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Improving energy and cost-effective workflow scheduling in cloud computing

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ABSTRACT - Cloud computing offers utility-oriented IT services to users worldwide applications. However, datacenters hosting Cloud applications consume huge amounts of electrical energy, contributing to high operational costs to the environment. The solution for this problem is that we need Green Cloud computing. This process may not only minimize operational costs but also reduce the environmental impact. The two heuristic strategies used in existing system for minimizing the cost. First strategy dynamically maps tasks to the most cost-efficient VMs based on the concept of Pareto dominance. Second strategy describes that it reduces the monetary costs of non-critical tasks and it complement of first one.In the previous system we have high energy consumption problem.To overcome this drawbacks we propose a energy-aware allocation heuristics provision datacenters resource to client applications in a way that improves energy efficiency of the datacenter, while delivering the negotiated Quality of Service (QoS). Through simulation-based studies, we shows our algorithm reduce monetary costs while producing makespan as good as the best known task-scheduling algorithm.

KEYWORDS- Cost-efficient task algorithm, scheduling, multiple workflows.

I. INTRODUCTION

The Cloud computing offers new platforms to execute large programs.To provide multiple VM to execute tasks in program cloud computing offers on-demand scaling process and pay-per use metered service .The execution of program can be viewed as multiple tasks and it is called as DAG. Dependent and independent tasks of multiple tasks used in DAG and to minimize the makespan [5]. Although different task- scheduling plans of same DAG using different virtual machines .Finally the result will be in different makespan and monetary costs. To reduce the monetary cost and yield good performance so we going for cost efficient task-scheduling algorithm. This algorithm was not suitable for multiple types of VMs With different pricing models.The main drawback of this algorithm is optimization problem and it built in Pegasus [17], Dryard [5], Nephele [2] to better than the pricing models. A simulation results shows that our algorithm will reduce monetary costs.The reminder of this paper organized as follows. Section II explains related existing research work. In Section III, we formulate the task-scheduling problem. Section IV contains scheduling process.Section V we present case study results obtained and we conclude our paper in Section VI.

II. EXISITING RELATED RESEARCH

The research based on task-scheduling for DAG can be classified in three important methods 1)system development 2)scheduling heurisitics 3)multi-objective workflow scheduling. First method describes about parallel and distributed application development of microsoft for DAG-based task processing to optimize the throughput [5].To minimize the number of instances in the cloud for optimizing data locality [2].The second method is based upon different task scheduling algorithms like list scheduling algorithm, Task-duplication based scheduling, clustering algorithm, guided random-search algorithm. This algorithm is used to minimize the makespan of large tasks in cloud. Third method defines in heterogeneous resource environment devised in scheduling algorithms to dispatch parallel tasks according to the

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availability and cost of resources. The cloud resources having two pricing models in cost-efficient scheduling heuristic balance between makespan and monetary costs.

III. TASK - SCHEDULING PROBLEM

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This algorithm depends on application model and have terminologies in Microsoft Dryard [5].In a DAG G= (V,E) and v tasks to be executed and E is the edges of precedence constraints in tasks. The two tasks called as entry and exit tasks. If more than one exit task executes, it connect pseudo exit task with zero execution time and cost. But pseudo exit and entry task does not contain scheduling. The processing of latest time is called as the most influential parent task and the path along task called as critical path. The next model is cloud resources, it provides different VM for different workload cycles. Scheduling method is used to schedule the task in the DAG to minimize the makespan. Two models like linear and exponential pricing models. First model describes VM is correlated to the CPU cycles. The cost and the particular price is available to execute a task

$$c(v_i, m_j) = \sigma \times t(v_i, m_j) \times Vc_{base} \times \left(\frac{ca_{m_j}}{ca_{m_{slow}}}\right)$$

In the above equation random variables of different VM are available for executing a task. In second model, explains that the cost of VM allocation as calculated as follow

$$c(v_i, m_j) = \sigma \times t(v_i, m_j) \times Vc_{base} \times \exp^{\frac{ca_{m_j}}{ca_{m_{slow}}}}.$$

Finally the total monetary cost value and pricing value is calculated for each resources of VM in the tasks of different workloads.

IV. COST -EFFICIENT SCHEDULING METHOD

In cloud setting the processing of multiple tasks in DAG depend upon methods like Pareto optimality, Pareto optimal scheduling heuristic, slack time scheduling heuristic.

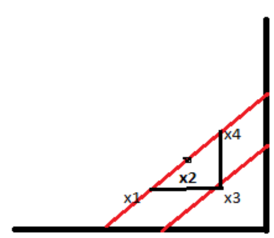

Fig 4(a) Combinations of cost and time for same task

POSH assigns the task to highest priority of VM to minimize the earliest finish time.It can be classified as three categories as follows
a) Weighting phase
b) Prioritizing phase
c) Mapping phase
The STSH method produce the time slots of executing task in VM of both critical and non-critical tasks.

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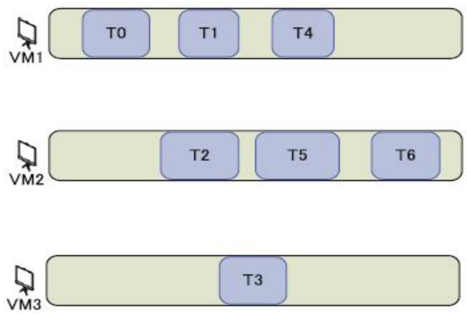

Fig 4(b) Scheduling tasks

In this scheduling critical and non-critical time slots are available for each task.The slack time of non-critical task is calculated based on immediate predecessor task.

V. CASE STUDY

In hybrid to produce a scheduling plan the algorithm used as POSH and STSH. To compare the performance level of hybrid with HEFT algorithm it can only be suitable for baseline algorithm and it does not contain monetary cost. Some of the simulations techniques have been carried out of high pricing VMs in extensive period of time.

VI. CONCLUISON

The previous algorithm like task scheduling may not be suited for running large programs in the cloud and it also does not consider monetary cost and this algorithm may not be directly applied to the cloud process.But our algorithm computes the scheduling plans and produce good makespan of reducing the monetary costs. The advantage of our algorithm explains that it can apply to large DAGs and also used in real-world applications.To maintain a constant monetary costs by using cloud services, the users have to manage storage and network resources.

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