ARCHITECTING A WEB-BASED ONLINE PSYCHOLOGICAL TEST PROCTORING REPORT APPLICATION

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Abstrak - The proctoring report process at PT Hara Anargya Indonesia is still conducted manually via WhatsApp, causing inefficiencies in scheduling, reporting, and coordination. This study aims to design and develop a web-based application to improve the efficiency and accuracy of online psychological test proctoring. Using the Rapid Application Development (RAD) method, the system was built with NestJS, Vue.js 3, and MySQL for modularity and maintainability. Data collection involved field observations, internship experience, and literature reviews. In this system, proctors play a key role by managing their schedules, accepting or declining assignments, as well as createing and submitting supervision reports digitally. The Assessment Division schedules tasks and monitors progress, while the Research Division reviews and validates submitted reports. Black box testing confirmed the system's core features run effectively. The results show the application's readiness for real-world use and its potential to streamline the reporting process while improving data consistency and traceability.

***Kata Kunci*: Online Psychological Test, Proctoring System, Rapid Application Development, Reporting System, Web-Based Application.**

I. INTRODUCTION

In the last two decades, the development of digital technology has transformed the way companies operate across all industrial sectors [1]. Information from one division is interconnected with another, meaning that the information provided by one division significantly influences the activities of others. With the utilization of technology, companies can achieve greater results with the same or even fewer inputs, leading to increased productivity [2]. Fast, accurate, and integrated information facilitates smoother processes within a company's related divisions, ensuring operational efficiency and competitive advantage.

As businesses increasingly rely on digital solutions to streamline their operations, the need for web-based applications has grown significantly. According to Ovan et al., a web-based application is an application that can be accessed using a web browser through an internet network, offering the advantage of being easily accessible to users without requiring installation [3]. These applications offer several advantages, including real-time data access, process automation, and enhanced collaboration among teams. By automating routine tasks such as data entry, report generation, and document management, companies can reduce manual workload and minimize human errors, leading to improved operational efficiency. Web-based applications, which rely on cloud computing technologies, enable employees to access necessary information from anywhere with an internet connection, ensuring flexibility and responsiveness in business operations. Cloud computing enhances these applications by providing scalability and efficient resource management, allowing businesses to streamline processes and adapt to changing demands more effectively [4].

PT Hara Anargya Indonesia is a leading company providing comprehensive human resource management (HRM) consulting services based on research and the latest technology. As a strategic partner in online assessments and HR development, the company offers end-to-end solutions designed to meet organizational needs. The services provided include training, workshops, employee recruitment & selection, methodology development, implementation of assessment tools, and various other HR-related services.

In addition to providing consulting services, PT Hara Anargya Indonesia also provides various application-based psychological assessment tools to support the employee assessment process. During the assessment session, the company implements an online proctoring system through a special application to ensure the integrity of the assessment in accordance with the standards of the Association of Test Publishers and the National College Testing Association. Each proctoring session is assigned by the Assessment Division to a Proctor who will monitor the test remotely. After the session ends, the Proctor compiles a report containing the number of participants, indications of violations, obstacles, etc., and submits it to the Research Division for review.

Various studies have developed web-based reporting systems to improve the efficiency of recording and reporting in various fields. For example, one study developed a web-based Cooperation Report Management Information System, aiming to facilitate the management and creation of cooperation reports. This system assists the cooperation department in managing cooperation data and reports, and supports the monitoring and evaluation process automatically, which in turn facilitates the

leadership in making decisions [5]. Other research designed a web-based reporting system that makes it easy to make reports quickly and easily, especially in writing budget reports and receipts at BPS Sukabumi Regency [6]. This system uses the Prototype method, with Codeigniter and PHP as the framework and MySQL for the database, which allows easy access via the internet network. A similar solution also exists in the development of a web-based reporting application to facilitate employee performance reporting at the North Sumatra Communication and Informatics Office, which previously used Google Form. The system developed uses PHP and MySQL as a database, with the aim of increasing effectiveness and efficiency in inputting performance reports, as well as making the reporting process more systemized and digitized [7].

However, no research has specifically developed a reporting application for online test proctoring reports. Although the proctoring workflow at PT Hara Anargya Indonesia is already running, important processes such as scheduling, reporting, and reviewing reports are still done manually via WhatsApp. The Assessment Division schedules proctors through chat, which causes difficulties in schedule management, format inconsistency, and no clear tracking of report status. Proctors also struggled to access assignment information quickly, while reporting via chat slowed down the process and made archiving difficult. In addition, the Research Division had difficulty reviewing reports tucked away in chat, making it difficult to track and manage previous report documents. These issues point to the need for a centralized system that supports efficient and documented scheduling, reporting, and reviewing of reports.

This research aims to design and implement a web-based application to support the reporting process of online psychological test proctoring at PT Hara Anargya Indonesia. The application is designed to allow the Assessment Division to perform structured scheduling, Proctors can fill out reports digitally after the session is completed, and the Research Division can review reports through a centralized interface. With this approach, the system is expected to improve operational efficiency, ensure a consistent format, and simplify the tracking and archiving of the entire proctoring reporting process.

The identification of this issue and the clear articulation of research objectives are crucial in ensuring that the developed solution truly addresses the organization's operational gaps and contributes to more effective human resource practices.

II. RESEARCH METHODS

This study employs a qualitative approach to data collection and adopts a system development model based on the Rapid Application Development (RAD) method to design the web-based online psychological test proctoring report application. Data is gathered through direct observation during previous internship activities, the researcher's practical involvement as a proctor, and literature review to obtain a comprehensive understanding of the current processes and challenges at PT Hara Anargya Indonesia. Additionally, the researcher's hands-on experience provided contextual insights that supported the formulation of system requirements, even in the absence of formal interviews with stakeholders.

The RAD method was chosen due to its emphasis on iterative prototyping and user feedback, which facilitates rapid development from planning to implementation [8]. In addition, RAD supports the development of information systems that prioritize speed, accuracy, and cost-efficiency, making it a practical choice for organizations aiming for rapid yet effective software delivery [9]. The phases of the RAD methodology applied in this study are illustrated in Figure 1.

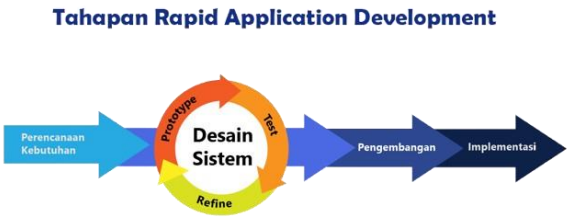

Figure 1. Rapid Application Development Method Diagram

As illustrated in Figure 1, this method consists of four main phases: requirement planning, system design, development, and implementation. During the planning phase, user needs are identified and translated into system functionalities. This stage is critical to avoid miscommunication between developers and users, as it serves as the foundation for understanding what features are required and how the system should function [10]. In the system design phase, the application is structured by aligning the system's features with the research goals and addressing the identified issues during the planning process [11]. The development phase focuses on building the system based on the previously agreed-upon design. During this phase, the application is coded to transform the design into a functional, user-friendly system, and the database structure is also developed [12]. In the implementation phase, the developed system is tested and refined based on user feedback to ensure it meets the required functionalities and is free from errors [13].

In this context, observation is an integral part of the research process that involves analyzing specific situations and conditions using distinct characteristics and specialized techniques [14]. At literature study stage, the activities carried out include data collection involving analysis and review of books, scientific journals, the internet, notes and reports that are relevant to the problem being investigated [15]

III. RESULTS AND DISCUSSION

A. Requirement Analysis

In developing the web-based proctoring report application, a thorough requirement analysis was conducted to identify the essential features and system constraints. This process aimed to ensure that the system meets the needs of its users, including proctors, the Assessment Division, the Research Division, and the

Superadmin. The identified requirements are categorized into functional and non-functional requirements, as outlined in Table 1 and Table 2.

Table 1. Funtional Requirements

Requirement	Description
User Authentication	The system must allow users (proctors, assessment division, research division) to log in securely.
View Event List	The system must provide a list of upcoming test events as a reference for assigning proctoring schedules.
Proctoring Schedule Management	The system should enable the Assessment Division to create, edit, and assign proctoring schedules.
Accept/Decline Schedule	Proctors must be able to accept or decline assigned schedules with a written reason.
Proctoring Report Entry	Proctors must be able to fill out reports during the test session.
Report Submission & Review	Proctors submit reports, and the Research Division must be able to review and confirm them.
Report Search & Filtering	Users should be able to search, filter, and sort past reports based on various criteria.
Role-Based Access Control	Different user roles should have appropriate access rights to system functionalities.
User Management	Superadmins must be able to manage all user accounts, including assessment and research divisions.
Proctor Management	The Assessment Division should be able to add, edit, or remove proctor accounts.
Violation Data Management	The Assessment Division must be able to define and manage categories of test violations.

The functional requirements listed in Table 1 define the core capabilities of the system, including user authentication, schedule management, real-time proctoring report entry, and multi-role access control. These features ensure that each user, from proctors to administrative divisions, can perform their tasks efficiently—such as accepting or declining schedules with reasons, managing user accounts, handling report workflows, and configuring violation categories. However, beyond these functional aspects, the system must also meet several non-functional requirements to ensure reliability, usability, and performance. These non-functional requirements are presented in Table 2.

Table 2. Non-Functional Requirements

Requirement	Description
System Availability	The system must be accessible 24/7 to accommodate various test schedules.
Scalability	The system should handle an increasing number of users and test events without performance degradation.
Security	The system must implement role-based access control (RBAC), data encryption, and secure authentication.
Data Integrity	All records must be stored securely to prevent unauthorized modifications or deletions.
Usability	The system should have an intuitive interface to ensure ease of use for proctors, assessment, and research divisions.
Compatibility	The system must be compatible with major web browsers (Chrome, Firefox, Edge) and mobile devices.
Compliance	The system should adhere to data protection regulations applicable to the organization.

B. Design

Figure 2 illustrates the interactions between various stakeholders and the system, highlighting key functionalities such as scheduling proctoring sessions, submitting reports, and reviewing them. This use case diagram establishes a clear overview of the roles played by proctors, the Assessment Division, and the Research Division within the web-based proctoring report application, serving as a foundational reference for understanding the system's overall workflow.

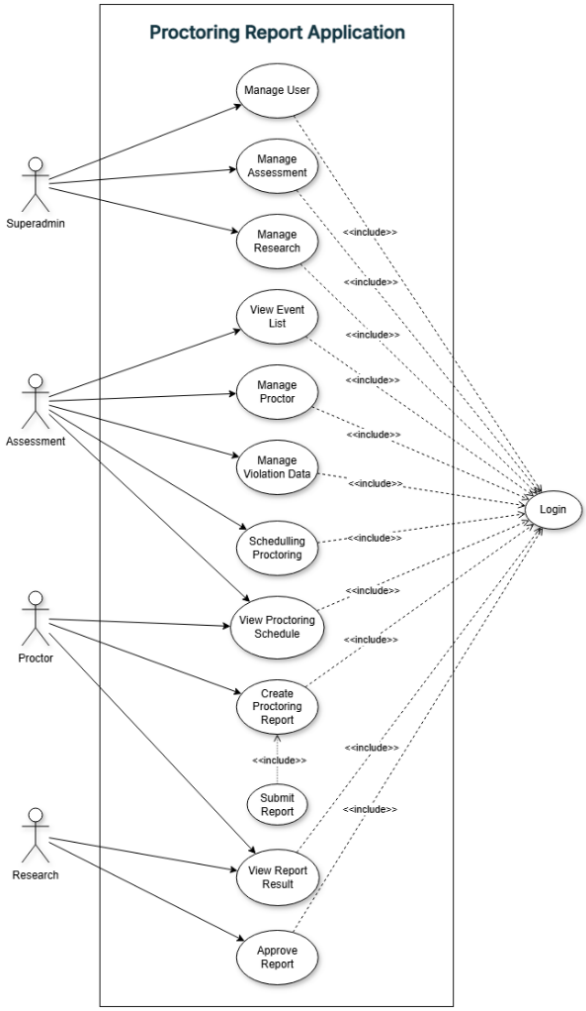

Figure 2. Use Case Diagram

Figure 3 presents the unified activity diagram illustrating the complete end-to-end workflow of the online psychological test proctoring system. It begins with the Assessment Division viewing the list of upcoming events and assigning proctoring schedules to available proctors. Proctors can then accept or decline the assigned schedules with an accompanying reason. Once a session starts, proctors are responsible for submitting a draft report during the test. The workflow continues with the Research Division reviewing the submitted reports and confirming them once the contents are deemed valid and complete. This consolidated diagram provides a comprehensive view of how each user role interacts within the system, emphasizing the collaborative flow of information and responsibility from scheduling to final report confirmation.

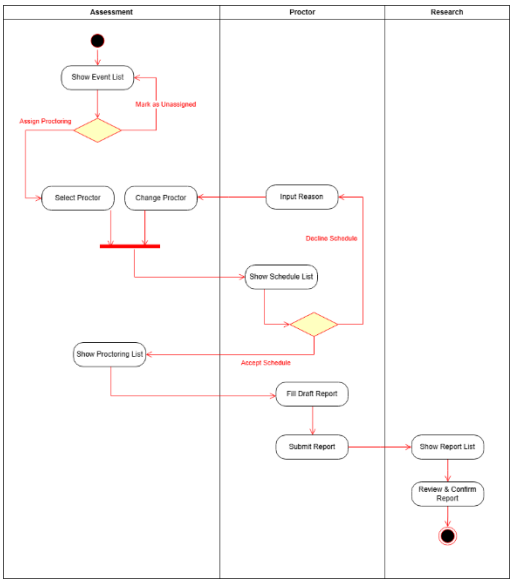

Figure 3. Acitivity Diagram

Figure 4 shows the Entity Relationship Diagram (ERD), which depicts the underlying data structure of the application. It identifies and illustrates the relationships between key entities such as test events, users, proctoring reports, and system logs. This comprehensive view of the database design is crucial for ensuring data integrity and facilitating efficient information retrieval across the system.

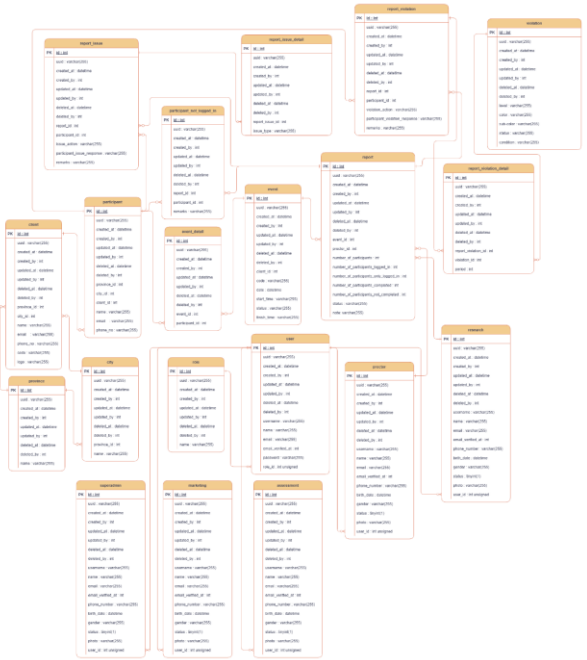

Figure 4. Entity Relational Diagram

C. Implementation

This application was developed using NestJS for the backend and Vue.js 3 with TypeScript for the frontend, ensuring modularity and responsiveness. MySQL was used as the relational database, managed through MikroORM for efficient and type-safe data handling. For styling, Tailwind CSS was chosen to enable rapid UI development with a clean and consistent design.

Figure 5 illustrates the event list interface, which displays all scheduled psychological test events along with relevant details such as test date, time, and venue. This page acts as a reference for assigning proctors and monitoring timelines, supporting efficient test coordination.

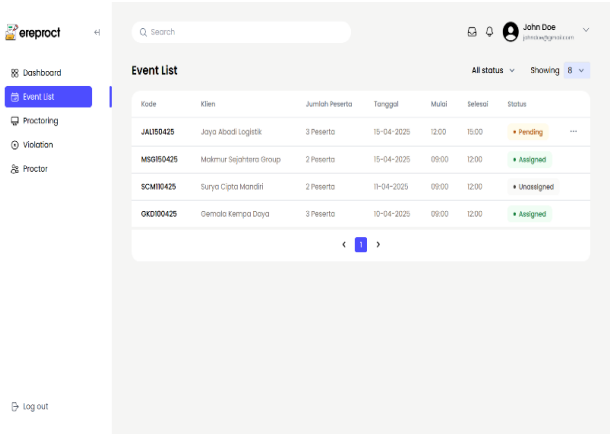

Figure 5. View Event List Page

Figure 6 presents the form used by the Assessment Division to assign proctors to specific events. The interface facilitates inputting event details and selecting proctors, ensuring clarity and traceability in assignment processes.

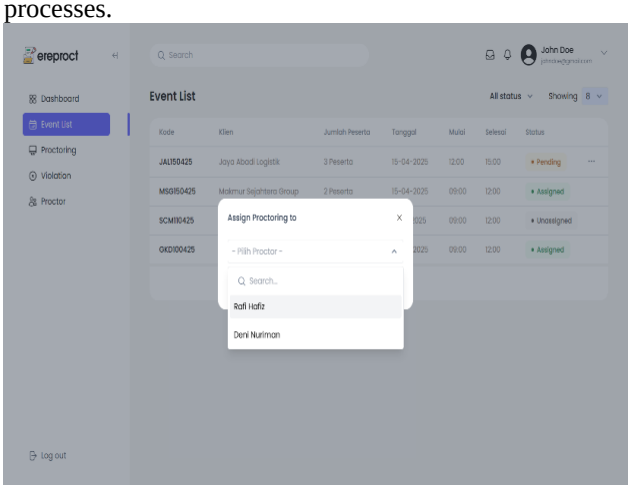

Figure 6. Assign Proctoring Schedule Form

Figure 7 displays the interface that allows proctors to view their assigned schedules and respond with either acceptance or rejection. If rejecting, they must provide a reason. This feature enhances communication while preserving schedule integrity.

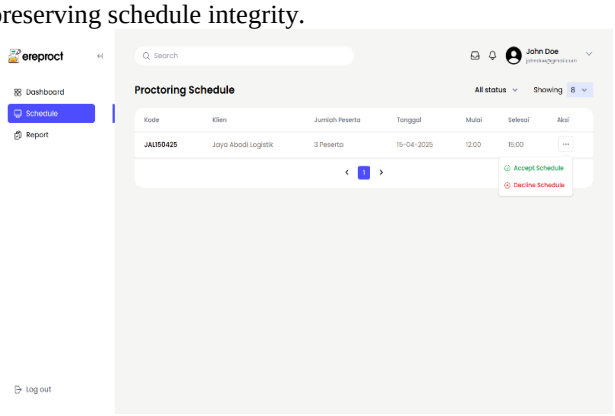

Figure 7. Accept/Decline Schedule by Proctor

Figure 8 shows the report list page, where all proctoring reports are accessible. Users can filter, sort, and search based on attributes such as event code and status, simplifying data access and retrieval.

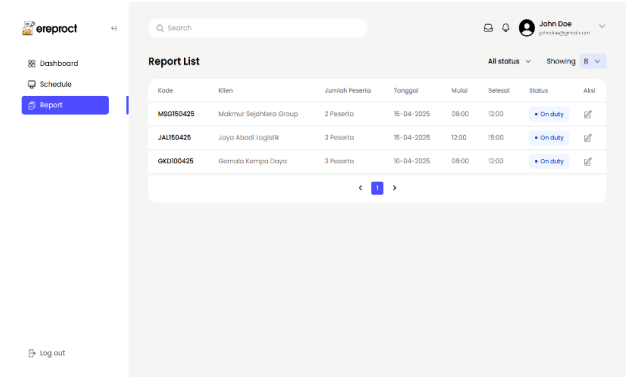

Figure 8. Report List Page

Figure 9 presents the draft report form used by the proctor during or after the test session. It allows for incremental editing, enabling real-time documentation of observations and maintaining data accuracy throughout the session.

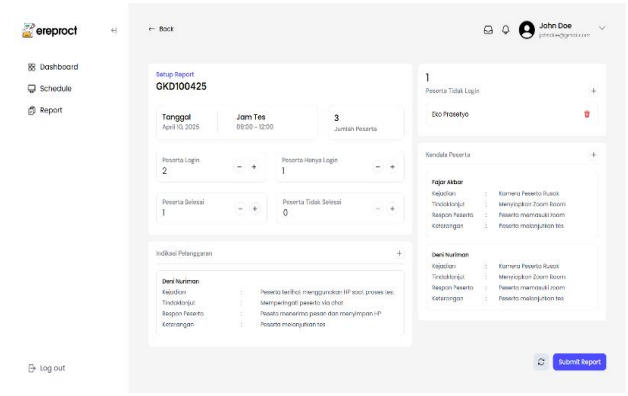

Figure 9. Draft Report Page

Figure 10 shows the report review page used by the Research Division. Reviewers analyze the content of submitted reports and confirm them once the content meets the necessary standards, finalizing the reporting process.

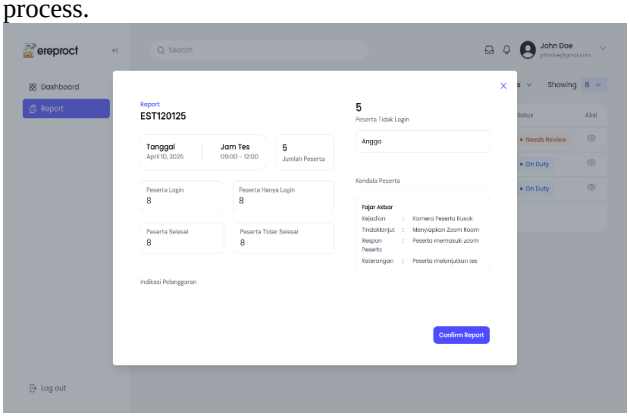

Figure 10. Report Review and Confirmation Page

To ensure that each feature of the application functions as intended, black box testing was conducted. This testing method focuses on verifying the system's outputs based on various input scenarios without considering the internal code structure. The objective was to validate the correctness, reliability, and user flow of critical functionalities, including login, schedule management, report handling, and role-based access. The results of this testing are summarized in Table 3.

Table 3. Black Box Testing Results

No	Feature	Test Scenario	Expected Result	Status
1	User Authentication	User enters valid email and password	User is redirected to their dashboard	Passed
2	User Authentication	User enters invalid credentials	Error message is shown	Passed
3	View Event List	User navigates to the event list page	List of scheduled events is displayed	Passed
4	Accept/Decline Schedule	Proctor accepts a schedule	Status is updated, and confirmation message is shown	Passed
5	Accept/Decline Schedule	Proctor declines a schedule with reason	Schedule is marked declined and reason is saved	Passed
6	Proctoring Schedule Management	Assessment Division assigns a schedule to a proctor	Schedule appears on the proctor's dashboard	Passed
7	Proctoring Report Entry	Proctor writes and saves a draft during the session	Draft is saved and can be edited later	Passed
8	Report Submission	Proctor submits a completed report	Report status changes to "REVIEW"	Passed
9	Report Review and Confirmation	Research Division reviews and confirms the report	Report status changes to "COMPLETED"	Passed
10	Report List & Filtering	User filters reports by event code	Reports matching the event code are displayed	Passed
11	User Management	Superadmin creates, edits, deletes users or changes password/status	User data is updated and managed properly	Passed
12	Assessment Management	Superadmin performs CRUD operations on assessment division data	Assessment data is created, updated, or removed correctly	Passed
13	Research Management	Superadmin performs CRUD operations on research division data	Research data is created, updated, or removed correctly	Passed
14	Proctor Management	Assessment Division manages proctor profiles and status/password	Proctor data is updated or deleted as intended	Passed

15	Violation Management	Assessment Division performs CRUD operations on violation data	Violation records are created, edited, or removed correctly	Passed

IV. CONCLUSION

Based on the design and implementation processes carried out in this research, it can be concluded that the development of the web-based online psychological test proctoring report application using the Rapid Application Development method successfully met the functional requirements of the system. This application allows proctors to view their schedules, accept or decline assignments, as well as create and submit monitoring reports. The Assessment Division is responsible for creating proctoring schedules based on existing event timelines and overseeing the assigned personnel, while the Research Division reviews and confirms the submitted reports to ensure they meet internal standards and maintain the quality of documentation. By integrating modern technologies such as NestJS, Vue.js 3, and MikroORM with a MySQL database, the system ensures modularity, maintainability, and responsive user experience. The conducted black box testing confirmed the system's reliability in handling key functionalities, indicating its readiness for deployment and use in real-world scenarios at PT Hara Anargya Indonesia.

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