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ANALYSIS OF WORKFLOW SCHEDULING PROCESS USING ENHANCED SUPERIOR ELEMENT MULTITUDE OPTIMIZATION IN CLOUD

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Abstract — In this paper the resource condition and scheduling model for logical workflows on Infrastructure as a Service (IaaS) clouds is described. This paper presents an algorithm based on the Enhanced Superior Element Multitude Optimization (ESEMO), which aims to minimize the overall workflow execution cost while meeting deadline constraints. The main scope of the proposed system is used to analyze best available resource in the cloud depend upon the total execution time and total execution cost which is compare between one process to another process. The cloud provider compare the two processes result in the application, if the second result better than previous result process then the process will be terminated. The administrator utilizes the best resource in the area using the execution cost and execution time.

Keywords — Cloud Environments, logical workflow, ESEMO, Cost and Execution Time

I. INTRODUCTION

Cloud computing environments facilitate applications by providing virtualized resources that can be provisioned dynamically. However, users are charged on a pay-per-use basis. User applications may incur large data retrieval and execution costs when they are scheduled taking into account only the execution time [1] [2]. In addition to optimizing execution time, the cost arising from data transfers between re-sources as well as execution costs must also be taken into account.

A workflow is a set of ordered tasks that are linked by data dependencies. A Workflow Management System (WMS) is generally employed to define, manage and execute these workflow applications on Grid resources [3]. A WMS may use a specific scheduling strategy for mapping the tasks in a workflow to suitable cloud resources in order to satisfy user requirements.

The main challenge of dynamic workflow scheduling on virtual clusters lies in how to reduce the scheduling overhead to adapt to the workload dynamics with heavy fluctuations[4] [5]. In a cloud platform, resource profiling and stage simulation on thousands or millions of feasible schedules are often performed, if an optimal solution is demanded. An optimal workflow schedule on a cloud may take weeks to generate.

The rest of this paper is organized as follows. Section 2 presents the related work followed by the main contribution workflow as well as the problem definition in Section 3. Section 4 gives a brief introduction to work logical scheduling and explains the proposed approach. Finally, Section 5 presents the evaluation of the algorithm followed by the conclusions described in Section 6.

II. RELATED WORK

The advent of Cloud computing as a new model of service provisioning in distributed systems encourages researchers to

investigate its benefits and drawbacks on executing scientific applications such as workflows. One of the most challenging problems in Clouds is workflow scheduling, i.e., the problem of satisfying the QoS requirements of the user as well as minimizing the cost of workflow execution. It have previously designed and analyzed a two-phase scheduling algorithm for utility Grids, called Partial Critical Paths (PCP), which aims to minimize the cost of workflow execution while meeting a user-defined deadline.

However, it believes Clouds are different from utility Grids in three ways: on-demand resource provisioning, homogeneous networks, and the pay-as-you-go pricing model. It adapt the PCP algorithm for the Cloud environment and propose two workflow scheduling algorithms: a one-phase algorithm which is called IaaS Cloud Partial Critical Paths, and a two-phase algorithm which is called IaaS Cloud Partial Critical Paths with Deadline Distribution [6] [7].

Workflows are usually represented by Graph. Workflows for large computational problems are often composed of several interrelated workflows. Workflows in an ensemble typically have a similar structure, but they differ in their input data and number of tasks, individual task sizes. There are many applications that require scientific workflow in single cloud provider in cloud environments utility computing has emerged as a new service provisioning model and is capable of supporting diverse computing services such as servers, storage, network and applications for e-Business and e-Science over a global network [8] [9].

III. MAIN CONTRIBUTIONS

Workflow scheduling on distributed systems has been widely studied over the years and is NP-hard by a reduction from the multiprocessor scheduling problem. Therefore it is impossible to generate an optimal solution within polynomial time and algorithms focus on generating approximate or near-optimal solutions. Numerous algorithms that aim to find a schedule that meets the user‘s quality of services (QoS) requirements have been developed.

A vast range of the proposed solutions target environments similar or equal to community grids. This means that minimizing the application‘s execution time is generally the scheduling objective, a limited pool of computing resources is assumed to be available and the execution cost is rarely a concern. The solutions provide a valuable insight into the challenges and potential solutions for workflow scheduling. However, they are not optimal for utility-like environments such as IaaS clouds. There are various characteristics specific to cloud environments that need to be considered when developing a scheduling algorithm.

IV. PROPOSED ALGORITHM

The proposed algorithm named ESEMO (Enhanced Superior Element Multitude Optimization) which is compare the total execution time and total execution cost between one processes to another process. In addition, it extends the resource model to consider the data transfer cost between data in cloud environment so that nodes can be deployed on different regions

Also, it assigns different options for the selection of the initial resources and the given task the different set of initial resource requirements is assigned. In addition, data transfer cost between data environment are also calculated so as to minimize the cost of execution in multi-cloud service provider environment.

In this proposed system contains are workflows scheduling strategies and dynamic resource allocation for executing IaaS in Cloud environment. The scenario is modeled as implement the multi cloud environment and its optimization problem is to minimize the overall execution cost.

The proposed approach incorporates basic IaaS cloud principles heterogeneity, multi cloud, and cloud provider of the resources. The proposed system is workflow scheduling strategies implementing superior element multitude optimization execution cost reduced to optimization execution. It aims to minimize the overall execution cost and time in executing the processes in multi cloud environment.

PROPOSED ALGORITHM

Initialize resources
Repeat

For each resources do
calculate the fitness value

If fitness value is better than the best fitness value (optimal best) in list
set current value as the new optimal best
End if

End for resources with the best fitness value of all the
resources a for each resources do

Calculate resource capacity according to capacity update
equation Update resources position according to position update
equation end for
until maximum iterations or minimum error criteria is attained

V. EXPERIMENTAL RESULTS

The Table 1.1 and Table 1.2 used to represent the process of value as Total execution cost and Total Execution Time in multi system environment. The specified value is varied from dynamic manner depend upon the number of the resource and belong tasked to those resource. It represented in the basis of number of task assigned to the resource belong to the resource capability.

Resource Id	Total Execution Cost	Total Execution Time
1,2	34	36
2,3	39	34
3,4	28	32
4,5	14	34
1,2,3	35	22
2,3,4	28	36
3,4,5	22	40
1,2,3,4	40	34
2,3,4,5	32	40
1,2,3,4,5	30	34

Table 1.1 Process value of Total execution cost and Total execution time in multi resource

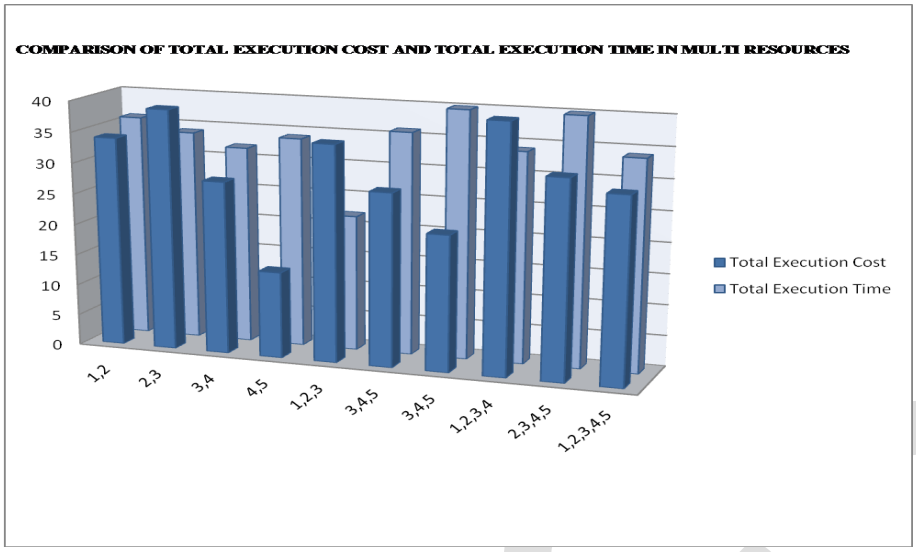

Table 1.2 Chart representation of Total execution cost and Total execution time in multi resource

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VI.CONCLUSION

As research conclusion of proposed system work the paper presents the ESEMO (Enhanced Superior Element Multitude Optimization) algorithm which is used to predict the least time computation in the cloud provider area. In addition, the dissertation compared the time evaluation work between one dynamic resource flows to another process flow of dynamic resource in the cloud environment. In addition, it extends the resource model to consider the data transfer cost between data centers so that nodes can be deployed on different regions. Extending the algorithm to include heuristics that ensure a task is assigned to a node with sufficient memory to execute it will be included in the algorithm. Also, it assigns different options for the selection of the initial resource pool. In addition, data transfer cost between data center are also calculated as to minimized the cost of execution in multi cloud services provider environments.

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