Managing a Workload through Load Balancing Technique in Cloud Environment

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Abstract

Being an emerging area in IT sector, Cloud computing enables a wide range of users to access distributed, scalable, virtualized hardware and/or software, applications and platforms which are provided over the Internet. Cloud Computing is a shared pool of Configurable computing resources which requires the proper distribution of dynamic workload among multiple computers to ensure that no single node is underloaded or overloaded. Load balancing aims to reduce response time of jobs, to reduce the migration time for VMs, to increase resource optimization, to maximize overall performance and avoid overload of any single node. In our work, we study various techniques related to load balancing in Cloud Environment and further, we proposed modified agent based dynamic load balancing algorithm by adding the standard deviation method to decide whether the host is overloaded or not. To provide a better load balancing in terms of better performance, proposed algorithm has been implemented and evaluated using Cloudsim simulator. The simulator result shows reduction in CPU time, increase in resource utilization and also overall performance is improved as compared to the existing load balancing algorithm.

Introduction

Load Balancing is the major issues in Cloud Environment. It is the mechanism for Distributing Dynamic workload among the all nodes in Cloud. This is also remove the condition in which some nodes are overloaded while other nodes are under loaded which is used to achieving improvement in Resource utilization and User satisfaction. To removing imbalanced load into the node we can reassign the total load across all nodes into the system and it is also used to improve response time of job. Hence this will increase the overall performance. It is also used to prevent the bottlenecks of system which is occurs due to load imbalance. Proper Load balancing can decrease the Resource Consumption and also make enterprises greener. Implementation of Dynamic load balancing algorithm is most important things for estimation of load, performance of system, nature of work to be transferred, selecting **of** nodes and many other ones[14]. This load considered can be in terms of CPU load, amount of memory used, delay or Network load. Load balancing techniques can be classified as mainly two categories: static algorithms and dynamic algorithms that have been developed for Cloud computing which is shown in fig. 1

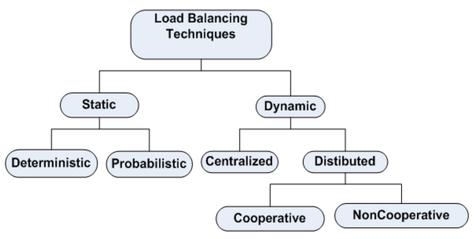

Fig.1 Classification of Load balancing techniques.

Static load balancing algorithms

In Static algorithms do not change the node's processing power, memory and storage capacity at run time·

Dynamic Load balancing algorithms

In Dynamic load balancing algorithms jobs are assign dynamically and reassign the jobs to another node based on workload of node.

Literature Survey

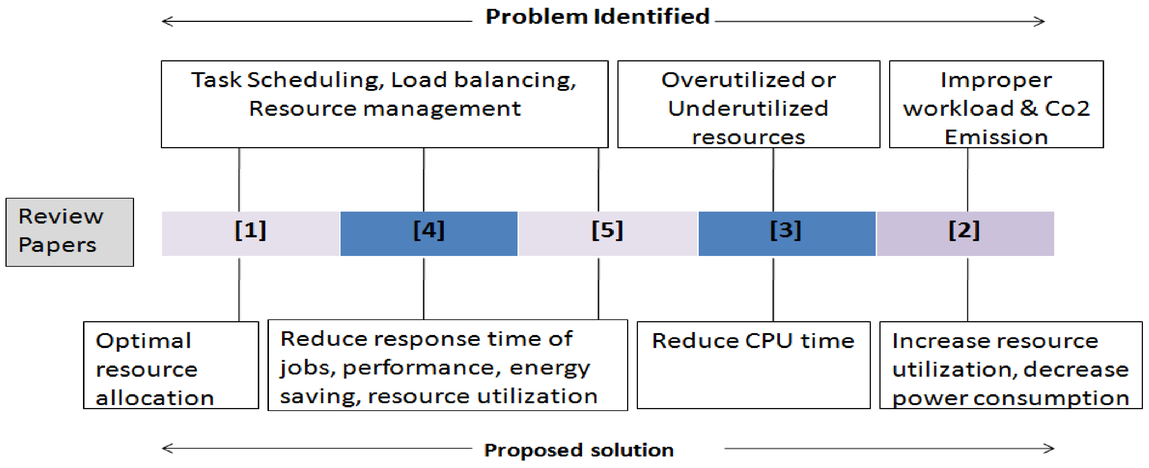

Fig. 2 Summarized literature survey

Proposed Work

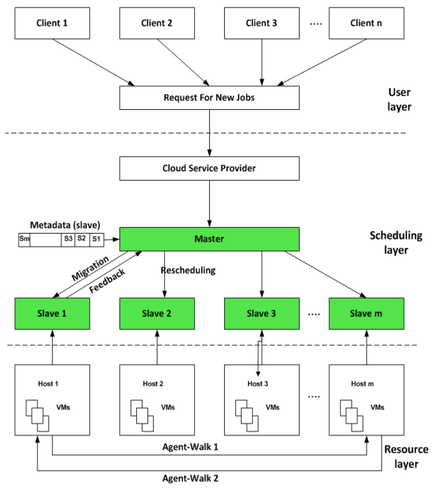

Fig. 3 Proposed Architecture

Fig.3 Shows the Proposed Architecture which is divided into three layer, User layer, Resource layer and scheduling layer. At the shared pool of Hosts, agent complete one cycle in two walks:
In First walk it moves from first server to last server and gathers information from all servers, for making decision for Load Balancing and
In Second walk it balances the host's load on the basis of Standard deviation method
Fig. 4 Shows the Agent Walk 1 flowchart in which first we find the Safety parameter using utilization of all VMs. After that calculate the upperthreshold using standard deviation method for decide Host is overloaded or not.

Fig. 5 shows the, agent will check the state of slave in master having the id and state. For each host check the condition, if the host_slave_state equals to overloaded then master send a migration request to the slave. If slave send a positive response to the master then migrate jobs to underloaded host. If the host_slave_state equals to underloaded then Receive jobs from "overloaded" host or new job is directly assign on that host. Agent will perform this operation until it reaches at the first host with balancing all host's load.

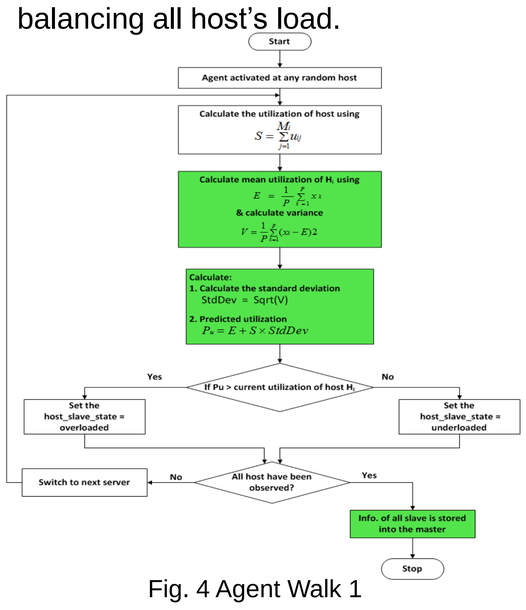

Fig. 4 Agent Walk 1

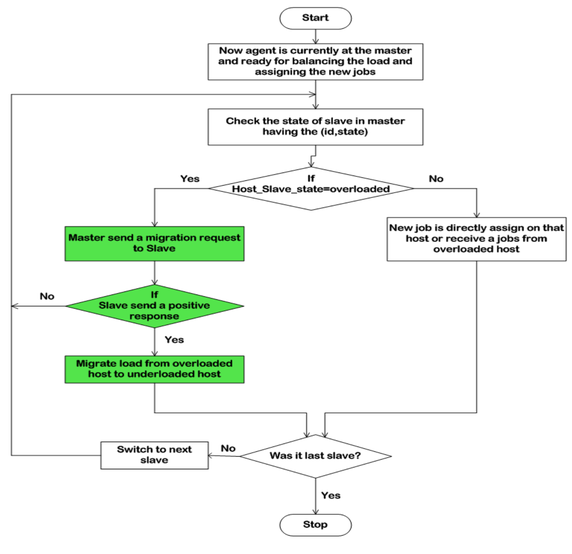

Fig. 5 Agent Walk 2

Simulation Result

In this section Result shows the Performance of proposed method as compared to Existing Load Balancing Technique based on number of parameter like CPU time, Migration time, Number of migrated Host, No. of host to be shut down for Resource utilization and energy efficiency.

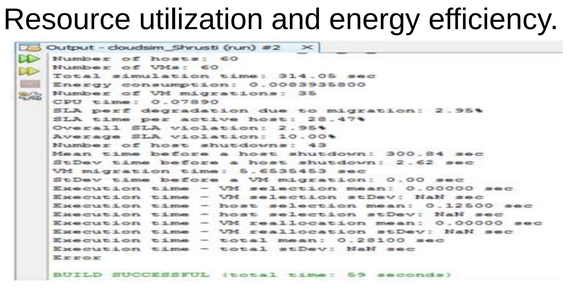

Fig.6 Output of Proposed system

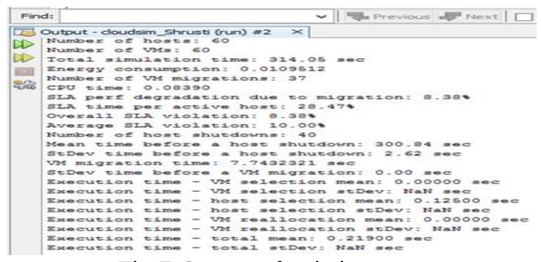

Fig.7 Output of existing system

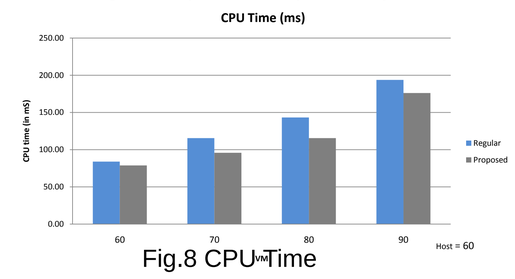

Fig.8 CPU Time

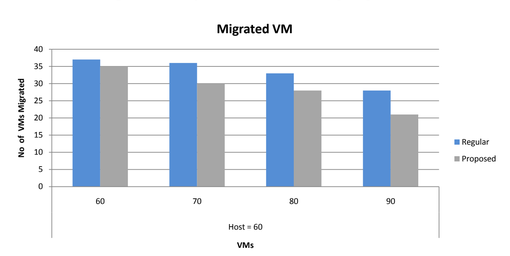

Fig.9 No. of VMs Migrated

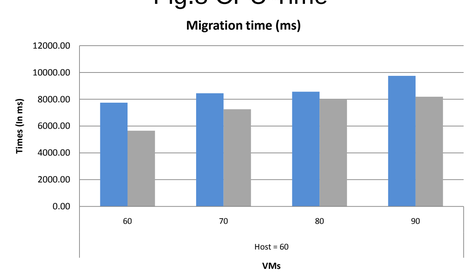

Fig.10 Migration time

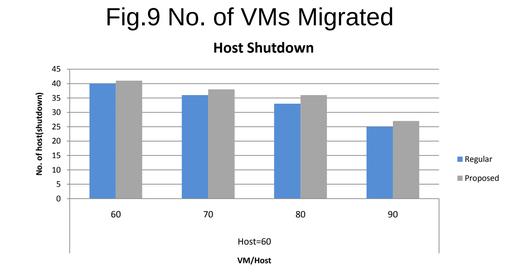

Fig.11 No. of Host shutdown

Conclusion and Future work

In this post-graduate dissertation, we study the various load balancing schemes and the issues of load balancing in Cloud computing. Improper workload in Cloud environment results into over or under utilization of computing resources and that affects the performance of overall system. It help to achieve the user satisfaction by improving the metrics like, response time, migration time, throughput, resource utilization and performance. In our proposed work, we modify the agent based dynamic load balancing algorithm by adding the standard deviation method to decide whether the host is overloaded or not. To provide a better load balancing in terms of improved performance, reduced CPU time, increased resource utilization. We implement this method in Cloudsim toolkit 3.0 and generated results of proposed method are compared with existing load balancing algorithm. Result shows the overall performance of proposed method has been improved as compared to the existing load balancing method.
In future work, one can extend the work by implementing the same on a real world Cloud environment like Xen or other.

References

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