

## Accepted Manuscript

A GSA based hybrid algorithm for bi-objective workflow scheduling in cloud computing

Anubhav Choudhary, Indrajeet Gupta, Vishakha Singh, Prasanta K. Jana



PII: S0167-739X(17)30321-7  
DOI: <https://doi.org/10.1016/j.future.2018.01.005>  
Reference: FUTURE 3912

To appear in: *Future Generation Computer Systems*

Received date: 28 February 2017  
Revised date: 12 October 2017  
Accepted date: 3 January 2018

Please cite this article as: A. Choudhary, I. Gupta, V. Singh, P.K. Jana, A GSA based hybrid algorithm for bi-objective workflow scheduling in cloud computing, *Future Generation Computer Systems* (2018), <https://doi.org/10.1016/j.future.2018.01.005>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

## A GSA based Hybrid Algorithm for Bi-objective Workflow Scheduling in Cloud Computing

Anubhav Choudhary, Indrajeet Gupta, Vishakha Singh, Prasanta K. Jana, *IEEE Senior Member\**

*Department of Computer Science and Engineering  
Indian Institute of Technology (ISM), Dhanbad, India*

---

### Abstract

Workflow Scheduling in cloud computing has drawn enormous attention due to its wide application in both scientific and business areas. This is particularly an NP-complete problem. Therefore, many researchers have proposed a number of heuristics as well as meta-heuristic techniques by considering several issues, such as energy conservation, cost and makespan. However, it is still an open area of research as most of the heuristics or meta-heuristics may not fulfill certain optimum criterion and produce near optimal solution. In this paper, we propose a meta-heuristic based algorithm for workflow scheduling that considers minimization of makespan and cost. The proposed algorithm is a hybridization of the popular meta-heuristic, Gravitational Search Algorithm (GSA) and equally popular heuristic, Heterogeneous Earliest Finish Time (HEFT) to schedule workflow applications. We introduce a new factor called cost time equivalence to make the bi-objective optimization more realistic. We consider monetary cost ratio (MCR) and schedule length ratio (SLR) as the performance metrics to compare the performance of the proposed algorithm with existing algorithms. With rigorous experiments over different scientific workflows, we show the effectiveness of the proposed algorithm over standard GSA, Hybrid Genetic Algorithm (HGA) and the HEFT. We validate the results by well-known statistical test, Analysis of Variance (ANOVA). In all the cases, simulation results show that the proposed approach outperforms these algorithms.

**Keywords:** Gravitational Search Algorithm, Workflow Scheduling, Cost, Makespan, Cost Time Equivalence

---



---

\*Corresponding author

Email addresses: anubhav.choudhary@live.com (Anubhav Choudhary), indrajeet7830@gmail.com (Indrajeet Gupta), vs.make.a.vish@gmail.com (Vishakha Singh), prasanta.jana@yahoo.com (Prasanta K. Jana, *IEEE Senior Member\**)

Download English Version:

<https://daneshyari.com/en/article/6873126>

Download Persian Version:

<https://daneshyari.com/article/6873126>

[Daneshyari.com](https://daneshyari.com)