

# A Comparative Performance Analysis of Task Scheduling Algorithms in Federated Clouds

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## Abstract:

Efficient task scheduling is crucial in the domain of cloud computing. Cloud computing is a service that allows users to access and share virtual resources as needed in order to fulfil their jobs. The primary objective of task scheduling is to execute tasks in a manner that maximizes performance by fully utilizing resources and minimising losses. Several scheduling algorithms currently exist with the goal of achieving various objectives, including minimising execution time, cost, makespan, enhancing resource utilisation, and load balancing. This study evaluates and compares the performance of six scheduling algorithms, including Particle Swarm Optimisation (PSO), Ant Colony Optimisation (ACO), Q-Learning, Round Robin (RR), First-Come, First-Served (FCFS), and Shortest Job First (SJF) algorithms. The algorithms' performance is assessed by comparing them using standard measures, such as makespan, execution time, and throughput, across various workload scenarios through graphical representation of the findings. The study employs Java and CloudSim for the purpose of implementing and evaluating. The Particle Swarm Optimisation (PSO) algorithm exhibits exceptional efficiency, particularly in minimising makespan, obtaining optimal throughput, and attaining the shortest execution time. The capacity to adjust to changing settings and efficiently utilise resources continually demonstrates its worth in many situations. The study emphasizes the pivotal significance of algorithm selection and data centre layout in optimising work scheduling, particularly in dynamic and distributed cloud computing systems.

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**I. Introduction**

Cloud computing delivers services, applications, infrastructure, and devices as needed by customers, offering shared resources on a pay-as-you-go model [1], [2]. Cloud computing, as defined by the National Institute of Standards and Technology (NIST), is an enabling environment that grants users access to a shared repository of storage resources [3]. The primary technology behind cloud computing is virtualization, which efficiently divides a single physical machine into several virtual machines [4].

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