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Design of Student Labor Information System Mobile Application Using Ionic Framework

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ABSTRACT

In this era, smartphone is a device that is difficult to separate from human life. This is because smartphones are not only used as a means of communication, but rather have applications that can be used to enjoy entertainment. Smartphones can also meet the needs in education, social, health, entertainment and even business, through an operating system that is almost like a computer. Universitas Advent Indonesia (UNAI) has a program for students who want to study while working on the campus. The program is known as student labor. The system used in the student labor program was still manual in which all stages, ranging from students applying for jobs in each department they want to fill the working hours still using paper. Student labor information system applications are built using hybrid mobile technology. The SDLC waterfall model is a research method used to support the process in making this student labor application. And the design of UML ensures that the system is built according to its purpose. This information system was developed using the IONIC framework. The result is an information system that can enabled departments to control student labor programs at UNAI. The application is able to send push notifications that will display the latest notifications directly for each stage that can be used as a service to facilitate each student, vice chancellor, head of the department, including finance department to find out every activity that takes place as program management for student labor more easily. Blackbox testing is used to validate the performance of the application and ensure that the application is built according to purpose. And it was found that the application is running well. Advice from the authors is that further research can be developed using react native applications or using another updated application. And pay more attention to the security side of data transmission.

Keywords: Student Labor, Waterfall Method, Ionic, Information System.

INTRODUCTION

Software development is currently developing very rapidly, especially mobile based software. One of device that use mobile-based software is smartphone. A smartphone is a device that cannot be separated by human activities, has many features that are very helpful in daily human needs and activities that can be accessed without being limited by time and location. Universitas Advent Indonesia (UNAI) has a program for students who want to study while

working. This program is known as Student Labor. The system used is still manual where all phases starting from students applying for jobs in each department, department approval sheets, vice president 1, 2, and 3 approval sheets to the filing of work hours and calculation of salaries are still using paper.

In fact, the system can hamper the process that will take place, because the system has the opportunity to reduce paper or scattering student labor data. Students who want to work have difficulty finding the department vacancies that have been opened. With the application that was built using hybrid mobile technology, it can become a facility for students, vice presidents, heads of departments, financial bureaus in carrying out student labor activities in accordance with applicable sector. Starting from job vacancies, registering jobs, departmental approvals, approval of vice presidents 1, 2, and 3, filing working hours report, and calculating the salary earned in accordance with working hours that have been fulfilled by a student labor, all in an application that is accessible and available in each student's smartphone. This application can send push notifications that will display notifications directly on the labor registration page, department approval, vice presidents 1, 2, and 3 approval, attendance approval as a condition of determining how much salary will be earned in that month, and this service is made to facilitate the latest information so this student labor program can become more easier. Some restriction of this study are system development only uses the android IONIC framework, this study has no edit and delete functions, this study does not discuss the terms of information system security, the latest Push Notification will only appear when the application is opened / minimized (onResume state).

LITERATURE REVIEW

Student labor

Student Labor is from the understanding that the term is used in a program that is owned by the Indonesian Advent University for students who are studying while working, because of the labor results students will have income to help with tuition fees each semester.

Waterfall

According to Pressman (2015: 42), the waterfall model is a classic systematic model, sequential in building a software. Called the waterfall because the step by step that is happening must wait for the completion of the previous stage and walk in sequence. Phases in the Waterfall Model according to Pressman's reference:

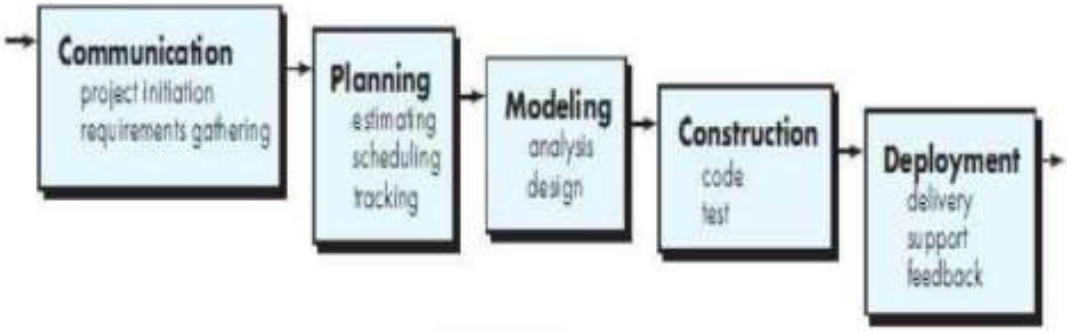

Figure 1. Waterfall.

Ionic Framework

Ionic is an HTML5-based mobile application framework that is capable of being a mobile application development facility with web technologies such as HTML, CSS, and Javascript, has cross platform applications for Android and IOS.

Unified Modeling Language (UML)

According to Gata, Windu and Grace Gata (2013: 4), "Unified Modeling Language UML is a standard specification language that is used to document, specify and build software. UML is a methodology for developing object-oriented systems and is also a tool to support system development. "

Some literature states that UML provides four types of diagrams, because there are several diagrams that are combined, for example communication diagrams, sequence diagrams and timing diagrams combined into interaction diagrams. However, the models can be grouped based on their characteristics, namely static or dynamic. The types of diagrams, are:

1. Use Case Diagrams

According to Gata and Gata, (2013: 4) states that "Use case diagrams is a model for the behavior of the information system that will be created. Use Case describes an interaction between one or more actors with the information system to be created".

2. Activity Diagram

A UML activity diagram illustrates the dynamic behavior of a system or part of a system through the flow of control between actions performed by the system. This is similar to a flowchart except that an activity diagram can show concurrent flow. The main component of an activity diagram is the action node, represented by a rounded rectangle, which corresponds to the task performed by the software system

3. Sequence Diagram

Sequence Diagram is a UML diagram that models the logic of a use case by describing how interactions between objects with each other are in a time sequence. This diagram illustrates how messages are sent and received between objects at a time. (Whitten & Bentley, 2007: 659)

METHODS

The study was conducted using the SDLC waterfall methodology where this method is required to go through the previous stages until it is completed after that the next stage, the stages of this method support the process of making and developing student labor applications. Analysis of the requirements needed to create a student labor information system that can facilitate students, heads of departments, vice presidents and financial bureaus in using the features provided by the author.

Use Case Diagram

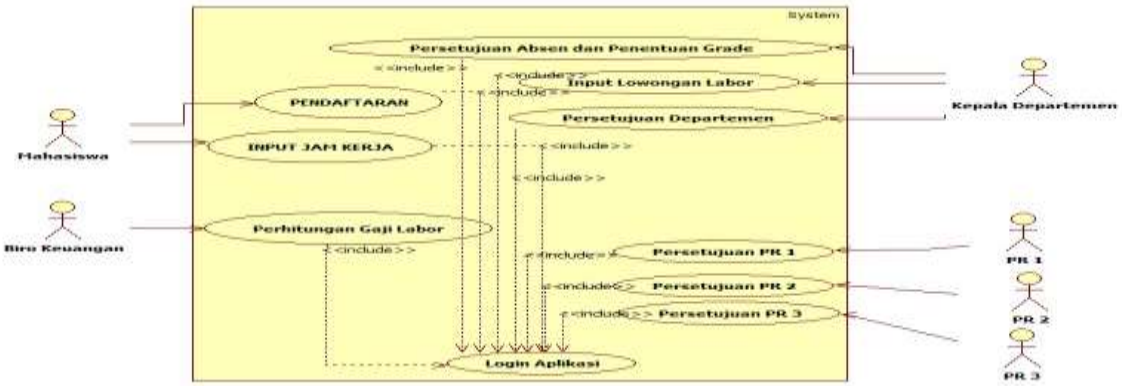

Figure 2. Use Case Diagram

Based on the use case diagram above explains that the processes that take place in this application include: Students login the application, view job openings, register and apply labor, input working hours that have been fulfilled. The head of the department inputs a vacancy, approves student registration, then approves the absence and determines the grade of the student. The Vice Presidents 1, 2 and 3 agreed to register laboratories. The financial bureau calculates the salary of a labor student in accordance with attendance that has been fulfilled by students.

Sequence Diagram

Login

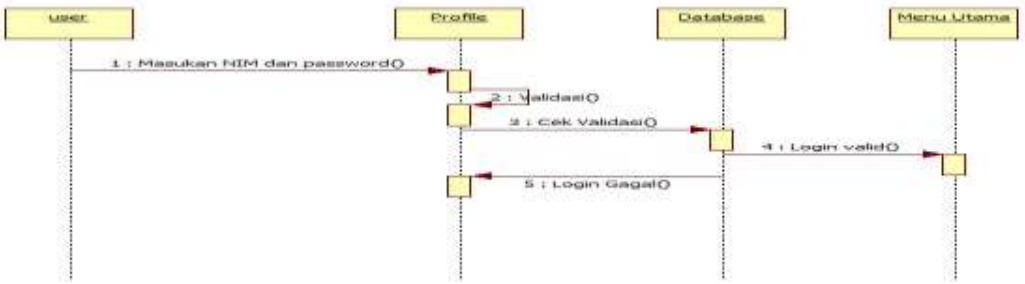

Figure 3. Login Sequence Diagram

In the login page, the user (student, department head, vice president 1, 2, 3, BO) will enter the NIM/NIK (Username) and password on the login page then the login page will be validated to the database if it is validated it will enter the main menu but if it is not validated it will return to the login page.

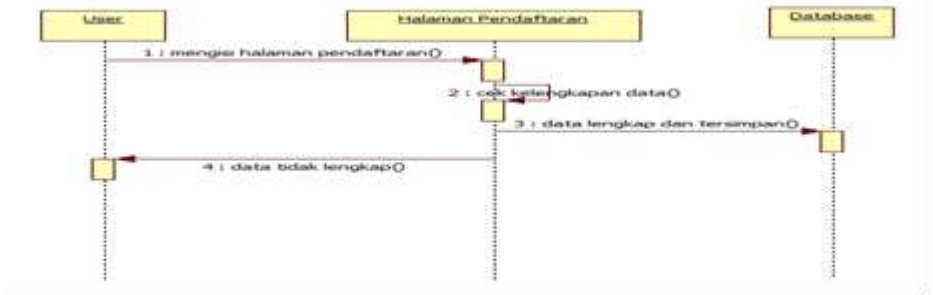

Figure 4. Labor Registration Sequence Diagram

Registration

In the registration page, the user (student) will enter the registration page on the registration page, user will fill in the required data, when the registration data is complete it will be stored in the database. But if it is incomplete, it will return to the user dashboard page.

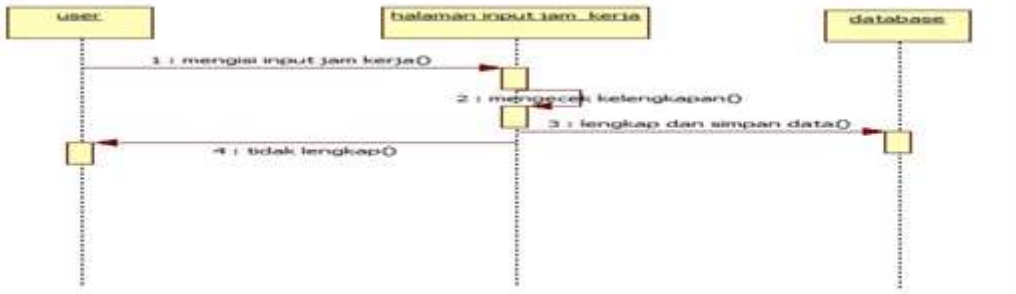

Figure 5. Work Hour Input Sequence Diagram

Work Hour Input

In the working hours input page the user (student) will fill in the working hours then the work input page will be checked for data completeness when it is complete it will be stored in the database. But if it is incomplete it will return to the user (student) dashboard

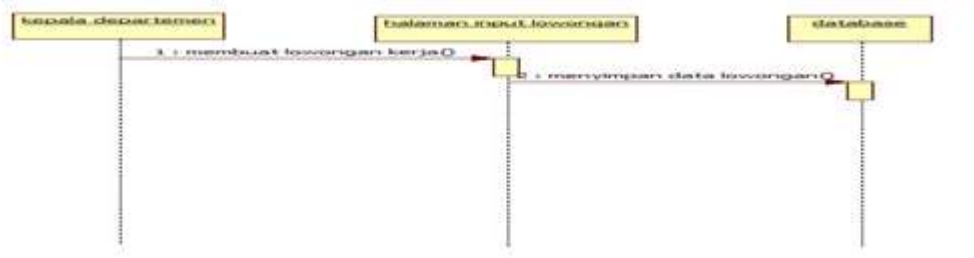

Figure 6. Labor Vacancies Input Sequence Diagram

Input Labor Vacancies

In the Labor Vacancies page, the department head will create a vacancy then the system will save it to the database.

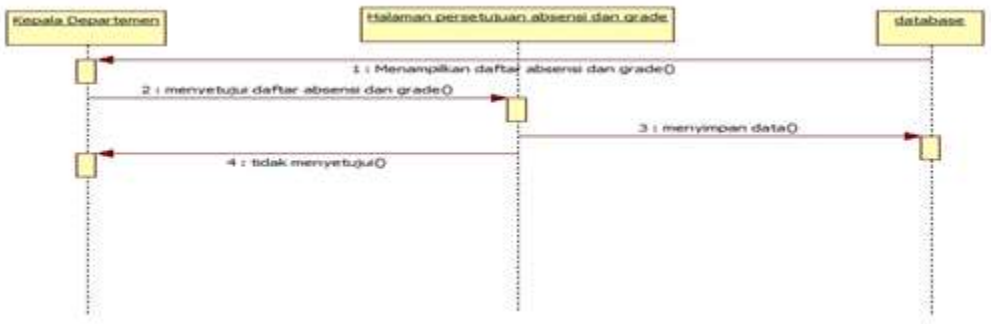

Figure 7. Sequence Diagram of Attendance and Grade Approval

Attendance and Grade Approvala

In the attendance and grade approval page, the database will bring up attendance and grade lists to the department head and if the department head approves the labor working hours data, the data will be saved to the database. But if the data were not approved it will return to the department head dashboard page.

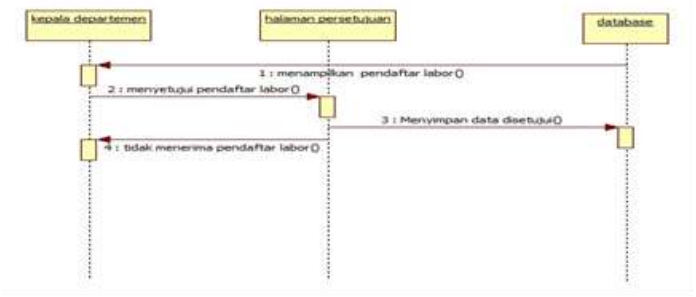

Figure 8. Department Approval Sequence Diagram

Department Approval

In the department approval page, the database will display the labor registrants to the head of the department and if the department head approves, the labor application data will be stored in the database. But if it does not accept the labor registrant it will return to the head of the department dashboard.

Vice President 1 Approval.

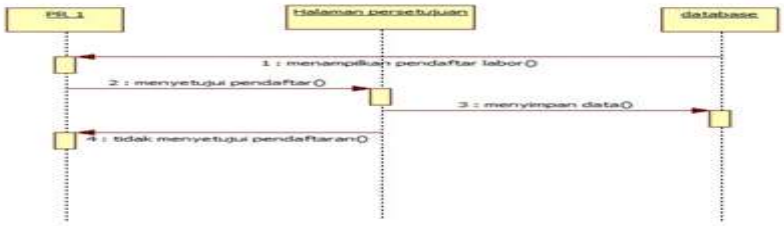

Figure 9. Vice President 1 Approval Sequence Diagram

In the vice president 1 approval page, the database will display labor registrants to vice president 1 then if he/she agrees, the labor application data will be stored in the database. But if he/she does not accept labor registrants it will return to vice president 1 dashboard

Vice President 2 Approval

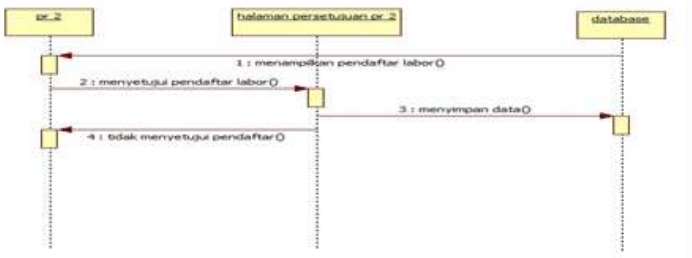

Figure 10. Sequence Diagram of Vice President 2 Approval

In the vice president 2 approval page, the database will display labor registrants to vice president 2 then if he/she agrees, the labor application data will be stored in the database. But if he/she does not accept labor registrants it will return to vice president 2 dashboard.

Vice President 3 Approval

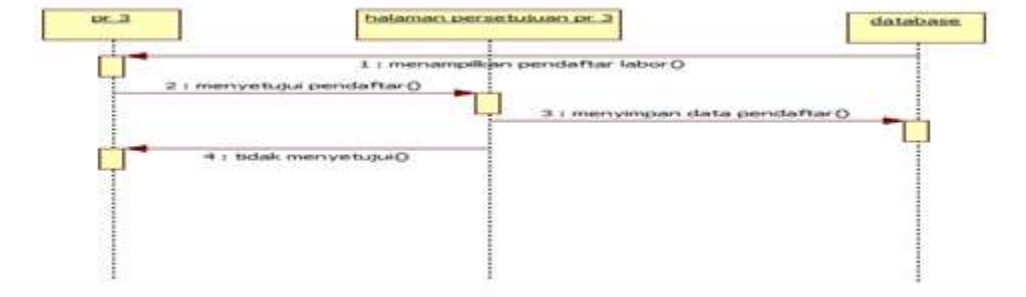

Figure 11. Sequence Diagram of Vice President 3 Approval

In the vice president 3 approval page, the database will display labor registrants to vice president 3 then if he/she agrees, the labor application data will be stored in the database. But if he/she does not accept labor registrants it will return to vice president 3 dashboard.

Approval of the Financial Bureau

Figure 12. Sequence Diagram of Approval of the Financial Bureau

In the Finance Bureau (BO) approval page, the database will display the hour and grade labor data to BO after that, BO will validate and approve, and then the data is stored in the database.

Database Table Relation

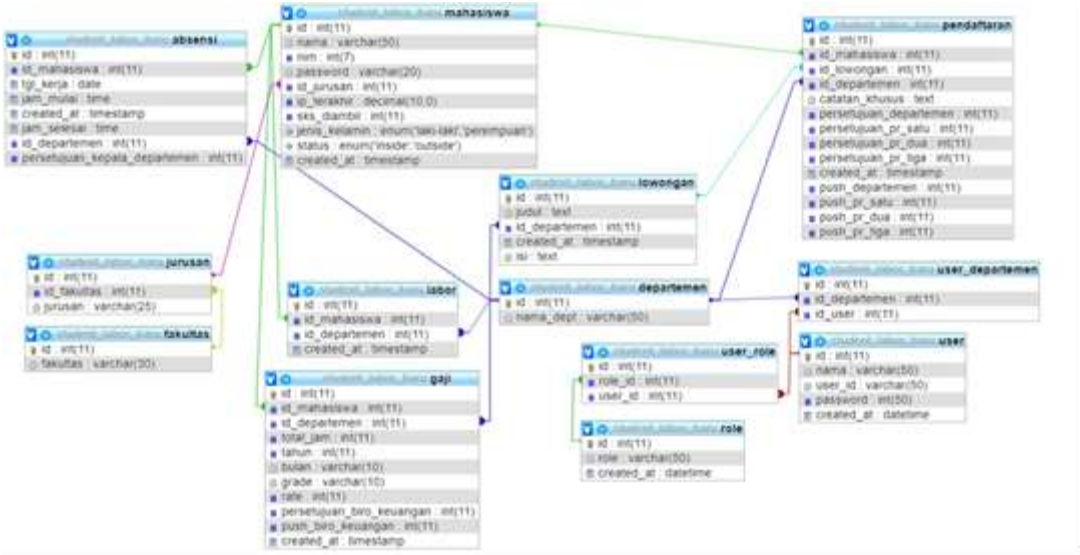

Figure 13. Relation Table

RESULTS

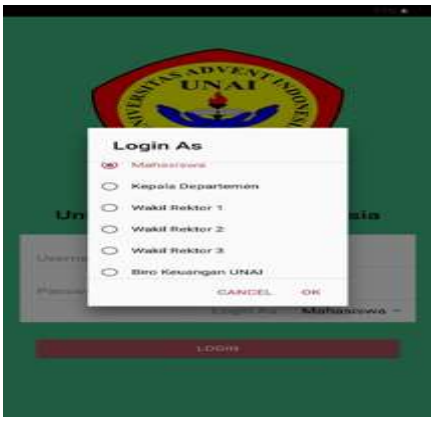

Figure 14. Login Display

On the user login page of this application there are 5 which are, students, department heads, vice presidents 1, 2, 3 and financial bureau, each user can log in according to their respective username and password to use this application.

Figure 15. Student Labor Home Display

Figure 16. Job Vacancies Display

After a successful student login, it will display a home display for students. There are 4 menus to choose from for students. The student vacancies menu will be given a choice of several department vacancies that have been opened, after the student has a choice the student will click and will go to the registration page.

Figure 17. Labor Registration Display

Figure 18. Status of Labor Registration

Figure 19. Student Attendance Display

In the registration menu the student will fill in the registration form in accordance with the student's personal data, if the student has a request or requirement the student will fill in a special note column for approval from the head of the department.

The labor registration status menu is only a report on the registration stage of the student.

In the labor student attendance menu, displays the date and working hours that have been fulfilled by the student.

Figure 20. Add Student Attendance Display

Figure 21. Student Labor Salary Display

The above menu explains that students can fill in the date and working hours that have been fulfilled by the student which will be sent to the head of the department for approval through Push Notification and the student labor salary menu can display student labor salaries that have been approved by the department head and financial bureau.

Figure 22. Department Head Home Display

Figure 23. Add Job Vacancies Display

Figure 24. Labor Vacancies Display

The department head page displays 4 menu, adding labor vacancies menu, labor vacancy menu, labor approval menu, and labor student attendance menu.

In pictures 23 and 24, it explains that the head of the department is obliged to fill in any labor vacancies that will be opened along with the contents / explanations according to the needs of

the department then the vacancies that have been opened are displayed on the labor vacancies page.

Figure 25. Student Approval Sheet Display

Figure 26. Student Attendance Display

On the student approval sheet menu displays the applicant's personal data along with special notes (if any) through Push Notification for the department head approval stage.
In the student attendance details menu displays Push Notification of student self-data, date, hours of work that have been fulfilled and submitted by the student, then the head of the department can fill in the grade of the student in accordance with the student's labor performance then click approve for approval and the data will automatically be sent to the financial bureau.

Vice Rector 1 Approval Sheet

Figure 27. Vice Rector 1 Approval Sheet Display

Figure 28. Vice Rector 2 Approval Sheet Display

Figure 29. Vice Rector 3 Approval Sheet Display

In pictures 27, 28 and 29, the menu will receive an approval push notification containing the personal data of each student who registers as a student labor to be approved by vice president 1 then vice president 2, and vice president 3, if the student is rejected by one of them then the student cannot become a student labor, if the student has been approved by PR 3 then the student can carry out their duties and responsibilities as a student labor

Figure 30. Financial Bureau Approval Display

Figure 31. Push Notification Display

In figure 30, the Finance Bureau receives a push notification from the department absentee agreement which will display student working hours data that has been approved by the head of the department and will agree as a sign that the student's salary calculation has been calculated.

In this view, it explains what push notifications will appear according to the latest notifications in the menu in this student labor application.

DISCUSSION

As for suggestions for further research for developing student labor applications:

1. Add edit and delete functions to the student labor application.
2. Add a security system from the student labor application.
3. Using react-native frameworks
4. Make push notification remains active even though the application has been closed

5. Linking the application to the database of Indonesia Advent University.

Conclusion

Based on the results of the design and manufacture of this application, it can be concluded that:

1. This application generates a Mobile Application for the UNAI Student Labor program
2. This application displays vacancies that have been opened by each department.
3. This application becomes a forum to facilitate each student labor in carrying out each stage.
4. This application makes it easy for department heads to display vacancies and control the absences and grades of each student labor.
5. This application can make it easy for the head of department, vice president 1, vice president 2 and vice president 3 to approve the registration submitted by each student via push notification.
6. This application can facilitate the financial bureau in calculating the salary of each student labor in accordance with working hours that have been met and approved by the head of the department through push notification.

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