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Optimization of Load Balancing using Bacteria Foraging Optimization in Cloud Computing

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Abstract: Cloud computing is an advancement in the field of web and focal remote servers to keep updated information and applications. It is one of most popular networks these days. There are some serious issues in the cloud computing like scalability, energy consumption, security and load balancing etc.Main issue of cloud computing is Load balancing, which degrades performance of the network and provides poor results. In the existing work, ACO had been implemented having low performance due to more failed request, Therefore, in the proposed work, BFO algorithm is proposed to overcome failed request problems. It helps to increase the performance of the system in terms of efficiency.

Keywords: Cloud Computing, ACO, BFO, Load Balancing

1. Introduction

Cloud computing consists of retrieving information and storing programs process over the Internet rather than computer's hard drive. Cloud is a symbol for the Internet. To collect data and run programs from the drive is known as local storage and computing. It simply defines that it is fast and easy to access your data for one computer to other on networking. There are numerous hybrid services work for cloud such as like Box,Dropboxand Sugar Sync. These services stored online synced version of your files but they not only sync those files and also synced it for local storage. Synchronization is the first step for the cloud computing experience [1].

IT mission or start-up that required a dependable and Internet related assets for computing for several facts centers. Today, it is straightforward to lease computing time and garage of any size. The variety begins with sensible machines slightly powerful enough to serve internet pages to the equal of a small supercomputer. At the identical time cloud services and sources are distributed over the world. This setup guarantees a high obtainability and unimaginable durability via maximum however the largest corporations.

For the calculation and computing purposes,Clouds deliver excellent resource services including platforms,Networks, data centers, storages, firewalls and software as a services. In addition it alsodescribes some methods which are helpful to improve performance of the network.

Fig. 1.1 Cloud Computing

Further there are three types of cloud computing models. According to level of attraction and service model of providers, namely:

(1) Infrastructure as a Service
(2) Software as a Service
(3) Platform as a Service

One of the Central features of cloud is Virtualization. Almost every software and hardware has delivered support to virtualization. There are various factors available where we can achieve virtualization such as software, hardware, storage and operating system, and manage them on cloud platform.

In following section of the paper, we will discuss about the literature survey in section 2, proposed method and results and discussions are discussed in section 3 and section 4 respectively.

2. Related Work

In paper [1] they discussed about architecture of cloud and its size. Experimental results show that, proposed TDARP is a proposed method and it provides high performance as compare to the existing algorithms. The chiefgoalof this algorithm is to request completes its task with lowest power consumption and provide complete uses of resources. Further it is proved that this novel algorithm is helpful to give maximum throughput and lowest requests failure count and computation power.So to minimize challenges of cloud architecture, they have proposed a trust based scheduling algorithm using ant colony to minimize the load and improveQoS of the system.

In paper [2] they surveyed on Cloud Computing Opportunities and Challenges. In this paper, they identified major challenges and issues associated with cloud-based environments. Therefore it tries to provide best suitable solution to that particular problem.In Overall, it is expected that cloud computing will be the most important and interesting issue in IT industry.

In paper **[3]** presented particular algorithmsin cloud data centers for energy capable scheduling of virtual machines (VMs). Mainly this research is focus on optimal allocation algorithmhaving lowest power consumption. An energy aware best fit algorithm is also used for comparison purpose. Whenever resources are released the exact migration algorithm adapts placements results from an integer and linear formulation of VM migration.Experimental results provethe positive effects of merging the allocation and prove their capability to attainimportant energy savings.

In paper **[4]**discussed dynamic and integrated resource scheduling algorithm for Cloud Datacenter.This proposed algorithm in total run time of request try to balance load between servers,moreoverthey tried to migrate an application from one server to another successfully without any interruption. Some load balancing measurements are also discussed in this paper.In experimental results, they provide a mathematical equations and average utilization to load balance. To apply DAIRS method in real time scenario they have used physical server with physical cluster and Virtual servers with virtual cluster. It saves time to migrate application as a replacement for of Application migrating whole VM data.

In paper [17], they explained that load balancing problem is multi-variant which degrades the performance. This paper presents a detailed encyclopedic review related to load balancing techniques. This paper depicts merits and demerits of efficient load balancing algorithms in future. The paper also suggests new insights towards load balancing in cloud computing.

In paper [18], represented Balanced Throttled Load Balancing Algorithm by comparing the results of the BTLB with round robin algorithm, AMLB algorithm and throated loaded algorithm. The proposed techniques shows improvement in response time in a better way. BTLB was developed and tested using Java. Thus, this papers shows that advanced techniques are better than the conventional one to produce more efficient results.

2.1 Challenges in Cloud Computing

Cloud computing is a vast field and it is not easy to understand its services and working procedure. So, it is always to clear every little concept related to this field. There are some challenges which are faced by the user. These challenges are discussed as follow:

Challenges	Description
1. Management and Resource Allocation of Data	Resource allocation is major challenging concept of cloud computing. A resource is optimizing virtual network by increasing the revenue. Furthermore, power consumption is more for data center networks.
2. Load Balancing	It is related to download performance and Storage utilization. This problem mainly occurs in distributed nodes.
3. Availability and Scalability	Performance degradation and oversizing problems occur due to unpredictable in cloud.
4. Compatibility and Migration to Clouds	To increasedependenceon outdoor third party is the main concerns during theprocess of migration. Secondly,misinterpretation

	about features of cloud and its structure, limitation of auxiliary resources, and lack of knowledge of new technology is also dangerous.
5.**Interoperability and Communication Between Clouds**	At every phase of communication and interoperability have some shortcomings that make the procedure of attaining interoperable cloud computing backgrounds more challengeable.

A Load balancing is one of the major issues in cloud clouding. To overcome this ant colony optimization algorithm with BFO for scheduling can be used.

3. Optimization Algorithms

There are various optimization algorithms are available to find optimal path. Main optimized algorithms are discussed as below:

1. Ant colony optimization: ACO ideas are situated on the ordinary behavior of ants. Of their daily life, probably the most duties ants must perform are to seek for meals in the neighborhood of their nest. While moving in such a quest, the ants deposit a chemical substance referred to as Pheromone within the floor. That is performed with two basic objects. On the one hand, it allows for ants to seek out their way again to the nest, comparable to Hansel and Gretel in the fairytale and however, it makes it possible for different ants to know the way they have taken, in order that the others can follow them.
The curiosity is that, in view that hundreds or even countless numbers of ants have this behavior, if one might see the pheromone laid within the floor as a variety of sunshine, the bottom could be a tremendous community with one of the arcs brighter than the others and inside the paths created with the aid of those arcs would absolutely be the shortest route between the nest and the meals source. This behavior may also be noticeable as a style of a conversation between the ants. If the path has a bigger awareness of pheromone that is mostly as a result of its shorter size that has allowed ants to travel turbo leading to a bigger number of travels through the path for this reason with much more ants depositing pheromone on it [1].

2. BCO (Bee Colony Optimization): The Bees Algorithm copies the searching method of bumble bees to search for the best answer for an advancement issue. Every applicant arrangement is considered as a nourishment source (blossom), and a populace (province) of n operators (honey bees) is utilized to seek the arrangement space. Every time a simulated honey bee visits a bloom (lands on an answer), it assesses its gainfulness (wellness).

The Bees Algorithm comprises of an initialization methodology and a fundamental quest cycle which is u iterated for a given number T of times, or until an answer of satisfactory wellness is found. Every hunt cycle is made out of five methods: enrollment, nearby pursuit, neighborhood contracting, site relinquishment, and worldwide inquires [3].

3. Bacteria Foraging Optimization: The Bacteria Foraging is an evolutionary algorithm. After each iterative stepcost function of the program proceeds and gives better output with better fitness results.Coordinates (position) parameter of the bacteria represents its optimized.

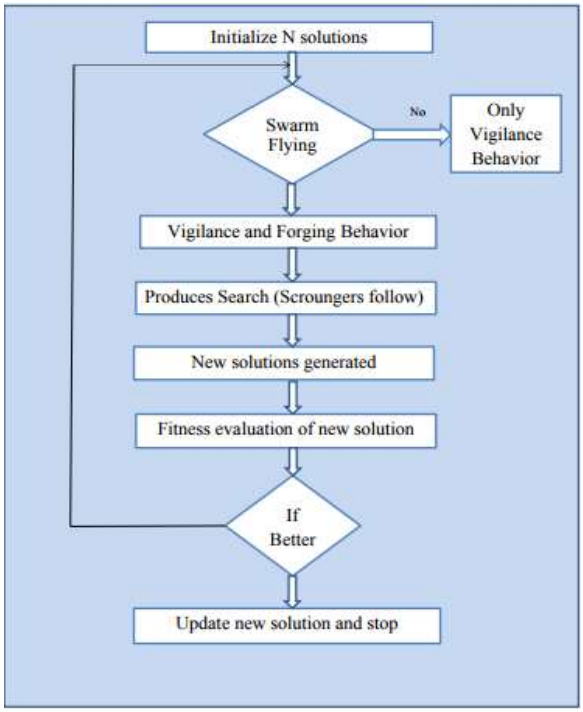

Fig.1.2 BFO process

Main parameters are discretized in the prerequisite range and every distinct values in particular set in the space coordinates to characterize a point. At each point, one bacterium is localized. After localized, cost function is calculated whenever bacteria move to the new position. Movement of the bacteria is defined by using updated cost function. At the end it leads bacteria to a position with highest fitness [11].

4. Methodology

In the existing work, Ant Colony Optimization had been used for the scheduling purpose. However this algorithm is not suited for the Trust Value Management. This algorithm has more failed requests. This degrades the performance of the system. In the proposed work, Bacterial Foraging Optimization will be used for Bacteria search in the similar way to make best use of energy acquired per unit time. Individual bacterium also interconnects by sending signals with other resources. It helps to minimize failed request and improve performance of the system.

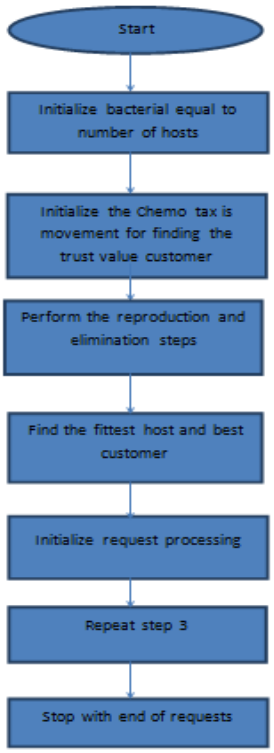

Fig.1.3 Flowchart of Methodology

First of all, datacenters and host are setup. Bacteria are deploying equal to the number of host. To find out the best customer, Chemotaxis is initialized. After this, reproduction and eliminate steps are performed to get the best results. As a result we get fittest host and best customer. In next step request processing is initialized. Again after the completion of this, step 3 is repeated. The entire process is end with the stop of requests.

For the implementation of proposed technique, cloud sim is used.

5. Results and Discussions

The whole scanerio has been implemenetd on Cloud Sim 3. The exiting technqiue consume more power and taking more time as compares to existing techniques. For the testing various tests have done over power frequency.

Table 1: Server configuration

Server	RAM	MIPS	PE	Host
1	3000	2000	10	5
2	3000	2000	10	5
3	3000	2000	10	5
4	3000	2000	10	5
5	3000	2000	10	5

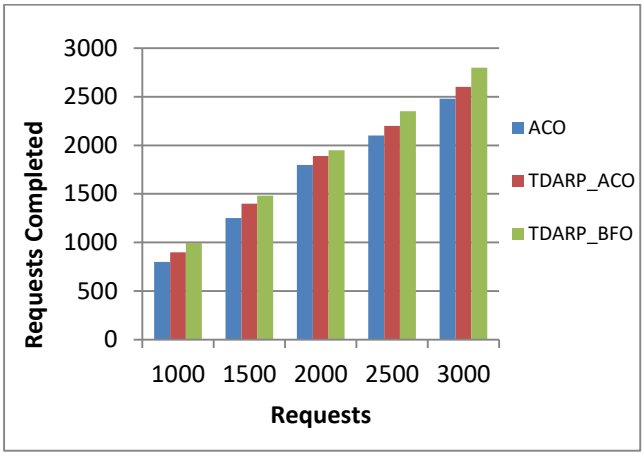

Fig.1.4 Compariosn between requets

In fig. 1.4, we have compared various algorithm for Request versus Request Completed. It is cocluded that proposed algorithm TDARP BFO gives better output as it completes more requests as compared to other algorithms. When 3000 requests has arrived it proposed algorithms completed 2800 which better than other algorithms.

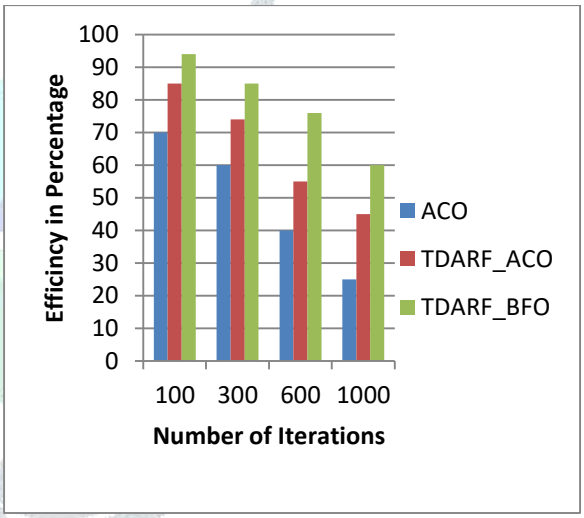

Fig.1.5 Efficiency

In fig. 1.5, we have compared various algorithm for No. of iterations versus efficiency. It is cocluded that proposed algorithm TDARP BFO gives better output as it completes more tasks as compared to other algorithms. With 1000 iterations it gives 60% efficiency which is more than other algorithms. Hence proposed algorithm is more efficient.

6. Conclusion

Cloud Computation is an emerging field in these days and need advance research in this topic to increase reliability. It also guaranteed to provide better user experience in term of task computation. So there is a need to propose a novel scheme having minimum energy consumption and more reliability of task completion scheduling.In overall performance phase, it's

considerably clear that TDARP_BFO provides high performance as examine to preceding proposed set of rules. The predominant of this set of rules in cloud computing is to complete the request while consuming minimumpower and full usage of resource. Further proposed set of rules proven that it can maximizethroughput and reduce the requests failure matter and computation power. Therefore experimental results show that proposednovel method is better than existing one.

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