



# The Video Rental System for a Video Rental Shop

By

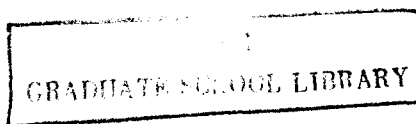
Mr. Praphant Pavasant

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

July, 1999





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Project Title	The Video Rental System for a Video Rental Shop
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Academic Year	July 1999

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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 of the degree of Master of Science in Computer and Engineering Management.

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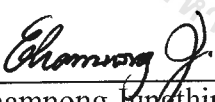
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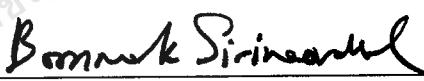
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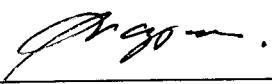
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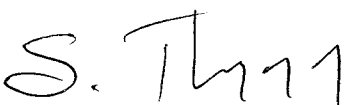
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## ABSTRACT

This project examines the analysis, design, and implementation of YOU'RE WELCOME video rental system with the purpose of assisting the shop officers in providing fast, comfortable, and correct services to the customers.

Since the YOU'RE WELCOME Video Rental Shop's owner had seen the possibility of investing in a new system for his/her shop, he/she therefore started to find a way to improve customer satisfaction by primarily using the System Development Life Cycle to develop this new system. By reducing the problems the shop is facing, he/she then designed the new system, which would provide fast and accurate services to the customers. This project, Video Rental System, indeed helped to eliminate the disadvantages and problems occurring in the current system. After the project was completed, it was properly tested to check for any error. Of course these errors were already solved. Then this system was evaluated by using the concept of utility and cost-benefit analysis in order to see the possibility and the greatest utilization of the project. At last, this system was implemented properly by using the in-house implementing technique. The internal training and system manual were provided for the users of the head office shop. Also the on-the-site-training manual and the system manual have been provided for both the user and the shop owner of the client's shop. This project is projected to be implemented at the end of August 1999.

At the end of this project, there is a conclusion to see one more time of the to overview this project, as well as the recommendations suggested for the improvement of the shop.

## ACKNOWLEDGEMENTS

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# **I. INTRODUCTION**

## **1.1 Overview of the Project**

The economic situation nowadays forces people to try to reduce their spending as much as they can. Therefore, most people do not go to see the movies at the theatre as frequently as they did in the past. This means that people aim to rent videos instead, because they are much less expensive.

Video Rental System here is designed for YOU'RE WELCOME video shop. This system is projected because the current system is running manually which provides slow services to the customers; as a consequence, the customers are not satisfied. The shop owner, therefore, is setting up the new system to solve this problem. This system is designed and developed by using the computerized systems and the franchise system. Thus, it is for people who would like to be part of the shop's franchise.

In conclusion, this project is trying to develop a new computerized system called Video Rental System for the YOU'RE WELCOME Video Rental Shop, which presently functions manually. It aims to solve the problems of slow services and to gain a more competitive edge on this business.

## **1.2 Objectives and Scopes of the Project**

Although the current system can provide services to the customers, the shop's owner still projects the new system, called Video Rental System, that will service more efficiently. The objectives for the new system are as follows:

- (a) Reducing the slow services to the customers:

This means that the customers do not need to wait in a long queue.

The shop's officer can provide fast services to them.

- (b) Reducing the use of paper:

This means that paper will not be used as much in the new system.



- (c) Gaining more customer satisfaction:

This is quite similar to the first one (a). Moreover, it covers providing sincere and convenient service to the customers.

- (d) Gaining a more competitive edge within this business:

This means that the new system must be better than systems used by other shops. Of course, it must also cover all objectives previously mentioned.

The scope of this project is to implement the following procedures into the Video Rental System:

- (1) Adding and recording new customers.
- (2) Adding and recording new transactions.
- (3) Adding and recording new videos.
- (4) Adding and recording new transactions and payment transaction.
- (5) Adding and recording new franchisees/clients.
- (6) Adding and recording new movie information.
- (7) Calculating cost and preparing receipt for customers.
- (8) Checking video stock in order to contact the suppliers in time.
- (9) Printing end of day reports for internal uses.
- (10) Updating client and head office databases.

These scopes are the abilities of the new system, which can be seen more clearly in Appendices E and F.

## II. REVIEW OF THEORIES

The system that is being used currently by YOU'RE WELCOME Video Rental Shop is a manual system, and is a stand-alone system. This means that the YOU'RE WELCOME Video Rental Shop manipulates all its tasks by hand and papers, and within its one shop only.

In order to gain a more competitive edge, the owner of the YOU'RE WELCOME Video Rental Shop has predicted that most people are going to reduce their cost by watching movies at their homes more and more. This is due to the downfall of the economic situation. Thus, Video Rental System should be a solution for those people.

However, customers are not satisfied with most video rental systems services provided to them. This is because the customers are tied to only the branch that they have applied for. They need to find their preferred movies wherever is necessary by using their membership. Therefore, the owner of the YOU'RE WELCOME Video Rental Shop will provide the customers with the convenience of renting movies wherever the shops are located. In other words, the customers can use their member cards to rent a movie at any YOU'RE WELCOME Video Rental Shop, called the franchise system.

In addition to the franchise system, the owner is going to bring computers to serve the customers. This service will reduce the time for each transaction; consequently, we will gain the customers' satisfaction. However, the owner of the YOU'RE WELCOME Video Rental Shop needs a standard system for every franchise; thus, he is developing a video rental program by using Microsoft Access 97, Delphi 3, and Microsoft Visual Basic 6, which are already prepared for Year 2000. This program, called YOU'RE WELCOME Video Rental System, will be a standard for every franchise.

In addition to the franchise system, he/she decides to use such system tools as

- (a) Computers or Personal Computers
- (b) Centralized computerized system
- (c) Data communication and Local Area Network (LAN)
- (d) System Development Life Cycle (SDLC)
- (e) Gathering information from Interviewing
- (f) Data Flow Diagram
- (g) Flow Chart
- (h) Batch-processing system
- (i) Database Knowledge
- (j) Data Dictionaries
- (k) Barcode Technology

These tools, together with the franchise system are used to set up the YOU'RE WELCOME Video Rental System.

## **2.1 Personal Computer (PC)**

This is often called the microcomputer, which is a machine that can be programmed to process data (input) into useful information (output). A computer system requires four main aspects of data handling; input, processing, output, and storage.

### **(a) Input:**

This is data that is accepted into the computer. Common input devices are a keyboard, a mouse, and a wand reader or bar code reader. A keyboard is a device that users can input data by typing on it. A mouse is a device, which translates movements of a ball on a flat surface to actions on the screen. A wand reader or bar code reader is a device that uses laser beams

to read special letters, numbers, or symbols.

(b) Processor, or Central Processing Unit (CPU):

This device processes raw data into meaningful, useful information.

The CPU interprets and executes program instructions and communicates with the input, output, and storage devices.

(c) Output:

This is the result since the raw data is processed by CPU, called information. It is used in form of words, numbers, and graphics. The users can see output displayed on screens and use printers to display output on paper.

## 2.2 Centralized Computerized System

The Centralized Computerized System is the system where all processing is done at the host computer or server. Many terminals can access the host at the same time (Multi-user), and it can run multiple applications simultaneously, called multi-tasking. This means that a number of users are connected to a computer system through terminals, or workstations as shown in a figure below:

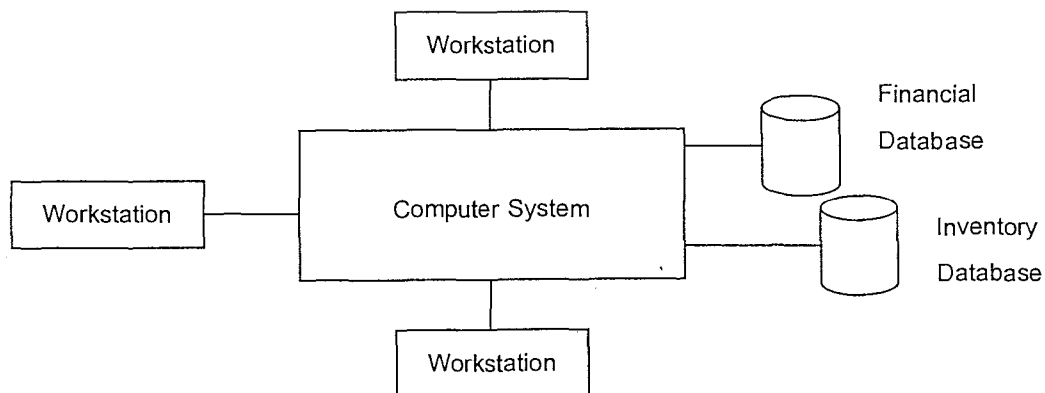


Figure 2.1. The Centralized Computerized System.



Terminals or workstations here do not do any processing in a centralized computing system, and they have appropriately been labeled as 'dumb terminals.' The terminal passes its request onto the host CPU by sending requests from its keyboard. The host application processes the requests and sends the answer back to the terminal as characters to be displayed on its screen. Connected terminals can be local via direct connection or remote via telephone lines. The host, therefore, acts as a central repository for application, data, and backups.

### **2.3 Data Communication and Local Area Network (LAN)**

Data communication, called teleprocessing or telecommunications, is the electronic transmission of data from a source to a destination. This is the movement of computer information from one point to another by means of electrical or optical transmission systems. Such systems often are called data communication networks. Analysts must be aware of the capabilities of data communications if they are to design system that may often employ such technology. Some of the objectives of the data communication network are:

- (a) Reduce the time, effort, and cost required performing various business tasks
- (b) Capture business data at its source and rapidly disseminate it
- (c) Support improved management control of the organization

There are three basic components for a data communication network, which are:

- (a) The host computer or server is the central computer in the network, storing data or software that can be accessed by the clients for the Centralized system, which is used by YOU'RE WELCOME Video Rental Shop
- (b) The client is the input/output hardware device at the other end of a communication circuit. It typically provides users with access to the network and the data and software on the host computer

- (c) The circuit is the pathway through that the messages travel. It is typically a copper wire.

There are many types of networks such as Wide Area Network (WAN) and Local Area Network (LAN). However, the type that will be used by YOU'RE WELCOME Video Rental Shop is Local Area Network (LAN). LAN links computers into a network that provides the standard office functions of word processing, electronic mail, file sharing, file transfer, printer sharing, and Internet access. However, there are two main basic reasons for developing a LAN: information sharing and resource sharing. Information sharing refers to having users who access the same data files, exchange information via electronic mail, or search the Internet for information. Resource sharing refers to one computer sharing a hardware device or software package with other computers on the network in order to reduce costs.

Also there are many types of LANs, which are classified by categories: dedicated server LANs, peer-to-peer LANs, and zero-slot LANs that consist of the following:

- (a) Dedicated Server LAN is a network that can handle very large databases. It has one or more computers that only support the network by providing access to files and other network resources. There are four common types of dedicated server LAN: file servers, database servers, print servers, and communication servers. File Servers allow many users to share the same set of files on a common, shared disk drive. A database server is more powerful than a file server. It not only provides shared access to the files on the server, but also can perform database processing on those files associated with client-server computing. Print servers handle print requests on the LAN by offloading the management of printing from the main LAN file server or database server. Communication servers are dedicated to

performing communication processing, including fax servers, modem servers, and access servers.

- (b) Peer-to-Peer LAN does not require a dedicated server. This means that any computer can function as both a user and a server, sharing its hard disk and printer with any other computer on the network. However, peer-to-peer LAN has less capability, support a more limited number of computer, provide less sophisticated software, and can prove more difficult to manage than dedicated server LAN.
- (c) Zero-Slot LAN is the lowest level of capability for a LAN, and is the inexpensive LAN, because it does not require a network interface circuit card. This means that the zero-slot LAN adapter plug can be plugged into a serial or parallel port instead of taking up one of the computer's expansion slots

All above are types of LAN that the users can choose to use. However, in order to make the system work, we still need to know about basic components of a LAN. There are five basic components:

- (1) Client Computer is a user point-of-entry for the required function and is normally a desktop computer, a workstation, or a laptop computer. The user generally interacts directly only with the client portion of the application, typically through a graphical user interface. The user will use it to input data and query a database to retrieve data. Once the data have been retrieved, the user can analyze and report on them.
- (2) The server or the host computer will satisfy some of the user's entire request for data and/or functionality. The servers provide the ability of store, retrieve, transfer, and archive data files, which are not visible to users.

many different types, including applications, text data, graphic or image, and sound files.

- (3) Network Interface Card (NIC) allows the computer to be physically connected to the network cable, which provides the physical layer connection among the computers in the network. NIC can be either installed inside the computer itself, or installed by using a special port, PCMCIA slots.
- (4) Network Cables and Hubs. Normally each computer must be physically connected by network cable to the other computers in the network. Therefore, the types of cables influence the type of network. The following will be describing the types of network cables:

- (a) Network Cable

Most LANs are formed with a blend of unshielded twisted pair wires, shielded twisted pair, coaxial cable, and fiber optic cable. The twisted-pair cable is commonly used to connect telephone subscribers to the local exchange. It is necessary to ensure uniform propagation of high-speed signals down the cable and to permit the equipment connected to have characteristic impedance that matches the line, therefore transferring the maximum amount of power to the line. A line with well-defined characteristic impedance may be terminated at the ends by matching value impedance to prevent signals being reflected and causing transmission errors.

The unshielded twisted-pair is also used extensively on trunk communications links.

The coaxial cable is physically larger than the twisted pair,



weighing anywhere from 20 to 90 pounds per 1000 feet, which can be detrimental in an overhead ceiling. However, coaxial cable is not flexible, so it cannot be bent around sharp corners easily.

The fiber optic cable is even thinner than the unshielded twisted pair and therefore takes far less space when cabled throughout a building. It is much lighter, weighing less than 10 pounds per 1000 feet. Due to its high capacity, the fiber optic cabling is perfect for backbone networks.

(b) Network Hubs

Network hubs go by many names depending upon the type of network and the specific vendor, such as concentrator, multi-station access unit, transceiver, or repeater. Network hubs serve two purposes. First is that they provide an easy way to connect network cables. Second is that hubs act as repeaters or amplifiers.

- (5) Network Operating System (NOS) is the software that controls the network and provides software that performs functions associated with the data link and the network layers, and must interact with the application software and the computer's own operating system. Every NOS provides two sets of software: one that runs on the network server(s), and one that runs on the network client(s).

(a) NOS Server Software

This software enables the file server, print server, or database server to operate. NOS server software typically replaces the normal operating system on the server.

(b) NOS Client Software

This software provides the data link layer and network layer to run on the client computers.

## 2.4 The System Analyst

The systems analyst is usually a member of the information systems group of the organization. He / she normally performs both analysis and design. Consequently, the analysts play a major role in analyzing and designing a new system. The obvious tasks associated with the role include the technical application of analysis and design tools. Therefore, the analysts should possess characteristics such as:

- (1) An analyst must enjoy working with people. This is because he / she must serve as a translator and buffer between the technical staff, such as programmers, and the non-technical staff, or the managers and users. Thus, excellent communication skills are critical.
- (2) An analyst must be a diplomat and a good motivator. He / she must try to elicit cooperation from everyone involved in a project, from team members to users.
- (3) An analyst must be able to work in a project team, either as a team member or as a team leader.
- (4) An analyst must have well-developed problem-solving skills. Also the analyst must be able to identify symptoms, determine the cause of the symptoms, and find a solution to the problem.
- (5) An analyst must serve as a business generalist, maintaining a broad business perspective at all times. This means that a good analyst needs to know as much about business systems as about computer system, in order to be able to link the two. He / she must be able to look at a system from multiple points of view, as a programmer, a manager, a user, and a

company financial officer.

## **2.5 The System Development Life Cycle (SDLC)**

The SDLC is a phased approach to analysis and design which holds that system are best developed through the use of a specific cycle of analyst and user activities. Analysts disagree on exactly how many phases there are in the SDLC, but generally there are 7 steps as are listed below:

- (1) Identifying problems, opportunities, and objectives
- (2) Determining information requirements
- (3) Analyzing system needs
- (4) Designing the recommended system
- (5) Developing and documenting software
- (6) Testing and maintaining the system
- (7) Implementing the system
- (8) Evaluating the system

Each of the steps of SDLC is not actually presented discretely. This is because several activities can occur simultaneously, and some activities may be repeated. The following is defining the meaning of each step of SDLC.

### **2.5.1 Identifying Problems, Opportunities, and Objectives**

In this first phase of the SDLC, the analyst is concerned with identifying problems, opportunities, and objectives. This stage is critical to the success of the rest of the project, since no one wants to waste subsequent time addressing the wrong problem.

The first phase requires that the analyst look honestly at what is occurring in a business. Then the analyst pinpoints problems. Often, others will bring these up and they are the reason the analyst was initially called in. Opportunities are situations that

the analyst believes can be improved through the use of computerized information systems. Seizing opportunities may allow the business to gain a competitive edge or set an industry standard.

Identifying objectives is also an important component of the first phase. First, the analyst must discover what the business is trying to do. Then the analyst will be able to see if some aspect of information systems applications can help the business reach its objectives by addressing specific problems or opportunities.

The people involved in the first phase are the users, analysts, and systems managers coordinating the project. Activities in this phase consist of interviewing user management, summarizing the knowledge obtained estimating the scope of the project, and documenting the results. The output of this phase is a feasibility report containing a problem definition and summarizing the objectives. Management must then make a decision whether to proceed with the proposed project. If the user group does not have sufficient funds in their budget, desires to tackle unrelated problems or the problems do not require a computer system, a manual solution may be recommended, and the system project does not proceed any further.

#### 2.5.2 Determining Information Requirements

The next phase that the analyst enters is that of determining information requirements for the particular users involved. Among the tools used to define information requirements in the business are: sampling and investigating hard data, interviewing, questionnaires, observing decision makers' behavior and office environments, and even prototyping.

In this phase, the analyst is striving to understand what information users need to perform their jobs. You can see that several of the methods for determining information requirements involve interacting directly with users. This phase serves to fill in the



picture that the analyst has of the organization and its objectives. Sometimes only the first two phases of the SDLC are completed. This kind of study may have a different purpose and is carried out by a specialist called an information analyst (IA).

The people involved in this phase are the analysts and users, typically operations managers and operations workers. The system analyst needs to know the details of current system functions for consideration of designing the new system.

### 2.5.3 Analyzing System Needs

The next phase that the systems analyst undertakes involves analyzing system need. Analysis is the phase in which the requirements for a new information system are identified. It is the process of studying an existing system to determine how it works and how it meets user needs. System analysis lays the groundwork for improvements to the system. It also involves an investigation, which in turn usually involves establishing a relationship with the client for whom the analysis is being done, and with the users of the system.

Again, special tools and techniques help the analyst make requirements and decisions. One such tool is the use of data flow diagrams to chart the input, processes, and output of the business's functions in a structured graphical form. Here, a data dictionary is developed that lists all of the data items used in the system, as well as their specifications- whether they are alphanumeric and how much space they will take up when printed.

During this phase the systems analyst also analyzes the structured decisions made. Structured decisions are those for which the conditions, condition alternatives, actions, and action rule can be determined. There are three major methods for analysis of structured decisions, which are structured English, decision tables, and decision trees.

Not all decisions in organizations are structured, but it is still important for the systems analyst to understand them. Semi-structured decisions are often supported by decision support systems. When analyzing semi-structured decisions, the analyst examines the decisions based on the degree of decision-making skill required, the degree of problem complexity, and the number of criteria considered when the decision is made.

Analysis of multiple-criteria decisions is also part of this phase. Many techniques are available for analyzing multiple-criteria decisions, including the tradeoff process and the use of weighting methods.

At this point in the SDLC, the systems analyst prepares a system proposal that summarizes what has been found, provides cost/benefit analyses of alternatives, and makes recommendations on what should be done. If one of the recommendations is acceptable to management, the analyst proceeds along that course. Each systems problem is unique, and there is never just one correct solution.

#### 2.5.4 Designing the Recommended System

In this phase of the SDLC, the systems analyst uses the information collected earlier to accomplish the logical design of the information system. Design is the phase in which those requirements are used to create blueprints, or actual plans, for the new system. It is the process of developing a plan for an improved system, based on the results of the systems analysis. The analyst designs accurate data-entry procedures so that data going into the information system are correct. In addition, the analyst also provides for effective input to the information system by using techniques of good form and screen design.

Part of the logical design of the information system is devising the user interface. The interface connects the user with the system and is thus extremely important.

The design phase also includes designing files or databases that will store much of the data needed by decision-makers in the organization. A well-organized database is the basis for all information systems. In this phase the analyst also works with users to design output either on-screen or printed that meets their information needs.

#### 2.5.5 Developing and Documenting Software

In this fifth phase of the SDLC, the analyst works with programmers to develop any original software that is needed. Some of the structured techniques for designing and documenting software include structure charts, the HIPO method, flowcharts, Nassi-Shneiderman charts, Warnier-Orr diagrams, and Pseudocode. The analyst uses one or more of these devices to communicate to the programmer what needs to be programmed.

During this phase, the analyst also works with users to develop effective documentation for software, including procedure manuals. Documentation tells users how to use software and also what to do if software problems occur.

#### 2.5.6 Testing and Maintaining the System

System testing is recognized as an important part of quality assurance. Testing proceeds in parallel with system development, as shown in Figure 2.2. Here, a test plan is developed in parallel with system design. The test plan is then used to develop test cases that are used in system testing. Testing proceeds through a number of steps. First, individual program modules are tested by their developers. Once individual modules are tested, the next step is to test whether they can be combined. This is known as integration testing. During integration testing, groups of modules are combined into test modules and tested together. The goal is to determine whether the interfaces between modules work. Then the entire system is tested. It is important to design test cases that test all the conditions that can arise in system inputs, while at the same time ensuring

that the tests do not take too long.

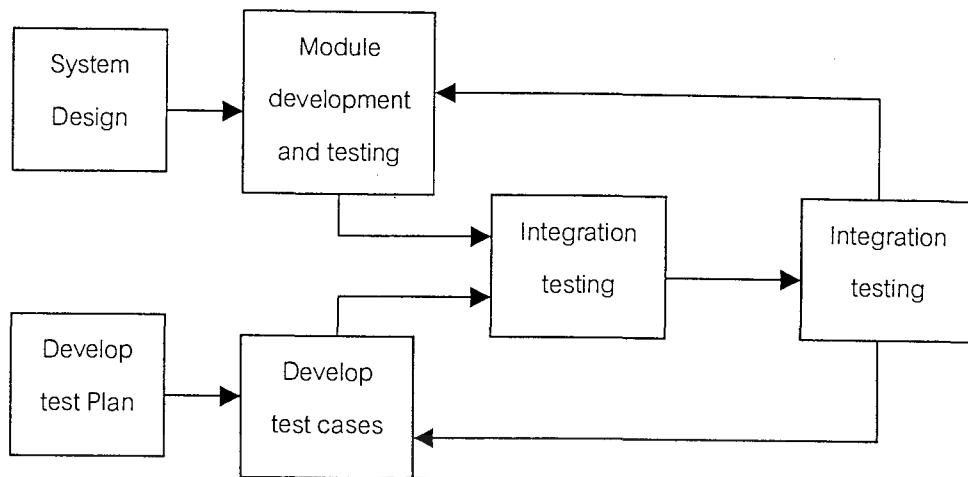


Figure 2.2. The System Testing.

Before the information system can be used, it must be tested. It is much less costly to catch problems before the system is signed over the users. Some of the testing is completed by programmers alone, some of it by systems analysts in conjunction with programmers. A series of tests to pinpoint problems is run first with sample data and eventually with actual data from the current system. Also maintenance of the system and its documentation begins in this phase and is carried out routinely throughout the life of the information system.

Maintenance is necessary to eliminate errors in the system during its working life and to tune the system to any variations in its working environment. There are always some errors detected that must be corrected. Often small system deficiencies are found as a system is brought into operation, and changes are made to remove these deficiencies. Information planners must always plan for resource availability to carry

out these maintenance functions.

If a major change to a system is needed, a new project may have to be set up to carry out the change. This new project will then proceed through all the mentioned system development life cycle phases.

#### 2.5.7 Implementing the System

Here, the analyst helps implement the information system. This involves training users to handle the system. Some training is done by vendors, but oversight of training is the responsibility of the systems analyst. Additionally, the analyst needs to plan for a smooth conversion from the old system to the new one. This process includes converting files from old formats to new ones or building a database, installing equipment, and bringing the new system into production. Here, the key criterion that must be satisfied is whether the intended users are indeed using the system.

##### (a) Training Strategies

These are determined by who is being trained and who will train them. The analyst will want to ensure that anyone whose work is affected by the new information system is properly trained by the appropriate trainer.

Who to train: All people who will have secondary or primary use of the system must be trained. This includes everyone from data-entry personnel to those who will use output to make decisions without personally using a computer. The amount of training a system requires thus depends on how much someone's job will change because of the new system. You must ensure that users of different skill levels and job interests are separated. It is certain trouble to include novices in the same training sessions as experts, since novices are quickly lost, and experts are rapidly



bored with basics. Both groups are then lost.

People who train users: For a large project, many different trainers may be used depending on how many users must be trained and who they are. Possible training sources include Vendors, Systems Analysts, External Paid Trainers, In-house Trainers, and Other System Users.

(b) Conversion Strategies.

There are many conversion strategies available to analysts, and there is also a contingency approach that takes into account several organizational variables in deciding which conversion strategy to use. There is no single best way to proceed with conversion. The importance of adequate planning and scheduling of conversion, file backup, and adequate security cannot be over-emphasized.

There are five strategies for converting from the old system to the new system:

(1) Direct changeover:

This is the conversion that on a specified date, the old system is dropped and the new system is put into use. It can only be successful if extensive testing is done beforehand and it works best when some delays in processing can be tolerated.

An advantage of this conversion is that users have no possibility of using the old system rather than the new. Adaptation is a necessity. However, it is considered a risky approach to conversion, and its disadvantages are numerous.

(2) Parallel conversion:

This refers to running the old system and the new system

at the same time, in parallel. This is the most frequently used conversion approach, but its popularity may be in decline because it works best when a computerized system replaces a manual one.

Both systems are run simultaneously for a specified period of time, and the reliability of results is examined. When the same results can be gained over time, the new system is put into use, and the old one is stopped.

The advantages of this include the possibility of checking new data against old data in order to catch any errors in processing in the new system. Parallel processing also offers a feeling of security to users, who are not forced to make an abrupt change to the new system.

However, there are many disadvantages to 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. Another disadvantage is that unless the system being replaced is a manual one, it is difficult to make comparisons between outputs of the new system and the old one. Supposedly, the new system was created to improve on the old one. Thus, outputs from the systems should differ. Finally, it is understandable that employees who are faced with a choice between two systems will continue using the old one because of their familiarity with it.

(3) Gradual conversion:

This type of conversion attempts to combine the best features of the earlier two plans, without incurring all of the risks. In this plan, the volume of transactions handled by the new system is gradually increased as the system is phased in.

The advantages of this include allowing users to get involved with the system gradually and the possibility of detecting and recovering from errors without a lot of down time. Disadvantages of this conversion include taking too long to get the new system in place and its inappropriateness for conversion of small-uncomplicated systems.

(4) Distributed conversion:

This refers to a situation in which many installations of the same systems are contemplated, as is the case in banking or in franchises such as restaurants or clothing stores. One entire conversion is done (with any of the four approaches considered already) at one site. When that conversion is successfully completed, other conversions are done for other sites.

An advantage of this conversion is that problems can be detected and contained, rather than inflicted simultaneously on all sites. On the other hand, a disadvantage is that even when one conversion is successful, each site will have its own peculiarities to work through, and these must be handled accordingly.

#### 2.5.8 Evaluating the System

Throughout the system development life cycle, the analyst, management, and users have been evaluating the evolving information system in order to give feedback for its eventual improvement. Evaluation is also called for following system implementation. In recognition of the fact that ongoing evaluation of information systems is important, many evaluation techniques have been devised. These techniques include cost-benefit analysis. Also the information system utility approach for evaluating information systems can be a comprehensive and fruitful technique for measuring the success of a developed system.

- (a) Utilities of information include possession, form, place, and time:

In order to evaluate the information system comprehensively, these utilities must be expanded to include actualization utility and goal utility. Then the utilities can be seen to address adequately the questions of who (possession), what (form), where (place), when (time), how (actualization), and why (goal).

- (1) Possession utility answers the question of who should receive output, or who should be responsible for making decisions. Information has no value in the hands of someone who lacks the power to make improvements in the system or someone who lacks the ability to use the information productively.
- (2) Form utility answers the question of what kind of output is distributed to the decision-maker. The documents must be useful for a particular decision-maker. Acronyms and column headings must be meaningful to the users. Furthermore, information itself must be in an appropriate form.
- (3) Place utility answers the question of where information is

distributed. Information must be delivered to the location where the decision is made. More detailed reports or previous management reports should be filed or stored to facilitate future access.

- (4) Time utility answers the question of when information is delivered. Information must arrive before a decision is made. Late information has no utility. At the other extreme is the delivery of information too far in advance of the decision. Reports may become inaccurate or may be forgotten if delivered prematurely.
- (5) Actualization utility involves how the information is introduced and used by the decision-maker. First, the information system has value if it possesses the ability to be implemented. Second, actualization utility implies that an information system has value if it is maintained after its designers depart or if a one-time use of the information system obtains satisfactory and long-lasting results.
- (6) Goal utility answers the why of information systems by asking whether the output has value in helping the organization obtain its objectives. The goal of the information system must not only be in line with the goals of decision-makers, but must also reflect their priorities.

(b) The Cost–Benefit Analysis:

This analysis usually includes two steps: producing the estimates of costs and benefits, and determining whether the project is worthwhile once



these costs are ascertained.

The goal of producing cost-benefit analysis is to produce a list of what is required to implement the system and a list of the new system's benefits. Cost – benefit analysis is always clouded by both tangible and intangible items. Tangible items are those to which direct values can be attached, such as the purchase of equipment, time spent by people writing programs. Some tangible costs often associated with computer system development are:

- (1) Equipment costs for the new system. Various items of computing equipment, as well as items such as accommodation costs and furniture, are included here.
- (2) Personnel costs. These include personnel needed to develop the new system and those who will subsequently run the system when it is established. Analysts, designers and programmers will be needed to build the system.
- (3) Material costs. These include stationary, manual production and other documentation costs.
- (4) Conversion costs. The costs of designing new forms and procedures and of the possible parallel running of the existing and new systems are included here.
- (5) Training costs. These include the cost of training users of the new system, as well as developers who may be required to use new technologies.
- (6) Other costs. Sometimes consultants' costs are included here, together with management overheads, secretarial support, travel

budgets, and so on.

Intangible items, on the other hand, are those whose values cannot be precisely determined and are the result of subjective judgment. Considerable argument can take place before agreement is reached on such intangible costs. The sum value of costs of items needed to implement the system is known as the cost of the system. Once we agree on the costs and benefits, we can evaluate whether the project is economically viable. The cost estimates are usually used to set the project budget. Often it is convenient to divide these costs into project phases to give management an idea of when funds and personnel will be needed. The cost estimates need to be worked out very carefully. One should avoid omitting anything from the estimates, as this will necessitate requests for more funds because something was forgotten.

On the other side of the evaluation are the benefits of the project, which may also be tangible or intangible. Tangible benefits include those benefits that can be measured in actual monetary terms. Such benefits can include reduced production costs through the introduction of new technologies or reduced processing costs through the use of computers. Less tangible benefits include the possibility of increased sales through improvements to the ordering system, the possibility of the wider market through better distribution of marketing data. Still less tangible, or perhaps intangible, benefits are those benefits that cannot be measured.

The costs and benefits are used to determine whether a project is economically feasible. There are four ways to do this: Break-Even Analysis, Payback Method, Cash-Flow Analysis, and Present Value

Method.

- (1) The Break-Even Analysis allows the systems analyst to determine the break-even capacity of the proposed information system. The point at which total costs and benefits of the current system and of the proposed system intersect represents the break-even point – where it becomes profitable for the business to get the new information system. Total costs include the costs that recur during operation of the system plus the developmental costs that occur only once (one-time costs of installing a new system). Figure 2.3 is an example of break-even analysis. From the figure, it shows that the new system would be cost-effective if the business has run for 3 years. Break-even analysis is useful when a business is growing. However, one disadvantage of this analysis is that benefits are assumed to remain the same, regardless of which system is in place.

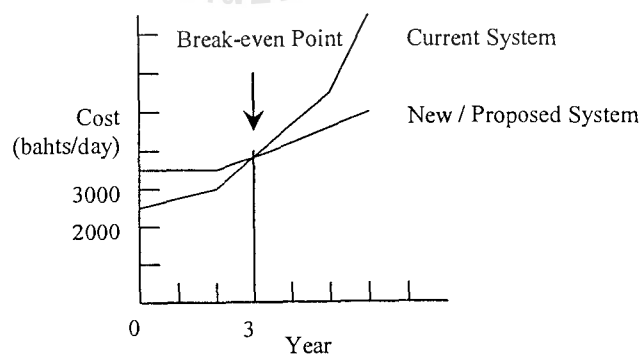


Figure 2.3. The Example of the Break-Even Point.

(2) The Payback Method defines the time required to recover the money spent on a project. It is a simple way to assess whether a business should invest in a proposed information system based on how long it will take for the benefits of the system to pay back the costs of developing it. Briefly, the payback method determines the number of years of operation that the information system needs to pay back the cost of investing in it. Figure 2.4 shows the example of the payback method during the period of three and a half years. From the figure, it shows that during the six-year periods of the project, the payback period is a three and a half-year. This means that before this payback period, the business is still in lost, because the business starts with costs more than benefits. However, after the payback period, the business will gain benefit – the benefits now are more than costs.

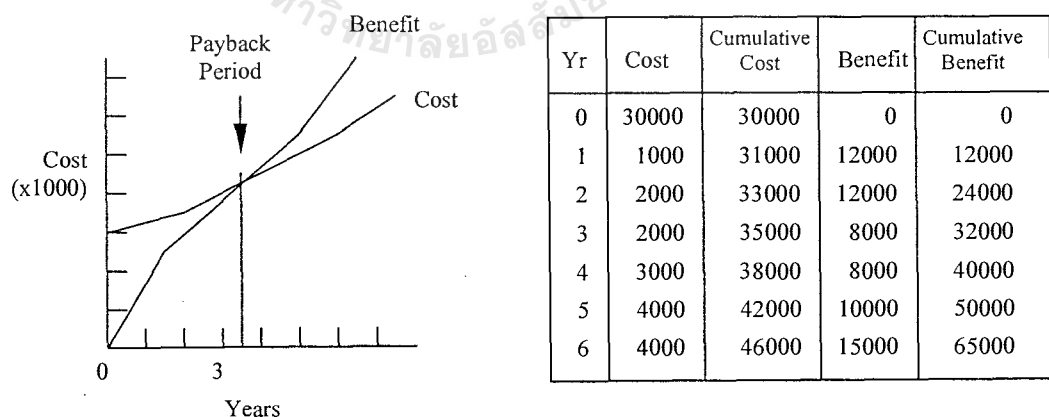


Figure 2.4. The example of the Payback Method.

Although the payback method offers a well-known and simple way to assess the worthiness of the information system, it has three drawbacks that limit its usefulness. One drawback is that it is strictly a short-term approach to investment and replacement decisions; the second is that it does not consider the importance of how repayments are timed; the third is that the payback method does not consider the total returns from the new project that may go well beyond the payback year.

- (3) The Cash-Flow Analysis examines the direction, size, and pattern of cash flow that is associated with the proposed information system. If you are proposing the replacement of an old information system with a new one and the new information system will not be generating any additional cash for the business, only cash outlays are associated with the project. If this is the case, the new system cannot be justified on the basis of new revenues generated and must be examined closely for other tangible benefits if it is to be pursued further. Table 2.1 shows an example of using the cash-flow analysis.
- (4) Present Value Method helps the systems analyst to present to business decision-makers the time value of the investment in the information system as well as the funds flow. The idea of the present value method is to determine how much money it is worthwhile investing now in order to receive a given return in some years' time. Table 2.2 shows an example of the use of the present value method. It depicts that the present value is the cost



or benefit measured in today's currency, and depends on the cost of money. The cost of money is the opportunity cost, or the rate ( $i$ ) that could be obtained if the money invested in the proposed system was invested in another project. This  $i$  rate is called a discount rate, which is calculated by determining the factor:

$$\frac{1}{(1+i)^n}$$

From the above formula,  $n$  is the number of periods. Then this formula will be multiplied by the currency amount. Figure 2.6 shows the present value method of six periods of the year, and a 12 percent discount rate. After this method is performed, we will get the conclusion for the proposed or new system, whether we would recommend using this system or not.

Table 2.1. The Cash-Flow Analysis.

	Year 1				Year 2
	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Quarter 1
Revenue	5,000	20,000	24,960	31,270	39,020
Software Development	10,000	5,000			
Personnel	8,000	8,400	8,800	9,260	9,700
Training	3,000	6,000			
Equipment Lease	4,000	4,000	4,000	4,000	4,000
Supplies	1,000	2,000	2,370	2,990	3,730
Maintenance	-	2,000	2,200	2,420	2,660
Total Costs	26,000	27,400	17,370	18,670	20,090
Cash Flow	- 21,000	- 7,400	7,590	12,600	18,930
Cumulative cash flow	- 21,000	- 28,400	- 20,810	- 8,210	10,720

Figure 2.5 below, as a conclusion, shows the clear picture of the System Development Life Cycle step. It shows that in order to begin another step, the previous one should be finished first. However, this does not always mean that each step is totally separated from each other. This means that every step can go through at the same time, or can go through at a different time. The system analyst and his/her team must figure out a suitable way. Moreover, if one step is not right or correct, it can go back to the previous step. This helps the system analyst and his/her team to make the system more precise.

Table 2.2. The Present Value Method.

	Year						
	1	2	3	4	5	6	Total
Costs	40,000	42,000	44,100	46,300	48,600	51,000	
Multiplier	0.89	0.80	0.71	0.64	0.57	0.51	
Present Value	35,600	33,600	31,311	29,632	27,702	26,010	183,855
Benefits	25,000	31,200	39,000	48,700	60,800	76,000	
Multiplier	0.89	0.80	0.71	0.64	0.57	0.51	
Present Value	22,250	24,960	27,960	31,168	34,656	38,760	179,484

## 2.6 Gathering information through Interviewing

Interviewing is the main approach used to analyze large structures systems. It is used by analysts to gradually build a subject world model and to understand any system problems. It is a directed conversation with a specific purpose that uses a question-and-answer format. There are many important factors in successful interviewing. The first is to choose people to interview. This is important, as the analyst must ensure that all key people within the study boundary are considered. The next important factor is finding

the right way to conduct an individual interview. Here, good interpersonal relationships

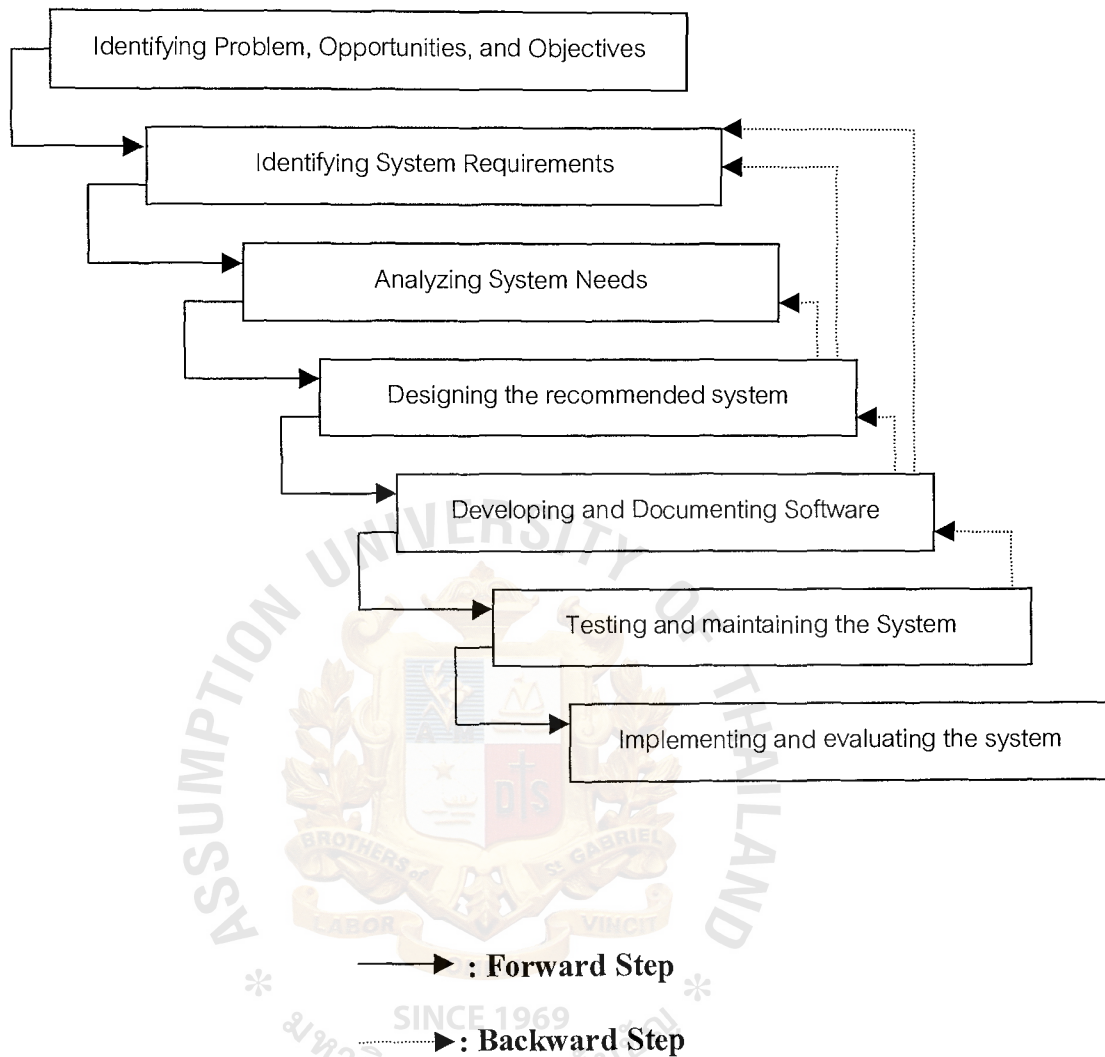


Figure 2.5. The System Development Life Cycle.

must be considered and the interviewer must establish some rapport with the interviewee to ensure the cooperation necessary to get all the relevant facts.

Information gathering through interviewing for a large and complex system can be a very responsible task. Information must be gathered in an organized way to ensure that nothing is overlooked and that all system detail is eventually captured. All users

must be consulted to ensure that every system problem and each user requirement is identified and that useful objectives are proposed.

The benefits of using the interview to both internal users and the customers are:

- (1) Getting to their needs directly
- (2) Getting to relevant data
- (3) Getting to the problems on the current system

These benefits of interviewing are used to analyze and design the new system in order to create the system, which both internal users and customers need, and which eliminates problems in the current system.

## **2.7 Data Flow Diagrams (DFDs)**

Here, the systems analyst needs to make use of the conceptual freedom afforded by data flow diagrams (DFD), which graphically characterize data-processes and flows in a business system. When systems analysts attempt to understand the information requirements of users, they must be able to conceptualize how data moves through the organization, the processes or transformation that the data undergoes, and what the outputs are.

Through a structured analysis technique called data flow diagrams (DFD), the systems analyst can put together a graphical representation of data-processes throughout the organization. The data flow approach emphasizes the logical underlying the system. By using combinations of only four symbols, which are described below, the systems analyst can create a pictorial depiction of processes that will eventually provide solid system documentation.

Data flow diagrams use a number of symbols to represent a system. Most data flow modeling methods use four basic symbols to represent four kinds of system components as shown in Figure 2.6.

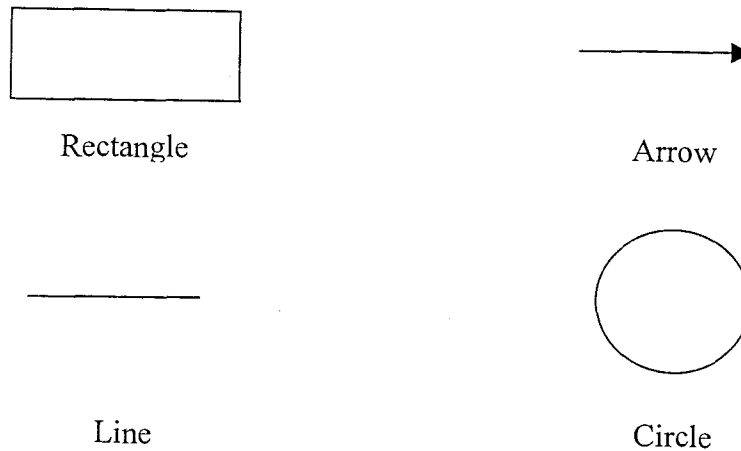


Figure 2.6. Data Flow Diagram's Symbols.

The rectangle is used to depict an external entity such as another department, a business, a person, and a machine. This entity can send data to or receive data from the system. The external entity is also called a source or destination of data. Each external entity is labeled with an appropriate name, with a noun. The same external entity may be used more than once on a given data flow diagram to avoid crossing data flow lines.

The arrow shows movement of data from one point to another, with the head of the arrow pointing toward the data's destination. Data flows occurring simultaneously can be depicted doing just that through the use of parallel arrows. Since an arrow represents data about a person, place, or thing, it too should be described with a noun.

A circle is used to show the occurrence of a transforming process. Processes always denote a change in or transformation of data; thus, the data flow leaving a process is always labeled differently from the one entering it. Processes represent work being performed within the system and should be named clearly by using one of the following formats:

- (a) Assign the name of the whole system as a noun when naming a high level



process.

- (b) Use verb-adjective-noun format for detailed processes.

Moreover, processes must also be given a unique identifying number indicating the level of the diagram. Several data flows may go into and out of each process.

The last basic symbol used in DFD represents a data store and is a line symbol. This symbol is drawn only wide enough to allow identifying of its name, as a noun. In DFD, the type of physical storage such as a tape or a diskette is not specified. This means that at this point, the data store symbol is simply showing a depository for data that allows addition and retrieval of data.

### 2.7.1 Developing Data Flow Diagrams

Data flow diagrams can and should be drawn systematically. We can use a Top-Down Approach to accomplish the Data flow diagrams by:

- (1) Making a list of business activities and use it to determine
  - (a) External Entities
  - (b) Data Flows
  - (c) Processes
  - (d) Data Stores
- (2) Creating a context diagram which shows external entities and data flow to and from the system. Do not show any detailed processes or data stores.
- (3) Drawing Diagram 0, the next level. Show processes, but keep them general. Show data stores at this level.
- (4) Creating a child diagram for each of the processes in Diagram 0
- (5) Checking for errors and make sure the labels you assign to each process and data flow are meaningful.
- (6) Developing a physical data flow diagram from the logical data flow

diagram. Distinguish between manual and automated processes, describe actual files and reports by name, and add controls to indicate when processes are complete or errors occur.

- (7) Partitioning the physical data flow diagram by separating or grouping parts of the diagram in order to facilitate programming and implementation.

### 2.7.2 Creating the Context Diagram

With a top-down approach to diagramming data movement, the diagrams move from general to specific. While the first diagram helps the systems analyst grasp basic data movement, its general nature limits its usefulness. The initial context diagram should be an overview including basic inputs, the general system, and outputs.

The context diagram is the highest level in a data flow diagram and contains only one process, representing the entire system. The process is given the number zero. All external entities are shown on the context diagram, as well as major data flow to and from them. The diagram does not contain any data stores and is fairly simple to create.

#### (1) Creating Diagram 0 (The Next Level)

More detail than the context diagram permits is achievable by exploding the diagrams. Inputs and outputs specified in the first diagram remain constant in all subsequent diagrams. However, the rest of the original diagram is exploded into close-ups involving three to nine processes and showing data stores and new lower-level data flows. The effect is that of taking a magnifying glass to view the original data flow diagram. Each exploded diagram should use only a single sheet of paper.

By exploding DFDs into sub-processes, the systems analyst begins to fill in the details about data movement. Diagram 0 is the explosion of the context diagram and may include up to nine processes. Including more

processes at this level will result in a cluttered diagram that is difficult to understand. Each process is numbered with an integer, generally starting from the upper left-hand corner of the diagram and working toward the lower right-hand corner. The major data stores of the system and all external entities are included on Diagram 0.

## (2) Creating Child Diagrams (More Detailed Levels)

Each process on Diagram 0 may in turn be exploded to create a more detailed child diagram. The process on Diagram 0 that is exploded is called the *parent process*, and the diagram that results is called the *child diagram*. The primary rule for creating child diagrams, vertical balancing, dictates that a child diagram cannot produce output or receive input that the parent process does not also produce or receive. All data flow in or out of the parent process must be shown flowing in or out of the child diagram.

The child diagram is given the same number as its parent process in Diagram 0. However, the processes on the child diagram are numbered using the parent process number with a decimal point. This number is a unique number for each child process.

External entities are usually not shown on the child diagrams. Data flows that matches the parent flow is called an interface data flow and is shown as an arrow from or into a blank area on the child diagram. If the parent process has data flow connecting to a data store, the child diagram may include the data store as well. Additionally, this lower-level diagram may contain data stores not shown on the parent process.

Nonetheless, processes may or may not be exploded, depending on their level of complexity. When a process is not exploded, it is said to be

functionally primitive and is called a *primitive process*.

### 2.7.3 Logical and Physical Data Flow Diagrams

DFDs are categorized as either logical or physical. A logical data flow diagram focuses on the business and how the business operates. It is not concerned with how the system will be constructed. Instead, it describes the business events that take place and the data required and produced by each event. Conversely, a physical data flow diagram shows how the system will be implemented, including the hardware, software, files, and people involved in the system.

Ideally, systems are developed by analyzing the current system (the current logical DFD), then adding features that the new system should include (the proposed logical DFD). Finally, the best methods to implement the new system should be developed (the physical DFD).

Developing a logical data flow diagram for the current system affords you a clear understanding of how the current system operates and thus a good starting point for developing the logical model of the current system. This time-consuming step is often omitted in order to go straight to the proposed logical DFD.

However, the logical data flow diagram of the current system can be used to create the logical data flow diagram of the new system. Processes that will be unnecessary in the new system may be dropped and new features, activities, output, input, and stored data may be added. After the logical model for the new system has been developed, it may be used to create a physical data flow diagram for the new system.

#### (1) Developing Logical Data Flow Diagrams

First, construct a logical data flow diagram for the current system.

Here, a logical model is easier to use when communicating with users of the

system. This is because it is centered on business activities. Users will thus be familiar with the essential activities and many of the information requirements of each activity.

Systems formed using a logical data flow diagram are often more stable than those that are not because they are based on business events and not on a particular technology or method of implementation. Logical data flow diagrams represent features of a system that would exist no matter what the physical means of doing business are.

A logical data flow diagram has a business emphasis and helps the analyst to understand the business being studied, to grasp why procedures are performed, and to determine the expected result of performing a task. Then using the current logical data flow diagram will develop the new system. This new system will be more flexible and easier to maintain. Therefore, examining a logical model may help you to create a better system by eliminating redundancies and inefficient methods that exist in the current system.

## (2) Developing Physical Data Flow Diagrams

When a logical model of the new system is completed, it may be used to create a physical data flow diagram for the new system. The physical data flow diagram shows how the system will be constructed. Just as logical data flow diagrams have certain advantages, physical data flow diagrams have others, including:

- (a) Clarifying which processes are manual and which are automated
- (b) Describing processes in more detail than do logical DFDs

- (c) Sequencing processes that have to be done in a particular order
- (d) Identifying temporary data stores
- (e) Specifying actual names of files and printouts
- (f) Adding controls to ensure the processes are done properly

Table 2.3 compares the features of logical and physical models.

## 2.8 System Flowchart

A system flowchart is a graphic way of showing the major inputs, outputs, and process of a system. In some cases, a system flowchart can be used in place of a data flow diagram; in other cases, it is a useful supplement. Some analysts start by creating a system flowchart, then move on to the data flow diagram as their understanding of the system grows. A system flowchart uses a finite set of symbols to represent system components, which may be physical hardware devices, information stores or flows, as well as process. Figure 2.7 below show symbols used to represent computer components such as punched cards, terminals, magnetic tape, and so on.

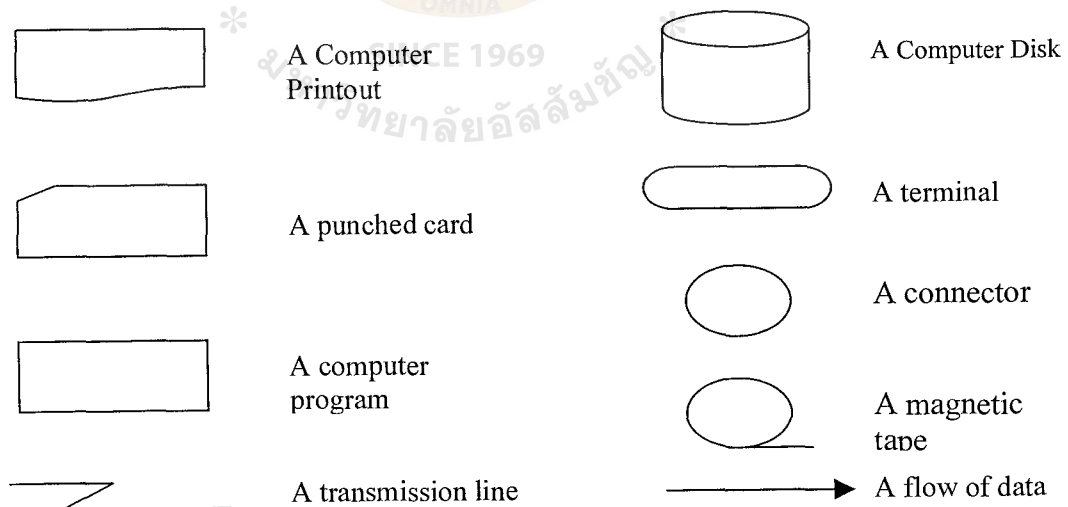


Figure 2.7. System Flowchart Symbols for Computing Components.



Table 2.3. Features of the Physical and Logical Data Flow Diagram.

Design Feature	Logical	Physical
What the model depicts	How the business operates	How the system will be implemented or how the current system operates
What the processes represent	Business activities	Programs, program modules and manual procedures
What the data stores represent	Collections of data, regardless of how the data is stored	Physical files and databases, manual files
Type of data stores	Show data stores representing permanent data collections	Master files, transaction files. Any processes that operate at two different times must be connected by a data store
System controls	Show business controls	Show controls for validating input data, for obtaining a Record, for ensuring successful completion of a process and for system security

Moreover, Figure 2.8 illustrates symbols used to represent data storage devices and user activities in the procedure.

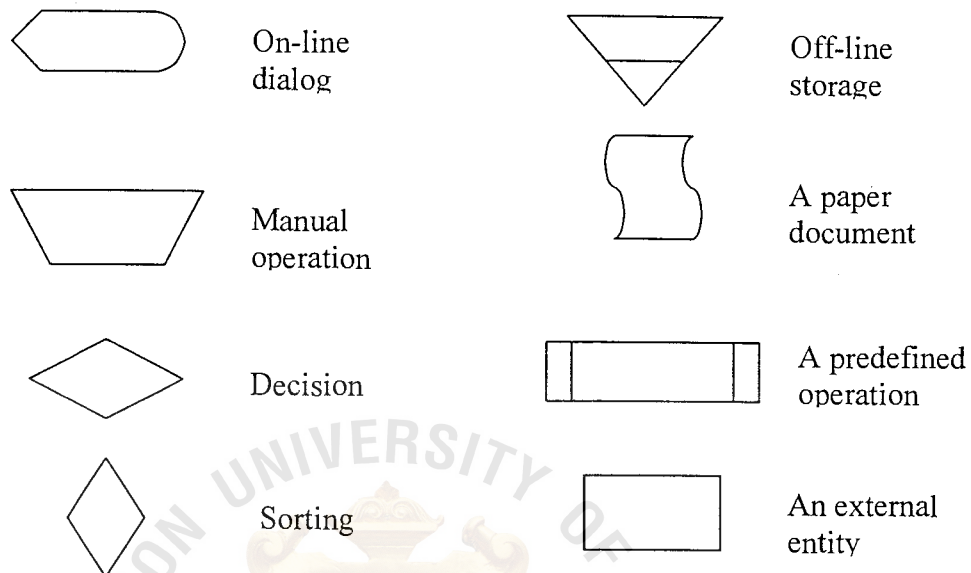


Figure 2.8. System Flowchart Symbols for non-computing components.

When drawing system flowcharts, we represent each physical system component by one of the system flowchart symbols. Then we look at information flows between these components and join the corresponding representations on the system flowchart.

## 2.9 Batch-Processing Systems

Batch-processing systems or off-line transactions are the systems where all transactions are collected into batches which may be held for a while and input into the computer system later, often overnight when computers are not busy. These systems do not provide such immediate responses. In return, a number of transactions are collected before entry into a computer system. For example, a number of hourly work slips may be collected during the day and gathered into a batch. This batch will be input into the computer system at the end of the day, or at the beginning of the day. Thus, the users

will obtain any responses on the following day. A typical batch run is shown in Figure 2.9. It begins by collecting a set of transactions, which are entered on to a form. The form is then passed to data entry operators who enter the data into machine-readable form. One early method was to enter the data on to punched cards that were then read into the computer. A more common way now is to enter the data through a computer terminal. In Figure 2.9, the transactions are stored on an input file and the input file goes through an edit run, which outputs any errors found in the transactions. The error transactions can be corrected and input again on a subsequent batch run. The correct transactions are passed to a FILE UPDATE program that updates existing files using transaction data. The file is then processed by a report program to produce a set of reports.

## **2.10 Database Management**

A database system is essentially nothing more than a computerized record-keeping system. The database itself can be regarded as a kind of electronic filing cabinet. It is a repository for a collection of computerized data files. The user of the system will be given facilities to perform a variety of operations on such files, including the following among others:

- (a) Adding new, empty files to the database
- (b) Inserting new data into existing files
- (c) Retrieving data from existing files
- (d) Updating data in existing files
- (e) Deleting data from existing files
- (f) Removing existing files, empty or otherwise, from the database

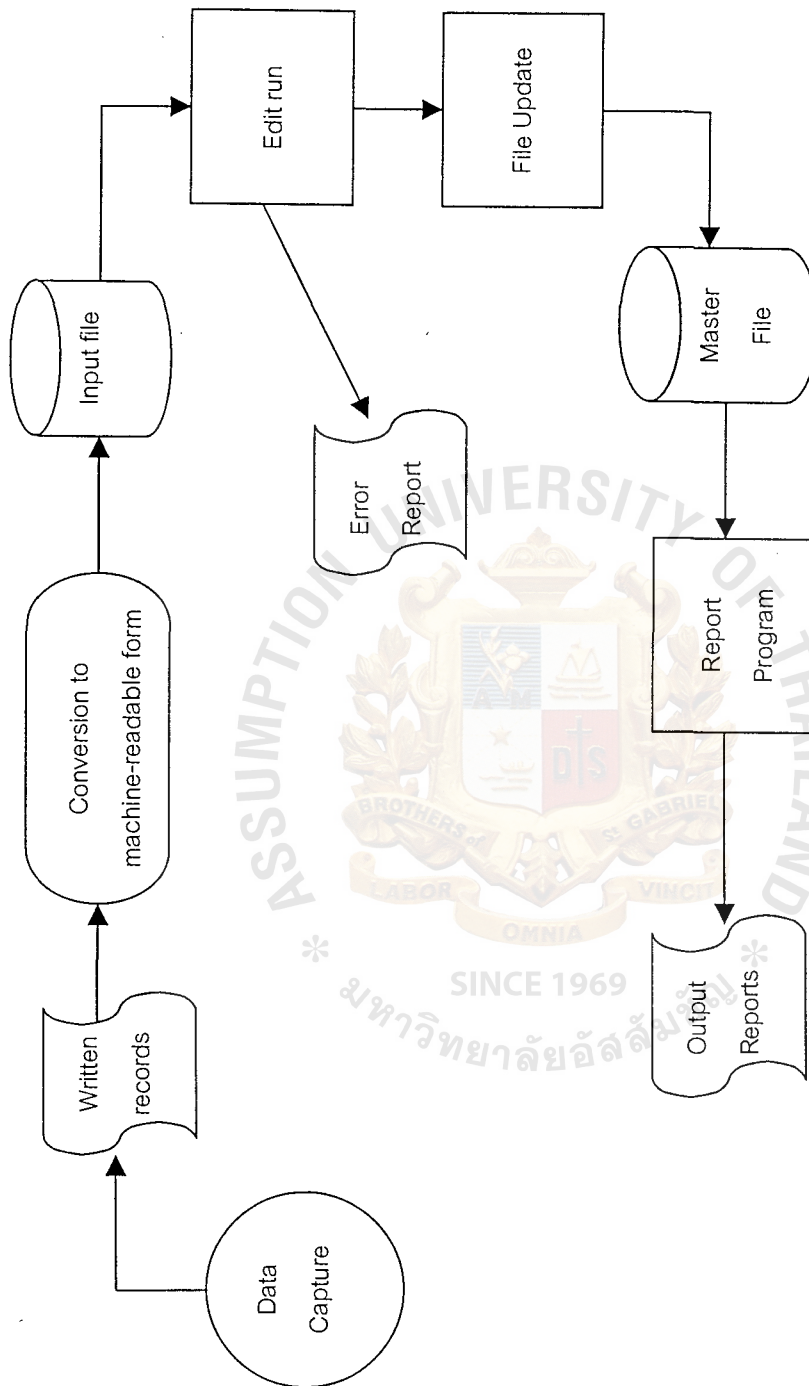


Figure 2.9. The Example of the Batch-Processing Systems.

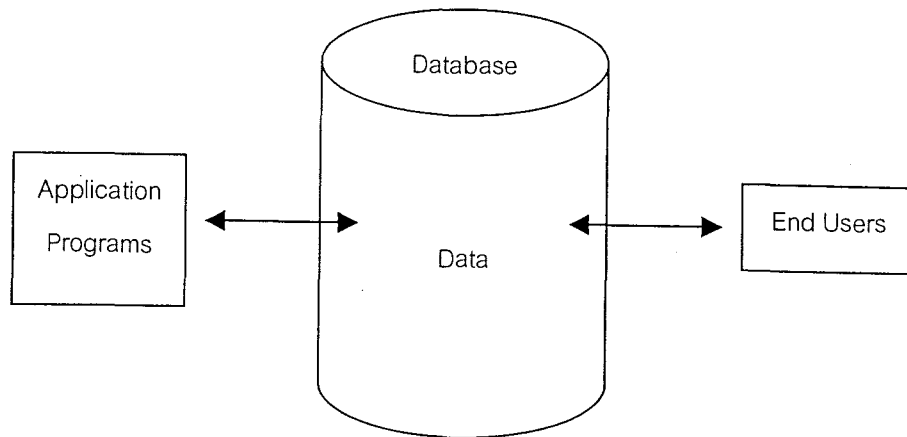


Figure 2.10. The Database System.

A database system involves four major components, namely, data, hardware, software, and users as shown in Figure 2.10.

(1) Data and Database

Database systems are available on machines that range all the way from quite small micros as PCs to the largest mainframes. In particular, systems on large machines or large systems tend to be multi-user, whereas, those on smaller machines or small systems tend to be a single-user.

A single-user system is a system in which at most one user can access the database at any given time; on the other hand, a multi-user system is a system in which many users can access the database concurrently. In general, then, the data in the database will be both integrated and shared.

By integrated, this means that the database can be thought of as a unification of several otherwise distinct data files, with any redundancy among those files wholly or partly eliminated. By shared, this means that individual pieces of data in the database can be shared among several

different users, in the sense that each of those users can have access to the same piece of data.

(2) Hardware

The hardware portions of the system consist of:

- (a) The secondary storage volumes that are used to hold the stored data, together with the associated I/O devices, device controllers, I/O channels, and etc.
- (b) The processor and associated main memory that are used to support the execution of the database system software

(3) Software

Between the physical database and the users of the system is a layer of software called the database manager or database management system (DBMS). All requests from users for access to the database are handled by the DBMS for adding and removing files, retrieving data from and updating data in such files or tables.

(4) Users

There are three considerable classes of users:

- (a) First, there are the application programmers, who are responsible for writing application programs that use the database
- (b) Second, the class of end users who interact with the system from online workstations or terminals. A given end user can access the database via one of the online applications or he/she can use an interface provided as an integral part of the database system software.



- (c) The third class of users is the database administrator or DBA. This is the person who makes the strategic and policy decisions regarding the data of the enterprise. Also he/she is the person who provides the necessary technical support for implementing those decisions. Thus, the DBA is responsible for the overall control of the system at a technical level.

(5) Relational Database Management Systems

The relational model stores data as a set of tables or relations, as shown in Figure 2.11 where each record is a row in table. In a relational DBMS, each such relation would be defined using the system's definition language. Commands provided by the DBMS would then be used to store and retrieve data.

(6) Network Database Management Systems

DBMSs that support network structures store data as record types. Furthermore, parent-child relationships can be established between these record types. Such relationships are illustrated in Figure 2.12. In a network model, each record type can be a parent of any other record types. It can also have any number of parents.

(7) Hierarchical Database Management Systems

The hierarchical data model differs from the network model because each record type can have only one parent. Figure 2.13 illustrates the example of this kind of DBMS.

(8) Benefits of the Database Approach

- (a) Redundancy can be reduced

This fact can often lead to considerable redundancy in stored

data, with resultant waste in storage space.

- (b) Inconsistency can be avoided

An inconsistent database is supplying incorrect or contradictory information to its users; therefore, it is necessary that the two entries will not agree when one of the two has been updated and the other has not.

- (c) The data can be shared

Sharing means not only that existing applications can share the data in the database, but also that new application can be developed to operate against that same stored data.

DEPARTMENTS

DEPT-NO	MANAGER	DATE-ESTABLISHED

PROJECTS

PROJECT-NO	DEPT-NO	BUDGET

PARTS

PART-NO	COLOR	WEIGHT

PART-USE

PART-NO	PROJECT-NO	QTY-USED

JOBS

JOB-NO	PROJECT-NO	COST

Figure 2.11. The Relational Database Management Systems.

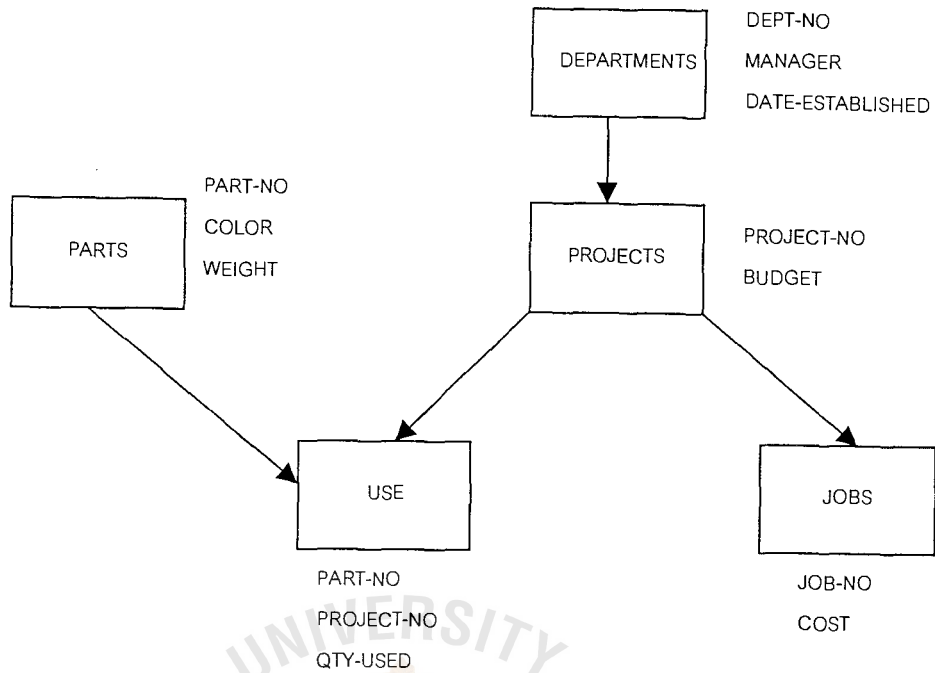


Figure 2.12. The Network Database Management Systems.

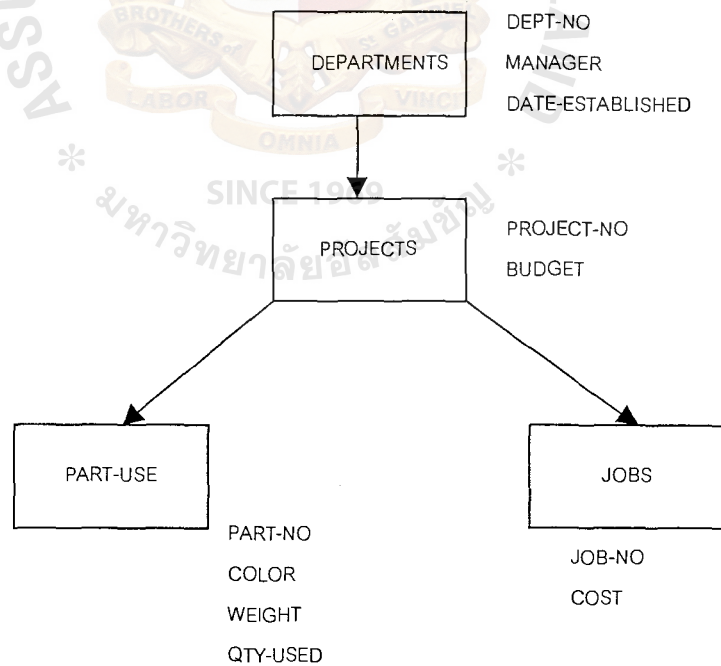


Figure 2.13. The Hierarchical Database Management Systems.

- (d) Standards can be enforced

With central control of the database, the DBA can ensure that all applicable standards are observed in the representation of the data.

- (e) Security restrictions can be applied

Having complete control over the database, the DBA can ensure that the only means of access to the database is through the proper channels, and can define security rules to be checked whenever access is attempted to sensitive data.

- (f) Integrity can be maintained

This means that using the database properly can ensure that the data in the database is accurate, especially for a multi-user database system. This is because the users can always have correct data in the database, which is shared with other users concurrently.

## **2.11 Data Dictionaries**

After successive levels of data flow diagrams are complete, system analysts use them to help catalog the data processes, flows, stores, structures, and elements in a data dictionary. This means that the system analysts need to make the name meaningful for the data component names.

Data dictionary is an integral component of structured analysis, since data flow diagrams by themselves do not fully describe the subject of the investigation. The data dictionary provides additional information about the system.

The data dictionary is a specialized application of the kinds of dictionaries used as references in everyday life. The data dictionary is a reference work of data about data compiled by system analysts to guide them through analysis and design. As a document, the data dictionary collects, coordinates, and confirms what a specific data

term means to different people in the organization. In other words, it is a catalog or a repository of the elements in a system. As the name suggests, these elements center on data and the way they are structured to meet user requirements and organization needs. The data dictionary stores details and descriptions of these elements.

System analysts must be aware of and catalog different terms that refer to the same data item. This helps to avoid duplication of effort, allows better communication between organizational departments sharing a database, and makes maintenance more straightforward. The data dictionary can also serve as a consistent standard for data elements. Thus, the data dictionaries can be used for five important reasons:

- (1) To manage the detail in large systems
- (2) To communicate a common meaning for all system elements
- (3) To document the features of the system
- (4) To facilitate analysis of the details in order to evaluate characteristics and determine where system changes should be made
- (5) To locate errors and omissions in the system

Data dictionary entries may be created after the data flow diagram has been completed or constructed as the data flow diagram is being developed. The use of algebraic notation and structural records allows the analyst to develop the data dictionary and the data flow diagram using a top-down approach. This means that the analyst may concurrently create the data dictionary entries with the Diagram 0 of data flow diagrams.

## **2.12 Barcode Technology**

Barcodes typically appear on product labels, but also appear on patient identification bracelets in hospitals and in almost any context in which a person or object needs to be checked into and out of any kind of inventory system. Barcodes can

be thought of as 'metacodes,' or codes encoding codes, since they appear as a series of narrow and wide bands on a label which encodes numbers or letters. These symbols in turn have access to product data stored in computer memory. A beam of light from a scanner or light-pen is drawn across the bands on the label either to confirm or record data about the product being scanned. A bar-coded label such as the one shown in Figure 2.12 includes coding for a particular grocery product; the manufacturer identification number, the product identification number, a code to verify the scan's accuracy, and codes to mark the beginning and end of the scan.

Bar coding affords an extraordinarily high degree of accuracy for data entry. It saves labor costs for retailers in that each item does not have to be individually price-marked. Additionally, bar coding allows automatic capturing of data that can be used for reordering, more accurate inventory tracking, and forecasting future needs. Sale prices or other changes in the meaning of the bar codes are entered into the central processor, saving the trouble of marking down numerous items.

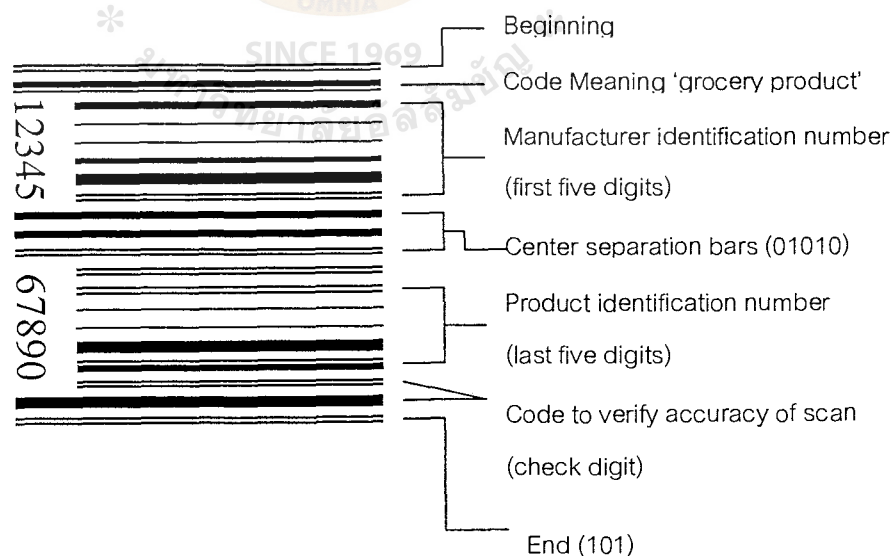


Figure 2.14. The Example of Barcode.



New input devices are constantly being developed. Of course it has been possible to transfer photographic images for some time now using systems like the Kodak Photo CD process, but a digital camera such as apple computer's QuickTake would cut out the middle step of digitizing your photographs.

### **2.13 The Franchise System**

From a business point of view, a franchise is a right or privilege granted to an individual or a group. Franchises may be granted by the government or by private bodies. From the point of view of economics, a franchise is a right granted to operate a business under the general regulation of one who grants it.

As a consequence, we would say that a franchise is a legal agreement in which an owner, called a franchisor, agrees to grant rights or privileges, called license, to someone else, called a franchisee, to sell the products or services under set specific conditions. This method of doing business is referred to as franchising.

Thus, we would say that franchising is a system or method of marketing a product or service. The franchisor develops a special product, service, or system and gains national recognition. The franchisor then grants a right or license to small, independent businessmen throughout the country to merchandise this service or product under the national trademark and in accordance with a proven, successful format.

There are many benefits by using the franchise system as follows:

- (1) A nationally recognized trade name and the instant collective goodwill of the franchise.
- (2) Standard quality and uniformity of a product or service
- (3) A successful and existing system of marketing and accounting, and a proven guidance system
- (4) Expert advice on location, design, capitalization, operation, and marketing

- (5) Specialization of a national level to maintain the necessary research and market analysis to remain competitive in an ever-changing economy
- (6) A business framework for developing a relatively independent business with a number of the risks lessened and shared
- (7) Cost savings by sharing a centralized purchasing system

Nevertheless, there is much variety of business arrangements within a franchise system that can be classified into two major groups:

(1) Product-and-Trade-Name Franchising:

This kind of franchising began primarily as an independent sales relationship between supplier and dealer, in which the dealer acquired some of the supplier's identity. The dealer (franchisee) identifies with the supplier (franchisor) through the product line and to some extent with its trade name or trademark.

Franchisees are granted the rights to distribute a franchisor's products within a specified territory or at a specific location, generally with the use of the manufacturer's identifying name or trademark.

(2) Business-Formal Franchising:

This kind of franchising involves a complete business-format rather than a single product or a trademark. Business-format is a relatively new concept of franchising and is characterized by an ongoing business relationship between franchisor and franchisee. Business-format not only includes product, service, and trademark, but the entire business concept itself – a marketing strategy and plan, operating manuals and standards, quality control, group purchasing power, research and development, and a continuous process of training, assistance, and guidance.

The franchisee is required to comply with the franchisor's guidelines pertaining to all aspects of the business, including operating procedures, the quality of the products and/or services, and the physical appearance of the business facility. A two-way channel of communication is maintained within this franchising. This means that there is an ongoing relationship between the franchisor and the franchisee.



### III. THE CURRENT SYSTEM

#### 3.1 Background of YOU'RE WELCOME Video Rental Shop

The YOU'RE WELCOME Video Rental Shop is a shop that provides video rental services to customers around the Silom area of Bangkok, Thailand. It consists of an owner of the shop, a front-desk officer, and a financial officer; as a result, the organization chart of YOU'RE WELCOME Video Rental Shop can be seen as follows:

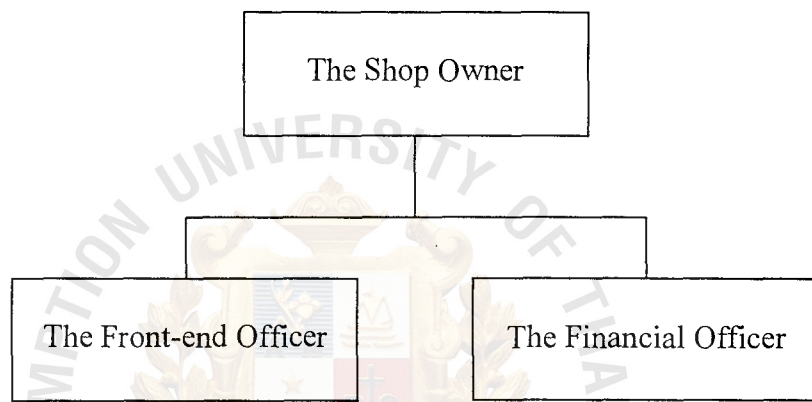


Figure 3.1. The Current Organization Chart of YOU'RE WELCOME Video Rental Shop.

##### 3.1.1 Job Descriptions

- (a) The shop owner
  - (1) Controls all operations within the shop.
  - (2) Checks all financial occurrences in the shop.
  - (3) Contacts with video suppliers.
  - (4) Services and informs customers.
  - (5) Generates daily reports.
- (b) The Front-end officer
  - (1) Generates customer member cards.

- (2) Keeps customer records.
  - (3) Adds and edits customer information.
  - (4) Services and informs customers.
- (c) The Financial officer
- (1) Generates customer receipts.
  - (2) Collects rent cost to the shop owner.

As mentioned earlier, the current system of YOU'RE WELCOME Video Rental Shop is done manually. Thus, in this section I will try to show all shop's workflow. The workflow for YOU'RE WELCOME Video Rental Shop is divided into two parts: customer registration and rental transaction system.

Customer registration is the part that explains the step of adding new customers to be the shop's members. This flow can be in Figure 3.2. From the figure, we can see that first the customers walk in to our shop; then the front-end officer will check their member cards. If they have member cards, they are our existing customers; on the other hand, if they do not have member cards and would like to be a member of YOU'RE WELCOME Video Rental Shop, the front-end officer add them to the customer list, and give them member cards. Then the customer must pay a fee of 100 bahts to the financial officer.

In order to register for membership, the shop is using a registered form for each customer. This means that each customer must first fill out the registration form before receiving a member card. The customer registration form can be seen in Figure 3.3.

For the rental transaction system, this can be explained by using Figure 3.4. This system is different from the first one, the customer registration system. The system involves only the customers who have member cards. Figure 3.3 shows any flow of the

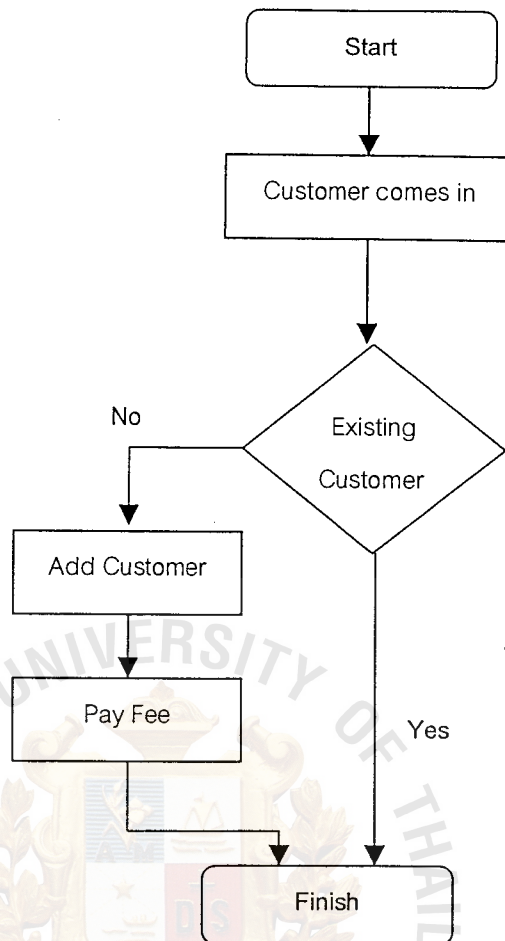


Figure 3.2: The Current Flowchart of the Customer Registration System.

rental transaction happening within the YOU'RE WELCOME Video Rental Shop, which can be explained as follows:

The customers first walk into the shop with or without videos. In the case that the customers have videos with them, this means that they have come to return these videos to the shop. Then the front-end officer would check the rental list to see whether they are overdue videos or not. If they are overdue, the front-end officer calculates the fine for those customers; then they have to pay the fine to the financial officer, and obtain their receipts. Possibly, both customers who have to pay fines and who do not to pay fines would rent more videos, thus they take them to the front-end officer. He/she



writes these videos on the customer lists with the date they must return back to the shop. Also he/she calculates the cost for them. Then the customers pay the fee to the financial officer, and obtain their receipts. Then the transaction is ended. On the other hand, the customers do not want to rent more videos; the transaction is also ended in this case.

In the case that the customers do not come to return the videos, they come only to rent videos. If they do, they take the videos to the front-end officer; then he/she calculates the fee for them. They must pay the fee to the financial officer, and get their receipt; then the transaction is completed. However, the customers may not have interest in any video right now, so they do not obtain anything from the shop; the transaction is again completed.

To keep customer rental information, the shop is using a rental transaction form for each customer. This form keeps the customer name, his/her member number, and the record of all video that have been rented by that customer. It also tracks dates that the customer rents and returns. This rental transaction's form can be seen in Figure 3.5.

The following, Figure 3.6, shows the style of a member card that each customer brings to the YOU'RE WELCOME Video Rental Shop in order to be able to rent any video. This card is easily made of hard paper with printing all information upon it. It is laminated before giving it to the customer.

As mentioned earlier, the customers might pay either or both the rental fee and the fine; thus, the shop must generate receipts for them. For fee payment, the financial officer writes all details on the receipt. This means that if that fee is for customer registration, the receipt consists of the date, membership cost, tax, and total cost. If that fee is for rental transaction, the receipt consists of the date, video name(s), video cost (s), tax, and total cost. On the other hand, if the customer pays for a fine, the receipt

S/N	<div></div>
Date	<div></div>
Customer Information	
Name: -	<div></div>
Address:	<div></div>
	<div></div>
	<div></div>
Telephone Number:	<div></div>
Sex:	<div></div>
Date of Birth:	<div></div> (dd/mm/yy)
<div></div>	
Customer Signature	

Figure 3.3. The Current Customer Registration Form.

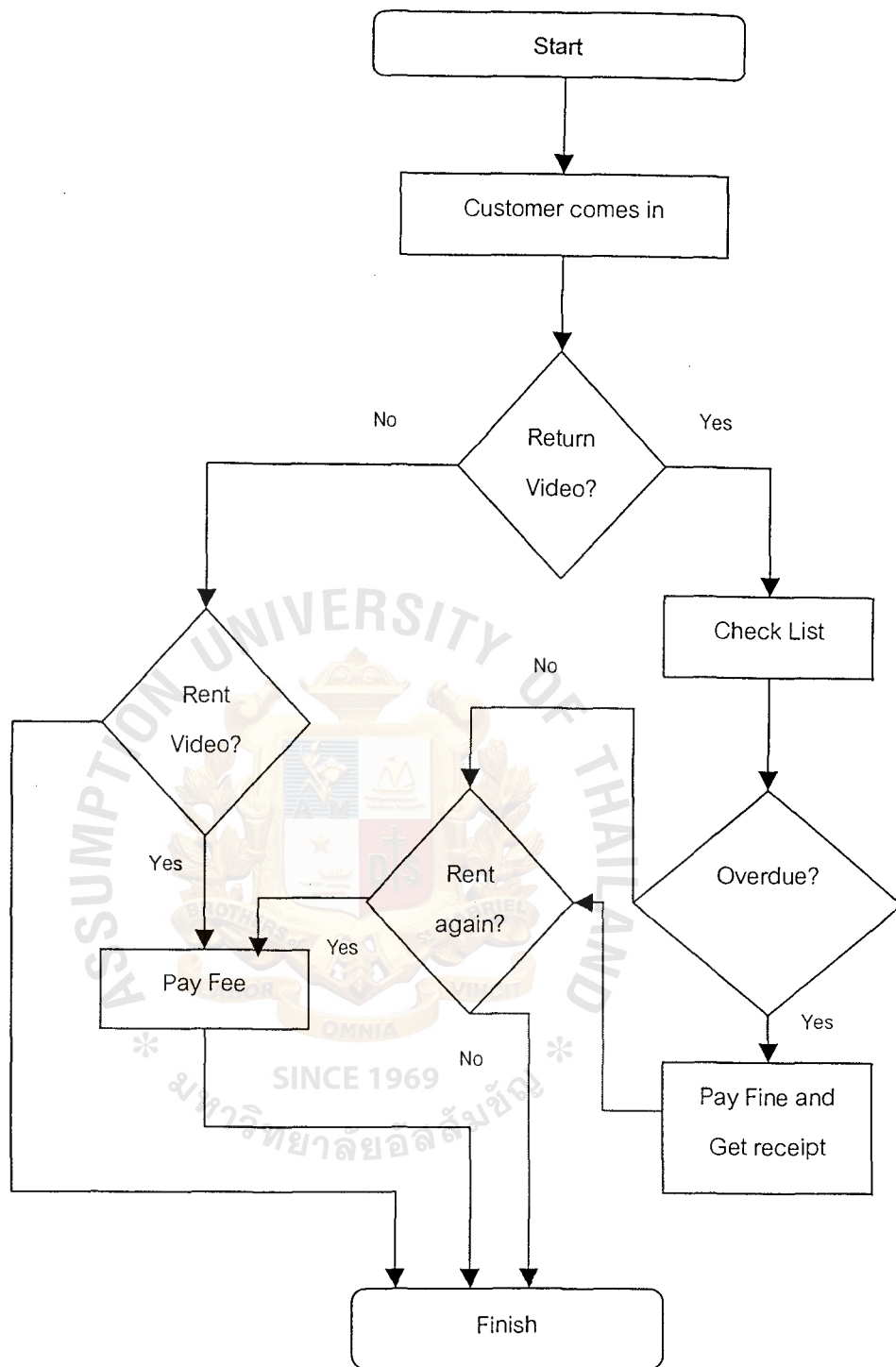


Figure 3.4. The Current Flowchart of the Rental Transaction System.

S/N

Name \_\_\_\_\_

Video Rental Information

	Rent Video	Rent Date	Return Date
1		/ /	/ /
2		/ /	/ /
3		/ /	/ /
4		/ /	/ /
5		/ /	/ /
6		/ /	/ /
7		/ /	/ /
8		/ /	/ /

Page 1

Figure 3.5. The Current Rental Transaction Form.

YOU'RE WELCOME VIDEO

Name: \_\_\_\_\_

S/N: \_\_\_\_\_

Expire Date: \_\_/\_\_/\_\_

(Front)

MEMBERSHIPS CRITERIAS

1. Bring your card every time you come
2. Lost your card, cost 50 bahts for a new one
3. Please return videos in time
4. The shop can terminate this card

(Back)

Figure 3.6. The Current Customer Member Card.

consists of the date, fine cost, tax, and total cost. Although there are many types of payment, the shop is using only one receipt form. In other words, there is only one receipt form for all types of payment, but they consist of different details. The receipt form can be seen in Figure 3.7.

Currently, the shop owner can buy this invoice type from every wholesaler store,

such as Macro Wholesaler Store. The financial officer concludes the revenue that the shop has gained at the end of each day to a summary report. Also at end of each month, the total revenues are calculated to the end of the summary report. Then the owner of the shop uses this report in order to assess the situation of the YOU'RE WELCOME Video Rental Shop. The summary report can be seen in Figure 3.8.

INVOICE		
DATE ____/____/____		
NO.	Detail	Cost

Figure 3.7. The Current Receipt Form.



## SUMMARY REPORT

DATE	TOTAL (BAHTS)
__/__/__	
__/__/__	
__/__/__	
__/__/__	
__/__/__	
__/__/__	
__/__/__	
__/__/__	

PAGE 1

Figure 3.8. The Current Summary Report.

The following is the current shop layout of the YOU'RE WELCOME Video Rental Shop, Figure 3.9. This figure depicts the obvious picture of the shop operations. The customers, for example, walk into the shop to find the desired movies upon the shelves. Then they bring those movies to the front-end officer in order to pay their rental fee and to maintain the records. Finally, the financial officer generates receipts for them.

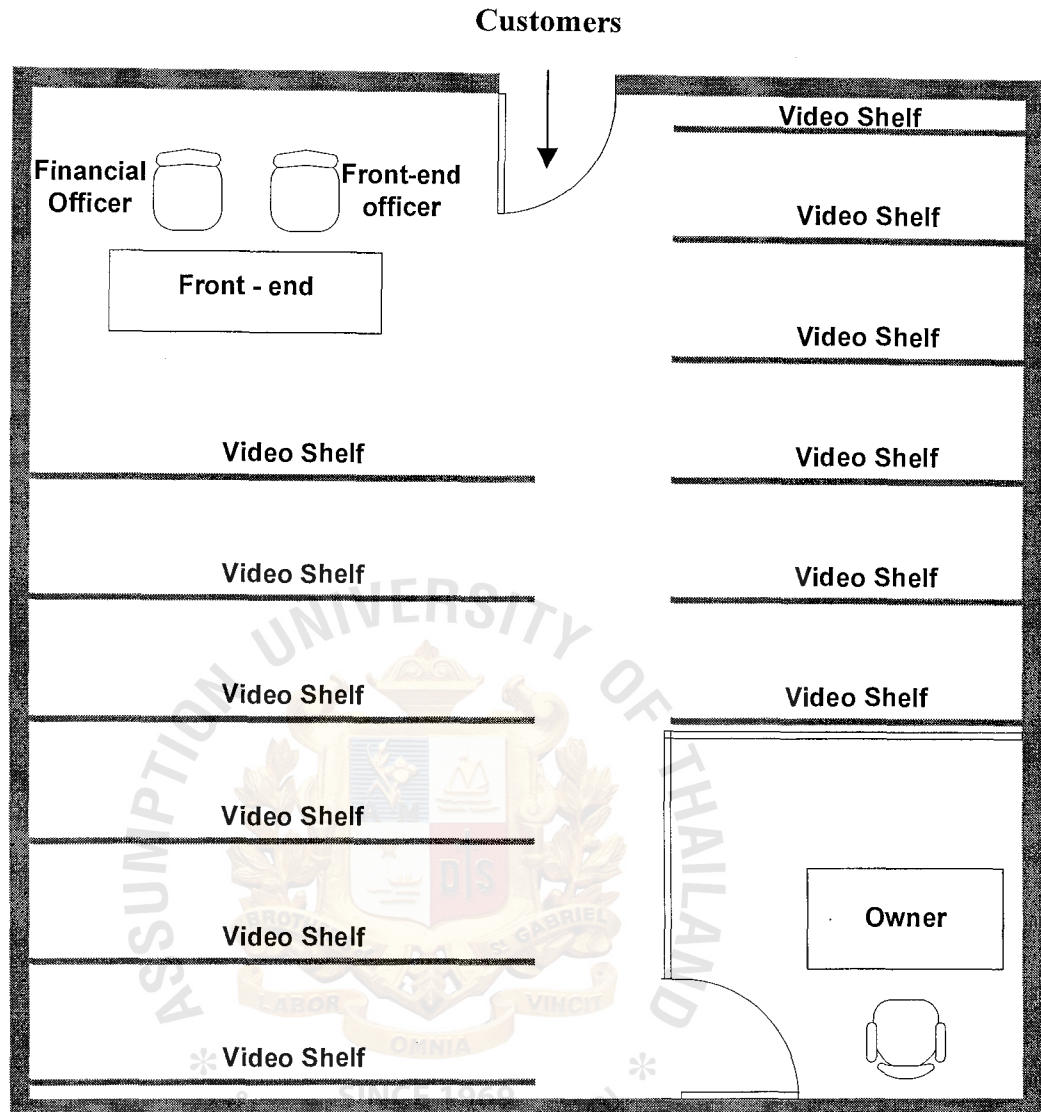


Figure 3.9. The Current Shop Layout.

As a conclusion, the current systems for YOU'RE WELCOME Video Rental Shop are working manually. This means that all activities occurring within the shop are operated manually. Moreover, all reports are generated by hand.

### 3.2 Problems on the Current System

In order to be competitive in this business, the owner of the shop finds out that there are some flecks on this kind of operation, which are as following:

- (1) Because of manual operations, the customers somehow need to be in the long queue.
- (2) All information of videos, customers' profiles, etc are collected manually; therefore, it sometimes causes errors on them.
- (3) For standalone shop as YOU'RE WELCOME Video Rental Shop, the customers are tied to one shop only.
- (4) The shop nowadays has only videos in type of tapes; thus, the shop cannot sufficiently respond to the customers' needs such as Video CD (VCD), Digital Video CD (DVD), Laser Disc.
- (5) The shop does not have contact with the bank for any credit card payment, so the customers must pay in cash every rental time.
- (6) The shop itself does not have its own parking lot; therefore, this is uncomfortable to the customers.

All mentioned problems can cause customer dissatisfaction, and can cause the bankruptcy to the business. The owner of the shop decides to adjust and to develop the system in order for survival and to be competitive in this business. He/she starts to keep all requirements from his/her team, and from the customers. These requirements will be used to design the new system for the YOU'RE WELCOME Video Rental Shop; this topic is in Chapter 4.

#### IV. VIDEO RENTAL SYSTEM (VRS)

Video Rental System or VRS is a computerized system that is designed to use for the YOU'RE WELCOME Video Rental Shop. According to the flecks of the current system, this system is designed and developed to solve those problems by using system development life cycle (SDLC) technique.

##### 4.1 Identifying the Problems, Opportunities, and Objectives

In order to create the new system, Video Rental System, the shop owner figures out problems in the current system (previously mentioned at the end of the chapter 3). The new system must solve all these flecks. Again, the problems that the shop owner mentioned are:

- (1) Because of manual operations, the customers somehow need to be in the long queue.
- (2) All information of videos, customers' profiles, etc are collected manually; therefore, it sometimes causes errors on them.
- (3) For standalone shop as YOU'RE WELCOME Video Rental Shop, the customers are tied to one shop only.
- (4) The shop nowadays has only videos in the form of tapes; thus, the shop cannot sufficiently respond to the customers' needs such as Video CD (VCD), Digital Video CD (DVD), Laser Disc.
- (5) The shop does not have contact with the banks for any credit card payment, so the customers must pay in cash every rental time.
- (6) The shop itself does not have its own parking lot; therefore, this is uncomfortable to the customers.

After defining the problems that the current system is facing, the shop owner finds that since the economic situation is in crisis, and the price of cable television has

increased, most people have been saving their expenses by watching movies at home. This means that people seem to rent videos more and more because the price is cheaper. Also they can freely select movies they would like to see. Thus the shop owner decides that YOU'RE WELCOME Video Rental Shop system must be redesigned. However, there are many video rental shops available, so the shop owner needs to make his/her new system outstanding to the customers. He/she first sets up the objectives of having the new system so he/she knows the direction of developing this new system. The objectives of the new system are: -

- (a) Reducing the slow services to the customers
- (b) Reducing the use of paper (reducing cost)
- (c) Gaining more customer satisfaction
- (d) Gaining a more competitive edge within this business

#### **4.2 Determining Information Requirements**

At first, the shop owner has designed people who will be involved in the shop operation. Because he/she is going to use a computer and franchise system for the new shop operational system; thus, he/she must have someone being able to take care of the computer system and computer programming. Also he/she must have someone being able to convince and negotiate with clients – people who need to buy the franchise. As a result, the shop owner designs that he/she should have the following officers within the head office:

- (1) The shop owner
- (2) The front-end officer
- (3) A programmer
- (4) A computer officer
- (5) A marketing connector

Figure 4.1 as following shows a new organization chart for YOU'RE WELCOME Video Rental Shop. However, it is the organization designed for YOU'RE WELCOME Video Rental Shop head office. Here, there is a programmer, a computer officer, and a marketing connector in order to take care and maintain the Video Rental System, and in order to preliminarily inform and convince the clients to buy this system. This group of people will not be within a client's shop, called a franchisee, because all franchisees would already be provided all services by the head office. Therefore, the client's shop will consist of two people to operate all tasks within the shop: an owner and a front-end officer.

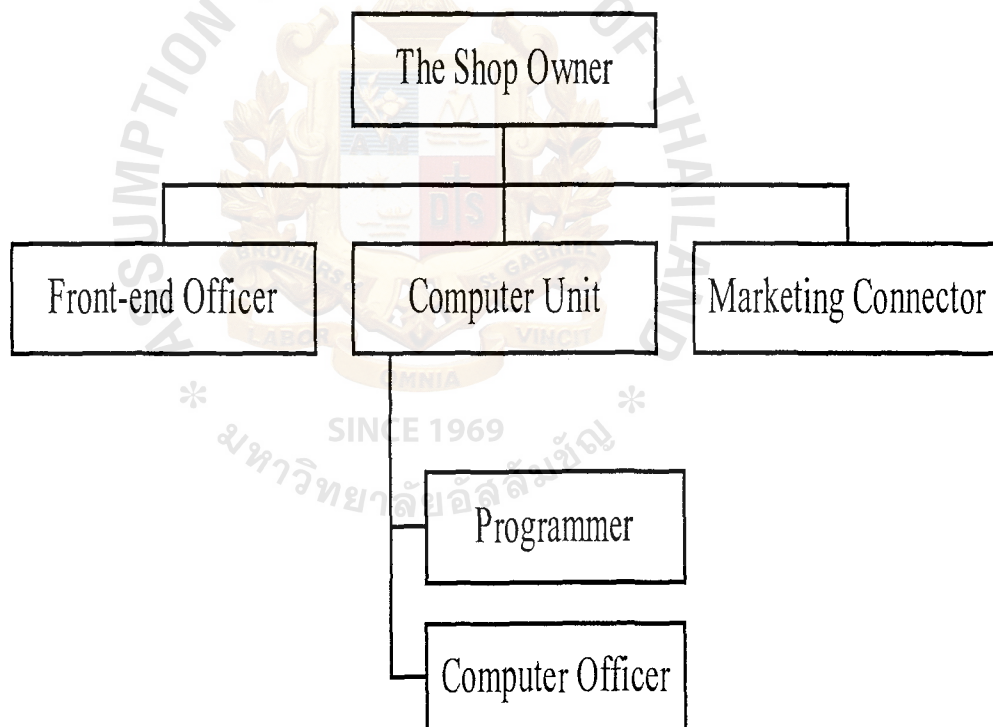


Figure 4.1. The New Organization Chart for the Head Office Shop.

Figure 4.2 as following shows the organization chart for the clients or franchisees



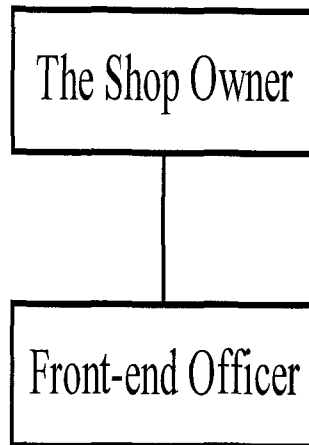


Figure 4.2. The New Organization Chart for the Franchisee or Client Shop.

#### 4.2.1 Job Descriptions of the Head Office

##### The shop owner

- (1) Controls all activities within the shop.
- (2) Checks all financial statement occurring in the shop.
- (3) Contacts with video suppliers.
- (4) Coordinates with a marketing connector to design a marketing plan.
- (5) Services and informs the customers.
- (6) Generates daily reports.

##### The front-end officer

- (1) Keeps all customer information.
- (2) Keeps customer records.
- (3) Adds and edits customer information.
- (4) Services and informs customers.
- (5) Collects money – fees, fines, and rent costs – from the customers.
- (6) Generates receipts for the customers.

The programmer

- (1) Designs and develops the Video Rental System.
- (2) Implements the Video Rental System.
- (3) Tests the Video Rental System.
- (4) Maintains the Video Rental System.
- (5) Coordinates with the computer officer to determine hardware and software requirements.

The computer officer

- (1) Designs and sets up the network layout.
- (2) Tests the network system.
- (3) Maintains the network system.
- (4) Coordinates with the programmer to determine hardware and software requirements.

The marketing connector

- (1) Develops the strategies in order to convince the clients to buy the Video Rental System.
- (2) Coordinates with the shop owner to design the marketing plan.
- (3) Develops the marketing plan.
- (4) Implements the marketing plan to the clients.

#### 4.2.2 Job Descriptions of the clients

The shop owner

- (1) Controls all activities within the shop.
- (2) Checks all financial statement within the shop.
- (3) Contacts with the shop owner of the head office for any movie and video issues.

- (4) Contacts with the marketing connector of the head office for any marketing plan.
- (5) Services and informs the customers.

The front-end officer

- (1) Keeps all customer information.
- (2) Keeps all customer records.
- (3) Adds and edits customer information.
- (4) Services and informs the customers.
- (5) Collects money – fees, fines, and rent costs – from the customers.
- (6) Generates receipts for the customers.

To solve problems mentioned in the current system, the shop owner tries to figure out what kind of system his/her employees would like to have, and what kind of system the customers prefer. He/she interviews his/her employees in order to gain more user requirements; also he/she interviews some customers to gain customer requirement suggestions.

All these requirements help the shop owner to analyze how the new system will be designed. This means that the new system will solve all problems in the current system.

#### 4.2.3 Users' Requirements

- (1) The new system must be easy to understand and to use.
- (2) The new system must be able to assist the users to track all information easily.
- (3) The new system must satisfy the customer's requirements, such as fast services and movie information.
- (4) The new system must provide reports, which each group of users needs,

such as daily reports.

- (5) The new system must be YEAR 2000 compliant.

#### 4.2.4 Customer Requirements

- (1) The new system must provide fast services.
- (2) The new system must make customers find videos and movie information easily.
- (3) The new system must calculate all costs correctly.

Together with the computer officer and a programmer, the shop owner designs new flows of operation. They still have two operations similar to the current system: the customer registration, and the rental transaction system. These systems can be described by using a system flowchart and a data flow diagram, which are both in the next section: designing, developing, and documenting the new system.

### 4.3 Analyzing, Designing, Developing, and Documenting the New System

The team developer uses system flowchart and data flow diagram to analyze and design the new system, the Video Rental System.

#### 4.3.1 Describing Systems by Using a System Flowchart

Figure 4.3 below shows the customer registration system. This system is similar to the current system of YOU'RE WELCOME Video Rental Shop. However, the new system uses computers to operate all tasks. From the figure, if the customers coming in the shop do not have member cards, and they also would like to be shop members, the front – end officer collects their information for the new system, VRS, then generates the member cards for them. Afterwards, he/she collects member fees from the customers, and prints them receipts, which is shown in Figure 4.4, Figure 4.5, and Figure 4.6.

Figure 4.4 – Figure 4.5 as mentioned shows the receipt that VRS itself generates

for customers after they apply for the shop's memberships. Figure 4.5 shows the receipt generated for customers after they rent videos from the shop. At last, Figure 4.6 shows the receipt generated for customers if their rental videos are overdue.

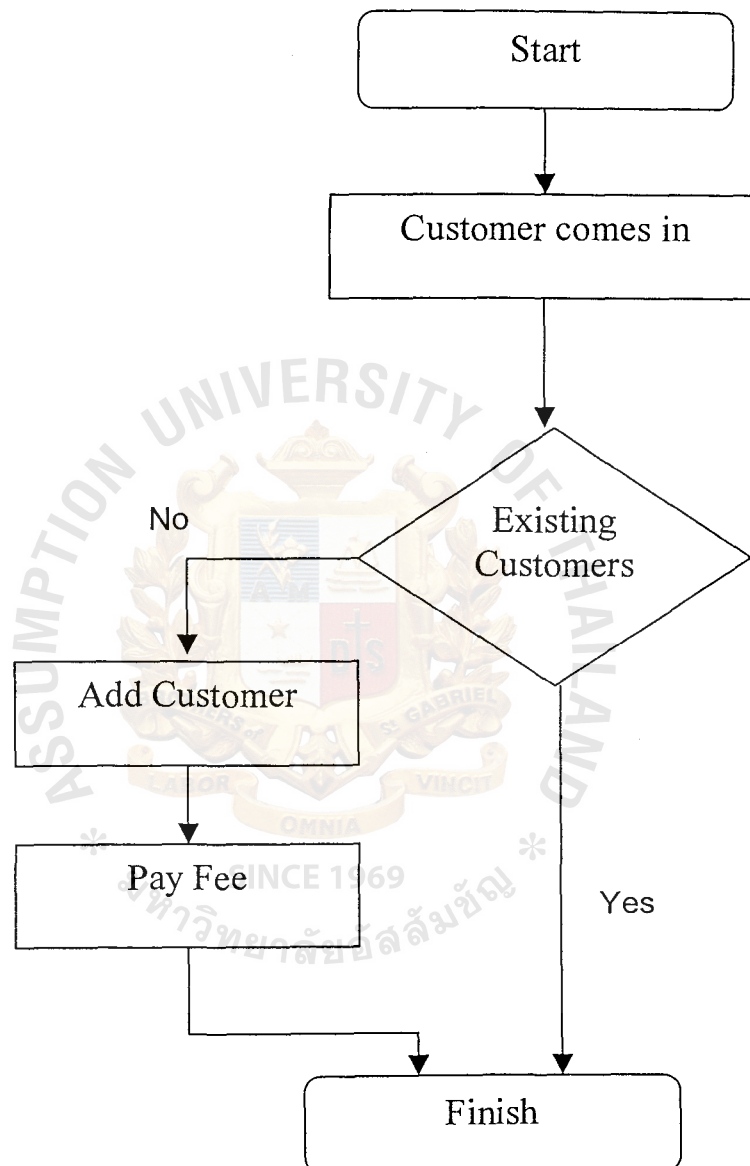


Figure 4.3. The Flowchart of the Customer Registration.

Figure 4.4, Figure 4.5, and Figure 4.6 show the receipt generated for customers. To add the new customers, they do not need to fill out an application, see the system

manual in Appendices D and E. This is because the customers themselves can use a shop's computer to apply for a membership directly, called an electronic application.

INVOICE NUMBER		
DATE __/__/__		
<b>YOU'RE WELCOME Video Rental Shop</b>		
<TAX ID>		
<BRANCH NAME>		
<ADDRESS>		
<PHONE NUMBER>		
MEMBER CODE	MEMBER NAME	COST
TAX (7%)		
TOTAL		
(BAHTS)		

Figure 4.4. The Customer Receipt for New Members.



TRANSACTION NUMBER

DATE \_\_/\_\_/\_\_

YOU'RE WELCOME Video Rental Shop

<TAX ID>

<BRANCH NAME>

<ADDRESS>

<PHONE NUMBER>

<CUSTOMER CODE AND CUSTOMER NAME>

RENTAL COST

VIDEO CODE	VIDEO NAME	COST
VIDEO CODE	VIDEO NAME	COST
VIDEO CODE	VIDEO NAME	COST
VIDEO CODE	VIDEO NAME	COST

TAX (7%)

TOTAL (BAHTS)

Figure 4.5. The Customer Receipt for Rental Transactions.

INVOICE NUMBER

DATE \_\_/\_\_/\_\_

YOU'RE WELCOME Video Rental Shop

<TAX ID>

<BRANCH NAME>

<ADDRESS>

<PHONE NUMBER>

<CUSTOMER CODE AND CUSTOMER NAME>

OVERDUE COST

VIDEO CODE	VIDEO NAME	COST
VIDEO CODE	VIDEO NAME	COST
VIDEO CODE	VIDEO NAME	COST
VIDEO CODE	VIDEO NAME	COST
VIDEO CODE	VIDEO NAME	COST
		TAX (7%)
		TOTAL (BAHTS)

Figure 4.6. The Customer Receipt for Overdue Transactions.

The customers can key in this application by themselves. However, the shop still provides the customers with a paper application, Figure 4.7. This kind of application will be used when the customers cannot type, or when there are many people applying for membership. Then the front-end officer will key in their information to the system. After either the customers or the front-end officer keys in the electronic application, the front-end officer will generate the customer member cards, Figure 4.8. This card shows the customer's name, his/her card number (barcode), his/her expiration date, and the shop's rules. The developer team uses the standard barcode EAN 128 to develop all barcode. Moreover, this barcode will be used on all videos as well.

For the rental transaction system, in Figure 4.9, it is also similar to the current system. However, this system is a computerized system. This means that instead of the manual operation, all operational people use computers to operate jobs such as creating a customer's rental record, generating customer receipts, and so on. This system starts when the customers come in the shop. If the customers would like to return videos, the front-end officer would first check their member cards and then review the database whether their videos are overdue or not. If they are overdue, the customers must pay fine to the cashier; the cashier will generate receipts to them. If not, the customers just return the videos to the front-end officer. Then if the customers do not need to rent more videos, the transaction is completed. On the other hand, if the customers would like to rent more videos, they bring these videos together with their member cards to the front-end officer in order to update their rental records. Afterwards, he/she collects their rental fee, and gives them receipts; then the transaction is completed. In the case that the customers do not have videos to return, they may rent videos or may not rent if the shop does not have the videos available that they are interested in. Thus, if they do not rent videos, the transaction is completed.

Date     \_\_\_/\_\_\_/\_\_\_

**Customer Information**

**Name:** - \_\_\_\_\_

**Address:** \_\_\_\_\_

\_\_\_\_\_

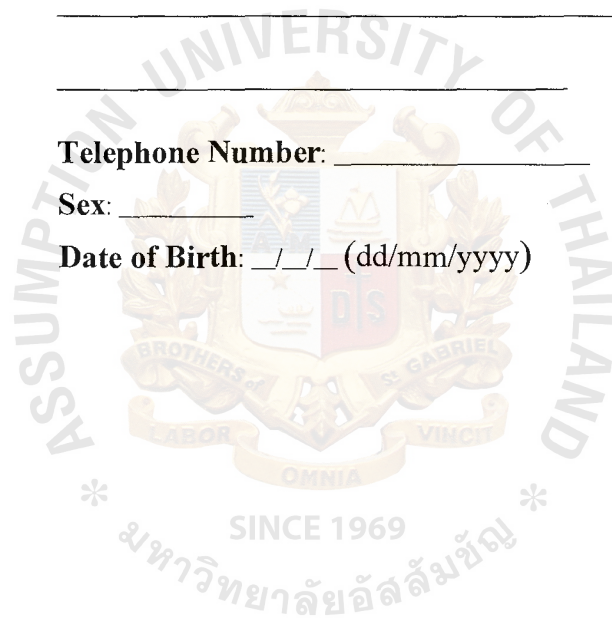
\_\_\_\_\_

\_\_\_\_\_

**Telephone Number:** \_\_\_\_\_

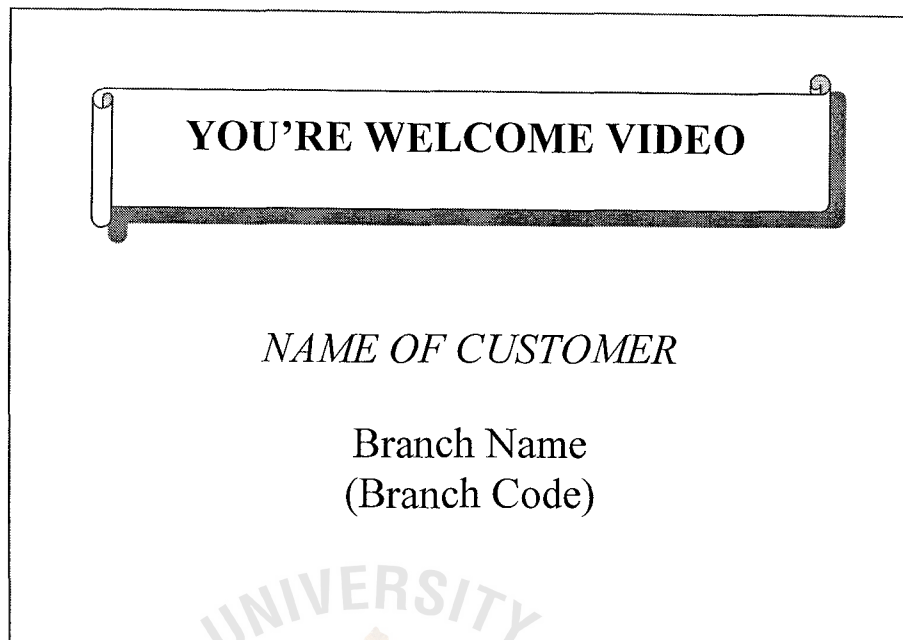
**Sex:** \_\_\_\_\_

**Date of Birth:** \_\_\_/\_\_\_/\_\_\_ (dd/mm/yyyy)



Customer Signature

Figure 4.7. The Customer Registration Form.



(FRONT)



(BACK)

Figure 4.8. The Customer Member Card.

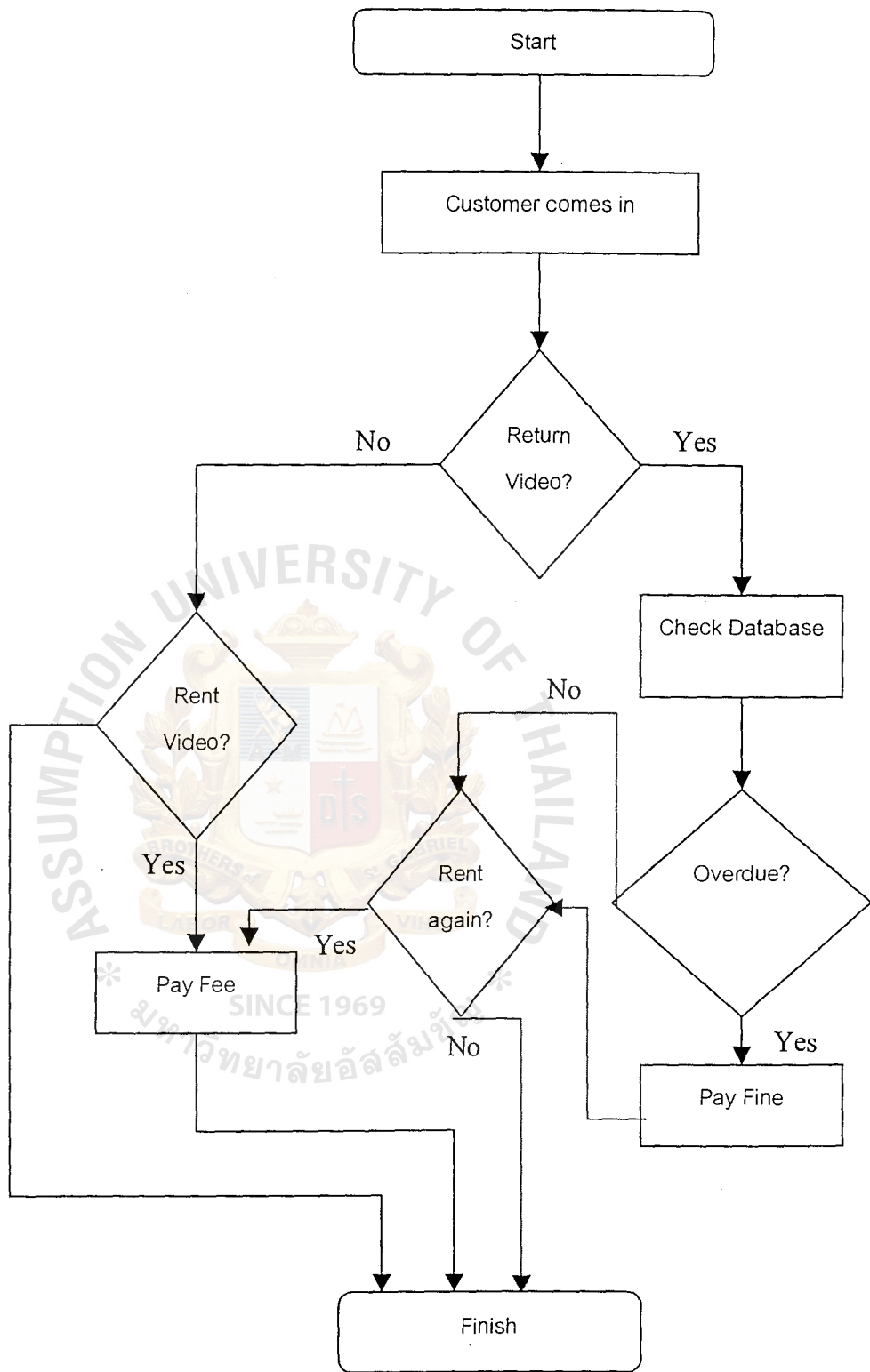


Figure 4.9. The Flowchart of the Rental Transaction System for Video Rental System.



If they rent videos, they will bring these videos to the front-end officer to update their rental records; the cashier, afterwards, collects their rental fee and prints them receipts; then the transaction is completed.

#### 4.3.2 Describing the Value-Added Transaction

To create transaction for the Video Rental System, the front-end officer, within either the head office shop or the client's shop, can input data by either using a barcode reader or by typing the code number on a keyboard. Each rented video means one transaction. Therefore, for example, if a customer rents three videos, there are three transactions. Each video usually can be rented for two days. However, there are gimmicks for the customers as following:

- (1) If a customer rents videos not more than two tapes/CDs per time, he/she can rent them for two days as usually.
- (2) If a customer rents videos more than two but not more than five tapes/CDs per time, he/she can rent them for three days.
- (3) If a customer rents videos more than five but not more than ten tapes/CDs per time, he/she can rent them for five days. In this case, the customer can also rent one more video for free, as a bonus. This means that every customer can get one more free video for every ten tapes/CDs. However, these gimmicks are not fixed. In the case a customer rents more than ten tapes/CDs, for example, the return date can be changed manually into the system. Thus, the customer can rent videos for more than five days. Also the bonus can be adjusted manually if the shop owner would like to give special production to the customer.

#### 4.3.4 Describing the systems by using the Data Flow Diagrams (DFDs)

- (1) Context Data Flow Diagram

Figure 4.10 illustrates an overview picture of the whole system. It shows all entities involved with the head office shop. However, each entity has many relationships with the head office so that within the Figure 4.10, it cannot show all relationships. Thus all relationships are shown in the following figures.

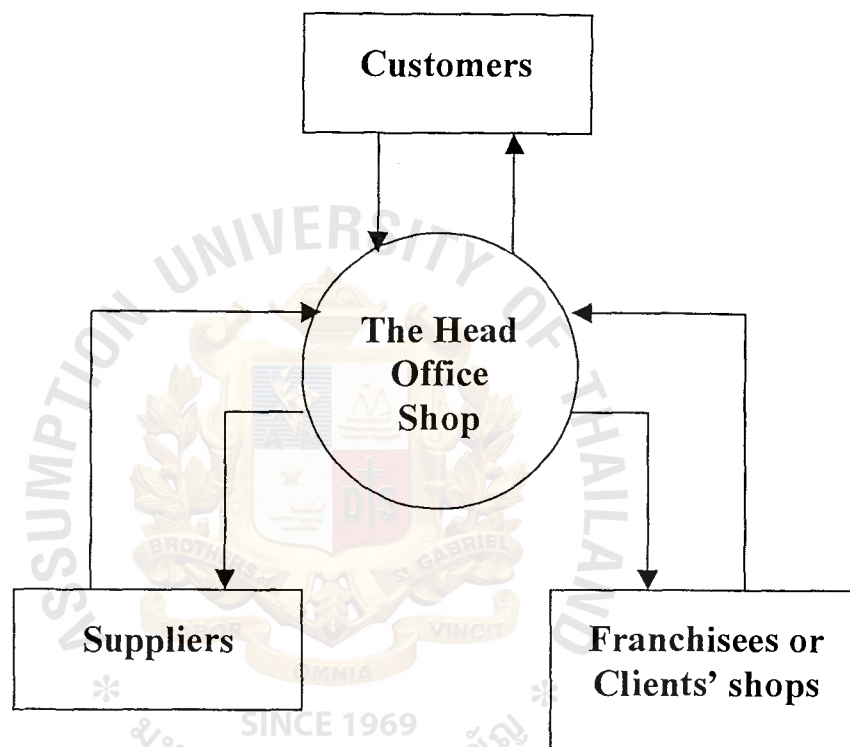


Figure 4.10. The Overview Picture of the Context Data Flow Diagram.

Figure 4.11 depicts the picture of the system between the head office shop (the Video Rental System) and the clients' shops by using the data flow diagram called a context data flow diagram. The franchisees or the clients' shop are called an entity.

The franchisees or clients need to buy our franchise, so the shop owner gives them the right to use the Video Rental System. Also they need

to pay for the system charge first. Then the programmer, the computer officer, and the marketing connector then start to setup the whole system to a client's shop: the Video Rental System and all computer components.

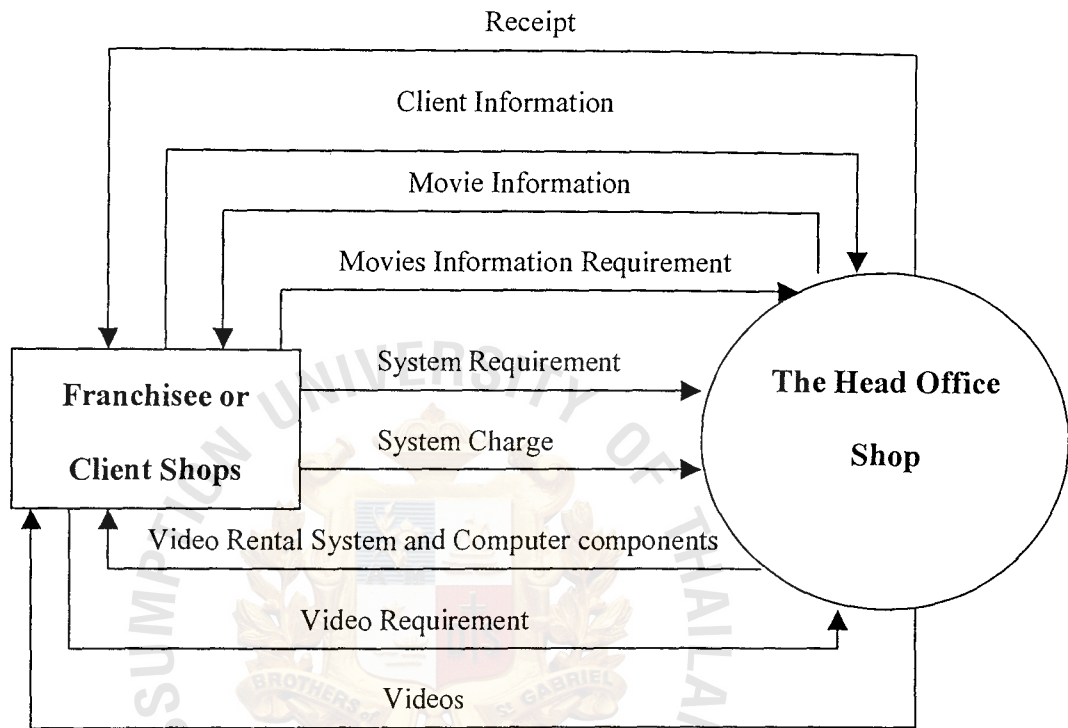


Figure 4.11. The Context Data Flow Diagram between the Head Office Shop and the Clients' Shops.

During the operation, if the clients would like to have both movie information and videos, they can request their needs to the head office shop's owner. He/she then contacts with the suppliers in order to retrieve that information and those videos, and distributes them to the clients required.

Figure 4.12 shows the relationships between the head office shop and the customers. At first each customer gives the shop his/her information.

Then the shop generates them a member card, which is used to rent videos. The customer therefore needs to pay for this fee to the shop, and the shop gives him/her a receipt. Now the members can rent videos or ask for any movie information from the shop. The members here need to pay for a rental cost and the shop generates receipts for them.

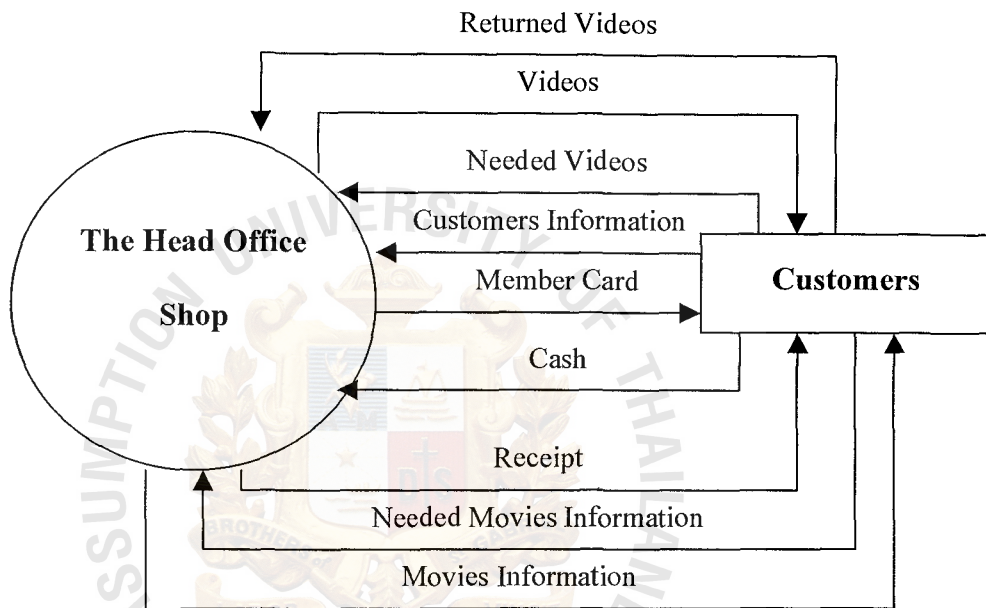


Figure 4.12. The Context Data Flow Diagram between the Head Office Shop and the Customers.

Then the members return those videos to the shop. If those videos are not overdue, the customers do not have to pay for any fine. On the other hand, the members need to pay for a fine if they are overdue.

Figure 4.13 shows the relationships between the head office shop and the suppliers. These suppliers will provide videos and movie information to the head office shop in order to arrange to the customers, and in order to distribute to the client shops. The head office here must pay for all costs to

the suppliers, and they generate the head office shop a receipt. Each supplier needs to give the head office shop its information such as the supplier's name, address, telephone number, and so on. This is kept in the suppliers' databases so that the head office shop and all client shops can use these databases to inform the customers.

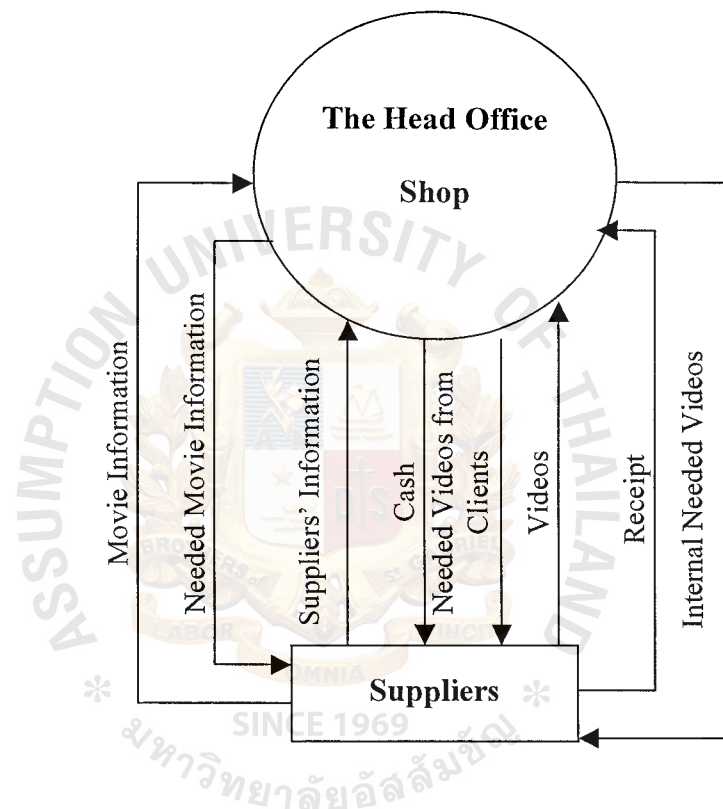


Figure 4.13. The Context Data Flow Diagram between the Head Office Shop and the Suppliers.

## (2) Logical Data Flow Diagram and Physical Data Flow Diagram

These diagrams are different from the context data flow diagram. The context data flow diagram shows the relationships of the system and all involved entities. It does not show how data and information move within the system to the entities and vice versa.

On the other hand, the logical and the physical data flow diagram show the data and information movement within the system, called processes. They are however different from each other. This is because the logical data flow diagram shows WHAT the system does, but the physical data flow diagram shows HOW the system works. In order to see more clearly, the following figures show the logical and the physical data flow diagrams for each context data flow diagrams mentioned above. For both the logical and the physical data flow diagram, there are eleven processes involved, which are:

- (1) Receive customer information
- (2) Create member card
- (3) Receive customer requirements
- (4) Receive cash and prepare receipt
- (5) Receive and distribute videos and/or movie information requirements
- (6) Check stock
- (7) Receive movie information
- (8) Receive supplier information
- (9) Receive client information
- (10) Develop / update Video Rental System
- (11) Pay expenses and receive receipts
- (12) Update databases
- (13) Upload information to the clients' databases

Figure 4.14 and Figure 4.15 show the data and information movement among processes within the system between the head office shop's system



and the clients' shops (see Figure 4.10). The difference between the Figure 4.14 and Figure 4.15 is the place to keep files. Figure 4.14 has many places to maintain, because each type of file is kept separately. On the other hand, Figure 4.15 has only one place to maintain, because all users see only one database.

Relationships between the head office system and the clients' shop involve processes:

- (a) Receive cash and prepare Receipt (4)
- (b) Receive and distribute videos and/or movies information requirements (5)
- (c) Receive client information (9)
- (d) Develop / update Video Rental System (10)

From Figure 4.14 and Figure 4.15, the clients are interested in the Video Rental System; thus they give their requirements and their information to the head office owner (ninth process). The head office officers – a programmer, a computer officer, and a marketing connector – start to setup the Video Rental System to the clients' shops (tenth process). The clients then have to pay for this franchised license to the head office shop. They receive receipts from the head office shop in turn (fourth process). At this point, the client shops must be ready to provide video rental services to the customers. Here the clients do not need to directly contact with the suppliers in order to request for videos and movie information. They instead request their requirements to the head office shop. The head office shop requests these requirements to the suppliers and receives videos and movies information from the suppliers. Then the head

office shop distributes these videos and movies information to the client shops.

However, the clients need to update their customer information, rental information, movie information, and franchise information or other client information everyday with the head office shop. This means that the clients have to upload their customer information and their rental information to the head office. On the other hand, the clients must update their customer information, their movies' information, and other franchise or client information. Thus, each client needs to download this information to his/her database.

Updating the databases to the head office shop and all client information is very necessary, because this system is a franchise system, in which the customers are able to use their member cards to rent videos to every YOU'RE WELCOME Video Rental Shop. Both uploading and downloading at the client shops are done by connecting through the modem. As the result of this updating, the head office team designs the additional context data flow diagram, the logical data flow diagram, and the physical data flow diagram as the following: Figure 4.16, Figure 4.17, and Figure 4.18.

Figure 4.16 shows what data and information needs to be updated for both the head office shop and the client shops. The next two figures, Figure 4.17 and Figure 4.18, show the processes of updating.

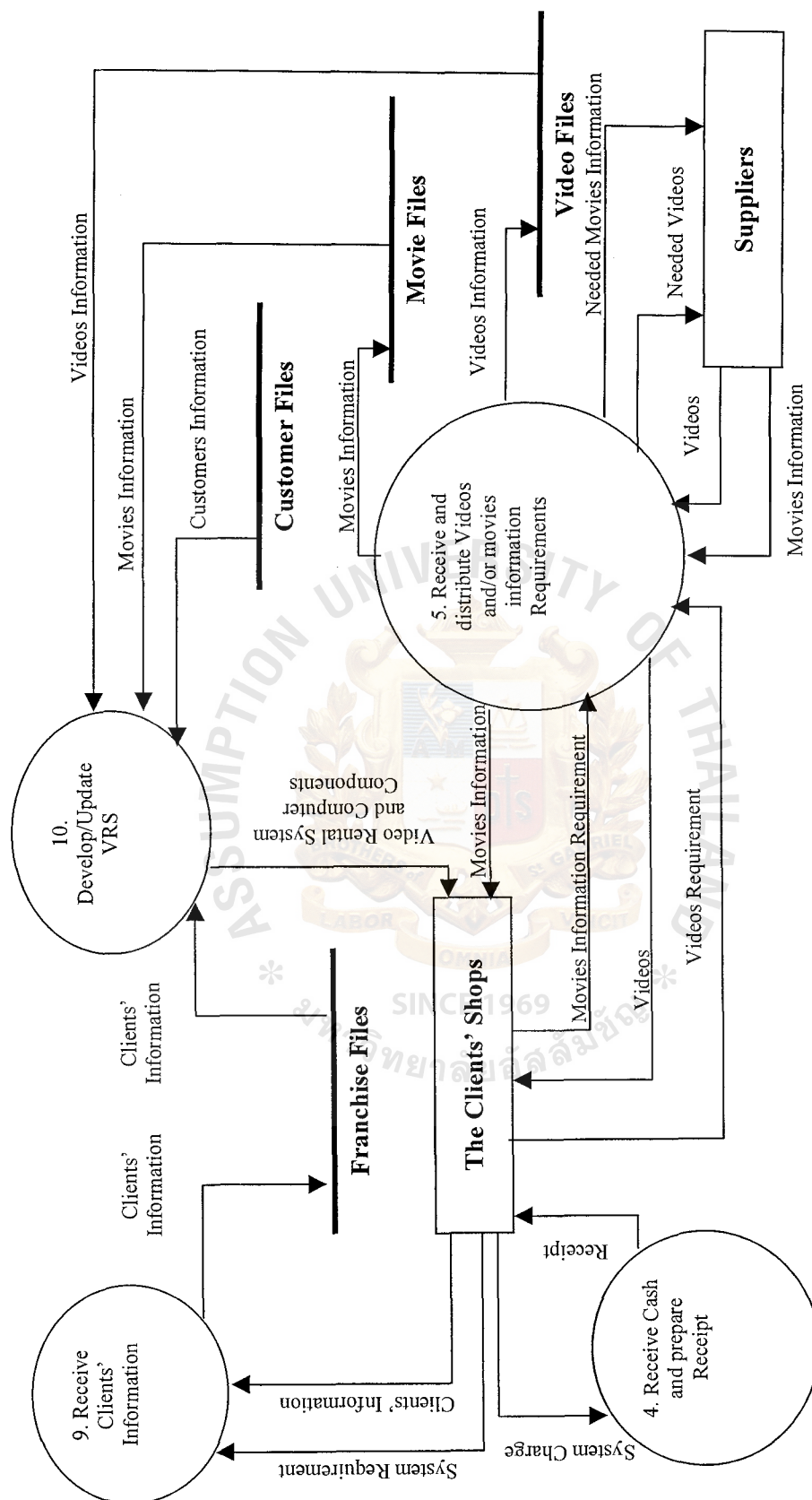


Figure 4.14. The Logical Data Flow Diagram between the Head Office Shop and the Client Shops.

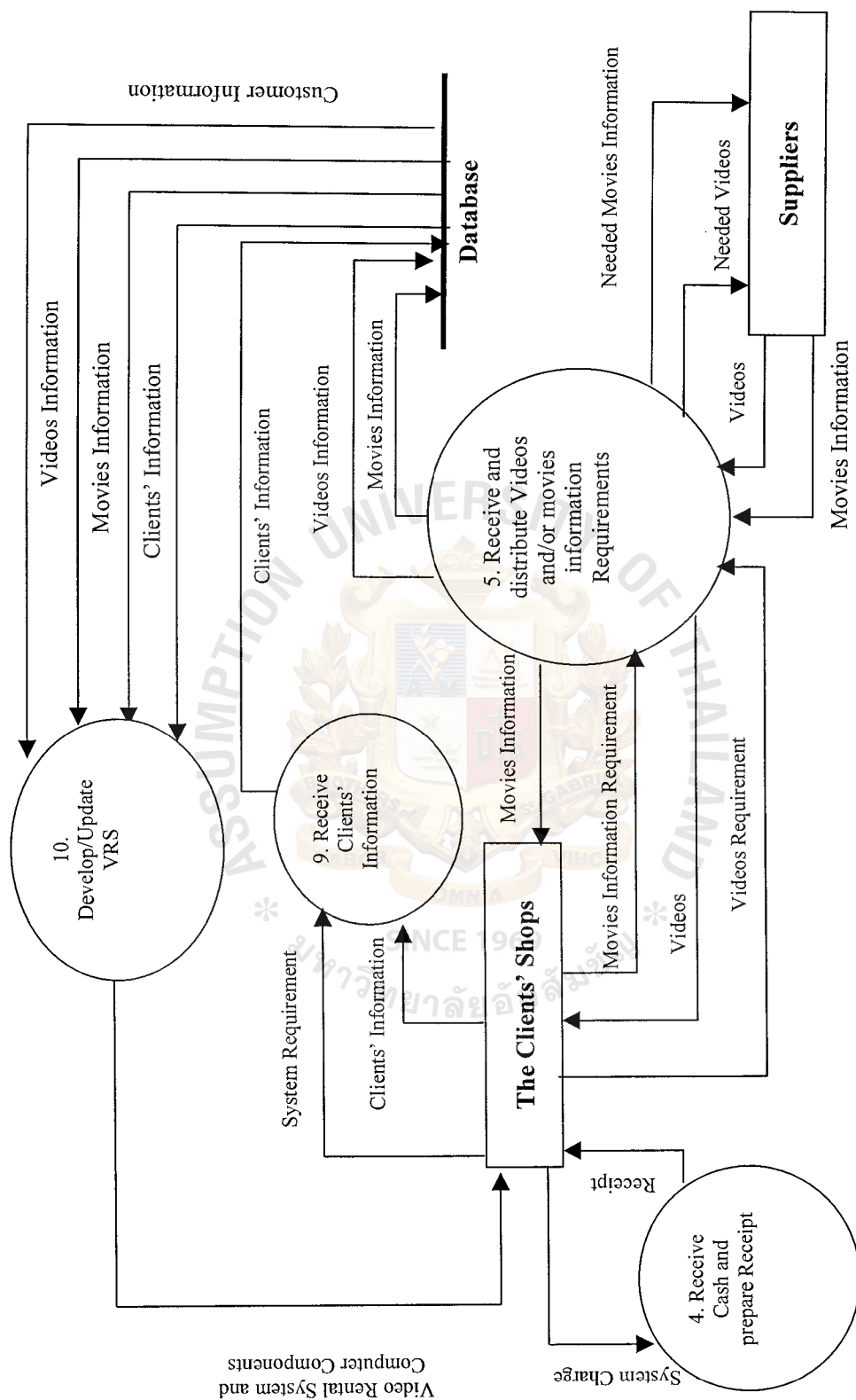


Figure 4.15. The Physical Data Flow Diagram between the Head Office Shop and the Client Shops.

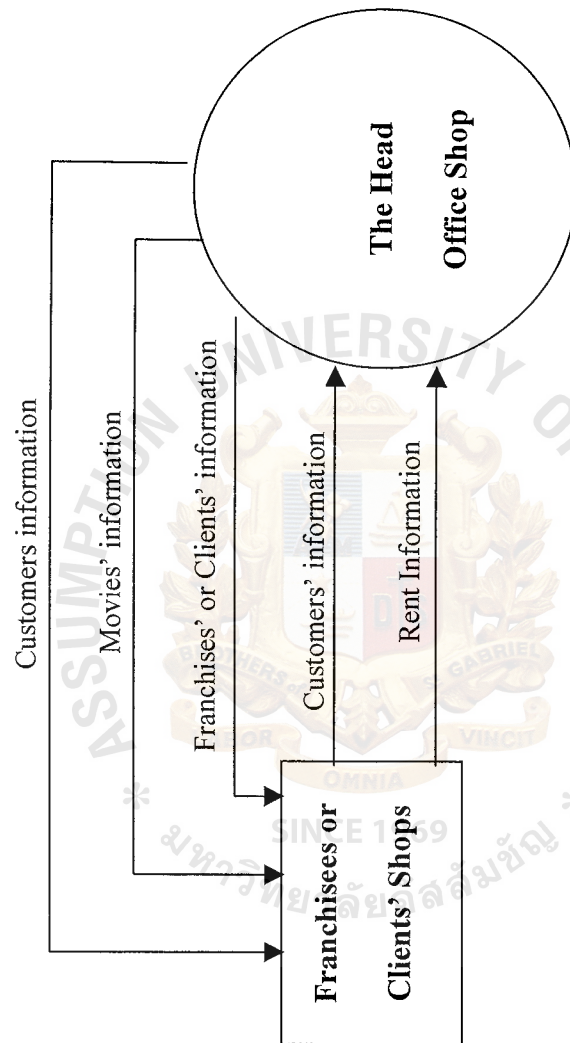


Figure 4.16. The Context Data Flow Diagram of Updating Databases between the Head Office Shop and the Client Shops.

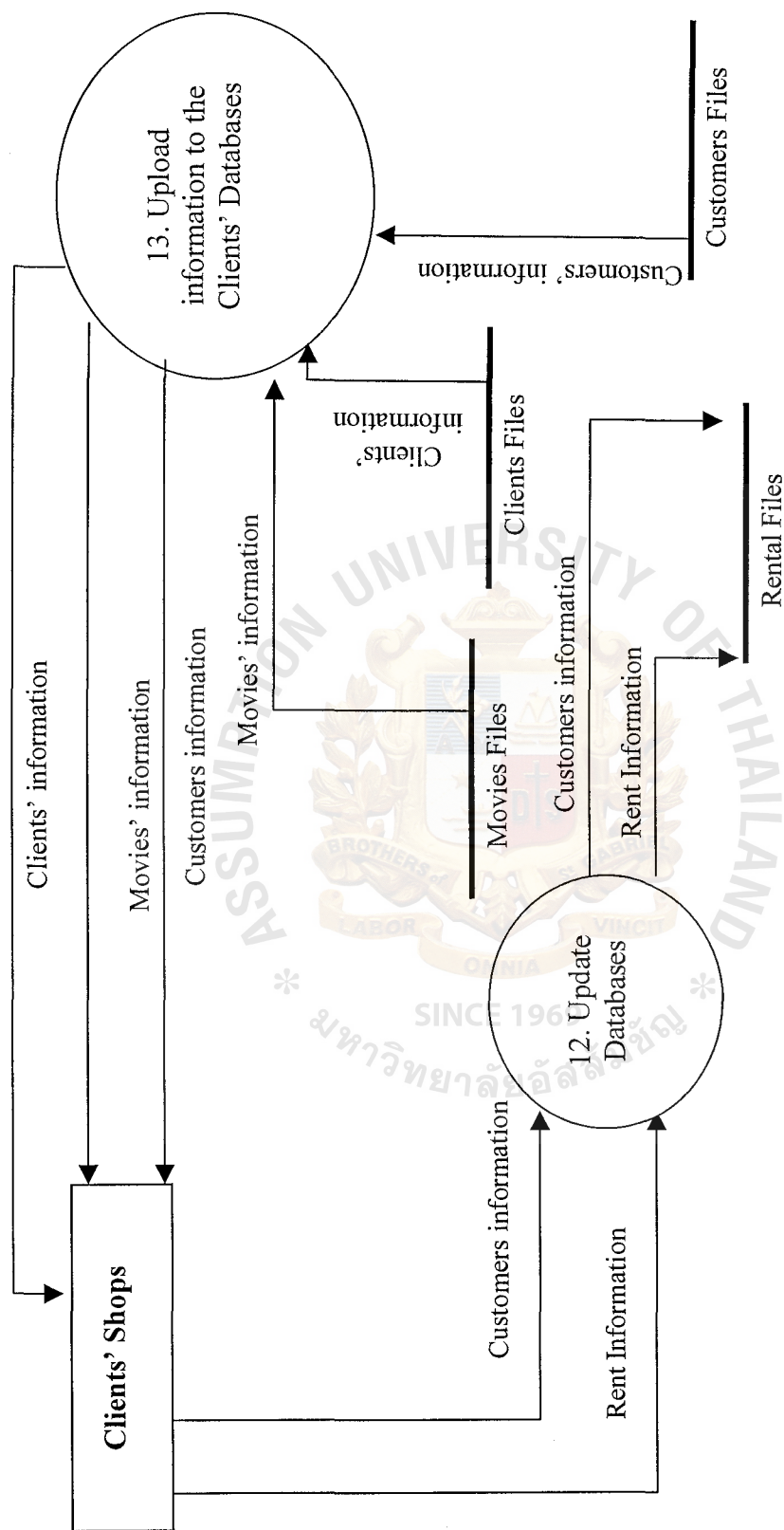


Figure 4.17. The Logical Data Flow Diagram of Updating Databases between the Head Office Shop and the Client Shops.



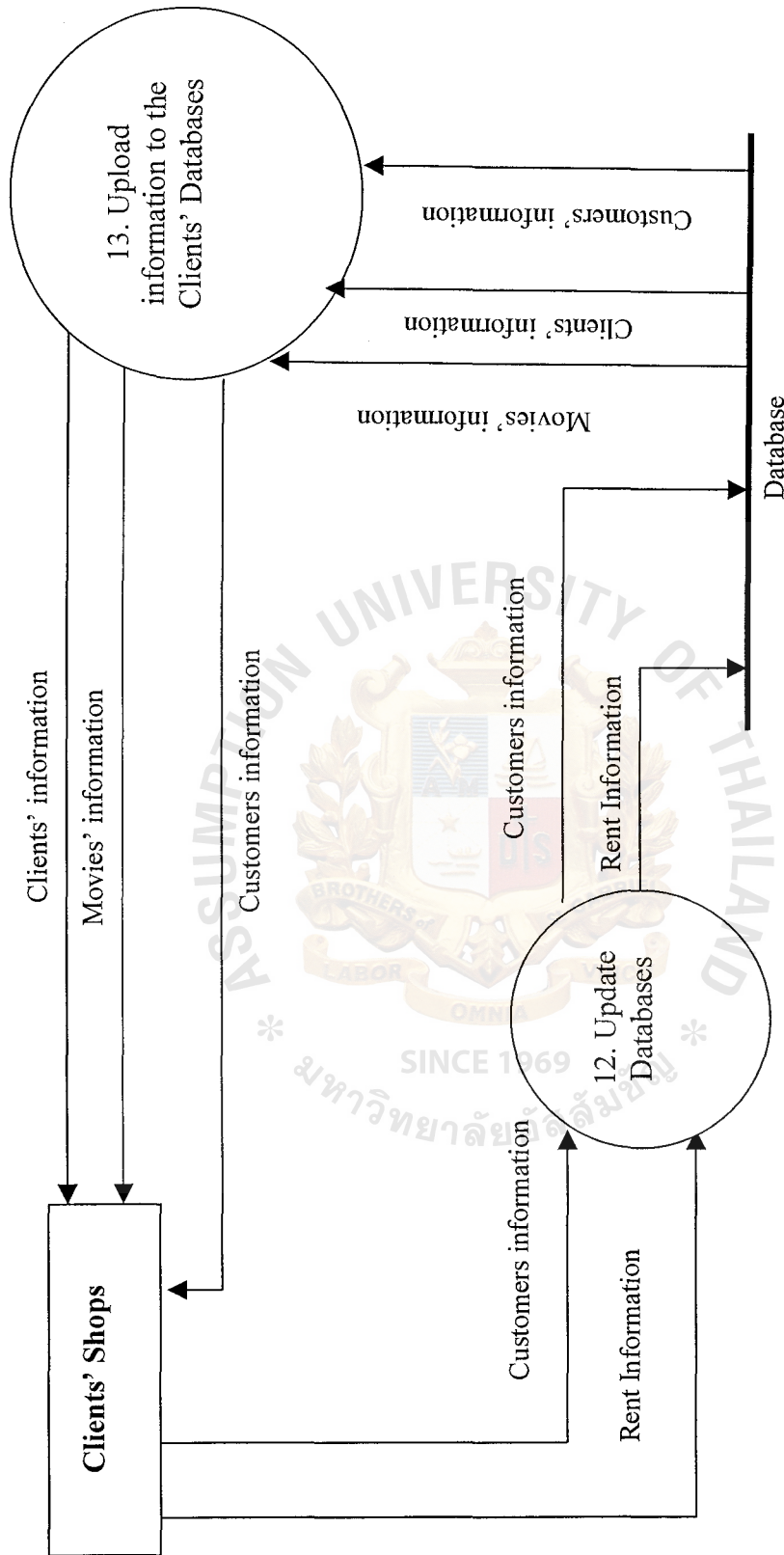


Figure 4.18. The Physical Data Flow Diagram of Updating Information between the Head Office Shop and the Client Shops.

Relationships between the clients and the head office in order to update the databases involve processes

- (a) Update Database (12)
- (b) Upload data and information to the clients' databases (13)

At first, the clients need to connect to the head office server by using the modem. After the connection, they can send their data and information to the head office. Concurrently, they receive data and information from the head office.

All data and information from the clients will be used for updating all customers; thus the customers can rent videos from every YOU'RE WELCOME Video Rental Shop. Other data and information from the clients will be used to evaluate the shops' performances and situations.

On the other hand, the clients will use data and information from the head office to provide to the customers. This means that the clients themselves do not need to maintain that data and information. The head office team maintains it in the server; the clients therefore can retrieve and update them online. This connection between the head office shop and the clients' shops is called the centralized computerized system. This is because the clients will mostly retrieve data and information from the head office into their workstation. Also they must update the head office databases by uploading their data and information to the head office databases. This can also be called Client/Server Networking. The following logical and physical data flow diagram, Figure 4.19 and Figure 4.20, shows the relationships between the head office shop and the customers.

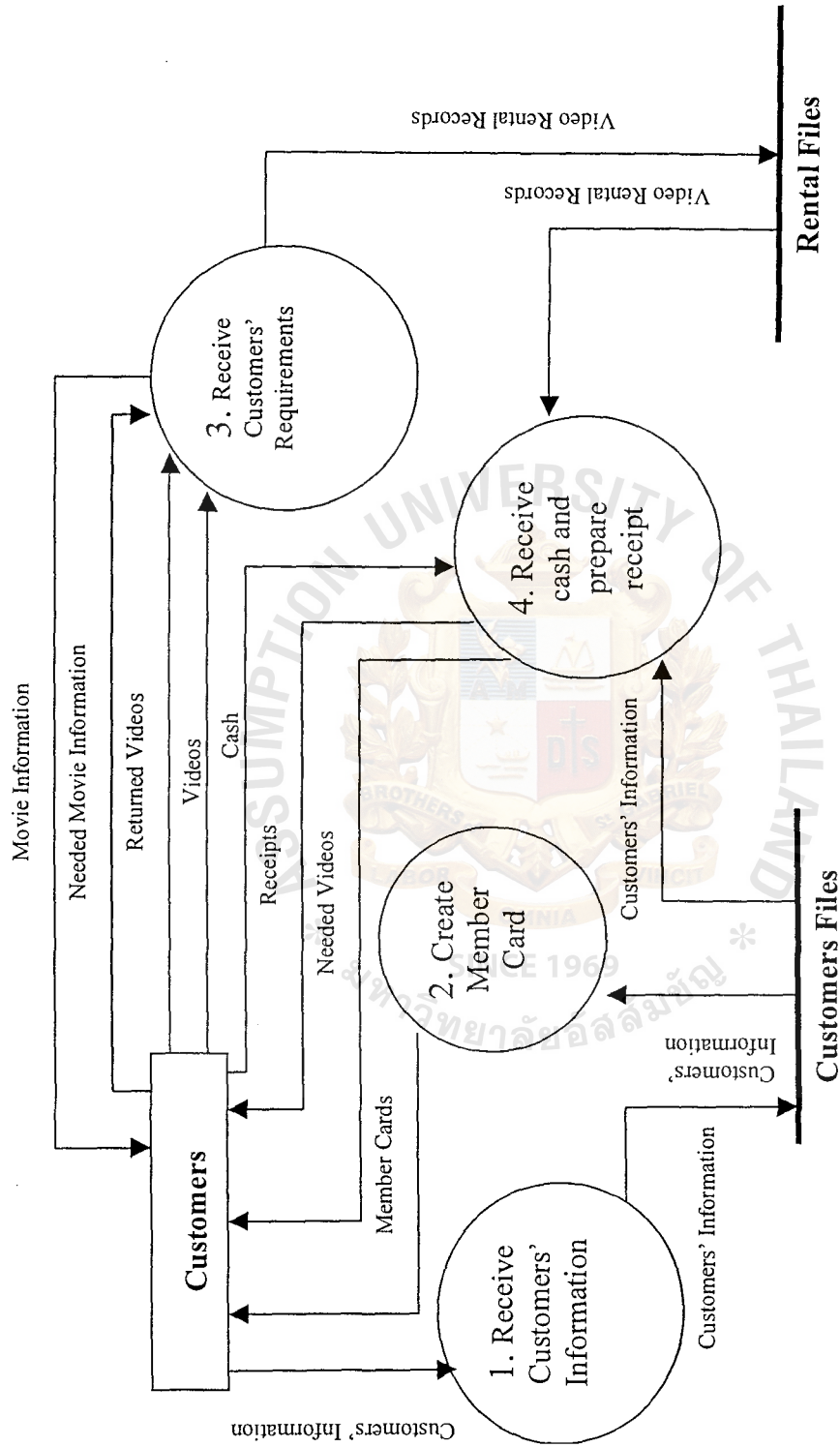


Figure 4.19. The Logical Data Flow Diagram between the Head Office Shop and the Customers.

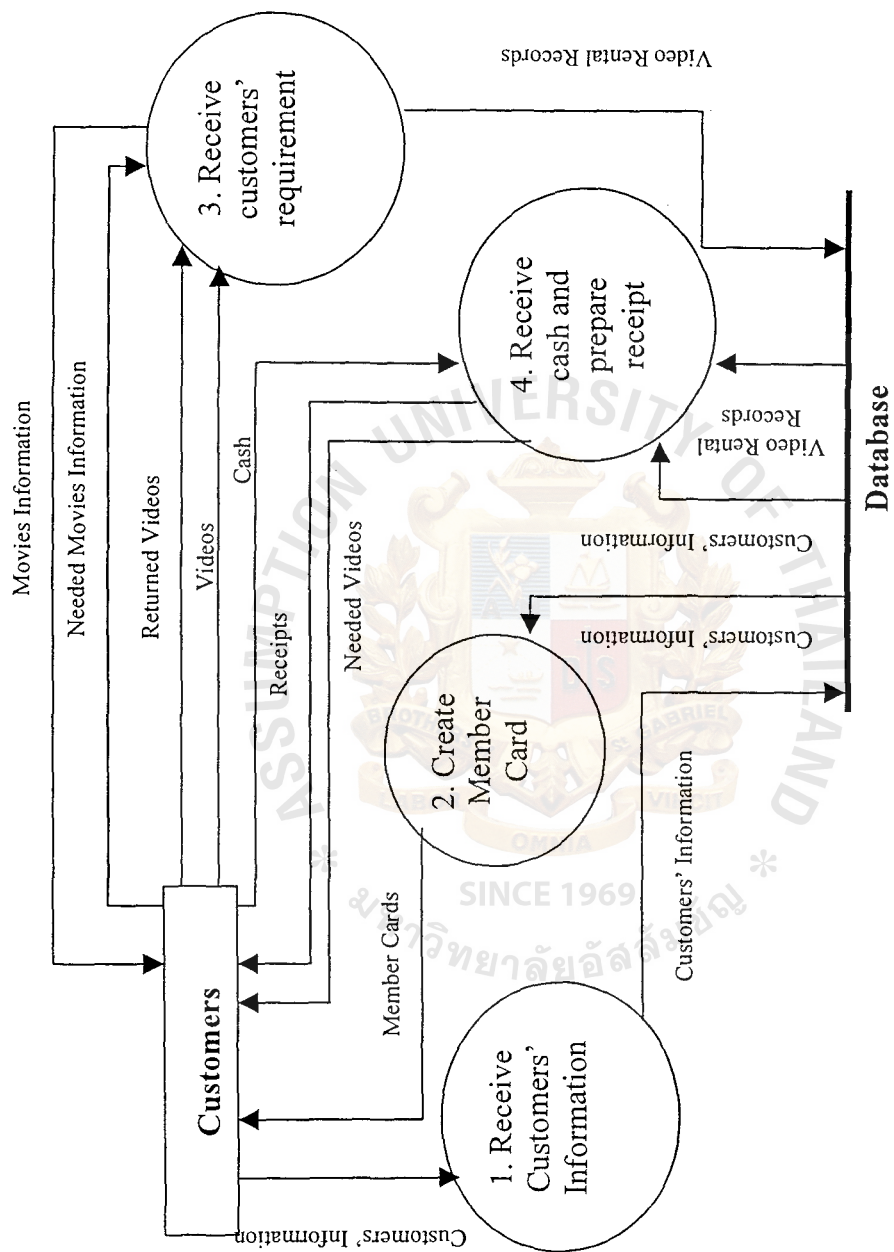


Figure 4.20. The Physical Data Flow Diagram between the Head Office Shop and the Customers.

The difference between these flows is the same as the difference happening between the head office shop and the clients' shops. Relationships between the head office system and the customers involve processes:

- (a) Receive customer information (1)
- (b) Create member card (2)
- (c) Receive customer requirements (3)
- (d) Receive cash and prepare receipt (4)

The customers then apply for the memberships by giving the shop their information. The shop then generates the member cards to them. The customers afterwards pay for member fees, and receive the receipts from the shop. The members now are ready to rent videos from the shop. They bring needed videos to the shop officer in order to keep records. The shop then collects the rental costs from the customers, and gives them receipts.

The last logical and physical data flow diagrams, Figure 4.21 and Figure 4.22 are the diagrams depicting the relationships between the head office system and the suppliers. Again, these Figures are slightly different from each other. There are many places maintaining data and information for the logical data flow diagram. However, all users see only one place or one database for the whole system.

Relationships here between the head office system and the suppliers involve processes:

- (a) Receive and distribute videos and/or movies information requirements (5)
- (b) Check stock (6)

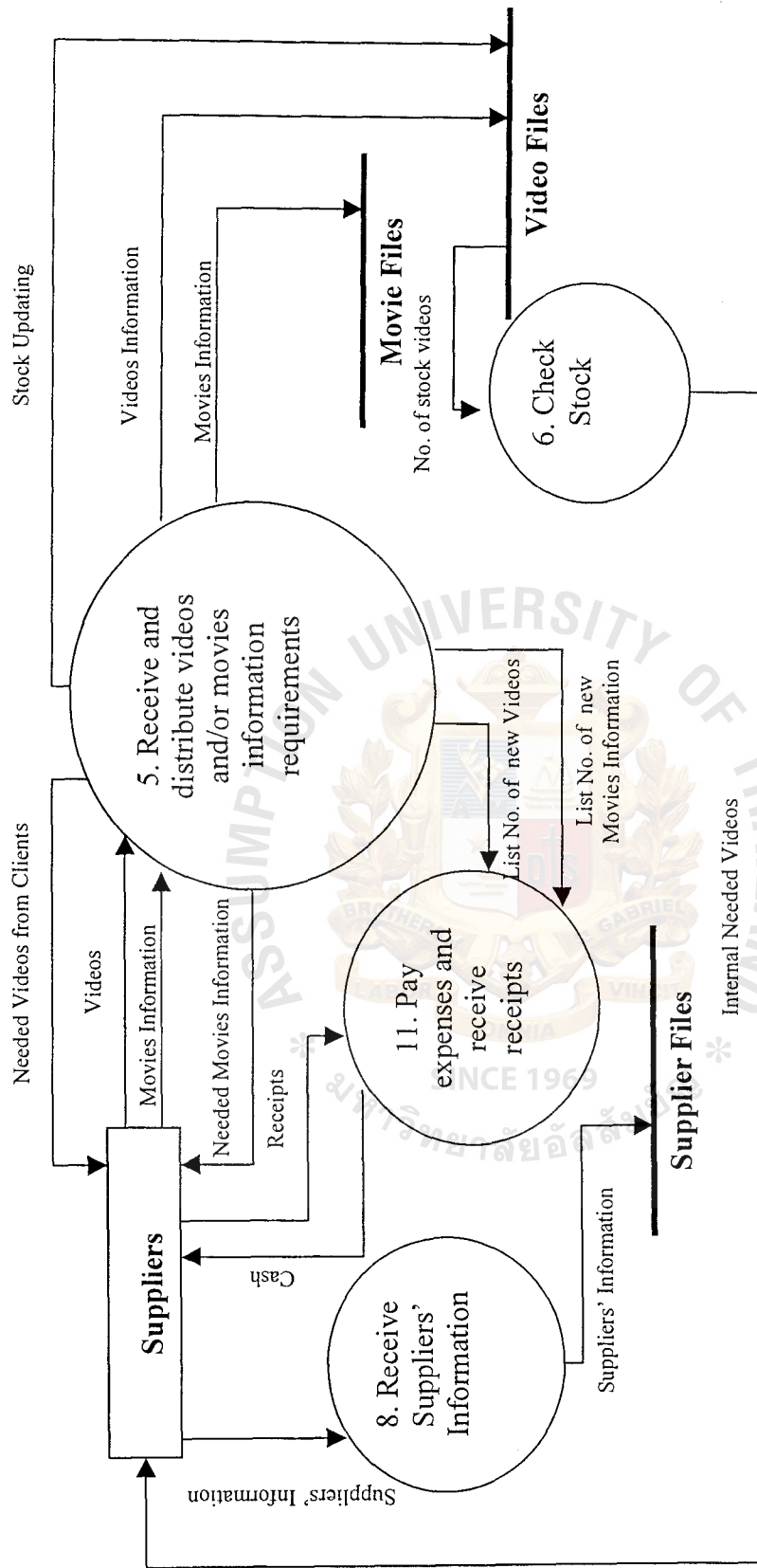


Figure 4.21. The Logical Data Flow Diagram for the Video Rental System between the Head Office Shop and the Suppliers.



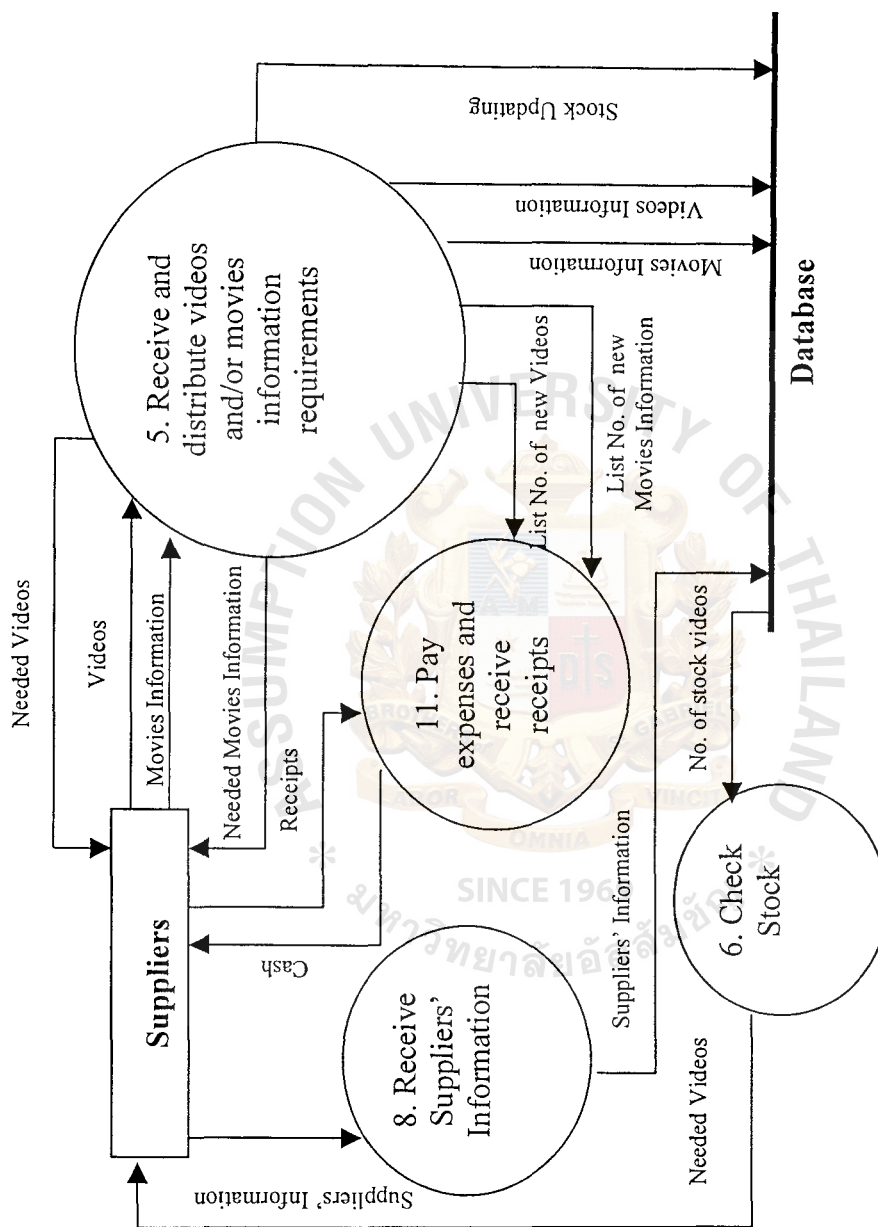


Figure 4.22. The Physical Data Flow Diagram for the Video Rental System between the Head Office Shop and the Suppliers.

- (c) Receive supplier information (8)
- (d) Pay expenses and receive receipts (11)

Here the head office shop's owner contacts with video suppliers in the market in order to find the video suppliers for YOU'RE WELCOME Video Rental Shop. The suppliers then give their information in order to maintain to the head office shop. This information is used to develop and setup the system for the clients. Thus, after videos and/or movie information are ordered, the suppliers distribute them to the head office shop. To order these videos and/or movies information, the head office shop itself may require them if the stock is not enough, or the clients' shops request to the head office shop.

Therefore, if the clients request these videos and/or movie information, it is the head office shop's responsibility to distribute them to the clients. However, the head office shop needs to record their information to the database first.

After designing all data flow diagrams, the head office team sees that there are relationships between each entity. Therefore, they use the entity-relationship diagram (E-R Diagram) to depict the relationship of all components that are involved in the Video Rental System. Figure 4.23 shows the picture of the E-R Diagram of the system.

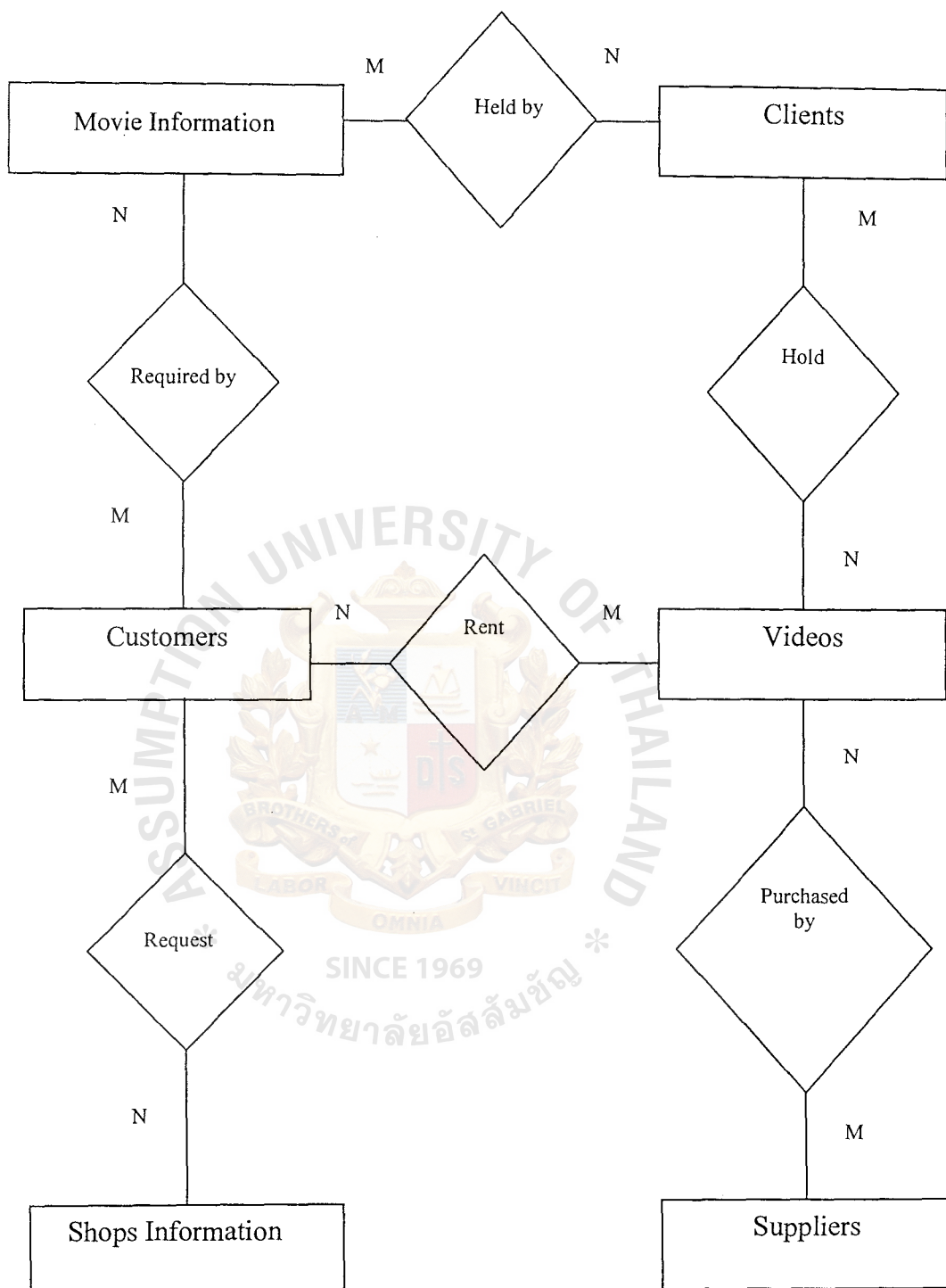


Figure 4.23. The Entity Relationships Diagram.

Attributes for each entity and relation in E-R Diagram

*Entity Movie Information*

<u>Movie_Code</u>	Movie_Thai
Movie_Name	Movie_Type
Movie_Description	

*Entity Customers*

<u>Member_Code</u>	Post_Code
Personal_ID_Card	Phone_Number1
Member_First_name	Phone_Number2
Sex	Applied_Date
Birthday	Expired_Date
Age	Status
Address1	Media_Type
Address2	Branch

*Entity Clients*

<u>Franchise_Code</u>	Postal_Code
Franchise_Branch	Phone_Number
Address1	Head_Office_Phone_No
Address2	

*Entity Videos*

<u>Product_Code</u>	Sound_Track
Movie_Type	Total_No_Rent
Movie_Name	Status
Movie_Nation	

*Entity Suppliers*

<u>Supplier_Code</u>	Address2
Supplier_Name	Post_Code
Address1	Phone_Number

*Entity Shops Information*

<u>ID</u>	Post_Code
Branch_Name	Phone
Branch_Code	Fax
Address1	Address2

*Relation Required By*

<u>Member_Code</u>	<u>Movie_Code</u>
--------------------	-------------------

*Relation Hold*

<u>Franchise_Branch</u>	<u>Movie_Code</u>
-------------------------	-------------------

*Relation Rent*

<u>Member_Code</u>	<u>Product_Code</u>
--------------------	---------------------

Transaction\_Code

*Relation Held By*

<u>Movie_Code</u>	<u>Franchise_Code</u>
-------------------	-----------------------

*Relation Purchased By*

<u>Supplier_Code</u>	<u>Product_Code</u>
----------------------	---------------------

*Relation Request*

<u>Member_Code</u>	<u>ID</u>
--------------------	-----------

Note: Underlined attributes are the primary keys for those entities or relations

Since the head office shop's team has finished analyzing the relationships of all components involved, the head office shop's team then generates the database tables for each entity and each relation. Each table consists of attributes that are necessary for its own table. In order to create all the tables for this project, the team developer uses the concept of Relational Database and Data Dictionary, which are mentioned in Chapter 2. All the database tables and data dictionary are shown in Appendices B and C, respectively.

Afterwards, the team developer defines the necessary hardware and software that will be used at the head office shop, and at the client shops. These hardware and software are setup by the team developer. This mandatory information will be explained in Appendix A.

#### 4.3.5 Hardware and Software Requirements for the Head Office Shop

(a) Hardware Requirements:

(1) A compatible computer as a server with:

- (a) Pentium II 300Mhz processor
- (b) 20 Gigabytes and Ram 256 MB

(2) IBM-PC Series and Compatible computers

- (a) Four computers for model Pentium 166 or higher
- (b) Hardisk 1 GB and Ram 16 MB (At least) for each computer

(3) Four 14 SVGA monitors

(4) UTP Hub

(5) Four Network Cards for each computers

(6) 102-key Enhanced keyboards

(7) A Dot Matrix Printer used to generate receipts for customers, and

reports for internal usage

- (8) A Laser Printer used to generate member cards
  - (9) A Dot Matrix Printer as a shared printer in the office room
  - (10) A 56K modem
  - (11) A Barcode Reader
- (b) Software Requirements for the head office shop:
- (1) Microsoft Windows NT 4.0 Thai Enabled Edition (Full)
  - (2) Video Rental System (VRS)

#### 4.3.6 Hardware and Software Requirements for the Clients' Shops

- (a) Hardware Requirements:
- (1) IBM-PC Series and Compatible computers
    - (1.1) Two computers for model Pentium 166 or higher
    - (1.2) Hardisk 1 GB and Ram 16 MB (At least) per computer
  - (2) Two 14 SVGA monitors
  - (3) 102 key Enhanced keyboards
  - (4) Two Network Cards for each computer
  - (5) UTP Hub
  - (6) A Dot Matrix Printer for receipts, rental transactions, and reports connected to a computer model Pentium 166.
  - (7) A Barcode Printer connected to a computer model 486/DX4
  - (8) A Dot Matrix Printer for internal use
  - (9) A 56K modem
  - (9) Barcode Reader
- (b) Software Requirements for the client shops:
- (1) Microsoft Windows 95 or 98 Thai Edition (Full)



## (2) Video Rental System (VRS)

After setting all needed hardware and software, the shop owner then designs the system configuration for both head office and client shop, which are shown in Figure 4.24 and Figure 4.25. These configuration figures are used to show the whole system picture. They show the connection of all computers and other components within the head office shop, and within the client shop.

Figure 4.24 shows that all workstation computers and components are connected to the computer server that stores all the data and information. A registration computer is connected with a laser printer, which is used to print member cards for the customers. A front computer is connected with a dot matrix printer, which is used to print receipts for customers, and print reports for internal usage. There is a printer connected to the computer server. This is a shared printer – a dot matrix printer - that is used by the head office shop's officer: a programmer, a computer officer, and a marketing connector. Since this is a franchise system, the computer server is connected to the 56K modem in order to allow all clients to connect to it. Thus, the clients can retrieve the data and information they need. This kind of network is called a computerized computer system. On the other hand, the client shop configuration in Figure 4.25 is called client computers. All workstation computers are connected to the modem, which is linked to the head office modem. This connection is used to send the clients' data and information to the head office shop. Also it is used to retrieve data and information from the head office. Moreover, the head office team redesigns the layout of the head office shop and the client shop (see Figure 4.26 and Figure 4.27). The layout shows where the types of videos are stored upon the shelves, and where the types of movies are placed. Figure 4.26 shows the shop layout of the head office shop.

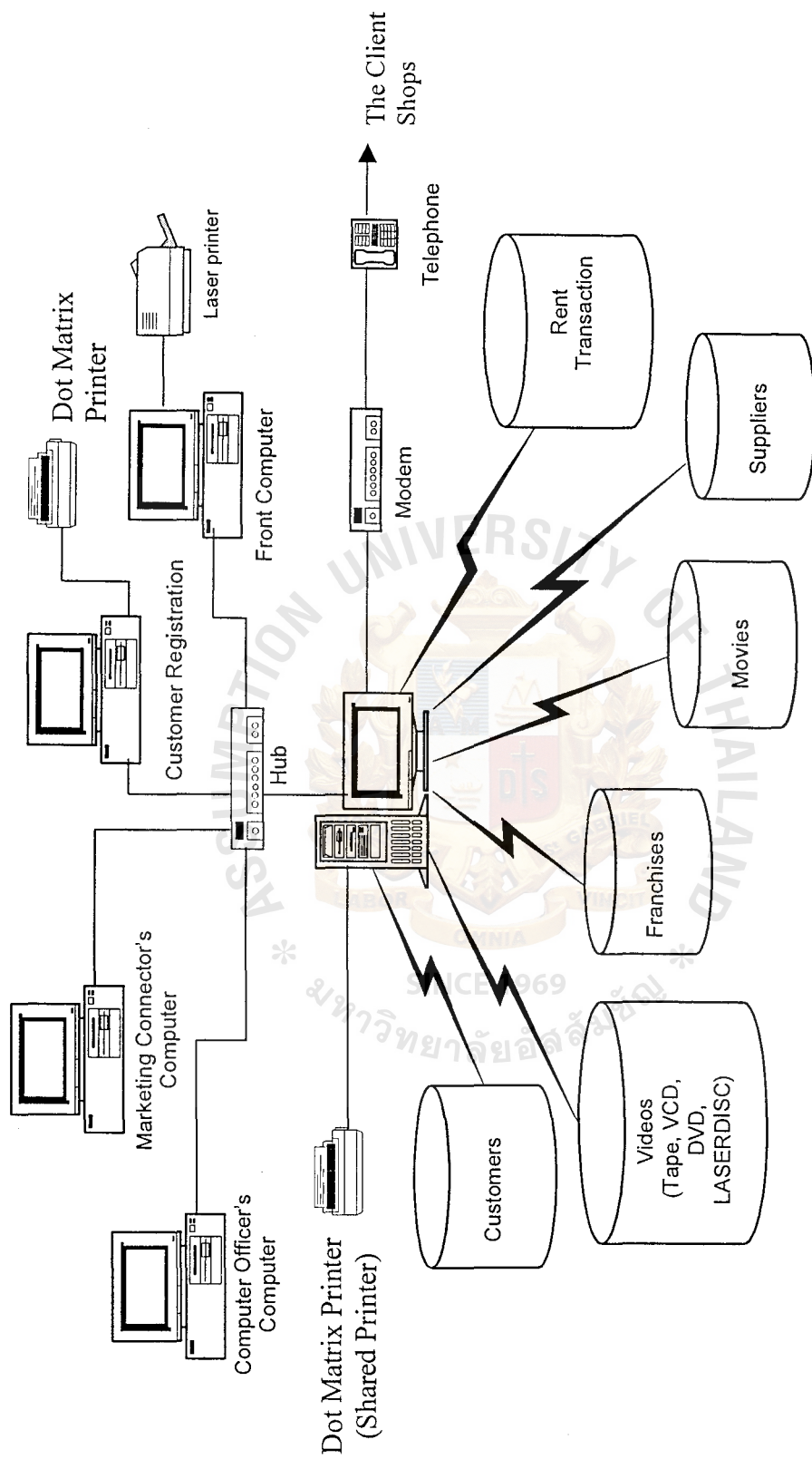


Figure 4.24. The System Configuration of the Head Office Shop.

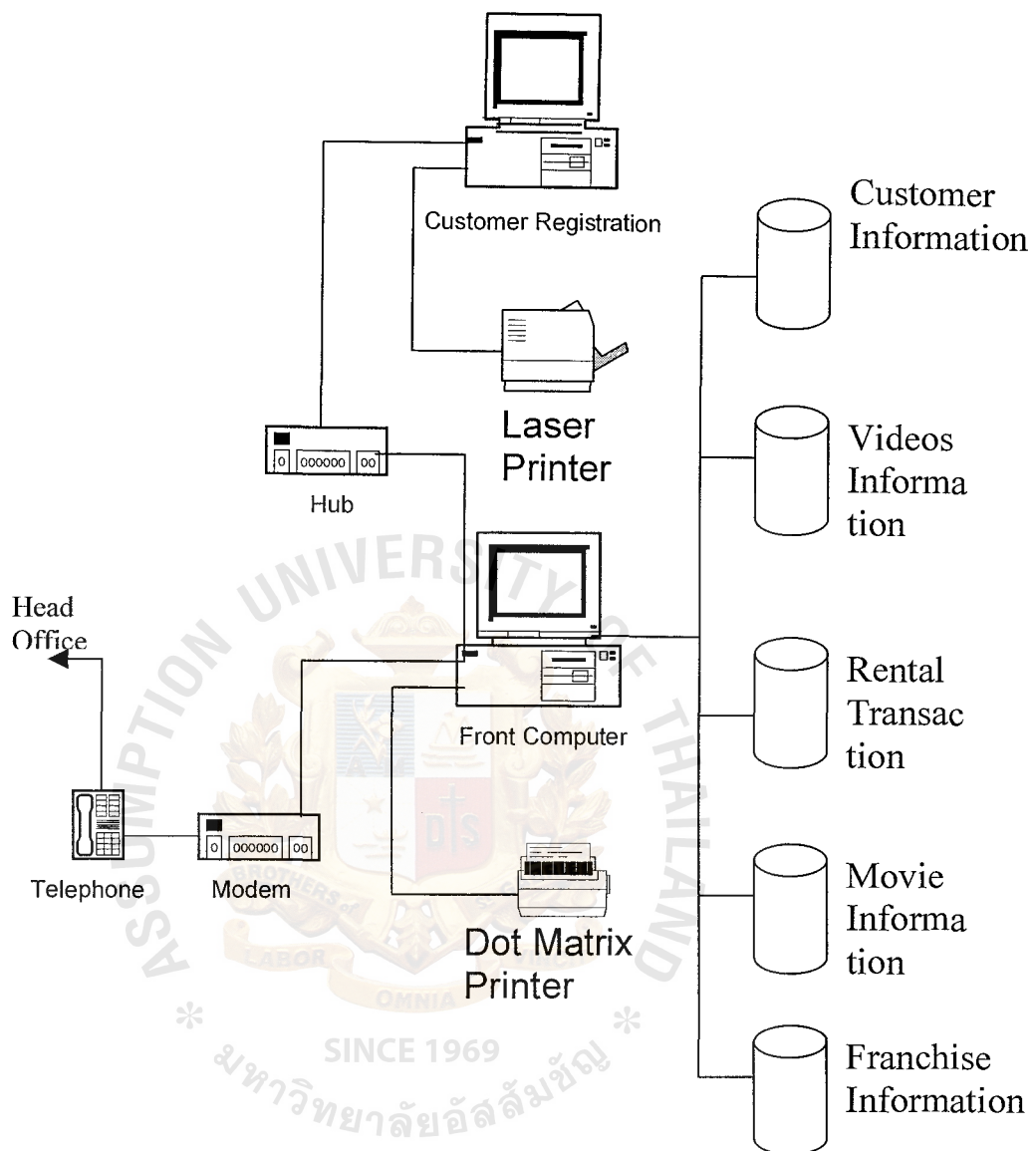


Figure 4.25. The System Configuration of the Client Shop.

This shop has two parts inside First is the YOU'RE WELCOME Video Rental Shop where the customers can come to register memberships, to rent, or to return videos to the front-end officer. Second is the office room, which other officers, including the head office shop owner, are in.

Figure 4.27 shows the shop layout of the client shop. All client shops are

supposed to be set according to the standard layout. However, it depends on the size of the building the clients have. The client shops have only one part inside. It is the part of the YOU'RE WELCOME Video Rental Shop where the customers come to register for memberships, to rent and to return videos to the front-end officer. There is, however, an owner's room for the shop owner. Both Figure 4.26 and Figure 4.27 show that video shelves are separated by types of movies. This separation helps the customers to find needed videos more easily. Moreover, all shops will present the new coming movies on the advertising board. This helps the customers to know what the new coming videos are, and when they will come.

To develop the Video Rental System, the head office shop's team together with the head office shop owner uses Microsoft Access 97 to develop databases, and uses Delphi Version 3 to develop interfaces for the Video Rental system (VRS). These two application programs are already Y2K compliant. Therefore, the Video Rental System is Y2k Compliant as well. Data dictionaries and system interfaces can be seen at the Appendix C.

#### **4.4 Testing and Maintaining the System**

As mentioned in Chapter 2, testing is a very significant phase in program development because testing plays a key role in the quality of the end product. Testing checks the developed program to ensure that it performs according to the users' requirements.

For the Video Rental System, the head office shop's team developer first tests each module of the program. This testing is to check that each module can whether work properly. If so, the team developer then tests the next module. If not, the team developer will figure out what is wrong with this module. They may go back to the

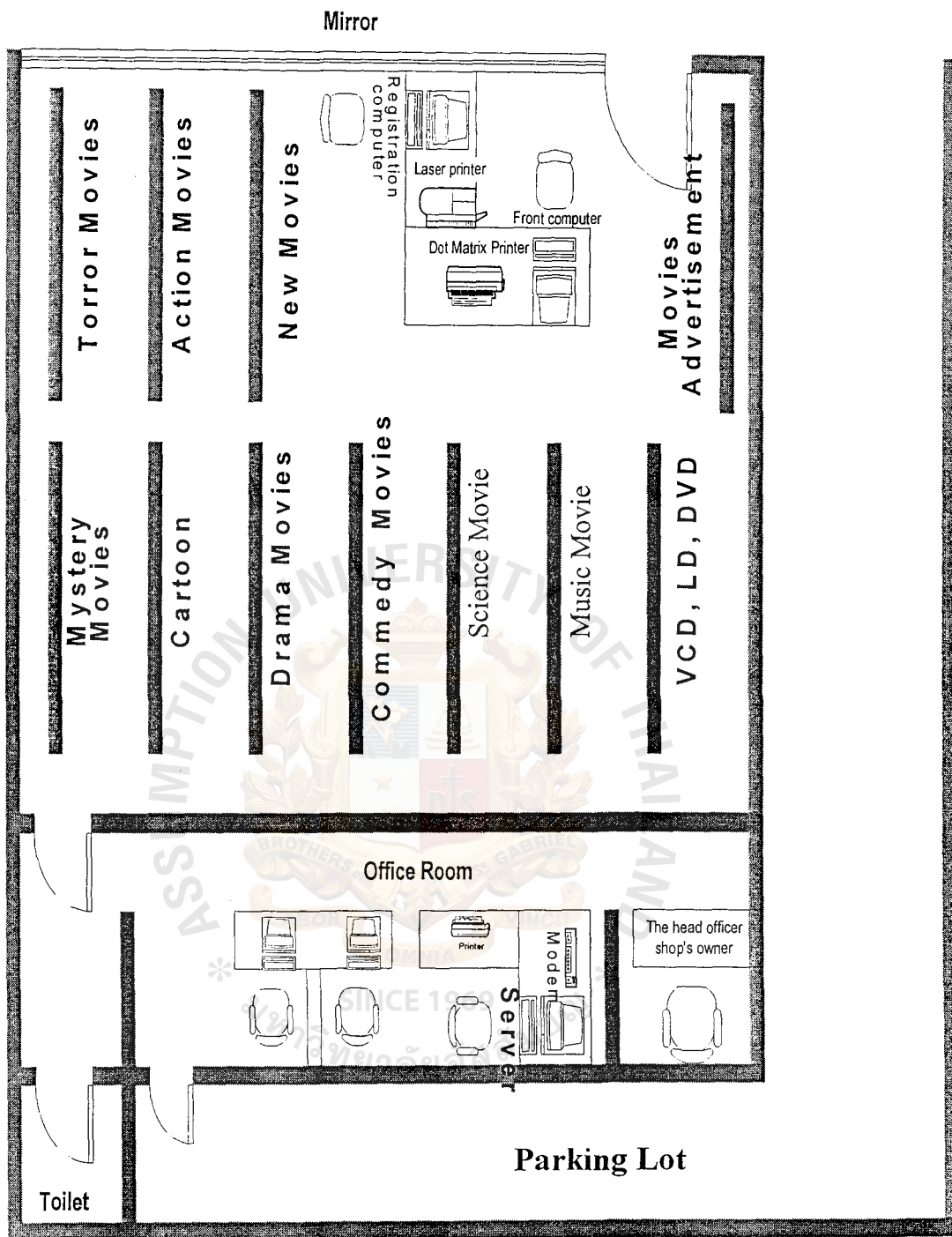


Figure 4.26. The Head Office Shop Layout.

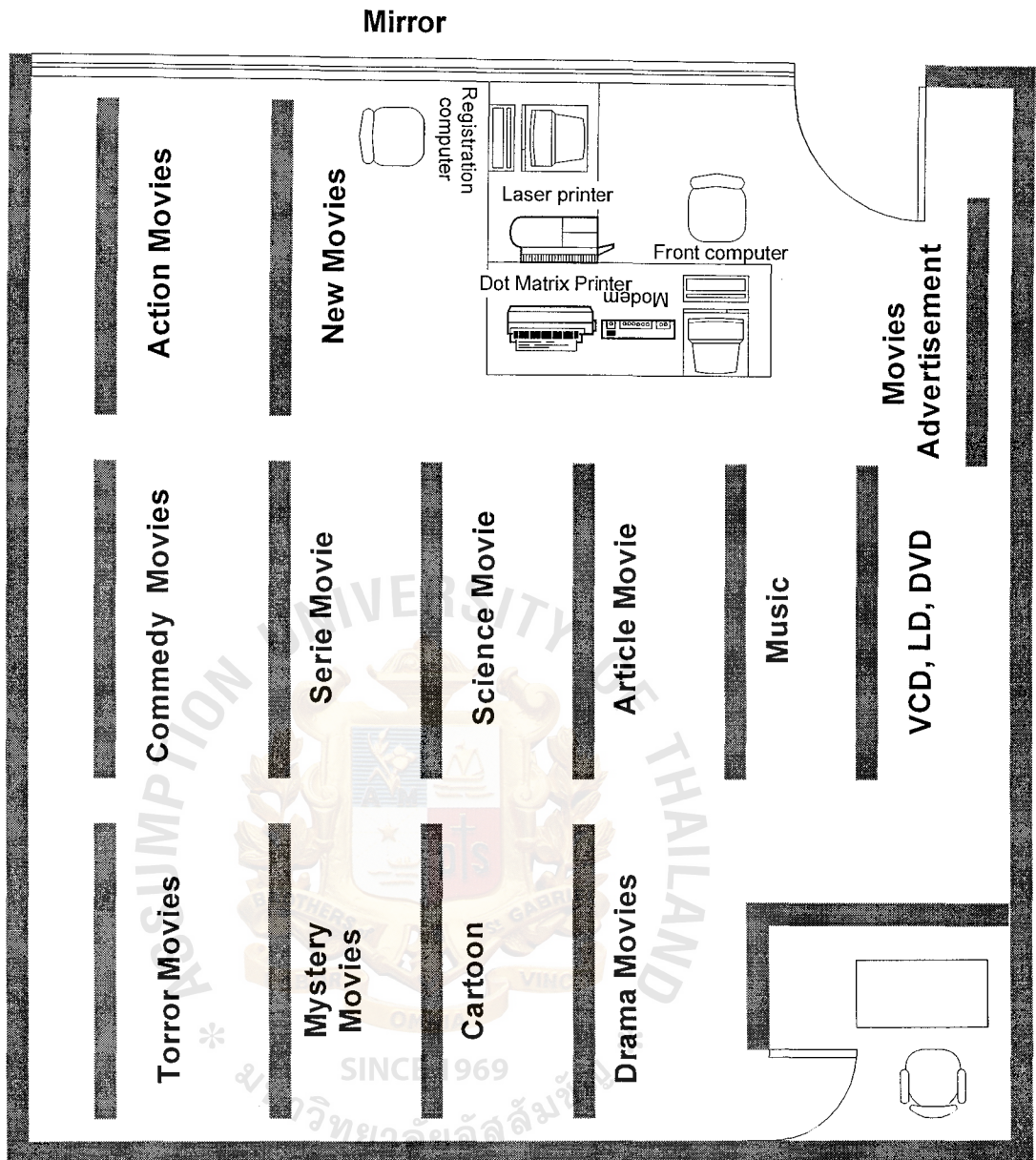


Figure 4.27. The Client Shop Layout.



previous phase, which is the system design phase, in order to see if this module has been designed correctly. Otherwise, they may go back to the system analysis phase in order to see whether the users' requirements are totally collected or not. This back-step helps the team developer to adjust or even to change the program according to the users' requirements.

By testing the module, the team developer makes up some example data to test each; module's functionality. After all modules are tested individually, the next step of the team developer is to test all modules together. This testing is called integrated testing. This will test the connection among all modules in order to see that they are connectable to each other. This is because each module does not work independently. Instead, it must work with other modules; therefore, it must not have any problems with connection. Again, by testing all modules together, the team developer makes up example data to put into all modules to test their connectivity and their functionality.

When each module and all modules are tested, and they are working properly, it is time for the team development to implement this program into the real-work situation. This is the next phase that is described in the next section.

#### **4.5 Implementing and Evaluating the System**

The objectives of implementing and evaluating the system are to ensure that the proposed system is working properly, and is worthwhile to be invested in.

##### **4.5.1 System Implementation**

The objective of implementing the system is to put the developed system and program into the production program. This means that after the team developer finishes testing and adjusting the system, it is ready to be implemented into a real-work situation. The team developers plan to use both training strategies and conversion strategies to implement the Video Rental System.



This system is developed in order to convert the manual system to the computerized system for YOU'RE WELCOME Video Rental, All users are involved in developing this system. They are already aware that the new system will replace their manual work soon. Thus, the head office shop's owner decides to use the direct changeover to his shop, called full conversion. Afterwards, he/she decides to use the distributed conversion for all franchises.

After the conversion of this system, the head office shop's owner trains the users who are not involved in developing the system. This training will be handled by the head office shop's owner himself / herself, or by the programmer. This is set as an internal training, called in-house training, which will be handled by the system analyst, the programmer, and the shop's owner. Moreover, the team developer generates the system manual for the users so that they are able to review the uses of this system by themselves (see Appendix E). This training is done within the head office shop.

Nevertheless, since the YOU'RE WELCOME Video Rental System is a franchise system, this system must be installed at the client or franchisee shops. The team developer then arranges the training for these clients at their shop, called on-the-site training. This is the service that the head office shop provides for the clients. In addition to the training, the head office shop provides the system manual for the clients too (see Appendix F). This manual will be slightly different from the manual for the head office shop. This is because some modules will not be provided for the clients.

#### 4.5.2 System Evaluation

The head office shop's owner uses two techniques to evaluate the system: Utility and Cost-benefit Analysis.

(1) Utility:

- (a) Possession Utility. For YOU'RE WELCOME Video Rental Shop, the

head office shop's owner is responsible to make any decision for the shop, and all client shops.

- (b) Form Utility. Each client must send the everyday data and information of his/her shop to the head office shop at the end of each day, or at the beginning of the next day, before the shop is open.
- (c) Place Utility. Since the head office shop's owner makes any decision for all shops, all clients send their data and information to the head office shop.
- (d) Time Utility. As mentioned in the Form Utility, the everyday data and information of all clients' shops must be sent to the head office shop by the end of each operational day, or at the beginning of the next operational day before the shop is open.
- (e) Actualization Utility. The head office shop's owner uses data and information from each client's shop in order to see what the shop must provide for the customers.
- (f) Goal Utility. The Video Rental System is designed to eliminate the problems that occur in the current system:
  - (1) The customers are provided with fast services from every shop
  - (2) Information errors during the operation are eliminated
  - (3) The customers are not tied to only one shop; instead, they can rent videos wherever the shops are located.
  - (4) The shops provide the customers more varieties of videos: Tape, VCD, Laser Disc, and DVD.
  - (5) The customers are welcome to pay their fee charge or their payment by credit card

- (6) Each shop will be located close to a parking area, or it will have its own parking area; thus the customers are more comfortable.

In addition to the utility, the team developer will find out the problem that might occur during the real-time operation. These problems may come from both internal operation and client shops. Thus, the team developer decides to setup the suggestion box in every shop. Each suggestion will be anonymous so that the customers can feel free to give their advice. However, the client shop's owners may have their own way to gain information, so they can give this information directly to the head office shop by any way such as telephone, fax, etc.

(2) The Cost-benefit Analysis

There are many ways to evaluate the new system by using this technique: Break-even point, Payback method, Cash-flow analysis, and Present value method. The head office shop's owner decides to use just two of them to evaluate the Video Rental System for YOU'RE WELCOME Video Rental Shop: the Payback method and the Present value method.

However, cost and benefit between the head office shop and the clients' shops are different; therefore, each method must be used to evaluate both the head office shop and the clients' shops. Remember that all costs and benefits for these two methods are assumed in order to see whether this project is worthwhile or not.

(a) The Payback Method for the Head Office Shop

Costs for the first year:

- (1) 2,000,000 bahts for building cost
- (2) 300,000 bahts for setting up the shop

- (3) 20,000 bahts for a computer model Pentium II
- (4) 65,000 bahts for four computers model Pentium 166
- (5) 8,000 bahts for dot matrix printers
- (6) 10,000 bahts for a laser printer
- (7) 5,000 bahts for four network cards
- (8) 5,000 bahts for a UTP Hub
- (9) 2,000 bahts for a modem
- (10) 7,000 bahts for a barcode reader
- (11) 100,000 bahts for videos from suppliers
- (12) 500,000 bahts for employees' salary
- (13) 200,000 bahts for miscellaneous costs

Total costs for the first year is 3,222,000 bahts.

Costs for the second year:

- (1) 200,000 bahts for videos from suppliers
- (2) 525,000 bahts for employees' salary
- (3) 200,000 bahts for miscellaneous costs

Total costs for the second year is 925,000 bahts

Costs for the third year:

- (1) 300,000 bahts for videos from suppliers
- (2) 551,250 bahts for employees' salary
- (3) 200,000 bahts for miscellaneous costs

Total costs for the third year is 1,051,250 bahts

Costs for the fourth year:

- (1) 400,000 bahts for videos from suppliers
- (2) 578,813 bahts for employees' salary

- (3) 200,000 bahts for miscellaneous costs

Total costs for the fourth year is 1,178,813 bahts

Costs for the fifth year:

- (1) 500,000 bahts for videos from suppliers
- (2) 607,754 bahts for employees' salary
- (3) 200,000 bahts for miscellaneous costs

Total costs for the fifth year is 1,307,754 bahts

Grand total costs are 7,684,817 bahts

Benefits for the first five years:

- (1) 1,500,000 bahts for any shop's fee charges
- (2) 1,500,000 bahts for the clients' registrations
- (3) 200,000 bahts for the franchise royalty

Total benefits for first year is 3,200,000 bahts

Grand total benefits are 16,000,000 bahts

From the assumed costs and benefits for the payback method for the head office shop, it can be graphed as Figure 4.28. This figure shows approximately, after one year the head office shop's owner would be able to recover the costs and to earn the benefits.

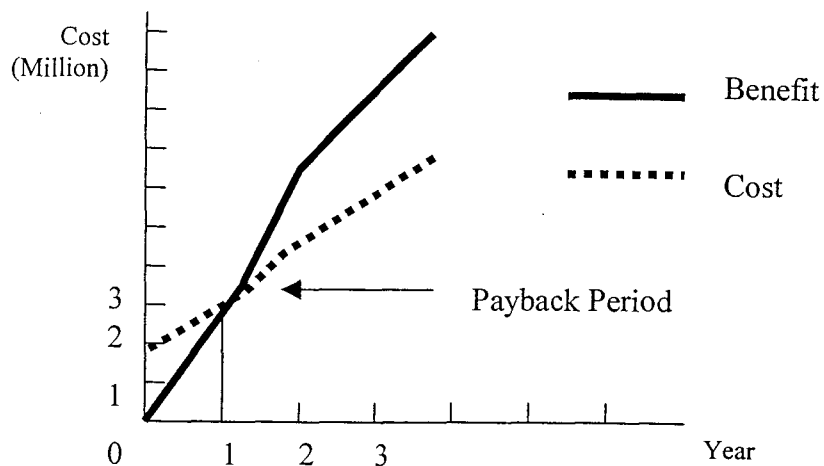


Figure 4.28. The Payback Graph for the Head Office Shop.

(b) The Payback Method for the Clients' Shops

Costs for the first year:

- (1) 1,000,000 bahts for the building
- (2) 300,000 bahts for franchise fee
- (3) 40,000 bahts for franchise royalty
- (4) 370,000 bahts for setting up the shop including all needed components
- (5) 20,000 bahts for videos
- (6) 120,000 bahts for employee's salary
- (7) 150,000 bahts for miscellaneous costs

Total costs for the first year is 2,000,000 bahts

Costs for the second year:

- (1) 40,000 bahts for franchise royalty
- (2) 20,000 bahts for videos

(3) 126,000 bahts for employee's salary

(4) 150,000 bahts for miscellaneous costs

Total costs for the second year is 336,000 bahts

Costs for the third year:

(1) 40,000 bahts for franchise royalty

(2) 20,000 bahts for videos

(3) 132,300 bahts for employee's salary

(4) 150,000 bahts for miscellaneous costs

Total costs for the third year is 342,300 bahts

Costs for the fourth year:

(1) 40,000 bahts for franchise royalty

(2) 20,000 bahts for videos

(3) 138,915 bahts for employee's salary

(4) 150,000 bahts for miscellaneous costs

Total costs for the fourth year is 348,915 bahts

Costs for the fifth year:

(1) 40,000 bahts for franchise royalty

(2) 20,000 bahts for videos

(3) 145,861 bahts for employee's salary

(4) 150,000 bahts for miscellaneous costs

Total costs for the fourth year is 355,861 bahts

Grand total costs are 3,383,076 bahts

Benefit for the first five years:

Total benefit for each year is 1,500,000 bahts for any shop's fee charges. Therefore, the grand total benefit for the



first five years is 7,500,000 bahts.

The assumed costs and benefits for the payback method for the client shop can be graphed in Figure 29. This figure shows that the client would be able to recover his/her costs and to earn benefits within two years.

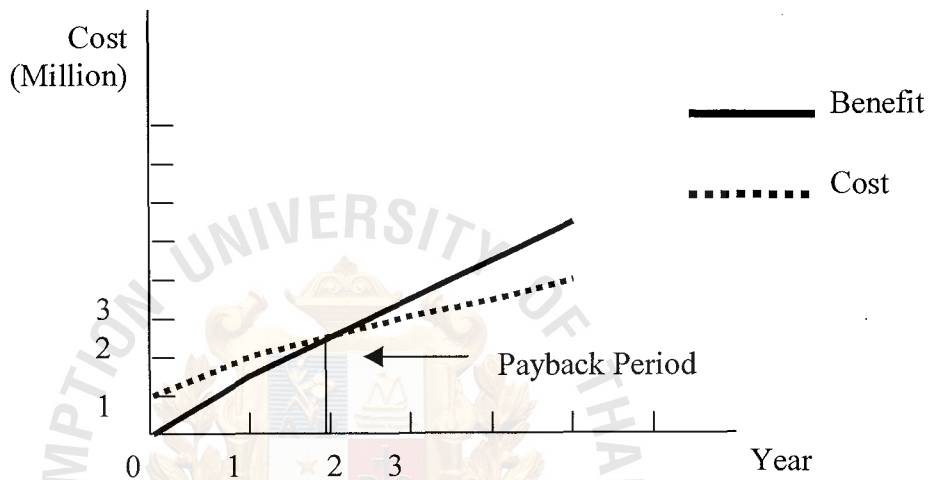


Figure 4.29. The Payback Graph for the Client Shop.

(c) The Present Value Method for the Head Office Shop

The bank interest nowadays is approximately five percent. Furthermore, from the assumed costs and benefits from the payback method for the head office, we can say that:

For Costs:

- (1) Cost for the first year is 3,222,000 bahts
- (2) Cost for the second year is 925,000 bahts, which equals 880,952 bahts in the first year
- (3) Cost for the third year is 1,051,250 bahts, which equals

953,515 bahts in the first year

(4) Cost for the fourth year is 1,178,813 bahts, which equals 1,018,303 bahts in the first year

(5) Cost for the fifth year is 1,307,754 bahts, which equals 1,075,893 bahts in the first year

Grand total costs are 7,150,663 bahts

For benefits:

(1) Benefit for the first year is 3,200,000 bahts

(2) Benefit for the second year is 3,200,000 bahts, which equals 3,047,619 bahts in the first year

(3) Benefit for the third year is 3,200,000 bahts, which equals 2,902,494 bahts in the first year

(4) Benefit for the fourth year is 3,200,000 bahts, which equals 2,764,280 bahts in the first year

(5) Benefit for the fifth year is 3,200,000 bahts, which equals 2,632,648 bahts in the first year

Grand total benefits are 15,547,041 bahts

From this present value method for the head office shop as shown in Table 2.4, it shows that it is good for the head office shop' owner to make an investment in YOU'RE WELCOME Shop.

(d) The Present Value Method for the Client Shops

The bank interest nowadays is approximately five percents. Furthermore, from the assumed costs and benefits from the payback method for the head office, we can say that:

Table 2.4. The Present Value for the Head Office Shop.

Year	1	2	3	4	5
Costs	3,222,000	925,000	1,051,250	1,178,813	1,307,754
Present Value for costs	3,222,000	880,952	953,515	1,018,303	1,075,893
Benefits	3,200,000	3,200,000	3,200,000	3,200,000	3,200,000
Present Value for benefits	3,200,000	3,047,619	2,902,494	2,764,280	2,632,648

For Costs:

- (1) Cost for the first year is 2,000,000 bahts
- (2) Cost for the second year is 336,000 bahts, which equals 320,000 bahts in the first year
- (3) Cost for the third year is 342,300 bahts, which equals 310,476 bahts in the first year
- (4) Cost for the fourth year is 348,915 bahts, which equals 301,406 bahts in the first year
- (5) Cost for the fifth year is 355,861 bahts, which equals 292,768 bahts

Grand total costs are 3,224,650 bahts

For benefits:

- (1) Benefit for the first year is 1,500,000 bahts
- (2) Benefit for the second year is 1,500,000 bahts, which equals 1,428,571 bahts in the first year

- (3) Benefit for the third year is 1,500,000 bahts, which equals 1,360,544 bahts in the first year
- (4) Benefit for the fourth year is 1,500,000 bahts, which equals to 1,295,756 bahts in the first year
- (5) Benefit for the fifth year is 1,500,000 bahts, which equals to 1,234,054 bahts in the first year

Grand total benefits are 6,818,925 bahts

From this present value method for the client shops as shown in Table 2.5, it shows that it is good for the clients to make an investment in the YOU'RE WELCOME Shop.

Table 2.5. The Present Value for the Client Shop.

Year	1	2	3	4	5
Costs	2,000,000	336,000	342,300	348,915	355,861
Present Value for costs	2,000,000	320,000	310,476	301,406	292,768
Benefits	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000
Present Value for benefits	1,500,000	1,428,571	1,360,544	1,295,756	1,234,054

## V. CONCLUSION AND RECOMMENDATIONS

### 5.1 Conclusion

The current system of YOU'RE WELCOME Video Rental System is a manual system. This shop's owner currently has rented a town house in the Silom area to operate the shop. However, the shop itself does not have its own parking area. The shop provides the video - only tape – rental services to the customers who are the shop's members.

The main objective of this project is to develop a computerized system for YOU'RE WELCOME Video Rental Shop, called Video Rental System (VRS). This system is developed to solve the disadvantages and problems as stated in the current system (Chapter 3). This means that after these disadvantages and problems are recognized, the Video Rental System is then developed.

After developing this system, the team developer then provides the system testing for the proposed system. This testing helps the team developer to be ascertained that the Video Rental System is developing properly. Afterwards, the team developer starts implementing and evaluating this system in order to make it worthwhile to the clients.

Here, the team developer has found out that there are many advantages to the internal users, and customers:

- (a) It provides user-friendly to the users
- (b) It reduces the errors during the data – entry phase
- (c) It increases the speed of each transaction
- (d) It does not tie the customers to only one branch of the shop
- (e) It provides more varieties of videos to the customers
- (f) It provides conveniences for the customers to pay bills
- (g) It provides the parking lot for the customers; otherwise, it is close to the

parking area so that the customers do not waste time to find a parking lot

- (h) This quick system increases the customers' satisfaction

This research, implementing and evaluating results, and the system's advantages make the Video Rental System worthwhile to both the head office shop's owner and the clients to invest their money in this system.

## **5.2 Recommendations**

It is recommended to the head office shop's owner that:

- (a) Every shop should provide the computers for the customers to search for movie information, and videos' availability.
- (b) The team developer should develop the shop's web site that contains information for each branch so that the customer can find information at home or at work in order to determine their requirements before they come to the shop.
- (c) The customers should be able to reserve the videos they need to rent.
- (d) For a security feature, the shops should have the sensor gates so that it would cause an alarm when someone tries to steal videos.
- (e) The head office shop should provide more telephone lines so that the clients will be able to connect more easily.





YOU'RE WELCOME Video Rental Shop is a franchise shop where every customer is able to rent videos wherever the shops are located. This means that all shops must provide the same videos and services to the customers. Moreover, data and information from each shop must be relayed to other shops.

Since it uses a franchise system for its operation, people called clients who need to buy this franchise must follow the rules of the head office shop's team setups as following:

Standards for the clients

- (1) The shop must not be in the allocated radius – 10 kilometers around
- (2) The clients must have their own building
- (3) The clients must have a parking place for the customers such as Siam Square or a shop in the department store
- (4) The clients must pay 300,000 bahts to buy this franchise
- (5) The clients must pay 40,000 bahts each year for a franchise royalty fee
- (6) The clients must pay for videos distribution:
  - (a) 200 bahts per tape
  - (b) 250 bahts per VCD
  - (c) 1200 bahts per LD
  - (d) 500 bahts per DVD
- (7) The clients must follow the head office shop's rules seriously:
  - (a) The clients must update their data and information daily
  - (b) The clients must not copy videos by themselves
  - (c) The clients must not contact the videos suppliers by themselves
- (8) The client must work 6 days a week (Monday to Saturday) from 10:00 to 24:00 o'clock

#### Standards for the head office shop

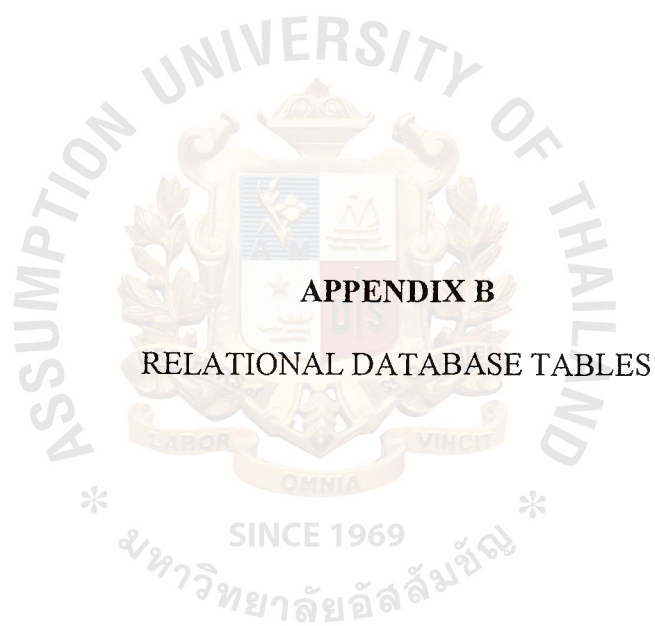
- (1) The head office shop must provide all equipment for the clients
- (2) The head office shop must provide the system for the clients
- (3) The head office shop must provide videos for the clients
- (4) The head office shop must provide all services for the system for the clients
- (5) The head office shop works 6 days a week (Monday to Saturday) from 10:00 to 24:00 o'clock

All standards above are the contract between the head officer shop called the franchisor and the client shops called the franchisees. Both franchisor and franchisee must follow these rules seriously.

In addition to the standards between franchisor and franchisee, there also are standards for the customers who need to be YOU'RE WELCOME Video Rental Shop members, and / or who need to rent videos from the shop. These customers must also follow the rules seriously.

#### Standards for the customers

- (1) In order to have memberships at YOU'RE WELCOME Video Rental Shop, the customers must pay 100 bahts for member fee
- (2) Each member must pay a rental fee of 30 bahts per each video
- (3) Each member must return rental videos on time. If not, each member must pay an overdue fee of 10 bahts per each video
- (4) Each member must be responsible for the rental videos.



**APPENDIX B**  
**RELATIONAL DATABASE TABLES**

TABLE CUSTOMERS

Member_	Personal_ID_	Member_First	Member_Last_	Sex	Birthday	Age	Address1	Address2	Post_code
Code	Card	Name	Name						

Phone_Number1	Phone_Number2	Applied_Date	Expired_Date	Status	Media_Type	Branch

TABLE MOVIE INFORMATION

Movie_Code	Movie_Name	Movie_Thai	Movie_Type	Movie_Description

TABLE CLIENTS / FRANCHISES

Franchise _Code	Franchise _Branch	Address1	Address2	Post_Code	Phone_Number	Head_Office_Phone_No

TABLE VIDEOS

Product_Code	Movie_Type	Movie_Name	Movie_Nation	Sound_Track	Total_No_Rent	Status

TABLE SHOPINFO

ID	Branch_Name	Branch_Code	Address1	Address2	Post_Code	Phone	Fax

**TABLE RENT**

Transaction _Code	Transaction _Date	Member_Code	Product_Code	Date_Return	Total_Rent	No_Rent _Return	Bonus (No Charge)

Cost_Charge	Tax_Charge	Total_Cost_ Charge	Branch_Rent	OverDueChrg	Returned _Date

**TABLE SUPPLIERS**

Supplier_Code	Supplier_Name	Address1	Address2	Post_Code	Phone_Number

TABLE MOVIE\_CUSTOMERS

Member_Code	Movie_Code

TABLE CUSTOMERS\_SHOPINFO

Member_Code	ID

TABLE CUSTOMERS\_VIDEO

Member_Code	Product_Code	Transaction_Code

TABLE CLIENTS\_VIDEOS

Franchise_Branch	Product_Code

TABLE MOVIE\_INFO\_CLIENTS

Franchise_Code	Movie_Code

TABLE VIDEOS\_SUPPLIERS

Supplier_Code	Product_Code



TABLE VIDEOS\_SUPPLIERS

Supplier_Code	Product_Code

TABLE MOVIE INFO\_CLIENTS

Franchise_Code	Movie_Code





## APPENDIX C

### DATA DICTIONARIES

**TABLE CUSTOMERS**

Attributes	Field Length	Field Type	Field Description
Member_Code	8	Text	Unique Code for each customer
Personal_ID_Card	17	Text	ID Card of the Customer
Member_First_Name	25	Text	Customer's first name
Member_Last_Name	25	Text	Customer's last name
Sex	6	Text	Sex of the customer
Birthday		Date/Time	Customer's Birthday
Age	2	Text	Age of customer
Address1	30	Text	Customer's Address
Address2	30	Text	Customer's Address
Post_Code	5	Text	Customer's Post Code
Phone_Number1	15	Text	Customer's telephone number
Phone_Number2	15	Text	Customer's telephone number
Applied_Date		Date/Time	Date the customer apply member
Expired_Date		Date/Time	Last date for memberships
Status		Yes/No	Check the membership status
Media_Type	4	Text	Type of memberships: Tape, VCD, DVD, LS
Branch	15	Text	Branch customer applies for member

**TABLE MOVIE INFORMATION**

<b>Attributes</b>	<b>Field Length</b>	<b>Field Type</b>	<b>Field Description</b>
<b>Movie_Code</b>	10	Text	Code of each movie
Movie_Name	35	Text	English name of movie
Movie_Thai	50	Text	Thai name of movie
Movie_Type	4	Text	Media type of movie
Movie_Description		Memo	Description of movie

**TABLE CLIENTS**

<b>Attributes</b>	<b>Field Length</b>	<b>Field Type</b>	<b>Field Description</b>
<b>Franchise_Code</b>	3	Text	Code for each client
Franchise_Branch	15	Text	Branch the client locates
Address1	30	Text	Client's address
Address2	30	Text	Client's address
Postal_Code	5	Text	Client's postal code
Phone_Number	15	Text	Client's telephone number
Head_Office_Phone_No	15	Text	Head office's telephone number

**TABLE VIDEOS**

<b>Attributes</b>	<b>Field Length</b>	<b>Field Type</b>	<b>Field Description</b>
<b>Product_Code</b>	15	Text	Code for each video
Movie_Type	4	Text	Media type of movie
Movie_Name	35	Text	Name of the movie
Sound_Track		Yes/No	Original language or not
Total_No_Rent		Number	Number of time video has been rent
Status		Yes/No	Available or not

**TABLE SHOP'S INFORMATION**

<b>Attributes</b>	<b>Field Length</b>	<b>Field Type</b>	<b>Field Description</b>
<b>ID</b>		Auto-number	Running number of list
Branch_Name	25	Text	Name of Client's branch
Brach_Code	3	Text	Code of Client's branch
Address1	30	Text	Client's address
Address2	30	Text	Client's address
Post_Code	5	Text	Client's post code
Phone	15	Text	Client's telephone number
Fax	15	Text	Client's fax number

**TABLE SUPPLIERS**

Attributes	Field Length	Field Type	Field Description
Supplier_Code	7	Text	Code of each supplier
Supplier_Name	25	Text	Name of supplier
Address1	30	Text	Supplier's address
Address2	30	Text	Supplier's address
Post_Code	5	Text	Supplier's post code
Phone_Number	15	Text	Supplier's telephone number

**TABLE MOVIE\_CUSTOMERS**

Attributes	Field Length	Field Type	Field Description
Member_Code	8	Text	Code of each member
Movie_Code	10	Text	Code of each movie

**TABLE MOVIE INFO\_CLIENTS**

Attributes	Field Length	Field Type	Field Description
Franchise_Code	3	Text	Code of each client
Movie_Code	10	Text	Code of each movie

**TABLE RENT**

<b>Attributes</b>	<b>Field Length</b>	<b>Field Type</b>	<b>Field Description</b>
<b>Transaction_Code</b>	10	Text	Code of each transaction
Transaction_Date		Date/Time	Date and time of that transaction
Member_Code	8	Text	Code of each customer
Product_Code	15	Text	Code of each video
Date_Return		Date/Time	Date videos will be returned
Total_Rent		Number	Number of rent videos
No_Rent_Return		Number	Number of returned videos
Bonus(No_Charge)		Number	How many free videos provided
Cost_Charge		Currency	Amount of this transaction
Tax_Charge		Currency	How much tax for this transaction
Total_Cost_Charge		Currency	Cost + Tax
Branch_Rent	15	Text	Branch the customer rent videos
OverDueChrg		Number	Amount charge for overdue videos
Returned_Date		Date/Time	Date the customer return videos



**TABLE CLIENTS\_VIDEOS**

Attributes	Field Length	Field Type	Field Description
Franchise_Branch	15	Text	Branch name of each client
Product_Code	15	Text	Code for each video

**TABLE VIDEOS\_SUPPLIERS**

Attributes	Field Length	Field Type	Field Description
Supplier_Code	7	Text	Code of each supplier
Product_Code	15	Text	Code of each video

**TABLE CUSTOMERS\_VIDEOS**

Attributes	Field Length	Field Type	Field Description
Member_Code	8	Text	Code of each customer
Product_Code	15	Text	Code for each product
Transaction_Code	10	Text	Code for each transaction

**TABLE CUSTOMERS\_SHOPS' INFO**

<b>Attributes</b>	<b>Field Length</b>	<b>Field Type</b>	<b>Field Description</b>
<b>Member_Code</b>	8	Text	Code of each customer
<b>ID</b>		Auto-number	Running number for shop information





# END OF DAY REPORT

PAGE X

For

< BRANCH NAME >

DATE – MONTH - YEAR

## New Members

Code	Name	Cost
xxx-xxxxx	xxxxxxxxxxxxxxxxxxxxxxxx	xxx
Total		xxxx

## Rental Transactions

Code	Name	Type	Cost
xxxxxxx	xxxxxxxxxxxxxxxxxxxx	xxxx	xxx
Total			xxxx

## Overdue Transactions

Code	Name	Type	Cost
xxxxxxx	xxxxxxxxxxxxxxxxxxxx	xxxx	xxx
Total			xxxx

Cumulative Income      xxxx

## All Franchise Information

Code	Branch	Address & Phone No.
XXX	XXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX
XXX	XXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX
XXX	XXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX
XXX	XXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX
XXX	XXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX
XXX	XXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX

## Movie Information

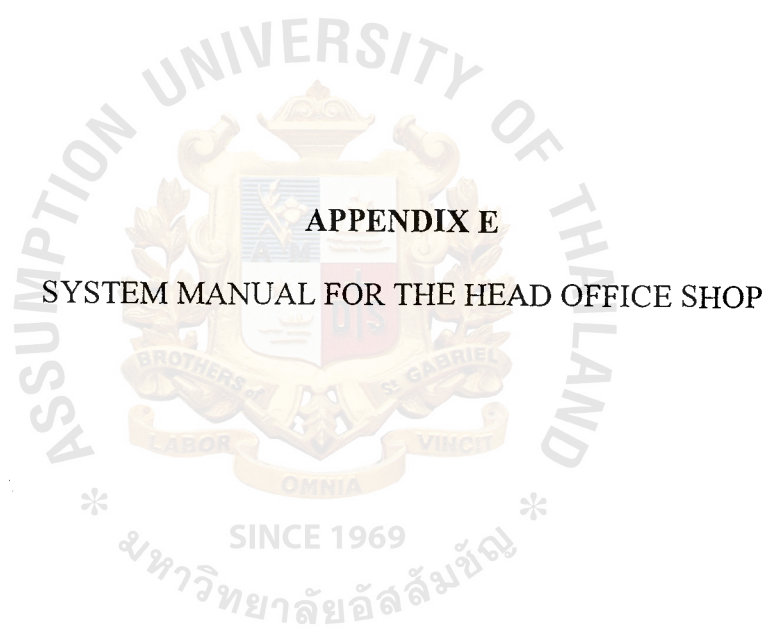
**Movie Name:** xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

**Movie Type:** xxxxxxxxxx

## Movie Description

XX  
XX  
XX  
XX  
XX



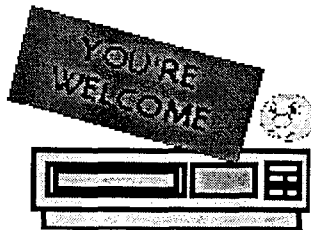




## Step of Using the Video Rental System Program

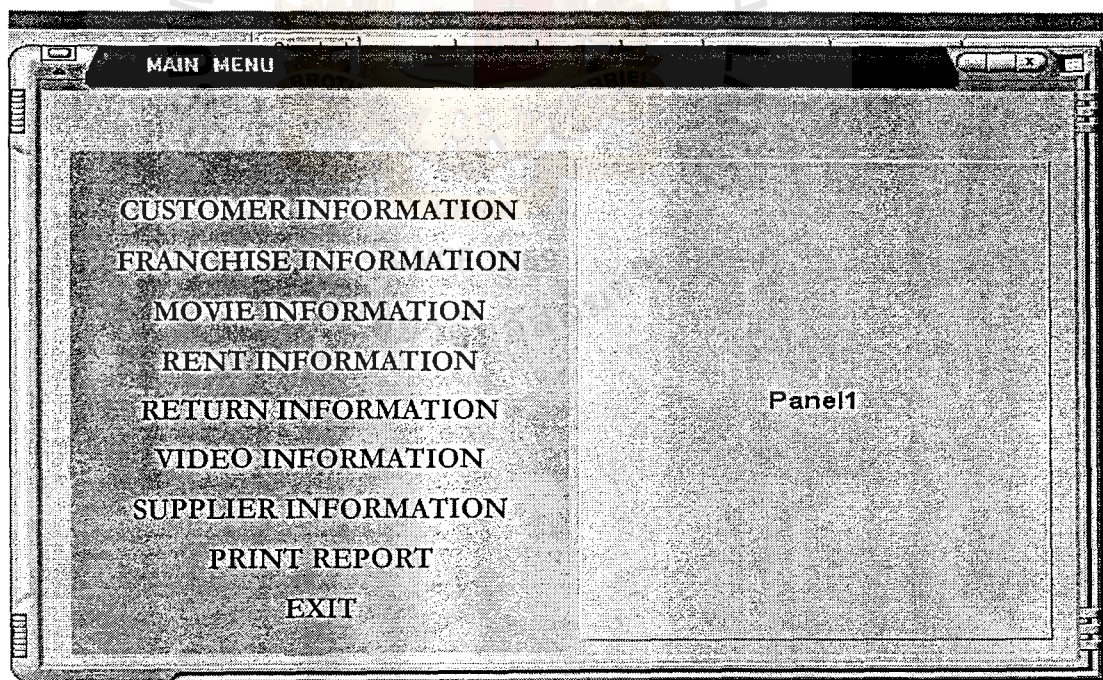
Step 1. Start program Windows 95/ 98 / NT

Step 2. Double click on the following icon to start the Video Rental System:



Video Rental System

Step 3. The program shows the Main menu screen as following:



This is the main menu for the users at the head office shop. Here, it consists of nine modules: Customer Information, Franchise Information, Movie Information, Rent

Information, Return Information, Video Information, Supplier Information, Print Report, and Exit. When the users point the mouse to each module, the system shows the example of the screen and some description on the right frame: Panel 1.

#### (1) Module Customer Information

Either the customers themselves or the front-end officer can input this module in case the customers cannot type.

The screenshot shows a window titled 'MAIN MENU' with a sub-header 'CUSTOMER INFORMATION'. The form contains the following fields and labels:

- (a) Member No: [00000004] (b) Search
- (c) First Name [ ] Last Name [ ] (d)
- [ ] Status
- (e) Birthday [ ] / [ ] / [ ] Age [ ] (f)
- (g) Sex [Male] (h) Personal ID Card [ ]
- Address1 [ ] (i)
- Address2 [ ]
- Post Code [ ]
- Phone No1 [ ] Phone No2 [ ] (j)
- (k) Applied Date [18/6/99] (l) Expire Date [17/6/00]
- (m) Media Type [Tape] (n) Branch [Silom]
- [Update] (o)
- [Return to Main Menu] (p)

#### (a) Member No:

This number is generated automatically for every new member. It consists of two parts. The first part is the first three digits showing the branch code of the client. The second part is the rest showing the running number of the members.

- (b) The search button is used when the customers would like to find their information, or to find their friends' information.

Customer Search : Form

Name

Surname

Here, the customers can enter either or both name and surname that they need to look for. If not, they can click on 'back button' to go back to the previous menu

- (c) First name of the customer
- (d) Last name or surname of the customer
- (e) Customer's birthday
- (f) Customer's age
- (g) Customer's gender
- (h) Customer's identification card number
- (i) Customer's address and post code
- (j) Customer's telephone numbers

- (k) The applied date is the date that the customer applies for memberships
  - (l) The expired date is the date that the customer will no longer be a member. The status marker will disappear. However, if he/she would like to extend his/her membership, the front-end officer can type a new expired date here. Then the status marker will show up
  - (m) The media type is the type of video: Tape, CD, DVD, Laser Disc. It is selected for each customer so that they can rent videos for that type only
  - (n) The branch name is the name that the client belongs to. This field is fixed for each branch
  - (o) After completing all the information, the front-end officer clicks on the 'update button' in order to put customer's data into the database
  - (p) The front-end officer click on the 'return to main menu' in order to process another job
- (2) Module Franchise Information

All information about every franchisee or client is maintained at the head office shop only. However, every client can update this information by using the dial-up connection, which is a module for every client's shop



**FRANCHISE INFORMATION**

(a) [Navigation buttons: back, forward, search, etc.]

Franchise Branch (b)

Address1  (c)

Address2  (c)

Post Code

Phone No  (d)

Head Office Phone No  (e)

(f)

- (a) These are the navigator buttons for the users to search, add, delete, update, and delete all shop information
- (b) Branch for each shop
- (c) Address of each shop
- (d) Phone number of each shop
- (e) Phone number of the head office shop; this will be fixed
- (f) Return to the main menu for other processes

### (3) Module Movie Information

This module is used to maintain all movie information for all shops

The screenshot shows a software window titled "MAIN MENU" with a sub-header "MOVIE INFORMATION". At the top, there is a row of navigation buttons labeled (a), which include icons for first, previous, next, last, add, delete, and search. Below this are four input fields: "Movie Code" with a small arrow icon labeled (b), "Movie Name" labeled (c), "Movie Type" with a dropdown arrow icon labeled (d), and a large "Description" text area labeled (e). At the bottom, there is a "Return to Main Menu" button labeled (f).

- (a) These are the navigator buttons for the users to search, add, delete, update, and delete all movie information
- (b) This is a unique number for each movie. It is generated automatically, and it is a running number.
- (c) This field is for a movie's name
- (d) This field is for type of movie such as action, drama, mystery, etc
- (e) This field is for the background of the movie
- (f) Return to the main menu for other processes

#### (4) Module Rent Information

This form is used to record any rental transaction information from the customers. In order to insert data into the database, the front-end officer can use either the barcode reader or key-in by him/herself.

The screenshot shows a 'RENT' application window. At the top, there's a header bar with the title 'RENT'. Below it, a form contains several fields and buttons. Annotations (a) through (e) point to specific parts of the interface:

- (a) Points to the top section containing 'Branch' (Silom), 'Transaction Code' (000001), 'Member Code', and 'Transaction Date' (6/18/99).
- (b) Points to the 'Add to Rent' button.
- (c) Points to a large, shaded rectangular area, likely a list or table of movies.
- (d) Points to the bottom section containing 'Date Return', 'Total Rent', 'Bonus', 'Cost', 'Tax' (7%), 'Total Cost', and a 'Print Reciept' button.
- (e) Points to the 'Return to Main Menu' button at the very bottom.

(a) These fields are usually generated automatically.

- (1) The branch code is a fixed field that gives the code of that branch
- (2) The transaction code is also a fixed field that is a running number
- (3) The member code is a code of each member, which is input by using barcode reader or by keying-in the code on the customer's member card
- (4) The transaction date is a fixed field, which is a system date



- (b) The front-end officer uses the barcode reader, or keys in the video code, which is on each video. Then he/she clicks on the 'Add to Rent' button in order to record data into the database
- (c) Data that is recorded into the database shows up here
- (d) These fields are usually generated automatically, but it is still possible to change some information
  - (1) The date return is dependent on the number of rental videos. If the customer rents less than three videos, he/she can rent them for two days. If he/she rents less than five videos, but more than three videos, he/she can rent them for three days. If he/she rents less than ten videos, but more than five videos, he/she can rent them for five days. However, this front-end officer can adjust this field upon the situation.
  - (2) Total rent is the total number of rental videos
  - (3) Bonus is a number of free video. Usually, if the customer gets one free video every ten rental videos. However, the shop's owner can regulate the rule by him/herself, so the front-end officer can enter the number of bonus videos by him/herself.
  - (4) Cost is a total cost of rental videos excluding tax
  - (5) Tax is mandatory. The front-end officer can change the tax rate when the tax rate is really changed.
  - (6) Total cost is a total amount of rental videos including tax
  - (7) After the transaction is completed, the front-end officer prints a receipt for the customer by clicking on the 'Print Receipt' button

- (e) Return to the main menu for other processes
- (5) Module Return Information

This module is used when the customer comes to return videos. There are two cases here. In the first case, videos are not overdue. In the second case, some or all videos are overdue.

Delphi 3 - Video [running]

**RETURN VIDEO**

(a) Member Code  
Transaction Code  
Date

Movie Code	Movie Name	Duedate	Fee Charge	Return
(b)				

(c) Total Overdue Charge  
VAT  
Total Charge

Print Receipt

(d) Close

- (a) The transaction code is generated automatically after the front-end officer enters the member code by using either the barcode reader or by keying-in. Date is a system date.
- (b) This field shows all videos information for that transaction. Here, the front-end officer can use the barcode reader, or type the video code

into the system in order to update the status of videos. If a video is not overdue, there is no charge to the customer.

(c) These fields are used when there is any overdue charge to the customer. The front-end officer can print a overdue receipt for him/her.

(d) Return to the main menu for other processes

## (6) Module Video Information

The screenshot shows a software window titled "Video Information : Form". At the top, there is a toolbar with several icons: a left arrow, a double left arrow, a right arrow, a double right arrow, a plus sign, a minus sign, a checkmark, and an 'X' mark. Below the toolbar, the form contains several input fields and checkboxes. The fields are labeled as follows: "Product Code" (with label (b) pointing to the input box), "Movie Name" (with label (c) pointing to the input box), "Movie Type" (with label (d) pointing to the input box), "Movie Nation" (with label (e) pointing to the input box), and "Total No. of Rent" (with label (f) pointing to the input box). There are also two checkboxes labeled "Sound Track" and "Status". At the bottom of the form, there is a button labeled "Return to Main Menu" with label (g) pointing to it. A large, faint watermark reading "ASSUMPTION UNIVERSITY" is visible across the center of the form.

This form is used to record any video information. Each video has its own code, which is unique, and is a running number.

(a) These are the navigator buttons for the users to search, add, delete, and update all video information

- (b) As mentioned, this field is generated automatically as a running number.
  - (c) This field is used to input the movie name
    - (1) Sound Track is used to inform whether this video is sound track or not
    - (2) Status is used to show whether this video is available or not
  - (d) Movie type is used to inform the movie type of this movie
  - (e) Movie nation is used to inform the nation of the movie
  - (f) This field is to inform how many times this video has been rented
  - (g) Return to the main menu for other processes
- (7) Module Supplier Information

This module is used to maintain information of all suppliers.

The screenshot shows a window titled "Supplier". At the top, there is a toolbar with icons for navigation and editing. Below the toolbar, there are several input fields, each with a label and a corresponding letter in parentheses to its right:

- Supplier Code** (b): A short text input field.
- Supplier Name** (c): A longer text input field.
- Address1** (d): A text input field.
- Address2** (e): A text input field.
- Post Code** (f): A short text input field.
- Phone Number** (g): A text input field.
- Return to Main Menu** (h): A button at the bottom of the form.

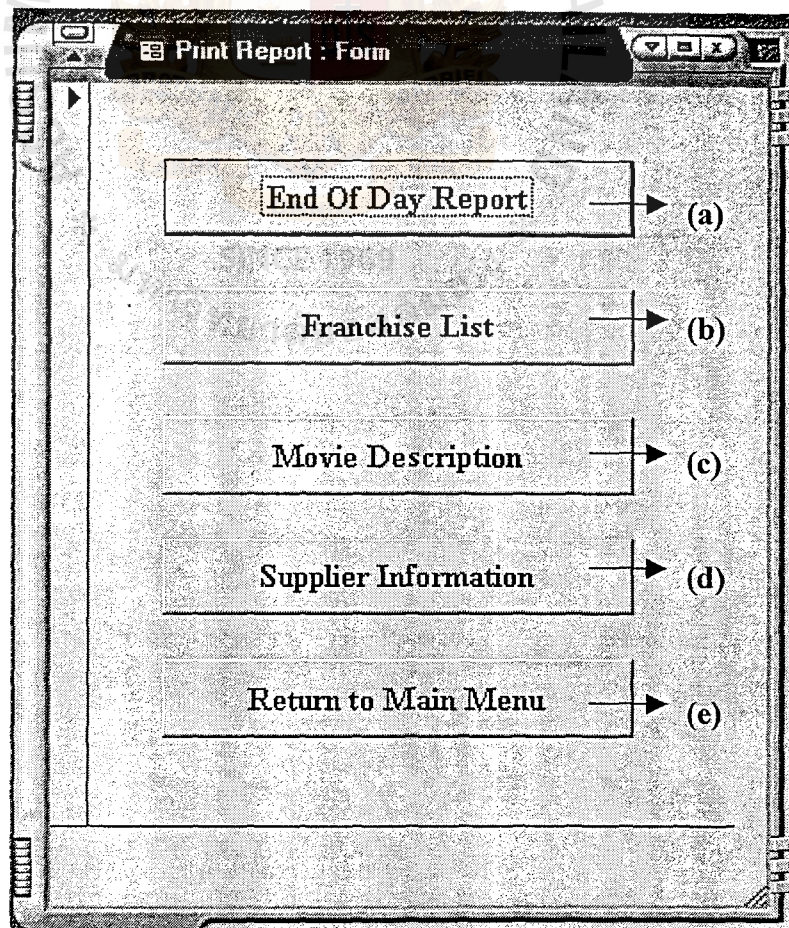
Each input field has a small arrow pointing to its label letter. The window also has a standard Windows-style title bar and a scroll bar on the left.



- (a) These are the navigator buttons for the users to search, add, delete, update, and delete every video information
- (b) This is a code for each supplier. It runs sequentially and automatically
- (c) This field is for a name of each supplier
- (d) This field is for the supplier address.
- (e) In addition, this field is also for the supplier address
- (f) This field is for the supplier postal code
- (g) This field is for the supplier telephone number
- (h) This button is used to go back the main menu

(8) Module Print Report

This module is used to print needed reports for each shop.



- (a) The end of day report is used to print a report at the end of each day. However, it can set the range of day so that the shop can print past reports

The screenshot shows a window titled "Date search : Form". Inside, there are two text input fields. The first is labeled "From:" and the second is labeled "To:". Below these fields are two buttons: "Print" and "Return to Main Menu". The window has a standard Windows-style border with a title bar and a scroll bar on the left.

- (b) Franchise list is used to print all the franchise branches, and telephone numbers.
- (c) Movie description is used to print the needed movie information for customers.

The screenshot shows a window titled "Search Movie : Form". Inside, there are two text input fields. The first is labeled "Movie Name in English" and the second is labeled "Movie Name in Thai". Below these fields are two buttons: "Search" and "Return to Main Menu". The window has a standard Windows-style border with a title bar and a scroll bar on the left.

The front-end officer helps the customer to find his/her needed movie description by typing in the name of the movie either in English or Thai. Then he/she clicks 'Search' button to find that movie.

The screen shows the movie description the customer is looking for. The front-end officer can print it for him/her.

- (d) This button is used to print all suppliers of YOU'RE WELCOME Video Rental Shop
- (e) Return to the main menu for other processes
- (9) Module Exit

This module is used to close the Video Rental System.

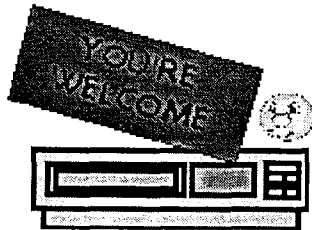




## Step of Using the Video Rental System Program

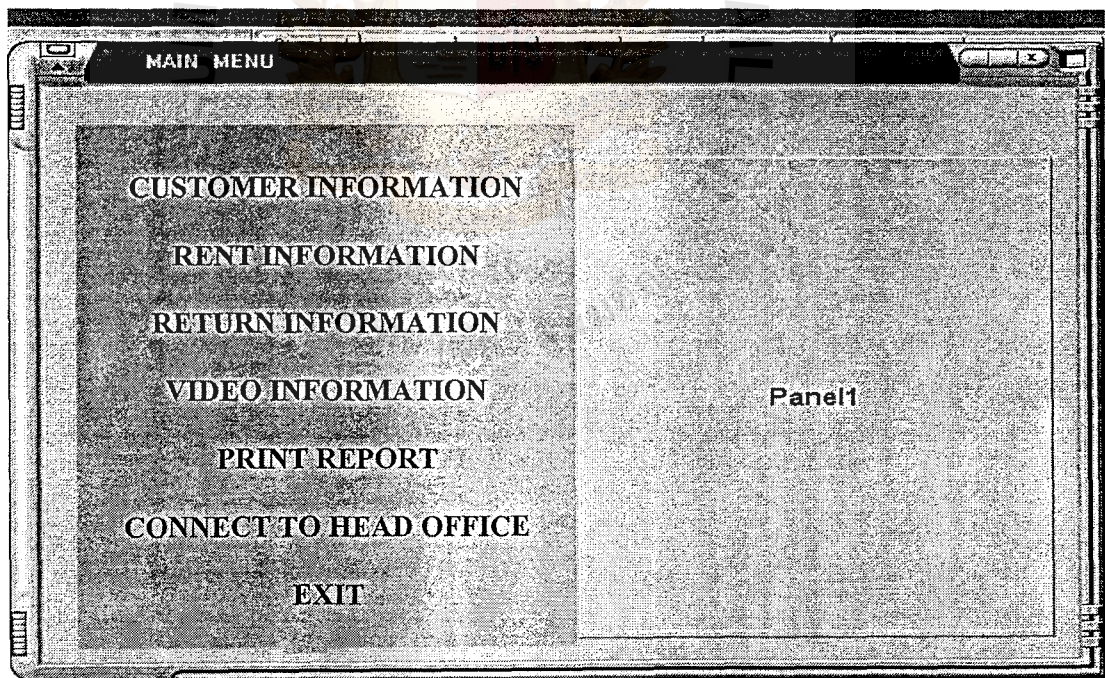
Step 1. Start program Windows 95/ 98 / NT

Step 2. Double click on the following icon to start the Video Rental System:



Video Rental System

Step 3. The program shows the Main menu screen as following:



This is the main menu for the users at the client's shop. Here, it consists of seven modules: Customer Information, Rent Information, Return Information, Video

Information, Print Report, Connect to head office, and Exit. When the users point the mouse to each module, the system shows the example of the screen and some description on the right frame: Panel 1.

#### (1) Module Customer Information

Either the customers themselves or the front-end officer can input this module in case the customers cannot type.

The screenshot shows a software window titled "MAIN MENU CUSTOMER INFORMATION". The form contains the following fields and labels:

- (a) Member No: 00000004
- (b) Search button
- (c) First Name
- (d) Last Name
- (e) Birthday
- (f) Age
- (g) Sex: Male
- (h) Personal ID Card
- (i) Address1, Address2, Post Code
- (j) Phone No1, Phone No2
- (k) Applied Date: 18/6/99
- (l) Expire Date: 17/6/00
- (m) Media Type: Tape
- (n) Branch: Silom
- (o) Update button
- (p) Return to Main Menu button

#### (a) Member No:

This number is generated automatically for every new member. It consists of two parts. The first part is the first three digits showing the branch code of the client. The second part is the rest showing the running number of the members.

- (b) The search button is used when the customers would like to find their information, or their friends' information.

Customer Search : Form

Name

Surname

Search

Back

Here, the customers can enter either or both name and surname that they need to look for. If not, they can click on 'back button' to go back to the previous menu

- (c) First name of the customer
- (d) Last name or surname of the customer
- (e) Customer's birthday
- (f) Customer's age
- (g) Customer's gender
- (h) Customer's identification card number
- (i) Customer's address and post code
- (j) Customer's telephone numbers



- (k) The applied date is the date that the customer applies for membership
  - (l) The expired date is the date that the customer will no longer be a member. The status marker will disappear. However, if he/she would like to extend his/her memberships, the front-end officer can type a new expired date here. Then the status marker will show up
  - (m) The media type is the type of video: Tape, CD, DVD, Laser Disc. It is selected for each customer so that they can rent videos for that type only
  - (n) The branch name is the name that the client belongs to. This field is fixed for each branch
  - (o) After completing all the information, the front-end officer clicks on the 'update button' in order to add the customer's data into the database
  - (p) The front-end officer clicks on the 'return to main menu' in order to process another job
- (2) Module Rent Information

This form is used to record any rental transaction from the customers. In order to insert data into the database, the front-end officer can use either the barcode reader or key-in by him/herself.

The screenshot shows a software window titled "RENT". At the top, there are fields for "Branch" (containing "Silom"), "Transaction Code" (containing "000001"), "Member Code", and "Transaction Date" (containing "6/18/99"). Below this is a section with "Movie Code" and "Movie Name" input fields, followed by an "Add to Rent" button. Underneath is a table with two columns: "Movie Code" and "Movie Name". The table body is shaded grey. Below the table are fields for "Date Return", "Total Rent", "Bonus", "Cost", "Tax" (with a dropdown showing "7"), and "Total Cost". To the right of these is a "Print Receipt" button. At the bottom is a "Return to Main Menu" button. Labels (a) through (e) point to the top header area, the "Add to Rent" button, the table, the "Print Receipt" button, and the "Return to Main Menu" button respectively.

(a) These fields are usually generated automatically.

- (1) Branch code is a fixed field that inform the code of that branch
- (2) Transaction code is also a fixed field that is a running number
- (3) Member code is a code of each member, which is input by using a barcode reader or by keying-in the customer code on the customer's member card
- (4) Transaction date is a fixed field, which is a system date

(b) The front-end officer uses the barcode reader, or keys in the video code, which is on each video. Then he/she clicks on the 'Add to Rent' button in order to record data into the database

(c) Data that is recorded into the database shows up here

(d) These fields are usually generated automatically, but it is still possible to change some information

(1) Date return is dependent on the number of rental videos. If the customer rents less than three videos, he/she can rent them for two days. If he/she rents less than five videos, but more than three videos, he/she can rent them for three days. If he/she rents less than ten videos, but more than five videos, he/she can rent them for five days. However, this front-end officer can adjust this field depending upon the situation.

(2) Total rent is the total number of rental videos

(3) Bonus is a number of free video. Usually, if the customer gets one free video for every ten rental videos. However, the shop's owner can regulate the rule by him/herself, so the front-end officer can choose the number of bonus by him/herself.

(4) Cost is the total cost of rental videos excluding tax

(5) Tax is mandatory. The front-end officer can change the tax rate when the tax rate is really changed.

(6) Total cost is the total amount of rental videos including tax

(7) After the transaction is completed, the front-end officer prints a receipt for the customer by clicking on the 'Print Receipt' button

(e) Return to the main menu for other processes

(3) Module Return Information



The screenshot shows a 'RETURN VIDEO' form within a window titled 'Dapit 3 - Video [Running]'. The form includes input fields for 'Member Code', 'Transaction Code', and 'Date'. A table with columns 'Movie Code', 'Movie Name', 'Duedate', 'Fee Charge', and 'Return' is present. At the bottom, there are fields for 'Total Overdue Charge', 'VAT', and 'Total Charge', along with 'Print Receipt' and 'Close' buttons. Annotations (a) through (d) point to specific parts of the form: (a) points to the 'Transaction Code' field, (b) points to the table, (c) points to the 'Print Receipt' button, and (d) points to the 'Close' button.

Movie Code	Movie Name	Duedate	Fee Charge	Return

This form is used when the customer comes to return videos. There are two cases here. In the first case, videos are not overdue. In the second case, some or all videos are overdue.

- (a) The transaction code is generated automatically after the front-end officer input the member code by using either the barcode reader or keying-in. Date is a system date.
- (b) This field shows all video information for that transaction. Here, the front-end officer can use the barcode reader, or type the video code into the system in order to update the status of videos. If a video is not overdue, it has no charge to the customer.

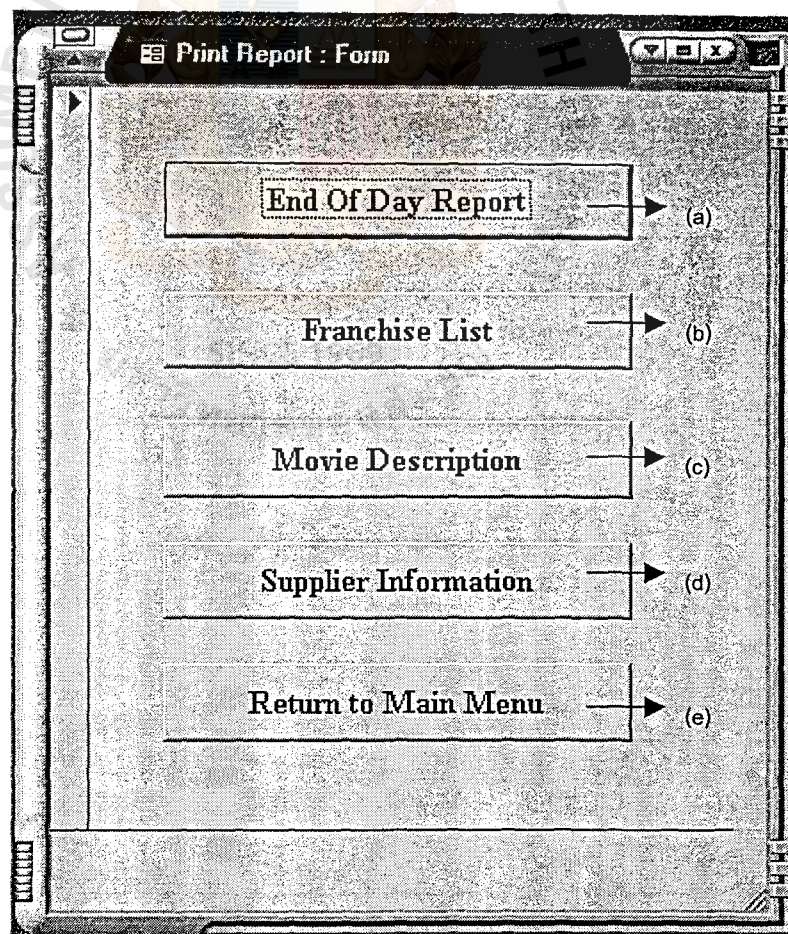
- (c) These fields are used when there is any overdue charge to the customer. The front-end officer can print a overdue receipt for him/her.
  - (d) Return to the main menu for other processes
- (4) Module Video Information

This form is used to record any video. Each video has its own code, which is unique, and is a running number. This module cannot be changed or amended by the clients themselves. They can use it for searching only.

- (a) These are the navigator buttons for the users to search, add, delete, update, and delete all video information
- (b) As mentioned, this field is generated automatically as a running number.

- (c) This field is used to input the movie name
    - (1) Sound Track is used to inform whether this video is sound track or not
    - (2) Status is used to show whether this video is available or not
  - (d) Movie type is used to inform the type of this movie
  - (e) Movie nation is used to inform the nationality of this movie
  - (f) This field is to inform how many times this video has been rented
  - (g) Return to the main menu for other processes
- (5) Module Print Report

This module is used to print needed reports for each shop.



- (a) End of day report is used to print a report at the end of each day.

However, it can set the range of day so that the shop can print past reports

The screenshot shows a window titled 'Date search : Form'. Inside the window, there are two text input fields. The first is labeled 'From:' and the second is labeled 'To:'. Below these fields are two buttons: 'Print' and 'Return to Main Menu'. The window has a standard Windows-style title bar with minimize, maximize, and close buttons.

- (b) Franchise list is used to print all the franchise branches and telephone numbers.

- (c) Movie description is used to print the needed movie information for customers.

The screenshot shows a window titled 'Search Movie : Form'. Inside the window, there are two text input fields. The first is labeled 'Movie Name in English' and the second is labeled 'Movie Name in Thai'. Below these fields are two buttons: 'Search' and 'Return to Main Menu'. The window has a standard Windows-style title bar with minimize, maximize, and close buttons.



The front-end officer helps the customer to find his/her needed movie description by typing in the name of the movie either in English or Thai. Then he/she clicks 'Search' button to find that movie.

**Movie Description : Form**

**Movie Name:** XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

**Movie Type:** XXXX

**Movie Description:**

XX

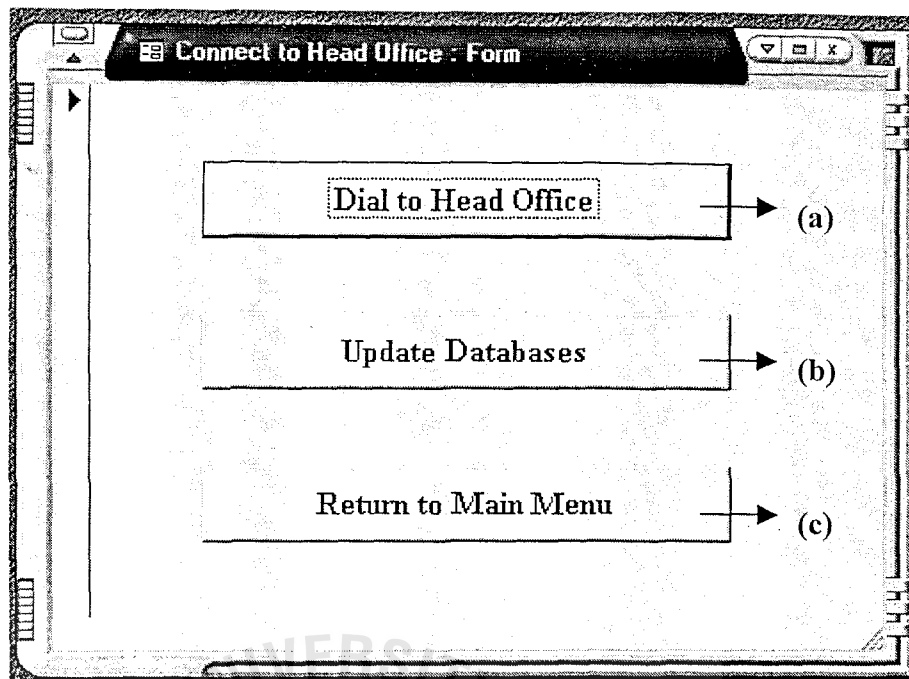
XX

**Print** **Return to Main Menu**

The screen shows the movie description the customer is looking for.

The front-end officer can print it for him/her.

- (d) This button is used to print all suppliers of YOU'RE WELCOME Video Rental Shop
  - (e) Return to the main menu for other processes
- (6) Module Connect to head office

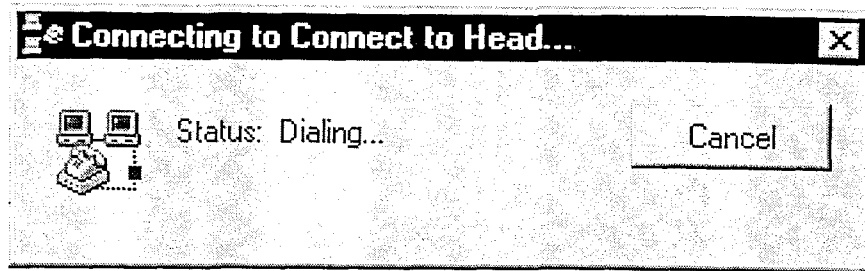


This module is used to connect to the head office database. Both clients and the head office shop can update all information of all clients. Within the connect to head office module, there are three sub-modules which are:

- (a) Dial to head office

This is used to dial the modem to the head office.

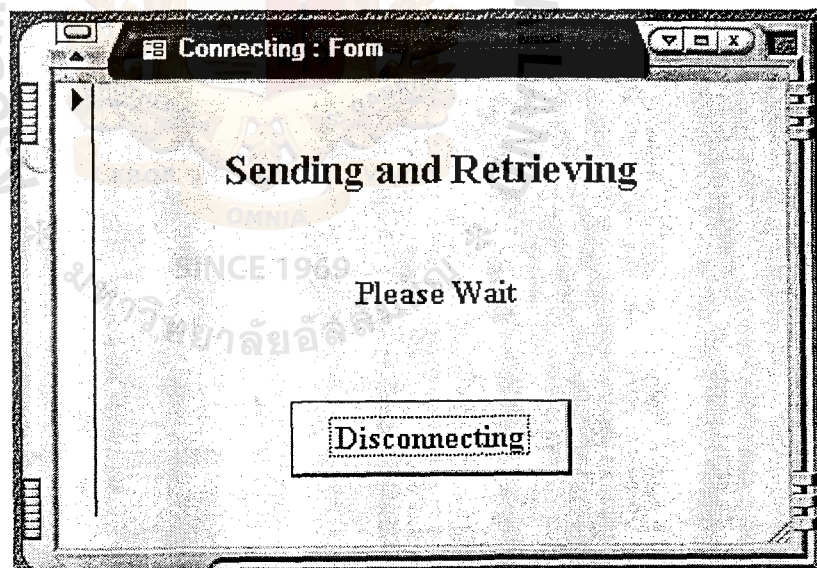




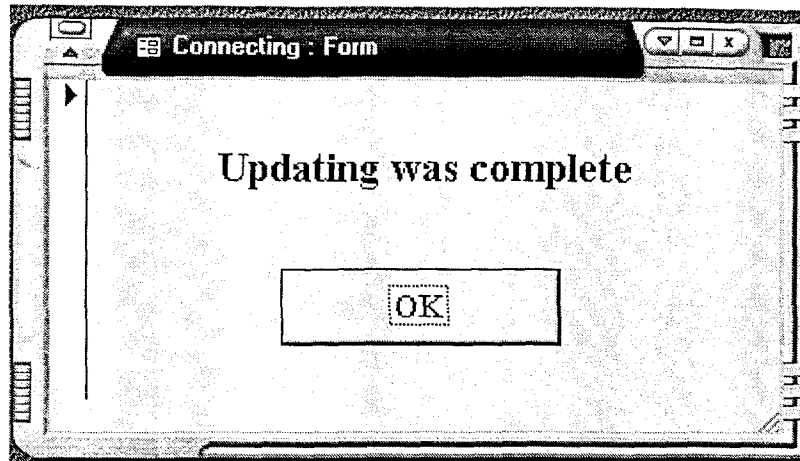
The two figures above show the step of connecting. At first, each client must enter his/her user-name and password. Then he/she starts to connect. The second figure shows that it is connecting.

(b) Update databases

After connecting to the head office, this sub-module is used to start updating the database of both client and head office.



This figure shows that the databases of both the client and the head office are updating. The client now has to wait for the next screen to show up.



This screen is used to inform that updating is already done.

The client can click on the 'OK' button in order to disconnect the line.

(c) Return to main menu

This is used to go back for other processes.

(7) Module Exit

This module is used to close the Video Rental System.

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