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Notice for the PhD Viva Voce Examination

Ms Manasa Kulkarni (Registration Number: 2090208), PhD scholar at the School of Sciences, CHRIST (Deemed to be University), Bangalore will defend her PhD thesis at the public viva-voce examination on Saturday, 1 June 2024 at 10.30 am in Room No. 044, Ground Floor, R & D Block, CHRIST (Deemed to be University), Bengaluru - 560029.

Title of the Thesis	:	**Load Balancing Strategy for Large Scale Software Defined Networks**
Discipline	:	**Computer Science**
External Examiner (Outside Karnataka)	:	**Dr Atulgiri Mayagiri Gonsai** Professor Department of Computer Science Saurashtra University Rajkot - 360005 Gujarat
External Examiner (Within Karnataka)	:	**Dr Rama Satish K V** Associate Professor Department of Computer Science and Engineering RNS Institute of Technology, Rajarajeshwari Nagar Bengaluru – 560098 Karnataka
Supervisor	:	**Dr Joy Paulose** Professor Department of Computer Science School of Sciences CHRIST (Deemed to be University) Bengaluru – 560092 Karnataka
Co-Supervisor	:	**Dr Bhargavi Goswami** Researcher and Academician School of Computer Science Queensland University of Technology Brisbane, Australia

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-voce examination.

Place: Bengaluru
Date: 28 May 2024

Registrar

ABSTRACT

Programmability has left its mark on every facet of business, with technology playing an integral role. Trends in the networking industry underscore the ubiquity of technology in nearly every business transaction. Traditional networks grapple with numerous challenges, rendering them ill-equipped to effectively process and handle the demands of the modern landscape. The lack of programming in these networks leads to stagnation, inhibiting their ability to evolve or enhance performance. The advent of Software Defined Networks (SDN) has introduced increased flexibility into conventional networks, opening avenues for the creation of innovative services.

SDN technology has been considered an effective solution to the various challenges of large-scale networks, such as high throughput, network virtualization, fast fault detection, and load balancing. The rapid expansion of network services and applications in SDN environments demands sophisticated load-balancing solutions that adapt to dynamic traffic patterns and varying service requirements. This study presents a pioneering algorithm, the Dynamic Load Balancing Algorithm (DLBA), which utilizes the Programming Protocol-independent Packet Processors (P4) language. The algorithm is specifically crafted to tackle the issues associated with optimizing traffic distribution in the data plane of SDN.

P4 programming language, recognized as one of the most robust languages, addresses the limitations of traditional networking, enhancing programmability and agility by distributing the load across the network. The research implements a novel "Dynamic Load Balancing Algorithm" using the P4 language to instill dynamism and achieve load balance in large-scale networks. The P4-based implementation showcases dynamicity, scalability, flexibility, and adaptability. The research commences with a thorough examination of existing load-balancing algorithms implemented using the P4 language, followed by a comparative analysis between these algorithms and DLBA. Parameters such as throughput, packet loss, and congestion window are considered in the evaluation. The P4-based DLBA algorithm aims to eliminate the drawbacks associated with traditional networks by effectively distributing the load across the network.

Keywords: Network Programmability, Software-Defined Networks, P4 Language, Data Plane Programmability, Dynamic Load Balancing, Large Scale Networks

Publications:

1. B. Goswami, **M. Kulkarni** and J. Paulose, "A Survey on P4 Challenges in Software Defined Networks: P4 Programming," in *IEEE Access*, vol. 11, pp. 54373-54387, 2023, doi: 10.1109/ACCESS.2023.3275756. [Q1 Journal]
2. **M. Kulkarni**, B. Goswami and J. Paulose, "Dynamic Load Balancing on Switches of Software Defined Network Managed by OpenDayLight Controller," in *Human-centric Computing and Information Sciences*, 2023. [Q1 Journal]
3. **M. Kulkarni**, B. Goswami and J. Paulose, "Efficient Traffic Distribution: P4 language-based Dynamic Load Balancing Algorithm in SDN," in *IEEE Transactions on Computers*, 2024. [Q1 Journal]
4. **M. Kulkarni**, B. Goswami and J. Paulose, "A Review of Artificial Intelligence's use in Software-Defined Networking," *Journal of Network and Systems Management*, 2024. [Q2 Journal]