

Web-Based Application Development for Applying Research or Internship Cover Letters at Kalbis Institute

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ABSTRACT

This study aims to develop a web-based application for applying for research or internship cover letters at Kalbis Institute. The software development life cycle (SDLC) used the Rational Unified Process (RUP), and the software modelling used the Unified Modeling Language (UML). RUP has several phases. They are Business Modelling, Requirements, Analysis and Design, Implementation, Testing, and Deployment. The UML used a use case, activity, and class diagram. The application development used Visual Studio Code software with the PHP programming language. The results of this study are a web-based application for submitting research or internship cover letters for web admins and users. Web admin will be operated by academic operations while the users for students. All functional applications can run properly based on black box testing. The users, both academic operation administrators and students, agree that this application can help the administrators and students to process cover letters for research and internship at Kalbis Institute.

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1. INTRODUCTION

Kalbis Institute Student Services are public services that prepare academic documents such as certificates, cover letters, reprint certificates, lists of cumulative grades, and account passwords [1]. The process of applying for academic documents is by coming to the Kalbis Institute Student Services office and then filling out an academic document application form and submitting it to Student Services. The Student Services Officer then processes the academic document and will contact the student to retrieve it when it is finished.

The SARS-Cov-2, or COVID-19 virus, was first detected in China at the end of 2019, and in June 2021, it spread worldwide [2] and WHO declared it a pandemic on March 11, 2020 [3]. Meanwhile, COVID-19 was detected in Indonesia for the first time on March 2, 2020 [4], followed by the establishment of social restrictions or social distancing and the "Pemberlakuan Pembatasan Kegiatan Masyarakat" (PPKM) [3]. On April 1, 2020, all lecture activities at Kalbis Institute, including services from Student Service conducted online [5].

To apply for academic documents before the pandemic, the student must fill out the form and submit it directly to the Student Services office. During the pandemic, it is changed via email and through the learning management system used by Kalbis Institute called LeaPS on the Student Statement Letter page [1], [6]. Based on the experience of several students when submitting academic documents, especially a cover letter

for research or internship through the application, they experienced problems both from the student side and the Student Services admin.

The admin's obstacle when applying cover letter on the student statement letter page on LeaPS is that the admin can not decline the submission form before approval. It resulted in the admin making changes manually when there was an error. Besides that, the admin has to send the letter manually via email when the letter is finished. While the obstacle faced by students is, the process of applying cover letter needs a long time to complete. Not only that, but also students will not be able to monitor the step of their application because it will be sent via email when it is done. This results in students waiting for an email from Student Services without knowing the status update of the application being accepted or rejected if they do not access the LeaPS.

Several previous studies have developed web-based applications to apply for cover letters, for example, an online application information system at the sub-district level [7] and system information for applying letters of statement at the village office [8]–[11]. This study will develop a web-based application to apply for research or internship cover letters that can systematize the process and monitor the submission stage. The SDLC used is the RUP. RUP is an SDLC that uses an approach that refers to use cases to determine software requirements or use case-driven. The development process of RUP is iterative and incremental. Several studies developed software with RUP. They are employee training and certification applications [12] sales order management systems [13], and HR information systems [14].

2. METODE

This study used RUP for SDLC and UML for modelling the application. RUP is a component-based software development process focusing on UML [16]. Figure 1 is the RUP architecture that has four phases. They are inception, elaboration, construction, and transition. Besides that, RUP has several main workflows: business modelling, requirement, analysis and design, implementation, test, deployment, configuration and change management, project management, and environment.

The four phases of RUP [15], [17]:

- Inception is the identification stage of the developed software.
- Elaboration is the stage of carrying out architectural designs based on the analysis results in the previous stages.
- Construction is a design implementation and testing stage based on the initial architecture.
- Transition is the release preparation and adjustment stage based on user feedback to ensure the software is available.

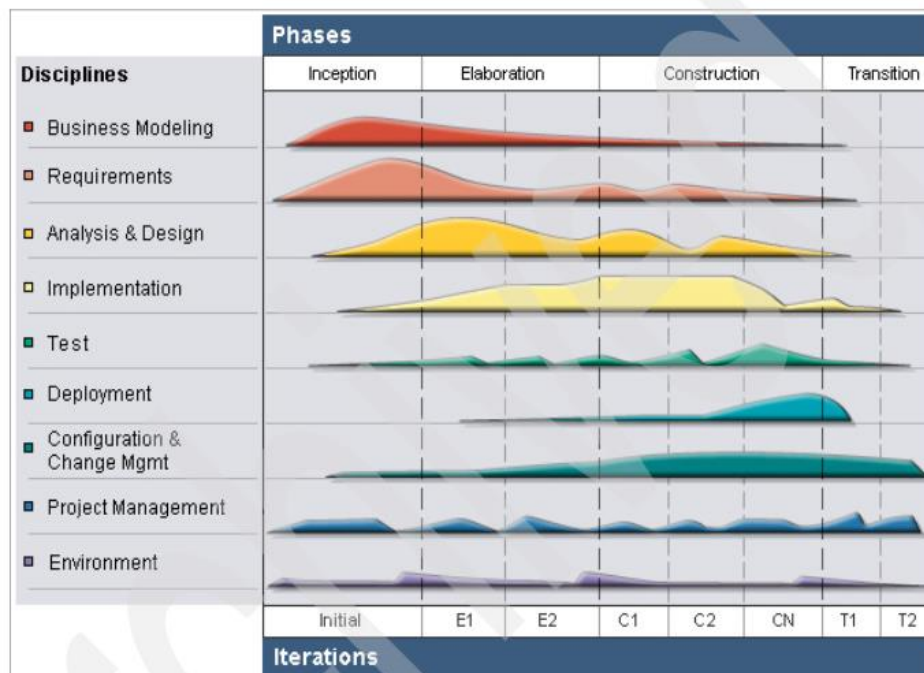


Figure 1. RUP Architecture [15]

The main workflows of RUP [18]:

- a. Business Modelling is the process identification and description of business processes and organizational structure.
- b. Requirement defines user and stakeholder requirements and high-level features converted into software functional and non-functional requirements.
- c. Analysis dan Design, based on the needs that have been identified, then converted into implementation and design.
- d. Implementation, perform analysis and design that has been made, then implemented and translated into the program code.
- e. Testing is the process of testing and verifying the implementation and quality of the developed software.
- f. Deployment is the stage of distributing the software to users and providing documentation for the application functions and features.

Figure 2 is a research workflow for developing a web-based application for applying research or internship cover letters at Kalbis Institute.

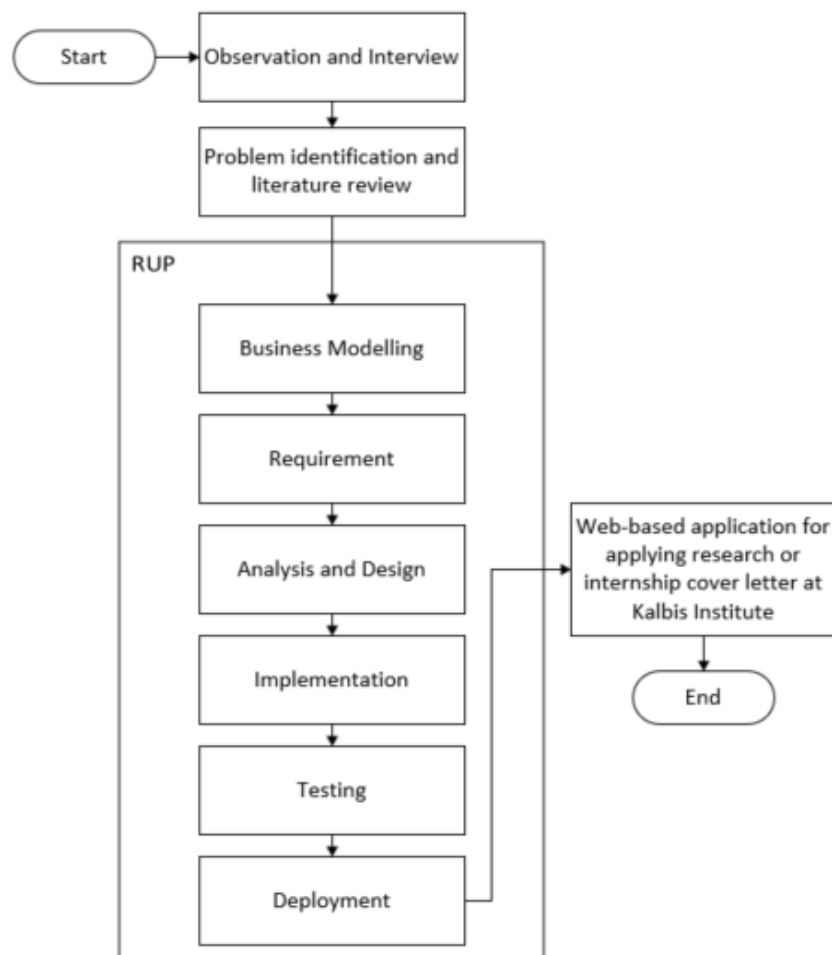


Figure 2. Research Workflow

2.1. Observation and Interview

The initial study was conducted by observing Student Service Office and interviewing its officer. Based on the interviews, it was found that the Student Service officer can not refuse the submission of the cover letter that has been applied to the student statement letter's page at LeaPS before it is approved. It resulted in the officer making changes manually when there was an error and then the admin having to send the letter manually via email when it was finished. In addition, the process of writing a letter is quite long and cannot be monitored by the students, and they have to ask and wait for the letter to be sent by Student Services.

2.2. Problem Identification and Literature Review

The next stage is problem identification based on the results of observations and interviews. After all the problems are identified, the next step is to look for a literature review. The literature review intends to find references and related research to solve the problems encountered.

2.3. Business Modelling

Business Modeling is the initial stage in the RUP. Table 1 shows the current business process for applying cover letters and the expected business process after using the application.

Table 1. The Business Process for applying for research or internship cover letters

| Current Business Process | Expected business processes |
|--|---|
| <ul style="list-style-type: none"> Students apply for a cover letter for research or internship through the LeaPS application on the student statement letter page by filling out the form and selecting the letter type. The student service officer approved the application letter and emailed it to the student. | <ul style="list-style-type: none"> Students apply for a cover letter for research or internship cover letter through the application. Students can monitor the stage of their cover letter. When the cover letter is ready, they can access it through the application or email. |

2.3. Requirement

Requirements were obtained based on an analysis of observations and interviews conducted with students and Kalbis Institute Student Services divided into functional and non-functional requirements. Functional requirements are functions that must exist in the application for all users, both Student Service admins and users/ students. The functional requirements in the application for applying research or internship cover letter for research/practical work are:

- Admin can access the application by entering a username and password.
- Admin can view, modify, and search user data.
- Admin can view, create, and print cover letter data.
- Admin can view, modify, and monitor the form data.
- Users can access the application by entering a username and password.
- Users can view, create and monitor form data.
- Users can view and print cover letter data.

Table 2 is the non-functional requirement for the application for applying research or internship cover letter. A non-functional requirement is a minimum requirement for hardware and software to develop the application.

Table 2. Non-functional Requirement

| Hardware | Software |
|--|---|
| PC with the minimum specification is Windows 7 32bit/Mac OS X 10.6/Ubuntu 16.04 LTS, RAM minimal 4 GB, Processor Intel Core i5-4200U, CPU @1.60GHz 2.30 GHz. | <ul style="list-style-type: none"> XAMPP Visual Studio Code CodeIgniter 3, PHP 7.4, Bootstrap 4, HTML 5, CSS 3 |

2.4. Analysis and Design

The analysis and design stage is analyzing and modelling the system. In this study, modelling the system using UML. UML is a system or software modelling language that simplifies complex problems with paradigms or object-oriented [19]. In this study, UML used are case diagram and activity diagram.

A use case diagram is a model for the behaviour of the information system that will be made [19]. The applying research or internship cover letter application has two actors. They are the admin or student service officer and the user or student. Figure 3 is the use case for applying for research or internship cover letter application. The admin can manage users, cover letters, forms, and signature data. Meanwhile, users or students can manage user students, manage cover letter students, and manage forms. Both admin and users can do all the activities by login into the system using username and password.



Figure 3. Use case diagram

An activity diagram is a diagram that describes the workflow of a system in a software or application that focuses on system activities, not the activity done by the actors [19]. Figure 4 is one of the activity diagrams on the developed system. It shows the activity diagram for the admin to edit and monitor the form applying a cover letter.

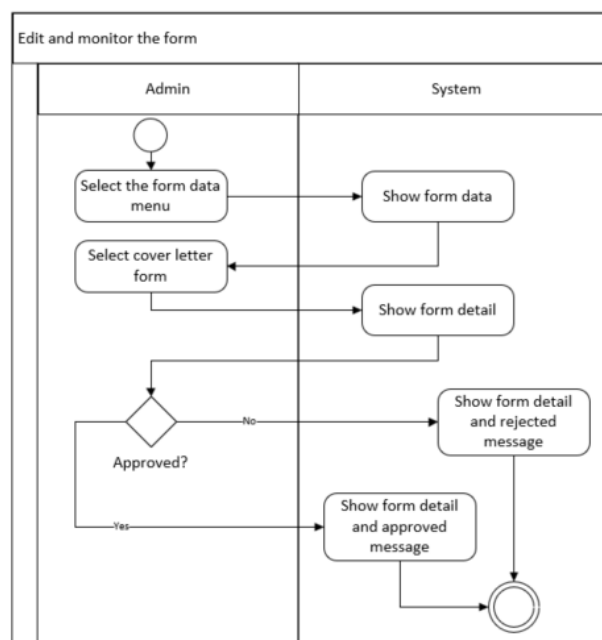


Figure 4. Admin's activity diagram: edit and monitor the form

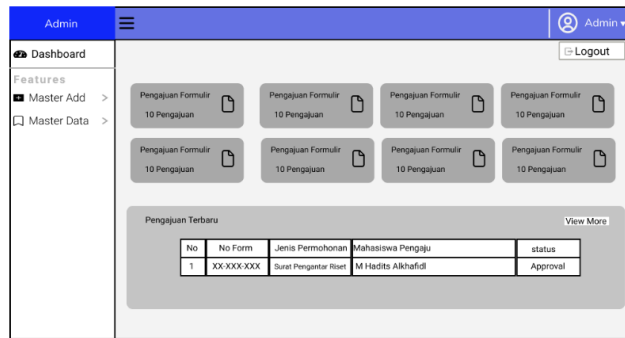


Figure 5. The user interface design of the admin dashboard

Figure 5 is the page design of the admin dashboard user interface. This page will appear after the admin successfully logs in to the application. The page will show the list of the latest cover letters that have been applied and their status.

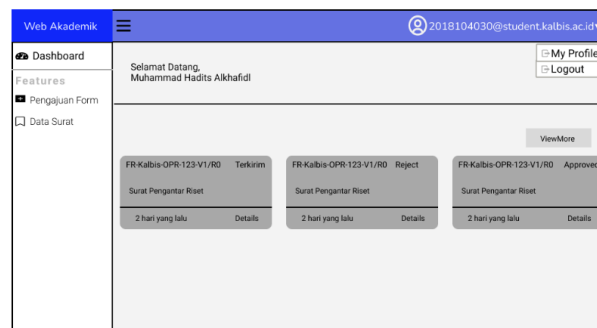


Figure 6. The user interface of the student dashboard

Figure 6 shows the design of the student dashboard user interface. This page will appear after the students successfully log in to the application. It shows their cover letter submission along with details and stages of the process.

2.5. Implementation

In the implementation stage, the result of analysis and user interface design are coded using a programming language. The application developed in this study is web-based. It was developed using the PHP programming language and CodeIgniter framework as server-side scripts. It uses MySQL as the database management system. For the user interface, it uses the Admin-space Bootstrap 4 framework and Skydash with JQuery/Ajax libraries.

2.6. Testing

Testing in this study used black box testing for testing the application functionality based on predetermined requirements in the initial phase [20] and a user acceptance test (UAT) to verify that the given solution is suitable for the users [21].

2.7. Deployment

The process development of this application is only until the testing process. The user must further review the application so it is not hosted and used yet.

3. RESULT AND DISCUSSION

Figure 7 shows the user interface for the admin dashboard when the admin successfully logs in to the application for applying research or internship cover letters. The admin can monitor the number of cover letter submissions and new submissions on this page.

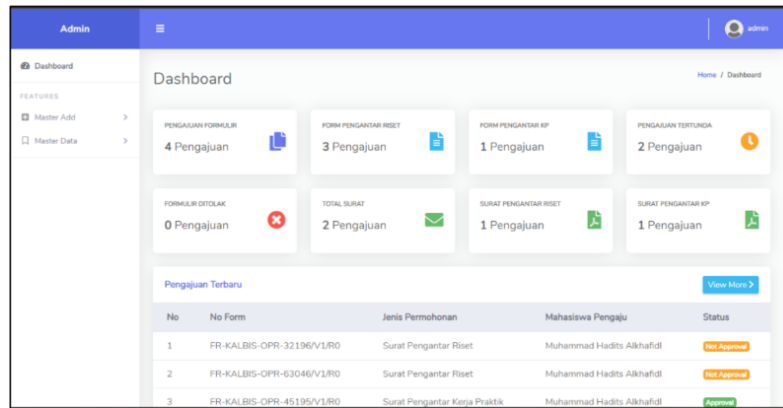


Figure 7. The user interface for the dashboard admin page

Figure 8 shows the user interface for the submission form data page from the admin side. This page shows the list of the submitted cover letter along with the information on the form and cover letter status.



Figure 8. The user interface for the submission form

Figure 9 shows the page view of the cover letter. The list of cover letters numbered and given signatures or completed can be seen on this page.



Figure 9. The user interface of the cover letter page view

Figure 10 shows the student dashboard page. This page can be accessed after student login. The student's dashboard shows the status of the cover letters that have been applied both in the ongoing and the past. The student can select to see the details.

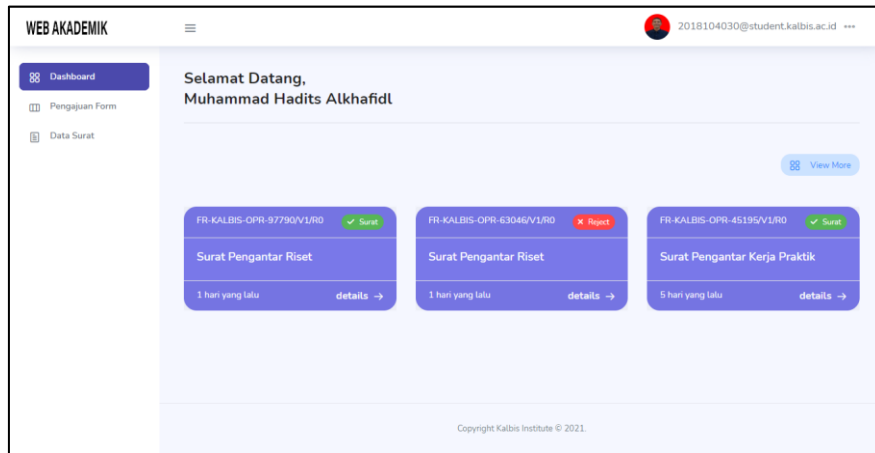


Figure 10. The user interface of the student's dashboard

Figure 11 shows the display when students want to apply the cover letter. The student can choose whether to choose a research or internship cover letter.

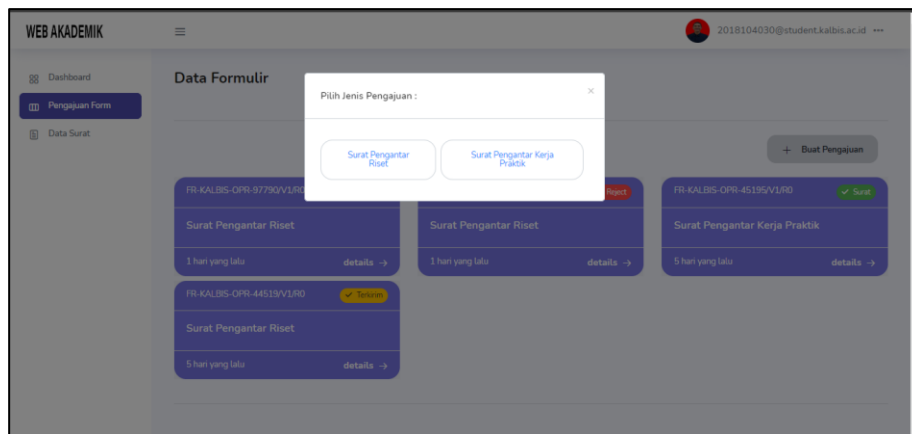


Figure 11. The user interface for choosing the kind of cover letters

Figure 12 shows the page for viewing the cover letter that has been completed. It is in the PDF file format.

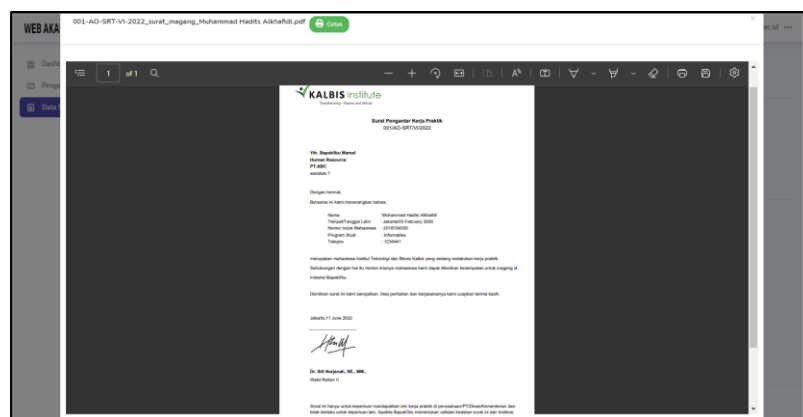


Figure 12. The user interface for viewing the completed cover letter

Figure 13 shows an email notification automatically sent by the system whether the student's cover letter application is accepted or rejected.

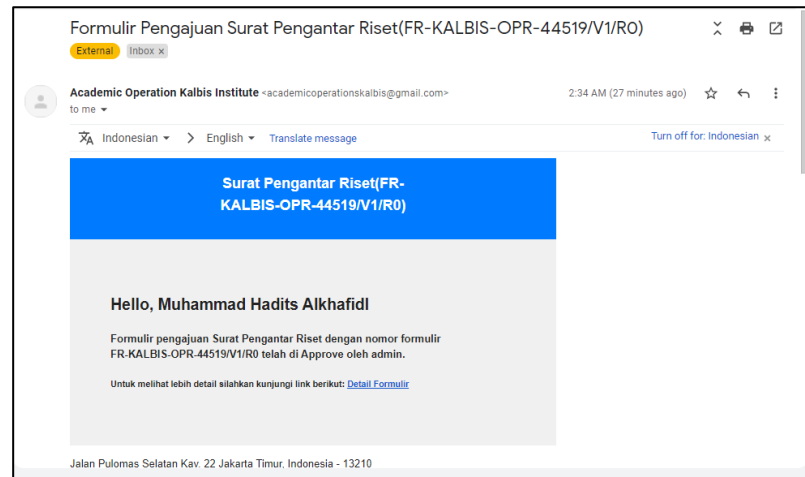


Figure 13. The user interface for email notification

Based on the black box testing result, all the application functionality for applying research or internship cover letters on both admin and student pages can run well as expected.

Table 3. Result of the UAT Test from Student

| No | Scenario | S | N | TS | STS |
|----|--|---|---|----|-----|
| 1 | Is the application easy to understand and use by students? | 4 | | | |
| 2 | The application facilitates the process of applying for cover letters by students. | 3 | | | |
| 3 | The user interface of the application looks attractive to students? | 6 | | | |
| 4 | Is the writing or font used on the application visible to students? | 3 | | | |
| 5 | The icon on the application looks attractive to students? | 6 | | | |

Table 3 shows the UAT results that are conducted on students. Based on these results, according to the students, the application is easy to understand and use for applying the cover letters. The students agree that the user interface and the icons used in the application are attractive. The writing or the fonts used are visible.

4. CONCLUSION



Based on the study conducted, it can be concluded that the web-based application for applying for research or internship cover letter was successfully carried out. All the application functionality went as expected based on the result of the black box testing. All the users who conducted the UAT tests agreed that the application was attractive and easy to use. In addition, the application can assist users in applying for cover letters for research and internship. This study still lacks in several ways. Here are some suggestions for application development or future study: (1) Gives a barcode to verify the originality of the cover letter that contains the student's data. (2) Upgrade the user interface to access the application through the smartphone's browser.

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