The Development of a Postgraduate Management System

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Abstract—Because of the increasing number of the postgraduate students in the universities, it usually takes quite a long time to fill the postgraduate project applications and to process these applications after being submitted. Therefore, developing a system that helps students and staff face these obstacles and saves time and efforts is being a must. This paper aims to develop a prototype system for postgraduate students in the University of Utara Malaysia (UUM), especially students in the Graduate Department of Information Technology and Computer Science, focusing on the entry requirements for the final project. The system development life cycle (SDLC) methodology will be used in this study as it is considered one of the best methodologies for system development.

Keywords-postgraduate; management system; development system

I. INTRODUCTION

Each semester, there are a number of postgraduate students who register to complete their final project. Students choose their supervisors based on a subject area that matches their project title. This process might face some difficulties such as management issues for instance; estimate the number of students which are willing to register their final project. Therefore, this paper seeks to develop an electronic system that can facilitate the final project registration and process operation.

According to David and Wixon [2], project management is rapidly becoming a standard way of doing business. An increasing percentage of typical firm's efforts are being devoted to projects. The future promises an increase in the importance and the role of projects in contributing to the strategic direction of organizations. The purpose of this paper is to develop a management information system that provides the necessary facilities that include all operations of final postgraduate project management system.

A. Research Motivation

As the University of Utara Malaysia is becoming bigger, and the number of postgraduate students also increasing in different academic programs especially in the Faculty of Information Technology FIT such as MSc. Information technology, MSc information and communication technology, and MSc Intelligence System. Therefore, those students face problems to record the tentative projects' titles and find the prospective supervisors for their postgraduate final project. It also takes a long time for the application form to be processed after it has been filled. Currently, the Faculty has some difficulty to determining the final project for postgraduates as the process is done manually by a postgraduate project coordinator.

B. Research Aim and Objectives

The main aim of this study is to develop a prototype for postgraduate students in University Utara Malaysia (UUM). The specific objectives are:

- To develop a prototype that can help the faculty information technology (FIT) to arrange the schedule for postgraduate students in registering the projects' titles and announcements.
- To provide help facilities in FIT to manage the arrangement of projects for Postgraduate students.
- To evaluate the effectiveness of postgraduate management system in FIT according to the users' point of view using Statistical Package for Social Sciences (SPSS).

C. Research Context

The scope of this project is to develop a prototype for post graduate (master's students) final projects at Faculty of Information Technology, Northern University of Malaysia. The project management system has to cover the following scope:

- Master of Science Information Technology (IT).
- Master of Science Information and Communication Technology (ICT).
- Master of Science Intelligence System (IS).

II. LITERATURE REVIEW

A. Management Information System History

Management information systems do not have to be computerized, but with today's large, multinational corporations, computerization is a must for a business to be successful. However, management information systems began with simple manual systems such as customer databases on index cards. As early as 1642, the French mathematician and philosopher Blaise Pascal invented the first mechanical adding machine so that figures could be

added to provide information [4]. Almost two hundred years later, Charles Babbage, a professor of mathematics at Cambridge University in England, wanted to make a machine that would compute mathematical tables. He attempted to build a computing machine during the 1880s. He failed because his ideas were beyond his technical capabilities, not because the idea was flawed. Babbage is often called the father of the computer. With the advent of the computer, management information systems became automated [9].

According to Stair [11], effective management information system is needed by all business organization because of the increased complexity and rate of change of today's business environment. For Example, Marketing manager needs information about sales performance and trends, financial manger returns, production managers needs information analyzing resources requirement and worker productivity and personnel manager requires information concerning employee compensation and professional development. Thus, effective management information systems must be developed to provide modern managers with the specific marketing, financial, production and personnel information products they require to support their decision making responsibilities and also provides the following advantages: It facilitates planning, minimizes information overload, encourages decentralization, brings coordination, makes control easier and assembles, processes , stores , retrieves , evaluates and disseminates the information.

Gray [5] observes that the web-based customer relationship management seems like the perfect place to do customer service. It is where people go to find answers fast. It provides the basic technology needed to help customers navigate their way through lots of content to the particular piece of information they need. And it's open seven days a weeks, 24 hours a day. Poor customer service could cost online retailers millions in losing customers Customer service is a relationship that begins at the entry to a site and should follow all the way through and after the customer leaves It costs six times more to get a new customer than to keep an old one, and if customer support falls down, then companies are greatly reducing their chances of repeat business. In the absence of live sales assistants, who follow you through a land-based store, customer service is probably 10 times more important.

B. Similar Studies

Mitchell [7] argued that in most universities, coordinator job applications are handled through standardized paper forms that are completed by each job applicant and managed through traditional paper filling system. This system works well enough for gathering and storage purposes, but is much less efficient when it comes to managing the selection process, and is virtually useless as a system for accumulating data on large numbers of teaching job applicants. Realizing the severe limitations on data access presented by the traditional filling of paper form job applications, the California Educational Research Cooperative has developed a postgraduate management System (PG-MS). The PG-MS system is an electronic relational database designed to address the information management problems associated with teacher selection, application postgraduate management System. The system was designed using MySQL server and is designed to work in a networked environment with Pentium 3 & 4 machines. Currently, some of universities have developed their own project management system for postgraduate. The University of Pretoria is one of these universities that implemented this system [12]. However, the customized software only provides an avenue for submission, choosing topic and supervisors, view schedule, and change or modifying previous things.

C. Current System in PG-MS

In the current FIT postgraduate student's management system, the students start registration final project course. Then, the students record all final project requirements (title, supervisors, metric number). After that, the management staff prepares the schedule for proposal presentation that includes the presence of the evaluator and a chair person. Then, the students must submit two copies after one week from the registration. Then, the students do a presentation for their project proposal in front of an evaluator from that the evaluator can put a mark out of ten for the students based on the discussion. If he get accepted, he can go ahead in writing the thesis in twelve weeks otherwise he have to redo the proposal. Then, a week before the end of the semester, the student prepares project finding schedule (normally week thirteen). After that, the student submits a hard copy of the thesis. After that, the student presents his final projects in front of an evaluation committee. If he gets accepted, the student prepares the final thesis. Finally, the project is evaluated by a supervisor and a set of evaluators. If he gets accepted, he submits the final report (two hard copies, one loose binding, and one softcopy).

D. New System in PG-MS

1) *Student's Functions:* The new electronic postgraduate student's project management system in FIT is described as follow. The students start registration in the final project course. After that, the students enter to final project interface and login. Then, they select one of the three majors (i.e. IT, ICT, and IS), and enter final project requirements (student name, metric, area, final project name, and choose supervisor). Finally they submit the application. Here, the system will arrange and match between a supervisor and students depending on his/her area. Then, as a final step, the system prints a summary report.

2) *Supervisor's Functions :* The supervisors have account to make login to management staff, through management staff interface shows all students submit final project requirements and coordinator with management staff to manage and match between students and supervisor and he has a permission to choose any students unspecific the supervisor if he interest of his topic.

III. RESEARCH METHODOLOGY

A system development lifecycle (SDLC) has three primary objectives: ensure that high quality systems are delivered, provide strong management controls over the projects, and maximize the productivity of the systems staff.

In order to meet all of the SDLC's objectives and requirements there are certain design approaches that are required: the SDLC must be an example of a system created using the techniques it espouses; it must use a layered approach to analysis, design, installation support and production support; it must keep distinct the "what" from the "how" in regards to doing the tasks and creating the outputs; and it must organize its information in a hierarchical manner so that users with varying degrees of familiarity can find what they want easily and quickly.

The prototype development using System Development Life Cycle (SDLC) that divided into four phases or process. The prototype flows of phases are requirements definition, system and software design, implementation, unit testing, and integration and system testing. Figure 1 illustrates the methodology approach adopted for this project [10].
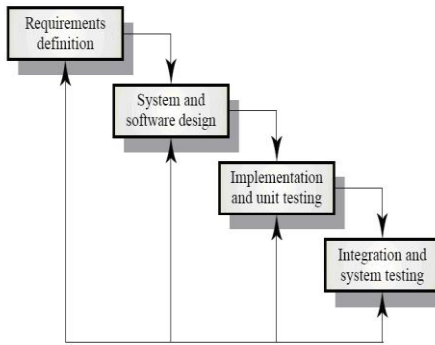

Figure1. Methodology approaches to design (PG-MS)

A. Requirements Definition

Requirements definition is the process of analyzing the information needs of the end users, the organizational environment, and any system presently being used, developing the functional requirements of a system that can meet the needs of the users. In this phase the requirements of the system have been determined and divided into functional requirements and nonfunctional requirements.

1) Functional requirements: This system consists of three users' administration as coordinator of the system, the students as Beneficiary of the system, and lectures (supervisors, evaluators) communicate with students through a system to supervise them. As will as, the user may interact to this system through interfaces which are website. Therefore the functional requirements represent it based on the three users interface.

2) Non functional requirements: Non-functional requirements are constraints, quality attributes and quality of service requirements in this research some nonfunctional

requirements have been determined. Speed, Reliability, Constraints, Hardware, and software considerations.

B. System and Software Design

System Analysis and Design phase, the whole software development process, the overall software structure and its outlay are defined. In case of the client/server processing technology, the number of tiers required for the package architecture, the database design, the data structure design etc are all defined in this phase. After designing part a software development model is created. Analysis and Design are very important in the whole development cycle process. Any fault in the design phase could be very expensive to solve in the software development process. In this phase, the logical system of the product was developed. In this research, UML diagrams and system architecture was developed in addition to database design.

C. Implementation and Unit Testing

At this stage, the developer implements the prototype postgraduate project management system by using all the components from previous phases in order to test the system. The implementation will follow the postgraduate project management system architecture and requirements modelling. If any error occurs while testing the system, developer will go back to the previous step and fix the problem until the system can work properly.

D. Integration and Testing

Individual program units are put together, the system is tested as a whole (interaction between units).The outcome is a system that is ready to be delivered the PG-MS. Measuring and analyzing data the Statistical Package for Social Sciences (SPSS) technique that had been used for the analysis purpose is Descriptive statistics, where reliability index of the questionnaire is determined the evaluating value of 'cronbach alpha'. Findings have been made based on questionnaires' statements and the research purpose.

IV. EMPIRICAL STUDY FOR EVALUATION THE PG-MS

The evaluation of PG-MS adoption and acceptance has been conducted based on a pilot study (i.e. user-based evaluation-questionnaire). More specifically, it focuses on how the PG-MS's functions that affect the efficiency of the delivery its purposes [13]. The pilot study was conducted in UUM in 2008; where this research used a questionnaire to collect quantitative data to identify significant factors influencing the FIT students adoption and acceptance of PG-MS. The evaluation used a number of empirical methods, including questionnaire observations with end-users (students). Furthermore, students performed many tasks based on the research protocol during the final evaluation for the release version of PG-MS, to identify the list of factors and requirements that influences on the perceive quality and efficiency of the PG-MS. Finally, the level of the PG-MS quality and efficiency was determined statistically.

According to problem statement, to develop a prototype for postgraduate students in faculty information Technology that has been determined as the scope for this research.

A. System Architecture

The architecture of this prototype is a standalone system as shown in Figure 2; however, it is implemented on a database to store students, administrators, and lecturers (evaluators and supervisors). Figure 4 demonstrates the prototype environment to access a database on web based system through a website. The students should type the URL in an internet browser, then the request from Apache server will call the URL that contains the requested page and sends it to MySQL database to retrieve data from it, manipulate it, and send it to the Apache server to read it and do processing, then return to browser to show the interface design [1], [3], [6].
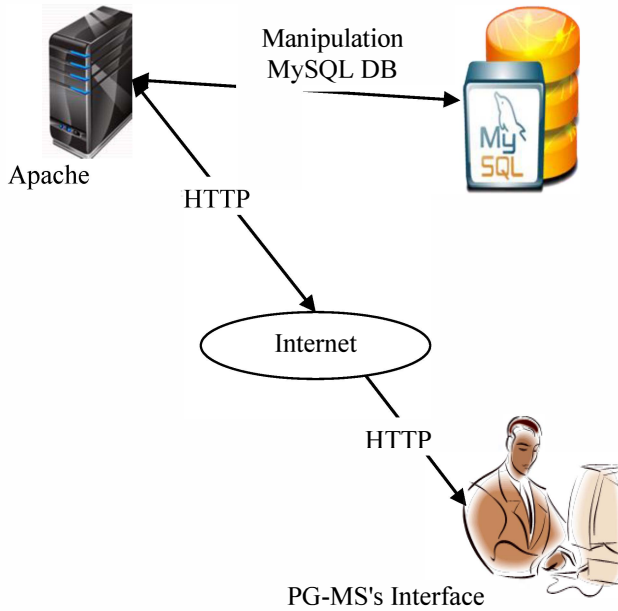

Figure 2. Postgraduate management System Architecture

B. System Requirements Modelling

To model this prototype we used UML diagrams to show the whole process in the system such as Use Case diagram. Figure 4.2 show the whole system use case diagram.Where a use case is a set of scenarios that describe an interaction between a user and a system. A use case diagram displays the relationship among actors and use cases. The two main components of a use case diagram are use cases and actors [8].

Figure 3 shows the process for the whole system, where students, academic staff, and management staff have four functions, listed in the use case diagram. They log in the system; and everyone gets his own interface suitable for completing his tasks and requirements. For example the student can create an account, register a project, view a report, and view announcements. But an academic staff has

different tasks such as suggest topics, approve project, manage his data, and choose student's topic. Finally management staff is able to manage student data, manage academic staff data, prepare announcements, and print report.
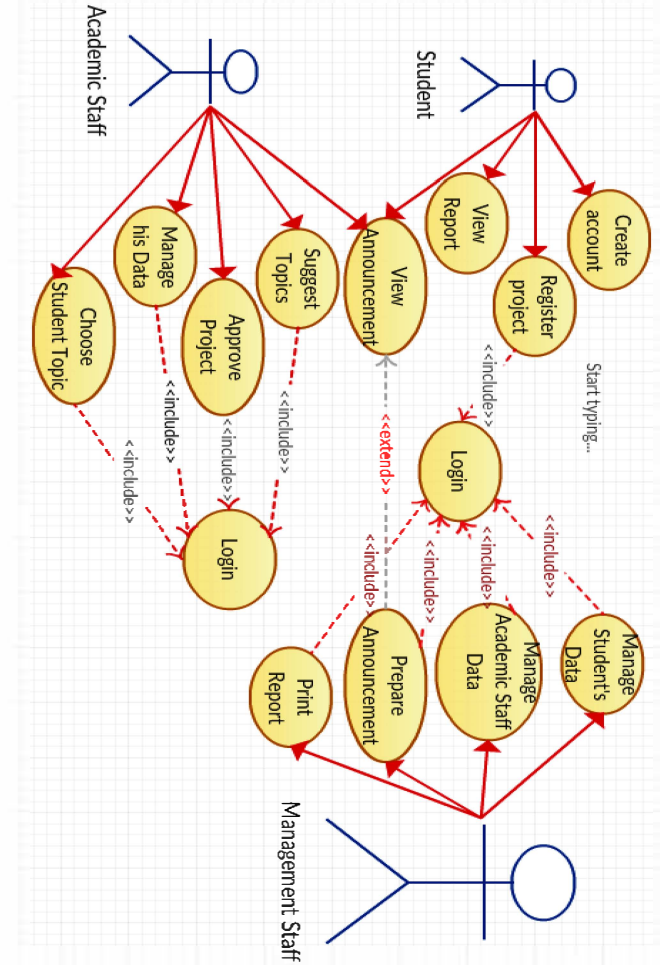

Figure 3. The whole postgraduate management system use case.

C. User Interface

In this section we describe the user interface for the students in the **main page,** and **project registration.**

1) Main page : The main page represents the system interface which is only available for the students. In this page the user clicks on new account to create his own account to be able to log in the system as shown in figure 4.

2) Project registration : As shown in figure 5, project registration page represents the system interface which is also enabled just for students. In this webpage, the user enters all the requirements belong to his final project. Then, clicks on registration to submit the application and waits for his supervisor to get the acceptance.
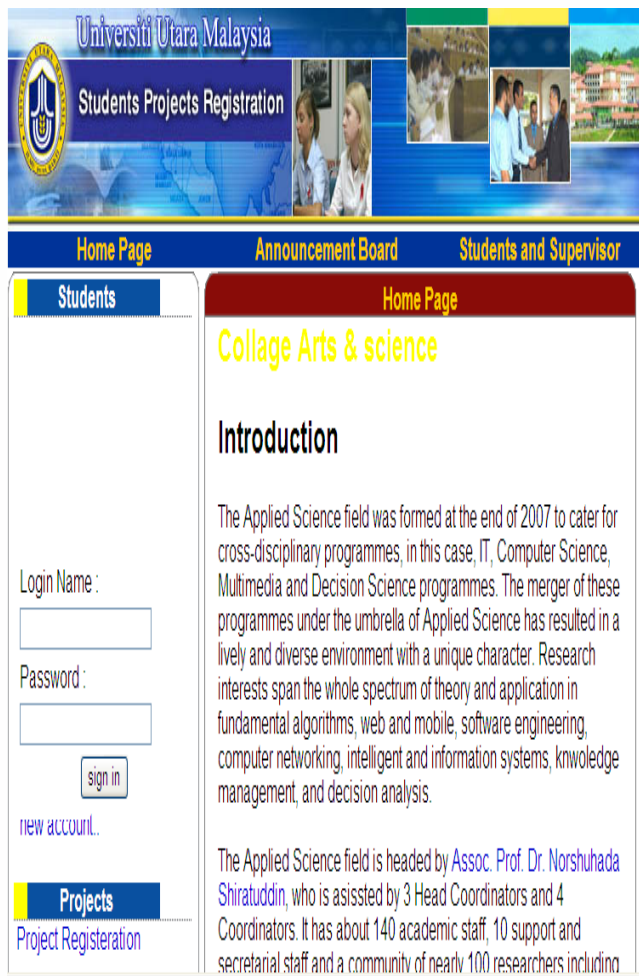
Figure4. Main page

carried out in different phases (see figure 1), in order to provide realistic opportunities for facilitating students submit their final project requirements and coordinator with management staff to manage and match between students and supervisors for the final project. Furthermore, PG-MS allows permission for supervisors to choose any student unspecific the supervisor if he interests of his topic.

Figure 5. project registration webpage

D. Prototype Testing

The development of a postgraduate management system (PG-MS) was tested using usability testing through an Evaluation Questionnaire. This questionnaire covered a sample of twenty members for both staff and students; in order to measure three main aspects which are the usefulness, benefits and development of the (PG-MS) according to the user's point of view.

VI. CONCLUSION

This paper showed that the postgraduate projects management system (PG-MS) process can assist the Faculty of Information Technology in accomplishing all the requirements of final postgraduate project registration by reducing time and efforts. This paper concludes that prototype technology is useful in solving the way that students can improve their performance. Especially that faculty information technology holds in wide all majority and need to wireless technology to close the distance and increase the competition [12]. This research is of benefit to both students and supervisors within the e-learning area. This research paper follows the SDLC guidelines [10]. The main contributions according to research methodology is

A. System Limitation

In this paper we presented a postgraduate management system (PG-MS), the main weakness I faced is getting data from MySQL database as MySQL is not fully secure so any professional hacker can penetrate the database.

B. Future Work

In order to improve the capability of this prototyped system, future works can be undertaken to enhance the prototype as listed in the following:

- Expand the feature of software to cover all postgraduate students in UUM for this prototype that is developed just for master students in FIT.

- Improve the postgraduate management system website to contain more guide information about UUM postgraduate management system.
- Upload the system into UUM especially in FIT centre in order to test this prototype in real world.
- Improve prototype interface and increase the features that make it available for easy to usable.

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