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A Novel Approach for Load Balancing in Cloud Computing by HARA Algorithm

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***Abstract*— *Load* balancing was identified as a major concern to allow Cloud computing to scale up to increasing distributed solution is required, as it is not practical or cost efficient in many cases to maintain idle service/hardware provision merely to keep up with all identified demands. Equally, when dealing with such complexity, it is impossible to fully detail all system future states. Therefore, it is necessary to allow local reasoning through distributed algorithms on the current system state. We proposed suggested efficient load balancing Algorithm HARA. With this approach, we proposed how to allocate task to server on the basis of priority of task for efficient results.**

***Index Terms*— Cloud Computing, Green Cloud, HARA, VM.**

I. INTRODUCTION

Cloud computing is starting to provide an environment whereby Web Services can realize their initially promised potential. Up to the present time, Web Services within Service Oriented Architectures (SOA) have been used in a limited way within business boundaries for integration of applications. The predicted widespread availability and uptake of web-delivered services has not occurred to any great scale commonly cited reasons include; high

Complexity and technical expertise required large Expense of implementation and maintenance, and the inflexibility and lack of widely accepted standards for defining service cooperation, identification and orchestration. These concerns arise as a consequence of associated service architecture management and maintenance difficulties. The scale and complexity of these systems makes centralized governance of specific servers infeasible; requiring effective distributed solutions. Distributed governance, achieved through local knowledge, is a vital prerequisite in order to enable the vision inherent in the Internet of Services/Things (IoS/T) model of service/hardware provision. Systems may form digital ecosystems (systems of systems) providing the structure, communication and coordination necessary for a given federation (co-operative collection) of services to deliver the required system goals or intentions. For this model to work efficiently, self-organization and management capabilities must pervade every layer or plane of these digital ecosystems.

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Global outcome can thus be controlled through local interaction via self-autonomic properties and decentralized feedback control mechanisms. In the seminar presented initial work towards this goal; enabling scalable virtualization of these systems. [1]

Elastic Compute Cloud (Amazon EC2) [2] is an example of such an approach, where a computing platform is provided. In common with many commercial approaches *provision* is the primary objective; management and governance handled via redundancy or replication, scaling capacity up or down as required. In contrast the authors proposed a Cloud Coordination framework in 2005 with the notion of a Cloud being a system of loose boundaries, which interacts and merges with other systems [1]. This definition of a Cloud is refined to a federation of interacting services and resources, which share and pool resources for greater efficiency. Thus governance, in general, and scalability are handled as part of the separated coordination framework [4]

II. RELATED WORK

Meenakshi Sharma et al. (2012) in the paper, "Performance Evaluation of Adaptive Virtual Machine Load Balancing Algorithm" The conception of Cloud computing has not only reshaped the field of distributed systems but also extend businesses potential. Load balancing is a core and challenging issue in Cloud Computing. How to use Cloud computing resources efficiently and gain the maximum profits with efficient load balancing algorithm is one of the Cloud computing service providers' ultimate goals. In this paper firstly an analysis of different Virtual machine (VM) load balancing algorithms was done, a new VM load balancing algorithm has been proposed and implemented in Virtual Machine environment of cloud computing in order to achieve better response time and cost. [3]

Mousumi Paul1 et al. (2011) in the paper, "Dynamic job Scheduling in Cloud Computing based on horizontal load balancing" Cloud computing is a latest new computing paradigm where applications, data and IT services are provided across dynamic and geographically dispersed organization. How to improve the global throughput and utilize Cloud computing resources proficiently and gain the maximum profits with job scheduling system is one of the Cloud computing service providers' ultimate objectives. The motivation of this paper is to establish a scheduling mechanism which follows the Lexi – search approach to find an optimal feasible assignment. Task scheduling has been treated as general assignment problem to find the minimal cost. Here cost matrix is generated from a probabilistic factor based on some most vital condition of efficient task

scheduling such as task arrival, task waiting time and the most important task processing time in a resource. [4]

Amandeep Kaur et al. (2013) in the paper, "Analysis of Load Balancing Techniques in Cloud Computing" Cloud Computing is an emerging computing paradigm. It aims to share data, calculations, and service transparently over a scalable network of nodes. Since Cloud computing stores the data and disseminated resources in the open environment. So, the amount of data storage increases quickly. In the cloud storage, load balancing is a key issue. It would consume a lot of cost to maintain load information, since the system is too huge to timely disperse load. Load balancing is one of the main challenges in cloud computing which is required to distribute the dynamic workload across multiple nodes to ensure that no single node is overwhelmed. It helps in optimal utilization of resources and hence in enhancing the performance of the system. A few existing scheduling algorithms can maintain load balancing and provide better strategies through efficient job scheduling and resource allocation techniques as well. In order to gain maximum profits with optimized load balancing algorithms, it is necessary to utilize resources efficiently. [5]

M.Monica et al. (2013) in the paper, "Investigation on Efficient Management of workflows in cloud computing Environment" Cloud computing is an on-demand service model often based on virtualization technique and this paper explores the use of cloud computing for scientific workflows, focusing on a widely used application. The approach is to evaluate from the point of view of a scientific workflow the tradeoffs between running in a local environment, if such is available, and running in a virtual environment via remote, wide-area network resource access. Our results show that a workflow with short job runtimes, the virtual environment can provide good compute time performance but it can suffer from resource scheduling delays and wide area communications. [6]

Kumar Mandal et al. (2013) in the paper, "On-Demand VM Placement on Cloud Infrastructure" Cloud Computing paradigm is most popular because of its provisioning resources quickly and efficiently. In cloud computing the resource requests are served by creating virtual machines of the requested speciation on the underlying physical infrastructure. If the placement of virtual machines to the underlying physical machines will take long time or if all the accepted virtual machine requests can't be served then some data will lost. In on-demand access to cloud computing services the requested resources are served on the available infrastructure for short span of time. [7]

III. PROPOSED WORK

Proposed Algorithm (HARA):

Step 1: Generate cloud scenario using green cloud.

Step 2**:** Start with some initial elements like 'no of nodes', 'neighbor node', 'load balancing task scheduling.
Step 3: Initialize with n no. of nodes.

Step 4: Implement HARA technique.

Step 5: Initially, start HARA algorithm for load balancing and scheduling jobs and find the priority of job before job scheduling.

Step 6: In HARA the adaptive resource allocation algorithm and Algorithm Priority Based Scheduling Algorithm (PBSA) is use for load balancing and job scheduling respectively.

Step 7: Then finally With HARA Algorithm the priority and load allocation is done with the combination of both the algorithm for better job execution time and load balancing.

Step 8: This process continuation until the load balancing in tasks is done.

IV. EXPERIMENTAL RESULTS

The experimental result on the basis of Average execution time and energy consumption

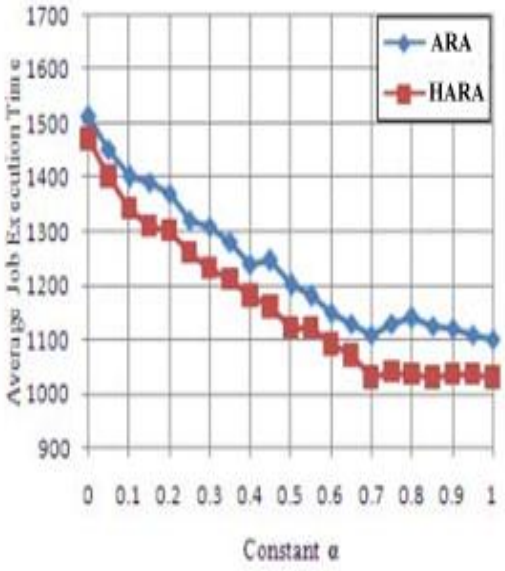

Fig. 1: Analysis of old technique ARA and Proposed Technique HARA on Average Job execution time

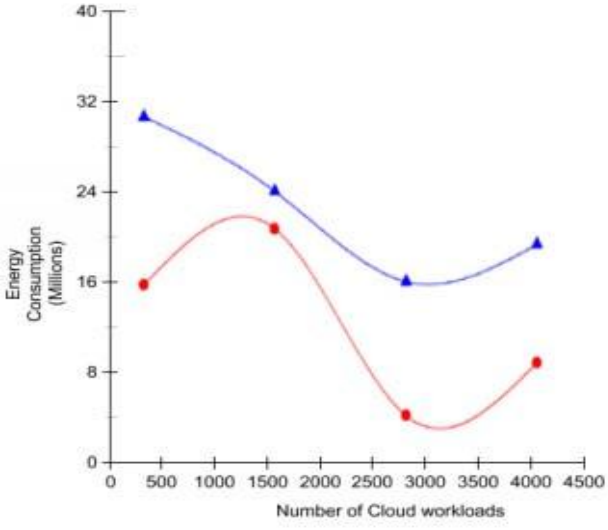

Fig. 2: Analysis of old technique ARA and Proposed Technique HARA on Energy Consumption

The result show proposed technique is better than old technique on the basis of execution time and energy consumption as we proposed new technique HARA with the combination of ARA and PBSA.

V. CONCLUSION

In this thesis the load balancing issue in cloud computing and analyzed various techniques used in load balancing. In cloud computing load balancing is the main issue. Load balancing is required to distribute the excess dynamic local workload evenly to the entire node in the whole cloud to achieve a high user satisfaction and resource utilization ratio. It also ensures that every computing resource is distributed efficiently and fairly. There are various researchers who have used the load balancing techniques to propose new strategies. Their work done in the domain of load balancing is analyzed and compared. But the issues of load balancing are still open for research work so that higher user satisfaction and resources utilization can be achieved. We have discussed on basic concepts of cloud computing and load balancing and studied some existing load balancing algorithms, which can be applied to clouds. The performance of these strategies with respect to timing and to effect of link clouds. The performance of these strategies with respect to the timing and the effect of link and measurement speed were studied. A comparison is also made between different strategies.

VI. FUTURE SCOPE

Cloud computing is a vast concept and load balancing plays a very important role in case of clouds. There is huge scope of improvement in this area. We have discussed only two divisible load scheduling algorithms that can be applied to clouds, but there are still other approaches that can be applied to balance the load in clouds. The performance of the given algorithms can also be increased by varying different parameters.

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