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Multi-Objective Task Scheduling using K-mean Algorithm in Cloud Computing

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ABSTRACT: Cloud Computing is a collection of physical and virtualized resources provided to the customers as per demand and pay per uses bases via internet. Now a days cloud computing users are increasing day by day so volume of data are very large to handle. That's why proper allocation of tasks to the available VMs is very important aspect. Because of poor task scheduling resources are not utilized efficiently. This paper define multi-objective task scheduling algorithm using k-mean clustering techniques for better outcomes.

KEYWORDS: Task scheduling , Multi-objective, K-mean, Execution time, Makespan

I. 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.

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. Fig 1.1 define the flow of scheduling.

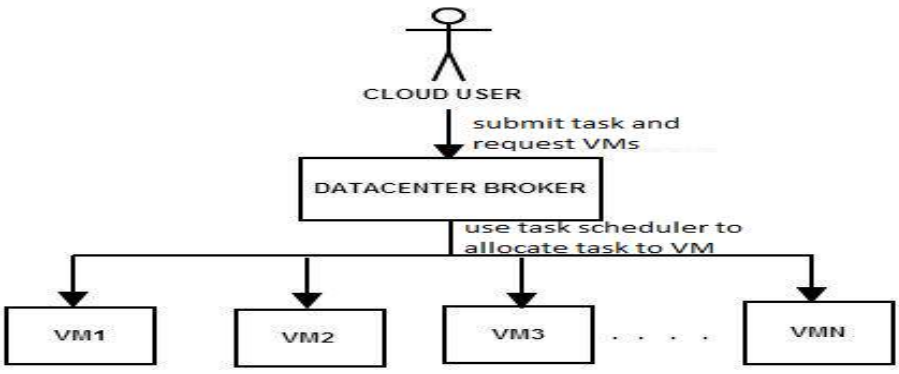

Figure 1.1

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II. LITERATURE SURVEY

In Task scheduling main problem is to map the task received by broker to particular VM in the way to minimize the execution time and makespan. Single criteria does not provide efficient result. There are many priority based task scheduling algorithms like FCFS(First come first serve) ,SJF(shortest job first) [2,3]. But in priority based algorithm task with higher priority always executed first and task with lower priority always have to wait.

Multi-objective task scheduling algorithms are defined by many researchers. Multi-objective task scheduling algorithm for heterogeneous multi-cloud environments use weighted-sum method for multi-objective optimization[4]. Other used non dominated sorting [5]. Evolutionary algorithm use multi-objective Genetic algorithm[6]. In [7] author proposed cost and deadline base algorithm using Min Heuristic approach. In [8] Multi level priority based algorithm for workflow is proposed. In cloud computing broker has to allocate task at runtime. In [9] author proposed VM selection process using K-mean algorithm. Some algorithm based on execution time and arrival time are proposed [10] which pick specific task for allocation on VM. Generally task scheduling our goal is to minimize the execution time and makespan.

III. PROPOSED WORK

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)

$Dl = VM_{mips} / Tl$ (2)

Where Tl=Tasksize

Dl=Deadline

VM_{mips}= MIPS of Average VM

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

Where x= tasksize

y=deadline

A . *K-MEAN ALGORITHM*

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.

B: *MULTI-OBJECTIVE TASK SCHEDULING ALGORITHM*

Step1: Get a list of unscheduled task.
Step2: Create a cluster using K-mean algorithm.
Step3: Arrange clusters in descending order (higher the centroid higher the cluster).
Step4: Map clusters to the Best VM using Resource selection algorithm.

C: *RESOURCE SELECTION ALGORITHM*

Step1 : Input: Get Resource list.
Step2: Begin i=0
Step3: While cluster[i] is not empty do
Step4: Select the VM which has máximum capacity using equation (4) [12].

$Ci=Pro_{ni} * P_{mpi} + VM_{bwi}$ (4)

Where Pro_{ni} is the number of processors in VMi,

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P_{mpi} is millions of instructions per second of all processors in VMi
Vm_{bwi} is the communication bandwidth ability of VM_i

Step5: Schedule the cluster and execute it.
Step6: Update status of resorces.
Step7: i=i+1
Step8: End while
Step9: End.

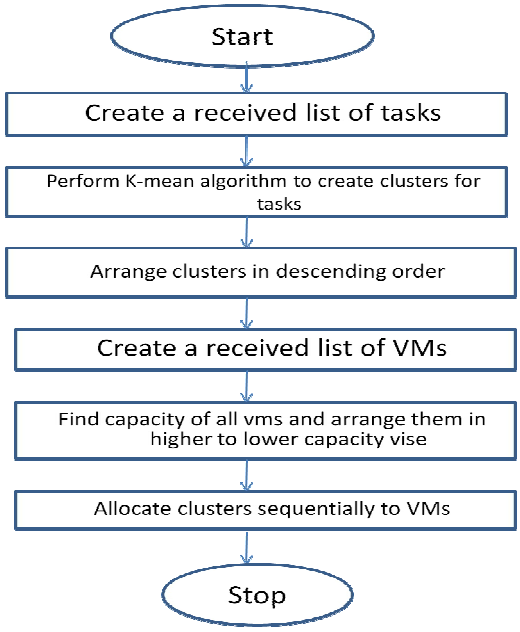

Figure 3.1

IV. SIMULATION RESULTS

The proposed algorithm is implemented using CloudSim simulator which runs on NetBeans IDE 7.2.1. CloudSim is a simulation toolkit which used to checking performance of algorithm [11]. The proposed system compared with multilevel task scheduling algorithm. Here we consider many tasks with different sizes 5000-15000 MI. We have also consider multiple VMs with range of 2000-8000 MIPS. Our result shows that will give minimum execution time and makespan.

V. CONCLUSION AND FUTURE WORK

The proposed task scheduling algorithm for cloud computing environment is based on multiobjective using K-mean clustering. This algorithm allocate clusters on best VMs by calculating capacity of VMs. This algorithm has better Execution time and Makespan.

In future other clustering algorithms can be used and we can also consider more Qos parameres.

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