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Efficient Load Balancing and Fault tolerance Mechanism for Cloud Environment

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ABSTRACT

In this paper, a hybrid bio-inspired algorithm (MPSO and MCSO) is proposed to solve the task scheduling problem in real time cloud environment. The proposed algorithm reduced execution time while allowing maximum parallelization. the proposed method also work effectively if fault occurs during task execution.

Keywords : task scheduling, cloud computing, Modified Particle Swarm algorithm, Modified Cat Swarm Algorithm, etc

I INTRODUCTION

Cloud computing delivers a computing environment where different resources are delivered as a service to the customer or multiple tenants over the internet. Task scheduling is an essential and most important part in a cloud computing environment. The task scheduling mainly focuses to enhance the efficient utilization of resources and hence reduction in task completion time. Task scheduling is used to allocate certain tasks to particular resources at a particular time instance. Many different techniques have been proposed to solve the problems of task scheduling. Task scheduling improves the efficient utilization of resource and yields less response time so that the execution of submitted tasks takes place within a possible minimum time.

In a cloud environment, there are different service models such as SaaS, IaaS, PaaS and XaaS where X refers to anything as a service. All these service models need to satisfy the incoming tasks of the clients within the service level agreements(SLA).To execute these tasks, we need to deploy Virtual Machines (VMs) in the cloud and these VMs play a key role in serving the incoming client tasks . Since cloud is a pay as you go model hence several VMs can be created and destroyed inside the physical machines (PMs).

Scheduling in Cloud Computing

Task scheduling is the process of allocating the resources to the particular job in specific time. The main objective of scheduling is to maximize the resource utilization. Minimizing the waiting time is the goal of scheduling. A good scheduling algorithm yields good system performance. In the cloud there are numerous and distinct resources available. The cost of performing tasks in cloud depends on which resources are being used so the scheduling in a cloud environment is different from the traditional scheduling. In a cloud computing environment task scheduling is a biggest and challenging issue. Task scheduling problem is NP-Complete problem. Many heuristic scheduling algorithms have been proposed, but more improvement is needed to make system faster and more responsive. The traditional scheduling algorithms like First Come First Serve (FCFS), Shortest Job First (SJF), Round Robin (RR), Min-Min, Max-Min algorithms are not much better solution to scheduling problems with cloud computing. So we need the better solution to this heuristic problem.

Types of Scheduling

The scheduling can be distinguished as Static Scheduling and Dynamic Scheduling.

1. Static Scheduling: In Static Scheduling all information are known to scheduler about tasks and resources before execution. It has less runtime overhead.
2. Dynamic Scheduling: In Dynamic Scheduling information about task components is not known before execution. Task execution time may not be known. It has more runtime overhead.

II RELATED WORK

From the overall study it is seen that the above topic put emphasis on some important methods or techniques. Dynamic algorithms are well suited in cloud computing environment because they distribute work at run time and assign suitable weights to the servers. A lightest weight server is search in network and preferred by this algorithm . Now a day's Bio-inspired dynamic load balancing algorithms are widely getting importance in load balancing techniques.

Ant colony algorithm

Different ant colony algorithms also introduce to balance the load applying ant behaviour for searching food.[10]Larger weight means that resource has high computation power. Load balancing ant colony optimization (LBACO) not only balance the load but also minimizes make span. All tasks are assumed to be mutually independent and computationally intensive.

Honey bee foraging algorithm

This algorithm is basedforaging behaviour of honey bees. When an under loaded VM assigns a task, it updates number of priority tasks and load of VM to other tasks in waiting list. This approach helps other processes to choose

their VM [59]. If a task has high priority, then it selects a VM having minimum number of priority tasks. It does not take into consideration only load balancing but also keeps track of priorities of tasks which currently removed from heavy loaded machines. It increases throughput and minimizes response time.[9]

Throttled load balancing

This algorithm depends upon the theory of suitable search of virtual machine.[8] The task manager makes a list of virtual machines. By using the list, client request allotted to the relevant machine. If the size and capability of the machine is suitable for request, then the job is given to that machine. This algorithm is better than round robin algorithm.

Pareto based fruit fly optimization algorithm

A Pareto based fruit fly optimization algorithm (PFOA) is use to solve the task scheduling and resource allocating (TSRA) problem in cloud computing environment.[2] First, a heuristic based on the property of minimum cost initialize the population. Second, a resource reassign operator is used to generate non dominated solutions. Third, a critical path based search operator is used to improve the exploitation capability.

Multi objective Scheduling cuckoo algorithm

CSA mimics the breeding behavior of cuckoos, where each individual searches the most suitable nest to lay an egg (compromise solution) in order to maximize the egg's survival rate and achieve the best habitat society.[4] Fuzzy set theory is used to create the fuzzy membership search domain where it consists of all possible compromise solutions. CSA searches the best compromise solution within the fuzzy search domain simultaneously tuning the fuzzy design boundary variables. Tuning of fuzzy design variables eliminate the requirement of expertise needed for setting these variables.

Min-Min algorithm in cloud environment.

Load Bbalancing Min Min algorithm has a three level load balancing framework.[11] In first level LBMM architecture is the request manager which is responsible for receiving the task and assigning it to service manager, when the service manager receives the request; it divides it into subtask and assigns the subtask to a service node based on node availability, remaining memory and the transmission rate which is responsible for execution the task.

SYSTEM MODEL

We proposed improved hybrid (MPSO+MCSO) for task schedulling scheduling.

III ALGORITHMS

A. Modified Bio-Inspired Algorithm Receive request from user

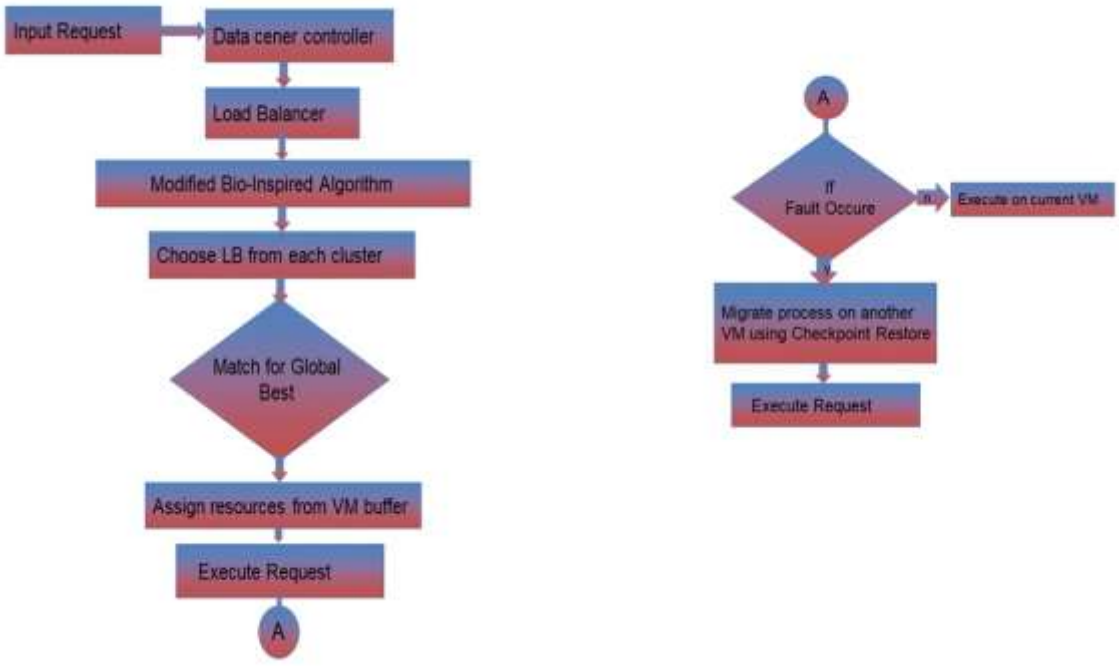
1. Encrypt the request processing parameters using Caesar Algorithm
2. find existing loads and maximum load each servers can handle
3. find minimum of the loads by calculating difference between maximum load and current load on each serveri.e. for each server i, load(i) = min (maximum_load(i)-current_load(i))

4. first two servers are given priority for redirection. if they are found busy then request is redirected on third server
5. identify current time instance and calculate queuetime required to perform the redirection decision.
6. update current load of the selected server as current_load=current_load+1
7. redirect on Application server on respective Virtual Machine to perform transactions

B. Fault Tolerance algorithm

1. Enter search query and redirect on application server using proposed load balancing algorithm
2. Calculate the response time required by respective server to process a request and store in db
3. For every request processing evaluate the time required against average response time using response history
4. if time required is more than average time, fault is said to be occured and reported
5. the request is sent back to controller and redirected to the next least loaded server

IV FLOWCHART



V CONCLUSION

Checkpoint - Rollback is a technique which can be used to build fault tolerance into a computing system.

This paper provide information about checkpoint Restore technique and various mechanism proposed by different author to enhance the performance of checkpoint restore technique. This study throws light on process of check pointing and classification of check pointing schemes.

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