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Research Article

Designing a Web-Based Information System for Umrah and Hajj Travel Agencies

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Abstract

This study focuses on the design and implementation of a web-based information system for the Sanematour Jakarta Umrah and Hajj Travel Agency. The system aims to improve the efficiency of administrative tasks such as pilgrim registration, travel package management, payment validation, and reporting. By utilizing the Waterfall model in system development, the study outlines the phases of planning, requirements analysis, design, implementation, testing, and maintenance. The system's effectiveness was tested through Black Box Testing, which confirmed that the core features, including login modules, registration forms, payment verification, and report generation, functioned correctly with both valid and invalid inputs. The testing results demonstrated that the system was free of critical errors and met the expected operational requirements. The successful implementation of the system allows for more efficient management of data, better accessibility for pilgrims, and faster report generation, thereby enhancing overall service quality. It is concluded that the system contributes to the digital transformation of the travel agency, improving operational efficiency and customer satisfaction. The research also recommends further improvements such as automatic notification features and enhanced data security protocols for continuous system optimization.

Keywords: Umrah and Hajj, Web-Based System, System Development Life Cycle (SDLC), Black Box Testing, Travel Agency, Digital Transformation, Payment Validation

INTRODUCTION

The Umrah and Hajj are among the most awaited religious rituals by Muslims around the world, and for the Indonesian community, the demand for travel services related to these pilgrimages continues to grow annually. This increased demand places a significant burden on travel agencies, including those in Jakarta, which struggle with the limitations of manual systems used for managing pilgrim data, registration, and departure schedules. These manual processes often lead to data inaccuracies, duplication, delayed information, and, ultimately, reduced satisfaction among pilgrims (Rosalina, n.d.; Suryadi et al., 2025).

Sanematour Jakarta, a travel agency dedicated to providing high-quality pilgrimage services, faces similar challenges. The agency has traditionally relied on Excel spreadsheets and manual records for managing registration, schedules, and payment tracking. This not only complicates data management but also hinders the ability to efficiently track and monitor pilgrim progress, leading to operational inefficiencies (Menteri Agama Republik Indonesia, 2023). With the rapid development of information technology, there is a clear opportunity to transition from these manual systems to an automated, web-based application designed to optimize agency operations and service delivery.

The purpose of this research is to design and implement a web-based information system that supports the automation of processes at Sanematour Jakarta. By utilizing the Waterfall model of the System Development Life Cycle (SDLC), the proposed system aims to streamline operations such as pilgrim registration, package management, payment tracking, and administrative reporting. This transition to a web-based system is expected to improve internal efficiency, reduce administrative errors, and increase service transparency for pilgrims (Pressman, 2005; Sommerville, 2011).

While many travel agencies in Indonesia, including Sanematour Jakarta, continue to rely on outdated manual methods, research has shown that such approaches lead to inefficiencies and inaccuracies that could be avoided with the adoption of automated systems (Suryadi et al., 2025). Several studies, such as those by Suryadi et al., (2025) and Auliya & Prabowo, (2021), have demonstrated the importance of systematizing processes like registration and payment management. However, there remains a significant gap in the existing literature regarding integrated solutions that combine multiple functions—such as registration, payment management, real-time information updates, and reporting—into a cohesive web-based system.

The urgency of this research is highlighted by the increasing demand for more efficient, transparent, and error-free systems in the Hajj and Umrah travel sector. As the industry continues to grow, traditional methods of managing pilgrim data are increasingly inadequate, which can result in delays, mistakes, and dissatisfaction among clients (Behl et al., 2019). Therefore, implementing a web-based system at Sanematour Jakarta is an urgent and necessary step toward modernizing the agency's operations and improving the overall experience for pilgrims.

Previous studies have explored various aspects of information systems for the travel industry, including Umrah and Hajj services. Abdulrauf et al., (2023) developed

a web-based reservation system for Umrah travel agencies, focusing on improving the reservation process. Similarly, Suryadi et al., (2025) explored the application of the Waterfall model in designing an online ticket booking system. Both studies provided valuable insights into the benefits of automation in reducing errors and increasing efficiency but did not offer comprehensive solutions that integrate registration, payment processing, and reporting functionalities. This research fills that gap by proposing an integrated web-based solution that manages all essential functions in a unified platform.

In addition, the need for systems that provide real-time data access has become increasingly critical. The shift toward web-based solutions is supported by studies highlighting the advantages of real-time updates, accessibility, and scalability (Kendall & Kendall, 2011; Sutabri, 2012). Such systems allow agencies to operate more efficiently and reduce the risk of manual errors, thereby improving service quality for clients.

This research introduces a novel approach by developing a web-based information system that integrates various critical processes into one cohesive platform. Unlike previous studies, which have focused on individual components such as reservation systems or payment processing (Suryadi et al., 2025), this study presents a comprehensive solution that addresses all operational areas, including pilgrim registration, package management, payment validation, and reporting. Additionally, the system is designed to provide real-time updates to both pilgrims and internal stakeholders, ensuring transparency and efficiency.

The use of the Waterfall model for system development ensures that each phase, from requirements analysis to implementation and testing, is completed systematically and thoroughly, minimizing risks and ensuring high-quality outcomes (Sommerville, 2011). The integration of these functionalities into a single platform represents a significant contribution to the field of information systems for religious travel agencies.

The primary objective of this research is to design and develop a web-based information system that will enhance the efficiency and accuracy of operational tasks at Sanematour Jakarta. Specifically, the proposed system aims to streamline the pilgrim registration and package management processes, making these activities more efficient for both pilgrims and staff. By integrating various functions such as pilgrim data management, payment records, and departure schedules into one cohesive platform, the system ensures that all necessary information is easily accessible and up-to-date. Moreover, the system will provide real-time updates to both pilgrims and internal stakeholders, ensuring that all parties have access to the latest information at any given time, thus improving communication and operational transparency.

The expected benefits of this research are significant for various stakeholders. For Sanematour Jakarta, the implementation of the proposed system will greatly improve operational efficiency by automating and streamlining key processes, such as registration, package management, and payment tracking. It will also reduce administrative errors, ensuring more accurate data management and facilitating better decision-making. The digital solution provided by the system will enhance the

management of Umrah and Hajj services, enabling the agency to operate more professionally and efficiently (Rosalina, n.d.).

For the general public, the system will provide easy access to real-time information regarding travel packages, departure schedules, and registration statuses. This will improve customer satisfaction by allowing pilgrims to obtain all the necessary information without needing to visit the agency's office, thus enhancing the overall convenience of the service (Suryadi et al., 2025).

For researchers and the broader field of information systems, this study will contribute valuable insights into the development and implementation of digital solutions for religious travel services. The research will provide a deeper understanding of how SDLC methodologies, database management systems, and web technologies can be applied in the context of the travel industry, particularly in managing complex systems such as Umrah and Hajj services (Pressman, 2005).

METHODS

Research Type and Approach

This study adopts a software engineering approach, with a qualitative-descriptive methodology combined with a system development methodology. The focus of this research is to design and implement a web-based information system specifically for an Umrah and Hajj travel agency. The methodology employed in this study follows a structured and systematic approach to ensure the system meets the necessary requirements, is well-constructed, and functions optimally to support the agency's operations. This approach is based on the Waterfall model, a widely used software development life cycle (SDLC) methodology, which includes clear phases such as planning, requirement analysis, design, implementation, testing, and maintenance (Sommerville, 2011).

System Development Methodology

The system development for this research follows the Waterfall model, which consists of the following key phases:

1. Planning Phase

In this phase, the project's needs are clearly defined, goals are set, and a plan for each development phase is prepared. The planning phase ensures the project is organized and the required steps are ready to be implemented systematically.

2. Requirement Analysis

This phase involves analyzing the system requirements to ensure that the developed system will meet the operational needs of the Sanematour Jakarta Umrah and Hajj Travel Agency. The analysis includes both functional and non-functional requirements.

a. Functional Requirements

Functional requirements describe the primary functions that the system must have to support the operational needs of the agency. These requirements include managing pilgrim data, registration, payment processing, and travel package management. Table 1. below outlines the key functional requirements:

Table 1. Functional Requirements for the Web-Based Information System

No	Functional Requirement	Description
1	Pilgrim Data Management	The system must allow for recording, updating, and deleting pilgrim data (e.g., identity, passport, contact information).
2	Pilgrim Registration	The system provides an online registration form for prospective pilgrims.
3	Travel Package Management	Admin can create, edit, and delete travel packages (e.g., schedule, price, facilities).
4	Payment and Confirmation	The system must support invoice creation, record payment status, and provide payment proof.
5	Departure Schedule	The system displays departure and return schedules for pilgrims.
6	Report Management	The system generates reports on pilgrim data, financial reports, and departure schedules.
7	User/Admin Management	The system provides user access management for admins and managers.
8	Notifications	The system sends notifications on registration status, departure schedules, and payment confirmations.
9	Admin Dashboard	The system provides a dashboard for monitoring pilgrim data, packages, payments, and schedules.
10	Document Printing	The system supports the printing of registration proof, invoices, and departure letters.

b. Non-Functional Requirements

Non-functional requirements define the system's performance and technical constraints. These requirements ensure that the system will operate optimally under various conditions. Table 2. below presents the non-functional requirements for the system:

Table 2. Non-Functional Requirements for the Web-Based Information System

No	Non-Functional Requirement	Description
1	Data Security	The system must have secure login authentication, encryption for sensitive data, and periodic backups.
2	System Availability	The system must be accessible online 24/7 to allow pilgrims to register at any time.
3	Usability (User-Friendly)	The interface must be intuitive and easy for both admins and pilgrims to use.
4	Device Compatibility	The system must be accessible from various devices, including laptops, tablets, and smartphones.
5	Response Time	The system should have a fast response time when processing user requests.
6	System Maintenance	The system must be easy to update and modify as necessary to meet operational needs.

Stakeholder Analysis

Stakeholder analysis is essential to identify and understand the needs and roles of various users involved in the system. Table 3. below summarizes the main stakeholders, their roles, and specific system requirements:

Table 3. Stakeholder Analysis and System Requirements

Stakeholder	Role	Requirements
Admin	Manages pilgrim data, packages, payments, and reports.	A secure, user-friendly system that supports quick data entry and retrieval.
Manager	Oversees operations and reports.	Real-time, accurate reporting capabilities through a comprehensive dashboard.
Pilgrim/User	Registers and monitors their registration status.	Easy access to online registration, travel package information, payment confirmation, and schedule notifications.

The findings from the stakeholder interviews and analysis guided the identification of the system's functional and non-functional requirements, which in turn informed the design phase of the project.

System Design

The design phase involves creating the overall system architecture and structure, including essential diagrams such as Data Flow Diagrams (DFD), Entity Relationship Diagrams (ERD), and user interface designs. In this research, the following steps were taken during the design process:

1. Data Flow Diagram (DFD)

The DFD outlines the flow of data across the system and defines the system's key processes. DFD Level 0 provides an overview of the system, detailing the main processes such as pilgrim data management, travel package management, payment management, schedule management, and report management.

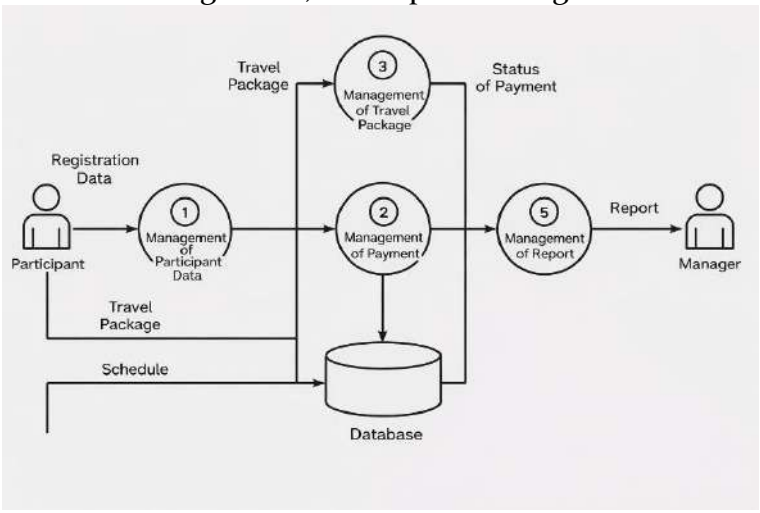

Figure 1. illustrates the DFD Level 0, showing the primary system processes.

2. Entity Relationship Diagram (ERD)

The ERD defines the relationships between key entities in the system, such as Pilgrims, Admin, Packages, Registrations, and Payments. The ERD shows how these entities are linked and how data is shared among them.

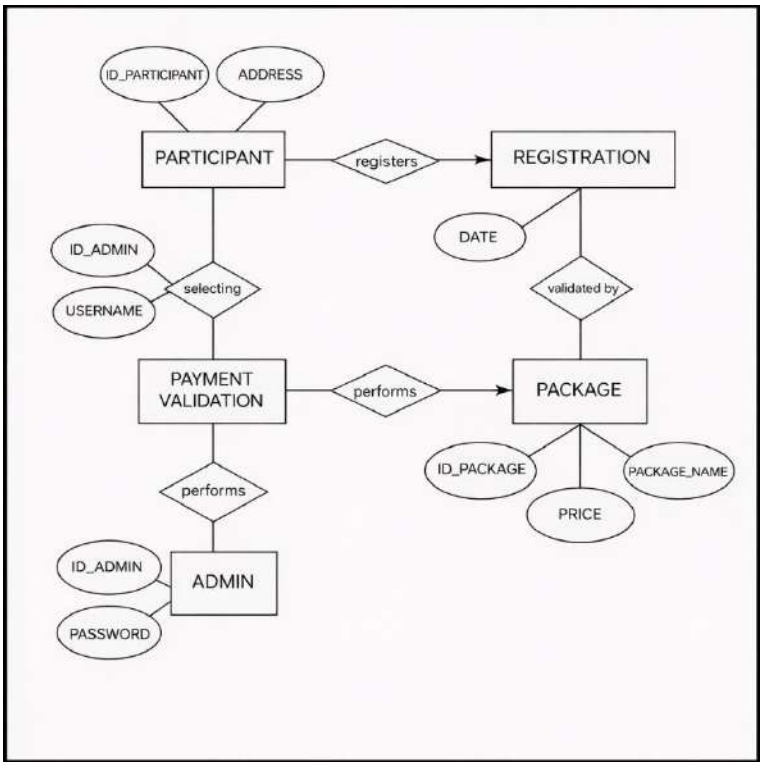

Figure 2. presents the ERD for the system database.

Implementation

During the implementation phase, developers begin coding according to the design specifications. The backend of the system is developed using PHP, the database is managed using MySQL, and the frontend uses Bootstrap to ensure a dynamic, responsive interface (Bootstrap, n.d.). The system's modules are developed and integrated according to the design to create a functional web application.

Testing

System testing is conducted to ensure the software meets the defined requirements. Functional testing, User Acceptance Testing (UAT), and integration testing are performed to identify bugs and ensure the system functions as intended.

Maintenance

Once the system is deployed, ongoing maintenance is essential to address bugs, add new features, and improve system performance based on user feedback. Regular updates and optimizations ensure the system remains functional and adaptable to future operational needs.

Data Collection Methods

This study employs multiple data collection methods, including direct observation of operational activities, interviews with stakeholders (such as admins and managers), and document review to collect relevant historical and administrative data. Observations provide insights into the current workflows, interviews gather user requirements, and document reviews offer structured, historical data (Putra & Yuliani, 2023). These combined methods help ensure the system meets the real-world needs of the travel agency.

RESULT AND DISSCUSSION

System Implementation

The system implementation began with preparing the infrastructure, which included hardware (local server or hosting) and supporting software such as the web server (Apache), database server (MySQL), and programming language PHP with the Bootstrap framework for interface design. The development team then prepared the system installation files and the database according to the pre-designed plan.

The installation process involved uploading the system files to the hosting server. The web application folder structure was organized according to the modules: admin, pilgrim, package, payment, and reporting. The database was imported via phpMyAdmin, with tables that matched the ERD design. A database connection test was carried out to ensure the system was functional and error-free.

The following sections outline the implementation of each core system feature:

1. Admin and Pilgrim Login Feature

The system provides separate login pages for the admin, manager, and pilgrims. Username and password validation are implemented using hash encryption for data security.

2. Pilgrim Registration Feature

Pilgrims can fill out an online registration form through the frontend page. The data entered is directly stored in the pilgrim and registration tables in the database.

3. Package Management Feature

Admins can add, edit, or delete travel package data via the dashboard panel. The package data automatically appears on the frontend page.

4. Payment Validation Feature

Pilgrims upload payment proof on the payment form. Admins verify this proof through the dashboard and update the payment status.

5. Reporting Feature

Managers can generate and print reports on pilgrim data, registration status, and payments through the reporting module, which produces PDF files.

System Testing

System testing was conducted to ensure the web application designed and developed meets the needs of the users (pilgrims, admin, and managers) and supports the operational flow of the Sanematour Jakarta Umrah and Hajj travel agency. The

objective of the testing was to identify bugs in the main system functions and ensure the output matches the expected input.

The Black Box Testing method was used for testing, which focuses on the system's functions and outputs without examining the program's code in detail. With Black Box Testing, each module was tested based on predefined input-output scenarios.

Testing was carried out on key features, such as:

- Admin and Pilgrim Login Module: Ensuring that only users with valid accounts can access the system.
- Pilgrim Registration Form: Testing if the registration data is saved correctly in the database.
- Payment Validation Module: Verifying whether the payment status changes after admin verifies the payment proof.
- Travel Package Management: Testing whether new packages can be added, edited, and deleted correctly.
- Pilgrim and Payment Report: Ensuring that reports are displayed and printed correctly according to stored data.

Each test was carried out with both valid and invalid data to observe how the system responds to different inputs. The test results were documented in a testing table, which included the module name, input, expected output, actual output, and pass/fail status.

This testing phase confirmed that the system functions as intended, with all features working correctly and supporting the operational processes of Sanematour Jakarta efficiently.

Testing Results

The overall testing was conducted according to the planned test cases, as shown in the Test Plan table 4. below.

Table 4. Test Plan

No	Module	Test Scenario	Expected Result
1	Admin Login	User logs in with valid credentials	System redirects to the admin dashboard
2	Admin Login	User logs in with invalid credentials	System displays error message "Username or Password Incorrect"
3	Pilgrim Login	Pilgrim logs in with registered account	System redirects to the user page
4	Pilgrim Login	Pilgrim logs in with incorrect account	System displays error message
5	Pilgrim Registration	Pilgrim fills out the complete form	Data is saved in the database and status set to pending
6	Pilgrim Registration	Pilgrim fills out incomplete form	System displays validation message "All fields must be filled"

7	Payment Validation	Admin verifies payment with valid proof	Payment status changes to valid
8	Payment Validation	Admin verifies with invalid proof	Payment status remains pending
9	Travel Package Management	Admin adds a travel package	Package data appears in the travel package list
10	Travel Package Management	Admin deletes a package	Package data is removed from the database
11	Reporting	Manager views the registration report	Report displays correctly according to the data
12	Logout	User logs out from the system	System redirects to the login page

Based on the results of the Black Box Testing, it can be concluded that the Sanematour Jakarta Umrah and Hajj Travel Agency Web-based Information System has successfully met all functional requirements. All core modules, including admin and pilgrim login, pilgrim registration, travel package management, payment validation, and report generation, were tested using both valid and invalid data to ensure the accuracy of processes and outputs.

The testing results demonstrate that each feature functions properly, providing the expected output without critical errors. Therefore, it can be concluded that the system is ready to be implemented and operated as a support tool for Sanematour Jakarta's operational services, and it is expected to enhance work efficiency, data accuracy, and service quality for the pilgrims.

Discussion

The implementation and testing of the web-based information system for the Sanematour Jakarta Umrah and Hajj Travel Agency have demonstrated that the system meets its functional requirements, with all core features working effectively. The results from the Black Box Testing confirmed that the system's key modules, such as the admin and pilgrim login, registration process, payment validation, and package management, functioned as expected without critical errors. These findings align with the growing need for digital transformation in the travel industry, especially in sectors dealing with complex, large-scale operations such as pilgrimage services (Pencarelli, 2020).

One of the most significant findings from the system's implementation is the successful management of pilgrim data and payment statuses. The system effectively automates previously manual processes, which are critical for ensuring accuracy and reducing human error. This aligns with the principles of software engineering and system design, as discussed by Pressman and Sommerville (2011), where the use of structured models such as the Waterfall SDLC helps in streamlining complex processes by breaking them down into manageable, systematic steps. By employing a robust design, the system enables real-time updates and ensures that both pilgrims and administrators can access accurate and up-to-date information, which enhances operational efficiency.

In line with these findings, theoretical frameworks around management information systems (MIS) support the idea that automating administrative processes not only improves efficiency but also enhances decision-making capabilities. According to Behl et al., (2019), modern MIS tools provide critical support for day-to-day operations, as seen in the reporting module of this system, which allows managers to generate detailed reports on pilgrim data and payments. This feature facilitates better decision-making and timely interventions, ensuring a more transparent and efficient operational environment.

Moreover, the user-friendliness and accessibility of the system were key points highlighted in the testing results. The system's ability to be accessed via various devices such as laptops, tablets, and smartphones reflects its design as a responsive, user-friendly interface, in line with the non-functional requirements. The use of the Bootstrap framework (W3Schools, n.d.) contributed significantly to this aspect, making the interface adaptable to different screen sizes and ensuring that users can easily navigate the system.

However, one of the critical aspects that emerged from the results is the importance of data validation and security. As observed during the payment validation process, the system correctly identifies valid and invalid payment proof, ensuring that the payment status is updated accurately. This feature is essential in maintaining the integrity of financial data and protecting sensitive information. As emphasized by Standardization, (2008), ensuring security, especially in payment systems, is fundamental to the success of any online platform.

From a broader perspective, the findings highlight the increasing importance of digitalization in the travel and pilgrimage sectors, where handling large volumes of sensitive data efficiently is crucial. As seen in the pilgrim registration feature, automating this process eliminates the potential for manual errors, which is particularly critical in religious travel, where accurate records are vital for operational success (Menteri Agama Republik Indonesia, 2023).

In conclusion, the system's implementation and testing results underscore the effectiveness of the web-based solution in enhancing the operational capabilities of Sanematour Jakarta. It has not only improved the efficiency and accuracy of business processes but also ensured that the agency can provide better services to pilgrims, thereby meeting both functional and non-functional requirements. Future improvements could focus on integrating additional security features, enhancing the user interface, and expanding the system to handle even more complex operational tasks, ensuring scalability as the agency grows.

CONCLUSION

Based on the design and analysis conducted, it can be concluded that the development of a web-based information system for the Sanematour Jakarta Umrah and Hajj Travel Agency effectively supports the digitalization of services. This system facilitates ease of online registration for prospective pilgrims, eliminating the need to visit the office in person. Furthermore, it enables more structured and accurate management of pilgrim data, travel packages, departure schedules, and payment validation. The implementation of this system also significantly improves

administrative efficiency, automating tasks that were previously handled manually. The system generates reports more quickly and accurately, providing valuable assistance to managers in making informed operational decisions.

The application of this web-based system is expected to enhance service quality and foster greater trust from pilgrims toward Sanematour Jakarta, positioning it as a more efficient, transparent, and reliable agency in the competitive Umrah and Hajj travel market.

Recommendations

To ensure that the designed information system is implemented to its full potential, it is recommended that the management of Sanematour Jakarta continue the development of supporting modules. For instance, implementing an automatic notification feature via email or SMS could help remind pilgrims of important dates, such as departure schedules, registration statuses, or payment confirmations. This would improve communication and enhance user satisfaction.

Additionally, it is recommended to strengthen the data security measures by implementing periodic backup systems and encryption protocols to safeguard sensitive information. Regular system evaluations and maintenance are crucial for identifying and resolving any technical issues early on, as well as adjusting to the evolving operational needs of the agency.

Collaborating with technology service providers is also advisable to facilitate quicker system updates and ensure that the system remains adaptable to new technological advancements.

This research aims to serve as a reference for developing similar systems in other travel agencies, promoting a more widespread adoption of digital transformation. Such advancements will positively impact the ease and accessibility of Umrah and Hajj services in Indonesia, benefiting pilgrims and travel agencies alike.

For future research, it is suggested to explore the integration of additional technologies such as artificial intelligence (AI) or machine learning to predict travel trends, optimize package offerings, or provide personalized recommendations to pilgrims. Moreover, expanding the system's capabilities to include features such as multi-language support or mobile app integration could further enhance accessibility and usability for a broader range of users. Further research into user experience (UX) design could also provide valuable insights to improve system interfaces, making them even more user-friendly for both pilgrims and administrators.

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