



An Information System for Book Rental Service

By

Mr. Sakol Sakuljinda

A Final Report of the Three - Credit Course
CE 6998 Project

Submitted in Partial Fulfillment
of the Requirements for the Degree of
Master of Science
in Computer and Engineering Management
Assumption University

November 1999

MS (CEM)

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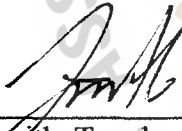
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Project Title An Information System for Book Rental Service
Name Mr. Sakol Sakuljinda
Project Advisor Mr. Smith Tungkasmit
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The Graduate School of Assumption University has approved this final report of the three-credit course, CE 6998 PROJECT, submitted in partial fulfillment of the requirements for the degree of Master of Science in Computer and Engineering Management.

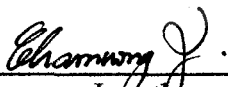
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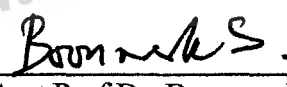
(Mr. Smith Tungkasmit)
Advisor



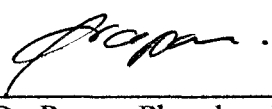
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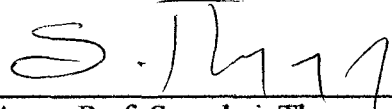
(Dr. Chamnong Jungthirapanich)
Dean and Co-advisor



(Asst.Prof.Dr. Boonmark Sirinaovakul)
Member



(Dr. Prapon Phasukyud)
Member



(Assoc.Prof. Somchai Thayarnyong)
MUA Representative

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ABSTRACT

This project is developed to improve the existing operation system of Variety Book Shop. All of the work processes of this existing system are manual. The computer information system will be used for the development of this existing system. The project is based on Book Service System for the shop. The system analysis and design process cover the current problem definitions, information gathering and analysis of the existing system, providing the new requirements, determining areas for improvements and designing the new system. The new system is presented by using dataflow diagrams, structure chart, entity relationship diagram, data dictionary, input form, output form, screen layout, process specification and cost and benefit analysis to solve or minimize the problem. The cost and benefit requirement section is very important for the project because we must compare the revenue of the current system with the new system. If the new system provides the pay back period in a suitable time, we will accept the new system. The implementation consists of coding, testing, conversion, training and system maintenance.

The scope of the project includes the Book detail requisition, collecting payment, registering customers , registering new books , providing book service, collecting revenue. The new system can help to save time and effort spent on system development, and can help to provide more efficient service to customers.

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I. INTRODUCTION

1.1 Background of the Project

Because of the growing number of rental service companies, the rental service companies have to generate better quality such as providing faster service and information service to customers. So, the rental service business is becoming increasingly complex.

The main responsibilities of rental service business are to generate revenue and make a higher profit for the business. The process cycle of rental service may include rental service transaction, reservation service transaction, returning transaction and information inquiry service to the customers who use service and information service from any company. The rental service transaction should provide faster information service and adequate information to make higher service volume provided to customers. And the rental service system should generate reports for the management to update and perform periodic record review.

This project proposes a computer information system, which is designed in the form of a rental book service system for use in Variety book shop. The existing system is analyzed and new design for the system is proposed to provide more efficiency in providing service to customers and better update information to the management. The proposed system will be tested whether it provides better quality for rental service system.

1.2 Objectives of the Project

The objectives of the project on a computer information system for book service are as follows:

- (1) To develop a computerized system that can reduce manual work and produce a report that covers major aspects and satisfy the company and user requirements.
- (2) To analyze the existing system and to design a new system that will improve the effectiveness of the company's operation.
- (3) To collect effectively all information into the computer system for convenience in providing all details of books for user requirements and management.
- (4) To design a computer-based information system for reducing time to provide service to customers and produce more efficient work in organization.
- (5) To compare cost and benefit between the existing system and the proposed system to make profit in business.
- (6) To develop a software package to collect documents and provide fast retrieved in rental service system.
- (7) To reduce routine time for making effective management in the shop according to the objectives of Computer Engineering Management.

1.3 Scope of the Project

The project will cover the major aspects of the rental book service system which includes the following:

- (1) Collect book item
- (2) Collect payment
- (3) Register customer
- (4) Register new book
- (5) Provide book service
- (6) Collect revenue

Collect book item

- (a) Produce purchase order sent to supplier.
- (b) Collect book item from supplier.

Collect payment

- (a) Calculate cost of new book registration.
- (b) Collect payment details and prepare payment to supplier.

Register customer

(New member registration)

- (a) Get details from customer and record new member details.
- (b) Verify customer identification and validation.
- (c) Edit customer report in details of customer rental book.
- (d) Control all transactions of customer service activities
 - (1) Rental service activities
 - (2) Reserve service activities
 - (3) Returning service activities
 - (4) Providing information for user requirement

- (e) Produce member card.

Register new book

- (a) Determine the book number
- (b) Get book items and update new book information.

Provide book service

- (a) Provide rental service, reservation service and returning service.
- (b) Check the rental and return of book services.
- (c) Search book information required by a member for providing convenience to customer.
- (d) Produce reminding letter to member
- (e) Provide service function to view the member transaction

Collect revenue

- (a) Calculate the rental fee, the fines, and the miscellaneous fee.
- (b) Collect all payments from new members and old members.
- (c) Issue receipt to members.

II. LITERATURE REVIEW

2.1 Background of the Organization

The Variety book shop is located on Dankao Road, Muang, Samutprakarn, 10270. Most of the decisions come from the top management and all of work processes are manual. Nowadays, our society is rather full of tensions due to many problems such as economic problems and political problems. However, the entertainment business is still alive and has the trend to grow. For this reason, the management team of the Variety book shop agrees to computerize the whole system by starting with computerizing the service department.

The Variety book shop rents books to their customers and the way of management of the items is perfect. All the books are purchased by the inventory department. After that, the inventory department sends the details of books to the service department, the service department keeps record of the details of books. At the service department, they provide all routine services to the members. There are four main services that are provided to member customers.

- (1) Rental service
- (2) Return service
- (3) Reservation service
- (4) Information inquiry service

After the service department receives the transaction record, they send all financial information to the finance and accounts department. Approximately 150 books are rented each day with a difference in the rent period. Normally it is not possible for the staff to send out late notices to members on all the late returning books because the system is done manually. It is hard to keep track of late returns.



Figure 2.1. Organization Chart.

2.2 Existing Business Functions

There are five main functions in the existing business.

- (1) Member Registration
- (2) Book Item Collection
- (3) Book Registration
- (4) Book service
- (5) Payment Collection

Member Registration

The member registration is prepared before the member starts to use the rental service in order to control all the transactions. The customer or non-member can use the identity card or driving license or student ID card plus an admission fee in order to become a member of the shop. The non-member must provide their information in the application form and send it to the staff. The staff verifies the application form, approves it, assigns the member ID to the member and keeps record in the member book. After checking the applying process as well as the identity card or driving license or student ID, the staff will give a member card to the new member. The format of the member book can be seen in Table 2.1.

Book Item Collection

The book shop should have available the book items for customer service. So the shop contact several suppliers and compares the best prices, payment terms, quality of the products and service between them. The shop has to make a decision for the most suitable supplier and order the book items from them. The system will produce a purchase order form which includes the details of supplier, item number, book name, price per unit, quantity, amount and payment terms. Then the shop hands in the

Table 2.1. Member Book.

DATE	MEMBER ID	NAME	ADDRESS	TELEPHONE
06/07/99	2345	Mr. Supachai Kunyanuch	90/9 Dankao Rd, Samutprakarn, 10270	378-0358
06/07/99	2346	Ms. Monrudee Itaratana	49/3 Dankao Rd, Samutprakarn, 10270	399-2971
06/07/99	2347	Ms. Sasiri Sakuljinda	67/5 Dankao Rd, Samutprakarn, 10270	389-1314
15/06/99	2348	Ms. Orrapun Punthong	190 Dankao Rd, Samutprakarn, 10270	377-2071

purchase order to the supplier. The supplier sends back the book and its information to the shop. The system keeps the purchase order in the purchase order file and sends it to process 2 for collecting the payment amount. Once the shop gets the book and its information, the book items will be sent to Inventory department.

Book Registration

This function records the books into the file after they arrive. The staff will record the book items in separate books. The staff classify the items, identify the item numbers and record them into the item books. The shop has divided the books into different categories such as action, joke or comedy, fantasy, romance, cartoons, sport, thriller, ghost, detective, murder, etc. The book comprises of receive date, sequence number, book, book name. The format of the book can be seen in the Table 2.2.

Book Service

When the Variety book shop was established, it imposed agreement regulations about the service in terms of the rent period, the rent fee, the fine and other regulations. The general regulations of the Variety book shop:

- (a) Membership fee is 150 bahts for a life time member. The price rate for rent: the novel 3 bahts/item a day, cartoon and others 1 bahts/item a day. The price rate for return: the novel 4 bahts/item a day, cartoon and others 2 bahts/item a day. The membership fee is not refunded.
- (b) Members are prohibited from lending the card or handing it over to anybody except to their family or their children. Children should be below 18 years old. Violation of this rule will result in confiscation of the member card.
- (c) In case a member has lost the member card, a fee of 50 bahts will be charged for a replacement.

Table 2.2. Book Record.

DATE	SEQ. NO.	NAME	COPY
8/6/99	1234	The Piano	7
8/6/99	1235	Robinhood	7
8/6/99	1236	The Police	7
8/6/99	1237	Forget Me Not	7
8/6/99	1238	Lomhuany	7

- (d) Maximum rental of book each time is 5 items and members cannot rent anymore until they return some of the books.
- (e) If members return a book later than seven days, they pay for late returning.
- (f) A member is requested to inform the shop if there is any change in his/her address or other information given in his/her application form. Invalid information may lead to termination of the membership.
- (g) In case members scratch or tear a book, they must purchase it at full value.
- (h) In case there is a problem with the book, members should inform the shop on the day of rental so that the shop can exchange it for another one.
- (i) Members should review all rented books before returning them to the shop.
- (j) The books of the shop are prohibited from being used in other businesses.
- (k) Members who delay returning books over the rental period will be liable to pay a fine.
- (l) In case members return books earlier than the expected returning date, the balance fee will not be refunded.

There are four main services that are provided to the members.

- (a) Rental service

The staff need to ensure that all members are qualified to utilize the service of the shop, so the staff should verify the member ID.

The steps for providing rental service are as follows:

- (1) The member registration is valid.
- (2) The member needs to show his/her member card to the staff who will check whether it is valid.
- (3) The member chooses the needed item and sends it to the staff.

- (4) The staff fill in the rent date, item name, and then calculate the rent fee from the rent fee table . After that the staff ask the member to sign his name on the rental card.
- (5) The member receives the book from the shop. The rental card will be kept in the charging tray as a record of the transaction.

(b) Returning service

When the books are returned to the shop, the staff will pick up the rental card in order to check the book name and the return date. The staff check the information on the rental card. The item name on the rental card and on the items should be matched. The rental card is placed on the rental card file and the items are placed on the trolley. If there is a reserve list for the book, it would be placed on the "Reserved shelves". If the member is returning a book that is overdue, the fine must be paid by the member before using the rental service. The staff will calculate the fine based on the number of days which the items are late.

(c) Reservation service

When members cannot locate a needed book due to the item being rented by another member, they reserve the book in advance to make sure that they can receive the book when it is returned. If the book is checked out, the staff will fill in the reserved book in the reserved list.

(d) Information inquiry service

When members want to know some information about the books such as the new top ten books for this month, they can ask from the information service of the shop. The information service provides the general information about books, rental fee, fines, etc.

Payment Collection

After the staff calculate the rental fee from the members, it is the responsibility of the finance and account department which will handle the payment transaction and record such transaction in the accounting book. And when the fine occurs for each transaction, the staff also keep records to see how often the member returns the books late. Repeated delays may lead to termination of membership.

2.3 Current Problems and Areas for Improvements

Current Problems:

The existing system is a manual system, so there are many problems that occur in the service system.

- (1) In using the manual system, the process of the service department operations is very slow because there are not enough staff when there are more customers visiting the shop. For this reason the staff often make mistakes in recording the items and this can create many problems later.
- (2) The staff use more time to handle one member since they waste time for recording information in the items book or waiting for the member to sign in the rental card.
- (3) The process of information inquiry is slow; every kind of book cannot be found at one time. The way to access the books information is slow, the recording of the particular book must be locked at, which is very slow.
- (4) It is difficult to verify the status of the inventory.
- (5) There is a lack of statistical reports to support the decision making process to improve the service operations. This also makes the shop lack good control and efficient management.

- (6) Since we do not know exactly about what types of books are rented more by members, the revenue source cannot be identified and the revenue cannot be expected.
- (7) Finding information for the members takes time and it is not easy to find the needed book if the members cannot provide the necessary details.

Areas for Improvements

For this section, we try to identify the existing problems and try to find the ways to improve the current situation and solve the problems.

The following are the criteria that need to be developed:

- (1) Avoid errors by inputting the information at one time as the information will then be on permanent record for further use.
- (2) The staff can use the book numbers to check with the items in the database. It makes the staff work fast and correctly.
- (3) The staff should retrieve the information requested by the member within a few minutes.
- (4) Reduce the staff workload by using the computer-based systems.
- (5) Retain the information on all books, members and service transactions in the database file. The information will never be lost or there will be no mistakes. This will provide a better management security on the data.
- (6) Create the member ID and item numbers by the computer that can manage it by using the data input in sequence automatically.
- (7) To reduce of printing load, input data in the worksheet and let the computer generate many printouts. It is correct and faster than the manual process.
- (8) Implement computer information to provide all services.

- (9) Use computer information system to help reservations so that the computer warns with an alarm which items are reserved.
- (10) The computer information system can help users to retrieve the items faster than manual.
- (11) The reports which come from the computer information system can help estimate the amount of revenue and classify the revenue sources.
- (12) Collect the statistical information by using the computer-based system that will keep all information in database and retrieve the information in the report form in the required format.
- (13) The computer information system can produce the statistical reports to support the decision making process.
- (14) One retrieval can find all kinds of books.

2.4 User Requirements

2.4.1 Staff Requirements

- (1) The proposed system must be easy to use and faster to retrieve information and the staff can access the needed information by the keys other than the item numbers. The service will be an automated system which is simple to identify the due date of any rental items and proceed all the information on the existing inventory of the items.
- (2) The services such as rent, returning, reservation, or inquiry for information will be provided by computer-based system.
- (3) Any overdue fines can be calculated at the time the books are returned.
- (4) All information on the members and the books will be kept in a database file in order that the status of member can be accessed for approval of permission to use the services.

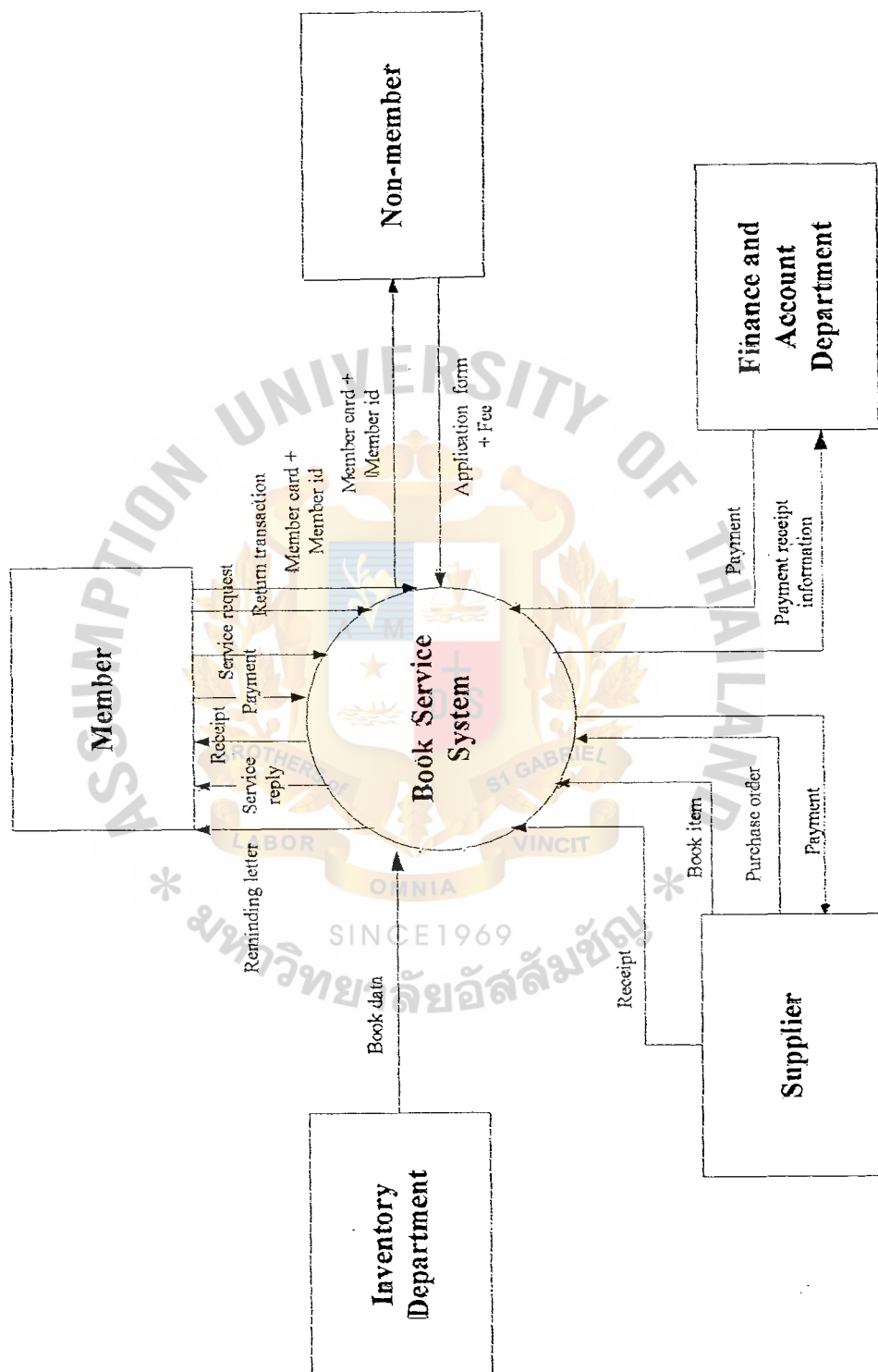


Figure 2.2. Context Diagram - Existing System.

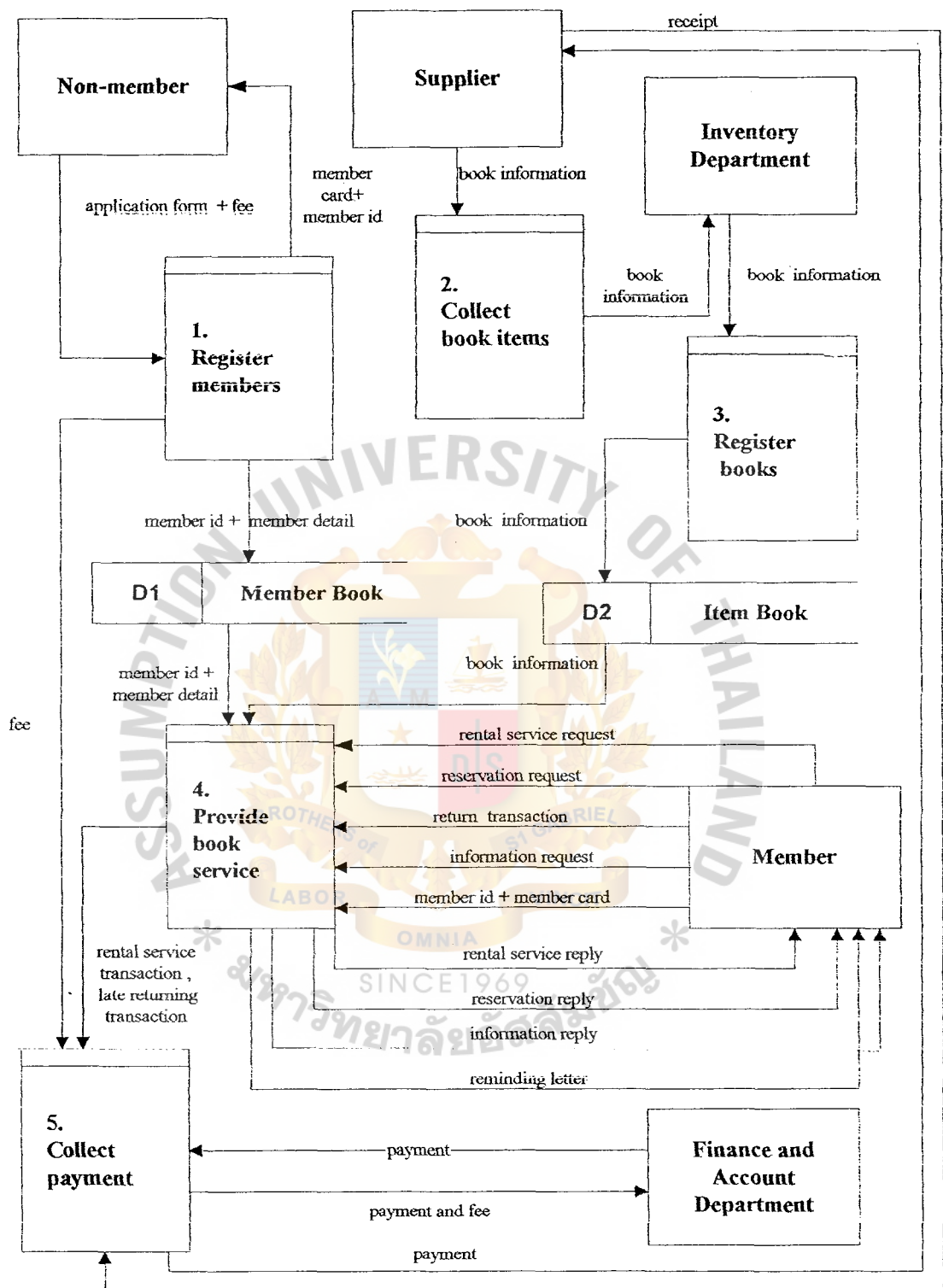


Figure 2.3. Data Flow Diagram - Level 0 - Existing System.

- (5) The computer system enables the staff to check whether the book is available in the shop, or who has rented the book and when it will be returned.
- (6) The input and output screens are designed in a user-friendly format that is easy for new users to learn.
- (7) The language to be used is natural and easy to understand in order that only minimal training is necessary for the staff to use the program

2.4.2 Management Requirements

- (1) The statistical reports about the books, members, and service transactions can be produced on a weekly, monthly, or quarterly basis to meet management requirements.
- (2) The reports about the books, members, and service transactions can be produced on weekly or quarterly basis to meet management requirements.
- (3) The comparison reports about the books, members, and service transactions can be produced on a weekly, monthly or quarterly basis to meet management requirements.

The main user requirements are the following:

- (a) Inquiry of the items should be dealt with fast.
- (b) The language of inquiry should be natural and easy to understand.
- (c) The service operations should be fast.
- (d) There are many ways to access the needed items.

2.5 System Design

The system design categories are divided into the following parts:

- (1) Design of Input Screen
- (2) Design of Output Screen
- (3) Design of Context Diagram and Data Flow Diagram

- (4) Design of Data Dictionary
- (5) Design of Database Interaction
- (6) Design of File

Design of Input Screen

The objective of this design is to provide staff convenience in inputting data into a form. The input screen should keep the screen simple, create an attractive screen, keep the forms easy to fill out, ensure that the forms meet the purpose for which they are designed and assure accurate completion.

The characteristics of the screen design:

- (a) Keep the screen simple.
- (b) Keep the screen presentation consistent.
- (c) Facilitate user movements among screens
- (d) Create an attractive screen.
- (e) Present good layout easy to key-in.

The Input screen of Book Service System includes the following:

- (1) Login - when the user would like to use the book service system, they should input the password into the login screen. If the user inputs the wrong password, they cannot enter the system.
- (2) Main Menu - The user can choose from the menu screen to enter each transaction
- (3) Register Member - The user enters the member transactions.
- (4) Registration Member Form - When the customer would like to rent a book from the shop, the system records customer information into the registration member form.

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- (5) Book Registration - The user selects book registration menu to enter book registration transaction.
 - (6) New Book Registration - When the shop gets book items from the supplier, the staff use this screen to register new book.
 - (7) Information Service - This screen shows information service menu.
 - (8) Member Searching – This screen is used to search user information.
 - (9) Member Information
 - (10) Book Searching - This screen is used to search book information.
 - (11) Book Information
 - (12) Inventory Searching - This screen use to find inventory information.
 - (13) Inventory Information
 - (14) General Report Menu
 - (15) General Report Period – The user uses it to view a detail of report.
 - (16) Popular Member List
 - (17) Service Transaction – The user inputs the member code and the book code to determine service transaction of each member.
 - (18) Return Service - The user inputs member code and book series to update the return status of book from each member.
 - (19) Reserve Book - The user inputs member code and book code into this screen to check the availability of book or update status of book.
 - (20) Update Book Status
 - (21) Revenue Transaction - The user inputs member code into the screen to determine the amount of payment for each member.
 - (22) Revenue Information
 - (23) Revenue Detail

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(24) Payment Transaction – Purchase Order Form

The Design of Input Screen is shown in Appendix D.

Design of Output Screen

The objectives of Design of Output screen are as follows:

- (a) To design output to serve the intended purpose.
- (b) To design output to fit the user.
- (c) To deliver the appropriate quantity of output.
- (d) To assure that the output is where it is needed.
- (e) To provide the output on time.
- (f) To choose the right output method.

The output screen will display the data for reference of printing reports. The output screen should keep the screen simple and create an attractive screen.

The Output Screen of Book Service System includes the following:

- (1) Member Card and Detail.
- (2) New Member List.
- (3) Book List.
- (4) Inventory List
- (5) Monthly Rental Service Report.
- (6) Monthly Late Returning Record.
- (7) Quarterly Book Loss Record for 1999
- (8) Popular Member List.
- (9) Popular Book List
- (10) Purchase Order Form

The Design of Output Screen is shown in Appendix E.

Design of Context Diagram and Data Flow Diagram

The objective of the Context Diagram is to represent an overview of the entire system. It depicts the relationship between the Book Service System with each external entity. Since the system must keep track of the number of book a customer has rented, the external entity CUSTOMER has the most data flow to and from it. Note that the Context Diagram should be kept relatively simple. Diagram 0 depicts the major activities for the Book Service System. Note that there is one process for each major activity. Each process is analyzed to determine the data required and the output produced. The proposed system's Context Diagram and Diagram 0 are shown in Appendix A.

The objective of data flow diagram level 1 of the proposed system is to depict the operation in each process of the Book Service System.

The proposed system's operation process include seven processes.

- (1) Book Item Collection.
- (2) Payment Collection.
- (3) Customer Registration.
- (4) New Book Registration.
- (5) Book Service.
- (6) Revenue Collection.

Book Item Collection

The book shop should have available the Book Items for customer service. The shop contacts several suppliers and compares the best prices, payment terms, quality of the products and services between them. The shop has to make a decision for the most suitable suppliers and order the book items from them. The system will produce a purchase order form which includes the details of supplier, item number, book name,

price per unit , quantity, amount and payment terms. Then the shop hands in purchase order to the supplier. The supplier sends back the book item and its information to the shop. The system keeps the purchase order in the purchase order file and sends it to process 2 for collecting the payment amount. Once the shop gets the book item and its information, the book items will be sent to the inventory department. The process is shown in Appendix A.3.

Payment Collection

Once the supplier provides book items to the shop, the shop should send back the payment to the supplier in payment terms. The system computes the payment amount from the purchase order details. It creates a payment form to collect and update payment details. The payment details should be kept in the payment file. The system makes the shop run faster operations in collection and update the payment information. The shop also can use this record and compare the cost and the revenue . The shop can plan to save the cost and gain benefit in the future. The payment information can be kept in a reliable and simple form.

Customer Registration

When a customer would like to rent a book from the shop, the customer must pay for the member card. When the shop receives the payment , the system records the new member's details in the member form which includes the details of the member's ID, member's name, member's surname, member's address, member's telephone, sex and application date. The system assigns the member an ID number and prints the member's card which includes the member's ID, member's name and application date . All information of the member will be kept in the member file. The system can record, edit and update the member information in the member form. It provides fast operation in recording, editing, searching for member record and helps it identify the

valid customer card in the rental operation. It also helps in a fast operation of member information retrieval and in customer service request.

New Book Registration

Once the shop gets book items, the book information will be registered in the register form screen. Book items will be assigned numbers and kept in the item file. The system records the new book data which includes the book code, book name, actor's name, actress's name, language, categories, and available date into the book form screen. The system provides a fast operation in checking the stock of items and in customer service request.

Book Service

When a customer would like to rent , return or reserve a book from the shop, the system provides rent, return, reserve, information service operations for the member. The first service operation is the rental service operation. When a member would like to rent a book, the system will check the validity of the member status. If the system gets an invalid member card, the shop returns the member card to the customer. But if the system gets a valid member card , it will determine the rent status of the member. Once the system determines the rent status of the member , it defines the due date for returning the book. The shop provides the book to the member and returns the member card to the member. The second service operation is the return service. Once a member would like to return the book, the member shows the member card to the shop for member card verification process . If the system finds the member card valid, it will check the return transaction and update the return record. If the system finds late return operation, it will update loss record and put it into the item file. The third service operation is reserve service. If a member would like to reserve a book, the member must show the member card for verification. If the system finds a valid member card,

it will determine the availability of the book. If the book is available ,the shop provides the book to the member. Then the system will update the book status in the book form screen which includes the details of the book code, book name, status, member ID, member name, member surname. The symbols used to update the book status include four symbols, which are A, X, R, L. The symbol A means the book is available for rent now. The symbol X means the book is rented now. In this case the member can not rent the book. So the shop will recommend the member to reserve the book in advance or recommend the member to rent other books. The symbol R means the book is reserved now. In this case the member cannot reserve this book, the shop will recommend a new book. The symbol L means the book is lost. The system will help the shop to update the status of the book and check the validity of the member card to prevent the book from being rented by an unauthorized person. It also helps in fast customer service request in rental operation, return operation , reserve operation and provide information service to the member.

Revenue Collection

Once a member uses one of the service operations from the shop, the member must be issued a payment form for the shop. The system computes the rental fee for rent, defines transaction, and the fine for late returning transaction and loss fee from loss transaction. And all the information will be updated and put into the file. The system also collects all received amounts from new members and old members. Then the system inputs all payment information into the payment form , which includes the details of description, book name , quantity and amount of payment. Then the system will print a receipt for the member and keep the receipt information in the receipt file. It helps to identify the revenue and determine the revenue compared to cost.

Design of Data Dictionary

The objectives of Data Dictionary are

- (a) To validate the data flow diagram for completeness and accuracy.
- (b) To provide a starting point for developing screens and reports.
- (c) To determine the contents of data stored in files.
- (d) To develop the logic for data flow diagram processed.
- (e) To provide documentation.
- (f) To eliminate redundancy.

The data dictionary of the proposed system contains information about data and procedures, information about data maintained by the system including data flow, data stores, record structures, and elements, screen, procedural logic, data relationships, such as how one data structure is linked to another, screen and report design. The data dictionary is created by examining and describing the contents of the data flow, data stores, and process. Each data store and data flow should be defined and then expanded to include the details of the elements it contains. The logic of each process is described by using the data flowing in or out of the process. In this project, we include all the four data dictionary categories – data flows, data structures, data elements, and data stores. The design describes the meaning of all related contents for the user's understanding.

Design of Database Interaction

The objectives in the design of database interaction are as follows:

- (a) To keep data accurate and consistent.
- (b) To prevent duplication of data or have minimum redundancy.
- (c) To keep data available for user requirements.

- (d) To make efficient storage of data as well as efficient updating and retrieval.

The Database is important to the system. It formally defines and centrally controls the store of data intended for use in many different applications. The design of the database is completed and monitored by the database administrator. The database is appropriately designed to ensure high degree of data independence, to reduce data redundancy, data security and not to cause any problem to the system after implementation. The design of the Database interaction is presented in the form of Entity- Relationship Diagram and Normalization. It is shown in the Appendix D.

Design of File

The objective of the file design is to include the decision on the nature and the content of the file itself. The design will incorporate the storing of the details of the service transactions and other reference information. The service information system is a new application that requires the design of all the files used in the application. Some of the master files may already exist as they are used in other applications. A new application needs to refer to the existing master files.

2.6 Hardware and Software Requirements

2.6.1 Hardware Requirements

- (1) PC Microcomputer

1 Unit

Datamini Festiva FD350,

Intel Pentium II Processor 350 MHz, 64 GB HDD

40x CD-ROM Drive, 14" Monitor MPR II, L2 Cache

Memory 512 KB, 32 MB SDRAM, 1.44 MB FDD

PCI Sound Card, Net Mouse with Pad , Multimedia Keyboard

- (2) Printer

2.6.2 Software Requirements

- (1) Operating system - Window 98 Thai Edition
- (2) Microsoft Office for Window 98 Thai Edition
- (3) Book service system

2.7 Security and Control

The risk and threat to the computer system are any advance situation or unfortunate event that would interrupt the service operations of the shop. The risk might include loss of data, incorrect input of data, unauthorized access or unauthorized program changes. So security and control is very important in the computer-based information system.

The goal of computer security is to design the system to ensure that the data's integrity, secrecy, and availability. And the security system will ensure that the data are kept safely from unauthorized persons.

The book shop's computer-based information system, security is important. For the shop's investment, the management team must be prudent and examine the risks and threats involved and evaluate the measures of work. They must also formulate on acceptable security policy and plan for the book service system.

The Security and Controls may include:

- (1) To protect the availability and integrity of data.
- (2) To protect data from unauthorized person access.
- (3) To protect the loss of data and items used from accidental disaster.
- (4) To examine the risks and threats of the proposed system.
- (5) To ensure that controls are effective in time, hardware and software.
- (6) To assure which controls will be implemented.

- (7) To evaluate necessary controls during the development of the system specification and the coding of the program.
- (8) During testing, to verify that the controls have been implemented.
- (9) For physical control such as prepare locks on doors for authorized person with keys, back up copies of data and guards in the shop.
- (10) To control procedures to ensure the system is being controlled properly.
- (11) To control integrity, availability of the data and shop resources.
- (12) To assure that method has been considered in the design of system.
- (13) Only authorized persons can access to the system and data through the use of a password.
- (14) Only authorized persons can access, modify and input data.
- (15) Copy protection should be employed to prevent copy of the file.
- (16) Data must be double-checked and verified. All forms of authorization signatures should be reviewed by supervisor level
- (17) To review the operating procedures to ensure that they are being followed for data entry.
- (18) The software program will search for duplication of data entry. A message is given when duplication is found.
- (19) Output reports on a random basis must be reviewed thoroughly to ensure that data entry is complete, correct, and in the proper format.
- (20) The formats for reports should include a proper heading, the date prepared, and the date printed for easy reference.
- (21) Access control features can be designed in the program or can be part of the operating system.

(22) People who are responsible for using control should have knowledge to

provide security in each situation

(23) The source document will be stored in a secure cabinet that is located outside

the shop in order to prevent unauthorized changes and to prevent loss of

source documents due to a natural disaster such as a fire or flood.

2.8 Cost and Benefit Analysis

2.8.1 Cost Analysis:

Hardware Specification:

(1) PC Microcomputer	1 Unit	32,900 Bahts
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Datamini Festiva FD350,

Intel Pentium II Processor 350 MHz, 6.4 GB HDD

40x CD-ROM Drive, 14" Monitor MPR II, L2 Cache

Memory 512 KB, 32 MB SDRAM, 1.44 MB FDD

PCI Sound Card, Net Mouse with Pad , Multimedia Keyboard

(2) Printer:

HP Deskjet 695 C	1Unit	6,900 Bahts
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Total Hardware Cost		<u>39,800 Bahts</u>
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Software Specification:

Window 98 Thai edition	3,500 Bahts
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Microsoft office 97 Thai edition	2,500 Bahts
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Book service system	10,000 Bahts
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Total Software Cost	<u>16,000 Bahts</u>
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Total Cost	<u>55,800 Bahts</u>
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System Operating cost	<u>15,000 Bahts</u>
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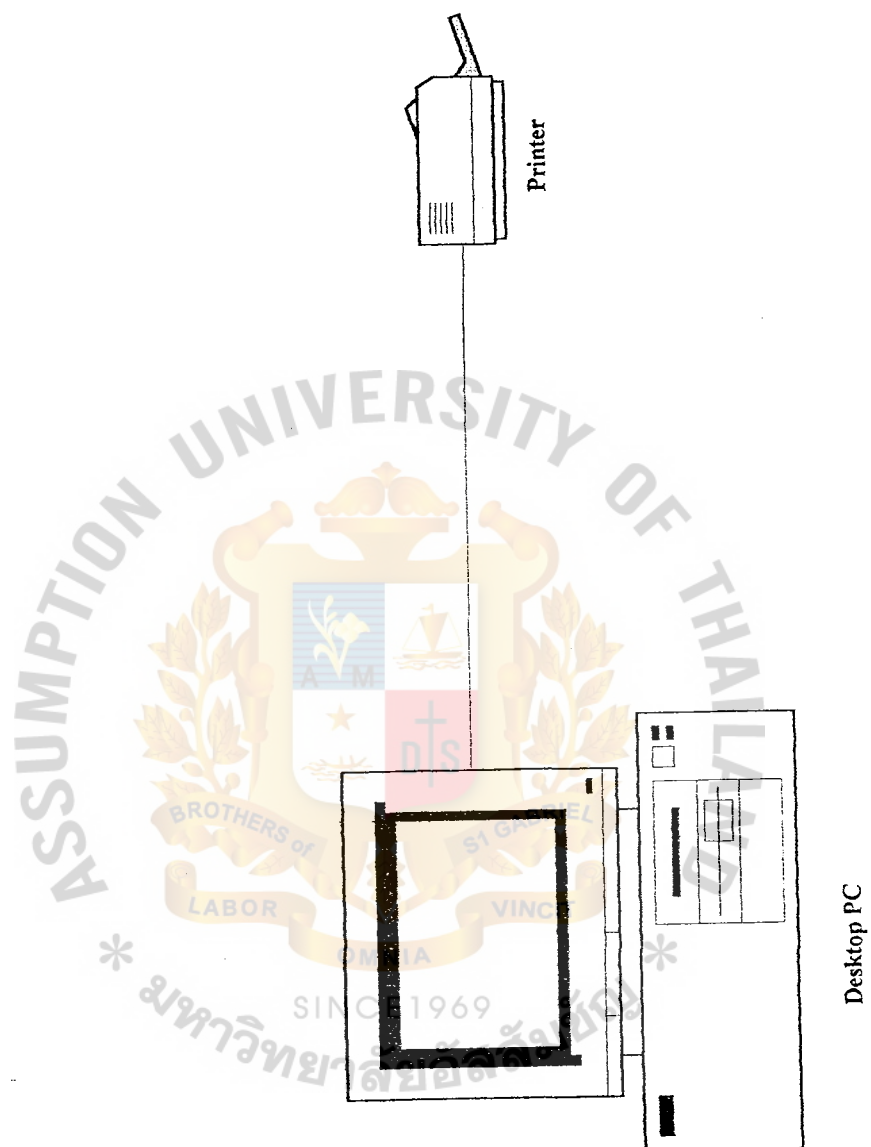


Figure 2.4. Network Configuration of Book Service System.

2.8.2 Benefit Analysis:

The benefit of the book rental service system is not only that it increases the efficiency of the book service but also many more things can be gained from the proposed system. The probability can be projected in both tangible and intangible benefit as follows:

Benefit for company

Tangible benefits:

Faster information retrieval	100,800 Bahts
Reduction in time and salary for staff work	60,000 Bahts
Reduction of time for providing service to customer	10,000 Bahts
Reduction of paper work and faster production of report	12,000 Bahts
Total annual saving	<u>182,800 Bahts</u>

Intangible benefits:

- Improved services to the members
- Improvement in providing various kinds of reports
- More efficient allocation of resources
- More time for staff to do other work
- Improvement of staff work
- Improved efficiency of operations
- Improvement of the decision-making process

Benefit for customer

Intangible benefits:

- Save customer time for using service each time

Provide convenience to customer for using service

Make customer's decision in choosing service easier

Provide impressive service to customer

Payback period to install the system:

Payback period is the number of years required to accumulate earnings sufficient to cover the investment cost.

$$\text{Payback period} = \frac{I}{(1 - T)R}$$

where I = Cost of investment

R = Annual earning

T = Tax rate (30%)

$$\text{Payback period} = \frac{235,800}{(1-0.3) 182,800} = 1.84 \text{ Years}$$

For hardware specifications, we choose this specification because the computer's price and capacity are suitable for this system. The price is cheap in comparing with its capacity:

- (a) Intel Pentium 2 processor processes rapidly information to respond to customer satisfaction in both service and time.
- (b) 4 GB HDD provides high space for keeping database.
- (c) The other components are special promotion set from the supplier.

In the beginning year, the cost of computerized system is higher than the cost of manual system. But in the manual system the cost of staff will be high. After several years, the cost of manual system will be higher than the cost of the

computerized system. Because there are higher requirements of records in the manual system, the operation requires more staff, and the cost of staff will increase. But in the computerized system, only the operating staff is required to handle all the operation. So I recommend the use of the computerized system for this project.



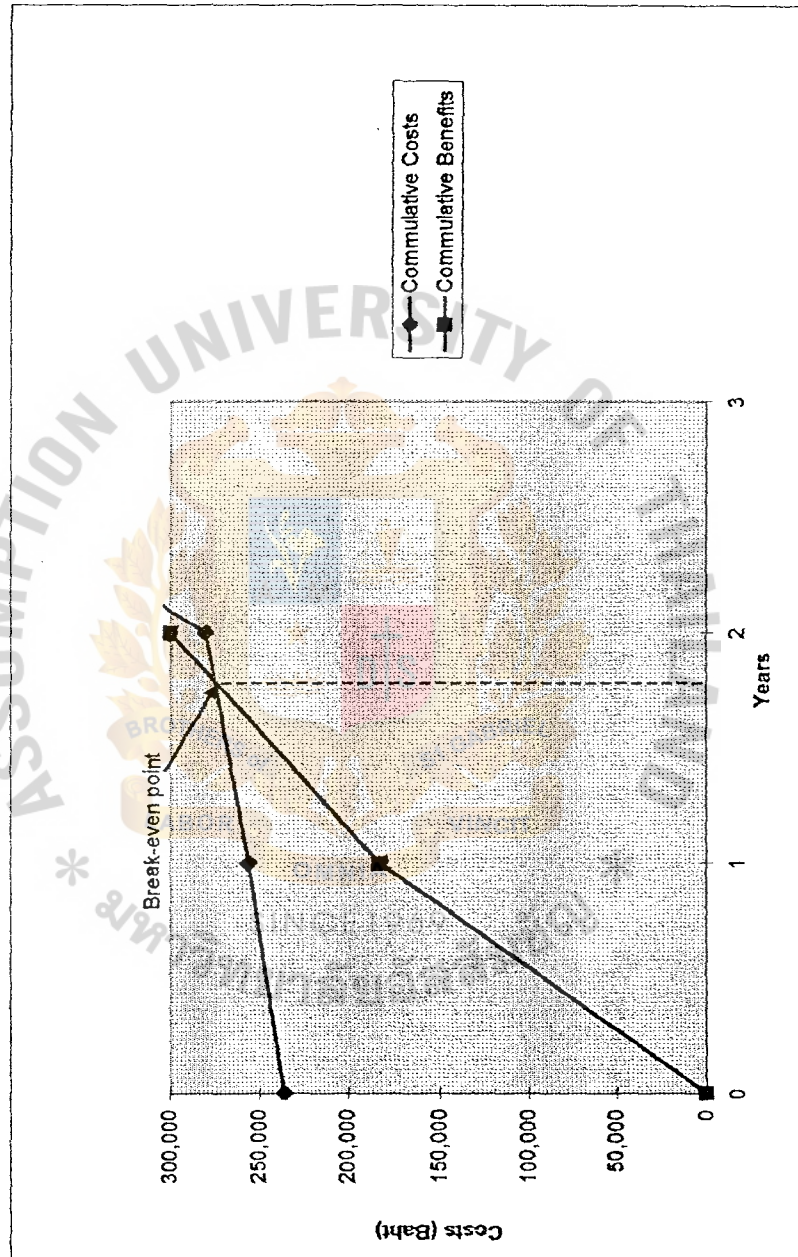


Figure 2.5. Cost and Benefit Analysis.

III. THEORY

A primary focus of customer service and support is to ensure that the customer has maximum use and derives maximum value from the purchase. The general area of logistics or distribution is often referred to as customer service. This is generally taken to mean managing the channels of sale from order receipt through to shipment, ensuring that the end consumer of the product experiences an optimal balance of availability and price. This activity has particular relevance to after sales support as a distribution and network for the original product should also be capable of shipping spare parts to ensure rapid service completion. People to cover the process of dealing directly with customers often use the term customer service. To respond quickly, whether it be the speed of acknowledgement of the presence of a customer need in the first instance, of the ability to deliver a completed service faster than the competition. The first principle to be observed is surely that the customers must be able to make contact quickly and easily with the person who can deal with their request. Information is a critical asset for any service business. Not only is information necessary in order to make decisions about the future direction of the organization and also to control its regular activities, the information possessed by the service organisation about its customers often provides a major barrier against its competitors. With an emerging product the demand for product and service will be uncertain, and the emphasis of the information system is therefore placed on market and customer research. Information systems may be used to create time advantage. If the service staff can respond more quickly through better scheduling or because there are faster communications this will be reflected in higher customer satisfaction. (Armistead and Clark 1994).

The role of the service and support operations is to create the new network and to plan and control the service delivery to consistent standards of performance. The pressure for change will be greater on some providers of customer service and support than others. Communications networks are especially important in the support activity. The use of databases, giving information on products and their performance in operation and customer history, allows support activities to be delivered from anywhere in the network so long as there is no language barrier. This facilitates the centralisation of specialists associated with product groups which reduces costs and improves the turn round time of support problems because of the concentration of resources.(Christopher 1978).

Computer must be regarded as purely a channel for the exchange of information amongst people. It is sometimes held that intelligence is an essential precondition for participation in any process of communication, and the turing test gives us a way of determining whether a machine may be considered intelligent. Although we have no machines capable of fully satisfying the turing test, it is feasible to construct machines which give the appearance of intelligence which means an ability to answer questions and make decisions. To distinguish communication with machines from that between people, as well as to point out its technological nature, the process of transferring information across the human/machine boundary is termed "interfacing". Interfacing embraces, as well as traditional text and multimedia techniques for delivery of information by machines to people, a set of methods for information transfer in the reverse direction – from people to machines. Such methods are important because they can lead to the harmonious collaboration of people and machines in improving the quality of life for human. The purpose of this project is to produce a logical analysis of

the existing system, extracting from it the implicit requirements of the business. This must be made in the form of the design of the new system. It is also the purpose of this project to include in the business requirements any extra facilities, which the user identifies, that are not considered in the current system. It is rare that users require extensive new processes or data, because usually they are concerned with getting their current requirements handled faster and more accurately. The business analysis dealt purely with the logical view of the system, never concerning itself with the way requirements might be satisfied, the system design stage involves immediately examining options for implementing the requirements. The first model used is referred to as the system data flow diagram. The system uses the business data flow diagram as the starting point. Each process is examined in turn and decisions are made as to which parts of the system are to be computerized. The system DFD contains the computer processes and the administration/operational processes, point to the location of the data stores. Examining such diagrams, a number of processes need to be split, as they will involve a human-computer interface. (Schmid et al. 1994).

Inventory is a major area of asset deployment which should be required to provide a minimum return on capital investment. A measurement problem exists, however, since the typical corporate profit-and-loss statement does not adequately display the true cost or benefits gained by inventory investments. The basic function of inventory is to increase profitability through manufacturing and marketing support. The ideal concept of inventory would consist of manufacturing a product to a customer's specifications. The requirement for transport between facilities is based on the inventory policy followed by an enterprise. Theoretically, an enterprise could stock each and every item carried in inventory in the same quantity at every facility. The

objective of inventory integration into the logistical system is to maintain the lowest quantity of items consistent with customer service goals. Inventory policies should be designed to protect customers by providing rapid and consistent logistical service. (Bowersox 1978).

It is a general rule in distribution that the faster and more reliable the transportation service, the lower the inventory requirement on both ends of the goods movement. The speed of goods movement affects the length of time that money is tied up in inventories while goods are in transit. The product offering any company might reasonably be described by the product characteristics of price, quality, and service. Buyers select suppliers based on the mix of these characteristics in order to satisfy certain needs for the product. The idea of stockless production drives people to examine operations in detail for the purposes of eliminating waste of time, eliminating waste of energy, eliminating waste of material, eliminating waste from errors. Inventories actually serve a number of purposes as follows:

Improve customer service – Inventories are an aid to the marketing of a firm's products. Products can be spotted near where customers purchase them and in the quantities that they wish to buy. This is an advantage to the customers who desire to have immediate stock availability or short delivery times.

Encourage production economies – The lowest per-unit cost for producing products generally occurs with long production runs at constant quantities. Inventories act as buffers demand and supply so that production can be geared to a more constant output than fluctuating demand might otherwise allow.

Permit purchase and transportation economies – When goods are purchased to supply the needs of production or when customer orders are served from the production line, in many cases small quantities are involved.

Hedges against price changes – Goods that are purchased on the open market are subject to the price levels dictated by changing supply-demand patterns.

Hedges against contingencies – Labor strikes, fires, and floods are just a few of the contingencies that can befall an organization. Maintaining backup inventories is one way in which normal supplies can be maintained for a period of time.

Inventory objectives are divided as follows:

Cost objective – Setting inventory levels and locating them is part of the overall problem of logistics planning. Within this broad objective, planning and controlling of inventories is a matter of balancing carrying, procurement, and out-of-stock costs.

Service objective – The difficulty of estimating out-of-stock costs leads to a different objective for inventory control. Procurement costs and carrying costs are adjusted by means of the amount ordered to minimize costs.

There has been a virtual stampede of companies and organizations that have converted their manual inventory systems to computer-based systems. There are a number of incentives as follows:

- (1) The inventory problem is easily adapted to the computer.
- (2) Many firms have already acquired a computer for billing purposes.
- (3) Computer software programs are available.
- (4) There is a promise that inventory investment will be reduced while maintaining or improving service level.
- (5) There will be improved reporting.

The management information system refers to all the equipment, procedures and people that create an information flow useful to the daily operations of an organization as well as to the overall planning and control of the organization's activities. Information on sales inventory and purchases may be retained in paper copy form as compared with the magnetic tape and disk storage of the computer. Computers are readily available to business of all sizes and the information system is associated with the computer in some way. (Ballou 1978).



IV. PROJECT IMPLEMENTATION

4.1 Overview of Project Implementation Schedule

The process of assuring that the information system is operational and then allows the users to take over the operation for use and evaluation is called implementation. The system analyst has several approaches to implementation that should be considered as the change over to the new system is being prepared.

The implementation of the book service system will begin after the top management and service manager agree with the proposal outlining the new system and analyzing the cost versus benefits. The implementation phase can be the most difficult and frustrating time of the project due to problems that were not discovered during the design and the software development. The users may have new requirements after using the live system. The development team must be prepared for these problems and must also be prepared for possible modifications to the program.

4.2 Training

Training involves all people who will have the secondary and primary use of the system in this project. It means staff and users. The training will provide the main guideline to the uses of the system to prevent problems with the system.

The objective of training is to provide the training for users at all levels and provide special training if necessary. Training will provide service to help staff who cannot use the computer or were not trained to use computer before.

4.2.1 Specialist Staff Training

Staff are the main group that the Company has to train all about the new system, how to update the new system and familiarize them with simple system maintenance

activities. So a training course will be provided for staff who are responsible for recording customer information, providing the information service for customer requirements, introducing the application to end users and controlling equipment performance.

Training must involve the capability to support staff familiarization with the system and general basic computer task system, such as putting the information into the form, copying information file, formatting and leading the allocation program into computer, and using printer. The staff must know the methods and processes in order to succeed in the work. They also must know the method to solve the problems of operations, malfunctions and how to detect these problems.

4.2.2 Inexperience Staff Training

End users who are inexperienced about computer have never used the computer. They have never run the application program. The Company has to train them so that they may understand the way to use the computer. It is necessary for the end users to know how to turn on a workstation, how to insert diskette into workstation, and how to save the information in the computer or diskette and how to load a program into the system. They must also be sure when it is safe to take a certain action without the risk of losing the data. They must know how to correct a simple problem about data.

The main problem of user training involves the use of the system itself. The training in entry of data details into the system or in the keeping data includes the method to enter data and the data should be redundant. Users must be shown how to add data, make changes or edit it, formulate inquiries to retrieve specific information, and delete records of data. These functions are the most basic features of the system, and the person conducting the training session must be sure everyone understands them and can perform them efficiently. It is necessary for the project developer to

gain feedback from the trainees of the system. The project developer should make sure that once the staff are working with the system completely by themselves, they will be able to utilize the system as it has been designed. To evaluate the effectiveness of the training, it is recommended to provide some testing of the users in key tasks and understanding of the functions.

4.3 Conversion

Conversion is the process of changing from the old system to the new one. There are four conversion methods of handling the system conversion. They are parallel systems, direct cut over, pilot approach, and phase in method. This project selects the parallel systems method. This method converts the old system to the new system carefully, since the book shop did not have a computer system before, but just a manual operation. The committee and all the staff would like the new computer book rental service system to fully replace the old one so that the staff will not have to rely on the old manual system. The existing system of book rental service is manual operation. The Company should convert the system step by step, because if the book rental service for the book shop is damaged, all work will stop immediately. It is difficult to solve the damaged system. Moreover, the staff have never operated a computer system. So it would be step by step conversion of the system. We must give staff time to be familiar with the computer and there will be training for staff eventually. I will use the parallel systems so that the book rental service system for the book shop is operated side by side with the old one to ensure that data will not be lost or no problem arises. We can test the correction or completeness of the information report of the book rental service system for a book shop on the real operation and compare with the existing system. I use the parallel conversion strategy for conversion. It is suitable for a computerized system, which replaces a manual one. There are many disadvantages in

the parallel conversion. These include the cost of running two systems at the same time, and the burden on employees of virtually doubling their workload during conversion, but this will offer a feeling of security to users who are not forced to make an abrupt change to the new system.

4.4 Testing

After training the users, the test for the new system is proposed. To test the new system, conversion is required. After the system is implemented and the conversion is complete, the Company will have a review to determine whether the system is meeting expectations and where improvements are needed. The System's quality, user's confidence, and operating statistics are assessed through the techniques as follows:

- (a) Event logging requires users to record unusual or expected events that have impact on the system. These events may reflect incidents that the system cannot handle because of incomplete design or activities that are not occurring in the prescribed manner.
- (b) Attitude surveys, data collections of ideas and opinions about the system.

There are several tasks involved in testing as follows:

- (1) To evaluate whether the system can handle the volume of activities that will occur when the system is at the peak of its processing demand.
- (2) To test the addition and deletion of records to files, and test all the retrieval algorithms for file storage.
- (3) To test error routines, normal processing routines and to create both valid and invalid test data.
- (4) To test and compare the time between inputting data into screen by the computerized system and inputting data by the manual system.

The review not only assesses how well the current system is designed and implemented, but also is a valuable source of information that can be applied to the next systems. Also there is system maintenance which is important for the book service system. The objective of system maintenance is to have a system operational at all times. The users of the system want the system to be error-free, efficient, and effective for their operations. A periodic evaluation of the system is necessary to discover any problems before they become too serious to require more than normal maintenance.

The first maintenance requirement is hardware which, is used in the book service system. It will be provided by the supplier. The supplier usually provides maintenance on a fee basis for the services provided. The book shop may get guarantee service from the supplier. This is convenient for the shop as they do not have special technical staff to resolve the hardware problems.

The second maintenance requirement is software maintenance. The service of the system developer will be available on a basis of once a month, three months, six months or one year after the system is implemented. It may include the correction of debugging program, virus effect, and other application program problems.

We should implement software as follows:

- (1) Software should be modular, partitioned into elements for specific functionality and sub-functions, and distinctly separate the representation of the data and the procedure.
- (2) Software should be modular to have independent functional characteristics.
- (3) Software should be designed as user-friendly.
- (4) Software should be designed with a hierarchical organization for better control.

Table 3.1. Gantt Chart of the Project Schedule.

GANTT CHART OF THE PROJECT SCHEDULE												
ACTIVITIES	Apr				May				Jun			
	1	2	3	4	1	2	3	4	1	2	3	4
System Analysis and Design												
- Identify the area under study												
- Develop the logical DFD of the system												
- ER- Model and table												
- Process Specification												
- Screen Layout												
- Report Layout												
- Theory												
Implementation												
- Programming												
- Testing												
- Acceptance Test												
- Documentation												

V. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

From the study of the existing manual system of the book shop, problems of difficulties in getting information both accurately and timely for users and management are:

There are so many data redundancies and it is also time consuming to do the routine work of searching information by the staff and for the customers. It also needs many staff to perform each task.

In the proposed system, a computerized system is recommend to the management to solve the problems about data redundancies and time consumption in accessing and searching information. The proposed system can provide a more efficient service for the members and help the staff to do their routine work more quickly. It can reduce the requirement for human resources. It can reduce time consumption in operations.

The purpose of the project is to analyze the existing system and to design a new system that will improve the efficiency and effectiveness of the operations. The project estimates and compares costs and benefits between the existing system and the new system. It also develops the computerized system that can reduce manual work and produce reports that cover major aspects and satisfy the management and user requirements.

The scope of the proposed project includes 6 main steps as follows: Collect Book Item , Collect Payment, Register Customer, Register New Book, Provide Book Service and Collect Revenue. The proposed project includes the Data Flow Diagrams, Data Dictionary, Input and Output Screen, Hardware and Software Specification, Cost and Benefit Analysis Security and Control, and Project Implementation. The

programs are coded in Microsoft access. The shop may have branches in the future. That means the Company can link to the network of other buildings, which will provide service information for users. It also provides the security and control. Only the authorized personnel can access the important data.

5.2 Recommendations

In this system development project, the shop has only one microcomputer. But in the future the Company may have other branches of book shops. The Company can expand the network to connect with other facilities in many buildings in order to provide services to the members by increasing some necessary facilities and changing some existing facilities. Because of the limitation of time, I will use a bar code to have faster input information.

In human resources, the staff and other users should develop efficiency in participation. If the end user is more familiar with the special staff, they will have a better communication with each other. It is of good benefit because they will have a chance to know about the misunderstandings and miscommunications between the end user and the special staff. So the Company can resolve the problem immediately before it becomes a great problem.

For information and documentation, the Company should keep it clear, precise, concise and safe. The Company should be careful about unauthorized personnel accessing the confidential information. Hardware and Software should be checked periodically to resolve problems on time.



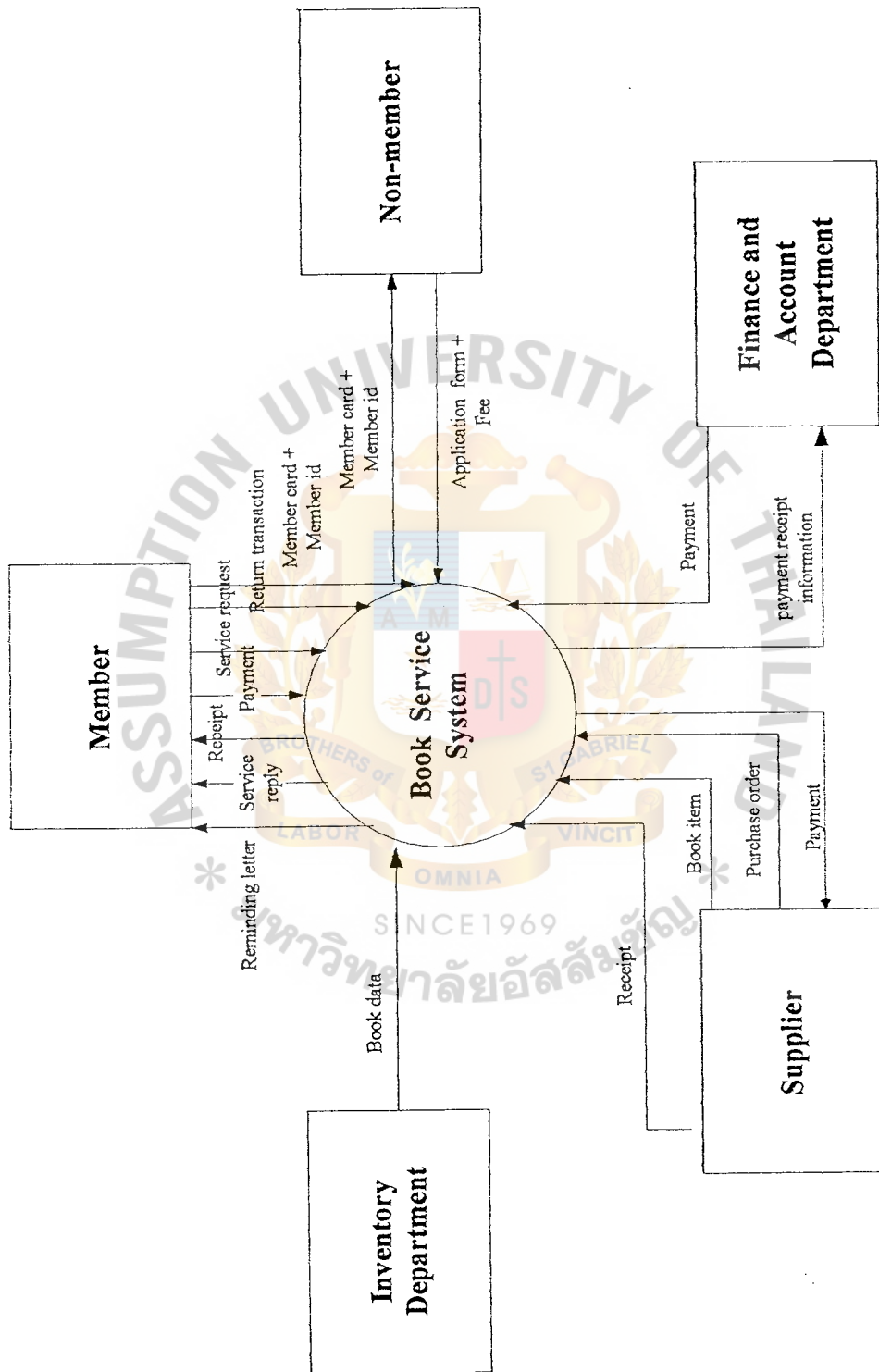


Figure A.1. Context Diagram - Proposed System.

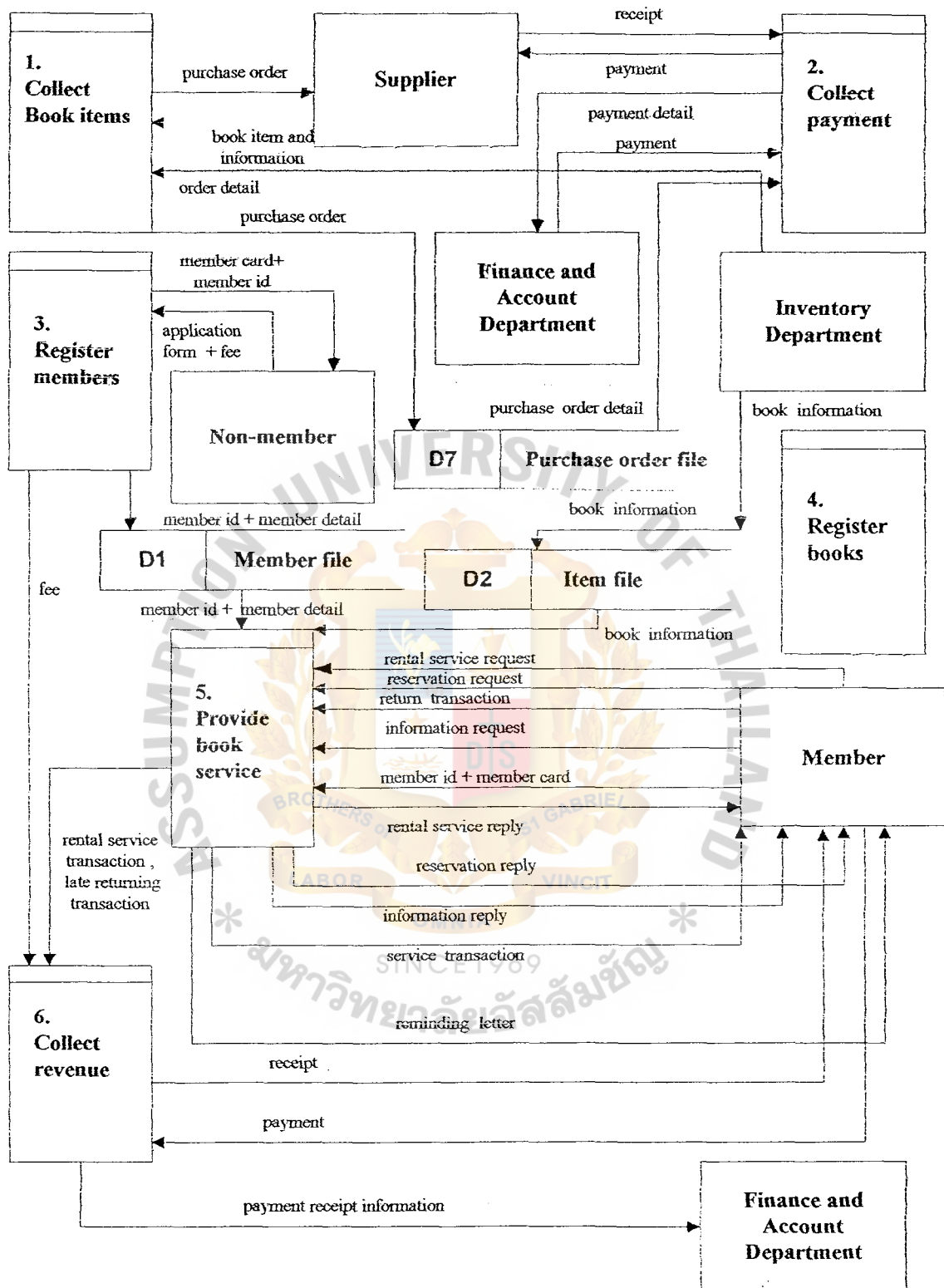


Figure A.2. Data Flow Diagram - Level 0 - Proposed System.

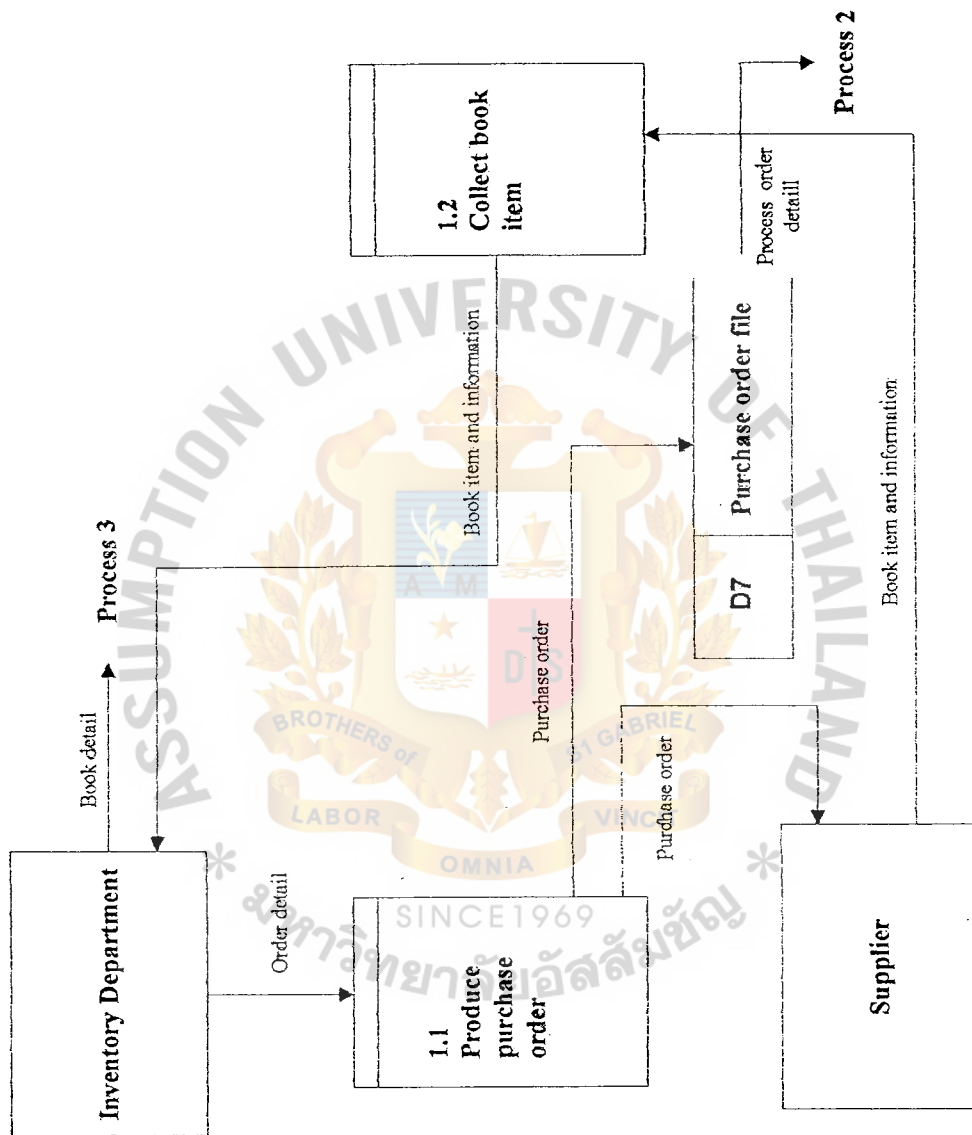


Figure A.3. Data Flow Diagram - Process 1 - Collect Book Items.

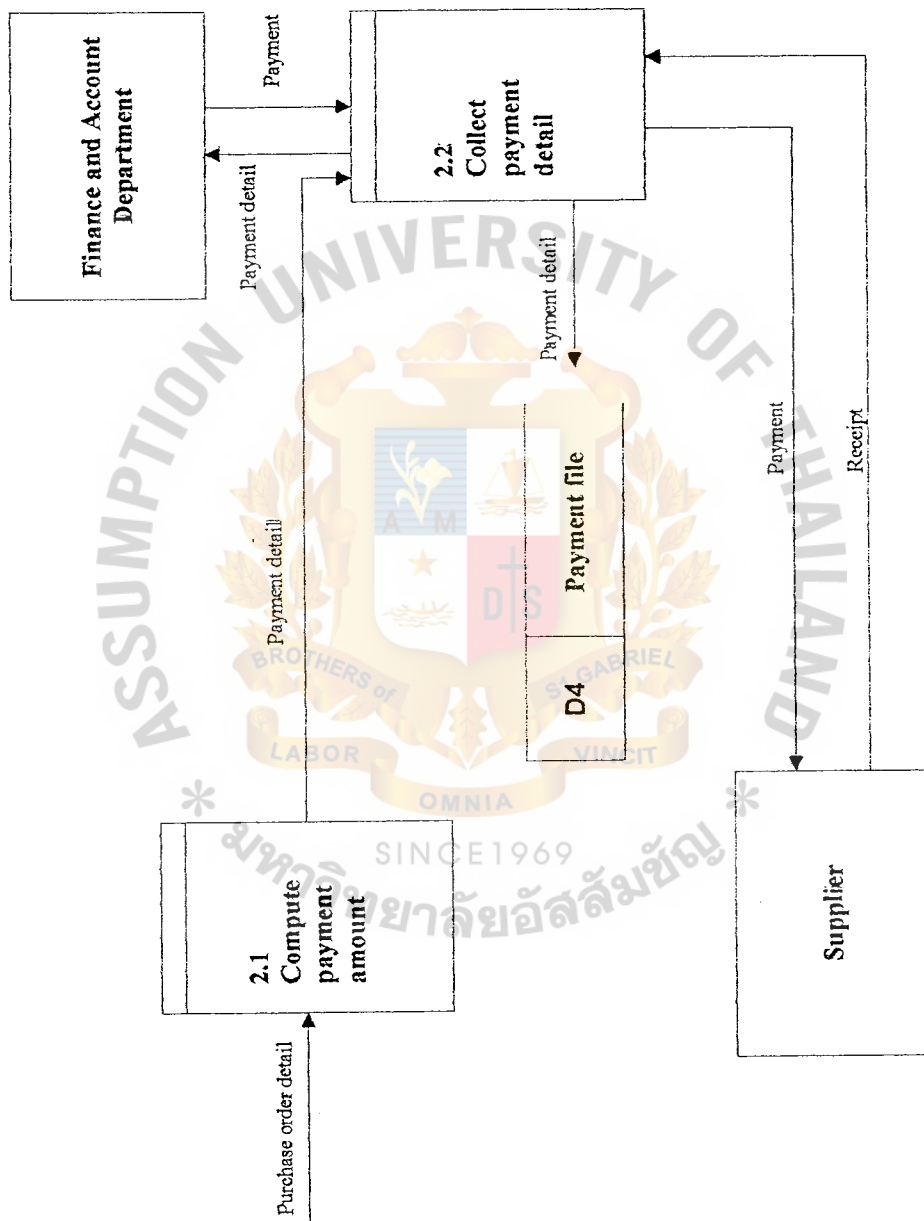


Figure A.4. Data Flow Diagram - Process 2 - Collect Payment.

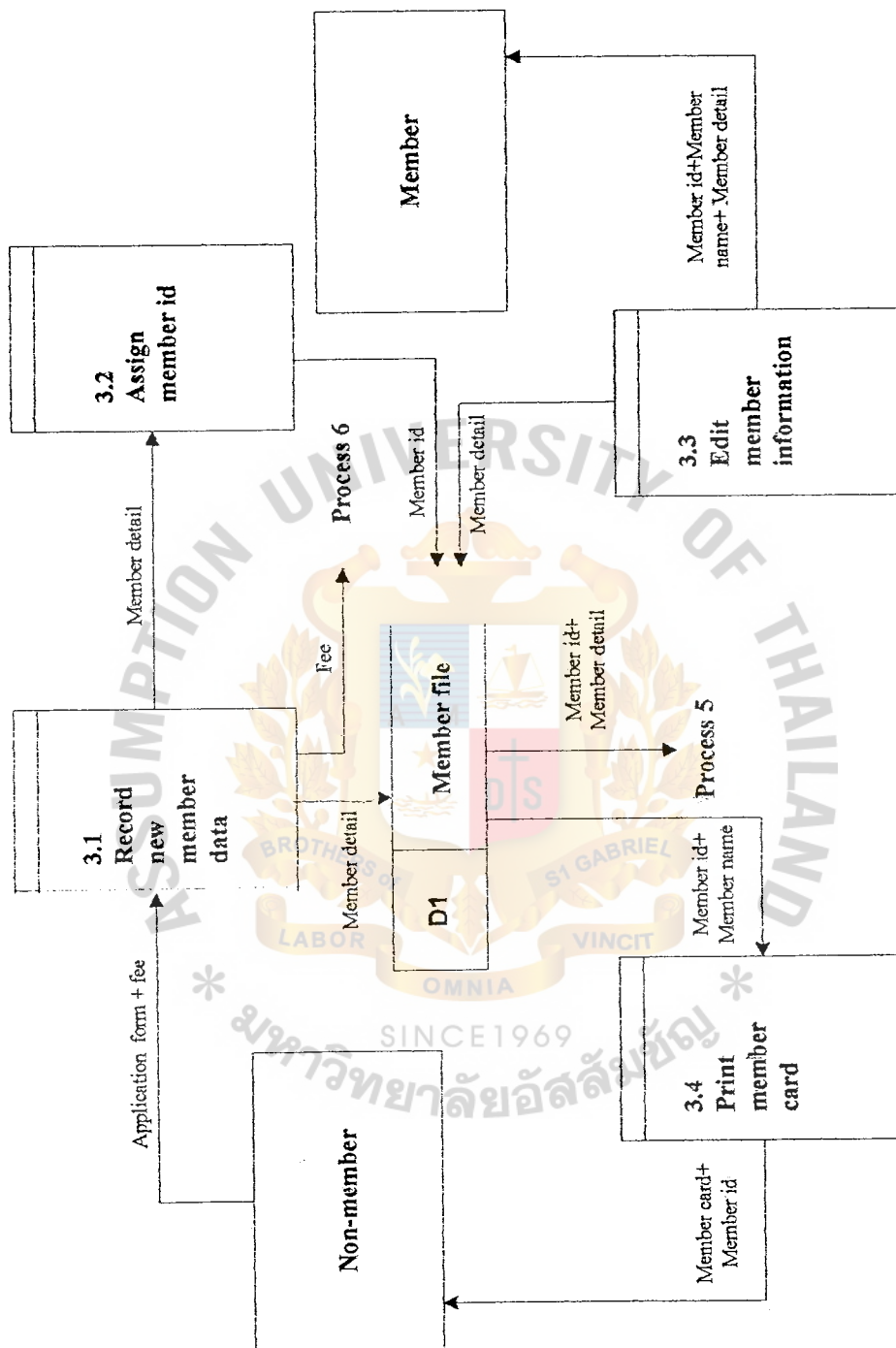


Figure A.5. Data Flow Diagram - Process 3 - Register Members.

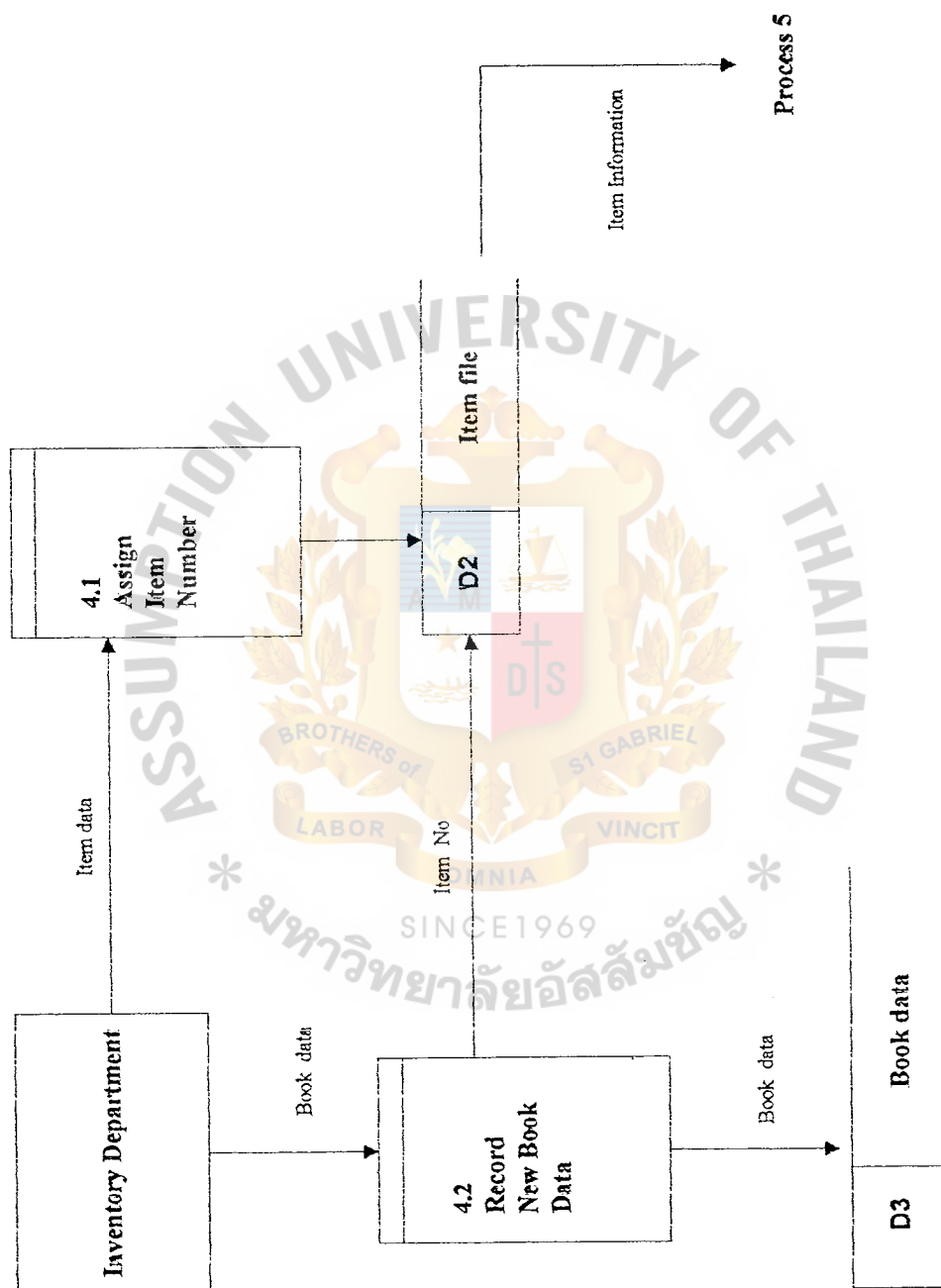


Figure A.6. Data Flow Diagram - Process 4 - Register Books.

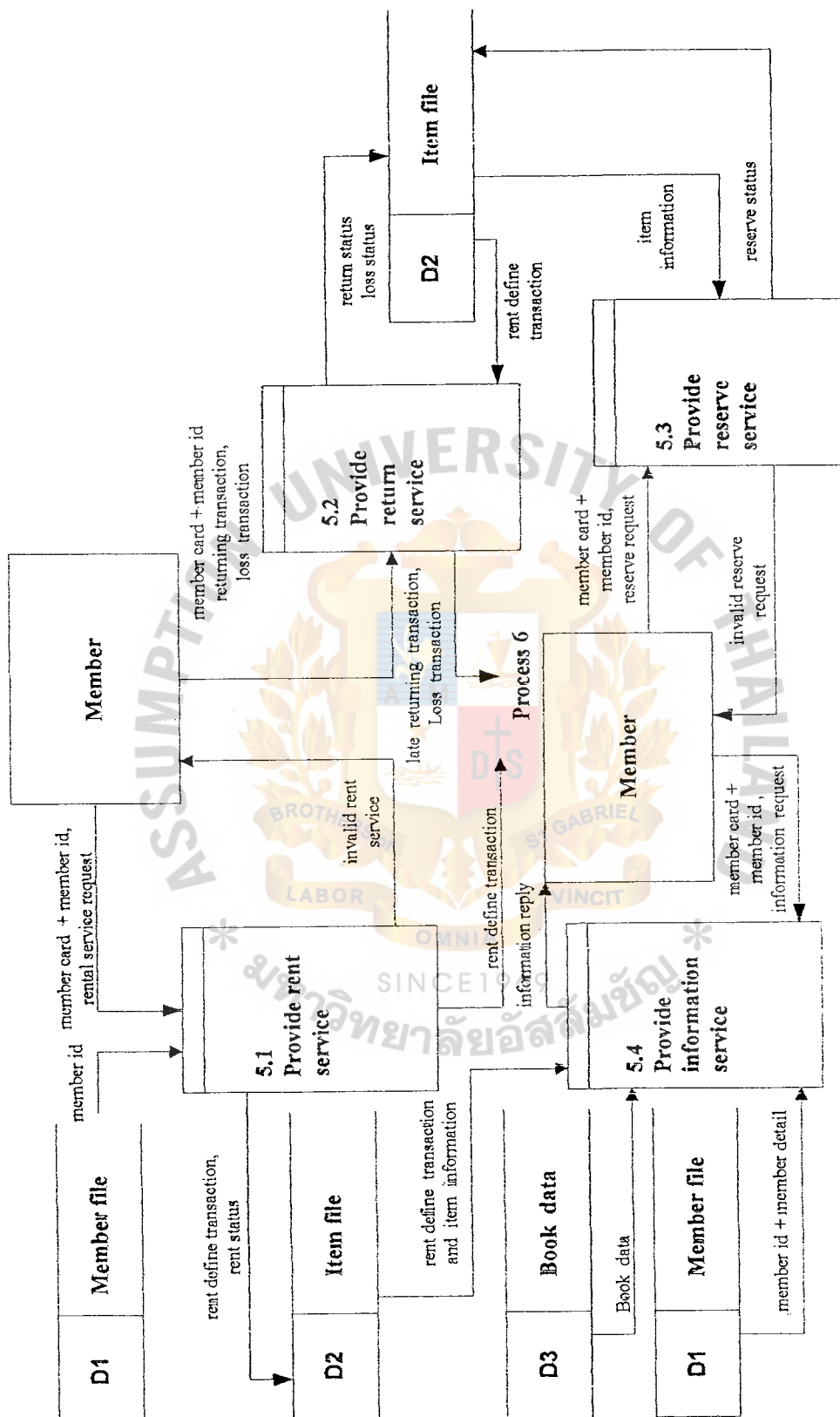


Figure A.7. Data Flow Diagram - Process 5 - Provide Book Service.

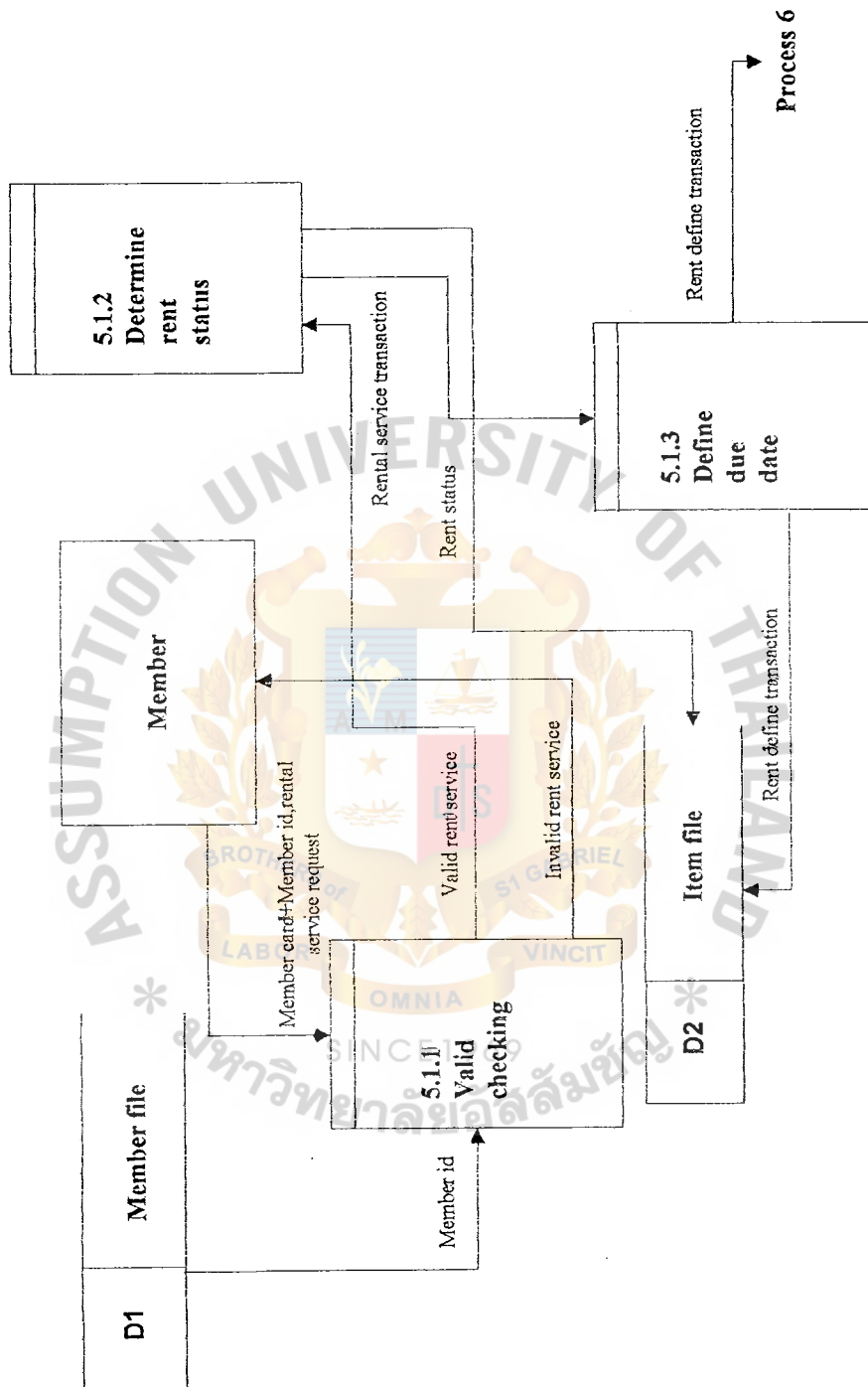


Figure A.8. Data Flow Diagram - Process 5.1 - Provide Rent Service.

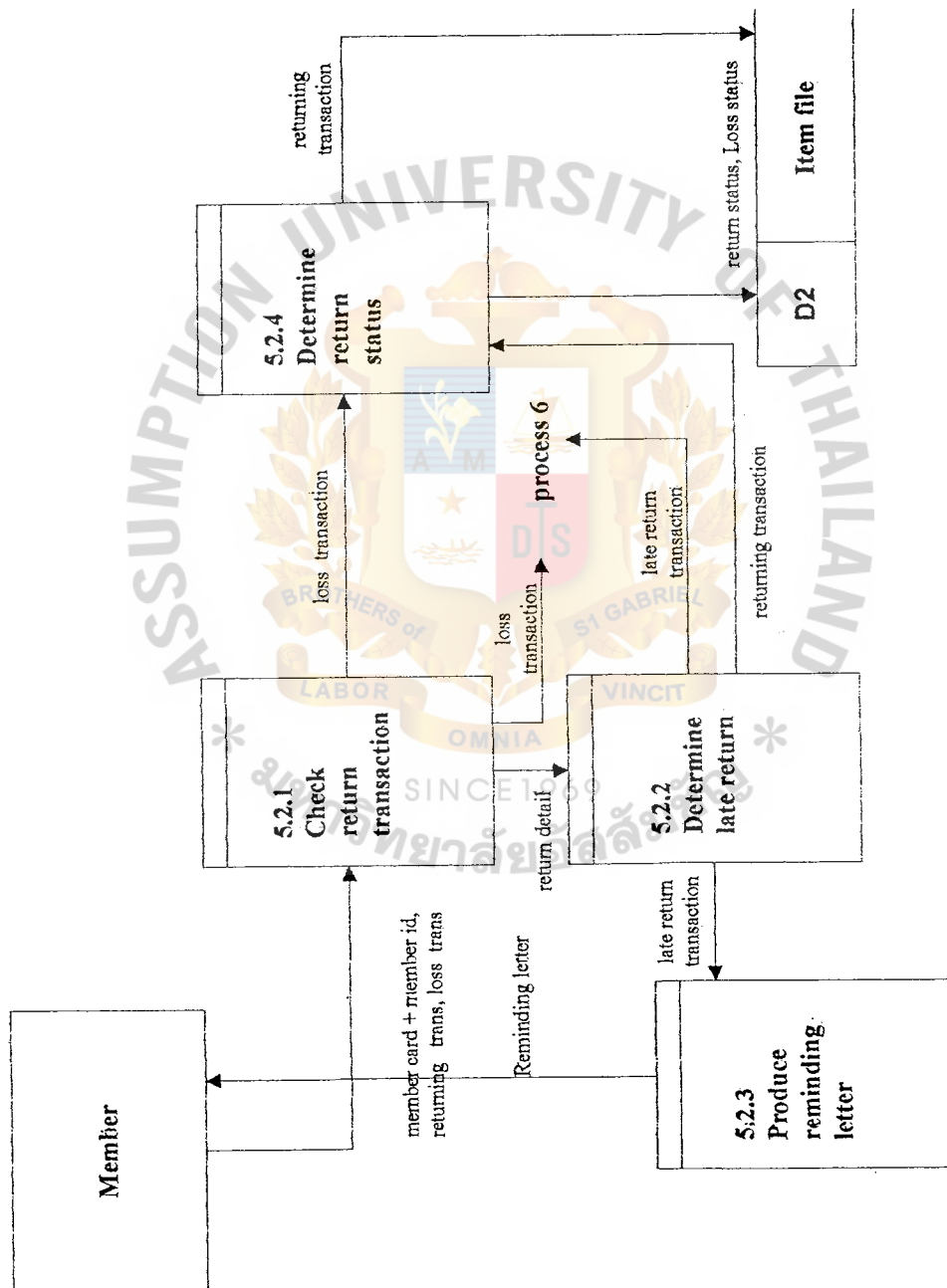


Figure A.9. Data Flow Diagram - Process 5.2 - Provide Return Service.

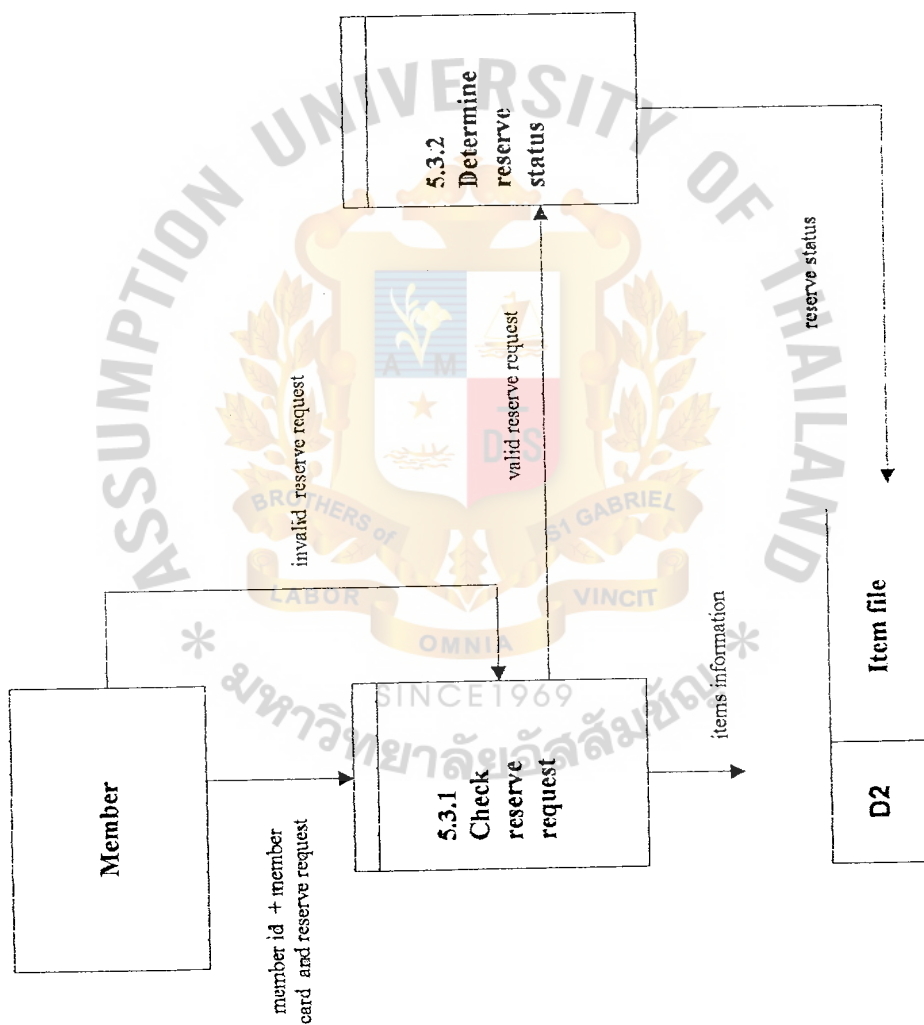


Figure A.10. Data Flow Diagram - Process 5.3 - Provide Reserve Service.

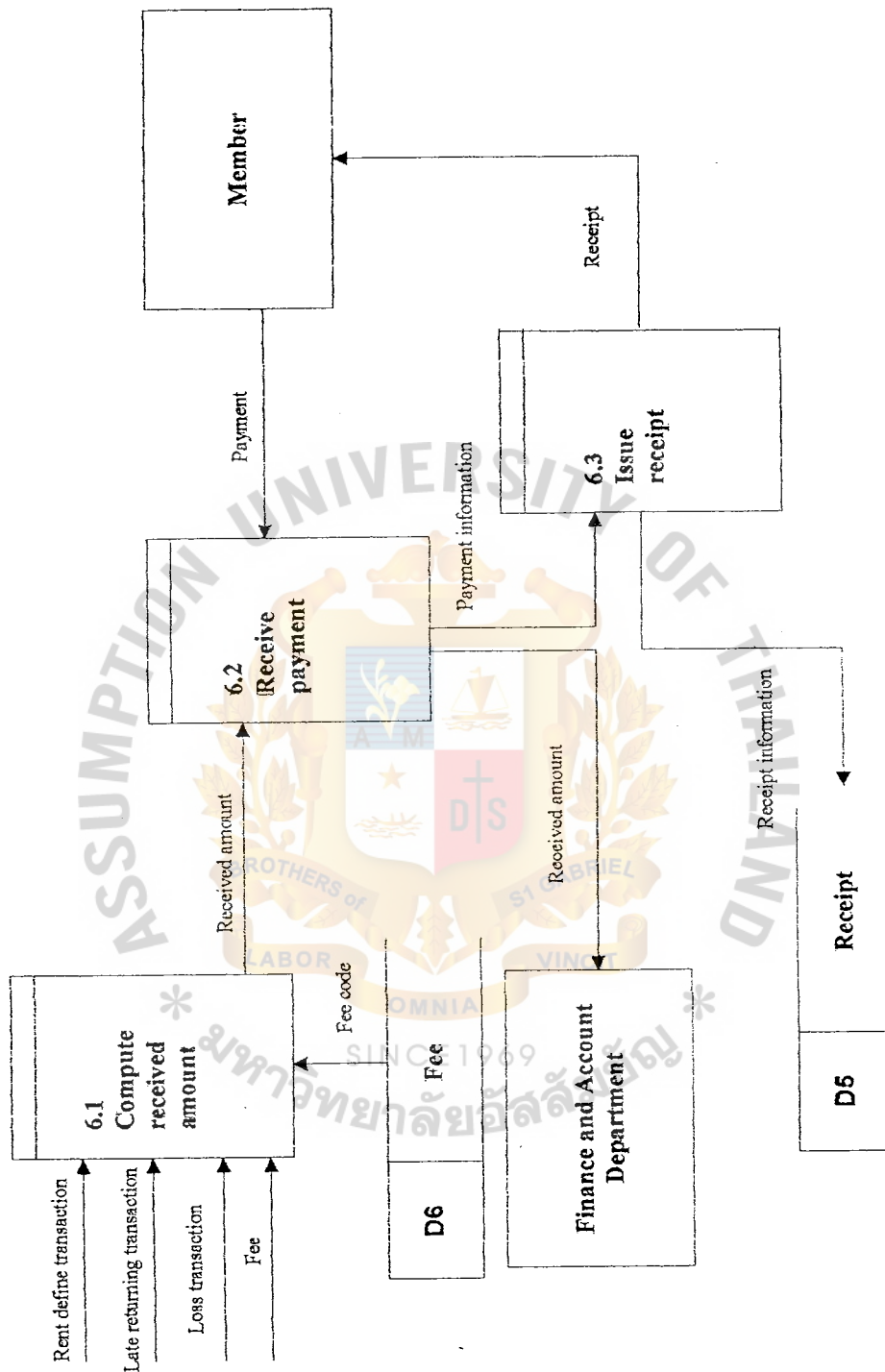


Figure A.11. Data Flow Diagram - Process 6 - Collect Revenue.

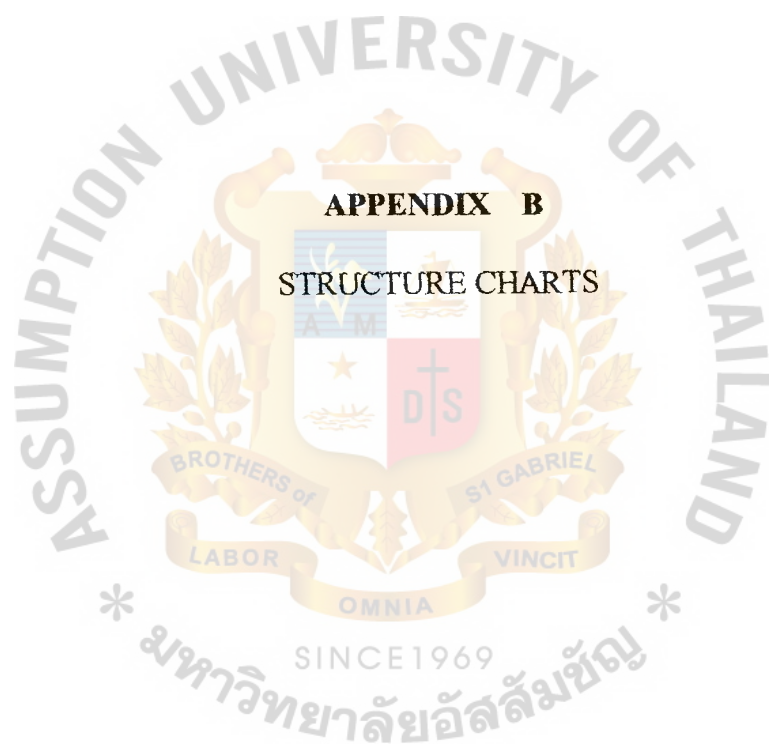




Figure B.1. Structure Chart - Process 1 - Collect Book Items.

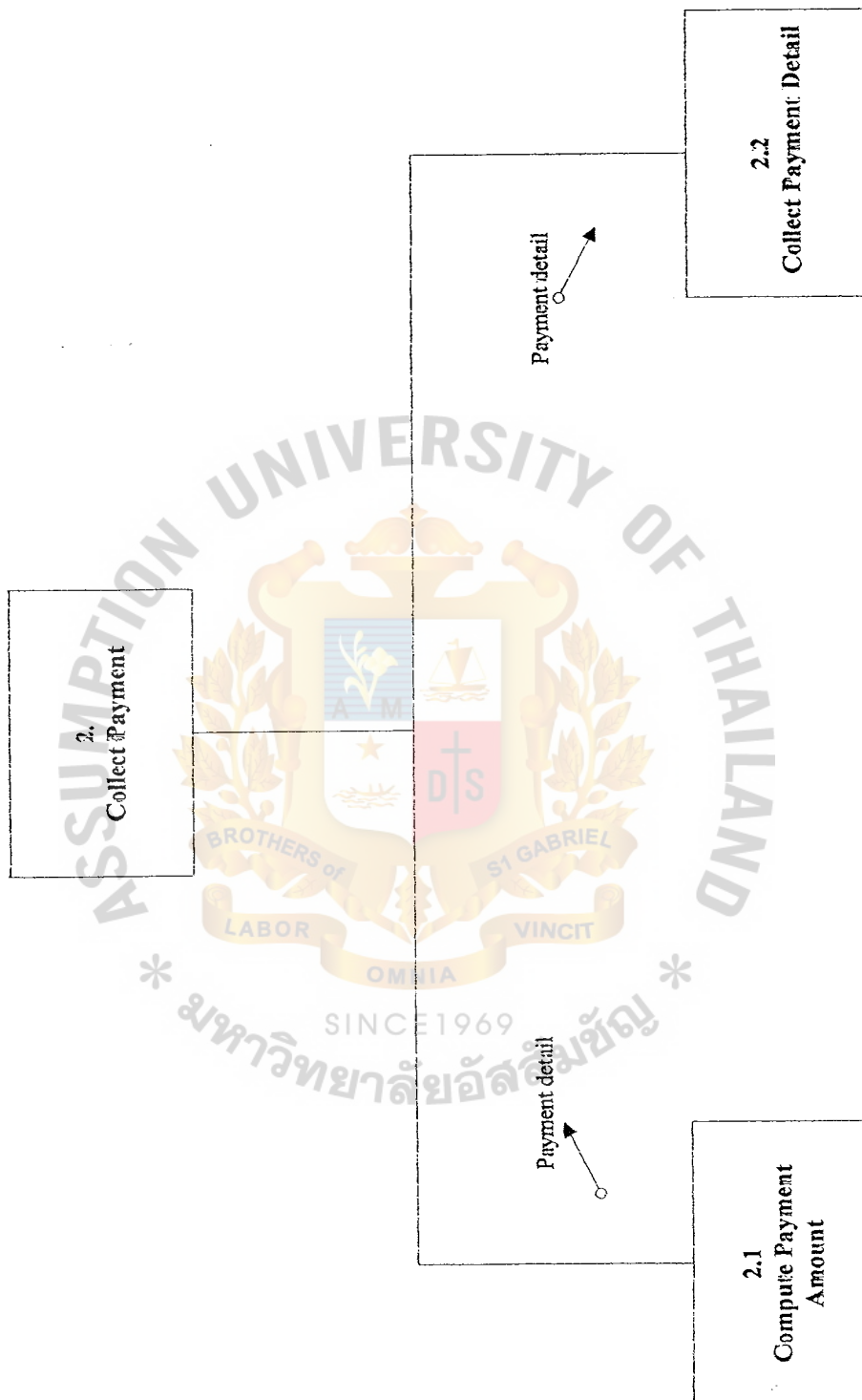


Figure B.2. Structure Chart - Process 2 - Collect Payment.

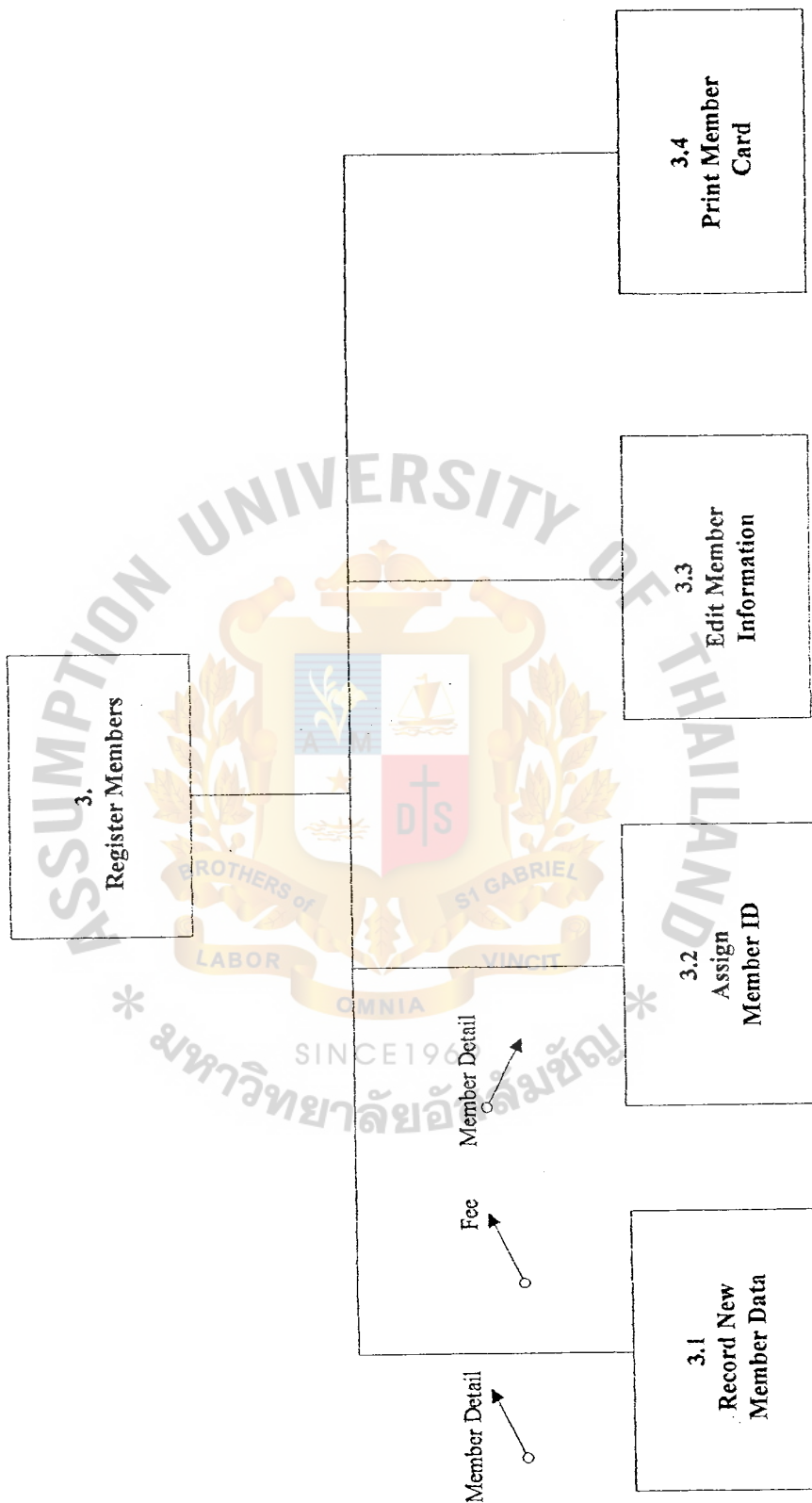


Figure B.3. Structure Chart - Process 3 - Register Members.

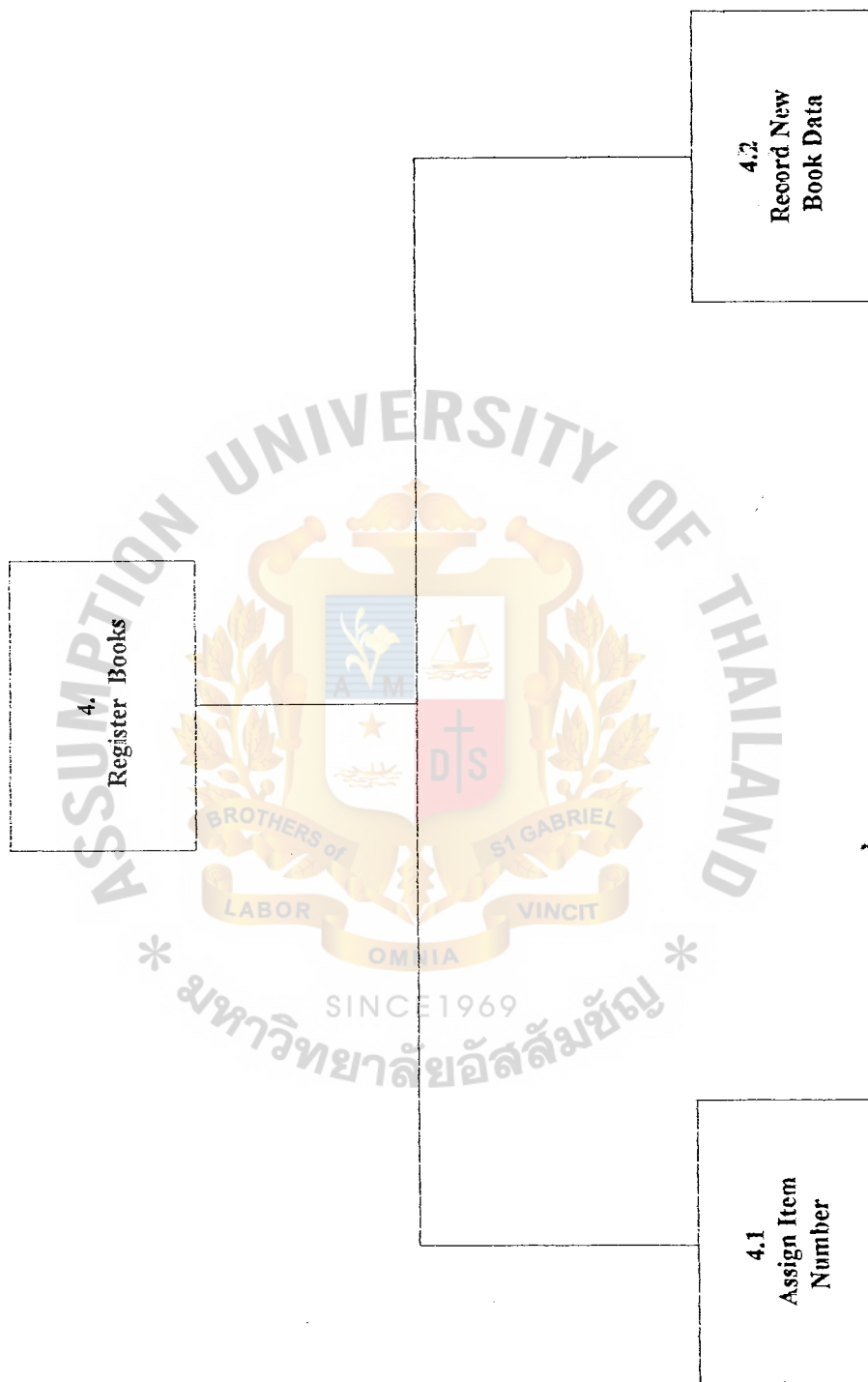


Figure B.4. Structure Chart - Process 4 - Register Books.

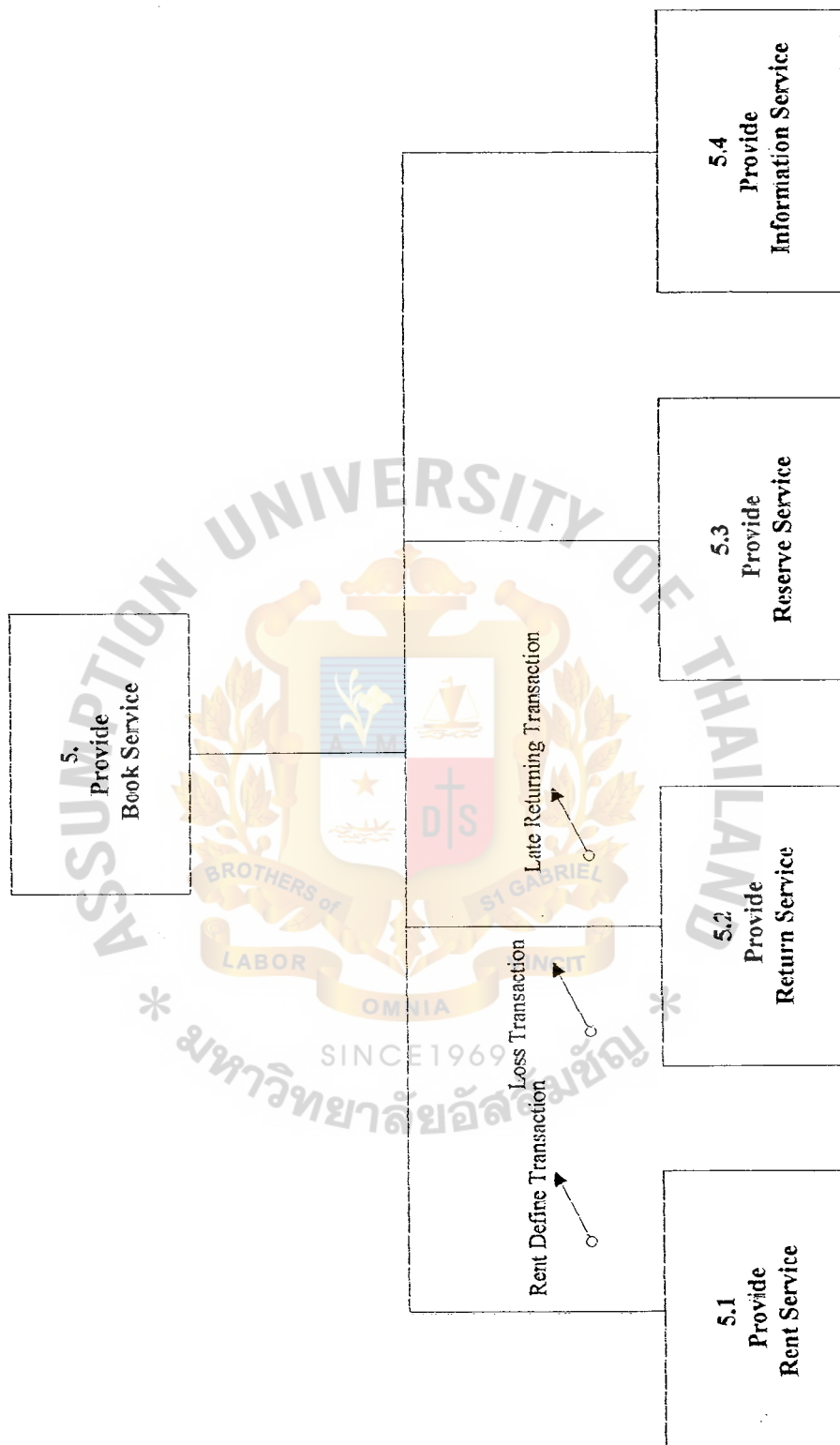


Figure B.5. Structure Chart - Process 5 - Provide Book Service.

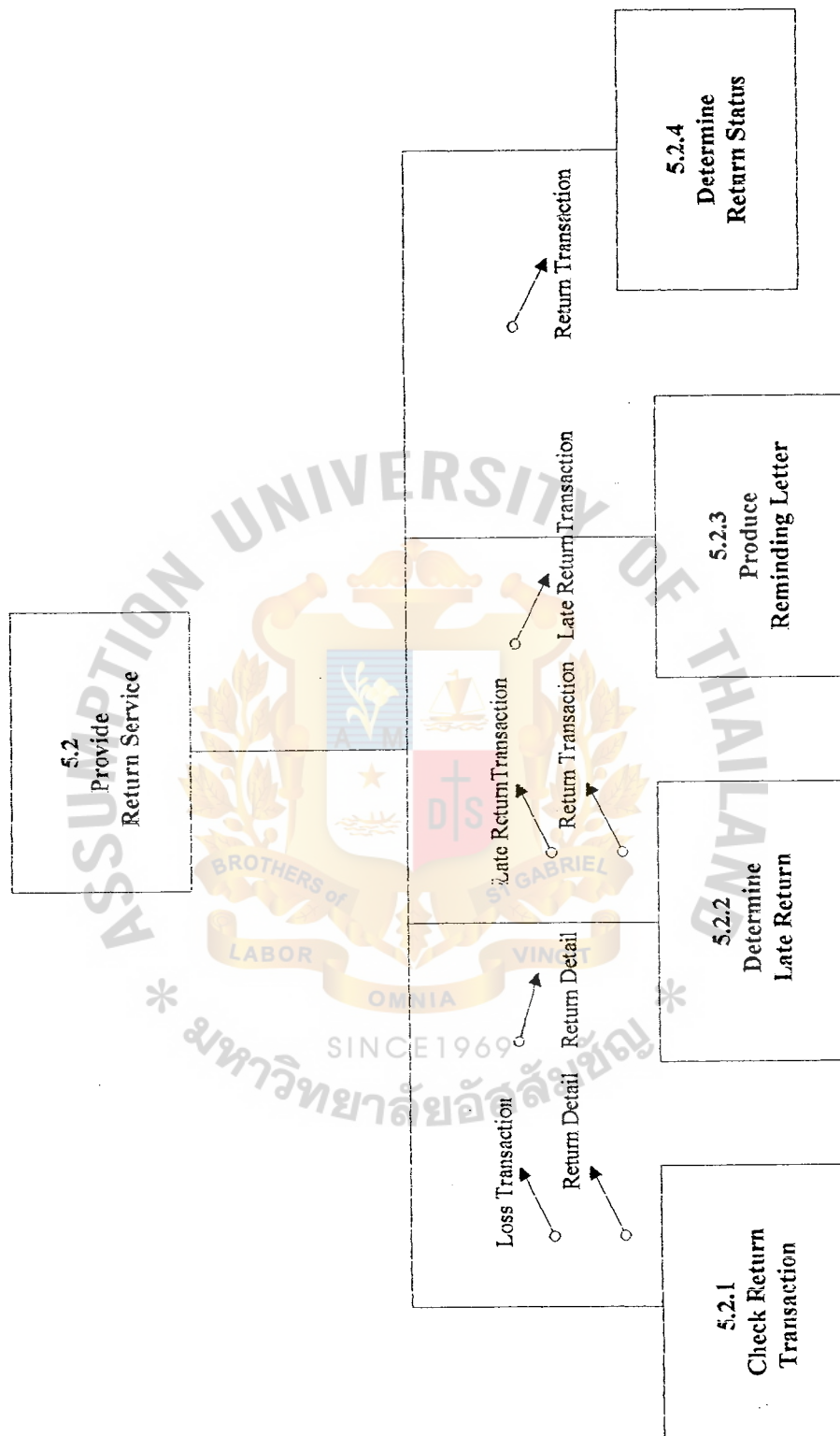


Figure B.7. Structure Chart - Process 5.2 - Provide Return Service.

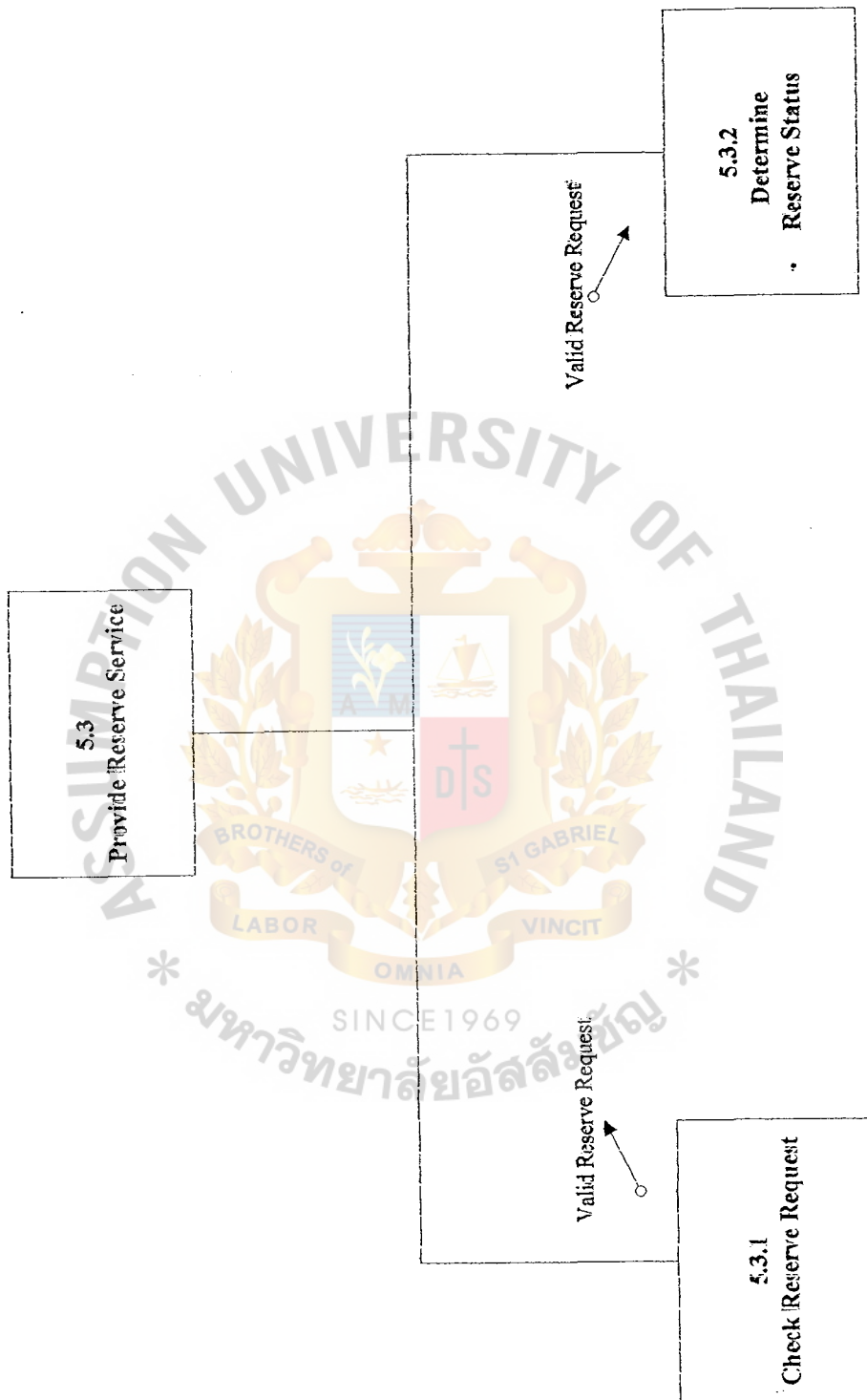


Figure B.8. Structure Chart - Process 5.3 - Provide Reserve Service.

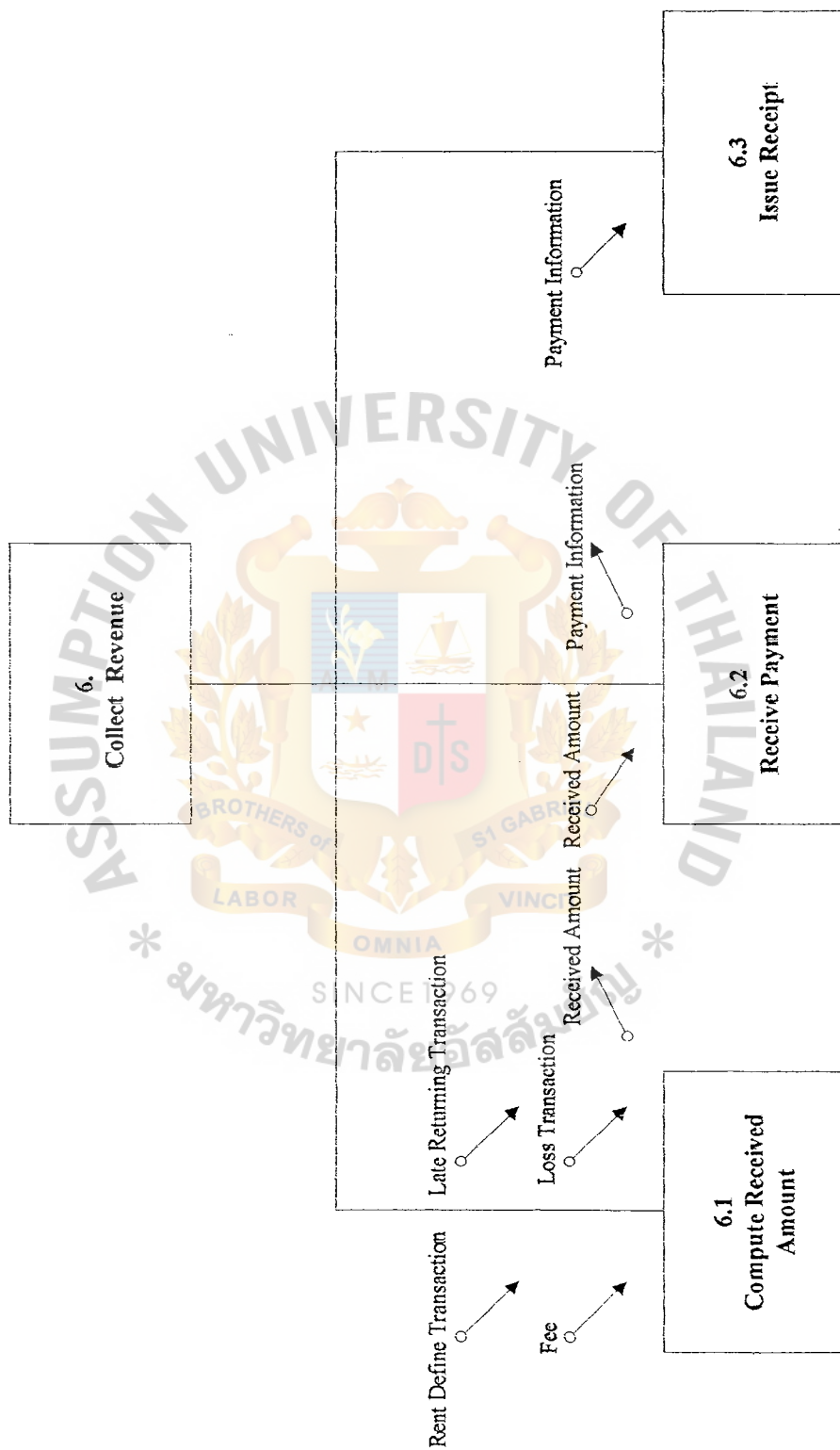


Figure B.9. Structure Chart - Process 6 - Collect Revenue.



Data Dictionary

A	=	The status of book item is active for a rental service
Amount	=	The amount of the payment paid by member for each rental service.
Application form	=	A form for non member to fill in order to become the member and rent the books from the shop(member name + member surname + member address + member telephone + member sex + application date)
Application date	=	The date that the new member applies to be the shop's member
Author Name	=	The name of the author
Blank	=	The items are blank for matching the book data (Yes/No)
Book category	=	The book's category such as cartoon, comic (legal character)
Book code	=	The identification of the book
Book data	=	The details of book for keeping records
Book name	=	The book's name (legal-character)
Book type	=	The book's type (legal-character)
Company name	=	The name of the company which issues payment
Current date	=	The date which the member rents the book
Date record	=	The record date of the items
Date issue	=	The date of issue check
Due date	=	The due date of a rental service transaction

Fee	=	The amount of payment that the non-member pays to the shop in order to become the member
Fee code	=	The identification of the book fee depends of the book language and master
Frequency	=	The frequency of items (numeric digit)
Information reply	=	The information that the shop provides to the member
Information request	=	The information that the member asks to the shop
Invalid rent service	=	The member's rent request is invalid; for example, the member has no member card or the items cannot be rented by someone who does not reserve it
Invalid reserve request	=	The member's reserve request is invalid when needed, the items cannot be reserved, is being rented or is reserved by someone
Item data	=	The details of new item for keeping records (item no + status + blank + frequency)
Item information	=	The details of item that has already matched with the book code (item no + status + book code + book name + book category + book type + publisher + Author name + translator + date record + available)
Item no	=	The book number (numeric digit)
L	=	The item is lost

Late returning fee	=	The fee that the member must pay for the late returning according to the fine regulation of the shop (numeric digit)
Late returning transaction	=	The member returns the item over due date (member id + item no + rent date + due date + return date)
Loss status	=	The identification of the items status that is lost
Member address	=	The member's address (legal-character)
Member sex	=	The identification of a member's sex (Male/ Female)
Member telephone	=	The telephone number of the shop's member
Member name	=	The member's name (legal-character)
Member surname	=	The member's surname (legal-character)
Member card	=	The card for the shop's member (member ID+ member name + member surname + apply date)
Member detail	=	The details of the member (member name + member surname + member address + member telephone + member sex + apply date)
Member ID	=	The identification of the member (numeric digit) (Book code + book category + book type + book name + date record + available + publisher + translator + author name)
Over day	=	The number of days over due date that the member returns the items

Overdue information	=	The details involving the member who rent the item over due date (member ID + item no +rent status +rent date +due date + over day)
Pay code	=	The identification of payment from member (numeric digit)
Payment detail	=	The detail of payment paid to the supplier
Pay name	=	The description of payment code (Character)
Payment	=	The payment from member for rental service
Payment information	=	The detail of (payment amount + rent fee + late returning fee + loss fee)
Purchase order	=	The order form which is sent to the supplier for purchasing the book item
R	=	The item is reserved
Receipt date	=	The date on which the member gets the receipt for the shop
Receive no	=	The identification of the receipt (numeric digit)
Receipt	=	The form sent to the member to guarantee the payment of member (receipt no.+ receipt date + member ID + member name + member surname + pay code + pay name + member name +amount + total)
Receipt information	=	The information of revenue that takes from the receipt

		(receipt date + member ID + member name + member surname + pay code + pay name + book code + book name + amount + total)
Received amount	=	The amount paid to the supplier
Rent define transaction	=	The rental service transaction defines the due date (member ID + item no + book code + book name + rent status + rent date + due date)
Rent fee	=	The fee that the member must pay for the rental service transaction (numeric digit)
Rent date	=	The date that the member rents the book
Rent status	=	The identification of item status that is rented
Rent service reply	=	The book shop allows the member to rent the item (member ID + item no + rent status + rent date + due date)
Rental service request	=	The member's request to rent the item in the shop (member ID + member name + book type + book category + book name + publisher + author name + translator)
Report reply	=	The request report from the member sent to the management
Report request	=	The management requests the report
Reservation reply	=	The shop allows the member to reserve the needed item (member ID +item no +book code +member name + reserve status)

Reservation request	=	The member's request to reserve the needed item (member ID + item no + book code + book name)
Reserve transaction	=	The reserve transaction is provided by the member (member ID + item no + book code + book name + reserve status)
Reserve status	=	The identification of item status that is reserved
Return detail	=	The details concerning the member's return of the rented item to the shop (member ID + item no + rent status + rent date + due date + return date)
Return date	=	The date that the member returns the rental item
Return status	=	The identification of status of item that is returned
Returning information	=	The details which determines the member's returning the rented item to the shop (member ID + item no + return status + rent date + due date + return date)
Returning transaction	=	The returning transactions that are provided to members (member ID + item no + return status + rent date + due date + return date + over day)
Sample	=	The sample of book for inquiry
Service request	=	The member's request for the services from the shop (rental service request + reservation request + information request)

Service transaction = The service transaction which is provided for members

(rent define transaction + returning transaction + reserve transaction)

Status = The status of item (A/X/R/L)

Total = The total amount of payment

Translator = The person who translates books into Thai

Vacant = The availability of items for rental service
(Yes/No)

Valid rent service = The member's rental service request is valid when the needed item can be rented, is not rented by someone

Valid reserve request = The member's reserve request is valid when the needed item can be rented, is not reserved by other persons

X = The status of item that is rented



ASSUMPTION*



Figure D.2 Main Menu.

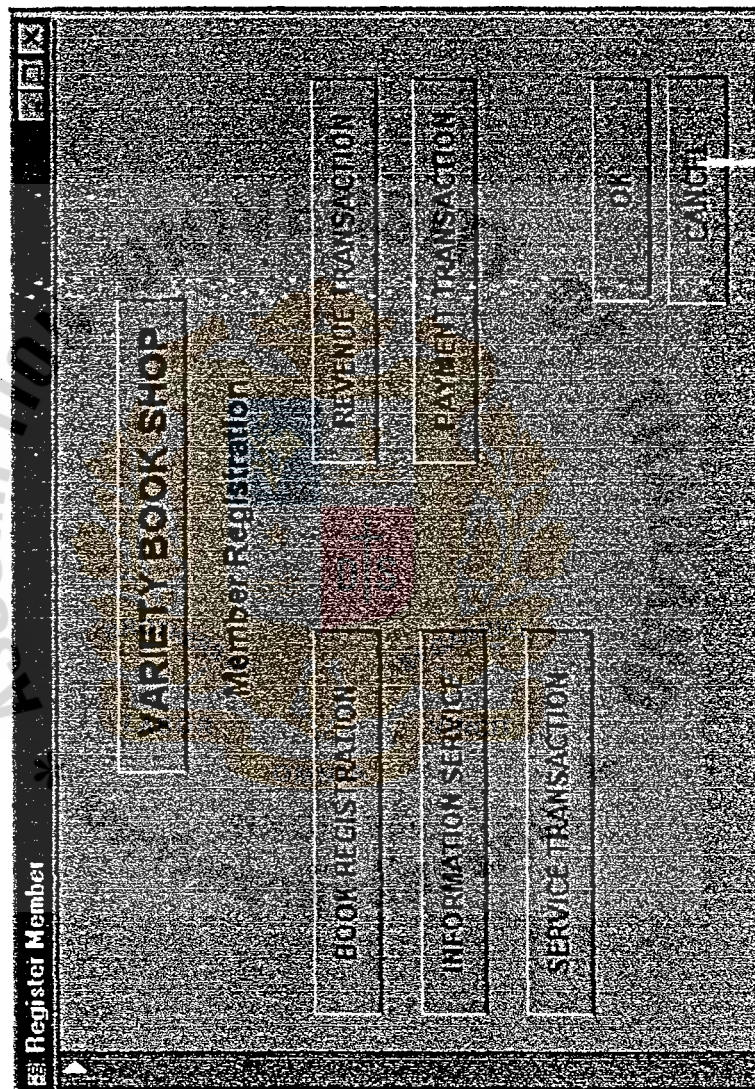


Figure D.3. Member Registration.



Figure D.5. Book Registration.

Register New Book

VARIETY BOOK SHOP

New Book Registration

Book Code	99-00001
Book Name	The Piano
Author Name	Jane Campian
Translator	Kilima Amaratat
Publisher	Jender Press Co. Ltd.
Book Type	Novel
Book Category	Drama
Date Recd	01/04/99
Available	Yes

Navigation buttons: [Back] [Next] [Cancel] [OK] [Print] [Exit]

Figure D.6. New Book Registration.

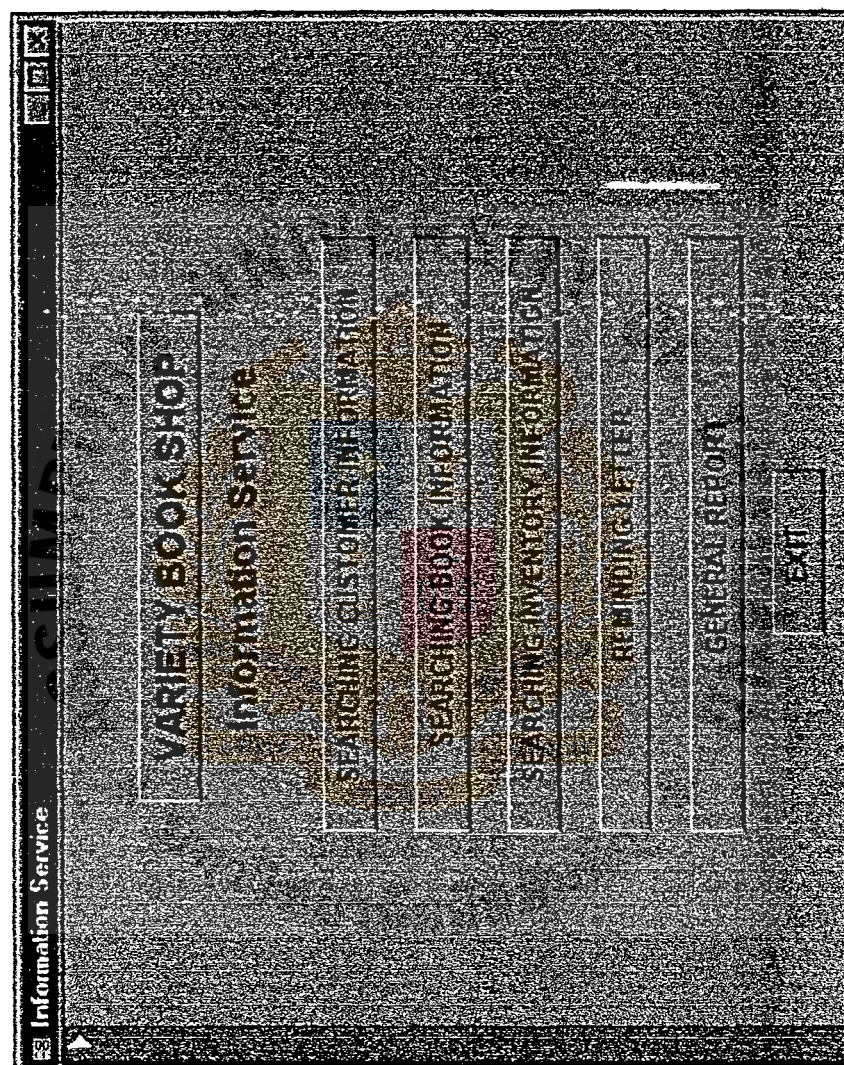


Figure D.7. Information Service.

Member Searching

VARIETY BOOK SHOP

Member searching

Member ID	99-0001
Member Name	Sasri
Member Surname	Sakolkit
Address	AA
Telephone	AA
Sex	AA
Application Date	AA

SUBMIT QUERY

11

Figure D 8. Member Searching.

Member Detail

VARIETY BOOK SHOP

Member Information

ID	Member Name	Member surname	Address	Telephone
99-0001	Sasri	Sakolkit	47 Dankap	389-3834

1

2

3

4

5

6

7

8

9

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*

/

Back

Enter

Print

Exit

Figure D.9. Member Information.

Book Searching

VARIETY BOOK SHOP

Book Searching

Book Code	99-00001
Book Name	The Piano
Author Name	Jens campian
Translator	Klitima Amoralat
Publisher	Jenderpress
Book Type	Novel
Book Category	Drama
Date Recored	1/6/99
Available	Yes

SUBMIT QUERY

Figure D.10. Book Searching

Inventory Searching

VARIETY BOOK SHOP

Inventory Searching

Please enter Member Code

99-0001

SUBMIT QUERY

1

Figure D.12. Inventory Searching.



General report	
VARIETY BOOK SHOP	
General Report	
TOP TEN MEMBER	TOP TEN BOOK
1	2

Figure D.14. General Report.

General report period

VARIETY BOOK SHOP

General Report Period

Start Date 1/8/99

End Date 7/8/99

+

-

Figure D.15. General Report Period.

Popular Member List

VARIETY BOOK SHOP

Popular Member List

Number	Member ID	Member Name	Member Status
1	99-0001	Sakulit	
2	99-0002	Sureerat Jitwanichkul	

2

1

1

Figure D.16. Popular Member List.

Service Transaction

VARIETY BOOK SHOP

Service Transaction

Please enter Member Code: 99-0001

Please enter Book Code: 99-00001

RENTAL SERVICE

RETURN SERVICE

RESERVE SERVICE

OK

X

U

Figure D.17. Service Transaction.

Return Service

VARIETY BOOK SHOP

Return Book

Please Enter Member Code: 99-0001

Please Enter Book Code to Return: 99-00001

UPDATE RETURN RECORD

UPDATE LOSS RECORD

OK

Cancel

Figure D. 18. Return Service.

Reserve Book

VARIETY BOOK SHOP

Reserve Book

Please enter Member Code

99-00001

Please enter Book Code

99-00001

1

DETERMINE AVAILABILITY OF BOOK

UPDATE STATUS OF BOOK

Figure D.19. Reserve Book.

Update Book Status

VARIETY BOOK SHOP

Update Book Status

Book Code	99-00001
Book Name	The Piano
Book Status	X
Member ID	99-0001
Member Name	Seem
Member Surname	Sakolkit

Navigation buttons: << < > >>

Figure D.20. Update Book Status.

Revenue

VARIETY BOOK SHOP

Revenue

Please enter Member Code 99-0001

REVENUE INFORMATION

11

Figure D.21. Revenue Transaction

Revenue Information

VARIETY BOOK SHOP

Revenue Information

Date	9/8/99	Revenue Code	1
Member Code	99-0001	Book Code	99-00001
Member Name	Sasin		
Member Surname	Sakulit		
Book Name	The Piano	Description	Rental Fee
Quantity	1	Amount	10
Total	10		

Figure D.22. Revenue Information.

Revenue Detail

VARIETY BOOK SHOP

Revenue Detail

Code	Description	BOOK CODE	BOOK NAME	QTY	Amount
1	Rental Fee	99-00001	The Piano	1	10
2	Rental Fee	99-00002	The Titanic	1	10

2

20.00

Total

20.00

Figure D.23. Revenue Detail

Purchase Order

VARIETY BOOK SHOP

Purchase Order Form

Date	05/06/99	P/O Number	19368
Supplier Name	Doubleline printing Co., Ltd.		
Address	16/2 Panchayakarnthornburi, Bangkok, Pasjareen, Bangkok, 10110		
Phone Number	389-3755	Fax Number	389-3756
Payment Term	N/30	Item	1
Book Name	The Piano	Price per Unit	60
Qty	7	Amount	420.00

Figure D.24. Purchase Order Form.



APPENDIX E

OUTPUT FORMS

VARIETY BOOK SHOP

Member Detail

MEMBER ID : 99-0001
MEMBER NAME : Wattana
MEMBER SURNAME : Tuntarom
ADDRESS : 45 Dankao Rd, Samutprakarn,10270
TELEPHONE : 279-4900
SEX : male
APPLICATION DATE : 09/08/99

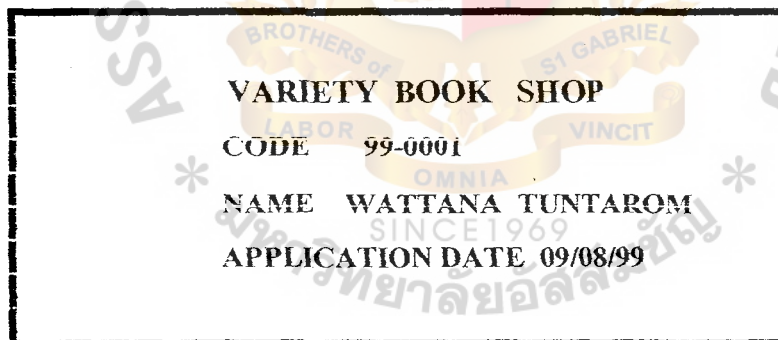


Figure E.1. Member Card and Detail.

VARIETY BOOK SHOP

NEW MEMBER LIST

Number	Member ID	Member Name	Member Surname	Address	Telephone	Sex	Date
1	99-0001	Jenjera	Suwannapong	49 Dankao Rd, Samutprakarn, 10270	389-3789	Female	9/1/99
2	99-0002	Duangta	Thongpun	55 Srinakaran Rd, Samutprakarn, 10270	389-6579	Female	9/1/99
3	99-0003	Sirin	Kanarat	90/9 Dankao Rd, Samutprakarn, 10270	378-7650	Female	9/1/99
4	99-0004	Sanyima	Thanmarat	100 Srinakaran Rd, Samutprakarn, 10270	389-7689	Female	9/1/99
5	99-0005	Sakol	Sakolsak	57/1 Srinakaran RD, Samutprakarn, 10270	369-6709	Male	9/1/99
6	99-0006	Morudee	Itarat	59 Tayban Rd, Samutprakarn, 10270	390-6760	Female	9/1/99
7	99-0007	Atiporn	Srithong	79, Taparak Rd, Samutprakarn, 10270	789-4900	Female	9/1/99
8	99-0008	Sasiri	Sakulkit	109 Srinakaran Rd, Samutprakarn, 10270	777-0319	Female	9/1/99
9	99-0009	Sujitta	Jungpong	56 Sukhrapiban Rd, Samutprakarn, 10270	779-4599	Female	9/1/99
10	99-0010	Chantana	Raungroaj	10/9 Dankao Rd, Samutprakarn, 10270	378-1270	Female	10/1/99
11	99-0011	Orapun	Panthong	159 Tayban Rd, Samutprakarn, 10270	389-0933	Female	10/1/99
12	99-0012	Porama	Darakorn	90/7 Dankao Rd, Samutprakarn, 10270	398-6730	Female	10/1/99
13	99-0013	Darakorn	Punyadee	79, Taparak Rd, Samutprakarn, 10270	379-6903	Male	10/1/99
14	99-0014	Sureerat	Jitwanichkol	56 Sukhrapiban Rd, Samutprakarn, 10270	778-1782	Female	10/1/99

Figure E.2. New Member List.

VARIETY BOOK SHOP

BOOK LIST

Book Code	Book Name	Author Name	Translator	Publisher	Book Category	Book Type	Date	Vacant
99-00001	The Piano	Jane Campian	Kitima Amorntot	Jenderpress	Drama	Novel	9/1/99	Yes
99-00002	Apollo 13	Jim Rowell	Kajomian	Bakery Group	Fiction	Novel	9/1/99	Yes
99-00003	Sad Cypress	Agatha Christie	Laksanawong	The library	Detective	Novel	9/1/99	Yes
99-00004	Baby's day out	Ron Fonte	Isariyaporn	Kukhag Group	Comedy	Novel	10/1/99	Yes
99-00005	Robinhood	Louise Red	Keawkhumtip	Classic	Fantasy	Novel	10/1/99	Yes
99-00006	James bond	Raymond Bend	Sakda Puncha	Dokya	Action	Novel	10/1/99	Yes
99-00007	Lomhuany	Sopark Suwan	—	Yaikhawe	Romance	Novel	10/1/99	Yes
99-00008	Forget me not	Thomayuntree	—	Wannakhum	Romance	Novel	10/1/99	Yes
99-00009	Maasribangkok	Suwannee S.	—	Dokya	Comedy	Novel	10/1/99	Yes
99-00010	PC Magazine	—	—	Mangroup	Computer	Magazine	10/1/99	Yes
99-00011	Image	—	—	Image	Entertainment	Magazine	10/1/99	Yes
99-00012	Woman	—	—	—	Entertainment	Magazine	10/1/99	Yes
99-00013	The Police	Yong Fa	Juntana Unakun	Wubeeworlod	Action	Magazine	10/1/99	Yes
99-00014	Computer Users	—	—	Mangroup	Computer	Magazine	10/1/99	Yes

Figure E.3. Book List.

VARIETY BOOK SHOP

INVENTORY LIST

Number	Book Status	Book Code	Book Name	Book Category	Quantity	Stock
1	R	99-00001	The Piano	Drama	7	4
2	A	99-00002	Apollo 13	Fiction	7	2
3	A	99-00003	Sad Cypress	Detective	7	5
4	A	99-00004	Baby's day out	Comedy	7	2
5	X	99-00005	Robinhood	Fantasy	7	3
6	R	99-00006	James bond	Action	7	6
7	X	99-00007	Lomhuany	Romance	7	4
8	X	99-00008	Forget me not	Romance	7	4
9	R	99-00009	Maasribangkok	Comedy	7	5
10	R	99-00010	PC Magazine	Computer	7	6
11	A	99-00011	ELLE	Entertainment	7	1
12	A	99-00012	Woman	Entertainment	7	4
13	X	99-00013	The Police	Action	7	5
14	X	99-00014	Computer Users	Computer	7	3

Figure E.4. Inventory List.

VARIETY BOOK SHOP

RENTAL SERVICE REPORT FOR JANUARY 1999

Number	Book Code	Book Name	Member ID	Rent date	Due date	Amt
1	99-00001	The Piano	99-0001	1/7/99	8/7/99	21
2	99-00002	The Piano	99-0002	1/7/99	8/7/99	21
3	99-00003	The Piano	99-0003	1/7/99	8/7/99	21
4	99-00004	The Piano	99-0004	1/7/99	8/7/99	21
5	99-00005	The Piano	99-0005	1/7/99	8/7/99	21
6	99-00006	The Piano	99-0006	1/7/99	8/7/99	21
7	99-00007	The Piano	99-0007	1/7/99	8/7/99	21
8	99-00008	Apollo 13	99-0008	1/7/99	8/7/99	21
9	99-00009	Apollo 13	99-0009	1/7/99	8/7/99	21
10	99-00010	Apollo 13	99-0010	1/7/99	8/7/99	21
11	99-00011	Apollo 13	99-0011	5/8/99	12/8/99	21
12	99-00012	Apollo 13	99-0012	5/8/99	12/8/99	21
13	99-00013	Apollo 13	99-0013	5/8/99	12/8/99	21
14	99-00014	Apollo 13	99-0014	5/8/99	12/8/99	21

Figure E.5. Monthly Rental Service Report.

VARIETY BOOK SHOP

LATE RETURNING RECORD FOR JULY 1999

Number	Book Code	Book Name	Member ID	Rent Date	Due Date	Return Date	Fine
1	99-00001	James bond	99-0001	5/6/99	12/6/99	13/6/99	3
2	99-00001	James bond	99-0002	5/6/99	12/6/99	14/6/99	6
3	99-00001	James bond	99-0003	5/6/99	12/6/99	13/6/99	3
4	99-00001	James bond	99-0004	5/6/99	12/6/99	14/6/99	6
5	99-00001	James bond	99-0005	5/6/99	12/6/99	13/6/99	3
6	99-00001	James bond	99-0006	5/6/99	12/6/99	13/6/99	3
7	99-00001	James bond	99-0007	5/6/99	12/6/99	13/6/99	3
8	99-00008	Baby's day out	99-0008	5/6/99	12/6/99	13/6/99	3
9	99-00008	Baby's day out	99-0009	5/6/99	12/6/99	14/6/99	6
10	99-00008	Baby's day out	99-0010	5/6/99	12/6/99	14/6/99	6
11	99-00008	Baby's day out	99-0011	10/6/99	17/6/99	21/6/99	12
12	99-00008	Baby's day out	99-0012	10/6/99	17/6/99	20/6/99	9
13	99-00008	Baby's day out	99-0013	10/6/99	17/6/99	21/6/99	12
14	99-00008	Baby's day out	99-0014	10/6/99	17/6/99	20/6/99	9

Figure E.6. Monthly Late Returning Record.

VARIETY BOOK SHOP

QUARTERLY BOOK LOSS RECORD FOR 1999

Number	Book Code	Book Name	Book Status	Member ID	Member Name	Surname	Date Rent	Fee
1	99-00001	The Piano	L	99-0001	Jenjera	Suwannapong	20/6/99	300
2	99-00002	Apollo 13	L	99-0002	Duangta	Thongpun	8/5/99	300
3	99-00003	Sad Cypress	L	99-0003	Sirin	Kanarat	15/6/99	300
4	99-00004	Baby's day out	L	99-0004	Sanyima	Thammarat	7/6/99	300
5	99-00005	Robinhood	L	99-0005	Sakol	Sakolsak	13/6/99	300
6	99-00006	James bond	L	99-0006	Morudee	Itarat	19/5/99	300
7	99-00007	Lomhuany	L	99-0007	Atiporn	Srithong	3/5/99	300
8	99-00008	Forget me not	L	99-0008	Sasiri	Sakulkit	12/6/99	300

Figure E.7. Quarterly Book Loss Record for 1999.

VARIETY BOOK SHOP
POPULAR MEMBER LIST
FOR THE MONTH..... JULY, 1999

Number	Member ID	Member Name	Member Surname
1	99-0109	Varaporn	Kanjandit
2	98-0310	Sureerat	Jitwanichkul
3	98-0034	Atiporn	Srithong
4	98-0453	Monrudee	Itaratana
5	98-0397	Mahisorn	Kanjapon
6	98-0763	Thawan	Chatrapong
7	98-0061	Sanyima	Thammarat
8	98-0059	Suteera	Junpibul
9	98-0029	Porana	Darakorn
10	99-0333	Juntima	Junjongjit

Figure E.8. Popular Member List.

VARIETY BOOK SHOP
POPULAR BOOK LIST
FOR THE MONTH..... JULY, 1999

Number	Book Name	Book Category
1	The Piano	Action
2	Apollo 13	Action
3	Sad Cypress	Fiction
4	Baby's day out	Fiction
5	Robinhood	Fantasy
6	James bond	Action
7	Lomhuany	Fiction
8	Forget me not	Comedy
9	Maasribangkok	Fiction
10	PC Magazine	Fiction

Figure E.9. Popular Book List.

VARIETY BOOK SHOP

49 Dankao Rd, Paknum, Samutprakarn, 10270

TEL 389-3755

PURCHASE ORDER

P/O No. 19368

Date 05/06/99

To : Doublenine Printing co,ltd.,
16/2 Panichyakarnthonburi, Bangkaa, Pasrijareun
Bangkok 10160

Attn : Sale Manager

Item	Book Name	Price per Unit	Qty	Amount
1	The Piano	60	7	420.00
2	Robinhood	50	8	400.00
Total				820.00

Account Payable : n/30

Manager

Figure E.10. Purchase Order Form.

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Assumption University
MS (CEM) Program

Written Comprehensive Examination
September 1999

Paper 1: Management of Computing Activities

Paper 2: Engineering Management and Economy

Paper 3: Production Management and Operations Research

Paper 4: Management

No.	I.D.Code	Name	Surname	P.1	P.2	P.3	P.4	Result
1	351-9342	Mr. Pichit	J.	F	PP	FF	PP	FAIL
2	371-9412	Ms. Chanakarn	T.	P	PP	F	PP	FAIL
3	373-9372	Mr. Sermsak	O.	PP	P	P	PP	PASS
4	382-9302	Mr. Anan	Y.	PP	PP	F	PP	FAIL
5	393-9301	Ms. Achara	A.	FF	PP	FF	PP	FAIL
6	393-9307	Ms. Attipa	J.	F	-	FF	-	FAIL
7	393-9317	Ms. Chompoo	S.	FF	-	FF	PP	FAIL
8	393-9322	Mr. Jesada	N.	F	P	P	F	FAIL
9	393-9329	Ms. Kuntinee	K.	F	PP	PP	PP	FAIL
10	393-9337	Ms. Napit	N.	F	PP	PP	PP	FAIL
11	393-9367	Mr. Romsai	T.	FF	PP	FF	PP	FAIL
12	393-9373	Mr. Sarun	W	F	PP	PP	PP	FAIL
13	393-9378	Mr. Somchaet	K.	P	PP	PP	PP	PASS
14	393-9387	Ms. Sudarat	C.	FF	PP	PP	PP	FAIL
15	402-9315	Ms. Duangchai	S.	P	PP	PP	PP	PASS
16	402-9330	Ms. Lawan	J.	F	PP	PP	PP	FAIL
17	402-9343	Ms. Orawan	S.	F	PP	PP	PP	FAIL
18	402-9352	Mr. Pawaret	T.	FF	PP	PP	PP	FAIL
19	402-9354	Mr. Pichit	H	F	PP	PP	PP	FAIL
20	402-9362	Ms. Pornthip	T.	F	PP	PP	PP	FAIL
21	402-9363	Mr. Prakit	S.	FF	PP	PP	PP	FAIL
22	402-9377	Mr. Samarn	K	-	-	-	F	FAIL
23	402-9381	Ms. Sasithorn	P.	P	PP	PP	PP	PASS
24	402-9392	Ms. Supattra	K.	PP	PP	P	PP	PASS
25	402-9409	Ms. Yuwaluck	A.	FF	PP	PP	FF	FAIL
26	411-9304	Mr. Adisorn	N.	F	P	P	F	FAIL