A Laboratory Control Management System

by

Mr. Narit Voralertpijan

A 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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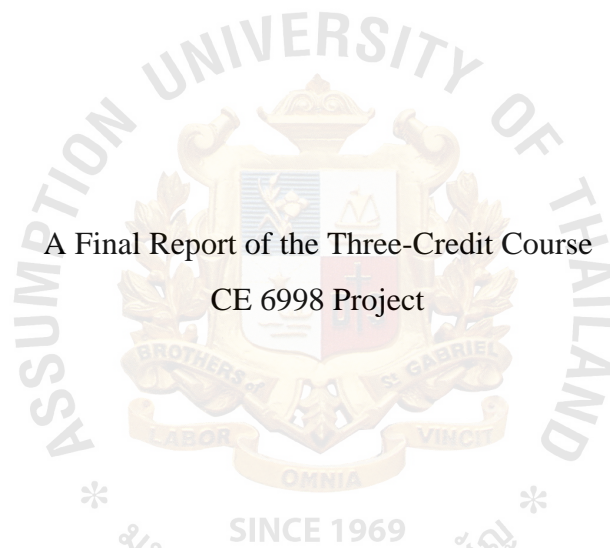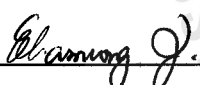
Assumption University

November 2006

Project Title   A Laboratory Control Management System

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Academic Year   November 2006

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

The LCMS (Laboratory Control Management System) project started with an idea of improving the existing computer laboratories within Assumption University. Since then, Assumption University has increasingly developed computer laboratories. These computer laboratories are mainly served for teaching purposes. Therefore, this project has been considered to be conducted with the help of Information Technology.

The current existing system of computer laboratory control is manually operated. The instructors tend to have no choice but to operate the computer laboratories classes with the anxiety to monitor over all attending students. Certainly, this is difficult or even impossible to watch over all students in your conducting laboratories while you are teaching.

The new proposed LCMS will be developed to replace the manual and some computerized information system with intranet system. The LCMS will help to solve the existing problems which the instructors themselves have tried to avoid since the existence of ABAC laboratories. This implementing LCMS will be able to install in all computer laboratories. This will definitely increase the effectiveness in all instructors' laboratories teachings.

The implementation of the system is the planned and orderly conversion from a current existing system to the new proposed Information System. The final design should be evaluated first to make sure that the new proposed system can meet the desired goals and objectives, and then the other remaining processes will be performed.

This system will definitely improve the old manual system which will provide the full potential in using computer laboratories.

ACKNOWLEDGEMENT
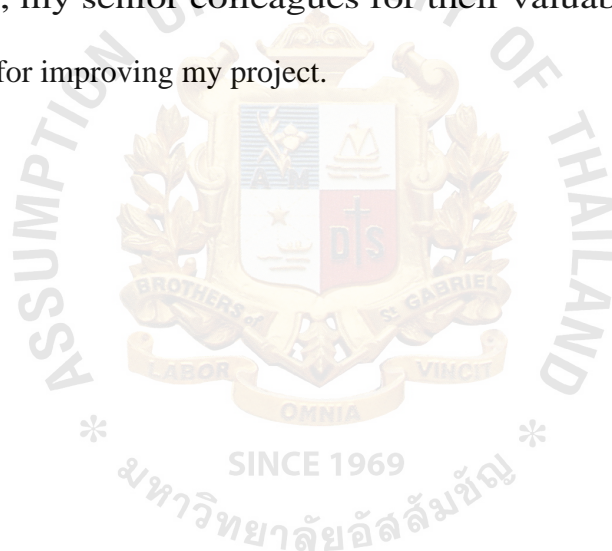
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I. INTRODUCTION

1.1 Background of the Project

Nowadays, all organizations are trying to keep up with the latest technology to be able to perform well in their environment. It is difficult to deny the growing Information Technology world. People tend to follow the IT trends to simplify and serve their daily lives. Now computers have become part of our lives.

This project will be analyzed on how the Information Technology can be matched with our educations. As computers are the important IT resources and play very important role in all educations. Universities can be compared with the organizations, as they are both trying to get rid of the tedious manual monitoring or operations.

In this case, Thai schools and universities contain computer laboratories. At the present, most of the Thai universities are still using the manual process in controlling their students within the computer laboratories. These computer laboratories are provided for the teachers and students and they are believed to make the full potential use of them. The teaching in these laboratories without any attentions from the students will definitely make the computer laboratories with no purpose. They are supposed to be treated as the main facilities in the study places and should be wisely used. Knowing that each computer lab is being used by several classes. This is the reason that we need the "Laboratory Control Management System" to control and check every single computer in each computer lab.

Therefore, taking the full control of all computers is the heart of "Laboratory Control Management System". Some of the computer laboratories may already have other systems installed. Nevertheless, the complete and better version of Laboratories

Control Management System is still needed to handle the computers in the laboratories more effectively. This version of "Laboratory Control Management System" will be able to add, edit and delete immediately through the administrator's computer.

Why Laboratory Control Management System should be installed? This is because the system will tell the instructor exactly what kind of programs that his/her students had been opened or used. The instructor will be able to control computers inside a computer lab through the administrator's computer. The main computer will also be used to control the restart shutdown, lock the mouse and keyboard of the controlled computer.

1.2 Objective

1) The implementation of the "Laboratory Control Management System" will be developed in order to cover up all weak points of the old system. The new system will allow the main computer to control all clients' computers with several functions such as restart and shutdown the computer, the ability to control the 1/0 devices such as mouse and keyboard. The able/disable policy which implies for the Control Panel, Network Connection, Add/Remove Program, Display, Task Manager will be provided within the control functions to extend its capability.

2) The "Laboratory Control Management System" will help to reduce the manual monitoring by the instructors during the classes. This will some how improve the teaching as well.

3) The "Laboratory Control Management System" will provide the user with the full flexibility for controlling the whole laboratory by just a single point of monitoring.

4) Each instructor who is using this "Laboratory Control Management System" will be able to control every single computer which he/she uses for teaching. The function that the "Laboratory Control Management System" can control, for instance, to lock all the I/O devices. This will increase the teaching potential for the instructor while he/she is teaching. This will prevent the students from playing games or any distracting activities.

5) To give higher security to the system by providing different usernames and passwords to all instructors and students.

6) The change from the manual system to a web-base system. In order to provide the convenient to the users and to benefit from data/information stored in computerized system.

1.3 Scope

1) The program is to be written as a client-server application using C# .NET with the main server of computer laboratory. The program is to be used to control the teaching and training computer laboratories.

2) Administrator allows general users (i.e. students) to register themselves in order to use computer lab. The initial username and password will be given to each of the student. This is to allow the students to access into the system. The students will then be allowed to modify their usernames and passwords through the lock screen provided by the system.

3) Administrator's ability to manipulate the functions provided for the system. The functions include the following.

- Administrator is able to add, edit, delete and view administrators and the instructors from the system.

  For adding function, the administrator is provided with the administrator's page which allows the administrator to add the new administrators and new instructors who appear to be new users for the system.

  For editing function, the administrator is provided with the administrator's page which allows the administrator to edit the existing administrators and instructors. This also refers to all types of users.

  For deleting function, the administrator is provided with the administrator's page which allows the administrator to delete the inactive administrators and instructors who are no longer related or used the system.

  For viewing function, the administrator is provided with the administrator's page which allows the administrator to view the users' information. The administrators who are logged in the system will be shown at the "View Admin" page. The view function can be searched by five types which are All Users, ID, Name, Surname and also Semester.

- Administrator is able to add, edit, delete and view students from the system.

For adding function, the administrator is provided with the administrator's page which allows the administrator to add new students who appear to be new users for the system.

For editing function, the administrator is provided with the administrator's page which allows the administrator to edit the existing students. This also refers to all types of users.

For deleting function, the administrator is provided with the administrator's page which allows the administrator to delete the inactive students who are no longer related or used the system.

For viewing function, the administrator is provided with the administrator's page which allows the administrator to view the users' information. The students who are logged in the system will be shown at the "View Student" page. The view function can be searched by five types which are by all users, ID, Name, Surname and also Semester.

- Administrator is able to control the machine information. This machine information refers to the provided page by the system which the administrator can group their computers into different laboratories. This function is provided with a page calls "Machine Information".

4) Instructor's ability to manipulate the functions provided for the system. The functions include the followings.

- The instructor is able to add, edit, delete and view students from the system.

5

For adding function, the instructor is provided with the instructor's page which allows the instructor to add new students who appear to be new users for the system.

For editing function, the instructor is provided with the instructor's page which allows the instructor to edit the existing students. This also refers to all types of users.

For deleting function, the instructor is provided with the instructor's page which allows the instructor to delete the inactive students who are no longer related or used the system.

For viewing function, the instructor is provided with the instructor's page which allows the instructor to view the users' information. The students who are logged in the system will be shown at the "View Student" page. The view function can be searched by five types which are by all users, ID, Name, Surname and also Semester.

■ The Instructor is provided with several functions for computer laboratory control while he or she is conducting classes. Instructors can use the page calls "Control Client" which is provided through the system. This page provides the IP presentations of all computers in the selected laboratory. It shows and counts the number of logged in computers as "working" and logged off computers as "switch off". The page also shows the total computers in each laboratory. Through this page, the instructor can also control the working students' computers. The controlling functions provided are Shutdown, Reboot, Lock Mouse and Keyboard, Unlock Mouse and Keyboard and also Policy Setting.

The Policy Setting involves able/disable policy which implies for the Control Panel, Network Connection, Add/Remove Program, Display, Task Manager. Once any of the mentioned function is being set disable by the instructor, all or selected client will not be able to process with the disabled function.

II. EXISTING SYSTEM

2.1 Background of the Organization

Assumption University was initially originated from Assumption Commercial College in 1969 as an autonomous higher education institution under the name of Assumption School of Business. In 1972, with the approval of the Ministry of Education, it was officially established as Assumption Business Administration College or ABAC. In May 1975, it was accredited by the Ministry of University Affairs. In 1990, it was granted new status as "Assumption University" by the Ministry of University Affairs.

The university contains approximately 15 computer laboratories. These laboratories are different in sizes. Not all of these laboratories are for teachings, some are for the students to use in any purposes. The laboratories for conducting the classes required the password at the initial lock screen on each of the computer.

2.2 Current problems and Areas for Improvement

Current Problems

Nowadays, there are several existing Laboratory Control Management Systems that are used in computer labs. This kind of laboratory control system needs human being to control the computers manually by the following the stated policy. The manual laboratory control system has several problems which are:

1) Student uses same user login and same password which is given by the instructor.

2) The narrow vision in watching over all using computer is one of the main problem. For instance, if one person is assigned to look after one computer

lab with 20 students using the computers, he/she can only watch over the computers in his/her vision only.

3) Some students tend to start the given work as soon as they could without listening to the whole lecture. The mentioned situation often occurs because students believe that finishing their work earlier would give them more time to spend on their own leisure.

4) Sometimes we need to keep track about the programs the student have accessed but existing system is unable to do so. This is because there is no record of student for checking.

5) Every year, the maintenance engineers must check and delete programs that many students have loaded into computers. This has led to time consumption and complication as these computers contain tons of useless programs and documents.

6) The unnecessary accessing of some programs and playing games by the students during the classes will interrupt the instructor's teaching, especially with no system that can control them.

Areas for Improvement

There are several issues for areas of improvement, the Information Technology and Networking will help to increase the efficiency and effectiveness for all areas for users who are the instructors and students in this case.

Administrators' fields

1) The computer workgroups in different laboratories will be set and monitored in a page by just clicking the desired options. This function will allow the

administrator to settle the computers into the appropriate laboratories so that it will be much easier to control each different laboratory.

2) **Only the authorized users are granted in this system due to the administrators' adding, updating and deleting all users. This will make the system control more effective.**

3) Further more, the system will allow more than one administrators to access and work together at the same time.

Students' fields

1) The students lack concentrations in classes which are hard to monitor especially in computer laboratories classes. Obviously, this is the most concern part why we develop this program. LCMS will diminish the students' lack of concentration behaviors.

2) The same login page for the students to put only their passwords which is given by the instructors. The students have been using the same passwords throughout the classes when using the same computer laboratories no matter which computers they are sitting at. Now with the use of different usernames and passwords, each student can be easily tracked by the instructors. Students can also now remember their own usernames and passwords without asking the instructors repeatedly.

Instructors' fields

1) The tedious monitoring in all computer laboratories classes will be reduced as the instructors will know through the Instructor's monitor which students

have logged in. The I/O devices such as mouse and keyboard can also be set as locked mode by the instructors.

2) The instructor will know exactly number of students who are in his/her classes as the instructor's screen will tell exactly the number of students who have logged in and from which computers.

3) The unauthorized person will not be allowed to log into the system because each instructor has his/her own usernames and passwords to enter the system. This is to make sure that they are no pranks playing by the unauthorized persons.

2.3 Existing Computer System

The existing computer system in ABAC's computer laboratories are connected together through normal LAN system. There are no particular systems which help to monitor the students using the computers especially during the classes.

As for the system, the only function which the administrators have been implementing for the computer laboratories classes is to lock the main page. This main page contains the textbox which the users have to input the provided username and password which are given by the instructor during each computer laboratory class. Then the correct password will be certified by the system. For this process, the computers are simply set up by using the function which the window has provided as a tool. The given username and password are exactly the same throughout every user. These username and password seem also to be seldom updated by the administrators.

The lack of ability to control the students who sit behind the computer, make it the nightmare for the instructors who teach them.

Context Diagram for Existing Laboratory System

Admin

Password setting

Distribute user name & password

0

Password

Certified password

Existing lab system

Instructor

Distribute password

Student
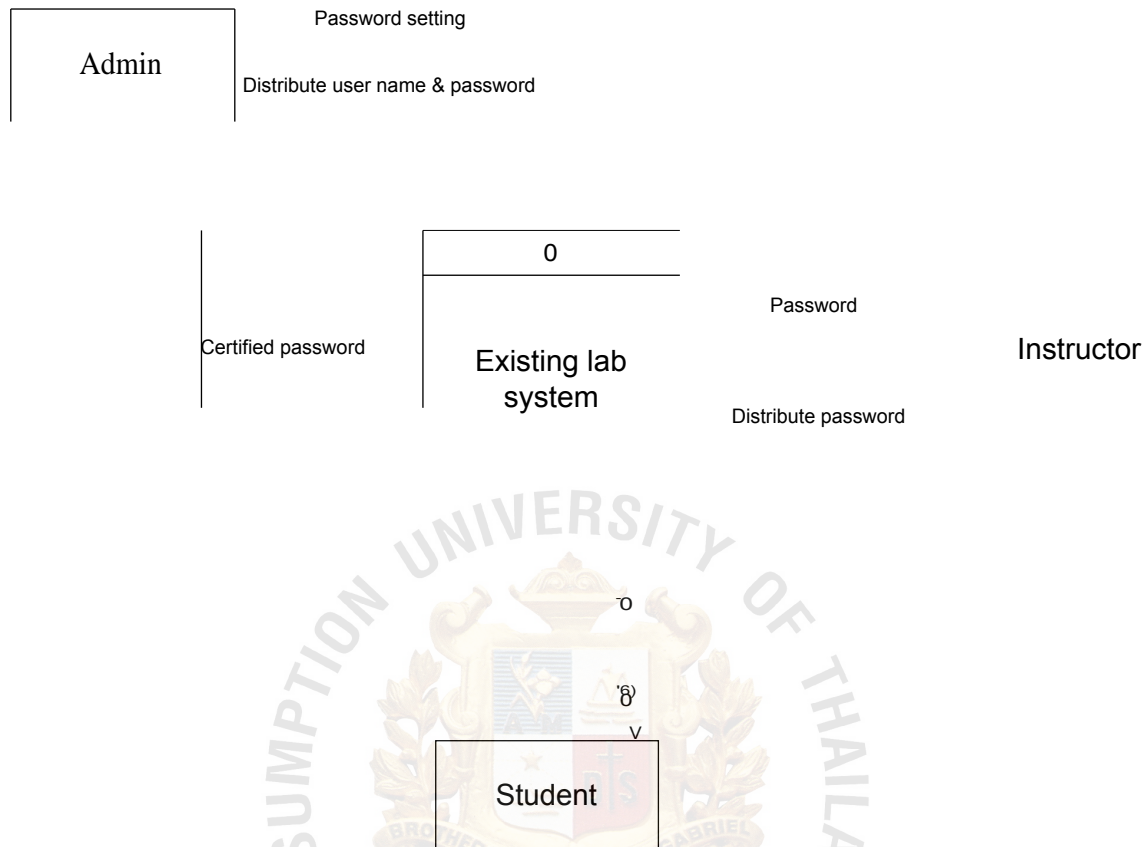
Figure 2.1 Context Diagram for Existing Laboratory System

DFD level 0 for Existing Laboratory System

Password setting

Setting password required

1.0
Set window login requirement

Admin

Certified Password

DI Login file (Window) [4]

Verified data

2.0
Distribute userna me & Password to Instructor

Login request

Login verified

Instructor

0

ธ.

a

v

3.0
Inform Password to student during class

Informed password

Student

Password

A

4.0
Login system

Login verification received

Figure 2.2 DFD level 0 for Existing Laboratory System

III. THE PROPOSED SYSTEM

3.1 System Specifications

The system is designed to be able to work under the following conditions. It is noted that this LCMS will be first implemented in the 5th floor of E-Building laboratory first and the server will be located at Net work Operation Center (NOC) which is located at E-building 7th floor. This is because Single location installation will be carried out as the selected conversion phase. Compare to the organization, this is to implement a single department of the organization first and will continue the installation in others if the System is carried out successfully.

1) General Specifications

The program is to be written as a client-server application with the main server located at the Network Operation Center (NOC). This server site is located at 7th floor of E-building. The initial installation is a trial as a single location conversion plan will be used to make sure that the system will run well before implementing it all over the university's laboratories.
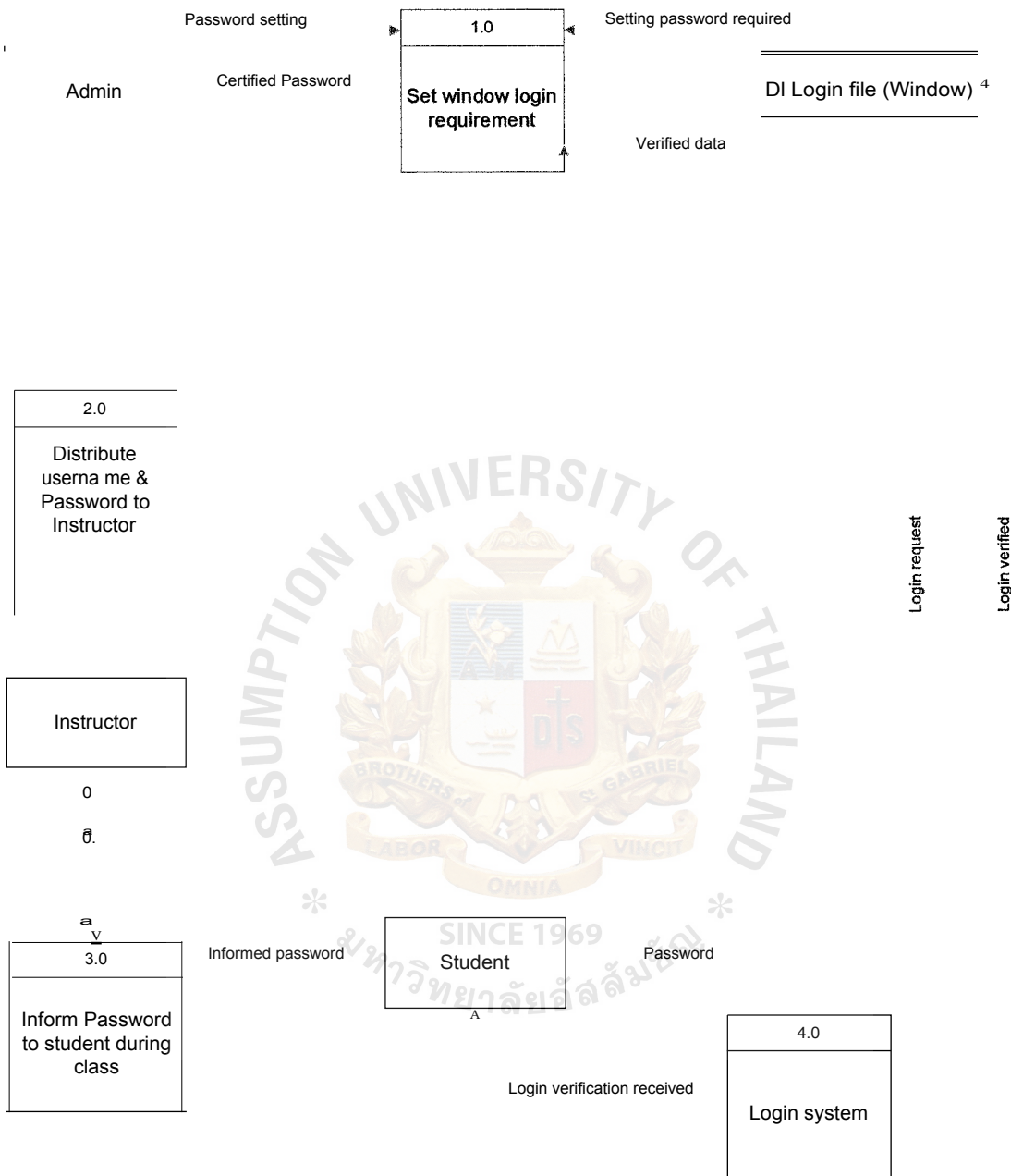
The system is to be used preliminary to control the teaching computer laboratories. Therefore, due to the single location conversion plan, the teaching laboratory will be first installed with the system. The trial teaching site at E —building 5th floor computer laboratory will be the first to implement.

The program is divided into three major components which are the Administrative Module, Lecturer Module and User Management Module.

2) Administrative Module

The administrative module is used to manage and maintain the operations of the teaching computer laboratories. All users (Administrator, Instructors, Students) are to register themselves for the initial usernames and passwords in order to access into the system.

The Administrative page which is called "Admin Menu" is provided for the administrator to select 5 different main menus which are Admin Profile, User Profile, Machine Info, Control Client. For the Admin Profile and User Profile, the Administrators are allowed to add, delete, edit and also view all types of users including themselves.

For the Machine Info menu, the administrators are allowed to manage the workgroup in each laboratory. The computers connected to the network are appeared at this page and they can be easily arranged into desired laboratories.

3) Lecturer Module

For the lecturer mode, the instructors are able to add, delete, edit and also view students. The Control Client menu is supposed to be the most common use for the instructors. Instructors can use the page "Control Client" which is provided through the system. This page provides the IP presentations of all computers in the selected laboratory. It shows and counts the number of logged in computers as "working" and logged off computers as "switch off'. The page also shows the total computers in each laboratory. Through this page, the instructor can also control the working students' computers. The controlling functions provided are Shutdown, Reboot, Lock Mouse and Keyboard, Unlock Mouse and Keyboard. Instructors may also control the

Policy Setting involves able/disable policy which implies for the Control

Panel, Network Connection, Add/Remove Program, Display, Task Manager.

Once any of the mentioned function is being set disable by the instructor, all

or selected client will not be able to process with the disabled function.

4) User Management Module

The user Management Module refers to students function in this

system. The students have the least ability in doing functions as this system is

created specifically to control them. Therefore, the students are allowed to

only log into the system with their usernames and passwords. The

extraordinary improvement at the student's part is that the students contain

different usernames and passwords to log into the system. Another special

function is the students' ability to modify their usernames and passwords.

3.2 System Design

System Design is such an important phase in developing any system. System

Design phase includes the drafting of Context Diagrams, Data flow Diagrams, all kind

of UML Diagrams and also the E-R diagrams. The E-R diagram is always

accompanied by the Data Dictionary which explains the attributes within each entity.

For the system design part, the Context Diagrams and Data Flow Diagrams in

level 0 and 1 are drawn up to illustrate the clearer picture of the whole system. These

Data Flow Diagrams explain clearly on how the data flows from one entity to another

entity by passing through each process and where each data/information is kept within

the files. It also tells which data/information is being requested and which is being

retrieved from the system. Furthermore, Data Flow Diagram Level 1 shows the

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breakable processes from Data Flow Diagram level 0. This is very helpful to clarify the uncertain processes have been mentioned in Data Flow Diagram level 0.

These diagrams are later on accompanied by the extended explanations illustrating by the variety of UML diagrams. These UML diagrams contain the Use Case Diagram, Activity Diagram, Component Design and also Class Diagram.

The properties of the database which have been designed before implementing the actual system are illustrated by E-R Diagram which is shown below too. The E-R Diagram is very similar to the Class diagram in UML diagrams. This report has shown both of them to make the clearer vision for the readers.

Context Diagram for LCMS Laboratory Control Management System

Specific action taken (Admin)

Admin — Specific action taken (user)

Username & Password (Instructor)

0

Username & Password (Admin)

Lab control Info.

Work group Info.

Distributed username & password for instructor

Instructor

LCMS

First username & Password

Initial username & Password for student

Specific action taken (user)

me & password for student

Student info

Username & password (student)

Student
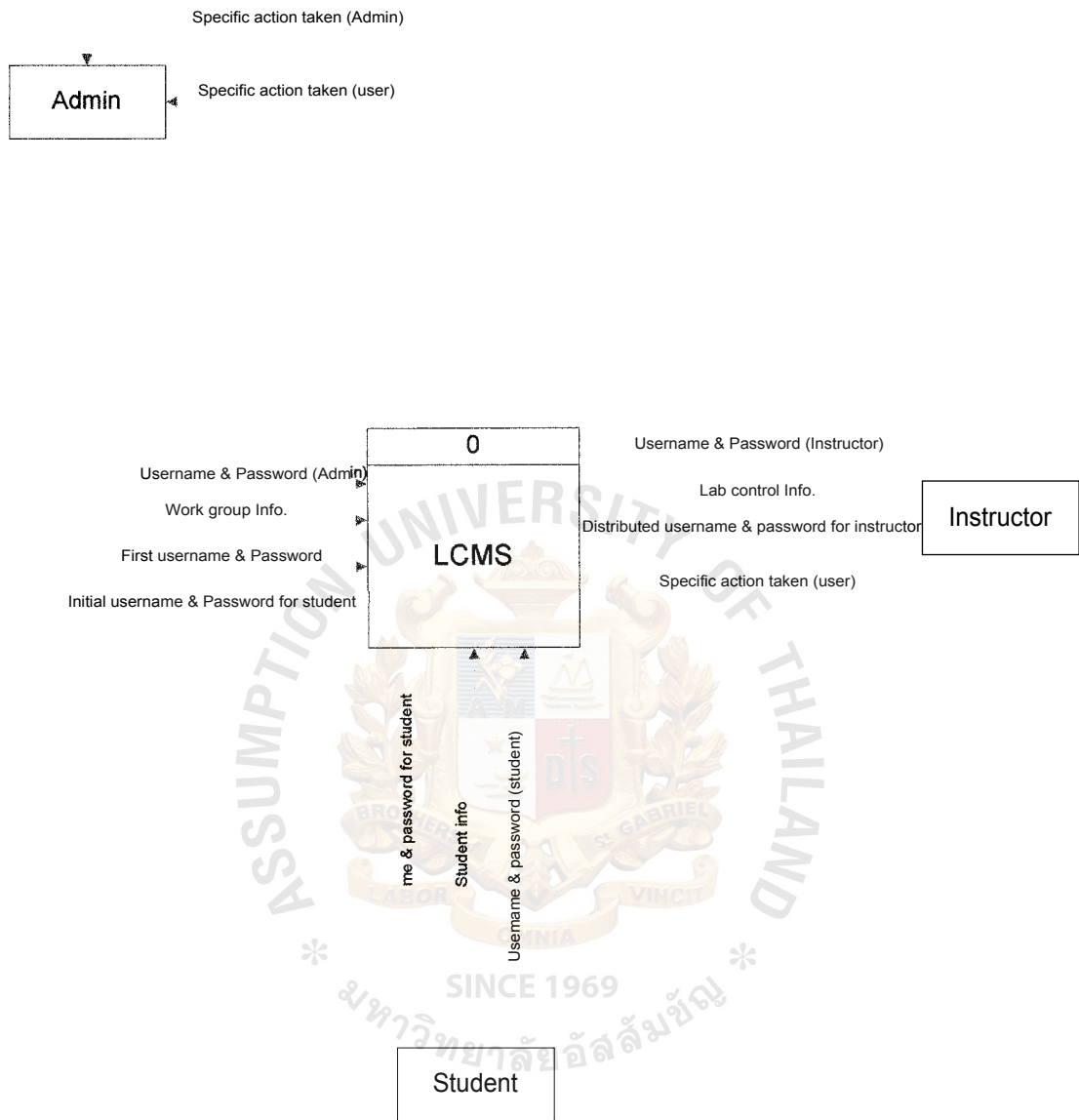
Figure 3.1 Context Diagram for LCMS

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DFD Level 0 for LCMS Laboratory Control Management System

2.0
Distribute username & password

initial username & password fo Instructor

&bat username & password fo Student

Administrator

First username & password

1.0
Set initial username & password

New usemame & password

| D1 | Admin File |

Workgroup Info.

Username & password (Admin)

4.0
Set Workgroup for each lab

Updated Workgroup Info.

| D4 | Lab File |

Instructor

Usemame & password (instructor)

Lab control Info.

Updated Workgroup Info.

| D3 | Computer File |

Distributed username & password for Instructor

Student

Usemame & password (Student)

3.0
Log in to the system

Verified admin/instructor

Requested Lab action

5.0
Using LCMS to control Lab during classes

| D2 | Client File |

| D1 | Admin File |

7.0
Modify Username and password

Update student info.

Updated client info

Administrator

Specific action taken (user)

6.0
View, Add, Modify, Delete users

| D1 | Admin File |

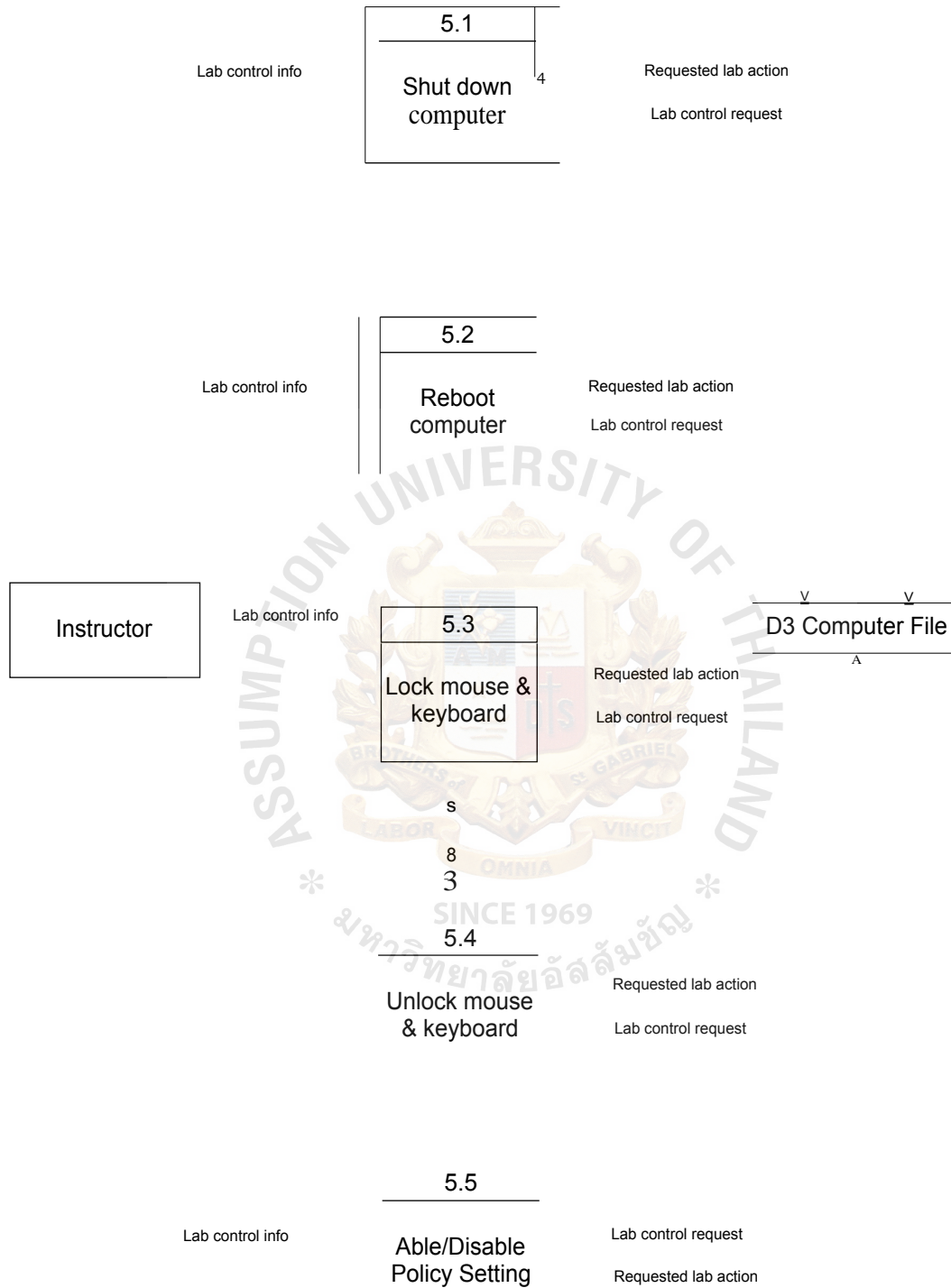| 7.0 |
|---|
| View, Add, Modify, Delete Admin/ Instructor |

Instructor

Figure 3.2 DFD Level 0 for LCMS

Figure 3.3 DFD Level 1 of process 5.0 for LCMS

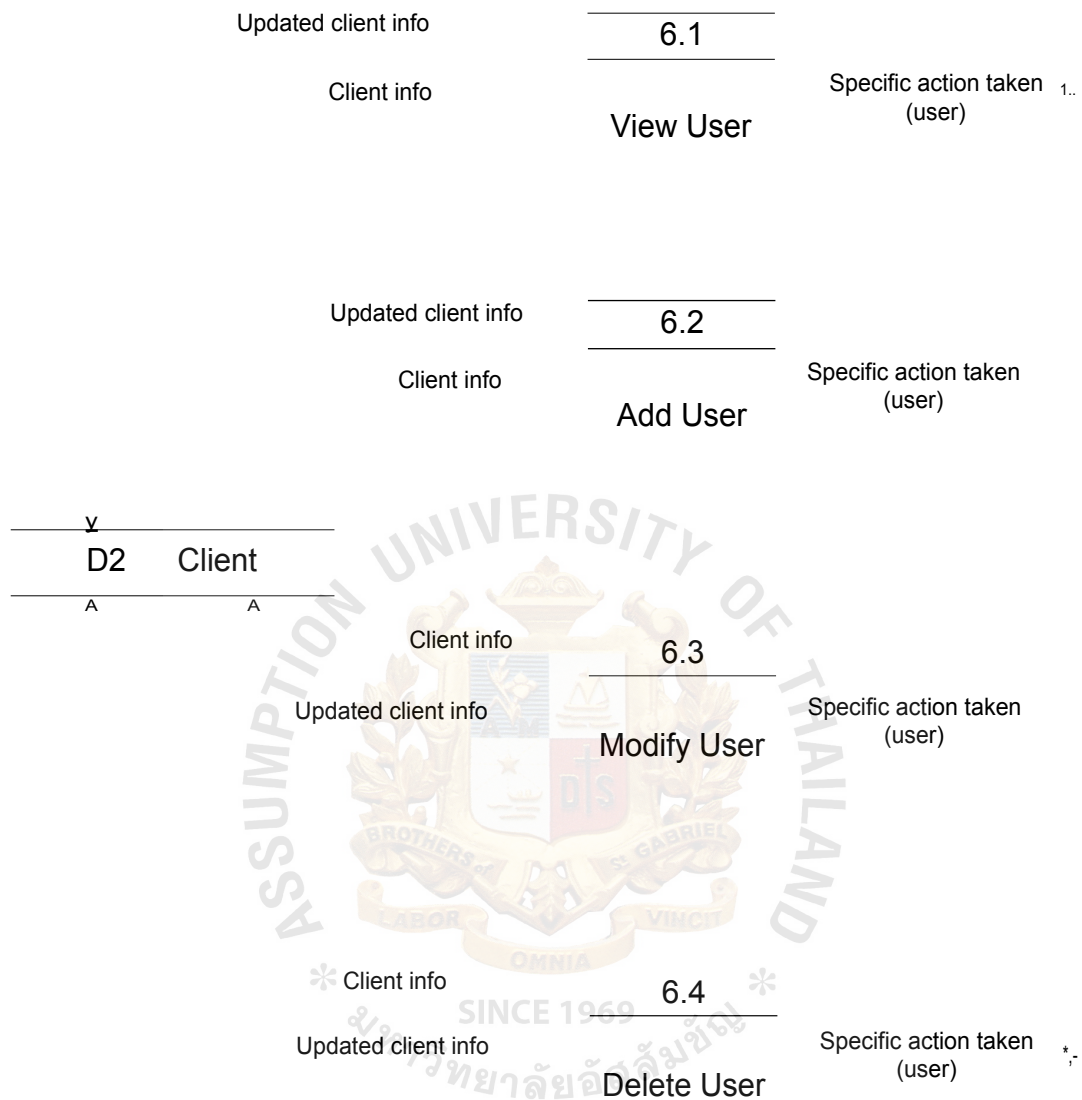DFD Level 1 of Process 6.0 for LCMS Laboratory Control Management System

Updated client info | 6.1 |
Client info | | Specific action taken 1..
View User | (user)

Updated client info | 6.2 |
Client info | | Specific action taken
Add User | (user)

| Y |
| D2 | Client |
| A | A |

Client info | 6.3 |
Updated client info | | Specific action taken
Modify User | (user)

Client info | 6.4 |
Updated client info | | Specific action taken
Delete User | (user)

Figure 3.4 DFD Level 1 of process 6.0 for LCMS

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DFD Level 1 of Process 6.0 for LCMS Laboratory Control Management System

Updated Admin/
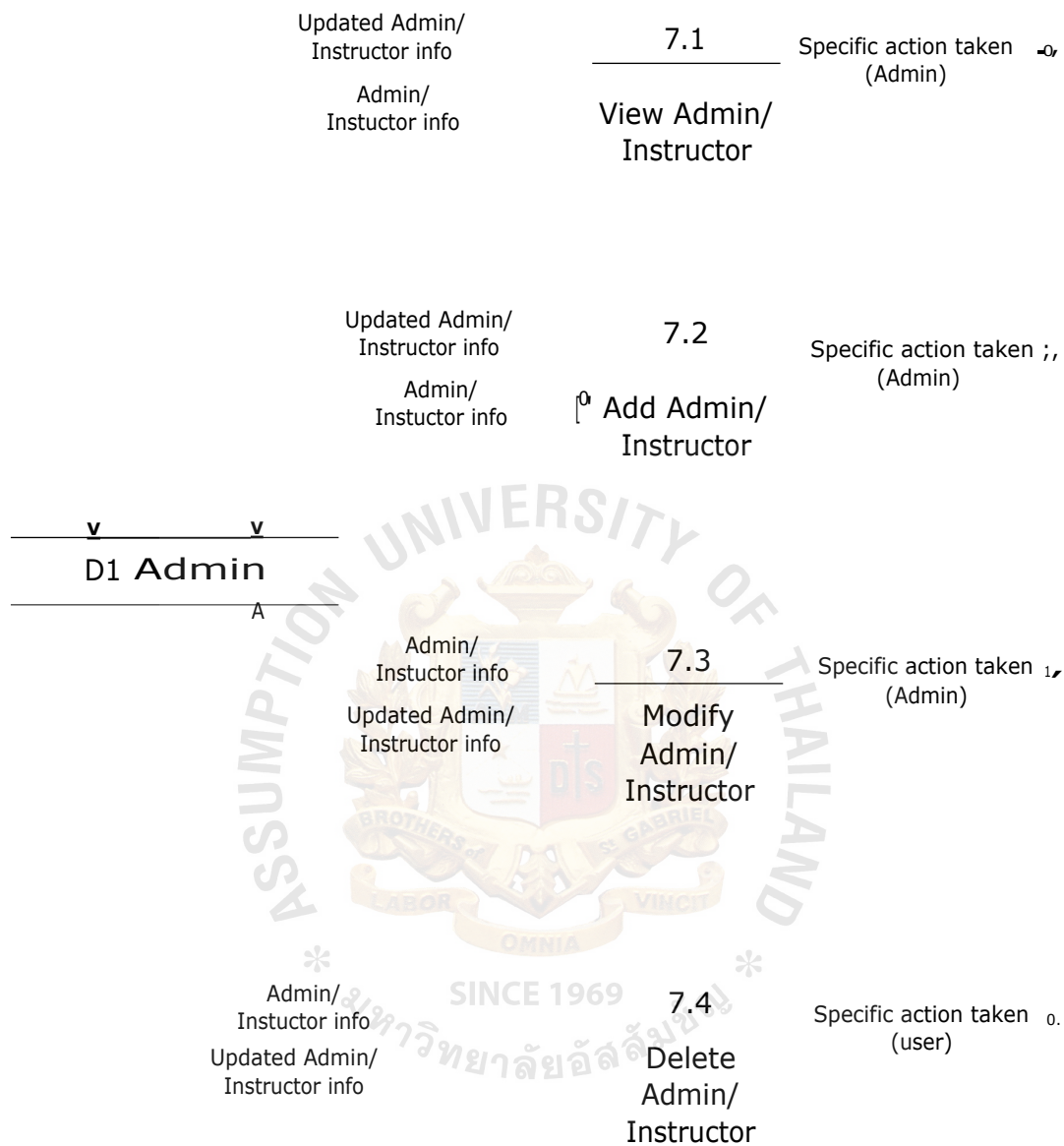Instructor info

7.1

Specific action taken
(Admin)

Admin/
Instuctor info

View Admin/
Instructor

Updated Admin/
Instructor info

7.2

Specific action taken ;,
(Admin)

Admin/
Instuctor info

Add Admin/
Instructor

D1 Admin

A

Admin/
Instuctor info

7.3

Specific action taken 1,
(Admin)

Updated Admin/
Instructor info

Modify
Admin/
Instructor

Admin/
Instuctor info

7.4

Specific action taken 0.
(user)

Updated Admin/
Instructor info

Delete
Admin/
Instructor

Figure 3.5 DFD Level 1 of process 7.0 for LCMS
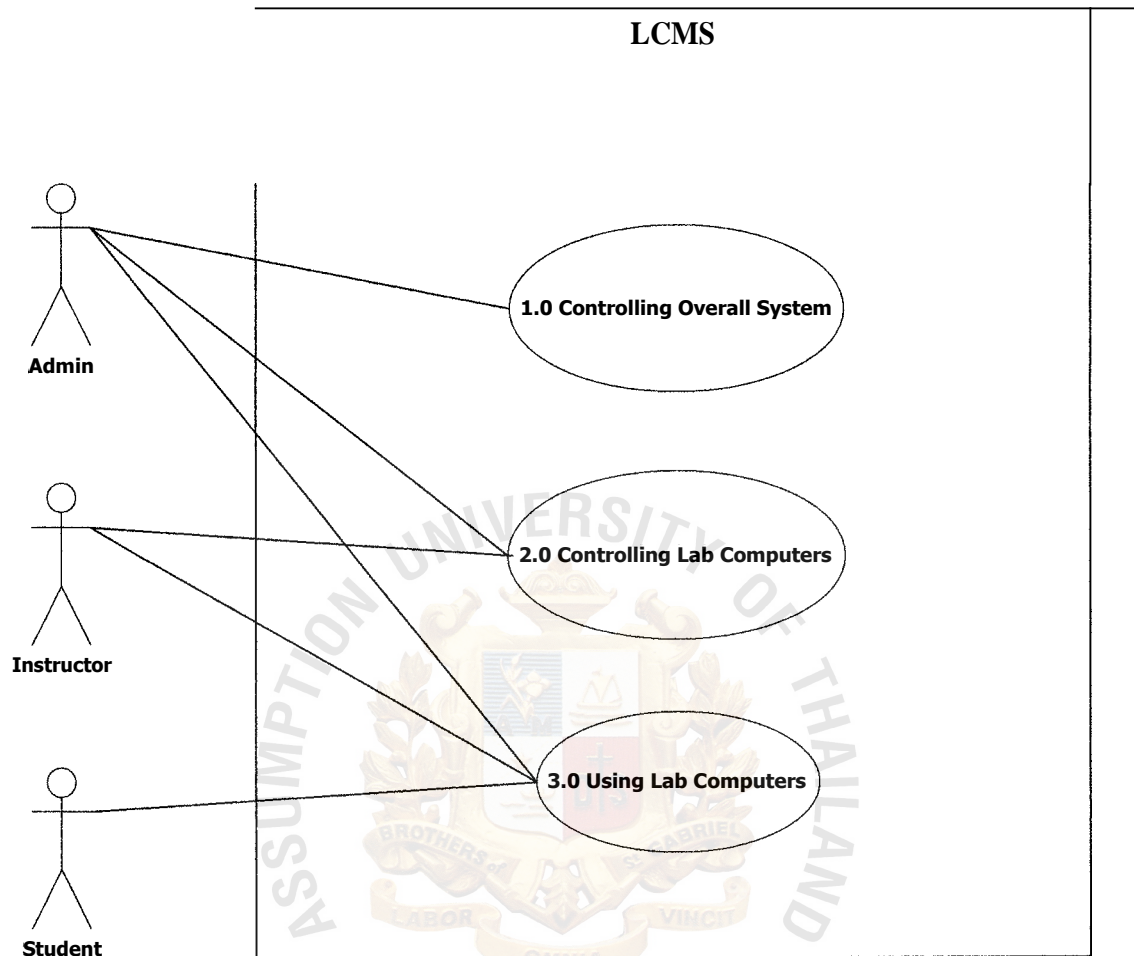
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Use Case Analysis

Figure 3.6 Laboratory Control Management System

This figure shows Laboratory Control Management System. Admin can control all functions in the system. Instructor can control everything in computer laboratory. Student can only use computer in the laboratory after logging into the system.
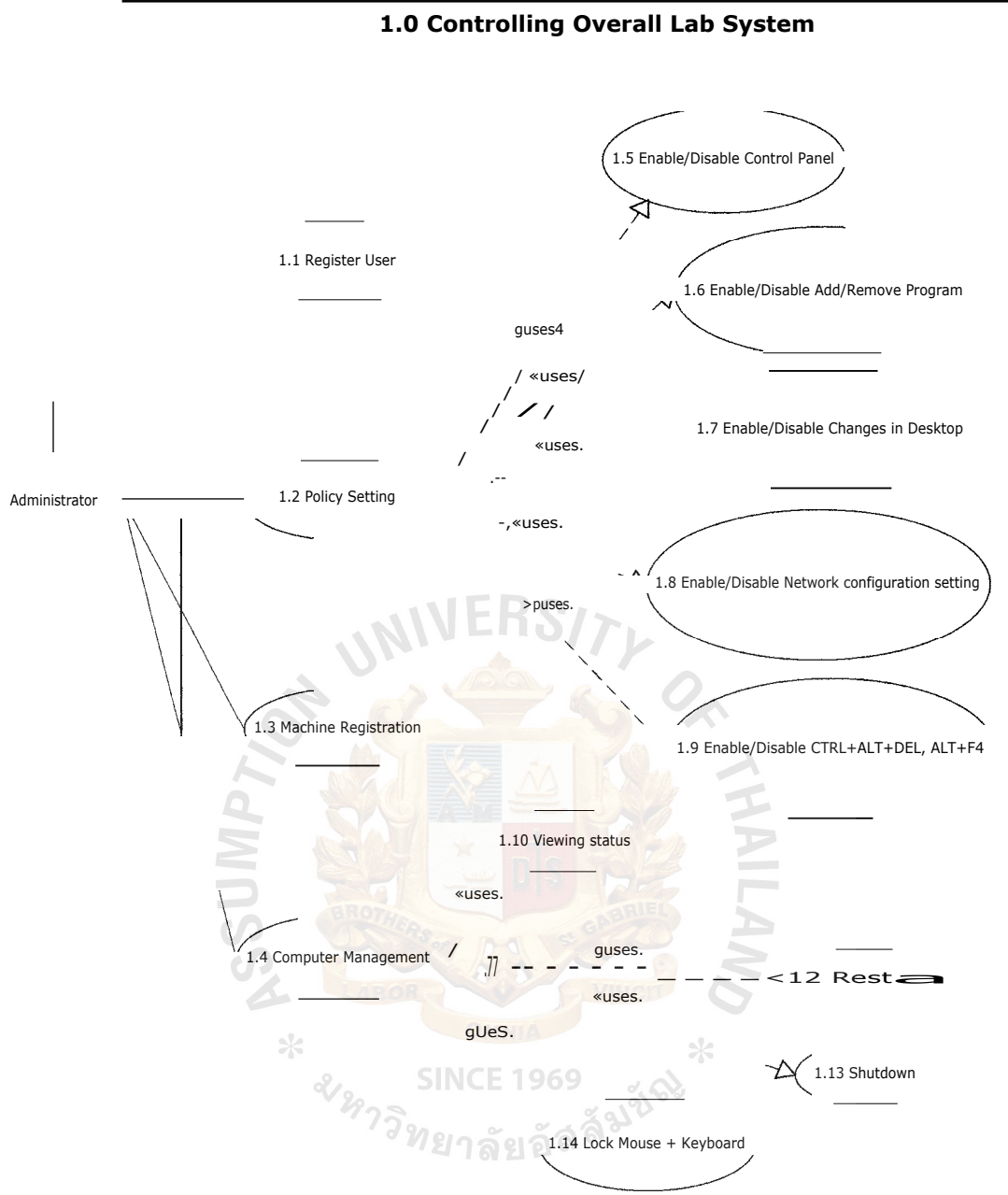
1.0 Controlling Overall Lab System

1.5 Enable/Disable Control Panel

1.1 Register User

guses4

/ «uses/

«uses.

Administrator — 1.2 Policy Setting

1.6 Enable/Disable Add/Remove Program

1.7 Enable/Disable Changes in Desktop

1.8 Enable/Disable Network configuration setting

>puses.

1.3 Machine Registration

1.9 Enable/Disable CTRL+ALT+DEL, ALT+F4

1.10 Viewing status

«uses.

1.4 Computer Management

guses.

«uses.

gUeS.

<12 Rest

1.13 Shutdown

1.14 Lock Mouse + Keyboard

Figure 3.7 Controlling Overall Lab System

This figure shows how the administrator can control laboratory overall system. Administrator can register all users and administrators. The machine registration function helps to categorize computers into different laboratories. Administrator also can set policy such as enable/disable the user access to Control Panel, Add/Remove program, Network Setting, Display.
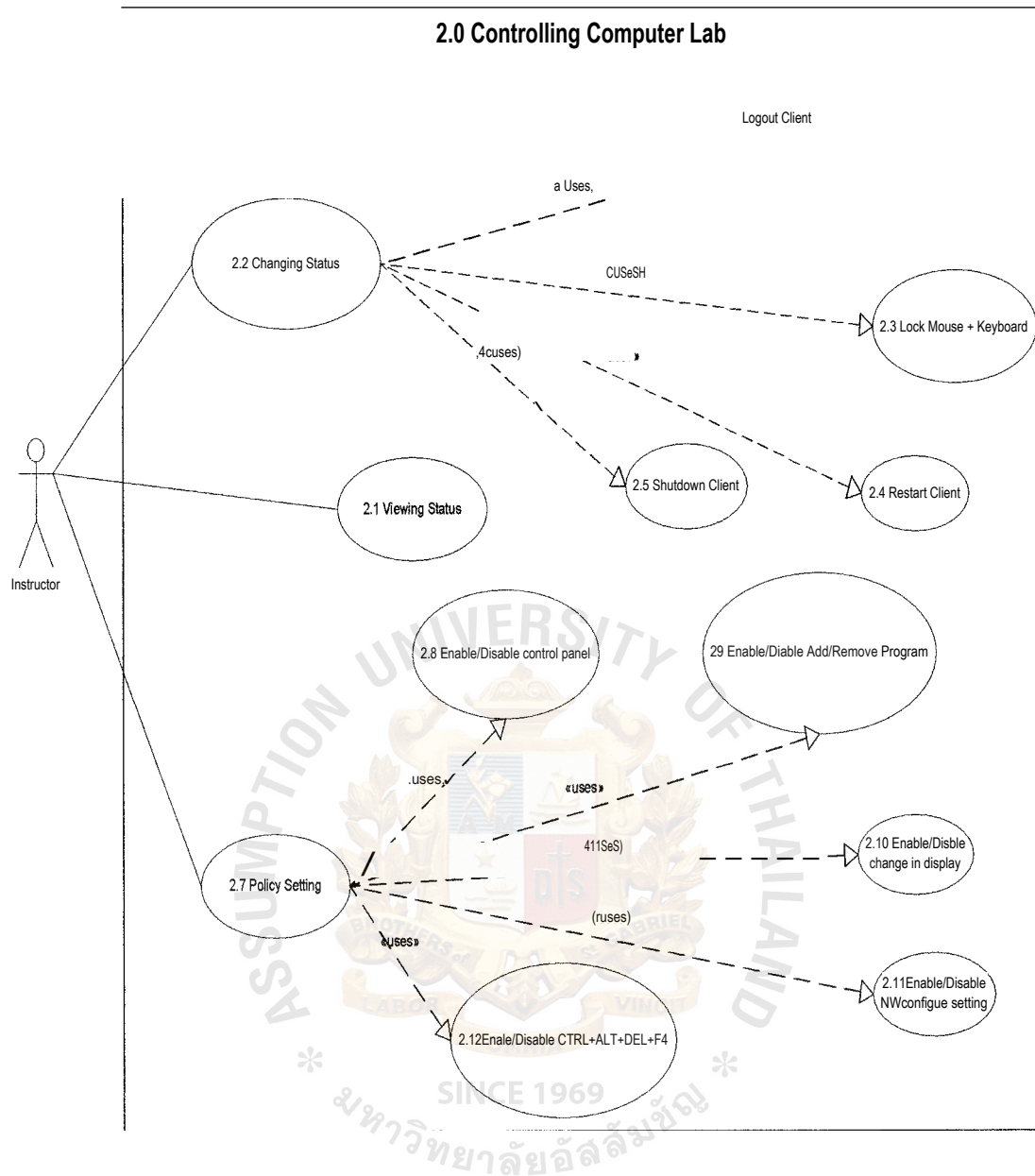
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2.0 Controlling Computer Lab

Figure 3.8 Controlling Computer Lab

This figure shows how instructor can change status such as log out client (i.e. student), restart client, shutdown client, lock/unlock mouse/keyboard. Instructor can also view status in lab and able to set policy such as enable/disable the users access to Control Panel, Add/Remove program, Network Setting, Display.
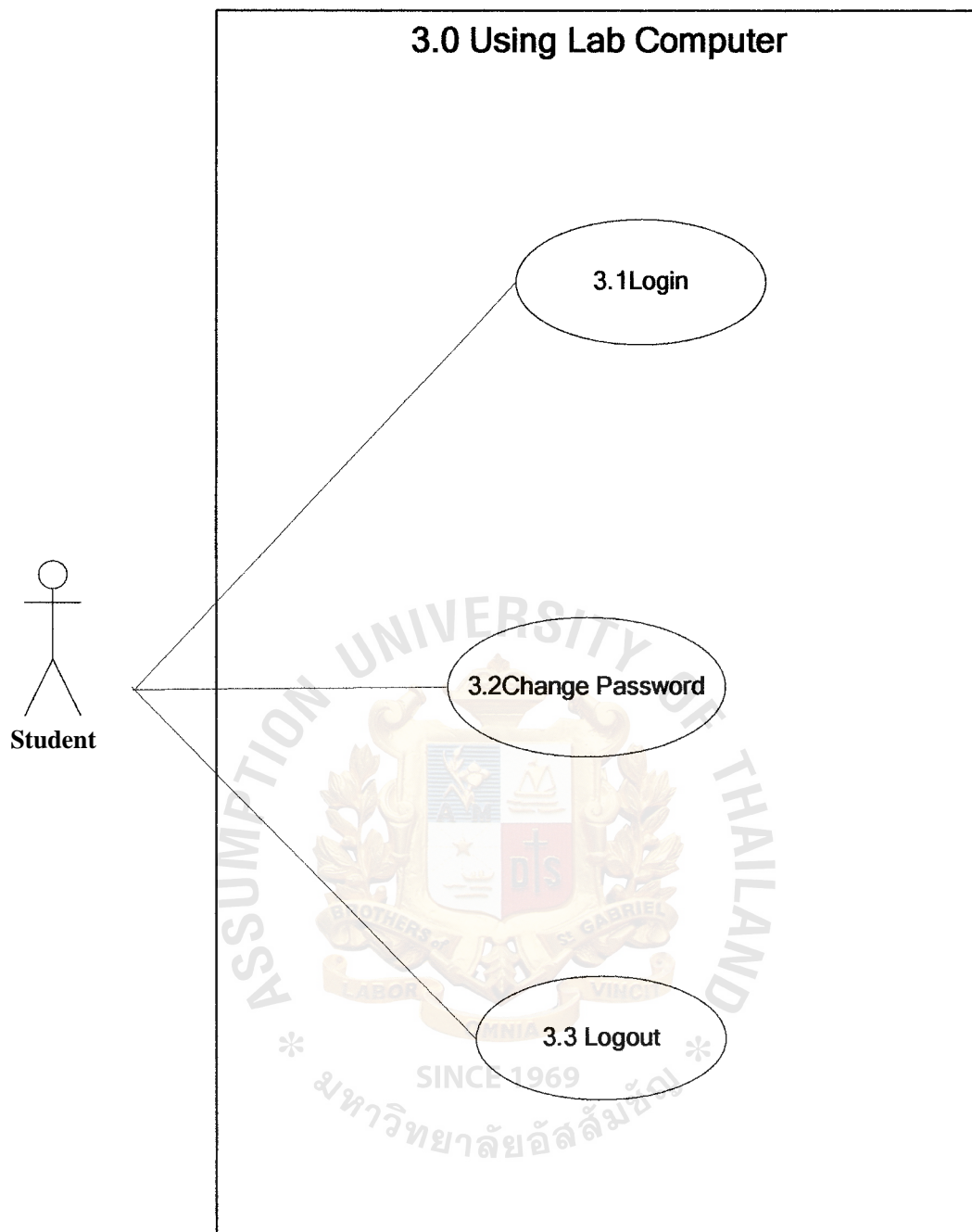
Figure 3.9 Student who Uses lab computers

This figure shows how students are able to use their computers with the implemented computer laboratories. Students can login, logout and also change individual password.

Activity Diagram
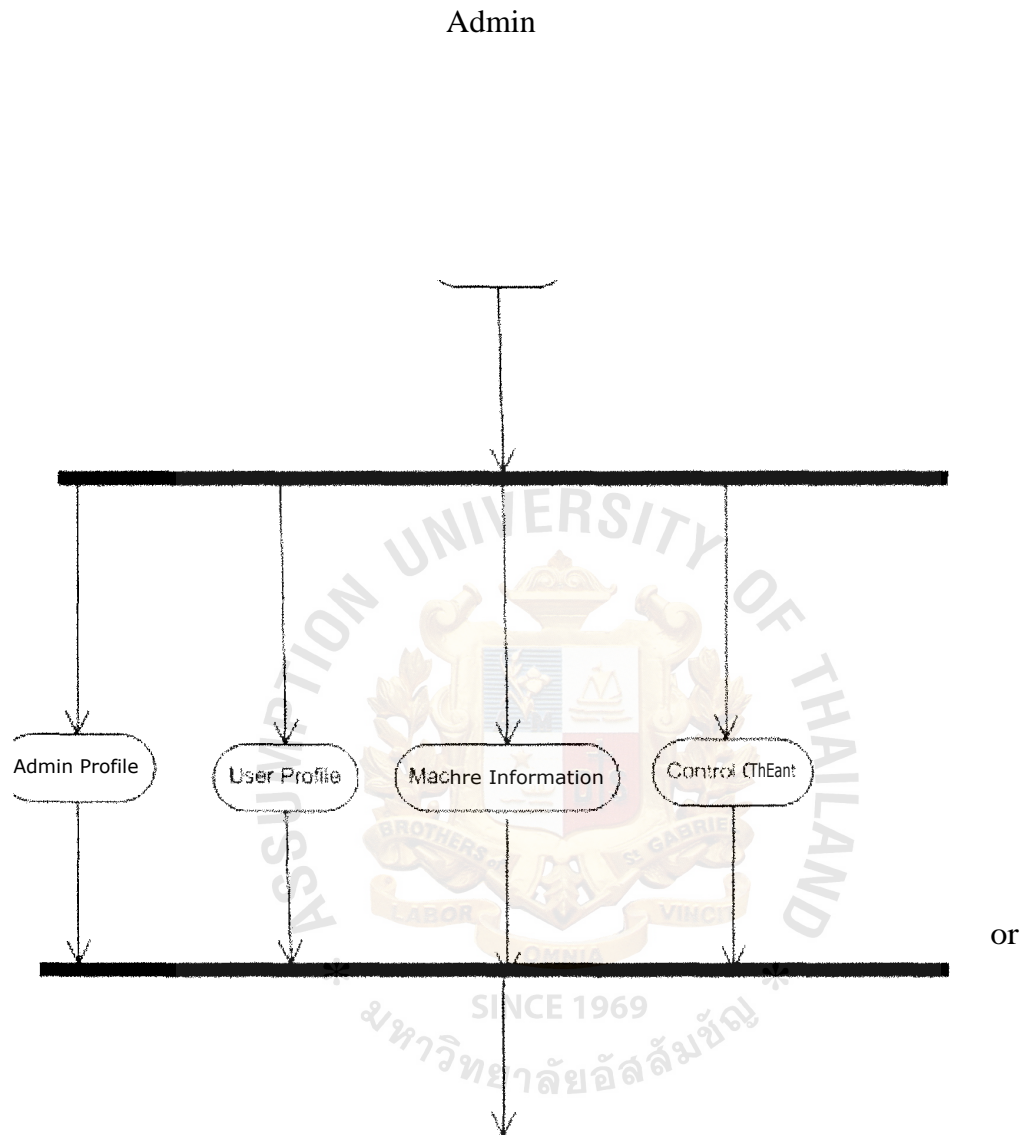
UML Activity diagram for Administrator

Admin

Figure 3.10 Activity diagram for Administrator

This figure shows activity diagram for administrator. Administrator can login to the system and then can select Admin Profile, User Profile, Machine Information or Control Client.

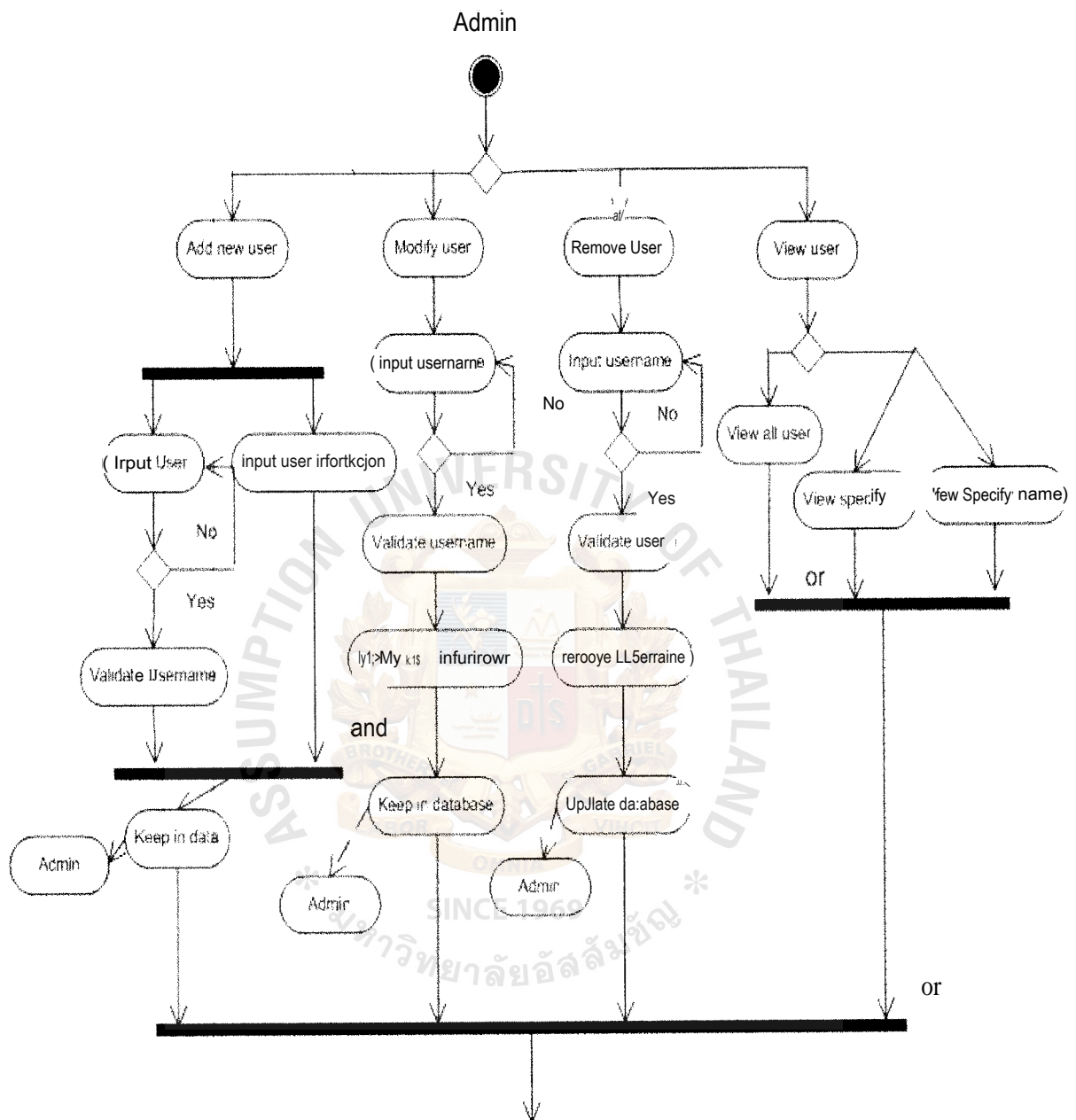UML Activity Diagram for Administration profile

Figure 3.11 Activity diagram for Administrator Profile

Administrator has 4 choices in Administration Profile

1. Add new user: Administrator can input new administrator and input administrator's information and then system will check administrator's existence with the database. System then will keep new administrator's profile into the database.

2. Modify user: Administrator can modify any users (both Administrators and Instructors) within the system, the system then will make sure that the modify username is not duplicate after comparing with the database. Administrator can modify administrator's information himself or instructors. The system will keep updated information into the database.

3. Remove user: Administrator can input username and then system will check in database that the specified username is within the database. Then the administrator can remove existing username, system will update new information in database.

4. View user: Admin can view all users who are connected into the system, view specify ID and view specify name.

UML Activity diagram of what Administrator/ instructor can do in User Profile
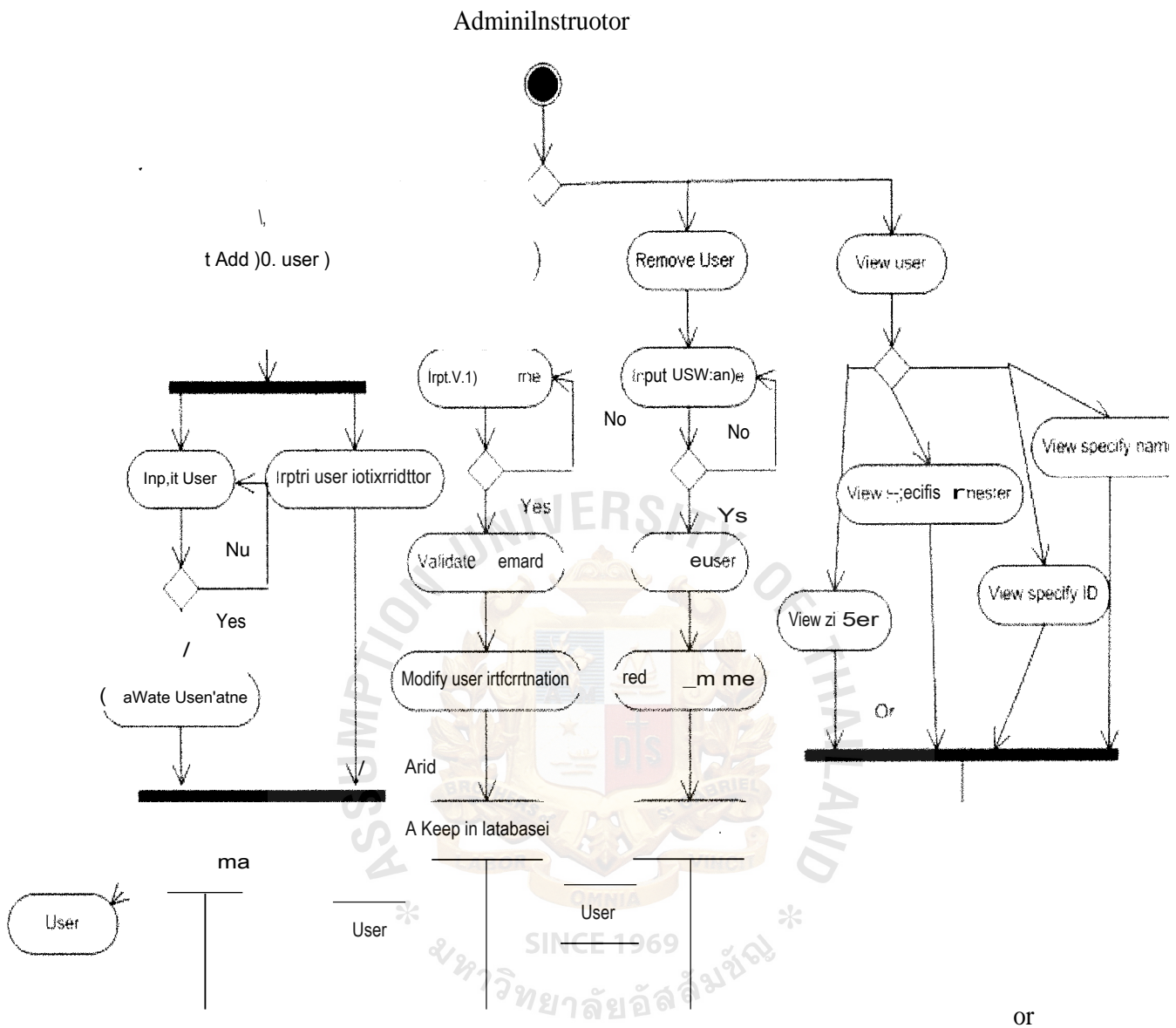
Adminilnstruotor

Figure 3.12 Activity diagram of what Administrator/ instructor can do in User Profile

Administrator/Instructor has 4 choices in User Profile

1. Add new user: Both Administrator and Instructor can input new user and input user's information which then the system will check user's duplication in database. If it is not duplicated then the system will keep new user in database.

2. Modify user: Both Administrator and Instructor can modify the username and passwords for all users within the database through the system.

3. Remove user: Both Administrator and Instructor can remove any users within the database though the system.

4. View user: Both Administrator and Instructor can view all users, views specify ID, views specify semester and view specify name.

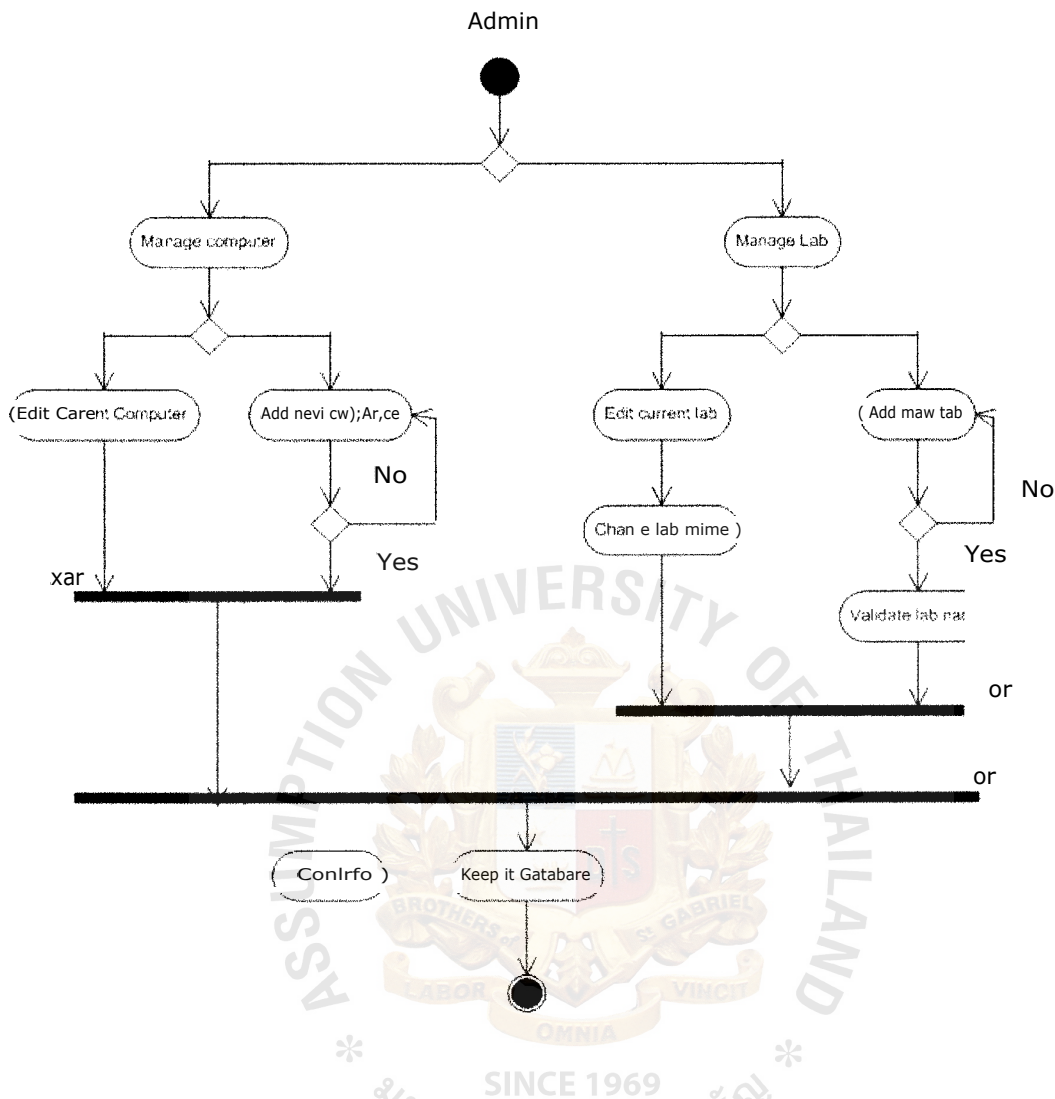**UML Activity diagram for Machine Info.**

Figure 3.13 Activity diagram for Machine Info.

Administrator has 2 choices:

    1. Manage computer: Administrator can edit information of computer or add
new computer in each laboratory. The system will update information with
database.

    2. Manage lab: Admin can edit information of computer lab, in this part admin
can change lab's name. Admin can add new lab and then system will check
and validate lab in database. System keeps new information in database.

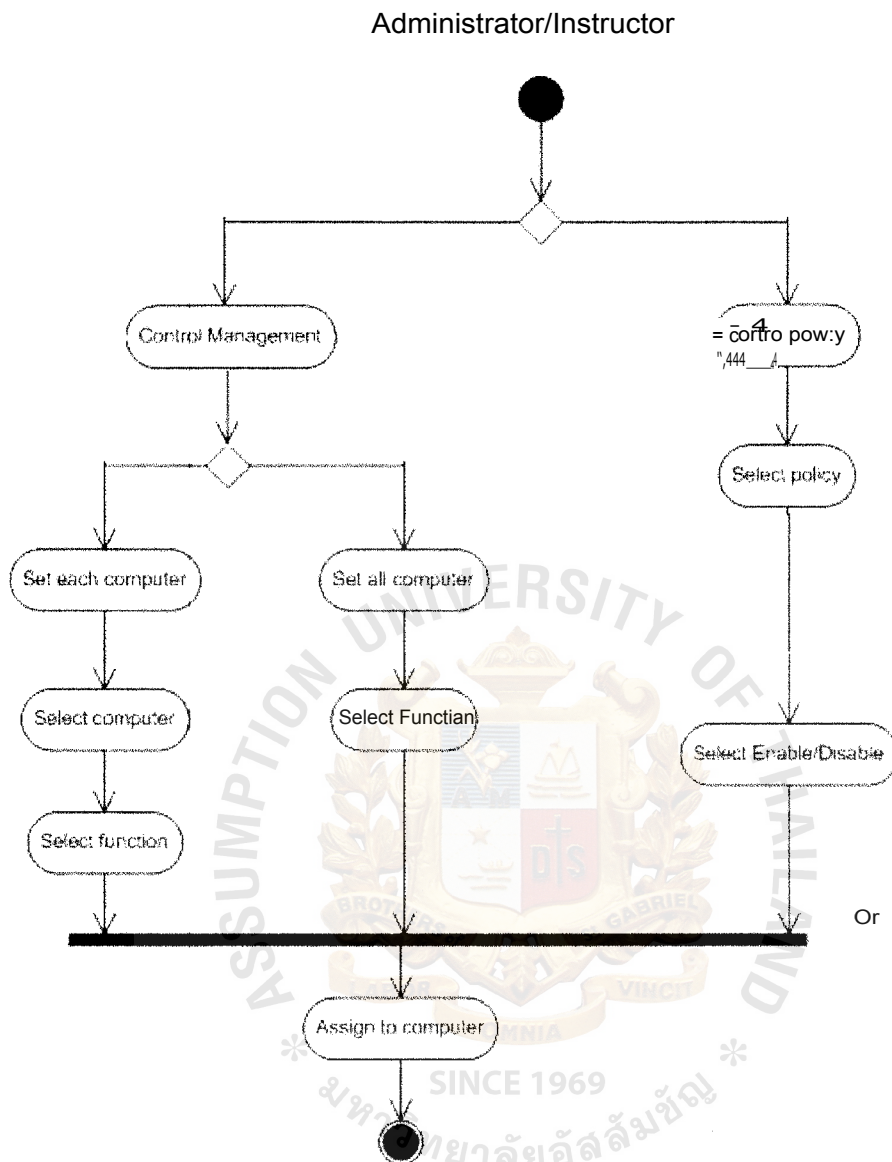**UML Activity diagram for Control Client**

Administrator/Instructor

Figure 3.14 Activity diagram for Control Client

Administrator and Instructor have 2 choices:

1. Control Management: Administrator and Instructor can set functions which

are Restart, Shutdown, lock/unlock mouse/keyboard for each computer or set

all computers at the same time.

2. Control Policy: Administrator and Instructor can select each policy and set

it as Enable/Disable. The policy includes Control Panel, Network Connection,

Add/Remove Program, Display, Task Manager(Ctrl +Alt +Del).

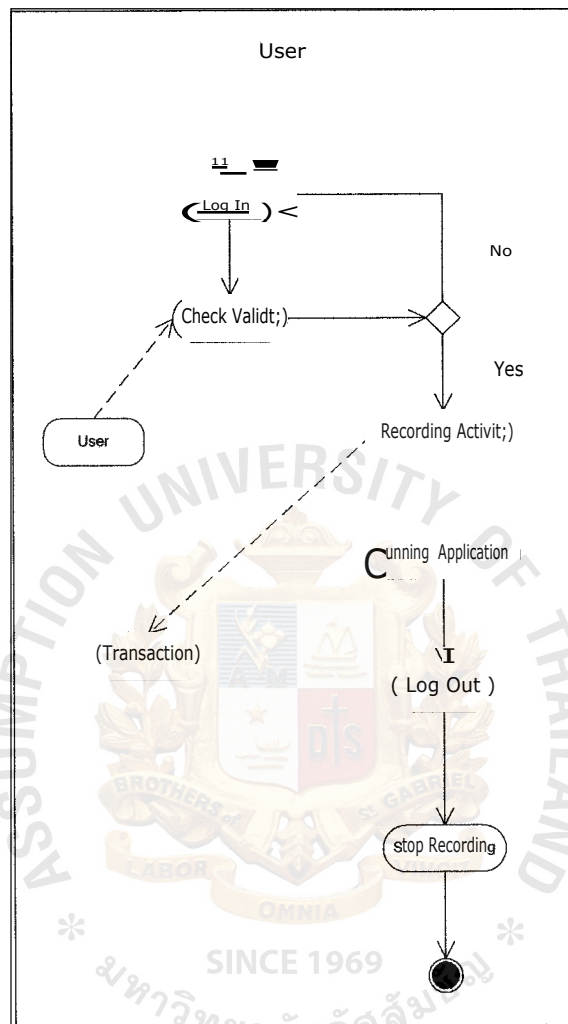UML Activity Diagram for *Student Log-In Log-Out*

Figure 3.15 Activity diagram for student log-in! log-out

This figure shows that after the student has login to the system, the LCMS will keep

track of the task and take full control of the computer.

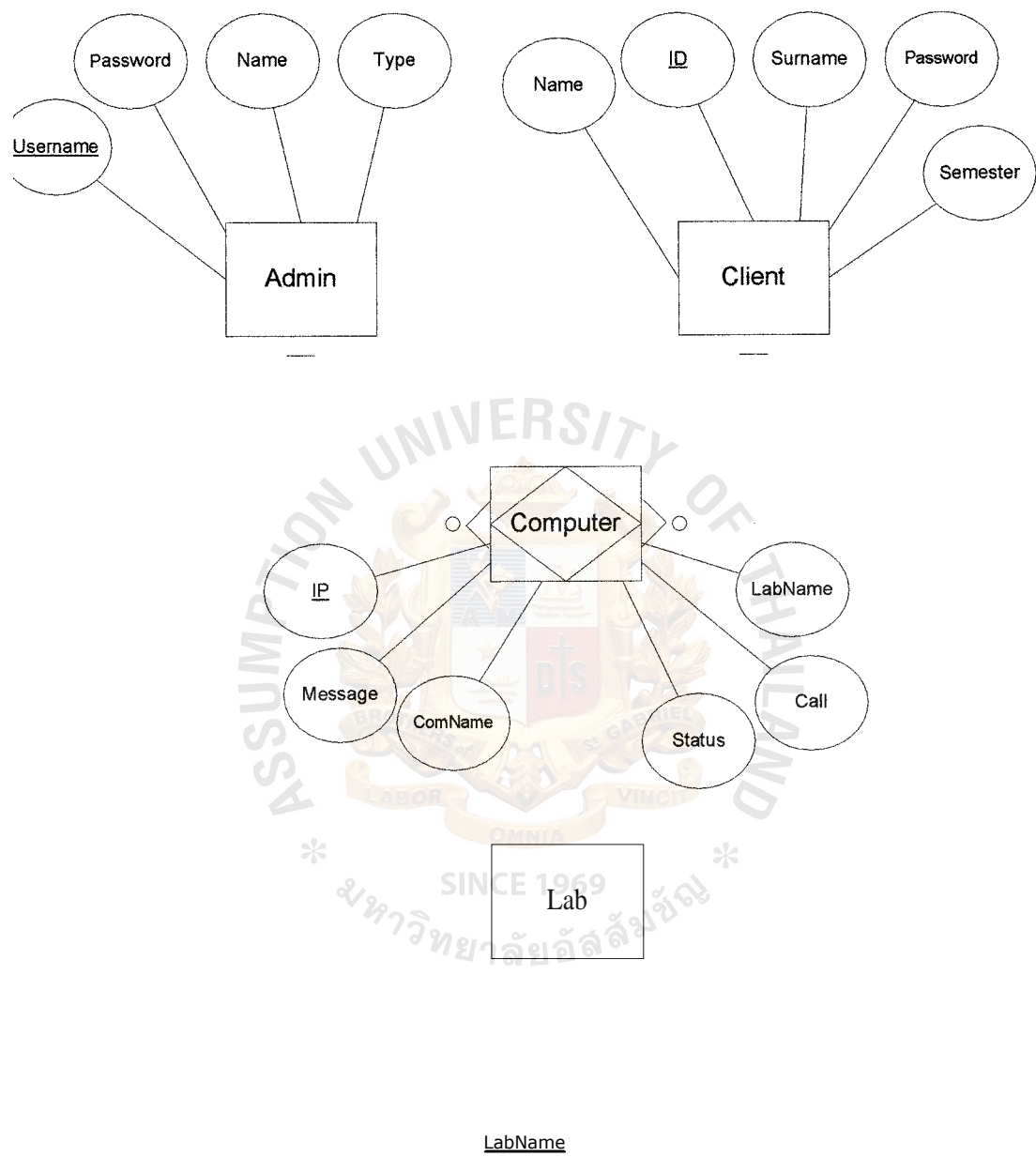**Entity Relationship Diagram for LCMS (E-R Diagram)**

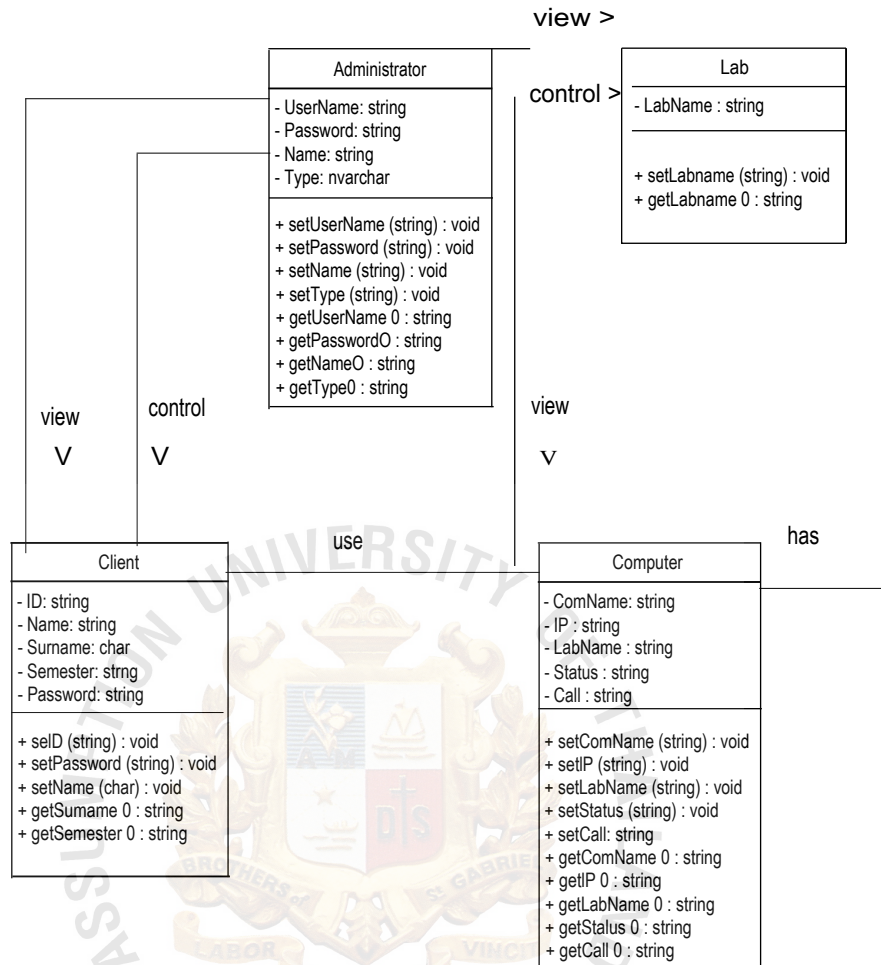Figure 3.16 LCMS E-R Diagram

Class Diagram

Figure 3.17 LCMS Class diagram
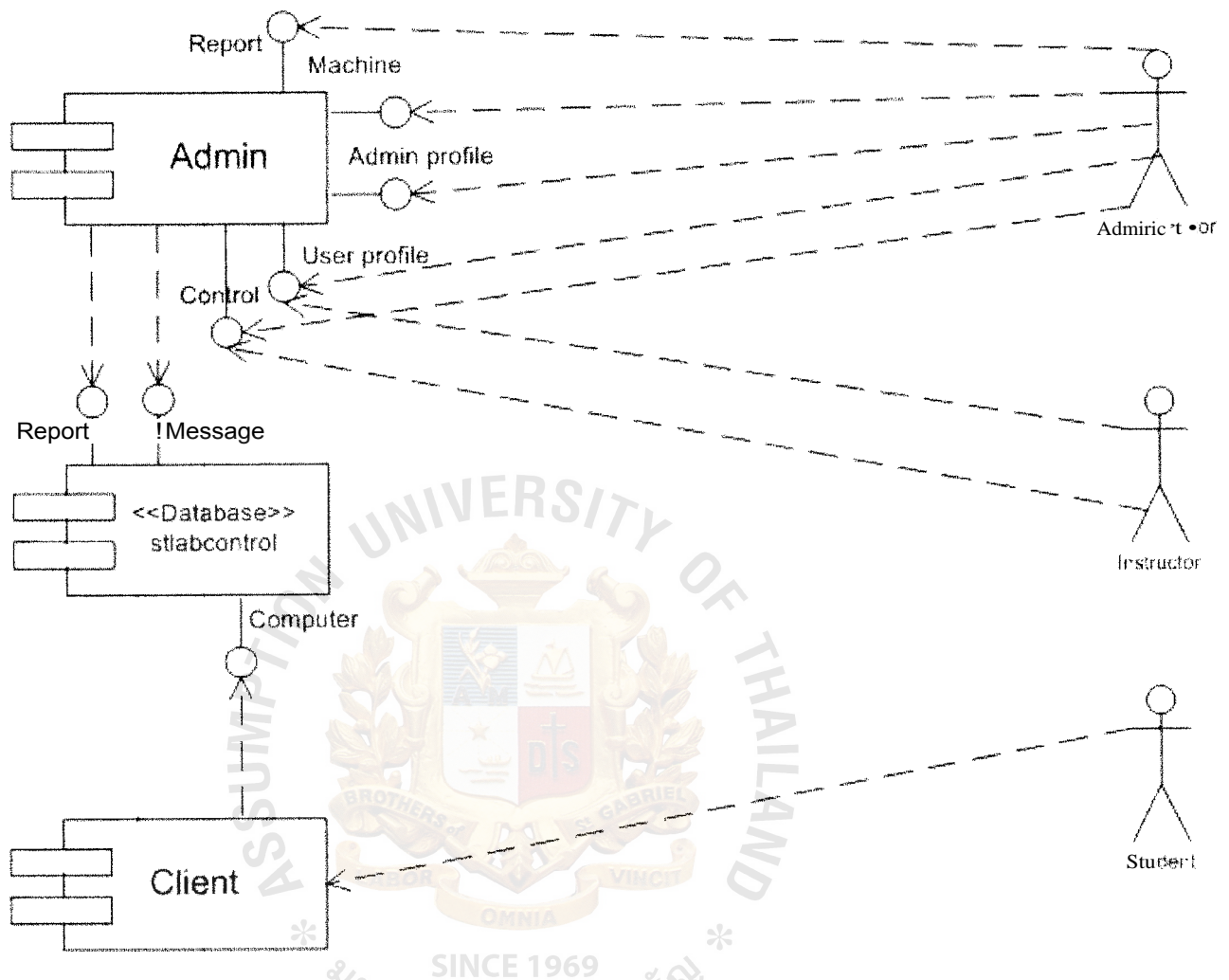
Component Design

Figure 3.18 LCMS Component Design

Administrator can control over all of system which are Control, User profile, Admin Profile, Machine.

Instructor can control all computers in laboratory and view user profile. Student can use computer in laboratory as a client. All processes are mostly contact with database.

3.3 Hardware and Software Requirements

Hardware Requirements on Computer

1) CPU Intel Celeron. 1.8 GHz or above

2) RAM 256 MB or more

3) HDD 40 GB or larger

4) Keyboard, Mouse, Monitor

Software Requirements

1) Operating System, Microsoft Window XP

2) .Net Framework

3) Microsoft SQL Server

3.4 Security and Control

There are several security and control factors to be considered. Firstly, each instructor should obtain the usernames and passwords from the administrator at the beginning of each semester. Repeatedly, each of the students should be assigned with initial usernames and passwords by the instructors through the administrator. This will reduce the problems when some students appear to have no identity in using the computers within the laboratory. This will also help in avoiding the unauthorized access from the outsiders.

The computers within the laboratories should be installed and lock screen at the user's login page which will leave the user with no choice to enter username and password before using the computers. This will also certify that all the logged in computers will be visible though the instructor's main computer.

For the security of the system, The LCMS will keep the IP addresses of the every user who comes to log into the system. By keeping the IP address, it will be

able to keep track of each user who is connected to the system. This will enable the instructors or the administrators to know which direction of the computers the student is using and then can mange the task management either way. This will prevent the unauthorized users. By keeping the IP addresses will be able to help the system when the system needs to proof that the transactions were really occurred.

The LCMS contains a function which is called "current log password". Sometimes, the connections between the LAN system can be down, this function will provide the user with the current password throughout all computers. This current password will be shown to the students through their screens and the students will use the given password to log into the system. The "current password" can be changed according to the administrator.

The Instructors are supposed to allow the students to change their username and password immediately once they have received the initial username and password. In doing this, the instructors will reduce problems in some students who forget their initial distributed username and password. The students who forget their username and password can create nuisance to the instructors and believing that there will not only be a few of the forgetful students. The students should also be suggested to change their username and password in the way that they can remember them well, such as their email passwords.

3.5 Cost and Benefit Analysis

Hardware Cost

Computer Server	1 unit	B 66,900
UPS PowerCom QUN-525AP	1 unit	B 3,280

When fully developed and tested, this Laboratory Control Management System will be implemented in Assumption university computer laboratories where there are already equipped with hundreds of computers. So, all the hardware costs and the other hardware associated costs of this new LCMS system will be virtually zero except that the laboratory would like to expand its capacity or would like to purchases more computers. This LCMS system will be installed on existing computers, both for the instructors who will be controlling other computers and the students whose computers will be controlled by the LCMS, with no extra hardware cost to be bothered for all the enjoyable benefits of the new system.

Software Cost

Application Software

MS SQL 2000	1 unit	B 223,500
MS IIS (Web Server)		
Internet Explorer 5 or 6		

Development Cost

Microsoft.Net C# Programming	1 unit	B 50,000

Operation System

Microsoft Windows XP		
Professional W/SP2	1unit	B14,500

The software cost for this Laboratory Control Management System will be only for the cost of the software being used for program development; in this case the development software being used is .NET Framework. The rest of the requirements declared in the software requirements, which are the operating system (Microsoft Window XP) and the database management system (Microsoft SQL Server), are needless of re-purchase because they are already installed on the laboratories' computers. The cost of one unit of software being used for program development is very cheap compared to its capabilities, the cost is approximately 6,000 Baht for the .NET Framework.

Benefits

When talking about the benefits of this new system, there are many of them which can be divided in to tangible and intangible benefits. Tangible benefit means the benefits that can be counted or in forms of money or other countable things. Intangible benefit means the benefits that don't take any physical form; they are usually in logical or mental foirns.

Intangible benefits

There are several intangible benefits to this Laboratory Control Management System. First to be mentioned is an intangible benefit for the instructors who teach classes in the computer laboratories. With the new system, the class instructors will enjoy a privilege to just prohibit the students from all their monkey businesses with the computers while the instructors are giving lectures. The distractions when the instructors have to stop lecturing and scold at a group of students who play with the

computer will be put away. This is good in the long run for both the instructors and the students because both individuals will need not to be upset from scolding and being scolded at anymore.

The second intangible benefit can be seen as a consequence of the first mentioned benefit, which is a better quality of education for all the students who need to study in the computer laboratories. Let's put it this way, when there's noting on the computers for the students to play, they would tend to listen more to what the instructor is trying to lecture to them, and the more they listen, the more precious knowledge they can absorb. **I** believe that students do gain more knowledge listening to the lecturer than playing with the computers or checking their e-mails while in the class room.

Tangible benefits

When fully implemented, the LCMS will help in managing all the users in the university computer laboratories more easily because the staff will be doing all the controlling tasks from just the computer screen. Thus, the cost for hiring staff would be reduced because the new system will enable the person controlling the lab to watch over more computers more conveniently and more efficiently. Suppose 2 personnel are needed to control one computer laboratory, this new system might be able to reduce that number to only one staff per laboratory. Assume that the monthly salary for each computer laboratory is about 8,000 Baht, so the system will save the university 8,000 Baht per laboratory per month; of there are 10 laboratories, then the figure will sum up to 80,000 Baht per month, almost a million Baht per year; quite a considerable amount of money for such a low investment cost.

Cash Flow Issues

Please note that this calculation of cash flow involves only 1 computer laboratory

Investment Cost:

Computers	Already Available
Computer Server	66,900 Bath
UPS PowerCom QUN-525AP	3,280 Bath
MS SQL 2000 MS IIS (Web Server)	223,500 Bath
C#.NET Program LCMS Development Cost	50,000 Bath
Total	**343,680 Bath**
Lab Staff Monthly Salary (8000 x 12)	96,000 Bath
Printing Ink/ month (10,200 x 12)	122,400 Bath
Maintenance Cost (5000 x 12)	60,000 Bath
Total/ year	**278,400 Bath**

Monthly Income:

Estimated Printing revenue (1.5 Bathl/ page)	52,100 Bath/Month
Total/ year (52,100 x 12)	**625,200 Bath**

Monthly Cost:

Residue:

The estimated salvage values for all hardware after 5 years	**40,000 Bath**

Therefore, Annual Income will be 625,200 — 278,400 = 346,800 Bath

Assuming the PW is to be calculated for 5 years period. Therefore the cash flow will look like the following:
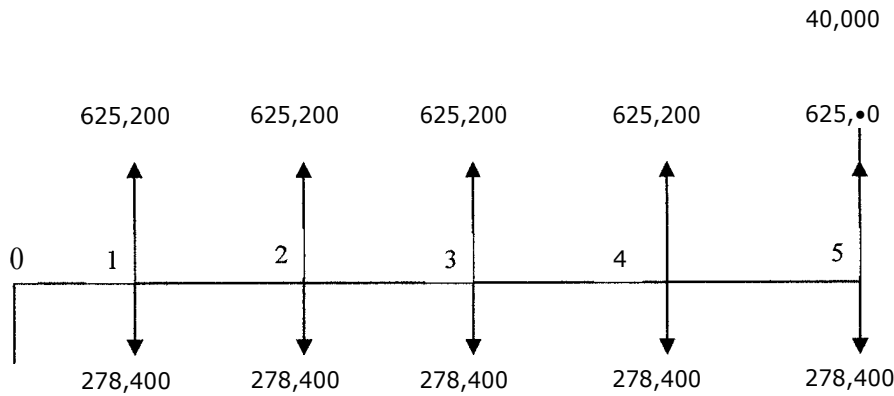
The summarized table below is shown to use in calculating PW

Descriptions	Amount in Bath
Investment Cost	343,680
Estimated income /Annual	346,800
Market Value	40,000

From the above information,
Calculating Present Worth, MARR at 20%

PW(20%) = -343,680 + 346,800(P/A, 20, 5) + 40,000(P/F, 20, 5)
$\qquad$ = -343,680 + 346,800(2.9906) + 40,000(0.4019)
$\qquad$ = -343,680 + 1,037,140.08 + 16,076
$\qquad$ **= 709,536.08 Bath**

Payback Period

$\quad$ Initial Investment (Loan from bank)
$\qquad$ Annual Net Income

= $\dfrac{343,680}{346,800}$

= 0.991
= **10 months**

IV. PROJECT IMPLEMENTATION

4.1 Overview of Project Implementation

System Implementation is the planned and orderly conversion from a current existing system to the new proposed Information System. The final design should be evaluated first to make sure that the new proposed system can meet the desired goals and objectives, and then the other remaining processes will be performed. The typical processes of the System Implementation are:

1) Software acquisition and installation

For this case the developer will get the software as Microsoft Visual Studio .NET. This software will be used in order to write LCMS program. After the program has been installed, MS SQL server will be checked for existence or newly installed throughout the computers. This is to support the use after the installation of the system.

The Installation of the LCMS will be installed into two computer laboratories first as a trial. If the program is considered as helpful and worth to replace the old one then all computer laboratories will be installed with LCMS.

2) Personnel training

The initial training will be conducted for all administrators. The administrators will be guided with the steps for how to use LCMS to control the system. This is to make the full potential out of the system. After the initial meeting, the administrators are supposed to run the LCMS for at least two weeks and during this time, the administrator has to train the instructors. The instructors have to inform the students about the new system but in this case, the students have only

the function to log in and change the password. Therefore the students are not need to be trained.

After two weeks of the trial operation, the follow up meeting will be conducted and at this time both administrators and instructors will be called up and discuss about the use of the implemented LCMS. The feedback will be observed and the bugs will be corrected by the programmer.

3) Site preparation

The computer laboratories in Assumption University have been used for a long period of time and the maintenances are quite often. The computers are not the factor to be considered. The only thing is that to install the LCMS into the provided computers.

4) Data preparation

The data is collected along the way during the process of developing this program. The information as user manual is prepared once the program is developed. The Information will focus on the use of the systems. This information is believed to be very useful resources for the next system developer who wants to further improve the program or maintain it.

5) Documentation

The documentation will be provided to all users together after installation of the LCMS, this will include the user manual for all different level of users. The user manual will contain the step by step accompanied by interfaces and instructions. This will be a great help for the new users who need to use the program.

Moreover, it also involves fine tuning system elements, in order to maximize the system efficiency and productivity.

4.2 Test **Plan**

Software Installation

After the Software has been developed, the installation should be carried out within one computer laboratory first to make sure that the software will work well and the need of any modifications. Debugging of the program will also be necessary after the preliminary implementation.

Testing can help to find debugs and regressions and make the code better overall. I have test for retrieving the accurate information from database, and checking the correctness of the sequence of the actions in order to find the error of the system.

During test I have found some error occurs, therefore I have corrected the errors until there was only few or no error in the system.

Testing involves all functional testing of the system to ensure that there is no errors and debugs during using the program.

Hardware Testing

All the computers within the testing laboratory have to be up to the same standards as the stated Hardware requirements. This will simplify the task for the software installation afterwards. Any way the hardware testing will be tested throughout the computer laboratories. All existing computers will be tested, if any problems happen with the hardware then we will not

waste time to install the LCMS into those defected computers. The defected computers will be fixed before the software installation.

The LAN system is another important factor to be tested especially on the hardware side. The routers, switches and hubs and all communication devices will be checked for the defection. All wires will not be left out but to be observed too.

Testing is another important factor to be considered besides implementing the system. Having good test results in all fields will lead to a good foundation in installing new system.

4.3 Conversion Plan

Single location installation will be applied for the conversion plan for LCMS. This is because after considering many conversion plans this seems to be the best solution for replacing the newly implemented Information Technology into the manual tasks.

Single location installation, also known as location and pilot installation, is a middle-of-the-road approach compared to direct and parallel installation. Rather than convert all of the organization at once, single location installation involves changing from the current to the new system in only one place or in a series of separate sites over time. The single location, in this case may be a single laboratory. The key advantage to single location is that it limits potential damage and potential cost by limiting the effects to single site. Once management has determined that installation has been successful in one location, the new system may be deployed in the rest of the organization, possibly continuing with installation in one location at a time. Success at the pilot site can be used to convince reluctant personnel in other sites that the system

can be worthwhile for them as well. Problems with the system (the actual software as well as documentation, training and support) can be resolved before deployment to other sites.

Even though the single location approach may be simpler for users, it still places a large burden on IS staff to support two versions of the system. On the other hand, because problems are isolated at one site at a time, IS staff can devote all its efforts to the success at the pilot sites. However, some parts of the organization will not get benefits of the new system until the pilot installation has been completely tested.

4.4 Source Code

The source code has been written in Visual Studio C# .Net. The program is completed and in debugging processes and looking for further improvement.

V. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Laboratory Control Management System is the program which is able to help to solve the problem in computer laboratories. It can control and manage many functions in the computer laboratories.

The LCMS has been implemented to solve the instructors' burdens in teaching and monitoring the students at the same time. It also prevents the access of the unauthorized users in conducting computer laboratories. This will increase the efficiency and effectiveness to the use of computer laboratories. This LCMS will also prevent the students who lack concentration during the classes.

This system will solve the problem statement that we have been facing for a long period of time. The system will also reduce the number of students who download unnecessary programs or some other distractions to computers, sometimes it will lead to some serious problems to the computers. Sometimes, when instructor is teaching students in laboratory classes, some students don't pay attention and play some games. Now, the instructors will be able to monitor their students closely. Instructor will also be able to block I/O devices (mouse and keyboard). After the LCMS has been implemented, administrator and instructor can control from the single point from main computer. And they can view status of each computer from one main computer. Last but not least, this program contains higher security as every user contains different usernames and passwords.

This system will definitely improve the old manual system which will provide the full potential in using computer laboratories.

5.2 Recommendations

Firstly, training will be necessary to all users once the system is implemented. In order to make the full use of the LCMS, all the users should cooperate with the administrator to attend the conducted meetings. The meeting will be conducted at least twice. There are the initial meeting and follow up meeting. The initial meeting is to newly inform the administrator about how to process with the system. The administrators are to be instructed first because I believe that they are the most equipped in their computer knowledge and somehow familiar with the ideas of handling various systems which they have faced before.

Secondly, the computers within the laboratory should be well connected through the LAN system. The Hardware is considered as an important factor. Therefore, all hardware should meet the requirements and recheck for connection again.

The instructors should make full use of the developed system in order to control the computer laboratory classes. The instructors should use the function of controlling the control panel and task manager as far as possible. For instance, they should be reminded to lock their mouse, keyboard or even shut down the students' computers while they are instructing until they want the students to use their computers to carry out the given tasks. The usage time should be observed frequently to observe the students using the computer. This is to make sure that no students are disobedient.

The maintenance of the system should also be closely monitored. The follow up meeting will help to get feedback from the users but will not be good enough if those feedbacks are not analyzed and take further reaction. The maintenance of the system is suggested to be carried out at least once a month after the system has been

used for sometime and getting stable. The administrators play a very important role in maintenance. This is because they can do all the functions provided in this system. Therefore, the administrators are to be often contacted by the programmer to make sure that there are no bugs.

The conversion plan should also be followed. The single location approach is the conversion plan which the system developer feels most suitable for this system. The other way of conversion should be avoided to make the process of converting the existing system into new environment smoothly and reduce time consumption.

Last but not least, the instructions should be reminded and followed all the time to increase the efficiency and effectiveness for the LCMS.

APPENDIX A

INTERFACE DESIGN

Client's(students) Interfaces
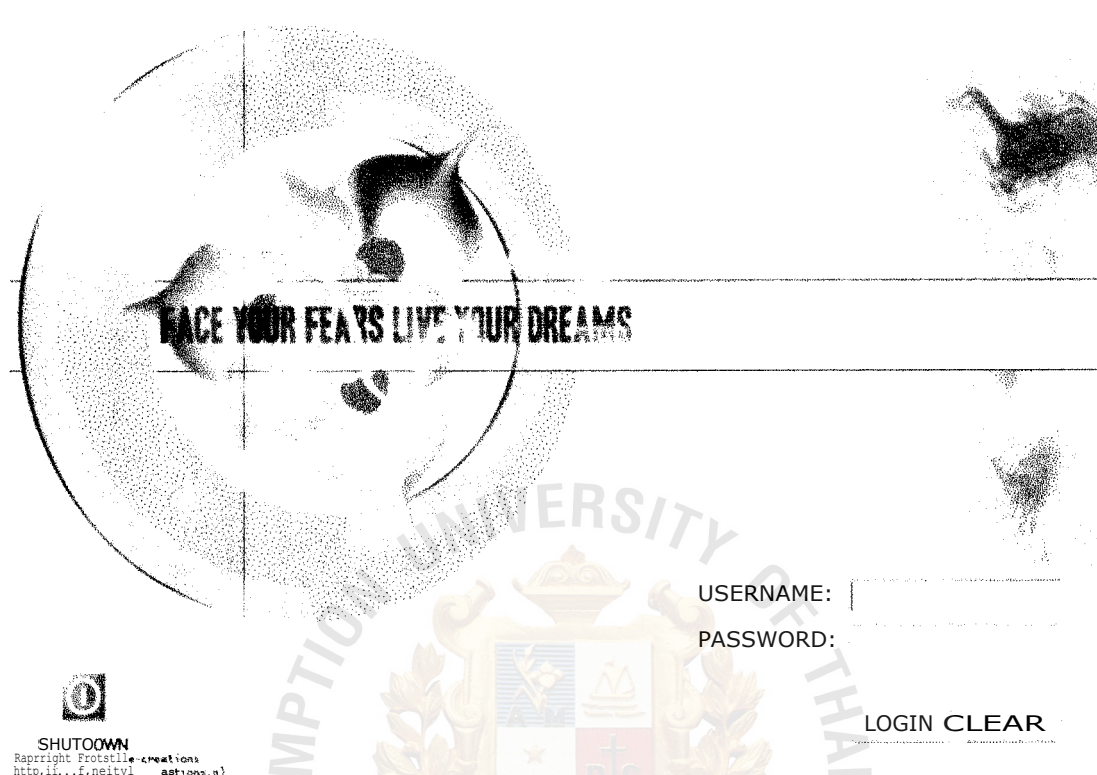
Figure A.1. Lock Screen

This is the initial interface for each client to login to the system. Lock screen has usemame and password to fill in.
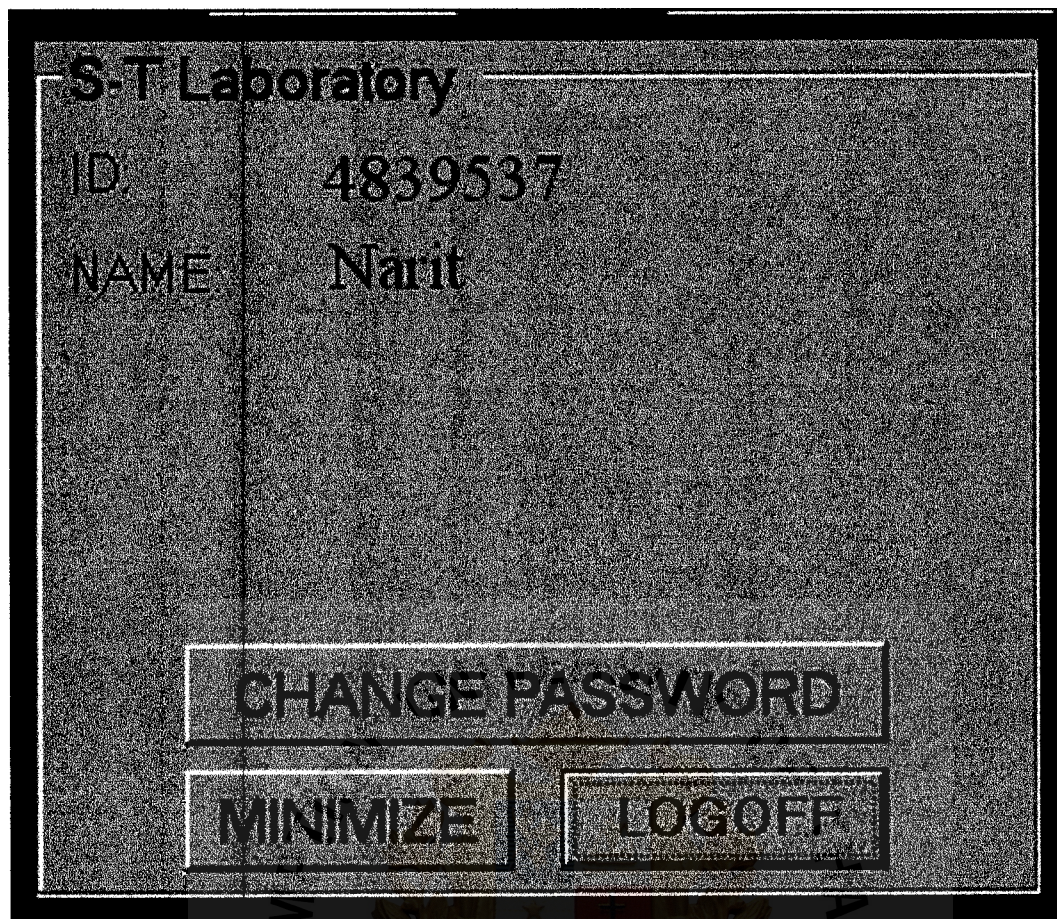
Figure A.2. Status

This interface is a status form to show the computer's user. This form has 3 functions:

1. Change password function: change username and password.

2. Minimize form function: minimize this interface.

3. Logoff function: logoff from the system.
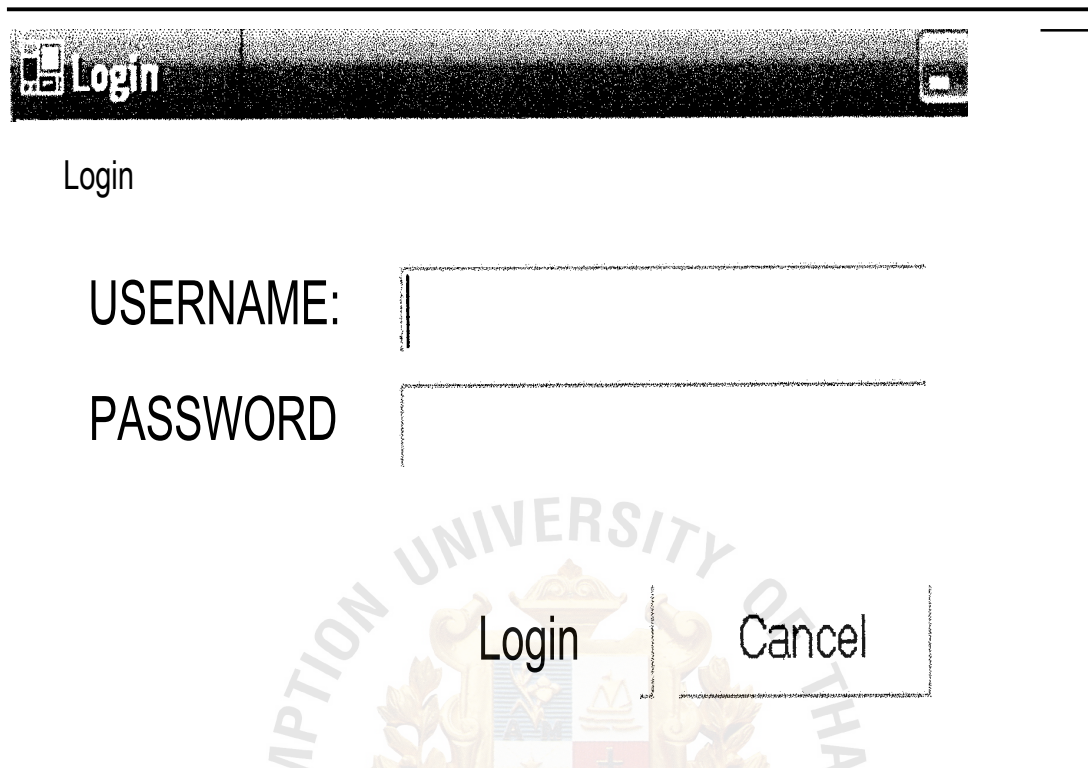
Figure A.3. Change Password

This interface shows the change password box. The user may type the authorized

existing password and the new password in order to change new desired password.

Administrator's/ Instructor's Interface

Figure A.4. Administrator's Login

This page requires the username and password from both administrator and instructor to login to the LCMS. The user may log in as Administrator or Instructor, this depends on the username and password the user uses to log in. The system automatically tracks the username and password and then log into the according page. The Administrator's menu is different from Instructor's menu by which some functions are blocked when the user log in as instructor.

Administrator's Interface
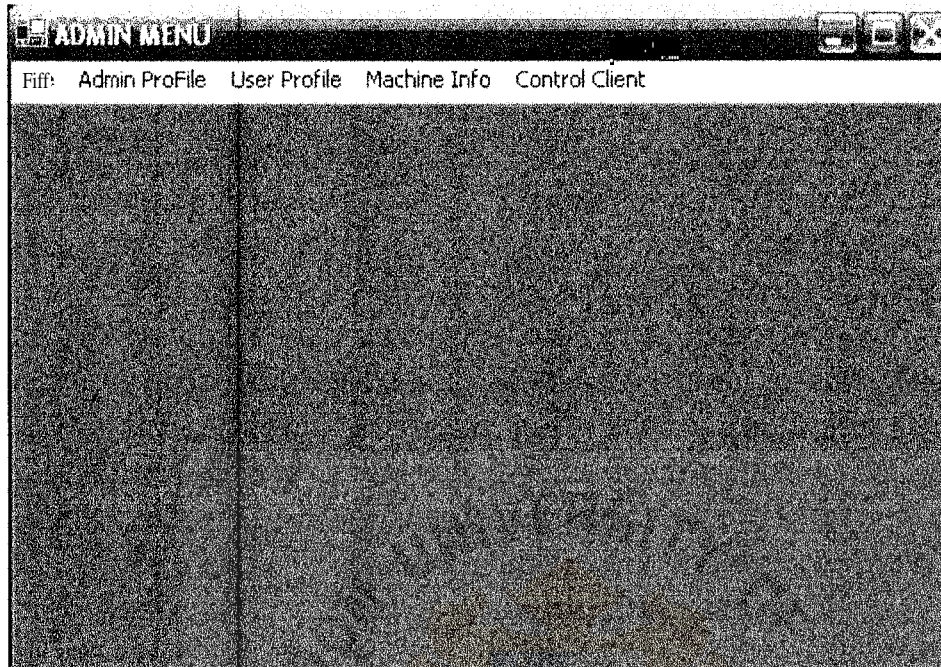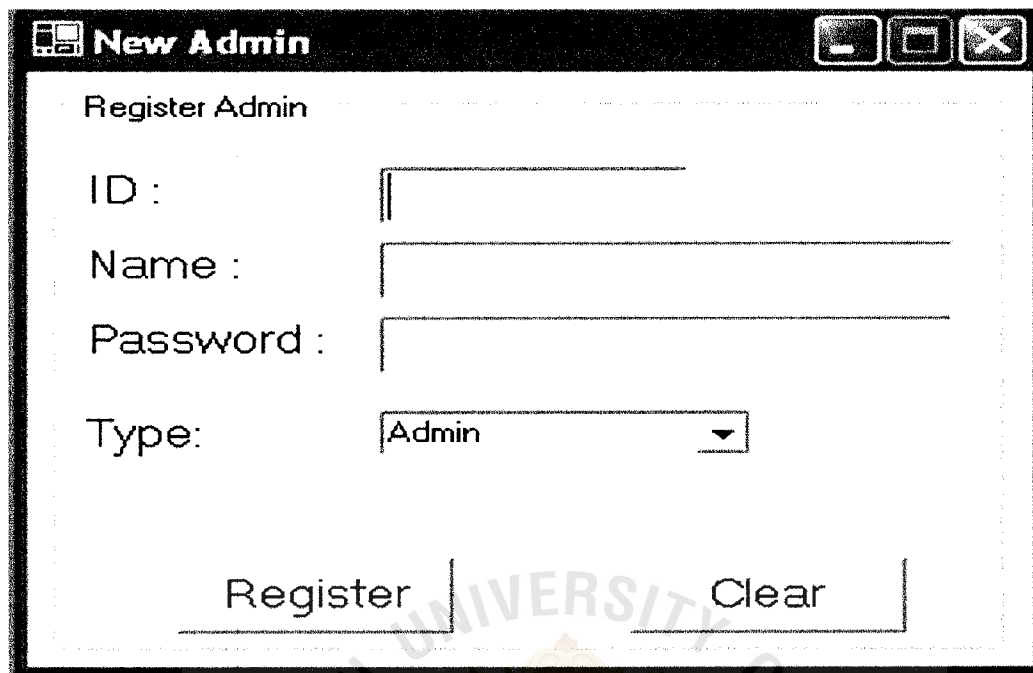
Figure A.5. Administrator's Menu

This figure shows Administrator's Menu. There are many functions that provide for

administrator to manage the system. Administrator can check

- File: to exit the program

- Admin profile

- Machine Information

- Control client

Administrator's Profile(for Administrator's function)

Figure A.6. Administrator Profile (register new administrator)

This figure shows the entry of new administrator for registering new administrator or instructor. Administrator/Instructor has to insert ID, Name and Password. In this case, the type has to be selected. Type includes Admin and Instructor. Then he/she can register for new administrator or instructor

o

Modify Admin

SEARCH:

ID: SEARCH

Password :

Name:

Clear

Figure A.7. Administrator Profile (modify administrator)

This box allows administrator wants to modify, when administrator wants to modify their information for either administrator or instructor. This allows administrator to modify his/her or any instructor username and password. The administrator has to search for his/her or any instructor ID and then type Password, Name and Update button will appear active.

Figure A.8. Administrator Profile (remove administrator)

This box allows user to remove any inactive administrator or instructor out from the system. When you want to remove you can search ID and then Password, Name and Delete button will appear active. You can then delete admin from database.
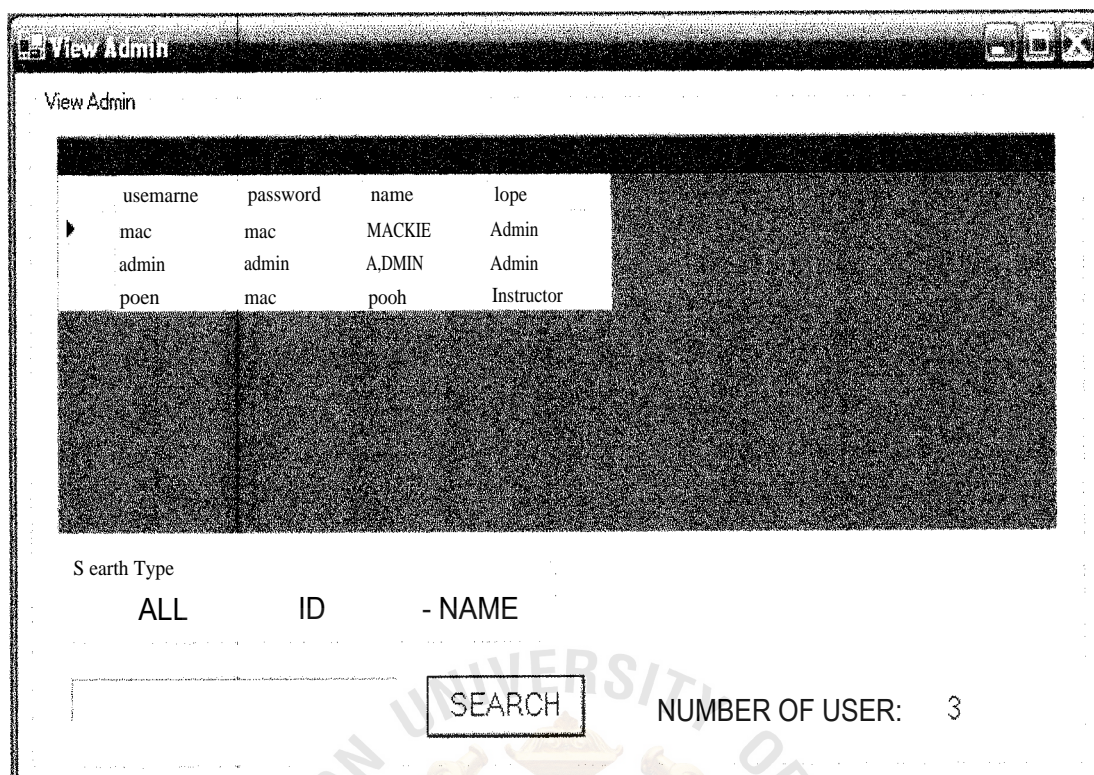
usemarne	password	name	lope
mac	mac	MACKIE	Admin
admin	admin	A,DMIN	Admin
poen	mac	pooh	Instructor

S earth Type

ALL   ID   - NAME

SEARCH   NUMBER OF USER: 3

Figure A.9. Administrator Profile (view administrator)

This interface shows View Administrator to view all existing administrators or instructors who are in the system by searching ID, or Name or all filters. You can view information of administrator or instructor by clicking search button, the information is then shown. Number of user will also be shown after the search results.

Register User

ID:

Name:

Surname:

Semester :   eg. 2/2005

Password :

          Register   Clear

Figure A.10. Client Profile (register new user)

This box allows the new user as a client(student) to register as a new client. Administrator will have to enter new client's information above before clicking register.

Modify User

SEARCH:

ID:　　　　　　　　　　　　　　　　SEARCH

Name :

Surname:
Semester :
Password :

Clear

Figure A.11. Client Profile (modify user)

This is similar for adding new client but the existing ID can be searched before the user can modify the information provided in the textboxes. The Update button will become active and all Name, Surname, Semester, Password will be shown after the existing ID has been searched.

Remove User

SEARCH:

ID: SEARCH

Name:

Surname:

Semester :

Password :

Clear

Figure A.12. Client Profile (remove user)

After administrator or instructor has searched IL) and it has been found, the Name,

Surname, Semester, Password will appear and delete button will become active for

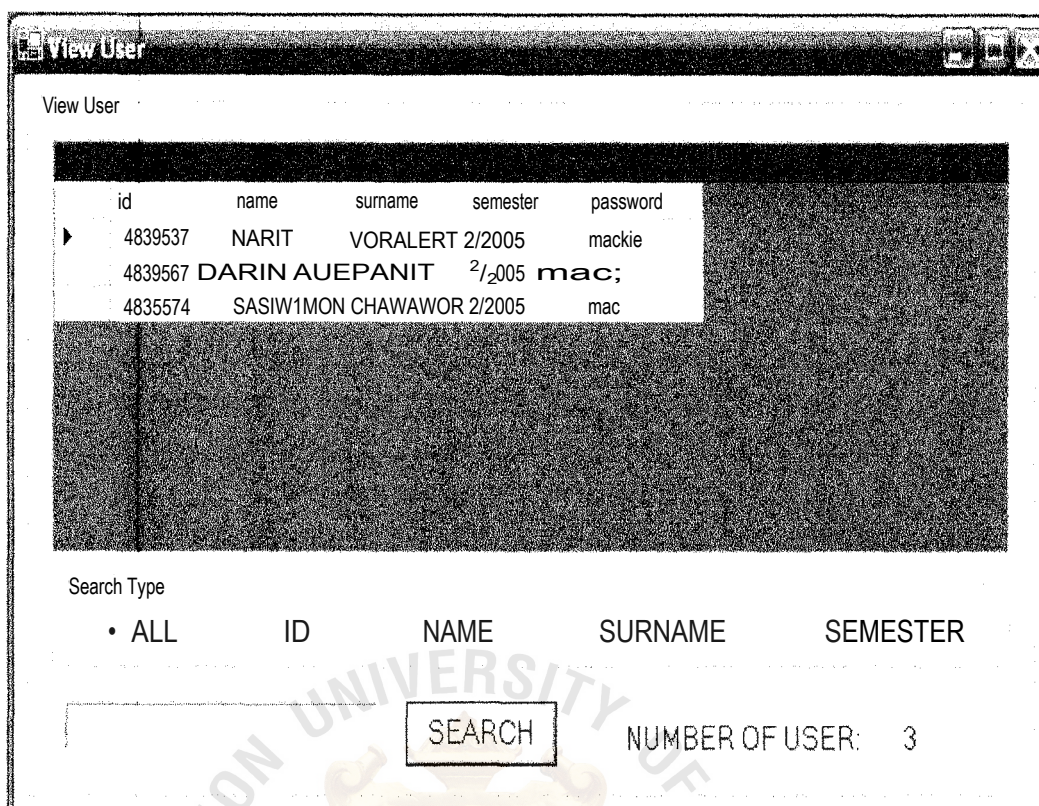Administrator or instructor to remove particular client user.

Figure A.13. Client Profile (view user)

The clients who are registered in the system can be viewed through the main computer by the Administrator or Instructor. There are different options to search which are All filters, Ill, Name, Surname, Semester. The total number of user will also be shown.

Machine Information (for Administrator's use)

Figure A.14. Machine Information

The Administrator will be able to group the computers by detecting the IP address or computer name to into each laboratory according to laboratory's name. New laboratory can also be created logically through this function.
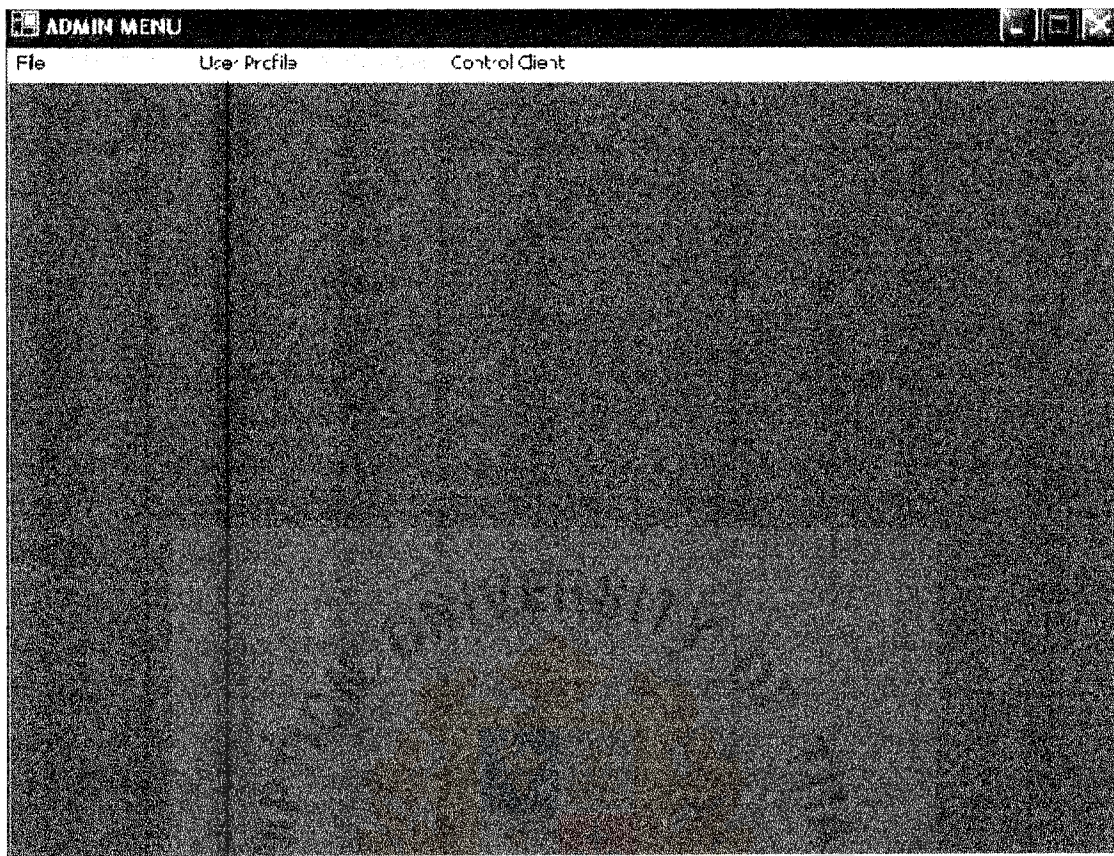
Instructor's Interfaces

Figure A.15. Instructor's Menu

This figure shows Instructor's Menu. As we can see from this menu that the Admin profile and Machine info functions are blocked. This happens when the input username and password are from the instructors. The username and password are recognized by the system of which type(Administrator/Instructor) the user has logged in. Therefore we left only 3 functions that the instructor can process on which are:

- File: to exit the program

- User profile: This function is the same as administrator's function which has

     been mentioned in the Administrator's interface

- Control client

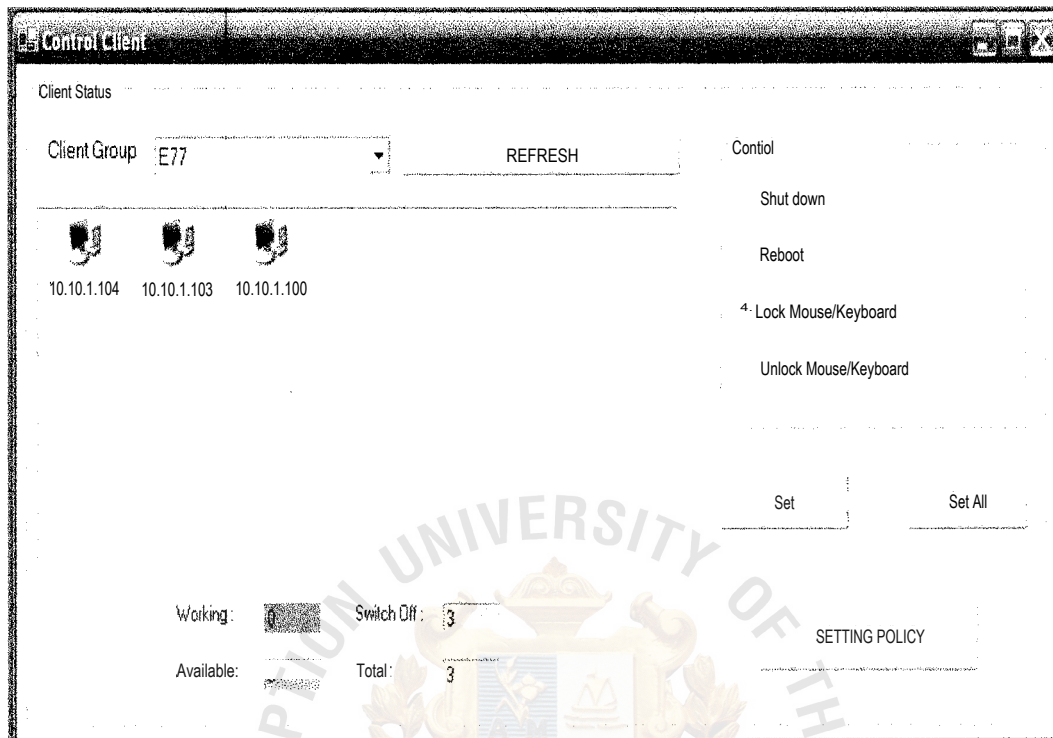## Control Client (Instuctor's use)

Figure A.16. Control Client

This interface shows Client Status to show status of each computer and enable Administrator or Instructor to control each or all computers. Administrator or Instructor can also choose client group and view how many computer is working in each computer laboratory. The Administrator or Instructor may look at switch off, available and total of computers in each laboratory. Administrator or Instructor can also set the policy and shutdown, restart, lock mouse/keyboard and unlock mouse/keyboard.
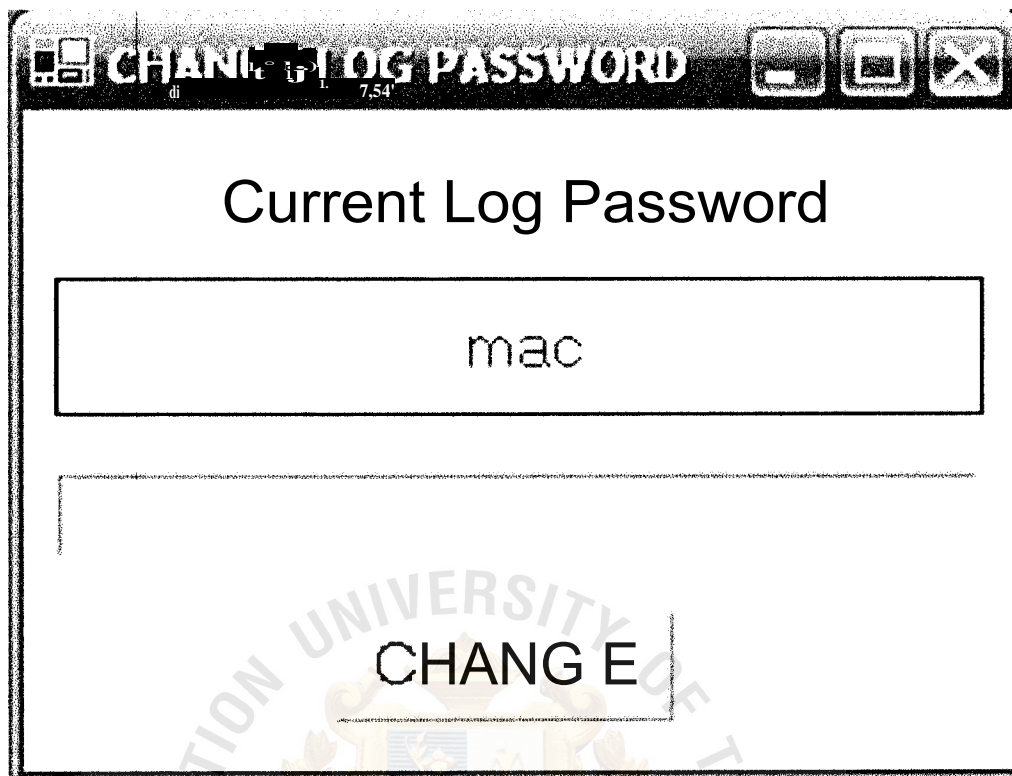
Figure A.17. Current Lock Password

This interface shows Current Log Password (Emergency Case), this box will be used when computers don't connect with server or database, user must use this password to terminate program. Users fill this specified password into the client's initial lock screen as both username and password and the lock screen will disappear automatically. The routine task will be carried on without using the LCMS until someone fix it. Administrator or Instructor can change this password.

APPENDIX B

DATA DICTIONARY

Computer File = {Computer Record}

Computer Record = ComName + IP + Labname + Status + Call + Message

Attribute Name	Type	Field	Description
ComName	nvarchar	50	Name of each computer.
IP	nvarchar	50	Address to identify each computer in the network
LabName	nvarchar	50	Name of each lab that signed by admin.
Status	nvarchar	2	Type of computer at that time.
Call	nvarchar	10	Flag that use for checking order from admin.
Message	nvarchar	50	

Table B.3. Computer File

Lab File { Lab Record}

Lab Record = LabName

Attribute Name	Type	Field	Description
LabName	nvarchar	50	Name of lab that signed by administrator.

Table B.4. Lab File

BIBLIOGRAPHY

References Books

1) Kenneth E. Kendall and Julie E. Kendall Systems Analysis and Design, 5th edition (Practice Hall),

2) Jeffery A. Hoffer, Joey F. George and Joseph S. Alacich Modern Systems Analysis & Design, 3r^d edition (Practice Hall)

3) Jeffrey A. Hoffer Modern Database Management, 7th edition

Websites

1) http://www.csharp-station.com/Tutorials/AdoDotNet/Lesson06.aspx

2) Timer Computer Shutdown - The Code Project - C# Programming: http://www.codeproject.comicsharp/timercomputershutdown.asp

3) http://www.codeproject.com/vbscript/ipaddress.asp

4) http://www.codeproject.com/managedcpp/get the ip out tcpclient.asp

5) http://www.pinvoke net ExitWindowsEx (user32).html

6) http://msdn.microsoft.com/library/default. asp?ur1=/library/en-us/cpref/html/frlifsystemmarshalbyrefobjectclasstopic.asp

7) http://technet2.microsoft.com/vvindowsserver/enitechnologies/featured/gp/default. mspx

8) Group Policy Registry Table http://msdn.microsoft.com/library/default.asp?ur1=/library/en-us/dnanchor/html/anch win2000.asp