A Survey on Various Task Scheduling Algorithm in cloud Environment

Gurjeet kaur [1] , Gurjot singh sodhi[2]
Shaheed Udham Singh College of Engineering & Technology,(Tangori)

_____

Abstract - **Cloud computing is a popular distributed computing model. It is based on pay as per use policy. It intends to share pool of resources globally. Job scheduling is one of the active area of research on cloud environment. The main aim of job scheduling is to achieve high performance on various computing application. A good job scheduling policy help to proper utilization of resource on virtual Machine (vm). Job scheduling algorithm solve many problems like NP complete, which plays an important role on cloud environment. In this paper different types of scheduling algorithm in different cloud environment are discussed.**

Index Terms **- cloud computing, job scheduling, algorithm, virtualization**

_____

I. INTRODUCTION

Cloud computing is one of efficient technology that is popular now a days in IT field. It is a provider of dynamic services using large scalable, secure, quick, data storage and virtualized resources over internet [4]. It is supposed to manage the execution of tasks, operations, virtual servers, virtual infrastructure as well as the back end hardware and software resources of cloud environment [7].

To gain the maximum benefits from cloud computing, developers must design mechanisms that optimize the use architectural and deployment [3].Economically, the main goal of cloud computing is that customers only use when need ,and only pay for actually use. These resources are available in cloud every time to be accessed from the cloud any time from any location via the internet [3].

  Cloud computing architecture has three layers for the software which require on demand services over internet. Figure1. shows different layer cloud architecture.

1. Infrastructure as a Services (IaaS):- This layer means buying access to raw computing hardware over the net ,such as servers or storage.
2. Platform as a Service (PaaS):- This layer use cloud application ,Automatic Scaling ,Load balancing with other services (For example Google Documents) are the major benefits to cloud application.
3. Software as a Service(SaaS):- This layer hosts the software and provide to the customer through Internet. It reduces the maintenance cost of the customer.
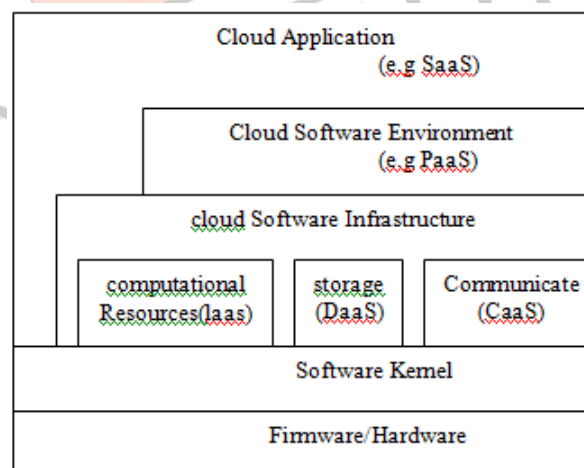

Figure 1. Cloud Computing Environment

The main Purpose is to schedule tasks to the virtual machines .Job scheduling is major activates performed in all the computing environment .To increase the working efficiency on cloud. Job scheduling is the task performed in order to gain profit with adaptable time. The job scheduling of cloud computing is challenge task. The goal of scheduling algorithm in distributed system is spreading the load on processor and proper utilization resource while minimizing the total task scheduling [4].Two main categories of scheduling algorithm.1)static scheduling algorithm 2) dynamic scheduling algorithm .

II. SCHEDULING

There are different types of scheduling algorithm used to solve scheduling problems, most of applied in the cloud environment with suitable verification. Various algorithms has been proposed by researches to allocate and schedule in the cloud environment [11][4]. Jobs are schedule by user need. New scheduling strategies require to be proposed to overcome the problems posed by network properties between user and resource[1]. The main advantages of scheduling algorithm obtain a high performance and proper utilization resources. Job scheduling are the key technologies of cloud computing plays a vital role in an efficient use resource Management[5]. The main examples of scheduling algorithms are FCFS,Round Robin, Min-Min ,and Max-Min algorithm.

a. First Come First Serve Algorithm:
This algorithm is simple and easy to understand. In this algorithm only those job are execute first that come in first because it is base on the FCFS.

b. Round Robin Algorithm:
In this scheduling algorithm processes are execute base on the time slice.

c. Min-Min Algorithm:
In min-min algorithm only smallest job to be execute first.

d. Priority scheduling algorithm:
In this algorithms each process is assigned based on priority and priority is allowed to run. If both process have same priority that is executed base on the FCFS.

SCHEDULING PROCESS
Scheduling process in cloud can be divided into three stages.

1) Resource Discovering and Filtering them.
2) Resource Selection(Decision stages).
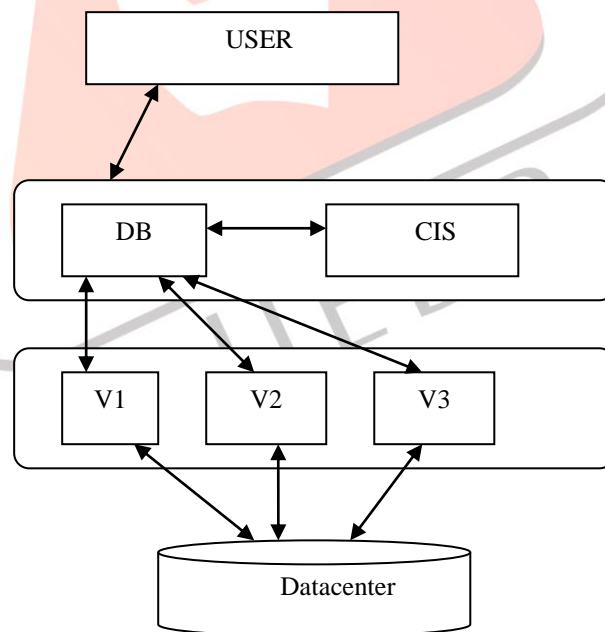3) Task Submission.

Figure 2. Scheduling Stage

III. EXISTING SCHEDULING POLICY

The following task scheduling algorithm are presently established in the cloud environments .

3.1 Particle swarm optimization
PSO is a sell adaptive global search based optimization technique. PSO has become popular simplicity and effective in wide range of application with law computation cost .
The PSO algorithm is same other population based algorithm like genetic , but there is no direct link of individuals of the population .PSO algorithm assign task to the virtual machine in best but manner the task check the virtual machine and task is

being assigned to the proper virtual machine that minimum wastage of memory .The objective is the minimize the cost of the execution application on cloud and also include time of processing transferring ,transfer and process cost[5] [2].
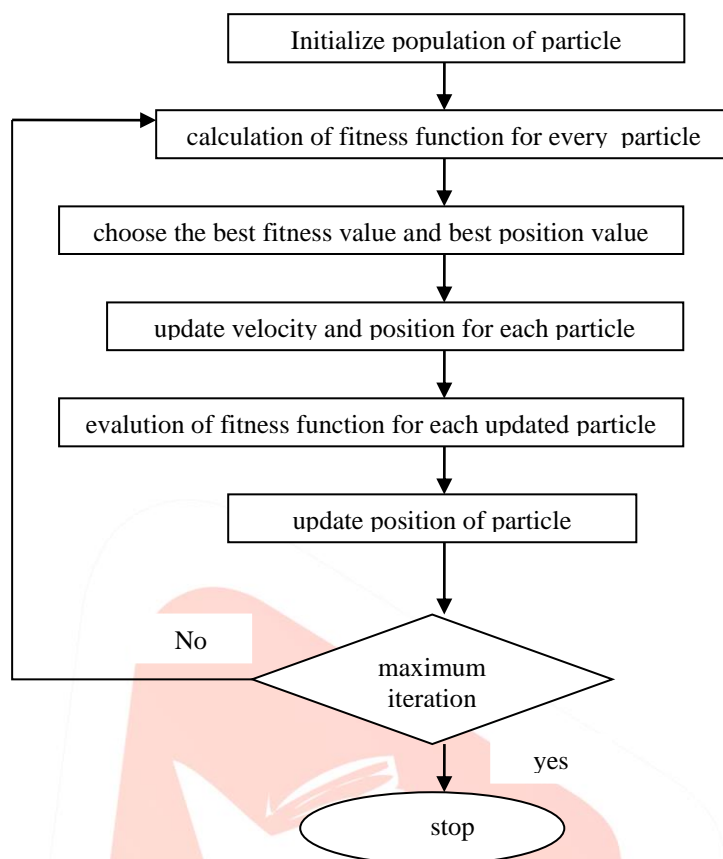

Figure 3. PSO Algorithm Flowchart

3.2 Ant Colony Optimization

Ant colony optimization is heuristics algorithm with efficient local search for combinational problems. The fist algorithm to find the optimal path in a graph , based on the behaviors of ant. Many researches use ACO to solve NP hard problems such as travelling salesman problem ,graph coloring problem and so on. Tasks includes shortest path traversal to find food source information sharing with other ants by generating pheromone.

The ant takes more time to travel down the path and back again, the more time the chemical have to evaporate .The shortest path selected which, get marched over more frequently , and thus the chemical density becomes higher on short path than longer ones [6][10][11].
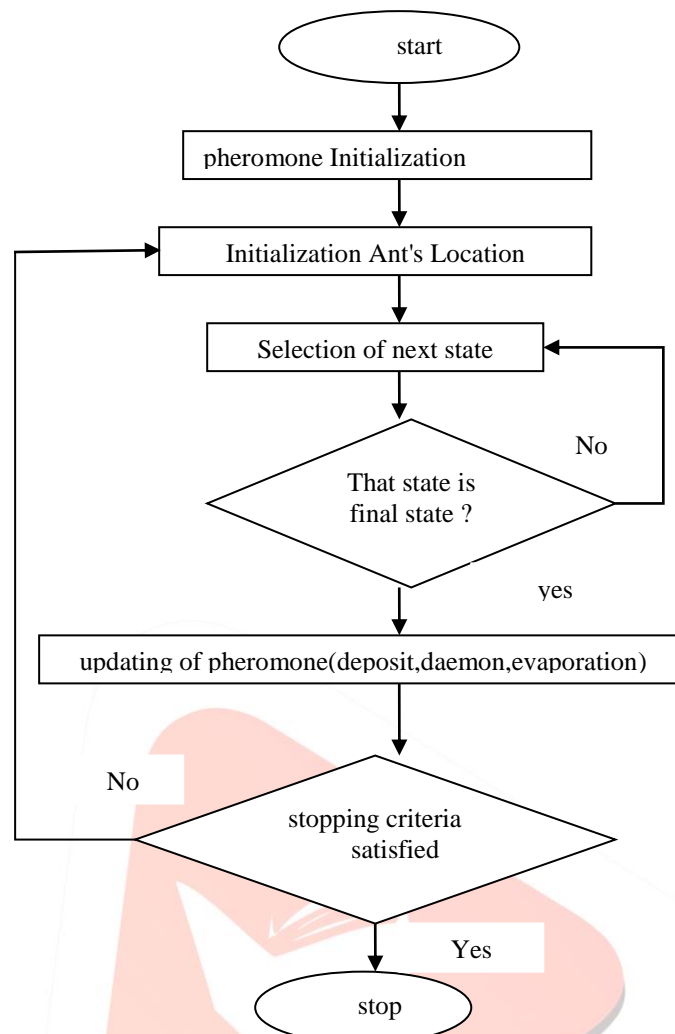
Figure 4 Ant Colony Optimization Flowchart

3.3 Job scheduling Model Based On Multi-Objective Genetic Algorithm

Multi-objective Genetic Algorithm to minimize energy consumption and maximize the profit of service provides. Request cognition component should be information about needs for different businesses. It include the computing, storage and communication requirements, for computing arrival law and concurrent conditions, security and privacy requirement, QOS of the service etc.

Service decomposition component decomposes the service request into different level of granularities with different processor preferences. Task manager analyze the resource requirement of each granularity and mapping .it on to optimal processors to reach an effective solution .It is responsible for task status Management (start ,stop, cancel)determining the scheduling sequence and resource assignment for the requests and allocating suitable resource to each job under the help of the scheduling algorithm. Resource cognition component manage the available resources,
monitoring of the performances of resources, dynamic optimization of error notification[3][7] .
Following operation of genetic algorithm used.

1) Encoding Rule.
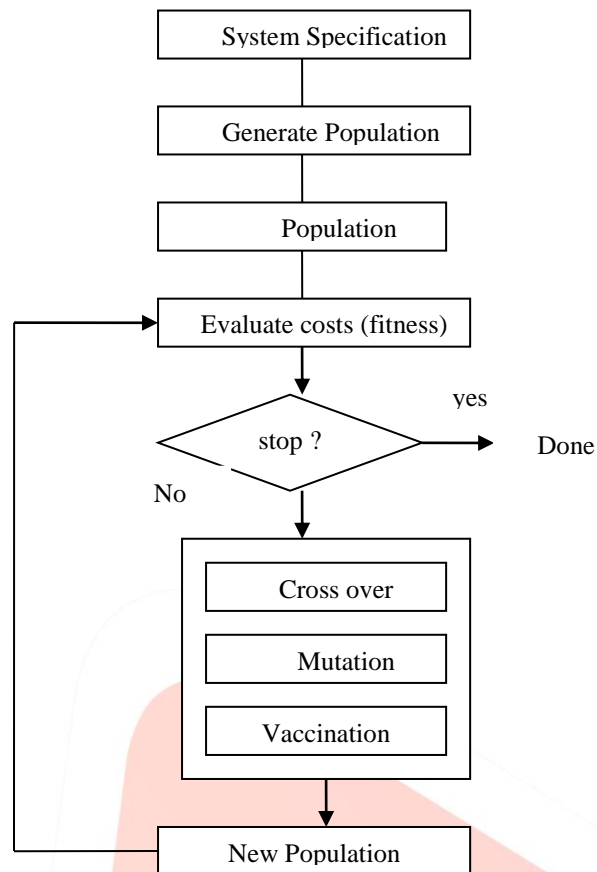2) Population initialization.
3) Individual evaluation.

Figure 5.Multi Objective Genetic Algorithm Flowchart

3.4 Short Job Scheduling Algorithm

An efficient job allocation algorithm SJS in multiple clouds. It can handle the over load condition and for that the load balancing scheme is presented.
The SJS algorithm consist of the following
objectives-

- Create an intermediate architecture that will accept the user request and monitor the cloud servers for their capabilities.
- Scheduling of the user requests is performed to identify the order of allocation of the processes.
- Performing the effective resource allocation under defined parameters and the cloud server capabilities.
- Define a dynamic approach to perform the process migration from one cloud to another.
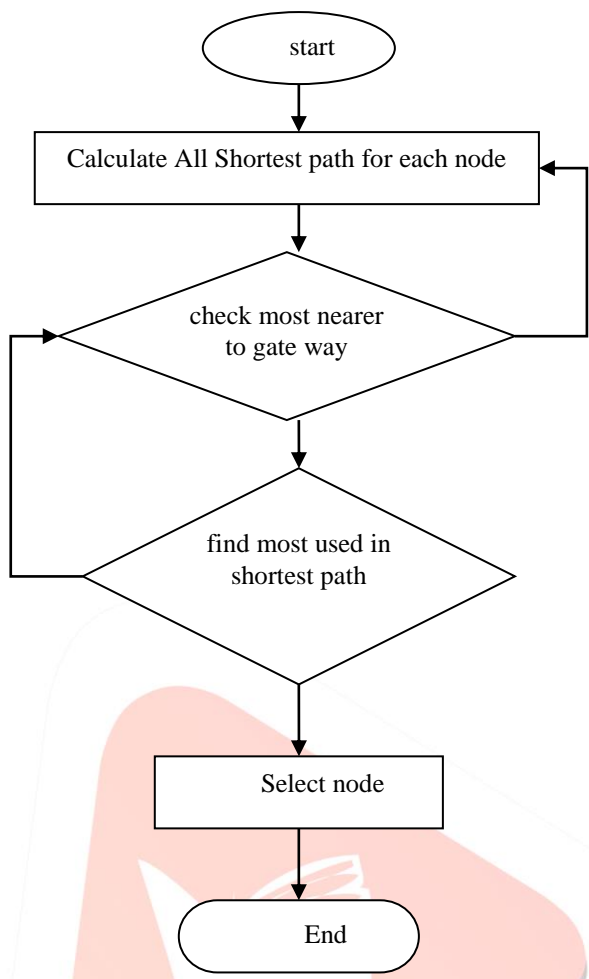- Analysis of work using graph under different parameters[7][8].

Figure 6 short job scheduling algorithm Flowchart

3.5 Artificial bee colony

Artificial bee colony algorithm is swarm based algorithm. It simulates the foraging behaviors of honey bee swarm. It relies on bees activities found food source and represent a possible solution to the problem for nectar information sharing with other bees. It consists of three agents of bees:- employed, onlooker and the scout. employed bee modification on the solution and storage in her memory. Employed bee find the new value if new value is find higher than the old then bee memorize the new value and forgets old .when all bees complete find process ,they share nector information for food and their position information shared with onlooker bees. It randomly disturbed population.[11[13].
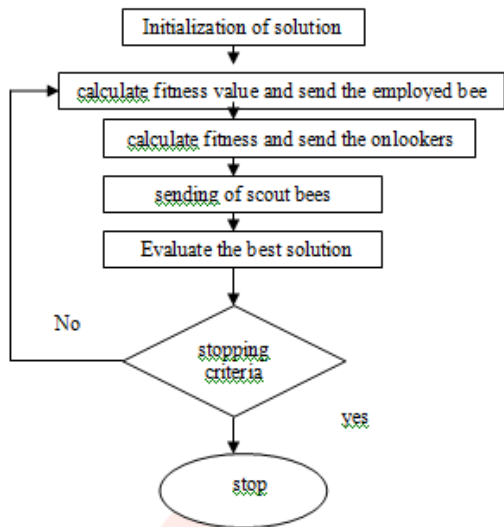

Figure 7 Artificial bee colony Flowchart

3. 6 Priority Based Job Scheduling Algorithm:

The problem is to decide the priority of jobs when number of jobs executed while there is a limited number of resource. Priority of job is an important issues in scheduling because some job is not stay long time .This algorithm is consisted of three level of priorities.1.Objective Level 2.Attribute Level 3.Alternative Level.

The PJSC algorithm has reasonable complexity but its lacks in determining value of finish time (make span) cannot be calculated, it depends on the priority of jobs and may change from worst value to the best value[5][12].
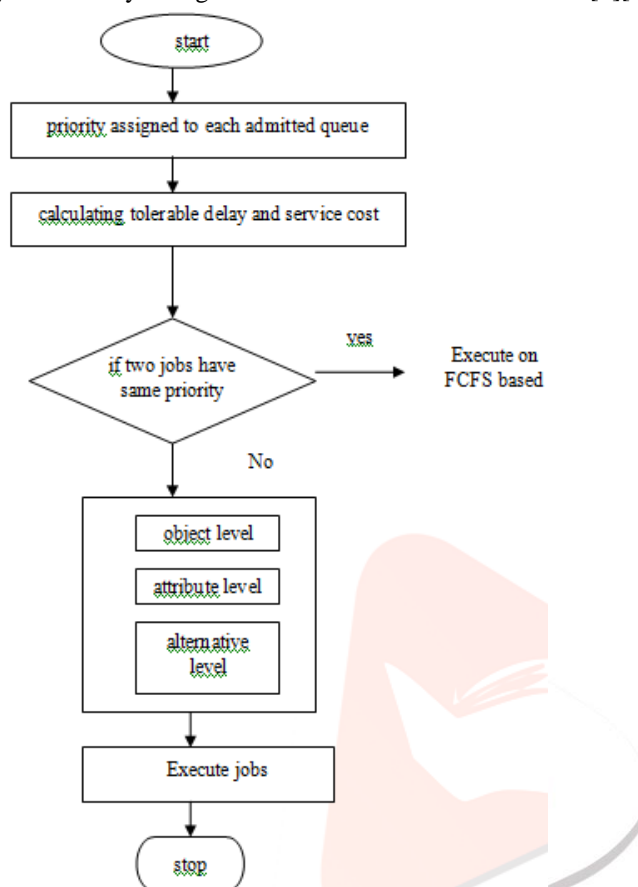

Figure 7 Priority based job scheduling algorithm flowchart

IV. CONCLUSION

Scheduling is being one of the key issues in the management of application execution in cloud environment and important factors that affect the resource utilization and cloud performance . A large quantity of research work is available to efficiently schedule tasks with available resource .we also Noticed that disk space management is critical in virtual environment. when a virtual image is created ,the size of the disk is fixed .In this paper discuss the different types of scheduling algorithms. Most appropriate technique for scheduling is metaheuristic technique. Future work will cover some more issues related to task scheduling and advance scheduling heuristics.

NAME OF ALGORITHM	AREAS OF APPLICATION	ADVANTAGE	DISADVANTAGE
Particle Swarm Optimization	PSO algorithm is most popular due to its simplicity and its effectiveness. It is used in many of application like : Data mining, design, telecommunications , network training and environment engineering etc.It also solved the problem of NP-Hard in Scheduling.	1.PSO has faster convergence rate than other optimization technique 2. calculation in PSO algorithm is simple .	1.PSO algorithm suffers the partial optimism, which decreased the regulation of its speed and direction
Ant Colony Optimization	ACO Algorithm is basically useful for Discrete optimization problems, job shop scheduling problem , vehicle routing , graph colouring and set covering , shortest path problem and parallel implementations etc .	1.It is efficient for Traveling salesman problem and other same problem .	1.It is difficult to analysis theoretical.

Job Scheduling Model Based On Multi-Objective Genetic Algorithm	Multi objective genetic algorithm used in many applications like: Dynamic and multiple criteria web-site optimization, distributed detection in wireless sensors, optimization problem in data mining and rule extraction.	1.single objective extension in MO-GA	1. usually slow convergence
Short Job Scheduling Algorithm	Short job algorithm used in networking or telecommunications, Driving directions on web mapping websites like map quest or Google map.	1.reduce average waiting time. 2.high throughput.	1 It execution-completed-time must be noted, it additional result is overhead on the processor.
Artificial Bee Colony	ABC algorithm is used in MR brain image classification , inference of face pose ,scheduling problems, assembly line balancing problem , resource-constrained project.	1.It is useful technique to solve the unconstrained and constrained optimization problem.	1. The number of ABC parameters must be tuned before executing of the algorithm.
Priority Based Job Scheduling Algorithm	PBJS used in power energy, Robotics and control systems, energy and industry applications, job scheduling .	1.Good output for the higher priority processes.	1.Starvation is possible for low priority processes.

REFERENCES

[1].Tilak, Sujit, and Dipti Patil. "A survey of various scheduling algorithms in cloud environment." *International Journal of Engineering Inventions* 1.2 (2012): 36-39.

[2].Pandey, Suraj, et al. "A particle swarm optimization-based heuristic for scheduling workflow applications in cloud computing environments." *Advanced Information Networking and Applications (AINA), 2010 24th IEEE International Conference on*. IEEE, 2010.

[3].Liu, Jing, et al. "Job scheduling model for cloud computing based on multi-objective genetic algorithm." *IJCSI International Journal of Computer Science Issues* 10.1 (2013): 134-139.

[4].Salot, Pinal. "A survey of various scheduling algorithm in cloud computing environment." *International Journal of research and engineering Technology (IJRET), ISSN* (2013): 2319-1163.

[5].Fazel Mohammadi, Dr, Shahram Jamali, and Masoud Bekravi. "Survey on Job Scheduling algorithms in Cloud Computing."

[6.]Shimpy, Er, and Mr Jagandeep Sidhu. "DIFFERENT SCHEDULING ALGORITHMS IN DIFFERENT CLOUD ENVIRONMENT." *algorithms* 3.9 (2014).

[7].Naik, Pradeep, Surbhi Agrawal, and Srikanta Murthy. "A survey on various task scheduling algorithms toward load balancing in public cloud." *American Journal of Applied Mathematics* 3.1-2 (2015): 14-17.

[8].Devi, Poonam. "Implementation of Cloud Computing By Using Short Job scheduling." *International Journal of Advanced Research in Computer Science and Software Engineering* (2013).

[9].Parsa, Saeed, and Reza Entezari-Maleki. "RASA-A New Grid Task Scheduling Algorithm." *JDCTA* 3.4 (2009): 91-99.

[10].Merkle, Daniel, Martin Middendorf, and Hartmut Schmeck. "Ant colony optimization for resource-constrained project scheduling." *Evolutionary Computation, IEEE Transactions on* 6.4 (2002): 333-346.

[11].Bilgaiyan, Saurabh, et al. "Study of Task Scheduling in Cloud Computing Environment Using Soft Computing Algorithms." *International Journal of Modern Education and Computer Science (IJMECS)* 7.3 (2015): 32.

[12].Liu, Xiaocheng, et al. "Priority-based consolidation of parallel workloads in the cloud." *Parallel and Distributed Systems, IEEE Transactions on* 24.9 (2013): 1874-1883.

[13].Karaboga, Dervis, and Bahriye Akay. "A comparative study of artificial bee colony algorithm." *Applied Mathematics and Computation* 214.1 (2009): 108-132.