

Adaptive Technique For Efficient Process Migration In Distributed Systems

Surbhi Singh

Department of Computer Science & Engineering
Research Scholar, Deenbandhu Chhotu Ram University of Science & Technology, Sonipat

Abstract- Process migration in Distributed systems is one of the important technologies that used in the real world, with the emergence of cloud computing virtual machine migration is also used the process migration techniques. Load balancing is the most important factor for migrating any process from one machine to another because in a distributed system when a machine becomes overloaded and another machine is lightly loaded, in this situation if some load of overloaded machine is transferred to the lightly loaded machine the process speed will increased. In this paper we proposed an adaptive technique which reduces the migration time and also decreases the network bandwidth consumption.

Keywords- process migration, load balancing.

I. INTRODUCTION

A Distributed system consists of a collection of autonomous computers, connected through a network and distribution middleware which enables computers to coordinate their activities and to share the resource of the system so that users perceive the system as a single, integrated computing facility.

Process migration is the process of moving one process from one machine to another machine. When a machine is overloaded and the performance of the machine is low then we sends the some processes to the another machine it is a process migration. Basically the process are migrated to balance the workload on the clusters so the performance of the underutilized node is improved. Migration can be dynamic or static. Migration is the act to disembodifying the process that is active on to the currently running machine, it transfer its current state to another machine and resume the execution where it was suspended. In the process migration the process will continues execution on the targeted machine. Load sharing is the important feature of the process migration in it process is moved from heavily loaded system to lightly loaded system and load is balance to overall performance improvement. To reduce the communication cost a process which interact intensively can move to the same node and the process which needs a large amount of remote data, move to the location of data. If the goal of process migration is load balancing the load balancing

component of the operating system will decide that when the migration will take place. To the migrating process migration is transparent.

II. PROCESS MIGRATION TECHNIQUES

Process migration techniques are basically used to balance the load and increases the performance of the machine. There are five techniques of process migration

Total copy algorithm: Total copy algorithm suspend the process and transfer all the state information and then process resume. It suspend the process on the source machine then source machine sends migration request message to the destination machine and then destination machine reply to the request message accept or reject. If the destination machine is accept the migration then process state is transferred by the source machine and all the code, heap and stack pages are ships and then source machine ask destination machine for restart process. All the necessary information of process is transferred and the virtual memory is transmitted to the destination. If process information is remains at the source machine is eliminated by this algorithm. This algorithm provide a fault tolerant system

Pre-copy algorithm: Pre-copy algorithm minimize transfer of virtual address space to the destination system by using it in parallel with the execution of the migration process at destination system. If the migration is accepted, the old host transferring stack pages, all cods and heap to the destination system. The total number of pages which are modified is greater than the predefined limit process will continue the execution and modified pages are retransmitted, if this will not happen than the process is suspended all the state transformation is transferred. Pre-copy algorithm reduce the migration time by reduces the number of pages of virtual address space at the time of process suspension. If the pages are continuously modified when the process is executing on the old host and need to be retransmitted will increased the overall cost.

Demand Page Algorithm: Demand page algorithm is like total copy algorithm but at migration time no virtual memory pages are transferred, all the other states are transferred but virtual

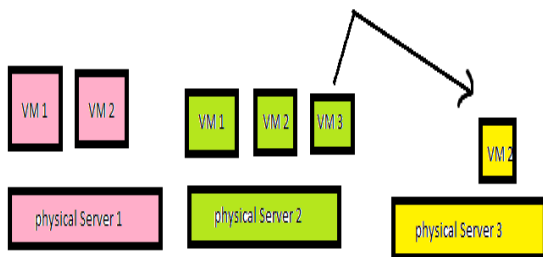
memory pages are not. At the new machine when process restart will immediately page fault. In demand page algorithm no waste transfer of the pages that are not used. Process migration latency time is shorter in this algorithm. The disadvantage is that until the process completes the old host should maintain address space information, if a process migrate multiple times then it creates the problem.

File Server Algorithm: A third machine, the file server is introduced in this algorithm. In pre copy and demand page algorithms source node and the destination node are in the process migration, when a file server is added, using the efficiency of demand paging without residual dependency on the source node, process migration can be done. Performance of the file server algorithm is the best of old system and leave no residual dependency.

Freeze Free Algorithm: In the freeze free algorithm host machine suspends the migration and marshals execution state and sends it to the new host machine. New host machine can be accepted or rejected this request from old host. After that old host transmits the current code, stack and heap pages to the new host new host receive these codes and stacks and resume the migration process. The old host then transmits the file cache pages to the new host. After sending all data to the new host the old host sends a complete message to it. And migration process completes with this step.

III. LOAD BALANCING MIGRATION TECHNIQUES

To balance the load virtual machines can be migrated from one server to another server. In fig 1.a there are three physical servers on the server 1, two VM are running, on server 2 three VM are running and the server 3 is having only one VM. On the physical server two load is more than the rest two servers. So Migrate the VM 1 from server 2 to server three load is balanced. In fig 1.b all three server having two VM and having the equal load. So the load is balanced and the performance is also increased.



Load is balanced by shifting VM from server 2 to server 3

Fig 1 a. Load balancing migration (before migration)

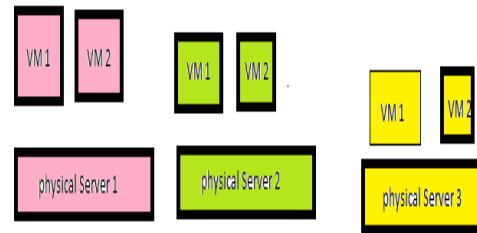


Fig 1 b. Load balanced migration

IV. ENERGY EFFICIENT MIGRATION TECHNIQUE

Cooling infrastructure and the power consumption constitute 42% of the total cost of the data center. In fig 2a. Three virtual machines are running on the two physical servers. Physical server 1 has the capacity to handle three VM but on it only two VM are running and on the server 2 only one VM is running. Migrate the VM 1 from server 2 to server 3 the server two will reach in its ideal state and energy will also save.

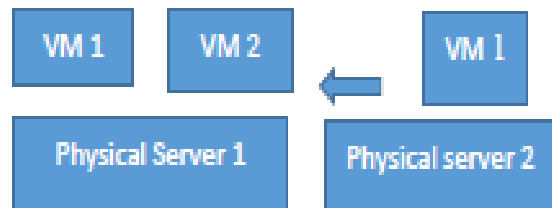


Fig 2 a. Energy efficient Migration (Before Migration)

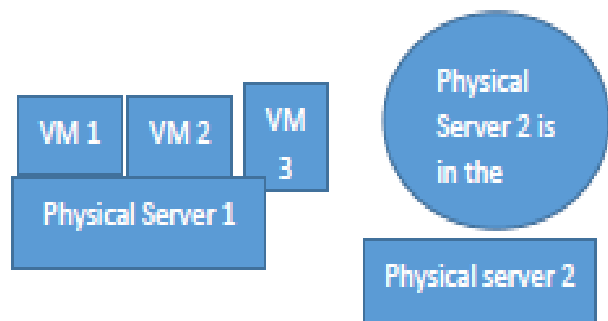


Fig 2b. Energy Efficient Migration (after migration)

V. PROPOSED ALGORITHM

In the distributed environment when one process or virtual machine migrated from one machine to the other machine a lot of network bandwidth is used. Like, in pre-copy algorithm host machine sends all the data pages to the new host and also some dirtied duplicate pages to the new host machine. In this process a lot of network bandwidth is used if number of

dirtied pages is large. So we have proposed a technique by which network bandwidth can be saved during migrating the process or virtual machine.

In our proposed technique, the old host machine did not suspend the process or virtual machine and compress the memory pages and sends it to the new host machine. New host machine copies that pages. In the process of sending memory pages from old host to the new host some pages may be dirtied or changed by the process because process is not yet suspended. So now again old host has to send that pages to the new host to made changes to original pages. In our approach old host did not sends the full pages to the new host, it sends only changes to the file server, and then transmit the state of the process along with log files to the new host. New host resumes the process and as soon as it starts file server sends that dirtied pages to the new host machine and new machine apply these changes to the pages while in running mode. By our approach time to resume the process on another machine is reduced because dirtied pages has not to be sends to the new machine before resuming the process and by compressing the memory pages, bandwidth is also saved.

VI. CONCLUSION

We have presented a process migration methodology that reduce the time taken in process migration and to reduce the load on the network bandwidth. These two problems are very common in distributed environment while migrating the process because now a day large process have to be migrated and while copying the pages of these processes many number of pages become dirtied because very high computing speed. In live virtual machine migration also these problems occurs and to resolve these problems we have proposed a system.

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