Glowworm Swarm Optimization (GSO) for Cloud Jobs Scheduling

Dolagi Izzat Esa and Adil Yousif

University of Science and Technology-Omdurman-Sudan
adiluofk@gmail.com

Abstract

Cloud computing is a new technology provides computing resources as services, and allows users to access these resources via the Internet without the need to own knowledge and experience, or even control of infrastructure that support these services. Job scheduling is considered one of the main issues in cloud computing. The main task of job scheduling is how to find an optimal mapping of set of jobs to a set of available resources. Unsuitable mapping of jobs to resources usually leads to inefficient cloud performance. The current methods for cloud job scheduling process produce acceptable solution but not optimal solution. This paper proposes a new job scheduling mechanism using Glowworm Swarm Optimization (GSO). The proposed mechanism aims to find the best mapping in order to minimize the execution time of jobs. The proposed mechanism based on information of jobs (cloudlets) and resources (virtual machines) such as length of jobs, speed of resources and identifier for both. The scheduling function in the proposed job scheduling mechanism firstly creates a set of jobs and resources to generate the population by assigning the jobs to resources randomly and evaluates the population using fitness values which represent the execution times of jobs. Secondly the function used iterations to regenerate populations based on glowworms behavior to produce the best job schedule that gives the minimum execution time of jobs. The methodology of this research is based on simulation of the proposed mechanism using the CloudSim simulator. The evaluation process of the proposed mechanism started with a set of different experiments. These experiments revealed that, the proposed mechanism minimized the execution time of jobs. The proposed mechanism is compared with the First Come First Servers (FCFS) algorithm and experimental results revealed that the proposed mechanism has a better performance than FCFS for minimizing the execution time of jobs.

Keywords: Cloud, Job Scheduling, Metaheuristic, Glowworm Swarm Optimization

1. Introduction

Cloud computing is the practice of using a network of remote servers hosted on the Internet to store, manage, and process data, rather than a local server or a personal computer technology. Cloud computing and storage solutions provide users and enterprises with various capabilities to store and process their data in third-party data centers. It relies on sharing of resources to achieve coherence and economies of scale, similar to a utility (like the electricity grid) over a network. At the foundation of cloud computing is the broader concept of converged infrastructure and shared services [1].

NIST define of Cloud computing as "a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (*e.g.*, networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction"[2].

Cloud Computing has become a widely accepted paradigm for high performance computing, because in Cloud Computing all type of IT facilities are provided to the users