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Bandwidth Aware vm Migration Policy in Cloud Data Centers

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Abstract: *with the advent of Cloud Computing and its tremendous use, Efficient VM migration using task scheduling has become an important issue that affect the performance of Cloud. Designing and implementing .an effective VM Migration moving task between two data centers is one of the ultimate goals of Cloud Providers. Focusing on the need of effective migration of tasks (of different sizes) to the resources, a new scheduling algorithm is proposed for multiple data center adapting to the different size of tasks size ,Bandwidth and capacity Mostly the task scheduling is done considering the CPU and memory requirements of resource. In this paper, in order to obtain better performance, the Bandwidth and CPU (MIPS) of the resource are considered for binding the tasks with most efficient resources to minimize the total time. Results of the paper are evaluated using Cloudsim toolkit.*

Keywords: *task scheduling; data center; virtual machine;*

I. Introduction

Cloud computing is a very fancy term used every now and then in the companies and within the individuals. Even the ones unaware of the term are using this technology. Gone are the days when one compromised with the cheaper technologies as they could not afford using their services. Pay as per Use policy has increased its use vastly. Cloud Computing provides access to the shared pool of resources on-demand and with least efforts. The services of the cloud are easy to use and access as one pays only on basis of usage. The cloud services are limitless, reliable and very cheap systems. The various services offered by cloud Infrastructure are:

- Infrastructure as Services (Iaas): In this model, the consumers are provisioned with IT resources like storage, networking and computing.
- Platform as a Service (Pass): In this model, the consumers are provisioned with the languages, libraries and tools required by users to develop the applications.
- Software as a Service (Sass): In this model, the consumers are provisioned with the services of application through browser, no administrative power other than that.

Cloud computing being the hottest technology in today's world has the massive request and tasks of users. Due to the increased workload, the efficient scheduling of user requests/jobs to the resources is very important. Task Scheduling is the key challenge in Cloud Computing responsible for allocating the most suitable resources of the cloud for the user jobs considering the various factors that restrict the user jobs. There are various good Scheduling algorithms that focus on the CPU and memory requirements of the resource but there are only few that consider bandwidth as one of the factors to scheduling the user tasks on the resource. This paper focuses on efficient utilization of cld resources with the tasks of variant sizes considering both the computing power and bandwidth of the resource for scheduling tasks. Resources in the cloud are heterogeneous and geographically distributed. Furthermore resource demand by the user can change dynamically at run time. So the resource management and the resource scheduling in such a large-scale distributed environment is a very challenging task. Resources management is a core function of any dynamic systems, it requires some complex policies and decisions for the management of multi dimension objective such as CPU, memory and network bandwidth. For the proper utilization of the resources an efficient load balancing strategy are required. Load balancing approach can be static or dynamic. In the static approach fixed threshold are used that can not changed with time to define a percentage of resources that can be used. While in the dynamic load balancing approach threshold can be changed with time. Static load balancing approach is not suitable for the cloud, where user request can change with time.

II. Parameters Observed

it's generates number of the following challenge and issues, which are summarized as follow.

A. Compilation Time:
allocate the resources for batch of tasks so that the completion time is minimal.
B. Power:
It manages the cloud environment for maximal resource utilization which leads to minimal power consumption as well.
C. Size:
The model must work for any size of batch requests. The data centers are over provisioned to meet the unexpected workload variations
D. Makespam*:*
Make span is the total length of the schedule that is, when all the jobs have finished processing. The problem is presented as an online problem as dynamic scheduling, online algorithm needs to make the job scheduling according to which job is first execute and their scheduling dependency also scheduled.
E. Resource Utilization:
The model must enable to provide uninterrupted services to customers. Services are done for available round of clock. If any resource is shut due to any reasons the work load on that resource must be migrated to another nearby, lightly loaded resource to meet the service level agreements. During the migration of task migration cost and the down time should be minimized.
E. Reliability*:*
When meta-heuristic algorithms are applied on the model the outcome may not be guaranteed. However one has to design the system for maximal reliability.
F. Bandwidth*:*
Bandwidth is what determines how much stuff can pass through your network at once. It affects how long time taken for download and upload the information
E. Network Capacity:
Capacity management under approach tends to center on predicting peak usage needs like hardware software resources and ensuring that in-house data centers can meet those demands according to capacity.

III. Related work

Weiwei Lin1, Chen Liang1, James Z. Wang2 and Rajkumar Buyya [1] have proposed a novel approach for obtain better performance. to obtain better Performance and to minimize time, they propose a bandwidth aware divisible task scheduling algorithm .A bounded multi port task scheduling algorithm constraints can be proposed in the paper. this algorithm is proposed for single data center with using multiple dimensional resources like bandwidth capacity and Cpu. BATS algorithm is owned by broker or here task allocation is between from one VM to another VM while VM is idle situation.amd binding the task to VM is done by using bind method. no of Cloudlets Are Send To VM Done By Broker. Here All Scenario Of Broker Is Situated

IV. Algorithm's Description

The Algorithm's basic idea can be describes as:

- At first, get the computing power and bandwidth of the VMs. Also get the information about the tasks which include the size of different tasks and the number of tasks. This information owned by broker.
- Cloudlets are allocated to VMs using optimized allocation scheme that is directly generated by system.
- While there is a situation occurred if datacenter current load is greater than the data center saturation load that is a limit of datacenter load then cloudlet of current datacenter VM transfer to the next data center.
- Otherwise cloudlets are executed in the current datacenter.
- Bind the cloudlets to particular VM and send the task concurrently to user using transmission bandwidth.

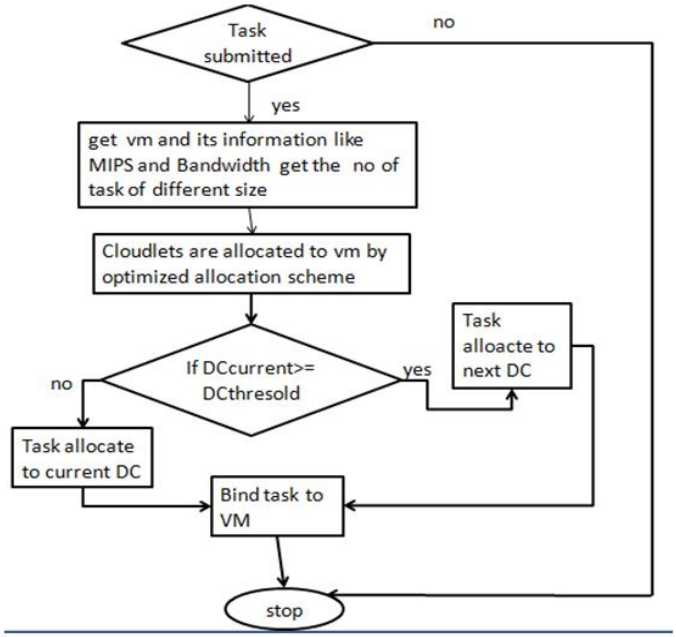


Figure 2. Steps of the Proposed Scheduling Algorithm

The main procedures to the algorithm can be explained by the pseudo code below

```
Procedure BATSMDC ()
While (task=!null) // if there is a set of tasks submitted
      GetVmInfo ()// get computing power and bandwidth of VMs owned by broker
      Get Task Info ()// get information about tasks including     total number and size
If (DLd≥DLT)
{
      Vmi= GetNextDi+1 // select Vm of Di+1    Bind (Ti, Vm (Di+1)
}
Else
{
     Vmi = GetNextDi// select Vm of Di
     Bind (Ti, VmDi)
}
     Submit ()// concurrently send tasks
End While
```

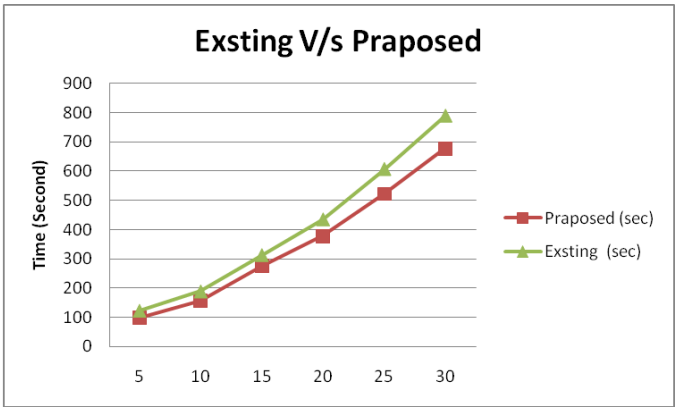
Bind the no of cloudlets to the VM of datacenter which is either current or next datacenter according to the load of the datacenter. After completed all tasks is concurrently send to the user. And bandwidth aware task scheduling for multiple data center procedure is finished

V. Experiment and Evaluation

In order to evaluate the results of proposed algorithm, the experiments are performed on Cloudsim which is simulation software for Cloud Computing. To implement the algorithm, the Datacenter Broker class of Cloud Sim is overwritten by our new broker class. A Datacenter Broker class is created that obtains the computing power and bandwidth of VMs With bandwidth and computing power as input, we get the optimized solution involving the number of different sized tasks to be allocated to each VM. With this allocation scheme we get the minimum completion time for the scheduling.overhere multiple data center scenario is used so when no of the tasks are allocated to VM which is scheduled by broker.

The implementation of algorithm is done by creating that broker class and passing the computing power and bandwidth and obtain optimized allocation scheme which is generated by system and tasks are allocated to VMs of particular data center. that for that Bind all() function used to bind the tasks to the VMs.

To analyze the performance of algorithm, various experiments with different number of tasks and virtual machines performed. We performed the experiments for the multiple data center. And compared with the single datacenter result. Results are according to the no of VM to total times executed by the all VM for completing the tasks The size of the tasks is randomly selected between [10000, 100000] for our proposed algorithm and dynamic changing task scheduling.



No. of VM	Praposed (sec)	Existing (sec)
5	98	123
10	157	189
15	276	313
20	378	435
25	523	607
30	678	789

VI. Results Discussion

The experiment results and graph below proves that the proposed algorithm has less completion time than existing single data center work of BATS algorithms. In this algorithm the real life scenario of Cloud Computing is considered in which the user tasks are of different sizes The use of both the Bandwidth and computing power in the implementation of scheduling algorithm along with the make the results optimized and we get the best solution out of all the solutions for allocation of tasks with resource and migrate the task from one data center to another data center using minimized time task is completed very fast.

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VII. Conclusion

Proposed work is the modification of BATS algorithm into multiple data center scenario. if there is a situation occurred when datacenter overall load greater than saturation then new task transfer to another datacenter results are much better while compare with single data center.

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