Task Scheduling Method Based on Dynamic Queue and Hybrid Meta Heuristic Algorithm in Cloud Computing Environment

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Abstract: Cloud Computing Has the Characteristics of Distributed Computing Storage, High Availability, Cost-Effective and So on. It Has Gradually Involved in Many Fields, Such as Medical Treatment, Network Security, Image Processing and So on. in the Cloud Computing Environment, the Optimization of Task Scheduling Method is One of the Core Contents of Current Scholars. in This Context, the Paper First Describes the Relevant Task Scheduling Algorithm in the Cloud Computing Environment. Secondly, the Model of Dynamic Queue and Mixed Meta Heuristic Algorithm is Constructed to Optimize the Task Scheduling Calculation Method. Finally, the Paper Points out the Detailed Execution Process of Task Scheduling, in Order to Provide Useful Reference Experience and New Problem-Solving Ideas for the Follow-Up Algorithm Research.

1. Introduction

1.1 Literature Review

Cloud computing, also known as network computing, can process tens of thousands of data in a short time to achieve network services. Wang Wenfeng and Shuai Jianmei find that commercial cloud computing turns task scheduling into a challenging problem, so they propose a task scheduling strategy, which aims to optimize the time required for task completion by using genetic algorithm, and in the idle state, the computing unit dynamically adjusts the resource utilization of task allocation to significantly optimize, and uses cloudsim simulation platform to verify the effectiveness of genetic algorithm(Wang et al,2012).Zhang Junjie, Shi Junhao and Xu Zhenliu, etc., according to the characteristics of 10geponon upstream channel burst transmission, through OMNeT + + to build 10gepon simulation model, get the quantitative reference data and energy-saving design method of dynamic queue cache technology to realize 10geponon, and carry out experimental verification on FPGA platform(Zhang et al,2012).Li Guocheng and Xiao Qingxian proposed a new hybrid meta heuristic search algorithm based on chaos and gravitation search, particle swarm optimization and other algorithms, which has the ability of balancing development and exploration. By comparing the new hybrid algorithm with genetic algorithm and particle swarm optimization, they found that the new hybrid algorithm has the ability of non dominated investment in solving the problem of portfolio selection. Better results in terms of portfolio(Li and Xiao,2013).Xu Wenzhong, Peng Zhiping, Zuo Jinglong, etc. found that there are some problems in the cloud environment, such as low resource utilization rate, unbalanced node load, etc. using the best fit method and the combination of crossover and mutation operations, we created a high-quality initial population and got the optimal solution. Through the simulation analysis and comparison of cloudsim platform, we got an optimal heuristic hybrid based on genetic algorithm. The cost-effective method is used for workflow scheduling of task completion time, acceleration ratio, etc(Xu et al,2018).

1.2 Research Purposes

With the rapid development of the information age, massive data and huge task processing amount put forward high requirements for the hardware facilities of the enterprise or government, individual and other terminal systems, and also bring huge costs in the process of maintenance and

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equipment procurement. As a new algorithm in distributed computing, cloud computing decomposes huge data processing program into numerous small programs through network cloud, and gets the results through multi program processing and returns them to users. Cloud computing realizes data resource sharing and storage, and provides certain environment and conditions for platforms, users, software and other programs. Cloud computing task transfer is a key technology in cloud computing. Using dynamic queue algorithm and mixed meta heuristic algorithm in cloud computing can effectively save the time and space needed to complete data processing, optimize the tedious steps in the process of task mobilization, and improve the utilization rate of data utilization resources. In this paper, by summarizing the problems in the process of task scheduling using dynamic queue and hybrid meta heuristic algorithm, through model building and task scheduling execution process, the processing of massive data in the cloud computing environment is realized, so as to achieve the optimal solution to save time and cost in the process of data processing.

2. Description of the Problem

Cloud computing is a mature algorithm in distributed computing. Cloud computing system has powerful information resources, including computing, network and storage resources. By sharing these resources, reasonably allocating and deploying them, cloud computing can reasonably process the existing data, so as to reach the standard of providing services for users (Tao and Shen, 2018). Cloud computing is becoming one of the most popular data processing algorithms, which is widely used in all walks of life. With the rapid development of the information age, the network and computer technology are becoming more and more mature, and the application field of Internet is more and more extensive. Cloud computing puts forward higher standards for data processing methods and hardware infrastructure used in computing, but it brings huge costs to enterprises, governments and users in terms of updating computing, equipment maintenance and human recruitment (Wu, 2018).

In the cloud computing environment, resources are generally transferred to customers in a virtual way. *VM* represents any kind of resources in the cloud computing environment. Resources can be described as follows: $VM = \{vmid, mips, size, ram, bw, pesNumber\}$.

In the above formula, *id* in *vmid* refers to a certain resource, *mips* refers to CPU operation instruction data, *size* refers to resource size, *ram* refers to memory, and *pesNumber* refers to the number of CPUs in cloud computing environment.

If a user submits any task for a resource, it can be represented as: $Clet = \{id, length, fileSize, outputSize\}$.

In the above formula, *id* refers to a task uploaded by the user, *length* refers to the task length uploaded by the user, *fileSize* refers to the file input size of the task uploaded by the user, and *outputSize* refers to the output size of the task file uploaded by the user.

In the cloud computing environment, the task scheduling method of dynamic queue and hybrid meta heuristic algorithm actually means that in the same system, there are multiple tasks, and each task is independent of each other. All tasks are allocated according to the scheduling strategy of dynamic queue method or meta heuristic method, and the number of virtual resource execution assigned m is less than the number of tasks n.

The set of this task can be represented by a formula: $Clet = \{clet_1, clet_2, \ldots, clet_n\}$. Under this condition, the virtual resource collection can be expressed as: $VM = \{vm_1, vm_2, \ldots\ldots, vm_n\}$. From

the above two formulas, we can get the assignment formula of task scheduling in the cloud computing environment: $X = \begin{pmatrix} x_{11} & x_{12} & x_{1n} \\ x_{21} & x_{22} & x_{2n} \\ & & \\ x_{m1} & x_{m2} & x_{mn} \end{pmatrix}$.

In the above formula, x_{mn} represents the relationship between a task $clet_n$ submitted by the user and its corresponding virtual resource. The values of m and n are both natural numbers greater than or equal to 1. In the matrix, task scheduling can find the most suitable resource subset function.

3. Model Building

In the cloud computing environment, the purpose of using dynamic queue and mixed meta heuristic algorithm is to optimize the task scheduling method, and then to promote the reasonable calculation of resources. In the process of task scheduling, it is very important to build a reasonable coding. First of all, we assume that in cloud computing task scheduling, there is n kind of task to execute, and the number of virtual machines is m . n is the dimension of each group of data. The number of virtual machines m corresponds to the dimension value of this dimension. In this process, in order to do a good job in data statistics, when coding the virtual machine, we must use the way of increasing the number. For the convenience of understanding, this requirement is expressed as follows: $X = [x_1, x_2, \ldots, x_n], x_i \in [1, m+1)$, Where x_i is the real number. When task scheduling is decoded in this way, it can also be expressed as follows: $X' = [|x_1|, |x_2|, \ldots, |x_m|]$. The above two formulas are used to schedule tasks. After decoding, each dimension has corresponding values, which represent the matching resource sequence numbers of different tasks.

4. Task Scheduling Execution Process

First of all, in the cloud computing environment, according to the computing system set up by task scheduling, users' task processing requests are usually divided into different kinds of tasks according to the information data of the cloud computing center. These tasks can be scheduled by the system scheduling scheme.

The second step is to use hybrid meta heuristic algorithm, such as genetic algorithm, to optimize all the computing units of the tasks to be processed. The sorting method needs to be carried out according to millions of instructions to achieve the expected value of each task.

The third is to check each task request queue. If there is an empty queue, there is no need for task requests. The system only needs to process task queues in order. If it is checked and found that the computing unit corresponding to the task queue can be used and scheduled at the same time, it is necessary to modify the properties of the relevant queue and send the task request. If it is found that some task calculation units cannot be scheduled in the process of task scheduling, but they can be used, the system can calculate the next unit first. If the computing unit fails, the next task cannot be docked for calculation. In this case, the unfinished tasks need to be migrated. Continue the calculation in the previous cell and change the relevant queue properties to match them. In a cell without a task request queue, if there is a vacancy in the queue, the scheduling algorithm will be terminated.

The fourth step is that if the remaining tasks meet the re allocation requirements after the task scheduling calculation stops, the corresponding tasks can be migrated to the new task request queue. After the property modification is completed, the third step of the calculation step can be started. If the remaining computing tasks do not meet the requirements of redistribution, the computing system will continue to perform task scheduling according to step 3. In this step, we need to fully understand the reassignment of computing tasks. Find the fastest computing unit that can be utilized and scheduled, and filter the unexecuted and fastest running task requests in the corresponding task

request scheduling queue. If the task request scheduling queue meets the migration conditions, the task will be migrated. If the migration requirements are not met, empty queues should be processed in order.

Finally, we need to pay attention to the task running situation reflected by each computing unit and the properties of the task request queue.

5. Conclusion

In this paper, based on the cloud computing environment, dynamic queue and new hybrid meta heuristic algorithm are used to realize the task transfer of various data, which effectively saves the huge cost and resource utilization in the process of data processing. By analyzing the concept and characteristics of cloud computing task transfer, and comparing the traditional algorithm, we find that there are some problems in the current dynamic queue and hybrid meta heuristic algorithm. Combining the advantages and disadvantages of the traditional and new algorithm, we improve the cloud computing task transfer scheme. The dynamic queue and hybrid meta heuristics are used to optimize the scheduling of combined task transfer, build a reasonable coding, optimize and improve the task transfer scheme of dynamic queue and hybrid meta heuristics through verification in the simulation platform according to the queue verification, task request and operation in the process of task transfer calculation. Therefore, the new cloud computing algorithm can not only reduce the cost of data processing time, but also make full use of resources. In the future research process, this kind of method is considered to be used for experiments, and an effective method for better data processing in the future is proposed, as well as a task mobilization scheme based on the dynamic queue and hybrid meta heuristic new algorithm in the cloud computing environment. It is expected that Further research provides valuable reference and reference.

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