Interactive Graduate Student Information Database

Midterm Report

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Abstract

The purpose of this report is to document preliminary elicited requirements 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 documented. Our 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 performed with the preliminary implementation in place. For preparation of future iterations, a sign-off from end users and client is required. However, we have started the rapid prototyping of the e-signature component for the advisory meeting tracking feature.

1 System 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 at the 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.

1.1 High Level Model

Figure 1 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).

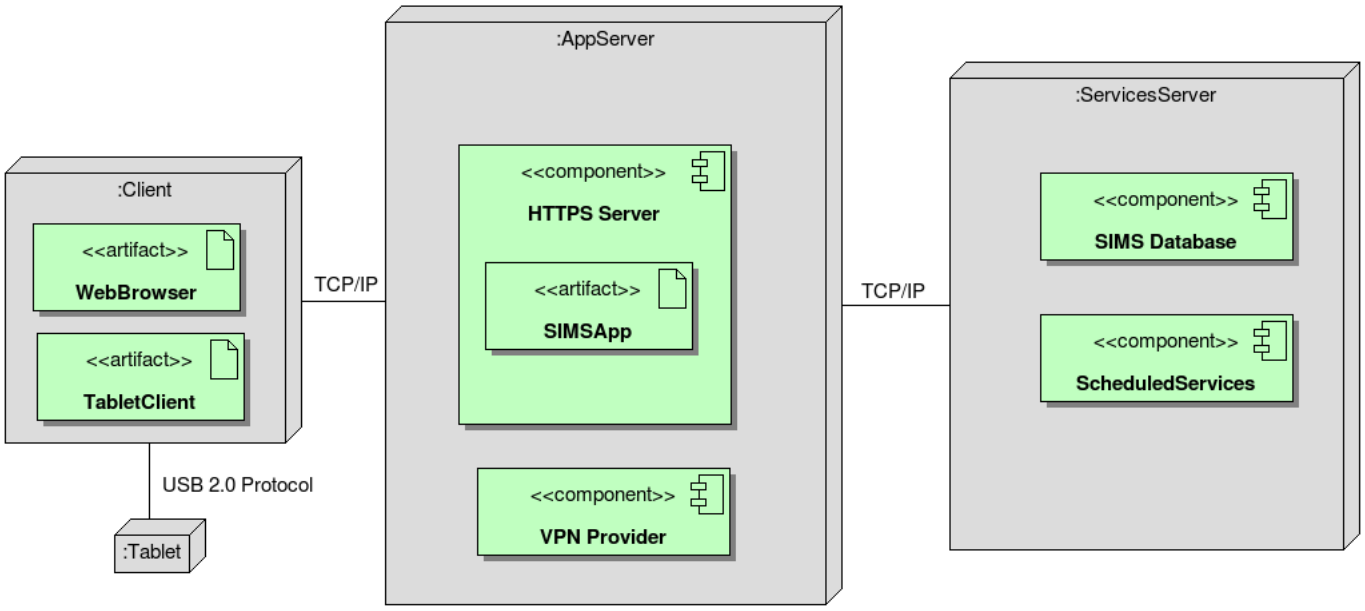


Fig. 1: The proposed system

Figure 2 describes the users of the SIMS system.

1.2 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.

2 Specific requirements

2.1 External interface requirements

2.1.1 Hardware interfaces

Electronic Signature Pad

A hardware interface capable of recording electronic signatures from various stakeholders to create a e-record of the forms for added accessibility. The image captured by the signature pad will go through layers of encryption and image processing algorithms to be encrypted and then saved using an appropriate protocol in the database.

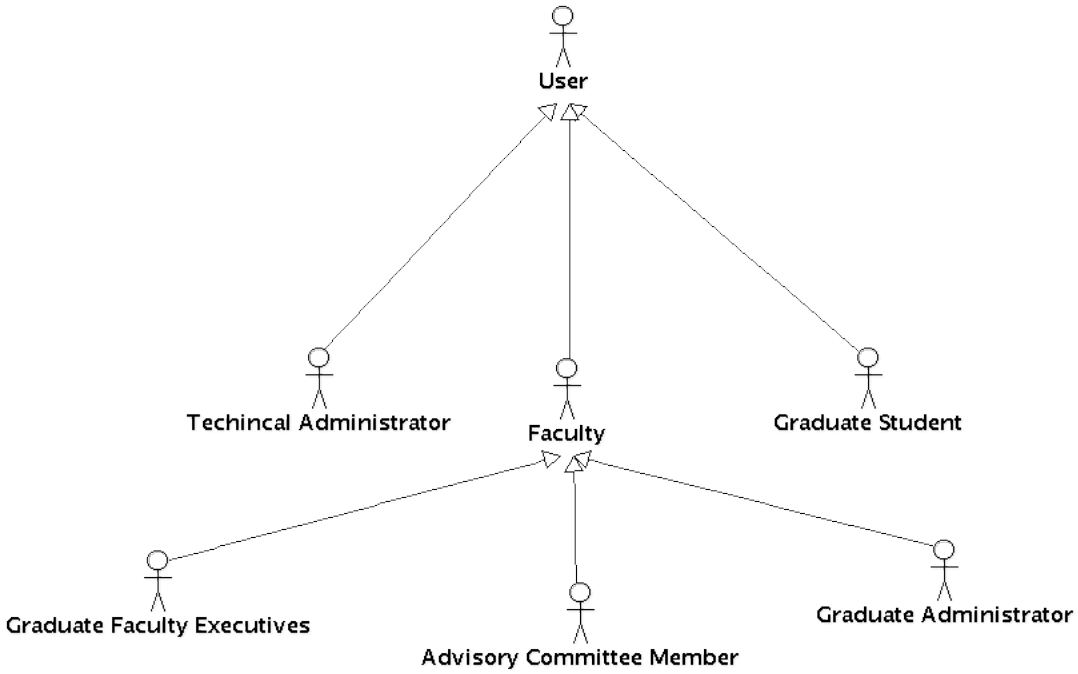


Fig. 2: Users of the SIMS system

2.1.2 Software interfaces

Web Interface

The web interface is primary link for providing users with system functionality access. The web interface will require a specific web browser to be used in order to prevent any compatibility issues. An accessibility guide will be posted on the web site for accessing the system using other browsers.

2.1.3 Communications interfaces

Network

The network interface will provide security to the database, so as to prevent access from unknown devices. Additionally any transfer of data between the user and the system must be placed in a secure channel/protocol.

2.2 System features

2.2.1 Graphical User Interface

1. Purpose: Provide an intuitive dossier format interface for users to see the student profile in a centralized location.

2. 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.

3. Associated Functional Requirements:

   (a) Drill down: Functional Requirement 1

      i. Sections: each student will have multiple sections that can be disabled or enabled.

      ii. Expansion: sections will expand to show summary of addition information.

      iii. Link: sections will link to sections pages for more detailed information.

2.2.2 Term Calculations

1. Purpose: Calculate dates and event times for graduate student programs

2. Response sequence: When a student profile and program is created the system will make triggers for relevant events to each milestone.

3. Associated Functional Requirements:

   (a) Milestones: Functional Requirement 1

      i. Calculate start - end Semester dates for Graduate Students

      ii. Calculate due dates and triggers for milestones

   (b) Funding Calculations: Functional Requirement 2

      i. Track funding availability for each semester and the source of funding

      ii. Show next date for major funding applications

2.2.3 Tracking

1. Purpose: Track Major Milestones (grants, publications, exams etc) for graduate students through the program.

2. Response sequence: Data is updated according to business rules and workflow of the program and the student's progress.

3. Associated Functional Requirements:

   (a) Publications and Grants: Functional Requirement 1

i. Track student publications that have been published
ii. Track grants that have been received by the student

(b) Advisory Committee Members: Functional Requirement 2

i. Send trigger to student to form an Advisory Committee
ii. Allow students, and advisory committees to store and track comments and discussions
iii. Show calendar view of all meetings and results of the meetings
iv. Allow for single or joint supervisors
v. Track electronic submissions of advisory meeting form

(c) Manage Milestones: Functional Requirement 3

i. Handle and process milestones for the Masters program in BioMedical Physics at UWO
A. Form advisory committee by end of 1st term
B. Annual seminars
C. Low-level exams for new students
D. Exams are organized by department
E. Exams usually in late June; informed in early May
F. Possible MSc to PhD reclassification
G. Discuss reclassifications with supervisor and advisory committee first
H. Reclassification must be completed before end of 5th semester
I. Submit and defend MSc thesis if not reclassified
J. `http://www.uwo.ca/biophysics/grad_program_policies/guidelines_intro.htm`

(d) Send Triggers and Receive Responses: Functional Requirement 4

i. Process conditional and requested triggers
ii. Allow Faculty Advisor to create and view all triggers
iii. Conditional triggers are event based automatic or triggered conditions
iv. Requested Triggers are created by users and their activities on the system
v. The system should allow responses to each Triggers be collected and stored
vi. Responses should be accessible by relevant users only

2.2.4 User Layers and Collaboration

1. Purpose: Ensure ad-hoc access for multiple users to facilitate realtime collaboration and ensure up-to date information in the database. Permissions map to prevent unauthorized access and control the scope of data.

2. Response Sequence: Multiple users will be able to log in simultaneously and information will update in realtime.

3. Associated Functional Requirements:

(a) User Group Permission Map

i. Graduate Students: This group of users will be able to log in and able to edit, update and save their demographic information and other program information including Advisory Committee members, Publications, Thesis etc.

ii. Advisory Committee Members: This group will be able to comment and provide feedback on a student's advisory committee meeting output. Ideally, other student information will be restricted for changes.

iii. Graduate Executives: This group of users will primarily utilize the generated reports for planning and information purposes. Access will be restricted to viewing information. Will be taken to a Project dashboard where they will have a bird's eye view of reports and information statistics. Read-Only Access.

iv. Graduate Affairs Assistant: Key stakeholder for the system. WIll be able to manage, administer and access all informational program data. Access to change log. Generate reports in Excel, PDF etc.

v. Technical Administrator: Primarily responsible for system administration, periodic maintenance schedule and providing technical assistance to users. Ability to reset system passwords and create users.

2.2.5 Security

1. Purpose: To build a secure system that adheres to local and federal privacy laws (FIPPA)
2. Response Sequence: Any data inputted into the system will be encrypted and all passwords will be stored using hash.
3. Associated Functional Requirements:
   (a) To be defined

2.2.6 Storage of Data

1. Purpose: Improve Error detection and stability of the system.
2. Response Sequence: The information will be normalized and data redundancy will be introduced
3. Associated Functional Requirements:
   (a) Data Normalization: Systematic way to ensure that the design is free from any undesirable characteristic - insertion, update, and deletion anomalies that could lead to the loss of data integrity.
   (b) Data Redundancy to improve error detection
   (c) Data Schema should be logically clear and understandable so as to allow future work on it

3 Iteration 1

3.1 Features

3.1.1 Authentication

Multiple user access to the systems from an organization role aspect.

3.1.2 Student Funding

Feature to archive student funding data, calculate ending term and provide reports.

3.2 Analysis

3.2.1 Roles and Operation Analysis

Organizational roles and what need

3.2.2 Data Flow Analysis

What are the criteria for our DFD components. Concerns ..

3.2.3 Relationship Analysis

Critical Assumptions, Scope checking

3.3 Design

3.3.1 Use Class Diagrams

What can a user do

3.3.2 Access Control List

Who can use what

3.3.3 Data Flow Diagrams

Sources, processes, Sinks

3.3.4 Class Diagrams

Auth.PNG and StudentFunding.PNG

3.4 Implementation

3.4.1 Catalyst Framework

Chained Operations

3.4.2 Rapid Database Prototyping

SQLite database and rapid schema changing

3.5 Testing

3.5.1 Regression Testing

Unit Tests

3.5.2 Acceptance Testing

User Tests and feedback

4 Iteration 2

Add Student milestone tracking.

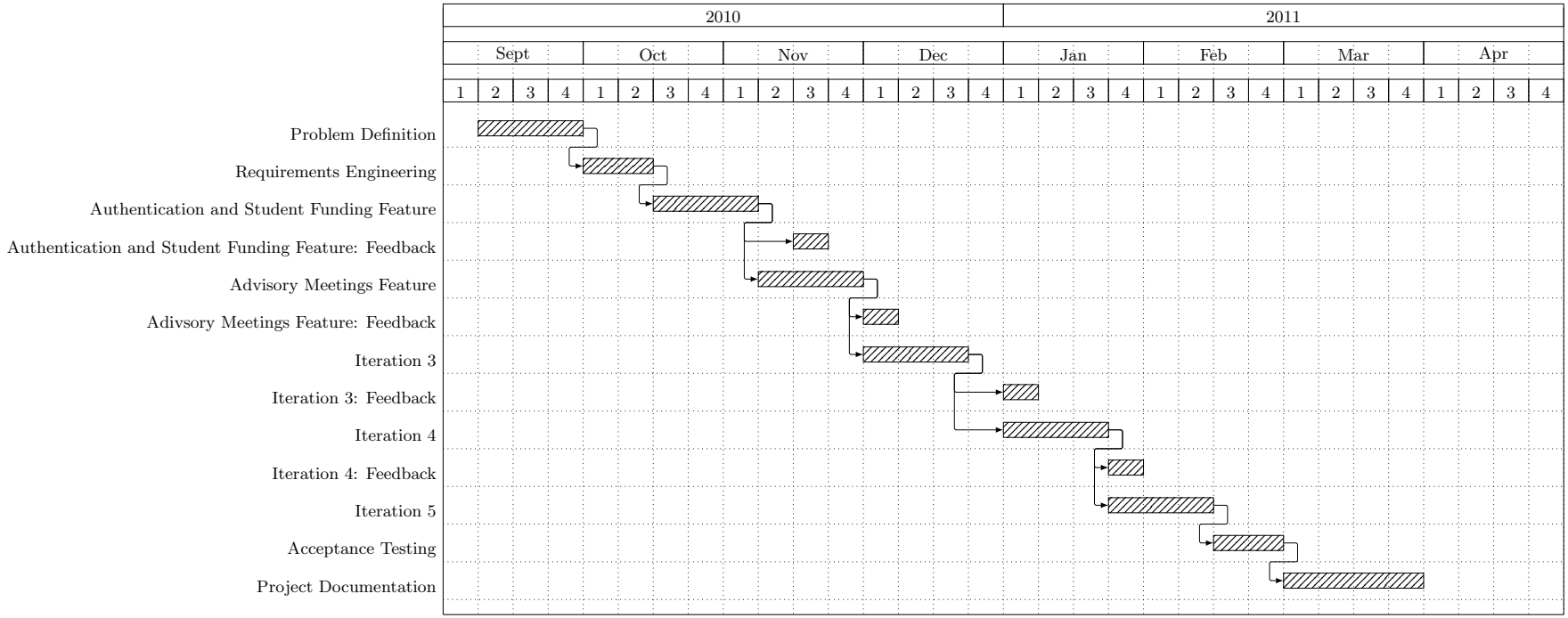
4.1 Rapid Prototyping

For signature Pad

5 Progress

5.1 Updated Gantt Chart

5.2 Gantt Chart



5.3 Changes

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