MICROSERVICE-BASED ARCHITECTURE FOR TRANSPORT NETWORK PLANNING

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DECLARATION

I declared that this dissertation represents my original work. Any ideas or materials used from other sources have been properly acknowledged. As far as I am aware, this dissertation does not include any content that has been previously published or written by someone else, unless it has been explicitly referenced. Furthermore, this dissertation acknowledges all sources used and does not incorporate any material from previous submissions for a degree or diploma in any other university or institute of higher learning.

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Shashika Chathumadusha Date,

I have overseen the research carried out by the above candidate for their master's dissertation.

Supervisor: Prof. Indika Perera

…….. 09/07/2023

Signature(supervisor) Date

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ABSTRACT

In today's digital era, industries across the board are transitioning to digital platforms to optimize resources, reduce costs, enhance customer value, and improve productivity and efficiency. This research focuses on software solutions tailored to the telecom industry's needs in adapting to the digital world. Within the communication industry, data transmission stands as a critical area that wants to increase attention. Customer satisfaction relies heavily on the bandwidth capacity that can be efficiently carried through the network. Consequently, engineers must concentrate on this area and upgrade it based on demand, considering the limitations posed by high equipment and resource costs.

Traditional manual approaches to telecom operations are inefficient, time-consuming, and expensive. For instance, expanding fiber connections to new locations requires physical surveys to determine distances, which may not always result in the shortest path. The Dijkstra algorithm offers a solution to this technological challenge, allowing for more optimized routing. This research delves into how transmission planning for wireless and wired can be simplified through the application of such algorithms and calculations.

To develop the proposed microservice-based model, the research leverages the latest technologies and incorporates user-friendly dashboards. The chosen implementation model is a hybrid one combining Model-View-Controller (MVC) and microservices (MS). The hybrid model provides flexibility as specific modules can be reused for other tasks or applications when necessary. By implementing microservices, each problem is addressed individually, enabling a more modular approach. Additionally, the integration capabilities incorporated into the application facilitate the onboarding of third-party systems and automate the planning process.

This research serves as a valuable resource for the telecom industry, offering insights into software solutions tailored to the digital world. The incorporation of advanced algorithms and a hybrid implementation model empowers engineers to overcome technological challenges efficiently, optimize resource utilization, and streamline transmission planning processes. Ultimately, the findings presented in this research contribute to the ongoing digital transformation within the telecom industry.

Contents

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

LOS – Line of Sight

NMS – Network Monitoring Systems

RF – Radio Frequency

RA – Rain Attenuation

FSL – Free Space Loss

MPL – Multi Path Loss

FM – Fade Margin

PM – Performance

MW – Microwave

OFN – Optical Fiber Network

EIRP - Effective Isotropic Radiated Power

MS – Microservice

AWS - Amazon Web Services

MVC – Model View Controller

API – Application Processing Integration

CAPEX – Capital Expenditure

OPEX - Operational Expense