

Fall 11-1-2006

A Web-Based Portal for Aspiring Students and Prospective Employers in .NET & C#

Vidya C. Tripuraneni
Dakota State University

Follow this and additional works at: <https://scholar.dsu.edu/theses>

Recommended Citation

Tripuraneni, Vidya C., "A Web-Based Portal for Aspiring Students and Prospective Employers in .NET & C#" (2006). *Masters Theses*. 118.
<https://scholar.dsu.edu/theses/118>

This Thesis is brought to you for free and open access by Beadle Scholar. It has been accepted for inclusion in Masters Theses by an authorized administrator of Beadle Scholar. For more information, please contact repository@dsu.edu.

**A WEB-BASED PORTAL FOR ASPIRING STUDENTS AND
PROSPECTIVE EMPLOYERS IN .NET & C#**

**A graduate project submitted to Dakota State University in partial fulfillment of the
requirements for the degree of**

Master of Science

In

Information Systems

November, 2006

By

Vidya C Tripuraneni

Project Committee:

Ronghua Shan

Omar El Gayar

Stephen Krebsbach



PROJECT APPROVAL FORM

We certify that we have read this project and that, in our opinion, it is satisfactory in scope and quality as a project for the degree of Master of Science in Information Systems.

Student Name: VIDYA C TRIPURANENI

Master's Project Title: A Web-based Portal for Aspiring Students and Prospective Employers in .NET & C#

Faculty supervisor: Mr. Shem Date: 11/30/06

Committee member: [Signature] Date: 11/30/06

Committee member: [Signature] Date: 11/30/06

ACKNOWLEDGMENT

I would like to thank Dr. Ronghua Shan, my project supervisor for his support and prompt replies to all my questions through out the project. I would also like to thank my other project committee members-Dr. Omar El Gayar and Dr. Stephen Krebsbach for their invaluable support for this project.

ABSTRACT

Career Services System is a web-based application designed to assist students in their career development and to expose them to options that best fit their individual career needs. This application allows them to search and apply for jobs online, upload their resumes and submit them to the employer and Schedule/Change/Cancel their interview appointments. Through this application employers can post their jobs online, search for students and review students' job applications. The application is developed in C# and ASP.NET with Oracle Database at the back end. The major deliverable of this project is a web-based portal for students and employers.

This report gives an overview of the entire project. The problem statement, system overview and the main objectives of the project are outlined in the Introduction part of the report. System Specifications, System Architecture, Database Design and Data flow diagrams for all the functional components of the system are presented under System Analysis and Design. Career Services System is divided into seven modules. System Implementation explains each of these modules, the functionality included in them and the use of stored procedures in this application. System Testing explains how this system is tested and presents the summary results of the testing phase. Finally, the report concludes with the future enhancements to the system and the lessons learned by doing this project.

DECLARATION

I hereby certify that this project constitutes my own product, that where the language of others is set forth, quotation marks so indicate, and that appropriate credit is given where I have used the language, ideas, expressions or writings of another.

I declare that the project describes original work that has not previously been presented for the award of any other degree of any institution.

Signed,

<Student name>

TABLE OF CONTENTS

PROJECT APPROVAL FORM.....	II
ACKNOWLEDGMENT.....	III
ABSTRACT.....	IV
DECLARATION.....	V
TABLE OF CONTENTS.....	VI
LIST OF TABLES.....	VIII
LIST OF FIGURES.....	IX
INTRODUCTION.....	1
BACKGROUND OF THE PROBLEM.....	1
STATEMENT OF THE PROBLEM.....	1
SYSTEM OVERVIEW.....	2
OBJECTIVES OF THE PROJECT.....	4
SYSTEM ANALYSIS AND DESIGN.....	6
SYSTEM REQUIREMENTS.....	6
<i>Hardware</i>	6
<i>Software</i>	6
SYSTEM ARCHITECTURE.....	6
SYSTEM DESIGN.....	9
<i>Database Design</i>	9
<i>Dataflow Diagrams</i>	17
SYSTEM IMPLEMENTATION.....	28
CAREER SERVICES SYSTEM IMPLEMENTATION MODULES.....	28
<i>Registration Module</i>	29
<i>Authentication Module</i>	32
<i>Administrator Module</i>	33
<i>Student Module</i>	36
<i>Employer Module</i>	44
<i>Account Maintenance Module</i>	49
<i>Email Notification Module</i>	54

STORED PROCEDURES55

SYSTEM TESTING.....57

 FUNCTIONAL TESTING.....57

CONCLUSIONS.....59

 FUTURE ENHANCEMENTS59

 LESSONS LEARNED.....60

REFERENCES62

APPENDIX A: PROJECT PLANNING63

 PROJECT WORK BREAKDOWN STRUCTURE AND GANTT CHART.....63

LIST OF TABLES

Table 1: System Testing Summary	58
---------------------------------------	----

LIST OF FIGURES

Figure 1: Top-Level Diagram of the System	4
Figure 2: High Level Technical Diagram	8
Figure 3: Database Model Diagram	9
Figure 4: Student Table Screenshot	10
Figure 5: StudentInfo Table Screenshot.....	11
Figure 6: Administrator Table Screenshot	11
Figure 7: TempEmp Table Screenshot.....	12
Figure 8: Employer Table Screenshot.....	13
Figure 9: Jobs Table Screenshot	14
Figure 10: Applied Jobs Table Screenshot.....	14
Figure 11: StudResumes Table Screenshot.....	15
Figure 12: Interview Schedules Table Screenshot	16
Figure 13: Context Flow Diagram	18
Figure 14: Low Level Diagram-User Login	18
Figure 15: Low Level Diagram-New Student Registration (Students).....	19
Figure 16: Low Level Diagram-Forgot Password (Students).....	19
Figure 17: Low Level Diagram-Search and apply for jobs (Students)	20
Figure 18: Low Level Diagram-Update Account Information (Students).....	20
Figure 19: Low Level Diagram-Schedule Interview Appointments (Students)	21
Figure 20: Low Level Diagram-Change Password (Students)	21
Figure 21: Low Level Diagram-Upload Resumes (Students).....	22
Figure 22: Low Level Diagram-New Employer Registration (Employers).....	23
Figure 23: Low Level Diagram-Forgot Password (Employers)	23
Figure 24: Low Level Diagram-Post Jobs (Employers)	24
Figure 25: Low Level Diagram-Review Students' Applications (Employers).....	24
Figure 26: Low Level Diagram-Search for Students (Employers)	25
Figure 27: Low Level Diagram-Update Account Information (Employers)	25
Figure 28: Low Level Diagram-Change Password (Employers).....	25
Figure 29: Low Level Diagram-Employer Validation (Administrators)	26

Figure 30: Low Level Diagram-Create/Modify Interview Schedule (Administrators)	27
Figure 31: New Student Registration Page Screenshot.....	29
Figure 32: New Student Registration Confirmation Page Screenshot.....	30
Figure 33: New Employer Registration Page Screenshot.....	31
Figure 34: New Employer Registration Confirmation Page Screenshot	32
Figure 35: Login Page Screenshot	33
Figure 36: Administrator Main Page Screenshot.....	35
Figure 37: Student's Search for Jobs Page Screenshot	37
Figure 38: New Students Resume Upload Page Screenshot.....	39
Figure 39: Students Change Resume Page Screenshot.....	40
Figure 40: Students Apply for Jobs Page Screenshot	41
Figure 41: Students Schedule Interview Appointments Page Screenshot	43
Figure 42: Employers Post Jobs Page Screenshot	45
Figure 43: Employers Remove Jobs Page Screenshot.....	46
Figure 44: Review Students' Applications Page Screenshot.....	47
Figure 45: Employers Search for Students Page Screenshot	48
Figure 46: Students My Account Page Screenshot.....	50
Figure 47: Employers My Account Page Screenshot	50
Figure 48: Students and Employers Change Password Page Screenshot	51
Figure 49: Students Forgot Password Page Screenshot.....	53
Figure 50: Employers Forgot Password Page Screenshot	53
Figure 51: Stored Procedures.....	56
Figure 52: Functional Testing.....	57
Figure 53: Project Work Breakdown Structure and Gantt chart.....	63

CHAPTER 1

INTRODUCTION

1.1 Background of the Problem

Career planning and development is an important aspect in any student's life. The main goal of any Career Services Department (CSD) is to help students in the process of their career planning and provide placement assistance to them. The main objective of this project is to develop a web application for the University's CSD that will assist the department in achieving its goal.

Web applications are the applications that are accessed using a Web browser and a network such as an Internet. These applications are increasingly gaining importance these days. Unlike the traditional software or desktop applications, it is not required that these applications are installed or downloaded on all the client computers. Instead these applications can be accessed easily from any where in the world and from any computer if the user has a Web browser and an access to the Internet.

1.2 Statement of the problem

The current website for Dakota State University's (DSU) Career Services contains static HTML pages. Although it provides students with a centralized access to the job listings, it does not allow them to apply for the jobs online or submit their resumes to the employers or schedule their interview appointments. Employers do not have the ability to post their jobs

online by themselves. They should send an email to the career services to do this. They neither have the ability to review students' applications online nor search for students online.

The web-application developed in this project will provide a wide array of services to help students of any major in achieving their goals. Students and employers can access this application any time and from anywhere around the world.

1.3 System Overview

The web-based portal developed in this project can be used by the Career Services Department (CSD) in Universities to facilitate it in the process of providing placement assistance to students. Users of this application fall under the following three categories: Students, Employers and Administrators.

Both the students and employers must first register to the site in order to access it. Administrators' authentication details will be created by the CSD and will be provided to them. Students will be able to access the site soon after their registration is completed but employers will have to wait until their information is validated by the CSD. Employer's registration information will be sent through an email (through this application) to the department. Once their information is validated the administrators will then approve/reject their registration through this application. A corresponding email notification will then be sent to employer.

If the employer is approved he/she can now access the application using their usernames and passwords and post their jobs online. After logging in, students can search for jobs posted by the employers based on certain criteria such as major, location, full-time or part-time and then apply for jobs. This application also allows students to upload up to three

resumes. He/she can then choose which resume should be sent to the employer at the time of applying for the job. Employers will review all the students' job applications and can either approve or reject them. If the student application is approved an email notification is automatically sent to the student to schedule his/her interview appointments. The employer interviews only students whose applications are approved.

After reviewing students' applications employers should contact the CSD to fix the date(s), timings and the place of interview. Based on this the administrators will create an interview schedule for the job using this application. Students whose applications are approved can now access the application and schedule their interview appointments based on the open slots available for that job interviews. Students can also change (if there are any available open slots) or cancel their interview appointments. Corresponding email notifications will be sent to the students whenever he/she schedules, changes or cancels his/her appointment.

This application will also allow employers to search for students based on major and to remove the jobs that are filled from the website. It will also allow both the students and employers to change their passwords and update their information if needed. If students or employers forget their passwords they can also request for a new password using their usernames. A new password will be randomly generated and sent to their email address.

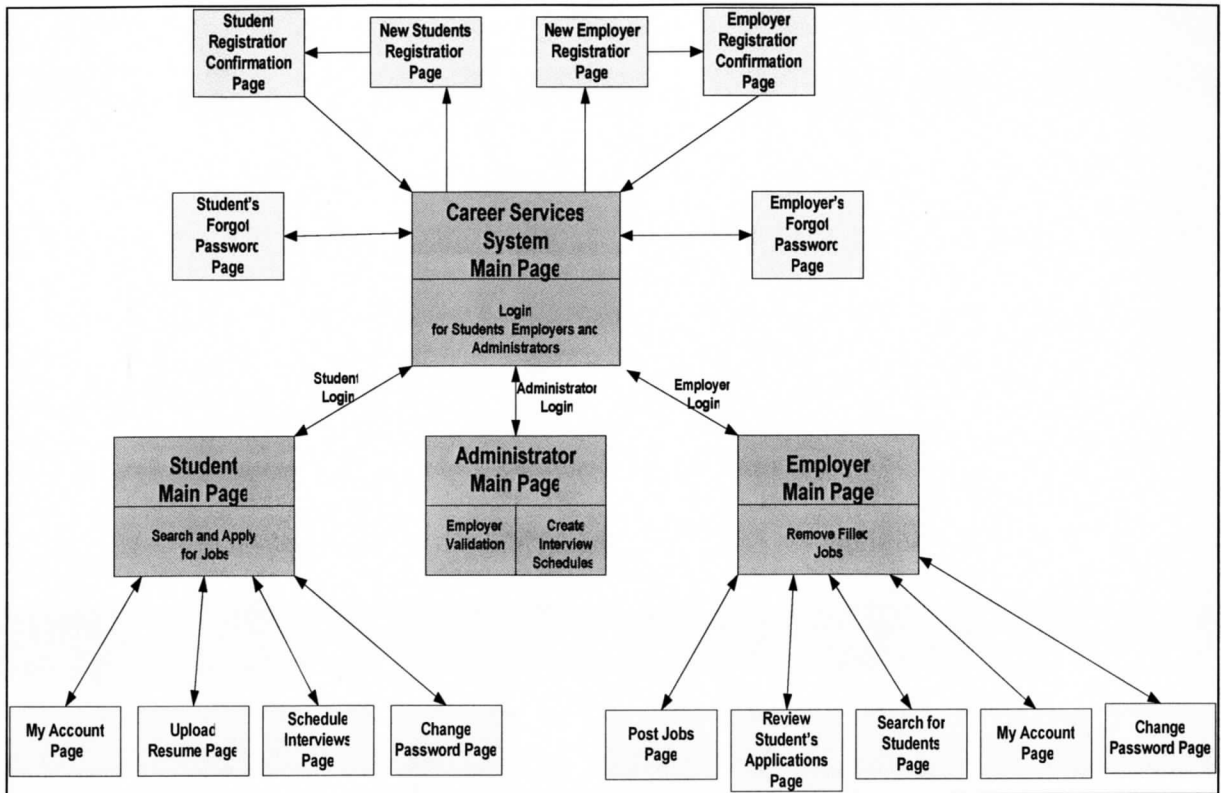


Figure 1: Top-Level Diagram of the System

1.4 Objectives of the project

The main objective of this project is to provide functionality for:

- New students and employers to register to the portal
- Students, Employers and Administrators to login to the portal using their user names and passwords
- Students to search for jobs posted by the employers based on major, location and full-time/part-time criteria
- Students to apply for jobs online
- Students to upload resumes and submit them to the employers

- Students to Schedule/Change/Cancel their interview appointment based on the open slots available
- Employers to post their jobs online
- Employers to search for the prospective students online
- Employers to review students' applications and approve them online
- Employers to remove their jobs that are filled from the portal
- Students and Employers to update their account information
- Students and Employers to change their passwords
- Randomly generate new password and send it to the student's or employer's email address if they forget their passwords
- Send email notifications through the application
- Administrators to approve/reject employer registration
- Administrators to create schedules for job interviews.

The major deliverable of this project is a Web application with all the above-mentioned functionality. Another project deliverable is a detailed project report that includes all the documentation about this project.

CHAPTER 2

SYSTEM ANALYSIS AND DESIGN

2.1 System Requirements

2.1.1 Hardware

The following hardware configuration is used to design Career Services System:

Processor	: Intel Pentium
RAM	: 2 GB
Hard disk capacity	: 60 GB

2.1.2 Software

The following software configuration is used to design Career Services System:

Technology	: .NET Framework 2.0
Data Access Component	: ADO.NET
Operating System	: Windows 2000 server
Database	: Oracle 8i

2.2 System Architecture

Career Services System is developed using an N-tired architecture. ASP.NET is used at the front end for creating the web pages. All the code in the middle layer is written in C#. C# presents a fully Object-Oriented architecture that promotes the development of well

structured and easy to maintain code. Internet Information Server is used as the web server. Oracle Database is used at the back end to store all the data.

N-tiered Architecture

Presentation Layer:

All the web pages are developed in ASP.NET. ASP.NET has several built-in server controls that enable us to build pages with far less code. ASP.NET Master and Content pages makes it easy to create web pages with a consistent look-and-feel.

Application Layer:

The Application layer consists of the

- a) Data Access Layer
- b) Business Logic Layer

The database contains tables and stored procedures that store and manipulate data. Data Access Layer consists of the class libraries that deal with manipulating data inside the database. Manipulating data includes inserting, updating and deleting the data in the database. Data Access layer and the database are very important in the application architecture, so most of the time is spent in making the database solid.

All the logic on how the data is handled once it is brought from the database using data access layer is written in business layer class libraries. Keeping the business logic in the presentation layer is very dangerous as the user will have direct interaction with the business logic and it can be easily hacked. So the business logic is always kept in the class libraries. This approach makes the separation of the user interaction with business logic and also makes the libraries portable, so they can be used by some other same type of application.

Database Layer:

All the data in the application is stored in an Oracle database. It consists of all the tables that are used in the application and the stored procedures that are used for accessing this data.

IIS Server:

Internet Information Services (IIS) is a powerful Web server that provides a highly reliable, manageable, secure and scalable Web application infrastructure. IIS server enables us to quickly and easily deploy powerful websites and applications. It also helps us lower system administration costs and increase website and application availability. (“What’s New in Internet Information Services 6.0”, 2003)

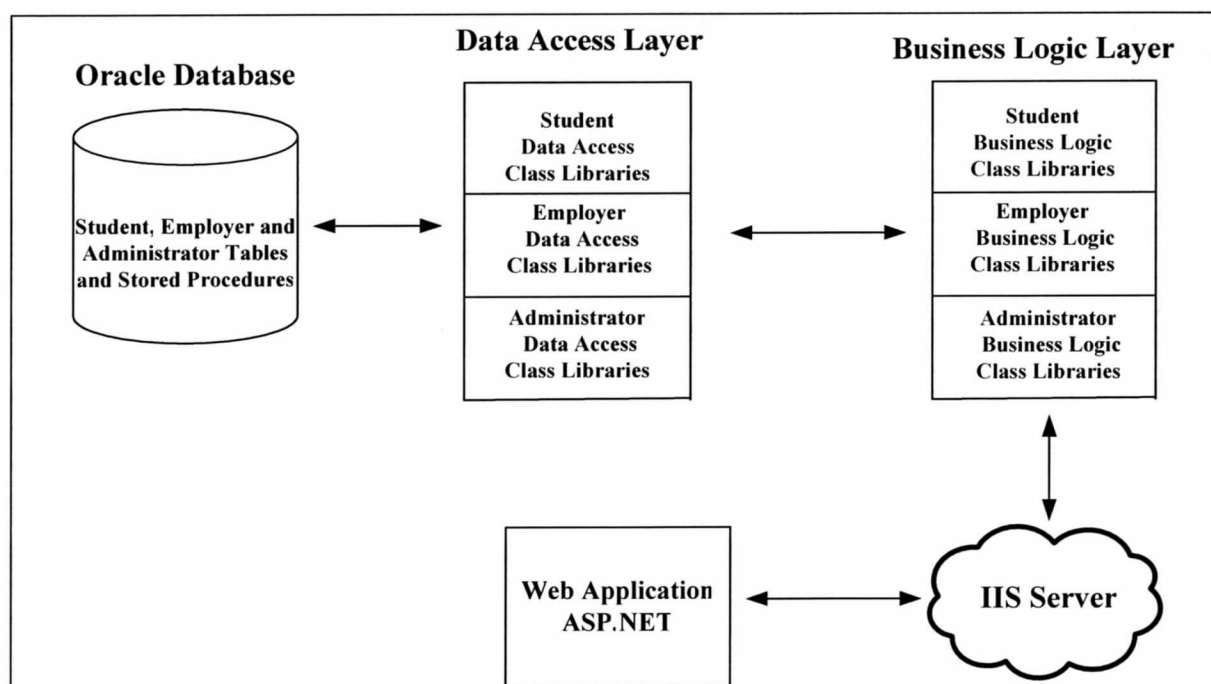


Figure 2: High Level Technical Diagram

2.3 System Design

2.3.1 Database Design

The Database Model diagram for the Career Services System is shown below. This diagram shows all the tables used in this project and the relationships between them. It is a key diagram that gives an understanding of all the fields in the tables. The letters PK before the field names indicate that those fields are the primary keys of that table. The letters FK before the field names indicate that those fields are foreign keys to that table. The fields that are in bold in the tables are the required fields (i.e. these fields cannot be null) in that table.

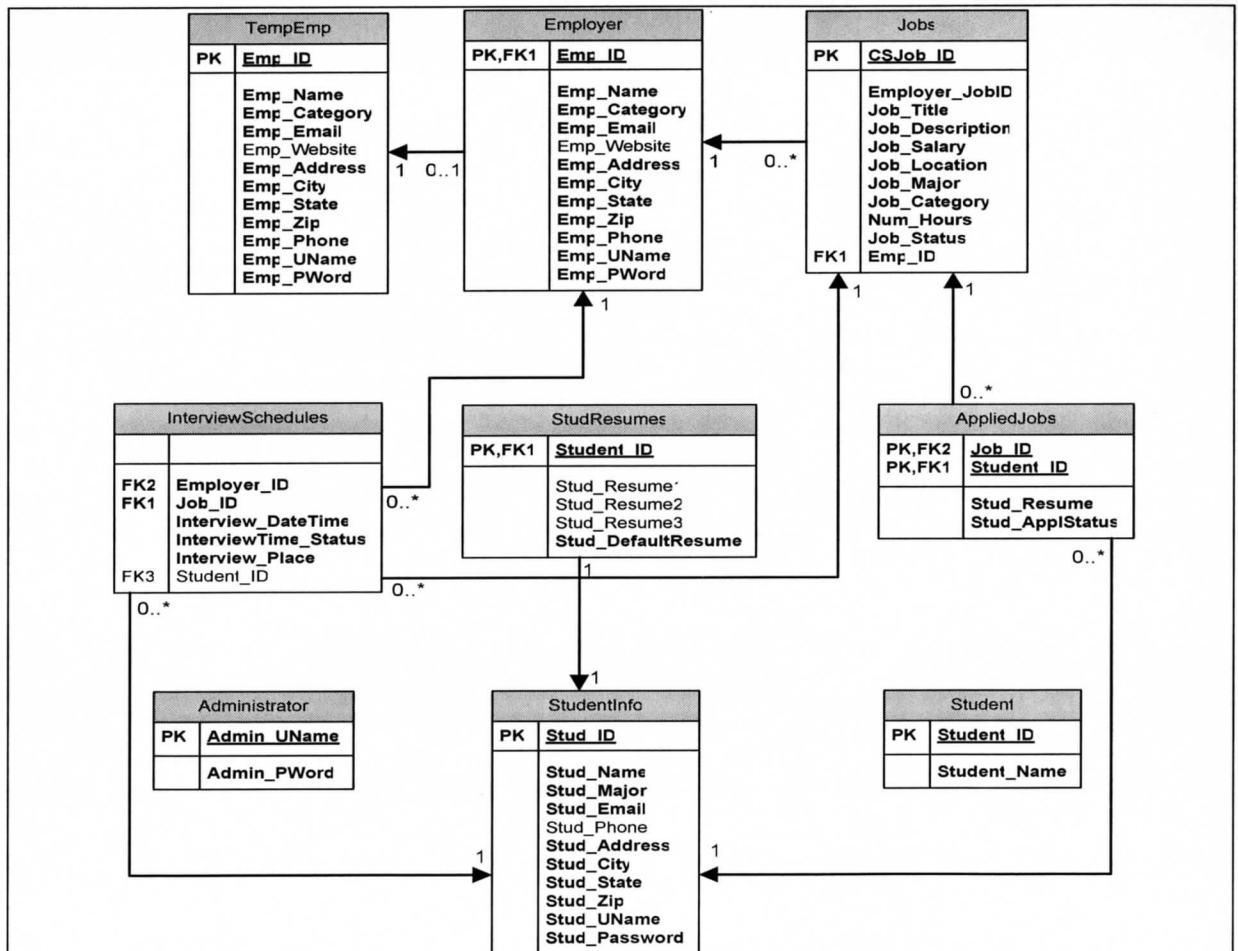
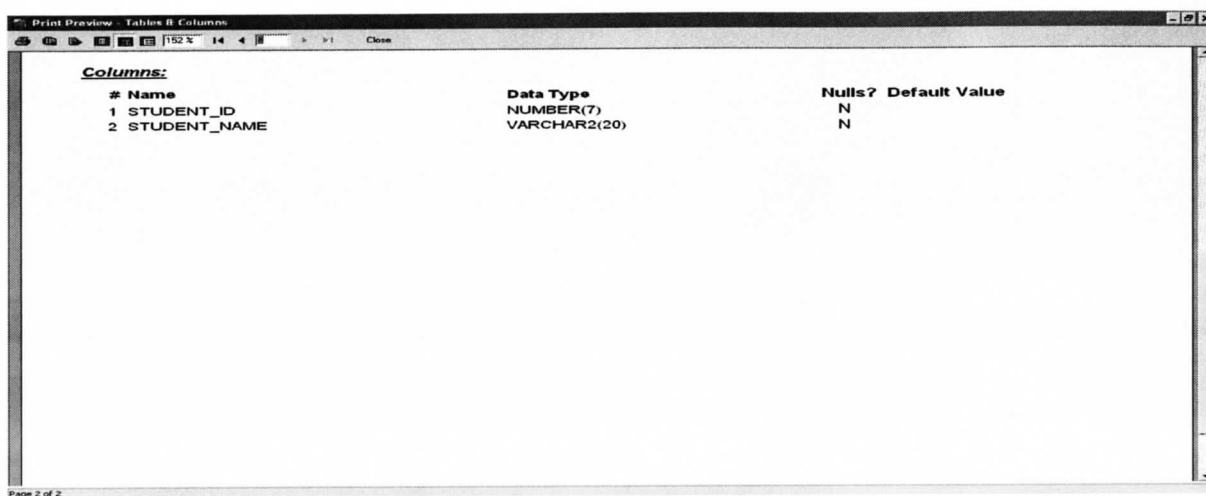


Figure 3: Database Model Diagram

2.3.1.1 Database Tables Description

Student Table:

The Student table contains ID numbers and names of all the University's students. This table is obtained from the University's registrar office and is not created through this application. The only purpose of this table is to check whether the student ID entered at the time of New Student Registration to the portal is a valid University's student ID.



The screenshot shows a window titled "Print Preview: Tables & Columns" with a "Close" button. The window displays a table structure for the Student table. The table has two columns: STUDENT_ID and STUDENT_NAME. The STUDENT_ID column is of type NUMBER(7) and is nullable (N). The STUDENT_NAME column is of type VARCHAR2(20) and is nullable (N). The window also shows a "Columns:" header and a "Page 2 of 2" indicator at the bottom left.

#	Name	Data Type	Nulls?	Default Value
1	STUDENT_ID	NUMBER(7)	N	
2	STUDENT_NAME	VARCHAR2(20)	N	

Figure 4: Student Table Screenshot

Student Info Table:

The StudentInfo table contains all the information about the students. When a new student registers to the Career Services System, his/her information is inserted into this table. All the information except Stud_ID and Stud_UName in this table can be modified by the student if he/she wishes to do so.

#	Name	Data Type	Nulls?	Default Value
1	STUD_ID	NUMBER(7)	N	
2	STUD_NAME	VARCHAR2(30)	N	
3	STUD_MAJOR	VARCHAR2(30)	N	
4	STUD_EMAIL	VARCHAR2(40)	N	
5	STUD_PHONE	VARCHAR2(20)	Y	
6	STUD_ADDRESS	VARCHAR2(50)	N	
7	STUD_CITY	VARCHAR2(30)	N	
8	STUD_STATE	VARCHAR2(30)	N	
9	STUD_ZIP	NUMBER(10)	N	
10	STUD_UNAME	VARCHAR2(20)	N	
11	STUD_PASSWORD	VARCHAR2(20)	N	

Figure 5: StudentInfo Table Screenshot

Administrator Table:

This table contains the usernames and passwords of the administrators. The system administrator manually inserts the data in this table. This table is used for authentication purposes for checking the validity of the administrator's username and password at the time of logging in.

#	Name	Data Type	Nulls?	Default Value
1	ADMIN_UNAME	VARCHAR2(10)	N	
2	ADMIN_PWORD	VARCHAR2(10)	N	

Figure 6: Administrator Table Screenshot

TempEmp Table:

This table holds the information of all the newly registered employers and the information of all the employers whose registration is approved by CSD. Whenever a new employer registers to the portal then his/her information is inserted into this table. A unique number for Emp_ID is generated using Oracle Sequence each time a row is inserted into this table. After the employer information is validated, if the employer is rejected by the CSD then their information is deleted from this table. Approved employers' information is not deleted from this table. This table is used to check for availability of the usernames selected by the employer at the time of registration. The information in this table is also used for sending portal registration approval or rejection emails to the employers.

#	Name	Data Type	Nulls?	Default Value
1	EMP_ID	NUMBER	N	
2	EMP_NAME	VARCHAR2(40)	N	
3	EMP_CATEGORY	VARCHAR2(40)	N	
4	EMP_EMAIL	VARCHAR2(40)	N	
5	EMP_WEBSITE	VARCHAR2(40)	N	
6	EMP_ADDRESS	VARCHAR2(30)	Y	
7	EMP_CITY	VARCHAR2(20)	N	
8	EMP_STATE	VARCHAR2(20)	N	
9	EMP_ZIP	NUMBER(10)	N	
10	EMP_PHONE	VARCHAR2(20)	N	
11	EMP_LNAME	VARCHAR2(20)	N	
12	EMP_PWORD	VARCHAR2(20)	N	

Figure 7: TempEmp Table Screenshot

Employer Table:

This table contains the information of all the approved employers. TempEmp table described above also contains this information but it contains information about the newly registered employers also. So in order to avoid confusion, employers' information from the TempEmp table is inserted into this table when they are approved by the CSD. From then

onwards employer information in this table is used for all other purposes such as employer logging in, posting jobs, updating their information etc.

#	Name	Data Type	Nulls?	Default Value
1	EMP_ID	NUMBER	N	
2	EMP_NAME	VARCHAR2(40)	N	
3	EMP_CATEGORY	VARCHAR2(40)	N	
4	EMP_EMAIL	VARCHAR2(40)	N	
5	EMP_WEBSITE	VARCHAR2(40)	Y	
6	EMP_ADDRESS	VARCHAR2(30)	N	
7	EMP_CITY	VARCHAR2(20)	N	
8	EMP_STATE	VARCHAR2(20)	N	
9	EMP_ZIP	NUMBER(10)	N	
10	EMP_PHONE	VARCHAR2(20)	N	
11	EMP_UNAME	VARCHAR2(20)	N	
12	EMP_PWORD	VARCHAR2(20)	N	

Figure 8: Employer Table Screenshot

Jobs Table:

This table contains all the information about the jobs posted by the employer. Whenever an employer posts a new job using Post Jobs Form, then that information is inserted into this table. CSJob_ID is the primary key field for this table. A unique number for this field is generated using Oracle Sequence each time a new job is posted. Employer_JobID is the job ID of the employer. This field is not an UNIQUE field. This ID and the Employer ID (Emp_ID) together are used to check if the same job is already posted by that employer. When students search for jobs, the information from this table is displayed to the students. The Job_Status field can have either of the two values 'Filled' or 'Not Filled'. Its value is initially set to 'Not Filled' when the job is posted. When that job is filled and the employer selects to remove it from the portal then that field value is updated to 'Filled'. Only the jobs with the Status 'Not Filled' are displayed to the students.

#	Name	Data Type	Nulls?	Default Value
1	CSJOB_ID	NUMBER	N	
2	EMPLOYER_JOBID	VARCHAR2(10)	N	
3	JOB_TITLE	VARCHAR2(40)	N	
4	JOB_DESCRIPTION	VARCHAR2(1000)	N	
5	JOB_SALARY	VARCHAR2(20)	N	
6	JOB_LOCATION	VARCHAR2(50)	N	
7	JOB_MAJOR	VARCHAR2(40)	N	
8	JOB_CATEGORY	VARCHAR2(20)	N	
9	NUM_HOURS	NUMBER	N	
10	EMP_ID	NUMBER	N	
11	JOB_STATUS	VARCHAR2(10)	N	

Figure 9: Jobs Table Screenshot

Applied Jobs Table:

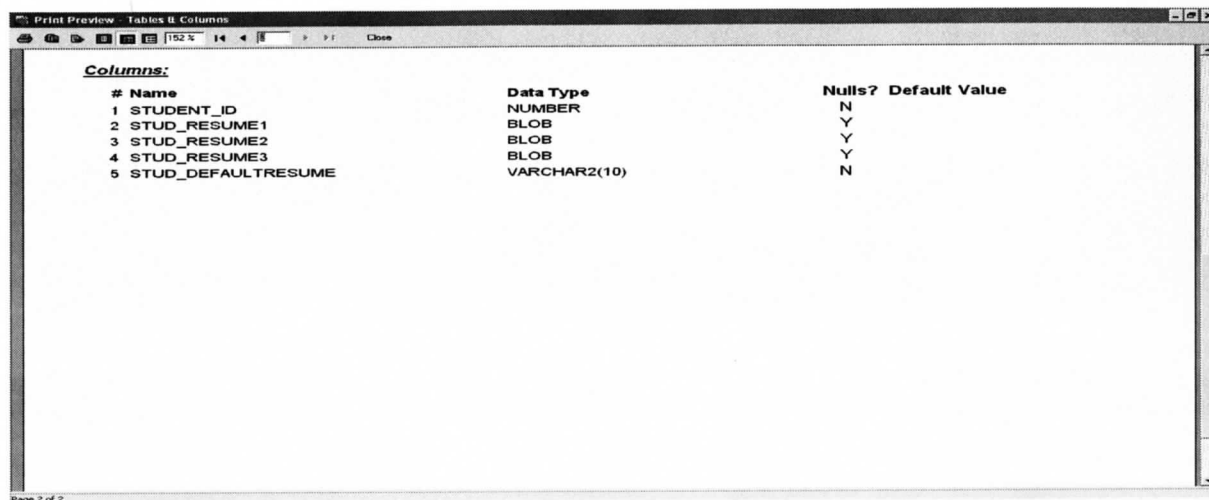
When a student applies for a job, then that student ID and that job ID are inserted into this table. At the time of applying for the job, the student must also select a resume that should be sent to that employer. Stud_Resume column in this table holds the ID of that resume selected by the student. This ID is used to open the specified resume to the employer when he/she reviews the student's application. The Stud_ApplStatus field can have either of the two values 'Approved' or 'Not Approved'. Its value is initially set to 'Not Approved' when the student applies for the job. When that student application is approved by the employer then that field value is updated to 'Approved'.

#	Name	Data Type	Nulls?	Default Value
1	JOB_ID	NUMBER	N	
2	STUDENT_ID	NUMBER	N	
3	STUD_RESUME	VARCHAR2(10)	N	
4	STUD_APPLSTATUS	VARCHAR2(15)	N	

Figure 10: Applied Jobs Table Screenshot

StudResumes Table:

This table contains the resumes uploaded by the students. When a student uploads his/her resume(s) they are stored as BLOB field in this table together with that student ID. The student should also select which of the resumes uploaded by him/her is the default resume. This value is stored in the Stud_DefaultResume field of the table.



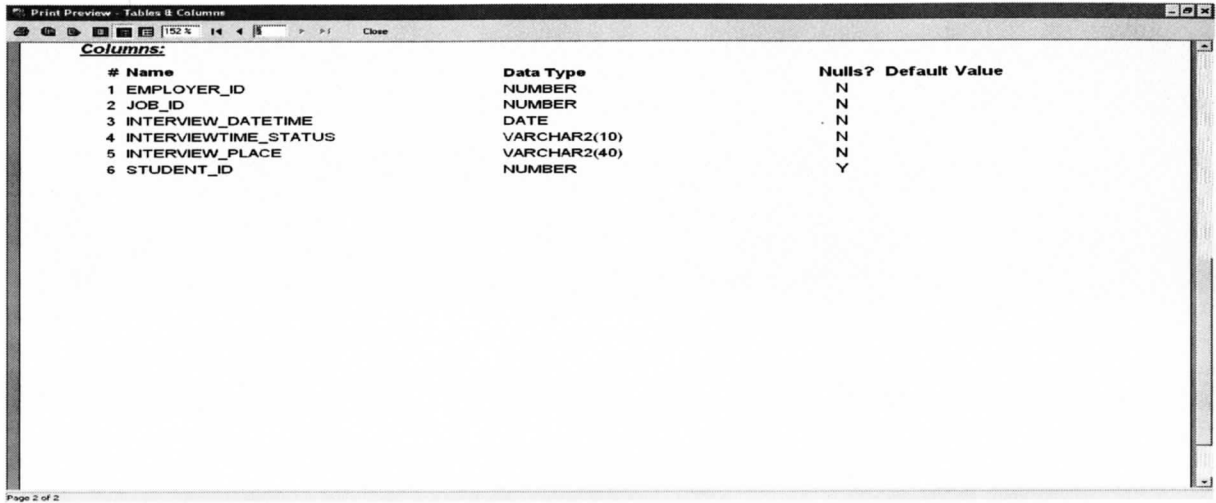
#	Name	Data Type	Nulls?	Default Value
1	STUDENT_ID	NUMBER	N	
2	STUD_RESUME1	BLOB	Y	
3	STUD_RESUME2	BLOB	Y	
4	STUD_RESUME3	BLOB	Y	
5	STUD_DEFAULTRESUME	VARCHAR2(10)	N	

Figure 11: StudResumes Table Screenshot

Interview Schedules Table:

This table contains the interview dates and times for the jobs whose interview schedule has been created. When the administrator creates interview schedules for a job, then they are inserted into this table together with that Job ID and the Employer ID. The values of the Interview_DateTime field are generated by the application when the administrator enters the Interviews Start Time, Interviews Finish Time and the duration of each interview. The values of Interview_Place field are provided by the administrator. The field InterviewTime_Status in this table can have either of the two values- 'Open' or 'Closed'. This field indicates whether a particular interview time slot is open or is closed. Its value is initially

set to 'Open' when the schedule is created. When a student selects this interview date and time then that field value is updated to 'Closed'. Only the slots whose status is 'Open' are displayed to the student. Student_ID field doesn't contain any value initially, but when a student selects a particular date and time for a job interview then his/her ID is inserted into this field.



The screenshot shows a window titled "Print Preview - Tables & Columns" with a "Close" button. The main content is a table with the following columns: # Name, Data Type, Nulls?, and Default Value. The table lists six columns: 1 EMPLOYER_ID (NUMBER), 2 JOB_ID (NUMBER), 3 INTERVIEW_DATETIME (DATE), 4 INTERVIEWTIME_STATUS (VARCHAR2(10)), 5 INTERVIEW_PLACE (VARCHAR2(40)), and 6 STUDENT_ID (NUMBER). The Nulls? column contains 'N' for all columns except STUDENT_ID, which contains 'Y'. The Default Value column is empty for all columns.

#	Name	Data Type	Nulls?	Default Value
1	EMPLOYER_ID	NUMBER	N	
2	JOB_ID	NUMBER	N	
3	INTERVIEW_DATETIME	DATE	N	
4	INTERVIEWTIME_STATUS	VARCHAR2(10)	N	
5	INTERVIEW_PLACE	VARCHAR2(40)	N	
6	STUDENT_ID	NUMBER	Y	

Page 2 of 2

Figure 12: Interview Schedules Table Screenshot

2.3.2 Dataflow Diagrams

Dataflow diagram is a major graphical modeling tool that is used to graphically represent the major functions of the system and the flow of data through the system. These diagrams facilitate the users in visualizing how the new system will operate and what the system will accomplish. First, a context flow diagram which gives an overall picture of the interaction between the new system and the outside entities is created and then each functional area of the system is analyzed in more detail. The main components of a data flow diagram are:

- **The Process:** A process is a part of the system functionality that shows how the inputs are changed into outputs. It is graphically represented by a circle.
- **The Flow:** The flow shows how the data flows from its source (a process, store or terminator) to its destination (a process, store or terminator). It also shows the direction of the data flow. It is represented by an arrow. The arrow head shows the direction of the flow.
- **The Store:** A data store is a repository of the system's data and is represented by a rectangle with rounded corners.
- **The Terminator:** A terminator is an external entity with which the system communicates. The system may send data to or obtain data from an external entity. It is represented by a rectangle.

(Ed Yourdon, 2006, Chapter 9), (“Data Flow Diagram”) and (“Free Data Flow Diagrams Tutorial”)

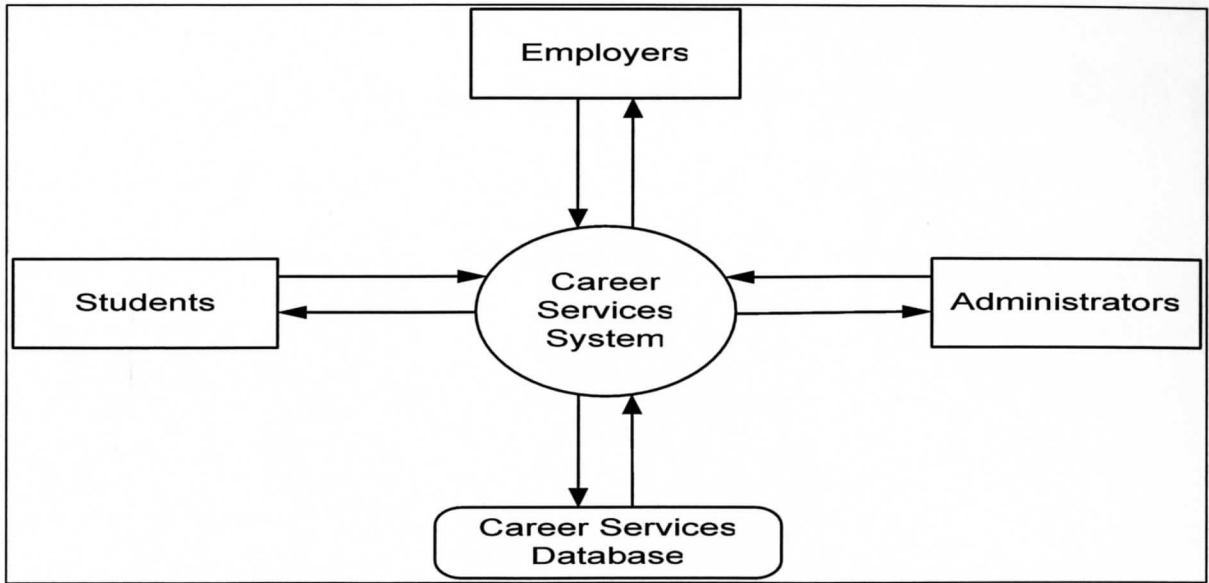


Figure 13: Context Flow Diagram

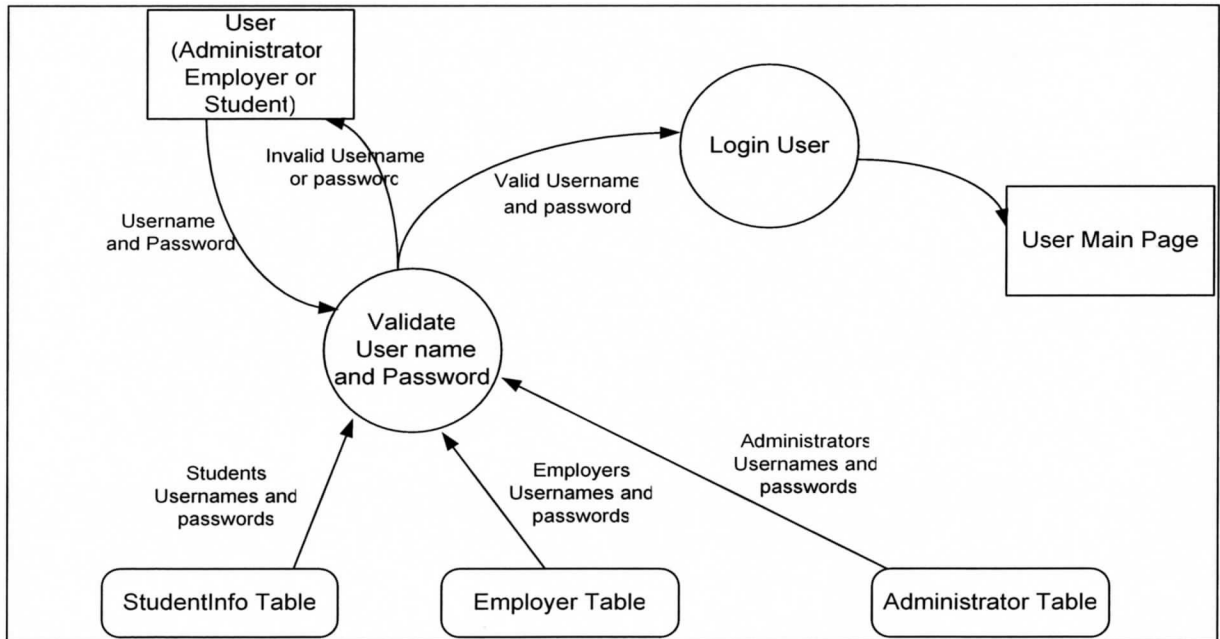


Figure 14: Low Level Diagram-User Login

2.3.2.1 Students Data flow Diagrams

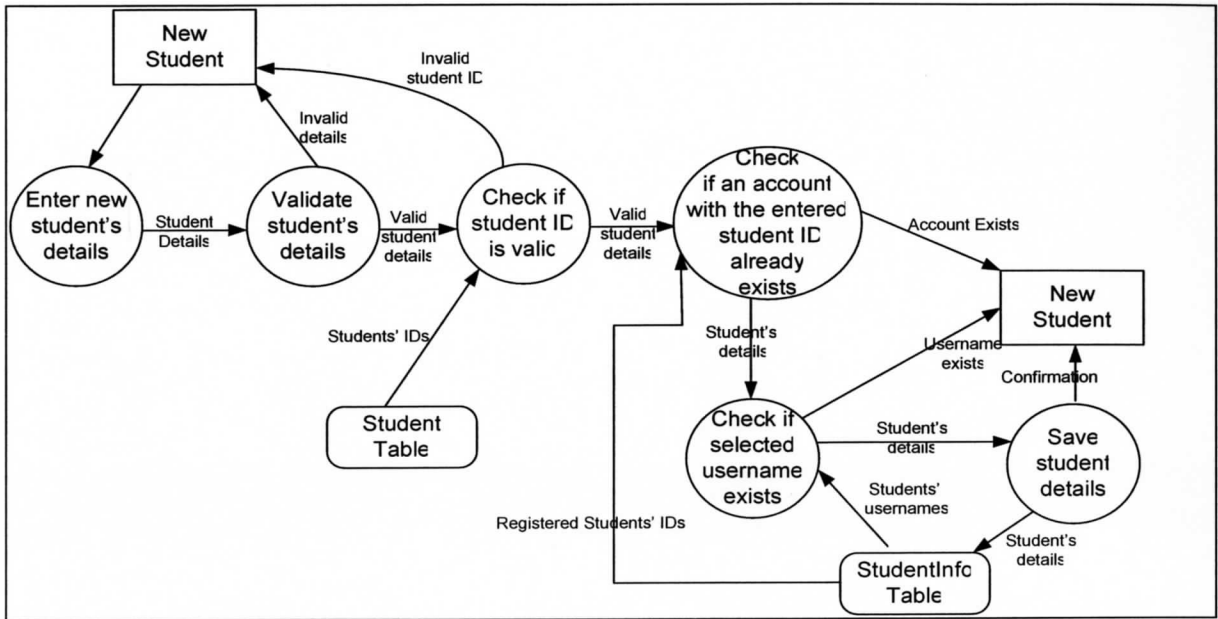


Figure 15: Low Level Diagram-New Student Registration (Students)

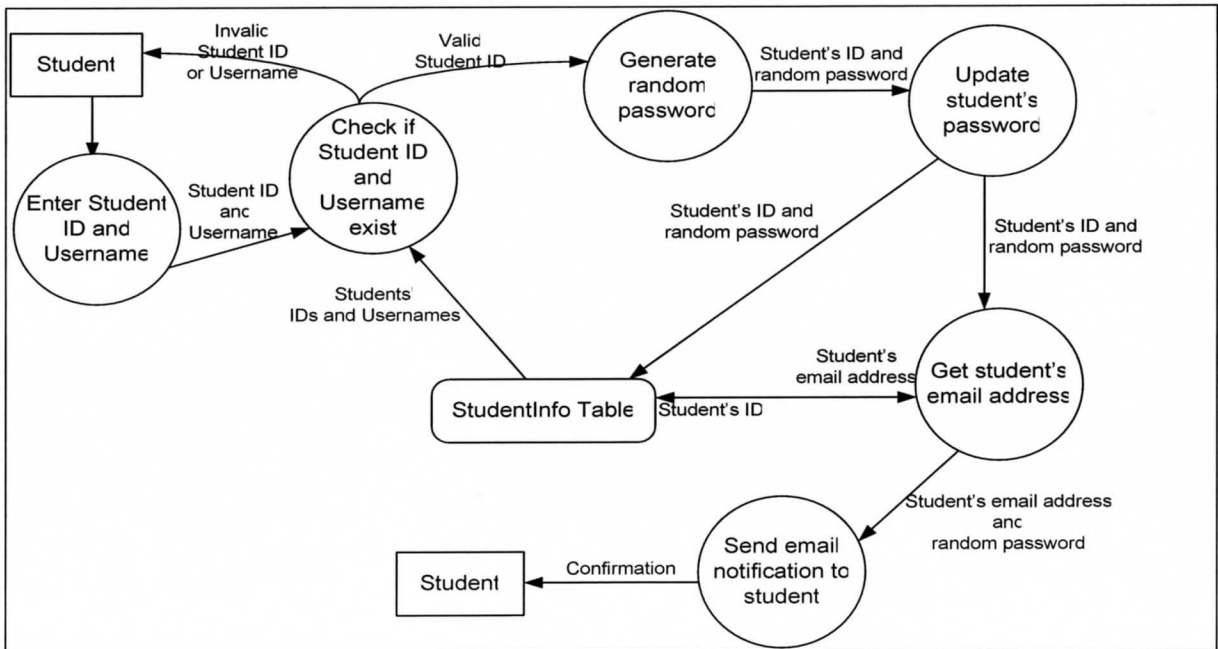


Figure 16: Low Level Diagram-Forgot Password (Students)

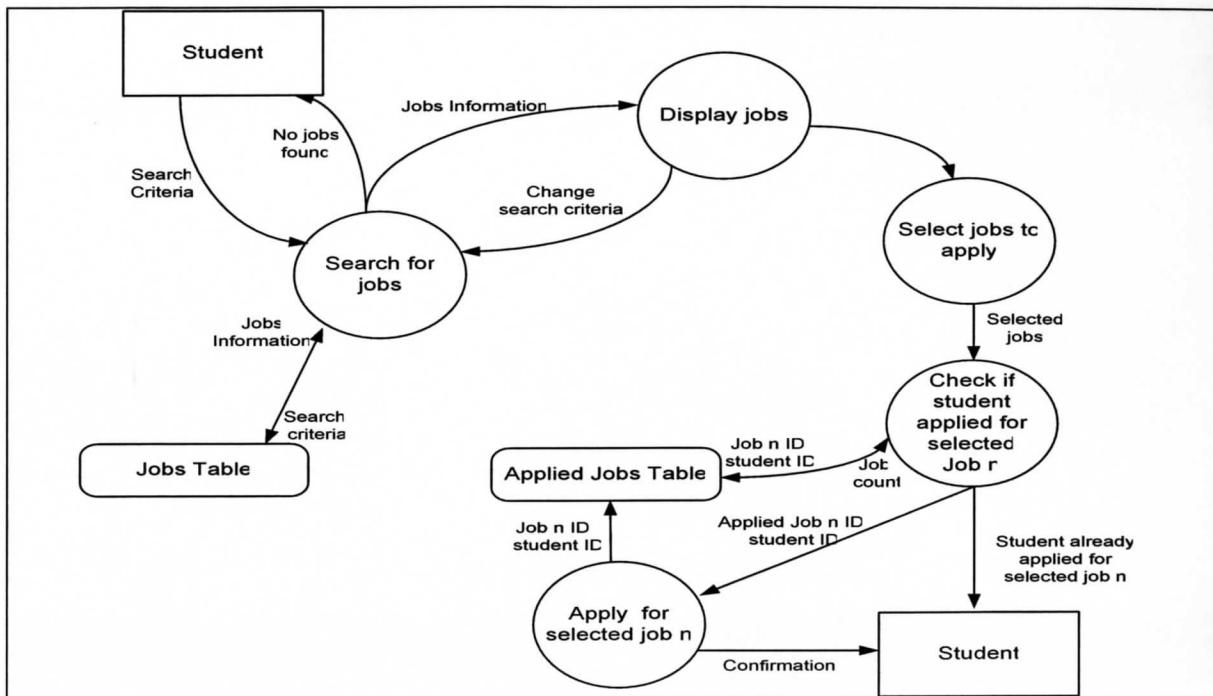


Figure 17: Low Level Diagram-Search and apply for jobs (Students)

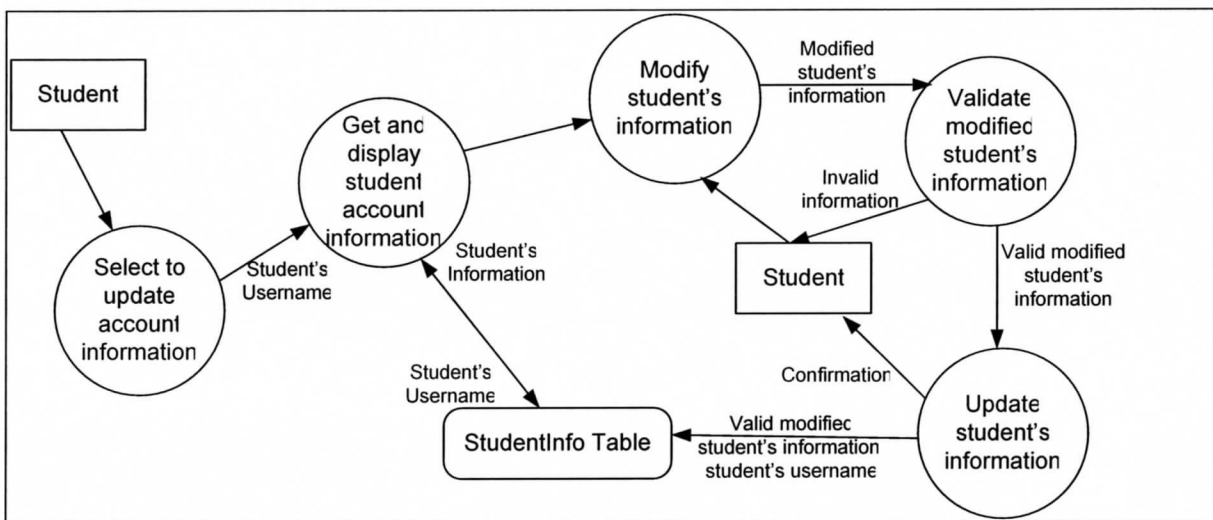


Figure 18: Low Level Diagram-Update Account Information (Students)

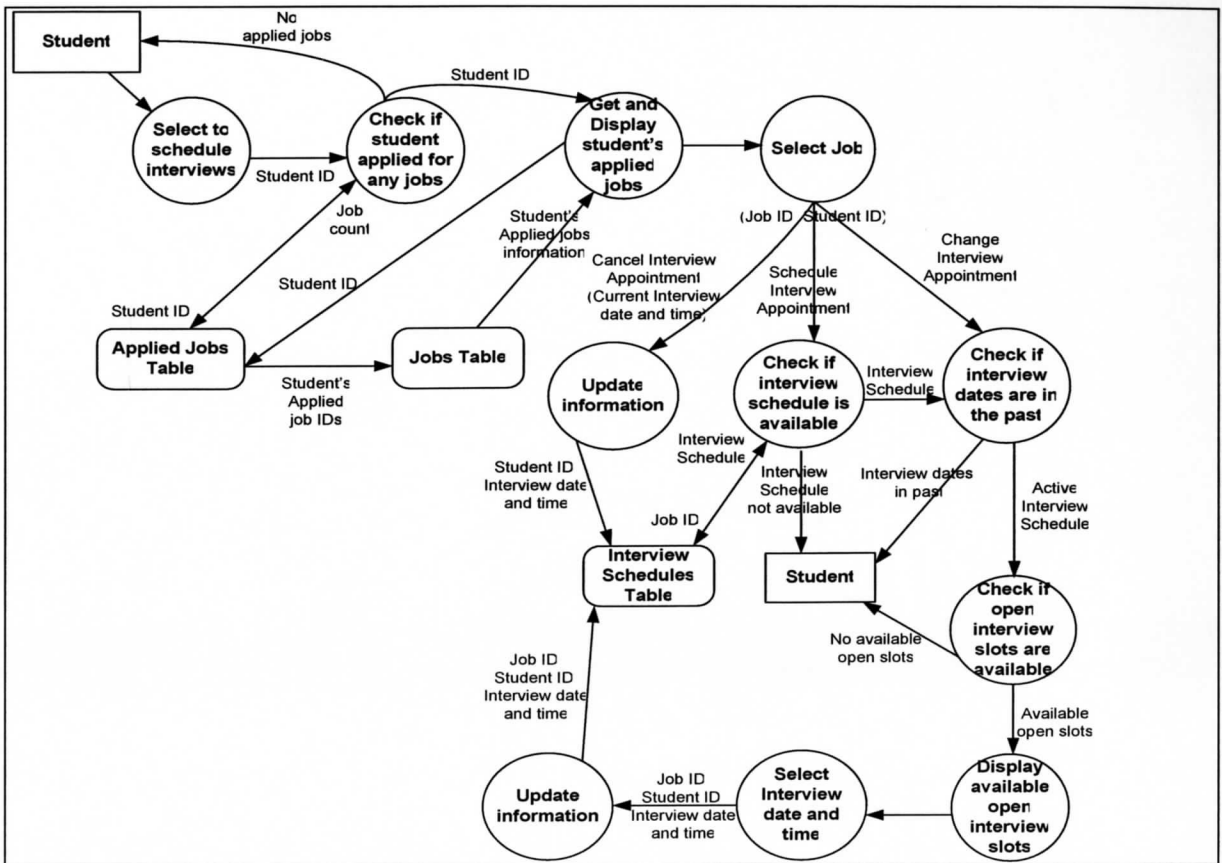


Figure 19: Low Level Diagram-Schedule Interview Appointments (Students)

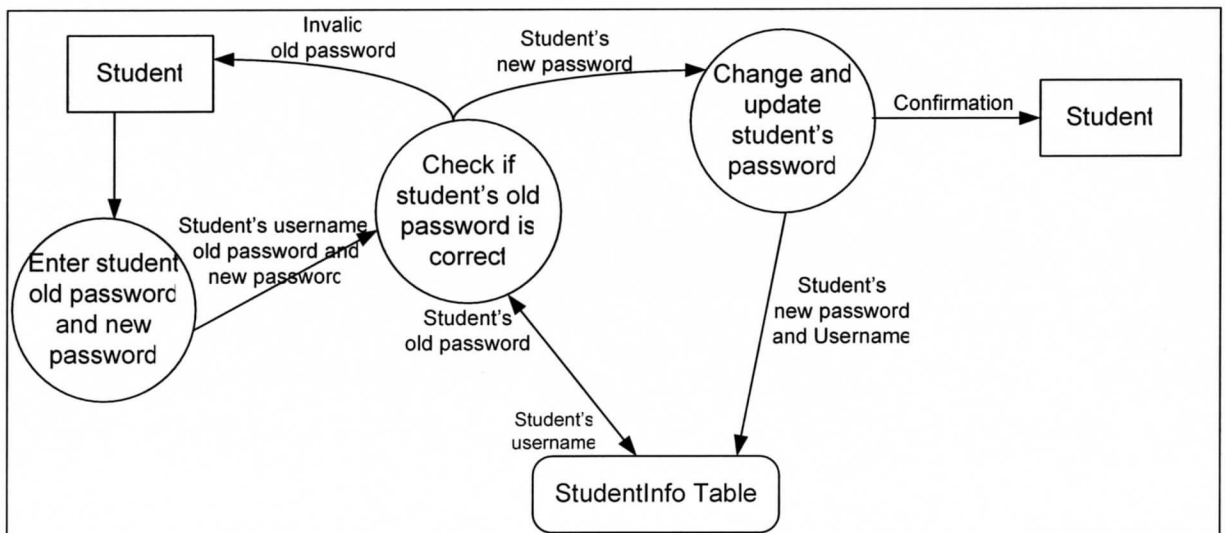


Figure 20: Low Level Diagram-Change Password (Students)

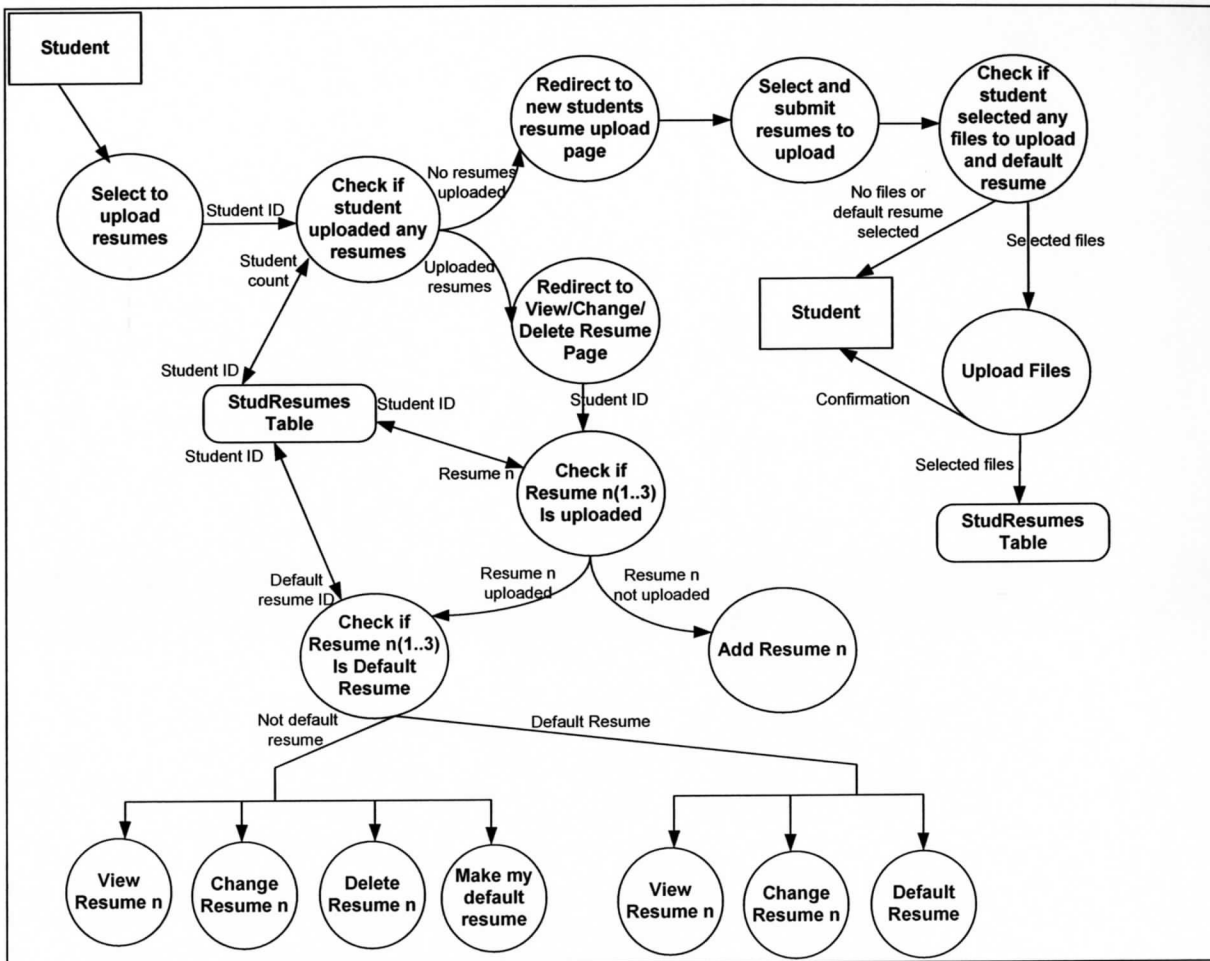


Figure 21: Low Level Diagram-Upload Resumes (Students)

2.3.2.2 Employers Data flow Diagrams

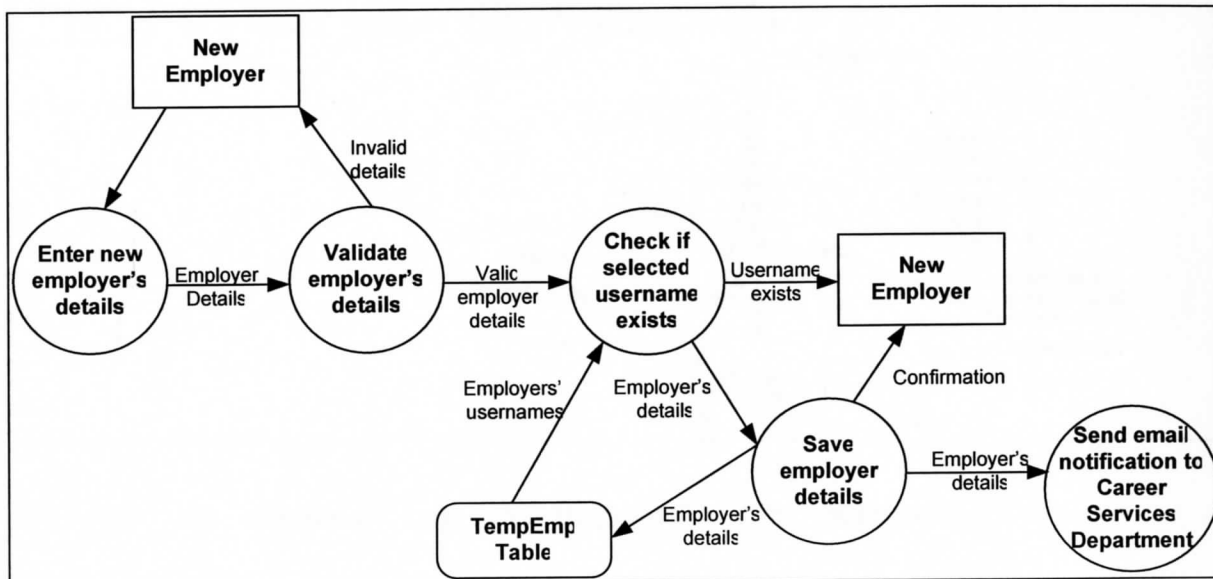


Figure 22: Low Level Diagram-New Employer Registration (Employers)

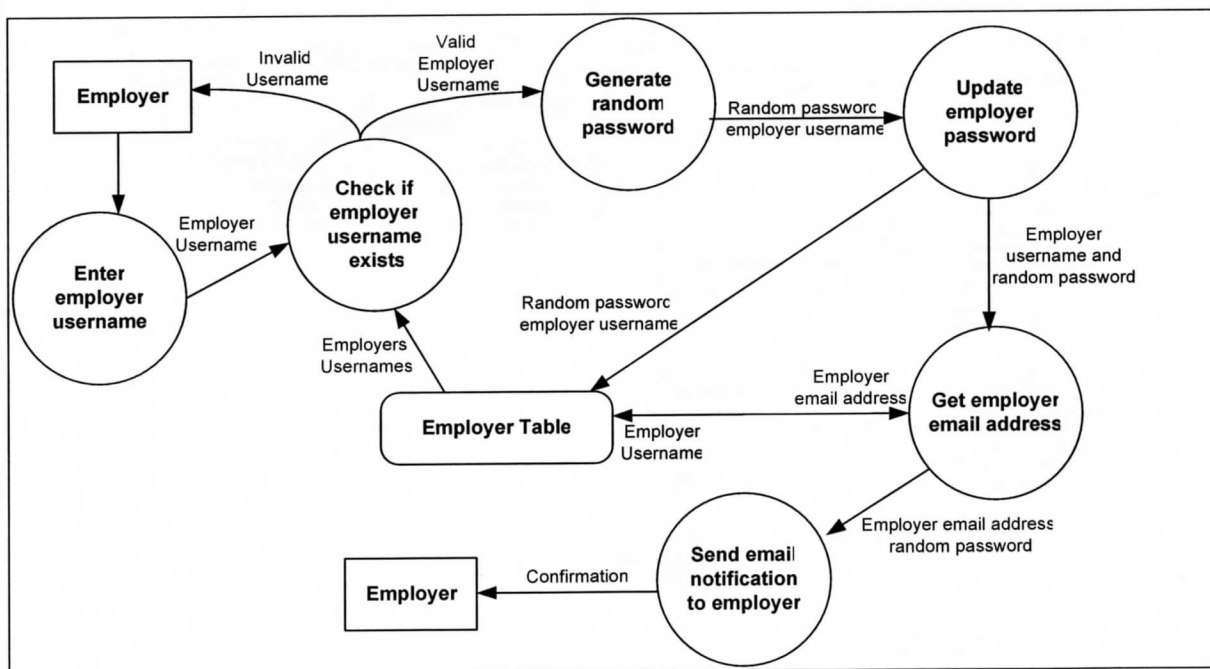


Figure 23: Low Level Diagram-Forgot Password (Employers)

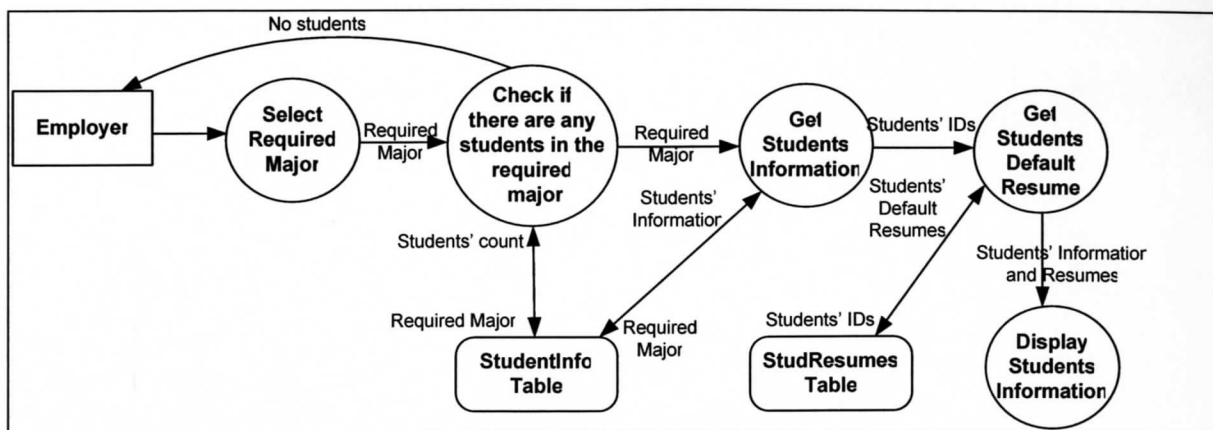


Figure 26: Low Level Diagram-Search for Students (Employers)

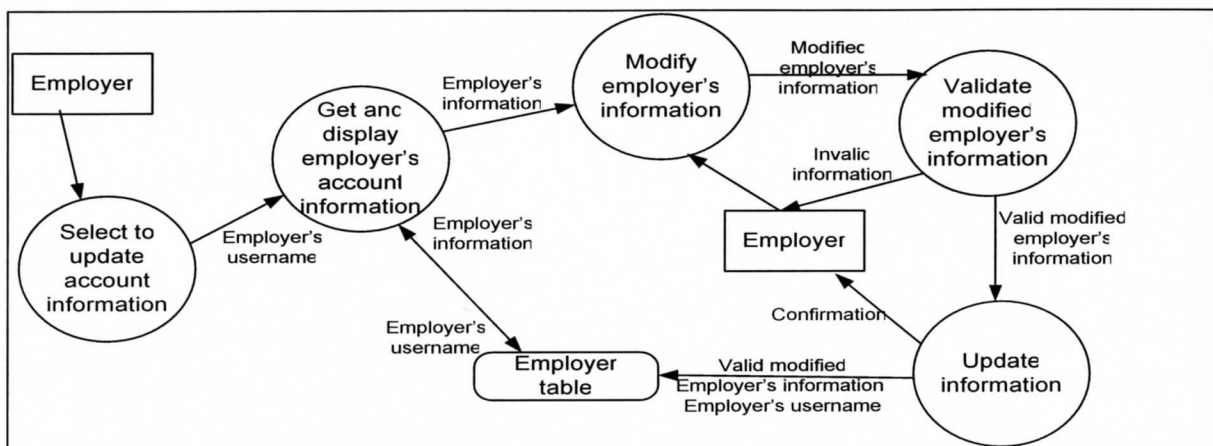


Figure 27: Low Level Diagram-Update Account Information (Employers)

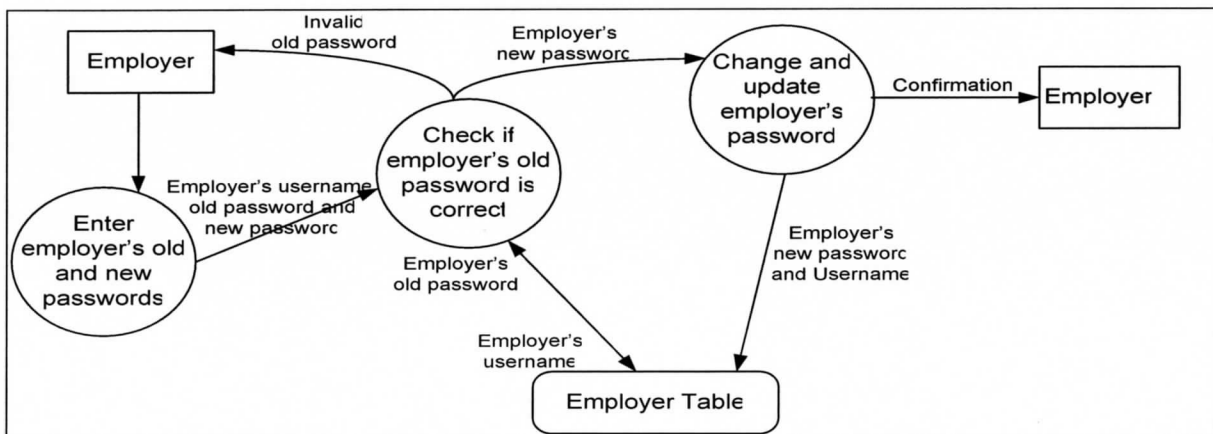


Figure 28: Low Level Diagram-Change Password (Employers)

2.3.2.3 Administrators Data flow Diagrams

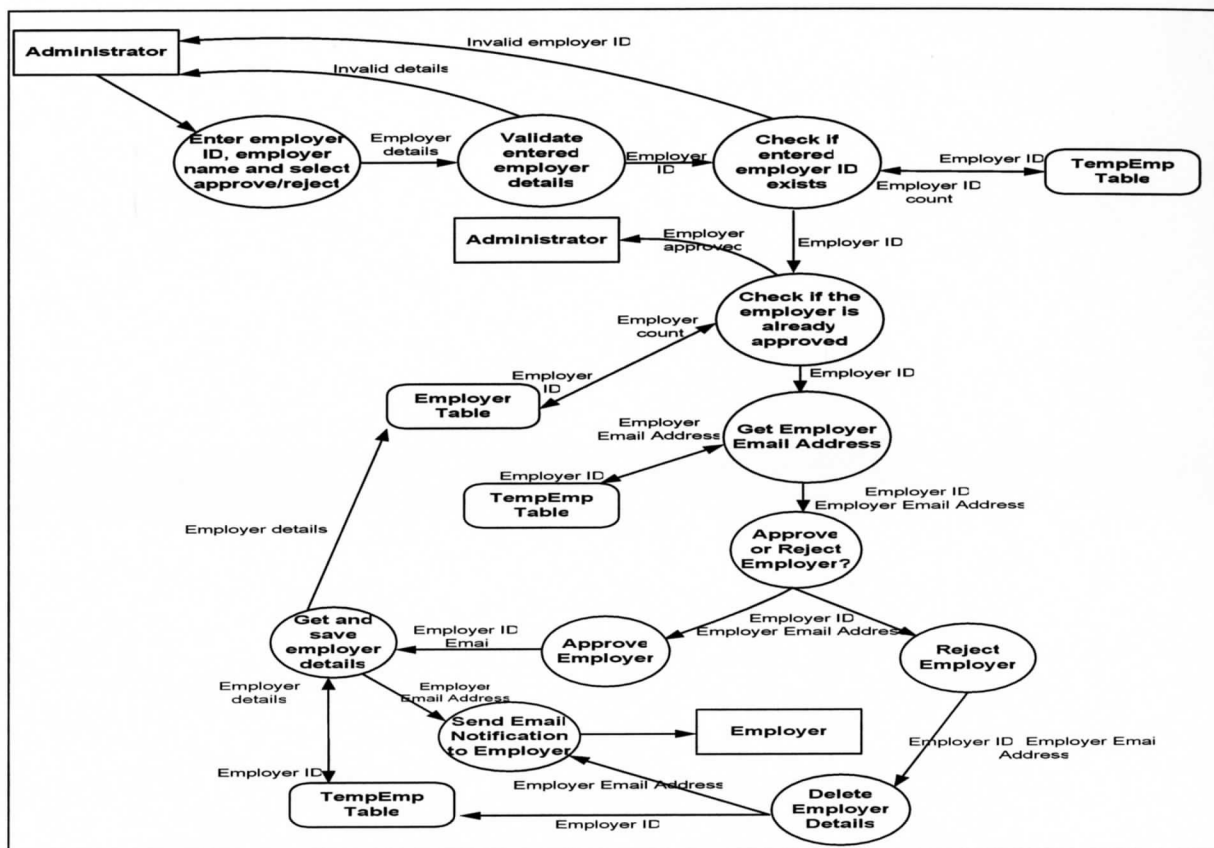


Figure 29: Low Level Diagram- Employer Validation (Administrators)

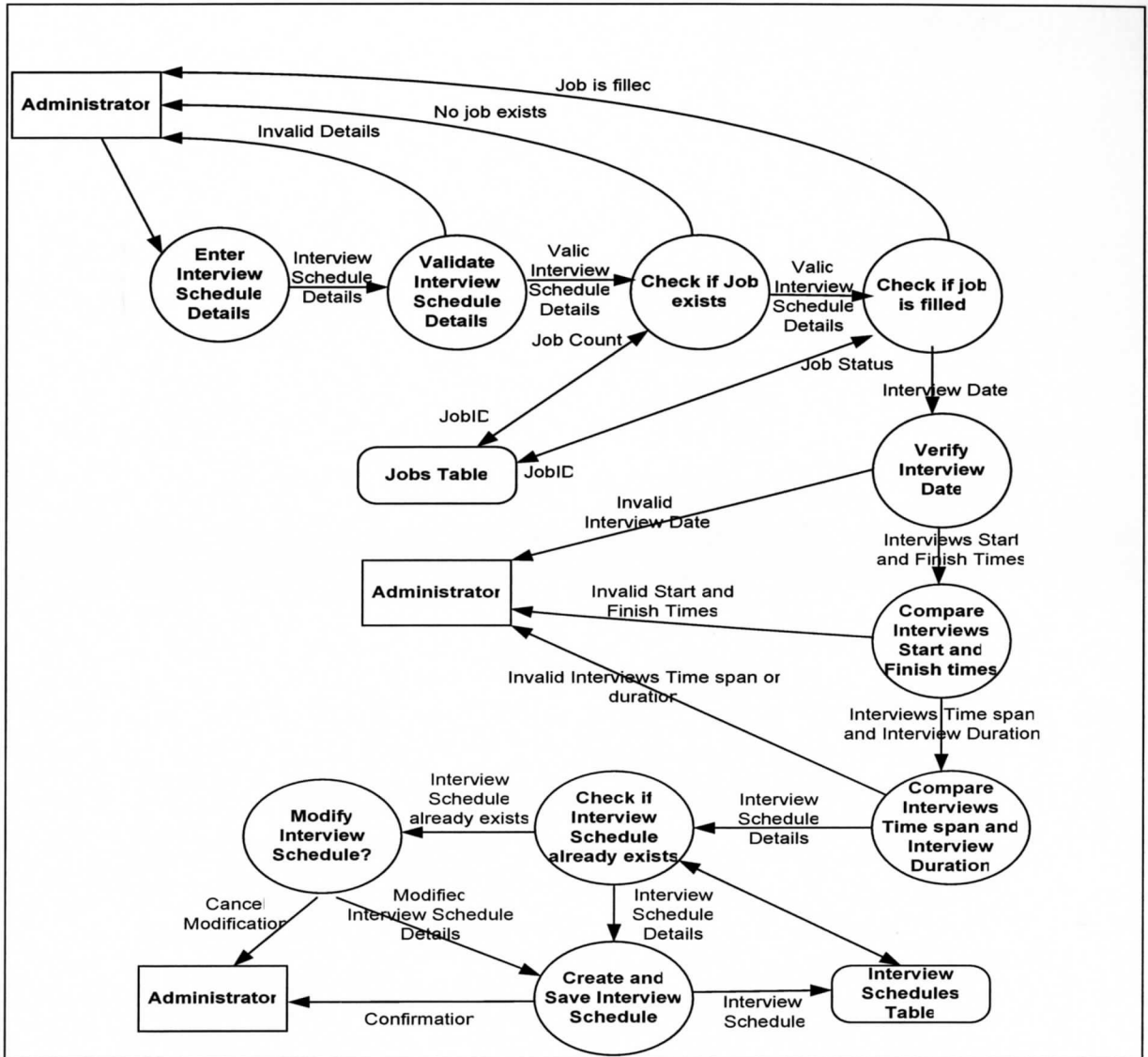


Figure 30: Low Level Diagram- Create/Modify Interview Schedule (Administrators)

CHAPTER 3

SYSTEM IMPLEMENTATION

3.1 Career Services System Implementation Modules

The implementation of the Career Services System is divided into the following seven modules:

- Registration Module
- Authentication Module
- Administrator Module
- Student Module
- Employer Module
- Account Maintenance Module
- Email Notification Module

All these modules and the functionalities included in these modules are discussed in the following section. This discussion is also supported by the screenshots of the different pages in the web-application.

Validation on all the forms in the application is done using ASP.NET Validation Server Controls. Required Field Validation Control is used for all the required fields to check whether a value is entered into that field or not. Regular Expression Validation Control is used for fields like email address, phone number or zip code to check whether the entered value is in the correct and required format. Compare Field Validation Control is another control which is used in this application. It is used to compare the values entered in any two

textboxes. This control is used on the 'Change Password Page' in which the user has to re-enter his new password. In this case the password entered in the first text box is checked with that in the second text box to see if both of them match. After all the validation is completed, ASP.NET Validation Summary Control is used to report all the errors to the user.

3.1.1 Registration Module

Every new user (student or employer) must first register to the Career Services System in order to access the system. This functionality is implemented in this module. Links to the New Student Registration Form and New Employer Registration Form are provided on the Main Page of the application. New Students and Employers should fill these forms and submit them. All the fields in the form that are marked with an asterisk (*) are the required fields. The submitted forms are first validated using ASP.NET Validation controls.

DSU Home Page
Career Services Location
 820N. Washington Avenue
Mailing Address
 Career Services
 Dakota State University
 820N. Washington Avenue
 Madison, SD 57042
Office Hours
 Mon-Fri 8AM-5PM
 *Career Services is closed
 whenever the DSU Campus is
 closed
Telephone
 1-888-378-9988
 (605)256-5122
Fax
 (605)256-5020
**Director of Career
 Services**
 Dr. Marie Lohsandt
 Email:marie.lohsandt@dsu.edu
**Student Employment
 Coordinator**
 Heather Muller
 Email:Heather.Muller@dsu.edu
Senior Secretary
 Janelle Nielsen
 Email:janelle.nielsen@dsu.edu
Webmaster
 Vidya C. Tripuraneni
 Email:tripuraneniv@dsu.edu
 Phone:(605)-256-7355

DAKOTA STATE UNIVERSITY
Career Services

New Student Registration

Fields marked with an asterisk (*) are required

*Student ID Number: 1111111
 *Full Name: William Smith
 *Major: Computer Information Systems
 *Email Address: preerservices@yahoo.com
 Phone: 605-111-2222
 *Address: 405 E 12th Street
 *City: Sioux Falls
 *State: South Dakota
 *Zip: 57104
 *Username: william321
 *Password: *****

Submit Cancel [Go To Login Page](#)

Our Mission: Our goal is to provide comprehensive career-related services, including career counseling/coaching, career interest testing, job postings, on-campus recruitment for internships and permanent positions, a variety of career-related workshops, internship assistance, as well as student employment opportunities. We want all DSU students and graduates to meet their career potential and hope that this web site serves as a helpful resource in that endeavor.

©2006 Dakota State University, Career Services.

Figure 31: New Student Registration Page Screenshot

Once the student registration form is validated, then the Student ID entered is checked against the 'Student' Table to see if it is a valid University Student's ID. If it's not a valid ID then an error message is displayed to the student that his/her Student ID is not valid. If the ID is valid then it is checked against the 'StudentInfo' table to see if an account with that ID already exists. Only one student account can be created for one student ID. If the account with the entered ID already exists then a corresponding error message is displayed to the student. If an account with the entered student ID does not exist then the username entered by the student is checked against the 'StudentInfo' table to see if the username selected already exists. If the username exists then a corresponding error message is displayed asking the user to select a different username. This process is repeated until the student enters a username that is not already registered. Once the username is valid the student is successfully registered, the student information is inserted into the 'StudentInfo' table and the student is re-directed to the Student Registration Confirmation Page. He/she can now login using his/her username and password and access the site.

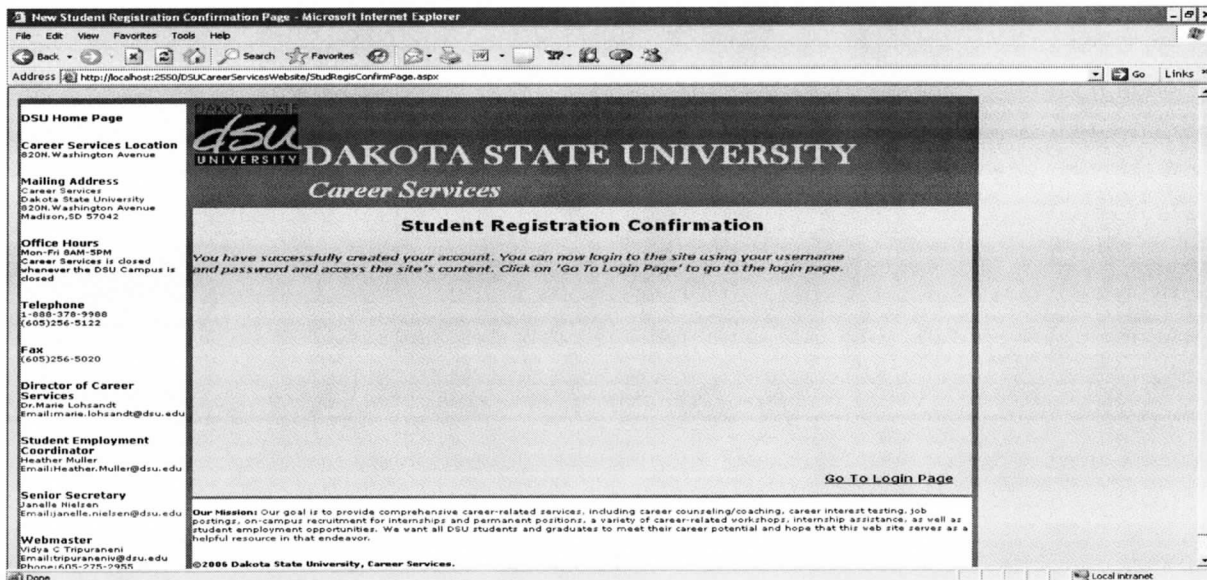


Figure 32: New Student Registration Confirmation Page Screenshot

After the employer registration form is validated, the username entered is checked against the 'TempEmp' to see if it already exists just as in the case of the student. Once the username is valid, the employer information is inserted into the 'TempEmp' table, an email notification containing the employer details is sent to the Career Services Department (CSD) and the employer is re-directed to the Employer Registration Confirmation Page.

Unlike the student, the employer cannot login and access the site upon registration. The employer's information is validated by the CSD and based on that the employer registration is either approved or rejected by the administrator. A corresponding email notification will then be sent to the employer. If the employer registration is approved, then his/her information is moved from the 'TempEmp' table to the 'Employer' table. From then onwards, he/she can use his/her username and password to login to the site and access the site's content. If the employer is rejected, then his/her details are deleted from the 'TempEmp' table.

The screenshot shows a web browser window displaying the 'New Employer Registration' page. The page header includes the Dakota State University logo and 'Career Services'. The main content area is a registration form with the following fields:

- *Organization Name:** ABC Corporation
- *Employer Category:** Business/Financial
- *Contact Email Address:** dsu_careerservices@yahoo.com
- Website:** www.abccorporation.com
- *Address:** 400 W 26th Street
- *City:** Minneapolis
- *State:** Minnesota
- *Zip:** 55414
- *Phone:** 612-111-2222
- *Username:** abcCorp
- *Password:** [masked]

Buttons for 'Submit' and 'Cancel' are at the bottom of the form. A 'Back To Login Page' link is also present. The sidebar on the left contains contact information for Career Services, including office hours, telephone, fax, and staff members like the Director of Career Services and Student Employment Coordinator.

Figure 33: New Employer Registration Page Screenshot

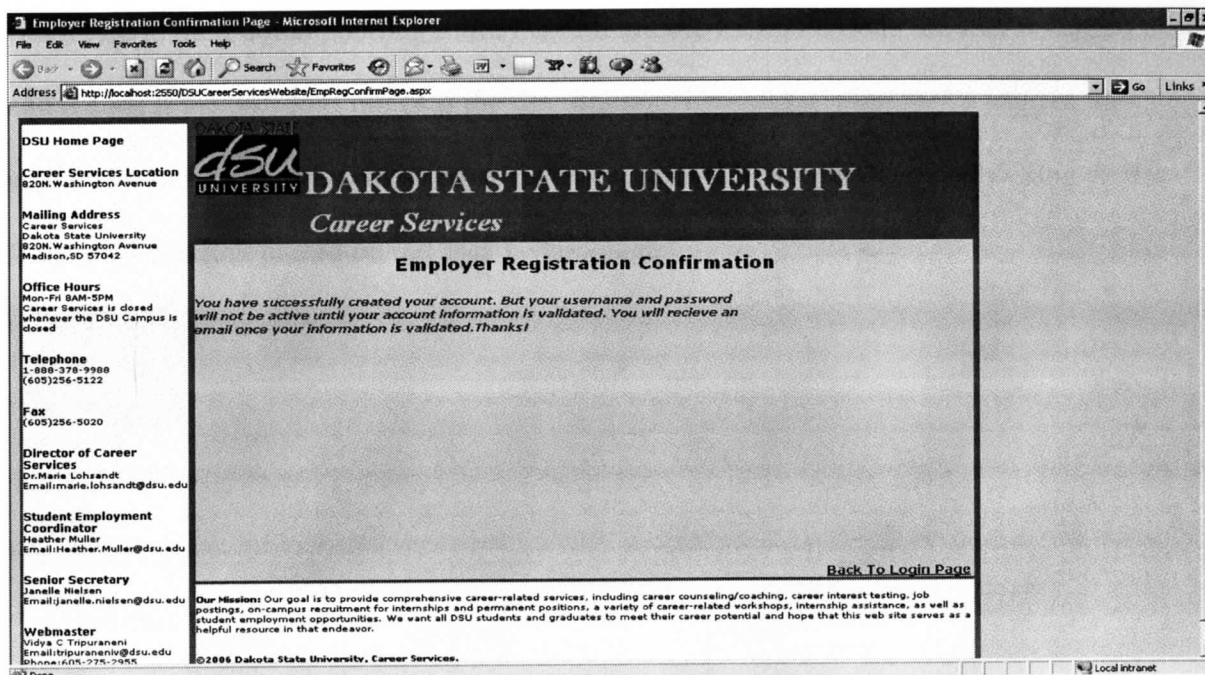


Figure 34: New Employer Registration Confirmation Page Screenshot

3.1.2 Authentication Module

Every user (Students, Employers and Administrators) must login using their usernames and passwords in order to access the site's content. Students' and Employers' usernames and passwords are created by them at the time of registration. Administrators' usernames and passwords are created by the Career Services Department (CSD) and are provided to them.

The user enters his/her username and password on the login page. The application first checks the username against the corresponding data table ('StudentInfo' table for students, 'Employer' table for employers and 'Administrator' table for administrator) to see if it exists in that table. If the username does not exist in the database an error message is displayed to the user that his/her username is not valid. If the username exists in the data table, then its corresponding password is retrieved from the table. This password is then checked with the password entered to see if both the passwords match. If the passwords match then the user is

Approve/Reject New Employer Registration

When a new employer registers to the application then his/her information is sent to the Career Services Department through an email notification. This information is validated by the Career Services Department (CSD) and the department will decide whether to approve/reject this employer.

Once a decision is made then the administrator will login into the application and enter the employer's ID and name and select the Yes/No radio buttons on the page to approve/reject the employer respectively. When the form is submitted, it is first validated using ASP.NET Required Field Validation Controls to check whether all the information is entered or not.

Once the form is validated, then it is checked to see if either one of the radio buttons is checked. If it's not checked then an error message asking the administrator to select either one of the radio buttons is displayed. The employer ID is then checked against the 'TempEmp' table to see if it exists in the database otherwise an error message is displayed to the administrator. If it exists then it is checked against the 'Employer' table to see if the employer with the entered employer ID is already approved. If the employer is already approved then a message saying that the employer is already approved is displayed to the administrator. If the employer is not approved then it is checked if the 'Yes' radio button or the 'No' radio button is selected. The email address of the employer is also retrieved from the 'TempEmp' table. If the 'Yes' radio button is selected then the employer is approved and his/her information is taken from the 'TempEmp' and is inserted into the 'Employer' table and an email notification that his/her registration is approved is sent to the employer. If the 'No' radio button is selected then the employer information is deleted from the 'TempEmp' table and an email notification that his/her registration is rejected is sent to the employer.

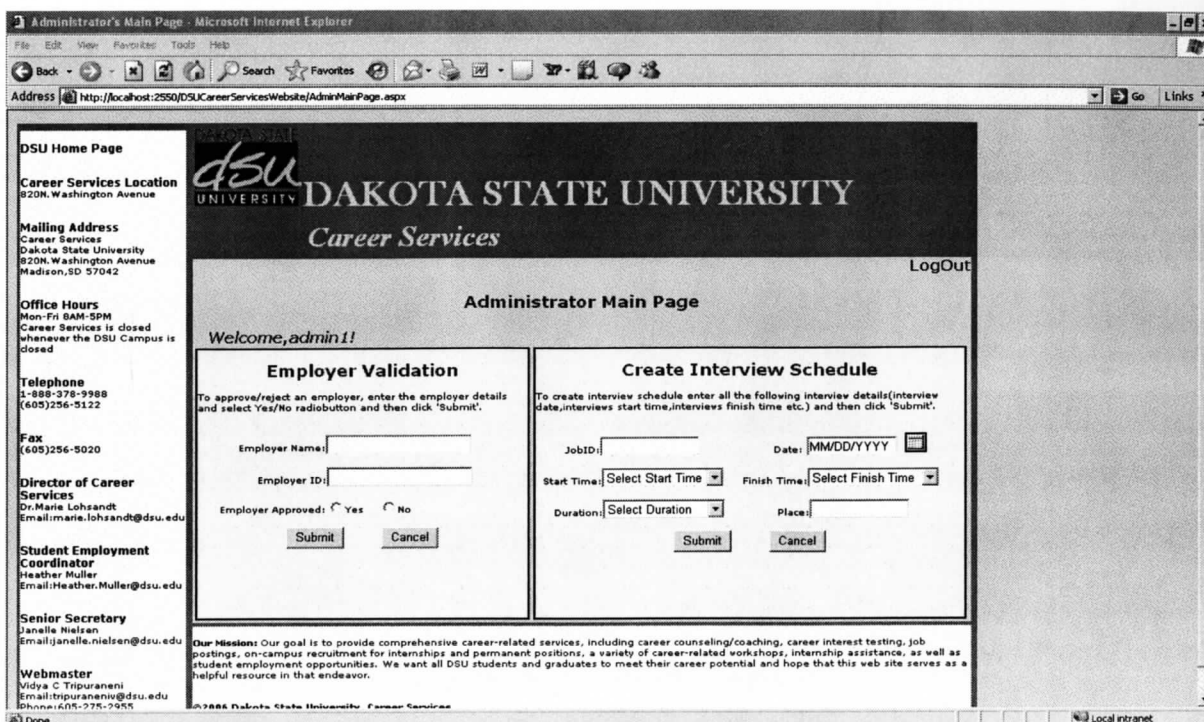


Figure 36: Administrator Main Page Screenshot

Create/Modify Interview Schedule

To Create an Interview Schedule the administrator should first enter the Job ID, select interview date from the calendar, interviews start time, finish time and duration from the drop down lists and enter interview place and then submit the form. The form is then validated using ASP.NET Required Field Validation Controls.

Once the form is validated, the Job ID is checked against the 'Jobs' table to see if the job with the entered ID exists, otherwise an error message is displayed. If the job exists, then it is checked to see if that job is already filled. If it is filled then an error message is displayed, otherwise the selected date of interview is checked to see if it is today's date or a date in the past. If it is so then an error message that the interview date cannot be today's date or a date in the past is displayed.

Interviews Start and Finish times are then compared to check if the Interview Start time is greater than the Interview Finish Time. If it is so then an error message that the Interviews Start time cannot be greater than the Interviews Finish Time is displayed. Otherwise, the interview duration and the total interviews time span (Interviews Start Time – Interviews Finish Time) are compared to check if the interview duration is greater than the total interviews time span. If it is so then an error message is displayed.

If the interview duration is not greater than the total time span then it is checked to see if the interview schedule with the entered Job ID, selected Interview Date and Interview Place is already created. This application allows the administrator to create only one interview schedule with the same Job ID, Interview Date and place. If an interview schedule with the same Job ID, same interview date and same interview place already exists then the administrator is prompted if he wishes to modify the existing schedule. Otherwise, the number of interviews and their timings are mathematically calculated and are inserted into the 'Interview Schedules' table together with the Job ID and Interview Place. The interview slot status is initially inserted as 'Open'.

3.1.4 Student Module

This module implements the functionality that is related to students only. The functionality implemented in this module will allow students to

- Search for jobs posted by the employers based on major, location and full-time/part-time criteria
- Upload and Change their resumes
- Apply for jobs and submit their resumes to employers online
- Schedule/Change/Cancel their interview appointments

Search for Jobs

This application allows students to search for jobs based on three criteria-Major, Location and Full-Time/Part-Time criteria. Drop-down menus for all these three criteria are provided on the student's main page. When a student selects his/her required criteria then the information about all the un-filled jobs (if any) in that search criteria is brought from the 'Jobs' table and is displayed to the student. If there are no posted or unfilled jobs in that criterion then a message is displayed to the student that there are no available jobs in the selected criteria. ASP.NET Grid View Control is used to display the jobs in the selected criteria.

The screenshot shows the 'Student Main Page' in Microsoft Internet Explorer. The page header includes the DSU logo and 'DAKOTA STATE UNIVERSITY Career Services'. A navigation bar contains links for 'MyAccount', 'Upload Resume', 'Schedule Your Interviews', 'Change Password', and 'LogOut'. The user is logged in as 'William321'.

The 'Search For Jobs By:' section includes three dropdown menus: 'Major' (set to 'Select a Major'), 'Full-Time/Part-Time' (set to 'Select Full-Time/Part-Time'), and 'Location' (set to 'Select a Location').

The 'Your Applied Jobs' table is as follows:

Job Title	Employer Name	Job Description	Job Status	Application Status
.NET Developer	XYZ Corporation	Object oriented thinker. Must have experience with web technologies such as HTML, JavaScript, and CSS. Experience with object orientated programming preferred. Experience with ASP.NET, ADO.NET and C# preferred. Experience with Microsoft .NET framework and Visual Studio preferred. Possess strong verbal and excellent written communication skills, ability to work well with others, ability to work independently with minimum supervision, ability and willingness to work on a variety of tasks, ability to learn by reading. Demonstrated ability to take responsibility and learn. Demonstrated ability to adapt to change. JobSalary:\$20/hr, JobCategory:Part-Time, NumOfHours:5hrs/day, JobLocation:South Dakota	Not Filled	Not Approved
Software Engineer	XYZ Corporation	Employees work both in teams and solo on projects in a relaxed office environment. Our clients cover a broad range from farmers to railroads to state government. We create desktop and web based software in a variety of projects and are looking for people with solid programming skills. Experience in .Net or MS SQL is a plus but not mandatory. JobSalary:\$20/hr, JobCategory:Part-Time, NumOfHours:5hrs/day, JobLocation:South Dakota	Not Filled	Not Approved

At the bottom, the 'Our Mission' statement reads: 'Our goal is to provide comprehensive career-related services, including career counseling/coaching, career interest testing, job postings, on-campus recruitment for internships and permanent positions, a variety of career-related workshops, internship assistance, as well as student employment opportunities. We want all DSU students and graduates to meet their career potential and hope that this web site serves as a helpful resource in that endeavor.'

Figure 37: Student's Search for Jobs Page Screenshot

Upload and Change Resumes

All the registered students can upload up to three of their resumes to this application. When a student selects 'Upload Resume' on his/her main page then his/her student ID is first checked against the 'StudResumes' table to see if the student has already uploaded his resumes. If a student is uploading his resumes for the first time then he/she is re-directed to 'New Students Resume Upload Page', otherwise he/she is re-directed to 'Students Change Resume Page'.

In the 'New Students Resume Upload Page' three ASP.NET File Upload Server Controls (FUSC) and three radio buttons corresponding to each FUSC are placed. FUSC comes with a text box and a 'Browse' button to select the file to upload from the student's computer. Once the student selects the required file its path is automatically filled in the corresponding text box. Student should then select which resume is his/her default resume by selecting the corresponding radio button. Once the student submits the form then it is first checked whether the student selected any files to upload, otherwise an error message saying that 'You haven't selected any files to upload' is displayed. If the student selected file(s) to upload then it is checked whether any one of the radio buttons is selected, otherwise an error message that 'You should choose your default resume' is displayed. If the student selected the default resume radio button, then it is checked to see if the FUSC corresponding to the default resume radio button has any file in it. If not an error message asking the student to select his default resume file is displayed. After all this verification is successfully completed then the student's resume(s) are uploaded to the server.

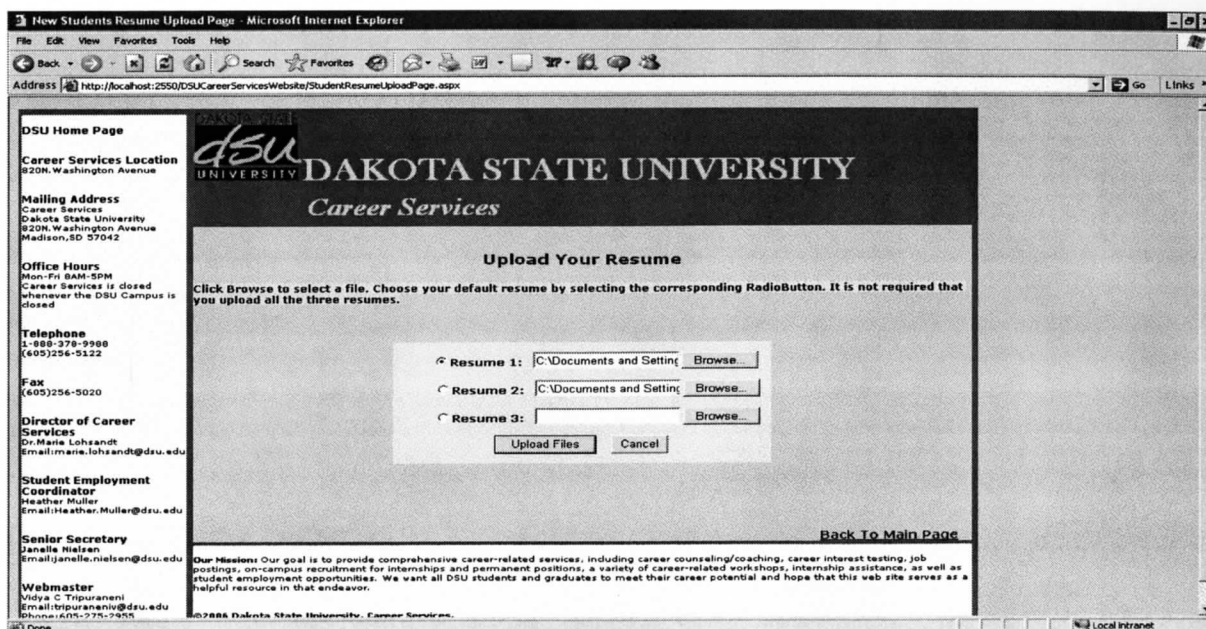


Figure 38: New Students Resume Upload Page Screenshot

In the 'Students Change Resume Page', students can view, delete, replace their existing resumes and also change their default resumes. If the student has not uploaded any of the three resumes he/she can also add this new resume on this page. On this page it is first checked which (Resume 1, Resume 2 or Resume 3) of the student's resumes are uploaded and which Resume is his/her default resume. If Resume n is uploaded and it is the default resume then the buttons-'View Resume n', 'Replace Resume n' and 'Default Resume' are displayed to the students. If Resume n is uploaded but it is not the default resume then the buttons-'View Resume n', 'Replace Resume n', 'Delete Resume n' and 'Make my Default Resume' are displayed. If Resume n is not uploaded then the button-'Add New Resume' is displayed to the student.

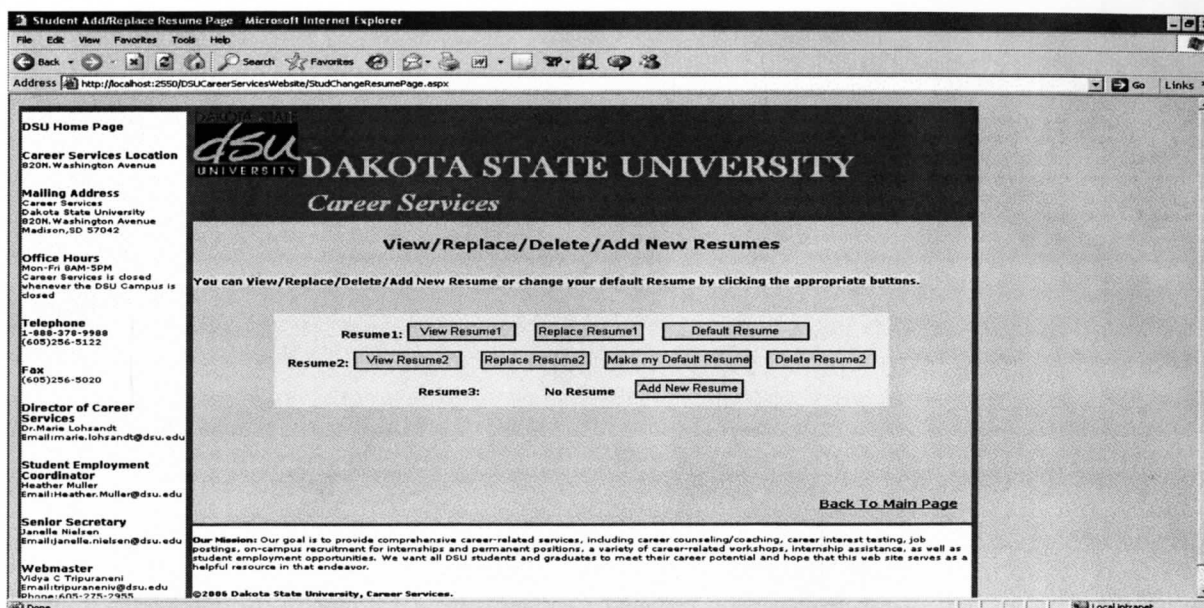


Figure 39: Students Change Resume Page Screenshot

When the 'View Resume' button is clicked then the student's resume is retrieved from the database and is displayed to the user as a Microsoft Word document. When a 'Replace Resume' or 'Add New Resume' button is clicked then the user is re-directed to another page with a FUSC. On this page the student can browse and select his new resume and upload it to the server. This resume will either replace the existing resume or will be added to the student's account in 'StudResumes' table. When 'Delete Resume' button is clicked it is first checked whether that resume is sent to any employer when the student applied to any job posted by that employer. If the resume is not sent to any employer then the resume is deleted from the student's account otherwise a message that this resume cannot be deleted now is displayed to the student. By clicking on the 'Make my Default Resume n' button student's default resume will be changed to Resume n.

Apply for Jobs

All registered students can apply for jobs and send their resumes to the employers online using this application. When a student searches for jobs all the un-filled jobs in the selected criteria are displayed to the student in a Grid View. For each job displayed in the Grid View a checkbox corresponding to it is placed in the Grid View. By querying the 'StudResumes' table a list of Student's uploaded resumes is created and is used to populate the Resume drop down menu which is also placed in the Grid View. If the student has not uploaded any resumes then 'No resumes' is listed in the drop down menu. Two buttons 'Apply' and 'Cancel' are also placed on this page.

The screenshot shows the 'Student Main Page' in Microsoft Internet Explorer. The page header includes the DSU logo and 'DAKOTA STATE UNIVERSITY Career Services'. A navigation menu contains: MyAccount, Upload Resume, Schedule Your Interviews, Change Password, and LogOut. A welcome message reads 'Welcome, william321'. Below this are 'Apply' and 'Cancel' buttons. The main content area features a table of job listings with the following columns: Select Job, Job ID, Employer Name, Job Title, Job Description, Major Required, and Select Resume.

Select Job	Job ID	Employer Name	Job Title	Job Description	Major Required	Select Resume
<input type="checkbox"/>	104	XYZ Corporation	.NET Developer	Object oriented thinker. Must have experience with web technologies such as HTML, JavaScript, and CSS. Experience with object orientated programming preferred. Experience with ASP.NET, ADO.NET and C# preferred. Experience with Microsoft .NET framework and Visual Studio preferred. JobSalary: \$20/hr. JobCategory:Part-Time, NumOfHours:5hrs/day, JobLocation:South Dakota	Computer Science	Select a Resume
<input type="checkbox"/>	105	XYZ Corporation	Software Engineer	Employees work both in teams and solo on projects in a relaxed office environment. Our clients cover a broad range from farmers to railroads to state government. We create desk-top and web based software in a variety of projects and are looking for people with solid programming skills. Experience in .Net or MS SQL is a plus but not mandatory. JobSalary: \$20/hr. JobCategory:Part-Time, NumOfHours:5hrs/day, JobLocation:South Dakota	Computer Science	Select a Resume

On the left side of the page, there is a sidebar with contact information for Career Services, Office Hours, Telephone, Fax, Director of Career Services (Dr. Marie Lohsandt), Student Employment Coordinator (Heather Muller), Senior Secretary (Janelle Nielsen), and Webmaster (Vidya C. Tripuraneni).

Figure 40: Students Apply for Jobs Page Screenshot

In order to apply for jobs the student should select the job(s) to apply by checking the corresponding checkbox, select the resume that should be sent to that employer and click on the 'Apply' button. When this button is clicked, it is first checked whether the student has

selected any jobs to apply by using a 'For Loop' to loop through all the rows in Grid View. If the student has selected any jobs then for each job selected it is checked whether the student has selected the resume to be sent to the employer. If the resumes are selected for all the selected jobs, then for each job it is checked whether the student has already applied for that job by querying the 'Applied Jobs' table using the Student ID and the Job ID. If the student has not applied for the selected job(s) then the Student ID, corresponding job ID and the selected Resume ID is inserted into the Applied Jobs table and a confirmation message is displayed to the student. By clicking on the 'Cancel' button all the checked checkboxes and the selected values in the dropdown menus are cleared.

Schedule/Change/Cancel Interview Appointments

This application allows students to Schedule/Change/Cancel their interview appointments for their approved jobs. When a student applies for a job, then the employer reviews the student's information and resumes and either approves/rejects the student's application. Only the approved students will be interviewed by the employer. If the student's application is approved then an email notification will be sent to the student to schedule his/her interview appointment.

To schedule an interview appointment the student should login in to the application and click on 'Schedule Your Interviews' on his/her Main Page. The student is then re-directed to 'Student's Schedule Interview Appointments Page'. On this page all the student's applied jobs that are approved by the employer and are still not filled are displayed to the student in a Grid View. The jobs that are approved but are filled are not displayed to the student.

DSU Home Page
Career Services Location
 920N. Washington Avenue
Mailing Address
 Career Services
 Dakota State University
 920N. Washington Avenue
 Madison, SD 57042
Office Hours
 Mon-Fri 8AM-5PM
 Career Services is closed
 whenever the DSU Campus is
 closed
Telephone
 1-888-379-9988
 (605)256-5122
Fax
 (605)256-5020
Director of Career Services
 Dr. Marie Lohsandt
 Email:marie.lohsandt@dsu.edu
Student Employment Coordinator
 Heather Muller
 Email:Heather.Muller@dsu.edu
Senior Secretary
 Janelle Nielsen
 Email:janelle.nielsen@dsu.edu
Webmaster
 Vidya C. Tripuraneni
 Email:tripuraneniv@dsu.edu
 Phone:(605)-275-2355

DAKOTA STATE UNIVERSITY
Career Services

[Back To Main Page](#)

Schedule Your Interviews

Your Approved and Un-filled Jobs

For approved and not filled jobs-click on 'Schedule' to schedule your interviews, click on 'change' to change your interview timings and click on 'Cancel' to cancel your interview appointment.

Job ID	Job Title	Employer Name	Job Status	Application Status/Notes	Your Interview Timings	Change Interview Timings	Cancel Interview Appointment
104	.NET Developer	XYZ Corporation	Not Filled	Approved	Your interview is on 12/06/2006@10:00:00	Change	Cancel
105	Software Engineer	XYZ Corporation	Not Filled	Approved	Schedule		

Available Interview Timings

Choose your interview timings and click on 'Select'

Job ID	Interview Date & Time	Interview Place	Select Interview Time
105	12/05/2006@10:00:00	TCB100	Select
105	12/05/2006@11:00:00	TCB100	Select
105	12/05/2006@12:00:00	TCB100	Select
105	12/05/2006@13:00:00	TCB100	Select
105	12/05/2006@14:00:00	TCB100	Select

Figure 41: Students Schedule Interview Appointments Page Screenshot

For each approved and un-filled student's it is checked whether the student has already scheduled for that job interview by using a 'For Loop' to loop through all the rows in the Grid View. If the student has not scheduled his interview appointment then the button 'Schedule' is displayed to the student. To schedule his interview appointment the student should click this button. All the open slots (if available) in the Active Interview Schedule (Interview Schedule that is not in the past) are then displayed to the student in another Grid View. The student can select his desired timings by clicking on the 'Select' button in this Grid View and then that interview slot is allocated for the student and the status of that slot is updated to 'Closed' in the database. If there are no open slots or if the interviews for that job are already finished then an error message is displayed to the student.

If the student has already scheduled his interview appointment for a job then the student's current interview date and timings, a 'Change' button and a 'Cancel' button are

displayed to the student. When the 'Change' button is clicked, then the same process just as when the 'Schedule' button is clicked is carried on. The status of the student's current interview slot is updated to 'Open' if the student changes his appointment. When the 'Cancel' button is clicked, then the student's current interview appointment is cancelled and the information is updated in the database.

Email notifications are sent to the student whenever he/she schedules/changes/cancels his/her interview appointment.

3.1.5 Employer Module

This module implements the functionality that is related to employers only. The functionality implemented in this module will allow employers to

- Post Jobs online
- Remove their filled jobs from being displayed on the website
- Review Students' Applications and approve/reject them
- Search for Students

Post Jobs

This application allows employers to post their job openings online. To post a job the employer should first login to the application and click on 'Post Jobs' hyperlink on their main page. He/she will then be re-directed to 'Post Jobs Page' which has the Post Jobs form. He/she should then fill out all the job information and submit the form. The form will then be validated using validation controls and any errors will be displayed to the employer. There is a field named 'Employer Job ID' on this form. Upon successful validation, this field together with the Employer ID is checked in the database (Jobs Table) to see if this job is already

posted to the site. If it is not already posted to the site then all the job information is inserted into the 'Jobs' table otherwise an error message that this job is already posted to the site is displayed to the employer. Whenever a new job is inserted into the table, a unique ID is created for that job using Oracle Sequence. The status of the job is initially set to 'Not Filled' when it is posted to the site.

The screenshot shows a web browser window titled 'Post Jobs Page - Microsoft Internet Explorer'. The address bar displays 'http://localhost:2550/DSUCareerServicesWebsite/EmpPostJobsPage.aspx'. The page content includes a sidebar with contact information for DSU Career Services, a main header for 'DAKOTA STATE UNIVERSITY Career Services', and a central 'Post Jobs Form'. The form contains the following fields:

- *Employer JobID: abc1
- *Job Title: Business Services Associ
- *Job Description: ABC Corporation is looking for a qualified
- *Salary: \$30/hr
- *Job Location: Minnesota
- *Required Major: Business Administration
- *Full-time/Part-time: Full-Time
- *Number of Working Hours/day: 8hrs/day

At the bottom of the form are 'Submit' and 'Cancel' buttons, and a link for 'Back To Main Page'. A footer contains the text: 'Our Mission: Our goal is to provide comprehensive career-related services, including career counseling/coaching, career interest testing, job postings, on-campus recruitment for internships and permanent positions, a variety of career-related workshops, internship assistance, as well as student employment opportunities. We want all DSU students and graduates to meet their career potential and hope that this web site serves as a helpful resource in that endeavor. ©2005 Dakota State University, Career Services.'

Figure 42: Employers Post Jobs Page Screenshot

Remove Filled Jobs

With this application employers can also remove their posted jobs that are filled from being displayed on the website. When an employer logs in all the jobs posted by this employer that are still not filled are displayed in a Grid View on his/her main page. There is a checkbox corresponding to each job on the Grid View. This page also has two buttons 'Remove Job' and 'Cancel'. If the employer wants to remove a job(s) from the website then he/she should select the corresponding checkbox and click on 'Remove Job' button. Then the

status of this job will be updated to 'Filled' in the 'Jobs' table and from then onwards this job will not be displayed to the students. By clicking on the 'Cancel' button on this page, all the checked checkboxes in the grid view will be deselected.

The screenshot shows a web browser window displaying the DSU Career Services website. The page title is 'Employer Main Page'. The navigation menu includes: Post Jobs, Review Applications, Search for Students, My Account, Change Password, and LogOut. The main content area displays a welcome message for 'abcCorp' and a section titled 'Your Posted Jobs'. Below this, there is a table with columns: Select Job, Your JobID, JobTitle, Job Description, and Major Required. Two jobs are listed: 'Business Services Associate' (JobID: abc1) and 'Financial Advisor' (JobID: abc2). Each job has a checkbox in the 'Select Job' column. Below the table are 'Remove Job' and 'Cancel' buttons. The footer contains the DSU logo and 'Career Services' text.

Select Job	Your JobID	JobTitle	Job Description	Major Required
<input type="checkbox"/>	abc1	Business Services Associate	ABC Corporation is looking for a qualified candidate to assist in providing business services to our commercial members. This position includes prospect development, assisting with member's financial needs through cross-selling of ABC Corporation products and services, commercial loan processing, and spreads of financial data. Preferred candidates should possess strong analytical, communication, and sales skills and take initiative in providing organizational support. Knowledge of word and Excel is a plus. ABC Corp. offers competitive pay along with incentives and an excellent benefits package. JobSalary:\$30/hr, JobCategory:Full-Time, NumOfHours:8hrs/day, JobLocation:Minnesota	Business Administration
<input type="checkbox"/>	abc2	Financial Advisor	Must have experience in management training or business related experience. Will be starting out in a 4 1/2 month sales training program to learn about selling stocks, bonds, mutual funds and other financial planning services. Training classes held once per month. Pre-employment aptitude testing will be conducted. JobSalary:\$20/hr, JobCategory:Part-Time, NumOfHours:5hrs/day, JobLocation:Minnesota	Business Management

Figure 43: Employers Remove Jobs Page Screenshot

Review and Approve Students' Applications

This application allows the employers to review all the students' applications to their posted jobs and approve these applications. Only the students whose applications are approved will then be interviewed by the employer. To review applications employer should first login to the site and click on 'Review Applications' hyperlink on the main page. He/she will then be re-directed to 'Review Students' Applications Page'.

On this page all the employer's posted jobs that are not filled are retrieved from the database (Jobs Table) and are displayed to the employer in a grid view. There is a link button

named 'Review' corresponding to each job on the grid view. When this button is clicked then the information (name, address, phone number, link to student's resume (if any) etc.) about all the students who applied for this job (if any) is retrieved from the database (AppliedJobs Table and StudentInfo Table) and is displayed to the employer in another grid view. On this grid view there is a checkbox corresponding to each student. There are two buttons 'Approve Application' and 'Cancel' below this grid view. After reviewing all the students' applications and resumes, the employer can approve them by selecting the corresponding check box and clicking on the 'Approve Application' button. If the student is already approved then an error message is displayed otherwise the student is approved and his/her application status is updated to 'Approved' in the 'AppliedJobs' table. An email notification that his application for that job is approved is then sent to the student. By clicking on the 'Cancel' button on this page, all the checked checkboxes in the grid view will be deselected.

DSU Home Page
 Career Services Location
 820N. Washington Avenue
 Mailing Address
 Career Services
 Dakota State University
 820N. Washington Avenue
 Madison, SD 57042
 Office Hours
 Mon-Fri 8AM-5PM
 Career Services is closed
 whenever the DSU Campus is
 closed
 Telephone
 1-888-378-9988
 (605)256-5122
 Fax
 (605)256-5020
 Director of Career
 Services
 Dr. Marie Lohsandt
 Email:marie.lohsandt@dzu.edu
 Student Employment
 Coordinator
 Heather Muller
 Email:Heather.Muller@dzu.edu
 Senior Secretary
 Janelle Nielzen
 Email:janelle.nielzen@dzu.edu
 Webmaster
 Vidya C. Tripuraneni
 Email:tripuraneniv@dzu.edu
 Phone:605-275-2955

DAKOTA STATE UNIVERSITY
Career Services
[Back To Main Page](#)

Review Student's Applications
 Your un-filled jobs

To see the details of students who applied for a job, click the Review Button for that job. Student's details will be displayed below.

Your JobID	Job Title	Student's Applications
abc1	Business Services Associate	Review
abc2	Financial Advisor	Review
abc3	Office Assistant	Review

Applied Students' Information

To view a student's resume, click the View Resume Button for that student. To approve student application check the checkbox for that student and click 'Approve Application' button below.

Student Name	Student Major	Student Email	StudentPhone	Student Application Status	Student's Resume	Approve Student Application
Saibaba	Business Administration	dzu_careerservices@yahoo.com	605-275-0000	Not Approved	View Resume	<input type="checkbox"/>
Chris Halverson	Business Administration	dzu_careerservices@yahoo.com	605-275-4444	Not Approved	View Resume	<input type="checkbox"/>

Figure 44: Review Students' Applications Page Screenshot

Search for Students

Employers can search for prospective student employees online using this application. To search for students, the employer should first login to the site and click on 'Search for Students' hyperlink on his/her main page. He/she will then be re-directed to the 'Search for Students Page'. There is a drop down menu on this page which contains a list of all the majors in the university. Employer can select any major from this list and then all the registered students' information in this major is retrieved from the database and is displayed to the employer in a grid view. A link to the student's default resume (if uploaded) is also placed in the grid view along with all the other information. If there are no registered students in this major then a message that there are no students in this major is displayed to the employer.

The screenshot shows a web browser window displaying the 'Search For Students Page' on the Dakota State University Career Services website. The page features a search dropdown menu set to 'Computer Information Systems'. Below the search bar, a table titled 'Computer Information Systems Students' Information' displays the following data:

Name	Email Address	Phone	Address	City	State	Zip Code	Resume
William Smith	dsu_careerservices@yahoo.com	605-111-2222	405 E 12th Street	Sioux Falls	South Dakota	57104	View Resume
Vidya Tripuraneni	tripuraneni_vidya@yahoo.com	605-275-2955	6201 S Connie Avenue	Sioux Falls	South Dakota	57108	View Resume

The page also includes contact information for DSU Career Services, such as the Director of Career Services (Dr. Marie Lohsandt) and the Student Employment Coordinator (Heather Muller). A 'Back To Main Page' link is visible at the bottom of the table area.

Figure 45: Employers Search for Students Page Screenshot

3.1.6 Account Maintenance Module

Career Services System will allow students and employers to update their account information and change their passwords. In cases when the students or employers forget their passwords, a random password will be generated by the application and will be sent to their email address. If the administrators forget their passwords or would like to change their passwords then the Career Services Department (CSD) will take care of it. All this functionality is implemented in this module.

Update Account Information

Users (students or employers) can update their account information at any time. To do this they should login to the system and click on 'My Account' hyperlink on their Main Page. The user will then be re-directed to their Account Page. On this page all the user's information such as their name, address, phone number etc. are retrieved from the database using his/her username(stored in a session variable) and are displayed to him/her. If the user wants to change any information he/she can modify it and click on the 'Save' button at the bottom of the page. When the user clicks on the 'Save' button then the user information will be validated using the Validation Controls and upon successful validation this information will be updated in the database.

Student's Account Page - Microsoft Internet Explorer

Address: http://localhost:2550/DSUCareerServicesWebsite/StudentMyAccountPage.aspx

DSU Home Page

Career Services Location
920N. Washington Avenue

Mailing Address
Career Services
Dakota State University
920N. Washington Avenue
Madison, SD 57042

Office Hours
Mon-Fri 8AM-5PM
Career Services is closed
whenever the DSU Campus is
closed

Telephone
1-888-378-9988
(605)256-5122


Fax
(605)256-5020

Director of Career Services
Dr. Marie Lohsandt
Email:marie.lohsandt@dsu.edu

Student Employment Coordinator
Heather Muller
Email:Heather.Muller@dsu.edu

Senior Secretary
Janelle Nielsen
Email:janelle.nielsen@dsu.edu

Webmaster



DAKOTA STATE UNIVERSITY

Career Services

Your Account Information

Update your information here and click 'Save' button below to save the changes made.

Name:

Major:

Email:

Phone:

Address:

City:

State:

Zip:

[Back To Main Page](#)

Our Mission: Our goal is to provide comprehensive career-related services, including career counseling/coaching, career interest testing, job postings, on-campus recruitment for internships and permanent positions, a variety of career-related workshops, internship assistance, as well as student employment opportunities. We want all DSU students and graduates to meet their career potential and hope that this web site serves as a helpful resource in that endeavor.

Figure 46: Students My Account Page Screenshot

Employer My Account Page - Microsoft Internet Explorer

Address: http://localhost:2550/DSUCareerServicesWebsite/EmployerMyAccountPage.aspx

DSU Home Page

Career Services Location
920N. Washington Avenue

Mailing Address
Career Services
Dakota State University
920N. Washington Avenue
Madison, SD 57042

Office Hours
Mon-Fri 8AM-5PM
Career Services is closed
whenever the DSU Campus is
closed

Telephone
1-888-378-9988
(605)256-5122


Fax
(605)256-5020

Director of Career Services
Dr. Marie Lohsandt
Email:marie.lohsandt@dsu.edu

Student Employment Coordinator
Heather Muller
Email:Heather.Muller@dsu.edu

Senior Secretary
Janelle Nielsen
Email:janelle.nielsen@dsu.edu

Webmaster
Vidya C. Tripuraneni
Email:tripuraneni@dsu.edu
Phone:(605)-275-2955



DAKOTA STATE UNIVERSITY

Career Services

Your Account Information

Update your information here and click 'Save' button below to save the changes made.

Organization Name:

Category:

Email:

Website:

Address: City:

State: Zip:

Phone:

[Back To Main Page](#)

Our Mission: Our goal is to provide comprehensive career-related services, including career counseling/coaching, career interest testing, job postings, on-campus recruitment for internships and permanent positions, a variety of career-related workshops, internship assistance, as well as student employment opportunities. We want all DSU students and graduates to meet their career potential and hope that this web site serves as a helpful resource in that endeavor.

©2006 Dakota State University, Career Services.

Done Local intranet

Figure 47: Employers My Account Page Screenshot

Change Password

If the user (student or employer) wishes to change his/her password, he/she can do so by clicking on the 'Change Password' hyperlink on his/her Main Page. The user will then be re-directed to the 'Change Password Page'.

On the change password page the user should enter his/her old and new passwords and re-enter the new password. When the user submits the form first it is validated using ASP.NET Required Field and Compare Validation Controls. Error message is displayed if the user did not enter any or all of the three values or if the two new passwords entered do not match. Once the form is validated then the user's current password is retrieved from the database using his/her username (stored in a session variable) and is checked against the user entered old password. If both of them match then the user's password is changed to the new password and is updated in the database. A confirmation message is then displayed to the user.

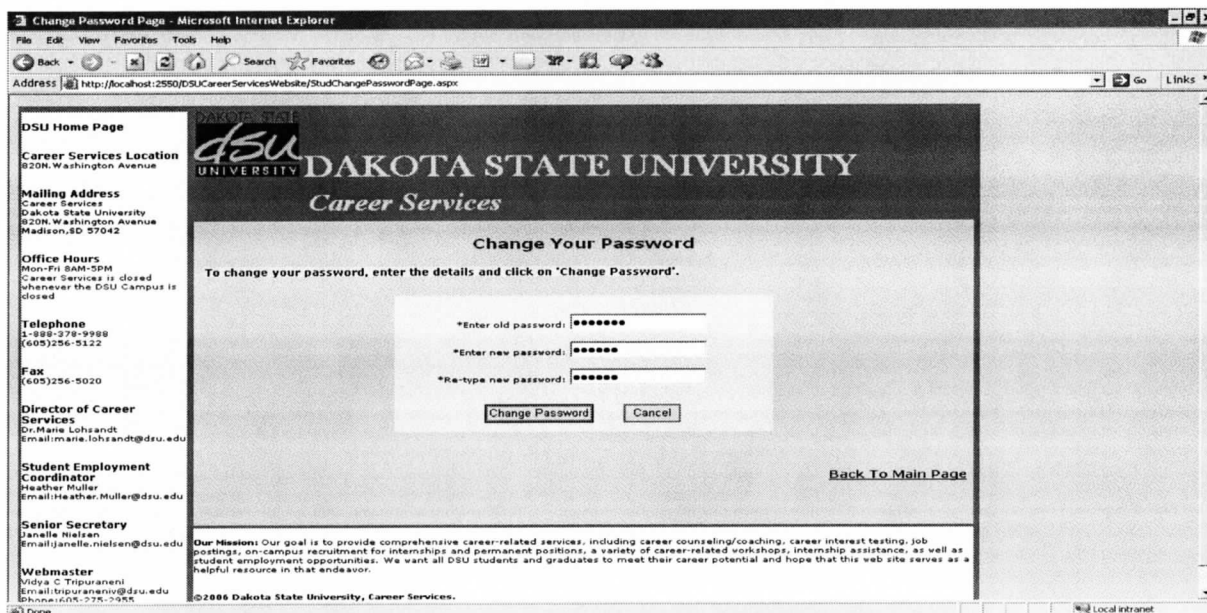


Figure 48: Students and Employers Change Password Page Screenshot

Forgot Password

Today many of the websites require users to register to their sites in order to access the site's content. As this number goes up, it has become very common that the users forget their usernames and passwords. In this application, if the user (students/employers) forgets his/her username then he has to contact the CSD in order to recover it. But if the user forgets his/her password then the application will randomly generate a new password and send it to his/her email address. Links to the 'Forgot Password Page' for both the students and employers are placed on the 'Login Page'.

On the students' 'Forgot Password Page', the student should enter his/her student ID and username. The form is first validated using Required Field Validation Controls. Upon validation it is first checked to see whether an account with the entered ID exists in the database (StudentInfo table); otherwise an error message is displayed. If an account exists then the username corresponding to that ID is retrieved from the database and is checked against the student entered username to see if both of them match. If they match then a new password is randomly generated by the application and the email address corresponding to that student ID is retrieved from the database. Student's password is then updated in the database and an email notification with the student's new password is sent to the retrieved email address.

Employers should only enter their usernames on their 'Forgot Password Page' and upon successful validation this username is checked to see whether it exists in the database (Employer Table). If the username exists then just as in the case of students, a new password is randomly generated, corresponding email address is retrieved from the database, the new

password is updated in the database and an email notification with the new password is sent to the employer's email address.

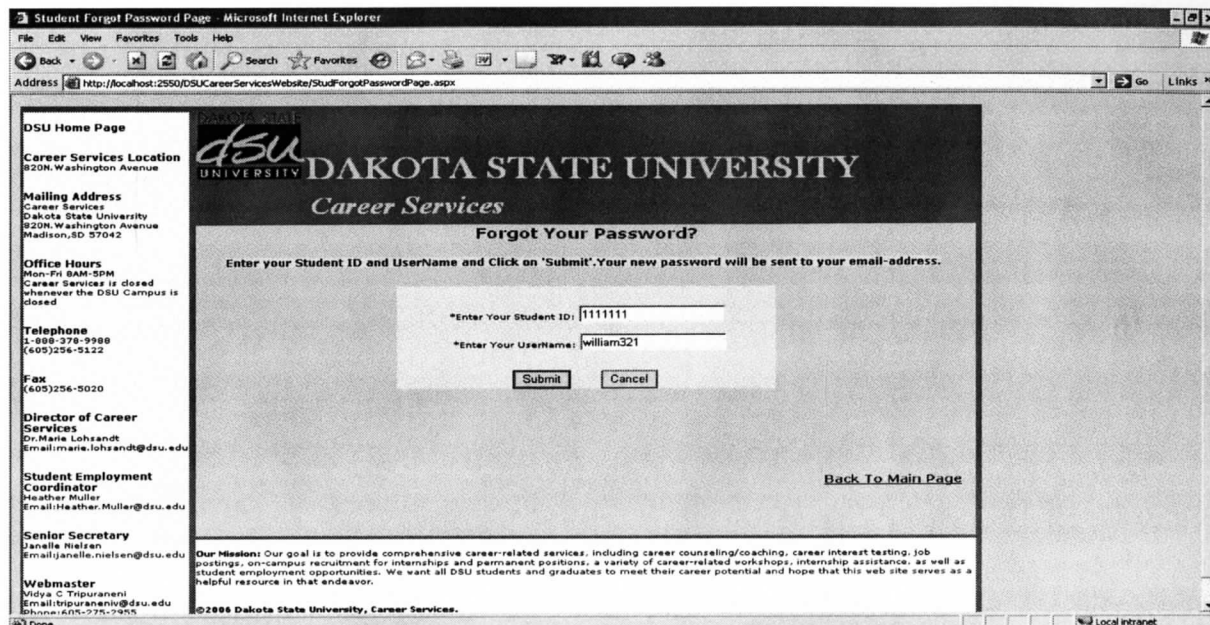


Figure 49: Students Forgot Password Page Screenshot

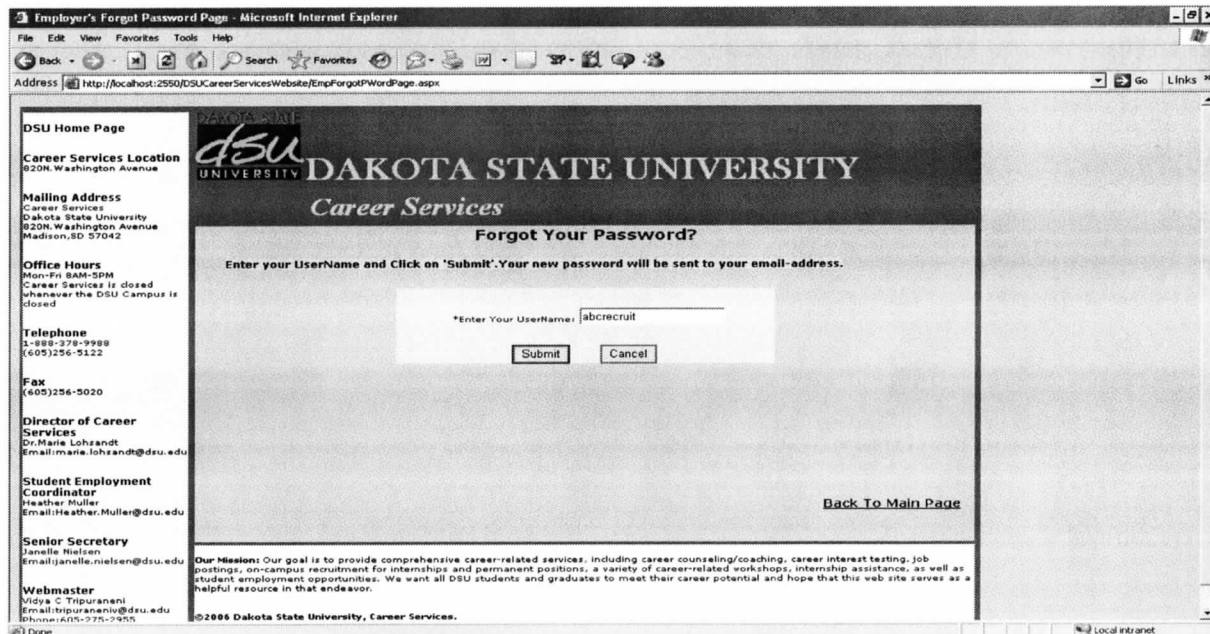


Figure 50: Employers Forgot Password Page Screenshot

3.1.7 Email Notification Module

Sending automatic email notifications is used in many areas of this application. Email notifications are sent to the Career Services Department whenever a new employer registers to the website. Email notifications are also sent to new employers when their registration is either approved/rejected by the Career Services Department. Corresponding email notifications are sent to students when their job application is approved by the employer and whenever they schedule/change/cancel their interview appointment for any job. Emails are also sent to students and employers when they request for a new password. This functionality of sending automatic email notifications is implemented in this module.

A method 'SendEmail' which takes the recipient's email address ('To' address), the sender's email address ('From' address), the Subject of the message, the sender's display name and the body of the message as input parameters is created. When an email notification has to be sent then all these parameters are generated by the application and this method is called which sends the email to the recipient. .NET's 'MailMessage' class in its System.Webmail namespace is the main class used in this method. Google Mail's (GMail) Simple Mail Transfer Protocol (SMTP) server is used as the SMTP server for this Career Services System. If we have a GMail account, Google allows us to use their SMTP server (free of cost) to send emails from any network to any email address.

3.2 Stored Procedures

In this application, most of the interaction with the database is done using stored procedures. A stored procedure is a pre-compiled SQL code that is stored in the database server and so they improve application performance. They are also executed on the database server which has a direct access to the data and so the network communication costs are also reduced. Other advantages of using stored procedures are reusability and encapsulation. As these procedures reside on the database server they can be reused by different applications. Users can make use of these procedures just by knowing their names. They do not need to know the details about the database objects in order to access them. As the stored procedures reside on a centralized server, data management (security, administration and maintenance) is also simplified. By using stored procedures, any changes (if needed) are made only at a single location (on the database server) and these changes are immediately available to all the applications that use them. (“Benefits of using stored procedures”), (“Stored Procedures”) and (“Stored Procedure”)

Figure 51 below gives a list of stored procedures used in this application.



Figure 51: Stored Procedures

CHAPTER 4

SYSTEM TESTING

System Testing is an important phase in the System Development Life Cycle.

Functional testing is conducted on the Career Services System to ensure that it is operating correctly and all the functional requirements or objectives of the system are met.

4.1 Functional Testing

In functional testing every functional unit or component in each module is tested separately using valid input parameters and it is determined whether the system is behaving as expected. If any functional component fails to work as expected then the required modifications are made to it and it is tested again to ensure that it is operating correctly.

Table 1 below shows the results of the functional testing on the Career Services System.

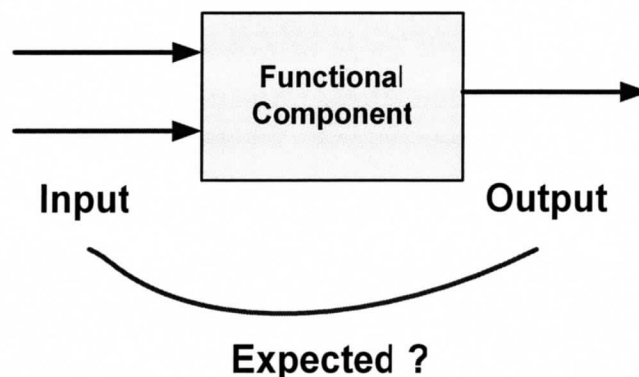


Figure 52: Functional Testing

Figure Source: ("Function Testing")

Table 1: System Testing Summary

Functionality	Testing Result
New User Registration	Passed
Login Authentication	Passed
Approve/Reject New Employer Registration	Passed
Create/Modify Interview Schedule	Passed
Search for Jobs	Passed
Upload and Change Resumes	Passed
Apply for Jobs	Passed
Schedule/Change/Cancel Interview Appointments	Passed
Post Jobs	Passed
Remove Filled Jobs	Passed
Review and Approve Students' Applications	Passed
Search for Students	Passed
Update Account Information	Passed
Change Password	Passed
Forgot Password	Passed
Sending Automatic Email Notifications	Passed
Validation Controls	Passed
Logout	Passed

CHAPTER 5

CONCLUSIONS

Career Services System development has been completed with great success. All the proposed objectives of the system have been achieved and all the features have been implemented as planned. All the major milestones of the project are met and the project was completed within the planned duration.

5.1 Future Enhancements

Scheduling is a major area in the Career Services System that can be enhanced further. This application allows students to Schedule/Change/Cancel their interview appointments based on the open slots available but it does not allow employers themselves create their interviews schedules. The functionality implemented in this project has been limited to administrators creating the interview schedule. Employers should first contact the Career Services Department either by phone or by email to find out the available dates and places for conducting their interviews and then fix the date(s), timings and the place(s) of interview. The administrator then creates that interview schedule. Scheduling can be further enhanced to allow employers themselves search for the available dates, timings and places for conducting their interviews and then create their interview schedule.

5.2 Lessons Learned

This project has given me ample opportunities to learn different concepts in .NET and Oracle.

- Working on this project helped me gain a better understanding of the Object-Oriented programming concepts such as Classes, Objects, Inheritance, Encapsulation, Polymorphism, Interfaces etc.
- This project also helped me improve my C# programming skills
- ASP.NET has several built in features such as web-server controls and validation controls that we can make use of when designing web pages. This project allowed me to explore several of these features such as Drop down List server control, Grid View server control, Panel Server Control, Calendar server control, File Upload server control, Required Field Validation Control, Regular Expression Validation Control, Compare Validation Control, etc.
- Through this project I learned how to create Master and Content pages in ASP.NET. Master and Content pages not only give a consistent look to all the pages in the application but also facilitate the process of making changes (if needed) to the web pages.
- This project also helped me learn how to divide the programming code or logic into Data Access Layer and Business Logic Layer.
- I also learned how to programmatically send email notifications
- Connecting to the database and accessing its data is another area in which this project helped me gain a better understanding.

- Creating Stored Procedures in Oracle is an important concept that I learned in the 'Information Retrieval' course in MSIS program. By making use of Stored Procedures in this project I was able practice those concepts and become familiar with them.

Overall, working on this project helped me learn many new concepts and improve my programming skills.

REFERENCES

- Benefits of using stored procedures.* (n.d.). IBM Corporation. Retrieved November 6, 2006, from http://publib.boulder.ibm.com/infocenter/db2luw/v8/index.jsp?topic=/com.ibm.db2.udb.doc/doc/dc/c_spbenefits.htm
- Data Flow Diagram.* (n.d.). Wikipedia, The Free Encyclopedia. Retrieved October 11, 2006, from http://en.wikipedia.org/wiki/Data_flow_diagram
- Ed Yourdon. (2006). *Just Enough Structured Analysis*. [Online Book]. Retrieved October 11, 2006, from <http://www.yourdon.com/strucanalysis/chapters/ch9.html>
- Free Data Flow Diagrams Tutorial. (n.d). *Get Ahead-Data Flow Diagrams*. Retrieved October 11, 2006, from <http://www.getahead-direct.com/gwbadfd.htm>
- Function Testing.* (n.d.). Retrieved November 6, 2006, from <http://www.cs.bath.ac.uk/~amb/UQC011H2/testing/tests310.html>
- Stored Procedure.* (n.d.). Wikipedia, The Free Encyclopedia. Retrieved November 6, 2006, from http://en.wikipedia.org/wiki/Stored_procedures
- Stored Procedures.* (n.d.). IBM Corporation. Retrieved November 6, 2006, from http://publib.boulder.ibm.com/infocenter/db2luw/v8/index.jsp?topic=/com.ibm.db2.udb.doc/doc/dc/c_spbenefits.htm
- What's New in Internet Information Services 6.0.* (2003). Microsoft Corporation. Retrieved October 11, 2006, from <http://www.microsoft.com/windowsserver2003/evaluation/overview/technologies/iis.mspx>

APPENDICES

APPENDIX A: PROJECT PLANNING

Project Work Breakdown Structure and Gantt chart

The Work Breakdown Structure and the Gantt chart for this project is shown in Figure 53. This project is divided into five phases: Finding Project Idea, Project Planning, Design, Implementation and Project Closing. The various steps in each phase and their durations are also shown in the figure.

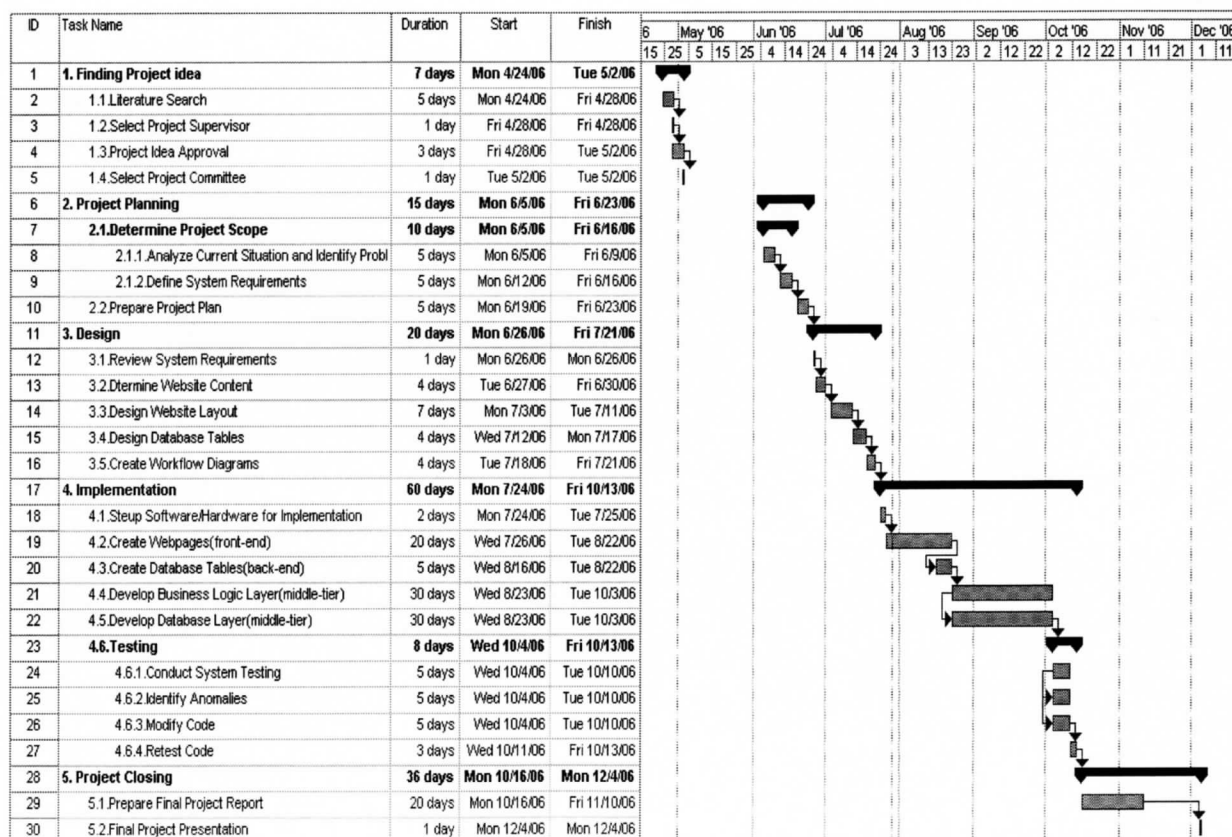


Figure 53: Project Work Breakdown Structure and Gantt chart