Implementation of Push Notification in the Final Project Title Submission Information System Using Websockets

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Abstract

The Sekolah Tinggi Informatika dan Komputer Indonesia (STIKI) Malang is a private higher education institution located in the city of Malang, with a focus on computer science education. To complete their academic programs at STIKI Malang, students must successfully complete a set of courses and undertake a research project as their final assignment. At undergraduate level, the final assignment at STIKI Malang spans from the 7th semester (Pre-Final Project / Pre-FP) to the 8th semester (Final Project / FP), during which students propose a research topic in the Pre-FP and present their research findings in the FP. Presently, the process of submitting FP research proposals at STIKI Malang involves several stages. It begins with downloading a document for data input, followed by submitting this document to prospective faculty advisors. These advisors then make decisions regarding whether to accept or reject the proposals. Given the high volume of proposal submissions by students over a short period, prospective faculty advisors face challenges in responding to and managing these submissions effectively. The objective of developing this Information System for Submitting Final Project Titles Using Websockets is to assist and streamline the processes for both faculty advisors and students in managing, responding to, and monitoring the submission of final project research topics throughout the submission period. Testing was carried out using the Black Box Testing method by inputting various data to verify whether the generated outputs align with the expected outcomes. The expected outcome of this research is to assist and streamline the processes for both faculty advisors and students during the final project proposal submission period, making it more effective and efficient.

1. Introduction

The Sekolah Tinggi Informatika dan Komputer Indonesia (STIKI) Malang is a private higher education institution in the city of Malang with a focus on education in the field of informatics. STIKI Malang has three undergraduate programs (Strata 1 - S1): Informatics, Information Systems, Visual Communication Design; and

one diploma program (Diploma 3 - D3) in Information Systems. To complete their education at STIKI Malang, students must take a certain number of courses and also conduct research as their final assignment.

The Final Project is one of the courses and also a form of scientific writing created by students in the final stage of their studies. The final project is based on the results of research on a carefully chosen problem. In the undergraduate level, the Final Project at STIKI Malang is carried out from the 7th semester (Pre-Final Project / Pre-FP) to the 8th semester (Final Project / FP), during which students propose a title to be researched in Pre-FP and present the research results in the 8th semester (FP).

Currently, the process of proposing a Final Project title at STIKI Malang is done through several stages. In the first stage, students download a document to fill in the required data. In the second stage, students choose a prospective advisor by sending the completed document through WhatsApp or email. In the final stage, the chosen advisor decides whether the proposed title is accepted or rejected. The submission of proposals by students to potential advisors through WhatsApp or email can be very high in a short period, causing potential difficulties for advisors in responding to or handling the submissions.

In the development of this system, an analysis of needs, system design, system implementation, as well as testing and system evaluation will be conducted. It is hoped that the information system for submitting final project titles using WebSocket can assist and facilitate both professors and students during the period of submitting final project titles to make the process more effective and efficient.

1.1 Literature Review

Based on the research conducted by Dharmaadi & Arya Sasmitha (2018) titled "Perancangan Sistem Informasi Restoran Terintegrasi Berbasis Java Web Socket Online" ("Design of an Integrated Restaurant Information System Based on Java Web Socket Online"), the study explores the development of an integrated restaurant information system with a kitchen that utilizes Java Web Socket online for real-time and efficient information exchange. The use of web sockets in the restaurant information system ensures that when the waiter's application records an order, the kitchen application automatically receives notifications promptly, enhancing the restaurant's performance. Additionally, the information system provides features such as receipts, income and expenditure tracking, menu lists, financial reports, and user management, which can facilitate managers or cashiers in serving customers. The kitchen's information system also aids chefs in processing orders, and the notification feature of the web socket speeds up communication of order status from the waiter to the kitchen.

Based on the research conducted by Kamaludin & Dharmayanti (2019) titled "Aplikasi Monitoring Kurir Antar Jemput Pada Petshop Dengan Memanfaatkan Websocket Dan Flutter" ("Courier Monitoring Application for Pet Shops Utilizing Websocket and Flutter"), the study focuses on creating a monitoring application for pet shops to track the activities of pickup and delivery staff. The aim is to maximize service efficiency for customer satisfaction through analysis, software development using the waterfall method, and application testing. The monitoring of pickup and delivery staff requires the implementation of websocket technology to provide real-time location information, enabling the display of location points. Additionally, in this application, pet owners can place service orders at the pet shop, including grooming, health services, and pet accommodation.

Based on the research conducted by Yudianto P et al. (2017) titled "Pengembangan Push Notification Menggunakan Websocket" ("Development of Push Notification Using Websocket"), the study explores the development of a notification delivery mechanism from the HTTP protocol to websocket. The use of the HTTP protocol often leads to notification delays because brokers restrict communication between servers and clients in the delivery mechanism, making it inefficient. Therefore, websocket is employed as a solution to address these issues. Websocket serves as a protocol for faster push notification delivery. The notifications sent include titles and links to news, and the delivery is carried out within the scope of the local network.

Based on the aforementioned previous research, the author conducted a gap analysis (differences) between each study and the upcoming research. The following is the gap analysis between the previous research and the research the author will conduct.

Table 1. Analysis Gap Table

Authors	Research Title	Research Methodology	Differences
Dharmaadi & Arya Sasmitha (2018)	Perancangan Sistem Informasi Restoran Terintegrasi Berbasis Java Web Socket Online	SDLC Method (System Development Life Cycle) Using Java Server Pages and Java Websocket	The research utilized a MySQL database, whereas the author employs Firebase as the database due to its faster and more responsive (real-time) capabilities
Kamaludin & Dharmayanti (2019)	Aplikasi Monitoring Kurir Antar Jemput Pada Petshop Dengan Memanfaatkan Websocket Dan Flutter	Location-Based Services (LBS), Google Maps, and Flutter-Based Android Application	The research is Android-based with a focus on map usage, while the author develops a web-based information system using the NextJS framework due to its good performance, practicality, and efficiency
Yudianto P et al. (2017)	Pengembangan Push Notification Menggunakan Websocket	Flask and Cordova Frameworks, Socket.IO Library, and Websocket	The research did not employ a development methodology, and each stage was worked on directly. The author utilizes the waterfall method in development because each stage is completed as a whole before moving on to the next stage, ensuring optimal results at each stage

2. Research Methods

2.1 Research Location and Time

The research took place at STIKI Malang campus, conducted from September 2022 to February 2023.

2.2 Research Tools and Materials

The tools used in this research include a Lenovo V14-ADA laptop with specifications: AMD Athlon Gold, 8 GB memory, and 256 GB SSD. The software used includes Visual Studio Code, Google Chrome, Whimsical, Draw.io, and Microsoft Office Word 2013. The research materials used by the researcher for this study include journals on websockets and information systems, the current template for submission documents, and the applicable Standard Operating Procedures (SOP).

2.3 Data Collection and Analysis

Data collection was carried out by the researcher through observation, interviews, and literature review. The data analysis was conducted using a qualitative descriptive method, presenting the data according to the problem formulation on the object of the study.

2.4 Research Procedure

In conducting this research, there are several stages taken from the beginning to the end, namely:

1. Data Collection.
2. Problem Analysis.
3. System Design.
4. Implementation.
5. System Testing.
6. Drawing Conclusions.

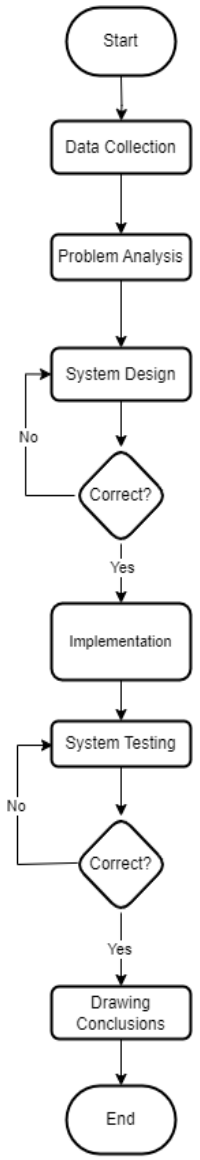

Fig. 1 Research Procedure

3. Result and Discussion

3.1 Program Implementation

In the implementation phase, the author applied the results of the system design to the final project title submission information system using WebSocket, utilizing Visual Studio Code and Google Chrome.

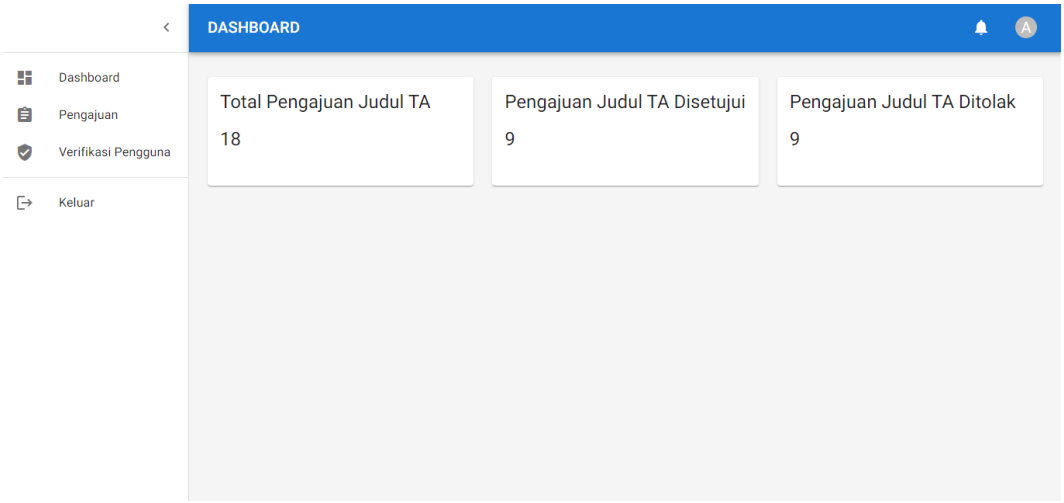

Fig 2. Dashboard Page

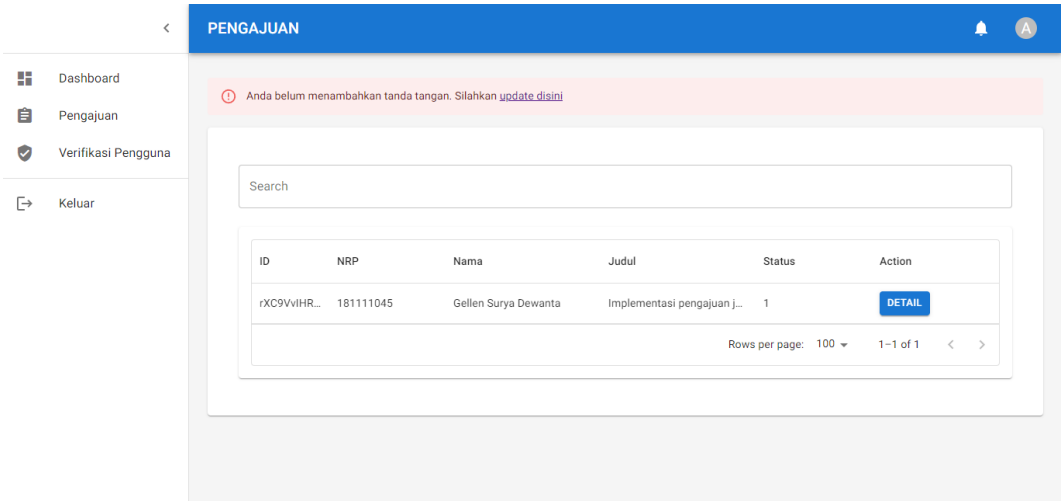

Fig 3. Submission Page

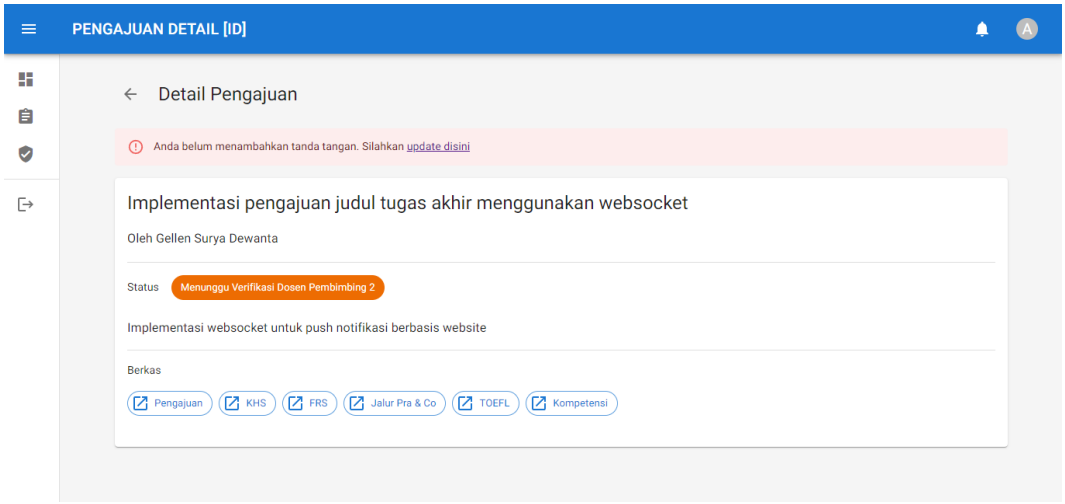

Fig 4. Submission Detail Page

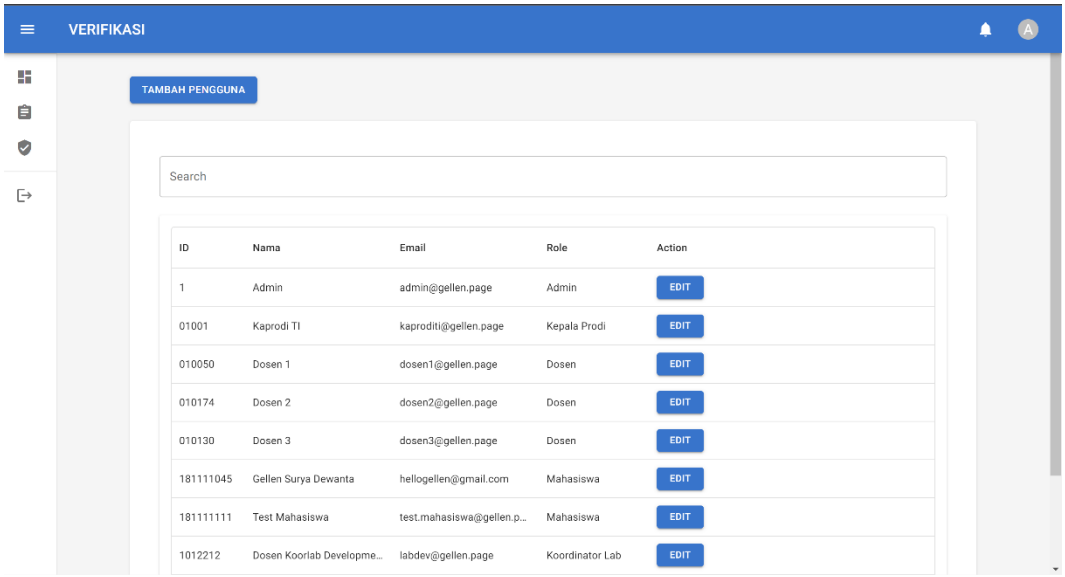

Fig 5. User Verification Page

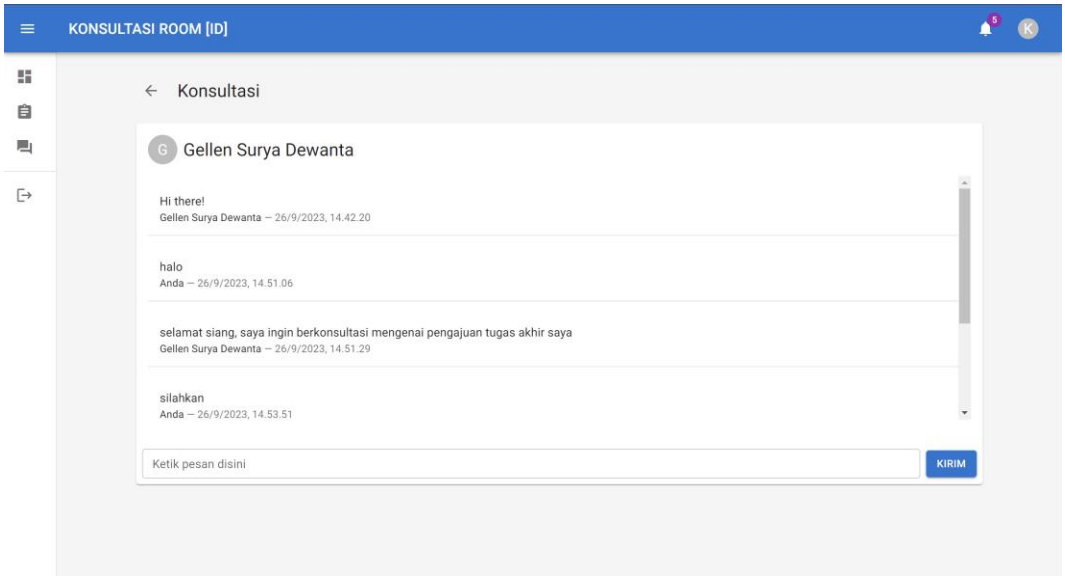

Fig 6. Consultation Page

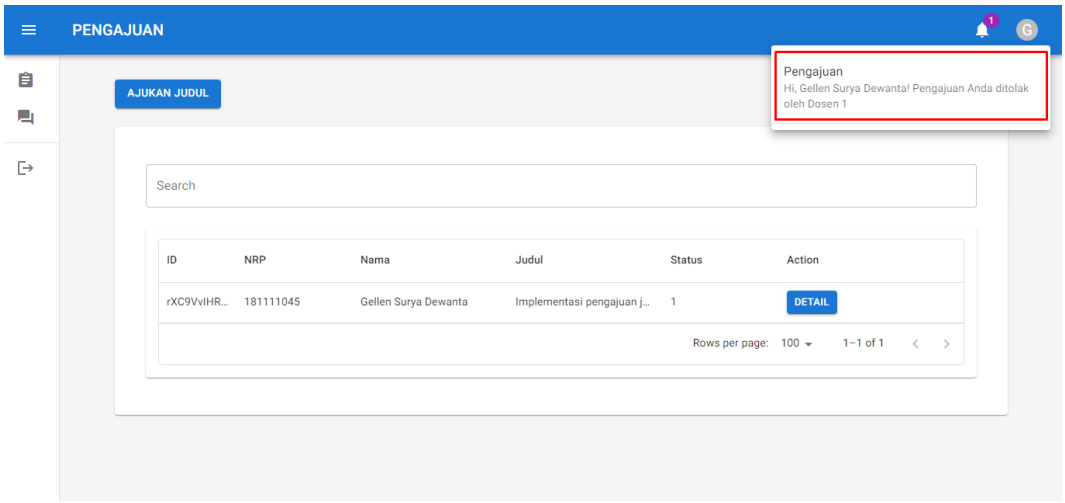

Fig 7. Notification Display

3.2 Test Case

The testing process was conducted to assess every function and feature present in the final project title submission information system using WebSocket, employing a black box approach. The following details the results of the web testing that was carried out:

Table 2. Test Case Table

Testing Scenarios	Testing Cases	Expected Results	Test Results
Login	Accessing the website URL, displaying the login page, entering the email address and password, pressing the 'Login' button	Displaying the admin/student dashboard page	As expected

Displaying Dashboard Page (Admin)	Logging in with admin account on the login page	Displaying the admin dashboard page containing the total number of students' Final Project Title submissions, the number of approved Final Project Title submissions, and the number of rejected Final Project Title submissions	As expected
Displaying Submission Page (Lecturer)	On the dashboard page, press the submission menu button	Displaying the submission page containing a list of students' Final Project Title submissions	As expected
Displaying Submission Detail Page (Lecturer)	On the submission page, press the 'Detail' button in the list of submissions corresponding to the student whose Final Project Title submission you want to view	Displaying the submission detail page containing the Final Project Title, student's name, submission status, and the required submission documents	As expected
Displaying User Verification Page (Admin)	On the dashboard page, press the user verification menu button	Displaying the user verification page containing the list of website users	As expected
Adding a New User (Admin)	On the user verification page, press the "Add User" button, display the add user page, fill in the user data form, and press the "Submit" button	Saving the new user data in the database and displaying a success message	As expected
Displaying Profile Page (All Roles)	On the dashboard page, click the account icon button, then press the profile button	Displaying the profile page	As expected
Editing Profile (All Roles)	On the profile page, click the pencil icon button, display the update profile page, modify the profile data, and then press the "Update" button	Displaying a notification of successful update	As expected
Logging Out of the Website (All Roles)	On the dashboard page, click the logout button on the left or on the account icon, then choose "Logout"	Displaying the website login page	As expected
Creating an Account (Student)	On the login page, click the "Create an account" link, display the account	Displaying the notification "Registration successful"	As expected

	registration page, fill in the student data form, and then press the "Register" button	and then showing the submission page	
Submitting Final Project Title (Student)	On the submission page, click the "Submit Title" button, fill in the Final Project Title submission form, upload the required submission documents, and then press the "Submit" button	Displaying the notification "Submission successful" and then returning to the submission page with the latest list of Final Project Title submissions	As expected
Viewing Submission Details (Student)	On the submission page, click the "Detail" button.	Displaying the submission detail page containing the submitted Final Project Title, student's name, submission status, Final Project Title description, and the submitted documents	As expected
Submission Notification (Student)	On the submission page, the notification icon displays the number of new notifications; click the notification icon	Displaying a message containing the latest notification	As expected
Displaying Consultation Page (Student)	On the submission page, press the consultation menu button	Displaying the consultation page containing a list of supervisors such as the Head of the Department, Supervisor 1, Supervisor 2, Supervisor 3, and the Coordinator of Development Lab	As expected
Displaying Consultation Room Page (Student)	On the consultation page, click the desired supervisor, such as the Head of the department	Displaying the consultation room page containing the supervisor's name and a list of consultation messages between the student and the supervisor	As expected
Sending Consultation Messages (Student)	On the consultation room page, type a consultation message about the Final Project Title and then press the "Send" button	Displaying the successfully sent message in the consultation room	As expected
Displaying Profile Page (Student)	On the submission page, click the profile icon, then press the "Profile" button	Displaying the student's profile page containing the ID, student's name, email address, account	As expected

		role, program of study, and signature	
Editing Profile (Student)	On the profile page, click the pencil icon, display the profile page, modify the data you want to change, and then press the "Update" button	Saving the latest student data, displaying the message "Profile update successful"	As expected

4. Conclusions

From the results of the testing and discussion of the final project title submission information system using WebSocket, it can be concluded that this information system is capable of facilitating both faculty and students in managing and staying updated on submissions. Additionally, both parties are also eased when engaging in consultations.

5. References

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