



Web-Based Thesis Guidance Monitoring Information System Based on Quick Response Code Technology

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Abstract. Thesis is one form of scientific writing created by students in the final stage of their studies. The Thesis is based on research results or studies on identified issues. During the execution or completion of the thesis, students are guided by a supervisor. One of the assessments in the Institutional Quality Indicator (IKU) is on-time graduation. Timely graduation is also influenced by the completion of the thesis. Therefore, monitoring of the completion of the thesis carried out by students is necessary. The use of manual monitoring forms has several drawbacks, mainly related to the manual nature of monitoring. Therefore, there is a need for the digitalization of thesis monitoring forms. The Thesis Monitoring Information System (SIMITA) is built on a web-based platform, using the PHP programming language and MySQL database. Quick Response Code (QR-Code) technology is a 2D technology capable of storing information in a 2D format. QR-Code technology serves the purpose of quickly delivering information and receiving fast responses. Supported by the current development of smartphones, they can be utilized as scanning tools. QR-Codes are employed to provide information more efficiently. The application development method used is the throw-away prototype method. The application is designed using a web-based system and MySQL database. With the advancement of QR-Code technology and smartphones, it is possible to integrate them into the final project monitoring information system. This integration will facilitate the provision of progress information on final projects undertaken by students.

Keywords: Thesis, Monitoring Information System, QR-Code.

1 Introduction

Udayana University, established in 1962, is the largest and comprehensive university in Bali and Eastern Indonesia. It is a state university under the Indonesian Ministry of Education and Culture. One field that has utilized technology in both the education and professional sectors, particularly in the utilization of information and communication technology, is the field of education[2]. The Final Project is one form of scientific writing created by students in the final stage of their

studies. The final project is based on research results or studies on identified issues. In the execution or completion of the Final Project, students are guided by a supervising lecturer. One of the assessments in the Institutional Quality Assurance (IKU) is timely graduation. Timely graduation is also influenced by the completion of the final project. Therefore, monitoring of the completion of the Final Project undertaken by students is necessary.

This research focuses on the case of the Computer Science study program at the Faculty of Mathematics and Natural Sciences. In the Computer Science study program, there are approximately 70 students completing their final projects each year. The computer science study program has a final project commission as the organizer of final projects and as the monitor of their implementation. Each year, the final project commission creates a timeline/schedule for the implementation of final projects. It is hoped that students can complete their final projects on time. However, due to conventional supervision, the completion of final projects often deviates from the established schedule.

In the literature review, based on previous research, various similar systems have been developed in the form of web-based and Android-based information systems that allow students to report the progress of their final projects to their supervising lecturers online [4][5].

QR Code is an evolution of the barcode, progressing from one dimension to two dimensions. While a one-dimensional barcode can only store information horizontally, QR Code can store information both horizontally and vertically, giving it high capacity in data encoding or information storage[3]. Initially, QR Code was used for tracking vehicle parts in manufacturing. However, it is now widely used for commercial purposes, especially in mobile phone applications[6]. Based on the background of the problem, this research builds a QR Code-based information system for monitoring final projects, which can assist in the supervision and monitoring of timely completion of final projects.

2 Research Methodology

A software prototype can be used in the software development process to help anticipate potential changes that may be needed. The throwaway prototype methodology involves a relatively comprehensive analysis phase used to gather information and develop ideas for the system concept[1]. However, many features suggested by users may not be well understood, and there may be technical issues that need to be addressed. Each of these issues is examined by analyzing, designing, and building a prototype design. If a prototype design doesn't work with the system, then the product, which is part of the system, needs additional improvement and only contains enough details to allow users to understand the issues being considered.

A system developed using this methodology may rely on several prototype designs during the analysis and design phases. Each prototype is used to minimize risks associated with the system by stating that important issues must be understood before building the system. Once the issues are resolved, the project moves from design to implementation. At this point, the prototype design is discarded, marking the difference between the throwaway prototype methodology and the prototyping methodology, where the prototype evolves into the final system. The throwaway prototype methodology balances carefully considered benefits in the analysis and design phases. The advantage of using a throwaway prototype is the ability to address key issues before the system is built. It takes longer to deliver the final system compared to the prototyping methodology, but this methodology can produce a more stable and reliable system[7].

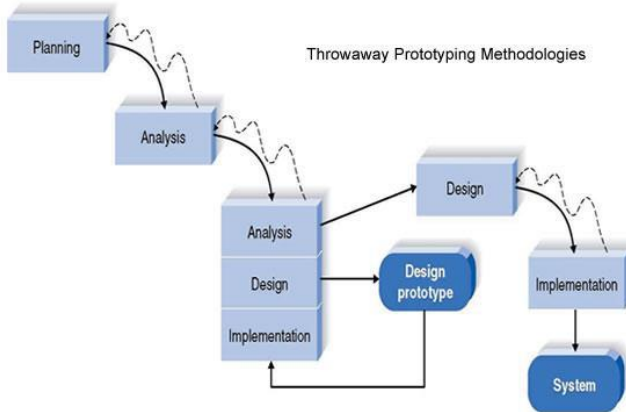


Figure 1 Throwaway Prototype

The stages performed in the throwaway prototype method are as follows:

2.1 System Requirements Analysis

This stage produces a document containing system requirements, both functional and non-functional, that have been identified. The next process models the data in an Entity-Relationship Diagram (ERD) and models functional needs using Unified Modeling Language (UML). ERD is a network model that abstractly represents stored data from the system. Entity Relationship Diagrams aim to show the data objects (Entities) and relationships present in these objects. UML (Unified Modeling Language) is a widely used method to visualize and document software system designs. UML uses object-oriented design concepts but is independent of any specific programming language and can be used to depict business processes and general requirements. A flowchart is used for the logical flow of the system.

2.2 System Design

This stage models the structure of the database in the form of tables ready to be implemented in coding and includes interface design based on the system architecture created from UML functionality.

2.3 Implementation

Coding translates the design into a language recognizable by the computer. In this stage, the system is implemented based on the modeling done in the previous stage, utilizing components already present in the prototyping process. Once coding is complete, testing is performed on the system. The goal of testing is to find errors in the system, which can then be corrected.

2.4 System Testing

After analysis, design, and coding, the completed system is used by users. An evaluation is then conducted to identify any shortcomings in meeting customer requirements. The development process then listens to customer complaints to improve the existing prototype. This testing ensures that the inputs given to the system produce the corresponding outputs.

3 Result and Discussion

3.1 System Requirements Analysis

In identifying system requirements, the researcher conducted interviews and questionnaires with lecturers and students. From the results of this identification, a system is needed to assist in monitoring guidance for final projects. Analysis of system input requirements involves the need for input data from lecturers, input data from students, and input data from the guidance process. Analysis of system output requirements involves the need to display information about lecturer data, student data, and guidance progress data. Guidance progress data can also be viewed through scanning QR codes. The analysis of functional requirements in the analysis stage aims to obtain the functional requirements that will be developed on each page[8]. Functional requirements analysis for this system can be seen in the following table.

Table 1. Functional Requirements

Kode	Pengguna	Kebutuhan	Deskripsi
KF1	Admin	Login Database	Sistem melakukan fasilitas login sebagai autentifikasi admin untuk menggunakan sistem

KF2	Admin	Input Data User	System menyediakan fasilitas input data user
KF3	Admin	Input Data Bimbingan	System menyediakan fasilitas untuk input Data Bimbingan
KF4	Admin	Update data User	System menyediakan fasilitas untuk update data user
KF5	Admin	Update Data Bimbingan	System menyediakan fasilitas untuk update data bimbingan
KF6	Mahasiswa	Lihat	System menyediakan fasilitas untuk melihat progress bimbingan TA
KF7	Dosen	Input Data Bimbingan	System menyediakan fasilitas untuk melakukan input data bimbingan TA dengan melakukan centang
KF8	Dosen	Lihat	System menyediakan fasilitas untuk melihat progress bimbingan TA

As for the non-functional requirements that must be fulfilled by the system, aside from the functional requirements to complete the system as a whole, they are reviewed in terms of:

3.1.1 User-Friendliness

The built system should present a user-friendly interface that is easily understood by users, providing comfort and ease of use. The implemented interface in the system takes the form of a design that is easily understood by users, including functional buttons for scanning data codes in the system. The results of scanning barcodes are then displayed as inventory item data.

3.1.2 Interface Convenience

The system is constructed with a user-friendly interface, emphasizing consistency in providing feedback, dialogs for actions, and error prevention. Feedback information includes displaying error messages during login, input data errors, confirmation of changed data, and deletion in the system.

3.1.3 Processing Speed

In terms of performance, the designed and built system implements data processing quickly and efficiently.

3.2 System Design

Based on the requirements analysis that has been conducted, a data flow diagram can be designed. A data flow diagram illustrates the flow of data in the system. The data flow is directed towards user entities. There are three user entities: the admin entity, the Dosen entity and the mhs entity. The next design is the Entity-Relationship Diagram (ERD). In the ERD, there are two entities: mhs and dosen. In Table 2, it represents the table for the student entity

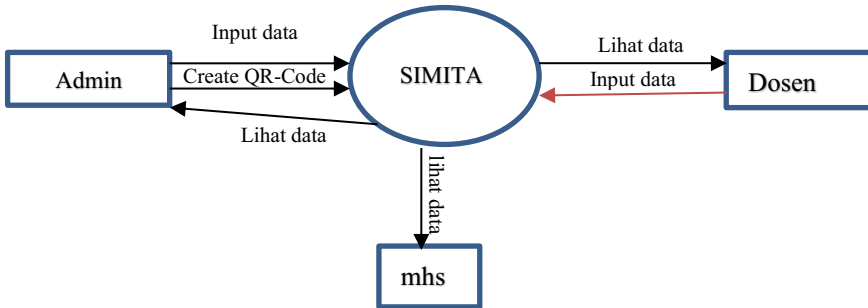


Figure 2. Data flow Diagram



Figure 3. ERD

Table 2. Table Mahasiswa

Nama field	Tipe field	Keterangan
NIM	String(12)	Primary Key
Nama	String (10)	
Alamat	String(50)	
NoHp	String(15)	

3.3 Implementation

The system implementation involves coding in a programming language. The implementation used is web-based. The implementation is done initially through localhost before being transferred to hosting and a domain. The following is the display of the implemented SIMITA web-based system. It appears that SIMITA has three user roles: admin, lecturer (dosen), and student (mhs). All users are required to log in to

differentiate access rights on the main page. The admin page is used for adding users, modifying the list of final project progress, and viewing final project progress. The lecturer page is used for guiding final projects and checking off the progress made by the supervising lecturer. Meanwhile, on the student page, users can only view the results of their final project progress.

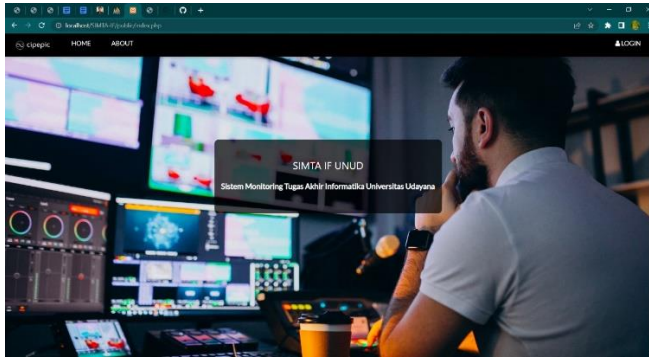


Figure 4. Landing Page

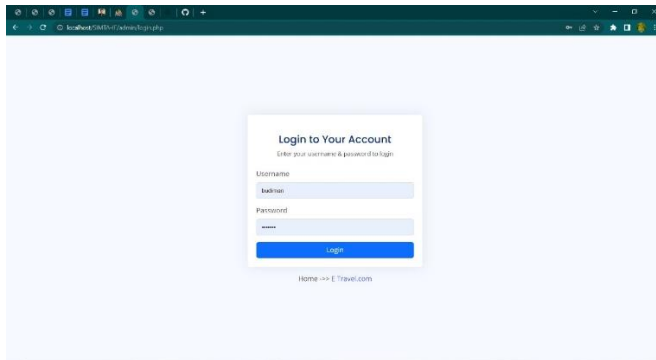


Figure 5. Login Page

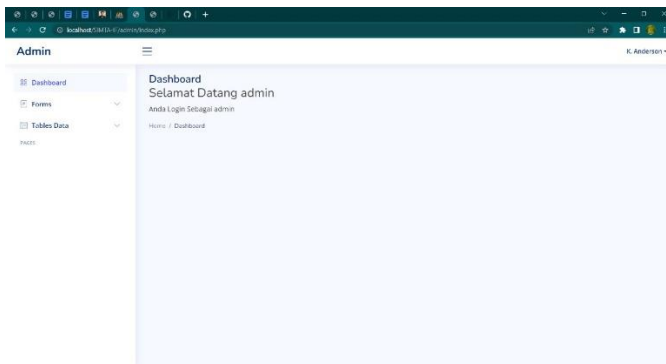


Figure 6. Admin Page

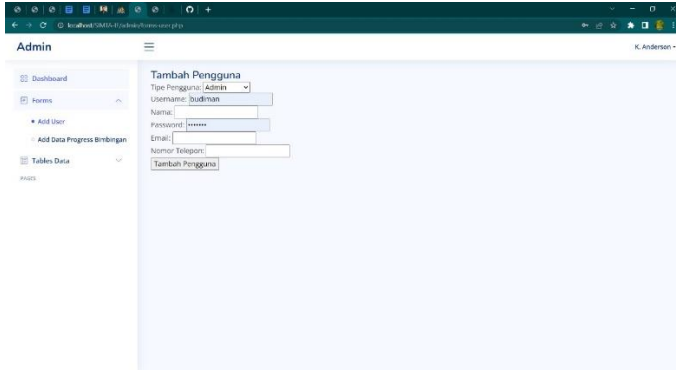


Figure 7. Admin Page Add User

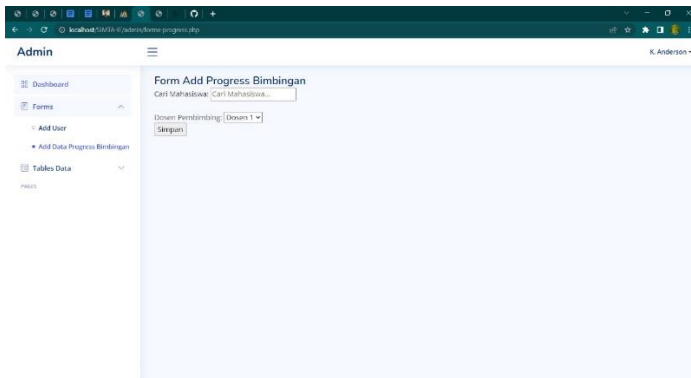


Figure 8. Admin Page Add Progress Thesis

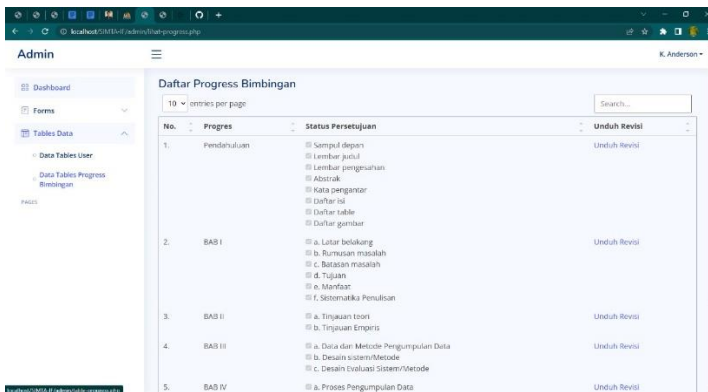


Figure 9. Admin Page Add List Progress

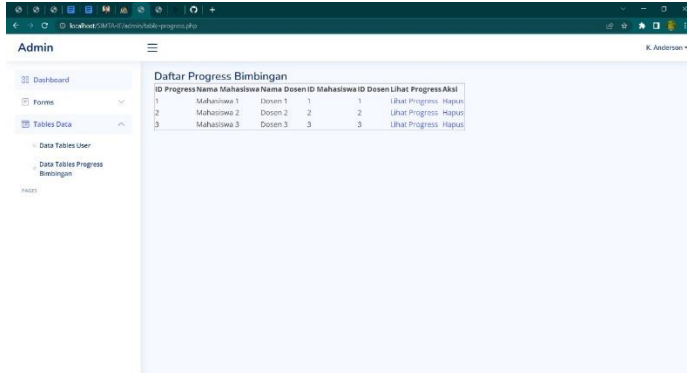


Figure 10. Admin Page List of Guidance

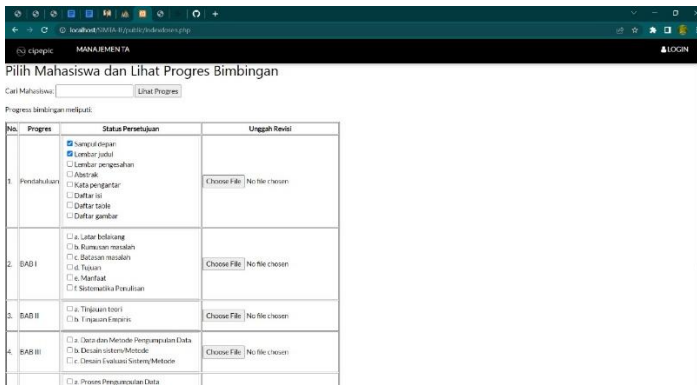


Figure 11 Lecture Page Thesis

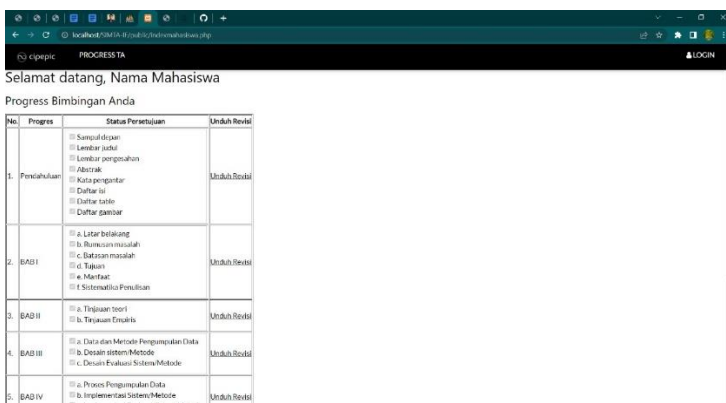


Figure 12 Student Page Thesis



Figure 13 Qr-Code

3.4 System Testing

System testing is conducted using the Black Box Testing method. The Black Box Testing method aims to test each module or function in the system to ensure that it operates as expected. Black box testing is one form of system testing that focuses on testing partitions or functional specifications of software. The main goal of black-box testing is to test the functional aspects of a system or software[9]. The results of Black Box Testing are presented in the following table

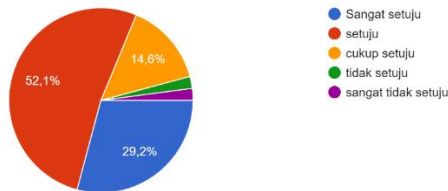
Table 3. Blackbox Testing

No	Skenario Pengujian	Test Case	Hasil Yang Di-harapkan	Hasil Pengujian	Kesimpulan
1	If the username and password are not filled in, and then the user clicks the login button	Username : (empty) Password : (empty)	The system will reject and display a message "please fill out this field"	As expected	Valid
2	Fill in the username and password blank then click the login button	Username : admin Password : (empty)	The system will reject and display a message on the password "please fill out this field"	As expected	Valid
3	Username is blank and password is filled in then click the login button	Username : (empty) Password : admin	The system will reject and display a message on the username "please fill out this field"	As expected	Valid
4	Fill in the username and	Username : admin	The system accepts login	As expected	Valid

	password, then click the login button	Password : admin	access and then displays the admin page		
5	The title, description, image and sound fields are empty then click the add button	Clicking the add button without filling in data	The system will reject and display a message "please fill out this field"	As expected	Valid
6	Fill in the title, description, image and sound fields then click the add button	Click the add button by filling in the data	The system will receive access and display the data that has been added	As expected	Valid

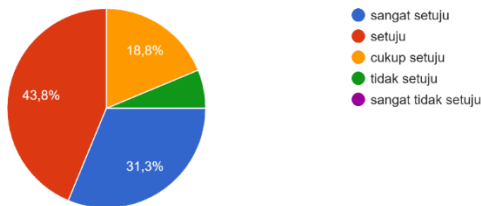
User testing is conducted using a questionnaire. Users are encouraged to try the application first and then fill out the questionnaire. Below is an image of the questionnaire results through Google Forms. From the questionnaire results, it can be concluded that the phase 1 of the application has shortcomings in terms of the interface, and users face difficulties in obtaining information displayed by the system.

Apakah aplikasi mudah digunakan?
48 jawaban



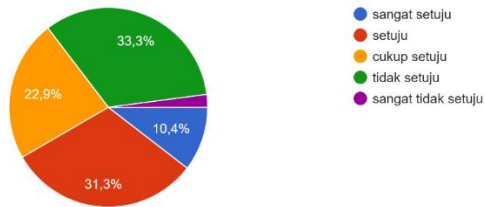
Gambar 14. Hasil kuisisioner user

Apakah informasi pada aplikasi dapat ditangkap dengan mudah dan jelas?
48 jawaban



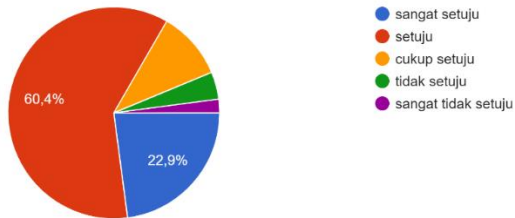
Gambar 15. Hasil kuisisioner user

Apakah aplikasi memiliki tampilan yang menarik?
48 jawaban



Gambar 16. Hasil kuisisioner user

apakah aplikasi bermanfaat untuk anda?
48 jawaban



Gambar 17. Hasil kuisisioner user

4 Conclusion

Based on the research results, it can be concluded that the study has reached the implementation and testing stages. The obtained results indicate that SIMITA is functional as expected; however, improvements are needed in the user interface to make it more user-friendly.

References

- [1] Pressma, R. S. 2010. Software engineering: a practitioner's approach. McGraw Hill Higher Education.
- [2] R. T. Mangesa, "Pengembangan Sistem Informasi Akademik Sekolah Berbasis Web Di Smp Negeri 3 Pattalassang Gowa," Jurnal MediaTIK : Jurnal Media

- Pendidikan Teknik Informatika dan Komputer, vol. 33, no. 2, 2021, [Online]. Available: www.gtmatrix.com.
- [3] S. Suhartono, "Development of E-Document Information System in Information and Computer Engineering Department Using Quick Response Code." [Online]. Available: <https://www.researchgate.net/publication/358352596>
- [4] Fx rahyono, "Kiat Menyusun Skripsi dan Strategi Belajar di Perguruan Tinggi", penaku, 2010.
- [5] T. H. Nasution, F. Pratama, K. Tanjung, I. Siregar, and A. Amalia, "Online thesis guidance management information system," J. Phys. Conf. Ser., vol. 978, no. 1, 2018, doi: 10.1088/1742-6596/978/1/012081.
- [6] T. N. Wenny, S. Suhartono, and J. M. Parenreng, "Development of Lecture Attendance System Using QR Code in Information and Computer Engineering Education Study Program of Universitas Negeri Makassar," Elinvo (Electronics, Informatics, and Vocational Education), vol. 7, no. 1, pp. 19–26, Jun. 2022, doi: 10.21831/elinvo.v7i1.47865.
- [7] Wiley, John. And Sons 2005. Systems Analysis and Design with UML (Second Edition). America.
- [8] DIANASARI, Ni Kadek Evi; CAHYADI PUTRA, I Gusti Ngurah Anom. E-Banten sebagai Media Online Penjualan Banten di Bali. JELIKU (Jurnal Elektronik Ilmu Komputer Udayana), [S.l.], v. 12, n. 1, p. 101-112, jan. 2023. ISSN 2654-5101
- [9] ADIARTIKA, Made Harry Dananjaya; SUPRIANA, I Wayan. Pengembangan Sistem Informasi Manajemen Tuas Akhir Program Studi Teknik Informatika Universitas Udayana. JELIKU (Jurnal Elektronik Ilmu Komputer Udayana), [S.l.], v. 9, n. 1, p. 13-24, oct. 2020. ISSN 2654-5101.
- [10] Pramarta C, Mimba NPSH. Udayana University International Student Management: A Business Process Reengineering Approach. ComTech: Computer, Mathematics and Engineering Applications. 2020;11(2):57-64.

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