Design and Development of UUM Internship Monitoring System: A Web-based Application for Monitoring Practicum Students

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Abstract: The practicum program is a part of the bachelor's degree for the School of Computing's core course requirement in Universiti Utara Malaysia (UUM). Students undertaking the practicum program would be assigned a UUM supervisor and a company's supervisor to monitor their progress throughout the program. Currently, the supervision process is based on the conventional method of email and phone calls, leading to ineffective communication and mismanagement in the practicum program. Thus, the UUM's web-based Internship Monitoring System was created for UUM Supervisors, Practicum Students, and the Company's Supervisors to facilitate communications among them throughout the practicum program. The purpose of the system is to help the supervisors monitor students' progress. The methodology that has been used in this project is the system prototyping methodology. This methodology comprises the planning, analysis, design, and implementation phases. In short, the UUM Internship Monitoring System is expected to facilitate supervisors to monitor the students more effectively.

1. Introduction

The practicum program is a part of the bachelor's degree for the School of Computing (SOC) core course requirement at Universiti Utara Malaysia (UUM). All students are required to undergo six months of compulsory practical training in the final semester, which is semester 7. In addition, students are getting an equal opportunity to select either private or government sector organizations for practicum. This practical training is intended to expose students to the industrial environment before work. Throughout the practicum program, students could apply their theory to practice in or outside organizations to develop professional and personal competencies. Thus, practical training has become a critical factor in the scholarly inspiration of students [1]. Nevertheless, students must follow and pass all the prerequisites before being eligible for

practicum. After they are eligible to go to the practicum, a student will be assigned a SOC UUM supervisor to supervise him/her for the whole practicum process, such as to monitor the work performed and the progress of the report writing.

Monitoring practicum progress is a challenge for supervisors. Most students are doing the practicum outside the UUM, at an organization far from the supervisor. Thus, the supervisor and student cannot meet face to face to discuss the problem, if any. In addition, it is also difficult for the supervisors to visit on-site to check the student's progress. Most of the time, supervisors still use conventional methods such as email and phone calls to communicate with practicum students, which leads to ineffective communication and mismanagement in the practicum program. In this current situation, the communication between supervisors and practicum students is informal, and

it would make them inconvenient when they need to update the progress of each other.

Due to this issue, the proposed system named UUM Internship Monitoring system (UIMS), a web-based application, has been developed to help supervisors monitor student progress from time to time. The UIMS can be accessed by the UUM supervisor, practicum student, and company supervisor. Therefore, the UIMS aims to facilitate supervisors to monitor the students effectively. This paper discusses related studies, design development, UIMS usability evaluation of UIMS, and future works in the final section.

2. Related Studies

Related studies about how other colleges and universities manage internship procedures will be presented in this section. Internships were defined as the most attractive non-scholastic activities to the practicum student, constituting a great chance to turn the newly obtained theoretical knowledge into a natural experience [3,8]. Thus, many researchers observed and tried to improve the internship procedures conducted by colleges and universities. They intended to facilitate the procedures for the academic supervisor, practicum student, and company's supervisor.

One of the studies listed the disadvantages of conventional internship management models, which are (1) deficient and ineffectual, (2) rigid to actualize internship monitoring and there are probabilities of absence from positions, (3) supervisor hard to decide whether the final reports, journals, and other documents about internships are genuine or not, (4) tough to gather and analyze data on internship management, and (5) tough to collect the sundry printed documents that about internship [2,10]. All of these reflect the current situation of UUM internship management.

Moreover, the Laravel framework also had been used for creating a web-based internship monitoring system that facilitates the progress and activities of internships [4,9]. In another study, the authors indicated that the Universiti Teknologi Petronas (UTP) still apply a conventional management model to conduct the internship programs. As a result, it causes them to face numerous issues during the practicum period, such as information missing and excess, delays in reviewing process, correspondence issues, and, most vital, monitoring students. Thus, the Student Industrial Internship Web Portal (SIIWP) has been designed and developed as a communication platform to replace conventional processes [5]. On the other hand, the universities and colleges that still apply conventional internship management models face the issues and problems listed above. Thus, several universities and colleges discussed and proposed internship monitoring systems as the platform to improve the current situation, as summarized in Table 1.

Table 1. The functions of internship systems

Related Studies	Description
Internship Management Platform [2]	The internship management platform can be login by students, supervisors, and Internship management departments through laptops or smartphones. Students can use the platform to input internship logs, upload photos, compose journals, and discuss with the supervisor about issues they face in internships. Moreover, supervisors can check students' journals, view the progress uploaded by the students, and gives feedback to them. Finally, internship management departments can analyze the statistics of internships and announce the notices about the internship.
Internship Monitoring System [4]	The internship monitoring system can be accessed by administrators, the head of the study programs, students, field supervisors, and lecturers. Administrators can use the system to manage user data by adding, editing, and deleting user data. The head of the study program is a user to manage internship information' data and conducts monitoring of the internship process. Moreover, field supervisors and lecturers can check the internship's final and daily reports that the students upload.
Student Industrial InternshipWeb Portal (SIIWP) [5]	The web portal comprises the leading index portal. It can be accessed by administrators, students, lecturers, and coordinators. The administrators can access the system to upload documents and analyze database statistics and tables. In contrast, the students can view the status of the application and submit the weekly reports. The lecturers can base on the weekly report to evaluate the grade of students and supervise them. Moreover, the coordinators and administrators can determine the date for the lecturer's visit.

3. Methodology of Study

The study was conducted by adopting the System Prototyping methodology. Software Prototyping performs all the phases very quickly to develop a proposed system, and the proposed system will be evaluated by the users [6]. System Prototyping consists of four main phases: planning, analysis, design, and Implementation. The illustration in Figure 1 shows the flow of the phases.
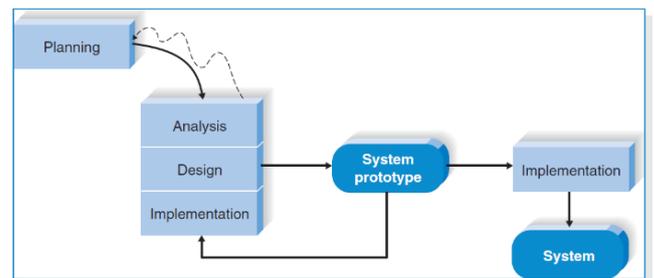

Figure 1. The phases of System Prototyping Methodology.

The planning phase is fundamental to understanding why an information system should be built. At this stage, a plan is proposed to develop a system that can assist the supervisor in monitoring and guiding the practicum student effectively. The analysis phase answers the questions of who will use the system, what it will do, and where and when it will be used. The activities involved in this phase identify the functional and non-functional requirements for the UUM Internship Monitoring System. A use case analysis, process modelling and data modelling will be produced at this stage. The design

phase is to determine the operational way of the system. Thus, the feasibility analysis and project plan will be reexamined and revised at the end of the design phase. A low-fidelity prototype will be developed to refine the functional and non-functional requirements at this stage. The implementation phase is the final phase of the System Prototyping Methodology. Target users and software tester will test the system to ensure it performs as designed.

4. Design and Development of UIMS

The design and development of UIMS are described in this section. In this project, the main problem that UUM supervisors faced was their inability to monitor practicum students from time to time due to the lack of a standard communication platform. Therefore, during the analysis phase, the project team used requirement-gathering techniques such as interviews to get the users' requirements. In this project, the UUM Internship Monitoring System's requirements have been analyzed by conducting a requirements analysis process. The requirements have been gathered by interviewing SOC UUM's supervisors, interviewing practicum students, interviewing the director of the Centre for University-Industry Collaboration (CUIC) UUM, and analyzing similar systems implemented in other fields, such as project progress monitoring system. Table 2 has been tabulated with a list of requirements for UIMS From the requirement gathering process. They include login, manage task due date, view content of the submission, upload commented document, view Gantt Chart, view content of digital logbook, view task due date, manage Gantt Chart, manage the submission, view commented document, update content in a digital logbook, and verify the content of digital logbook.

Table 2. List of requirements for UIMS

ID	Requirement Description	Priority
1	**LOGIN**	
1.1	UUM Supervisor, Practicum Student and Company's Supervisor must login into UIMS by key in the username and password.	High
1.2	The UIMS must verify the username and password of UUM Supervisor, Practicum Student and Company's Supervisor.	High
2	**MANAGE TASK DUE DATE**	
2.1	System must display a page that allow UUM Supervisor to set up task due date.	High
2.2	The system must allow the UUM Supervisor to view all the task due date information.	Medium
2.3	System must display a page that allow UUM Supervisor to edit task due date	Medium
2.4	The system must allow UUM Supervisor to delete the selected task due date information.	High
3	**VIEW CONTENT OF SUBMISSION**	
3.1	UUM Supervisor can view and download content of submission that submitted by Practicum Student.	Medium
4	**UPLOAD COMMENTED DOCUMENT**	
4.1	UUM Supervisor should able to upload the commented document.	Low
4.2	UUM Supervisor should able to delete the commented document.	Low
5	**VIEW GANNT CHART**	
5.1	UUM Supervisor and Company's	High
	Supervisor can view the content of Gantt Chart that set up by the Practicum Student.	
6	**VIEW CONTENT OF DIGITAL LOGBOOK**	
6.1	UUM Supervisor can view the content of digital logbook that updated by Practicum Student and verified by Company's Supervisor.	High
7	**VIEW TASK DUE DATE SET UP BY UUM SUPERVISOR**	
7.1	Practicum Student can view the task due date that set up by UUM Supervisor.	High
8	**MANAGE GANTT CHART**	
8.1	Practicum Student shall set up main task of Gantt Chart.	High
8.2	Practicum Student shall set up subtask of Gantt Chart.	High
8.3	The system must allow Practicum Student to view all the main task and subtask information.	Medium
8.4	The system must allow Practicum Student to edit the selected main task and subtask information.	High
8.5	The system must allow Practicum Student to delete the selected main task and subtask information.	High
8.6	The system must allow Practicum Student to view the content of Gantt Chart.	High
9	**MANAGE SUBMISSION**	
9.1	System must display a page that allow Practicum Student to upload document.	High
9.2	System must display a page that allow Practicum Student to delete submission.	High
10	**VIEW UUM SUPERVISOR'S COMMENTED DOCUMENT**	
10.1	The system must allow Practicum Student to view and download the commented document that uploaded by UUM Supervisor.	Medium
11	**UPDATE CONTENT IN DIGITAL LOGBOOK**	
11.1	Practicum Student can update their daily activities in digital logbook.	High
12	**VERIFY CONTENT OF DIGITAL LOGBOOK**	
12.1	Company's supervisor can verify the content of the digital logbook.	High

The Unified Modeling Language (UML) has been used to visualize the functional requirement in Table 2. In this phase, the use case diagrams and sequence diagrams as a behavioral diagram model were constructed to represent the list of requirements, while a class diagram represented the structural components of UIMS. The communications between use cases and actors of UIMS are shown in Figure 2. The major use cases are login, manage task due date, manage Gantt Chart, manage the submission, update digital logbook content and verify digital logbook content. In addition, The UUM Supervisor, Practicum Student, and company supervisor can directly log in to UIMS without registration. It is because UIMS will only allow the members of UUM to use the system, and the UIMS will directly retrieve the database of UUM Portal to authenticate the related users who the registered users of UUM Portal.
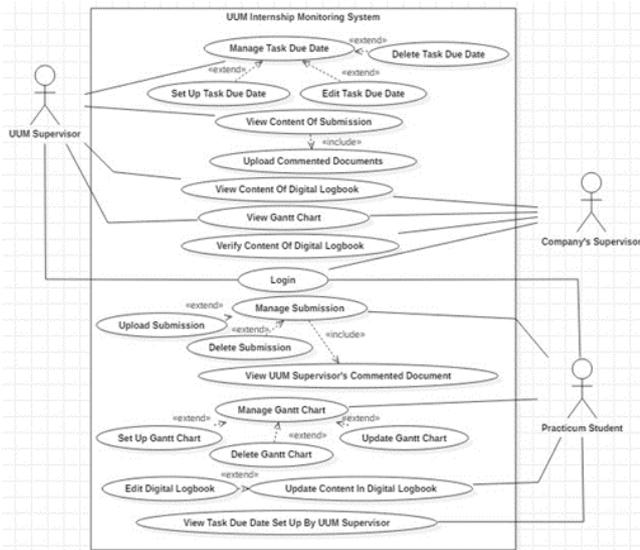
Figure 2. The Use Case Diagram of UIMS

5. The UMS Prototype Development

A prototype of a web-based application for helping UUM's supervisor to monitor the practicum students named UIMS was developed. It depicts the explanation of requirements in the previous subsection. Software prototyping is a standard method of showing the product prerequisites for further remarks and recommendations from the related clients or users, depending on their involvement with the prototype. The cPanel was the web hosting control panel that can natively sustain HTML, PHP, and JavaScript. Further, cPanel was used to manage pivotal functions such as storing data and authenticating the user. The selected interfaces of UIMS are shown in Figures 4, 5, and 6.
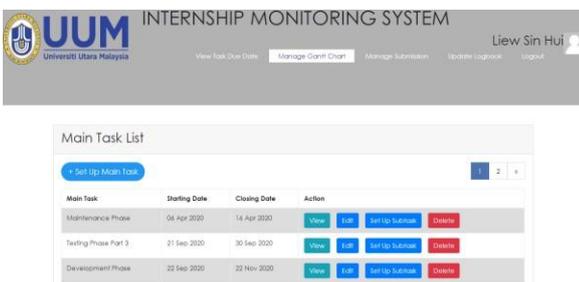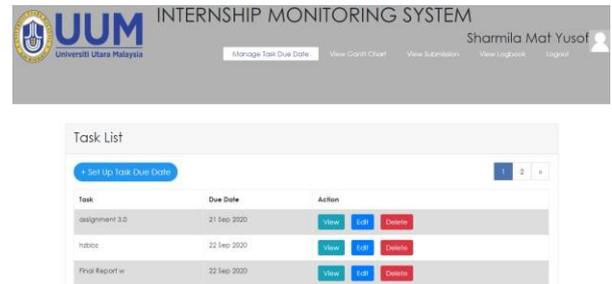

Figure 4. The interface for UUM Supervisor users

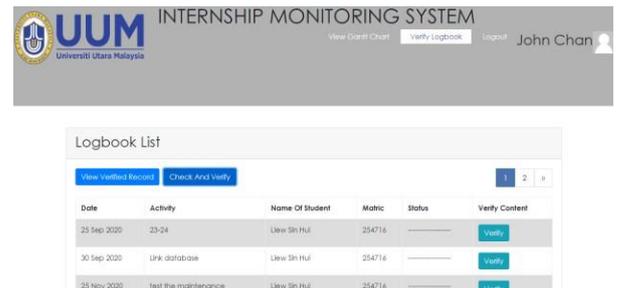

Figure 5. The interface for Practicum Student users

Figure 6. The interface for the Company's Supervisor users

6. Evaluation of UIMS

This usability evaluation was conducted on 30 participants who are UUM's supervisor, practicum student, and company's supervisor. The respondents were randomly invited by using a recruited email that attaches the UIMS URL and Google Form URL. A post-task questionnaire and UIMS web-based application as the instruments were used for the evaluation. The post-task questionnaire was adapted from [7], which consists of 31 questions, and the questions were divided into two sections: Section A, which is about respondents' demographic and background information, while Section B is for evaluation of the UIMS. A five-point Likert scale was used for respondents to evaluate the UIMS in Section B, where one represents strongly disagree, and five represents strongly agree. The step-by-step procedure for the evaluation that the respondents followed were: (1) read the provided information sheet, (2) give consent in the Google Form, (3) interact with UIMS web-based application, and (4) answer the post-task questionnaire.

Analysis of the respondents' demographic information revealed that 40% were practicum students, 33% were UUM's supervisors, and 26.7% were the company's supervisors. In addition, 53.3% were female, and 46.7% were male. Most respondents were between 21 and 25 and aged between 36 and 45, with 33.33% each, 23.3% of them aged between 26 and 35, and 10% between 46 and above. The respondents reported that 60% accessed 4 to 10 websites daily. However, 20% had accessed less than four websites per day, 16.7% had accessed 11 to 20 websites per day, and the rest had accessed more than 20 websites.

Regarding respondents' knowledge about "Internship Monitoring System", 40% of the respondents had heard about the "Internship Monitoring System", 33.3% had not heard about the system; the rest were unsure whether they had heard about it. Furthermore, 70% of the respondents reported that they thought the internship monitoring system is necessary nowadays, 26.7% were unsure whether the system is necessary nowadays, while the rest thought the internship monitoring system is not necessary nowadays. Most respondents (i.e., 86.7%) indicated that if they are UUM supervisors, they want to have a system for monitoring their students, and 13.3% of them were unsure whether they want to have a system for monitoring the student or not.

An analysis was conducted on respondents' responses in Section B post-task questionnaire. The section measures respondents' perception of UIMS's usefulness and ease of use. It also measured the satisfaction of respondents toward UIMS. Tables 3, 4, and 5 show the amount and average of the responses. The respondents rated three, four, or five of the post-task scales for the three aspects of usability. Apart from the respondents rated two. Only a few rated one.

The evaluation results have shown that UIMS is useful and easy to use. Further, most of the respondents indicated they were satisfied with the functions and the characteristic of the UIMS that facilitates them in updating the internship progress from time to time. Furthermore, the feedback of respondents had been analyzed where the majority of the respondents agree and strongly agree that UIMS give them greater control over their work and enables them to accomplish tasks more quickly. Moreover, the respondents also recognized that UIMS could help them manage and update the internship's progress more productively and met the expectation they wanted to have in managing and updating the progress of the internship. Besides, a minority of the respondents indicated that they disagreed that they could use UIMS without written instruction, but they can easily remember the step of using the UIMS. Furthermore, most respondents were satisfied with the web-based application's characteristics and intended to recommend the UIMS to their friends.

7. Conclusion and Future Works

This paper depicted the design and development of a web-based application for helping UUM's supervisor to monitor the practicum students. There are numerous parts of the internship monitoring system that can be studied. According to the data from the respondents, most of the respondents were satisfied with the functions of UIMS and agreed that the UIMS could help them to complete their tasks during the internship period. However, apart of the respondents indicated that the user interface of UIMS is not consistent and hard to understand the functions of the buttons. From this point, they may need some time to learn it. Moreover, some of the respondents preferred to use mobile applications than web-based applications. Thus, in future work, we plan to improve the user interface design and create a mobile application for UIMS.

Table 3. The respondents' responses on the usefulness of UIMS

The post-task questionnaire items	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Average
UIMS enhances my effectiveness in completing all internship tasks.	0 (0.0)	0 (0.0)	10 (33.3)	14 (46.7)	6 (20.0)	3.86
UIMS gives me greater control over my work.	0 (0.0)	0 (0.0)	10 (33.3)	17 (56.7)	3 (10.0)	3.76
UIMS enables me to accomplish tasks more quickly.	0 (0.0)	4 (13.3)	7 (23.3)	8 (26.7)	11 (36.7)	3.86
UIMS saves my time when I use it.	1 (3.3)	1 (3.3)	6 (20.0)	17 (56.7)	5 (16.7)	3.80
UIMS meets my needs.	0 (0.0)	4 (13.3)	4 (13.3)	13 (43.3)	9 (30.0)	3.90
UIMS does everything I would expect it to do.	0 (0.0)	3 (10.0)	8 (26.7)	16 (53.3)	3 (10.0)	3.63
UIMS is useful in overall.	1 (3.3)	2 (6.7)	7 (23.3)	12 (40.0)	8 (26.7)	3.80

Table 4. The respondents' responses on the ease of use of UIMS

The post-task questionnaire items	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Average
UIMS is easy to use.	0 (0.0)	1 (3.3)	5 (16.7)	20 (66.7)	4 (13.3)	3.90
UIMS is user-friendly.	0 (0.0)	1 (3.3)	6 (20.0)	19 (63.3)	4 (13.3)	3.86
UIMS is flexible	0 (0.0)	2 (6.7)	8 (26.7)	11 (36.7)	9 (30.0)	3.90
UIMS is easy to learn how to use it.	0 (0.0)	4 (13.3)	5 (16.7)	12 (40.0)	9 (30.0)	3.86
I can use UIMS without written instructions.	0 (0.0)	6 (20.0)	5 (16.7)	11 (36.7)	8 (26.7)	3.70
I can easily remember how to use UIMS.	0 (0.0)	1 (3.3)	7 (23.3)	16 (53.3)	6 (20.0)	3.90
I don't notice any inconsistencies as I use UIMS.	0 (0.0)	3 (10.0)	3 (10.0)	19 (63.3)	5 (16.7)	3.76
I can recover from mistakes quickly and easily when using UIMS.	0 (0.0)	3 (10.0)	6 (20.0)	15 (50.0)	6 (20.0)	3.80
I can use UIMS successfully every time.	0 (0.0)	1 (3.3)	7 (23.3)	15 (50.0)	7 (23.3)	3.93

Table 5. The respondents' responses on their satisfaction with UIMS

The post-task questionnaire items	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Average
I am satisfied with UIMS.	1 (3.3)	1 (3.3)	5 (16.7)	17 (56.7)	6 (20.0)	3.86
I would recommend UIMS to my friend.	0 (0.0)	2 (6.7)	7 (23.3)	16 (53.3)	5 (16.7)	3.80
UIMS works the way I want it to work.	0 (0.0)	2 (6.7)	6 (20.0)	18 (60.0)	4 (13.3)	3.80
I feel I need to have UIMS during the internship period.	0 (0.0)	3 (10.0)	3 (10.0)	16 (53.3)	8 (26.7)	3.96
UIMS is wonderful and pleasant to use.	0 (0.0)	1 (3.3)	7 (23.3)	17 (56.7)	5 (16.7)	3.86

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