An Online Examination System Development

by

Mr. Nattapol Phitapoonsri

A Final Report of the Three-Credit Course
CE 6998 Project

Submitted in Partial Fulfillment
of the Requirements for the Degree of
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Project Title	An Online Examination System Development
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Academic Year	November 2004

The Graduate School of Assumption University has approved this final report of the three-credit course, CE 6998 PROJECT, submitted in partial fulfillment of the requirements for the degree of Master of Science in Computer and Engineering Management.

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ABSTRACT

Nowadays the computer has been widely used in every field. It can help people to increase efficiency and effectiveness in their work. It can process jobs in a short time with more accuracy. Therefore an online examination system development will increase the competitive advantages against rivals.

Moreover, there are many kinds of examinations each year and if a hard copy is kept it will take much space. At present, computers are developed to interact with users more easily and conveniently and if they are used at work today it will reduce the waste of human resource, time and money, etc.

This project contains all phases of system analysis and design. First, user's information requirements are collected. Then the proposed system is set up to meet the user's requirements and to solve the problems in the existing system. It includes a context diagram depicting the net input to the system and the net output from the system to their destination and shared database, DFD diagram and input and output design. Cost and Benefit Analysis showing the comparison between the existing and the proposed system results in the breakeven point of 2.8 years. Net Present Value is positive. That means the value of benefits is higher than the value of cost. The result of the payback period is 2.71 years, so it is appropriate to implement the proposed system.

ACKNOWLEDGEMENTS

I am indebted to the following people and organizations. Without them, this project would not have been possible.

I wish to express my sincere gratitude to my advisor, Dr. Chamnong Jungthirapanich, for his invaluable guidance, patience, constant encouragement and support throughout the course of my project study.

I would like to thank my friends for their kindness and full support. Special thanks are also expressed to my colleagues for their help and useful information.

Finally, my deepest gratitude is expressed to my parents for their continued encouragement, love and support.

TABLE OF CONTENTS

LIST OF FIGURES

Figure Page

LIST OF TABLES

I. INTRODUCTION

1.1 Background of the Project

Presently, each examination uses human resource and wastes a lot of time to verify before collecting and releasing the results to students according to the many subjects and students. Teachers need to take more time to verify all of it .

Moreover, there are many kinds of examinations each year and if a hard copy is kept it will take much space. At present, computers are developed to interact with users more easily and conveniently and if they are used at work today it will reduce the waste of human resource, time and money, etc.

Thus, this project is set up based on examination data base which has the ability to link through the internet network by categorizing the database into subject, type and examination difficulties. The system will random the examination following on the difficulty level. When the test is completed, the system will verify and release the marks via the internet.

Moreover students are able to increase their learning skill via the internet. Otherwise the teachers can retrieve and estimate scores effectively to make appropriate plans for each subject. When we can cope with it very well, the teachers will be able to spend more time to prepare their courses, programs and laboratory for education that will be useful for all students, teachers and the institution. The distance learning might be developed, where students do not need to come to class, but just work at home which increases the value of education and serves the social needs much more boardly.

1.2 Objectives

The objectives of the project on the sales information system are as follows:

(1) To study the existing system

(2) To identify the problems that occurred and user requirement.

(3) To design a new the online examination system.

(4) To implement a new system.

(5) To minimize the new system cost and make use of resource more effectively through the use of the proposed system.

1.3 Scope

Set examination database by using Microsoft Access 97 which is able to log into the internet through ASP. Teachers can increase the warehouse space in the database all the time which can easily be categorized into subjects. Each subject will be categorized into types of true-false, matching, and difficulty exam level. When keeping the process is completed, teachers can indicate rating in random from the examination database. And students can do the exam and practice by following the registration table in each semester. The program will release the result after the exam is over.

II. THE EXISTING SYSTEM

2.1 Background of the Organization

The way of checking the result of education is examination, which is the effective way. But the process of examination is very difficult and have to use a lot of human resource which takes a long time.

At present, the computer can have the role of improving the education which is not only in studies but also in the process of examination. This will help reduce the constraint such as human resource and time. So they will have more time to prepare their course to be modern and cover everything that the students have to know.

2.2 Current Problems

The current problems and areas for improvement of the existing system can be summarized as follows:

(1) Lose a lot of resource in the process of examination such as paper, ink, copying etc. In one year, they will lose these resources a lot because there are a lot of students in each term and also many courses.

(2) Lose time in finding the right examination because each term has a lot of examinations that are not used. So a lot of time is used to find the right one. The new process will help by making categories for each course in the database so the user can find and edit the examination.

(3) Lose the space for keeping the examination papers which are not used.

(4) Instructors will have problems about examinations because they cannot remember which one has ever been tested. So the examination can be ineffective because of the level of examination.

(5) With the old process of examination, the students do not know the result immediately. They have to wait and check the results many times. But with the new process, students can know the result immediately.

2.3 Existing Computer System

(1) Teacher Task Processing

Instructors conduct the examination. After they have finished they will send the question papers to the examination department. This department will make a copy for the students that register. After the students have finished their examination, this department will send the answer sheets to the instructors who will send the result to the department to be announced to the students.

(2) Student Task Processing

The students receive the examination papers from the department. When they have finished, the answer sheets will be sent to the department and the students will wait for the result. The students will not know the exact date of the result so this will waste their time.

Context Diagram of the Existing System.

III. THE PROPOSED SYSTEM

This Project has brought Internet Technology to allocate any kind of test into categories for facilitating the searching process in the system and examination database.

3.1 System Specification

This project is set up based on examination data base which has the ability to link through the internet network by categorizing the database into subject, type and examination difficulties. The system will random the examination following on the difficulty level. When the test is completed, the system will verify and release the marks via the internet.

Moreover students are able to increase their learning skill via the internet. Otherwise teachers can retrieve and estimate scores effectively to making appropriate plans for each subject. When we can cope with it very well, teachers will be able to spend more time to prepare the courses, programs and laboratory for education that will be useful for all students, teachers and institution. The distance learning might be developed where students do not need to come to class, just work at home which increases the value of education and serves the social needs much more boardly.

The Online examination development program launches its program via the internet network and compiles from ASP database to operate, which consist of 3 major functions.

(1) Teacher:

Teachers have the authority in adding, editing and deleting chapters in each subject and teachers are able to record, edit and delete by categories depending on the subjects the teachers teach.

(2) Student:

The students are able to login to do the exam according to the registration timetable which students can choose by categories. They can have their own test scores after finishing the exam via the internet.

(3) Admin:

Admin has the most authority in managing all activities in the database to facilitate the teachers and the students.

Structure Program and Database

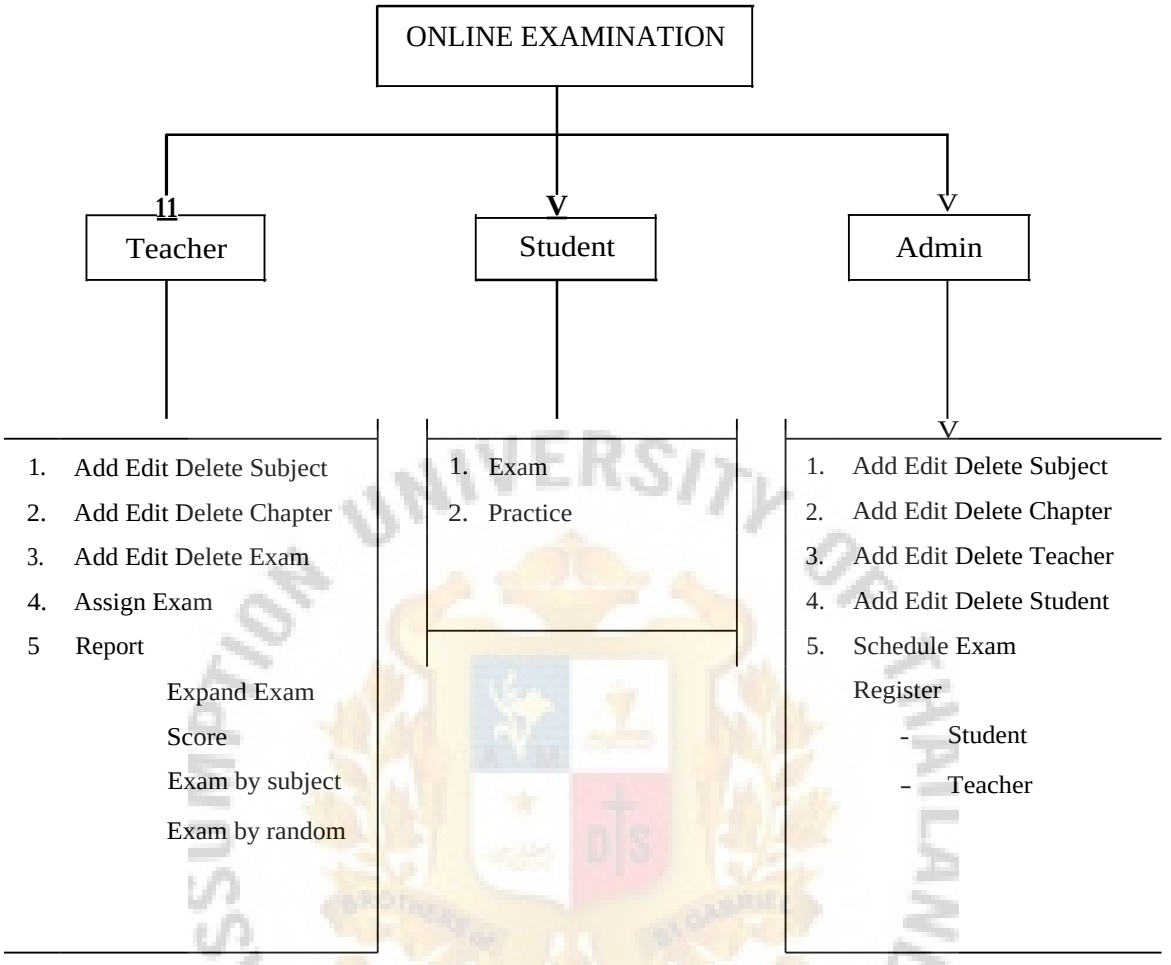


Figure 3.1. Structure Program and Database.

3.2 System Design

3.2.1 System Process

The Online examination development program is launched via the internet network and compiles ASP database to operate which consists of 3 major processes:

(1) Teacher Task Processing

(2) Student Task Processing

(3) Admin Task Processing

Process 1: Teacher Task Processing

Teachers have the authority in adding; editing and deleting chapters in each subject and they are able to record, edit and delete by categories depending on the subjects the teachers teach which consist of the following:

(1) Security System

A teacher is fully authorized to login by using the username and password. The system arranges the teacher's usage level along with the subject he/she teaches. Steps of implementation are: the teacher opens the first screen and prints the username and password, then presses the "OK" button. The system verifies the username and password. If valid, the system allows the user to access to the main menu. If invalid, it automatically asks for the password again. If invalid more than three times, the user needs to contact the officers and the teacher can be changed when the user requests. Steps of implementation: After the user has accessed the program, the user chooses " Change Password" to access into Change Password's screen. Then he/she has to type the current password in the blank and type the new password in the "New Password" blank and the "Confirm Password" blank and then press the "OK" button. The system verifies the user database and if the new

password does not match, the system will pop up " Password invalid". If the password is valid, it will pop up " Password was already changed".

(2) Maintenance System

Objective: To have flexibility when the teacher arranges, edits, deletes, and categorizes the examination. Steps of implementation: The user goes to the main menu, selects the "Add Subject" button, passes the code and name of subject and presses the "OK" button. The system verifies the database and if those subjects exist, it will pop up "Please save again as this subject already exists". If valid, it will pop up " File-has already been saved". The user goes to the "Edit subject " button when he/she needs to edit the subject. After putting the code and name of the subject, the system verifies the database and it will show the list of subjects that the teacher wants to edit or delete. Teachers are able to edit and delete the chapters in each subject. Steps of implementation: The user goes to the main menu, selects the " Add chapter" button and types the code of each subject. The system will show the list of subjects and chapters. Then he/she has to press the "OK" button. When he/she wants to edit, he/she has togo to the "Edit/Delete" button and type the code of the subject. The system accesses the data and shows what it has found. Teachers are able to add, search, edit, and delete the exam by categories such as choice, matching, true-false, short-answer, and essay. Teachers can determine the difficulty level and save in the database to prevent loss and for convenience in searching for the next time. Steps of implementation: The user goes to the Menu Exam and chooses the semester and subject. Then chooses the chapter and categories of the exam which are multiple choice, matching, true-false, short-answer, and essays. In case we

choose multiple choice. add "choice" by inserting the question, solution and difficulty level and press the "Continue" button. The system verifies the database. If they have existed, the message alerts "Question has already existed. Please type a new question". When editing is finished, press the button to confirm. The user goes back to add the "choice" category again. If he/she wants to change to other categories, press the button of that type, in this case if we choose "matching", insert the question, answer and difficulty level of the exam. Then press the "save" button. It will alert the record to re-check accuracy again.' If data is valid, press the confirm button. Add "true-false test" category by inserting the question and collecting the answer true or false. Adjust the difficulty level and press the save button. It will alert the record to re-check accuracy again and press the button to confirm. Add "fill in the blank" category by inserting the question, answer and adjust the difficulty level. Then press the save button, it will alert the record to re-check accuracy again and press the button to confirm. Add the essay type by inserting the question, answer and adjust the difficulty level. Then press the save button, it will alert the record to re-check accuracy again and press the button to confirm. The user goes to "searching/ edit/ delete" menu by choose one condition button and the system will search in the database and show the result of the tests that are chosen.

(3) Processing System

Teachers are able to define the difficulty level of the exam to be suitable for the student level. Steps of implementation: The User chooses the "subject and chapter" menu. The system will show all of the list , then choose the chapter. The User chooses the difficulty level menu, and subject When the

"search category of exam" button is pressed, It will show the category of exam. Then adjust the number of exam by the difficulty level. Press the save button, and the system will show "record was completed". Choose other categories of exam to adjust the number of exam. The User goes to the "random exam" menu, and chooses the subject and then it will show the random detail. Press "random exam" button, then the system, will random all database by condition.

(4) Reporting

The user can check the student's essay. Steps of implementation: The user goes to the "essay" menu and chooses the academic year, subject and student identification number. The system will verify by condition and show the student 's essay report. To release the result of the student's score the steps of implementation are: The user goes to the student's "essay score" menu and chooses the academic year and subject. The system will verify by condition and show the student 's score.

The user can report the number of exams for each subject. Steps of implementation: The user goes to the "number of report" menu by choosing the academic year and subject. The system will verify by condition and show the number of exam, chapter and type of exam.

The user can report the exam by Randoming. Steps of implementation: The user goes to the "random exam" button and chooses the subject. The system will verify by condition and show category and number of exam

Process 2: Student Task Processing

Student does the exam through registration and schedule from which he/she can choose the category of exam. And the system will release the result after

the student has completed the exam. Moreover, students can test via the Internet and know the solution after they complete the online exam. The system consists of minor functions as follows:

(1) Security System

Students login to the system by typing the username and password. The system separates the level of student from the student registration. The only student who can login to the system is the one who has the password. Steps of implementation: The user needs to type "Username" and "Password" and then press the "OK" button. The syStem verifies Username and password. When the passwOrd is valid it will login to the next screen and if it is invalid, the user has to type the password again. If invalid more than three times, the user needs to contact the officer.The users can change the password whenever they want. Steps of implementation: After login to the system, go to "Change Password", then type "Current Password" and "New Password" and confirm the new password again in "Confirm Password" and press the "OK" button. If the new password and confirmed password do not match, the user has to type the new password and confirmed password until they match together.

(2) Processing System

It will be helpful in allocating resources when using this kind of system. Students can do the exam according to their registration and the result is released after they finish the exam. Steps of implementation: Students choose the "do the exam" menu, academic year and subject that they had registered. The system verifies the registration of the student database. If students did not register they cannot access the exam and for the students

who had registered they have the right to login to do the exam screen. Students can move downward and upward during the exam by limited timeframe. When the time is up students cannot press any button except "send the exam" only. After sending the exam answer sheets, students can edit but cannot confirm the sending of the exam paper again.

Students can practice the exam whenever they want to practice their skill before doing the final exam. Steps of implementation: The user goes to "do the exercise" button and chooses the subject and chapter. The student can move downward or upward when he/she does the exercise with unlimited time. The system verifies and releases the score when the button is pressed , to check the answer. The student can see the solution whenever he/she pushes the button.

Process 3: Admin Task Processing

Administrators have to manage all database which they can add, delete, and edit from the database of the teachers and students. They have a duty to record student registration, schedule or even which subject the teachers teach. It consists of minor functions as follows:

(1) Security System

The Admin can login to the system by passing the username and password. The System separates the user level from the student registration database. The only student who can login to the system is the one who has the password. Steps of implementation: The user has to pass the username and password before getting into the screen. The system verifies the Username and password and if the password is valid the user can pass and do the next screen. If it is invalid the user needs to type the password again. If passed

more than three times, the officer has to be contacted. Users can change password whenever they want. Steps of implementation: After login to the system, go to "Change Password" then type "Current Password" and "New Password" then confirm the new password again in "Confirm Password" and press the "OK" button. If the new password and the confirmed password do not match, it is required to type the new password and the confirmed password until they match together.

(2) Maintenance System

Student profile is used for the administrator. They can be added, deleted, edited, and searched by the administrator. It will be secure and flexible when saved into the student profile. Steps of implementation: Administrator adds the student information into the profile and saves. The system verifies the student profile in the database. If it has already existed, it will alert "Student profile has already existed, Please edit again". If there is no existing data, it will pop up "student profile has been saved." The user then goes to the "Edit" menu and gives the student identification. The system verifies the student profile in the database and shows the student profile that needs to be edited. The user goes to the "Delete" menu and gives the student identification number that has to be deleted. The System verifies the student profile in the database and shows the student profile that needs to be deleted. The user goes to "Add teacher profile" and saves the record. The System verifies the teacher profile in the database. If it has already existed, it will alert" Student profile has already existed, Please edit again". If there is no existing data, it will alert "student profile has been saved." The user goes to the "Edit" menu and gives the teacher identification that has to be

edited. The System verifies the teacher profile in the database and shows the teacher profile that needs to be edited. The User goes to the "Delete" menu and gives the teacher identification number that has to be deleted. The System verifies the teacher profile in the database and shows the teacher profile that needs to be deleted. The Administrator has the authority to add, delete, and edit student schedule. Steps of implementation: The user goes to the menu "Add schedule", chooses the academic year, subject, and saves the date and time of the exam. The System verifies and saves in the database. The user goes to the "Edit schedule" menu, chooses the academic year and subject and presSes the "search" button. The System verifies the database. The user goes to the "Delete schedule" menu, chooses the academic year and subject and presses the "delete" button. The System verifies the database. Administrators are able to save, edit, and delete the information of students regarding their registration in order to do and practice the exam according to their registration. Steps of implementation: The user goes to . the tab "register" and gives the student's identification number. The System shows the list of subjects according to the student's registration. The administrator will, see all the list that the student had registered.

Administrators are able to save, edit, and delete the subjects that teachers teach in order to create the exam by the subjects that they teach. Steps of implementation: The user goes to the tab "register" and gives the teacher's identification number. The System shows the list of subjects that the teacher teaches. The Administrator will see all the list that the teacher teaches.

3.2.2 Proposed Database

Database design is concerned with the data focus. The end product is called database schema. The database design translates the data models, which are developed for the system users during the definition phase into data structure. In order to design the database for this project, we use the database schema to show the technical implementation of logical data model. We also use the related database schema to define the structure in terms of tables, keys indexes, and integrity rules.

Data Analysis

It is a technique used to improve a model in preparation for the database design. Moreover, it is a process that prepares a data model as a simple, essential, flexible, and adaptable database for implementation. The specific technique used is called normalization. Normalization is a three-step technique-dividing model into the first normal form, the second normal form, and the third normal form.

Database Schema

This is depicted as a special model. It is the physical model of a blueprint for a database. It represents the technical implementation of the logical model. The transformation of the logical model into a physically related database schema is gov'emed by some fairly generic rules and options. Sales Inventory System is generated from the logical data model.

The proposed database system for the sales system provides several benefits as follows:

(1) Increasing data accessibility for users to extract needed information from the data resources.

(2) Improving data quality by reducing data duplication and redundancy.

(3) Improving data control with more consistency in the data descriptions.

(4) Improving data source by preventing unauthorized access to data.

3.2.3 Data Dictionary

Data Dictionary defines the meaning and components of terminator, stored data and data flows. This is shown in Appendix C.

3.2.4 Graphical User Interface Design

The graphical user interface design is the design of the design of input screens and the outcomes of the input for the system. This is shown in Appendix A.

3.2.5 Report

The output reports are shown in Appendix B.

3.3 System Design Interface

3.3.1 Input

The designing of collecting information will focus on the necessary information and the information lacking in the system to help reduce double information. We can divide into 3 parts.

(1) Admin

In the part of monitor for collecting information, the user will key the information step by step starting from the most important thing until the least important thing. Some information can be obtained from the database.

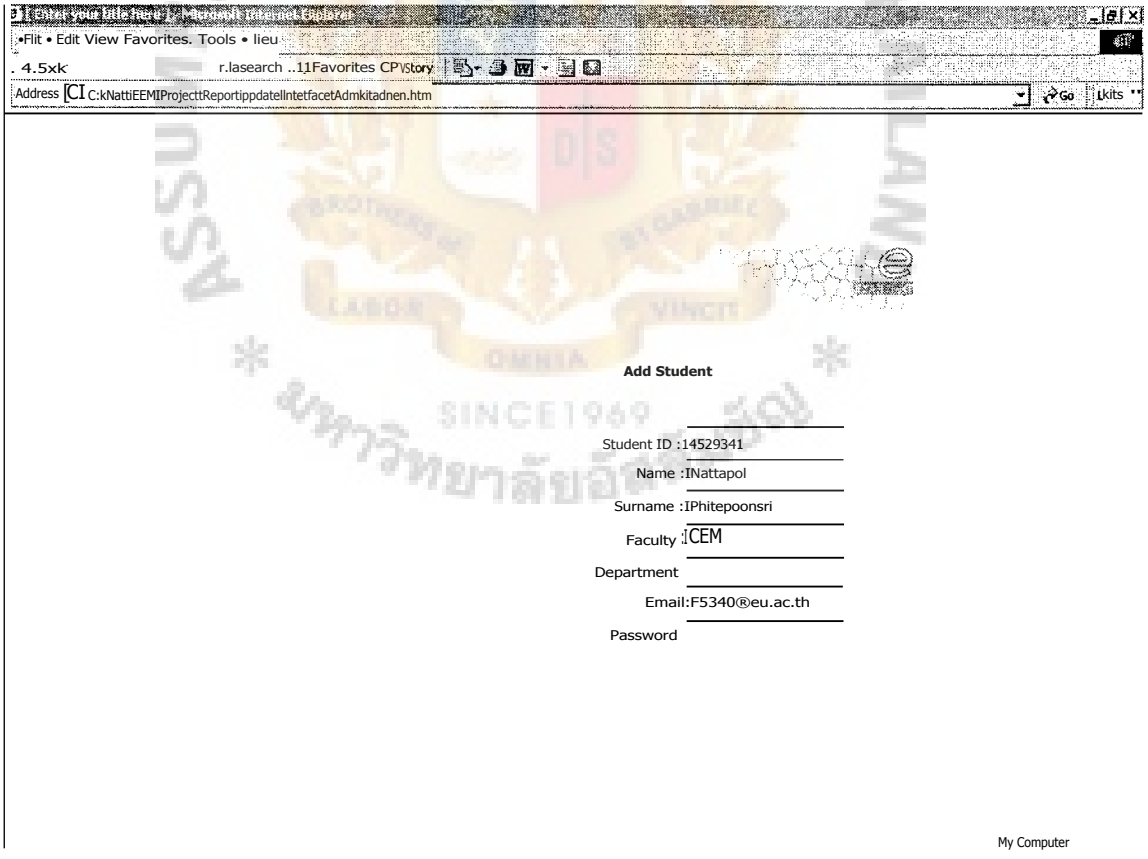


Figure 3.2. Sample Data Input for Admin.

(2) Teacher

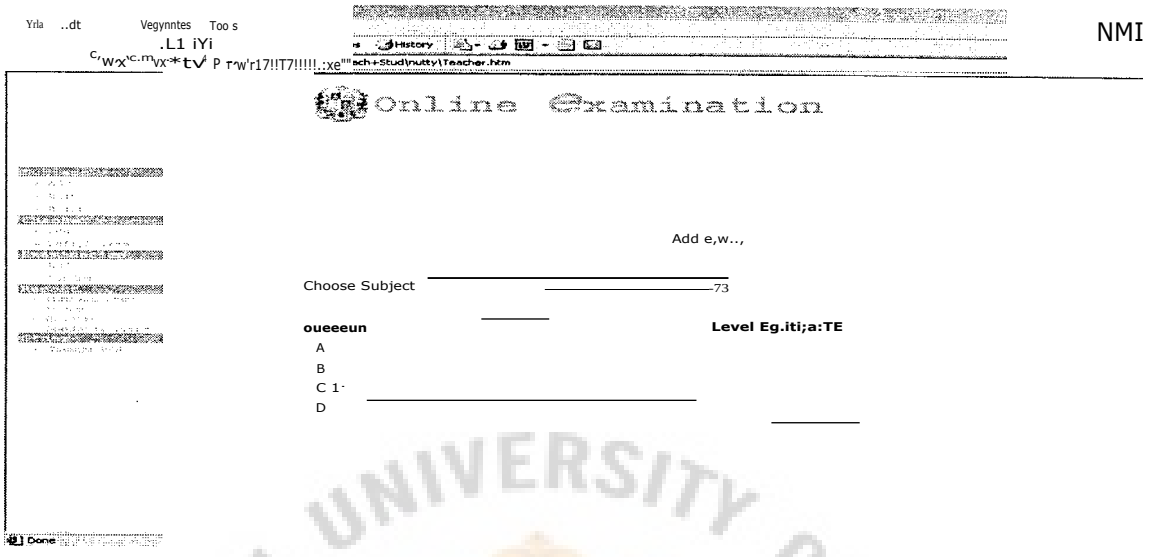


Figure 3.3. Sample Data Input for Teacher.

(3) Student

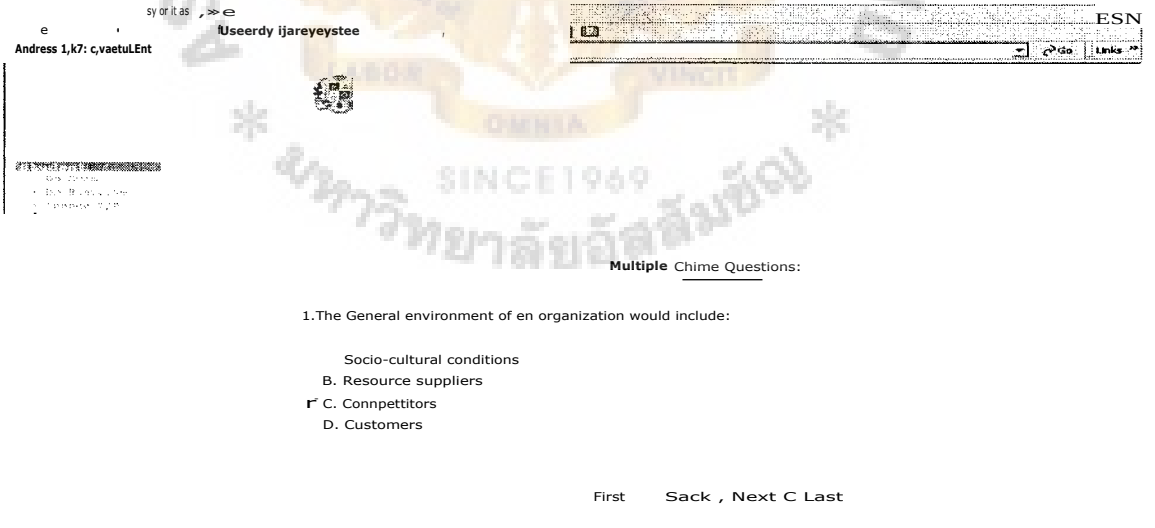


Figure 3.4. Sample Data Input for Student.

3.2.2 Output

The designing for the result will depend on the need of the users. The users can choose each kind of report that they want.

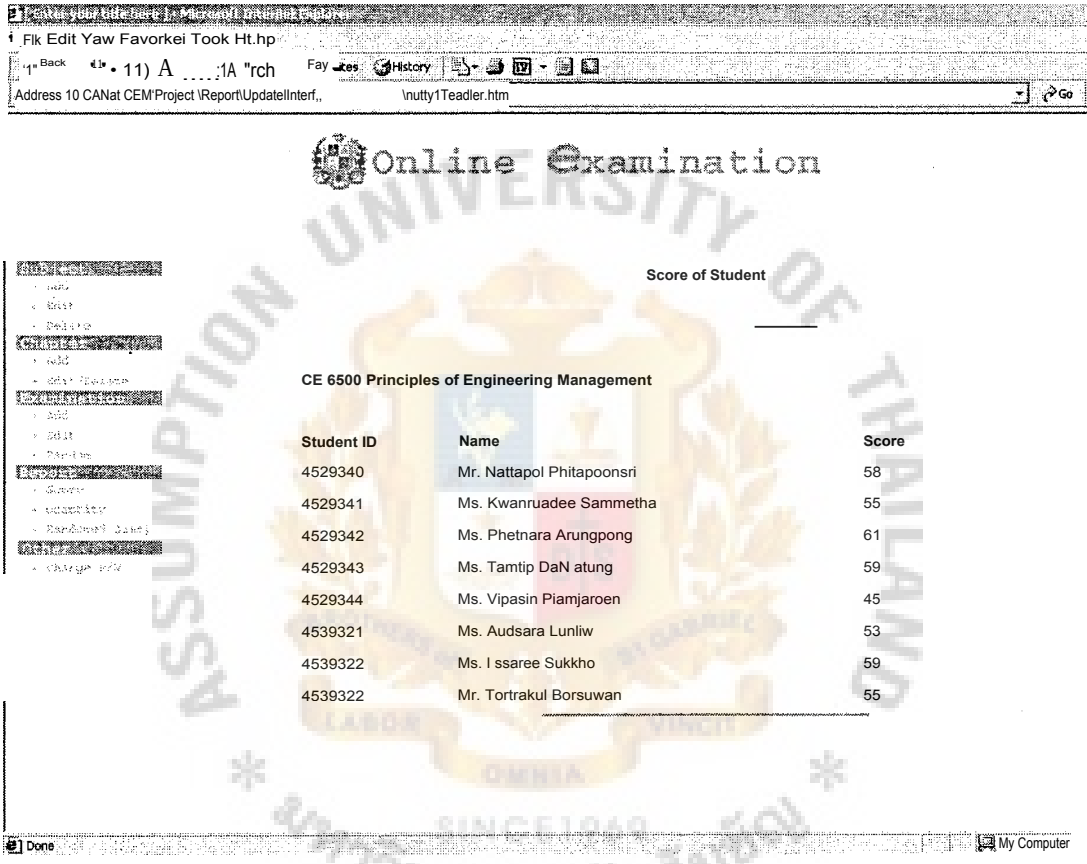


Figure 3.5. Sample Data Output (Report Score of Student).

3.2.3 Coordination of Users

The design for coordination of users will focus on the users.

The monitor is designed to be of the same standard for easy understanding and will not create confusion when working. The standard is the menu will stay on the left hand side and the working part will be in the middle right hand side.

Figure 3.6. Sample Interface Admin Menu.

Color is used to differentiate the normal word and alert word. For example, the explanation will use black or blue color. Alert information will use red color and the continue information will use the underline.

The monitor is designed to be used easily but have efficiency in working. A lot of information should not be put in the monitor and the information can continue to the next page.

3.2.4 Security

The system has security by checking the user name and password before using the system. If it is not correct, the user cannot use the system.

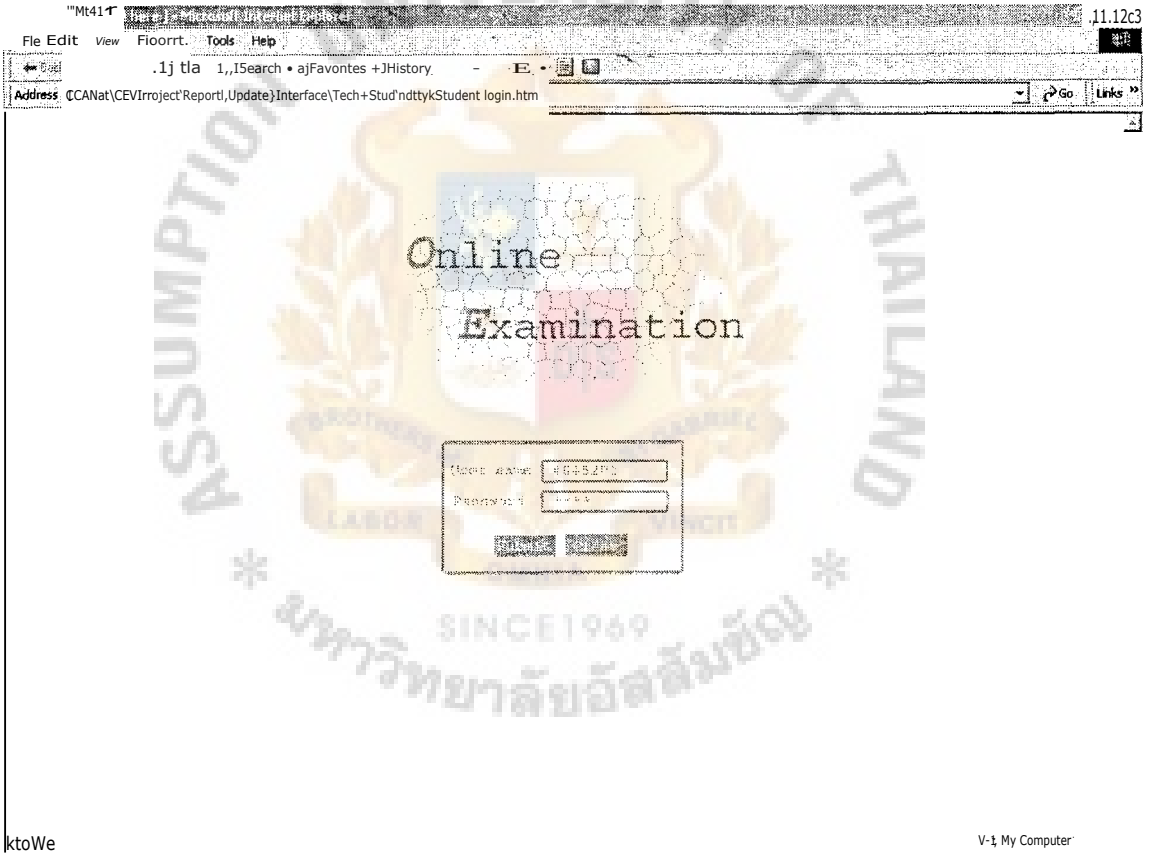


Figure 3.7. Sample Login Menu.

The right of using information will depend on the role or the position of the user. The Admin will take care about the role of the user. The role will be in Figure 3.8

Position	Role
1. Admin	- Add Edit Delete Subject - Add Edit Delete Chapter - Add Edit Delete Teacher - Add Edit Delete Student - Schedule Exam - Register Student and Teacher
2. Teacher	- Add Edit Delete Subject - Add Edit Delete Chapter - Add Edit Delete Exam - Assign Exam - Report
3. Student	- Exam - Practice

Figure 3.8. Role.

3.2.5 Database

The designing of the database will depend on relation so it will change the class from the analyzing system to be the E-R Diagram to show the relationship of information by changing each object to be appropriate like in the relation table in Figure 3.9 and the details are shown in the appendix.

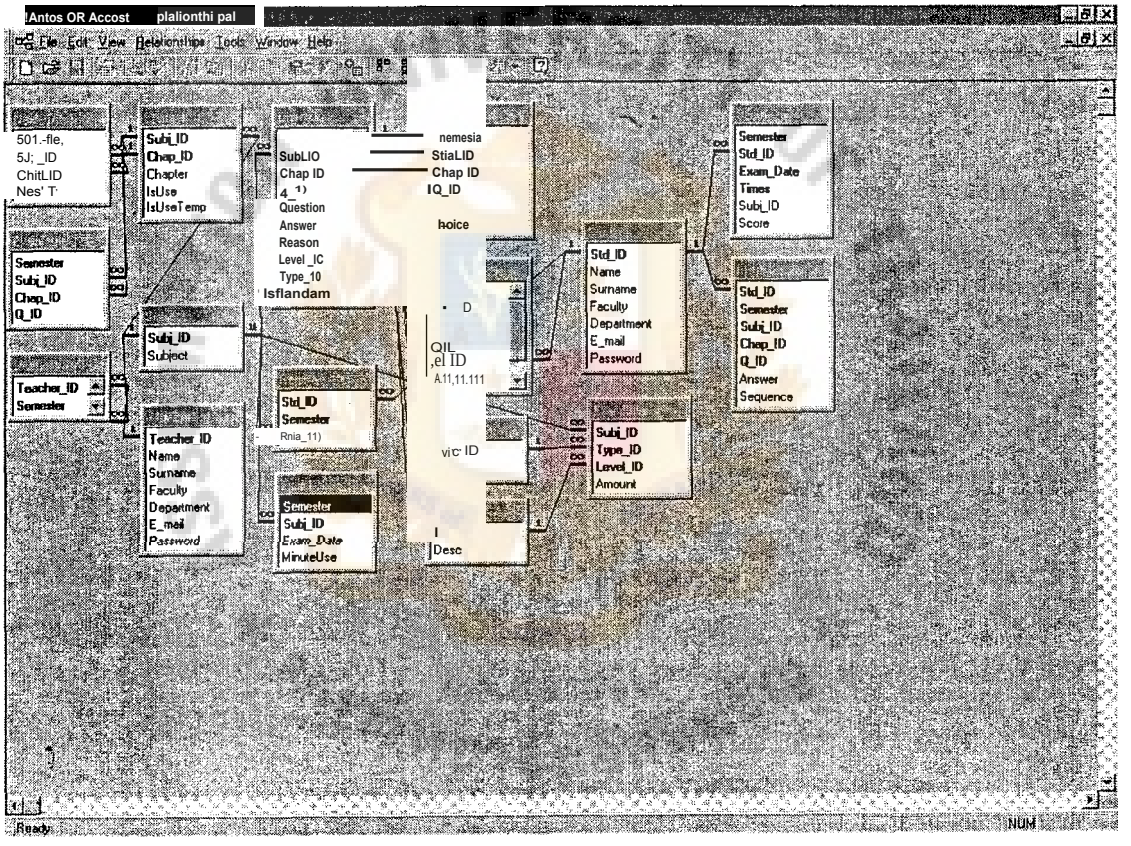


Figure 3.9. Relation E-R Diagram.

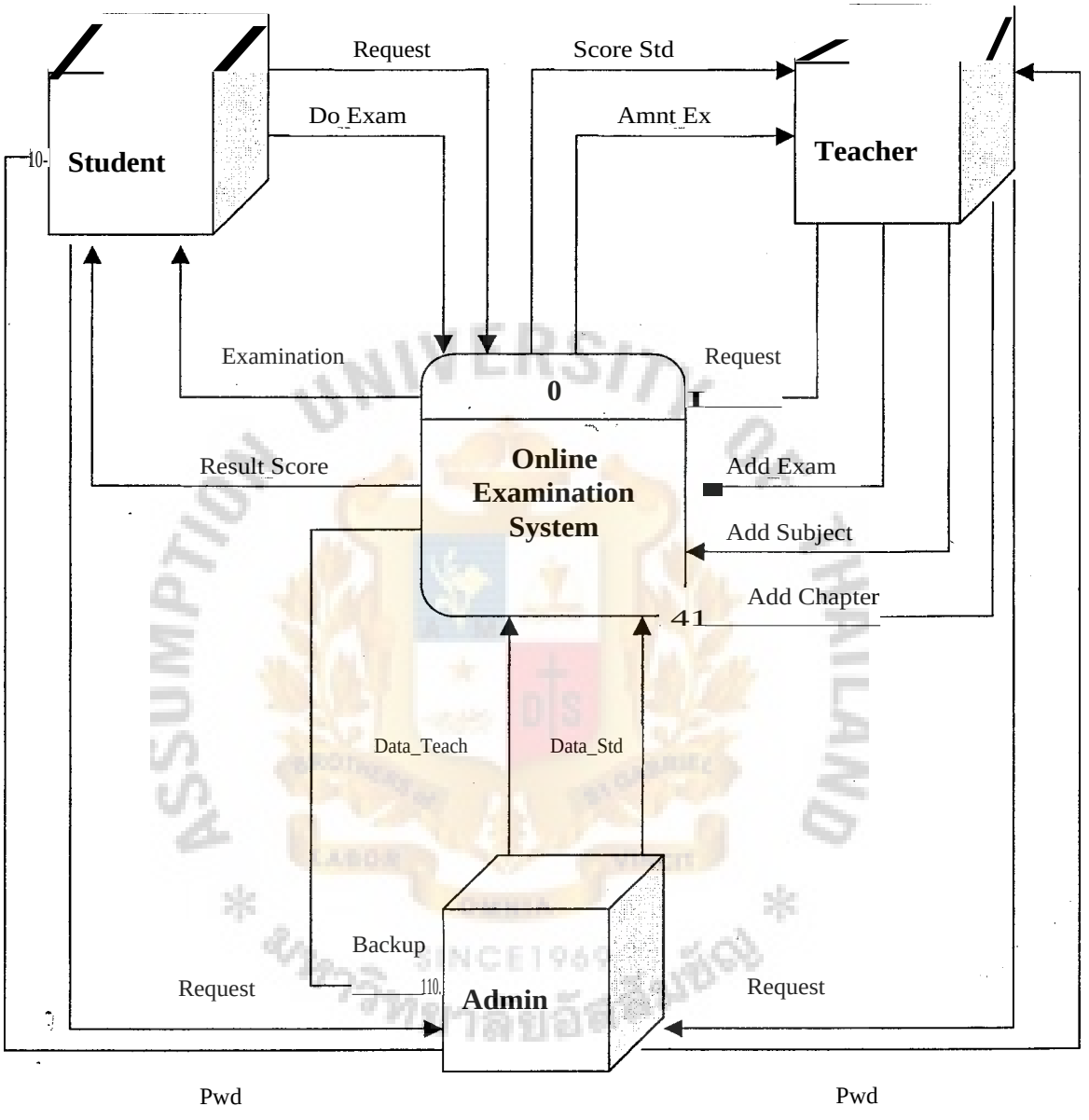
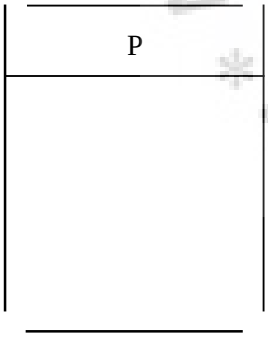


Figure 3.10. Context Diagram of the Online Examination System.

After we have defined the Context diagram, another task we must do is draw a Data Flow Diagram. The Data Flow Diagram is a graphic representation of a system that shows data flow to, from, and within the systems, processing function that change the data in some manner, and the storage of this data. The Data Flow Diagrams are nothing more than a network of related systems functions (processing data) that indicate from where information (data) is received (inputs) and where it is sent (output).

The Data Flow Diagrams are constructed to show various levels of detail. When a system is too complex or too large for a single data flow diagram to depict its working adequately, several data flow diagraMs may be ,constructed. Each of these data flow diagrams shows a different, and successively lower, level of detail. The level 0 diagram is the high-level data flow diagram for the system and shows all major processes and major data flow from the "area being studied" circle of the context diagrams.

The following are data flow diagram symbols:

Symbol	Description
	This symbol refers to process. Processes are actions performed upon data flowing through the systems. That means they represent the various individual functions that the system carry out. Functions transform inputs into outputs. A number identifies each process. The number corresponds to the level of the process on the hierarchy chart.

Symbol	Descri ption
	This symbol refers to "data store". They show collection (aggregates) of data that the system must remember for a period of time.
	This symbol refers to "flow". They are the connection between the process (systems function), and they represent the movement of data through a system.

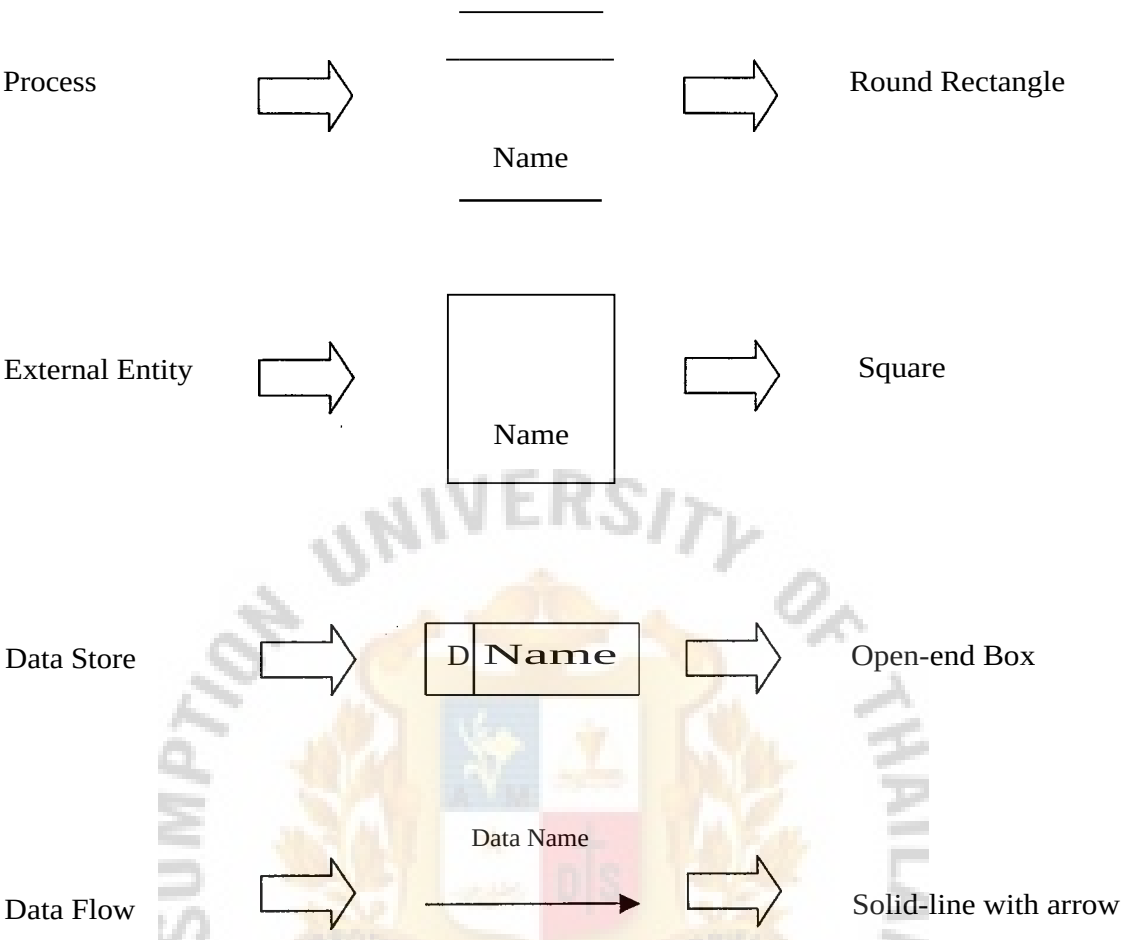


Figure 3.10. Element of Data Flow Diagram (Use Gane and Sarson Symbol).

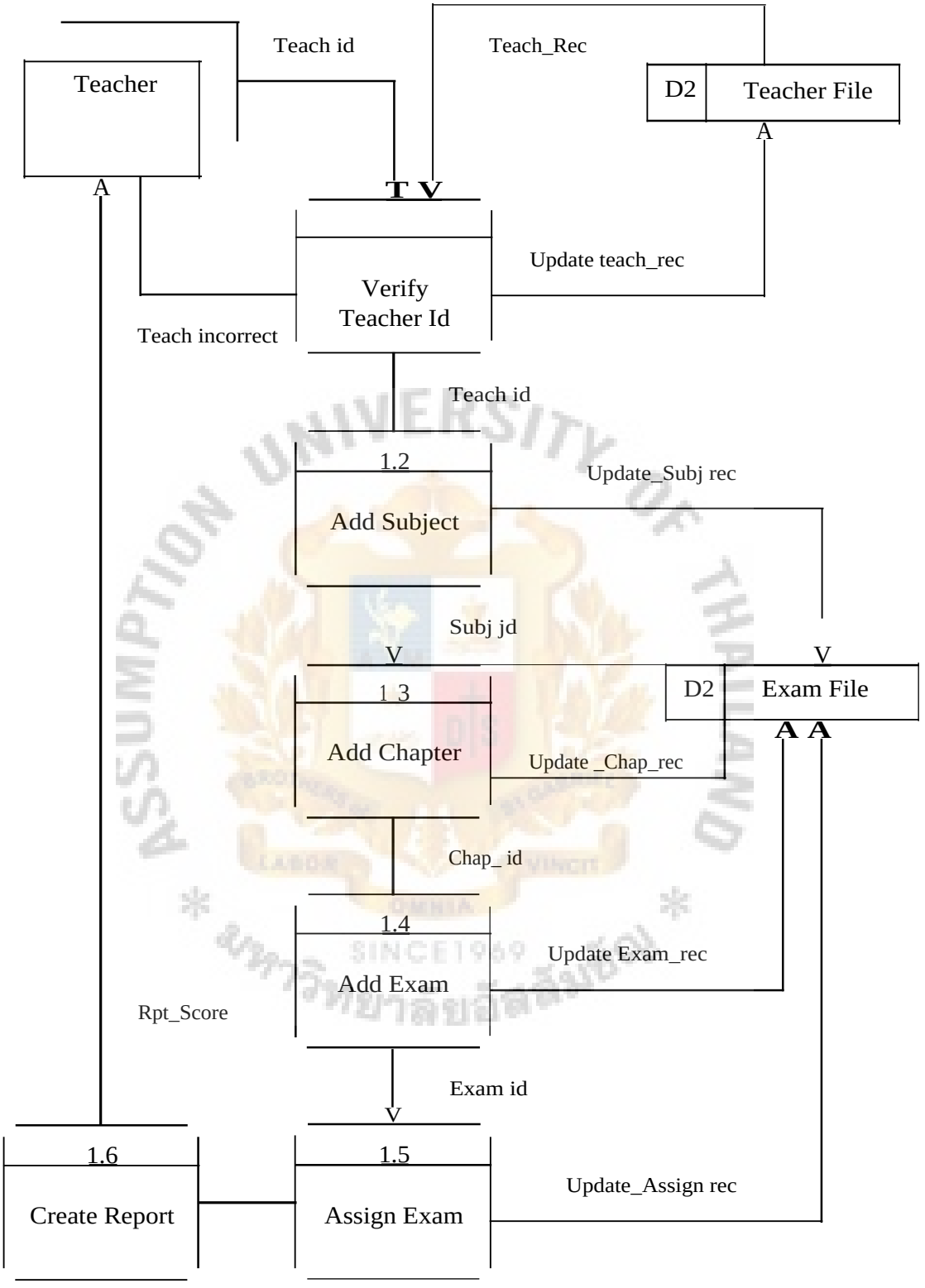


Figure 3.1.1. Level 1 Data Flow Diagram of Teacher Task Processing.

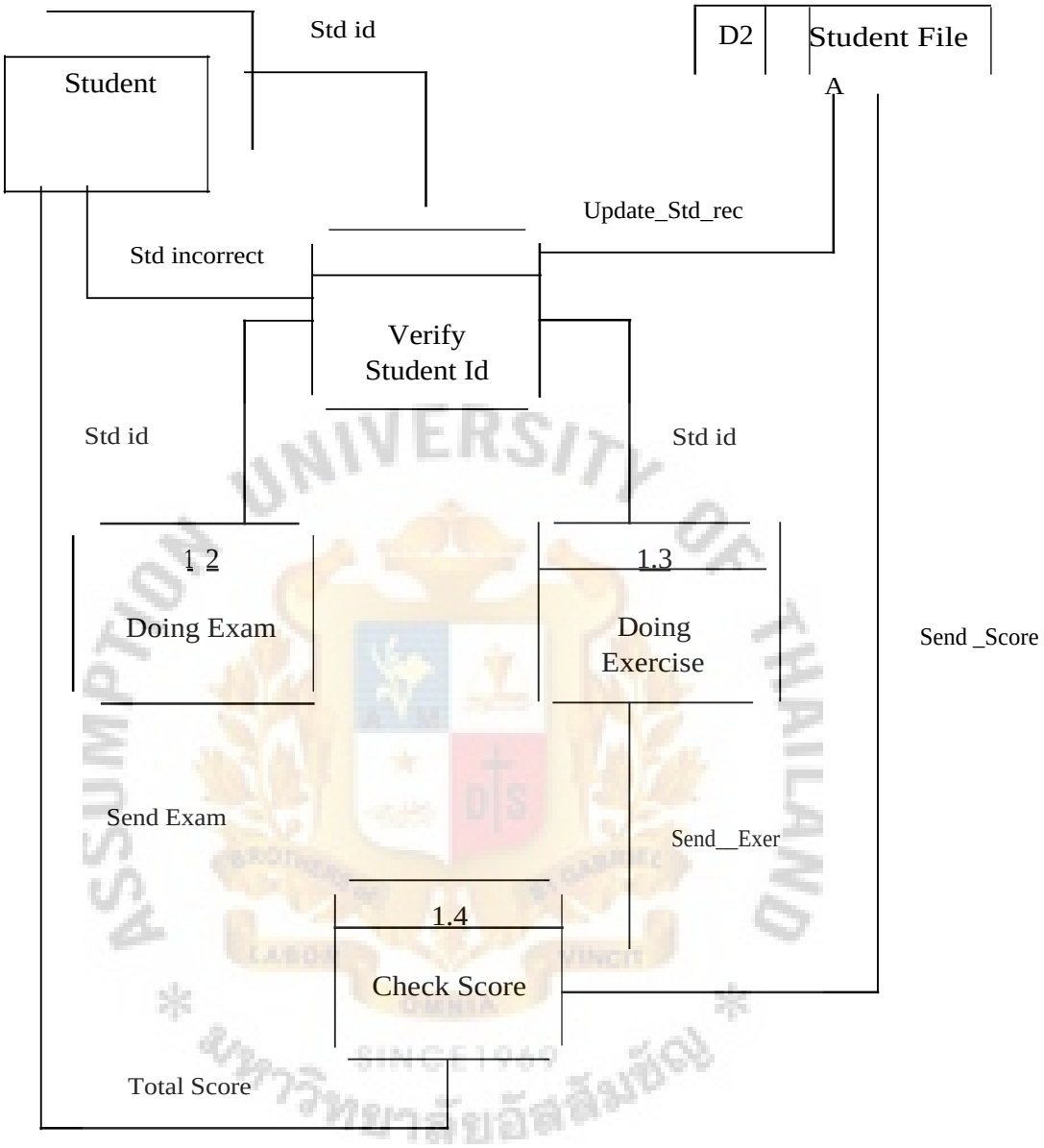


Figure 3.12. Level 1 Data Flow Diagram of Student Task Processing.

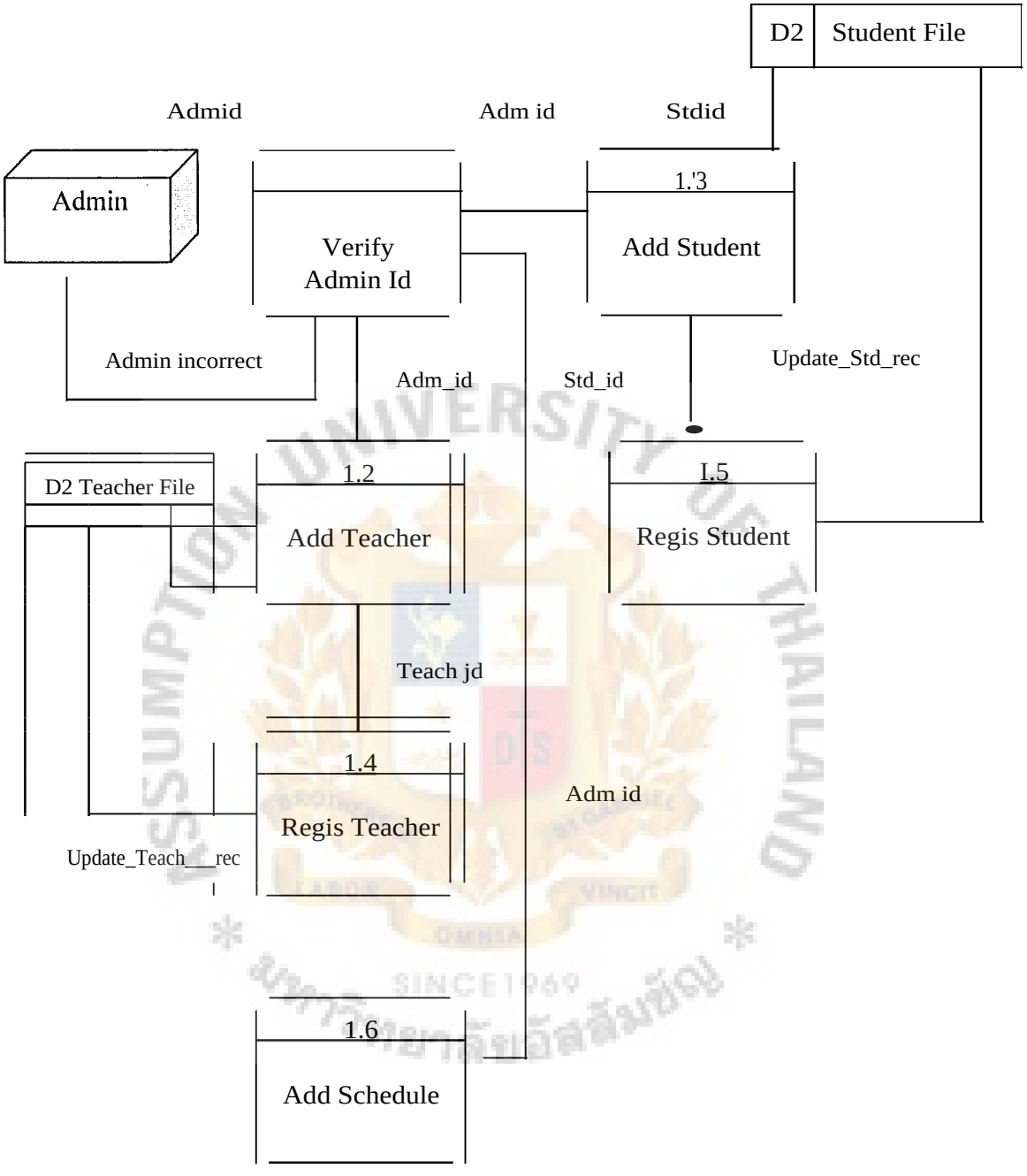


Figure 3.13. Level 1 Data Flow Diagram of Admin Task Processing.

3.4 Hardware and Software Requirements

The proposed system requires the following hardware components:

Table 3.1. The Hardware Specification for the Internet Server.

Hardware	Specification
CPU	Intel Pentium IV up to 2.8 GHz
Cache	1 MB
Memory	**DDR** SDRAM 4 GB
Hard Disk	200 GB
CD-Rom Drive	24 X or higher
Floppy Drive	1.44 MB
Network Adapter	Ethernet 10- Base T
Display Adapter	SVGA card
Display	15" monitor
Printer	Laser printer, Ink jet

Table 3.2. The Software Specification for the Internet Server.

Software	Specification
Operating System	Microsoft Windows NT Server 5.0
Web Server	Microsoft Internet Information System 2.0
Application Server	Microsoft Active Server Pages
Database server	Microsoft Access 97

For this proposed system, the hardware and software requirements for client machines are shown in Table 3.3 and Table 3.4 respectively.

Table 3.3. The Hardware Specification for Each Client Machines.

Hardware	Specification
CPU	Intel Pentium III
Cache	256 KB
Memory	256 MB
. Hard Disk	20 GB
Floppy Drive	1.44 MB
Network Adapter	Ethernet 10- Base T
Display Adapter	SVGA card
Display	15" monitor

Table 3.4. The Software Specification for Each Client Machines.

Software	Specification
Operating System	Microsoft Windows 98
Web browser	Microsoft Internet Explorer 6.0

3.5 Security and Control

(1) User Access Control (Authentication)

This project uses the Username/ Password system. Every user in the network system will be given a 'Username and Password for accessing the system and programs. The system checks the Username and Password. When the user accesses into the system, he will be asked for the user's login and password. So, only the authorized users can access the system. This is the network security. After the user gets into the system, the company will recheck whether the authorized users can access the functions in the sales information system.

(2) Data Access Control

All the data can be updated or modified depending on the level of authorized users. Staff members are allowed to only inquire about the data. The manager and office personnel are able to update some information in the system. This is the data security control policy.

(3) Back up and Recovery

File back-ups are done daily, weekly and monthly. The tape for daily backup is provided one per day (Monday, Tuesday, Wednesday, Thursday, and Friday). So, the company will have one tape for a monthly backup. In addition, there should be a backup before and after updating.

(4) File Server Security Control

Emphasis of the file server security control will be given on both the hardware and software. For hardware, the file server of the proposed system is kept in the locked room with a thick wall that is not easily damaged by fire. Only authorized persons having authorized key cards can enter the room.

IV. SYSTEM EVALUATION

4.1 Cost — Benefit Analysis

4.1.1 Cost Analysis of the Computerized System

(1) The Investment Cost

Personnel:

1	System Analysis (300 hours @ 217)	65,000 Bahts
1	Telecommunication Specialist (60 hours @ 200)	12,000 Bahts
1	Programmer (450 hours @ 150)	45,000 Bahts
1	System Architect (100 hours @ 200)	20,000 Bahts

Hardware:

1	File Server	80,000 Bahts
6	Workstation (33,000 / set)	200,000 Bahts
1	LaserJet Printer	13,000 Bahts
2	Hub (3 coin 10/100 Dual speed 16 ports)	10,000 Bahts
2	UPS	
	- 1 Backup 60 Minutes, full 1500 VA	18,500 Bahts
	- 1 Backup 30 Minutes, full 1000 VA	13,500 Bahts
	Network Cost	45,000 Bahts

Software:

1	MS Window NT Server	32,000 Bahts
1	MS SQL Server 6.5	55,000 Bahts
Total Investment Cost		617,000 Bahts

(2) Annual Operation Cost

Personnel:

1	Programmer (150 hours @143)	21,500 Bahts
1	Database Administrator (150 hours @100)	15,000 Bahts

Expense

1	Maintenance Agreement for Server	20,000 Bahts
	Zip Drive	2,350 Bahts
	Toner	2,650 Bahts
Total Annual		61,500 Bahts

(1) Costs of Manual System

Table 4.1. The Manual System Cost Analysis in Bahts.

Cost items	Years				
	1	2	3	4	5
1.Manpower -3 Staff (12,000x12m) (Increase by 10 % annually)	432,000	475,200	522,720	574,992	632,491
2.Utility Cost (Increase by 15 % annually)	150,000	172,500	198,375	228,131	262350
3.Paper (Increase by 10 % annually)	200,000	220,000	242,000	266,200	292,820
4.0thers/Miscellaneous (Increase by 5 % annually)	40,000	42,000	44,100	46,305	48,620
5.Overtime Cost (Increase by 5 % annually)	35,000	36,750	38,587	40,517	42,543
Total Cost	857,000	946,450	1,045,783	1,156,145	1,278,825

Table 4.2. Five-Year Accumulated Manual System Cost, Bahts.

Year	Total Manual Cost	Accumulated Cost
1	857,000	857,000
2	946,450	1,803,450
3	1,045,782	2,849,232
4	1,156,145	4.005.377
5	1,278,825	5,284,202
Total	5,284,202	-

Table 4.3. The Computerized System Cost Analysis in Bahts.

Cost items					
1.Investment Cost					979453
2.Maintenance Cost					879,370
3.Annual Operation Cost					
4.Manpower					
-2 Staff (10,000x12m) (Increase by 10 % annually)					
5.Utility Cost (Increase by 5 % annually)					
Other/Miscellaneous (Increase by 5 % annually)					
Total Cost					

Table 4.4. Five-Year Accumulated Computerized System Cost, Bahts.

Year	Total Manual Cost	Accumulated Cost
0	617,000	617,000
1	641,500	1,258,500
2	711,650	1,970,150
3	790,565	2,760,715
4	879,397	3,640,112
5	979,453	4,619,565
Total	4,619,565	-

(3) The Comparison of the System Costs between the Manual System and the Computerized System.

Table 4.5. The Cost Comparison between the Two Systems, Bahts.

Year	Accumulated Manual Cost	Accumulated Computerized Cost
0	-	617,000
1	857,000	1,258,500
2	1,803,450	1,970,150
3	2,849,233	2,760,715
4	4,005,378	3,640,112
5	5,284,203	4,619,565

4.1.2 Benefit Expected

The proposed system will provide both tangible and intangible benefits of which the details are as follows:

Table 4.6. Tangible Benefits.

Tangible Benefit	Year 1	Year 2	Year 3	Year 4	Year 5
1. Saving of Manpower Cost	192,000	211,200	232,320	255,552	281,107
2. Saving of Paper	200,000	220,600	242,000	266,200	292,820
3. Saving of Other Cost	- 10,000	- 10,500	- 11,025	- 11,576	- 12,155
4. Saving of Overtime Cost	35,000	36,750	38,588	40,517	42,543
Total	417,000	457,450	501,883	550,693	604,315

4.1.3 Payback Period

From table 4.7. the payback period between accumulated net benefits are in the second year and third year. The payback period has the formula as follows:

Payback = 2 + [(accumulated net benefits second year)/(second year + third year)]

= 2 + [(153,304.21/(153,304.21+62,466.63)]

= 2 .71

Payback period for the proposed system is 2.71 year

4.1.4 Net Present Value

The net present value is a discount cash approach based on the present value of money. The net present value has the formula as follows:

NPV = RJ(l+k)^1+ ...+R/(1+K)^n-PV

PV = Development Cost

= 577,000 Bahts

K = Interest rate

= 12 %

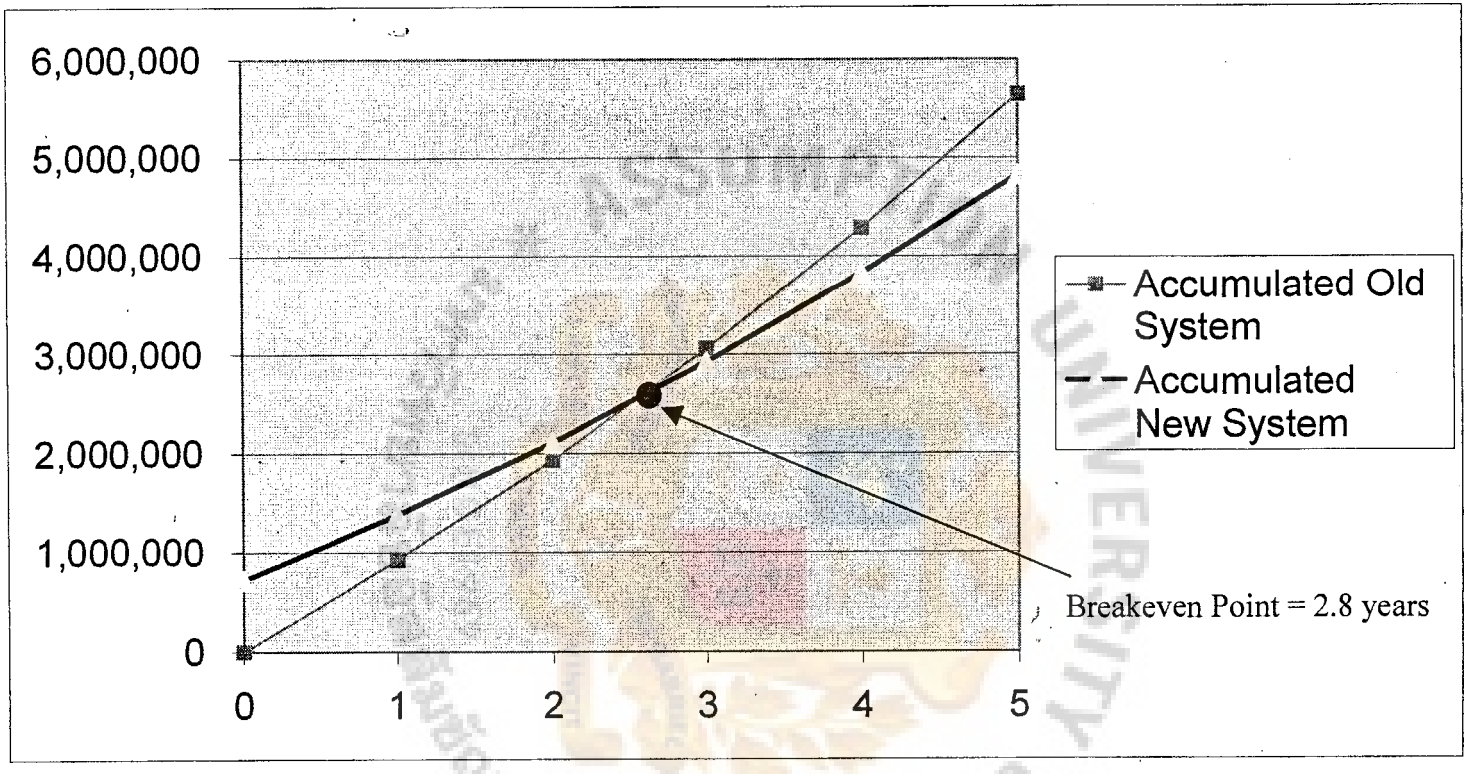
N = Number of years saving available

= 5 years

NPV = (417,000/(1+...+417,000/0.893+...)-577,000

= 459,749.16 Bahts

The payback period often takes 2.71 years and the net present value shows 459,749.16 Bahts. These indicate that the proposed investment is cost-justifiable.



Cost Comparison between the Existing System and the Proposed System.

Table 4.7. Payback Period and Net Present Value.

Cost items							
Accumulated Net Benefits						-379,946.43	-153,304.21

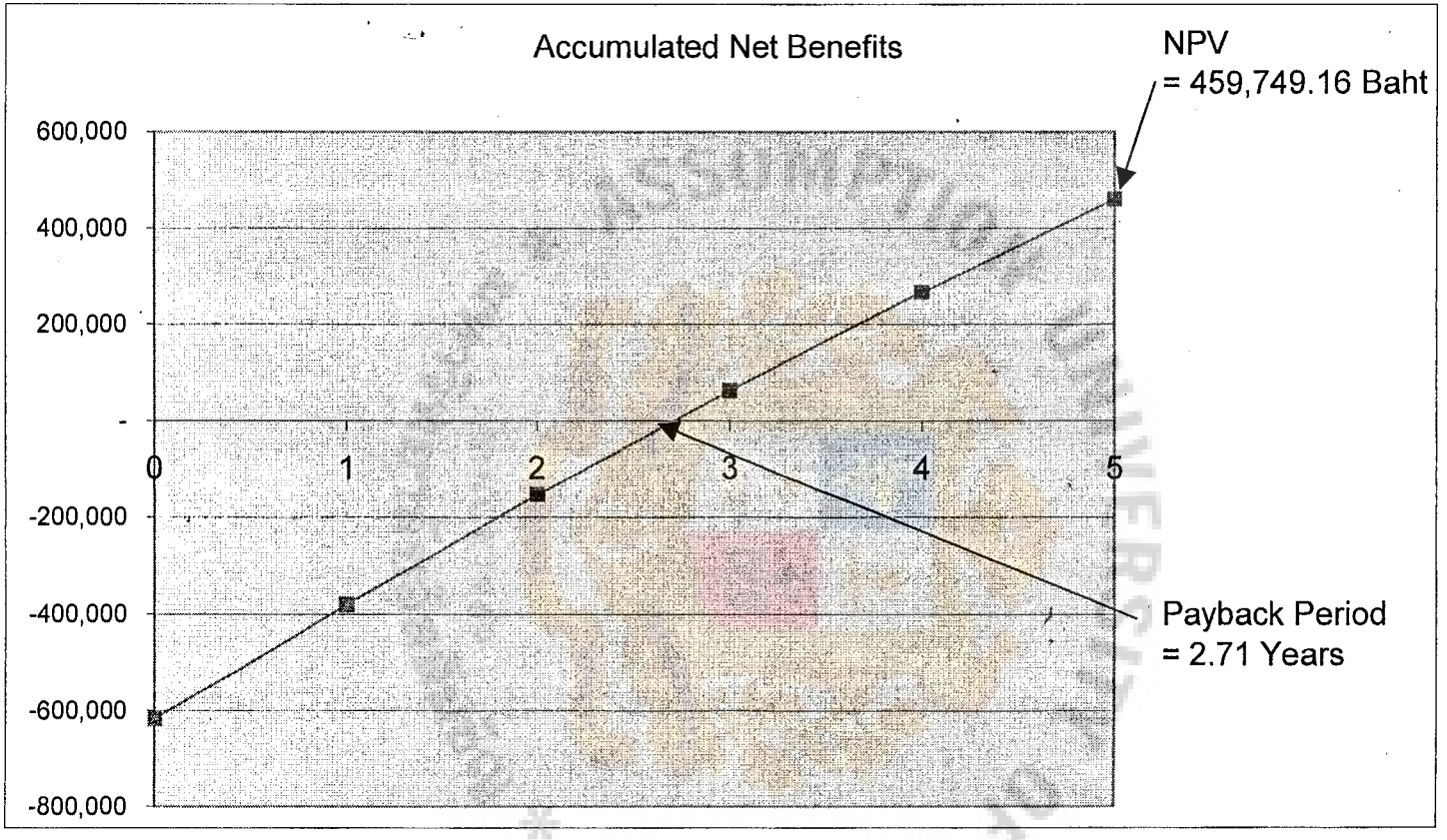


Figure 4.2. Payback Period and Net Present Value.

We used 3 techniques to assess economic feasibility. The result of each technique is shown in the table below.

Table 4.8. Summary of Cost-Benefit Analysis Results.

Technique	Results
Breakeven Analysis	2.8 years.
Net present Value	459,749.16 Bahts.
Payback Analysis	2.71 years.

As -you can see from the above table, we can consider the results of each • technique as follows:

(1) Breakeven Analysis

The breakeven point between the manual system and proposed system is 2.8 years. That means this proposed system should be accepted because even if it has the investment cost for the beginning stage but its operation cost is lower than the manual system and its accumulated cost can be equal to the manual system within a short period of time (2.8 years).

(2) Net Present Value

Its result is positive. That means the value of benefits is higher than the value of cost, so it is worthwhile investing in this proposed system.

(3) Payback Analysis

A payback period guideline of the organization is 4 years. The result of payback period is 2.71 years, which is lower than the organization's payback period guideline, so it is right to implement the proposed system.

4.2 Overview of Project Implementation

The parallel run concept sets up the implementation process. By this concept, the . process will work on both existing system and new system for a number of cycles until the result of the new system proves to be successful. Therefore, it will take the users a lot of time in this period to do double jobs each day and to make them familiar with the new process. So it should not take them too much time to understand the new process and operate it correctly.

4.3 Source Code

In this stage, the application program is written in order to perform the computerized business. The programming language of this project is Microsoft Access 97.

4.4 Test Plan

The step before the installation of any system is acceptance testing. This activity tests everything that makes up the system: hardware, proposed software, end users, procedures, and data.

(1) Testing with test data

During the programming phase of the system development, programs are written according to the system specification. Then they are individually tested. To ensure that the proposed software can be combined into the operation system the programs need to be thoroughly tested. The purpose of the system test is to validate all software, input, output, procedures, and the database. To validate the Sales Information System, the first stage is to test each subsystem. After testing, modifications are made to enable subsystems or cycles to function properly. At this point the entire system is tested as a unit. The test and modification of the Sales Information System will go on until the components of the system work properly and all input/output are validated.

(2) Testing with live data

The second stage of the system test is done with live data. Live data are actual data that have already been processed through the existing system. Testing with live data provides an extra level of assurance that the system will work properly after the implementation.

4.5 Conversion

At this stage, the overall system is running the program, interfacing with the different files of data, utilizing the communication networks, and interfacing with the users. The type of conversion we use for this proposed system is "parallel conversion" on which both manual and proposed system are operated for a short period of time. This method ensures that all major problems in the proposed system will be solved before the old system is discarded.

V. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

This project is set up based on the examination data base which has the ability to link through the internet network by categorizing data base into subject, type and examination difficulty. The system will random along the difficulty level effectively. When the test is completed, the system will verify and release the marks via the internet.

Moreover, students are able to increase their learning skill via the internet. Otherwise teachers can retrieve and estimate scores effectively by making appropriate plans for each subject. When we can cope with it very well, the teachers will be able to spend more time to prepare the courses, programs and laboratory for education that will be useful for all the students; teachers and the institution as well. The distance learning might be developed whereby students do not need to come to class but just do it at home. This will increase the value of education and serve social needs much more boardly.

To implement a computerized system, a high amount of budget is required. The computerized system increases the efficiency making the company more competitive in the business. Due to its speed and accuracy, the company can reduce the total cost and the amount of working time. The plan to implement the proposed system has been set up into the following stages:

(1) System programming

(2) System Testing

(3) System Installation

(4) Training

(5) Documentation

In the end, the company will recognize the advantages of applying the computerized system into its operations as soon as the proposed system has been designed to support the new technology in the near future.

Table 5.1 shows the benefits of the proposed system compared with the existing system. So, it can be concluded that the proposed system is more efficient and effective than the existing system.

Table 5.1. Tangible Benefits of the Proposed System.

Tangible Benefit	Year 1	Year 2	Year 3	Year 4	Year 5
1. Saving of Manpower Cost	192,000	211,200	232,320	255,552	281,107
2. Saving of Paper	200,000	220,000	242,000	266,200	292,820
3. Saving of Other Cost	- 10,000	- 10,500	- 11,025	- 11,576	- 12,155
4. Saving of Overtime Cost	35,000	36,750	38,588	40,517	42,543
Total	417,000	457,450	501,883	550,693	604,315

5.2 Recommendations

(1) The administration will take care of the process of examination which has the information of students and instructors. This will waste a lot of time to collect all the information. If the administration can connect with the registration to get the information of students, instructors, courses and registration, it will reduce the time for the administration.

(2) Regarding the essay, the online examination system cannot check this examination because the program cannot check each word. If the students write the wrong word, the meaning will be_changed. And the result of the essay also depends on the instructors so the system will not be effective. The way of checking the essay is to print and give to the instructors and checked by them. But in the future, the online examination system will be developed and improved and it can check the sentences

(3) When the students take the examination, it will have the range of time for them. And when the time is out, this system will have the automation lock. So the students have to press the button which will send the examination. If the students do not press this button, the system cannot check the result. The online system will be improved and if the time is up, the system will automatically check the result.

APPENDIX A

WEB INTERFACE DESIGN

1. Admin Menu

Figure A.1. Login Screen of Admin.

This screen is used has to pass the username and password before getting into the screen. The system verifies the username and password and if the password is valid the user can do the next screen. If it is not invalid the user needs to type the password again. If the user cannot get into the system more than three times, the officer should be contacted.

Figure A.2. Main Menu Form.

This screen shows the main menu for User Admin. The Admin can select the specific information base in the system, depending on the purpose of usage.

Figure A.3. Add Student Menu Form.

The administrator can add student information into the profile and save. The System verifies the student profile in the database. If it has already existed, it will alert "Student profile has already existed, Please edit again". If there is no existing data, it will pop up "student profile has been saved."

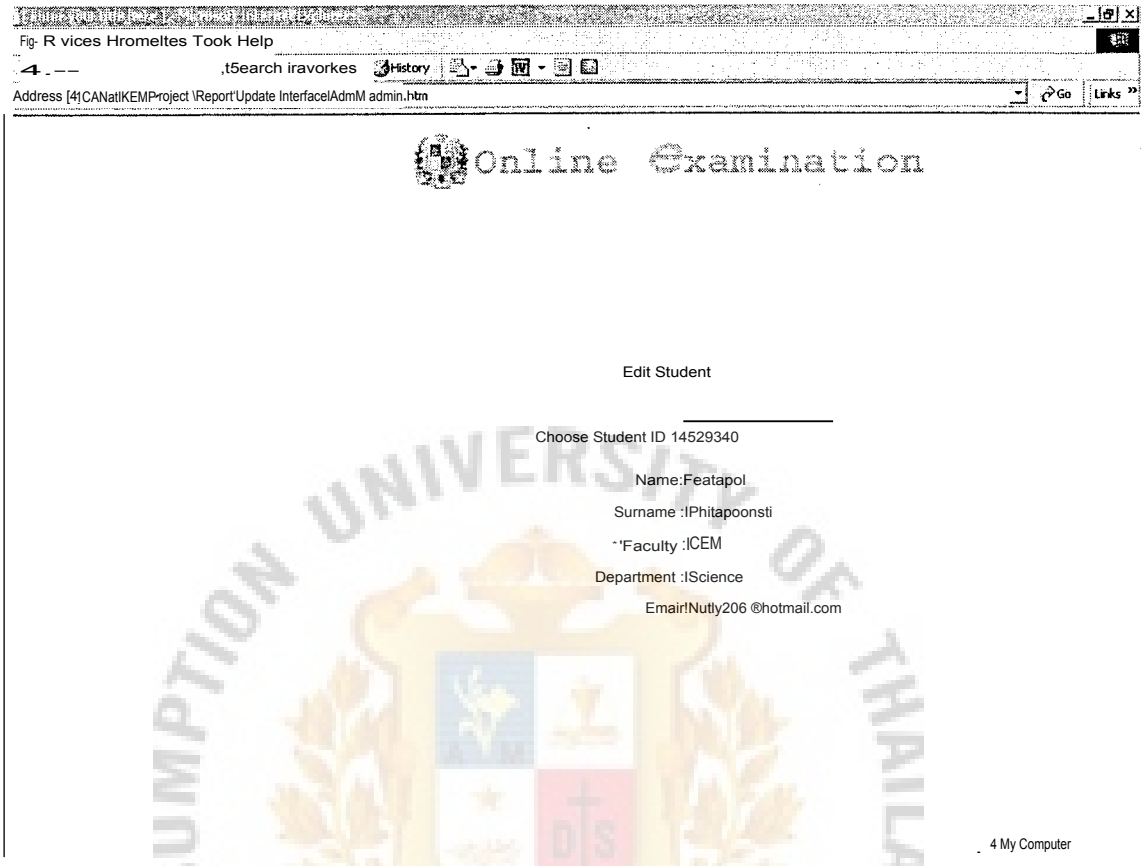


Figure A.4. Edit Student Menu Form.

The administrator selects the "Edit" menu and gives the student identification. The System verifies the student profile in the database and shows the student profile that needs to be edited.

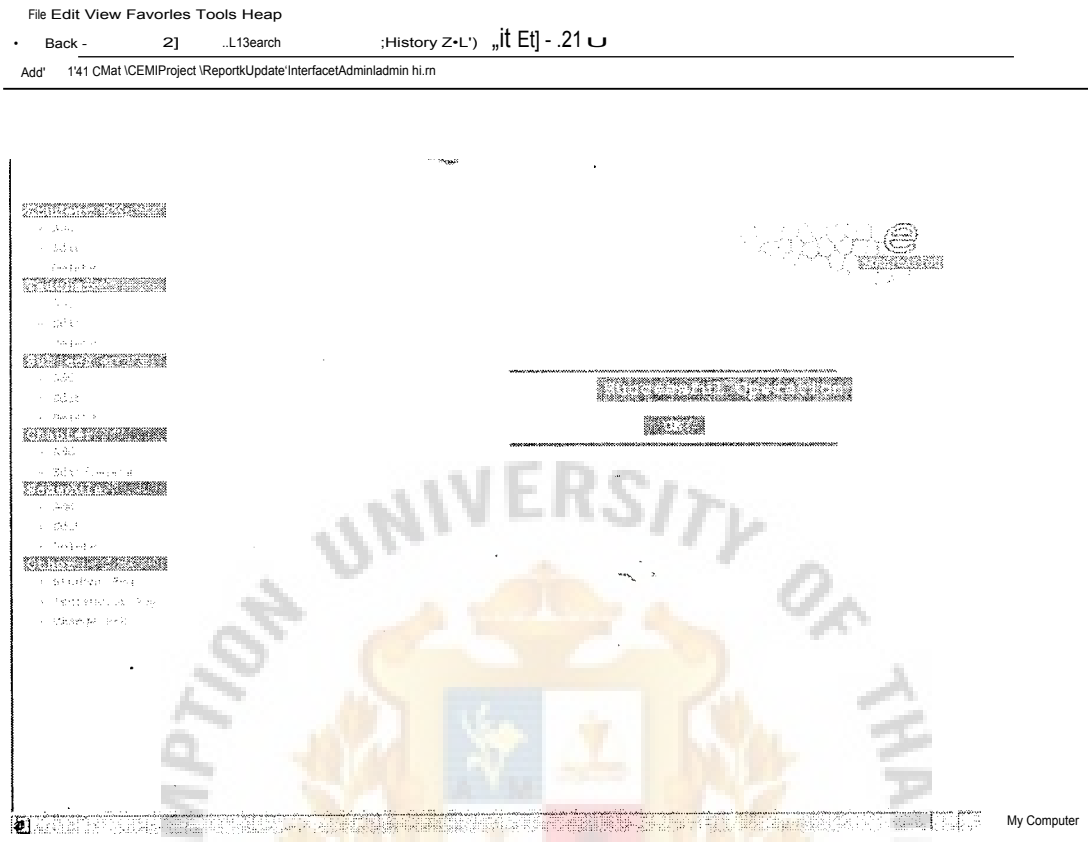


Figure A.5. Successful Operation Form.

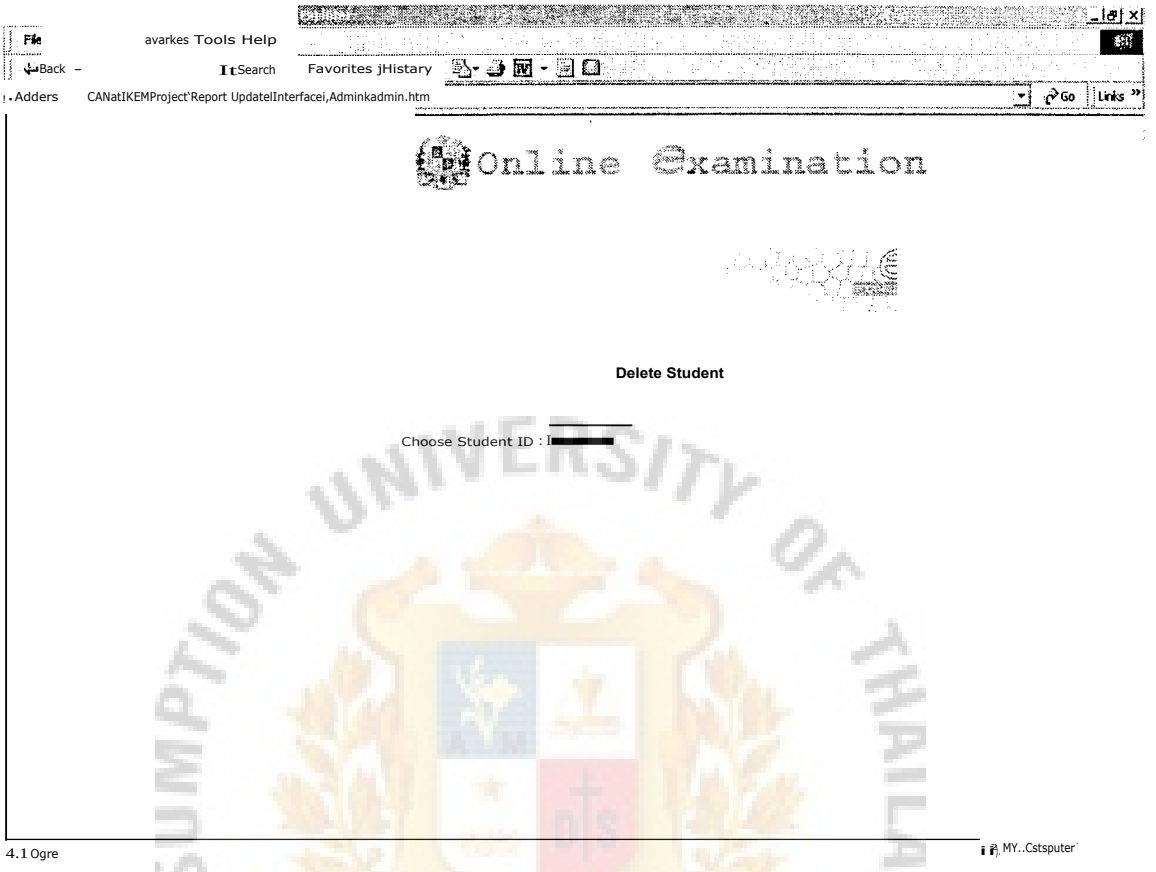


Figure A.6. Delete Student Menu Form.

The administrator goes to the "Delete" menu and gives the student identification number that has to be deleted. The System verifies the student profile in the database and shows the student profile that needs to be deleted.

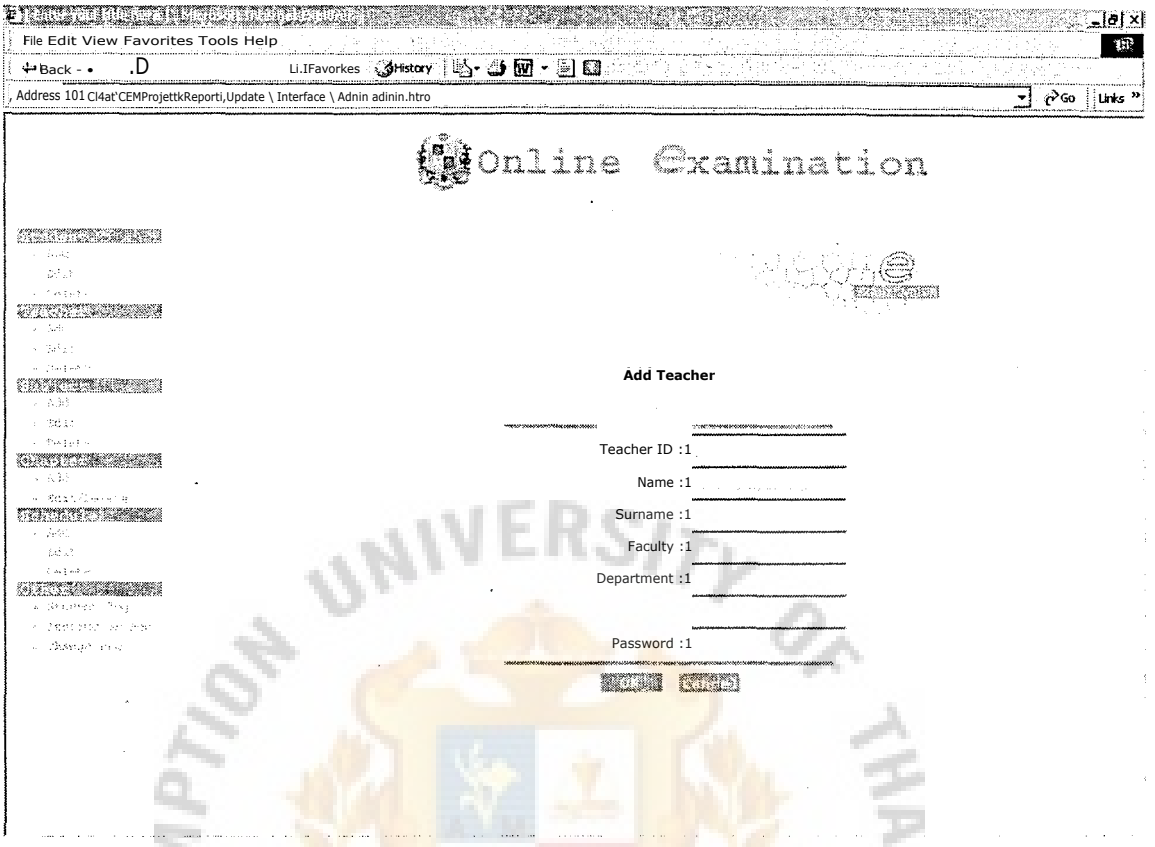


Figure A.7. Add Teacher Menu Form.

The administrator goes to "Add teacher profile" and saves the record. The System verifies the teacher profile in the database. If it has already existed, it will alert "Teacher profile has already existed, Please edit again". If there is no existing data, it will alert " teacher profile has been saved."

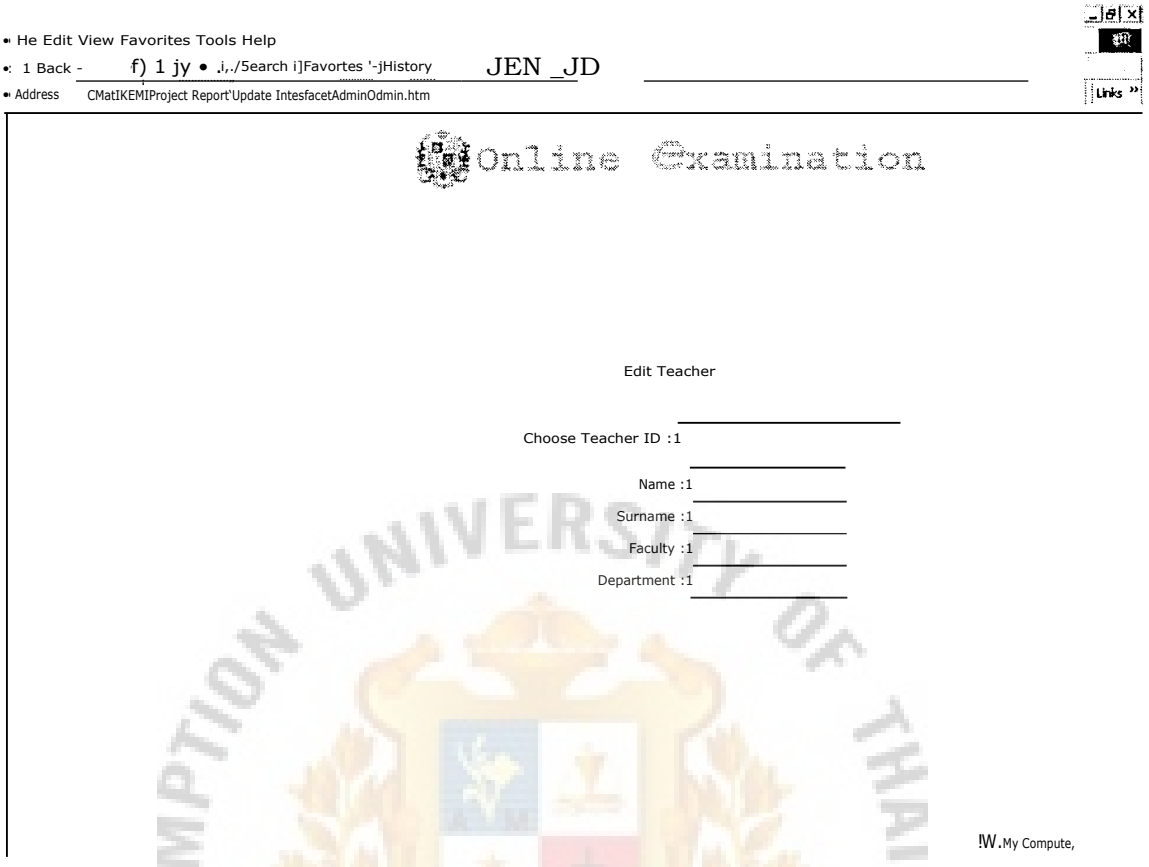


Figure A.8. Edit Teacher Menu Form.

The administrator goes to the "Edit" menu and gives the teacher identification that has to be edited. The System verifies the teacher profile in the database and shows the teacher profile that needs to be edited.

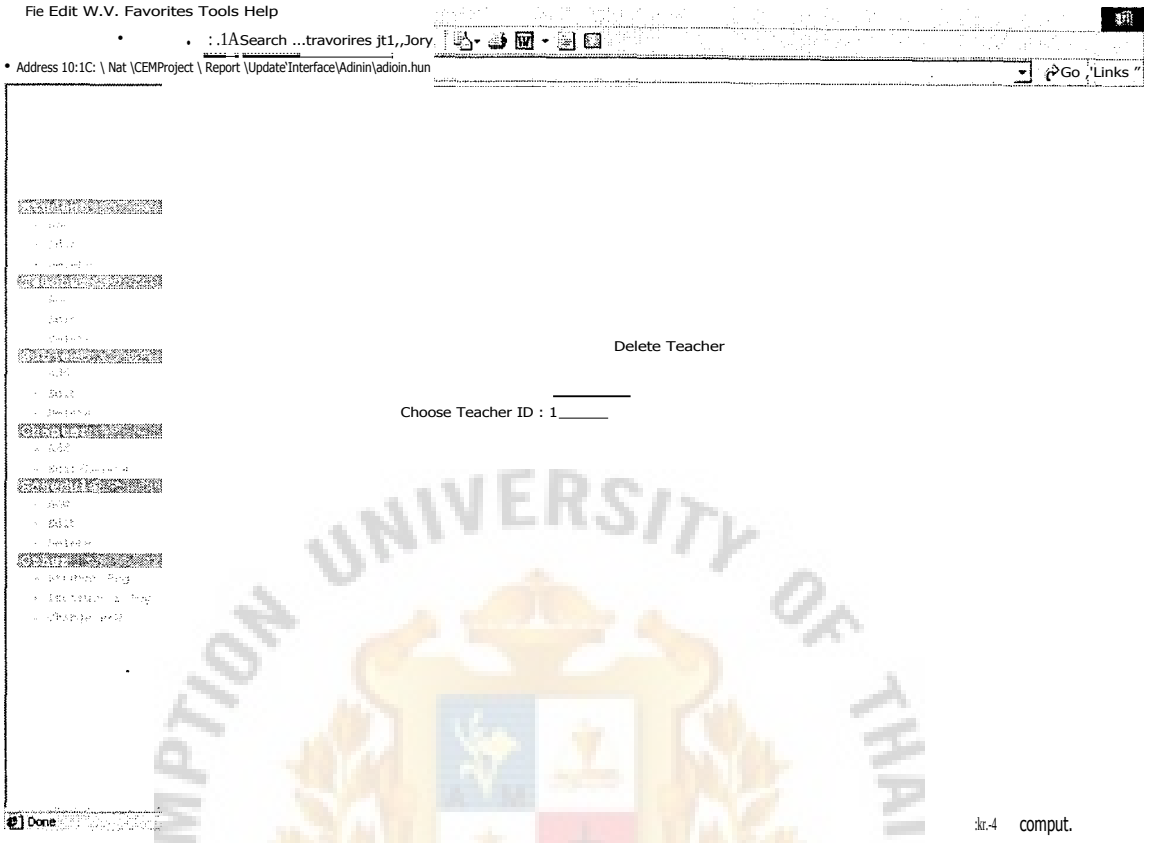


Figure A.9. Delete Teacher Menu Form.

The administrator goes to the "Delete" menu and gives the teacher identification number that has to be deleted. The System verifies the teacher profile in the database and shows the teacher profile that needs to be deleted.

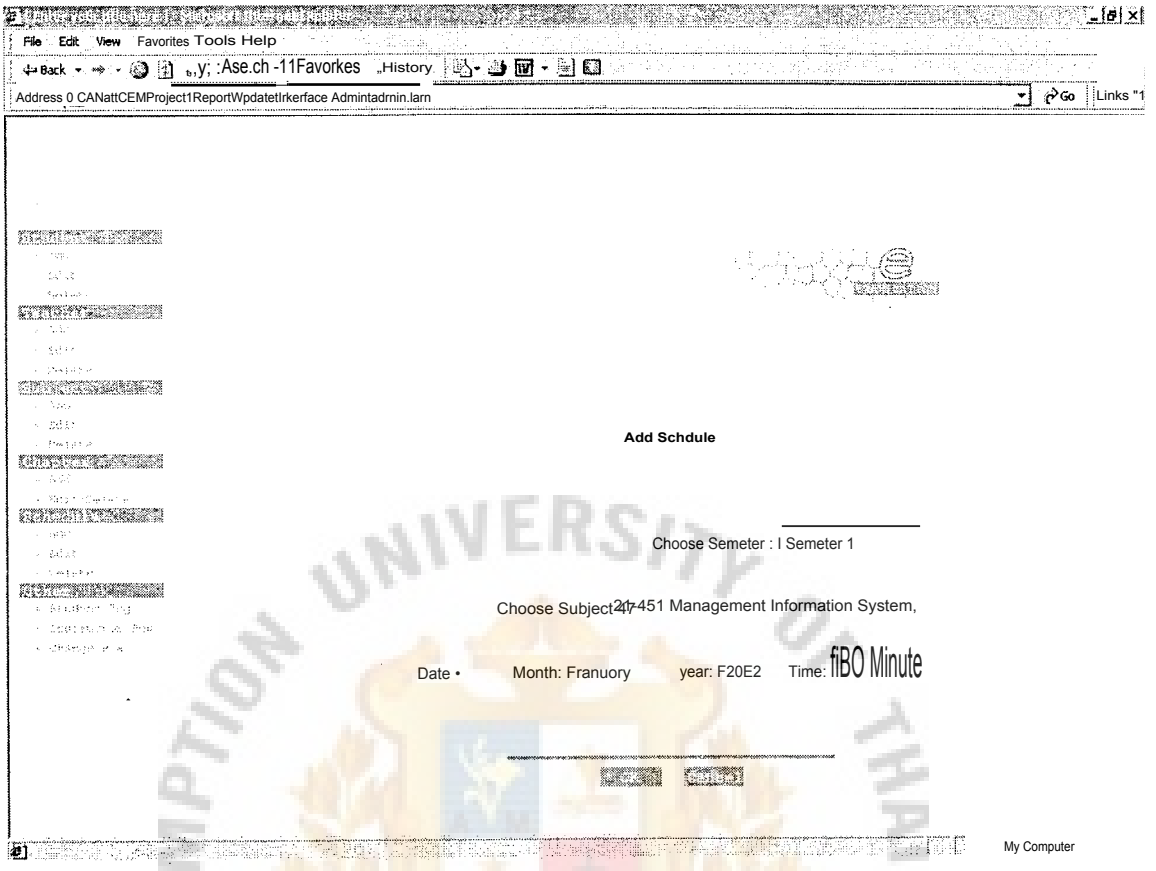


Figure A.10. Add Schedule Menu Form.

The administrator goes to the menu "Add schedule", chooses the academic year, subject, and saves date and time of the exam. The System verifies and saves in the database.

Figure A.11. Edit Schedule Menu Form.

The administrator goes to the "Edit schedule" menu, chooses the academic year and subject and presses the "search" button. The System verifies the database.

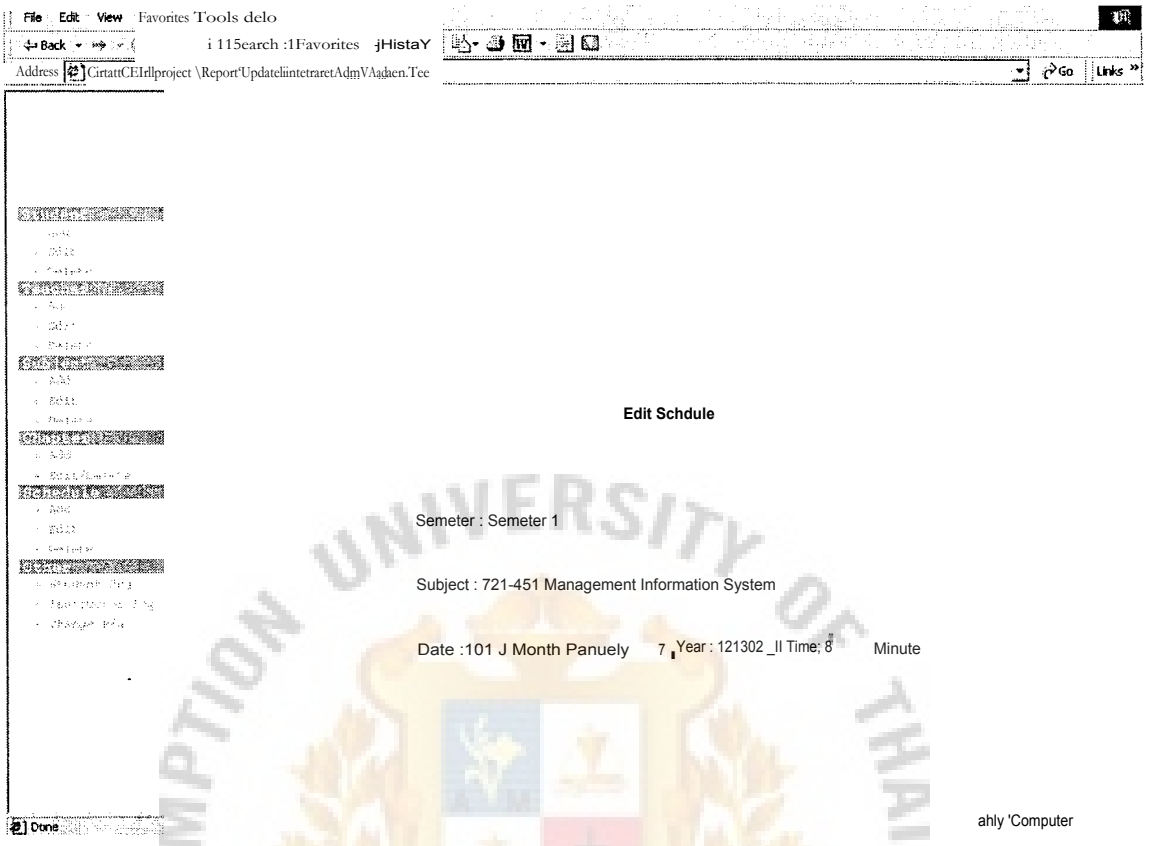


Figure A.12. Result Edit Schedule Menu Form.

This screen shows the result from Figure A.11.

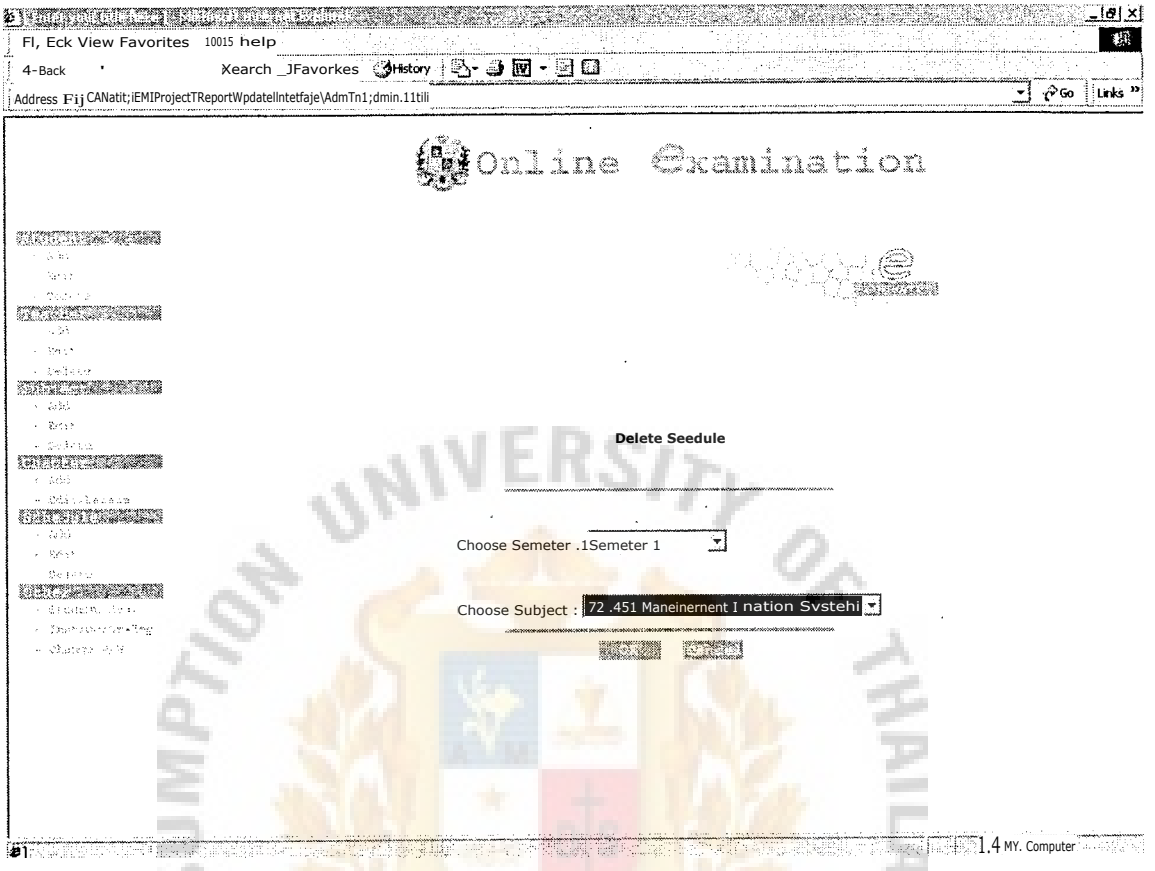


Figure A.13. Delete Schedule Menu Form.

The administrator goes to the "Delete schedule" menu, chooses academic year and subject and presses the "delete" button. The System verifies the database.

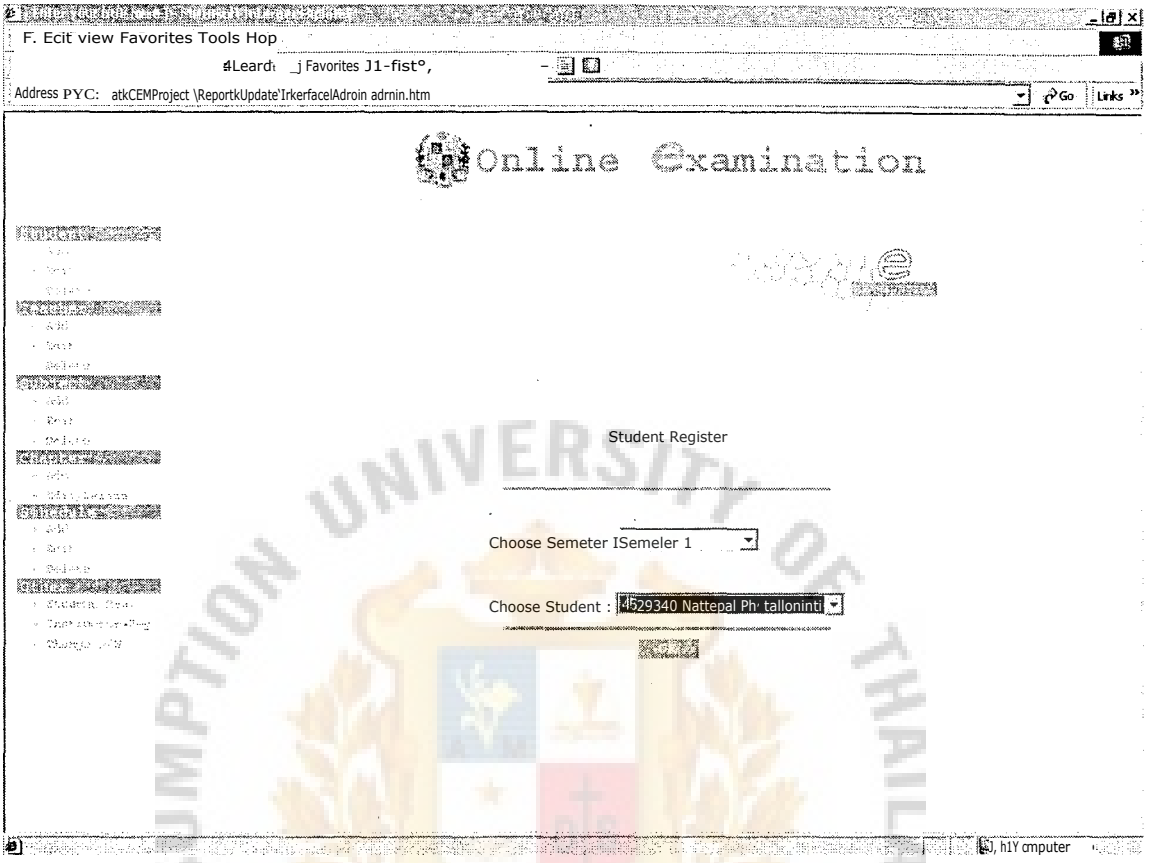


Figure A.14. Student Register Menu Form.

The administrator goes to the tab "register" and gives the student identification number. The System shows the list of subjects from the student's registration. The administrator will see all the list that the students have registered.

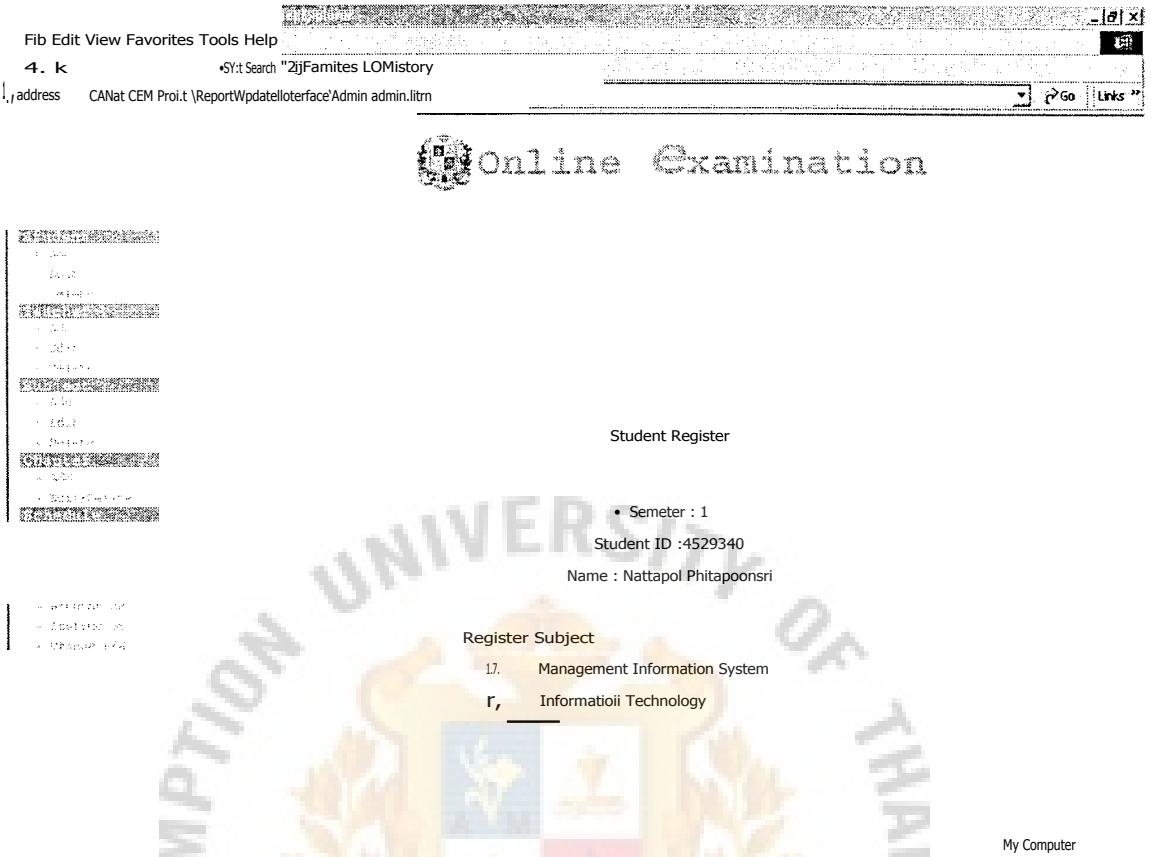


Figure A.15. Result Student Register Menu

This screen shows the result from Figure A.14.

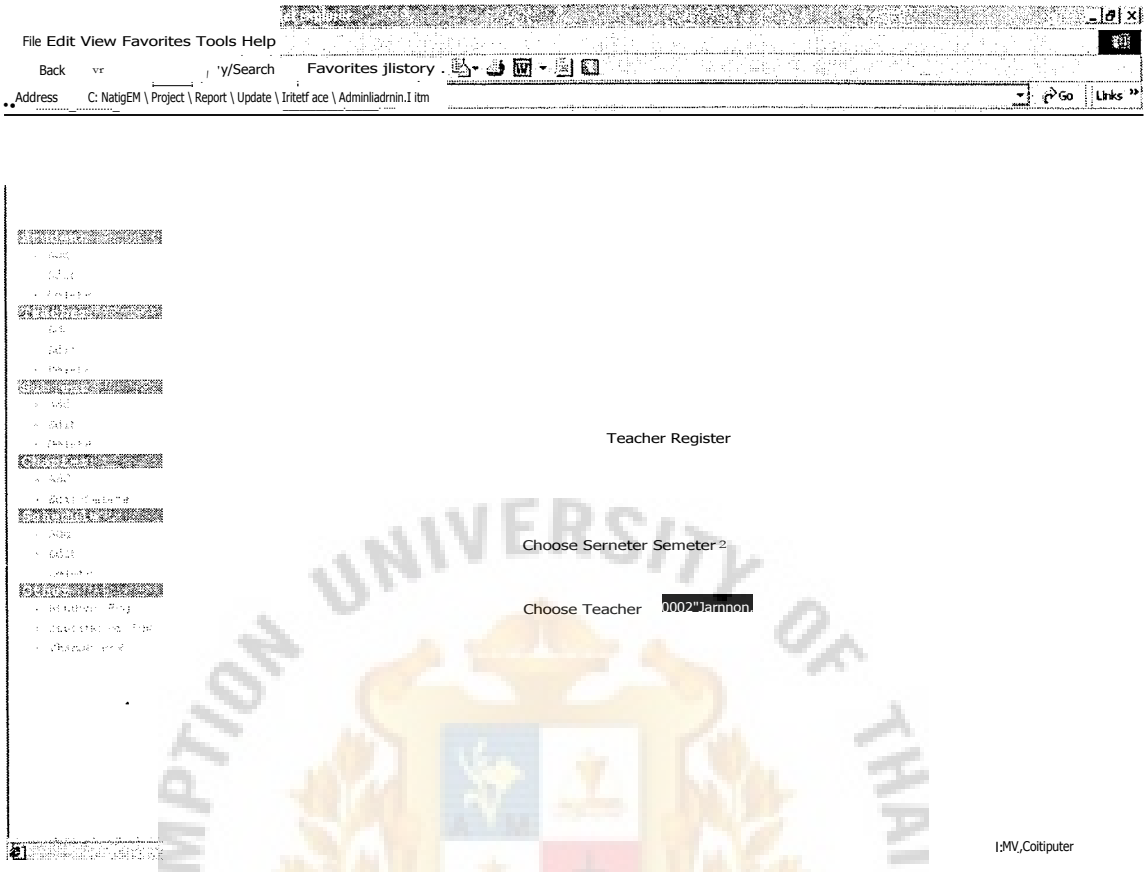


Figure A.16. Teacher Register Menu Form.

The administrator goes to the tab "register" and gives the teacher identification number. The System shows the list of subjects that the teacher teaches. The administrator will see all the list that the teachers teach.

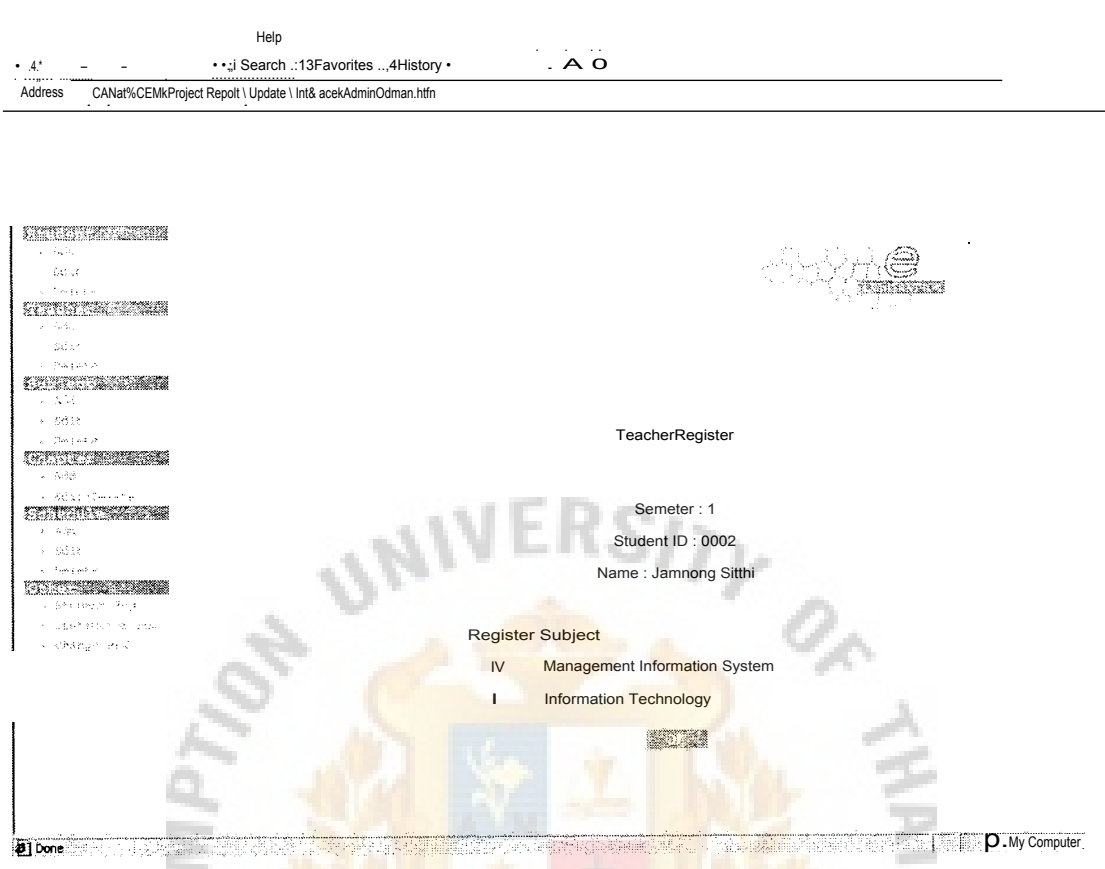


Figure A.17. Result Teacher Register Menu.

This screen shows the result from Figure A.16.

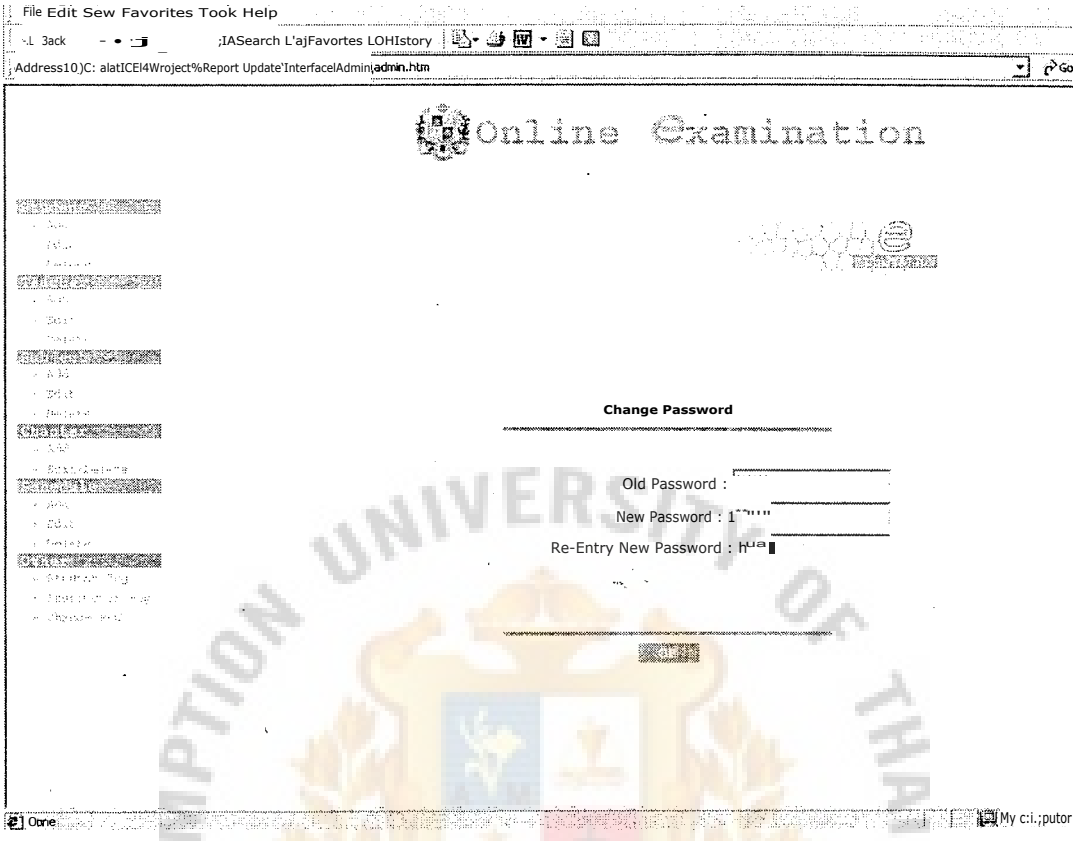


Figure A.18. Change Password Menu Form.

The users chooses "Change Password" to access into the Change Password screen. Then types the current password in the blank and types the new password in the "New Password" blank and the "Confirm Password" blank and then presses the "OK" button. The System verities the user database and if new passwords do not match, the system will pop up " Password invalid". If the password is valid, it will pop up "Password was already changed"

2. Teacher Menu

Figure A.19. Login Screen of Teacher.

This screen is used to the pass the username and password before getting into the screen. The system verifies the Username and the password and if the password is valid the user can do the next screen. If it is invalid, the user needs to type the password again. If the user cannot get into the system more than three times, the officer should be contacted.

Figure A.20. Main Menu Form.

This screen shows the main menu for User Teacher. The teacher can select the specific information base in the system, depending on the purpose of usage.

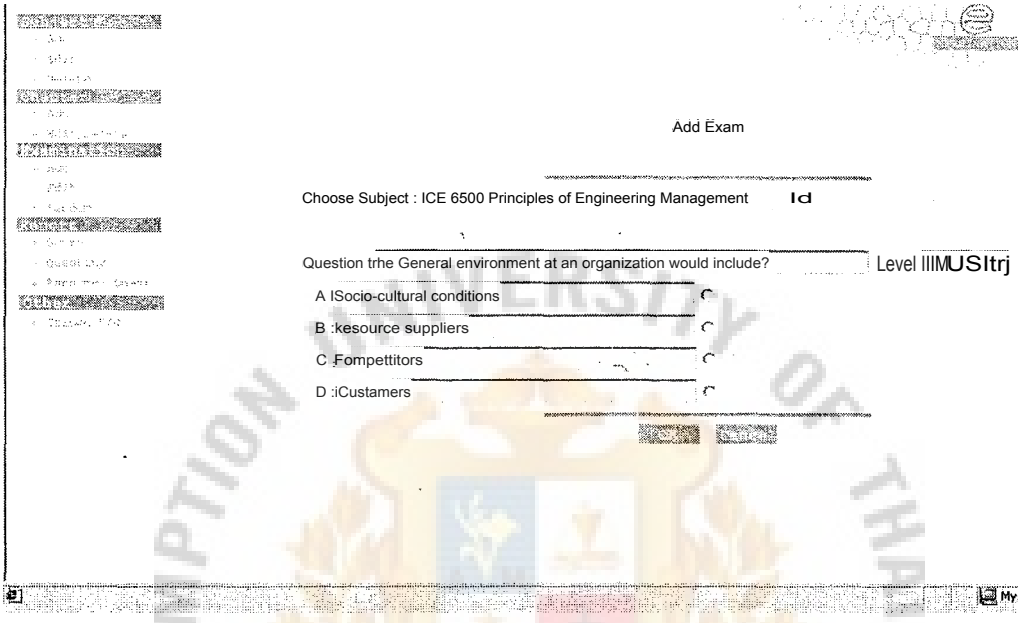


Figure A.21. Add Exam Menu Form.

The user selects the Menu Exam and chooses the semester and subject. Then chooses the chapter and categories of the exam which are multiple choice, matching, true-false, short-answer, and essays. In case we choose choice, add "choice" by inserting the questions, solutions and the difficulty level and press the "Continue" button. The System verifies the database. If they have existed, the message alerts "Question has already existed. Please type new question ". When editing is finished, press button to confirm. Go back to add the "choice" category again. If we want to change to other categories, press the button of that type. In case we choose "matching", choose matching, insert the questions, answers and the difficulty level of the exam. Then press the "save" button. It will alert the record to re-check accuracy again. If data

is valid, press the confirm button. Add the "true-false test" category by inserting questions and collect the answer true or false. Adjust the difficulty level and press the save button. It will alert the record to re-check accuracy again and press the button to confirm. Add "fill in the blank" category by inserting the questions, answer and adjust the difficulty level. Then press the save button, and it will alert the record to re-check accuracy again and press the button to confirm. Add the essay type by inserting the questions, answers and adjust the difficulty level. Then press the save button and it will alert the record to re-check accuracy again and press the button to confirm.

Figure A.22. Edit Exam Menu Form.

The user selects to "searching/ edit/ delete" menu by choose one condition button and system will searching in database and show result of the test that are chosen.

Figure A.23. Result Edit Exam Menu.

This screen shows the result from Figure A.22.

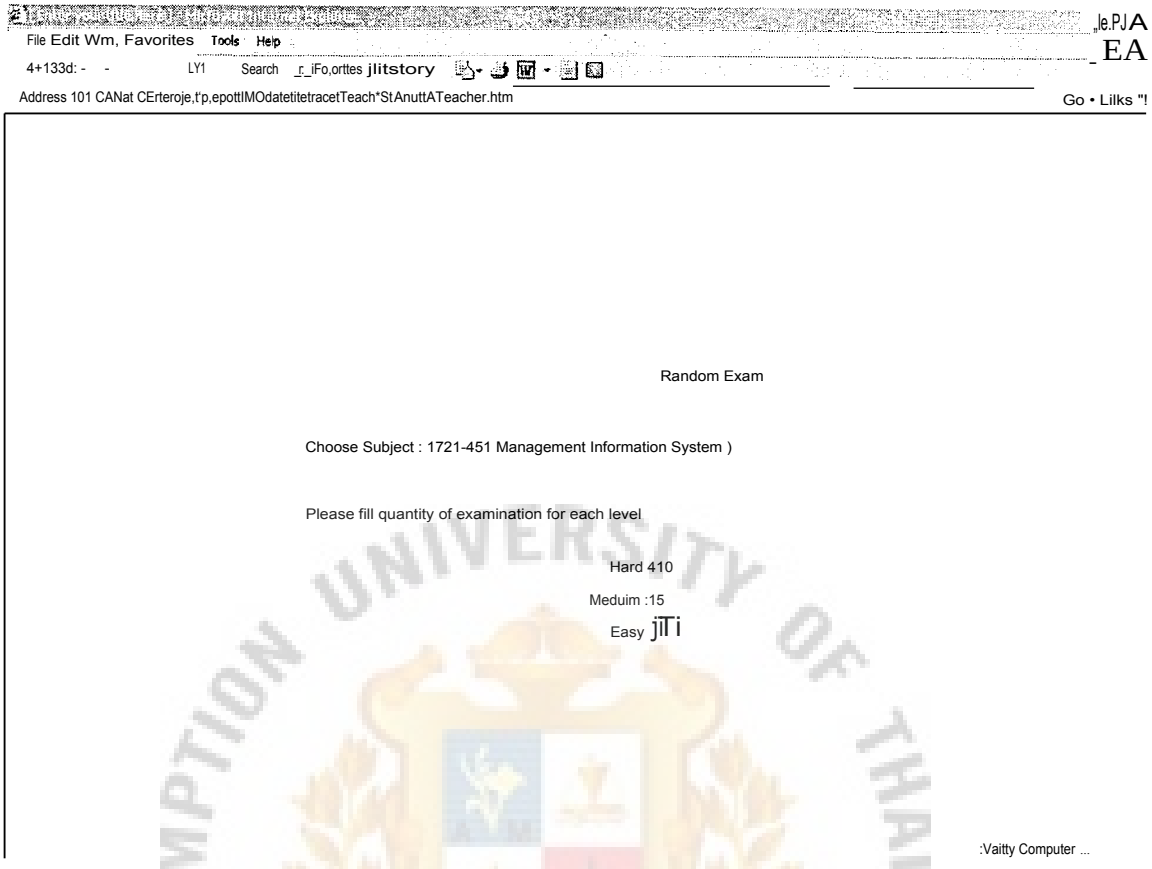


Figure A.24. Random Exam Menu Form.

The user selects the "random exam" menu, chooses the subject and then it will show the random detail. Press the "random exam" button, then the system will random all database by condition.

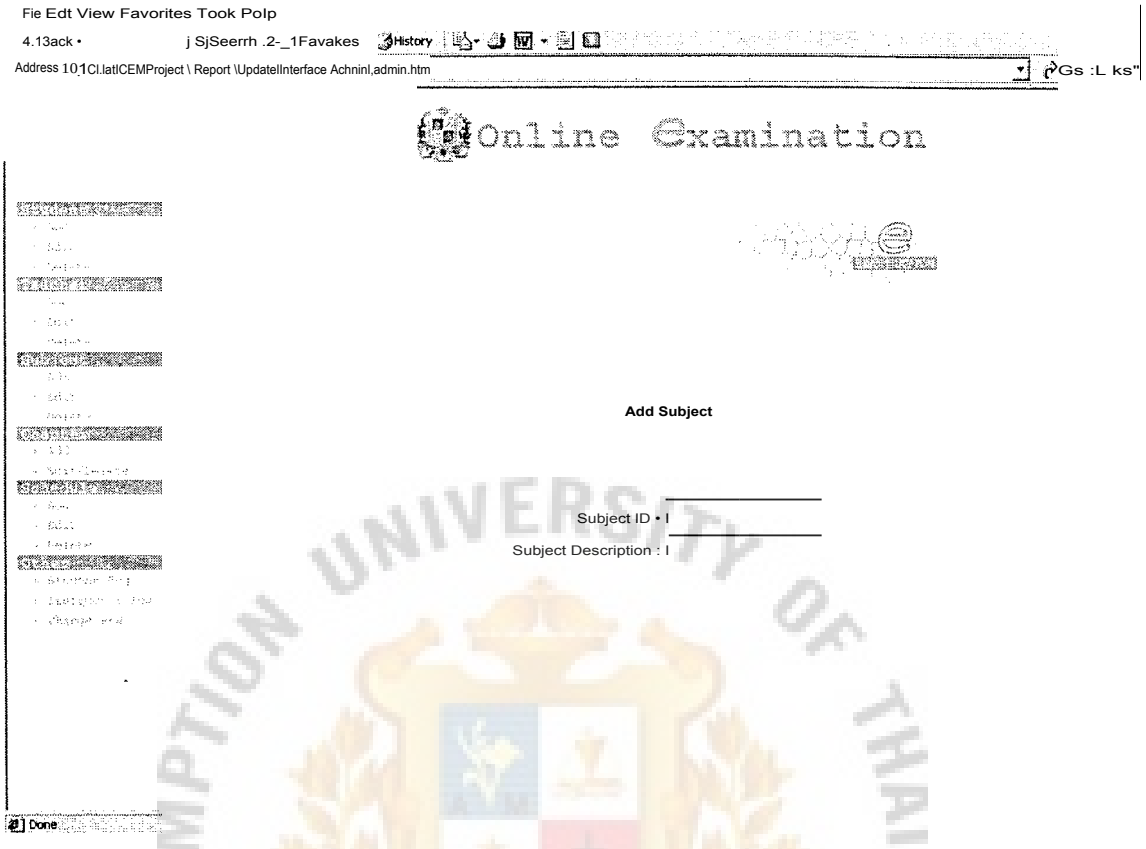


Figure A.25. Add Subject Menu Form.

The user goes to the main menu, selects the "Add Subject" button, gives the code and name of subject and presses the "OK" button. The System verifies the database and, if those subjects existed, it will pop up "Please save again. This subject has already existed". If valid, it will pop up " File has already been saved".

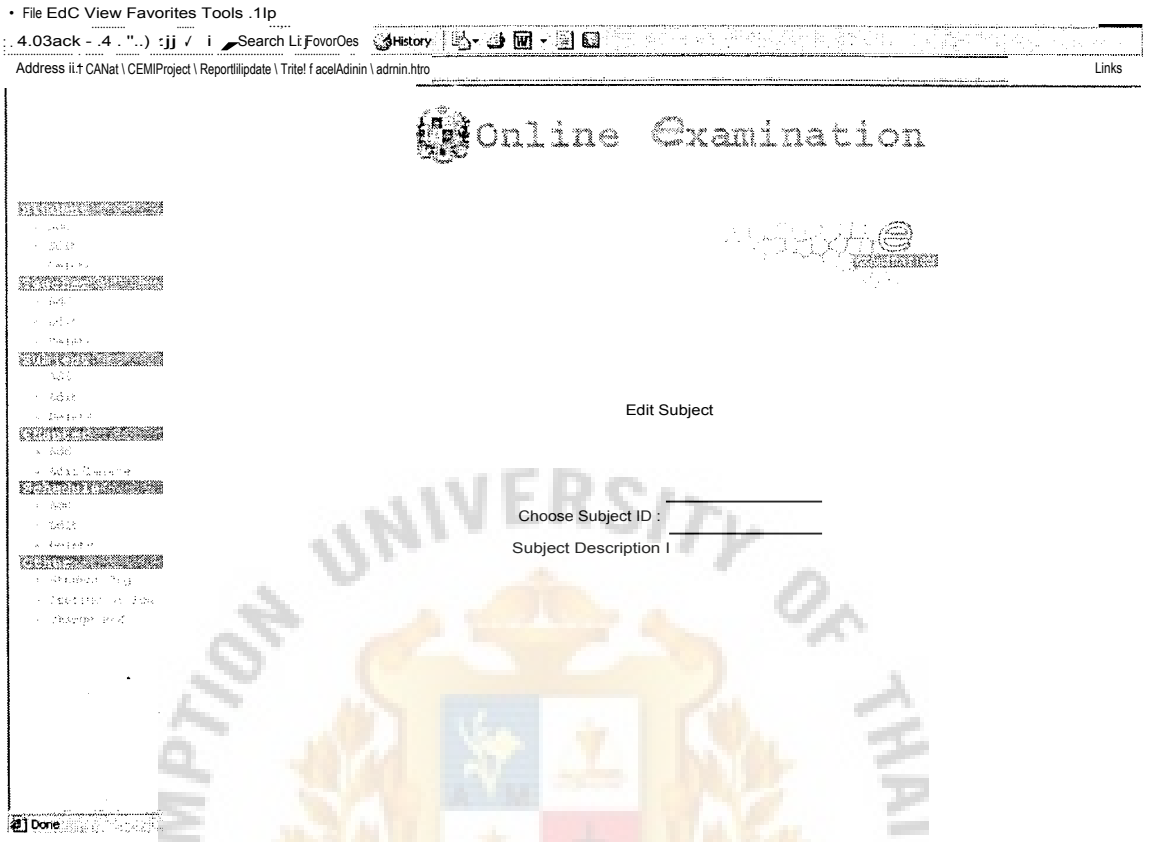


Figure A.26. Edit Subject Menu Form.

The user goes to the main menu, selects the "Edit subject " button when there is need to edit the subject. The gives the code and name of subject. The System verities the database and it will show the list of subjects that the teacher wants to edit or delete.

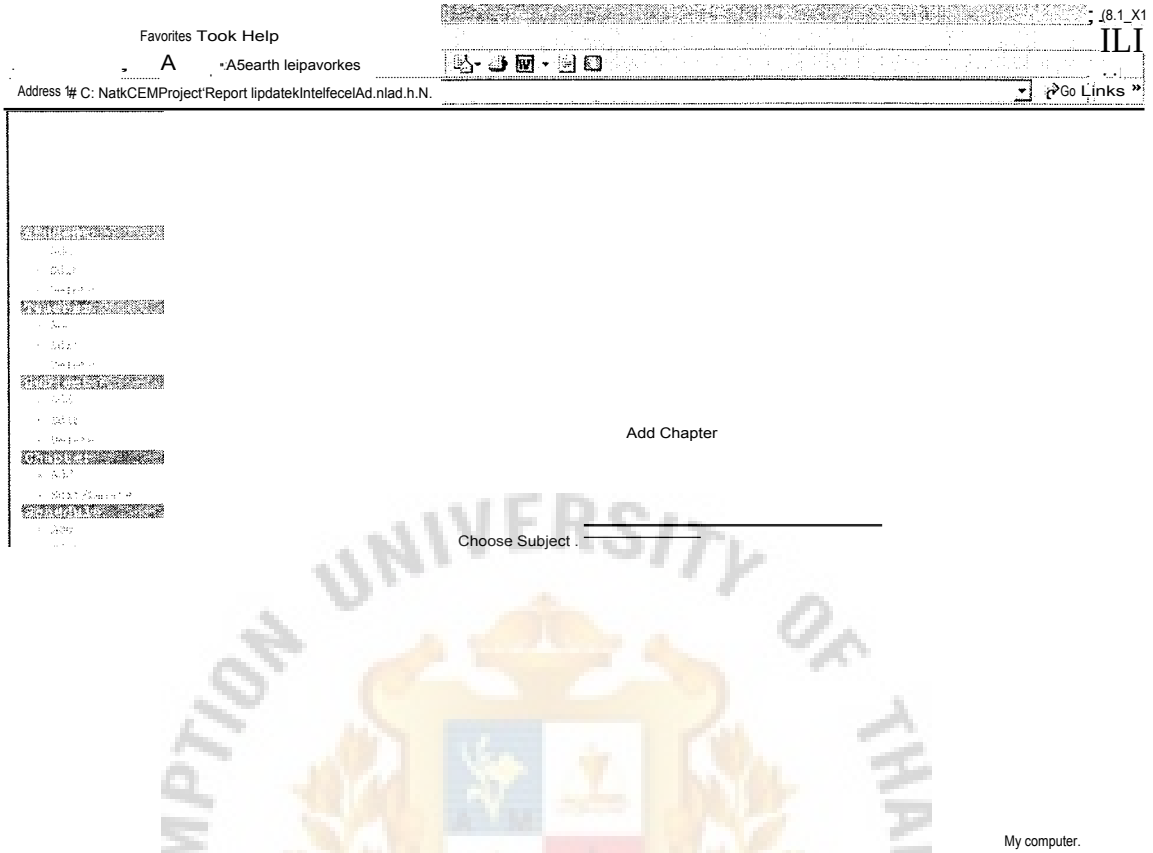


Figure A.27. Add Chapter Menu Form.

The user goes to the main menu, selects the "Add chapter" button and types the code of each subject. The System will show the list of subjects and chapters. Then the users presses the "OK" button.

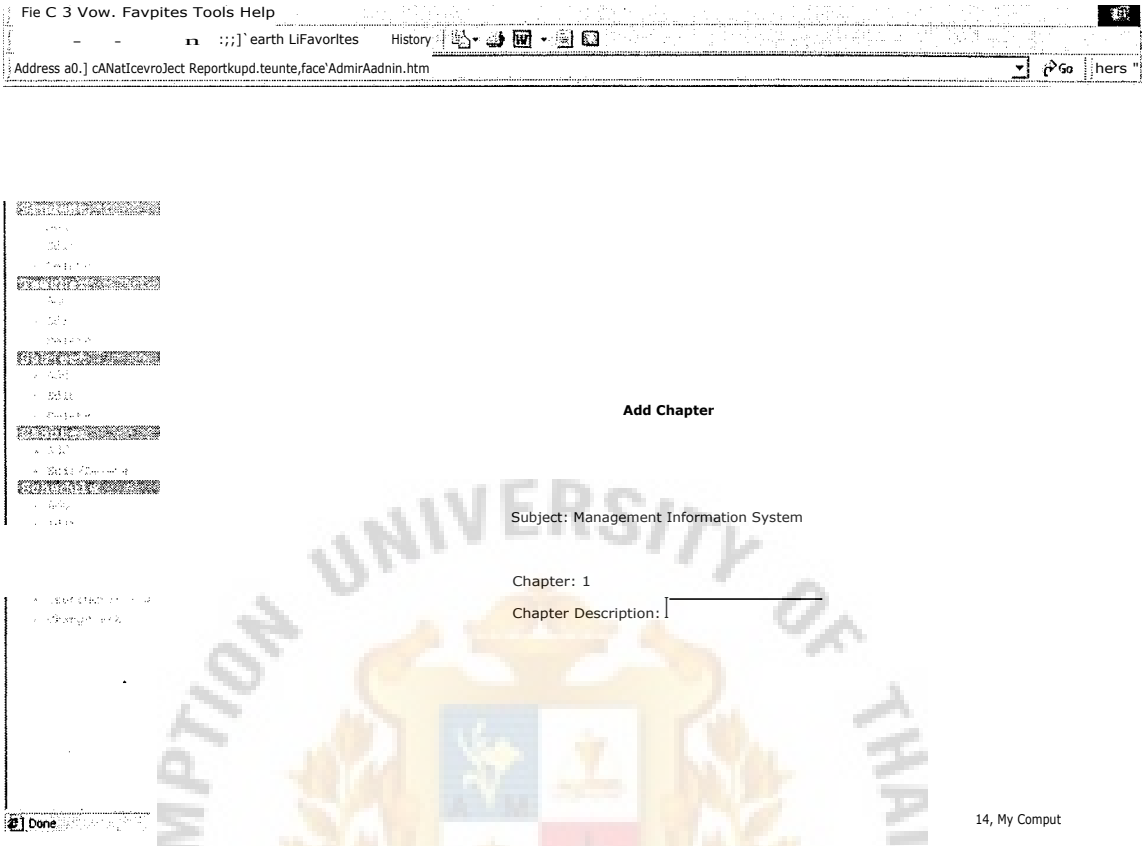


Figure A.28. Result Add Chapter Menu Form.

This screen shows the result from Figure A.27.

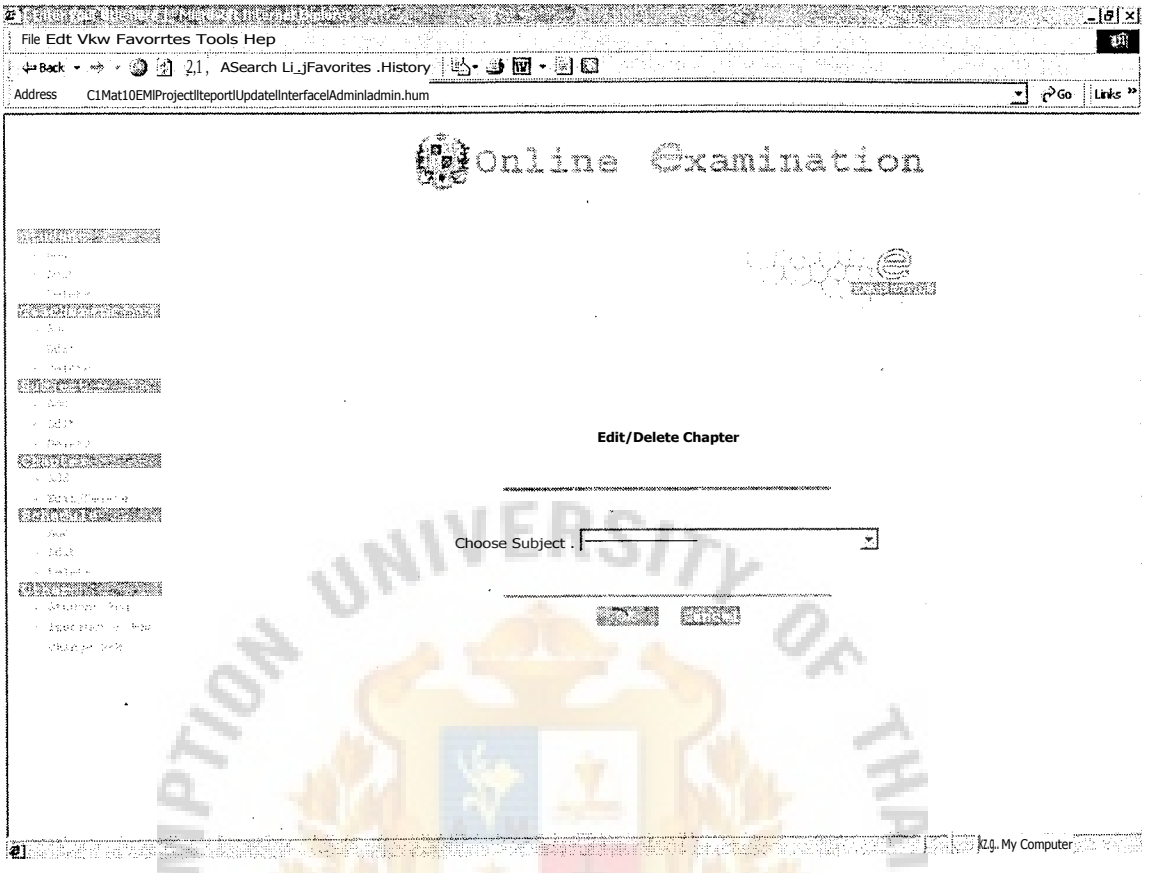


Figure A.29. Edit/Delete Chapter Menu Form.

The user goes to the main menu, selects the "Edit/Delete" button and types the . code of subject. The System accesses the data and shows what it has found.

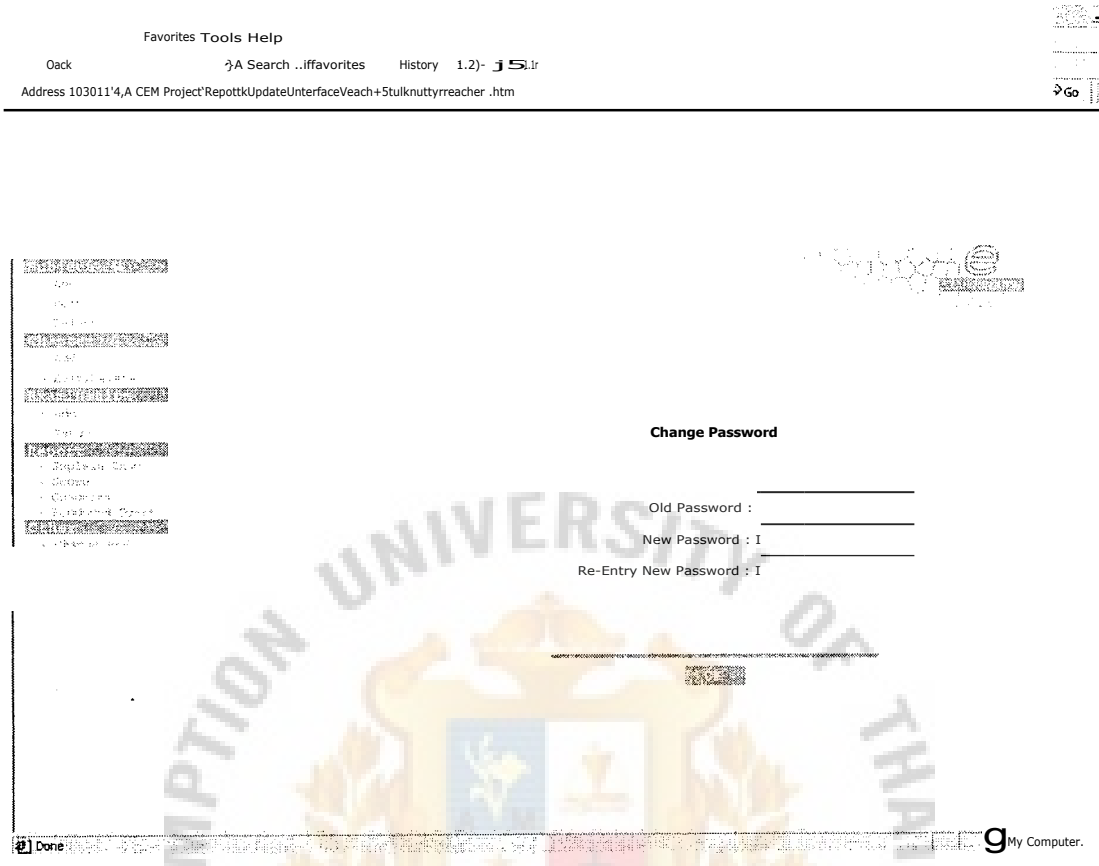


Figure A.30. Change Password Menu Form.

The user selects the "Change Password" to access into the Change Password screen. Then types the current password in the blank and types the new password in the "New Password" blank and the "Confirm Password" blank and then presses the "OK" button. The System verifies the user database and the if new passwords do not match, the system will pop up " Password invalid". If the password is valid, it will pop up " Password was already changed".

3. Student Menu

Figure A.31. Login Screen of Student Menu Form.

This screen is used to pass the usemame and password before getting into the screen. The system verifies the Username and the Password and if the password is valid the user can do the next screen. If it is invalid the user needs to type the password again. If the user cannot get into the system more than three times, the officer should be contacted.

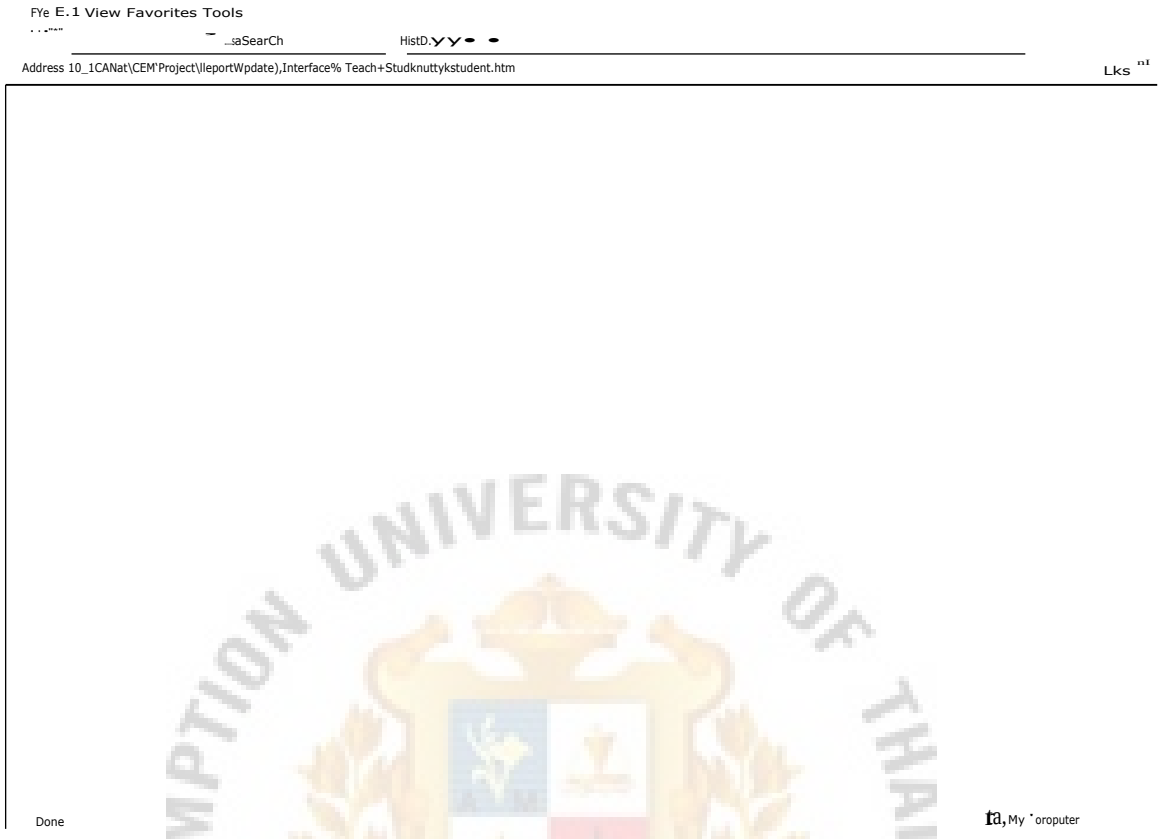


Figure A.32. Main Menu Form.

This screen shows the main menu for the Student User. The student can select the specific information base in the system, depending on the purpose of usage.

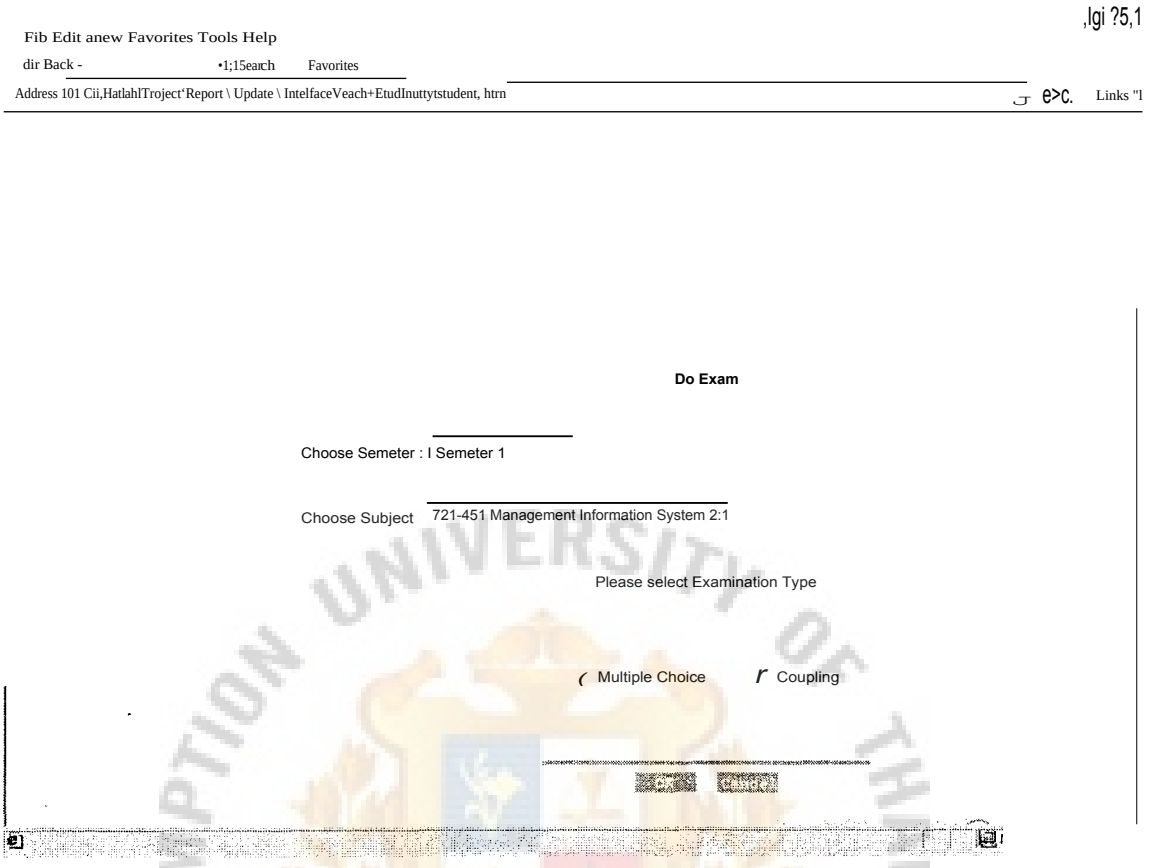


Figure A.33. Examination Menu Form.

The student chooses the "do the exam" menu, the academic year and the subjects that the student had registered. The system verifies the registration of student database. If **the** student did not register, he/she cannot access the exam and for the students who had registered they have the right to login to do the exam screen.

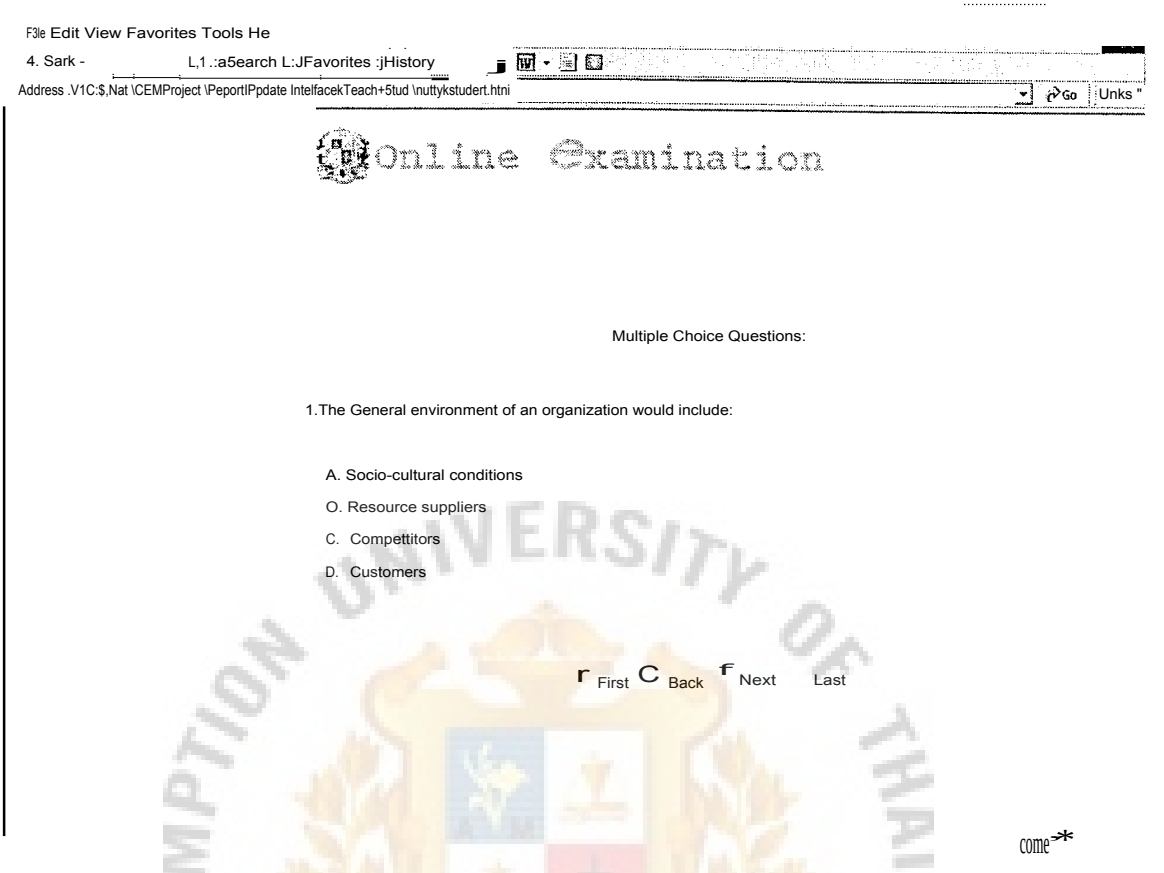


Figure A.34. Choice Examination Menu Form.

The student can move downward and upward during the exam by limited timeframe. When the time is up the student cannot press any button except "send the exam" only.

Figure A.35. Total Score Menu Form.

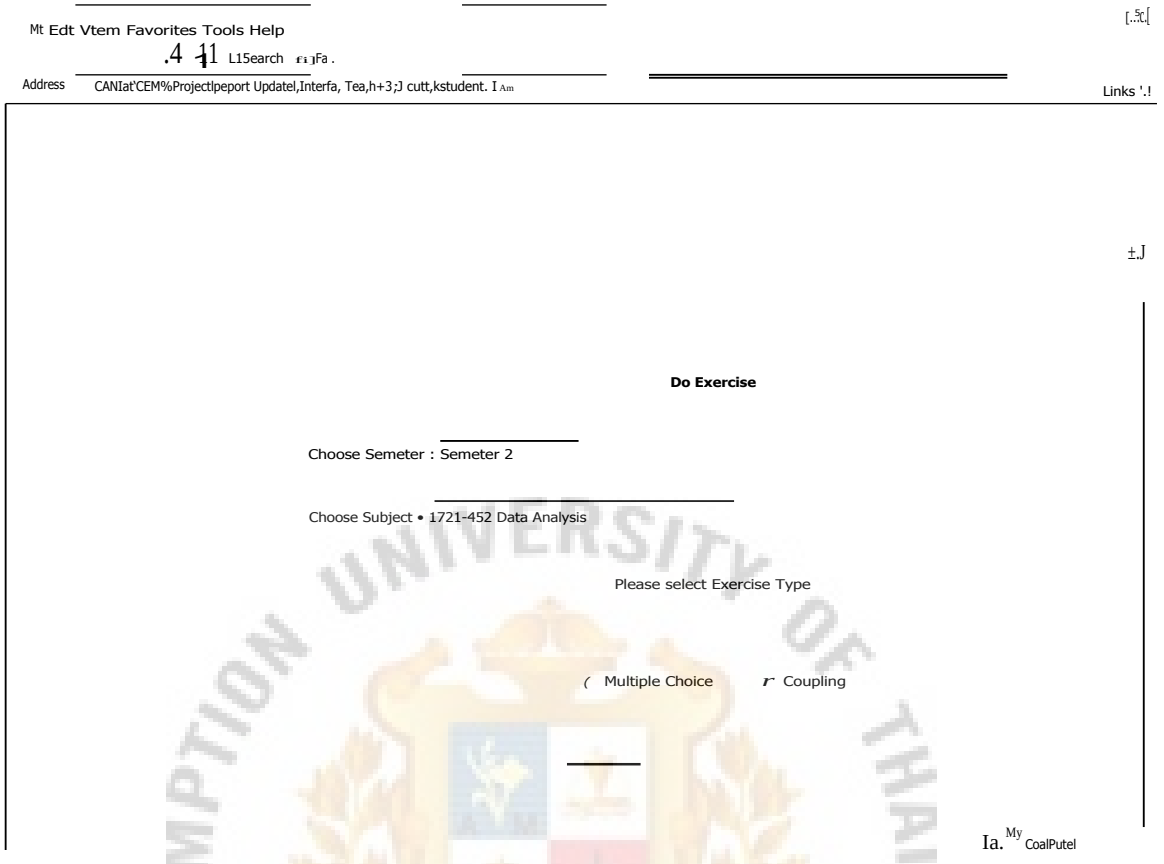


Figure A.36. Exercise Menu Form.

The student chooses the "do the exercise" button and chooses the subjects and chapters. The user can choose the Multiple choice or Couple exercise.

Figure A.37. Multiple Choice Menu Form.

This screen shows the result from Figure A.36. The students can move downward or upward when they do the exercise with unlimited time.

Figure A.38. Total Score Menu Form.

After the user clicks "Submit", the system verifies and releases the score .If the user would like to know the answer, then he/she has to press the button to check the answer.

Figure A.39. Answer Menu Form.

APPENDIX B

REPORT DESIGN

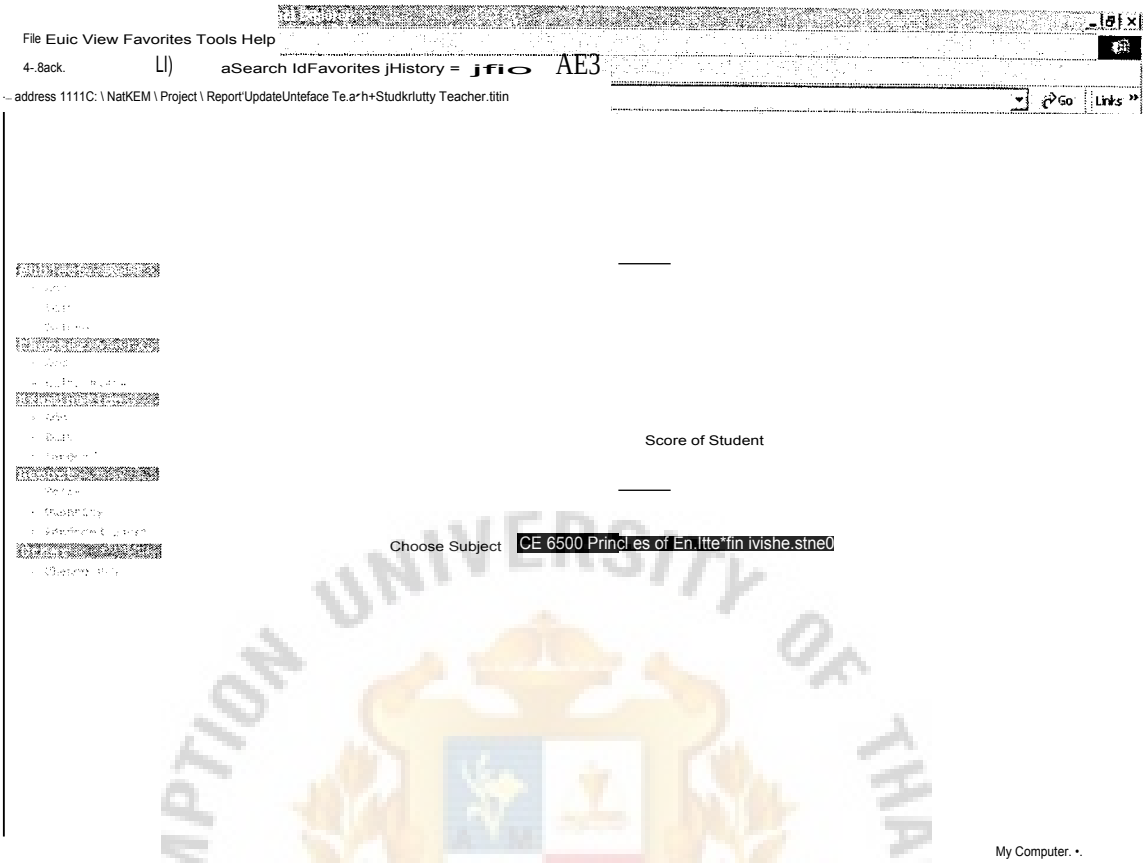


Figure B.1. Menu Report Score of Student.

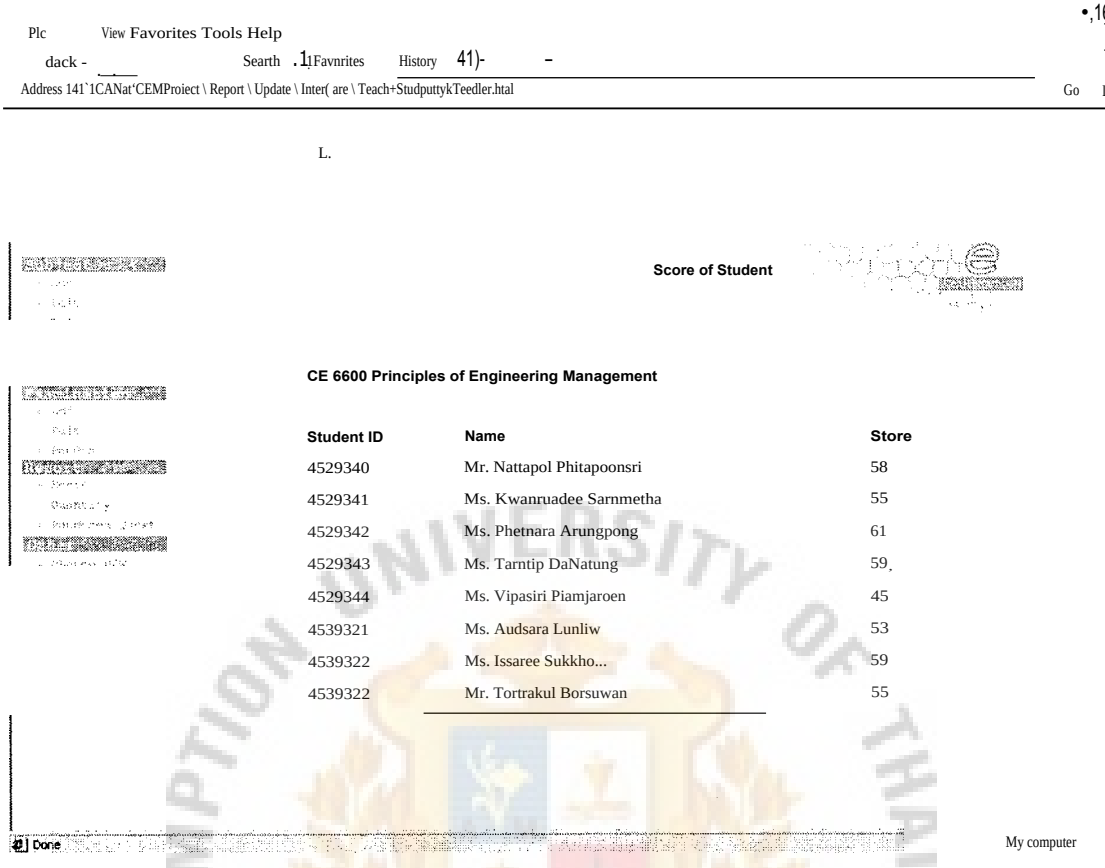


Figure B.2. Report Score of Student.

Figure B.3. Menu Report of the Number of Examinations

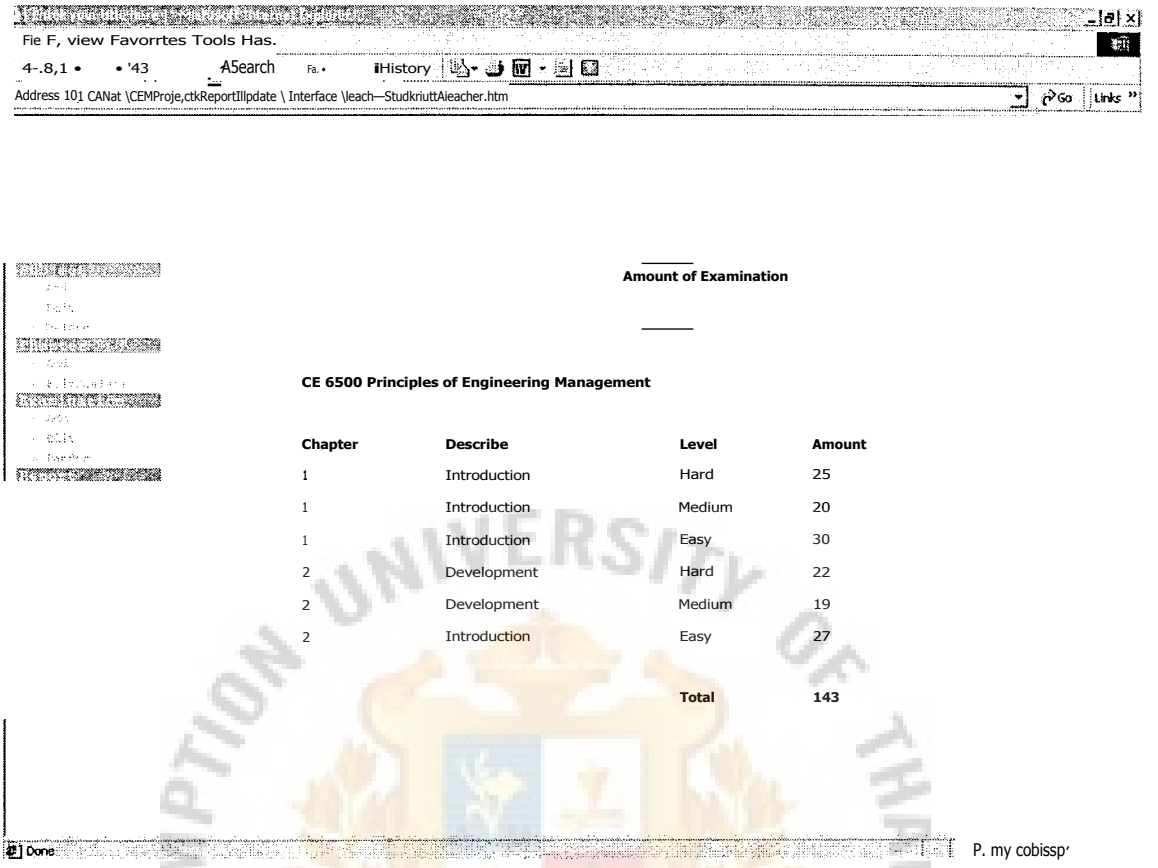


Figure B.4. Report of the Number of Examination.

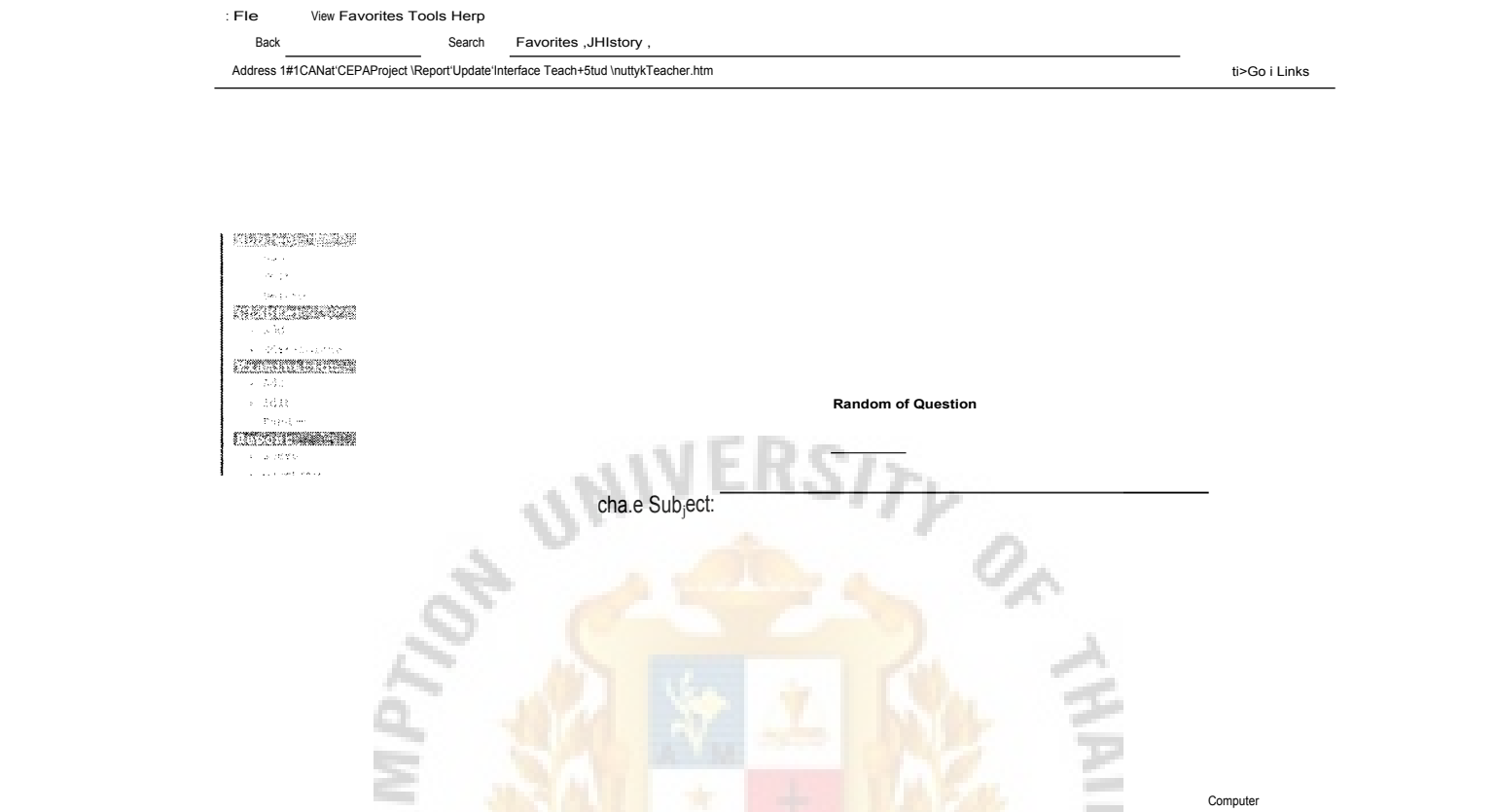


Figure B.5. Menu Random of Question.

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Online Examination

Random of Question

CE 6500 Principles of Engineering Management

Chapter	Describe	Level	Amount
1	Introduction	Hard	10
1	Introduction	Medium	10
1	Introduction	Easy	10
2	Development	Hard	10
2	Development	Medium	10
2	Introduction	Easy	10
		Total	**GO**

Ai Dune

Y Computer

Figure B.6. Report Random of Question.

APPENDIX. C

DATABASE DESIGN

Table C. I . Student.

Name	Data type	Size	Scale	Description	Key
Std ID	Text	7	-	Student ID	PK
Name	Text	25	-	Student name	
Surname	Text	25	-	Surname	
Faculty	Text	**100**	-	Faculty	
Department	Text	50	-	Department	
Email	Text	30	-	Email	
Password	Text	20	-	Password	

Table C.2. Teacher.

Name	**Data type**	**Size**	**Scale**	**Description**	**Key**
Teacher ID	Text	**7**	-	Teacher ID	PK
Name	Text	25	-	Teacher name	
Surname	Text	25	-	Surname	
Faculty	Text	**100**	-	Faculty	
Department	Text	50	-	Department	
E mail	Text	30	-	Email	
Password	Text	20	-	Password	

Table C.3. Instructor.

Name	Data type	Size	Scale	Description	Key
Subj_ID	Text	7	-	Subject ID	PK
Teacher_ID	Text	7	-	Teacher ID	PK

Table C.4. Subject.

Name	Data type	Size	Scale	Description	Key
Subj_ID	Text	7	-	Subject ID	PK
Subject	Text	7	-	Subject Name	PK

Table C.5. Chapter.

Name	Data type	Size	Scale	Description	Key
Subj_ID	Text	7	-	Subject ID	PK
Chap_ID	Number	Integer	-	Chapter ID	PK
Chapter	Text	255	-	Chapter Name	

Table C.G. Question.

Name	Data type	Size	Scale	Description	Key
Semester	Text	20	-	Semester	PK
Sub_ID	Text	7	-	Subject ID	PK
Chap_ID	Number	Integer	-	Chapter ID	PK
Q_ID	Text	6	-	Question ID	PK
Question	Text	255	-	Question	
Answer	Memo	-	-	Answer	
Reason	Memo	-	-	Reason	
Level ID	Number	-	-	Level	
Type_ID	Text	-	-	Type	

Table C.7. Choice.

Name	Data type	Size	Scale	Description	Key
Semester	Text	20	-	Semester	PK
Sub_ID	Text	7	-	Subject ID	PK
Chap_ID	Number	Integer	-	Chapter ID	PK
Q_ID	Text	6	-	Question ID	PK
CID	Text	2	-	Choice ID	
Choice	Text	255	-	Choice	

Table C.8. Next_ID.

Name	Data type	Size	Scale	Description	Key
Semester	Text	20	-	Semester	PK
Sub_ID	Text	7	-	Subject ID	PK
Chap_ID	Number	Integer	-	Chapter ID	PK
Next_ID	Number	Integer	-	Next ID	

Table C.9. Register.

Name	Data type	Size	Scale	Description	Key
Std ID	Text	7	-	Student ID	PK
Semester	Text	20	-	Semester	PK
Sub_ID	Text	7	-	Subject ID	PK

Table C.10. Exam Date.

Name	Data type	Size	Scale	Description	Key
Semester	Text	20	-	Semester	PK
Sub_ID	Text	7	-	Subject ID	PK
Exam Date	Date/Time	Date	-	Exam Date	

Table C.11. StdAnsDescribe.

Name	Data type	Size	Scale	Description	Key
Semester	Text	20	-	Semester	PK
Sub_ID	Text	7	-	Subject ID	PK
Chap_ID	Number	Integer	-	Chapter ID	PK
Q _ID	Text	6	-	Question ID	PK
Std ID	Text	7	-	Student ID	PK
Answer	Memo	-	-	Answer	

Table C. 12. QuestionType.

Name	Data type	Size	Scale	Description	Key
Type_ID	Text	2	-	Type ID	PK
Desc	Text	50	-	Type Name	PK

Table C.13. QuestionLevel.

Name	Data type	Size	Scale	Description	Key
Level_ID	Number	Integer	-	Level ID	PK
Desc	Text	50	-	Level Name	PK

Table C.14. ExamCriteria.

Name	Data type	Size	Scale	Description	Key
Subj_ID	Text	7	-	Student ID	PK
Type_ID	Text	2	-	Type	PK
Level_ID	Number	Integer	-	Level	PK
Amount	Number	Integer	-	Amount Exam	

Table C.15. ExamPaper.

Name	Data type	Size	Scale	Description	Key
Semeter	Text	20	-	Semeter	PK
Subj_ID	Text	7	-	Student ID	PK
Chap_ID	Number	Integer	-	Level	PK
Q_ID	Text	6	-	Question ID	PK

Table C.16. Score.

Name	Data type	Size	Scale	Description	Key
Std ID	Text	7	-	Student ID	PK
Exam Date	Text	10	-	Exam Date	PK
Times	Number	Integer	-	Times	PK
Sub_ID	Text	7	-	Subject 1D	
Type_ID	Text	2	-	Type	
Score	Number	Integer	-	Score	

Table C.17. InstantExam.

Name	Data type	Size	Scale	Description	Key
Std ID	Text	7	-	Student ID	PK
Semester	Text	20	-	Semester	PK
Sub_ID	Text	7	-	Subject ID	PK
Chapter ID	Number	Integer	-	Chapter ID	PK
Q_ID	Text	6	-	Question ID	PK
Answer	Text	255	-	Answer	
Sequence	Number	Integer	-	Sequence	

Table C.18. Admin.

Name	**Data type**	**Size**	**Scale**	**Description**	**Key**
User ID	Text	7	-	User ID	
Password	Text	20	-	Password	

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