



Digitalization of guest record management through a web-based information system to support security and efficiency

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ABSTRACT

Digitization of visitor registration improves efficiency and security in visit management in many institutions. This project seeks to create a web-based information system that replaces manual registration techniques to reduce the possibility of data loss and inaccuracy of registration, while increasing the efficiency and accuracy of guest information processing. The study used a software development methodology that leverages the Rapid Application Development (RAD) concept, which facilitates rapid and adaptive system development. The novelty of this system lies in its integration of automated blacklist detection and personalized notification workflows, features that are not commonly found in prior visitor registration systems. The system was designed and implemented specifically within an institutional environment but has the potential to be generalized and adapted for diverse organizational contexts, including government offices, corporate facilities, and educational institutions. The study results show that the web-based information system improves efficiency in visitor registration through automated verification, real-time monitoring, and notification integration, thereby facilitating safer and more organized guest management. This solution aims to enable institutions to improve their visitor reception processes, strengthen workplace security, and facilitate digital transformation in visit management.

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Introduction

The Ministry of Defense Data and Information Center is a work unit that plays an important role in managing and providing data and information for all parts of the Ministry of Defense. As the main information center in the national defense sector, Pusdatin is responsible for ensuring that the available data is always accurate, quickly accessible, and relevant to support the decision-making process by the leadership. Pusdatin is also tasked with processing defense data, developing information systems, and distributing strategic information that is crucial to the smooth operation of the Ministry. In order to deal with the complexity and many interactions that must be managed, Pusdatin is required to continue to develop and implement the latest information technology that can increase the efficiency and effectiveness of various operational aspects, one example of which is a website-based visitor management application system. Currently, the implementation of the guest reception and data

collection process at Pusdatin is still manual, which still uses books for the recording process. This will certainly take a long time in the data collection process, besides being prone to errors and inconsistencies in data collection (Fiesler et al., 2020; Whang et al., 2023). The manual system also does not allow for continuous monitoring and management of guest information, especially in terms of filtering out unwelcome guests or putting them on a blacklist of unwelcome guests (Dezfoli & Newman, 2022; Đurović & Kniepkamp, 2022). The periodic daily change of guard duty is also a challenge in ensuring that information about unwelcome guests can be conveyed correctly (CALDER & WATKINS, 2024; Willett & Thor Arnason, 2007).

An application in the form of a website-based visitor management information system is needed to overcome this problem. Unlike previous visitor management systems that focused mainly on digital record-keeping, the system developed in this study introduces automated blacklist detection integrated with real-time notifications to relevant stakeholders, thereby enhancing both security and responsiveness. This system must be able to automate the guest reception process in the form of verification, data collection, recapitulation, and archiving of guest data at Pusdatin (Guest & Martin, 2023). While several prior studies have proposed digital visitor logbooks (Whang et al., 2023) or barcode-based guest tracking (Dezfoli & Newman, 2022), few have comprehensively addressed the problem of dynamic blacklist management combined with interdepartmental coordination in government institutions. This represents a critical research gap that this project aims to fill. In addition to aiming to support operational productivity, this system can also improve coordination between departments, especially between guard duty, superiors, and administrative staff who are responsible for the recapitulation and archiving of the data. Guest data filtering will be entered into this guest information system by checking guest data to verify whether or not they are blacklisted based on the NIK (Population Identification Number) data from the guest's ID card, organized guest visit data collection, guest list recapitulation, and data archiving that can be accessed and managed by related parties, which in this case is the administration department at Pusdatin. The implementation scope of this system includes all visitor reception points within Pusdatin, with the potential for replication across other units within the Ministry of Defense and similar high-security institutions. From a technical perspective, the system contributes a model for integrated, real-time visitor screening and monitoring; from a managerial perspective, it offers a framework to improve accountability, operational transparency, and data-driven decision-making in visitor management processes. With this system, it is hoped that the guest reception process at Pusdatin will be more efficient, transparent, and controlled. In addition, errors that may be made by hand can be minimized. The development of this guest information system allows real-time data integration, which is very helpful in making decisions about guests who come to Pusdatin at that time. Thus, this system not only functions as an operational tool, but also helps maintain security and the decision-making process in the Pusdatin environment of the Ministry of Defense.

Method

The method employed in the implementation of On the Job Training (OJT) activities involved a series of systematic stages. The process began with identifying issues within the General Sub-Section of Administration at the Ministry of Defense's Center for Data and Information (Pusdatin). These problems were initially uncovered through observations and were further explored through structured interviews with key stakeholders, including security personnel, superior officers, and the Head of the General Sub-Section (Kasubagum). A total of seven informants participated in the interviews: three personal assistants with more than four years of experience in visitor management, two administrative staff members responsible for the operational processing of visitor data, and two superior officers overseeing the General Sub-Section. The informants were selected using purposive sampling based on the relevance of their roles and their experience in the guest reception process. The interviews focused on understanding the existing manual procedures of guest visit management, covering processes such as guest reception, registration, summary reporting, and archiving (MacLeod, 2024; Suwitra Wirya, 2023).

After gathering relevant information and user needs, the design and development phase was initiated. This included creating workflow diagrams such as use case diagrams, activity diagrams, and class diagrams to visualize system processes and user interactions (Maatuk & Abdelnabi, 2021; Planas & Cabot, 2020). The diagrams and technical documentation were created using draw.io and Microsoft Visio to ensure clarity and consistency across all design artifacts. The system development methodology adopted was Rapid Application Development (RAD). RAD was selected for its iterative nature and strong emphasis on user involvement throughout the development cycle (Irnawati et al., 2018), promoting faster development and increased alignment with user expectations (Pricillia & Zulfachmi, 2021)

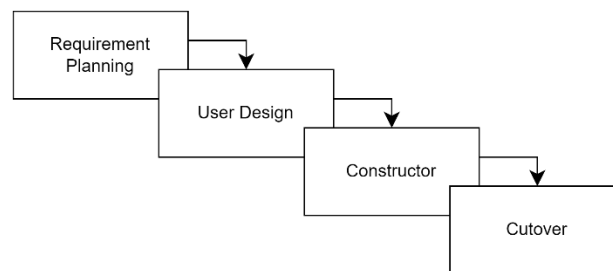


Figure 1 Rapid Application Development

The RAD model used in this project includes four key phases: Requirements Planning, User Design, Construction, and Cutover (Aila Gema Safitri & Firas Atqiya, 2022; Shaker et al., 2023). During the Requirements Planning phase, a detailed analysis of the necessary system features was conducted (Hidayat & Hati, 2021). The User Design phase involved creating initial designs, including workflow charts, use case diagrams, and wireframes for a user-friendly interface (Rudianto & Achyani, n.d.). The Construction phase encompassed system coding and integration. Laravel was chosen as the backend framework because of its robust support for MVC architecture, built-in authentication scaffolding, and efficient handling of database queries, which improved maintainability and development speed. The Telegram API was integrated to enable instant notification delivery to personal assistant (SPRI), enhancing responsiveness in visitor approval workflows. The system was developed using Laravel for backend operations and MySQL for database management, supported by HTML, CSS, and JavaScript for the frontend (Mahussin et al., 2022; Muittari, 2020; Tran, 2021). The system also integrated Telegram API to provide real-time notifications to security personnel.

In the final Cutover phase, testing and deployment were carried out. The Black Box Testing method was used to validate the system's functions, particularly in areas such as guest registration, ID verification, data recording, and alert notifications. Testing scenarios included verifying successful data entry for new visitor records, correct triggering of notifications upon approval or rejection, and accurate report generation. Success criteria were defined as all critical functions operating without errors across at least 10 consecutive test runs. Usability testing involved 5 end users who completed predefined tasks, with qualitative feedback collected via structured questionnaires and observations indicating a 90% satisfaction rate regarding ease of use and perceived efficiency. Usability evaluations were also conducted by involving end users to ensure the system's practical effectiveness (Corso et al., 2021; Han et al., 2020; Riccio et al., 2020).

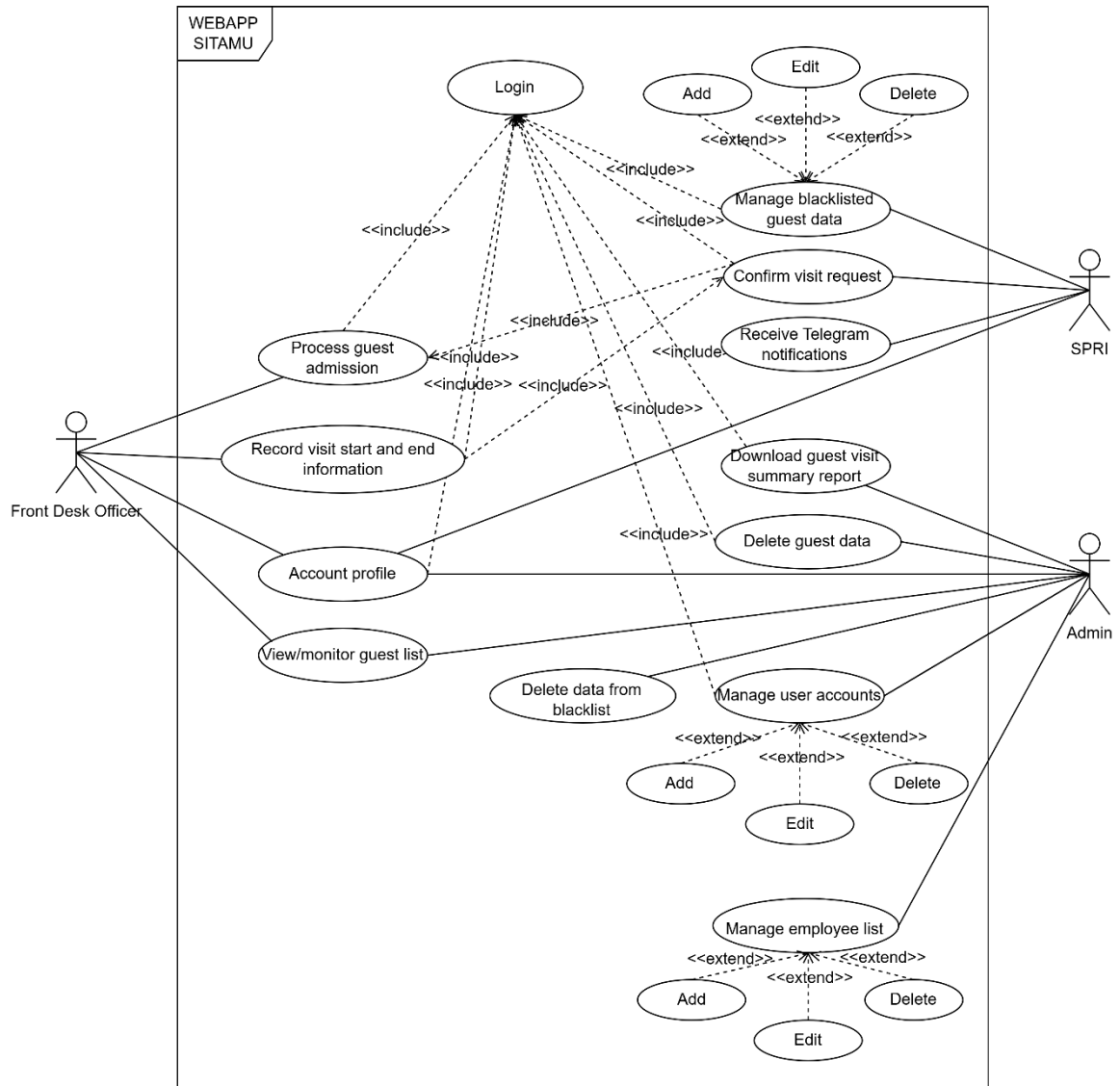


Figure 2 Use Case Diagram

Results and Discussions

The result of this project is the successful development of a web-based guest management system known as SiTamu, which was specifically designed to address the limitations and inefficiencies of the previous manual system. Traditionally, the guest registration process relied heavily on physical logbooks and paper forms, which were prone to data loss, inaccuracy, and limited accessibility. SiTamu offers a modern, automated solution that transforms these manual procedures into a streamlined digital workflow.

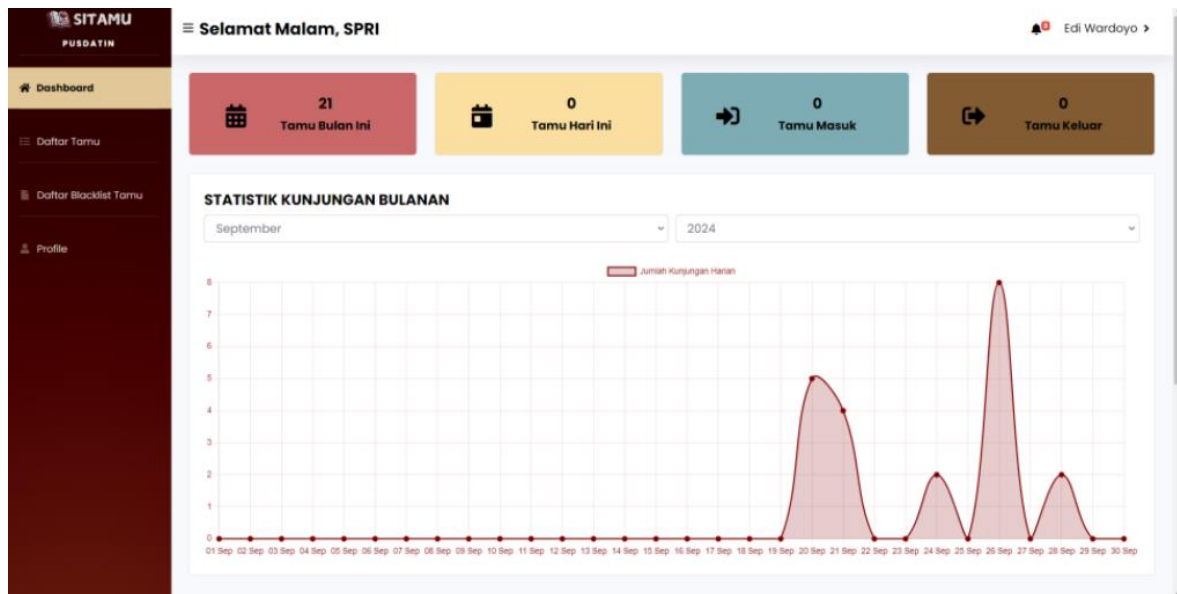


Figure 3 Dashboard SPRI

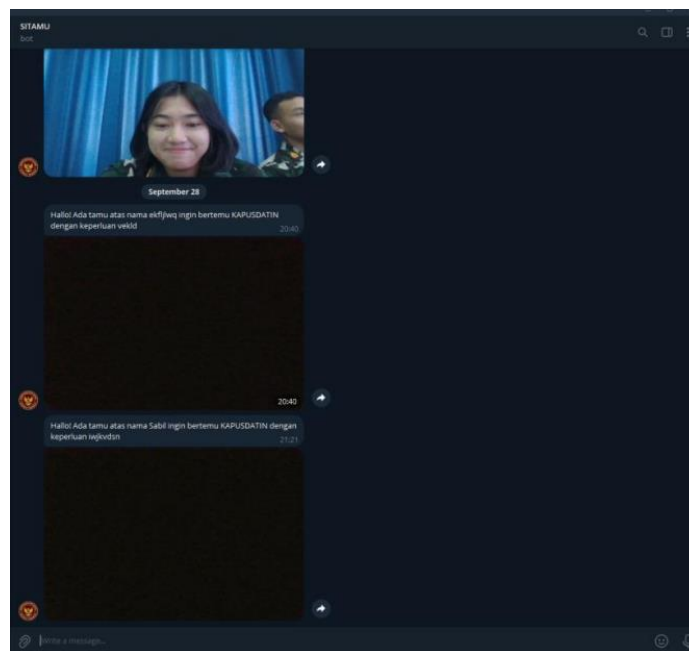


Figure 4 Notifications

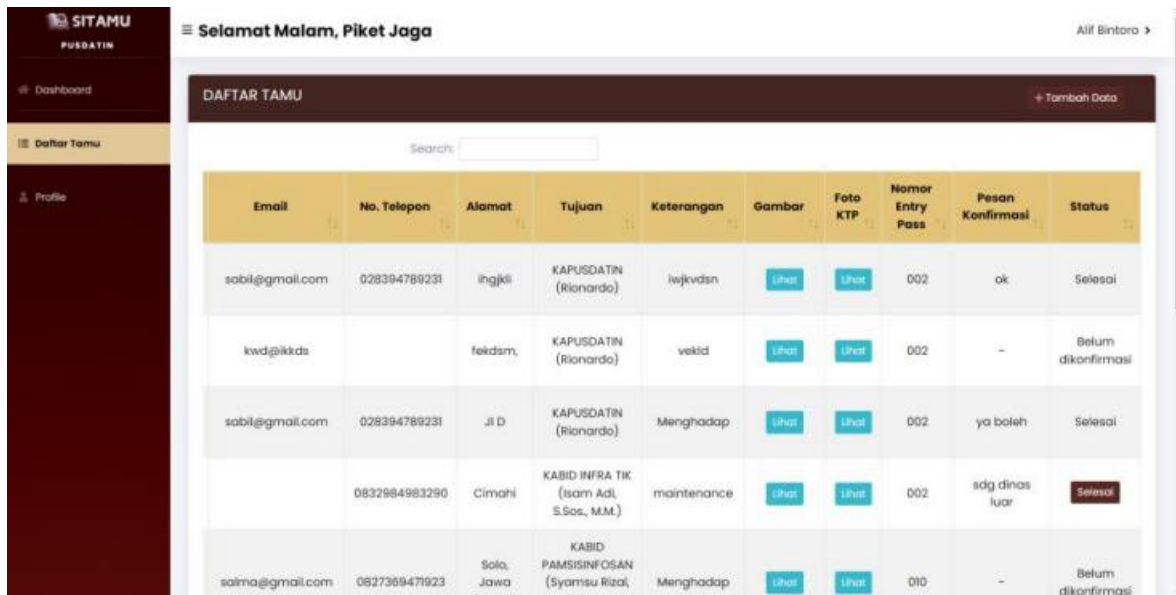


Figure 5 Page Guest Visit

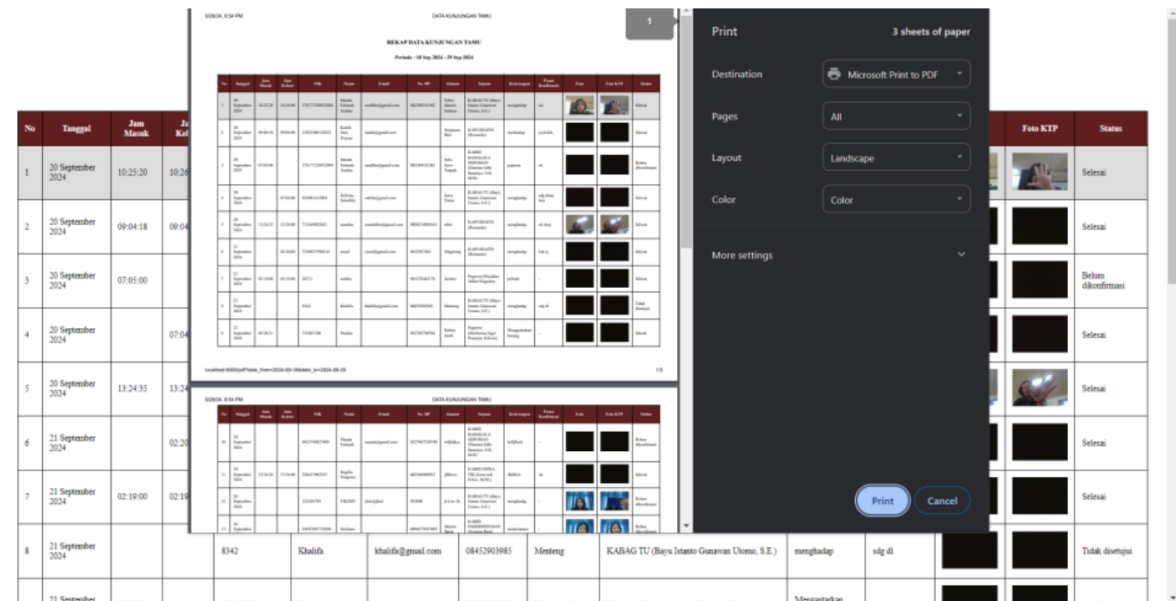


Figure 6 Summary Report

One of the core features of the system is digital guest registration, which allows visitors to be recorded directly into the application without the need for handwritten entries, thereby improving data entry speed and minimizing errors. In addition, the system includes an automated identity verification mechanism, where guest identities are validated using digital processes to ensure accuracy and reduce the potential for fraudulent entries or human oversight.

Another critical feature is the blacklist detection capability, which enables the system to automatically screen incoming guests against a predefined list of individuals who are restricted from entering, based on inputs provided by authorized superior officers. This function enhances security by preventing unauthorized visits and ensuring that sensitive areas remain protected.

To improve communication and coordination, the system is integrated with real-time notification functionality through the Telegram platform. This integration allows security officers and relevant administrative staff to receive immediate updates and alerts regarding visitor statuses, including approvals, rejections, or arrival notifications, thereby enabling quicker and more informed decision-making.

Furthermore, all visitor information and related records are stored in a structured and centralized database, which facilitates efficient data management, easy retrieval, and the generation of automated reports. This ensures that guest data is both accurate and accessible, supporting better monitoring, traceability, and accountability within the institutional environment, particularly within the Ministry of Defense's Center for Data and Information (Pusdatin).

Quantitative testing of the system's core functions revealed high performance across key indicators: the identity verification process achieved a 98% success rate in correctly matching guest information; blacklist detection functioned with 100% accuracy in identifying restricted individuals during test scenarios; and the average notification delivery time via Telegram API was 3.2 seconds, indicating near-real-time responsiveness.

These features were developed and tested based on the RAD model, and the system interface was designed to be user-friendly for staff involved in guest reception and coordination. System testing confirmed that the application functioned correctly according to the expected use cases. Feedback gathered during user trials highlighted the application's usability, speed, and accuracy in managing guest data.

The results are consistent with previous studies that have demonstrated the benefits of digitizing visitor management processes (Whang et al., 2023; Dezfoli & Newman, 2022). In comparison with prior approaches that focused mainly on digital record-keeping, SiTamu adds significant value by integrating real-time blacklist screening and automated notifications, which are known to strengthen security and improve decision-making workflows (Fiesler et al., 2020; Guest & Martin, 2023). This alignment with the existing body of research supports the validity of the system's effectiveness in addressing institutional needs.

During development and implementation, several technical challenges were encountered. One issue involved optimizing database query performance when processing large volumes of visitor records; this was mitigated by implementing indexing strategies and query caching mechanisms in MySQL. Additionally, integrating the Telegram API required addressing authentication token renewal to maintain uninterrupted notification delivery. These challenges were resolved through iterative testing and code refactoring.

While the system achieved its objectives, certain limitations remain. The current implementation does not yet integrate biometric verification technologies or AI-based anomaly detection, which could further enhance security and predictive capabilities. Future development should consider incorporating machine learning models to analyze visitor patterns and detect suspicious behaviors automatically. Additionally, extending compatibility with mobile devices may improve accessibility and user experience.

Overall, the implementation of SiTamu demonstrates a practical model for modernizing visitor management in high-security institutions and offers a transferable framework for other government agencies, corporate environments, or educational institutions seeking to improve visitor reception workflows. The inclusion of modern web technologies and messaging APIs contributed significantly to improved workflow efficiency and visitor tracking within the institution.

Conclusions

A web-based visitor management system named SiTamu has been successfully developed, effectively replacing the previous manual system that relied on logbooks and paper sheets. The system encompasses all features required for a web-based visitor management solution, addressing the existing challenges within the Ministry of Defense's Center for Data and Information (Pusdatin). SiTamu was developed to realize an integrated system capable of managing guest visits efficiently and effectively through a more structured and organized approach. It enables the automatic generation of accurate reports, which are accessible within the operational environment of the Ministry of Defense's Data and Information Center. The program is then tested before being fully installed and implemented. Testing is carried out using the Black Box Testing method to ensure that all features function properly and the system can run as expected. The main findings of this study demonstrate that the adoption of SiTamu contributes significantly to improving the efficiency of visitor registration, enhancing security by enabling real-time blacklist detection, and supporting the digitization of administrative processes within Pusdatin. This stage is a crucial step before the system is actually implemented in the work environment so that it can operate optimally and provide maximum benefits to users. Nevertheless, the system has certain limitations, including the absence of integration with broader security infrastructure such as biometric verification and centralized security databases. Future development is recommended to explore the incorporation of artificial intelligence techniques for predictive analysis of visitor behavior and anomaly detection. Beyond its implementation in the Ministry of Defense, the solution offers practical implications for other government agencies, corporations, or institutions that face similar challenges in visitor management. It is recommended that organizations seeking to modernize their guest reception processes consider adopting similar systems to enhance operational transparency, improve security controls, and support digital transformation initiatives.

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