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Virtual machine tree task scheduling for load balancing in cloud computing

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ABSTRACT

The increasing number of publications towards cloud computing proves that much research and development has been done, especially for task scheduling. Organizations are eager to get more customized technology to run the most smoothly in the provision of visual cloud services for fruity users. As the circumstances of Covid indicate to technology that everyone should run digitally, the workload on machines increased. For workload solutions, organizations are trying to balance the situation with the successful operation of cloud services to use appropriate services/resources. Nevertheless, the issues are still to be resolved by researchers, so we respect all my friends who are putting a lot of effort into developing new techniques. A proposed paper is showing a new collation with the load balancing factor by implementing quality of service (QoS) and virtual machine tree (VMT). A CloudSim toolkit will then be used to compare them. A tree structure graph is included in the VMT algorithm to schedule tasks with the appropriate distribution on each machine. The QoS algorithm performs the task of scheduling based on the service required by the user with the best quality and satisfies the user.

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1. INTRODUCTION

Proved that cloud computing can perform under all circumstances and we would like to thank all our friends/developers voluntarily for their efforts. The performance of cloud services has also shown its good impact on the Corona effect. Cloud computing primarily considers data centers and service delivery connections on a rent basis. Since this is the common and basic definition of cloud computing, but due to changing today's scenario, data centers are filled with millions of applications and requests to get it approved as soon as possible [1]. All fields, it may be of education, it may be of development, it may be of healthcare, it may be of militarization, the cloud will have to demonstrate its powers and full of intelligence for all indulgence.

Cloud computing is like a breeze from which things flow slowly. Its job is to complete the deployment of applications on servers only and then provide it through a defined channel to attract the attention of users/organizations [2]. Cloud computing has chosen the way the traditional system works and transforms it into soft-access conditions [3]. It provides many fruitful services such as infrastructure, platform, software, security, trust, and data as a service. Allocation of the scheduling and resources are the key factors that must comply with the users' requests at the required time. Thousands more applications are in the pipeline to run as quickly as possible according to user requests [4], [5]. To execute them in parallel, internetwork and usage always try to complete the processing, which is called virtualization. Many duplicate files can be stored on

multiple machines so that users can be satisfied by providing services with full efficiency and availability. Reliability and scalability can be accessed by the term task scheduling [6]. The vision of the information technology (IT) industry will become cloud IT in the early days which will operate on a service-oriented model. This will apply to new services such as requests, healthcare as service, assurance as service, and dependency as service [7].

In addition, factors such as balancing are focused in the proposed paper for task scheduling algorithms in cloud computing [8]. Shortly, the balancing factor tries to improve the Covid effect on scheduling and make users feel so light with the comfort of the proposed collation. Still, our friends are trying a lot to create soft processing to balance the Covid impact from an already running or executed system [9], [10]. The Cloudsim3.0 toolkit runs programs in the NetBeans integrated development environment (IDE) with multiple cloudlets and virtual machines.

2. METHOD

The proposed paper compares the optimized quality of service (QoS) and virtual machine tree (VMT) algorithm with the balancing factor with the dynamic collation of machines and tasks. Here the facts are described in the section. A basic view of the comparison is shown by Figure 1. A comparison usually appears all the hidden facts by showing with the graphs. Figure unfolds the comparing values between traditional and optimized algorithm here. It is well known that the optimized always outperform the conventional algorithm. Optimization is basically a way of solving a problem by giving a set of inputs to a particular scenario along with some valid facts. And somehow optimization always performs well to give the maximum and minimum finite value or range to the specified function or method.

Scheduling in particular for load balancing is generalized by many research papers. A very dramatic classification and survey is shown with various articles. Comparison with existing methods is performing very well in terms of load balancing. It also indicates the current issues that are happening with complex execution in real and dynamic positioned problems [11], [12]. Such problems may consider quality issue in which the provider or authorized dealer is not able to produce satisfaction ratio for the user [13].

Various load parallelism methodologies have been illustrated in published papers for better visualization in a distributed environment. The load is generally distributed in a very distributed manner across social channels such as Facebook, and Twitter. Still a lot of parallelism is needed as the data is increasing its volume day by day [14], [15]. Distributions are also classified for specific scenarios. Primarily for social websites, education and business polls, the task or performance load must be received through designated channels. Zone based approach may also be taken into consideration for smooth load balancing. A quick view of the existing techniques is given here by a tabular representation.

Different graded scheduling taking into account the load balancing parameters for better improvement as shown by Figure 2. Tasks, resources and virtual machine (VM) scheduling are bearing heavy load on the communication channel. By analyzing the data or several research articles by Table 1 it is clear to say that a small number of VM scheduling took this parameter to improve networking [16]. Because of this shortcoming, the proposed paper implemented better results with VM_Tree scheduling and showed better results in terms of balancing the load with traditional first-come-first-serve (FCFCS) scheduling.

Figure 1. Optimization for task scheduling

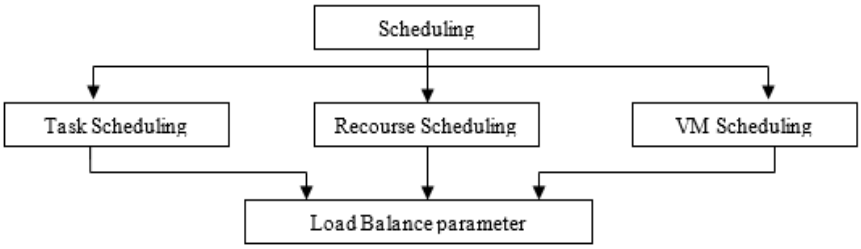

Figure 2. Optimization for task scheduling

Table 1. Existing Techniques in various published papers

Technique used	Scheduling type
Conventional non-classical	Task scheduling
Full set algorithm and column generation algorithm	VM scheduling
Dragonfly optimization and constraint measure-based load balancing	Task scheduling
Fairness aware algorithm	Resource scheduling
Honey bee behavior	Task scheduling
ACO	Task scheduling
Agent based nature inspired algorithm	Resource scheduling
Non-classical	Resource scheduling
Weighted round robin	Resource scheduling
Nature inspired GA	Task and resource scheduling

This research paper shows that the load balancing techniques are presented in a very detailed manner by considering the virtual machine tree concept. Due to the new workload, the existing technology needs to be in sync with the new things to make the execution smooth. Nature naturally performs actions by getting the real and present situation in time, results or complications in the coming life, similarly with technology, if scheduling is done by adopting natural calls, the results are substantial. These results may yield many unexpected ways to solve complex applications [17]. The author tries to deliver efficient results by passing data or queries to the existing system. Since the data is available as big data, a pre-prioritization algorithm is implemented to use the steps for the next innovative priority levels [18], [19].

Steps for pre-priority are ranked with their size such that the functions with the highest length are getting the lowest degree or rank for the specification. Along with tasks, virtual machines are also prioritized along with their size which holds some multiple instructions per second (MIPS) unit to run. Then a tree will be formed by the binary structure. These cloudlets are working in a group and the group of tasks considered with their allocated virtual machine is shown through mentioned code lines for creating machines.

Code lines

```
package org.change.costbased;
public class tree {public static void main(String[] args){ new tree().run(); } static class Node { Node left; Node right; int value; public Node(int value) {this.value = value; } } public void run() { Node rootnode = new Node(25); System.out.println("Building tree with rootvalue " + rootnode.value); System.out.println("======================== ==========="); insert(rootnode, 00); insert(rootnode, 01); insert(rootnode, 02); insert(rootnode, 03); insert(rootnode, 04); System.out.println("Traversing tree in order"); System.out.println("======================== ==========="); printInOrder(rootnode); } public void insert(Node node, int value) { if (value < node.value) { if (node.left != null) { nsert(node.left, value); } else { System.out.println(" Inserted " + value + " to left of node " + node.value); node.left = new Node(value); } } else if (value > node.value) { if (node.right != null) { insert(node.right, value); } else { System.out.println(" Inserted " + value + " to right of node " + node.value); node.right = new Node(value); } } } public void printInOrder(Node node) { if (node != null) { printInOrder(node.left); System.out.println(" Traversed " + node.value); printInOrder(node.right); if(node.left==null && node.right==null) { System.out.println(" leaf node" + node.value); } } }}
```

At the top of the root, the machine with the highest memory will be set as the starting machine to start with for task scheduling. Then the next nodes will set their rank below the root value and then move left side first then get intimate after right move [20]. Since it is following the basic property of binary tree, the proposed scheduling will eventually take the trick of virtual machines with real tasks to complete the proposed scheduling with some optimized results [21]. Figure 3 shows the actual run of the proposed evaluation of the defined virtual machine tree scheduling.

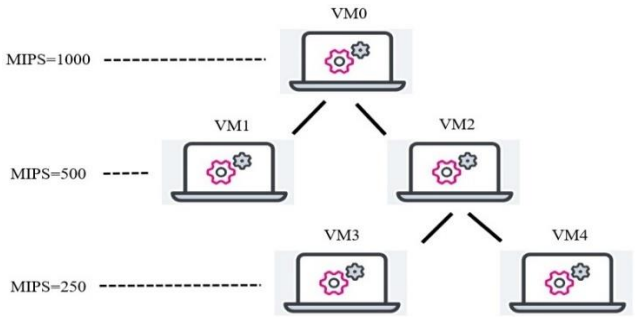

Figure 3. Virtual machines with different size on different levels

3. RESULT AND DISCUSSION

CloudSim simulator provides a platform for the developers to design and determine the result matrix with some specialized functions. It has a lot of built-in functionality to process the entire model for task scheduling. Load balancing means tracking over-underload points and achieving good by distributed load among all active machines. The achievement of goodness increases the value of the mentioned factor. Through priority and fixed rank, the algorithm is able to spread the quality of work equally [22]. Balancing factor calculation:

$$CL = TL_{VMT} / N_{VMT}$$

here, centre load (CL) represents centre load. TL_{VMT} represents load of virtual machines is calculated by the load average of the cloudlets that execute on it. N_{VMT} represents number of virtual machines. Coding is done on the Java platform with 5 virtual machines and 37 cloudlets. Output code is shown through Figure 4.

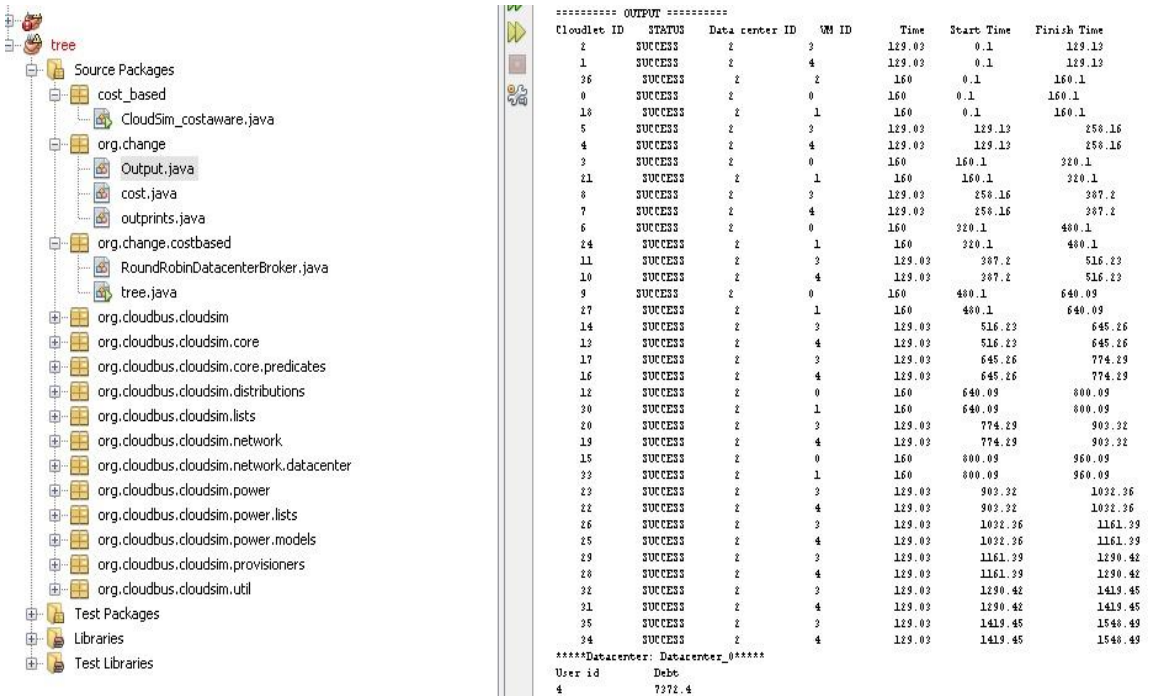

Figure 4. Optimized scheduling outcomes

For effective results, multiple views of results have been generated using CloudSIM method with the help of Microsoft Office Excel. The system automatically saves the results in such drives and then sees the results and tries to make effective charts to make better understanding of the results. Such correctly and smoothly running tasks may vary the number of cloudlets to show more transactions for load balancing [23].

The graph is designed with manual calculation of tasks per machine. The main advantage of the paper is that it is analyzed among optimized algorithms [24]. By obtaining the results shown by Figure 5, all machines run on all machines with equal load distribution, which leads to the correct use of every resource. Then further execution will be relaxed for the next incoming request for the machines.

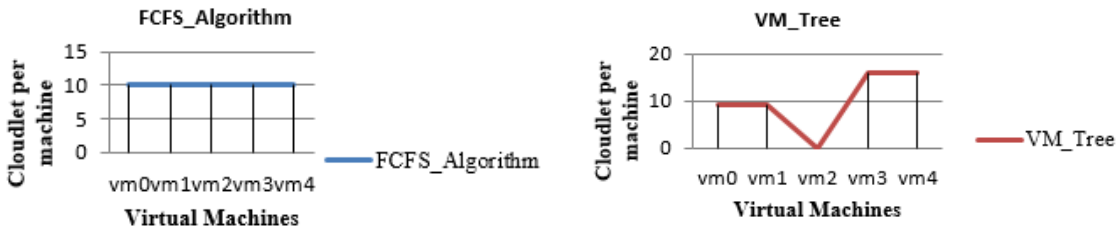

Figure 5. Optimized scheduling outcomes

Here counting for a virtual machine, it takes 5 and 20 cloudlets to run the scheduling on a particular event [25]. Total tasks taking their processing with same parameters is first come first serve scheduling. Whereas virtual machine is taking cloudlet for tasks based on machine specifications and then starts working with actual load.

4. CONCLUSION

A landscape view is shown in the articles in the direction of today's innovation. The revolutions are done using bee's algorithm as a form of swarm optimization. In order to cut down on cost and execution time, an optimal algorithm is implemented in the cited paper. Also, many authors evaluate the term scheduling with the help of gang scheduling by measuring the cost for each running phase. Multiple tasks were completed using this scheduling and multiple outputs were obtained at the same time with great accuracy. One to one instruction execution or communication is done for the processor along with their relevant functions. Gang scheduling is basically an extension of traditional scheduling. With many announced jobs, Gang Scheduling is able to provide deadlines for each activity. Amazon cloud also uses this scheduling to run its tasks most of the time. Overburden is also reduced in your value calculation and it provides proof of performance with efficient results.

The study involves balancing factor with different technologies and comparing quality of services with the dynamic nature within the cloud environment. Surveying several parameters, it was found that the balancing factors require more refinement to achieve load balancing on each machine. Due to epidemic conditions, data on the server is in many natures. Now requests/applications are coming up with new Covid challenges to make the system run with heavy applications. The bulk of the data engages researchers to make the technology more refined to handle the system efficiently. The ideas are hypothetically many, but still need to be implemented. It also increases security challenges for data. Through upcoming invoices, it is building mash-up intelligence to do something more interesting and innovative things.

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