Virtual Machine Allocation in Cloud Optimizing Energy Consumption

[1] Anuradha Desai, [2] Brona Shah, [3] Nilesh Solanki
[1]Assistant Professor, [2] Assistant Professor, [3] Assistant Professor
[1] Department of Information Technology,
[1] Silver Oak College of Engineering & Technology, Ahmedabad, India.

Abstract : Cloud computing is an information technology (IT) paradigm that enables ubiquitous access to shared pools of configurable system resources and higher-level services that can be rapidly provisioned with minimal management effort, often over the Internet. It is a big challenge to fulfill the on demand services in cloud maintaining the SLA and some times migration of cloud is required to fulfill the on demand services in cloud. But migration of cloud is not a cost effective solution so we will use prediction algorithm for the virtual machine allocation which saves energy and is cost effective.

Index Terms—Virtualization, Resource Allocation, Service Level Agreement (SLA) , Virtual Machine Allocation.

I. INTRODUCTION

Cloud is a pool of resource from where you can access various services on the basis of pay as per you use. It provides on demand services fulfilling the SLA.

1) **Public Cloud:** A cloud is called a "public cloud" when the services are rendered over a network that is open for public use[1].

2) **Private Cloud**: Private cloud is cloud infrastructure operated solely for a single organization, whether managed internally or by a third-party, and hosted either internally or externally [1].

3) **Community Cloud:** Community cloud shares infrastructure between several organizations from a specific community with common concerns (security, compliance, jurisdiction, etc.), whether managed internally or by a third-party, and either hosted internally or externally [1].

4) **Hybrid Cloud:** Hybrid cloud is a composition of two or more clouds (private, community or public) that remain distinct entities but are bound together, offering the benefits of multiple deployment model's [1].

There are 3 types of services that cloud provides. Infrastructure as a Service (IaaS), Software as a Service (SaaS), Platform as a Service (PaaS):

Each and every cloud has finite resources and when it's get overloaded and if asked for extra resources by the customer then it's not possible for cloud provider to fulfill the request and leads to Service Level Agreement (SLAs) violation. This can be solved by federated cloud. Here more than one cloud provider co-ordinates with each other to share resources with each other, by renting their unused resources and the provider which use that resources pay on the basis of usage. Migration is also one of the solution but our aim is to save the energy hence we avoid such solution.

II. BACKGROUND THEORY

Key Concepts:

Virtual Machine Allocation: Virtual machine allotment is characterized as a designation of an accumulation of virtual machines (VMs) to an arrangement of physical machines situated on data center. [1]

Virtualization: Virtualization means the possibility of running several operating system instances on a physical machine (single) thus utilizing the hardware capabilities more fully. [1]

III. EXISTING ALGORITHM FOR VIRTUAL MACHINE ALLOCATION.

Best Fit: This policy allocates the process to the host in which the process get best fit[3][5].

Here we have used best fit algorithm as it is most efficient for virtual machine allocation over datacenters which is combined with algorithm for efficient allocation of VM on data centers.

Proposed algorithm will be used for allocating the virtual machine on the physical machines located on datacenters in such a way that resource utilization will get increased and hence more revenue will get generated reducing the power consumption.

IV. BESTFIT ALOGORITHM

Step 1: User request for virtual machine.

Step 2: Cloud provider ask about configuration required by the consumer.

Step 3: Calculate the load of VM that we are going to allocate: Vm_l.

Step 4: Calculate the load of each host : host_l

Step 5: Calculate total load of each host
Total_l = Vm_l + host_l

Step 6: Find Lowest Total Load

If Total_l = <85 %
Yes: Allocate Vm on this host and stop
No: Find next lowest load

V. PROPOSED ALOGORITHM

Step 1: User request for virtual machine.

Step 2: Configuration and time required by the consumer Toaccess the resources is taken by the user.

Step 3: Based on the time duration the task are categorized into small and large task.

Step 4: If the task is small directly best-fit algorithm is used for proper VM distribution.

Step 5: If the task is large check weather count>5 where count=no of request user done till now for resources.

Step 6: If count>5, calculate the last five resource release time (t) else consider the time given by user (t).

Step 7: Based on time (t), predict the time at which user will release the resources.

Step 8: Calculate the load of VM that we are going to allocate: Vm_l.

Step 9: Calculate the load of each host : host_l

Step10: Calculate total load of each host

Total_l = Vm_l + host_l

Step11: Find Lowest Total Load

Step 12: If Total_l = <85 %?

Yes: Allocate Vm on this host and stop

No: Check If Total_l = <95 %?

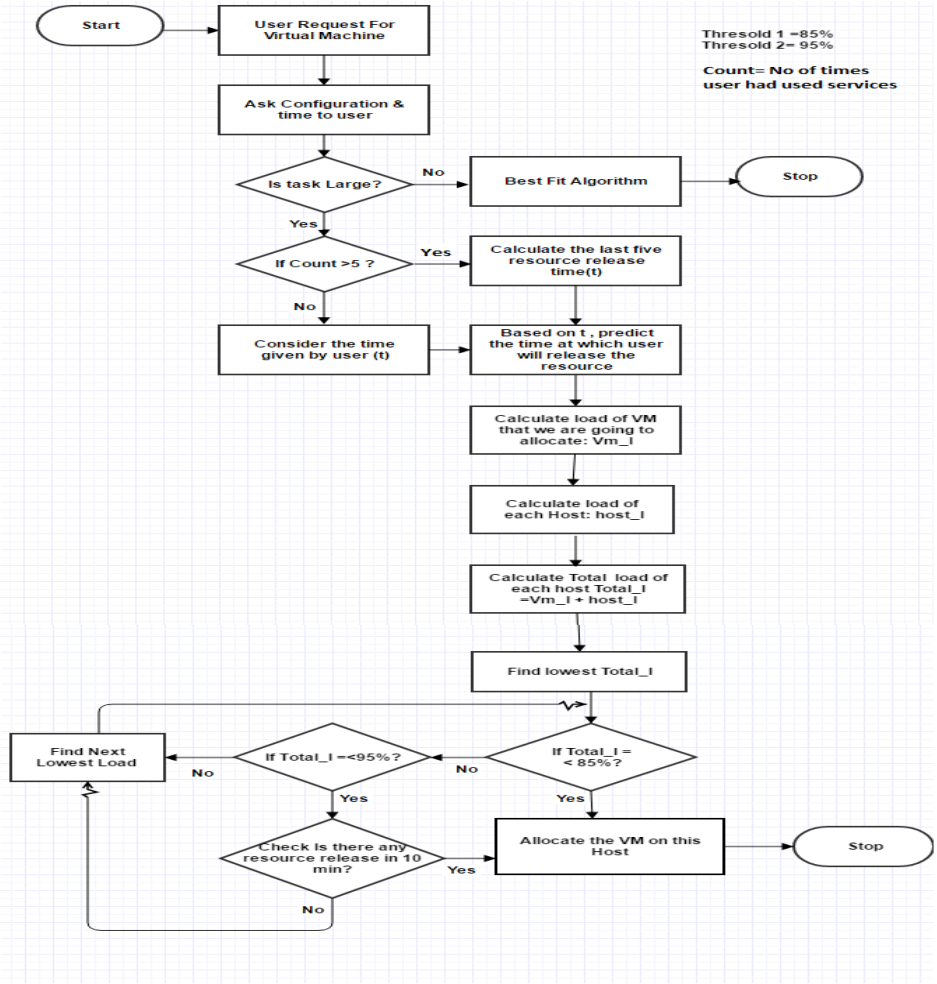
Yes: Check is there any resource release in 2 minute?

Yes: Allocate Vm on this host

No: Find next lowest load

Step 13: If all conditions are failed switch on new node and allocate VM on that node.

VI. PROPOSED FLOWCHART



VII. WORKING OF PROPOSED ALGORITHM

When user request for any resources or virtual machine the configuration and time to use particular resources is collected from the user. Based on the time duration the task is categorized into small and large task. If the task is small then directly best-fit algorithm is used for virtual machine allocation or distribution else if the task is large then it will check count whether the count is greater than five where count=no of request user done till now for resources. If count is greater than five then calculate the last five resource release time (t) else consider the time given by user (t). Based on the time t we will predict the resource release time. Then the load of the virtual machine is calculated which we are going to allocate i.e vm_l. The host load is also calculated i.e host_l. Then the total load i.e total_l is calculated which is addition of vm_l and host_l The lowest total load is considered and if the lowest total load is less than 85 percent allocate resource on that host else find the next host which have load less than and equal to 95 percent .If such host is available then check if there is any recourse release in 2 minute. If there is any recourse release in given time then allocate the virtual machine on that host else find the next host which have lowest load .If all conditions failed then switch on new host and allocate virtual machine on that host. Using proposed algorithm for

VM distribution it will reduce the no of host and hence energy consumption is reduced which is our main objective.

VIII. CONCLUSION

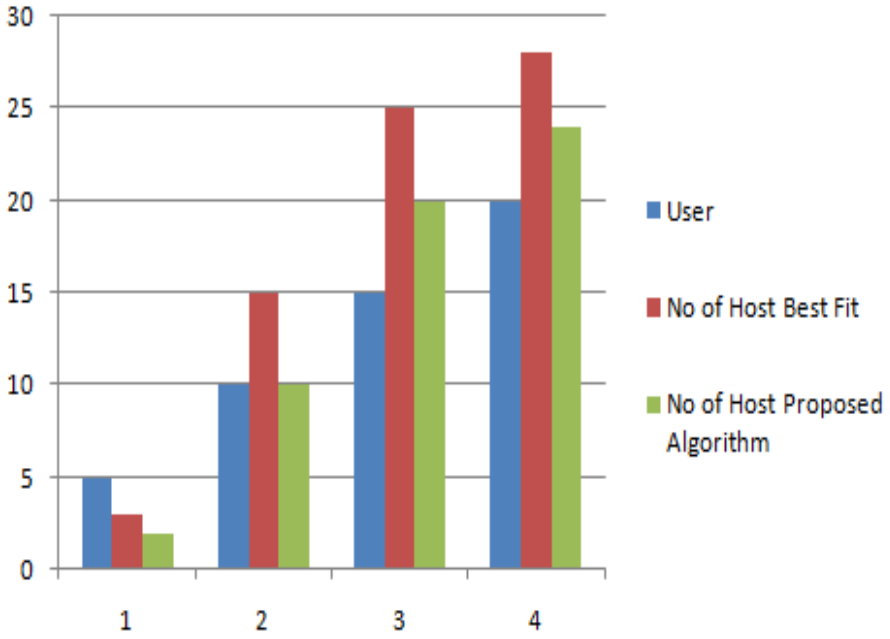
By using our proposed algorithm which predicts the time of release of resources. The usage of resources will get increased as the less number of servers will fulfill the existing demand and also upcoming demand. Here task is divided into large and small. If task is small Best Fit algorithm is used directly but if the task is large proposed algorithm is used which predict the time of resource release so we can allocate virtual machine more efficiently, increasing the usage as less no of server will fulfill the demand and hence energy will be conserved and hence generating more revenue.

IX. RESULTS AND DISCUSSION

Below in result table it is clearly visible that if best fit algorithm is used then it will fulfill the requirement of users by using more number of data centers and in proposed algorithm less data center will fulfill the requirement of same number of user (see in result table and hence generate more revenue and hence will optimize the power consumption which the our main objective. The whole algorithm is implemented in Cloud Simulator and the result as below mentioned in table.

User	No of Host Best Fit	No of Host Proposed Algorithm
5	3	2
10	15	10
15	25	20
20	28	24

Based on the result table the following graph is obtained which clearly shows that in best fit no of host used is more than in proposed algorithm hence by using proposed algorithm more energy optimization is done which is our main objective.



REFERENCES

[1] Aditya Narayan Singh, Shiva Prakash, "Challenges and Opportunities of Resource Allocation in Cloud Computing: A Survey ", in IEEE 2nd International Conference on Computing for Sustainable Global Development (INDIA Com), pg. 2047-2051, 2015.

[2] Peter Mell, Timothy Grance, "The NIST Definition of Cloud Computing (Draft)" in Computer Security Division, Information Technology Laboratory, 2011.

[3] Shufen Zhang, Hongcan Yan, Xuebin Chen, "Research on Key Technologies of Cloud Computing" in ELSEVIER - International Conference on Medical Physics and Biomedical Engineering, Physics Procedia 33 (2012) 1791 – 1797.

[4] George Pallis, "Cloud Computing - The New Frontier of Internet Computing" in IEEE Computer Society, IEEE Internet Computing 2010.

[5] Jonathan Chase, RakpongKaewpaung , Wen Yonggang and DusitNiyato , " Joint Virtual Machine and Bandwidth Allocation in Software defined Network (SDN) and Cloud Computing Environments " in IEEE ICC, pg. 2969-2975, 2014.