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A New Approach of Virtual Machine Allocation In Cloud

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***Abstract*— Cloud is a pool of resources from where you can access the resources very easily and efficiently on internet. In cloud computing, as per their changing need of resources various cloud consumers demand variety of services so it's a big challenge for cloud service provider to allocate the resources to the cloud consumer. As the resources are finite, it is very difficult to fulfill all demanded resources by the cloud consumer and so that it is not possible to meet cloud consumers QoS requirement and satisfaction as per Service Level Agreements (SLA). Virtual machine allocation is defined as an allocation of a set of virtual machines (VMs) to a set of physical machines located on data centers. Here the objective is to increase the revenue by increasing the resource usage by allocating the VM in the efficient manner so that resource utilization will get increase and hence more revenue will be generated. Best-Fit a greedy approach is used here which is combined with the proposed algorithm to allocate the VM more efficiently.**

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

I. INTRODUCTION

Cloud is a pool of resources from where you can access the resources very easily and efficiently on internet. Although, this is not a new thing, but the technology which is used by a cloud developer's is new [2][3]. The objective of a cloud is to simplify the use of multiple network connection, computers and entailed in provisioning online services.

It was said by Dr. Rajkumar Buyya that "A Cloud is a type of parallel and distributed system consisting of a collection of inter- connected and virtualized computers that are dynamically provisioned and presented as one or more unified computing resource(s) based on service-level agreements established through negotiation between the service provider and consumers." [3]

Cloud computing is an emerging technology nowadays. Cloud computing is computing in which large groups of remote servers are connected and form a network so that, the centralized data storage and online access of computer services or resources is permitted. Clouds can be classified among four models: public, community, private and hybrid. [1]

1) Public Cloud: The cloud accessed or used by general masses and hosted, are maintained as well as managed by cloud service providers such as Amazon, Google and Microsoft. In this type, the cloud service provider charges the cloud consumer according to their usage.

2) Private Cloud: In private cloud, the cloud computing infrastructure is solely designed for a single organization and cannot be accessed or shared with other organization. This allows maximum security and privacy.

3) Community Cloud: The community cloud is a type of cloud that is shared among various organizations with a common tie. This type of cloud is generally managed by a third party offering the cloud service and can be made available on or off premises. Shared cost and convenient interplay between groups are the main advantage.

4) Hybrid Cloud: The cloud environment in which various internal or external service providers provide services to many organizations is known as hybrid cloud. In hybrid clouds an organization can use both types of cloud i.e public and private. The cloud infrastructure contains number of clouds of different type and each cloud has the ability to allow the data to be shifted from one cloud to another cloud.

Cloud providers are sometimes referred as cloud service provider. There are three service models of clouds computing [4][5][6][7].

1) Cloud Infrastructure as a Service (IaaS):

Infrastructure as a Service means renting hardware. The IaaS Service model provides infrastructure resources i.e hardware as a service. The consumer are not able to manage or control the underlying cloud infrastructure but has a control over operating system; storage, applications deployed, and possibly limited control of select networking components (e.g.,

host firewalls). The cost of the Hardware got reduced, as all the hardware are available in the form of service. Amazon Web Services, GoGrid etc offers IaaS.

2) Cloud Platform as a Service (PaaS):

In the context of cloud computing, Platform as a service in which a platform for computing is provided to the cloud consumer on the web. It provides a platform on which web applications are developed quickly, without spending money to buy underlying software/hardware and without the complexity of buying and managing the underlying software/hardware. The cloud consumers have control over deployed application but do not need to take care of underlying cloud infrastructure. Sales Force and Microsoft Azure are the example of such model.

3) Cloud Software as a Service (SaaS):

Whatever software we use on the internet without installing on our system all that software services comes under SaaS in cloud definition. The SaaS service model offers the service as applications to the consumer using standardized interface. It is the duty of all cloud providers to manage and maintain a software services that the cloud consumer use. The cloud providers then charges according to the quantity of software and for the time it had been used.

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.

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]

Virtual Machine (VM): A virtual machine (VM) is a software program that not exclusively displays the conduct of a different PC, yet is moreover fit for performing errands like running applications and projects like a different PC. A virtual machine, is made inside another processing environment alluded as a "host." Multiple virtual machines can exist among a solitary host at once [1]

Data Center: A datacenter (now and again spelled datacenter) is a concentrated archive, either physical or virtual, for the capacity, administration, and dispersal of information. [1]

Physical Machine: A physical computer (referred to as a physical machine physical) is a hardware-based device, such as a private computer. The term is used to differentiate hardware-based computers from software-based virtual machines (VMs). [1]

Greedy Algorithms For Virtual Machine Distribution

1) Best Fit: This policy allocates the process to the host in which the process get best fit.

2) Worst Fit: This strategy dispenses the procedure to the host having biggest realistic space contrast with various host.

3) Next Fit: Each time a call solicitation is (made) the pointer starts watching out from the spot it last wrapped up.

4) First Fit: It allocates process from the first host it encounters large enough to satisfy the request.

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

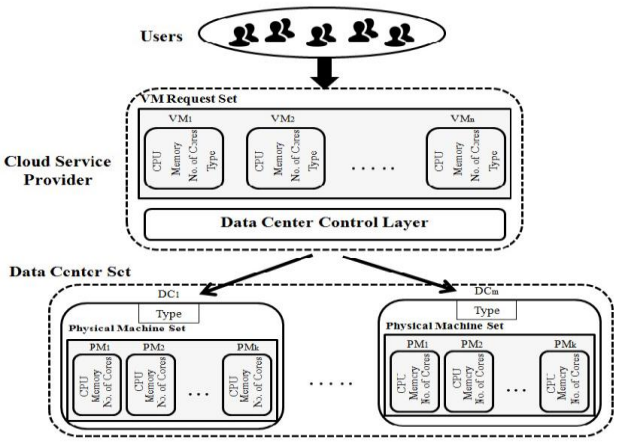
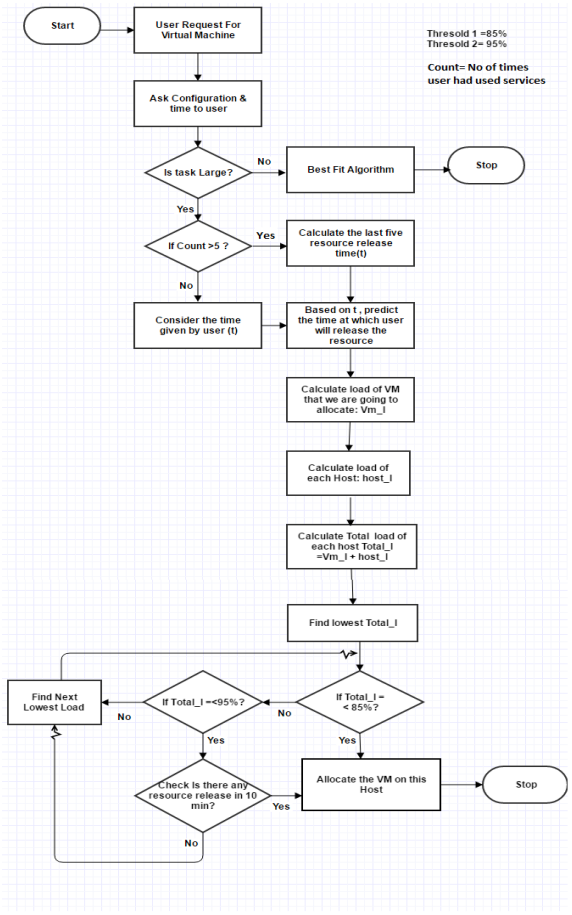


Fig 1 Allocation Of Virtual Machine [18]

Best fit and 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. Figure 1 shows how the VM are allocated on datacenters.

III. PROPOSED MODEL

Our Objective is to increase the revenue by increasing the resource usage. For this we divided the task in into small task and large task. For small task directly the Best fit algorithm is used for proper virtual machine distribution .When the task is large we predict the time of release of resources of users who demanded the resources more than five times and based on this we will make resources available. So if the resources will get free according to this predicted time and before the threshold point is reached which is predefined we will not make a new host available and if the resources will not get free in that predicted time after waiting till the threshold point is reached, a new host is allocated . The revenue will get increased automatically as the utilization of resources will get increased and energy consumption is decreased. For the user whose request count is less than five we accept that time and make the resources available to that accordingly.



Proposed Algorithm:

Step 1: User request for virtual machine.

Step 2: Cloud provider ask about configuration and time required by the consumer to access the resources.

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

Step 10: Calculate total load of each host
Total_l = Vm_l + host_l

Step 11: 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 10 minutes?
Yes: Allocate Vm on this host
No: Find next lowest load
No: Find next lowest load

Existing Algorithm Used :

Best Fit : This policy allocates the process to the host in which the process get best fit and every time checks from the first host.

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

IV. RESULT AND DISCUSSION

Bestfit algorithm will allocate VM to datacenters for fulfilling the requirement of user, but more efficient allocation of VM can be done so that resource utilization is increased and hence more revenue is generated. 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 which the main objective.

Number of users	Server used in Best fit algorithm	Server used in Proposed algorithm
20	4	4
40	8	7
60	12	10
80	15	13

V. 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.

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