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Design of a Web-Based Village Tourism Management Information System with Multi-Tenant Architecture as an Integrated Platform: The Nusa Wisata Module

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Abstract

The rapid development of information technology has significantly impacted various sectors, including tourism. However, in practice, village tourism management is still commonly conducted conventionally and lacks integration, resulting in various issues related to service efficiency, data management, and operational transparency. This study aims to design a web-based village tourism management information system using a multi-tenant architecture approach in the Nusa Wisata module as part of the integrated Nusa Eka platform.The research method employed in this study is system design using the System Development Life Cycle (SDLC) approach, focusing on the requirements analysis and system design stages. System modeling was conducted using Entity Relationship Diagram (ERD) for database design and flowcharts to illustrate the system process flow. The results of this study are in the form of a system design capable of integrating the management of multiple villages within a single platform while maintaining data separation through the use of the tenant_id attribute. The system is designed with several main features, including e-ticketing, tourism package and attraction management, tourism operational staff management, and parking management with an automated revenue-sharing mechanism. In addition, the system supports integration with other modules within the Nusa Eka platform, such as Nusa Praja, Nusa Graha, and Nusa Artha. Based on the design and analysis results, the proposed system provides a more integrated, flexible, and scalable solution compared to previous systems that still use a single-tenant approach. This system design is expected to improve operational efficiency, data transparency, and service quality in digital-based village tourism management.

***Keywords**: multi-tenant, information system, village tourism, e-ticketing, integrated platform, web-based*

1. Introduction

The rapid development of information technology has significantly impacted various sectors, including tourism. The utilization of information systems in tourism management has been proven to improve operational efficiency, data processing accuracy, and information accessibility for both tourists and managers [1]. In particular, web-based systems can optimize real-time destination information delivery and support tourism promotion that was previously limited to physical media such as brochures [2]

Tourism information systems play an important role in assisting tourism managers in organizing operations and providing accurate information to tourists. In addition, information systems support more structured data integration, enabling centralized tourism data management and more effective monitoring of tourism activities [2].

Village tourism is one of the sectors with significant potential to support local community economies. By utilizing cultural uniqueness, natural beauty, and local wisdom, village tourism can attract tourists effectively. However, in practice, tourism management in many villages is still carried out conventionally and is not integrated into a centralized database system [3]. These conditions create several operational problems, such as physical ticket queues, difficulties in monitoring transaction data, and a lack of transparency in tourism operations management [4].

Previous studies indicate that tourism information systems are generally developed using a single-tenant approach, where the system only serves a single region or village [5]. Such limitations cause data management to remain decentralized and hinder broader system

development. Therefore, a system is needed not only to manage tourism data but also to function as an integrated platform capable of connecting various tourism services within a unified system.

To address these issues, a system architecture capable of serving multiple entities (multi-tenant) within a single integrated platform is required. Multi-tenant architecture enables a single software instance to serve multiple tenants while maintaining proper data separation, thereby offering cost efficiency, easier maintenance, and high scalability for cloud-based or Software as a Service (SaaS) applications [6]. Through this approach, multiple village tourism destinations can utilize the same system without data conflicts while enabling more centralized system management.

In addition, the implementation of digital systems in village tourism management requires features that comprehensively support operational activities. One important feature is e-ticketing, which allows users to make ticket reservations electronically without having to visit the tourism location directly. The implementation of e-ticketing can reduce queues and improve automatic transaction recording efficiency [4].

Another important feature is tourism attraction management, which includes the management of facilities, capacities, and pricing within tourism destinations. In addition, parking area management is also an important aspect of village tourism operations, especially regarding revenue sharing between tourism managers and landowners. In conventional systems, profit-sharing calculations are often conducted manually, potentially causing errors and reducing transparency. Therefore, a system capable of automatically calculating parking revenue sharing based on recorded parking transactions is required.

Based on these issues, this study aims to design a web-based village tourism management information system using a multi-tenant architecture approach in the Nusa Wisata module. The system design focuses on developing e-ticketing features, tourism attraction management, tourism operational staff management, and an automated parking revenue-sharing system to improve revenue transparency. Through this system, village tourism management is expected to become more integrated, efficient, and scalable to support sustainable tourism development.

2. Methodology

This study employs a system design method using a structured approach to produce a web-based village tourism management information system design for the Nusa Wisata module. The research approach focuses on system requirements analysis, system architecture design, and process and database modeling to produce an integrated system design that meets the needs of village tourism management.

The system development method used in this research refers to the System Development Life Cycle (SDLC) approach, which is a systematic system development method consisting of several stages, ranging from requirements analysis to system design [7]. This approach was selected because it supports more structured system development and effectively facilitates web-based system design [8]

2.1. Literature Study

The literature study was conducted by reviewing various journals, scientific articles, and previous studies related to tourism information systems, e-ticketing, multi-tenant architecture, and web-based system development. The literature sources were obtained from scientific publications within the last five years to ensure relevance to current technological developments and system requirements.

The literature review aimed to obtain theoretical foundations, understand approaches used in previous studies, and identify research gaps and opportunities for system development.

2.2. Requirements Analysis

Requirements analysis was conducted to identify the functional and non-functional requirements of the system based on literature review findings and problems identified in previous studies. This process aimed to ensure that the designed system meets user requirements and supports integrated village tourism management.

The functional requirements include tourism data management, online ticket booking (e-ticketing), tourism package management, parking area management, and user management based on specific roles, namely administrators, operational staff, and customers. Meanwhile, non-functional requirements include data security, web-based accessibility, and support for multi-tenant architecture to enable system usage by multiple villages within the same platform.

2.3. System Development Method

The system development method used in this study adopts the System Development Life Cycle (SDLC) approach. SDLC remains widely used in modern information system development because it supports systematic and organized system design processes [9] The stages conducted in this research include:

2.3.1 Requirements Analysis

This stage aims to identify the functional and non-functional requirements of the system. The system is designed to support three primary user roles: administrator, operational staff, and customer.

2.3.2 System Design

At this stage, the system structure is designed, including:

a. Database design using Entity Relationship Diagram (ERD), which is used to describe relationships among entities within the system to support data integrity and consistency.
b. System design using flowcharts to illustrate system workflows structurally, starting from the login process to data management based on user roles.
c. Design of relationships among entities within the system.

2.3.3 System Feature Design

The system is designed with several main features, including e-ticketing, tourism package and attraction management, parking area management, and tourism operational staff management. Staff management includes ticket officers, parking attendants, cleaning staff, and tour guides to support integrated village tourism operations.

2.3.4 Multi-Tenant Architecture Design

The system is designed using a multi-tenant architecture approach, where a single application can be used by multiple villages (tenants) within the same platform while maintaining proper data separation. Data separation is implemented using the tenant_id attribute in each main entity of the system. This approach supports centralized system management without merging data among villages.

Through this approach, each village maintains isolated data even though the same application is used. The multi-tenant concept was selected because it supports system management efficiency, easier maintenance, and scalability in Software as a Service (SaaS)-based system development [6].

3. Results and Discussion

3.1. System Design

The result of this study is a web-based village tourism management information system design using a multi-tenant architecture approach. The system is designed to support tourism management for multiple villages within a single integrated platform while maintaining data separation through the tenant_id attribute. This approach allows each village to use the same system without causing data conflicts among users.

The designed system is part of the integrated Nusa Eka platform, which consists of several system modules within a centralized architecture. In this study, the development focuses on the Nusa Wisata module, which is used to support digital and integrated village tourism management.

The system also functions as an integrated platform for village tourism management because it connects various tourism operational services within a single system. The main features developed include e-ticketing, tourism package and attraction management, parking area management, and tourism operational staff management such as ticket officers, parking attendants, cleaning staff, and tour guides. The development of these features aligns with previous studies indicating that web-based tourism information systems can improve operational efficiency and service accessibility for users [1], [4].

Before designing the tourism module, the system was first developed using a multi-tenant core structure as the foundation for managing users, tenants, modules, and system access rights. This core structure supports the management of multiple villages within one integrated platform.

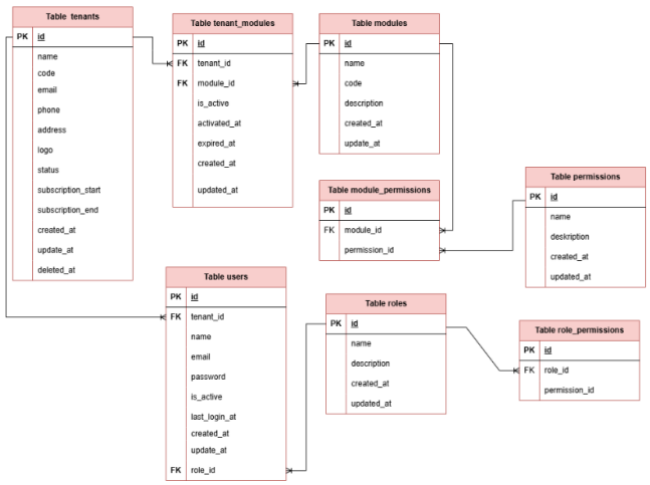

Fig.1: Core Multi-Tenant Architecture of the Nusa Eka System

Figure 1 illustrates the core structure of the multi-tenant system, consisting of the tables tenants, users, roles, permissions, modules, tenant_modules, role_permissions, and module_permissions. This core structure is used to manage tenants, users, system modules, and user access permissions within the Nusa Eka platform.

The tenants table stores data for each village using the system, while the users table stores user data associated with specific tenants through the tenant_id attribute. In addition, the system implements role- and permission-based access control to manage user access to system modules more effectively.

The implementation of this core structure supports the multi-tenant architecture, allowing multiple villages to use the same platform without merging tenant data. This structure also enables each village to activate specific modules according to operational needs through the tenant_modules table.

Within the Nusa Eka platform, the Nusa Wisata module is designed to integrate with several other modules. Integration is conducted with the Nusa Praja module to obtain village resident data, the Nusa Graha module for parking area rental management, and the Nusa Artha module to support transaction and financial management within the tourism system. This inter-module integration enables more centralized and efficient data management within a single integrated platform.

After designing the core structure, the next stage involves designing the database structure for the Nusa Wisata module using the Entity Relationship Diagram (ERD) approach to illustrate relationships among entities within the system. ERD is used to model integrated data structures that support data consistency and integrity in village tourism management processes [10].

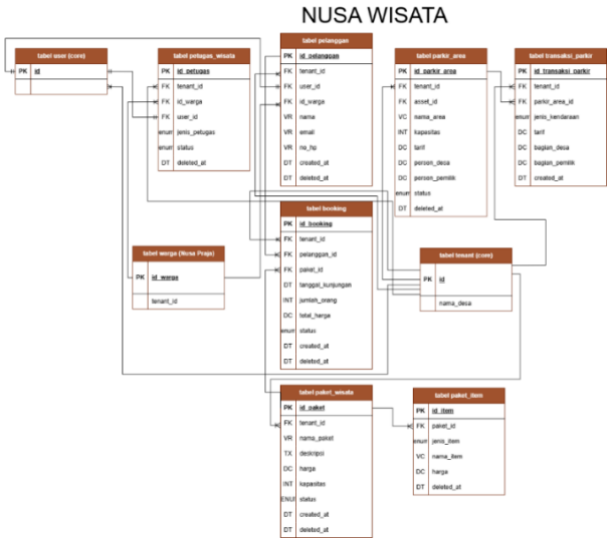

Fig 2: Entity Relationship Diagram of the Nusa Wisata Module

Figure 2 illustrates the database structure of the Nusa Wisata module, which consists of several main entities. These entities include core tables such as users and tenant, integration tables such as warga from the Nusa Praja module, and tourism-specific entities such as pelanggan, petugas_wisata, paket_wisata, paket_item, booking, parkir_area, and transaksi_parkir.

Each entity is connected using foreign keys to maintain data integrity and support integrated transaction processes. Several main entities within the Nusa Wisata module serve the following functions:

a. The pelanggan is used to store tourism customer data.
b. The petugas_wisata is used to store tourism operational staff data.
c. The paket_wisata contains available tourism package information.
d. The paket_item stores detailed components of each tourism package.
e. The booking records ticket booking transactions (e-ticketing).
f. The parkir_area stores parking location data.
g. The transaksi_parkir records parking transactions and revenue-sharing processes.

The system applies the multi-tenant concept through the use of the tenant_id attribute in each main table, enabling data separation among villages within the same system. Inter-module integration allows the system to operate cohesively within a Software as a Service (SaaS)-based platform.

In addition, integration with other modules within the Nusa Eka platform enables more centralized data management. Resident data from the Nusa Praja module can be used for tourism user management, while parking transaction data can be integrated with the Nusa Graha and Nusa Artha modules to support parking management and financial recording processes.

The relationships among tables are designed to support e-ticketing processes, tourism attraction management, operational staff management, and automated parking transaction and revenue-sharing management. Through an integrated database structure, the system is expected to improve the efficiency of village tourism management and facilitate future system development.

3.2. System Process Design

The system process design was developed using flowcharts to illustrate system workflows based on user roles and operational processes within the Nusa Wisata module. Flowcharts are used to visualize system processes structurally to facilitate system analysis and development.

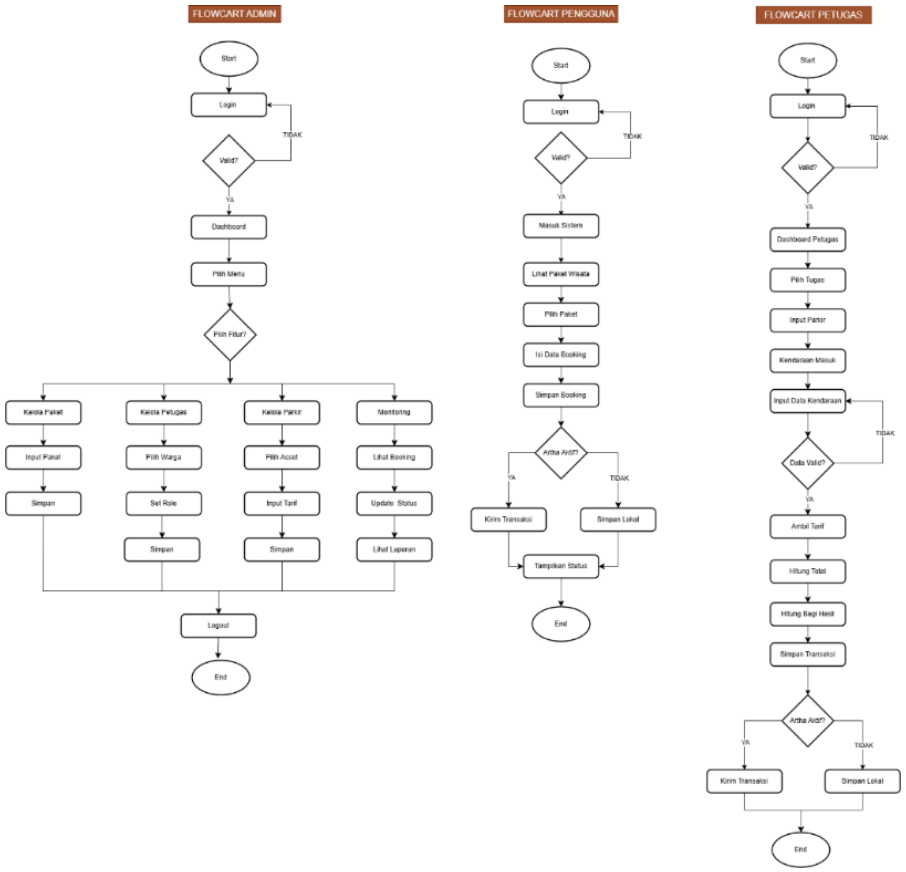

Fig 3: Nusa Wisata System Flowchart

Figure 3 illustrates the workflow of the Nusa Wisata system, which is designed based on three primary user roles: administrator, customer, and tourism operational staff. Each role has different processes and access rights according to its respective functions within the system.

From the administrator side, the process begins with system login and data validation. After successfully logging in, the administrator is directed to the dashboard page to access available menus. The administrator has several primary functions, including managing tourism packages, operational staff data, parking areas, customer data, and monitoring booking and tourism transaction data. All data managed by the administrator are stored in the integrated system database. The administrator may log out after completing system operations.

From the customer side, the process begins with account registration followed by data validation. After successfully accessing the system, customers can view available tourism packages, select packages, and complete booking data. The booking data entered by customers are stored within the system as part of the e-ticketing feature. Subsequently, the system checks whether the financial module is active. If active, transaction data are sent to the financial system (Nusa Artha); otherwise, the data are stored locally. The process concludes by displaying transaction status information to the user.

From the tourism operational staff side, the process begins with user login and validation. Operational staff members have access to perform tourism operations according to their assigned tasks, such as parking management, tourism monitoring, and field service management. In parking management operations, staff input vehicle data entering the tourism area. The system then validates the data and automatically calculates parking fees.

In addition to calculating parking fees, the system also supports automated parking revenue-sharing processes between the village and parking landowners integrated with the Nusa Graha module. Processed parking transaction data are stored in the system and can be forwarded to the financial module for transaction recording purposes.

Within the staff flowchart, operational processes are primarily focused on parking services as one of the main activities in village tourism. However, the petugas_wisata table is designed flexibly through the jenis_petugas attribute, enabling future development to support ticket officers, attraction officers, cleaning staff, and other tourism operational services according to operational requirements.

This system process design aims to ensure that all village tourism operational processes are conducted systematically, integratively, and according to user requirements. Through a structured workflow, the system is expected to improve the efficiency of village tourism management and facilitate integration among modules within the Nusa Eka platform.

3.3. System Feature Design

The village tourism management information system within the Nusa Wisata module is designed with several main features that support integrated village tourism operational processes. These features were developed based on system requirements analysis and adjusted to problems identified in conventional village tourism management processes.

3.3.1 E-Ticketing

The e-ticketing feature is designed to support online tourism ticket booking processes. Through this feature, customers can register accounts, select tourism packages, and complete booking processes without directly visiting tourism locations. Booking data entered by customers are stored within the system and can be monitored by tourism managers in real-time.

The implementation of e-ticketing facilitates transaction processes and helps reduce queues at tourism sites. In addition, the system supports automatic transaction recording, making data management more structured and transparent. This concept aligns with previous studies stating that web-based ticket booking systems can improve tourism service efficiency [4].

3.3.2 Tourism Package and Attraction Management

The tourism package management feature is used to manage information related to available tourism services, such as package names, prices, capacities, and facility details. Data management is conducted by administrators through the system dashboard, enabling easier and more centralized tourism information updates.

In addition, the system supports tourism attraction management through the paket_wisata and paket_item entities within the database. Through this feature, managers can organize detailed components of each tourism package more systematically. The use of web-based systems in tourism management is considered capable of improving information delivery effectiveness and tourism service management [1].

3.3.3 Tourism Operational Staff Management

The system provides a tourism operational staff management feature used to store and manage tourism staff data. The petugas_wisata entity is designed flexibly using the jenis_petugas attribute, enabling support for various types of staff such as ticket officers, parking attendants, cleaning staff, and tour guides.

Through this feature, administrators can centrally manage staff data, including adding data, modifying data, and assigning operational tasks. This approach supports more structured human resource management in village tourism operations.

3.3.4 Parking Management and Revenue-Sharing System

The parking management feature is designed to support vehicle transaction recording and automated parking revenue-sharing processes. Parking attendants can input vehicle data entering parking areas, after which the system automatically calculates parking fees according to predefined regulations.

Furthermore, the system supports automated revenue-sharing mechanisms between tourism managers and parking landowners based on predetermined percentages. Parking transaction data are stored within the transaksi_parkir entity, facilitating parking revenue monitoring and reporting processes transparently.

3.3.5 Inter-Module System Integration

The Nusa Wisata module is designed as part of the integrated Nusa Eka platform connected to several other modules. System integration is conducted with the Nusa Praja module for resident data retrieval, the Nusa Graha module for parking area management, and the Nusa Artha module for financial transaction management.

Inter-module integration enables more efficient data exchange within a centralized platform. This approach supports the Software as a Service (SaaS) concept and strengthens the implementation of multi-tenant architecture in village tourism management systems [6].

3.4. Analysis and Discussion

The designed system implements the multi-tenant concept, where a single system can be used simultaneously by multiple villages while maintaining data separation through the tenant_id attribute. This approach enables system management efficiency, easier maintenance, and scalability for future development. The concept aligns with Software as a Service (SaaS) architecture, which supports centralized system management [6].

The implementation of multi-tenant architecture in the Nusa Wisata module enables each village to maintain isolated data while remaining within the same platform. Through the use of the tenant_id attribute in each main entity, the system can maintain data integrity and security among villages without requiring separate application development. This approach provides advantages in system resource efficiency and simplifies sustainable application development processes.

In addition, the designed system supports integration with several other modules within the Nusa Eka platform, such as the Nusa Praja module for resident data management, the Nusa Graha module for parking area management, and the Nusa Artha module for financial transaction management. This inter-module integration enables village tourism management processes to become more centralized and structured, thereby improving data exchange efficiency among systems.

From an operational perspective, the designed e-ticketing feature assists online tourism ticket booking processes, reducing queues and improving tourism service efficiency. The system also supports more organized tourism package and attraction management through integrated data management within the system database. This finding aligns with previous studies indicating that web-based tourism information systems can improve tourism service management effectiveness [1], [4].

Within the parking management feature, the system supports vehicle transaction recording and automated parking revenue-sharing processes based on predetermined percentages. This approach is considered capable of improving transparency in parking revenue management compared to manual methods still used in several village tourism management systems.

In the operational staff flowchart, operational processes are focused on parking services as one of the primary activities within village tourism. However, the petugas_wisata table is flexibly designed through the jenis_petugas attribute, enabling future development to support ticket officers, attraction officers, cleaning staff, and tour guides according to village tourism operational requirements.

Compared to previous studies, most tourism information systems still implement a single-tenant approach, serving only one specific region or village [5]. In addition, previously developed systems generally focus only on tourism information provision without integrating transaction features such as e-ticketing and parking management [11].

Unlike previous studies, the Nusa Wisata system integrates various features within a single platform, thereby improving operational efficiency and transparency in village tourism management. Therefore, this system design not only provides technical solutions but also offers a more integrated approach compared to previous studies while strengthening the role of the system as an integrated platform for village tourism management.

Thus, the proposed system design not only provides technical solutions for village tourism management but also offers a more integrated, flexible, and scalable approach compared to previous studies. The designed system has the potential to support sustainable digital-based village tourism management development.

4. Conclusion

Based on the results of this study, a web-based village tourism management information system design using a multi-tenant architecture approach in the Nusa Wisata module as part of the integrated Nusa Eka platform has been successfully developed. The designed system supports the management of multiple villages within a single platform while maintaining data separation through the use of the tenant_id attribute, enabling safer, more structured, and centralized inter-village data management.

The system design was developed using the System Development Life Cycle (SDLC) approach, focusing on requirements analysis and system design stages. System modeling using Entity Relationship Diagram (ERD) and flowcharts successfully illustrates the database structure, entity relationships, and integrated system workflows according to village tourism operational requirements.

The designed system includes several primary features, namely e-ticketing, tourism package and attraction management, tourism operational staff management, and a parking management system with an automated revenue-sharing mechanism. In addition, the system supports integration with other modules within the Nusa Eka platform, such as Nusa Praja, Nusa Graha, and Nusa Artha, enabling village tourism management processes to be conducted more comprehensively within a single integrated platform.

Based on the analysis and discussion results, the implementation of multi-tenant architecture provides advantages in system management efficiency, easier maintenance, and scalability for future development. Compared to previous studies that still apply single-tenant approaches and focus only on tourism information provision, the designed system offers a more comprehensive solution through the integration of various operational and transaction features within one system.

Therefore, the proposed system is expected to improve operational efficiency, data management transparency, and the quality of village tourism services. Furthermore, this system design has the potential to be further developed through actual system implementation and testing to support sustainable digital transformation in village tourism management.

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References

[1] E. Nur Annisa, N. H. Matondang, and S. Afrizal, “Sistem Informasi Pariwisata Berbasis Web pada Kabupaten Nunukan,” 2022.
[2] B. B. Aryandra and A. C. Wardhana, “Perancangan Sistem Informasi Desa Wisata Berbasis Website dengan Metode Rapid Application Development (RAD) (Studi Kasus: Desa Wisata Melung),” 2024.

[3] H. Tuhuteru, D. G. Palyama, J. G. Ferdinandus, and D. Y. Metiary, "Development of a Web-Based Village Tourism Management Information System to Support Sustainable Tourism Destinations," Inspiration: Jurnal Teknologi Informasi dan Komunikasi, vol. 14, no. 2, pp. 78–90, Dec. 2024, doi: 10.35585/inspir.v14i2.101.
[4] D. Murdiani and W. Stiyoso, "Sistem Informasi Pariwisata Berbasis Website di Desa Wisata Winduaji Paguyangan Brebes," vol. 9, no. 1, pp. 32–41, 2023.
[5] C. Rizal and M. Eka, "Mengembangkan Potensi Wisata Desa dengan Sistem Informasi Berbasis Web," 2024.
[6] S. K. Pippal, S. Kumar, and R. Rani, "Optimizing Multi-Tenant Database Architecture for Efficient Software as a Service Delivery," Telkomnika (Telecommunication Computing Electronics and Control), vol. 22, no. 5, pp. 1128–1137, Oct. 2024, doi: 10.12928/TELKOMNIKA.v22i5.26385.
[7] M. A. Hasibuan, "Analisis dan Rancang Bangun Sistem Informasi Akademik Menggunakan Metode System Development Life Cycle (SDLC)," Jurnal Informatika Teknologi dan Sains, vol. 7, no. 1, p. 385, 2025.
[8] E. R. Rahmi, E. Yumami, and N. Hidayasari, "Analisis Metode Pengembangan Sistem Informasi Berbasis Website: Systematic Literature Review," REMIK, vol. 7, no. 1, pp. 821–834, Jan. 2023, doi: 10.33395/remik.v7i1.12177.
[9] I. S. Nurhalizah, S. Annur, A. Rosad, and M. Magister UIN Raden Fatah Palembang, "Tinjauan Literatur Peran SDLC dalam Pengembangan Sistem Informasi Manajemen Modern," 2026.
[10] P. Skavantzos and S. Link, "Entity/Relationship Graphs: Principled Design, Modeling, and Data Integrity Management of Graph Databases," Proceedings of the ACM on Management of Data, vol. 3, no. 1, pp. 1–26, Feb. 2025, doi: 10.1145/3709690.
[11] A. Hafizhah, Theresiawati, and B. Warsuta, "Sistem Informasi Pariwisata Badan Usaha Milik Desa Tirta Sejahtera pada Masa Pandemi Berbasis Website (Studi Kasus: Wisata Desa Pluneng)," IFTK, Aug. 2022.