

# Novel Approach of Workflow Scheduling by Semantic Optimization Approach in Cloud Environment

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**Abstract:** Workflow scheduling in scientific computing systems is one of the most challenging problems that focuses on satisfying user-defined quality of service requirements while minimizing the workflow execution cost. So, to reduce the cost we use cloud environment. In cloud environment, resources will increase but it's utilization is another challenge while using cloud environment. In this thesis, to maintain and utilization of the resources on the cloud computing scheduling mechanism is needed. Many algorithms and protocols are used to manage the parallel jobs and resources which are used to enhance the performance of the CPU on the cloud environment.

## I. INTRODUCTION

Cloud computing attracts the users by its fast computing platform, resources and services provides at anywhere. Many applications run parallel on the cloud and provide effective services. These applications maximize the communication, synchronisation and decrease in utilization of CPU resources. It is very important task for the data centres to utilize the resources properly and maintains the response of the parallel jobs.

To maintain and utilization of the resources on the cloud computing scheduling mechanism is needed. Many algorithms and protocols are used to manage the parallel jobs and resources which are used to enhance the performance of the CPU on the cloud environment. Algorithms like first come first serve, shortest job first and round robin are the most popular scheduling algorithm which are used to schedule the process [3]. It is mainly needed for the following reasons:-

- To reduce the waiting time.
- To reduce the switching time.
- To process the job according to their priority.
- Improve the performance of the servers that are allocated to the specific job.

In cloud computing scheduling is the way toward plotting errands onto assets and the frameworks (e.g. CPU time, bandwidth and memory) effectively. In cloud computing numerous unpredictable applications require parallel preparing to execute the occupations adequately. Because of the correspondence and synchronization between relating

forms there is a decline in usage of CPU assets. Thusly it is vital for a server farm to accomplish the usage of hubs while keeping up the level of responsiveness of parallel occupations. Due to the availability of vast data on the internet and growing number of user's day to day, it almost impossible to assign the various tasks manually to the virtual machines[1]. Hence, to allocate the resources to each job effectively, scheduling plays an important role in cloud computing. Thus various scheduling algorithms are proposed so that they can help in achieving the order of jobs in such a way that balance between improving the performance, cost, make span, load balancing and more over quality of service can be improved.

## II. LITERATURE REVIEW

Pandey et al. in this paper proposed the hybrid routing algorithm for mobile ad-hoc network. In this work ant colony optimisation and particle swarm optimization method is hybridized to provide best routing. The ACO is based on the ant movement and selects the best path in the network. To decide the best path between two best paths PSO is used. PSO provide best solutions and reduced the end-to-end delay and power also. This method improves the performance in MANET and reduces communication cost [1]. Chen et al. proposed the ant colony optimization algorithm to solve the issue of grid workflow scheduling. This algorithm is used to find the optimal solution for the quality of service according to user preferred scheduling. In this work ant colony optimisation is based on the ant movement and selects the best path in the network. This method improves the performance in MANET and gives best quality of services [2].

Byun et al. in this paper, the author reviewed the challenges and issued faced in the cloud computing. It mainly focused on the service- oriented computing and grid computing. In this paper author gives brief introduction on the techniques and algorithm used for cloud computing [3].

Malawski et al. review the workflow scheduling approaches that are used in the cloud computing. The goal of this paper is to select the cost-aware approach which is based on quality of service. In this author analyze the cost aware workflow

scheduling challenges. It also provides the recommendation for services and utility providers [4].

Abrishami et al. in this paper, the author proposed a deadline constrained workflow scheduling algorithm for IaaS. In this paper, the author proposed partial critical path algorithm with IaaS environment and this is called as PCP with deadline distribution. Both the algorithm supports the polynomial time complexity which is good for the scheduling in large workflows. This algorithm also reduces the execution cost and response on the deadline. The simulation result of the proposed methodology is also compared with other methods and gives better results[5]. Xue et al. proposed a QoS-based absolutely hybrid particle swarm optimization (GHPSO) to calendar bundles to cloud sources. In GHPSO, hybrid and change of hereditary arrangement of standards is implanted into the particle swarm optimization set of principles (PSO), all together that it could play a position inside the discrete bother. A hill hiking algorithm was additionally brought into the PSO that allows you to improve the nearby seek ability and to hold the variety of the populace. The simulations effects show that the GHPSO achieves higher performance than fashionable particle swarm algorithm used in reduce costs inside a given execution time[6].

Rodriguez et al. explained a decent way to meet the shopper's best of carrier (QoS) necessities or to incorporate a couple of basic standards of Cloud computing comprehensive of the pliability and heterogeneity of the computing assets, there have to be asset provisioning and scheduling approach for medical work forms on Infrastructure as a service (IaaS) Clouds. They gave an algorithm based totally at the meta-heuristic optimization approach, Particle Swarm Optimization (PSO), which aims to restrain the overall work handle execution value at the same time as assembly closing date constraints [7]. Netjinda et al. focused on optimizing the value of buying infrastructure-as-a-service cloud competencies to attain clinical work goes with the flow execution in the unique closing dates. Authors considered the quantity of purchased

times, example types, buying options, and venture scheduling as constraints in an optimization technique. Particle swarm optimization augmented with a variable community seeks approach turned into used to discover the superior solution. Results display promising performance from the views of the total fee and fitness convergence when in comparison with other trendy algorithms [8].

Verma et al. recommended that the users put up their workflows alongside a few QoS constraints like closing date, budget, and consider, reliability and so on. For computation, Authors considered the two constraints: closing date and finances and recommend cut-off date and finances Due date and Budget Distribution based cost-Time Optimization (DBD-CTO) work process scheduling set of rules that points of confinement execution regard while get together time diagram for giving over outcomes and separate the direct of the estimation[9]. Xu et al. recommended a various Quality of services compelled scheduling strategy of multi-work processes (MQMW). The procedure can plan different work processes which are begun whenever and the QoS prerequisites are considered and ready to build the planning achievement rate essentially [10].

Bettencourt et al. [11] clarified that the customer has versatility given by methods for open cloud resources that can be collected to the private assets pool as fundamental. One inquiry confronted by method for the clients in such frameworks is: which can be the fine resources for demand from an open cloud based at the present day request and on sources costs? maker exhibited HCOC: The Hybrid Cloud Optimized esteem scheduling set of principles. HCOC goes to a choice which sources ought to be rented from people in general cloud and accumulated to the private cloud to sufficiently offer handling quality to execute a work process inside a given execution time. What's more, outcomes demonstrate that HCOC can diminish costs while achieving the mounted favoured execution time.

### III LATEST ALGORITHMS USED IN SCHEDULING

Author's Name	Year	Technology used	Summary
Anubhav, et al.	2018	GSA Algorithm	<ul style="list-style-type: none"> <li>It minimizes the make span and cost by proposed algorithm.</li> <li>Performs the bi-objective optimization.</li> </ul>
Vinothina, et al.	2018	Ant Colony optimization	<ul style="list-style-type: none"> <li>This approach maps the work flow task by using ACO.</li> <li>Provides effective resource utilization and reduce the cost.</li> </ul>
Rimal et al.	2017	Cloud Based Workflow Scheduling	<ul style="list-style-type: none"> <li>Reduces the cost of execution, completion time and provides the effective scheduling of resources.</li> <li>It also improves the performance of work flows on cloud.</li> </ul>
Abdullahi, et al.	2016	Symbiotic Organism Search Optimization	<ul style="list-style-type: none"> <li>Used SOS optimization algorithm.</li> <li>It minimize make span and enhance the resource utilization.</li> </ul>
Rodriguez Sossa et al.	2014	Scheduling Algorithm	<ul style="list-style-type: none"> <li>Reduce Cost and make span.</li> </ul>
Netjinda et al	2014	PSO	<ul style="list-style-type: none"> <li>Provide the cost effective results.</li> </ul>

#### IV. CONCLUSION

Cloud computing is a distributed design that brings together server resources on an acceptable stage in order to provide on request figuring resources and administrative data. A cloud specialist organization (CSP's) provides the different stages to their customers to use the services and make the web administrative control. This service is similar to a broadband band connection offered by the service provider for the internet connection. Cloud computing provides the services through the internet these service belongs to hardware and software both. Cloud computing concept is growing high day by day due to its service pay per usage concept.

#### REFERENCES

- [1]. Pandey, Suraj, L. Wu, S. Mayura and R.Buyya, "A particle swarm optimization-based heuristic for scheduling workflow applications in cloud computing environments." in *24th IEEE International Conference on Advanced Information Networking and Applications (AINA)*, pp. 400-407, April 20, 2010.
- [2]. Chen, Wei-Neng, and Jun Zhang, "An ant colony optimization approach to a grid workflow scheduling problem with various QoS requirements." in *IEEE Transactions Systems, Man, and Cybernetics, Part C: Applications and Reviews*, vol. 39, no.1 pp. 29-43, Jan. 2009.
- [3]. Byun, Eun-Kyu, Y.S Kee, J.S Kim and S.Maeng, "Cost optimized provisioning of elastic resources for application workflows." in *ELSEVIERFuture Generation Computer Systems*, vol. 27, no. 8, pp. 1011-1026, Oct. 2011
- [4]. Malawski, Maciej, G.Juve, E. Deelman and J. Nabrzyski, "Cost- and deadline-constrained provisioning for scientific workflow ensembles in IaaS clouds." in *Proceedings of the International Conference on High Performance Computing, Networking, Storage and Analysis*, pp. 22, 2012
- [5]. Abrishami, Saeid, Mahmoud Naghibzadeh and Dick HJ Epema, "Deadline-constrained workflow scheduling algorithms for Infrastructure as a Service Clouds." in *ELSEVIERFuture Generation Computer Systems*, vol. 29, no. 1 pp. 158-169, Jan.2013.
- [6]. Xu, Meng, Lizhen Cui, H. Wang, and B. Yanbing, "A multiple QoS constrained scheduling strategy of multiple workflows for cloud computing." in *IEEE International Symposium Parallel and Distributed Processing with Applications*, pp. 629-634, Aug. 2009.
- [7]. Rodriguez Sossa, M., and RajkumarBuyya, "Deadline based Resource Provisioning and Scheduling Algorithm for Scientific Workflows on Clouds." in *IEEE Transactions on Cloud Computing*, vol. 2, no. 2, pp.222-235, June 2014.
- [8]. Netjinda, Nuttapong, B. Sirinaovakul, and T.Achalakul, "Cost optimal scheduling in IaaS for dependent workload with particle swarm optimization." in *The Journal of Supercomputing*, pp. 1-25, Feb. 2014.
- [9]. Bittencourt, Luiz Fernando, and E. Madeira, "HCOC: A Cost Optimization Algorithm for Workflow Scheduling in Hybrid Clouds" in *Journal of Internet Services and Applications*, vol.2, no. 3, pp 207-227, Dec. 2011
- [10]. Verma, Amandeep, and SakshiKaushal. "Deadline and budget distribution based cost-time optimization workflow scheduling algorithm for cloud." *IJCA Proceedings on international conference on recent advances and future trends in information technology (iRAFIT 2012)*. Vol. 4. iRAFIT (7), 2012.
- [11]. Choudhary, Anubhav, et al. "A GSA based hybrid algorithm for bi-objective workflow scheduling in cloud computing." *Future Generation Computer Systems* (2018).
- [12]. Vinothina, V., and R. Sridaran. "An Approach for Workflow Scheduling in Cloud Using ACO." *Big Data Analytics*. Springer, Singapore, 2018. 525-531.
- [13]. Rimal, Bhaskar Prasad, and Martin Maier. "Workflow scheduling in multi-tenant cloud computing environments." *IEEE Transactions on Parallel and Distributed Systems* 28.1 (2017): 290-304.
- [14]. Abdullahi, Mohammed, and MdAsriNgadi. "Symbiotic Organism Search optimization based task scheduling in cloud computing environment." *Future Generation Computer Systems* 56 (2016): 640-650.