



REVIEW: ANALYSIS OF JOB SCHEDULING ALGORITHMS AND PHYSICAL SERVERS

Mandeep Kaur
M.Tech Student

Dept. of Computer Science & Engineering
Gurukul Vidyapeeth Institute of Engineering
and Technology, Banur, 140601, Punjab

Rohini Sharma
Assistant Professor

Dept. of Computer Science & Engineering
Gurukul Vidyapeeth Institute of Engineering
and Technology, Banur, 140601, Punjab

Abstract- In cloud computing, with full control of the underlying infrastructures, cloud providers can flexibly place user jobs on suitable physical servers and dynamically allocate computing resources to user jobs in the form of virtual machines. As a cloud provider, scheduling user jobs in a way that minimizes their completion time is important, as this can increase the utilization, productivity, or profit of a cloud. In this paper, we focus on the problem of scheduling embarrassingly parallel jobs composed of a set of independent tasks and consider energy consumption during scheduling. Thus, scheduling becomes tough in cloud computing because of large number of jobs submitted randomly. The ultimate objective of the study analysis is to reduce the make span of the job, to improve the processor utilization irrespective with the cloud environment. Adaptive Deadline Based Dependent Job Scheduling (A2DJS) algorithm in cloud computing that comprises of three major components as job manager, data center and VM creation. Here, the job manager embeds with dependency resolver and task-prioritizer. The dependency resolver will determine the dependency among the tasks and task-prioritizer will prioritize the tasks to avoid starvation. Moreover, the data center embeds with job scheduler and host creation with VM allocation. The job scheduler schedules the job with the VM existing. The host creation with VM allocation allocates the jobs to the VM in a two-tier VM architecture.

Keywords- Cloud Computing, jobs, physical servers, deadline based dependent jobs and task –priorities.

I. INTRODUCTION

Cloud computing illustrates a new supplement, consumption and delivery model for IT services via the internet. It typically involves the provisioning of actively scalable and often virtualized resources as a service over the Internet. Cloud computing contains a number of cloud service providers, which offer different service, that cluster into a hierarchy of as a service namely Software as a Service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS). The cloud infrastructure offers computing services and charges the end-user depending on the consumption of the computing resource that is termed as pay per usage model. Along with the above scenario, the end users are presently moving towards cloud computing due to the following benefits such as on-demand self



Figure: 1. Cloud Network



provisioning of services, location and device independent, multitenant, reliability, scalability and security. Green Computing was portrayed and perceived as a new technology but it was also widely accepted as an evolution in various technology areas such as datacentre networking, datacentre-hosted-services, request performance-measurement etc. This was also known as green technology. In the end of 1970s, the world saw revolution and by the starting of 1990s green computing came into limelight. Then business starts using environment friendly ways to do business. Since, there has been fast rate in the increase of the high energy consumption rate. As given the evolutionary nature of Green Computing, it could mean different things and thus it is wise to pay attention to definition of Green Computing [4].

II. GREEN CLOUD COMPUTING AND NEED

“Green Computing is a model for enabling convenient, environment sustainability in IT sector that can be rapidly provisioned and released with minimal management effort or green provider interaction”. Green computing has been widely accepted from individual to official employee of government. “Green-computing has been enabled by the availability of broadband networks and low-priced end-user devices, along with commodity-computing nodes that can be simply interconnected and controlled, as well as virtualization to make available the advent of isolating processes that share computers by reducing CO2 emission rate”.

Modern datacentres, operating below the Cloud computing model are hosting a variety of applications ranging from those that run for a few instants (e.g. serving requests of web applications such as e-commerce and social networks portals with transient capacities) to those that run for longer periods of time (e.g. simulations or large data set processing) on shared hardware stages. The essential to manage multiple applications in a datacentre creates the challenge of on-demand resource provisioning and apportionment in response to time-varying workloads. Normally, datacentre resources are statically assigned to applications, based on peak load characteristics, in order to maintain isolation and provide performance guarantees.[5] In particular, Cloud resources need to be allocated not only to content QoS requirements specified by users via Service Level Agreements (SLA), but also to reduce energy usage.

III. JOB SCHEDULING

The Job management is the fundamental concept of cloud computing systems job scheduling issues are fundamental which identifies with the effectiveness of the entire cloud computing framework[6]. Job scheduling will be a mapping component from clients' assignments to the proper determination of assets & its execution. In job scheduling charactersrics described i.e,

A. Job scheduling is global centralized -As cloud computing will be a processing model which supply the unified asset by the mirror administration to various disseminated functions, & this reflecting arrangement can make heterogeneous methodology's executing of interoperate get to be simpler, which utilized to be hard to bargain with. Consequently, virtualized innovation & reflecting administrations make the assignment booking of cloud computing accomplish a worldwide concentrated planning.

B. The scalability of job scheduling: The size of assets supply from cloud supplier may be constrained in right on time stages. With the expansion of an assortment of computing assets, the measure of the theoretical virtual assets may turn out to be vast, & the function interest proceeds with expanding [14]. In the cloud, errand booking must meet the adaptability highlights, so that the throughput of the undertaking planning in the cloud may not be too low.

C. The set of job scheduling- Job planning is partitioned into two parts: one will be utilized as a bound together resource pool scheduling, & essentially dependable for the scheduling of functions & cloud API.

Job scheduling need required that is ;

A. Load Balance-Load balancing & job scheduling has nearly related with one another in the cloud environment, job planning system capable for the optimal matching of jobs & assets. Job scheduling algorithm can keep up load balancing. So load balancing get to be another imperative measure in the cloud.

B. Quality of Service-The cloud is primarily to give clients computing & distributed storage administrations, asset interest for clients & assets supplied by supplier to the clients in such a route



along these lines, [7] to the point that quality of service can be accomplished. At the point while job scheduling management come to job project, it is imperative to make sure regarding QoS of assets.

C. Economic Principles-Cloud computing assets are generally conveyed every throughout the globe. These assets may fit in with diverse relations. They have their possess exacting direction scheme. As a plan of action, distributed computing as point out by the individual basics, give applicable management. So the demand accuse are sensible.

D. The best running time -jobs can be separation into varied classes as indicated by the requirements of customers, & after that set the top running time on the foundation of idiosyncratic objectives for each job. It will improve the QoS of job scheduling not directly in a cloud environment.

E. The throughput of the system-Mainly for distributed computing frameworks, throughput is a measure of framework undertaking planning streamlining execution, & it is likewise [16] an objective which must be considered in plan of action advancement. Build throughput for clients & cloud suppliers would be advantage for both of them.

IV. RELATED WORK

LipsaTripathyet.al(2014) Cloud computing is an increasing knowledge. It way huge quantity of data so preparation apparatus workings as a very important role in the cloud computing. Thus my procedure is projected to diminish the switch time, get superior the supply operation & also pick up the lavender maître d' production & throughput. This method or process is based on preparation the job in the cloud & to decide the disadvantage in the breathing protocols. Here allocate the main concern to the job which give better presentation to the processor & try my best to reduce the to come time & control time. Best effort has been made to direct the scheduling of jobs for solving disadvantage of breathing protocols & also manage the capability & throughput of the wine waiter.[8]**RajveerKauret.al(2014)** Cloud computing is rich day by day & it will carry on in just beginning phase until computer & internet era is in endurance. While commerce with cloud computing, a numeral of matter are face up to like weighty load or transfer while computation. Job scheduling is single of the answer to these matter. It is the process of map job to available resource. In section (1) converse about

cloud computing & scheduling. In part (2) give details about job scheduling in cloud computing. In part (3) accessible algorithms for job scheduling are discuss, part (4) existing algorithms are compared & lastly part (5) conclusion & future work are discussed.[9]**Chihyun Jung et al(2014)** suggest an superior scheduling come up to bottom on a rolling prospect scheduling idea. appropriate to the combinatorial environment of the preparation difficulty, the difficulty of the difficulty increase exponentially, when the numeral of work & tools augment. However, the calculation time authorized for the scheduler is incomplete in rehearsal, since the unpredictability in mainly Fobs require schedulers to modernize the schedule in small period. We propose an mixed figure linear indoctrination replica for dispersion procedure, & recommend an effectual putrefaction process to transaction with this difficulty trouble. The rotting method repeats numerous preparation iterations, as it steadily expand the figure of runs on equipment, facilitate the scheduler to produce near-optimal schedule in imperfect time period. It investigation the space to yourself guard of outsourced data by test is approved out on the storeroom of manuscript records with changeable dimension. The safekeeping & recital examination give you an idea about that the planned means is highly proficient than alive system concert [10,11].**Swachil Pate et.al(2013)** Cloud Computing is the use of computing assets (Hardware & Software) that are transport as a check over a system to the customers. It means to split great scale equipment's & possessions for calculation, luggage section, in order & in sequence for technical investigate. In cloud computing, there are several jobs entail to be performed by the obtainable income to attain best appearance, negligible total time for termination, straight reply time, process of reserve practice & etc. as of these varied objectives & high presentation of computing surroundings, we require to design, expand, suggest a scheduling algorithm to break appropriate allotment map of jobs due to dissimilar issue. [12]

V. TECHNIQUES OF JOB SCHEDULING

In this section, we elaborate the vious types of techniques or algorithms in job scheduling :

a) First Come First Serve

First-come, first-served (FCFS) – sometimes first-in, first-served and first-come, first choice – was a



service policy whereby the requests of customers or clients are attended to in the order that they arrived, without other biases or preferences. The policy can be working when processing sales instructions, in determining restaurant seating, on a taxi stand, etc. In Western society, it was the standard policy for the processing of most queues in which people wait for a service that was not prearranged or trepanned.

b) Priority Scheduling Algorithm

In Priority Scheduling, each process was given a priority and higher priority methods executed first. Priorities can be defined either internally or externally. Internally define priority use some measurable quantity to compute the priority of a process. Externally significances were set by criteria outdoor the OS, such as the importance of the process.

c) Multilevel Feedback Queue Scheduling

Multilevel feedback queue-scheduling algorithm allows a process to move between queues. It uses

many ready lines and associates a different importance with each queue. The Algorithm chooses to process with highest priority from the occupied queue and run that process either pre-emptively or un-pre-emptively. If the procedure uses too much CPU time it will progressed to a lower-priority line. Similarly, a process that wait too long in the lower-priority queue may be moved to a higher-priority queue may be moved to a highest-priority queue.

d) Multi feedback queue scheduling

Multi-level feedback queue scheduling permits a process to move between queues. This movement is facilitated by the typical of the CPU burst of the process [13]. If a process uses too much CPU time, it will be encouraged to a lower-priority queue. This scheme leaves I/O-bound and interactive processes in the higher priority queues. In accumulation, a process that waits too extended in a lower-priority queue may be moved to a higher priority queue. This form of aging also helps to avert starvation of convinced lower priority processes [14,15].

Table no.1 Comparison between Scheduling Algorithm/parameters/ findings and Tools

| S.No | Scheduling Algorithm | Scheduling Parameters | Findings | Tools |
|------|--|-----------------------------|--|----------|
| 1 | SHEFT workflow scheduling algorithm [16] | Execution time, scalability | To optimizing task execution time. To enables resources to scale elastically during task execution. | CloudSim |
| 2 | Improved cost-based algorithm for task scheduling [17] | Cost, performance | To measures both computation performance and resource cost To improves the communication /computation ratio. | CloudSim |
| 3 | Multiple QoS Constrained [18] | Scheduling success rate, | To schedule the workflow dynamically. | CloudSim |



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|----|---|---------------------------------|--|-------------|
| 4 | Innovative transaction intensive cost- constraint scheduling algorithm [19] | Execution cost and time | To minimize the cost under certain user-designated Deadlines. Enables the compromises of execution cost and time. | SwinDeW-C |
| 5 | Compromised-Time- Cost Scheduling Algorithm [20] | Cost and time | To reduce cost. | SwinDeW-C |
| 6 | Market-oriented hierarchical scheduling strategy | Make span, cost, CPU time | To minimize the overall running cost of cloud workflow systems To optimize both make span and cost simultaneously. | SwinDeW-C |
| 7 | A PSO-based Heuristic for Scheduling [21] | Resource utilization, time | cost saving as compared to BRS Used for good distribution of workload onto resources | Amazon EC2 |
| 8 | Optimized-Resource Scheduling Algorithm | Speed, Resource Utilization | Speed of the IGA is almost twice the traditional GA The utilization rate of resources is high | Eucalyptus |
| 9 | Optimal Workflow based Scheduling (OWS) algorithm | CPU utilization, Execution time | To find a solution that meets all user preferred QoS constraints. To improve CPU utilization. | Open nebula |
| 10 | A multi-objective GA[22] for scheduling in flow shops | Makespan& Total flow time | To minimize the make span and total flow time | ---- |

VI. CONCLUSION

Job scheduling is an essential requirement in cloud computing environment with the given constraints. Some intensive investigates have been complete in the area of job scheduling of cloud computing. effort are to minimize the makespan of the job and to improve the utilization of the processing speed of the VM. In the Review study , the interdependency of the job was evaluated and removed the unwanted jobs.

After that, the jobs are prioritized using the different attributes of the job and mapped with the best suitable VM. The various techqnieusdiscussed.i.e First Come First Serve, Multi-view queue scheduling and Priority Algorithm. The first choice was a service policy whereby the requests of customers or clients are attended to in the order that they arrived, without other biases or preferences. The rule can be employed when dispensationsales orders, in decisive restaurant seating, on a taxi stand, etc.



VII. REFERENCES

- [1] Dikaiakos, M.D. Katsaros, D. Mehra, P. Pallis, G. Vakali, A., "Cloud Computing: Distributed Internet Computing for IT and Scientific Research", IEEE in Internet Computing, vol.13, no.5, pp.10-13, 2009.
- [2] K. Dinesh, G. Poornima and K. Kiruthika, "Efficient Resources Allocation for different Jobs", International Journal of Computer Application, vol. 56, no.10, pp.30-35 2012.
- [3] Qi Zhang, Lu Cheng, RaoufBoutaba, "Cloud computing: state-of-the-art and research challenges", Journal of Internet Services and Applications, vol.1, no. 1, pp.7-18, 2010.
- [4] Bo Li, Jianxin Li, JinpengHuai, TianyuWo, Qin Li,LiangZhong (2009) , "EnaCloud:AnEnergy-saving function Live Placement Approach for Cloud Computing Enviornments" ,In IEEE Intenational Conference on cloud Computing 200, 17-24.
- [5] C. Ward, N. Aravamudan, K. Bhattacharya, K. Cheng, R. Filepp, R. Kearney, B. Peterson, L. Shwartz, C. C. Young, "Workload Migration into Clouds – Challenges, Experiences, Opportunities", 2010 IEEE 3rd International Conference on Cloud Computing, pp. 164-171, 2010.
- [6] Microsoft Azure, Generic Migration Scenarios & Case Studies, 2012.
- [7] Mocanu, "Cloud Computing—Job scheduling based on genetic algorithms", IEEE, Systems Conference (SysCon), 2012 IEEE International, 2012.
- [8] Tripathy, Lipsa, and RasmiRanjanPatra. "Scheduling in cloud computing." International Journal on Cloud Computing: Services and Architecture (IJCCSA) 4, no. 5 (2014): 21-7.
- [9] Kaur, Rajveer, and SupriyaKinger. "Analysis of job scheduling algorithms in cloud computing." International Journal of Computer Trends and Technology (IJCTT) 9, no. 7 (2014): 379-386.
- [10] Jung, Chihyun, and Tae-Eog Lee. "An efficient mixed integer programming model based on timed Petri nets for diverse complex cluster tool scheduling problems." IEEE Transactions on Semiconductor Manufacturing 25, no. 2 (2012): 186-199.
- [11] Patel, Swachil J., and Upendra R. Bhoi. "Improved Priority Based Job Scheduling Algorithm in Cloud Computing Using Iterative Method." In Advances in Computing and Communications (ICACC), 2014 Fourth International Conference on, pp. 199-202. IEEE, 2014.
- [12] Patel, Swachil, and UpendraBhoi. "Priority based job scheduling techniques in cloud computing: A systematic review." International journal of scientific & technology research 2, no. 11 (2013): 147-152.
- [13] SONG Peng, ZHAO Qihong, function of Outer Join in Data Migration, Computer Systems & functions, vol. 10, 2008.
- [14]Virendra Singh Kushwah*, AradhanaSaxena, "A Security approach for Data Migration in Cloud Computing", International Journal of Scientific & Research Publications, Volume 3, Issue 5, pp. 1-9, May 2013.
- [15] Xia Kai, "Data migrate in three steps", China information world, vol. 17, January 2005.
- [16] Mansouri, Najme, GhDastghaibyfar, and A. Horri. "A Novel Job Scheduling Algorithm for Improving Data Grid's Performance." P2P, Parallel, Grid, Cloud and Internet Computing (3PGCIC), 2011 International Conference on. IEEE, 2011.
- [17] Patel, Swachil. "UpendraBhoi "Priority Based Job Scheduling Techniques In Cloud Computing: A Systematic Review" International Journal Of Scientific & Technology Research." (2013).
- [18] Li, Keqin. "Experimental performance evaluation of job scheduling and processor allocation algorithms for grid computing on metacomputers."Parallel and Distributed Processing Symposium, 2004. Proceedings.18th International.IEEE, 2004.
- [19] Gregor von Laszewski ,LizheWang ,Andrew J. Younge ,Xi He (2009) ,"Power-Aware Scheduling of Virtual Machines in DVFS-enabled clusters" ,cluster 09 IEEE international on Cluster , 1-11.
- [20] Haitao Li, LiliZhong, Jiangchuan Li, , Bo Li, KeXu, " Cost-effective Partial Migration of VoD Services toContent Clouds", 2011 IEEE 4th International Conference on Cloud Computing, pp. 203-110, 2011.
- [21] Jiahong Wang, NorihisaSegawa, Masatoshi Miyazaki," On-Line Data Migration Approaches &



Their Performance Comparisons”, IEEE Software & Information Science, 0-7803-7080-5/01, 2001.

[22]Aparnaa, S. K., and K. Kousalya. "An Enhanced Adaptive Scoring Job Scheduling algorithm for minimizing job failure in heterogeneous grid

network." Recent Trends in Information Technology (ICRTIT), 2014 International Conference on.IEEE, 2014.