ABSTRACT

Cloud computing is one of the prominent technology in the networking area. Cloud computing provides various types of services. Vast amounts of resources are accommodated in the cloud data center. The cloud data center is one of the most energy-consuming areas in cloud computing. Energy consumption is caused by inefficient resource utilization. The efficient Data Center topological architecture may improve the efficiency of resource utilization and energy efficiency.

This research work focuses on the improvement of the energy efficiency on the cloud data center servers. This research achieves energy efficiency via proper resource utilization. This thesis contains the following framework.

- To implement Energy Efficient Virtual Round Robin (EEVRR) scheduling algorithm with FAT-Tree topological architecture.
- To implement Starvation aware scheduling, Shortest Round robin Vibrant Quantum (SRVQ) algorithm with DVFS.
- To implement Hybrid Artificial Bee Colony (HABC) algorithm with CART flow scheduling.
- To implement the Adaptive Cache Replacement (ACR) algorithm to improve the energy efficiency in cloud storage such as (PACS).

The EEVRR algorithm gives higher priority to the least time-consuming process, so it improves the QoS parameters as well as improves the energy efficiency. The EEVRR algorithm combined with the Threshold-based load balancing technique; these are incorporated into the FAT-Tree topological architecture. The FAT-Tree architecture cut off 50% of the power consumption in cloud data centers. The experiments were carried out into the Cloud Sim simulator. The EEVRR algorithm provided the best results compared to other algorithms.

The SRVQ algorithm reduces the starvation among the process. In the SRVQ algorithm, dynamic time quantum is calculated at each and every round of the process execution.

This SRVQ algorithm is an amalgamation of the Shortest Round Robin (SRR) and Round Robin (RR) algorithm. The DVFS scaling method incorporates the SRVQ. The DVFS reduces the energy consumption at the Server hardware level. The experiments were executed in the Cloud Sim simulator.SRVQ and DVFS had established the highest performance, evaluated by others. The increment of the energy efficiency is about 45% is higher than previously and it improved the QoS parameter in the value 33%, compared to other works.

The HABC algorithm is one of the best optimization methods. This optimization technique comes from the Artificial Bee Colony ("ABC") algorithm. The Simulation Annealing (SA) method is included with ABC, finally got the HABC. The SA is used to find out the fitness of the server in a random manner. The HABC improves the fitness of the servers. The HABC incorporates with the CART flow scheduling scheme. The experimental trials were performed by the greatest Java-based Simulator, which is Cloud Sim. The comparisons were conducted with various optimization techniques and various algorithms. Energy, time, correct mapping, cost valid request an optimum quantity of resources and resource allocation, these parameters were evaluated during the experimentation. At the end of the results, HABC is proved to have the best performance compared to others.

The main objective of the research work is to improve the energy efficiency in cloud data storages (PACS). To improve the efficiency of the information retrieval process, on PACS with DICOM routers. The ACR algorithm is implemented to improve the cache hit ratio. If the cache hit ratio increases, then the delay will be reduced. The cache hit ratio also increases energy efficiency. The ACR algorithm is implemented in a Java IDE. The Client Server architecture is

developed by the Java IDE. The ACR algorithm increases the cache hit ratio, reduces the delay, and increases energy efficiency.

The above mentioned four frameworks are evaluated with various parameters with various techniques. Finally, the four frameworks enhanced the best results. The thesis mentioned four frameworks that improve energy efficiency in cloud data centers. This thesis proposed research work enables the cloud data center as the green cloud data center.