Design and Implementation of a Web-Based Thesis Coordinator System (TCS)

Geanne Ross L. Franco[1], Carlo Ysmael C. De Guzman[2]
College of Computer Studies, De La Salle University
Manila, Philippines
geanne.franco@dlsu.edu.ph[1], cycdgcs@yahoo.com[2]

Abstract*— Managing and coordinating thesis processes could be a tedious task. Students, advisers and panels must be coordinated properly for documents and requirements submissions, defense scheduling up to different related activities concerning the needs of identified entities in the thesis process. This research aims to provide an effective thesis management system for academic department and will be implemented in Computer Technology as pilot department. The objective of the Thesis Coordinator System is to provide a prototype for executing and coordinating thesis activities of CT department from enlisting students to their specific thesis courses, towards assigning them a hassle-free defense schedule that would benefit both advisers and panels. The prototype includes a search engine and archiving process that enable the students to find a suitable title for their thesis topics. In addition, the system is capable of document uploading and will incorporate an adviser-to-student forum to offer a venue for communication between the adviser and the advisee throughout the development of the thesis topic. The system's interface design was developed using Java (JSP/SERVLET), PHP, MySQL, and applied the Spiral Life Cycle Model. This research project is still under evaluation in terms of Ease of Use, Functionality, and Accessibility. It is expected that upon completion of the evaluation, the project will receive a higher acceptance rate from the evaluators. The Thesis Coordinator System (TCS) is currently installed in a pilot-test college for system monitoring and maintenance.

Keywords—Web Development; Thesis System; DBMS; Information Management System

I. INTRODUCTION

In this era of computer technology, there is a whole variety of information that every people need to take care of. Starting with information about a person or group of people, cars, shopping lists and ending with information about statistics and logistics, it is hard to imagine the society developing any further without a means of a fast and easy management of such data [1]. Fortunately, in this era of computer science, it is possible to register and aggregate nearly unlimited amount of information thanks to so-called information systems. The goal of this research is to implement such system for the management of theses in an academic department and will be implemented in Computer Technology (CT) as pilot department.

There are several universities all over the world have developed and implement their own thesis management system that deals with document submission, theses archiving and theses coordination. Most of these universities used the power of Internet to manage activities concerning their thesis processes. One of these is the Thesis Management System for Industrial Partner Red Hat [2] by Vaclav Dedik of the Masaryk University from Czech Republic. His study aims to design and implement a thesis management system for industrial partner Red Hat. The system has user management module where it allows creating, reading, updating, and deleting (CRUD) users; registration module where only students of Masaryk University can sign up upon agreeing to the terms of use; log-in module where anonymous users can sign in using email and password; thesis topic management module where it allows the CRUD process, where the management of topic is offered and represented by the university list and students can apply for it; category management module where it allows the CRUD categories and contains title and description; university management module where it allows the CRUD universities and contains the name of the university; and application management module where it allows CRUD applications. It can authenticate users who subscribe and unsubscribe for thesis topics. It also allows document or file uploads to theses. Logged in users can comment on topics and theses and users with certain authority (administrator or group leader) can create comments that are not visible to students and guests. The system has the capability to filter topics by university, type, leader, title, tag or category. The researcher used the Waterfall[1] approach in his methodology.

The e-Thesis Management System (eTMS) [3] by Nursyazwana Binti Sadri aims to provide an efficient management system for PSM/PTA thesis in faculty's collection. The objective of eTMS is to provide the prototype of searching the thesis for student in order to find the suitable title of PSM/PTA project from their previous semester. It also provides information and availability of the thesis by transforming the process into the computerize system. The system's interface design is developed using Adobe Dreamweaver CS4, and will used Spiral Life Cycle Model as the methodology. MySQL is used to construct the database and store the thesis information. This system is a web based application and to be used by Student, lecturer and Coordinator. The system's performance is expected to be better than the conventional system because it manages the thesis easier and faster. This project will contribute towards a better thesis management in future. It also aims to overcome the problem of missing thesis's data as well as the fast retrieval of thesis information.

A website named Idea Source [4] developed by blankdots.com collects and developed various projects that

[1] Waterfall approach includes requirement analysis, design, implementation, verification, maintenance

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focus on sharing ideas and promoting innovations. One of their proposed projects entitled Academic Thesis Management System aims to manage Bachelor and Master thesis inside a University/Faculty/Institute. It consists of two parts: candidate and the professor modules. An additional (independent) module is the thesis management module. The general features of the projects includes: (1) a calendar view until the thesis defense; (2) search through past theses with the same areas of research (from that university/faculty/institute); (3) the system recognizes students & professors belonging to an institution (same e-mail and password used to login in the institution account but with the option to include allow other members); (4) the system will also verify that the final (and intermediary) submissions respect certain (formatting, quality) standards (latex, pdf, source code formatting); (5) the system will automatically notify the candidate of new assignments and deadlines via e-mail. For the professor module, the following features were also identified: (1) a professor will be able to accept or deny/reject to advise certain students, or establish a certain limit to the number of students he will coordinate; (2) a professor will be able to post assignments and deadlines to those assignments; (3) give individual and public notes/comments/resources to students; (4) optional approve/deny students to register for a certain thesis defense slot (maybe the thesis is not complete); (5) visualize statistics of assignments completed, students thesis grades, past student grades; (6) if a deadline is established that means that after that deadline no more submissions will be accepted. The candidate module and thesis management module were designed with relation to both thesis management and professor module.

The Web-Based PhD Thesis Management System for Tripoli Faculty of Computer Technology in Libya (WBPTMS) [5] by Salaheddin. S. Mohamed Sayeh aims to develop web based PhD's thesis management information system to automatically ensure the PhD students' thesis information management in the Faculty of Technology in Tripoli. The web based PhD's thesis management information system is often used in educational organizations due to its effectiveness in facilitating and enhancing the monitoring of the supervision and manage of thesis's and project paper . To develop such system, there has been a combination of both the general methodology on one hand, and Nunamaker's system research process approach to develop the system, on the other hand. The entire study is hereby divided into to four main stages (1) requirement gathering, (2) prototype development, (3) prototype implementation and (4) usability testing.

The current thesis coordination process in different academic department units are either done manually or using semi-automated system. Specifically, CT department thesis management is performed with the help of a semi-automated based system called the [6] TCS ver1.0. This system is locally installed and was developed using Microsoft® Visual Basic 6.0. The system allows storage and record management of the faculty, students, thesis groups and documents. These said tasks are critical to the thesis coordinator duties; however, there are still major tasks that are manually performed such as document routing, report generation and information dissemination.

The objective of this research is to develop a web-based thesis coordinator system that will allow online accessibility and automated document routing. Specifically, this study aims to: (1) Study and analyze the thesis management of the CT department; (2) Identify system capabilities that will be retained and removed; (3) Design the data flow diagram for the database implementation of the system; (4) Design the use case diagram to determine the expected users and their corresponding tasks; (5) Design the interface of the system; (6) Develop a document routing module; (7) Develop an adviser-to-student forum; (8) Evaluate the system according to ease of use, functionality and accessibility. These objectives were formulated with reference to the cited literatures. According to Mohamed-Sayeh [5] the WBPTMS in their university is often used in effective facilitation of thesis monitoring. This is also the same goal of the TCS where it will serve as a centralized system to faculty and students in thesis management process. TCS will have modules primarily used by both student and faculty user. These modules will serve as the enhancement of the current TCS ver 1.0 where it aims to lessen the manual process of the thesis management.

II. THE TCS DESIGN

Capabilities of the system are identified according to four (4) users as seen in Figure 1: the thesis coordinator, the adviser, the panel and the student. The thesis coordinator has the capability to manage records and accounts for the faculty, students, room, thesis course, thesis general area and sub-area, thesis groups, curriculum, course flowchart, defense scheduling, setting of school year and date when the term start and end. The CRUD processes are implemented to each record. The adviser account can manage his profile and account, can view and download students' document that includes endorsement for a defense through approval and disapproval of their document and uploading for some revisions, viewing of notification, and browsing of thesis schedule. The panel account can manage his profile and account; browse the information of the assigned thesis group that includes viewing of the document, download document and upload revisions if there's any, browse thesis schedule and viewing of notifications. The student account is able to manage profile and account, upload document for checking, view notification and browse thesis defense schedule. Additional feature is the document routing and adviser-to-student forum. The purpose of this is to document the history of their conversation like a consultation log, to avoid any unnecessary event that might happen. The system also includes generation of reports like mentoring and paneling report. The system supports web-based remote access, coupled with an authentication system that protects private information as well as manages user specific privileges for information access and editing. The system will also provide back-up and recovery capabilities to survive potential failures and disasters. This study produced a web-based system that can be accessed anytime using a web browser. The system will only create defense schedule once faculty and students' schedules are entered and the declared holiday has been set. A school year must also be entered as well as date when the term start and end, where important dates will then be generated. Student enrollment will still be encoded by the thesis coordinator since the database of the

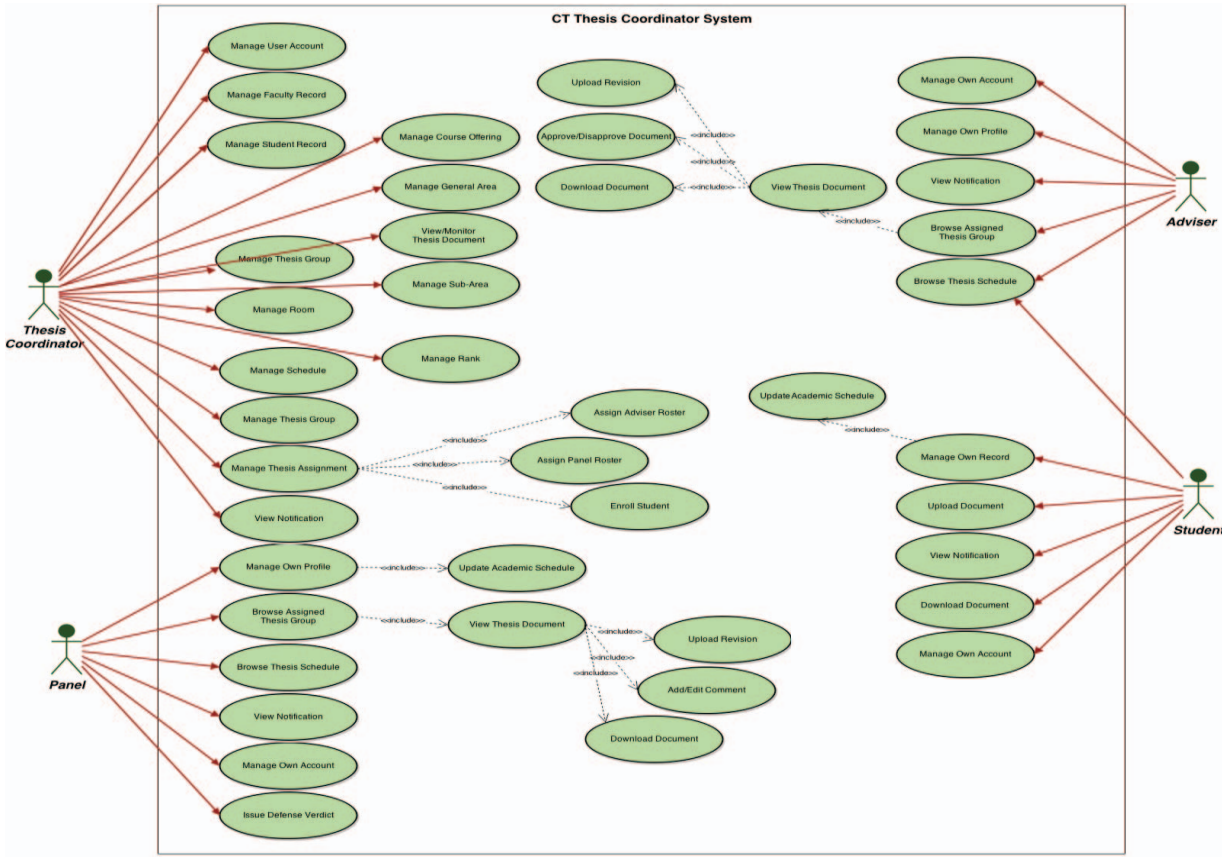

Fig. 1. Use Case Diagram of TCS

animo.sys[2] system is not connected to the database of the TCS.

To design the system, use case diagram was designed as shown in the Fig 1. Use cases focus on the users of the system, not the system itself, thus the real system needs are brought to light early on. In the diagram, there are 4 expected types of users: (1) the thesis coordinator, (2) adviser, (3) panel, and (4) student, through adviser and panel is identified as faculty, the researcher opted to separate them to distinguish the tasks for each. The thesis coordinator is responsible in maintaining the records of students, faculty, and thesis information. He/she is also responsible for the updating the scheduling and document routing information. The faculty user can able to manage his account, view schedule and update document revision. The student user can able to update his account, view schedule and upload thesis manuscript on the system

For the System Development Methodology (SDM)[3], the researcher used Spiral Life Cycle Model. The Spiral Life Cycle Model is a type of iterative software development model that combines the features of the prototyping model[4] and the waterfall model[5] where activities are arranged in a form of a spiral [7]. It includes identification, designing, construction and evaluation.

The following activities will be carried out to achieve the objective of this research. (1) Identification: examine and identify system requirements; identify deliverables for different phases of the development; determine users and their roles or tasks; collect and examine data; determine new functionalities of the system; (2) Designing: design a use case diagram; Design a data flow diagram; design the web template; (3) Construction: prototype will be constructed according to the accepted design; revisions to the prototype after testing will be performed; final system is constructed, based on the refined prototype; (4) Evaluation:the prototype will be evaluated according to its strengths, weaknesses and risks; the final system is thoroughly evaluated and tested

TCS is initially hosted in the CCS data server facility, and used by the CT department as the pilot test college. The same facility will also be used for the deployment of the proposed system.

III. The TCS Components

The web-based Thesis Coordinator System (TCS) is comprised primarily of database-driven modules designed to store, present and generate reports needed by the identified users. These users include (1) the Thesis Coordinator, (2) the Faculty as adviser

[2] animo.sys is the enrollment system of De La Salle University

[3] SDM refers to the framework that is used to structure, plan, and control the process of developing an information system [11]

[4] Prototyping Model is an SDM which a prototype is built, tested, and then reworked as necessary until an acceptable prototype is finally achieved [9].

[5] Waterfall model is an SDM that is linear and sequential [10].

and panel, (3) and the Students. To support each user type, nine (9) data modules were created for the TCS.

A. System Modules

The TCS has nine modules. Each module was designed and created according to the functions below:

1) Login Module. This was developed to authenticate and validate identified users of the system. Initially, thesis coordinator will create a system account for every user before they are allowed to use the system

2) User Management Module. This was developed to manage user information.

3) Data Entry Module. Since users are given privileges to access their accounts, this module specifically designed to allow users to manage their information that provides access to the database.

4) Thesis Management Module. This module specifically designed to manage the thesis activities.

5) Course Management Module. This module specifically manages the thesis course offering in term. In CT department, there are four (4) theses courses; the Title Proposal (THES0[6]), Thesis Proposal (THES1), Development (THES2), and Writing (THES3).

6) Scheduling Module. This module manages the creation of schedule for faculty and students, and creation/modifying of thesis defense schedule.

7) Report Generation Module. This module will generate reports that will be used by the thesis coordinator.

8) Document Submission Module. This module will be primarily used to route document for submission

9) Adviser-to-Student Forum Module. This will serve as a venue to adviser and students to discuss their concerns to their thesis projects. This can be an online consultation for both users.

B. SystemTools

The thesis coordinator system is based on the following tools:

1) Apache - web server software. It is used by the researchers since it supports the PHP and MySQL system;

2) MySQL - a relational database management system. It runs as a server providing multi-user access to the database and compatible to PHP;

3) Javascript - object oriented language. The researcher used the language to add interactive components to the system;

4) JSON - Javascript Object Notation, is a lightweight data-interchange format. It is used in the program to easily call and reference the retrieved data;

5) PHP – Hypertext Preprocessor. It is the main programming language used by the researcher, and is more appropriate in developing dynamic web system;

6) CSS - Cascading Stylesheets used to designed the interface of the system.

7) API Key, for the security, for user authentication.

IV. System Monitoring and Maintenance

The TCS is initially deployed in the Computer Technology department as the pilot-test department. For the initial testing, the TCS will be presented for evaluation to thirteen (13) CT faculty, and forty (40) students under the BSCS with Specialization in Network Engineering and BSCS major in Computer Systems Engineering and currently enrolled in their thesis course. To calculate and determine the appropriate sample size that will be included in the evaluation process, Slovin's Formula [7] will be used. Respondents will be given sets of questionnaires in evaluating the system. The result of the evaluation will be used for the constant update, possible improvements, and maintenance is constantly being performed.

[6] Subject code of thesis courses used in CT Dept. of De La Salle University

V. Summary and Conclusion

This research was undertaken primarily to enhance the thesis coordinator system of the CT department. Requirements from the department when it comes to thesis related matters has been gathered and taken into account. As a good thesis management system, it has the ability to trace schedule conflicts in creating defense schedule, upload document for revision, manage user and thesis records, and communicate between adviser, panels and students. It uniformly gives information for users of the system. User management tool in web based management system is a good appliance for keeping eye on the database management of the system, and for giving rights or privileges to different users. This all makes a complete and good communication system in the college, all data and material are accessible from one place, to facilitate thesis related activities between users. Finally, the whole system will be tested to ensure that everything functions correctly before the system processes actual data and produces information that people will rely on. The TCS will be evaluated by all faculty members of the pilot-test department and forty (40) students that are currently enrolled in their thesis course. The TCS will be evaluated in terms of ease of use, functionality, and accessibility. The result of the evaluation will be used for the constant update, possible improvements, and maintenance is constantly being performed.

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