



Performance Evaluation of Cost-Time Based Workflow Scheduling Algorithms in Cloud Computing

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Abstract— Cloud Computing has become more like an onset trend in the face of enterprises. It sets a milestone in the field of workflow execution in business process management. Workflow Management System is mainly devoted to support the definition as well as execution cum control of business processes. Workflow Scheduling is a key to workflow management. For efficient Scheduling in workflows, cost-time based evaluation of various algorithms has been included in this paper. A number of parameters are there on the basis of which performance of cost-time scheduling algorithms can be evaluated and compared to find the efficient cost-time workflow scheduling algorithm.

Keywords— Cloud Computing, Task, WorkflowSim, Workflows, Workflow Scheduling.

I. INTRODUCTION

Cloud Computing is a technology that provides facilities including scalability, efficient computing and resource sharing. It provides three types of services which are Software-as-a-service, Platform-as-a- service and Infrastructure-as-a-service. Cloud computing is divided into five layers that are clients, applications, platform, infrastructure and servers. A workflow enables the structuring of applications in a DAG form. Nodes of DAG represent constituent task and edges represent inter task dependencies. Tasks in a workflow may communicate with another task. In the management of workflow execution workflow scheduling is a key issue [9]. A workflow mainly focused with automation of procedures. Workflow scheduling is a type of global task scheduling which focus on mapping and managing the execution of interdependent tasks on shared resources that are not directly under its control. A workflow management system manages and executes workflows. It includes five dimensions that are time, cost, fidelity, reliability and security [2].

II. COST-TIME BASED WORKFLOW SCHEDULING

This paper compares the cost-time based workflow scheduling algorithms namely DBD-CTO(Deadline Budget Distribution based cost-time Optimization), Greedy Cost and DTC(Dispensation Time-Cost). The main objective of this paper is to analyze the performance of these cost-time based workflow Scheduling algorithms to find the efficient algorithm among these three algorithms.

III. SIMULATION AND PERFORMANCE ANALYSIS

This section includes the details of the implementation of cost-time based workflow scheduling algorithms of cloud computing. For relative comparison of the algorithms, WorkflowSim simulator and Java language has been used. In order to analyze the efficiency of the cost-time based workflow scheduling algorithms parameters which are execution cost and execution time have been used in the simulation.

Table 1: Execution Time of three compared algorithms

| No. of Simulations | Execution Time in seconds (DBD-CTO Algorithm) | Execution Time in seconds (GC Algorithm) | Execution Time in seconds (DTC Algorithm) |
|--------------------|---|--|---|
| 1 | 7.14 | 6.77 | 6.51 |
| 2 | 7.19 | 6.71 | 6.69 |
| No. of Simulations | Execution Time in seconds (DBD- | Execution Time in seconds | Execution Time in seconds |

| | CTO Algorithm) | (GC Algorithm) | (DTC Algorithm) |
|---|----------------|----------------|-----------------|
| 3 | 7.23 | 6.73 | 6.43 |
| 4 | 7.27 | 6.70 | 5.10 |
| 5 | 7.41 | 6.82 | 5.40 |
| 6 | 7.46 | 6.83 | 6.76 |
| 7 | 7.50 | 6.69 | 6.56 |

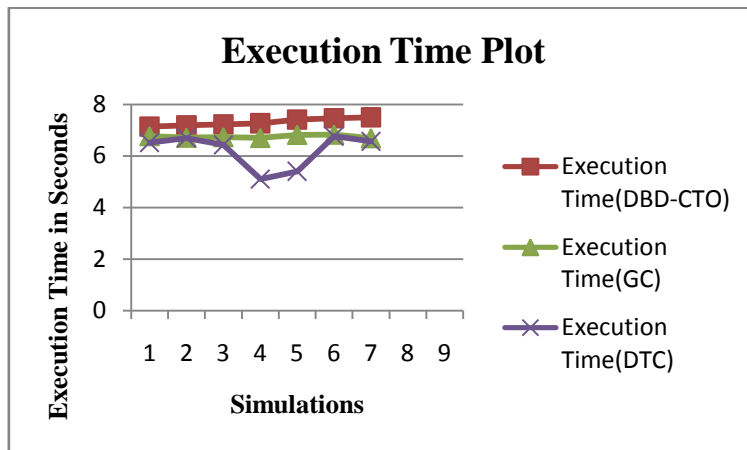


Figure 1: Graph of Execution Time

Table 2: Execution Cost of three compared algorithms

| No. of Simulations | Execution Cost in \$ (DBD-CTO Algorithm) | Execution Cost in \$ (GC Algorithm) | Execution Cost in \$ (DTC Algorithm) |
|--------------------|--|-------------------------------------|--------------------------------------|
| 1 | 8.57 | 8.13 | 7.81 |
| 2 | 8.63 | 8.05 | 8.02 |
| No. of Simulations | Execution Cost in \$ (DBD-CTO Algorithm) | Execution Cost in \$ (GC Algorithm) | Execution Cost in \$ (DTC Algorithm) |
| 3 | 8.67 | 8.07 | 7.71 |
| 4 | 8.73 | 8.04 | 6.12 |
| 5 | 8.90 | 8.19 | 6.50 |
| 6 | 8.96 | 8.19 | 8.11 |
| 7 | 9.00 | 8.03 | 7.87 |



Figure 2: Graph of Execution Cost

IV. CONCLUSION AND FUTURE WORK

Cloud computing is internet based computing in which resources are provided to users on demand. Workflow scheduling focus on mapping and managing the execution of interdependent tasks on shared resources that are not directly under its control[5]. Cost and time reduction is one of the very important concern to build up a cloud system. Cost-Time based Workflow scheduling algorithms of cloud computing are analyzed. From the analysis, it is concluded that DTC Algorithm takes lesser time and Cost for Execution than DBD-CTO and GC Algorithm. Among the DBD-CTO and GC, GC takes lesser time and Cost for execution. Thus, DTC is more efficient than DBD-CTO and GC in cost-time based scheduling algorithms of workflow scheduling in cloud computing. GC is more efficient than DBD-CTO Algorithm. In future, performance of the cost-time based workflow scheduling algorithms can be measured by using other simulators. More number of scenarios and other parameters can be considered.

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