



# Computer Tracking System for ISO Certified

by

Mr. Vachara Ratanasupakorn

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

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

July, 2001

## Computer Tracking System for ISO Certified

by  
Mr. Vachara Ratanasupakorn

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

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

July 2001



## St. Gabriel Library, Au

Project Title                      Computer Tracking System for ISO Certified

Name                                Mr. Vachara Ratanasupakorn

Project Advisor                  A. Chackapong Wongwan

Academic Year                  July 28, 2001

---

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

Approval Committee:



(A. Chackapong Wongwan)  
Advisor



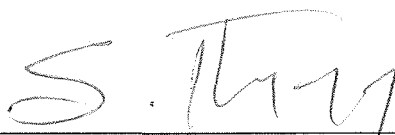
(Prof. Dr. Srisakdi Charmonman)  
Chairman



(Air Marshal Dr. Chulit Meesajjee)  
Dean and Co-advisor



(Asst. Prof. Dr. Vichit Avatchanakorn)  
Member



(Assoc. Prof. Somchai Thayarnyong)  
MUA Representative

July 28, 2001

## ABSTRACT

Computer Tracking System is a computerized information system which supports the Sales & Marketing department, Auditor department and Executive. The existing workflows of each department are done manually. It takes a lot of time to process the report and also with occasionally inaccurate results. In addition, the increased volume of customers causes it difficult to manually process efficiently.

Therefore, the Information System is developed to solve the problem occurring from the existing system and to support the process in each department of Easy Certified Co., Ltd. The system consists of five processes: Customer Information, Sales Activities, Auditor Activities, Report, and System Maintenance. The computerized system can provide accuracy, daily plan, and reduce response time for report. As the result, staff will provide better service to customer.

Apart from the increased efficiency in each department process and service, the Information System also provides executive information and reports in graphical for executive.

## ACKNOWLEDGEMENTS

The writer grateful to several people who have made contribution to the preparation of this project report. He would like to acknowledge their effort and thank them for their contributions.

First, he would like to thank and express his deepest gratitude to his advisor of the project, A. Chackapong Wongwan, for his valuable time in instructions, suggestions, advice, and correction during the project preparation. Thanks are also due to the MS (CIS) committee for their guidance on the initial proposal of this project, attendance during oral examination, and all constructive criticisms.

He also wishes extend his sincere thanks to The Technology Promotion Association (Thailand-Japan), SGS (Thailand) Ltd., and N.E. Trading Co., Ltd., the staff of those companies who gave the information. Finally, he would like to thank you to his father, mother, three elder sisters and all beloved persons for their constant love, moral support, patience, encouragement and sacrifice made during the entire period of education.

## TABLE OF CONTENTS

<u>Chapter</u>	<u>Page</u>
ABSTRACT	i
ACKNOWLEDGEMENTS	ii
LIST OF FIGURES	v
LIST OF TABLES	vii
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	4
II. THE EXISTING SYSTEM	6
2.1 Background of the Organization	6
2.2 Existing Business Functions	6
2.3 Current Problems and Areas for Improvement	8
2.4 Existing Manual System	10
III. THE PROPOSED SYSTEM	14
3.1 System Specification	14
3.2 System Design	15
3.3 Hardware and Software Requirement	15
3.4 Security and Control	18
3.5 Cost and Benefit Analysis	20
IV. PROJECT IMPLEMENTATION	24

<u>Chapter</u>	<u>Page</u>
4.1 Overview of Project Implementation	24
4.2 Stage of Implementation	25
4.3 Test Plan	25
4.4 Training	26
4.4 Conversion	26
V. CONCLUSIONS AND RECOMMENDATIONS	27
5.1 Conclusions	27
5.2 Recommendations	29
APPENDIX A CANDIDATE MATRIX	30
APPENDIX B DECOMPOSITION AND DATA FLOW DIAGRAM	57
APPENDIX C ENTITY RELATIONSHIP	66
APPENDIX D STRUCTURE CHART	67
APPENDIX E DATA DICTIONARY	72
APPENDIX F USER INTERFACE DESIGN	81
APPENDIX G REPORT DESIGN	91
BIBLIOGRAPHY	98

## LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
1.1 Project Plan of Computer Tracking System for ISO Certified	5
2.1 Organization Chart of Easy Certified Co., Ltd.	7
2.2 Context Diagram	12
2.3 Context Diagram of Existing System	13
3.1 Network Diagram	23
A.1 Payback Period for Candidate 1, Baht	39
A.2 Cost Comparison between Manual & Proposed System (Candidate 1)	42
A.3 Payback Period for Candidate 2, Baht	46
A.4 Cost Comparison between Manual & Proposed System (Candidate 2)	49
A.5 Payback Period for Candidate 3, Baht	53
A.6 Cost Comparison between Manual & Proposed System (Candidate 3)	56
B.1 A Functional Decomposition Diagram	57
B.2 A Functional Decomposition Diagram (Continued)	58
B.3 Logical DFD – Level 1 of Process Add Customer’s Information	59
B.4 Logical DFD – Level 1 of Process Change Customer’s Information	60
B.5 Logical DFD – Level 1 of Process Customer’s Information Report	61
B.6 Logical DFD – Level 1 of Sale’s Activities Information Subsystem	62
B.7 Logical DFD – Level 1 of Auditor’s Activities Information Subsystem	63
B.8 Logical DFD – Level 1 of Executive Information Subsystem	64
B.9 Logical DFD – Level 1 of Maintenance Subsystem	65
C.1 Entity Relationship Diagram	66
D.1 Structure Chart – Customer’s Information Subsystem	67



<u>Figure</u>	<u>Page</u>
D.2 Structure Chart – Sales’ Activities Information Subsystem	68
D.3 Structure Chart – Auditor’s Activities Information Subsystem	69
D.4 Structure Chart – Executive Information Subsystem	70
D.5 Structure Chart – Maintenance Subsystem	71
E.1 Datatype for SQL Server	79
E.2 Datatype for SQL Server (Continued)	80
F.1 Customer Tracking System Sign on Screen	81
F.2 Customer Input Information Screen	82
F.3 Customer’s Certified Input Information Screen	83
F.4 Contact Person Input Information Screen	84
F.5 Sales’s Activities Input Information Screen	85
F.6 Auditor’s Activities Input Information Screen	86
F.7 Executive Information Screen	87
F.8 Sales’ Activities Information in Graph Format	88
F.9 Auditor’s Activities Information in Graph Format	89
F.10 User Setup Screen	90
G.1 Customer Information Report	91
G.2 Customer Report with Contact Person	92
G.3 Contact Person Label Report	93
G.4 ISO Certified Report	94
G.5 Sales’ Activities Report	95
G.6 Auditor’s Activities Report	96
G.7 Executive Information Report	97

## LIST OF TABLES

<u>Table</u>	<u>Page</u>
2.1 Manual Cost Analysis	11
3.1 The Hardware Specification for the Computer Server	16
3.2 The Hardware Specification for Each Client Machine	17
3.3 The Peripheral Specification for Proposed System	17
3.4 The Software Specification for the Computer Server	18
3.4 The Software Specification for Each Client Machine	18
5.1 Degree of Achievement between the Proposed and the Existing System	28
A.1 Candidate Systems Matrix	31
A.2 Feasibility Analysis Matrix	34
A.3 Alternative Candidate Requirement Category Analysis	35
A.4 Estimated Costs for Candidate 1, Baht	36
A.5 Estimated Operation & Maintenance Cost for Candidate 1, Baht	37
A.6 Payback Period for Candidate 1, Baht	38
A.7 Net Present Value for Candidate 1, Baht	40
A.8 The Comparison of the System Costs (Candidate 1)	41
A.9 Estimated Costs for Candidate 2, Baht	43
A.10 Estimated Operation & Maintenance Cost for Candidate 2, Baht	44
A.11 Payback Period for Candidate 2, Baht	45
A.12 Net Present Value for Candidate 2, Baht	47
A.13 The Comparison of the System Costs (Candidate 2)	48
A.14 Estimated Costs for Candidate 3, Baht	50
A.15 Estimated Operation & Maintenance Cost for Candidate 3, Baht	51

<u>Table</u>	<u>Page</u>
A.16 Payback Period for Candidate 3, Baht	52
A.17 Net Present Value for Candidate 3, Baht	54
A.18 The Comparison of the System Costs (Candidate 3)	55
E.1 Data Dictionary – t_customer	72
E.2 Data Dictionary – contact	73
E.3 Data Dictionary – aim_cert	74
E.4 Data Dictionary – saction	75
E.5 Data Dictionary – aaction	76
E.6 Data Dictionary – systeminfo	77
E.7 Data Dictionary – executiveinfo	78



## I. INTRODUCTION

### 1.1 Background of the Project

The International Organization for Standardization (ISO) is a worldwide federation of national standards bodies from some 140 countries, one from each country. ISO is a non-governmental organization established in 1947. The mission of ISO is to promote the development of standardization and related activities in the world with a view to facilitate the international exchange of goods and services, and to develop cooperation in the spheres of intellectual, scientific, technological and economic activity. ISO's work results in international agreements that are published as International Standards.

"ISO" is a word, derived from the Greek "isos", meaning "equal", which is the root of the prefix "iso-" that occurs in a host of terms, such as "isometric" (of equal measure or dimensions) and "isonomy" (equality of laws, or of people before the law). From "equal" to "standard", the line of thinking that led to the choice of "ISO" as the name of the organization is easy to follow.

For the time being, ISO is the important company strategy for Executives to use it to upgrade their company's image because ISO represents such as Quality, Customer's satisfaction, workflow system organizing, standard management control, safety and etc. With this image that goes with the company and their product, customers can be sure that they will get valuable from ISO Certified products or services for their money spent. As the result, many companies are aware of this and try to obtain ISO in order to be the leader in their products or services.

Easy Certified Co., Ltd. (E.C.) is the company that does verification; testing and certification for those companies that need ISO Certified. With the increasing number of



customers, it is necessary for E.C. to have a system to handle the increasing number of customers; and to track the activities for all staff and to help follow up the activities more efficiently. Furthermore, the system must have good security such as login function and must be track-able for most activities in the program. The system must also have a daily report, a weekly report and an executive report.

## **1.2 Objectives of the Project**

The objective of the project is to provide efficient customer service and to ensure sales & marketing department with good activity plans; the auditor department must have an efficient audit record and at the end, the system must be able to provide executive information. To achieve this objective, the following tasks are carried out:

### **1.2.1 Sales & Marketing Department:**

- (1) To improve customer information storing and retrieving.
- (2) To share customer information with Auditor department
- (3) To improve tracking activities on sales staff.
- (4) To reduce the time for running report.
- (5) To reduce the lost of information on paper based system.\*

### **1.2.2 Auditor Department:**

- (1) To improve tracking activities on auditor staff.
- (2) To improve tracking outstanding or working process customer
- (3) To reduce the time for running report

### **1.2.3 Other Function:**

- (1) To be able to provide executive screen

### 1.3 Scope of the Project

The project presents the analysis, design, and proposed solution for the computer tracking system that concentrates on the customer information, staff activities and executive page. The scope of the project can be categorized into:

#### 1.3.1 Review the Current Operation Model

- (1) Develop understanding of present and future operation model (e.g. sales & marketing, auditor, and executive).
- (2) Review existing operation method and reporting.
- (3) Interview operational person and management to identify requirements and gaps.
- (4) Prepare a concept design for the customer information requirements.
- (5) Prepare a summary report with finding, conclusions and recommendations.

1.3.2 Development of the proposed system covers major parts of the Computer Tracking System as follows:

- (1) Manage user information
  - (a) Create /change /update / delete user information
  - (b) Manage security of user
- (2) Manage customer information
  - (a) Create / change /update customer information record.
  - (b) Keep track of user who creates customer record.
- (3) Manage activities
  - (a) Create / change / update schedule information record.
  - (b) Create / change / update activities information record.
  - (a) Check appointment schedule.
  - (c) Report Activities.

- (4) Manage Audit information
  - (a) Create / change / update audit status
  - (b) Create / change / update schedule audit
  - (c) Audit Report
- (5) Executive information
  - (a) Inquiry all information in drill down & graphic interface.
  - (b) Inquiry specific information such as customer information.
  - (c) Executive Report
- (6) System Maintenance
  - (a) Day end function
    - (1) Executive Information Preparation
    - (2) Sales Reminder Preparation
  - (b) User setup

#### **1.4 Deliverables**

The deliverables for the system development project are as follows:

- (1) Work flow of the Existing System.
- (2) Context Diagram and Data Flow Diagram of the Proposed System.
- (3) Screen Layout and Report.
- (4) Cost and Benefit Analysis.

#### **1.5 Project Plan (Include Gantt Chart)**

The project plan is illustrated in the form of Gantt Chart as shown in Figure1.1.

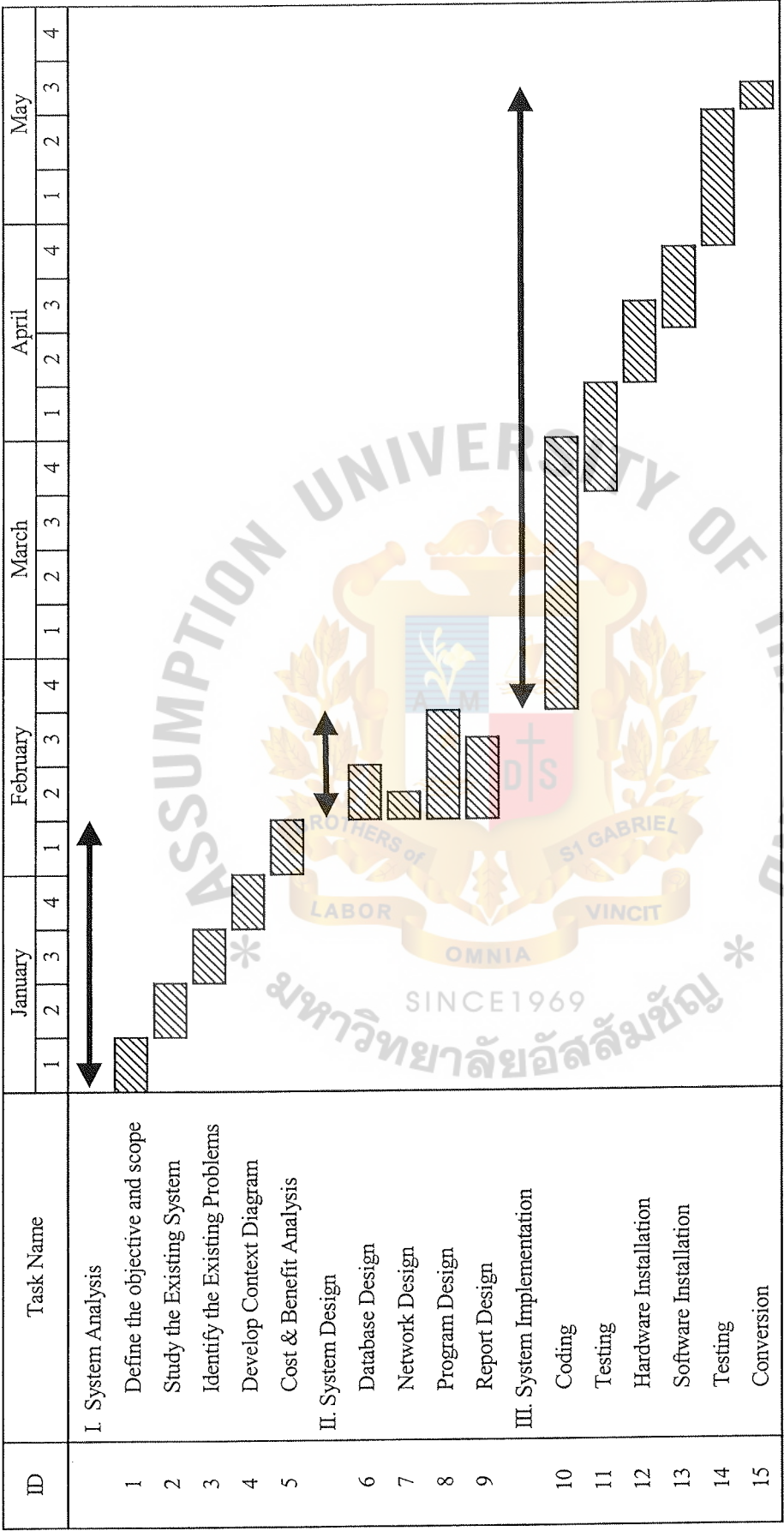


Figure 1.1. Project Plan of Computer Tracking System for ISO Certified.



## II. THE EXISTING SYSTEM

### 2.1 Background of the Organization

The Easy Certified Company Co., Ltd., is the alias of the company that issues the certification. The company is operated by skilled professionals specializing in a wide range of fields, Sales & Marketing, Auditor, and Executive. These people are highly trained to provide quality service, adding real value to customer quality system and organization as a whole. The relevant market is any organization aiming at managing and continually improving its management practices and work processes.

An organization wishing to gain third party certification must first install an effective management system, which complies with the relevant clauses in the standard. This can be carried out by either the use of an independent consultant, a training provider, distance learning or the employment of a qualified representative. Once the system has been running and proven over a 4 month period, the Easy Certified will issue the pursued certification to that organization.

The benefits of an organization pursuing a certification are; increased productivity, improved efficiency, reduced waste, enhanced profitability, and it also allows you to operate consistently, gives you a competitive edge, satisfies customers' needs, encourages investment and helps national and international recognition.

The company has 3 departments; Sales & Marketing, Audit, and Financial department. The organization chart of the Easy Certified Company Co., Ltd. is shown in Figure 2.1.

## Organization Chart

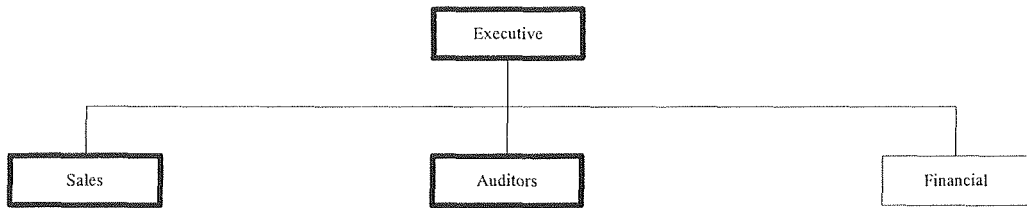


Figure 2.1. Organization Chart of Easy Certified Co., Ltd.

### 2.2 Existing Business Functions

The business functions of the Easy Certified Co., Ltd. are categorized into five main functions as follows:

#### 2.2.1 Sales & Marketing Section

- (1) Find customer
  - (a) Collect Customer Information
- (2) Find Contact Person
  - (a) Collect Contact Person Information.
- (3) Appointment with Customer
  - (a) Arrange the time and set the schedule to visit Customer
- (4) Visit Customer
  - (a) Visit Customer and do the visiting report
- (5) Contract Sign
  - (a) Sales send request detailed business activities & asset information
  - (b) Customers send their information to Sales
  - (c) Sales send quotation for audit area and contract for signing
  - (d) Customers sign contract and send back to company
  - (e) Sends copy of contract sign to Auditor & Financial department

### 2.2.2 Auditor Section

- (1) Receive contract signed from Sales
  - (a) Setup the date for audit
  - (b) Audit until every audit area complete

### 2.2.3 Financial Section

- (1) Receive contract signed from Sales
  - (a) Collect money from customer

### 2.2.4 Executive Section

The executive will need a summary report from sales and auditor.

## 2.3 Current Problems and Area for Improvement

Several problem domains are identified during the analysis of the existing system. Those problems are in unstructured problem classified by using the PIECES Problem-Solving Framework as follows:

### P-PERFORMANCE

#### Throughput

Problems:- Small number of work is accomplished due to the slow manual system.

#### Response time

Problems:- Inability to provide good response to customer as the separate data store as well as they were kept in paper base. In addition, it takes a lot of more time to find or search for information.

### I-INFORMATION (and Data)

#### Outputs

Problems:- Information is difficult to produce and is not timely for subsequent use because it is processed manually so it takes much time in preparing a report.

Opportunities: - Enable to provide ad-hoc report and select format of reports.

#### Inputs

Problems:- There is a lot of redundancy of customer information since the customer information are kept separately. It would not be good for the company to have different customer information at sales & marketing and auditor. At the result, we will not know which one is the correct or updated one.

Opportunities: - Enable to share customer information between Sales & Marketing and Auditor department

#### Stored Data

Problems:- It is difficult to maintain or arrange data and documents because there is a great number of data and documents.

- Data are not secured against accident
- Data are not easy to meet new information needs from stored data

Opportunities: - Using DBMS to manage data.

### E-ECONOMICS

#### Company image

Problems:- Company image might lose if there is a lack of services due to a loss of information.

### C-CONTROL (and Security)

#### Too little security or control

Problems:- No back up and recovery plan when patient information is lost.



- Lack of access to management and decision-making information.
- There are no efficient control activities of Sales and Auditor staff.

Opportunities: - Using login and password to access the registration system.

- Defining authorization of each staff to access the system.
- Defining executive information for executive

### E-EFFICIENCY

People, machines, or computer waste time

Problems:- Work is not processed smoothly because it is done manually so it cannot efficiently provide activity information or good services.

### S-SERVICE

The system produces inaccurate results

Problems:- Accurate results are not good enough.

The system is inflexible to change

Problems:- Since there is no database, it is inflexible to update information or to expand the information system in the future.

## **2.4 The Existing Manual System**

### **2.4.1 The Existing System Process**

The process of the existing system is summarized as follows:

- (1) Sales & Marketing section
  - (a) Write down customer information in personal plan book
  - (b) Write down contact Person Information in personal plan book
  - (c) Write down Appointment in personal plan book.
  - (d) Send report to manager and executive
- (2) Audit section
  - (a) Write down appointment in personal plan book.

- (b) Write down Audit Result in Paper and keep in Box File.
- (c) Write down new appointment in case there is incomplete audit area in personal plan book.
- (d) Send report to manager and executive

All transactions of the activities are in paper base, and most of them are kept in personal plan book. As the result, there is the fragment of information and inconsistency of data. The tracking of activities will be impossible to do.

#### 2.4.2 Workflow of the Existing System

The context diagram of the existing system is shown in Figure 2.2 interacting with 4 external entities that are Customer, Sales & Marketing, Auditor and Executive.

#### 2.4.3 Existing System Cost

The existing system costs include the cost of human resource, and office supplies and miscellaneous costs. The existing system costs (annual cost) is shown in Table 2.1. and the context diagram of existing system in Figure 2.3.

Table 2.1. Manual Cost Analysis, Baht.

Cost Items	Years				
	1	2	3	4	5
<u>Operating Cost</u>					
Personnel Cost:					
Sales Staff      10 persons@30000	3,900,000.00	4,095,000.00	4,299,750.00	4,514,737.50	4,740,474.38
Auditor Staff    10 persons@30000	3,900,000.00	4,095,000.00	4,299,750.00	4,514,737.50	4,740,474.38
Manager          1 person@60000	780,000.00	819,000.00	859,950.00	902,947.50	948,094.88
Total Annual Personnel Cost	8,580,000.00	9,009,000.00	9,459,450.00	9,932,422.50	10,429,043.63
<u>Office Supplies &amp; Misc Cost:</u>					
Stationary        per annual	40,000.00	44,000.00	48,400.00	53,240.00	58,564.00
Paper             per annual	50,000.00	55,000.00	60,500.00	66,550.00	73,205.00
Utilities          per annual	15,000.00	16,500.00	18,150.00	19,965.00	21,961.50
Misc              per annual	15,600.00	17,160.00	18,876.00	20,763.60	22,839.96
Total Office Supp & Misc Cost	120,600.00	132,660.00	145,926.00	160,518.60	176,570.46
Total Annual Operating Cost	8,700,600.00	9,141,660.00	9,605,376.00	10,092,941.10	10,605,614.09

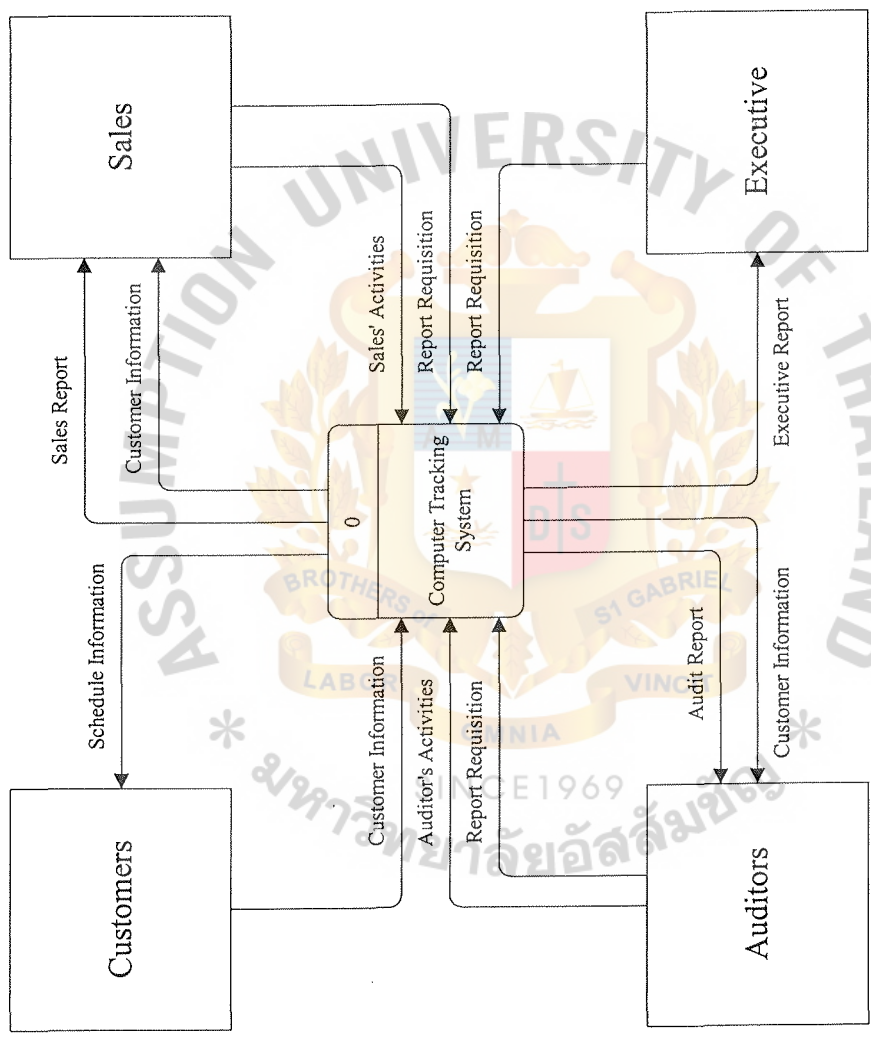


Figure 2.2. Context Diagram.

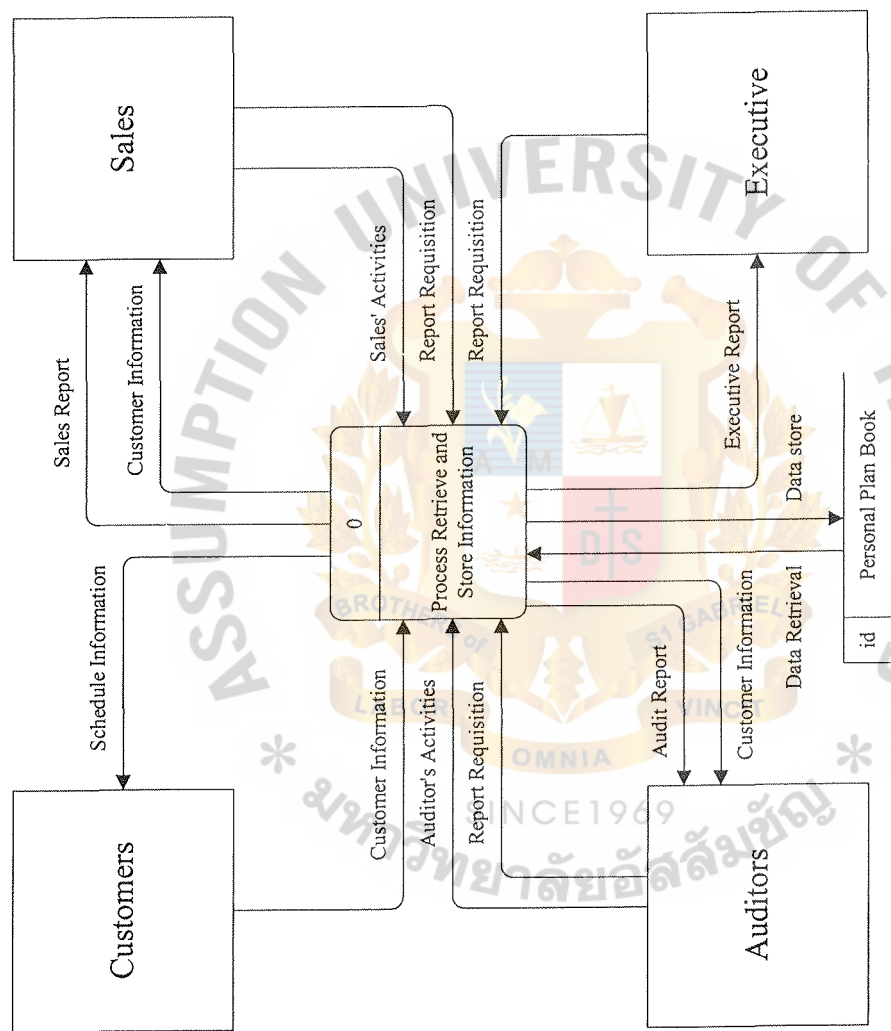


Figure 2.3. Context Diagram of Existing System.



### III. THE PROPOSED SYSTEM

#### 3.1 System Specification

The proposed system for Easy Certified Co., Ltd is the “Computer Tracking System” which can do track customer information as well as the staff activities to customer. The proposed system is the essential for certified business that can eliminate fault or reduce human error by letting the system do the job of storing information. In addition, operation and management staff are benefit from this new system from the various types of report.

In order to achieve the target, the new proposed Computer Tracking System should have the components as follows:

- (1) Provide and maintain a computerized customer database to replace the existing manual system and to update customer information on demand and to enable to add, and change information.
- (2) Provide and maintain an appointment’s schedule and activity database to facilitate the staff’s work, to provide current appointment information on demand, and to solve the problem occurring from the current system.
- (3) Provide customer information reports such as customer list for a time period (days, months, and annual).
- (4) Provide GUI screen for user to interact with the system friendly.
- (5) Provide security and control procedure to prevent unauthorized person and define authorization of each level for accessing the system.
- (6) Provide data retrieval process to access easily and fast.
- (7) Provide summarized information page for executive.

### **3.2 System Design**

#### **3.2.1 Entity Relationship Diagram**

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

#### **3.2.2 Data Flow Diagram**

The system structure charts for the proposed system are shown in Appendix G. The system structure charts show the hierarchy and organization of partitioned modules, and the communication interfaces between modules.

#### **3.2.3 Interface Design**

The proposed system uses method called On-line processing that inputs editing and outputs formatting occur on client computers in an on-line mode. Input transactions and information requests are transmitted on-line to several computers for processing, so updating, inquires, and reports can be processed immediately.

All input screens of the proposed system are shown in Appendix A. All output screens and reports of the proposed system are shown in Appendix B.

### **3.3 Hardware and Software Requirement**

#### **3.3.1 Candidate Solution**

For the customer information system, we identify alternative candidate solutions for a proposed system by using a matrix format. The candidate system matrix shown in Table 3.1 is used to provide overview characteristics concerning the portion of the system to be computerized, the business benefits, and software tools.

#### **3.3.2 Network Requirement**

The proposed system uses the computing model called Client/Server Computing in form of two-tier client/server. This architecture places the information system's stored data on a server and the business logic and user interface on clients connected by

a local area network using Star Network Topology in which each computer is attached to a central point called a Switch. This topology will be cooperated with a LAN operating system using Microsoft Windows 2000 Server.

The local area network (LAN) is required for data communication of the system. The objectives of using LAN are as follows:

- (1) To improve the employee productivity through automation of routine job functions.
- (2) To improve manageability of the information through reduction of duplication and improvement of accessibility.
- (3) To improve employee interaction through the shared information.
- (4) To be able to implement cooperative processing with high-speed links between PC clients and the server.
- (5) To get standardization of computer communication usage.

The network configuration for the proposed system is shown in Figure 3.1.

3.3.3 Hardware Requirement

The computer hardware that will be used for both server and client needs to be the well known brand name such as IBM, HP, Compaq, and Dell. In addition, the computer needs to be server class.

Table 3.1. The Hardware Specification for the Computer Server.

Hardware	Specification
CPU	Pentium IV 1 GHz.or better
Memory	SDRAM 512 Mb.
Harddisk	18 GB (Raid –5)
CD-ROM	20x or better (SCSI interface)
Floppy Disk	1.44 MB

Table 3.1. The Hardware Specification for the Computer Server (Continued).

Hardware	Specification
Network Card	3COM 3C980 Server class 10/100-BaseT
Monitor	15" SVGA monitor or better
Display Card	16 Mb display Card or better
UPS	1200 VA.

Table 3.2. The Hardware Specification for Each Client Machine.

Hardware	Specification
CPU	Intel Pentium III 800 MHz.
Memory	SDRAM 128 MB.
Harddisk	12 GB or better
CD-ROM	50X
Floppy Disk	1.44 MB
Network Card	3COM 10/100 Base T
Display Card	16 Mb display card or better
Monitor	17" SVGA monitor
UPS	600 VA.

Table 3.3. The Peripheral Specification.

Hardware	Specification
Laser Printer	HP4050 N
DeskJet Printer	HP Deskjet (print 8 page / min) or better
Switch	24 Port 10/100 Mbit/s

### 3.3.4 Software Requirement

The proposed system uses Oracle 8.0 as file server to store all data on server and uses MS Visual Basic as the software program to run the business logic of the information system application on the clients. The software specification for server and clients are shown in Table 3.4 and Table 3.5 respectively.

Table 3.4. The Software Specification for the Computer Server.

Software	Specification
Operating System	Microsoft Windows 2000 Server
Application Server	Microsoft Visual Basic Version 6.0
Database Server	SQL Server

Table 3.5. The Software Specification for Each Client Machine.

Software	Specification
Operating System	Microsoft Windows 2000 Workstation
Application Program	Microsoft Visual Basic Version 6.0

## 3.4 Security and Control

The proposed system must be able to use security procedures to protect personal information against unauthorized disclosure and to control integrity ensuring that the things users are trying to do are correct.

The proposed system provides the security and control as follows:

- (1) Login-Password



The first level of security is login to system. When user signs on to the system, it requires their user ID and password to recognize the requesting user. Then the only authorized person will be able to gain access to the system and its input screens.

(2) Access Permission

The system supports user group to share the same user ID in each level. Each level can access to different part of the system that provides procedures for users to review and correct their personal information of customer including other information.

(3) Integrity Control

There are two parts of control as follows:

(a) Input Control

The proposed system provides checking the accuracy and validity of data whenever any data updated operation is attempted. The system uses Limit and Range Checks to determine whether the input data for each field falls within the legitimated range of values defined for that field.

(b) Output Control

Each printed report must be approved by manager or executive before sending to the destination who is the right person.

(4) Back Up

Both system database and user database will be backed up daily onto tape back up system to ensure that data can be recovered whenever the system is crashed.

(5) Uninterruptible Power Supply (UPS)

UPS will supply the power to the server and client in order to continue the outstanding job for a short period of time after the outage of the main power.

### 3.5 Cost and Benefit Analysis

#### 3.5.1 Cost Analysis

System costs are categorized into:

- (1) Fixed Cost
  - (a) Hardware purchase.
  - (b) Software purchase.
  - (c) Implementation cost, including preparation of computer site, training, and documentation for a new system, and file conversion.
  - (d) Personnel hours for analysis, design, programming, and testing.
- (2) Operating Cost
  - (a) Hardware and software maintenance contracts.
  - (b) Day-to-day personnel cost, including computer operations, data entry operators, and end-user costs.
  - (c) Office supplies and miscellaneous costs.

#### 3.5.2 Benefit Analysis

Benefits increase profits or decrease costs both highly desirable characteristics of a proposed system. Benefits are classified as follows:

(1) Tangible Benefits

(a)	Reduction of redundant work (200 hrs@100 baht)	20,000 baht
(b)	Reduction of work delay (100 hrs@100 baht)	10,000 baht
(c)	Reduction of office supply expenses	56,000 baht
(d)	Reduction of time for report (1500 hrs@100 baht)	150,000 baht
Total annual benefit costs		236,000 baht

(2) Intangible Benefits

- (a) Improve service to customer.
- (b) Improve decision making by providing statistical reports to manager.
- (c) Improve image of the company.
- (d) Improve operation and management efficiency.
- (e) Improve security and control of customer’s information.

Payback analysis is the method for determining when an investment will pay for itself. The exact point at which initial investment costs are recovered completely and new system saving begins is the payback period. All payback period analysis of candidates is shown in Appendix A. The payback period formula is the following:

Payback period = negative cash flow +  
difference

Last year of  
difference

Cumulative difference  
last negative year

Absolute value of  
cumulative difference  
(last negative plus  
first positive year)

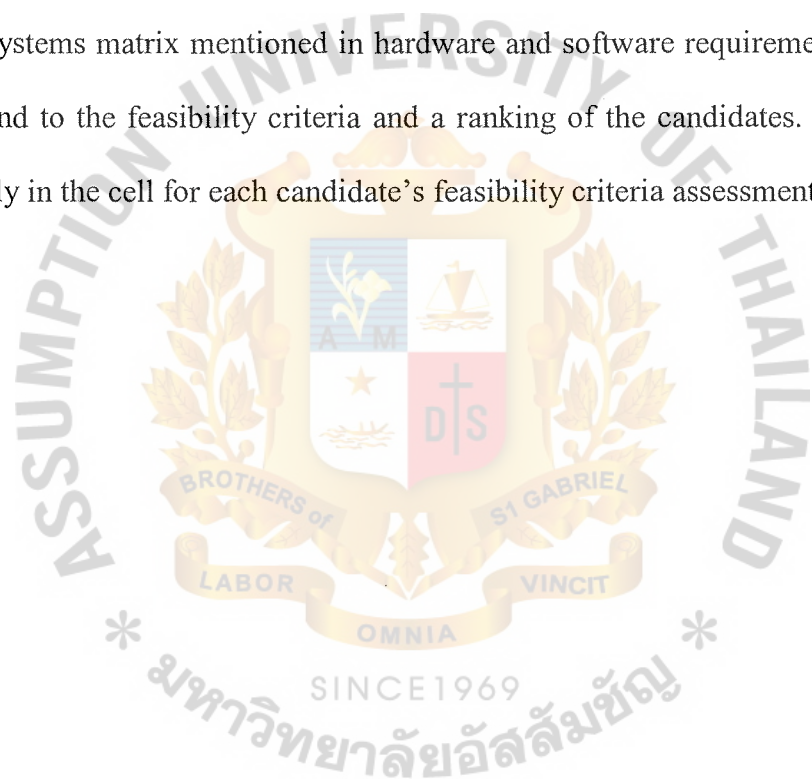
In addition, Net Present Value Analysis is the technique that compares alternatives with different lifetimes. Appendix H illustrates the net present value calculation. Costs are represented by negative cash flows while benefits are represented

by positive cash flows. After discounting all costs and benefits, subtract the sum of the discounted costs from the sum of the discounted benefits to determine the net present value.

3.5.3 Feasibility Analysis

Table A.1 illustrates feasibility analysis matrix. It complements the candidate systems matrix with an analysis and ranking of the candidate systems.

The columns of the matrix correspond to the same candidate solutions as shown in the candidate systems matrix mentioned in hardware and software requirement section. Rows correspond to the feasibility criteria and a ranking of the candidates. A score is recorded directly in the cell for each candidate’s feasibility criteria assessment.



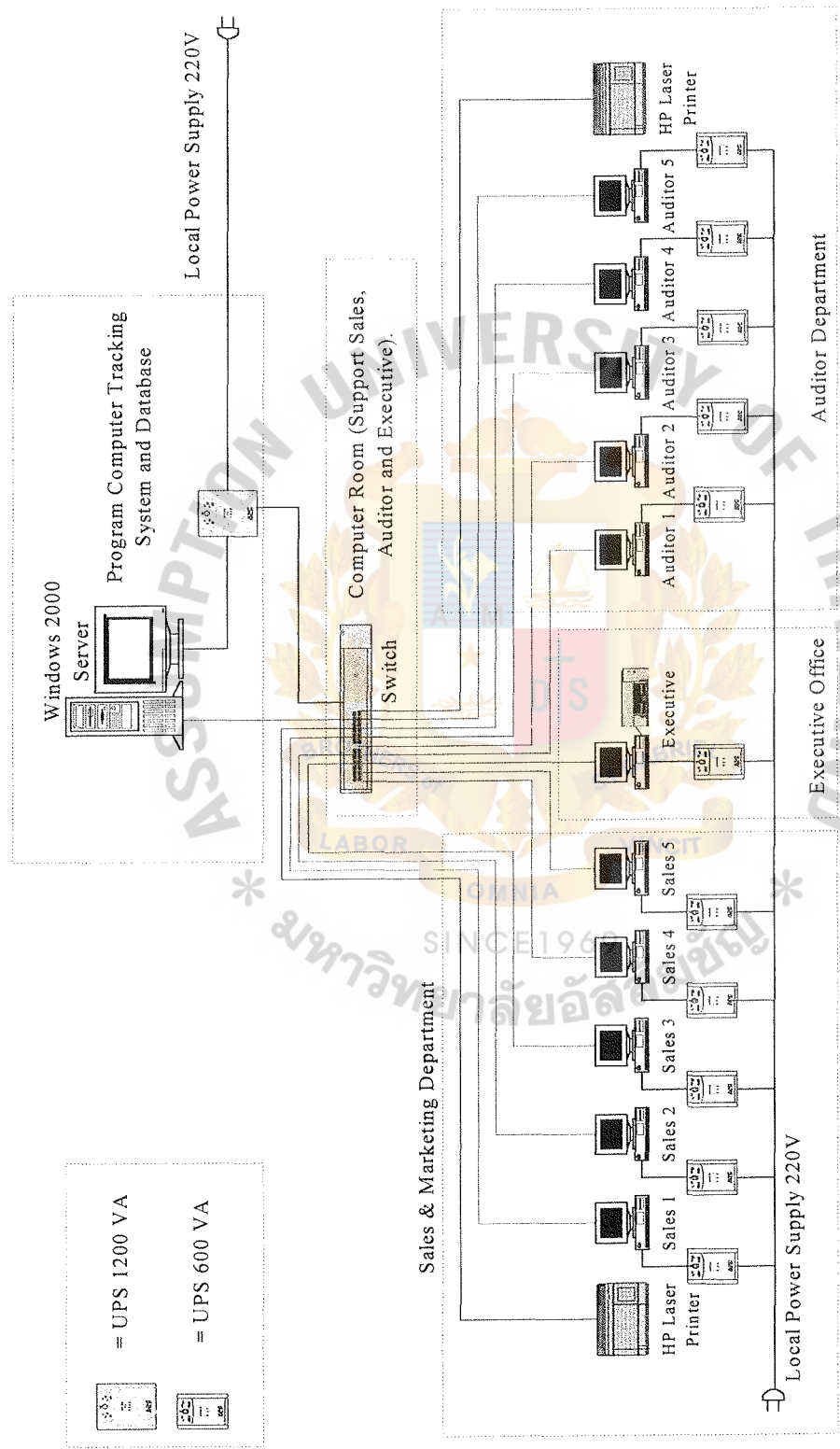


Figure 3.1. Network Diagram.



## IV. PROJECT IMPLEMENTATION

### 4.1 Overview of Project Implementation

After the approval of the technical design statement and prototypes, the System Implementation can proceed. The System Implementation is the construction of the new system and the delivery of the final system into operation. The processes of the System Implementation are:

(1) Computer Programming

According to the Design Specification in Chapter 3, programmers are responsible for writing program following those requirements. Then implement management reporting and decision support programs. Finally, backup and recovery process will be used from tool provided in the operating system.

(2) Testing

Programs are tested in the test environment and debugged top-down as they are coded. There are three levels of testing mentioned in the Testing section. The user might involve the testing by giving them right to access to test system.

(3) Training and User Document

In converting to a new system, it is necessary for users to be trained and provided with document that guides them through using the new system.

Users need to familiarize themselves with the computerized system including functions of the hardware and software. They should be trained on

how to use the system properly and efficiently such as how to perform data entry, how to print reports.

(4) Hardware Acquisition and Installation

According to the Hardware Requirement section in Chapter 3, both computer server and clients should be readily configured and could install whenever is needed. Mostly, it is done before training.

(5) Conversion

This conversion process must be carried out carefully. The conversion plan includes detailed installation strategies to follow for converting from the manual existing system to the new computerized information system.

## 4.2 Computer Programming

All programming will be done in the test environment. All source codes of the proposed system will be kept there. The test environment will have the same software requirement as the life system but hardware capacity might be of disadvantage.

## 4.3 Test Plan

Test plans are developed at the same time the requirements specification document is being developed and can be refined and updated during design as well.

Testing strategy of the proposed system is the same as the strategy mentioned in the Computer Programming section that is Top-down testing. It starts at an overview of the system to be tested, then works its way down into the details of the system such as update databases, print lines on a report, and display text or graphics on a screen.

There are three levels of testing to be performed:

(1) Unit/Module Testing

It is done while the program is in the process of creating the individual module. It serves to detect error in coding and errors in logic. Finally, unit testing is done with test data created by the programmers themselves.

## (2) Function Testing

It is the combination of one or more integration-tested groups of modules that collectively perform a user identified function.

## (3) System Testing

It is a test that ensures that application programs written in isolation work properly when they are integrated into the total system. Whenever testing discovers errors at any level of the methodology, the programmer will need to make coding changes followed by a trip back through the layers to ensure defect-free code in all test levels.

### 4.4 Training

Training is provided for all operation and management staffs until they fully understand. During the test, there will be documentation for each department due to different job responsibility. That document will help them revise system by themselves later.

### 4.5 Conversion

Once a successful system test has been completed, the last process of project implementation is the delivery of the new system into operation. The strategy for converting from the old system to the new system is Parallel Conversion that allows the user to continue to use the manual and new system simultaneously for a period of time.

This is done to ensure that all major problems in the new system have been solved and everyone is satisfied with the new system that can operate correctly. This strategy minimizes the risk and can be compared with the old system.

## V. CONCLUSIONS AND RECOMMENDATIONS

### 5.1 Conclusions

The Existing system is a manual system which has a lot of problems such as it is hard to search for desired information, special information is easily lost since each person keeps it in a personal plan book. It is also very difficult to summarize a report or find out other person's appointment or schedule information.

The above are example problems that occur and can be solved by implementing the proposed system. The proposed system is a computerized system that can eliminate human mistakes, increase data processing speed and improve services efficiency.

The purpose of this system development project is to analysis, design, implement and develop database software application for tracking information such as staff's activities to customers of Easy Certified Co., Ltd. This application is designed to improve the efficiency and effectiveness of the current manual system. It can be used to reduce the workload and provide timeliness, accuracy, intergrity and up dated information. This system can produce various reports and simplify and speed up all the analysis processes.

In addition, this system also provides executive information in drill-down graphical interface that helps manager or executive to manage and control their staff. The computerized system provides the company incremental performance and reduction of redundancy of work. As the result, the proposed system can yield higher productivity.

Finally, it is benefit to the company in the way of increasing working ability both operation and management staff in the company. With the increasing of staff's ability and their quality of services, the customers will be interested in using the company

services. Table 5.1 presents the achievement of the proposed system compared with the existing system. It shows that it has reduced time spent on each task.

(1) Executive Information Preparation

Executive Information will summarize all information into single page or screen. It is time consuming to summarize each task. With the new purposed system, all information can be prepared at night and when the executive wants it in the morning, he or she can view the information right away.

(2) Inquiry

A response time to inquiry customer information and staff activities can be reduced since information can easily be retrieved from the system.

(3) Report Process

Officer does not have to gather information from multiple files. The system can select the required information from the shared database and produce a formatted report easily.

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

Process	Existing System	Proposed System
Executive Information Preparation	1 day	Less than 1 hour
Inquiry	20 minutes	1 minute
Report Process	50 minutes	5 minutes



## 5.2 Recommendations

There are some major variable factors that effect the performance of the proposed system. Here are some critical points.

In system development life cycle, the analysis phase is one of the most important. User requirement is collected by the appropriate method. The system analyst has to consider each requirement whether it is worth or not to solve this problem or to satisfy their need.

Maintenance is also important part of the post-install phase so that it will be good for the person who has responsibility to maintain the system.

The program itself might have the limitation of what they can do or cannot do. Another thing is, even there are the same types of customer doing the same certified, the process of each customer can be different due to their process. That means the way of auditing and recording to the system might be different.

Finally, this system may not be perfect. There still are functions to add or change due to the needs of users or circumstance change. It might be necessary to revise the system after implementing it for one year.



**APPENDIX A**

**CANDIDATE MATRIX**

## CANDIDATE SOLUTION

### Candidate 1

Candidate1 uses Microsoft Visual Basic 6.0 as the tool for developing the QMS software; and uses SQL Server for storing database as it is one of the reliable DBMS. There are many benefits in choosing this candidate. First, we do not have to hire IT Specialist to take care the system after the system implementation, as it is cover in maintenance contract. Second, the system can be implemented faster than other candidate because they have already been developed and need to adjust some function to our requirement. Finally, they are experts in this field and their system might cover the area that we have not yet thought of.

### Candidate 2

In this solution, we will develop the software by ourselves by using Delphi 5.0 as the developing tool, and SQL Server for database storing, as it is one of the reliable DBMS. With Raid-5 storage technique, it is given fault-tolerant as well as the more efficient for data access. There are many third-party companies that develop the add-on function or tools to Delphi. As the result, it reduces the developing time by using those add-on tools. To choose this solution, we do need the IT specialist working in the company to take care of the system.

### Candidate 3

In this solution, it is more likely to use Candidate2. The difference is the tool used for developing which is Microsoft Visual Basic 6.0, and the DBMS that is Oracle. It is easier to find VB Developer in the market. But the developing time will be more than Delphi as the way of programming is different. The price of Oracle is the disadvantage for this solution.

Table A.1. Candidate Systems Matrix.

Characteristics	Candidate 1	Candidate 2	Candidate 3
<p>Portion of System Computerized</p> <p>Brief description of that portion of the system that would be computerized in this candidate.</p>	QMS package from Quality Software house Company would be purchased and customized to propose project requirement.	Self develop the proposed system	Same as candidate 1
<p>Benefits</p> <p>Brief description of the business benefits that would be realized for this candidate.</p>	This solution can be implemented quickly because it's a purchased solution.	Fully supports user required business processes for E.C. due to self develop	Same as candidate 2.
<p>Servers and Workstations</p> <p>A description of the servers and workstations is needed to support this candidate.</p>	<p>Server : Server Class, MS Windows 2000</p> <p>Server Workstation : MS Windows 2000 Professional.</p>	Same as candidate 1.	Same as candidate 1.
<p>Software tools needed</p> <p>Software tools are needed to design and build the candidate (e.g., database management system, emulators, operating systems, languages etc.) Not generally applicable if applications software packages are to be purchased.</p>	MS Visual Basic 6.0 and Crystal Report to create report.	Delphi 5.0 and Crystal Report to create report	Same as candidate 1.
<p>Application software</p> <p>A description of the software to be purchased, built, accessed, or some combination of these techniques</p>	Package Solution	Custom Solution	Same as candidate 2.
<p>Method of data processing</p> <p>Generally some combination of: on-line, batch, deferred batch, remote batch, and real-time.</p>	Client/Server	Same as candidate 1.	Same as candidate 1.
<p>Output Devices and Implications</p> <p>A description of output devices that would be used, special output requirements (e.g., network, preprinted form, etc.), and output considerations (e.g., timing constraints).</p>	<p>(2) HP4050N department laser printer</p> <p>(1) HP1150C Deskjet printer</p>	Same as candidate 1.	Same as candidate 1.

Table A.1. Candidate Systems Matrix (Continued).

Characteristics	Candidate 1	Candidate 2	Candidate 3
Input Devices and Implications  A description of input methods to be used, input devices (e.g., keyboard, mouse, etc.), special input requirements (e.g., new or revised forms from which data would be input), and input considerations (e.g., timing of actual inputs)	Keyboard and mouse	Same as candidate 1.	Same as candidate 1.
Storage Devices and Implications  Brief description of what data would be stored, what data would be accessed from existing stores, what storage media would be used, how much storage capacity would be needed, and how data would be organized	MS SQL Server DBMS, 18 GB (Mirror)	MS SQL Server DBMS, 18 GB (Raid-5)	Oracle, 18 GB (Raid-5)



## FEASIBILITY ANALYSIS

With Figure A.1 information, we can identify the difference in each candidate. We now will consider which one is the suitable one for the Easy Certified Co., Ltd. There are four areas that we will focus and give the score in each section in order to get the most suitable one to our need.

The total score is 100 and is divided into four areas. Each portion will not be the same due to the needs and priority. Four areas are:

- (1) Operational feasibility, to fulfill the requirement and needs of user. The score would be 30 out of 100.
- (2) Technical feasibility, since all Technical feasibilities are almost the same, the score would be 20 out of 100.
- (3) Economic feasibility, the cost and returning. Since company has very good finance, the score would be 20 out of 100.
- (4) Schedule feasibility, faster is better for business. So the score would be 30 out of 100.

Table A.2. Feasibility Analysis Matrix.

Feasibility Criteria	Wt.	Candidate 1	Candidate 2	Candidate 3
<p>Operational Feasibility</p> <p>Functionality. A description of to what degree the candidate would benefit the organization and how well the system would work.</p> <p>Political. A description of how well received this solution would be from user management, user, and organization perspective.</p>	30%	<p>Only supports to function that the system already had. To adjust the system to our requirement will take time and might not be able to do so due to the software standard.</p> <p>Score: 90</p>	<p>Fully supports user requirements in terms of functionality and business process.</p> <p>Score: 100</p>	<p>Same as candidate 2.</p> <p>Score: 100</p>
<p>Technical Feasibility</p> <p>Technology. An assessment of the maturity, availability (or ability to acquire), and desirability of the computer technology is needed to support this candidate.</p> <p>Expertise. An assessment of the technical expertise is needed to develop, operate, and maintain the candidate system.</p>	20%	<p>This candidate will do the maintenance for the company as we do not need to worry much when there is the turnover in IT department But we do have to pay the high rate maintenance.</p> <p>Score: 90</p>	<p>All technical coding / programming are done by our IT staff. If there is any turnover, it is very difficult to find someone continue support as well as modified the program.</p> <p>Score: 80</p>	<p>All technical coding / programming are done by our IT staff. If there is any turnover, it is easier to find IT staff replacement than candidate2.</p> <p>Score: 85</p>
<p>Economic Feasibility</p> <p>Cost to develop</p> <p>Payback period</p> <p>Net present value</p> <p>Detailed calculations</p>	20%	<p>Approximately 2,982,500 Baht.</p> <p>Approximately 4.2 years</p> <p>Approximately 1,180,136.69 Baht</p> <p>See Attachment</p> <p>Score: 65</p>	<p>Approximately 1,407,500 Baht.</p> <p>Approximately 2.5 years</p> <p>Approximately 2,299,949.69 Baht</p> <p>See Attachment</p> <p>Score: 90</p>	<p>Approximately 1,437,500 Baht.</p> <p>Approximately 2.6 years</p> <p>Approximately 2,782,156.31 Baht</p> <p>See Attachment</p> <p>Score: 95</p>
<p>Schedule Feasibility</p> <p>An assessment of how long the solution will take to design and implement</p>	30%	<p>Approximately 2 months</p> <p>Score: 100</p>	<p>Approximately 3 months</p> <p>Score: 90</p>	<p>Approximately 5 months</p> <p>Score: 70</p>
Ranking	100%	88	91	87

Table A.3. Alternative Candidate Requirement Category Analysis.

Requirement	Category	Candidate 1	Candidate 2	Candidate 3
1. The network where application and information within the company can be linked	E	X	X	X
2. The computers that are more efficient, with high speed and guarantee the transfer rate data.	E	X	X	X
3. Network operating system that manages and controls the file server.	E	X	X	X
4. Software tools used to link clients and server.	E	X	X	X
5. DBMS to create and maintain database.	E	X	X	X
6. System administrator to maintain the system	D	-	X	X
7. Database administrator who has more technical aspects of managing data, designing database and maintenance.	D	-	X	X
8. Our IT staff can add more function later on as they wrote this program by themselves	O	-	X	X

E = Essential    D = Desirable    O = Optional

Table A.4. Estimated Costs for Candidate 1, Baht.

Cost Items	Qty	Prices	Total
Fixed Cost			
Hardware Cost:			
Computer Server	1	200,000.00	200,000.00
Computer Client	11	35,000.00	385,000.00
Laser Printer	2	45,000.00	90,000.00
Switch 24 Port 10/100 MB	1	30,000.00	30,000.00
UPS for Server	1	15,000.00	15,000.00
UPS for Client	11	3,500.00	38,500.00
Total Hardware Cost			758,500.00
Requirement Software Cost:			
Server Software (Microsoft Windows 2000 Server) (5 clients access package)	1		43,000.00
Client access (add to cover number of client)	6	3,500.00	21,000.00
DBMS Server Software	1	80,000.00	80,000.00
Total Software Cost			144,000.00
Implementation Cost:			
Wiring LAN + Power	20	4,000.00	80,000.00
Total Implementation Cost			80,000.00
Proposed System Cost			
Software House (QMS)	1	2,000,000.00	2,000,000.00
- Installation and Setup			
- training 10 Days + document			
- free Visual Basic and Crystal Report			
Total Proposed System Cost			2,000,000.00
Grand Total			2,982,500.00

\* Note \*

The Maintenance proposed system is 15% of the prices

Table A.5. Estimated Operation &amp; Maintenance Cost for Candidate 1, Baht.

Cost Items	Years				
	1	2	3	4	5
Operating Cost					
Maintenance Cost:					
Maintenance for Hardware	—	10,000.00	10,000.00	50,000.00	55,000.00
Maintenance for Proposed System (15%)	300,000.00	300,000.00	300,000.00	300,000.00	300,000.00
Total Maintenance Cost	300,000.00	310,000.00	310,000.00	350,000.00	355,000.00
Office Supplies & Misc Cost:					
Computer Supplies	24,000.00	26,400.00	29,040.00	31,944.00	35,138.40
Stationary	10,800.00	11,880.00	13,068.00	14,374.80	15,812.28
Misc.	9,400.00	10,340.00	11,374.00	12,511.40	13,762.54
Total Office Supp & Misc Cost	44,200.00	48,620.00	53,482.00	58,830.20	64,713.22
Utility Cost:					
Power Supply	5,000.00	5,500.00	6,050.00	6,655.00	7,320.50
Total Utility Cost	5,000.00	5,500.00	6,050.00	6,655.00	7,320.50
Total Operating Cost	349,200.00	364,120.00	369,532.00	415,485.20	427,033.72
Total Computer System Cost	3,331,700.00	364,120.00	369,532.00	415,485.20	427,033.72
Accumulative Cost	3,331,700.00	3,695,820.00	4,065,352.00	4,480,837.20	4,907,870.92



Table A.6. Payback Period for Candidate 1, Baht.

Cost items	Years					
	0	1	2	3	4	5
Development Cost	-2,982,500.00	-	-	-	-	-
Operation & Maintenance*:	-	-349,200.00	-364,120.00	-369,532.00	-415,485.20	-427,033.72
Discount Factors for 12%	1.00	0.89	0.80	0.71	0.64	0.57
Time-adjusted Costs (adjusted to present value):	-2,982,500.00	-311,785.71	-290,274.23	-263,025.58	-264,048.36	-242,310.40
Cumulative Time-adjusted Costs Over Lifetime	-2,982,500.00	-3,294,285.71	-3,584,559.95	-3,847,585.53	-4,111,633.88	-4,353,944.28
Benefits Derived from Operation of New System:	0.00	900,000.00	1,170,000.00	1,521,000.00	1,977,300.00	2,570,490.00
Discount Factors for 12%	1.00	0.89	0.80	0.71	0.64	0.57
Time-adjusted Benefits (adjusted to present value):	0.00	803,571.43	932,716.84	1,082,617.76	1,256,609.90	1,458,565.06
Cumulative Time-adjusted Benefits Over Lifetime	0.00	803,571.43	1,736,288.27	2,818,906.02	4,075,515.92	5,534,080.98
Cumulative Lifetime Time- adjusted Costs + Benefits:	-2,982,500.00	-2,490,714.29	-1,848,271.68	-1,028,679.51	-36,117.96	1,180,136.69

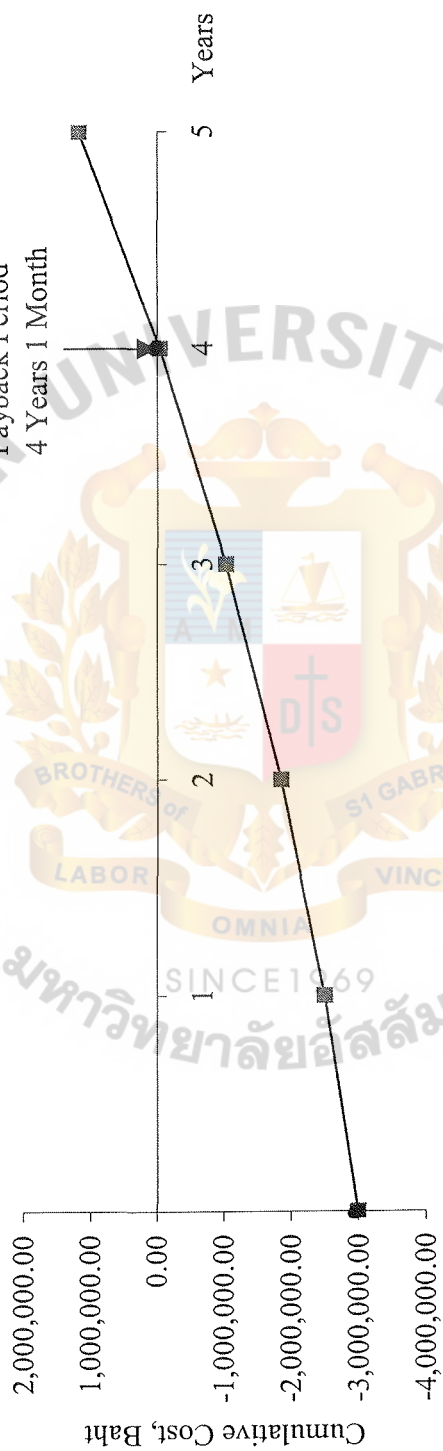


Figure A.1. Payback Period for Candidate 1.

Table A.7. Net Present Value for Candidate 1, Baht.

Cost items	Years						Total
	0	1	2	3	4	5	
Development Cost:	-2,982,500.00	-	-	-	-	-	
Operation & Maintenance *:	-	-349,200.00	-364,120.00	-369,532.00	-415,485.20	-427,033.72	
Discount Factors for 12%	1.00	0.89	0.80	0.71	0.64	0.57	
Present value of annual cost:	-2,982,500.00	-311,785.71	-290,274.23	-263,025.58	-264,048.36	-242,310.40	
Total present value of lifetime costs:							-4,353,944.28
Benefits Derived from Operation of New System:	0.00	900,000.00	1,170,000.00	1,521,000.00	1,977,300.00	2,570,490.00	
Discount Factors for 12%	1.00	0.89	0.80	0.71	0.64	0.57	
Present value of annual benefits:	0.00	803,571.43	932,716.84	1,082,617.76	1,256,609.90	1,458,565.06	
Total present value of lifetime benefits:							5,534,080.98
NET PRESENT VALUE OF THIS ALTERNATIVE:							1,180,136.69

Table A.8. The Comparison of the System Costs (Candidate 1), Baht.

Year	Accumulated Manual Cost	Accumulated Computerized Cost
1	1,120,600.00	3,331,700.00
2	2,253,260.00	3,695,820.00
3	3,899,186.00	4,065,352.00
4	5,559,704.60	4,480,837.20
5	7,736,275.06	4,907,870.92



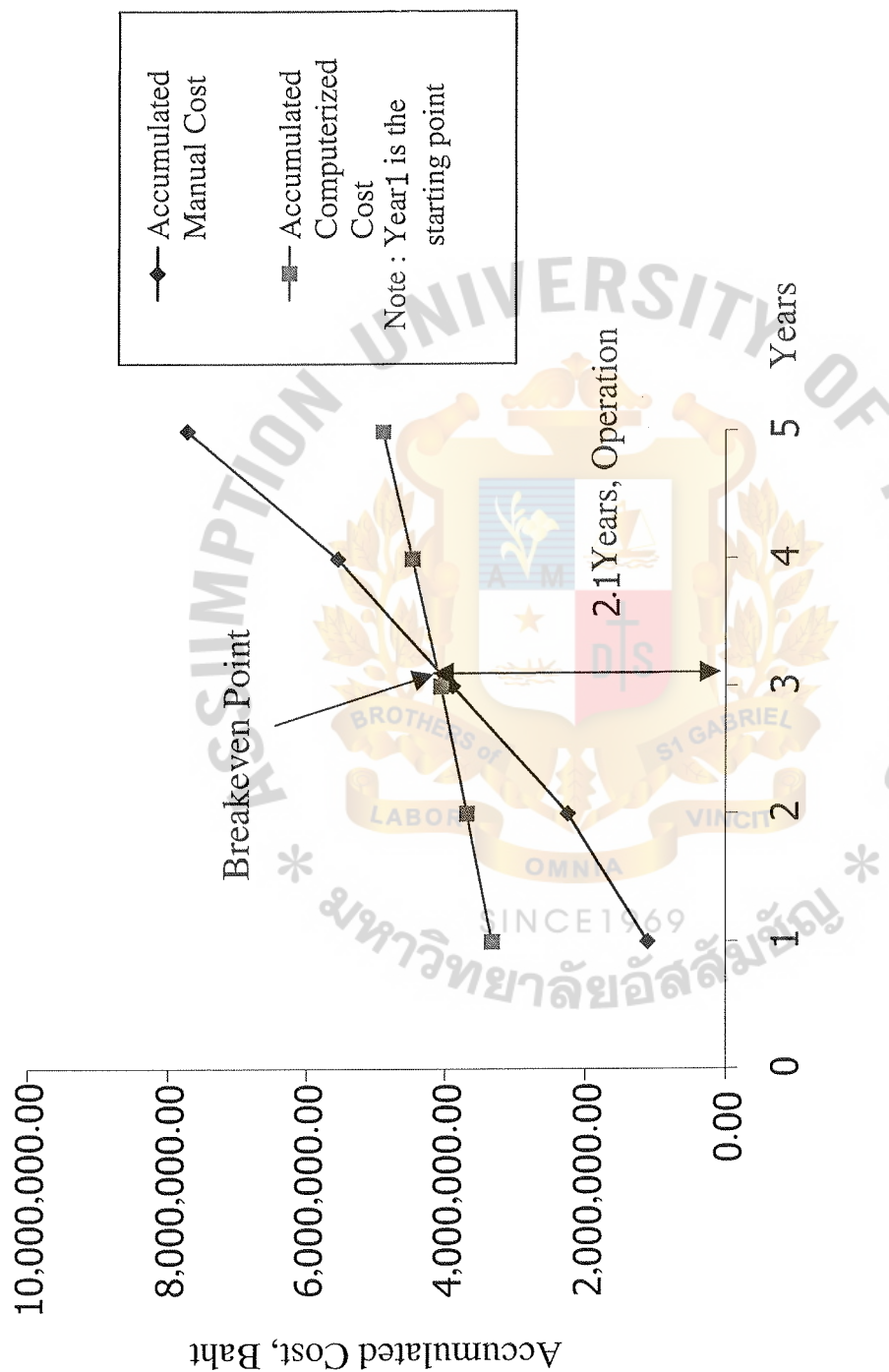


Figure A.2. Cost Comparison between Manual & Proposed System (Candidate 1).



Table A.9. Estimated Costs for Candidate 2, Baht.

Cost Items	Qty	Prices	Total
Fixed Cost			
Hardware Cost :			
Computer Server	1	200,000.00	200,000.00
Computer Client	11	35,000.00	385,000.00
Laser Printer	2	45,000.00	90,000.00
Switch 24 Port 10/100 MB	1	30,000.00	30,000.00
UPS for Server	1	15,000.00	15,000.00
UPS for Client	11	3,500.00	38,500.00
Total Hardware Cost			758,500.00
Requirement Software Cost :			
Server Software (Microsoft Windows 2000 Server) (5 clients access package)	1		43,000.00
Client access (add to cover number of client)	6	3,500.00	21,000.00
DBMS Server Software	1	80,000.00	80,000.00
Total Software Cost	1	150,000.00	150,000.00
			294,000.00
Implementation Cost:			
Wiring LAN + Power	20	4,000.00	80,000.00
Total Implementation Cost			80,000.00
Developing Team			
System Analyst (4 months @25000 Baht/month)	1	100,000.00	100,000.00
Programmer (5 months @20000 Baht/month)	2	100,000.00	100,000.00
Database Specialist (3 months @ 25000 Baht/month)	1	75,000.00	75,000.00
Total Personnel Cost			275,000.00
Grand Total			1,407,500.00

Table A.10. Estimated Operation & Maintenance Cost for Candidate 2, Baht.

Cost Items	Years				
	1	2	3	4	5
Operating Cost					
Maintenance Cost:					
Maintenance for Hardware	—	10,000.00	10,000.00	50,000.00	55,000.00
1 IT Specialist (30,000 baht@month)	390,000.00	409,500.00	429,975.00	451,473.75	474,047.44
Total Maintenance Cost	390,000.00	419,500.00	439,975.00	501,473.75	529,047.44
Office Supplies & Misc Cost:					
Computer Supplies	24,000.00	26,400.00	29,040.00	31,944.00	35,138.40
Stationary	10,800.00	11,880.00	13,068.00	14,374.80	15,812.28
Misc.	9,400.00	10,340.00	11,374.00	12,511.40	13,762.54
Total Office Supp & Misc Cost	44,200.00	48,620.00	53,482.00	58,830.20	64,713.22
Utility Cost:					
Power Supply	5,000.00	5,500.00	6,050.00	6,655.00	7,320.50
Total Utility Cost	5,000.00	5,500.00	6,050.00	6,655.00	7,320.50
Total Operating Cost	439,200.00	473,620.00	499,507.00	566,958.95	601,081.16
Total Computer System Cost	1,846,700.00	473,620.00	499,507.00	566,958.95	601,081.16
Accumulative Cost	1,846,700.00	2,320,320.00	2,819,827.00	3,386,785.95	3,987,867.11

Table A.11. Payback Period for Candidate 2, Baht.

Cost items	Years					
	0	1	2	3	4	5
Development Cost:	-1,407,500.00	-	-	-	-	-
Operation & Maintenance *:	-	-439,200.00	-473,620.00	-499,507.00	-566,958.95	-601,081.16
Discount Factors for 12%	1.00	0.89	0.80	0.71	0.64	0.57
Time-adjusted Costs (adjusted to present value):	-1,407,500.00	-392,142.86	-377,566.96	-355,539.22	-360,312.66	-341,069.59
Cumulative Time-adjusted Costs Over Lifetime:	-1,407,500.00	-1,799,642.86	-2,177,209.82	-2,532,749.04	-2,893,061.70	-3,234,131.29
Benefits Derived from Operation of New System:	0.00	900,000.00	1,170,000.00	1,521,000.00	1,977,300.00	2,570,490.00
Discount Factors for 12%	1.00	0.89	0.80	0.71	0.64	0.57
Time-adjusted Benefits (adjusted to present value):	0.00	803,571.43	932,716.84	1,082,617.76	1,256,609.90	1,458,565.06
Cumulative Time-adjusted Benefits Over Lifetime:	0.00	803,571.43	1,736,288.27	2,818,906.02	4,075,515.92	5,534,080.98
Cumulative Lifetime Time- adjusted Costs + Benefits:	-1,407,500.00	-996,071.43	-440,921.56	286,156.98	1,182,454.22	2,299,949.69

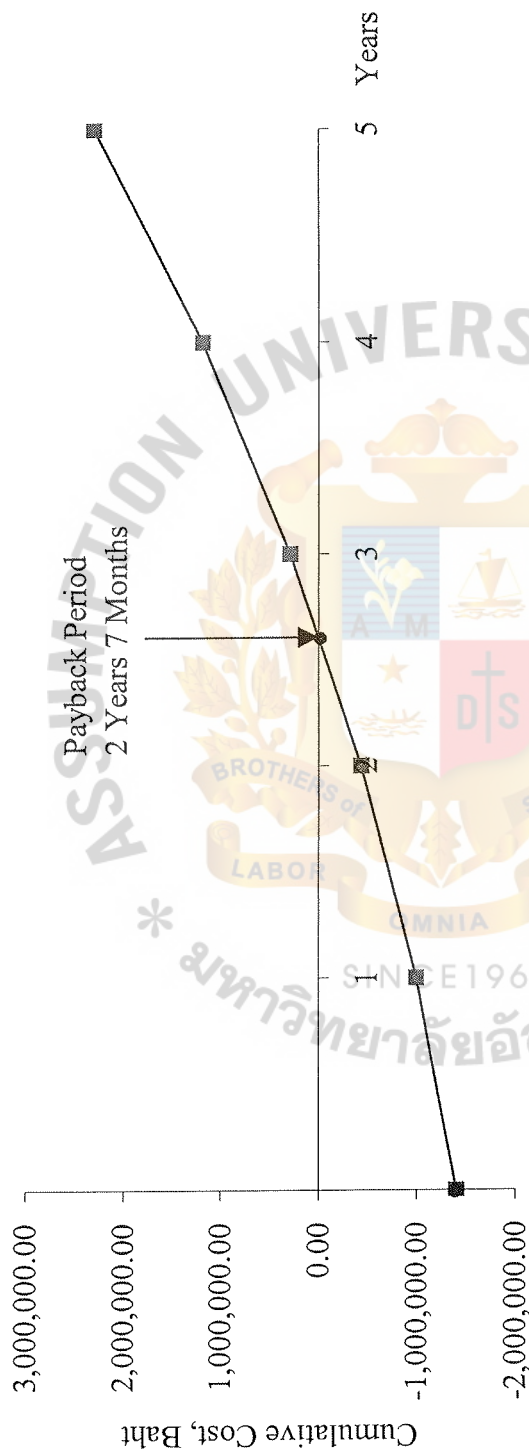


Figure A.3. Payback Period for Candidate 2.

Table A.12. Net Present Value for Candidate 2, Baht.

Cost items	Years						Total
	0	1	2	3	4	5	
Development Cost	-1,407,500.00	-	-	-	-	-	
Operation & Maintenance*:	-	-439,200.00	-473,620.00	-499,507.00	-566,958.95	-601,081.16	
Discount Factors for 12%	1.00	0.89	0.80	0.71	0.64	0.57	
Present value of annual cost	-1,407,500.00	-392,142.86	-377,566.96	-355,539.22	-360,312.66	-341,069.59	
Total present value of lifetime costs							-3,234,131.29
Benefits Derived from Operation of New System	0.00	900,000.00	1,170,000.00	1,521,000.00	1,977,300.00	2,570,490.00	
Discount Factors for 12%	1.00	0.89	0.80	0.71	0.64	0.57	
Present value of annual benefits	0.00	803,571.43	932,716.84	1,082,617.76	1,256,609.90	1,458,565.06	
Total present value of lifetime benefits							5,534,080.98
NET PRESENT VALUE OF THIS ALTERNATIVE:							2,299,949.69



Table A.13. The Comparison of the System Costs (Candidate 2), Baht.

Year	Accumulated Manual Cost	Accumulated Computerized Cost
1	1,120,600.00	1,846,700.00
2	2,253,260.00	2,320,320.00
3	3,899,186.00	2,819,827.00
4	5,559,704.60	3,386,785.95
5	7,736,275.06	3,987,867.11



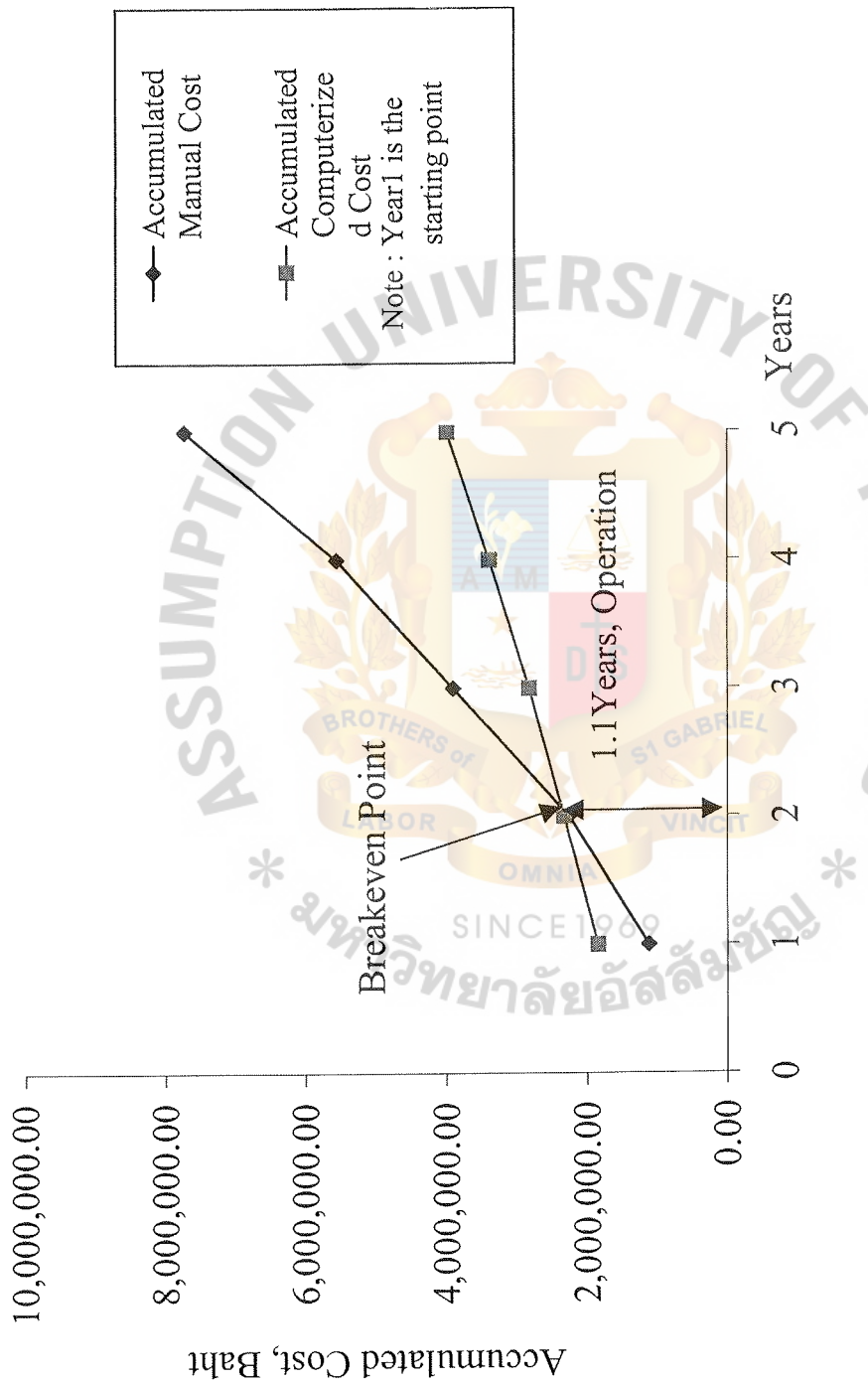


Figure A.4. Cost Comparison between Manual & Proposed System (Candidate 2).

Table A.14. Estimated Costs for Candidate 3, Baht.

Cost Items	Qty	Prices	Total
Fixed Cost			
Hardware Cost :			
Computer Server	1	200,000.00	200,000.00
Computer Client	11	35,000.00	385,000.00
Laser Printer	2	45,000.00	90,000.00
Switch 24 Port 10/100 MB	1	30,000.00	30,000.00
UPS for Server	1	15,000.00	15,000.00
UPS for Client	11	3,500.00	38,500.00
Total Hardware Cost			758,500.00
Requirement Software Cost :			
Server Software (Microsoft Windows 2000 Server) (5 clients access package)	1		43,000.00
Client access (add to cover number of client )	6	3,500.00	21,000.00
DBMS Server Software	1	80,000.00	80,000.00
Visual Basic & Crystal Report	1	200,000.00	200,000.00
Total Software Cost			344,000.00
Implementation Cost :			
Wiring LAN + Power	20	4,000.00	80,000.00
Total Implementation Cost			80,000.00
Developing Team			
System Analyst (4 months @20000 Baht/month)	1	80,000.00	80,000.00
Programmer (5 months @20000 Baht/month)	2	100,000.00	100,000.00
Database Specialist (3 months @ 25000 Baht/month)	1	75,000.00	75,000.00
Total Personnel Cost			255,000.00
Grand Total			1,437,500.00

Table A.15. Estimated Operation & Maintenance Cost for Candidate 3, Baht.

Cost Items	Years				
	1	2	3	4	5
Operating Cost					
Maintenance Cost:					
Maintenance for Hardware	—	10,000.00	10,000.00	50,000.00	55,000.00
1 IT Specialist (20,000 baht@month)	260,000.00	273,000.00	286,650.00	300,982.50	316,031.63
Total Maintenance Cost	260,000.00	283,000.00	296,650.00	350,982.50	371,031.63
Office Supplies & Misc Cost:					
Computer Supplies	24,000.00	26,400.00	29,040.00	31,944.00	35,138.40
Stationary	10,800.00	11,880.00	13,068.00	14,374.80	15,812.28
Misc.	9,400.00	10,340.00	11,374.00	12,511.40	13,762.54
Total Office Supp & Misc Cost	44,200.00	48,620.00	53,482.00	58,830.20	64,713.22
Utility Cost:					
Power Supply	5,000.00	5,500.00	6,050.00	6,655.00	7,320.50
Total Utility Cost	5,000.00	5,500.00	6,050.00	6,655.00	7,320.50
Total Operating Cost	309,200.00	337,120.00	356,182.00	416,467.70	443,065.35
Total Computer System Cost	1,746,700.00	337,120.00	356,182.00	416,467.70	443,065.35
Accumulative Cost	1,746,700.00	2,083,820.00	2,440,002.00	2,856,469.70	3,299,535.05

Table A.16. Payback Period for Candidate 3, Baht.

Cost items	Years					
	0	1	2	3	4	5
Development Cost	-1,437,500.00	-	-	-	-	-
Operation & Maintenance*:	-	-309,200.00	-337,120.00	-356,182.00	-416,467.70	-443,065.35
Discount Factors for 12%	1.00	0.89	0.80	0.71	0.64	0.57
Time-adjusted Costs (adjusted to present value):	-1,437,500.00	-276,071.43	-268,750.00	-253,523.31	-264,672.75	-251,407.18
Cumulative Time-adjusted Costs Over Lifetime	-1,437,500.00	-1,713,571.43	-1,982,321.43	-2,235,844.74	-2,500,517.49	-2,751,924.67
Benefits Derived from Operation of New System:	0.00	700,000.00	1,170,000.00	1,521,000.00	1,977,300.00	2,570,490.00
Discount Factors for 12%	1.00	0.89	0.80	0.71	0.64	0.57
Time-adjusted Benefits (adjusted to present value):	0.00	625,000.00	932,716.84	1,082,617.76	1,256,609.90	1,458,565.06
Cumulative Time-adjusted Benefits Over Lifetime	0.00	625,000.00	1,557,716.84	2,640,334.59	3,896,944.49	5,355,509.55
Cumulative Lifetime Time- adjusted Costs + Benefits:	-1,437,500.00	-1,088,571.43	-424,604.59	404,489.85	1,396,427.00	2,603,584.88



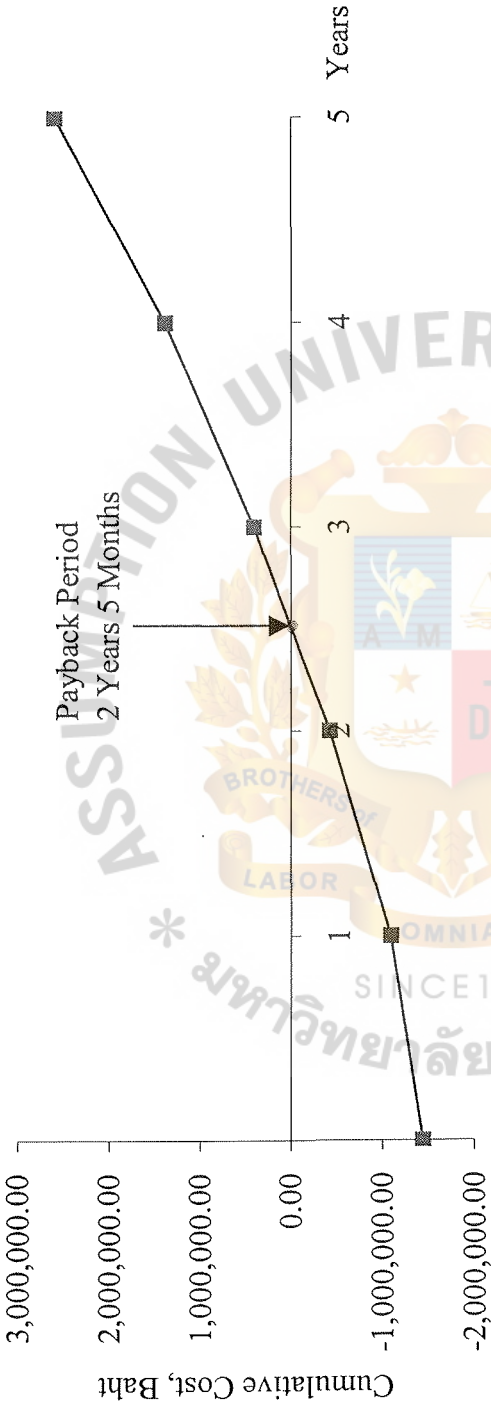


Figure A.5. Payback Period for Candidate 3.

Table A.17. Net Present Value for Candidate 3, Baht.

Cost items	Years						Total
	0	1	2	3	4	5	
Development Cost :	-1,437,500.00	-	-	-	-	-	
Operation & Maintenance *:	-	-309,200.00	-337,120.00	-356,182.00	-416,467.70	-443,065.35	
Discount Factors for 12%	1.00	0.89	0.80	0.71	0.64	0.57	
Present value of annual cost:	-1,437,500.00	-276,071.43	-268,750.00	-253,523.31	-264,672.75	-251,407.18	
Total present value of lifetime costs:							-2,751,924.67
Benefits Derived from Operation of New System:	0.00	900,000.00	1,170,000.00	1,521,000.00	1,977,300.00	2,570,490.00	
Discount Factors for 12%	1.00	0.89	0.80	0.71	0.64	0.57	
Present value of annual benefits:	0.00	803,571.43	932,716.84	1,082,617.76	1,256,609.90	1,458,565.06	
Total present value of lifetime benefits:							5,534,080.98
NET PRESENT VALUE OF THIS ALTERNATIVE:							2,782,156.31

Table A.18. The Comparison of the System Costs (Candidate 3), Baht.

Year	Accumulated Manual Cost	Accumulated Computerized Cost
1	1,120,600.00	1,746,700.00
2	2,253,260.00	2,083,820.00
3	3,899,186.00	2,440,002.00
4	5,559,704.60	2,856,469.70
5	7,736,275.06	3,299,535.05



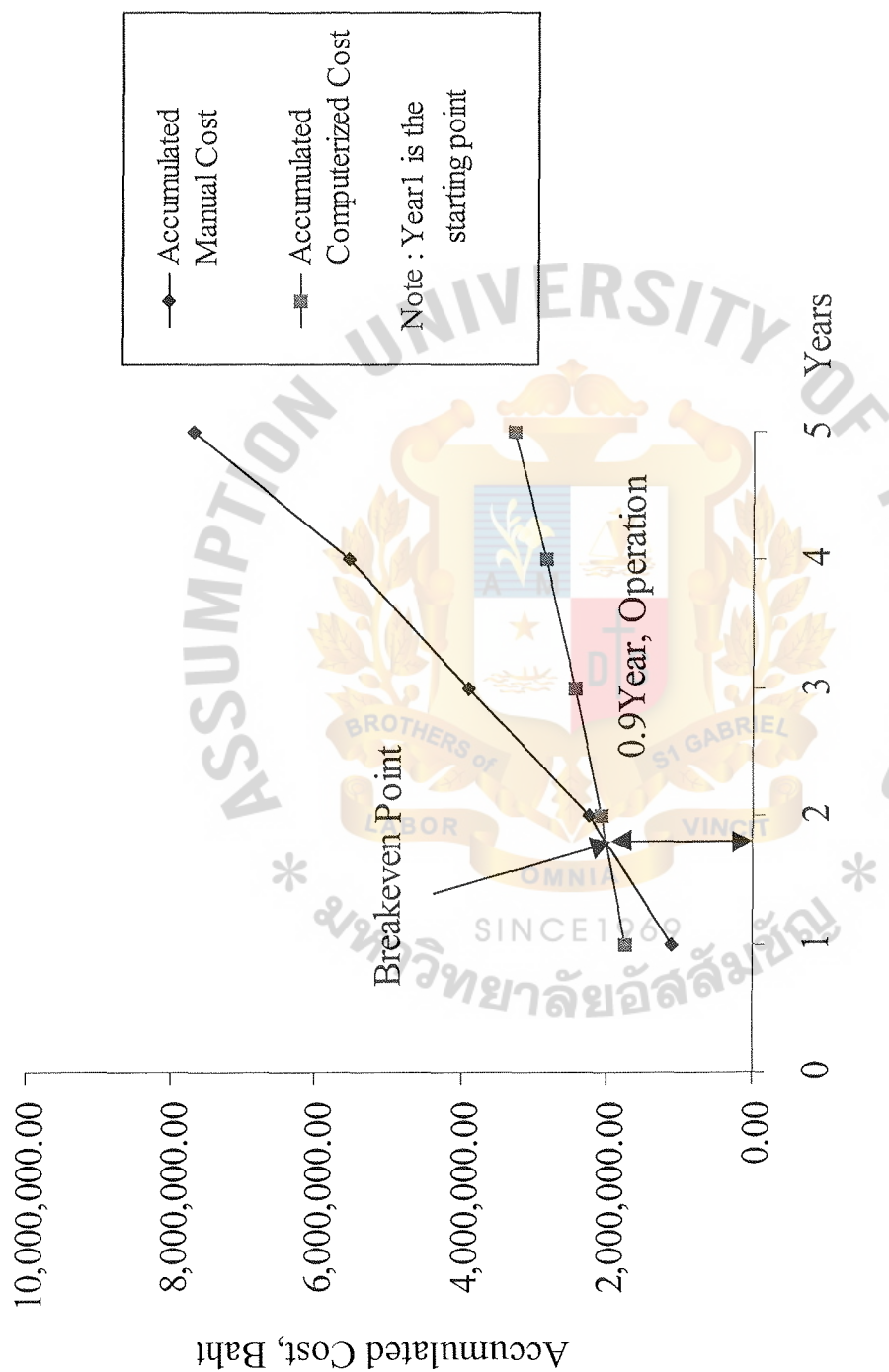
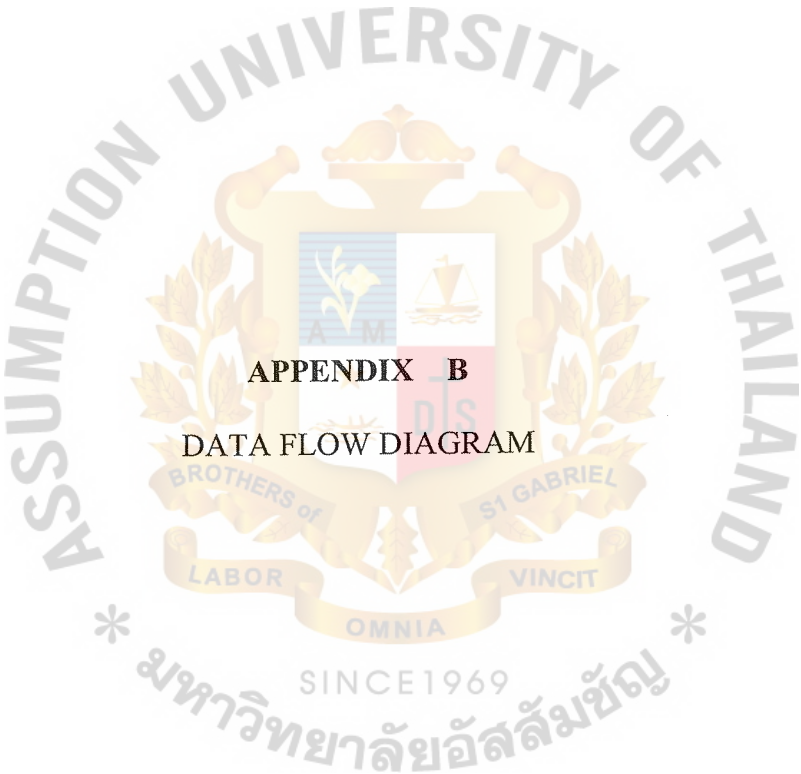


Figure A.6. Cost Comparison between Manual & Proposed System (Candidate 3).



APPENDIX B

DATA FLOW DIAGRAM



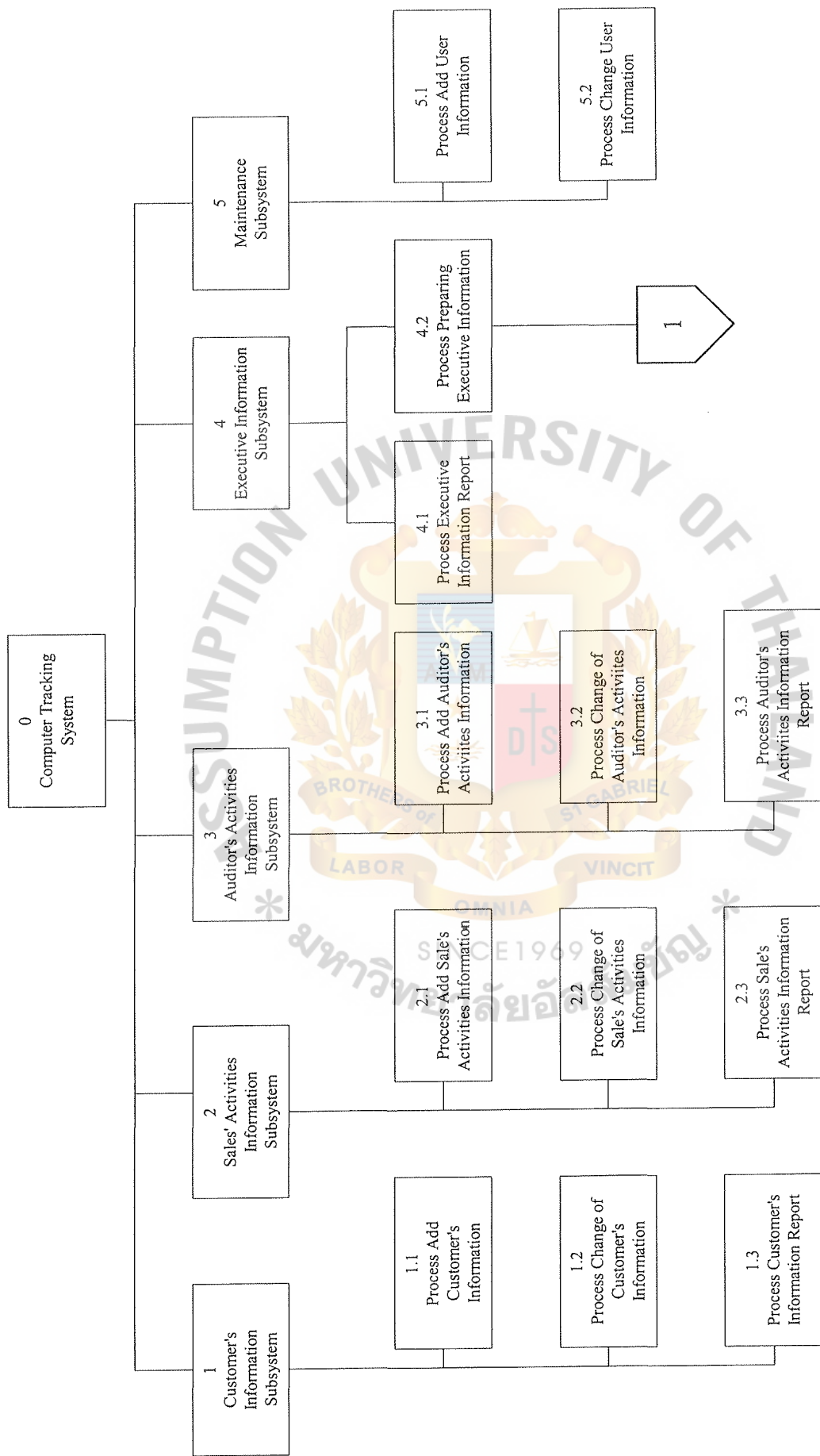


Figure B.1. A Functional Decomposition Diagram.

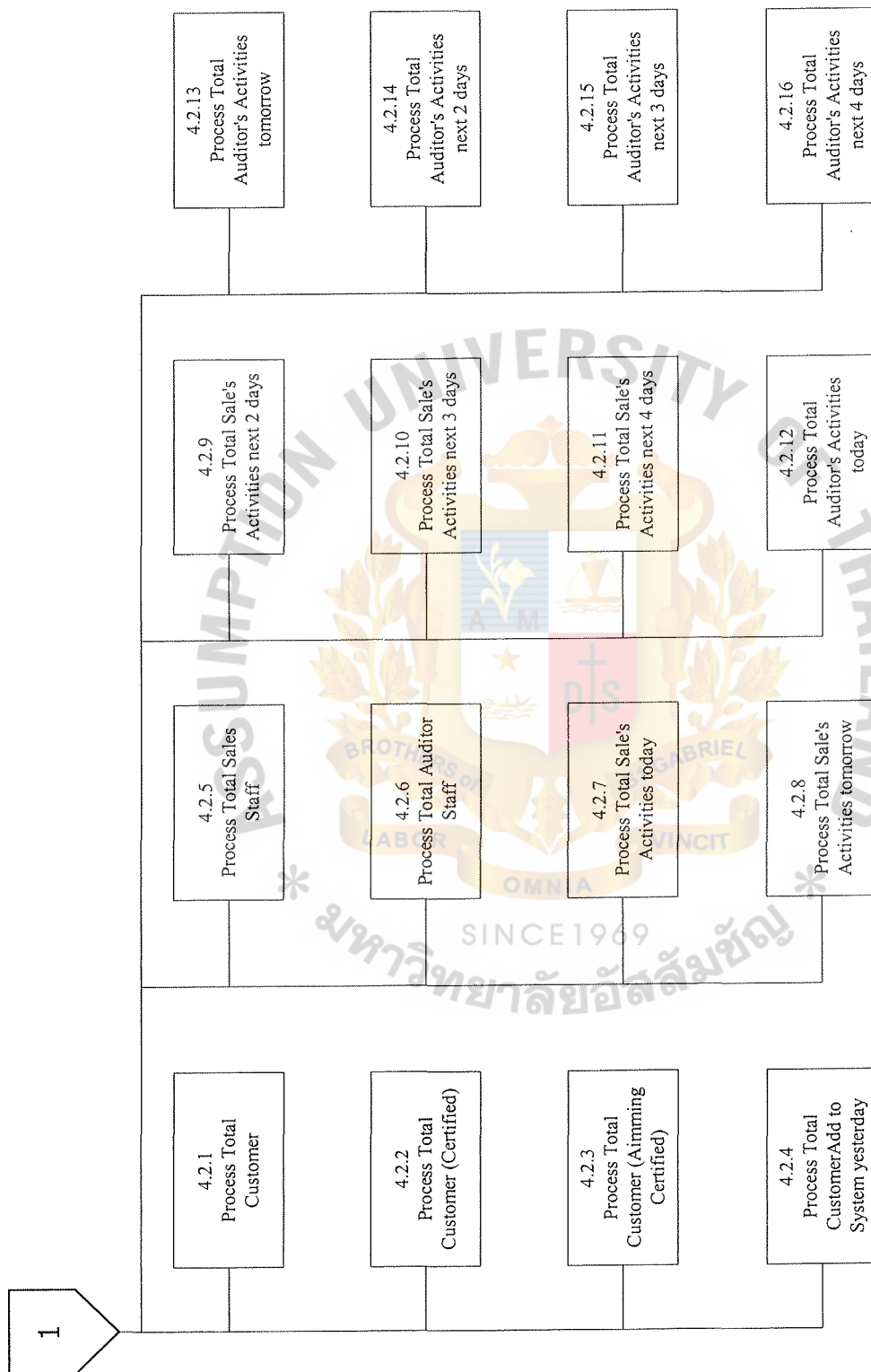


Figure B.2. A Functional Decomposition Diagram (Continued).

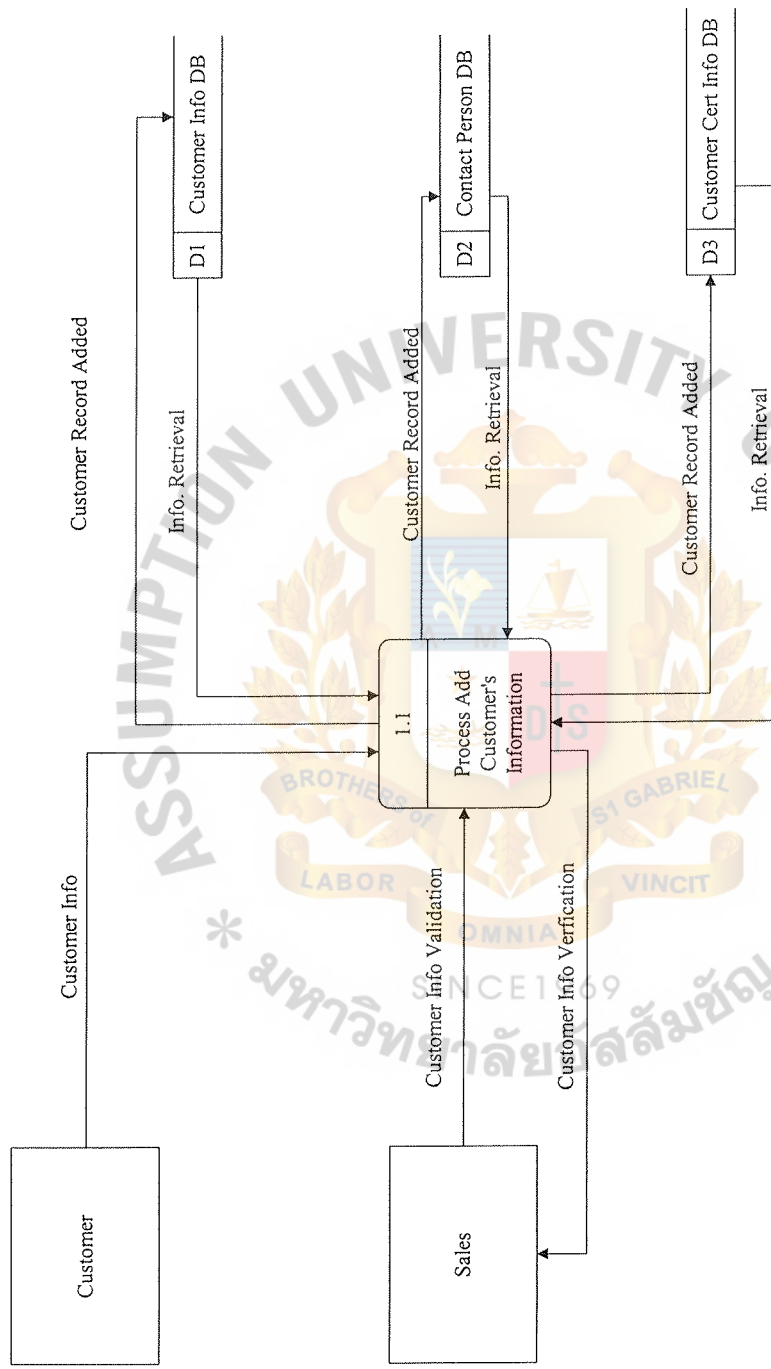


Figure B.3. Logical DFD - Level 1 of Process Add Customer's Information.

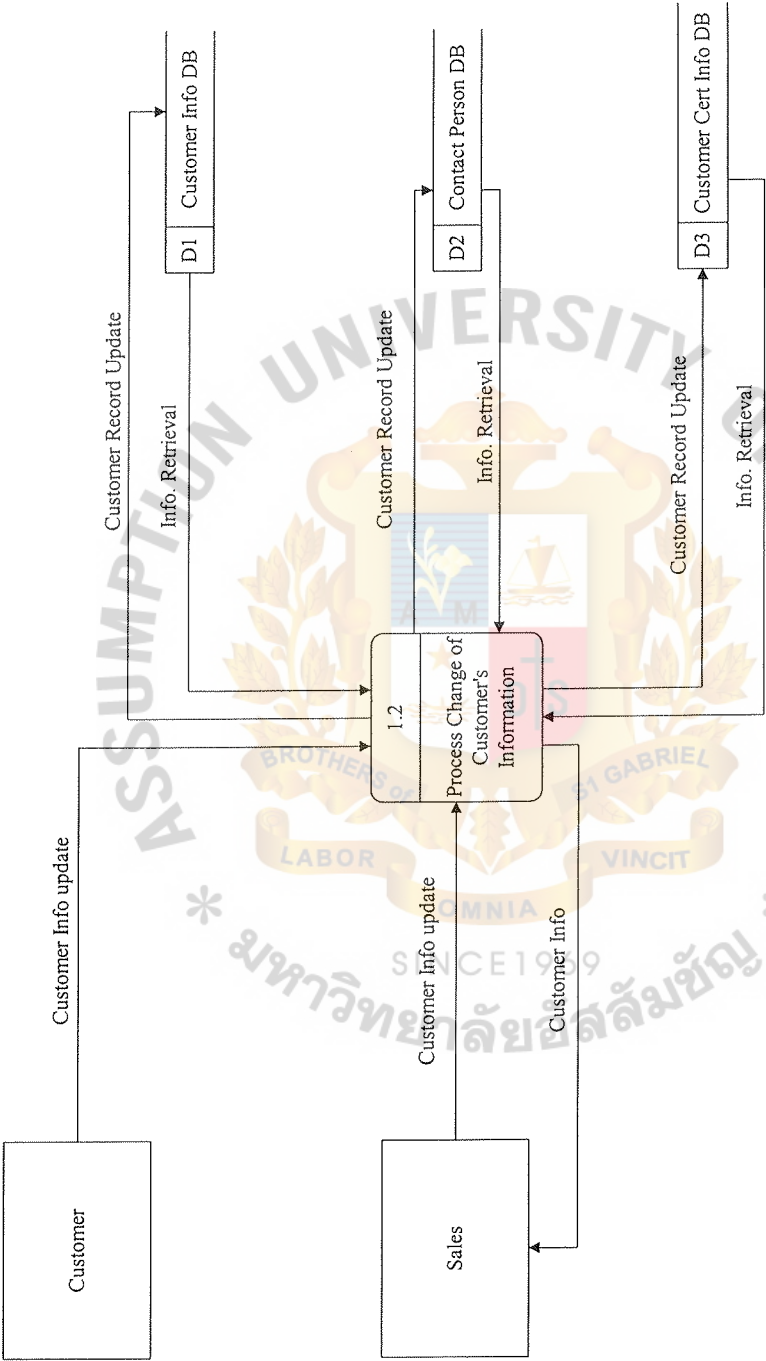


Figure B.4. Logical DFD - Level 1 of Process Change Customer's Information.

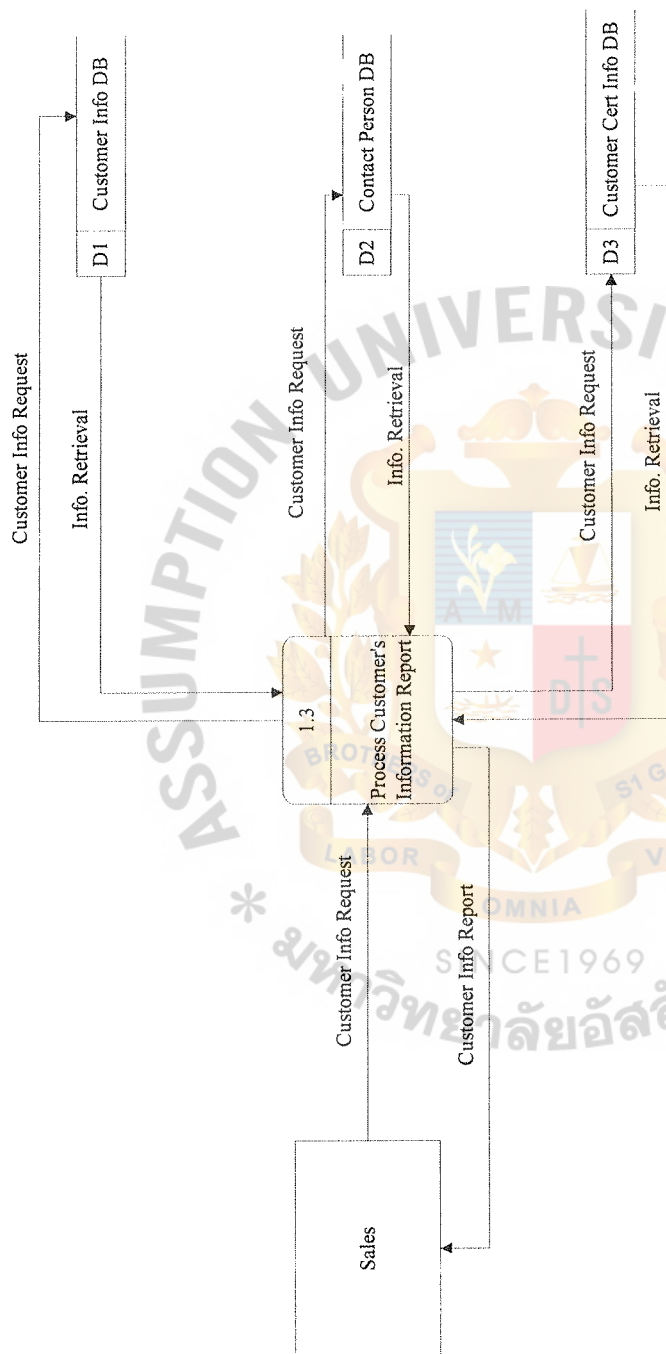


Figure B.5. Logical DFD - Level 1 of Process Customer's Information Report.



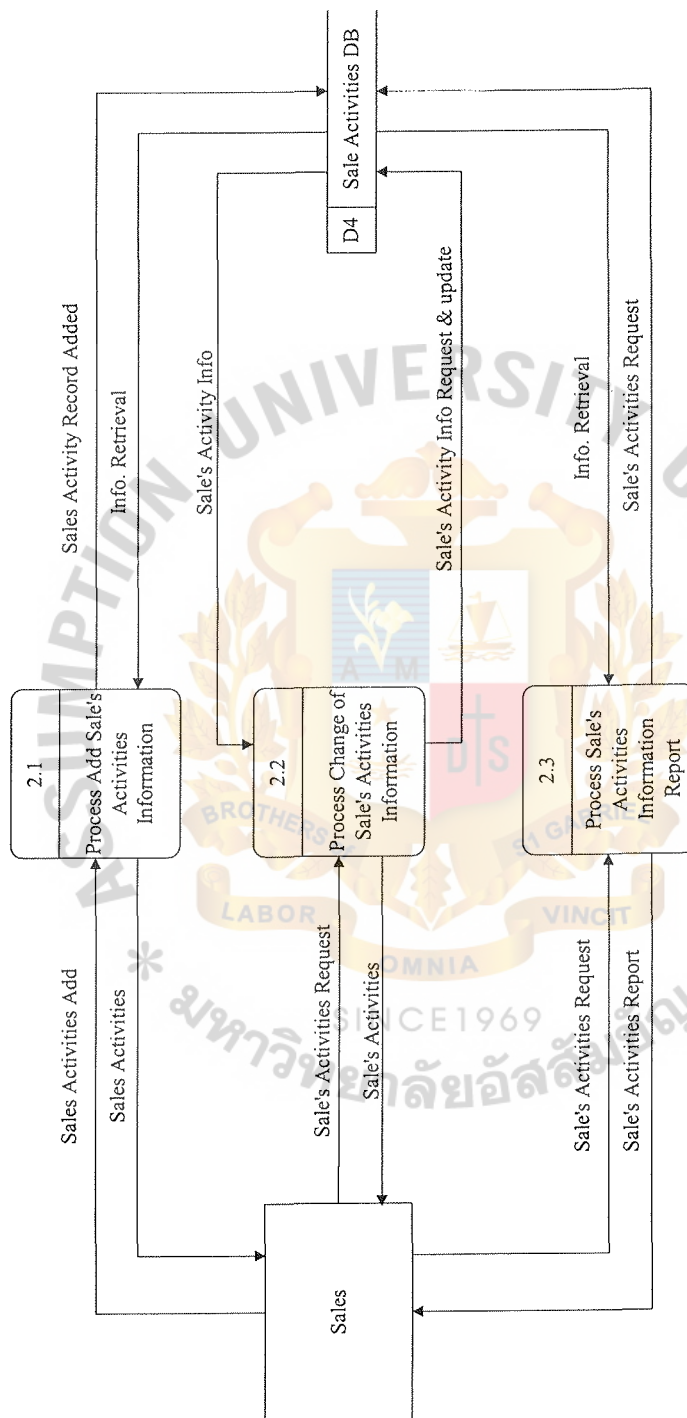


Figure B.6. Logical DFD - Level 1 of Sale's Activities Information Subsystem.

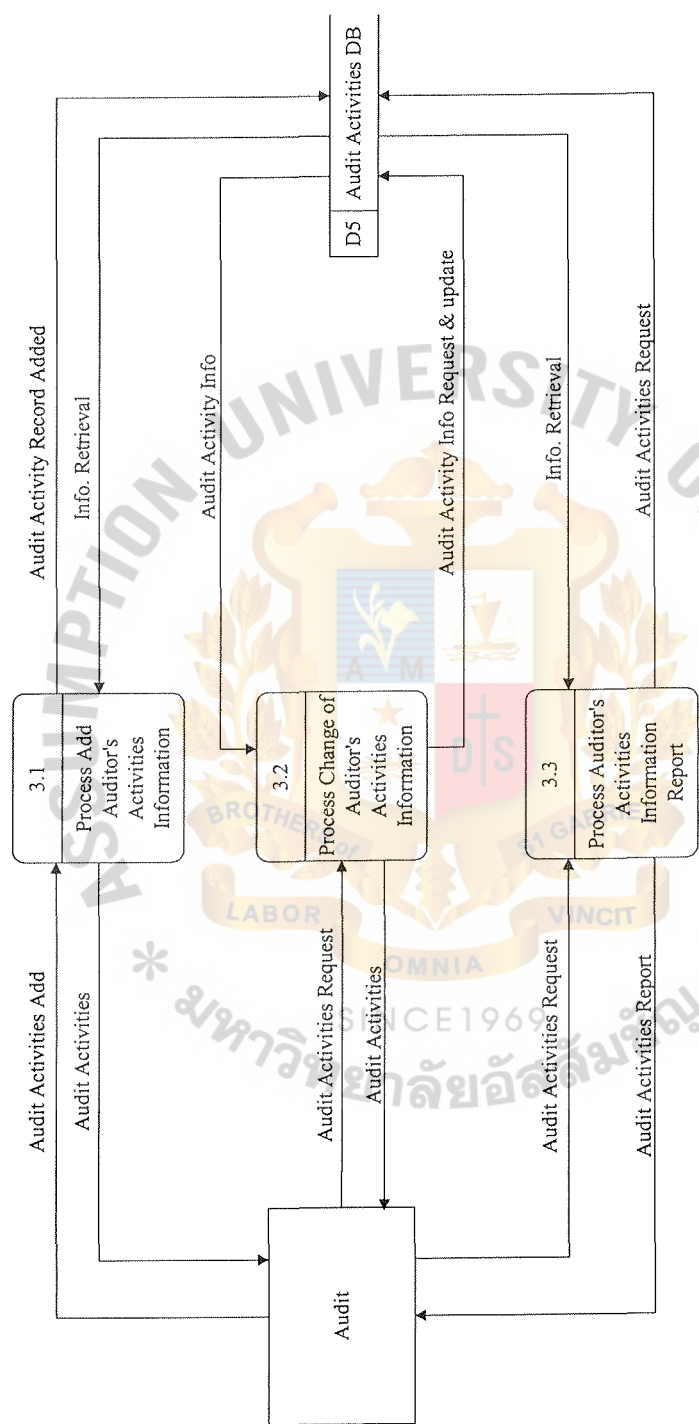


Figure B.7. Logical DFD - Level 1 of Auditor's Activities Information Subsystem.

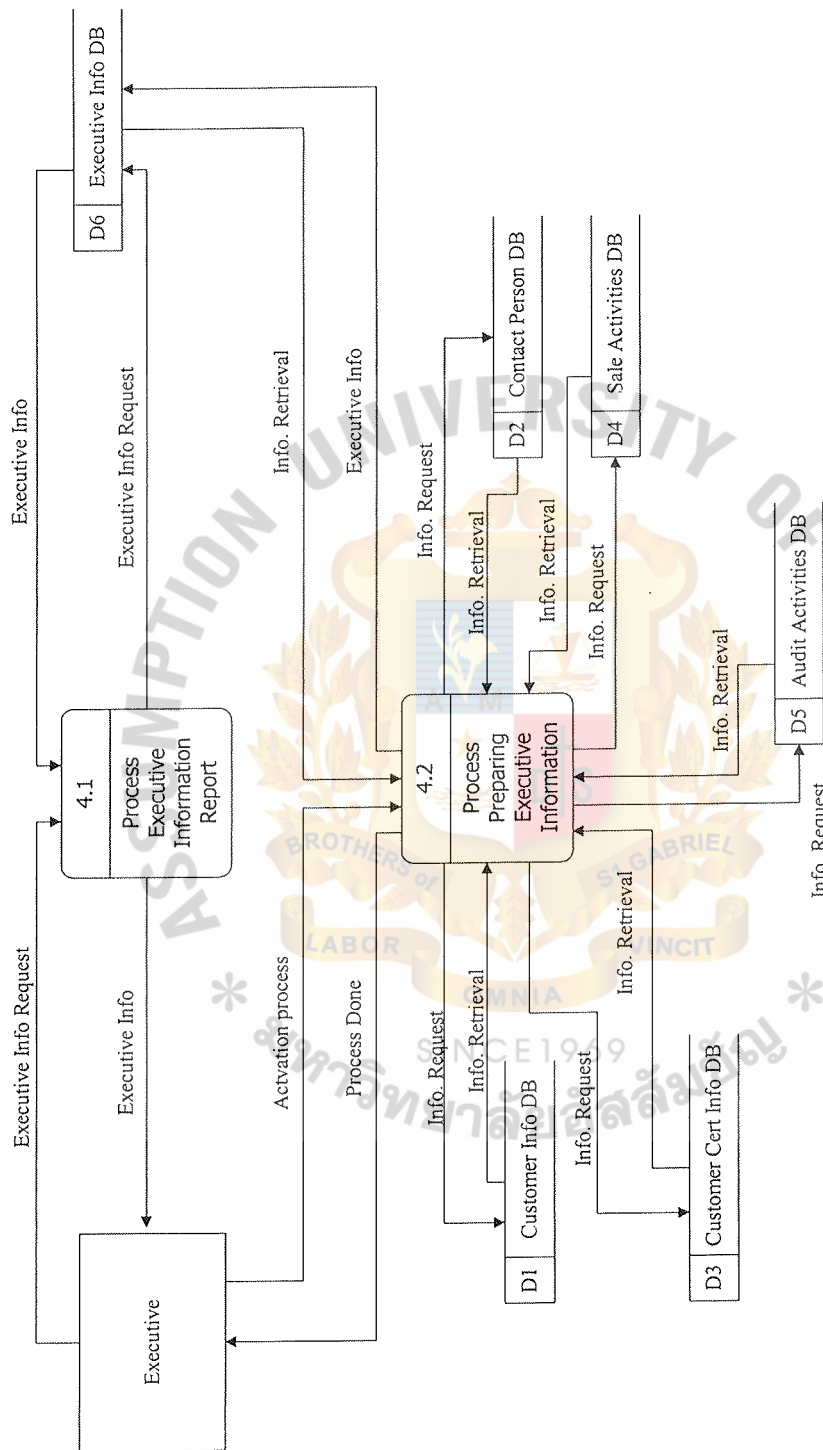


Figure B.8. Logical DFD - Level 1 of Executive Information Subsystem.

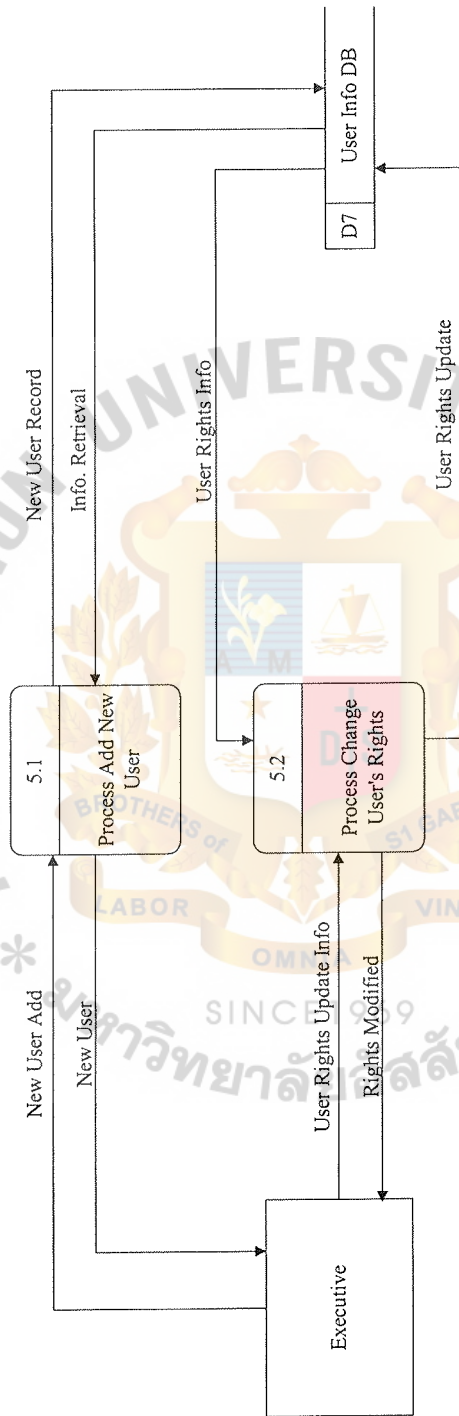


Figure B.9. Logical DFD - Level 1 of Maintenance Subsystem.



## APPENDIX C

### ENTITY RELATIONSHIP



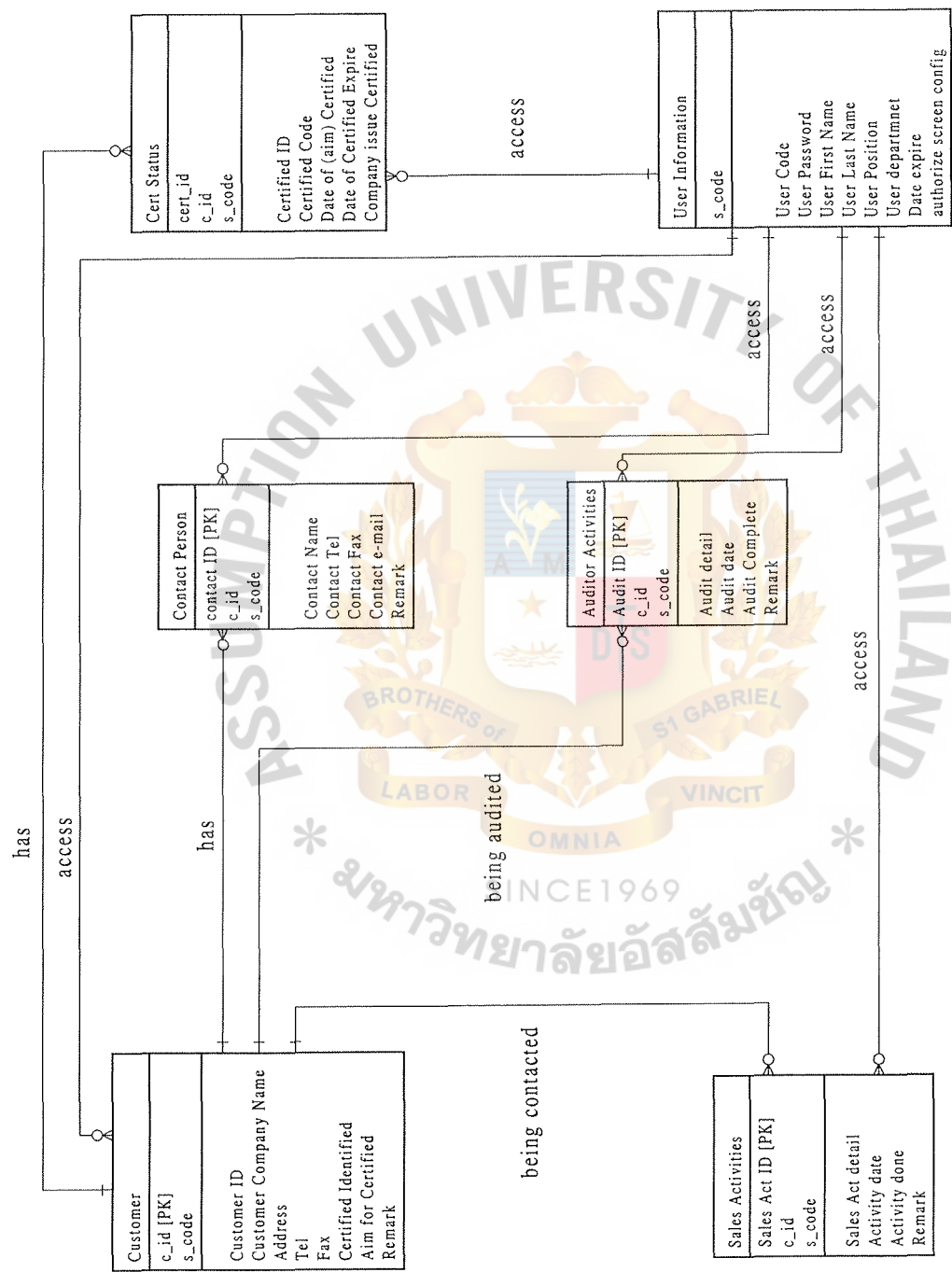
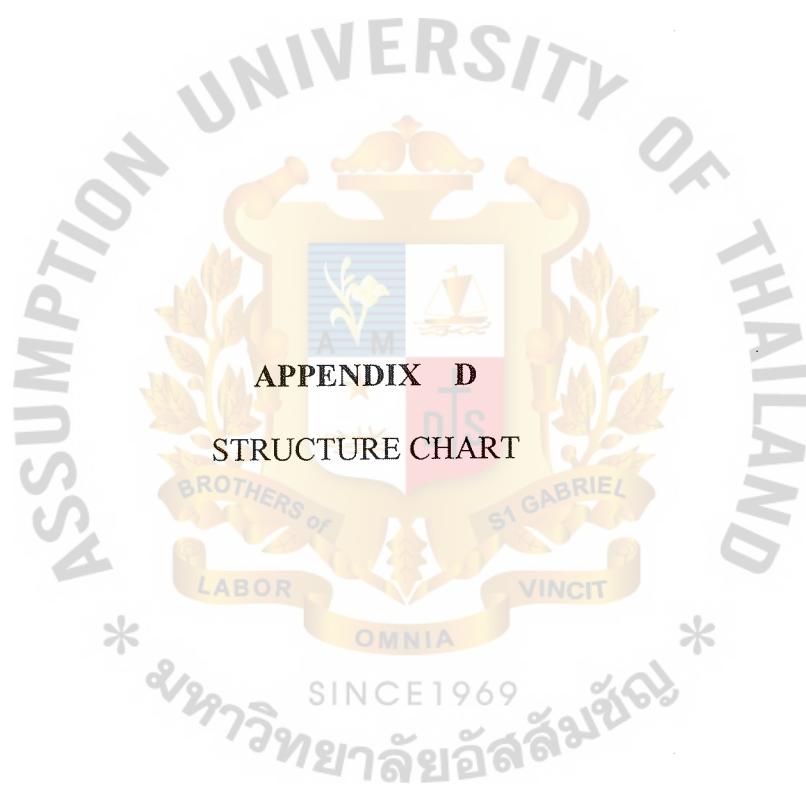


Figure C.1. Entity Relationship Diagram.



**APPENDIX D**  
**STRUCTURE CHART**

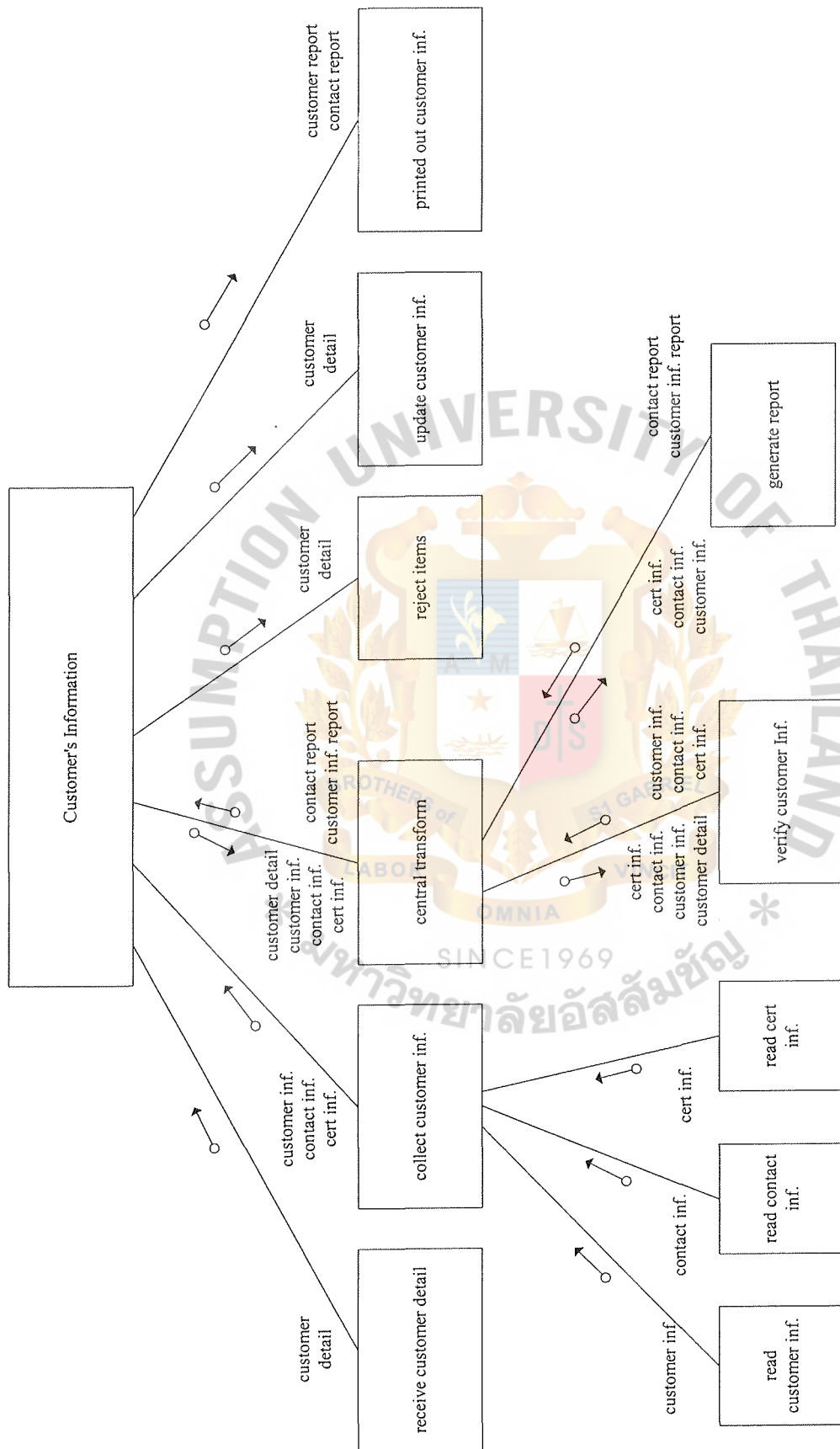


Figure D.1. Structure Chart - Customer's Information Subsystem.

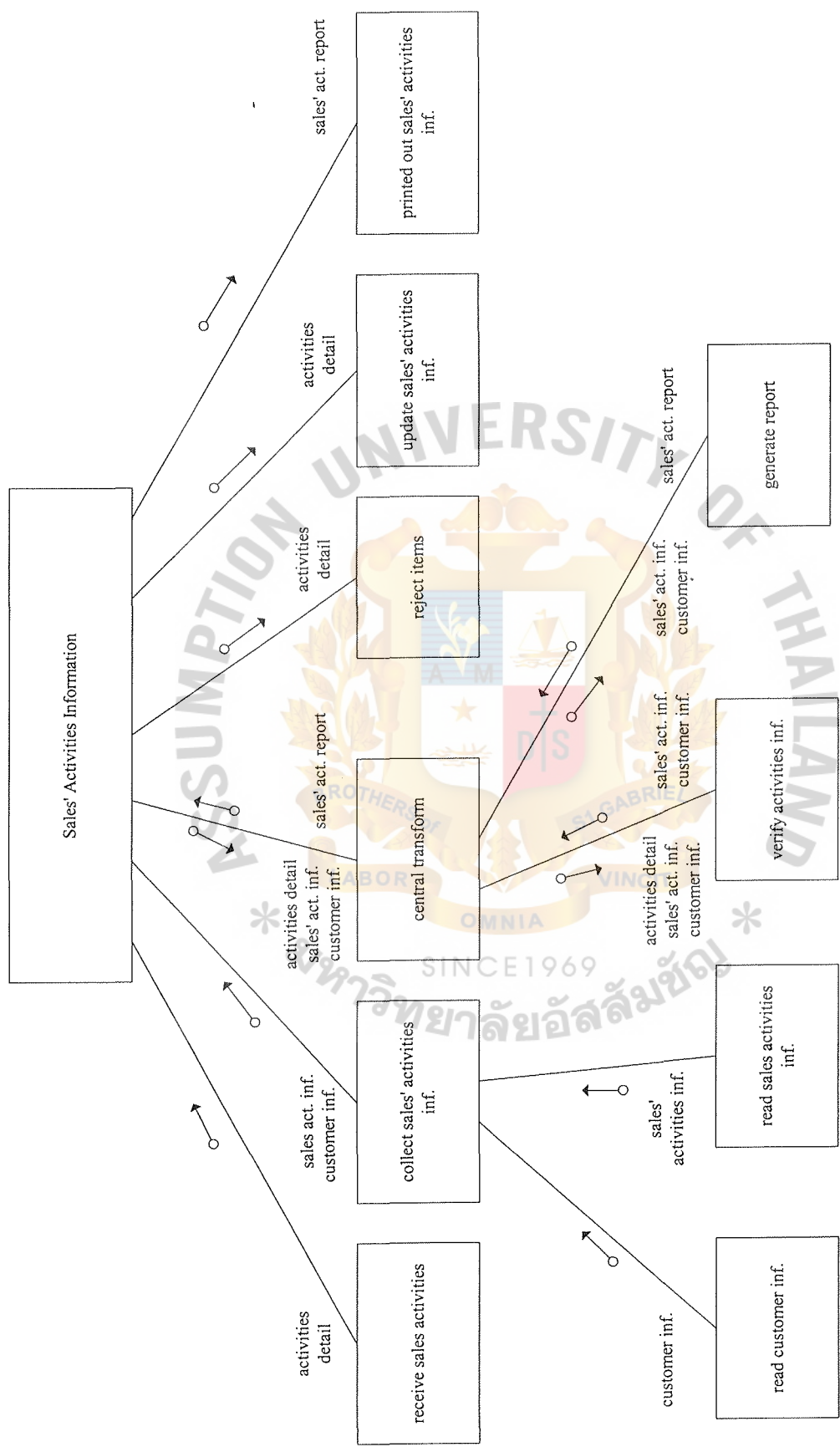


Figure D.2. Structure Chart - Sales' Activities Information Subsystem.

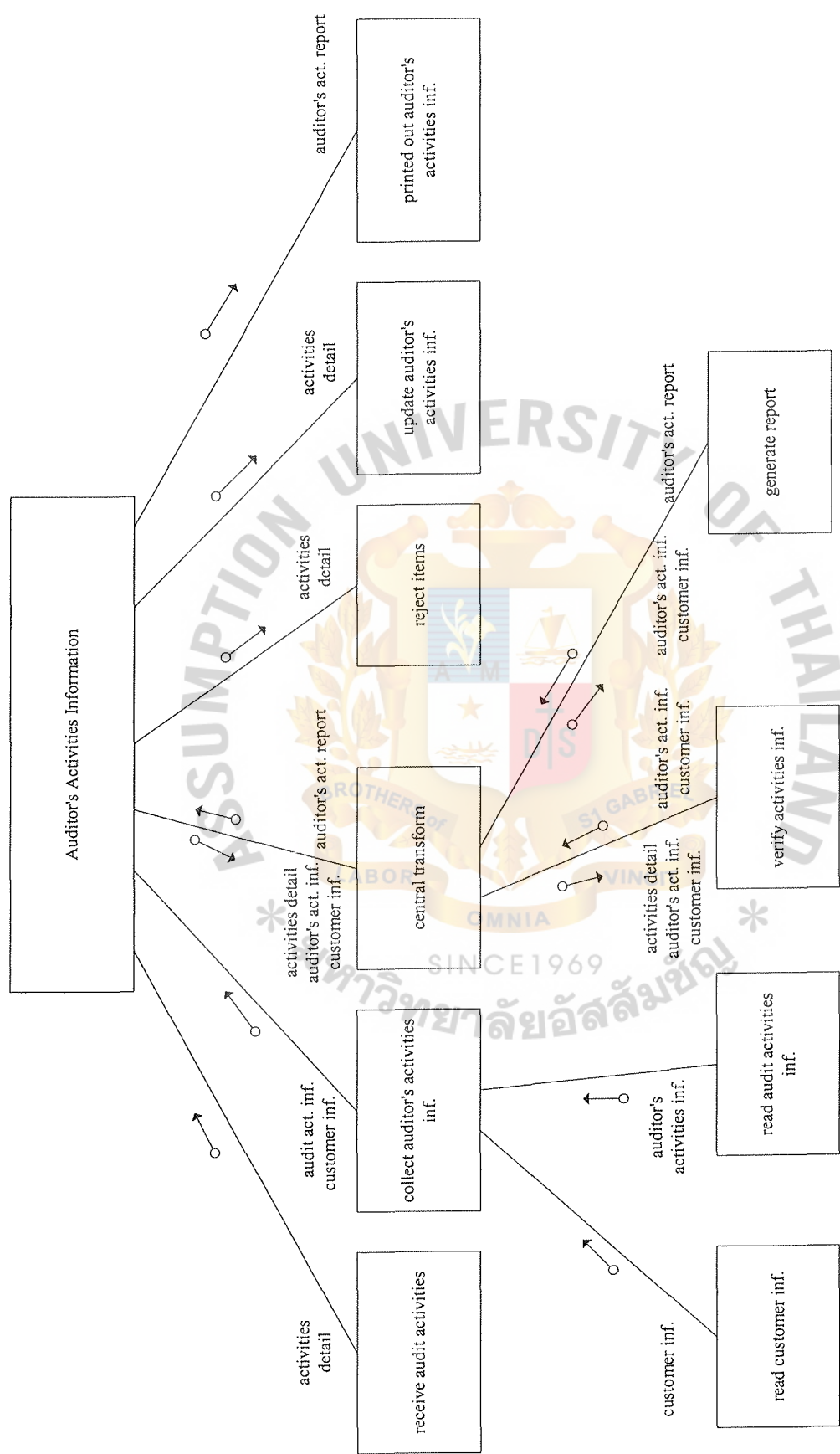


Figure D.3. Structure Chart - Auditor's Activities Information Subsystem.



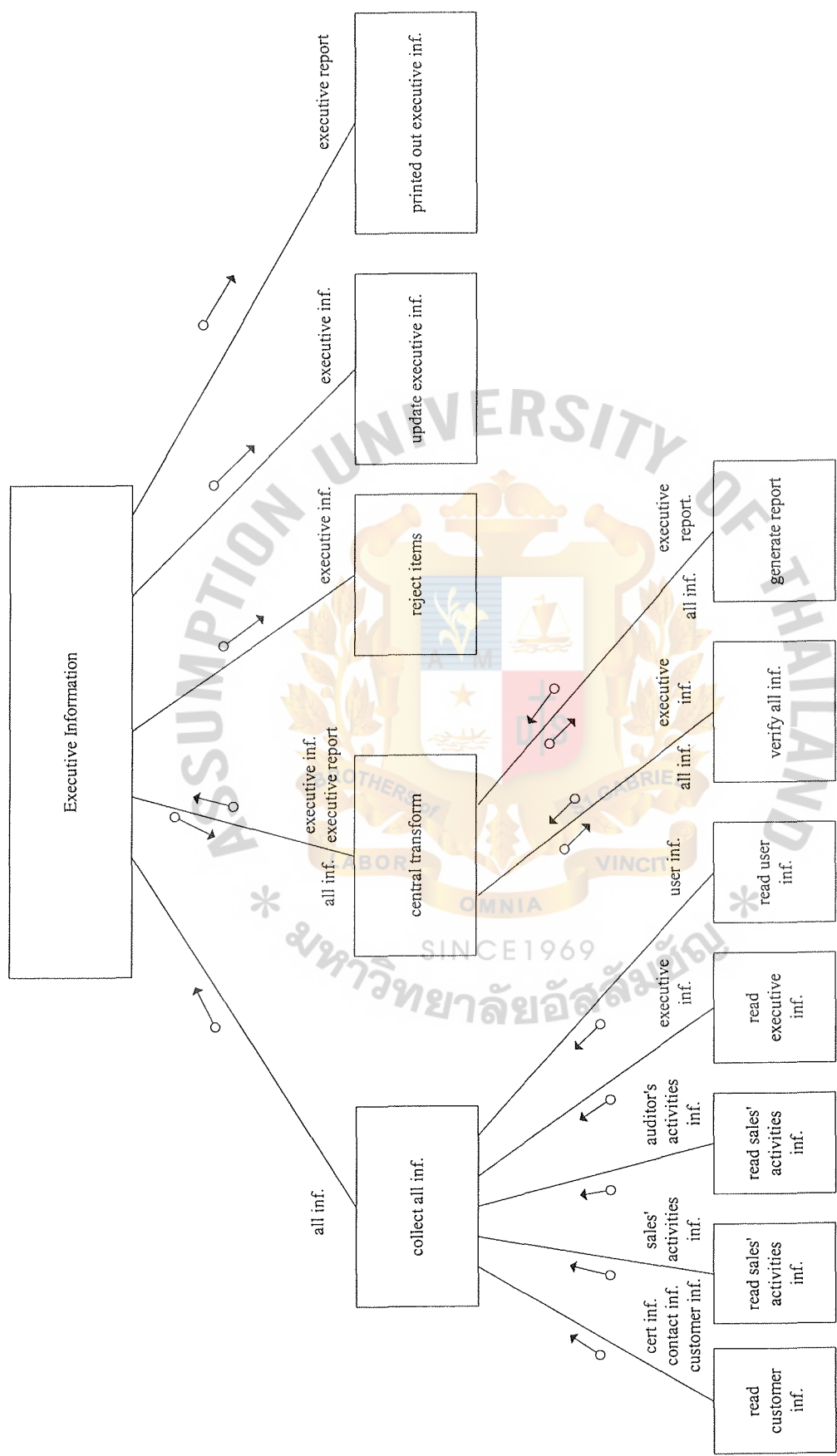


Figure D.4. Structure Chart - Executive Information Subsystem.

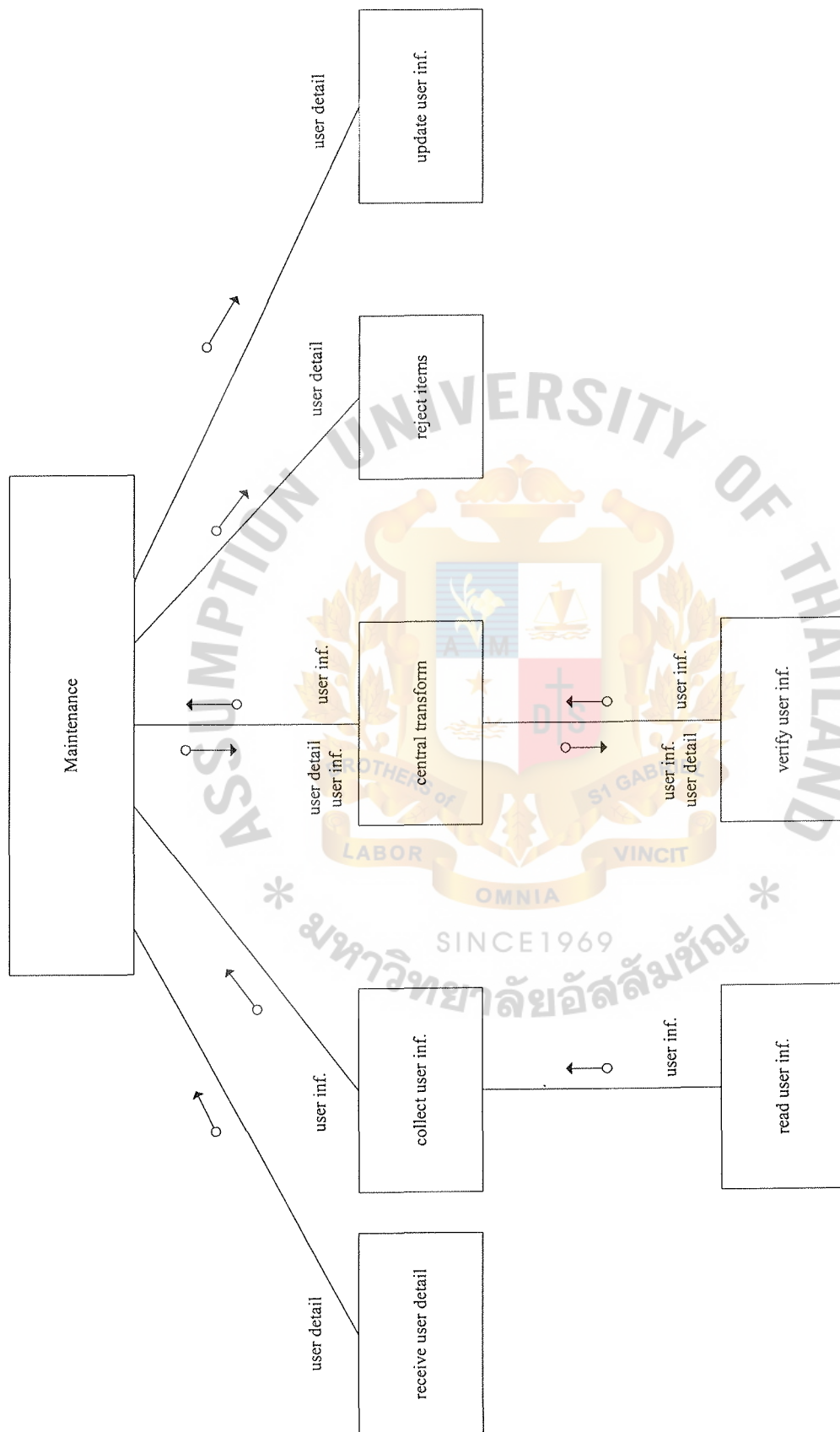


Figure D.5. Structure Chart - Maintenance Subsystem.



## APPENDIX E

### DATA DICTIONARY

DATA DICTIONARY

Description: Customer Information

Table E.1. T\_Customer.

Field Name	Type	Length	Description
C_id	Int	8	Customer ID
C_name	Varchar	30	Costomer Company Name
C_add1	Varchar	30	Address 1
C_add2	Varchar	30	Address 2
C_add3	Varchar	30	Address 3
C_city	Varchar	20	City
C_zip	Varchar	8	Zip
C_state	Varchar	3	State
C_country	Varchar	15	Country
C_tel	Varchar	30	Telephone
C_fax	Varchar	20	Fax
C_certified	Boolean		Already have certified
C_aim_cert	Boolean		Aim for (another) certified
C_Date_entry	Date and time		Date of this entry
C_remark	Varchar	100	Remark (contract no)
S_code	Char	3	User code

Primary key: C\_ID

- Secondary key: 1. C\_name
2. S\_code

Description: Contact Person

Table E.2. Contact.

Field Name	Type	Length	Description
Con_id	Int	10	Contact person's Code
Con_title	Varchar	10	Contact person's Title
Con_fname	Varchar	30	Contact person's First name
Con_lname	Varchar	30	Contact person's Last name
Con_position	Varchar	20	Contact person's Position
Con_email	Varchar	30	Contact person's e-mail
Con_tel	Varchar	30	Contact person's Tel
Con_fax	Varchar	30	Contact person's Fax
Con_mobile	Varchar	20	Contact person's Mobile
Con_other	Varchar	50	Contact person's other Information
Con_remark	Varchar	100	Remark
S_code	Char	3	User code
C_id	Int	8	Customer ID

Primary key: Con\_id

Secondary key:

1. Con\_fname
2. Con\_lname
3. S\_code
4. C\_id



Description: Customer who wants to do certified

Table E.3. aim\_cert.

Name	Type	Length	Description
Cert_id	Int	10	Certified Id reference
Cert_code	Varchar	10	Certified Code
Cert_date	Date and time		Date of aim Cert / get cert
Cert_exp_date	Date and time		Date of Certified expire
Cert_with	Varchar	30	Company that issue certified
Cert_status	Char	1	Certified Status (A=aim, E=expired, C=certified, O=outstanding, P=pending)
Cert_remark	Varchar	100	Remark
S_code	Char	3	Staff code
C_id	Int	10	Customer ID

Primary key: Cert\_id

Secondary key: 1. \* Cert\_code

2. Cert\_date

3. Cert\_status

4. S\_code

5. C\_id

Description: Sales Activities

Table E.4. saction.

Field Name	Type	Length	Description
Sa_id	Varchar	10	User activity number
Sa_date	Date and time		Date (to) do sale activity
Sa_detail	Varchar	100	Detail of sale activity
Sa_finish	Boolean		Job done
Sa_date_finish	Date and time		Date Job done
S_code	Char	3	User Code
S_remark	Varchar	100	Remark
C_id	Int	8	Customer ID

Primary key: Sa\_id

- Secondary key:
1. S\_Code
  2. Sa\_date
  3. \* Sa\_date\_entry
  4. C\_id

Description: Auditor Activities

Table E.5. aaction.

Field Name	Type	Length	Description
Aa_id	Varchar	10	User activity number
Aa_date	Date and time		Date (to) do audit activity
Aa_detail	Varchar	100	Detail of audit activity
Aa_finish	Boolean		Job done
Aa_date_finish	Date and time		Date Job done
Aa_remark	Varchar	100	Remark
S_code	Char	3	User Code
C_id	Int	8	Customer ID

Primary key: aa\_id

- Secondary key:
1. S\_Code
  2. aa\_date
  3. aa\_date\_entry
  4. C\_id

Description: User Information

Table E.6. Systeminfo.

Field Name	Type	Length	Description
S_code	Char	3	User Code
S_password	Char	8	User Password
S_title	Varchar	10	User Title
S_fname	Varchar	20	User First Name
S_lname	Varchar	20	User Last Name
S_position	Varchar	25	User Position
S_department	Char	1	Code for department A=Auditor, S=Sales & Marketing, E=Executive, O=other
S_date_exp	Date and time		Last date that user can use system
S_cscreen	Boolean		User allowed to view Customer information from Customer Menu
S_sscreen	Boolean		User allowed to view Sales activities information from Sale & Marketing Menu
S_ascreen	Boolean		User allowed to view Auditor activities information from Auditor Menu
S_escreen	Boolean		User allowed to access to Executive Menu
S_mscreen	Boolean		User allowed to access to maintenance Menu

Primary key: S\_Code

Secondary key: 1. S\_fname

Description: Executive Information

Table E.7. executiveinfo.

Name	Type	Length	Description
Date_info	Date and time		Date of information
N_cus	Varchar	6	Number of customer in system
N_cus_certed	Varchar	6	Number of certified customer in system
N_cus_aim_cert	Varchar	6	Number of aimed certified customer in system
N_cus_add	Varchar	3	Number of customer added in system yesterday
N_sales	Varchar	2	Number of sales in system
N_auditors	Varchar	2	Number of auditors in system
N_sact_today	Varchar	3	Number of sales activities today
N_sact_n1	Varchar	3	Number of sales activities Next 1 days
N_sact_n2	Varchar	3	Number of sales activities Next 2 days
N_sact_n3	Varchar	3	Number of sales activities Next 3 days
N_sact_n4	Varchar	3	Number of sales activities Next 4 days
N_aact_today	Varchar	3	Number of auditor activities today
N_aact_n1	Varchar	3	Number of auditor activities Next 1 days
N_aact_n2	Varchar	3	Number of auditor activities Next 2 days
N_aact_n3	Varchar	3	Number of auditor activities Next 3 days
N_aact_n4	Varchar	3	Number of auditor activities Next 4 days

Primary key: Date\_info



Type of Data	Base Datatype	Synonyms	Range/Domain	Storage Size
Integer	<i>int</i>	<i>integer</i>	Whole numbers from -2,147,483,648 to 2,147,483,647	4 bytes
	<i>smallint</i>		Whole numbers from -32,768 to 32,767	2 bytes
	<i>tinyint</i>		Whole numbers from 0 to 255	1 byte
	<i>bit</i>		0 or 1	Bit datatypes share a byte with other bit columns of the same table. Hence, 8-bit columns of the same table use 1 byte of storage. If the table has only 1-bit columns, it still uses 1 byte, although 7 more such columns could be added "for free."
Packed decimal (exact numeric)	<i>decimal (p,s)</i>	<i>dec</i> <i>numeric</i>	Whole or fractional numbers from $-10^{38}$ to $10^{38}$	2- 7 bytes, depending on specified precision, <i>p</i> , which can range to 38 digits. On average, 1 byte of storage is required per every 2 digits of precision.
Floating point (approx numeric)	<i>float</i> (15-digit precision)	<i>float(n)</i> , where <i>n</i> is between 8 and 15 Double precision	Approximations of numbers from $-1.79E^{308}$ to $1.79E^{308}$ Positive range: $2.23E^{-308}$ to $1.79E^{308}$ Negative range: $-2.23E^{-308}$ to $-1.79E^{308}$	8 bytes
	<i>real</i> (7-digit precision)	<i>float(n)</i> , where <i>n</i> is between 1 and 7	Approximations of numbers from $-3.40E^{38}$ to $3.40E^{38}$ Positive range: $1.18E^{-38}$ to $3.40E^{38}$ Negative range: $-1.18E^{-38}$ to $-3.40E^{38}$	4 bytes
Character (fixed length)	<i>char(n)</i>	<i>character (n)</i> <i>character</i> <i>character</i> without a specific size is synonymous to a 1-character field, <i>char(1)</i>	Up to 8000 characters, as designated by <i>n</i> , of the installed character set	1 byte per character <i>n</i> declared, even if partially unused.
Character (variable length)	<i>varchar(n)</i>	<i>character varying (n)</i> , <i>char varying (n)</i>	Up to 8000 characters, as designated by <i>n</i> , of the installed character set	1 byte per character stored. Declared but unused characters do not consume storage.
Unicode character strings	<i>nchar(n)</i>	<i>national character (n)</i> , <i>national char(n)</i>	Up to 4000 characters	2 bytes per character declared.
	<i>nvarchar(n)</i>	<i>national character varying (n)</i> , <i>national char varying (n)</i>	Up to 4000 characters	2 bytes per character declared. Declared but <i>unused</i> do not use storage.
	<i>ntext</i>	<i>national text</i>	Up to $2^{30}-1$ (1,073,741,823) characters	See text for description.

Figure E.1. Datatype for SQL Server.



Type of Data	Base Datatype	Synonyms	Range/Domain	Storage Size
Monetary	<i>money</i>		Numbers with accuracy to one ten-thousandth of a unit (four decimal places), typically used to store currency values. From -922,337,203,685,477,5808 to 922,337,203,685,477,5807	8 bytes
	<i>smallmoney</i>		Numbers with accuracy to one ten-thousandth of a unit (four decimal places), typically used to store currency values. From -214,748,3648 to 214,748,3647	4 bytes
Date and Time	<i>datetime</i>		Combined date and time representation. (SQL Server does not have separate DATE and TIME datatypes.) Date part: 01-JAN-1753 to 31-DEC-9999  Time part: Number of milliseconds since midnight of the given date	8 bytes
	<i>smalldatetime</i>		Combined date and time representation. Date part: 01-JAN-1900 to 06-JUN-2079  Time part: Number of minutes since midnight of the given date	4 bytes
Binary (fixed length)	<i>binary(n)</i>		Any binary representation (bit patterns) up to 255 bytes	<i>n</i> bytes, even if <i>n</i> is partially unused
Binary (variable length)	<i>varbinary(n)</i>	<i>binary varying</i>	Any binary representation (bit patterns) up to 255 bytes	The number of bytes actually stored. No storage for space declared but not used.
Long text/BLOB	<i>text and image</i>		Text: Character data up to $2^{31}-1$ (2,147,483,647) characters.  Image: Binary data up to $2^{31}-1$ (2,147,483,647) characters. The text and image datatypes are always variable length.	If not null, a 16-byte pointer is used on the data page, plus however many 8-KB pages are required to store the actual length. Text and image pages can be shared with other text and image data from the same table.
Numerics	<i>cursor</i>		A reference to a cursor, can be used for variables only, not table definitions.	
	<i>timestamp</i>		A database-wide unique number.	8 bytes
	<i>uniqueidentifier</i>		A globally unique identifier.	16 bytes

Figure E.2. Datatype for SQL Server (Continued).



## APPENDIX F

### USER INTERFACE DESIGN

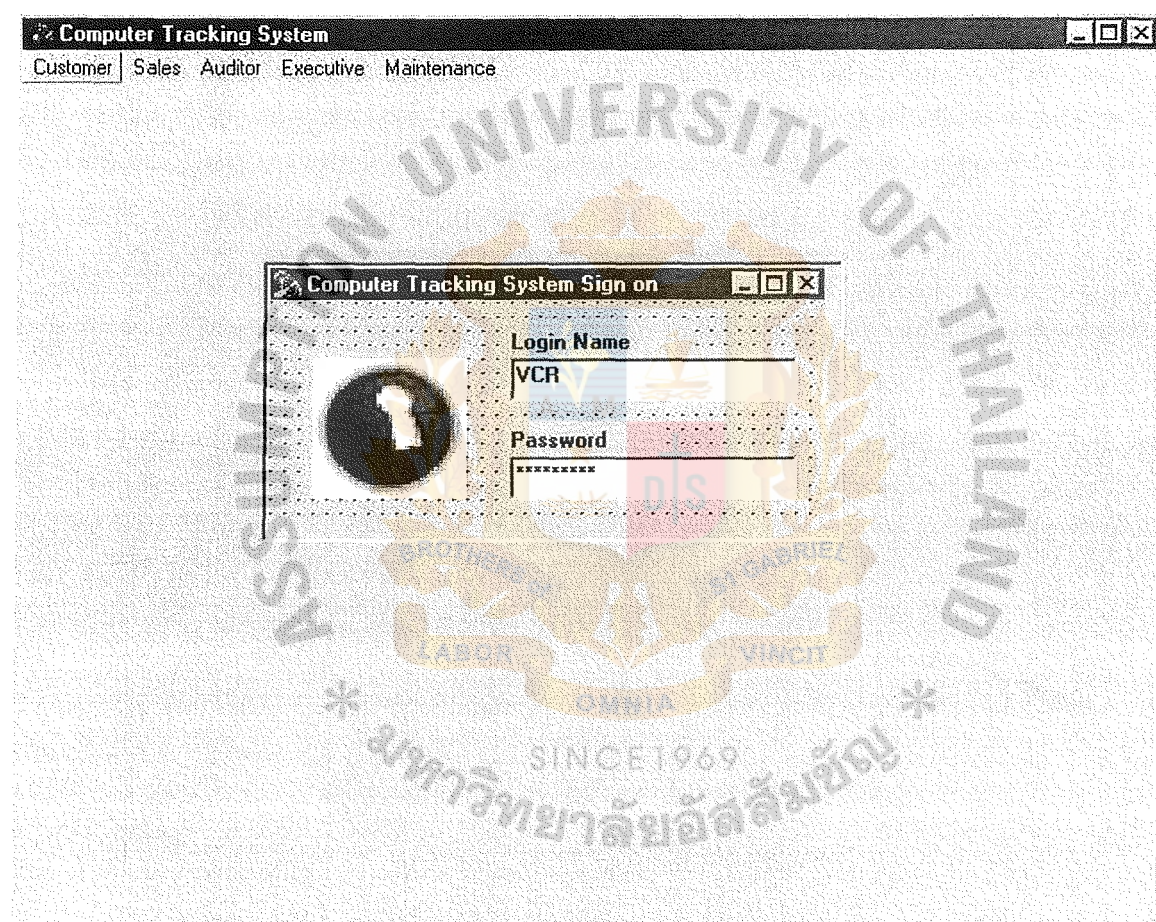


Figure F.1. Computer Tracking System Sign on Screen.



**Computer Tracking System : Customer Information**

Customer Sales Auditor Executive Maintenance

Customer Information Previous / Outstand Certified Contact Person

Customer ID: 1 Company Name: A.B.C. International Co., Ltd

Address: 1/2 Sukhumvit Soi 1  
Sukhumvit Road

City: Bangkok ZIP: 10110 State:

Country: Thailand First Contact (Date): 1/1/00

Tel: 253-1234 Fax: 253-1235

Remark: Selling Bag

☒ Obtain Certified ☒ Aiming certified

Certified Information (Quick View only)

ISO Code	Certified Status
9001:2000	Aiming
9002	Certified

Contact Person (Quick View only)

Title	First Name	Last Name	Position
Mr.	Somchai	Chaiyo	Managing Director
Ms.	Somsri	SriSuk	Secretary to Managing Director

OK Exit

Figure F.2. Customer Input Information Screen.

**Computer Tracking System : Customer Information**

Customer Sales Auditor Executive Maintenance

Customer Information Previous / Outstand Certified Contact Person

ISO Code A.B.C. International Co., Ltd  
9002

ISO Description  
Quality system model for quality assurance in prod

Certified Status Certified Since (date) Aiming Certified (Date)  
Certified 1/1/00 ☒ Obtain this Certified

ISO Code	ISO Description	Certified Status	Certified Since	Aiming Certified	Obtain this Certified
9001:2000	Quality system model for quality assurance	Aiming	01/09/01	False	
9002	Quality system model for quality assurance	Certified	1/1/00	True	

Navigation buttons: Back, Forward, Home, Search, Print, etc.

OK Exit

Figure F.3. Customer’s Certified Input Information Screen.

**Computer Tracking System : Customer Information**

Customer Sales Auditor Executive Maintenance

Customer Information | Previous / Outstand Certified | **Contact Person**

A.B.C. International Co., Ltd

Title	First Name	Last Name
Mr.	Somchai	Chaiyo
Position		
Managing Director		
e-mail address		Tel
somchai@abc.co.th		253-1230
Mobile		Fax
		253-1231

	Title	First Name	Last Name	Position
▶	Mr.	Somchai	Chaiyo	Managing Director
▶	Ms.	Somsri	SriSuk	Secretary to Managing Director

\* มหาวิทยาลัยอัสสัมชัญ \*  
SINCE 1969

Navigation: ◀ ◻ ▶ ▶ ▶ + - ▲ ↶ ✕ ↷

OK Exit

Figure F.4. Contact Person Input Information Screen.



**Computer Tracking System**

Customer Sales Auditor Executive Maintenance

## Sales Schedule

Date: 1/6/01      A.B.C. International Co., Ltd

Task Information: Visit customer site and discuss the audit date

Completed Date: 1/6/01      Remark:

☒ Completed

Staff Code: VCR

OK

Date	Task Information	Completed Date	Completed	Staff Code
1/6/01	Visit customer site and discuss the audit date	1/6/01	True	VCR

Figure F.5. Sales' Activities Input Information Screen.

**Computer Tracking System**

Customer Sales Auditor Executive Maintenance

## Audit Schedule

Date  
1/6/01

Task Detail  
Visit Customer site for get manufacturing information

Completed Date  
1/6/01

Remark

☒ Completed

Staff Code  
VCR

OK

Date	Task Detail	Completed	Completed Date	Staff Code
* 1/6/01	Visit Customer site for get manufacturing information		1/6/01	VCR

Figure F.6. Auditor's Activities Input Information Screen.

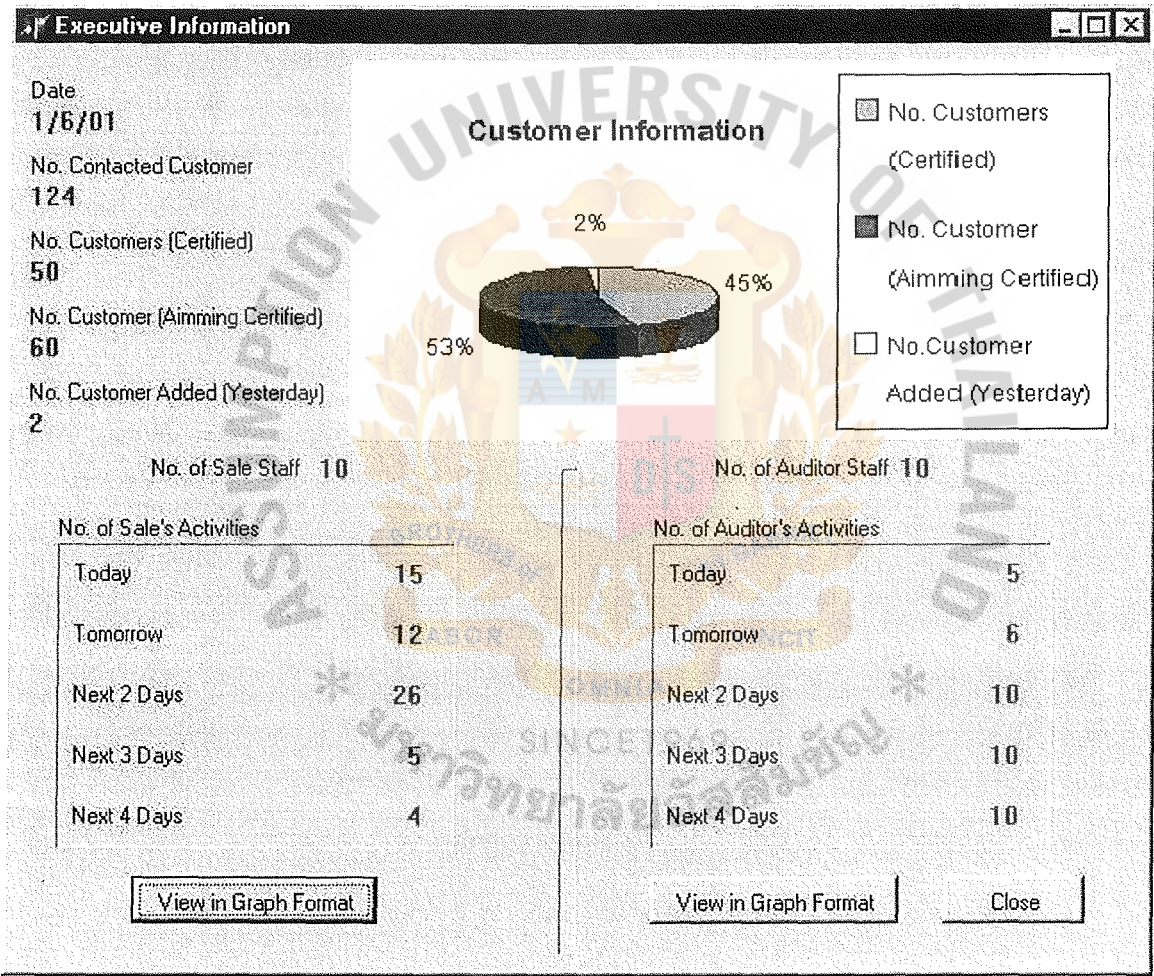


Figure F.7. Executive Information Screen 1.



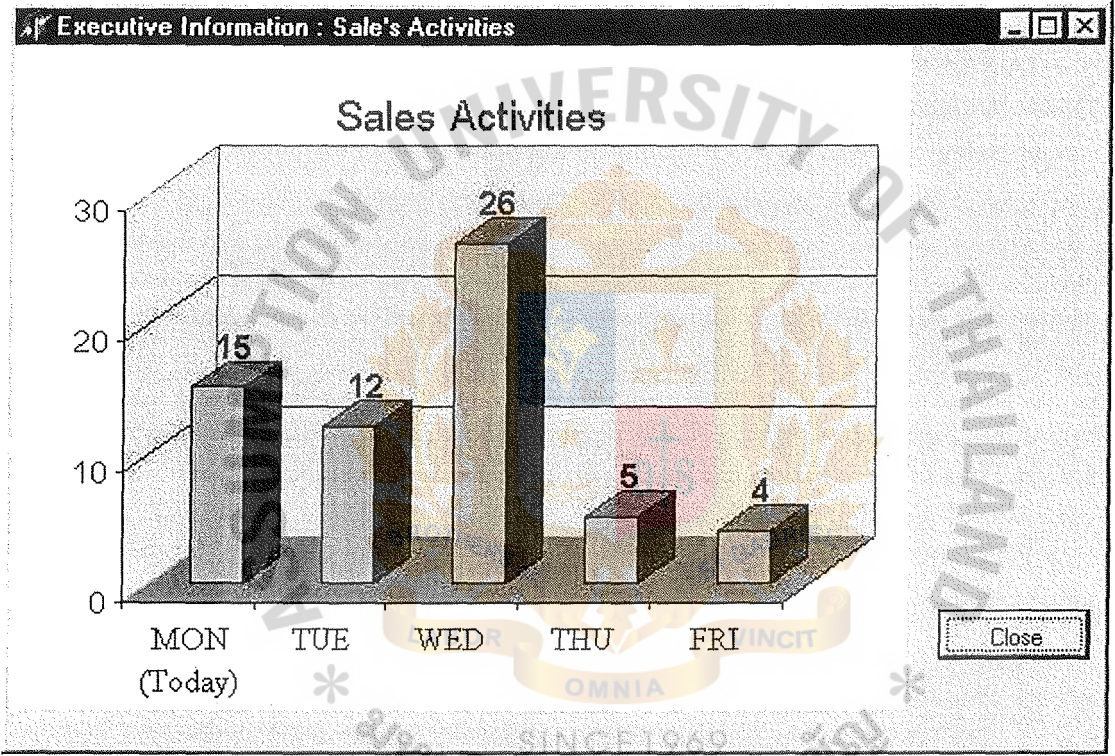


Figure F.8. Sales' Activities Information in Graph Format.

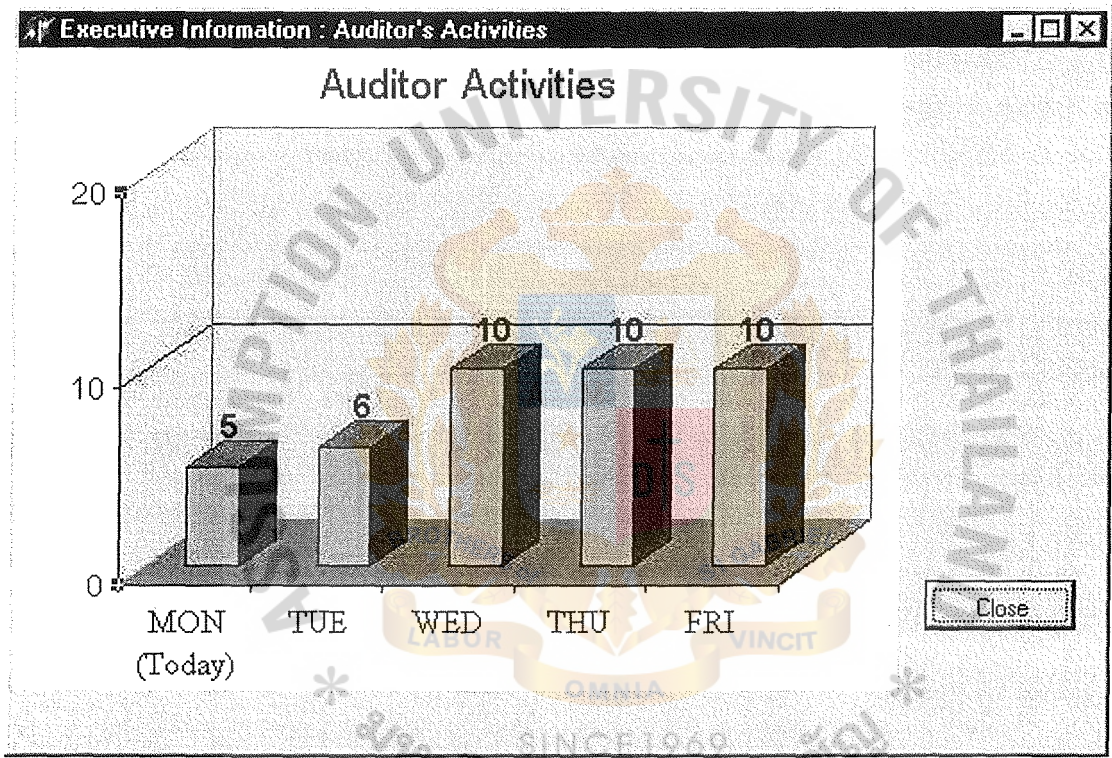


Figure F.9. Auditor’s Activities Information in Graph Format.

**User Setup**

Staff Code	Password	Date Expired
VCI	xxxx	
Title	First Name	Last Name
Mr.	Vachara	Ratanasupakorn
Position	Department	
IT		

Menu Authorize

<input checked="" type="checkbox"/> Customer	<input checked="" type="checkbox"/> Executive
<input checked="" type="checkbox"/> Sales	<input checked="" type="checkbox"/> Maintenance
<input checked="" type="checkbox"/> Auditor	

OK

Cancel

Figure F.10. User Setup Screen.





APPENDIX G  
REPORT DESIGN

Easy Certified Co., Ltd.					
Customer Information Report	1-Jun-01				
Company Name	Address	Location	Tel	Fax	First Contact Date
A.B.C. International Co., Ltd	1/2 Sukhumvit Soi 1, Sukhumvit Road, -	Bangkok / Thailand	253-1234	253-1235	1/1/00

Figure G.1. Customer Information Report.

Easy Certified Co., Ltd.				1-Jun-01
Customer with Contact Person Report		Address	Location	Remark
Company Name				
A.B.C. International Co., Ltd		1/2 Sukhumvit Soi 1, Sukhumvit Road,	Bangkok / Thailand	Selling Bag
Mr. Somchai Chaiyo, Managing Director			Tel.253-1230	<a href="mailto:Somchai@abc.co.th">Somchai@abc.co.th</a>
Mr. Somsri Srisuk, Secretary to Managing Director			Tel.253-1230	<a href="mailto:somsri@abc.co.th">somsri@abc.co.th</a>
IT industry		303 Sukhumvit Road	Bangkok / Thailand	Consult
Mr.Tan Terry, General Manager			Tel.251-0010	-

Figure G.2. Customer Report with Contact Person.

Mr.Somchai Chaiyo Managing Director A.B.C. International Co., Ltd 1/2 Sukhumvit Soi 1 Sukhumvit Road, Bangkok 10110 Thailand	Ms.Somsri SriSuk Secretary to Managing Director A.B.C. International Co., Ltd 1/2 Sukhumvit Soi 1 Sukhumvit Road, Bangkok 10110 Thailand
Mr.Thomas Wong General Manager CDF Hotel 12 Sukhumvit Soi 2 Sukhumvit Road, Bangkok 10110 Thailand	Mr.Thamrong Yuyen Asistant Executive Manager CDF Hotel 12 Sukhumvit Soi 2 Sukhumvit Road, Bangkok 10110 Thailand
Mr.Somsak Rajvitboon General Manager SOS Hospital 33 Sukhumvit Soi 3 Sukhumvit Road, Bangkok 10110 Thailand	Mr.Somjai boontasub Secretary to General Manager SOS Hospital 33 Sukhumvit Soi 3 Sukhumvit Road, Bangkok 10110 Thailand
Ms.Somsri Makmee Managing Director Machim Food Center 55 Sukhumvit Soi 5 Sukhumvit Road, Bangkok 10110 Thailand	Mr.Pornchai Kullawong Managing Director MNO International Co., Ltd 78 Sukhumvit Soi 101 Sukhumvit Road, Bangkok 10110 Thailand
Mr.Thanawong Sukhum Managing Director HG Construction 44 Sukhumvit Soi 13 Sukhumvit Road, Bangkok 10110 Thailand	Ms.Porntip Tipawan Project Manager HG Construction 44 Sukhumvit Soi 13 Sukhumvit Road, Bangkok 10110 Thailand

Figure G.3. Contact Person Label Report.

Easy Certified Co., Ltd.				1-Jun-01
ISO Certified Report				
Company Name	Location	Certified Date	Remark	
ISO 9001:2000				
A.B.C. International Co., Ltd	Bangkok / Thailand	1-Jan-2000	Selling Bag	
IT industry	Bangkok / Thailand	1-Jan-2000	Consult	
Total 2 Companies				
ISO 9002				
A.B.C. International Co., Ltd	Bangkok / Thailand	1-Jan-2000	Selling Bag	

Figure G.4. ISO Certified Report.

Sales Activities Report				2-Jun-01
Easy Certified Co., Ltd.				
Sales Name	Company Name	Job Done	Detail	
VCR	Mr.Vachara Ratanasupakorn			
1-Jun-00	A.B.C. International Co., Ltd	Completed	Visit Customer to discuss Audit Schedule	
1-Jun-00	IT Industry Co., Ltd	Not Complete	Contact Mr.Tan for receive contract signed	
1-Jun-00	XYZ company Co., Ltd	Completed	Visit Company for the first time for future propose	
Total 3 Activities				

Figure G.5. Sale's Activities Report.



Easy Certified Co., Ltd.				2-Jun-01
Sales Activities Report				
Sales Name	Company Name	Job Done	Detail	
SRB	Mr.Somrak Boonchu			
1-Jun-00	MN Network Service Co., Ltd	Completed	Audit ISO 9002 (Engineer Section)	
1-Jun-00	OP Oil Co., Ltd	Completed	Contact K.Piyachat for Audit Schedule	
Total 3 Activities				

Figure G.6. Auditor's Activities Report.

# Easy Certified Co., Ltd.

Executive Report

1-Jun-01

	Companies	Percentage
No. Customers (Certified)	50	40.32%
No. Customer (Aimming Certified)	60	48.39%
No. Customer Added (Yesterday)	2	1.61%
No. Customer (No Cert & Aim)	12	9.68%
No. Contacted Customer	124	100.00%

Sales Activities	Activities	Activities / Person
Today	15	1.5
Tomorrow	12	1.2
Next 2 Days	26	2.6
Next 3 Days	5	0.5
Next 4 Days	4	0.4
No. Sales Staff = 10		

Auditor Activities	Activities	Activities / Person
Today	5	0.5
Tomorrow	6	0.6
Next 2 Days	10	1
Next 3 Days	10	1
Next 4 Days	10	1
No. Auditor Staff = 10		

Figure G.7. Executive Information Report.

## BIBLIOGRAPHY

1. Chen, Peter P. Entity-Relationship Approach to Systems Analysis and Design. Proc. 1st International Conference on the Entity-Relationship Approach. North Holland: (Contents), 1980.
2. Forouzan, Behrouz A. Introduction to Data Communication and Networking. Singapore: McGraw-Hill Book Co., 1998.
3. Hsu, Cheng. Structured Database System Analysis and Design through Entity Relationship Approach. NJ: Prentice-Hall, 1985.
4. Kroenke, David. Database Processing: Fundamentals, Design, and Implementation, Sixth Edition. Upper Saddle River, NJ: Prentice-Hall, 1997.
5. Laudon, Kenneth C. Management Information Systems, 5<sup>th</sup> Edition. New Jersey: Prentice Hall International, Inc., 1998.
6. McNurlin, Barbara C. and Ralph H. Sprague, Jr. Information Systems Management in Practice, 4<sup>th</sup> Edition. New Jersey: Prentice Hall International, Inc., 1998.
7. Millington, Donald. Structured Systems Analysis and Design Using Standard Flowcharting Symbols. The Computer Journal 24(4)1981: 295-300.
8. Page-Jones, Meilir. The Practical Guide to Structured System Design. NJ: Prentice-Hall International Company, 1988.
9. Parkin, Smith. Data Analysis and System Design by Entity-Relationship Modelling. A Practical Example. The Computer Journal 25(4)1982: 401-409.
10. Whitten, Jeffrey L. and Lonnie D. Bentley. Systems Analysis and Design Methods, 4<sup>th</sup> Edition. New York: Irwin McGraw-Hill, 1998.

St. Gabriel Library, Au