

Web-based Admission System
for
Physical Therapy Graduate Program

A Manuscript

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by

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Master of Software Engineering

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Web-based Admission System for Physical Therapy Graduate Program

By Hien Nguyen

We recommend acceptance of this manuscript in partial fulfillment of this candidate's requirements for the degree of Master of Software Engineering in Computer Science. The candidate has completed the oral examination requirement of the capstone project for the degree.

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ABSTRACT

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Web-based applications are no doubt replacing a paper-based process in most of higher education activities. Web-based applications can help to improve the reliability and to reduce the processing time and cost. In graduate admissions, the applicants are able to apply and retrieve the application status online. All of the application forms, fees, resumes, transcripts, GRE scores, and letters of recommendation are submitted electronically.

This project was initiated by Doctoral Program in Physical Therapy (DPT) at University of Wisconsin-La Crosse (UWL), in order to assist the admission office to manage the applications. The project objective is to build a web-based system that allows the applicants to submit their applications online. The recommenders for the applicants are also able to submit their recommendation via this system. Furthermore, the admission officers can manage the applications and export the needed reports.

This manuscript is written as a summary of the development process of the web-based application mentioned above. It also includes the challenges and fun that I have encountered during this project. Limitations and possible improvements are also mentioned.

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This capstone project can not be done on my own. I'm indebted to a lot of people who have assisted and encouraged me during the project development.

I would like to show my gratitude to Dr. John Greany from Physical Therapy Program, UW-La Crosse, who initiated this project and selected me as the student developer.

I also wish to thank Dr. Thomas Gendreau and Dr. Kenny Hunt for their thoughtful advising and invaluable comments.

Michael Taylor from ITS, who is the database administrator, has provided me great help on technical problems. Thank you, Mike.

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GLOSSARY

Applicant

A prospective student who creates a profile on the PT admission website to apply for the admission to the PT Doctoral Program.

Application

The collection of all required materials for an applicant to be considered for admission.

ADF

Oracle Application Development Framework (ADF) is an innovative Java development framework for creating enterprise applications.

EAR

Enterprise Archive (EAR) is a file format for packaging application modules so that they are deployed consistently.

EJB

Enterprise JavaBeans (EJB) is a server-side component which encapsulates the business logic of the application.

GRE

Graduate Record Examinations (GRE) is a test supplied by Educational Testing Service. It is required by almost all graduate programs in the U.S.

HTML

Hypertext Markup Language (HTML) is a language for creating web pages.

ITS

Information Technology Services (ITS) is a department in UW-La Crosse. They are responsible for providing, maintaining the web server and database server for this project.

J2EE

Java Platform, Enterprise Edition (J2EE) is an environment for developing multi-tier Java-based applications.

JDeveloper

JDeveloper is a free Integrated Development Environment from Oracle.

JSF

JavaServer Faces (JSF) is a Java web development framework. It simplifies the user interfaces building in Java-based web applications.

JSP

JavaServer Pages (JSP) is a technology that allows HTML or XML code to be dynamically generated in response to web client requests.

JSPX

JSP document, which is an XML representation of a JSP page.

MSE

Master of Software Engineering (MSE) is a graduate program in Computer Science Department, UW-La Crosse

MVC

Model-View-Controller (MVC) is a widely used software design approach.

ORACLE AS

Oracle Application Server (Oracle AS) is a platform for deploying J2EE applications.

POJO

Plain Old Java Objects (POJO) is a model technology that creates java objects from database tables

PT

Physical Therapy (PT), Department of Health Professions, UW-La Crosse

TOEFL

Test of English as a Foreign Language (TOEFL) is a test supplied by Educational Testing Service. It is required for international students.

TOPLINK

Oracle Toplink is a technology that provides Java object-to-relational persistence, enabling developers to access and persist relational data.

TSE

Test of Spoken English (TSE) is a test supplied by Educational Testing Service. It is required for international students.

XML

Extensible Markup Language (XML) is a specification language for creating markup languages.

1. INTRODUCTION

The current admission process of Doctoral Program in Physical Therapy (DPT) requires the applicants to download the forms from the DPT website, complete them by hand and return them via mail.

In Spring semester 2007, Dr. John Greany from DPT came to see Dr. Kasi Periyasamy, who is the MSE Director, to initiate a project to provide DPT admission office with a web-based admission system. I was, fortunately, selected to be the student developer for this project.

The admission system was supposed to perform the following core functionalities:

The applicants are able to complete the forms, submit the application, and retrieve the application status online. The forms can be modified several times before the applicant submits them.

Each applicant has to provide at least 02 supervising physical therapists as recommenders and at least 02 other personal references. The recommenders are able to complete the recommendation forms in this system.

All of the applications, recommendations are managed by the administrators. The administrators are able to retrieve the forms in pre-defined formats.

Beside these functional requirements, the system also needs to be user-friendly, reliable and secure.

2. DEVELOPMENT MODELS FOR DPT ADMISSION SYSTEM

Software development involves a great deal of activities to guarantee that the software product is delivered on time and is high-quality. The set of those activities and the strategy of how to perform them form the development model. According to R.S. Pressman in [4], there are a number of different models widely used: the linear sequential model, the prototyping model, the component assembly model, the formal method model, etc. Each model has its own advantages and challenges, depending on the nature of the application domain, time, cost, and resources. A particular project may apply more than one model to take their advantages. In this project, a few models have been selected to cope with the system development.

At the beginning, in order to gather functional requirements, I used *rapid prototyping* model. The admission system is supposed to be built from scratch; and the customer does not have a similar system in use. Therefore, they were not specific and clear what work needed to be completed. The rapid prototype was able to help both parties have a look and feel about the final product.

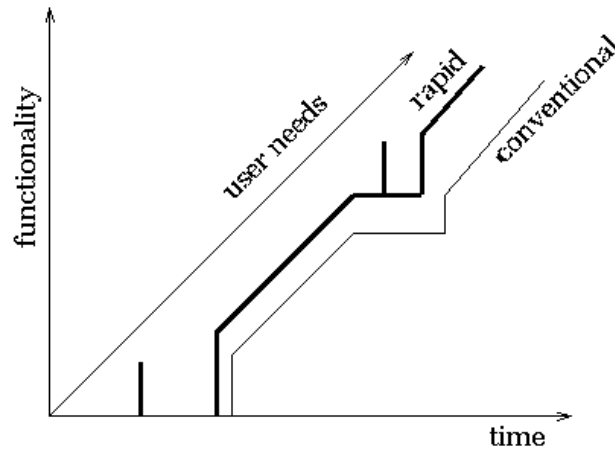


Figure 1. Rapid prototyping model
Courtesy of Dr. Kasi Periyasmy in [5]

This prototyping model has completed its role of requirements gathering more than expectation. I learned more about the application domain functionalities, while the

customer learned more about web-related operations such as user authentication and authorization. Furthermore, we both agreed upon the user interface design used in this prototype.

When core functionalities became clear and specific with the first prototype, I started to build the second one. Then I faced another challenge: requirement changes. Functionalities are likely to be modified and added more and more on the way. To cope with the changes, I applied a different model that was more helpful: *incremental prototyping*.

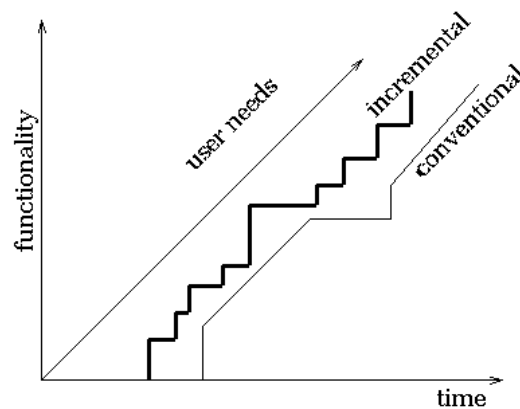


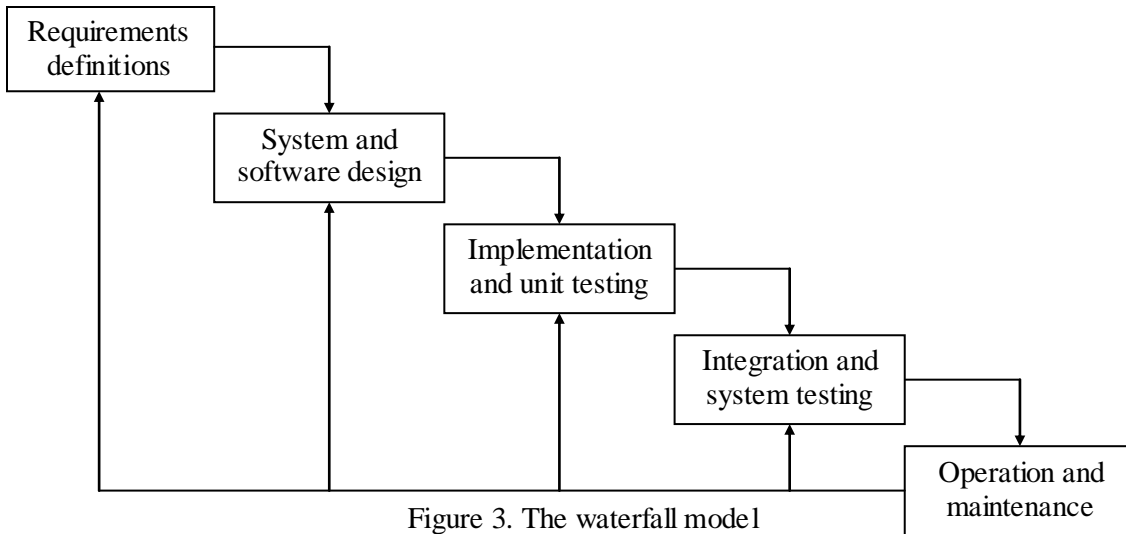
Figure 2. The incremental prototyping model
Courtesy of Dr. Kasi Periyasamy in [5].

With incremental prototyping model, the prototype would not be thrown away but reused with added or modified functionalities. During the development of a prototype, I integrated some phases from the *waterfall* model.

According to I. Sommerville in [3], the water model consists of 5 phases:

- requirements analysis and definition
- system and software design
- implementation and unit testing
- integration and system testing
- operation and maintenance.

The name *waterfall* originated from the idea that the phases are processed one after another.



Theoretically speaking, each phase has to wait until its preceding phase is completed. When any problems occur, the developers may return to the preceding phase to work out the solution. At one time, only one phase is active while the others are locked, e.g. staying unchanged.

But in this project, I integrated the waterfall model with the incremental prototyping model. To be specific, in each prototype, I applied four steps: requirements analysis, design, implementation and testing. Not every prototype used all four steps. Some of them needed only implementation and testing steps.

In brief, I used rapid prototyping model to gather functional requirements, then I used a hybrid model of incremental prototyping and waterfall to develop the system.

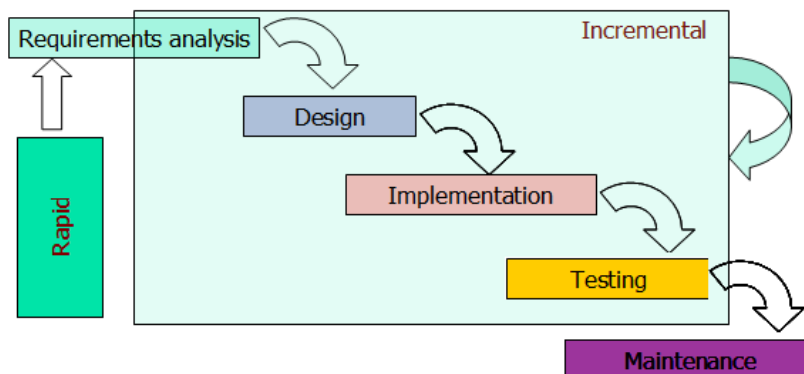


Figure 4. Software lifecycle model that was used in this project

3. THE ADMISSION SYSTEM DEVELOPMENT

As stated above, the development models that I used was prototyping models. Therefore, I am going to reveal the prototypes one after another. Some prototypes may be more specific than others, especially the ones that run through the phases of waterfall model.

3.1 Prototype #1: rapid prototype

This prototype aimed to gather the functional requirements. The admission system was supposed to be built from scratch. There were no functional requirements specifications beforehand. Therefore, the system functionalities were learned through application domain, which is graduate admission procedure in this project. After analyzing a variety of forms and application materials, as well as discussing with the customer, there came the core functionalities as below.

There are 3 groups of users who will interact with the system: (i) the applicants, (ii) the references of the applicants, and (iii) the staff of admission office (also called administrators). There are two times of consideration for admission, one in November for early admissions and one in January for general admissions. The admission applications which fail the first time will be open for updating until the second deadline in January.



Figure 5. User groups

An applicant is able to create a new admission application, edit it as many times as he wants until he submits it. The staff of the admission office is able to write comments on the applications, and able to open them for the applicants to update.

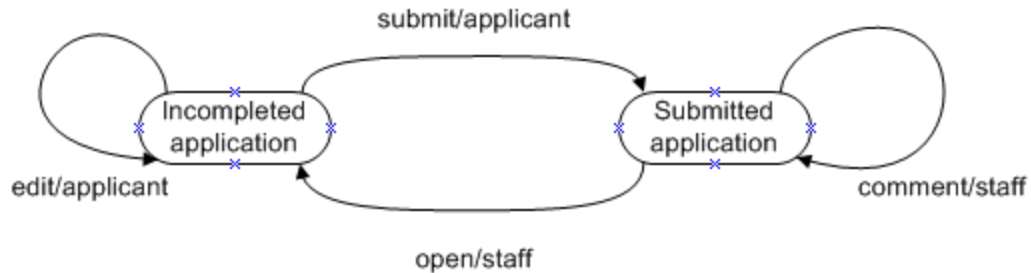


Figure 6. State transitions of admission applications

Each applicant must have at least two physical therapists who agree to be his references. He must also provide two other people as personal references. Those references form a group of users. They are provided a web page to complete the respective recommendation forms.

From these core functionalities, I developed the rapid prototype with the graphical user interface (GUI) only. The prototype consisted of web pages using UW-L web templates; but having no interactions with the database. Actually, no database was designed by this time.

The color and style of the pages are in accordance to UW-La Crosse template: maroon header, dark green sidebar, and dark blue footer (Figure 7).

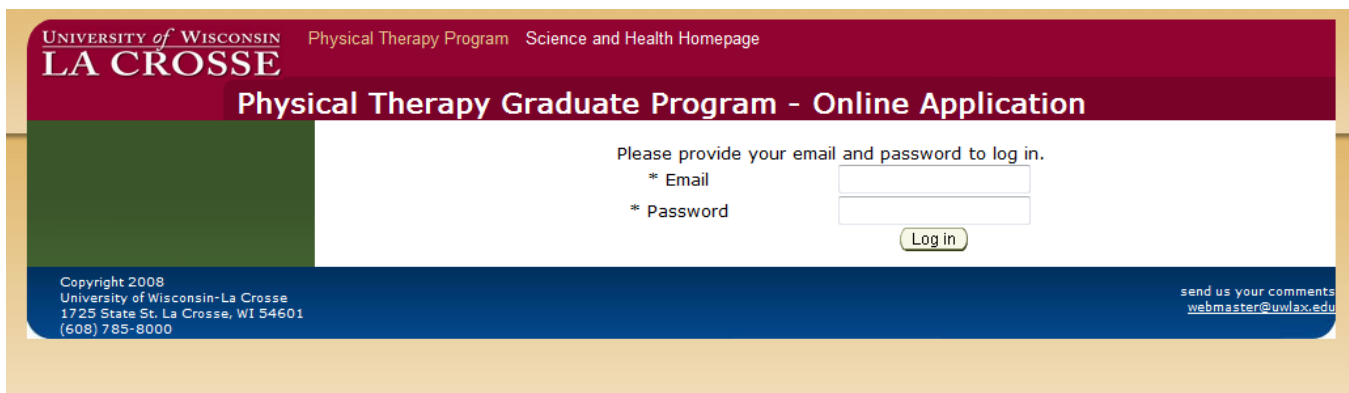


Figure 7. Web skin using UW-L templates

3.2 Prototype #2

Gaining the customer's agreement on GUI specifications via the rapid prototype, I started to build another prototype using incremental prototyping. Taking the feature that the system is supposed to interact with 3 groups of users, I planned to develop the prototypes in a respective routine to user groups. The first prototype of the incremental model was to cover the applicants' operations.

3.2.1 Database design

According to the application materials, an applicant has to provide a lot of information including personal data, courses grades and employment history. Initially, all personal data such as address, phone number, etc are put into a table named PTCANDIDATE which uses CANDID field as the primary key.

Each applicant may have attended many institutions. As a result, the institutions' information is put into a separated table named PTINSTITUTION with a foreign key which references CANDID in the PTCANDIDATE table (Figure 8).

This idea was repeated for similar entities such as employments (PTEMPLOYMENT), courses (PTCOURSE), references (PTREFERENCE), and GRE scores (PTGRE). As for TOEFL and TSE scores, domestic applicants don't need these score, while each international applicant is supposed to submit only one score. For the sake of space capacity, TOEFL and TSE scores are stored in a different table (PTTOEFL). The primary key of this new table is also the foreign key, which references the primary key of the PTCANDIDATE table.

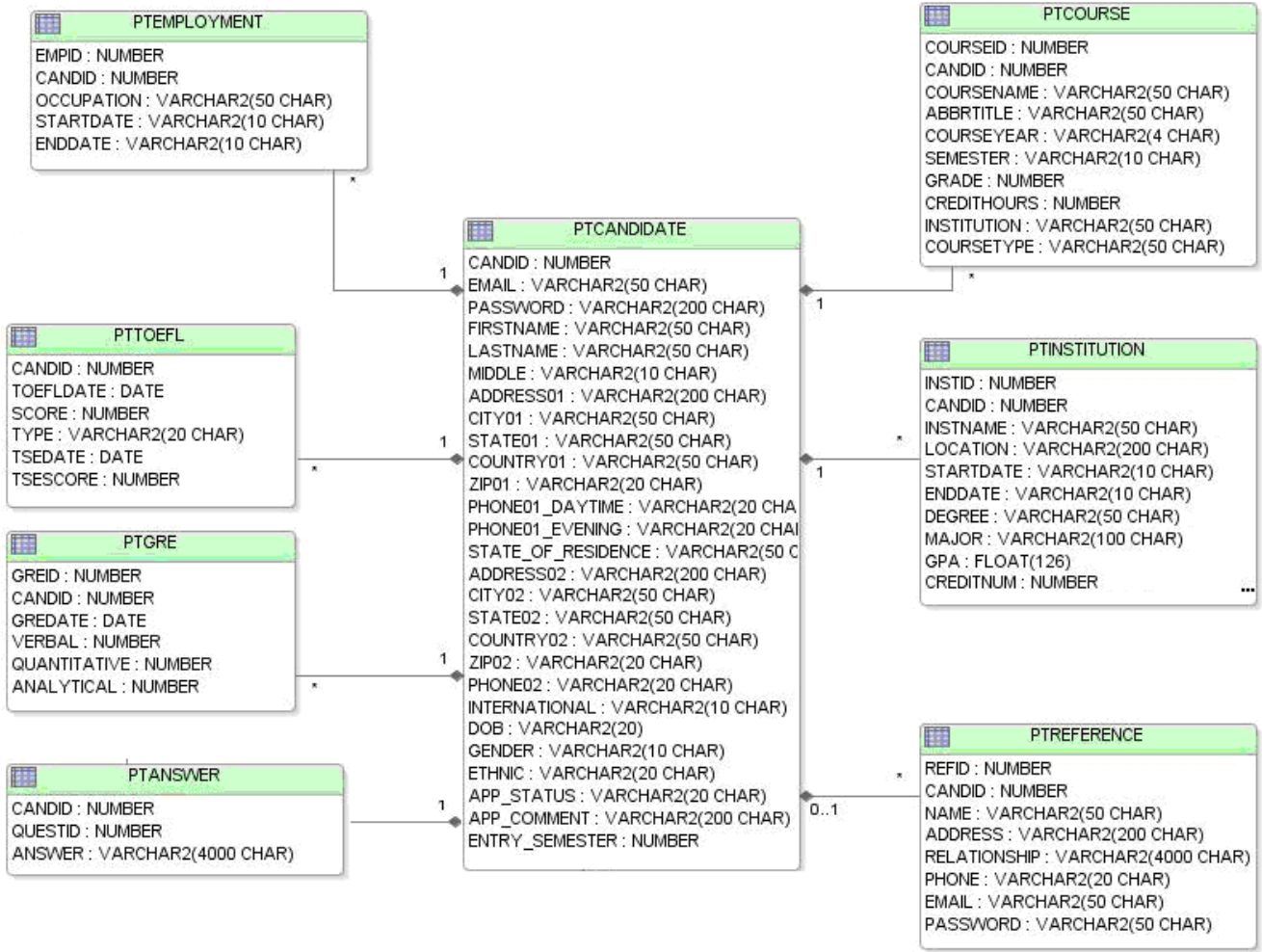


Figure 8. Entity-Relationship Diagram for Applicants

3.2.2 MVC architecture

Model-View-Controller (MVC) is an architectural pattern that divides software into three components: the model, the view, and the controller, according to Christensen and Thayer in [2]. The *model* represents the working data and states of the system; the *view* represents the user interface; the *controller* receives the requests from the *view* and gives response, it also directs the *model* to change the application state. One of the greatest advantages of this pattern is that the user interface (the *view*) and the business logic (the *model*) can be modified independently.

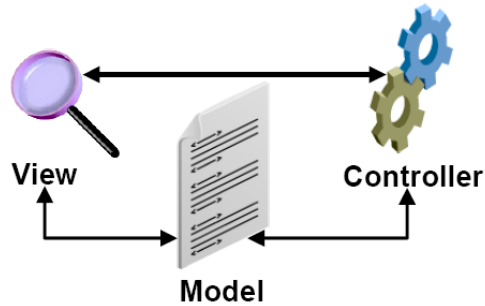


Figure 9. MVC architecture

In this particular admission system, I used the MVC architecture with a slight modification. The three components together with the database are depending on each other as layers (Figure 10).

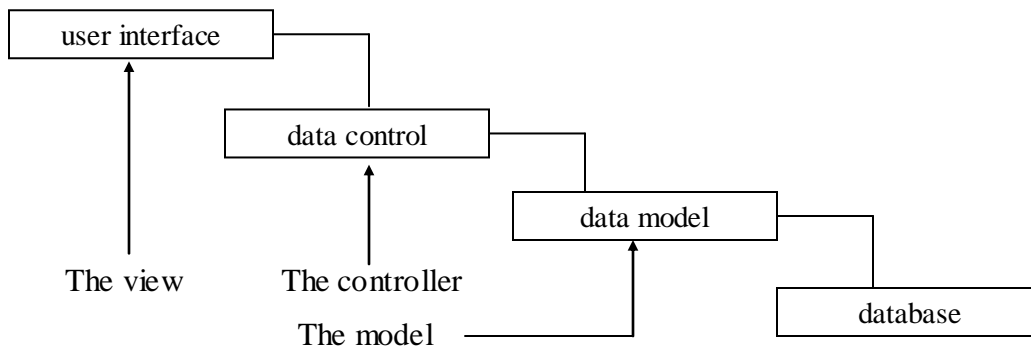


Figure 10. System layers

The data model is database-driven. It consists of classes generated from database tables. Upon these classes, several functional methods are developed to form the data control layer. The data control receives the events from the user interface and makes the data model operate. The use interface layer is the set of web pages that users directly work with.

3.2.3. Implementation

The system was planned to deploy on a server maintained by UW-L Information Technology Services (ITS). Therefore, in this project, the choice of programming languages and technologies was affected by ITS's policy. After meetings with ITS server administrator, we came to a few options for MVC pattern as in Table 1.

Model	Controller	View
ADF BC	ADF BC	ADF Faces
Toplink	EJB	Struts
		JSF, JSP

Table 1. Model View Controller implementation options

ADF: Oracle Application Development Framework

BC: Business Components

JSF: JavaServer Faces

EJB: Enterprise JavaBean

JSP: JavaServer Pages

Oracle Application Development Framework (ADF) is a development framework created by Oracle for Java applications. It was designed to highly support MVC pattern with its components (ADF BC and ADF Faces). It's also integrated into JDeveloper.

Finally, the technologies I chose to use are TopLink, EJB together with ADF Faces.; and the IDE (Integrated Development Environment) was JDeveloper 10g. TopLink is a very powerful mapping package to converts relational databases to classes and vice versa ¹. TopLink in this project is in charge of creating the data model from the database as well as processing queries. It maintains a mapping between the database and the data model which physically consists of java and xml files. Each table in the database is mapped to a Toplink descriptor and a class in the data model (physically a java file). Two classes are associated only if two respective tables have relationship between.

¹ According to Wikipedia: <http://en.wikipedia.org/wiki/Toplink>

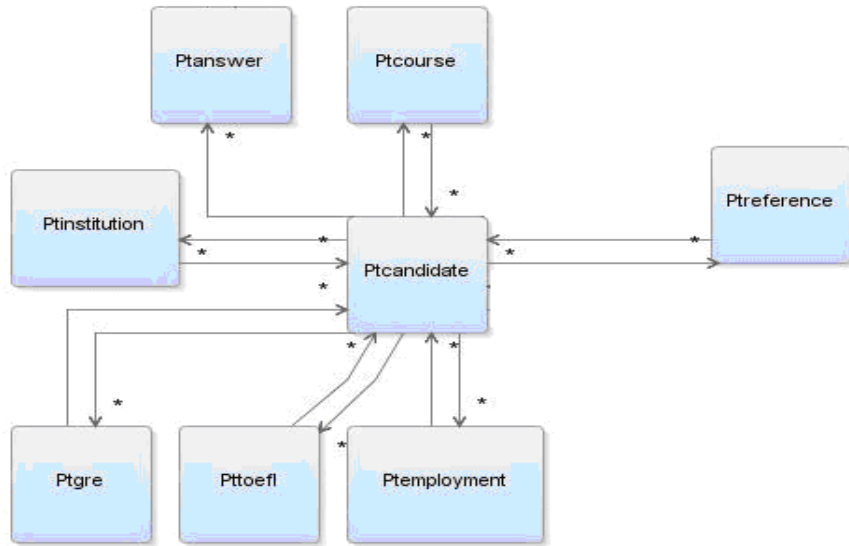


Figure 11. Diagram of core classes

3.2.3.1 The data model layer

The data model was created by using Toplink technology. Toplink creates a *map* that maps database tables to Toplink descriptors (Figure 12). Based on these descriptors, we can write several needed queries by creating Toplink Named Queries.

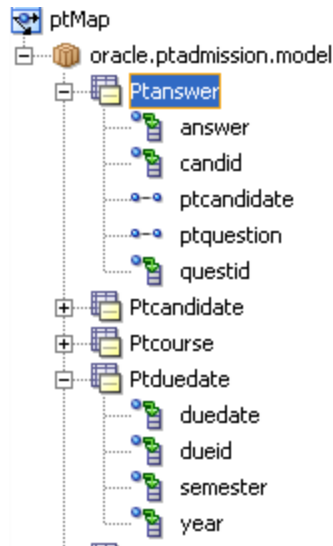


Figure 12. Toplink Map

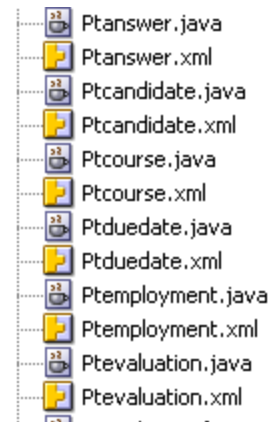


Figure 13. Toplink classes

Oracle Toplink also creates several java classes and specification files for all descriptors (Figure 13). The properties of a class are the fields of the respective descriptor.

3.2.3.3 The data control layer

This layer was implemented by using EJB Session Bean. The Session Bean encapsulates the model logic and provides the interface for the data control to access without concern about the model complexity². The Session Bean includes two files:

- ◇ PTPublicFacadeBean.java: containing the bean code
- ◇ PTPublicFacadeLocal.xml: containing the local interface.

The following figures partly reveal these two files.

```
1 package oracle.ptadmission.model;
2
3 import ...;
12
13 @Stateless(name="PTPublicFacade")
14 public class PTPublicFacadeBean implements PTPublicFacade,
15     PTPublicFacadeLocal {
16     private SessionFactory sessionFactory;
17
18     public PTPublicFacadeBean() {
19         this.sessionFactory =
20             new SessionFactory("META-INF/sessions.xml", "PTAdmissionSession");
21     }
22
23     public Object mergeEntity(Object entity) {
24         UnitOfWork uow = getSessionFactory().acquireUnitOfWork();
25         Object workingCopy = uow.readObject(entity);
26         if (workingCopy == null)
27             throw new RuntimeException("Could not find entity to update");
28         uow.deepMergeClone(entity);
29         uow.commit();
30
31         return workingCopy;
32     }
}
```

Figure 14. PTPublicFacadeBean.java

² According to Wikipedia: <http://en.wikipedia.org/wiki/EJB>

```

1 <?xml version="1.0" encoding="UTF-8" ?>
2 <JavaBean xmlns="http://xmlns.oracle.com/adfm/beanmodel" version="10.1.3.41.57"
3     id="PTPublicFacadeLocal"
4     BeanClass="oracle.ptadmission.model.PTPublicFacadeLocal"
5     Package="oracle.ptadmission.model" isJavaBased="true">
6 <MethodAccessor IsCollection="true" Type="oracle.ptadmission.model.Ptanswer"
7     BeanClass="oracle.ptadmission.model.Ptanswer"
8     id="findAllPtanswer"
9     ReturnNodeName="oracle.ptadmission.model.Ptanswer"
10    CollectionBeanClass="UpdateableCollection"/>
11 <MethodAccessor IsCollection="true"
12    Type="oracle.ptadmission.model.Ptcandidate"
13    BeanClass="oracle.ptadmission.model.Ptcandidate"
14    id="findAllPtcandidate"
15    ReturnNodeName="oracle.ptadmission.model.Ptcandidate"
16    CollectionBeanClass="UpdateableCollection"/>
17 <MethodAccessor IsCollection="true" Type="oracle.ptadmission.model.Ptcourse"
18    BeanClass="oracle.ptadmission.model.Ptcourse"
19    id="findAllPtcourse"
20    ReturnNodeName="oracle.ptadmission.model.Ptcourse"
21    CollectionBeanClass="UpdateableCollection"/>
22 <MethodAccessor IsCollection="true"
23    Type="oracle.ptadmission.model.Ptemployment"
24    BeanClass="oracle.ptadmission.model.Ptemployment"
25    id="findAllPtemployment"
26    ReturnNodeName="oracle.ptadmission.model.Ptemployment"
27    CollectionBeanClass="UpdateableCollection"/>

```

Figure 15. PTPublicFacadeLocal.xml

JDeveloper supplies a function which allows the developers to create data control from the session bean. All the needed queries were converted to java code in PTPublicFacadeBean.java, and to access methods stored in PTPublicFacadeLocal.xml.

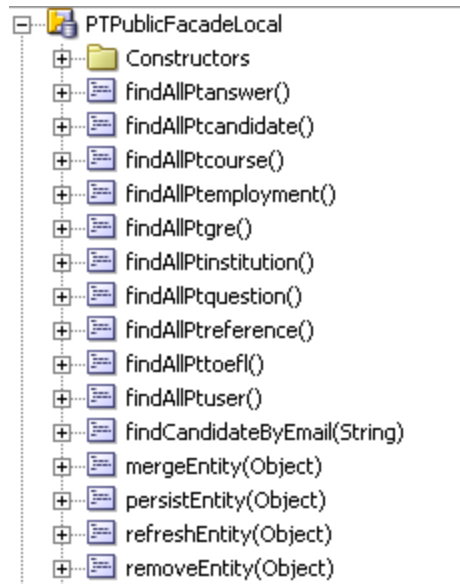


Figure 16. Data control methods

3.2.3.4 The user interface layer

This layer was implemented based on Oracle ADF Faces [7] with JSF components. It consists of three categories of files. The first category is the JSP documents, which contain web pages elements such as tables, texts, combo boxes, etc (Figure 18). The second category is the java beans, which contain the java code (Figure 19). The last category is page definitions in XML representation, which contain the connectors between the data controls and the web pages (Figure 20).

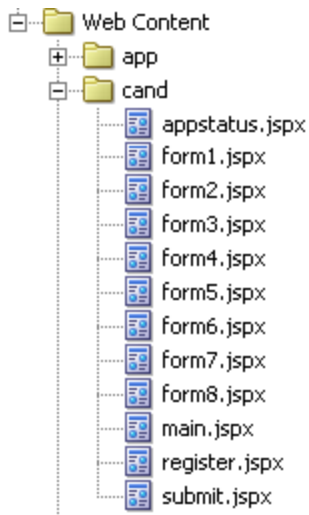


Figure 17. JSPX pages

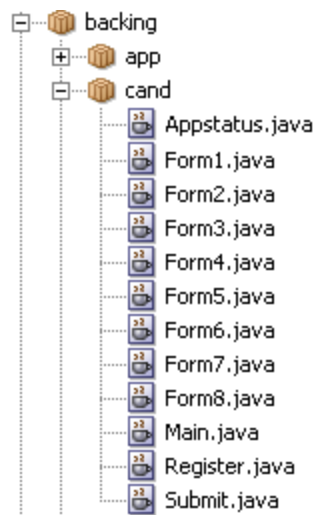


Figure 18. Java beans

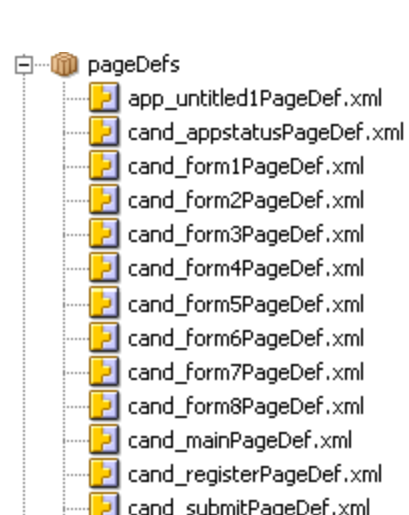


Figure 19. Page definitions

When an event was activated in a JSPX page, the data controls may tell the HTTP server to redirect to another JSPX page. Those transitions are described in Figure 21

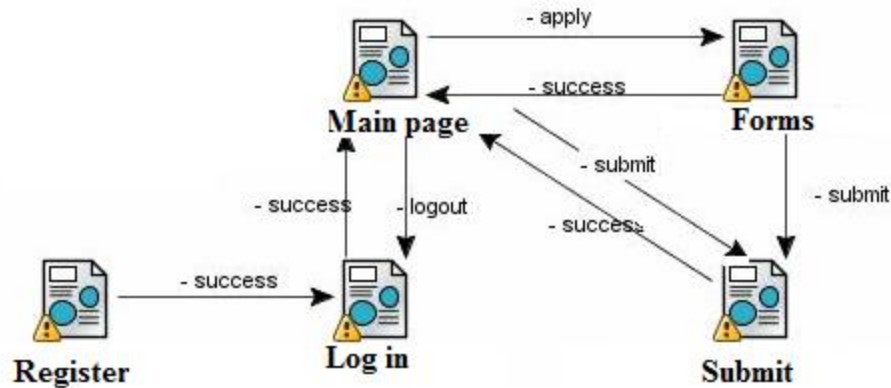


Figure 20. Page transitions for applicants

An applicant must register an account at /cand/register.jspx. After his account is created, he can log in the system and view his admission application status at /cand/appstatus.jspx. The page /cand/forms.jspx contains the forms that he needs to fill out. When the applicant submits the application, the server will redirect to /cand/submit.jspx to process.

3.2.3.5 Testing

In this prototype, I performed two kinds of testing: unit testing and functional testing. For unit testing, I integrated JUnit to JDeveloper and put testing code into a package. For functional testing, the black box testing technique was used based upon the functional requirements specification. And of course, only applicants' operations were tested.

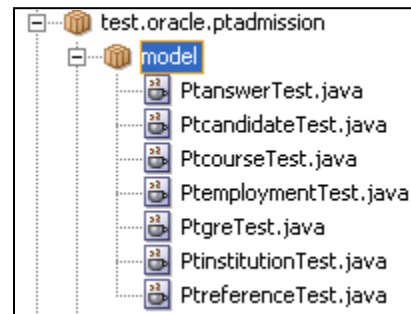


Figure 21. Unit testing for an applicant's operations

3.3 Prototype #3

This prototype focused on the operations of recommenders. There are two different kinds of recommenders: physical therapists and personal references. Each type of recommender uses a different recommendation form. Personal references have to give comments about certain characteristics such as maturity, emotional stability, communication skills, critical thinking and leadership skills. Meanwhile, physical therapists have to rate the applicant's qualifications by numerical values. The admission office needs the average value of these rates. Therefore, I have to redesign some of the database tables and relationships.

3.3.1 Database design

I splitted the PTREFERNCE table to two. One table still held the same name to store personal references data, the other one named PTTHERAPISTS and stored the therapists data. Besides, two additional tables were created to support the rating of physical therapists: PTEVALUATIONFORMQUEST to store the questions in the recommendation form; and PTEVALUATION to store the rates. (Figure)

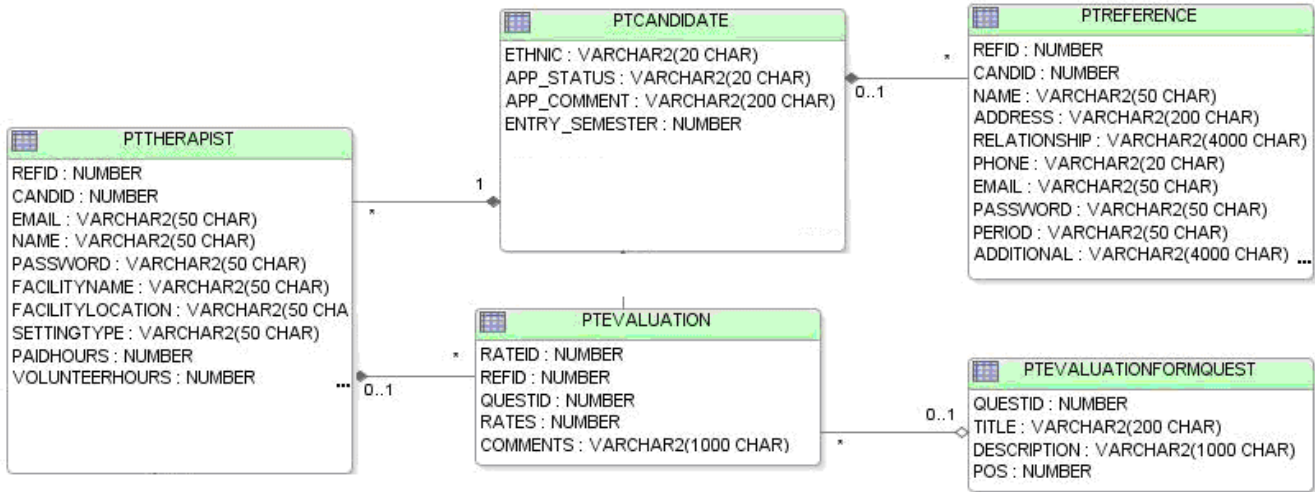


Figure 22. ERD for recommenders

3.3.2 Implementation

The Toplink worked smoothly with the incremental prototyping model. At this phase, I only needed to extend the data model, then created data controls for the extended part. Amazingly, I can do it in a few minutes without writing any lines of code. The only portion that I had to write codes for was the user interface layer.

The recommenders do not have much to do with the system. They can only log in, fill the recommendation and log out (Figure 23). The account information was sent via email by one of the operations of the administrator.

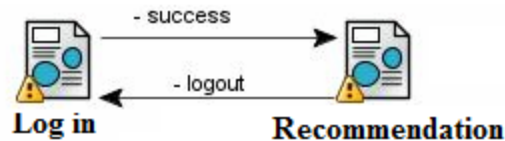


Figure 23. Page transition for references

3.3.3 Testing

This prototype also needed unit testing. Similar to the previous prototype, I used JUnit to create the testing code. Besides, I did the functional testing for a recommender's operations with black box testing upon the requirements specification. The functional

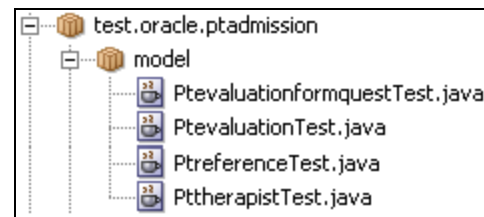


Figure 24. Unit testing for a reference's operations

testing for an applicant's operations was also performed again to make sure the added portion of this prototype had not affected the implemented operations.

3.4 Prototype #4

This prototype came with the functionalities that an administrator can do. Basically, an administrator is able to retrieve all the information of applicants and recommenders. Fortunately, no additional relational tables are needed for this retrieval operations. But there are a few more operations that a root administrator has to take care of. A root administrator account is an user account that can not be deleted. He or she can manage the deadlines of the applications and to manage other administrator accounts.

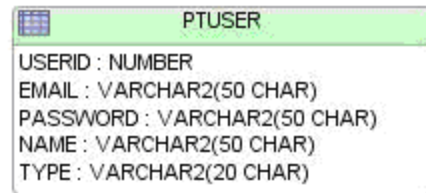


Figure 25. Ptuser table

The administrator accounts are stored in a separate table named PTUSER (Figure 25).

As for the deadlines, they come with the semester and year of entry. The table PTDUEDATE stores these information. Each applicant has to select which semester and year that he wants to get into the PT Program. For each semester (and year), there may be hundreds of applicants. That's why the table PTDUEDATE came into being together with a relationship with table PTCANDIDATE (Figure 26)

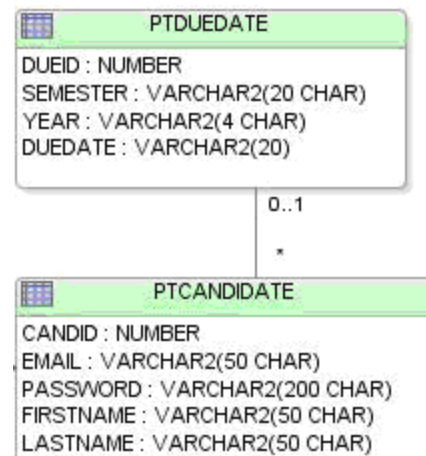


Figure 26. PTDUEDATE table and its relationship with PTCANDIDATE

An administrator has to log in the system to perform his privileged operations. Figure 29 shows the transitions between the pages that the administrator can access to perform his operations. The Main page contains a list of all applications in the database and enables the administrator to filter the data based on semester and year, application status, and a few more. When he selects to process an individual application, the server will redirect to Candidates' applications page. The Deadline page helps the administrator to manage the entrance semesters and years.

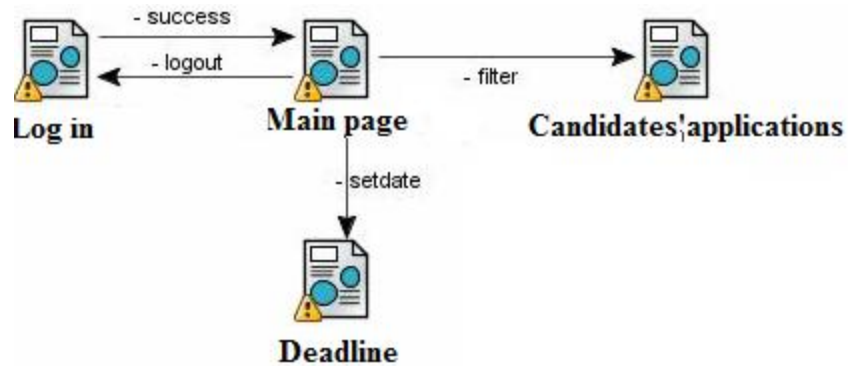


Figure 27. Pages transitions for administrators

Up to this point, the database design has been completed, taking all types of users into account. Figure 28 shows the entities and relationships, then Figure 29 shows the class diagram driven by the database design.

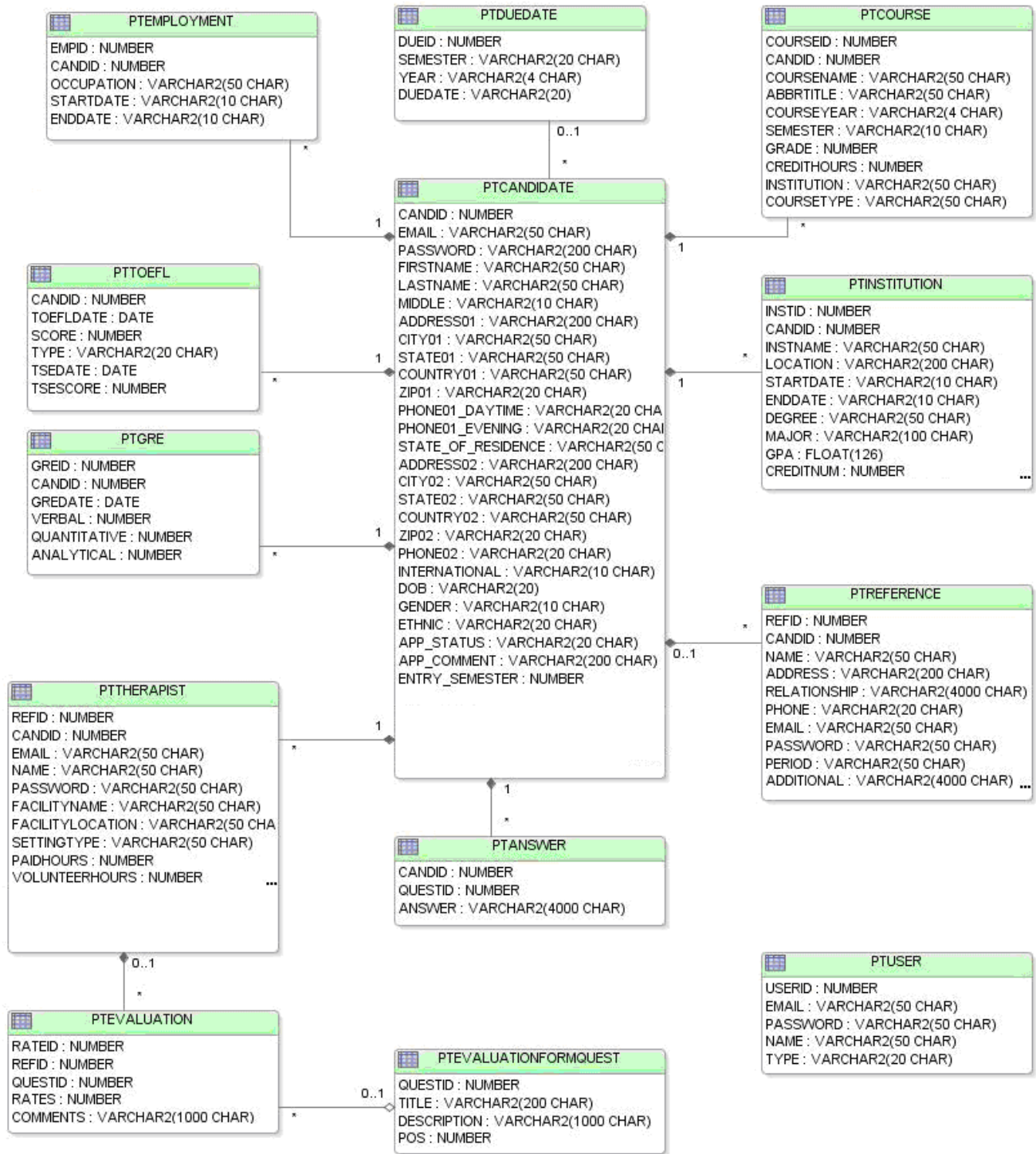


Figure 28. Entity Relationship Diagram

Based on the database, the Toplink will create the data model in Java classes and make associations between them based on the relationships between the tables.

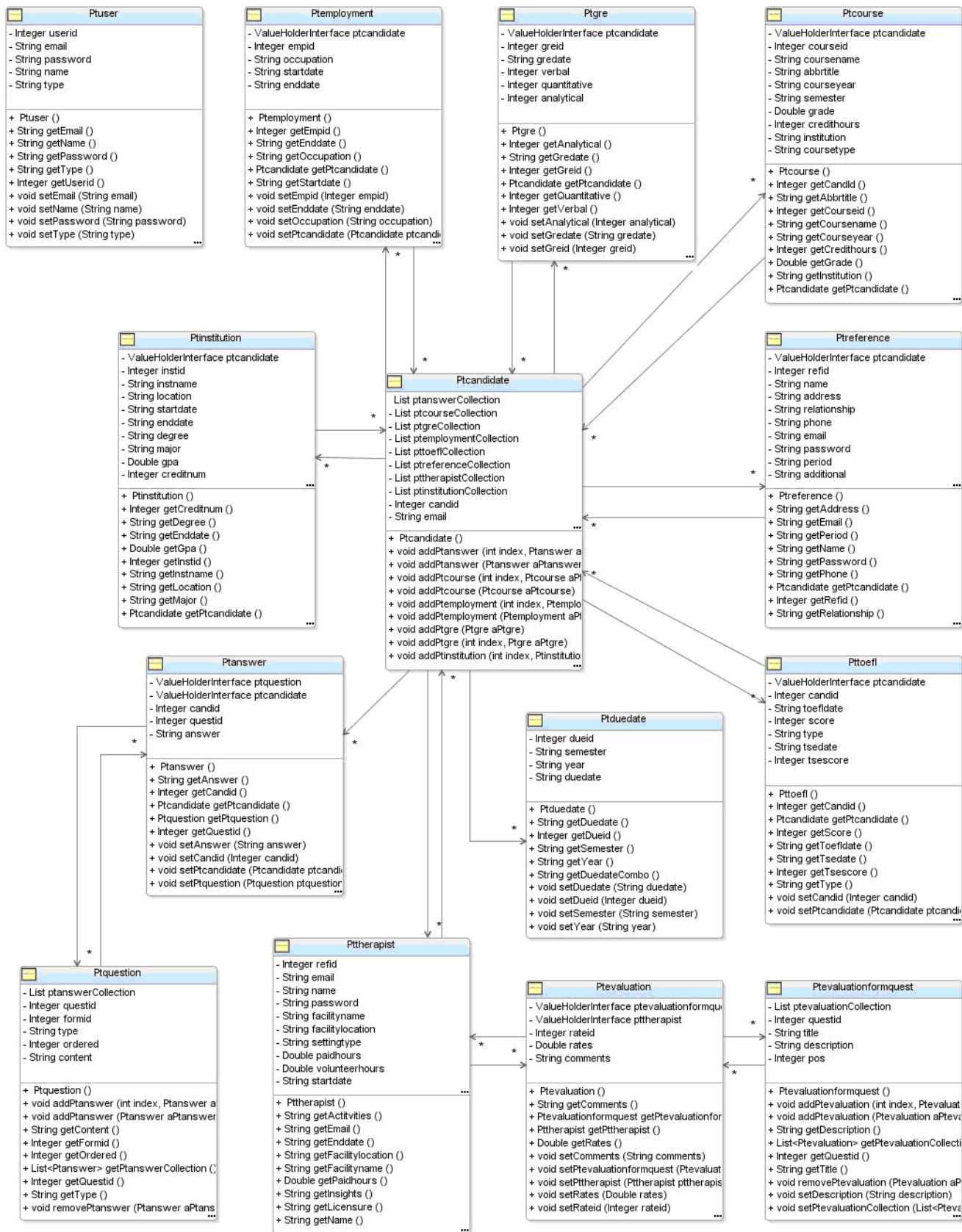


Figure 29. Database-driven Class Diagram

Prototype #4 (including administrators' tasks) witnessed a huge effort of testing, especially integrated testing for the tasks that affect other types of users. Those tasks are:

- ◇ Initiating the recommendation forms for recommenders and sending them emails to inform how to log in the system.
- ◇ Changing the application status and giving feedback to applicants.

The integrated testing aims at making sure the applicants and recommenders are able to interact with the system correctly when the administrators performs these tasks.

3.5 Prototype #5

This last prototype added the reporting and printing functionalities. In brief, each type of users is able to view applications and/or recommendations in PDF format and to print it out. There was not any modifications to the database design or architectural design. And fortunately, there are some free reporting tools for Java applications. The most popular one thus far is JasperReport from Jasper Soft. I integrated JasperReport to JDeveloper to make PDF files. Generally, it reads an XML file, compile it to a Jasper file, then generate a PDF file from the jasper file. Therefore, all the reports are design in XML formats. Jasper Soft also provides a tool to design reports in XML files. That's iReport. In fact, I used iReport 3.0.0 to design the PDF format for applications and recommendations and stored them in XML files. The JasperReport would be in charge of generating the PDF when users trigger report buttons.

This prototype also came with an addition testing : installation testing. I tried to simulate the real web server by installing Oracle Application Server 10g to a PC in MSE Lab. After that, I created the deployment profile for this prototype and deployed it to the installed simulating web server.

3.6 System security

It is impossible to make a system absolutely secure. In this system, I employed a few security strategies to make it acceptably secure.

Firstly, every user must be authenticated by log-in mechanism. The user has to provide the username (email) and the password to log in. The password was encrypted in the database, so even database administrator can not reveal the password. Actually, the password encoding algorithm was SHA (Secure Hash Algorithm). It is a built-in algorithm in java.security.MessageDigest class. In addition, a session timeout is assigned to a working session. If the user forgets to log out, the system will log him out when the timeout expires.

Secondly, each user is authorised before granted access to a page. An applicant can not see a recommender's pages, for instance. Another example is that only the root administrator can create and modify the administrator accounts.

Thirdly, in an attempt to prevent SQL injection, most of the input texts are validated before going to the server. Using email as the username is one step to avoid SQL injection in login pages.

3.7 Some metrics

The data model includes 15 classes which are generated from the database tables. There are around 100 lines of code (LOC) in average in each class.

The data controller contains only 1 class (EJB session bean). Its size is over 950 LOC.

The view component includes 21 JSF pages for all types of users, 33 backing beans (15 beans for 15 core classes plus supporting beans). Each bean is over 600 LOC in average.

The number of test cases generated by JUnit is around 70.

4. THE ADMISSION SYSTEM WEB PAGES

This section discusses the user interface. There are a few common features that users need to consider before perform any specific tasks:

- ✓ All web pages except for login pages are required logging in to access. If they are directly visited without logging in, the system will redirect to respective login pages.
- ✓ The system uses the UW-La Crosse mail server to send emails. Sometimes, there may be a few hours delay in sending emails.
- ✓ In any forms (login, search...) the users are supposed to click the buttons rather than to press Enter.
- ✓ All tables are able to be sorted by columns (either ascending or descending). Just click the columns' headers.
- ✓ In any cases that navigational links are available, users should use them rather than using browser's back button.
- ✓ * symbol means required fields
- ✓ In searching forms, use % symbol as the wildcard. For instance, to search for names that begin with letter J, type J%

4.1 Operations of the admission staff

4.1.1 Logging in

URL : /faces/staff/login.jspx

The screenshot shows a web page with a dark red header. The header contains the text "UNIVERSITY of WISCONSIN LA CROSSE" and "Physical Therapy Program Science and Health Homepage". Below the header, the page title is "Physical Therapy Graduate Program - Online Application". The main content area is white and contains a login form. The form has the text "Please provide your email and password to log in." followed by two input fields: "* Email" and "* Password". Below the input fields is a "Log in" button. The footer of the page is dark blue and contains copyright information: "Copyright 2008 University of Wisconsin-La Crosse 1725 State St. La Crosse, WI 54601 (608) 785-8000" and a link to "send us your comments webmaster@uwlax.edu".

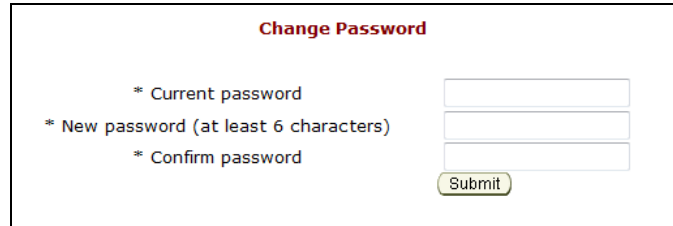
Figure 30. Login form for admission staff

The admission officers are supposed to provide username (email) and password to log in the system. After providing email and password, the Login button must be clicked. The

login forms for applicants and recommenders look and operate in the same way with this one.

4.1.2. Changing password

URL: /faces/staff/changepass.jspx



The form is titled "Change Password" in red text. It contains three input fields with asterisks indicating required fields: "* Current password", "* New password (at least 6 characters)", and "* Confirm password". To the right of the "New password" field is a "Submit" button.

Figure 31. Change password form

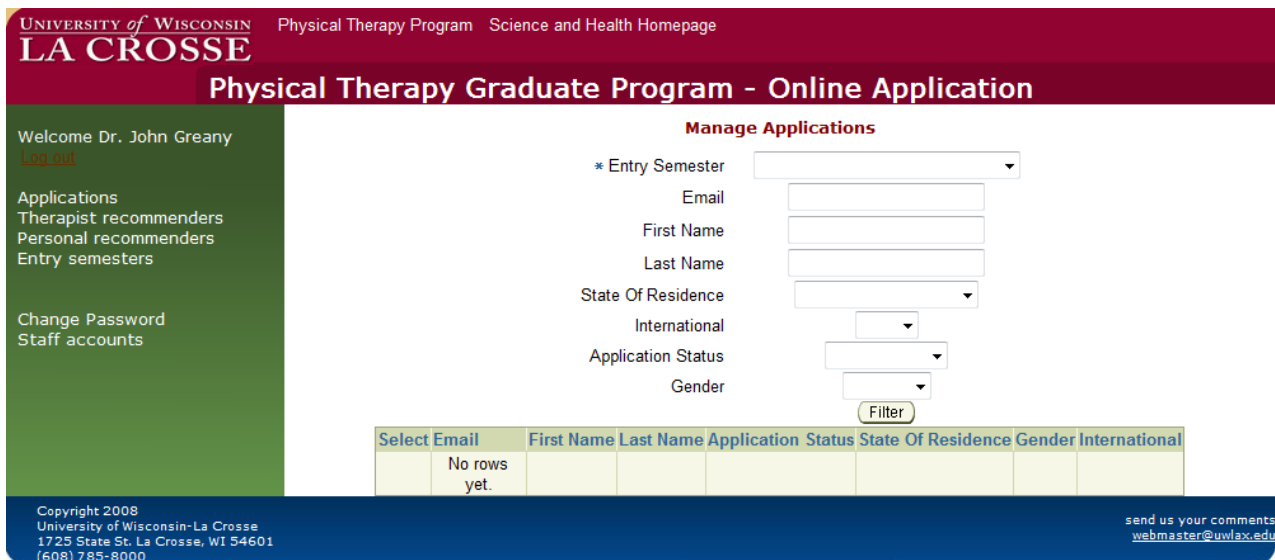
In this change password form, there are a number of rules that the texts must be followed:

- The current password must match the password currently stored in the database.
- The new password must be at least 6 characters. It may or may not be the same with the current one.
- The confirm password must be the same with the new password. It is to make sure there is no typo in the new password.

For applicants and recommenders, the change password forms are the same.

4.1.3 Managing applications

URL: /faces/staff/main.jspx



The screenshot shows the "Physical Therapy Graduate Program - Online Application" interface. The header includes the University of Wisconsin-La Crosse logo and navigation links for "Physical Therapy Program" and "Science and Health Homepage". The main content area is titled "Manage Applications" and features several dropdown menus: "Entry Semester", "State Of Residence", "International", and "Application Status". There are also input fields for "Email", "First Name", "Last Name", and "Gender". A "Filter" button is located below the "Gender" field. On the left, a sidebar contains a "Welcome Dr. John Greany" message with a "Log out" link, and a list of application management options: "Applications", "Therapist recommenders", "Personal recommenders", "Entry semesters", "Change Password", and "Staff accounts". Below the form is a table with the following headers: "Select", "Email", "First Name", "Last Name", "Application Status", "State Of Residence", "Gender", and "International". The table currently displays "No rows yet." in the "Email" column. The footer contains copyright information for 2008 and contact details for the University of Wisconsin-La Crosse, along with a link to "send us your comments" at webmaster@uwlax.edu.

Figure 32. Managing applications (initially)

This page is loaded when the user successfully logs in. Initially, no applications are displayed. The user has to select the semester of entry, then click Filter button. There are more criteria for filtering, including email, name, application status.

UNIVERSITY of WISCONSIN
LA CROSSE Physical Therapy Program Science and Health Homepage

Physical Therapy Graduate Program - Online Application

Welcome Dr. John Greany
[Log out](#)

Applications
Therapist recommenders
Personal recommenders
Entry semesters

Change Password
Staff accounts

Manage Applications

* Entry Semester: **Fall 2009, Deadline: 01/15/2009** ▼

Email:

First Name:

Last Name:

State Of Residence:

International:

Application Status:

Gender:

Filter

Select and

Select	Email	First Name	Last Name	Application Status	State Of Residence	Gender	International
<input checked="" type="radio"/>	bill@macrosoft.com	bill	gates	Incompleted			No
<input type="radio"/>	nguyen.hien@students.uwlax.edu	Hien	Nguyen	Incompleted	Wisconsin	Male	Yes

Copyright 2008
University of Wisconsin-La Crosse
1725 State St. La Crosse, WI 54601
(608) 785-8000

send us your comments
webmaster@uwlax.edu

Figure 33. Managing applications (filtered)

After clicking Filter, several rows of applicants will be displayed. The user then can do two operations with a selected applicant: view/ edit his application and reset his password.

4.1.4 Reset an applicant's password

Step 1: retrieve that applicant in the managing applications page: /faces/staff/main.jspx

Step 2: select the applicant from the table

Step 3: click Reset Password button. A textbox and a Save button will appear.

Step 4: type the new password in the textbox. The minimum number of characters is 6.

Step 5: click Save

Select and

Select	Email	First Name	Last Name	Application Status	State Of Residence	Gender	International
<input checked="" type="radio"/>	bill@macrosoft.com	bill	gates	Incompleted			No
<input type="radio"/>	nguyen.hien@students.uwlax.edu	Hien	Nguyen	Incompleted	Wisconsin	Male	Yes

Figure 34. Reset an applicant's password

After resetting the password, the system will automatically send an email to the applicant to inform him.

```

Subject: Notification from Admission Office, Physical Therapy Program in UW-La Crosse

Your password to login our system has been reset

Please visit the link below, use the following username and password to log in.
(Copy and paste into your web browser)
Recommendation Form Link :
http://138.49.196.201:8888/pt/faces/cand/login.jspx

Username: nguyen.hien@students.uwlax.edu
Password: asdfgh123

Regards
Physical Therapy Program - University of Wisconsin La Crosse
    
```

Figure 35. Email to inform password reset

4.1.5. Process an application

Repeat step 1 and step 2 in previous section of Resetting password. Then click View Detail / Edit button.

CANDIDATE PROFILE

Semester of entry: Fall 2009, Deadline: 01/15/2009

Application Status

Comment

Supervising Physical Therapists

Select	Therapist Name	Therapist Email
<input checked="" type="radio"/>	Sample PT	hoanghien@gmail.com
<input type="radio"/>	Dr. Kenny Hunt	hh@gmail.com

Personal References

Select	Reference Name	Reference Email
<input checked="" type="radio"/>	Dr Thomas Gendreaunhhien@yahoo.com	
<input type="radio"/>	Dr Periyasamy	kasi@geemail.com

Figure 36. Retrieve an application

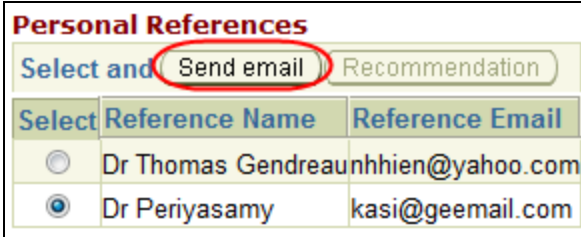
From this page, beside the capability of retrieving all of the applicant's information, the admission staff is also able to perform the following operations:

- ✓ View the application in PDF Format: simply click the PDF Format button.
- ✓ Change the application status and write some comments about it. Click Save to finish. The system will send an email to the applicant to inform about the update.

```
Subject: Notification from Admission Office, Physical Therapy Program in UW-La Crosse  
  
Dear Applicant  
  
Your application into Physical Therapy Program, UW-La Crosse has some updates.  
Please login to our system to see those updates.  
(Copy and paste into your web browser)  
Application updates link :  
http://138.49.196.201:8888/pt/faces/cand/main.jspx  
  
Regards  
  
Physical Therapy Program - University of Wisconsin La Crosse
```

Figure 37. Email to inform application's updates

- ✓ Send an email to the respective supervising PT or personal recommenders. The list of recommenders may be changed by the applicant if he has not submitted the application yet. Therefore, the admission staff should check the status Submitted before sending email. By clicking Send Email button, the user triggers the system to run the following tasks:



Personal References

Select and **Send email** Recommendation

Select	Reference Name	Reference Email
<input type="radio"/>	Dr Thomas Gendreaunhhien	Dr Thomas Gendreaunhhien@yahoo.com
<input checked="" type="radio"/>	Dr Periyasamy	kasi@geemail.com

Figure 38. Send email to a recommender

- Dynamically create a password for the recommender.
- Initialize the respective recommendation form.
- Send an email to the recommender to inform him/her about the applicant and his/her account

You have been asked to give an evaluation/recommendation for an applicant to our Physical Therapy Program.
 Applicant Name: Hien Nguyen
 Semester of Entry: Fall 2009, Deadline: 01/15/2009

Please visit the link below, use the following username and password to log in.
 (Copy and paste into your web browser)
 Recommendation Form Link :
<http://138.49.196.201:8888/pt/faces/personalref/login.jspx>

Username: kasi@geemail.com
 Password: VrezBuKISUTxB

Regards
 Physical Therapy Program - University of Wisconsin La Crosse

Figure 39. The content of the email to the recommender

After sending email, the system will disable the Send Email button, to make sure the password and the form won't be replaced. At the same time, the Recommendation button will be enabled. This button will lead to a PDF Format of the recommendation form.

Also on the this page, the admission staff is able to view all other parts of the application.

General Information	
Email	nguyen.hien@students.uwlax.edu
First Name	Hien
Middle Initial	H
Last Name	Nguyen
Address	1437 State St
City	La Crosse
State	Wisconsin
Zip	54601
Phone - Daytime	3475833505
Country	U.S.A
Phone - Evening	
State Of Residence	Wisconsin
.....	
Permanent Mailing Address	
Address	108 Dinh Bo Linh
City	Saigon
State	
Zip	
Country	Vietnam
Phone	84-8-8997885
.....	
International	Yes
.....	
Date of Birth	08/17/1979
Ethnic / Racial Heritage	Vietnamese
Gender	Male

Figure 40. General Information Form

Academic History

Institutions

Institution	Location	Degree	Major	From (mm/yyyy)	To (mm/yyyy)	GPA	Credits earned
Univ of Wisconsin- La Crosse	La Crosse, WI	Master	Software Engineering	09/2006	08/2008	3.5	48
Univ of Technology	Saigon, Vietnam	Bachelor	Computer Engineering	09/1997	05/2002	3	120

Prerequisite courses

Course Name	Course Title & Department	Semester	Year	Credit Hours	Grade	Indicate UWL or other institution
General Biology		Spring	2007	4	4	UWL
Chemistry I		Fall	2007	4	3.5	UWL
Chemistry II		Spring	2008	4	3	UWL
Human Anatomy/ Physiology I		Spring	2008	4	4	UWL
Human Anatomy/ Physiology II		Fall	2007	3	4	UWL
Physics I		Spring	2007	3	3	UWL
Physics II		Spring	2008	4	3	UWL
Statistics		Fall	2006	3	3	UWL
Psychology		Spring	2007	3	3.5	UWL
Sociology				0	0	

GPA of prerequisite courses: 3.45

Courses in last 2 semesters

Course Name	Course Title & Department	Year	Semester	Credit Hours	Grade	Indicate UWL or other institution
Physiology I		2008	Spring	4	4	UWL
Chemistry II		2008	Spring	4	3	UWL

GPA of last 2 semesters courses: 3.5

In-progress courses

Course Name	Course Title & Department	Semester	Year	Credit Hours	Indicate UWL or other institution
Psychology		Fall	2008	4	UWL
Sociology		Fall	2008	4	UWL
Sample course		Spring	2008	4	UWL

Figure 41. Academic History Form

Employment History

Occupation	Start Date	End Date
UWL	09/2007	06/2008
Educational Technologies	07/2007	08/2008

Figure 42. Employment History Form

GRE and TOEFL

GRE

Date taken	Verbal	Quantitative	Analytical
10/2006	500	800	5
04/2007	550	790	6

TOEFL (for international applicants)

Date 10/2005
 Score 600
 Type PBT

TSE (for international applicants)

Date
 Score

Figure 43. Standardized Tests Form

Personal Narratives and Disclosure Statement

#	Questions	Answer
1	Please consider the characteristics of your background including your previous experiences and describe how these characteristics might allow you to contribute to a diverse learning environment or a diverse Physical Therapy work force. (Characteristics of your background might include, for example, socioeconomic background, international travel, family make up or size, cultural background. Please note that the characteristics of your background are not limited to the above examples but, rather, should include any characteristics and past experiences that you feel may influence you as a Physical Therapist or Physical Therapy student.)	this is the answer for personal narrative #1
2	Please tell us about a time in your life when you experienced adversity. Was this situation stressful? Why or Why not? How did you handle the situation and what did you learn about yourself from this experience?	this is the answer for personal narrative #2
3	Is there any additional information that you would like the admissions committee to know about you that has not already been shared in this application?	this is the answer for personal narrative #3
4	Have you ever been admitted to, then withdrawn from, or been asked to withdraw from, or been dropped from, a clinical program for other than academic reasons?	No
5	Has licensure been denied to you, or been revoked from you, in any state in the United States for reasons other than insufficient credits or courses?	No
6	Have you ever been charged with, convicted of, pleaded guilty or no contest to, or forfeited bail for any criminal conduct under law or ordinance, excluding only minor traffic violations? PLEASE NOTE: The existence of criminal charges or a criminal record or denial of revocation of a license does not constitute an automatic bar to admission and will be considered only as they substantially relate to the duties and responsibilities of the program and eventual licensure.	No
7	Have you ever been suspended, expelled, placed on probation, or otherwise disciplined by any college or university, or from any program of a college or university other than for academic reasons?	No
8	Is there anything that would prohibit you from performing essential job-related functions, or functions related to your responsibilities as a student in the program to which you are applying? Please refer to Part III of application packet entitled Technical Standards of Performance for Applicants.	No
9	Additional explanation	

Figure 44. Personal Narratives and Disclosure Statements

4.1.6 Managing Supervising Physical Therapists

URL: /faces/staff/therapists.jspx

The screenshot shows the 'Managing Supervising Physical Therapists' interface. At the top, there are two input fields for 'PT Name' and 'PT Email', followed by a 'Filter' button. Below these are four buttons: 'Select and', 'Send Email', 'Recommendation', and 'Reset Password'. The 'Filter' button is circled in red. Below the buttons is a table with the following data:

Select	PT Name	PT Email	Licensure	Facility Name	Facility Location	Applicant Name	Applicant Email
<input checked="" type="radio"/>	Sample PT	hoanghien@gmail.com				Hien Nguyen	nguyen.hien@students.uwlax.edu
<input type="radio"/>	Dr. Kenny Hunt	hh@gmail.com	123			Hien Nguyen	nguyen.hien@students.uwlax.edu

Figure 45. Managing Supervising PT (filtered)

In this page, the user can filter the PT according to name or email. With a selected PT, the user is able to perform the following operations:

- ✓ Reset password for the recommender:
 - Step 1: click the Reset Password button. A textbox and a Save button will appear.
 - Step 2: type the new password in the text box.
 - Step 3: click Save. The text box and Save button will disappear.

This screenshot is similar to Figure 45 but highlights the 'Reset Password' button with a red circle and a red arrow pointing to it. The table below the buttons is identical to the one in Figure 45.

Figure 46. Reset a recommender's password

The system will automatically send an email to the recommender to inform that the password has been reset.

Subject: Notification from Admission Office, Physical Therapy Program in UW-La Crosse

Your password to login our system has been reset

Please visit the link below, use the following username and password to log in.
(Copy and paste into your web browser)

Recommendation Form Link :
http://138.49.196.201:8989/pt/faces/ref/login.jspx

Username: hoanghien@gmail.com
Password: asdfgh123

Regards
Physical Therapy Program - University of Wisconsin La Crosse

Figure 47. Email to inform reset password

- ✓ View the PDF format of the recommendation: just click Recommendation button
- ✓ Send Email to the recommender. These two operations are the same as described in previous section.

4.1.7. Managing Personal References

URL: /faces/staff/personalRef.jspx

The operations are similar to those with supervising PTs: sending email, retrieving recommendation and resetting password.

Managing Personal References

Recommender Name

Recommender Email

Select and

Select	name	email	relationship	address
<input checked="" type="radio"/>	Dr Thomas Gendreaunhhien@yahoo.com	Professor	1725 State St	
<input type="radio"/>	Dr Periyasamy	kasi@geemail.com	Professor	1725 State St

Figure 48. Managing Personal References (filtered)

4.1.8 Managing semester of entry

URL: /faces/staff/setdate.jspx

Manage entrance semester, year and application deadline

Select and |

Select	Semester	Year (yyyy)	Due Date (mm/dd/yyyy)
<input checked="" type="radio"/>	Fall ▾	2009	11/01/2008
<input type="radio"/>	Fall ▾	2009	01/15/2009

Figure 49. Managing semester of entry

How to add a new deadline:

- Step 1: click *Add a new deadline* button. A blank row will be displayed.
- Step 2: fill in the blank text boxes.
- Step 3: click Save.

Manage entrance semester, year and application deadline

Select	Semester	Year (yyyy)	Due Date (mm/dd/yyyy)
<input checked="" type="radio"/>			
<input type="radio"/>	Fall	2009	11/01/2008
<input type="radio"/>	Fall	2009	01/15/2009

Figure 50. Add a new deadline

4.1.9. Managing Staff Accounts

URL: /faces/staff/staff.jspx

Staff Accounts

Select	Email	Name
<input checked="" type="radio"/>	greany.john@uwlax.edu	Dr. John Greany
<input type="radio"/>	nhhien@yahoo.com	Hien Nguyen
<input type="radio"/>	b@b.b	b b

Save

Figure 51. Administrator account

There is an administrator account of Dr. John Greany. This user can add, edit or delete a staff account. He is the only one who can get access to this page. Moreover, this administrator account cannot be deleted. That's why when this user is selected; the Edit and Delete button are disabled.

Staff Accounts

Select	Email	Name
<input type="radio"/>	greany.john@uwlax.edu	Dr. John Greany
<input type="radio"/>	nhhien@yahoo.com	Hien Nguyen
<input checked="" type="radio"/>	b@b.b	b b

Save

Figure 52. Staff accounts

How to edit a staff account

- Step 1: select the account to be edited
- Step 2: click edit. The email and name text boxes will become editable. A text box for new password is also rendered.
- Step 3: type new name and/or new email and/or new password.
- Step 4: click Save.

Staff Accounts

Select and **Edit** Delete | Create

Select	Email	Name
<input type="radio"/>	greany.john@uwlax.edu	Dr. John Greany
<input type="radio"/>	nhhien@yahoo.com	Hien Nguyen
<input checked="" type="radio"/>	<input type="text" value="b@b.b"/>	<input type="text" value="b b"/>

New password

Save

Figure 53. Edit a staff account

How to add a new staff account

- Step 1: click Create. A new blank row will be rendered.
- Step 2: fill in the name and email of this staff.
- Step 3: click Save
- Step 4: click Edit
- Step 5: type a password
- Step 6: click Save

Staff Accounts

Select and Edit Delete | **Create**

Select	Email	Name
<input checked="" type="radio"/>	<input type="text"/>	<input type="text"/>
<input type="radio"/>	b@b.b	b b
<input type="radio"/>	greany.john@uwlax.edu	Dr. John Greany
<input type="radio"/>	nhhien@yahoo.com	Hien Nguyen

Save

Figure 54. Add a new staff account

4.2 Operations of the supervising physical therapists

4.2.1 Logging in

URL: /faces/ref/login.jspx

UNIVERSITY of WISCONSIN
LA CROSSE Physical Therapy Program Science and Health Homepage

Physical Therapy Graduate Program - Online Application

Please provide your email and password to log in.

* Email

* Password

Copyright 2008
University of Wisconsin-La Crosse
1725 State St. La Crosse, WI 54601
(608) 785-8000

send us your comments
webmaster@uwlax.edu

Figure 55. Login page for PT

4.2.2 Changing password

URL: /faces/ref/changepass.jspx

Logged in as Sample PT [Recommendation Form](#) [Log out](#)

Change Password

* Current password

* New password (at least 6 characters)

* Confirm password

Figure 56. Changing password

Basically, the logging in and changing password operations are the same with other users. The account information (email and password) must be sent to the recommenders via email beforehand.

4.2.3 Fill the recommendation form

URL: /faces/ref/comment.jspx

Logged in as Sample PT [Change password](#) [Log out](#)

Evaluation Form - Filled by the Supervising Physical Therapist

The applicant personal information:

Email
First Name
Last Name
Gender
Phone Number
Semester of entry

The following data are provided by the applicant:

Name of Supervising Physical Therapist
Facility Name
Facility Location (City, State)
Type of Setting
Number of paid hours
Number of volunteer hours
Start date (mm/dd/yyyy)
End date (mm/dd/yyyy)

Note: The applicant refuses to waive his/her right to review your comments on this page.

Listed below are qualities that are crucial in physical therapy students and practicing physical therapists. For each category below, please rate the applicant on the 1 to 5 scale (1= poor, 5= excellent) AND make comments of cite examples. If you wish to go into greater detail than this space allows, feel free to attach a letter. Thank you for this valuable contribution to the application process for future physical therapists. The information you provide is significant in the evaluation of this applicant for entry into the UW-La Crosse Physical Therapy Program.

1. Commitment to Learning: The ability to self assess, self correct and self direct; identify needs and sources of learning; continually seek new knowledge and understanding.

1 2 3 4 5 Not Assessed

2. Interpersonal Skills: The ability to interact effectively with patients, families, colleagues, other health care professionals and the community; deal effectively with cultural/ethnic diversity issues.

1 2 3 4 5 Not Assessed

3. Communication Skills: The ability to communicate effectively (speaking, body language, reading, writing, listening) for varied audiences and purposes.

1 2 3 4 5 _____ Not Assessed

4. Effective Use of Time and Resources: The ability to obtain the maximum benefit from a minimum investment of time and resources.

1 2 3 4 5 _____ Not Assessed

5. Use of Constructive Feedback: The ability to obtain the maximum benefit from a minimum investment of time and resources.

1 2 3 4 5 _____ Not Assessed

6. Professionalism: The ability to exhibit appropriate professional conduct and to represent the profession effectively (attitude, demeanor and appearance appropriate for health care setting).

1 2 3 4 5 _____ Not Assessed

7. Responsibility: The ability to fulfill commitments and be accountable for actions and outcomes.

1 2 3 4 5 _____ Not Assessed

Your state licensure number:

Figure 57. Recommendation form of a PT

The recommender is able to get the form in PDF format to store or print. Just click PDF Format button.

4.3 Operations of a personal reference

4.3.1 Logging in

URL: /faces/personalref/login.jspx

4.3.2 Changing password

URL: /faces/personalref/changepass.jspx

4.3.3 Fill the recommendation form

URL: /faces/personalref/recform.jspx

Logged in as Dr Thomas Gendreau [Change password](#) [Log out](#)

Applicant Recommendation Form

You have been asked to submit a reference/recommendation for an applicant to the University of Wisconsin Consortium Physical Therapy Program. Please assist the Admissions Committee in assessing this individual's characteristics and aptitude for Physical Therapy by completing this form to the best of your ability. Be assured that this form will be used only for the admission process and will not be released for any other purposes.

1. Applicant Data

Applicant Email
First Name
Last Name
Gender
Phone Number

2. Your Name / Title Your phone number

3. In what capacity do you know the applicant?
(high school teacher, college advisor, employer, supervisor, etc.)

4. How long have you known the applicant?

5. For each of the following characteristics, please indicate the appropriate number that describes the applicant. If you unable to assess a particular characteristics, check the NOT ASSESSED.
1=poor 2=below average 3=average 4=very good 5=excellent

Integrity	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> Not Assessed
Maturity	<input type="radio"/> 1	<input checked="" type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> Not Assessed
Dependability/Accountability	<input type="radio"/> 1	<input type="radio"/> 2	<input checked="" type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> Not Assessed
Adaptability/Flexibility	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input checked="" type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> Not Assessed
Initiative	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input checked="" type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> Not Assessed
Emotional stability/Ability to handle stress	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input checked="" type="radio"/> Not Assessed
Oral communications	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input checked="" type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> Not Assessed
Written communications	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> Not Assessed
Critical thinking skills	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input checked="" type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> Not Assessed
Empathy toward others	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input checked="" type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> Not Assessed
Attention to detail	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> Not Assessed
Interest in accuracy and precision	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input checked="" type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> Not Assessed
Organizational ability	<input type="radio"/> 1	<input checked="" type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> Not Assessed
Ability to accept direction	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input checked="" type="radio"/> Not Assessed
Social responsibility	<input type="radio"/> 1	<input type="radio"/> 2	<input checked="" type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> Not Assessed
Leadership development	<input type="radio"/> 1	<input type="radio"/> 2	<input checked="" type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> Not Assessed

6. Please share any additional comments you have about the applicant.

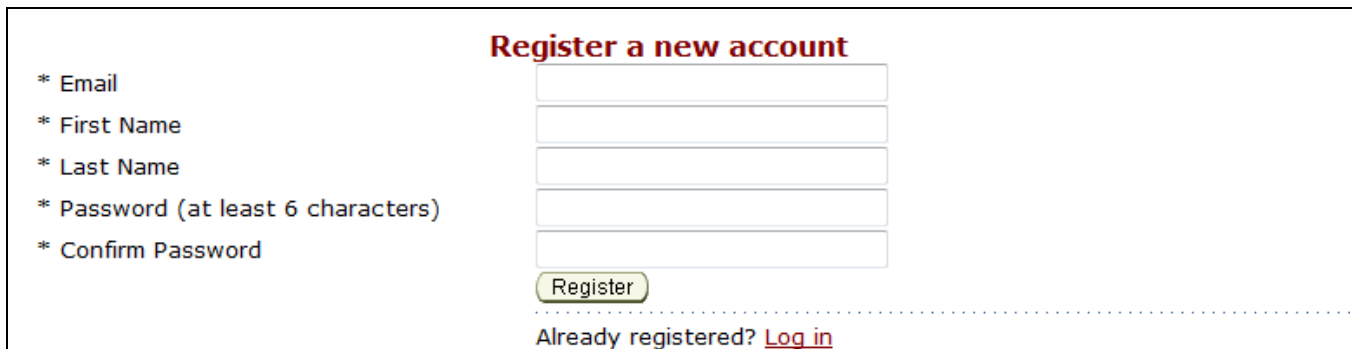
Figure 58. Recommendation form of a personal reference

The recommender is able to get the form in PDF format to store or print. Just click PDF Format button.

4.4 Operations of an applicant

4.4.1 Register an applicant account

URL: /faces/cand/register.jspx



Register a new account

* Email

* First Name

* Last Name

* Password (at least 6 characters)

* Confirm Password

.....

Already registered? [Log in](#)

Figure 59. Register an applicant account

When creating a new applicant account successfully, the system will automatically send him/her a email to confirm the registration.

```
Subject: Notification form Admission Office, Physical Therapy Program in UW-La Crosse  
  
Dear Applicant  
  
This email is to confirm that you have created an account in our Admission System.  
Username/Email: nguyen.hien@students.uwlax.edu  
Password: 123456  
  
You can review your application at the following address (copy and paste into your web browser)  
http://138.49.196.201:8888/pt/faces/cand/login.jspx  
  
Regards  
  
Physical Therapy Program - University of Wisconsin La Crosse
```

Figure 60. Email sent to the new applicant to confirm the registration

4.4.2 Logging in

URL: /faces/cand/login.jspx

At the first time login in, the applicant will be asked to initialize his/her application.



Figure 61. Initialize the application

Once the application is initialized, the applicant will be able to view the application status, the comments from the admission office. On the other hand, he will be asked to select the semester of entry as well as the deadline. He can change this information anytime before submitting the application.

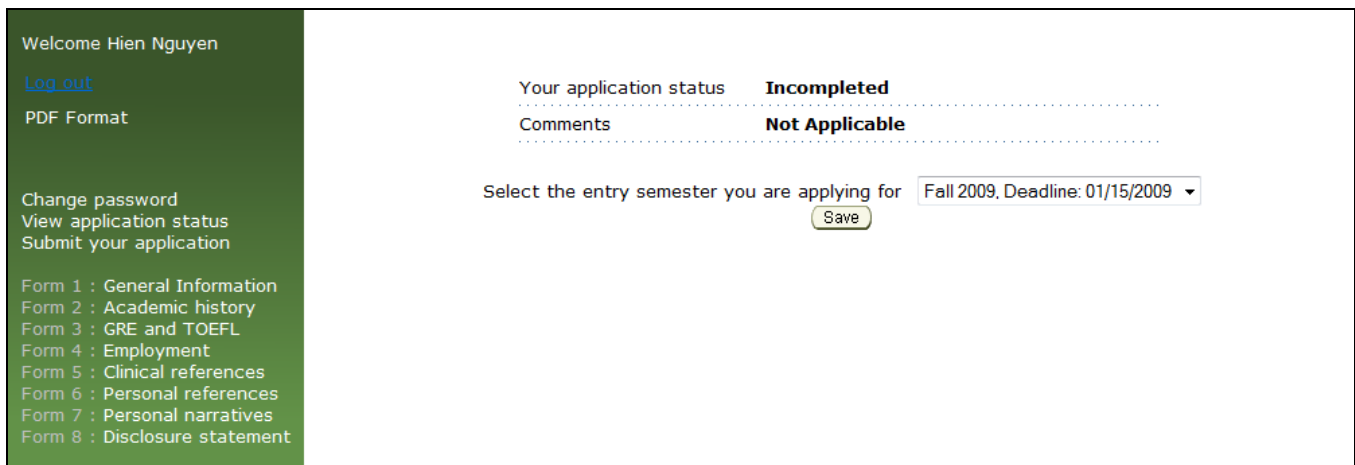


Figure 62. Application status

4.4.3 Fill in the forms

Form 1: General Information

First Name	Hien
Middle Initial	H
Last Name	Nguyen
Address	1437 State St
City	La Crosse
State	Wisconsin
Zip	54601
Country	U.S.A
Phone - Daytime	3475833505
Phone - Evening	
Current State of Legal Residence	Wisconsin

Permanent Mailing Address (if different from above)

Address	108 Dinh Bo Linh
City	Saigon
State	
Zip	
Country	Vietnam
Phone	84-8-8997885
Are you an international student?	<input checked="" type="radio"/> Yes <input type="radio"/> No

The items in this section are for data collection purposes and completion is voluntary

Date of Birth (mm/dd/yyyy)	08/17/1979
Gender	Male
Ethnic/Racial Heritage	Vietnamese

Figure 63. General Information Form

Form 2: Academic History

Please list in chronological order ALL colleges, universities and technical schools you have attended.

Select and |

Select	Institution	Location (city, state)	From (mm/yyyy)	To (mm/yyyy)	Degree	Major	GPA	Credits earned
<input checked="" type="radio"/>	Univ of Wisconsin- L	La Crosse, WI	09/2006	08/2008	Master	Software E	3.5	48
<input type="radio"/>	Univ of Technology	Saigon, Vietnam	09/1997	05/2002	Bachelor	Computer	3	120

Pre-requisite course work completed

Course Name	Course Title & Department	Year	Semester	Grade	Credit Hours	Indicate UWL or other institution
General Biology		2007	Spring	4	4	UWL
Chemistry I		2007	Fall	3.5	4	UWL
Chemistry II		2008	Spring	3	4	UWL
Human Anatomy/ Physiology I		2008	Spring	4	4	UWL
Human Anatomy/ Physiology II		2007	Fall	4	3	UWL
Physics I		2007	Spring	3	3	UWL
Physics II		2008	Spring	3	4	UWL
Statistics		2006	Fall	3	3	UWL
Psychology		2007	Spring	3.5	3	UWL
Sociology				0	0	

Courses in last 2 semesters

Select and |

Select	Course Name	Course Title & Department	Year	Semester	Grade	Credit Hours	Indicate UWL or other institution
<input checked="" type="radio"/>	Physiology I		2008	Spring	4	4	UWL
<input type="radio"/>	Chemistry II		2008	Spring	3	4	UWL

Required courses in progress

Select and |

Select	Course Name	Course Title & Department	Year	Semester	Credit Hours	Indicate UWL or other institution
<input type="radio"/>	Psychology		2008	Fall	4	UWL
<input type="radio"/>	Sociology		2008	Fall	4	UWL
<input type="radio"/>	Sample course		2008	Spring	4	UWL

Figure 64. Academic History Form

Form 3: GRE and TOEFL

GRE

Select and |

Select	Test Date (mm/yyyy)	Verbal	Quantitative	Analytical
<input checked="" type="radio"/>	10/2006	500	800	5
<input type="radio"/>	04/2007	550	790	6

TOEFL (for international applicants)

Test Date (mm/yyyy)

Score

Type

TSE (for international applicants)

Test Date (mm/yyyy)

Score

Figure 65. Standardized Tests Form

Form 4: Employment History

Please list in chronological order beginning with the most recent

Select and |

Select	Primary Occupation	From (mm/yyyy)	To (mm/yyyy)
<input type="radio"/>	UWL	09/2007	06/2008
<input type="radio"/>	Educational Technologies	07/2007	08/2008

Figure 66. Employment History Form

Form 5: Clinical References

List 2 licensed physical therapists that are submitting clinical (volunteer or paid) evaluations for you

Select and |

Select	name	email	facilityname	facilitylocation	settingtype	waive
<input checked="" type="radio"/>	Sample PT	hoanghien@gmail.com				
<input type="radio"/>	Dr. Kenny Hunt	hh@gmail.com				waive

Figure 67. Supervising PT Form

When the applicant click *Add a physical therapist* button, another web page will be opened.

Form 5: Clinical References - Adding Form

Forty (40) hours of either paid or volunteer patient care experience in **two distinctly different** physical therapy patient care settings (e.g., Inpatient Rehabilitation, Acute Care, Subacute Care, Outpatient Orthopedics, Pediatrics, Skilled Nursing Facility, Schools, Home Health) under the supervision of a licensed physical therapist are required for admission. The two distinctly different experiences may occur within one institution; however, the patient populations must not overlap. It is vital that this directive is followed as it insures that each applicant has appropriate exposure to diverse patient populations. There must be a minimum of 20 hours in each setting. This experience may be either observational or participatory but **MUST INVOLVE DIRECT PATIENT CARE.**

When the application is submitted, an evaluation form will be sent to the supervising physical therapist by email.

Name of Supervising Physical Therapist	<input type="text"/>
* Email address for Physical Therapist	<input type="text"/>
Facility Name	<input type="text"/>
Facility Location (City, State)	<input type="text"/>
Type of Setting	<input type="text"/>
Number of paid hours	<input type="text"/>
Number of volunteer hours	<input type="text"/>
Start date (mm/dd/yyyy)	<input type="text"/>
End date (mm/dd/yyyy)	<input type="text"/>

Patient-related activities which I observed/performed

Valuable insights into the physical therapy profession that I acquired from this experience

Under the Family Education Rights and Privacy Act of 1974 (Buckley Amendment), you are entitled to review this form or to waive your right to access. If you do not waive this right, and request to review the form, you will be provided with a copy. Please select the appropriate option below.

- I waive my right to review the letter of recommendation from this reference.
- I refuse to waive my right to review the letter of recommendation from this reference.

Figure 68. Adding a new Supervising PT

Form 6: Personal References

List 2 persons who are submitting letters of reference on your behalf. They must be different individuals from those who are submitting clinical evaluations.

Select	Name	Relationship to applicant	Address	Phone	Email of the reference
<input checked="" type="radio"/>	Dr Thomas Gen	Professor	1725 State St	608-785-1234	nhhien@yahoo.com
<input type="radio"/>	Dr Periyasamy	Professor	1725 State St		kasi@geemail.com

Figure 69. Personal Reference Form

Form 6: Personal References

List 2 persons who are submitting letters of reference on your behalf. They must be different individuals from those who are submitting clinical evaluations.

Select	Name	Relationship to applicant	Address	Phone	Email of the reference
<input checked="" type="radio"/>					
<input type="radio"/>	Dr Thomas Gen	Professor	1725 State St	608-785-1234	nhhien@yahoo.com
<input type="radio"/>	Dr Periyasamy	Professor	1725 State St		kasi@geemail.com

Figure 70. Adding a new personal reference

Form 7: Personal Narratives

1. Please consider the characteristics of your background including your previous experiences and describe how these characteristics might allow you to contribute to a diverse learning environment or a diverse Physical Therapy work force. (Characteristics of your background might include, for example, socioeconomic background, international travel, family make up or size, cultural background. Please note that the characteristics of your background are not limited to the above examples but, rather, should include any characteristics and past experiences that you feel may influence you as a Physical Therapist or Physical Therapy student.)

this is the answer for personal narrative #1

2. Please tell us about a time in your life when you experienced adversity. Was this situation stressful? Why or Why not? How did you handle the situation and what did you learn about yourself from this experience?

this is the answer for personal narrative #2

3. Is there any additional information that you would like the admissions committee to know about you that has not already been shared in this application?

this is the answer for personal narrative #3

Save

Figure 71. Personal Narratives Form

Form 8: Disclosure Statements

1. Have you ever been admitted to, then withdrawn from, or been asked to withdraw from, or been dropped from, a clinical program for other than academic reasons?

Yes No

2. Has licensure been denied to you, or been revoked from you, in any state in the United States for reasons other than insufficient credits or courses?

Yes No

3. Have you ever been suspended, expelled, placed on probation, or otherwise disciplined by any college or university, or from any program of a college or university other than for academic reasons?

Yes No

4. Have you ever been charged with, convicted of, pleaded guilty or no contest to, or forfeited bail for any criminal conduct under law or ordinance, excluding only minor traffic violations?

Yes No

PLEASE NOTE: The existence of criminal charges or a criminal record or denial of revocation of a license does not constitute an automatic bar to admission and will be considered only as they substantially relate to the duties and responsibilities of the program and eventual licensure.

5. Is there anything that would prohibit you from performing essential "job-related" functions, or functions related to your responsibilities as a student in the program to which you are applying? Please refer to Part III of application packet entitled Technical Standards of Performance for Applicants.

Yes No

PLEASE NOTE: The existence of a physical or mental condition or impairment does not constitute an automatic bar to admission to the student/intern program and will be considered only as it/they relate(s) to an ability to perform the duties or responsibilities of a student or intern. Further, the University will make reasonable accommodations to a physical or mental disability.

If you say 'Yes' to any of the above. Please explain

Save

Figure 72. Disclosure Statements Form

4.4.4 Submit the application

URL: /faces/cand/submit.jspx

Submit your application

Are you sure you want to submit your application. After submission, you won't be able to modify your application.

Figure 73. Submit the application

Once the applicant submits the application, all of the information will become read-only. He cannot modify anything except for the case that the admission staff opens it for late consideration (the second deadline). In order to do that, the admission staff just needs to change the application status from 'Submitted' to 'Incomplete'. The system will automatically send an email to the applicant to notify this update.

5. LIMITATIONS & FUTURE WORK

The final web-based admission system satisfies the core functional requirements as stated in the SRS (system requirements specification). However, there exists some limitations that can be improved in future work.

The most serious limitation of this system is that all the data are transmitted over the Internet in plain text. That would cause the system vulnerable to eavesdropping attack. To overcome this threat, we can use SSL (secure socket layer) protocol to encrypt the transmitted data.

The second thing is the reliability of the system. There is no projects where all possible test cases are run through because of the combinatorial explosion. But the more test cases are performed, the more reliable the system becomes. So I suggest to perform more testings in the future work.

As for functional improvements, it is more usable if the system adds the upload functionality. This functionality would help applicants as well as recommenders to upload the documents, forms to the system.

And if possible, a payment module should be added to the system to support the admission fee payment.

6. CONCLUSIONS

The web-based admission system is a web application that allows a graduate program to collect the admission applications electronically. It reduces the time of sending application materials and time of typing data to nearly zero.

The technologies used for user interface, business logic and database are Oracle technologies. Therefore, they are working together consistently and coherently. Oracle technologies are fully supported by ITS, the maintenance team of this system.

In brief, this web-based admission system is a user-friendly, cost effective web application which resolves rather complicated tasks of a graduate admission office.

7. BIBLIOGRAPHY

- [1] Hans van Vliet, *Software Engineering: Principles and Practice*, John Wiley & Sons, 2000
- [2] M. J. Christensen, R.H. Thayer, *The Project Manager's Guide to Software Engineering's Best Practices*, IEEE Computer Society, 2001
- [3] Ian. Sommerville, *Software Engineering 6th Ed.*, Addison Wesley, 2001
- [4] R.S. Pressman, *Software Engineering – A Practitioner's Approach, 5th Ed.*, The McGraw-Hill, 2001
- [5] A.Roy-Faderman, P. Koletzke, P. Dorsey, *Oracle JDeveloper 10g Handbook*, Oracle, 2004
- [6] J. Gallus, G. Williams, K. Heap, *Oracle Application Development Framework: Tutorial (10.1.3.1.0)*, Oracle , 2006
- [7] R. Gordon, *Oracle Application Development Framework Development Guidelines Manual*, Oracle, 2005
- [8] The Java EE 5 Tutorial, <http://java.sun.com/javaee/5/docs/tutorial/doc/JavaEETutorial.pdf>
- [9] Oracle Community Discussion Forums, <http://forums.oracle.com>
- [10] Sun Forums, <http://forums.sun.com>

APPENDIX A.

The application printed by the applicant (without average calculation).

APPENDIX B.

The printed recommendation form of a supervising physical therapist.

APPENDIX C.

The printed recommendation form of a personal reference.

APPENDIX D.

The application printed by the administrator (with average calculation).