**A Hierarchical Task Allocation Model in Cloud Computing Environment using Multi-Objective Particle Swarm Optimization**

Shaimaa Yosry, May Salama, and Abdelwahab Al-Sammak

Electrical Engineering Department, Faculty of Engineering at Shoubra, Benha University, Cairo, Egypt

**Abstract.**

 Many cloud services are running on top of geographically distributed data centers in the service provider. For better reliability and performance, the optimum data center with the best suitable virtual machine must be selected by the service provider to handle the customer request. In this proposed work, A multi-objective particle swarm algorithm (MOPSO) is applied to select the optimum data center and virtual machine in the Cloud environment. The multi-objective particle swarm algorithm is an optimization algorithm inspired by social behavior of swarm’s behavior. It is characterized by the relatively small number of parameters that need to be evaluated during the iterations. Thus, its convergence speed is much better than other swarm techniques like Ant Colony and Bee optimizations. The novelty of the algorithm is two folded. First it considers many constraints, one of which is standard deviation which is a new parameter that has not been considered before. Second, it is a hybrid algorithm which not only selects the best Data Center but also the most suitable Virtual machine. The performance of the algorithm was evaluated against Benchmark algorithms. Simulation results show that the proposed algorithm reduced the makespan profoundly regardless of the number of requests reaching 14% of Round Robin, while it increased the service provider income by four times and attained a customer satisfaction of 97%.