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Implementation of a Mobile-Based E-Ticket Booking System for Mount Kerinci Climbing to Optimize Route Quota Management

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ABSTRACT

Mount Kerinci, one of the highest mountains in Indonesia, attracts numerous climbers annually. Effective management of climbing quotas is essential to balance the number of climbers with environmental sustainability. The existing manual system often results in quota uncertainties, overbooking, and calculation errors. To address these issues, this study developed an Android-based mobile application using the Rapid Application Development (RAD) method for e-ticket booking. The application enhances transparency and efficiency in managing climbing route quotas, enabling real-time ticket booking for climbers and facilitating better quota management for administrators. This innovation aims to optimize quota management, enhance the climber experience, and contribute to sustainable tourism by reducing human error and improving resource allocation..

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1. Introduction

Mount Kerinci is one of the seven highest mountains in Indonesia, which has succeeded in becoming an attraction for climbers every year. Managing climbing quotas is very important to maintain a balance between the number of climbers and environmental sustainability. In manual management, there is often uncertainty regarding the availability of route quotas, which has the potential to cause overbooking, delays, or even cancellations of climbs [1]. In addition, this manual process is also time-consuming and prone to errors. Along with the increasing number of ticket orders, a system is needed that can make it easier for climbers to order climbing tickets [2].

The development of mobile technology and the digitalization of public services have created opportunities to address these issues through a mobile application-based e-ticket booking system. Currently, with the increasing number of smartphone users, the development of Android-based applications continues to increase [3]. Android offers a flexible development environment, making it more accessible via smartphone devices. This system is expected to provide transparency in the management of climbing route quotas, as well as making it easier for climbers to make ticket reservations in real-time and accurately [4].

The problem faced by the management of Mount Kerinci is how to optimize the management of climbing quotas to make them more effective and efficient [5]. Manual management often causes errors in quota calculations. In addition, the system is unable to present accurate and real-time information for

prospective climbers. Therefore, a technology-based solution is needed to facilitate quota management and the climbing ticket reservation process. The Rapid Application Development (RAD) based development method is a software development method that aims to accelerate the development process while producing products with better quality compared to the traditional life cycle approach [6]. This method is very suitable for application development contexts for public services, such as e-ticket booking for climbing.

This study develops a mobile application for booking e-tickets for climbing Mount Kerinci, which is designed to optimize the management of climbing route quotas. This application will allow climbers to book tickets online, choose climbing routes, and get real-time quota information [7]. In addition, this system is integrated with a quota management feature that allows managers to set quotas based on the capacity of the quota route.

The main innovation of this research is the implementation of an integrated hiking trail quota management system in a mobile application, which has not been widely implemented in other hiking areas in Indonesia [8] [9]. This system not only helps to facilitate the booking process but also ensures optimal and efficient management of hiking trail quotas. In addition, valid hiking information is provided for those who have completed the booking process to facilitate hiking reporting [10] [11].

2. Research Methods

Rapid Application Development (RAD) is a software development model that is linear sequential in nature, with a focus on fast and short development cycle [12]. The RAD method was chosen because of its ability to facilitate rapid and efficient application development. The development process with RAD consists of phases that enable user-centered application development, where prototypes are built and tested in a short time. By using this method, developers can quickly respond to user feedback, allowing for gradual revision and improvement of the application over several iterations until the desired product is achieved.

The following is an explanation of each step in the Rapid Application Development (RAD) method, which includes requirements design, system design, development, and implementation:

1. Needs Plan

   At this stage, identification and analysis of the needs of users and stakeholders involved in the e-ticket ordering system is carried out. This process includes user identification by determining all parties involved, such as climbers and trail managers. In addition, data collection was carried out through interviews and surveys to understand specific needs related to ticket booking and quota management. Furthermore, the needs analysis formulates functional and non-functional needs, such as ease of access and speed of booking.

2. System Design

   After the requirements plan is prepared, the next stage is system design. At this stage, developers create a user interface (UI) prototype that displays the initial design for the mobile application, including elements such as the main page, ticket booking, and quota management. System flow development was also carried out to determine the steps that users must follow in the ticket ordering process, including registration and login. To ensure compliance with user expectations, a trial session is conducted involving users to obtain feedback on the prototype, which is then used to make adjustments. All the results of this phase are documented in the form of use case diagrams, sequence diagrams, class diagrams, and functional descriptions of each module.

3. Development

   The development stage involves transforming an approved design into a functioning application. In the context of an e-ticket booking system, the application is built in a modular manner, where each module, such as booking and quota management, can be tested separately. System integration is also important to ensure that all modules function properly as a whole; for example, the ordering system must be able to interact with the database to update quotas in real-time. During this phase, initial testing is conducted periodically to find and fix bugs before the application is released to the public. In addition, code documentation is compiled to explain the structure and functionality of each module, which will be useful for future maintenance.

4. Implementation

   The final stage in the RAD method is implementation, where the application that has been tested is moved to the production environment. In this phase, the application is prepared for use by

end users, and training is provided to users and managers on how to use the system, including how to book tickets and manage line quotas. After launch, application performance monitoring is performed and feedback is collected from users to detect any problems that may arise. Based on the feedback, continuous improvements are made to the application, including the addition of new features where necessary, to ensure that the system remains relevant to user needs.

3. Results and Discussion

3.1. Use Case Diagram

The use case design has two actors, namely user and admin. The user can do the registration and login process, and after account validation is done, it will be directed to the initial display containing the home menu, make an order, and logout. While the admin logs in, it will be directed to the initial display, namely the home page, make an order, see order data, see reports, and logout. The use case diagram can be seen in the figure 1.

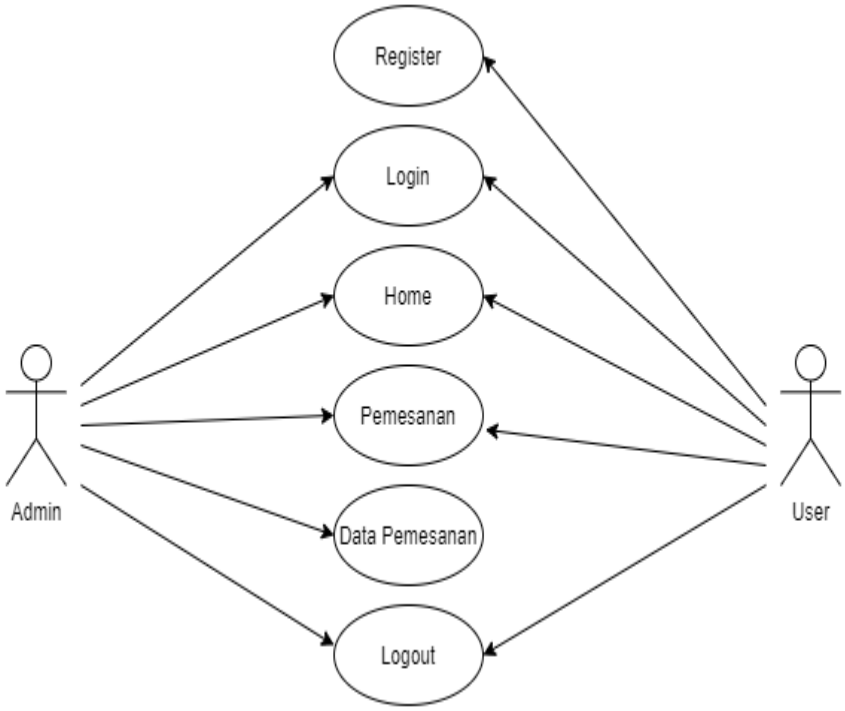

Figure 1. Use Case Diagram

3.2. Sequence Diagram

Sequence diagrams are used to describe the sequential interaction process between the user and the system, which runs according to the way the system that has been created works. Following are several sequence diagrams used in this research.

1. Login Sequence Diagram

   The login sequence diagram is used to illustrate the login process carried out by the user or admin in order to access the system. When logging in, the user or admin is asked to enter a username and password. If one of the two inputs is invalid, there will be a warning about incorrect input, and if all inputs are correct, it will go to the home page. The login sequence diagram can be seen in figure 2.

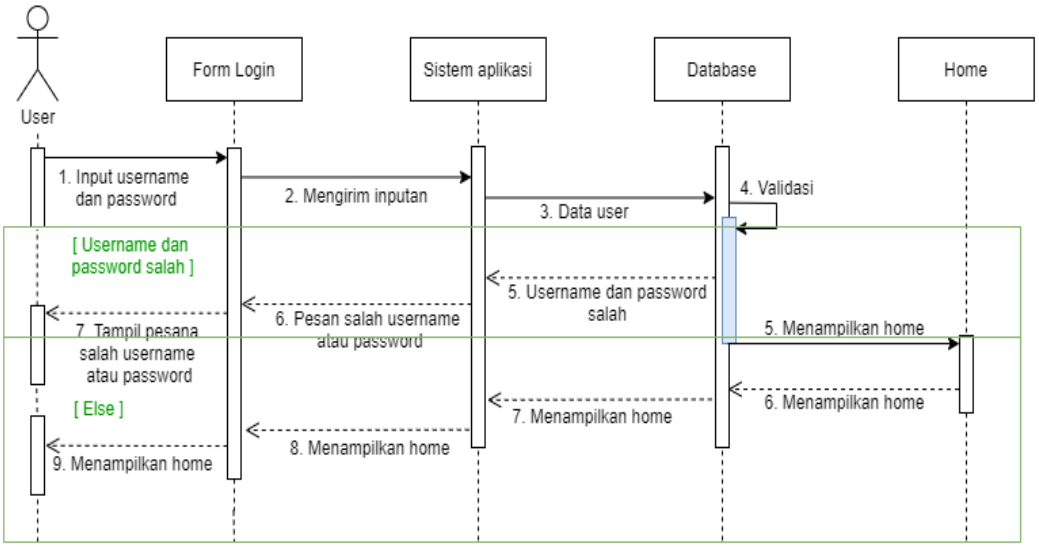

Figure 2. Login Sequence Diagram

2. User Sequence Diagram for User Register

The registration sequence diagram is used to illustrate the process of registering new users so they can enter the system. When registering, the user is expected to fill in the registration form, namely username, full name, email and password. The register sequence diagram can be seen in figure 3

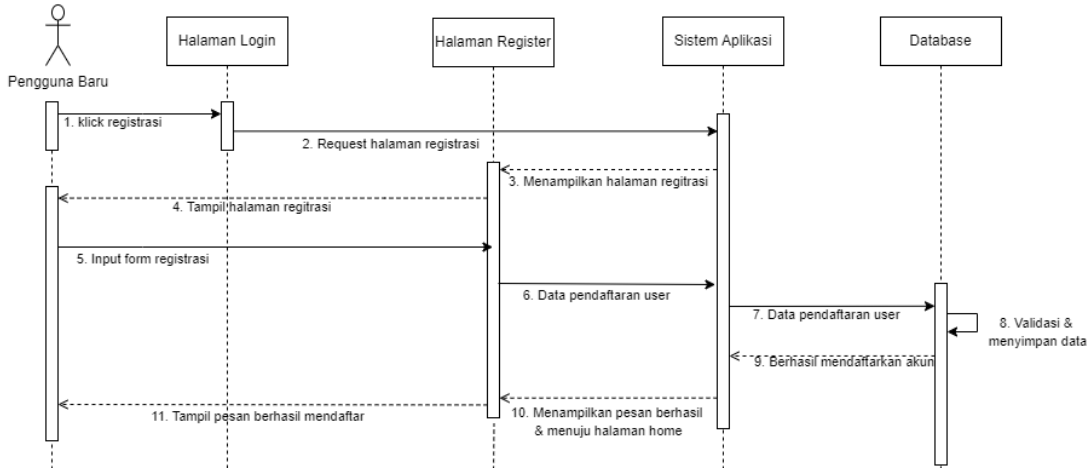

Figure 3. Sequence Diagram Register User

3. Ordering Sequence Diagram

The ordering sequence diagram that can be used by users or admins depicts a ticket ordering process that is in accordance with the sequence in the system. Starting from the booking page, the user or admin is asked to fill out the booking form, then the system will validate the input and check the quota on the date and route booked. The booking sequence diagram can be seen in figure 4.

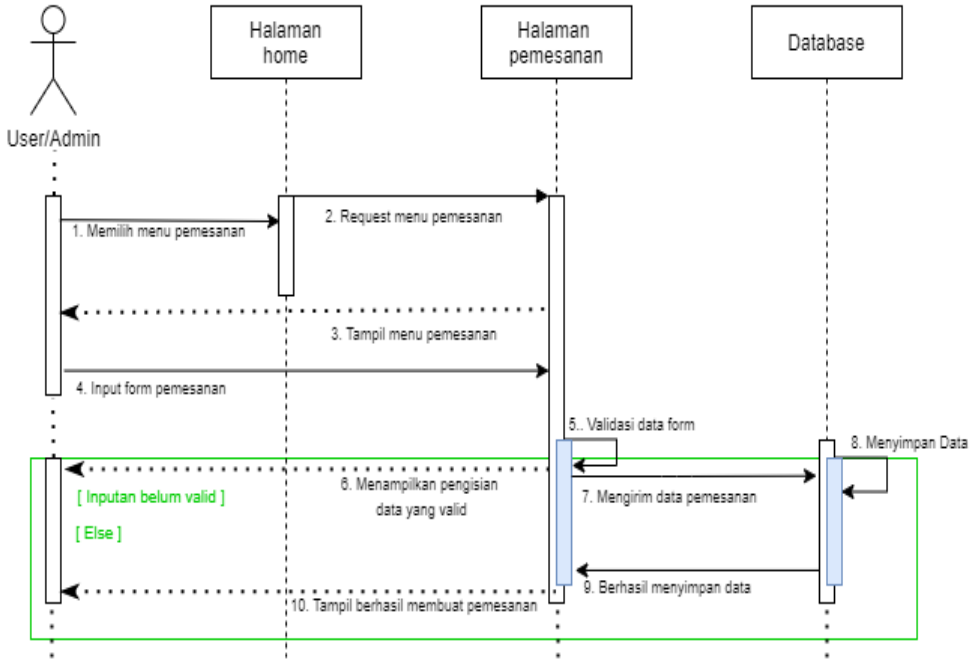

Figure 4. Ordering Sequence Diagram

4. Sequence Diagram Add Quota

To carry out the quota addition process, the admin is asked to fill out the quota addition form, by selecting the route to be added, selecting the date and how much quota is added. The climb can be seen in figure 5.

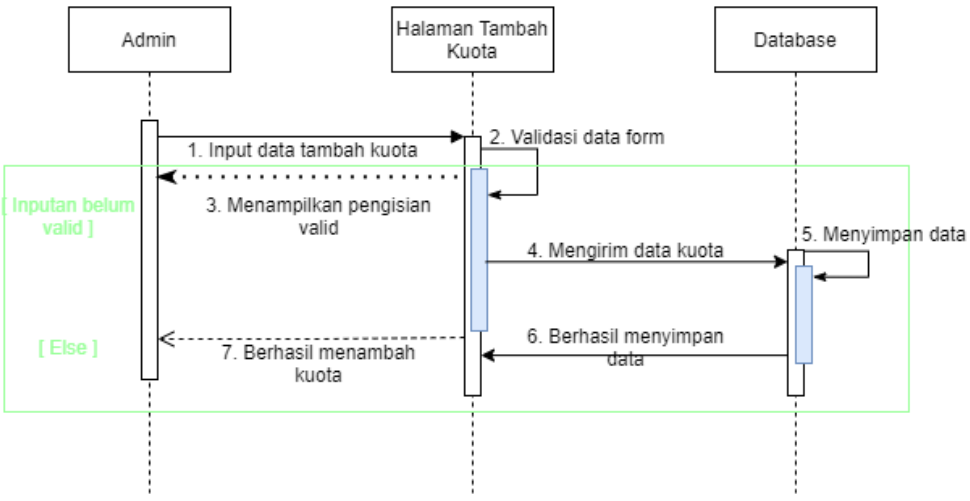

Figure 5. Sequence Diagram Add Quota

This diagram visualizes the interactions between system components with a UML (Unified Modeling Language) model-based approach. The goal is to ensure a clear understanding of the system workflow and make it easier for developers to implement the data addition process.

3.3. Class Diagram

This class diagram consists of five main classes: User, Admin, Reservation, Route, and RouteQuota. The User class stores user data with main attributes such as user_id, full name, email, and password, and has a relationship with the Reservation class, because each user can make many reservations. The Admin class contains administrator information (admin_id, name, email and password) who has access to manage data in the system, including route and quota settings. The Reservation class stores ticket reservation details, including information such as reservation_id, user_id, admin_id, route_id, ID photo, phone number, total ticket and date_of_reservation, and has a relationship with the Route class to determine the selected hiking route. The Route class records hiking route data, such as route_id and route_name, and has a relationship to RouteQuota, which manages daily quotas per route with the attributes quota_id, route_id, quota_date, and quota_amount. The relationship between these classes ensures that quota ordering and management can be arranged according to the paths available in the system. The class diagram can be seen in figure 6.

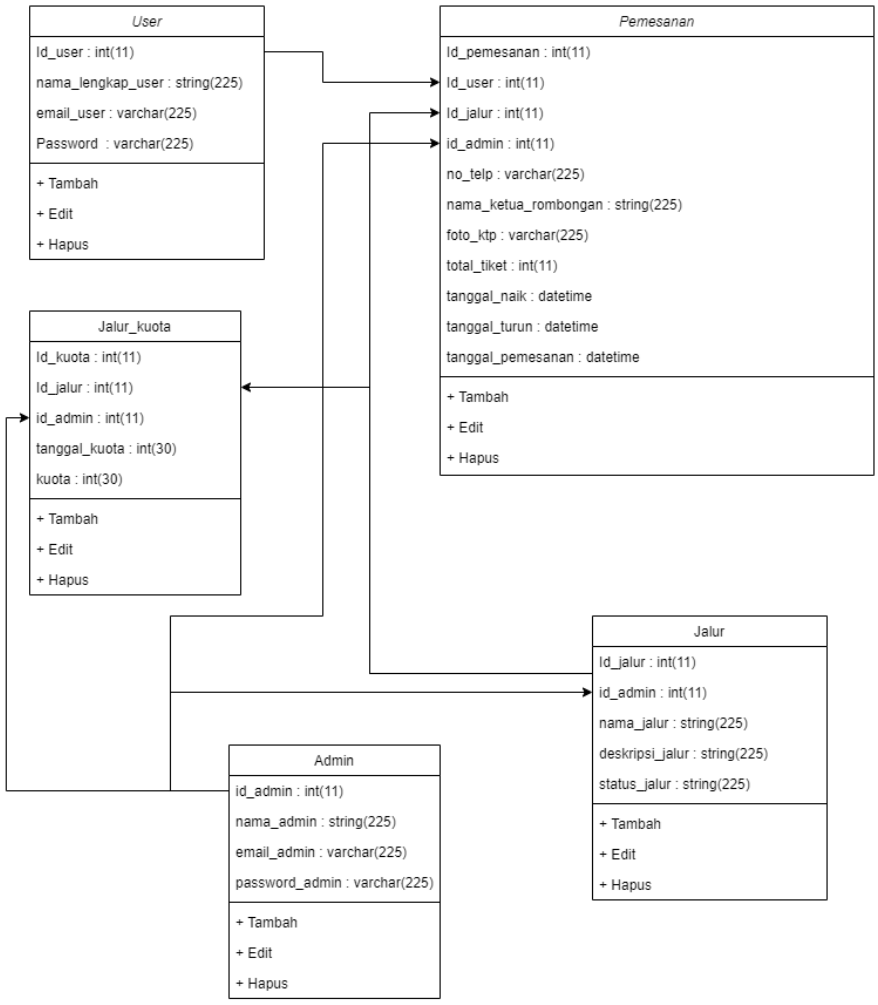

Figure 6. Class Diagrams

3.4. Design Results

1. Login page

The login page is used when a user wants to enter the system and already has a registered account. It can be seen in figure 7.

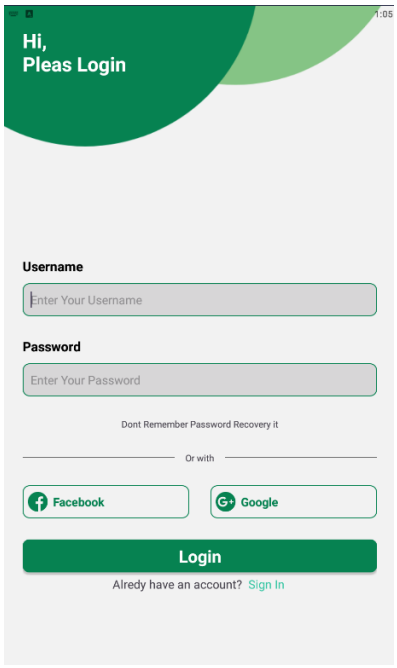

Figure 7. Login Page

2. Register page

If the user doesn't have an account yet, the user is expected to create one first on the register page. This can be seen in figure 8.

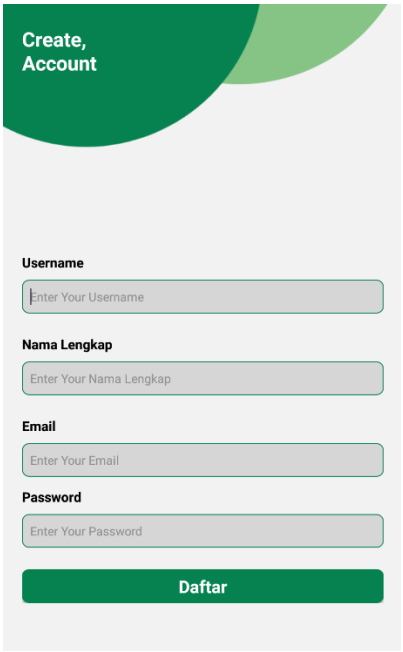

Figure 8. Register Page

3. Order page

When placing an order, the user will fill in the form completely and validly, starting with the name of the group leader, telephone number, route, boarding date, disembarkation date and ID card photo. After placing an order, the system will check the quota on the selected route. As in figure 9.

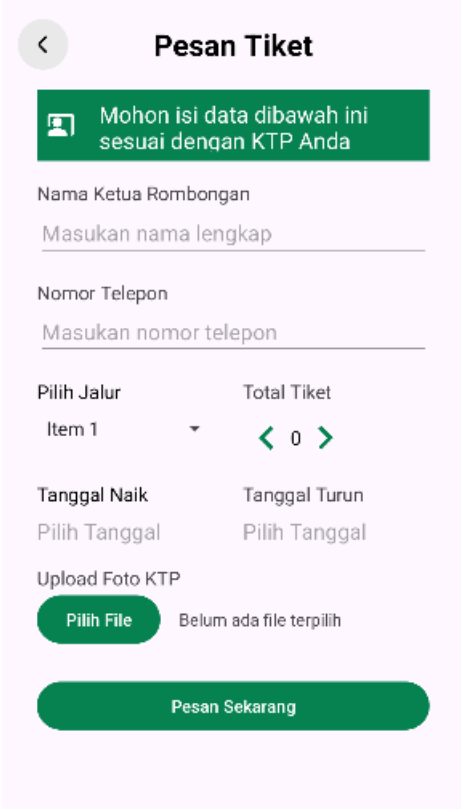

Figure 9. Order Page

4. Order data page

To see all order processes that have been successfully made, the admin can view the data on the order data page in figure 10

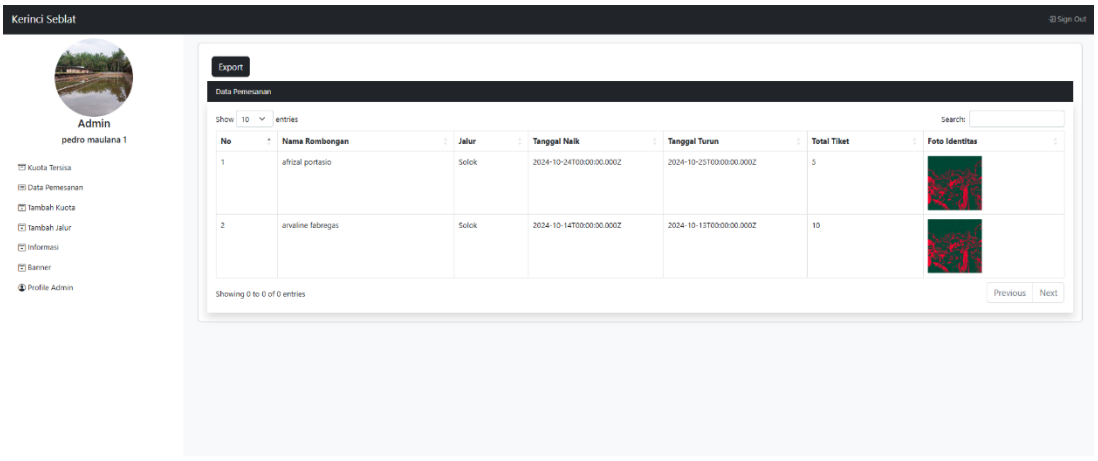

Figure 10. Order Data Page

5. Add Quota Page

Admin can set and manage quota on the add quota page on the add quota page for admin. Can be seen in figure 11

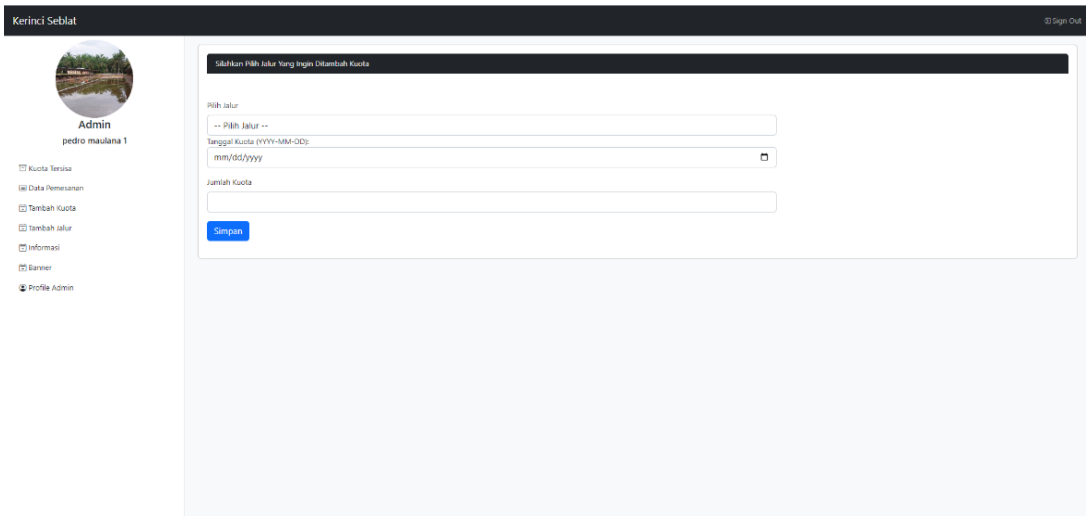

Figure 11. Add Quota Page

4. Conclusion

After going through the stages of designing and building a mobile-based e-ticket ordering system for climbing Mount Kerinci, it can be concluded that the system can overcome the problem of managing quotas for climbing Mount Kerinci, which was previously done manually and often caused uncertainty and errors. We developed an Android-based mobile application that allows real-time e-ticket ordering and more efficient management of climbing route quotas.

Through the Rapid Application Development (RAD) method, we are able to develop applications quickly, involve users throughout the process, and reduce communication errors. This application not only provides online ticket booking features but also integrates route quota management, which makes it easier for administrators to manage capacity based on route and weather conditions.

Confession

This journal article was written by myself, Dilan Nanda Pratama, based on the results of research on the Implementation of a Mobile-Based Mount Kerinci Climbing E-Ticket Booking System for Optimizing Route Quota Management, which was funded by the Faculty of Science and Technology, Yogyakarta University of Technology, and was based on the title of my report in 2024. The contents are entirely the responsibility of the author.

DAFTAR PUSTAKA

[1] R. T. Aldisa, "Penerapan Metode RAD (Rapid Application Development) Pada Sistem Informasi Promosi dan Pemesanan Makanan Berbasis Website Studi Kasus Restoran Waroenk Anak Kuliahan," *BITS,* vol. 3, no. 3, 2021.

[2] I. ahmad and H. indra, "Rancang Bangun Sistem Tiket Masuk Pada Objek Wisata Pantai Mutun," *Jurnal Rekayasa dan Manajemen Sistem Informasi,* vol. 2, no. 2, 2016.

[3] A. R. Faqih and A. A. Widya, "Implementasi Aplikasi E-Ticket pada Bumdes Desa Sumbermulyo Kec.Jogoroto Kab. Jombang sebagai Solusi Digitalisasi Pengelolaan Tiket," *JUSTIKPEN,* vol. 2, no. 2, 2023.

[4] Y. D. Wijaya and M. W. Astuti, "Sistem Informasi Penjualan Tiket Wisata Berbasis Web Menggunakan

Metode Waterfall," *SENATIK,* vol. 2, no. 1, 2019.

[5] I. Hadi, H. Fahmi and M. Saleh, "Perancangan Aplikasi Pengelolaan Tiket Wisata Pada Desa Wisata Lantan Berbasis Web," *ETIK,* vol. 1, no. 1, 2022.

[6] A. Baihaqi and T. , "Penerapan Metode Rapid Application Develomment (Rad) Dalam Pengembangan Sistem Pemesanan Menu Berbasis Android," *Jurnal Informasi Dan Komputer,* vol. 9, no. 2, 2021.

[7] A. Y. A. Ma'ruf, D. O. Hajjar and E. N. Sulastri, "Analisis Dan Perancangan Aplikasi E-Ticketing Wisata Indonesia (Tiwi) Berbasis Android Dengan Metode Waterfall," *SITASI,* vol. 1, no. 1, 2021.

[8] D. Sweetania and A. Hafidz, "Perancangan Ui/Ux Pada Aplikasi Berbasis Mobile E-Ticket Museum Di Jakarta Dengan Menggunakan Metode Design Thinking," *JTS,* vol. 2, no. 3, 2023.

[9] H. Prasetyo, . N. Radita and A. Tirtana, "Aplikasi Manajemen Pendakian Berbasis Android Menggunakan Metode Scrum," *TEKNIKA,* vol. 11, no. 3, 2022.

[10] S. S. Askarinda, "Aplikasi Pembelian Tiket Semeru Berbasis Android Untuk Meminimalisir Antrian Berbasis Android," *JATI(Jurnal Mahasiswa Teknik Informatika),* vol. 2, no. 1, 2018.

[11] R. Hamimi, "Pemodelan Aplikasi Pemesanan E – Tiket Pendakian Gunung Berbasis Android," *TEKNOIS,* vol. 13, no. 1, 2023.

[12] C. Mandang, D. W. C. J. Wuisan and J. . G. L. Mandagi, "Penerapan Metode RAD dalam Merancang Aplikasi Web Proyek PLN UIP Sulbagut," *JOINTER,* vol. 1, no. 2, 2020.

[13] R. Romadhon and H. ,. G. , "Sistem Informasi Booking Wisata Pendakian Melalui Online di Kawasan Gunung Prau Dataran Tinggi Dieng Jawa Tengah," *Journal of Informatics and Advanced Computing,* vol. 2, no. 1, 2021.

[14] N. Hidayat and K. Hati, "Penerapan Metode Rapid Application Development (RAD) dalam Rancang Bangun Sistem Informasi Rapor Online (SIRALINE)," *JURNAL SISTEM INFORMASI ,* vol. 10, no. 1, 2021.

[15] S. R. P. Wulung and E. Novianti,, "Implementasi Komunikasi Daring Dalam Menunjang Jawa Barat Sebagai Destinasi Pariwisata Cerdas," *Jurnal Komunikasi,* vol. 12, no. 1, 2020.

[16] N. S. Sibarani, G. Munawar and B. Wisnuadhi, "Analisis Performa Aplikasi Android Pada Bahasa Pemrograman Java dan Kotlin," *POLBAN,* 2018.

[17] E. P. Harahap, U. Rahardja and M. Salamuddin , "Aplikasi Panduan dan Pembayaran Tiket Masuk Mendaki Gunung Menggunakan Metodologi Sistem Multimedia Luther-Sutopo Berbasis Android," *SATIN - Sains dan Teknologi Informasi,* vol. 4, no. 2, 2018.

[18] Y. Fatman, N. K. Nafisah and P. . B. J. Pambudi, "Implementasi Payment Gateway dengan Menggunakan Midtrans pada Website UMKM Geberco," *Jurnal KomtekInfo,* vol. 10, no. 2, 2023.

[19] A. S. Putra, "Konsep Kota Pintar Dalam Penerapan Sistem Pembayaran Menggunakan Kode Qr Pada Pemesanan Tiket Elektronik," *TEKINFO,* vol. 21, no. 1, 2020.

[20] W. Santoso and . F. A. Nugroho, "Penerapan Sistem Penjualan Makanan Berbasis Android Kotlin Dengan Metode Prototype," *OKTAL : Jurnal Ilmu Komputer dan Science,* vol. 3, no. 9, 2024.

[21] C. P. Wijaya, K. I. Satoto and . R. R. Isnanto, "Perancangan Sistem Informasi Pemesanan Tiket Travel Berbasis Web," *TRANSMISI,* vol. 15, no. 2, 2013.

[22] E. Kartikadarma, I. Rizqa and D. Trirosandi, "Rancangan Bangun Aplikasi E-Museum Sebagai Upaya Melestarikan Kebudayaan," *semnasIF,* 2010.

[23] I. Fauzi and . I. H. Ikasari , "Rancang Bangun Penerapan Teknologi Aplikasi Payment Gateway pada Sistem Pembayaran Berbasis Web (Studi Kasus : Toko Bandar Aki)," *Jurnal Informatika MULTI ,* vol. 1, no. 3, 2023.

[24] G. Y. Swara and Y. Pebriadi, "Rekayasa Perangkat Lunak Pemesanan Tiket Bioskop Berbasis Web," *Jurnal TEKNOIF,* vol. 4, no. 2, 2016.

[25] Kartini, B. U. Fahnun and D. Pratiwi, "Perancangan Sistem Informasi Pemesanan Tiket Konser Musik Online Berbasis Lokasi," *Seminar Nasional Teknologi Informasi Dan Multimedia,* 2013.