Abstract. An orphan is a term used to refer to someone who has been left by their parents while still underage. Providing support for orphans is a commendable activity. Supporting orphans has many virtues, as stated in the following Hadith: Narrated by Abu Ya'la and Thobrani, Shahih At Targhib Al Albani: "Whoever includes an orphan among two Muslim parents in their meals and drinks, providing for their needs, will surely enter Paradise.". The first step in supporting orphans is to find them. Searching for orphan data is difficult to accomplish if we rely solely on manual data collection. Sometimes the obtained data does not match the desired requirements. To help facilitate this step, an information system for managing orphan data is created. The aim is to simplify the management of orphan data and assist the community in searching for orphan data. The development of this orphan data management information system utilizes the waterfall method, which includes the stages of analysis, design, implementation, testing, and maintenance using the Laravel framework. The result of this research is a web-based information system for managing orphan data, with a case study in Karangsari Village, Kalimanah, Purbalingga Regency.
1 Introduction

Orphan is a term used to refer to someone who has been left by their parents while still underage. The word "yatim" originates from Arabic, meaning a young child (not yet mature) who has lost their father due to death. Providing support for orphans is a commendable activity and has many virtues, as stated in the following Hadith: Narrated by Abu Ya'la and Thobrani, Shahih At Targhib Al Albani: "Whoever includes an orphan among two Muslim parents in their meals and drinks, providing for their needs, will surely enter Paradise." [HR. Thabrani]. To obtain these virtues, many people compete to give assistance to orphans by providing clothing, shelter, and food.

Karangsari Village is a village located in Kalimanah District, Purbalingga Regency, Central Java. In the village, there is currently no easily accessible and up-to-date data on orphans. The process of orphan data collection is still done manually through population census conducted by the local government. The data is also not well managed.

Those who wish to provide assistance are required to search for data directly in the target area or inquire with local figures. However, people's various engagements and busy schedules often reduce their free time. Most of their free time is used for rest and vacations. This can make it difficult for people to find spare time just to search for orphan data. This approach is not effective, considering the obstacles encountered during the collection of orphan data, such as frequent data repetition or redundancy, data loss, and the fact that orphan data is not stored in the village government but scattered within the community, or vice versa [1].

Information System is a combination of software, hardware, infrastructure, and trained human resources [2]. The use of information systems in managing orphan data is already developing. However, it still requires further development for more efficient results.

A non-profit organization named Popay (Youth Caring for Orphans) conducted research by creating a web-based management information system for youth organizations caring for orphans. In their research, they aimed to develop a management information system to facilitate the public, especially donors, in accessing financial information and activities carried out by Popay, as well as to simplify the data management of Popay's organization, particularly in inputting orphan data [3]. However, their research did not include a history of user activities within the system.

Pandu Wiranata conducted research on the design of an information system for orphanage homes. The research aimed to facilitate the computerized management of orphan data [4]. However, the research did not provide ease in categorizing orphan categories.

Arfian Juniadi also conducted research on the development of an orphanage information system. The research aimed to facilitate access to orphanage information and make it easier for donors to make donations [5]. However, the research did not include a flexible feature for selecting orphan categories, nor did it provide recommendations on who is in greater need.

Ahmad Fainun conducted research on an information system for the registration of orphans and the poor. The research aimed to register orphans and the poor within the village scope [6]. Sarini, Retha, and Oka conducted research on an information system for the registration of orphaned children in madrasahs. The aim was to conduct a census of orphans [1]. However, their research did not provide ease in updating orphan data, requiring periodic changes.

Based on these issues, there is a need to develop a more up-to-date orphan data management information system. This will effectively address unresolved problems and facilitate data management while enabling the community to access orphan data easily.
2 Research Methodology

This research method also follows a sequential flow in order to achieve optimal results. The research flow is illustrated in Fig 1.

![Research Flowchart](attachment:fig1)

**Fig. 1.** Research Flowchart

2.1 Problem Analysis
The stage of problem analysis aims to identify the relevant issues and challenges related to the reasons or background of the system to be developed.

2.2 Data Collection
Interviews were conducted with the employees of the Karangsari Village Government in Kalimanah, Purbalingga to obtain the required data. The collected data will be used to gain an understanding of user needs and the data related to the system to be developed. Literature Review, In this stage, the author compares previous research and seeks other references to improve the system development. Observation, during the observation stage, the author observes the process of searching for data on orphaned children in Karangsari Village, Kalimanah, Purbalingga to determine the current workflow of orphan data collection.

2.3 Application Development
The development method used in this research is the waterfall development method. The waterfall model is known as a sequential software development process where the process flows from top to bottom like a waterfall, passing through the required stages for successful system development. The application development cycle using the waterfall method is illustrated in Fig 2.

![Waterfall Development Method](attachment:fig2)

**Fig. 2.** Waterfall Development Method

1. Analysis
Analysis, also known as Software Requirements Specification (SRS), is a comprehensive description of the software behavior to be developed. It involves system and business analysts to determine functional and non-functional requirements.

2. Design
The design phase is the process of planning and problem-solving for software solutions. It involves software developers and designers to determine the solution plan, including algorithm design, software architecture design, conceptual database scheme, logical diagram design, concept design, user interface design, and data structure definition.

3. Implementation
This phase involves writing the actual code and compiling it into an operational application, as well as creating databases and text files. In other words, it is the process of transforming all requirements and designs into a production environment.

4. Testing
The testing phase, also known as verification and validation, is the process of checking whether the software solution meets the original requirements and specifications and achieves its intended goals.

5. Maintenance
The maintenance phase is the final stage of the waterfall method. The completed software is operated and maintained. Maintenance includes debugging errors and making various improvements requested by users. Maintenance is the final and most critical phase of the software development life cycle. It involves debugging errors and implementing various user-requested improvements.

6. Result Analysis
The result analysis stage involves analyzing the data obtained from the application development phase. The developed system will be analyzed to determine if it meets the user requirements obtained from the analysis phase.

2.4 Conclusion
The conclusion stage is the process of drawing conclusions based on the results of the result analysis stage. In this stage, conclusions are drawn to explain the suitability of the developed system with the user's needs.

3 Results and Discussion

3.1 Analysis
The planning phase is a stage where the process of identifying goals and requirements to design and develop the Final Study Management System takes place. This phase includes the process of designing research schedules, conducting interviews with system users, analyzing user requirements and system requirements, and creating system designs that encompass UML designs such as Use Case Diagrams, Activity Diagrams, Sequence Diagrams, Class Diagrams, Tables, and Entity Relationship Diagrams.

3.1.1. Requirement Interview
The interview was conducted by asking several questions to the research informant, Mrs. Siti Wahyuningsih, as the Head of Government in Karangsari Village, Kalimanah District, Purbalingga Regency, in order to gather the necessary data. The collected data will be analyzed to obtain results in the form of workflow and process flow of the orphan data management system that will be developed.
3.1.2.  **Requirement Analysis**

The requirement analysis phase is a system design stage aimed at identifying system problems and requirements so that developers can understand the overall system overview in accordance with user requirements. The requirement analysis stage includes the identification of system users, analysis of user requirements, and analysis of system requirements.

3.1.2.1. **User Identifications**

There are two user categories in the orphan data management system, namely operators and admins. Both users are government employees from Desa Karangsari, Kalimanah, Purbalingga.

3.1.2.2. **User Requirement**

Based on user identification and interview results, a list of user requirements and procedures that can be performed by each user has been obtained. The description of user requirements is presented in Table 1.

<table>
<thead>
<tr>
<th>User Category</th>
<th>Access Rights</th>
<th>Access Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>View Data Access</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operator</td>
<td>Viewing data in the orphanage support system, including orphan data, applicant data, and relevant operator data. Able to search orphan data based on specific needs categories.</td>
<td>URS-SIPAY.01</td>
</tr>
<tr>
<td>Admin</td>
<td>View data on the orphanage support system, including orphan data, applicant data, operator data, and relevant admin data.</td>
<td></td>
</tr>
<tr>
<td>Edit Data Access</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operator</td>
<td>Modify data in the system, including orphan data and profile data.</td>
<td>URS-SIPAY.02</td>
</tr>
<tr>
<td>Admin</td>
<td>Modify profile data.</td>
<td></td>
</tr>
<tr>
<td>Add Data Access</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operator</td>
<td>Add applicant data and orphan data.</td>
<td>URS-SIPAY.03</td>
</tr>
<tr>
<td>Admin</td>
<td>Add operator data and admin data.</td>
<td></td>
</tr>
<tr>
<td>Delete Data Access</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operator</td>
<td>Delete applicant data and orphan data.</td>
<td>URS-SIPAY.04</td>
</tr>
<tr>
<td>Admin</td>
<td>Delete operator and admin data.</td>
<td></td>
</tr>
</tbody>
</table>

3.1.2.3. **System Requirement**

After understanding the analysis of user requirements, the requirements of the system to be developed can be formulated. System requirements consist of the processes that will be
executed by the system when it is running. The description of system requirements is presented in Table 2.

**Table 2. System Requirement**

<table>
<thead>
<tr>
<th>User Category</th>
<th>Access Rights</th>
<th>Access Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>View data access</td>
<td>The system provides a feature to view overall orphan data and offers a search feature to retrieve data based on specific requirements.</td>
<td>SRS-SIPAY.01</td>
</tr>
<tr>
<td>Operator</td>
<td>The system provides a feature to view overall orphan data, operator data, and admin data.</td>
<td>SRS-SIPAY.02</td>
</tr>
<tr>
<td>Admin</td>
<td>The system provides a feature to view overall orphan data, operator data, and admin data.</td>
<td>SRS-SIPAY.03</td>
</tr>
<tr>
<td>Add data access</td>
<td>The system provides features to add applicant data and orphan data.</td>
<td>SRS-SIPAY.04</td>
</tr>
<tr>
<td>Operator</td>
<td>The system provides features to add applicant data and orphan data.</td>
<td>SRS-SIPAY.03</td>
</tr>
<tr>
<td>Admin</td>
<td>The system provides features to add operator data and admin data.</td>
<td>SRS-SIPAY.04</td>
</tr>
</tbody>
</table>

3.2 Design

The system design phase is the stage of modeling the system design based on user requirements defined in the requirements analysis phase. In this phase, user and system requirements are transformed into the characteristics of software or a system before development in the form of programming or coding takes place. This phase involves the design of Unified Modeling Language (UML) such as Use Case Diagrams, Activity Diagrams, Sequence Diagrams, and Class Diagrams.

UML is a standard modeling language used for developing software built using object-oriented programming techniques. UML can be understood as a standardized modeling language that utilizes object-oriented programming techniques to model a system. UML serves the purpose of modeling only. Therefore, the use of UML is not limited to specific methodologies, although in practice, UML is mostly used in object-oriented methodologies [12]. Object-oriented programming is an approach to programming that utilizes objects and classes [13].

3.2.1 Use Case Diagram

The use case diagram is a diagram that illustrates the interaction between a system and actors who play the role of system users[14].

A. Use Case Diagram
3.2.2 Activity Diagram

Activity diagram, also known as an activity chart, depicts the workflow or activities of a system or menu within a software application. It provides a visual representation of the system's activity flow from one activity to another. We can determine which objects are responsible for each activity. In the context of the Orphan Data Management System, the activity diagram consists of several processes as represented in Fig 4-Fig 7.

A. Activity Diagram of Login Process

Fig. 4. Activity Diagram of Login Process

B. Activity Diagram for Orphan Data Search Process
C. Activity Diagram for Orphan Data Management Process

D. Activity Diagram for Operator Data Management Process
3.2.3 Sequence Diagram

The sequence diagram is an interaction diagram that illustrates the relationship between objects during the execution of an operation. It also defines the messages that are exchanged and arranges them based on their timing. The objects involved in the operation's execution process are ordered from left to right based on the occurrence time of the messages in a sequential manner. In the context of the orphan data management system, the sequence diagram consists of several processes as follows.

A. Sequence Diagram of the Login Process

Fig. 7. Activity Diagram for Operator Data Management Process

Fig. 8. Sequence Diagram of the Login Process
B. Sequence Diagram of Orphan Data Management Process.

C. Sequence Diagram of the Orphan Data Search Process
Fig. 11. Sequence Diagram of the Orphan Data Search Process

D. Sequence Diagram for Operator Data Management Process

Fig. 12. Sequence Diagram for Operator Data Management Process
3.2.4 Class Diagram

The class diagram is a diagram that depicts the system's structure in terms of defining the classes within a system.

![Class Diagram](image)

**Fig. 13. Class Diagram for Orphan Data Management System**

### 3.3 Implementation

This stage involves the implementation of the design stage into commands through the coding process using a programming language to make it understandable for computers and a specific database. The programming language used in developing this system is PHP programming language with the Laravel Framework, combined with HTML, CSS, and JavaScript. The database used is MYSQL[16]. In this Development stage, the interface implementation will be presented through coding based on the design created in the design stage.

#### A. Implementation of login page

The login page is the first interface that appears when users access the system. On the login page, a security authentication process takes place for users to enter the system by entering their username and password. The login page also serves as a separator between admin users and operator users. Here is an image of the login page interface for the orphan data management system can be seen on Fig 14.
B. Implementation of dashboard page
The dashboard page is a display that contains a summary of information within the system. The dashboard page consists of various menus. The differentiating factor between the operator and admin views is their color scheme. The operator view is in orange, while the admin view is in dark blue. Here is the interface of the dashboard page for the orphan data management system can be seen on Fig 15.

C. Implementation of the Orphan Data Search Page
The orphan data search page is the main search page used to find orphan data according to specific needs. The search process consists of 3 steps, which are filling out the applicant form, selecting a category, and downloading the search results. The interface of the orphan data search are represented on Fig 17-Fig 20.
Fig. 17. Implementation of the Applicant Form Page

Fig. 18. Implementation of the Category Selection Page

Fig. 19. Implementation of the Search Result Page
D. Implementation of the Add Orphan Data Page

The operator can add orphan data by selecting the "Add Data" menu located at the top left. After clicking the "Add Data" button, it will display the orphan data addition form page as shown in Fig 21.

E. Implementation of operator add page

The admin can add an operator by selecting the "Add Data" menu located at the top left. After pressing the "Add Data" button, it will display the operator addition form page as shown in Fig 22.
F. Implementation of Search History Page

The search history page is a display that contains search data grouped based on the month of the search. This page is only available in the admin dashboard view. Here is an image of the search history page interface for the orphan data management system:

Fig. 22. Implementation of the Add Operator Page

Fig. 23. Implementation of Search History Page
3.4 Testing

In this stage, the system undergoes a testing process using black box testing to evaluate the functionality of the system, whether it can function properly or not. Black box testing is a form of functional testing driven by input and output[17].

3.5 Maintenance

Maintenance is the final stage of the waterfall development method[10]. The maintenance of this system will be performed by the Karangsari Village Government, Kalimanah, Purbalingga, and the author.

4 Conclusion

Based on the research, developing an orphan data management system using the Unified Modeling Language is based on the findings from literature studies, observations, and interviews with the Karangsari Village Government in Kalimanah, Purbalingga. This study resulted in a web-based Orphan Data Management System built using the Laravel framework and developed using the waterfall development method. The testing results using black-box testing methods indicate that the system is following the defined requirements. The orphan data management information system facilitates the Karangsari Village Government to manage orphan data. It also allows the community to search for orphan data according to their needs. Suggestions obtained during the research include making the system more responsive on mobile devices for easier use outside the office and expanding the research to the sub-district or regency level to process a larger amount of orphan data.

References


