Enhancing The Resource Utilization And Minimizing Down Time During VM Migration In Cloud

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***Abstract*— The Cloud Computing is enabling innovative and on demand services by allowing pay per use, location independency and device independency. In process of migration VM moves one physical machine to another. In live migration, the VMs are migrated without stopping their working. In offline migration, process is stopped till the VM can continue on target machine. In this we first present a live migration performance strategy. Live Task of migration and the needed properties of VM for monitoring the resources and optimal the fitness function evaluation. We Will reduce the operation cost, down time and also increases the resource utilization than migrate VM one server to another server base checking of prediction capacity. To solve the problem of the overload of virtual machine, virtual machine migration techniques used which maintain the load balance on the Physical Machine which is undergo unnecessary problems caused during the time of overload and also optimize the resource utilization and total down time.**

***Index Terms*— Cloud Computing, virtual machine migration.**

I. INTRODUCTION

Cloud computing is a model for enabling ubiquitous, on-demand access to shared pool of configurable computing resources (e.g., computer networks, servers, storage, applications and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. Cloud computing is computing services provided over the internet, whereby shared resources, software and information are provided to computers and other devices on demand. A pool of abstracted, highly scalable, and managed compute infrastructure capable of hosting end customer applications and billed by Consumption[2].

II. THEORATICAL BACKGROUND

Cloud computing is a popular trend in current computing, which people can easy access to computational resources, what's more, its very cheap. There are certain services and models working behind the scene making the cloud computing feasible and accessible to end users. Following are the working models for cloud computing:

- Deployment Models
- Service Models

Deployment models define the type of access to the cloud, i.e., how the cloud is located? Cloud can have any of the four types of access: Public, Private, Hybrid, and Community.

A cloud is called a "public cloud" when the services are rendered over a network that is open for public use.

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.

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 models.

A community cloud in computing is a collaborative effort in which infrastructure is shared between several organizations from a specific community with common concerns (security, compliance, jurisdiction, etc.), whether managed internally or by a third-party and hosted internally or externally.

Cloud computing is based on service models. These are categorized into three basic service models which are Software-as-a-Service (SaaS), Platform-as-a-Service (PaaS), Infrastructure-as–a-Service (IaaS)

Virtualization In Cloud Computing

Virtualization is the "creation of a virtual (rather than actual) version of something, such as a server, a desktop, a storage device, an operating system or network resources". In other words, Virtualization is a technique, which allows to share a single physical instance of a resource or an application among multiple customers and organizations. It does by assigning a logical name to a physical storage and providing a pointer to that physical resource when demanded[7].

III. VIRTUAL MACHINE MIGRATION

VMs refer to one instance of an operating system along with one or more applications running in an isolated partition within the computer. There will be multiple VMs running on top of a single physical machine. When one physical host gets overloaded, it may be required to dynamically transfer certain amount of its load to another machine with minimal interruption to the users. This process of moving a VM from one physical host to an other is termed as migration. In the past, to move a VM between two physical hosts, it was necessary to shutdown the VM, allocate the needed resources to the new physical host, move the VM files and start the VM in the new host.VM is a software or operating system, which operate like a separate system. The migration is termed as the process of moving a VM from one physical machine (PM) to another physical machine (PM). When one physical machine gets overloaded, it may be required to transfer the data in one to another machine[1].

The performance of the VM migration is calculated by two metrics

- Total migration time: the time from the beginning of pre-migration work to the end of all migration work[1].
- Down time: the time during the VM service is unavailable.[1]

Types Of VM Migration

1.Cold Or Non-live Migration

In this type of migration, the VMs are migrated when they are not working.

2.Hot Or Live Migration :

In this type of migration, the VMs are migrated without stopping their working.

Live VM Migration:

Live migration migrate running VM from one server to another. It reduce the system downtime compare to cold VM migration. Live migration is an extremely powerful tool for cluster and cloud administrator. An administrator can migrate OS instances with application so that the machine can be freed for maintenance. Similarly, to improve manageability, OS instances may be rearranged across machines to relieve the load on overloaded hosts to perform the live migration of a VM, its runtime state must be transferred from the source to the destination while VM still running.

Live migration is a technology used for load balancing and optimization of VM deployment in data Centers. With the help of live migration, VMs can be transferred to another node without shutting down. Live migration is classified into two steps (i) Control is switched to the destination. (ii) Data Transferring (memory/disk) to the destination. Pre-copy- In this, first Memory is transferred and after this execution is transferred. The pre-copy method is used to transfer the memory to the destination node over a number of iterations. Post-copy- In this, First execution is transferred and after this, memory is transferred. Unlike pre-copy, in post copy the Virtual CPU and devices on the destination node is transfer in the first step and starts the execution in second step.

Techniques Of VM Migration

1.Pre copy migration

In pre-copy approach pages of memory are iteratively copied from the source machine to the destination host, all without ever stopping the execution of the VM being migrated[1].

Warm-up phase

In pre-copy memory migration, the Hypervisor typically copies all the memory pages from source to destination while the VM is still running on the source.

Stop-and-copy phase

After the warm-up phase, the VM will be stopped on the original host, the remaining dirty pages will be copied to the destination, and the VM will be resumed on the destination host.

2 . Post copy migration

In post-copy approach each memory page is transferred only once, which is the main benefit over

pre-copy approach. Post-copy VM migration is initiated by suspending the VM at the source. With the VM suspended, a minimal subset of the execution state of the VM (CPU state, registers and, optionally, non-pageable memory) is transferred to the target. The VM is then resumed at the target.

IV. LITERATURE REVIEW

VM is a software or operating system, which operate like a separate system. Live VM (VM) migration enables seamless movement of an online server from one location to another to achieve failure recovery, load balancing, and system maintenance. Beyond single VM migration, a multi-tier application involves a group of correlated VMs and its live migration will require careful scheduling of the migrations of the member VMs.

(1)"Efficient VM Migration in Cloud Computing"

In this paper, total migration time and total down time both are key parameters of live migration process. They consider proposed approach of modification of already existing optimized pre-copy approach will work better for high dirty page rate and low dirty page rate environment and we will further decrease page rate by compressing data by compression algorithm CBC (characteristic Based Compression) and gives efficient migration[1].

(2)"VM Migration Strategy in Cloud Computing"

In this paper, proposed framework architecture is equipped with two main components, Central controller and Local controller. The central controller deployed on the controller physical node along with the local controller. There is only one central controller for cluster. On the other hand data collector and distributer responsible for fetching data from the central database and distributes it to the relevant component in the framework and also saving central controller data on the central database[2].

(3)"POLVM: Parallel Optimized Live VM Migration"

In this paper, the parallel optimization problem for Live VM migration in cloud. They introduce a Adaptive Genetic Algorithm to characterize the service process in which VM should migrate to where in cloud and achieve load balance. The proposed system overloaded nodes has to be optimized and the resources in under loaded node can be redistributed amongst the other resource-starving nodes. After performing proper migration, the underutilized node can be turned off and this will in turn contribute towards more energy conservation. It allows business customers to scale up and down their resource usage based on needs. Different organization provides same service with different service charges and waiting time[3].

(4)"vHaul: Towards Optimal Scheduling of Live Multi-VM Migration for Multi Tier application"

In this paper, demonstrate that different migration strategies result in distinct performance impacts on a multi-tier application in dedicated data Centers. Using controlled experiments and queuing theory, we show the interdependence between different tiers of a multi-tier application causes this problem. Then we present a system, vHaul, which computes the optimal multi-VM migration scheme and improves the performance of multi-tier application during migration[4].

(5)"A novel agent based match making algorithm in multitenant architecture"

In this paper considers load balancing (task placement) in optimal way. For the efficient task placement, They are Calculating the fitness function with more number of parameters such as memory availability, Central processing unit availability, i/o read availability, i/o write availability and bandwidth availability. They are using virtual machine live migration for load balancing which reduces the downtime. They considering network proximity between datacenters which reduces the response time. In this paper the author, study overloaded VM was Migrated to normal loaded VM by consist of different type of agents, which considers network proximity, live task migration and the needed properties of VM for optimal resource utilization. This algorithm reduces the system downtime, migration time by implementing live task migration and reduces the response time by considering the network proximity.

V. PROPOSED METHODOLOGY

Let us define the proposed work which make a migration process of VM in an evaluate fitness function for the resource utilization. Cloud Computing is most popular in the world. Now big enterprises and companies are migrating their work load on cloud. Workload is distributed on different location of data Center around the world. Sometimes it may happen that some data Center's VMs are in

overload condition and some are in under loaded condition. So we are using migration strategy to balance load of VMs. Overloaded data Center will migrate whole work load on another data Center on predication basis. So whole machine will be migrate on another data Center. So it will minimize downtime.

Steps of Proposed Work

Step 1: Evaluation process for all data center should be done for physical machine which decide inside.

Step 2: For that fitness function calculate.

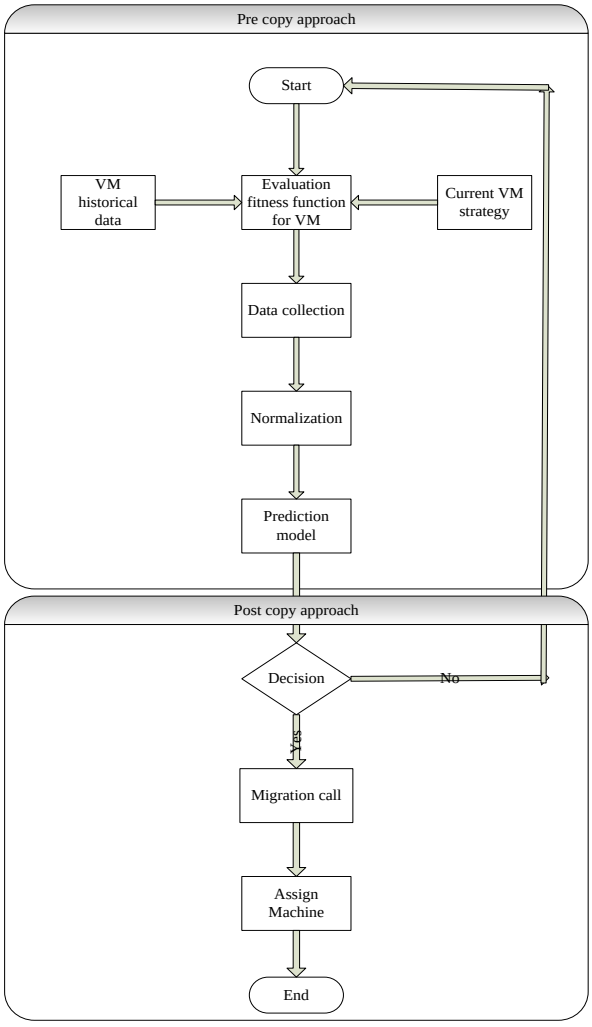
Step 3: The values at the fitness function at collectively collected as a data set.

Step 4: This data set is use for further preprocess to generate model.

Step 5: Predication model is applied to take precise decision.

Step 6: Based on the decisions migration call is taken care off.

Flowchart of proposed architecture



VI. CONCLUSION

In cloud computing, Virtualization means more than one VM single physical machine. Virtualization is mostly useful to handle workload balancing between physical machine in data Center when available resources are not enough for VMs. Based on this, the performance of VM migration is done in CPU utilization. It decreases the total migration time And down time using the prediction techniques. It increase the response time and work done in 0% down time.

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