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Development of Geographic Information System (GIS) on Web-Based Medan City Transportation Route Application at PT. Rahayu Medan Ceria

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Abstract - The aim of this project is to provide a modern and efficient solution for managing and navigating transport routes in Medan city. This system is designed to facilitate users in obtaining accurate and real-time information about available transport routes. The web-based application leverages GIS technology to display interactive maps showing transport routes, bus stop locations, and estimated vehicle arrival times. The development of this system involves several stages: requirements analysis, system design, and implementation. The route data utilized includes 8 routes, consisting of both outbound and return paths for Medan city transport operated by PT. Rahayu Medan Ceria. Additionally, to support speedy route search processes, a binary search method is employed. Testing results indicate that the system can provide route information quickly and accurately. This application is expected to enhance the quality of transportation services in Medan city and offer significant benefits to the wider community.

Keywords: Geographic, Information, Transportation, Web-Based, PT. Rahayu Medan Ceria..

1. INTRODUCTION

Public minibuses, known as angkot, are a vital component of urban transport, operating on routes designated by the authorities[1] [2]. Advances in information technology have significantly impacted various aspects of life, including the transportation sector. Medan, one of the largest cities in Indonesia, faces challenges in managing urban transportation efficiently and effectively. The growing population and increasing number of motor vehicles each year demand a transportation system that can provide better services and be responsive to the community's needs.

PT. Rahayu Medan Ceria, a key operator in Medan's urban transportation, recognizes the importance of technological innovation to enhance public transport services. One proposed solution is the development of a web-based Geographic Information System (GIS) for transport route applications. This system is designed to provide real-time information on transport routes, bus stop locations, and estimated vehicle arrival times, thus facilitating both drivers and passengers in planning their journeys.

The application aims not only to provide accurate and fast information but also to improve PT. Rahayu Medan Ceria's operational efficiency by reducing passenger wait times and increasing schedule accuracy. By utilizing GIS technology and efficient route search methods such as binary search, this system is expected to offer a modern solution for managing urban transport in Medan.

This research discusses various stages of application development, from needs analysis and system design to implementation and testing. The development of this system is expected to contribute positively to efforts in improving the quality of transportation services in Medan and provide significant benefits to the wider community.

Challenges faced by the public, such as not knowing the routes and fares of angkot, can stem from factors like the existence of various public minibuses with different routes and codes, along with inconsistent fares, which cause confusion and discourage the use of angkot[2].

2. DATA ANALYSIS

The route data consists of 8 routes, including both outbound and return paths for the Medan city public minibuses operated by PT. Rahayu Medan Ceria. The attributes for these routes include the route number, forward route, and return route, as shown in Table 1.

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Table 1. PT. Rahayu Medan Ceria Public Minibus Route Data

No	Number of Angkot	Routes	Forward Route	Return Route
1	43	Perumnas Mandala ⇄ Terminal PasarInduk	Perumnas Mandala – Jl. Garuda – Jl. Mandala Bypass – Jl. Denai – Jl. A.R. Hakim – Jl. Halat – Jl. Ir. H. Juanda – Jl. Mongonsidi – Jl. Pattimura – Jl. JaminGinting – Jl. KapitenPurba – PerumnasSimalingkar – Terminal PasarInduk	Terminal PasarInduk – PerumnasSimalingkar – Jl. KapitenPurba – Jl. JaminGinting – Jl. Pattimura – Jl. Jend. Sudirman – Jl. Ir. H. Juanda – Jl. SM. Raja – Jl. Halat – Jl. A.R. Hakim – Jl. Denai – Jl. Mandala Bypass – Jl. Garuda – Perumnas Mandala
2	54	Simpang UNIMED ⇄KebunBinatang	Simpang UNIMED/Jl. Willem Iskandar – Jl. HM. Yamin, SH. – Jl. Stasiun KA – Jl. P. Penang – Jl. Balai Kota – Jl. PutriHijau – Jl. Guru Patimpus – Jl. GatotSubroto – Jl. IskandarMuda – Jl. JaminGinting – Sp. Pos – Jl. Pintu Air – Jl. Luku I – Jl. Luku III – Jl. Pintu Air IV – Jl. BungaRampai Raya – KebunBinatang	KebunBinatang – Jl. BungaRampai Raya – Jl. Pintu Air IV – Jl. Luku III – Jl. Luku I – Jl. Pintu Air – Sp. Pos – Jl. JaminGinting – Jl. IskandarMuda – Jl. KH. Wahid Hasyim – Jl. SeiBesitang – Jl. IskandarMuda – Jl. Gajah Mada – Jl. S. Parman – Jl. GatotSubroto – Jl. KaptenMaulanaLubis – Jl. RadenSaleh – Jl. Balai Kota – Jl. PutriHijau – Jl. P. MerakJingga – Jl. P. Kemerdekaan – Jl. HM. Yamin, SH. – Jl. Willem Iskandar/Simpang UNIMED
3	103	Jl. JaminGinting⇄Simpang UNIMED	Jl. JaminGinting/Batas Kota Medan – Terminal PasarInduk – Jl. JaminGinting – Jl. IskandarMuda – Jl. Gajah Mada – Jl. KH. Wahid Hasyim – Jl. SeiBesitang – Jl. IskandarMuda – Jl. Gajah Mada – Jl. S. Parman – Jl. GatotSubroto – Jl. KaptenMaulanaLubis – Jl. RadenSaleh – Jl. Balai Kota – Jl. PutriHijau – Jl. P. MerakJingga – Jl. PerintisKemerdekaan – Jl. HM. Yamin, SH – Jl. Willem Iskandar – Simpang UNIMED	Simpang UNIMED – Jl. Willem Iskandar – Jl. HM. Yamin, SH – Jl. Stasiun KA – Jl. P. Penang – Jl. Balai Kota – Jl. PutriHijau – Jl. Guru Patimpus – Jl. GatotSubroto – Jl. IskandarMuda – Jl. JaminGinting – Terminal PasarInduk – Jl. JaminGinting
4	104	Simpang UNIMED ⇄ Jl. BungaRampai	Simpang UNIMED – Jl. Willem Iskandar – Jl. HM. Yamin, SH. – Jl. Stasiun KA – Jl. P. Penang – Jl. Balai Kota – Jl. PutriHijau – Jl. Guru Patimpus – Jl. GatotSubroto – Jl. IskandarMuda – Jl. JaminGinting – Jl. KapitenPurba – PerumnasSimalingkar – Jl. BungaRampe V – Jl. BungaRampai Raya – KebunBinatang	KebunBinatang – Jl. BungaRampai Raya – Jl. BungaRampe V – PerumnasSimalingkar – Jl. KapitenPurba – Jl. JaminGinting – Jl. IskandarMuda – Jl. Gajah Mada – Jl. KH. Wahid Hasyim – Jl. SeiBesitang – Jl. IskandarMuda – Jl. Gajah Mada – Jl. S. Parman – Jl. GatotSubroto – Jl. KaptenMaulanaLubis – Jl. RadenSaleh – Jl. Balai Kota – Jl. PutriHijau – Jl. P. MerakJingga – Jl. PerintisKemerdekaan – Jl. HM. Yamin, SH. – Jl.

ISSN: 3063-7929 (Online)
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				Willem Iskandar – Simpang UNIMED
5	113	Jl. KayuPutih⇄ Jl. SM. Raja	Jl. KayuPutih – Jl. PematangPasir – Jl. Aluminium Raya – Jl. TanjungMulia – Jl. K.L. YosSudarso – Jl. Budi Pembangunan – Jl. Bilal – Jl. Bhayangkara – Jl. Willem Iskandar – Jl. Aksara – Jl. KeretaApi – Jl. AR. Hakim – Jl. HM. Joni – Jl. GedungArca – Jl. Stadion – Jl. SM. Raja – Jl. KH. Rivai A. ManafLubis – Terminal Amplas – Jl. Sm. Raja	Jl. SM. Raja – Jl. KH. Rivai A. ManafLubis – Terminal Amplas – Jl. KH. Rivai A. ManafLubis – Jl. SM. Raja – Jl. Stadion – Jl. GedungArca – Jl. HM. Joni – Jl. AR. Hakim – Jl. KeretaApi – Jl. Aksara – Jl. Willem Iskandar – Jl. Bhayangkara – Jl. Bilal – Jl. Budi Pembangunan – Jl. K.L. YosSudarso – Jl. TanjungMulia – Jl. Aluminium Raya – Jl. PematangPasir – Jl. KayuPutih
6	121	Jl. Williem Iskandar⇄Perumnas Simalingkar	Jl. WilliemIskandar – Jl. Aksara – Jl. KeretaApi – Jl. AR. Hakim – Jl. Halat – Jl. GedungArca – Jl. HM. Joni – Jl. GedungArca – Jl. Stadion – Jl. SM. Raja – Jl. SaktiLubis – Jl. BrigjendKatamso – Jl. A. H. Nasution – Jl. Letjend. JaminGinting – Jl. KapitenPurba – PerumnasSimalingkar	PerumnasSimalingkar – Jl. KapitenPurba – Jl. Letjend. JaminGinting – Jl. A. H. Nasution – Jl. BrigjendKatamso – Jl. SaktiLubis – Jl. SM. Raja – Jl. Stadion – Jl. GedungArca – Jl. HM. Joni – Jl. GedungArca – Jl. Halat – Jl. AR. Hakim – Jl. KeretaApi – Jl. Aksara – Jl. WilliemIskandar
7	125	Terminal Amplas⇄Perumnas Martubung	Terminal Amplas – Jl. K.H. Rivai A. Manaf – Jl. Seksama Ujung – Jl. Selamat Ujung – Jl. Garu I – Jl. SM. Raja – Jl. Stadion – Jl. GedungArca – Jl. H. M. Joni – Jl. A.R. Hakim – Jl. KeretaApi – Jl. Aksara – Jl. Prof. H. M. Yamin, S.H. – Jl. Sutomo – Jl. Mahoni – Jl. Gaharu – Jl. KaptenMukhtarBasri – Jl. Mustafa – Jl. Bilal Ujung – Jl. Budi Pembangunan – Jl. K. L. YosSudarso – Jl. Pancing I – PerumnasMartubung	PerumnasMartubung – Jl. Pancing I – Jl. K. L. YosSudarso – Jl. Budi Pembangunan – Jl. Bilal – Jl. Mustafa – Jl. KaptenMukhtarBasri – Jl. Gaharu – Jl. Mahoni – Jl. Sutomo Ujung – Jl. PerintisKemerdekaan – Jl. Prof. H. M. Yamin, S.H. – Jl. Aksara – Jl. KeretaApi – Jl. A.R. Hakim – Jl. H. M. Joni – Jl. GedungArca – Jl. Stadion – Jl. SM. Raja – Jl. Garu I – Jl. Selamat Ujung – Jl. Seksama Ujung – Jl. K.H. Rivai A. Manaf – Terminal Amplas
8	120 P	Terminal Lubuk Pakam⇄ Terminal Ikan Paus Binjai	Terminal LubukPakam – Jl. SM. Raja – Jl. KH. Rivai A. Manaf – Terminal Amplas – Jl. KH. Rivai A. Manaf – Jl. SM. Raja – Jl. Tritura – Jl. Jend. A. H. Nasution – Jl. Letjend. JaminGinting – Jl. Dr.Mansyur – Jl. Setia Budi – Jl. Kasuari – Jl. Merak – Jl. Amal – Jl. T. B. Simatupang – Terminal Pinang Baris – Jl. T.B. Simatupang – Jl. GatotSubroto – Terminal IkanPausBinjai	Terminal IkanPausBinjai – Jl. GatotSubroto – Jl. T.B. Simatupang – Terminal Pinang Baris – Jl. T. B. Simatupang – Jl. Amal – Jl. Merak – Jl. Kasuari – Jl. Setia Budi – Jl. Dr.Mansyur – Jl. Letjend. JaminGinting – Jl. Jend. A. H. Nasution – Jl. Tritura – Jl. SM. Raja – Jl. KH. Rivai A. Manaf – Terminal Amplas – Jl. KH. Rivai A. Manaf – Jl. SM. Raja – Terminal LubukPakam

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Route Display Results On Google Maps Api

A. Perumnas Mandala ⇄ Terminal Pasar Induk (Route Number 43)

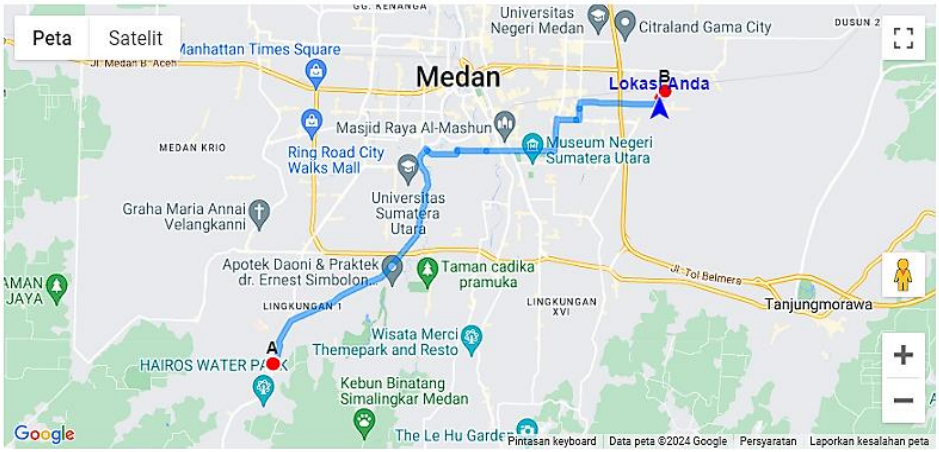

Figure 1**.** Perumnas Mandala ⇄ Terminal Pasar Induk (Route Number 43)

B. Simpang UNIMED ⇄Kebun Binatang (Route Number 54)

Figure **2.**Simpang UNIMED ⇄KebunBinatang (Route Number 54)

C. Jl. Jamin Ginting ⇄ Simpang UNIMED (Route Number 103)

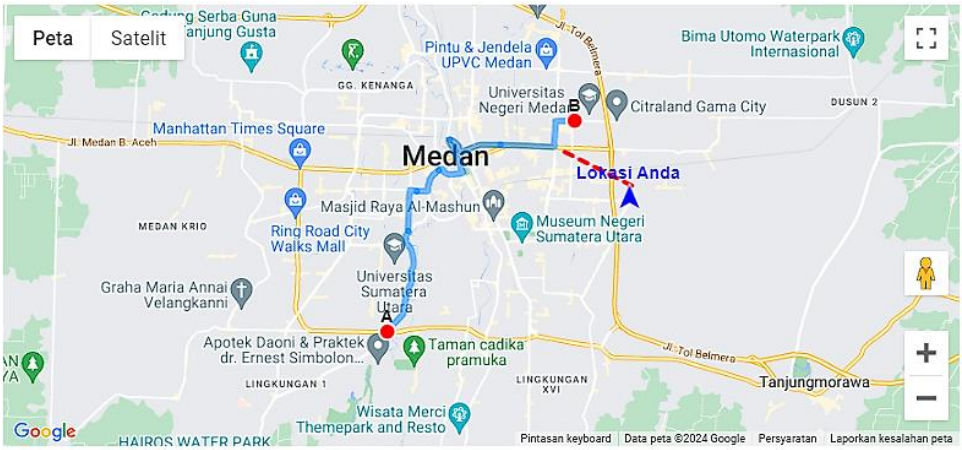

Figure 3**.** Jl. Jamin Ginting ⇄ Simpang UNIMED (Route Number 103)

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D. Simpang UNIMED ⇄ Jl. Bunga Rampai (Route Number104)

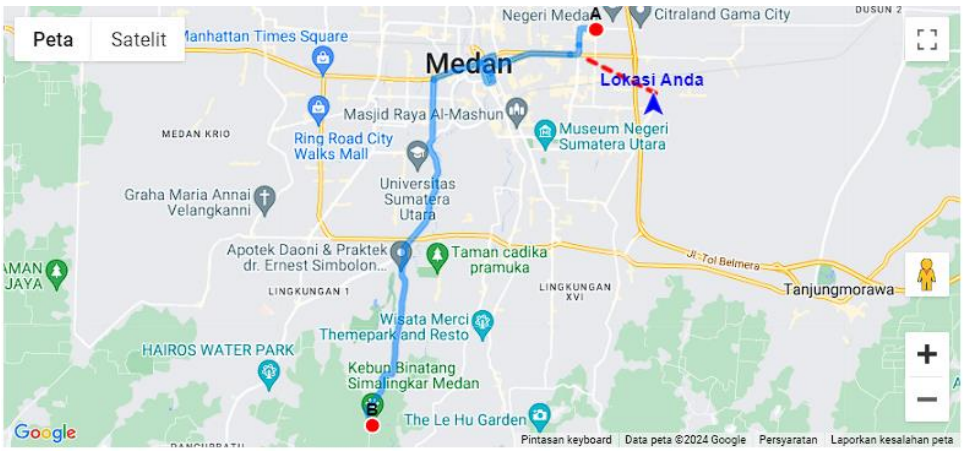

Figure 4**.** Simpang UNIMED ⇄ Jl. Bunga Rampai (Route Number 104)

E. Jl. Kayu Putih ⇄ Jl. SM. Raja (Route Number113)

Figure **5.** Jl. KayuPutih⇄ Jl. SM. Raja (Route Number 113)

F. Jl. Williem Iskandar ⇄ Perumnas Simalingkar (Route Number121)

Figure 6**.** Jl. Williem Iskandar⇄ Perumnas Simalingkar (Route Number 121)

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G. Terminal Amplas ⇄ Perumnas Martubung (Route Number125)

Figure **7.** Terminal Amplas⇄ Perumnas Martubung (Route Number 125)

H. Terminal Lubuk Pakam ⇄ Terminal Ikan Paus Binjai (Route Number120P)

Figure **8.** Terminal Lubuk Pakam⇄ Terminal Ikan Paus Binjai (Route Number 120P)

Display of the Medan City Public Minibus Route Application by PT. Rahayu Medan Ceria

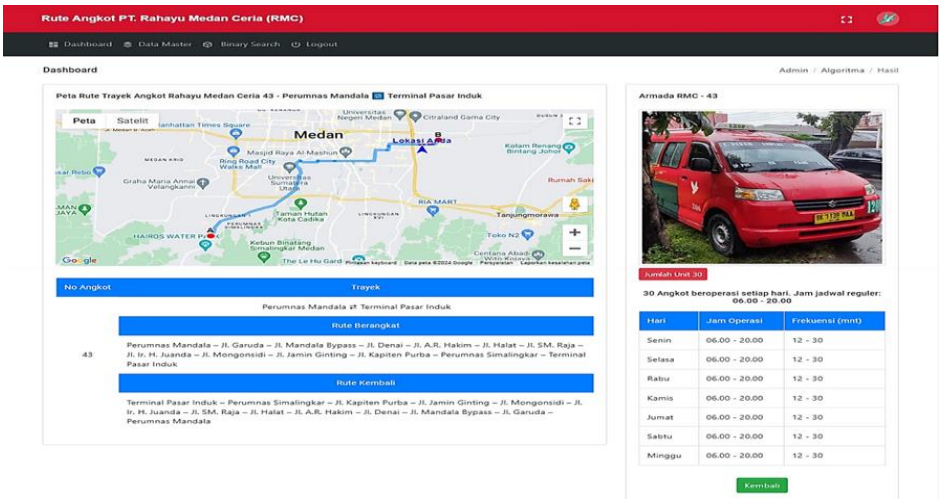

Figure 9**.** Display of the Medan City Public Minibus Route Application by PT. Rahayu Medan Ceria

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3. CONCLUSION

From the development of the Geographic Information System for Medan city public minibuses, the information displayed includes the minibus routes using the Google Maps API, accurately reflecting the routes provided by PT. Rahayu Medan Ceria.

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