are excessively approved, customers are not supportive. The cloud service provider (CSP) will take delivery of the services after a proper planning phase to address the circumstances. CSP-client communication is industrially referred to as a service level agreement (SLA) [10]. The SLA is a part of an operation.

While fulfilling the assignment of the service requirements to a collection of VMs operating on different hosts expressed within the SLAs and without reducing or diminishing the character of the job, the service issue is charged. Assigning Virtual Machines to PMs in the data center includes choices such as when to allocate Virtual Machines, which Virtual Machines to migrate, which Virtual Machines are assigned to which Physical Machines to switch off. Here the suggested solution reduces the disuse of resources with the assistance of a virtualization strategy and successful allocation policies in the cloud. We also introduced different subtypes of VM based on their resource capability .The entire input load of the data center can be limited number of tasks ,in which each task contains multiple VMs for execution .Our basic goal is to distribute virtual machine input tasks or create work-based virtual machine, assign dynamic host to the recently created virtual host. Different cloud assets and cloud model input roles are updated in this research work and a task know asset assignment environment is made current to minimize data center resource consumption.

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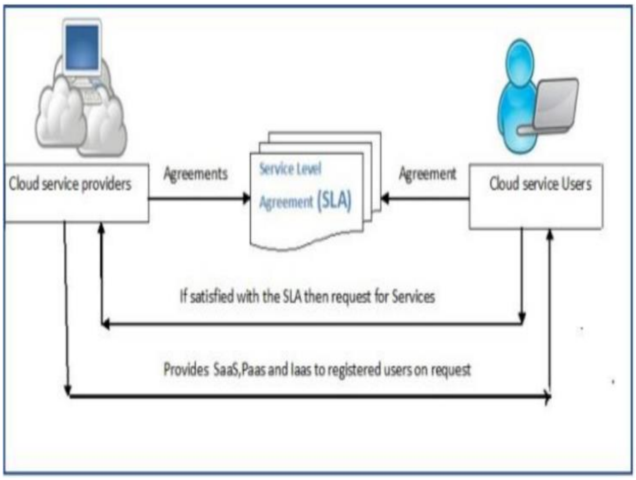

Fig. 1.Service Level Agreement

II. RELATED WORK

Several algorithms and techniques have been implemented in the process of maximizing and decreasing the entire energy consumption and making cloud data center duration. VM placement in a cloud computing is one of the essential operations. VM placement is a technique for selecting the correct Physical Machine (PM) for Virtual Machine (VM) assignment. Energy consumption depends on assigning the tasks to a particular virtual machine. Energy consumption depends on assigning the tasks to a particular virtual machine.

The process of selecting VM for a given task is based on 1. Specified Service Level Agreement 2.Cloud Service Provider (CSP) to achieve the benefit and 3. Other important goals such as time minimization, energy conservation, extension of the throughput. Virtual machine selection policy is also focused on degree of satisfaction with the results.

In the related work on energy consumption, we observe the problem of how to pick a host for Virtual Machine Placement and move VMs from irregular loaded hosts such as under loaded or overloaded to another, and turn off the idle host machine into sleep mode. The host machines are determined by virtual machine placement by the shortest distance, minimum energy consumption and maximum cloud use of bandwidth.

The process of Virtual Machine placement can either be static or dynamic. In static process, once the decision is made, the allocation is not altered. In dynamic process, at the time of task execution the allocation of VM to the physical machine may be altered. In the dynamic method the information related to the actual load is used but the information is not used in the static method. Based on the goal a Virtual Machine placement algorithm is divided into two 1.QoS based approach 2.Power based approach.

To optimize the different performance measures, an algorithm called the TVMC-Task based Virtual Machine Consolidation Algorithm is used. This algorithm 1.Includes a strong structured framework to easily map VMs, 2.It helps cloud service providers to reduce energy usage and lower a system's task failure rate, 3. It also helps cloud users to cut costs, time of execution.

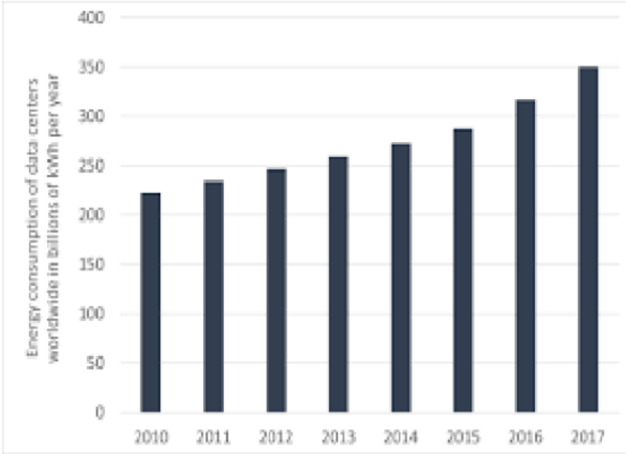

Fig. 2.Energy Consumption of Data Centers vs. Year

Virtual Machine Consolidation is a technique used by Virtualization which makes better use of data center infrastructure. Virtual Machine Consolidation involves live migration with the ability to change a virtual machine in a range of physical servers with zero down make span and is one of the best ways to increase resources efficiency and energy management in data centers. VM migration and Virtual Machine Placement also play a vital role in the strategies for consolidating the Virtual Machine [2]. Problems such as complexity, unpredictable work-loads, scalability and cost of migration make the technique of VM consolidation difficult. It can be done either statically, or dynamically. In the case of consolidation of Static VM, the VM Monitor assigns the physical resources to the VMs that depend on the need for peak load. In consolidation of Dynamic VM, VM Monitor adjusts the VM features based on the current requirements of the workload.

We run simulations using Cloud Simulator. The outputs give us the ability to start the policies included in the research performs in a better way than the policies provided about VM migration make span and the percentage of interruption of the service level agreement.

Current energy-efficient resource allocation solutions offered by different computing systems primarily focus on reducing energy use and user service needs that can be modified in cloud computing infrastructure on demand.

III. CLOUD SIMULATOR

Cloudsim has been implemented free of expenses for the cloud deviser to test the execution of their provided arrangements in an iterative and managing environment. It is a simulation device. Previously, it makes different adjustments to bottlenecks in real world distribution. It is a test system; thereafter, it does not run any of the actual programs. It can be defined as ' running an infrastructure system in a hardware environment, ' where previously technology-dependent knowledge was occupied.

CloudSim is the collection of files that are used to update cloud processes [13] . This provides basic classes to illustrate data centers, computing resources, software, consumers, virtual machines, and arrangements to manage various pieces of the planning and supply system. Using the above elements, it is easy to analyze unused plans describing cloud use, in terms of the undertaking, deployment scheduling, load balancing conditions. It can also be used to evaluate process capacity from different points of view such as size, model execution time. It also supports the growth in terms of Green IT terms.

It can also be used as a basis for a virtual cloud infrastructure and may include unused load balancing methods, unused scenarios and scheduling. It's adaptable and needed to be used as a library that allows you to include a specific circumstance by writing a Java instruction. Alliances,
R&D locations and also industry-related designers can chec k the performance of a newly created application in a manag eable and easy infrastructure setup, by using cloudsim.

The CloudSim layer offers personalized management interface for data, memory, virtual machines and bandwidth to view and recreate cloud situations. It also offers hosting of virtual machines and complex architectural conditions for managing program execution. At the present layer, cloud service provider should change modified methodologies to consider the skills of different arrangements in VM requirements. The user code layer revealed critical substances such as their requirements, system count, task count, VMs, device count, application types, and scheduling approaches. Some characteristics of cloudsim are incredible. For example, used to view and replicate a large-scale cloud base that includes server farms on a solitary manual registration center. This offers the cloud computing segments an architectural and social illustration. Cloud situations recreation, applications for execution permission can provide useful information to test these special, distributed and flexible circumstances.

IV. PROBLEM STATEMENT

The methodology of virtual machine placement plays a vital role in making good use of Cloud data center infrastructure. There are 'm' different hosts in cloud framework. Each host is in either of the two states: In either active or sleepy state and initially complete hosts provided are in sleep. Depending on the requirements ' v ' types of virtual machines are distributed. Tasks have been classified in the same way as VM types, so tasks of the same group could be set on the same type of virtual machines. Task director consists of detailed knowledge about the tasks that are present in the queue and also about the upcoming tasks into the queue. Therefore, modern VMs were rendered in a few different hosts based on the requirements defined by the task director for upcoming tasks. So, the challenge of fitting newly formed virtual machines to just a few hosts is a task problem. The important purpose of this project is a sub-optimized outcome for the given task problem with the intent of better performance.

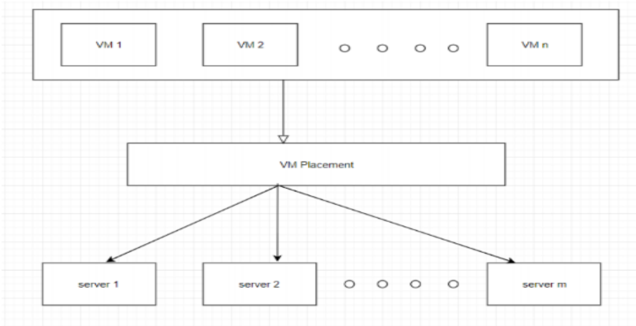

Fig. 3.Virtual Machine Placement in Servers

V. PROPOSED ALGORITHM

Task Based Virtual Machine Merging Algorithm

- Algorithm 1
  Input : task T={t1,t2,t3,…….tn}
  deadlines D={d1,d2,d3,……dn}
  VMT={VMT1,VMT2,VMT3,VMT4}
  for i=1 to n do
  task Q[j] ←pickMin(tj)
  end for
  q1,q2,q3,q4← Categorize task (task(Q) using Algorithm 3
  for each task tj ϵ task Q
  Free Host VM() using Algorithm 3
  Vm ←select VM (t0,1,aVM,t1Type) using Algorithm 4
  Assign j to VM initiated on host
  End
  for
  Free Host VM() using Algorithm 3

- Algorithm 2
  Segregate Tasks
  Input: task T={t1,t2,t3…………tn}
  Resource necessity R={li,di}
  UC=CU/DU
  for every task in Q[i]
  ci=li di
  wci=ci vc
  wmi=mi mu
  wio=ioi iou
  w λ i=--i bu
  xi=1 wci+wmi+wioi+w λ i
  wci=xi*wci
  wmi=xi*wmi
  wioi=xi*wioi
  w λ i=xi * w λ i
  maxi=max(wci,wmi.wioi,w λ i)
  ti ϵ qcpu iff ci= maxi
  ti ϵ qcon iff w λ i=maxi
  end for
- Algorithm 3
  Input: active hosts

```
ah={ah1,h2,…….ahn}
V={ v11,v12,…,v21,v22,….,v33}
for each active hosts ahi ϵ ah
  for each vij ϵ ahi
    if vij is not active then
Unassign regular of vij
  end if
end for
end for
v set1=0
for each ahi ϵ ah do
for rach vij ϵ ahi do
  if Migration of vij to ah-ahi then
startv+=1
Mgrij=target ID
  end if
end for
if startv=j-1
  relocate virtual machine
Keep the host ahi in sleep
end if
end for
```

- Algorithm 4

```
Input:m type={ Vm type1,Vm type2,Vm type3,Vmtype4}
Vm sub types:
Vmtype1={ Vm type11,……..,Vm type14}
Vmtype2={ Vm type21,……..,Vm type24}
Vmtype1={ Vm type31,……..,Vm type34}
Vmtype1={ Vm type41,……..,Vm type44}
for each Vsubtype Vmtype i=Vmtype
  if t is apt then
    Vmtype ←Vmtype i
    Return Vmtype Stop
end if
end for
```

VI. RESULT AND DISCUSSION

The experiment is made by using Cloud Sim three.03 simulator. Due to Virtual Machine Monitor, Xen is used. Here the Task-based Virtual Machine Consolidation (TVMM) method is applied and tested in Java on a dingle digital computer by using Intel i 7 three.07 GHz CPU and 32G memory.

CloudSim is a cloud computing simulation system that enables a feasible situation at no cost and iteratively. This shows bottlenecks and changes them before sending them to cloud. CloudSim proposes: another, description positive, extended replication framework. Some of the characteristics of cloudsim are remarkable, for example, helping to view and replicate large-scale cloud computing foundations, integrating server farms in a single physical registration hub (everyone with their qualities) to virtualize administration changes to switch between time shared and space shared portion of the handling center. Cloudsim offers design and interactive presentation of segments of cloud processing. Recreation of cloud situations and execution apps provides useful knowledge for reviewing these specific, flexible circumstances.

Experiments have been performed in a community of heterogeneous cloud properties, which is moreover hosts as heterogeneous demands for input resources and VMs. Often, the demand for assets and also the scope of a service 300 requests are arbitrarily made. Measurement of hosts is constant in all activities and also range of VMs spans from twenty to two hundred. The specifications for the VMs are produced arbitrarily and also criteria for total VMs are spread on a bunch is smaller than the host's asset potential. We tested the proposed TVMM formula with 305 Round-Robin, FCFS, in relation to the energy consumption of the system in order to determine the efficiency of our implemented method. TVMM algorithm works better than the previous algorithms and the results are detailed in the figure. The implemented algorithm in this project gives higher average energy consumption than FCFS and RR.

VII. CONCLUSION

By incorporating hosts, different types of tasks and VMs they have proposed Task-based VM-placement law (TVMC). The aim is to delegate tasks quickly to the VMs, hence VMs for hosts to reduce make span, and level of task rejection. Efficiency results for algorithm were obtained by comparing it with FCFS and Round-Robin; thereby the resource requirements of the database orders may periodically differ over the entire process time.

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