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Notice for the PhD Viva Voce Examination

Ms Chintureena Thingom (Registration Number. 1560077), PhD scholar at the School of Engineering and Technology, CHRIST (Deemed to be University), will defend her PhD thesis at the public viva voce examination on Friday, 25 November, 2022 at 10.30 am in the CDI Conference Room, Block V, Bangalore Kengeri Campus, Bengaluru 560074.

Title of the Thesis	**:**	**Design and Development of Dual Fuzzy Technique to Optimize Job Scheduling and Execution Time in Cloud Environment**
Discipline	**:**	**Computer Science and Engineering**
External Examiner (Outside Karnataka)	**:**	**Dr Gunavathi C** Associate Professor Department of Software Systems School of Computer Science and Engineering Vellore Institute of Technology Tiruvalam Road, Katpadi, Vellore Tamil Nadu - 632014
External Examiner (Within Karnataka)	**:**	**Dr Loganathan R** Professor and Head Department of Information Science and Engineering Sri Venkateshwara College of Engineering Kempegowda International Airport Road Vidya Nagar, Central Telecom Society Bengaluru Karnataka - 562157
Supervisor	**:**	**Dr Ganesh Kumar R** Associate Professor Department of Computer Science and Engineering School of Engineering and Technology CHRIST (Deemed to be University) Bengaluru – 560074, Karnataka

The members of the Research Advisory Committee of the Scholar, the faculty members of the Department and the School, interested experts and research scholars of all the branches of research are cordially invited to attend this open viva.

Registrar

Place: Bengaluru
Date: 19 November 2022

ABSTRACT

Cloud computing is a type of computing that relies on sharing a pool of computing resources, rather than deploying local or personal hardware and software. It enables convenient, on-demand network access to a shared pool of configurable computing re-sources (e.g., applications, storage, networks, services, and servers) that can be swiftlyprovisioned and released with minimal management control or through the interaction of the cloud service provider. The increasing demand for computing resources in the cloud has made elasticity an important issue in the cloud. The availability of extendingthe resources pool for the user provides an effective alternative to deploying applica- tions with high scalability and processing requirements. In general, a cloud computing infrastructure is built by a dynamic and complex inter- connecting process with large-scale data centers and various computing resources thatare available to the user over the Internet in the form of the pay-per-use model by us- ing virtual machines. Cloud computing has attracted many enterprises for its pay-as-go model and highly scalable resources. Many enterprises are not only cloud infrastructure for storage but also for their analytics. With the increasing volume of data-intensive applications hosted in the data center, research on providing a higher quality of service to user tasks while at the same time making effective use of resources in the data centerhas important. The utilization of the resources at the data center will be controlled to meet the required service level agreements committed to the users and to ensure prof- itability for any of the cloud service providers.

Providing a satisfactory Quality of Service (QoS) is an important objective in cloud data centers. The QoS is measured in terms of response time, job completion time andreliability. If the user jobs cannot be executed in high load and the job is crashed, it willenormously increase the response time and also push up the job completion time. Alsodue to load, the jobs may be still in the waiting queue and could not find a resource to execute. In such a situation, the user notices a big response delay and it will affect the QoS. Towards ensuring QoS, this research proposes the following solution - Dual Fuzzy Load Balancing for jobs. Dual Fuzzy Load Balancing balances the load in the data center with an overall goal of reduction of response and execution time for tasks. The solution is based on a dual decision. At the first level, the decision is made to select the VM and at the second level decision is made to choose a time slot for each job to ensure fair response time to all tasks. Heuristic scheduling used stochastic hill climbing for the resource optimization for tasks or jobs assigned in the workflows to reach our expected outcome in terms of execution and response time among others. Byexecuting the workflows in time and at minimum cost, users can save costs that they would have otherwise paid for resource wastage in the data center.

The proposed solutions were simulated in the Cloudsim simulator and performance metrics in terms of job response time, job completion time, resource utilization, a num-ber of SLA violations, and along with the cost comparison to the existing algorithms ofLoad Balancing. The proposed solutions are also implemented in a real cloud environ-ment and the effectiveness of the solution is evaluated. The proposed load balancing algorithms were able to reduce the response time by at least 37.2%, reduce job com- pletion time by 36.9%, CPU utilization is 34.8% higher, and increase the job success ratio by 63.3% compared to existing load balancers. As seen in the Cloud Simulator, the proposed solution is very efficient, and to prove its reliability, the proposed solutionhas experimented with the real time cloud through the Cloudx domain of AWS. The proposed solution shows as the best ranked as per the real time data in comparison to the other existing techniques. The research contributions are highlighted with the successful implementation of the proposed solution to address the important issues due to the dynamic load on the data center like an increased failure of the job completion ratio, failure to meet QoS in terms of response time, completion time, and efficient utilization of cloud resources.

Keywords*: Cloud Computing, Datacenters, Quality of Service, Dual Fuzzy Load Bal- ancing, Cloudsim*