

A review on VM migration in Cloud Computing

Parminder Kaur¹ & Amritpal Kaur²

¹M.Tech Student, ²Assistant Professor

Sri Guru Granth Sahib World University, Fatehgarh Sahib, Punjab, India

Abstract— Modern Cloud Data Centers exploit virtualization for efficient resource management to reduce cloud computational cost and energy budget. Virtualization empowered by virtual machine (VM) migration meets the ever increasing demands of dynamic work load by relocating VMs within Cloud Data Centers. VM migration helps successfully achieve various resource management objectives such as load balancing, power management, fault tolerance, and system maintenance. However, being resource-intensive, the VM migration process rigorously affects application performance unless attended by smart optimization methods. Furthermore, a Cloud Data Centre exploits server consolidation and DVFS methods to optimize energy consumption.

Keywords— VM, VM Migration, Cloud Computing

I. INTRODUCTION

Cloud computing has become additional and additional popular the wide reading of many cloud infrastructures [1]. The underlying principle of cloud computing is to deliver the specified services from shared hardware through virtualization technology. The goal of this computing model is to create a stronger use of distributed resources, place them along to create higher turnout and to handle large-scale computation downside expeditiously and economically. Cloud computing will be loosely classified into 3 levels of use model or cloud computing services.

Infrastructure-as-a-service (IaaS): Cloud computing replaces principally hardware. Users of IaaS will manage to support operative systems and applications, however do not need to shop for server, storage and networking hardware and an information centre to deal with the hardware. samples of those suppliers are corporations like Amazon, ENKI, GoGrid[2].

Platform-as-a-service (PaaS): Cloud computing replaces associate execution surroundings for a machine language by providing a system able to execute the user's software system. The user of PaaS is that the applied scientist. samples of those suppliers are corporations like Engine Yard or Google [3].

Software-as-a-Service (SaaS): The cloud user interacts directly with the Cloud software system provided by CSP and infrequently pays for usages solely in situ of laptop time. samples of those suppliers are NetSuite, Salesforce.com, Google Apps[4].

Typical design of associate IaaS cloud is given in Figure one. Scope of this paper principally focuses on the IaaS cloud. The IaaS cloud has numerous computing nodes classified along to make clusters.

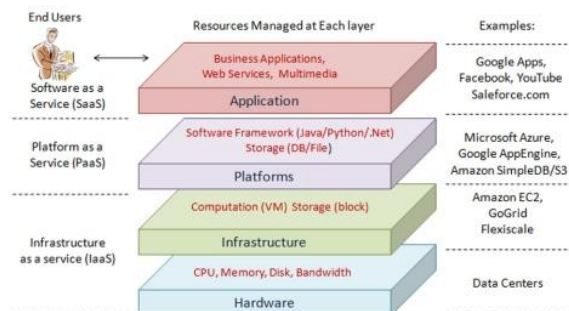


Fig 1: Cloud Computing Architecture

For every node, there's associate degree associated special purpose OS known as virtualization part. Its main perform is to creates and maintains the VMs and additional serves their requests for accessing to the specified hardware resources. The Node Controller (NC) executes on each node that hosts VM instances. American state additional makes queries to get the node's physical resources that embody data concerning the amount of cores, memory size, and on the market disc space. It conjointly gathers data concerning the state of VM instances on the node. The important data congregated is additional propagated up to the Cluster Controller. Cluster front-end machine typically executes the Cluster Controller (CC). it's 3 principal functions that embody issue running instances to specific NCs; dominant instances of virtual network overlay and gathering data a few set of node controllers. Cloud Controller is that the interface purpose between cloud used and cloud service suppliers. The cloud controller queries node managers for data concerning the resources. it always makes resource allocation selections supported gathered data and implements them by creating requests to cluster controllers.

Resource allocation module is incredibly necessary part of the IaaS cloud software package stack. It assigns resources to virtual machines. Figure a pair of depicts the practicality of resource allocation in virtual machines life cycle. Once user submits request to the IaaS cloud system, the cloud resource allocation module can notice the appropriate VMs and decides the initial places to run those virtual

machines. whereas the VMs area unit in execution method, the cloud system might commit to migrate VMs from initial place to alternative computing nodes. The cloud resource allocation module identifies that nodes to migrate. whereas the node is execution virtual machines, the OS of the node might perform coarse grained dynamic resource allocation to VMs [5].

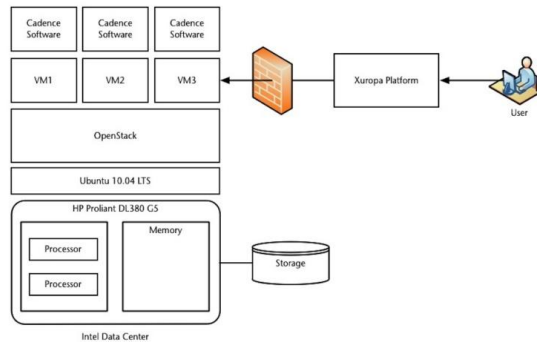


Fig 2: Resource Allocation in Cloud Computing

II. SCHEDULING IN CLOUD

Scheduling is that the cluster of methods that manage the order of execution of multiple tasks on the processors so as to decrease the time and price needed to execute of these tasks. within the cloud setting, task computer hardware plays very important role of allocating cloud provider's resources among the big variety of users. Task programing deals with distribution of the tasks among the cloud servers that method or execute these tasks for user (or client). AN economical task programing policy provides correct utilization of resources, load leveling and optimisation of execution value and time. thus nowadays task programing is main analysis topic within the space of cloud computing. There area unit numerous forms of programing like static, dynamic, pre-emptive, non pre-emptive, centralized and distributed programing.

III. VM MIGRATION IN CLOUD COMPUTING

VMs talk over with one instance of Associate in Nursing software at the side of one or a lot of applications running in Associate in Nursing isolated partition at intervals the pc. there'll be multiple virtual machines running on high of one physical machine. once one physical host gets overladen, it should be needed to dynamically transfer certain quantity of its load to a different machine with borderline interruption to the users. This method of moving a virtual machine from one physical host to a different is termed as migration. within the past, to maneuver a VM between 2 physical hosts, it absolutely was necessary to finish off the VM, portion the required resources to the new physical host, move the VM files and begin the VM within the new host. Live migration makes potential for VMs to be migrated

while not respectable period. The transfer of a VM really refers to the transfer of its state. This includes its memory, internal state of the devices which of the virtual electronic equipment. Among these, the foremost long one is that the memory transfer. 2 parameters square measure thought-about whereas acting the live VM-migration are:

1) Downtime- Down time refers to the time throughout that the service of the VM isn't obtainable.

2) Migration Time- Migration time refers to the entire quantity of your time needed to transfer a virtual machine at supply to destination node while not poignant its handiness.

Virtualization is major conception of cloud computing. it's changing into well-liked in cloud computing environments thanks to the advantage of server consolidation, resource isolation and live migration.

Virtualization facilitate in partitioning of 1 physical machine into range of virtual machines that runs at the same time and it conjointly shares identical physical resources. Virtual machine migration is completed from one physical machine to a different machine. it's used for load equalisation and physical machine fault tolerant. It may be wont to scale back power consumption in cloud knowledge centers.

Virtual Machine Migration ways square measure divided into 2 types:

1) Hot (live) migration- Virtual machine keeps running whereas migrating and doesn't lose its standing.

2) Cold (non-live) migration- The standing of the VM loses and user will notice the service interruption.

User doesn't feel any interruption in commission in hot (live) migration. In live migration method, the state of a virtual machine to migrate is transferred. The state consists of its memory contents and native filing system. native filing system needn't be transferred. In cold migration, first, VM is suspended, then its state is transferred, finally VM is resumed at destination host.

a) Live VM Migration- Live migration [8] could be a technology used for load equalisation and optimisation of VM preparation in knowledge centers. With the assistance of live migration, VMs will be transferred to a different node while not closing down. Live migration is classed into 2 steps –

(i) management is switched to the destination.

(ii) knowledge Transferring (memory/disk) to the destination.

Pre-copy- during this, 1st Memory is transferred and when this execution is transferred. The pre-copy technique is employed to transfer the memory to the destination node over variety of iterations.

Post-copy- during this, 1st execution is transferred and when this, memory is transferred. in contrast to

pre-copy, in post copy the Virtual electronic equipment and devices on the destination node is transfer within the beginning and starts the execution in second step. Following metrics area unit} wont to measure the performance of live migration.

i) Preparation- during this, resources square measure reserved on the destination that performed varied operations.

ii) Downtime- Time throughout that the VM on the supply host is suspended

iii) Resume- It will the representation of VM on the destination however with identical state as suspended supply.

iv) Total time- the entire time taken in completion of of these phases is named Total Migration time.

b) Live VM Migration Techniques- The pre copy [2] migration iteratively copies the memory pages from the supply machine to the destination host, while not ever stopping the execution of the VM. The unvaried nature of the algorithmic rule is thanks to the dirty pages, i.e. memory pages that are changed within the supply host since last page transfer should be sent once more to the destination host. If the speed of change of pages is extremely high, migration time can rise to a really high worth. however the advantage of this approach is that every one change square measure obtainable at the destination host. It will be activated any time. each VM can have some set of pages that it updates terribly oftentimes and that square measure so poor candidates for pre-copy migration.

There square measure three phases in live migration approach:

Warm-up phase-In this, copies all the memory pages from supply to destination whereas the VM remains running on the supply. If some memory pages amendment throughout memory copy method dirty pages, they're going to be re-copied till the speed of copy pages isn't but dirty page rate.

Stop and replica phase- during this, the VM are going to be stopped in supply and also the remaining dirty pages are going to be traced to the destination and VM are going to be resumed in destination.

Pre-Copy Phase- At this stage, the VM ceaselessly run, and its memory is traced page wise from the supply to the target host. It starts with transferring all active memory pages.

b) Advantages: varied benefits of VM Migration are:

Load balancing: This reduces the difference of resource usage levels across all the PMs within the cluster. This prevents some machines from obtaining overladen within the presence of gently loaded machines with sufficient spare capability. Live migration will be wont to balance the system. the system load will be balanced by migrating VMs from overladen PMs to under-loaded PMs.

Server Consolidation: so as to scale back server sprawl in knowledge centers, server consolidation

algorithms square measure needed. These algorithms square measure VM packing heuristics that try and pack as several VMs as potential on a PM so resource usage is improved and unused or under-utilized machines will be turned off. Consolidation can lead to reduced power consumption and so reducing overall operational prices for knowledge centre directors.

Hotspot & Coldspot Migration: The detection of hotspots and coldspot square measure forever supported thresholds that square measure set by the info center owner or supported the Service Level Agreements specified by the purchasers. Usually, the next resource usage worth near most is ready because the higher threshold and a really low resource usage worth is ready because the lower threshold. PMs having resource usage values on the far side the higher threshold square measure aforesaid to possess fashioned hotspots, and whose usage values below the lower threshold square measure aforesaid to possess fashioned coldspot. the previous implies over-utilization and also the latter implies under-utilization, applicable across any resource dimension.

Post-copy memory migration: Post-copy VM migration is initiated by suspending the VM at the supply. With the VM suspended, a borderline set 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. at the same time, the supply actively pushes the remaining memory pages of the VM to the target - Associate in Nursing activity referred to as pre-paging. At the target, if the VM tries to access a page that has not nevertheless been transferred, it generates a page-fault. These faults, referred to as network faults, square measure at bay at the target and redirected to the supply, that responds with the faulted page. Too several network faults will degrade performance of applications running within the VM. thence pre-paging will dynamically adapt the page transmission order to network faults by actively pushing pages within the section of the last fault. a perfect pre-paging theme would mask massive majority of network faults, though its performance depends upon the access pattern of the VM's work. Post-copy sends every page specifically once over the network. In distinction, pre-copy will transfer identical page multiple times if the page is dirtied repeatedly at the supply throughout migration. On the opposite hand, pre-copy retains Associate in Nursing up-to-date state of the VM at the supply throughout migration, whereas with post-copy, the VM's state is distributed over each supply and destination. If the destination fails throughout migration, pre-copy will recover the VM, whereas post-copy cannot.

IV. CONCLUSION

In this paper given a brief survey about the Virtualmachine migration and its importance,

Snapshot, kinds of virtual machine migration, working principle of Pre copy and post copy Migration. Tried to explain about the various techniques used to reduce the downtime during virtual machine migration. At the end given a small comparison between two virtual machine environments, VMWare and Xen Server. It has been observed that the memory load and memory access are the two factors that cause variation in the performance of live migration.

V. REFERENCES

- [1]. Mohammad Hamdaqa and Ladan Tahvildari, "Cloud Computing Uncovered: A Research Landscape". Elsevier Press. pp. 41-85. ISBN 0-12-396535-7.
- [2]. Huang Q.Y., Huang T.L., "An Optimistic Job Scheduling Strategy based on QoS for Cloud Computing", IEEE International Conference on Intelligent Computing and Integrated Systems (ICISS), 2010, Guilin, pp. 673-675, 2010
- [3]. Cristian Mateos, Elina Pacini & Carlos GarcGarino, (2013), An ACO-inspired algorithm for minimizing weighted flowtime in cloud-based parameter sweep experiments.
- [4]. K. Etmnani, and M. Naghibzadeh, "A Min-min Max-min Selective Algorithm for Grid Task Scheduling," The Third IEEE/IFIP International Conference on Internet, Uzbekistan, 2007.
- [5]. Rajkumar Buyya, A Particle Swarm Optimization-based Heuristic for Scheduling Workflow Applications in Cloud Computing Environments, Cloud Computing and Distributed Systems Laboratory, Department of Computer
- [6]. Yin H., Wu H., Zhou J., "An Improved Genetic Algorithm with Limited Iteration for Grid Scheduling", IEEE Sixth International Conference on Grid and Cooperative Computing, 2007. GCC 2007, Los Alamitos, CA, pp. 221-227, 2007
- [7]. Pooja Samal and Pranati Mishra, (2013), "Analysis of variants in Round Robin Algorithms for load balancing in Cloud Computing", International Journal of Computer Science and Information Technologies, pp. 416-419, Vol. 4(3)
- [8]. Wang Yonggui, Han Ruilian. Study on cloud computing task schedule strategy based on MACO algorithm[J]. Computer Measurement & Control, 2011, 19 (5): 1203-1204, 1211