DEADLINE BASED TASK ALLOCATION AND MANAGEMENT IN CLOUD COMPUTING

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ABSTRACT
Cloud is an emerging model which provides on demand services to the users with virtualization technique. Computing resources are delivered as virtual machines. In such a scenario, a task allocation method plays vital role which allocates the tasks to the proper virtual machines efficiently. To provide the machines properly and reducing the response time of the tasks, numerous task scheduling algorithm are used. Still, task scheduling is a NP-Complete problem. In this paper new algorithm is proposed to schedule the set of tasks with their deadline. In the existing protocol initially all virtual machines are used without considering the deadline. In this proposed work our aim is to minimize the usage of virtual machines and to efficiently complete the tasks within deadline.

Key words: cloud computing, virtual machine, deadline. Scheduling, Task allocation.

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1. INTRODUCTION
Cloud Computing is one of trending technology today, in which we can access and share data as a virtual resources on demand [8]. Resources include Hardware, Software, Infrastructure etc. In different ways we can access cloud computing namely public cloud, private cloud and hybrid cloud. Managing and distributing those data efficiently is a challenging task in cloud computing. In order to meet this challenge a proper scheduling algorithm is required.

Scheduling in cloud computing is one of the challenge which are being currently discussed. Assigning or Mapping of tasks to a specific virtual machine is referred as scheduling. The overall system performance is improved using an efficient task scheduling algorithm. In this paper a new static load balancing algorithm is proposed. Static scheduling algorithm has former knowledge about every tasks in an application and state of the system.

One of the most striking feature for cloud computing is virtualization [10], which is an abstraction of computer resources. It is the key to unlock the Cloud system. It is one of the ways in which we can access services on cloud. Virtualization services are provided by many companies like Amazon and Microsoft [9].
2. RELATED WORKS
In cloud computing, scheduling is obtained in two ways Static and Dynamic Scheduling Algorithm. For static scheduling, Prior knowledge of resources is required but in case of Dynamic no need of prior knowledge of resources.

In this paper we propose a new static Task scheduling Algorithm named (DBTA) Deadline Based Task Allocation. So we discuss some static scheduling algorithms in detail.

**Round Robin Scheduling**
One of the standard scheduling Algorithm which is used commonly in cloud environment is Round Robin, As in paper [5] & [7] the tasks are allocated to virtual machines in a round robin fashion with or without including the concept of time slice. In this scheduling, without considering the load and size of the virtual machines, tasks are allocated.

**Throttled Algorithm**
In this the number of tasks to be allocated in a virtual machine is fixed. As per paper [7], this algorithm contains task scheduler to maintain a virtual machine list and it selects an appropriate machine for the task. If number of requests present is greater than the count of virtual machine, place the requests in queue until the virtual machine become available.

As mentioned in this algorithm mainly depends on virtual machine status (AVAILABLE/BUSY).This indicate that whether the virtual machine is allocated to a task or not. These status details are maintained in task scheduler using Hash table, which contains virtual machine Id and Status. Initially all the machines are in an available state.

**Minimum Execution time Algorithm**
As in paper [2] MET is explained that Tasks are allocated to virtual machines based on which machine the execution time is less .But availability of the resources at the time of scheduling is not considered so in this case load imbalance will occur.

**Minimum Completion Time Algorithm**
In MCT, for scheduling the tasks among all the virtual machines available it chooses the machine which has minimum expected completion time. The load of the machine is also considered while assigning [2].

**Enhanced Throttled Load Balancing Algorithm**
Lavanya M., Sahana V., SwathiRekha K. and Vaithiyanathan V in their work titled Adaptive Load Balancing Algorithm Using Modified Resource Allocation Strategies on Infrastructure As a Service Cloud Systems [3] they proposed a scheduling Algorithm to overcome the drawbacks in Throttled Algorithm. In that Algorithm a global queue is maintained to avoid queuing time and to provide better response time for static scheduling than the existing model.

**Priority-based on Deadline and Size**
A new heuristic technique named Priority based on Deadline and Size is proposed in paper [4] to maximize the throughput of the system by prioritizing the tasks. In this model, a job needs series of virtual machines of two different types in sequence to finish its task.
**Equally Spread Current Execution Algorithm**

As mentioned in paper [6], the cloud scheduler calculates the job length and search for the available virtual machine. Once the job length and virtual machine size match, the manager allocates the virtual machine to the job immediately in queue. Using this algorithm there is an improvement in processing time and response time.

### 3. PROPOSED TECHNIQUE

The proposed DBTA algorithm includes deadline and Task size for each task and capacity of all virtual machines. Each task is allocated to the virtual machine based on deadline. Initially only one Virtual machine is used for the task allocation and virtual machines are incremented based on the demand. In the existing method all virtual machines are used for task allocation initially and deadline is not considered. But in the proposed method virtual machines are used only on demand thus reducing the usage of virtual machines and effectively completing the tasks within the deadline.

### 4. ALGORITHM

The proposed algorithm consists of n task set from T1 to Tn, Task size and deadline for each tasks are considered, set of virtual machines and their capacities are also given.

**INPUT:** Virtual Machine characteristics and Task characteristics.

- Initially one virtual machine is considered.
- For each task in the task set calculate execution time based on the virtual machine.
- Check the probability for the task whether it is able to complete within deadline or not.
- If probability exists, then check for the available high speed virtual machine and allocate the task to that machine.
- If probability doesn’t exist, consider other virtual machine for allocation and assign the task in that new machine.
- If the task cannot be allocated in any virtual machine and not able to complete the task within the deadline, then that task is dropped.
- Repeat the steps until all the tasks in the task set are allocated.
- After allocating, calculate the total completion time of the task set, number of tasks missing deadline and also calculate the number of virtual machines used.

### 5. EXPERIMENTAL ANALYSIS

This exemplify the proposed method, task set contains four virtual machines. Scheduler module will take the tasks and scheduling is performed based on deadline and execution time of each tasks in virtual machines. Initially only one virtual machine is used. Each task is allocated to the virtual machine based on deadline. Let us consider the arrival time for static scheduling is 0 for all the tasks. Since all tasks are coming at the same time the task having Earliest deadline is taken first for the allocation. In this method, initially only one virtual machine is used for the task allocation and task is allocated to that machine based on deadline. If the task cannot be allocated in that machine, then the next virtual machine is used for task allocation. If the task cannot be allocated in any of the virtual machines then the task can be dropped. After allocating all the tasks to the virtual machines number of virtual machines used, total completion time and number of tasks dropped are calculated. Number of virtual machines used, Completion Time, Number of Tasks missing Deadline are shown in Table1.
Table 1 Comparison of Results

<table>
<thead>
<tr>
<th>Algorithm</th>
<th>Number of virtual machines used</th>
<th>Completion Time</th>
<th>Number of Tasks missing Deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td>ETLB</td>
<td>4</td>
<td>42</td>
<td>4</td>
</tr>
<tr>
<td>RR</td>
<td>4</td>
<td>41</td>
<td>4</td>
</tr>
<tr>
<td>DBTA</td>
<td>3</td>
<td>30</td>
<td>0</td>
</tr>
</tbody>
</table>

6. COMPARISION CHART

The following Figure-1, Figure-2 clearly shows that Deadline Based Task allocation Algorithm (DBTA) shows better results.

![Figure 1](image1.png)

**Figure 1** Comparing Virtual machine count and Task missing rate of RR, ETLB and DBTA.

![Figure 2](image2.png)

**Figure 2** Comparing Completion time of RR, ETLB and DBTA.

Hence these two graphs shows that proposed DBTA algorithm provides better result in static than Round Robin and ETLB.

7. CONCLUSIONS

In Cloud Computing, to create virtual version of a device such as server, storage or operating systems a concept called Virtualization is used, where the framework divides the resource into one or more executing elements. Programs are executed in Virtual machines as if they were
actual physical machines. In this paper, the detailed analysis on existing scheduling algorithms are given. The proposed Deadline Based Task Allocation (DBTA) algorithm implemented c sharp language for implementing the virtual machine allocation. The Experimental and Comparative Analysis shows that this algorithm provides an efficient way than the existing Round Robin algorithm and Enhanced Throttled Algorithm to reduce the number of Virtual machines used for an application and also to efficiently complete the tasks within deadline.

REFERENCES


