E-Commerce System for
HongKong Gift Company

by

Mr. Bengong Ye

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

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Project Title   E-Commerce System for HongKong Gift Company

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Academic Year   November 2004

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.

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ABSTRACT

It is widely accepted that the success of business depends on E-Commerce Systems used in the business. The traditional methods of performing business operations are inefficient. The introduction of E-Commerce Systems enables business to operate more efficiently. Nevertheless, there are some businesses that still use the traditional methods to perform their business operations. The existing system of HongKong Gift Company is fully based on a manual system. Difficulties in maintaining the system are results from the general problems of a manual system, which is error-prone and has a high maintenance cost.

The new proposed E-Commerce System is developed to replace the manual system. Database server is required to keep all data of HongKong Gift Company. The user can access the database through the client workstation with less amount of system resource. The proposed system is designed in structured analysis and design using data flow diagram, structure chart, and also relational database concept. It has a central database for consistency and shared resource. This system can resolve the manual operational problem, save operation cost and time. This proposed system is easy to use for user.

i

ACKNOWLEDGEMENTS

TABLE OF CONTENTS

iii

LIST OF FIGURES

LIST OF TABLES

I. INTRODUCTION

1.1 Background of the Project

The HongKong Gift Company highly concentrated on exploring new products and services rather than finding new markets for existing product line. For this reason, E-Commerce System is launched to offer the new service for the existing and new customers.In the past, the company used a computer for basic tasks such as preparing documentation and keeping records of customer and business partners.

Modern business needs processes to be quick and efficient. Customers do not like it when they have to wait. To survive and prosper, a business must adapt to the changing requirements of its customers and to other internal and external pressures. With the increasing number of customers, the existing reservation system, which is manual, cannot handle it efficiently. It incurs high operating cost, and consumes much time in searching required information in hard copy form to respond to the customer request. The purpose of this project is to develop a new computerized system. The E-Commerce System for HongKong Gift Company can be divided into several subsystems.. In order to design the new E-Commerce system properly and efficiently, it needs to analyze the existing system.

1.2 Objectives of the Project

(1) To study and analyze the existing service system problems.

(2) To identify user requirement and business requirements.

(3) To identify information system requirements.

(4) To design and develop a new information system based on all requirements including functional and non-functional requirements.

(5)　To improve the efficiency and effectiveness of the organization and reduce costs.

(6)　To support the ever increasing data within the division.

(7)　To improve the operation time by using computerized system.

(8)　To reduce the high operating cost incurred in the manual system.

(9)　To eliminate the problem of different systems in different departments and enabling them to share and use the same information system.

1.3　Scope of the Project

This project will emphasize the development of a new computerized system to replace the existing manual system and will focus on the entire front office process, which is the main function in this business. The main process of the new system includes inputting and verifying redemption data, calculating redemption cost and point, inquiring redemption transaction through a graphical user interface, and generating reports for concerned users.It starts from receiving contact from customer, then providing action and reaction along business transaction until contract is made.

The scope will also be concerned on the following areas.

(1)　Creating a database for gift information.

(2)　Providing purchase ordering forms and request forms, sales records and invoices.

(3)　Providing a better decision making support tool.

(4)　Creating the database for an exact inventory control.

(5)　Implementation of the new computerized system to reduce paper work and paper use.

1.4　Deliverables

The deliverables of the project on E-Commerce System are as follows:

(1)   Data Modeling (ER Diagrams)

(2)   Process Modeling (Context Diagram, Data Flow Diagrams)

(3)   System Specification (Hardware and software specification)

(4)   Cost Benefit Analysis (Payback Period, Net Present Value)

(5)   Input Design (Input Screen of proposed system)

(6)   Output Design (Reports from proposed system)

(7)   Structured Design (Structured Charts)

(8)   Process Specification (Detail of each process of proposed system)

1.5   Project Plan

After the management approved the project proposal, the development team prepared the project plan, as shown in Figure1.1. Details of the project plan are shown as follows:

(a)   System Analysis Phase: which is the survey and planning of the system and project, the study and analysis of the existing business and information system, and the definition of business requirements and priorities for a new improved system. The output of this phase is to model business requirement for a proposed system in the form of a logical diagram called ERD (Entity- Relationship Diagram), and DFD (Data Flow Diagram)

(1)   Define the objectives and scope of the project.

(2)   Study the existing system (Context Diagram, Data Flow Diagram).

(3)   Identify the existing system problems.

(4)   Study and analyze the business requirements and priorities of a new improved system.

(5)   Generate the proposed system in the form of Entity Relationship Diagrams, Data Flow Diagrams.

(6) Analyze cost and benefit of existing system and proposed system.

(b) System Design Phase: which is the evaluation of alternative solutions and the specification of a detailed computer-based solution. In this phase, it deals with the physical or implementation dependent aspects of a system rather than logical emphasis in system analysis. The main activity is to design all system components including web interface, reports, database, network, and program.

(1) Evaluation of alternative solutions and specifications of a computer based solution.

(2) Study how the system will meet the requirements identified during system analysis.

(3) Provide a physical design of the proposed system.

(4) Describe the data to be input, calculated, or stored.

(5) Identify reports and other outputs to be produced by the system.

(6) Respond to provide programmers with complete and clearly outlined specifications that state what the software should do.

(c) System Implementation Phase: which is the construction of the new system and delivery of the new system into day-to-day operation. Besides construction and delivery activities that are the typical phases of system implementation, user training and testing of developed program before implementation should not be neglected. The training course for users is provided to illustrate a clear picture of the new system, and system testing is performed to guarantee that the new system operates smoothly.Implementation includes all those activities that take place to convert from the old system to the new system. Two main stages are

classified for implementing the proposed system, which are construction stage and delivery stage.

Task Name of the system	May 2004				June 2004				July 2004				August 2004			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
System Analysis																
Define the Objective and Scope																
Study the Existing System																
Identify the Existing Problems																
Study the Existing System																
Develop Context Diagram																
Develop Data Flow Diagram																
Cost and Benefit Analysis																
System Design																
User Interface and Report Design																
Database Design																
Program Design																
System Implementation																
Coding																
Testing																
Hardware Installation																
Software Installation																
Conversion																

Figure 1.1. Project Plan of E-Commerce System.

6

II. THE EXISTING SYSTEM

2.1 Background of the Organization

The Hongkong Gift Company is located in Hongkong. It was established in June 2000. The initiator of this company is Mr. Ben ,whose position is now the Managing Director.The major task of the company is to provide all kinds of gifts such as watches, flowers, handbags, etc.It is also convenient for shopping because it is located near the city center. The company is made up of three major offices based on their functional operations as shown in Figure 2.1.
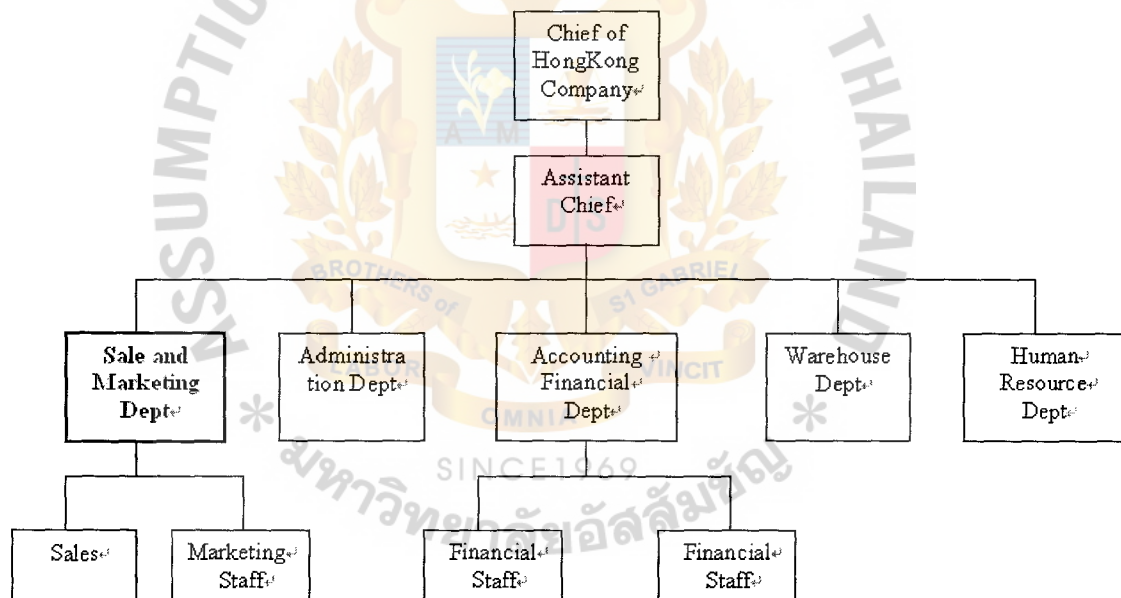
Figure2.1. Organization Chart of HongKong Gift Company

Front Office: Front office refers to the systems used to confirm the room rental electronically. This is the part of the business that the customer sees as Computerized Dormitory System. The front office system supports room reservation and room rental.

Middle Office: The middle office system covers the security management, service, housekeeping and maintenance functions of the dormitory. Middle office functions are as important to the front office as they are to the back office.

Back Office: Refers to computer programs that agents use to gather and manipulate data for record keeping, analysis and reporting. Accounting systems, programs used to prepare reports, database management and other software are used to track service preference pattern in order to serve them more effectively. The basic characteristics of agency management systems are as follows:

2.2 Existing Business Functions

The company is subdivided into the following departments:

(1) Sales Department has following responsibilities.

   (a) Accepting and checking purchase requests from the customers.

   (b) Receiving money according to each purchase requests.

   (c) Distributing products to customers as per paid purchase requests.

   (d) Sending acknowledgement of purchase requests to the accounts department.

   (e) Producing cash notes for sending money to the finance division of the company.

   (f) Requesting products from warehouse for sales purposes.

(2) Account Department has following responsibilities.

   (a) Recording products and goods according to existing documents.

   (b) Accepting acknowledged purchase requests.

   (c) Preparing income statements, balance sheet.

(3) Purchase Department has following responsibilities.

   (a) Prepare the list of products to be purchased.

(b)   Sending the list of products to the sales department

(c)   Sending acknowledgement of list of products to be purchased to the finance division of the company for approval of the budget.

(d)   Preparing Bid document to purchase the products from products suppliers.

(e)   Receive the invoice from supplier and send it to finance division for payment.

(f)   Sending purchased products to the stock department.

(g)   Sending information to the sales department about the details of new products purchased.

(4)   The Stock Department has following responsibilities.

(a)   Recording the number of units of products in the warehouse stock cards.

(b)   Sending products to warehouse.

(c)   Sending products to the sales department and receive request of products from sales department.

(d)   Receiving products from the purchase department.

(5)   The Administrative Department has following responsibilities.

(a)   Accepting and sending all documents to their respective destinations.

(b)   Filing all documents.

(c)   Producing all documents for all departments upon request for different purposes.

(d)   Acquiring and distributing overtime money to each employee.

2.3 Current Problems and Areas for Improvement.

The current existing system is based on the manual system. Most data are stored on paper. It needs many staff to maintain these data and files. Generating a report is slow and unreliable. When the management wants any information, it takes approximately a few days to get information. Every item has to be listed out and recorded in order to get the required information. The information can not be shared between departments since each department has its own filing system of the same record.

The problems with the current system are identified as follows:

(1) No inventory forecasting system because the existing system does not have data to develop and test model.

(2) The problem of data integrity.

(3) Difficulty of maintaining and updating the client's data.

(4) Data redundancy and confusion.

(5) A lot of time consumption in checking status of the property unit for the reservation.

(6) Lack of data sharing and availability

(7) Mistakes in calculating information causing incorrectness and unreliability of client's records and status of property unit.

(8) A lot of time consumption in searching for records,billing,invoice processing and compiling management report.

(9) Difficulty in dealing efficiently with inquiries from customers.

(10) Lack of procedure standardization.

(11) Inaccracy of information flow because of the reliance on the staff, using manual processing.

Areas of improvement consists of the following:

(1)   To create a computerized system to manage all transactions in the system.

(2)   To improve data integrity and data security.

(3)   To improve service quality.

(4)   To reduce time consumption for all services.

(5)   To reduce work redundancy.

(6)   To collect all information to a central database.

(7)   To provide a new report system.

(8)   To report all transactions to the chief of the company in order to provide a decision support system.
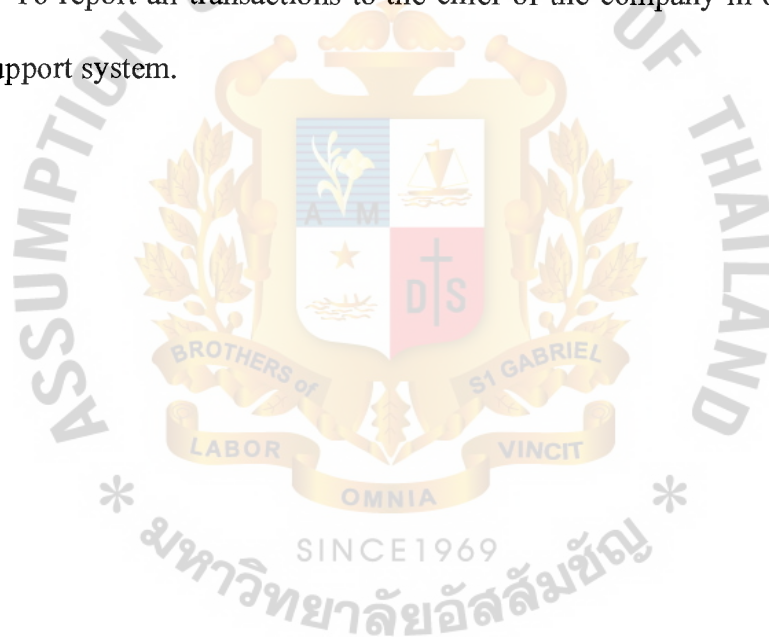
III. THE PROPOSED SYSTEM

3.1 System Specification

The **Hongkong Gift Company** E-Commerce system is the proposed system, which is developed and designed to facilitate in providing information and service for the customers. To develop the new system, users' requirement needs to be analyzed to know how they expect a proposed system to support their work and ease the current working problems.

Users would like to have central databases for information that can be shared by different departments and if possible, they would like to automate the request processing system in order to minimize the administrative staff and time spent; and all data be recorded for further use. To make system specification most efficient and effective, discussion of the system specification is done with all relevant staff and executives about their working problem, workflow, and developing budget.

In addition, this system will serve all user requirements and increase efficiency of the operations. The new system must also process the daily transaction automatically and generate the periodical management report for forecasting trend, making decision, and setting business plan.

The capability of the new system includes periodical report, sales report, database storage, security, and most of all, the system must be able to keep track of all extra charge items.

To achieve the specified objectives, the proposed system should have the following components:

(1) New system should be easy to issue information of the new gift to the customer.

(2)   The client/server technology is applied for better solution to request from server for accessing database from client with less resource and time.

(3)   This system should be easy to search the certain gift that the customers likes and easy to identify the customers' ID number.

(4)   This system should help to reduce data redundancy in the system and help to prepare various reports.

(5)   New system should reduce mistakes from collecting, reading, updating, and deleting data and have a good security.

(6)   New system replaces the existing manual system to facilitate the current process.

(7)   This system should be easy to provide access for a large number of customer simultaneously.

3.2   Requirement Analysis

The most important part is to find out what the requirements are.After interviewing the users, the conclusion can be categorized as follow:

(a)   Staff Requirements

(1)   Need for searching and modifying for a particular customer data using the customer number.

(2)   Need for program, that can support the routine and standard procedure of the ordering system.

(3)   User frienfly interface.

(4)   Need for generating simple reports like customer or supplier profile.

(5)   Need for error checking.

(b)   Management's Requirements

(1)   Reduction in the overall operation cost.

(2) Generating various kinds of reports to support decision marking and forecasting.

(3) Providing security to the database, assign the authority for the user.

(4) Designing back up and recovery.

(c) User's Requirements

(1) Fast inquiry of order processing.

(2) User-friendly interface.

3.3 System Design

For the proposed system, we choose the Relational Database as the Data Architecture. Sinse our database is not a huge one, we choose Microsoft SQL Server 2000 as the Relational Database Management System (RDBMS). And the Microsoft SQL Server 2000 is not an expensive product, which is required to run on Windows 2000 operating system, and then we choose Windows 2000 Professional as our Operating System (OS). Because our proposed system is a unique system, we desire to develop software application by ourselves, which can meet our system requirement easily. System design focuses on the technical or implementation concerns of the system. Thus the purpose of the design phase is to transform the business requirements statement from the requirements analysis phase into design specifications for construction.

The software that we use to develop software application is Visual Basic (VB) because it is the easiest learning program. For generating report, we use Visual Basic and Crystal Report as the tools. For the human communication in some process, we use Microsoft Outlook as a program to send and receive emails.

We desire to use the On-line inputs and outputs as the Interface Architecture. For human inputting process, we use keyboard and mouse as the hardware interface. Most

14

of the process is computer based, so Windows 2000 Graphic User Interface is the main input and output interface. System design is to translate the system users' business requirements and constraints into technical solutions. The computer files, databases, input, outputs, screens, networks, and programs are designed to meet the systems users' requirement. The detail of each design technique can be explained as follows:

Data Modeling

Data modeling is a technique for organizing and documenting a system's data. Data modeling is sometimes called database modeling because a data model is finally implemented as a database. A model is a way to represent business requirements or technical designs for the proposed systems. Fully attributed data model is to identify the remaining data attributes. Complete entity relationship diagram of the proposed system is shown in Appendix A.

Physical Data Flow Diagram

Physical data flow diagram server is derived as a technical blueprint for a system construction and implementation from the logical data flow diagram. It communicates technical choices and other design decisions to those who will actually construct and implement the system.Data Flow Diagrams are shown in Appendix B.

Structure Design

Structure design is a process-centered technique that transforms the structured analysis models into good software design models. Structured design introduces a modeling tool called structure charts, used to illustrate software structure to fulfill business requirements. All specified structure charts are shown in Appendix D.

Data Dictionary

Data dictionary provides a list of terms and definition for all data items and data stored within the developed system. Data dictionary for both entity relationship diagram and data flow diagram is shown in Appendix E.

Process Specification

Process specification is to define what the system does to transform inputs into outputs. It provides the details of system processes in table format, which is clear to look at all related inputs, outputs, and relevant process than a diagram. All specified tables, which are the processes from the logical data flow diagram, are shown in Appendix F.

Database Design

Service Information System is a computerized system that can serve user requirements and support most operation tasks. We have learned how to outline the design of a new information system to fullfill the requirements identified and modeled during systems analysis.This general design for the new system will guide the detailed design and construction of that system.

This project will model technology architecture and requirments during systems design with preparing a Physical Data Flow Diagram(DFD). Physical Data Flow Diagram(DFD) is a systems analysis tool for modeling the logical (meaning "nontechnical") business requirements of an information system.With just a few extensions of the graphical language,DFDs can also be used as a systems design tool for modeling the physical(meaning "technical") architecture and design of an information system.

Physical data flow diagrams model the technical and human design decisions to be implemented as part of an information system.They communicate technical choices and

other design decisions to those who will actually construct and implement the system.In other words,physical DFDs serve as a technical blueprint for system construction and implementation.

Physical DFDs must also indicate any data flows to be implemented as businedd forms.Business forms frequently use a multiple copy implementation.At some point in processing,the different copies are split and travel to different manual processes.Each copy should be uniquely named. We know that each data store on the logical DFD now represents all instances of a named entity on an entity relationship diagram.Physical data stores implement the logical data stores. The mechanics for drawing physical DFDs are virtually identical to those for logical DFDs.The rules of correctness are also identical.

The first physical DFD to be drawn is the network architecture DFD.A network architecture DFD is a physical data flow diagram that allocates processors and devices to a network and establishes (1) the connectivity between the clients and the servers and (2) where users will interact with the processors (usually only the clients).

To identify the processors and their locations,the developer utilizes two resources: If an enterprise information technology architecture exists,that architecture likely specifices the clint/server vision that should be targeted. The advice of competent network managers and/or specialists should be solicited to determine what's in place,what's possible,and what impact the system may have on the computer network.

Network architecture DFDs need to be labeled to show somewhat different information than normal DFDs.They show highways over which data flows may travel in either direction.Also,network topology DFDs indicate the following:

• Servers and their physical locations.

• Clients and their physical locations

17

• Processor specifications

• Transport protocols

The network topology DFD can be used to either design a computer network or document the design of an existing computer network . In either case,the network is being modeled so that we can subsequently assign information system processes,data stores,and data flows to servers on the network.

The next step is to distribute data stores to the network processors.The required logical data stores are already known from systems analysis,as data stores on the logical DFDs or as entities on the logical ERDs.We need only determine where each will be physically stored and how they will be implemented.

To distribute the data and assign their implementation methods, the developers utilize three resources:

• If available ,the data distribution matrices from systems analysis model the data needs at business locations from a technology independent perspective.

• If an enterprise information technology architecture exists,that architecture likely specifies the database vision and technologies that should be targeted.

• The advice of data and database administrators should be solicited to determine what's in place ,what's possible,and what impact the database may have on the overall system.

The last step of process design is to factor out any portion of the physical DFDs that represent manual,not computerized,processes.This is sometimes called "establishing a person/machine boundary". The result of database design is illustrated in Appendix G.

```sql
CREATE TABLE Gift
(
    GiftID CHAR(10),
    GiftName  CHAR(20) NULL,
    GiftType  CHAR(20) NULL,
    GiftSize  INTEGER,
    GiftNumber   CHAR(20) NULL,
    GiftAvailable  CHAR(25) NULL,
    GiftStatus  CHAR(6) NULL,
    GiftPrice INTEGER,
)
GO

CREATE TABLE Customer
(
    CustomerID  CHAR(10),
    CustomerName  CHAR(20),
    CustomerAddress  CHAR(25) NULL,
    CustomerZip INTEGER,
    CustomerCity  CHAR(20) NULL,
    CustomerCountry  CHAR(20) NULL,
    CustomerPhone INTEGER,
    CustomerFax INTEGER,
)
GO

CREATE TABLE Manufacture
(
    ManufactureID  CHAR(20),
    ManufactureCity  CHAR(20),
    ManufacturePhone INTRGER,
    ManufactureFax INTEGER,
    ManufactureAddress  CHAR(20) NULL,
    ManufactureName  CHAR(10) NULL,
)
GO

CREATE TABLE Order
(
    OrderID  CHAR(10),
    OrderNumber  CHAR(20) NULL,
    OrderDate   CHAR(10) NULL,
)
GO


CREATE TABLE Finance
```

```sql
(
    FinanceID  CHAR(20),
    FinanceDate  CHAR(10) NULL,
    CustomerCreditNumber INTEGER,
    CreditCardName  CHAR(20) NULL,
    CreditCardNumber INTEGER,
)
GO

CREATE TABLE Store
(
    StoreID  CHAR(15),
    StoreNumber  CHAR(20) NULL,
    StoreAddress  CHAR(25) NULL,
    StoreDate  CHAR(10) NULL,
)
GO

ALTER TABLE Gift ADD
    PRIMARY KEY (GiftID, GiftName, GiftType, ManufactureID , OrderID, StoreID)
GO

ALTER TABLE Customer ADD
    PRIMARY KEY (CustomerID,CustomerName, CustomerAddress)
GO

ALTER TABLE Manufacture ADD
    PRIMARY KEY (ManufactureID)
GO

ALTER TABLE Order ADD
    PRIMARY KEY (OrderID)
GO

ALTER TABLE Finance ADD
    PRIMARY KEY (FinanceID)
GO

ALTER TABLE Store ADD
    PRIMARY KEY (StoreID)
GO
```

20

Input Design

Most new applications of input design being developed today include a graphical user interface (GUI).Most are based on Microsoft Windows.While GUI designs provide a more user-friendly interface to the web browser,they also present more complex design issues than their predecessors.Several concepts are important to input design. One of first things that must be learnt is the difference between data capture and data input. Alternative input media and methods must also be understood before designing the inputs. And because accurate data input is so critical to successful processing, file maintenance, and output should also be learnt about human factors and internal controls for input design.

This is an important concept because system designers must determine when and how to capture the data. The designer must understand the difference between the following terms presented in the table beneath.

Table 3.1. Terms Used in Input Design

Terms of Data	Description of Data
Data Capture	is the identification of new data to be input
A source document	is a paper form used to record data that will eventually be input to a computer.
Data Entry	is the process of translating the source document into a machine-readable format. That formant may be a magnetic disk..
Data Input	is the actual entry of data in a machine-readable format into the computer.

When you think of "input",you usually think of input devices,such as keyboard and mice.But input begins long before the data arrives at the device.to actually input business data into a computer,the systems analyst may have to design source documents,input screens,and methods and procedures for getting the data into the computer.The system analyst usually selects the method or the medium of the input

21

such as Batch Input, or Remote Batch. Most new applications being developed today consist of screens having a "graphical" looking appearance. This type of appearance is referred to as a graphical user interface (GUI). A number of alternative automatic data collection (ADC) technologies are available today and fining their way into batch and on-line applications. With advances in these technologies, we can eliminate much human intervention associated with most traditional input methods; biometric, electromagnetic, magnetic, optical-bar coding, bar codes, optical-mark reader (OMR), optical-character reader (OCR)-smart cards, touch.

Inputs should be as simple as possible and designed to reduce the possibility of incorrect data being entered. Furthermore, the needs of data entry clerks must also be considered. With this in mind, system designers should understand human factors that should be evaluated during input design.

Input controls ensure that the data input to the computer is accurate and that the system is protected against accidental and intentional errors and abuse, include fraud.When designing input screens for an application that will contain a GUI appearance, the designer must be careful to select the proper control object for each input attribute. Each control serves a specific purpose, has certain advantages and disadvantages, and should be used according to guidelines. Some of the most commonly used screen-based controls for inputting data include: test box, radio button, check box, list box, drop-down list, combination box, and spin box.The resultant of the input design of the audio accessories computerized information system is based on the on-line processing and GUI, Graphical User Interface design. As mentioned, the system will accompany many of the input controls in order to ensure that the data input to the computer is accurate and that the system is protected against accidental and intentional errors and abuse, including fraud. The design of a user interface can be enhanced or

22

restricted by the available features of the terminal display or monitor/keyboard. Such features that should be considered include display area, character sets and graphics, paging and scrolling, display properties, split-screen and windowing capabilities, keyboards and function keys, and printer options. And the frequently used image icon in most of the interfaces will be presented in the next paragraph alongside with its signification.

Interal controls are a requirement in all computer-based systems.The following internal control guidelines are offered:The number of inputs shoule be monitored.This is especially true with the batch method,because source documents may be misplaced,lost,or skipped.Care must also be taken to ensure that the data is valid.Two types of errors can infiltrate the data:data entry errors and invalid data recorded by system users.Given the type of user for a system, there are a number of important human interfacing factors that should be incorporated into the design:

(1)   The system user should always be aware of what to do next.

(2)   The screen should always be formatted so that the various types of information, instructions, and messages always appear in the same area.

(3)   Messages, instructions, or information should be displayed long enough to allow the system user to read them.

(4)   Display attributes should be used sparingly.

(5)   Default values for fields and answers to be entered by the user should be specified.

The input screens of the proposed system are in Appendix H.

Output Design

Outputs present information to system users.Outputs are the most visible component of a working information system.Several concepts are important to output design. One of the first things that must be learnt is the difference between external and

internal outputs. Some external outputs are designed as turnaround outputs that leave and re-enter the system later. Such outputs are usually designed for printing on specially designed manufactured forms.

One way to classify outputs is according to their distribution inside or outside the organization and the people who read and use them.Some outputs are generated to fulfill management information system requirements. These outputs can be classified as one of the following three types of reports presented in the table beneath.

Table 3.2. Type of Output

Type of Output	Description of Output
Detailed Reports	which present information with little or no filtering or restrictions.
Summary Reports	which categorize information for managers who do not want to wade through details.
Exception Reports	which filter data before they are presented to the manager as information. Such reports usually report exceptions to some condition or standard.

The system designer usually selects the media and format for all outputs design and the entire system.

(1) Medium: is what the output information is recorded on, such as paper or video display. Common alternative media include the following: Microfilm, Microfiche, or Video Medium.

(2) Format: is the way the information is displayed on a medium, for instance, columns of numbers or a graph. There are several different formats you can choose for communicating information on a medium such as Tabular Output, Zoned Output, Graphic Output, or Narrative Output Format.

There are many system user issues that apply to output design. The following general principles are important for output design:

(1) Computer outputs should be simple to read and interpret.

(2) The timing of computer outputs is important.

(3) The distribution of computer outputs must be sufficient to assist all relevant system users.

(4) The computer outputs must be acceptable to the system users.

Before deciding to select the appropriate output for each type of document, the system designer must understand the type and the purpose of the output and should answer all the following questions:

human interfacing factors that should be incorporated into the design:

(1) What medium would best serve the output?

(2) What would be the best format for the report?

(3) How frequently is the output generated?

(4) How many pages or sheets of output will be generated for a single copy of a report?

(5) Does the output require multiple copies?

(6) For printed outputs, have distribution controls been finalized?

(7) For attribute contained on the output, what format should be followed?

Many types of output would have been used in our system: External Document, Internal Document, and Turn around Document. All the outputs will apply the same formats as similar as possible in order to facilitate the users. Several output designs include the following: Report and Graph Options,Order Information,and Shipping Information.The output design of report design is shown in Appendix H.

3.4 Candidate Solution Analysis

During the decision analysis phase of system analysis,the systems analyst identifies candidate system solutions and then analyzes those solutions for

feasibility.Decision analysis is a very important step for implementing system because the existing system is a strategic system. It performs mission-critical processing for the organization and users feel familiar to use it for many years. Therefore, the imperative to meet users' requirements is required.Also, there is more than one solution suggested after brainstorming process that creates some alternatives. Our principle task is to reduce them to a manageable number. This is done by the collective judgment of the development team after analyzing each. A useful technique for summarizing the major characteristics of potential alternatives to prepare a table is called a "candidate system matrix".

The columns of the maxtrix represent candidate solutions.Better analysts always consider multiple implementation options.To find out the solution that can support business requirement, we have found 3 candidates for the proposed system as shown in Table 3.3. We use a candidate evaluation matrix table to identify the performance and the cost of each candidate. This table shows the characteristics of each candidate that system designer and users can compare each candidate easily. The systems selected for detailed evaluation are candidates A, B, and C. They have different general characteristics as follows:

(1) Candidate 1: Resources Sharing LAN-File Server

This candidate uses purchased product to implement the proposed system. Software tool like Crystal Report is used to customize the software package to provide report writing. Using this candidate can reduce the development time with low risks but high cost compared to the other two candidates.

(2) Candidate 2: Client/Server Computing-Database Server

This candidate is run on two-tiered client/server architecture in which database is kept on a server, and presentation on client. Candidate 2 uses Visual Basic 6.0 as a programming development tool for the system. The programmer can use it without any technical assistance. It facilitates the programmer to develop the new application quickly. This candidate is easy to implement because MS Visual Basic 6.0 is available for the programmer to use. Thus, this candidate takes less time to design and implement in the current environment. For database server software, we use the SQL Server 7.0 as a tool. For the SQL Server7.0 itself, its advantages are that it is available for every type of front-end software. SQL Server 7.0 supports groups of users for security and database access.

(3)   Candidate 3: Client/Server Computing-Database Server

Oracle developer 2000 and Personal Oracle 8.0 are used as Development tool and Database Software respectively in this candidate. This solution supports the multi-user environment and relational database technology. Server is used to follow the concept of two-tier Client/Server Computing. This candidate has higher risk than candidate 2 because of lack of familiarity with the tools and platforms and highest development cost as it takes long time to develop.

At least one of these options should be the existing system because it serves as our baseline for comparing alternatives.

Table 3.3.   Candidate Systems Matrix.

Characteristics	Candidate 1	Candidate 2	Candidate 3
Portion of System Computerized Brief description of that portion of the system that would be computerized in this candidate.	Fully support all relevant units that are involved in MST Travel reservation process.	Member Services and warehouse operations in relation to order fulfillment.	Member Services and warehouse operations in relation to order fulfillment.
Benefits Brief description of the business benefits that would be realized for this candidate.	This solution can be implemented quickly because it is a purchased solution	Application development is easy with fast learning time.	Powerful DBMS and application that perform task more efficiently.
Servers and Workstations A description of the servers and workstations needed to support this candidate.	Server :Pentium IV 2.8 GHz PC : Pentium IV1.0 GHz	Server :Pentium IV 2.8 GHz PC : Pentium IV1.0 GHz	Server :Pentium IV 2.8 GHz PC : Pentium IV1.0 GHz
Software Tools Needed Software tools needed to design and build the candidate (e.g., database management system, emulators, operating system, languages, etc.) Not generally applicable if applications software packages are to be purchased.	Crystal Report 8.0 for customization of package to provide report writing and integration.	Windows 2000 Server Windows 98 SE MS Visual Basic 6.5 MS Access 97 MS SQL Server 7.0 Visible Analyst 7.5,	Windows 2000 Server Windows 98 SE Developer 2000 Personal Oracle 8.0 Visible Analyst 7.5,
Application Software A description of the software to be purchased, built, accessed, or some combination of these techniques.	Package Solution.	Custom Solution.	Custom Solution..
Method of Data Processing Generally some combination of : online, batch, deferred, remote batch, and real-time.	File Server	Two-tier Client/Server.	Two-tier Client/Server.
Output Devices and Implications A description of output devices that would be used, special output requirements (e.g., network, preprinted forms, etc.),and output considerations (e.g., timing constraints)	(2) Epson LQ 1170 (1) HP laser 4P printer	(2) Epson LQ 1170 (1) HP laser 4P printer	(2) Epson LQ 1170 (1) HP laser 4P printer
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 & Mouse.	Keyboard & Mouse.	Keyboard & Mouse.
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	Oracle 8.05I	MS SQL Server DBMS with 20 GB storage capacity.	Oracle 8.05I

28

<u>Feasibility Analysis</u>

Feasibility is a measure of how beneficial the development of information system will be to the organization. Thus, feasibility analysis is the activity by which feasibility is measured and assessed. Ability criteria are used to evaluate solutions against at least four criteria.

(1) Operational feasibility: It is a measure of how the solution change the user's work environment, how the solution fulfills the user's requirements and how the users feel about such a solution. From Table 3.3 candidate system matrix, all candidates can support the current business process but candidate 2 and 3 earn highest score. Candidate 2 is easy to design, and easy to understand interface. Candidate 2 and 3 fully support the current business process but candidate 2 is the most feasible because it is easy to design, easy to understand interface and it can be implemented very quickly without additional software installation and hardware upgrades.

(2) Technical feasibility:It is a measure of the practicality of a specific technical solution and the availability of technical resources and expertise. Candidate 3 is the most difficult to implement because oracle is extremely complex to understand and use for users. Candidate 1 and 2 are easy to design and implement because candidate 1 is using purchased software with faster development and candidate 2 is an in-house development of the software using MS Visual Basic 6.5 with experiences.

(3) Economic Feasibility:It is the measure of cost-effective solution. Candidate 3 is an extremely complex and more powerful software solution and requires a lot of user training that causes candidate 3 to take the largest investment. Candidate 2 is the most economically feasible and has the least investment with the shortest payback period.

(4) Schedule feasibility:It is a measure to determine whether the solution can be designed and implemented within an acceptable time period or not. Candidate 3

29

consumes the most time to design and implement the proposed system because Oracle is very difficult to learn. Candidate 1 takes the least time to develop because it uses ready-made software package. Candidate 2 spends more time than candidate 1. But it is quick to be implemented as candidate 1.

Table 3.4 shows the completed feasibility analysis matrix for each candidate. The full details of cost-benefit calculations are shown in Appendix C. The calculation includes all candidates cost tables, payback table and graph, and net present value (NPV). After completing the candidate system matrix and feasibility analysis matrix, Candidate 2 has the highest total score, and ranks the best solution for the proposed system. This candidate is in-house development. The company will hire 1 system analyst, 3 programmers and 1 network specialist. The solution will be analyzed and designed on our own.Candidate 2 is the best solution that should be selected for further design phase.

Table 3.4. Feasibility Analysis Matrix.

Feasibility Criteria	Wt	Candidate 1	Candidate 2	Candidate 3
Operational Feasibility **Functionality** A description of to what degree the candidate would benefit the organization and how well the system would work. **Political** A description of how well received this solution would be from both user management, user and organization perspective.	40%	It can not generate MIS report **Score: 80**	Fully supports user required functionality. **Score: 90**	Fully supports user required functionality. **Score: 90**
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.	20%	Requires to purchase software to create report and training. **Score: 70**	Required to hire expert **Score: 95**	Oracle is the leading DBMS software that provides high efficiency. But programmers have a little experience with oracle product. Continuous training course is required for operating and system maintenance **Score: 60**
Economic Feasibility **Cost to develop:** **Payback period (discounted):** **Net present value:** **Detailed calculations:**	30%	Approximately 432,000. Approximately 2.3 years 230,972 See Appendix C: **Score: 70**	Approximately 362,000. Approximately 1.7 years 951,559 See Appendix C: **Score: 85**	Approximately 510,000. Approximately 3.1 years 388,011 See Appendix C: **Score: 60**
Schedule Feasibility An assessment of how long the solution will take to design and implement	10%	Less than 3 Months **Score: 95**	6-8 Months **Score: 90**	8-10 Months **Score: 80**
Ranking	100%	78	90	74

31

3.5 Hardware/Software Requirements

The new system provides prepared hardware specifications and software specifications to support this system which is a major concern because the cost in this part is expensive and it has a long period of using time. The selection of hardware and software specification is of major importance to support system design and implement the proposed system. High quality hardware and software performance with the appropriate price is the best way to reduce cost of implementing.

The organization should select the appropriate way to implement the whole system. The new system requires database server and backup server to provide services needed by any client. It must use the high specification in server because everything is run and processed on server. The database must have more efficiency to support business and customer data. It also has good database management system (DBMS) to manage data extracted or retrieved from different information. The following Tables 3.5 and 3.6 show details of selection of hardware and software.

Table 3.5. Hardware Specification for Database Server.

Hardware	Specification
Processor Type and Speed	INTEL Pentium IV 2.8 GHz
Cache Memory	256 KB or Higher
Primary Memory	512 MB ECC SDRAM or Higher
Hard Drive Capacity	56.6 GB or Higher
CD-ROM Drive (X)	52X or Higher
Floppy Drive	1.44 MB
Network Adapter	Fast Ethernet NIC 10/100 Wake On Lan
Display Adapter	Nvidia M64 Pro 4-APG with 32 MB-VRAM
Display	17" Flat Screen
UPS	UPS 500 VA
HUB	Office connect switches dual speed 8

Table 3.6. Software Specification for Database Server.

Software	Specification
Operating System	Microsoft Windows 2000 Server
Database Server	Microsoft SQL Server 2000
Development Tools	MS Visual Basic , Visible Analyst CASE Tools

In addition, the connection between Database server and client machine can be established through the existing LAN with some little configurations. The network peripheral specification of the proposed system is shown in table 3.7.

33

Table 3.7. Network Peripheral Specification.

Network Peripheral	Specification
Network Topology	Star Topology
HUB	Office connect switches dual speed 8
Card	Network Interface Card
Interconnection	3 Com 1210/100 Mbps
Wiring and Cable	UTP 4 Pair CAT 5

3.6 Application Architecture

This part will cover and discuss the application architecture for the target system with a solution that relies on a Client/Server method of data processing to preserve datas sharing. The document is anticipated to describe the application architecture for the Hongkong Gift Company E-Commerce System. The function is defined to specify the technologies used to implement in terms of Data, Process, and Interface. In addition, it will clarify how these components can provide service for the customer through LAN network. These techniques are following

(1) We have to initiate with the Network Architecture that allocates processors and device to a network. As a result, the context data model is then created.

(2) Subsequently, the next step is to creat the logical data model and final physical data base.

(3) We have to consider about inputs, outputs, and intersystem connectivity that are considered as Interface Architecture.

3.6.1 Network Architecture

The Hongkong Gift Company distributes data to only staff to display all information. All data will be stored in Microsoft SQL Server 2000 on Database Server.With concern of cost and performance, we decide to use Ethernet 10BaseT (UTP

34

medium) which consists of Hub wiring the workstation, server, printer and peripherals in the star topology. For Network Interface Card(NIC), we choose 10/100 3 com NIC in order to support more than 10 Mbps network. In the future, our database will be huge and will be composed of not only text or character but also multimedia database(picture, sound, etc.)If we use 10Mbps networks to transfer consumed bandwidth application, it will degrade our productivity, so we use 10/100 NIC instead.

3.6.2 Data Architecture

Hongkong Gift Company E-Commerce System has standardized Database and Database Management System. They have standardized Microsoft SQL Server 2000 on Database Server computer as Relational Database Management System (RDBMS). Relational Database can reduce redundancy of data. It is easy to use for any person.Data storage is typically implemented using distributed relational technology that either partitions data to different servers or replicates data on multiple servers.Such data architecture is rendered possible through the use of a Client/Server underlying technology without any loss of centralized control.

3.6.3 Interface Architecture

The Hongkong Gift Company E-Commerce system defines interface architecture as Input, Output . The proposed system will use both the keyboard and mouse which are commonly used interfacing tools and it should also keep some room available for further development if a Bar Code reader I/O is to be implemented later on.

Hongkong Gift Company uses Remote Batch, because it combines the best aspect of batch and online input and output. In general, we use keyboard as main input to the system, and printout report as output.

Many input of our system use online input because it can increase response time and throughput of the system. It provides more conversational dialogue between end users and new system.

Hongkong Gift Company decides to use online input for the staff who use keyboard to key in information to this system. After that, this system will check various information for their authorization. The system will send the notification back as online output to the customer.

3.6.4 Process Architecture

The suitable process architecture for Hongkong Gift Company is Software Development Environments (SDEs) for Two-Tier Client/Server. They agree to develop the system by using Visual Basic 6 that embedded with SQL for programming. Microsoft Visual Basic 6 provides Rapid Application (RAD) for quickly and easily building the Graphic User Interface (GUI) that will be executed on the client computers. For report output, we use Crystal Report Application to be a tool for generating various reports for the company. The application software will also comprise some package products such as MS Office along with some web design tools and e-mail management software tools. Version control and configuration manager should not be needed for this specific project.

3.7 Security And Controls

Security and control are very important when a computer – based information system is involved.Assets are corporate property of some value that require varying degrees of protection. Assets most often include corporate data and the network hardware, software, and media used to transport and store that data. It encompassed not only the day to day protection of the computer hardware and

36

software but also the data integrity, data privacy, safeguarding of all physical facilities, and avoidance of disastrous losses.

Many of the security controls attempt to prevent or detect unauthorized access to data, computer equipment, or other facilities.Asset can potentially be endangered by numerous threats. Threats can be intentional or unintentional,natural or created. Possible threats include hackers, line outages, fires, flood, power failures, equipment failures, dishonest employees, or incompetent employees.

Other security controls are corrective in nature since they enable losses of data or facilities to be recovered or reconstructed.the following minimum requirement of security standard must be applied to the HongKong Gift Company E-Commerce System to prevent unauthorized access and alteration to the system.

The protective measures for the HongKong Gift Company are as follows:

(1) Identification

Password security,this control exists in the form of logon procedure.A user can gain access to the system by logon password. In addition, the system will disconnect after three invalid logon attempts.The system must have unique User ID and administrative system ID. For user ID creation, there must be a control procedure to ensure the proper verification of all users. Each user ID must be specified with its responsibility prior to the user ID assignment. Each user ID can't be shared among users. The system log is needed to keep track of the system usage.

(2) Authentication

The aim is to authenticate users through the use of the user ID. System security parameters must be configured to ensure the password secrecy. In general, specification of minimum length, non-display password is the

37

practical password feature. In addition, the password must not be revealed to others to protect the system from unauthorized access and alteration.

(3) Authorization

The system must define the authorized level of all users based on the accessing area in advance according to the sensitivity of data and software. The data owner is responsible for evaluating the right and responsibility of each user before assigning user ID. The user right must be reevaluated every 6 months to ensure the appropriate authorization in the system.

(4) Auditing

The system must have an audit trail that records all transactions done by each user. It is used for investigating an unauthorized access and alteration in the system. The authorized person must review auditing on a consistent basis.

(5) Production Environment

The control procedure must be set up to control the program migration to production environment because malicious program code can cause loss of organization assets. Duty of segregation is applied to test the developed software and accepted as a new application.

(6) Backup and Recovery

Data security,this method involves in minimizing data destruction risks.Backup data will be done in storage media every week.The proposed system must protect information from damages and loss of assets because of several kinds of disasters. The procedure must be identified to ensure that information will be available for users in any circumstance. Backup must be done on a periodical basis from the production system to the backup system.

The HongKong Gift Company has its own backup server to protect the loss of data cause of damages. For the flight database, the backup is done at the same time with main database server to avoid conflict reservation because all tour agents are accessing the flight database as the central database all the time. For the rest, the backup can be done daily. For recovery area, it must clarify how to restore information from the backup system into production with a minimum period of time.

3.8 Cost And Benefit Analysis

One of the tasks for the system designer is to show the management saving and improving the organization with the new system substantial enough to justify replacing the old system. Economic feasibility has been defined as a cost-benefit analysis. The details of both cost and benefit of the new system compared with the old system must be defined.

The system design should not only detail the capabilities of the new system, but it should also show the costs and benefits of a new system. Therefore, the analyst can weigh the costs and benefits of each alternative. Costs fall into two categories, developing and operating system cost. System development costs are the costs that occurred on developing the project such as people-ware cost, training cost, etc.

The operating costs tend to recur throughout the lifetime of the system such as office supplies cost, miscellaneous cost, salaries cost, and others. The benefits of the new system are presented in both tangible and intangible terms. Finally, the analysis technique, which performs break-even analysis between accumulated annual cost and

accumulated purposed cost, and payback period of proposed system show benefits over the cost after the proposed system is developed to replace the existing system.

(1)   Cost of existing system

The existing system is operated manually and incurs both fixed cost and annual operating cost. For fixed costs, there is only office equipment cost and for annual operating cost, it includes salary cost and office supplies & miscellaneous expense. The details of the existing system cost are summarized in Table 3.8.

Table 3.8. Cost of Manual System, in Baht.

Cost Items		Years				
		1	2	3	4	5
Fixed Cost	-					
Laser Printer	1 unit @120000	24,000.00	24,000.00	24,000.00	24,000.00	24,000.00
Dot Matrix Printer	1 unit @17346	3,500.00	3,500.00	3,500.00	3,500.00	3,469.20
Pentium II 500 Mz	2 unit @36000	14,400.00	14,400.00	14,400.00	14,400.00	14,400.00
Total Fixed Cost		41,900.00	41,900.00	41,900.00	41,900.00	41,900.00
Operating Cost						
Salary Cost						
Manager	1 person@20,000	20,000.00	22,000.00	24,200.00	26,620.00	29,282.00
2 Stock officers	1 person@15,000	30,000.00	33,000.00	36,300.00	39,930.00	43,923.00
Sales Staff and Receiving Clerk	4 persons@12000	48,000.00	52,800.00	58,080.00	63,888.00	70,276.80
Total Monthly Salary Cost		98,000.00	107,800.00	118,580.00	130,438.00	143,481.80
Total Annual Salary Cost		1,176,000.00	1,293,600.00	1,422,960.00	1,565,256.00	1,721,781.60
Office Supplies & Miscellaneous Cost						
Stationary	38,000 Per Annum	38,000.00	41,800.00	45,980.00	50,578.00	55,635.80
Paper	43,000 Per Annum	43,000.00	47,300.00	52,030.00	57,233.00	62,956.30
Utility	37,000 Per Annum	37,000.00	40,700.00	44,770.00	49,247.00	54,171.70
Miscellaneous	25,000 Per Annum	25,000.00	27,500.00	30,250.00	33,275.00	36,602.50
Total Annual Office Supplies & Miscellaneous Cost		143,000.00	157,300.00	173,030.00	190,333.00	209,366.30
Total Annual Operating Cost		1,319,000.00	1,450,900.00	1,595,990.00	1,755,589.00	1,931,147.90
Total Manual System Cost		1,360,900.00	1,492,800.00	1,637,890.00	1,797,489.00	1,973,047.90

Table 3.9. Five Year Accumulated Manual System Cost, in Baht.

Year	Total Manual Cost	Accumulated Cost
1	1,360,900.00	1,360,900.00
2	1,492,800.00	2,853,700.00
3	1,637,890.00	4,491,590.00
4	1,797,489.00	6,289,079.00
5	1,973,047.90	8,262,126.90
Total	8,262,126.90	-

(2)   Cost of the proposed system

The proposed system cost is also classified into fixed cost and annual operating cost. Fixed cost includes hardware cost, software cost, people-ware cost, maintenance, and implementation cost. The annual operating cost includes salary cost and office supplies and miscellaneous cost.The proposed system requires computer hardware and software. Therefore, the maintenance cost for hardware and software will be paid. In the first year of the proposed system, maintenance charge cost is counted. Moreover, the additional salary is paid to the people such as system analyst, programmers and network specialist who will develop the new system concerned. Besides, training and installation cost are spent according to the project budget. The details of the proposed system cost are summarized in Table 3.10.
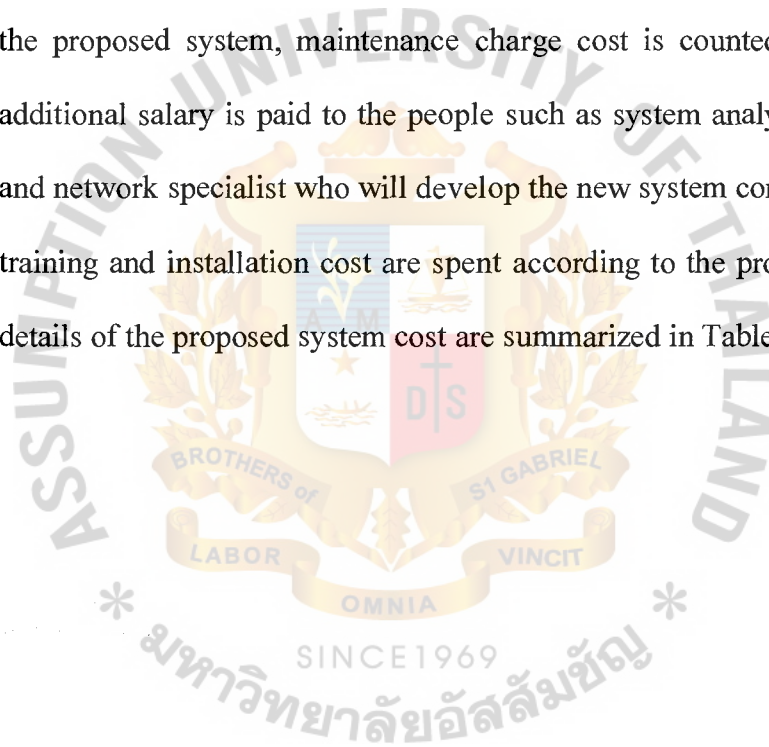
Table 3.10. Estimated Cost of Proposed System, in Baht.

Cost Items		Years				
		1	2	3	4	5
Fixed Cost	-					
1.Hardware Cost:	-					
Database Server	1 unit @60000	12,000.00	12,000.00	12,000.00	12,000.00	12,000.00
Dot Matrix Printer	3 unit@6000	3,200.00	3,200.00	3,200.00	3,200.00	3,200.00
Laser Printer	1 unit@35000	7,000.00	7,000.00	7,000.00	7,000.00	7,000.00
Client Machine	3 unit @20000	12,000.00	12,000.00	12,000.00	12,000.00	12,000.00
UPS	1 unit @4000	800.00	800.00	800.00	800.00	800.00
Total Hardware Cost		35,400.00	35,400.00	35,400.00	35,400.00	35,400.00
2.Software Cost						
Database Software	1 License@20,000	4,000.00	4,000.00	4,000.00	4,000.00	4,000.00
Total Software Cost		6,000.00	6,000.00	6,000.00	6,000.00	6,000.00
People-Ware Cost						
System Analyst	2 months@35,000	70,000.00				
3 Programmer	3 months@17000	153,000.00				
Network Specialist	1 months@35,000	35,000.00				
Total People-Ware Cost		258,000.00				
Maintenance Cost:						
Hardware Maintenance Cost			4,500.00	4,500.00	4,500.00	4,500.00
Software Maintenance Cost			3,000.00	3,000.00	3,000.00	3,000.00
Total Maintenance Cost			7,500.00	7,500.00	7,500.00	7,500.00
Implementation Cost:						
Training Cost		20,000.00				
Installation Cost		6,000.00				
Total Implementation Cost		26,000.00				
Total Fixed Cost		325,200.00	48,700.00	48,700.00	48,700.00	48,700.00
Operating Cost						
People-Ware Cost:						
User:						
Manager	1 person@20,000	20,000.00	22,000.00	24,200.00	26,620.00	29,282.00
Sales Staff and Receiving Clerk	3 person@10,600	31,800.00	34,980.00	38,478.00	42,325.80	46,558.38
System Administration:						
System Analyst	1 person@18,000	18,000.00	19,800.00	21,780.00	23,958.00	26,353.80
Network Administrator	1 person@18,000	18,000.00	19,800.00	21,780.00	23,958.00	26,353.80
Total Monthly Salary Cost		87,800.00	96,580.00	106,238.00	116,861.80	128,547.98
Total Annual Salary Cost		1,053,600.00	1,158,960.00	1,274,856.00	1,402,341.60	1,542,575.76
Office Supplies & Miscellaneous Cost						
Stationary	32,000 Per Annum	30,000.00	33,000.00	36,300.00	39,930.00	43,923.00
Paper	18,000 Per Annum	18,000.00	19,800.00	21,780.00	23,958.00	26,353.80
Utility	36,000 Per Annum	34,000.00	37,400.00	41,140.00	45,254.00	49,779.40
Miscellaneous	18,000 Per Annum	18,000.00	19,800.00	21,780.00	23,958.00	26,353.80
Total Annual Office Supplies & Miscellaneous Cost		100,000.00	110,000.00	121,000.00	133,100.00	146,410.00
Total Operating Cost		1,153,600.00	1,268,960.00	1,395,856.00	1,535,441.60	1,688,985.76
Total Computerized System Cost		1,478,800.00	1,317,660.00	1,444,556.00	1,584,141.60	1,737,685.76

43

Table 3.11. Five Year Accumulated Computerized Cost, in Baht.

Year	Total Computerized Cost	Accumulated Cost
1	1,478,800.00	1,478,800.00
2	1,317,660.00	2,796,460.00
3	1,444,556.00	4,241,016.00
4	1,584,141.60	5,825,157.60
5	1,737,685.76	7,562,843.36
Total	7,562,843.36	-

(3)   Comparison of system cost

After the existing system cost and proposed system cost are identified, the comparison table is constructed to reveal the cost saving after implementing the proposed system. The figures of the comparison of the system cost are summarized in Table 3.12.

Table 3.12. The comparison of the Accumulated Manual Cost and Accumulated Proposed Costs, in Baht.

Year	Accumulated Manual Cost	Accumulated Proposed Cost
1	1,360,900.00	1,478,800.00
2	2,853,700.00	2,796,460.00
3	4,491,590.00	4,241,016.00
4	6,289,079.00	5,825,157.60
5	8,262,126.90	7,562,843.36

(4)   Benefit Analysis

The benefit of the proposed system can be classified into tangible and intangible benefits. The tangible benefit can be expressed in monetary value,

44

whereas the intangible benefit is qualitative, and difficult to measure. The details of these benefits can be summarized as follows:

Tangible Benefits

Tangible benefits can be measured in value (Baht). Tangible benefits are realized when the proposed system is projected to save money. After implementing the new system for Hongkong Gift Company, the organization will receive benefits which are as follows :

(1) More efficient work is achieved through increase in speed of processing for each department to connect each other to exchange information or send data to storage.More efficient database designs and reduced redundancy enable the company to decrease the amount of employee time needed to complete a specific task.

(2) The need to hire addition people is reduced. Each year, the company needs more employees to support their business; so the cost of organization will increase every year. To solve this problem, the company decided to use a computer system instead.

(3) Employees' workload has reduced by using computerized system ,so they can save their time to do other works such as summary reports, and use them to analyze future planning.

(4) Other benefits such as improvement of accuracy of stock and budget in the organization,faster service,reduction in unnecessary forms, cost of paper and overtime are also attained by using the new system.

Table 3.13.   Tangible Benefits of Proposed System, in Baht.

Benefit Item		Price
Cost Saving:		
Salary Cost:		
2	Assistant Manager(15000.00 Baht per month)	360,000.00
	Staff(18000.00 Baht per month)	216,000.00
	Total Salary Cost:	**576,000.00**
Office Supplies Cost:		
	Paper Cost (2083 Baht per month)	24,996.00
	Stationary(500 Baht per month)	6,000.00
	Utility(83 Baht per month)	1,000.00
	Total Office Supplies Cost:	**31,996.00**
Miscellaneous Expenses:		
	Telephone Call (600.00 Baht per month)	7,200.00
	Total Miscellaneous Expenses:	7,200.00
	Total Cost Saving:	**615,196.00**
Operation Time Improvement		
	Manager(9000.00 Baht per month)	108,000.00
	Staff (15000.00 Baht per month)	180,000.00
	Total Operation Time Improvement	**288,000.00**
Elimination of the possible long run cost		
	Manager(12,000.00 Baht Per Month)	144,000.00
	Staff(28000.00 Baht per month)	336,000.00
	Total Long Run Cost Elimination	480,000.00
Total Tangible Benefit:		**1,383,196.00**

Intangible Benefits

Intangible are benefits that accrue in the organization due to the information system that are difficult to measure but important. System provides the intangible benefits as follows:

(1)   Reduce the risk of human errors.

(2)   Improve the decision making and planning process.

(3)   Reduce the volume of paper work produced and handled.

(4)   Provide on time, accurate and efficient operations.

(5) Payback Period

Payback period is the commonly used technique to assess the value of investment. Generally, payback period is the period within which cash inflow from the project can recover the initial investment of the project. To reflect the real value of money, the time value of money concept is also applied in this analysis. With adjusted costs and benefit, the discount rate of 3% to account for the time value of money concept is also applied in this analysis. The discount rate is required to calculate the discounted value of all costs and benefits after the first year back to the present year. The payback period of the proposed system is calculated to evaluate the candidate solution (see the full details of payback calculation in Appendix C.) The result of payback period of proposed system is 1 year and 7 months.

(6) Break-even Analysis

Break-even Analysis shows the point where the accumulative cost of the existing system is equal to the accumulative cost of the proposed system. At the beginning, the cost of the proposed system is higher than the cost of the current system. This difference comes from the development cost incurred at the first year of the new system implementation. But, in the long term, the proposed system can reduce the annual operating cost, especially salary cost and office supplies cost.

The break-even point of the proposed system is shown in Figure 3.1. The proposed system cost is less than the existing system cost when the time passes the second year. Thus, it can be concluded that the break-even point will occur approximately 7 months after the system has been operated. This result is satisfactory for investing and implementing the proposed system.

47

Table 3.14. Payback Period Analysis of the Proposed System.

Cost Items	Year0	Year1	Year2	Year3	Year4	Year5
Development Cost:	-368,000					
Annual Operating Cost:		-1,165,100	-1,281,610	-1,409,771	-1,550,748	-1,705,823
Discount Factor for 10%	1.000	0.909	0.826	0.715	0.683	0.621
Time Adjusteed Costs(adjusted to present value)	-368,000	-1,059,075	-1,058,609	-1,007,986	-1,059,160	-1,059,316
Cumulative time-adjusted cost over life time:	-368,000	-1,427,075	-2,485,684	-3,493,670	-4,552,830	-5,612,146
Benefit derived from operation of the new system:	0	1,383,196	1,521,516	1,673,667	1,841,034	2,025,137
Discount Factor for 10%	1.000	0.909	0.826	0.715	0.683	0.621
Time Adjusteed benefits (adjusted to present value)	0	1,257,325	1,256,772	1,196,671	1,257,426	1,257,610
Cumulative time-adjusted benefit over life time:	0	1,257,325	2,514,097	3,710,768	4,968,194	6,225,804
Cumulative ligetime-adjusted costs+benefits:	-368,000	-125,871	28,413	217,098	415,364	613,658

Accumulated Cost, baht

Figure 3.1.   Break-even Analysis.
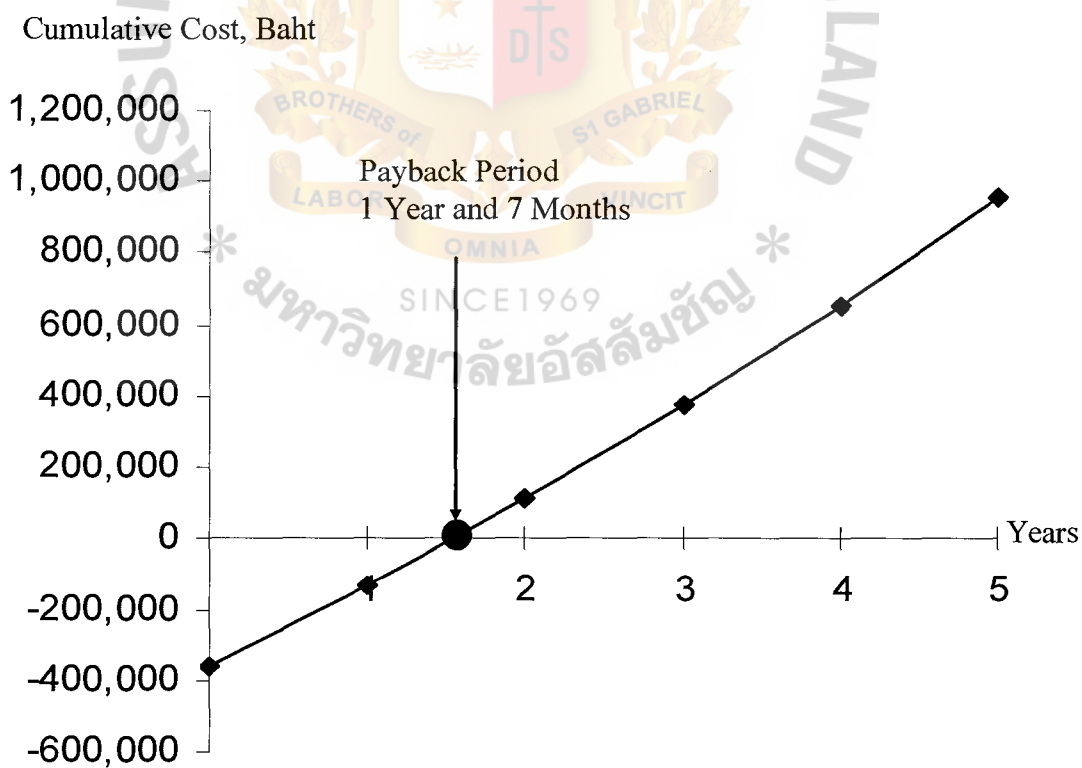
Cumulative Cost, Baht

Figure3.2. Payback Period Analysis of the Proposed System.

IV.   PROJECT IMPLEMENTATION

4.1   Implementation Plan

Implementation of the new system involves a partial installation.Since analysis and design of the proposed system have been done, proposed system is ready to be implemented to replace the existing operation. The system implementation can be the most frustrating time of the project due to the problems that were not discovered during the development. The typical processes of system implementation are presented in brief details as follows:

(1)   Hardware and Software Acquisition and Installation

The user may have new requirements after using the new system.The existing hardware and software resources can be utilized with some additional maintenance cost and license fee except for database server, which must be newly purchased and installed.

(2)   Personal Training

The development team should be prepared for these problems and be prepared for the purpose modification of the program too.Training is provided to the end-user and system administrator. The purpose of training is to give more understanding of the new system to all relevant users, and the system administrator. System administration training focuses on technical aspects of the proposed system. It describes how to configure and control the system, such as maintaining and creating new user ID and password.

(3) Site and Data Preparation

The IT Department is responsible for preparing the site to implement the new system. Network cabling and other facilities are set up before the new system is implemented.

(4) System Testing

Testing is conducted to ensure that the proposed system is working properly. If all testing results are satisfactory, the proposed system is ready for conversion.

(5) Conversion Plan

The conversion plan must be prepared by the development team to be used as a guideline for converting the existing into the proposed system. The main objective of conversion plan is to ensure that the responsible persons and tasks are clearly identified. This would help the conversion process to operate smoothly.

4.2 Stages of Project Implementation

To simplify the implementation process, the overall processes can be divided into two main stages, with the details as described below:

(1) Construction Stage

This stage aims to develop the information system that can fulfill the business objectives. After the system development is complete, testing needs to be done to ensure that it would operate properly. Prior to the system testing, the following task must be completed first- hardware and software acquisition and installation, and site and data preparation.

51

(2) Delivery Stage

The objective of this stage is to make the system conversion to be as smooth as possible without any disruption to the existing system. It includes network configuration, training manual preparation and conversion plan.

After the proposed system is launched in the production environment, users should evaluate the system performance in order to identify the difficulties that are discovered in the operation.

4.3 Training Plan

Before the proposed system is fully implemented, the training package and documentation must be prepared for users and system administrators. Any useful document must be collected to provide the user manual for the new system operation.

After the system is implemented, the organization will review it to determine whether the system meets expectations and whether improvements are needed, and to check whether the proposed system is compatible and suitable for solving existing problems or not.

The user manual explains how to use the computerized system in the work place. Moreover, all system features must be described for system administrators for them to be able to configure it correctly. The training required for each user group must be reviewed based on the requirements. Training should also encourage group learning possibilities, as it would reduce the learning curve of users.Testing for the new system is an important step, although it may take a long time to test and prepare data for this, but it is necessary to ensure that there is no error for the new system to be implemented. Testing is the best way when the user departments are asked to assist in identifying all possible situations that might occur.

(1) Code testing:

To test program module is to examine logic of the program so that the result in executing module should return correct results or expected results, or testing an individual program to ensure that it performs according to the program specifications.

(2) Specification testing:

The specification test is performed to test what the program should do or how it will perform under the various conditions such as peak load testing,storage testing, and performance time testing.

(3) Recovery testing:

This is done to make sure that a back up will be created for all data everyday or every week in order to solve the problems such as damaged data and loss of data.It will also ensure that all files can be reconstructed if they are totally destroyed. This is done by the operating system.

(4) Human factor testing:

This is to test human ability or understanding of the new system regarding, how to adapt their routine work to the new system; how the new system operate;etc.which may require time and training.

4.4 Conversion

This project selected the use of parallel system method. This method converts the old system to the new system carefully. This is done to ensure that all major problems in the new system have been met and solved before the old system is discarded. Parallel conversion minimizes the risk of major flaws in the new system causing irreparable harm to the business.

4.5 System Maintenance

When the proposed system has been placed into operation, the on-going maintenance of the system needs to be done. There are two types of maintenance to be carried out after installation of the new system. They are program maintenance and system improvement. The purpose of program maintenance is to fix any possible program errors that occur after the system is implemented. The system analyst and programmer must coordinate to solve the program bugs and, sometimes, advise the users to fix the system troubles by themselves.

After the proposed system installation, performance evaluation is necessary to be carried out with a standard measurement of system capacity. The evaluation result will serve as the criteria in decision making for further system improvement. This system evaluation and improvement can be done quarterly to make sure that the system is still working in the current situation.

V. CONCLUSIONS AND RECOMMENDATOINS

5.1 Conclusions

As stated in the objectives, the created report has introduced some basic concepts of OOA and OOD, which consist of object model diagram as well as object class model diagram.This new computerized system is developed to analyze, design and implement the E-Commerce System for HongKong Gift Company to facilitate the routine tasks of employees, eliminate the complexity of passing documents, provide better service to customers and improve the transaction process.

According to the Systems Design Approaches, which are major strategies or techniques for performing systems design, the techniques will be classified in order to assign for specific task with different design purposes.In the existing system, all activities have been done manually that made the company face many problems in handling the transactions like cost for excessive paper, and cost of communication in tracing previous record, and information for their customers. As mentioned earlier, the Structured Approach encourages Entity Relationship Diagram (data model) to symbolize each related information attribute with data oriented diagram as well as Data Flow Diagram (process model) to represent the flow of data throughout the whole system.

The new system is designed to meet the requirement of users and management. It can provide better service to the customers and help staff to do their routine tasks quickly and effectively. Moreover, the new computer system makes the company need fewer employees to operate entire system. However, the Object Oriented Approach is the other important technique that uses a model-driven technique to integrate data and

55

process concerns into constructs called objects. The model-driven technique is the drawing of pictorial system models that are derived from logical models.

Table 5.1 shows the time spent on each process of the Existing System compared to the Proposed System. It shows that each process of the Proposed System uses less amount of time to finish the mission. This can explain that the Proposed System is far more efficient and effective than the Existing System.

Table 5.1.   Degree of Achievement of the Proposed System.

Process	Existing System	Proposed System
Enquiry Process	25 Minutes	3 Minutes
Order Process	30 Minutes	5 Minutes
Cancel Order Process	25 Minutes	4 Minutes
Payment Process	30 Minutes	3 Minutes
Report Generation	120 Minutes	5 Minutes

5.2 Recommendations

The new system definitely changes staff's operation from manual to a computerized system. Most of the staff may resist the new system at first.In order to make conversion easier, the manager should make the users have positive attitudes toward the new system and provide more training courses to cause familiarization soon. Users from each apartment have to be involved and participate in all activities. Feedback from users will be valuable information for the evaluation of the new system after the implementation. The evaluation should be conducted three months after the implementation.

The new proposed system tends to use the program that is easy for users to use and operate. This system is designed to be the Client/Server architecture that can be used to interact within and outside the company.The new system should be

implemented using the parallel conversion method to ensure that the system works correctly and efficiently. After the system proves itself to be capable of replacing the existing system, we can terminate using the existing system.

User training sessions should be held regularly during the first stage of the new system's operations so that they can perform the procedures more efficiently using the improved aspects of the system. System administrators must also study the proposed system in order to troubleshoot the difficulties that may occur with the proposed system. In the future, the system should be integrated with accounting system and management information system.

The use of e–commerce nowadays has continuously been growing with the popularization of the Internet.However, people do not trust the Internet and are concerned with security completely.

In addition, the developed system may be expanded to support EDI (Electronic Data Interchange) for company in the future. EDI is the direct computer-to-computer exchange between two organizations of standard business transaction documents. EDI lowers transaction costs because transactions can be automatically transmitted from one information system to another through a telecommunications network, eliminating the printing and handling of paper at one end and the inputting of data at the other.

APPENDIX   A

ENTITY RELATIONSHIP DIAGRAMS

ENTITY RELATIONSHIP DIAGRAMS
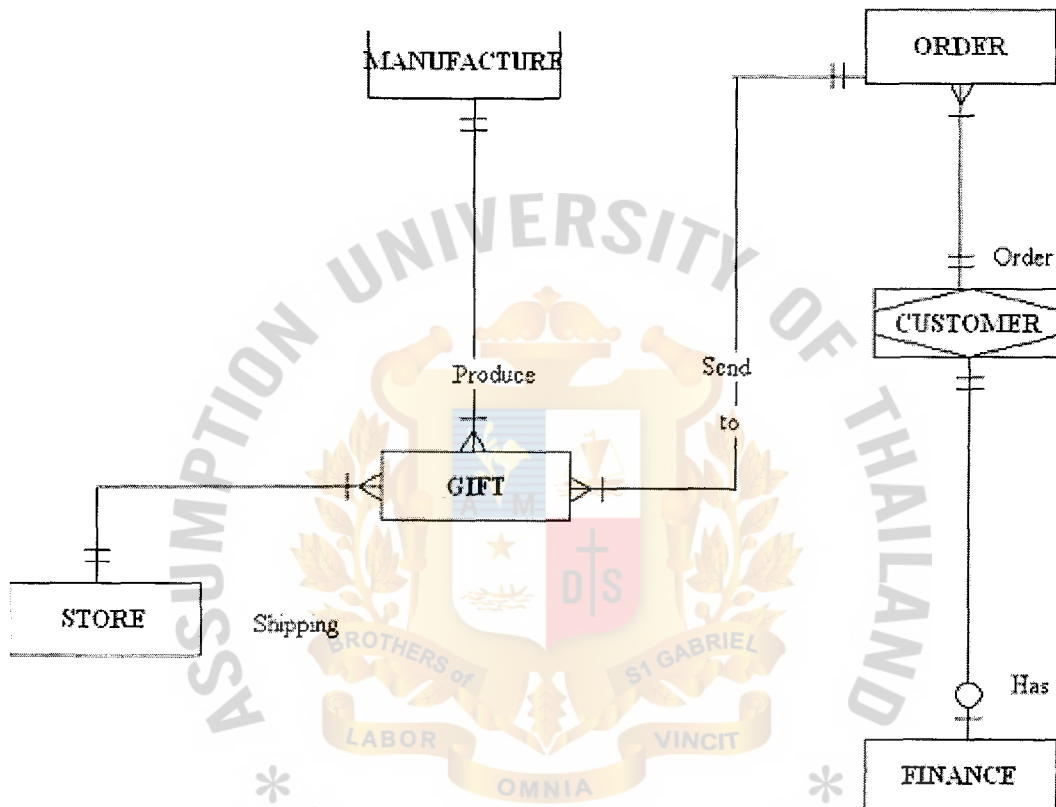
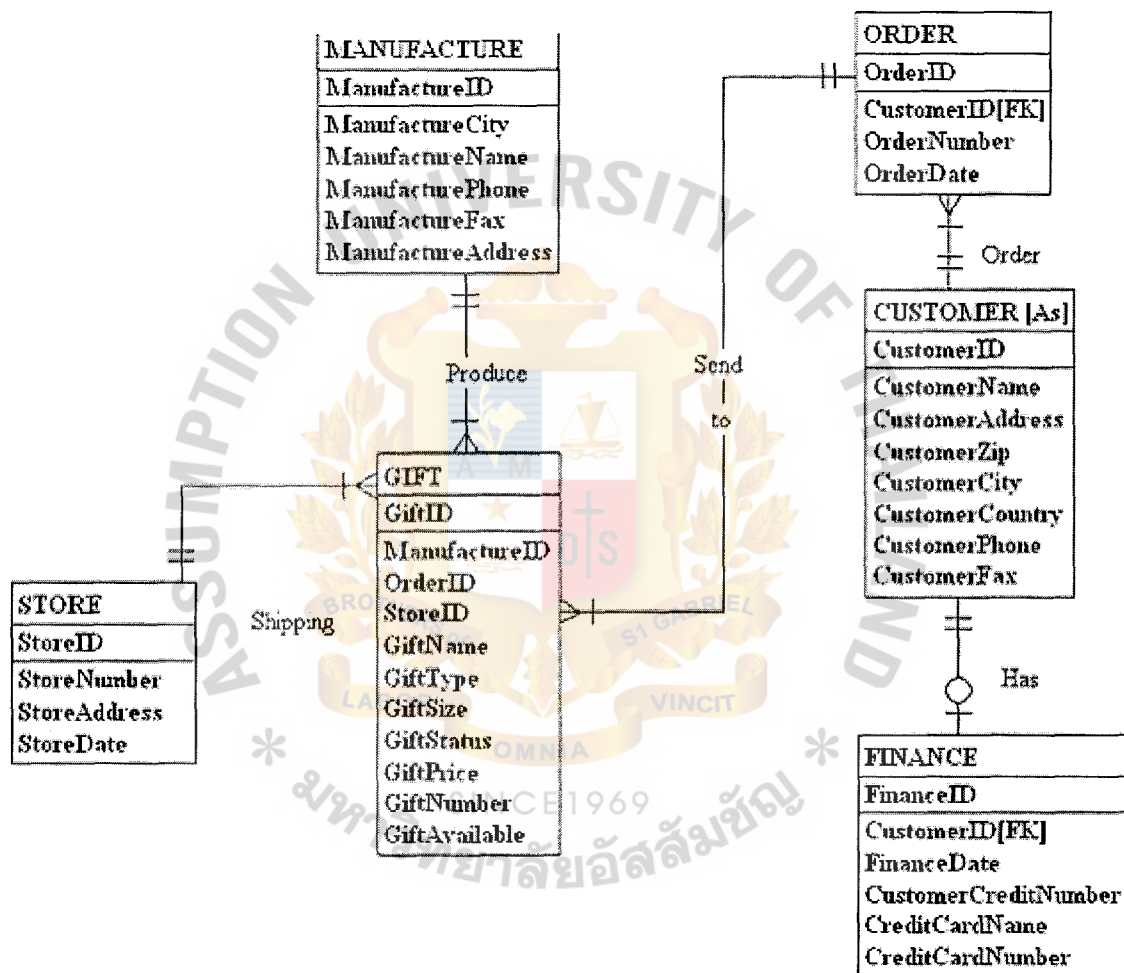Figure A.1.   Context Data Model of the Proposed System

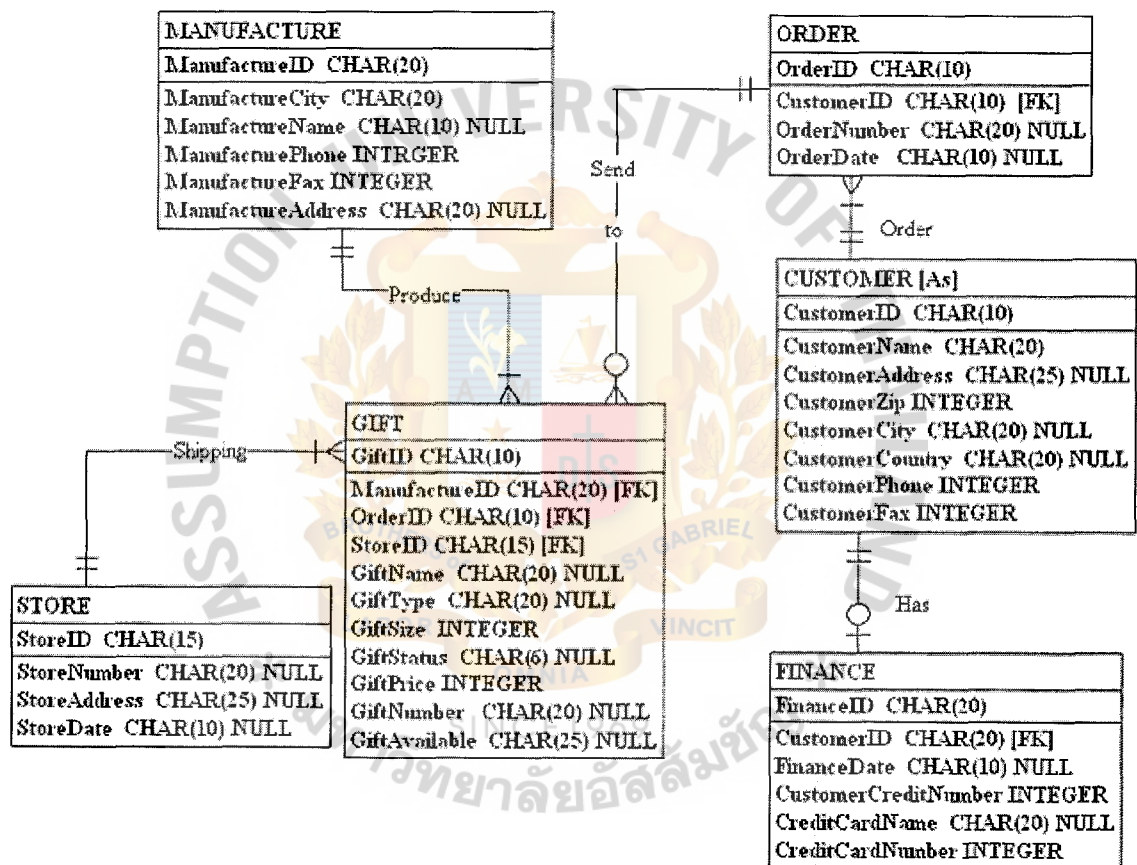Figure A.2. Logical Entity Relationship Diagram of the Proposed System

59

Figure A.3. Physical Entity Relationship Diagram of the Proposed System

APPENDIX   B
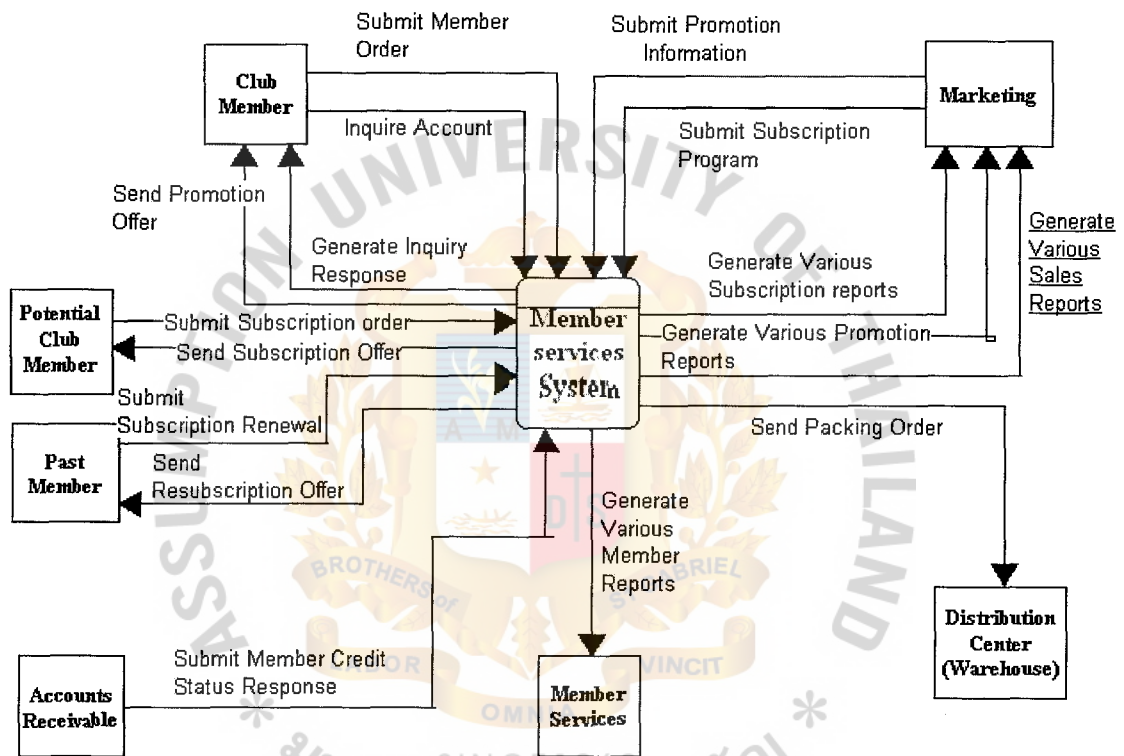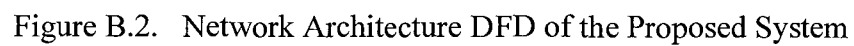
DATA FLOW DIAGRAMS

DATA FLOW DIAGRAMS

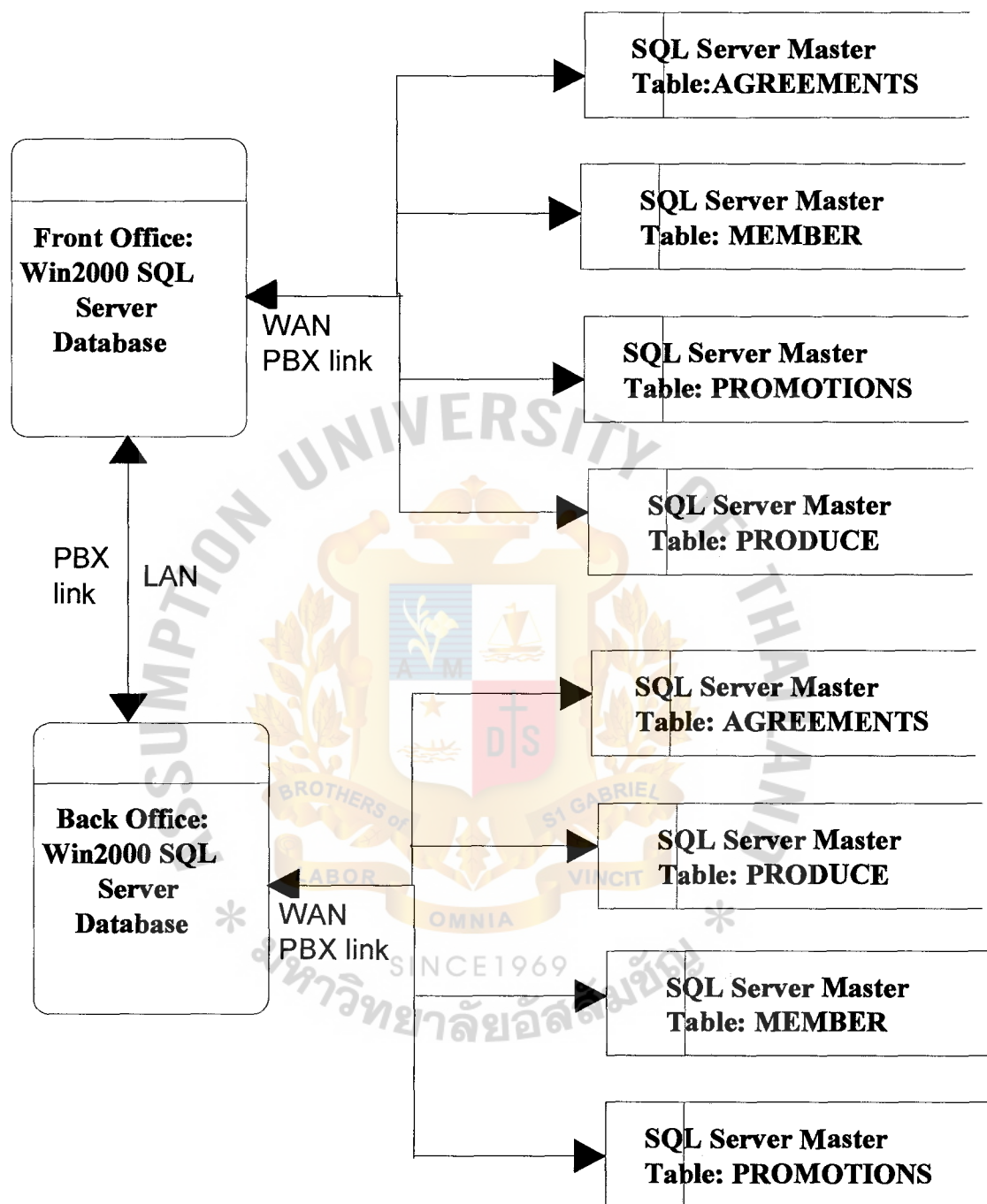Figure B.1.   Context Data Flow Diagram of the Proposed System

Figure B.2. Network Architecture DFD of the Proposed System

Figure B.3. Data Distribution and Technology Assignments Diagram

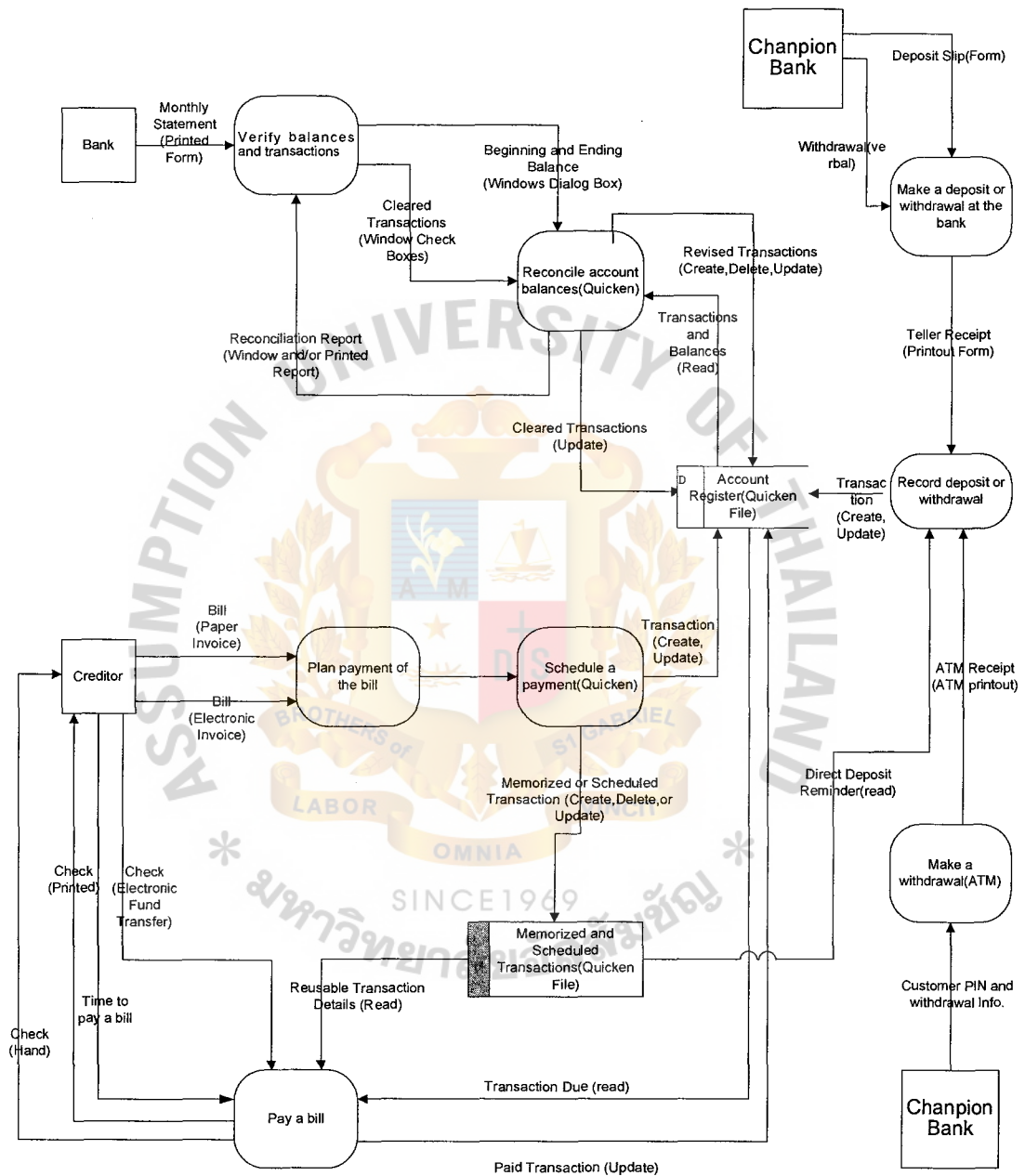of the Proposed System
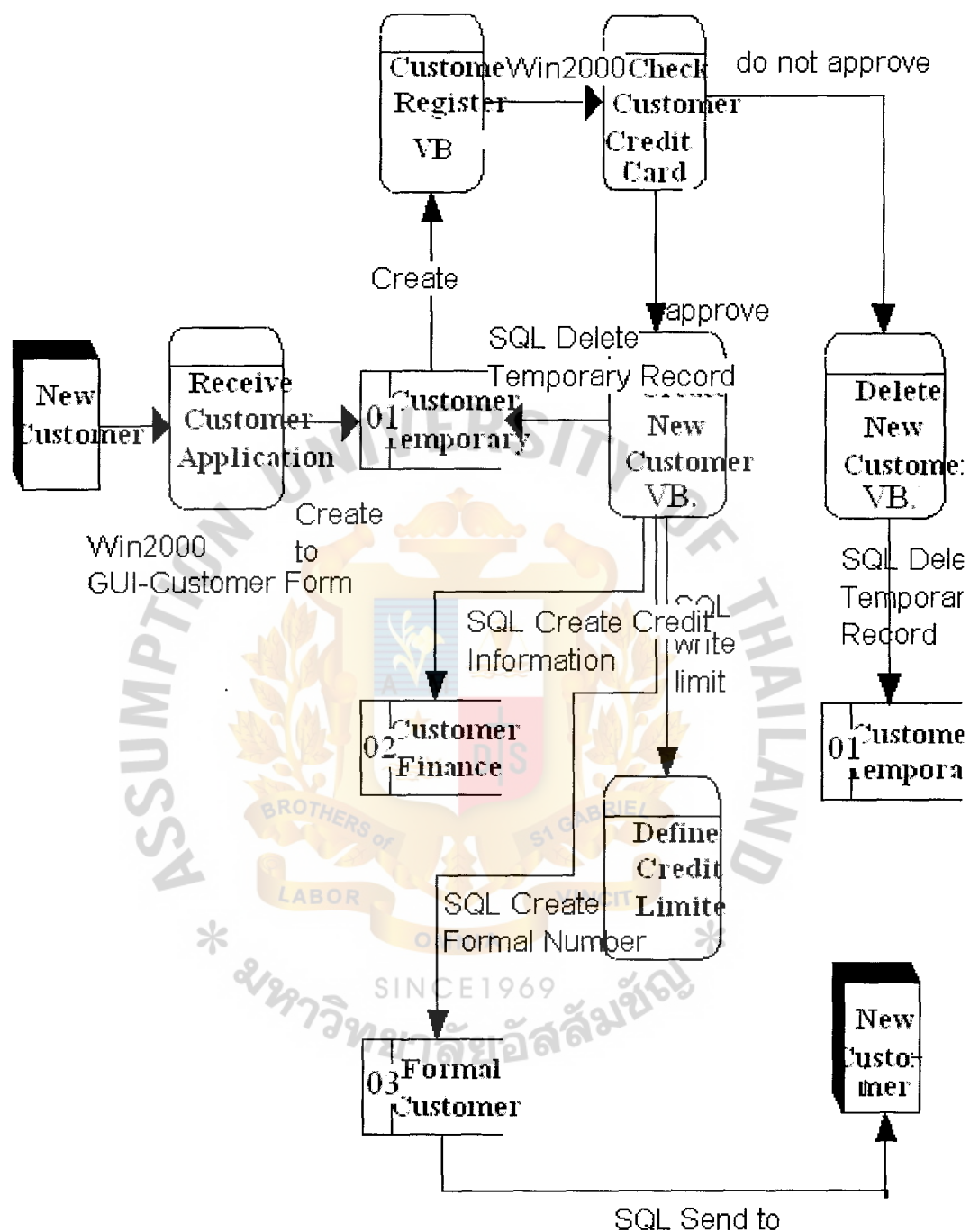
Figure B.4. Physical DFD for Registering New Customers of the Proposed System

Figure B.5. Physical Data Flow Diagram(DFD) for balance

of the Proposed System

65

APPENDIX   C

CANDIDATE SOLUTION ANALYSIS

CANDIDATE SOLUTION ANALYSIS

Table C.1. Estimated Cost of Candidate 1, in Baht.

Cost Items	Price
Development Cost:	
Hardware:	
1 Server	60,000.00
- Clients	0.00
1 UPS	4,000.00
Total Hardware Cost:	**64,000.00**
Software	
1 Server Software	20,000.00
- Clients Software	0.00
Travel Agent Package Software	250,000.00
Total Software Cost:	**270,000.00**
Personal:	
1 System Analyst(1 months @ 35,000)	35,000.00
1 Network Specialist(1 months @ 35000)	35,000.00
Toal Personal Cost:	**70,000.00**
Implementation:	
Training Cost	60,000.00
Installation Cost	30,000.00
Total Implementation Cost:	90,000.00
Total Development Cost:	**494,000.00**
Project Annual Operating Cost:	
User:	
1 Manager(20,000.00 Baht per month)	240,000.00
3 Staff(10000.00 Baht per month)	360,000.00
System Support	
1 System Analyst(18000.00 Baht per month)	216,000.00
1 Network Administrator(18000.00 Baht per month)	216,000.00
Office Supplies & Miscellaneous Cost:	
Stationery(2666.67 Baht per month)	32,000.00
Paper(1500.00 Baht per month)	18,000.00
Utility(3000.00 Baht per month)	36,000.00
Miscellaneous Expense(1500.00 Baht per month)	18,000.00
Maintenance Cost:	
Hardware Maintenance Cost(2083.00 Baht/5 years)	5,000.00
Software Maintenance Cost(1250.00 Baht/5 years)	30,000.00
Annual Operating Cost	**1,171,000.00**
Total Annual Cost:	**1,665,000.00**

Table C.2. Estimated Cost of Candidate 2, in Baht.

Cost Items		Price
Development Cost:		
Hardware:		
1	Server	60,000.00
-	Clients	0.00
1	UPS	4,000.00
	Total Hardware Cost:	**64,000.00**
Software		
1	Server Software	20,000.00
-	Clients Software	0.00
	Total Software Cost:	**20,000.00**
Personal:		
1	System Analyst(2months @ 35,000)	70,000.00
3	Programmer(3 months @17000)	153,000.00
1	Network Specialist(1 months @ 35000)	35,000.00
	Toal Personal Cost:	**258,000.00**
Implementation:		
	Training Cost	20,000.00
	Installation Cost	6,000.00
	Total Implementation Cost:	26,000.00
	Total Development Cost:	**368,000.00**
Project Annual Operating Cost:		
User:		
1	Manager(20,000.00 Baht per month)	240,000.00
3	Staff(10600.00 Baht per month)	381,600.00
System Support		
1	System Analyst(18000.00 Baht per month)	216,000.00
1	Network Administrator(18000.00 Baht per month)	216,000.00
Office Supplies & Miscellaneous Cost:		
	Stationery(2666.67 Baht per month)	32,000.00
	Paper(1500.00 Baht per month)	18,000.00
	Utility(3000.00 Baht per month)	36,000.00
	Miscellaneous Expense(1500.00 Baht per month)	18,000.00
Maintenance Cost:		
	Hardware Maintenance Cost(1875.00 Baht/5 years)	4,500.00
	Software Maintenance Cost(1250.00 Baht/5 years)	3,000.00
	Annual Operating Cost	**1,165,100.00**
	Total Annual Cost:	**1,533,100.00**

Table C.3. Estimated Cost of Candidate 3, in Baht.

Cost Items	Price
Development Cost:	
Hardware:	
1 Server	60,000.00
- Clients	0.00
1 UPS	4,000.00
Total Hardware Cost:	**64,000.00**
Software	
1 Server Software	50,000.00
- Clients Software	0.00
Total Software Cost:	**50,000.00**
Personal:	
1 System Analyst(3 months @ 35,000)	105,000.00
2 Programmer(3 months @30000)	180,000.00
1 Network Specialist(1 months @ 30000)	30,000.00
Toal Personal Cost:	**315,000.00**
Implementation:	
Training Cost	60,000.00
Installation Cost	20,000.00
Total Implementation Cost:	80,000.00
Total Development Cost:	**509,000.00**
Project Annual Operating Cost:	
User:	
1 Manager(20,000.00 Baht per month)	240,000.00
3 Staff(10000.00 Baht per month)	360,000.00
System Support	
1 System Analyst(20000.00 Baht per month)	240,000.00
1 Network Administrator(20000.00 Baht per month)	240,000.00
Office Supplies & Miscellaneous Cost:	
Stationery(2666.67 Baht per month)	32,000.00
Paper(1500.00 Baht per month)	18,000.00
Utility(3000.00 Baht per month)	36,000.00
Miscellaneous Expense(1500.00 Baht per month)	18,000.00
Maintenance Cost:	
Hardware Maintenance Cost(5000.00 Baht/5 years)	12,000.00
Software Maintenance Cost(8333.00 Baht/5 years)	20,000.00
Annual Operating Cost	**1,216,000.00**
Total Annual Cost:	**1,725,000.00**

Table C.4. Payback Period for Candidate 1, in Baht.

Cost Items	Year0	Year1	Year2	Year3	Year4	Year5
Development Cost:	-494,000					
Annual Operating Cost:		-1,171,000	-1,288,100	-1,416,910	-1,558,601	-1,714,461
Discount Factor for 10%	1.000	0.909	0.826	0.715	0.683	0.621
Time Adjusteed Costs(adjusted to present value)	-494,000	-1,064,439	-1,063,970	-1,013,090	-1,064,524	-1,064,680
Cumulative time-adjusted cost over life time:	-494,000	-1,558,439	-2,622,409	-3,635,499	-4,700,023	-5,764,703
Benefit derived from operation of the new system:	0	1383,196	1,521,516	1,673,667	1,841,034	2,025,137
Discount Factor for 10%	1.000	0.909	0.826	0.715	0.683	0.621
Time Adjusted benefits (adjusted to present value)	0	1,257,325	1,256,772	1,196,671	1,257,426	1,257,610
Cumulative time-adjusted benefit over life time:	0	1,257,325	2,514,097	3,710,768	4,968,194	6,225,804
Cumulative ligetime-adjusted costs+benefits:	-494,000	-301,114	-108,312	75,269	268,171	461,101

Table C.5. Payback Period for Candidate 2, in Baht.

Cost Items	Year0	Year1	Year2	Year3	Year4	Year5
Development Cost:	-368,000					
Annual Operating Cost:		-1,165,100	-1,281,610	-1,409,771	-1,550,748	-1,705,823
Discount Factor for 10%	1.000	0.909	0.826	0.715	0.683	0.621
Time Adjusteed Costs(adjusted to present value)	-368,000	-1,059,075	-1,058,609	-1,007,986	-1,059,160	-1,059,316
Cumulative time-adjusted cost over life time:	-368,000	-1,427,075	-2,485,684	-3,493,670	-4,552,830	-5,612,146
Benefit derived from operation of the new system:	0	1,383,196	1,521,516	1,673,667	1,841,034	2,025,137
Discount Factor for 10%	1.000	0.909	0.826	0.715	0.683	0.621
Time Adjusteed benefits (adjusted to present value)	0	1,257,325	1,256,772	1,196,671	1,257,426	1,257,610
Cumulative time-adjusted benefit over life time:	0	1,257,325	2,514,097	3,710,768	4,968,194	6,225,804
Cumulative ligetime-adjusted costs+benefits:	-368,000	-125,871	28,413	217,098	415,364	613,658

Table C.6. Payback Period for Candidate 3, in Baht.

Cost Items	Year0	Year1	Year2	Year3	Year4	Year5
Development Cost:	-510000					
Annual Operating Cost:		-1216000	-1,337,600	-1,471,360	-1,618,496	-1,780,345
Discount Factor for 10%	1.000	0.909	0.826	0.715	0.683	0.621
Time Adjusteed Costs(adjusted to present value)	-368,000	-1,059,075	-1,058,609	-1,007,986	-1,059,160	-1,059,316
Cumulative time-adjusted cost over life time:	-510,000	-1,615,344	-2,720,201	-3,772,223	-4,877,655	-5,983,249
Benefit derived from operation of the new system:	0	1,383,196	1,521,515	1,673,667	1,841,033	2,025,137
Discount Factor for 10%	1.000	0.909	0.826	0.751	0.683	0.621
Time Adjusted benefits (adjusted to present value)	0	1,257,325	1,256,771	1,256,923	1,257,425	1,257,610
Cumulative time-adjusted benefit over life time:	0	1,257,325	2,514,096	3,771,019	5,028,444	6,286,054
Cumulative ligetime-adjusted costs+benefits:	-510,000	-358,019	-206,105	-1,204	150,789	302,805

71
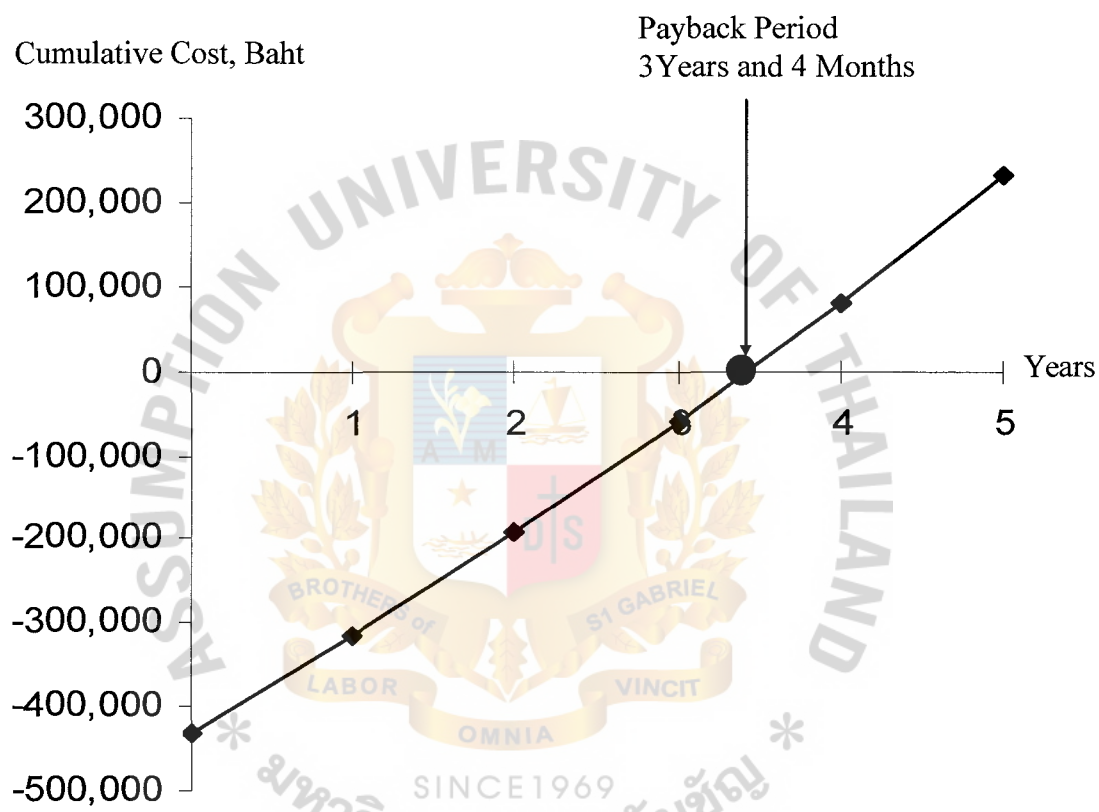
Figure C.1.   Payback Period for Candidate 1.
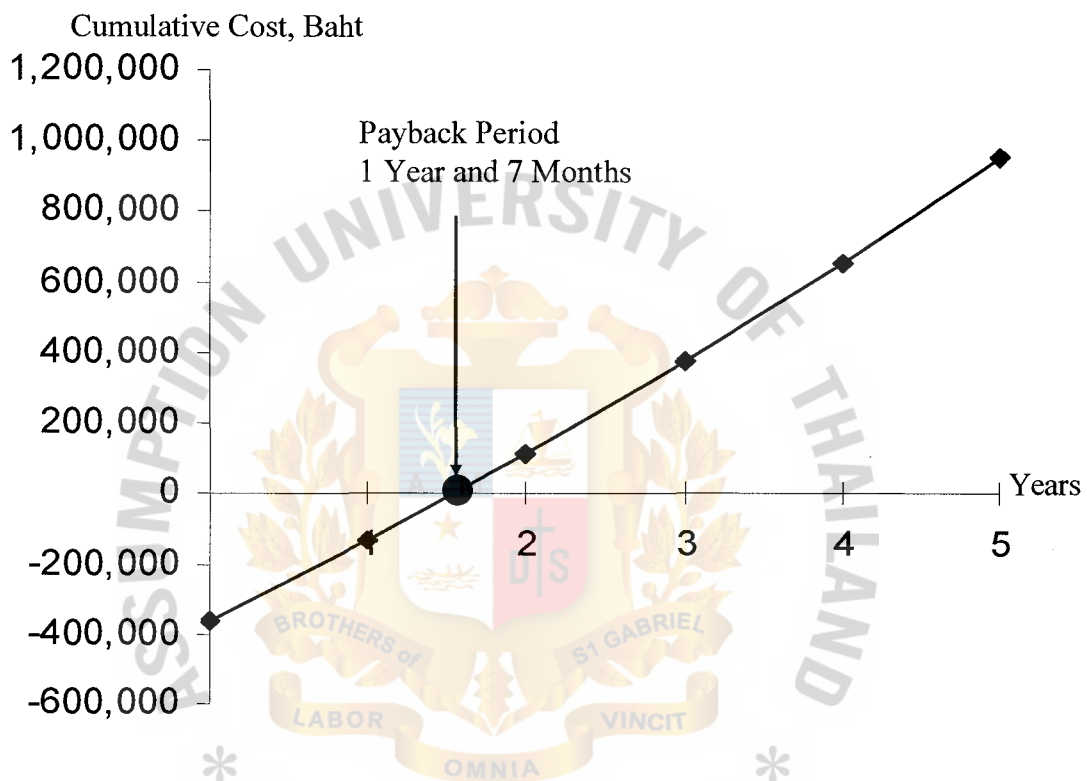
Figure C.2.   Payback Period for Candidate 2.

73
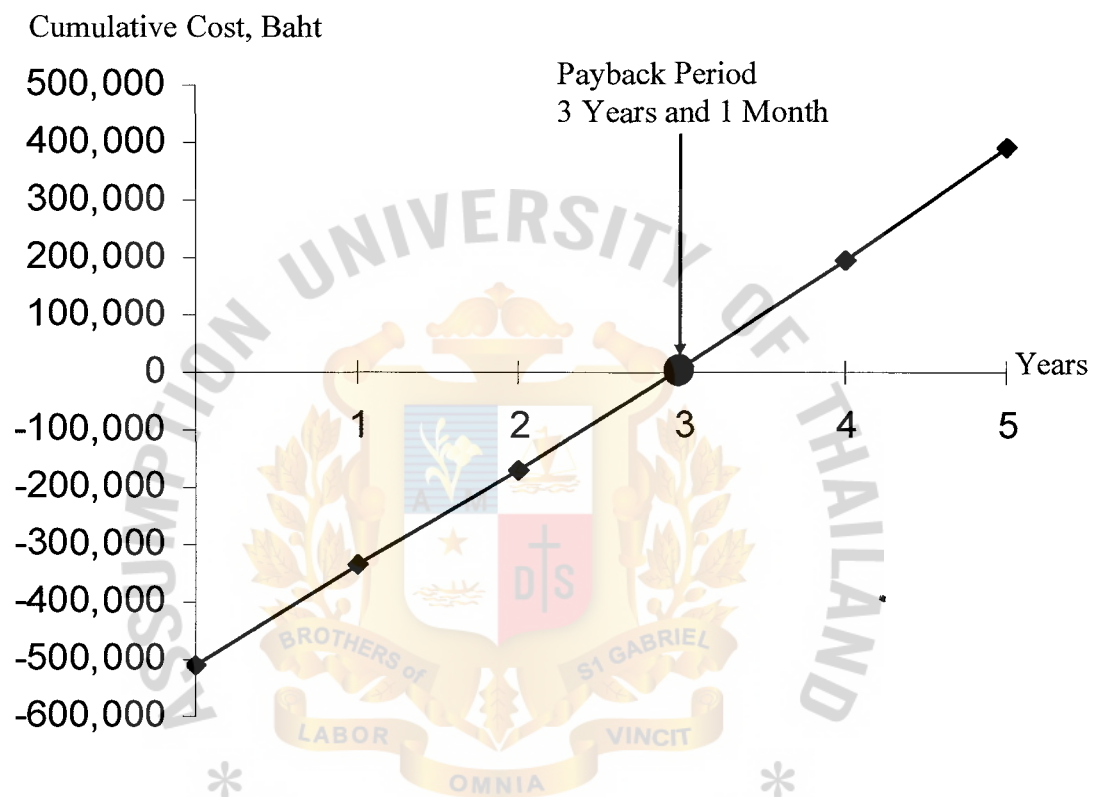
Figure C.3. Payback Period for Candidate 3.

APPENDIX   D

STRUCTURE DESIGN

STRUCTURE DESIGN
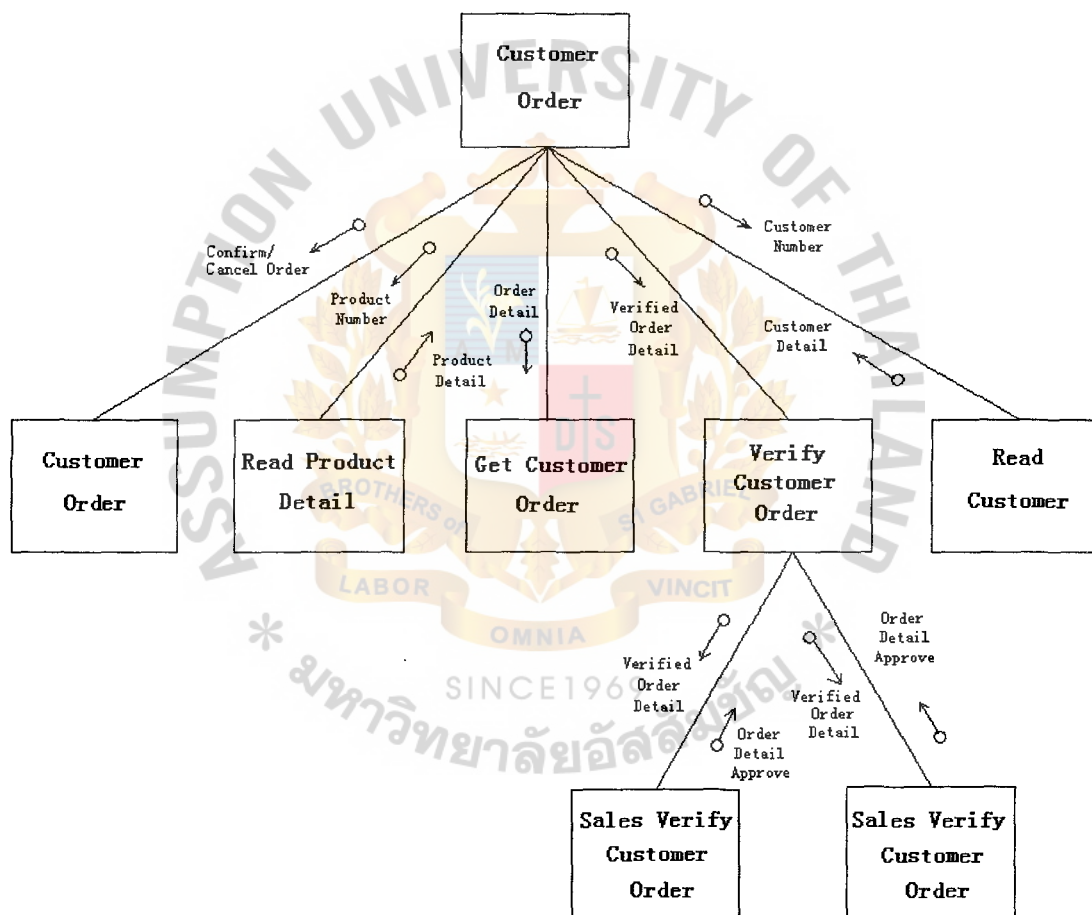
Figure D.1. Structure Chart of Verify Customer Order
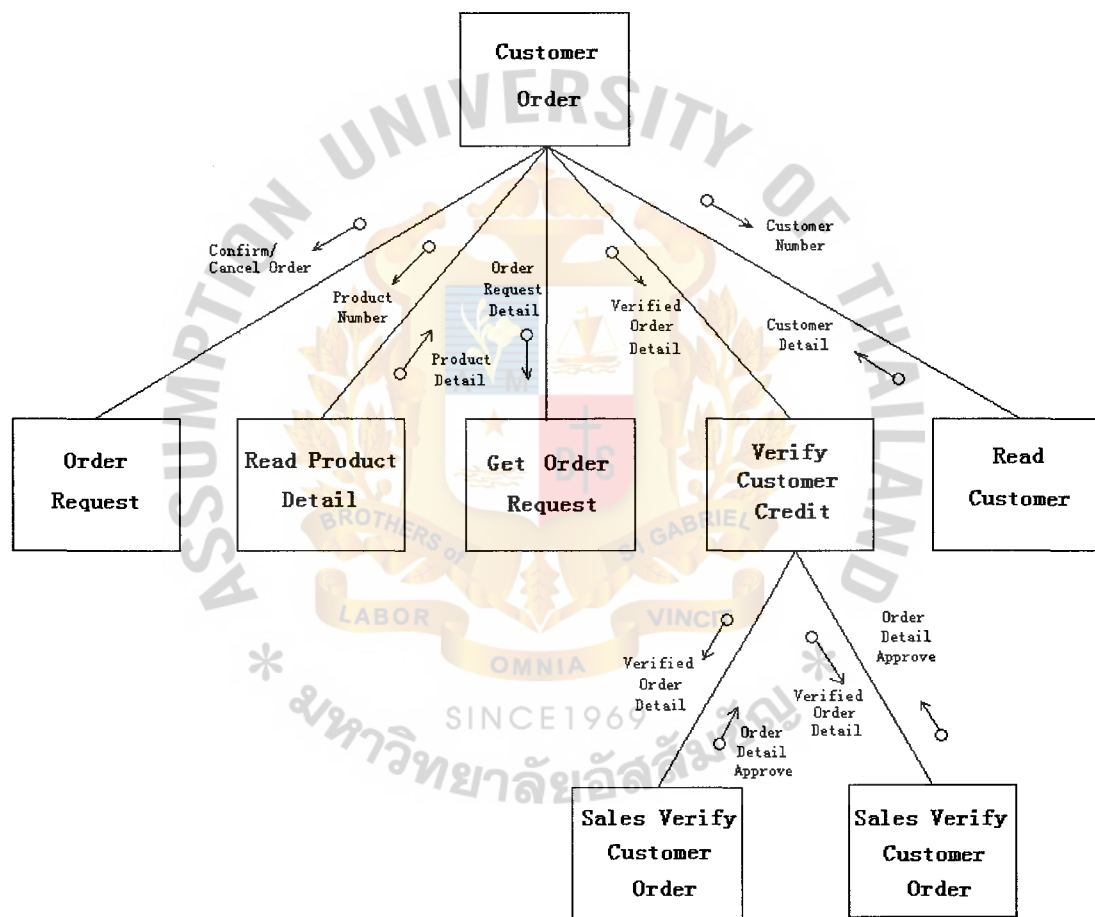
Figure D.2. Structure Chart of Checking Credit.
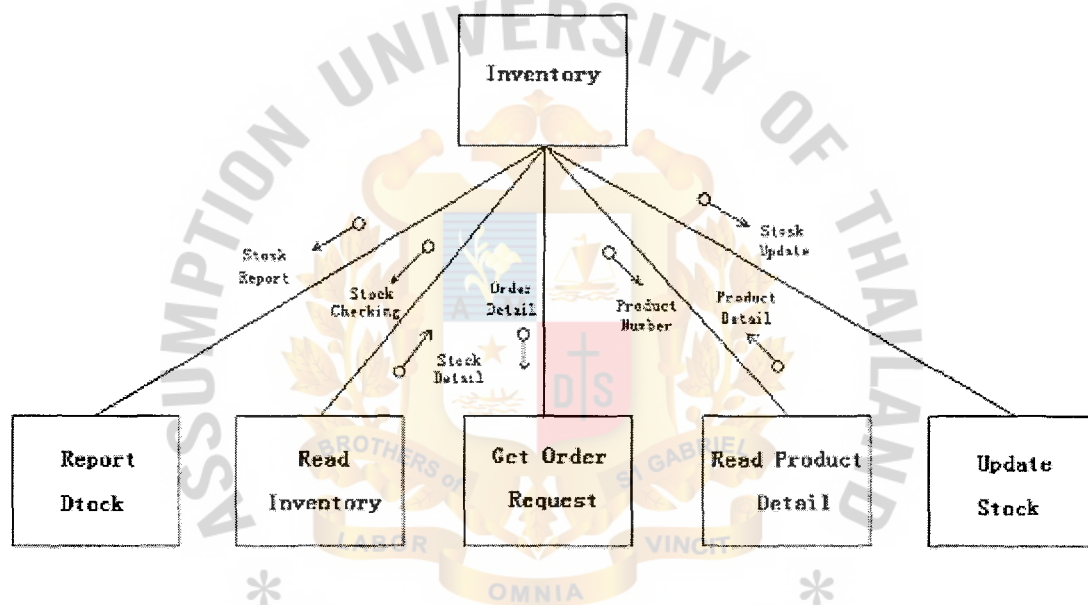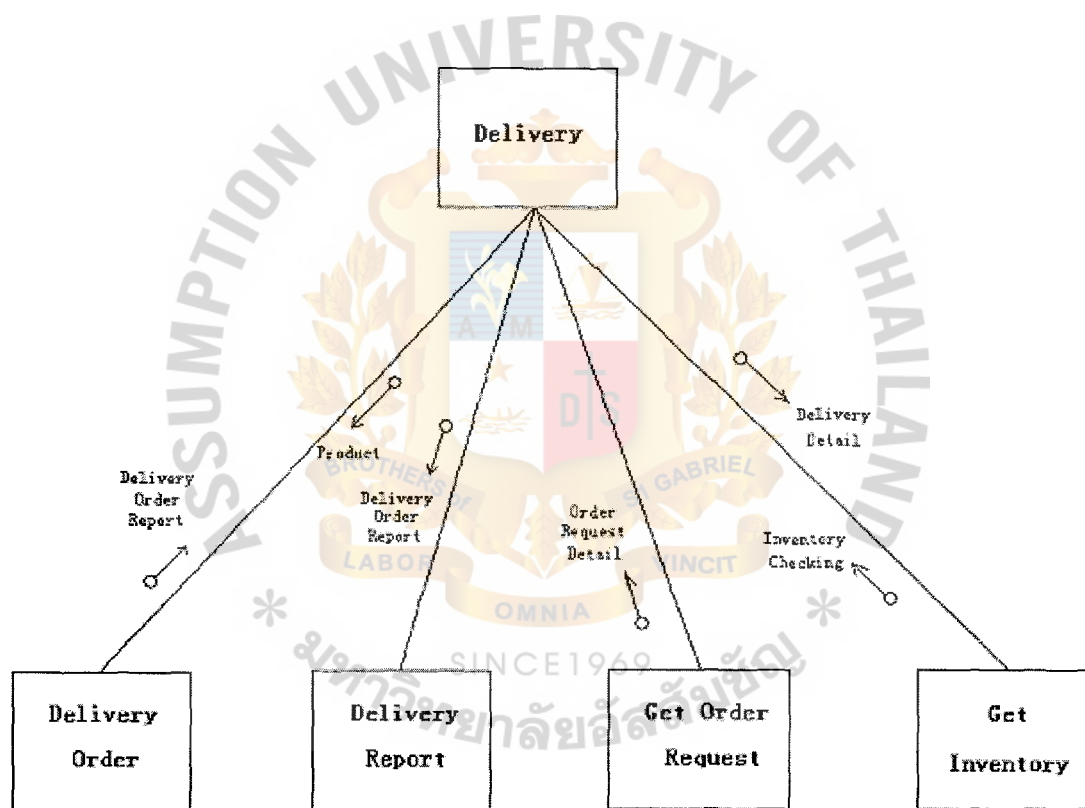
Figure D.3. Structure Chart of Inventory
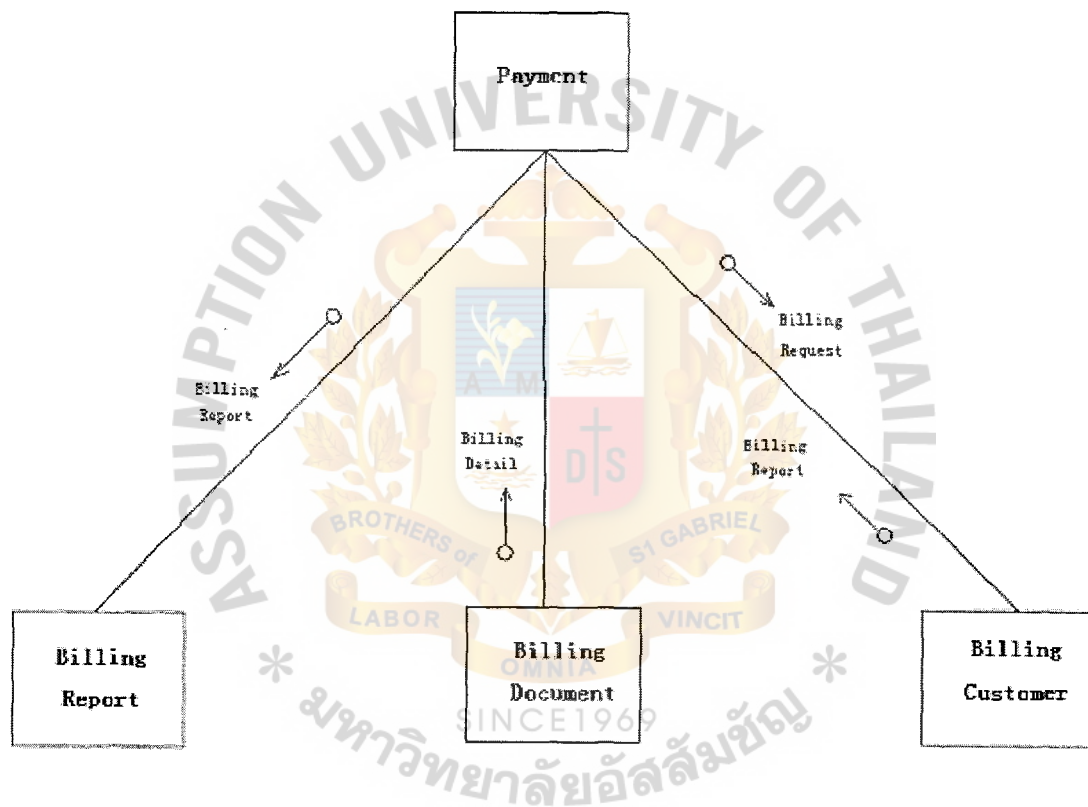
Figure D.4. Structure Chart of Delivery.

Figure D.5. Structure Chart of Billing.

APPENDIX E

DATA DICTIONARY

DATA DICTIONARY

Table E.1. Data Dictionary of Customer Entity.

Field Name	Meaning
Customer ID	Identity number of customer
Customer Name	Customer name or company name
E-mail	An e-mail of customer
Address	Customer's address
Telephone	Telephone number of the customer
Fax	Fax number of the customer
Contact Person	The person who contacts the company
Credit	Credit date for each customer
Date of order	The date that the product is ordered

80

Table E.2. Data Dictionary of Order Entity.

Field Name	Meaning
Order ID	Identity number of each order
Customer ID	Identity number of customer
Employee ID	Identity number of employee
Date of order	The date that order occurs
Discount	Discount price
Due Date	The date that credit customer has to pay

Table E.3. Data Dictionary of Product Order Associate Entity.

Field Name	Meaning
Order ID	Identity number of each order
Product ID	Identity number of product
Unit Price	Price for one unit of product
Order Qty	The amount of product ordering

82

Table E.4. Data Dictionary of Product Entity.

Field Name	Meaning
Product ID	Identity number of product
Product Name	Name of the product
Located	The place where product is kept
Price	Price for each product
Stock Qty	Total quantity units of each product in stock

Table E.5. Data Dictionary of Purchase Order Associate Entity.

Field Name	Meaning
Purchase ID	Identity number of purchasing order
Product ID	Identity number of product
Unit Price	Price for one unit of product
Purchase Qty	The amount of product purchased

Table E.6. Data Dictionary of Employee Entity.

Field Name	Meaning
Employee ID	Identity number of employee
Employee Name	Name of employee
E_E-mail	An e-mail of employee
E_Address	The address of employee
E_Telephone	Telephone number of employee
E_Fax	Fax number of employee
Department	Department of employee

Table E.7. Data Dictionary of Supplier Entity.

Field Name	Meaning
Supplier ID	Identity number of supplier
Supplier Name	Name of supplier
E_E-mail	An e-mail of supplier
E_Address	The address of supplier
E_Telephone	Telephone number of supplier
E_Fax	Fax number of supplier
Department	Department of supplier

Table E.8.   Data Dictionary of Purchase Entity.

Field Name	Meaning
Purchase ID	Identity number of Purchase
Employee ID	Identity number of employee
Supplier ID	Identity number of supplier
Date of Purchase	The date that purchase occurs
Date of Payment	The date that payment occurs
Total Purchase Price	The total price of purchasing

87

APPENDIX   F

PROCESS SPECIFICATIONS

PROCESS SPECIFICATIONS

Table F.1. Process Specification of Process 1.0.

Items	Description
Process Name	Sales Information System
Data In	Shipping Document Tax Invoice Credit Approve Payment Customer Order Credit Request
Data Out	Purchase Order Payment Details Order Details Inventory Report Customer Status Report Invoice Order Confirmation Delivery Order Purchase Catalogue
Process	(1) Get necessary data from customer,Sales Department exchanges credit information with credit control department and send product order from vendor.
Attachment	(1) Vendor (2) Account Department (3) Customer (4) Sales & Marketing Department

Table F.2. Process Specification of Process 1.

Items	Description
Process Name	Customer Order
Data In	Customer Order Product Details Customer Details
Data Out	Order Detail Order Confirmation Cancel Order
Process	(1) Get order from customer (2) Check product details (3) Check stock (4) Verify customer order
Attachment	(1) Datastore (2) Customer (3) Sales & Marketing Department

89

Table F.3. Process Specification of Process 1.1.

Items	Description
Process Name	Verify Customer Order
Data In	Customer Order Product Details Customer Details
Data Out	Order Details Order Confirmation Cancel Order
Process	(1) Get necessary data from customer (2) Get product code,customer history and verify order information
Attachment	(1) Datastore (2) Customer (3) Sales & Marketing Department

Table F.4. Process Specification of Process 1.1.1.

Items	Description
Process Name	Sale Verify Order
Data In	Customer Order Product Details Customer Details
Data Out	Send approvement
Process	(1) Get necessary data from customer. (2) Check product code,customer history and verify order information. (3) Check order Request
Attachment	(1) Datastore: Order request

Table F.5. Process Specification of Process 1.1.2.

Items	Description
Process Name	Sale ManagerVerify Order
Data In	Send approve
Data Out	Order details approve or cancel
Process	(1) Get necessary data from sale officer. (2) Approve order request (3) Cancel order request
Attachment	(1) Datastore: Order request

Table F.6. Process Specification of Process 2.

Items	Description
Process Name	Credit checking
Data In	Order request Product Details Customer Details
Data Out	Customer credit details Product details Due date
Process	(1) Check customer status in database (2) Send the result to sale department (3) Send the result to srock department
Attachment	(1) Accounting department (2) Customer (3) Sales & Marketing Department

Table F.7. Process Specification of Process 2.1.

Items	Description
Process Name	Check Product Price
Data In	Customer Order Product Details
Data Out	Update order detail
Process	Compare price in order request and price list
Attachment	(1) Datastore: Order request

Table F.8. Process Specification of Process 2.2.

Items	Description
Process Name	Credit customer credit
Data In	Customer credit detail Update order detail
Data Out	Order details Due date
Process	Verify customer payment date
Attachment	(1) Accounting department (2) Datastore: Order request (3) Sales & Marketing Department

Table F.9. Process Specification of Process 3.1.

Items	Description
Process Name	Add New Inventory
Data In	Order Product for stock
Data Out	Product detail
Process	Add new product in Datastore.
Attachment	(1) Datastore: Inventory

Table F.10. Process Specification of Process 3.2.

Items	Description
Process Name	Update customer order
Data In	Product detail Inventory detail
Data Out	Update product order Request product for stock Update customer order
Process	Update customer order
Attachment	(1) Sales & Marketing department (2) Datastore: Booking order (3) Datastore: Customer order

Table F.11. Process Specification of Process 4.1.

Items	Description
Process Name	Produce delivery document
Data In	Customer order detail Inventory detail Tax invoice
Data Out	Delivery order invoice Delivery detail
Process	Create delivery document
Attachment	(1) Customer (2) Datastore: Delivery order

Table F.12. Process Specification of Process 4.2.

Items	Description
Process Name	Produce delivery order report
Data In	Delivery order detail
Data Out	Delivery order report
Process	Create delivery order report
Attachment	(1) Account department

Table F.13. Process Specification of Process 5.1.

Items	Description
Process Name	Prepare customer payment document
Data In	Bill request
Data Out	Receipt Debt
Process	Create customer payment document Get customer payment
Attachment	(1) Customer

Table F.14. Process Specification of Process 5.2.

Items	Description
Process Name	Prepare customer payment report
Data In	Pay debt
Data Out	Payment report Customer detail Payment detail
Process	Create cu
Attachment	(1) Account department (2) Datastore: Invoice (3) Datastore: Customer

APPENDIX   G

DATABASE DESIGN

DATABASE DESIGN

Table G.1.   Design of Customer.

Field Name	Type	Length	Null	Key Type	Index	Check
CustomerID	Integer	6		Primary		
CustomertName	Char	20		Attribute		
CustomerAddress	Char	30		Attribute		
CStreet	Char	25		Attribute		
CCity	Char	15		Attribute		
CPostCode	Char	10		Attribute		
CTelephoneNo	Char	11		Attribute		
PaymentTerm	Number	2		Attribute		
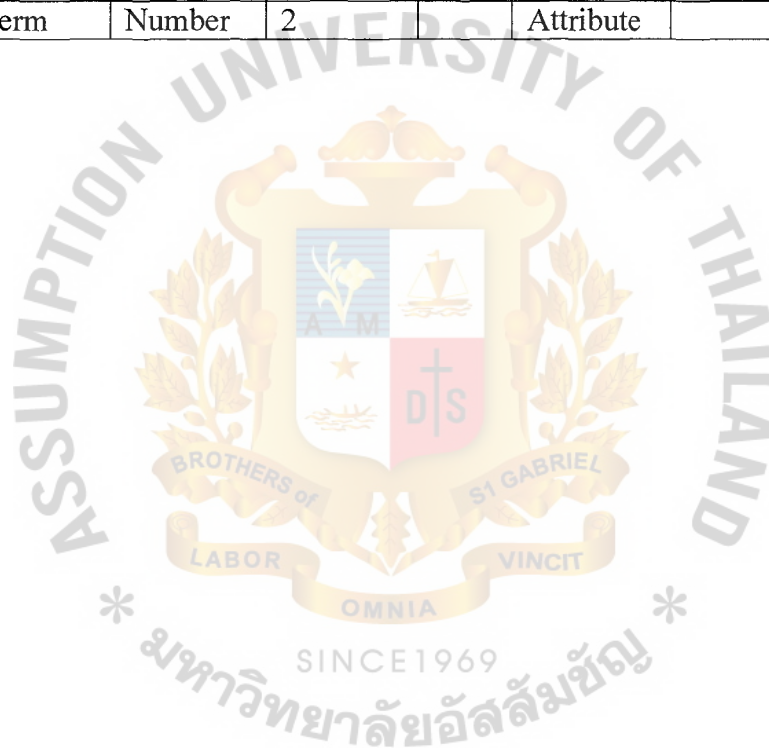
Table G.2. Design of Officer.

Field Name	Type	Length	Null	Key Type	Index	Check
OfficerID	Integer	6		Primary		
OfficerName	Char	20		Attribute		
OfficerAddress	Char	30		Attribute		
OStreet	Char	25		Attribute		
OPostCode	Char	10		Attribute		
OTelephoneNo	Char	11		Attribute		
WorkStartDate	Dater			Attribute		

Table G.3. Design of Purchase Order.

Field Name	Type	Length	Null	Key Type	Index	Check
PONo	Integer	6		Primary		
CustomerID	Integer	6		Foreign		
ProductNo	Integer	6		Foreign		
OrderDate	Date			Attribute		
ShipmentDate	Date			Attribute		
ShipTo	Char	10		Attribute		
UnitPrice	Integer	11		Attribute		
Quantity	Integer	7		Attribute		
Discount	Integer	10		Attribute		
P/O Amount	Integer	5		Attribute		
Total Payment	Integer	10		Attribute		

Table G.4. Design of Product.

Field Name	Type	Length	Null	Key Type	Index	Check
ProductNo	Integer	6		Primary		
SupplierID	Integer	6		Foreign		
ProductName	Char	10		Attribute		
ProductDescription	Char	30		Attribute		
ProductCategory	Chat	5		Attribute		
Unit Price	Integer	10		Attribute		
Stock Quantity	Integer	7		Attribute		

Table G.5. Design of Supplier.

Field Name	Type	Length	Null	Key Type	Index	Check
SupplierID	Integer	6		Primary		
SupplierName	Char	30		Attribute		
SupplierContact	Char	30		Attribute		
SupplierAddress	Char	50		Attribute		
SupplierPhone	Char	15		Attribute		
SupplierFax	Char	15		Attribute		

Table G.6.   Design of Sales Order.

Field Name	Type	Length	Null	Key Type	Index	Check
OrderNo	Integer	6		Primary		
Po No	Integer	6		Foreign		
ProductNo	Integer	6		Foreign		
OfficerID	Integer	6		Foreign		
Delivered Quantity	Integer	5		Attribute		

APPENDIX   H

USER INTERFACE DESIGN

USER INTERFACE DESIGN

Figure H.1. User Interface Diagram of Report and Graph Options

Figure H.2. User Interface Diagram of Order and Shipping Information

Figure H.3. User Interface Diagram of Entity Layout

110
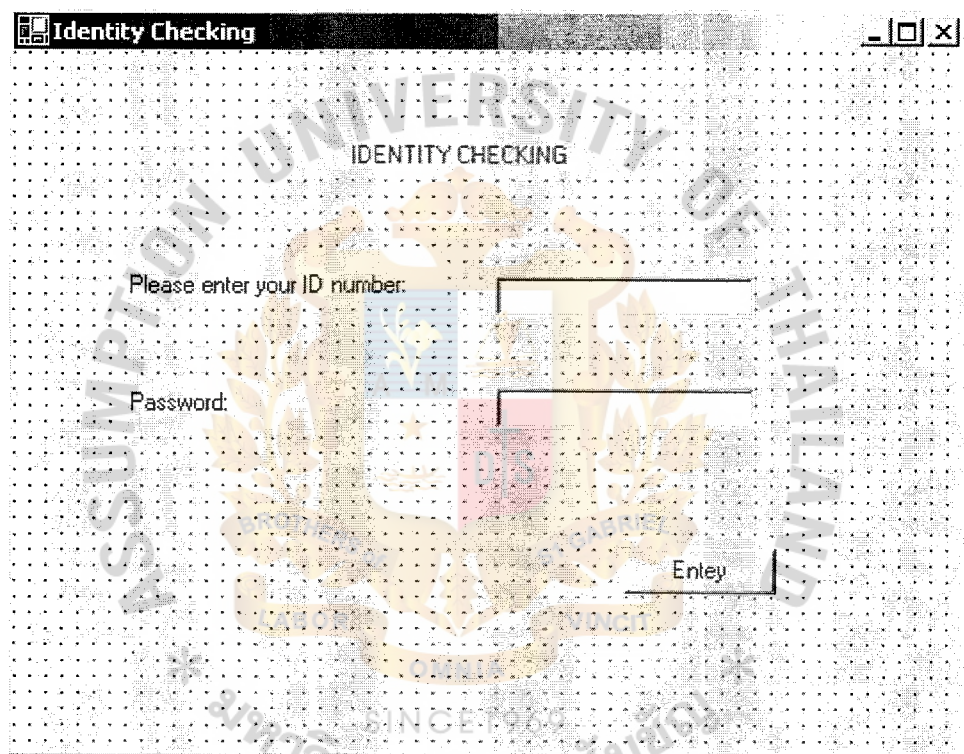
Figure H.4. User Interface Diagram of Identity Checking
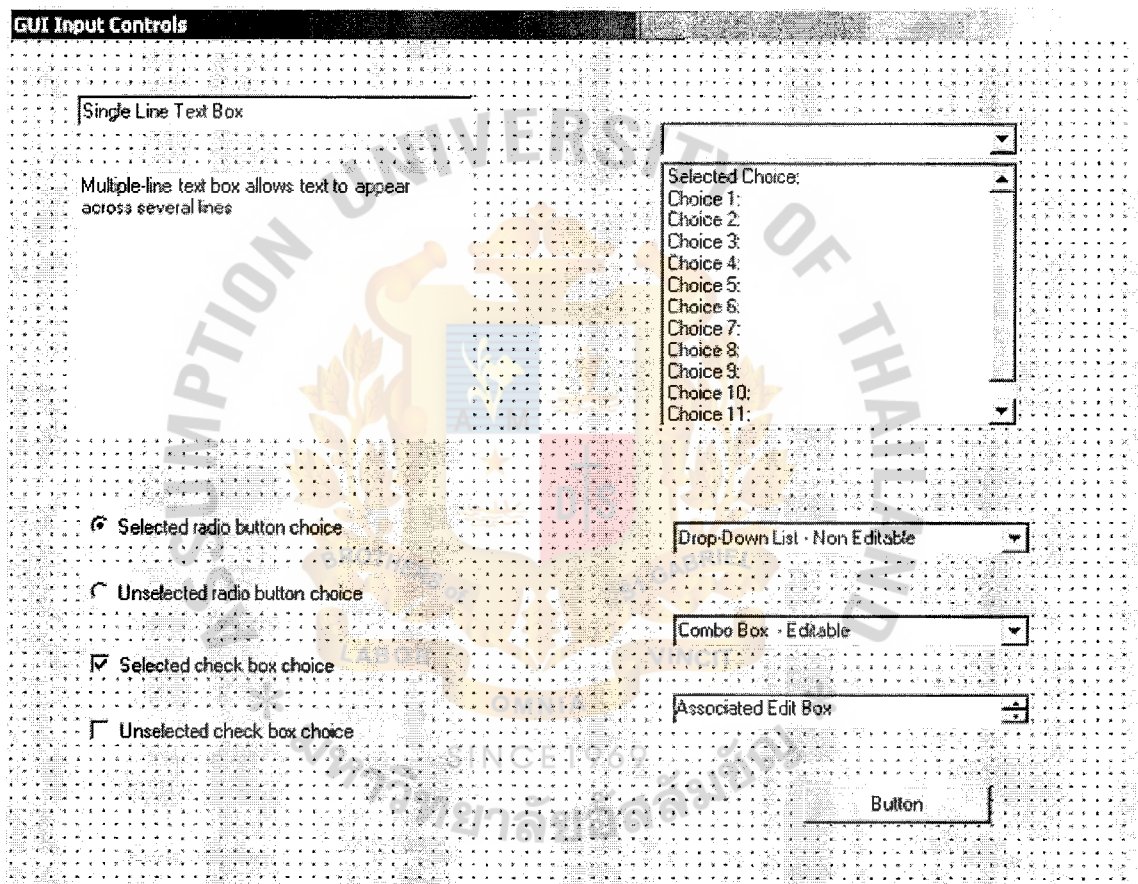
Figure H.5. User Interface Diagram of GUI Input Controls
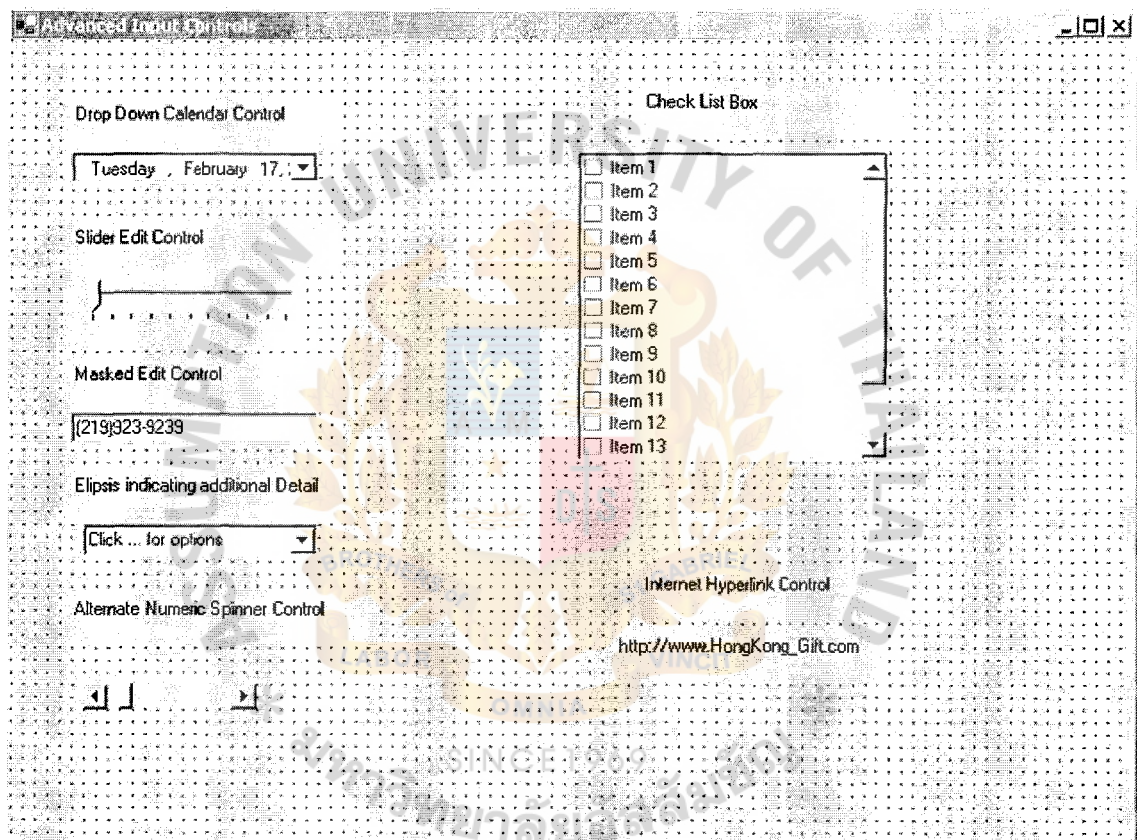
Figure H.6. User Interface Diagram of Advanced Input Controls

Figure H.7. User Interface Diagram of Members Maintenance
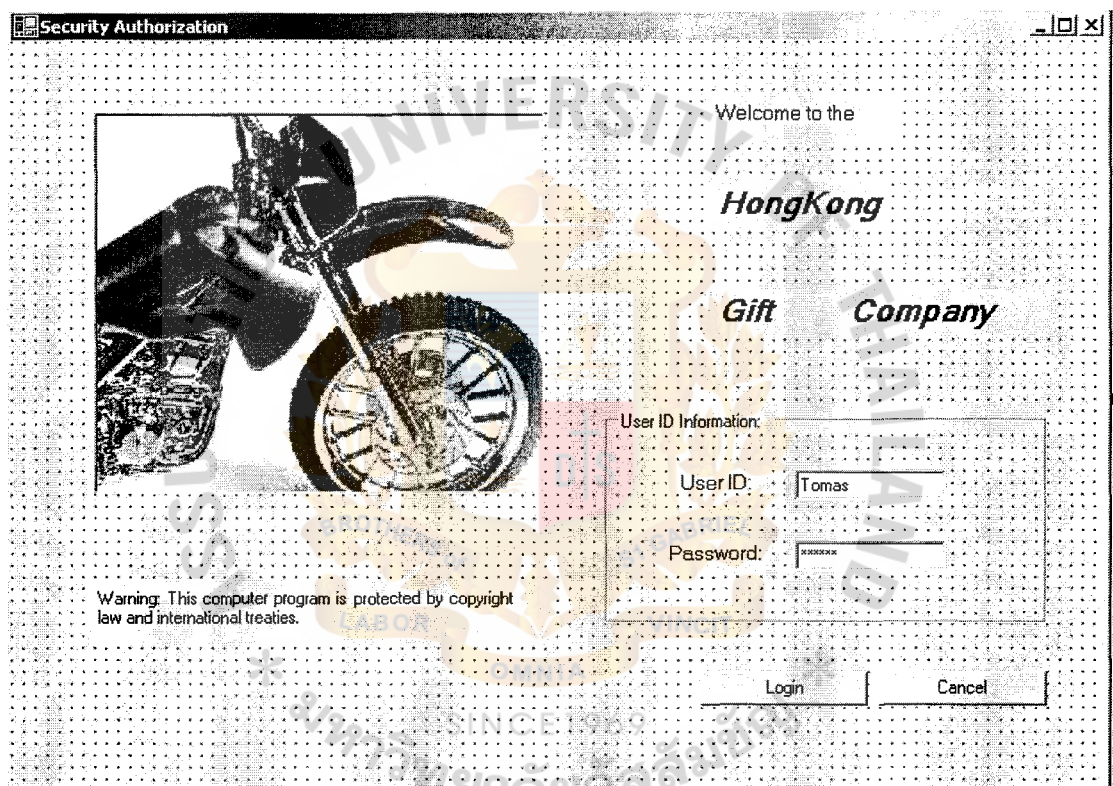
Figure H.8. User Interface Diagram of Security Authorization
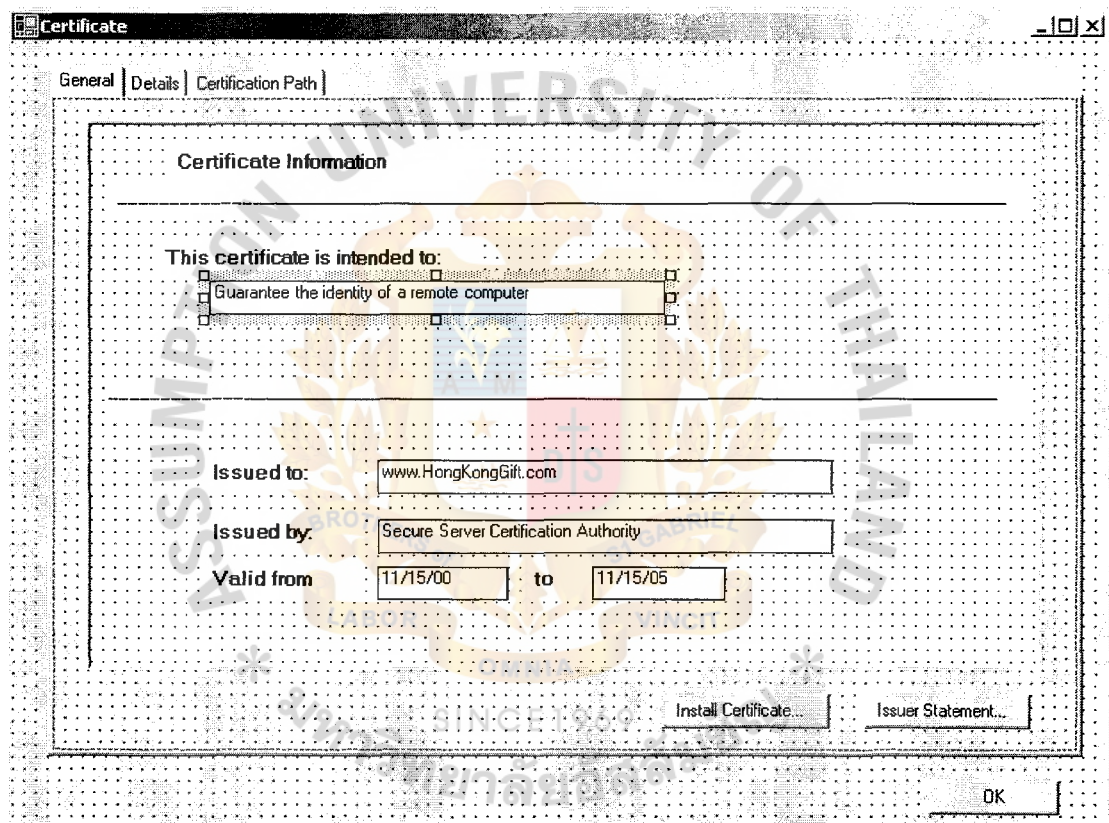
Figure H.9. User Interface Diagram of Certificate

Figure H.10. User Interface Diagram of Create New Account

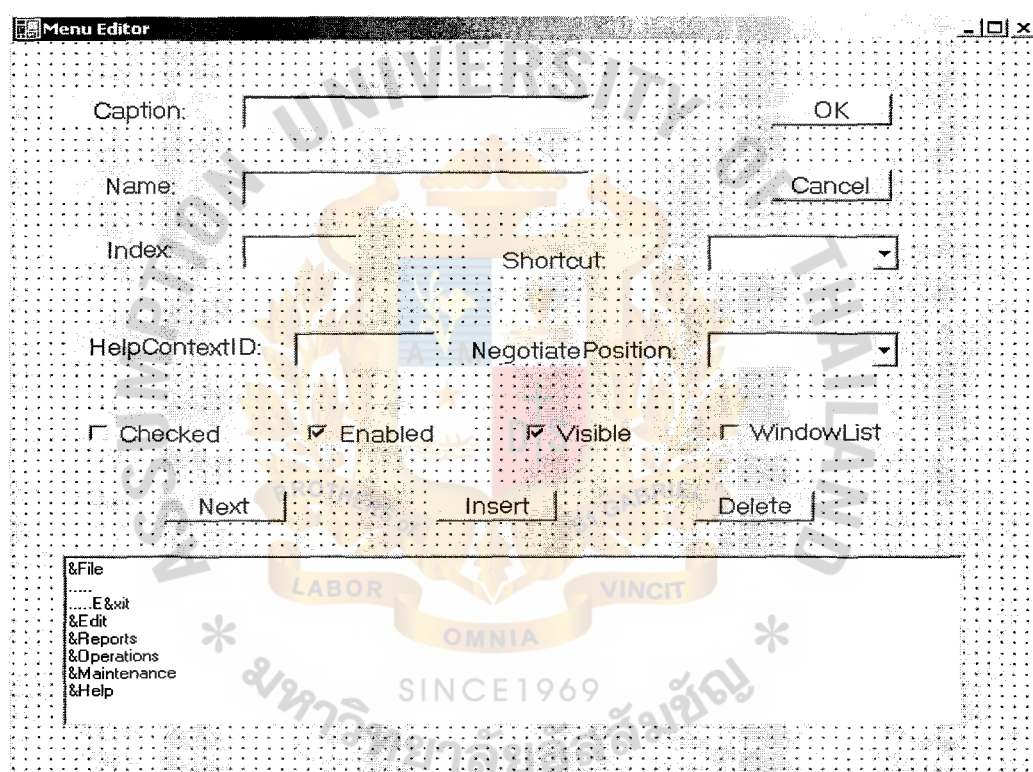Figure H.11. User Interface Diagram of Credit Card Account Setup

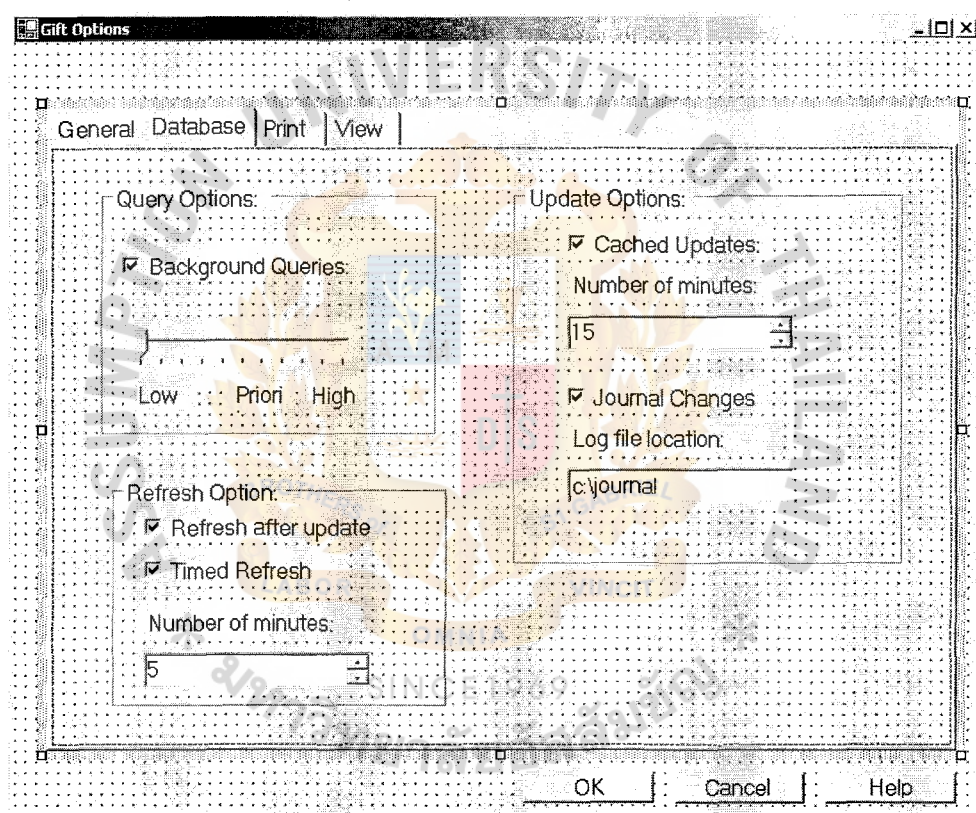Figure H.12. User Interface Diagram of Menu Editor

Figure H.13. User Interface Diagram of Gift Options

APPENDIX   I

REPORT DESIGN

REPORT DESIGN

HongKong Gift Company 239 ZuoDun Street,KongKong Tel: 852-2966 8111					
Date:February 2,2004		Daily Sales Report			Page: 1
Order	Customer	Product	Price	Qty	Remark
06347	Mr.Chuit	Watch	8,000	1	Credit
06879	Mr.Kiuot	Tie	2,580	3	Credit
06908	Ms.Miurf	Wine	5,900	2	Credit
06243	Ms.Areig	Watch	8,000	1	Credit
06178	Mr.Nejki	Wine	5,900	1	Credit
06948	Mr.Kokli	Watch	8,000	1	Credit
		Total	49,440		

Figure I.1.   Daily Sales Report

121

HongKong Gift Company					
239 ZuoDun Street,KongKong					
Tel: 852-2966 8111					
Date:February 2,2004		Product Detail Report			Page: 1 of 80
Product ID	Name	Type	Located	Selling price	Stock Qty
596003	Watch	Daed	Warehouse 1	8,000	1,470
596796	Watch	Daed	Warehouse 1	8,000	1,470
596976	Watch	Daed	Warehouse 1	8,000	1,470
596203	Watch	Daed	Warehouse 1	8,000	1,470
387940	Wine	Yarn	Warehouse 1	5,900	2,860
387455	Wine	Yarn	Warehouse 1	5,900	2,860
387435	Wine	Yarn	Warehouse 1	5,900	2,860
498907	Tie	Jack	Warehouse 1	2,580	1,940
498438	Tie	Jack	Warehouse 1	2,580	1,940

Figure I.2.   Product Detail Report

122

HongKong Gift Company					
239 ZuoDun Street,KongKong					
Tel: 852-2966 8111					
Date:February 2,2004		Employee Details Report			Page: 1
EmpID	Name	Address	Tel	E-Mail	Position
9001	Kingte	27Sum	890-1178	King@hotmail.com	Manager
9002	Smitess	38Kua	891-8973	Smi@hotmail.com	Officer
9003	Hummy	19Sev	890-9874	Hum@usa.com	Officer
9004	Davide	70Nut	890-2783	Dav@yahoo.com	Officer
9005	Susany	64Lof	891-8903	Susa@hotmail.com	Officer

Figure I.3.   Employee Details Report

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