Enhanced the Performance of Load Balancer in Cloud Environment Using Graph Theory and Allocation of Time

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ABSTRACT

The limited resource and unlimited number of user always wanted the process of balancing condition. The process of load balancing improves the efficiency of cloud system environment. The process of cloud load balancing used various methods and algorithm for process of balancing. The dynamic load balancing technique used heuristic and queuing based searching and allocation technique for the balancing of job in cloud environment. The load can be CPU load, memory capacity, delay or network load. Load balancing is the process of distributing the load among various nodes of a distributed system to improve both resource utilization and job response time while also avoiding a situation where some of the nodes are heavily loaded while other nodes are idle or doing very little work. Load balancing ensures that all the processor in the system or every node in the network does approximately the equal amount of work at any instant of time. The modified load balancing policy simulated in cloudsim simulator. The cloudsim simulator developed in java technology and free available for research purpose. Our modified load balancing policy compare with two different techniques one is round robin and other is JSQ algorithm. Our modified load balancing policy reduces load effect about 5-10%.

Keywords - Cloud Computing; Load balancing; CloudSim ; Virtual Machines (VM); cloud deployment models; Task Scheduling.

INTRODUCTION

Multi-hop wireless networks typically use routing techniques Cloud Computing is an attracting technology in the field of computer science. Cloud Computing involves sharing of resources. Cloud Computing is made up by aggregating two terms in the field of technology, First term is Cloud and the second term is computing [19]. Cloud is a pool of heterogeneous resources. It is a mesh of huge infrastructure and has no relevance with its name "Cloud". Infrastructure refers to both the applications delivered to end users as services over the Internet and the hardware and system software in datacenters that is responsible for providing those services. Computation in cloud is done with the aim to achieve maximum resource utilization with higher availability at minimized cost. Cloud is a collection of heterogeneous resources and requirements of these resources can change dynamically [8, 23].
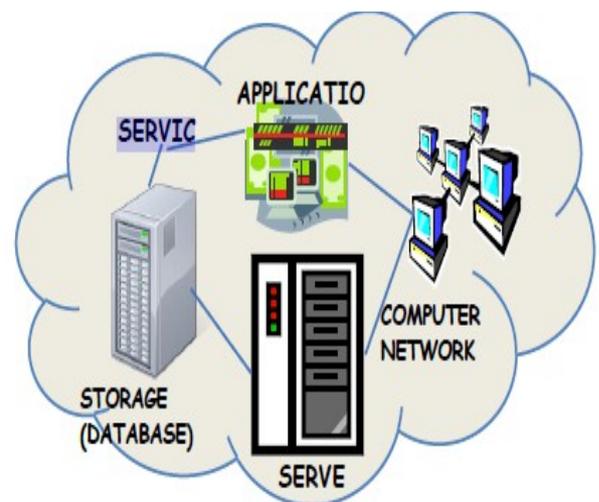

Figure 1: Basic structure of a cloud

Cloud providers are always interested in maximizing the resources utilization and the associated revenues, by trimming down energy consumption and operational expenses, while on the other hand cloud users are interested in minimizing response time and optimizing overall application throughput [21]. The cloud offers computing facilities on-demand, served over a network from a shared pool of resources, typically residing in a large data center. Cloud computing offers a new approach to the way applications are written and deployed. One of the primary benefits of cloud computing is elasticity, whereby resources can be automatically expanded during demand spikes, or contracted during demand lulls; thereby improving user experience and system utilization [16, 28].
Currently Cloud computing is an emerging concept which efficiently combining many fields of computing. Cloud computing provides us various services and software and processing capacity over the internet [18]. The biggest

advantage of cloud computing is that it is capable of handling a huge amount of growing work in a predestined manner for the usage of the business customers. Here in cloud computing the main concept for cloud computing is virtualization which generalizes the physical infrastructure and makes it easy to use and managed [16, 20].

2. TASK SCHEDULING

As the number of users of Cloud computing Systems increased, the tasks to be scheduled in Cloud increased proportionally. Therefore, there is a need for better algorithms to schedule tasks on these systems. Algorithms required to schedule tasks are service oriented and differ in different environments. Task Scheduling algorithms in cloud computing aim at minimizing the make-span of tasks with minimum resources efficiently. Cloud computing, uses low-power hosts to achieve high usability. The cloud computing refers to a class of systems and applications that employ distributed resources to perform a function in a decentralized manner. Cloud computing is to utilize the computing resources (service nodes) on the network to facilitate the execution of complicated tasks that require large-scale computation. Thus, the selecting nodes for executing a task in the cloud computing must be considered. A task is an activity that uses set of inputs to produce a set of outputs. In Cloud computing, user applications will run on virtual systems where distributed resources are allocated dynamically. Dynamic load-balancing mechanism has to allocate tasks to the processors dynamically as they arrive. Redistribution of tasks has to take place when some processors are overloaded. Every application is completely different in nature and independent where some require more CPU time to compute complex task, and some others may need more memory to store data. Different scheduling algorithms can be used depending on the type of the task to be scheduled. The scheduling algorithms can utilize better executing efficiency and maintain the load balancing of system. The efficiency of the cloud depends on the algorithms used for task scheduling.
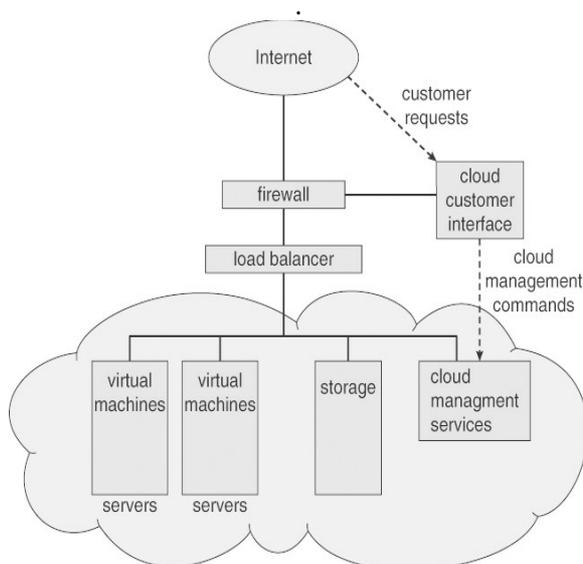

Figure 2: Task Scheduling

3. PROBLEM STATEMENT

The process of load balancing and task scheduling impart a major role in success of cloud computing. In review process we found that various factor effect the performance of cloud computational in concerns of storage of network data and sharing of resource. The sharing of cloud resource generates a network overload, the network overload arise the problem of bandwidth and stack overflow. Some problem related to cloud computing is given below.

1.   Increasing the time span for process[21]
2.   Failure of resource allocation[22]
3.   Traffic overhead of network[20]
4.   Waste of resource[4]
5.   Cost of monitoring of resource[2]
6.   Process feedback system[6]

For the minimization of this entire problem, used heuristic function by various author in load balancing in cloud computing

4. APPROACH USED

For load balancing and task scheduling of cloud computing used meta-heuristic function concerned with the design of intelligent multi-agent systems by taking inspiration from the collective behaviors of social insects and other animal societies. They are characterized by a decentralized way of working that mimics the behavior of the swarm. The optimization needs a level of solution approach of multi-criteria of problem formulation. Some optimization of resource method discuss here. Genetic Algorithms or Genetic algorithms are search algorithms based on the mechanism of natural selection, better known by the evolutionary process [8]. In the process of evolution, the individual is continuously changing genes to adapt to the environment of his life. Only individuals who are strong can survive.

The main idea of GSO is to model a problem as the search for a minimum cost path in a graph. Artificial glowworm as if walks on this graph, looking for cheaper paths. Each ant has a rather simple behavior capable of finding relatively costlier paths. Cheaper paths are found as the emergent result of the global cooperation among ants in the colony. The behavior of artificial ants is inspired from real ants: they lay pheromone trails (obviously in a mathematical form) on the graph edges and choose their path with respect to probabilities that depend on neighbor's swarm [15]. For the improvement of the system performance in cloud computing environment used queue based routing protocol for time quantum theory for the allocation of job.
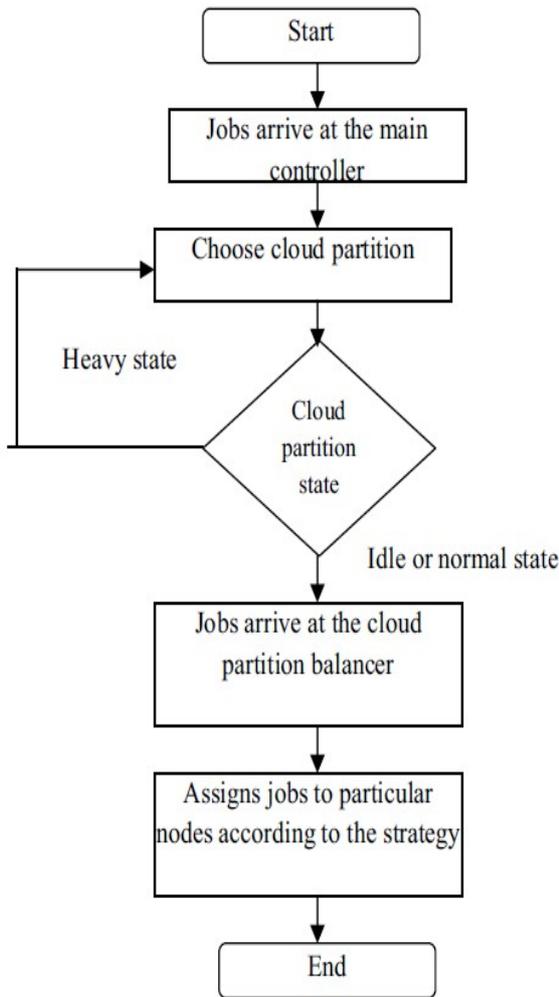
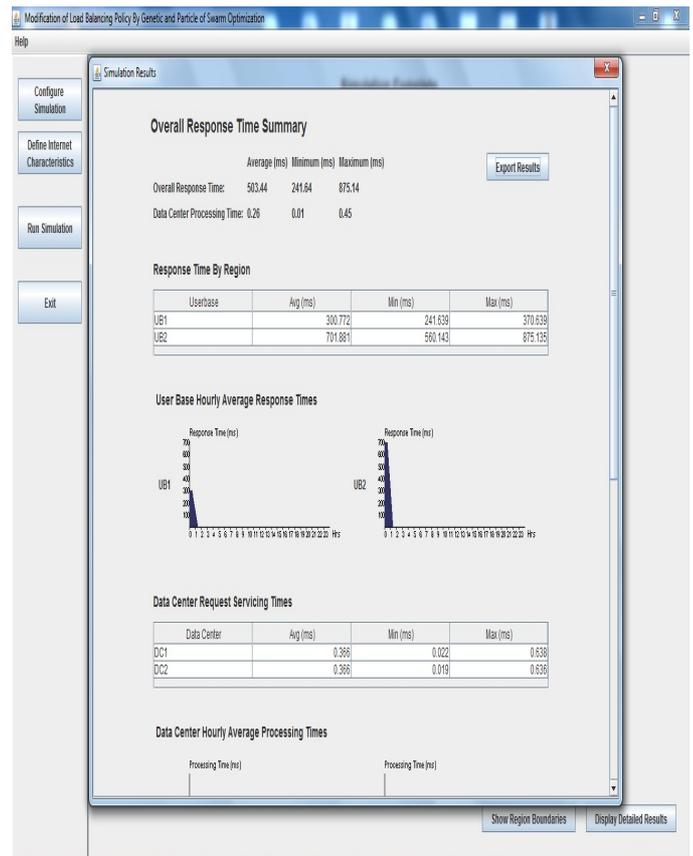**Figure 3: job allocation processes in public cloud computing model.**

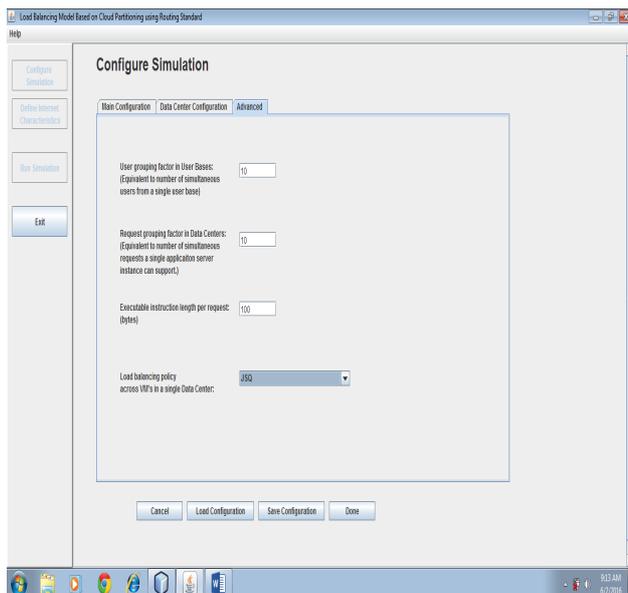**Figure 4: Shows the selection of JSQ method for the same Database used for Round Robin in Cloud Computing Environment.**

Figure 5: Shows the Overall Response Time and Data Center Processing Time for JSQ method in Cloud Computing Environment.
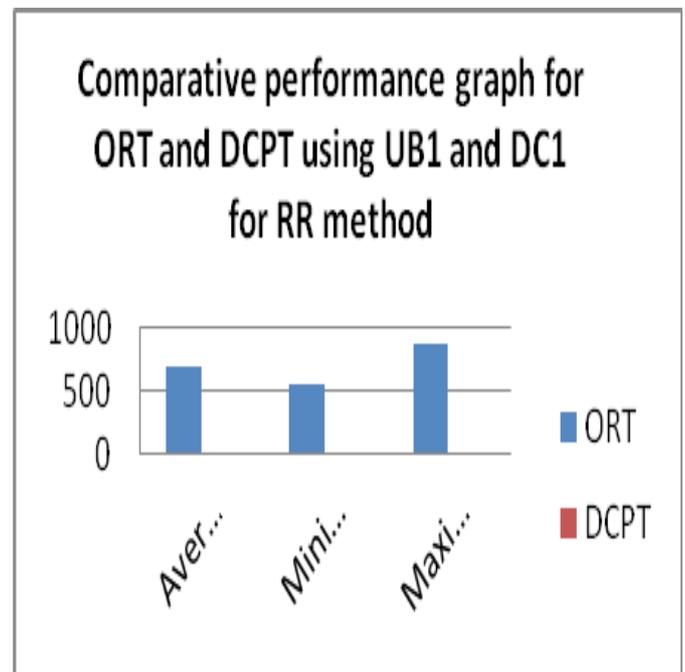

Figure 6: Shows the comparative performance of ORT and DCPT for UB1 and DC1 using Round Robin Method in terms of Average, Minimum and Maximum values in mili seconds.

CONCLUSION AND FUTURE WORK

The efficiency of cloud based infrastructure based on load balancing factor of different component of cloud computing. The load balancer plays a major role in cloud based services. The cloud based services interact with user and dedicated cloud infrastructure. In this paper used JSQ algorithm and DAG allocation for load balancing policy in cloud environments. The IJSQ optimization set the diverse property of virtual machine and request job. The define fitness constraints function partially allocated job for dedicate machine and the distribution of job according to the process job scheduler. For the evaluation of performance used cloud simulator software such is called cloud analyst. The cloud analysis software is bag of composition of cloud environment and load balancing policy. In scenario of policy design two services one is JSQ policy and other is IJSQ based policy. The IJSQ based policy reduces the load effect approx. 5-10% in compression of JSQ algorithm.

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