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A Framework of University Internship Information System with Web-Based Design Analysis

Ferdian Aditya Pratama
Department of Information System
Atma Jaya Catholic University of Indonesia, Jakarta, Indonesia
ferdian.aditya@atmajaya.ac.id

Riana Magdalena Silitonga
Department of Industrial and Systems Engineering
Chung Yuan Christian University, Taiwan
riana.magdalena@atmajaya.ac.id

Yung-Tsan Jou
Department of Industrial and Systems Engineering
Chung Yuan Christian University, Taiwan
ytjou@cycu.edu.tw

Abstract
The internship has become a phase that needs to be crossed by every college student in the lecture curriculum. In practice, there are many things to handle in an internship process flow, from selecting a company to do the internship on to experiencing internship report defense. Developing an information system to facilitate the internship process flow of complicated correspondence will be advantageous to college students, lecturers, and internship coordinators in executing the internship process flow of the Industrial Engineering Study Program Faculty of Engineering Atma Jaya Catholic University. The built system will be mapped, made, designed, and programmed to become a specialized website to run internship process flow. Built system uses System Development Life Cycle (SDLC) framework with a system prototyping method. The programming language used is HTML framework, CSS for styling, PHP for back-end processes, and javascript for the query. The development of the system starts from the planning phase, then continued by the requirement analysis, database design, prototype, and implementation. Testing with system testing is also done to make sure that the website can run properly.

Keywords
Information System, SDLC, and System Prototyping.

1. Introduction
An internship is an activity done by a college student guided and monitored by the lecturer in the forms of research or observation within a company or agency as a requirement to graduate from university. Moreover, an internship is also a part of working environment training organized in an integrated manner in a work institution by working directly under the guidance and supervision of more trained personnel in the production process of goods or services to master specific skills and expertise. Students can improve their competencies, self-confidence, and professionalism through the internship (Bah and Alanzi 2017). Usually, an internship is done by students in the later semester. This internship is done to experience real-life work experience through that internship with the report as a symbol of their contribution to solving problems that the company faces (Juhana et al. 2017).

Atma Jaya Catholic University, specifically the Industrial Engineering Department, encourages the internship because it is a program that goes hand in hand with the study program and university visions and missions, where internship aims to produce high-quality bachelors who qualified in the analysis of manufacturing industrial system of manufacturing and services and also play an active role in the development of the industrial world. Other than that, an

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internship has become a requirement for an important course, which is a thesis. Knowing that internship is an essential and must-take course by the students.

In its implementation, the management of the internship as a whole in Atma Jaya Catholic University, specifically the Industrial Engineering Department, is managed by a permanent lecturer called the internship coordinator. This internship coordinator manages the lecturer as guider and examiner, report defense date, and score input. Those data inputs are still manual with internship files that are arranged by folders. That kind of method will make it difficult for the coordinator because those files can be lost or corrupted. As a result, the coordinator must contact students again for confirmation on those files, thus wasting more time sending those files again. Other than that, forms as the requirements for internship are still done by manual means (hard copies) so that if they are lost, students need to write the forms again. Hard copies as papers degrade and can be lost easily. Furthermore, there are nine manual forms required to satisfy the requirements of the internship report.

To minimalize the human error and time consumption of the submitted forms by students, it is urgent to develop an integrated and non-physical information system to arrange all data. A good system will have a targeted goal to facilitate all connected entities in the system. An information system in an organization can help improve an individual character and professional skills since the information system can give direct feedback (Jaafar et al. 2017). This system will be the facilitator to the entities in inputting internship data and will make it easier for the lecturers and coordinator to do their jobs without printing physical forms. Also, an internship management system is a recommender system that can guide students to find the best organization that can suit their qualifications (Abdullah et al. 2017). This information system needs to interface that many users can access at once with real-time speed. Therefore a web-based system is necessary with the internet as its connection. The web-based application will be easier to customize, giving it a more dynamic feeling following the development of the rules of the internship program. With SDLC as its foundation, internship program information system development with a web-based application will be more structured. This research aims to design and develop the web-based internship information system for Industrial Engineering Department in Unika Atma Jaya.

2. Literature Review

Previous research conducted by Wijaya and Rakhmawati (2019) discusses about how to design a restaurant's information system using a UML. The information system was developed using a Waterfall method. There are five main phases conducted in this research, (1) system planning, (2) analysis, (3) design, (4) coding, and (5) testing. This research shows that developing an information system using a waterfall SDLC method can generate a software product that fits the user requirements.

Another previous research conducted by Kristanto et al. (2020) about designing a student's web blog information system using SDLC, specify using the waterfall model. There are five main phases conducted in this research (1) requirement, (2) design, (3) implementation, (4) verification, and (5) maintenance. This research shows that using the website as a working platform for the students can positively impact them. The students are more active in writing their work and can get any information regarding the work quickly.

Previous research from Hardyanto (2018) discusses how to develop an information system for managing the internship process using the SDLC model. There are five phases of SDLC conducted in this research; (1) requirement analysis, (2) design, (3) implementation, (4) testing, and (5) maintenance. This research found that using SDLC as a development model is still relevant and can answer all the user requirements.

3. Methods

The framework used in the system is system development life cycle (SDLC). SDLC is a process of developing a high-quality software product in some phases, such as requirements analysis, design, coding, testing, and maintenance (Suryantara and Andry 2018). Another definition state SDLC is either descriptive or perspective characterization of how software should develop (Pukdesree 2017). SDLC focuses on reaching a functional product in the shortest period by using the least resources possible (Mohino et al., 2019). SDLC used in this research is shown in Figure 1.

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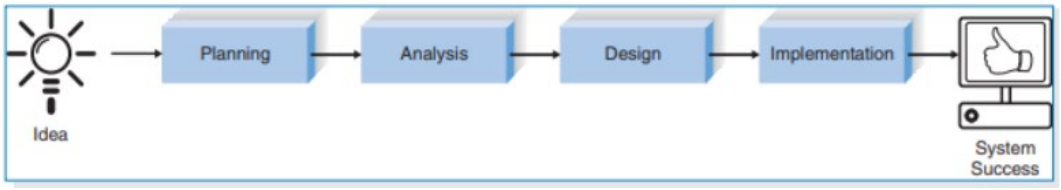

Figure 1. SDLC Process

There are four major steps to design this system:

3.1. Planning

A literature review, gathering the requirements, and generating an estimated plan schedule was conducted in this step. In the literature review process, knowledge about essential web-based system development and the Laravel framework was gathered. Also, similar previous research is searched in this step. The requirements for the system were collected by interview the internship coordinator using social media.

3.2. Analysis

The analysis step was conducted to have a better understanding of the whole process of the internship. The flow process of an internship is shown in Figure 2.

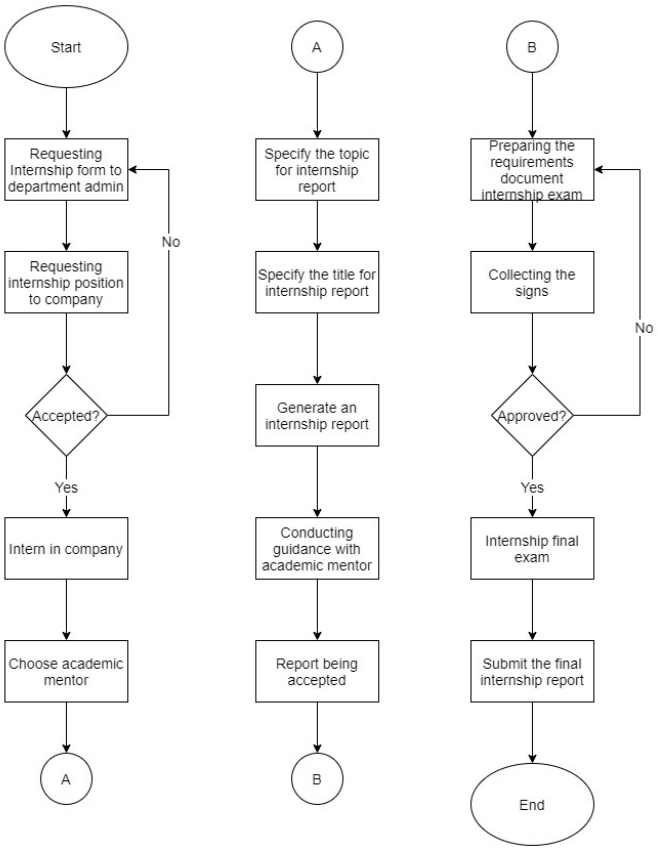

Figure 2. Current Internship Flow Process

In this process, the requirements definition was conducted to generate more detail about the main and supporting features in the system. There are three entities used in the system (1) students, (2) lecturers, and (3) Internship coordinator. In this step, the gathered requirements are being analyzed more detail. The requirements will be divided into primary and feature from students, lecturers, and coordinator requirements. The requirement definition is shown in Table 1.

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Table 1. Requirements Definition

Role	Primary	Features
Students	Online counseling	Lecturer information
	Online form and report upload	Display personal information
	Online document upload	Display defense information
	Personal account with information	Account modification Personal defense schedule
	Report defense request via online	Display internship counseling form Personal progress tracking
Lecturers	Online form approval	Account modification
	Online document approval	Display personal information
	Personal account	Make announcement
	Defense information	Student info
	Score submit	Student progress tracking
Internship Coordinator	Online form and document approval	Account modification and Display Account
	Assign lecturer to a student	Lecturer account register
	Make defense schedule	Make announcement
	Online report defense request approval	Defense information
	Score submit	Student progress tracking
Role	**Primary**	**Features**
Students	Online counseling	Lecturer information
	Online form and report upload	Display personal information
	Online document upload	Display defense information
	Personal account with information	Account modification Personal defense schedule

3.3. Design

The design process was conducted based on the requirement analysis in the previous step. This step will generate a use-case diagram and class diagram. The use-case diagram in this research is shown in Figure 3.

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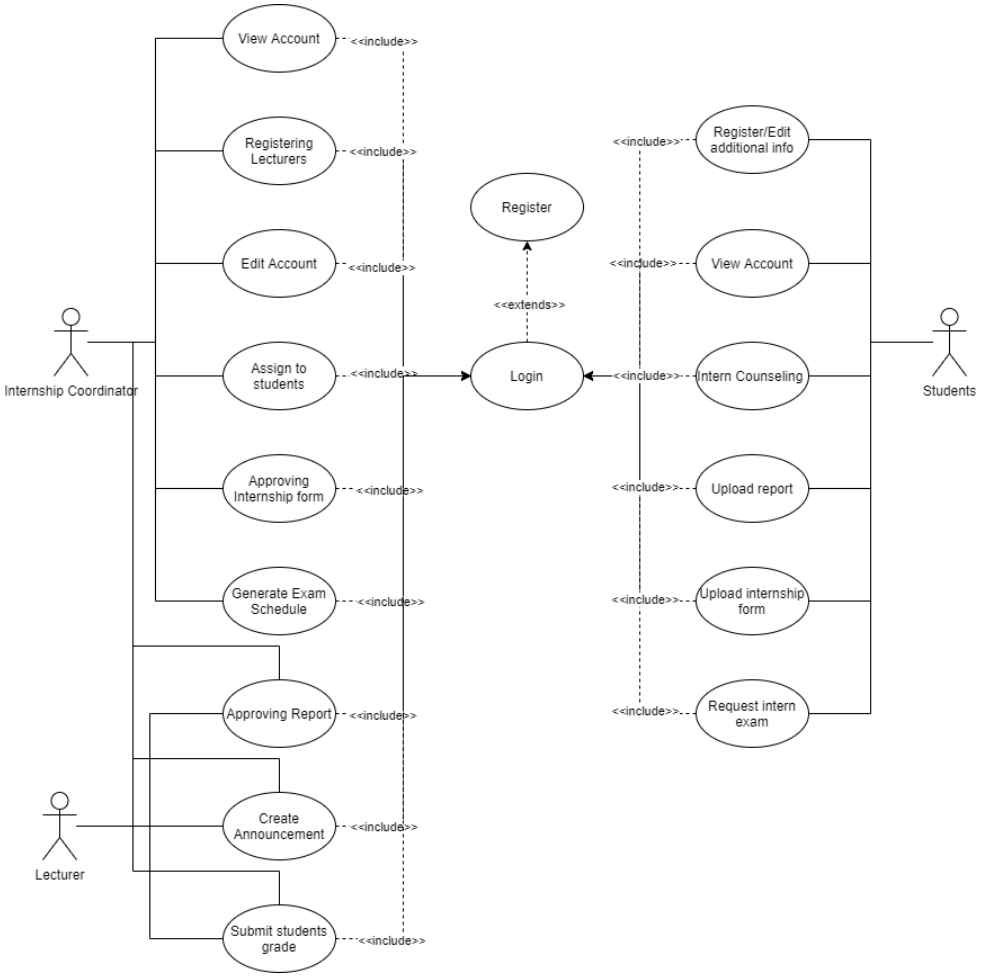

Figure 3. Use Case Diagram

There are three main actors in the system, internship coordinator, lecturers, and students. Each of the actors has its activities, and all of the activities are required to log in. All the functions declared in the use case diagram have their method as a trigger. A detailed explanation of the relationship between the use case and the class diagram is shown in Table 2.

Table 2. Relationship Between The Use Case and The Class Diagram

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Actor	Primary Function	Detailed Function	Class	Triggers (Method)
Internship Coordinator	Account Information	View Account, Edit Account,	User	getAccount()
		Registering Lecturers		Register()
	Approving internship registration	Approving Internship Form	Internship	approvingForm()
	Exam Schedule	Generate Exam Schedule	Exam	scheduleExam(), getReportData()
Internship Coordinator, Lecturer	Publish announcement	Create Announcement	Announcement	createAnnouncement()
	Grading	Submit Students grades	Grade	insertGrade()

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Table 2. Relationship Between The Use Case and The Class Diagram (cont.)

Actor	Primary Function	Detailed Function	Class	Triggers (Method)
Students	Account Information	View Account, Register, update Account Info	User	getAccount(), register(), updateAccountInfo()
	Internship Counseling Book	Submit Internship counseling book	Counseling	insertCounseling()
	Upload Report & Exam Registration	Upload Report, register internship exam	Report, Exam	uploadReport(), examRegister()

As the use case diagram explains the system's features, the class diagram will explain the system's structure. The class diagram of this system is shown in Figure 4.

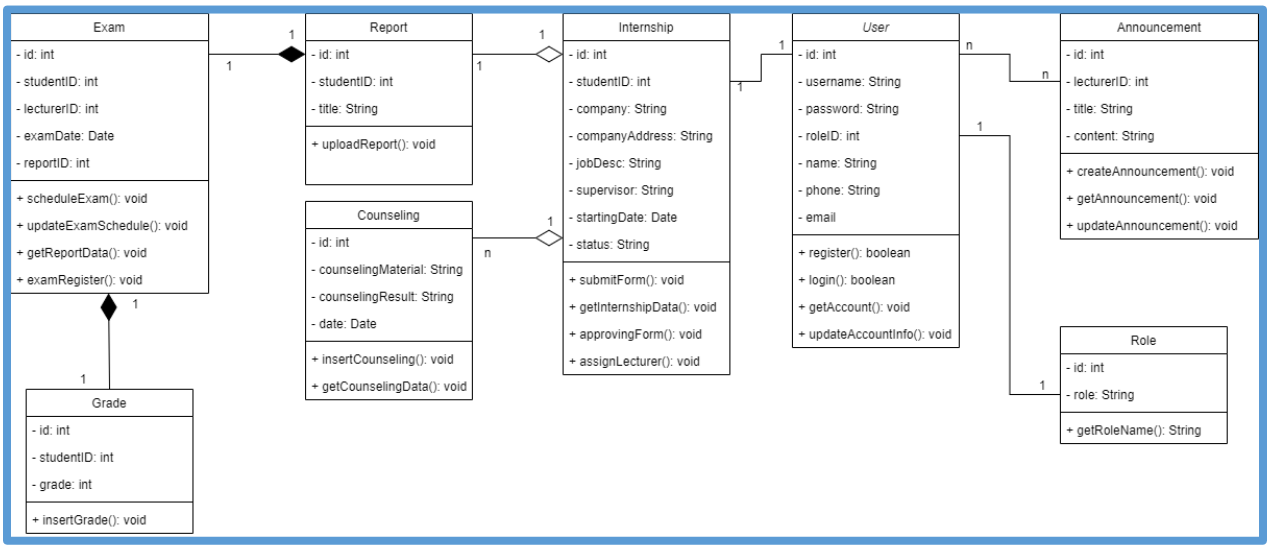

Figure 4. Class Diagram

Based on Figure 4, there are other types of relationships other than the general relationship. Report and Counseling class has an aggregation relationship, which means both the report and counseling class are part of the Internship class. As for the exam class has a composition relationship, which means the exam class cannot exist if the report class does not exist. The grade class also has a composition relationship with the exam class.

3.4. Implementation

The system design conducted in the previous research was implemented with the code and testing in this step. The system was developed using Laravel framework with PHP language as its basis. The database used in this system is MySQL. In the testing step, only functional testing was conducted in this research using black-box testing. The purpose of functional testing is to test each back-end process in the system, whether it's valid or not.

4. Results and Discussion

The information system of the internship was developed using Laravel framework. The system was developed based on the requirements and the design system. The system's homepage is shown in Figure 5, and the features inside the home page are shown in Table 3.

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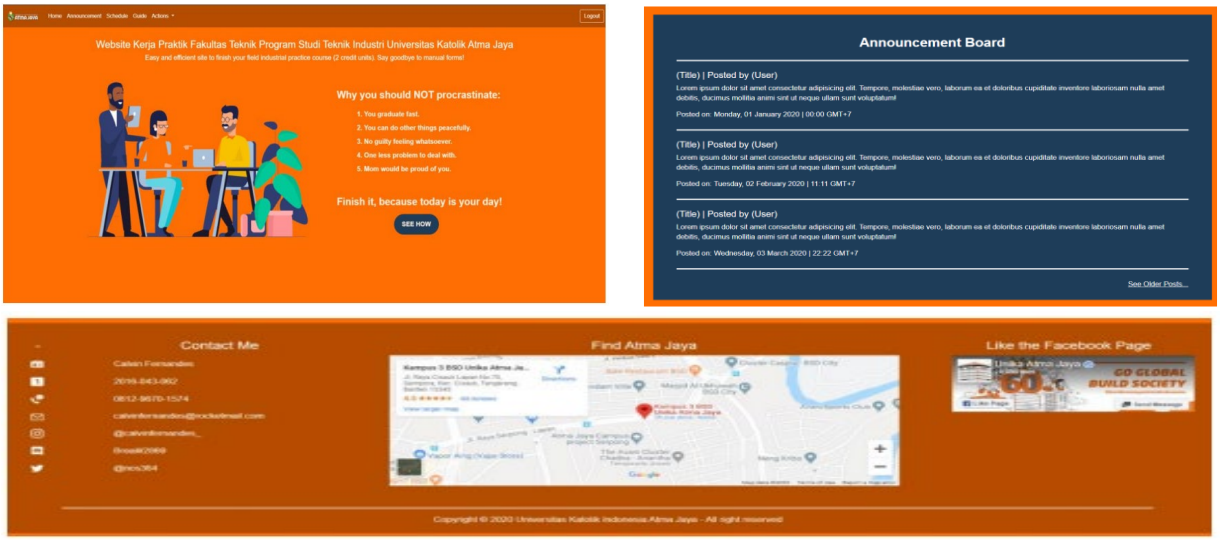

Figure 5. Home Page, Announce Board, and Footer of the System

Table 3. Features in Home Page

Name	Object	Feature
Navbar	Navigation bar with button and link	Grouping all the functions inside the website (primary function, login, register, etc.) for navigation
CTA Button	Button	Guiding the users to the page steps
Announcement Board	Div and Link	Show three newest announcement
About Us	Footer with text and button	Grouping the identity of the website

The students can see the important and updated information about the document submission deadline on the announcement board. The students can also follow the most updated schedule for the internship exam schedule. The interface of the internship schedule is shown in Figure 6.

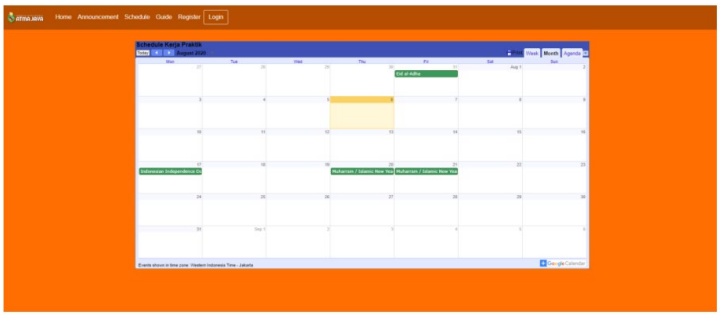

Figure 6. Schedule Interface of the System

This system also provides the students to fill their internship counseling books quickly. This process aims to help the students easily write and retrieve the material from the last counseling process. The interface of the internship counseling book is shown in Figure 7.

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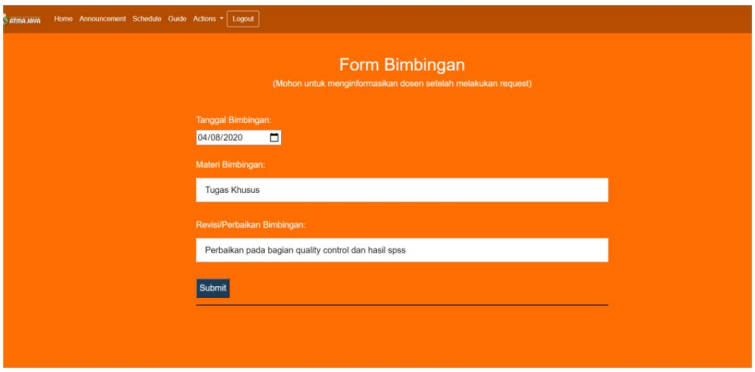

Figure 7. The interface of The Internship Counseling Book.

There are three fields that students need to fill up. The first one is the date when is the counseling process was done. The second is what material was discussed in the last counseling meeting. The last is what points need to be revised inside the report. The back-end process of this virtual internship counseling book is shown in Figure 8.

```
public function studentsubmitbimbingan(Request $request)
{
    $Err = "";
    $datebim = self::testinput($request->input('tanggalbimbingan'));
    $materi = self::testinput($request->input('materibimbingan'));
    $revisi = self::testinput($request->input('revisibimbingan'));
    $userid = Auth::id();
    $id = mahasiswa::where('userid', '=', $userid)->value('id');
    if (bimbingandosen::where('idmhs', '=', $id)->exists()) {
        $iddos = bimbingandosen::where('idmhs', '=', $id)->value('iddosen');
        $nim = mahasiswa::where('id', '=', $id)->value('nim');
        $bimbingan = new bimbingan;
        $bimbingan->idmhs = $id;
        $bimbingan->nim = $nim;
        $bimbingan->tanggalbimbingant = $datebim;
        $bimbingan->materibimbingant = $materi;
        $bimbingan->revisibimbingant = $revisi;
        $bimbingan->formstatus = 1;
        $bimbingan->iddos = $iddos;
```

Figure 8. The Back-End Process of The Internship Counseling Book.

Figure 8 explains the back-end process that happens between the controller and the database in Laravel framework. The data send to the database is based on the user input from the user interface in Figure 7. The input data is store in three variable ($datebim, $materi, and $revisi). As for the other data, it is retrieved from the data in other tables. The data is sent to the database via Laravel's model. The functionality of the system was tested using black-box testing. The black-box testing is shown in Table 4.

Table 4. Black-box Testing

Features	Condition	Expected Result	Obtained Result	Status
Home Page	Home Page showed successfully	CTA Button, Announce board, and About US can be shown on the home page	CTA Button, Announce board, and About US can be shown on the home page	Valid
Register	All fields inputted correctly	Success message pop up and data stored in the database	Successful message pop up and data stored in the database	Valid
	Some fields not inputted correctly	Failed message pop up and return to the register page	Failed message pop up and return to the register page	Valid
Login	Username and Password match with the data in the database	Success message pop up and redirect the user to the home page	Success message pop up and redirect the user to the home page	Valid

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Table 4. Black-box Testing (cont.)

Features	Condition	Expected Result	Obtained Result	Status
Login	Username or Password did not match with the data in the database	Failed message pop up and return the user to the login page again	Failed message pop up and return the user to the login page again	Valid
Register Lecturers	All fields inputted correctly	Success message pop up and data stored in the database	Successful message pop up and data stored in the database	Valid
	Some fields not inputted correctly	Failed message pop up and return to the register page	Failed message pop up and return to the register page	Valid
Create Exam Schedule	All fields inputted correctly, and no conflicting date	Success message pop up and data stored in the database	Successful message pop up and data stored in the database	Valid
	Some fields not inputted correctly, or there are conflicting date	Failed message pop up and return to the schedule page	Failed message pop up and return to the schedule page	Valid
Filling the Internship Counseling book	All fields inputted correctly	Success message pop up and data stored in the database	Successful message pop up and data stored in the database	Valid
	Some fields not inputted correctly	Failed message pop up and return to the internship counseling book page	Failed message pop up and return to the internship counseling book page	Valid
Exam Registration	All fields inputted correctly and all requirements documents uploaded successfully	Success message pop up and data stored in the database	Success message pop up and data stored in the database	Valid
	Some fields not inputted correctly, or some requirements documents are missing	Failed message pop up and return to the exam registration page.	Failed message pop up and return to the exam registration page.	Valid
Submit Grades	All fields inputted correctly	Success message pop up and data stored in the database	Successful message pop up and data stored in the database	Valid
	Some fields not inputted correctly	Failed message pop up and return to the grades page	Failed message pop up and return to the grades page	Valid

Based on Table 4, all the functionalities of the system have a valid result. It means all the functionalities on the system return the expected result.

6. Conclusion

The development process of the internship information system has four primary processes, (1) gather the requirements, (2) analyze the requirements definition, (3) design the system using a UML diagram based on the requirements, and (4) implement the design into the code step. The web-based system was developed to ensure real-time data processing. The web-based system also makes the system easily accessible and managed from anywhere with any platform device.

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The black-box testing was conducted in this research to evaluate all the functionalities in the system. Further testing like usability is required to evaluate the impact of the system in the next research.

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Biographies

Ferdian Aditya Pratama, was born in Semarang, Indonesia in 1993. He received his Bachelor's Degree in Informatics Engineering in 2014 and his Master's Degree in Computer Science in 2016 from Satya Wacana Christian University. Currently, he is working as an Assistant Professor at Atma Jaya Catholic University of Indonesia. He has a research interest in software engineering and human-computer interaction.

Riana Magdalena Silitonga, was born in Bandung, Indonesia in 1978. She received her Bachelor's Degree in Mathematics in 2001 and her Master's Degree in Management Technology in 2003 from Bandung Institute of Technology. Currently, she is a Ph.D. student in the Department of Industrial and Systems Engineering of Chung Yuan Christian University, Taiwan. Her research interest is in management technology, information system, product design, and innovation.

Yung-Tsan Jou, was born in Kaohsiung, Taiwan in 1963. He received his Master Degree of Mechanical Engineering in 1995 and Ph.D in Integrated Mechanical Engineering and Industrial Engineering in 2003 from Ohio University, USA. Currently he is an Associate Professor at Department of Industrial and Systems Engineering Chung Yuan Christian University, Taiwan.. Dr. Jou has published over 100 technical papers and reports, and 3 patents, and has translated 2 books. He has been involved in many research projects since he joined the Department in 2004 and has received significant amount of research grant from various sources, including the National Science Council, Chung-Shan Institute of Science & Technology, Industry Technology Research Institute, Chung-Yuan Christian University, and companies from the Industry. His research interest is virtual reality and ergonomics, design of innovative human-machine interfaces, new product design, smart manufacturing, machine learning, and data analysis.

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