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A SURVEY ON TASK SCHEDULING IN CLOUD COMPUTING USING METAHEURISTIC BASED METHODS

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Abstract: The information technology (IT) services are now provided outside of the workplace thanks to cloud computing. Unfortunately, there have been some difficulties with cloud computing. In order to decrease the execution time of users' activities (i.e., minimize make-span), and to maximize resource usage, a good mapping between the resources available and users' tasks is required. This is why the task scheduling problem is one of the major challenges. The purpose of this research is to present and put into practice an improved task scheduling method to distribute tasks from users among various computer resources. The proposed algorithm's goal is to enhance resource utilization while reducing execution time and cost. The suggested technique is thought to combine Tabu-Search, Particle Swarm Optimization (PSO), and Best-Fit (BF) and improvised Grey Wolf Optimization Technique using Cloud Sim Tool.

Index Terms **- Cloud Computing, Task Scheduling, Tabu-Search, Particle Swarm Optimization(PSO), Best-Fit(BF), Grey Wolf Optimization, Cloud Sim Tool.**

I. INTRODUCTION

A cloud computing is the collection of interconnected computed that are provided one or more computing resources. Task scheduling has an impact on the performances of cloud computing [1]. The increased complexity of solving the task scheduling problem. Therefore, it becomes more challenging to develop an efficient algorithm for solving the task scheduling in a cloud computing. In this study the main focus area is using the appropriate algorithm, we have implemented the task schedule algorithm which is based on heuristic and metaheuristic algorithm [2]. Task scheduling plays a significant role in cloud computing for maximum resource utilization by providing adequate performance under the different task such as execution. The idea of cloud computing provided many advantages in terms of reduced infrastructure cost, execution time, maintenance and many more. Np hard problems like task scheduling problems in cloud computing can be solved by using the enumeration method of heuristic-based methods [3]. Many metaheuristic approaches in recent years have considered task scheduling problem with multiple obtain as a single objective. A few researches have focused on applying a metaheuristic algorithm to find near-optimal solutions and provide trade-off to the cloud service providers by considering multiple objectives simultaneously. Cloud computing has brought a revolutionary change in business by offering efficient sharing of computing resources[4]. The paper consists of 4 sections. section [1] Introduction: we have introduced about the cloud computing and its implementation. Section[2] Literature :In literature we have presented about the technology /Algorithms used. section[3] Conclusion: The paper ends with demonstration and its result in the conclusion part.

II. LITERATURE REVIEW

In many studies, different types of techniques and algorithms were used in scheduling tasks in cloud computing.

DeafallahAlsadie [1] In order to identify near-optimal task scheduling solutions while handling competing objectives, this paper proposes a metaheuristic approach called Task Schedule utilising a Multi-objective Grey Wolf Optimizer (TSMGWO).

N. Bacanin, TimeaBezdan, Eva Tuba, I. Strumberger, M. Tuba, M. Zivkovic [2] In this study, we suggest a metaheuristic task scheduling technique. The algorithm used in the suggested scheduler, the grey wolf optimizer, was inspired by nature. The quality and reliability of the suggested procedure are demonstrated by the experimental findings.

Kun Li, Lewei Jia, Xiaoming Shi [3] Proposed a membrane computing and particle swarm optimization combined scheduling approach for cloud computing tasks. First, a paradigm for task scheduling that uses time and cost functions as its targets is suggested. Next, chaotic operation is employed in population initialization on the foundation of the particle swarm method to increase the

diversity of rich knowledge. To prevent the algorithm from reaching a local optimum, adaptive weighting based on sinusoidal function is applied. We compare the performance of the PSOMC method with six benchmark test functions.

Farouk A. Emara, Ahmed. A. A. Gad-Elrab, Ahmed Sobhi, K. R. Raslan [4] A new job scheduling method is suggested by the study based on these goals for effective resource management. This proposed solution employs a modified genetic algorithm to identify the best servers to deploy these VMs on and the best VMs to use for completing tasks that have been received (GA). The genome of GAS is represented by this proposed method using a matrix structure that combines the ids of jobs, VMs, and servers.

Raj Kumar Kalimuthu, Brindha Thomas [5] A multi-objective parallel machine scheduling method was proposed in this study using the oppositional grey wolf's optimization (OGWO). We proposed an unique method that combines the GWO with opposition-based learning (OBL), where OBL improves the performance of the GWO algorithm while optimising the task and resources, in order to achieve the multi-objective function.

Gobalakrishnan Natesan, Arun Chokkalingam [6] A multi-objective parallel machine scheduling method was proposed in this study using the oppositional grey wolf's optimization (OGWO). We proposed an unique method that combines the GWO with opposition-based learning (OBL), where OBL improves the performance of the GWO algorithm while optimising the task and resources, in order to achieve the multi-objective function.

K. Lalitha Devi, S. Valli [7] The primary contribution of the study is a developed scheduling algorithm that plans cloud jobs by figuring out how many virtual machines will be required in the near future, together with their anticipated CPU and memory needs. The K-means algorithm groups the tasks depending on criteria like CPU and memory utilisation.

Yefeng Yang, Bo Yang, Shilong Wang, TianguoJin, Shi Li [8] The multi-objective service composition and optimal selection (MO-SCOS) problem in cloud manufacturing is addressed in this paper using an improved multi-objective grey wolf optimizer (EMOGWO), where both service quality and energy consumption are taken into account from the standpoints of sustainable manufacturing. Given that the original multi-objective grey wolf optimizer still has issues with local optimum and variety (MOGWO).

Sudheer Mangalampalli, SangaramKeshari Swain, Vamshi Krishna Mangalampalli [9] In this research, a task scheduling algorithm is proposed that, while limiting datacenter energy usage and power costs, arranges tasks on the suitable VMS based on the determination of task and virtual machine priority.

SeyedaliMirjalali, Seyed Mohammad Mirjalili, Andrew Lewis [10] The Grey Wolf Optimizer (GWO), a new meta-heuristic proposed in this study and inspired by grey wolves (Canis lupus). The leadership structure and hunting strategy of grey wolves in nature are modelled by the GWO algorithm. For the purpose of mimicking the leadership hierarchy, four different varieties of grey wolves, including alpha, beta, delta, and omega, are used.

Year of Publication	Authors	Title	Technigue / Algorithm	Advantages	Disadvantages
2021	Deafallah Alsadie	Optimizing Task Schedule Using Multi-Objectives Grey Wolf Optimizer for Cloud Data Centers	Meta-heuristic algorithm, multi-objective grey wolf optimizer	Flexibility, Simplicity and ergodicity over conventional methods. Easier to apply.	Evaluating the job scheduling strategy utilising Aerial Cloud Workload is a very difficult process.
2019	N. Bacanin, TimeaBezdan, Eva Tuba, I. Strumberger, M. Tuba, M. Zivkovic	Task Scheduling In Cloud Computing By Grey Wolf Optimizer	Metaheuristic approach. Grey wolf optimizer nature inspired algorithm.	Schedules a given task on time, better utilise resources already in use.	Different tasks require various resources, some tasks require more storage.
2022	Kun Li, Liwei Jia, Xiaoming Shi	Research On Cloud Computing Task Scheduling Based On PSOMC	Particle Swarm Optimization and Membrane Computing Algorithm, Chaos Operation.	Reduce the task scheduling time consumption cost.	Virtualization effects PSO algorithm in cloud computing.
2021	Farouk A. Emara, Ahmed.A.A. Gad-Elrab, Ahmed Sobhi, K.R Raslan	Genetic – Based Multi – Objective Task Scheduling Algorithm in Cloud Computing Environment	Optimized Genetic Algorithm.	System with fewest no. of servers,Least consuming energy, Least wasting resources.	No VM assigned to host.

2022	Raj Kumar Kalimuthu, Brindha Thomas	An Effective Multi – Objective Task Scheduling and Resource Optimization in Cloud Environment Using Metaheuristic Algorithm	Metaheuristic Algorithm, Hybrid Bio-Inspired Algorithm with the hybridized of improvised Particle Swarm Optimization.	Less response time and less waiting time.	Due to diverse factors that may cause load and power imbalance which effects utilization and task scheduling.
2017	Gobalakrishnan Natesan, Arun Chokkalingam	Opposition Learning – Based Grey Wolf Optimizer Algorithm for Parallel Machine Scheduling in Cloud Environment	Oppositional Learning Based On Grey Wolf Optimizer on the bases of proposed cost and time model in cloud computing.	Improvised performance of fitness function.	Shows the performance analysis which occurs runtime of scheduling process only.
2021	K. Lalitha Devi, S. Valli	Multi – Objective Heuristics Algorithm for Dynamic Resource Scheduling In The Cloud Computing Environment	Dynamic resource scheduling can be controlled by a genetic algorithm based on encoded chromosomes (GEC-DRP).	Improves the availability and reliability of cloud computing compared to other algorithms.	It has load balancing results failure task to allocate task and resources.
2020	Yefeng Yang, Bo Yang, Shilong Wang, TianguoJin, Shi Li	An Enhanced Multi Objective Grey Wolf Optimizer for service Composition in Cloud Manufacturing	An Enhanced multi-objective grey wolf optimizer (EMOGWO) Technique.	Easy implementation and fast convergence helps to develop the problem and energy consumption.	Short coming in local trappingand blind obedience, prone to stagnate.
2021	Sudheer Mangalampalli, SangaramKeshari Swain, Vamshi Krishna Mangalampalli	Prioritized Energy Efficient Task Scheduling Algorithm in Cloud Computing Using Whale Optimization Algorithm	The Whale Optimization Algorithm is used to model VMS, which is based on the determination of task and virtual machine priorities.	Dynamic.	Power Cost and energy consumption depends upon the task.
2014	SeyedaliMirjalali, Seyed Mohammad Mirjalili, Andrew Lewis	Grey Wolf Optimizer	Heuristic Algorithm, Metaheuristics, Constrained Optimization.	Easy to implement, Meta-heuristics are more adept than traditional optimization methods at avoiding local optima.	There are abrupt jumps toward the promising area of the search space as a result of multiple candidate solutions sharing information about the search space.

III. CONCLUSION

Based on studying various research papers came up with the idea to design an algorithm that is to reduce the execution time, cost, as well as, increase resource utilization. The major purpose of this study is to show the problems such as scheduling issues, cost issues, etc. Some systems already exist by using metaheuristic algorithm to find near -optimal task scheduling solutions while handling conflicting objectives. The limitations and disadvantages of the existing systems are the essence of this paper.

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