Front-End Development and Data Fetching for Visualization of Mataram City Scout Data and Activities

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Abstract **Mataram City's scouting administration information system currently relies on manual processing like Google Forms and Excel that encounter challenges at the Scout Unit level up to the District Council. These manual processing result in data mistakes, reporting delays, and challenges for the Regency Council to obtain real-time information. This project aims to create a website-based information system using the Scrum methodology in order to centrally digitalize members, scoutmasters, and scout activities data management. Using Next.js and TypeScript, the authors develop a front-end and data retrieval from API Endpoints. This application to enhance user productivity, facilitate cross-level reporting, and provide effective data visualization. These benefits are supported by the User Acceptance Testing results, which show an average feasibility score of 81.74% in the "good" category across functionality, reliability, usability, and efficiency aspects. This confirms that the digitalization of scout administration is both ready to be implemented and aligned with user expectations.**

***Key words*: Scrum, Data Visualization, Front End, Scout Administration Website, Next.js**

I. INTRODUCTION

The term Pramuka comes from the acronym Praja Muda Karana, that refers to innovative and active young people. This organization develops personality, life skills, and noble character through the implementation of scouting concepts. Pramuka has different age membership like Siaga, Penggalang, Penegak, and Pandega. They all engage in extracurricular activities to develop their moral character [1].

Pramuka has several organizational structure in their data management administrative including membership and activities. These levels begin with the National Council (kwartir nasional or **kwarnas**) at the national level, the Provincial Council (kwartir daerah or **kwarda**) at the provincial level, the Regency Council (kwartir cabang or **kwarcab**) at the city/district level, and the District Council (kwartir ranting or **kwaran**) at the district level and Scout Unit (gugus depan or **gudep**) at the school or community level. Scout members and scoutmasters' data and their activities are reporteds to kwarcab by its lower levels, kwaran and gudep. One step below the kwarcab, kwaran, is responsible for overseeing and managing Gudep in its area [2].

Based on the discussions with the secretary of the Mataram City Scouts, Kwartir Cabang cannot directly access and collect scout data held by the gudep level which is a challenge for Kwartir Cabang and its staff in terms of data processing and storage. The data includes scout member identities, activity records, and scoutmaster information in each Gudep. Its complexity increases as each member's rank history and activity participation must be tracked over time, requiring a more intricate table structure with additional relational mappings. This is a challenge in the process of managing and storing data, especially since the current methods used are still manual. Data and reports at Gugus Depan and Kwartir Ranting levels are generally collected using Excel or Google Forms, which are prone to inconsistencies, limited access, and human error. Manual processing and reporting also slows down the work process, is less efficient in searching for data because it must be done one by one, and has a low level of security. In addition, the monthly reporting process that requires manual collection of data from each gudep often causes delays in decision-making and increases the risk of data inconsistencies. These challenges are also highlighted in studies [3], [4], and [5], which found that manual data collection using Excel or Google Forms commonly results in data inconsistencies, limited access, human error, prolonged processing times, and inadequate security.

Given those encountered issues, a centralized information system is crucial to streamline data collection, reporting, and efficient data management for scoutmasters and members at all levels [6]. The study at Elementary School 3 Rukti Basuki shows that a web based system with a database speeds up data processing, prevent loss and/or duplication of information, and facilitates data access and monitoring [7]. In addition, the development of a scout information system has also been implemented in Dumai City, where the system serves to displays information related to scout activities in their region [8]. By developing a similar system tailored to the organizational structure of the Mataram City Scouts, data management of members, scoutmasters, and activities is expected to be neater, more efficient, and supported by data visualization through

informative dashboards through query with complex relations between data that increase transparency and accountability and helps decission support.

The system is developed in a teams using Scrum approach to ensure efficient collaboration and flexibility in the development process as in [9]. The development team consisted of three people with UI/UX, Front End, and Back End roles. This paper reports the Front End development, while the Back End is reported separately . The authors develop a front-end, built interfaces using Next.js and TypeScript to deliver optimal performance and a responsive user experience [10] and was also responsible for retrieving data from the API Endpoint created by the Back End developer using RestAPI architecture. The system was designed with an attractive visual display, equipped with charts and graphs to facilitate data understanding, so that kwarcab easily monitors members, activities, and the scoutmasters statistic and distribution effectively. Scrum methodology enables adaptive and change-responsive development, ensures alignment from planning to execution, and accelerates the desired results [11]. This approach also directly involves stakeholders, to accomodate user needs [12].

This information system aims to provide a website-based platform to centralize data processing of scout members and scoutmasters, as well as their activities reporting from its lower levels. The system features data collection of members, activities, and scoutmasters from each Gudep. In addition, the system also provides comprehensive data visualization and informative dashboards for all levels, from Gudep to Kwartir Cabang Level, to support a faster, more accurate and data-driven decision-making process. It will easier to collect data on the number of members and scoutmasters from each Gugus Depan and Kwartir Cabang safely.

II. LITERATURE REVIEW

This section discusses previous research related to website development using the Scrum method and reviews studies on data processing, reporting, and front-end development using Next.js.

A research, entitled "Designing Information System for Warungkiara Branch Council Using SDLC Method" that discusses developing an Android application to facilitate digital scouting data management in the Warungkiara area. Using the SDLC (Waterfall) method and UML-based design, the system proved to be able to improve data management of managing data on members, materials, activities, and the potential of scouts effectively, as well as supporting more effective learning and administration [13].

A research entitled "Website-Based Project Data Processing Information System at PT Positive Management Consulting Jakarta". It explains that information systems facilitates data processing, increases efficiency, and supports faster and more accurate decision-making. The results showed that this system tidy up business processes and access project data easier [14].

A research is entitled "Web-Based Visualization of Student Academic Data of IIB Darmajaya Informatics Engineering Study Program", which discusses the development of an academic data visualization website using Extreme Programming and Bubble Sort, which presents the last three years of data in interactive graphics to facilitate data analysis and understanding [15].

A research entitled "Implementation of a Website-Based Queuing Information System with Scrum Methodology" and discusses the development of a queuing system with a flexible and adaptive Scrum method, through stages from product backlog to sprint review. As a result, the main features were successfully developed as needed, despite challenges in user understanding of the system. [16].

A reasearch entitled "Implementation of Waterfall Method in Company Profile Development on Small Company Web" and discusses the application of the Waterfall method in developing a small company profile website using Next.js and Tailwind CSS. Through the stages of needs analysis, design, development, testing, and maintenance, this project succeeded in creating a responsive, fast, and user-friendly website. The results showed that the use of a systematic approach and modern technology was able to improve the company's visibility and communication, despite the challenges of limited resources and responsive design customization [10].

A research entitled "Frontend Development of the Tekos Service Information System Using the NextJS Framework" discusses the development of a web-based information system using the Single Page Application (SPA) approach and Client-Side Rendering (CSR). Testing was conducted using Chrome browser version 115.0.5790.102 on a Macbook M1 Pro 2023 with network throttling enabled. The results showed that SPA with CSR had a load time under 5 seconds on a normal network (without throttling), but exceeded acceptable limits under slow network conditions. CSR was chosen due to its ability to render dynamic data more responsively compared to Server-Side Rendering (SSR), which requires the entire page to be rendered from the server. The development process considered both functional and non-functional requirements, as well as data complexity, to enhance user experience and system responsiveness [17].

Based on the literature review, the development of the Scout Information System of Kwartir Cabang Kota Mataram adopts the Scrum methodology, which is known for its flexibility and adaptability in software development. Unlike previous studies that focused on data management at Kwartir Ranting level, this research integrates features for reporting and collecting activity data from Gugus Depan level up to Kwartir Cabang level. The system also emphasizes efficiency in real-time data processing and visualization, aligning with studies highlighting the importance of web-based data management and information visualization. Furthermore, the use of modern technologies such as Next.js and TypeScript aims to enhance performance, scalability, and system

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maintainability offering a more robust alternative to conventional approaches that still rely on programming languages like PHP and Java.

III. RESEARCH METHODOLOGY

The development of this system utilizes the Scrum methodology, which includes feature planning, sprint execution, and periodic evaluation of results. Scrum allows teams to work iteratively and adaptively, ensuring each system part is developed prioritized on user needs. Through regular reviews and continuous improvement processes, the quality and performance of the system throughout the development cycle.
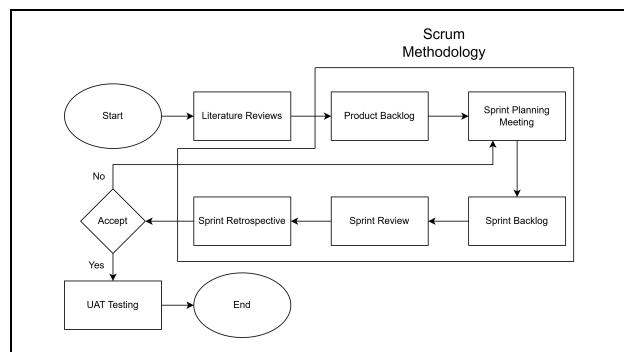

Fig 1. Research Methodology

A. Literature Review

In this step, the authors reviewed the literature regarding the use of the Scrum method, which is considered effective and flexible during development. In addition, studies related to data processing, reporting, and creating a website front-end using modern technology, the Next.js framework and the TypeScript programming language.

B. Product Backlog

In this step, the development team compiled a list of features to be developed in the Scout Information System of Kwartir Cabang Kota Mataram. The compilation was carried out based on the results of an interview with the Secretary of the Branch Office conducted on October 11, 2024. The features identified include account creation from Gudep to Kwarcab levels, data management of members and scoutmasters, activity management, and data visualization through dashboards. Each feature is prioritized and the actors involved.

C. Sprint Planning Meeting

In this step, a meeting was held to determine the objectives, scope of work, and estimated time for each sprint. There were 5 sprints in total, each focused on implementing one main feature from the product backlog. For example, Sprint 1 focuses on the scoutmasters data management feature, Sprint 2 on member data, and so on. Each sprint has an estimated time of 5-7 days depending on complexity. The division of tasks also includes who develops the interface (front-end), performs data integration (API fetching), and CRUD logic.

D. Sprint Backlog

This step contains details of the tasks to be completed in each sprint, which are obtained from the product backlog. In this research, the backlog is organized based on the features selected during sprint planning. Table IV shows the list of sprint backlogs, which includes descriptions of technical work (such as interface creation, data retrieval from APIs, and input validation), system actors involved (such as Gudep or Kwarcab), and their work status. All sprints were successfully completed as planned with a status of "Done".

E. Sprint Review

This step reviewed the results of the sprint that had been carried out by the development team. The focus at this stage was on reviewing the system that had been created by the development team.

F. Sprint Retrospective

This step reviewed of the team's performance during the sprint phase. The main focus was to find solutions to any obstacles encountered during the development process.

G. Testing

This step conducted a system trial by users (**Gudep**, **Kwaran**, and **Kwarcab**) using the User Acceptance Testing (UAT) method to ensure the system met the needs and worked effectively. UAT refers to the dimensions of functionality, reliability, usability, and efficiency [18].

IV. RESULTS AND DISCUSSION

In this research, the development of the Mataram Scout Information System was carried out using the Scrum method by three person, including one of the authors as one of the team members. The list of features was compiled based on the results of interviews with the Secretary of Kwartir Cabang Kota Mataram.

TABLE I.   MATARAM KWARCAB INFORMATION SYSTEM FEATURES

Features	Description	Actor	Priority
Login	Log in to the system using email and password	Kwarcab, Kwaran, Gudep	Medium
Profile	View and edit user information according to their role	Kwarcab, Kwaran, Gudep	Low
Account Creation	Create accounts for users at lower levels	Kwarcab (Kwaran), Kwaran (Gudep)	High
Activities	Manage or view activity data according to its level	Kwarcab, Kwaran, Gudep	High
Member	Manage member data (add, view, edit)	Gudep	High
Scoutmasters	Manage scoutmasters data (add, view, edit)	Gudep	High
Dashboard	View member and scoutmasters data in the form of visualizations	Kwarcab, Kwaran, Gudep	High
NTA Submission and Verification	Create and Verify Member Identification Number submissions	Kwarcab (verify), Gudep (create)	Medium

Table I list the features that have been agreed by the development team and the users. Based on the list, the Scrum Master divided the development tasks among the team members according to their roles and responsibilities. The Front-End Developer responsibles to implement the features displayed in the Product Backlog following predetermined priorities. The Login feature allows users (kwarcab, kwaran, gusdep) to log in with email and password, medium priority. Profile allows users to view and edit information according to role, with low priority. Other features, such as Account Creation, Activities, Members, and Scoutmasters, focus on data management with high priority. Finally, the Dashboard shows member and scoutmasters data in visualizations, also with high priority.
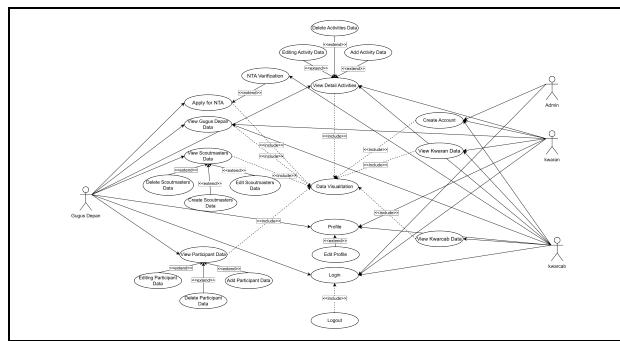

Fig 2. Usecase Diagram Kwarcab Mataram Website

Figure 2 is the use case diagram of the Scout Information System of Kwartir Cabang Kota Mataram, illustrating the interactions among four main actors: **Gusdep**, **Kwaran**, **Kwarcab**, and **Admin**. Gudep has the most comprehensive access, including managing data for scoutmasters, participants, activities, and submitting NTA applications. **Kwaran** and **Kwarcab** have more limited access, mainly focused on viewing and verifying data according to their authority level. The Admin is responsible for managing users and verifying submissions. The diagram also highlights the "include" and "extend" relationships, which represent the dependencies or optional functionalities between actors and system features.
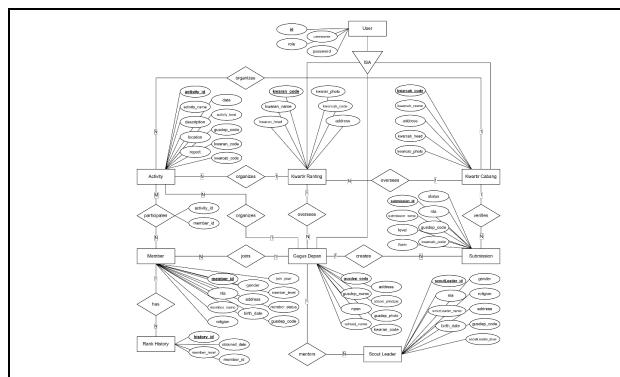

Fig 3. ER Diagram Kwarcab Mataram Website

Figure 3 is the ER Diagram of the Scout Information System of Kwartir Cabang Kota Mataram. The ER diagram models the database structure of the scouting organization information system in a structured way, with main entities such as "User", "Anggota", "Kwartir Ranting", "Kwartir Cabang", and "Gugus Depan" connected through relationships such as "menaungi", "memiliki", and "bergabung". This ER diagram shows the data flow and administrative relationships, including the quartier hierarchy, member's involvement in activities, and scouting levels.
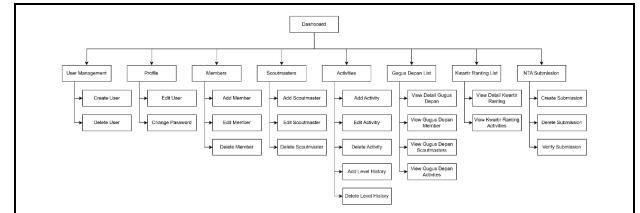

Fig 4. Sitemap of the Scout Information System of Kwartir Cabang Kota Mataram

Figure 4 shows the Scout Information System of Kwartir Cabang Kota Mataram, which starts from the Dashboard that contains features such as Manage User, Profile, Member, Scoutmasters, Activity, **Gudep** List, **Kwaran** List, and NTA Application, each with data management sub-functions. The system involves three actors: Kwarcab, Kwaran, and Gudep, with differentiated feature access according to their roles, as described in Table I.

A. Product Backlog

TABLE II. PRODUCT BACKLOG

Features	Description	Actor	Priority
Account Creation	Create accounts for users at a lower level	Kwarcab (Kwaran), Kwaran (Gudep)	High
Activities	Manage or view activity data according to its level	Kwarcab (lihat), Kwaran, Gudep	High
Member	Manage member data (add, view, edit)	Gudep	High
Scoutmasters	Manage scoutmasters data (add, view, edit)	Gudep	High
Dashboard	View member and scoutmasters data in the form of visualizations	Kwarcab, Kwaran, Gudep	High

At this stage, the Scrum Master divides the features based on the team's role. Table II summarizes six main features of the system along with their descriptions, associated actors, and assigned priorities. High-priority features include account creation, activities, members, scoutmasters, and the dashboard emphasizing data management and decision support. The login feature is given medium priority as it serves a complementary function. Overall, the system's structure reflects the organizational hierarchy with clearly defined roles and focuses on addressing user needs.

B. Sprint Planning Meeting

Sprint includes determine the sprint objectives, select items from the product backlog, and estimate the duration of each sprint as listed in Table III.

TABLE III. SPRINT PLANNING MEETING

Features	Purpose	Task	Estimation
Sprint 1			
Scoutmasters	Completed scoutmasters management for the Scout Unit	- Completed scoutmasters management for the Gugus Depan - Fetching data from the API Endpoint - Create add, edit, and delete logic	5 Days
Sprint 2			
Member	Provide a CRUD feature of Gugus Depan Member Data	- Create a front-end view of the list of Members in a Gugus Depan - Fetching data from the API Endpoint - Create add, edit, and delete logic	5 Days
Sprint 3			
Activities	Provides activity management of all actors	- Create a front-end view of the Activity list for all actors - Fetching data from the API Endpoint - Create add, edit, and delete logic	5 Days
Sprint 4			
Account Creation	Manage accounts for Kwartir Ranting and Kwartir Cabang	- Create a front-end view of account creation for Kwartir Ranting and Kwartir Cabang actors - Fetching data from the API Endpoint - Create add logic, and delete Gusdep and Kwaran accounts	7 Days
Sprint 5			
Dashboard	Display statistics and graphs for all actors	- Create a front-end dashboard data display for all actors - Fetching data from the API Endpoint	5 Days

The sprint planning meeting stage of the development of the Scout Information System of Kwartir Cabang Mataram was carried out by dividing the work into five main sprints as listed in Table III. Sprint 1 focused on completing the scout management features, including create the scoutmasters list view, integrate scoutmasters data with the database, and define the logic of adding, editing, and deleting data, which was targeted to be acomplished in five days. Sprint 2 focused on the features for the member, with similar tasks for gugus depan member data. Sprint 3 focused on managing activities for all actors, from interface design to activity CRUD logic. Sprint 4 focused to createand manage accounts for the Kwaran and Gudep, wich is estimated to be acomplished in seven work days due to the complexity of the authentication and role management. The final sprint, Sprint 5, focused to create an interactive dashboard that presents member and activity statistics through API integration, which isestimated to acomplished in five days. Each sprint was designed to accomplish one key part of the system, with relevant tasks to the front-end developers to build the user interface, perform API integration, and implement interactive logic in the application.

C. Sprint Backlog

This stage work on sprint planning by determining the prioritized tasks from the product backlog, to ensure the system was developed gradual, measurable, and fit with user requirement.

TABLE IV. SPRINT BACKLOG LIST

Sprint	Features	Description	Actor	Status
Sprint 1	Scoutmasters	Front-End Creation and Data Fetching Feature CRUD (add, view, and edit) scoutmasters data	Kwarcab (view), Kwaran (view), and Gudep	Done
Sprint 2	Member	Creation of Front-End and Data Fetching Features, CRUD (add, view, and edit) member data	Kwarcab (view), Kwaran (view), and Gudep	Done
Sprint 3	Activites	Front-End Creation and Data Fetching Features, CRUD (add, view, and edit) activities data	Kwarcab, Kwaran, and Gudep	Done
Sprint 4	Account Creation	Create accounts for lower levels	Kwarcab and Kwaran	Done
Sprint 5	Dashboard	Creating Front End and Fetching Data Visualization of data from participants and the scoutmasters	Kwarcab, Kwaran, and Gudep	Done

The Table IV shows the list of sprint backlogs that was carried out during the development process. Based on this table, five sprints were conducted, each focusing on delivering specific features incrementally. In addition, the table also contains an explanation of each feature along with the corresponding actors who will use them, as listed in the actor column of Table IV. This structure helps ensure

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that each sprint aligns with user roles and system requirements.

D. Sprint Result

This stage includes the results of all sprints, with pictures and explanations of each sprint. Development was done using Next.js and TypeScript, which were chosen for their flexibility and efficiency in building web applications. Next.js supports server-side rendering, resulting in fast, responsive displays and improving the overall user experience [10].
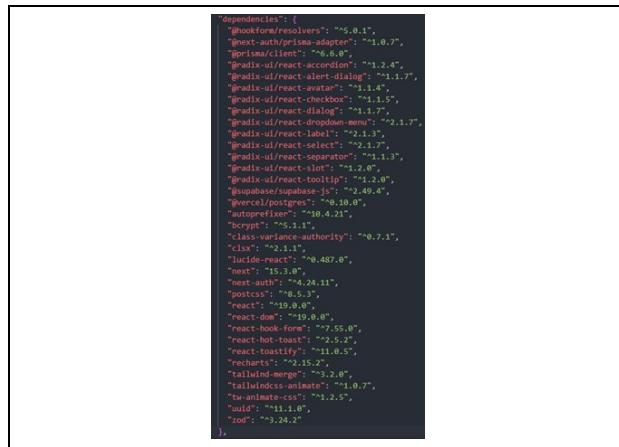

Fig 5. Use of Dependencies

Figure 5 shows the list of dependencies used during the system development. These dependencies include various libraries and tools with different versions, which were used to support various technical aspects of the system. Some of them are Next.js (version 15.9.0) as the main framework, Zod (version 3.24.2) for data schema validation, and Tailwind Merge (version 9.2.0) and Autoprefixer (version 0.4.21) for styling needs. In addition, there are also dependencies such as Crypt (version 9.1.1) used for security, and @vercel/postgres (version 0.10.0) to support connectivity with PostgreSQL databases.

The list of dependencies reflects the system's development complexity, covering interface, validation, security, and database needs. Next.js serves as the main front-end framework, supporting dynamic pages with SSR and SSG. Zod ensures data validation, while Tailwind Merge and Autoprefixer enhance responsive design and cross-browser support. Crypt secures sensitive data through encryption, and @vercel/postgres enables seamless PostgreSQL integration for direct UI-based data manipulation.

D.1. Sprint 1

Fig 6. Gudep's Scoutmasters Page

Figure 6 shows the Gugus Depan scoutmasters list page accessed by the **Gudep** actor. Scoutmaster data is displayed in a table containing fields such as name, NTA, date of birth, religion, level, and address to enhance readability. The page provides features to add, edit, or delete scoutmaster records as needed. It is integrated with the /pembina endpoint to allow real-time retrieval and management of data directly from the server. Additionally, it uses POST /pembina to create new scoutmaster entries, and PATCH or DELETE /pembina/:id to update or remove records ensuring that these operations are filtered based on the actor's role for appropriate access control.

D.2. Sprint 2

Fig 7. Gudep's Member Page

Figure 7 shows the member list page accessed by the **Gudep**. Member data is presented in a table containing key information such as name, NTA, level, and active status. The page includes features to add members, search, and filter data. Users can also view a member's level or participation history via the action button and history option. To support these functions, the page integrates with the /anggota endpoint to dynamically retrieve and synchronize member data based on the logged-in actor's role. It also uses POST /anggota to create new members and PATCH or DELETE /anggota/:id to update or remove member records ensuring that all operations are securely filtered according to role-based access control.

D.3. Sprint 3
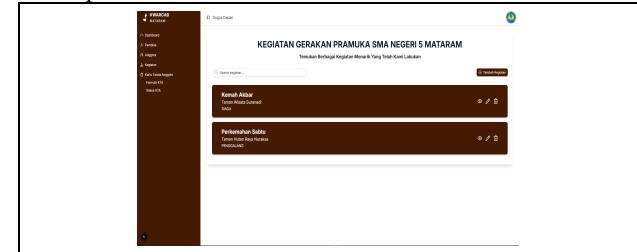
Fig 8. Gugus Depan's Activities Page
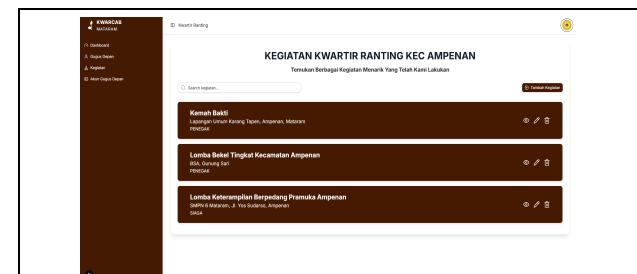
Fig 9. Kwaran's Activities Page

Fig 10. Kwarcab's Activities Page

Figures 8 to 10 show the activity pages for all actors (**Kwarcab**, **Kwaran**, and **Gudep**) in the Scout Information System of Kwartir Cabang Kota Mataram. Activities are displayed in card format with essential details like name, location, and level, along with search and intuitive action icons for adding, editing, or deleting data. Users can view full activity details via the view icon. The page integrates with the /kegiatan endpoint to retrieve role-filtered data, and uses POST /kegiatan to add new entries, as well as PATCH and DELETE /kegiatan/:id to update or remove activities all access controlled based on user roles.

D.4. Sprint 4
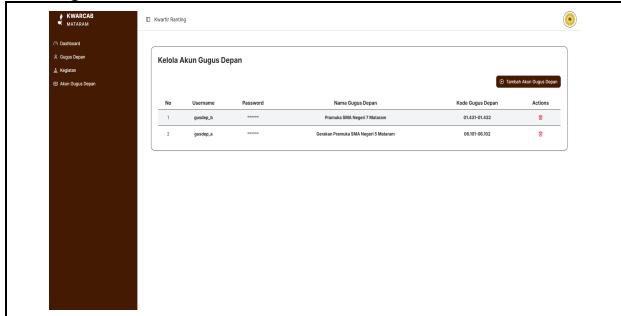

Fig 11. Gusdep's Account Creation Page
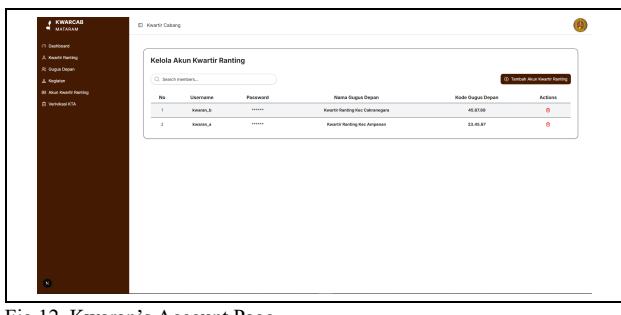
Fig 12. Kwaran's Account Page

Figures 11 and 12 show the account management pages in the Scout Information System of Kwartir Cabang Mataram. Figure 11 displays the **Gudep** account management page, accessible only by **Kwaran** actors, allowing them to add new Scout Unit accounts via the "Tambah Akun Gugus Depan" button and manage accounts with details like username, password, unit name, and unit code in a tabular format. Figure 12 presents the Kwartir Ranting account management page, accessible only by **Kwarcab** actors, with similar functions. Both

pages support efficient user management with search and account deletion features. They integrate with the API endpoints GET /user/account to view accounts, POST /user/account to add new ones, and DELETE /user/account/:id to delete accounts by ID. All API usage is filtered based on actor roles, ensuring only authorized access and actions.

D.5. Sprint 5
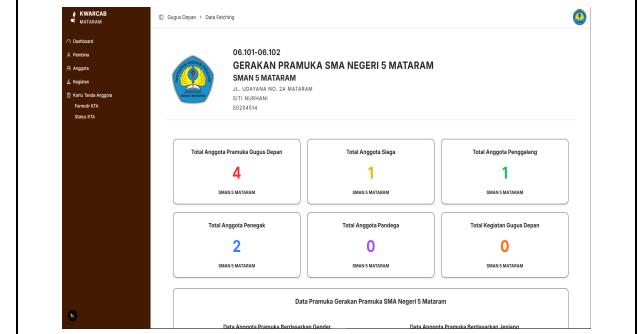
Fig 13. Gusdep's Dashboard Page
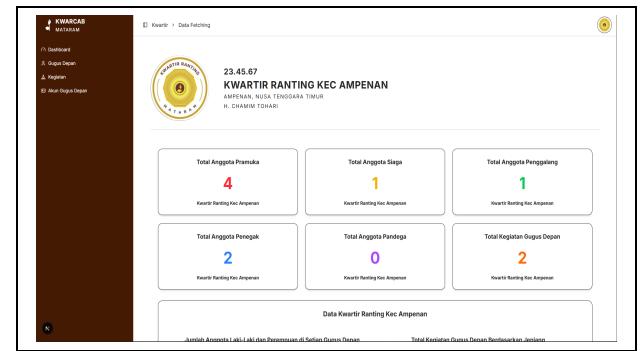
Fig 14. Kwaran's Dashboard Page
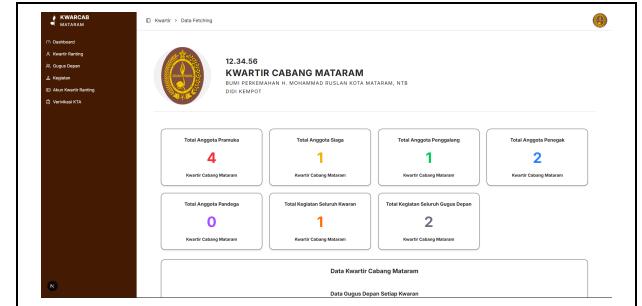
Fig 15. Kwarcab's Dashboard Page

Figures 13 to 15 show the dashboard views for the **Kwarcab**, **Kwaran**, and **Gudep** actors in the Scout Information System of Kwartir Cabang Kota Mataram. Each dashboard presents role-specific information such as number of members, activities, and administrative data through concise cards and corresponding charts to support efficient performance monitoring and secure access by role. Integrated into a centralized system, the dashboards enable real-time monitoring and data-driven decision making. The system uses GET method endpoints like /dashboard/anggotaByGender, /anggotaByJenjang, /anggotaByYear, /gudepByKwaran, /jenjangPerKwaran, /kegiatanPerJenjang, /totalAnggota, and /totalKegiatan, filtered by actor roles to ensure appropriate data access.

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E. Sprint Review

Based on the explanation of previous five sprints, all targeted features have been completed. In Sprint 1, the development focused on creating a scoutmasters page and integrating it with the API Endpoint. Sprint 2 successfully developed the member page and displayed the data stored in the database. During this sprint,we made adjustments to the member list feature by adding historical information, such as advancement and participation in the activities, as responses the growing functional requirements. Sprint 3 successfully displayed the list of activities according to the user actor. In Sprint 4, Gudep's account list page was developed for the Kwarcab actor, and Kwaran's account list for the Kwarcab actor. Although there was a problem when adding a new account, the problem was successfully resolved through handling input errors. Sprint 5 was ended with the development of dashboard features for the three actors, namely **Gudep**, **Kwaran**, and **Kwarcab**. All developed features, especially on the front-end and data fetching side, directly support the visualization of scout administrative data management that was previously processed manually. Interactive dashboards and tables make the monitoring of data on members, scoutmasters, and activities in real-time easier, in line with the motivation to develop the Mataram City Scout Information System.

F. Sprint Retrospective

At this stage, the author conducted a performance evaluation together with the team throughout the sprint process. During the development, a total of five sprints were carried out, each with a focus and outcome aligned with the stages of system development. In Sprint 1, the author successfully developed the scoutmasters data page integrated with the database without issues, and the partner provided feedback that the feature met their needs. During Sprint 1, the author encountered difficulties integrating the API from the Back-End Developer, which were resolved by reading the Next.js documentation and watching tutorial videos. Sprint 2 focused on completing the member page, with input from the partner to display a member's rank history and activity participation. The author faced challenges in displaying the latest rank history, which were resolved by studying the Next.js documentation and implementing a bubble sort algorithm. Sprint 3 went smoothly with the development of the activity list in a card format, and the partner agreed with the functionality of the feature. Sprint 4 encountered issues during the account creation process, but they were resolved through debugging, and the partner suggested adding notifications for duplicate usernames and a minimum password requirement. In Sprint 5, the dashboard feature for all actors was successfully completed despite challenges in API integration and user interface design, with suggestions from the partner to include annual data and charts to make it easier for non-technical users to understand. Partner feedback in each sprint became the foundation for continuous improvement in the system's development for subsequent sprints.

G. UAT (User Acceptance Testing)

The evaluation of the Scout Information System of Kwartir Cabang Mataram was carried out using the User Acceptance Testing (UAT) method with the Open Beta Testing approach. This testing focused on the user environment and involves an in-depth evaluation of the system [19]. The assessment was carried out using a Likert Scale as an ordinal measurement tool to rank respondent's responses, in five options: very good, good, fairly good, less good, and poor as islisted in Table IV [18].

TABLE V. LIKERT SCALE

Criteria	Weight	Percentage
Poor	1	20.00% - 36.00%
Less Good	2	36.01% - 52.00%
Fairly Good	3	52.01% - 68.00%
Good	4	68.01% - 84.00%
Very Good	5	84.01% - 100%

TABLE VI. USER QUESTIONNAIRE

Variables	No.	Question	Q
Functionality (Scout Unit)	1	Is the data display process on the dashboard running well?	Q1
	2	Does the system display data on members, Scoutmasters, and activities according to the input?	Q2
	3	Do the search and filter functions in the member table work accurately?	Q3
Functionality (Kwartir Ranting)	1	Does the addition of Scout Unit accounts work well?	Q1
	2	Does processing and accessing activity data work well?	Q2
	3	Does the process of displaying data on the dashboard work well?	Q3
Functionality (Kwartir Cabang)	1	Does the addition of the Kwartir Ranting account work well?	Q1
	2	Is processing and accessing activity data going well?	Q2
	3	Is the process of displaying data on the dashboard running well?	Q3
Realibility	4	Does the system run stably without errors when accessed for a long time?	Q4
	5	Have you ever experienced interruptions when accessing certain pages?	Q5
	6	Is the system able to save data inputted by users?	Q6
Usability	7	Is the system display easy to understand by users?	Q7
	8	Do you find it helpful to have data visualization (graphs and charts) on the dashboard?	Q8
	9	Are users able to navigate web pages easily?	Q9
Efficiency	10	Is the data processing time (such as adding members or viewing reports) fast?	Q10
	11	Do you feel the system helps speed up administrative work compared to manual methods?	Q11
	12	Has the overall use of this system improved your work efficiency?	Q12

Table V is designed to evaluate the performance of the Scout Information System of Kwartir Cabang Mataram based on four main aspects: Functionality, Reliability,

Usability, and Efficiency. The Functionality aspect is distinguished on three user roles: **Gudep**, **Kwaran**, and **Kwarcab**. Each user responded to three questions (Q1-Q3) that measured the smoothness of the system's main functions according to their roles. Reliability (Q4-Q6) assessed the stability of the system under long-term usage conditions and when it handle the large data loads. Usability (Q7-Q9) measured the ease of use, clarity of display, and effectiveness of data visualization. Meanwhile, Efficiency (Q10-Q12) evaluated the processing speed as well as its impact on user work efficiency. This instrument was used to evaluate the strengths and weaknesses of the system as a reference for future improvement and development. Table VI below, presents the results of questionnaire evaluation that had been mapped based on the weight of respondent's answers to each questioned aspect. Based on the questionnaires distribution, we obtained a total of 23 respondents for all actors, which were divided into 9 for **Gudep**, 6 for **Kwaran**, and 8 for **Kwarcab**.

TABLE VII.   USER QUESTIONNAIRE RESULT

Q	SD	D	MA	A	SA	Weight
Q1	0	0	4	11	8	96
Q2	0	0	3	12	8	97
Q3	0	0	4	11	8	96
Q4	0	0	6	11	6	92
Q5	0	0	6	10	6	88
Q6	0	0	5	12	6	93
Q7	0	0	5	11	7	94
Q8	0	0	6	10	7	93
Q9	0	0	7	10	6	91
Q10	0	0	4	12	7	95
Q11	0	0	4	12	7	95
Q12	0	0	2	13	8	98

G.1. UAT Calculation

We calculated the average percentage value of each questionnaire variable to determine the feasibility of the Scout Information System of Kwartir Cabang Mataram follow Formula (1).

$$Percentage = \frac{\left(\frac{Rating\ Weight}{Number\ of\ Respondents}\right)}{Maximum\ Weight} \times 100\% \qquad (1)$$

The calculation results are presented in Table VIII and IX to show the level of system feasibility based on the assessment of each aspect.

TABLE VIII.   USER PRESENTATION CALCULATION RESULT

Question	Percentage
Q1	83.48%
Q2	84.35%
Q3	83.48%
Mean Functionality	83.77%
Q4	80.00%
Q5	76.52%
Q6	80.87%
Mean Realibility	79.13%
Q7	81.74%
Q8	80.87%
Q9	79.13%
Mean Usability	80.58%
Q10	82.61%
Q11	82.61%
Q12	85.22%
Mean Efficiency	83.48%
Total Mean	81.74%

TABLE IX.   UAT CALCULATION RESULT

Variables	Value	Description
Functionality	83.77%	Good
Realibility	79.13%	Good
Usability	80.58%	Good
Efficency	83.48%	Good
UAT Test Result	81.74%	Good

V. CONCLUSION AND SUGGESTIONS

The experimental results concluded that the Scout Information System of Kwartir Cabang Mataram was successfully developed effectively and adaptively using the Scrum methodology. The Scrum method was applied through five structured sprints, each developing key features like scoutmasters, members, activities, accounts, and dashboards. These iterations enabled adaptive responses to user needs, resolution of technical issues, and incorporation of partner feedback, as detailed in the Results and Discussion. All main features were completed, including data management of members, scoutmasters, activities, account creation, and administrative data visualization through interactive dashboards. The front-end implementation covered user interfaces for managing members, scoutmasters, and activities, along with account creation and interactive dashboards. Built using Next.js and Tailwind CSS, the UI was responsive and integrated with REST APIs to display dynamic data through tables, forms, and charts. Data visualization presented in the form of interactive graphs and tables has proven to facilitate real-time monitoring of the scout members, scoutmasters, and activities and also support the main objective of digitalized and centralized Scout information system. Evaluation through User Acceptance Testing (UAT) involving 23 respondents from various levels resulted in an average system feasibility of 81.74% in the "Good" category, with details of Functionality of 83.77%, Reliability of 79.13%, Usability of 80.58%, and Efficiency of 83.48%. This achievement shows that the Scrum method is effective in building information systems for social organizations such as Scouts, because it can increase the effectiveness, reliability, ease of use, and efficiency of administration in the Kwartir Ranting environment.

For future development, it is recommended that the system improve the interface to make it more attractive and dynamic, as well as add administration book features, work program modules per semester, and automatic notifications as reminders for data entry or periodic reporting. In addition, integration with mobile platforms is also useful for Scouts who have limited access to a computer device. Further research should expand the scope of the system to the Regional or even to national level, to create an integrated, efficient, and real-time reporting and data collection environment.

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