Interactive Graduate Student Information Database

Technical Proposal

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Abstract

This paper presents a technical proposal to engineer a solution for tracking and archiving graduate student data. This solution will be a pilot program for the Graduate Affairs Assistant, Ms. Wendy Hough and the Department of Medical BioPhysics. This proposal will describe the in detail the methodology and project plan of this endeavour. The Agile Methodology will be used to guide project design, analysis, implementation and testing. Emphasis will be placed on quick delivery and rapid prototyping for regular feed back from users.

This proposal is written for the benefit of the advisor and stakeholder of this project, Dr. Hanif Ladak. Responsibilities of the team members is described are clarified in the task lists. Additional resources and costs required for the project are detailed. Deliverables that will be provided during on going work and upon completion are listed. Finally a project plan is defined to meet deliverables and schedule further meetings with the stakeholders and users.

1 Background

We began the search for our fourth year project during our internship. Dr. Ladak visited us for our internship reviews alongside which, we had several discussions on possible final year projects. During our term at CIBC, we have gained first-hand experience of manual inefficient processes and have played a critical role in revamping several inefficient business processes by implementing automated workflow tools. When Dr. Ladak presented a problem with managing graduate students information at various faculties across the university, we knew our past expertise could be utilized to engineer an efficient solution for the university. Furthermore, as a past graduate chair of the faculty of Medical BioPhysics, Dr. Ladak's experience and feedback would be crucial to the success of this project. To acquire a better understanding of the problem, we had meetings with Ms. Wendy Hough, the Graduate Affairs Assistant in the Medical BioPhysics Program. While working to define the problem, we have gained an appreciation of the complexity and difficulty in managing graduate student data. In our proposal below we describe the problem, and our objectives during this project. We will also cover the scope of project management aspects in regards to the Agile methodology, project resource and strategic planning. Overall we are excited and enthusiastic about this initiative and its potential benefits for other graduate faculties in the future.

The enrolment of Ontario graduate students is expected double by 2013, since 2005 [1]. One of the key issues is to administer and govern students' program milestones. For example, graduate students often miss milestones such as the annual advisory committee meetings. A program that can automatically calculate the

next date for an advisory committee meeting and prompt the student by sending a notification would aid in ensuring that all program requirements are completed on time. Furthermore, a manual reporting mechanism is currently used where several reports are generated from the database of various students. For example, in the Department of Medical BioPhysics, a large Excel spreadsheet and several cabinets of paper are being used to manage the data for graduate students, making it particularly challenging to keep track of students' information. In addition the user needs to manually calculate critical dates to prompt graduate students for feedback. Therefore, the existing system is no longer scalable to the demands and the complexity of milestones and critical dates for the program.

In our understanding of the problem, we would like to explore the concept of treating each student as a task which requires various rules and milestones. Application of the rules and milestones would conceptually define a process. Techniques of process engineering and management have been applied to student monitoring and tracking. Similar projects in the past have been met with some success and challenges [2]. Moreover an electronic system to manage administration can reduce burdens on students [3]. Prior solutions will help us avoid problems and follow best practices. Electronic systems to track and store data is a mature technology, and can be successfully applied to this problem.

2 Objectives

To design and implement an Interactive Student Information Management System (SIMS) database for Graduate students that can track important dates from inception to completion of the program life cycle and help manage information on an efficient basis. Upon completion, this system will be used to manage graduate students in various faculties and provide effective reporting techniques, which will aid in tracking, resource and strategic planning.

2.1 Goals

Features of the program include:

- Maintain a database of student information including but not limited to name, contact information, start date, thesis topic, current employment, etc.
- Calculate dates for important milestones and prompt student to take action. For instance, if an advisory committee meeting must be held before a certain date, the program should calculate the date based on the student's degree program (Master's or PhD) and start date and send e-mail. It should then keep track of whether or not the milestone was accomplished and what the outcome was.
- E-mail reminders (Standard text for that milestone and a way of sending that reminder via e-mail)
- RFID and e-applications will be explored (Seminar Attendance Management, e-signatures)
- Intelligent data analysis and management techniques will be implemented to generate reports and trend charts, which will aid in Resource/Strategy and Capacity planning on a departmental level. The framework can be used at the university level or on a provincial/federal level in the future.
- Custom ERP Reporting Plug ins

2.2 Constraints

2.2.1 Budget

Since this project will be implemented as a pilot for the department of Medical BioPhysics, the total cost of ownership must be reasonable. Academic pricing for the ERP software is an estimated one-time fee of $4000 for unlimited users. Alternatively, a trial license is available for 10 users for $10, which will be used for prototyping until full deployment. Cost of server deployment and maintenance is additional, unknown at this time (More information required from the UWO IT department)

2.2.2 Security

One of the major requirements and concern is with security of the data that is stored within the system. Additionally, the data retention and use must be compliant with the Personal Information Protection and Electronic Documents Act[4]. There are several user roles, and the final solution will have to be aware of the permission sets.

2.2.3 Ease of Use

The system will be used by non technical users so the interface, should accommodate them. Moreover training and help document will need to be written with care to improve adoption.

2.2.4 Powerful

While being easy to use, the user will also have to view lots of data quickly and efficiently. Reports must be engineered to provide users with appropriate slices of data.

2.2.5 Reliability

The system will be replacing a mission critical system, and thus will need to be reliable. Moreover data storage might be required for 10 to 15 years, therefore data redundancy and archiving will be needed in the solution.

3 Methodology

The success of this project depends heavily on user acceptance. The system will be used heavily and regularly, to read and collect critical data. Moreover the amount of time allocated to implementing and deploying the system is relatively small. The user must be involved in the progress of the project regularly and in all stages. Additionally the developers will only be working part time on the project. Due to these reasons and several others we will be proceed with an Agile Development methodology. Specifically feature driven development (FDD) will be done. FDD is driven by a list of features that are directly important for the user. At the starting of the project this list of requirements are captured in a Requirements Documentation. The Agile Project methodology will be employed where development is done in an iterative and incremental fashion. In each iteration a small chunk of features are analyzed, developed and tested. At the end of each iteration feedback will be captured, from Ms. Wendy Hough in the format of informal acceptance test. The

feedback from prior iteartion and new sets of features will be used in the next iteration. Figure 1 describes this process in a state chart.

During our requirement elicition phase we will be working on creating a preliminary feature list, as a business requirements document. These requirements will be prioritized and attached to each iteration. During an iteration further analysis, design, implementation and testing will be performed. At the end of each iteration a report will be generated, which will be used to track and measure the progress of the project.

Additional advantages of Agile Project management include:

- Regular Testing per Iteration
- Removing Bias from Designers and Developers
- Focus on End User Perspective
- Regular Meetings and Progess Updates

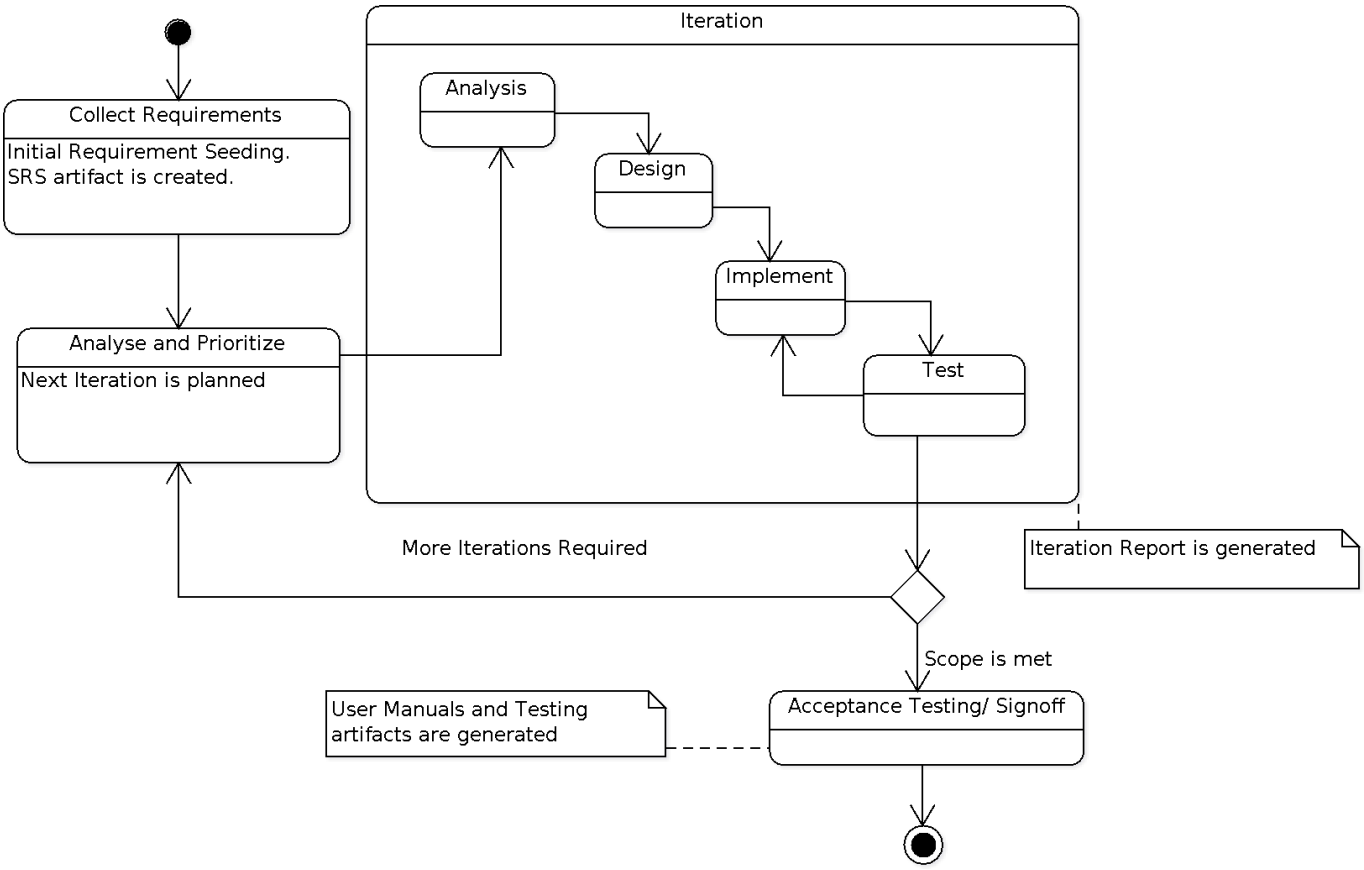


Fig. 1: The proposed feature driven development

4 Project Tasks and Resources

4.1 Collaborative Tasks

The entire project will be done as a team and several components will require collaborative work between both of us:

- Graphical User Interface
- Database Design
- Process Workflow Design
- Systems Analysis
- Implementation and Testing
- Project documentation

4.2 Software Tasks: Kartik Thakore

4.2.1 Reporting Software

Reporting Software will be used to calculate and generate data reports as needed. Statistical Software (R Language) will be explored as an alternative.

4.2.2 Rule Engine and Feedback Gathering System

The system will need to follow business rules and send triggers to gather feedbacks. This system will be built on existing technology such as: Email, SMS etc.

4.2.3 Core Framework and Interface

A core framework will be used to talk to databases and provide a graphical user interface to the user. Moreover several interfaces will be required to mesh with Radio Frequency Identification (RFID) and E-Signature technology.

4.3 Electrical Tasks: Parth Champaneri

4.3.1 Network Design and Encryption:

We will be using an iterative process to determine the most efficient design topology so that the new network meets the need for the end-users. The primary objective of this exercise to optimize the prototype network and have encryption at Application layer, Database level security and transport level security. Techniques will be implemented to minimize failures and increase protection at the server level.

4.3.2 Smart Access Applications:

Optionally if time permits, Smart access applications will be used to enhance the experience of the end user and provide useful data for processing. Some of the applications, which will be explored, are:

RFID applications will be explored to enhance and automate the system. Some of the identified uses are implementing an attendance management device, which will record Seminar attendance for graduate students. Furthermore, it can also be used for asset management.

4.3.3 E-Signature Pad:

The possibility of integrating a signature pad option will be explored time permitting, for recording signatures after the advisory committee meeting or other processes where signatures need to be captured. This will, in turn eliminate the use of paper and we will be able to align the system to eco-sustainability initiatives supported by UWO. All the data will be stored on the server, which can be utilized for planning and analysis at a later stage.

4.3.4 Smart Phone Applications

Smart Phone Apps have revolutionized the way users interact with technology. In order to exploit the power of mobile applications, we will optionally explore the development of a smartphone application that students can access to manage their information as well as administrative personnel. Furthermore, UPC scan codes can be implemented to facilitate student management at the seminars and advisory committees.

4.4 Part Lists

4.4.1 Hardware Components

- Application / Database Server
- RFID tag reader
- E-signature pad prototype

4.4.2 Software Components

- Software Licensing Costs
- SmartPhone Application Development Suite (As per manufacturers requirements)

5 Deliverables

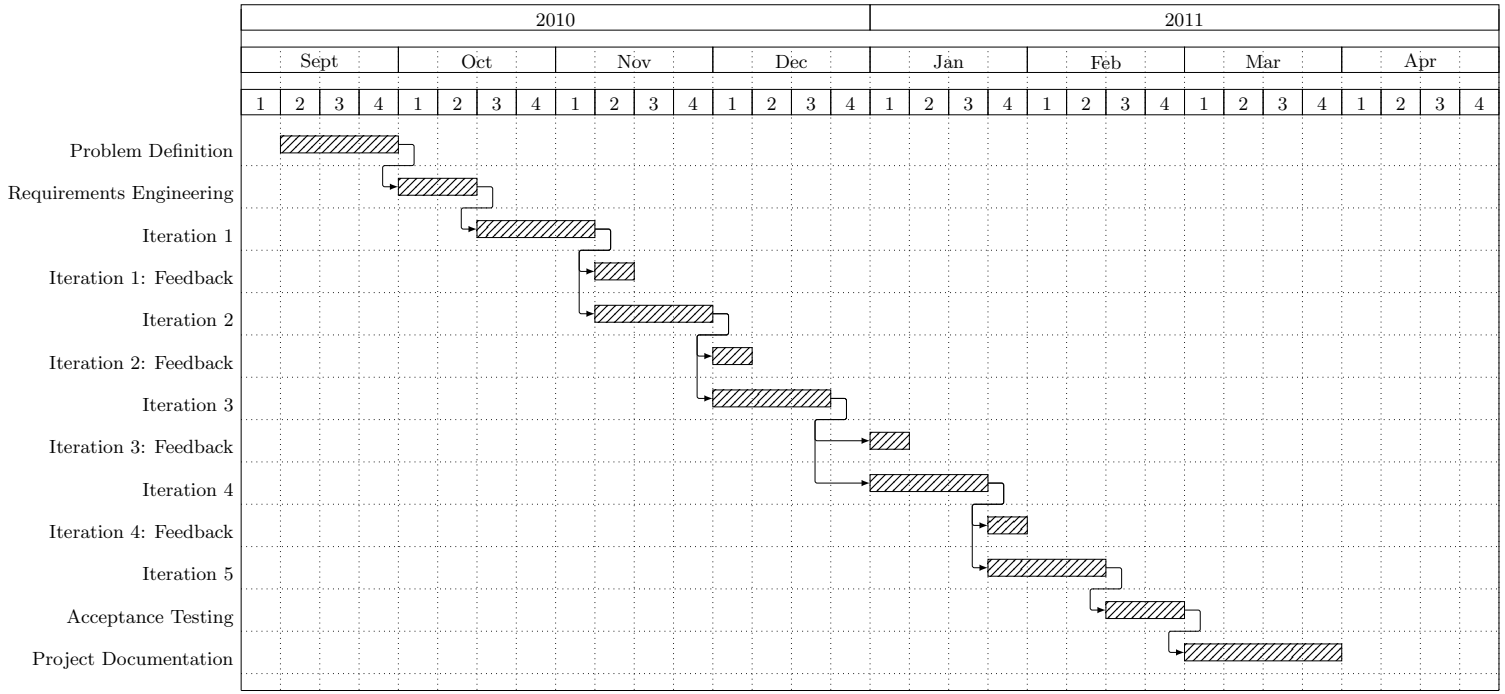
- Requirements Documentation
- Iteration Reports (Periodic Status Reports)
- Midterm Report
- Final Product and Report

6 Project Plan

As mentioned before, we will be using Agile project management technique to deliver the solution. As part of the methodology and as we will be delivering five iterations before a final roll-out of the prototype in March. The key advantages of this methodology are:

- Deliver work fast
- Ensures that the focus always remains from the end-users perspective.
- Very tight learning feedback loop allows for quick discovery of optimal solutions
- Each iteration will continue for a duration of three weeks following a one week period to obtain feedback from the stakeholders and the end-users.

6.1 Gantt Chart



7 Advisor

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Signature:

Date:

8 Grade

Mark of the Course Coordinator (ECE 4416): pass/fail

Date:

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