Autonomic Elastic Workflow Advanced Reservation Planning Algorithm for Grids and Clouds – EWARP*

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Abstract

Advanced Reservation (AR) is used to guarantee resource provisioning for many different types of applications including workflows. This technique is still under a huge controversy in both Business and Research communities because of its potentiality of reducing resource utilization. Most of the works proposed in this domain suggest reservation for the whole workflow schedule, and on all available resources at the same time, which worsen the problem of resource utilization.

Many solutions are introduced to improve resource utilization under advanced reservation through generating *relaxed and elastic reservation plans* that local scheduling systems could modify to improve utilization and decrease internal fragmentation. These solutions depend mainly on changing rigid AR, which considered to be the most difficult kind of reservation, into relaxed and elastic ones through adding extra time on the resulted schedule and then distributing it on all tasks of the workflow.

This paper presents a new autonomic algorithm (EWARP) for producing elastic reservation plans for workflow applications which doesn't add extra times. Instead, it depends on exploiting the timing gaps produced by the different scheduling algorithms. The new algorithm use the technique of discovering timing gaps, but modifies it, and adds to it to be used for producing an elastic reservation plan for workflows. The results presented in this paper demonstrate how the proposed algorithm outperforms existing works in the fields by a *lower bound approximating 25%*.This shows that (EWARP) algorithm offer efficient and practical solutions for the problem of scheduling workflow applications under QoS constrains.

Keywords: Grid Computing, Scheduling, Workflow applications, Resource availability on-demand, Advanced reservation, QoS, Elastic reservation plan.

* For the paper in Arabic see pages (307-324).

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