

Design of a Software Requirements Specification for a Parental Partnership Assistance Management System in Elementary School in Malang Regency

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Abstract

This research is motivated by the need for a more efficient and transparent aid management system in primary education institutions, particularly at SDK Yos Sudarso Kepanjen, where the processes of application, verification, and reporting are still conducted manually. Such conditions lead to various issues, including delayed distribution, data duplication, and difficulties in monitoring assistance. To address these problems, a Software Requirements Specification (SRS) document was designed as a reference for developing a web- and mobile-based Parent Partnership Aid Management Information System. This study employed a system engineering approach consisting of three main phases: analysis, design, and implementation. These phases include problem identification, system workflow redesign, and the development of an initial user interface prototype using HTML and CSS (Bootstrap framework). The results indicate that the SRS document successfully defines the system's functional and non-functional requirements, including user authentication, aid application, digital verification, automated reporting, and a GPS-based needs mapping feature. It is expected that this SRS document can serve as a guideline for developing collaborative, efficient, and accountable educational information systems in the future.

Keywords: Assistance Management Information System; Global Positioning System; Parental Partnership; Software Requirements Specification; Web and Mobile Application

1. Introduction

The rapid advancement of information technology has significantly transformed the way educational organizations manage resources and administrative activities [1]. One critical aspect that requires particular attention is the management of aid programs and partnerships between schools and other members of the school community, especially parents [2]. In the context of primary education, partnership initiatives play a strategic role in ensuring equitable access to learning opportunities for all students through both academic and non-academic support [2]. Effective and transparent aid management not only strengthens public trust in educational institutions but also serves as an indicator of good school governance practices [3]. Therefore, the implementation of management information systems is considered essential to establish administrative processes that are efficient, well-documented, and easily monitored by all educational stakeholders [4].

A major challenge commonly faced by primary education institutions is the management of aid programs that are still conducted manually without support from centralized digital systems [5]. A similar condition was identified at SDK Yos Sudarso Kepanjen, where aid application, verification, and reporting processes rely on physical documents and informal communication. Such practices lead to various issues, including delays in aid distribution, risks of data duplication, and difficulties in monitoring aid status in real time. Furthermore, the administrative workload increases as reports must be prepared manually, ultimately reducing operational efficiency and data accuracy [6]. These challenges indicate that traditional management mechanisms are no longer adequate to support effective and accountable aid management in modern educational environments [7].

To address these issues, this study proposes the design of a web- and mobile-based Parental Partnership Assistance Management Information System that integrates all aid-related processes, from application submission to reporting, within a single digital platform. The proposed system enables schools, committees, sponsors, and parents to interact through transparent and well-documented workflows, supported by features such as user registration, aid application submission, digital verification, and GPS-based mapping of aid distribution. This research focuses on the development of a Software Requirements Specification (SRS) document in accordance with the ISO/IEC/IEEE 29148:2018 standard, which provides a structured framework for requirements engineering throughout the software and system life cycle [8]. The SRS serves as a formal reference for identifying and documenting system requirements for the aid management information system at SDK Yos Sudarso Kepanjen [9]. Through the implementation of this web- and mobile-based system, it is expected that aid management

processes will become more efficient and transparent, while also strengthening collaborative partnerships among schools, parents, and sponsors and contributing to the development of collaborative educational information systems [10].

2. Research Methodology

This study was conducted using a system engineering approach based on the concept of three major phases, namely analysis, design, and implementation [11]. These phases were employed to provide a systematic workflow for developing solutions to problems related to web- and mobile-based parental partnership assistance management. The separation between web and mobile platforms was intentionally applied due to their differing characteristics and usage objectives. The web platform was designed to support comprehensive data management and administrative activities by schools and committee administrators through a more complex interface, while the mobile platform was intended to facilitate parents and sponsors in accessing information, submitting aid applications, and monitoring aid status in a fast and flexible manner. The overall research procedure and the relationship among these phases are illustrated in Fig. 1.



Fig. 1: Research procedure

This approach was selected because it is capable of systematically describing the software design process, starting from problem analysis through the development of a well-documented system design. Accordingly, the stages applied to address the case study in this research are described as follows:

2.1. Analysis Phase

The analysis phase focused on identifying existing problems and defining system requirements at SDK Yos Sudarso Kepanjen. This phase consisted of three main steps, namely data gathering, problem analysis, and requirements analysis, which were conducted sequentially to develop a comprehensive understanding of current conditions and to establish a solid foundation for system design.

2.1.1. Data Gathering

This step aimed to obtain a comprehensive understanding of the current aid management practices at SDK Yos Sudarso Kepanjen. Data were collected through interviews with the school principal and administrative staff, as well as a literature review to strengthen the theoretical foundation of the study. The collected information was used to identify operational activities, constraints, and system needs. The outcome of this step was a set of factual data that served as the basis for developing the as-is workflow and determining potential areas for improvement.

2.1.2. Problem Analysis

Problem analysis focused on mapping the existing business processes and identifying obstacles in their implementation. This analysis was conducted by modeling data flows to represent interactions among actors and information exchanges within the system. The results produced an as-is workflow that highlights inefficiencies, along with an initial to-be workflow that illustrates a more integrated and efficient process to be adopted in the proposed system.

2.1.3. Requirements Analysis

This step aimed to define system requirements in detail based on the results of the problem analysis. The requirements were categorized into **functional and non-functional requirements**, encompassing core features such as aid application, verification, reporting, needs mapping to support partnership and transparency, as well as security and accessibility aspects. The outcome of this step was an initial set of system requirements that formed the basis for system design and the preparation of the Software Requirements Specification (SRS) document.

2.2. Design Phase

The design phase translated the results of the analysis into a more structured system design that could be formally documented in the Software Requirements Specification (SRS). This phase involved two main approaches: logical design and database design.

2.2.1. Logical Design

In the logical design stage, a to-be workflow was developed to represent the new system processes. Use case diagrams were created to illustrate interactions among system actors, and a sitemap was designed to guide interface navigation. These designs ensured that the system could effectively support aid application, verification, and reporting processes in a transparent and efficient manner.

2.2.2. Database Design

The database design stage involved modeling system entities and their relationships to represent data interactions, along with the development of a data dictionary describing the structure and function of each table. The outcome of this stage was a conceptual and structural system design that served as a foundation for compiling the SRS document.

2.3. Implementation Phase

The implementation phase focused on translating the system design into an initial visual representation. This phase was carried out by developing user interface prototypes using HTML and CSS (Bootstrap framework), enabling the creation of responsive designs that could be directly evaluated. Through this phase, the system design was visualized as an initial prototype, allowing for assessment of design alignment with functional requirements and workflows defined in the earlier phases.

2.4. Software Requirements Specification Development

This phase focused on documenting the results of system analysis and design in the form of a Software Requirements Specification (SRS). The document was prepared in accordance with ISO/IEC/IEEE 29148:2018, which provides clear guidelines for developing structured requirements documentation. The final output of this phase was a formal specification document that serves as the primary reference for developing the parental partnership assistance management information system at SDK Yos Sudarso Kepanjen.

3. Results and Discussion

In the existing business process, the aid management system at SDK Yos Sudarso Kepanjen was still conducted manually, relying on physical documents and direct communication among the school, parents, and sponsors. Each stage, from application submission to reporting, required a considerable amount of time because data had to be processed repeatedly and was often inadequately documented. This condition posed risks of data loss, information duplication, and difficulties in tracking the status of ongoing aid programs. In addition, verification and validation processes were highly dependent on face-to-face interactions, resulting in delays and inefficiencies in information delivery. Limited transparency among stakeholders also emerged as a major constraint, adversely affecting trust and the overall effectiveness of aid program management.

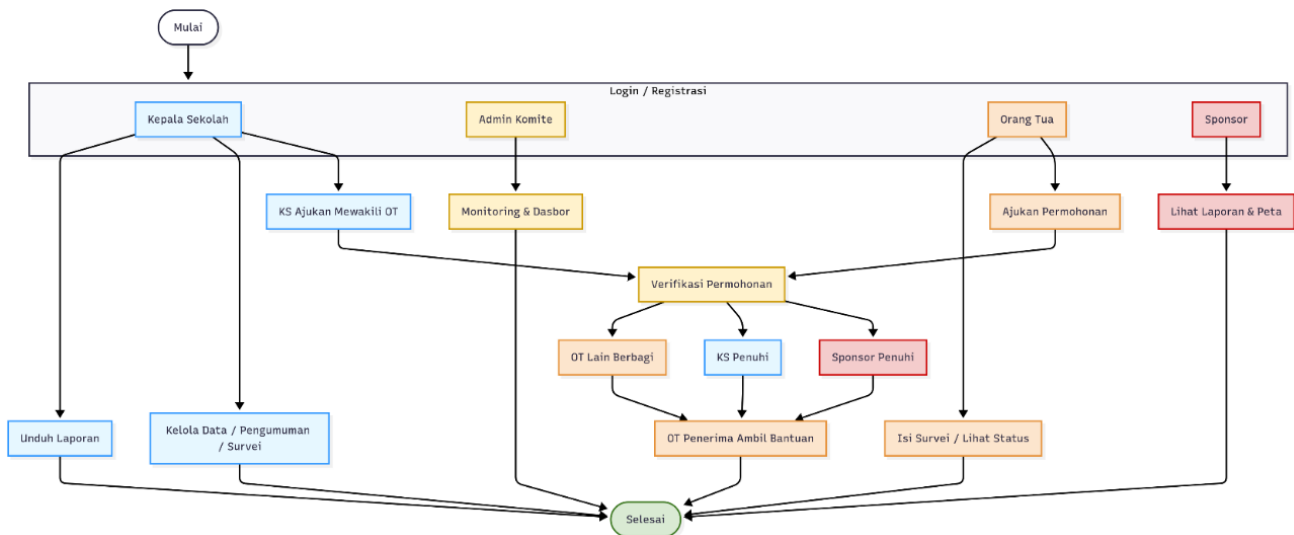


Fig. 2: To-be Workflow

Based on the observations and analysis conducted, a **to-be workflow**, representing the proposed business process, was developed and implemented through a web- and mobile-based Parental Partnership Assistance Management Information System. The proposed workflow is illustrated in Fig. 2. In this redesigned process, aid application, verification, and reporting activities are performed digitally, enabling all data to be recorded automatically and managed within a centralized system. The system was designed to assign user access rights according to specific roles, thereby promoting data transparency among participating stakeholders and enabling online validation processes supported by automated notifications to accelerate decision-making. Furthermore, a GPS-based needs mapping feature was incorporated to visually display the locations of aid recipients, supporting more targeted and transparent aid distribution.

3.1. User Characteristics

This section describes the characteristics of system users along with their specific requirements, which serve as a basis for tailoring the system design to the profiles and usage conditions of each actor. Understanding user characteristics is essential to ensure that the proposed system is usable, accessible, and capable of supporting the roles and responsibilities of all stakeholders involved. The analysis of user characteristics and their corresponding system requirements is summarized in Table 1.

Table 1: User Characteristics Analysis

No	Actor	User Characteristics	Specific System Requirements
1.	School Principal (SP)	Familiar with using computers for administrative tasks; holds full authority in decision-making processes.	Requires fast access to reports, centralized data visualization, and concise monitoring features.
2.	Committee Administrator (CA)	Involved in administrative validation; has intermediate-level technological proficiency; accustomed to managing data and documents.	The interface should support rapid verification, display real-time status updates, and allow easy monitoring.
3.	Parents (PR)	Have diverse backgrounds; not all are familiar with digital applications; primarily use smartphones.	Requires a simple and user-friendly interface, clear navigation, and informative status notifications.
4.	Sponsors (SN)	External stakeholders; may be individuals or institutions; familiar with digital platforms and data transparency.	The system should provide aid utilization reports, needs-mapping features, and secure donation processes.

3.2. Limitations

The limitations of the proposed system are as follows:

- a) The system is intended for internal use within SDK Yos Sudarso Kepanjen and does not cover aid distribution processes beyond the school environment.
- b) Fund disbursement and the physical distribution of assistance are still conducted manually by the school.
- c) The system functions as a digital platform for administrative management, data recording, and reporting, rather than as a fully operational aid distribution system.
- d) The system does not support integration with online payment services; donation records are maintained solely as internal data.

3.3. Functional Requirements

Functional requirements are defined to describe the primary services expected to be provided by the web- and mobile-based Parental Partnership Assistance Management Information System.

Table 2: Functional requirements

No	Functional Requirement	Description
1.	User Authentication (Registration, Login, and Logout)	The system provides user registration for new users (parents and sponsors) and authentication features (login and logout) for all actors based on their access rights.
2.	Aid Application Submission	The system provides an aid application form that includes applicant data, type of assistance, and application status.
3.	Application Verification and Approval	Administrators verify application data and grant approval for aid requests, aid collection requests, resource sharing requests, and fulfillment requests.
4.	Assistance Data Management	The system records, updates, and deletes assistance data and maintains the history of aid distribution.
5.	Resource Sharing and Request Fulfillment	This feature enables parents and sponsors to provide additional support in the form of funds or resources required by aid recipients.
6.	Aid Collection Confirmation	Parents can confirm the collection of approved assistance provided by the school or committee administrators.
7.	Assistance Status Tracking	Parents can monitor the status of aid applications, while sponsors can track assistance utilization through a dashboard.
8.	Automated Reporting	The system generates assistance reports that can be printed according to administrative needs.
9.	Monitoring Dashboard and Needs Mapping (GPS)	The system presents assistance data visually through an interactive dashboard, including GPS-based needs mapping and real-time transaction status.

3.4. Use Case Diagram

The Use Case Diagram is designed to model the interactions between users and the system. This diagram includes all primary actors, namely Parents, the Principal, Committee Administrators, and Sponsors, along with the functions accessible to each actor. Each actor plays a specific and complementary role within the overall process of aid application, verification, distribution, and reporting. The Use Case Diagram provides a comprehensive overview of system functionality and user interactions, as illustrated in Fig 3.

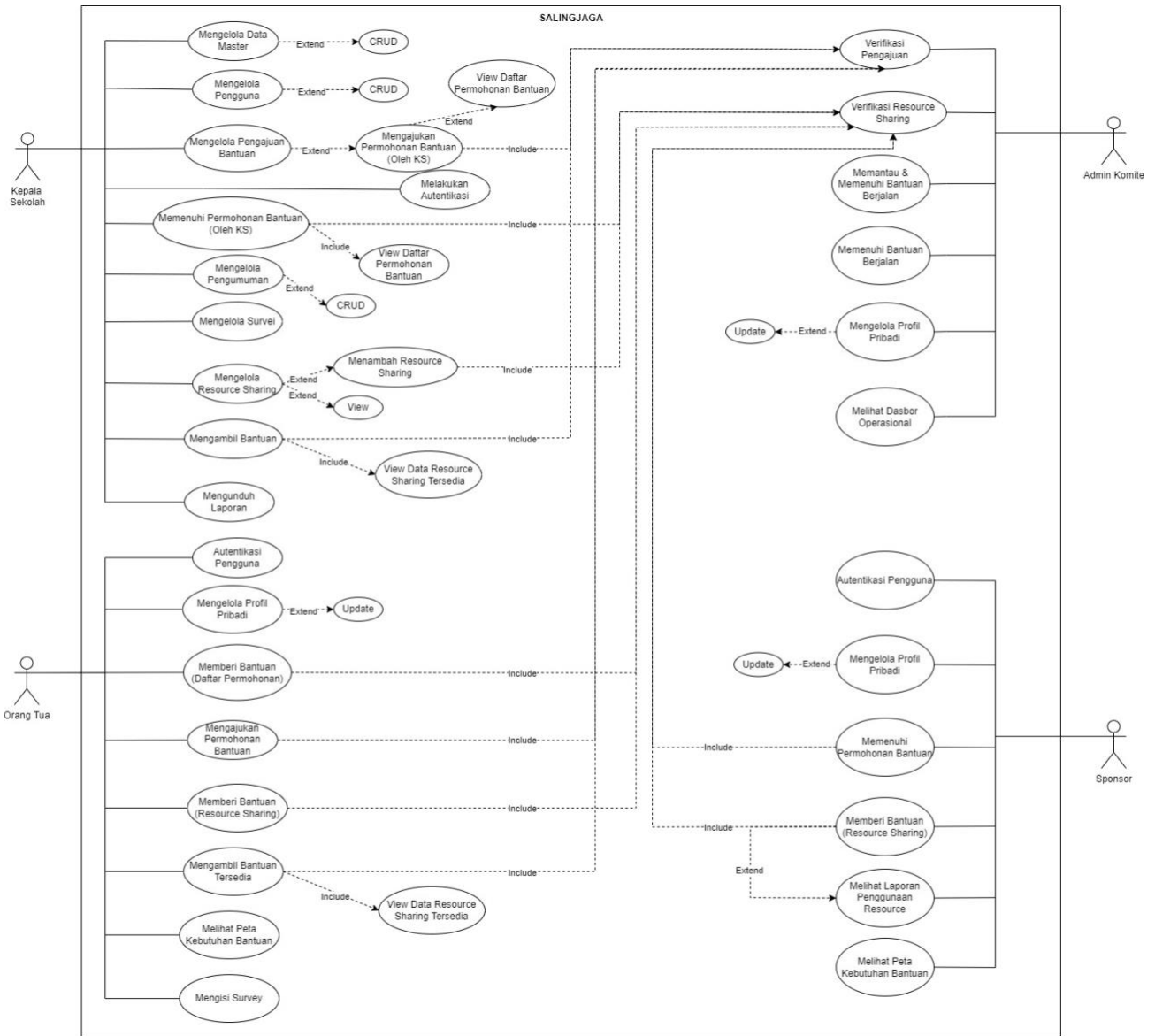


Fig. 3: Use case diagram of the parental partnership assistance management system

3.5. Logical Database

The logical database diagram illustrates the table structure and relationships among entities within the developed system. In this study, the database consists of 15 tables, including User, Siswa (Student), Kelas (Class), Tahun_Ajaran (Academic Year), Siswa_Kelas_Tahunan (Annual Student-Class Assignment), Komite_Paguyuban (Committee Group), Kategori_Kebutuhan (Needs Category), Permohonan_Bantuan (Aid Request), Penawaran_Resource_Sharing (Resource Sharing Offer), Sponsor, Survei_Kesehatan (Health Survey), Pengumuman (Announcement), File_Pengumuman (Announcement File), Log_Aktivitas (Activity Log), and Session tables. These tables collectively support core system functionalities such as user management, aid application processing, resource sharing, reporting, and system activity tracking. The logical database structure is illustrated in Fig 4.

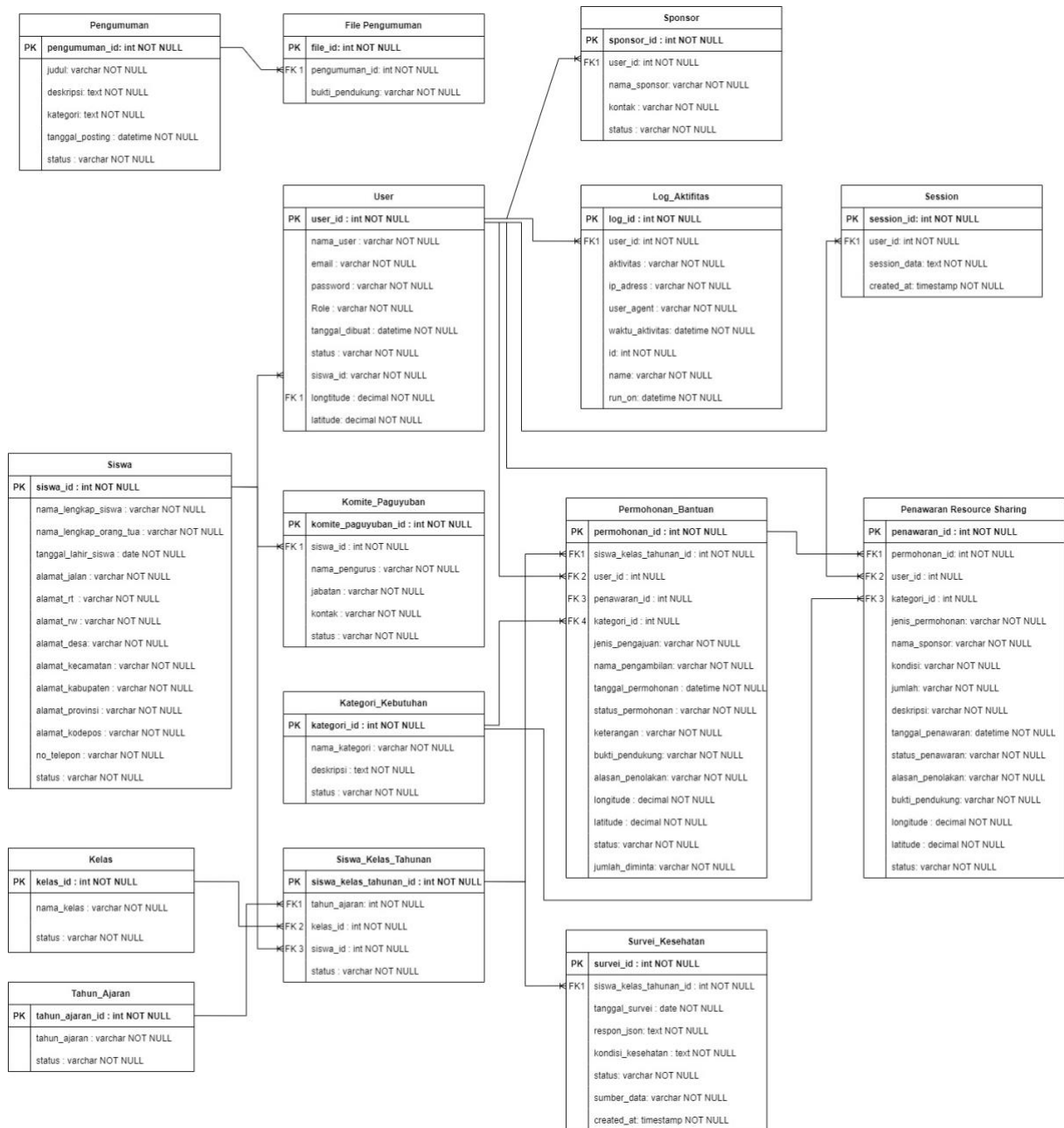


Fig. 4: Logical database structure of the proposed system

3.6. User Interface

This subsection presents the user interface design of the proposed system, highlighting how key functionalities are accessed by users according to their roles.

3.6.1. Homepage System

The homepage interface is designed as a centralized web-based administrative portal for the School Principal and Committee Administrator. This interface serves as the primary entry point for monitoring and managing school-related activities within the SALINGJAGA system. As shown in Fig. 5, the homepage presents key information through the Latest Announcements and School Information panels, enabling users to quickly access important updates and institutional details. This dashboard provides an overview of system activities and facilitates efficient navigation to other management and monitoring features.

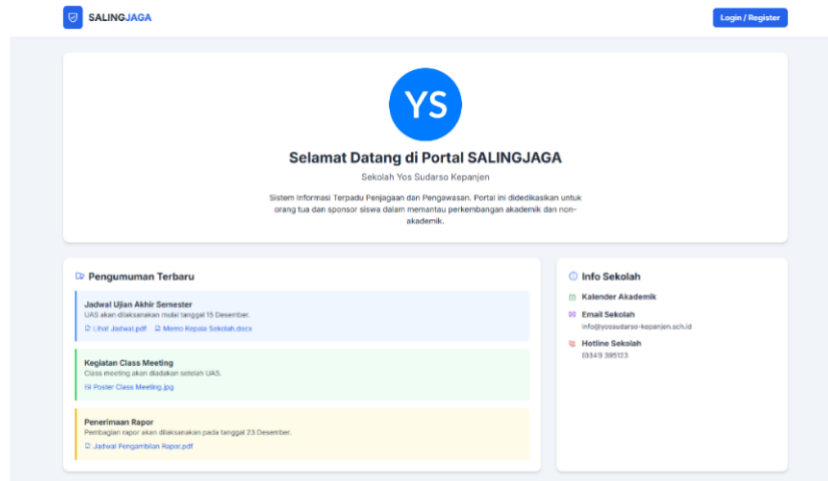


Fig. 5: Web homepage interface for the school principal and committee administrator

3.6.2. Login Interface

The login interface provides a secure authentication gateway for all system users. As illustrated in Fig. 6, users are required to select their role from a drop-down menu before entering their username and password to access the system. This interface ensures role-based access control and includes a navigation link to return to the homepage, supporting both security and usability.

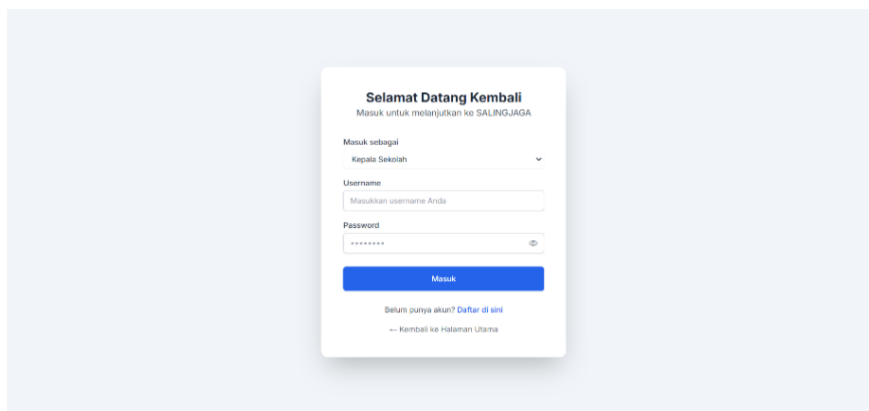


Fig. 6: Web login interface for the school principal user

3.6.3. Monitoring Dashboard and GPS-Based Needs Mapping

The monitoring dashboard provides the School Principal with a visual summary and quick access to key system features. As shown in Fig. 7, the dashboard displays a GPS-based needs map illustrating the spatial distribution of aid requests by category, supported by a clear legend for differentiation. In addition, quick navigation cards are provided to access core functionalities such as aid applications, ongoing assistance monitoring, resource sharing, user management, announcements, surveys, and master data. This interface enables efficient and integrated monitoring and management of assistance information.

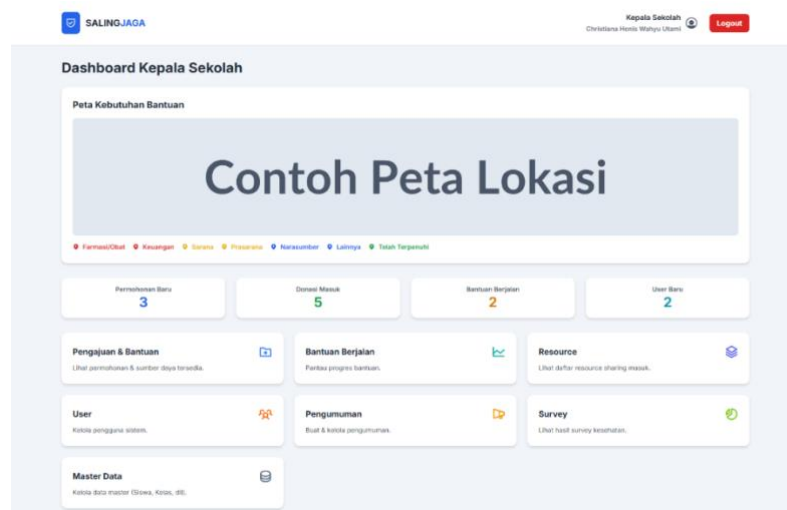


Fig. 7: Web dashboard and needs mapping interface for the school principal user

3.6.4. Verification and Approval Interface for Aid Requests and Aid Collection Applications

The verification interface enables the Committee Administrator to perform initial validation of incoming aid requests and aid collection applications. As illustrated in Fig. 8, the interface consists of two main tabs: Application Validation and Available Resources. The Application Validation tab presents application data in a tabular format, including request type, applicant name, category, requested amount, status, and supporting evidence. Applications with a Pending Validation status are accompanied by Approve and Reject action buttons, allowing administrators to make prompt decisions. Meanwhile, the Available Resources tab displays resource-sharing information similar to that accessible by the School Principal, supporting coordinated and transparent decision-making.

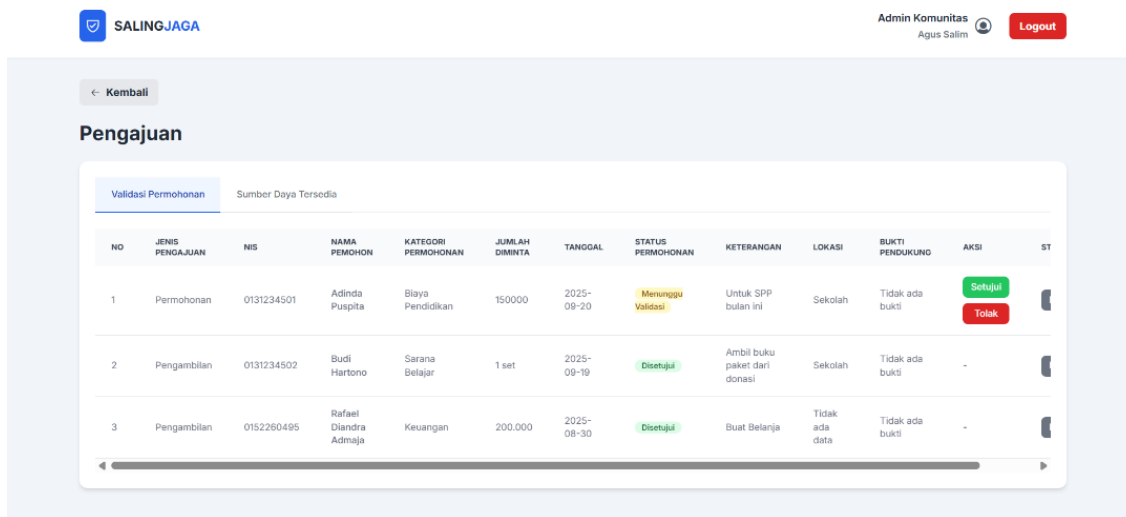


Fig. 8: Web verification interface for aid requests and aid collection applications by the committee administrator

3.6.5. Verification and Approval Interface for Aid Fulfillment and Resource Sharing

The resource sharing verification interface allows the Committee Administrator to review and perform initial validation of all resources offered by donors. As illustrated in Fig. 9, the interface presents incoming donations in a tabular format containing detailed information such as assistance type, applicant data, fulfilling party, sponsor, category, condition, quantity, description, submission date, and offer status. Entries marked with a Pending Validation status are accompanied by Approve and Reject action buttons, enabling the administrator to make prompt and informed decisions regarding aid fulfillment and resource sharing.

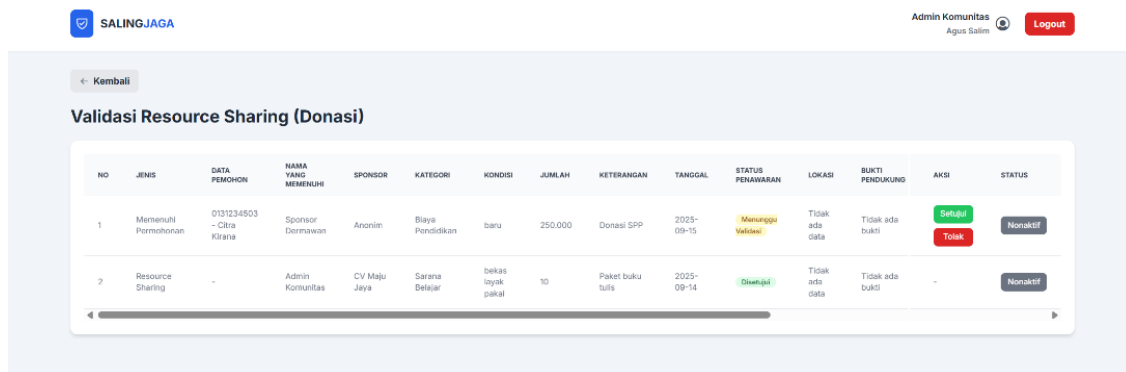


Fig. 9: Web verification interface for resource sharing and aid fulfillment by the committee administrator

3.6.6. Ongoing Aid Requests Interface

The ongoing aid requests interface allows the Committee Administrator and the School Principal to monitor the progress of assistance that has been previously verified and approved. As illustrated in Fig. 10, this interface presents active aid requests in a card-based layout, where each card displays the aid title, On-Going status, detailed requirements, a completion progress bar, and a list of collected resources. Each card is also equipped with a “Fulfill This Request” action button, enabling administrators to directly follow up on the aid fulfillment process in a timely and efficient manner.

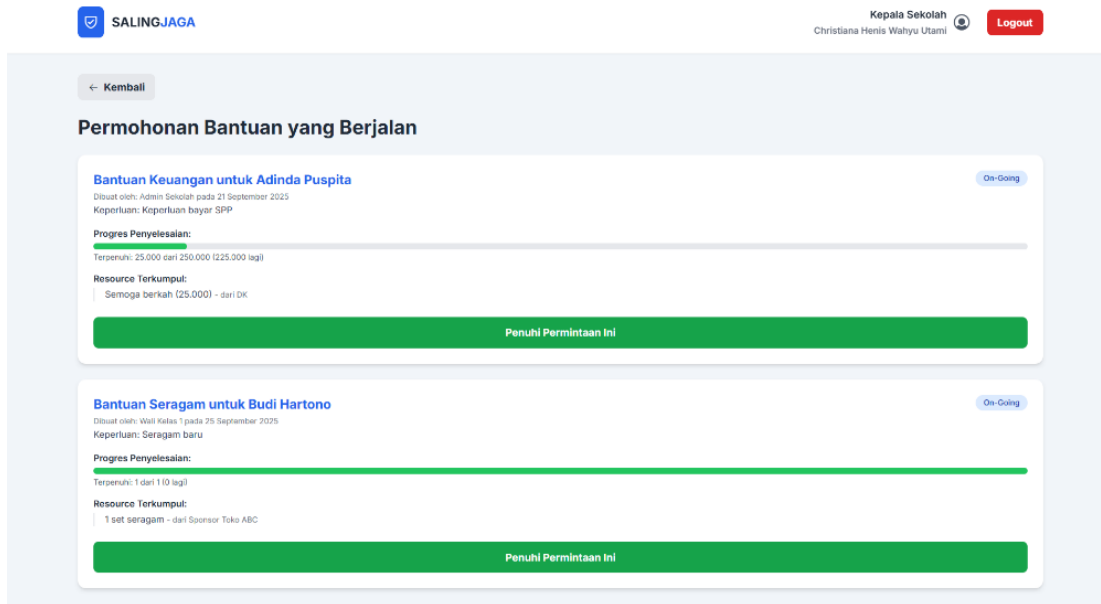


Fig. 10: Web interface for ongoing aid requests

3.6.7. Resource Sharing Collection Interface

The resource sharing collection interface allows the School Principal to view and utilize resources provided by donors. As illustrated in Fig. 11, available resources are grouped by category and displayed in a card-based format. For financial resources, the system shows the total collected amount, while non-financial resources are presented according to their respective types. Each card includes action buttons such as Collect Funds or Collect Resource, enabling the School Principal to process resource collection on behalf of parents efficiently.



Fig. 11: Resource sharing collection interface for the school principal

In addition to the user interfaces presented in this article, several other interfaces were also designed to support the completeness of system functionality. These include master data management pages, aid application and verification forms, resource sharing modules, as well as reporting and survey interfaces used by the school and committee administrators. On the other hand, the mobile version for parents and sponsors was specifically adapted to meet the needs of users accessing the system via mobile devices, featuring a more concise and responsive interface design. However, due to space limitations in this article, not all interface designs can be presented. All interface designs have been comprehensively documented in the Software Requirements Specification (SRS) for the Parental Partnership Assistance Management Information System at SDK Yos Sudarso Kepanjen.

4. Conclusion

This study resulted in the design of a Software Requirements Specification (SRS) as a reference document for the development of a Parental Partnership Assistance Management Information System at SDK Yos Sudarso Kepanjen. Through the analysis, design, and implementation phases, system requirements were successfully identified and translated into measurable functional and structural designs. The SRS document provides a comprehensive description of functional and non-functional requirements, user characteristics, system limitations, and proposed workflows aimed at improving the efficiency and transparency of aid management processes.

The web and mobile based approach adopted in this design ensures that all actors namely the school principal, committee administrators, parents, and sponsors can interact effectively through a unified platform. With the completion of this SRS document, it is expected that subsequent system development phases can be carried out in a more structured, well-documented, and standards-compliant manner. Furthermore, this study contributes to the implementation of collaborative and accountable educational information systems, particularly in the context of partnership-based aid management between schools and the community.

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