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A STUDY ON VM CONSOLIDATION ALGORITHM FOR MANAGING THE RESOURCES ACROSS HOST MACHINE IN CLOUD

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Abstract- Cloud Computing describes a scenario whereby computing resource is delivered as a service over a network connection, usually the internet. As the energy consumption is a factor which is growing daily, the expense of the data centers over the energy is also increasing, The different researches are keeping a goal towards increasing the efficiency of the data centres for better usage. In this paper, we do the study on VM consolidation algorithm in order to understand how this algorithm reduces the amount of power- on PM and average power consumption with power saving.
Keywords – Vitual Machine, Physical Machine, Service Level Agreements

1. INTRODUCTION

A cloud is a pool of physical processing resource i.e. an arrangement of hardware, processors, memory, networks, systems, and so on which can be provisioned on request into administrations that can develop or shrink in real-time scenario[15]. Virtualization plays an important part to manage and organizing the entrance from the resource pool. A virtualized environment that empowers the design of frameworks (i.e. compute power, data transmission and capacity) and additionally the making of individual virtual machines is the key highlights of the distributed computing. Virtualization is perfect for conveying cloud administrations. Virtualization Technology empowers the decoupling of the application payload from the hidden physical equipment and gives virtualized assets to larger amount applications. A vital element of a virtual machine is that product running inside it is constrained to resource and deliberations gave by the virtual machine (VM). The software layer that gives the virtualization is called virtual machine screen (VMM). VMM virtualizes the majority of the resources of physical machine, in this way supporting the execution of numerous virtual machines. Virtualization can give exceptional advantages in distributed computing by empowering VM movement to adjust stack over the server farms [6].

Dynamic workload consolidation among various servers in light of virtualization innovations [8] has been broadly concentrated to empower datacenters to enhance resource use and reduce power utilization. In particular, all the virtual machines (VMs) facilitating different applications are required to be combined into a subset of physical machines (PMs) through VM migration(relocation) [9], while other idle PMs (servers) can be changed to bring down power states or close down. Be that as it may, beneficial combination isn't as unimportant as theoretically pressing the most extreme number of VMs into the insignificant number of PMs. There are various practical issues to be tended to, for example, VM relocation cost [8– 10], resource contention and execution interference between co-located VMs [11– 12], and also cloud SLA violation [13, 14]

The rest of the paper is organized as follows. VM Consolidation algorithms are explained in section II. Conclusion and future work remarks are given in section III.

2. VM CONSOLIDATION ALGORITHM

2.1. EnaCloud: An Energy Saving Application –

In EnaCloud[1][2] the applications are used dynamically so that energy could be kept for future use and can be managed efficiently. EnaCloud help to migrate the data and limit the unused machines to save the efficiency and space . EnaCloud reduces the Number of open boxes as the workloads are collected . The applications have shifting resource requests thus workload resizing is included into it. It finds an answer for remapping workloads to the asset hubs through relocation at whatever point a workload arrives, withdraws or resizes. The movement here for the most part has two points: first to decrease the quantity of open boxes and second is to limit the relocation time.

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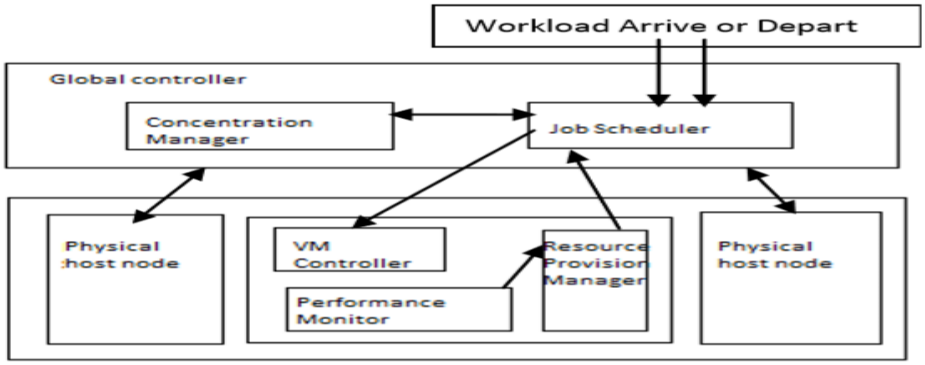


Figure 1. EnaCloud Architecture

The different kinds of nodes considered are :
1) Computing nodes are referred to as homogeneous and hosts at least one or more than one VM's.
2) storage nodes are used to store the information and document files .
The Workload is an area used for performing some of the application tasks and the system tasks simultaneously.
Idle server is referred as close Box and running node is referred as open box.
The open box is used to decrease load of work which are tightly aggregated .
The Resource pool(Job scheduler) is used to allocate the resources of the workload when given :there are three types of events :
•Workload arrival event: Here the work is been scheduled according to the available slots and if any preplaced node is smaller than the incoming node then the smaller node is removed from the scheduled slot and new node is been scheduled .
•Workload Departure Event Using the close box the workloads are removed or popped into the resource pool only if it is the only available work.
• Workload Resizing Event This technique is used to compare the load of works available and resize as required .

2.2. Energy Efficient VM Consolidation in Eucalyptus–
Energy Efficient VM Consolidation in Eucalyptus [3] approach clearly specifies about the saving of the energy while transfering (movement)of the energy while performing the VM operations since the EUCALYPTUS is an commonly performed approch to transfer the energy. Eucalyptus provides an simple scheduling algorithm that directly (automatically)puts off the servers which are not been used .The instance relocation algorithm must supervise the set of servers and also the available resources .

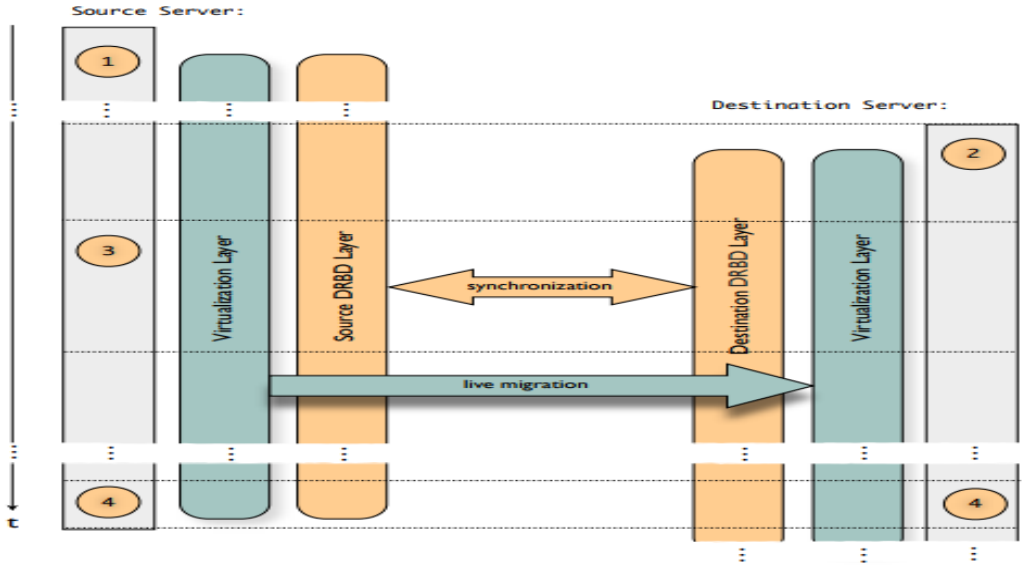


Figure 2. VM Relocataion Process

Figure.2 describes the interconnection between the source server and destination server while performing the relocation of the process. Cluster control relocation agent begins the steps as required .and the node controller administers the operations on the respective servers:

1) Initially the disk, ram disk and other related images are downloaded if required . For an instance support the MLFRS are included and the DRBD devices are initialized.
2) Once the initialization of the disk takes place the next step is to process the initialized disk on to the destination server the relocation is accordingly done according to the new start-ups which are set .
3) The DRBD devices are synchronized and the actual movement of the source to destination is performed
4) Once all the processing is performed the information removed from the source server and the destination server (Node) and an new the instance will initialized and will be activated.

2.3. Entropy: A Consolidation Manager for Clusters

On the basis of the constraint problem solving an consolidation algorithm is given by the Entropy[5][6]. The main intension of the constraint programming is to manage the VM resource allocation issue as a limitation to be fulfilled, and then the constraint solver is been applied for the solving of the optimization issue. The solver has the capacity to identify the global optimum solution and is an inspiration to the adoption the strategies the need to be applied (approached).

The Entropy checks the optimality constraint iteratively so that the current arrangement minimizes the nodes which are being run in background/foreground. If the Entropy is able to complete its construction of the optimal placement successfully at the VM packing problem (VMPP) stage, it will activate the re-allocation . While using entropy its looks after the memory usage and also the CPU utilization simultaneously so that both are looked after for better performance. The cost will be increased if there is high parallelism. There are two phases available for capturing the constraint programming techniques:

1) In the first stage the Entropy maps the VMs To PMs based on the topologies available and the resource utilization of PMs and VMs and reconfiguration design to use only limited number of PMs.
2) In the second stage the Entropy tries to redesign by using the minimum number of movements by adding some more features.

2.4. Memory Buddies: Exploiting Page Sharing for Smart Collocation in Virtualized Data Centers

Memory buddies[7] is an system used by the virtual machines for sharing the framework and the arrangement of the frameworks (virtual machines). It is an arrangement (placement) of the VMs for sharing the potential set which uses the memory fingerprinting system, and process more effective positions. It makes utilizations of the of the live relocation(Movement) of the VM placement as the workloads keep on changing. Memory buddies understands and recognizes the sharing potential to understand the advantages of it. The Memory Buddies system Comprise of the core, which keeps on running on every server ,and a control sheet is kept on running on the recognized server. Each nucleus initializes the memory footprint of all the memory pages inside the VMs resident server. This finger print represents the page level memory contents of the VM in a way which permits calculation of the number of pages available with the identical content across two VMs. The control plane is responsible for virtual movement of the placement positions and hotspot moderation. For placing an virtual machine inside the control plane ,it must comprise of the finger print of that VM against the server fingerprints with a specific location for deciding how to boost the energy of sharing the opportunities.

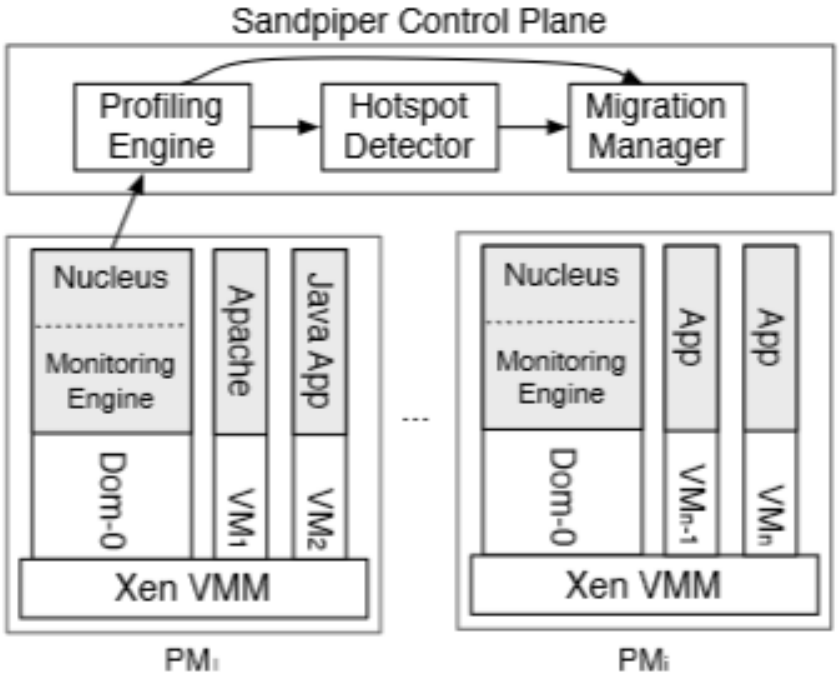
The server is then been placed with the VM and the initiating the relocation if necessary. The control plane communicates with the VMs through a VM administration API, such as VMware's Virtual Infrastructure or the libvirt API. The memory buddies consolidation algorithm then identifies the servers that are to be the candidate which are making the control to shut down in future and try to move the virtual machines for the betterment with the high sharing opportunities . In doing so it attempts to pack VMs onto the servers in order to reduce the total memory foot print and try to increase the number of VMs that can be placed in the information centres. Once the relocations are finished the finalised candidates can be resigned from benefit or shut down . until the new server is been initialised the saving of costs can be done .The consolidation algorithm performs its tasks periodically to check down the list of hosts which are the candidates for combining the mean usage which remains underneath the limit which is been specified for the better durability . The framework considers just memory uses while distinguishing combination competitors. The system considers only certain part of the memory usage when comparing the combination candidates.

Once the combination candidates are recognized, the calculation decides another physical server to house each VM. To do as such, the algorithm determines a new physical server to house each VMs . Live relocation guarantees straightforwardness and near zero down-times for the application executing inside the moved VMs. To guarantee least effect of system duplicating activated by every movement of utilization execution, the calculation puts a point of confinement on the quantity of the simultaneous relocations; once every movement finishes, a pending one is activated until all VMs have moved to their new has. The servers are then fueled off and resigned or moved to a shutdown with the goal that they can be reinitialized later if memory necessities increases.

2.5. Sandpiper: Black box and Gray-box resource management for Virtual Machines

Since the total number of resource allocated to an servers[6][7] has more variations which is also referred to as dynamic slicing, since the resources allocated have variations the applications also varies in fraction of time. None of the applications relocation are considered as a possibility for dynamic provisioning, basically since the relocation(movement) is not an feasible choice without an virtualization . in most of the applications the relocation is primarily transparent for executing inside(within) the virtual machines. Here the works are as the third approach- resource provisioning through a dynamic relocation in the available virtualized data centres. Here the Sandpiper is introduced as an framework for the automated relocation of the virtual servers in a data server centre o meet the application SLAs. Sandpiper basically accepts the large cluster specifically a heterogeneous servers. The servers has different kind of components which consists of the CPU, network interface, and also the disk storage space for the storage of the information in the memory.

The nucleus is an part which is run by the Sandpiper that keeps on running inside an unique virtual server and it is the charge of the forming the resource usage statistics in the server which is highlighted in the Figure 3.



The utilization and the managing of the engine that accumulates all the processors, network interface(Server) and a statistics of the memory swap. The gray box approach has an collection of the domain within the each virtual server to collect OS-level processed information (statistics) and also the different application logs.

The Nuclear occasionally transfer these statistics to the Sandpiper which has an control pane. The control plane keeps running on a recognized node and executes a great part of the knowledge in Sandpiper.

The Sandpiper has been basically divided into three segments:

1). The statistics are basically measured from the nucleus to develop the resource usage profiles for each and every virtual server and all the aggregate profiles for every physical serve. The usage of the profiles are managed by the hotspot detector continuously so that there wont be any unavailability of the hotspots, a hotspot is said to have happened if the total use of any resource(processor, arrange or memory)exceeds a limit or if SLA infringement happen for a "supported" period. In this way, the hotspot discovery part decides when to flag the requirement for movements and invoke the relocation administrator. upon hotspot identification, which attempts hotspot moderation through the powerful relocations. It executes algorithms that figure out what virtual servers to move from the over-burden servers, where to move them, and the amount of an asset to distribute the virtual servers once the relocation is finished (i.e., decide another resource portion to meet the objective SLAs).

2). The hotspot detection algorithm in the main responsible for any of the event to occur the signalling a need for the VM relocation the requirement point of the SLA violation detected implicitly taken care by the Black-Box approach or by the gray box technique implicitly. Hotspot detection is performed on a for each physical server premise in the back-box approach—a problem area is flagged if the total CPU or system usages on the physical server surpass an edge or if the aggregate swap movement surpasses an edge. Conversely, express SLA infringement must be distinguished on a for every virtual server premise in the dark box approach—a hotspot is flagged if the memory usage of the VM surpasses a limit or if the reaction time or the demand drop rate surpass the SLA-specified values.

3. CONCLUSION

In the present scenario the saving of energy and managing it has become an biggest task by the infrastructure provider in the cloud data centers. As the processing the data information keeps on changing and energy utilization also dynamical varies. we studied on VM consolidation algorithm in order to understand how these algorithm can reduce the number of power-on physical machine and average power consumption with power saving.

In future we practically compare the algorithms to check the efficiency in power in different environment setup.

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