SCHEDULING ALGORITHM IN CLOUD COMPUTING APPROACH

Dr. Pushpa M. Bangare¹, Dr. Manoj L. Bangare², Dr. Nilima R. Dhumale³, Dr. Rakesh B. Dhumale⁴

¹Assistant Professor, Department of E&TC, Sinhgad College of Engineering, Savitribai Phule Pune University, Pune, Maharashtra, India. pushpa.bangare@gmail.com
²Associate Professor, Department of Information Technology, Smt. Kashibai Navale College of Engineering, Savitribai Phule Pune University, Pune, Maharashtra, India. manoj.bangare@gmail.com
³Assistant Professor, Department of E&TC, Sinhgad College of Engineering, Savitribai Phule Pune University, Pune, Maharashtra, India. nilima_thobare@yahoo.com
⁴Assistant Professor, Department of E&TC, AISSMS Institute of I. T., Savitribai Phule Pune University, Pune, Maharashtra, India. rbd.scoe@gmail.com

ABSTRACT

Cloud computing is a relatively new technique in the realm of computing. It is an internet-based technology that connects users to shared resources such as databases, storage, servers, and applications. After then, users pay on a per-use basis. Scheduling is one of the factors that affect system performance. As a result, a logical scheduling method is required to improve overall performance. Algorithms for scheduling place a premium on achievement time, cost, and duration. Additionally, there are numerous heuristic-based scheduling procedures, although genetic algorithms have been shown to converge quicker and provide optimum outcomes. The purpose of this study is to offer an efficient scheduling method focused on energy consumption reduction. Resource usage determines the total amount of energy used. A genetic algorithm-based scheduling strategy is used. This work gives the detail overview of computing approach with their advantages and application. It gives the overall review of different approach that can be helpful for implementation.

Keywords: Cloud computing, Scheduling, Algorithms.

I. INTRODUCTION

Cloud computing is a fast-expanding field of computer technology in which customers pay for services on-demand through the internet [1]. The National Institute of Standards and Technology defines cloud computing as a paradigm founded on five key features: on-demand self-service, wide system access, supply pooling, quick elasticity, and measurable facility. Cloud technology is gaining broad acceptance due to many advantages such as cheap cost, reduced energy consumption, quick implementation, and more flexibility. Software as a Service (SaaS), Platform as a Service (PaaS), and Infrastructure as a Service (IaaS) are the three forms of cloud computing facilities [2]. In SaaS, applications are accomplished by a third party and distributed to clients via the web to be track straight. PaaS delivers outline developers can use to advance or modify applications, while IaaS delivers resources such as system, calculate, and storage that the user can purchase according to their needs. Private cloud, public cloud, and hybrid cloud are the three chief cloud computing deployment categories. Cloud computing is a term that encompasses several distinct ideas, including grid computing, distributed computing, ubiquitous computing, autonomous computing, and virtualization. Cloud computing is built on the foundation of virtualization. Virtual machines may have a variety of features, which provides users with a great deal of freedom. Numerous applications must be finished within a certain time frame while using the fewest possible resources in real-time. As a result, efficient task and resource scheduling strategies [3] and [4] are needed. Tasks should be allocated and scheduled on VMs in cloud computing to minimize resource consumption and optimize a certain goal function.

Allocating jobs to available computer resources are, by and large, an NP-hard issue. At the moment, no such method exists that can provide an optimum solution in polynomial time to such a problem. These issues may be...
addressed via metaheuristic methods that provide near-optimal answers in a reasonable amount of time. Due to their efficacy in resolving big and complicated issues, metaheuristic methods have been favored over several years. Several scheduling methods [5] using metaheuristic approaches include Ant Colony Optimization, Genetic Algorithm (GA), Particle Swarm Optimization (PSO), League Championship Algorithm (LCA), and BAT procedure. Genetic algorithms are shown to generate optimum solutions and converge more quickly than other algorithms. K. Gulati et al [20] [29] have proposed IOT review and interface related work.

II. RELATED WORK

Additionally, genetic algorithms apply to various issues and have been widely used to solve scheduling difficulties. Existing scheduling algorithms prioritize completion time, cost, and time required to complete. We have attempted to minimize energy usage throughout our study. Energy consumption is a function of resource utilization, as evidenced by the literature. We have developed a new scheduling method that is genetic algorithm-based. A genetic algorithm assigns responsibilities to virtual apparatuses with a fitness occupation that is proportional to supply consumption.

This section provides a high-level summary of the scheduling-related activities. In cloud computing, S Sindhu and S Mukherjee [6] developed a dual-objective scheduling strategy. It utilizes a genetic algorithm to improve both the makespan and the average CPU usage. The article discusses three distinct types of genetic processes. One is GA LCFP, which use LCFP to generate the preliminary population, dual crossover, and a roulette wheel technique for parent selection. The remaining two alter the technique used to generate the early population.

GA-SCFP use SCFP as a heuristic for the early population, while GA-MCT employs MCT as a heuristic. GA-LCFP offers the optimum solution and outperforms other techniques, as shown by the results. Sahar Hosseinzadeh and Mirsaed Hosseini Shirvani [7] examined the issue of energy consumption while scheduling tasks. We developed a genetic method for allocating work to virtual machines based on their availability and energy usage. Virtual machines are utilized that include all of the required resources and use the least amount of energy.

The suggested method lowers expenses and energy usage, as shown by the assessment of the results. In contrast to first- or best-fit reducing processes, this approach is more mountable and consumes less energy. Buyya et al. [8] have established processes for cloud resource distribution and provisioning that maximize energy savings while meeting quality of service criteria without breaching the SLA limit. The writers propose rules for assigning virtual apparatuses to appropriate resources and active association of virtual machine capitals. These methods have been developed and replicated on the CloudSim platform. Ge et al. [9] described a load balancing method for job scheduling based on evolutionary algorithms. By integrating a schedule optimizer with a genetic algorithm, optimal schedules are produced. The schedule optimizer is based on three models: the structure prototypical, the task prototypical, and the projected implementation time prototypical. The system prototypical includes data about slots, information duplication, and the workload of processors. The task prototypical provides data about jobs and tasks that are queued. The findings indicate that the suggested scheduling methodology lowers the makespan of jobs compared to FIFO and other interruption arrangement methods. M. L. Bangare et al [18] [19] [25] [26] [27] have done work in the cloud computing domain.

Additionally, it results in a more precise load distribution among the system's nodes. Li et al. [4] proposed a service level agreement-based resource scheduling method for cloud computing (SLA). To simulate a resource schedule, the authors used stochastic integer programming. A two-stage process is used to create the model. After introducing Grobner bases theory, it is expanded to MGBA, which solves stochastic integer programming. To assess the achievements, numerical analyses and simulations are conducted. The experimental findings indicate that developing an optimum solution requires less time. Zhongni Zheng et al. [10] investigated resource scheduling optimization to maximize resource use. The objective is to discover the optimal virtual machine allocation method. The authors created a parallel evolutionary method that utilizes virtual machines to maximize resource usage. The findings demonstrate that the module implemented increased resource allocation speed while maximizing resource usage compared to the Round robin and Greedy algorithms. Hamad et al. [11] described the Tournament Selection Genetic Method as a scheduling algorithm for job allocation.

To improve performance and achieve a better result, several changes are made to the fundamental genetic algorithm. Each iteration, the population will be generated using the kid acquired after the crossover and the parents. To determine the optimal chromosome, the Tournament Selection method is used. The algorithm's
fitness function is dependent on the task's achievement time and the time needed to develop it. Cloustrim is used to carry out the job. Numerous factors such as cost, achievement time, supply usage, and speedup are evaluated. The developed method is compared to both the elementary genetic process and the Round Robin process. S. L. Bangare et al [21] [22] [23] [24] [28] have done work for the artificial intelligence and machine learning for medical field.

III. PROBLEM FORMULATION

Compared to other scheduling algorithms, it is concluded that the Genetic Method is a very efficient algorithm for job scheduling and provides acceptable results. As previously said, energy consumption is a significant factor affecting the entire system and the scheduling algorithm's efficiency. As a result, the user needs to choose a virtual machine that satisfies the needed criteria. This article aims to plan tasks in such a manner that total energy usage is minimized.

IV. COMPARATIVE STUDY OF TASK SCHEDULING ALGORITHMS

This study identifies places where current algorithms may be enhanced to improve cloud scheduling performance. The scheduling algorithms react differently when a private, public, community or hybrid cloud utilizes various deployment methods. Parameters like bandwidth and transmission costs may vary significantly across deployment models. Many studies show that PSO is incapable of performing when the search space is vast and global optima dominate the search space. To improve the performance of PSO and IWD, the authors suggest the development of a hybrid PSO-IWD task scheduling algorithm, with the expectation that it would decrease cost, makespan time, execution time, reaction time, and enhance throughput, among other benefits. It will provide more accurate findings when certain other factors, such as energy efficiency, are included.

V. CONCLUSION AND FUTURE WORK

These days, cloud computing is a rapidly developing technology. We investigated energy usage in this study and suggested a genetic algorithm-based method for job scheduling. After selecting virtual machines based on their resource usage, tasks are assigned to them. Our work is compared to FCFS in terms of performance, and the experiment results indicate that our arrangement strategy uses less energy. In the upcoming, we will investigate task dependence and genetic algorithms that run in parallel.

REFERENCES:


29. Kamal Gulati, V.P. Sriram, Dr. Mukta Sharma, Parul, Sherin Eliyas, Sunil L. Bangare, “Use for Graphical User Tools in Data Analytics and Machine Learning Application", Turkish Journal of Physiotherapy and Rehabilitation; 32(3), ISSN 2651-4451, e-ISSN 2651-446X.