Design of Load Balancing Technique for cloud Environment using Live Migration of Virtual Machines

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ABSTRACT

Cloud Computing is promising in today's internet world. Cloud computing provides computing resources on demand on a pay per use basis. Live migration of Virtual Machine is an important part in cloud computing. With the increasing demand of cloud computing, organizations' data is heavily loaded in the cloud. This may cause Virtual Machine failure. Some datacenters are heavily loaded with the data and some datacenters are not. This may cause load imbalance. So, load balancing becomes an important task in cloud computing. Live virtual machine migration is used for load balancing. Most of the studies proposed the techniques for single virtual machine migration, multiple virtual machine migration, and load management. Sometimes, unnecessary virtual machine migration may happen. We will design a load balancing technique which will allocate Virtual Machines initially in order to prevent unnecessary virtual machine migrations.

Keywords: Cloud Computing, Virtualization, Virtual Machine, Load Management, Load Balancing, Virtual Machine Migration, Live Migration of Virtual Machines.

I. INTRODUCTION

Cloud computing is delivery of computing resources over the internet. Cloud computing provides services on demand. Cloud Computing provides three types of services. Software as a service, Infrastructure as a service, and Platform as a service. According to NIST, "Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources that can be rapidly provisioned and released with minimal management effort or service provider interaction."

Cloud Computing reduces cost, improves reliability, security, increases productivity. As the demand of cloud computing is increasing day by day organizations' data is heavily loaded in the cloud. This may cause Virtual Machine failure. This problem can be solved by virtualization. Through Virtualization many Operating Systems run concurrently on a single physical host.

Physical machines can be divided into number of virtual machines with the help of virtualization technique. Virtualization helps in cost reduction. Virtual Machine Migration is the process of transferring VM from one physical host to another physical host. Virtual Machine Migration was first proposed by Clark at al.

Live Migration of Virtual Machines is the task of migrating Virtual Machine from one physical host to another physical host in real time. Cloud service providers use this technique. Live Migration of Virtual Machines is used for load balancing. Migration of Virtual Machines prevents datacenters from overloading. Migration helps to obtain less downtime and migration time.

The structure of the paper is as follows. Section 2 presents Literature survey. Section 3 describes the summary of already existing techniques. Section 4 proposed methodology. Section 5provides concluding remarks.

II. LITERATURE SURVEY AND RELATED WORK

There are two techniques of live migration of virtual machines[1]: Pre Copy Live Migration and Post Copy Live Migration. In Pre Copy Live Migration hypervisor sends a complete VM to the destination and then iteratively copies modified memory pages. This process continues till sufficient memory pages are copied to the destination host. In Post Copy Live Migration VM is suspended on source and then memory pages are transferred to destination and then VM starts running on destination even the whole pages have not been copied. Occurrence of page faults at destination host is the drawback of Post Copy live migration technique.

In pre copy live migration VM recovery is possible because it keeps the copy of memory information on source machine. In case of destination failure, pre copy method is recommended.

Sanidhya Kashyap, Jaspal Singh Dhillon, Suresh Purini[2] proposed a Reliable Lazy Copy approach to Fast and Efficient Live Migration of Virtual Machines in the Clouds at a minimum cost. Lazy Copy approach reduces total data transfer and downtime in pre copy approach and perceivable downtime in post copy approach.

In the Push phase and Stop-and-Copy phase, if source gets failed then there is a permanent loss of VM. While if destination gets failed there is no effect on the VMs. But in Pull phase, there is a loss of VM in case of failure in either source or destination. Soauthors have modified pull phase for making LC migration scheme to work in case of destination failures. It works as follows: if there are any changes in the target host, the changes are reported to the secondary storage device. As the secondary storage device is accessible to both the source and target host, source will get updated with the changes which will reduce the recovery time of VM on source if there is a destination failure.

J. Octavio Gutierrez-Garcia and Adrian Ramirez-Nafarrate[3] designed the agent-based architecture for distributed load management. Agents are provided with the load balancing protocol and an energy aware consolidationprotocol to balance various loads whereas reducing energy consumption costs. When a host gets overloaded, agents team up with each other to model resource usage of hosts and decide the best target host for a VM. Agents may select the VMs to be migrated as well as they can decide when to migrate, where to migrate and when to turn on and off the hosts. Authors have focused on reducing energy consumption cost. The best advantage of this paper is that there is low overhead.

Authorsin[4] designed a VDC-M algorithm for migrating a Virtual Datacenter or multiple connected Virtual Machines among multiple datacenters to improve migration performance. VDC-M algorithm also helps to reduce blocking ratio and VDC migrating cost. The algorithm achieves lower migrating cost and remapping cost. It reduces the resource consumption as VMs will be possibly remapped to the same datacenter. As the algorithm uses parallel migration strategy, it results in lower downtime.

In the paper "Efficient Data Transmission during Virtual Machine Failures Using Hybrid Copy Live Migration"[5],authors designed a Hybrid approach to identify the reliable VM: The user request is sent to all available VMs. If a particular VM fails to receive a request it will not respond while all the remaining active VMs will respond to the request.The existing fault tolerance methods will recognize a reliable VM among all the VMs and respond to the client request. Hybrid Copy live migration combines pros of both pre-copy and post-copy live migration.

Authors proposed a willow path selection algorithm for data transmission from source to destination still there are node failures during live migration of virtual machines.

Walter Cerroni[6] in his paper, "Network performance of multiple virtualmachine live migration in cloud federations"presented a Markovian model to determine inter-Datacenter network performance of a federated cloud.The advantage using this model is smaller downtime.

III SUMMARY:

Year	Authors	Algorithm	Research gap and / or future work
2014	Sanidhya Kashyap, Jaspal Singh Dhillon, Suresh Purini[2]	Reliable Lazy Copy	-
2015	Lalithabhinaya Mallu & Ezhilarasie R[1]	Live Virtual Machine Migration	-
2015	J. Octavio Gutierrez-Garcia and Adrian Ramirez-Nafarrate	Agent-Based Architecture	Initial allocation of VMs to prevent unnecessary VM migrations, Storage sharing of VMs
2015	Gang Sun, Dan Liao, Dongcheng Zhao, Zichuan Xu, Hongfang Yu	VDC-M algorithm	Heavier network traffic load at a particular period.
2016	Miraculine.D, V.M.Sivagami	Hybrid Copy Live Migration/ Willow Path Selection Algorithm	In case of one or multiple virtual machine failures, multiple virtual machinesmigration can be handled.
2015	Walter Cerroni	Markovian model of inter-DC network	More precise modeling of availability of computing resources in remote datacenters

IV. PROPOSED METHODOLOGY

From the study of related work following research gap in the previous proposed approaches has been identified. With the increasing demand of cloud services, organizations are uploading the data in a cloud. So certain datacenters are heavily loaded whereas some datacenters are lightly loaded. The solution for this problem is to provide efficient load balancing technique for cloud environment using Live Migration of Virtual Machine.

We will design a load balancing technique for the allocating Virtual Machines initially to hosts in order to prevent unnecessary VM migrations.

V. CONCLUSION

With the increasing demand of cloud computing live migration of virtual machines becomes a promising task for load balancing. In order to prevent datacenters from overloading and to improve the performance of the system load balancing is necessary. This can be achieved by performing live virtual machine migrations. Existing technologies have focused on live migration techniques. Some algorithms are based on post copy live migration technique, some algorithms used pre copy live migration technique, some have focused on both the techniques combined. The migration helps to transfer the data from heavily loaded host to lightly loaded host. Our research will be based on allocating VMs initially to avoid unnecessary machine migrations.

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