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An Energy-Saving Task Scheduling Strategy based on Vacation Queuing & Optimization of Resources in Cloud

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Abstract - *Energy consumption in cloud computing systems has been the major concern. One of the most important tasks in cloud computing is the optimization of energy utilization and have a resultant green cloud computing. There are number of techniques as well as algorithms used to minimalize the energy consumption in the cloud. Techniques comprise DVFS, VM Migration and VM Consolidation. Algorithms are Maximum Bin Packing, Power Expand Min-Max and Minimization Migrations, Highest Potential growth, Random Choice. The main aim is to optimize cloud's energy utilization. This paper offers resource allocation technique that maximizes the efficiency of the system. Here, we offer two energy-conscious task consolidation heuristics that target to maximize the resource utilization and then explicitly take into consideration both idle and active energy consumption. This paper presents the proposed model for Vacation queuing and Cloud Task Scheduling. This approach has allowed us to advance the quality of the service by decreasing the energy consumption, the reduced processing time and more of sleeping nodes that are helpful for increase in the resting time and makes the system much more efficient.*

Key Words: **Resource allocation, Data Center independent task scheduling, vacation queuing, Load Balancer, Sojourn time, ACP (Average Computing Power)**

1. INTRODUCTION

Cloud computing could be defined as the technique for providing pay-as-you-use type services and access to some shared resources over a network based on the consumer request with a minimum management risk". The shared resources comprise of the servers, applications, storage, software, networks etc. all these resources can be configurable on the user demand. Most of the individual IT Companies and business enterprisers are opting for the cloud so as to share the business information. Existing cloud service provider are Amazon, Microsoft's Windows Azure, Google and IBM. The prime expectation of the cloud service consumer is to have a fast, reliable, and the available service. Cloud computing have been typically classified into two types such as the types of services offered as well as the location of the cloud. The services are classified as Infrastructure as a service (IaaS), Platform as a service (PaaS), and Software as a service (SaaS). Dependent on the location, cloud computing could be classified into four types like public cloud, hybrid cloud, private cloud and the community cloud. High energy consumption is led due to the various electrical equipment, the IT infrastructures, and the randomness jobs would be presented on the computing nodes. In order to handle the random nature of the tasks, computing nodes would be in power on all the time because the jobs would be incoming in any of the time for processing, that leads to the high energy produced.

This thesis proposes the model for the Could Task Scheduling dependent on the Vacation Queuing. This has permitted to improve the quality of service by minimizing the energy consumption, the reduced processing time and more number of the sleeping nodes that are helpful in increasing the resting time of a system and makes the system much more efficient. Based upon the different properties of the user tasks, the load balancer would be used in the proposed method that will take the user tasks and assign to the server side the computing nodes dependent on the tasks properties. The server sides nodes are also divided into the two parts the heavy and small nodes. The simulation results illustrate that the proposed algorithm could reduce the energy consumption of the cloud computing system efficiently while meeting with the task performance.

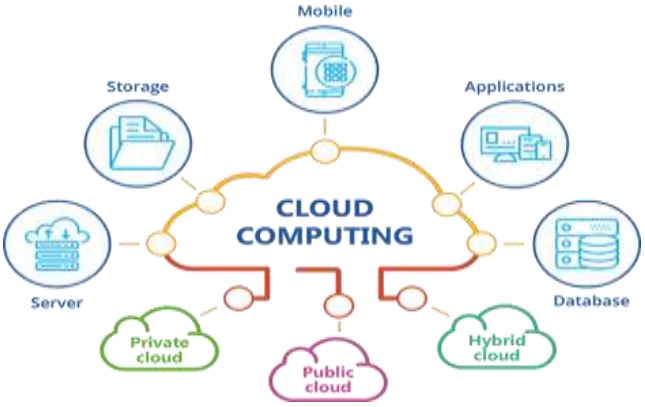

Fig-1: Cloud Computing

2. LITERATURE SURVEY

One of the task in order to reduce the energy consumption in the cloud system has tend to consolidate the VM in PM, that is, concentrating on the workload in a fewest possible PM. Hence, the energy consumption would be reduced. The drawback is that the performance system can be harmed and for this reason, working is done on the allocation resources. To explain it is, distributing VM through a system as efficiently as it is possible. Resource management has been

the core function of any system and affects the three main principles for the evaluation of a system: cost, functionality, and performance. Some inefficient resource management has the direct undesirable effect on the performance as well as the cost and an unintended effect on the functionality of the given system. Resource-allocation studies show the techniques in order to monitoring the availability system and performance. On the other hand, the propose techniques for control of the energy consumption in the cloud systems through resource management. Referring to performance as well as the availability system, they make use of the centralized model of a system, where there is the central entity, that knows the system state every time. The drawback of these techniques has been that the knowing of a system state is mandatory to make some decision. Whereas, this fact also implies to the decision-making that takes place more slowly, and as a result the internal communication network becomes slow. Moreover, it is not taken into consideration the energy consumption in the decision-making.

3. APPROACH

In order to solve the above problem, the advantage of the vacation queuing model is taken in order to analyse the energy consumption of the cloud computing system, and present the task scheduling algorithm dependent on the similar tasks. The main contributions include:

a) First attempt is done to apply an exhaustive service, the vacation queuing theory to the model of the cloud computing system; in augmentation to this, considering the various states of the compute node, the energy consumption characteristics, and the latency during the state transition of the cloud computing system that is heterogeneous in nature, improvements in the vacation queuing theory by addition of idle period when no tasks arrive at the compute node, the node goes through the period of some idle time despite of entering the vacation at once so as to avoid frequent switches amidst the different states.

b) Analyzation of the expectations of task, sojourn time, and the energy consumption of the cloud computing system dependent on the busy period and cycle under a steady state. Dependent on the analysis of partial derivatives of the energy consumption with relation to the variance of service time and idle time, it can be observed that energy can be saved by reduction in the variance of the service time with the scheduling tasks.

c) Based on the analysis, it is proposed that a task scheduling algorithm should be based on the similar tasks in order to optimize the energy consumption, and evaluate performance of the proposed algorithm through all the simulations.

4. RESEARCH METHODOLOGY

Researching the scheduling algorithms and selecting one that is appropriate for the current cloud environment.

a) Implementing the enhanced energy saving task scheduling algorithm with hybrid load balancer.
b) Testing the system using different quality metrics.
c) Presenting the results.

In this paper, we have tried to develop the better task scheduling for cloud computing. Firstly, we worked on researching the best scheduling policy in cloud and found that load-balanced Vacation Queuing method would be best as the VQ has very low energy consumption compared to many other algorithms like min-min etc. and the load balancing strategy aids in the average load over each node in the cloud therefore preventing some extra sojourn time. So, we have proposed a new load balancing shared with the algorithm.

5. NEED OF NEW SYSTEM

In the task scheduling algorithm, the tasks have been assigned to various compute nodes. There is a concept of the power consumption during the changing of the state and the concept of similar task says that these tasks can be scheduled alongside. This has been the poor concept as it has a few disadvantages. Firstly, in case the low energy tasks are assigned to low power systems there would be a cluttering as the tasks would fill up all the smaller nodes. Secondly disadvantage is, if the low energy tasks gets assigned to the high energy consumption nodes, then there would be more of the power consumption, that is a poor method in cloud computing in order to process the number of tasks on the server side.

To cope up with the situation, it is suggested to make improvements by adding the load balancer and the task scheduling strategy correction that can equally load server sides nodes in order to communicate with the processing tasks according to their needs.

6. RESULTS

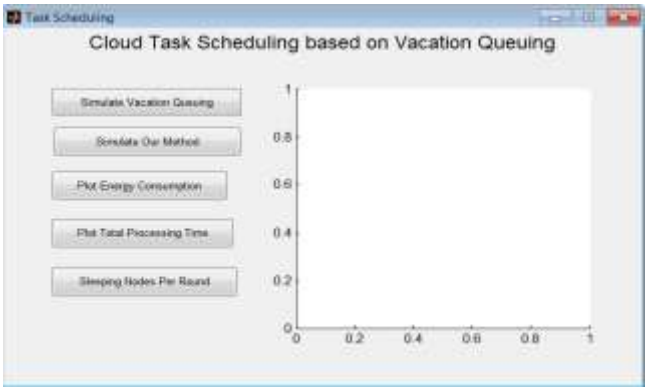

Fig- 2: Cloud Task Scheduling based on Vacation Queuing

The figure 1 shows the GUI having options like: simulate vacation queuing, simulate our method, plot energy consumption graph, plot total processing time graph and plot sleeping nodes per round which are used to simulate the method.

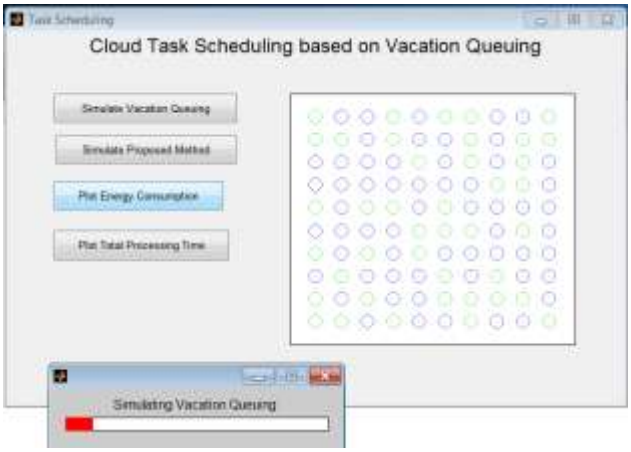

Fig-3: Simulation of the Vacation Queuing Algorithm

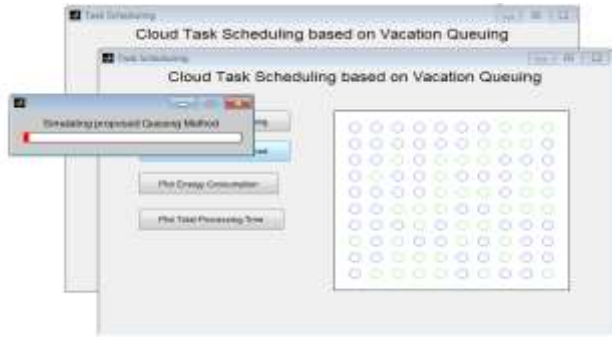

Fig- 4: Simulation of the Proposed Method

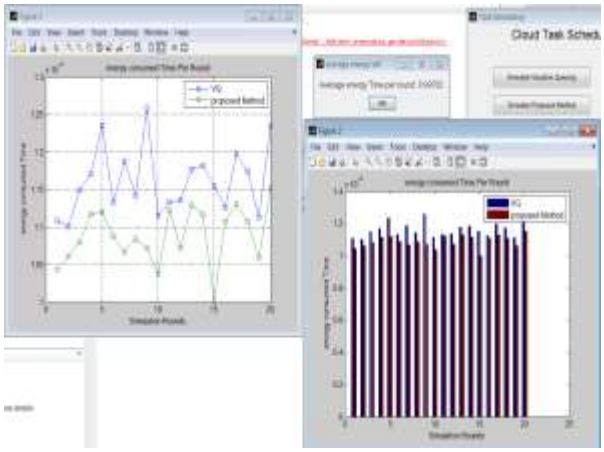

Fig- 5: Energy Consumption with 20 simulation rounds

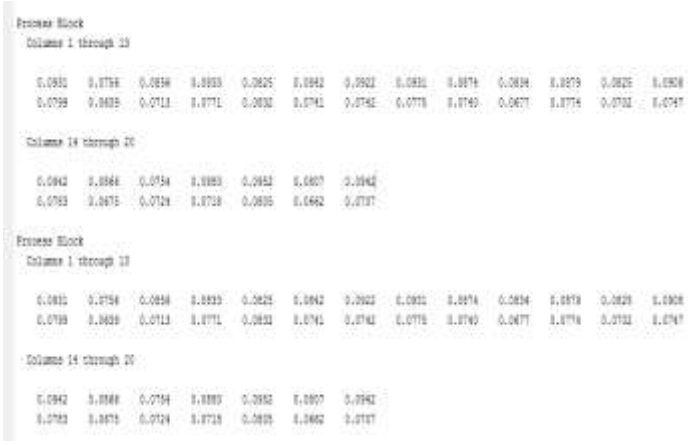

Fig- 6: Code for Simulation

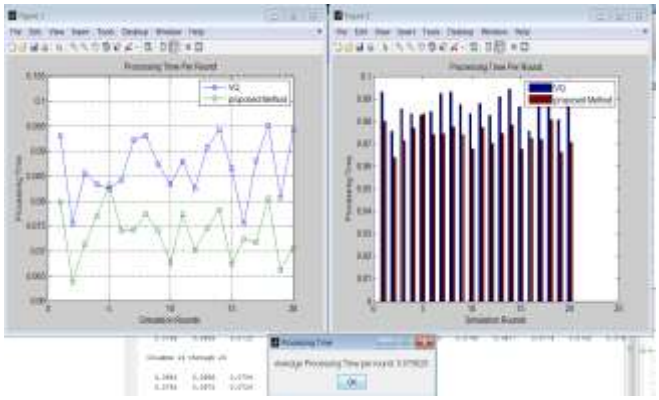

Fig-7: Processing Time

7. CONCLUSIONS

In this thesis, we proposed a method for the Cloud Task Scheduling dependent on the Vacation Queuing. In this proposed method the results are far better than the previous task scheduling method. Under vacation queuing method, the sojourn time is collected from waiting time in the local queue of the compute node as well as the service time of the performing tasks node. The time and power required to switch state have also been different. Each compute node does maintain the task queue.

In the purposed technique on taking modification to the vacation queuing method in order to obtain the desired results in both the process optimization and energy efficient. In this the balance threshold can be divided in the number of nodes to two different parameters based upon their software and hardware specifications. By using the energy consumed and the processing time in order to execute the tasks has been very less.

These results are more promising, we know in the proposed method that energy consumption is less, reduced the processing time and the number of sleeping nodes are more that are helpful in increasing the resting time of system and makes it more efficient.

8. FUTURE SCOPE

For the future work, we would like to present more of the intelligent techniques in order to improve the quality of service (Qos).

The research work can be stated as given below:

a) One extra load balancer can be used to distribute the task over the computer nodes very effectively.
b) On the computing nodes, the virtual machine can then be created and the different algorithms can be used in order to assign the tasks.

The virtual machine can also be created by defining the different configurations of the computing nodes on both the larger and smaller nodes.

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