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Evolutionary Algorithm Using K-mean For Task Scheduling in Cloud Computing

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Abstract: ***Currently Cloud Computing is fastly growing area in IT world. It provide physical and virtual resources to the users as pay per uses bases. Now a days users of cloud are increasing day by day so to handle a lots of data and tasks are difficult. That's why proper allocation of tasks to resources is very important factor in cloud computing. Here this paper define an algorithm using K-mean clustering technique for task scheduling in cloud for better outcomes.***

Keywords: Deadline, Tasklength, Task Scheduling, Makespan, ExecutionTime

1. Introduction:

Cloud Computing refers to applications and services that run on distributed network using virtualized resources and accessed by common internet protocols and networking standards. Cloud computing is an abstraction based on the notion of pooling physical resources and presenting them as a virtual resource. It is a new model for provisioning resources, for staging applications, and for platform-independent user access to services. Clouds can come in many different types, and the services and applications that run on clouds may or may not be delivered by a cloud service provider like Microsoft, Google etc[1].

In cloud environment task scheduling is very important concern. Basically, scheduling is the process of mapping and assigning task to the available resources as per user requirements.

There are many priority based algorithms has been developed like FCFS(First come first serve) [2], SJF(shortest job first) [3]. But in priority based algorithms higher priority task is executed first and lower priority has to wait for long time which decrease the performance. Others used non-dominated sorting [5], In [6] author develop cost and deadline based algorithm using Min-Heuristic approach ,In [7] Multilevel priority-based algorithm has been proposed.

Many of Task scheduling use single criteria for resource utilizations. So to enhance the performance we need multiple criteria. We proposed multi-objective task scheduling algorithm using two criteria "Tasklength and Deadline".

This algorithm integrated with K-mean clustering algorithm for assigning tasks to VMs. Figure 1 define the flow of task scheduling in cloud computing.

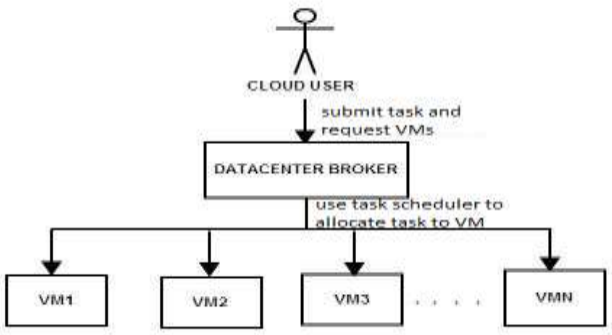

Figure.1 Flow of task scheduling in cloud

2. Proposed Algorithm

In proposed system K-mean clustering algorithm is used to create the clusters for tasks. In which for k clusters centroids are calculated based on multi-objectives Tasklengh and Deadline using equation (1) and (2) and Centroid is calculated using equation (3) where minimum distance value is selected as centroid.

Tl= Number of Instructions (MI) (1)

$$Dl = VMmips / Tl \quad (2)$$

Where Tl=Tasksize
Dl=Deadline
VMmips= MIPS of Average VM

$$Dist((x, y), (a, b)) = \sqrt{(x - a)^2 + (y - b)^2} \quad (3)$$

Where x= tasksize
y=deadline

2.1 Algorithm1: K-mean base Task-scheduling

Step1: Get a list of unschedule tasks and available VMs.
Step2: Calculate capacity of VMs and arrange them in decending order.
Step3: Apply K-mean algorithm by using Algorithm (2) to create clusters.
Step4: Bind clusters to VMs as per MIPS of clusters.
Step5: Check VMs are Underloaded or Overloaded. If Any one is overloaded than allocate task of overloaded VM to underloaded VM as per LIFO structure of clusters.
Step6: Repeat step4 untill all tasks are allocated properly.

2.2 Algorithm2: K-mean algorithm [4]

Step1: select k points as initial centroid.
Step2: Repeat
Step3:Form k cluster by assigning each point to its closest centroid.
Step4: Recompute the centroid for each cluster.
Step5:Untill centroid do not change.

2.3 Parameter Evolutions

- **ET (t,r) Execution Time:** The amount of time taken by resources r to accomplish task t which is defined as difference between finish time and start time.
- **Makespan:** Makespan is refered as Execution time of last task.

3. Experimental Result Analysis

Because of difficulties to validate the result in real infrastructure we used CloudSim 3.0.3 to evaluate the experimental result of proposed work. The proposed scheduling algorithm has been compared with Multilevel Priority-Based Task Scheduling Algorithm in Cloud Computing Environment. We evaluated our result using three different criteria. Table 1 define the three scenario for different no of cloudlets and available VMs.

Table 1 Different experimental criteria

Workload	No. of task	No. of VM
WL -1	20	3
WL-2	20	5
WL-3	50	5

Case 1: The proposed scheduling algorithm reduce execution time in comparison of Multilevel Priority-based Task scheduling algorithm, which is shown in Figure 2. As per graph we can conclude that proposed algorithm is working better in all criteria with different task list and number of Vms. If the size of cloudlet increase than execution time will decrease.

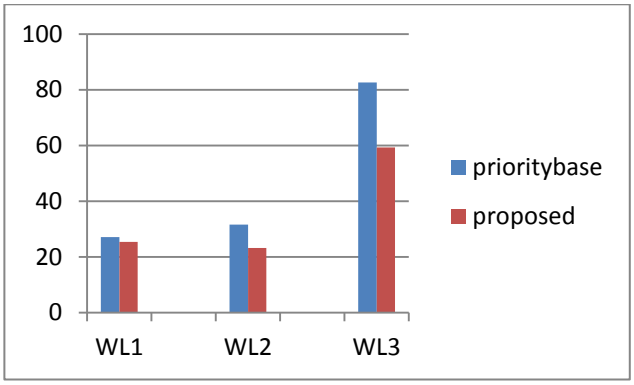

Figure 2: Execution Time

Case2: Figure 3 shows the comparative analysis of makespan of both the algorithms. As per graph we can conclude that if no of cloudlets increase than makespan will decrease as compared to Multilevel Priority-based algorithm. So performance of system will improve.

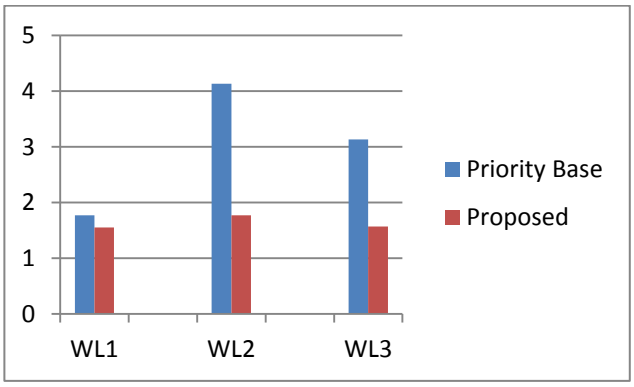

Figure 3: Makspan

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4. Conclusion

In this paper K-mean based task scheduling algorithm has been presented. The proposed algorithm create the clusters of tasks using k-mean clustering technique. Then allocate clusters to VMs as per capacity of VMs. Also check VMs are overloaded or under loaded. The proposed algorithm is reduced the execution time and makespan so it will improve the performance of task scheduling in cloud computing.

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Author Profile

Vanita Dandhwnai received B.E degree in Computer Engineering from SaurastraUniversity in 2010.Currently studying M.E in computer science from Gujrat Technological University.

Dr. Vipul Vekariya working as an Associate professor at Noble group of instructions - Junagadh. He has 13 years of teaching and research experience. He guided more than 30 students of Master degree and 4 students pursuing their PhD at various university under his guidance.