Improvement of resource allocation in workflows by stochastic method[*]

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Abstract

The performance of a human resource depends on several factors, like human parameters, the environment and the organization. Such specialities can belong to these factors, like which part of the day the operation is carried out, what qualities the human resource has, who the operator works with, what level of mood and health the human resource has, how motivated the operator is, etc. Having the goal effectiveness improvement, one has to determine how to measure the effectiveness, since different factors can work against each other. We can measure effectiveness considering the required time to perform a task, the necessitated raw materials, the number of attempts to solve a problem, the number and level of failures, the remained capacity or voluntary for performing other tasks, etc. Usually, the parameters of real task execution by a human resource are not constant but can be better described by random variables. In case of such tasks which are characterized by stochastic parameters, we can get different parameter values (e.g. for the operation time) for each execution. It is the reason for that applying several (e.g. hundreds of) simulations instead of using deterministic computation methods result more realistic values. We scheduled stochastic scheduling problems several times, after that we estimated the real values using the obtained values. Collecting the possible faults which may occur during the execution of the workflow, we built up a fault tree related to the human resources, and applied Monte Carlo method on the fault tree effectively.

Keywords: human resource allocation, fault tree, Monte Carlo method

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