

CLOUD VIRTUAL MACHINES MIGRATION BASED ON GREEDY ALGORITHM

Shubham Mahesh Chavan¹ & Mithun D'Souza²

Abstract: The term Cloud computing is used for distributed computing, on a network. Cloud Computing provides network-based services that are provided through virtual ISP's. The greater part of the old virtual machine movement systems are focused on the relocation of a solitary virtual machine. But when the whole virtual cluster needs to be migrated, these techniques seem to be insufficient. In these methods, data replication in each round leads to many computational overheads. In this paper, a method for virtual machine migration from one data centre to another is proposed. This proposed procedure uses the greedy algorithm for virtual machine selection process. Virtual machines within a cluster are given priority which reduces the total migration time [3].

General Terms- Distributed Systems, Virtualization, Greedy Algorithm

Keywords- Cloud Computing, Virtual Machine, Migration.

1. INTRODUCTION

Computers revolutionised the entire way of processing data. Earlier data was processed manually. Over the years, there have been many innovations and development of new technologies in the field of computers. And then the introduction of Internet, created a dramatic change in information exchange. Of course, at that time, no one would have thought that the Internet could be used as a powerful processing system. Among the emerging technologies, cloud computing has taken a step beyond other technologies.

Everything you are watching or using on the internet maybe using cloud computing, even if you don't realise it. If you use an online service to edit documents, send email, watch movies or TV, play games, listen to music, or store pictures and other files, it is likely that maybe cloud computing is used behind the scenes. Cloud computing is defined as the delivery of computing services—servers, databases, storage, networking, analytics, software, and more—over the Internet (“the cloud”). Cloud suppliers are organizations which offer computing services and ordinarily charge for their registering administrations as per usage, it is like how you are charged for water or power at home. The user has all the access to own data, but should not care about the infrastructure, operating system, and the software utilities [3].

Cloud computing has attracted significant attention from both industry and academia for the ability to deliver IT services at a lower cost, risk, and expertise, with higher flexibility and better scaling on-demand. While many cloud users with early successes have been realized using multiple clouds to deliver services and using a single cloud provider, is an emerging requirement [2].

The best mechanism for implementation of cloud is Virtualization technology. Virtualization is an old technology, which was used for the computer systems in 1964. Virtualization is meant to make a copy of everything, including the operating system, storage space and network equipment and so on.

Virtualization technology has several types, each of which will be utilized for special applications. A unique feature of Virtualization is a virtual machine live migration technique. So that, when a virtual machine is running and providing service to users, with different reasons, such as detect a failure in the physical machine, the system automatically decides to virtual machine migration from the physical machine to another, without occurs an interruption in service.

Therefore, virtual machine migration will be done with low latency. In cloud environments, services are provided through virtual machines.

2. RELATED WORK

Cloud computing gives an approach to boost the limit and abilities without putting resources into foundation. The primary reason for applying the method movement, stack adjusting, adaptation to internal failure, vitality administration and upkeep of servers. Its chief capacity is to enhance the administration. For the usage of this system has been proposed such a large number of techniques.

Pre-duplicate relocation tries to handle issues related with before plans by consolidating a limited iterative push advance with a last and commonly short stop-and-duplicate stage. The centre thought of this plan is that of iterative merging. It includes repeating through various rounds of replicating in which the virtual machine memory pages that have been altered amid the past duplicate are disdain to the goal on the presumption that sooner or later the quantity of adjusted pages will be sufficiently

¹ Department of Computer Science and Application, St Aloysius College, AIMIT, Mangaluru, Karnataka, India

² Department of Computer Applications, St Aloysius College, AIMIT, Mangaluru, Karnataka, India

little to end the virtual machine incidentally, duplicate the (modest number of) residual pages over, and restart it on the goal have. The consequence of this examination is lessening Time [1].

Agarwal in his paper [2] has expressed he points of interest and impediments of virtual machine relocation and among existing strategies; they assessed the Pre-Copy procedure and proposed a system for virtual machines movement in view of this approach.

In the post-duplicate method, first suspends the moving virtual machine at the source hub, duplicates negligible processor state to the objective hub, continues the virtual machine, and starts bringing memory pages over the system from the source. The path in which pages are gotten offers ascend to various variations of post-duplicate, each of which gives incremental upgrades. The after effect of this examination is to decrease the quantity of pages transmitted and add up to relocation time contrasted with the Pre-Copy system [5].

The majority of the past live virtual machine movement methods focused on the relocation of a solitary virtual machine which implies these strategies are deficient when the various virtual machine should be moved. Therefore, Ye et al [6] proposed a framework for migrating virtual clusters. They calculated the performance and overhead of virtual clusters live migration.

3. VIRTUALIZATION AND VIRTUAL MACHINE MIGRATION

Virtualization innovation played a key role in rising distributed computing worldview, since it enables assets to be designated to various applications on-request and conceals the unpredictability of asset sharing from cloud clients. Virtual machines are for the most part utilized in various sorts of cloud frameworks as compartments for facilitating application execution situations and provisioning assets. For instance, in Infrastructure-as-a-Service (IaaS) mists , virtual machines are specifically presented to clients to convey a full PC foundation over the Internet; In Platform-as-a-Service (PaaS) mists, likewise, the mists utilize virtual machines inside to oversee assets over the application execution stages conveyed to clients [7].

Virtual machine relocation is a one of a kind ability of framework virtualization which enables an application to be straightforwardly moved starting with one physical host then onto the next and to proceed with its execution after movement with no loss of advance. It is by and large done by exchanging the application alongside its VM's whole framework state, incorporating the state in CPU, memory, and here and there circle as well, from the source host to the goal have. VM relocation is imperative for overseeing assets and applications in huge scale virtualized server farms and cloud frameworks. It empowers asset utilization to be powerfully adjusted in the whole virtualized framework crosswise over physical host limits, and it additionally enables applications to be progressively migrated to has that can give speedier or more dependable executions.

Virtual machine relocation takes a running virtual machine and moves it starting with one physical machine then onto the next. This relocation must be straightforward to the visitor working framework, applications running on the working framework, and remote customers of the virtual machine. It should appear to all gatherings included that the virtual machine did not change its area. The main saw change ought to be a short back off amid the relocation and a conceivable change in execution after the movement because the virtual machine was moved to a machine with more accessible assets [7].

Live virtual machine movement innovations have turned out to be an extremely powerful device to empower server farm administration in a non-troublesome manner. Virtual machine movement procedures incorporate pre-duplicate, post-duplicate, Three-Phase Migration, CR/TR Motion, Heterogeneous and Dependency-Aware. These methods are not proficient for movement a bunch of virtual machines.

Two methods are proposed for migration a cluster of virtual machines concurrent migration and sequential migration [5].

- Concurrent Migration

In Concurrent relocation, a group of virtual machines is simultaneously sent from a source to a goal. This type of migration is most suitable when the size of the virtual machines within a cluster is small [5].

- Sequential Migration

In Sequential movement, the virtual machines are put in a line and they are sent continuously. They are utilized for shared relocation [5].

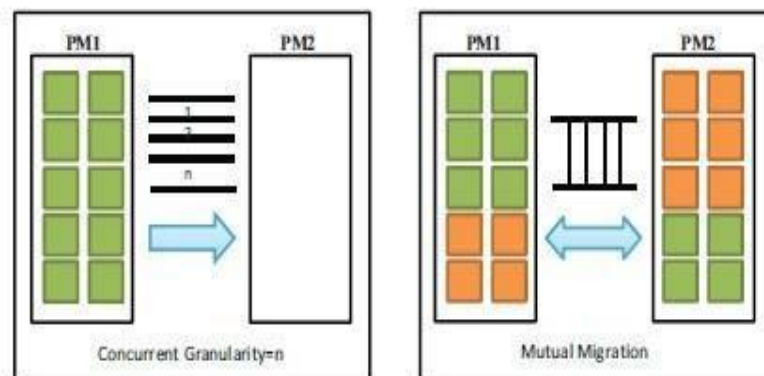


Figure 1: Concurrent and Sequential migration

In concurrent migration of virtual machines, it requires higher bandwidth to transfer data. Therefore, sequential migration is preferred over concurrent migration because it provides a better performance than the concurrent migration.

The Average migration time totally depends on the memory size. More data is transmitted over the network if the memory size of virtual machines within a cluster is large. Therefore, the migration time is equal to the sum of the migration time of virtual machines within a cluster, which increase simultaneously.

4. THE PROPOSED ALGORITHM FOR MIGRATION

This algorithm, considers two lists for a cluster of virtual machines and destination physical machines. These two lists are sorted by descending order [10].

The steps of this proposed algorithm for virtual machines migration is as follows:

- The Select an item from the list of destination physical machines.
- Until the selected element (physical machine) has enough storage space, perform the following steps:

Step 1: Select an item from the list of virtual machines [10].

Step 2: Comparing the size of the selected virtual machine with storage space of the physical machine [10].

If the size of virtual machine was greater, go to step 1 and select the next virtual machine. Otherwise, the virtual machine is migrated to the selected physical machine.

The pseudo-code of the proposed algorithm is shown in Figure 2.

5. GREEDY ALGORITHM

Data items are arranged in a sequential order in a greedy algorithm, each time it takes the best criteria, without any choice that has been made before or after it arrives at solution by making a sequence of choice [10].

A greedy algorithm starts with an empty set and adds items to the set-in sequence until the set represents a solution to an instance of a problem.

There are following components in per iteration:

- The next item is chosen by the selection procedure to be added to the set. If the given criteria satisfy the greedy algorithm, then the selection of local optimal value which is considered at a given time [10].
- If the new set is feasible or not the *Feasibility Check* determines by checking whether it is viable to complete this set in such that should give a solution to the instance [10].
- Whether the new set establishes a solution to the instance is determined by a *Solution Check* [10].

Proposed Algorithm for Virtual Machines Migration

input:

1. Array of Hostlist Vmlist (Sorted Desc)
2. Get Curent Time Link Speed VmMigration Time VmMigrationList Time
3. For i:0 to Hostlist
4. host: Host_LargSize in Hostlist
5. while host>0
6. vm: VM_LargSize in Vmlist
7. for j:1 to Vmlist
8. If vm>host then
9. vm: vm++ in vmlist
10. Else
11. host: host - vm (size)
12. vm is in Migration
13. VmMigrationList Time: Curent Time + (vm/Link Speed)
14. vm: vm++ in Vmlist
15. host: host++ in Hostlist

Figure 2: Pseudo-code of the greedy algorithm for virtual machines migration

6. SIMULATION

To recreate the proposed calculation, we have given by a situation to virtual machine movement. In this situation, two server farm are considered and there are five physical machines in every datum focus. The primary server farm contains 10 virtual machines and second server farm contains five virtual machines. For the execution of the proposed calculation, we utilized CloudSim [8,9] Tool in Eclipse. One of the highlights of this instrument is the execution of virtual machine movement. Underneath indicated are the recreation comes about. In this proposed strategy, we utilized of the voracious calculation and the

successive procedure, so that, with the difference in memory measure, the aggregate movement time is likewise changed. Figure 3 demonstrates these progressions.

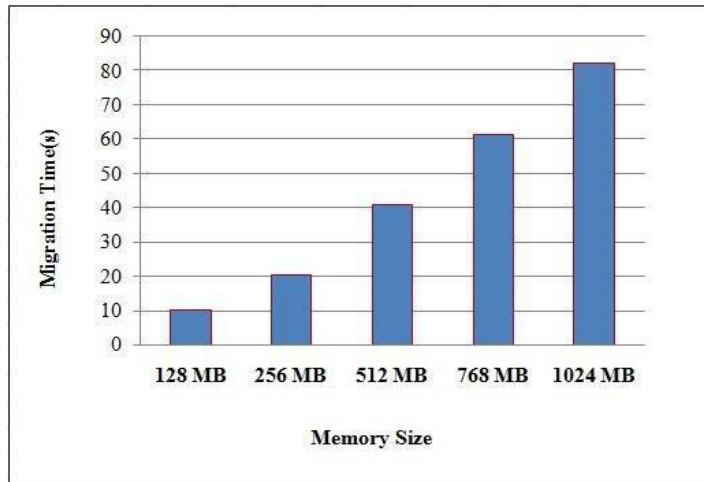


Fig 3: The Total Migration Time in Proposed Method

Also, with the change of the number of virtual machines in the cluster, the total migration time is changed. These changes are shown in Figure 4.

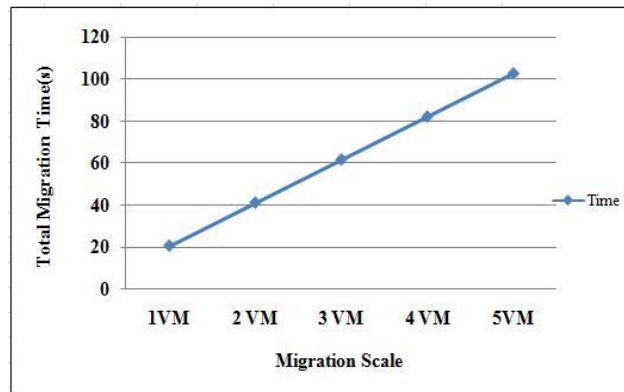


Fig 4: The Total Migration Time for cluster with different numbers of VM

The correlation of changes in relocation time for a bunch with virtual machines with various sizes, in serial technique and our proposed strategy are appeared in Figure 5.

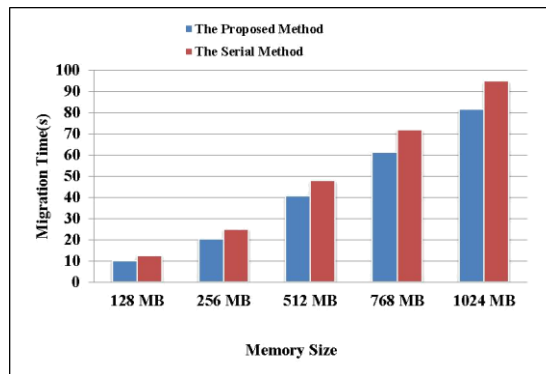


Fig 5: Comparison of Migration Time for clusters in two methods

Likewise, the correlations of changes add up to movement time of virtual groups with various quantities of virtual machines in serial strategy and our proposed technique are appeared in Figure 6.

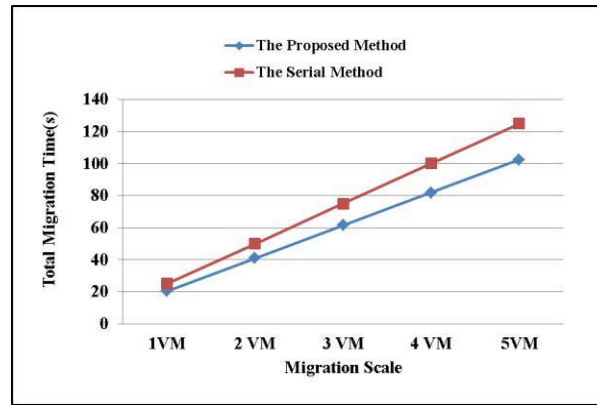


Fig 6: Comparison of Total Migration Time for cluster with different numbers of VM in two methods

7. CONCLUSION

This paper shows that there are many challenges and weaknesses in providing customers services through the Internet, like the lack of service quality due to lack of sufficient computational resources, geographical distance between clients and service providers. Cloud computing using virtualization technology can solve this issue. Most of the migration techniques are not adequate where whole cluster need to be moved to other location over the cloud. Data replacement in each round leads to many issues. This paper focuses on a method which is based on greedy algorithm where the set of virtual machines can be moved to another location, which reduces the total migration time based on the virtual machine priority.

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