IJARCCE

ISSN (Online) 2278-1021
ISSN (Print) 2319 5940

International Journal of Advanced Research in Computer and Communication Engineering
ISO 3297:2007 Certified
Vol. 5, Issue 7, July 2016

Enhanced Resource Scheduling in Virtual Cloud Laboratory (VCL) Cloud Architecture

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Abstract: IT infrastructure management and budget has been reduced by implementing cloud computing. Cloud computing has strengthened the current population. There are various cloud computing solutions, Virtual Cloud Laboratory (VCL) is one among them, per class hand–on labs is provided for every course. Capabilities of the universities have been increased by using Virtual Cloud Laboratory (VCL). Architecture of the VCL is very simple, but handling of VCL during the development is very difficult. Various works will be carried out at real and extended environments of VCL this entire are calculated, using various polices used for resource allocation along with scheduler algorithms. Default scheduler drawbacks are being recognized and new scheduler is proposed here. Performance of the scheduler algorithm is evaluated by simulating the environment of VCL cloud.

Keywords: Virtual Cloud Laboratory, Cloud Computing, Resource Scheduling Algorithm, CloudSim.

I. INTRODUCTION

Both software as well as infrastructural requirements is being served by the cloud solutions. Service will be provided by the cloud as per the demand. Cloud solutions are cost efficient and hence are very use full. Large number of educational institutions spread over the globe is making use of this cloud computing solutions. Resources needed for the educational institutions will not be same throughout the year, only during academic schedule there will be need for more resources. Since cloud provide the service as per the requirements. Whatever may be the location which ever may be the hardware an application may be provided with extra capabilities with the help of cloud environment; Inside cloud provide between the data centers services can be transferred. Automation of resources are carried out very efficiently in cloud and hence cloud computing has become very successful. Resources will be allocated as per the requests when there is a request for more resource the request is served, because of these feature the cloud has been successful. Applications using the cloud computing are very flexible. Large numbers of components of an institution which are being spread over the geographical area make use of service provided by the cloud which cannot be ignored.

Virtual lab is the distributed application in a cloud computing system. There will be various requests in-between end users and datacenter, how these are being achieved will be reflected in virtual lab. In datacenter how are all treated, executed is presented in virtual lab. Running an application in the cloud is not generally under control or unsurprising. The exponential increment of the requests in a cloud situation may constitute a significant condition of the administration uncovered and at times comes about a blocking state or bottleneck of the general framework expected to be accessible. The dynamic resource administration is performed by the scheduler who as a 'chief' element gives the way how assets to be provisioned and controlled. The VCL scheduler part administers too resources availability and intends to achieve high performance.

II. RELATED WORK

In this paper [1] there are several cloud computing solutions, Virtual Cloud Laboratory (VCL) is one among them, per class hand–on labs is given for every course. Abilities of the universities have been increased by using Virtual Cloud Laboratory (VCL). Architecture of the VCL is very simple, but handling of VCL during the development is very hard. Various works will be carried out at real and extended environments of VCL this entire are calculated, using various polices used for resource allocation along with scheduler algorithms. In this paper [2] internet and virtualization are two important technologies which influence cloud computing. Virtualization technique, plays a prominent role with respect to the performance of cloud computing. Hardware components like CPU, NIC, Memory and Disk are being virtualized and are being known as Hypervisor. By making use of these Hypervisors virtualization layer provides infrastructure for number of virtual machines above it. Hypervisors are mainly of three types fully virtualized, hybrid virtualized and para virtualized. In cloud computing environment three unlike Hypervisors Xen Server, ESXi and KVM are tested in order to analyse their performance. Private cloud having 64-bit operating system is used in order to carry out performance testing. Performance of Xen Server, ESXi found to be impressive on various tests. Performance of KVM was low. Ease of

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deployment, performance, dependability is various capabilities that need to be presented by virtualization cloud infrastructure. Test outcome show that Xen Server, ESXi Server meets all these capabilities. In this paper [3] virtualization is the key feature of cloud, virtualization has lots of benefits. Work efficiency of the enterprises can be increased by making use of the cloud. Cloud with great availability and dynamic resource allocation mechanism can be constructed by using open source software, how this is being carried out is explained in this paper. Cloud with great availability and dynamic resource allocation mechanism will be a boon for organizations and businesses. Cloud with great availability and dynamic resource allocation mechanism can be constructed by using open source software, how this is being carried out is explained. In the system that is proposed here, in case of emergency users virtual machine can be shifted to other machine which is known as live migration. This would be yet another new and important feature of cloud computing. In this paper [4] they have explained regarding Infrastructure as a Service is presented in this paper. IaaS is growing at a very fast rate. Computer which act as a virtual machine are given as resources to the users in IaaS model. Along with this even virtual machine, firewalls, network equipment's will also be the resources to the user.

Resource management in IaaS is one of the issues in demand. Scalability, quality of service, ideal utility, compact overheads, better throughput, concentrated latency, dedicated environment, charge effectiveness and easy interface are list of beneficial feature cloud when used infrastructure as s service. Source provisioning, resource distribution, resource plotting and resource edition are various resource management techniques. In this paper [5] various objects are considered and meta-heuristic workflow Scheduling algorithm is presented, it optimizes workload scheduling. In order of increase the efficiency of data analysis, scheduling the workflow, various purposes and limitations are being set. Pareto analysis is used to remove to ambiguities the objectives. The experiment was carried out to analyse the newly presented algorithm, analysis was carried out with respect to the quality of solution and speed of computation. Then the results of newly presented meta-heuristic workflow Scheduling logarithm are compared with that of older algorithms. Outcomes of experiment show that, meta-heuristic workflow Scheduling algorithm presented would be a good scheduler when built on many objects, and it takes less time for scheduling. In this paper [6] by implementing cloud computing in educational field, IT infrastructure can be managed and mentioned efficiently along with cost reduction. Since this burden of management of IT infrastructure is reduced using cloud concentration can be done on teaching as well as research. Courses regarding cloud computing can be presented by the institution to the students, which will be very helpful for the students. Optimal resources can be utilized by implementing the cloud. When educational date is being moved to cloud, NKN will handle them very smoothly. Connectivity is being solved by NOFN up to greater extension. The date relating the older students will be removed from the cloud; hence during verification lots of problems will be faced.

III. VCL ARCHITECTURE

VCL is explicitly a group of common-purpose, cloud management stack. From a signal service portal, various cloud services can be accessed by the students, they are as listed below

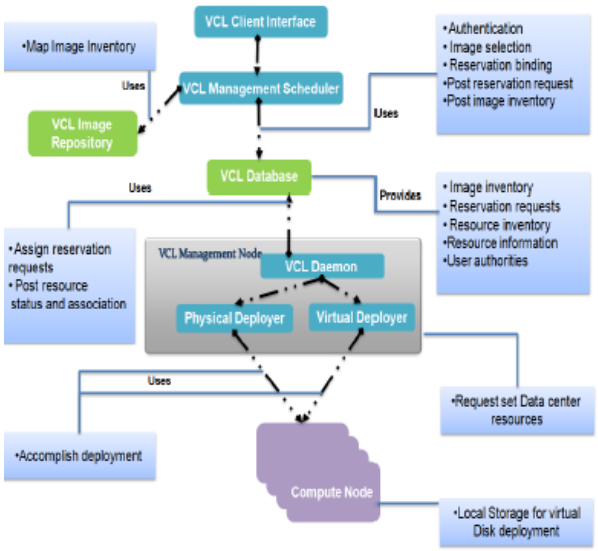

Figure 1: VCL Architecture overview plus Workflow description

- **IaaS:** On-demand, well-defined hardware and service running on other hardware products can be accessed using Infrastructure as a Service.
- **HaaS:** On-demand, to explicit computes, storage and network products can be accessed using Hardware as a Service.
- **PaaS:** On-demand, group of virtualization platforms along with user specific applications which are middleware enabled and will be running on HaaS or IaaS can be accessed using Platform as a Service.
- **SaaS:** On-demand, applications enclosing services which are defined by the user can be accessed using Software as a Service.
- **CaaS:** On-demand, sub-clouds that may encompass anything from IaaS and HaaS which are defined by user can be accessed using Cloud as a Service.
- **VCL graphical User Interface:** For servers and resources, end users will submit the reservation requests..
- **VCL Database:** system requirements, resources state statistics and usage measurements all of these are being stored at VCL database.
- **VCL Management node:** Scheduler distribution resources are presented.
- **Image repository:** Base-line operating system, applications running on a particular operating system are included in image repository.

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Various computers are present in the VCL environment these are defined in the VCL daemon.VCL Daemon (vcld) will be executed by management node. Without describing and generating entries to physical and virtual machines, VCL Daemon (vcld) will never be able to uncover data centre resources.

FLOW CHART

While carrying out some process there will be various steps that need to be followed in order and even some decision will be taken in between the process all these can be represented graphically, and this graphical representation of the process in known as flowchart. In order, each small step will be written in shape, by making use of lines and arrows, steps of the process will be connected in flowchart as shown in figure 2.

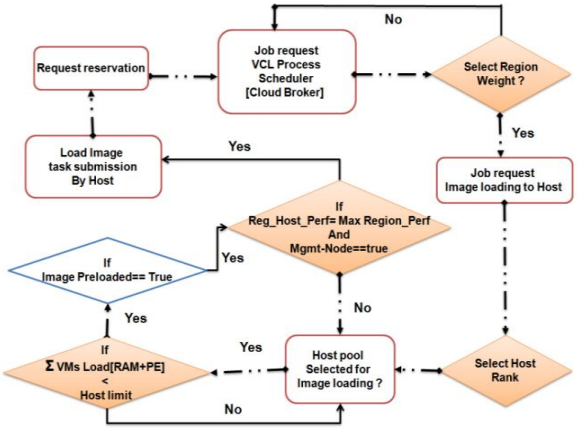

Figure 2: Flowchart of the Improved VCL scheduler algorithm

IV. PROPOSED APPROACH

The proposed system is an improved version of the standard VCL scheduler based on random selection of hosts. Instead of selecting the hosts randomly, the scheduling algorithm works in two phases at the Data Center level. In the first phase, the hosts are ranked by their connectivity to the other hosts and the resources availability. In the second phase, the highest ranked host given the resource request is selected for hosting the VM. Considering a full busy environment where all hosts are being under overwhelming burden, reservation requests will be submitted in a line for a particular Lab plan. Here, a locale based workload process planning framework is composed.

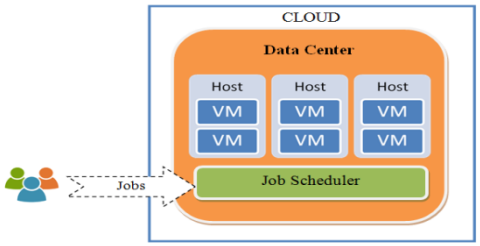

Figure 3: System Architecture

- Number of jobs will be submitted by different users.
- Data center and hosts are resources of cloud, VM Allocation Policies are used for scheduling the job, host are given ranks and the host with higher rank are allowed to host the virtual VM.
- If in case when the entire hosts are busy then jobs will be processed in Queue.

Phases of the system

The system that is proposed here has two important phases

Design of VCL simulation in CloudSim

In VCL environment to simulate the scheduling algorithms CloudSim toolkit is used. Virtual machines, Data centres and hosts are various resources of the virtual cloud. Cloud based model development would be the main aim of the platform which is proposed above, platform carries out this functionality by making use of virtual cloud resources. Performance of various services scheduling and Performance of allocation models are measured by CloudSim. Java is the programming language used to build cloud simulator. Various classes that build completely simulated cloud environment are defined by Cloud simulator.

Implementation of VCL Model on CloudSim

Some object classes are mapped with models that are implemented, in the present setup. Mapping of right class when done will provide components of right VCL, by doing this standard cloud computing environment is mimicked in CloudSim. Additions and alterations are enforced on native CloudSim code, along with Data centre, DatacenterBroker, Vm Allocation Policy, Host and VM classes. Improving scheduling policy in Data Center Broker and expansion scheduler policy would be the main reason for implementation.

The modules includes below steps

- **Job Scheduler Policy**

Dynamic Workload Job Scheduling Policy, is a policy that agendas the job by verifying all the jobs submitted to the VM.

- **VM Allocation Policy**

In a Data centre, policies of the host are provisioned to VMs, this is represented by abstract class known as Vm Allocation Policy. Reservation of host is carried out by two stages: initially reservation of host committed by the user, with respect to the submission request this will be effectively allocated.

- **Data Center Broker**

VM request need to be sent to the data centre, as well as task need to be sent to VM, both of these functionalities will be carried out by Data Center Broker. This will be carrying this function on behalf of the user.

- **Data Center and Host Configuration**

Datacenter along with the host are being reset on a different machine using this model. Unique ID is given for each host and will be characterized with RAM, Storage and available network bandwidth.

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Pseudo Code: Enhanced VCL Scheduler

```
Initialize:
Number of Regions<- N
Number of Datacenters<- M
Number of Hosts in Datacenter[i]<- P
Host Limit<- Sum of All VMs available in the host
Number of Virtual Machines VMList<- V
Number of Jobs to be executed<- J
HostList=ArrangeComputerByCapacity()
HostList=ArrangeComputerByMappedImages()
Loop1: for each Host in HostList
Assign a rank host by region
endloop1;
Loop2: for each Host in HostList
Remove reserved Computer within requested image
Update HostList from Low to High
endloop2;
Loop3: for each Host[j][k] in HostList in Datacenter[i][k]
If HostLoad<=HostLimit then
Loop4: for each VM in VMList
If image is virtual and Host[j][k] is not having sufficient
RAM or Pes
then
Remove VM within Host[j][k]
else
If VMImage requested is preloaded then
if Network Performance of Region[k] is the MAX in all
Region[k]
then
Filter Host[j][k] And assign lowest Rank
if Management Host found within Ranked Host then
Assign New reservation to VM within Host[j][k]
else
goto loop4;
Endif;
Endif;
Endif;
endloop4;
For each job in JobList
Assign highest job to highest reserved VM
Endif;
endloop3;
```

IV. SIMULATION AND RESULTS

In order to verify the performance of our approach, we consider the Round Robin Scheduler and the VCL Scheduler.

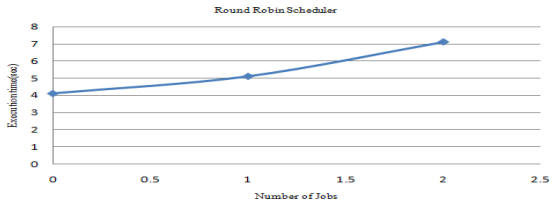

Figure 4: Plot

Figure 4 shows the existing approach and Figure 5 shows the proposed approach. Comparing standard scheduler i.e Round robin (existing) with the proposed scheduler i.e Enhanced VCL scheduler and choosing the best one by considering overall execution time.(Less execution time). The proposed approach gives the Resource idle time and Job execution time will be reduced as shown in second plot.

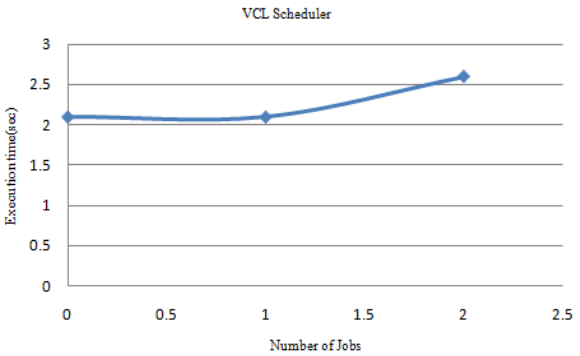

Figure 5: Plot

VI. CONCLUSION

In CloudSim VCL model is implemented and verified. When reservation request is submitted by the user, VCL model need to be implemented, during the implementing of VCL model some of the core functions and classes are being extended in CloudSim. Original VCL environment is not represented in this model. Results are obtained by using two algorithms, one would be round robin algorithm and another would be VCL scheduler algorithm.When result of the both the algorithms are analyzed we get to know the efficiency of the VCL scheduler algorithm.

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