IJARCCE

ISSN (Online) 2278-1021
ISSN (Print) 2319 5940

International Journal of Advanced Research in Computer and Communication Engineering
Vol. 4, Issue 12, December 2015

Intelligent Strategy of Task Scheduling in Cloud computing using Swarm Optimization with Griewangk's function

Ms. R. Dhivya[1], Mrs. C. Senbagavalli Msc, MPhil[2]

M. Phil Scholar, Dept of Computer Science, Kovai Kalaimagal College of Arts and Science, Coimbatore, India[1]

Assistant Professor, Dept of Computer Science, Kovai Kalaimagal College of Arts and Science, Coimbatore, India[2]

Abstract: The cloud computing has become a popular platform for scientific applications. Cloud computing is a term used to describe a new class of network based computing that takes place over the internet. It offers dynamic flexible resource allocation for reliable and guaranteed services in pay-as-you-use manner to cloud service users. Scheduling the job is most important task in cloud computing environment. The goal of task scheduling is to achieve high system throughput, resource utilization and response time. In a cloud environment, traditional scheduling methods are infeasible owing to its properties - dynamical, distributed, and sharable. The aim of resource allocation to tasks is for all services to meet their performance targets. Several jobs demand different resources while running simultaneously. It is important for efficient working of cloud to balance these jobs on appropriate resources for optimal performance, and various task parameters need to be considered for proper scheduling. Therefore, there is a need for better algorithms to schedule tasks on these systems. This research work focus on Griewangk's functions task Optimization Algorithm. This task scheduling algorithm is done under cloud computing environment based on life cycle of bird called cuckoo. The Cuckoo Optimization Algorithm is evaluated by using the Griewangk's function with Rastrigin function. By using this function, the best task is founded among the entire given task.

Keywords: Cloud Computing, Cuckoo Optimization Algorithm, Griewangk's functions, Swarm Optimization.

I.INTRODUCTION

Cloud computing refers to the release of computing resource over the internet. As a replacement of keeping data on your individual hard drive or updating relevance for your requests, you use a service over the internet, at an added position, to accumulate your information or use its applications. Cloud services permit individuals and businesses to use software and hardware that are managed by third parties at remote location. The cloud computing represent allows entrance to information and computer resources from somewhere that a network connection is available.

Cloud computing provides a collective group of resources, including data storage space, network, computer processing power, and dedicated corporate and user applications. Task scheduling ready to run task to a host based on information into only about the task. It describes CPOP (Critical Path on a Processor), PETS (Performance Effective Task Scheduling) algorithms. Regardless of the usage of resources afford in grid computing which is not adequate to use. So as a remedy for this, Cloud computing becomes visible in a way that provides on-demand resources to the users, so as to proceed locally available computational power, delivering new computing resources when necessary. The Cloud computing environment provides resources dynamically whenever demanded by the user. The resource is utilized by the user without having enough knowledge about the technical details involved in the resource provider in Cloud Computing as a computing model. In this model "customers" plug into the "cloud" to access IT resources which are priced and provided "on-demand". Over the last several years, virtual machines have become a standard object used. The cuckoo optimization algorithm (COA) is one of several new and powerful Meta-Heuristics. For evaluation and finding out efficiency of the COA, the Griewangk's function is used this function has several maximum and minimum points which have caused it to be utilize as a test function for assessment of the Meta-Heuristic algorithm. So the Griewangk's function is used to evaluate the utility of COA algorithm. Based on the other evolutionary algorithm a cuckoo optimization algorithm for solving task scheduling in cloud is constructed. The cuckoo's eggs corresponding to a solution of the problem. Generate initial population is base of beginning algorithm and based on incoming items including the number of tasks, number of machines, the operation of each task and the time required for each operation, algorithm tries to find the optimal solution. Here, Griewangk's function is used for optimization.

II. HONEY BEE SWARM FOR NUMERICAL OPTIMIZATION

Two fundamental concepts, self-organization and division of labor, are necessary and sufficient properties to obtain swarm intelligent behavior such as distributed problem solving systems that self-organize and adapt to the given environment, Self-organization can be defined as a set of dynamical mechanisms, which result in structures at the

global level of a system by means of interactions among its low-level components. These mechanisms establish basic rules for the interactions between the components of the system. The rules ensure that the interactions are executed on the basis of purely local information without any relation to the global pattern. They have characterized four basic properties on which self-organization relies, Positive feedback, negative feedback, fluctuations and multiple interactions inside a swarm, there are different tasks, which are performed simultaneously by specialized individuals. This kind of phenomenon is called division of labor. Simultaneous task performance by cooperating specialized individuals is believed to be more efficient than the sequential task performance by unspecialized individuals. Division of labor also enables the swarm to respond to changed conditions in the search space. Two fundamental concepts for the collective performance of a swarm presented above, self-organization and division of labour are necessary and sufficient properties to obtain swarm intelligent behavior such as distributed problem-solving systems that self-organize and -adapt to the given environment. In the case of honey bees, the basic properties on which self organization relies are as follows:

Positive feedback: As the nectar amount of food sources increases, the number of onlookers visiting them increases, too.
Negative feedback: The exploitation process of poor food sources is stopped by bees.
Fluctuations: The scouts carry out a random search process for discovering new food sources.
Multiple interactions: Bees share their information about food sources with their nest mates on the dance area.

In this work, a particular intelligent behavior of a honey bee swarm, foraging behavior, is considered and a new artificial bee colony (ABC) algorithm simulating this behavior of real honey bees is described for solving multidimensional and multimodal optimization problems. In the model, the colony of artificial bees consists of three groups of bees: employed bees, onlookers and scouts. The first half of the colony consists of the employed artificial bees and the second half includes the onlookers. For every food source, there is only one employed bee. In other words, the number of employed bees is equal to the number of food sources around the hive. The employed bee whose food source has been exhausted by the bees becomes a scout.

III. CUCKOO OPTIMIZATION ALGORITHM (COA)

Optimization is the method of creation something better and to find the maximum or the minimum of a fitness which expresses the optimization problem. There are a broad range of evolutionary optimization algorithms. Meta-Heuristic algorithms are frequently nature-inspired, and they are now among the most commonly used algorithms for optimization. The cuckoo optimization algorithm (COA) is one of several new and powerful Meta-Heuristics. The first evolutionary algorithm which is motivated by the cuckoos and their lifestyle was developed by Yang and Deb, called "Cuckoo search". The cuckoo search algorithm proposed by Yang and Deb is based on the obligate brood parasitic behavior of some cuckoo species in grouping with the Levy flight behavior of some birds and fruit flies. A relationship study between the cuckoo search algorithm and other Meta-Heuristic has been presented in several works The cuckoo optimization algorithm (COA) is summarized as follows:

- Preparation cuckoo habitats with some arbitrary solution on the objective function;
- This bird didn't make any host for itself and it be used the nests of other birds for laying eggs;
- Determine ELR for each cuckoo;
- Let cuckoo to lay eggs inside their corresponding ELR;
- If the bird's host discover eggs that are not mine, it throw away or leave the nest and it makes a nest in other places;
- Allow eggs hatch and chicks grow up;
- Access the habitat of each grown cuckoo;
- Limit cuckoo's maximum number in environment and kill those that live in worst habitats
- Cluster cuckoos and detect best place and select goal point;
- Allow new cuckoo population travel toward goal point

The main issue in existing system is to optimize scheduling is not achieved. Less accuracy in task scheduling with particle satisfaction of user requirements. The resource and to schedule separate tasks of an application on those resource in such a way to does not satisfy deadline requirement of the task with minimum executing time and cost. So has to be improved this algorithm by using the function called test function.

IV. PROBLEM STATEMENT

The customer is interested in reducing the overall execution time of tasks on the machines. The processing units in cloud environments are called as virtual machines (VMs). In business point of view, the virtual machines should execute the tasks as early as possible and these VMs run in parallel. This leads to problems in scheduling of the customer tasks within the available resources. The scheduler should do the scheduling process efficiently in order to utilize the available resources fully. More than one task is assigned to one or more VMs that run the tasks- simultaneously. This kind of environments should make sure that the scheduling is well balanced in all VMs.

V. MODIFIED CUCKOO OPTIMIZATION ALGORITHM (MCOA)

In the proposed methodology, cuckoo search algorithm is introduced for scheduling the tasks in the cloud optimally. CSA algorithm is based on the obligate brood parasitic behavior of some cuckoo species in combination with the Lévy flight behavior of some birds and fruit flies. Let us briefly review the interesting breeding behavior of certain cuckoo species. Thenwill outline the basic ideas and steps of the Cuckoo Search algorithm. Cuckoos are beautiful birds, but their aggressive reproduction strategy is more interesting to us. Cuckoos lay their eggs in communal

IJARCCE

ISSN (Online) 2278-1021
ISSN (Print) 2319 5940

International Journal of Advanced Research in Computer and Communication Engineering
Vol. 4, Issue 12, December 2015

nests which are chosen by levy flight. They often choose a nest where the host bird just laid its own eggs. To increase the probability of hatching their own eggs, they perhaps remove the other eggs. Some female cuckoos imitate the colors and patterns of the eggs of host species. Cuckoos reduce the probability of the eggs being abandoned to increase their re-productivity. Thus, when a host bird discovers a strange egg, either will throw them away or leave the nests and go somewhere else to build a new one. A cuckoo often chooses a nest with some eggs in it. The next section briefly explains cuckoos levy flight.

Pseudo code of the CSA

Objective function f(x), x=(x1, …, xd);
Initial a population of n host nests xi (I =1,2,…,n);
while (t < Maximum Generation) or (stop criterion);
Get a cuckoo (say I) randomly and generate a new solution by Lévy flights;
Evaluate its quality/fitness; Fi
Choose a nest among n (say j) randomly;2
if (Fi >Fj),
Replace j by the new solution;
end
Abandon a fraction (Pa) of worse nests[and build new ones at new locations via Lévy flights];
Keep the best solutions (or nests with quality solutions);
Rank the solutions and find the current best;
End while
Post process results and visualization

VI. EVALUATING THE MODIFIED CUCKOO SEARCH ALGORITHM

The Cuckoo Optimization Algorithm (COA) is evaluated by using the Griewangk's function. The problem is a non-linear continuous function which is used for evaluating optimization algorithms. The efficiency of the COA has been studied by obtaining optimal solution of various dimensions Griewangk's function.

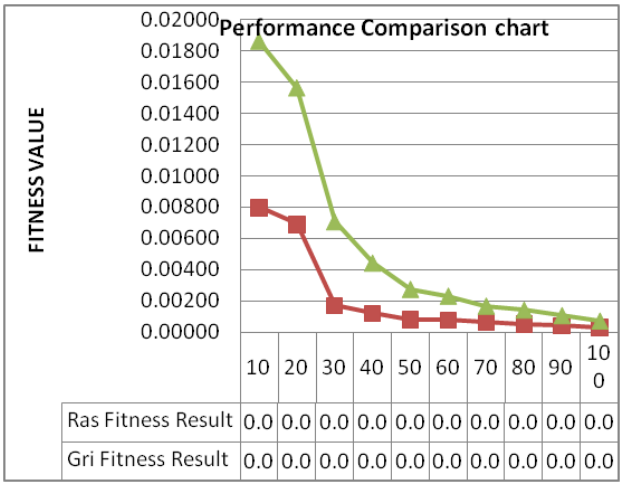
$$f_8(x)=sum(x(i)\text{^}2/4000)prod(cos(x(i)/sqrt(i)))+1$$
$$i=1:n;-600<=x(i)<=600.$$

Test area is generally controlled to hypercube $-600<=x_i<=600$, i=1 ...n. Its global minimum equal f(x) =0 is reachable for $x_i=0$, i=1 ...n. The function interpretation changes with the range; the common overview suggests convex function, medium-scale view suggests subsistence of local extremum, and finally zoom on the particulars indicates compound construction of numerous local extremum.

Fitness or quality value shows how fit the solution is, i.e. how well it adapts to its environment. For a maximization problem, the fitness of a solution can be proportional to the value of the objective function. For simplicity, we suppose that each egg in a nest represents a solution, and a cuckoo egg represents a new solution. The purpose is to use the new and potentially better solutions (cuckoos) to replace a not so good solution in the nest. Here we use the simplest approach where each nest has only a single egg. The performance evaluation were conducted to prove the effectiveness of the proposed methodology by comparing it with the existing approach called random scheduling in terms of makespan and the cost parameters.

VII. EVALUATING THE EXECUTING TIME

After initializing first population randomly the best nest is chosen for the next generation levy flight function is performed and opted new nest is chosen. For the generation, levy flight function is performed and best nest is chosen. For nest discovering, new value is generated. Also the best nests are kept for next generations this algorithms runs until no improvement in the fitness of the best member of the population has been observed for 20 generations.



In existing scenario the CSA methods shows the fitness function as higher. In proposed scenario the using Griewangk's function shows the minimum executing time as lower. Thus from the experimental graph we conclude that proposed scenario is better than existing scenario.

VII.CONCLUSION

Resource scheduling is the biggest concern in the cloud computing environment which needs to be handled carefully to satisfy the user constraints. In the proposed methodology, cuckoo search optimization algorithm used to schedule the task in the cloud resources in the optimal manner. The scheduling is done with the consideration of the parameters called the deadline and the budget which need to be satisfied for the mapping of tasks into the resources. The performance of the proposed methodology is tested by using the Griewangk's function. It is the testing function which is used to evaluate the convergence of the optimization approach. The experimental tests conducted were proves that the proposed methodology provides better result than the existing approaches.

REFERENCES

1. Arezki Mellal M, Adjerid S, Williams E and Benazzouz D, (2012) 'Optimal replacement policy for bsolete components using cuckoo optimization algorithm based-approach: Dependability context', Journal of Scientific & Industrial research, Volume 71, pp 715-721.
2. Abawajy J.H, (2009) 'An Adaptive Hierarchical Scheduling policy For Enterprise Grid Computing', Journal of Network and Computer Application, Volume 32, pp 770-779.

3. Alireza Ghaffarkhah, Ripal Nathuji and Aman Kansal, (2010) 'Q-Clouds: Managing PerformanceInterference Effects for QoS-Aware Clouds', Proceedings of the 5th European conference on Computer systems, pp 237-250.
4. Chien-Min Wange, Hsi-Min Chenb, Chun-Chen Hsuc, Jonathan Lee b, (2010) 'Dynamic resource selection heuristics for a non-reserved bidding-based Grid environment', Future Generation Computer System,Volume 26, pp 183-197.
5. Daoud M.I, Kharma N, (2008) 'A High Performance Algorithm For Static Task Scheduling In Heterogeneous Distributed Computing system', Jounal of Parallel Distributed Computing, Volume 68, pp 399-409.
6. Hedieh Sajedi, Maryam Rabiee, (2014) 'A Metaheuristic Algorithm for Job Scheduling in Grid Computing', International Journal of Modern Education and Computer Science, Volume 5, 52-5
7. Jing Xu and José Fortes, (2010) 'A Multi-Objective approach to Virtual Machine Management in Datacenters', Advanced computing and information system laboratory
8. Mohamad Khalini L, Analoui M, (2008) 'An approach to grid resource selection and fault management based on ECA rules', Future Generation Computer System Volume 24, pp 296-316.
9. Pinar Civicioglu, Erkan Besdok (2011) 'A conceptual comparison of the Cuckoo-search, Particle swarm optimization, Differential evolution and Artificial bee colony algorithm'.
10. Pradeep Padala, Kai-Yuan Hou, Kang G. Shin, Xiaoyun Zhu, Mustafa Uysal, (2010), 'Automated Control of Multiple Virtualized Resources', Proceedings of the 4th ACM European conference on Computer systems,pp 13-26.
11. Timothy Wood, Ludmila Cherkasova, Kivanc Ozonat, and Prashant Shenoy, (2008) 'Profiling and Modeling Resource Usage of Virtualized Applications Proceedings of the -9th ACM/IFIP/USENIX International Conference on Middleware, pp 366-387.
12. Will Sobel, Shanti Subramanyam, Akara Sucharitakul, Jimmy Nguyen, Hubert Wong (2009) 'Cloud stone: Multi-Platform, Multi-Language Benchmark and Measurement Tools for Web 2.0', Lecture Notes in Computer Science Volume 5931, pp 254-265
13. Xiaodan Wang, Eric Perlman, Randal Burns, Tanu Malik, Tamas Budav´ariz, (2010) 'JAWS: Job-Aware Workload Scheduling for the Exploration of Turbulence Simulations', Proceedings of the 2010 ACM/IEEE International Conference for High Performance Computing, Networking, Storage and Analysis, pp 1-11.
14. Yang X.S and Deb S, (2009) 'Cuckoo search via Levy Flights', In World Congress on Nature & biologically inspired Computing (NaBIC2009). IEEE Publications, pp.210-214.
15. Yajun Li, Yuhang Yanga, Maode Mab, Liang Zhoua, (2009) 'A Hybrid Load Balancing Strategy Of Sequential Task of Grid Computing environment', Future Generation Computer System Volume 25 ,pp 819-828.
16. Yang Gaoa, Hongqiang Rongb, Joshua ZhexueHuangc, (2005) 'An Adaptive Grid Job Scheduling With Genetic Algorithm', Future Generation Computer Systems, Volume 21, pp 151-161.
17. Zhang jian and Xinda Lu, 'A Dynamic Job Scheduling Algorithm for Computational Grid', Department of computer science and engineering Shanghai Jiaotong University, Shanghai 200030, China.

DOI 10.17148/IJARCCE.2015.41227