

基于粒子群优化的云 workflow 任务调度

薛凡^{1,2}, 吴志健¹

(1 武汉大学 计算机学院软件工程国家重点实验室, 湖北 武汉 430072;

2 黄淮学院 创新创业学院, 河南 驻马店 463000)

摘要: 为了解决云环境中科学 workflow 调度的代价优化问题, 提出一种基于改进粒子群优化模型的科学 workflow 调度算法 CWS_PSO. 该算法将科学 workflow 调度问题形式化为截止时间约束下的调度代价最优化问题, 利用粒子群模型建立了粒子位置与任务调度方案的编码与转换模型, 并通过粒子的迭代进化寻找满足截止时间约束的代价最小化调度方案. 通过科学 workflow 模型的仿真实验, 与同类型调度算法进行了性能比较. 实验结果表明, CWS_PSO 算法不仅可以有效均衡 workflow 的执行跨度与执行代价, 而且能以更高的截止时间约束满意度实现 workflow 执行代价的最小化.

关键词: 云计算; workflow 调度; 粒子群算法; 代价最优化; 约束满意度

中图分类号: TP393

文献标识码: A

文章编号: 1000-7180(2018)08-0122-06

Cloud Workflow Tasks Scheduling Based on Particle Swarm Optimization

XUE Fan^{1,2}, WU Zhi-jian¹

(1 State Key Lab of Software Engineering, Computer School, Wuhan University, Wuhan 430072, China; 2 International Education College, Huanghuai University, Zhumadian 463000, China)

Abstract: For solving the cost optimization of the scientific workflow scheduling in cloud environment, a scientific workflow scheduling algorithm CWS_PSO based on improved particle swarm optimization (PSO) model is presented in this paper. Our algorithm formalizes the scientific workflow scheduling problem as the scheduling cost optimization problem with the deadline constraint. The encoding and transfer model are constructed between the particle's position and tasks scheduling scheme by PSO model, and searching for the cost optimization scheme satisfying the deadline constraint is processed by the particle's iteration evolution. Through the simulation experimental of scientific workflows model, the performance comparisons are conducted in the same kind of algorithms. Experimental results show that our algorithm could efficiently achieve the trade-off between the workflow execution makespan and the execution cost, and achieve the execution cost minimization with the deadline constraint satisfaction.

Key words: cloud computing; workflow scheduling; particle swarm optimization; cost optimization; constraint satisfaction

作者简介:

薛凡男, (1978-), 博士生, 讲师. 研究方向为智能计算、云计算. E-mail: xufam78@163.com.

吴志健男, (1963-), 教授、博导. 研究方向为智能计算、智能信息处理.