Automobile Insurance Information System for Success Insurance Company Limited

by

Ms. Natinee Masangsan

A Final Report of the Six-Credit Course
CS 6998 - CS 6999 System Development Project

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

November 2002

Automobile Insurance Information System for Success Insurance Company Limited

by
Ms. Natinee Masangsan

A Final Report of the Six-Credit Course
CS 6998 – CS 6999 System Development Project

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

November 2002

Project Title	Automobile Insurance Information System for Success Insurance Company Limited
Name	Ms. Natinee Masangsan
Project Advisor	Air Marshal Dr. Chulit Meesajjee
Academic Year	November 10, 2002

The Graduate School of Assumption University has approved this final report of the six-credit course, CS 6998 – CS 6999 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

November 10, 2002

ABSTRACT

This project is written to be submitted for CS6998 – CS6999 System Development Project of MS (CIS) program, Assumption University. The project covers the system analysis, system design and implementation of Advanced Automobile Insurance Information System for Success Insurance Company Limited to solve the problems occurring in the existing system.

The existing system is based on a manual system, before the development of the Automobile Insurance Information System is done, the current problems of the existing system and area for improvement have been clearly defined. The objective of the proposed system is to defining the user requirements. Many alternative systems are of interest, but the final candidate solution will be selected based on the payback method, the break-even methodology, and feasibility study.

In the new computerized system, Automobile Insurance Information System has replaced the existing system, the problems occurring in the existing system have been solved including the decrease of high maintenance costs. The new system facilitates all user requirements in entering and finding details as well as providing reports as often as they need. Moreover, it can improve efficiency for planning, decision-making and also provide better response time to both operation and business process making the company get more efficient information and profit.

ACKNOWLEDGEMENTS

The effort of many people went into the creation of this project. The writer would like to express her sincere thanks to all of them for their kind cooperation and advice. The comments of their reviews were extremely helpful in the completion of this project.

Firstly, the writer desires to express her most sincere appreciation and thanks to Air Marshal Dr. Chulit Meesajjee, her project advisor, for his continuing advice, support and correction throughout this system development project.

She would like to thank Miss Rattana Kongchuan and Miss Nampetch Gadetragoon, friends who gave her the idea and advice in the preparation of this project.

She would like to thank Mr. Surachai Ngarmchanpli, vice president and all the people at Patthara Insurance Public Company Limited who have given support in providing the documents, information, and suggestion about Automobile Insurance Information System.

Finally, her very special thanks go to her parents, family members, and friends for the time they spent with her in the preparation, for their constant encouragement, and for their inspiration to complete this project.

ASSUMPTION UNIVERSITY OF THAILAND
SINCE 1969
มหาวิทยาลัยอัสสัมชัญ

TABLE OF CONTENTS

Chapter		Page
ABSTRACT		i
ACKNOWLEDGEMENTS		ii
LIST OF FIGURES		v
LIST OF TABLES		viii
I.	INTRODUCTION	1
1.1	Background of the Project	1
1.2	Objectives of the project	2
1.3	Scope of the Project	3
1.4	Deliverables	4
1.5	Project Plan	5
II.	THE EXISTING SYSTEM	7
2.1	Background of the Organization	7
2.2	Existing Business Function	11
2.3	Current Problems and Areas for Improvement	11
III.	THE PROPOSED SYSTEM	14
3.1	System Specification	14
3.2	System Design	15
3.3	Hardware and Software Requirement	19
3.4	Cost and Benefit Analysis	24
3.5	Security and Control	33
IV.	PROJECT IMPLEMENTATION	35
4.1	Overview of Project Implementation	35

ASSUMPTION UNIVERSITY OF THAILAND SINCE 1969 มหาวิทยาลัยอัสสัมชัญ

Chapter Page

4.2 Software Development 35

4.3 Hardware Installation 36

4.4 Personnel Training 36

4.5 Test Plan 36

4.6 Conversion 37

4.7 Documentation 37

V. CONCLUSIONS AND RECOMMENDATIONS 38

5.1 Conclusions 38

5.2 Recommendations 43

APPENDIX A DATABASE DESIGN 45

APPENDIX B DATA DICTIONARY 55

APPENDIX C DATA FLOW DIAGRAM 59

APPENDIX D PROCESS SPECIFICATION 76

APPENDIX E INTERFACE DESIGN 86

APPENDIX F REPORT DESIGN 97

APPENDIX G ALTERNATIVE CANDIDATE SOLUTIONS 103

BIBLIOGRAPHY 130

ASSUMPTION UNIVERSITY OF THAILAND SINCE 1969

LIST OF FIGURES

Figure		Page
1.1	Project Plan of Automobile Insurance Information System	6
2.1	The Organization Chart of Success Insurance Company Limited	10
2.2	Context Level Data Flow Diagram of Existing Automobile Insurance Information System	13
3.1	Context Level Data Flow Diagram of Proposed Automobile Insurance Information System	17
3.2	Level 0 Data Flow Diagram of Proposed Automobile Insurance Information System	18
3.3	The Network Configuration of Automobile Insurance Information System	23
3.4	Cost Comparison between the Manual and Proposed System	28
3.5	Payback Period of Automobile Insurance Information System	31
A.1	Context Level of Entity Relationship Diagram of Automobile Insurance Information System	45
A.2	Key-based Attributed Entity Relationship Diagram of Automobile Insurance Information System	46
A.3	Fully Attributed Entity Relationship Diagram of Automobile Insurance Information System	47
C.1	Context Level Data Flow Diagram of the Proposed Automobile Insurance Information System	59
C.2	A Functional Decomposition Diagram of the Proposed Automobile Insurance Information System	60
C.3	Level 0 Data Flow Diagram of the Proposed Automobile Insurance Information System	61
C.4	Level 1 Data Flow Diagram of Process Insured & Car Profile of the Proposed Automobile Insurance Information System	62
C.5	Level 1 Data Flow Diagram of Process Agency Profile of the Proposed Automobile Insurance Information System	63

Figure		Page
C.6	Level 1 Data Flow Diagram of Process Premium Registration of the Proposed Automobile Insurance Information System	64
C.7	Level 1 Data Flow Diagram of Process Issued Policy Schedule/Sticker of the Proposed Automobile Insurance Information System	65
C.8	Level 1 Data Flow Diagram of Process Issued Endorsement of the Proposed Automobile Insurance Information System	66
C.9	Level 1 Data Flow Diagram of Process Commission Registration of the Proposed Automobile Insurance Information System	67
C.10	Level 1 Data Flow Diagram of Process Generate Receipt/Report of the Proposed Automobile Insurance Information System	68
C.11	Structure Chart of Process Insured & Car Profile	69
C.12	Structure Chart of Process Agency Profile	70
C.13	Structure Chart of Process Premium Registration	71
C.14	Structure Chart of Process Issued Policy Schedule/Sticker	72
C.15	Structure Chart of Process Issued Endorsement	73
C.16	Structure Chart of Process Commission Registration	74
C.17	Structure Chart of Process Generate Report	75
E.1	Login Screen Form	86
E.2	Invalid User Screen Form	86
E.3	Main Menu Form	87
E.4	Insured Information Form	88
E.5	Car Information Form	89
E.6	Agent Information Form	90
E.7	Broker Information Form	91
E.8	Policy Transaction Information Form	92
E.9	Inquiry Policy Form	93

ASSUMPTION UNIVERSITY OF THAILAND SINCE 1969 มหาวิทยาลัยอัสสัมชัญ

Figure		Page
E.10	Policy Information Search by Policy Number Form	94
E.11	Policy Information Search by Endorsement Number Form	95
E.12	Policy Information Search by Sticker Number Form	96
F.1	Policy Schedule Document	97
F.2	Sticker Document	98
F.3	Endorsement Document	99
F.4	Policy Daily Report	100
F.5	Policy Monthly Report	101
F.6	Policy Annual Report	102
G.1	Cost Comparison between the Manual and Proposed System for Candidate 1	111
G.2	Payback Period for Candidate 1	114
G.3	Cost Comparison between the Manual and Proposed System for Candidate 2	118
G.4	Payback Period for Candidate 2	121
G.5	Cost Comparison between the Manual and Proposed System for Candidate 3	125
G.6	Payback Period for Candidate 3	128

ASSUMPTION UNIVERSITY OF THAILAND
SINCE 1969
มหาวิทยาลัยอัสสัมชัญ

LIST OF TABLES

Table		Page
3.1	The Hardware Specification for the Server	20
3.2	The Software Specification for the Server	20
3.3	The Hardware Specification for Each Client Machine	21
3.4	The Software Specification for Each Client Machine	21
3.5	Other Hardware Requirements	22
3.6	Manual System Cost Analysis, Baht	24
3.7	Five Years Accumulated Manual System Cost, Baht	24
3.8	Computerized System Cost Analysis, Baht	25
3.9	Five Years Accumulated Computerized System Cost, Baht	26
3.10	The Comparison of the System Costs, Baht	27
3.11	Payback Analysis for the Proposed Automobile Insurance Information System, Baht	30
5.1	The Degree of Achievement of the Automobile Insurance Information System	39
A.1	Structure of Insured Table	48
A.2	Structure of Car Table	49
A.3	Structure of Car_Type Table	50
A.4	Structure of Policy Schedule Table	51
A.5	Structure of Sticker Table	51
A.6	Structure of Endorsement Table	52
A.7	Structure of Agency Table	52
A.8	Structure of Agent Table	53
A.9	Structure of Broker Table	53

SUNPIOL UNIVERSITY OF THAILAND SINCE 1969 มหาวิทยาลัยอัสสัมชัญ

Table		Page
A.10	Structure of Commission_Agency Table	54
A.11	Structure of Commission_Type Table	54
A.12	Structure of Receipt Table	54
B.1	Data Dictionary of Insured Table	55
B.2	Data Dictionary of Car Table	55
B.3	Data Dictionary of Car_Type Table	56
B.4	Data Dictionary of Policy Schedule Table	56
B.5	Data Dictionary of Sticker Table	56
B.6	Data Dictionary of Endorsement Table	57
B.7	Data Dictionary of Agency Table	57
B.8	Data Dictionary of Agent Table	57
B.9	Data Dictionary of Broker Table	58
B.10	Data Dictionary of Commission_Agency Table	58
B.11	Data Dictionary of Commission_Type Table	58
B.12	Data Dictionary of Receipt Table	58
D.1	Process Specification of Process 1.1	76
D.2	Process Specification of Process 1.2	76
D.3	Process Specification of Process 2.1	77
D.4	Process Specification of Process 2.2	77
D.5	Process Specification of Process 3.1	78
D.6	Process Specification of Process 3.2	78
D.7	Process Specification of Process 3.3	79
D.8	Process Specification of Process 4.1	79
D.9	Process Specification of Process 4.1	80

Table		Page
D.10	Process Specification of Process 4.3	80
D.11	Process Specification of Process 4.4	81
D.12	Process Specification of Process 5.1	81
D.13	Process Specification of Process 5.2	82
D.14	Process Specification of Process 6.1	82
D.15	Process Specification of Process 6.2	83
D.16	Process Specification of Process 7.1	84
D.17	Process Specification of Process 7.2	85
G.1	Candidate Matrix	103
G.2	Comparison of Alternative Candidates	105
G.3	Feasibility Analysis Matrix	107
G.4	Computerized System Cost Analysis for Candidate 1, Baht	109
G.5	Five Years Accumulated Cost for Candidate 1, Baht	110
G.6	The Comparison of the System Cost for Candidate 1, Baht	110
G.7	Payback Analysis for Candidate 1	113
G.8	Computerized System Cost Analysis for Candidate 2, Baht	116
G.9	Five Years Accumulated Cost for Candidate 2, Baht	117
G.10	The Comparison of the System Cost for Candidate 2, Baht	117
G.11	Payback Analysis for Candidate 2	120
G.12	Computerized System Cost Analysis for Candidate 3, Baht	123
G.13	Five Years Accumulated Cost for Candidate 3, Baht	124
G.14	The Comparison of the System Cost for Candidate 3, Baht	124
G.15	Payback Analysis for Candidate 3	127

I. INTRODUCTION

1.1 Background of the Project

The report is done according to the requirements of MS (CIS) program, CS6998 – CS6999 System Development Project, which includes studying and analyzing the problems of the existing system, defining user requirements, and designing an appropriate computerized system for a company.

In Thailand, there are two main types of Motor Insurance Policies:

(1) Compulsory Motor Insurance (CMI): this is the type of insurance which the government forces every owner to effect the cover according to the Road traffic Accident Victim Protection Act B.E. 2535 (A.D. 1992);

(2) Voluntary Motor Insurance (VMI): this is the type of insurance which the vehicle owner decides to effect the cover by himself.

This report aims to replace the manual system with a computerized system which focus only on Compulsory Motor Insurance and plans to establish more focus to accommodate future growth. As a result of large volume of transactions, there is a lot of incomplete works especially in the insurance of policy schedule and other documents in the insurance industry. Managing information is the key to gaining a competitive edge including the ability to store, related, and use data translates directly into quicker service and better assessment of risk. The sophisticated integrated Insurance System, Automobile Insurance Information System, is the new approach that allows Success Insurance Company Limited to efficiently administer its day-to-day operations and to produce reports for managing its risk.

Automobile Insurance Information System utilizes leading-edge technology, employing client-server architecture with easy-to-use graphical user interface (GUI)

based on Microsoft Windows. The client-server architecture enables users to access and manipulate data by using the multitude of easy-to-use report writing, data retrieval and decision support software that can contribute to increase the performance, improve response time, reduce working procedures and time, and also support decision-making of management. The deployment of state-of-the-art technology and design will not be outdated in the near future and ensures long term usage of the system. Therefore, Success Insurance Company Limited needs a new computerized Information System to gaining a competitive edge in the insurance industry.

1.2 Objectives of the Project

The objectives of developing the Automobile Insurance Information System project for Success Insurance Company Limited are as the follows:

(1) To study the existing manual system and design a new system for compulsory motor insurance system which will make it more effective and efficient.

(2) To install and expand the computerized information system to be effectively and efficiently utilized in the organization.

(3) To eliminate the weaknesses and lack of compliance controls in the manual system.

(4) To help access the data and information needed with speed and accuracy.

(5) To reduce time of calculation and retrieval the data and information.

(6) To give the accurate information of each transaction.

(7) To reduce the operation cost with the computerized system to contact with other sections of the organization therefore we can reduce the cost of hard copy and also reduce time consumption.

(8) To save the area to store paper work including the historical internal or external information.

(9) To reduce data redundancy by developing a good database system that support for both current and future changes as well as avoid the possible problems.

(10) To reduce the number of errors which come from the manual system.

(11) To reduce redundant or duplicate work of the staffs.

(12) To provide timely reports which are more accurate and reliable to the directing manager for making decisions.

1.3 Scope of the Project

The Automobile Insurance Information System is the system scoped only on Compulsory Motor Insurance (CMI). This is the type of insurance which the government forces every owner to effect the cover according to the Road traffic Accident Victim Protection Act B.E. 2535 (A.D. 1992). Therefore, the proposed system is created to process only on policy and endorsement entry, which can be categorized into:

(1) Develop the information supporting system that can provide the useful and reliable information for decision-making.

(2) Develop the system that can facilitate the day-to-day operation of the operating staffs.

(3) Develop the system that can inquire immediately and update correctly.

(4) Create the computerized system linking acceptance to new policy transaction and renewal policy transaction and endorsement if desired.

(5) Create the computerized system linking acceptance to calculate motor premium and commission.

(6) Analyze and design the database, hardware and software for the projected Automobile Insurance Information System.

(7) Create the screen layouts and report layouts for the users

(8) Describe the process specification for the new computerized system.

1.4 Deliverables of the Project

The deliverables of the projected Automobile Insurance Information System are as follows:

(1) Project Introduction

- (a) Background of the project
- (b) Objectives
- (c) Scope

(2) The Existing System

- (a) Background of the organization
- (b) Existing business function
- (c) Current problems and areas for improvements

(3) The Proposed System

- (a) System specification
  - (1) Context diagram
  - (2) Data flow diagram
- (b) System design
  - (1) Database Design
  - (2) Structure Chart
  - (3) Interface Design
  - (4) Report Design
  - (5) Data Dictionary

ASSUMPTION UNIVERSITY OF THAILAND SINCE 1969

(c) Hardware and software requirement

(d) Security and controls

(e) Cost/benefit analysis

(4) Project Implementation

(a) Project implementation plan

(b) Test plan

(9) Conclusions and Recommendations

1.5 Project Plan:

The project plan is based on the concept of System Development Life Cycle (SDLC). The processes are divided into 3 main phases as following:

(1) Analysis of the existing system.

(2) Analysis and design of the proposed system.

(3) Implementation of the proposed system.

This project plan of Automobile Insurance Information System is given in Figure 1.1.

ASSUMPTION UNIVERSITY OF THAILAND
LABOR OMNIA VINCIT
SINCE 1969
มหาวิทยาลัยอัสสัมชัญ

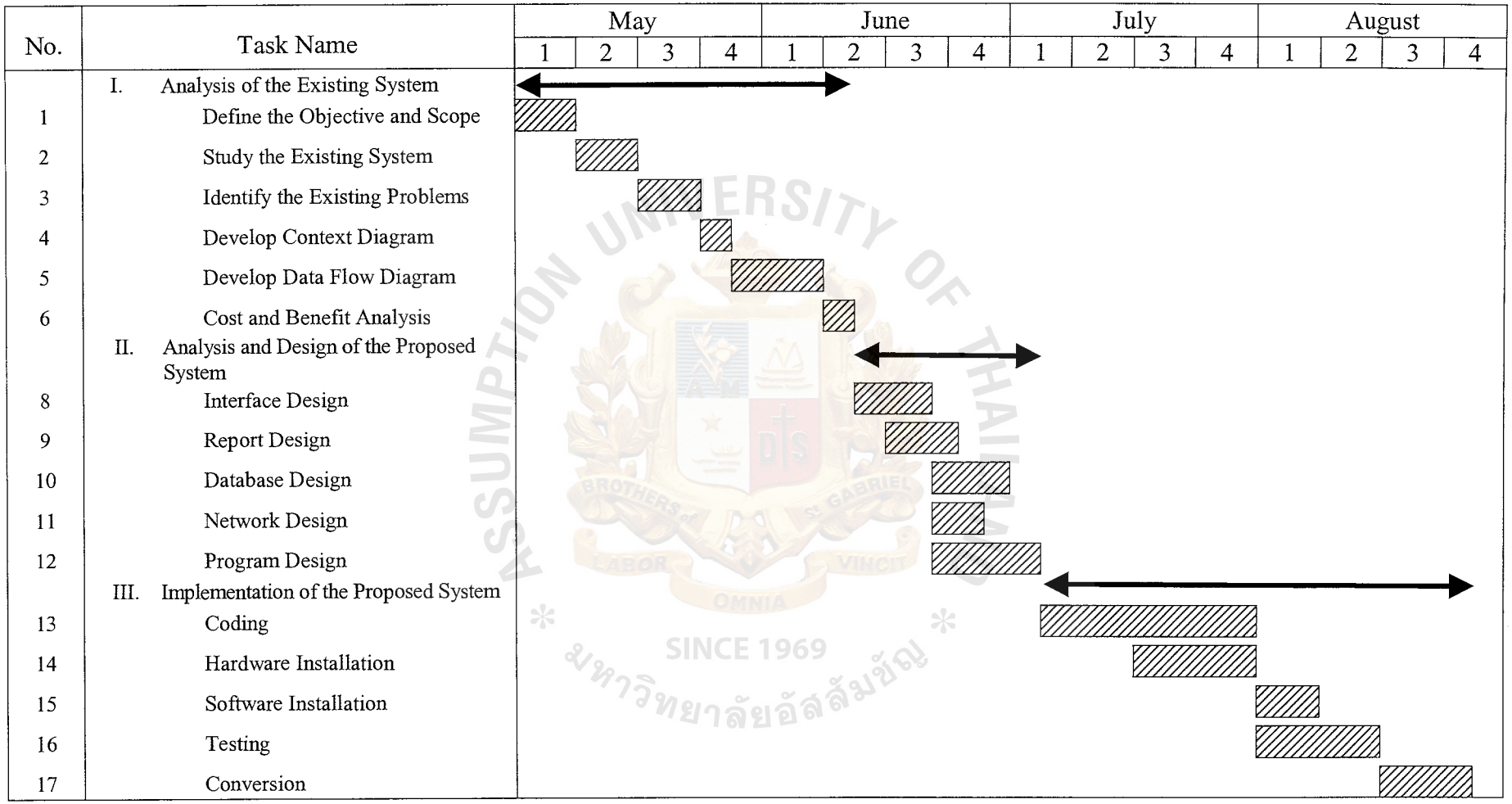


Figure 1.1. Project Plan of Automobile Insurance Information System.

II. THE EXISTING SYSTEM

2.1 Background of the Organization

Success Insurance Company Limited is the Automobile Insurance Company in Thailand, established in 1998 and located on 12 Sathorn Rd., Thungmahamek, Sathorn, Bangkok Province, Thailand. The company provides compensation for accidental loss or damage to an insurer's vehicle, including theft, and legal liability to other persons as a result of bodily injury or damage to their property based on two main types of Motor Insurance Policy, Compulsory and Voluntary Motor Insurance.

At the present, Success Insurance Company Limited has five departments, which are Marketing, Underwriting, Claim, Accounting and Administration Departments. All of the day-to-day operations and processes are currently done manually which causes serious problems to the organization. Moreover, Time is a very important factor, which affects human life. Given this reason, officers must work against time. The officer must complete more jobs in shorter time with a high level of efficiency.

As a result of obstacles of the manual system and rapid expansion, the company realized that the life cycle of a modern computer and information system tends to be shorter due to the advancement of new knowledge and technology that can provide a better service to the customer and also eliminate the errors that may occur in the business. Moreover, the company has adhered to the customer-oriented strategy, providing its clients with fair services and integrity. To further accommodate all clients, better meet their demands and strengthen mutual ties, the company embarked on an aggressive plan under an enhanced corporate vision by surveying the demands of its customers and developing new services. And that will certainly be of benefit and provide assurance to the clients.

There are 5 departments in the organization.

(1) Marketing Department

Marketing department is the department that contacts directly to the customer deals with getting request from customers, sending the policy schedule and other attachments to customer and also collecting motor premium.

(2) Underwriting Department

Underwriting department is the department deals which with the complete process of policy insurance such as calculation the motor premium, typing policies, endorsement, sticker and other documents, register the motor premium, separation copy policies and endorsements, sending the policy schedule and other attachment to marketing. This department also deals with sending the relevant copies to accounting department.

(3) Claim Department

Claim department is responsible for keeping track of each loss by claimant and managing the accident and claimants information such as receive claim forms, verify the policy contract and manage the claim, and also register the approximate claim.

(4) Accounting Department

Accounting department is responsible for all money related data from underwriting and claim department. All accounts are related to the insurance business such as premium collection, loss payment, claims expenses, commission and etc. This department also deals with all general accounts related with this company.

(5) Administration Department

Administration department is responsible for recording the job characteristics and personal information of the organization's employees.

The organization chart is shown in Figure 2.1.

ASSUMPTION UNIVERSITY OF THAILAND
SINCE 1969
มหาวิทยาลัยอัสสัมชัญ

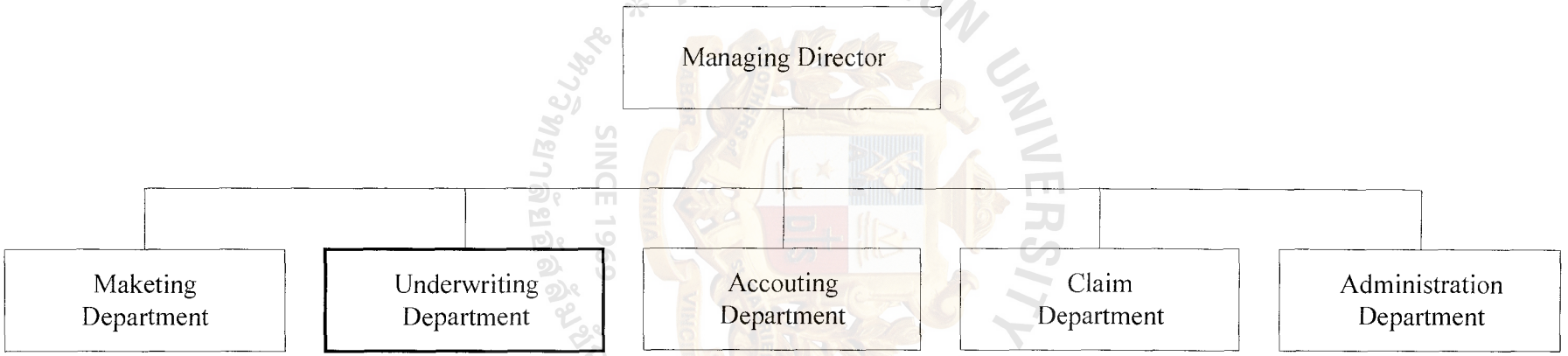


Figure 2.1. The Organization Chart of Success Insurance Company Limited.

2154 ค.4

2.2 Existing Business Function

The existing system is a manual system. It can be divided into two major processes:

(1) Underwriting Process

(a) Receive requests and documents from insured.

(b) Verify and approve insured and cars.

(c) Register the motor premium.

(d) Type policy schedule, sticker and endorsement if desired.

(e) Send the policy schedule and other documents to insured.

(2) Register Commission process

(a) Verify and approve agency.

(b) Register the commission.

(c) Type receipt for each policy.

(d) Send the relevant copies to account department.

2.3 Current Problems and Areas for Improvement

All the existing systems are based on manual systems that generate problems as follows:

(1) Problems of checking duplicate insured.

Because the registration is recorded on paper, it takes a lot of time to check the duplicate insured.

(2) Problem of verifying and approving the request.

Because the request from insured is recorded on paper that may get null in required fields.

(3) Problem of generating duplicate policy number.

The policy numbers are generated from manual system that may give duplicate number. Moreover, it is difficult to detected and effect to the next process.

(4) Problem of registering the motor premium.

It takes more time to register and calculate the motor premium and the numbers of errors that come from the manual system often occur.

(5) Type policies, sticker, and endorsement if desired.

The documents are created from different officers, therefore, the bottleneck in producing the policy schedules, stickers, and endorsements can occur including the duplicate documents.

(6) Problem of registering the commission.

It takes more time to register and calculate the commission and the numbers of errors that come from the manual system often occur.

(8) Problem of sends the completed documents to accounting department and insured.

Each document comes from many sources that may give wrong information and is difficult to get information easily and timely. Moreover, the problem that often occurs cannot be detected.

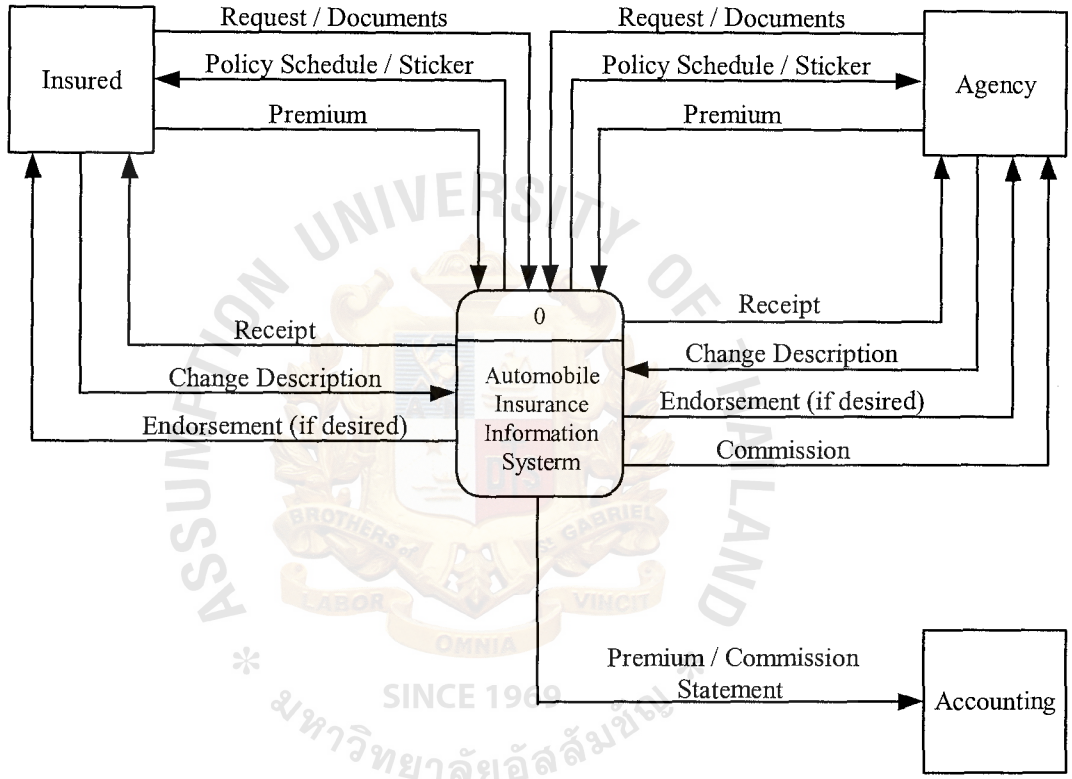


Figure 2.2. Context Level Data Flow Diagram of Existing Automobile Insurance Information System.

III. THE PROPOSED SYSTEM

3.1 System Specification

From the previous chapter, Success Insurance Company Limited should have an effective automobile insurance Information System that can provide more accurate information and solve the problems occurring from the existing manual system and some ineffective computerized information system.

In order to achieve the target, the Automobile Insurance Information System consists of three subsystems. They are profile, underwriting, and commission and report subsystem. The brief description of each subsystem is explained as the following features:

(1) Profile Subsystem

This subsystem performs input of insured and car information including agency information into the system by ensuring that all required insured, car and agency information will be stored into the system. If the record is already existed, the system will retrieve the information from the database. Otherwise, the system must generate new record, and report to the management level to support decision-making.

Moreover, this subsystem also facilitates the users in searching for insured, car, and agency information, and should result in decreasing the response time to access information.

(2) Underwriting Subsystem

This subsystem performs ability to calculate the motor premium due based on the period of cover, the new system provide the embedded arithmetic function within the system to generate calculation result

automatically. In addition, this subsystem also automatically creates the policy schedule, sticker, and endorsement if desired.

Moreover, this subsystem also facilitates the users in searching policy schedule, Sticker, and endorsement information related, and should result in decreasing the response time to access information.

(3) Commission and Report Subsystem

This subsystem performs the calculation of the commission due based on class of agency, the new system should provide the embedded arithmetic function within the system to generate calculation result automatically. In addition, this subsystem also ability to create receipt for each policy and requested reports or other documents to the user by introducing real time information in the form of hard copy and display screen.

Thus, the Automobile Insurance Information System of Success Insurance Company Limited will facilitate the various processes of acceptance to new policy and renew policy transactions and automatic calculation of premium and commission, gain more productivity and solve the problems occurring from the existing system.

3.2 System Design

(1) Entity Relationship Diagram

ERD data modeling is the technique used in organizing and documenting a system data. Data modeling, which is called database modeling, is usually a database implementation.

The ERD of the new system is shown in Appendix A as follows:

(a) A context level of entity relationship diagram

(b) A key-based attributed relationship diagram

(c) A fully attributed relationship diagram

The Data Dictionary, is the table that describes the details of each entity and attribute in ERD, is shown in Appendix B.

(2) Data Flow Diagrams (DFDs)

The logical Data Flow Diagrams (DFDs) are the structures analysis and design tools that analysts can use to understand the process of system and the movement of the data through the system.

The logical data flow diagram will indicate the flow of the requirement and the data type used in developing the program to support the new system. With DFDs, the analyst can design the file to cover the requirements of the users and support the report design of the system.

The proposed system is designed with the aim to solve the problems of the existing system as stated previously and to meet all user requirements as well. Context diagram of the proposed system is given in Figure 3.1 and level 0 Dataflow Diagram of the proposed system is given in Figures 3.2.

ASSUMPTION UNIVERSITY OF THAILAND
SINCE 1969
มหาวิทยาลัยอัสสัมชัญ

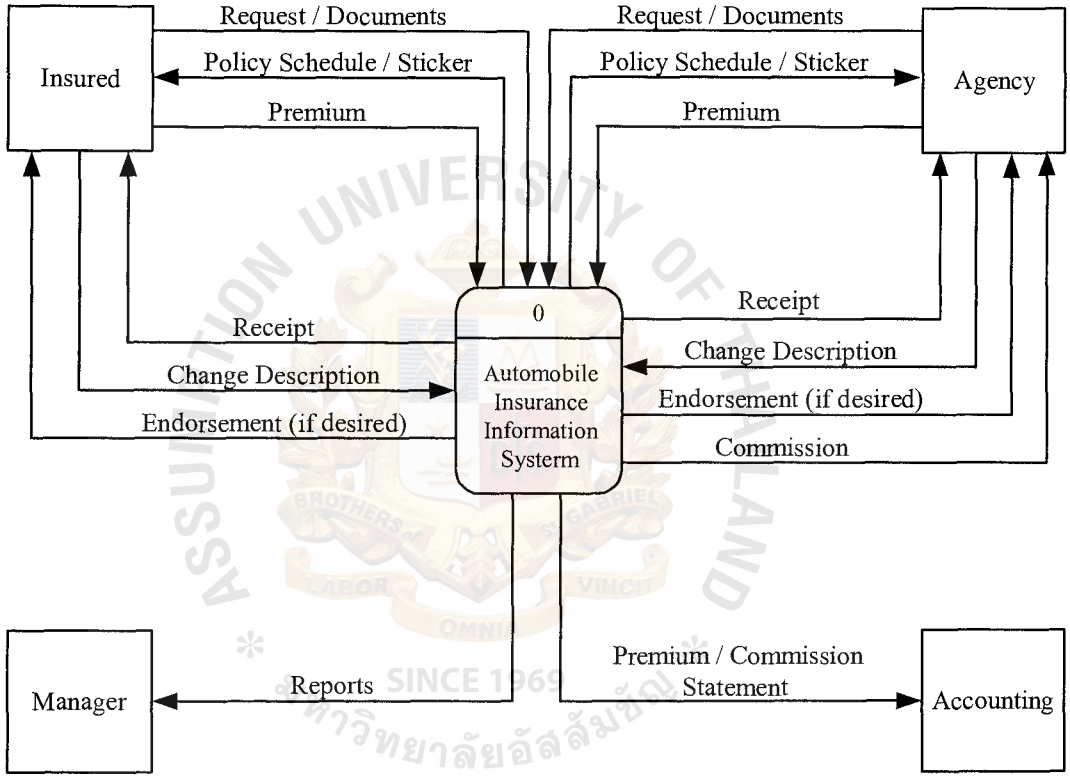


Figure 3.1. Context Level Data Flow Diagram of Proposed Automobile Insurance Information System.

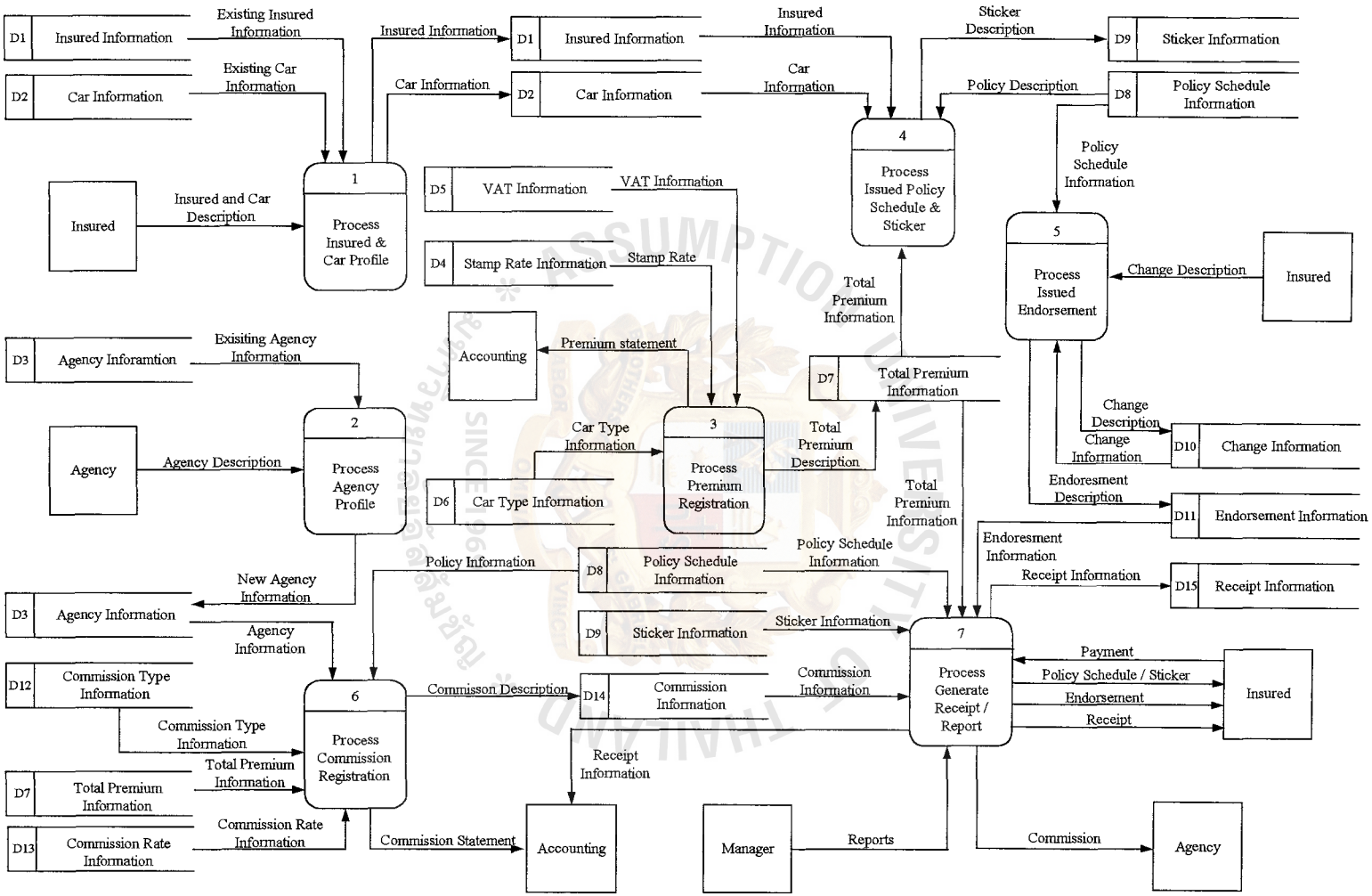


Figure 3.2. Level 0 Data Flow Diagram of Proposed Automobile Insurance Information System.

The details of data flow diagram of the Automobile Insurance Information System are shown in Appendix C, which includes:

(a) Context Data Flow Diagram

(b) Functional Decomposition Diagram

(c) Level 0 of Data Flow Diagram

(d) Level 1 of Data Flow Diagram

(e) Structure Chart

To understand the details of each process in data flow diagram, the process specification is shown in Appendix D.

(3) Input Design

Automobile Insurance Information System is easy to use and easy to understand for users, with GUI method for input screen. Users may not be confused and take time to fulfill the form we select the GUI method that appropriates for each field. The input screens of the system are in many forms for the various purposes are shown in Appendix E.

(4) Output Design

There are two types of system output forms that are in the form of hardcopy and in the form of displayed screen. Some reports are generated periodically such as on a daily, monthly, and yearly basis. The outputs in the displayed screen are for monitoring daily operation purposes.

All the reports and outputs generated by the system in shown in Appendix F.

3.3 Hardware and Software Requirement

The proposed the Advance Automobile Insurance Information System will be developed in the form of windows 2000 based. Microsoft Access 2000 is the major

software tool used to develop the input and output design of the system. The hardware & software specifications for server are shown in the Tables 3.1, 3.2 respectively.

Table 3.1. The Hardware Specification for the Server.

Hardware	Specification
CPU	Intel Pentium IV Processor 1.6 GHz.
Memory	256MB 100MHz SDRAM
Cache	1 GB or higher
Hard Disk	40 GB
CD-ROM Drive	48x CD-ROM Drive
Floppy Drive	1.44MB diskette drive
Network Adapter	10/100 Ethernet NIC
Display Screen	17"SVGA Monitor
Display Adapter	SVGA Card
Keyboard	USB Internet Keyboard (104-key)
Mouse	Internet Scroll Mouse
UPS	UPS 1000 VA

Table 3.2. The Software Specification for the Server.

Software	Specification
Operating System	Microsoft Windows 2000 Server
Database Software	Microsoft SQL Server

The client machines should be at least standard to support Microsoft Windows 98 and Microsoft Office 2000 professional. The hardware & software specifications for each client machine are shown in the Tables 3.3, 3.4 respectively.

Table 3.3. The Hardware Specification for Each Client Machine.

Hardware	Specification
CPU	Intel Pentium II Processor 1.0 GHz.
Memory	64MB 100MHz SDRAM
Cache	256 KB or higher
Hard Disk	20 GB
CD-ROM Drive	48x CD-ROM Drive
Floppy Drive	1.44MB diskette drive
Network Adapter	10/100 Ethernet NIC
Display Screen	15"SVGA Monitor
Display Adapter	SVGA Card
Keyboard	USB Internet Keyboard (104-key)
Mouse	Internet Scroll Mouse
UPS	UPS 1000 VA

Table 3.4. The Software Specification for Each Client Machine.

Software	Specification
Operating System	Microsoft Windows 98
Application Software	Microsoft Office 2000 Professional Edition Outsourcing Application Program

Other important hardware required for the proposed system is switch, network printer and cable. The specification of this hardware is shown in the Table 3.5.

Table 3.5. Other Hardware Requirements.

Hardware	Specification
Printer	Laser Printer, Dot Matrix Printer
Cable	LAN Cable UTP

The network configuration of the proposed Automobile Insurance Information System is shown in Figure 3.3.

ASSUMPTION UNIVERSITY OF THAILAND
SINCE 1969
มหาวิทยาลัยอัสสัมชัญ

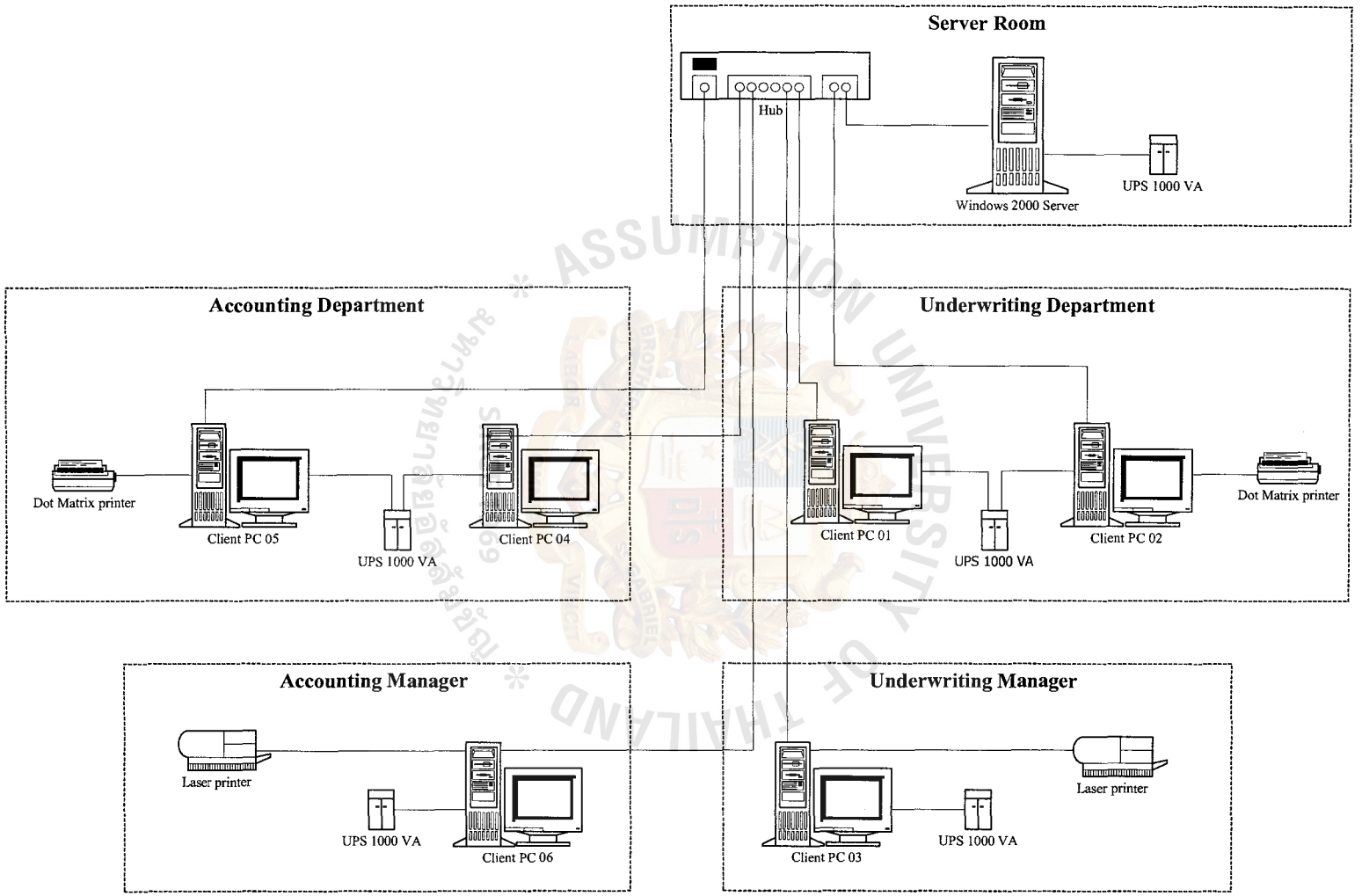


Figure 3.3. The Network Configuration of Proposed Automobile Insurance Information System.

3.4 System Cost Analysis

(1) Cost of Manual System

Table 3.6. Manual System Cost Analysis, Baht.

Cost items	Years				
	1	2	3	4	5
Fixed Cost					
Typewriter 4 units @ 10,000	8,000.00	8,000.00	8,000.00	8,000.00	8,000.00
Calculators 5 units @ 1,500	1,500.00	1,500.00	1,500.00	1,500.00	1,500.00
Total Fixed Cost	9,500.00	9,500.00	9,500.00	9,500.00	9,500.00
Operating Cost					
Salary Cost:					
Underwriting Manager 1 person @ 25,000	25,000.00	27,500.00	30,250.00	33,275.00	36,602.50
Underwriting officer 4 persons @15,000	60,000.00	66,000.00	72,600.00	79,860.00	87,846.00
Total Monthly Salary Cost	85,000.00	93,500.00	102,850.00	113,135.00	124,448.50
Total Annual Salary Cost	1,020,000.00	1,122,000.00	1,234,200.00	1,357,620.00	1,493,382.00
Office Supplies and Miscellaneous Cost:					
Stationary Per Annual	18,000.00	19,800.00	21,780.00	23,958.00	26,353.80
Paper Per Annual	14,000.00	15,400.00	16,940.00	18,634.00	20,497.40
Utility Per Annual	12,000.00	13,200.00	14,520.00	15,972.00	17,569.20
Miscellaneous Per Annual	12,000.00	13,200.00	14,520.00	15,972.00	17,569.20
Total Annual Office Supplies & Miscellaneous Cost	56,000.00	61,600.00	67,760.00	74,536.00	81,989.60
Total Annual Operating Cost	1,076,000.00	1,183,600.00	1,301,960.00	1,432,156.00	1,575,371.60
Total Manual System Cost	1,085,500.00	1,193,100.00	1,311,460.00	1,441,656.00	1,584,871.60

Table 3.7. Five Years Accumulated Manual System Cost, Baht.

Year	Total Manual System Cost	Accumulated Cost
1	1,085,500.00	1,085,500.00
2	1,193,100.00	2,278,600.00
3	1,311,460.00	3,590,060.00
4	1,441,656.00	5,031,716.00
5	1,584,871.60	6,616,587.60
Total	6,616,587.60	-

(2) Cost of Proposed System

Table 3.8. Computerized System Cost Analysis, Baht.

Cost items		Years				
		1	2	3	4	5
Fixed Cost						
Hardware Cost:						
Computer Server Cost	1 unit @ 54,000	10,800.00	10,800.00	10,800.00	10,800.00	10,800.00
Client Machine Cost	6 units @ 30,000	36,000.00	36,000.00	36,000.00	36,000.00	36,000.00
Laser Printer	2 units @ 15,000	6,000.00	6,000.00	6,000.00	6,000.00	6,000.00
Dot Matrix Printer	2 units @ 6,400	2,560.00	2,560.00	2,560.00	2,560.00	2,560.00
Hub (10/100)	1 unit @ 3,500	700.00	700.00	700.00	700.00	700.00
UPS 1000 VA	5 units @ 4,800	4,800.00	4,800.00	4,800.00	4,800.00	4,800.00
Total Hardware Cost		60,860.00	60,860.00	60,860.00	60,860.00	60,860.00
Software Cost:						
Windows 2000 Server	1 unit @ 30,000	6,000.00	6,000.00	6,000.00	6,000.00	6,000.00
MS SQL Server	1 unit @ 24,000	4,800.00	4,800.00	4,800.00	4,800.00	4,800.00
Microsoft Windows 98	6 units @ 8,000	9,600.00	9,600.00	9,600.00	9,600.00	9,600.00
MS Office 2000	6 units @ 12,000	14,400.00	14,400.00	14,400.00	14,400.00	14,400.00
Network Cost		4,800.00	4,800.00	4,800.00	4,800.00	4,800.00
Total Software Cost		39,600.00	39,600.00	39,600.00	39,600.00	39,600.00
Implementation Cost:						
Software Development Cost		86,000.00	-	-	-	-
Training Cost		74,000.00	-	-	-	-
Total implementation Cost		160,000.00	-	-	-	-
Maintenance Cost		-	15,000.00	16,500.00	18,150.00	19,965.00
Total Fixed Cost		260,460.00	115,460.00	116,960.00	118,610.00	120,425.00
Operating Cost						
Salary Cost:						
Underwriting Manager	1 person @ 25,000	25,000.00	27,500.00	30,250.00	33,275.00	36,602.50
Programmer	1 person @ 18,000	18,000.00	19,800.00	21,780.00	23,958.00	26,353.80
Underwriting Officer	2 persons @ 15,000	30,000.00	33,000.00	36,300.00	39,930.00	43,923.00
Total Monthly Salary Cost		73,000.00	80,300.00	88,330.00	97,163.00	106,879.30
Total Annual Salary Cost		876,000.00	963,600.00	1,059,960.00	1,165,956.00	1,282,551.60

ASSUMPTION UNIVERSITY OF THAILAND
SINCE 1969
มหาวิทยาลัยอัสสัมชัญ

Table 3.8. Computerized System Cost Analysis, Baht (Continued).

Cost items		Years				
		1	2	3	4	5
Office Supplies and Miscellaneous Cost:						
Stationary	Per Annual	15,000.00	16,500.00	18,150.00	19,965.00	21,961.50
Paper	Per Annual	8,200.00	9,020.00	9,922.00	10,914.20	12,005.62
Utility	Per Annual	12,000.00	13,200.00	14,520.00	15,972.00	17,569.20
Miscellaneous	Per Annual	10,000.00	11,000.00	12,100.00	13,310.00	14,641.00
Total Annual Office Supplies & Miscellaneous Cost		45,200.00	49,720.00	54,692.00	60,161.20	66,177.32
Total Operaing Cost		921,200.00	1,013,320.00	1,114,652.00	1,226,117.20	1,348,728.92
Total Computerized System Cost		1,181,660.00	1,128,780.00	1,231,612.00	1,344,727.20	1,469,153.92

Table 3.9. Five Years Accumulated Computerized System Cost, Baht.

Year	Total Computerized System Cost	Accumulated Cost
1	1,181,660.00	1,181,660.00
2	1,128,780.00	2,310,440.00
3	1,231,612.00	3,542,052.00
4	1,344,727.20	4,886,779.20
5	1,469,153.92	6,355,933.12
Total	6,355,933.12	-

ASSUMPTION UNIVERSITY OF THAILAND
SINCE 1969
มหาวิทยาลัยอัสสัมชัญ

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

Table 3.10. The Comparison of the System Costs, Baht.

Year	Accumulated Manual Cost	Accumulated Computerized Cost
1	1,085,500.00	1,181,660.00
2	2,278,600.00	2,310,440.00
3	3,590,060.00	3,542,052.00
4	5,031,716.00	4,886,779.20
5	6,616,587.60	6,355,933.20

ASSUMPTION UNIVERSITY OF THAILAND
SINCE 1969
มหาวิทยาลัยอัสสัมชัญ

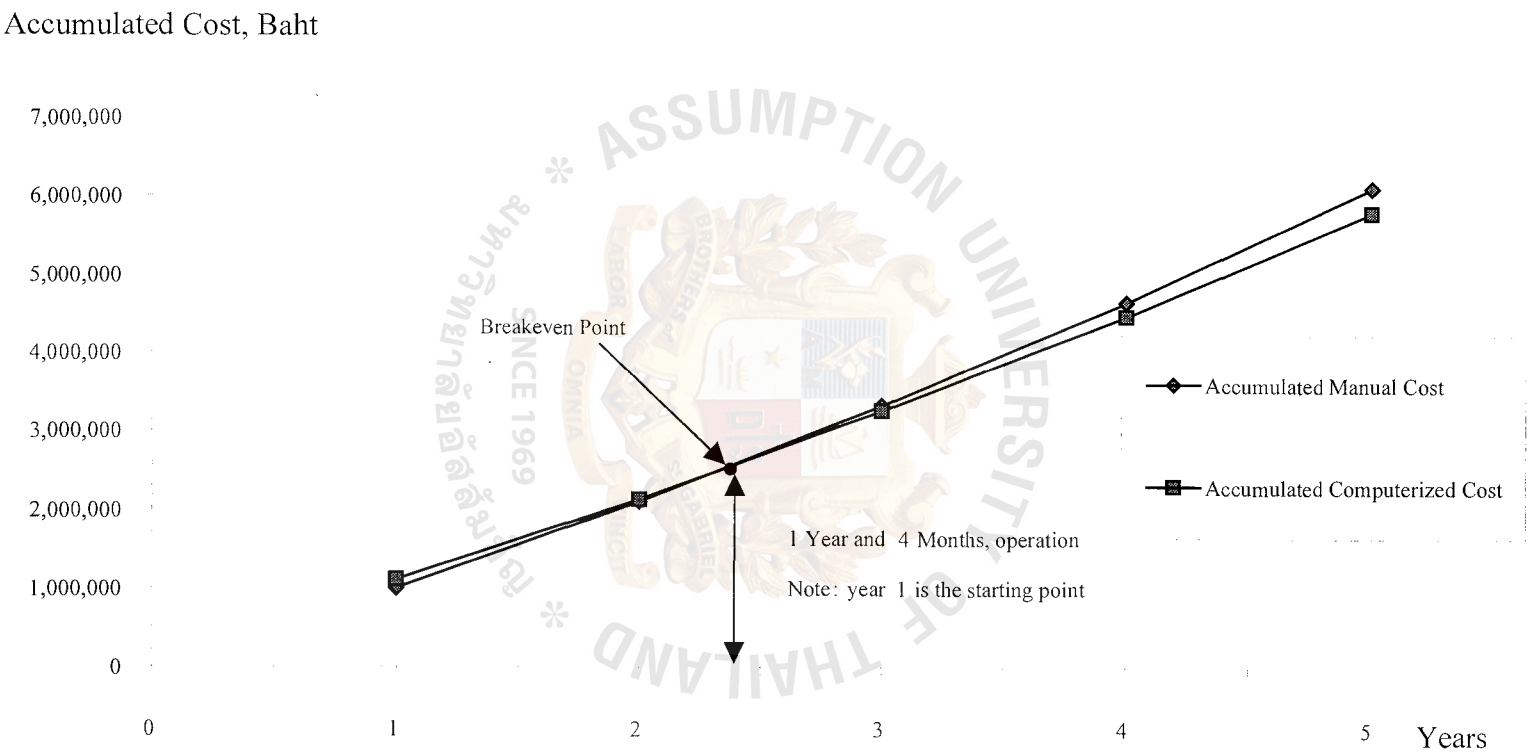


Figure 3.4. Cost Comparison between the Manual and Proposed System.

(4) Payback Analysis

The following cost items are required, shown in Table 3.11.

Investment Cost:

Hardware cost	304,300 Baht
Software cost	198,000 Baht
Software Development Cost	86,000 Baht
Training cost	74,000 Baht
Total Investment Cost	662,300 Baht

Annual Operating Cost:

People-ware cost	876,000 Baht
Office Supplies & Miscellaneous cost	66,000 Baht
Total Annual Operating Cost	942,000 Baht

Annual Cost:

The formula of annual cost of the Computerized system is

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

= (662,300/5) + 942,000

= 1,074,460 Baht

Saving:

Staff	144,000 Baht
Office Supplies & Miscellaneous	10,800 Baht
Opportunity cost & Intangible Benefit	1,405,600 Baht
Total Saving	1,560,400 Baht

ASSUMPTION UNIVERSITY OF THAILAND
OMNIA SINCE 1969
มหาวิทยาลัยอัสสัมชัญ

Table 3.11. Payback Analysis for the Proposed Automobile Insurance Information System, Baht.

Cost Items	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Development cost:	662,300.00						
Operation & Maintenance cost:		942,000.00	1,036,200.00	1,139,820.00	1,253,802.00	1,379,182.20	1,517,100.42
Discount factor for 10%	1.000	0.909	0.826	0.751	0.683	0.621	0.564
Time adjusted costs (adjusted to present value):	662,300.00	856,800.00	855,901.20	856,004.82	856,472.15	856,472.15	855,644.64
Cumulative time-adjusted costs over life time	662,300.00	1,518,578.00	2,374,479.20	3,230,484.02	4,086,830.79	4,943,802.93	5,798,947.57
Benefits derived from operation of new system:	0.00	1,560,400.00	1,716,440.00	1,888,084.00	2,176,982.40	2,284,581.64	2,513,039.80
Discount factor for 10%	1.000	0.909	0.826	0.751	0.683	0.621	0.564
Time adjusted benefits (adjusted to present value):	0.00	1,418,403.60	1,417,779.44	1,417,951.08	1,418,517.51	1,418,517.51	1,417,354.45
Cumulative time-adjusted benefits over life time:	0.00	1,418,403.60	2,836,183.04	4,254,134.12	5,672,651.63	7,091,376.83	8,508,731.28
Cumulative lifetime time-adjusted costs + benefits:	-662,300.00	-100,174.40	461,703.84	1,023,650.10	1,585,820.85	2,148,073.90	2,709,783.71

Payback period is the commonly used technique to assess the value of investment. Generally, payback period is the period that cash inflows can recover the initial investment within a specified period. To reflect the real value of money, the time value of money concept is also applied in this analysis. The discount rate is required to calculate discount value of all costs and benefits after the first year to the present value at the present year. Then the Payback period is then calculated to judge the profitability of the system as Table 3.11. and Figure 3.5.

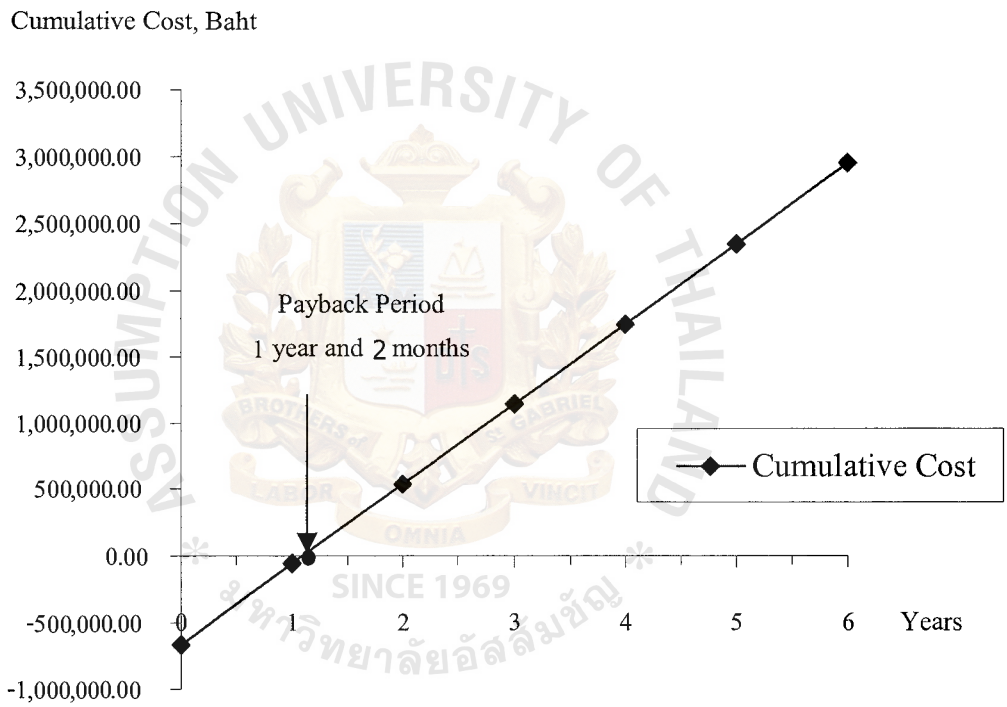


Figure 3.5. Payback Period of Automobile Insurance Information System.

As in Figure 3.5 the graph of cumulative cost of computerized system cross the x-axis at 1.2 years or the payback period of the computerized system is 1 year and 2 month.

Moreover, the payback period can be calculated by the formula as follows:

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

Where P = Payback Period

P = 1 + {(100,174.40/ (100,174.40 + 461,703.84)}

= 1.2 years or 1 year and 2 months

(5) Return-on-Investment Analysis (ROI)

Return-on-Investment Analysis technique compares the lifetime profitability of alternative solutions or projects. The ROI for a project is a percentage rate that measures the relationship between the amounts the business gets back from an investment and the amount invested. The ROI for a potential project is calculated by using the data from Table 3.11 as follows:

ROI = (Estimated lifetime benefits – Estimated lifetime costs) /
Estimated lifetime costs

ROI = ((8,508,731.28 – 5,798,947.57) / 5,798,947.57) x 100

= 0.46 x 100

= 46%

Therefore, the lifetime ROI is 46 percent.

3.5 Security and Control

The information that is stored in the Automobile Insurance Information System is so important for many departments Therefore, the data in the database must always be available to use when needed. A satisfactory level of shared ability must be achieved and unauthorized access must be prevented. The following security should be attained by the proposed system.

(1) The user's password must exist in the Automobile Insurance Information System for authentication of the users and to prevent unauthorized users accessing the system.

(2) There must be back up database and program in form of diskettes or CD-ROM every month.

(3) The user profile needed to exist in the Automobile Insurance Information System to classify the group of user who can read, update, and execute the data in the database.

(4) Input validation must exist in the Automobile Insurance Information System in each menu screen to protect the human errors.

(5) The company should set the rules for using the computer to protect physical components as well as computer system:

   (a) Do not use computer without switching on air-conditioning.

   (b) Do not smoke near a computer.

   (c) Do not eat or drink any food near a computer.

   (d) Shut down the computer when not using it.

   (e) Not allow users fix any physical part of computer by themselves.

   (f) Not allow users download any program into the computer by themselves.

IV. PROJECT IMPLEMENTATION

4.1 Overview of Project Implementation

System Implementation is the conversion processes from a current manual system to the new computerized information system. The final design should be evaluated first by the users and management teams to make sure that the new computerized system can meet the requirements and objectives, and then the other remaining processes will be performed. It is expected that the system implementation would take approximately six weeks. The duration may vary depending on the readiness of the staffs to use the new system. The processes of System Implementation are:

(1) Software development

(2) Hardware installation

(3) Personnel training

(4) Test Plan

(5) Conversion

(6) Documentation

4.2 Software Development

Using Microsoft Access as DBMS develops the Advance Automobile Information System. The computerized system is developed based on user friendly and the capability in making report. The system allows user to add, edit and delete the data and also search for desired data. In order to generate reports, the system will join tables in database file and make the calculation in the required field based on user and management requirements.

4.3 Hardware Installation

In order to establish the computerized system, the company requires new File Server as shown in the Cost/ Benefit Analysis section in Chapter 3. The two manual PCs need to be installed with LAN card so they can work in the network system in the proposed system. The additional hardware required is one client that has specification as shown in Chapter 3 and a Hub.

4.4 Personnel Training

User training course is an important process in system implementation. The objective of training course is to make users understand, be familiar and able to use the program correctly. The training course should include computer concepts, functions of hardware and software, functions of the proposed system and how to use the system properly and efficiently. Users should be given the system manual, class lecture about the procedure and hands on experience on using new equipment. Furthermore, the programmer or system analyst when initially using the system also should supervise the users.

4.5 Test Plan

After the program has been designed and installed, module testing, program testing and system testing are required to ensure that the new system is free from errors and can work well with the other systems in the company.

Module testing would help to check errors in program module. It can detect errors in coding and errors in logic. After finishing all module testing, program testing is used to check the program to verify the way the system works and to check whether each module can work together or not. System testing is checked whether the proposed system can share data or work with the other manual systems properly. When finishing all testing, the testing document plans and testing results should be made so when the

company has to do the testing again in the future, programmers can use these plans and results to do the testing again. Moreover, Security and Recovery testing is tested to ensure that the system can protect unauthorized users from access into the system. If failure happens to the database, the system should be able to recover those data.

The effective testing of the program does not guarantee system reliability. Therefore, the test case should include the Input Validation, Functionality, and Access Control.

4.6 Conversion

Conversion is the process of changing from a manual system to a new proposed system. The conversion process is set up based on the replacing concept. The users have to key in the data into the database, and then install the program for the system.

4.7 Documentation

Documentation of the proposed system is separated into two documents. First is the user guide, which describes how to access and use the program, how to correct the problems and how to use interface screens. The second is the flow of the system and data dictionary. Both documents can help the users whenever they need it or when there is a problem when using the programs, it can also help programmer to develop and maintain the system.

ASSUMPTION UNIVERSITY OF THAILAND
SINCE 1969

V. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The purpose of this project is to design and implement the Automobile Insurance Information System for Success Insurance Company Limited. During the analysis of the existing system which runs manually, the problems are found to be improper data entry, time consuming, too much document, record keeping, data redundancy, and complexity of data and processes.

This Automobile Insurance Information System is proposed to increase the efficiency of the manual system. It is expected to provide the accurate information and allow immediate access to the desired information including facilitating the routine tasks of the operational level and help the company to utilize the people and resources effectively. Moreover, it also provides more up-to-date and reliable information to support decision-making to the management.

The new computerized system consists of six clients and a server connected by LAN and is implemented on the Microsoft Access program. The cost analysis of the computerized system is determined by using payback method and the break-even point between manual system and computerized system. In the beginning the computerized system costs are higher than the manual system but in two years and four months, both systems will cost the same and then the accumulating cost of the computerized system will be lower in the long run. The payback period of the computerized system is one year and two month and the ROI is 46% in five years (system lifetime). The new system also can increase the security and control of the information in the system. It uses User Identification to ensure that only authorized users can enter to the system and access to the information and uses Data Entry Control to prevent data entry errors that may be

caused by users. The system has several benefits; the computerized system was also identified after system development and implementation; it was found that the system meets all the project objectives. The time required to finish a job for operational level is shorter and reduced the number of staff in the department. The new system is also considered to be user friendly and can provide many useful information that the manual system cannot generate. Many processes of the computerized system also perform in less time than the manual system.

Table 5.1 is the table of achievement that shows the time performance on each process of the computerized system compared with the manual system.

Table 5.1. The Degree of Achievement of the Computerized system.

Process	Manual System	Computerized System
Insured Profile	15 minutes	3 minutes
Car Profile	10 minutes	2 minute
Agency Profile	10 minutes	2 minute
Premium Registration	10 minutes	1 minute
Issue New / Renewal Policy Schedule	20 minutes	2 minutes
Issue Sticker	10 minutes	1 minutes
Issue Endorsement	20 minutes	2 minute
Commission Registration	15 minutes	2 minute
Generate the Daily Report	60 minutes	1 minute
Generate the Monthly Report	30 minutes	1 minute
Generate the Annual Report	30 minutes	1 minute

From the table, the time required to finish each process of the computerized system is less than in the manual system. In the existing system, all processes are done manually, the time taken to operate all work steps is quite long.

Explanation of the degree of achievement of the proposed system:

(1) Insured Profile process

The existing system takes fifteen minutes to create the new insured profile. The user will use a typewriter which makes it is difficult for any modification. In the proposed system, the user takes only three minutes to generate the new insured profile and the information can easily to be modified.

(2) Car Profile process

The existing system takes ten minutes to create the new car profile. The user will use a typewriter which makes it is difficult for any modification. For the proposed system, the user takes only two minutes to generate the new car profile and the information can easily be modified.

(3) Agency Profile process

The existing system takes ten minutes to create the new agency profile. The user will use a typewriter to generate that is difficult for any modification. For the proposed system, the user takes only two minutes to generate the new agency profile and the information can easily be modified.

(4) Premium Registration process

The existing system takes ten minutes to calculate the total premium. The user will use the calculator to calculate premium, VAT, and stamp relatively after that summation all of them to be the total premium of each policy. For the proposed system, the user takes only one minute to calculate premium, VAT, and stamp and automatically get the accurate total premium.

(5) Issue New / Renewal Policy Schedule process

The existing system takes a long time to issue new and renewal policy schedule because the user has to get the information from many sources and will use the typewriter to type the information. The users have many tasks to do, so they may forget or get the inaccurate information. With the proposed system, in only two minutes the process can be finished. The system will send the accurate information to the complete issue policy schedule.

(6) Issue Sticker process

The existing system takes ten minutes to generate stickers because the user has to find and select the required information and will use the typewriter to type the information. With the proposed system, in only one minute will be completed the process

(7) Issue Endorsement process

The existing system takes a long time to issue endorsement because the user has to get the information from many sources and will use the typewriter to type the information. The users have many tasks to do, so they may forget or get the inaccurate information. With the proposed system, in only two minutes the process can be finished. The system will send the accurate information to the complete the process.

(8) Commission Registration process

The existing system takes fifteen minutes to classify the level of agency and calculate the commission for each agency. The user will use the calculator to calculate commission. For the proposed system, the user takes only two minute to classify the level of agency and automatically get the accurate commission for each agency.

(9) Generate the daily report process

The existing system takes a long time and needs the user to look up, copy and prepare the daily report manually. The user will use a typewriter to generate the report that is difficult for any modification. So it takes an hour to generate a daily report. For the proposed system, all information can be queried and will take only one minute to generate the daily report.

(10) Generate the monthly report process

The existing system needs the user to look up, copy and prepare the monthly report manually. The user will use a typewriter to generate the report that is difficult for any modification. So it takes an hour to generate a monthly report. For the proposed system, all information can be queried and will take one minute to generate the monthly report.

(11) Generate the annual report process

The existing system needs the user to look up, copy and prepare the annual report manually. The user will use a calculator to calculate the total premium and commission and also use a typewriter to generate the report that is difficult for any modification. So it takes an hour to generate a annual report. For the proposed system, all information can be queried and will take one minute to generate the annual report.

Furthermore, some processes cannot be implemented by the manual system (or can be implemented but have to spend lots of time to finish). Therefore, it can be concluded that the computerized system is more efficient and effective than the manual system. The proposed system helps reduce the number of officer and time for processing, increases security and control, solve the manual system problems, decreases

the high maintenance cost, and supports the management's decision making with accuracy and completeness of the information and reports.

5.2 Recommendations

There are some recommendations that the company has to consider in order to expand this project.

(1) After the Automobile Insurance Information System is implemented, the company should continuously monitor the working procedure and look at the feedback of the system.

(2) Users should be involved in all processes to give their requirements and feedback to system analyst and programmer. So company can ensure that the new system will meet all user requirements and the program will not change much in the future.

(3) According to the scope of this project, Automobile Insurance Information System was focused only on the compulsory motor insurance. After the system is completed and meet all user requirements the voluntary motor insurance is the next phase that we plan to design the appropriate computerized system. Therefore, the system will be linked to the other insurance system to provide users with the integrated insurance system.

(4) The new system must be able to link with other systems so the system can receive various information from many departments that may be useful in the future. Furthermore, other Departments also can use the information from this system to do the job. This can enhance the processing performance and reduce some work cycle of the company.

(5) The system should use graph or graphics to make reports so it can help managers to better understand the information.

(6) Company should emphasize on security and control technology. New techniques or methods such as user identification should be added to the system to increase the security and to reduce errors in the system.

ASSUMPTION UNIVERSITY OF THAILAND
SINCE 1969
มหาวิทยาลัยอัสสัมชัญ

APPENDIX A

DATABASE DESIGN

ASSUMPTION UNIVERSITY OF THAILAND
SINCE 1969
มหาวิทยาลัยอัสสัมชัญ

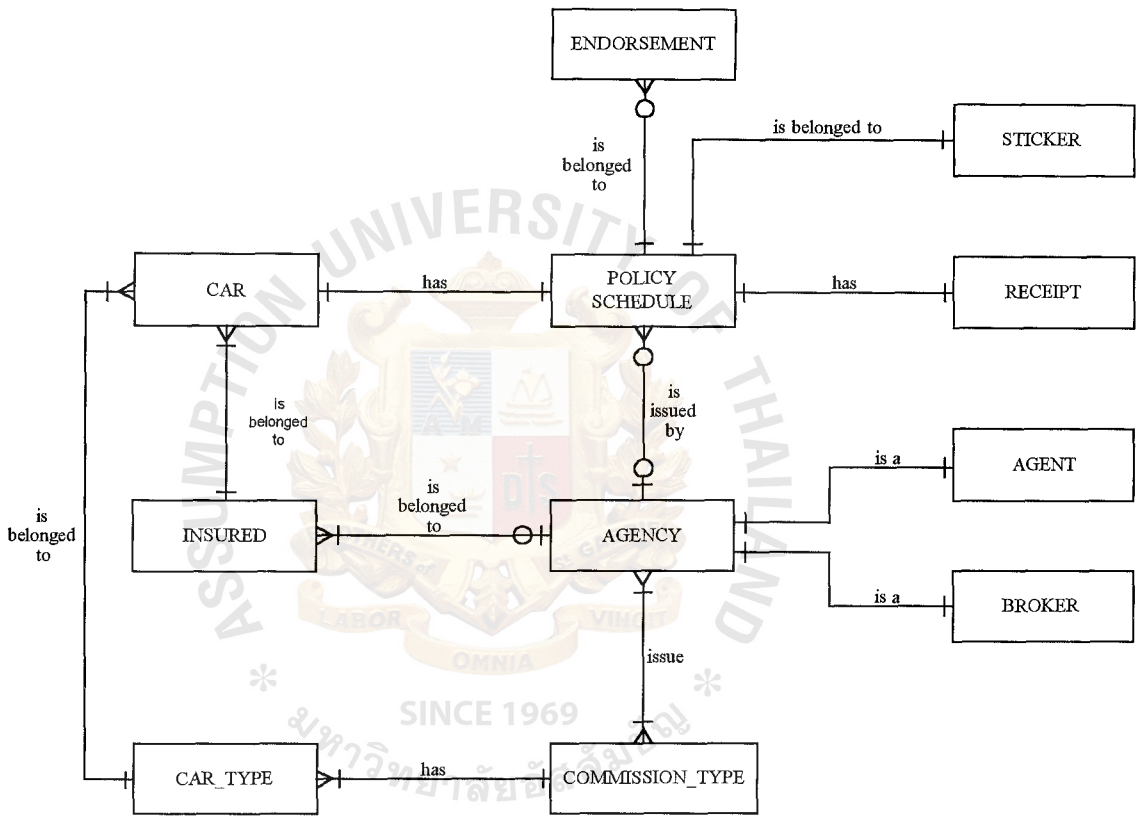


Figure A.1. Context Level Entity Relationship Diagram of Automobile Insurance Information System.

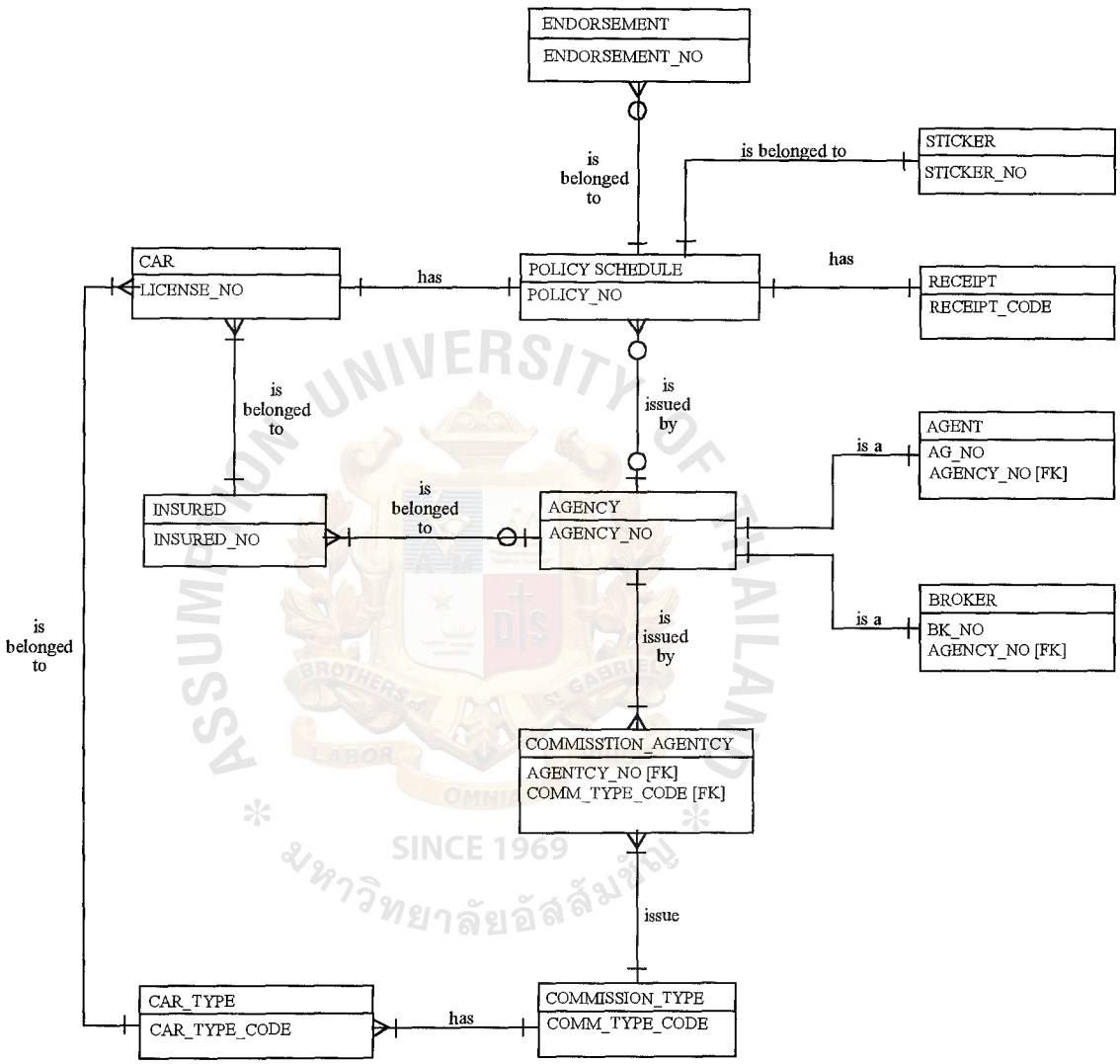


Figure A.2. Key-Based Attributed Entity Relationship Diagram of Automobile Insurance Information System.

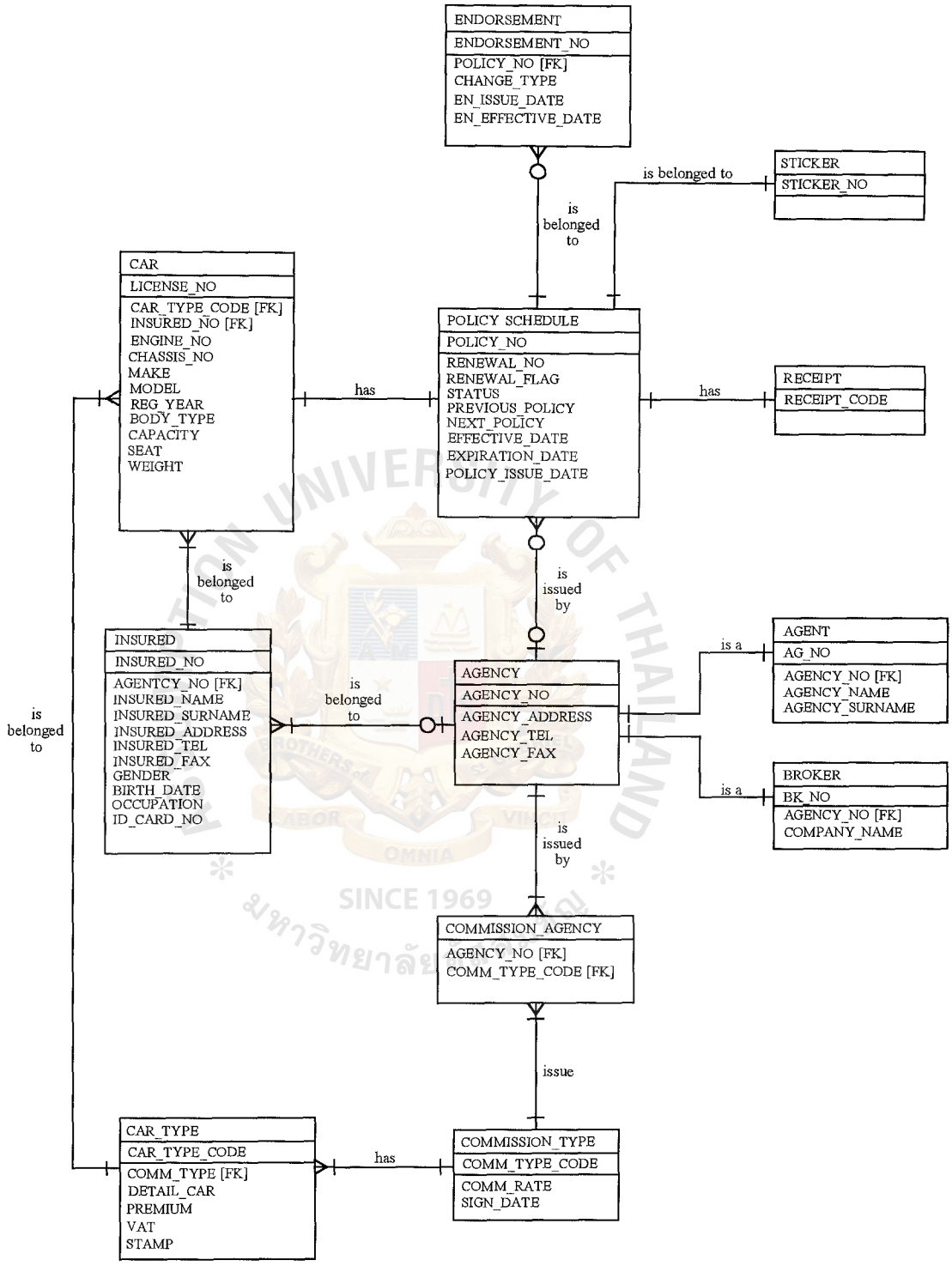


Figure A.3. Fully Attributed Entity Relationship Diagram of Automobile Insurance Information System.

Table A.1. Structure of Insured Table.

No.	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to Table	Check	Key Type
1	Insured_No	Varchar (7)	Y	Y		Car		Primary Key
2	Agency_No	Varchar (6)						Foreign Key
3	Insured _Name	Varchar (30)						Attribute
4	Insured _Surname	Varchar (30)						Attribute
5	Insured _Address	Varchar (50)						Attribute
6	Insured _Tel	Int (9)						Attribute
7	Insured _Fax	Int (9)						Attribute
8	Gender	Boolean						Attribute
9	Birth_Date	Date						Attribute
10	Occupation	Text						Attribute
11	ID_Card_No	Int (13)						Attribute

Table A.2. Structure of Car Table.

No.	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to Table	Check	Key Type
1	License_No	Varchar (6)	Y	Y				Primary Key
2	Car_Type_Code	Varchar (5)						Foreign Key
3	Insured_No	Varchar (7)						Foreign Key
4	Chassis_No	Varchar (17)						Attribute
5	Engine_No	Vachar (13)						Attribute
6	Make	Text						Attribute
7	Model	Text						Attribute
8	Reg_Year	Date						Attribute
9	Body_Type	Text						Attribute
10	Capacity	Number						Attribute
11	Seat	Number						Attribute
12	Weight	Number						Attribute

Table A.3. Structure of Car_Type Table.

No.	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to Table	Check	Key Type
1	Car_Type_Code	Varchar (5)	Y	Y		Car		Primary Key
2	Com_Type_Code	Int (4)						Foreign Key
3	Detail_Car	Text						Attribute
4	Premium	Decimal(10,2)						Attribute
5	VAT	Decimal(10,2)						Attribute
6	Stamp	Decimal(10,2)						Attribute

Table A.4. Structure of Policy Schedule Table.

No.	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to Table	Check	Key Type
1	Policy_No	Varchar (12)	Y	Y		Endorsement		Primary Key
2	Renewal_No	Int (2)						Foreign Key
3	Renewal_Flag	Boolean						Foreign Key
4	Status	Boolean						Attribute
5	Previous_Policy	Varchar (12)						Attribute
6	Next_Policy	Varchar (12)						Attribute
7	Effective_Date	Date						Attribute
8	Expirarion_Date	Date						Attribute
9	Pol_Issue_Date	Date						Attribute

Table A.5. Structure of Sticker Table.

No.	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to Table	Check	Key Type
1	Sticker_No	Int (11)	Y	Y				Primary Key

ASSUMPTION UNIVERSITY OF THAILAND SINCE 1969

Table A.6. Structure of Endorsement Table.

No.	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to Table	Check	Key Type
1	Endorsement_No	Varchar (7)	Y	Y				Primary Key
2	Policy_No	Varchar (12)						Foreign Key
3	Change_Type	Int (2)						Attribute
4	Change_Detail	Text						Attribute
5	En_Issue_Date	Date						Attribute
6	En_Effective_Date	Date						Attribute

Table A.7. Structure of Agency Table.

No.	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to Table	Check	Key Type
1	Agency_No	Int (4)	Y	Y		Agent, Broker		Primary Key
2	Agency_Name	Varchar (30)						Attribute
3	Agency_Address	Varchar (50)						Attribute
4	Agency_Tel	Int (9)						Attribute
5	Agency_Fax	Int (9)						Attribute

Table A.8. Structure of Agent Table.

No.	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to Table	Check	Key Type
1	Ag_No	Varchar (7)	Y	Y				Primary Key
2	Agency_No	Int (4)						Foreign Key
3	Ag_Name	Varchar (30)						Attribute
4	Ag_Surname	Varchar (30)						Attribute

Table A.9. Structure of Broker Table.

No.	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to Table	Check	Key Type
1	Bk_No	Varchar (7)	Y	Y				Primary Key
2	Agency_No	Int (4)						Foreign Key
3	Company_Name	Varchar (30)						Attribute

Table A.10. Structure of Commission_Agency Table.

No.	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to Table	Check	Key Type
1	Agency_No	Int (4)	Y	Y				Foreign Key
2	Com_Type_Code	Int (4)						Foreign Key

Table A.11. Structure of Commission_Type Table.

No.	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to Table	Check	Key Type
1	Com_Type_Code	Int (4)	Y	Y				Primary Key
2	Com_Rate	Number						Attribute
3	Sign_Date	Date						Attribute

Table A.12. Structure of Receipt Table.

No.	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to Table	Check	Key Type
1	Receipt_Code	Int (4)	Y	Y				Primary Key

ASSUMPTION UNIVERSITY OF THAILAND
SINCE 1969
มหาวิทยาลัยอัสสัมชัญ

APPENDIX B

DATA DICTIONARY

Table B.1. Data Dictionary of Insured Table.

Field Name	Meaning
Insured_No	Insured Number
Agency_No	Agency Number
Insured_Name	Name of Insured
Insured_Surname	Surname of Insured
Insured_Address	Contact Address
Insured_Tel	Contact Telephone Number of Insured
Insured_Fax	Contact Facsimile Number of Insured
Gender	Gender of Insured
Birth_Date	Birthday Date of Insured
Occupation	Occupation of Insured
ID_Card_No	Insured Identification Number

Table B.2. Data Dictionary of Car Table.

Field Name	Meaning
License No	License Number of Car
Car_Type_Code	Code of Car Type
Insured_No	Insured Number
Chassis_No	Chassis Number
Engine_No	Engine Number
Make	Make of Car
Model	Model of Car
Reg_Year	Regulation Year of Car
Body_Type	Body Type of Car
Capacity	Capacity of Car
Seat	Number of Seat of Car
Weight	Weight of Car

Table B.3. Data Dictionary of Car_Type Table.

Field Name	Meaning
Car_Type_Code	Code of Car Type
Com_Type_Code	Code of Commission Type
Detail_Car	Detail of Car
Premium	Amount of Premium
VAT	Amount of VAT
Stamp	Amount of Stamp

Table B.4. Data Dictionary of Policy Schedule Table.

Field Name	Meaning
Policy_No	Policy Number
Renewal_No	Renewal Number of Policy
Renewal_Flag	Renewal Flag of Policy
Status	Policy Status
Previous_Policy	Policy Number of Previous Policy
Next_Policy	Policy Number of Next Policy
Effective_Date	Effective Date of Policy
Expiration_Date	Expiration Date of Policy
Pol_Issue_Date	Issue Date of Policy

Table B.5. Data Dictionary of Sticker Table.

Field Name	Meaning
Sticker No	Sticker Number

Table B.6. Data Dictionary of Endorsement Table.

Field Name	Meaning
Endorsement_No	Endorsement Number
Policy_No	Policy Number
Change_Type	Type of changing Detail
Change_Detail	Detail of Changing Detail
En_Issue_Date	Issue Date of Endorsement
En_Effective_Date	Effective Date of Endorsement

Table B.7 Data Dictionary of Agency Table.

Field Name	Meaning
Agency_No	Agency Number
Agency_Name	Name of Agency
Agency_Address	Contact Address of Agency
Agency_Tel	Contact Telephone Number of Agency
Agency_Fax	Contact Facsimile Number of Agency

Table B.8. Data Dictionary of Agent Table.

Field Name	Meaning
Ag_No	Agent Number
Agency_No	Agency Number
Ag_Name	Name of Agent
Ag_Surname	Surname of Agent

Table B.9. Data Dictionary of Broker Table.

Field Name	Meaning
Bk_No	Broker Number
Agency_No	Agency Number
Company_Name	Company Name of Broker

Table B.10. Data Dictionary of Commission_Agency Table.

Field Name	Meaning
Agency_No	Agency Number
Com_Type_Code	Code of Commission Type

Table B.11. Data Dictionary of Commission_Type Table.

Field Name	Meaning
Com_Type_Code	Code of Commission Type
Com_Rate	Percentage of Commission
Sign_Date	Sign Date of Commission Registration

Table B.12. Data Dictionary of Receipt Table.

Field Name	Meaning
Receipt_No	Receipt Number

APPENDIX C

DATA FLOW DIAGRAM

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS of St. GABRIEL
LABOR OMNIA VINCIT
SINCE 1969
มหาวิทยาลัยอัสสัมชัญ

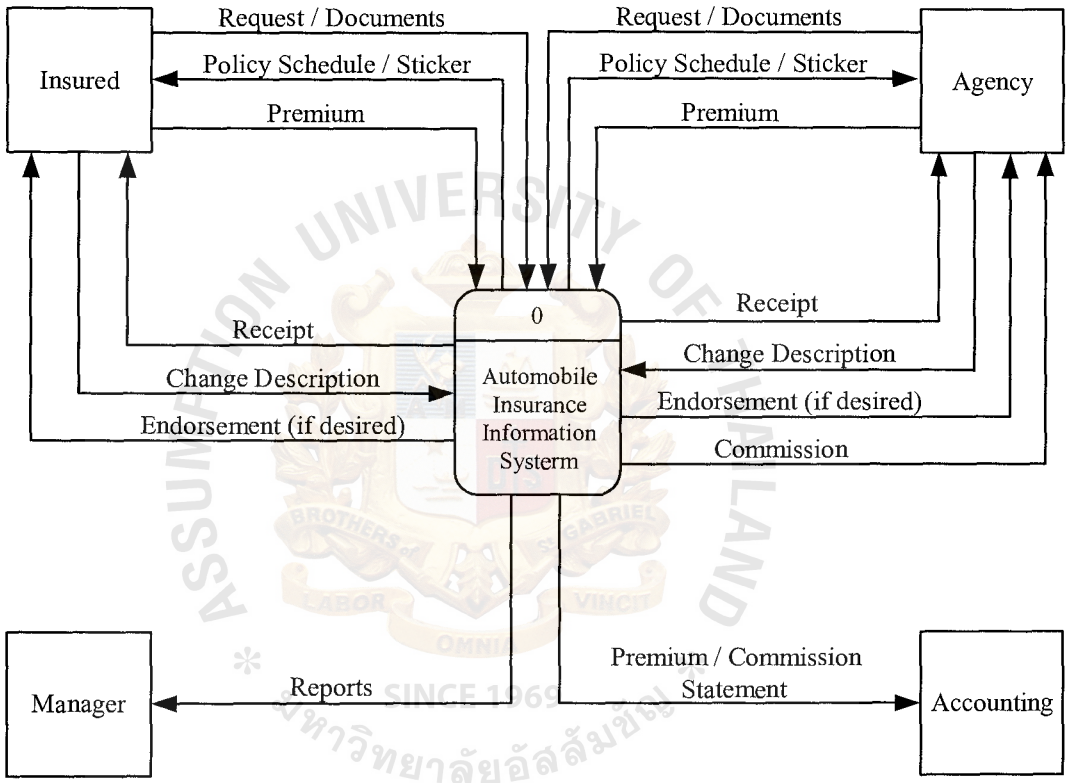


Figure C.1. Context Level Data Flow Diagram of Proposed Automobile Insurance Information System.

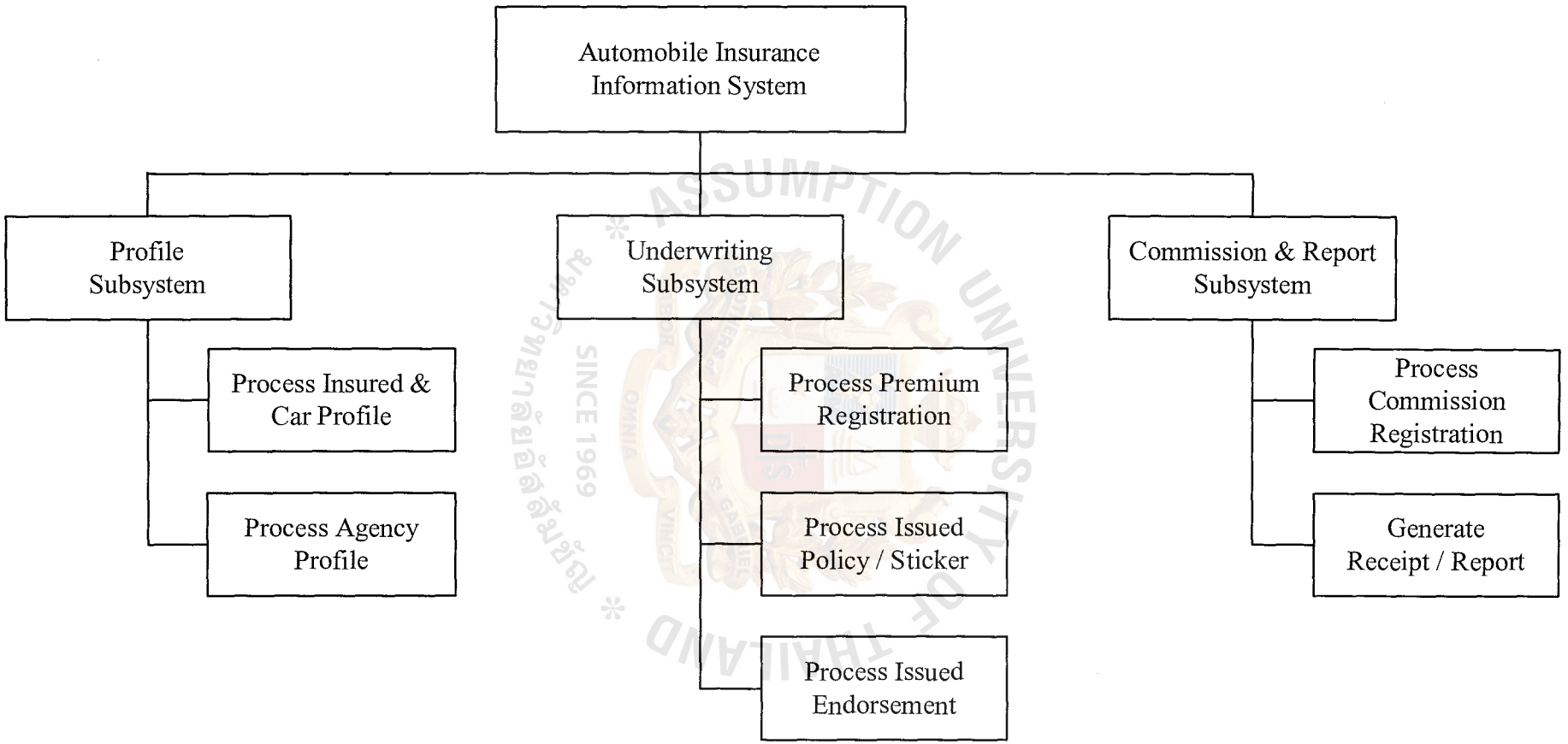


Figure C.2. A Function Decomposition Diagram of Proposed Automobile Insurance Information System.

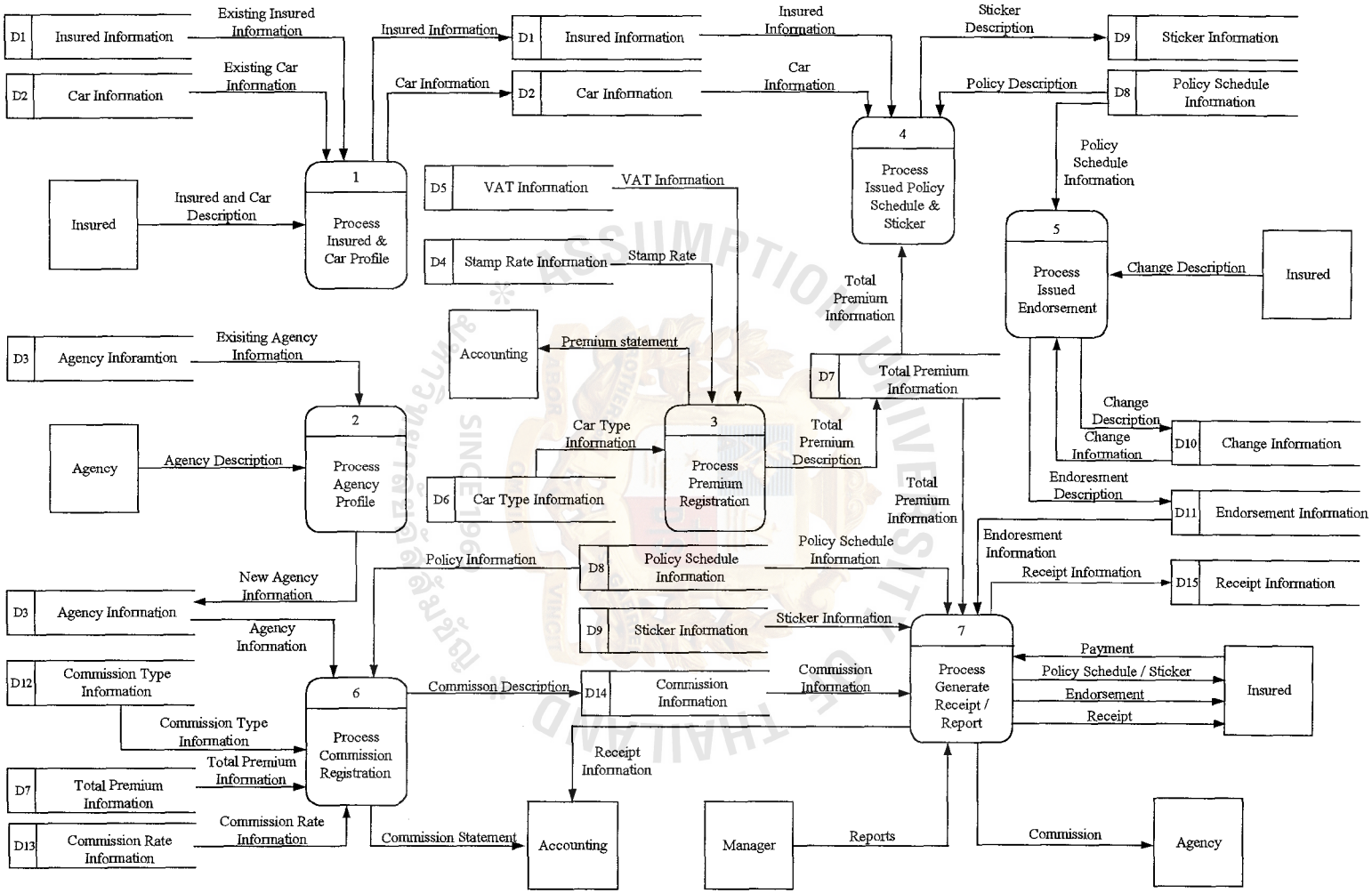


Figure C.3. Level 0 Data Flow Diagram of Proposed Automobile Insurance Information System.

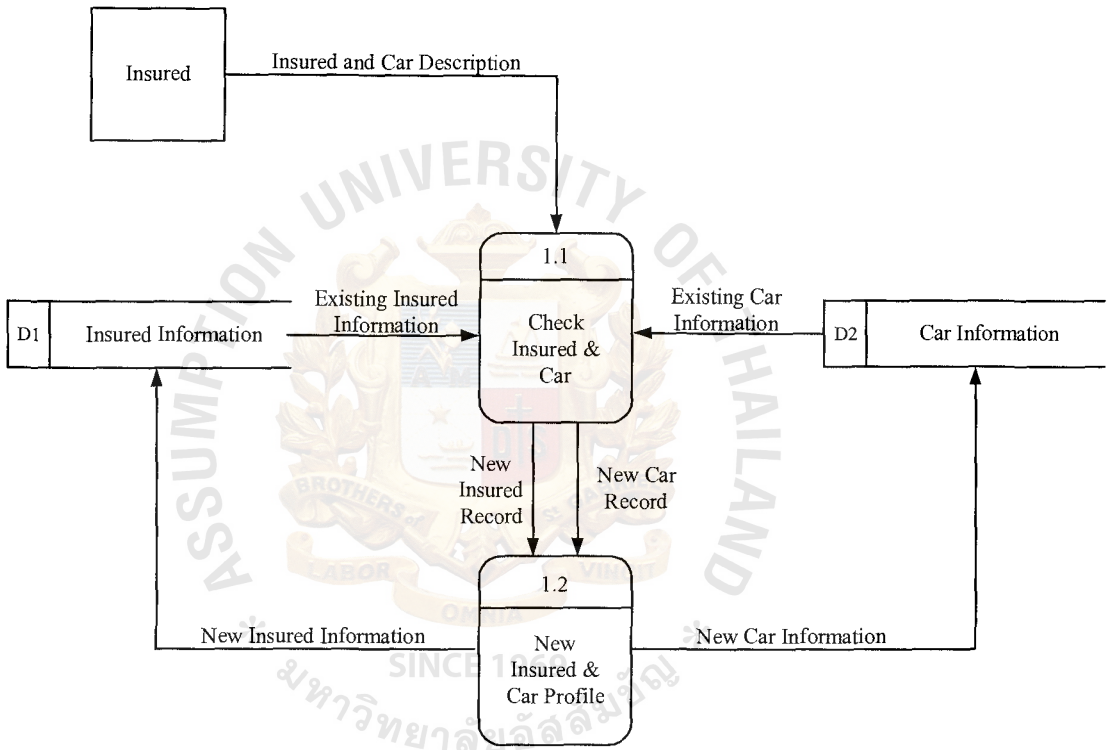


Figure C.4. Level 1 Data Flow Diagram of Process Insured & Car Profile of the Proposed Automobile Insurance Information System.

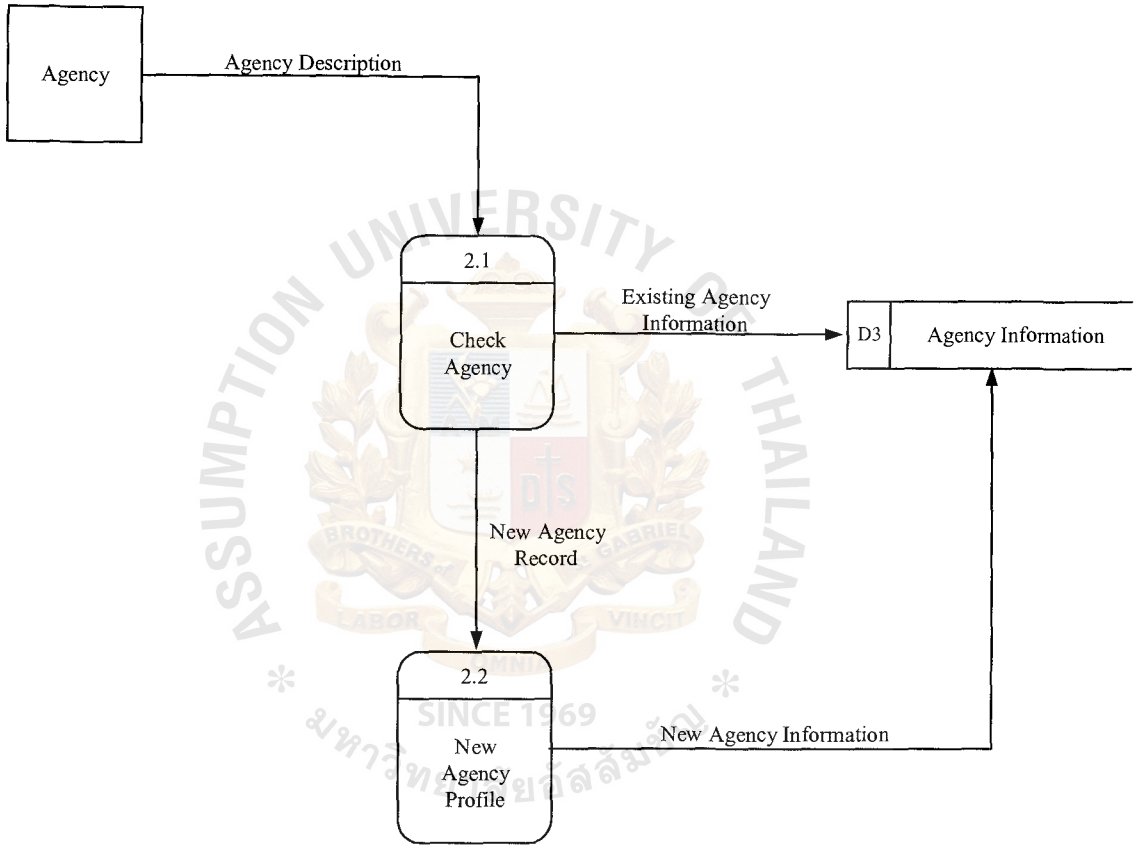


Figure C.5. Level 1 Data Flow Diagram of Process Agency Profile of the Proposed Automobile Insurance Information System.

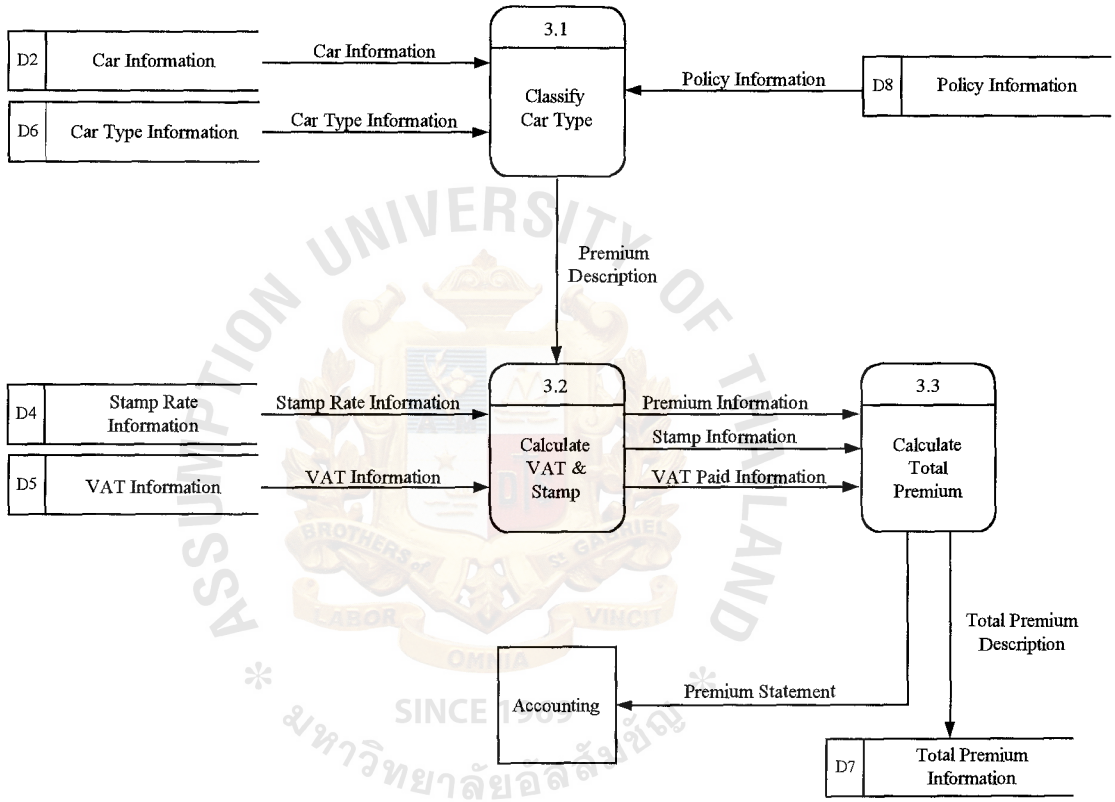


Figure C.6. Level 1 Data Flow Diagram of Process Premium Registration of the Proposed Automobile Insurance Information System.

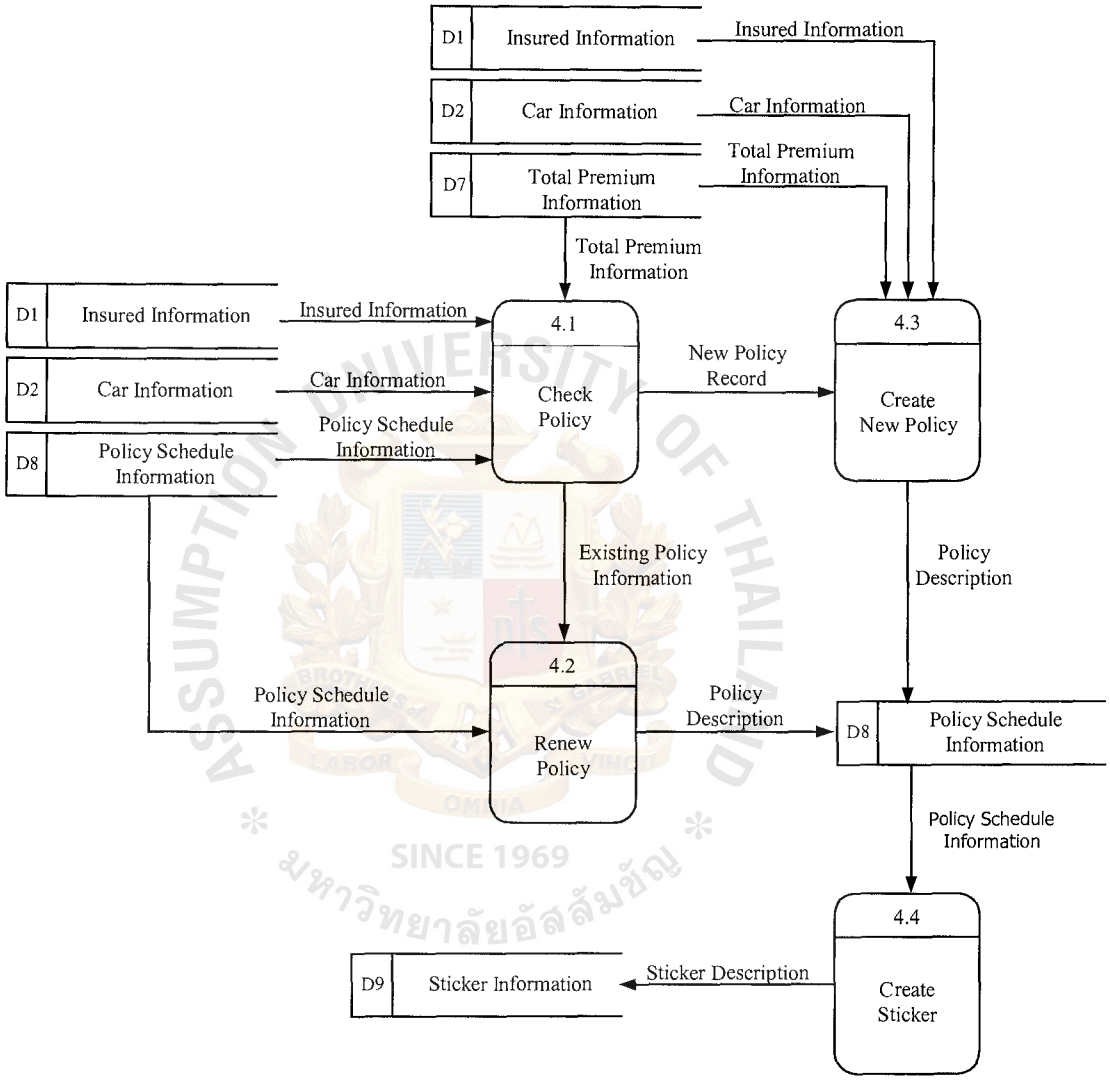


Figure C.7. Level 1 Data Flow Diagram of Process Issue Policy and Sticker of the Proposed Automobile Insurance Information System.

ASSUMPTION UNIVERSITY OF THAILAND
SINCE 1969
มหาวิทยาลัยอัสสัมชัญ

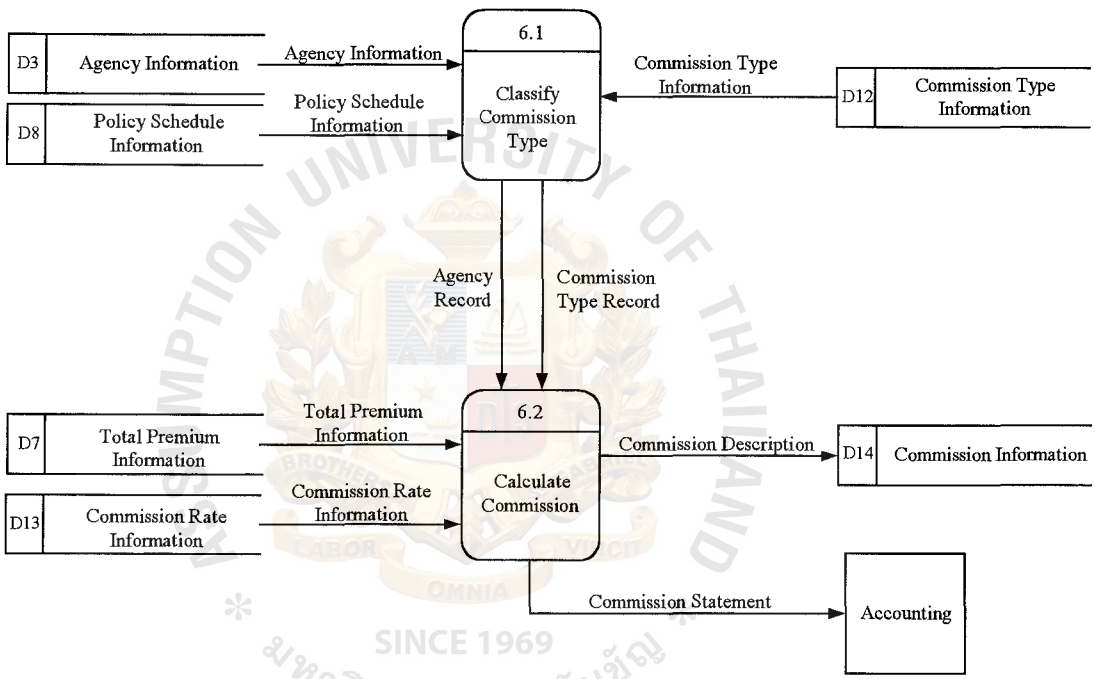


Figure C.9. Level 1 Data Flow Diagram of Process Commission Registration of the Proposed Automobile Insurance Information System.

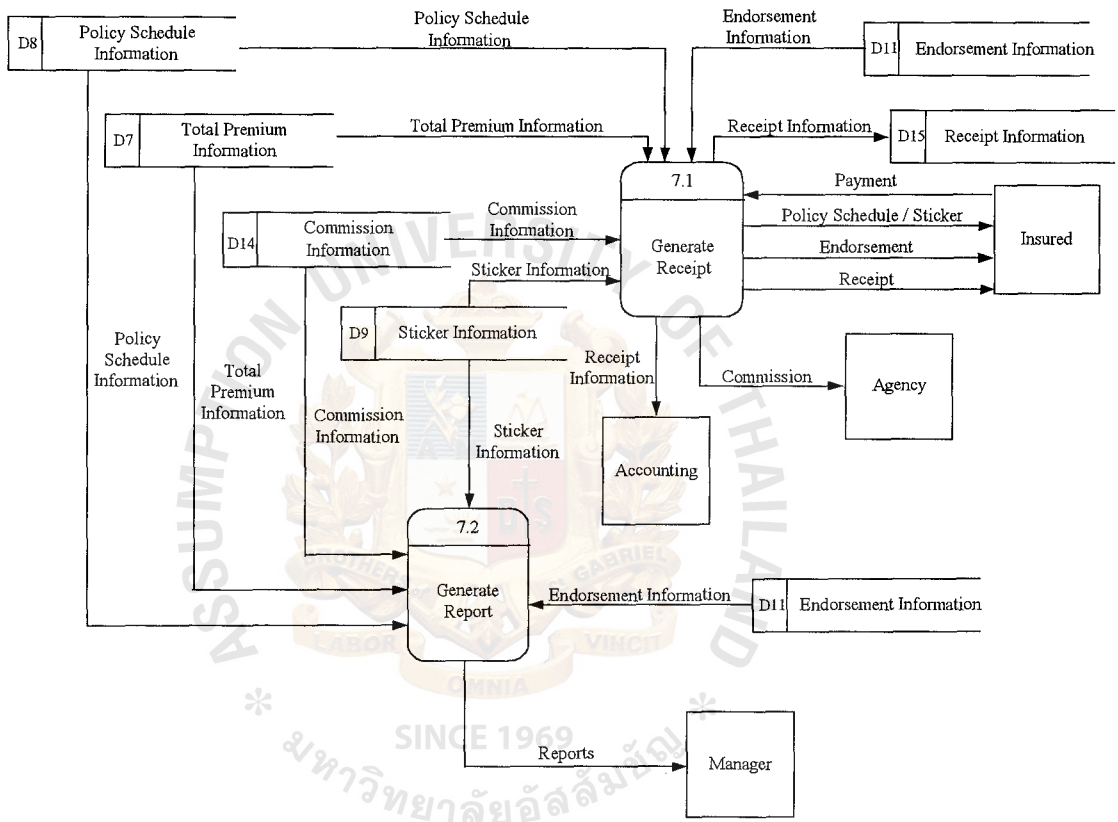


Figure C.10. Level 1 Data Flow Diagram of Process Generate Receipt/Report of the Proposed Automobile Insurance Information System.

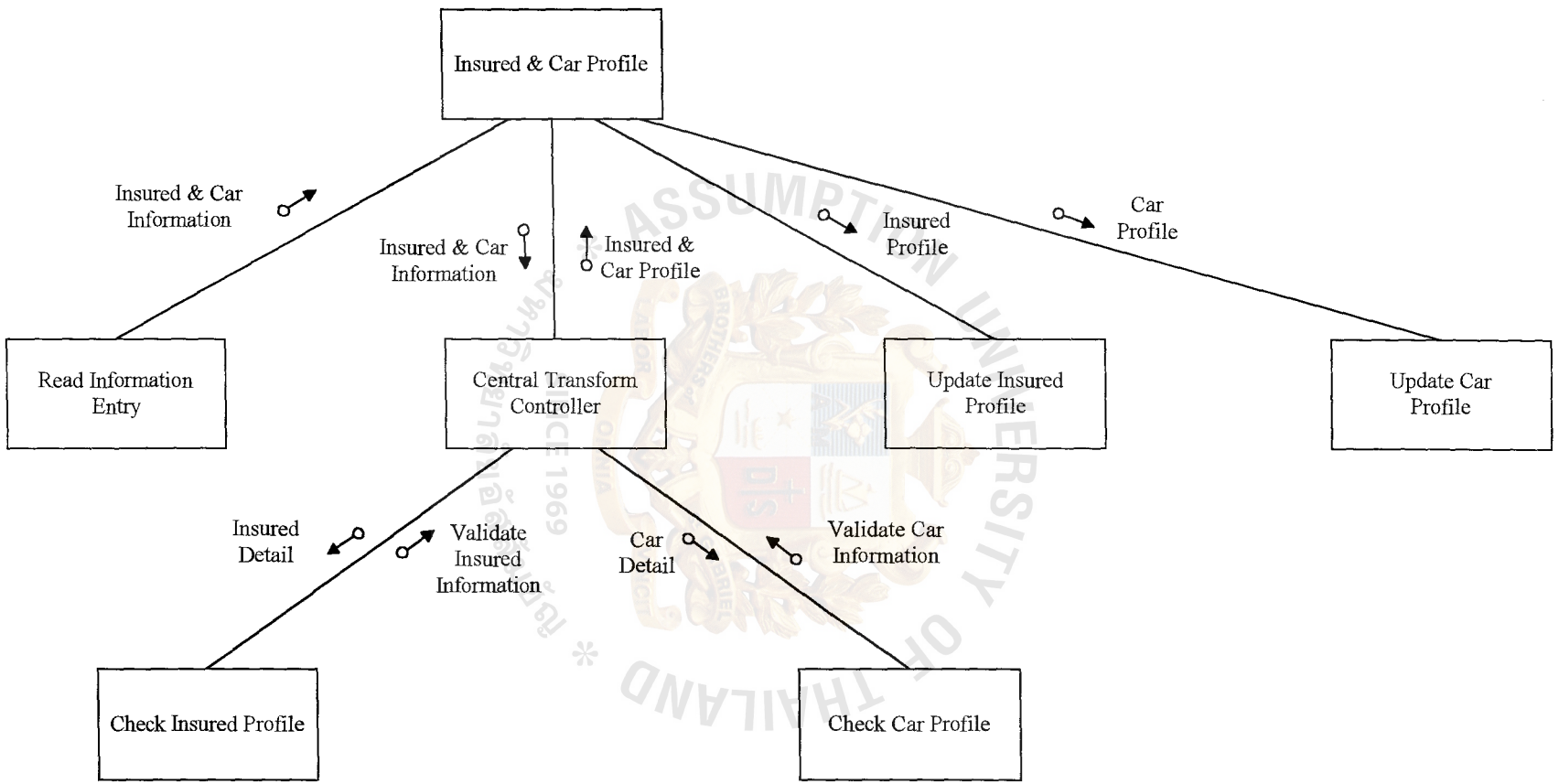


Figure C.11. Structure Chart of Process Insured and Car Profile.

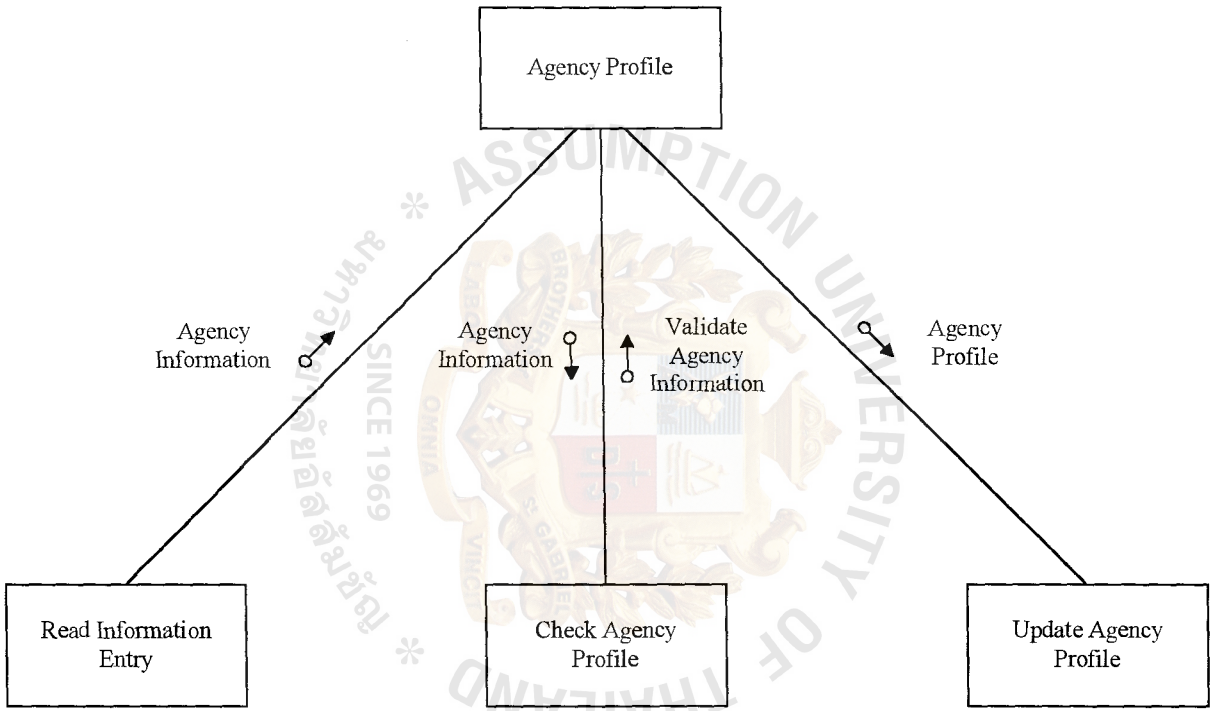


Figure C.12. Structure Chart of Process Agency Profile.

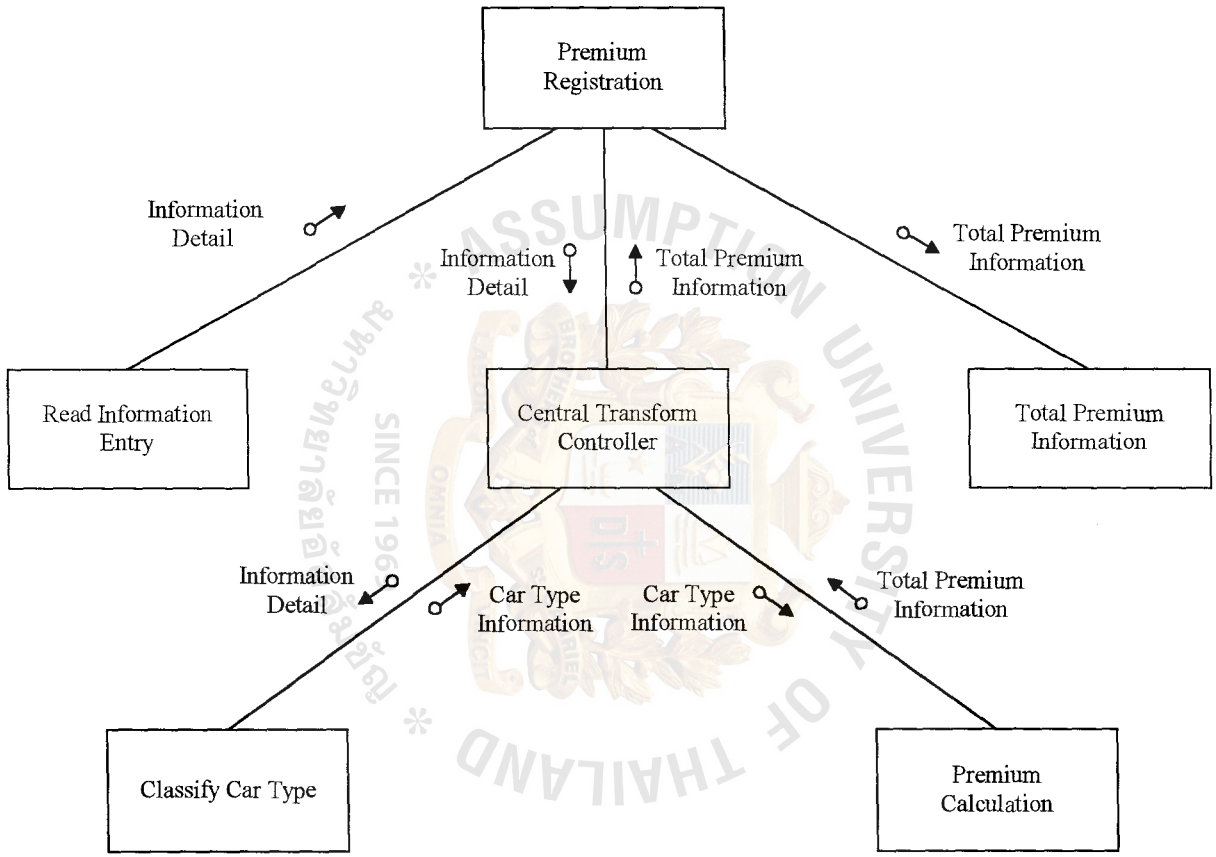


Figure C.13. Structure Chart of Process Premium Registration.

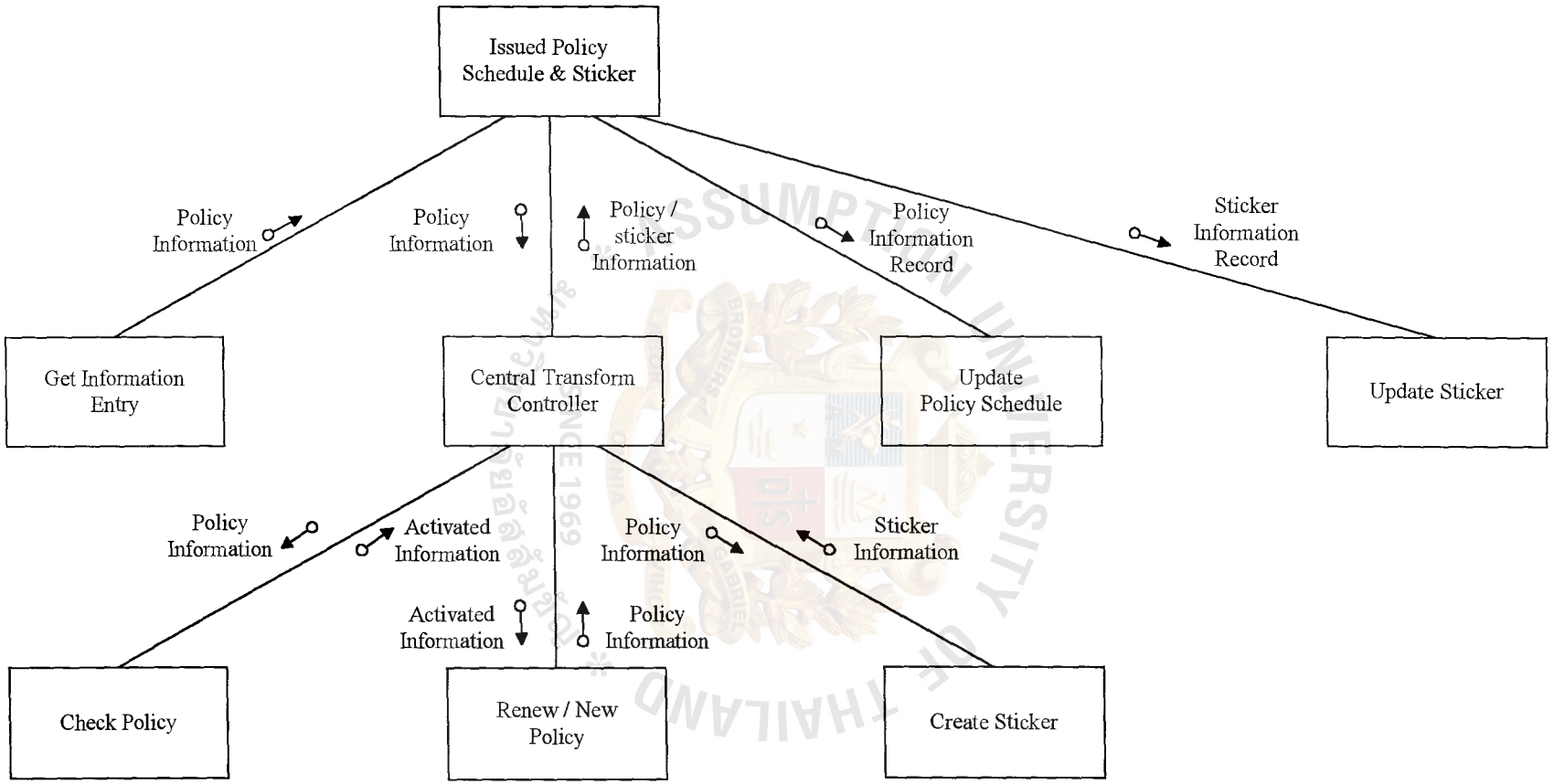


Figure C.14. Structure Chart of Process Issued Policy and Sticker.

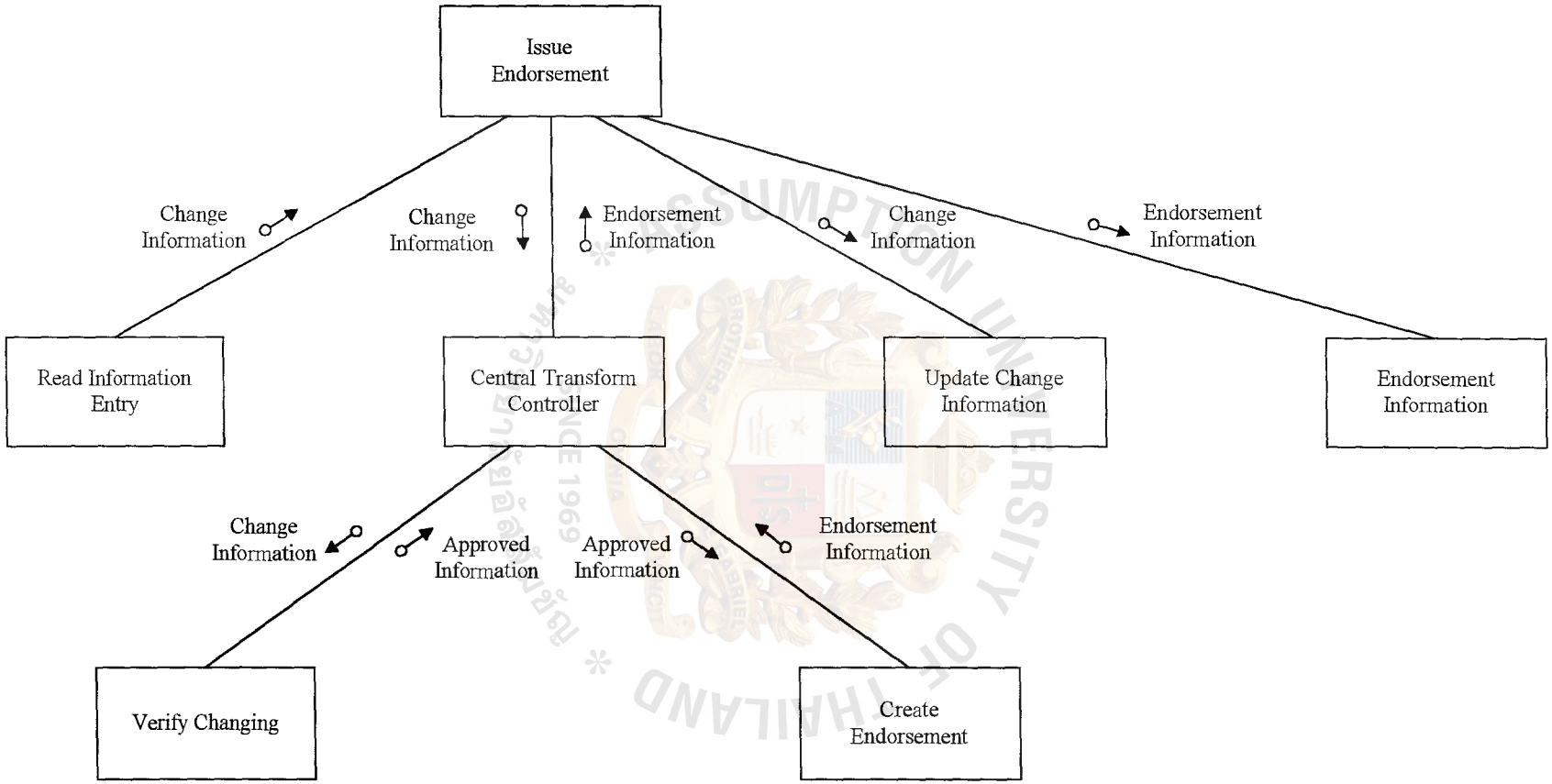


Figure C.15. Structure Chart of Process Issued Endorsement.

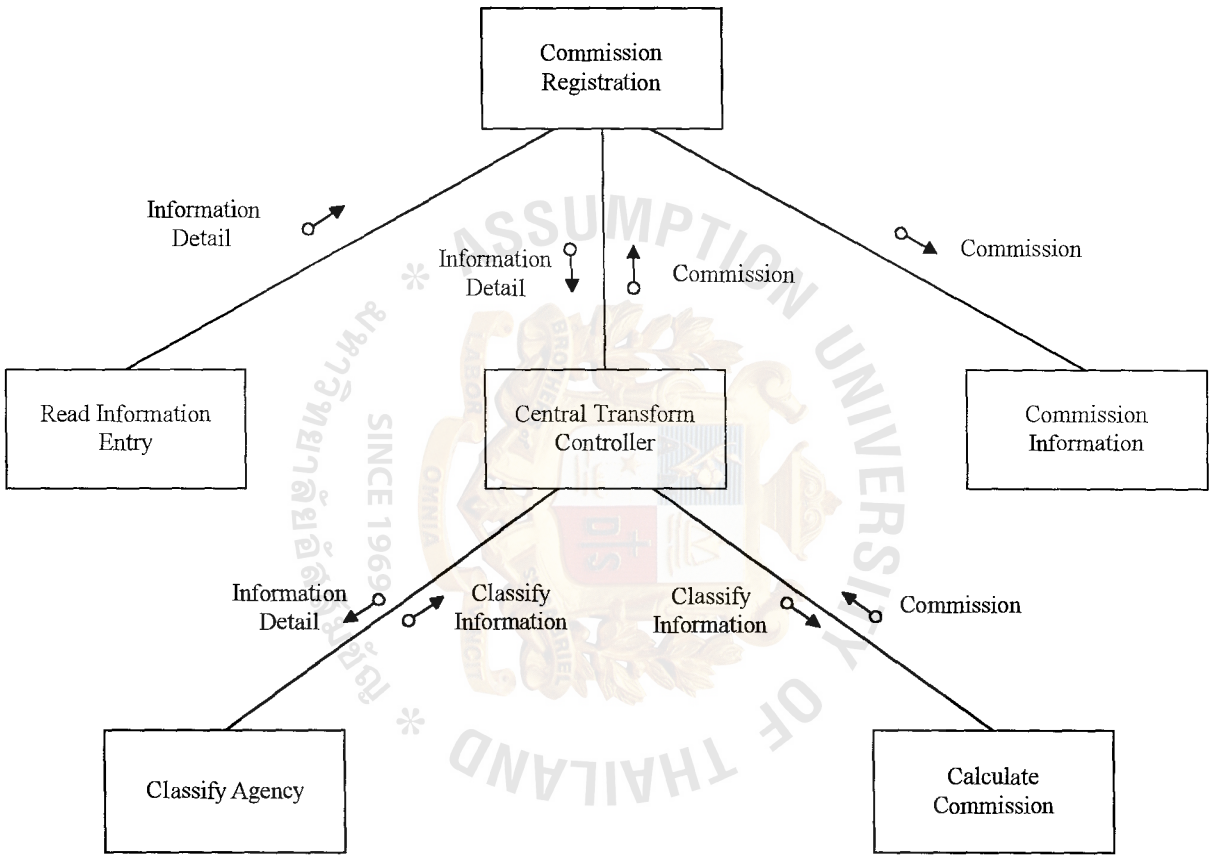


Figure C.16. Structure Chart of Process Commission Registration.

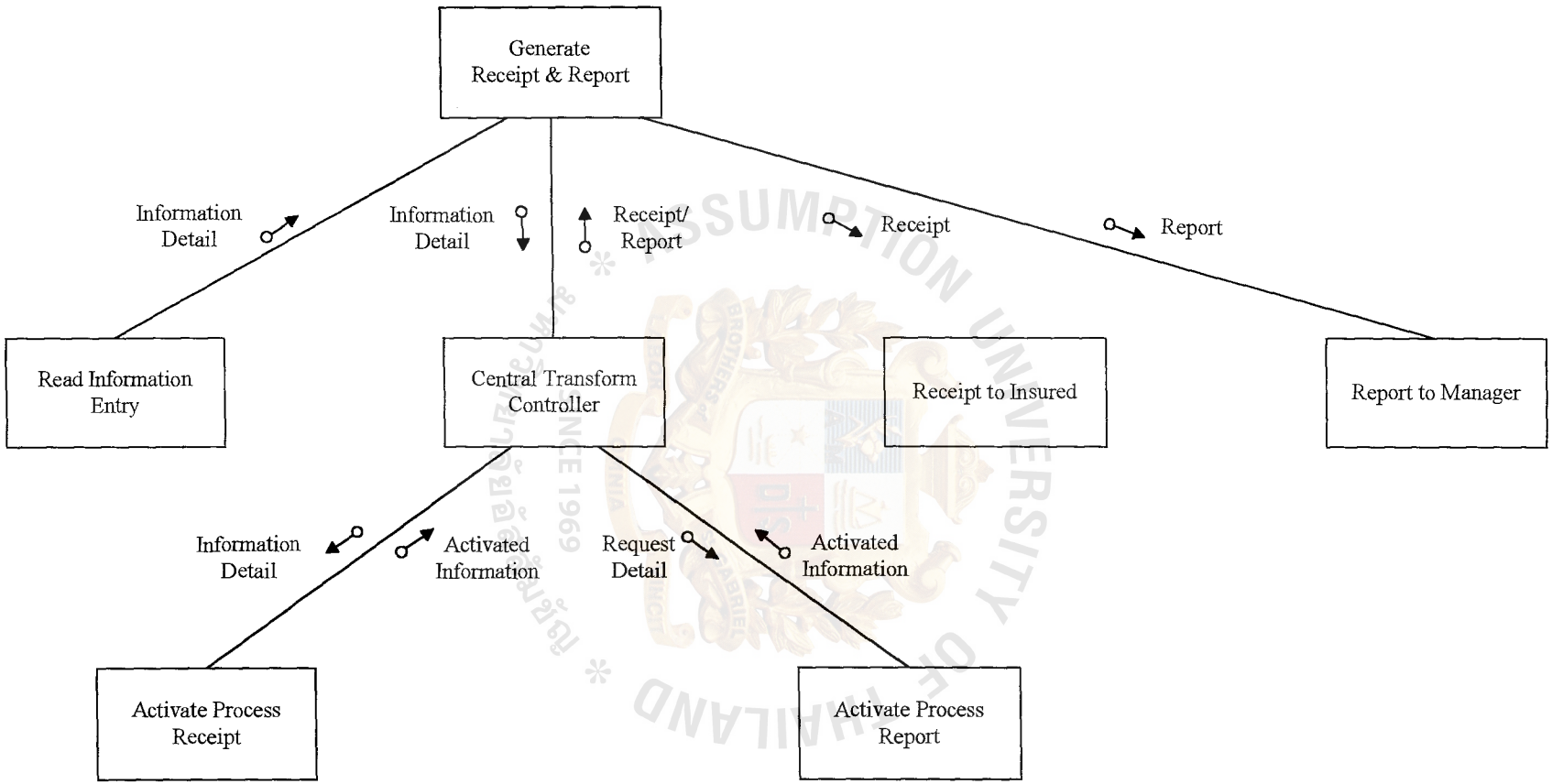


Figure C.17. Structure Chart of Process Generate Receipt and Report.

APPENDIX D

PROCESS SPECIFICATION

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

Table D.1. Process Specification of Process 1.1.

Data Item	Description
Process Name:	Check Insured
Data In:	(1) Insured Description (2) Car Description (3) Existing Insured Information (4) Existing Car Information
Data Out:	(1) New Insured Record (2) New Car Record
Process:	(1) Officer receives Insured and Car Description from Insured to verify with the Existing Insured and Existing Car Information
Attachment	(1) Insured (2) Data Store D1 (Insured Information) (3) Data Store D2 (Car Information)

Table D.2. Process Specification of Process 1.2.

Data Item	Description
Process Name:	New Insured Profile
Data In:	(1) New Insured Record (2) New Car Record
Data Out:	(1) New Insured Information (2) New Car Information
Process:	(1) Classify Insured Information and Car Information (2) Add New Record in Database
Attachment	(1) Data Store D1 (Insured Information) (2) Data Store D2 (Car Information)

Table D.3. Process Specification of Process 2.1.

Data Item	Description
Process Name:	Check Agency
Data In:	(1) Agency Description (2) Existing Agency Information
Data Out:	New Agency Record
Process:	Officer receives Agency Description from Agency to verify with the Existing Agency Information
Attachment	(1) Agency (2) Data Store D3 (Agency Information)

Table D.4. Process Specification of Process 2.2.

Data Item	Description
Process Name:	New Agency Profile
Data In:	New Agency Record
Data Out:	New Agency Information
Process:	(1) Classify Agency Information (2) Add New Record in Database
Attachment	Data Store D3 (Agency Information)

ASSUMPTION UNIVERSITY OF THAILAND
SINCE 1969
มหาวิทยาลัยอัสสัมชัญ

Table D.5. Process Specification of Process 3.1.

Data Item	Description
Process Name:	Classify Car Type
Data In:	(1) Car Information (2) Car Type Information (3) Policy Information
Data Out:	Premium Description
Process:	(1) Get Car Information (2) Verify with Car Type Information
Attachment	(1) Data Store D2 (Car Information) (2) Data Store D8 (Policy Information) (3) Data Store D6 (Car Type Information)

Table D.6. Process Specification of Process 3.2.

Data Item	Description
Process Name:	Calculate VAT
Data In:	(1) Premium Description (2) Stamp Rate Information (3) VAT Information
Data Out:	(1) Premium Information (2) Stamp Information (3) VAT Paid Information
Process:	(1) Get the Premium Description and Stamp Rate Information (2) Calculate Value of Stamp from Premium (3) Calculate VAT from the Summation of Premium and Stamp
Attachment	(1) Data Store D4 (Stamp Rate Information) (2) Data Store D5 (VAT Information)

Table D.7. Process Specification of Process 3.3.

Data Item	Description
Process Name:	Calculate Total Premium
Data In:	(1) Premium Information (2) Stamp Information (3) VAT Paid Information
Data Out:	(1) Total Premium Information (2) Premium Statement
Process:	(1) Get the Premium, Stamp, and VAT Paid Information (2) Calculate Total Premium from the Summation of Premium, Stamp, and VAT Paid Information
Attachment	(1) Data Store D7(Total Premium Information) (2) Accounting

Table D.8. Process Specification of Process 4.1.

Data Item	Description
Process Name:	Check Policy
Data In:	(1) Insured Information (2) Car Information (3) Total Premium Information (4) Policy Schedule Information
Data Out:	(1) Existing Policy Information (2) New Policy Record
Process:	(1) Get Insured, Car and Total Premium Information (2) Verify with Existing Policy Information
Attachment	(1) Data Store D1 (Insured Information) (2) Data Store D2 (Car Information) (3) Data Store D7 (Total Premium Information) (4) Data Store D8 (Policy Schedule Information)

Table D.9. Process Specification of Process 4.2.

Data Item	Description
Process Name:	Renew Policy
Data In:	(1) Existing Policy Information (2) Policy Schedule Information
Data Out:	Policy Description
Process:	(1) Get existing policy Information (2) Renew policy in the Policy Schedule Information Database
Attachment	Data Store D8 (Policy Schedule Information)

Table D.10. Process Specification of Process 4.3.

Data Item	Description
Process Name:	Create New Policy
Data In:	(1) New Policy Record (2) Insured Information (3) Car Information (4) Total Premium Information
Data Out:	Policy Description
Process:	(1) Get new policy record (2) Create new policy in Policy Schedule Information Database
Attachment	(1) Data Store D1 (Customer Information) (2) Data Store D2 (Car Information) (3) Data Store D7 (Total Premium Information) (4) Data Store D8 (Policy Schedule Information)

Table D.11. Process Specification of Process 4.4.

Data Item	Description
Process Name:	Issue Sticker
Data In:	Policy Schedule Information
Data Out:	Sticker Information
Process:	(1) Get Policy Schedule Information (2) Create Sticker Information
Attachment	(1) Data Store D8 (Policy Schedule Information) (2) Data Store D9 (Sticker Information)

Table D.12. Process Specification of Process 5.1.

Data Item	Description
Process Name:	Verify Changing
Data In:	(1) Change Description (2) Policy Schedule Information
Data Out:	Change Description
Process:	(1) Get Change Description from Insured (2) Verify with Policy Schedule Information (3) Keep Verified Change Description into Change Information File
Attachment	(1) Insured (2) Data Store D8 (Policy Schedule Information) (3) Data Store D10 (Change Information)

Table D.13. Process Specification of Process 5.2.

Data Item	Description
Process Name:	Issue Endorsement
Data In:	(1) Change Information (2) Policy Schedule Information
Data Out:	Endorsement Description
Process:	(1) Get Verified Change Information (2) Create Endorsement Information
Attachment	(1) Data Store D8 (Policy Information) (2) Data Store D10 (Chang information) (3) Data Store D11 (Endorsement Information)

Table D.14. Process Specification of Process 6.1.

Data Item	Description
Process Name:	Classify Commission Type
Data In:	(1) Policy Schedule Information (2) Agency Information (3) Commission Type Information
Data Out:	(1) Agency Record (2) Commission Type Record
Process:	(1) Classify Agency from Policy Schedule (2) Get Commission Type Information (3) Send Information to Calculate Commission
Attachment	(1) Data Store D3 (Agency Information) (2) Data Store D8 (Policy Schedule Information) (3) Data Store D12 (Commission Type Information)

Table D.15. Process Specification of Process 6.2.

Data Item	Description
Process Name:	Calculate Commission
Data In:	(1) Agency Record (2) Commission Type Record (3) Commission Rate Information (4) Total Premium Information
Data Out:	(1) Commission Description (2) Commission Statement
Process:	(1) Get Information from Process Collect Commission Data (2) Calculate Commission (3) Create Commission Statement and send to Account Department
Attachment	(1) Data Store D7 (Total Premium Information) (2) Data Store D13 (Commission Rate Information) (3) Data Store D14 (Commission Information) (4) Accounting

ASSUMPTION UNIVERSITY OF THAILAND
SINCE 1969
มหาวิทยาลัยอัสสัมชัญ

Table D.16. Process Specification of Process 7.1.

Data Item	Description
Process Name:	Generate Receipt
Data In:	(1) Total Premium Information (2) Policy Schedule Information (3) Endorsement Information (4) Sticker Information (5) Commission Information (6) Payment
Data Out:	(1) Policy Schedule / Sticker (2) Endorsement (3) Commission (4) Receipt Information (5) Receipt
Process:	(1) Get Information (2) Send Policy Schedule, Sticker, Endorsement, and Receipt to Insured (3) Send Commission to Agency (4) Store Receipt Information to the Receipt Information Database
Attachment	(1) Data Store D7 (Total Premium Information) (2) Data Store D8 (Policy Information) (3) Data Store D9 (Sticker Information) (4) Data Store D11 (Endorsement Information) (5) Data Store D14 (Commission Information) (6) Data Store D15 (Receipt Information) (7) Insured (8) Accounting (9) Agency

Table D.17. Process Specification of Process 7.2.

Data Item	Description
Process Name:	Generate Report
Data In:	(1) Total Premium Information (2) Policy Schedule Information (3) Endorsement Information (4) Sticker Information (5) Commission Information
Data Out:	Reports
Process:	(1) Retrieve Information to generate report that activated by time to manager
Attachment	(1) Data Store D7 (Total Premium Information) (2) Data Store D8 (Policy Information) (2) Data Store D9 (Sticker Information) (3) Data Store D11 (Endorsement Information) (4) Data Store D14 (Commission Information) (5) Data Store D15 (Receipt Information) (6) Manager

ASSUMPTION UNIVERSITY OF THAILAND
SINCE 1969
มหาวิทยาลัยอัสสัมชัญ

APPENDIX E

INTERFACE DESIGN

ASSUMPTION UNIVERSITY OF THAILAND
SINCE 1969
มหาวิทยาลัยอัสสัมชัญ

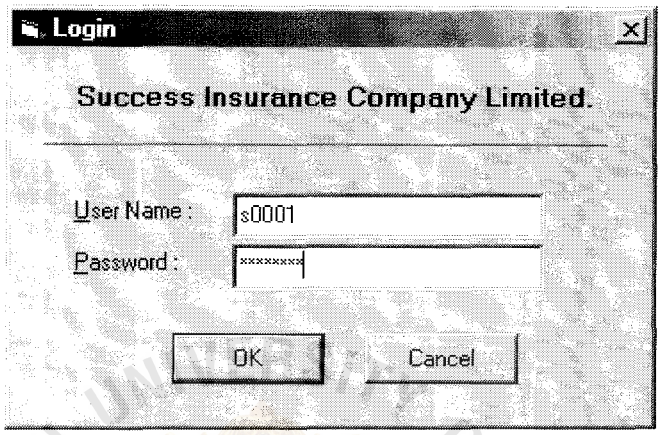


Figure E.1. Login Screen Form.

Figure E.2. Invalid User Login Form.

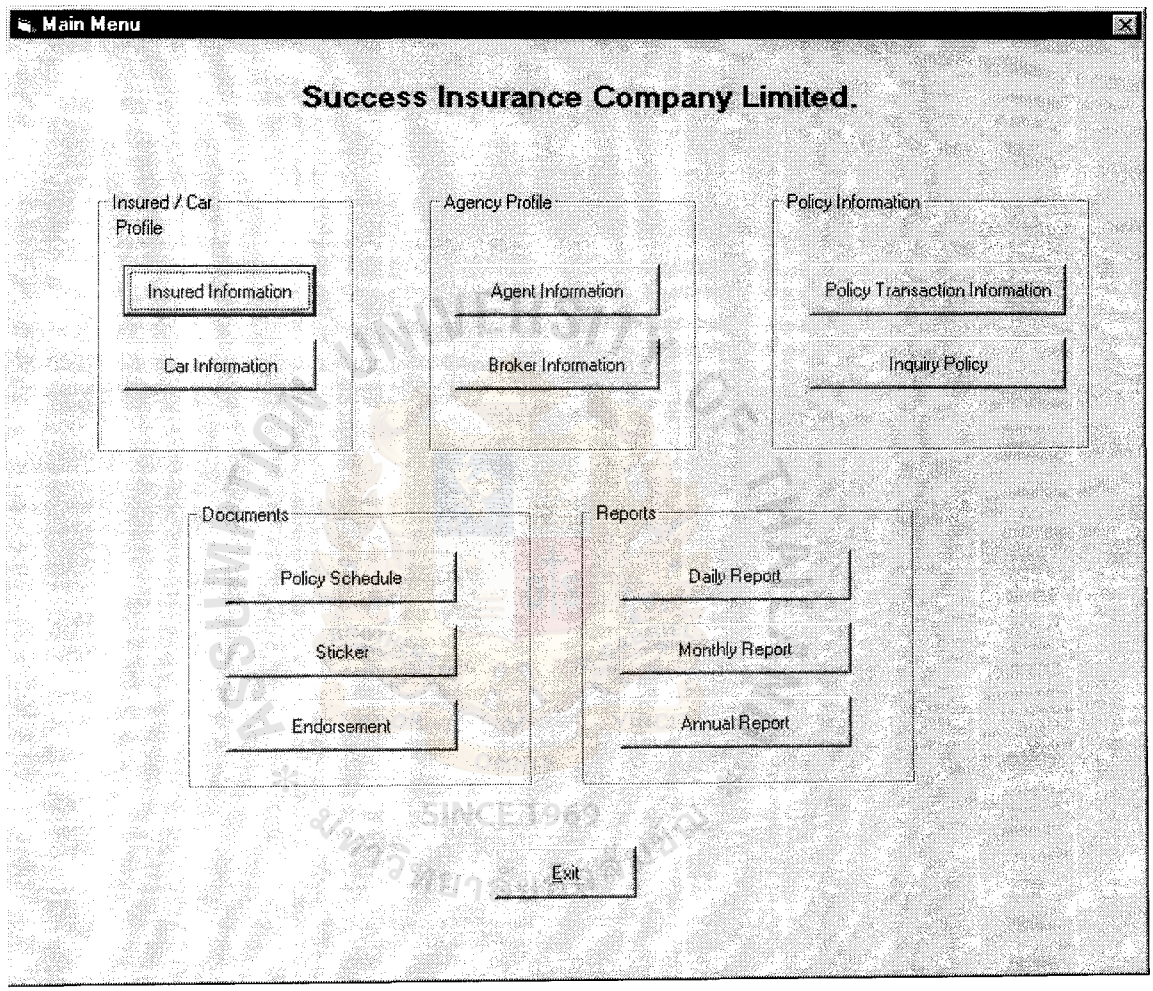


Figure E.3. Main Menu Form.

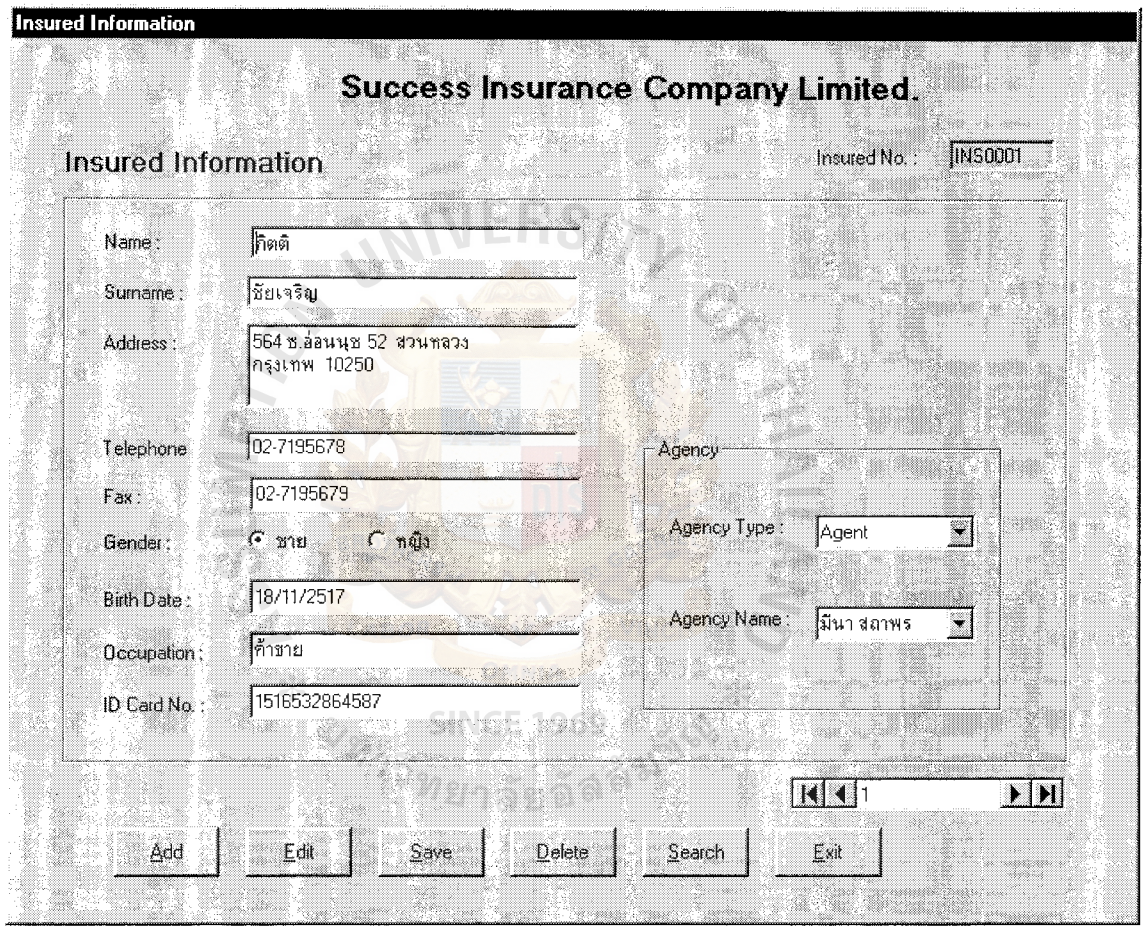


Figure E.4. Insured Information Form.

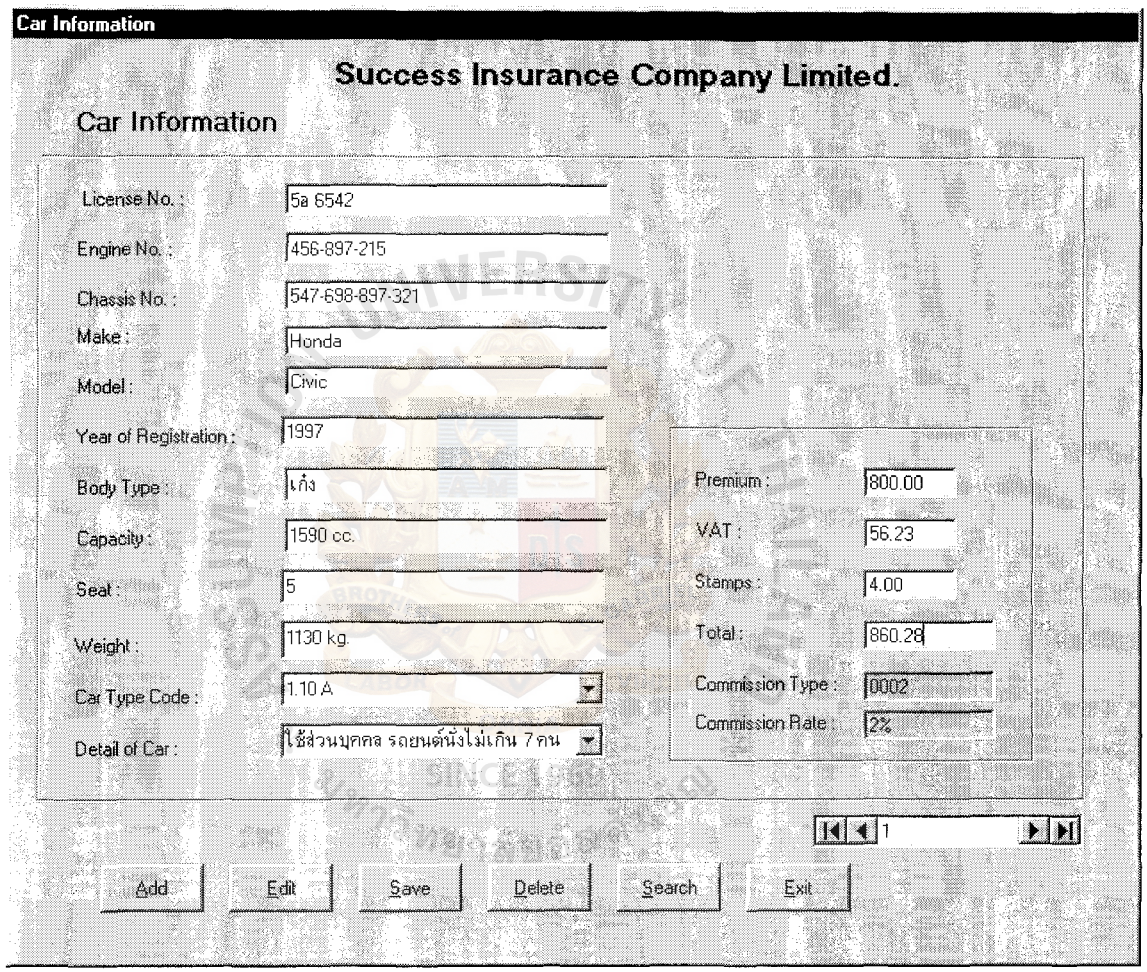


Figure E.5. Car Information Form.

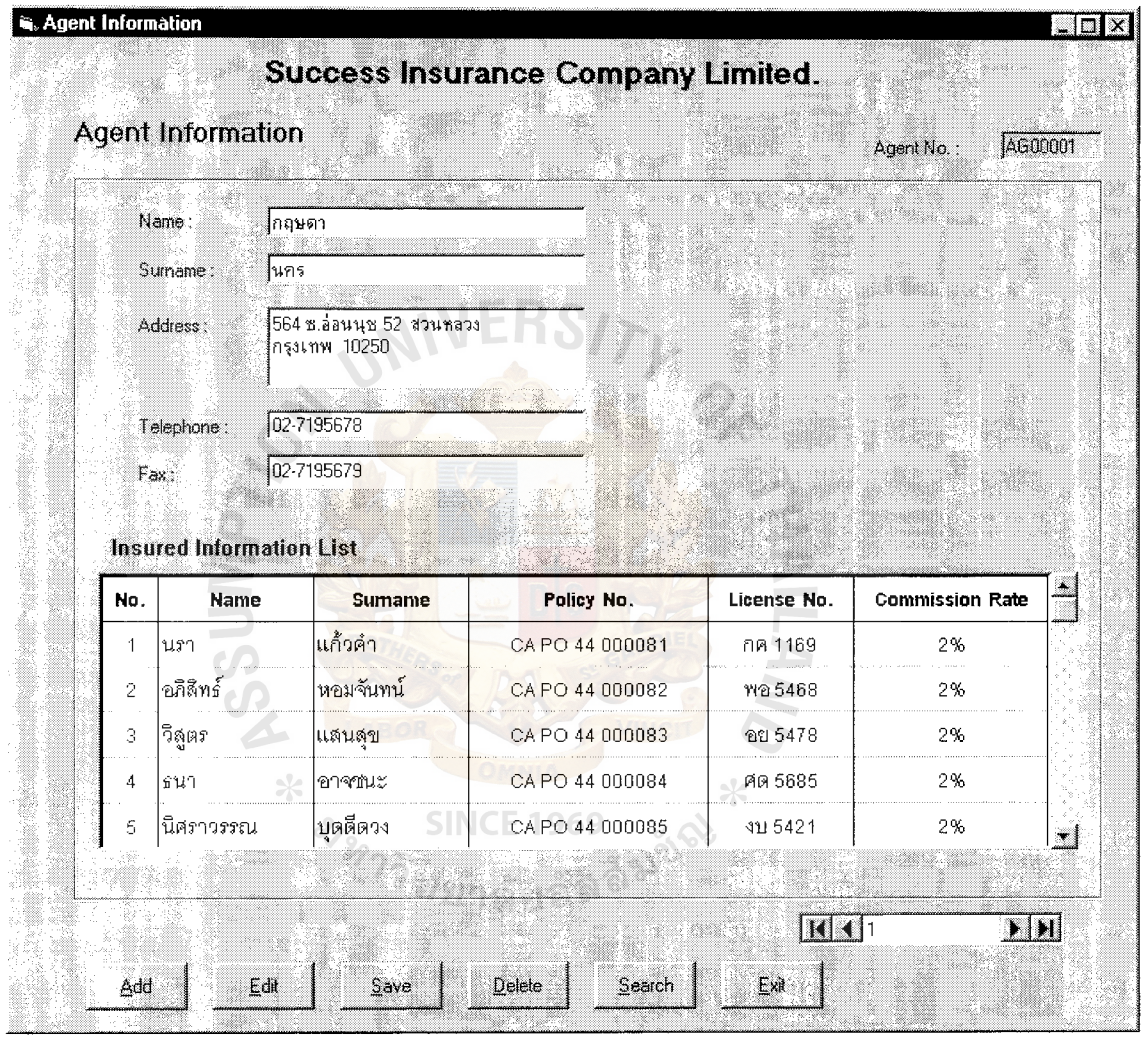


Figure E.6. Agent Information Form.

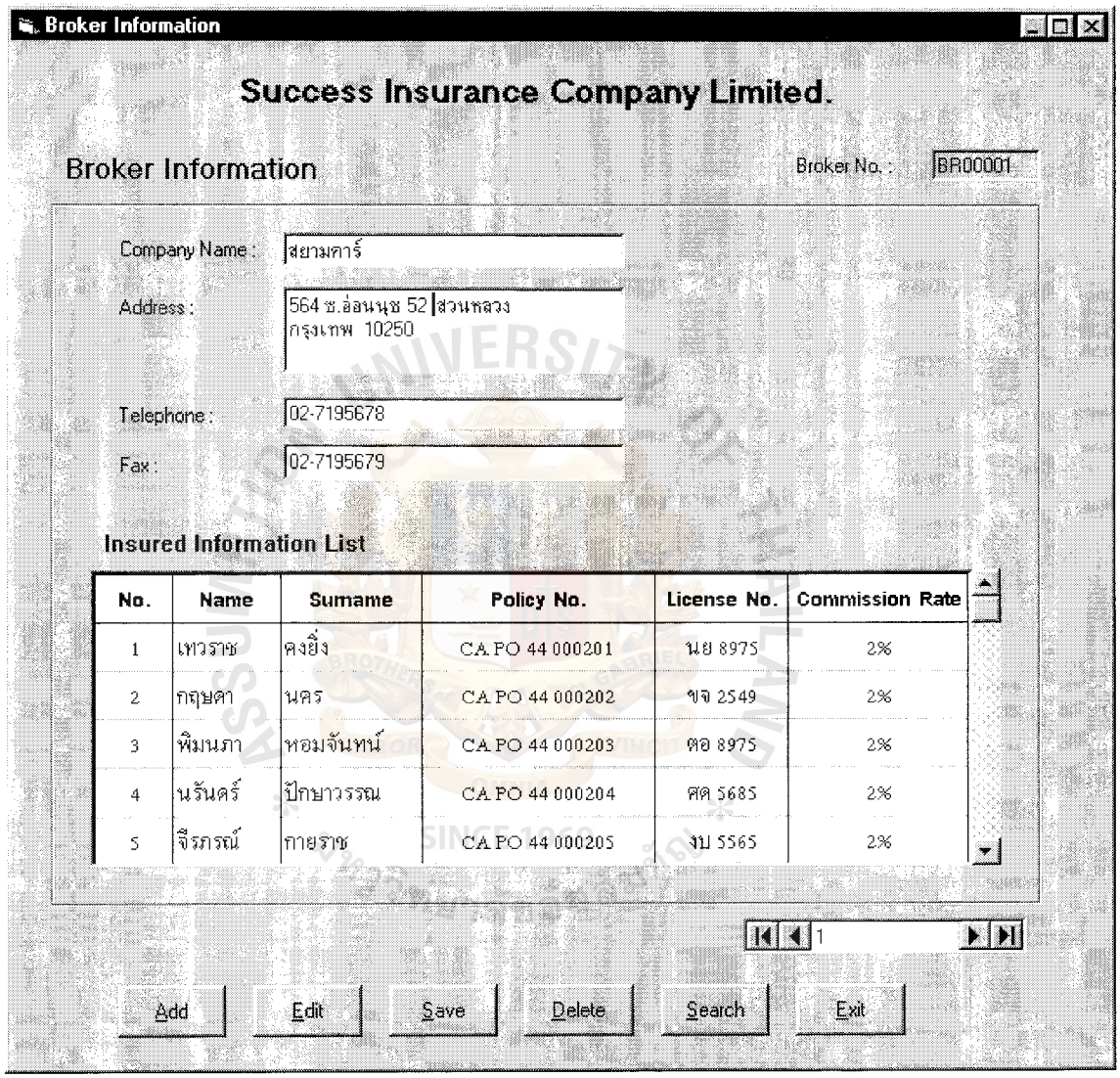


Figure E.7. Broker Information Form.

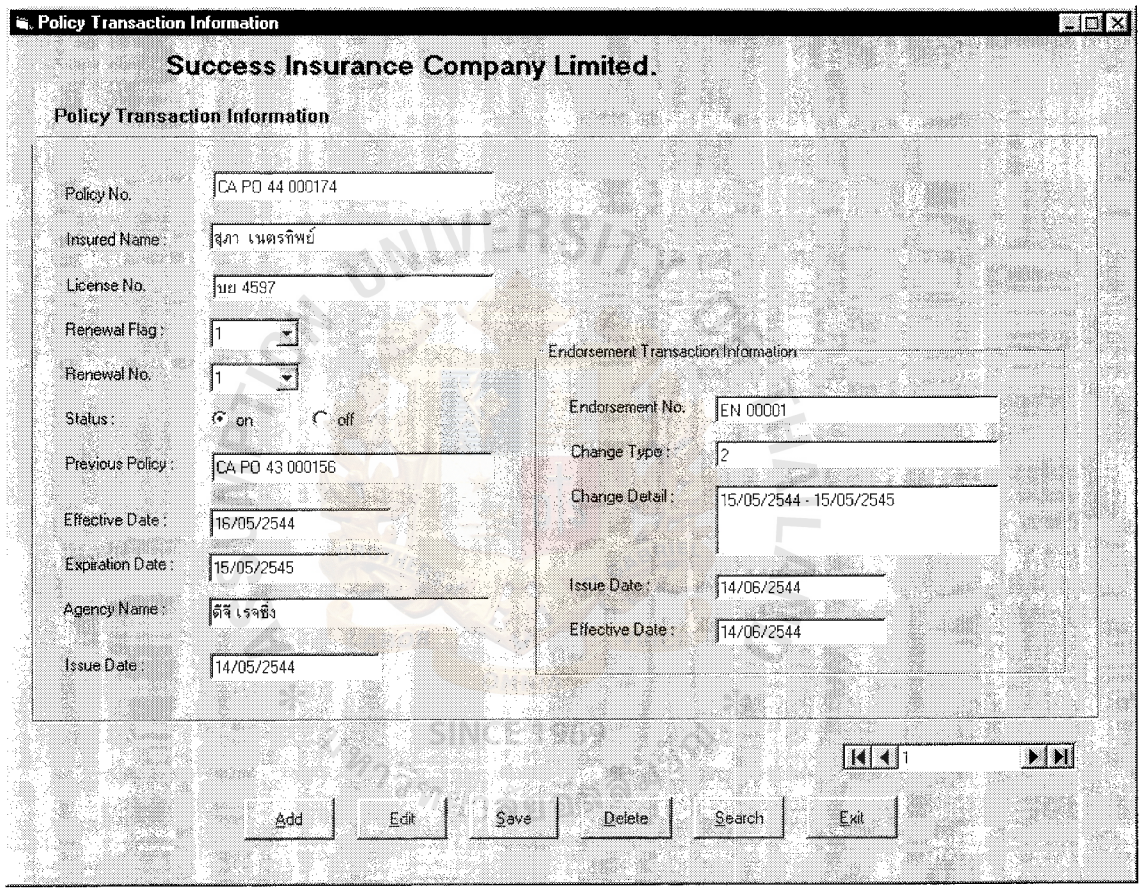


Figure E.8. Policy Transaction Information Form.

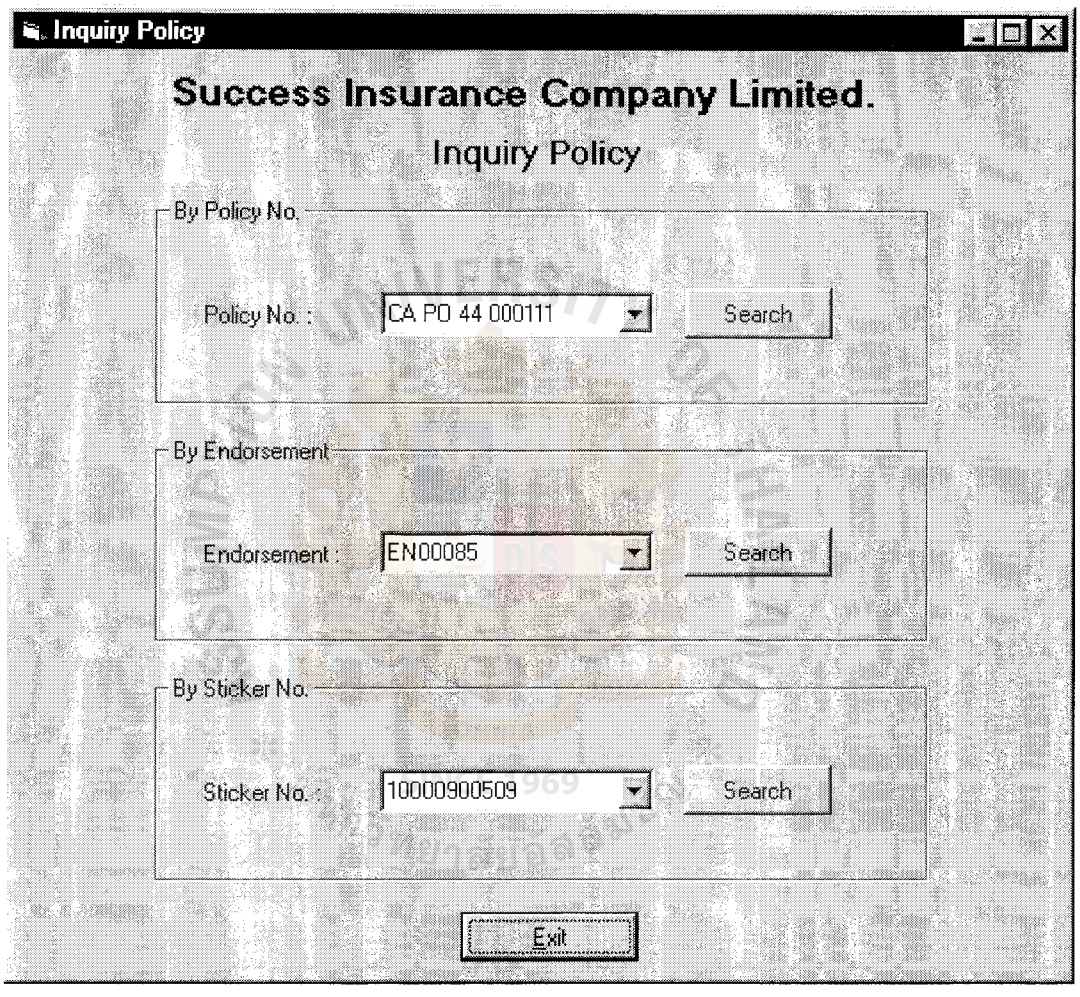


Figure E.9. Inquiry Policy Form.

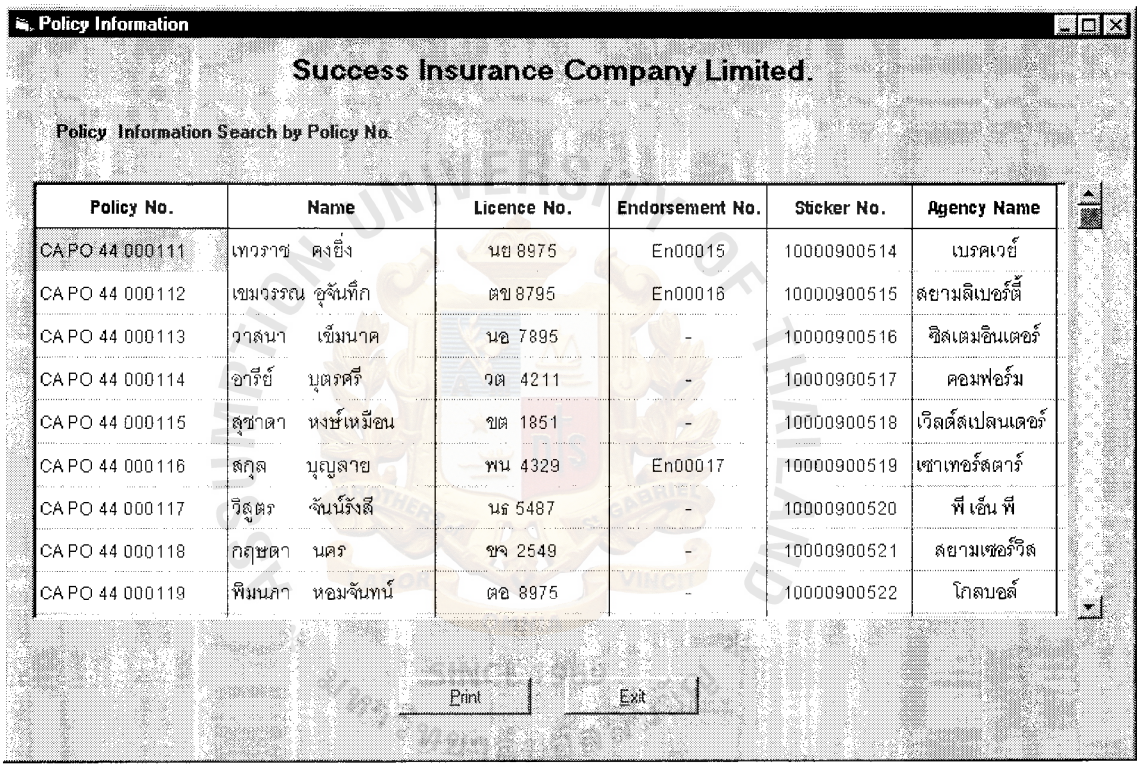


Figure E.10. Policy Information Search by Policy Number Form.

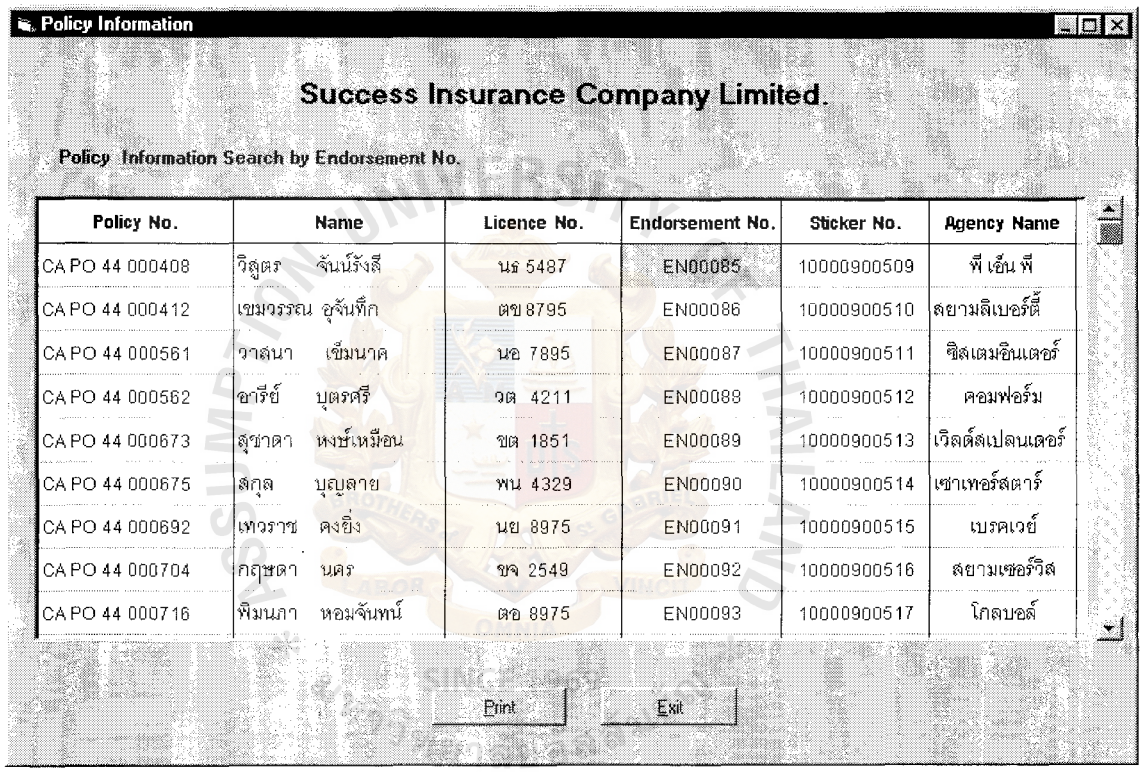


Figure E.11. Policy Information Search by Endorsement Number Form.

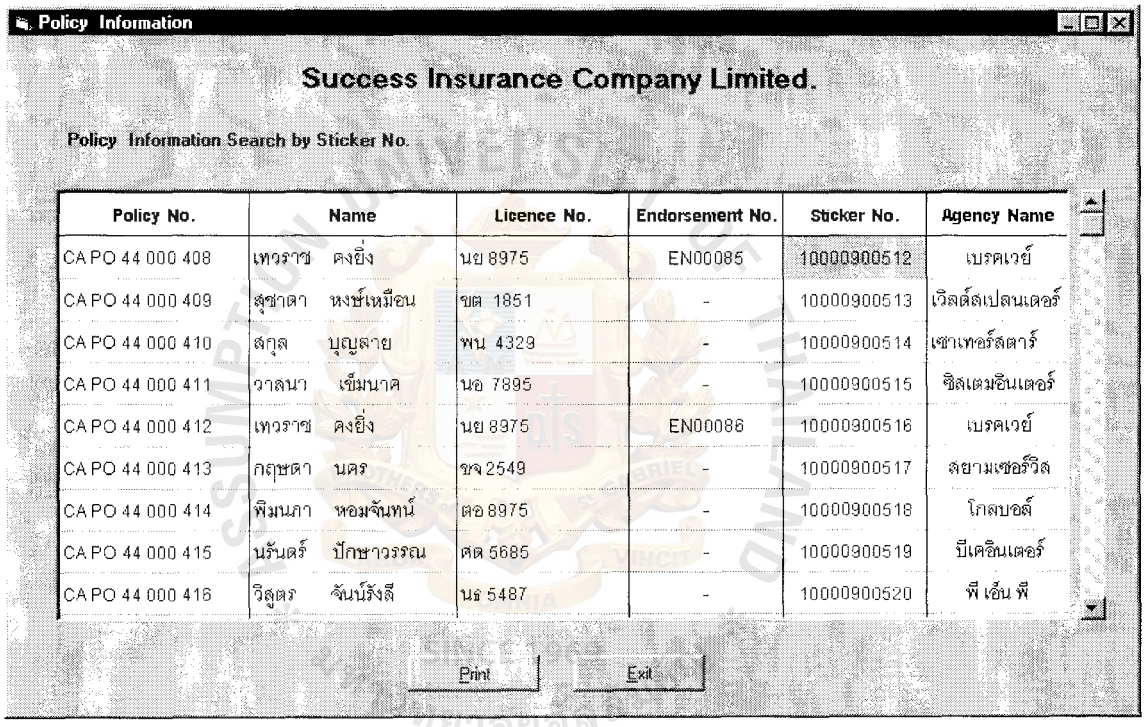


Figure E.12. Policy Information Search by Sticker Number Form.

APPENDIX F

REPORT DESIGN

ASSUMPTION UNIVERSITY OF THAILAND
SINCE 1969
มหาวิทยาลัยอัสสัมชัญ

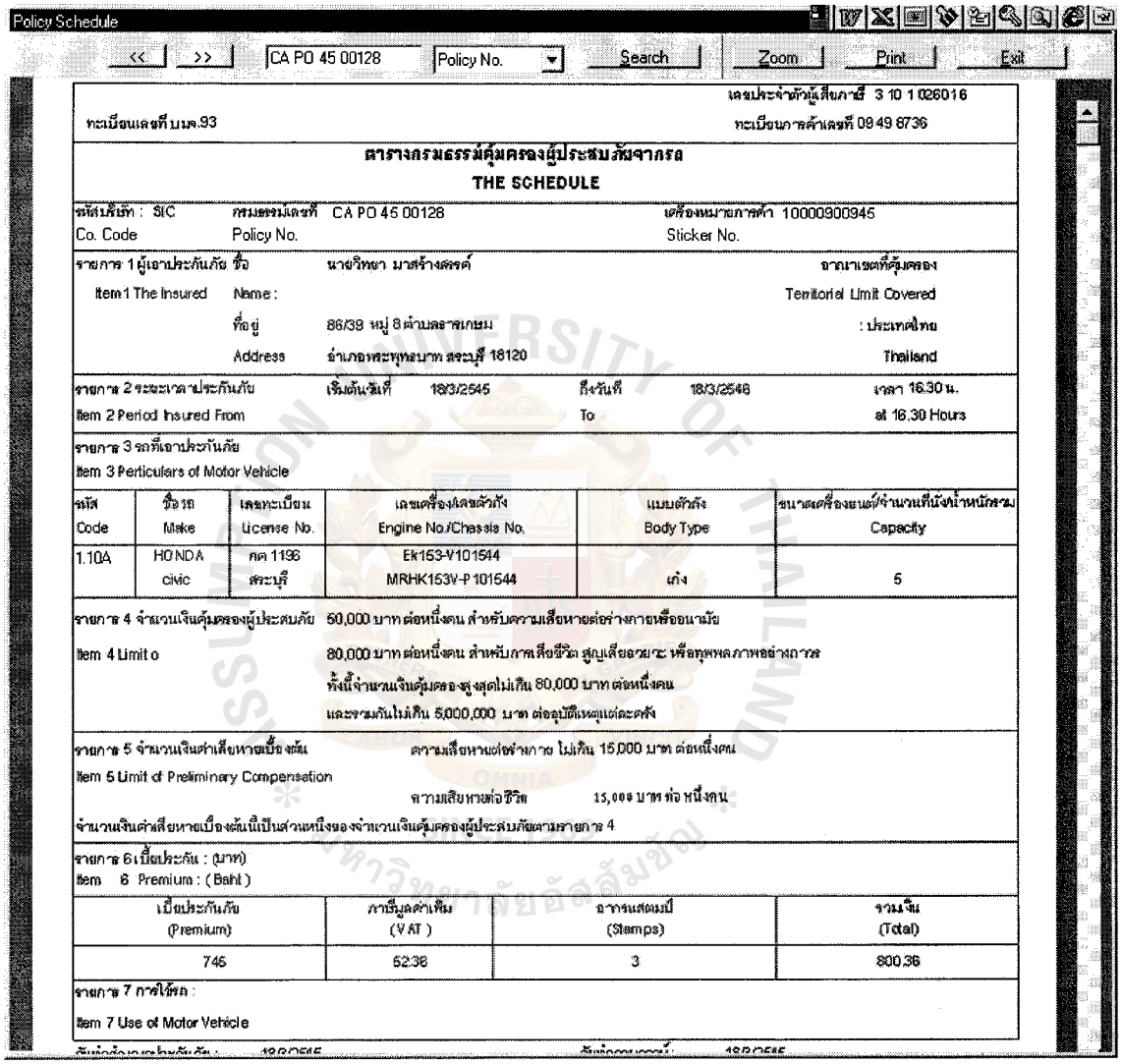


Figure F.1. Policy Schedule.

Figure F.2. Sticker.

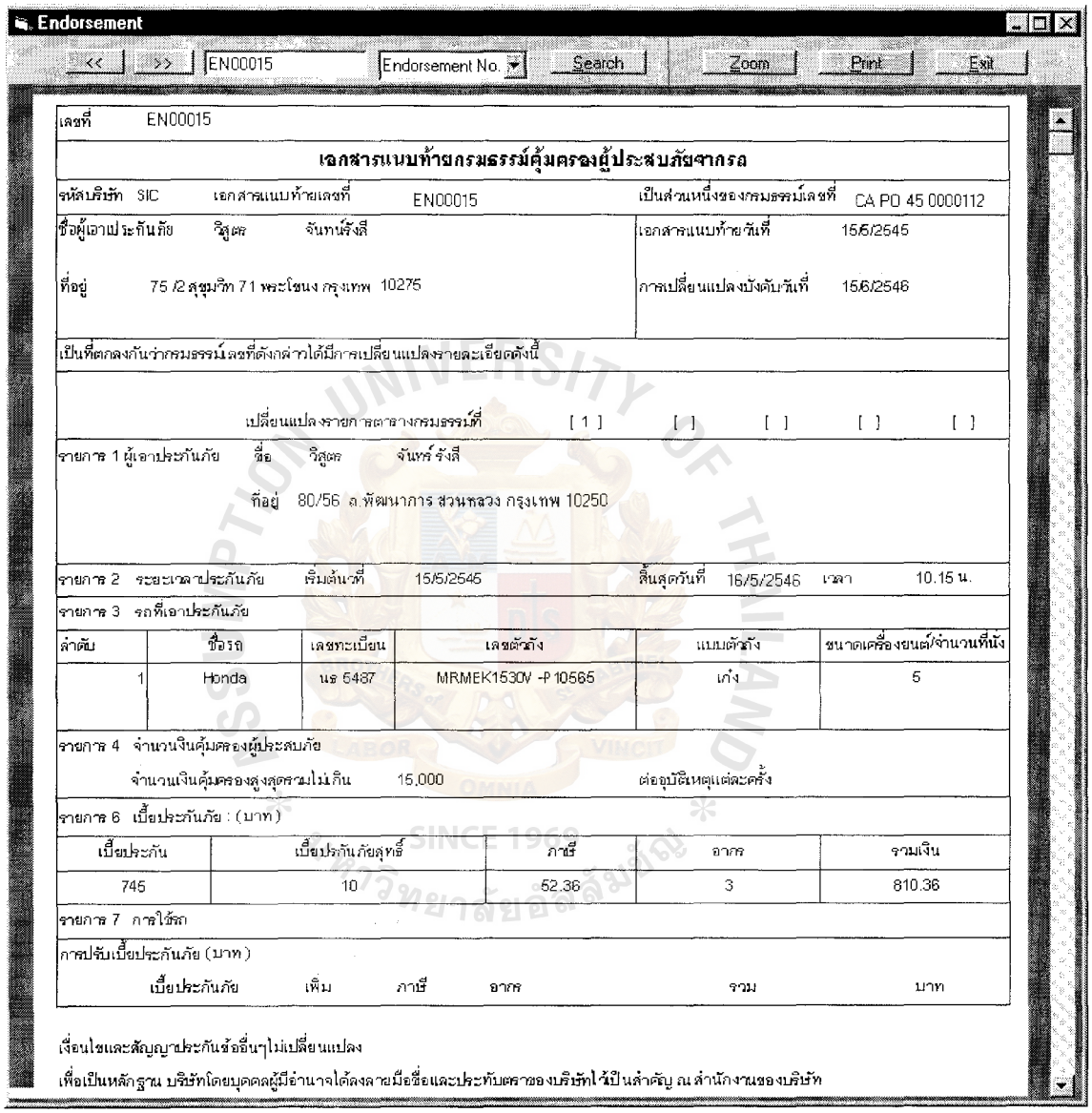
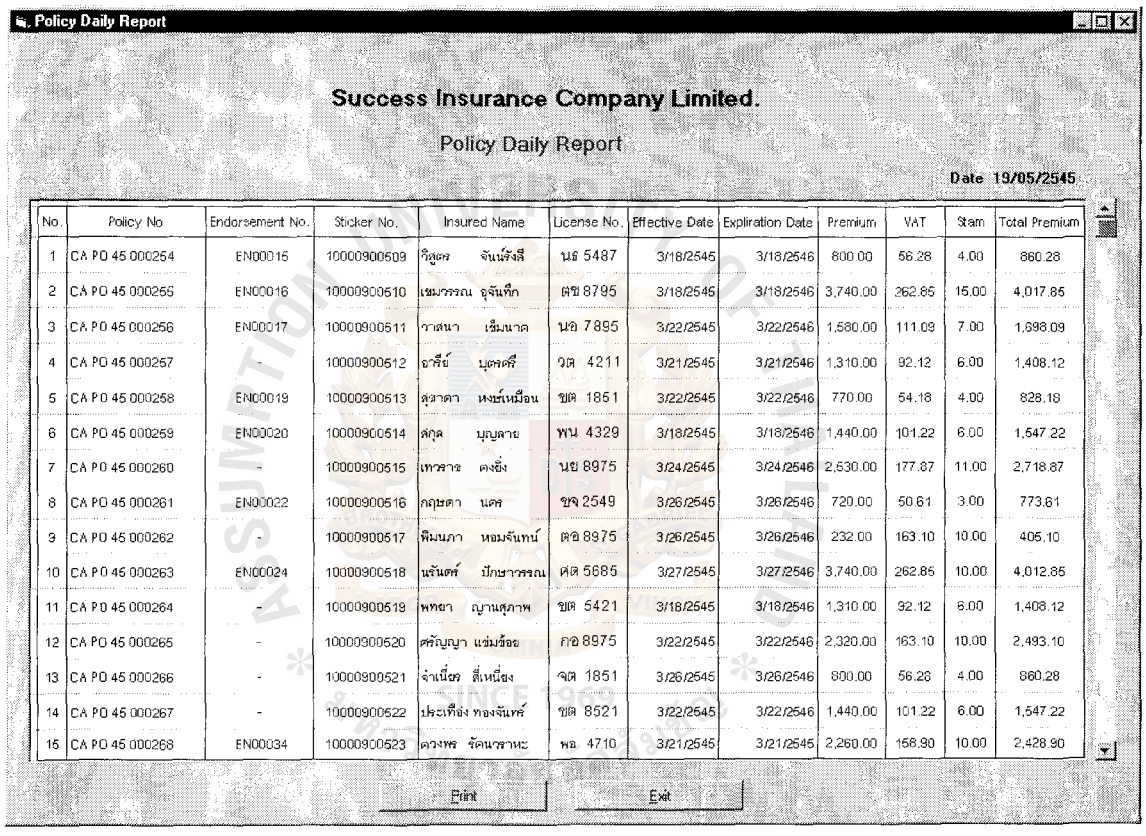
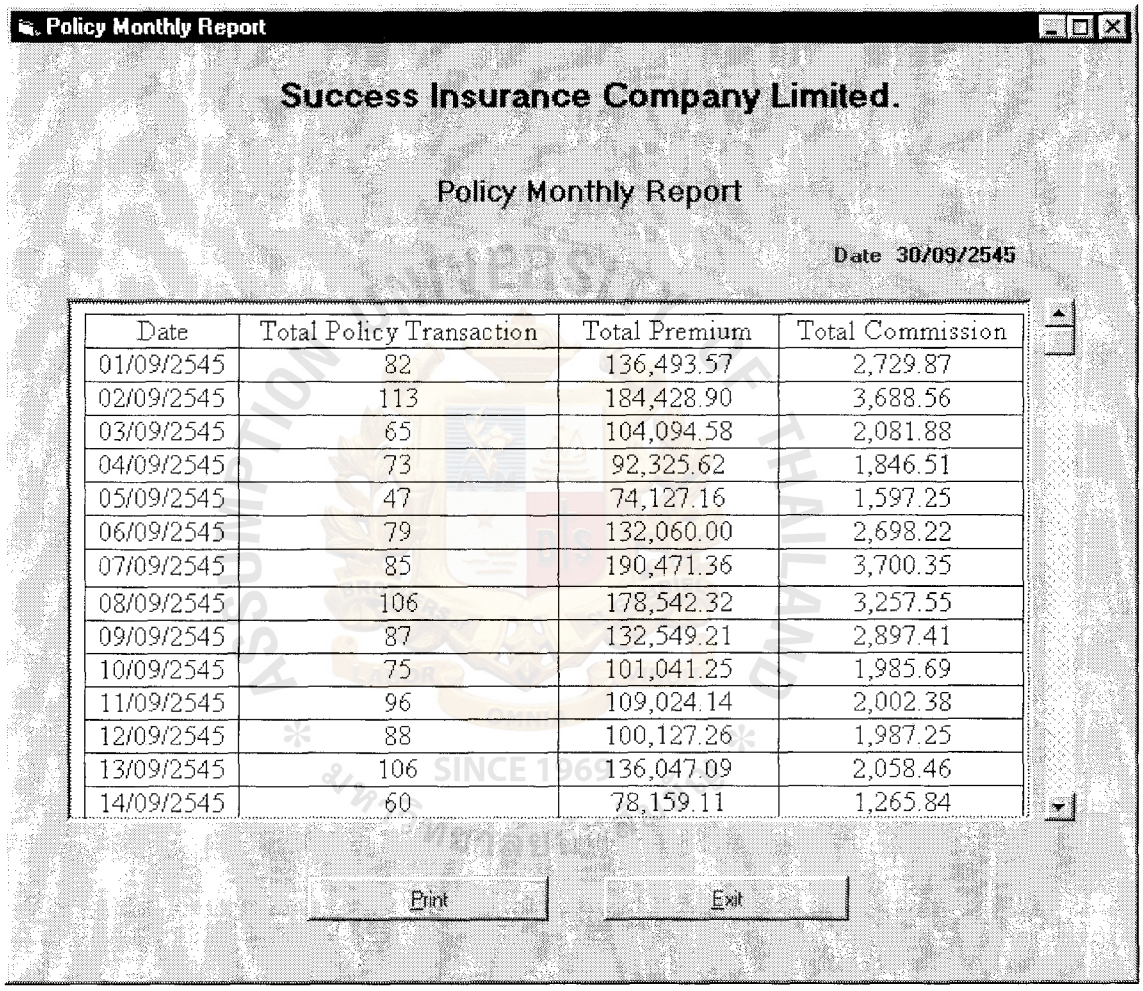


Figure F.3. Endorsement.



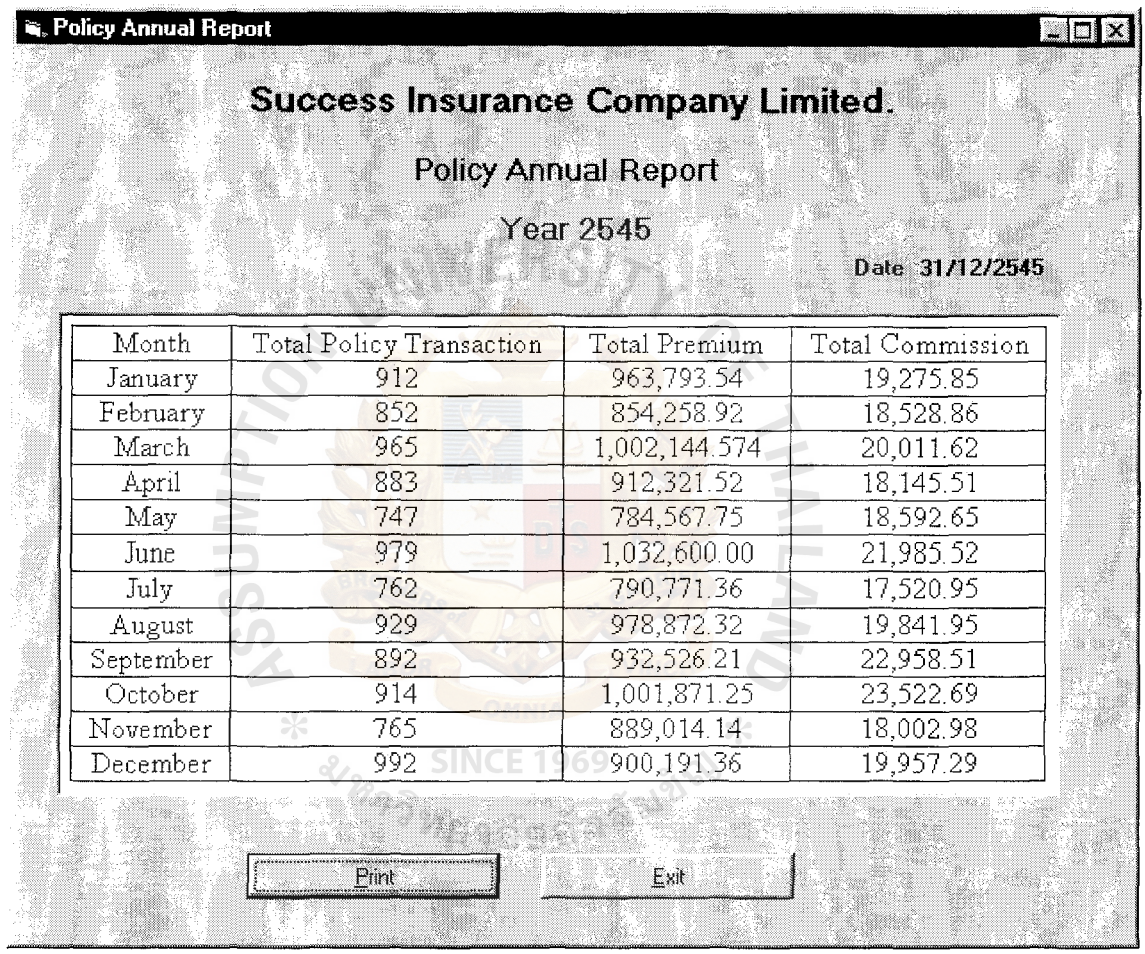
No.	Policy No	Endorsement No.	Sticker No.	Insured Name	License No.	Effective Date	Expiration Date	Premium	VAT	Stam	Total Premium
1	CA PO 45 000254	EN00015	10000900509	วิสูตร จันเรืองลี	นธ 5487	3/18/2545	3/18/2546	800.00	56.28	4.00	860.28
2	CA PO 45 000255	EN00016	10000900510	เขมวรรณ อุจันทึก	ตช 8795	3/18/2545	3/18/2546	3,740.00	262.85	15.00	4,017.85
3	CA PO 45 000256	EN00017	10000900511	วาสนา เข็มนาค	นอ 7895	3/22/2545	3/22/2546	1,580.00	111.09	7.00	1,698.09
4	CA PO 45 000257	-	10000900512	อาธีย์ บุตรศรี	วต 4211	3/21/2545	3/21/2546	1,310.00	92.12	6.00	1,408.12
5	CA PO 45 000258	EN00019	10000900513	ดุษาดา หงษ์เหมือน	ขต 1851	3/22/2545	3/22/2546	770.00	54.18	4.00	828.18
6	CA PO 45 000259	EN00020	10000900514	ลภุต บุญลาย	พน 4329	3/18/2545	3/18/2546	1,440.00	101.22	6.00	1,547.22
7	CA PO 45 000260	-	10000900515	เทวราช คงยิ่ง	นย 8975	3/24/2545	3/24/2546	2,530.00	177.87	11.00	2,718.87
8	CA PO 45 000261	EN00022	10000900516	กฤษดา นคร	ชจ 2549	3/26/2545	3/26/2546	720.00	50.61	3.00	773.61
9	CA PO 45 000262	-	10000900517	พิมนภา หอมจันทน์	ตอ 8975	3/26/2545	3/26/2546	232.00	163.10	10.00	405.10
10	CA PO 45 000263	EN00024	10000900518	นรันดร์ ปักษาวรรณ	ศต 5685	3/27/2545	3/27/2546	3,740.00	262.85	10.00	4,012.85
11	CA PO 45 000264	-	10000900519	พทยา ญาณสุภาพ	ขต 5421	3/18/2545	3/18/2546	1,310.00	92.12	6.00	1,408.12
12	CA PO 45 000265	-	10000900520	ศรัญญา แข่มช้อย	กอ 8975	3/22/2545	3/22/2546	2,320.00	163.10	10.00	2,493.10
13	CA PO 45 000266	-	10000900521	จำเนียร สี่เหนียง	จต 1851	3/26/2545	3/26/2546	800.00	56.28	4.00	860.28
14	CA PO 45 000267	-	10000900522	ประเทือง ทองจันทร์	ขต 8521	3/22/2545	3/22/2546	1,440.00	101.22	6.00	1,547.22
15	CA PO 45 000268	EN00034	10000900523	ควงพร จันนราหะ	พอ 4710	3/21/2545	3/21/2545	2,260.00	158.90	10.00	2,428.90

Figure F.4. Policy Daily Report.



Date	Total Policy Transaction	Total Premium	Total Commission
01/09/2545	82	136,493.57	2,729.87
02/09/2545	113	184,428.90	3,688.56
03/09/2545	65	104,094.58	2,081.88
04/09/2545	73	92,325.62	1,846.51
05/09/2545	47	74,127.16	1,597.25
06/09/2545	79	132,060.00	2,698.22
07/09/2545	85	190,471.36	3,700.35
08/09/2545	106	178,542.32	3,257.55
09/09/2545	87	132,549.21	2,897.41
10/09/2545	75	101,041.25	1,985.69
11/09/2545	96	109,024.14	2,002.38
12/09/2545	88	100,127.26	1,987.25
13/09/2545	106	136,047.09	2,058.46
14/09/2545	60	78,159.11	1,265.84

Figure F.5. Policy Monthly Report.



Month	Total Policy Transaction	Total Premium	Total Commission
January	912	963,793.54	19,275.85
February	852	854,258.92	18,528.86
March	965	1,002,144.574	20,011.62
April	883	912,321.52	18,145.51
May	747	784,567.75	18,592.65
June	979	1,032,600.00	21,985.52
July	762	790,771.36	17,520.95
August	929	978,872.32	19,841.95
September	892	932,526.21	22,958.51
October	914	1,001,871.25	23,522.69
November	765	889,014.14	18,002.98
December	992	900,191.36	19,957.29

Figure E.6. Policy Annual Report.

APPENDIX G

ALTERNATIVE CANDIDATE SOLUTIONS

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

G.1 Alternative Candidate

There are alternatives for the new system as presented below:

Table G.1. Candidate Matrix.

Characteristics	Candidate 1	Candidate 2	Candidate 3
(1) Portion of System Computerized Brief description of portion of the system that would be computerized in this candidate.	Automobile Insurance Information operations which include underwriting and reports	Same as candidate 1, but include inquiry, more powerful and more flexible to expand the portion of system to support other operations.	Same as candidate 2.
(2) Benefit Brief description the business benefit gained from this candidate.	This solution is very cheap, can support all user requirements.	This solution full supports all user requirements, provides efficient interaction between user, and support large database.	Same as candidate 2, and this solution is not too expensive
(3) Method of Data Processing Generally some combination of: online, batch, deferred batch, remote batch, and real time.	Client/Server	Same as candidate 1.	Same as candidate 1.
(4) Server and Clients A description of the servers and clients needed to support this candidate.	Server: Intel Pentium IV Processor 1.4 GHz., 40GB. HDD, Cache 1 GB., RAM 256 MB., 1.44 MB. Floppy Drive, with MS Windows 2000 Server	Same as candidate 1.	Same as candidate 1.

ASSUMPTION UNIVERSITY LIBRARY
SINCE 1969

Table G.1. Candidate Matrix (Continued).

Characteristics	Candidate 1	Candidate 2	Candidate 3
	Clients: Intel Pentium II Processor 1.0 GHz., 20GB. HDD, Cache 256 KB., RAM 64 MB., 1.44 MB. Floppy Drive, with MS Windows 98		
(5) Software Tools needed Software tools needed to design and build the candidate. Not generally applications software packages are to be purchased.	C++ and MS DOS	Oracle Developer Release 5.0	Microsoft Access 2000
(6) Application Software A description of the software to be purchased, built, accessed, or some combination of these techniques.	Custom Solution	Outsourcing Solution	Same as candidate 2.
(7) Storage Database Method Brief description of how data would be organized, and what storage media would be used.	File and Diskette	Oracle v8.x	Microsoft SQL Server
(8) Input Devices and Implications A description of input methods to be used, input devices, special input requirements, and input considerations.	Keyboard and Mouse	Same as candidate 1.	Same as candidate1.

UNIVERSITY OF THAILAND SINCE 1969 มหาวิทยาลัยอัสสัมชัญ

Table G.1. Candidate Matrix (Continued).

Characteristics	Candidate 1	Candidate 2	Candidate 3
(9) Output Devices and Implications A description of output devices that would be used, special output requirements, and output considerations.	2 Laser Printers, 2 Dot Matrix Printers, 17 inches SVGA Monitor, 15 inches SVGA Monitor.	Same as candidate 1.	Same as candidate 1.

There are the differences among those three alternative candidates. Not only the characteristics, but also the processing efficiency, flexibility, end-user friendliness, and programming complexity should be considered. The capacity of each alternative can determine from Table G.2.

Table G.2. Comparison of Alternative Candidates.

Alternative	Processing Efficiency	Flexibility	End-User Friendliness	Programming Complexity
Candidate 1	Low	Low	Low	Low
Candidate 2	Medium –High	High	Medium	High
Candidate 3	High	High	High	Low

Explanation of the degree of capacity:

(1) Processing Efficiency

Candidate 1 uses C++ Application for processing. So the processing efficiency is lower than others. For candidate 2 and 3, Oracle and Microsoft Access 2000 support high speed processing.

(2) Flexibility

Candidate 1 uses C++, so the flexibility is lower than others. While the flexibility of candidate 2 and 3 can be done according to the characteristic of the candidate to expand the porting of system supporting other operations.

(3) End-User Friendliness

The interface of candidate 1 generating from C++ is not object-oriented, which is not user friendly as interface of candidate 2 and 3.

(4) Programming Complexity

The programming of candidate 1 can use custom solution, so the programming complexity is too low. While the programming of candidate 2 cannot use custom solution and required programming license, so the programming complexity is too high. For the programming of candidate 3, it can use both custom solution and outsourcing because the programming complexity is low.

G.2 Feasibility Analysis

From the Feasibility Analysis Matrix below, the Candidate 3 is the best overall solution, as it gets the highest score of 92 in ranking.

Table G.3. Feasibility Analysis Matrix.

Feasibility Criteria	Weight	Candidate 1	Candidate 2	Candidate 3
(1) Operational Feasibility Functionality: A description of to what degree the candidate would benefit the company and how well the system would work. Political: A description of how well received this solution would be from both user, management, and organization perspective.	30%	Support the required functionality. Many users and management accept this solution, as it supports all thei requirements. But the system may not be able to support large database. Score: 80	Fully supports the required functionality. Many of users an management accept this candidate, as it fully supports their requirements and can be expanded to support other functions in the future. Moreover, The system can be able to support large database. Score: 95	Same as candidate 2 Score: 95
(2) Technical Feasibility Technology: An assessment of the maturity, availability (or ability to acquire), and desirability of the computer technology needed to support this candidate. Expertise: An assessment of the technical expertise needed to develop, operate, and maintain the candidate system.	30%	Microsoft DOS and C++ can easily be used to design and build the system. It can operate the system, but the system is not user friendly. Required to hire or train C++ expertise to perform modifications for integration requirements. Score: 80	Oracle can effectively be used to design an build the system. It is very good at support large database, but it may be complex and hard to learn. Require hiring a computer company to construct all the system, and the system engineer to take care of the system. Score: 85	Microsoft Access 2000 can effectively be used to design and build the system. It can easily learn and it is the user-friendly system. Moreover, it is very good at support large database. Require hiring a computer company to construct all the system, and the users can do maintenance. Score: 95

Table G.3. Feasibility Analysis Matrix (Continued).

Feasibility Criteria	Weight	Candidate 1	Candidate 2	Candidate 3
(3)Economic Feasibility Development Cost: Break-Even Point: Payback Period: Detailed Calculations:	30%	Approximately 611,300.00 baht 1 year and 1 month 1 year and 1 month See page 109-115 Score: 95	Approximately 735,300.00 baht 2 year and 3 months 1 year and 4 months See page 116-122 Score: 70	Approximately 662,300.00 baht 1 year and 4 months 1 year and 2 month See page 123-129 Score: 85
(4) Schedule Feasibility An assessment of how long the solution will take to design and implement.	10%	About 3 month Score: 95	About 6 months Score: 85	About 5 months Score: 85
Ranking	100%	89	85	92

ASSUMPTION UNIVERSITY OF THAILAND
SINCE 1969
มหาวิทยาลัยอัสสัมชัญ

G.3 Cost/Benefit Analysis for Candidate 1

(1) Cost of Candidate 1 Computerized System

Table G.4. Computerized System Cost for Candidate 1, Baht.

Cost items		Years				
		1	2	3	4	5
Fixed Cost						
Hardware Cost:						
Computer Server Cost	1 unit @ 54,000	10,800.00	10,800.00	10,800.00	10,800.00	10,800.00
Client Machine Cost	6 units @ 30,000	36,000.00	36,000.00	36,000.00	36,000.00	36,000.00
Laser Printer	2 units @ 15,000	6,000.00	6,000.00	6,000.00	6,000.00	6,000.00
Dot Matrix Printer	2 units @ 6,400	2,560.00	2,560.00	2,560.00	2,560.00	2,560.00
Hub (10/100)	1 unit @ 3,500	700.00	700.00	700.00	700.00	700.00
UPS 1000 VA	5 units @ 4,800	4,800.00	4,800.00	4,800.00	4,800.00	4,800.00
Total Hardware Cost		60,860.00	60,860.00	60,860.00	60,860.00	60,860.00
Software Cost:						
Windows 2000 Server	1 unit @ 30,000	6,000.00	6,000.00	6,000.00	6,000.00	6,000.00
Microsoft Windows 98	6 units @ 8,000	9,600.00	9,600.00	9,600.00	9,600.00	9,600.00
MS Office 2000	6 units @ 12,000	14,400.00	14,400.00	14,400.00	14,400.00	14,400.00
Network Cost		1,800.00	1,800.00	1,800.00	1,800.00	1,800.00
Total Software Cost		31,800.00	31,800.00	31,800.00	31,800.00	31,800.00
Implementation Cost:						
Software Development Cost		84,000.00	-	-	-	-
Training Cost		64,000.00	-	-	-	-
Total implementation Cost		148,000.00	-	-	-	-
Maintenance Cost		-	15,000.00	16,500.00	18,150.00	19,965.00
Total Fixed Cost		240,660.00	107,660.00	109,160.00	110,810.00	112,625.00
Operating Cost						
Salary Cost:						
Underwriting Manager	1 person @ 25,000	25,000.00	27,500.00	30,250.00	33,275.00	36,602.50
Programmer	1 person @ 18,000	18,000.00	19,800.00	21,780.00	23,958.00	26,353.80
Underwriting Officer	2 persons @ 15,000	30,000.00	33,000.00	36,300.00	39,930.00	43,923.00
Total Monthly Salary Cost		73,000.00	80,300.00	88,330.00	97,163.00	106,879.30
Total Annual Salary Cost		876,000.00	963,600.00	1,059,960.00	1,165,956.00	1,282,551.60

ASSUMPTION UNIVERSITY OF THAILAND SINCE 1969

Table G.4. Computerized System Cost for Candidate 1, Baht (Continued).

Cost items		Years				
		1	2	3	4	5
Office Supplies and Miscellaneous Cost:						
Stationary	Per Annual	15,000.00	16,500.00	18,150.00	19,965.00	21,961.50
Paper	Per Annual	8,200.00	9,020.00	9,922.00	10,914.20	12,005.62
Utility	Per Annual	12,000.00	13,200.00	14,520.00	15,972.00	17,569.20
Miscellaneous	Per Annual	10,000.00	11,000.00	12,100.00	13,310.00	14,641.00
Total Annual Office Supplies & Miscellaneous Cost		45,200.00	49,720.00	54,692.00	60,161.20	66,177.32
Total Operaing Cost		921,200.00	1,013,320.00	1,114,652.00	1,226,117.20	1,348,728.92
Total Computerized System Cost		1,161,860.00	1,120,980.00	1,223,812.00	1,336,927.20	1,461,353.92

Table G.5. Five Years Accumulated Cost for Candidate 1, Baht.

Year	Total Computerized System Cost	Accumulated Cost
1	1,161,860.00	1,161,860.00
2	1,120,980.00	2,282,840.00
3	1,223,812.00	3,506,652.00
4	1,336,927.20	4,843,579.20
5	1,461,353.92	6,304,933.12
Total	6,304,933.12	-

(2) Cost Comparison and Breakeven Analysis for Candidate 1.

Table G.6. The Comparison of the System Cost for Candidate 1, Baht.

Year	Accumulated Manual Cost	Accumulated Computerized Cost
1	1,085,500.00	161,860.00
2	2,278,600.00	2,282,840.00
3	3,590,060.00	3,506,652.00
4	5,031,716.00	4,843,579.20
5	6,616,587.60	6,303,933.12

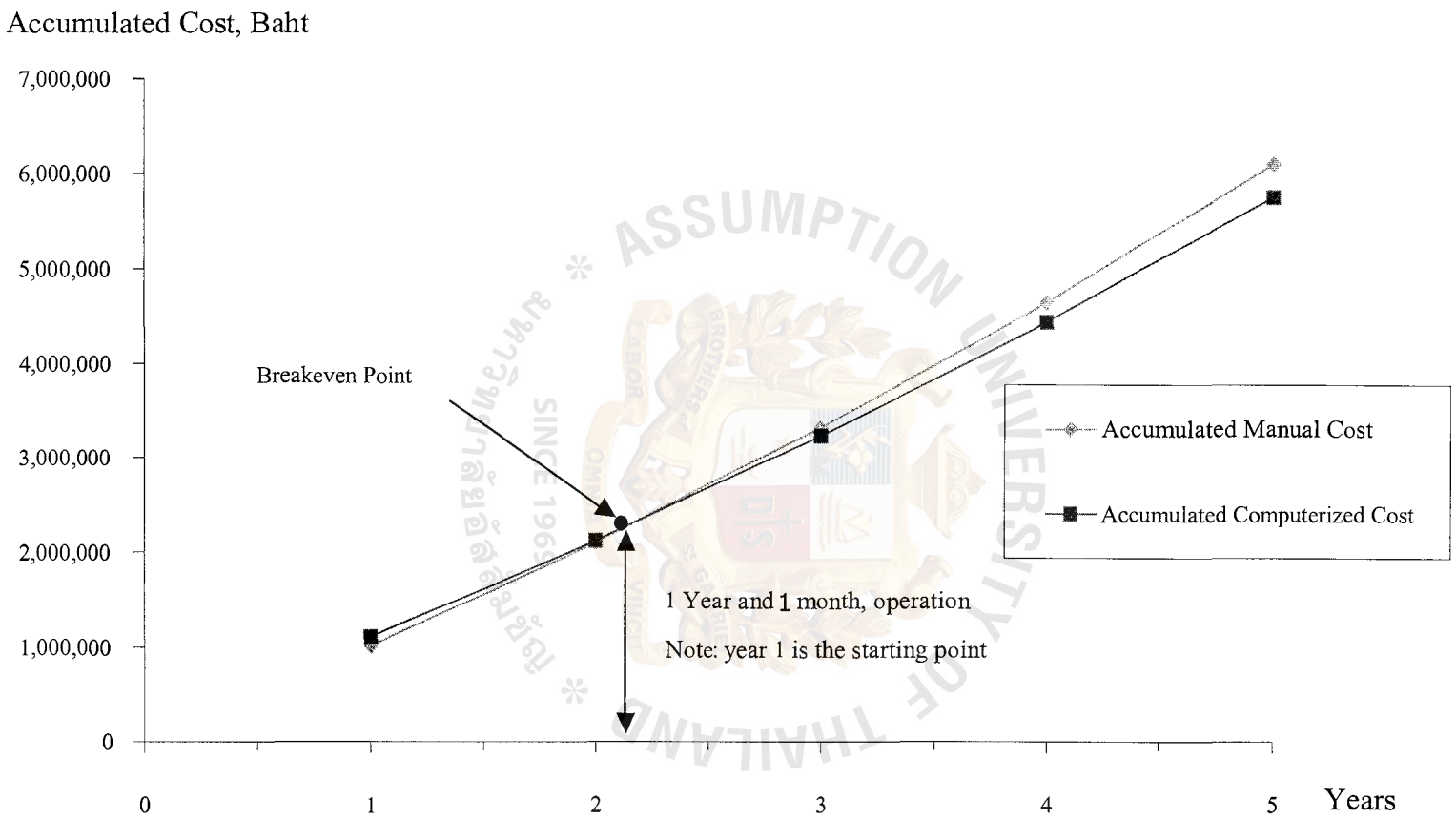


Figure G.1. Cost Comparison between the Manual and Proposed System for Candidate 1.

(4) Payback Analysis

The following cost items are required, shown in Table G.7.

Investment Cost:

Hardware cost	304,300 Baht
Software cost	159,000 Baht
Software Development Cost	84,000 Baht
Training cost	64,000 Baht
Total Investment Cost	611,300 Baht

Annual Operating Cost:

People-ware cost	876,000 Baht
Office Supplies & Miscellaneous cost	66,000 Baht
Total Annual Operating Cost	942,000 Baht

Annual Cost:

The formula of annual cost of the Computerized system is

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

= (611,300/5) + 942,000

= 1,064,260 Baht

Saving:

Staff	144,000 Baht
Office Supplies & Miscellaneous	10,800 Baht
Opportunity cost & Intangible Benefit	1,405,600 Baht
Total Saving	1,560,400 Baht

ASSUMPTION UNIVERSITY OF THAILAND
OMNIA SINCE 1969
มหาวิทยาลัยอัสสัมชัญ

Table G.7. Payback Analysis for Candidate 1, Baht.

Cost Items	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Development cost:	611,300.00						
Operation & Maintenance cost:		942,000.00	1,036,700.00	1,139,820.00	1,253,802.00	1,379,182.20	1,517,100.42
Discount factor for 10%	1.000	0.909	0.826	0.751	0.683	0.621	0.564
Time adjusted costs (adjusted to present value):	611,300.00	856,278.00	855,901.20	856,004.82	856,346.77	856,472.15	855,644.64
Cumulative time-adjusted costs over life time	611,300.00	1,467,578.00	2,323,479.20	3,179,484.02	4,035,830.79	4,892,302.93	5,747,947.57
Benefits derived from operation of new system:	0.00	1,560,400.00	1,716,440.00	1,888,084.00	2,076,892.40	2,284,581.64	2,513,039.80
Discount factor for 10%	1.000	0.909	0.826	0.751	0.683	0.621	0.564
Time adjusted benefits (adjusted to present value):	0.00	1,418,403.60	1,417,779.44	1,417,951.08	1,418,517.51	1,418,725.20	1,417,354.45
Cumulative time-adjusted benefits over life time:	0.00	1,418,403.60	2,836,183.04	4,254,134.12	5,672,651.63	7,091,376.83	8,508,731.28
Cumulative lifetime time-adjusted costs + benefits:	-611,300.00	-49,174.40	512,703.84	1,074,650.10	1,636,802.85	2,199,073.90	2,760,783.71

Then the Payback period is then calculated to judge the profitability of the system as Table G.7. and Figure G.2.

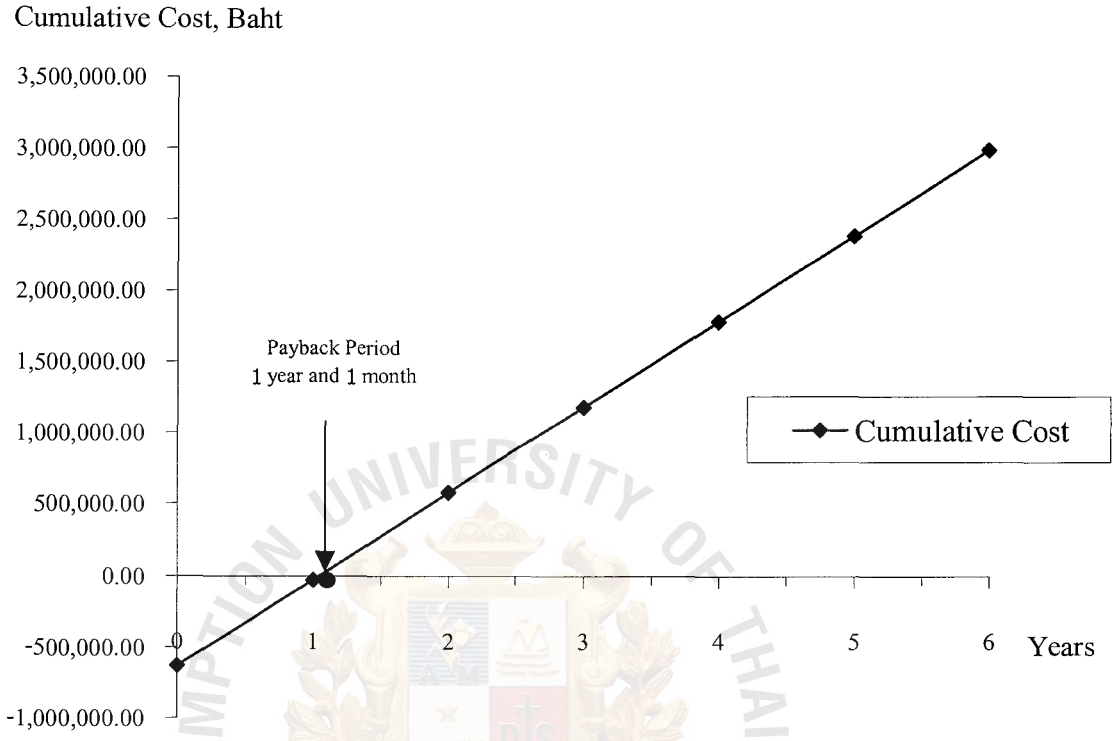


Figure G.2. Payback Period for Candidate 1.

As in Figure G.2. the graph of cumulative cost of computerized system cross the x-axis at 1year or the payback period of the computerized system is 1 year and 1 month.

Moreover, the payback period can be calculated by the formula 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

P = 1 + {(49,174.40 / (49,174.40 + 512,703.84)}

= 1.09 years or 1 year and 1 month

(4) Return-on-Investment Analysis (ROI)

Return-on-Investment Analysis technique compares the lifetime profitability of alternative solutions or projects. The ROI for a project is a percentage rate that measures the relationship between the amounts the business gets back from an investment and the amount invested. The ROI for a potential project is calculated by using the data from Table G.7. as follows:

ROI = (Estimated lifetime benefits – Estimated lifetime costs) / Estimated lifetime costs

ROI = ((8,508,731.28 – 5,747,947.57) / 5,747,947.57) x 100

= 0.48 x 100

= 48%

Therefore, the lifetime ROI is 48 percent.

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

G.5 Cost/Benefit Analysis for Candidate 2

(1) Cost of Candidate 2 Computerized System

Table G.8. Computerized System Cost for Candidate 2, Baht.

Cost items		Years				
		1	2	3	4	5
Fixed Cost						
Hardware Cost:						
Computer Server Cost	1 unit @ 54,000	10,800.00	10,800.00	10,800.00	10,800.00	10,800.00
Client Machine Cost	6 units @ 30,000	36,000.00	38,400.00	38,400.00	38,400.00	38,400.00
Laser Printer	2 units @ 15,000	6,000.00	6,000.00	6,000.00	6,000.00	6,000.00
Dot Matrix Printer	2 units @ 6,400	2,560.00	2,560.00	2,560.00	2,560.00	2,560.00
Hub (10/100)	1 unit @ 3,500	700.00	700.00	700.00	700.00	700.00
UPS 1000 VA	5 units @ 7,200	4,800.00	4,800.00	4,800.00	4,800.00	4,800.00
Total Hardware Cost		60,860.00	60,860.00	60,860.00	60,860.00	60,860.00
Software Cost:						
Windows 2000 Server	1 unit @ 30,000	6,000.00	6,000.00	6,000.00	6,000.00	6,000.00
Oracle License	1 unit @ 40,000	8,000.00	8,000.00	8,000.00	8,000.00	8,000.00
Microsoft Windows 98	6 units @ 8,000	9,600.00	9,600.00	9,600.00	9,600.00	9,600.00
MS Office 2000	6 units @ 12,000	14,400.00	14,400.00	14,400.00	14,400.00	14,400.00
Network Cost		7,200.00	7,200.00	7,200.00	7,200.00	7,200.00
Total Software Cost		45,200.00	45,200.00	45,200.00	45,200.00	45,200.00
Implementation Cost:						
Software Development Cost		105,000.00	-	-	-	-
Training Cost		100,000.00	-	-	-	-
Total implementation Cost		205,000.00	-	-	-	-
Maintenance Cost		-	18,000.00	19,800.00	21,780.00	23,958.00
Total Fixed Cost		311,060.00	124,060.00	125,860.00	127,840.00	130,018.00
Operating Cost						
Salary Cost:						
Underwriting Manager	1 person @ 25,000	25,000.00	27,500.00	30,250.00	33,275.00	36,602.50
Programmer	1 person @ 18,000	18,000.00	19,800.00	21,780.00	23,958.00	26,353.80
Underwriting Officer	2 persons @ 15,000	30,000.00	33,000.00	36,300.00	39,930.00	43,923.00
Total Monthly Salary Cost		73,000.00	80,300.00	88,330.00	97,163.00	106,879.30
Total Annual Salary Cost		876,000.00	963,600.00	1,059,960.00	1,165,956.00	1,282,551.60

Table G.8. Computerized System Cost for Candidate 2, Baht (Continued).

Cost items		Years				
		1	2	3	4	5
Office Supplies and Miscellaneous Cost:						
Stationary	Per Annual	15,000.00	16,500.00	18,150.00	19,965.00	21,961.50
Paper	Per Annual	8,200.00	9,020.00	9,922.00	10,914.20	12,005.62
Utility	Per Annual	12,000.00	13,200.00	14,520.00	15,972.00	17,569.20
Miscellaneous	Per Annual	10,000.00	11,000.00	12,100.00	13,310.00	14,641.00
Total Annual Office Supplies & Miscellaneous Cost		45,200.00	49,720.00	54,692.00	60,161.20	66,177.32
Total Operaing Cost		921,200.00	1,013,320.00	1,114,652.00	1,226,117.20	1,348,728.92
Total Computerized System Cost		1,232,260.00	1,137,380.00	1,240,512.00	1,353,957.20	1,478,746.92

Table G.9. Five Years Accumulated Cost for Candidate 2, Baht.

Year	Total Computerized System Cost	Accumulated Cost
1	1,232,260.00	1,232,260.00
2	1,137,380.00	2,369,640.00
3	1,240,512.00	3,610,152.00
4	1,353,957.20	4,964,109.20
5	1,478,746.92	6,442,856.12
Total	6,442,856.12	-

(2) Cost Comparison and Breakeven Analysis for Candidate 2.

Table G.10. The Comparison of the System Cost for Candidate 2, Baht.

Year	Accumulated Manual Cost	Accumulated Computerized Cost
1	1,080,400.00	1,232,360.00
2	2,268,400.00	2,369,640.00
3	3,574,760.00	3,610,152.00
4	5,011,316.00	4,964,109.20
5	6,591,087.60	6,442,856.12

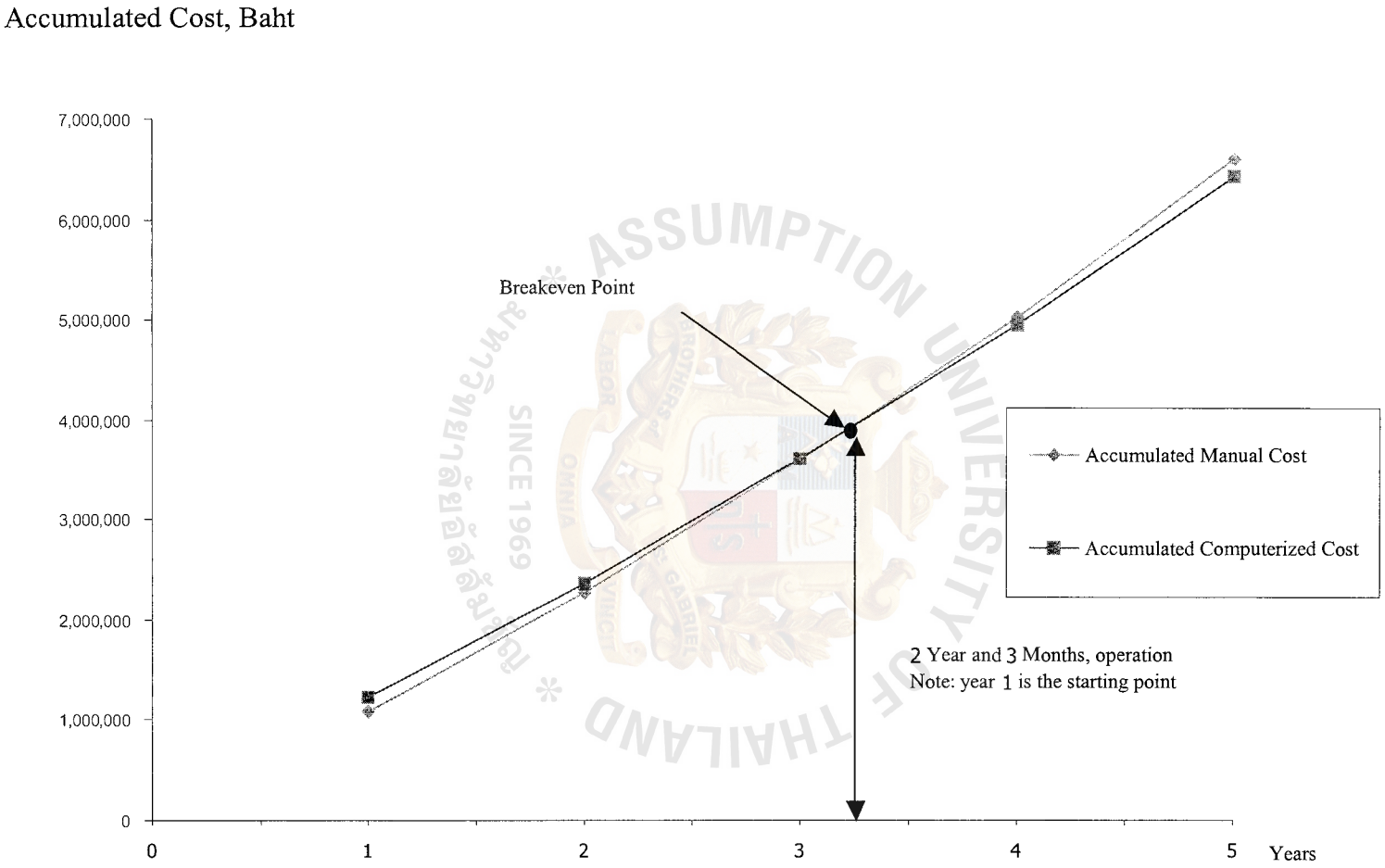


Figure G.3. Cost Comparison between the Manual and Proposed System for Candidate 2.

(4) Payback Analysis

The following cost items are required, shown in Table G.11.

Investment Cost:

Hardware cost	304,300 Baht
Software cost	226,000 Baht
Software Development Cost	105,000 Baht
Training cost	100,000 Baht
Total Investment Cost	735,300 Baht

Annual Operating Cost:

People-ware cost	876,000 Baht
Office Supplies & Miscellaneous cost	66,000 Baht
Total Annual Operating Cost	942,000 Baht

Annual Cost:

The formula of annual cost of the Computerized system is

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

= (735,300/5) + 847,000

= 994,060 Baht

Saving:

Staff	144,000 Baht
Office Supplies & Miscellaneous	10,800 Baht
Opportunity cost & Intangible Benefit	1,405,600 Baht
Total Saving	1,560,400 Baht

Table G.11. Payback Analysis for Candidate 2, Baht.

Cost Items	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Development cost:	735,300.00						
Operation & Maintenance cost:		942,000.00	1,036,200.00	1,139,820.00	1,253,802.00	1,379,182.20	1,517,100.42
Discount factor for 10%	1.000	0.909	0.826	0.751	0.683	0.621	0.564
Time adjusted costs (adjusted to present value):	735,300.00	856,278.00	855,901.20	856,004.82	856,346.77	856,472.15	855,644.64
Cumulative time-adjusted costs over life time	735,300.00	1,591,578.00	2,447,479.20	3,303,484.02	4,159,830.79	5,016,302.93	5,871,947.57
Benefits derived from operation of new system:	0.00	1,560,400.00	1,716,440.00	1,888,084.00	2,076,892.40	2,284,581.64	2,513,039.80
Discount factor for 10%	1.000	0.909	0.826	0.751	0.683	0.621	0.564
Time adjusted benefits (adjusted to present value):	0.00	1,418,403.60	1,417,779.44	1,417,951.08	1,418,517.51	1,418,725.20	1,417,354.45
Cumulative time-adjusted benefits over life time:	0.00	1,418,403.60	2,836,183.04	4,254,134.12	5,672,651.63	7,091,376.83	8,508,731.28
Cumulative lifetime time-adjusted costs + benefits:	-735,300.00	-173,174.40	388,703.84	950,650.10	1,512,820.85	2,074,073.90	2,636,783.71

Then the Payback period is then calculated to judge the profitability of the system as Table G.11. and Figure G.4.

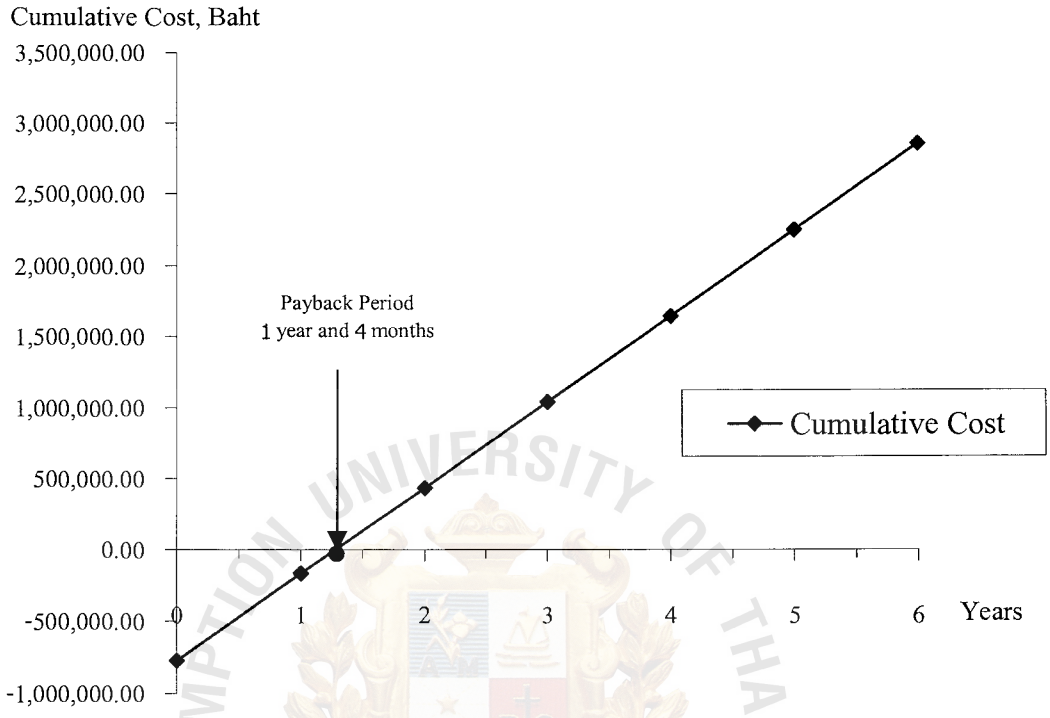


Figure G.4. Payback Period for Candidate 2.

As in Figure G.4. the graph of cumulative cost of computerized system cross the x-axis at 1.32 years or the payback period of the computerized system is 1 year and 4 months.

Moreover, the payback period can be calculated by the formula 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

P = 1 + {(173,174.40 / (173,174.40 + 388,703.84)}

= 1.31 years or 1 year and 4 months

(4) Return-on-Investment Analysis (ROI)

Return-on-Investment Analysis technique compares the lifetime profitability of alternative solutions or projects. The ROI for a project is a percentage rate that measures the relationship between the amounts the business gets back from an investment and the amount invested. The ROI for a potential project is calculated by using the data from Table G.11. as follows:

ROI = (Estimated lifetime benefits – Estimated lifetime costs) / Estimated lifetime costs

ROI = ((8,508,731.28 – 5,871,947.57) / 5,871,947.57) x 100

= 0.45 x 100

= 45%

Therefore, the lifetime ROI is 45 percent.

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

G.5 Cost/Benefit Analysis for Candidate 3

(1) Cost of Candidate 3 Computerized System

Table G.12. Computerized System Cost for Candidate 3, Baht.

Cost items		Years				
		1	2	3	4	5
Fixed Cost						
Hardware Cost:						
Computer Server Cost	1 unit @ 54,000	10,800.00	10,800.00	10,800.00	10,800.00	10,800.00
Client Machine Cost	6 units @ 30,000	36,000.00	38,400.00	38,400.00	38,400.00	38,400.00
Laser Printer	2 units @ 15,000	6,000.00	6,000.00	6,000.00	6,000.00	6,000.00
Dot Matrix Printer	2 units @ 6,400	2,560.00	2,560.00	2,560.00	2,560.00	2,560.00
Hub (10/100)	1 unit @ 3,500	700.00	700.00	700.00	700.00	700.00
UPS 1000 VA	5 units @ 4,800	4,800.00	4,800.00	4,800.00	4,800.00	4,800.00
Total Hardware Cost		60,860.00	63,260.00	63,260.00	63,260.00	63,260.00
Software Cost:						
Windows 2000 Server	1 unit @ 30,000	6,000.00	6,000.00	6,000.00	6,000.00	6,000.00
MS SQL Server	1 unit @ 24,000	4,800.00	4,800.00	4,800.00	4,800.00	4,800.00
Microsoft Windows 98	6 units @ 8,000	9,600.00	9,600.00	9,600.00	9,600.00	9,600.00
MS Office 2000	6 units @ 12,000	14,400.00	14,400.00	14,400.00	14,400.00	14,400.00
Network Cost		4,800.00	4,800.00	4,800.00	4,800.00	4,800.00
Total Software Cost		39,600.00	39,600.00	39,600.00	39,600.00	39,600.00
Implementation Cost:						
Software Development Cost		86,000.00	-	-	-	-
Training Cost		74,000.00	-	-	-	-
Total implementation Cost		160,000.00	-	-	-	-
Maintenance Cost		-	15,000.00	16,500.00	18,150.00	19,965.00
Total Fixed Cost		260,460.00	115,460.00	116,960.00	118,610.00	120,425.00
Operating Cost						
Salary Cost:						
Underwriting Manager	1 person @ 25,000	25,000.00	27,500.00	30,250.00	33,275.00	36,602.50
Programmer	1 person @ 18,000	18,000.00	19,800.00	21,780.00	23,958.00	26,353.80
Underwriting Officer	2 persons @ 15,000	30,000.00	33,000.00	36,300.00	39,930.00	43,923.00
Total Monthly Salary Cost		73,000.00	80,300.00	88,330.00	97,163.00	106,879.30
Total Annual Salary Cost		876,000.00	963,600.00	1,059,960.00	1,165,956.00	1,282,551.60

ASSUMPTION UNIVERSITY OF THAILAND
SINCE 1969

Table G.12. Computerized System Cost for Candidate 3, Baht (Continued).

Cost items		Years				
		1	2	3	4	5
Office Supplies and Miscellaneous Cost:						
Stationary	Per Annual	15,000.00	16,500.00	18,150.00	19,965.00	21,961.50
Paper	Per Annual	8,200.00	9,020.00	9,922.00	10,914.20	12,005.62
Utility	Per Annual	12,000.00	13,200.00	14,520.00	15,972.00	17,569.20
Miscellaneous	Per Annual	10,000.00	11,000.00	12,100.00	13,310.00	14,641.00
Total Annual Office Supplies & Miscellaneous Cost		45,200.00	49,720.00	54,692.00	60,161.20	66,177.32
Total Operaing Cost		921,200.00	1,013,320.00	1,114,652.00	1,226,117.20	1,348,728.92
Total Computerized System Cost		1,181,660.00	1,128,780.00	1,231,612.00	1,344,727.20	1,469,153.92

Table G.13. Five Years Accumulated Cost for Candidate 3, Baht.

Year	Total Computerized System Cost	Accumulated Cost
1	1,181,660.00	1,181,660.00
2	1,128,780.00	2,310,440.00
3	1,231,612.00	3,542,052.00
4	1,344,727.20	4,886,779.20
5	1,469,153.92	6,355,933.12
Total	6,355,933.12	-

(2) Cost Comparison and Breakeven Analysis for Candidate 3.

Table G.14. The Comparison of the System Cost for Candidate 3, Baht.

Year	Accumulated Manual Cost	Accumulated Computerized Cost
1	1,085,500.00	1,181,660.00
2	2,278,600.00	2,310,440.00
3	3,590,060.00	3,542,052.00
4	5,031,716.00	4,886,779.20
5	6,616,587.60	6,355,933.12

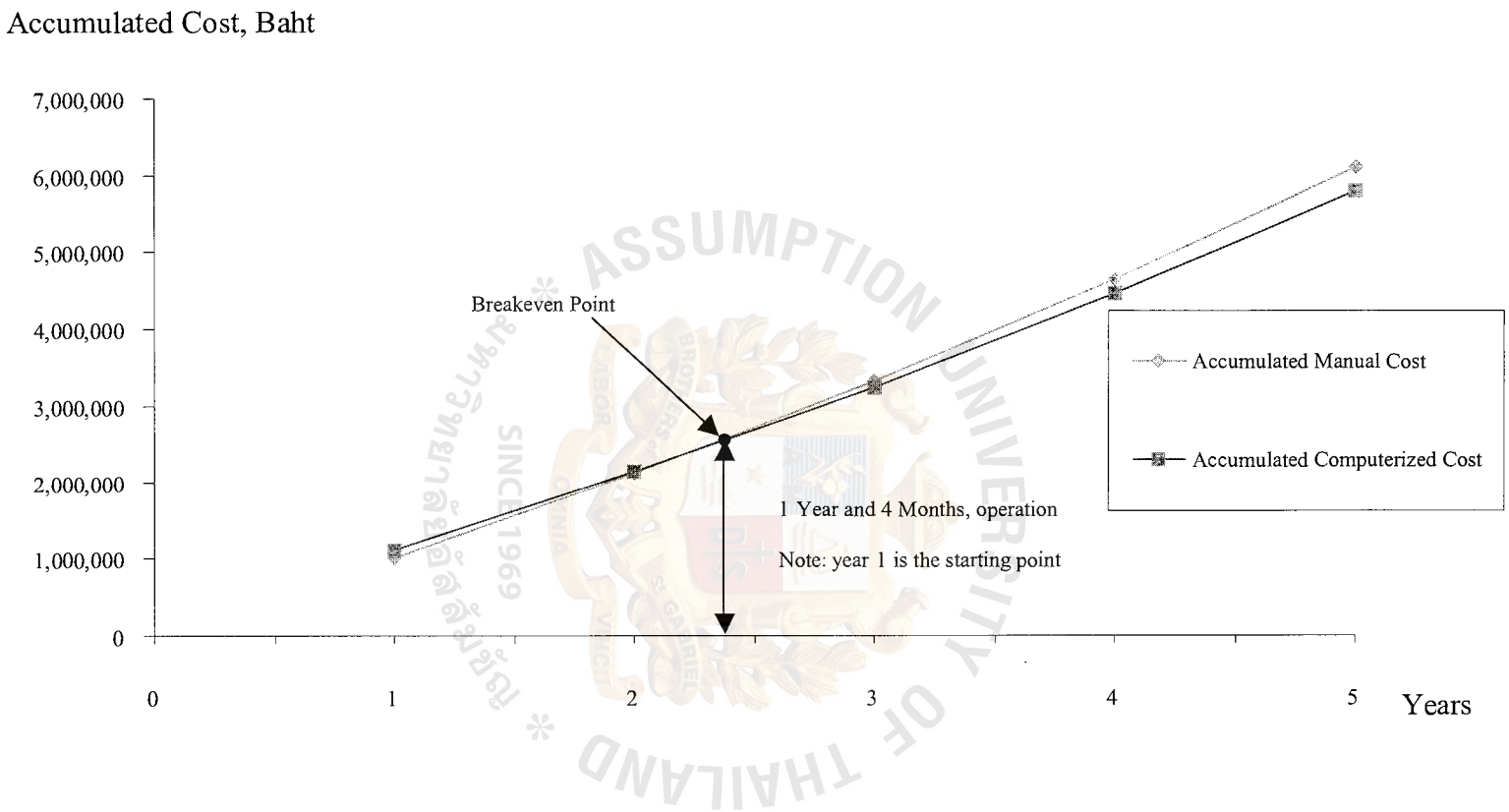


Figure G.5. Cost Comparison between the Manual and Proposed System for Candidate 3.

Table G.15. Payback Analysis for Candidate 3, Baht.

Cost Items	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Development cost:	662,300.00						
Operation & Maintenance cost:		942,000.00	1,036,200.00	1,139,820.00	1,253,802.00	1,379,182.20	1,517,100.42
Discount factor for 10%	1.000	0.909	0.826	0.751	0.683	0.621	0.564
Time adjusted costs (adjusted to present value):	662,300.00	856,800.00	855,901.20	856,004.82	856,472.15	856,472.15	855,644.64
Cumulative time-adjusted costs over life time	662,300.00	1,518,578.00	2,374,479.20	3,230,484.02	4,086,830.79	4,943,302.93	5,798,947.57
Benefits derived from operation of new system:	0.00	1,560,400.00	1,716,440.00	1,888,084.00	2,176,982.40	2,284,581.64	2,513,039.80
Discount factor for 10%	1.000	0.909	0.826	0.751	0.683	0.621	0.564
Time adjusted benefits (adjusted to present value):	0.00	1,418,403.60	1,417,779.44	1,417,951.08	1,418,517.51	1,418,517.51	1,417,354.45
Cumulative time-adjusted benefits over life time:	0.00	1,418,403.60	2,836,183.04	4,254,134.12	5,672,651.63	7,091,376.83	8,508,731.28
Cumulative lifetime time-adjusted costs + benefits:	-662,300.00	-100,174.40	461,703.84	1,023,650.10	1,585,820.85	2,148,073.90	2,709,783.71

Then the Payback period is then calculated to judge the profitability of the system as Table G.15. and Figure G.6.

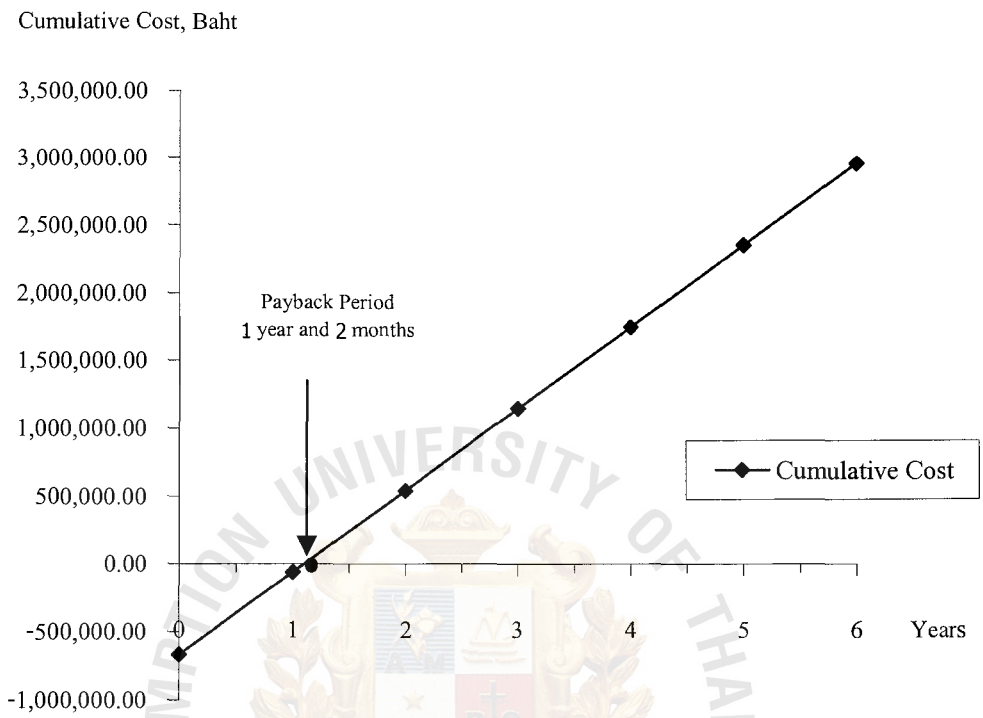


Figure G.6. Payback Period for Candidate 3.

As in Figure G.6. the graph of cumulative cost of computerized system cross the x-axis at 1.2 years or the payback period of the computerized system is 1 year and 2 month.

Moreover, the payback period can be calculated by the formula as follows:

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

Where P = Payback Period

P = 1 + {(100,174.40 / (100,174.40 + 461,703.84)}

= 1.2 years or 1 year and 2 months

(4) Return-on-Investment Analysis (ROI)

Return-on-Investment Analysis technique compares the lifetime profitability of alternative solutions or projects. The ROI for a project is a percentage rate that measures the relationship between the amounts the business gets back from an investment and the amount invested. The ROI for a potential project is calculated by using the data from Table G.15. as follows:

ROI = (Estimated lifetime benefits – Estimated lifetime costs) / Estimated lifetime costs

ROI = ((8,508,731.28 – 5,811,447.57) / 5,811,447.57) x 100

= 0.46 x 100

= 46%

Therefore, the lifetime ROI is 46 percent.

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS of St. GABRIEL
ABOR VINCIT OMNIA
SINCE 1969
มหาวิทยาลัยอัสสัมชัญ

St. Gabriel's

BIBLIOGRAPHY

1. Connoly, Thomas, Carolyn Begg, and Anne Strachan. Database Systems: A Practical Approach to Design, Implementation and Management. MA: Addison-Wesley, 1996.

2. Date, C. J. An Introduction to Database Systems. MA: Addison-Wesles, 1995.

3. FitzGerald, Jerry and Ander F. Fitzgerald. Fundamentals of System Analysis, Third Edition. NY: John Wiley & Sons, Inc., 1987.

4. Greer, Tyson. Understanding Intranets. Redmond, WA: Microsoft Press Publishing Company, 1998.

5. Laudon, Kenneth C. and Jane P. Laudon. Management Information Systems, Fifth Edition. Upper Saddle River, NJ: Prentice Hall International, 1998.

6. Loomis, Mary E. S. Data Management and File Structures, Second Edition. London: Prentice-Hall International, 1989.

7. McManus, Jeffrey P. Database Access with Visual Basic 6. Indianapolis, IN: Sams, 1999.

8. Modell, Martin E. Data Analysis, Data Modeling, and Classification. NY: McGraw-Hill, 1992.

9. Page-Jones, Meilir. The Practical Guide to Structured System Design, Second Edition. Englewood Cliffs, NJ: Prentice Hall, 1988.

10. Pratt, Philip J. and Joseph J. Adamski. Database System Management and Design, Third Edition. Davers, MA: Boyd & Fraser, 1994.

11. Rob, Peter and Carlos Coronel. Database System: Design, Implementation, and Management. Belmont, CA: Wadsworth, 1993.

12. Stallings, William. Local and Metropolitan Area Networks, Sixth Edition. Upper Saddle River, NJ: Prentice Hall International, 2000.

13. Trepper, Charles. E-Commerce Strategies. USA: Microsoft Press Publishing Company, 2000.

14. Whitten, Jeffrey L., Lonnie D. Bentley, and Kevin C. Dittman. Systems Analysis and Design Methods, Fifth Edition. NY: McGraw-Hill, 2001.

15. Rejda, George E. Principles of Risk Management and Insurance, Fifth Edition. N.Y.: HarperCollins College, 1995.

16. Trieschmann, James S. and Sandra G. Gustavson. Risk Management & Insurance, Ninth Edition. Cincinnati, OH: South-Western, 1995.