

Career Service Information System for Career Development Center

by

Mr. Xi Qi Kai

A Final Report of the Three-Credit Course
CS 6998 System Development Project

Submitted in Partial Fulfillment
of the Requirements for the Degree of
Master of Science
in Computer Information Systems
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Project Title	Career Service Information System for Career Development Center
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Academic Year	November 17, 2002

The Graduate School of Assumption University has approved this final report of the three-credit course, CS 6998 System Development Project, submitted in partial fulfillment of the requirements for the degree of Master of Science in Computer Information Systems.

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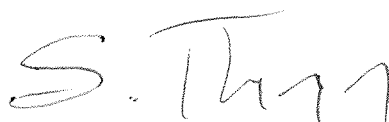
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November 17, 2002

ABSTRACT

The Career Development Center provides students with advice, information, and employment, career planning and development. It supports all sources of career information, including the collection of audio, video, tapes, and printed materials. Career development is a fluid and dynamic process, determined by each student's unique interests, values, experiences and decision-making style.

The current existing system is based on the manual system and some computerized system. Most data are stored on the paper, while some parts are kept in the Microsoft Word, and Microsoft Excel. The same information must be written many times for different documents, that is redundant work. It requires many administrative staffs to maintain the system. The manual system results in many general problems, which increases operation expenses.

This proposed system involves the automation of application and selection process of the career development center. Modules of the proposed system are written under Java, and data are kept in the database server, Microsoft SQL Server, and are accessed through the Internet, the Internet Explorer browser is the main tool to access to the desired information. It will reduce the number of unnecessary staff and unnecessary expanses, decreasing communication cost, and increase speed of workflow. The details will be described in the project report. ✓

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I. INTRODUCTION

1.1 Background of the Project

The Career Services System aims to help students and alumni of AU fulfill their career goals by facilitating the processes between the employers and students. This project involves the automation of application and selection process of the career development center

The application procedure for a job is as follows:

1. Get an application form from the Career Development Center (CDC).
2. Fill out the application according to the job openings list and hand in the filled out form to the CDC.
3. The officer in CDC retrieves the information for each applicant through the Student Information Access System.
4. The officer in the CDC decides whether the student is qualified to apply for the job based on various factors, like minimum qualifications, registration and credit requirements and student status.
5. If there is a job matching the officer of Career Development Center will notify the student the communication address of prospective employer.
6. Student can make an appointment with the prospective employer and manage an interview.
7. The employer will inform the Career Development Center whether he/she will hire the student. This is the work-flow of the Career Development Center. But everything is processed manually. In order to effectively manage the student employment application. Web-based systems is expected to be developed

1.2 Objectives of the Project

The objective of this project is to provide an efficient Internet career services towards students in an university in order to effectively managing the student employment application. To achieve this objective, the following tasks and functionalities are going to be carried out:

- (1) To improve the job posting by providing on line access.
- (2) To reduce workloads by accepting on line application from students.
- (3) To reduce a lot of paper and documentation leading to an effective cost reduction.
- (4) To reduce processing time by checking qualification and making matching automatically by the system.
- (5) Then efficiently provides assistance to qualified students
- (6) To allow the officer post and close jobs on line.
- (7) Easy to track the information we have in our routine work.
- (8) To provide an indirect communication service between employers and students.

1.3 Scope of the Project

To understand and improve the business processes.

To design the data models and process models for the proposed system.

To develop appropriate hardware and software architectures for the career service system..

This project involves the automation of application and selection processes of the career development center, as well as providing varieties of reports for management issues.

The scope of the project should be managed in as a proposed system, which actually contains the following functions:

- (1) A student information management that fluents the processes of career service.
- (2) A job search engine with an on line web application form that simplifies the job application procedure.
- (3) A job and employer information management that ensures the user the quality of the service.
- (4) A qualifying process that filters fundamentally unqualified applicants away from continuing the application procedure.
- (5) A mailing system that forwards employers interview outcomes to students

1.4 Deliverables

The deliverables for the system development project are as follows:

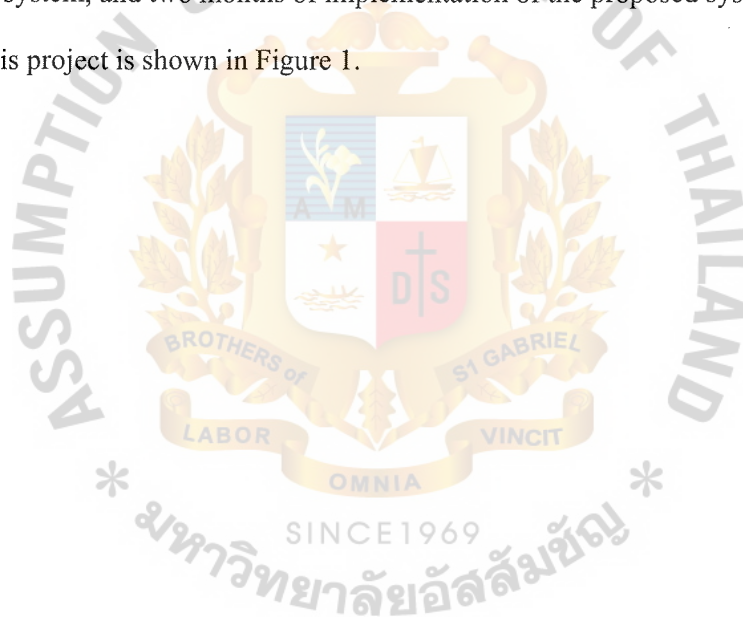
- (1) Implementation of the server side classes defined in the Design Documentation using Java Programming Language. These classes include decision making model for Job and Student matching, interface to Student and Job Information databases.
- (2) Implementation of client side user interfaces classes defined in the design documentations using Java Applet. These classes include the Student interface for job browsing and application, University officer interfaces for job inserting and deleting, reviewing server's decision on job and student matching, appointment making for student and interviewer
- (3) Database for Student Information.
- (4) Database for Job Information

- (5) Database for Job Application Forms.
- (6) Context Diagram and Data Flow Diagrams.

This project is intended to put the student job application process on line to reduce the paper work, so it is not expected to print out a lot of reports, which can be simply obtained through Database queries.

1.5 Project Plan (Include Gantt Chart)

This proposed project take a total of four months time, with one and a half-month of analysis of existing system and three weeks of analysis and design of the proposed system, and two months of implementation of the proposed system. The detail plan of this project is shown in Figure 1.



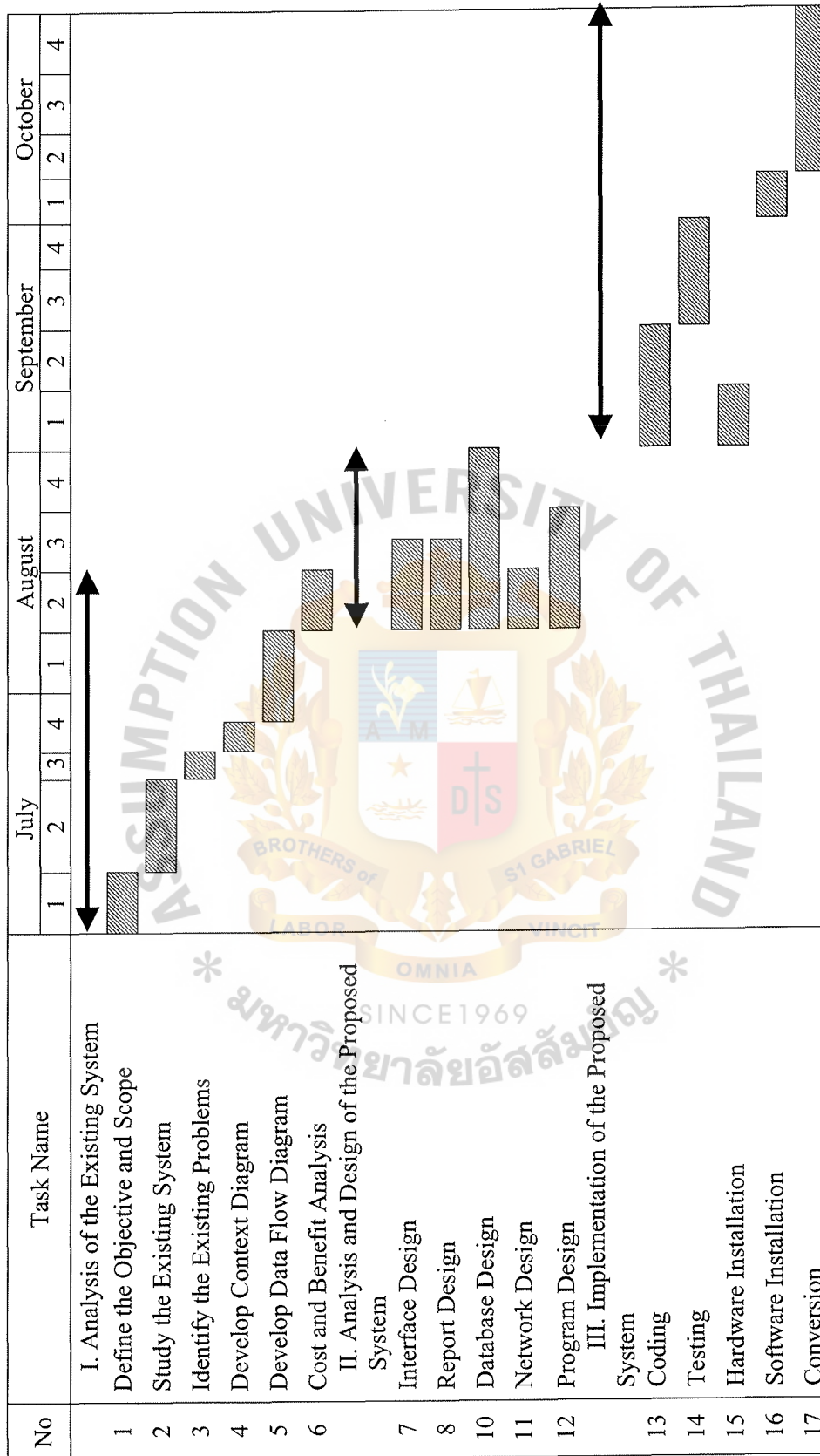


Figure 1.1. Project Plan (Gantt Chart)

II. THE EXISTING SYSTEM

2.1 Background of the Organization

The Career Development Center (CDC), located on the third floor of the Queen's Tower (Q Building), Huamark Campus, provides students and recent graduates with advice, information, and on-campus services regarding full-time and part-time employment, career planning and development. Services and activities of CDC include Job Placement, Career Resources & Testing, Professional Training, and more.

The center aims to serve every student who attends AU and to ensure an equitable level of service for all, regardless of background or interests and strives to be effective, informative, up-to-date, and organized.

The Career Development Center supports all sources of career information and company profiles, including the collection of audio, video, tapes, and printed materials. It maintains three bulletin boards, one in the CDC offices on the third floor of the Queen's Tower, one on the first floor of the E Building, and one on the first floor of P Building. These bulletin boards have news on CDC events, listings of full-time and part-time jobs, and listings of activities.

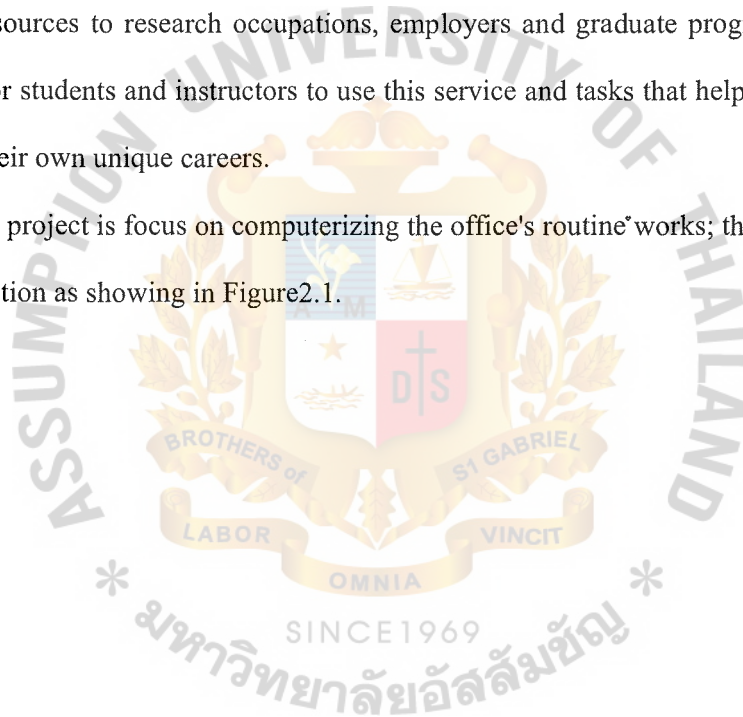
Career Development Center is an ongoing, life-long process. It is prepared to assist students in applying their particular combination of interests, abilities, values, and motivations to a systematic search of the working world and the potential professional and educational opportunities. Even the freshman year is not too soon to begin developing yourself.

Objectives of CDC are to develop students a sense social responsibility, help students experience the compensation value of hard work. To encourage and enrich student experience in business and in the management field by providing opportunities

for the students to apply their knowledge in running an actual business organization. To search for interests, and to evaluate the performance and efficiency of the students themselves in order to help them plan for future study or career.

Career development is a fluid and dynamic process, determined by each student's unique interests, values, experiences and decision-making style. CDC offers listings of part-time and full-time positions on-campus, through work-study and in the community. In addition, internships, co-ops and summer opportunities are available. The most common reason for using the Center was to "seek employment", and the classes used center resources to research occupations, employers and graduate programs. It can be helpful for students and instructors to use this service and tasks that help direct students toward their own unique careers.

The project is focus on computerizing the office's routine works; the main effort is on the section as showing in Figure 2.1.



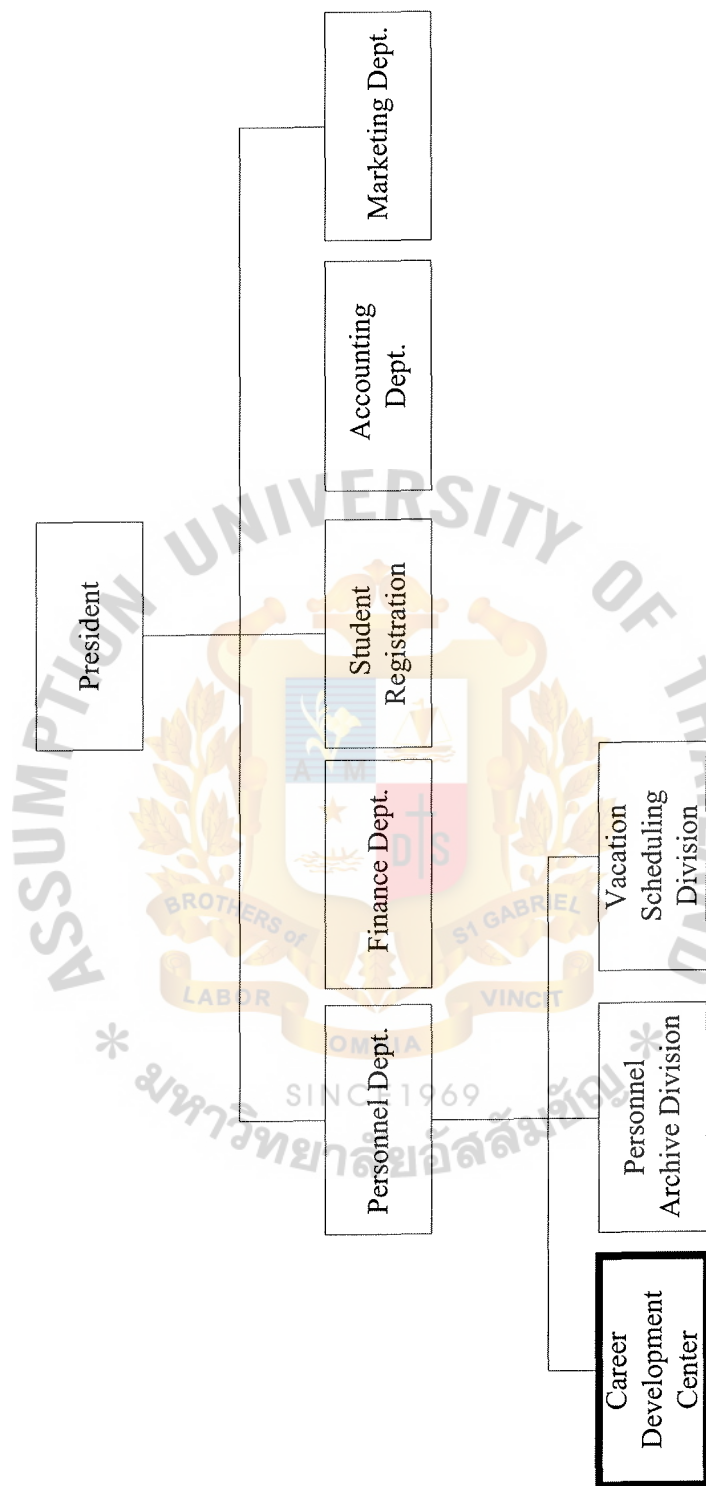


Figure 2.1. Organization Chart for Career Development Center

2.2 Existing Business Functions

The business functions of the Career Development Center are categorized into five main functions to act as follows:

(1) Full-time Job Placement

Placement for full-time jobs is available for all-4th year (Senior) students and recent graduates. The complete full-time Job vacancies from the top companies who are interested in employing ABAC students are listed at CDC. Students should fill out the full-time Application Form at CDC office or send your resume to CDC as it would increase your chance of being employed. Your application and/or resume will be presented and selected by the potential companies.

(2) Part-time Job Placement

Part-time job placement for students is both outside organization and inside of the univer On-Campus part-time Job Placement

Students can work part-time on campus by applying for Teacher's Assistant (TA). Students who are interested should fill out the part-time Application Form at CDC.

There are many part-time jobs available for students who would like to work off campus. Companies & Organizations' part-time Job Listing is available at CDC, then students should contact the interested company directly.

(3) Summer job placement

CDC provides an opportunity to participate in company training programs to put theories into practice, and to become familiar with actual working conditions.

(4) ABAC Dummy Company Summer Employment

Students can acquire actual working experiences during summer period, but still have the advantages of working in the university in the summer holiday period.

(5) Career Week

Career Week is a popular on-campus recruitment event organized every semester, providing opportunities for graduating students to meet with the recruitment officers of over 100 leading companies and personally apply for job offerings .

(6) Vacancy Announcement for Employers

Employers and alumni can contact and send their job vacancies for Assumption University students via the Internet. The acquisitions of the student name lists are free of charge.

(7) Regular workshops

CDC holds regular workshops, such as Resume Writing, Interviewing Techniques, and Personality Development. These workshops can help students make a more effective self-presentation in the working environment.

(8) Alumni Talk

The Alumni Talk is organized by the CDC about 4 times per semester by inviting the Alumni members of Assumption University who have been very successful in their fields to share their career experiences to students.

2247 e.1

(9) Career Field Visit

These visits are aimed at the 3rd and 4th year students and faculty members with the operations of selected organizations by visiting their premises. The career Field Visit is set up once per semester.

(10) Career Planning

Students can start planning about their career since the freshmen year. CDC has the layout for students in all years/levels

(11) Individual / Group Counseling & Testing

The CDC staff members are available to offer assistance with job searches tailored to individual student interests. In addition, the CDC will provide aptitude testing and psychological testing to help students understand how their abilities and interests can be matched with suitable career.

(12) Company Relations

The CDC arranges meetings between the top management of prominent companies and organizations, and the University administration and faculty members. These meetings have been very useful to both sides. There have been very useful discussions about how the curriculum of the University can be improved to better meeting the needs of the business community. The company Management provides useful feedback on ABAC alumni and how they perform. Closer relationships with the companies have been formed. These meetings provide a forum for discussions about future cooperation

2.3 Current Problems and Area for Improvement

There is a useful framework for classifying problems, opportunities and directives, calls it Wetherbe's PIECES framework. By applying it on our existing systems, the unstructured problems are classified as follows:

- 1) P the need to improve performance:

The right jobs and the right applicants matching usually takes long time since the process we do heavily depends on manpower.

- 2) I the need to improve information (and data):

The format of information is not useful and convenient for users and staff referring to, data redundancy problem appears very often and looks like unsolvable.

- 3) E the need to improve economics, control costs, or increase profits:

The cost of routine work processes could be cut down tremendously by promoting them on to Internet.

- 4) C the need to improve control or security:

Should we put appropriate controls over our processes, so we can provide better services to our students. The resource we have is so limited, that we ought to eliminate unauthorized person from employing our facilities.

- 5) E the need to improve efficiency of people and processes:

There are large amount of processes are unnecessary if we put most of the processes on line, our staff will be liberated from repeated and overlapped works, and be able to carry on more challenging works..

- 6) S the need to improve service to customers, suppliers, partners, employees, etc:

The career service is inflexible to update information or to expand the information system in the future., since there is no database. Using online processing to enable to coordinate with other systems.

2.4 The Existing Manual System

2.4.1 The Existing System Process

The process of the existing system is summarized as follows:

- (1) Maintain Employers and Jobs
 - (a) For a new employer registration, filling a registration form to create a new employer record..
 - (b) For a existed employer, verifying its identification, registering employer with its new job offers.
- (2) Maintenance Student records and applications
 - (a) Searching, updating, keeping, and deleting in order to keep student information corresponding to the student's current status.
 - (b) Record student's application forms after verifying that student's status.
- (3) Student and Job qualification
 - (a) The officer in CDC retrieves the information for each applicant through the student records.
 - (b) The officer in the CDC decides whether the student is qualified to apply for the job based on various factors, like minimum qualifications, registration and credit requirements and student status.
- (4) Intermediate Employer and Student interview
 - (a) If there is a job matching the officer of Career Development Center will notify the student the communication address of prospective employer.
 - (b) The employer will inform the Career Development Center whether he/she will hire the student. This is the work-flow of the Career Development Center. But everything is processed manually.

All processes of CDC are done manually by staff. Management information, tracking of statistical information is not available.

2.4.2 Workflow of Existing System

The context diagram of the existing system is shown in Figure 2.2 interacting with 3 external entities, and the productivity is quit low that it could not fulfill the increasing career service demands.

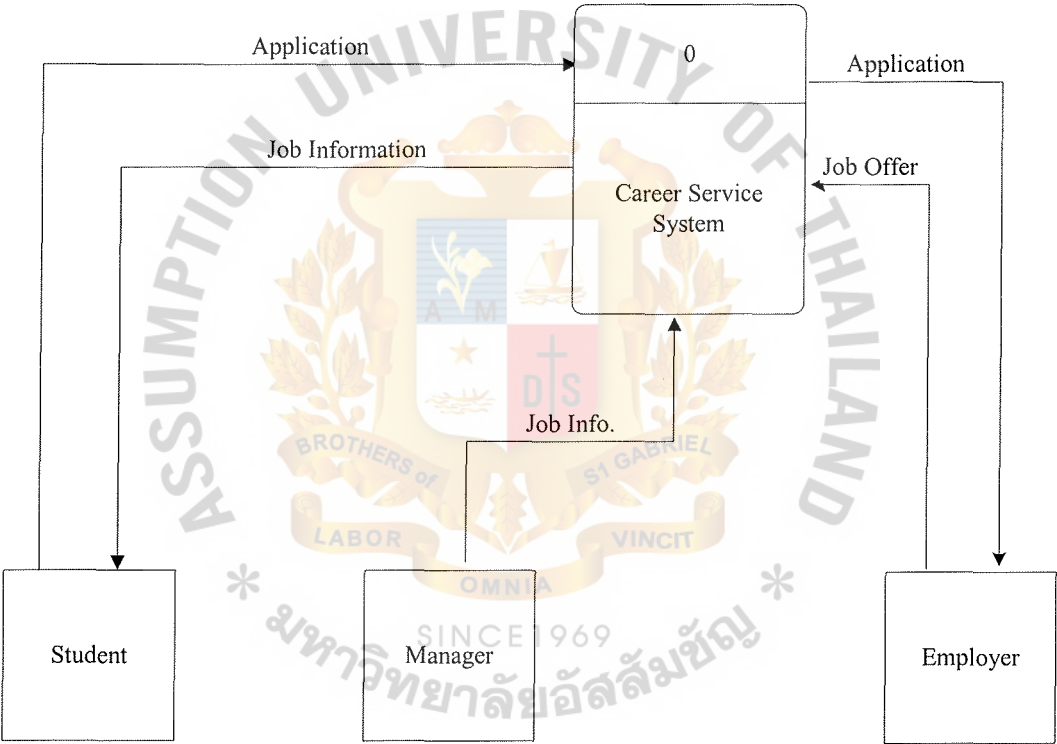


Figure 2.2. Context Diagram of Existing Career Service System.

III. THE PROPOSED SYSTEM

3.1 System Specification

According to the previous chapter, Career Development Center now requires an effective service system, which can facilitate the various processes of the center, and solve the problems occurring from the existing manual system.

In order to achieve the target, the new proposed career service system should have the components as follows:

- (1) Provide a Decision making module (Job matching & Qualification for application).
- (2) Provide a computerized system to assist with the routine process.
- (3) Provide and maintain a computerized student database replacing the existing manual system to provide current student information on demand.
- (4) Maintain a job database to provide current job information on demand, and to solve the redundancy problem occurring from previous system.
- (5) Prepare application, employer, and interview result files to facilitate the related processes within the center.
- (6) Provide employment information reports such as the number of candidate for a time period (days, months, and annual) by department.
- (7) Provide GUI screen for students and employers to interact with the system friendly.
- (8) Provide security and control procedure to prevent unauthorized person from accessing the system.
- (9) Provide data retrieval process to access easily and fast.
- (10) Provide the links to cooperate with other systems.

3.2 System Design

As the purpose of improving operations, services, controls, and decision making process of CDC. The objective of this project is to provide an Internet Career Service for the students in a university.

3.2.1 Application Architecture

(1) Network architecture

In proposed system a network is set up in order to communicate both inside and outside of CDC. We are supposed to employ the existing campus network to approach to students. The campus network is a FDDI (Fiber Distributed Data Interface) to which links the most of the university departments.

LAN technology is important but only to the extent that they support user applications. Because users do not care about connectivity. They care about applications that they can use. For example: Applications in the office, Electronic mail. LAN is very useful for organizations to operate. We can separate the applications of LAN into three major applications.:

- (a). Sharing Resources
- (b). Connectivity through LAN Networking
- (c). The all-important Applications

We use the star topology inside of CDC. It is a LAN topology which the endpoints on a network are connected to a common central switch or hub by point-to-point links. Network configuration of the proposed system is shown in Figure 3.1.

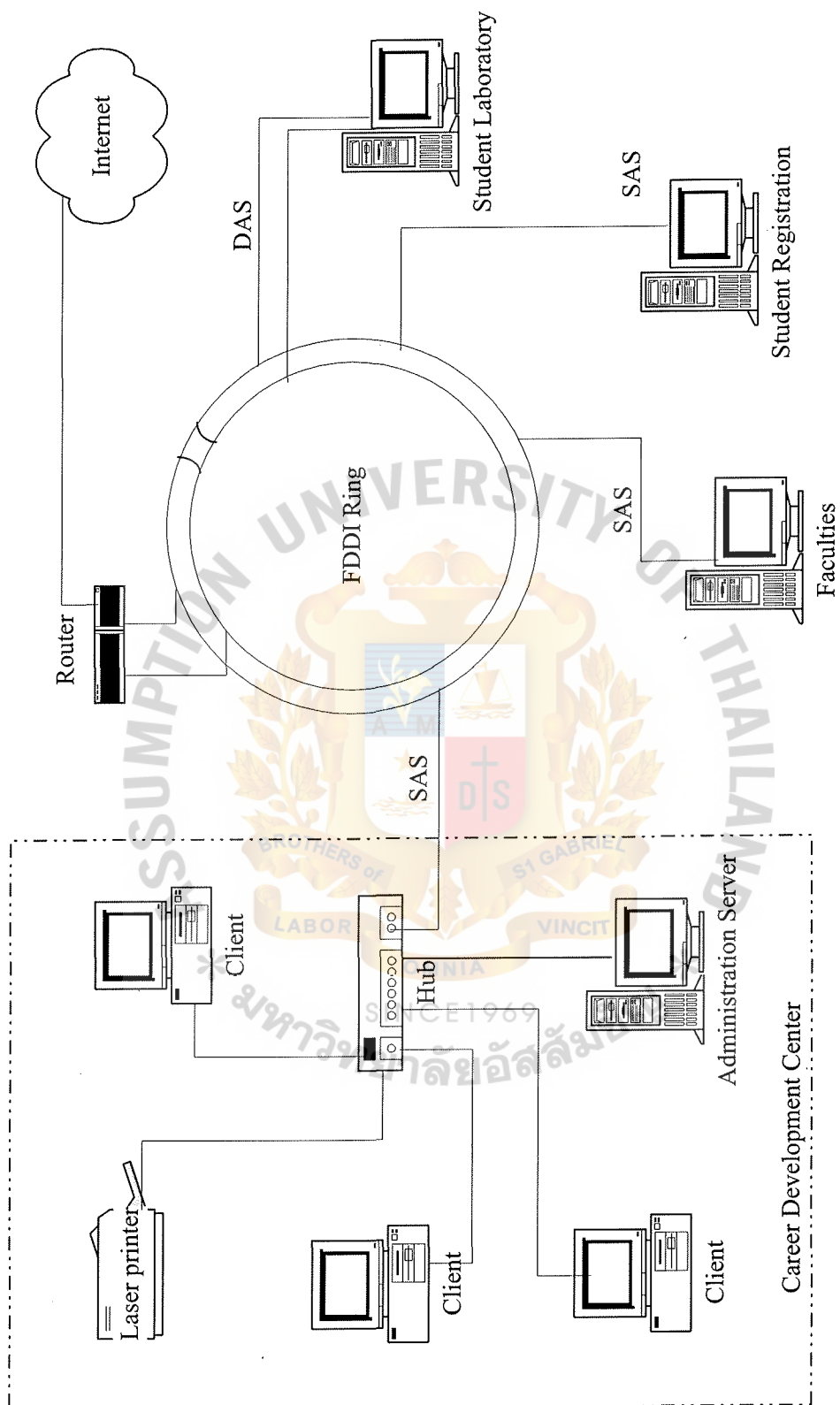


Figure 3.1 Network configuration of proposed system.

(2) Data Architecture

The proposed system uses the Relational Database System (DBMS) that is a software program that controls access to and maintenance of the stored data in the relational format. It provides for backup, recovery, and security. Its advantage is to reduce the data redundancy and also provides sophisticated backup, recovery, security, integrity, and processing.

(3) Interface Architecture

In the proposed system, there is much information that needs to be processed by a computer. So we need a good interface between computer and user. . On-line inputs and outputs is a best option for manipulating our proposed system

(4) Process Architecture

A software development environment (SDE) is a programming language and tool kit for constructing information systems software applications. What we need here is SDEs exist for Internet and Intranet client/server

3.2.2 Data Flow Diagram

(1) Context Diagram

The context diagram for the proposed system is prepared to define the scope and boundary for system as shown in Figure 3.2.

(2) Data Flow Diagram

In Figure 3.3 illustrates the level 0 data flow diagram of the career service system and in Figure 3.4 to 3.8 shows the subsystems respectively:

(a) Student Registration Maintenance:

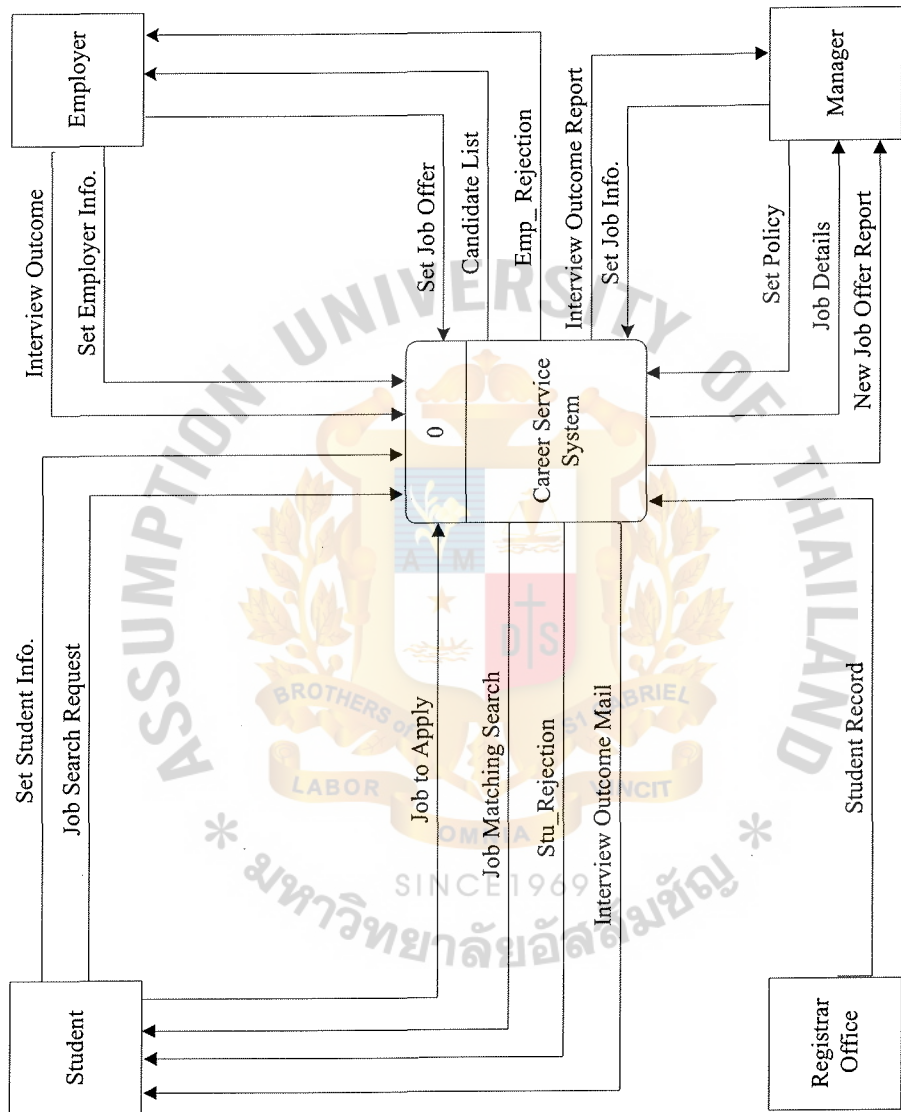


Figure 3.2. Context Diagram of Proposed Career Service System.

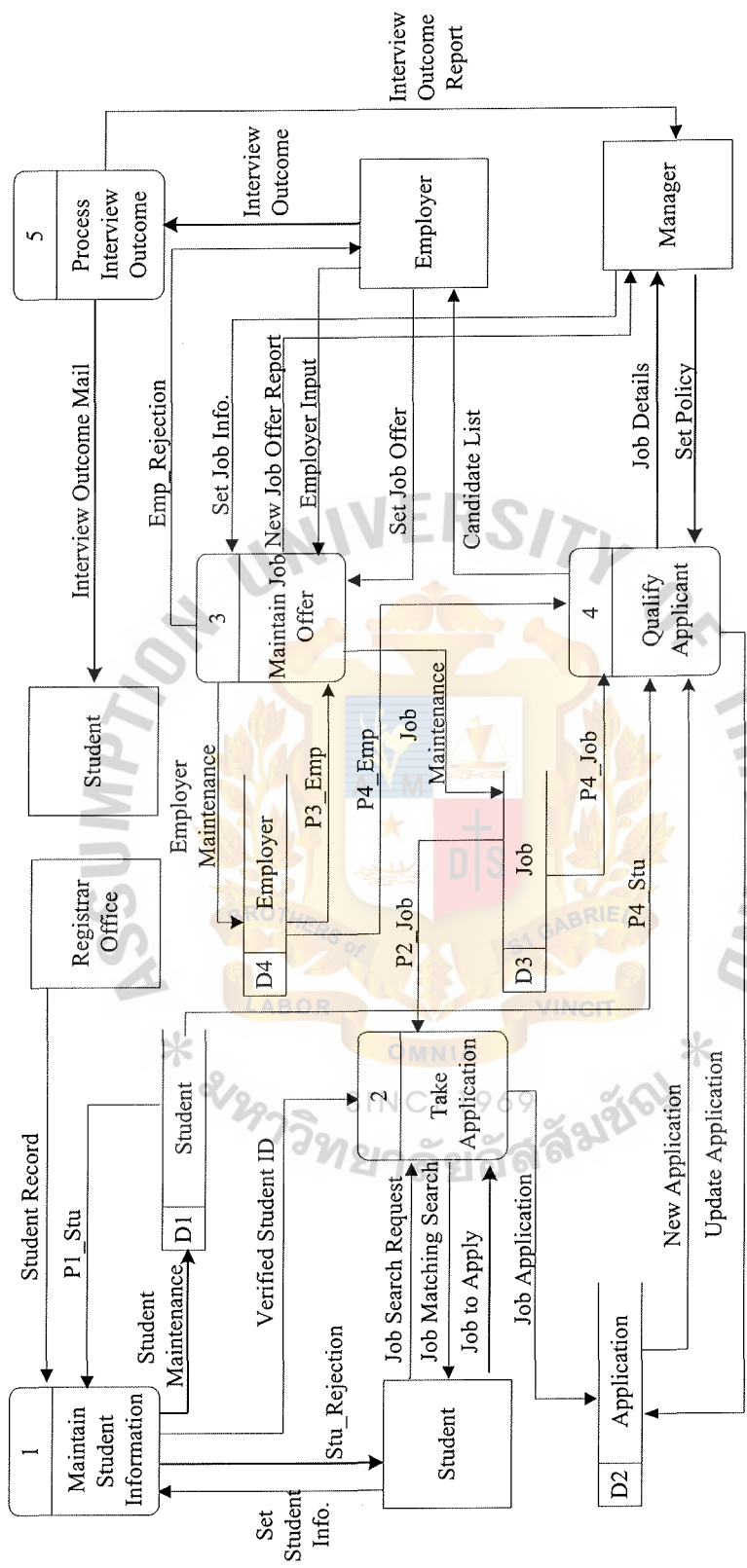


Figure 3.3. Level 0 Data Flow Diagram of Career Service System.

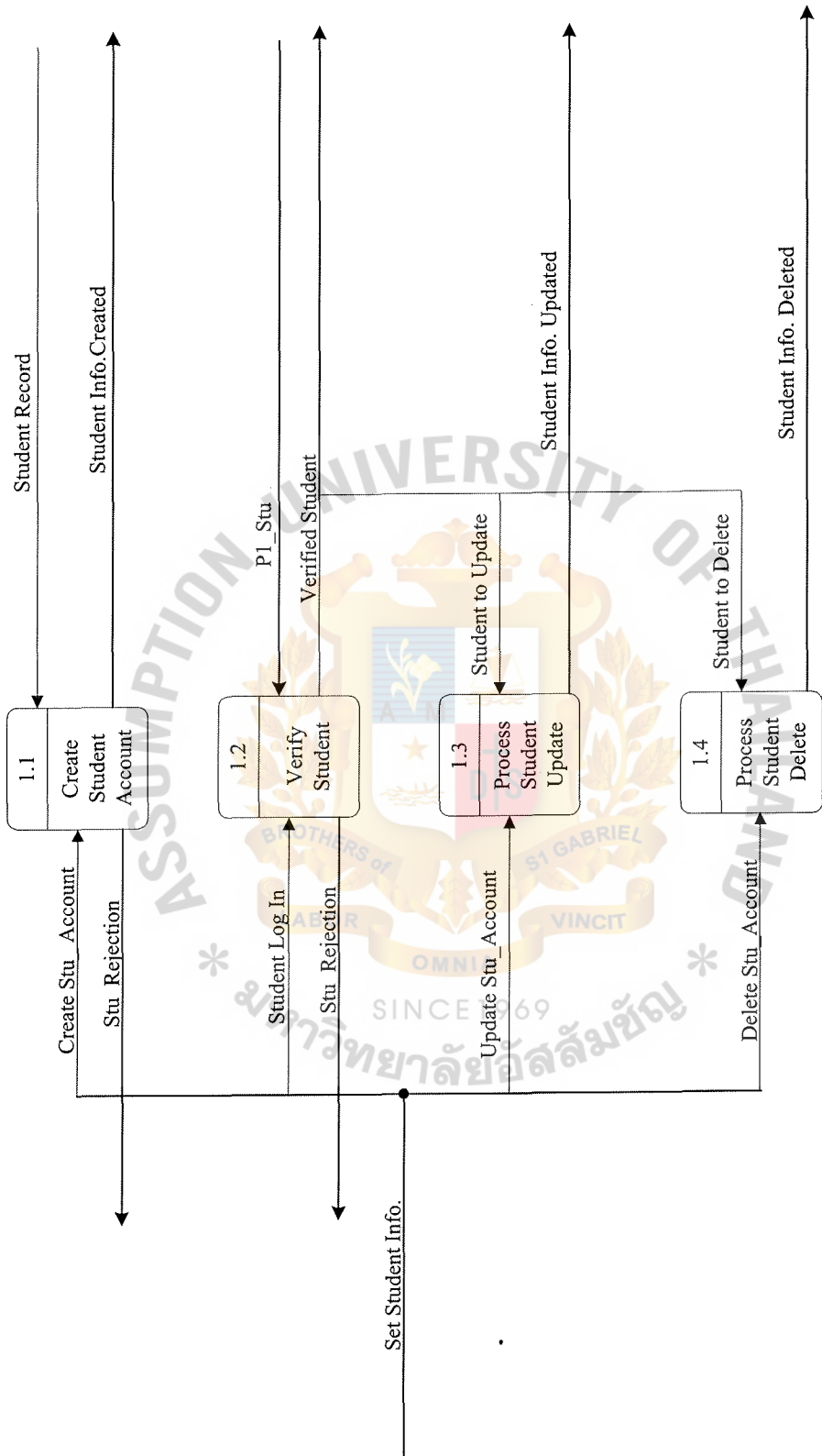


Figure 3.4. Data Flow Diagram level 1 for Maintaining Student Information

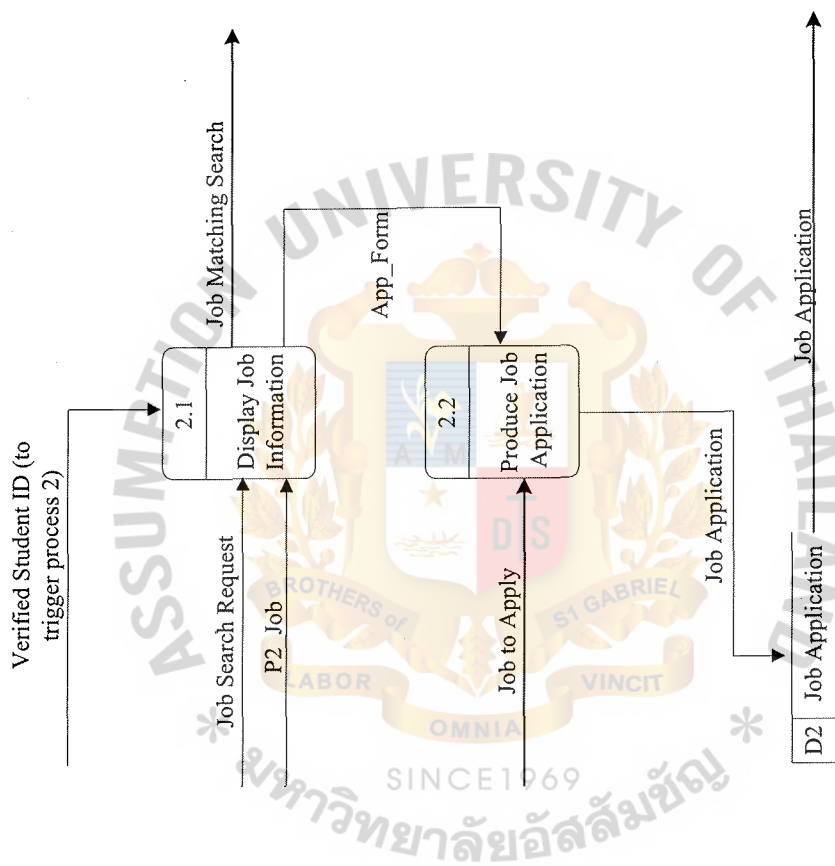


Figure 3.5. Data Flow Diagram level 1 of Take Application

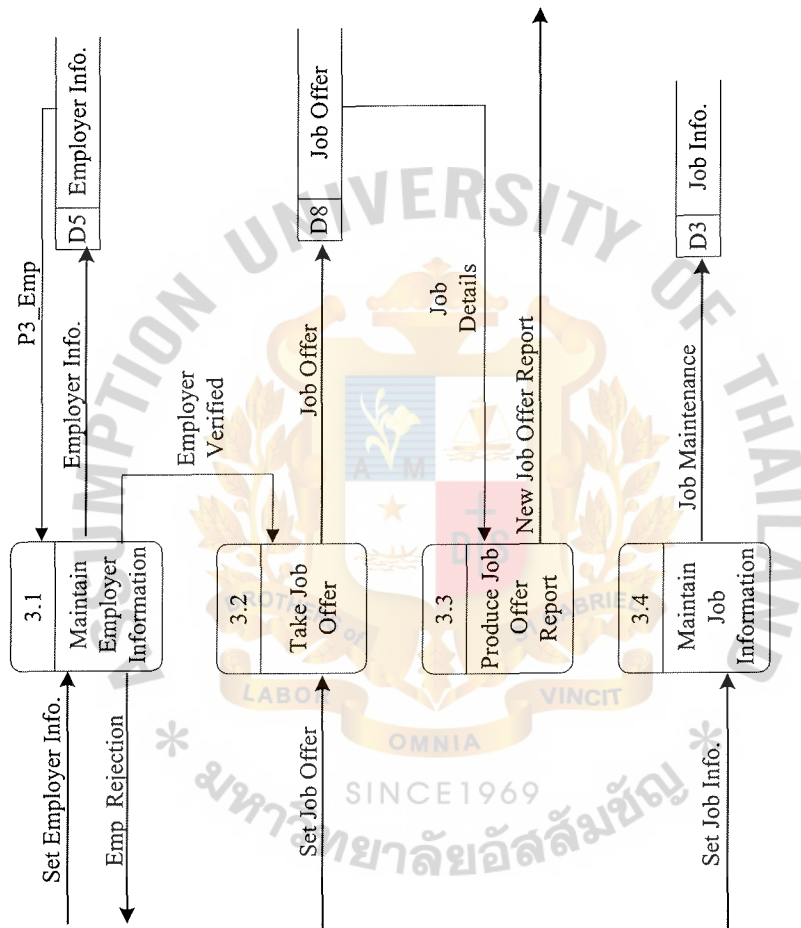


Figure 3.6. Data Flow Diagram level 1 of Maintain Job Information

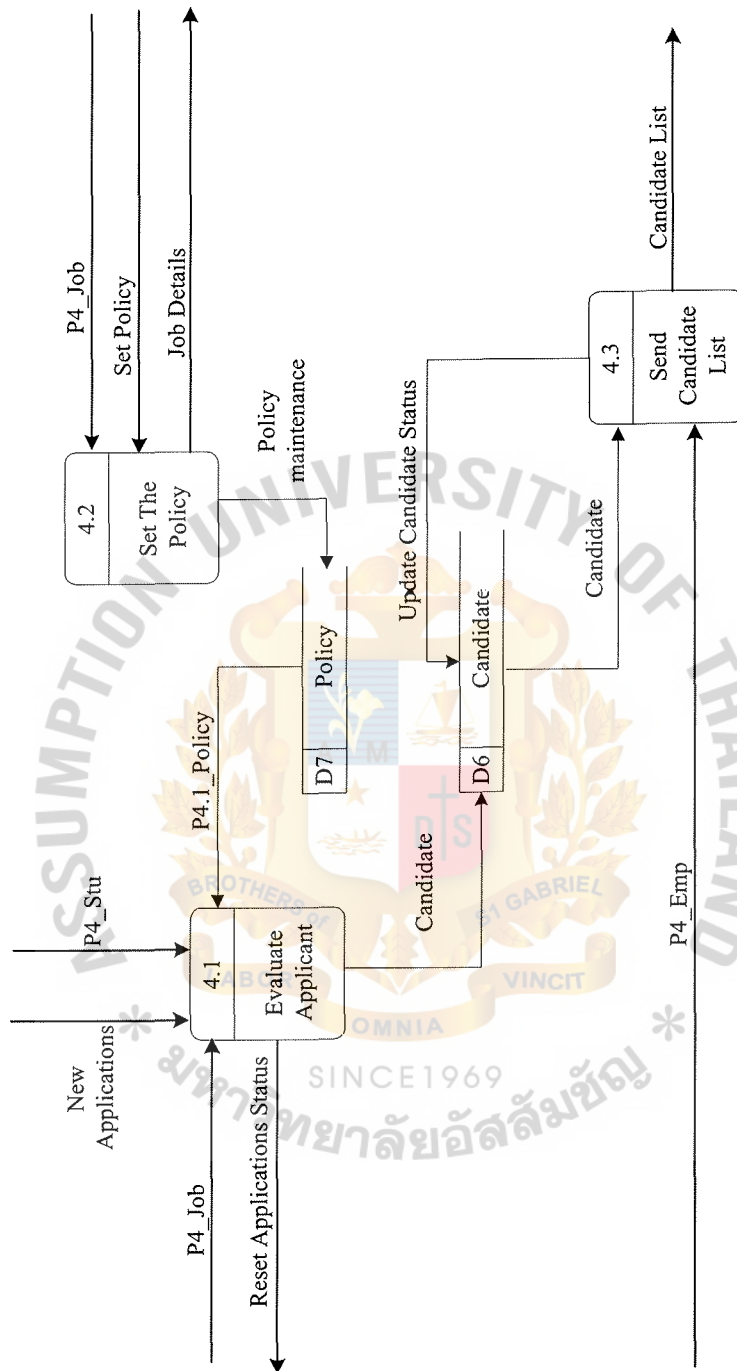


Figure 3.7. Data Flow Diagram level 1 of Qualify Applicant

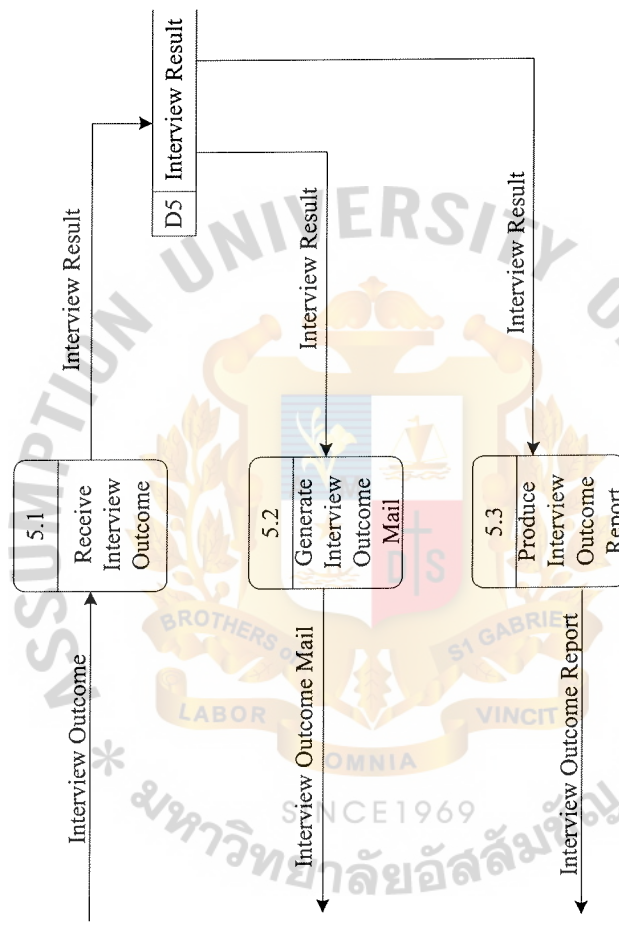


Figure 3.8. Data Flow Diagram level 1 of Sent Interview Outcome

- (1) For a new student, filling a registration form on our website to create a new student record in our system.
 - (2) For a current registered student, after verifying his/her username with password, the full functions of our service system will be granted to that user.
- (b) Job Search and Application:
- (1) Search jobs by categories, enable user to locate the jobs they are interest in.
 - (2) Get an application form to fill out after the user finished looking up jobs.
- (c) Jobs and Employers Maintenance:
- (1) For a new employer, filling a registration form on our web-site to create a new student record in our system.
 - (2) For a current registered employer, after verifying his/her username with password, the full functions of our service system will be granted to that user.
 - (3) Then that registered employer is able to post his/her jobs into our web based job-offer datastore by fill in details of the jobs, like job title, requirements, type, pay rate etc. The employer is only allowed to maintain his/her own job-offer information and account.
 - (4) A new job offer list report will be produced daily informs the manager to update our job database. Then the manager will decide if it is suitable for our university students to apply for based on his/her professional experience.

- (d) Produce the Candidate List for jobs:
 - (1) Check the job-related policy, like minimum GPA, health requirements with our student information datastore, to get a pre-qualified applicant list for each corresponding job.
 - (2) Query the each job pre-qualified applicant list with its corresponding job requirement statement (like requires typing, other language capabilities.) to produce the candidate list.
 - (3) Store the current generated candidate list in our candidate store for later employers' inquiring or automatically sending newsletters to them.
- (e) Process on Interview Outcome:
 - (1) The employer will inform the Career Development Center whether he/she will hire the student, rearrange the outcome into our datastore.
 - (2) Query the datastore with each applicant, then produce a mail to inform the student whether he/she is hired.
 - (3) Generating operation and management reports for the University management better designing curriculums.

The remains of the data flow diagram is shown in Appendix B. The process specification for the data flow diagram of the proposed system is listed in Appendix C.

3.2.3 Database Design

Logical data model has already mapped in the third normal form. Database design for proposed system is shown in Appendix D and its data dictionary is shown in Appendix E.

The database schema shown in Appendix F represents the technical implementation of the logical data model.

3.2.4 Input and Output Design

It emphasizes on web based interface design. Both input and output will be performed and displayed on the web browser screen. We try to design the interface to be easy to understand and capture the information. Users don't need the special training course. The interface designs are shown in Appendix A.

3.3 Hardware and Software Requirement

3.3.1 Hardware Requirement

Table 3.1. The Hardware Specification for the Computer Server.

Hardware	Specification
CPU	P4-2.8G SOCKET478
Cache	512 KB
Mainboard	ASUS P4B533E i845e
Memory	DDRAM 2 GB
Hard Disk	100 GB
CD-Rom Drive	CD-RW
Floppy Drive	1.44 MB
Network Adapter	Ethernet 10-Base T (RJ45 connector)
Display	21” SVGA monitor
VGA	ASUS /16Mb
UPS	750 VA.

Table 3.2. The Hardware Specification for Each Client Machine.

Hardware	Specification
CPU	AMD ATHLON XP 2200+
Mainboard	ASUS A7L133-VML SOCKET A
Memory	DDRAM 128 MB
Hard Disk	10 GB (5400 RMP)
CD-Rom Drive	40X
Floppy Drive	1.44 MB
Network Adapter	Ethernet 10-Base T (RJ45 connector)
Display Adapter	SVGA card
Display	17" SVGA monitor
UPS	750 VA.

Table 3.3. The Peripheral Specification.

Hardware	Specification
Laser Printer	Laser Printer (HP LaserJet 1 sets)
Dot Matrix Printer	EPSON
LAN Card	Ethernet LAN Card 10/100 Mbps.
HUB	24 Port 10/100 Mbit

3.3.4 Software Requirement

Table 3.4. The Software Specification for the Computer Server.

Software	Specification
Operating System	Microsoft Windows NT
Application Server	Perl and PHP
Database Server	MySQL

Table 3.5. The Software Specification for Each Client Machine.

Software	Specification
Operating System	Microsoft Windows
Web browser	Microsoft Internet Explorer 6.0
Application Software	Microsoft Office

3.4 Security and Control

- (1) Access control: Control of entry to a system.

This is one of the most important lines of defense against unwanted intruders. The role of access control is to identify the person desiring access to a system and its data, and to verify that person's identity. The common way to control access to a system is to restrict entry to anyone without a valid username and password..

- (2) Discretionary access control:

Control of access to resources such as files and programs once admitted into a system. The methods for coding this information can range from simple to complex. To accomplish this, some kind of encryption algorithm or method is required. It can be as simple as transposing letters or characters, or as complex as using a sophisticated equation combining both of these methods to create a complex code that can only be "unlocked" using a special key or set of keys.

- (3) Physical security: Security computer facilities and equipment..

There are also ways to prevent intentional sabotage of your computing equipment and facilities. Allowing the right persons access and keeping undesirables out is one of the key aspects of ensuring the physical security of your facilities. Some of different methods include the use of locks and keys

- (4) Treat media with care.

The pressure from ballpoint pen can damage a floppy disk.

- (5) Perform periodic backup.

Daily backups of changed files from a hard disk to a floppy disk or another device may be in order. Monthly backups of all files so that full system can be replaced in the event of a failure or so that backup copies are available of even supposedly insignificant file.

- (6) Data integrity uses data replication in order to store all data into all clients.

When we want to update, delete, and insert, we do these activities in only one client. Then data are automatically changed.

- (7) Practice separation of authority.

Design sensitive procedures so that no person alone has authority in sensitive data.

Control for a new system is designed during new system analysis and design stages. Control procedures are the specification of procedures that specify how something is to be controlled. In computer system, a number of controls must be put into place to ensure the security, accuracy, and privacy of data and other computer based information system resources.

(1) Input Control

All input forms must be checked and verified before data entry. When key-in data, key-operator is required to sign his name and date. Master file must be printed and check with the source documents. Authorized person is given passwords in order to log into the application system. And authorized person should change their password at least once a month for higher security.

(2) Process Control

Let the programs look for duplicate entries of data. When duplicate entries of data are detected, appropriate message or warning is given. Ensure that the data management program determines potential conflicts between two uses attempting to access the same file and keeps these two separate. Establish access restrictions on system utilities and other sensitive programs which might be utilized to manipulate the system. Ensure that appropriate backup procedure and designed with periodical backup of data files and program source listing.

3.5 Cost and Benefit Analysis

3.5.1 Cost Analysis

(1) Cost of Manual System

Table 3.6 Manual System Cost Analysis

Cost Item	Years				
	1	2	3	4	5
Fixed Cost:					
Typewriter 1 Units@3000	3,000.00	3,000.00	3,000.00	3,000.00	3,000.00
Calculator 4 Units@1600	1,600.00	1,600.00	1,600.00	1,600.00	1,600.00
Total Fixed Cost (Baht)	4,600.00	4,600.00	4,600.00	4,600.00	4,600.00
Operating Cost:					
Salary Cost:					
Manager Officer 1 person@20,000	20,000.00	21,600.00	23,328.00	25,194.24	27,209.78
Consellor Officer 2 person@10,000	20,000.00	21,600.00	23,328.00	25,194.24	27,209.78
Advisor Officer 2 persons@9,000	18,000.00	19,440.00	20,995.20	22,674.82	24,488.80
Staff 2 person@8,000	16,000.00	17,280.00	18,662.40	20,155.39	21,767.82
Overtime Payment Estimated 5,000/Month	7,500.00	7,875.00	8,268.75	8,682.19	9,116.30
Total monthly salary Cost (Baht)	81,500.00	87,795.00	94,582.35	101,900.88	109,792.48
Total Annual Salary Cost (Baht)	978,000.00	1,053,540.00	1,134,988.20	1,222,810.51	1,317,509.76
Office Supplies & Miscellaneous Cost:					
Stationary Per Annual	24,000.00	25,200.00	26,460.00	27,783.00	29,172.15
Paper Per Annual	20,000.00	20,800.00	21,632.00	22,497.28	23,397.17
Utility Per Annual	48,000.00	50,400.00	52,920.00	55,566.00	58,344.30
Miscellaneous Per Annual	24,000.00	25,200.00	26,460.00	27,783.00	29,172.15
Total Annual Office Cost	116,000.00	121,600.00	127,472.00	133,629.28	140,085.77
Total Annual Operating Cost (Baht)	1,094,000.00	1,175,140.00	1,262,460.20	1,356,439.79	1,457,595.53
Total Manual System Cost (Baht)	1,098,600.00	1,179,740.00	1,267,060.20	1,361,039.79	1,462,195.53

Table 3.7 Five Years Accumulated Manual System Cost.

Year	Total Manual Cost (Baht)	Accumulated Cost (Baht)
1	1,098,600.00	1,098,600.00
2	1,179,740.00	2,278,340.00
3	1,267,060.20	3,545,400.20
4	1,361,039.79	4,906,439.99
5	1,462,195.53	6,368,635.52
Total	6,368,635.52	

(2) Costs of Computerized System

Table 3.8 Computerized System Cost Analysis.

Cost Item	Year				
	1	2	3	4	5
<u>Fixed Cost</u>					
Hardware Cost:					
Computer Server Cost	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00
Workstations Cost	15,000.00	15,000.00	15,000.00	15,000.00	15,000.00
Laser Printer	5,600.00	5,600.00	5,600.00	5,600.00	5,600.00
Dot Matrix	4,000.00	4,000.00	4,000.00	4,000.00	4,000.00
UPS 750 VA	600.00	600.00	600.00	600.00	600.00
Backup Storage Device	2,000.00	2,000.00	2,000.00	2,000.00	2,000.00
LAN Card	960.00	960.00	960.00	960.00	960.00
Cable	800.00	800.00	800.00	800.00	800.00
HUB 8 Port	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00
Total Hardware Cost (Baht)	39,960.00	39,960.00	39,960.00	39,960.00	39,960.00
<u>Operating Cost</u>					
Maintenance Cost	-	12,000.00	12,600.00	13,230.00	13,891.50
Total Maintenance Cost		12,000.00	12,600.00	13,230.00	13,891.50
Software Cost:					
Server Software cost	8,000.00	8,000.00	8,000.00	8,000.00	8,000.00
Client Software cost	4,000.00	4,000.00	4,000.00	4,000.00	4,000.00

Table 3.8 Computerized System Cost Analysis (Continued).

Cost Item	Year				
	1	2	3	4	5
Total Software Cost (Baht)	12,000.00	12,000.00	12,000.00	12,000.00	12,000.00
Implementation Cost:					
Training Cost	15,000.00	-	-	-	-
File Conversion Cost	20,000.00	-	-	-	-
Total Implementation Cost (Baht)	35,000.00	-	-	-	-
Office Equipment and Furniture Cost:					
Calculator	3,000.00	-	-	-	-
Computer Desks	24,000.00	-	-	-	-
Total Equipment and Furniture Cost (Baht)	27,000.00	-	-	-	-
Personnel Cost:					
System Analysis	100,000.00	-	-	-	-
System Designer	75,000.00	-	-	-	-
System Builder	150,000.00	-	-	-	-
Network	50,000.00	-	-	-	-
Total Personnel Cost (Baht)	375,000.00	-	-	-	-
Total Fixed Cost (Baht)	488,960.00	63,960.00	64,560.00	65,190.00	65,851.50
Salary Cost:					
Manager Officer 1 person@20,000	20,000.00	21,000.00	22,050.00	23,152.50	24,310.13
Consellor Officer 2 persons@10,000	20,000.00	21,000.00	22,050.00	23,152.50	24,310.13
Advisor Officer 2 persons@9,000	18,000.00	18,900.00	19,845.00	20,837.25	21,879.11
Total Monthly Salary Cost (Baht)	58,000.00	60,900.00	63,945.00	67,142.25	70,499.36
Total Annual Personnel Cost (Baht)	696,000.00	730,800.00	767,340.00	805,707.00	845,992.35
Office Supplies & Miscellaneous Cost:					
Computer Supplies	10,000.00	10,200.00	10,404.00	10,612.08	10,824.32
Stationary	10,000.00	10,200.00	10,404.00	10,612.08	10,824.32
Preprinted Form	12,000.00	12,240.00	12,484.80	12,734.50	12,989.19
Utilities	50,000.00	51,000.00	52,020.00	53,060.40	54,121.61
Miscellaneous	18,000.00	18,360.00	18,727.20	19,101.74	19,483.78
Total Annual Office Supplies & Miscellaneous Cost	100,000.00	102,000.00	104,040.00	106,120.80	108,243.22
Total Operating Cost	796,000.00	832,800.00	871,380.00	911,827.80	954,235.57
Total Computerized System Cost	1,284,960.00	896,760.00	935,940.00	977,017.80	1,020,087.07

Table 3.9 Five Years Accumulated Computerized Cost.

Year	Total Manual Cost (Baht)	Accumulated Cost (Baht)
1	1,284,960.00	1,284,960.00
2	896,760.00	2,181,720.00
3	935,940.00	3,117,660.00
4	977,017.80	4,094,677.80
5	1,020,087.07	5,114,764.87
Total	5,114,764.87	

(1) The Comparison of the Manual System and Proposed System Costs:

Table 3.10. The Comparison of System Costs, Baht.

Year	Accumulated Manual Cost	Accumulated Computerized Cost
1	1,098,600.00	1,263,960.00
2	2,278,340.00	2,160,720.00
3	3,545,400.20	3,096,660.00
4	4,906,439.99	4,073,677.80
5	6,368,635.52	5,093,764.87

(2) Break Even Analysis:

The cost intersection of proposed system and existing system is shown in Figure 3.9 illustrates the needs to replace existing system, since the proposed system tends to prevail the existing system after its running for 7 months.

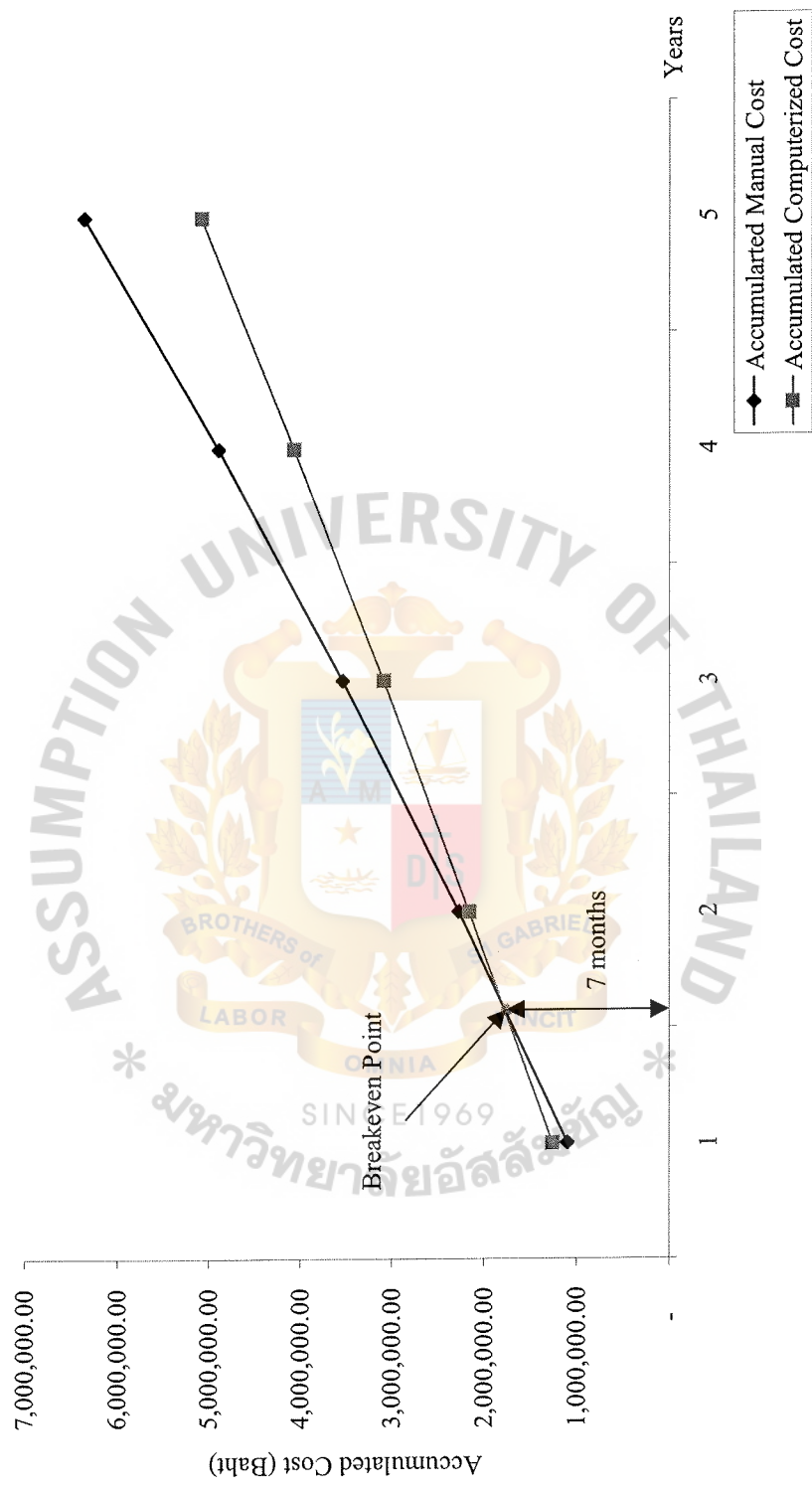


Figure 3.9. Cost Comparison between Manual and Proposed System.

3.5.2 Benefit Analysis:

Benefits can be classified into tangible benefits and intangible benefits.

(1) Tangible Benefits

Tangible benefits are benefits that can be quantified and its value can easily be measured. The proposed system has the following tangible benefits.

(a)	Reduction of office expense	60,000 baht
(b)	Reduction of personnel cost	480,000 baht
(c)	Reduction in overtime payment	90,000 baht
(d)	Reduction in redundant work	60,000 baht
(e)	Reduction in searching time	50,000 baht
(f)	Reduction in report preparation time	10,000 baht
(g)	Reduction in document preparation time	60,000 baht
	Total Tangible Annual Saving	<u>810,000 baht</u>

(2) Intangible Benefits

Intangible benefits are costs that are discrete and cannot be calculated into exact monetary value. The intangible benefits of the proposed system are listed as following:

- (a) Increases the productivity of career services
- (b) Lessens the operation errors.
- (c) Speeds up the information transmission.
- (d) Provides accurate information.

3.5.3 Pay Back Analysis:

The Table 3.11 shows the detailed calculations of proposed system pay back analysis. The graph in Figure 3.10 illustrates that the pay back period is about 3.5 years.

Table 3.11. The Proposed System's Pay Back Analysis.

Cost Items	Years					
	0	1	2	3	4	5
Development Cost:	-467,960.00	0.00	0.00	0.00	0.00	0.00
Operation & Maintenance Cost *:	0.00	-796,000.00	-832,800.00	-871,380.00	-911,827.80	-954,235.57
Discount Factors for 4%	1.00	0.96	0.92	0.89	0.85	0.82
Time-adjusted Costs (adjusted to present value):	-467,960.00	-765,384.62	-769,970.41	-774,653.65	-779,434.22	-784,312.08
Cumulative Time-adjusted Costs Over Lifetime:	-467,960.00	1,233,344.62	2,003,315.03	2,777,968.68	3,557,402.90	4,341,714.98
Benefits Derived From Operation of New System:	0.00	810,000.00	931,500.00	1,071,225.00	1,231,908.75	1,416,695.06
Discount Factors for 4%	1.00	0.96	0.92	0.89	0.85	0.82
Time-adjusted Benefits (adjusted to present value):	0.00	778,846.15	861,224.11	952,315.12	1,053,040.76	1,164,420.07
Cumulative Time-adjusted Benefits Over Lifetime:	0.00	778,846.15	1,640,070.27	2,592,385.39	3,645,426.15	4,809,846.23
Cumulative Lifetime Time-adjusted Costs + Benefits:	-467,960.00	-454,498.46	-363,244.76	-185,583.29	88,023.25	468,131.25

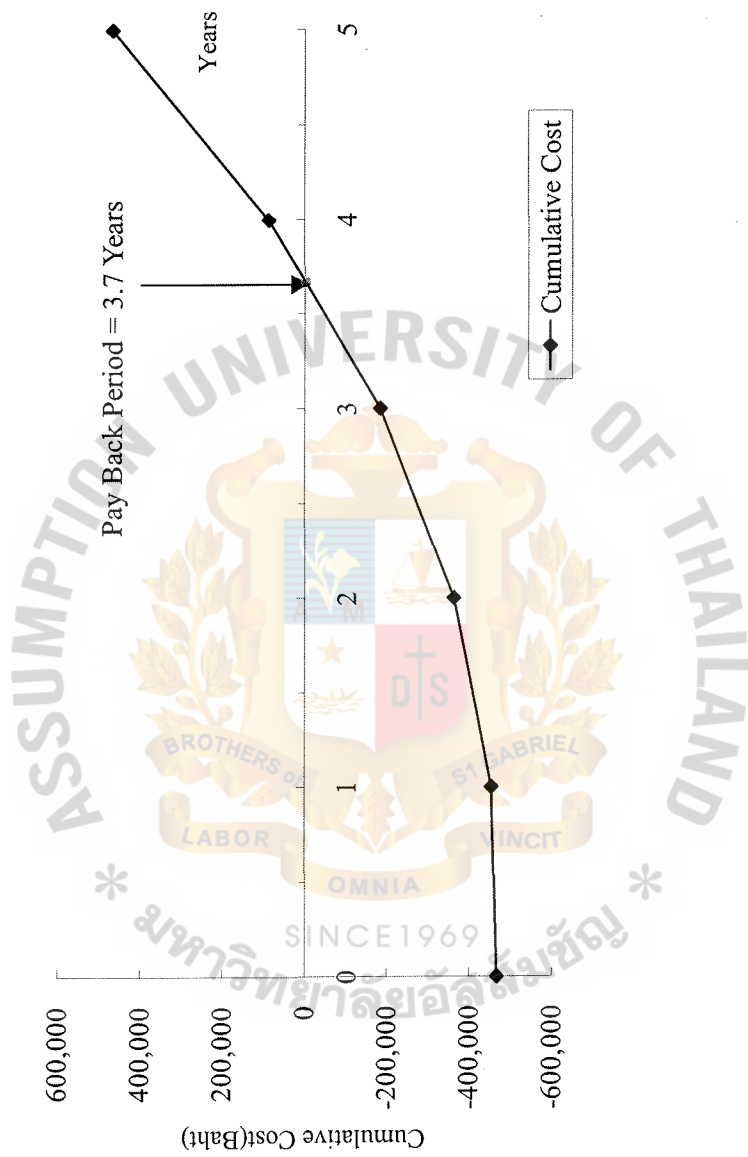


Figure 3.10. Pay Back Analysis.

IV. PROJECT IMPLEMENTATION

4.1 Overview of Project Implementation

The System Implementation is started after the approval of the technical design statement and prototypes. The System Implementation is the construction of the new system and the delivery of the final system into operation. The processes of the System Implementation are:

(1) Hardware Acquisition and Installation

According to the Hardware Requirement in Chapter 3, both computer server and clients are built for system implementation. In addition, a new network has to be implemented before writing and installing computer program.

(2) Computer Programming

Programmers are responsible for writing program that follows the requirements according to the Design Specification in Chapter 3.

(3) Testing

Programs, database, and network have to be tested together. The objective of testing is to uncover errors. To fulfill this objective, a series of test steps: unit, integration test, validation, and system tests are planned and executed.

(4) Training and User Document

Converting to a new system, it is necessary to provide users with document that guides them through using the new system.

Users need to familiarize with the computerized system including functions of the hardware and software. They ought to know on how to

manipulate the system properly and efficiently, like how to perform data entry, how to print reports.

4.2 Source Code

The source codes of all modules of the proposed system are written under Java. It is shown in Appendix G.

4.3 Test Plan

Testing strategy of the proposed system is the same as the strategy mentioned in the Computer Programming section that is Top-down testing.

The six levels of testing to consider are:-

1. Module: The testing of a segment of a program that performs a specific task, such as the interest calculation on savings accounts of the FICA deduction on payroll.
2. Program: The testing of all of the modules that are linked and compiled into a single program. This is sometimes labeled "string" testing.
3. Computer system: the testing of a series of programs that are interconnected as one processing unit, such as all the programs needed to produce weekly payroll check, or to bill customers for products ordered.
4. Application system: the testing of both the computer system and the manual interface. This test level would test from the point where data is originated through the use of that data in a user area. In other words, from human to human.
5. Inter-system: This test validates the links between two or more computer systems or application system.

6. Operating environment: Testing the functioning of all the operating support systems needed to enable computer systems to function properly.
- Unit/Module Testing

Whenever testing discovers errors at any level of the methodology, the programmer will need to make coding changes followed by a trip back through the layers to ensure error-free code in all test levels.

4.4 Conversion

This conversion method selected for this project is parallel conversion, which both the existing and proposed systems are run together for months. The conversion plan gives the detailed installation strategies to follow for converting from the manual existing system to the new computerized information system. This is to ensure that all major problems in the new system have been solved and everyone is satisfied with the new system that can operate correctly. This strategy minimizes the risk and ability to compare results with the old system. However it increases transition cost.

V. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The Career Service System really increases the service to both students and employers, reduce response time and personnel cost. The cost of analysis shows that the information system will be developed at a cost of 467,960 baht, the break-even point will occur approximately 7 months after the system's operating, and the payback period will take about 3.5 years to recover its development costs. The information system yields a net present value of 468131.25 baht and an ROI of 9.30 percent.

Table 5.1 presents the achievement of the proposed system compared with the existing system.

(1) New Student and Employer Register Process

There is no more process need our staff involved, and every process is under the system's control.

(2) Student Job Information Inquire Process

The service is only grant to the student who passed the system verification process.

(3) Job and Application Matching Processes

The officer can rely on the system to handle mass requests from users by setting a series of policy.

(4) Employer and Recruitment Process

Almost the process is accomplished by the system, but it still gives management the capability to maintain the appropriate jobs in the list.

(5) Recruitment Result Process.

Employer can inform the system whether he/she will hire the student.

(6) Report Process

The system can select the required information from the database and produces a formatted report easily.

Table 5.1. Degree of Achievement between the Proposed and the Existing System.

Process	Existing System	Proposed System
New Register Process	30 minutes	10 minutes
Student Job Inquire Process	20 minutes	5 minutes
Job Application Matching Processes	20 minutes	5 minutes
Employer and Recruitment Process	40 minutes	15 minutes
Recruitment Result Process	20 minutes	10 minutes
Report Process	50 minutes	10 minutes

5.2 Recommendations

The proposed system is developed to serve students and employers, so the next phase that needs to improve the career service is planned as follows:

- (1) Financial process should be involved with our career service system in the future.
- (2) An. appointment process should be included in our system for better managing interviews.
- (3) An on line interactive interview between students and employer would be an important supplement to our service.



APPENDIX A

WEB INTERFACE DESIGN

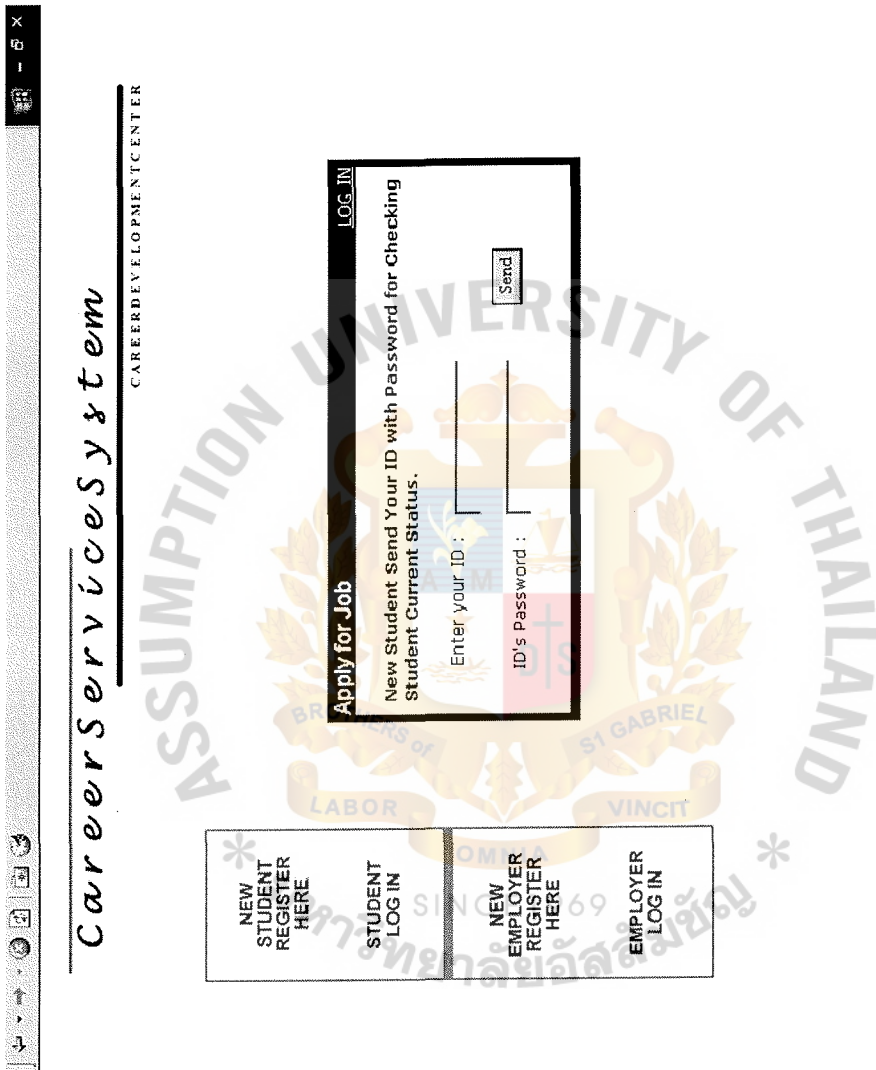


Figure A1. New Student User Status Verification.

NEW STUDENT REGISTER HERE

STUDENT LOGIN

NEW EMPLOYER REGISTER HERE

EMPLOYER LOGIN

Career Services System

CAREER DEVELOPMENT CENTER

Student Account Registration

Fields marked with a * are required.

* User Name:

* Password:

* Password:

* First Name:

Last Name:

Address:

City:

* Zip Code:

E-mail:

Phone:

Fax:

Alt phone:

Pager:

Submit

Reset

Figure A2. New Student User Account Registration.

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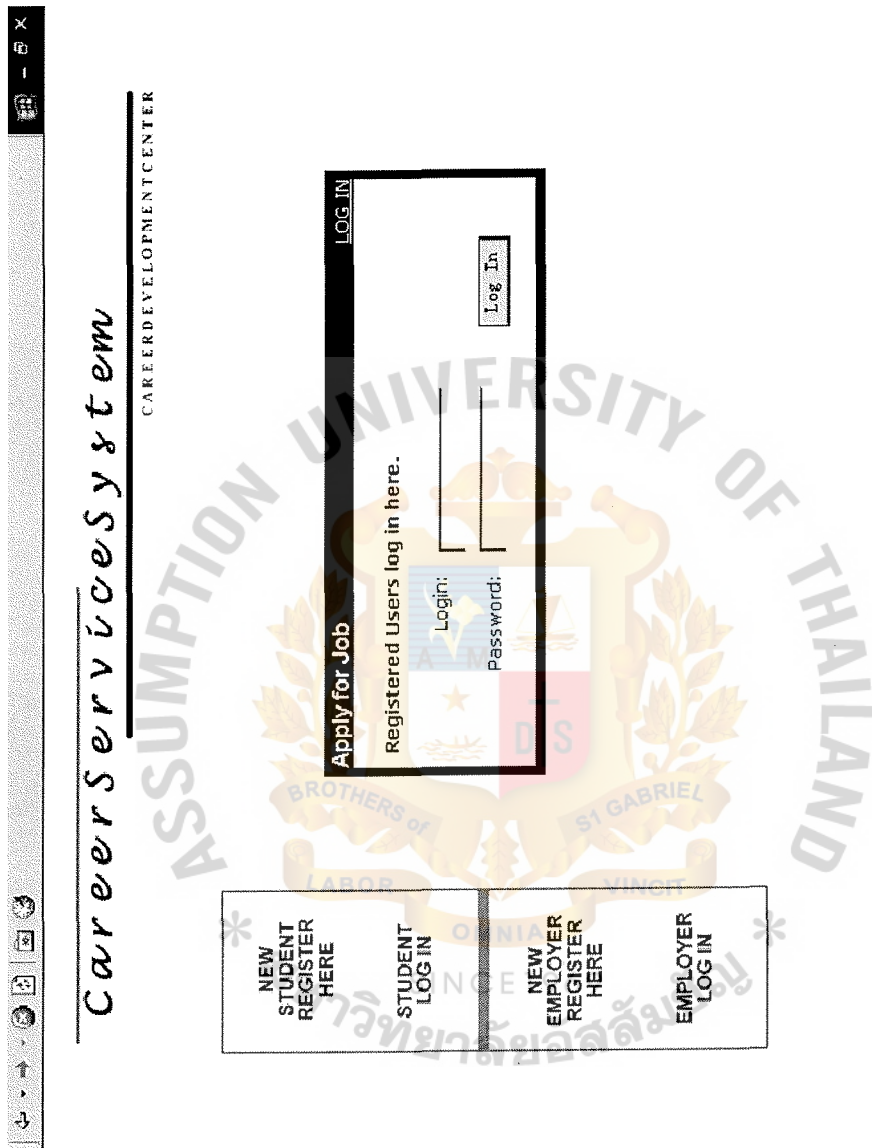


Figure A3. Old Student User Log In.



Career Services System

CAREER DEVELOPMENT CENTER

NEW STUDENT REGISTER HERE

STUDENT LOG IN

NEW EMPLOYER REGISTER HERE

EMPLOYER LOG IN

LOG OUT

Tools

Search for Jobs

Maintain Resume

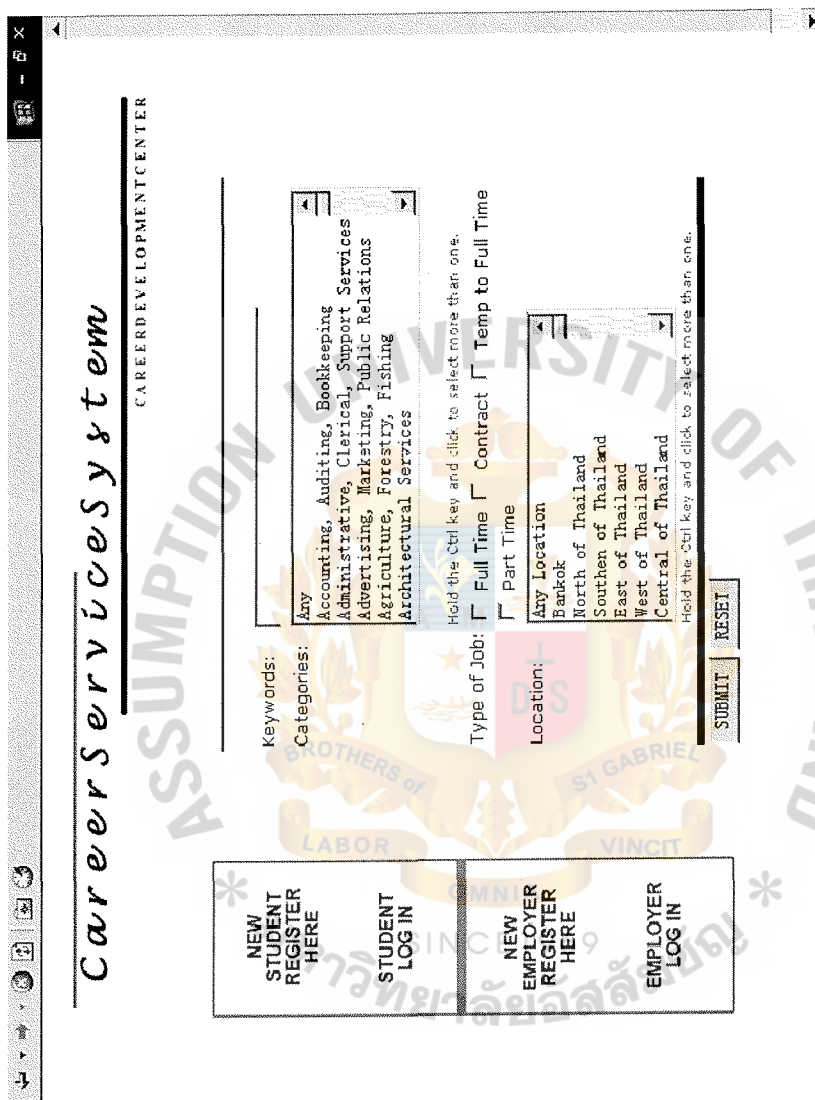
View info about companies with current openings

Job Applications

3

GCentral Celling Inc. / Sales	12-21-2001
MDeluxe Corporation / Marketing	10-19-2002
BKK Ravan's Company / Clerk	10-20-2002

Figure A4. Student User Account Details.

Figure A5. Student User Search for Jobs[®]

Career Services System

CAREER DEVELOPMENT CENTER

<p>Account Representative Electronic Label Technology</p>		<p>Salary: B 35,000 -B 40,000 Location: Bangkok Type: Full Time - Entry Level</p>
<p>SALES REP ELECTRONIC LABEL TECHNOLOGY SALES OPPORTUNITY for ACCOUNT REPRESENTATIVE RETAIL SALES DIVISION/ASSIGNED Bangkok, living in the Bangkok area.</p>		
<p>ELT has a diverse sales force stationed throughout Thailand. As a Sales Account Representative, you will be responsible for developing business within an assigned territory and for meeting sales plan for the sale of software systems, label stock and supplies for that territory.</p>		
<p>Preferred Education: 4 Year Degree</p> <p style="text-align: center;"> Back Apply For This Job </p>		

Figure A7. Apply for Selected Job^{es}



Career Services System

CAREER DEVELOPMENT CENTER

NEW STUDENT REGISTER HERE

STUDENT LOG IN

NEW EMPLOYER REGISTER HERE

EMPLOYER LOG IN

User: kk>> Change My Password

LOG OUT

Please choose a new login and password.

Login:

Password:

Confirm Password:

Set Login/Password

Figure A8. Student User Change Password.

NEW STUDENT REGISTER HERE

NEW EMPLOYER REGISTER HERE

STUDENT LOG IN

EMPLOYER LOG IN

Career Services System

CAREER DEVELOPMENT CENTER

User: kk>> Update My Profile LOG OUT

Contact Information

Fields marked with * are required.

* First Name: jkxixcv

* Last Name: jlkjlh

* Email: jkxixcv5@asia.com

* Address: k1j1

* City: j1j1

* Zip Code: 00000

Phone: 454456

Fax: 4554

Highest Degree: School/Faculty GPA

Job Hunting:

* Desired Job Title: Sales

Desired Salary: B/212.00

Update

Figure A9. Student User Edit Account Profile.



Career Services System

CAREER DEVELOPMENT CENTER

NEW STUDENT REGISTER HERE	STUDENT LOGIN	NEW EMPLOYER REGISTER HERE	EMPLOYER LOGIN
------------------------------------	------------------	-------------------------------------	-------------------

Maintain Resume:
Paste a text copy of your resume here.

My Resume

Name: kkkk
Age: 28

☐ Yes, advertise my resume for companies to search.
☐ No, don't advertise my resume.

Update

Figure A10. Student User Resume Maintenance.

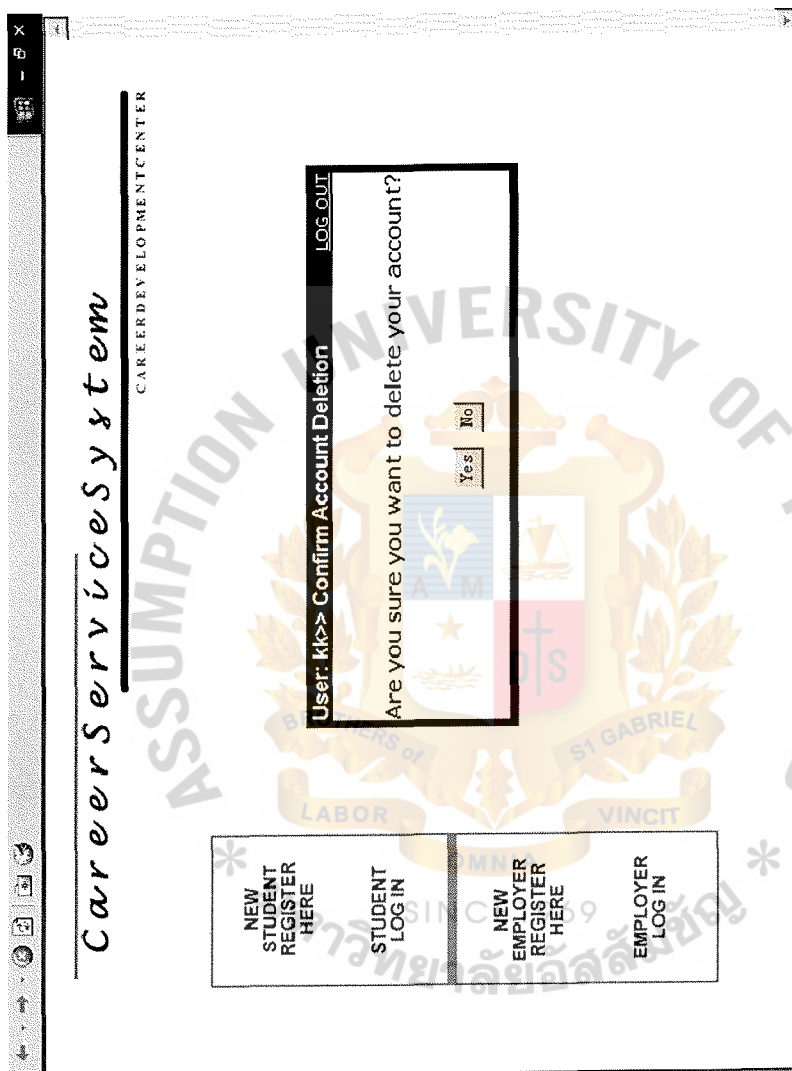
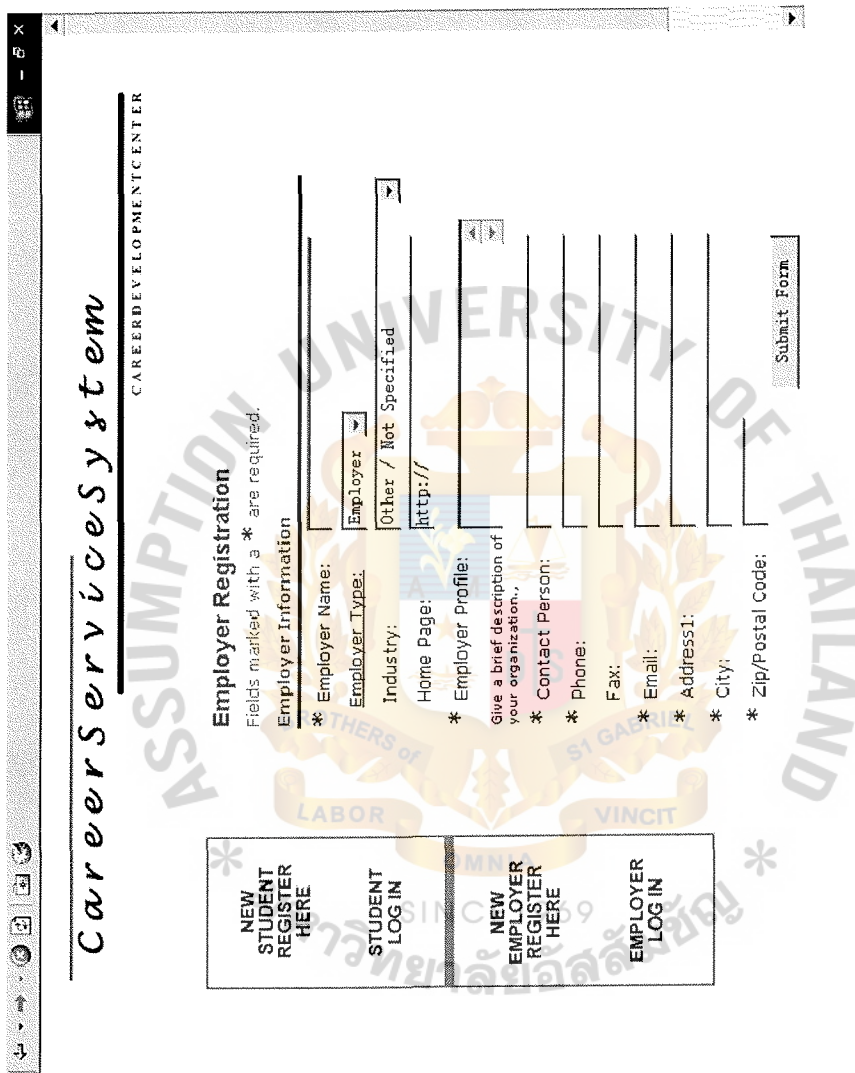


Figure A11. Student User Delete Account.

Figure A12. New Employer User Registration[⌘]



Career Services System

CAREERDEVELOPMENTCENTER

NEW STUDENT REGISTER HERE	
STUDENT LOG IN	
NEW EMPLOYER REGISTER HERE	
EMPLOYER LOG IN	

Advertising Jobs	
Registered Users log in here.	
Login:	<input type="text" value="Pongaree"/>
Password:	<input type="password" value="*****"/>
<input type="button" value="Log In"/>	

Figure A13. Old Employer User Log In.

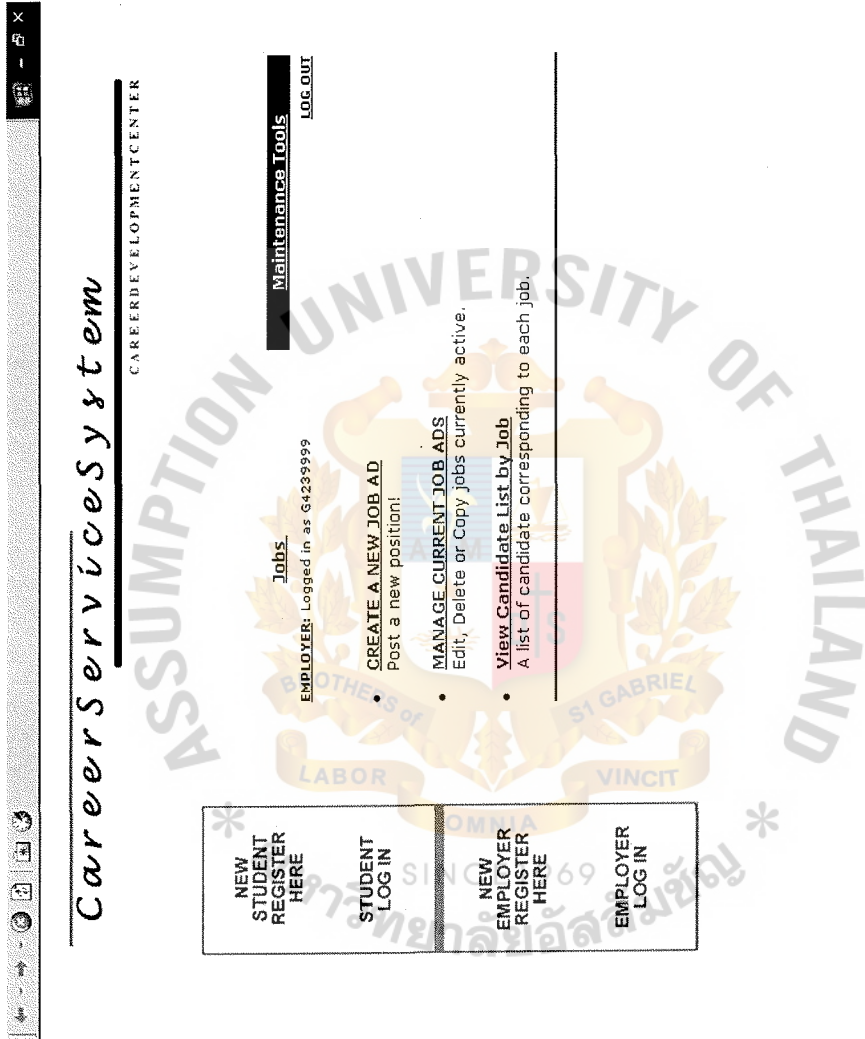


Figure A14. Employer User Account Details.

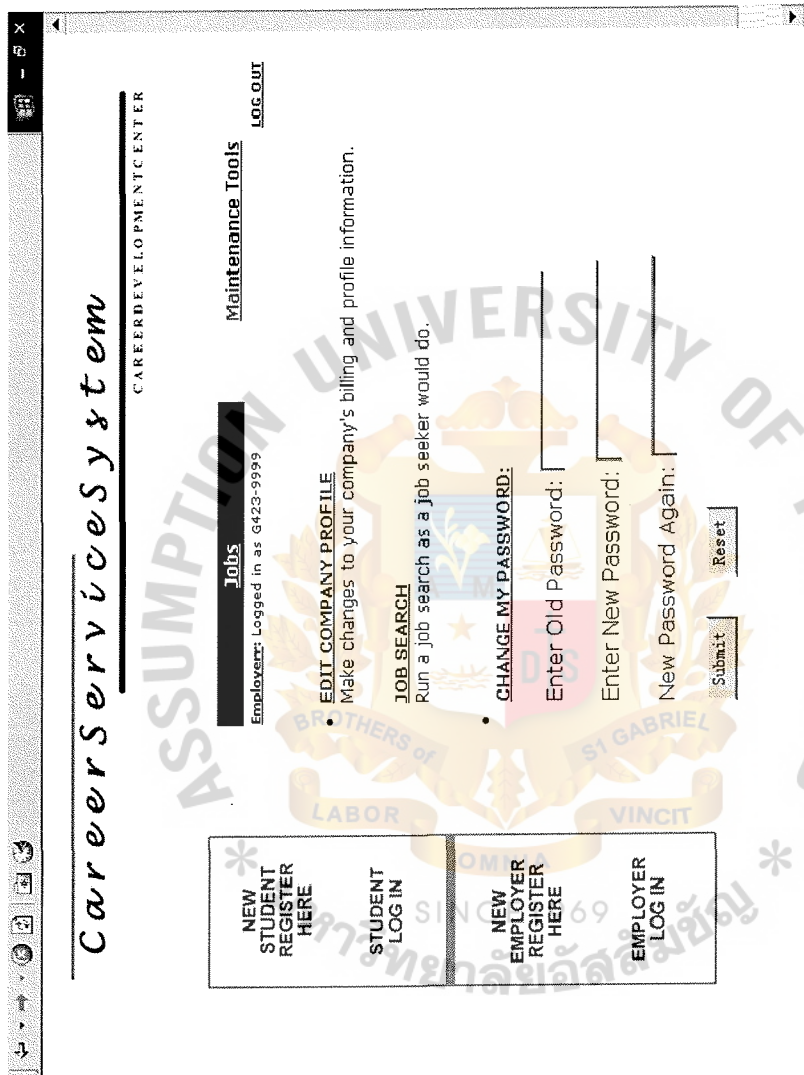


Figure A17. Employer User Account Maintenance Tools.

NEW STUDENT REGISTER HERE

STUDENT LOGIN

NEW EMPLOYER REGISTER HERE

EMPLOYER LOGIN

CareerServicesystem

CAREERDEVELOPMENTCENTER

Edit Employer Profile

Employer Information

* Employer Name: Pongaree

Industry: Construction

HomePage: http://pongaree.com

Employer Profile: Pongaree Celling Inc.

Give a brief description include size, number of employees, etc.

Contact Information

* Address: 11111/22222/33333/Address

* City:

* Zip: 10240

* Contact Person: Pongaree app

* Phone: 12345678

* Email: xqlk3@yahoo.com

Submit Changes

Figure A18. Employer User Edit Company Profile.

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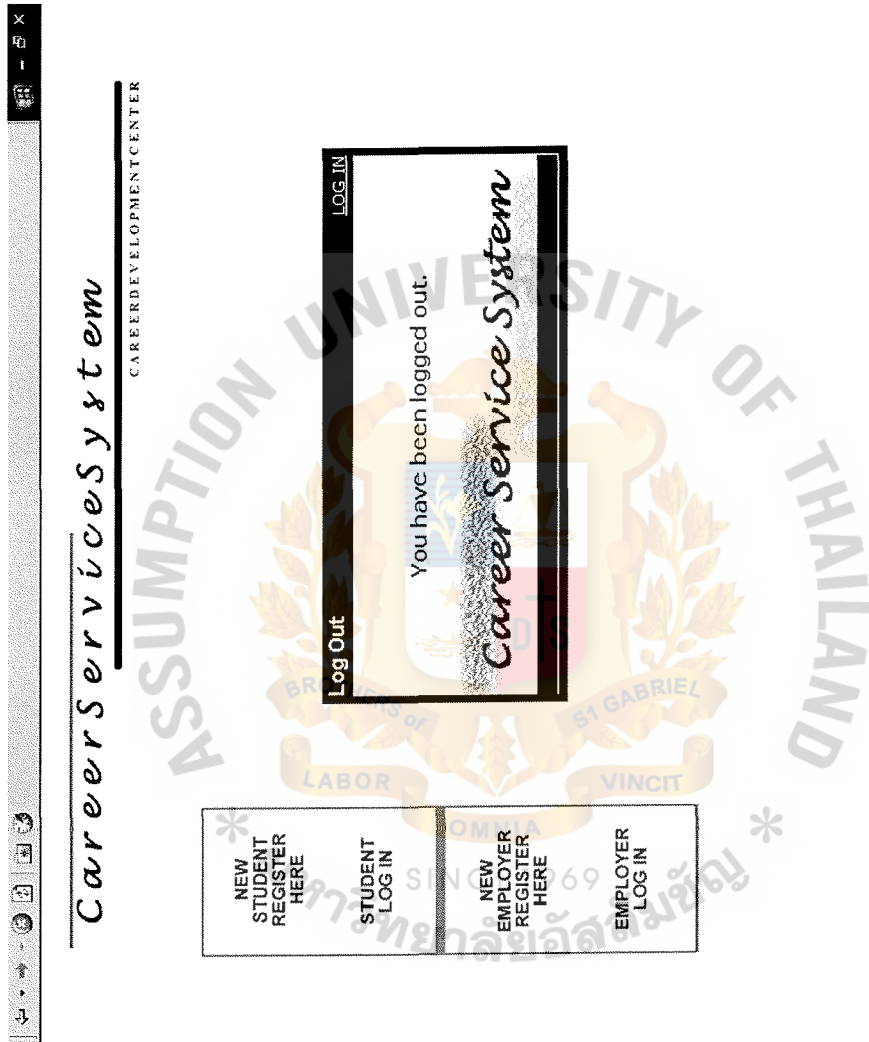
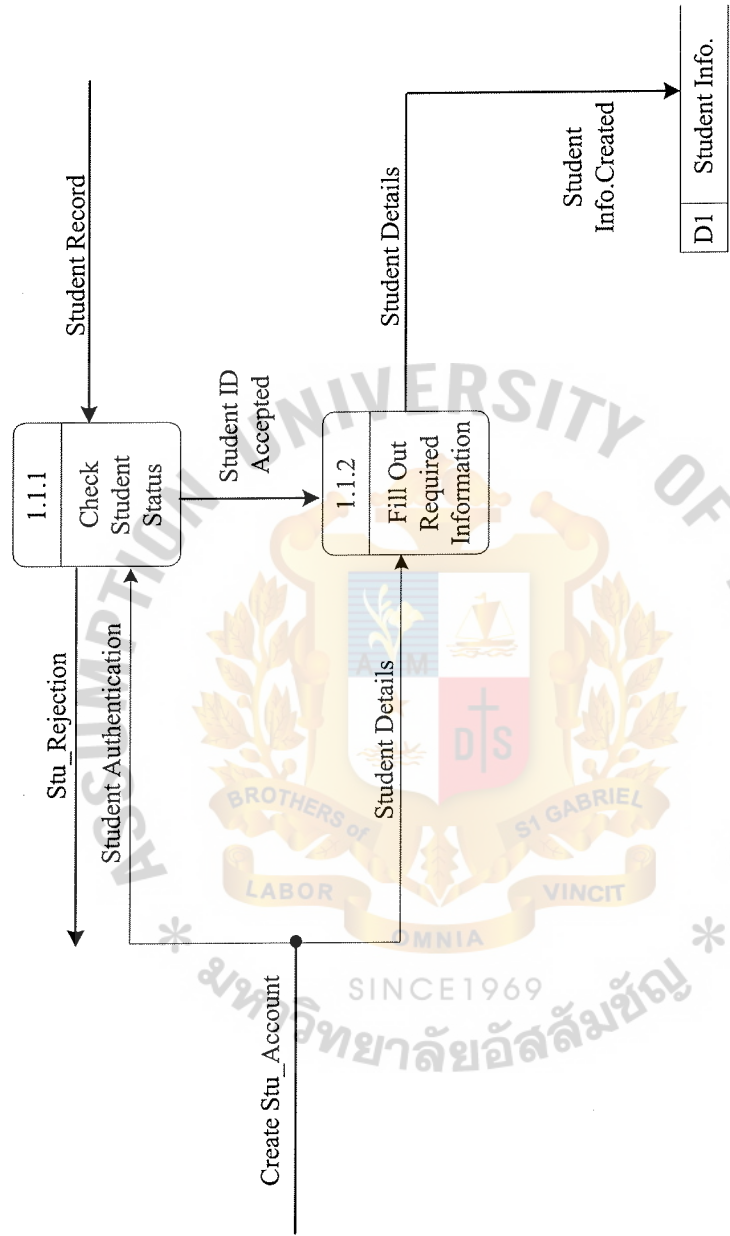


Figure A21. Student/Employer User Log Out.



APPENDIX B
DATA FLOW DIAGRAM



FigureB1.. Data Flow Diagram level 2 for Process 1.1*

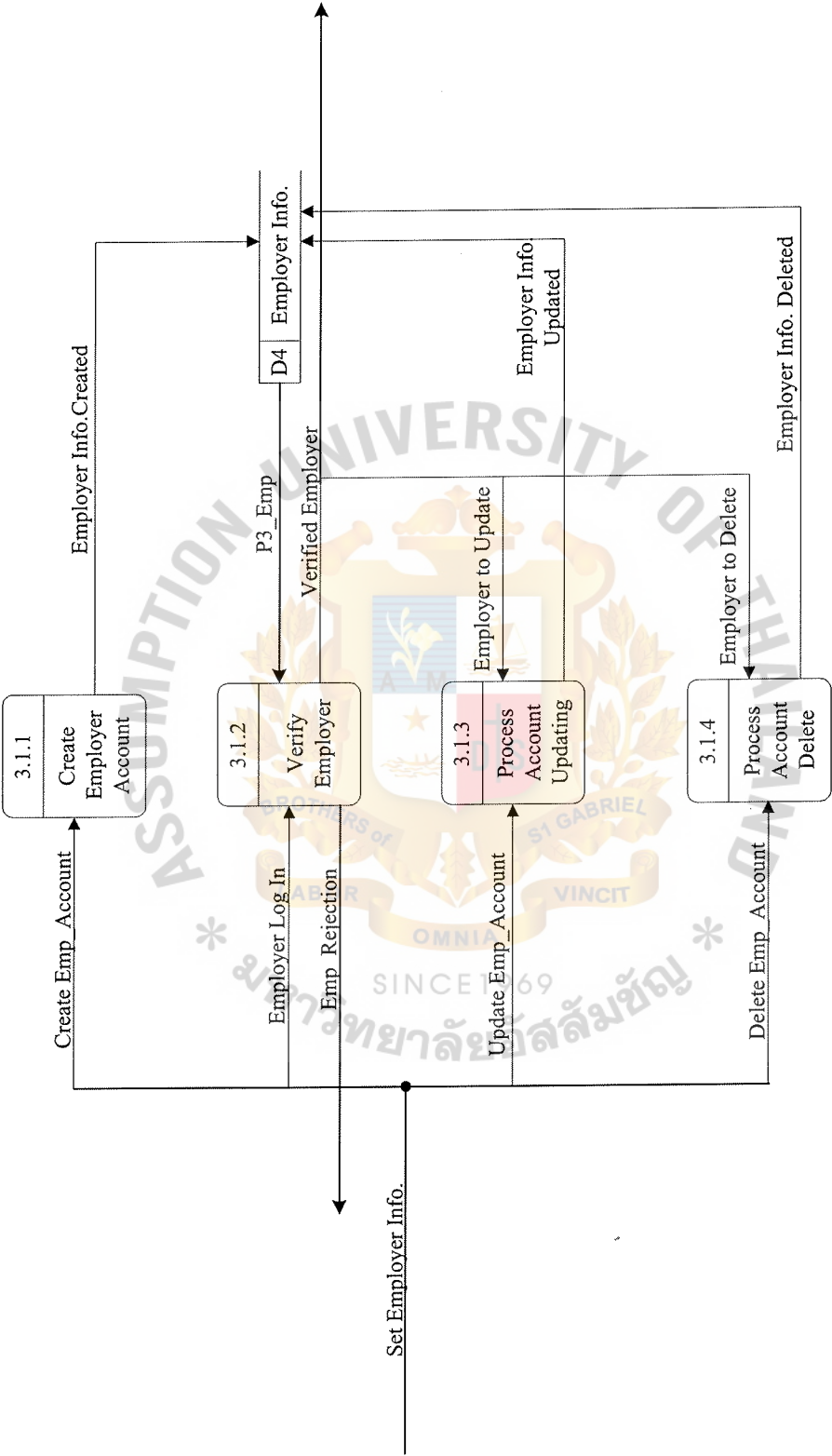


Figure B2. Data Flow Diagram level 2 for Process 3.1*

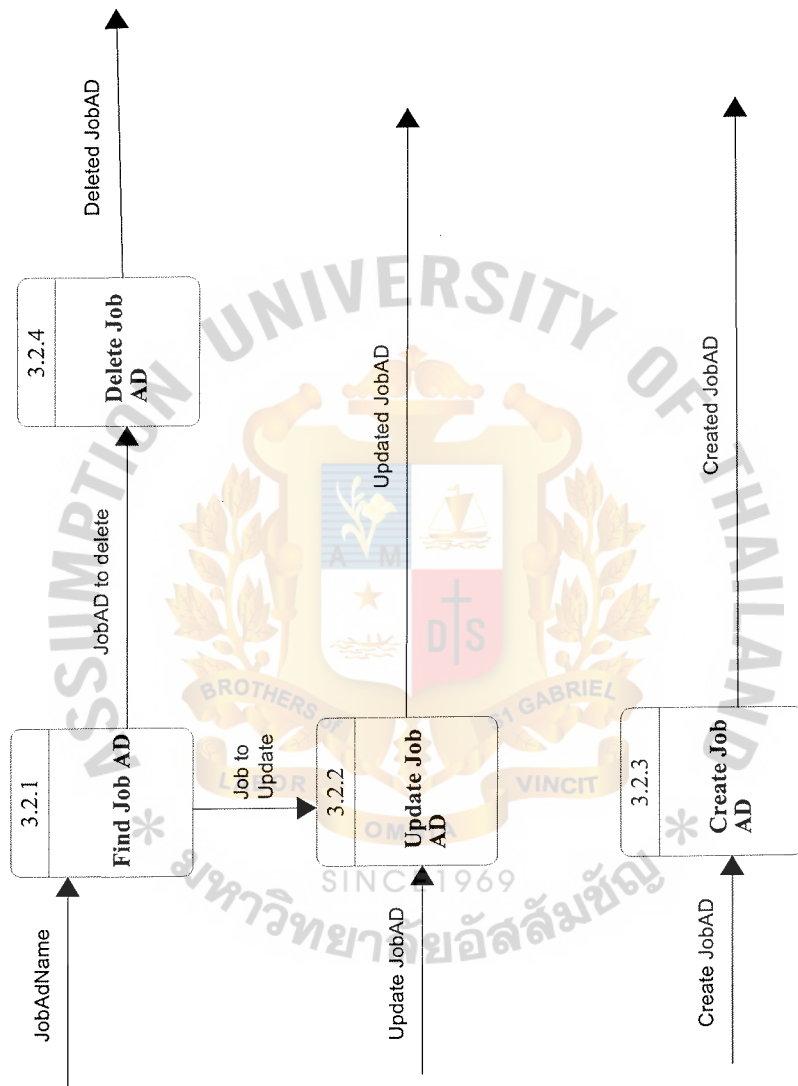


Figure B3. Data Flow Diagram level 2 for Process 3.2.

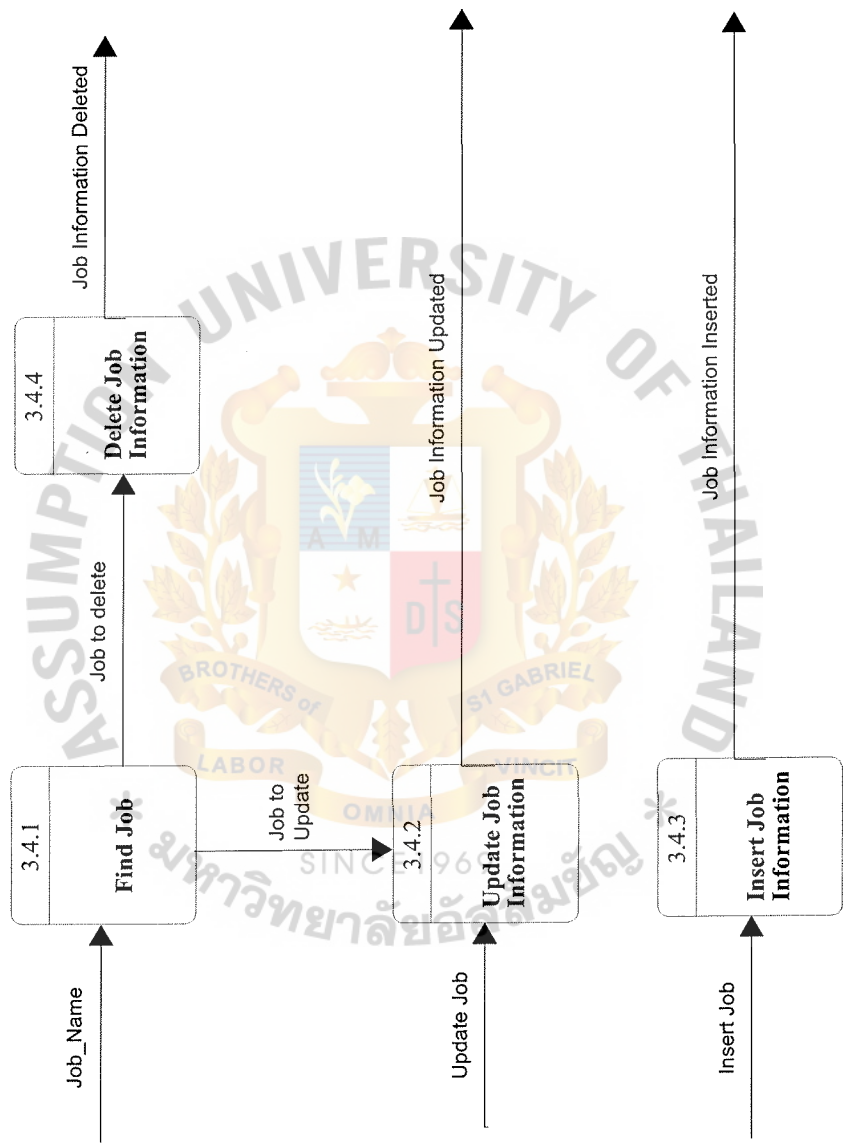


Figure B4. Data Flow Diagram level 2 for Process 3.4.

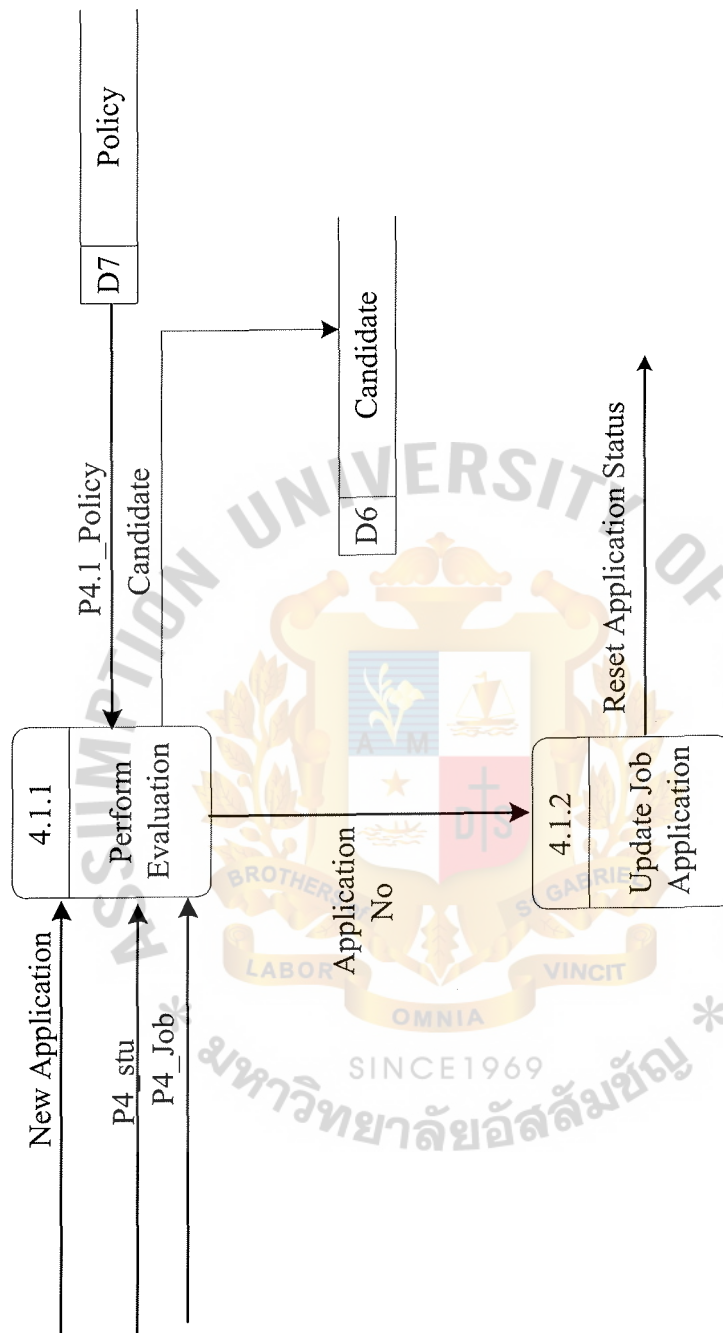


Figure B5. Data Flow Diagram level 2 for Process 4.1.

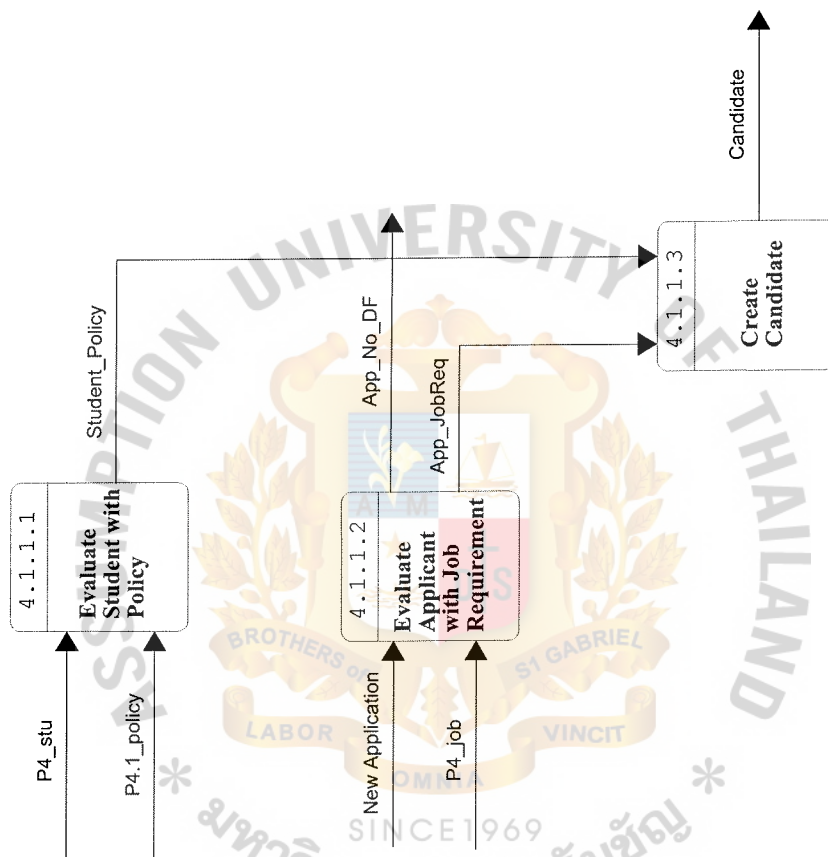


Figure B6. Data Flow Diagram level 3 for Process 4.1.1.*

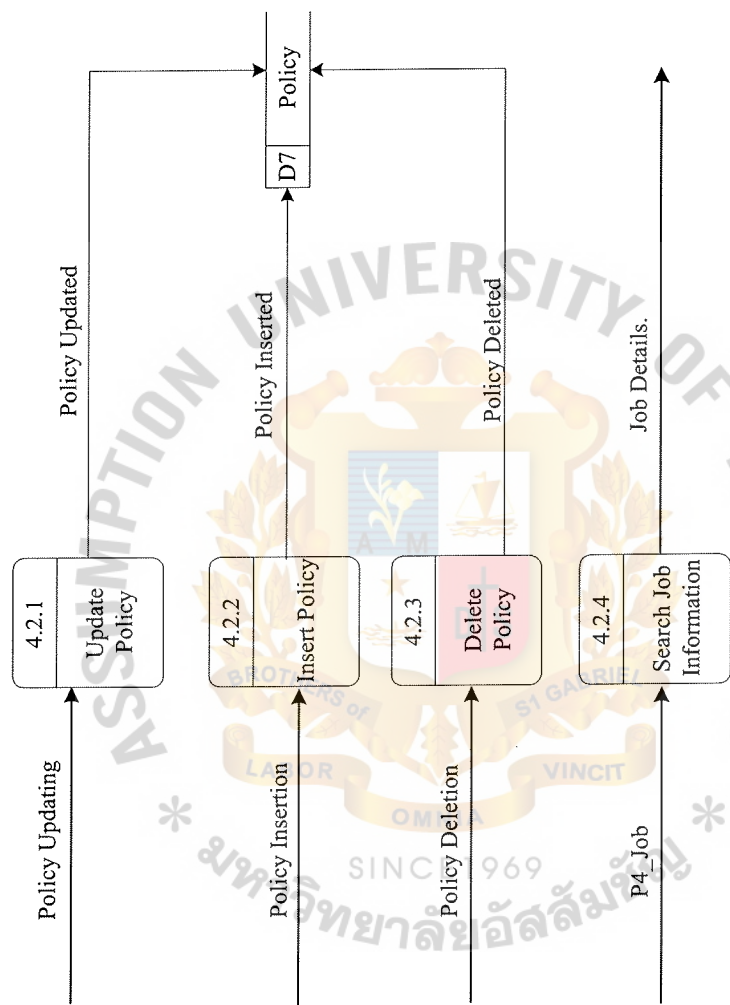


Figure B7. Data Flow Diagram level 2 for Process 4.2.

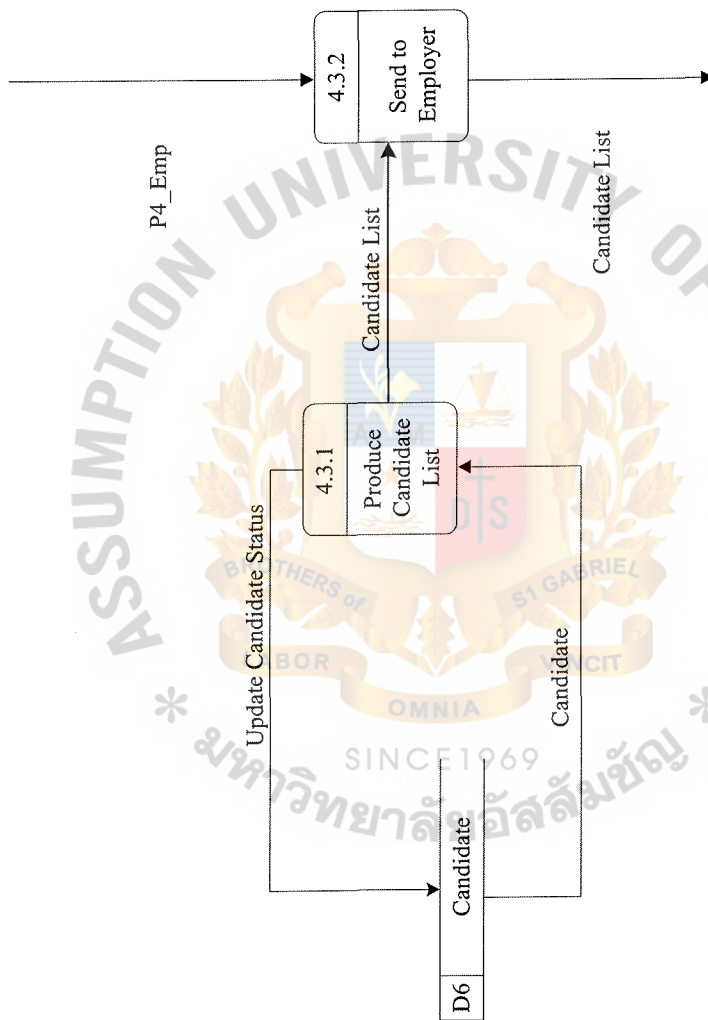


Figure B8. Data Flow Diagram level 2 for Process 4.3.



APPENDIX C

PROCESS SPECIFICATION

Career Service System	Process
Description: an Internet Career Service for the students in a university in order to effectively manage the student employment application	
Process #: 0	
Process Description: 1. Maintain student information and control student access. 2. Take Application and provide job search for studrntr. 3. Maintain job information and control access of employers. 4. Maintain candidate and send lists of candidate to employers. 5. Send interview outcomes to students and generate reports for manager.	
Location:	
Context (CONTEXT)	
Input Flows: Job Search Request Job to Apply Interview Outcome Student Record Set Policy Set Job Info. Set Student Info. Set Employer Info. Set_JobAD	
Output Flows: Job Matching Search Candidate List New Job AD Report Interview Outcome Mail Emp_Rejection Stu_Rejection Job Details	
Date Last Altered: 02-10-11	Date Created: 02-10-3

Check Student Status	Process
Description: Make sure that the student is currently enrolled in the registrar system.	
Process #: 1.1.1	
Date: 02-10-23 Time: 05:47:16 AM	Project: PJ1006 Page: 2
Detailed Listing -- Alphabetically All Process Entries -- Data Flow Diagrams	

Process Description:
use the student id with password to query the student registrar system
if the student is authorized then continue the following process
else repeat the student id and password entry.

Location:
Create Student Account (1.1)

Input Flows:
Student Record
Student authentication
Output Flows:
Stu_Rejection
Student ID Accepted

Date Last Altered: 02-10-6 Date Created: 02-10-4

Create Candidate Process

Description:
Create candidate.
Process #: 4.1.1.3
Process Description:
If student_policy's evaluation and app_jobreq's evaluation is 1,
then create that candidate.
Else discard the applicant.
Query another new application.

Location:
Perform Evaluation (4.1.1)

Input Flows:
Student_Policy
App_JobReq
Output Flows:
Candidate

Date Last Altered: 02-10-6 Date Created: 02-10-6

Create Employer Account Process

Description:
Creates the employer account.

Date: 02-10-23 Project: PJ1006 Page: 3
Time: 05:47:16 AM

Detailed Listing -- Alphabetically
All Process Entries -- Data Flow Diagrams

Process #: 3.1.1
Process Description:
The user specify an user name
if the user name is not used by someone else then continue

the form fill out process which leads the user to the completion of an account creation.
else repeat ask user to specify an user name.

Location:

Maintain Employer Information (3.1)

Input Flows:

Create Emp_Account

Output Flows:

Employer Info.Created

Date Last Altered: 02-10-6

Date Created: 02-10-4

Create Job AD

Process

Description:

Employer creates its job offer information.

Process #: 3.2.3

Process Description:

Employer creates a new job offer by filling the job offer form.

Location:

Take Job Offer (3.2)

Input Flows:

Create JobAD

Output Flows:

Created JobAD

Date Last Altered: 02-10-22

Date Created: 02-10-6

Create Student Account

Process

Description:

Process will verify eligibility for the service and set up a valid account.

Process #: 1.1

Date: 02-10-23

Project: PJ1006

Page: 4

Time: 05:47:16 AM

Detailed Listing -- Alphabetically

All Process Entries -- Data Flow Diagrams

Process Description:

Check the student authentication with Registrar office.

If it is valid then insert the ID into the student datastore.

and send a continue form to the student for completing the account creation.

else a rejection send to the student.

Location:

Process Student Information (1)

Input Flows:

Student Record

Create Stu_Account

Output Flows:
Stu_Rejection
Student Info.Created
Date Last Altered: 02-10-6 Date Created: 02-10-4

Delete Job AD Process

Description:
Employer deletes its job offer information.
Process #: 3.2.4
Process Description:
Deletes the row of record according to the Job_No.
Location:
Take Job Offer (3.2)
Input Flows:
JobAD to delete
Output Flows:
Deleted JobAD

Date Last Altered: 02-10-22 Date Created: 02-10-6

Delete Job Information Process

Description:
Process the request of deleting the job information..
Process #: 3.4.4
Detailed Listing -- Alphabetically
All Process Entries -- Data Flow Diagrams

Date: 02-10-23 Project: PJ1006 Page: 5
Time: 05:47:16 AM

Process Description:
Deletes the row of record according to the Job_No.

Location:
Maintain Job Information (3.4)
Input Flows:
Job to delete
Output Flows:
Job Information Deleted

Date Last Altered: 02-10-11 Date Created: 02-10-4

Delete Policy Process

Description:
Process the request of deleting the policy.
Process #: 4.2.3
Process Description:
Delete the row of record according to the Policy_No.
Location:

Maintain Policy (4.2)

Input Flows:
Policy Deletion
Output Flows:
Policy Deleted

Date Last Altered: 02-10-6

Date Created: 02-10-4

Display Job Information

Process

Description:

Triggered by a validated student ID. then give information about a job according user's Job Search Request.

Process #: 2.1

Process Description:

Query the Job information according the Job Search Request . then display the jobs matching search on the screen that let the user to make choice with.

Date: 02-10-23

Project: PJ1006

Page: 6

Time: 05:47:16 AM

Detailed Listing -- Alphabetically
All Process Entries -- Data Flow Diagrams

Location:

Take Application (2)

Input Flows:
Job Search Request
Validated Student ID
P2_job

Output Flows:
Job Matching Search
App_Form

Date Last Altered: 02-10-5

Date Created: 02-10-4

Evaluate Applicant

Process

Description:

It is triggered by a new application arrives, stoped by the end of application datastore is reached.

Process #: 4.1

Process Description:

1. perform evaluation.
2. update the application status.

Location:

Qualify Applicant (4)

Input Flows:
New Application

P4_stu
P4.1_policy
P4_job
Output Flows:
Update Application sttus
Candidate

Date Last Altered: 02-10-6 Date Created: 02-10-4

Evaluate Applicant with Job Requirement	Process
Description:	
Evaluate the applicant if he/she is qualified for the specific job requirement.	
Date: 02-10-23	Project: PJ1006 Page: 7
Time: 05:47:16 AM	
Detailed Listing -- Alphabetically	
All Process Entries -- Data Flow Diagrams	

Process #: 4.1.1.2
Process Description:
Query Application and Job, then make a comparison.
Location:
Perform Evaluation (4.1.1)
Input Flows:
New Application
P4_job
Output Flows:
App_No_DF
App_JobReq
Date Last Altered: 02-10-6 Date Created: 02-10-6

Evaluate Student with Policy	Process
Description:	
Evaluate the student if he/she is satisfactory to the university policy.	
Process #: 4.1.1.1	
Process Description:	
Query student and policy, then make a comparison.	
Location:	
Perform Evaluation (4.1.1)	
Input Flows:	
P4_stu	
P4.1_policy	
Output Flows:	
Student_Policy	
Date Last Altered: 02-10-6	Date Created: 02-10-6

Fill Out Required Information	Process

Description:

Provide student a form to complete the account creation.

Process #: 1.1.2

Date: 02-10-23

Project: PJ1006

Page: 8

Time: 05:47:16 AM

Detailed Listing -- Alphabetically
All Process Entries -- Data Flow Diagrams

Process Description:

Triggered by "Student ID Accepted".

Display a form to the user.

Complete the account when the form is submitted.

Location:

Create Student Account (1.1)

Input Flows:

Student Details

Student ID Accepted

Output Flows:

Student Details

Date Last Altered: 02-10-6

Date Created: 02-10-4

Find Job

Process

Description:

It provides the manage the job information access.

Process #: 3.4.1

Process Description:

finds the job by providing a search key, such as job number, job title.

Location:

Maintain Job Information (3.4)

Input Flows:

Job_Name

Output Flows:

Job to delete

Job to Update

Date Last Altered: 02-10-11

Date Created: 02-10-6

Find Job AD

Process

Description:

It provides the employer the job offer access.

Process #: 3.2.1

Date: 02-10-23

Project: PJ1006

Page: 9

Time: 05:47:16 AM

Detailed Listing -- Alphabetically
All Process Entries -- Data Flow Diagrams

Process Description:

finds the job by providing a search key, such as job number, job title.

Location:

Take Job Offer (3.2)

Input Flows:

JobAdName

Output Flows:

Job to Update

JobAD to delete

Date Last Altered: 02-10-22

Date Created: 02-10-6

Generate Interview Outcome Mail

Process

Description:

It sends interview outcome mail to the student.

Process #: 5.2

Process Description:

Retrieve the interview result database and send mails until the new results have all been processed.

Location:

Process Interview Outcome (5)

Input Flows:

Interview Result Info

Output Flows:

Interview Outcome Mail

Update intv_result status

Date Last Altered: 02-10-11

Date Created: 02-10-4

Insert Job Information

Process

Description:

Manager inserts a new job entry.

Process #: 3.4.3

Process Description:

Manager rechecks the jobs on the reports then insert a new job entry

Date: 02-10-23

Project: PJ1006

Page: 10

Time: 05:47:16 AM

Detailed Listing -- Alphabetically

All Process Entries -- Data Flow Diagrams

and its details according to the job offer reports.

Location:

Maintain Job Information (3.4)

Input Flows:

Insert Job

Output Flows:

Job Information Inserted

Date Last Altered: 02-10-11

Date Created: 02-10-4

Insert Policy	Process
Description:	
Process policy insertion.	
Process #: 4.2.2	
Process Description:	
Insert a policy with attributes into the datastore.	
Location:	
Maintain Policy (4.2)	
Input Flows:	
Policy Insertion	
Output Flows:	
Policy Inserted	
Date Last Altered: 02-10-6	Date Created: 02-10-4

Maintain Employer Information	Process
Description:	
Employer maintains its own account.	
Process #: 3.1	
Process Description:	
1. Create employer account	
2. Verify employer	
3. Update employer account	
4. Delete employer account	
Date: 02-10-23	Project: PJ1006
Time: 05:47:16 AM	Page: 11
Detailed Listing -- Alphabetically	
All Process Entries -- Data Flow Diagrams	

Location:	
Maintain Job Offer (3)	
Input Flows:	
Set Employer Info.	
P3_emp	
Output Flows:	
Employer Maintenance	
Emp_Rejection	
Verified Employer	
Date Last Altered: 02-10-6	Date Created: 02-10-4

Maintain Job Information	Process
Description:	
It operates on job datastore.	
Process #: 3.4	
Process Description:	

- 1.helps the manager find the job user requested, then apply delete or update operation on it
- 2.creates a new job entry and its attributes.

Location:

Maintain Job Offer (3)

Input Flows:

Set Job Info.

Output Flows:

Job Maintenance

Date Last Altered: 02-10-11

Date Created: 02-10-4

Maintain Job Offer

Process

Description:

It operates on JobOffer datastore.

Process #: 3

Process Description:

- 1.helps the employer find the job user requested, then apply delete or update operation on it
- 2.creates a new job entry and its attributes.

Date: 02-10-23

Project: PJ1006

Page: 12

Time: 05:47:16 AM

Detailed Listing -- Alphabetically

All Process Entries -- Data Flow Diagrams

Location:

Career Service System (0)

Input Flows:

Set Job Info.

Set Employer Info.

P3_emp

Set_JobAD

Output Flows:

New Job AD Report

Emp_Rejection

Job Maintenance

Employer Maintenance

Date Last Altered: 02-10-11

Date Created: 02-10-4

Maintain Policy

Process

Description:

It is maintained by the manager.

Process #: 4.2

Process Description:

1. Update Policy
2. Insert Policy
3. Delete Policy

4. Search Job Information

Location:

Qualify Applicant (4)

Input Flows:

Set Policy

P4_job

Output Flows:

Policy maintenance

Job Details

Date Last Altered: 02-10-6

Date Created: 02-10-4

Perform Evaluation

Process

Description:

Evaluation the student's applicant qualification.

Process #: 4.1.1

Date: 02-10-23

Project: PJ1006

Page: 13

Time: 05:47:16 AM

Detailed Listing -- Alphabetically

All Process Entries -- Data Flow Diagrams

Process Description:

Query student and policy, then make a comparison.

Query Application and Job, then make a comparison.

Location:

Evaluate Applicant (4.1)

Input Flows:

New Application

P4_stu

P4.1_policy

P4_job

Output Flows:

Candidate

App_No_DF

Date Last Altered: 02-10-6

Date Created: 02-10-4

Process Employer Delete

Process

Description:

Employer deletes its own account.

Process #: 3.1.4

Location:

Maintain Employer Information (3.1)

Input Flows:

Delete Emp_Account

Employer to Delete

Output Flows:

Employer Info. Deleted

Date Last Altered: 02-10-6

Date Created: 02-10-4

Process Employer Update

Process

Description:

Employer updates its own non-key attributes.

Process #: 3.1.3

Location:

Maintain Employer Information (3.1)

Date: 02-10-23

Project: PJ1006

Page: 14

Time: 05:47:16 AM

Detailed Listing -- Alphabetically
All Process Entries -- Data Flow Diagrams

Input Flows:

Update Emp_Account

Employer to Update

Output Flows:

Employer Info. Updated

Date Last Altered: 02-10-6

Date Created: 02-10-4

Process Interview Outcome

Process

Description:

It operates on interview outcome datastore.

Process #: 5

Process Description:

1. Produce interview outcome report to manager.
2. Send interview outcome mail to student.

Location:

Career Service System (0)

Input Flows:

Interview Outcome

Output Flows:

Interview Outcome Reports

Interview Outcome Mail

Date Last Altered: 02-10-6

Date Created: 02-10-4

Process Student Delete

Process

Description:

Student deletes its own account.

Process #: 1.4

Location:

Process Student Information (1)

Input Flows:

Delete Stu_Account

Student to Delete

Output Flows:
Student Info. Deleted
Date: 02-10-23 Project: PJ1006 Page: 15
Time: 05:47:16 AM
Detailed Listing -- Alphabetically
All Process Entries -- Data Flow Diagrams

Date Last Altered: 02-10-6 Date Created: 02-10-4

Process Student Information Process

Description:
Operates on student datastore.

Process #: 1

Process Description:

1. Create Student Account
2. Verify Student
3. Update Student Account
4. Delete Student Account

Location:

Career Service System (0)

Input Flows:

Student Record
Set Student Info.
P1_student

Output Flows:

Stu_Rejection
Validated Student ID
Student Maintenance

Date Last Altered: 02-10-6 Date Created: 02-10-4

Process Student Update Process

Description:
Student updates his/her own user account

Process #: 1.3

Process Description:

Update a student's non-key attributes.

Location:

Process Student Information (1)

Input Flows:

Update Stu_Account
Student to Update

Output Flows:

Student Info. Updated

Date: 02-10-23 Project: PJ1006 Page: 16

Time: 05:47:16 AM

Detailed Listing -- Alphabetically

All Process Entries -- Data Flow Diagrams

Date Last Altered: 02-10-6

Date Created: 02-10-4

Produce Candidate List

Process

Description:

It produces a candidate list.

Process #: 4.3.1

Process Description:

1. Query a new candidate, then add it on the list.
2. Update that cadidate status to processed.
3. Repeat until the "end of table" is reached.

Location:

Send Candidate List (4.3)

Input Flows:

Candidate

Output Flows:

Update Candidate Status

Candidate List

Date Last Altered: 02-10-6

Date Created: 02-10-4

Produce Interview Outcome Report

Process

Description:

It sends interview outcome report to manager.

Process #: 5.3

Process Description:

produces varieties of reports by using different query keys.

Date Last Altered: 02-10-11

Date Created: 02-10-4

Produce Job AD Report

Process

Description:

It produces job offer report to manager.

Process #: 3.3

Date: 02-10-23

Project: PJ1006

Page: 17

Time: 05:47:16 AM

Detailed Listing -- Alphabetically

All Process Entries -- Data Flow Diagrams

Process Description:

simply query the job datastore

Location:

Maintain Job Offer (3)

Input Flows:

Job Details

Output Flows:
New Job AD Report
Date Last Altered: 02-10-22 Date Created: 02-10-4

Produce Job Application Process

Description:

Student produces the job application.

Process #: 2.2

Process Description:

filling the required areas of the application form then hand it in with a system generated time stamp.

Location:

Take Application (2)

Input Flows:

Job to Apply

App_Form

Output Flows:

Job Application

Date Last Altered: 02-10-11 Date Created: 02-10-4

Qualify Applicant Process

Description:

It produces candidate list to the specified employer

Process #: 4

Process Description:

1. qualifies student with the university policy.
2. qualifies the application with the job requirements.

Date: 02-10-23

Project: PJ1006

Page: 18

Time: 05:47:16 AM

Detailed Listing -- Alphabetically

All Process Entries -- Data Flow Diagrams

3. lists the student who passes both qualifying processes, then send the list to the employer.

Location:

Career Service System (0)

Input Flows:

Set Policy

New Application

P4_stu

P4_emp

P4_job

Output Flows:

Candidate List

Update Application sttus

Recieve Interview Outcome Process
Description:
It keeps interview outcome information in the datastore.
Process #: 5.1
Process Description:
recieve interview outcomes from employers, then store them in
the datastore format.
Location:
Process Interview Outcome (5)
Input Flows:
Interview Outcome
Output Flows:
Interview Result Info
Date Last Altered: 02-10-11 Date Created: 02-10-4

Search Job Information Process
Description:
Get the job details for supporting manager to designi a university policy for
the specific job.
Date: 02-10-23 Project: PJ1006 Page: 19
Time: 05:47:16 AM
Detailed Listing -- Alphabetically
All Process Entries -- Data Flow Diagrams

Process #: 4.2.4
Process Description:
Query the job data store, then display the job details on the screen
for manager make a suitable policy for that job.
Location:
Maintain Policy (4.2)
Input Flows:
P4_job
Output Flows:
Job Details
Date Last Altered: 02-10-11 Date Created: 02-10-4

Send Candidate List Process
Description:
It sends the candidate list to a specific email address.
Process #: 4.3
Process Description:
lists the student who passes both qualifying processes, then

send the list to the employer.

Location:

Qualify Applicant (4)

Input Flows:

Candidate

P4_emp

Output Flows:

Candidate List

Update Candidate Status

Date Last Altered: 02-10-11

Date Created: 02-10-4

Send to Employer

Process

Description:

Email a candidate list to the specified employer.

Process #: 4.3.2

Date: 02-10-23

Project: PJ1006

Page: 20

Time: 05:47:16 AM

Detailed Listing -- Alphabetically

All Process Entries -- Data Flow Diagrams

Process Description:

Query the Employer datastore for the email address.
then send the corresponding candidate list.

Location:

Send Candidate List (4.3)

Input Flows:

Candidate List

P4_emp

Output Flows:

Candidate List

Date Last Altered: 02-10-6

Date Created: 02-10-4

Take Application

Process

Description:

It maintains student's applications

Process #: 2

Process Description:

1. helps student locate their interesting jobs
2. recieves application forms filled in by students then store it in a datastore.

Location:

Career Service System (0)

Input Flows:

Job Search Request

Job to Apply

Validated Student ID
P2_job
Output Flows:
Job Matching Search
Job Application
Date Last Altered: 02-10-11 Date Created: 02-10-4

Take Job AD	Process
Description: It maintains employer's original job offer information.	
Date: 02-10-23	Project: PJ1006 Page: 21
Time: 05:47:16 AM	
Detailed Listing -- Alphabetically	
All Process Entries -- Data Flow Diagrams	

Process #: 3.2
Process Description:
1.Transform the job offer forms handed in by employers into a datastore.
2.helps the employer locate their jobs posted before for updating or deleting.

Location:
Maintain Job Offer (3)
Input Flows:
Verified Employer
Set_JobAD
Output Flows:
JobAD_Maintenace

Date Last Altered: 02-10-22 Date Created: 02-10-4

Update Job AD	Process
Description: The employer updates its previous job offer information.	
Process #: 3.2.2	
Process Description: Update a job offer's non-key attributes.	
Location: Take Job Offer (3.2)	
Input Flows: Update JobAD Job to Update	
Output Flows: Updated JobAD	
Date Last Altered: 02-10-22	Date Created: 02-10-6

Update Job Application	Process
------------------------	---------

Description:

The process updates the application's status to processed.

Process #: 4.1.2

Date: 02-10-23

Project: PJ1006

Page: 22

Time: 05:47:16 AM

Detailed Listing -- Alphabetically
All Process Entries -- Data Flow Diagrams

Process Description:

Update Job_Status to equal to 1.

Query one new application.

Location:

Evaluate Applicant (4.1)

Input Flows:

App_No_DF

Output Flows:

Update Application status

Date Last Altered: 02-10-6

Date Created: 02-10-4

Update Job Information

Process

Description:

The manager processes job updating.

Process #: 3.4.2

Process Description:

Update a job's non-key attributes.

Location:

Maintain Job Information (3.4)

Input Flows:

Update Job

Job to Update

Output Flows:

Job Information Updated

Date Last Altered: 02-10-6

Date Created: 02-10-4

Update Policy

Process

Description:

Process policy updating.

Process #: 4.2.1

Process Description:

Update a policy's non-key attributes.

Date: 02-10-23

Project: PJ1006

Page: 23

Time: 05:47:16 AM

Detailed Listing -- Alphabetically
All Process Entries -- Data Flow Diagrams

Location:
Maintain Policy (4.2)
Input Flows:
Policy Updating
Output Flows:
Policy Updated
Date Last Altered: 02-10-6 Date Created: 02-10-4

Verify Employer Process
Description:
Verifies the employer log in information, protect user's account from unauthorized log in.
Process #: 3.1.2
Process Description:
Check the user name with the password to make sure the user is authorized.
if the user name match the password then continue the service to the user.
else send a rejection notification to the user.

Location:
Maintain Employer Information (3.1)
Input Flows:
Employer Log In
P3_emp
Output Flows:
Emp_Rejection
Verified Employer
Employer to Update
Employer to Delete
Date Last Altered: 02-10-5 Date Created: 02-10-4

Verify Student Process
Description:
Verifies the student log in information, protect user's account from unauthorized log in.
Process #: 1.2
Date: 02-10-23 Project: PJ1006 Page: 24
Time: 05:47:16 AM
Detailed Listing -- Alphabetically
All Process Entries -- Data Flow Diagrams

Process Description:
Verify the user name with the password to make sure the user is authorized.
if the user name match the password then continue the service to the user.

else send a rejection notification to the user.

Location:

Process Student Information (1)

Input Flows:

Student Log In

P1_student

Output Flows:

Stu_Rejection

Validated Student ID

Student to Update

Student to Delete

Date Last Altered: 02-10-6

Date Created: 02-10-4





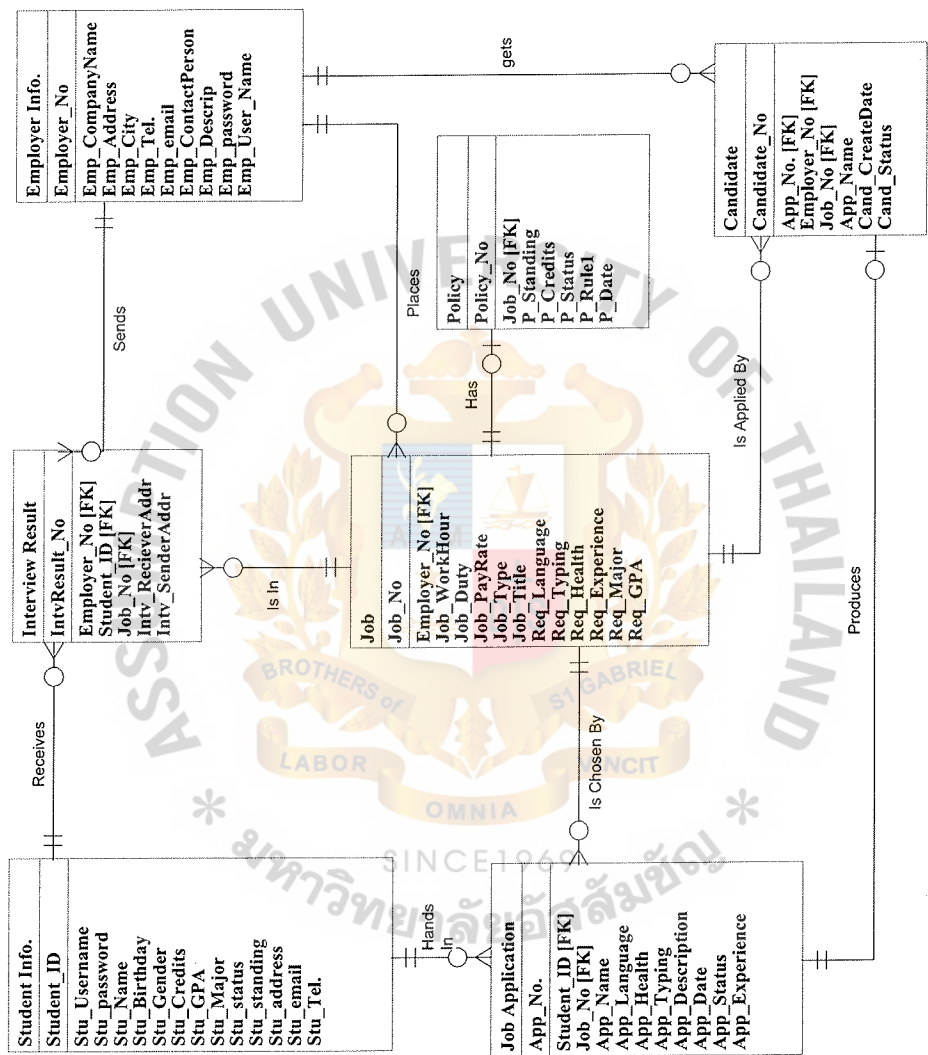


Figure D1. Full Attribute Entity Relationship Diagram for Career Service System

Detailed Listing -- Alphabetically
All Entity Entries -- Entity Relationship

Candidate	Entity
Description: contains the information about a candidate.	
Composition: Candidate_No : Integer 4 App_No. : Integer 4 Employer_No : Employer_No Job_No : Job_No App_Name : Char Cand_CreateDate : Date Cand_Status : Binary	
Primary Key: Index Name: Generated by VAW Column(s): Candidate_No [ASC]	
Foreign Key(s): Employer Info. 'gets' Candidate Employer_No -> Employer_No On Delete Restrict On Update Restrict On Insert of Child Row Restrict Job 'Is Applied By' Candidate Job_No -> Job_No On Delete Restrict On Update Restrict On Insert of Child Row Restrict Job Application 'Produces' Candidate App_No. -> App_No. On Delete Restrict On Update Restrict On Insert of Child Row Restrict	
Location: ERD	
Attached relationships on ERD:	
[gets]	MIN: 1 MAX: 1
Employer Info. [Produces]	MIN: 1 MAX: 1
Job Application [Is Applied By]	MIN: 1 MAX: 1
Job	

Detailed Listing -- Alphabetically
All Entity Entries -- Entity Relationship

Date Last Altered: 02-10-5		Date Created: 02-10-4

Employer Info.	Entity	
Description:		
contains the information about a employer.		
Composition:		
Employer_No : Employer_No		
Emp_CompanyName : Char		
Emp_Address : Char		
Emp_City : Char		
Emp_Tel. : Integer 4		
Emp_email : Char		
Emp_ContactPerson : Char		
Emp_Descrip : Char		
Emp_password : Char		
Emp_User_Name : Char		
Primary Key:		
Index Name: Generated by VAW		
Column(s): Employer_No [ASC]		
Location:		
ERD		
Attached relationships on ERD:		
Sends		MIN: 0 MAX: many
Interview Result		
gets		MIN: 0 MAX: many
Candidate		
Places		MIN: 0 MAX: many
Job		
Date Last Altered: 02-10-6		Date Created: 02-10-4

Interview Result	Entity	
Description:		
The resultl is generated only if the student is qulified for the specific job.		
Composition:		
IntvResult_No : Integer 4		
Employer_No : Employer_No		
Date: 02-10-23	Project: PJ1006	Page: 3
Time: 05:53:12 AM		
Detailed Listing -- Alphabetically		
All Entity Entries -- Entity Relationship		

Student_ID : Student_ID		
Job_No : Job_No		
Intv_RecieverAddr : Char		

Intv_SenderAddr : Char
Primary Key:
Index Name: Generated by VAW
Column(s): IntvResult_No [ASC]
Foreign Key(s):
Student Info. 'Receives' Interview Result
Student_ID -> Student_ID
On Delete Restrict
On Update Restrict
On Insert of Child Row Restrict
Job 'Is In' Interview Result
Job_No -> Job_No
On Delete Restrict
On Update Restrict
On Insert of Child Row Restrict
Employer Info. 'Sends' Interview Result
Employer_No -> Employer_No
On Delete Restrict
On Update Restrict
On Insert of Child Row Restrict

Location:

ERD

Attached relationships on ERD:

[Receives]	MIN: 1 MAX: 1
Student Info.	
[Is In]	MIN: 1 MAX: 1
Job	
[Sends]	MIN: 1 MAX: 1
Employer Info.	

Date Last Altered: 02-10-5

Date Created: 02-10-4

Job Entity

Description:

contains the information about a job

Date: 02-10-23

Project: PJ1006

Page: 4

Time: 05:53:12 AM

Detailed Listing -- Alphabetically

All Entity Entries -- Entity Relationship

Composition:

Job_No : Job_No

Employer_No : Employer_No

Job_WorkHour : Integer 4

Job_Duty : Char

Job_PayRate : Money

Job_Type : Char

Job_Title : Char

Req_Language : Char
Req_Typing : Binary
Req_Health : Integer 4
Req_Experience : Char
Req_Major : Char
Req_GPA : Float
Primary Key:
Index Name: Generated by VAW
Column(s): Job_No [ASC]
Foreign Key(s):
Employer Info. 'Places' Job
Employer_No -> Employer_No
On Delete Restrict
On Update Restrict
On Insert of Child Row Restrict

Location:
ERD

Attached relationships on ERD:
Is In MIN: 0 MAX: many
Interview Result
Is Chosen By MIN: 0 MAX: many
Job Application
Has MIN: 0 MAX: 1
Policy
[Places] MIN: 1 MAX: 1
Employer Info.
Is Applied By MIN: 0 MAX: many
Candidate
Date Last Altered: 02-10-5 Date Created: 02-10-4

Date: 02-10-23 Project: PJ1006 Page: 5
Time: 05:53:12 AM
Detailed Listing -- Alphabetically
All Entity Entries -- Entity Relationship

Job Application	Entity
Description:	
contains the information about a application.	
Composition:	
App_No. : Integer 4	
Student_ID : Student_ID	
Job_No : Job_No	
App_Name : Char	
App_Language : Char	
App_Health : Integer 4	
App_Typing : Binary	
App_Description : Char	

App_Date : Date
 App_Status : Binary
 App_Experience : Char
 Primary Key:
 Index Name: Generated by VAW
 Column(s): App_No. [ASC]
 Foreign Key(s):
 Student Info. 'Hands In' Job Application
 Student_ID -> Student_ID
 On Delete Restrict
 On Update Restrict
 On Insert of Child Row Restrict
 Job 'Is Chosen By' Job Application
 Job_No -> Job_No
 On Delete Restrict
 On Update Restrict
 On Insert of Child Row Restrict
 Location:
 ERD
 Attached relationships on ERD:
 [Hands In] MIN: 1 MAX: 1
 Student Info.
 [Is Chosen By] MIN: 1 MAX: 1
 Job
 Produces MIN: 0 MAX: 1
 Candidate
 Date Last Altered: 02-10-6 Date Created: 02-10-4
 Date: 02-10-23 Project: PJ1006 Page: 6
 Time: 05:53:12 AM
 Detailed Listing -- Alphabetically
 All Entity Entries -- Entity Relationship

Policy	Entity
Description:	
The qualification policy for differen kind of students with jobs.	
Composition:	
Policy_No : Integer 4	
Job_No : Job_No	
P_Standing : Integer 4	
P_Credits : Integer 4	
P_Status : Integer 4	
P_Rule1 : Char	
P_Date : Date	
Primary Key:	
Index Name: Generated by VAW	
Column(s): Policy_No [ASC]	
Foreign Key(s):	
Job 'Has' Policy	

Job_No -> Job_No
On Delete Restrict
On Update Restrict
On Insert of Child Row Restrict
Location:
ERD
Attached relationships on ERD:
[Has] MIN: 1 MAX: 1
Job
Date Last Altered: 02-10-6 Date Created: 02-10-4

Student Info. Entity
Description:
It contains the basic information about the student.
Composition:
Student_ID : Student_ID
Stu_username : Char
Stu_password : Char
Date: 02-10-23 Project: PJ1006 Page: 7
Time: 05:53:12 AM
Detailed Listing -- Alphabetically
All Entity Entries -- Entity Relationship

Stu_Name : Char
Stu_Birthday : DateTime
Stu_Gender : Binary
Stu_Credits : Integer 4
Stu_GPA : Float
Stu_Major : Char
Stu_status : Integer 4
Stu_standing : Integer 4
Stu_address : Char
Stu_email : Char
Stu_Tel. : Integer 4
Primary Key:
Index Name: Generated by VAW
Column(s): Student_ID [ASC]
Location:
ERD
Attached relationships on ERD:
Receives MIN: 0 MAX: many
Interview Result
Hands In MIN: 0 MAX: many
Job Application
Date Last Altered: 02-10-6 Date Created: 02-10-4



APPENDIX E
DATA DICTIONARY

Candidate List	Data Flow
Description: a list of candidates that send to an employer.	
Composition: Candidate_No : Integer 4 App_Name : Char App_No. : Integer 4 Emp_Address : Char Job_Type : Char Job_Title : Char	
Location: Context (CONTEXT) Source: Career Service System (Process) Dest: Employer (External Entity) Career Service System (0) Source: Qualify Applicant (Process) Dest: *** Not on Diagram *** Qualify Applicant (4) Source: Send Candidate List (Process) Dest: *** Not on Diagram *** Send Candidate List (4.3) Source: Send to Employer (Process) Dest: *** Not on Diagram *** Source: Produce Candidate List (Process) Dest: Send to Employer (Process)	
Date Last Altered: 02-10-6	Date Created: 02-10-3

Emp_Rejection	Data Flow
Description: This is a notification shows the employer that they are not allowed to log into that account.	
Date: 02-10-23 Time: 06:00:35 AM	Project: PJ1006 Page: 2
Detailed Listing -- Alphabetically All Data Flow Entries -- Data Flow Diagrams Current Diagram is: Context	

Composition: Emp_Rejection :
Location:

Context (CONTEXT)
Source: Career Service System (Process)
Dest: Employer (External Entity)
Career Service System (0)
Source: Maintain Job Offer (Process)
Dest: *** Not on Diagram ***
Maintain Job Offer (3)
Source: Maintain Employer Information (Process)
Dest: *** Not on Diagram ***
Maintain Employer Information (3.1)
Source: Verify Employer (Process)
Dest: *** Not on Diagram ***
Data Flow --> Emp_Rejection
Date Last Altered: 02-10-6 Date Created: 02-10-3

Interview Outcome Data Flow
Composition:
Interview_Outcome :
Location:
Context (CONTEXT)
Source: Employer (External Entity)
Dest: Career Service System (Process)
Career Service System (0)
Source: *** Not on Diagram ***
Dest: Process Interview Outcome (Process)
Process Interview Outcome (5)
Date: 02-10-23 Project: PJ1006 Page: 3
Time: 06:00:35 AM
Detailed Listing -- Alphabetically
All Data Flow Entries -- Data Flow Diagrams
Current Diagram is: Context

Source: *** Not on Diagram ***
Dest: Recieve Interview Outcome (Process)
Date Last Altered: 02-10-6 Date Created: 02-10-3

Interview Outcome Mail Data Flow
Composition:
Interview_Outcome :
Location:
Context (CONTEXT)
Source: Career Service System (Process)
Dest: Student (External Entity)
Career Service System (0)
Source: Process Interview Outcome (Process)
Dest: *** Not on Diagram ***

Process Interview Outcome (5)
Source: Generate Interview Outcome Mail (Process)
Dest: *** Not on Diagram ***
Date Last Altered: 02-10-6 Date Created: 02-10-3

Job Details

Data Flow

Description:

Contains the job details.

Composition:

Job_Descript : Char
Job_No : Job_No
Req_Experience : Char
Req_GPA : Float
Req_Health : Integer 4
Req_Language : Char
Req_Major : Char
Req_Typing : Binary
Job_Duty : Char
Job_PayRate : Money
Job_Title : Char

Date: 02-10-23

Project: PJ1006

Page: 4

Time: 06:00:35 AM

Detailed Listing -- Alphabetically

All Data Flow Entries -- Data Flow Diagrams

Current Diagram is: Context

Job_Type : Char

Job_WorkHour : Integer 4

Location:

Maintain Job Offer (3)

Source: Job_AD (Data Store)

Dest: Produce Job AD Report (Process)

Qualify Applicant (4)

Source: Maintain Policy (Process)

Dest: *** Not on Diagram ***

Career Service System (0)

Source: Qualify Applicant (Process)

Dest: *** Not on Diagram ***

Context (CONTEXT)

Source: Career Service System (Process)

Dest: Manager (External Entity)

Maintain Policy (4.2)

Source: Search Job Information (Process)

Dest: *** Not on Diagram ***

Data Flow -->

Insert Job

Data Flow -->

Update Job

Date Last Altered: 02-10-6

Date Created: 02-10-4

Job Matching Search	Data Flow
Description: Jobs list with links to the details of each entry.	
Composition: Job_No : Job_No Job_Title : Char Job_Descript : Char Job_Duty : Char Job_PayRate : Money Job_Type : Char Job_WorkHour : Integer 4	
Date: 02-10-23	Project: PJ1006
Time: 06:00:35 AM	Page: 5
Detailed Listing -- Alphabetically All Data Flow Entries -- Data Flow Diagrams Current Diagram is: Context	

Location:
Context (CONTEXT)
Source: Career Service System (Process)
Dest: Student (External Entity)
Career Service System (0)
Source: Take Application (Process)
Dest: *** Not on Diagram ***
Take Application (2)
Source: Display Job Information (Process)
Dest: *** Not on Diagram ***
Date Last Altered: 02-10-6 Date Created: 02-10-3

Job Search Request	Data Flow
Description: The search request that query the job datastore.	
Composition: Job_Type : Char	
Location: Context (CONTEXT) Source: Student (External Entity) Dest: Career Service System (Process) Career Service System (0) Source: *** Not on Diagram *** Dest: Take Application (Process) Take Application (2) Source: *** Not on Diagram *** Dest: Display Job Information (Process)	
Date Last Altered: 02-10-6	Date Created: 02-10-3

Date: 02-10-23 Project: PJ1006 Page: 6
Time: 06:00:35 AM

Detailed Listing -- Alphabetically
All Data Flow Entries -- Data Flow Diagrams
Current Diagram is: Context

Job to Apply	Data Flow
Description: The selected job which is applied for.	
Composition: Job_No : Job_No Job Application :	
Location: Context (CONTEXT) Source: Student (External Entity) Dest: Career Service System (Process) Career Service System (0) Source: *** Not on Diagram *** Dest: Take Application (Process) Take Application (2) Source: *** Not on Diagram *** Dest: Produce Job Application (Process) Date Last Altered: 02-10-6 Date Created: 02-10-4	

New Job AD Report	Data Flow
Composition: Job_No : Job_No JobAD_DF :	
Location: Context (CONTEXT) Source: Career Service System (Process) Dest: Manager (External Entity) Career Service System (0) Source: Maintain Job Offer (Process) Dest: *** Not on Diagram *** Maintain Job Offer (3) Date: 02-10-23 Project: PJ1006 Page: 7 Time: 06:00:35 AM	

Detailed Listing -- Alphabetically
All Data Flow Entries -- Data Flow Diagrams
Current Diagram is: Context

Source: Produce Job AD Report (Process) Dest: *** Not on Diagram ***

Date Last Altered: 02-10-22

Date Created: 02-10-3

Set Employer Info.

Data Flow

Description:

Combined "Employer Log In" and "Create Emp_Account"

Composition:

Employer Log In :

Create Emp_Account :

Delete Emp_Account :

Update Emp_Account :

Location:

Context (CONTEXT)

Source: Employer (External Entity)

Dest: Career Service System (Process)

Career Service System (0)

Source: *** Not on Diagram ***

Dest: Maintain Job Offer (Process)

Maintain Job Offer (3)

Source: *** Not on Diagram ***

Dest: Maintain Employer Information (Process)

Date Last Altered: 02-10-11

Date Created: 02-10-3

Set Job Info.

Data Flow

Description:

Job Information

Composition:

Job to delete :

Insert Job :

Update Job :

Job_Name :

Date: 02-10-23

Project: PJ1006

Page: 8

Time: 06:00:35 AM

Detailed Listing -- Alphabetically

All Data Flow Entries -- Data Flow Diagrams

Current Diagram is: Context

Location:

Context (CONTEXT)

Source: Manager (External Entity)

Dest: Career Service System (Process)

Career Service System (0)

Source: *** Not on Diagram ***

Dest: Maintain Job Offer (Process)

Maintain Job Offer (3)

Source: *** Not on Diagram ***

Dest: Maintain Job Information (Process)

Date Last Altered: 02-10-6

Date Created: 02-10-3

Set Policy

Data Flow

Composition:

Policy Updating :

Policy Insertion :

Policy Deletion :

Location:

Context (CONTEXT)

Source: Manager (External Entity)

Dest: Career Service System (Process)

Career Service System (0)

Source: *** Not on Diagram ***

Dest: Qualify Applicant (Process)

Qualify Applicant (4)

Source: *** Not on Diagram ***

Dest: Maintain Policy (Process)

Date Last Altered: 02-10-4

Date Created: 02-10-3

Date: 02-10-23

Project: PJ1006

Page: 9

Time: 06:00:35 AM

Detailed Listing -- Alphabetically

All Data Flow Entries -- Data Flow Diagrams

Current Diagram is: Context

Set Student Info.

Data Flow

Description:

Student Input.

Composition:

Student Log In :

Update Stu_Account :

Delete Stu_Account :

Create Stu_Account :

Location:

Context (CONTEXT)

Source: Student (External Entity)

Dest: Career Service System (Process)

Career Service System (0)

Source: *** Not on Diagram ***

Dest: Process Student Information (Process)

Date Last Altered: 02-10-6

Date Created: 02-10-3

Set_JobAD

Data Flow

Composition:

Update JobAD :

Create JobAD :
JobAdName :
Location:
Context (CONTEXT)
 Source: Employer (External Entity)
 Dest: Career Service System (Process)
Maintain Job Offer (3)
 Source: *** Not on Diagram ***
 Dest: Take Job AD (Process)
Career Service System (0)
 Source: *** Not on Diagram ***
 Dest: Maintain Job Offer (Process)
Date: 02-10-23 Project: PJ1006 Page: 10
Time: 06:00:35 AM

Detailed Listing -- Alphabetically
All Data Flow Entries -- Data Flow Diagrams
Current Diagram is: Context

Date Last Altered:	02-10-22	Date Created: 02-10-6
--------------------	----------	-----------------------

Stu_Rejection	Data Flow
---------------	-----------

Description:
This is a notification shows the student that they are not allowed in.
Composition:
Stu_Rejection :
Location:
Context (CONTEXT)
 Source: Career Service System (Process)
 Dest: Student (External Entity)
Career Service System (0)
 Source: Process Student Information (Process)
 Dest: *** Not on Diagram ***
Process Student Information (1)
 Source: Verify Student (Process)
 Dest: *** Not on Diagram ***
 Source: Create Student Account (Process)
 Dest: *** Not on Diagram ***
Create Student Account (1.1)
 Source: Check Student Status (Process)
 Dest: *** Not on Diagram ***
Data Flow --> Stu_Rejection
Date Last Altered: 02-10-6 Date Created: 02-10-3

Student Record	Data Flow
----------------	-----------

Description:
Contains the information from querying the registrar system.

Composition:

Reg_Password : Char

Date: 02-10-23

Project: PJ1006

Page: 11

Time: 06:00:35 AM

Detailed Listing -- Alphabetically

All Data Flow Entries -- Data Flow Diagrams

Current Diagram is: Context

Stu_Credits : Integer 4
Stu_GPA : Float
Stu_Major : Char
Stu_standing : Integer 4
Stu_status : Integer 4
Student_ID : Student_ID

Location:

Context (CONTEXT)

Source: Registrar (External Entity)

Dest: Career Service System (Process)

Career Service System (0)

Source: *** Not on Diagram ***

Dest: Process Student Information (Process)

Process Student Information (1)

Source: *** Not on Diagram ***

Dest: Create Student Account (Process)

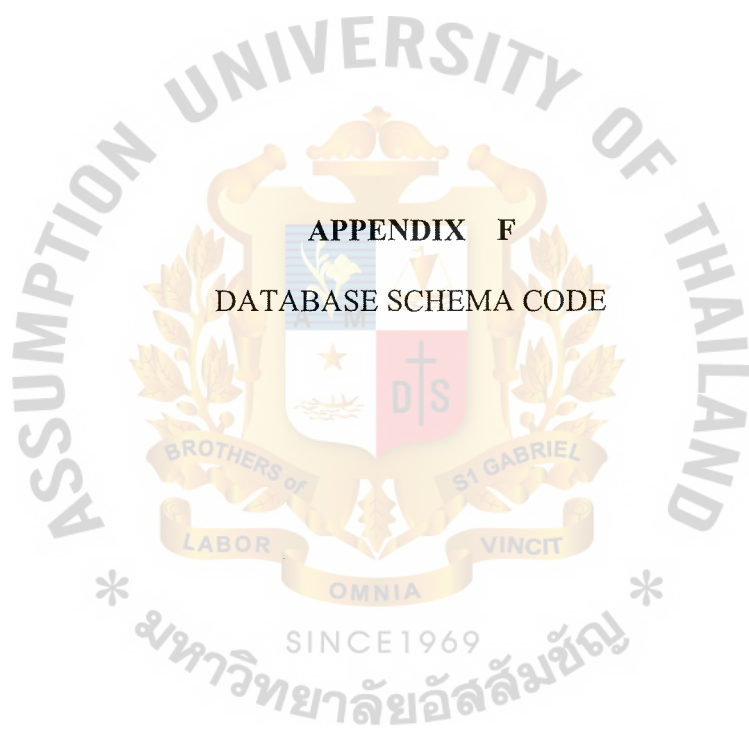
Create Student Account (1.1)

Source: *** Not on Diagram ***

Dest: Check Student Status (Process)

Date Last Altered: 02-10-6

Date Created: 02-10-3




```

CREATE TABLE `Candidate`
(
    `Candidate_No`    INTEGER NOT NULL,
    `App_No`          INTEGER NOT NULL,
    `Employer_No`     INTEGER NOT NULL,
    `Job_No`          INTEGER NOT NULL,
    `App_Name`        CHAR(20) NOT NULL,
    `Cand_CreateDate` TIMESTAMP NOT NULL,
    `Cand_Status`     BINARY NOT NULL
);

```

```

CREATE TABLE `Employer Info`
(
    `Employer_No`     INTEGER NOT NULL,
    `Emp_CompanyName` CHAR(30) NOT NULL,
    `Emp_Address`     CHAR(30) NOT NULL,
    `Emp_City`        CHAR(20) NOT NULL,
    `Emp_Tel`         INTEGER NOT NULL,
    `Emp_email`       CHAR(20) NOT NULL,
    `Emp_ContactPerson` CHAR(20) NOT NULL,
    `Emp_Descrip`     CHAR(50),
    `Emp_password`    CHAR(10) NOT NULL,
    `Emp_User_Name`   CHAR(10) NOT NULL
);

```

```
CREATE TABLE `Interview Result`
(
    `IntvResult_No`    INTEGER NOT NULL,
    `Employer_No`     INTEGER NOT NULL,
    `Student_ID`      INTEGER NOT NULL,
    `Job_No`          INTEGER NOT NULL,
    `Intv_RecieverAddr` CHAR(20) NOT NULL,
    `Intv_SenderAddr` CHAR(20) NOT NULL
);
```

```
CREATE TABLE `Job Application`
(
    `App_No`           INTEGER NOT NULL,
    `Student_ID`      INTEGER NOT NULL,
    `Job_No`           INTEGER NOT NULL,
    `App_Name`         CHAR(20) NOT NULL,
    `App_Language`     CHAR(10),
    `App_Health`       INTEGER NOT NULL,
    `App_Typing`       BINARY(1),
    `App_Description`  CHAR(50),
    `App_Date`         TIMESTAMP NOT NULL,
    `App_Status`       BINARY(1) NOT NULL,
    `App_Experience`   CHAR(30)
);
```

```
CREATE TABLE `Job`
```

```
(
```

```
  `Job_No`      INTEGER NOT NULL,
```

```
  `Employer_No`  INTEGER NOT NULL,
```

```
  `Job_WorkHour` INTEGER,
```

```
  `Job_Duty`     CHAR(30) NOT NULL,
```

```
  `Job_PayRate`  MONEY,
```

```
  `Job_Type`     CHAR(20) NOT NULL,
```

```
  `Job_Title`    CHAR(20) NOT NULL,
```

```
  `Req_Language` CHAR(20),
```

```
  `Req_Typing`   BINARY(1),
```

```
  `Req_Health`   INTEGER,
```

```
  `Req_Experience` CHAR(40),
```

```
  `Req_Major`    CHAR(20),
```

```
  `Req_GPA`      DOUBLE
```

```
);
```

```
CREATE TABLE `Policy`
```

```
(
```

```
  `Policy_No`  INTEGER NOT NULL,
```

```
  `Job_No`     INTEGER NOT NULL,
```

```
  `P_Standing` INTEGER NOT NULL,
```

```
  `P_Credits`  INTEGER NOT NULL,
```

```
  `P_Status`   INTEGER NOT NULL,
```

```

`P_Rule1` CHAR(20) NOT NULL,
`P_Date` TIMESTAMP NOT NULL
);

```

```

CREATE TABLE `Student Info_`

```

```

(
  `Student_ID` INTEGER NOT NULL,
  `Stu_Username` CHAR(10) NOT NULL,
  `Stu_password` CHAR(20) NOT NULL,
  `Stu_Name` CHAR(20) NOT NULL,
  `Stu_Birthday` TIMESTAMP NOT NULL,
  `Stu_Gender` BINARY(1) NOT NULL,
  `Stu_Credits` INTEGER NOT NULL,
  `Stu_GPA` DOUBLE NOT NULL,
  `Stu_Major` CHAR(20) NOT NULL,
  `Stu_status` INTEGER NOT NULL,
  `Stu_standing` INTEGER NOT NULL,
  `Stu_address` CHAR(20) NOT NULL,
  `Stu_email` CHAR(20) NOT NULL,
  `Stu_Tel_` INTEGER NOT NULL
);

```

```

ALTER TABLE `Candidate` ADD

```

```

CONSTRAINT `PKC_Candidate0003` PRIMARY KEY ( `Candidate_No` );

```

ALTER TABLE `Employer Info_` ADD

CONSTRAINT `PKC_Employer Info_0004` PRIMARY KEY (`Employer_No`);

ALTER TABLE `Interview Result` ADD

CONSTRAINT `PKC_Interview Result0008` PRIMARY KEY (`IntvResult_No`);

ALTER TABLE `Job Application` ADD

CONSTRAINT `PKC_Job Application000D` PRIMARY KEY (`App_No_`);

ALTER TABLE `Job` ADD

CONSTRAINT `PKC_Job000A` PRIMARY KEY (`Job_No`);

ALTER TABLE `Policy` ADD

CONSTRAINT `PKC_Policy000F` PRIMARY KEY (`Policy_No`);

ALTER TABLE `Student Info_` ADD

CONSTRAINT `PKC_Student Info_0010` PRIMARY KEY (`Student_ID`);

ALTER TABLE `Candidate` ADD

CONSTRAINT `FKC_gets0000` FOREIGN KEY (`Employer_No`)

REFERENCES

`Employer Info_`;

ALTER TABLE `Candidate` ADD

CONSTRAINT `FKC_Produces0001` FOREIGN KEY (`App_No_`)

REFERENCES

`Job Application`;

ALTER TABLE `Candidate` ADD

CONSTRAINT `FKC_Is Applied By0002` FOREIGN KEY (`Job_No`)

REFERENCES `Job`;

ALTER TABLE `Interview Result` ADD

CONSTRAINT `FKC_Receive0005` FOREIGN KEY (`Student_ID`)

REFERENCES

`Student Info_`;

ALTER TABLE `Interview Result` ADD

CONSTRAINT `FKC_Is In0006` FOREIGN KEY (`Job_No`) REFERENCES `Job`;

ALTER TABLE `Interview Result` ADD

CONSTRAINT `FKC_Sends0007` FOREIGN KEY (`Employer_No`)

REFERENCES

`Employer Info_`;

ALTER TABLE `Job Application` ADD

CONSTRAINT `FKC_Hands In000B` FOREIGN KEY (`Student_ID`)

REFERENCES

`Student Info_`;

ALTER TABLE `Job Application` ADD

CONSTRAINT `FKC_Is Chosen By000C` FOREIGN KEY (`Job_No`)

REFERENCES `Job`;

ALTER TABLE `Job` ADD

CONSTRAINT `FKC_Places0009` FOREIGN KEY (`Employer_No`)

REFERENCES

`Employer Info_`;

ALTER TABLE `Policy` ADD

CONSTRAINT `FKC_Has000E` FOREIGN KEY (`Job_No`) REFERENCES `Job`;





APPENDIX G
SOURCE CODE

Class Categories

Category name:

Career Service System

Documentation:

This system provides an Internet Career Service for the students in a university in order to effectively manage the student employment application. This is the work-flow of the student employment office that we implemented dynamically on the Internet using JAVA program.

Exported Classes:

Policy, AppForm, Job, EmployerBrowser, StudentBrowser, Manager, DBInterface, Student.

Local Classes:

<none>

Has visibility to Categories:

<none>

Is visible from Categories:

<none>

Parent Category:

<Top Level>

Class name:

Policy

Documentation:

The qualification policy for different kind of students.

Superclasses:

<none>

Roles/Associations:

manager in association generating a policy

policy in association modifying the policy

Attributes:

credits : int[] = Null

The minimum required credits for applicants.

status : int[] = Null

The status requirement for applying a job.

standing : int[] = Null

The standing (graduate/undergraduate/senior/junior) requirement for applying a job.

Has-A Relationships:

<none>

Operations:

getCredits() : int []

Get the minimum required credits.

setCredits(credits : int[] = Null)

Change the minimum credits requirement policy.

getStatus() : int[]

Get the required status for applying a job.

setStatus(status : int[] = Null)

Change the required status policy for apply a job.

getStanding() : int[]

Get the required standing for applying a job.

setStanding(standing : int[] = Null)

Change the required standing policy for applying a job.

Class name:

Application

Documentation:

this classe contains the application form of a student
and related operations

Superclasses:

DBInterface, Student

Roles/Associations:

<no rolename> in association <unnamed>

<no rolename> in association <unnamed>

<no rolename> in association <unnamed>

Attributes:

highschool : String = Null

the graduate high school name

canTyping : boolean = false

whether the applicant can type or not.

skill : String = Null

The applicant's skills.

driverLicenseType : int = 0

The type (A, B, C) of the driver license.

Has-A Relationships:

<none>

Operations:

AppForm()

The constructor.

AppForm(highschool : String, ishsg : boolean, cantyping : boolean, skill : String, driverlicense : int = 0)

The constructor.

Class name:

Job

Documentation:

contains the information about a job and related operations

Superclasses:

DBInterface

Roles/Associations:

<no rolename> in association <unnamed>

<no rolename> in association <unnamed>

Attributes:

ID : String = Null

The unique ID of a job

workHour : int = 0

The total work hours per week.

payRate : float = 0.0

The hourly pay rate.

duty : String = Null

The description of the duty .

contactPerson : String = Null

The name of the contact person for a job.

companyName : String = Null

The name of the recruiting commany.

telephone : String = Null

The phone number of the contact person.

titile : String = Null

The job title.

address : String = Null

the address of the contact person.

type : String = Null

The work field of a job.

onCampus : boolean = true

OnCampus or offCampus job type.

requireTyping : boolean

The job requires typing skill or not.

applicants : String[]

The list of the IDs of the applicants for this job.

Has-A Relationships:

<none>

Operations:

getID() : int

return the ID of a job

Job()

Constructor of the Job class

getContactPerson() : String

get the name of the contact person.

getWorkhour() : int

Get the job's work hour

getPayrate() : float

Get the pay rate of the job

getDuty() : String

Get the duty of the job.

getCompanyname() : String

Get the name of the company which offers the opening job.

getTelePhone() : String

Get the telephone number of the contact person.

getTitle() : String

Get the title of the job.

getAddress() : String

Get the address of the contact person.

getType() : String

Get the type of the job.

getReqTyping() : boolean

Get the typing requirement of the job.

getApplicants() : String[]

Get the applicants' IDs who apply the job.

Class name:

EmployerBrowser

Documentation:

This is the Employer browser, which contains the officer information.

Superclasses:

<none>

Roles/Associations:

<no rolename> in association <unnamed>

<no rolename> in association <unnamed>

<no rolename> in association <unnamed>

<no rolename> in association <unnamed>

<no rolename> in association <unnamed>

Attributes:

ID : String = Null

the work ID of the officer. It's used to login in the officer browser.

passwd : String = Null

the Password of the officer

streamlistener : StreamListener = Null

A thread that listens on a socket to get input from the Server site.

socket : Socket = Null

This attribute contains the socket number at which the officer client connect with the server.

inputstream : InputStream = Null

The inputstream from which the Officer client read in information from the server.

outstream : OutputStream = Null

This is the output stream to which the student client out put the query information to server.

Has-A Relationships:

<none>

Operations:

viewStdInfo(StudentId : String)

this method display the information of a student given the student id

viewJobs()

View the job list and detail information.

getIDPasswd() : String

Get the Officer ID and password .

submitNewJob(newjob : Job)

Send the new job information to the Server.

submitDelJobID(jobID : String)

Send the closed job ID to the Server.

Class name:

StudentBrowser

Documentation:

This class defines the information of a student object and the related operations

Superclasses:

<none>

Roles/Associations:

<no rolename> in association <unnamed>

<no rolename> in association <unnamed>

<no rolename> in association <unnamed>

<no rolename> in association <unnamed>

<no rolename> in association <unnamed>

Attributes:

student : Student = Null

This attribute access the student information

jobs : Job[] = Null

This attribute contains the job list get from the server

appform : AppForm = Null

This attribute contains the application form corresponding to the student

socket : Socket = Null

This attribute contains the socket number at which the student client connect with the server.

inputstream : InputStream = Null

The inputstream from which the student client read in information from the server.

outstream : OutputStream = Null

This is the output stream to which the student client out put the query information to server.

Has-A Relationships:

<none>

Operations:

listJob()

this method display the job list

submitJob()

submit the jobs choosed by the student

submitAppForm(appform : AppForm)

fillAppForm()

Let the students fill out or update his/her application form.

Connection()

Connect to the Server on the default port number.

getIDPasswd()

Get the student ID and passward from the Student class.

Class name:

Manager

Documentation:

This class is the manager of the whole system and Server class.

Superclasses:

<none>

Roles/Associations:

manager in association shutdown

manager in association modifying the policy

Attributes:

policy : Policy = Null

The qulification policies for job matching and decision_making.

Has-A Relationships:

<none>

Operations:

ChangePolicy()

Change the job applying policy .

ShutDownServer()

The manager send the shutdown signal to the Server.

Class name:

DBInterface

Documentation:

The interface to the central DB.(It is implemented as a Interface in Java).

Superclasses:

<none>

Roles/Associations:

<none>

Attributes:

<none>

Has-A Relationships:

<none>

Operations:

addItem()

Add a item to the corresponding DB.

delItem()

Delete a item from the corresponding DB.

update()

Update the corresponding DB.

getItem()

Get a item from the corresponding DB.

Class name:

Student

Documentation:

This class contains the basic information about the student.

Superclasses:

<none>

Roles/Associations:

<no rolename> in association <unnamed>

Attributes:

ID : String = Null

The ID of the student.

name : String = Null

The student name.

address : String = Null

The address of the student.

Email : String = Null

Student's email address

phoneNum : String = Null

Student's phone number.

Has-A Relationships:

<none>

Operations:

getID() : String

The methods returns the ID of the student.

getName() : String

This method returns the name of the student.

getAddress() : String

The method returns the address of the student.

getEmail() : String

This method returns the email address of the student.

Student(id : String, name : String, address : String, SSN : String, email : String)

The constructor of the class.

getPhoneNum() : String

Returns the student's phone number.

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