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Development of Web-Based Student Registration Information System with Rapid Application Development Approach

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ABSTRACT

The management of student data and the student registration process is an important aspect in the world of education. In the digital era, the use of information technology is crucial to maintain the quality and efficiency of education. Therefore, the development of a web-based student registration information system with a Rapid Application Development (RAD) approach is an efficient and effective solution. This research proposes the development of a web-based student enrolment information system with a RAD approach to improve efficiency, accessibility of student data, and the ability to adapt the system to continuous change. The RAD method consists of requirements planning stages, RAD design workshops, and implementation. The test results of the application show that this application is worth using and meets the expected standards. Thus, the development of a web-based student registration information system with the RAD approach is expected to provide innovative and efficient solutions in overcoming student data management problems and the student registration process

Keywords: Rapid Application Development, Student Registration System

INTRODUCTION

Education has a crucial role in the development and progress of a nation. In the context of education, the management of student data and the student registration process is a very important aspect. Efficiency and accuracy in managing student data and the registration process can have a direct impact on the delivery of quality education. In today's digital era, the use of information technology has become a must in maintaining the quality and efficiency of educational processes (Mei Prabowo, 2020). Therefore, the development of a web-based student enrolment information system is an efficient and effective solution in supporting education management.

Problems faced in managing student data and the student registration process include data repetition, the length of the registration process, and difficulties in accessing information related to students. Student registration information systems that still use manual approaches or inadequate software can be obstacles in the implementation of optimal education. Therefore, the development of an efficient and web-based student registration information system is a much-needed solution.

The development of student enrolment information systems is nothing new. Various previous research and development have proposed various solutions in improving efficiency and effectiveness in student enrolment management. Several previous studies have used web-based approaches to improve student data accessibility and enrolment processes (Shifa Dwi Oktaviani et al., 2022). However, there is still a lot of potential to improve certain aspects, such as flexibility in development, speed of development, and responsiveness to change. (Windiarti et al., 2022)

One approach that stands out in software development is Rapid Application Development (RAD). The RAD approach emphasizes on developing prototypes that can be adjusted quickly based on feedback from users (Prabowo, 2020). This allows developers to respond to changes more quickly and create software that better suits user needs. Along with the development of web technology, web-based applications with RAD approach have also become an increasingly popular trend in information system development. (Fauzi & Harli, 2019)

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This research will combine these elements by developing a web-based student enrolment information system using the RAD approach. Thus, this research will provide innovative and efficient solutions in overcoming the problems mentioned earlier. Through this approach, it is hoped that the student registration process can be improved efficiency, student data accessibility can be improved, and the ability to adapt the system to continuous changes can be better

LITERATURE REVIEW

The development of web-based student enrolment information systems has been a significant research focus in improving the efficiency and effectiveness of education management. In the research literature, several studies highlight the RAD approach and its implementation in the development of student enrolment information systems, along with its challenges and benefits.

Numerous studies have explored methods of information systems development. According (Pressman, 2014), the RAD method is an effective approach to developing systems with a focus on creating prototypes that can be adjusted quickly. This approach provides flexibility in responding to changing user needs in an iterative manner.

In the context of web development, conduct a study comparing the use of RAD in the development of web-based information systems. The results show that RAD provides speed in development and makes it easy to customize web-based systems according to user needs.(Murdiani & Hermawan, 2022)

(Surniandari et al., 2020) highlights the benefits of RAD in improving efficiency and responsiveness to change in the context of student enrollment. Iterative development and active user participation ensure that the system can be continuously updated according to evolving needs.

Looking at the development of web technology, research by examining the application of the latest technology in the development of student registration systems. The integration of web technologies enables global accessibility of student data and improves user experience.(Nugroho, 2023)

METHOD

Methods to achieve the objectives in this research are carried out in several stages of development, namely literature study, needs analysis, system development, system implementation and trial, and dissemination of research results. Figure 2 describes the stages of research.

Figure 1. Stages of Research

The initial stage is carried out literature studies related to application development. This stage aims to collect information related to the development of technology and methods in application development.

The next stage is to conduct a needs analysis. This stage aims to collect information and analyze the need for application development in the form of user requirements and system design. The next stage is system development. At this stage, system design is carried out starting from Use Case design, Database Design, and User Interface design.

The system development technique in this study was carried out using the RAD (Rapid Application Development) model approach. RAD aims to accelerate the development process by prioritizing speed and flexibility.

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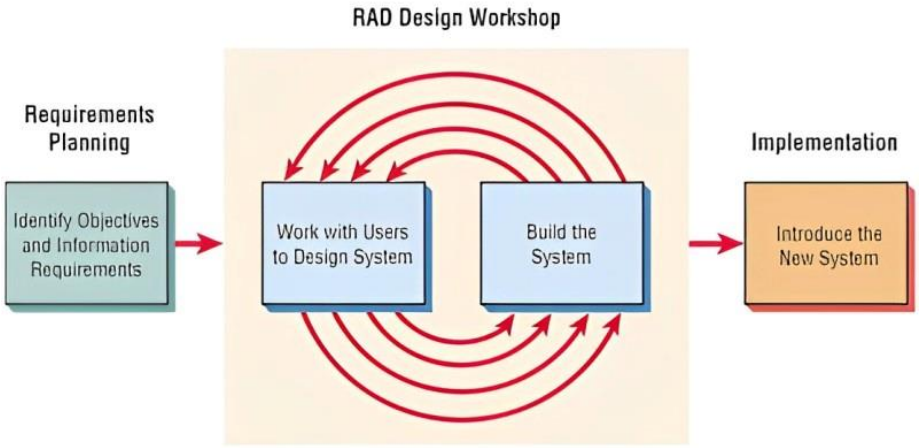

Figure 2 Stages of RAD Method (source: kendall, 2013) (Kendall & Kendall, 2013)

The RAD method consists of 3 stages that are structured and interdependent at each stage:

a. Requirements Planning: In this stage, users and analysts meet to recognize the purpose of the application or system and establish information requirements arising from those objectives. The focus at this stage is on solving business challenges. Although information technology and systems may form part of a proposed system plan, its primary concern is always to efforts to achieve business goals.
b. RAD Design Workshop: This stage is the period during which design and improvement is carried out in the form of workshops. Analysts and developers work together to build and show users visual representations of designs and work patterns (Aini et al., 2019). The duration of these design workshops can vary, depending on the experience, skills, and complexity of the application being developed. During RAD design workshops, users respond to existing prototypes, and analysts make improvements to modules designed based on user feedback. If the developer has experience as both a developer and a user, this can accelerate system development significantly. (Kosasi et al., 2015)
c. Implementation: In the implementation phase, analysts collaborate closely with users in workshops, designing the business and non-technical parts of the company. After approval of these aspects and the construction and screening of the system is carried out, new systems or parts of the system are tested before being introduced to the organization.(Aswati et al., 2017)

System testing is carried out using the blackbox testing method. Blackbox testing is a software testing method that is carried out without knowing the details of the implementation of the program code. In blackbox testing, testing is done by entering inputs into the system and observing the outputs produced. The purpose of blackbox testing is to ensure that the system functions according to predetermined functional specifications. This method is very useful for identifying bugs and errors in the system that may not be detected during development (Markiegi et al., 2019). Backbox testing can be done with several techniques such as equivalence partitioning, boundary value analysis, decision table testing, state transition testing, and error guessing.(Sharma & Zulfiah, 2016)

RESULT

Requirement Planning

The application of the RAD method in application development begins with the planning stage of the application requirements. The development process of this application is based on the analysis of user needs, consisting of visitors and administrators. The main focus at this stage is to solve existing problems. Here are the results of an analysis of system requirements, data requirements, software, and other elements.

The functional requirements of the application include:

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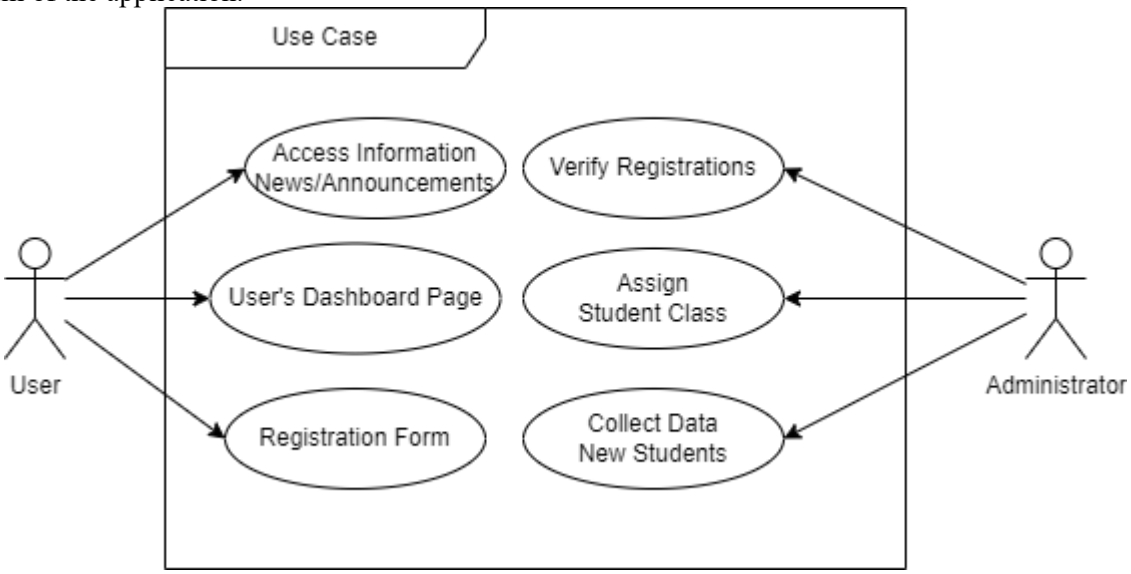
- Student Registration
- Class/Level Allocation
- Master number generation (by class and alphabetical order)
- Setting Master data
  - o Class Settings
  - o School Year
  - o Cost Components (registration, spp, etc.)

RAD Design Workshop

The RAD model takes inspiration from the waterfall model but shortens development time because it applies an object-based rather than procedural development approach. Therefore, in this phase, there are processes that run simultaneously, such as program code generation, prototype development, system UML diagram model generation, and testing processes.

In this case, the results of the analysis in the form of user requirements are outlined in a use case diagram to make it easier to understand user interaction with the system to be built. Figure 3 describes the use case diagram of the application.



Gambar 3. Use Case Diagram

There are 6 use cases and 2 actors that show user interaction with the system including: new student registration process, registration verification process, access to information, access to dashboard pages, determine student classes and recap new student data.

Based on the use case diagram, a database design is then created to store data and information related to the application being built. Figure 4 describes the entity relationship diagram or relationships between tables.

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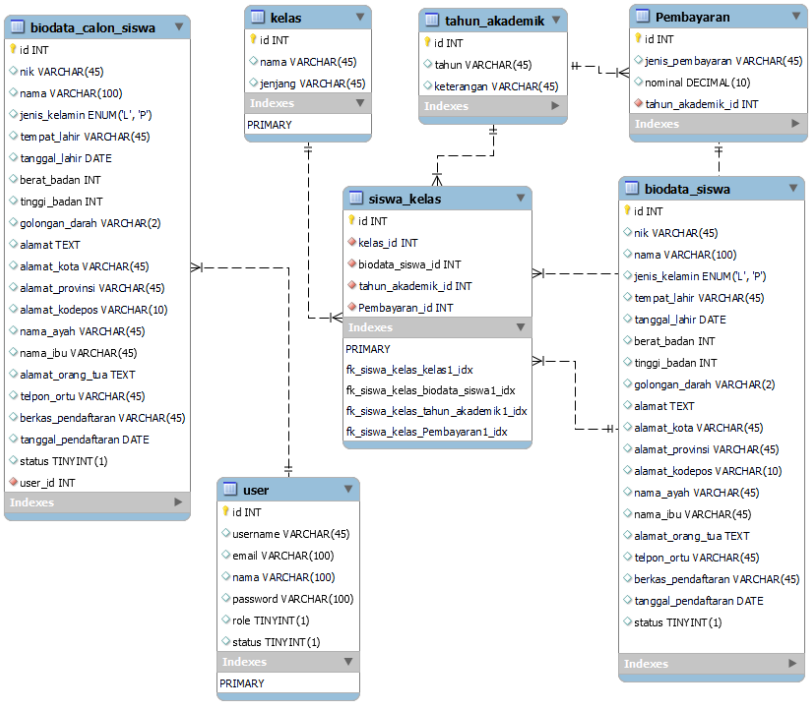

Figure 4 ERD

Implementation

In this implementation stage, the process of refining the prototype that has been made previously has been carried out. All fixes, upgrades and modifications are applied at this stage. Based on feedback from users regarding appropriate, non-compliant elements, which need to be removed, and added, here are the results of this stage of RAD implementation.

Figure 5. Homepage

Figure 5 shows the main page of the system in the form of initial information and selectable menus.

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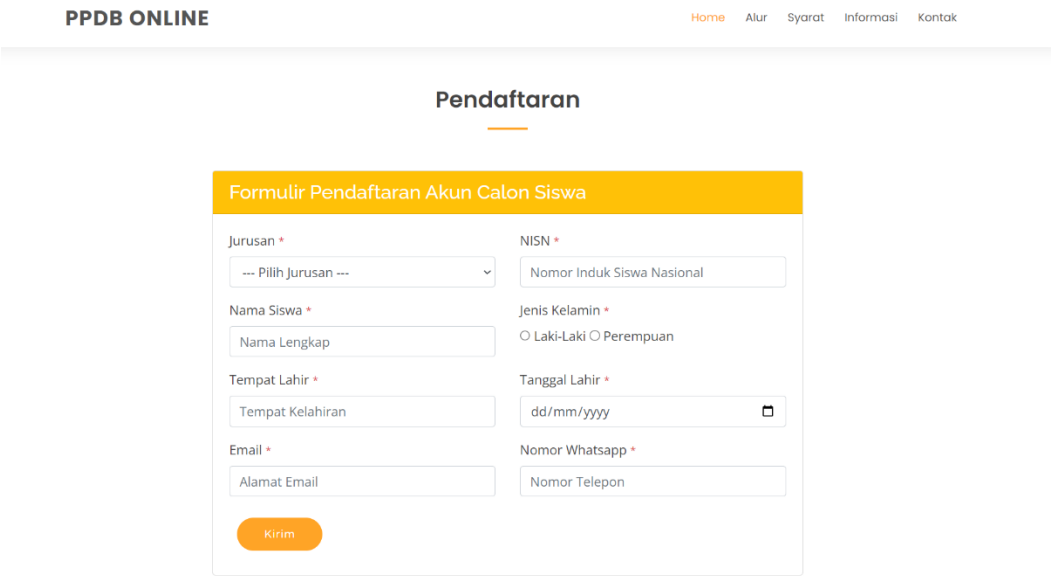

Figure 6. Registration form page

Figure 6 displays the new student account registration form page then after successfully registering an account, then the user can directly log in to the dashboard page to complete the biodata fields and registration files required as shown in Figure 7.

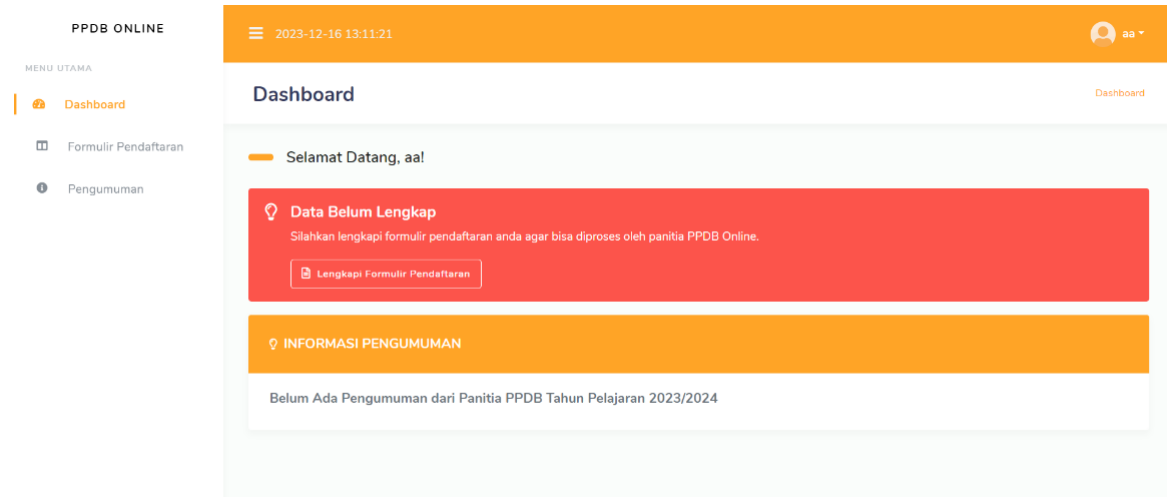

Figure 7. User Dashboard Page

Application Testing

In application testing, testing the functionality of the application in responding to requests is carried out. To find bugs in the application used black box testing method during the development process. Various conditions are tested on the application to ensure that the application can run properly. Table 1 shows the results of the testing process using black box testing. This is done to ensure this application can run properly and minimize the possibility of bugs or errors appearing in the application when used by users.

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Table 1. Black box testing results

No	Functionality	Test Results
1	Open the App	Succeed
2	Application Login	Succeed
3	Select the registration menu	Succeed
4	Input registration data	Succeed
5	Display detailed information page	Succeed
6	Display the admission list page	Succeed

Based on the results of the black box testing, it can be concluded that the application testing process has gone through all scenarios with results that are as expected. All test scenarios have been performed with the test result being "successful". This shows that this application is feasible to use and meets the expected standards.

DISCUSSIONS

In this section, the researchers can give a simple discussion related to the results of the research trials. This section contains the author's opinion about the research results obtained. Common features of the discussion section include the comparison between measured and modeled data or comparison among various modeling methods, the results obtained to solve a specific engineering or scientific problem, and further explanation of new and significant findings

CONCLUSION

The development of a web-based student registration information system with a Rapid Application Development (RAD) approach is an innovative and efficient solution to overcome the problems of managing student data and the student registration process. The RAD method allows developers to respond quickly to changes and create software that better suits user needs. The test results of the application show that this application is worth using and meets the expected standards. Thus, the development of a web-based student registration information system with the RAD approach is expected to improve efficiency, accessibility of student data, and the ability to adapt the system to continuous changes in the educational context

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