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Research Article

WEBSITE-BASED INFORMATION SYSTEM PROJECT FOR MEETING ROOM RESERVATION, DELIVERY, AND PROCUREMENT AT PT. REKAYASA INDUSTRI

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Abstract

The advancement of information technology has driven various industrial sectors, including manufacturing, to transform toward more efficient and responsive distribution systems. PT. Rekayasa Industri, a rubber manufacturing company, still relies on manual processes in managing goods delivery, resulting in various issues such as delays, distribution errors, and a lack of transparency in tracking. This study aims to design a web-based goods delivery information system integrated with Internet of Things (IoT) technology and API services. The system development method used is the Waterfall method, which consists of five stages: requirement analysis, system design, implementation, testing, and maintenance. The developed system includes delivery recording, real-time tracking, IoT device data integration, and access to information through a web interface. The results of the study show that the designed system successfully replaces the previously used manual processes, enhances distribution effectiveness, and facilitates easier monitoring and reporting. Thus, this system is capable of improving operational efficiency and the quality of logistics services at PT. Rekayasa Industri.

Keywords: Delivery, Web, IoT, API, Waterfall

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INTRODUCTION

In the era of digitalization and globalization, the manufacturing industry is required to have an efficient and responsive distribution system. The delivery system plays a crucial role in the supply chain as it directly affects customer satisfaction, smooth distribution, and the company's competitiveness. Many manufacturing companies have begun adopting information technology

to support logistics activities, such as real-time shipment tracking, system integration, and digital coordination across departments (Zhafar et al., 2023).

However, several companies in Indonesia still rely on manual systems for their delivery processes. One example is PT. Rekayasa Industri, a rubber manufacturing company that continues to depend on manual recording and conventional coordination in its distribution activities. This approach creates operational challenges, particularly in terms of delivery speed and accuracy (Setyaningsih & Sidqon, 2020).

PT. Rekayasa Industri specifically faces issues such as ineffective reporting and monitoring of shipments. The absence of an integrated system makes real-time tracking difficult and increases the likelihood of errors, ranging from misplaced items to lost goods. These problems become significant obstacles to achieving optimal efficiency and accuracy in the delivery process (Asmoro et al., 2021). Previous studies have discussed the use of web-based information systems to support logistics, but research focusing on the integration of IoT and external API services in medium-sized companies in Indonesia remains limited. This gap highlights the research opportunity addressed in this study.

Therefore, this research aims to design a web-based delivery information system integrated with IoT technology and API services. The system is expected to enable real-time tracking, improve inter-department coordination, and enhance delivery speed and accuracy. By implementing this system, PT. Rekayasa Industri can reduce errors caused by manual methods, increase operational efficiency, and improve overall customer service quality (E. Putri & Matondang, 2023).

RESEARCH METHOD

The research was conducted at PT. Rekayasa Industri, located at Jl. Cukanggalih Kidul No. 99, Tangerang Regency, Banten. The study was carried out over a five-month period, from October 2024 to March 2025. The research focused on delivery management processes within the company, including delivery note preparation, shipment tracking, and reporting.

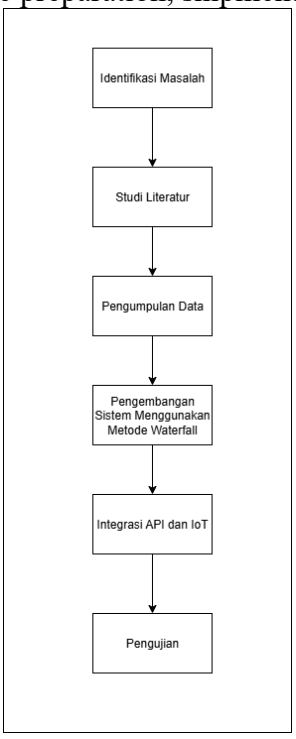

Image 1 Research Framwork

Research Design

This study applies the Waterfall development model to support a structured and systematic process of system development. The model consists of sequential phases, namely planning, requirement analysis, system design, implementation, testing, deployment, and maintenance. This approach was chosen because it provides a clear and linear workflow, making it suitable for the design and development of a web-based delivery information system integrated with IoT devices and API services.

Research Target/Subject

The research target is the delivery management process at PT. Rekayasa Industri, which faces challenges such as shipment delays, errors, and lack of transparency due to its manual system. The research subjects include warehouse staff, logistics personnel, and shipping administration officers, who were directly involved in providing information regarding workflows, operational issues, and system requirements.

Research Procedure

The research procedure was adapted from the stages of the Waterfall model, which consist of the following phases:

1. **Problem Identification** – Identifying inefficiencies in delivery management, such as delays, errors, and lack of shipment visibility.
2. **Literature Study** – Reviewing references on IoT, API services, and web-based systems to establish theoretical foundations and best practices.
3. **Data Collection** – Conducted through observation of delivery workflows and interviews with warehouse and logistics staff to capture detailed requirements.
4. **System Design** – Designing system architecture, user interfaces, ERD diagrams, and IoT integration models using tools such as Draw.io.
5. **Implementation** – Developing the system using PHP with the CodeIgniter framework, MySQL for database management, and ESP32 microcontrollers for IoT device integration.
6. **Testing** – Applying black-box testing to evaluate functional aspects of forms and modules, ensuring system functionality aligns with specifications.
7. **Deployment and Maintenance** – Deploying the system to the production environment and performing maintenance to ensure system stability.

Instruments, and Data Collection Techniques

- **Observation:** Direct observation of the existing delivery process, from order processing to shipment, to identify bottlenecks and improvement opportunities.
- **Interviews:** Semi-structured interviews with warehouse staff, logistics officers, and shipping administrators to validate system requirements and operational issues.
- **Literature Study:** Analysis of books, journals, and online resources related to IoT, API services, and logistics systems to strengthen the theoretical foundation.

Data Analysis Technique

The data obtained were analyzed qualitatively and functionally. Qualitative analysis was used to identify existing problems and user requirements, while functional analysis ensured that the developed system addressed these problems. Black-box testing results were evaluated to validate that each module operated according to predefined specifications. The analysis

emphasized improvements in operational efficiency, reduction of errors, and enhancement of shipment transparency and customer satisfaction.

RESULTS AND DISCUSSION

System Development Results

The system development process was carried out using the Waterfall methodology, starting from planning, requirement analysis, design, implementation, testing, until deployment. The final system provides modules for delivery order creation, shipment tracking with IoT devices, real-time monitoring through API integration, and delivery reporting.

The results of user observation and interviews confirmed several critical problems in the existing workflow: manual documentation of delivery orders, lack of shipment transparency, and high risk of delivery errors such as delays or misplaced items. After the system was deployed, functional testing was conducted using black-box testing. The results are presented in Table 1.

Table 1 Results of Black-Box Testing on Realtime Delivery System With IoT and API Servces

No.	Test Scenario	Expected Output	Result	Status
1	Create new delivery order with valid data	Delivery order successfully saved to database	OK	Passed
2	Assign delivery order to courier	Delivery order assigned and recorded in system	OK	Passed
3	IoT device sends GPS location	Location data updated in real-time on system	OK	Passed
4	API retrieves shipment tracking status	Status displayed and synchronized correctly	OK	Passed
5	Generate delivery report	Report displayed/exported correctly	OK	Passed

System Workflow

The system workflow illustrates the end-to-end process of delivery management at PT. Rekayasa Industri. It starts when the warehouse administrator creates a delivery order containing customer data, product details, and delivery schedule. Once created, the system assigns the order to a courier, who is equipped with an IoT-enabled device (ESP32 with GPS).

During the delivery, the IoT device automatically sends location data to the server in real time, which is displayed on the web dashboard. At the same time, the system integrates with external API services to synchronize delivery status, ensuring transparency and accountability. If any issue occurs (such as delay or incorrect route), the system provides notifications to both the administrator and the customer. The workflow ensures that each delivery is traceable, transparent, and aligned with company standards.

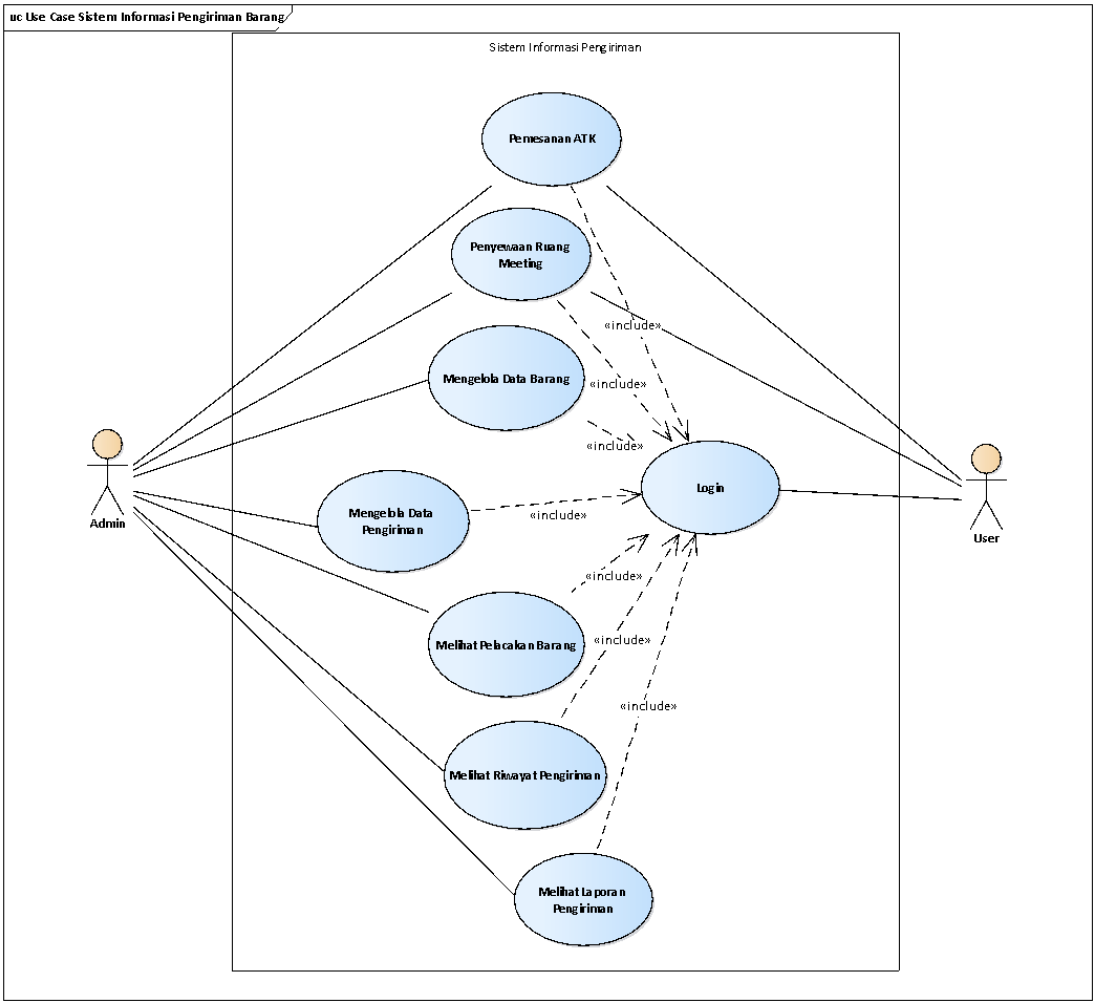

Image 2 Use Case Diagram System

Database Schema / ERD

The database schema was designed to ensure structured, accurate, and real-time management of delivery operations. It consists of core entities such as Users, Delivery Orders, Locations, IoT Devices, and Shipment Status. Users store role-based access for administrators, couriers, and managers, while Delivery Orders capture essential shipment details including customer, product, and schedule. Locations are integrated with GPS coordinates for precise tracking, IoT Devices log data from ESP32 modules, and Shipment Status maintains updates synchronized from IoT and API services. This relational design supports data integrity, enables seamless integration, and facilitates comprehensive reporting for operational analysis.

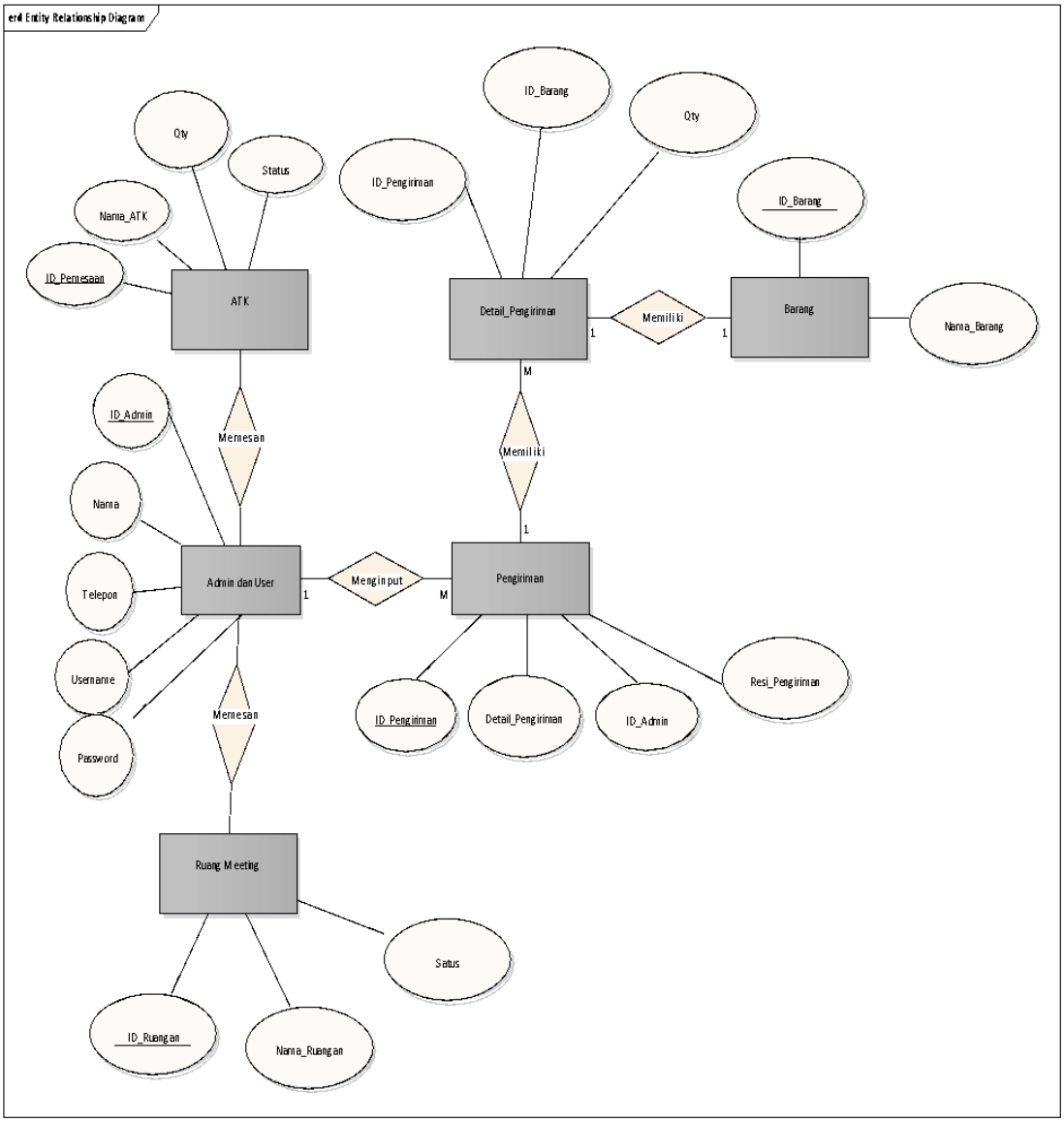

Image 3 Entity Relatonship Diagram

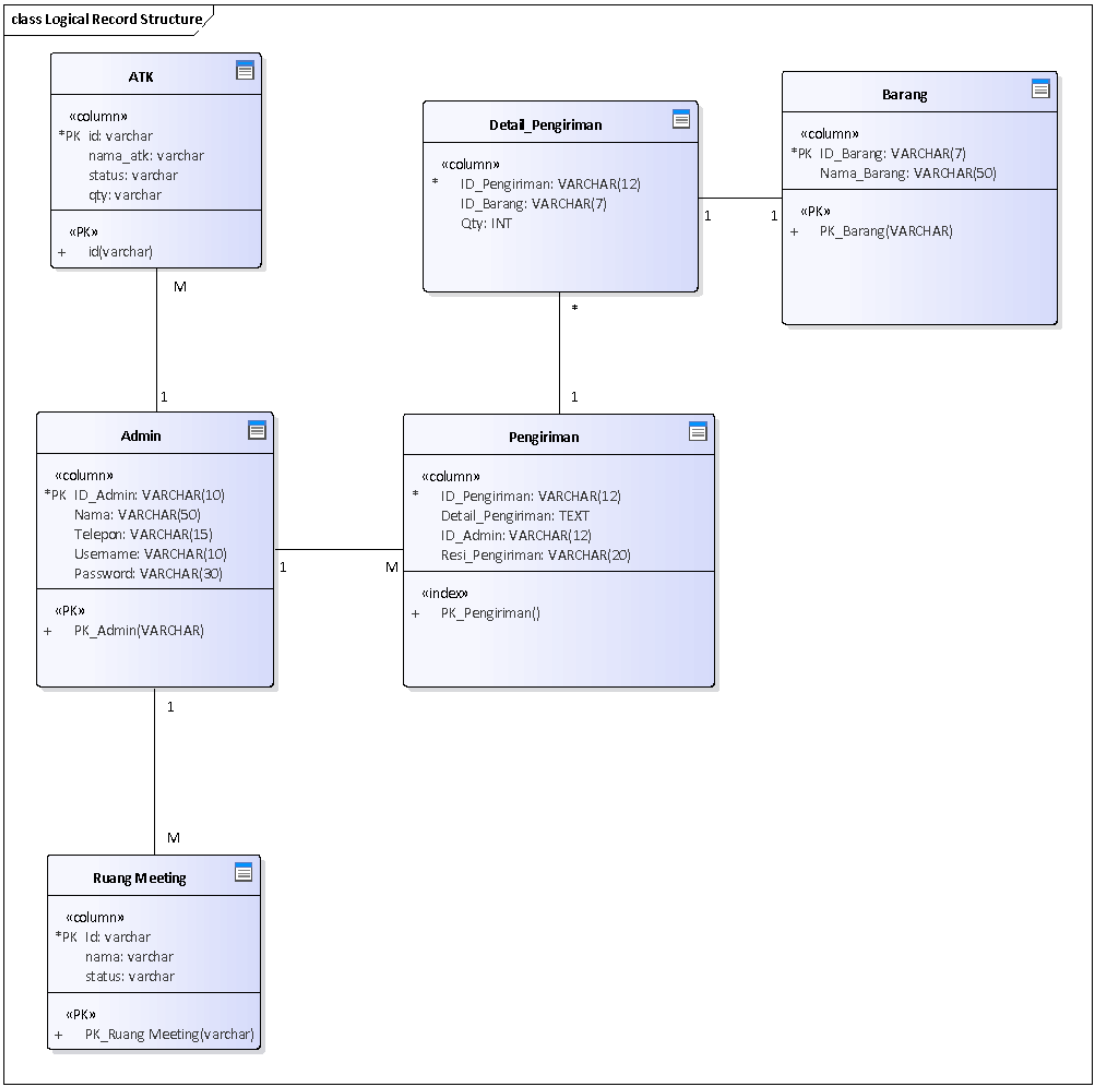

Image 4 Logical Record Structure

User Interface

The user interface (UI) was developed with a focus on usability, responsiveness, and accessibility across desktop and mobile platforms. Warehouse administrators manage shipment data through structured forms, couriers update delivery progress using mobile views, and managers monitor performance via dashboards and reporting modules. Features such as real-time shipment tracking, progress indicators, color-coded statuses, and alert notifications enhance transparency and decision-making. Exportable reports in PDF or Excel formats further support managerial analysis, while the overall UI design improves efficiency, accuracy, and user satisfaction in the delivery process.

Image 1 Entity Relationship Diagran

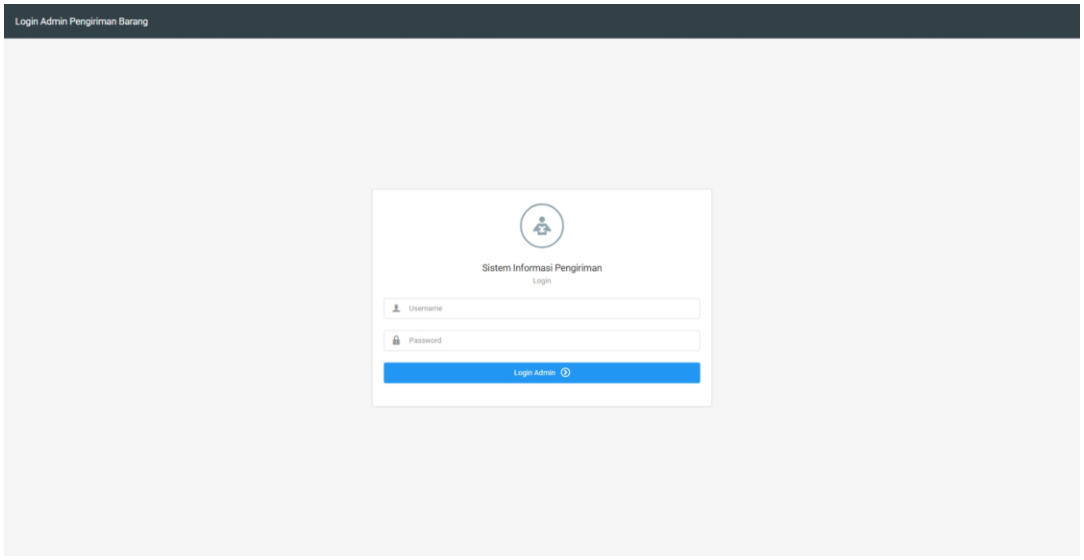

Image 6 Login View

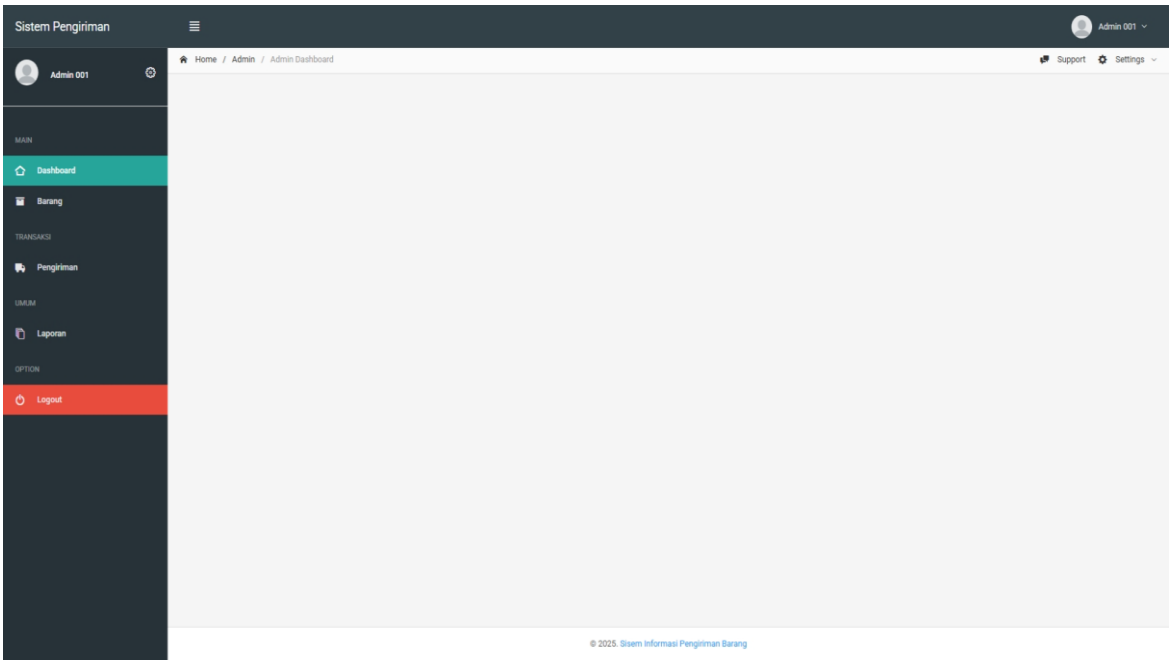

Image 7 Admin Dashboard View

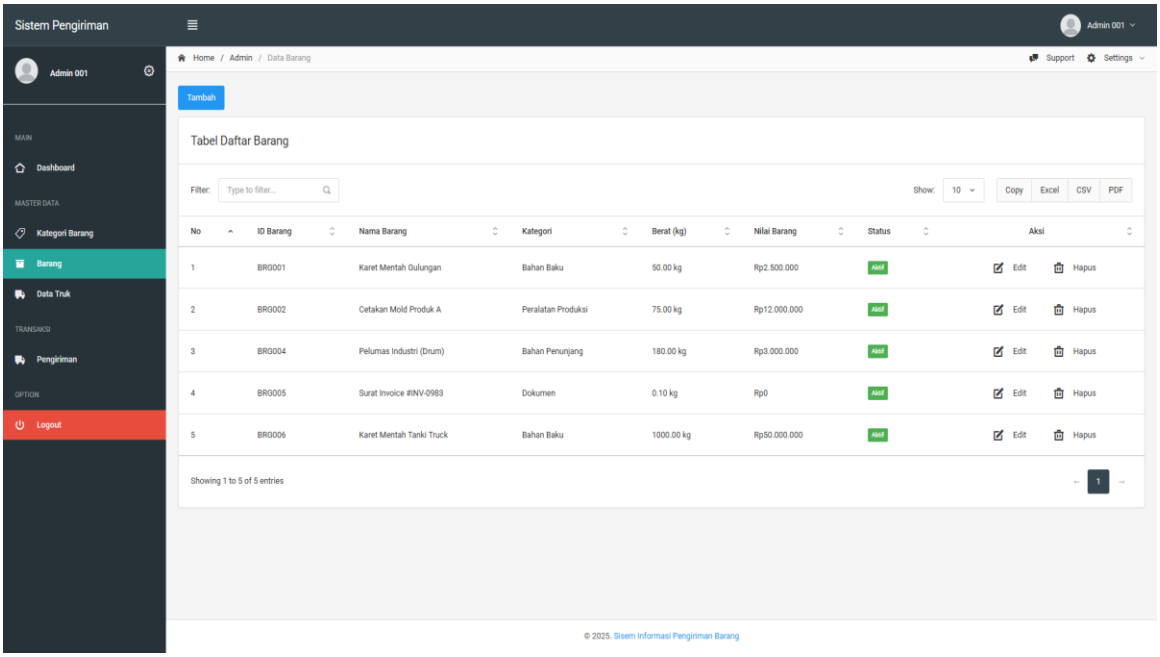

Image 8 Goods Data View

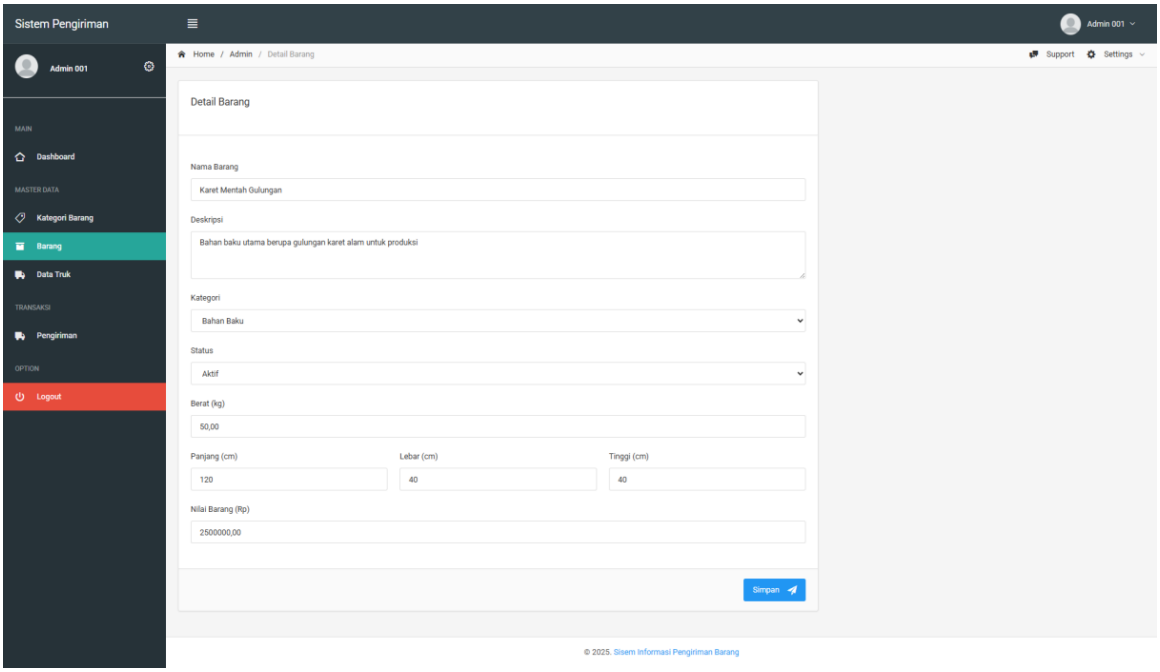

Image 9 Goods Detail View

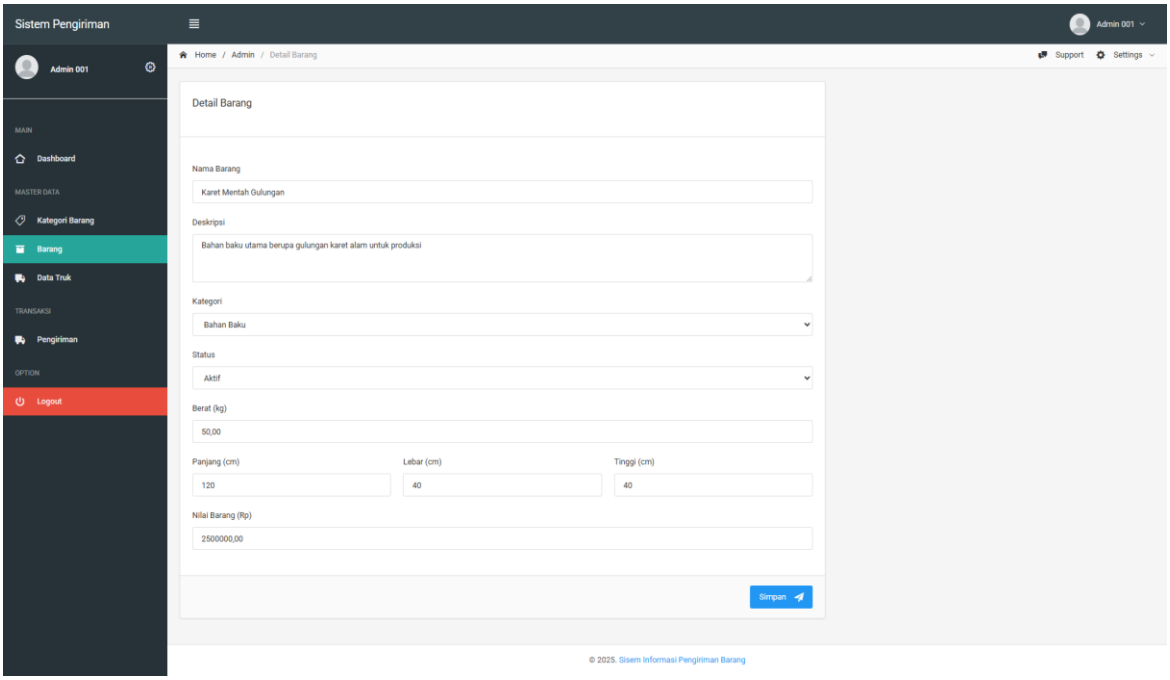

Image 10 Truck Data View

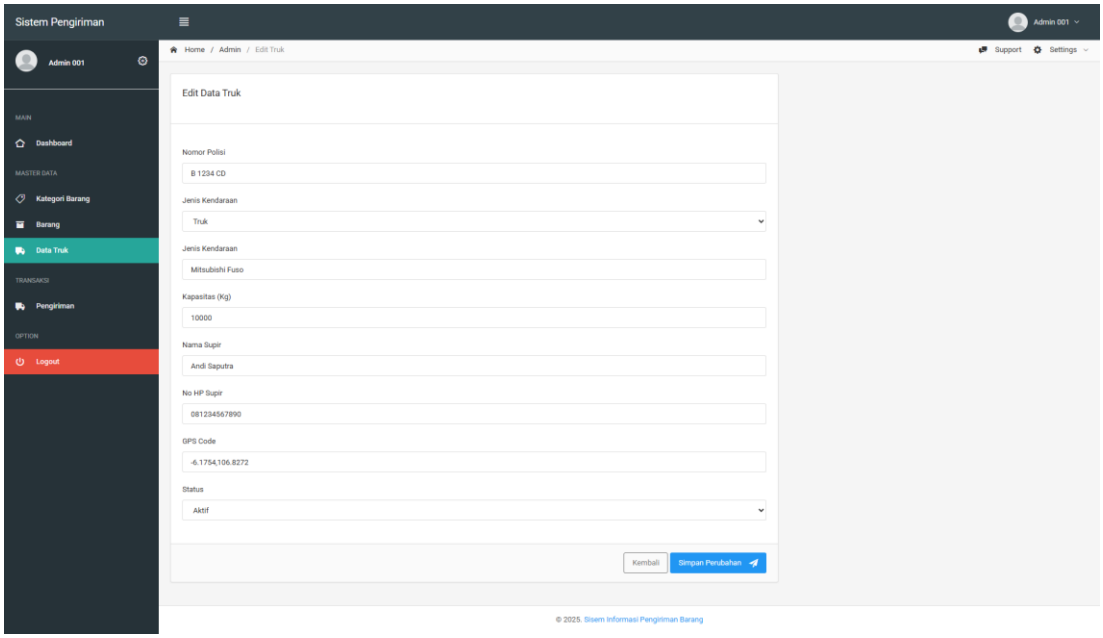

Image 11 Truck Detail View

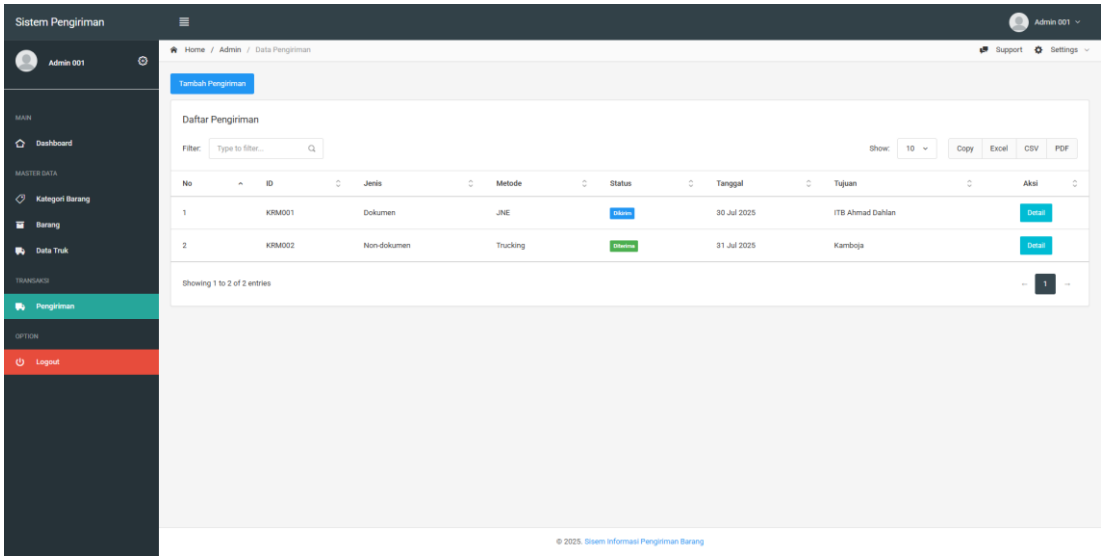

Image 12 Delivery Main Menu View

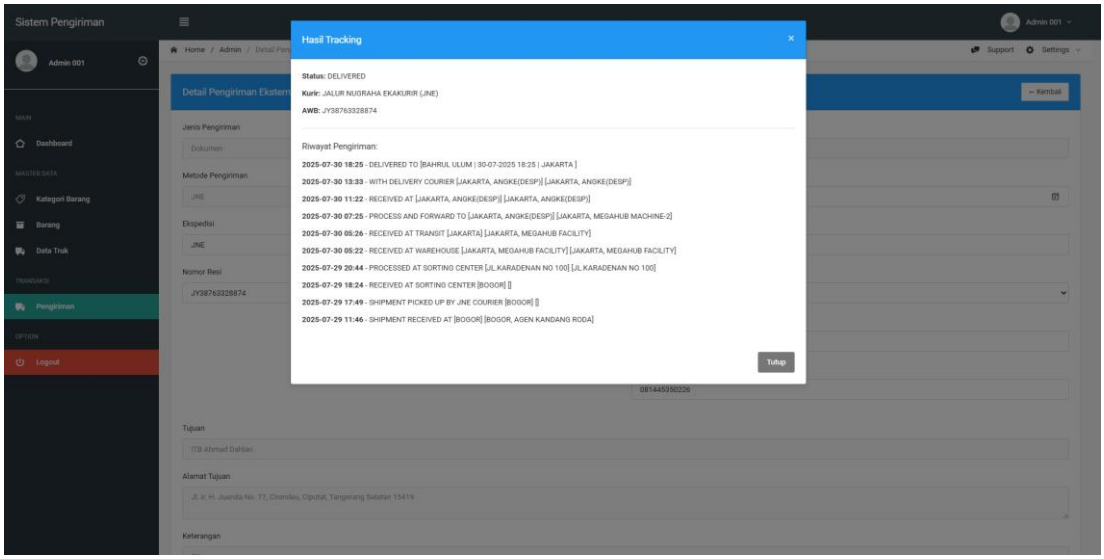

Image 13 Tracking Document with API

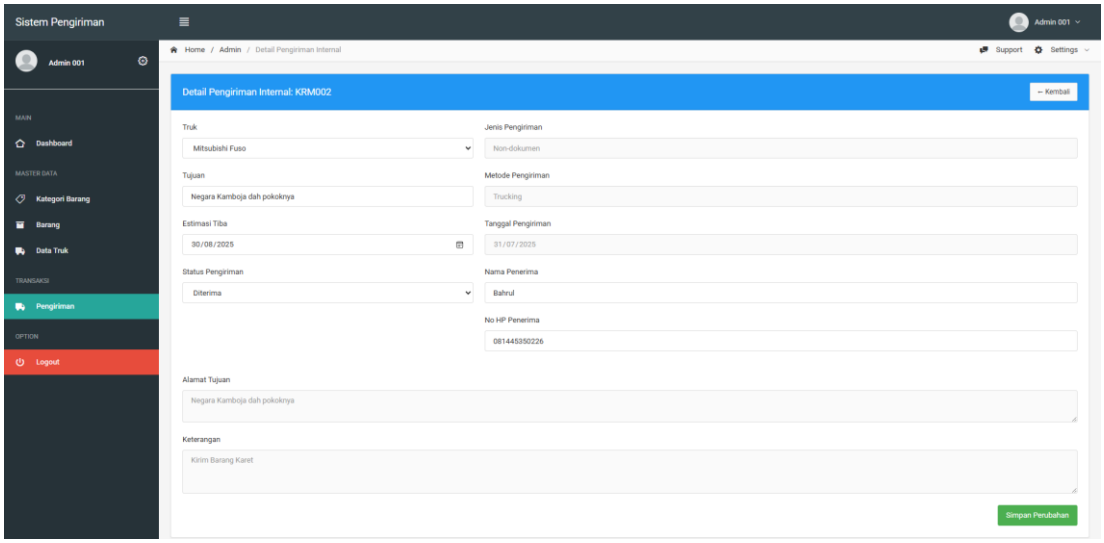

Image 14 Trucking Delivery Detail

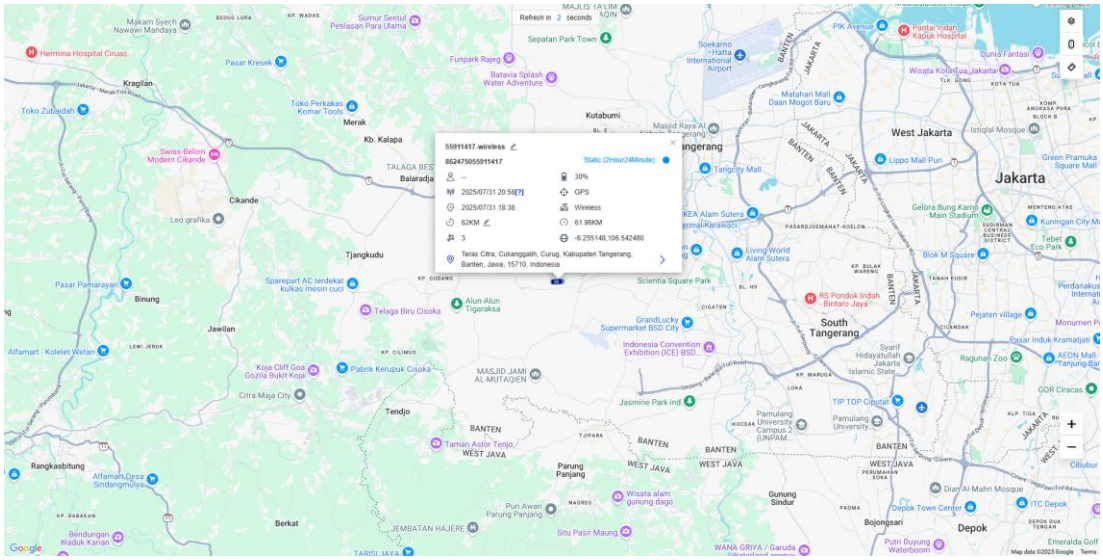

Image 15 Realtime Tracking

CONCLUSION

This study demonstrates that the integration of IoT and API services into a web-based delivery management system can effectively address inefficiencies in logistics operations. The implemented system improves shipment accuracy, reduces delays and errors, and enhances transparency through real-time monitoring and structured delivery workflows.

The scientific contribution of this research lies in showing how IoT enables real-time data acquisition and tracking, while API services ensure interoperability across heterogeneous systems, resulting in a more automated, transparent, and data-driven logistics framework. This integrated approach provides a foundation for future studies on predictive analytics, third-party logistics (3PL) integration, and broader IoT adoption to further optimize delivery performance.

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AUTHOR CONTRIBUTIONS

Author 1 : Conceptualization; Data curation; Formal analysis; Methodology; Project administration; Software development; Validation; Writing – original draft; Writing – review and editing.

Author 2 : Conceptualization; Investigation; Supervision; Validation; Writing – review and editing.

Author 3 : Investigation; Methodology; Supervision; Resources; Validation.

CONFLICTS OF INTEREST

The authors declare no conflict of interest. The affiliated organization had no role in the design of the study, data collection and analysis, manuscript preparation, or the decision to publish the results..

REFERENCES

Ahmad, Munawar, & Hendini. (2021). *Analisis Perancangan Sisstem Berbasis Objek Dengan UML*. Informatika.

Ahmad, Munawar, & Hendini. (2022). Sistem Informasi Manajemen Pada Jasa Expedisi Pengiriman Barang Berbasis Web. *JATISI (Jurnal Teknik Informatika Dan Sistem Informasi)*, *4*(2), 123–132. https://doi.org/10.35957/jatisi.v4i2.94

Akmal, N. K., & Dasaprawira, M. N. (2022). Rancang bangun Application Programming Interface (API) menggunakan gaya arsitektur Graphql untuk pembuatan sistem informasi pendataan anggota Unit Kegiatan Mahasiswa (UKM) studi kasus UKM Starlabs. *Jurnal SITECH : Sistem Informasi Dan Teknologi*, *5*(1), 37–40. https://doi.org/10.24176/sitech.v5i1.7937

Andriansyah, D. (2022). *Membangun Aplikasi Pelayanan Publik Dengan Framework Codeigniter*. Asfa Solution.

Anugrah, I. B., Elekro, F. T., Telkom, U., Virgono, A., Elekro, F. T., Telkom, U., Septiawan, R. R., Elekro, F. T., Telkom, U., Posisi, P., & Berkendara, K. (2024). *Implementasi GPS pada Sistem Pemantauan Posisi Kendaraan Secara Real-Time*. *11*(6), 6827–6836.

Asmoro, E. T., Ekasari, M. H., Diana, D., & ... (2021). Rancang Bangun Aplikasi Sistem Pengiriman Barang pada PT Mandiri Jaya Medika Fatmawati. *Journal of Information System, Informatics and Computing*, *5*(2), 324–338. https://doi.org/10.52362/jisicom.v5i2.611

Basuki, A. P. (2021). *Membangun Aplikasi SMS Gateway Berbasis Web*. Lokomedia.

Daniel Pesik, B., & Fiodinggo Tanaem, P. (2022). Perancangan Sistem Informasi Absensi Online Deteksi Lokasi Berbasis Web. *JATI (Jurnal Mahasiswa Teknik Informatika)*, *6*(2), 817–822. https://doi.org/10.36040/jati.v6i2.5727

Gustiawan, H., & Rian, H. (2023). Perancangan Sistem Informasi Manajemen Pengiriman Barang Berbasis Web. *Jurnal Teknologi Informatika Dan Komputer*, *9*(1), 236–242. https://doi.org/10.37012/jtik.v9i1.1443

Hanif, A. N. (2024). *Penerapan Iot Di Tokopedia Untuk Meningkatkan Efisiensi Proses Logistik Dan Distribusi Barang*. *April*. https://doi.org/10.13140/RG.2.2.33426.67528

Harahap, N. A. P., Al Qadri, F., Harahap, D. I. Y., Situmorang, M., & Wulandari, S. (2023). Analisis Perkkembangan Industri Manufaktur Indonesia. *El-Mal: Jurnal Kajian Ekonomi & Bisnis Islam*, *4*(5), 1444–1450. https://doi.org/10.47467/elmal.v4i5.2918

Ibrahim, P., Anton, A., & Astuti, P. (2021). Perancangan Sistem Informasi Pengiriman Barang Berbasis Web Pada Pt. Boma Tirta Prima. *Reputasi: Jurnal Rekayasa Perangkat Lunak*, *2*(1), 31–36. https://doi.org/10.31294/reputasi.v2i1.211

Junaidi, J. J., Ardiansyah, M., Sanusi, S., Murhaban, M., & Andiini, M. R. (2024). Perancangan Sistem Informasi Absensi Berbasis Website Di Dinas Kominfo Gayo Lues. *Jurnal Teknologi Informasi*, *3*(1), 20. https://doi.org/10.35308/jti.v3i1.9419

Lukman, & Yudhiastari, M. (2021). Analisis Kinerja Web Server Apache Dan Litespeed Menggunakan Httperf Pada Virtual Private Server (VPS). *Jurnal Teknologi Informasi*, *XVI*, 24–32.

Maulana, A., & Panjaitan, A. Z. K. (2023). Manajemen Database, Karakteristik Database Dan Langkah-Langkah Menyusun. *Jurnal Pendidikan Dan Konseling*, *5*(2), 4441–4447.

Monicha, S. H. (2021). Implementasi framework codeigniter 3 dalam marketplace showroom Dp Dua Putri (Codeigniter 3 Framework Implementation in Building Marketplace of the Dp Dua Putri Showroom). *Jurnal Transit*, 1–5.

Mubarak Dinas Pertanian Kab Bantaeng Jl Andi Mannappiang, S. (2023). Pemanfaatan Sistem Informasi Geografis (SIG) untuk Pemetaan Wilayah Kelompok Tani Utilization of Geographic Information Systems (GIS) for Mapping the Area of Farmer Groups. *Jurnal Suluh Tani*, *1*(1), 2023–2059.

Muzaki, A., Ramadhan, F., Rahayu, G. S., Al Ghifari, M. F., Pratama, M. R., Kamisik, R. A., Sani, S. A., Lestari, M., & Septiani, N. W. P. (2024). Perancangan Sistem Tracking Pengiriman Barang Multi Logistik. *Jurnal Riset Dan Aplikasi Mahasiswa Informatika (JRAMI)*, *5*(1), 210–216. https://doi.org/10.30998/jrami.v5i1.10724

Nurhayani. (2022). Analisis sektor industri manufaktur di Indonesia Nurhayani. *Jurnal Paradigma Ekonomika*, *17*(3), 2085–1960.

Pasaribu, A., Samuel, & Handry, P. (2024). Sistem Pengiriman Barang Berbasis Web. *SINTEK*, *IV*(02), 53–57.

Pranatawijaya, V. H., & Yulianto, H. (2022). Penerapan API (Application Programming Interface) MIDTRANS Sebagai Payment Gateway Pada Indekos Berbasis Website. *Journal of Information Technology and Computer Science*, *2*(4), 254–262. https://doi.org/10.47111/jointecoms.v2i4.8877

Prehanto, D. R. (2020). *Buku Ajar Sistem Informasi*. Scopindo.

Putri, E., & Matondang, N. H. (2023). Sistem Informasi Monitoring Ekspedisi Pengiriman Barang Berbasis Website Pada PT. Ridho Makmur Sentosa. *Seminar Nasional Mahasiswa Ilmu Komputer Dan Aplikasinya (SENAMIKA)*, 426–438. https://conference.upnvj.ac.id/index.php/senamika/article/view/2558

Putri, H. R. N., & Yennisa. (2024). Integrasi IoT dan Big Data untuk Optimasi Logistik dan Rantai Pasokan. *Jurnal Rekayasa Informasi Swadharma*, *4*(2), 91–99.

Raharjo, B. (2021). *Belajar Ototdidak MYSQL*. Informatika.

Saifanis, R. (2024). *RANCANG BANGUN GPS IoT DENGAN ARDUINO NANO DAN MODUL NEO-6M DALAM SISTEM PEMANTAUAN LOKASI OBJEK*. *8*(2), 286–290.

Setyaningsih, A., & Sidqon, M. (2020). *RANCANG BANGUN SISTEM INFORMASI PENGIRIMAN BARANG BERBASIS WEB (STUDI KASUS PT. DUTA TRANSINDO PRATAMA SURABAYA)*. *2507*(February), 1–9.

Sianipar. (2021). *Pemrograman Database Menggunakan MySQL*. ANDI.

Sumirat. (2023). *Analisis Perancangan Sisstem Berbasis Objek Dengan UML*. Informatika.

Taufan, I., & Santoso, A. (2021). Information System Design for Tracking and Tracing in Warehouse using QR Technology. *J@Ti Undip*, *16*(2), 102–108.

Wilyanto, N., Firnando, J., Franko, B., Tanzil, S. P., Tan, H. C., & Hartati, E. (2023). Pembuatan Website Menggunakan Visual Studio Code di SMA Xaverius 3 Palembang. *Fordicate*, *3*(1), 1–8.

Winnarto, M. N., Yulianti, I., & Rahmawati, A. (2021). Penerapan Framework Codeigniter Pada Pengembangan Website E-Commerce Batik Tulis HR Ambar. *Swabumi*, *9*(1), 1–8. https://doi.org/10.31294/swabumi.v9i1.9813

Zamachsyari, M., Marini, L. F., & Suhendra, C. D. (2024). *Rancang Bangun Sistem Informasi Distrik Masni Berbasis Web Menggunakan Framework Codeigniter 3 Web-Based Masni District Information System Design Using Codeigniter 3 Framework*. *13*(1), 1–12.

Zhafar, R., Zulham, Z., & Prayoga, J. (2023). Sistem Informasi Pengiriman Barang Pada Pt. Pos Indonesia Berbasis Web. *Device : Journal of Information System, Computer Science and Information Technology*, *4*(2), 80–91. https://doi.org/10.46576/device.v4i2.4045