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An Examination of Different Scheduling Algorithms in Cloud Computing

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Abstract: ***Rapid growth in the use of cloud base service comes up with so many challenges. Service providers of cloud base service looking for the best solution to these challenges. Users of service sends the request for a particular task so at a time number of request sends by different users for different task, this all task need to be complete in a particular time is one of the biggest challenges in cloud computing It is defined as a workflow scheduling. Parallel other key points are better utilization of resources, reduce make span time, energy-saving and many more consider as QoS parameters. Researchers conduct so many Qos parameter oriented research to make it efficient The Aim of this review paper is to provide systemic review and better understating of ongoing research on different approaches and service providers always looking for better solutions of challenges to maintain service level.***

Keywords: Workflow scheduling, Load balancing, Make span, Resource utilization, Qos parameters

I. INTRODUCTION

The cloud is only a similitude for the Internet. Cloud computing is a development uses the web and central remote servers to keep up data and applications. Distributed computing permits purchasers and associations to use applications without foundation and access their own records at any PC with web find a workable pace. if we looking for an example of cloud service so AWS, google drive, online streaming videos and audio are the best examples of cloud base service cloud base service basically well-known with these three-key services one is service which service with software (SaaS), second which provide infrastructure for service (IaaS), and the third one is the platform for service (PaaS).

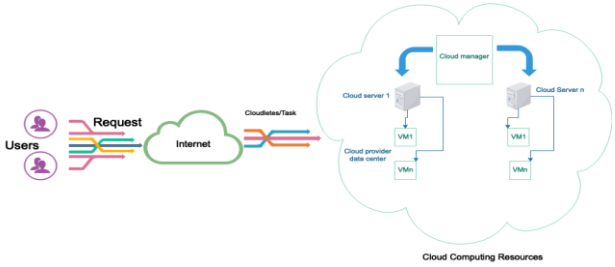

Figure :1 Scheduling process of task

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As above figure reflecting the simple working cloud architecture, Users sends a bunch of request a time and the work of service providers (SP) is to complete those all request in the particular time to reflect Qos with the available resource [2]. In the resource pool, there are a number of virtual machines handling the request and response [2]. Service providers have limited number of resource so the big challenge is that they require effective mechanism within the limited resource to response customer request within the small amount of time so for that effective task scheduling technique requires which lead to minimize response time parallelly another parameter like better utilization of resource better throughput execution time and also focus on reducing turnaround time [2]. Here in this review paper techniques and approaches are represented for better solutions to some of these parameters.

II. RELATED WORK

A. Qos parameters considered

Table:1 Qos parameters

.Execution time	When process or task get CPU, and take time to get execute [2].
Make span time	Also known as completion time, entire time unit take by set of tasks [1].
Computation time	Also considers as running time it defines as a time require for computation process [7].
Layover time	Layover time define as a gap time between two couple task [6].
Turnaround time	Time taken by the host to complete all process [6].

B. Novel approach for improvement in Task execution time in the cloud environment proposed by Naoufal Er-raji, Dsouza Benabbou and Ahmed Eddaoui in 2018

author also presented some of the literature review and the objective of that literature was task scheduling [2]. In proposed algorithm author used quicksort sorting algorithm to divide large queue of the task into small-small queues first task list and list of VM are submitted further that using quicksort algorithm VM list get sorted in descending according to their MIPS (million instructions per sec.) and task get sorted in descending according to their length [2]. And then find a number of tasks per machine and schedule the current task assign to VM as per VMindex [2]. The author compares this proposed approach with traditional approaches FIFO, MAX-MIN, and MAX-MAX [2]. The author concludes a noticeable reduction in execution time as compared to other compared approaches [2].

C. Workflow scheduling in cloud computing with a cuckoo search algorithm proposed by Nima Jafari Navimipour and Farnaz Sharifi Milani in 2015 [3]. Much research conducted base on optimization techniques which provides an optimal solution consider as a meta-heuristic approach. In this proposed approach author took Pa as the host can discover an alien egg by probability Pa (01) [3]. The proposed algorithm works like this first it starting population arbitrarily in further process best node get selected then levy flight performed, selection of new nest then fitness function gets evaluated then selection of best nest happens then population for the discover nest get initialize and best nest reflect [3]. In this proposed approach author conclude the best result in execution time [3] as well as in a case where Pa value is low algorithm work very efficient [3]. Author planning to compare this approach with existing GA (genetic algorithm) and bee optimization algorithm as their future work [3].

D. Modify genetic algorithm with Efficient Tune-In of the resource proposed by Israel Casas, Javid Taheri and their researcher team with good research outcome in 2016 [1]. proposed algorithm works based on the GA approach with its standard process [1]. The process followed by the selection of best chromosome and using that best solution produce, to find a best solution process includes crossover which splits and combine the genes of two pre-selected chromosome according to probability [1]. The next process is known as mutation which follows the process of a random selection of genes from crossover chromosome and change values according to pre-define probability [1]. And the process will end when it fulfills the criteria. Here the author uses GA with ETI (Efficient tune in of resource) the objective of this process is to schedule workflows of cloud environments to optimize execution time and cost as well [1]. Adjustment of genetic operators to distribute workflow of tasks among VM queues in such a way that it works efficiently [1]. Author compared proposed work's results with some well-known existing approach like HEFET, Provenance and FSV, Proposed algorithm provide efficient scheduling and also reduce make span and execution time [1].

, Analysis, Comparative Investigation, Investigation'.

E. For the cloud computing environment pair-based scheduling technique proposed by Sanjaya kumar panda and research team in 2018 their proposed technique mainly focus how efficiently task should in onto available resource [6]. author analysis various approaches and find scheduling problems. Proposed pair base scheduling approach lays on combination of optimize algorithms tasks get divide into two groups which are G1 and G2 followed process calculate lease time between the Task, Assumption of transfer time, next process of proposed algorithm id calculates row opportunity matrix which followed by opportunity matrix of column, In the event that the two frameworks are same, at that point the all-out circumstance network is same as the section opportunity lattice [6].minimum uncovers element from the matrix derived in this proposed approach , his procedure is rehashed until the base number of flat and vertical lines to cover all the zeros is half of the all-out number of undertakings[6].author compare this proposed method with other existing approach like FCFS,HA-LT and Ha-CLT the find that this proposed approach minimize layover time as compare to compared approach [6].

F. Improved make span lays on prediction of Tasks computation time scheduling algorithm for cloud computing environment proposed by Belal ali-Maytami, Pingzhi Fan and other research team in-2019[7]. Author proposed novel base approach PTCT (Predication of Tasks Computation Time) which starts with grouping of data, each group can include high and low Qos, make span time for total six algorithms get evaluated where H is stands for Host and m for number of machine it is like H= {h1, h2.hm} for all algorithm [7]. Selection occur base on minimum make span, mean value also evaluate for every dimension in future run process of execution time of Task [7]. Author conclude that simulation work of algorithm is efficient in parameters like make span and also improve performance [7].

III. INSIGHTS OF VARIOUS ALGORITHM

Below table provides insights of various algorithm with their advantage and disadvantages and their improved perameter

Table:2 Insights of algorithm

Source	Improved parameters	Advantage	Disadvantage
N. Er-Raji et al [2].	Execution time	Proposed algorithm gives minimum total execution time [2].	Yet remain with VM classification and Task migration [2]
N. J. Navimipour et al [3].	Execution time	Changing in execution time noted parameter change [3].	When virtualized cluster used problem will be more complex and not yet compare with another algorithm like GA and bee colony [3].
J. Taheri et al [1].	Lower make span, monetary cost.	Proposed approach lowers the make span as compare to existing approach like HEFT, FSV [1]. Lower execution time [1].	Fluctuation of the hiring cost not yet considered for VM scheduling [1].
S. K. Panda et al [6].	Layover time	Algorithm effectively schedule the task, minimize lay over time [6].	More efficient task scheduling requires [6].

B. A. Al-Maytami et al [7].	Computation time	Efficient make span time, schedule length ratio [7].	Dynamic scheduling not yet consider for real-time, also attention require for energy utilization [7].

IV. IMPLEMENTATION AND RESULT

Here in this portion implementation of honey bee algorithm make and SRT (Shortest Remaining Time) make done to identify which algorithm give minimum turnaround time
Shortest reaming time is heuristic approach and in font of that bee behavior base algorithm is meta heuristic approach.
Here for the implementation cloud sim simulation use result shows significant minimization in turnaround time so SRT algorithm proves good scheduling algorithm.

```
<terminated> First (1) [Java Application] C:\jdk-13.0.2\bin\javaw.exe (13-Feb-2020, 10:51:13 pm)
Starting CloudSim...
Initialising...
DatacenterCreator is executed
Process is started.
Virtual machine id :128
Virtual machine id :156
Virtual machine id :184
Virtual machine id :212
Virtual machine id :240
Virtual machine id :268
Virtual machine id :296
Virtual machine id :324
 CREATED VIRTUAL MACHINES (umang 1.1.1)
Task 0 = 1000
Task 1 = 2000
Task 2 = 3000
Task 3 = 4000
Task 4 = 5000
Task 5 = 6000
Task 6 = 7000
Task 7 = 8000
Task 8 = 9000
Task 9 = 10000
Task 10 = 11000
Task 11 = 12000
Task 12 = 13000
Task 13 = 14000
Task 14 = 15000
Task 15 = 16000
Task 16 = 17000
Task 17 = 18000
Task 18 = 19000
Task 19 = 20000
```

Figure 2: VM and Task list created

```
<terminated> First (1) [Java Application] C:\jdk-13.0.2\bin\javaw.exe (13-Feb-2020, 10:51:13 pm)
= Submitted Cloudlets List To VMs =
VM ID   Cloudlet ID
 0          0  8  16
 1          1  9  17
 2          2  10  18
 3          3  11  19
 4          4  12
 5          5  13
 6          6  14
 7          7  15

Added to Overloaded List VM# 0 Load is : 100.0%
Added to Overloaded List VM# 1 Load is : 100.0%
Added to Overloaded List VM# 2 Load is : 94.0%
Added to balanced List VM# 3 Load is : 77.0%
Added to balanced List VM# 4 Load is : 30.0%
Added to Underloaded List VM# 5 Load is : 27.0%
Added to Underloaded List VM# 6 Load is : 24.0%
Added to Underloaded List VM# 7 Load is : 22.0%

 UnderloadVM Group
VM Id   VM Load
7       22.0
6       24.0
5       27.0
 Balanced VM Group
VM Id   VM Load
4       30.0
3       77.0
 OverloadVM Group
VM Id   VM Load
0       159.0
1       118.0
```

Figure 3: Task assignment to VM

After assigning task to VM will divided into three group which is overloaded under loaded and balanced VM
Using bee behavior algorithm high priority task assign to VM priority assign base on execution time, which task have low execution time select for assign on VM. And finally find the execution time.

OUTPUT of algorithm

Cloudlet ID	STATUS	Data center ID	VM ID	Time	Start Time	Finish Time
0	SUCCESS	2	0	10	10.1	20.1
1	SUCCESS	2	1	15.62	20.1	35.73
2	SUCCESS	2	2	19.23	30.1	49.33
3	SUCCESS	2	3	21.74	30.1	51.84
4	SUCCESS	2	4	23.58	40.1	63.68
5	SUCCESS	2	5	25	45.73	70.72
6	SUCCESS	2	6	26.12	45.73	71.84
7	SUCCESS	2	7	27.03	50.1	77.13
11	SUCCESS	2	3	65.21	59.33	124.54
12	SUCCESS	2	4	61.32	63.68	125
14	SUCCESS	2	6	55.97	71.84	127.81
13	SUCCESS	2	5	58.33	70.72	129.05
10	SUCCESS	2	2	70.51	59.33	129.83
15	SUCCESS	2	7	54.05	77.13	131.18
9	SUCCESS	2	1	78.12	59.33	137.44
8	SUCCESS	2	0	90	55.73	145.72
17	SUCCESS	2	6	67.16	127.81	194.97
18	SUCCESS	2	7	64.19	131.18	195.37
16	SUCCESS	2	5	70.83	129.05	199.88
19	SUCCESS	2	3	108.69	124.54	233.24

Figure 4: Turnaround time of bee benefit algorithm

OUTPUT of algorithm(SRT)

Cloudlet ID	STATUS	Data center ID	VM ID	Time	Start Time	Finish Time
0	SUCCESS	3	0	320	0.1	320.1
5	SUCCESS	3	0	320	0.1	320.1
1	SUCCESS	3	1	320	0.1	320.1
6	SUCCESS	3	1	320	0.1	320.1
2	SUCCESS	3	2	320	0.1	320.1
7	SUCCESS	3	2	320	0.1	320.1
4	SUCCESS	3	4	320	0.1	320.1
9	SUCCESS	3	4	320	0.1	320.1
3	SUCCESS	3	3	320	0.1	320.1
8	SUCCESS	3	3	320	0.1	320.1
101	SUCCESS	3	101	320	200.1	520.1
106	SUCCESS	3	101	320	200.1	520.1
103	SUCCESS	3	103	320	200.1	520.1
108	SUCCESS	3	103	320	200.1	520.1
100	SUCCESS	3	100	320	200.1	520.1
105	SUCCESS	3	100	320	200.1	520.1
102	SUCCESS	3	102	320	200.1	520.1
107	SUCCESS	3	102	320	200.1	520.1
104	SUCCESS	3	104	320	200.1	520.1
109	SUCCESS	3	104	320	200.1	520.1

Figure 5: Turnaround time of SRT algorithm

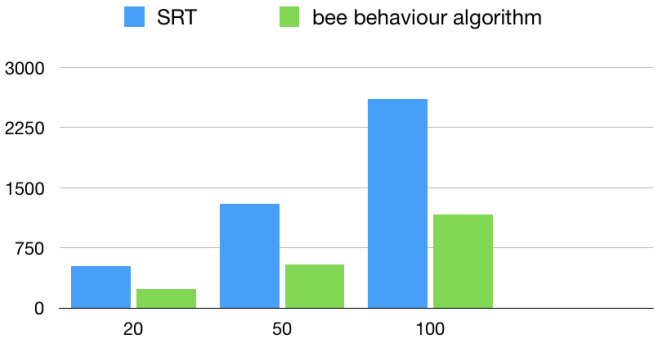

Figure 6: Result Analysis

Here result analysis reflects that bee behavior algorithm have minimum execution time over the SRT algorithm. implementation need to done on large number of task to check the eligibility of algorithm.

V. CONCLUSION

Right now investigation of different algorithm inferred which lead cloud condition towards better arrangements yet different methodology have its own favorable circumstances and drawbacks, according to review ongoing framework execution requires to check qualification of calculations and parameter like undertaking planning, load adjusting, make span time, turnaround time, better usage of asset need more consideration,

legitimate consideration will lead it towards better characteristics of administration, in the further run. Cloud base assistance utilization going to be expanded such huge numbers of more difficulties yet stay to come. Thus, a superior and viable arrangement is a key point. Also, as a future vision hybridization of the calculation may work successfully on the cloud condition and research ought to be led on parameters like better use of assets this will lead the framework towards vitality sparing and just as better throughput.

REFERENCES

1. Casas, J. Taheri, R. Ranjan, L. Wang, and A. Y. Zomaya, "GA-ETI: An enhanced genetic algorithm for the scheduling of scientific workflows in cloud environments," *Journal of Computational Science*, vol. 26, pp. 318–331, 2018.
2. N. Er-Raji, F. Benabbou, and A. Eddaoui, "A New Task Scheduling Algorithm for Improving Tasks Execution Time in Cloud Computing," *Innovations in Smart Cities and Applications Lecture Notes in Networks and Systems*, pp. 298–304, 2018.
3. N. J. Navimipour and F. S. Milani, "Task Scheduling in the Cloud Computing Based on the Cuckoo Search Algorithm," *International Journal of Modeling and Optimization*, vol. 5, no. 1, pp. 44–47, 2015.
4. Z. Tong, H. Chen, X. Deng, K. Li, and K. Li, "A scheduling scheme in the cloud computing environment using deep Q-learning," *Information Sciences*, vol. 512, pp. 1170–1191, 2020.
5. G. Rjoub, J. Bentahar, and O. A. Wahab, "BigTrustScheduling: Trust-aware big data task scheduling approach in cloud computing environments," *Future Generation Computer Systems*, 2019.
6. S. K. Panda, S. S. Nanda, and S. K. Bhoi, "A pair-based task scheduling algorithm for cloud computing environment," *Journal of King Saud University - Computer and Information Sciences*, 2018.
7. B. A. Al-Maytami, P. Fan, A. Hussain, T. Baker, and P. Liatsis, "A Task Scheduling Algorithm with Improved Makespan Based on Prediction of Tasks Computation Time algorithm for Cloud Computing," *IEEE Access*, vol. 7, pp. 160916–160926, 2019.
8. S. Kumar, G. Kumar, K. Jain, and A. Jain, "An approach to reduce turnaround time and waiting time by the selection of round robin and shortest job first algorithm," International Journal of Engineering & Technology, vol. 7, no. 2.8, p. 667, 2018.
9. G. Patel, R. Mehta, and U. Bhoi, "Enhanced Load Balanced Min-min Algorithm for Static Meta Task Scheduling in Cloud Computing," Procedia Computer Science, vol. 57, pp. 545–553, 2015.
10. D. Wu, "Cloud Computing Task Scheduling Policy Based on Improved Particle Swarm Optimization," 2018 International Conference on Virtual Reality and Intelligent Systems (ICVRIS), 2018.

AUTHORS PROFILE

Umang panchal is a student and pursuing M.tech in computer engineering and now doing research in a cloud computing for task scheduling techniques.

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