Interactive Graduate Student Information Database: Midterm Report

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Contents

Chapter 1

Software Specifications

1.1 Introduction

1.1.1 Purpose

The purpose of this report is to document the Software Requirement Specifications (SRS), preliminary Iteration Report and respond to the for the Interactive Graduate Student Information System (SIMS). Additionally, in accordance with the Agile project management methodology, a walk through of the first iteration is included. The first iteration includes two system critical features which will be used for iterative system development of the system. Database schemas and operational logic for user authentication and calculations for graduate student funding were accomplished. A database schematic was designed after performing extensive analysis based on our specifications, data flow requirements and approved system critical assumptions. Data normalization was performed and a Representational State Transfer (REST) framework was implemented to combine components. Furthermore, unit and integration testing were completed with the preliminary implementation in place. For preparation of future iterations, a sign-off from end users and client is required. The rapid prototyping of the e-signature component for the advisory meeting tracking feature has begun.

1.1.2 Scope

The scope of the following requirements is to provide a pilot software back end for the BioMedical Physics Graduate Program at UWO. First the system will replace the current method of tracking student information pictured in Figure 1.1.

- The current system provides the following features which directly fall into scope for this product:
  - Storage of Intrinsic Student Value
  - Graphical User Interface for Entering Student Data
  - Saving portable reports for external users

- The new system will additionally need to address the following concerns:
  - Store data securely and with more redundancy
  - Simpfly the User Interface for the system
  - Remove the load of managing data solely on one user
  - Allow faculty members to view data in a meaningful way
  - Allow students to update their information
  - Allow advisory committee members to store and retrieve signatures and comments on the system

Currently the scope is limited to tackling these core issues. However since the project cycle is iterative, the scope can be expanded in a controlled manner, should the situation demand it.

1.1.3 Definitions, acronyms, and abbreviations

- SIMS: Student Information System
- UWO: University of Western Ontario
- REST: Software Architecture for Web Applications
- VPN: Virtual Private Network
- SSL: Security Protocol for Web Applications
- SRS: Software Specifications Document
- SDS: Software Design Document

1.1.4 Overview

The SIMS core is a secure application that aims to be flexible to handle business rules of varying graduate student programs. In the scope of this project however, focus will be placed on the Graduate Student Program for BioMedical Physics Program at University of Western Ontario. At the very least SIMS will hold graduate student, funding and advisory meeting data. Additionally SIMS will allow the program administrator to organize collected data into reports and to send automatic request for data to students. Also advisors and other faculty users will be able to see student data, progress and any advisory meetings they have attended. SIMS will also place an emphasis on providing security of student personal data and faculty identifications. Overall SIMS, will be replacing the current manual system of tracking students and their progress through graduate programs. Figure 1.2 shows the overview of the required system. The user will access the system via the Client and Tablet devices. The data from the tablet will be processed in the client and sent via the TCP/IP protocol to the Application Server (AppServer). The responsibility of the AppServer is to provide secure access, and host the application. The AppServer will communicate with the Services Server to add triggers and

use the database. The AppServer and the ServicesServer will be located on a local network which is accessed via a Virtual Private Network (VPN). Figure 3 models the users of the SIMS system. The user groups can be broken down into 3 categories, the Student, the Faculty and the Technical Administrator. The technical administrator will have access only to the authentication data. While the student and the faculty will have access only to the tracked data. Additionally the faculty will have more access over the student. The role and operations requirements will be covered more in-depth in the system features.

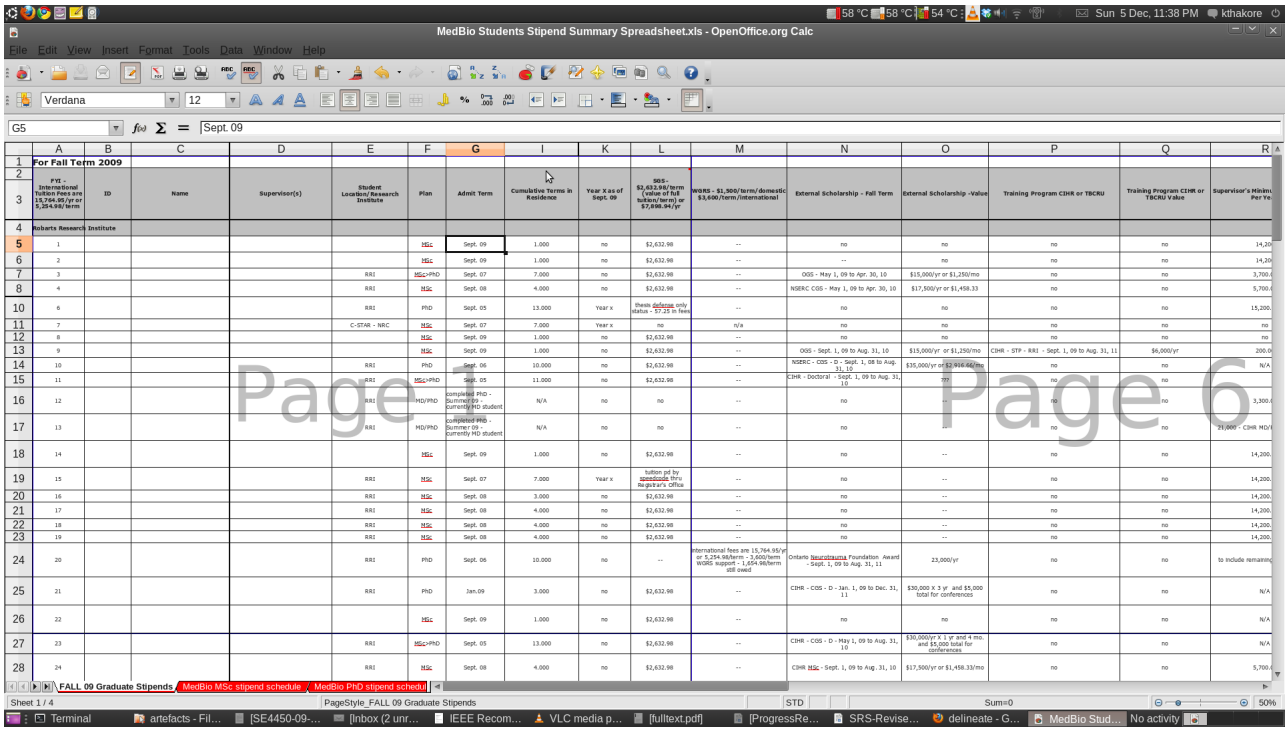

Figure 1.1: Current System

1.2 Overall Description

1.2.1 Product perspective

The product will be self contained as it is responsible for the User Interface, Application and Data Storage. Figure 1.2 again describes the perspective of the system. The product will have the following constraints:

- User Interface: The specifications of each view of the user interface will be provided for this project.
- Hardware Interface: The system will be using a Wacom tablet as a hardware to acquire signatures.
- Software interfaces: The system will have to employ several software interfaces.

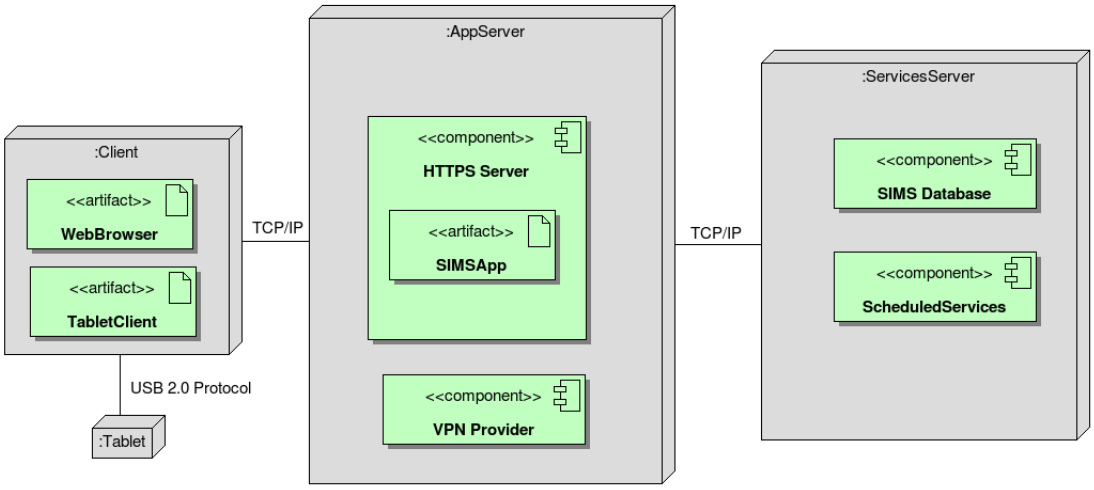

Figure 1.2: Proposed System

- Application Server: Apache 2.0 will be used to deploy the system with SSL security.
- VPN Provider: OpenVPN will be used to deploy our system as a self contained virtual private network.
- Database Software: A PostgreSQL RDBMS server will be used to run our Data Storage Component of the Software.

1.2.2 Product Function

1.2.3 User Characteristics

Figure 1.3 describes the relation between the users of the systems, for further clarification:

- General User: Any user of the system, can login into the system
  - Faculty: Members of the faculty that can see data of several students who are not student themselves
    - Graduate Administrator: Essentially the super user of the system, can access and modify all data
    - Advisory Committee Member: Can view attached student data and advisory meeting documents
    - Graduate Faculty Executives: Can view all student data and view publish reports
  - Technical Administrator: A user that cannot access any data but can manage users
  - Graduate Student: A student that can only view their own information and update it

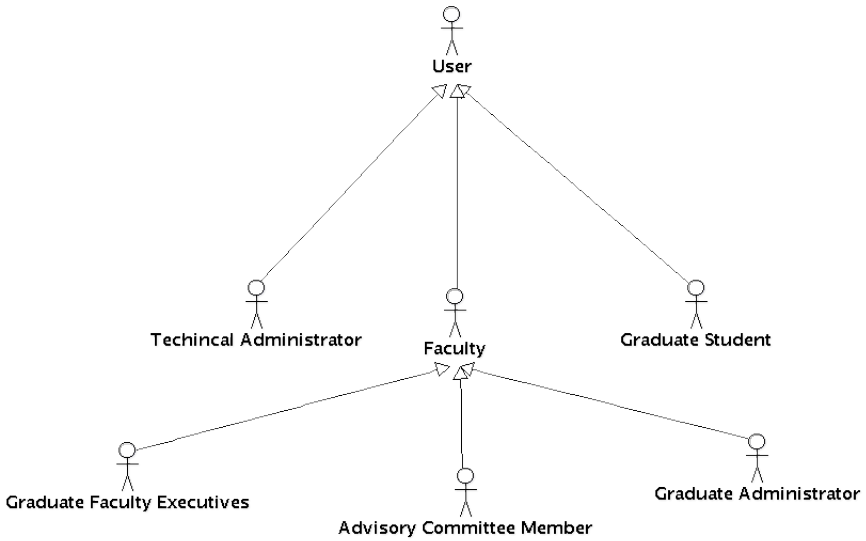

Figure 1.3: Users of the System

1.2.4 Constraints

Technical Environment

SIMS will be built on the Linux Server platform for the Database and Application Server. The client will be limited to a Linux Operating System with the Firefox 3.6 web browser.

Security

UWO has strict guidelines (FIPPA) to handling signatures and student data. For this purpose proven technologies will be used, such as HTTP secure and VPN.

Reliability of Data

Data in SIMS is critical and needs to be protected from data losses. A regular backup of the database will help to accomplish this.

1.2.5 Assumptions and dependencies

Student Data v.s User Data

Student Data is separate from the system, and will not be removed from the system after they graduate. However a user can still be expired from the system. Since archival is needed for a period of atleast 7 years SIMS will need to separate user access and student data.

Intrinsic Student Data

Another assumption required by SIMS's requirement is that Student can only be stored in the system if they have a funded term attached to them. This implies that funding is tied on a term basis, which can help to simply futher calculations.

1.3 Specific Requirements

1.3.1 External interface requirements

Graphical User Interface

A set of graphical user interfaces defined in HTML will be provided for the system to template. SIMS will show the interfaces as is and add dynamic data to them.

Hardware Interface

SIMS will acquire signatures from client side wacom tablets from a USB 2.0 protocol. Data will be outputted in a BMP file format.

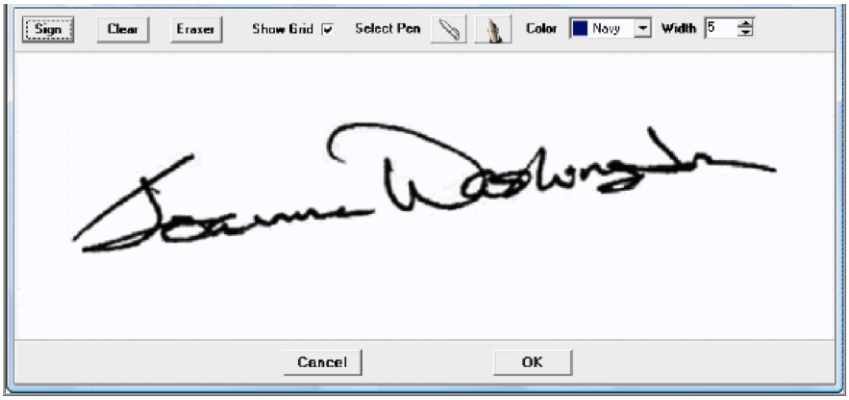

Figure 1.4: Signature Interface View

- Purpose: To provide an interface for recording advisory committee member signatures.
- Response Sequence: When the e-signature pad is connected to the device, it will automatically start the e-signature interface which records an individual signature.
- Associated Functional Requirements:
  - Clear: Ability to clear the signature if the signer does not accept the signature
  - Sign: Once the output on the screen is satisfactory, the user can "Sign" the document which will save the image into the document and link it to the current document.

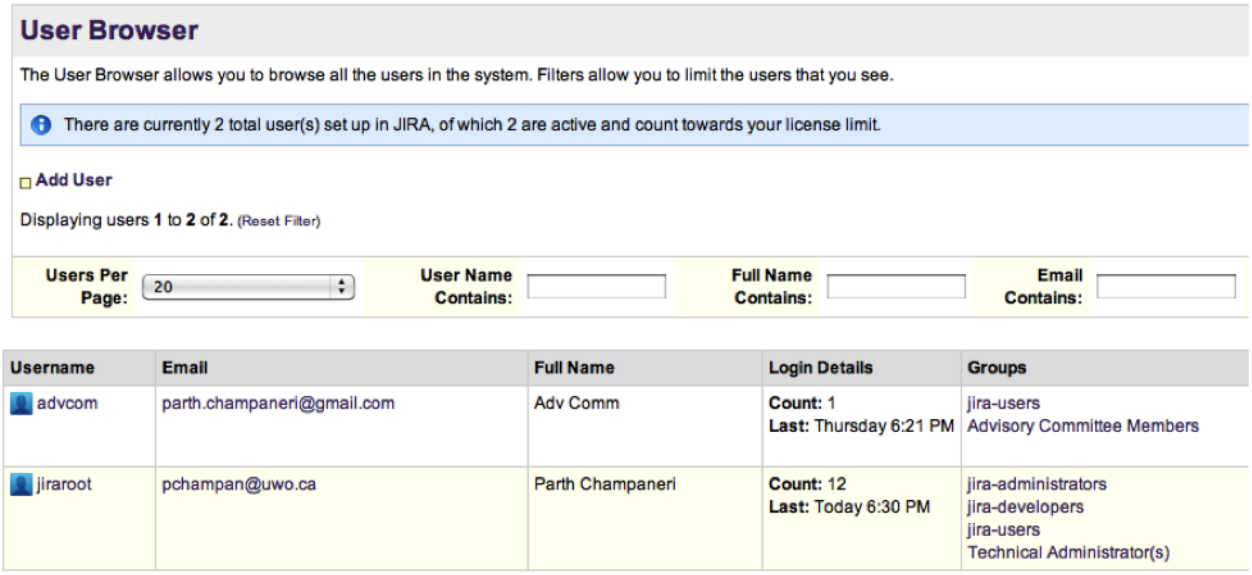

Figure 1.5: User Browser

1.3.2 Functional requirements

User Administration

- Purpose: The user browser lists all the users in the system for technical administration.
- Response Sequence: Login and click on User Browser from the administration dashboard. From this page, the administrator can perform the following functions:
- Associated Functional Requirements:
  - Create new users: Adding a new user to the system can only be accomplished by the Technical Administrator after an approval from the Graduate Administrator.

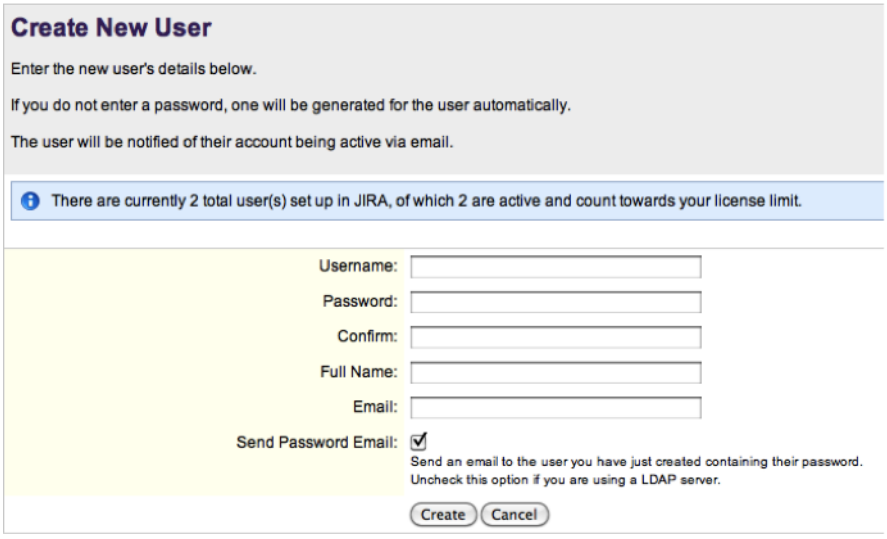

Figure 1.6: New Users

– Adding new user roles: User roles are primary stakeholder groups for the system. Currently, our primary stakeholders are Advisory Committee Members, Graduate Administrators, Graduate Executives, and Graduate Students.

Group Name	Users
Advisory Committee Members	1 (View)
Graduate Administrator(s)	0 (View)
Graduate Executives	0 (View)
Graduate Students	0 (View)

Figure 1.7: New Users Roles

– Adding Operation to roles: Permissions can be added to the user permission list by clicking on the Add New permission button under User Administration. This can be done by the Technical Administrator.

Group Name	Users
Advisory Committee Members	1 (View)
Graduate Administrator(s)	0 (View)
Graduate Executives	0 (View)
Graduate Students	0 (View)

Figure 1.8: New Operations

System Wide Login Page

Figure 1.9: System Wide Login Page

- Purpose: Provide a universal log-in page to provide access to the end users of the system
- Response Sequence: In order to access the login page, user will have to type the system URL in a supported browser, which will direct them to this log in page.

- Associated Functional Requirements:
  - Introduction widget: This widget will provide a short introduction to the purpose of the management system. It will also feature an Important Links section with a link to the website of The Department of Medical BioPhysics. Furthermore, a link to a technical troubleshooting page will be created.
  - Login window: This is the actual login page where the user will enter their credentials to login. Users cannot sign up for the system individually. The Graduate Administrator facilitates the sign up process and a direct link to request the login credentials will be set up.

System Dashboard

Figure 1.10: System Dashboard Page

- Purpose: Provide a centralized location of all system functions while preserving ease of use and accessibility.
- Response sequence: The user will be directed to this page after login.
- Associated Functional Requirements:
  - Provide various plugins on the dashboard based on different user roles and operation for access to student profiles and various system features.
  - Search: Be able to search a students profile from the dashboard.

Student Profile

- Purpose: Provide an intuitive dossier format interface for users to see the student profile in a centralized location. The key goal is to ensure that all the important system functionality is in a centralized location. Note the attached sample HTML page.

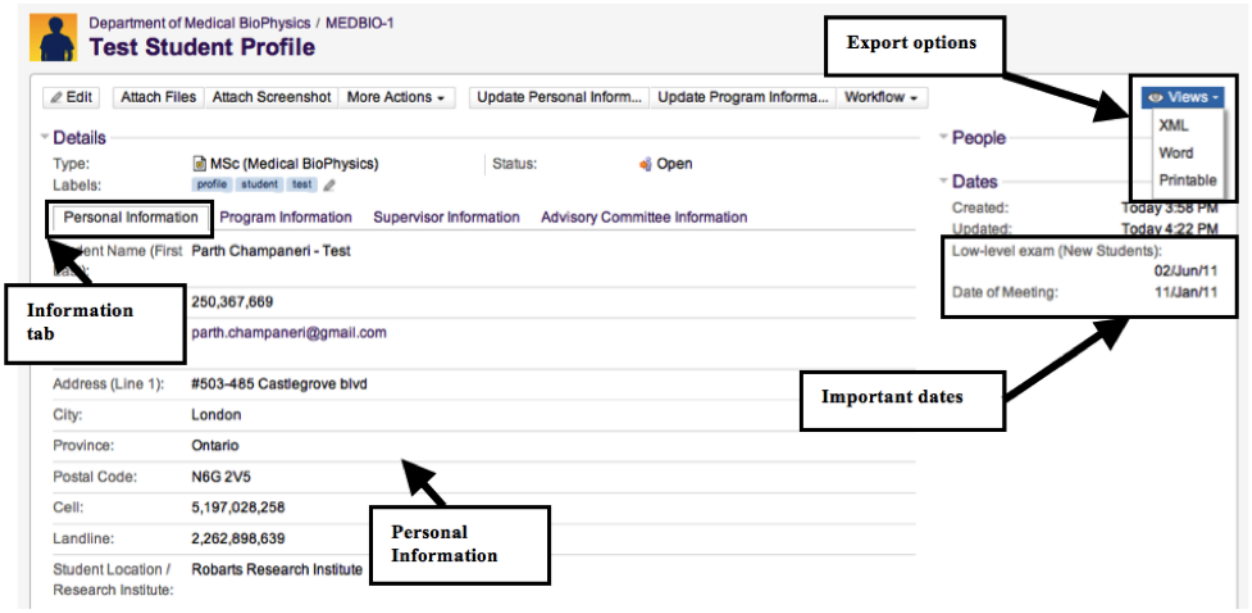

Figure 1.11: Student Profile Page

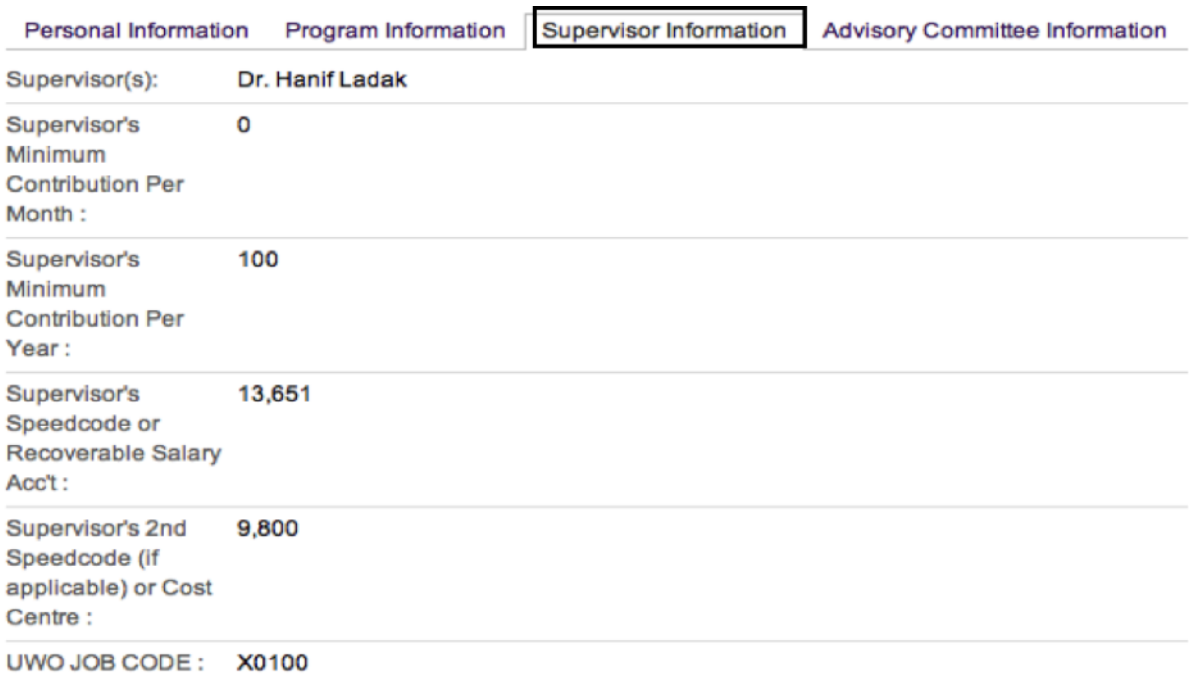

Figure 1.12: Supervisor Information Page

- Response sequence: In order to access the GUI, the user will be required to login and will be taken to a dashboard which will have options to generate reports and search a student by their assigned id. Once selected the user will be able to see a student profile and be able to perform various functions based on their authentication scope as defined in the access control list.
- Associated Functional Requirements:
  - Information Tab Section: The profile page will feature information tabs with centralized information about their Personal Information, Program Information, Supervisor Information and Advisory Committee Meeting Information.
  - Supervisor Information: This tab contains information regarding a students' direct Supervisor Name and information about the supervisors minimum student contribution along with other logistical information. This information is created with the sample medical biophysics excel sheet provided by the Graduate Administrator user at the Department of Medical BioPhysics.
  - Expansion: Each section can be clicked on to show summary of additional information
  - Link: Each information tab will link to another section pages (if applicable)
  - Grouping: Group Dates and people in the same window area for better accessibility Export Options: There should be an export option to ensure that a user can export their entire student profile in Word, PDF and a printable HTML.
  - Attachment Options: The dossier should feature an attachment tab that includes all relevant attachments/forms for that student profile.

Graduate Students' Personal Information

- Graduate Students' Personal Information: Contains data regarding the students contact information including their UWO e-mail address and their current location. This system feature is to document how personal information is stored and accessed via different user roles.
- Graduate Students: Graduate Students can view their entire profile which includes information on their program, supervisor, advisory committee, as well as any personal records. Data access is restricted only to their personal profile.
- Graduate Administrator: Ability to edit all fields.
- Graduate Executives and Advisory Committee members: Read only access.
- Update Personal information
  - Visibility: Graduate students only
  - Restrictions: Only allowed to update contact information and address.
  - Usability: Graduate administrator is responsible for inputting student data.

Graduate Students Program Information

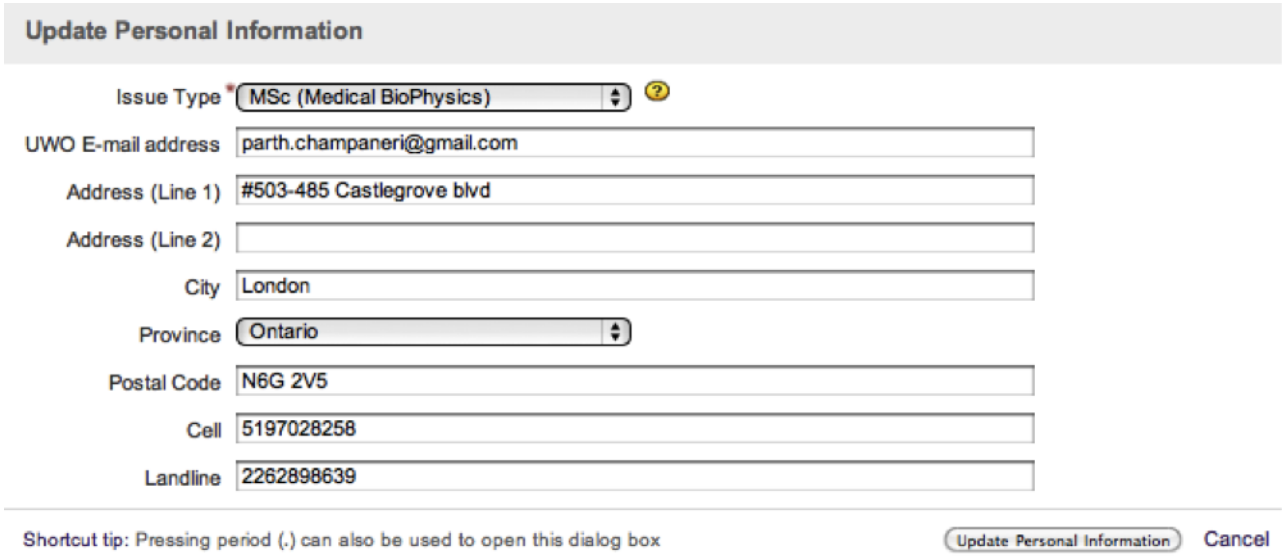

Figure 1.13: Update Personal Information Student

- Contains information related directly to the students program enrollment. Information includes Admission Term and Year, Thesis information, Publications (if any) and a custom field that records if the student has indicated MSc to PhD reclassification.
- Update Program Information
  - Visibility: Graduate students only
  - Restrictions: Allowed to update Publications, Thesis (if applicable) and Low-Level exam date if known.

Graduate Students' Advisory Committee

- Advisory Committee Information tab is a centralized location for all advisory committee information which has taken place for a student. Under this tab, pertaining information such as the list of all advisory meetings, evaluation of a particular advisory meeting whether it was satisfactory or unsatisfactory and any supervisor/member recommendations after the meeting. Advisory committee is a progression requirement which happens for each student atleast once a year. Scheduling is usually done by the student or by the graduate administrator. One of the key requirements is to track and remind students of their advisory meeting output and ensure that a post-meeting report is generated to satisfy their progression requirements.
- Update Advisory Committee Information
  - Visibility: Graduate students and Graduate Administrator

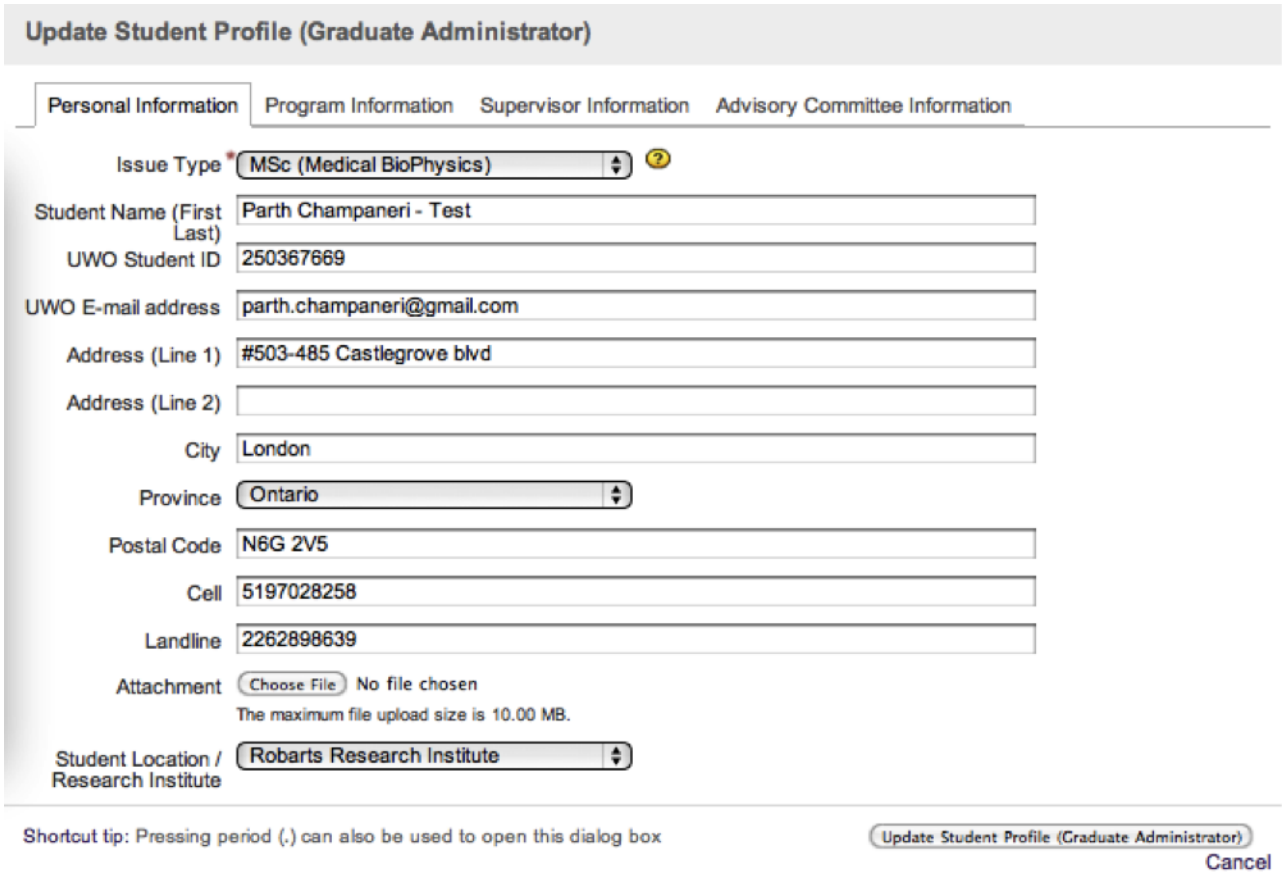

Figure 1.14: Update Advisory Committee Information

- Restrictions: Allowed to update names of supervisor and advisors after a date for the meeting has been formed.

- Comment on Advisory Committee Meeting:

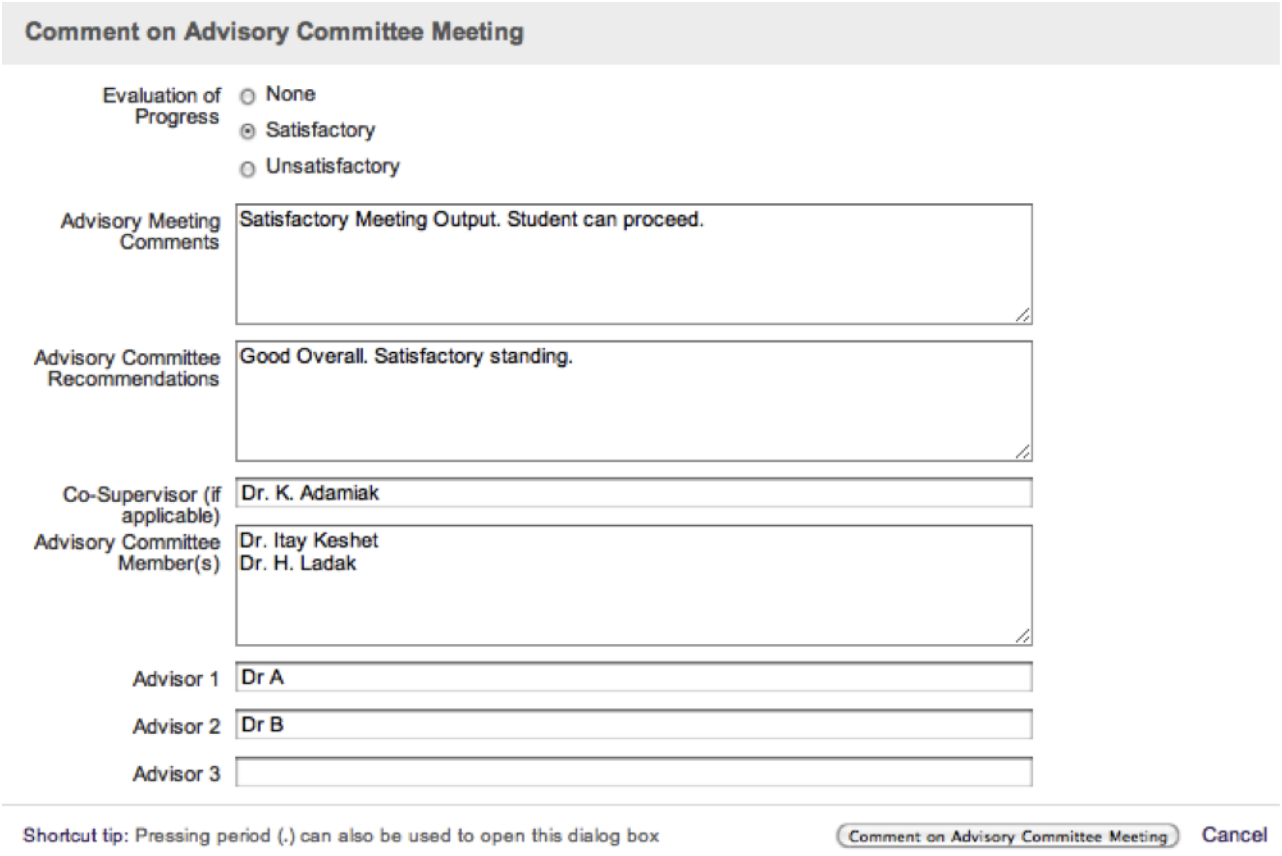

Figure 1.15: Adding Comments to Advisory meetings

- Visibility: Advisory Committee Members
- Restrictions: Cannot access any other data. Members can update progress and output of the meeting. Can also provide recommendations and comments.

Data Reporting

- Queries: Reports can be generated by filtering via various fields or by entering customized queries in the reporting interface.
- Queries can be run by the administrator, advisory members and graduate executives.
- Sample Student Profile Report (Word): Users can export student profile in a Word document which contains all the information regarding the selected student. The scope of the document generated will be restricted to the roles and permission of the user.
- Sample Graduate Student Output Report (SOR) - Excel: Users can export a SOR based on custom queries which are either preset or custom created.

The University of Western Ontario
Department of Medical Biophysics
Learning Through Research
Western
Schulich MEDICINE & DENTISTRY

Graduate Student Output Report (SOR) (The University of Western Ontario (Graduate Program Administration))

Displaying **2** students at **17/Nov/10 4:39 PM**.

Plan	System ID	Student Name (First Last)	Student Location / Research Institute	UWO E-mail address	UWO Student ID	Admit Term (Fall/Winter)	Admit Term (Year)
MEDBIO-2 MSc (Medical BioPhysics)	MEDBIO-2	Kartik Thakore	Medical Biophysics - LHRI (Grosvenor Hospital)	kthakore@uwo.ca	250738876	Winter (January)	2010
MEDBIO-1 MSc (Medical BioPhysics)	MEDBIO-1	Parth Champaneri - Test	Robarts Research Institute	parth.champaneri@gmail.com	250367669	Fall (September)	2010

Generated at Wed Nov 17 16:39:20 EST 2010 by Parth Champaneri

Figure 1.16: Excel Graduate SOR Report

- Custom Pie Charts: Pie charts and trend charts can be generated based on the SOR or a custom query.

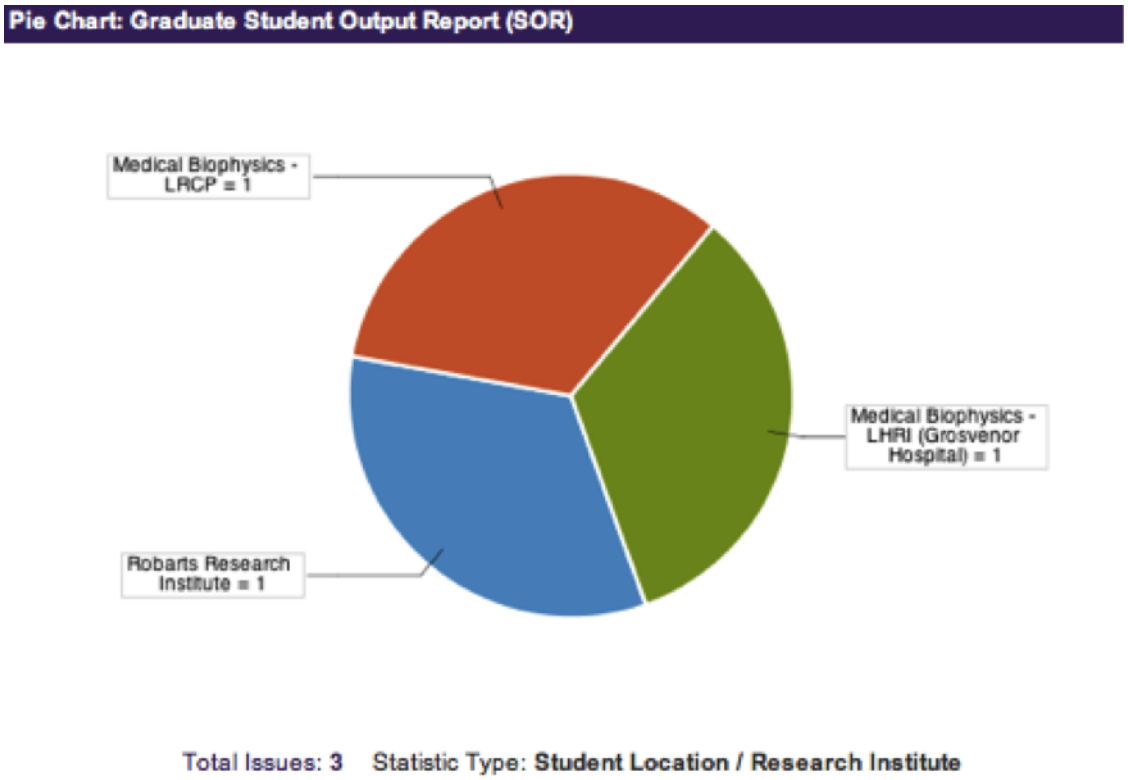

Figure 1.17: Excel Graduate SOR Pie Chart

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Chapter 2

Design

2.1 Iteration 1

The first iteration focused on completing the analysis of the user use cases, understanding the data flow of the system. Finally based on the analysis a MVC architecture was designed and implementation. The implementation focused on :

- Student Data Representation
- Framework to display HTML templates
- Authentication Data Repersentation

2.2 Analysis

2.2.1 User Hierarchy

As specified in the SRS the user hierarchy is well defined in Figure 1.3. Looking at the user interface provided the following use cases can be defined.

2.2.2 Use Cases

Generic User

Figure 2.1 defines the use cases of any user of the system. The user will be able to login and logut.

Dashboard

Figure 2.2 defines the use cases on the Dashboard features for each user.

User Administration

Figure 2.3 defines te use cases to do user administrator.

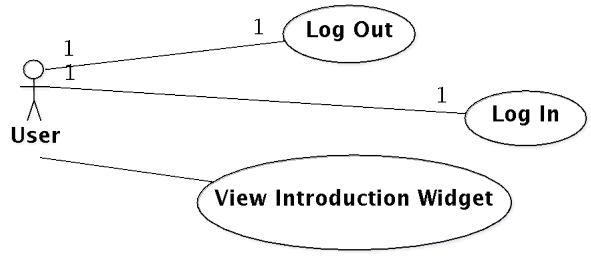


Figure 2.1: Generic User Use Case

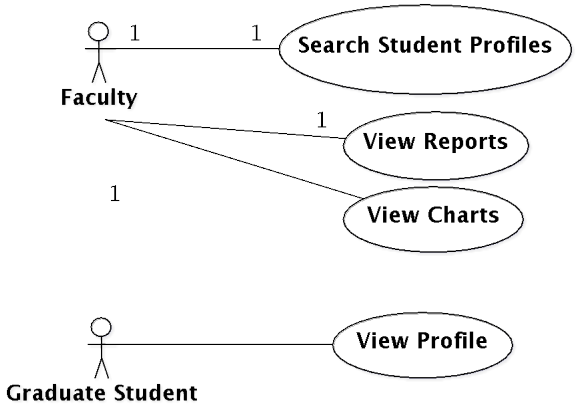


Figure 2.2: Dashboard Use Case

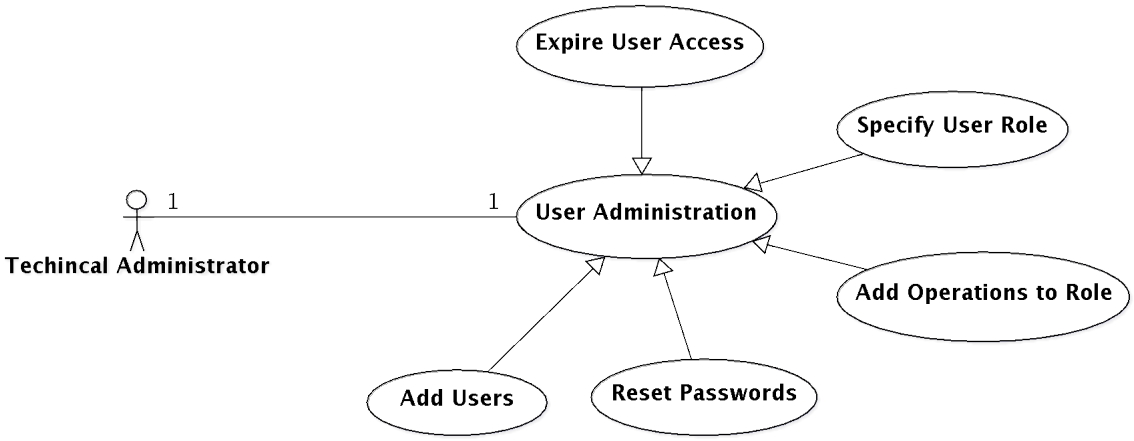


Figure 2.3: User Administration Use Case

Student Data Access

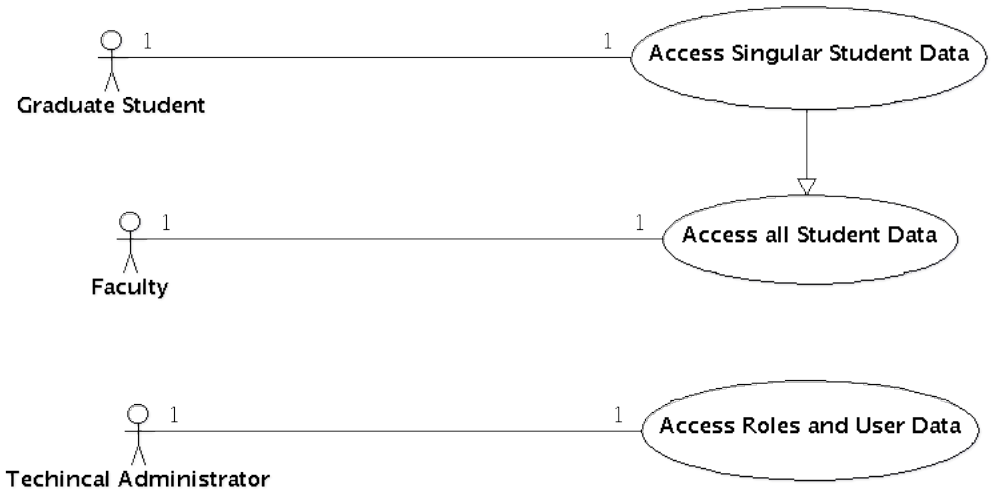


Figure 2.4: Data Access Use Case

Figure 2.4 defines the use cases that determines the access level on the student data.
Figure 2.5 defines modifications that can be done by the Graduate Administrator.

Triggers and Reporting

Figure 2.6 describe the functionality access for providing triggers and reporting.

2.2.3 Data Flow Considerations

Figure 2.9 describes the data flow analysis of the system.
Figure 2.8 describe the generic user transitions through the systems.

2.3 Design

2.3.1 Component Design

In iteration 1 the first component the focus on the student funding described in Figure 2.9.

2.3.2 Architecture Design

Due to the web nature of this application a Representational State Transfer (REST) architecture was decided on. REST architectures are driven by clients, which requests responses from the server. The server processes requests as representations of resources. Where any data or function can be considered a resource. The representation of the resource is captured as a document

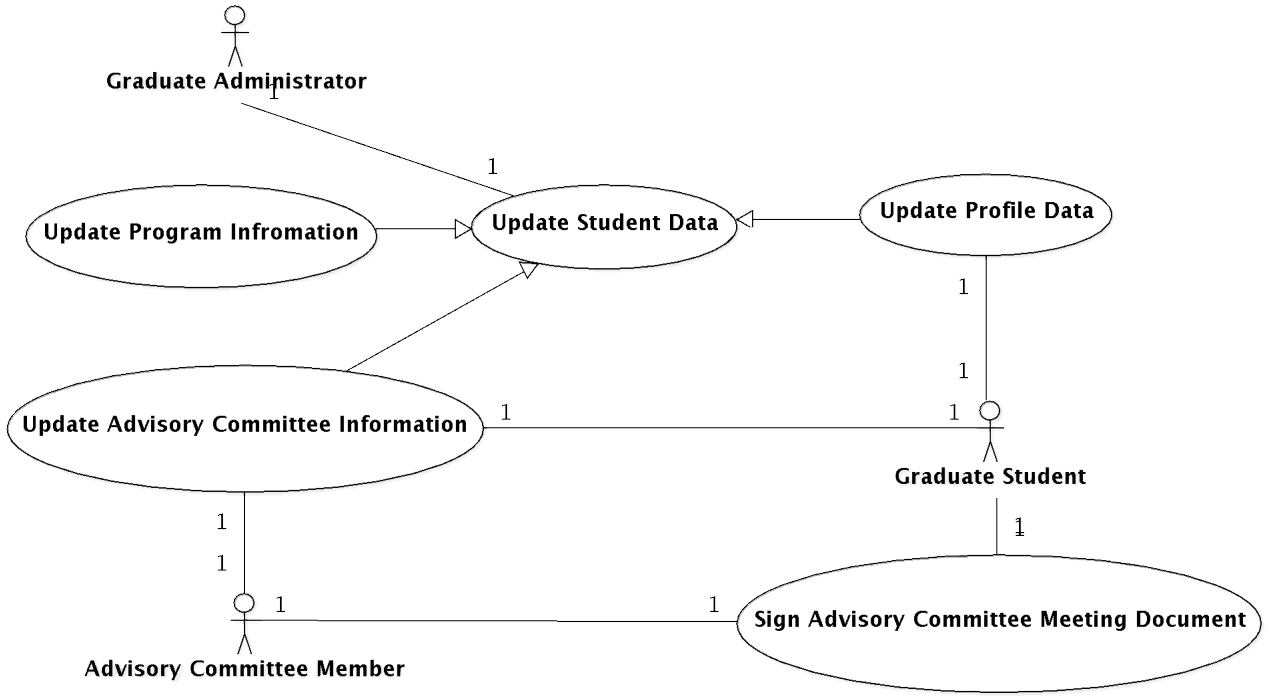


Figure 2.5: System Data Use Case

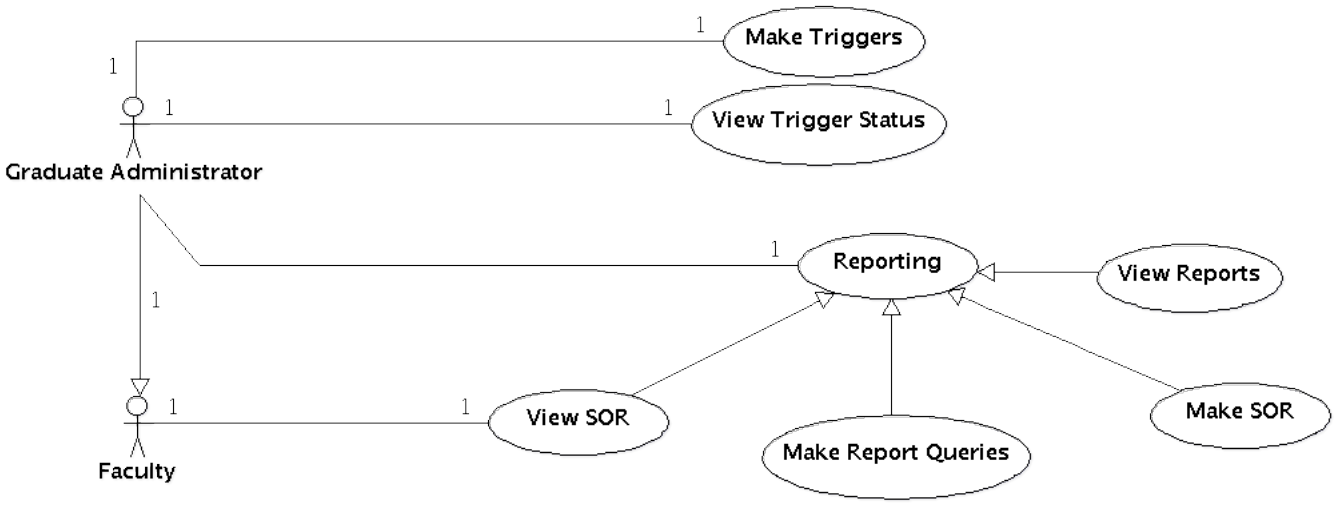


Figure 2.6: Triggers and Reporting Use Case

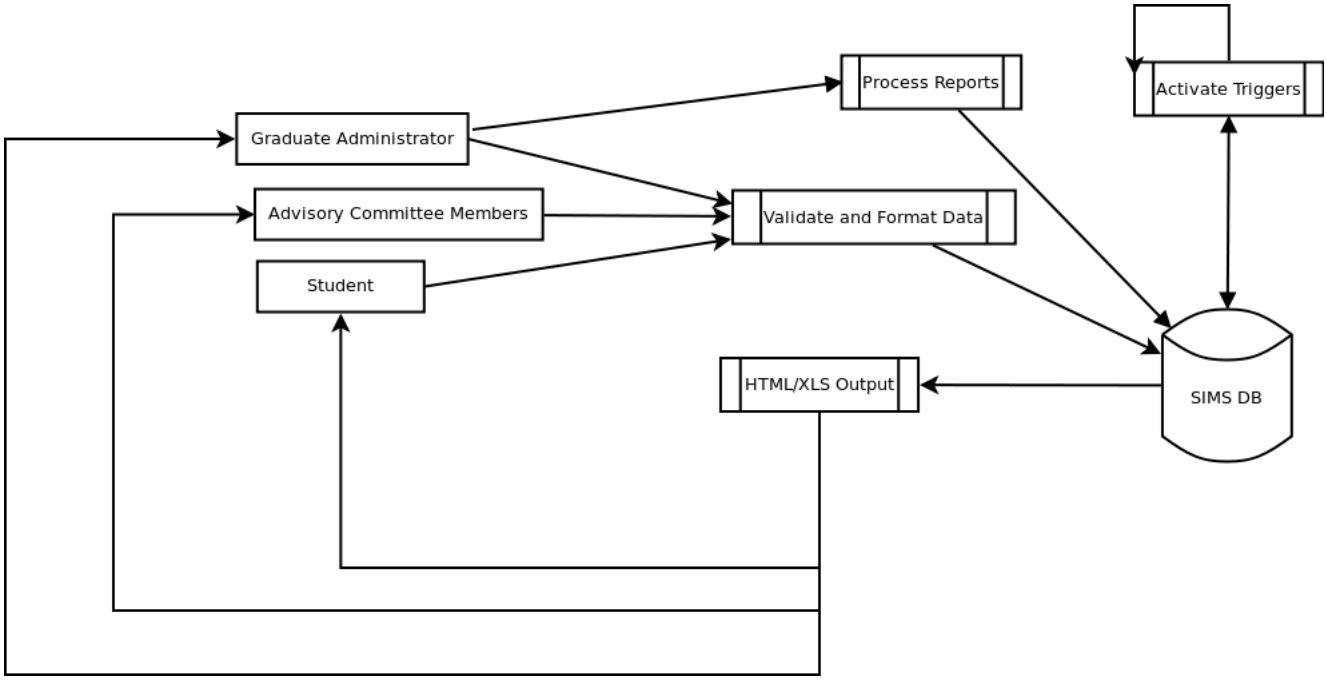


Figure 2.7: Data Flow of the System

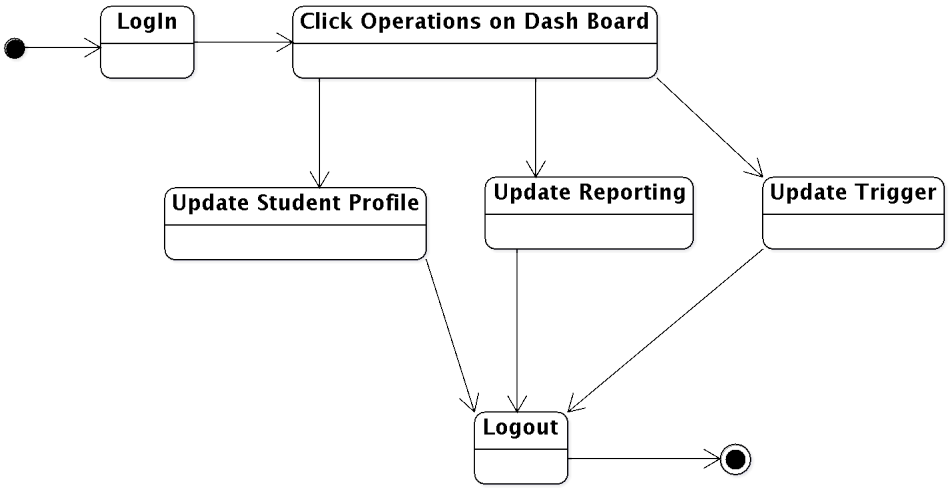


Figure 2.8: Transitions through the System Interface

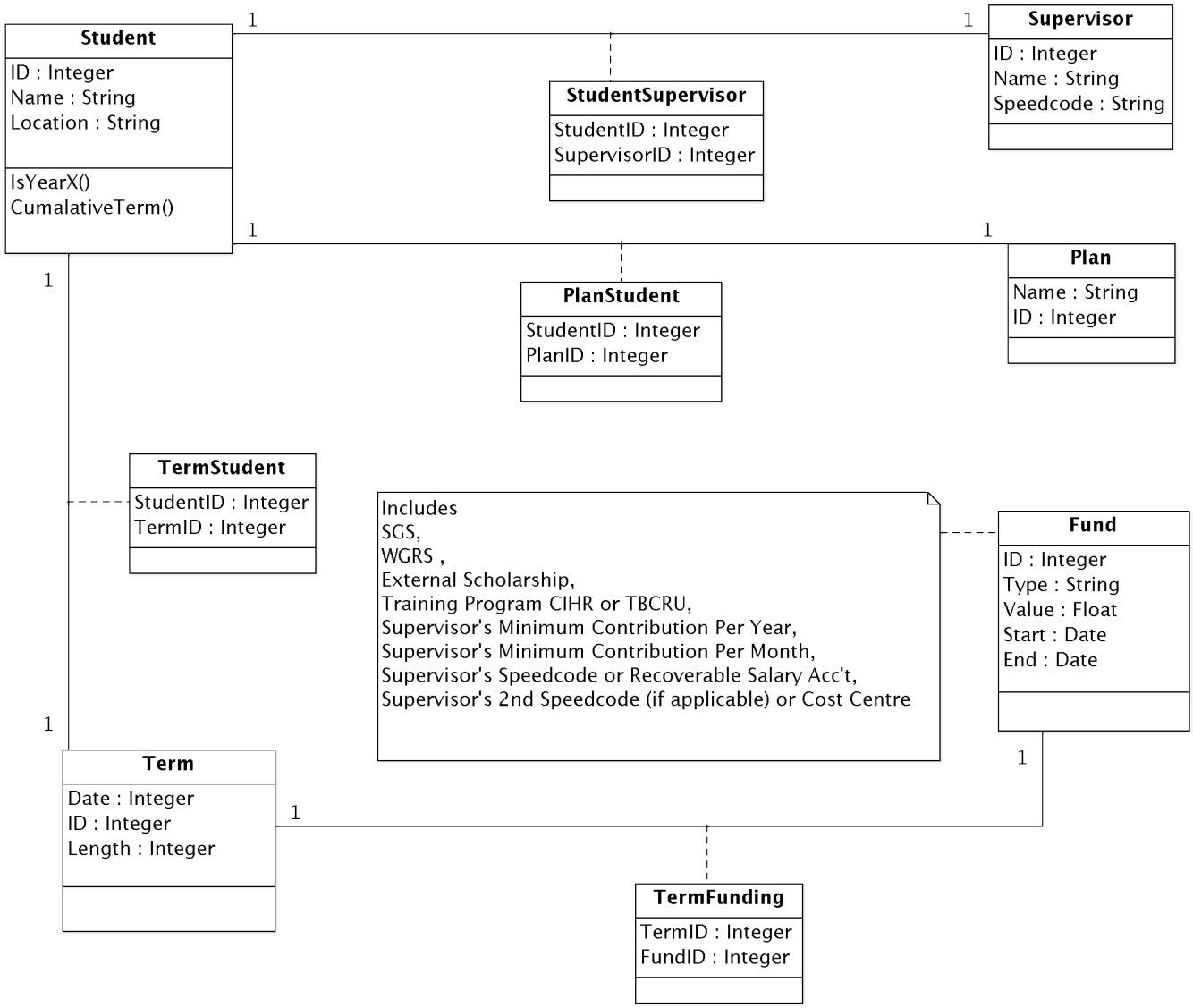


Figure 2.9: Funding Model

(HTML, XLS or PDF). The requests and responses are made to transfer the representation, current or otherwise. Figure **??** show the architecture of the system.

2.4 Implementation

2.4.1 Catalyst Framework

2.5 Testing and Feedback

2.6 Future Work

2.6.1 HTML Templates

2.6.2 Server Configuration

2.6.3 Advisory Committee Meeting

Chapter 3

Walk through

3.1 Concerns

3.1.1 Organization

3.2 Report & Follow up

3.2.1 Structure in Design

Chapter 4

Partial Test Plan

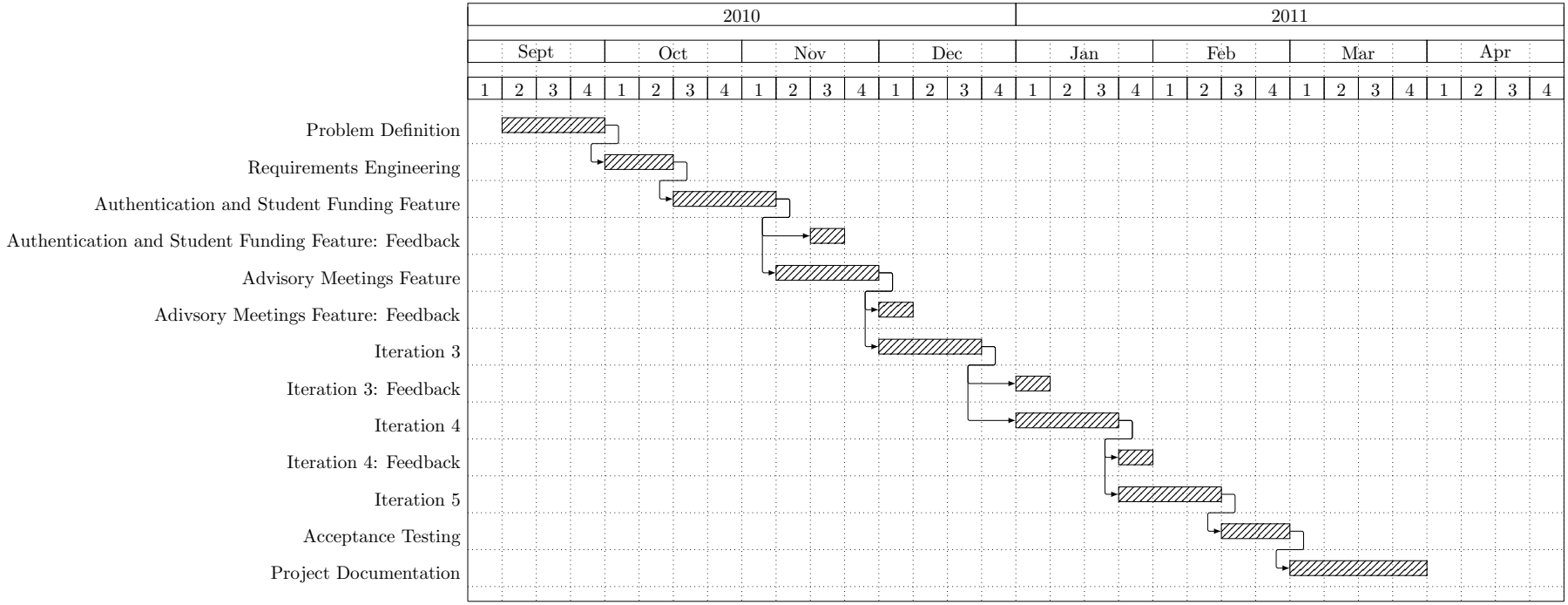
4.1 Unit Testing

4.2 Integration Testing

4.3 Performance Testing

Chapter 5

Updated Gantt Chart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2011
Sept
Oct
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Dec
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Problem Definition
Requirements Engineering
Authentication and Student Funding Feature
Authentication and Student Funding Feature: Feedback
Advisory Meetings Feature
Adivsory Meetings Feature: Feedback
Iteration 3
Iteration 3: Feedback
Iteration 4
Iteration 4: Feedback
Iteration 5
Acceptance Testing
Project Documentation

Chapter 6

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"Council highlights",http://www.cou.on.ca/News/News---Views/Newsletters/PDFs/Council-Highlights-2005May.aspx, 2005, This is an electronic document. Date of publication: May 1, 2005. Date retrieved: Sept 29th, 2010.

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