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Cloud Scheduling using PSO based on Process Management

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Abstract
Cloud is the central collection of types of resources. it exists in two ways it can be private cloud, public cloud. Users who are the member of the cloud can use the cloud services on pay per use basis. Various clients put the request to the cloud for services it provides. All the request will be submitted to the central virtual machine. Virtual machine to avoid the deadlock situation put the scheduling algorithm on to the requests submitted by the users. So that any unnecessary competition can be avoided. Min-Max and Min-Min algorithm can be failed if the numbers of resources with max requirements are more or numbers of resources with min. requirements are more. To avoid this conflict PSO as optimization technique is applied to identify the optimum resource for the process. the performance of the PSO has been compared to the RASA on the basis of two different parameters like power consumption and Throughput. Scheduling based on PSO has better performance in terms of 8.11% improvement in power consumption and 16.53% improvement in the throughput.

Keywords: RASA, PSO

Introduction
Cloud
Cloud computing is a new technology. It providing online resources and online storage to the users. It provides all the data at a lower cost. In cloud computing users can access resources all the time through internet. They need to pay only for those resources which they use and pay as much they use.
The success of clouds has been driven in part by the use of virtualization as their underlying technology. It is a technology that allows running two or more operating systems side-by-side on just one PC. Virtualization greatly helps in effective utilization of resources and builds an effective system.
Cloud can be a private cloud or it may be public cloud. In each type basic objective is to provide the resources to the users at cost effective way.

Fig. 1: Cloud Computing [1].

Scheduling
The resources collected in the cloud are being put in use for the requests submitted by the user. The requests submitted are to be scheduled for the users. Main advantage of the cloud scheduling is to achieve best throughput and better resource utilization. Cloud scheduling can be categorized into three parts one is resource discovery and filtering process, second is resource selection and third is task submission. In resource discovery datacenter broker

discover the resource available in cloud. Resource identification is always based on the resource and task criteria. According to the criteria if resource availability is there then resource selection is taken place. And selected resource will be allocated to the task.

MIN-Min Algorithm

Min-Min scheduling is based on minimum completion time for any task. In this type of scheduling that resource is selected which has minimum completion time? The completion time is selected based on the Meta tasks list. Main objective is to complete the task with minimum time and complete the task with minimum waiting time.

1. For all submitted tasks in meta-task Ti
2. For all resource Rj
3. Compute Cij = Eij + rj
4. While meta-task is not empty
5. Find the task Tk consumes minimum completion time.
6. Assign task Tk to the resource Rj with minimum execution time.
7. Remove the task Tk from meta-tasks set
8. Update rj for selected Rj
9. Update Cij for all i

MAX-MIN algorithm

It is another way works opposite to the MIN-MIN. In MAX-MIN algorithm that resource is located which has maximum completion time. So that maximum task is allocated to the resource with maximum completion time. So that multiple smaller tasks can be allocated to the smaller completion time resources. It will made easy to execute multiple tasks to be completed concurrently.

1. For all submitted tasks in meta-task Ti
2. For all resource Rj
3. Compute Cij = Eij + rj
4. While meta-task is not empty
5. Find the task Tk consumes maximum completion time.
6. Assign task Tk to the resource Rj with minimum execution time.
7. Remove the task Tk from meta-tasks set
8. Update rj for selected Rj
9. Update Cij for all i

RASA Algorithm

In both MIN-MIN and MAX-MIN the scheduling techniques will be failed when there are multiple smaller tasks and multiple larger tasks. In case of multiple larger tasks MAX-MIN will be failed. Because multiple larger tasks cannot be allocated to multiple large completion time tasks. Similarly when there are large number of smaller tasks and it is not possible to allocate all the tasks to be allocated to multiple smaller resources. so in RASA MAX_-MIN and MIN-MIN is done simulteously. So that Resource awareness is performed. When there is large no. of larger tasks then max. completion time will be selected and when there is large no. of smaller tasks then MIN-MIN is used.

1. For all tasks Ti in meta-task
2. For all resources Rj
3. Compute Cij = Eij + rj
4. Do until all tasks in metatask are mapped to the resource
5. If the number of resources is even then
6. For each task in meta task find the expected completion time and the resource that make it.
7. Find the task which gives the maximum expected completion time.
8. Assign that task to the faster resource to get minimum completion time.
9. Delete the task from meta task.
10. Update ready time rj
11. Update completion time Cij for all task i.
12. Else
13. For each task in meta task find the expected completion time and the resource that make it.
14. Find the task which gives the minimum expected completion time.
15. Assign that task to the faster resource to get minimum completion time.
16. Delete task from meta task.
17. Update ready time rj
18. Update completion time Cij for all i.
19. End do.

Literature Survey

Shuibing He*et al.* [4]: In this paper, they have considered to improve scientific workflows in cloud environments where data transfers between tasks are performed via provisioned in-memory caching as a service, instead of relying entirely on slower disk-based file systems.

Devipriya[10] In cloud computing, many tasks need to execute at a time by the available resources in order to achieve better performance, minimum completion time, shortest response time, resource utilization etc. To overcome the limitation of the MIN-MIN Algorithm, MAX-MIN Algorithm has been proposed; in this we can execute the tasks concurrently.

RajwinderKaur*et al*. [8]Cloud Computing helps in proper utilization of resources and hence in enhancing the performance of the system. A few existing algorithms can maintain load balancing and provide better strategies through efficient scheduling and resource allocation techniques as well.

Proposed PSO Algorithm

PSO is a dynamic load balancing technique. It can be used in decentralized load balancing. It is used for dynamic decentralized optimum load balancing at broker level.

PSO is a swarm based heuristic optimization technique. It is developed by observing the social and biological behavior of swarm intelligence i.e. movement behavior of bird flocks and fish flock. The birds are scattered throughout the searching process for food. While the birds are searching for food from one source to other one, there is always a bird from the bird flock that can sense the food source very well. That bird is detectable of the lay where the in the flock are transmitting the information about their location for the food, it helps them to move nearer towards the food source.

PSO algorithm

Step1: Set the algorithm parameters: size of population and dimensions, maximum number of Iterations, Tmax or the expected detected entropy, the inertia weight Wmax, Wmix and the optimal solution set.

Step2: Initialize each population, calculate the fitness value of each particle Fij (x1, x2, x3).

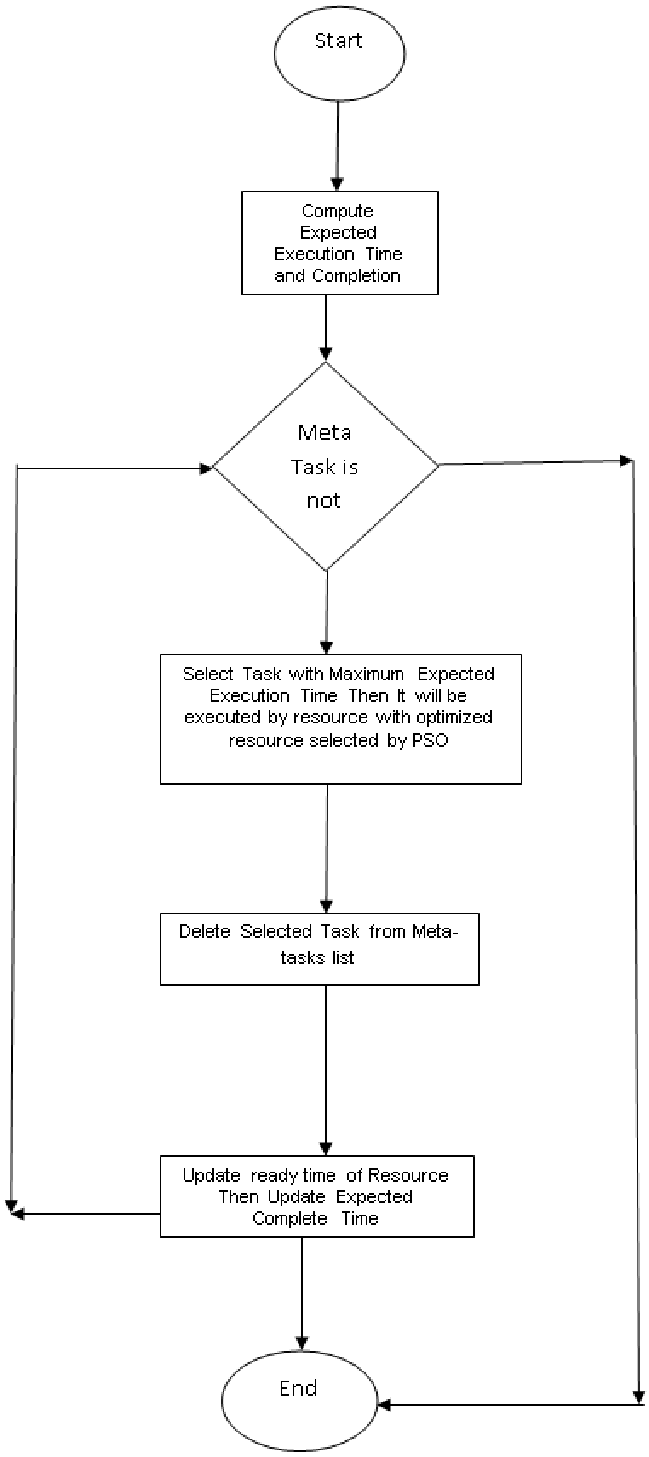
Step3: Particles conduct migration in the system in accordance with each particle's value Fi (x1, x2, x3) in which following the principle: follow the migration process, the particles move to immigration node with the minimal cost (Fi (x1, x2, x3) value is the smallest node). The fitness value of each particle compare with Pbest, if the current position is better, it will be the best position Pbest;

Step4: For each particle, compare its fitness value and the best position it passed Pbest. If the former is better, take it as current best position.

Step5: Obtain particle's new speed and position based on the formula of iterations. When the load value of immigration node is equal to the total load value /number of nodes of the threshold value of system, then the node is automatically removed.

Step6: the termination condition: the number of iterations reaches the maximum number of iterations set or achieve set detection value (entropy) of best resource for allocation.

4.2 PSO Flow Chart



Analysis

Power Consumption

It is the total power consumed while executing the task from a gibe resource. In case of PSO the power consumption is less compare to the RASA. That means in context to the power the PSO performance has improved to 16.53%.

Table 1: for power consumption of RASA and PSO

Power Consumption of PSO	Power Consumption Of Rasa
16.124516	17.888
17.66352	17.888
16.462078	17.888
16.124516	17.888
15.652476	17.888
16.093477	17.888
15.394804	17.888
16.852299	17.888
16.703293	17.888
17.117243	17.888
17.20465	17.888
15.652476	17.888
17.464249	17.888
16.763054	17.888

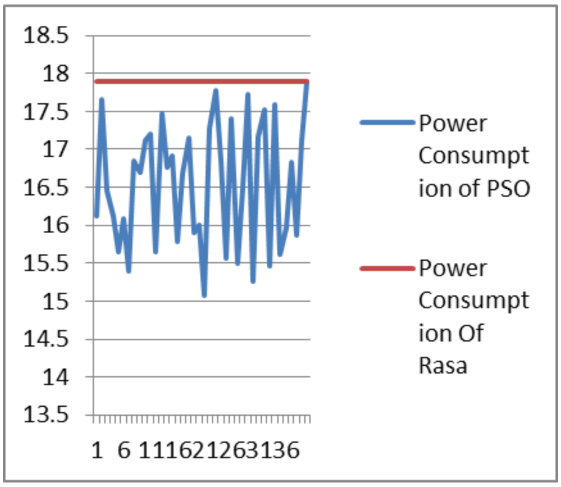


Fig. 1: graph for comparison of RASA and PSO

Throughput

It is the performance parameter in terms to number of processes per unit interval of time. In case of PSO the throughput has improved to 8.11%.

Table 2: throughput for RASA and PSO

Throughput of PSO	Throughput of Rasa
17.84555749	13.88854356
18.11643349	17.88854356
19.43861511	13.88854356
18.84555749	13.88854356
19.44404947	16.88854356
18.88383213	13.88854356
20.78623411	15.88854356
16.98850744	16.88854356
17.15789916	15.88854356
18.69459956	15.88854356
17.59962183	14.88854356
19.44404946	16.88854356
17.32314726	13.88854356
18.08960038	15.88854356

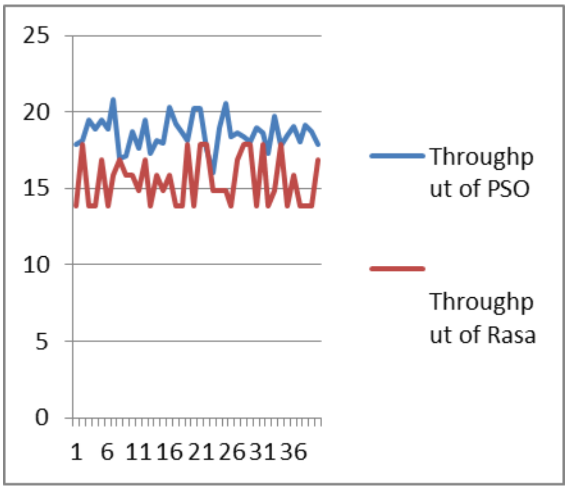


Fig. 2: Comparison of throughput of PSO and RASA

Conclusion

From the current research it is clear that cloud efficiency will depends upon this issue that how well cloud schedules the resources amongst different processes. MAX-MIN and MIN-MIN individually are not so efficient because there may be various longer or even shorter tasks. For optimization of the selection process in current research we have used PSO. This technique identifies the best possible resources amongst the multiple available resources. In previous research the RASA based technique was used. Performance parameters like throughput, power consumption has been used to compare the performance of previous and current research. PSO has improved upon the power consumption and throughput. Power consumption has improved 16.53%. and throughput has improved upon 8.11%.

Future Work

In future another genetic based approach can be tested and compared with PSO. So that best optimization technique can be identified.

References

1. GarimaMahajan, "Job Scheduling In Cloud Computing: A Review of Selected Techniques" International Journal of Emerging Trends & Technology in Computer Science (IJETTCS), Volume 3, Issue 3, May-June 2014.
2. R.Durga Lakshmi1, N Srinivasu,"A Review and Analysis of Task Scheduling Algorithms in Different Cloud Computing Environments" International Journal of Computer Science and Mobile Computing, IJCSMC, Vol. 4, Issue. 12, December 2015, pg.235 – 241.
3. Neeta Patil, "A REVIEW – DIFFERENT SCHEDULING ALGORITHMS IN CLOUD COMPUTING ENVIRONMENT", 11th International Conference on Intelligent Systems and Control (ISCO), 2017.
4. Shuibing He, Yang Wang, Xian-He Sun IEEE Fellow and ChengzhongXu,"Using Min-Max-Memory Claims to Improve In-Memory Workflow Computations in the Cloud", 1045-9219 (c) 2016 IEEE.
5. Long Thai, Blesson Varghese and Adam Barker, "Task Scheduling on the Cloud with Hard Constraints", 2015 IEEE World Congress on Services.

6. Dr.M.Sridhar, “Hybrid Particle Swarm Optimization Scheduling for Cloud Computing”, 2015 IEEE.
7. EaktaKumari and Monika, “a review on task scheduling algorithms in cloud computing”, International Journal of Science, Vol. 4, No 2, 2015, 433 – 439.
8. RajwinderKaur and PawanLuthra,“Load Balancing in Cloud Computing”, Association of Computer Electronics and Electrical Engineers, 2014.
9. GulshanSoni,“A Novel Approach for Load Balancing in Cloud Data Centre”, 2014 IEEE.
10. S.Devipriya,“Improved max-min heuristic model for task scheduling in cloud”, 978-1-4673-6126-2/13.
11. ShaminderKaur andAmandeepVerma, “An Efficient Approach to Genetic Algorithm for Task Scheduling in Cloud Computing Environment”,I.J. Information Technology and Computer Science, 2012, 10, 74-79.