Computer Aided Logging and Information Tracking System of ANEWS (Thailand) Ltd.

by

Mr. Vorapoj Kangsamut

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

Submitted in Partial Fulfillment
of the Requirements for the Degree of
Master of Science
in Computer Information Systems
Assumption University

July 2003

St. Gabriel's Library, Au

164986

Computer Aided Logging and Information Tracking System of ANEWS (Thailand) Ltd.

by
Mr. Vorapoj Kangsamut

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

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS of ST GABRIEL
LABOR VINCIT
OMNIA
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

Submitted in Partial Fulfillment
of the Requirements for the Degree of
Master of Science
in Computer Information Systems
Assumption University

July 2003

Project Title	Computer Aided Logging and Information Tracking System of ANEWS (Thailand) Ltd.
Name	Mr. Vorapoj Kangsamut
Project Advisor	Air Marshal Dr. Chulit Meesajjee
Academic Year	July 20, 2003

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

Approval Committee:

(Air Marshal Dr. Chulit Meesajjee)
Dean and Advisor

(Prof.Dr. Srisakdi Charmonman)
Chairman

(Asst.Prof.Dr. Vichit Avatchanakorn)
Member

(Assoc.Prof. Somchai Thayarnyong)
MUA Representative

July 20, 2003

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS of ST GABRIEL
LABOR OMNIA VINCIT
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

ABSTRACT

This project presents the analysis and design of the Computer Aided Logging and Information Tracking System. The system is developed based on the environment of the services and supports in MIS department. The scope of the project emphasize on more effective services and supports management. As the demand and needs of reliable, accurate, timely and economical information by people at all levels or the management also grows at a much faster rate, the computerized system is essential to improve effective resource management. Thus the manual system is replaced by the computerized system in sharing CALITS information to many process systems in the distribution system.

The study of this project begins with the requirement definitions and analysis of the existing by using structure tools such as data flow diagrams. The new system is designed to solve the problems found in the existing system and to satisfy the management in decision making by providing the accurate service information. The system is developed based on the client-server application that accesses the data in on-line real time. The system is implemented in Microsoft Access, Graphic User Interface (GUI) technology that is easy to handle by users themselves. The GUI allows executives to monitor and analyze information through their workstations without waiting for the report from operation level. The cost analysis and cost comparison of the new system is determined by the payback methods for determining payback apply to cost saving anticipated each year, and the break-even point is covered at first month after the new system started. The proposed system will run parallel with the existing system until the users feel confident with the new system.

ACKNOWLEDGEMENTS

The writer would like to take this opportunity to express the most sincere appreciation and gratitude to Air Marshal Dr. Chulit Meesajjee, the advisor of this project for his valuable encouragement and advice through the course of this study.

Thanks also go to all staffs of MIS department for their timely assistance and information provided to him while carrying out the data collection required in this project.

Finally, the writer is grateful to MS(CIS) committee members for providing him the opportunity to pursue this project and ABAC teachers who gave him knowledge and advice so that this project can be completed. They have been a great source of encouragement to him throughout study at Assumption University.

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS OF ST GABRIEL
LABOR OMNIA VINCIT
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

TABLE OF CONTENTS

Chapter		Page
ABSTRACT		i
ACKNOWLEDGEMENTS		ii
LIST OF FIGURES		v
LIST OF TABLES		ix
I.	INTRODUCTION	1
	1.1 Background of the Project	1
	1.2 Objectives of the Project	2
	1.3 Scope of the Project	2
	1.4 Project Plan and Schedule	3
II.	THE EXISTING SYSTEM	5
	2.1 Background of the Company	5
	2.2 Existing Business Functions	6
	2.3 Current problem and Area for Improvement	13
III.	THE PROPOSED SYSTEM	14
	3.1 User Requirement	14
	3.2 System Design	15
	3.3 Hardware and Software Requirements	17
	3.4 Security and Controls	20
	3.5 Systems Cost Evaluation and Comparison	22
IV.	PROJECT IMPLEMENTATION	33
	4.1 Overview of Project Implementation Schedule	33
	4.2 Resources Utilization	36

ASSUMPTION UNIVERSITY OF THAILAND
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

Chapter			Page
	4.3	Test Plan and Results	36
V.	CONCLUSIONS AND RECOMMENDATIONS		37
	5.1	Conclusions	37
	5.2	Recommendations	39
APPENDIX	A	CONTEXT DIAGRAM	41
APPENDIX	B	DATA FLOW DIAGRAM	42
APPENDIX	C	DATA DICTIONARY	55
APPENDIX	D	STRUCTURE CHART	58
APPENDIX	E	SCREEN DESIGN	71
APPENDIX	F	REPORT DESIGN	89
APPENDIX	G	ENTITY RELATIONSHIP DIAGRAM	101
APPENDIX	H	TABLE DESIGN	102
APPENDIX	I	ALTERNATIVE CASES STUDY	117
BIBLIOGRAPHY			119

ASSUMPTION UNIVERSITY OF THAILAND
LABOR OMNIA VINCIT
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

LIST OF FIGURES

Figure		Page
1.1	Project Plan of Computer Aided Logging and Information Tracking System	4
2.1	Organization Chart	7
2.2	Context Diagram of Computer Aided Logging and Information Tracking System	8
2.3	Data Flow Diagram Level 0 of the Existing System	9
2.4	Work Order Form	10
2.5	Netware File Server Request Form	11
2.6	Demo / Training Room Request Form	12
3.1	CALITS System	19
3.2	Payback Analysis	27
3.3	Break-Even Analysis between the Existing System and the Proposed System	32
5.1	The Degree of Achievement of the Proposed System	37
5.2	The Description of Achievement of the Proposed System	38
A.1	Context Diagram of Computer Aided Logging and Information Tracking System	41
B.1	Data Flow Diagram Level 0	42
B.2	Data Flow Diagram Level 1 of Process 2	43
B.3	Data Flow Diagram Level 1 of Process 5	44
B.4	Data Flow Diagram Level 2 of Process 5.2	45
B.5	Data Flow Diagram Level 2 of Process 5.3	46
B.6	Data Flow Diagram Level 1 of Process 6	47
B.7	Data Flow Diagram Level 2 of Process 6.2	48

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS OF ST GABRIEL
LABOR OMNIA VINCIT
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

Figure		Page
B.8	Data Flow Diagram Level 1 of Process 7	49
B.9	Data Flow Diagram Level 2 of Process 7.3	50
B.10	Data Flow Diagram Level 2 of Process 7.4	51
B.11	Data Flow Diagram Level 2 of Process 7.5	52
B.12	Data Flow Diagram Level 2 of Process 7.6	53
B.13	Data Flow Diagram Level 1 of Process 9	54
D.1	Structure Chart of Context Diagram	58
D.2	Structure Chart of Process 2	59
D.3	Structure Chart of Process 5	60
D.4	Structure Chart of Process 5.2	61
D.5	Structure Chart of Process 5.3	62
D.6	Structure Chart of Process 6	63
D.7	Structure Chart of Process 6.2	64
D.8	Structure Chart of Process 7	65
D.9	Structure Chart of Process 7.3	66
D.10	Structure Chart of Process 7.4	67
D.11	Structure Chart of Process 7.5	68
D.12	Structure Chart of Process 7.6	69
D.13	Structure Chart of Process 9	70
E.1	Loading CALITS	71
E.2	CALITS Security Login	72
E.3	CALITS Login Error	73
E.4	CALITS Login Information	74
E.5	Main Menu	75

ASSUMPTION UNIVERSITY OF THAILAND
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

Figure		Page
E.6	2ND Staff	76
E.7	2ND Support	77
E.8	Employees	78
E.9	Hardware	79
E.10	Logon	80
E.11	MIS Staff	81
E.12	Request Information	82
E.13	Server	83
E.14	Software	84
E.15	Software List	85
E.16	Solution	86
E.17	Supplier	87
E.18	Report Menu	88
F.1	The Example of Monthly Management Report	89
F.2	Hardware Failure Report	90
F.3	Pending Job Report	91
F.4	Daily Request Report	92
F.5	Expired Warranty Report	93
F.6	Legal Software Report	94
F.7	User Logon Report	95
F.8	Virus Scan Report	96
F.9	Development Report	97
F.10	Local Product Testing Report	98
F.11	Inter Product Testing Report	99

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS OF ST GABRIEL
LABOR OMNIA VINCIT
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

Figure		Page
F.12	Data Source Report	100
G.1	Entity Relationship Diagram	101

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS of ST GABRIEL
LABOR OMNIA VINCIT
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

LIST OF TABLES

Table		Page
3.1	Payback Analysis for the Proposed System	26
3.2	Cost Comparison between the Existing System and the Proposed System	30
3.3	Five Years Accumulated Manual System Cost	31
3.4	Five Years Accumulated Computerized Cost	31
3.5	The Comparison of the System Cost	31
5.1	The Degree of Achievement of the Proposed System	37
5.2	The Description of Achievement of the Proposed System	38
I.1	The Alternative Cases Study Comparison	117

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS of ST GABRIEL
LABOR VINCIT OMNIA
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

I. INTRODUCTION

1.1 Background of the Project

We have several departments in ANEWS (Thailand) Limited such as Sales, Finance, Editorial, Technical and etc. There is special software for each department to serve own job. Editorial department has software to send news. Sales department has software to support their customer. Finance department has software to calculate account. Technical has software for technique and system control. We used personal computer to run these software. Sometimes this software has the problem. MIS department was established to take care the problem in the office.

A function of MIS department is receiving users' request and correct that request as soon as possible. We need to contact another department to correct some request if that request is over function. Some times we are coordinator to finalize some request.

In 1996, Reuters' employees had 50 persons. We received request by telephone call. We will send technician to correct that request if we can't correct on calling. We have 220 persons now after ANEWS merge BISNEWS. We found many problems after we merge together. They are following:

(1) No records that what did you do.

(2) No priority of the job.

(3) Can't go to users on time.

(4) Forgot some job that user request for support.

(5) Irrelevant database maintained by each person.

(6) Time- consuming users information processing.

Problem arise in lieu of each person has independently maintained, updated and monitored its own user database without uniform database shared among all.

To utilize the Microsoft Access program to replace for keeping the calling database and to assign a person to update and manage calling database. New system help reduce the problem occurred at ANEWS (Thailand) Limited.

1.2 Objectives of the Project

The objectives of the project on Computer Aided Logging and Information Tracking System for MIS department can be defined as follows:

(1) To study the existing system of Computer Aided Logging and Information Tracking System (CALITS).

(2) To identify problems and user requirements.

(3) To design a new CALITS system.

(4) To develop and test the software package.

(5) To implement the new CALITS system by using Microsoft Access.

(6) To utilize the new system that allows management to track the performance and quality of CALITS.

1.3 Scope of the Project

The scope of the project on Computer Aided Logging and Information Tracking System will cover the following parts:

(1) Design input screen format for the MIS staff.

(2) Update new hardware software and network information of MIS department.

(3) Update new user requests and solutions to the problem.

(4) Create management reports.

(5) Tracking calls information.

The project will be implemented on a PC-based system using Microsoft Access to create user interfaces (input/output screen).

1.4 Project Plan and Schedule

As shown by Gantt chart in Figure 1.1, the system development project plan is starts from April 1st 2000 to July 30th 2000. The project plan is divided into three parts, consisting of System Analysis, System Design and Implementation. Their details are shown in Figure 1.1 below:

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS of ST GABRIEL
LABOR OMNIA VINCIT
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

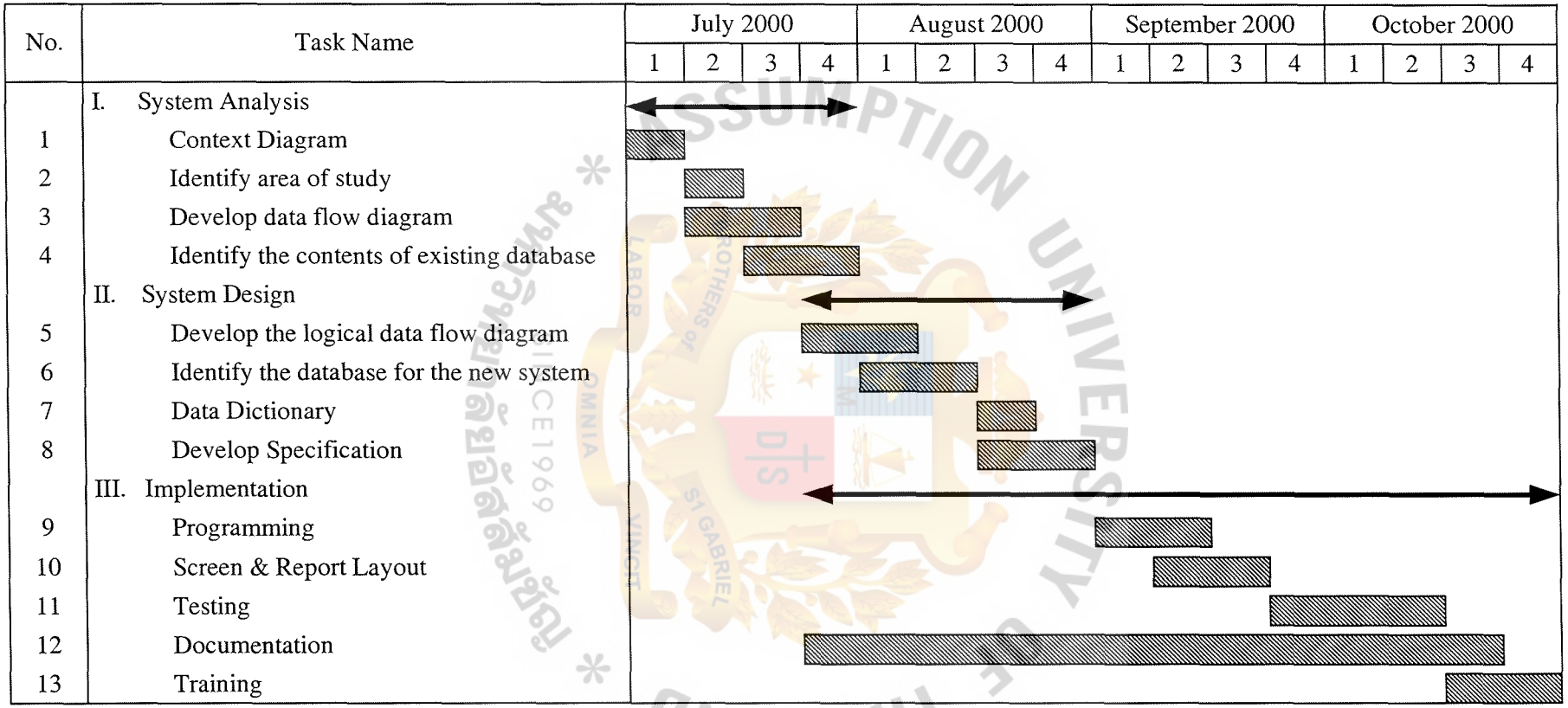

Figure 1.1. Project Plan of Computer Aided Logging and Information Tracking System.

II. THE EXISTING SYSTEM

2.1 Background of the Company

ANEWS (Thailand) Limited is an international company renowned for its real-time financial news, information, and analytic, provides reports on price movements in the world's markets and the events that affect the world's economies, together with analyses of the conditions affecting a vast range of business interests. ANEWS reporting comes directly from prominent information centers around the world, including New York, London, The European Union, Tokyo, Hong Kong, Singapore, and Sydney ensuring up-to-the-second, accurate information.

ANEWS merged with local vendor BISNEWS Information Services Limited on July 1st 1998. BISNEWS provides up-to-the-minute Thai stock information with data contributed by The Stock Exchange of Thailand (SET) therefore strengths in international news and financial market coverage have been greatly enhanced by the ability to supply comprehensive domestic market coverage in Thai and English languages.

ANEWS (Thailand) Limited is able to offer a full range of services for customers in finance, media and business. These include real-time financial information and reference data, television news and multi-media web technologies, and business news databases.

2.2 Existing Business Function

The organization is divided into five departments as follows (see detail in Figure 2.1):

(1) Finance & Account Department is responsible for matching invoice with purchase order and any agreement terms to get discount or credit note from suppliers and customers. In addition, it issues statement reports to stores. Purchasing and Operation are including in this department.

(2) Information System Department is responsible for developing and designing both existing and existing and new system processes. In addition, it supports and solves any problem occurred.

(3) Marketing Department is responsible for providing the solution and researching Thailand market to sell the products.

(4) Personnel Department is responsible for selecting, recruiting and providing training to employees. In addition to maintaining and calculating payroll for both fulltime and part time to employees, it maintains and adjusts employee information master file.

(5) Content & General Information Department is responsible for preparing and finding information in Thailand to keep in the database for products.

ANEWS (Thailand) Limited

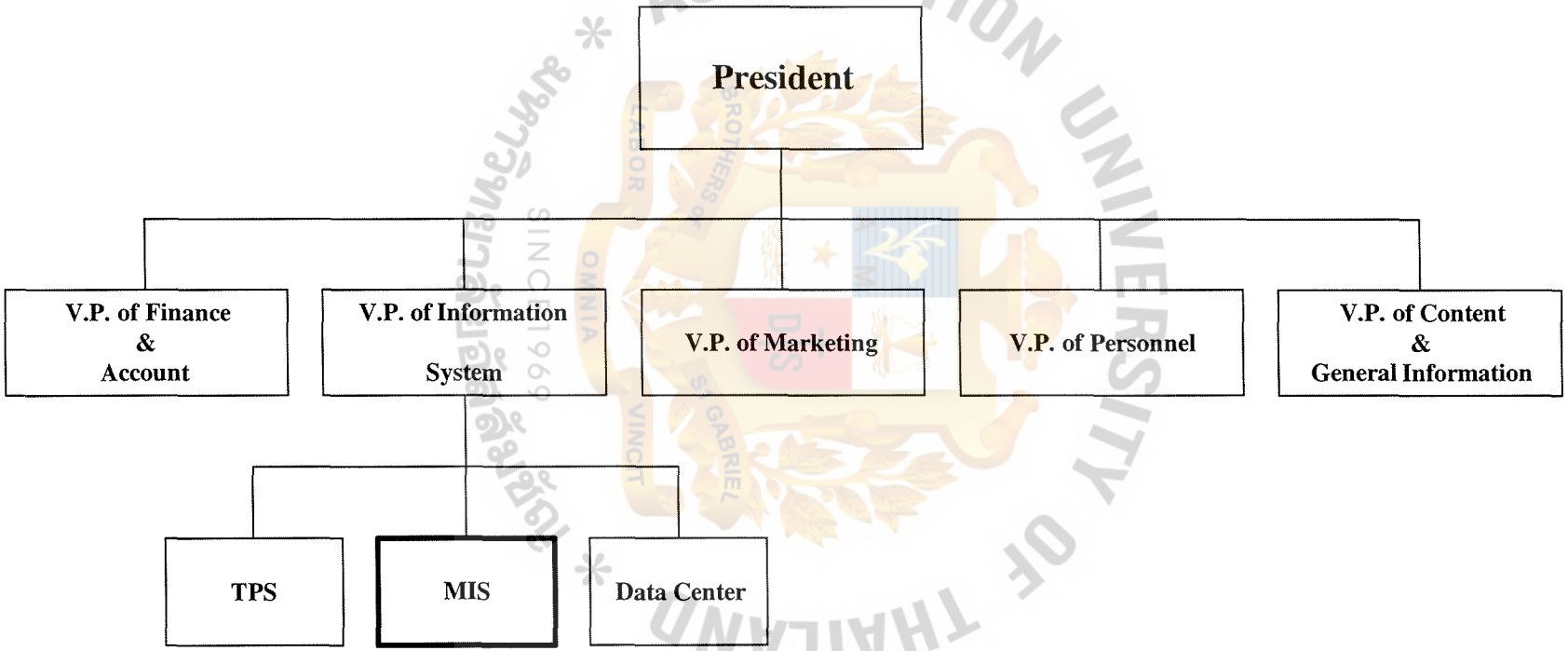

Figure 2.1. Organization Chart.

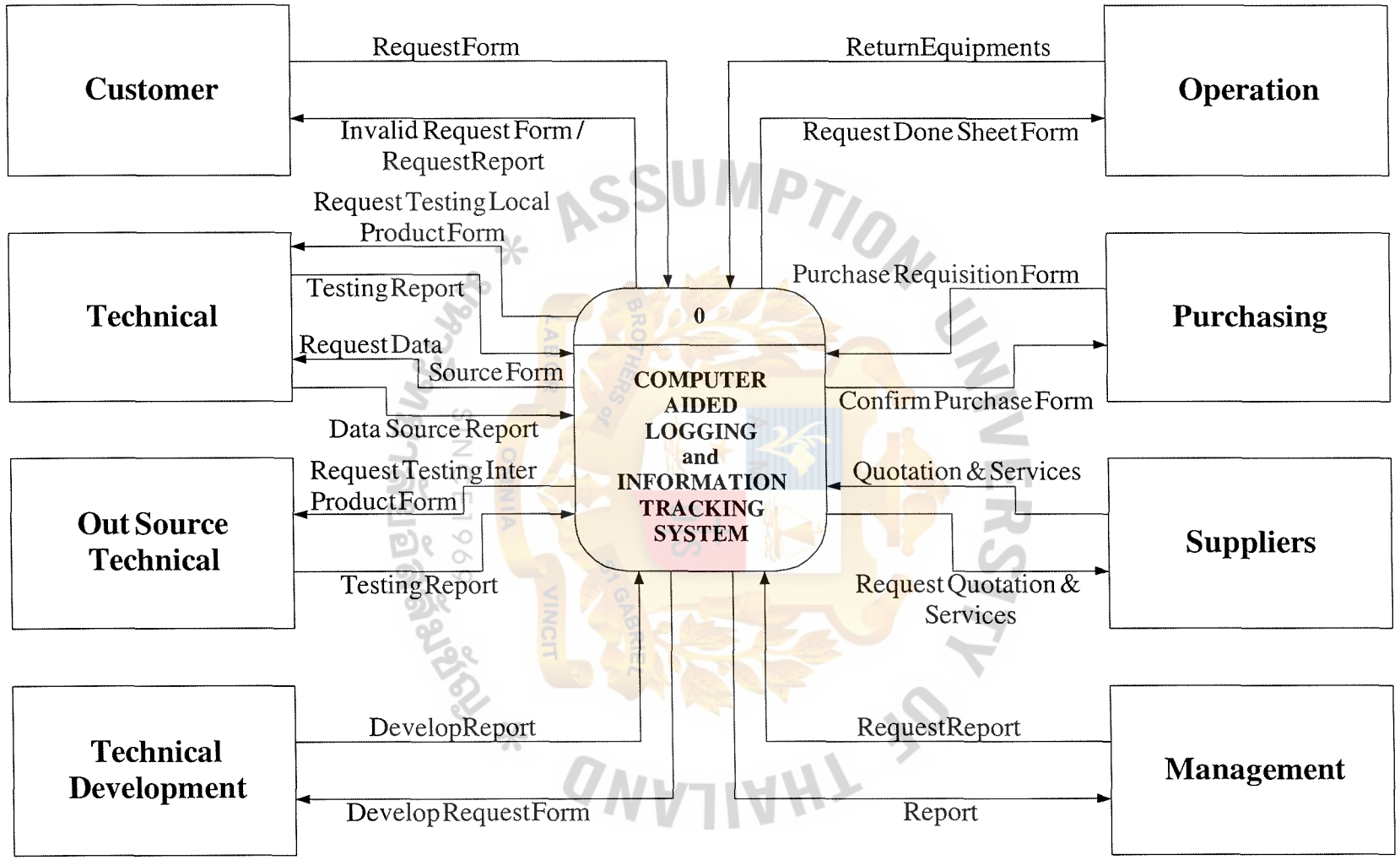

Figure 2.2. Context Diagram of Computer Aided Logging and Information Tracking System.

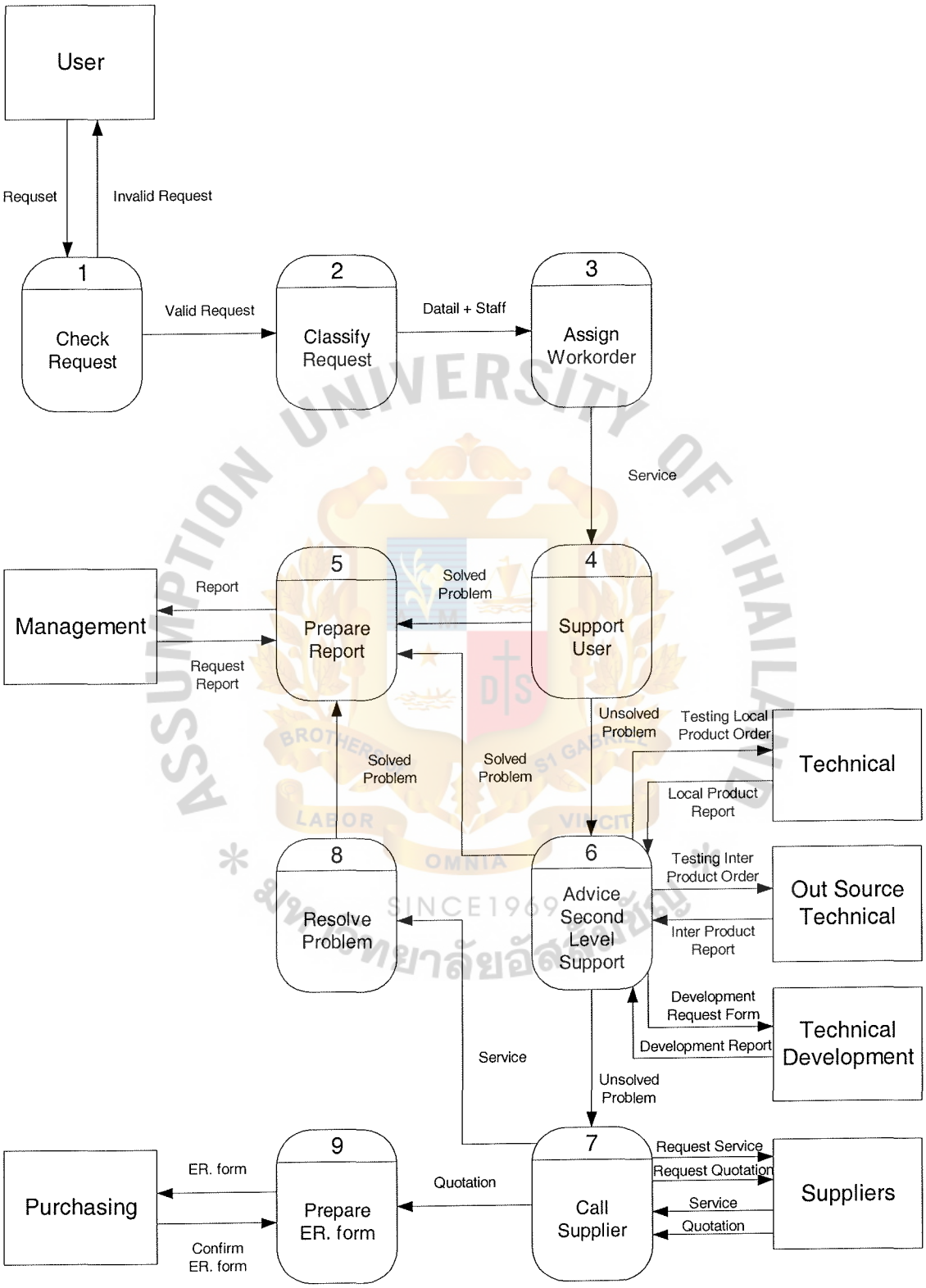

Figure 2.3. Data Flow Diagram Level 0 of the Existing System.

WORK ORDER FORM

RTR. No. _____

ROADS number		**Subscriber name**	
Service name		**Contact name**	
Target Date		**Contact phone**	
Action of Requirement		**Actioned by**	

Subscriber Address

Detail:

NNB. name		Requestor name	
Date		Date	
		Operation name	
Date		Date	

Figure 2.4. Work Order Form.

St. Gabriel's Library, Au
2469 c. 1

NetWare File Server Request Form

Node Name: NETWARE1

I understand that I must adhere to the Company standards on security for computer usage. These include the following:

- Users must protect passwords from disclosure to others and ensure that passwords are change regularly.
- Users must not leave terminals logged on and unattended for long periods outside normal office hours.
- Users must not make connections between equipment connected to the system and any public computer network without the consent of the system or network manager.
- All dial-in access to the network must be protected by an approved challenge-response mechanism.
- Users must report any suspected misuse of their account to the system or network manager.

Account Name: _____

Request For: ☐ Additional 10 MB in volume: User Centre (circle the selection)
☐ Read only access in directory _____
☐ Read and write access in directory _____

Signature: _____ Date: _____

Authorizing Signature: _____ Date: _____

Note: Authorizing Signature must be signed by Manager

Remark: _____

Figure 2.5. Netware File Server Request Form.

DEMO/Training Room Request Form

Please send the completed form to MIS

Name of Demo/Training	
Date:	**Demo Time**
Requester Name	**Department**

Demo (For Demo, please fill in **Demo Section**)
Training (For Training please fill in **Training Section**)

Demo Section

Room:

Software Requirement
(For i.e. WinNT, Win 2000 etc)

Other Equipment
(Projector, projection, monitor)

Notes:
(other information, if needed)

Training Section

Room:

Trainer Workstation

Software Requirement

Operating System
(NT, Windows 2000, including of language – Thai/English)
Others
(Other information, please specify)

Delegate's Workstation
Same as Trainer Workstation
Others, please specify in below section
No. of Delegates
(Note: The training room is currently equipped with 14 delegates PCs)
Software Requirement

Operating System
(NT, Windows 2000, including of language – Thai/English)
Other Equipment
(Projector, projection, flip chart)
Others
(Other information, please specify)

Figure 2.6. Demo / Training Room Request Form.

2.3 Current Problem and Area for Improvement

After interviewing and observing the processes during for a while, there are many problems occurred in each process. The problems that have been investigated were that information is wrong and unreliable, which is caused from duplicate, redundant and incomplete in each area. The existing system is controlled by a manual system that causes several problems as follows:

(1) It takes a lot of time to finish user request because of lack of information about hardware, software and network.

(2) It is difficult to control pending job. MIS staffs do not follow up the problem which is still unsolved.

(3) The summary report that is generated to MIS management is not accurate.

(4) It is difficult for MIS management to monitor the performance and workload of each MIS staffs.

(5) The volume of paperwork is too much time consuming and costly.

ASSUMPTION UNIVERSITY OF THAILAND
LABOR VINCIT OMNIA SINCE1969
มหาวิทยาลัยอัสสัมชัญ

III. THE PROPOSED SYSTEM

3.1 User Requirement

The user requirements are obtained from the users themselves and the existing system evaluation. Actually, the existing system can serve the user requirements to some extent but users still need further development for more system function as well as improvement within the existing system operating scope. The main development and improvement includes query capability and report production, database storage, security etc. The user requirements are concluded as follow:

(1) MIS staffs want to retrieve required information more quickly and easily.

(2) Report must be easy to generate and understand.

(3) Data retrieving should be performed faster.

(4) The developed system must be easy to maintain.

(5) To get reliable information to support both operational and top management levels in their decision-making.

3.1.1 Output Requirement

The output requirements for the system are as follows:

(1) Monthly Management Report.

(2) Monthly Computer and Peripheral Repair Report.

(3) Pending Job Report.

(4) Daily Request Report.

(5) Expired Warranty Report.

(6) Legal Software Report.

(7) User Logon Novell Netware.

(8) Virus Scan Update.

(9) Development Report.

(10) Local Product Testing Report.

(11) Inter Product Testing Report.

(12) Data Source Report.

3.1.2 Input Requirements

The input requirements for the system are as follows:

(1) Done Sheet form.

(2) User logon Novell Netware form.

(3) Work Order form.

(4) Demo/Training Request form.

(5) Development Request form.

(6) Purchase Requisition form

3.2 System Design

The objective of the system design is converting from user requirement to computer system for support user requirements. User requirements describe what must be done but design will tell how to do it.

There are many techniques in developing a proposal system; however, structural approach is used to accomplish this system development project. The context diagram and data flow diagram of the existing system with user requirements are used as a basic for developing the model of the proposed system. For the proposed system, there are context diagram and data flow diagram shown in Appendix A and B. The data dictionary is defined in Appendix C.

3.2.1 Database Design

The database models consist of three common models that are relational model, hierarchical or tree model and network model.

In this system development project, the design is based on relational model because it is conceptually simple and easy to understand for the system analyst and end user. All data elements are placed in two-dimensional tables and stored in one database file. The tales used in this proposed system are described as follows:

(1) Request Information table.

(2) Staff table.

(3) MIS Equipments table.

(4) Data Source table.

(5) Solution table.

(6) Virus Scan table.

(7) User logging table.

(8) Computer Information table.

(9) Development table.

(10) Local Product table.

(11) Inter Product table.

(12) Supplier table.

3.2.2 Input Design

The objectives of designed input are providing easier means to input data and reduce unnecessary paperwork by using graphic user interface screen input as shown in Appendix E.

3.2.3 Output Design

The outputs of this project are illustrated in two ways; screen and report that are shown in Appendix E and F.

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS OF ST GABRIEL
LABOR VINCIT OMNIA
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

3.3 Hardware and Software Requirements

3.3.1 Hardware Requirement

The hardware requirement can be summarized as follows:

File Server 1 Set

(1) IBM xSeries e220 Pentium III 1.13 GHz, 512 Cache

(2) Memory 512 MB SDRAM

(3) FDD 1.44 MB

(4) Hard disk 2 x 18 GB

(5) CD-Rom 24x

(6) Keyboard Enhance 104 keys keyboard

(7) Color Flat Monitor 15"

(8) Mouse

(9) IBM Netfinity Network Interface Card 10/100

(10) Internal Tape Backup HP SureStore Tape DDS3

(11) UPS 800 VA.

Workstation 4 Sets

(1) IBM Netvista Pentium III 850 MHz, 512 KB Cache

(2) Memory 256 MB SDRAM

(3) FDD 1.44 MB

(4) Hard disk 20 GB

(5) CD-Rom 24x

(6) Keyboard Enhance 104 keys keyboard

(7) Color Flat Monitor 15"

(8) Mouse

(9) IBM Netfinity Network Interface Card 10/100

ASSUMPTION UNIVERSITY OF THAILAND
LABOR OMNIA VINCIT
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

Network Equipment 1 Set

(1) Cisco model 2950 10/100 24 Ports

Printer 1 Set

(1) HP Laserjet 4050 with HP jet direct 10/100

Tape Backup 21 Sets

(1) Tape DDS3

3.3.2 Software Requirement

The software requirement can be summarized as follows:

Operating System

(1) MS Windows 2000 Server (5 Licenses) 1 Set

(2) MS Windows 2000 Professional 4 Sets

Software Package

(1) MS Office 2000 Professional 4 Sets

(2) Veritus EXEC 1 Set

For the application, we are developer to develop it by Microsoft Access 2000

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS OF ST GABRIEL
LABOR OMNIA VINCIT
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

St. Gabriel's Library, Au

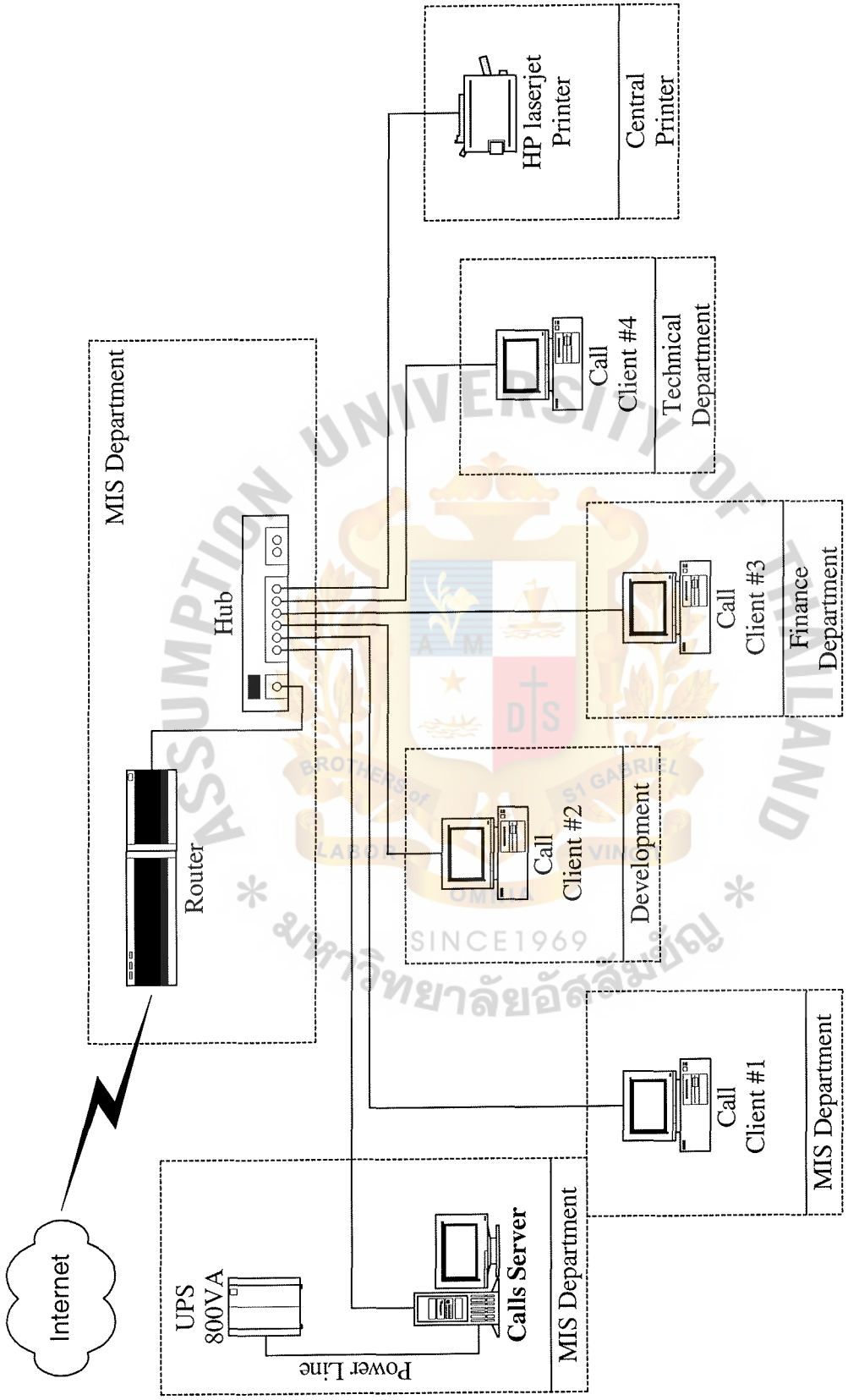

Figure 3.1. CALITS System.

3.4 Security and Controls

We reverse these three security objectives when we consider vulnerabilities. It is sometimes easier to consider vulnerabilities as they apply to the three broad categories of system resources (hardware, software and data).

3.4.1 Security of Hardware

Because a physical device is so visible, it is a rather simple point to attack; fortunately, however, reasonable safeguards are usually in place. Computers have been drenched with water, burned, gassed, and electrocuted with lightning or power surges from other sources. People have spilled soft drinks, corn chips, ketchup, beer, and many other kinds of food on computing devices. Mice have chewed through cables. Particles of dust, especially particles of ash from cigarette smoke, have threatened precisely engineered moving parts. Computers have been kicked, slapped, bumped, jarred, and punched. All of this abuse might come under the category of involuntary machine-slaughter: accidental acts not intended to do serious damage to the hardware involved.

A more serious attack could be called voluntary machine-slaughter or machinicide, in which someone actually wishes to do harm to the computer. Machines have been shot with guns and stabbed with knives. Bombs, fires, and collisions have destroyed computer rooms. Ordinary keys, pens, and screwdrivers have been used to short out circuit boards and other components. Machines have been carried off by thieves. The list of human attacks on computers goes on almost without end.

Of all the ways people have deliberately attacked computer equipment in order to limit availability, theft and destruction are the primary techniques. Sometimes the security of hardware components can be enhanced greatly by simple physical measures such as locks and guards.

3.4.2 Security of Software

Computing equipment is worthless without the software (the operating system, utility programs, and application programs) that users expect. Software can be destroyed maliciously, or it can be modified, deleted, or misplaced accidentally. The result is the same, however, regardless of the motive: a loss of software becomes apparent when one tries to run it. These attacks are all problems of availability of software.

Subtler is software that runs but has been altered. Physical equipment usually shows some mark of inflicted injury, but the loss of one crucial lime of source or object code may not leave an obvious mark in a program. Furthermore, it is possible to change a program so that it does all it did before, and then some.

Software Deletion: Software is surprisingly easy to delete. Probably every programmer has accidentally erased a file, or saved a bad copy of a program, destroying a good previous copy. Because of software's high value to a commercial computing center, access to software is usually carefully controlled through a process called configuration management so that software is not deleted, destroyed, or replaced accidentally.

Software Modification: In this attack, a working program is modified, either to cause it to fail during execution or to cause it to do some unintended task. Software is relatively easy to modify: changing a bit or two can convert a working program into one that fails. Depending on which bit was changed, the program crash when it begins, or it may execute for some time before it falters.

The category of software modification includes:

(1) Trojan house, a program the overtly does one thing while covertly doing another.

(2) Virus, a specific type of Trojan horse that can be used to spread infection from one computer to another.

(3) Trapdoor, a program that has a secret entry point.

(4) Information leaks in a program, which make information accessible to unintended people or programs.

Software Theft: This attack includes unauthorized copying of software. Software authors and distributors are entitled to fair compensation for use of their product, as are musicians and book authors. Unauthorized copying of software has not been stopped satisfactorily.

3.4.3 Security of Data

There are three qualities of data security: confidentiality (preventing unauthorized disclosure), integrity (preventing unauthorized modification), and availability (preventing denial of authorized access).

The Computer Aided Logging and Information Tracking System is concern of this part so that provide security on data by using UPS to protect data lost. This is the device that can supply the electric current for a period long enough for users to save data on a disk and the shut down the system in an orderly way.

The other security that Computer Aided Logging and Information Tracking System provide for data security is password. In providing password, user accesses wire limited to those who supplied the correct password at the time the system was opened. The password is required when the user wants to access to their Main Menu.

3.5 System Cost Evaluation and Comparison

3.5.1 Cost of the Existing System

Cost of the existing system is mainly the staff cost because the system operates manually. The cost of the manual system can be identified as follows:

Fixed Cost:

Depreciation Hardware (10%, Expected life 10 years)

(1)	PC Pentium II 200 MHz. 3 Set @ 2,600 Baht	7,800	Baht
(2)	Laser Printer 1 Set @ 2,100 Baht	2,100	Baht

Variable Cost:

(1)	Salary of Supervisor 1 @ 18,000 Baht	18,000	Baht
(2)	Salary of Staff 6 @ 14,000	1,224,000	Baht
(3)	Report, Paper & Files Expense	23,000	Baht
(4)	Overhead Expense	35,000	Baht
Total cost per year		1,291,900	Baht
Total cost per month		107,658.33	Baht

3.5.2 Cost of the Computerized System

There are two main categories of the proposed system cost, consisting of Annual Operation Cost, Investment Cost and Implementation Cost as follow:

(1) Annual Operation Cost

(a)	Salary of Supervisor 1 @ 18,000 Baht.	216,000	Baht
(b)	Salary of Staff 3 @ 14,000 Baht	504,000	Baht
(c)	Depreciation Hardware (10%, life 10 years)		
	(1) Pentium 4 Set @ 2,900 Baht	11,600	Baht
	(2) Laser Printer 1 Set @ 2,100 Baht	2,100	Baht
(d)	Miscellaneous Expense	14,000	Baht
(e)	Overhead Expense	31,500	Baht
(f)	Maintenance Expense	12,000	Baht
Total Annual Operation Cost		791,200	Baht
Total Cost Per Month		65,933.33	Baht

(2) Investment Cost

Hardware Cost Estimate

(a)	File Server 1 Set @ 180,000 Baht	180,000	Baht
(b)	Workstation 4 Set @ 35,000 Baht	140,000	Baht
(c)	Network Equipment	50,000	Baht
(d)	HP LaserJet Printer	50,000	Baht
(e)	Tape Backup DDS3 24 Set	10,000	Baht

Software Cost Estimate

(a)	MS Windows 2000 Server (5 Licenses)	30,000	Baht
(b)	MS Windows 2000 Professional	10,000	Baht
(c)	MS Office 2000 Professional	11,500	Baht
(d)	Veritus EXEC	45,000	Baht
(e)	Installation Cost	15,000	Baht
(f)	Implementation Cost		
	(1) Technical Training Cost	10,000	Baht
	(2) Software Development Cost	100,000	Baht
Total Investment & Implementation Cost		651,500	Baht

ASSUMPTION UNIVERSITY OF THAILAND
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

Payback Analysis

The payback period is defined as the number of ears required accumulating sufficiently to cover the cost of the proposed system. The following cost items are required, shown in Table 3.1.

Investment Cost:

Hardware cost	430,000	Baht
Software cost	111,500	Baht
Software Development cost	100,000	Baht
Training cost	10,000	Baht
Total Investment cost	651,500	Baht

Annual Operating Cost:

People-ware cost	720,000	Baht
Office Supplies & Miscellaneous cost	71,200	Baht
Total Annual Operating cost	791,200	Baht

Annual Cost:

The formula for annual cost of the computerized system is

Annual Cost = (Investment Cost / Estimated System Life Year) + Annual Operating Cost

= (651,500 / 5) + 791,200

= 921,500 Baht

Saving:

Staff	504,000	Baht
Office Supplies & Miscellaneous	12,500	Baht
Opportunity cost & Intangible Benefit	792,000	Baht
Total Saving	1,308,500	Baht

Table 3.5. Payback Analysis for Candidate 1, Baht.

Cost Items	Years					
	0	1	2	3	4	5
Development cost	-651,500.00					
Operation & maintenance cost	0.00	-791,200.00	-870,320.00	-957,352.00	-1,053,087.20	-1,158,395.92
Discount factors for 10%	1.000	0.909	0.826	0.751	0.683	0.621
Time-adjusted costs (adjusted to present value)	-651,500.00	-719,200.80	-718,884.32	-718,971.35	-719,258.56	-719,363.87
Cumulative time-adjusted costs over lifetime	-651,500.00	-1,370,700.80	-2,089,585.12	-2,808,556.47	-3,527,815.03	-4,247,178.90
Benefits derived from operation of new system	0.00	1,308,500.00	1,439,350.00	1,583,285.00	1,741,613.50	1,915,774.85
Discount factors for 10%	1.000	0.909	0.826	0.751	0.683	0.621
Time-adjusted costs (adjusted to present value)	0.00	1,189,426.50	1,188,903.10	1,189,047.04	1,189,522.02	1,189,696.18
Cumulative time-adjusted costs over lifetime	0.00	1,189,426.50	2,378,329.60	3,567,376.64	4,756,898.66	5,946,594.84
Cumulative lifetime time-adjusted costs + benefit	-651,500.00	-181,274.30	288,744.48	758,820.16	1,229,083.63	1,699,415.94

St. Gabriel's Library, Au

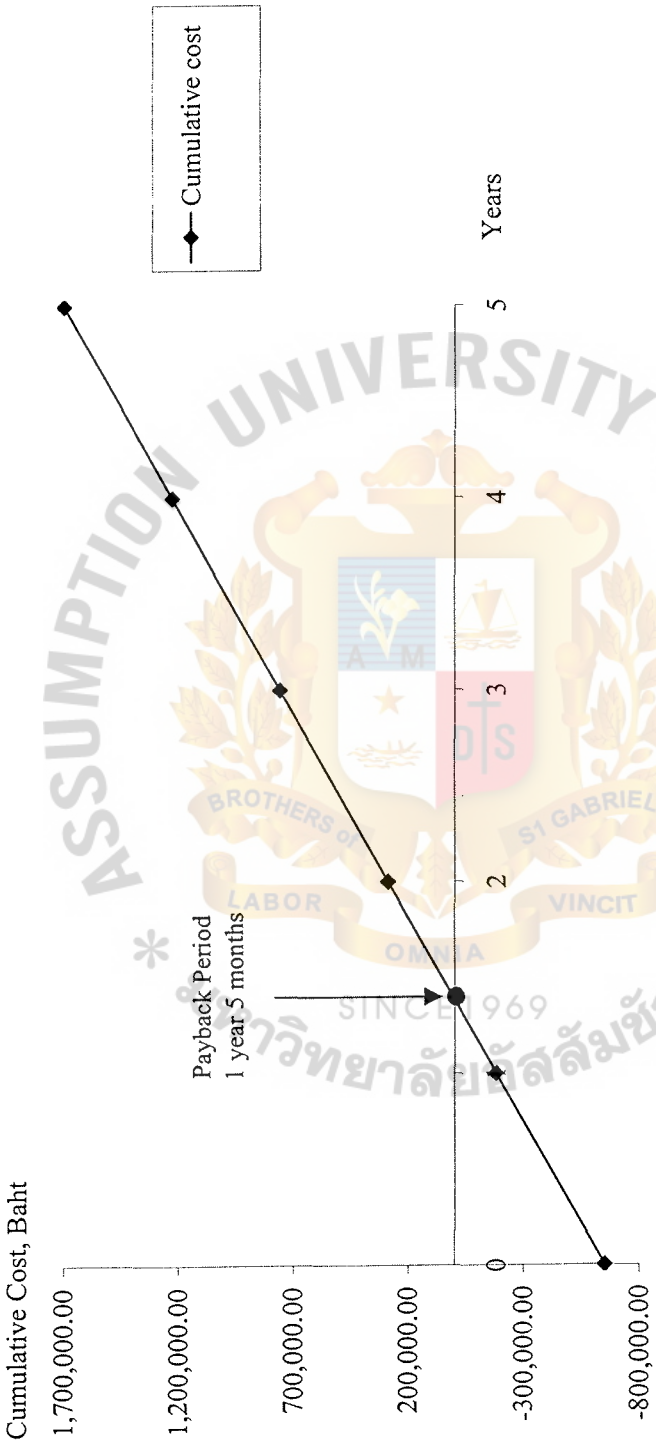

Figure 3.2. Payback Analysis.

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS OF ST GABRIEL
LABOR OMNIA VINCIT
SINCE 1969

As in Figure 3.2. the graph of cumulative cost of computerized system cross the x-axis at 1.39 years or the pay back period of the computerized system is 4 years and 5 months.

The formula for payback is as follows:

$$P = \text{Last year of negative Cash flow difference} + \frac{\text{Cumulative different last negative year}}{\text{Absolute value of cumulate difference (Last negative plus first year positive year)}}$$

Where

P = Payback period

Payback period = 1 + (181,274.30 / (181,274.30 + 288744.48))

= 1.39 Years

Payback period for the proposed system is about 1 year 5 months

3.5.3 Break-Even Analysis

Break-Even is the point at which total costs of the current system and of the proposed system intersect representing the break-even point where it becomes profitable for the business to get the new information system.

The assumption is that the cost in the first year of the proposed system will be high because of hardware and software installation. In the second year and the next, the cost will decrease continuously. Maintenance cost is estimated to be 10% of hardware cost and will be increased around 10% per year. In the meantime, the promotion rate for staff increases approximately 10% per year. And the inflation rate of annual operation cost of the existing system will increase at around 7% per year.

Cost comparison between the existing system and the proposed system is shown in Table 3.2. The results show that the cost of the proposed system will be higher than that of the existing system in the first year. Subsequently, it becomes decreasing until

equal to the cost of the existing system during the second year. Figure 3.3 represents the graph of break-even analysis, which shows that the break-even point is about two years. This figure shows that after the break-even point, the cost of the proposed system becomes more economical to operate than that of the current system.

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS of ST GABRIEL
LABOR OMNIA VINCIT
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

Table 3.1. Cost Comparison between the Existing System and the Proposed System, Baht.

Cost Items	1st Year		2nd Year		3rd Year		4th Year		5th Year	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
Investment Cost										
Investment Cost	-	541,500.00	-	-	-	-	-	-	-	-
Implementation Cost	-	110,000.00	-	-	-	-	-	-	-	-
Total	-	651,500.00	-	-	-	-	-	-	-	-
Annual Operating Cost										
Fixed Cost:										
Depreciation (10%, life 10 yrs)										
- Hardware	9,900.00	13,700.00	19,800.00	27,400.00	29,700.00	41,100.00	39,600.00	54,800.00	49,500.00	68,500.00
Variable Cost:										
Annual Salary (up 10%)	1,224,000.00	720,000.00	1,346,400.00	792,000.00	1,481,040.00	871,200.00	1,629,144.00	958,320.00	1,792,058.40	1,054,152.00
Miscellaneous Expense (inflat 7%)	23,000.00	14,000.00	24,610.00	14,980.00	26,332.70	16,028.60	28,175.99	17,150.60	30,148.31	18,351.14
Overhead Expense (inflat 7%)	35,000.00	31,500.00	37,450.00	33,705.00	40,071.50	36,064.35	42,876.51	38,588.85	45,877.86	41,290.07
Maintenance Cost (up 10%)	-	12,000.00	-	13,200.00	-	14,520.00	-	15,972.00	-	17,569.20
Utility Cost (up 10%)	-	-	-	-	-	-	-	-	-	-
Total	1,291,900.00	791,200.00	1,428,260.00	881,285.00	1,577,144.20	978,912.95	1,739,796.49	1,084,831.46	1,917,584.57	1,199,862.42
Grand Total	1,291,900.00	1,442,700.00	1,428,260.00	881,285.00	1,577,144.20	978,912.95	1,739,796.49	1,084,831.46	1,917,584.57	1,199,862.42
Accumulated Total Cost	1,291,900.00	1,442,700.00	2,720,160.00	2,323,985.00	4,297,304.20	3,302,897.95	6,037,100.69	4,387,729.41	7,954,685.26	5,587,591.82

St. Gabriel's Library, Au

Table 3.3. Five Years Accumulated Manual System Cost, Baht.

Year	Total Manual Cost	Accumulated Cost
1	1,291,900.00	1,291,900.00
2	1,428,260.00	2,720,160.00
3	1,577,144.20	4,297,304.20
4	1,739,796.49	6,037,100.69
5	1,917,584.57	7,954,685.26
Total	7,954,685.26	–

Table 3.4. Five Years Accumulated Computerized Cost, Baht.

Year	Total Computerized Cost	Accumulated Cost
1	1,342,700.00	1,342,700.00
2	881,285.00	2,223,985.00
3	978,912.95	3,202,897.95
4	1,084,831.46	4,287,729.41
5	1,199,862.42	5,487,591.82
Total	5,487,591.82	–

Table 3.5. The Comparison of the System Costs, Baht.

Year	Accumulated Manual Cost	Accumulated Computerized Cost
1	1,291,900.00	1,342,700.00
2	2,720,160.00	2,223,985.00
3	4,297,304.20	3,202,897.95
4	6,037,100.69	4,287,729.41
5	7,954,685.26	5,487,591.82

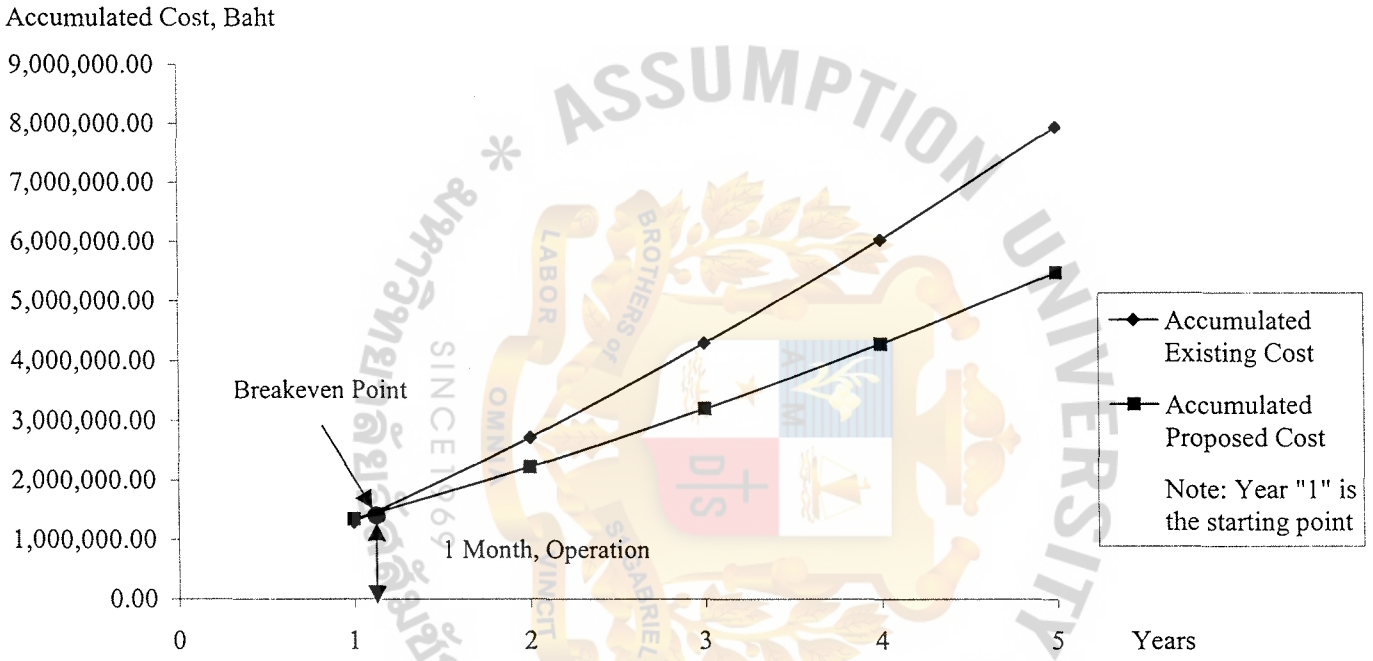

Figure 3.3. Break-Even Analysis between the Existing System and the Proposed System.

IV. PROJECT IMPLEMENTATION

4.1 Overview of Project Implementation Schedule

Implementing a system, whether a new one or an existing one that has been modified, consists of the three primary activities of training, conversion and post-implementation review. Training involves system operators and users who will use the new system either by providing data, receiving information, or actually operating the equipment. Conversion, the process of changing from an old system to a new one, must also be carefully planned and executed. The conversion plan describes all the activities that must occur to implement the new system and put it into operation. It identifies the tasks and assigns the responsibilities for carrying them out. The conversion plan should also anticipate the most common problems, such as missing documents, incorrect data formats, lost data and unanticipated systems requirements and provide ways for dealing with them when they occur.

After the system is implemented and the conversion is complete, a review should be conducted to determine whether the system is meeting expectations and where improvements are needed. System quality, user confidence and operating statistics are assessed through such techniques as event logging, impact evaluation and attitude surveys. The data collection methods used during analysis are equally effective during the post-implementation review. The review not only assesses how well the current system is designed and implemented, but also is a valuable source of information that can be applied to the next systems project.

Implementing a system consists of the three primary activities as following:

(1) Training

(2) Conversion

(3) Post-implementation

4.1.1 Training

Even well designed and technically elegant systems can succeed or fail because of the way they are operated and used. Therefore, the quality of training received by the personnel involved with the system in various capacities helps or hinders and may even prevent, the successful implementation of an information system.

For the Computer Aided Logging and Information Tracking System, a training program is developed to cover the following topics:

(1) Purpose and objectives of the system.

(2) Difference between the existing and the proposed system.

(3) Overview of the system operation and procedures.

(4) Organization and use of the user manual and help screens.

(5) Duties and responsibilities of the end users.

(6) An introductory hand-on walks through of the system.

The user manual and the help screens are the primary resources for the user-training program. Since the propose system are designed with most easiest program operation, so the duration of training program will take only a few hours.

4.1.2 Conversion

The primary process of changing from the old system to the new one is "Pilot approach" because the new systems involve new techniques change in organization performance. This method, a working version of the system is implemented in one part of the company.

When the system is deemed complete, it is installed throughout the company by "Direct cutover method".

During the pre-implementation stages, when the conversion is being planned, analysts should list of all tasks, including the following:

(1) List all files for conversion.

(2) Identify all data required to build new files during conversion.

(3) List all new documents and procedures that go into use during conversion.

(4) Identify all controls to be used during conversion.

(5) Assign responsibility for each activity.

(6) Verify conversion schedules.

4.1.3 Port implementation Review

The system analysts remained with the project through the implementation stage to assure a smooth transition process. Programmers were also available if their services were needed.

The implementation was well planned and the entire event went smoothly. The system has been in use for some time, but virtually no problems have been encountered. Analysts and management jointly wish to review the system after 6 months. The objectives of the port implementation review will be following:

(1) Determine whether the systems goals and objectives have been achieved.

(2) Determine whether personnel procedures, operating activities, and order controls have improved.

(3) Determine whether user service requirements have been met, while simultaneously reducing errors and costs.

(4) Determine whether known or unexpected limitations of the system need attention.

All indications are that the new system was well received and that will meet the performance objectives that led to its development in the first place.

4.2 Resources Utilization

During development, resource utilization comprises both intangible and tangible resource. Intangible resource includes the effort from MIS officer and Users. These are measurable in man-hour and computing facility for system developer. Tangible resource includes office supplies.

Actually, the computing facility has already been available as the basic facility of the company. The quantitative measurement on resource utilization is shown in the cost/benefit analysis.

4.3 Test Plan and Results

Before the new system will be on production, the final step is the system testing. This testing activity encompasses everything that make up the system, the hardware, the proposed software, the end users, the procedures (including user manuals) and the data.

At the first phase, during the programming phase of systems development, programs are written according to system specifications and individually tested. At this point the entire system is tested as a unit. Testing and modifications continue until the components of the system work as users should and all input/output is validated.

The second stage of system testing is done with live data. A representative group of users are trained and set loose on the system. While being observed by project team members, users enter and use live data to perform routine transactions. During this stage of testing, the user manual, help screens, system procedures and interactions between other systems are given a good test. Testing and modifications are continued until the project team and participating users are satisfied with the results of the test.

Finally, the phase of user acceptance testing is coming. User managers examine and test the operation of the system until they are satisfied that it meets the original system objectives.

St. Gabriel's Library, Au

V. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The purpose of this project is to design and implement a Computer Aided Logging and Information Tracking System. The entire study is conducted to improve the existing operation of MIS department and solving problems the occurred form using the manual system.

The process started with the analysis of the existing system and defined user requirements. The analysis phases are conducted by using the structural analysis technique such as context diagram, data flow diagram and data dictionary.

The new system will provide correct and reliable CALITS and generate required reports. It can improve efficiency of operations, enhancing accuracy of operations, enhancing accuracy of information and reduce costs.

Table 5.1 shows the time performance on each process of the proposed system compared with the existing system. It shows that each process of the proposed system performs less time than each process of the existing system which has to operate man work steps in manual system. So, it can be concluded that the proposed is more efficient and effective than the existing system.

Table 5.1. The Degree of Achievement of the Proposed System.

Process	Existing System	Proposed System
Check Request Process	2.5 mins.	2.5 mins.
Classify Request Process	5 mins.	10 mins.
Assign Staff Process	5 mins.	1 min.
Analyze Problem Process	-	5 mins.

Table 5.1. The Degree of Achievement of the Proposed System (Continued).

Process	Existing System	Proposed System
Local Support Process	-	30 mins.
Support User Process	2 hrs.	30 mins.
Call 2ND Level Support Process	2 hrs.	30 mins.
Resolve Problem Process	15 mins.	5 mins.
Inform User Process	-	2 mins.
Prepare ER. Form	10 mins.	5 mins.
Prepare Report	-	5 mins.

Table 5.2. The Description of Achievement of the Proposed System.

Process	Existing System	Proposed System
Check Request Process	Check the request is right format.	Check the request is right format.
Classify Request Process	Keep the record in the block files in separate category.	Keep the record in the Database by computerize system.
Assign Staff Process	Check available staff by ask from MIS staffs.	Check available staff from Database.
Analyze Problem Process	Don't have it.	Check the old problem form Database to check how we fixed it.
Local Support Process	Don't have it.	Get the equipment or contact other department to get more information.
Support User Process	Go to support user at site.	Go to support user at site.
Call 2ND Level Support Process	Problem couldn't solve by MIS. Need to check another support.	Problem couldn't solve by MIS. Need to check another support.

Table 5.2. The Description of Achievement of the Proposed System (Continued).

Process	Existing System	Proposed System
Resolve Problem Process	Fixed the problem.	Fixed the problem.
Inform User Process	Don't have it.	Report to user that the problem has been fixed and training to prevent the next problem.
Prepare ER. Form	Prepare form to buy equipment.	Prepare form to buy equipment.
Prepare Report	Don't have it.	Prepare report to management.

5.2 Recommendations

The implementation of Computer Aided Learning and Information Tracking System is one part of the whole organization tasks. MIS staffs and MIS manager use this new system. In the future, the organization should implement this system not only to be used by MIS department but also to be used by all staff in the organization. The organization must be growing which makes the company have more information. The current harddisk and computers may not be enough to store data. The staffs that are responsible for the system must maintain it bye expanding and upgrading the harddisk, hardware and software as necessary.

The one important criteria in Computer Aided Learning and Information Tracking System for MIS department is employees. The employees who control and operate the computing system that supports all requests for services from end users mush have good knowledge in computer environment because they will provide information by which users can request for advice on any facet of the computing system. They should have a basic analysis skill to classify a problem for forwarding to the responsible section to solving problems for users. They should also have a service mind. The system cannot

operate efficiently without a good staff member. These criteria can be provided with training for them.

To ensure that the new system is used at maximum capability an evaluation of the performance of the new system after running it for a period of time is required together with enquiry of end users stratification, management stratification and comparison of error reducing between the old system and the new system. In this way, the results will sow the trend to be adopted in the information system to meet the organization's needs and targets.

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS of ST GABRIEL
LABOR OMNIA VINCIT
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

APPENDIX A

CONTEXT DIAGRAM

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS of ST GABRIEL
LABOR VINCIT OMNIA
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

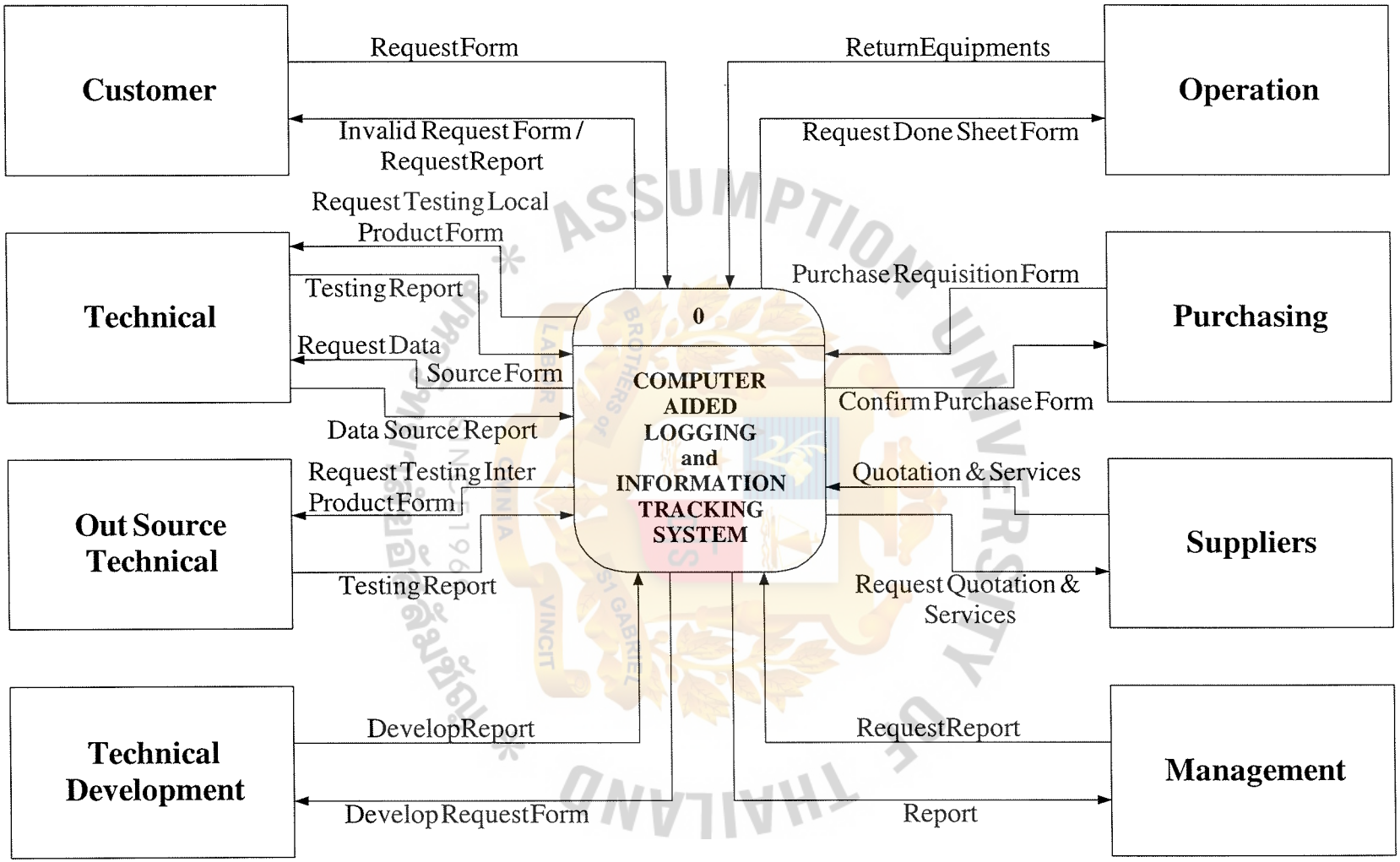

Figure A.1. Context Diagram of Computer Aided Logging and Information Tracking System.

APPENDIX B

DATA FLOW DIAGRAM

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS of ST GABRIEL
LABOR OMNIA VINCIT
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

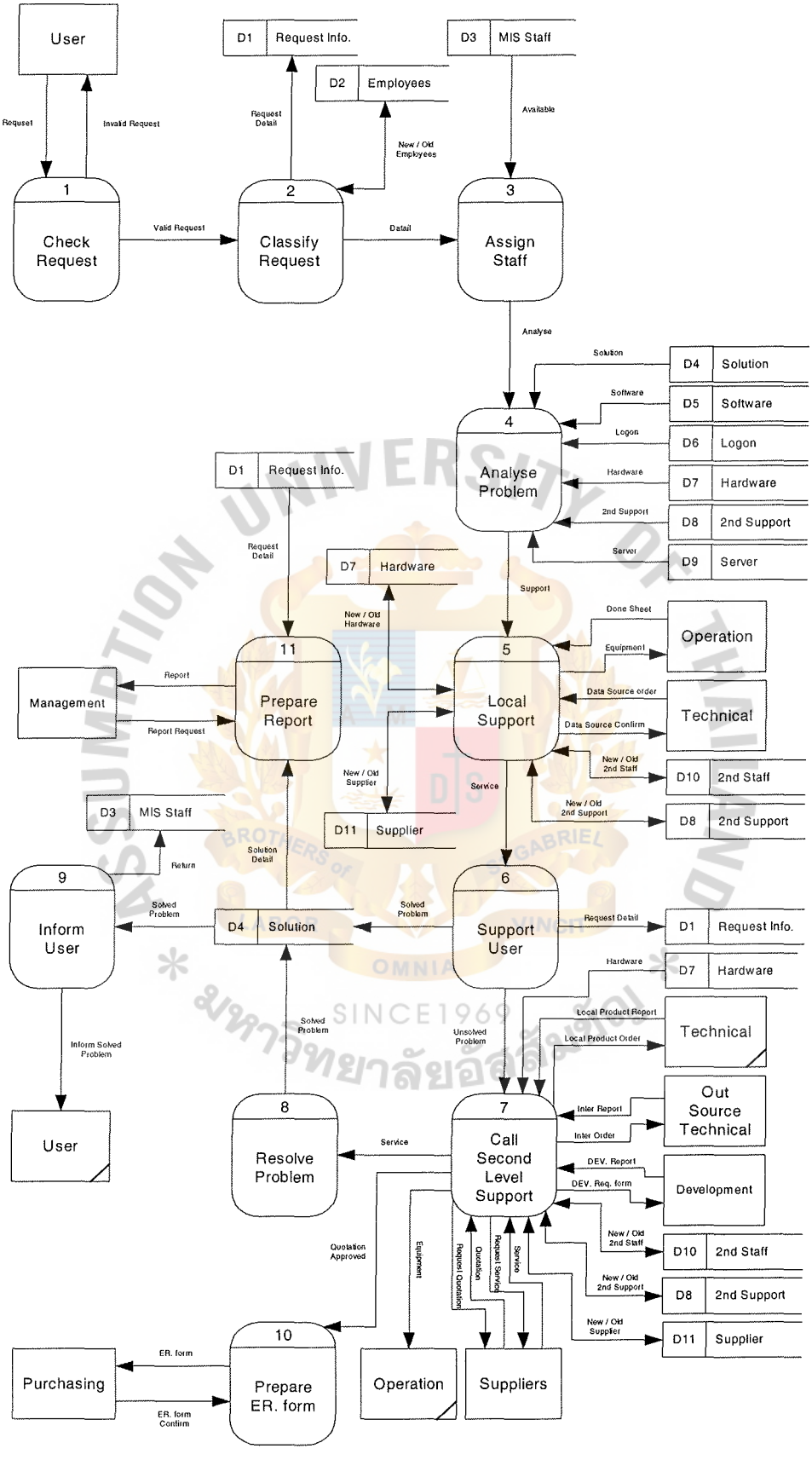

Figure B.1. Data Flow Diagram Level 0.

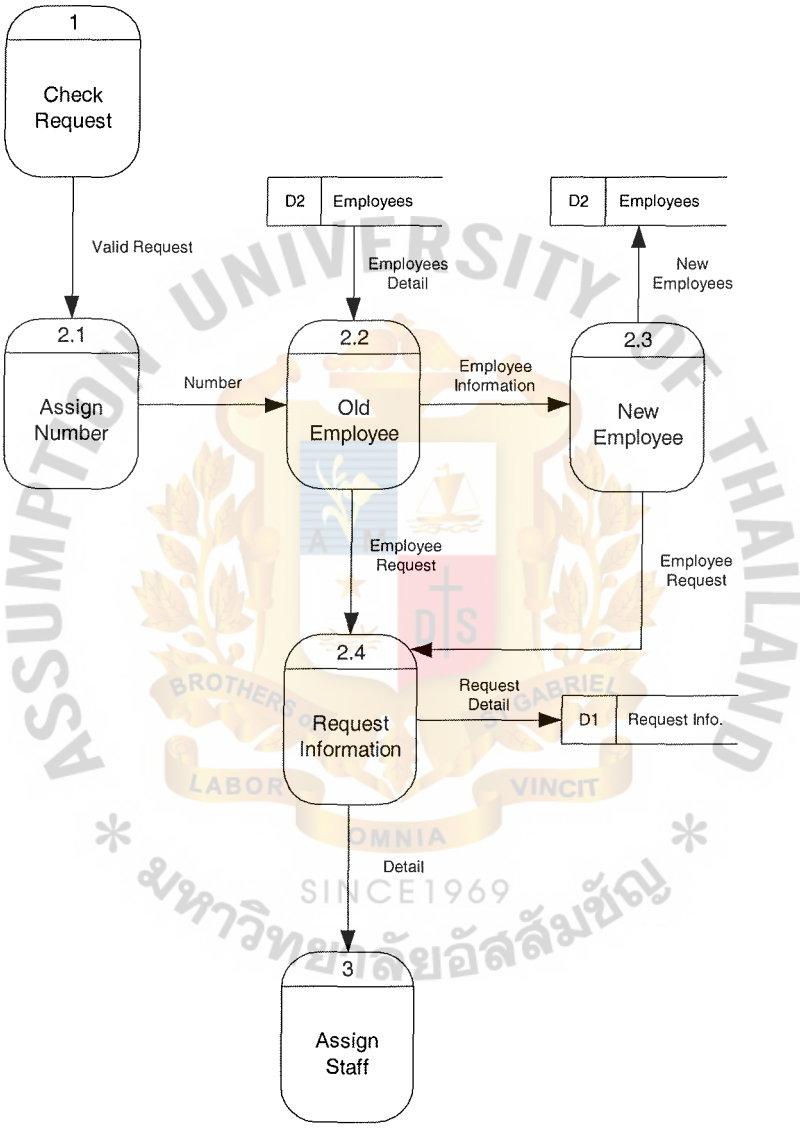

Figure B.2. Data Flow Diagram Level 1 of Process 2.

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS OF ST. GABRIEL
LABORE ET CONSTANTIA
OMNIA VINCIT
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

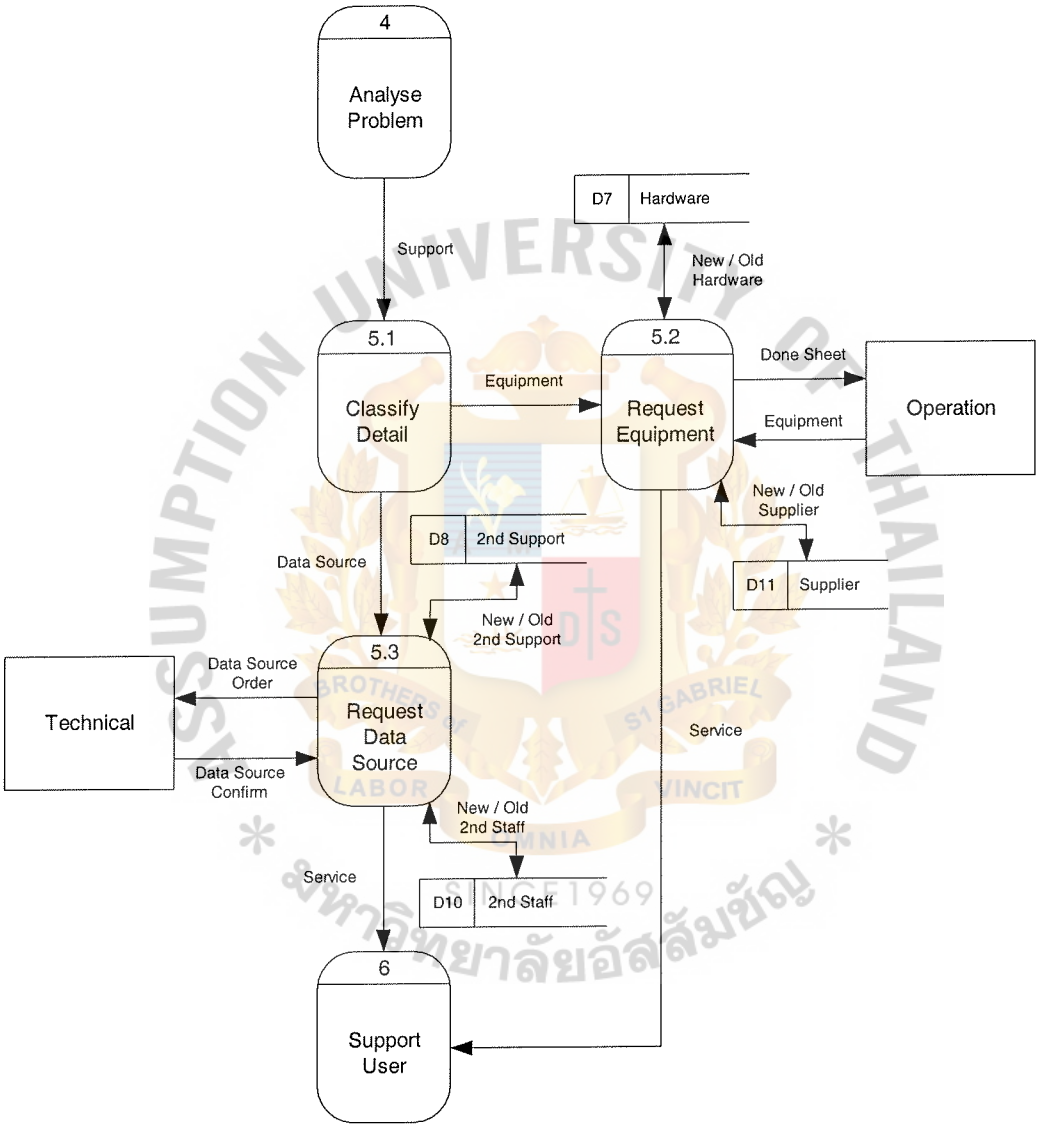

Figure B.3. Data Flow Diagram Level 1 of Process 5.

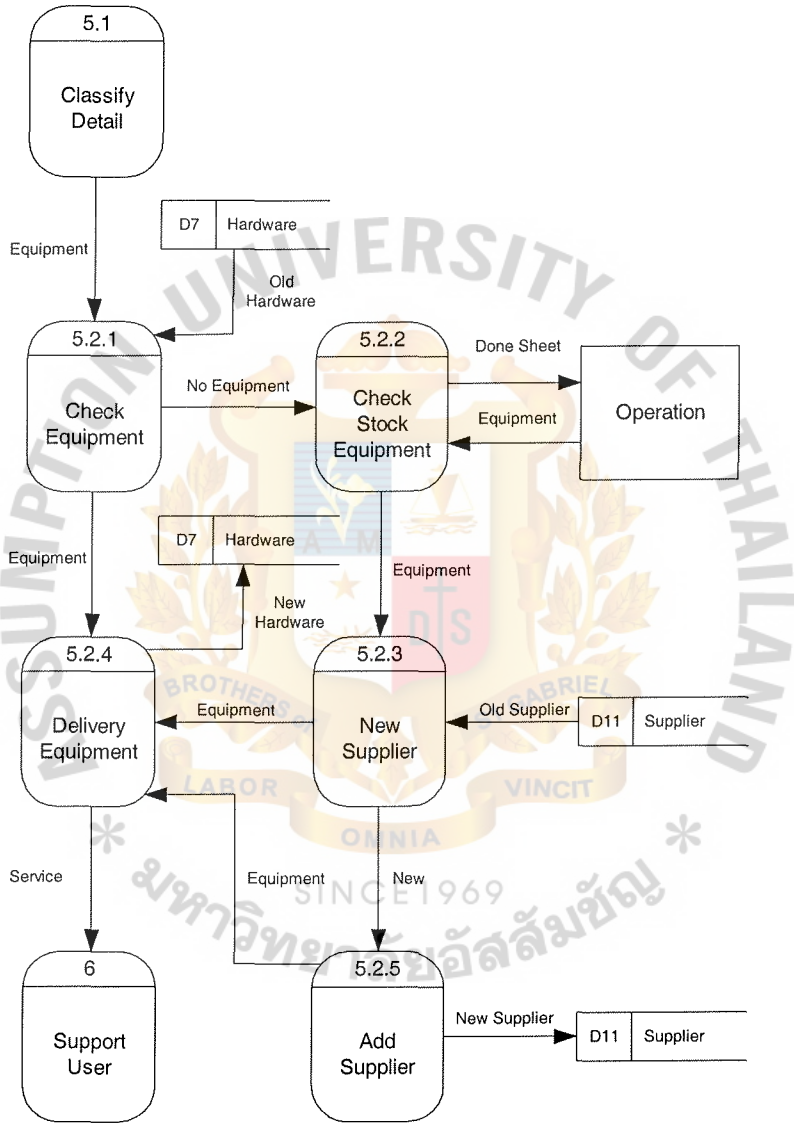

Figure B.4. Data Flow Diagram Level 2 of Process 5.2.

St. Gabriel's Library, Au

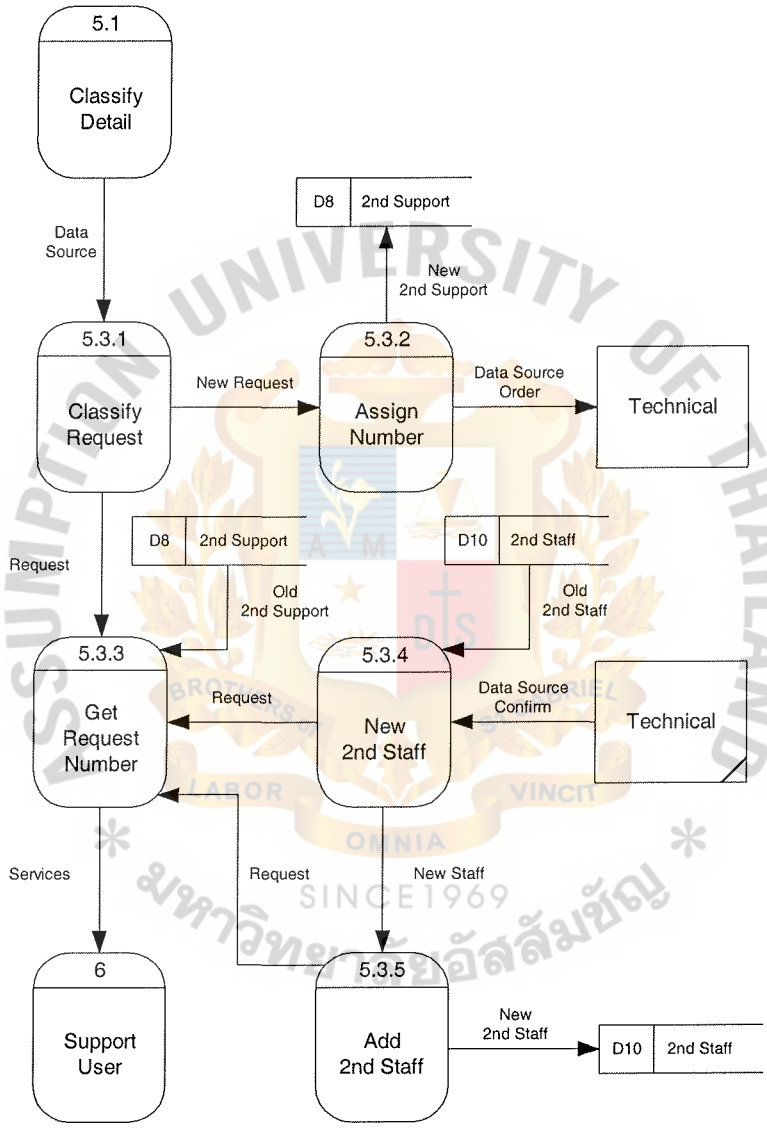

Figure B.5. Data Flow Diagram Level 2 of Process 5.3.

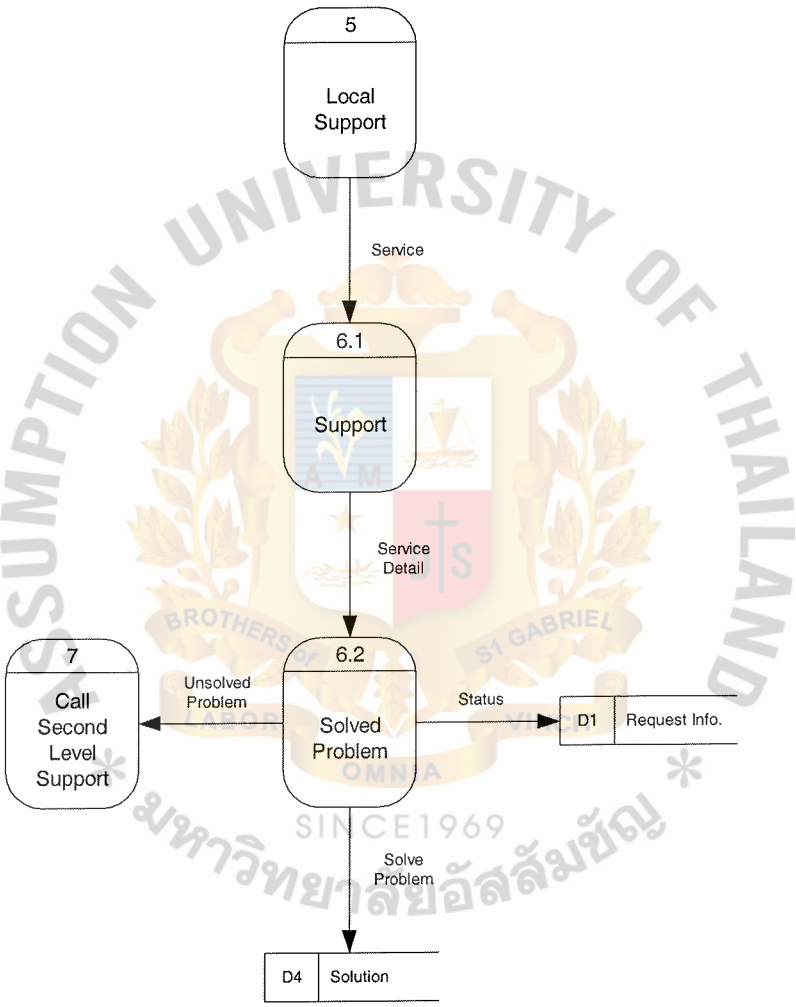

Figure B.6. Data Flow Diagram Level 1 of Process 6.

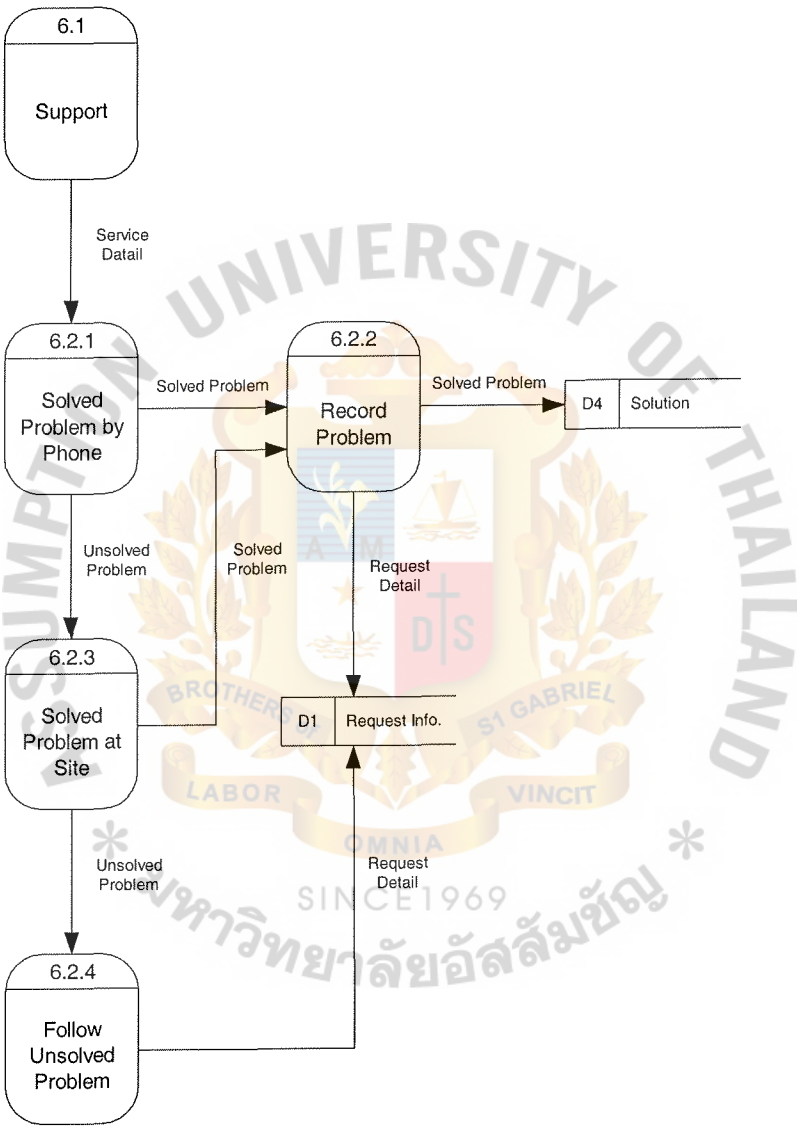

Figure B.7. Data Flow Diagram Level 2 of Process 6.2.

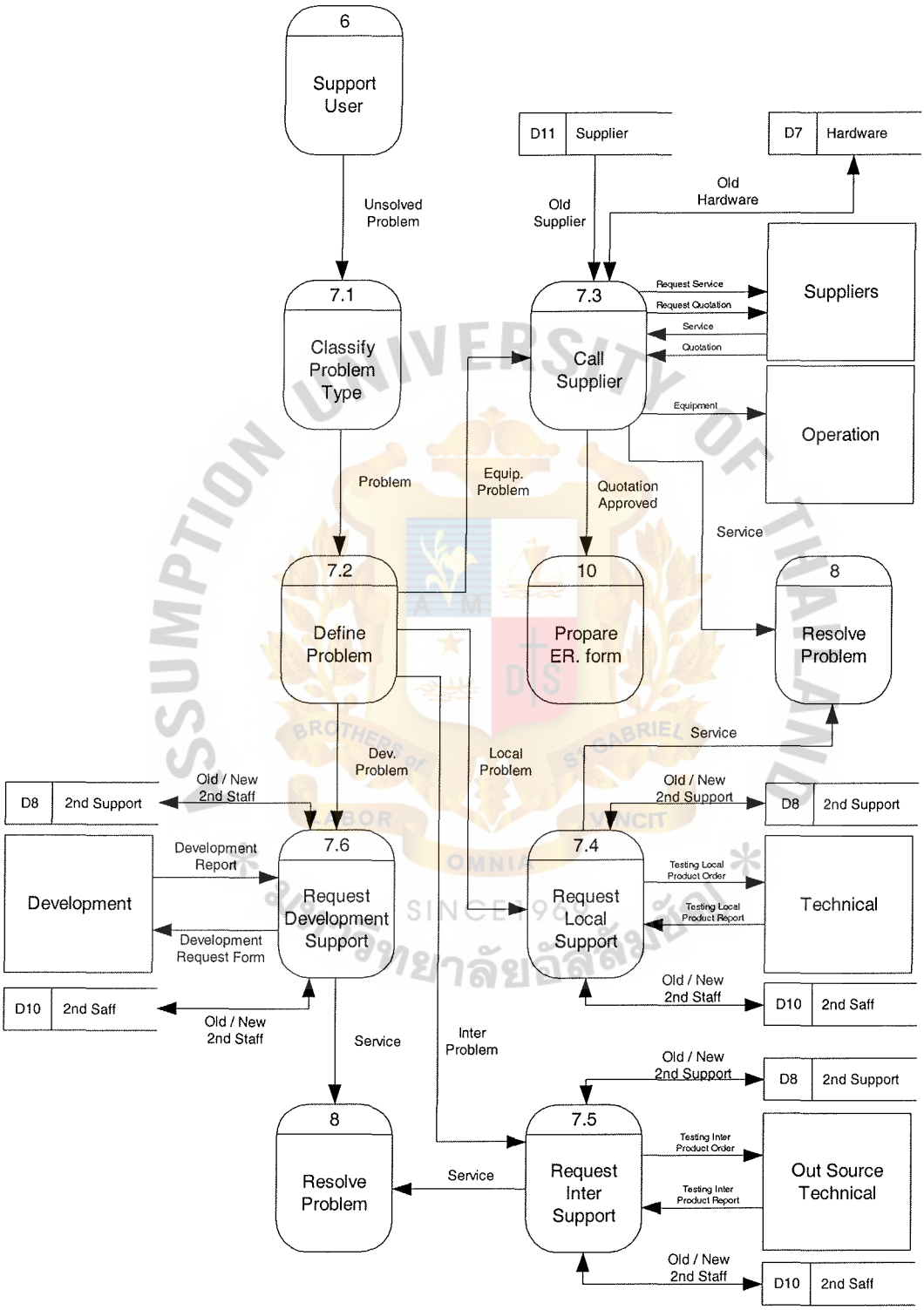

Figure B.8. Data Flow Diagram Level 1 of Process 7.

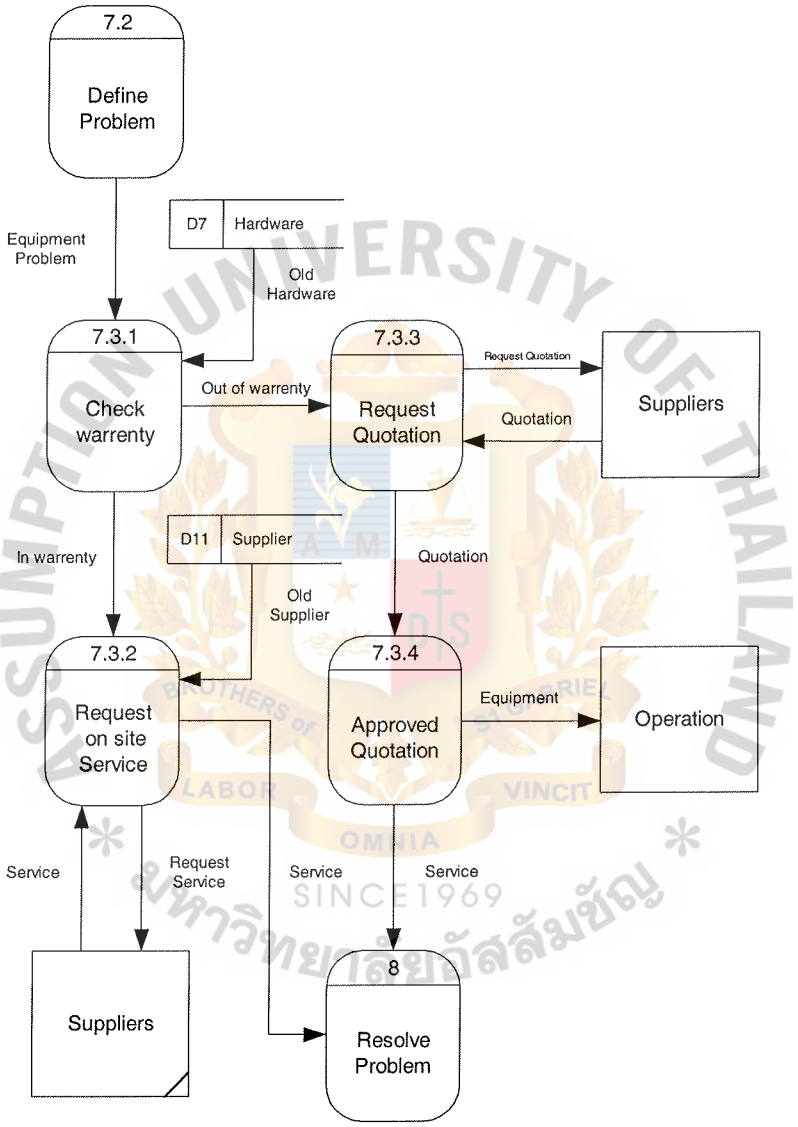

Figure B.9. Data Flow Diagram Level 2 of Process 7.3.

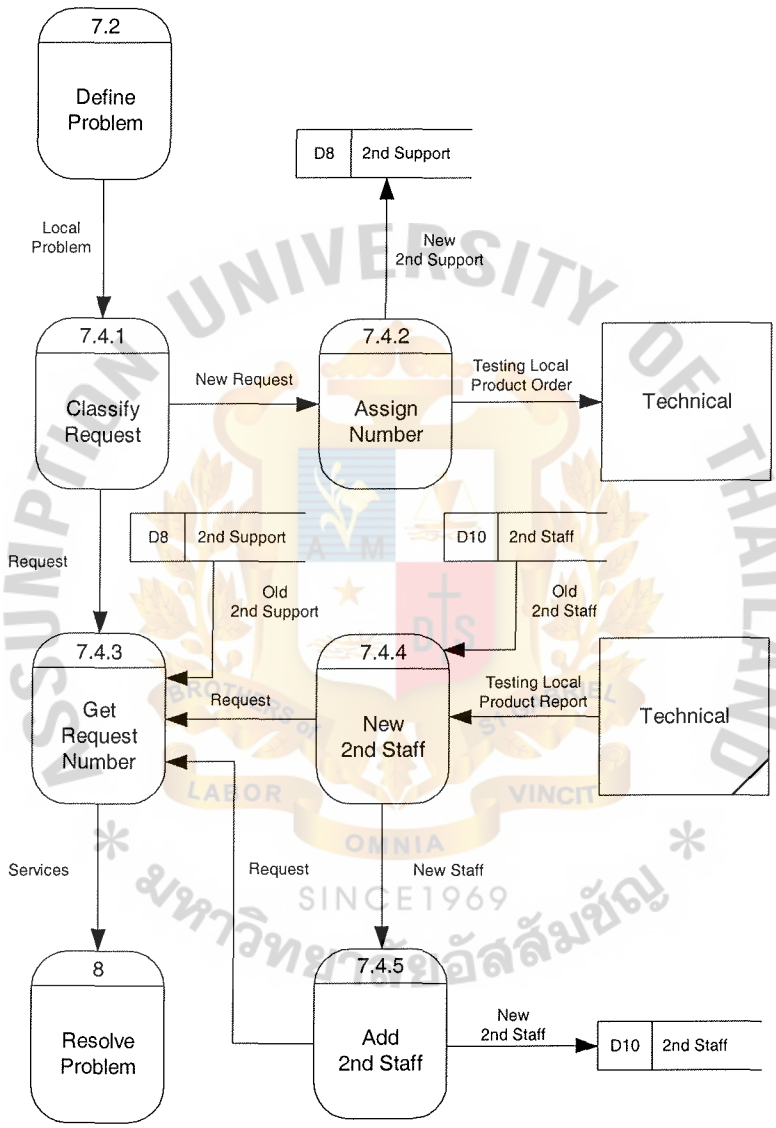

Figure B.10. Data Flow Diagram Level 2 of Process 7.4.

St. Gabriel's Library, Au

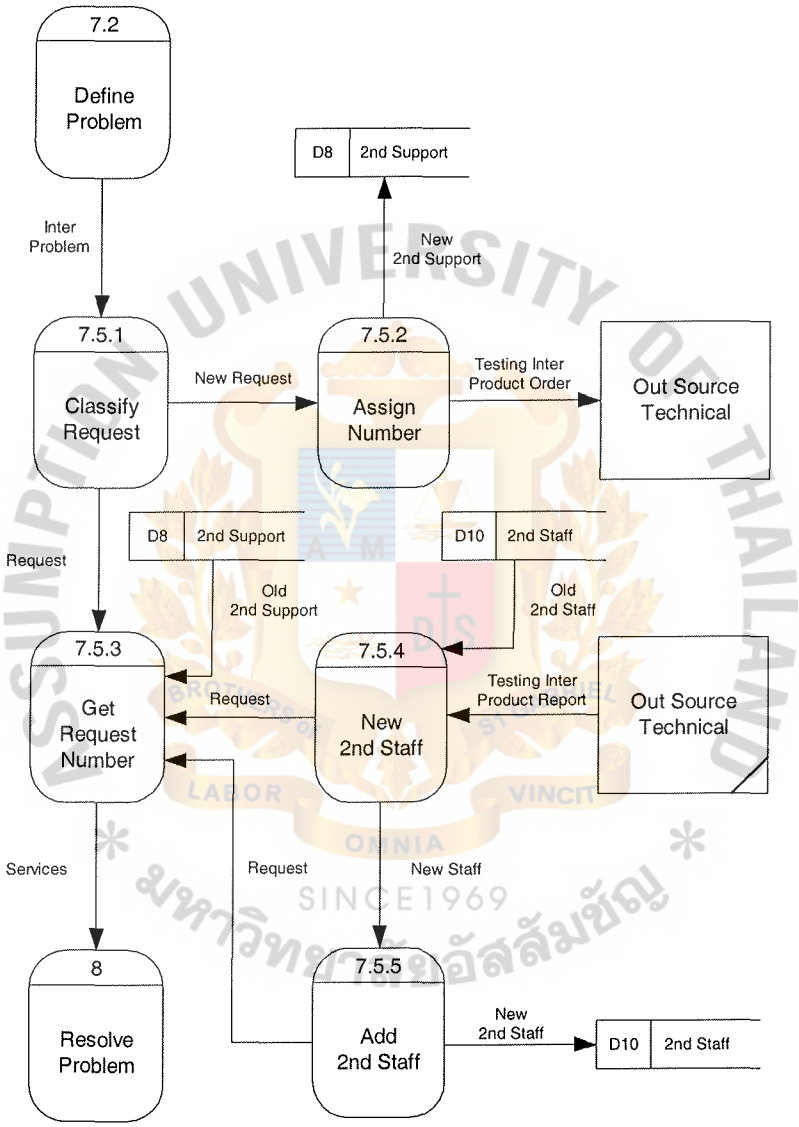

Figure B.11. Data Flow Diagram Level 2 of Process 7.5.

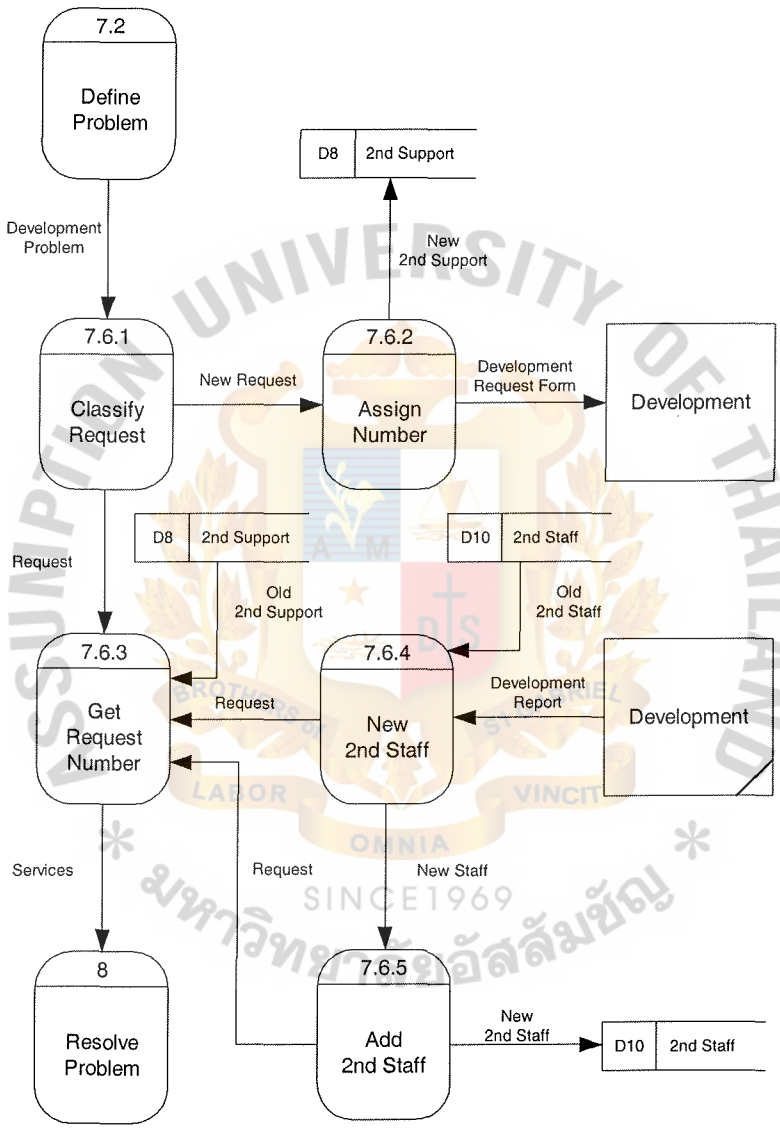

Figure B.12. Data Flow Diagram Level 2 of Process 7.6.

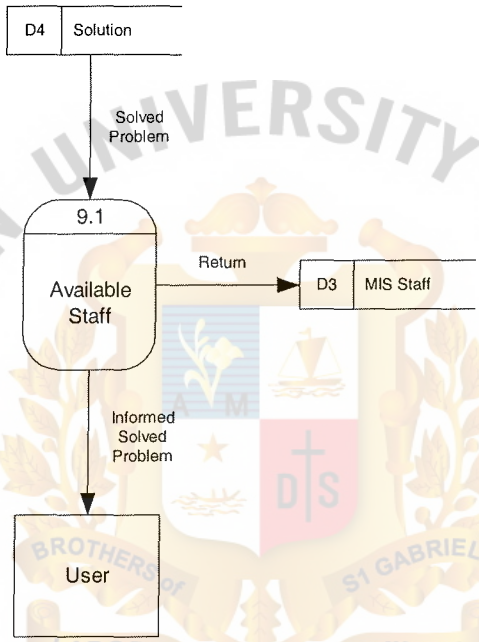

Figure B.13. Data Flow Diagram Level 1 of Process 9.

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS OF ST GABRIEL
LABOR VINCIT OMNIA
SINCE 1969
มหาวิทยาลัยอัสสัมชัญ

APPENDIX C

DATA DICTIONARY

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS of ST GABRIEL
LABOR VINCIT OMNIA
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

DATA DICTIONARY

Name	Description
2ND_DEPT	2nd level support department
2ND_EMAIL	2nd level support email address
2ND_ID	2nd level support ID.
2ND_NAME	2nd level support name
2ND_PHONE	2nd level support phone number
2ND_STAFF	2nd level support staff
2ND_SUPPORT	2nd level support
2S_ID	2nd level staff ID.
2S_NDATE	2nd level staff end date
2S_REQUEST	2nd level staff request
2S_SDATE	2nd level staff start date
EMP	Employee Table
EMP_DEPT	Employee department
EMP_EMAIL	Employee email address
EMP_ID	Employee ID.
EMP_NAME	Employee name
EMP_PHONE	Employee phone number
EMP_POSITION	Employee position
EMP_SURNAME	Employee surname
HARDWARE	Hardware Table
HW_BRAND	Hardware brand name
HW_ID	Hardware ID.

Name	Description
HW_MODEL	Hardware model
HW_SERIAL	Hardware serial number
HW_SPEC	Hardware specification
HW_TYPE	Hardware type
LOGON	Logon Table
LOGON_ID	Logon ID.
LOGON_NAME	Logon name
LOGON_NDATE	Logon end date
LOGON_SDATE	Logon start date
LOGON_STATUS	Logon status
MIS_ID	MIS ID.
MIS_NAME	MIS name
MIS_STAFF	MIS staff table
MIS_STATUS	MIS status
MIS_SURNAME	MIS surname
REQUEST	Request Table
REQUEST_ID	Request ID.
REQUEST_NDATE	Request end date
REQUEST_NTIME	Request end time
REQUEST_PROBLEM	Request problem
REQUEST_SDATE	Request start date
REQUEST_STIME	Request start time
SERVER	Server Table
SOFTWARE	Software Table

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS OF ST GABRIEL LABOR VINCIT
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

Name	Description
SOL_DESCRIPTION	Solution description
SOL_ID	Solution ID.
SOLUTION	Solution Table
SUP_COMPANY	Suppliers Company
SUP_CONTACT1	Suppliers contact no.1
SUP_CONTACT2	Suppliers contact no.2
SUP_EMAIL	Suppliers email address
SUP_FAX	Suppliers fax number
SUP_ID	Suppliers ID.
SUP_PRODUCT	Suppliers product
SUP_TEL1	Suppliers telephone no.1
SUP_TEL2	Suppliers telephone no.2
SUPPLIERS	Suppliers Table
SV_DESCRIPTION	Server description
SV_ID	Server ID.
SV_NAME	Server name
SW_ID	Software ID.
SW_LICENSE	Software license
SW_NAME	Software name
SW_TYPE	Software type
WARRANTY_EXPIRED	Warranty expired

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS OF ST GABRIEL LABOR VINCIT
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

APPENDIX D

STRUCTURE CHART

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS of ST GABRIEL
LABOR VINCIT
OMNIA
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

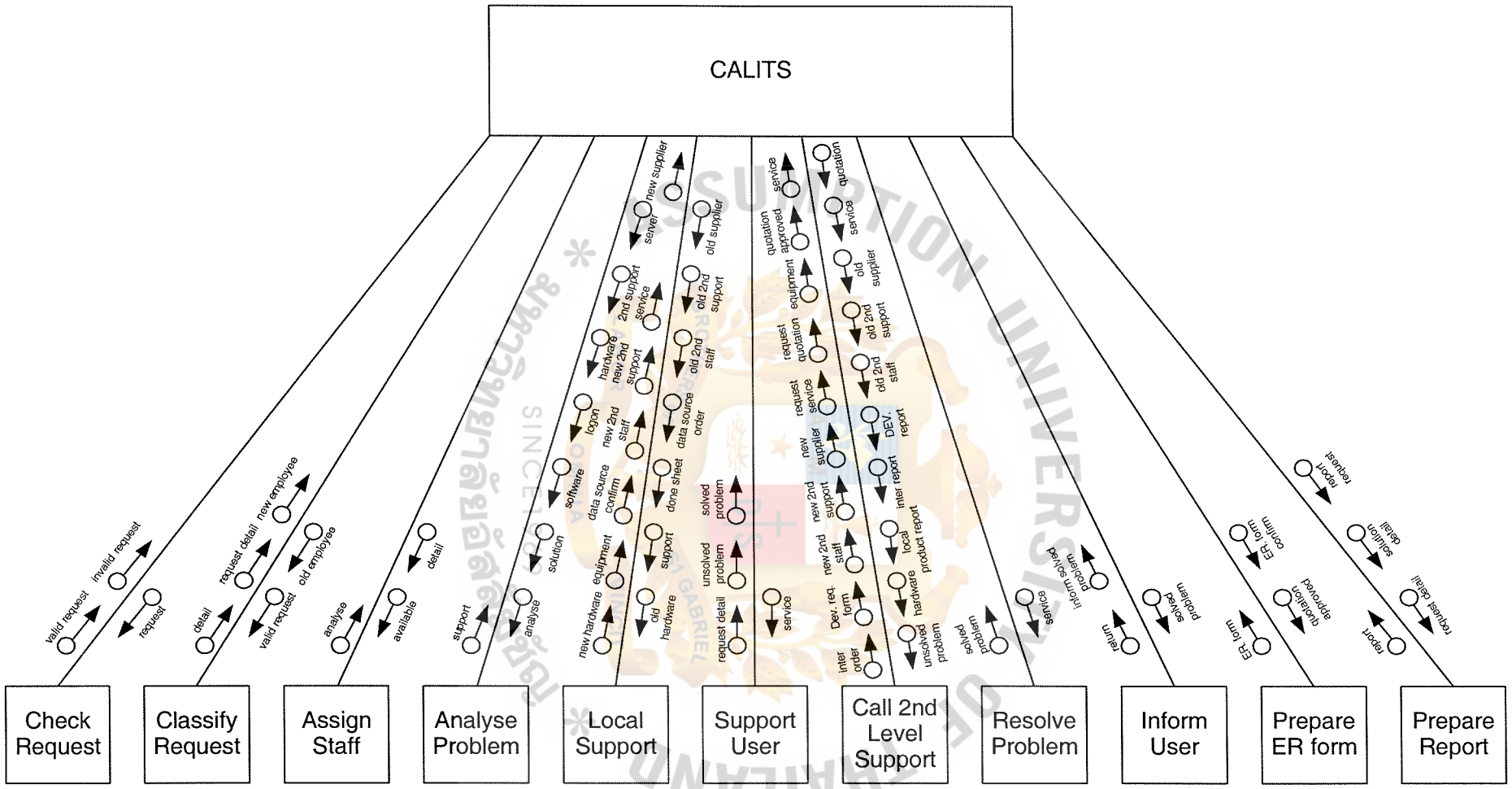

Figure D.1. Structure Chart of Context Diagram.

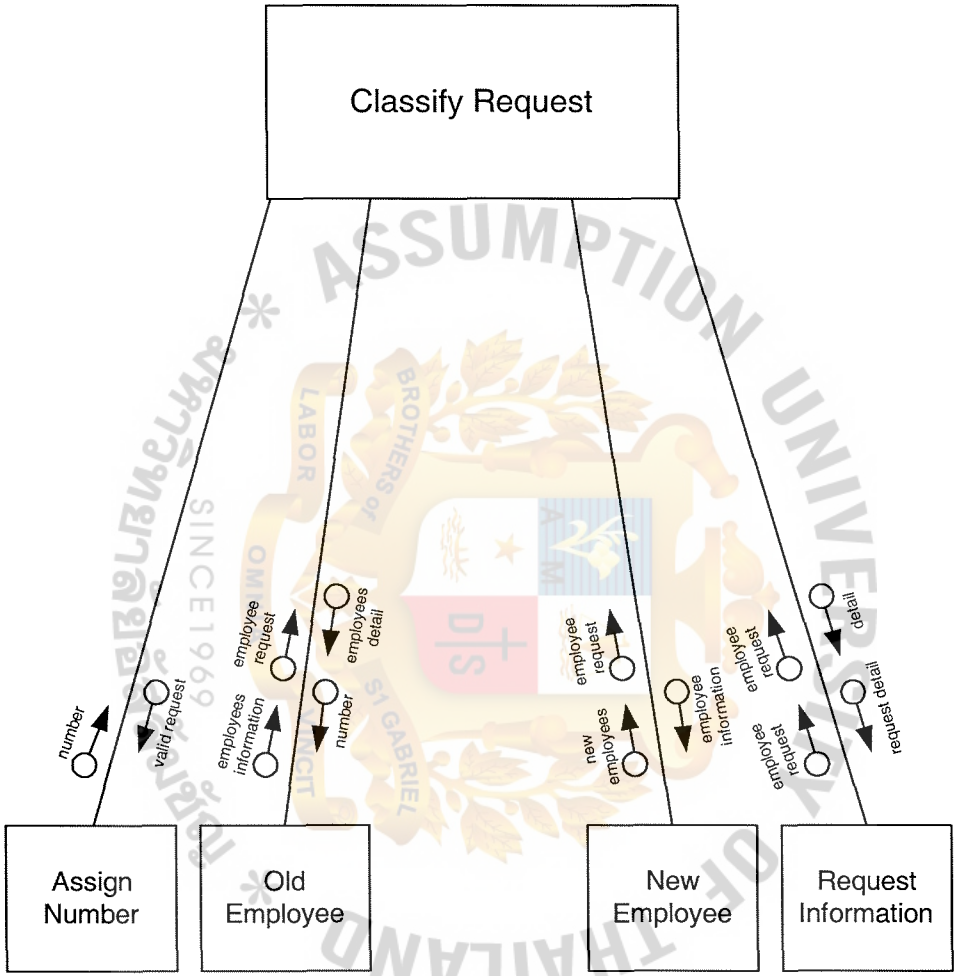

Figure D.2. Structure Chart of Process 2.

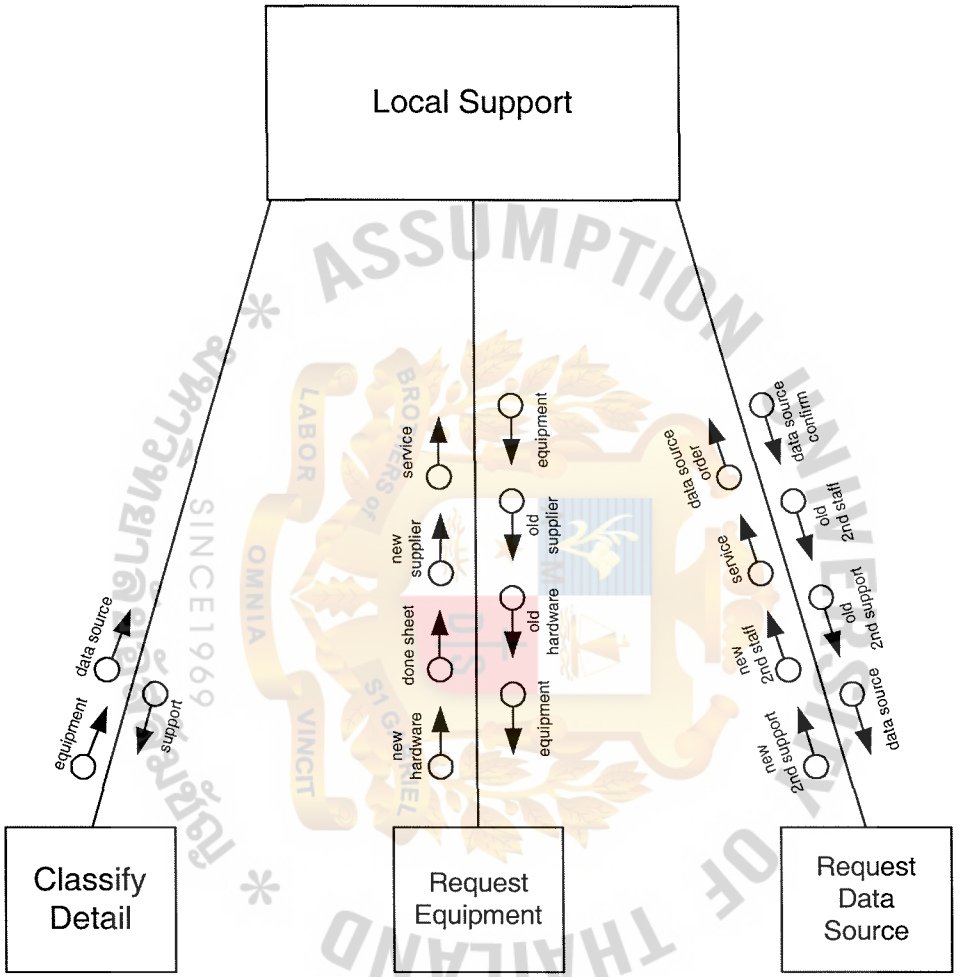

Figure D.3. Structure Chart of Process 5.

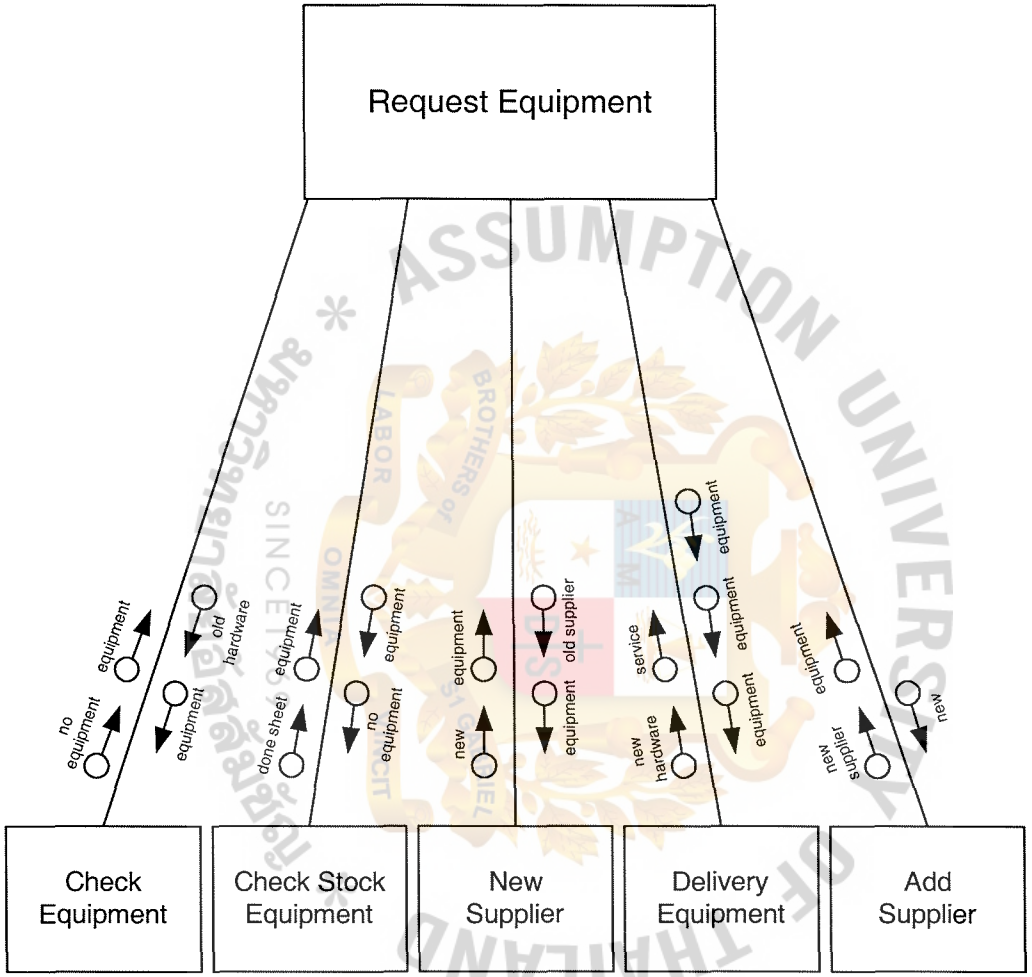

Figure D.4. Structure Chart of Process 5.2.

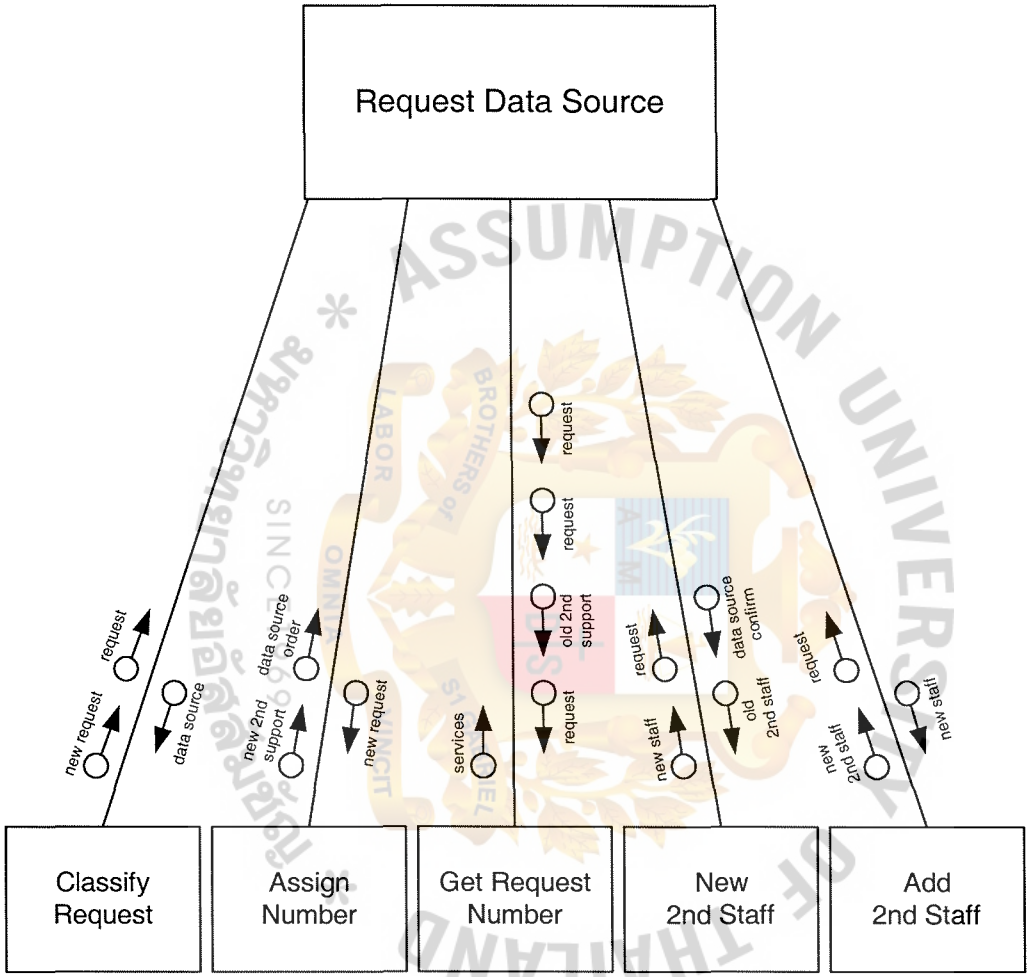

Figure D.5. Structure Chart of Process 5.3.

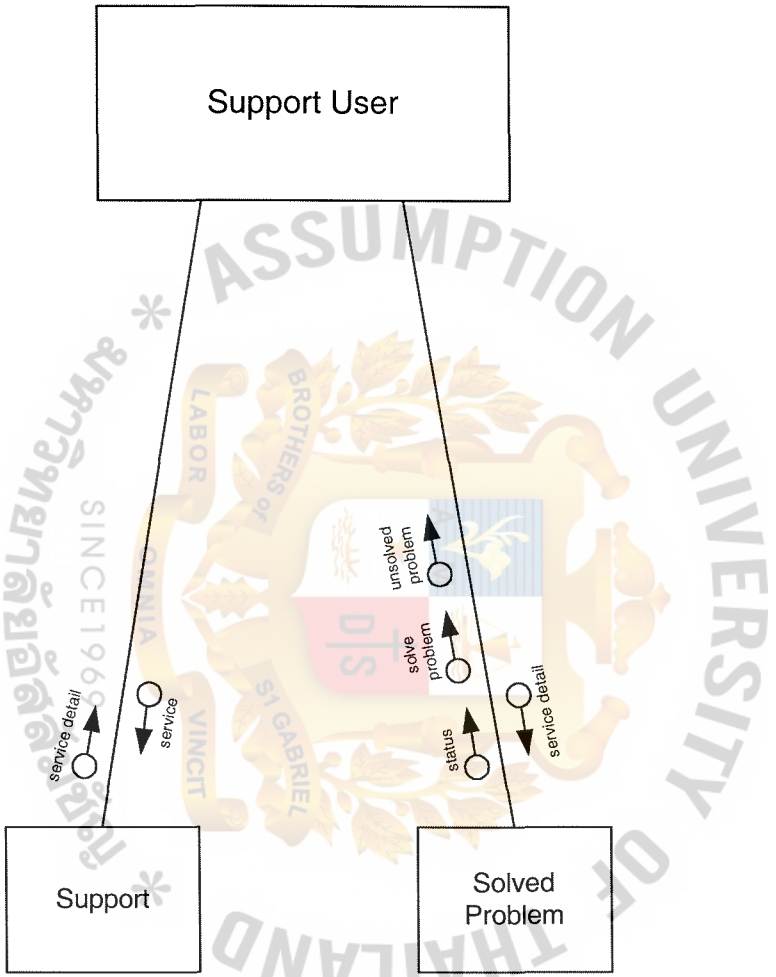

Figure D.6. Structure Chart of Process 6.

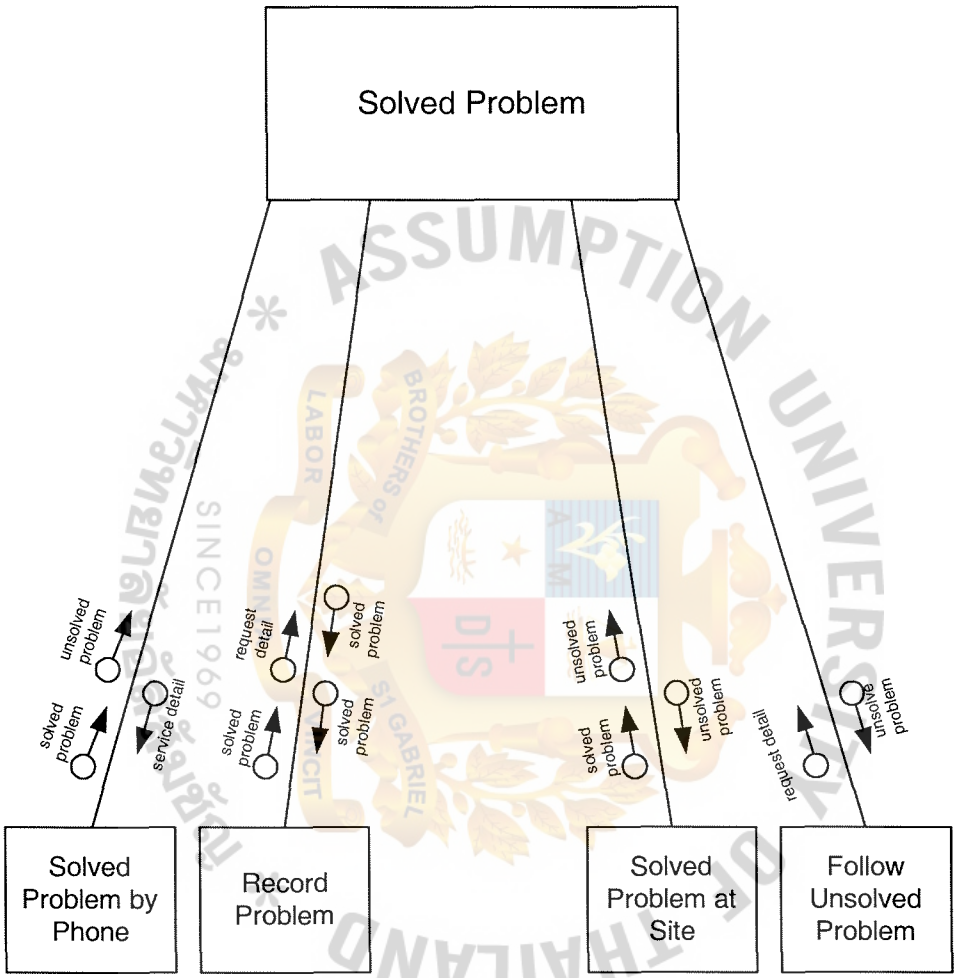

Figure D.7. Structure Chart of Process 6.2.

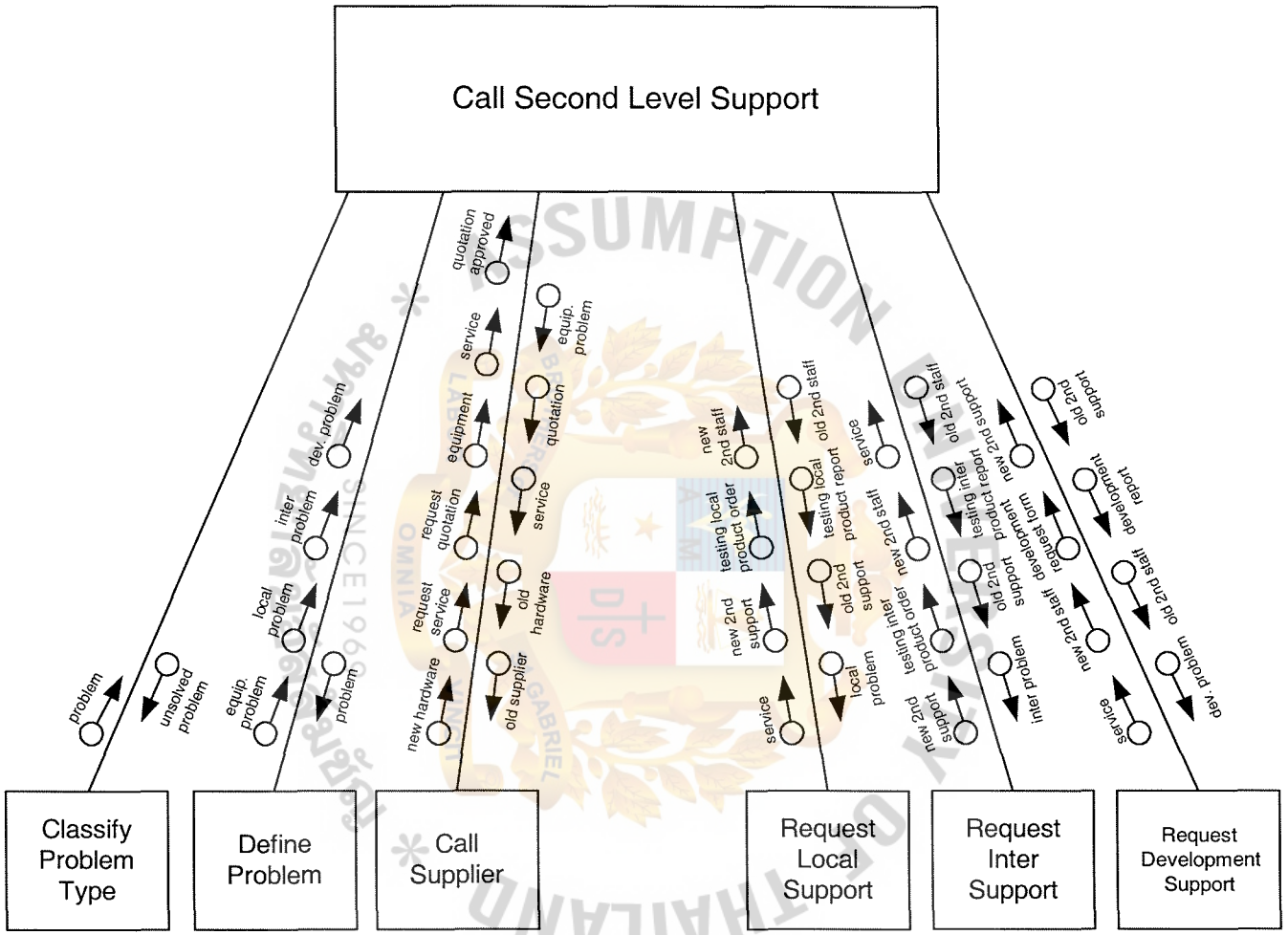

Figure D.8. Structure Chart of Process 7.

St. Gabriel's Library, Au

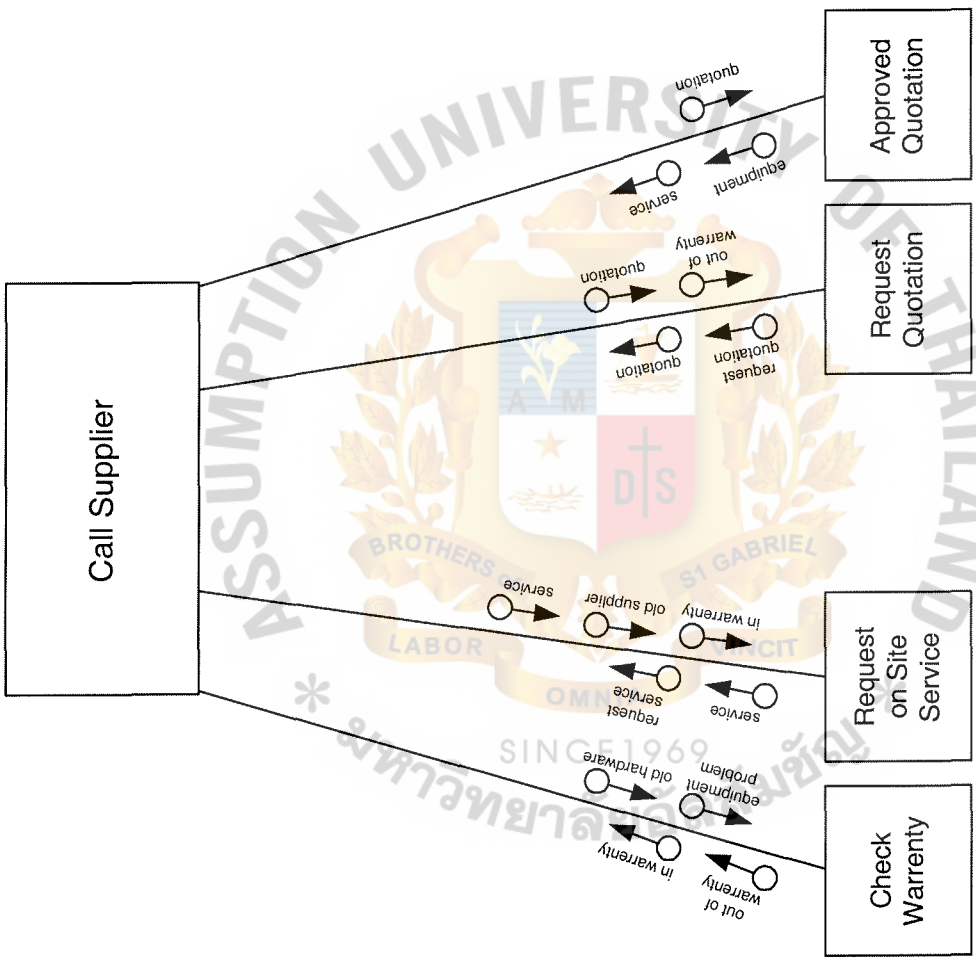

Figure D.9. Structure Chart of Process 7.3.

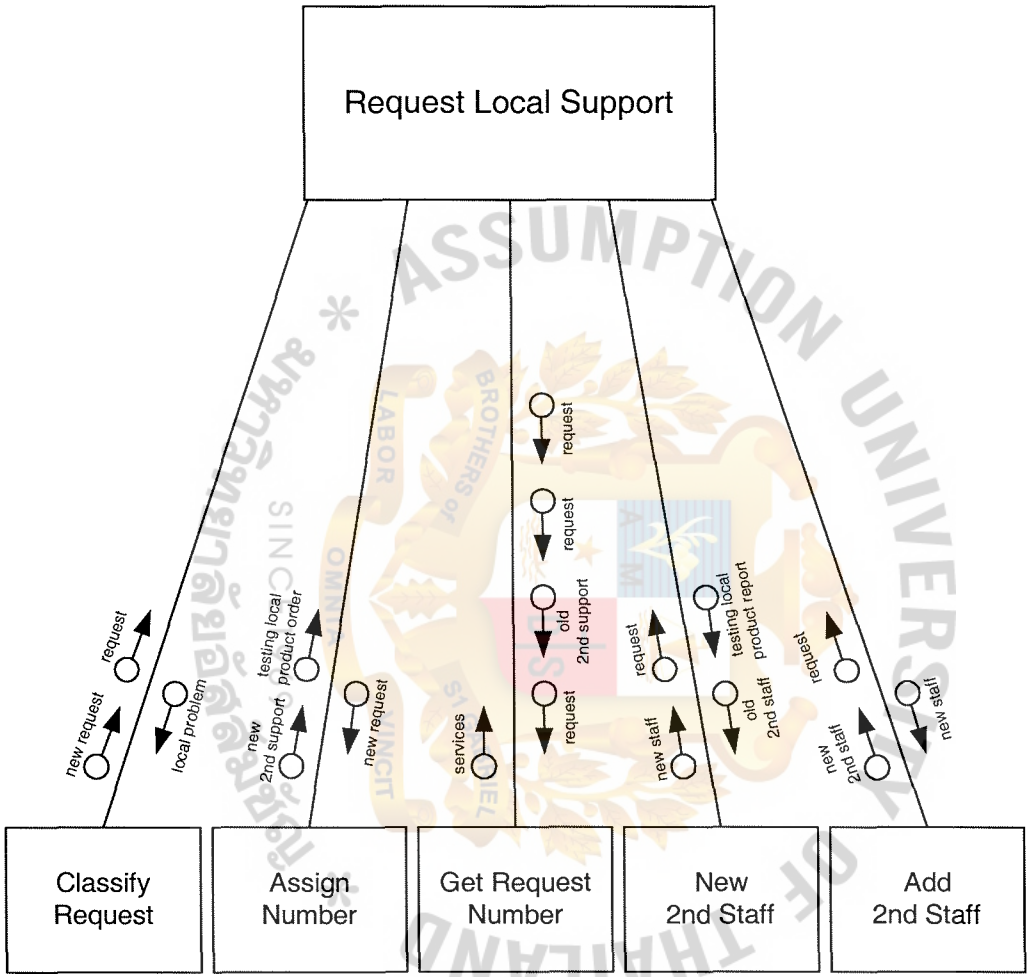

Figure D.10. Structure Chart of Process 7.4.

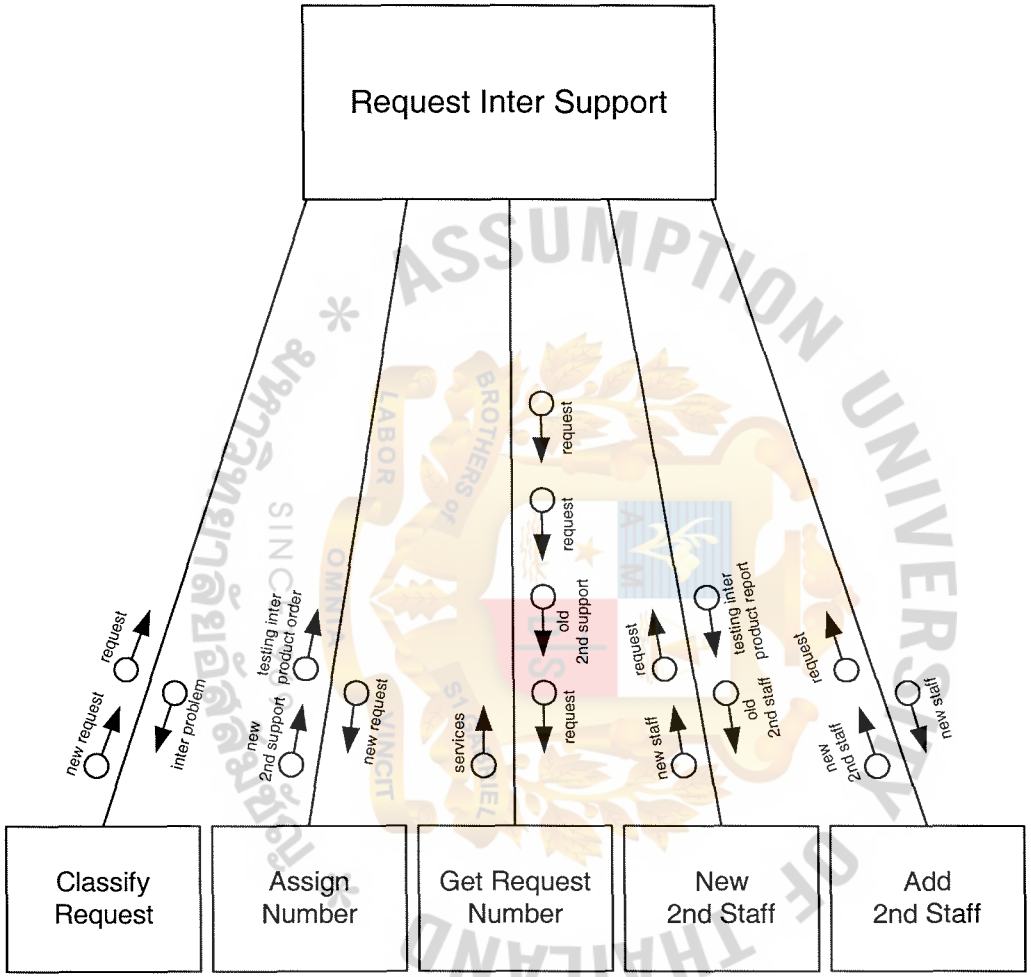

Figure D.11. Structure Chart of Process 7.5.

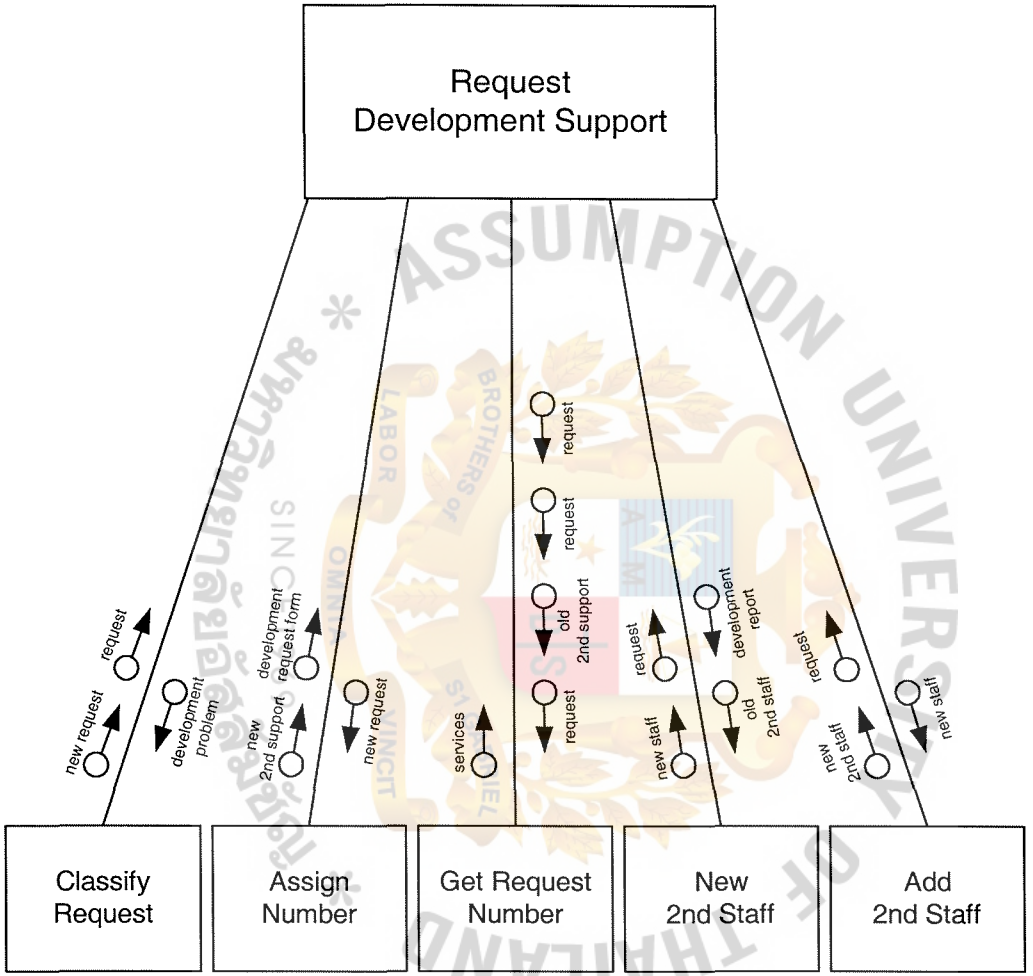

Figure D.12. Structure Chart of Process 7.6.

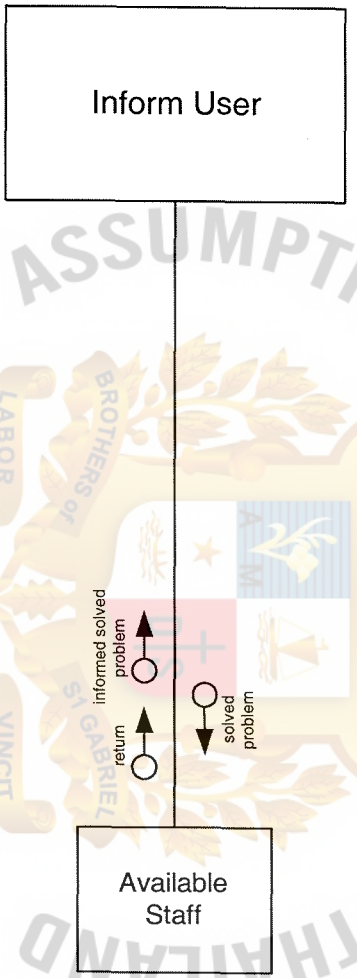

Figure D.13. Structure Chart of Process 9.

APPENDIX E

SCREEN DESIGN

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS of ST GABRIEL
LABOR VINCIT OMNIA
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

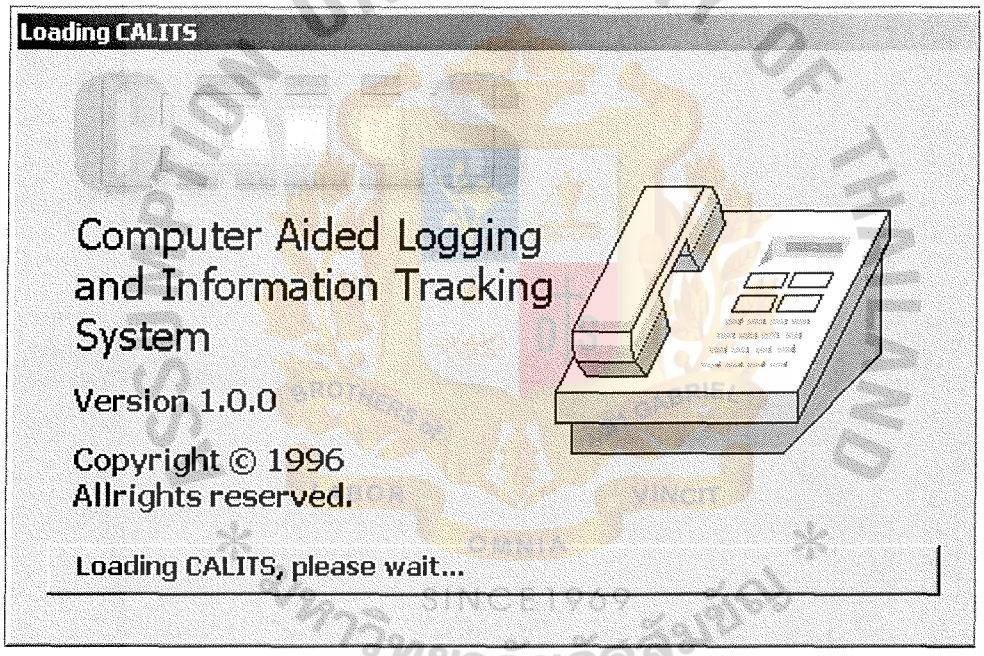

Figure E.1. Loading CALITS.

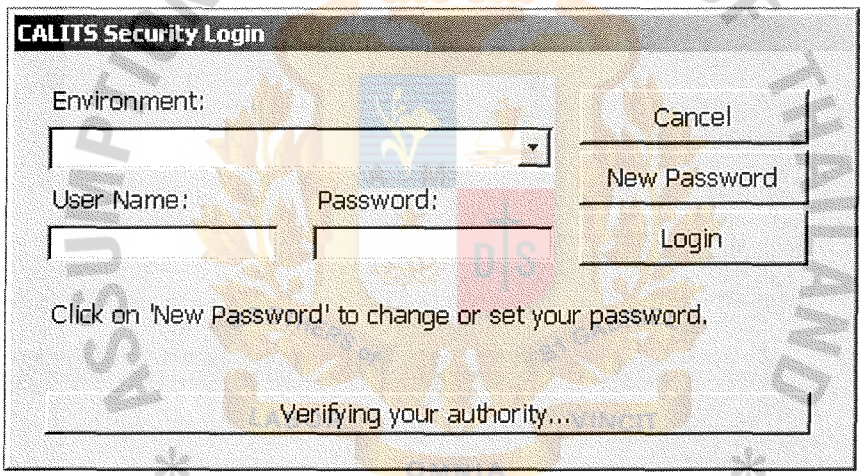

Figure E.2. CALITS Security Login.

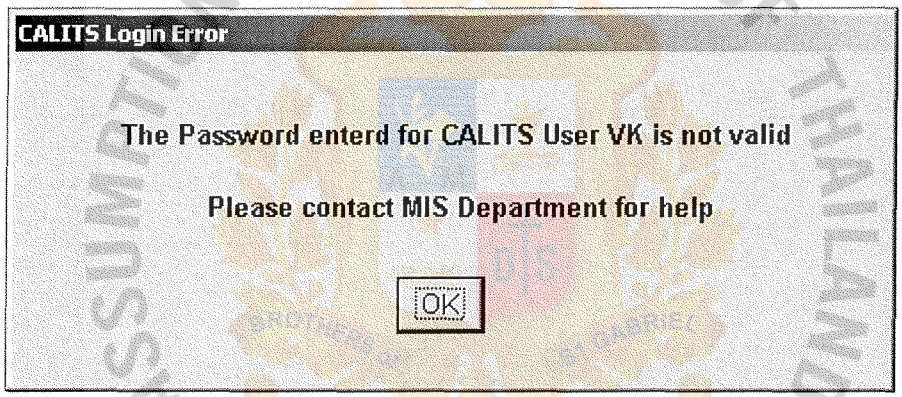

Figure E.3. CALITS Login Error.

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS OF ST. GABRIEL
LABOR VINCIT OMNIA
มหาวิทยาลัยอัสสัมชัญ

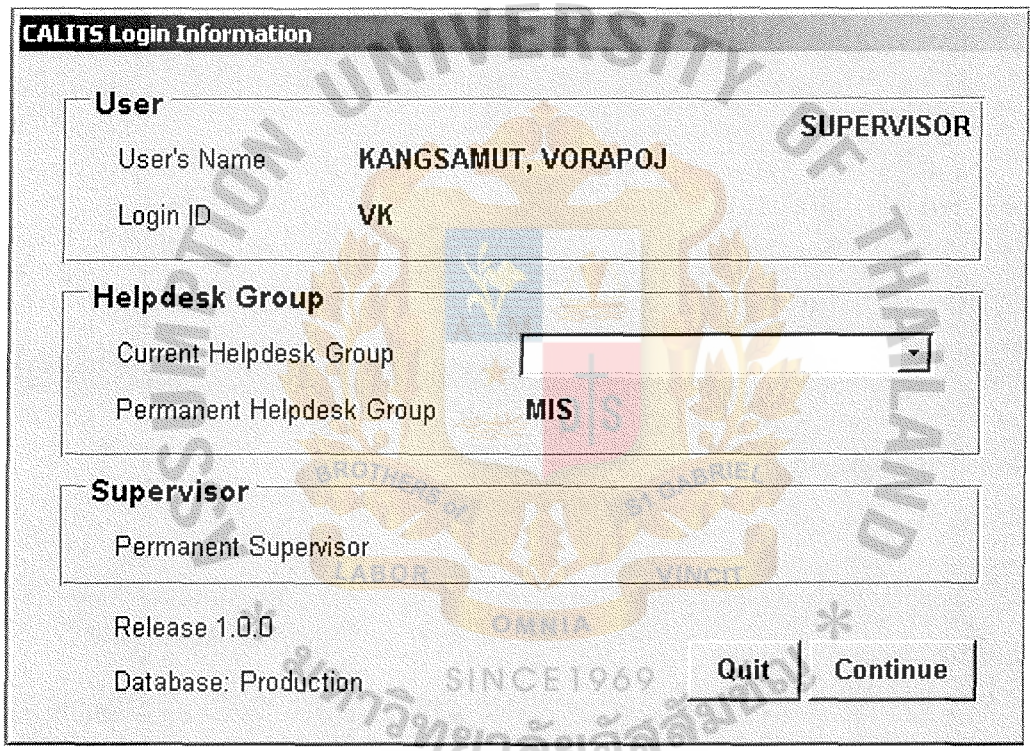

Figure E.4. CALITS Login Information.

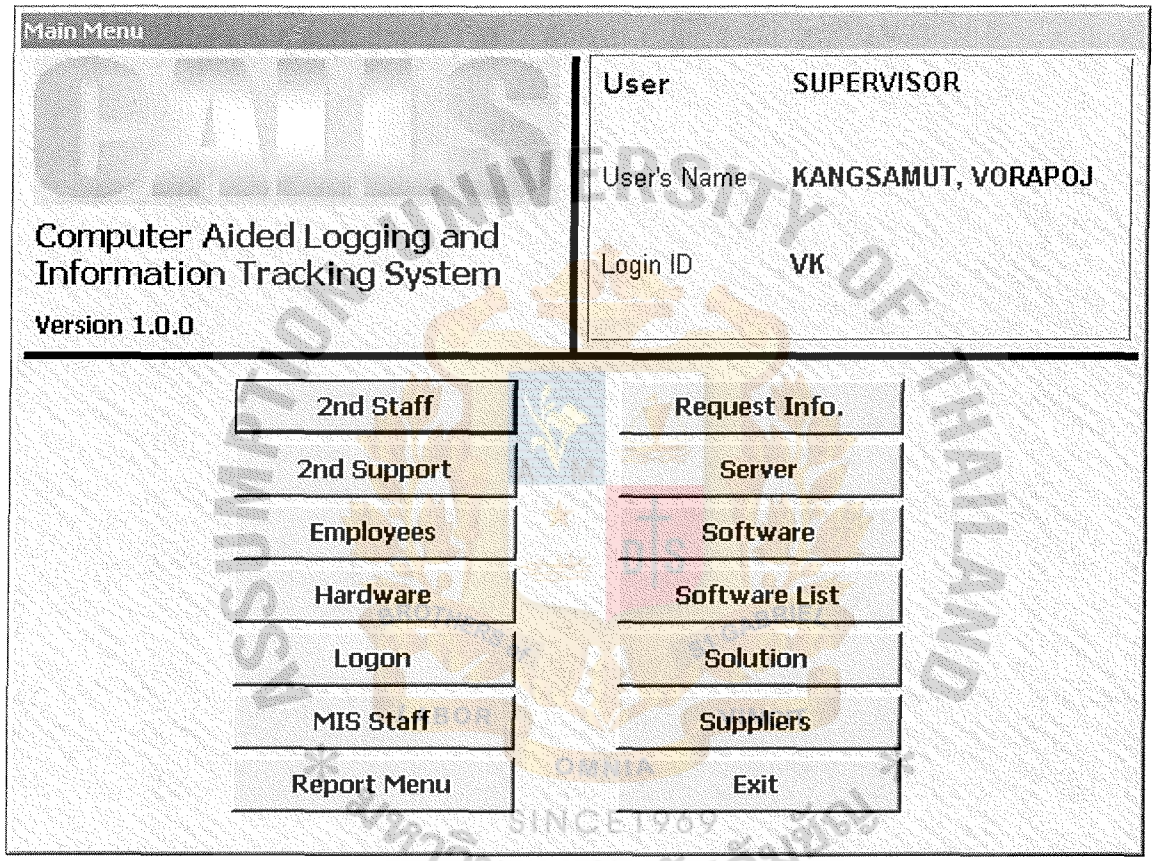

Figure E.5. Main Menu.

St. Gabriel's Library, Au

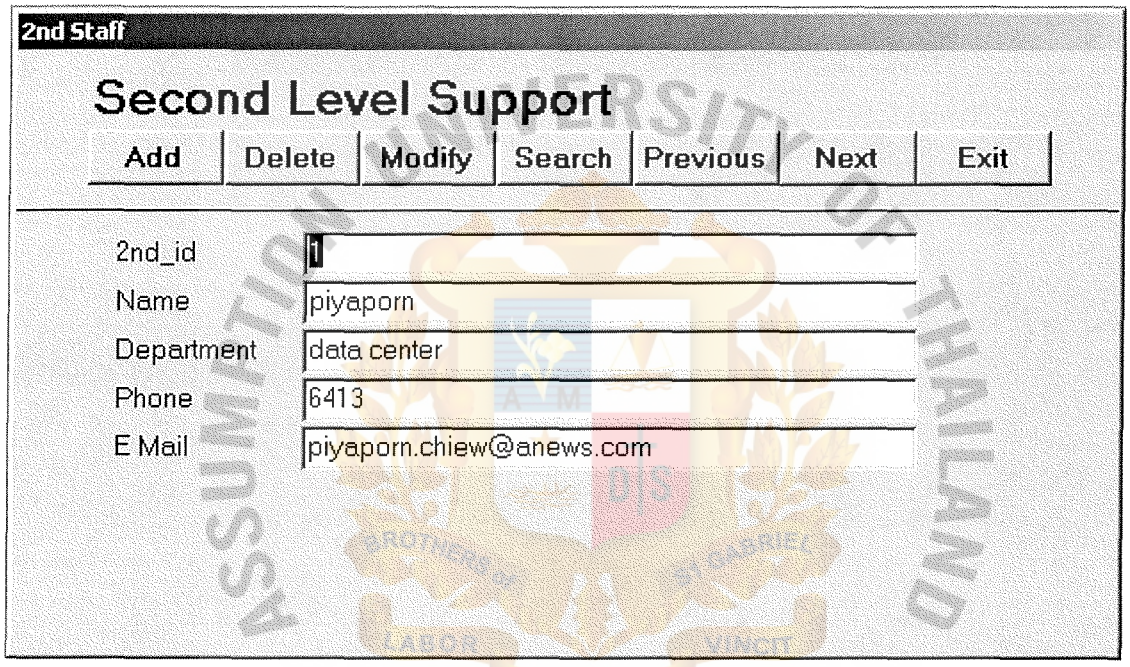

Figure E.6. 2nd Staff.

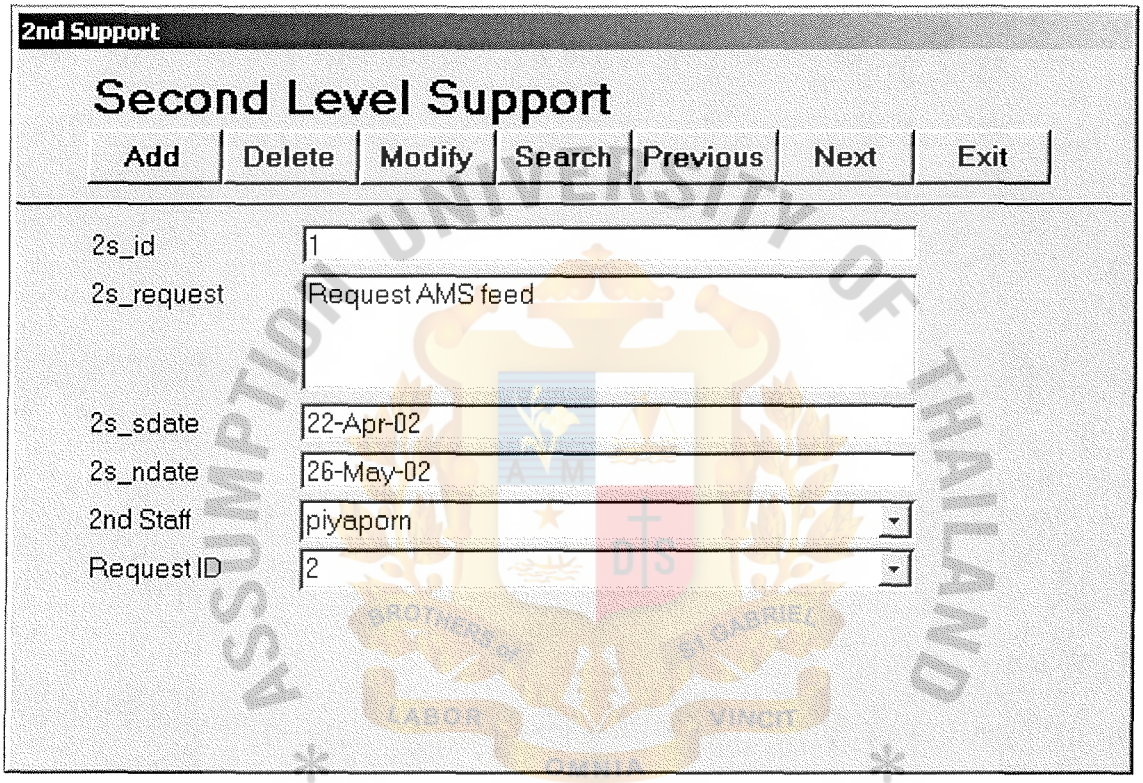

Figure E.7. 2nd Support.

ASSUMPTION UNIVERSITY OF THAILAND
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

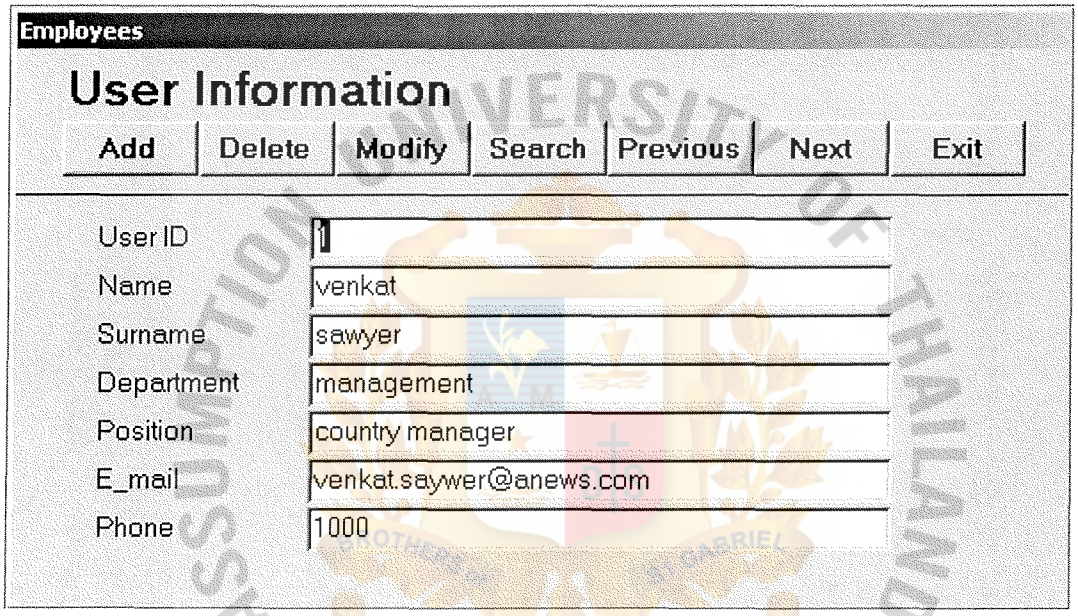

Figure E.8. Employees.

ASSUMPTION UNIVERSITY OF THAILAND
LABOR OMNIA VINCIT
มหาวิทยาลัยอัสสัมชัญ

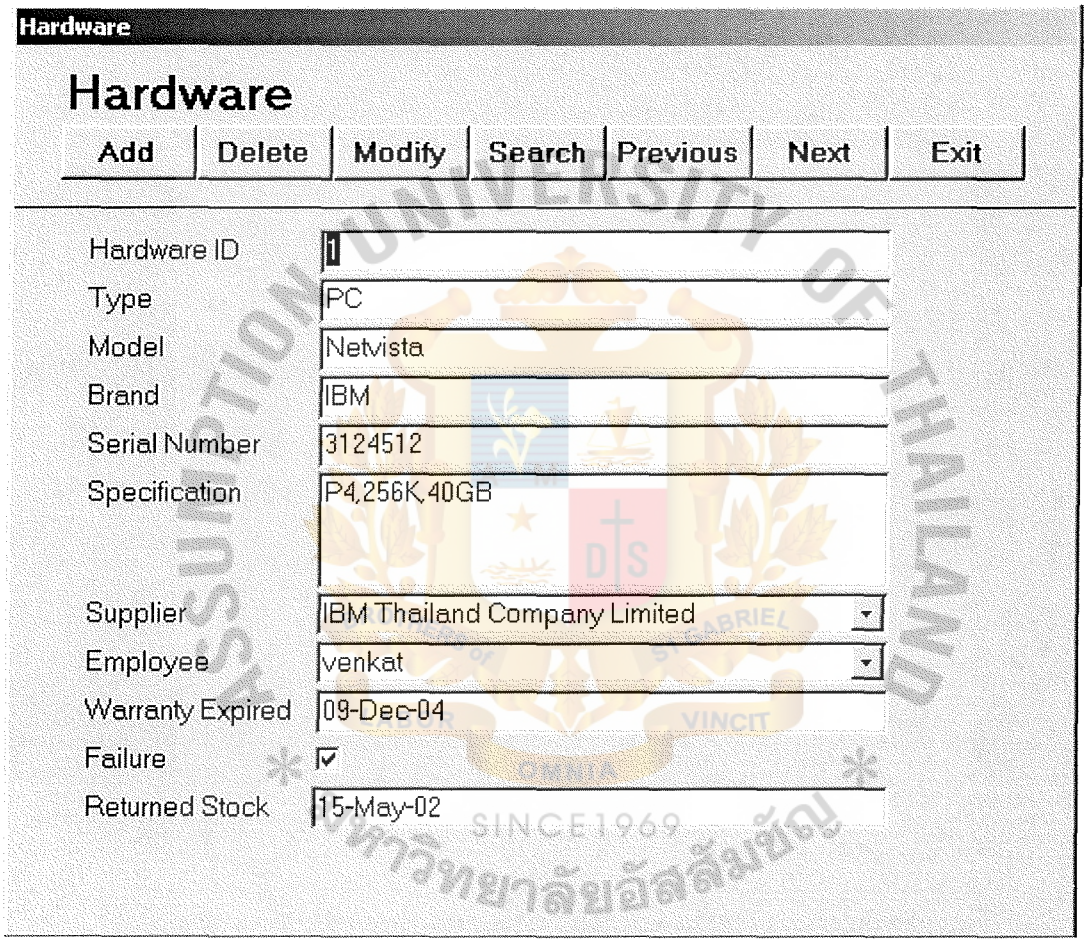

Figure E.9. Hardware.

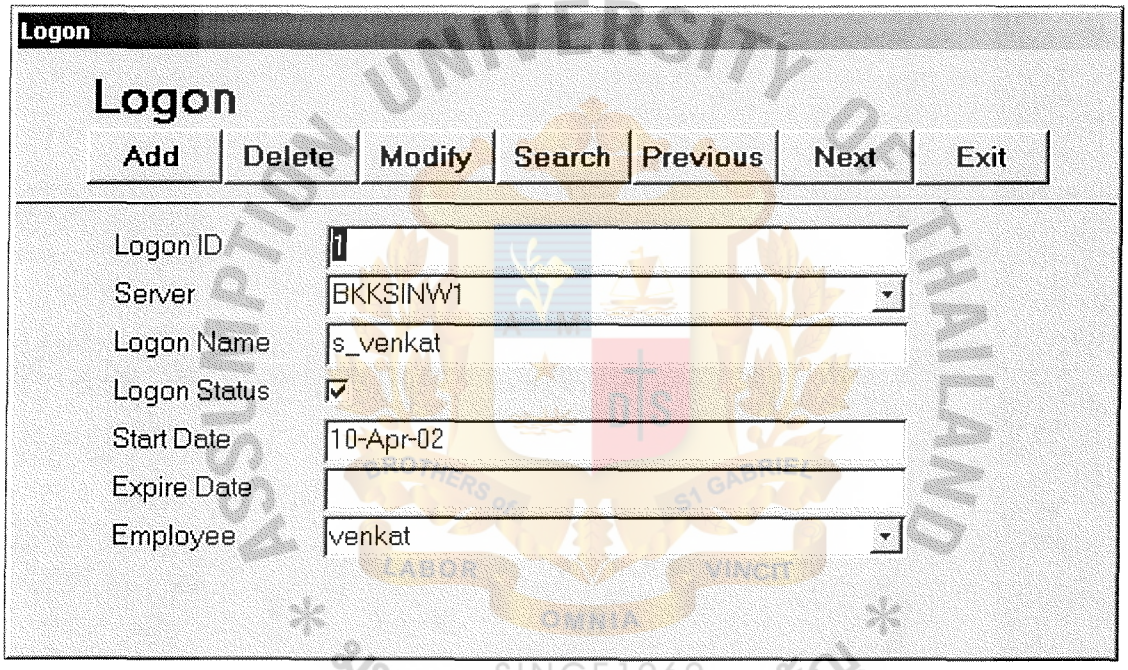

Figure E.10. Logon.

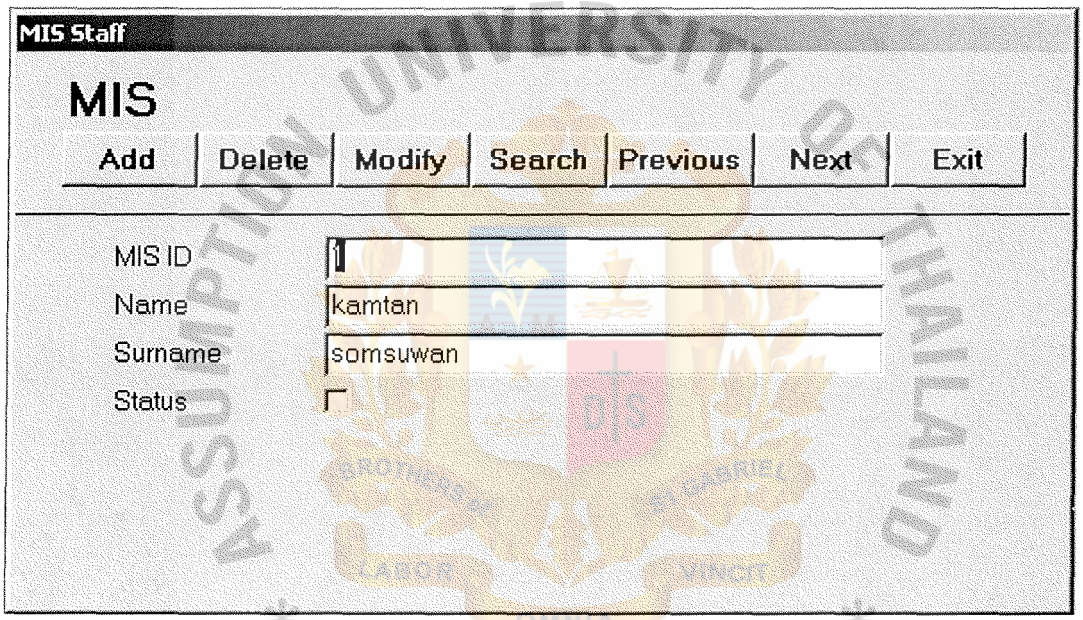

Figure E.11. MIS Staff.

ASSUMPTION UNIVERSITY OF THAILAND
SINCE1969

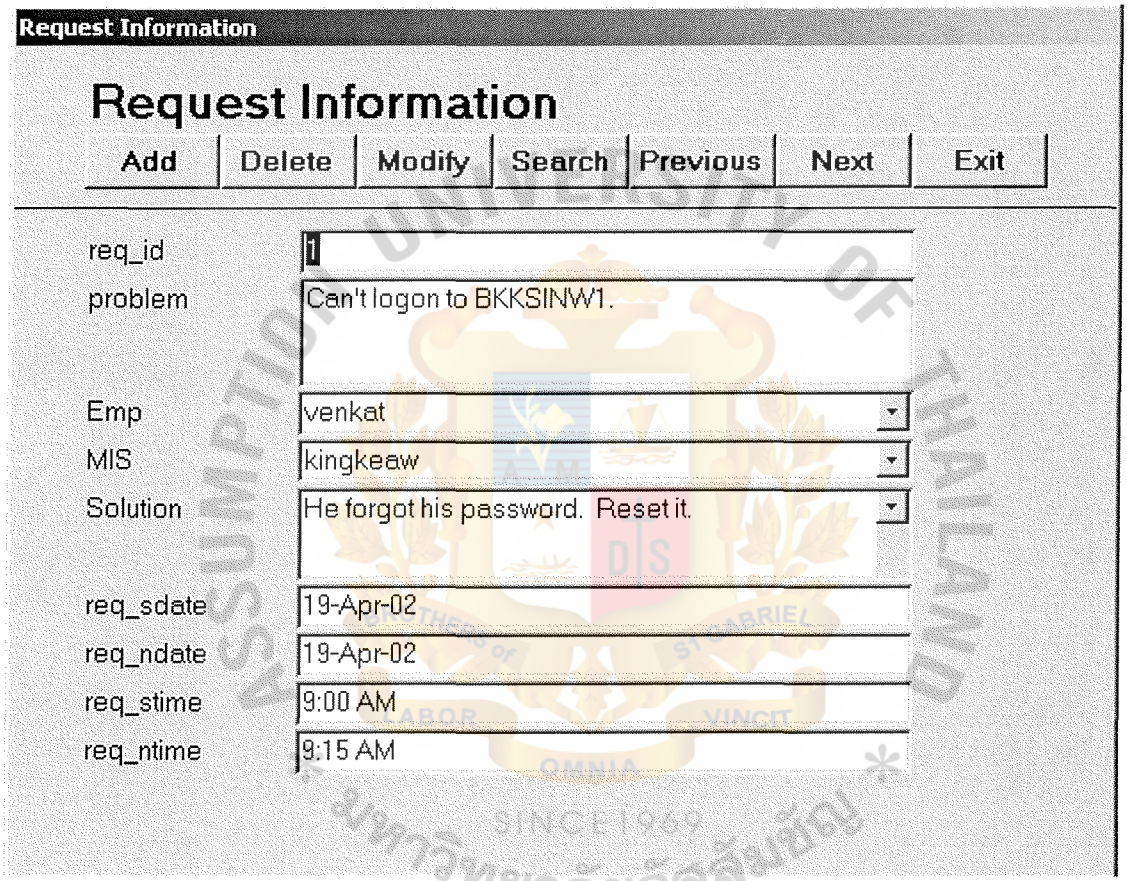

Figure E.12. Request Information.

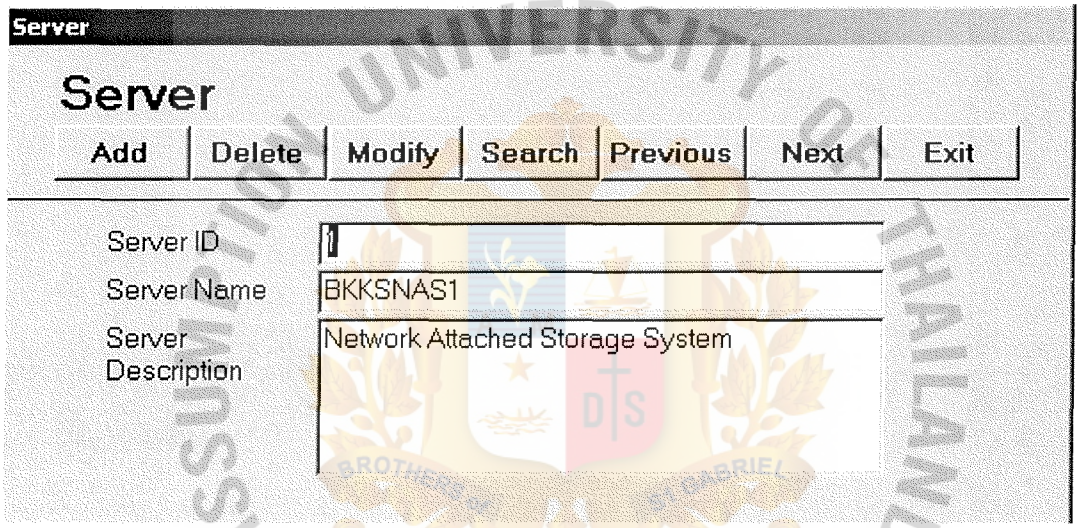

Figure E.13. Server.

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS OF ST. GABRIEL
LABOR VINCIT
OMNIA
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

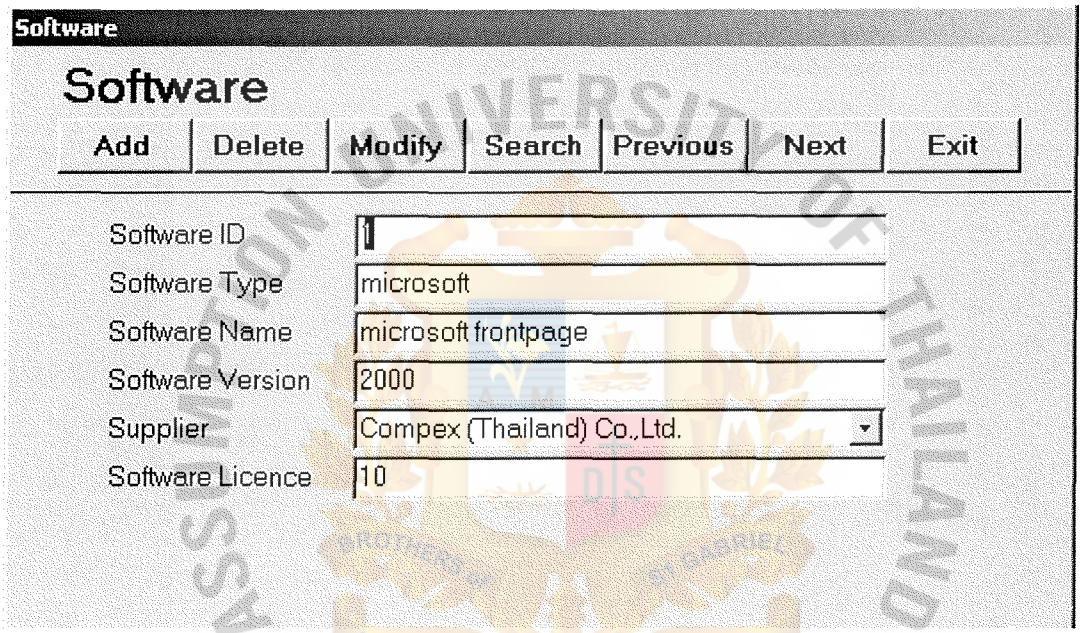

Figure E.14. Software.

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS OF ST GABRIEL
LABOR VINCIT
OMNIA
SINCE 1969
มหาวิทยาลัยอัสสัมชัญ

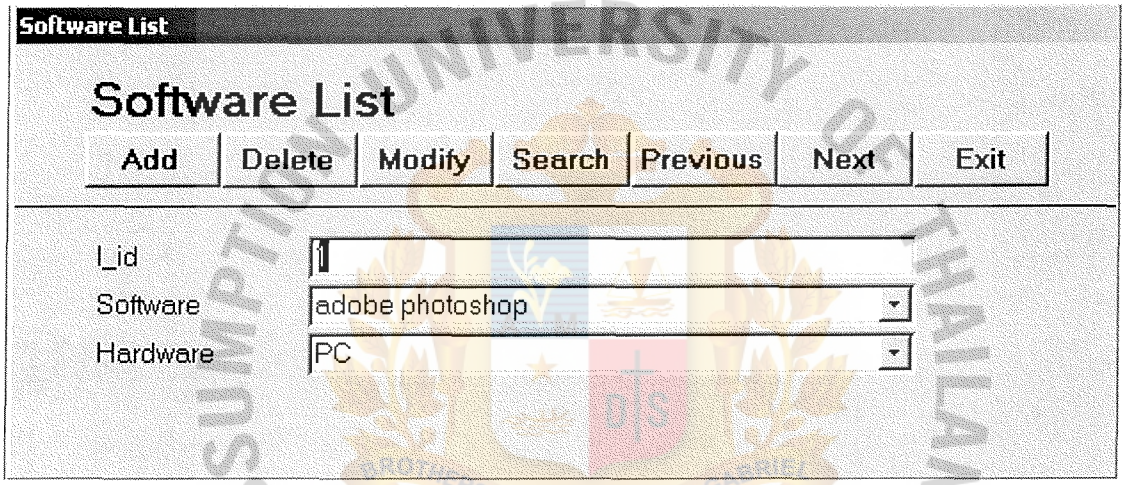

Figure E.15. Software List.

ASSUMPTION UNIVERSITY OF THAILAND
LABOR OMNIA VINCIT
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

St. Gabriel's Library, Au

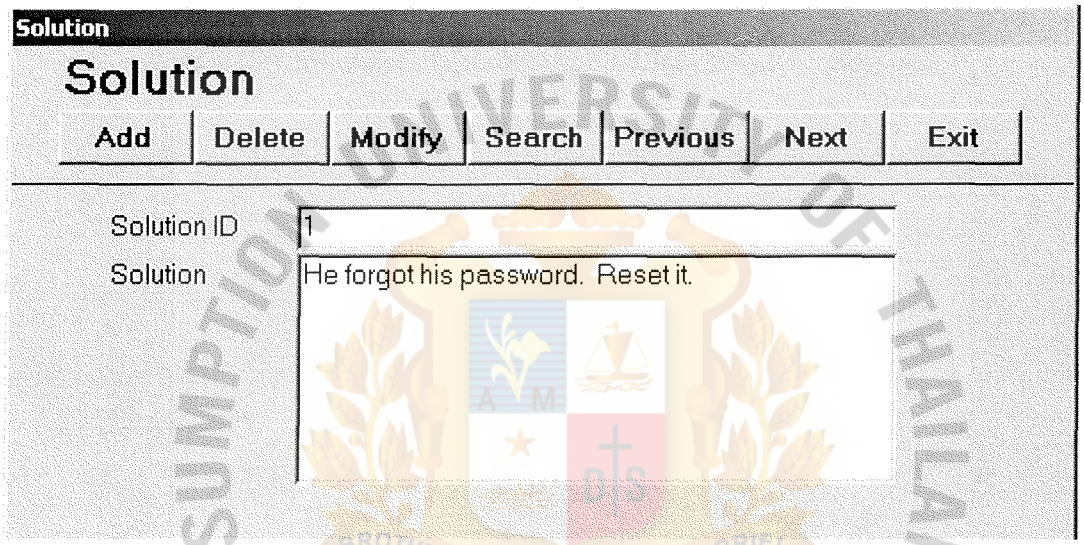

Figure E.16. Solution.

ASSUMPTION UNIVERSITY OF THAILAND
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

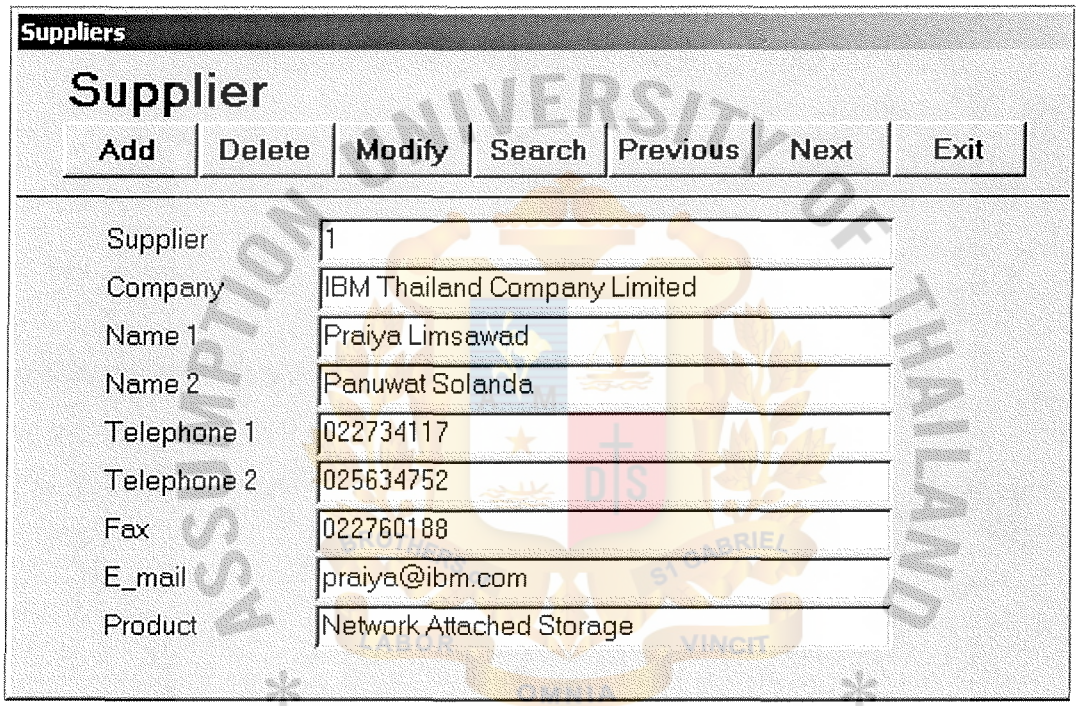

Figure E.17. Supplier.

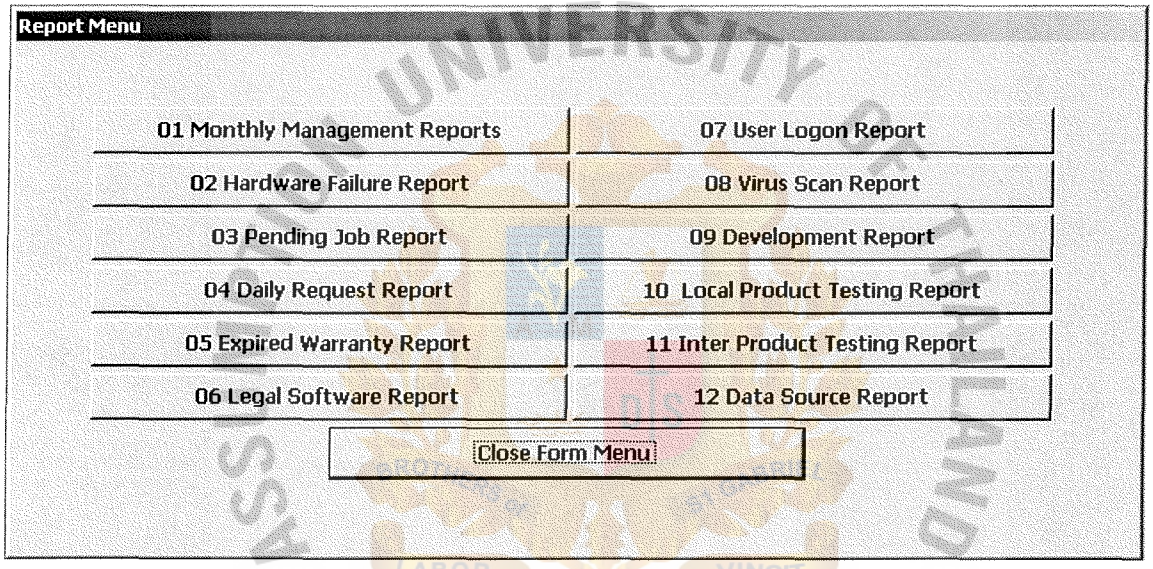

Figure E.18. Report Menu.

APPENDIX F

REPORT DESIGN

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS of ST GABRIEL
LABOR VINCIT OMNIA
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

The Example of Monthly Management Report

User Name		Request Date	Time	Problem	Solution	MIS	Finish Date	Time
apichada	rojchanasatit	09-May-02	8:45 AM	Can not logon her windows.	PC has been locked because of wrong password. Reset it.	kampee	09-May-02	8:51 AM
apichada	rojchanasatit	14-May-02	11:03 AM	Can not access web site "Swiss"	Escalate problem to 2nd support.	kampee	14-May-02	11:30 AM
apichada	rojchanasatit	17-May-02	8:30 AM	web site "Swiss" can access.	Tell her to access web site "Swiss".	kampee	17-May-02	8:45 AM
arunwan	chankan	13-May-02	5:12 PM	Request to add holiday in his calendar.	Advise the process for her.	kingkeaw	13-May-02	5:23 PM
chalermpol	kraisuwan	07-May-02	9:03 AM	Apex Server down every day around 8:00AM	Escalate problem to 2nd support.	kampee	07-May-02	11:00 AM
chatrudee	kittisuksatit	02-May-02	4:20 PM	RSIM2 PC doesn't connect automatically.	Check on "connect automatically" check box and uncheck "work offline"	kingkeaw	02-May-02	4:30 PM

Page 1 of 4

Figure F.1. The Example of Monthly Management Report.

Hardware Failure Report

Type	Company	Model	Brand	Serial No.	Specification	Expired	User
PC	IBM Thailand Comp	300PL	IBM	2024911	P3,256K,8GB	11-Dec-02	sirichai
PC	IBM Thailand Comp	Netvista	IBM	3126701	P4,256K,40GB	23-Oct-03	christopher
PC	IBM Thailand Comp	Netvista	IBM	3124512	P4,256K,40GB	09-Dec-04	venkat
PC	MMCP	Rockaway	Intel	1129061	P2,64K,2.5GB	30-Jul-01	utai

Page 1 of 1

Figure F.2. Hardware Failure Report.

Pending Job Report

Request Date Time		Problem	User Name		MIS
21-May-02	10:00 AM	Request to install teleconference at meeting room.	chalermpol	kraisuwan	kingkeaw
21-May-02	10:07 AM	Request to install RMC	wiyada	kim	kamtan

Page 1 of 1

Figure F.3. Pending Job Report.

Daily Request Report on 03-May-02

User Name		Time	Problem	Solution	MIS	Finish Date	Time
pavinee	yongpatinat	9:35 AM	Can not add a new item in Ron's calendar.	Advise to add deligation in Notes preferences.	siriwan	03-May-02	10:00 AM
than	naing	10:20 AM	Delivery 10 network cables.	Delivery 10 network cables.	kampee	03-May-02	10:27 AM

Page 1 of 1

Figure F.4. Daily Request Report.

Expired Warranty Report

Expired Date	Type	Brand	Model	Serial No.	Specification	Company	User Name	
05-Jul-02	Modem	3COM	US Robotics	403295	56K	Compex (Thailand) Co.,Ltd.	venkat	sawyer
11-Dec-02	PC	IBM	300PL	2025475	P3,256K,8GB	IBM Thailand Company Limited	ornanong	phankao
11-Dec-02	PC	IBM	300PL	2025199	P3,256K,8GB	IBM Thailand Company Limited	anurug	mingdira
11-Dec-02	PC	IBM	300PL	2024711	P3,256K,8GB	IBM Thailand Company Limited	arunwan	chankan
11-Dec-02	PC	IBM	300PL	2025233	P3,256K,8GB	IBM Thailand Company Limited	wiyada	kim
11-Dec-02	PC	IBM	300PL	2024535	P3,256K,8GB	IBM Thailand Company Limited	than	naing
11-Dec-02	PC	IBM	300PL	2025174	P3,256K,8GB	IBM Thailand Company Limited	prakit	tharaprasert
11-Dec-02	PC	IBM	300PL	2025739	P3,256K,8GB	IBM Thailand Company Limited	pavinee	yongpatinat
11-Dec-02	PC	IBM	300PL	2025163	P3,256K,8GB	IBM Thailand Company Limited	apichada	rojchanasatit
11-Dec-02	PC	IBM	300PL	2025295	P3,256K,8GB	IBM Thailand Company Limited	puangthong	suntornpisarn
11-Dec-02	PC	IBM	300PL	2025280	P3,256K,8GB	IBM Thailand Company Limited	chatrudee	kittisuksatit
11-Dec-02	PC	IBM	300PL	2024836	P3,256K,8GB	IBM Thailand Company Limited	pornthip	pongpitan
11-Dec-02	PC	IBM	300PL	2025026	P3,256K,8GB	IBM Thailand Company Limited	munee	yooprapat
21-Mar-03	Printer	HP	4050	762311	2M	Hewlett-Packart (Thailand) Ltd.	chalermpol	kraisuwan

Figure F.5. Expired Warranty Report.

Legal Software Report

Type	Name	Licence Key	Licence No.	Version	Company
adobe	adobe photoshop	EGH0B6340249-112	5	5.0	Tech D&I Co.,Ltd.
microsoft	microsoft frontpage	50662-497-751753	10	2000	Compex (Thailand) Co.,Ltd.
microsoft	microsoft office	4114-7859156	200	2000	Compex (Thailand) Co.,Ltd.
microsoft	microsoft project	JGWLJ-RT9IJ-9166652	10	2000	Compex (Thailand) Co.,Ltd.
microsoft	microsoft virtual studio	HN4ZK-FJ673-491601	15	2000	Compex (Thailand) Co.,Ltd.
microsoft	microsoft windows 2000	RAZRD-ECID3-F4AK2-F9R7Z-GJA7Q	200	2000	Compex (Thailand) Co.,Ltd.
microsoft	visio	1275-1714-6585	30	2000	Compex (Thailand) Co.,Ltd.
norton	norton antivirus	KSDLK-2343295	200	2000	NET ENG TEL Co.,Ltd.
thaisoft	thaisoft so sethaputra dictionary	-	50	2.0	SCS Computer Systems (Thailand) Co.,Ltd.
winzip	nico mak	-	70	7.0	Bara Advanced InfoTech Co.,Ltd.

Page 1 of 1

Figure F.6. Legal Software Report.

User Logon Report

Server Name	Logon Name	Status	Start Date	User Name	
BKKSINW1	c_arunvarn	☑	03-Jul-97	arunwan	chankan
BKKSINW1	cr_johnson	☑	10-Oct-98	christopher	johnson
BKKSINW1	k_chalermpol	☑	17-Feb-95	chalermpol	kraisuwan
BKKSINW1	m_anurug	☑	03-Jan-95	anurug	mingdira
BKKSINW1	m_anurug	☑	23-May-99	anurug	mingdira
BKKSINW1	m_surapee	☑	17-Feb-95	surapee	mingmongkol
BKKSINW1	p_utai	☑	20-Jul-98	utai	phetburapa
BKKSINW1	s_venkat	☑	10-Apr-02	venkat	sawyer
BKKSINW1	tay_lisa	☑	06-Jul-00	lisa	tay
BKKSNAS1	k_chalermpol	☑	21-Sep-01	chalermpol	kraisuwan
RATHIA	c_arunvarn	☑	10-May-99	arunwan	chankan
RATHIA	m_surapee	☑	10-May-99	surapee	mingmongkol
REUTER6	cr_johnson	☑	10-Oct-98	christopher	johnson
REUTER6	m_surapee	☑	23-May-99	surapee	mingmongkol
REUTER6	s_venkat	☑	10-Apr-02	venkat	sawyer
REUTER6	tay_lisa	☑	06-Jul-00	lisa	tay

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS OF ST GABRIEL
LABOR OMNIA VINCIT
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

Figure F.7. User Logon Report.

Virus Scan Report

Version	User Name	
2000	lisa	tay
2000	surapee	mingmongkol
2000	venkat	sawyer

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS of ST GABRIEL
LABOR OMNIA VINCIT
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

Figure F.8. Virus Scan Report.

Development Report

ID	Request Information	Start Date	Finished Date	DS Name	Request ID
4	Data on Analyst Server is not correct.	15-May-02	22-May-02	rungsan	27

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS of S1 GABRIEL
LABOR VINCIT OMNIA
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

Figure F.9. Development Report.

Local Product Testing Report

ID	Request Information	Start Date	Finished Date	DS Name	Request ID
5	Apex Server down every day around 8:00 AM	07-May-02	10-May-02	nutthanicha	25

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS of ST GABRIEL
LABOR OMNIA VINCIT
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

Figure F.10. Local Product Testing Report.

Inter Product Testing Report

ID	Request Information	Start Date	Finished Date	DS Name	Request ID
3	Can not access web site "Swiss"	14-May-02	17-Mar-02	koh	19
6	RT can't connect to RT web page.	17-May-02	17-May-02	koh	29

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS of ST GABRIEL
LABOR VINCIT OMNIA
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

Figure G.11. Inter Product Testing Report.

Data Source Report

ID	Request Information	Start Date	Finished Date	DS Name	Request ID
1	Request AMS feed	22-Apr-02	26-May-02	piyaporn	2
2	Request 10 network cables	30-Apr-02	05-Mar-02	wanchai	9

ASSUMPTION UNIVERSITY OF THAILAND
SINCE1969

Figure F.12. Data Source Report.

APPENDIX G

ENTITY RELATIONSHIP DIAGRAM

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS of ST GABRIEL
LABOR VINCIT OMNIA
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

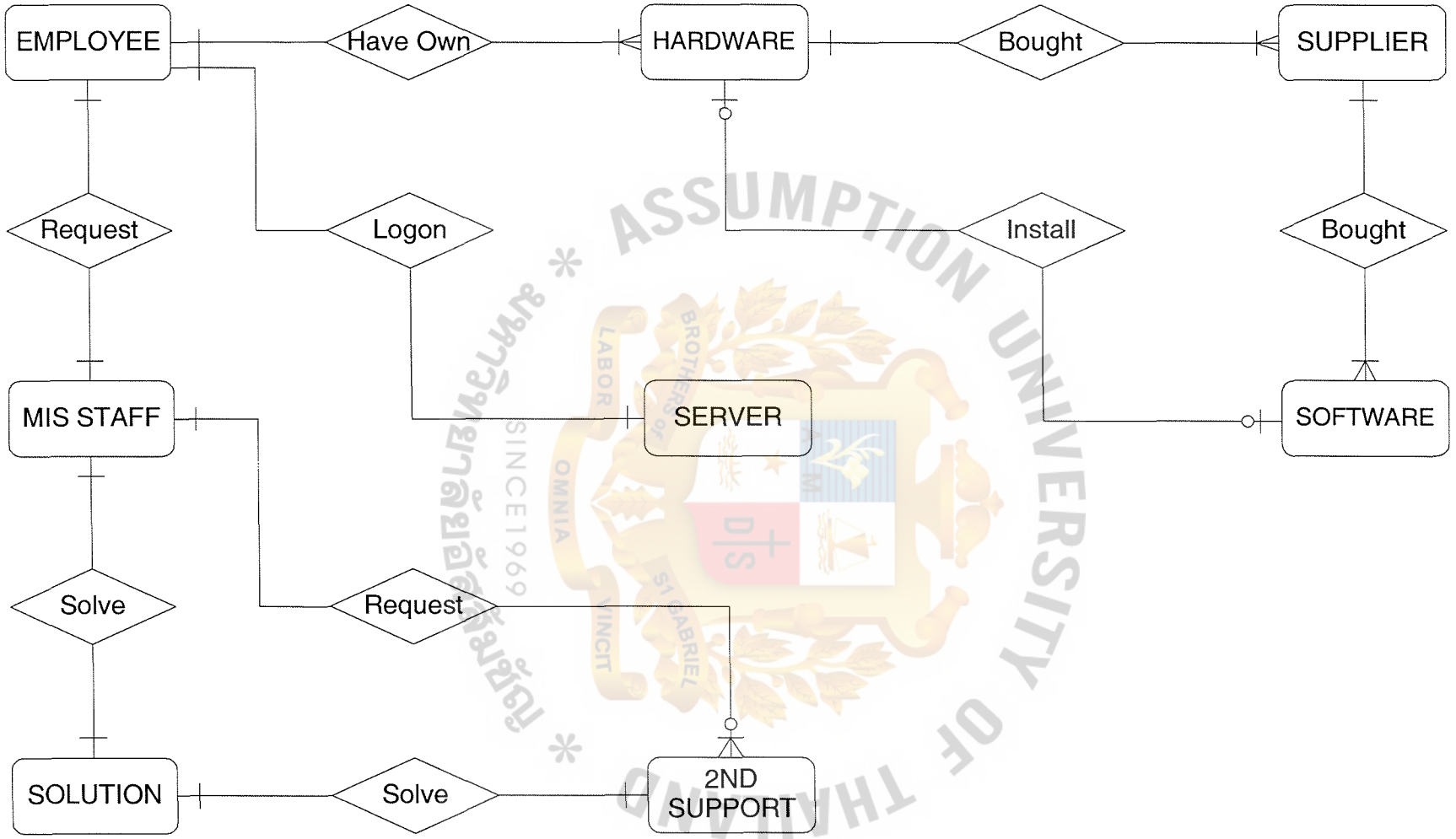

Figure G.1. Entity Relationship Diagram.

St. Gabriel's Library, Au

APPENDIX H

TABLE DESIGN

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS of ST GABRIEL
LABOR VINCIT OMNIA
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

Table: 2ND_SUPPORT

Properties

Date Created: 7/9/2002 Last Updated: 8/20/2002

Record Count: 6

Columns

Name	Type	Size
2s_id	Long Integer	4
2s_request	Text	255
2s_sdate	Date / Time	8
2s_ndate	Date / Time	8
2nd_id	Long Integer	4
req_id	Long Integer	4

Table Indexes

Name	Number of Fields
PrimaryKey	1

Clustered:	False
Distinct Count:	6
Foreign:	False
Ignore Nulls:	False
Name:	PrimaryKey
Primary:	True
Required:	True
Unique:	True
Fields:	2s_id, Ascending

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS OF ST GABRIEL
LABOR VINCIT
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

Table: 2ND_STAFF

Properties

Date Created: 7/9/2002 Last Updated: 8/20/2002

Record Count: 12

Columns

Name	Type	Size
2nd_id	Long Integer	4
2nd_name	Text	20
2nd_dept	Text	20
2nd_phone	Text	20
2nd_email	Text	50

Table Indexes

Name	Number of Fields
PrimaryKey	1
Clustered:	False
Distinct Count:	12
Foreign:	False
Ignore Nulls:	False
Name:	PrimaryKey
Primary:	True
Required:	True
Unique:	True
Fields:	2nd_id, Ascending

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS OF ST GABRIEL
LABOR VINCIT
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

Table: EMPLOYEES

Properties

Date Created: 7/9/2002 Last Updated: 8/20/2002

Record Count: 21

Columns

Name	Type	Size
emp_id	Long Integer	4
e_name	Text	20
e_surname	Text	20
e_dept	Text	20
e_position	Text	30
e_email	Text	50
e_phone	Text	10

Table Indexes

Name	Number of Fields
PrimaryKey	1

Clustered:	False
Distinct Count:	21
Foreign:	False
Ignore Nulls:	False
Name:	PrimaryKey
Primary:	True
Required:	True
Unique:	True
Fields:	emp_id, Ascending

Table: HARDWARE

Properties

Date Created: 7/9/2002 Last Updated: 8/13/2002

Record Count: 23

Columns

Name	Type	Size
hw_id	Long Integer	4
hw_type	Text	15
hw_model	Text	15
hw_brand	Text	15
hw_serial	Text	20
hw_spec	Text	255
warranty_expired	Date / Time	8
hw_fail	Yes / No	1
hw_rdate	Date / Time	8
sup_id	Long Integer	4
emp_id	Long Integer	4

Table Indexes

Name	Number of Fields
PrimaryKey	1
Clustered:	False
Distinct Count:	23
Foreign:	False
Ignore Nulls:	False
Name:	PrimaryKey

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS OF ST GABRIEL
LABOR VINCIT
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

Primary:	True
Required:	True
Unique:	True
Fields:	hw_id, Ascending

Table: LOGON

Properties

Date Created: 7/9/2002 Last Updated: 8/13/2002

Record Count: 16

Columns

Name	Type	Size
logon_id	Long Integer	4
sv_id	Long Integer	4
logon_name	Text	20
logon_status	Yes / No	1
logon_sdate	Date / Time	8
logon_ndate	Date / Time	8
emp_id	Long Integer	4

Table Indexes

Name	Number of Fields
PrimaryKey	1

Clustered:	False
Distinct Count:	12
Foreign:	False
Ignore Nulls:	False
Name:	PrimaryKey
Primary:	True
Required:	True
Unique:	True
Fields:	logon_id, Ascending

Table: MIS STAFF

Properties

Date Created: 7/9/2002 Last Updated: 7/17/2002

Record Count: 5

Columns

Name	Type	Size
mis_id	Long Integer	4
m_name	Text	20
m_surname	Text	20
m_status	Yes / No	1

Table Indexes

Name	Number of Fields
PrimaryKey	1
Clustered:	False
Distinct Count:	5
Foreign:	False
Ignore Nulls:	False
Name:	PrimaryKey
Primary:	True
Required:	True
Unique:	True
Fields:	mis_id, Ascending

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS OF ST GABRIEL
LABOR VINCIT
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

Table: REQUEST INFO

Properties

Date Created: 7/9/2002 Last Updated: 8/20/2002

Record Count: 30

Columns

Name	Type	Size
req_id	Long Integer	4
problem	Text	255
emp_id	Long Integer	4
mis_id	Long Integer	4
sol_id	Long Integer	4
req_sdate	Date / Time	8
req_ndate	Date / Time	8
req_stime	Date / Time	8
req_ntime	Date / Time	8

Table Indexes

Name	Number of Fields
PrimaryKey	1
Clustered:	False
Distinct Count:	31
Foreign:	False
Ignore Nulls:	False
Name:	PrimaryKey
Primary:	True
Required:	True

Unique:	True
Fields:	req_id, Ascending

Table: SERVER

Properties

Date Created: 7/9/2002 Last Updated: 8/13/2002

Record Count: 4

Columns

Name	Type	Size
sv_id	Long Integer	4
sv_name	Text	20
sv_description	Text	255

Table Indexes

Name	Number of Fields
PrimaryKey	1
Clustered:	False
Distinct Count:	8
Foreign:	False
Ignore Nulls:	False
Name:	PrimaryKey
Primary:	True
Required:	True
Unique:	True
Fields:	sv_id, Ascending

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS OF ST GABRIEL
LABOR VINCIT
SINCE 1969
มหาวิทยาลัยอัสสัมชัญ

Table: SOFTWARE

Properties

Date Created: 7/9/2002 Last Updated: 8/14/2002

Record Count: 10

Columns

Name	Type	Size
sw_id	Long Integer	4
sw_type	Text	20
sw_name	Text	35
sw_key	Text	30
sw_licence	Long Integer	4
sup_id	Long Integer	4
sw_version	Text	10

Table Indexes

Name	Number of Fields
PrimaryKey	1

Clustered:	False
Distinct Count:	10
Foreign:	False
Ignore Nulls:	False
Name:	PrimaryKey
Primary:	True
Required:	True
Unique:	True
Fields:	sw_id, Ascending

Table: SOFTWARE LIST

Properties

Date Created: 7/11/2002 Last Updated: 8/21/2002

Record Count: 5

Columns

Name	Type	Size
l_id	Long Integer	4
sw_id	Long Integer	4
hw_id	Long Integer	4

Table Indexes

Name	Number of Fields
PrimaryKey	1
Clustered:	False
Distinct Count:	5
Foreign:	False
Ignore Nulls:	False
Name:	PrimaryKey
Primary:	True
Required:	True
Unique:	True
Fields:	l_id, Ascending

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS OF ST GABRIEL
LABOR VINCIT
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

Table: SOLUTIONS

Properties

Date Created: 7/9/2002 Last Updated: 8/20/2002

Record Count: 23

Columns

Name	Type	Size
sol_id	Long Integer	4
sol_description	Text	255

Table Indexes

Name	Number of Fields
PrimaryKey	1
Clustered:	False
Distinct Count:	26
Foreign:	False
Ignore Nulls:	False
Name:	PrimaryKey
Primary:	True
Required:	True
Unique:	True
Fields:	sol_id, Ascending

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS OF ST GABRIEL
LABOR VINCIT
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

St. Gabriel's Library, Au

Table: SUPPLIERS

Properties

Date Created: 7/9/2002 Last Updated: 8/13/2002

Record Count: 14

Columns

Name	Type	Size
sup_id	Long Integer	4
s_company	Text	50
s_contact1	Text	40
s_contact2	Text	40
s_tel1	Text	10
s_tel2	Text	10
s_fax	Text	10
s_email	Text	50
s_product	Text	50

Table Indexes

Name	Number of Fields
PrimaryKey	1
Clustered:	False
Distinct Count:	14
Foreign:	False
Ignore Nulls:	False
Name:	PrimaryKey
Primary:	True
Required:	True

Unique:	True
Fields:	sup_id, Ascending

APPENDIX I

ALTERNATIVE CASES STUDY

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS of ST GABRIEL
LABOR VINCIT
OMNIA
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

ALTERNATIVE CASES STUDY

There are 3 alternative cases study.

(1) CALITS by MS Access

(2) CALITS by MS SQL

(3) CALITS by Oracles

The alternative cases study comparison is shown in table I.1

Table I.1 The Alternative Cases Study Comparison.

Characteristics	Case 1	Case 2	Case 3
Accessibility	Directly	Use another PC with restricted access	Use another PC with restricted access
Concurrent Usages	10 (max)	More than 100	More than 100
Data Integrity	Medium	High	High
Data Requirements	50,000 records	More than 100,000 records	More than 100,000 records
Database Software	MS Access	MS SQL	Oracles
DB Technique	File Based	Client/Server	Client/Server
Development Cost	Less	High	High
Hardware Cost	Less	High	High
Implementation	2 months	4 months	6 months
IT Support	Yes / No	Yes	Yes
Network Architecture	Ethernet LAN using Star Topology	Ethernet LAN using Star Topology	Ethernet LAN using Star Topology
Performance	Medium	High	High
Reliability	Medium	High	High
Scalability	Small	Huge	Huge

ASSUMPTION UNIVERSITY OF THAILAND
SINCE1969

Table I.1 The Alternative Cases Study Comparison (Continued).

Characteristics	Case 1	Case 2	Case 3
Security	Medium	High	High
Software Cost	Less	High	High
Training Cost	Less	High	High
Usage	Easy	Difficult	Difficult
Ranking	High	Medium	Low

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS of ST GABRIEL
LABOR OMNIA VINCIT
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

BIBLIOGRAPHY

1. Date, C. J. An Introduction to Database System. MA: Addison-Wesley, 1995.

2. FitzGerald, Jerry and Ardra F. FitzGerald. Fundamentals of Systems Analysis: Using Structured Analysis and Design Techniques, Third Edition. NY: John Wiley, 1987.

3. Kaufman, Charlie, Radia Perlman, and Mike Speciner. Network Security. London: Prentice-Hall International, 1995.

4. Kendall, Kenneth E. and Julie E. Kendall. System Analysis and Design, Second Edition. Englewood Cliffs, NJ: Prentice-Hall, Inc., 1992.

5. Page-Jones, Meilir. The Practical Guide to Structured Systems Design, Second Edition. NJ: Prentice Hall, 1998.

6. Parker, Charles and Thomas Case. Management Information Systems, Second Edition. NY: McGraw-Hill, 1993.

7. Pfleeger, Charles P. Security in Computing, Second Edition. London: Prentice-Hall International, 1997.

8. Pressman, Roger S. Software Engineering, Fourth Edition. NY: McGraw-Hill, 1997.

9. Senn, James A. Analysis and Design of Information Systems, Second Edition. NY: McGraw-Hill, 1989.

10. Stallings, William. Data and Computer Communications, Fifth Edition. London: Prentice-Hall International, 1997.

11. Yourdon, Edward. Modern Structured Analysis. London: Prentice-Hall International, 1989.

Thai References

1. ฉันทวิท กุลไพศาล. การวิเคราะห์และพัฒนาระบบงาน. กรุงเทพมหานคร: บริษัท อินฟอร์เมติก บิซิเนส พับลิเคชัน จำกัด, 2535.

2. ดวงแก้ว สวามิภักดิ์. ระบบฐานข้อมูล. กรุงเทพมหานคร: บริษัท ซีเอ็ดยูเคชั่น จำกัด(มหาชน), 2539.

3. ไพรัช โมระนิธิสวัสดิ์. Microsoft Access สำหรับวินโดวส์ (Step by Step). กรุงเทพมหานคร: บริษัท ซีเอ็ดยูเคชั่น จำกัด(มหาชน), 2537.

4. ยุคลอาจ ชาญพานิชกิจการ. Advance Access 2000. กรุงเทพมหานคร: บริษัท ซีเอ็ดยูเคชั่น จำกัด(มหาชน), 2542.

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS of ST GABRIEL
LABOR OMNIA VINCIT
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

St. Gabriel's Library, Au