Video Rental Information System

By

Mr. Piyawat Lertwatananukul

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

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

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The Graduate School of Assumption University has approved this final report of the six-credit course, CS 6998 – CS 6999 System Development Project, submitted in partial fulfillment of the requirements for the degree of Master of Science in Computer Information Systems.

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ABSTRACT

This system development project presents the analysis and design of Video Rental Information System. The project is developed to solve the problems of the current existing information system that is based on the manual system. All data are stored on paper. It requires many administrative staff to maintain the system, and has to face the general problems of manual system, which is error-prone and requires a high maintenance cost. The objective of this project is to replace the manual system with a computerized system. It will reduce the number of administrative staff, solve the problem of manual system and decrease the high maintenance cost.

The study of this project begins with the required definition and analysis of the existing system. Information system analysis and design tools such as context diagrams, data flow diagrams, data dictionaries, and structure charts are used to analyze both the existing and purposed systems. Candidate solution matrix is also used to compare various alternatives in order to come up with the most effective solution. Capital budgeting models such as the payback method, the cost-benefit ratio, and the net present value are used to evaluate the purposed system.

It was found out that the new computerized system can be implemented using 10Base-T LAN with 1 server, 5 clients, and 4 printers. Software for the purposed system are Windows 2000, Microsoft Visual Basic 6.0 and Microsoft Access 2000. The payback method shows that the initial investment of the proposed system will pay for itself after 2.8 years. In terms of degree of achievement, the purposed system can process data about 20 times faster than the existing system.

To further improve the purposed system, it is recommended that a Web-based solution should be developed and implemented.

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I. INTRODUCTION

1.1 Background of the Project

Nowadays, computerized system is increasing its role in every part of business and organization. It reduces the processing time and costs of businesses. It also satisfies customers due to fast & reliable service and meets the users' requirements in utilizing the system. Moreover, it increases efficiency and effectiveness to businesses that are more competitive. Because computerized system is more important in the business, it is important to develop an appropriate system, using computer based technology to maintain and increase the position of business and customer recognition.

The project conducts 'Something Special' video rental store as a case study for developing the store information system because the current system is run manually that produces slow service. Although its service is better than others, it still cannot satisfy customers and facilitate users. In order to provide more efficient service to customers and users, it is necessary to design a new system to eliminate these problems and gain more competitive advantage of this business.

To achieve the target above, the computer technology is used to develop a new system technology that can be installed to improve the performance according to the requirements acquired from users which reduces overlapped and repeated jobs in order to spend less time during the process of service to customers.

1.2 Objectives of the Project

This project will use computer technology to improve the quality and also the scope of the video rental store information system. The objectives are as follows:

(1) To study the existing system to define the problems and users requirements.

(2) To design new computerized system that solves the problems and meets the requirements.

(3) To improve data controlling & sharing that will reduce job redundancy.

(4) To improve processing time, reduce human error, and minimize the paper work of the routine works.

(5) To increase quality of service to satisfy customers.

(6) To design user interface that is easy to use and understand for everyone.

(7) To design corresponding reports which provide highest benefits to the business.

1.3 Scope of the Project

The scope of the project is to study the existing system to find out which area should be improved, and to change from manual system to computerized system. The scope of the project will be as follows:

(1) Information Inquiry

Staff can inquire video information on the computer screen that reduces processing time to satisfy customers.

(2) Calculating Capability

By only scanning or typing the barcode of video/DVD on the computer, the staff can know the rental amount instantly.

(3) Stock Checking

The staff can immediately check video quantity in the store and received video items without manual counting.

(4) Report Generating

The staff can immediately produce the management reports upon their manager requests.

1.4 Deliverables

The deliverables of the project will include the following:

(1) Program to manage information corresponding to the system

(2) Program to inquire member information

(3) Program to check rental status of member

(4) Program to search video item

(5) Program to check video stock

(6) Full Attribute Entity Relationship Diagram

(7) Data Flow Diagram

(8) Data Dictionary

1.5 Project Plan

The project plan consists of three main phases that can be represented in term of Gantt Chart as shown in Figure 1.1. The details are as follows:

(1) System Analysis Phase:

(a) Define the objective and scope of the project.

(b) Study the existing system.

(c) Identify the existing system problems.

(d) Develop Context Diagram.

(e) Develop Data Flow Diagram.

(f) Define the new system requirements.

(g) Cost and Benefit Analysis.

(2) System Design Phase:

(a) Setting New System Management Policies.

(b) Database Design.

(c) Data modeling.

(d) Network Design.

(e) Input and Output Design.

(3) System Implementation Phase:

Implementation includes all those activities that take place to convert from the old system to the new system.

(a) Hardware Installation.

(b) Hardware and Network Testing.

(c) Software Installation.

(d) Software and System Testing.

(e) Paralleling and System Conversion.

(f) Training system users.

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No.	Task Name
	I. System Analysis
1	Define the Objective and Scope
2	Study the Existing System
3	Identify the Existing Problems
4	Develop Context Diagram
5	Develop Data Flow Diagram
6	Define the New System requirement
7	Cost & Benefit Analysis
	II. System Design
8	Report Design
9	Database Design
10	Network Design
11	Program Design
	III. System Implementation
12	Coding
13	Testing
14	Hardware Instalation
15	Software Installation
16	System Conversion

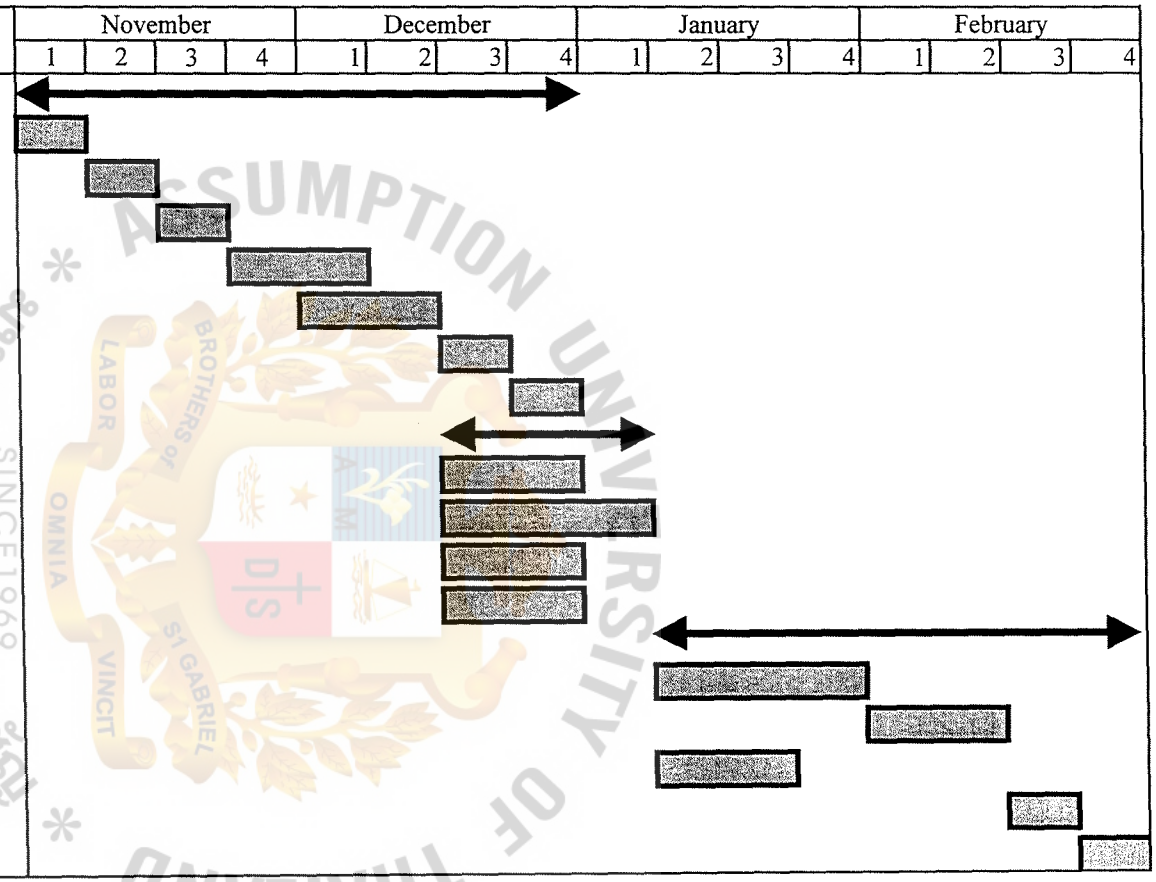

Figure 1.1. Project Plan of Video Rental Information System.

II. THE EXISTING SYSTEM

2.1 Background of the Organization

'Something Special' video rental store provides a variety of videos for customers. It caters to various kinds of viewer providing Action, Comedy, or Chinese films. To become profitable and competitive store, satisfying customers with good service is very important.

2.1.1 Vision of Something Special video rental store

(1) Providing service to various groups of customers.

(2) Providing a variety of quality video media for customers.

(3) Providing customers with convenient service.

(4) Attracting customers and maximum business opportunity.

(5) Managing cash flow effectively to achieve maximum profit.

(6) Producing maximum work efficiency.

(7) Providing a meaningful opportunity for staff to be enthusiastically involved and to take pride in their work.

2.1.2 Service Type

(1) Video Inquiry Service.

Staff helps customers to find the video required and able to find out which media (Video tape, VCD, DVD) is/are available.

(2) Video Briefing Service.

Staff tells the brief story of the film to customers.

(3) Provide video suggestions for any customer.

Staff introduces the blockbuster films to customers.

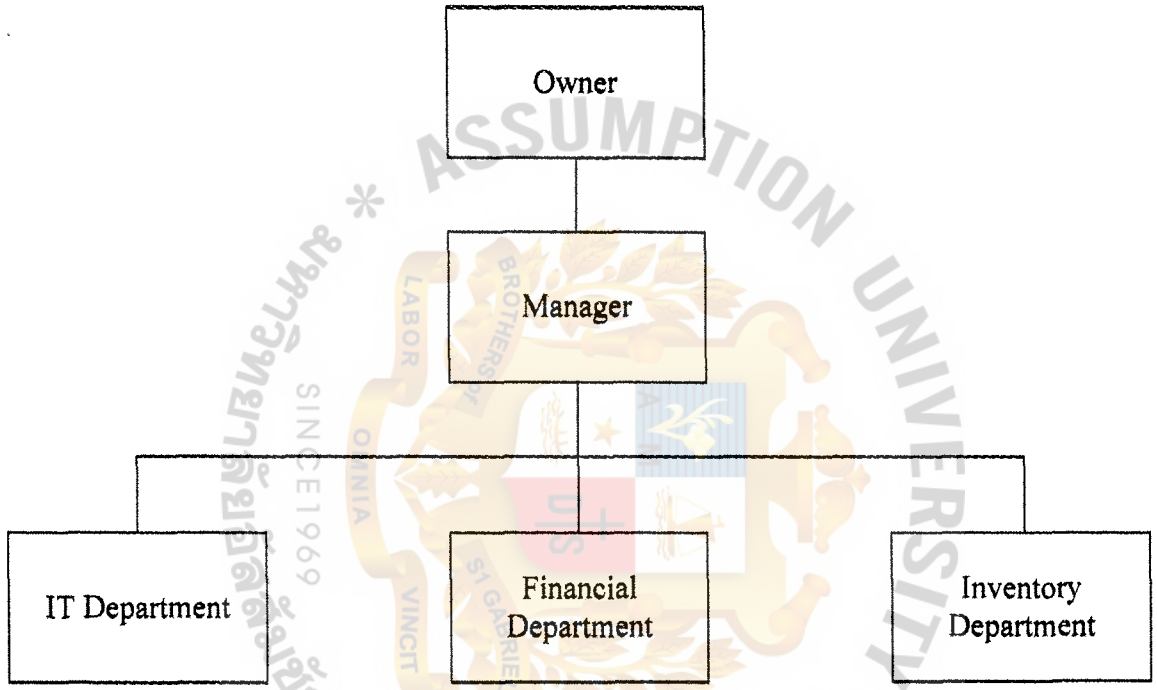

Figure 2.1. Organization Chart of Something Special Video Rental Store.

From the organization chart shown in Figure 2.1, the job description of each position will be as following:

(1) Owner

(a) Verify financial transactions of the store

(b) View management reports.

(2) Manager

(a) Control all operations within the video rental store.

(b) Generate daily reports.

(c) Send management reports to the owner.

(d) Examine the accuracy of all reports and transactions.

(e) Control the work of staff.

(3) Computer Unit

(a) Link information between server and clients.

(b) Back up any information and transactions of the store.

(c) Print management reports.

(4) Financial Unit

(a) Create customer rental transactions.

(b) Create customer receipts.

(c) Generate financial transaction for the manager.

(5) Inventory Control Unit

(a) Check video media in the store.

(b) Create rental status.

(c) Check the accuracy of the returned video items from customers.

(d) Check non-returned video items which are beyond their due dates.

2.2 Current Problems and Areas for Improvement

2.2.1 Problems and Opportunities

(1) The processing / response time between customers and our staff is too long.

(2) There is currently data redundancy in the database.

(3) The store must hire more staff to serve the customers, which requires more money than computer-based service.

(4) When the customers want to inquire information, staff take long time to search them. It is very inconvenient and the store may lose customer.

(5) The system spends a lot of time to update both current and new member.

(6) Staff must calculate the rental transactions by themselves. It is possible that error occurs because of their wrong calculation.

(7) Some information is known by only one staff, there is no information to share or exchange among staff. So some staff have no or little information in answering the customers' questions.

(8) There is no management report for the owner and manager to check the correctness of conducting the business.

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2.2.2 Problem Statements

Table 2.1. Problem Statements Matrix.

Brief Statements of Problem, Opportunity, or Directive	Urgency	Visibility	Annual Benefits (Baht)	Priority or Rank	Proposed Solution
1. The processing / response time between customer and our staff is too long.	-	High	800,000	2	New Development
2. There is currently data redundancy in the database.	1.5 month	Low	300,000	1	New Development
3. The store must hire more staff to serve the customer, which requires much more money than computer-based service.	3 months	Medium	500,000	2	New Development
4. When the customers want to inquire information, staff take long time to search them. It is very inconvenient and the store may lose customers.	-	High	Unknown	2	New Development
5. The system spends a lot of time to update both current and new member.	4 months	Medium	900,000	3	Future Version of newly developed system

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Table 2.1. Problem Statements Matrix (Continued).

Brief Statements of Problem, Opportunity, or Directive	Urgency	Visibility	Annual Benefits (Baht)	Priority or Rank	Proposed Solution
6. Staff must calculate the rental transactions by themselves. It is possible that error occurs because of their wrong calculation.	4 months	High	500,000	2	New Development
7. Some information is known by only one staff, there is no information to share and exchange among staffs. So some staff have no or little information to answer the customers' questions.	4 months	Medium	300,000	1	New Development
8. There is no management report for the owner and manager to check the correctness of conducting the business.	4 months	Medium	700,000	3	New Development

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2.2.3 Problems, Opportunities, Objectives, and Constraints Matrix

Table 2.2. Problems, Opportunities, Objectives, and Constraints Matrix.

Cause and Effect Analysis		System Improvement Objectives	
Problem or Opportunity	Causes and Effects	System Objective	System Constraint
1. The processing / response time between customer and our staff is too long.	1. When customers send their request to staff, staff must find the answer by themselves. This is slower than computerized system. 2. The number of customers that the staff can serve at the same time is limited.	1. Enable staff to find the answer from the computer. 2.Enable staff to respond the requests faster.	1. Any developed system must be compatible with the Microsoft Windows 2000.
2. There is currently data redundancy in the database.	1. The problems of the database are inserting, deleting, and updating information. 2. The redundancy wastes the database space. 3. Information of the store is not stored in a single source.	1. Split the database into 5th normal form. 2. Reduce or no redundancy in the database.	1. The new system is designed for Microsoft Access or Database Server.

Table 3.3. Feasibility Analysis Matrix.

Feasibility Criteria	Wt.	Candidate1	Candidate2	Candidate3
Operational Feasibility Functionality: A description of to what degree the candidate would benefit the organization.	30%	Fully support user required functionality. Score: 100	Support user required functionality but need to modify some functions. Score: 90	Support business requirements but low performance and security. Score: 70
Technical Feasibility Technology: A description of the maturity of the technology used in each candidate. Expertise: An assessment of the technical expertise needed to develop, operate, and maintain the candidate system.	30%	Required to hire or train Microsoft SQL Server 2000 expertise to perform modifications for integration requirements. Score: 50	Microsoft Access is widely used. Microsoft Visual Basic is a mature technology based on version number. Although current technical staff has only Powerbuilder experience, the senior analysis who saw the MS Visual Basic demonstration and presentation have agreed the transition will be simple and finding experienced VB programmers will be easier than finding Powerbuilder programmers and at a much cheaper cost. Score: 90	In-House database software is easy to learn and operate. Also it is almost no cost at all, as freeware / shareware. Score: 80

Table 2.2. Problems, Opportunities, Objectives, and Constraints Matrix (Continued).

Cause and Effect Analysis		System Improvement Objectives	
Problem or Opportunity	Causes and Effects	System Objective	System Constraint
6. Staff must calculate the rental transactions by themselves. It is possible that error occurs because of their wrong calculation.	1. The rental amount must be calculated manually. 2. Staff may calculate wrong amount.	1. Reduce the mistake of calculating amount.	1. The new system can calculate amount accurately.
7. Some information is known by only one staff, there is no information to share and exchange among staffs. So some staff have no or little information to answer the customers' questions.	1. Customers are not satisfied with the service. 2. It decreases customer intention and royalty.	1. Increase customer satisfaction. 2. Facilitate staffs to acquire information easily and instantly.	1. The new system must be more convenient to customers and staff.
8. There is no management report for the owner and manager to check the correctness of conducting.	1. The current system has no ad-hoc report.	1. Provide ad-hoc reporting and inquiry feature for users.	1. The new system must be more convenient to staff.

2.3 Existing System

The existing system is the manual system. Any information such as video, member, rental transaction, video stock are recorded on paper or log book by pen. Also, searching information, generating a rental / late fee receipt, checking video availability, checking rental status of member are generated by human. In addition, staff has to calculate the rental amount manually.

There is no computerized system, no database management system (DBMS), or no network application to support our business. All activities are generated by staff. Staff search, insert, delete, and update information by themselves. Furthermore, they also manually check video stock and create the rental receipt as well as add / update member.

The existing system can be illustrated in The Context Data Flow Diagram and Data Flow Diagram as shown in Figures A.1 and A.2 in Appendix A respectively.

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III. THE PROPOSED SYSTEM

3.1 System Specification

After studying the existing system's process and identifying the problems of the system, the next step is to analyze and design the proposed system.

According to the previous chapter, 'Something Special' Video rental store now requires an effective system, which can facilitate the various processes of its service, and solve the problems occurring from the existing manual system.

In order to achieve the goals, the new proposed Information System should have the components as follows:

(1) Design a database which has no data redundancy, high efficiency, and security control.

(2) Design a new system using computer technology that should allow users to input information and respond with output.

(3) The new system can generate corresponding reports to owner and manager.

(4) The new system needs a secure system that only authorized people can access.

(5) The new system should possess user friendly interface and be easy to use.

(6) The new system should define the privilege of each level of staff in reading, inserting, deleting, and updating information.

(7) The new system can increase customer satisfaction.

(8) Provide staff with management tools on the computerized system to search and view information. This increases the work efficiency.

(9) Staff can inquire information faster and better.

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(10) The new system is able to calculate the rental / fee amounts accurately.

(11) Staff can check the stock of remaining video items instantly and correctly.

3.2 System Design

The system design involves developing technical design specifications that will guide the construction and implementation of the new system. To complete the design phase, the system designer must complete the following tasks:

Application Architecture

An application architecture specifies the technologies to be used to implement one or more information systems in terms of Data, Process, Interface, and how these components interact and communicate across a network. It serves as outline for detailed design, construction, and implementation.

Network Architecture

(1) File Server System

A file server system is a LAN-based solution in which a server computer hosts only the data layer. All other layers of the information system application are implemented on the client PC.

File server systems can store data on a server, but the entire file or table must be transported to the client to do anything with it.

Note: Since our system has to serve many clients and also the projected of expand the store. Also the store needs a very stable & flexible system.

The file server system architecture is not considered.

(2) Client/Server System

A client/server system is a solution in which the presentation, presentation logic, application logic, data manipulation, and data layers are distributed between client PCs and one or more servers.

Client/Server systems separate the application and data manipulation logic. The server can add or extract records directly on the server, and only pass the necessary data (as opposed to the entire file or table) back to the client for subsequent processing.

Note: We use the Client/Server system as the network architecture for the project. The reasons that support our decisions are as follows:

(a) Client/Server system is practical for modern database applications. Alike, our video rental store system has database to be shared by users that have to be updated everyday.

(b) This architecture is typical of that used for many PC database engines such as Microsoft Access. The new proposed system uses Microsoft Access in storing data.

(c) Client/Server tools can be used to develop fairly robust applications for individuals and work groups environment.

(d) Client/Server databases can be used to rapidly construct prototypes for more robust architectures.

(3) Network Computing System

A network computing system is a multi-tiered solution in which the presentation and presentation logic layers are implemented in client-side web browsers using content downloaded from a web server.

Network computing is based on Internet and Intranet technology. It distributes data, data manipulation, application logic, and presentation logic to servers, and only the presentation to the clients-the latter to be displayed in the context of a browser.

Note: As our system is not executed from a web server, this architecture is not considered.

Data Architecture

The data architecture can be illustrated as The Entity Relationship Diagram as shown in Appendix B. The Entity Relationship Diagram shows the database design about data field, data type, data domain, attribute, primary key, and foreign key, etc.

This system uses Microsoft Access 2000 as the database management system to store, insert, delete, and update records on the database. After sending SQL statements to Access, Access sends the result back to the data.

With relational database technology, Microsoft Access is responsible for storing, inserting, deleting, and updating data including backing up, recovery, and providing security of the database.

Note: Since this video rental store system is relatively limited in variables database, we can use Microsoft Access as database server that saves costs of installing the new system.

Interface Architecture

The client can input the data within online mode for processing and keeping into the database server. Other clients can retrieve the actual data as well. The data is shared to all clients via online processing that increases the efficiency of services to users.

Graphical User Interface (GUI) allows user to access the database via GUI. The interface is important to the system, so the applications are of similar look and feel using GUI model. The input/output screens include the supporting system and repository based programming as shown in Appendix C.

This system uses Microsoft Access 2000 and Microsoft Visual Basic 6.0 because both programs can work together efficiently and effectively.

Process Architecture

Microsoft Access 2000 stores data in the database which is used to run with Microsoft Visual Basic.

Microsoft Visual Basic 6.0 is used to construct the application program which can run on PC Client based on Windows 2000.

The process architecture can be shown in the data flow diagram as shown in Appendix A. The Data Flow Diagram is the flow of data that depicts the processes of the Video Rental store Information System. The Context Data Flow Diagram and Functional Decomposition Data Flow Diagram contain the system as a whole that is shown in figure A.3 and A.4 respectively. Level 0 Data Flow Diagram presents the subsystem of the system as shown in figure A.5. Level 1 Data Flow Diagram deeply depicts the processes in each subsystem as shown in figure A.6-A.9.

3.3 Feasibility Analysis

Feasibility is a measure of how beneficial the development of an information system would be to an organization. Feasibility analysis is the process which measures the feasibility.

There are four feasibility tests: operational, technical, schedule, and economic.

Operational feasibility is a measure of problem urgency or solution acceptability. It includes a measure of how the end-user and managers feel about the problems or solutions.

Technical feasibility is a measure of how practical solutions are and whether the technology is already available within the organization. If the technology is not available to the firm, technical feasibility also looks at whether it can be acquired.

Schedule feasibility is a measure of how reasonable the project schedule or deadline is.

Economic feasibility is a measure of whether a solution will pay for itself or how profitable a solution will be. For management, economic feasibility is the most important of the four measures.

(1) Candidate Systems Matrix

A candidate systems matrix is used to provide overview characteristics concerning the portion of the system to be computerized, the business benefits, and software tools and applications needed.

Table 3.1. Candidate System Matrix.

Characteristics	Candidate1	Candidate2	Candidate3
Portion of System Computerized: Brief description of that portion of the system that would be computerized in this candidate.	Information Inquiry System, Order System, Backorder System, and Report System are customized on LAN.	Same as candidate1	Information Inquiry System, Order System, Backorder System, and report are customized on stand alone computer.
Benefits: Brief description of the business benefits that would be realized for this candidate.	Increase the speed of processing, Save cost of hiring staffs, Gain competitive advantage, Enhance high performance	Fully supports user requirements and business process.	Save system development cost and time.
Servers and Workstations: A description of the servers and workstations needed to support this candidate.	Microsoft Windows XP Professional for server and Microsoft Windows XP Home Edition for workstation.	Microsoft Windows 2000 Server for server and Microsoft Windows 2000 for workstation.	Linux (new version) for server and Microsoft Windows 98 Second Edition for workstation.

Table 3.1. Candidate System Matrix (Continued).

Characteristics	Candidate1	Candidate2	Candidate3
Software Tools Needed: Software tools needed to design and build the candidate (e.g., database management system, languages, etc.) Not generally applicable if applications software packages are to be purchased.	Microsoft SQL Server 2000, Microsoft Visual Basic 6.0	Microsoft Visual Basic 6.0, Microsoft Access 2000	In-House database tools
Method of Data Processing: Generally some combination of online, batch, deferred batch, remote batch, and real-time.	Client/Server	Client/Server	Client/Server
Output Devices and Implications: A description of output devices that would be used, special output requirements (e.g., network, preprinted forms, etc.), and output considerations (e.g., timing constraints).	Laser Printer for reports and Dot Matrix Printer for customer receipt.	Same as candidate 1	Dot Matrix Printer for both report and customer receipt.

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Table 3.1. Candidate System Matrix (Continued).

Characteristics	Candidate1	Candidate2	Candidate3
Input Devices and Implications: A description of input methods to be used, input devices (e.g., keyboard, mouse, etc.), special input requirements (e.g., new or revised forms from which data would be input), and input considerations (e.g., timing of actual inputs).	Keyboard & mouse	Keyboard & mouse	Keyboard & mouse
Storage Devices and Implications: Brief description of what data would be stored, what data would be accessed from existing stores, what storage media would be used, how much storage capacity would be needed, and how data would be organized.	Microsoft SQL Server 2000	Microsoft Access 2000	In-House database tools

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Table 3.2. Alternative Candidate Requirement Analysis.

Characteristic	Candidate 1	Candidate 2	Candidate 3
Portion of System Computerized			
- LAN	X	X	
- Stand alone computer			X
Benefit			
- Increase processing Speed	X		
- Save Cost	X		X
- Competitive advantage	X		
- High performance	X		
- Fully support business process		X	
Server			
- Microsoft Windows XP Professional / 2000 Server	X	X	
- Linux OS			X
Workstation			
- Microsoft Windows XP / 2000	X	X	
- Microsoft Windows 98			X
Software Tools			
- Microsoft SQL Server 2000	X		
- Microsoft Visual Basic 6.0	X	X	
- Microsoft Access 2000		X	
Method of Data Processing			
- Client/Server	X	X	X
Output Devices and Implications			
- Laser Printer	X	X	
- Dot Matrix Printer	X	X	X
Input Devices and Implications			
- Keyboard	X	X	X
- Mouse	X	X	X
Storage Devices and Implications			
- Microsoft SQL Server 2000	X		
- Microsoft Access 2000		X	

Note: X means the characteristic that each candidate processes.

(2) Feasibility Analysis Matrix

Feasibility analysis matrix complements the candidate systems matrix with an analysis and ranking of the candidate systems. Payback analysis defines how long it will take for a system to pay for itself. Net present value analysis is preferred because it can compare alternatives with different lifetimes.

From Table 3.3, we use to rank the candidates to know what choice is the best by scoring and weighting the feasibility criteria. For this project, we can summarize the best choice is the candidate 2 that can fully support user requirements when compared with other candidates.

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Table 2.2. Problems, Opportunities, Objectives, and Constraints Matrix (Continued).

Cause and Effect Analysis		System Improvement Objectives	
Problem or Opportunity	Causes and Effects	System Objective	System Constraint
3. The store must hire more staff to service the customer, which requires much more money than computer-based service.	1. The cost of hiring staff is expensive and increasing over time. 2. One staff can service only one customer at a time.	1. Lower the cost of hiring staffs.	1. The new system must be more convenient to customers and staff. 2. The new system must be able to perform all functions that staff can do in the existing system.
4. When the customers want to inquire information, staff take long time to search them. It is very inconvenient and the store may lose customers.	1. Staff must find the answer to customers without the computer.	1. Facilitate staff to inquire the answer quickly.	1. The new system must be more convenient to customers and staff.
5. The system spends a lot of time to update both current and new member.	1. The member information must be managed manually. 2. Updating must be recorded manually. 3. Staff may not insert or edit information immediately. It is possible that they forgot to do so.	1. Allow staff to input the changes of customer information real-time. 2. Decrease time required by Manager.	1. The new system must have security control for updating information. 2. There is a limit in updating for each level of staff.

Table 3.3. Feasibility Analysis Matrix (Continued).

Feasibility Criteria	Wt.	Candidate1	Candidate2	Candidate3
Economic Feasibility	30%			
Cost to develop: Baht		Approximately 2,442,500	Approximately 1,357,500	Approximately 1,217,500
Payback period (discounted):		Approximately 4 Years 2 Months	Approximately 2 Years 8 Months	Approximately 2 Years 6 Months
Net present value (Baht)		Approximately 392,686.00	Approximately 1,486,691.75	Approximately 1,626,691.75
Detailed Calculations:		See Appendix I	See Appendix I	See Appendix I
		Score: 70	Score: 80	Score: 90
Schedule Feasibility An assessment of how long the solution will take to design and implement.	10%	9 months	4 months	4 months
		Score: 60	Score: 90	Score: 90
Ranking	100%	72	87	85

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3.4 Hardware and Software Requirement

Microsoft has provided a lot of software, which can transform a normal Intel-based PC server, Application server and Database server. The software is designed to integrate with Microsoft Windows 2000 Server, and is also packed together as Microsoft Back Office suite.

The client machines should have hardware specification higher enough to run Microsoft Windows 2000.

This section is when the hardware and software are used in the proposed system. With the proposed system, we require only one server to provide full functions. The following tables contain the hardware and software requirements for the system.

(1) Hardware Requirement

Table 3.4. Hardware Specification for the Network Server.

Hardware	Specification
CPU	Intel Pentium III 1GHz or higher
Cache	512 KB
Memory	SDRAM 256 MB
Hard Disk	40 GB
CD-ROM Drive	40 X
Floppy Drive	3.5" 1.44 MB
Network Adapter	Ethernet 10-Base T
Display Adapter	TNT 2
Monitor	17" Monitor
Printer	Laser Printer
UPS	1,000 VA

Table 3.5. Hardware Specification for the Client.

Hardware	Specification
CPU	Intel Pentium III 700 MHz or higher
Cache	256 KB
Memory	SDRAM 128 MB
Hard Disk	10 GB
CD-ROM Drive	40 X
Floppy Drive	3.5" 1.44 MB
Network Adapter	Ethernet 10-Base T
Display Adapter	TNT 2
Monitor	15" Monitor
Printer	Dot Matrix Printer

(2) Software Requirement

Table 3.6. Software Specification for the Network Server.

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

Table 3.7. Software Specification for the Client.

Software	Specification
Operating System	Microsoft Windows 2000
Application Software	Microsoft Office 2000

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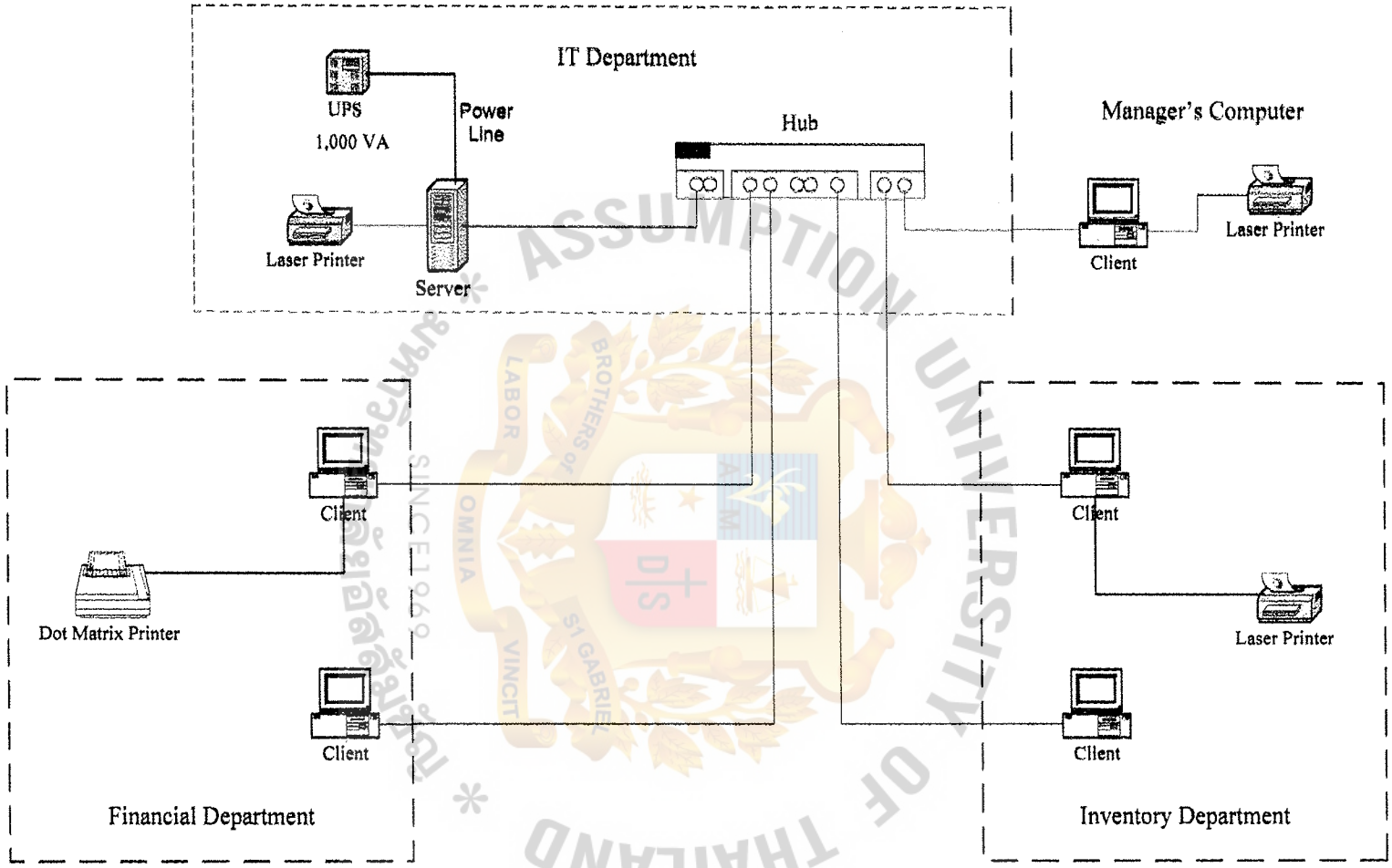

Figure 3.1. Network Configuration of Something Special Video Store.

3.5 Security and Control

Since this Video rental store Information System is based on the computer technology, one of the most important considerations in the system development is security. Staff can capture any information from the computerized system. Therefore, it is crucial to be careful at this point to keep the data security.

(1) Password

When staff login to the system, they must enter their staff ID and password first. If incorrect password, staff cannot access the system. Each staff has his/her own password.

(2) Privilege

Since Information is important to the system, there is a need to protect some confidential information from the staff. Different levels of staff have different searching, viewing, inserting, deleting, and updating capability.

The manager can insert, delete, and update all information in the database whereas staff can update only the member information.

(3) Physical Security

The staff are not allowed to eat or smoke while working with the computer because these actions can cause damage to the computer.

UPS is used to supply a power in case electrical power is turned off.

(4) Auditing

Manager should validate reports and output and test the authenticity and accuracy of data and information because users often have a tendency to trust system more than they should.

(5) Back up and Recovery

All data are printed in the backup computer at the end of the day and kept in a secure place.

(6) Virus Scan

Viruses are also mainly concerned with information destruction. So we need to prevent the virus by installing the Virus scan software. It can detect and clean the virus out of the system. However, we need to update the virus definition every week in order to be able to cover new viruses.

3.6 Cost and Benefit Analysis

To analyze economic feasibility, we itemize benefits and costs. Benefits are either tangible or intangible. Costs fall into two categories: development cost and operating cost. Development costs are onetime costs associated with analysis, design, and implementation of the system. Operating costs may be fixed over time or variable with respect to system usage.

Given the costs and benefits, economic feasibility is evaluated by the techniques of cost-benefit analysis. Cost-benefit analysis determines if a project or solution will be cost-effective (if lifetime benefits will exceed lifetime costs).

(1) Cost of Existing Manual System

Table 3.8. Cost of Existing Manual System, Baht.

Cost Items	Years				
	1	2	3	4	5
Fixed Cost					
Hardware Cost:					
Calculator 3 units @ 2,000	6,000.00	-	-	-	-
Total Fixed Cost	6,000.00	-	-	-	-
Operating Cost					
Salary:					
Manager 1 person @ 15,000	15,000.00	16,500.00	18,150.00	19,965.00	21,961.50
Member Staff 3 person @ 8,000	24,000.00	26,400.00	29,040.00	31,944.00	35,088.40
Accounting Staff 2 persons @ 8,000	16,000.00	17,600.00	19,360.00	21,296.00	23,425.60
Operation Staff 3 persons @ 8,000	24,000.00	26,400.00	29,040.00	31,944.00	35,088.40
Total monthly salary cost	79,000.00	86,900.00	95,590.00	105,149.00	115,563.90
Total Annual Salary Cost	948,000.00	1,042,800.00	1,147,080.00	1,261,788.00	1,386,766.80
Office Supplies & Miscellaneous:					
Stationary Per Annual	20,000.00	22,000.00	24,200.00	26,620.00	29,282.00
Paper Per Annual	35,000.00	38,500.00	42,350.00	46,585.00	51,243.50
Utility Per Annual	40,000.00	44,000.00	48,400.00	53,240.00	58,564.00
Miscellaneous Per Annual	20,000.00	22,000.00	24,200.00	26,620.00	29,282.00
Total Annual office Supplies & Miscellaneous Cost	115,000.00	126,500.00	139,150.00	153,065.00	167,371.50
Total Annual Operating Cost	1,053,000.00	1,169,300.00	1,286,230.00	1,414,853.00	1,554,138.30
Total Manual System Cost	1,059,000.00	1,169,300.00	1,286,230.00	1,414,853.00	1,554,138.30

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

Year	Total Existing Manual Cost	Accumulated Existing Manual Cost
1	1,059,000.00	1,059,000.00
2	1,169,300.00	2,228,300.00
3	1,286,230.00	3,514,530.00
4	1,414,853.00	4,929,383.00
5	1,554,138.30	6,483,521.30
Total	6,483,521.30	-

(2) Cost of Proposed Computerized System

Table 3.10. Proposed Computerized System Cost, Baht.

Cost Items	Years				
	1	2	3	4	5
Fixed Cost					
Hardware Cost:					
Computer Server Cost	35,000.00	35,000.00	35,000.00	35,000.00	35,000.00
Personal Computer 5 units @ 21,600	108,000.00	108,000.00	108,000.00	108,000.00	108,000.00
Laser Printer 3 units @ 10,000	30,000.00	30,000.00	30,000.00	30,000.00	30,000.00
Dot Matrix Printer 1 unit @ 9,000	9,000.00	9,000.00	9,000.00	9,000.00	9,000.00
UPS 1,000 VA	1,500.00	1,500.00	1,500.00	1,500.00	1,500.00
Hub	3,300.00	3,300.00	3,300.00	3,300.00	3,300.00
Total Hardware Cost	186,800.00	186,800.00	186,800.00	186,800.00	186,800.00
Maintenance Cost:					
Maintenance Cost	-	-	30,000.00	28,500.00	27,075.00
Total Maintenance Cost	-	-	30,000.00	28,500.00	27,075.00
Software Cost:					
Microsoft Windows 2000 Server	5,000.00	5,000.00	5,000.00	5,000.00	5,000.00
Microsoft Windows 2000	3,000.00	3,000.00	3,000.00	3,000.00	3,000.00
Total Software Cost	8,000.00	8,000.00	8,000.00	8,000.00	8,000.00
Implementation Cost:					
Basic Training Cost	15,000.00	-	-	-	-
Advanced Training Cost	10,000.00	-	-	-	-
Set up Cost	15,000.00	-	-	-	-
Total Implementation Cost	40,000.00	-	-	-	-
Office Implementation Cost:					
Calculator 1 units @ 2,000	2,000.00	-	-	-	-
Total Office Implementation	2,000.00	-	-	-	-
Total Fixed Cost	236,800.00	194,800.00	224,800.00	223,300.00	221,875.00
Operating Cost					
People Ware Cost:					
Manager 1 person @ 15,000	15,000.00	16,500.00	18,150.00	19,965.00	21,961.50
Accounting Staff 1 person @ 8,000	8,000.00	8,800.00	9,680.00	10,648.00	11,712.80
Member Staff 3 persons @ 8,000	24,000.00	26,400.00	29,040.00	31,944.00	35,088.40
Operation Staff 2 persons @ 8,000	16,000.00	17,600.00	18,320.00	20,152.00	22,167.20
Total monthly salary cost	63,000.00	69,300.00	75,190.00	82,709.00	90,929.90
Total Annual Salary Cost	756,000.00	831,600.00	902,280.00	992,508.00	1,091,158.80
Office Supplies & Miscellaneous:					
Stationary 1,000 Per Month	12,000.00	13,200.00	14,520.00	15,972.00	17,569.20
Paper 2,000 Per Month	24,000.00	26,400.00	29,040.00	31,944.00	35,138.40
Utility 3,000 Per Month	36,000.00	39,600.00	43,560.00	47,916.00	52,707.60
Miscellaneous 1,000 Per Month	12,000.00	13,200.00	14,520.00	15,972.00	17,569.20
Annual office Supplies & Miscellaneous Cost	84,000.00	92,400.00	101,640.00	111,804.00	122,984.40
Total Operating Cost	840,000.00	924,000.00	1,003,920.00	1,104,312.00	1,214,143.20
Total Computerized System Cost	1,076,800.00	1,118,800.00	1,228,720.00	1,327,612.00	1,436,018.20

Table 3.11. Five Years Accumulated Proposed System Cost, Baht.

Year	Proposed Cost	Accumulated Proposed Cost
1	1,076,800.00	1,076,800.00
2	1,118,800.00	2,195,600.00
3	1,228,720.00	3,424,320.00
4	1,327,612.00	4,751,932.00
5	1,436,018.20	6,187,950.20
Total	6,187,950.20	-

(3) Comparison of Accumulated Existing Cost and Proposed Cost

Table 3.12. Comparison of Accumulated Existing Cost and Proposed Cost, Baht.

Year	Accumulated Existing Cost	Accumulated Proposed Cost
1	1,059,000.00	1,076,800.00
2	2,228,300.00	2,195,600.00
3	3,514,530.00	3,424,320.00
4	4,929,383.00	4,751,932.00
5	6,483,521.30	6,187,950.20

(4) Break-even Analysis

Break-even analysis shows the point where the accumulative cost of the existing system is equal to the accumulative cost of the proposed system.

From figure 3.2, the cost of the proposed system in the beginning is higher than the cost of the existing system because we must invest the development cost of the new system at the first year. However, for the long time, the cost of the proposed system is lower because the new system can reduce the annual cost.

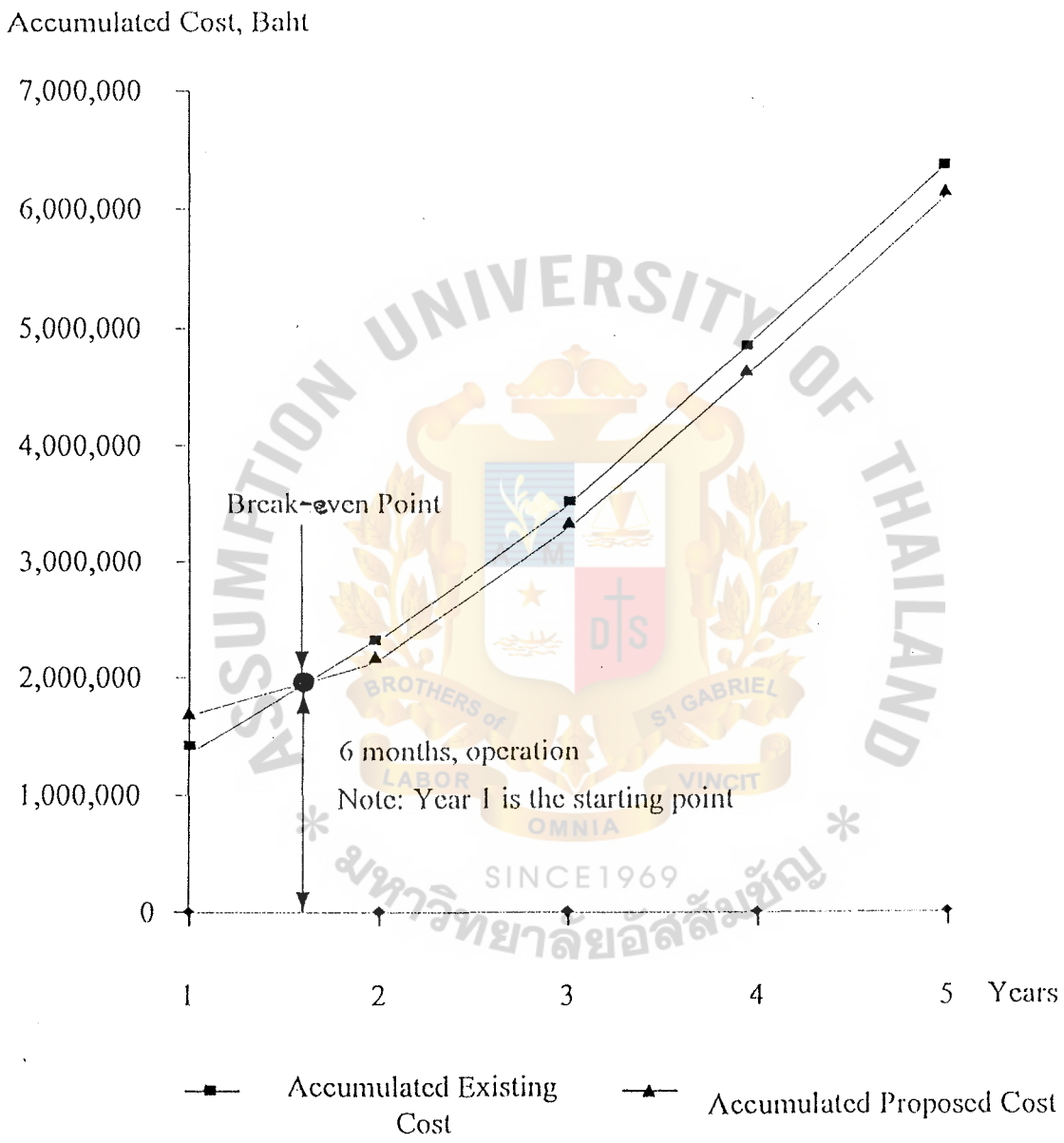

Figure 3.2. Break-even Analysis.

IV. PROJECT IMPLEMENTATION

4.1 Overview of Project Implementation

System implementation is the construction of the new system and the delivery of the new system into production (daily operation). It can be divided into 2 phases-construction phase and delivery phase.

Construction phase contains developing and testing network, database, new program and also includes installing and testing new software package. Delivery phase is like converting from the old system into the new system, conducting a system test, installing database, preparing a conversion plan and training system users.

(1) Physical Entity Relationship Diagram

A physical entity relationship diagram is the physical model or blueprint for a database. It represents the technical implementation of the logical data model as depicted in Figure B.4 in Appendix B.

(2) Physical Data Flow Diagram

Physical data flow diagrams model the technical and human design decisions to be implemented as part of an information system. They communicate technical choices and other design decisions to those who will actually construct and implement the system. They are illustrated in Figure A.10-A.14 in Appendix A.

4.2 Coding

Microsoft Visual Basic 6.0 is used to develop the new system of this project. It gathers all information into forms and integrates them with the database that enables users to perform transaction and query information in other related databases.

4.3 Test Plan

Test plan is divided into three levels on the proposed system:

(1) Stub testing is the test performed on individual modules, whether they are main program, block, or paragraph.

The system has eight major modules that are tested: Check Member Validity, Calculate Rental Total, Create Receipt, Check Items In Stock, Check Late Status, Check Received Video Items, Generate Management Reports, and Print Management Reports.

(2) Unit or program testing is a test whereby all the modules that have been coded and stub tested are tested as an integrated unit.

We need to test on information request, problem, new solution, inquiry, search losses and responses to customer process.

(3) Systems testing ensures that application programs written in isolation work properly when they are integrated into the total system.

First, Username and Password Testing by trying to login wrong username or password and observe the result later. Next, Application Testing by different levels of staff try to search, insert, delete, and update information in order to observe its process and outcome.

Note: The new system can run properly, so it has passed the whole steps of the test plan.

4.4 Conversion

The conversion of the project is Parallel conversion. There are several reasons to support this choice as follows:

(1) Abrupt cut-over: On a specific date, the old system is terminated and the new system is placed into operation. This conversion is too risky because all

the old system is replaced with the new system. Although the new system has been tested, Practice may not be like the testing and some staffs do not have the expertise in the new system. These may cause trouble.

(2) Location conversion. When the same system will be used in numerous geographical locations, it is usually converted at one location and, following approval, farmed to the other sites. This conversion is used in case there are many places. Since this video rental store has only one location, it is necessary to use it.

(3) Staged conversion. Each successive version of the new system is converted as it is developed. Each version may be converted using the abrupt, parallel, or location strategies. Alike, this project does not take a long time, there is no need to use this conversion.

(4) Parallel conversion. Both the old and new system are operated for some time period to ensure that all major problems in the new system are solved before the old system is discarded. This conversion is the best way to convert the old system into the proposed system because we can analyze both expected and unexpected problems as actually practicing and solve them before terminating the old system. Staff also have time to learn and utilize the new system fluently.

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V. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The proposed system replaces the old system while bringing more benefits to organization. It is concerned about cost, management, Information technology, organization, information and business solution.

In term of management, the proposed system improves the performance of technical support and increases the customer satisfaction. It does not waste time to service customers as staff can search information which customers need from a powerful system.

This project uses Microsoft Visual Basic 6.0 and Microsoft Access 2000 to design and access database. It will move the video rental store system to computerized system, therefore reduce the number of staff and reduce costs.

When the processing time can be reduced, staff can service members faster. The members must not wait for the member validity & rental process for a long time.

At the beginning, the cost of the proposed system is higher than the cost of existing system because of the development cost incurred at the first year of the new system implementation. But, for the long term, the proposed system can reduce the annual operating cost especially salary cost and office supplies cost.

The break-even point of the proposed system is depicted on the Figure 3.2. The break-even point will occur approximately 1 year 6 months after the system has been operated. This result is satisfactory for investing and implementing the proposed system because it will incur less operating cost than the existing system in the long run operation.

Video rental store information system achieves the business solution in all sides. It provides the opportunity to increase revenue, increase member, reduce processing time and reduce time in solving the problem.

We have witnessed that the computerized system gains more benefits in many ways. We ensure that this project will be really worth to be implemented.

Table 5.1. shows the time performance on each process of the proposed system compared with the existing system. It shows that each process of the proposed system performs in less time than each process of the existing system which has to operate many work steps in manual system. So, it can be concluded that the proposed system is more efficient and effective than the existing system.

Table 5.1. The Degree of Achievement of the Proposed System.

Process	Existing System	Proposed System
Check Member Process	2 minutes	5 seconds
Video Items Checking Process	10 minutes	10 seconds
Rental / Late Fee Payment Process	3 minutes	30 seconds
Management Reports Generating Process	half day	10 minutes

In proposed system, member-checking process is processed by computer system, while it is processed by manual system on papers. In the existing system, staff must search the member record in the logbook to verify it. But in the proposed system, staff just only key in member ID or name, all related information will be shown on the screen right away.

In the existing system, staff must check video items in the store that recorded on paper. But in the proposed system, staff can check video items on computer that reduces the processing time. Thus, the proposed system uses less time in checking the items availability.

In the proposed system, staff only key in video & member related data in the computer then all payments information will appears. Moreover all transactions will be keep track automatically. In the existing system, staff must calculated the rental / late amount then keep all transactions on paper that spends a lot of time.

In the existing system, staff must type the records on papers to generate reports. But in the proposed system, staff need only to click "print" button on the database server to print reports.

5.2 Recommendations

The new computerized system has been designed to support the requirements of the owner and internal operations for the store. The staff can use PC to perform the processes efficiently and effectively.

This Video Rental Store Information System can be integrated to the existing system of an organization to expand the system capability. This system can and has already been applied directly on LAN.

We also plan to implement this project to other video rental stores. We may develop the specific features or modify the existing feature to be suitable with each location or customer.

For data protection, it can be done by providing backup computers.

In the next 1 or 2 years, the Microsoft .NET technology will become mature. Therefore, the system can be moved from Microsoft Visual Basic 6.0 technology to VB.NET technology.

APPENDIX A

DATA FLOW DIAGRAM

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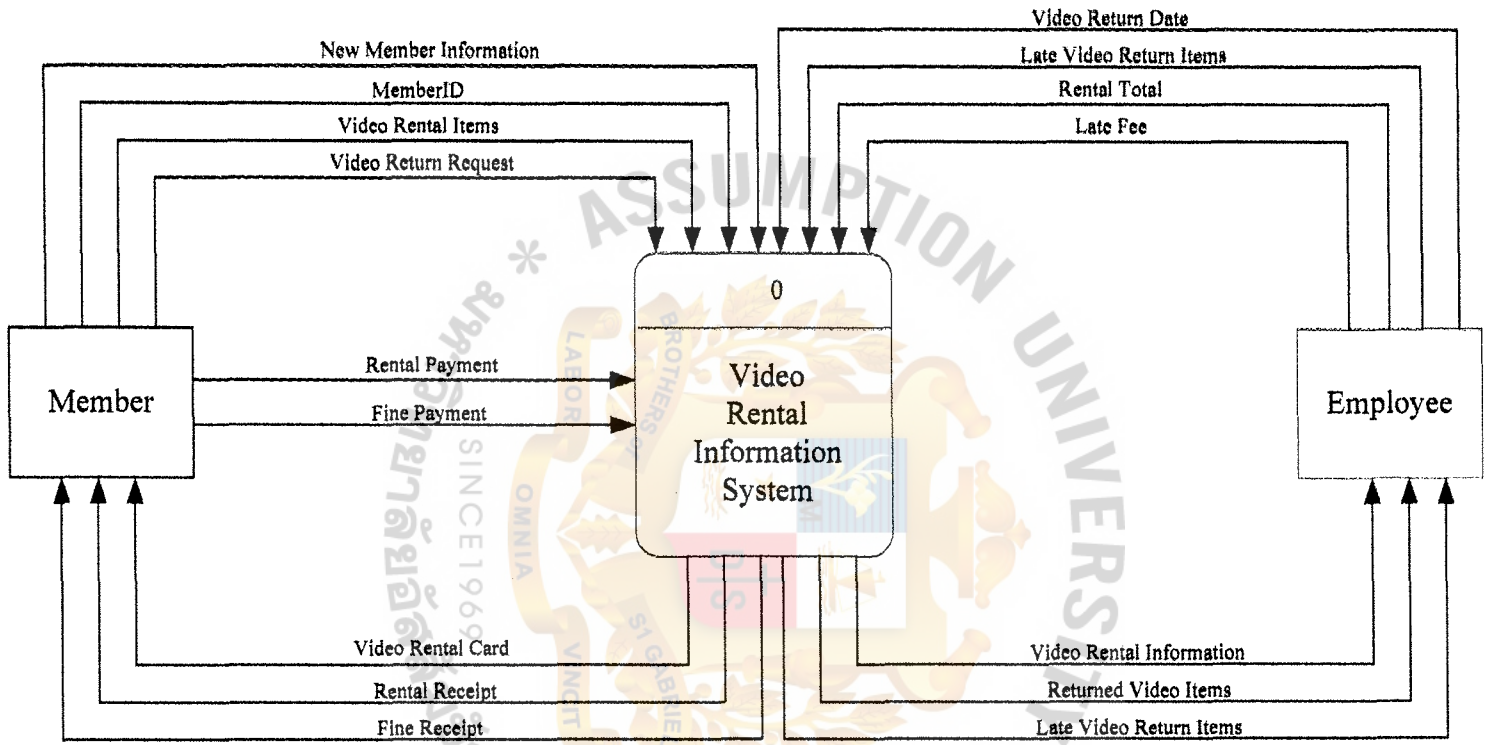

Figure A.1. Context Data Flow Diagram. (Existing System).

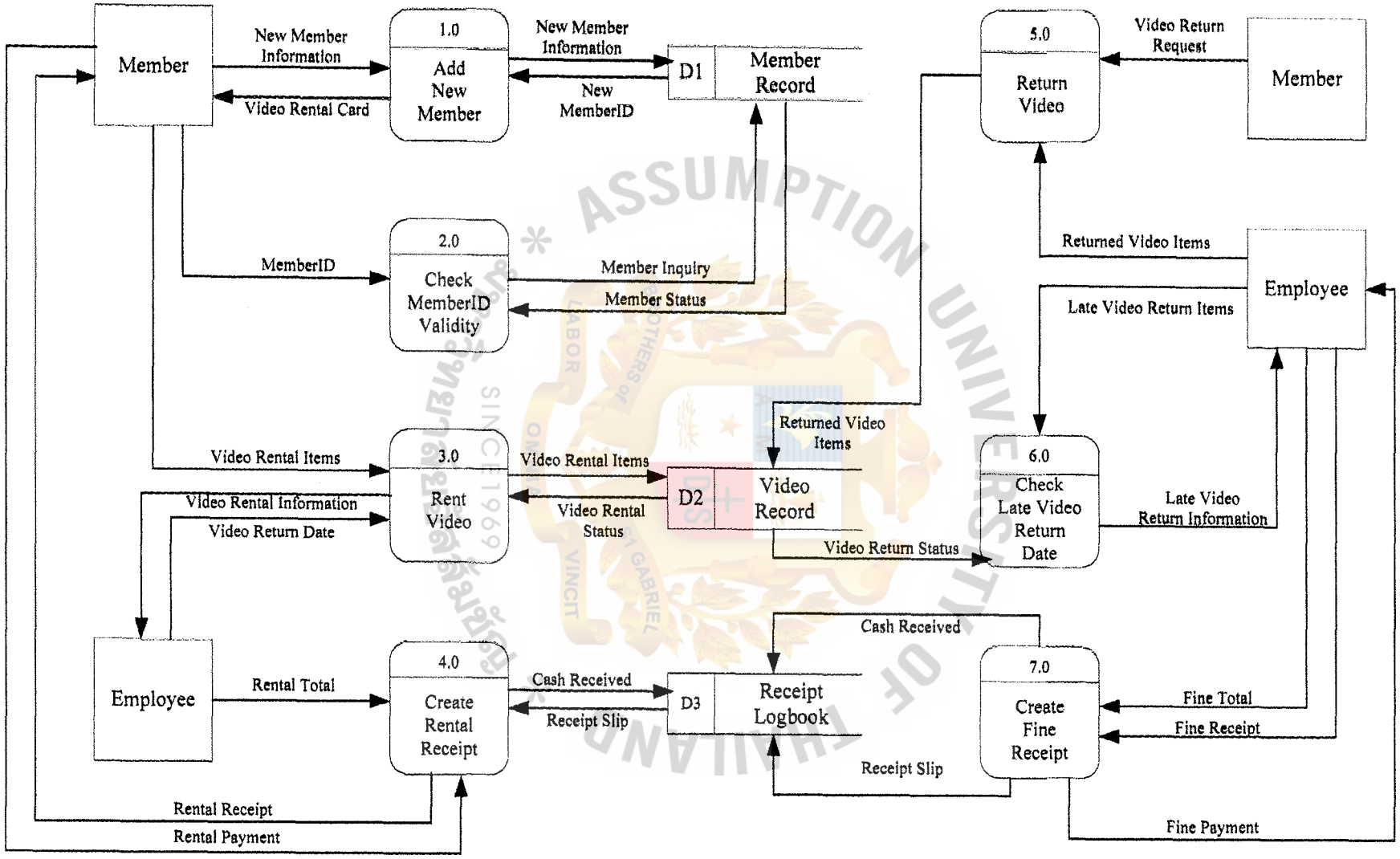

Figure A.2. Data Flow Diagram (Existing System).

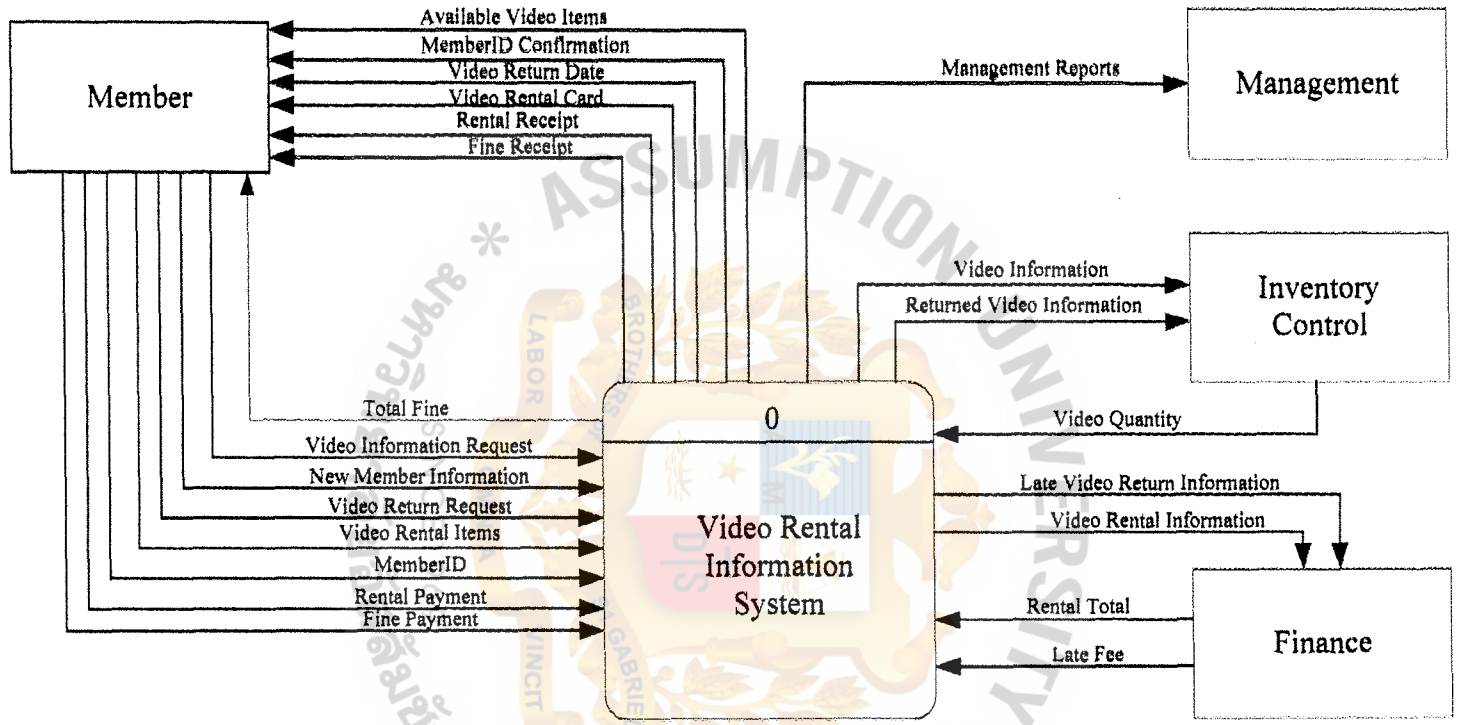

Figure A.3. Context Data Flow Diagram (Proposed System).

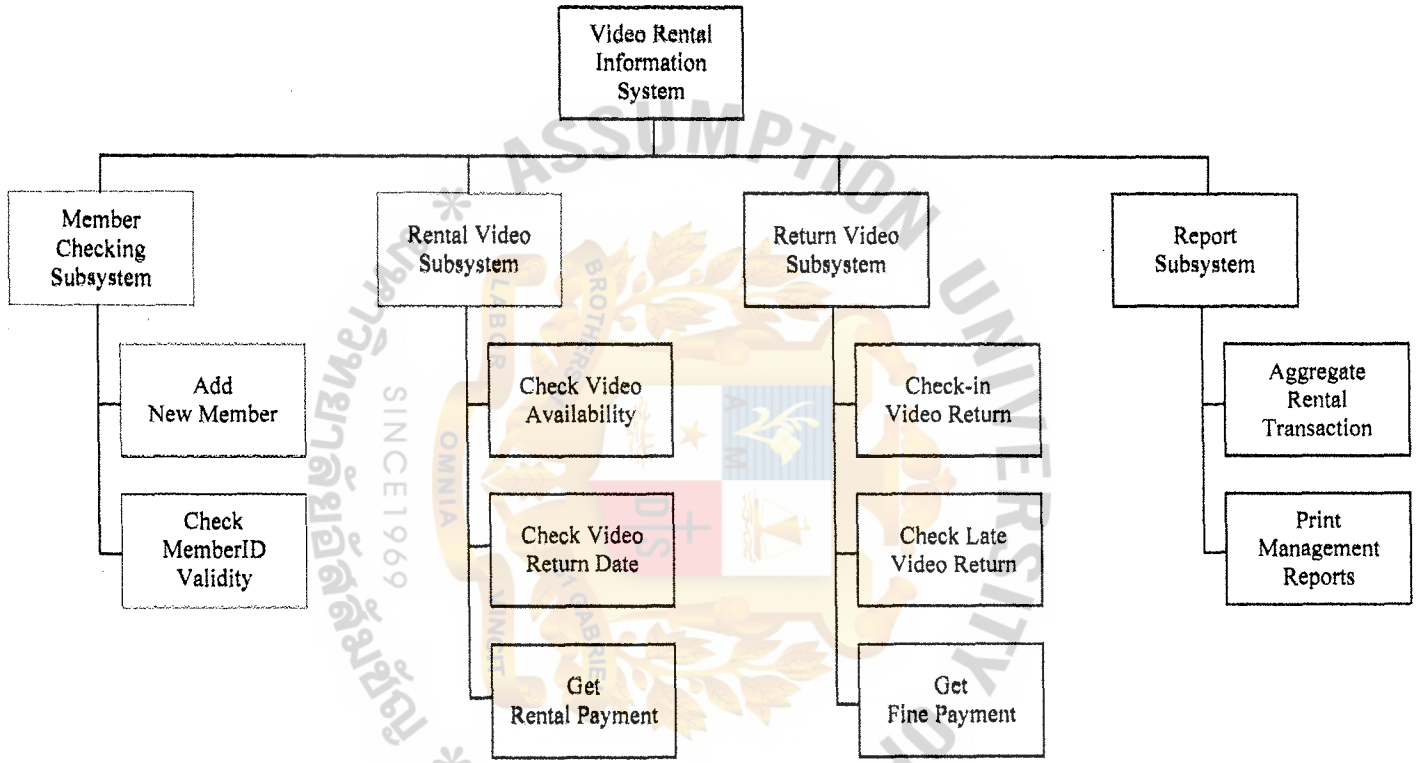

Figure A.4. Functional Decomposition Data Flow Diagram.

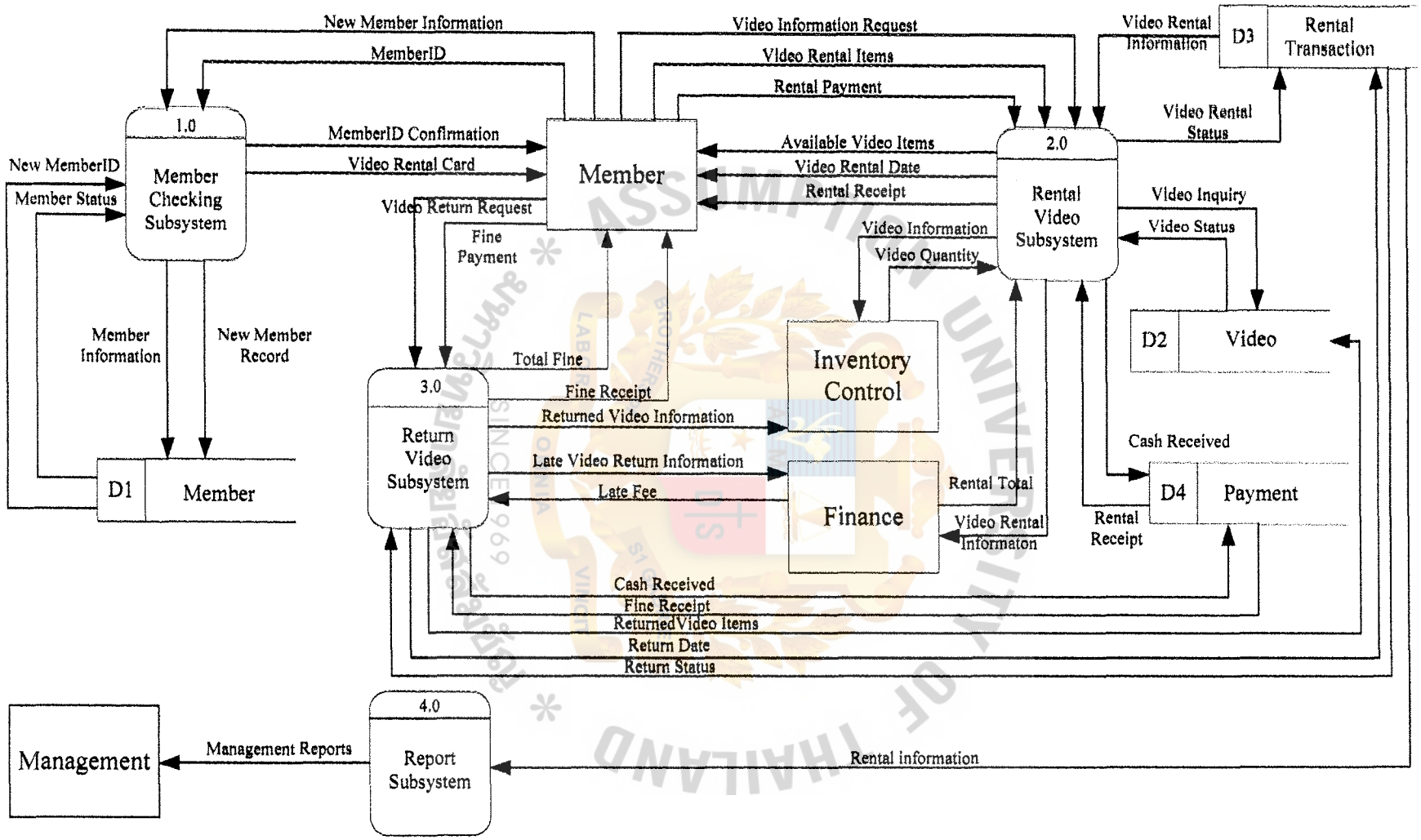

Figure A.5. Level 0 Logical Data Flow Diagram (Proposed System).

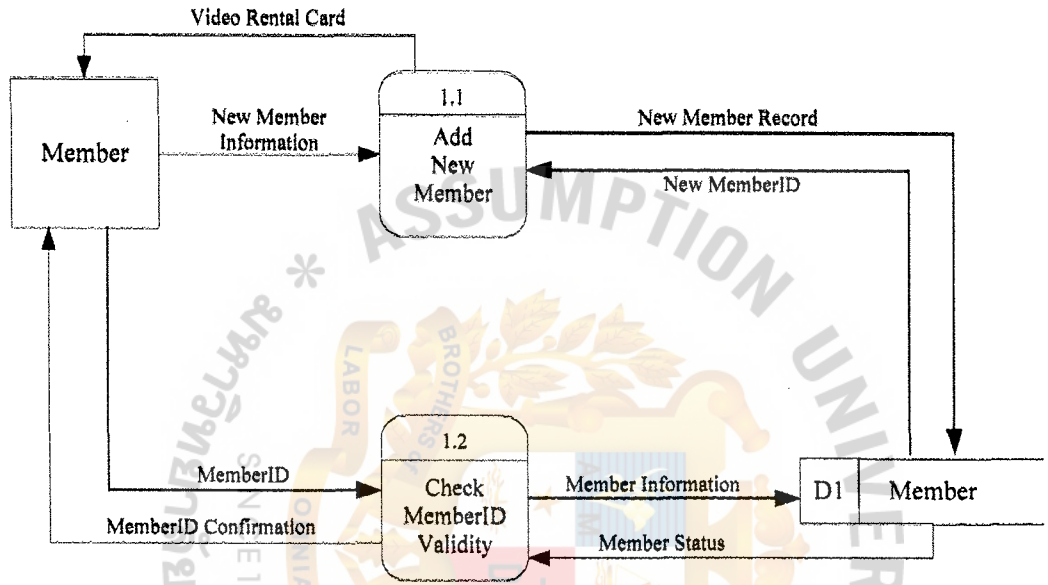

Figure A.6. Level 1 Logical Data Flow Diagram of Process 1 (Member Checking Subsystem).

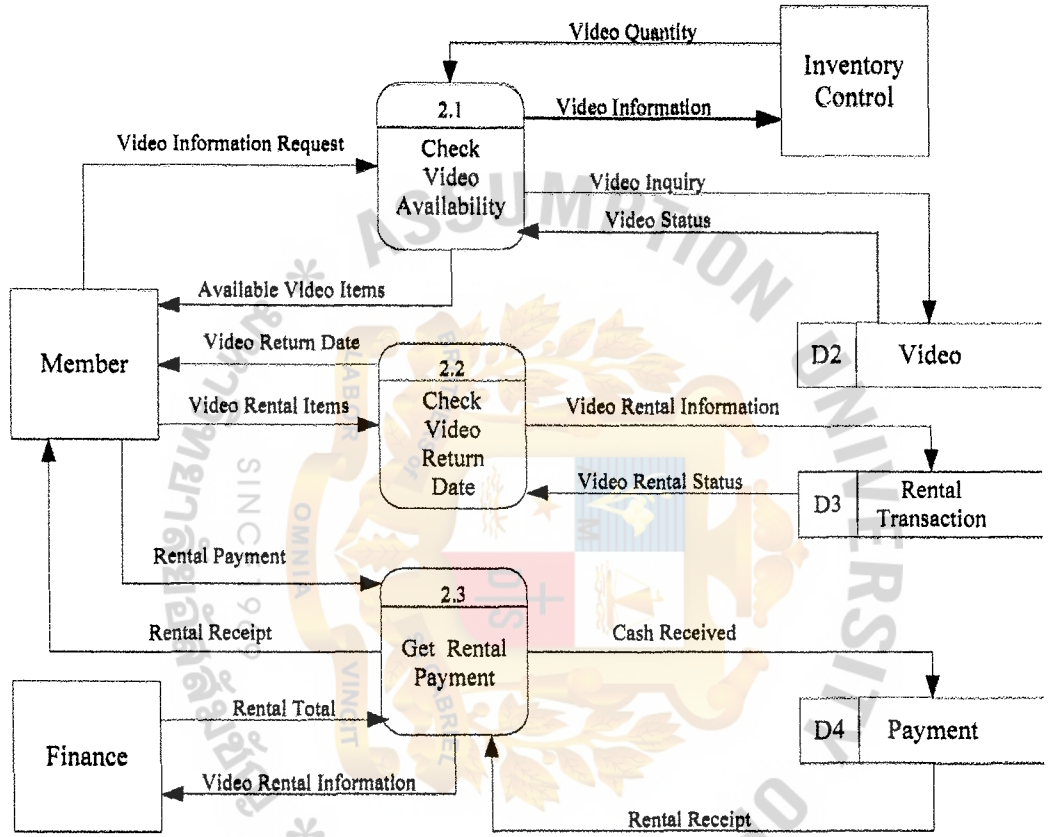

Figure A.7. Logical Data Flow Diagram - Level 1 - Process 2 (Rental Video Subsystem).

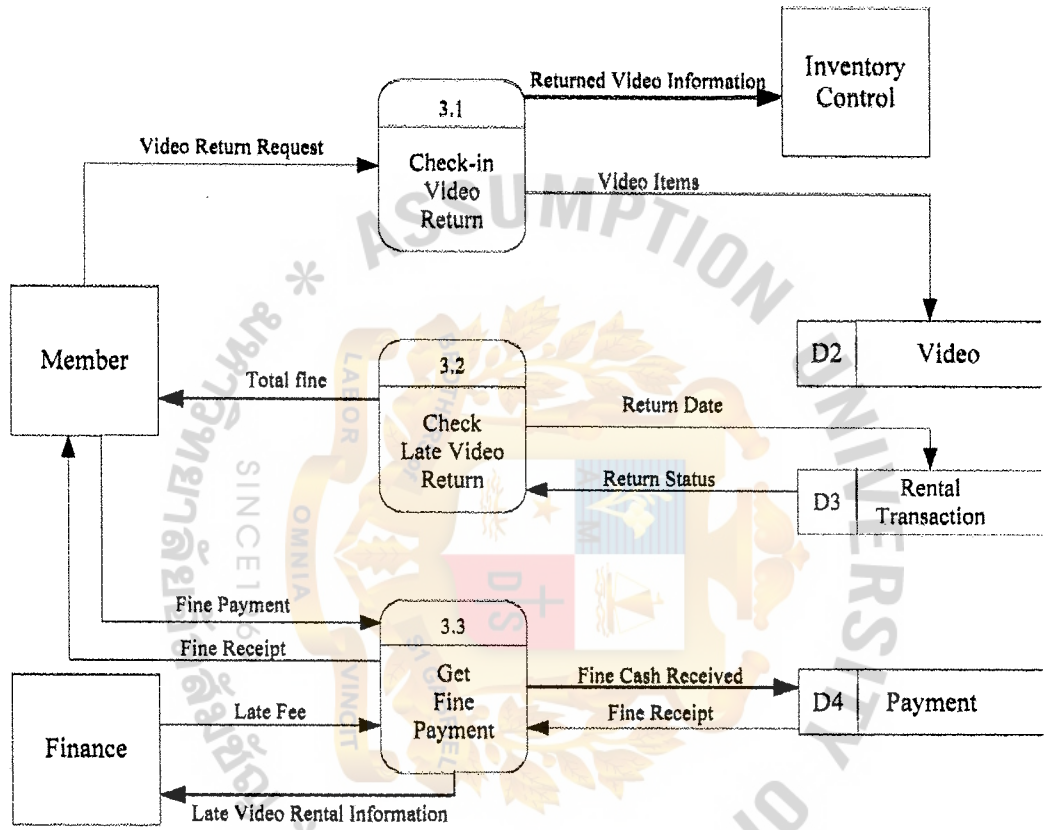

Figure A.8. Level 1 Logical Data Flow Diagram of Process 3 (Return Video Subsystem).

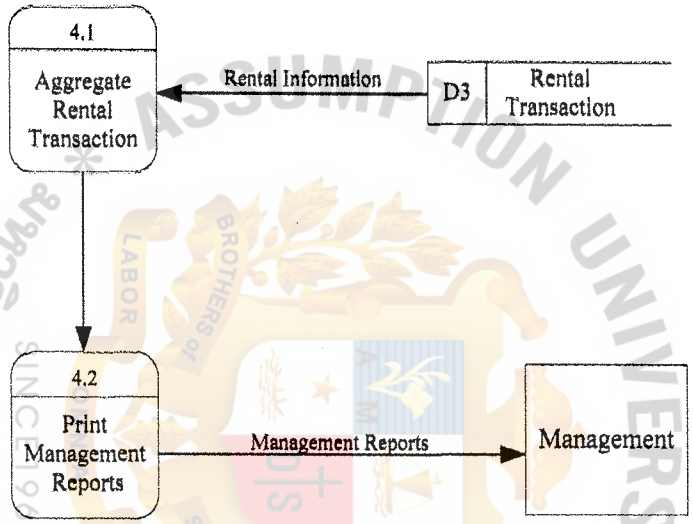

Figure A.9. Level 1 Logical Data Flow Diagram of Process 4 (Report Subsystem).

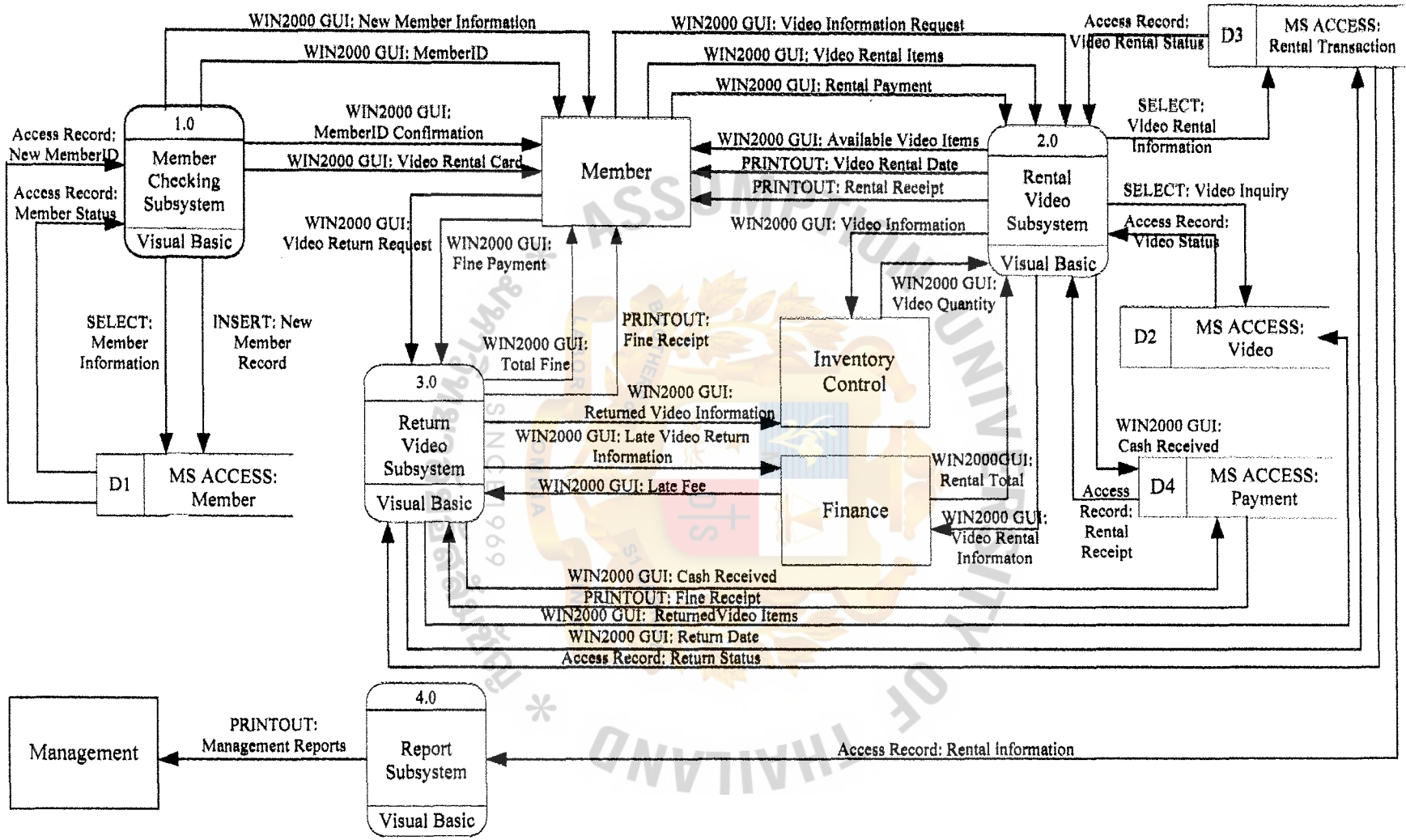

Figure A.10. Level 0 Physical Data Flow Diagram (Proposed System).

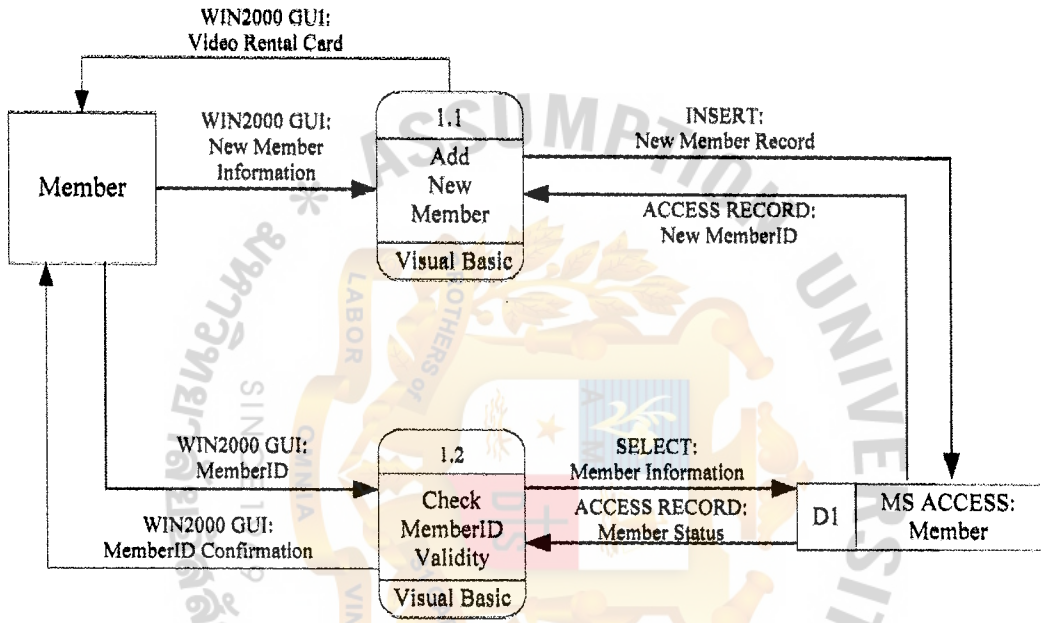

Figure A.11. Physical Data Flow Diagram - Level 1 - Process 1.
(Member Checking Subsystem)

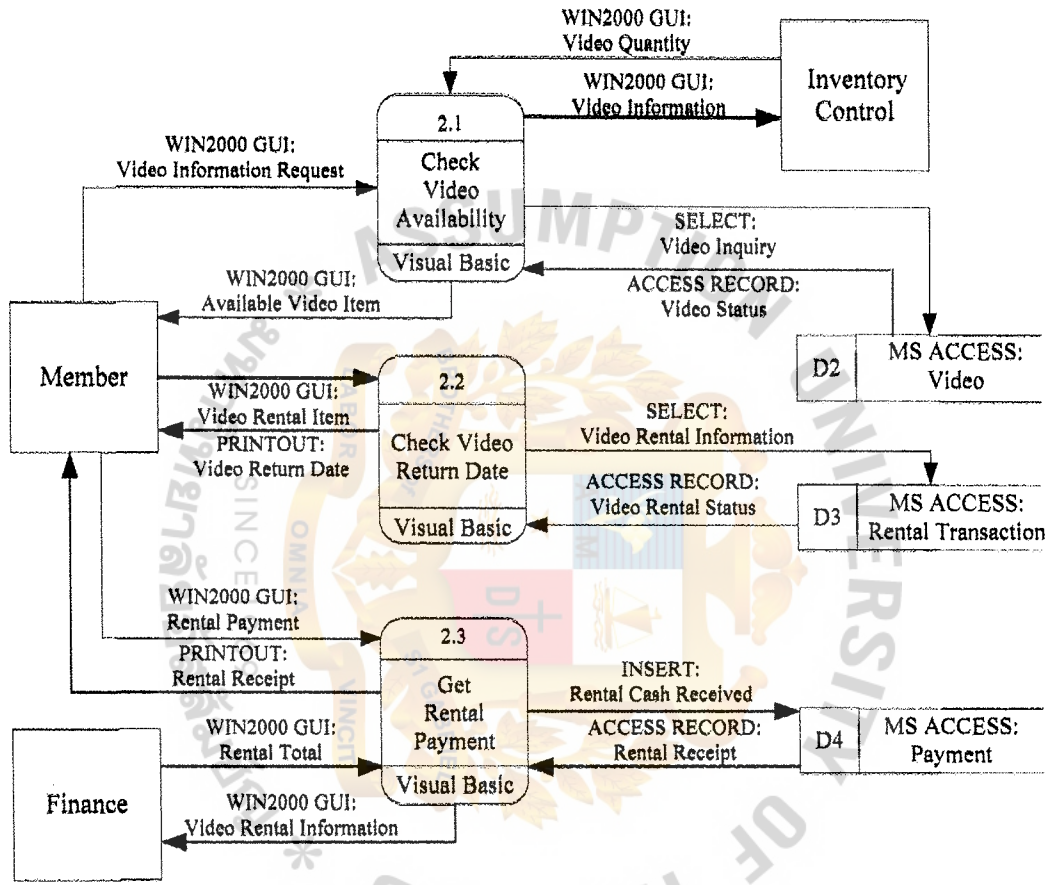

Figure A.12. Physical Data Flow Diagram - Level 1 - Process 2.
(Rental Video Subsystem)

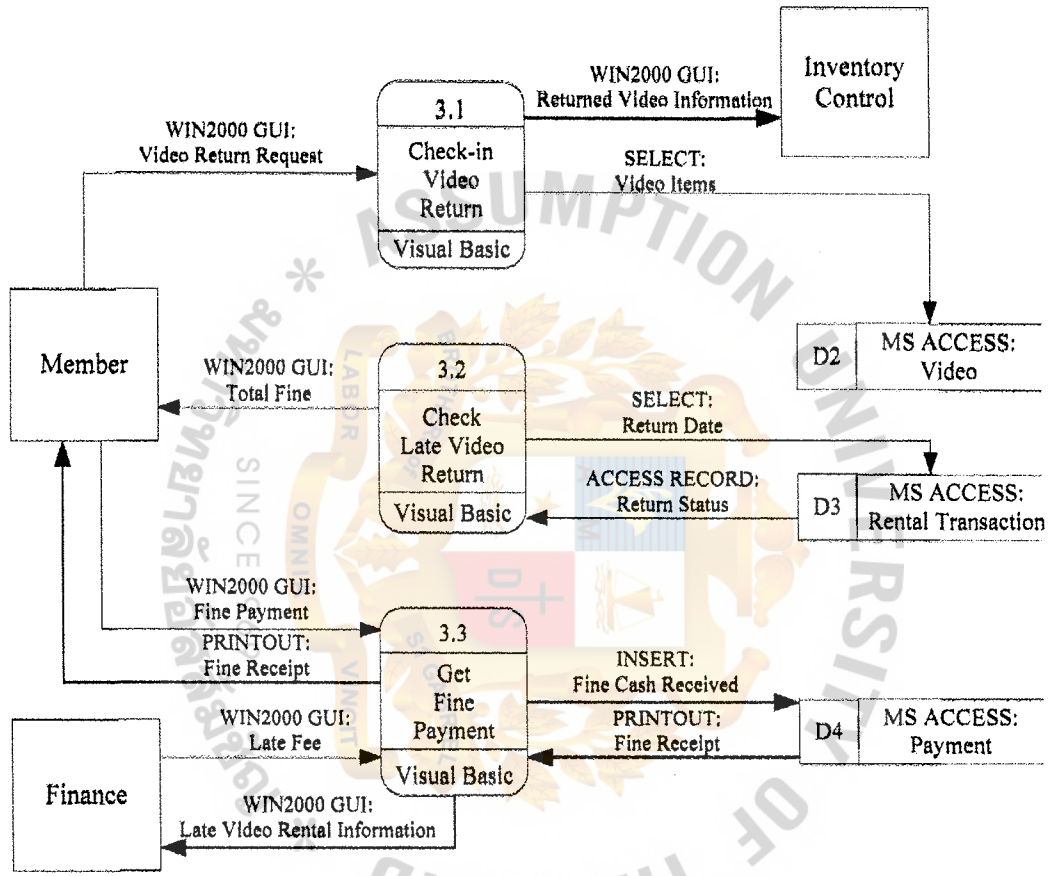

Figure A.13. Physical Data Flow Diagram - Level 1 - Process 3.
(Return Video Subsystem)

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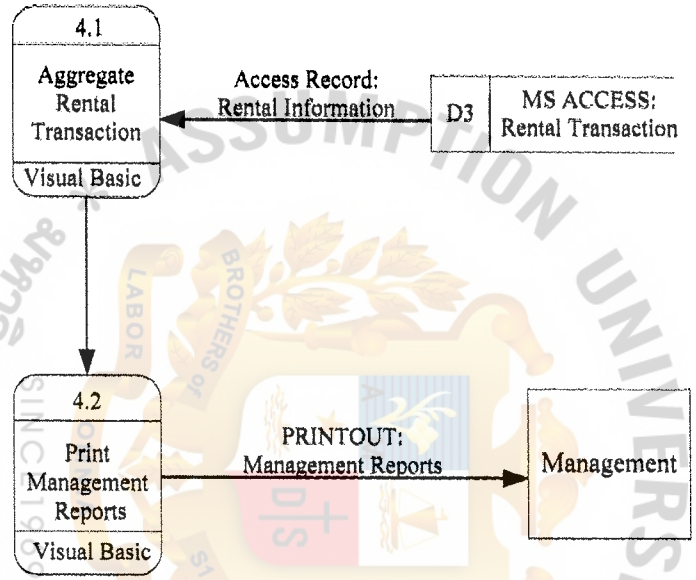

Figure A.14. Level 1 Physical Data Flow Diagram of Process 4 (Report Subsystem).

APPENDIX B

ENTITY RELATIONSHIP DIAGRAM

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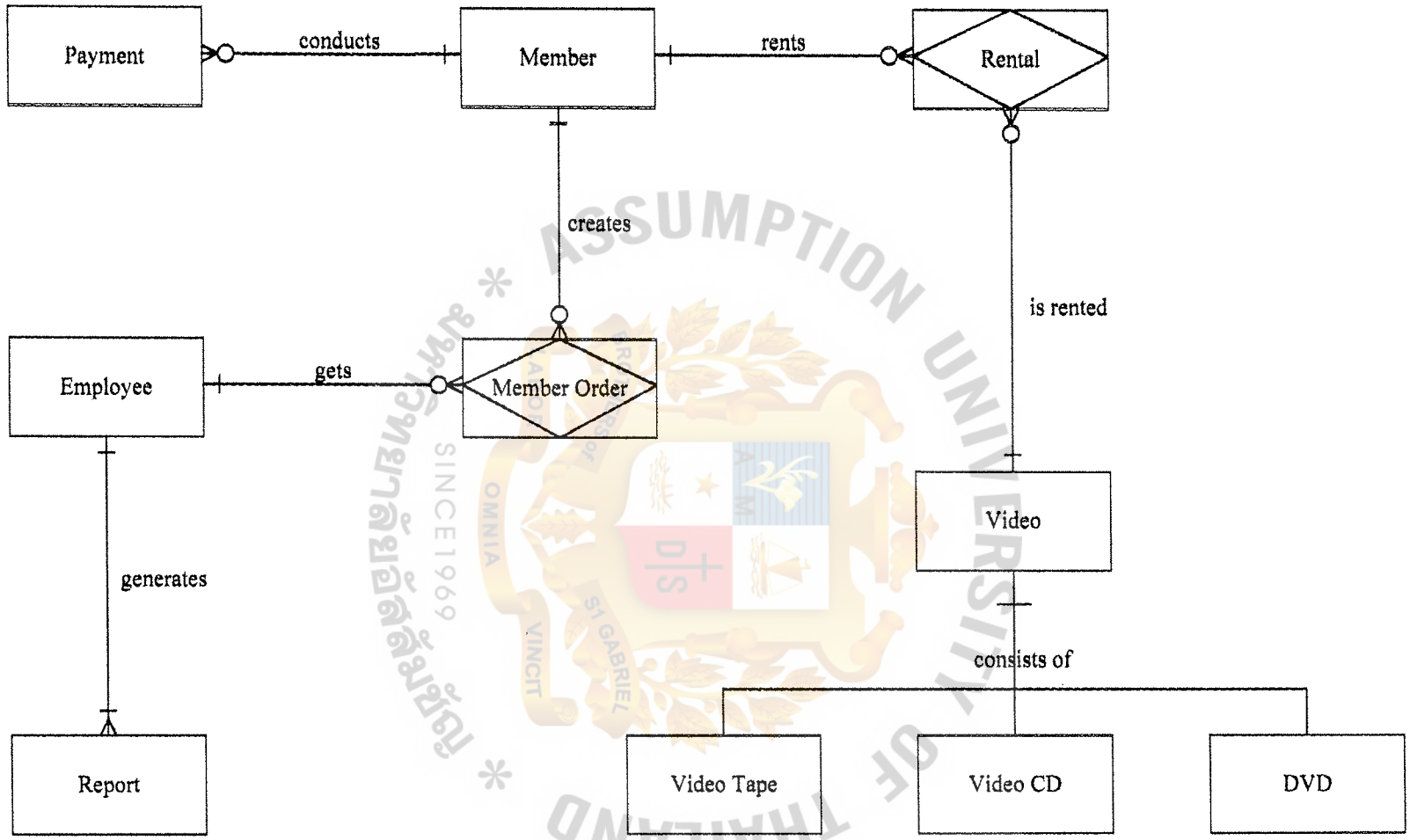

Figure B.1. Context Entity Relationship Diagram.

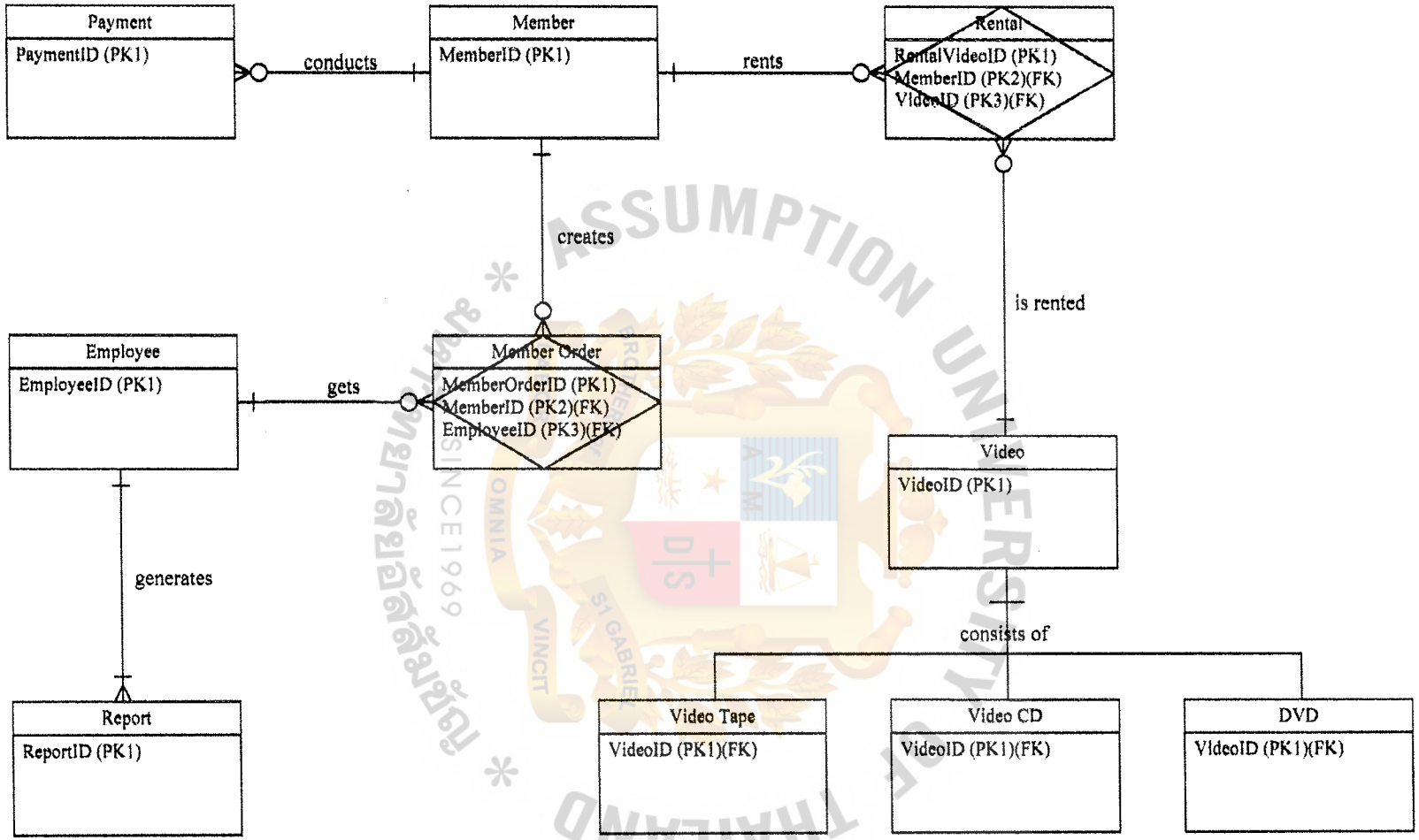

Figure B.2. Key Based Entity Relationship Diagram.

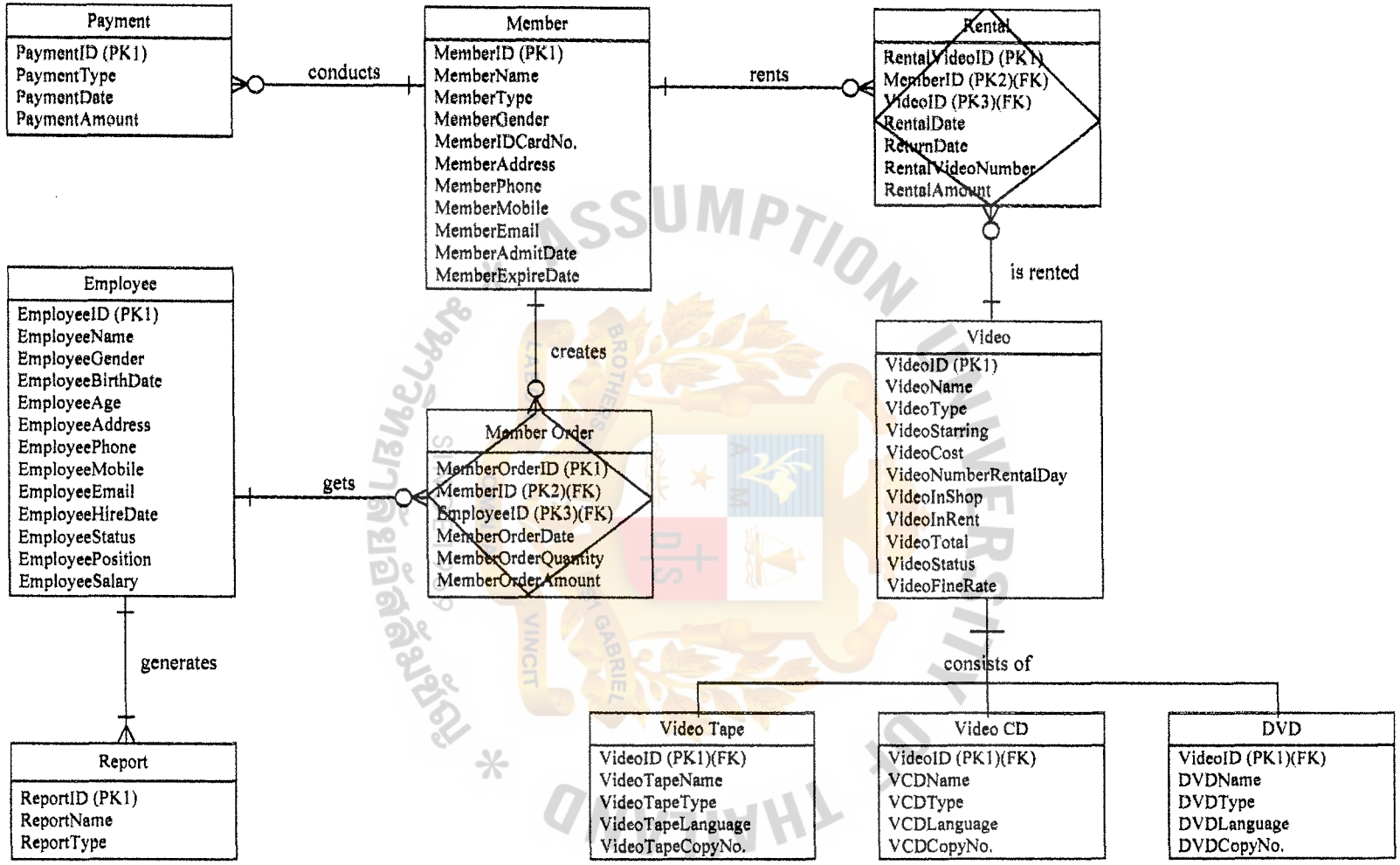

Figure B.3. Full-attributed Entity Relationship Diagram.

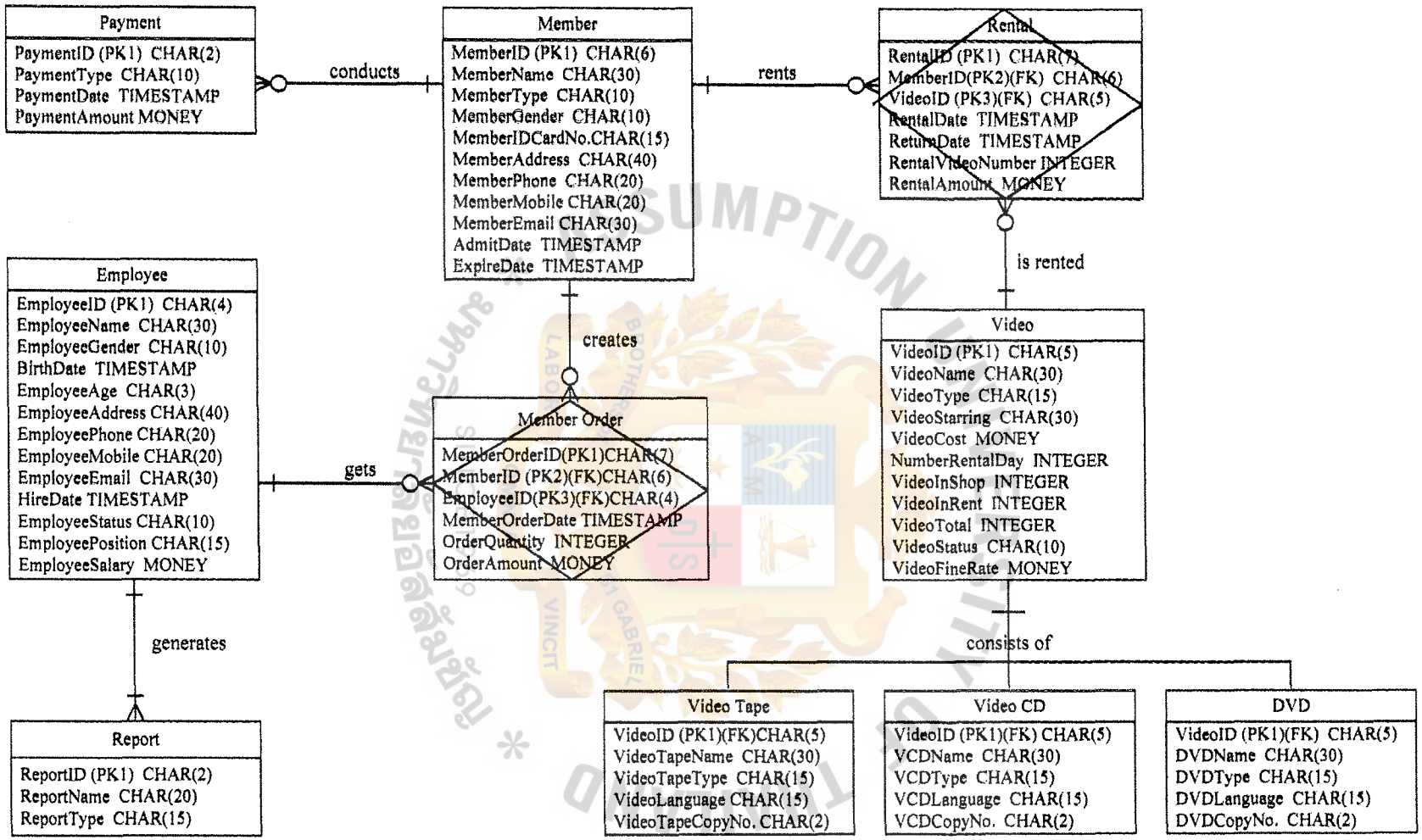

Figure B.4. Physical Entity Relationship Diagram.

APPENDIX C

STRUCTURE CHART

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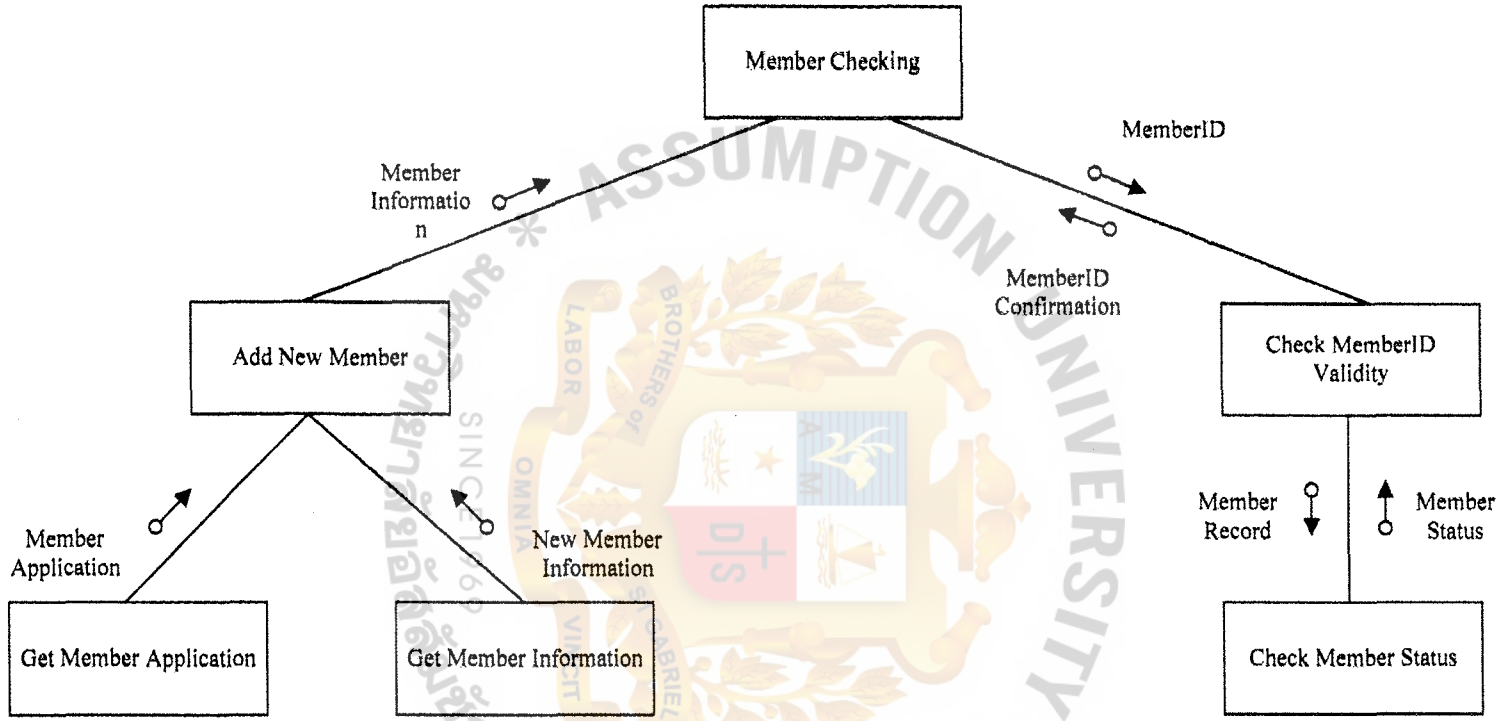

Figure C.1. Structure Chart of Member Checking Subsystem.

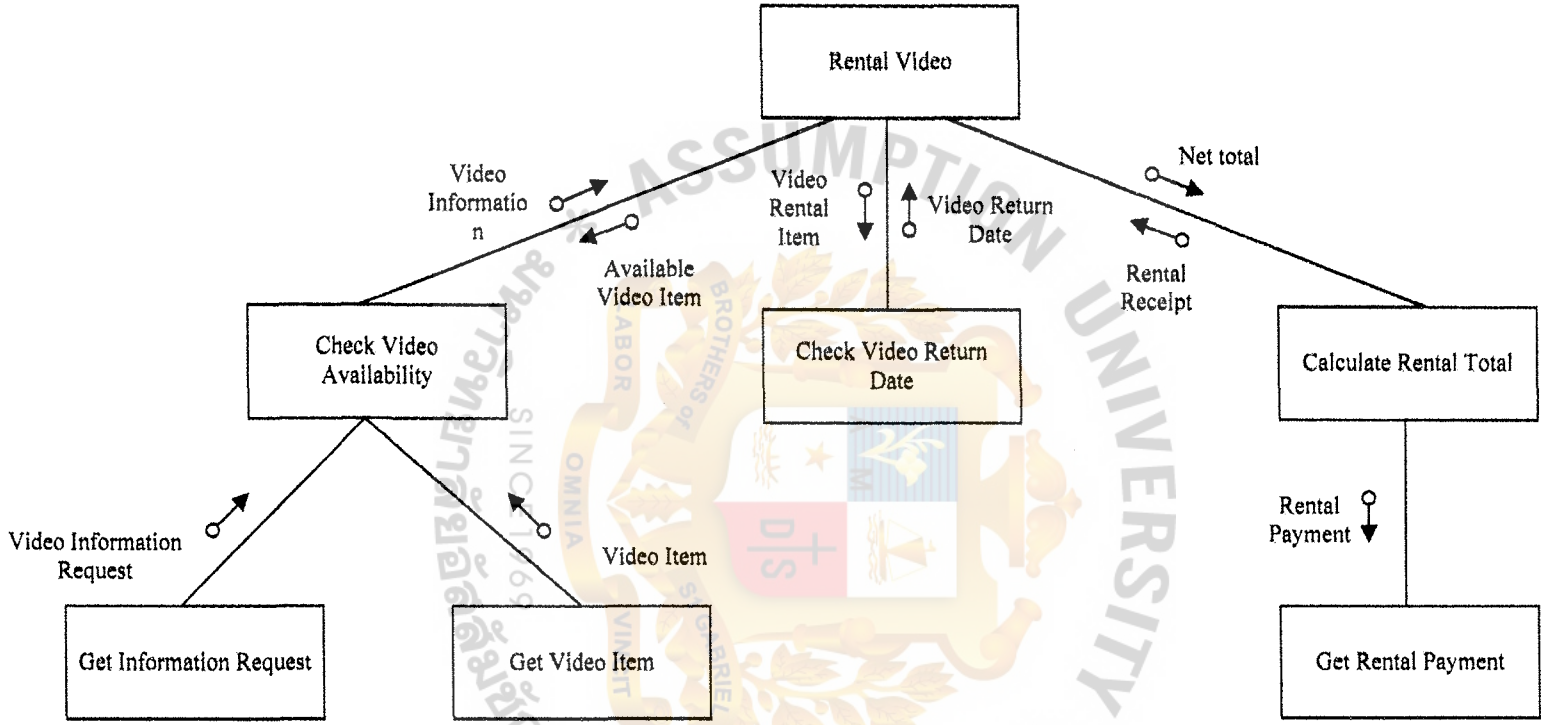

Figure C.2. Structure Chart of Rental Video Subsystem.

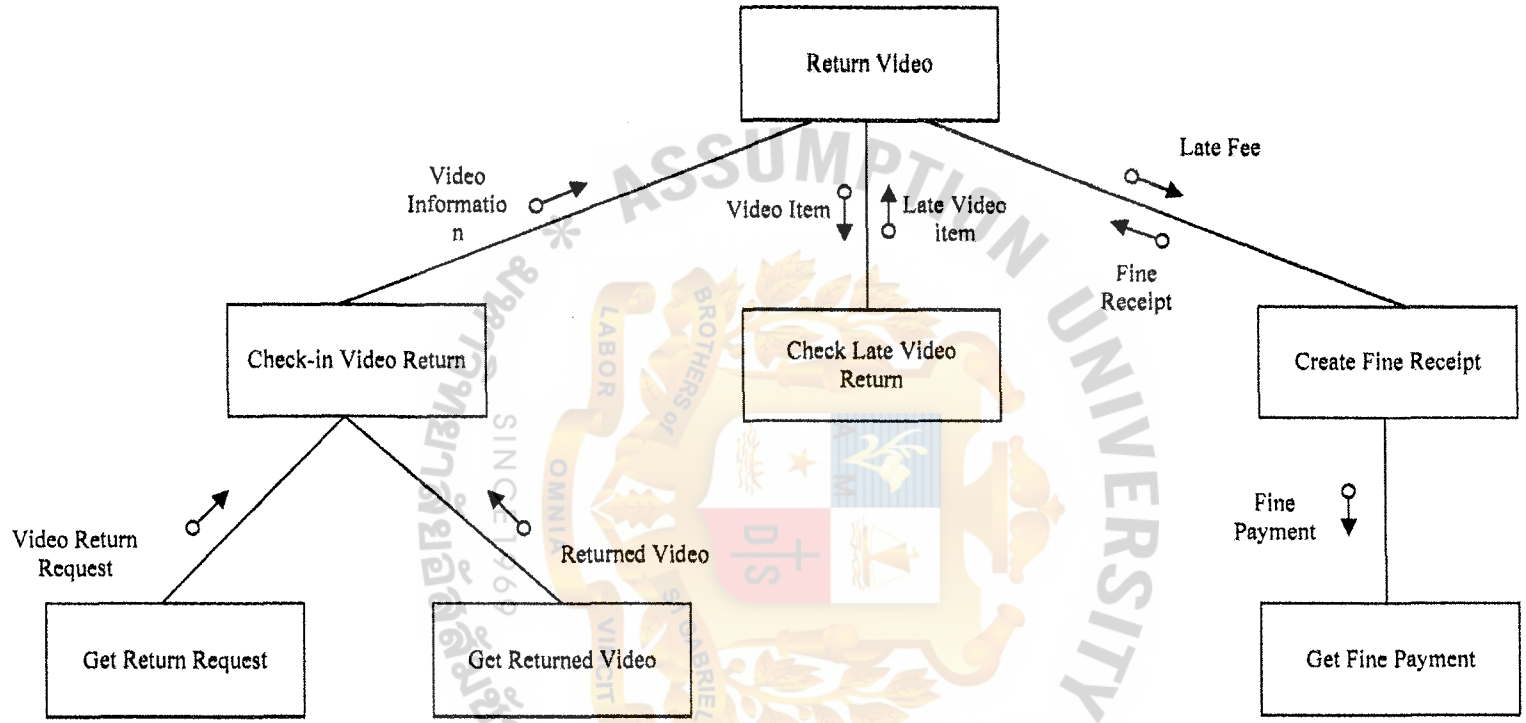

Figure C.3. Structure Chart of Return Video Subsystem.

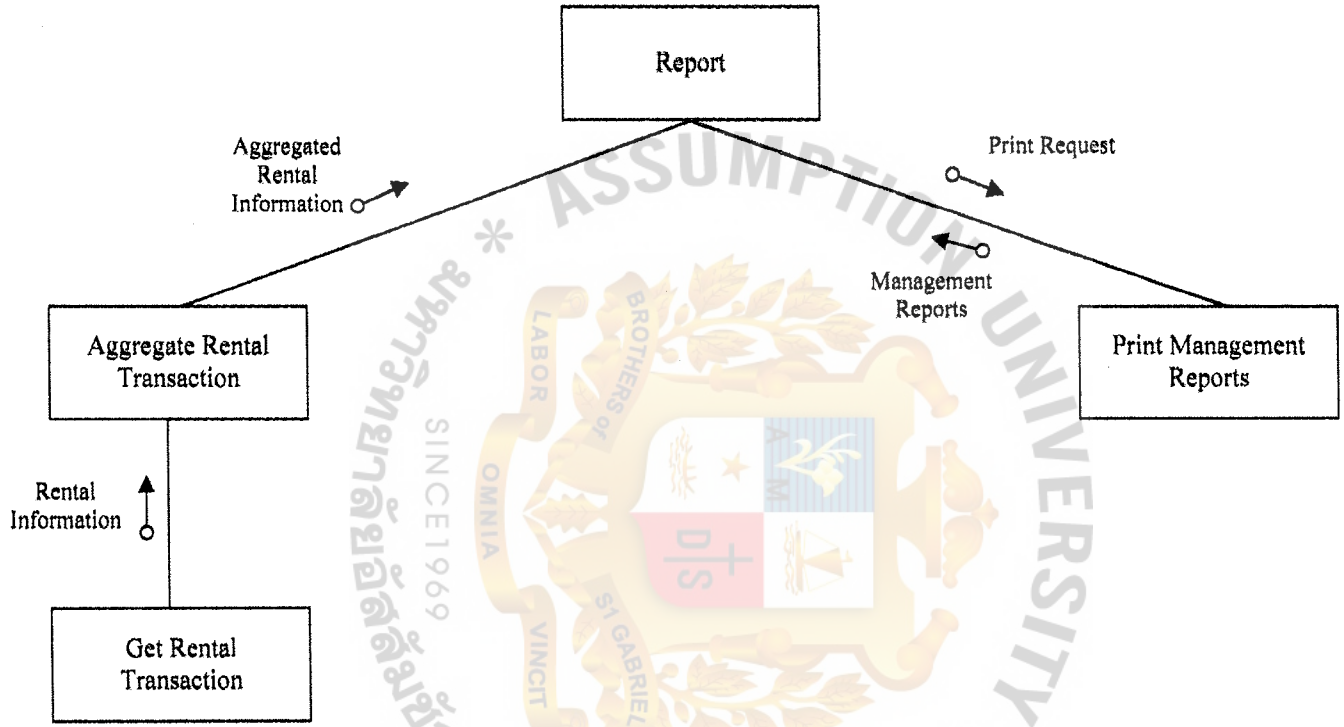

Figure C.4. Structure Chart of Report Subsystem.

APPENDIX D

INTERFACE DESIGN

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(1) Login page

Before accessing this page, you must login.

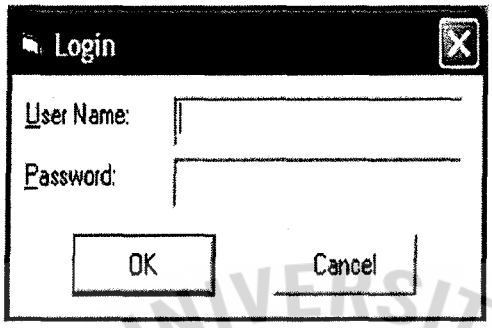

Figure D.1. Login Page.

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(2) Video page

This page is about the video information that is used to check the available videos and other details you need. It is comprised of 3 pages according to types of video-Video Tape, Video CD, and DVD.

You can open it by either selecting "Menu/Video Tape or Video CD or DVD" or by clicking sub button "Video Tape/Video CD/DVD".

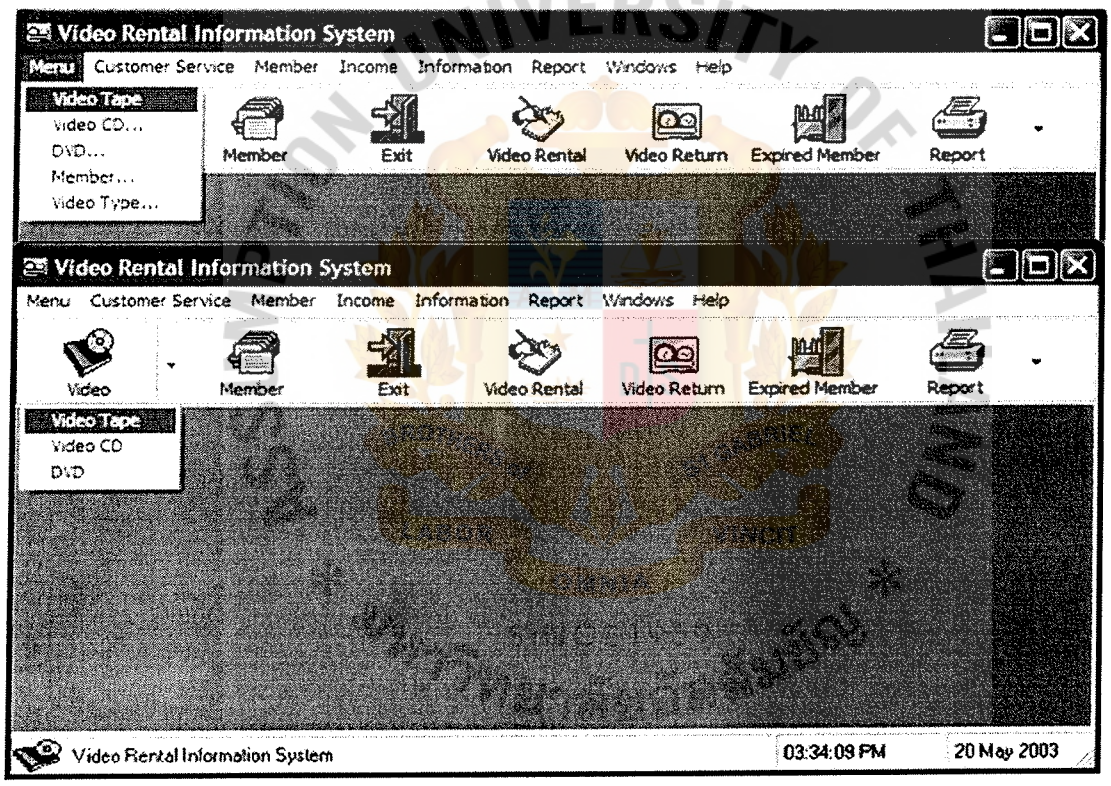


Figure D.2. Video page (1).

You can search a video item from VideoID or Video Name as shown in the figure below.

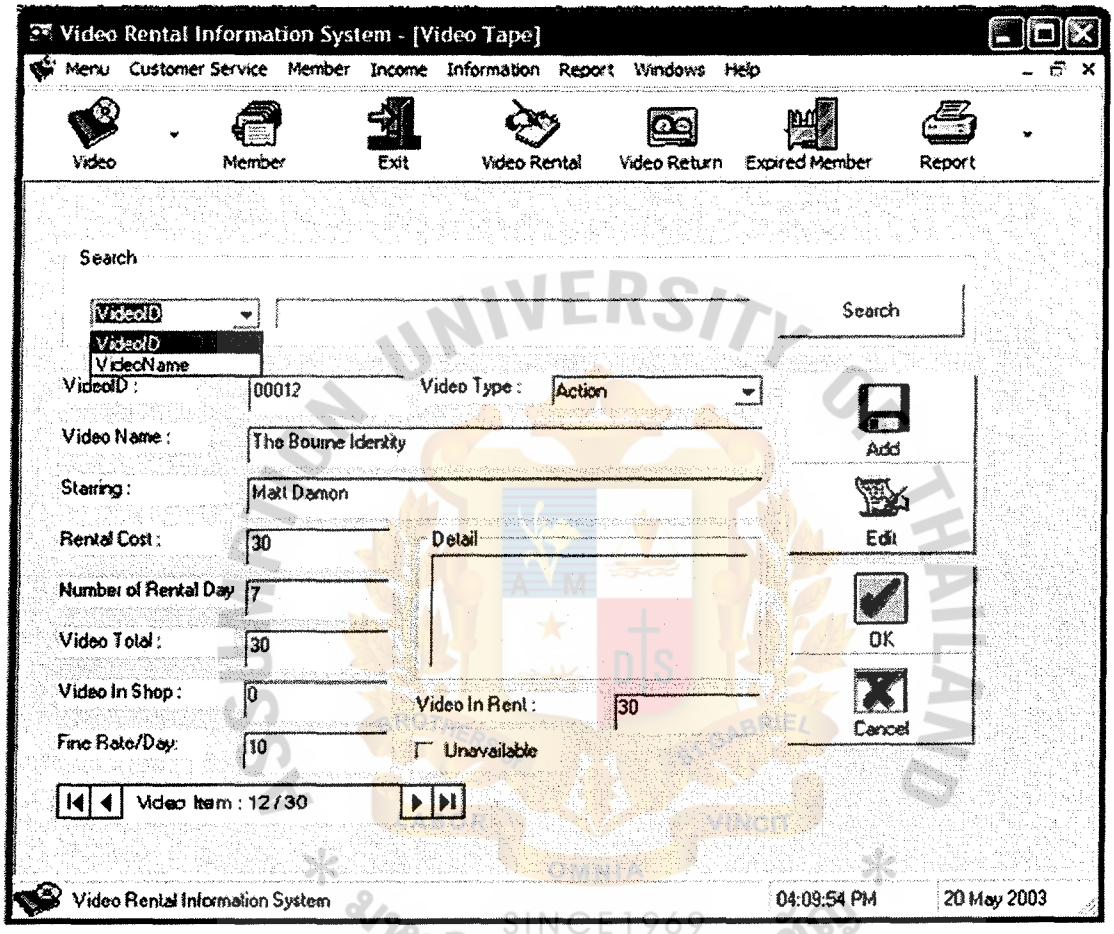


Figure D.3. Video Page (2).

The following figure is the example of Video Tape page.

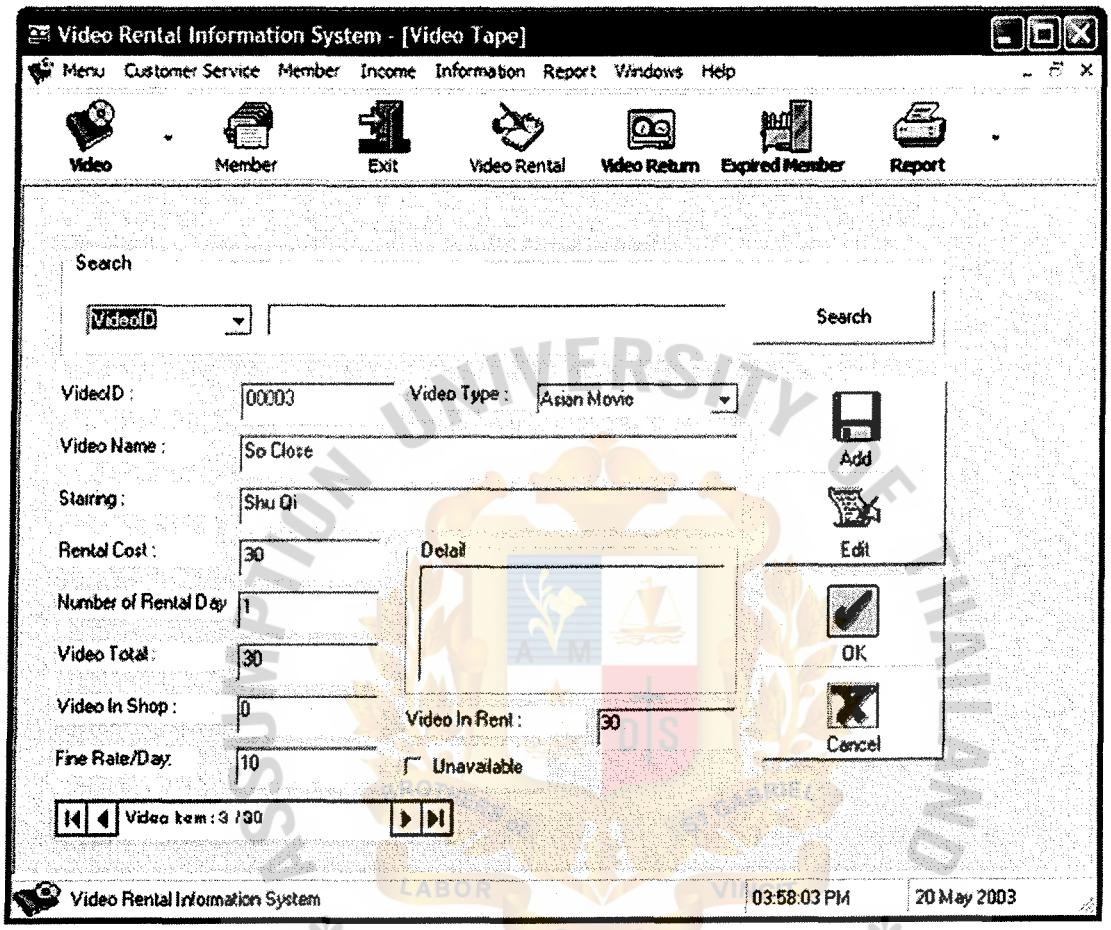


Figure D.4. Video Tape Page.

This is the example of Video CD page.

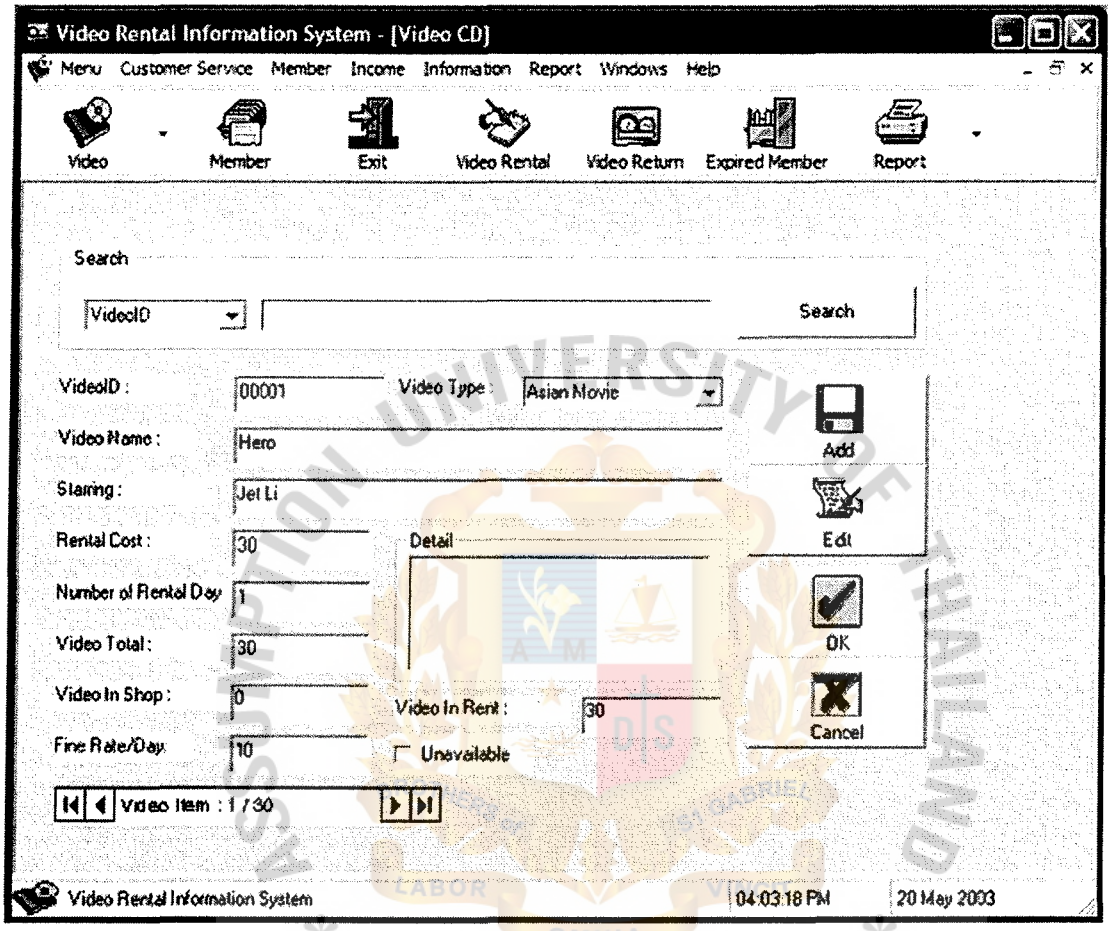


Figure D.5. Video CD Page.

This is the example of DVD page.

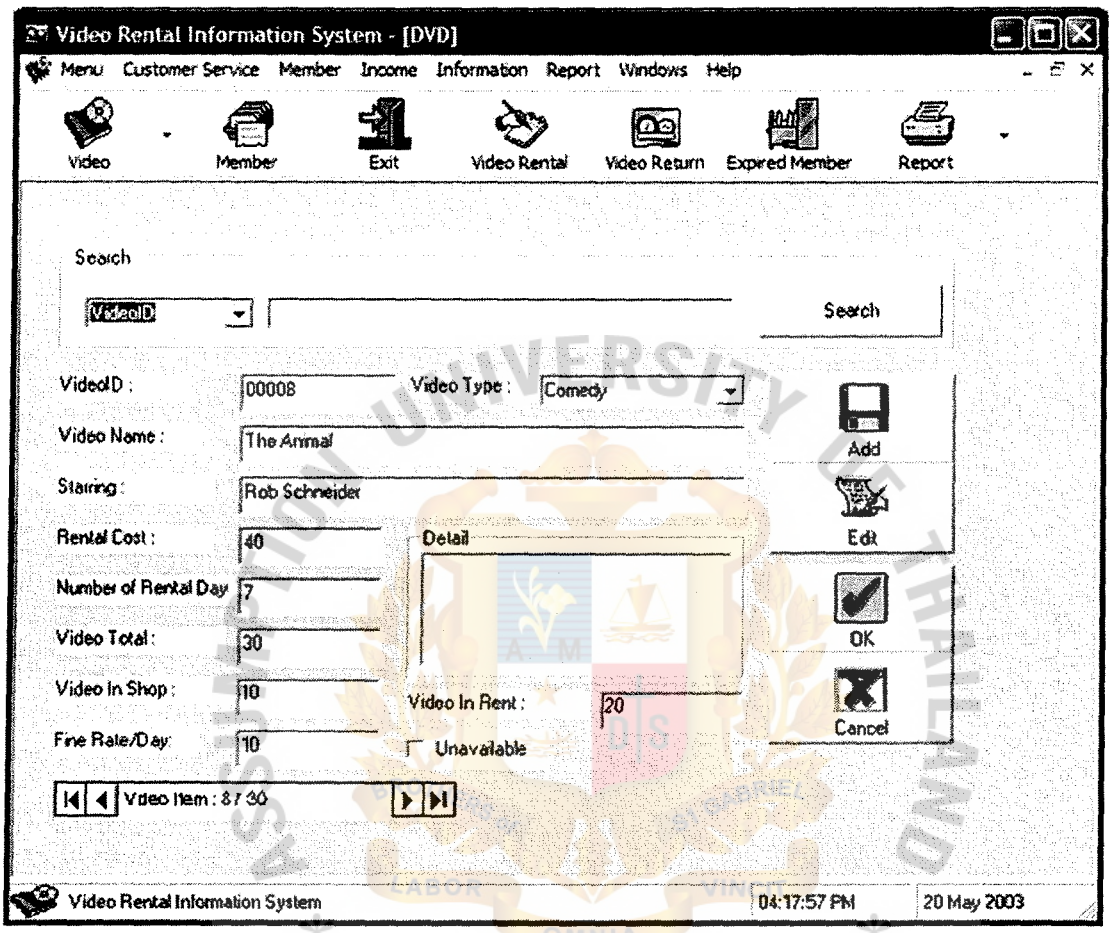


Figure D.6. DVD Page.

(3) Video Type page

This page is used to add or edit the type of video. It is opened by selecting "Menu/Video Type".

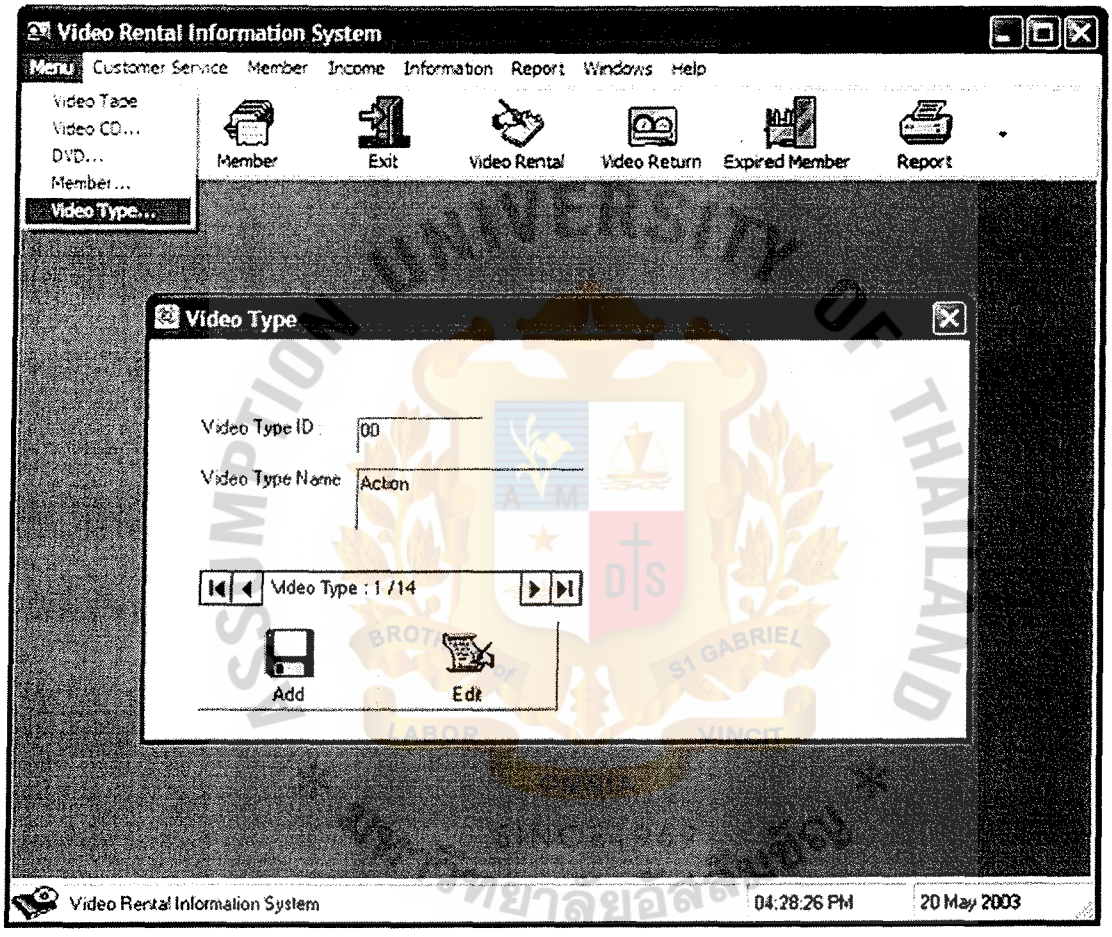


Figure D.7. Video Type Page.

(4) Member page

Member page is used to present all the member information of our video store. It is divided into 3 tabs as follows:

(1) General Information Tab: stores each basic member details.

(2) Supplementary Tab: displays the admit date and expire date of each member. Including their user name and password for further checking via the Internet.

(3) Unreturned Video Item Tab: represents the video items which each member has not yet returned to our video store.

You can see this page by selecting "Menu/Member" or "Member" button.

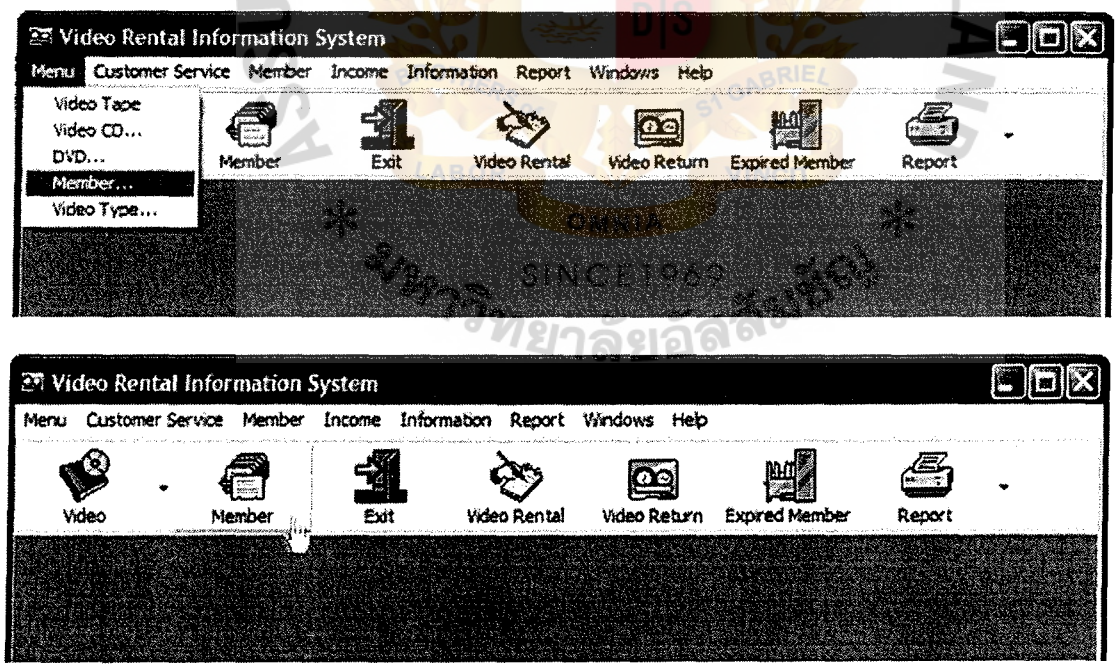


Figure D.8. Member Page (1).

Searching member can be done by 2 ways- MemberID or Member Name as shown below.

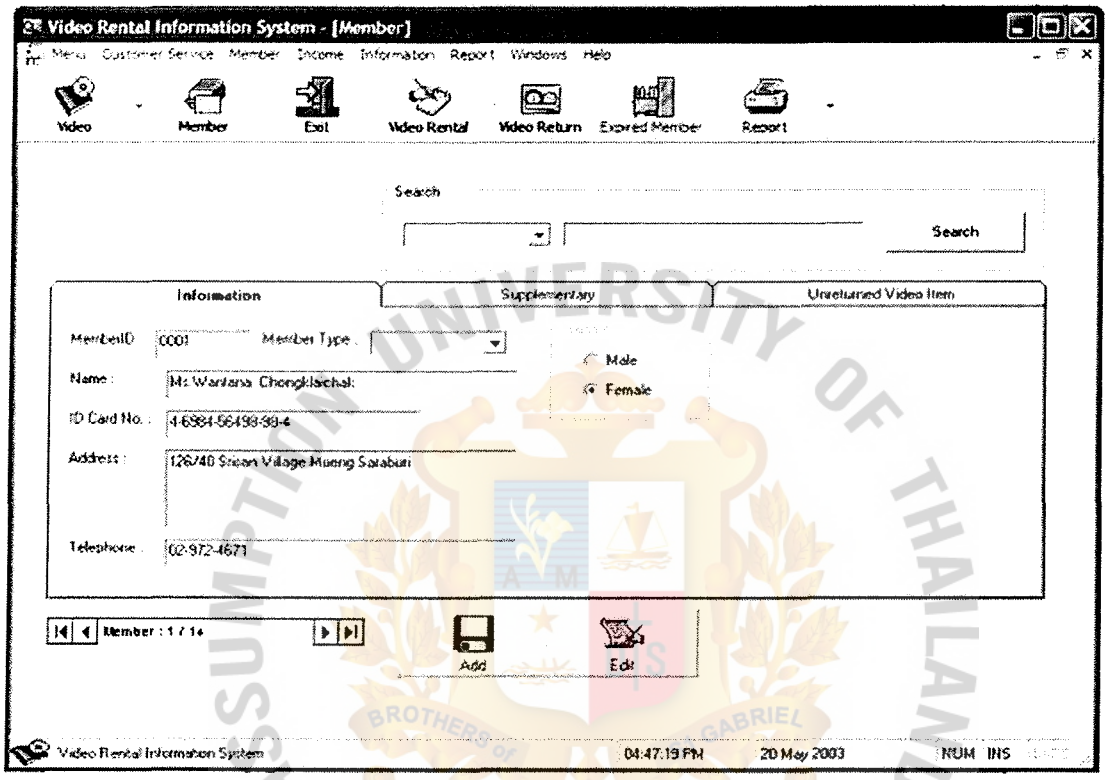


Figure D.9. Member Page (2).

The following figure is the example of supplementary tab.

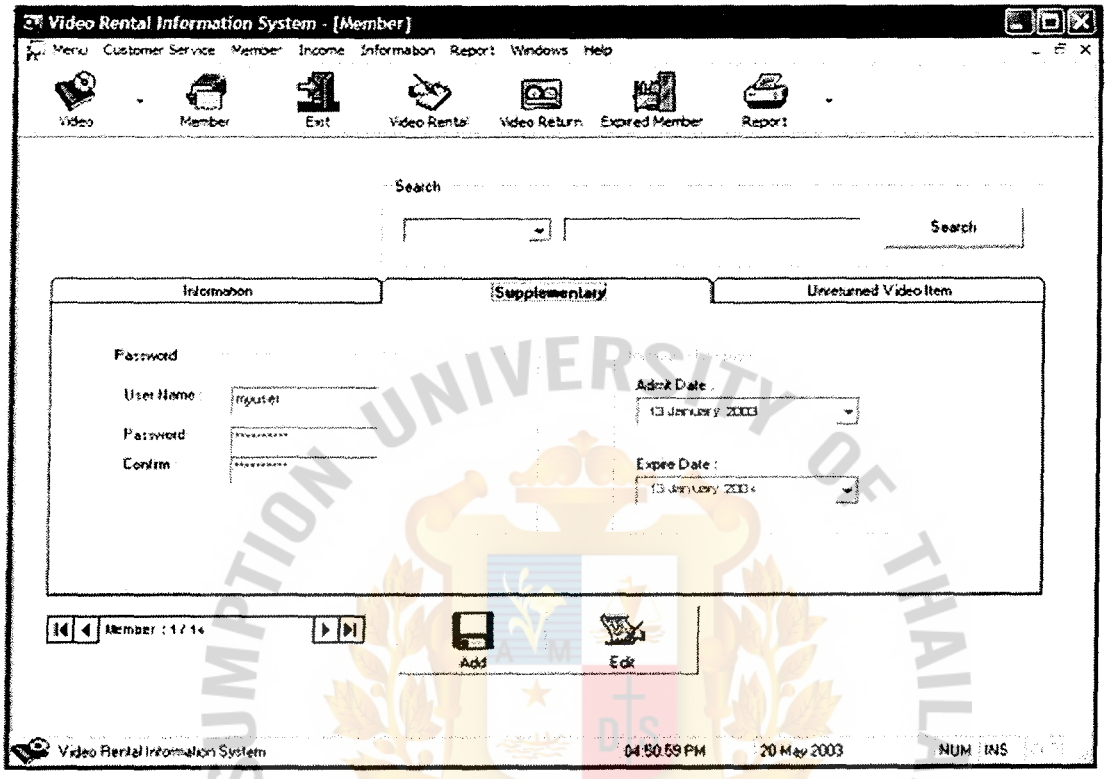


Figure D.10. Member Page (3).

St. Gabriel's Library, Au

The following figure is the example of unreturned video item tab.

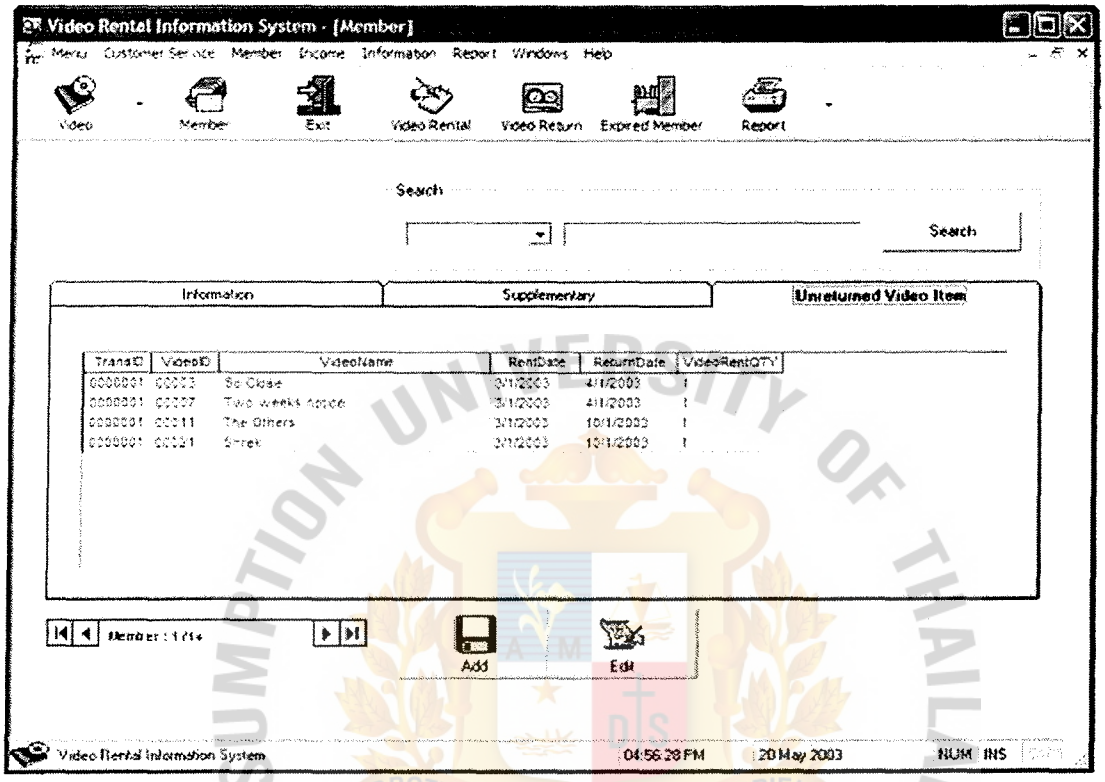


Figure D.11. Member Page (4).

(5) Adjust Expired Member page

For this page, it is used to check which member is expired, that must be done at the end of every day.

It is opened by selecting either "Member/Adjust Expired Member" or "Expired Member" button as shown in figure A.11.

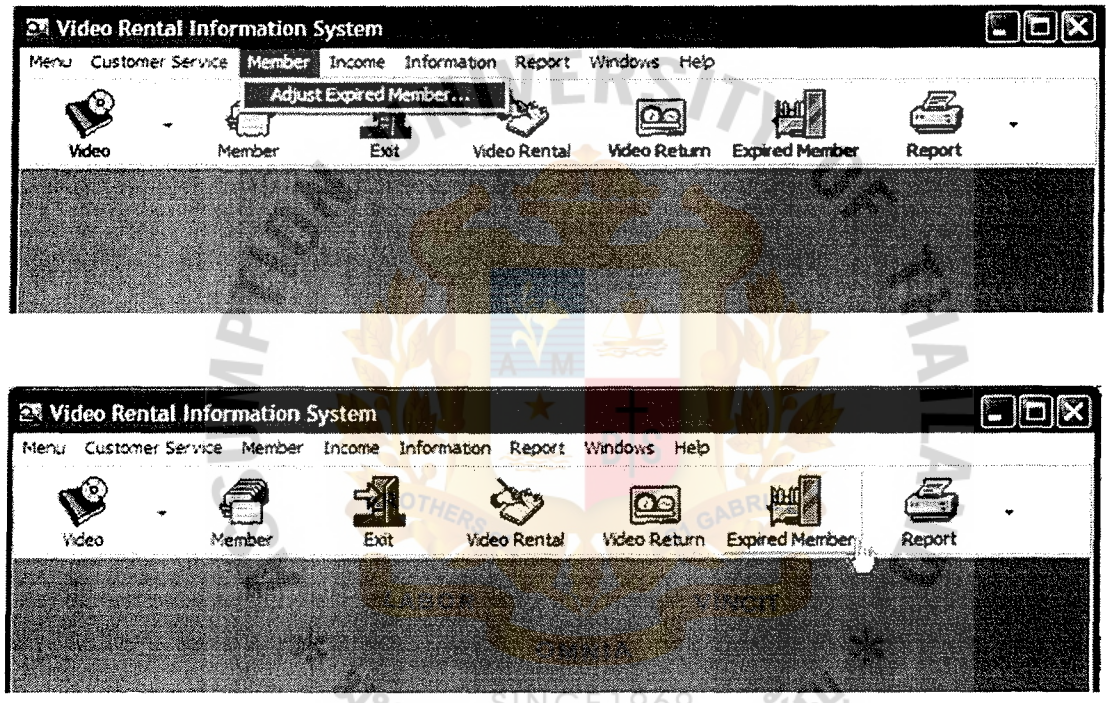


Figure D.12. Adjust Expired Member Page (1).

This page is Adjust Expired Member page after selecting.

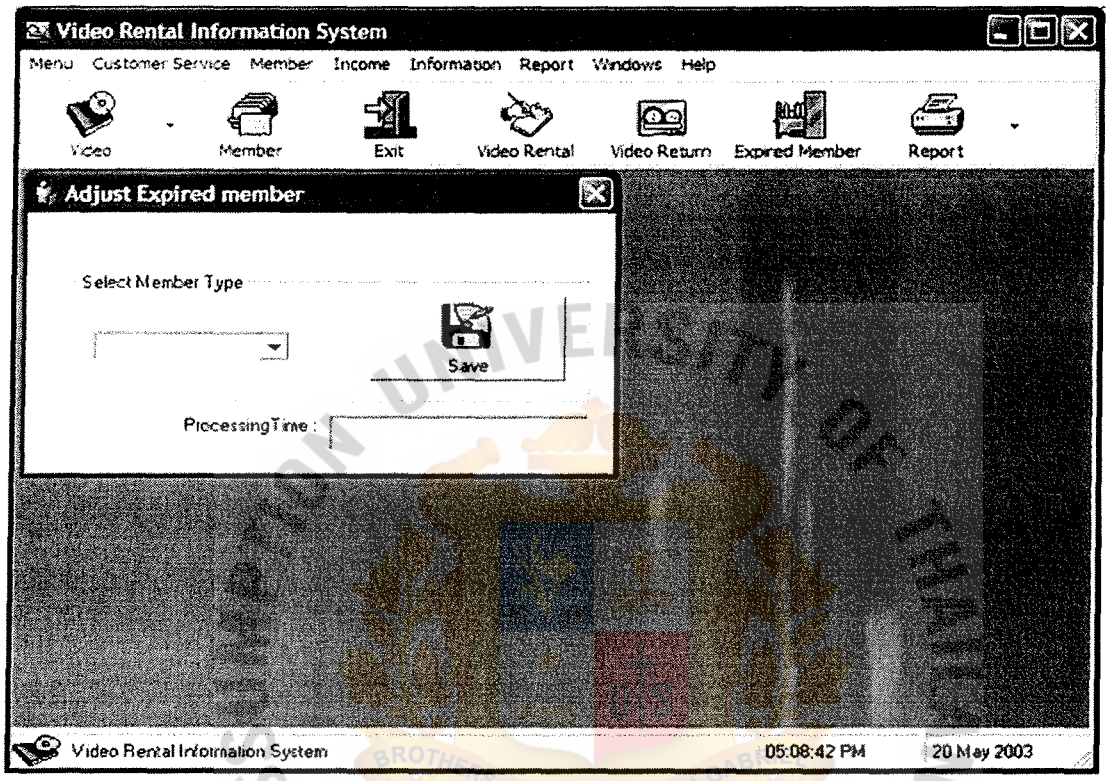


Figure D.13. Adjust Expired Member (2).

(6) Rent page

This page shows the description of rental video items that can be opened by selecting "Customer Service/Video Rental" or by clicking "Video Rental" button.

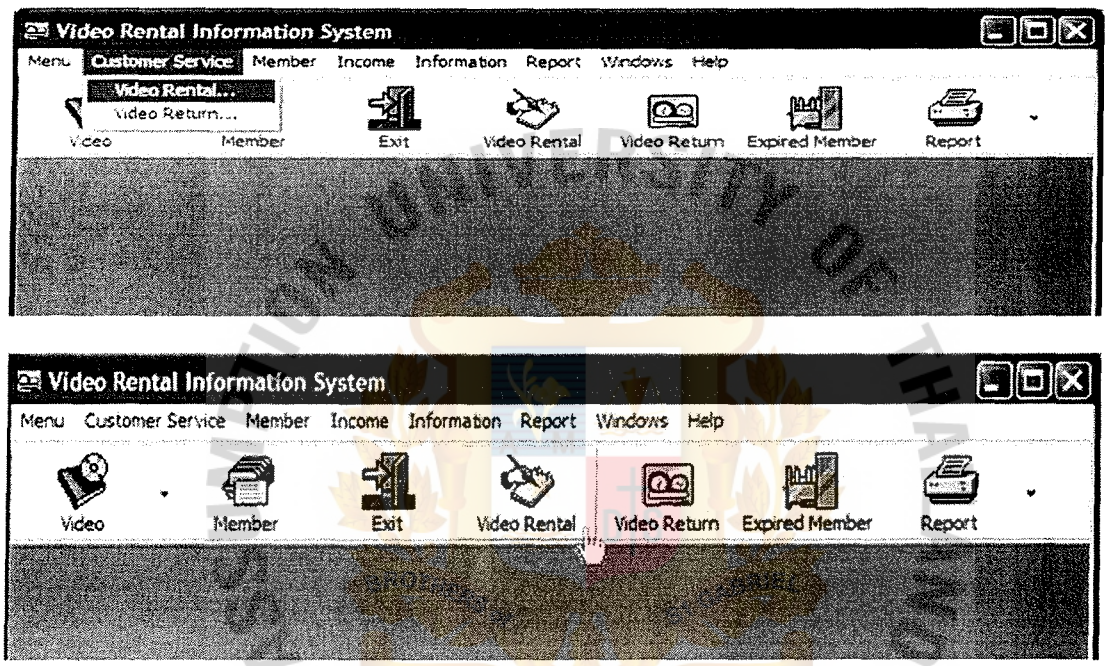


Figure D.14. Rent Page (1).

This is the example of Rent page after reading the video rental information .

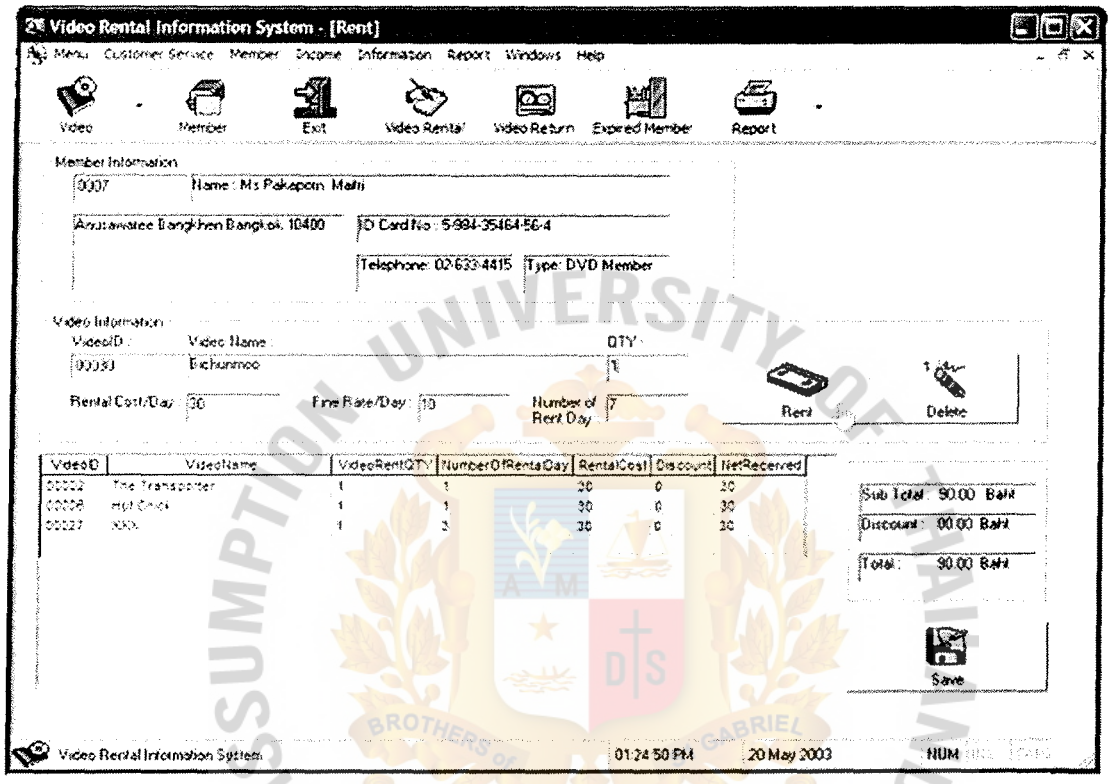


Figure D.15. Rent Page (2).

(7) Return page

The Return page is about the video return information, video unreturned information as well as fine for late video return item.

You can select "Customer Service/Video Return" or click "Video return" button.

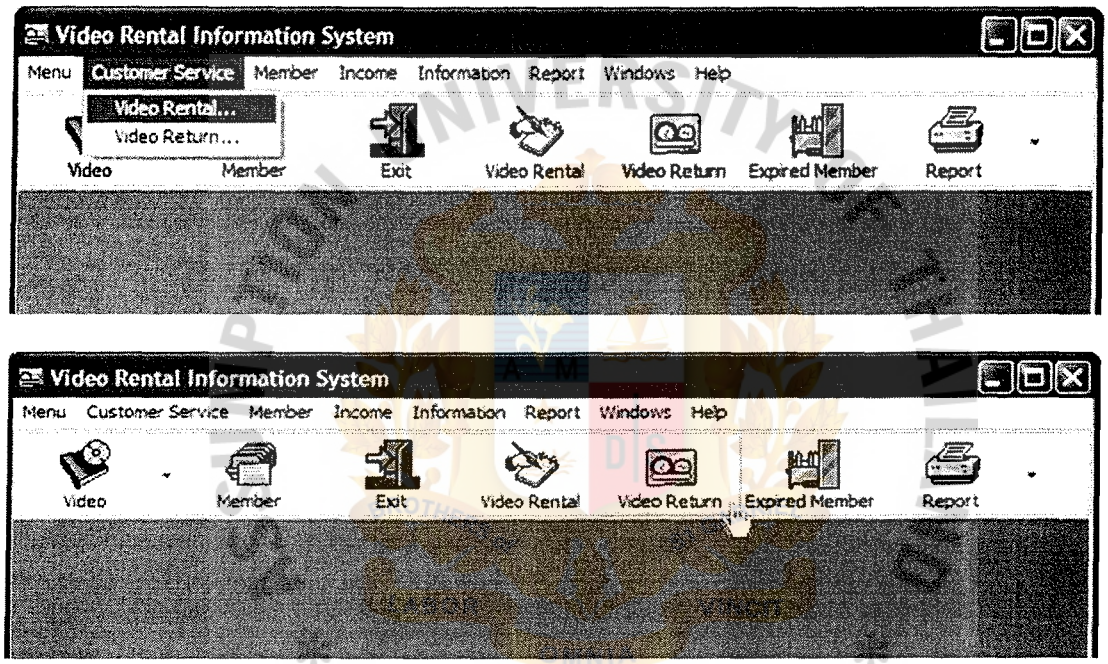


Figure D.16. Return Page (1).

The example of Return Video Tab is depicted below.

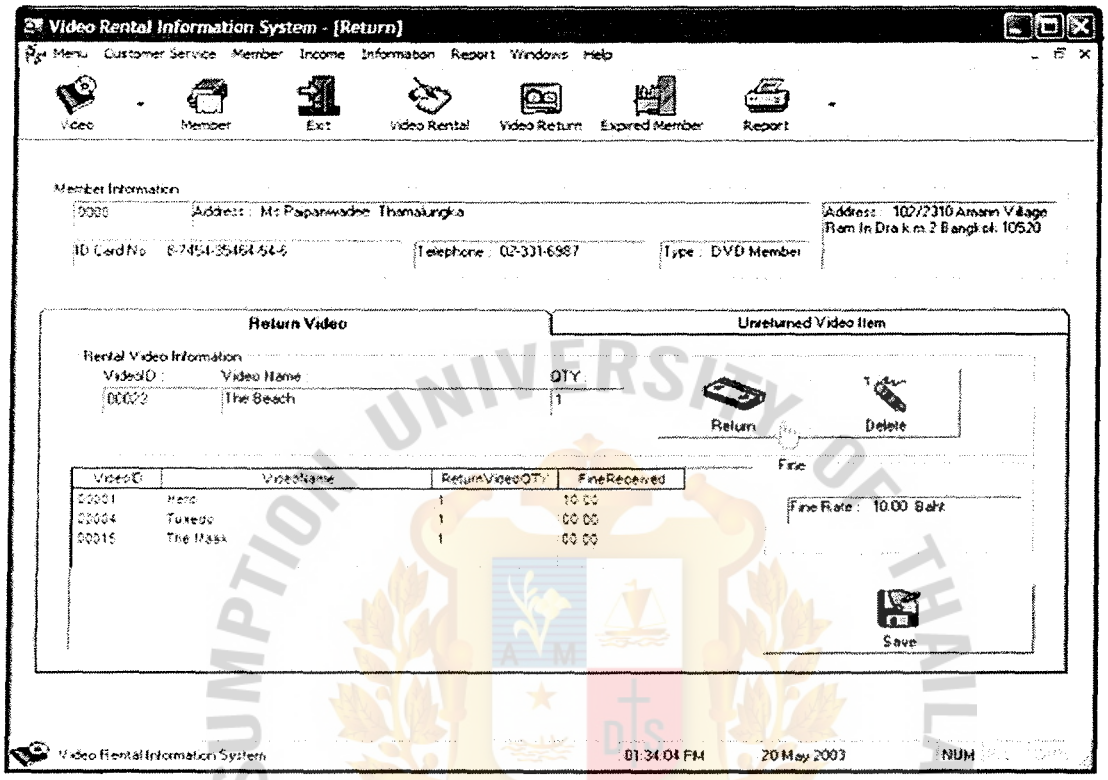


Figure D.17. Return Page (2).

This is an example of Unreturned Video Item Tab.

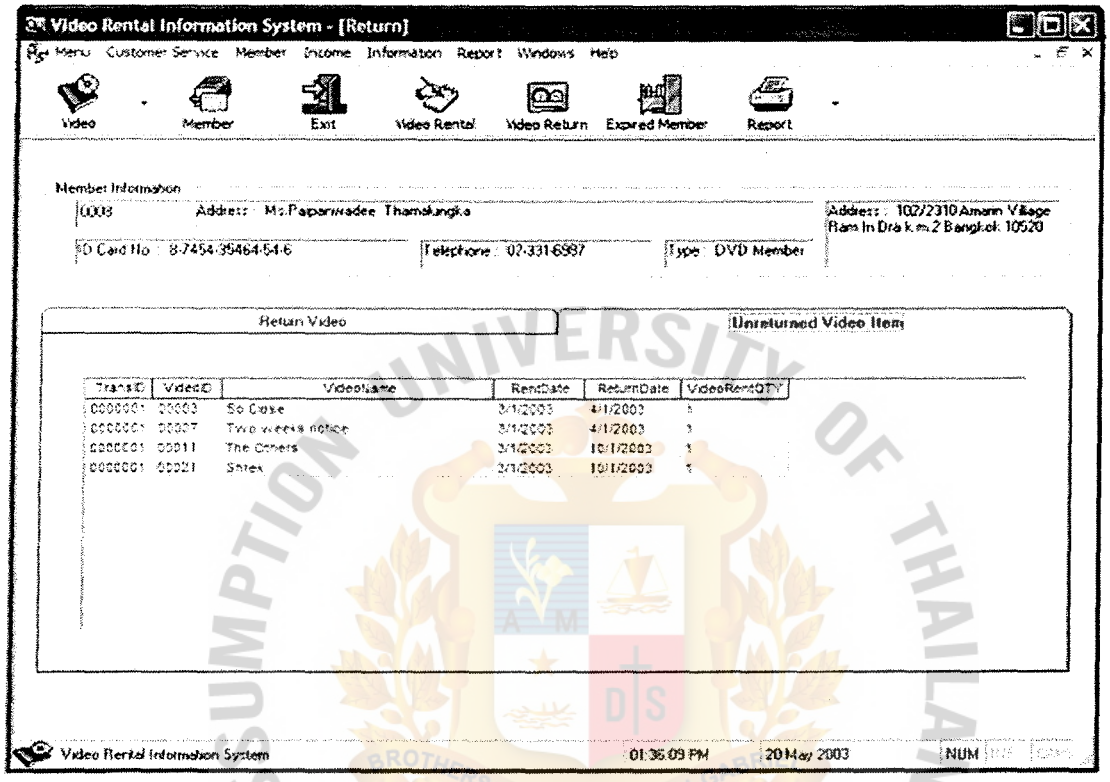


Figure D.18. Return Page (3).

(8) Income Summary page

This page is the calculation all income defined by TransactionID as figure shown.

You can open this page by selecting "Income/Income Summary".

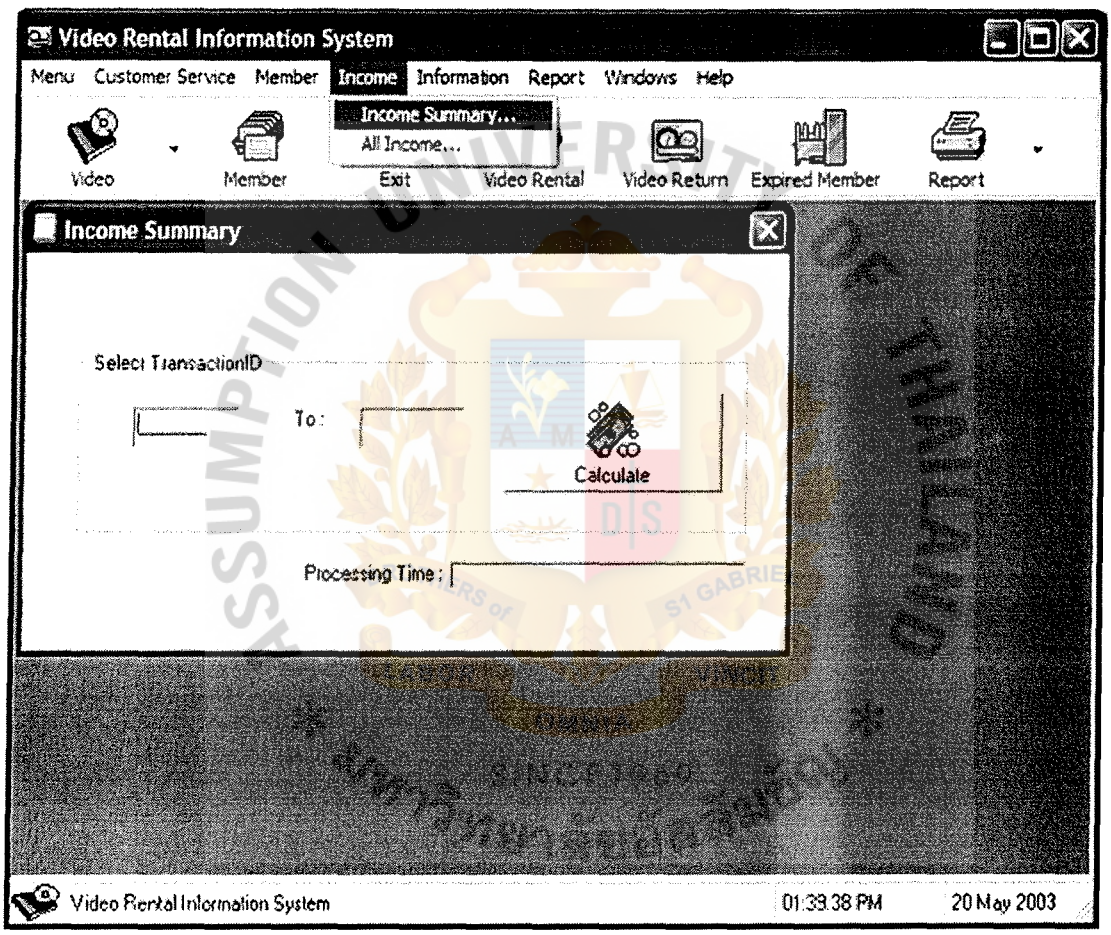


Figure D.19. Income Summary Page.

(9) All Income page

Alike, this page represents the total income of each transaction, which is depicted by selecting "Income/All Income".

From the figure below, you can print "All Income" report by selecting button "Preview Report", which is depicted in Appendix B.

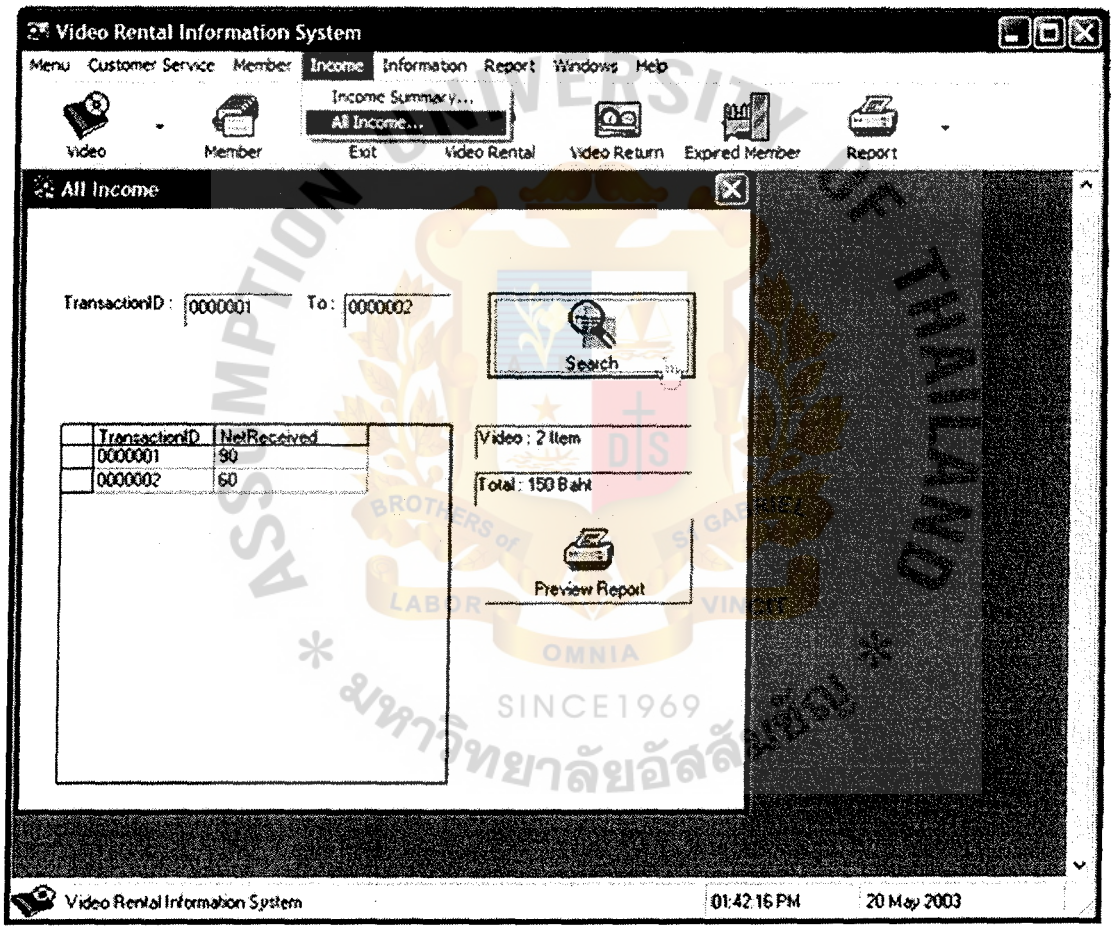


Figure D.20. All Income Page.

(10) Unreturned Video Item page

This page shows the member who did not return video and also the details of these unreturned video items.

It is shown by selecting "Information/Unreturned Video Item".

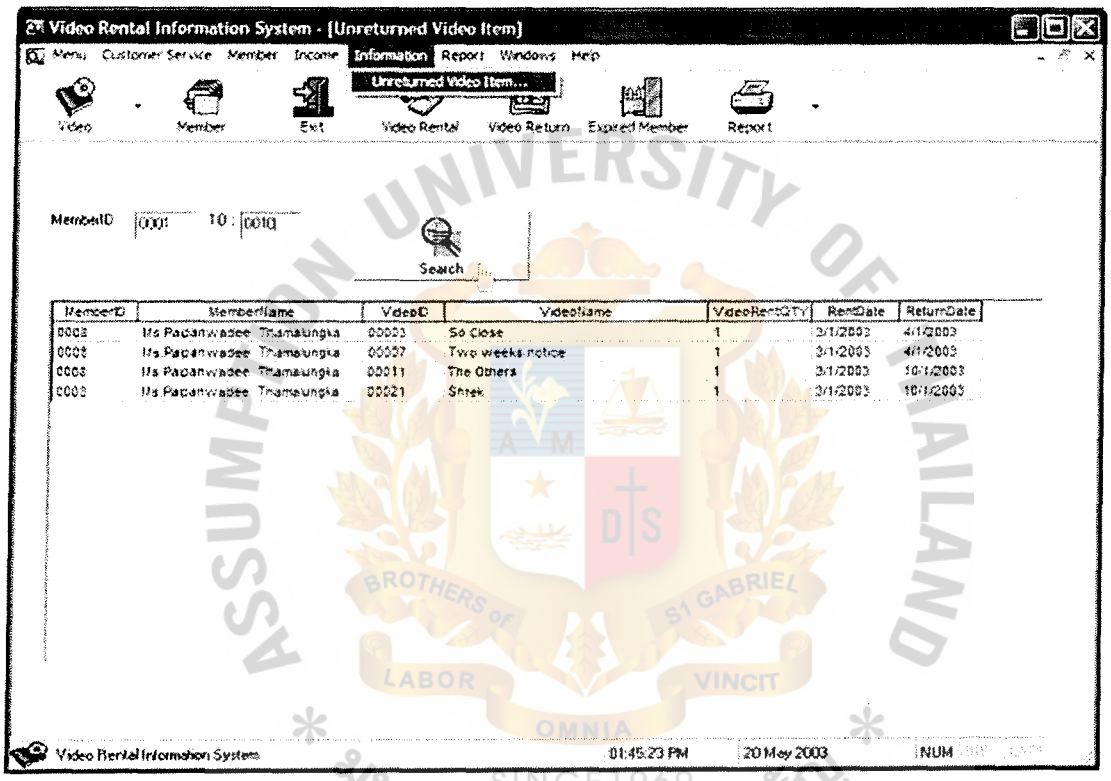


Figure D.21. Unreturned Video Item Page.

(11) Report page

The report of our video store can be prepared by selecting "Report/.....(define the needed report)" or by clicking sub button of "Report" as shown in the figure below.

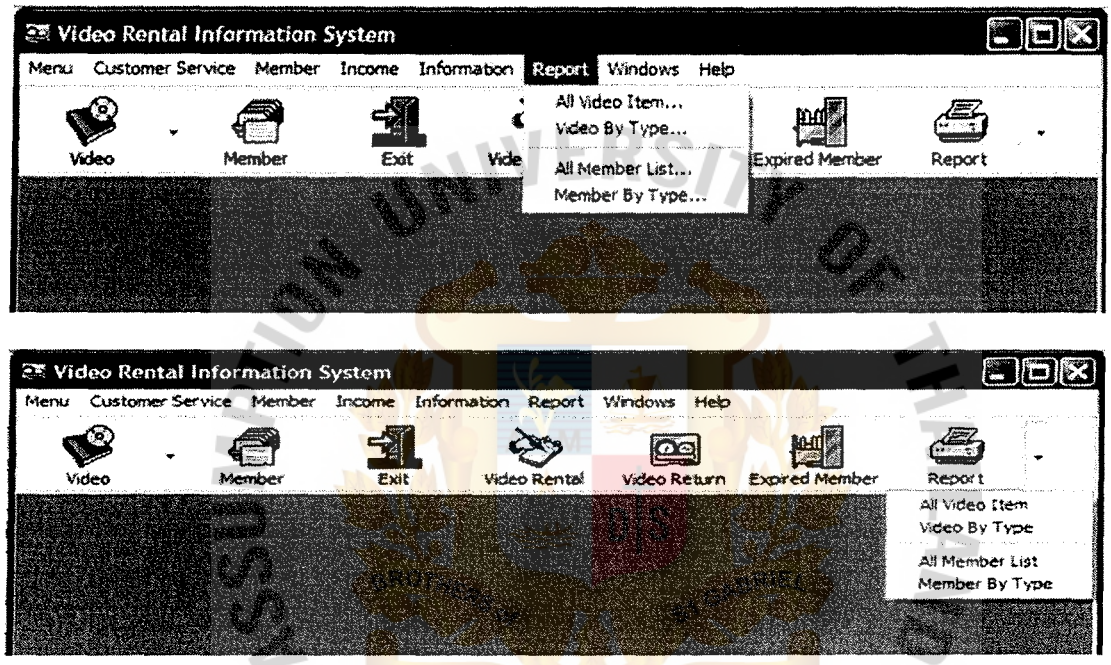


Figure D.22. Report Page.

APPENDIX E

REPORT DESIGN

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS OF ST GABRIEL
LABOR OMNIA VINCIT
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

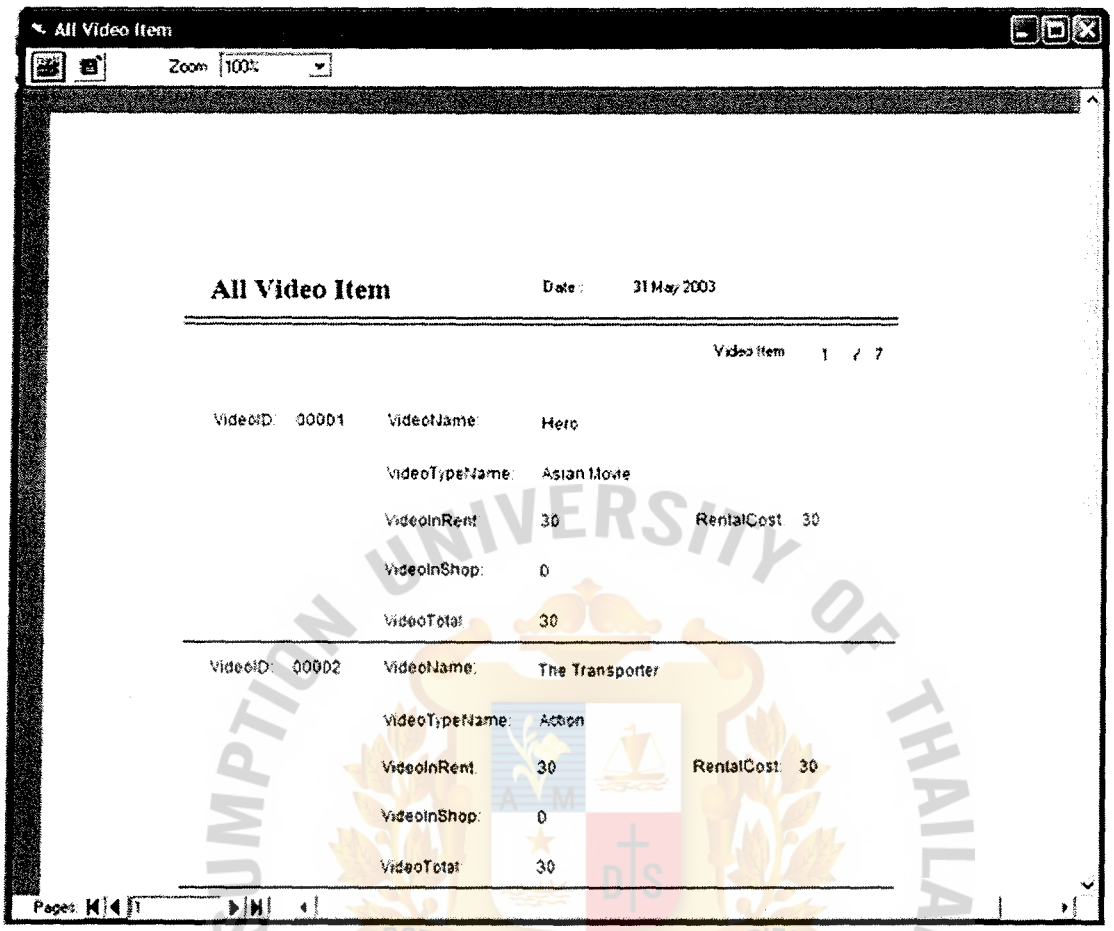


Figure E.1. All Video Item Report (1).

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS OF ST GABRIEL
LABOR OMNIA VINCIT
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

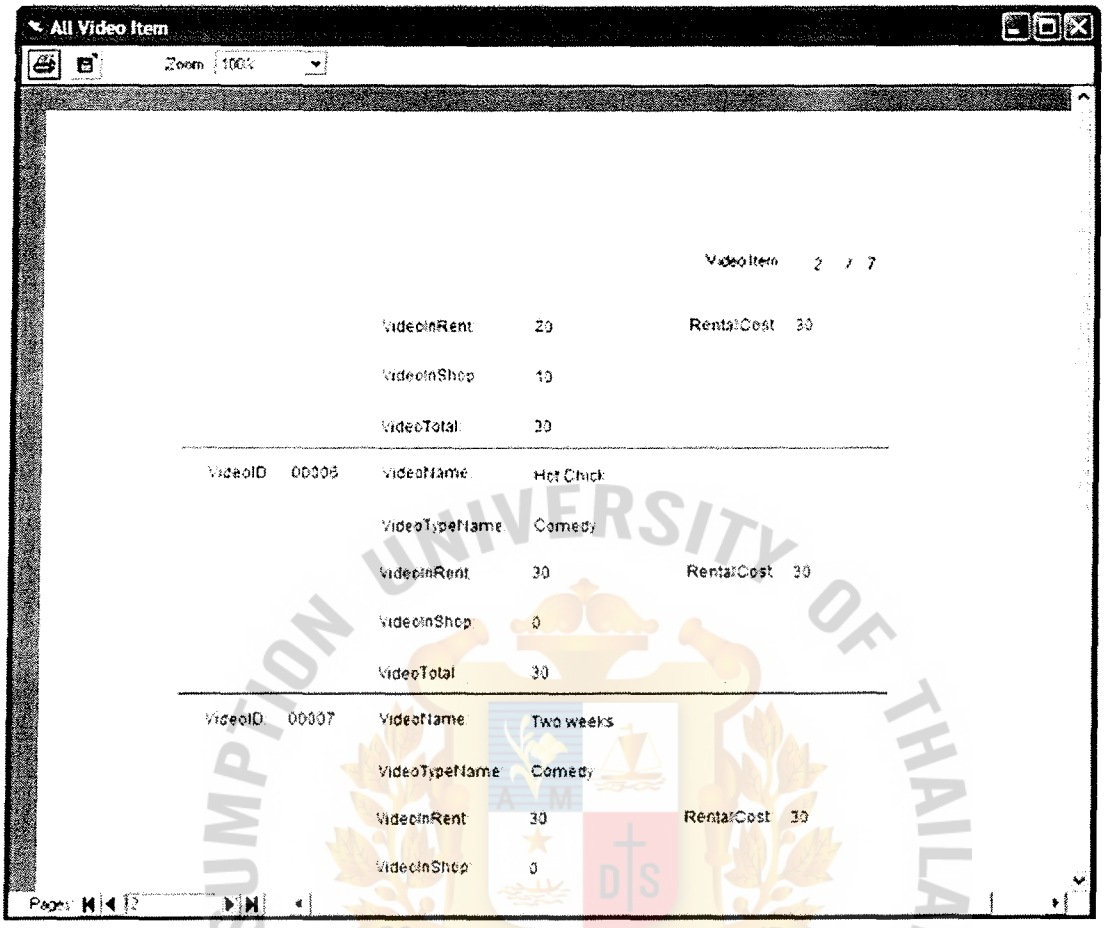


Figure E.2. All Video Item Report (2).

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS OF ST GABRIEL
LABOR OMNIA VINCIT
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

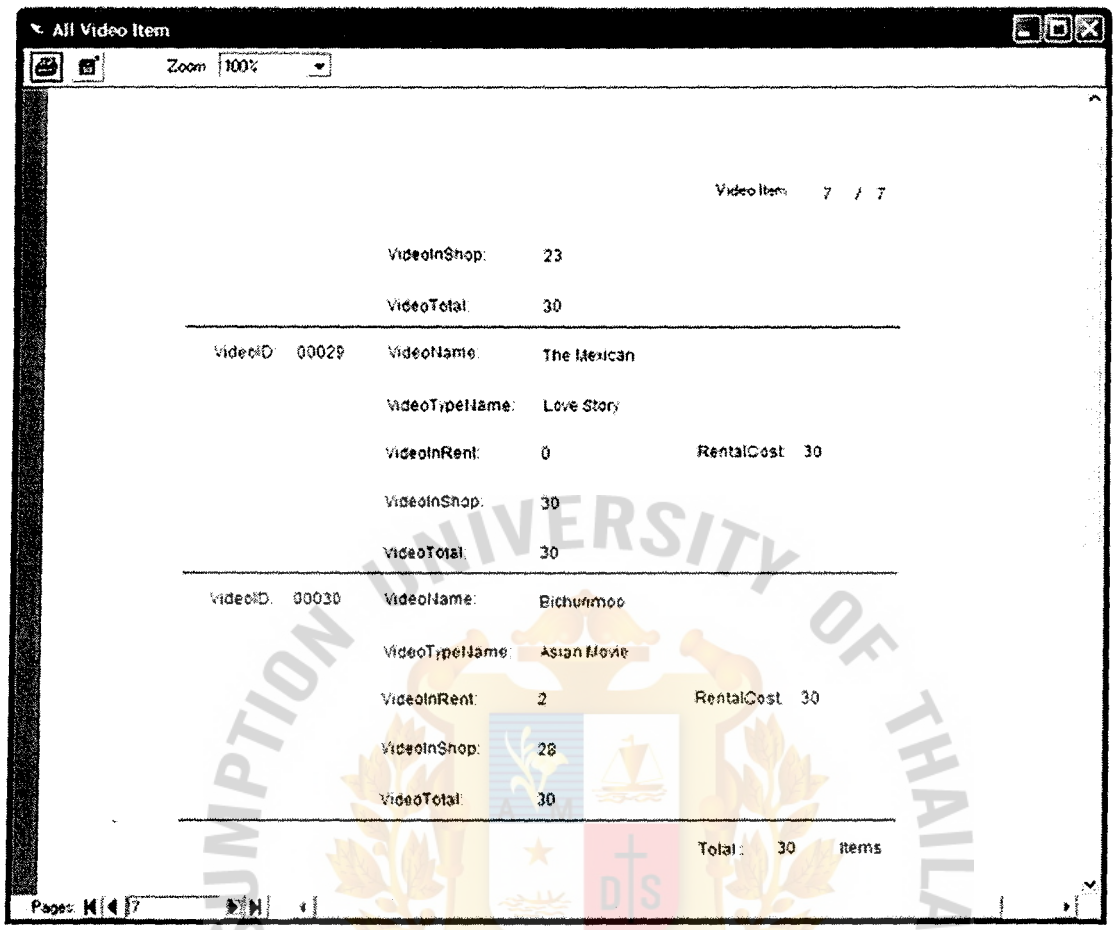


Figure E.3. All Video Item Report (3).

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS OF ST GABRIEL
LABOR OMNIA VINCIT
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

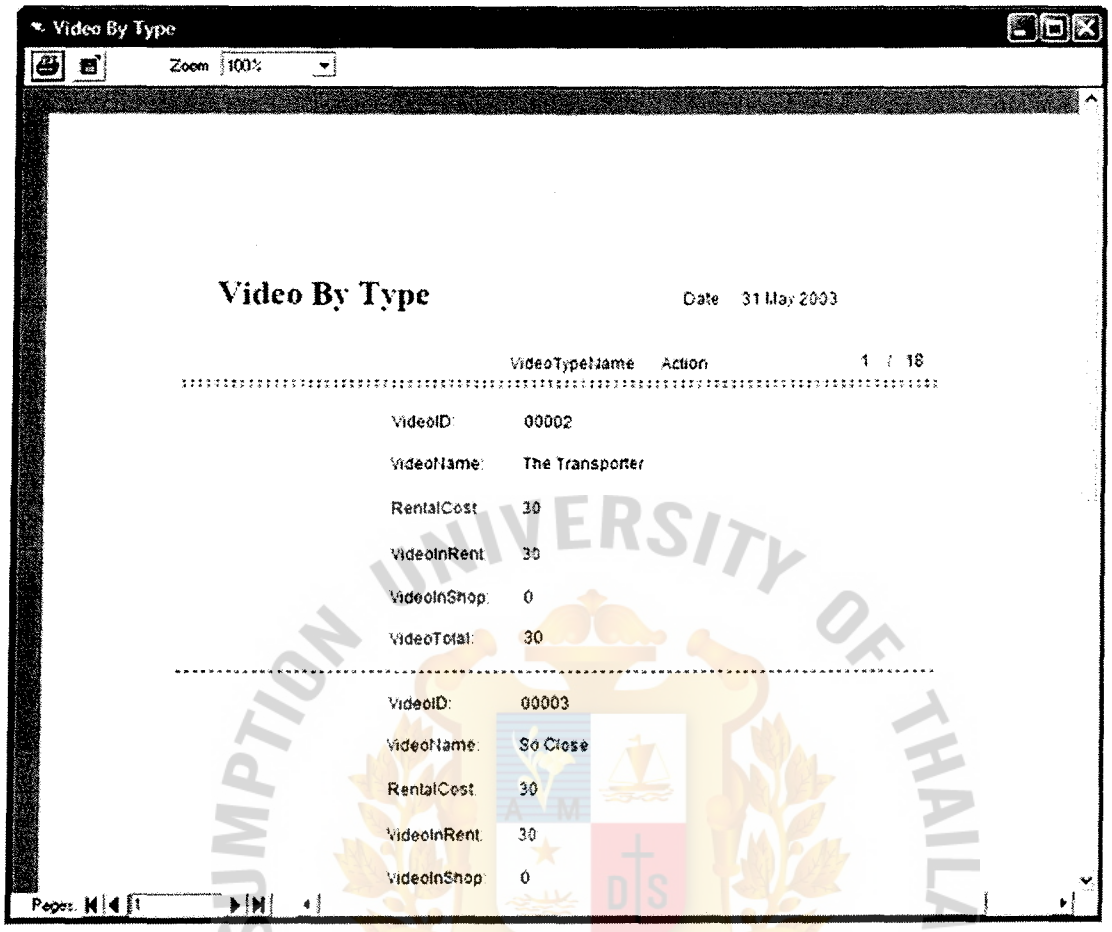


Figure E.4. Video By Type Report (1).

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS OF ST GABRIEL
OMNIA
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

St. Gabriel's Library, Au

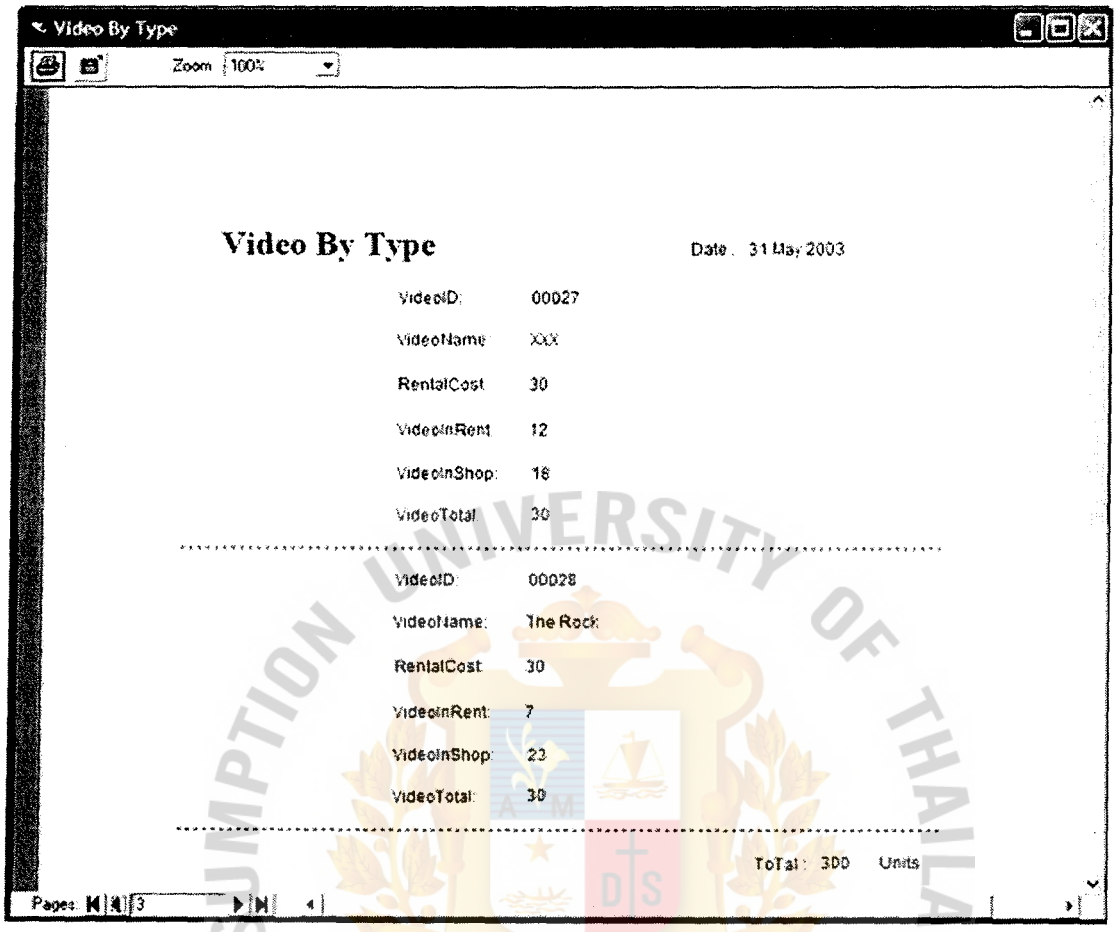


Figure E.5. Video By Type Report (2).

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS OF ST GABRIEL
OMNIA
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

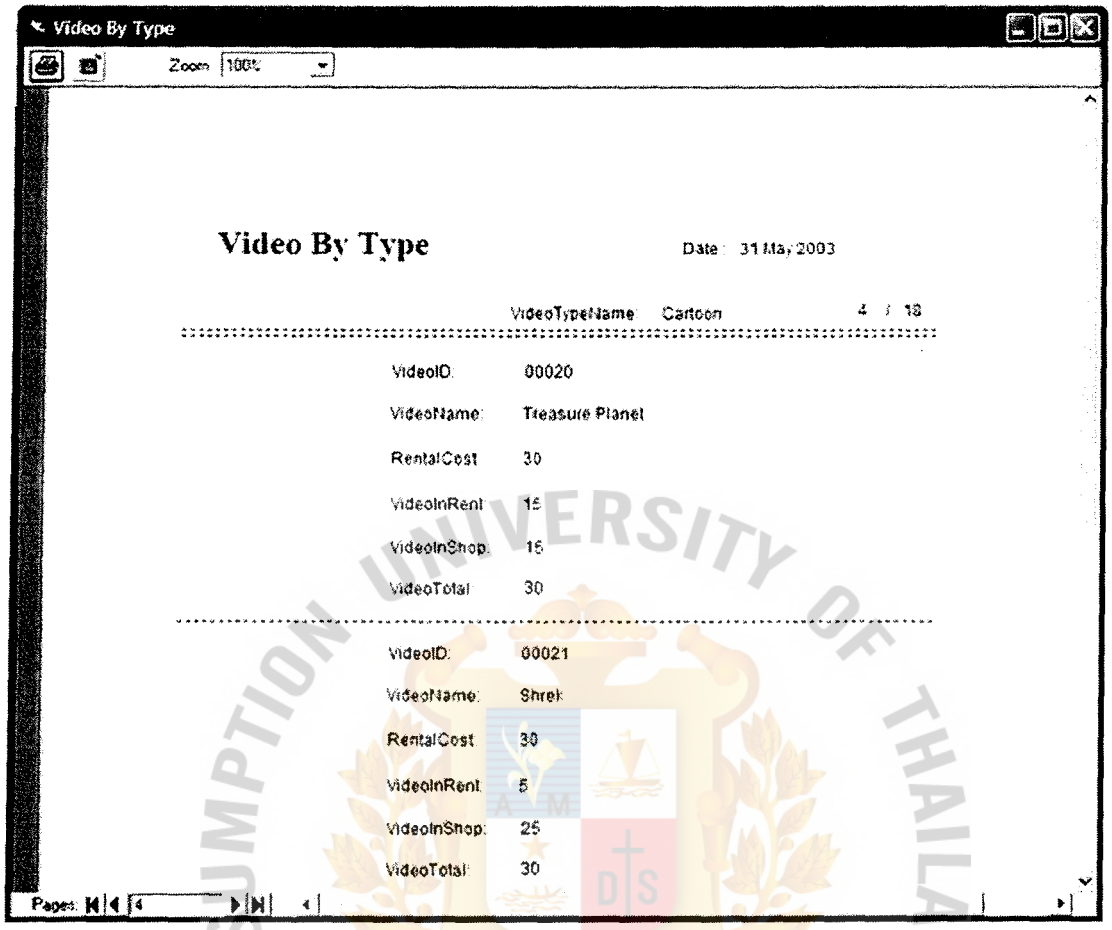


Figure E.6. Video By Type Report (3).

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS OF ST GABRIEL
OMNIA
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

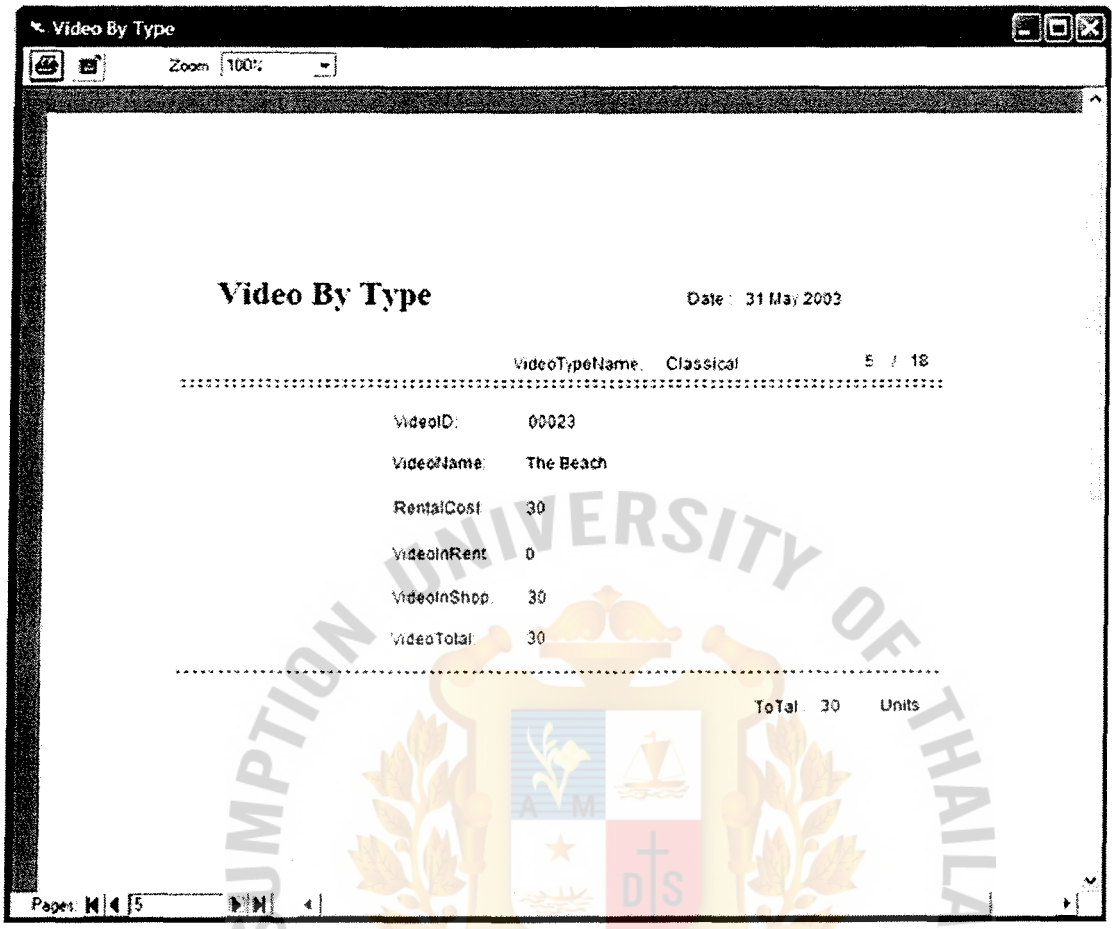


Figure E.7. Video By Type Report (4).

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS OF ST GABRIEL
LABORE ET OMNIA
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

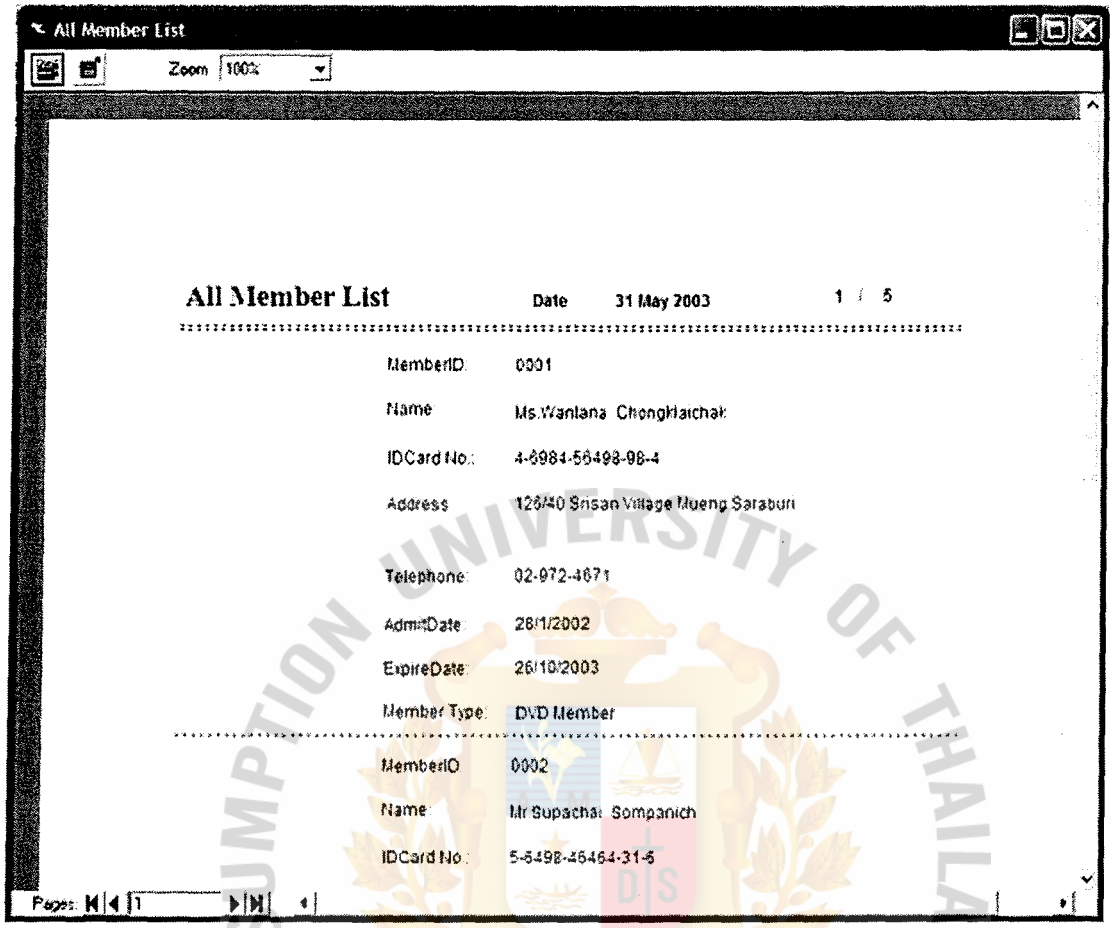


Figure E.8. All Member List Report (1).

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS OF ST GABRIEL
LABORE OMNIA
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

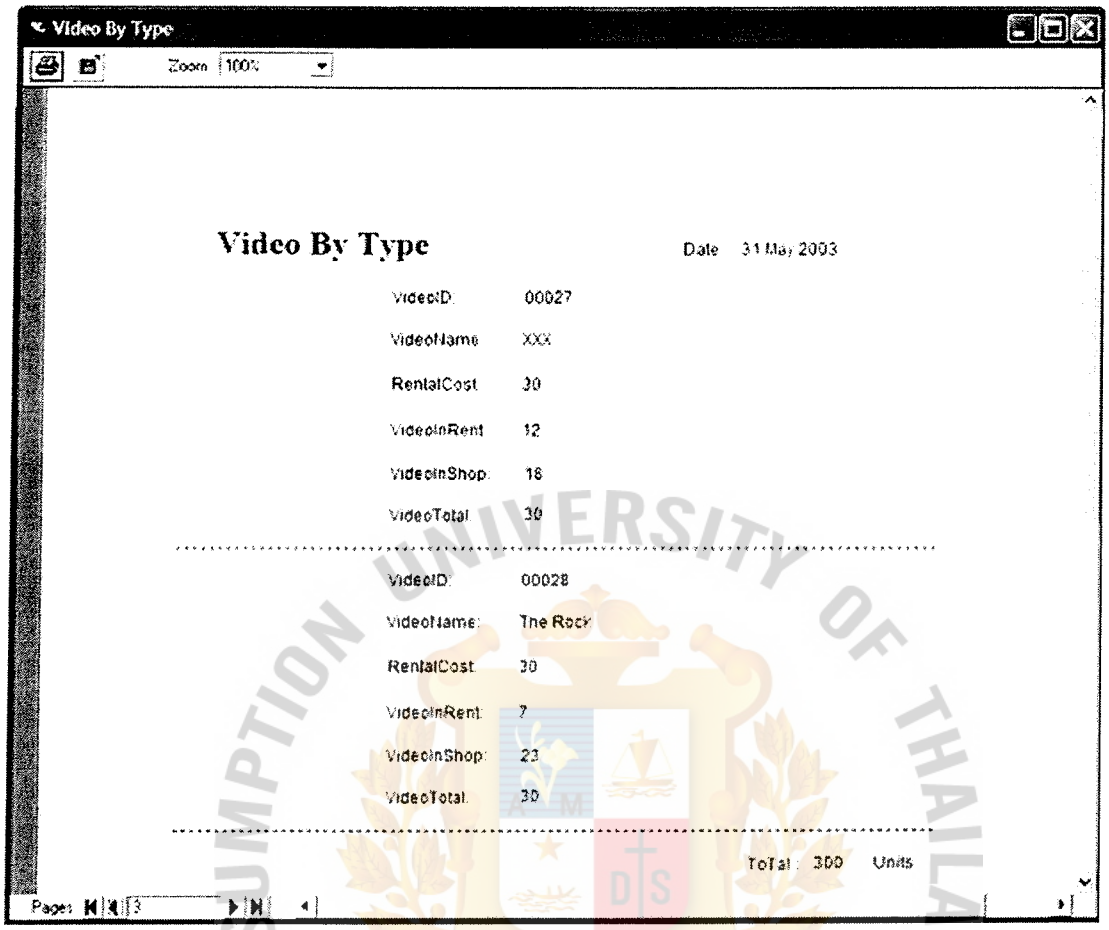


Figure E.5. Video By Type Report (2).

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS OF ST GABRIEL
LABORE ET INGENIO
OMNIA
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

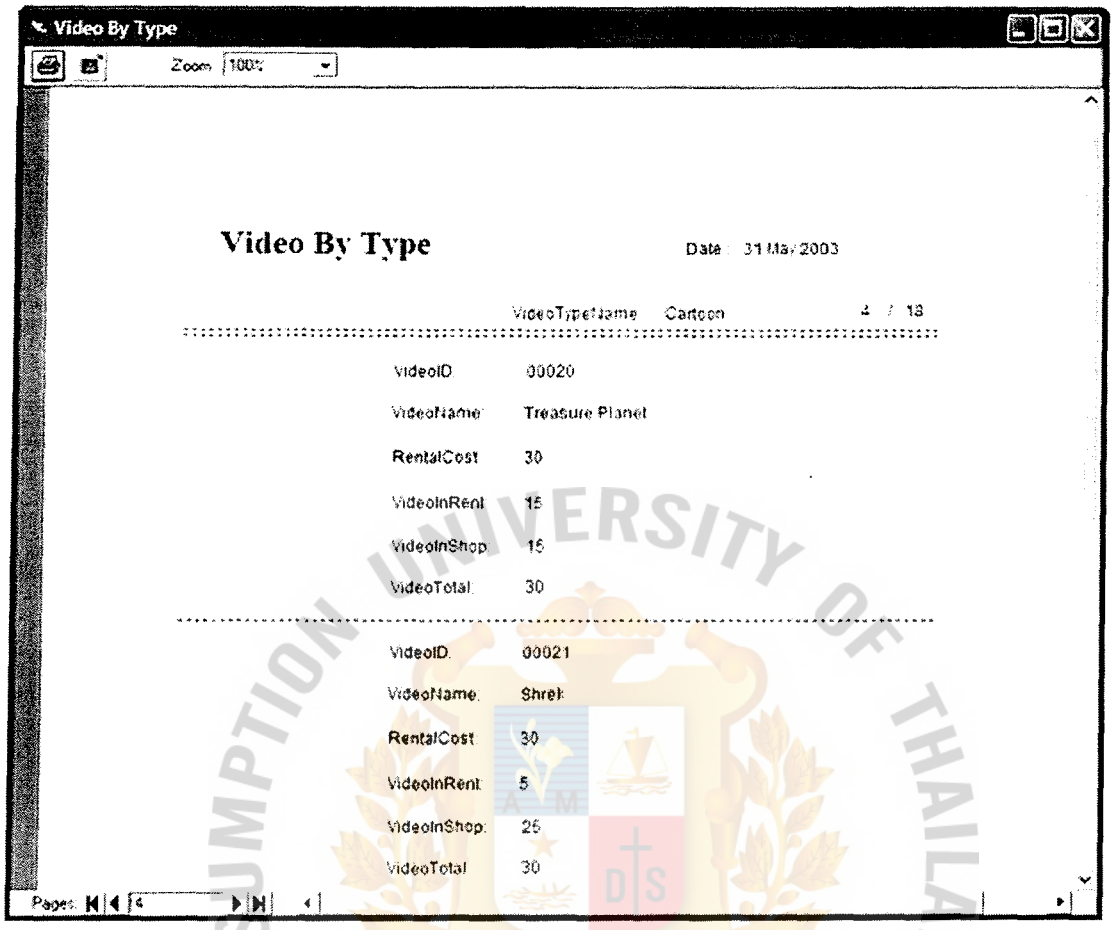


Figure E.6. Video By Type Report (3).

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS OF ST GABRIEL
LABORE ET INTEGRITATE
OMNIA
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

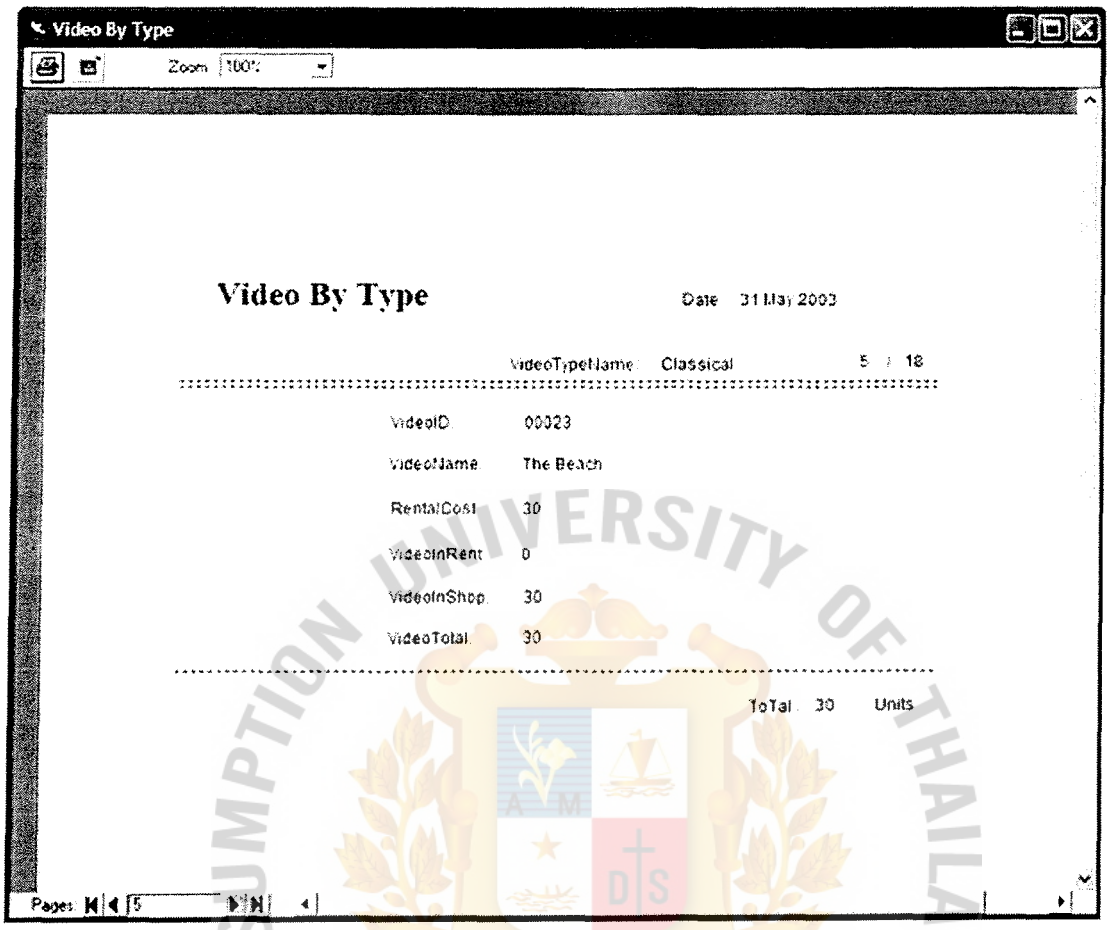


Figure E.7. Video By Type Report (4).

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS OF ST GABRIEL
OMNIA
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

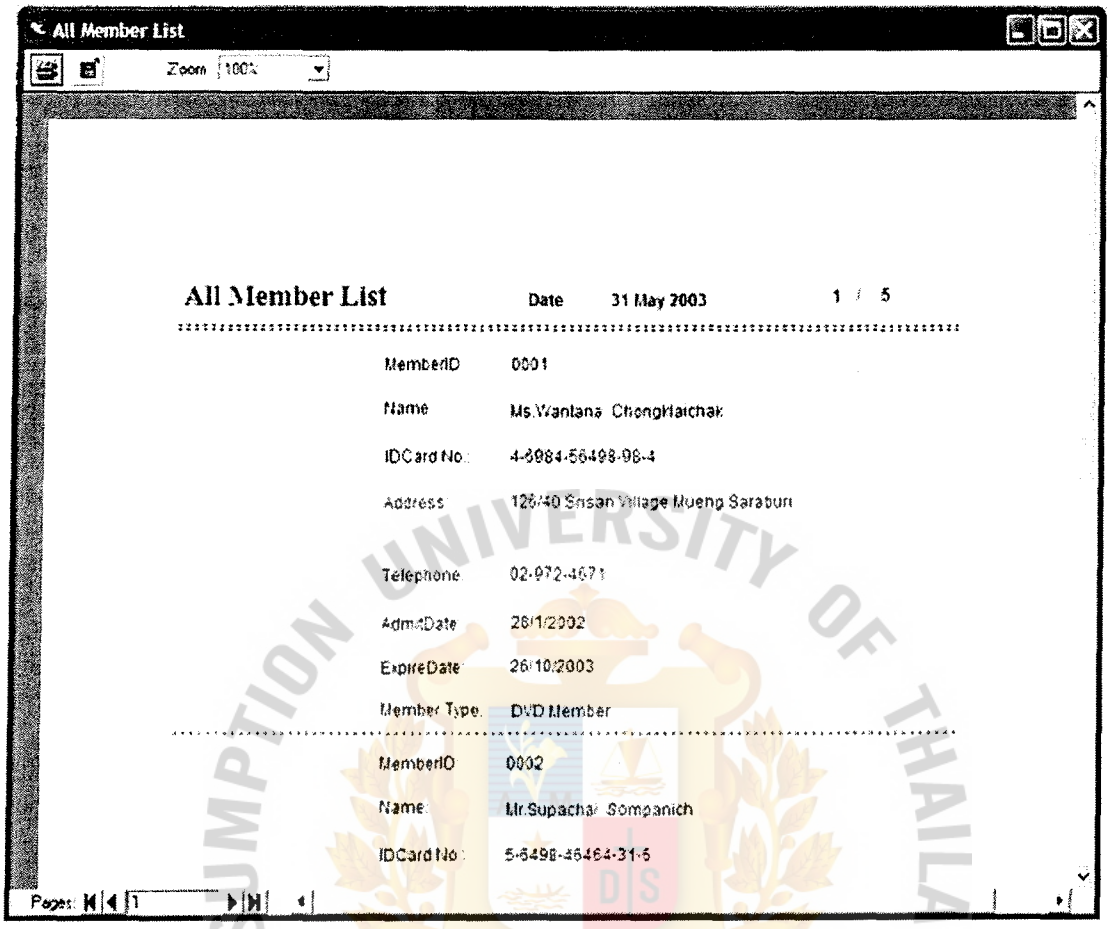
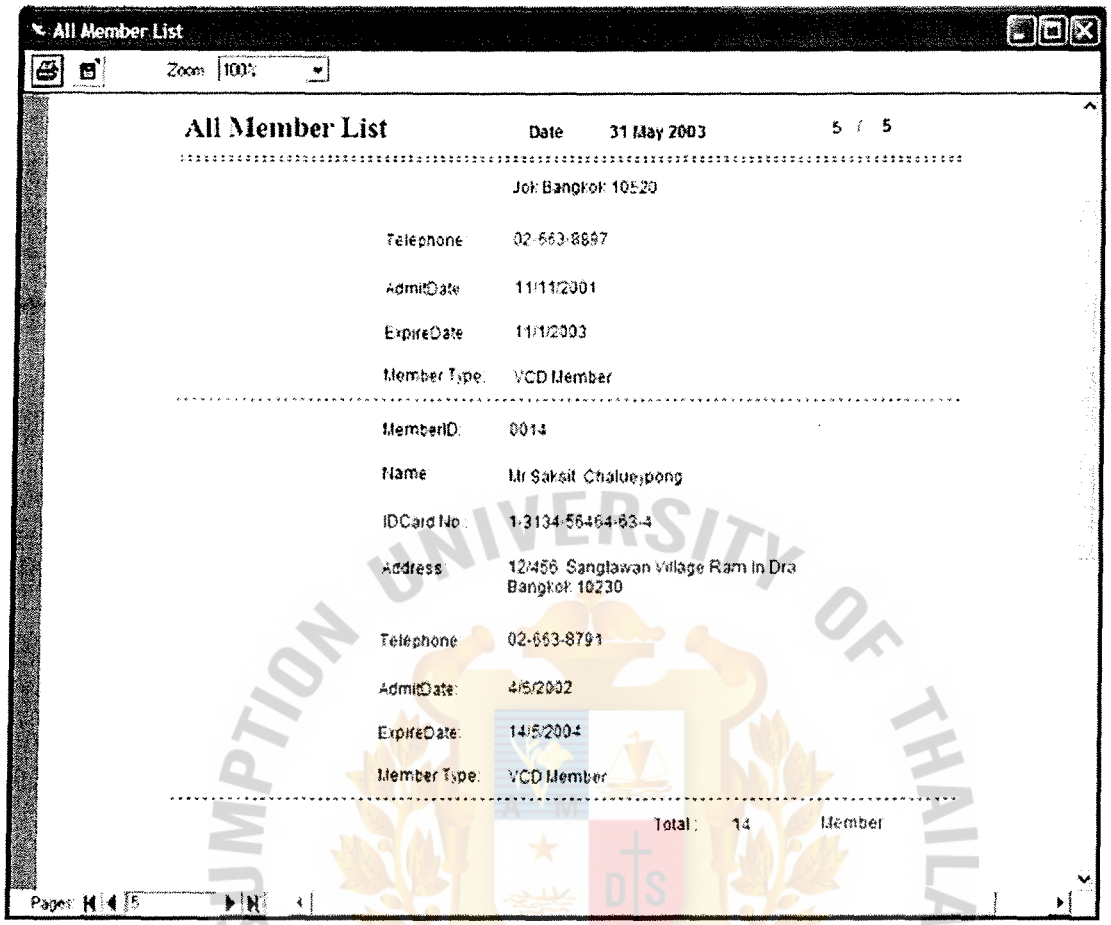


Figure E.8. All Member List Report (1).



All Member List

Zoom 100%

All Member List Date 31 May 2003 5 / 5

Jok Bangkok 10520

Telephone 02-663-8897

AdmitDate 11/11/2001

ExpireDate 11/1/2003

Member Type: VCD Member

MemberID: 0014

Name Mr Saksit Chaluepong

IDCard No : 1-3134-56464-63-4

Address 12/456 Sanglawan Village Ram In Dra Bangkok 10230

Telephone 02-663-8791

AdmitDate: 4/6/2002

ExpireDate: 14/6/2004

Member Type: VCD Member

Total : 14 Member

Page: 5

Figure E.9. All Member List Report (2).

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS OF ST GABRIEL
OMNIA
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Member Order
24 September 2003

TransID	MemID	MemberName	VideoID	VideoName	VideoType	ReturnDate	RentalCost	QTY	Total
0000001	0002	Mr.Supachai Som	00001	Hero	Asian Movie	25/9/2003	30.00	1	30.00
0000001	0002	Mr.Supachai Som	00004	Tuxedo	Action	25/9/2003	30.00	1	30.00
0000002	0007	Ms.Paksporn Mait	00001	Hero	Asian Movie	25/9/2003	30.00	1	30.00
0000003	0015	Mr.Sommai Chand	00017	Minority Report	Action	1/10/2003	30.00	1	30.00
0000003	0015	Mr.Sommai Chand	00003	So Close	Action	25/9/2003	30.00	1	30.00
0000004	0020	Mrs.Pattama Sriss	00006	Hot Chick	Comedy	25/9/2003	30.00	1	30.00
0000005	0021	Ms.Naree Chuano	00027	XXX	Action	27/9/2003	30.00	1	30.00

Sub Total:	210.00	Baht
Discount:	0.00	Baht
Total:	210.00	Baht

Figure E.14. Member Order Report.

Unreturned Video Item
24 September 2003

TransID	MemID	MemberName	VideoID	VideoName	RentDate	ReturnDate	QTY
0000001	00007	Ms.Paksporn Msit	00021	Shrek	16/9/2003	23/9/2003	1
0000005	00008	Ms.Paipanwadee Thamsiungka	00003	So Close	23/9/2003	24/9/2003	1
0000006	00024	Mr.Wanchai Sirisatorn	00011	The Others	16/9/2003	23/9/2003	1
0000006	00030	Ms.Siri Boonwattana	00001	Hero	22/9/2003	23/9/2003	1

Figure E.15. Unreturned Video Item Report.

Fine Payment
25 September 2003

TransID	MemID	MemberName	VideoID	VideoName	RentDate	ReturnDate	QTY	LateDay	Fine
0000001	00007	Ms.Pakaporn Mait	00021	Shrek	18/9/2003	23/9/2003	1	2	20.00
0000005	00008	Ms.Paipanwadee Thamalungka	00003	So Close	23/9/2003	24/9/2003	1	1	10.00
0000006	00024	Mr.Wanchai Sirisatorn	00011	The Others	16/9/2003	23/9/2003	1	2	20.00
0000006	00030	Ms.Siri Boonwattana	00001	Hero	22/9/2003	23/9/2003	1	2	20.00

Sub Total:	70.00	Baht
Discount:	0.00	Baht
Total:	70.00	Baht

Figure E.16. Fine Payment Report.

Top 10 Rental Video
24 September 2003

No.	VideoID	Video Name	Video Type	Rental Cost	QTY	Total
1.	00001	Hero	Asian Movie	30.00	40	1,200.00
2.	00003	So Close	Action	30.00	40	1,200.00
3.	00007	Two Week Notice	Comedy	30.00	38	1,140.00
4.	00008	Hot Chick	Comedy	30.00	36	1,080.00
5.	00004	Tuxedo	Action	30.00	36	1,080.00
6.	00020	Treasure Planet	Cartoon	30.00	32	960.00
7.	00005	Harry Potty and the chamber of the secret	Family Child	30.00	28	840.00
8.	00012	The Bourne Identity	Action	30.00	25	750.00
9.	00027	XXX	Action	30.00	23	690.00
10.	00017	Minority Report	Action	30.00	19	570.00
				Sub Total:	9,510.00	Baht
				Discount:	0.00	Baht
				Total:	9,510.00	Baht

Figure E.17. Top 10 Rental Video Report.

APPENDIX F

DATABASE DESIGN

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS OF ST GABRIEL
LABOR OMNIA VINCIT
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

Table F.1. Member Table.

No.	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to Table	Key Type
1	MemberID	Text	Y	Y			Primary Key
2	Name	Text			Y		Attribute
3	Gender	Text			Y		Attribute
4	IDCard	Text			Y		Attribute
5	Address	Text			Y		Attribute
6	UserName	Text			Y		Attribute
7	Password	Text			Y		Attribute
8	AdmitDate	Date/Time			Y		Attribute
9	ExpireDate	Date/Time			Y		Attribute
10	Member TypeID	Text	Y	Y		MemberType	Attribute
11	IsExpired	Text			Y		Attribute

Table F.2. MemberType Table.

No.	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to Table	Key Type
1	Member TypeID	Text	Y	Y			Primary Key
2	Member Desc	Text			Y		Attribute
3	Discount Rate	Number			Y		Attribute
4	FineRate	Number			Y		Attribute

Table F.3. Video Table.

No	Field Name	Field Type	Index	Unique	Null able	Foreign Key to Table	Key Type
1	VideoID	Text	Y	Y			Primary Key
2	Video TypeID	Text	Y	Y		Video Type	Attribute
3	VideoNam e	Text			Y		Attribute
4	Starring	Text			Y		Attribute
5	Detail	Text			Y		Attribute
6	RentalCost	Number			Y		Attribute
7	Num RentDay	Number			Y		Attribute
8	Video InShop	Number			Y		Attribute
9	Video InRent	Number			Y		Attribute
10	VideoTotal	Number			Y		Attribute
11	VideoStatu s	Text			Y		Attribute

Table F.4. VideoType Table.

No	Field Name	Field Type	Index	Unique	Null able	Foreign Key to Table	Key Type
1	VideoTypeID	Text	Y	Y			Primary Key
2	VideoType Name	Text			Y		Attribut e

Table F.5. Rent Table.

No	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to Table	Key Type
1	TransID	Text	Y	Y			Primary Key
2	MemberID	Text	Y	Y		Member	Attribute
3	NetReceived	Number			Y		Attribute
4	IsReturn	Text			Y		Attribute

Table F.6. Rent Detail Table.

No.	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to Table	Key Type
1	TransID	Text	Y	Y			Primary Key
2	VideoID	Text	Y	Y		Video	Attribute
3	RentDate	Date/Time			Y		Attribute
4	ReturnDate	Date/Time			Y		Attribute
5	Video RentQTY	Number			Y		Attribute
6	Video ReturnQTY	Number			Y		Attribute
7	AmountReceived	Number			Y		Attribute
8	FineReceived	Number			Y		Attribute
9	TotalReceived	Number			Y		Attribute
10	IsReturn	Text			Y		Attribute

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APPENDIX G

PROCESS SPECIFICATION

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS OF ST GABRIEL
LABOR OMNIA VINCIT
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

Table G.1. Process Specification of Process 1.1.

Items	Description
Process Name:	Add New Member
Data In:	New Member Information New MemberID
Data Out:	New Member Record Video Rental Card
Process:	(1) Get necessary member data, member name, address, phone number, etc. and assign new member (2) Record the member data into Member database
Attachment:	(1) Member (2) Data Store D1

Table G.2. Process Specification of Process 1.2.

Items	Description
Process Name:	Check MemberID Validity
Data In:	MemberID Member Status
Data Out:	Member Information MemberID Confirmation
Process:	(1) Get member data (2) Send member status to employee
Attachment:	(1) Employee (2) Data Store D1

St. Gabriel's Library, Au

Table G.3. Process Specification of Process 2.1.

Items	Description
Process Name:	Check Video Availability
Data In:	Video Information Request Video Quantity Video Status
Data Out:	Video Information Video Inquiry Available Video Items
Process:	(1) Get request for video information (2) Send video information to employee
Attachment:	(1) Employee (2) Data Store D2

Table G.4. Process Specification of Process 2.2.

Items	Description
Process Name:	Check Video Return Date
Data In:	Video Rental Items Video Rental Status
Data Out:	Video Rental Information Video Return Date
Process:	(1) Get video rental items (2) Send return date to employee
Attachment:	(1) Employee (2) Data StoreD3

Table G.5. Process Specification of Process 2.3.

Items	Description
Process Name:	Get Rental Payment
Data In:	Rental Payment Rental Total Rental Receipt
Data Out:	Cash Received Rental Receipt Video rental Information
Process:	(1) Calculate rental total (2) Get rental payment from member
Attachment:	(1) Employee (2) Data Store D4

Table G.6. Process Specification of Process 3.1.

Items	Description
Process Name:	Check-in Video Return
Data In:	Video Return Request
Data Out:	Returned Video Information Video Items
Process:	(1) Get returned video (2) Check returned video items
Attachment:	(1) Employee (2) Data Store D2

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Table G.7. Process Specification of Process 3.2.

Items	Description
Process Name:	Check Late Video Return
Data In:	Return Status
Data Out:	Return Date Total Fine
Process:	(1) Check video return date (2) Calculate fine
Attachment:	(1) Employee (2) Data StoreD3

Table G.8. Process Specification of Process 3.3.

Items	Description
Process Name:	Get Fine Payment
Data In:	Fine Payment Late Fee Fine Receipt
Data Out:	Fine Cash Received Late Video Rental Information Fine Receipt
Process:	(1) Inform total fine to member (2) Get fine payment from member
Attachment:	(1) Employee (2) Data StoreD4

Table G.9. Process Specification of Process 4.1.

Items	Description
Process Name:	Aggregate Rental Transaction
Data In:	Rental Information
Data Out:	Aggregated Data
Process:	(1) Access rental data (2) Aggregate rental data (3) Prepare management repots
Attachment:	(1) Employee (2) Data StoreD3

Table G.10. Process Specification of Process 4.2.

Items	Description
Process Name:	Print Management Reports
Data In:	Formatted Data
Data Out:	Management Reports
Process:	(1) Get report request (2) Format management report (3) Print management reports
Attachment:	(1) Employee (2) Data StoreD3

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APPENDIX H

DATA DICTIONARY

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS OF ST GABRIEL
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Table H.1. Data Dictionary of Video Rental Information System.

Field Name	Meaning
MemberID	ID of Member
Name	First Name and Last Name of Member
Gender	Gender of Member
IDCard	Identification Number of Member
Address	Address of Member
UserName	Login Name of Member
Password	Password of Member
AdmitDate	Admit Date of Member
ExpireDate	Expire Date of Member
MemberTypeID	ID of Member Type
IsExpired	Status of Member 0 = Expired 1 = Normal
MemberDesc	Description of Member Type
DiscountRate	Discount Rate of Rent
VideoID	ID of Video
VideoTypeID	ID of Video Type
VideoName	Name of Video
Detail	Detail of Video
NumRentDay	Number of Rental Day
VideoInShop	Number of Video In Shop
VideoInRent	Number of Video In Rent
VideoTotal	Total Number of Video
FineRate	Fine Rate of Late Video Return
VideoStatus	Status of Video 0 = Unavailable 1 = Available
VideoTypeName	Name of Video Type
TransID	Sequence Number of Transaction
NetReceived	Net Total of Rent
IsReturn	Status of Return 0 = Completed 1 = Uncompleted
RentDate	Date of Rent
ReturnDate	Date of Return
VideoRentQTY	Number of Rental Video
VideoReturnQTY	Number of Returned Video
AmountReceived	Amount of Rent
FineReceived	Fine of Late Return
TotalReceived	Net Total of Rent (Rent + Fine)

APPENDIX I

ECONOMIC FEASIBILITY

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS OF ST GABRIEL
LABOR OMNIA VINCIT
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มหาวิทยาลัยอัสสัมชัญ

Candidate 1:

Table 1.1. Estimated Costs for Candidate 1, Baht.

Units	Descriptions	Costs
	Development Costs Personnel:	
1	Systems Analysts (400 hours/ea 1,000/hr)	400,000.00
4	Programmer/Analysts (250 hours/ea 500/hr)	500,000.00
1	GUI Designer (200 hours/ea 700/hr)	140,000.00
1	Telecommunications Specialist (50 hours/ea 1,000/hr)	50,000.00
1	System Architect (100 hours/ea 1,000/hr)	100,000.00
1	Database Specialist (15 hours/ea 1,000/hr)	15,000.00
1	System Librarian (250 hours/ea 350/hr)	87,500.00
	Expenses:	
4	SQL training registration (15,000/student)	60,000.00
	New Hardware & Software:	
1	Development Server	780,000.00
1	Server Software (operating system, misc.)	60,000.00
1	DBMS Server software	250,000.00
	Total Development Costs:	2,442,500.00
	Projected Annual Operating Costs: Personnel:	
2	Programmer/Analysts (125 hours/ea 500/hr)	250,000.00
1	System Librarian (20 hours/ea 350 hr)	7,000.00
	Expenses:	
1	Maintenance Agreement for Server	45,000.00
1	Maintenance Agreement for Server DBMS software	20,000.00
	Preprinted forms (15,000/year @ 10/form)	150,000.00
	Total Projected Annual Costs:	472,000.00

Table I.2. Payback Analysis for Candidate 1, Baht.

Cash flow description	Year0	Year1	Year2	Year3	Year4	Year5	Year6
Development cost:	(2,442,500)						
Operation & maintenance cost:		(472,000)	(500,000)	(540,000)	(580,000)	(620,000)	(660,000)
Discount factors for 12%:	1.000	0.893	0.797	0.712	0.636	0.567	0.507
Time-adjusted costs (adjusted to present value):	(2,442,500)	(421,496)	(398,500)	(384,480)	(368,880)	(351,540)	(334,620)
Cumulative time-adjusted costs over lifetime:	(2,442,500)	(2,863,996)	(3,362,496)	(3,646,976)	(4,015,856)	(4,367,396)	(4,702,016)
Benefits derived from operation of new system:	0	1,000,000	1,200,000	1,400,000	1,600,000	1,800,000	2,000,000
Discount factors for 12%:	1.000	0.893	0.797	0.712	0.636	0.567	0.507
Time-adjusted benefits (current of present value):	0	893,000	956,400	996,800	1,017,600	1,020,600	1,014,000
Cumulative time-adjusted benefits over lifetime:	0	893,000	1,849,900	2,846,200	3,863,800	4,884,400	5,898,400
	0	1	2	3	4	5	6
Cumulative lifetime time-adjusted benefits - costs:	(2,442,500)	(1,970,996)	(1,513,096)	(800,776)	(152,056)	517,004	1,196,384

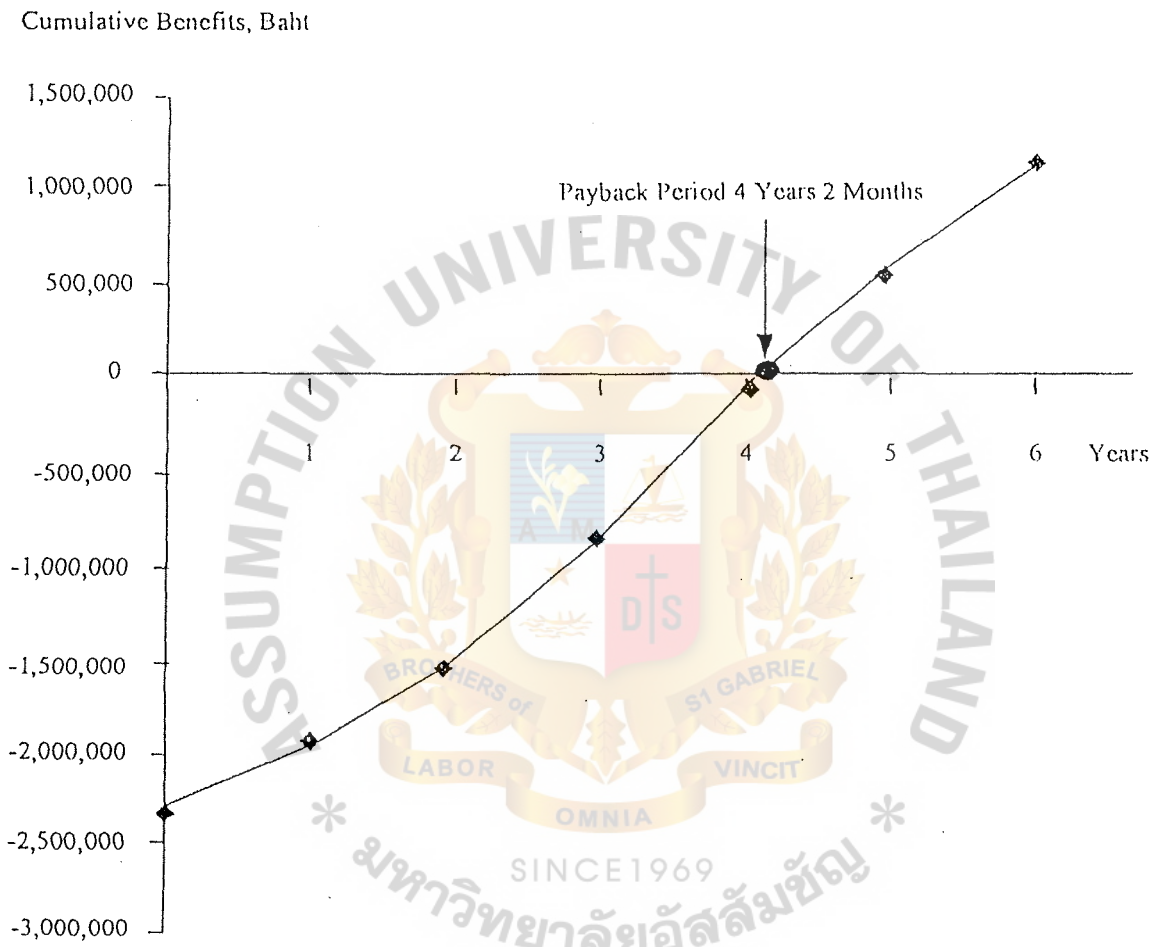

Figure I.1. Payback Period of Candidate 1.

Table I.3. Net Present Value Analysis for Candidate 1, Baht.

Cash flow description	Year0	Year1	Year2	Year3	Year4	Year5	Year6	Total
Development cost:	(2,442,500)							
Operation & maintenance cost:		(472,000)	(500,000)	(540,000)	(580,000)	(620,000)	(660,000)	
Discount factors for 12%:	1.000	0.893	0.797	0.712	0.636	0.567	0.507	
Present value of annual costs:	(2,442,500)	(421,496)	(398,500)	(384,480)	(368,880)	(351,540)	(334,620)	
Total present value of lifetime costs:								(4,702,016)
Benefits derived from operation of new system:	0	1,000,000	1,200,000	1,400,000	1,600,000	1,800,000	2,000,000	
Discount factors for 12%:	1.000	0.893	0.797	0.712	0.636	0.567	0.507	
Present value of annual benefits:	0	893,000	956,400	996,800	1,017,600	1,020,600	1,014,000	
Total present value of lifetime benefits:								5,094,700
Net Present Value of This Alternative:								392,686

Candidate 2:

Table I.4. Estimated Costs for Candidate 2, Baht.

Units	Descriptions	Costs
	Development Costs Personnel:	
1	Systems Analysts (400 hours/ea 1,000/hr)	400,000.00
2	Programmer/Analysts (250 hours/ea 500/hr)	250,000.00
1	GUI Designer (200 hours/ea 700/hr)	140,000.00
1	Telecommunications Specialist (25 hours/ea 1,000/hr)	25,000.00
1	System Architect (50 hours/ea 1,000/hr)	50,000.00
1	Database Specialist (10 hours/ea 1,000/hr)	10,000.00
1	System Librarian (150 hours/ea 350/hr)	52,500.00
	Expenses:	
4	Visual Basic training registration (10,000/student)	40,000.00
	New Hardware & Software:	
1	Development Server	320,000.00
1	Server Software (operating system, misc.)	30,000.00
1	DBMS Server software	40,000.00
	Total Development Costs:	1,357,500.00
	Projected Annual Operating Costs: Personnel:	
1	Programmer/Analysts (80 hours/ea 500/hr)	40,000.00
1	System Librarian (15 hours/ea 350 hr)	5,250.00
	Expenses:	
1	Maintenance Agreement for Server	20,000.00
1	Maintenance Agreement for Server DBMS software	10,000.00
	Preprinted forms (15,000/year @ 10/form)	150,000.00
	Total Projected Annual Costs:	225,250.00

Table I.5. Payback Analysis for Candidate 2, Baht.

Cash flow description	Year0	Year1	Year2	Year3	Year4	Year5	Year6
Development cost:	(1,357,500)						
Operation & maintenance cost:		(225,250)	(250,000)	(270,000)	(290,000)	(310,000)	(330,000)
Discount factors for 12%:	1.000	0.893	0.797	0.712	0.636	0.567	0.507
Time-adjusted costs (adjusted to present value):	(1,357,500)	(201,148.25)	(199,250)	(192,240)	(184,440)	(175,770)	(167,310)
Cumulative time-adjusted costs over lifetime:	(1,357,500)	(1,558,648.25)	(1,757,898.25)	(1,950,138.25)	(2,134,578.25)	(2,310,348.25)	(2,477,658.25)
Benefits derived from operation of new system:	0	800,000	850,000	900,000	950,000	1,000,000	1,500,000
Discount factors for 12%:	1.000	0.893	0.797	0.712	0.636	0.567	0.507
Time-adjusted benefits (current of present value):	0	714,400	677,450	640,800	604,200	567,000	760,500
Cumulative time-adjusted benefits over lifetime:	0	714,400	1,391,850	2,032,650	2,636,850	3,203,850	3,964,350
	0	1	2	3	4	5	6
Cumulative lifetime time-adjusted benefits - costs:	(1,357,500)	(844,248.25)	(366,048.25)	82,511.75	502,271.75	893,501.75	1,486,691.75

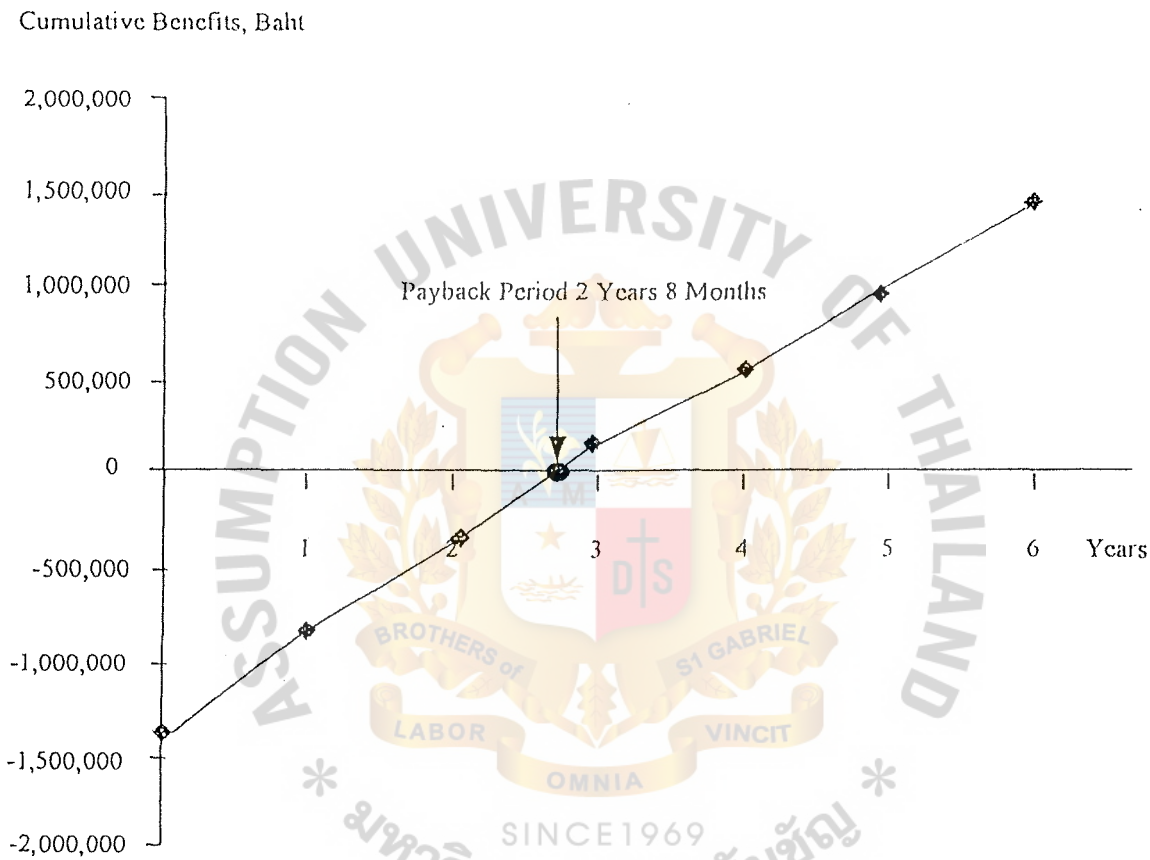

Figure I.2. Payback Period of Candidate 2.

Table I.6. Net Present Value Analysis for Candidate 2, Baht.

Cash flow description	Year0	Year1	Year2	Year3	Year4	Year5	Year6	Total
Development cost:	(1,357,500)							
Operation & maintenance cost:		(225,250)	(250,000)	(270,000)	(290,000)	(310,000)	(330,000)	
Discount factors for 12%:	1.000	0.893	0.797	0.712	0.636	0.567	0.507	
Present value of annual costs:	(1,357,500)	(201,148.25)	(199,250)	(192,240)	(184,440)	(175,770)	(167,310)	
Total present value of lifetime costs:								(2,477,658.25)
Benefits derived from operation of new system:	0	800,000	850,000	900,000	950,000	1,000,000	1,500,000	
Discount factors for 12%:	1.000	0.893	0.797	0.712	0.636	0.567	0.507	
Present value of annual benefits:	0	714,400	677,450	640,800	604,200	567,000	760,500	
Total present value of lifetime benefits:								3,964,350.00
Net Present Value of This Alternative:								1,486,691.75

Candidate 3:

Table I.7. Estimated Costs for Candidate 3, Baht.

Units	Descriptions	Costs
	Development Costs Personnel:	
1	Systems Analysts (400 hours/ea 1,000/hr)	400,000.00
2	Programmer/Analysts (250 hours/ea 500/hr)	250,000.00
1	GUI Designer (200 hours/ea 700/hr)	140,000.00
1	Telecommunications Specialist (25 hours/ea 1,000/hr)	25,000.00
1	System Architect (50 hours/ea 1,000/hr)	50,000.00
1	Database Specialist (10 hours/ea 1,000/hr)	10,000.00
1	System Librarian (150 hours/ea 350/hr)	52,500.00
	Expenses:	
4	Access training registration (10,000/student)	40,000.00
	New Hardware & Software:	
1	Development Server	200,000.00
1	Server Software (operating system, misc.)	30,000.00
1	DBMS Server software	20,000.00
	Total Development Costs:	1,217,500.00
	Projected Annual Operating Costs: Personnel:	
1	Programmer/Analysts (80 hours/ea 500/hr)	40,000.00
1	System Librarian (15 hours/ea 350 hr)	5,250.00
	Expenses:	
1	Maintenance Agreement for Server	20,000.00
1	Maintenance Agreement for Server DBMS software	10,000.00
	Preprinted forms (15,000/year @ 10/form)	150,000.00
	Total Projected Annual Costs:	225,250.00

Table I.8. Payback Analysis for Candidate 3, Baht.

Cash flow description	Year0	Year1	Year2	Year3	Year4	Year5	Year6
Development cost:	(1,217,500)						
Operation & maintenance cost:		(225,250)	(250,000)	(270,000)	(290,000)	(310,000)	(330,000)
Discount factors for 12%:	1.000	0.893	0.797	0.712	0.636	0.567	0.507
Time-adjusted costs (adjusted to present value):	(1,217,500)	(201,148.25)	(199,250)	(192,240)	(184,440)	(175,770)	(167,310)
Cumulative time-adjusted costs over lifetime:	(1,217,500)	(1,418,648.25)	(1,617,898.25)	(1,810,138.25)	(1,994,578.25)	(2,170,348.25)	(2,337,658.25)
Benefits derived from operation of new system:	0	800,000	850,000	900,000	950,000	1,000,000	1,500,000
Discount factors for 12%:	1.000	0.893	0.797	0.712	0.636	0.567	0.507
Time-adjusted benefits (current of present value):	0	714,400	677,450	640,800	604,200	567,000	760,500
Cumulative time-adjusted benefits over lifetime:	0	714,400	1,391,850	2,032,650	2,636,850	3,203,850	3,964,350
	0	1	2	3	4	5	6
Cumulative lifetime time-adjusted benefits - costs:	(1,217,500)	(704,248.25)	(226,048.25)	222,511.75	642,271.75	1,033,501.75	1,626,691.75

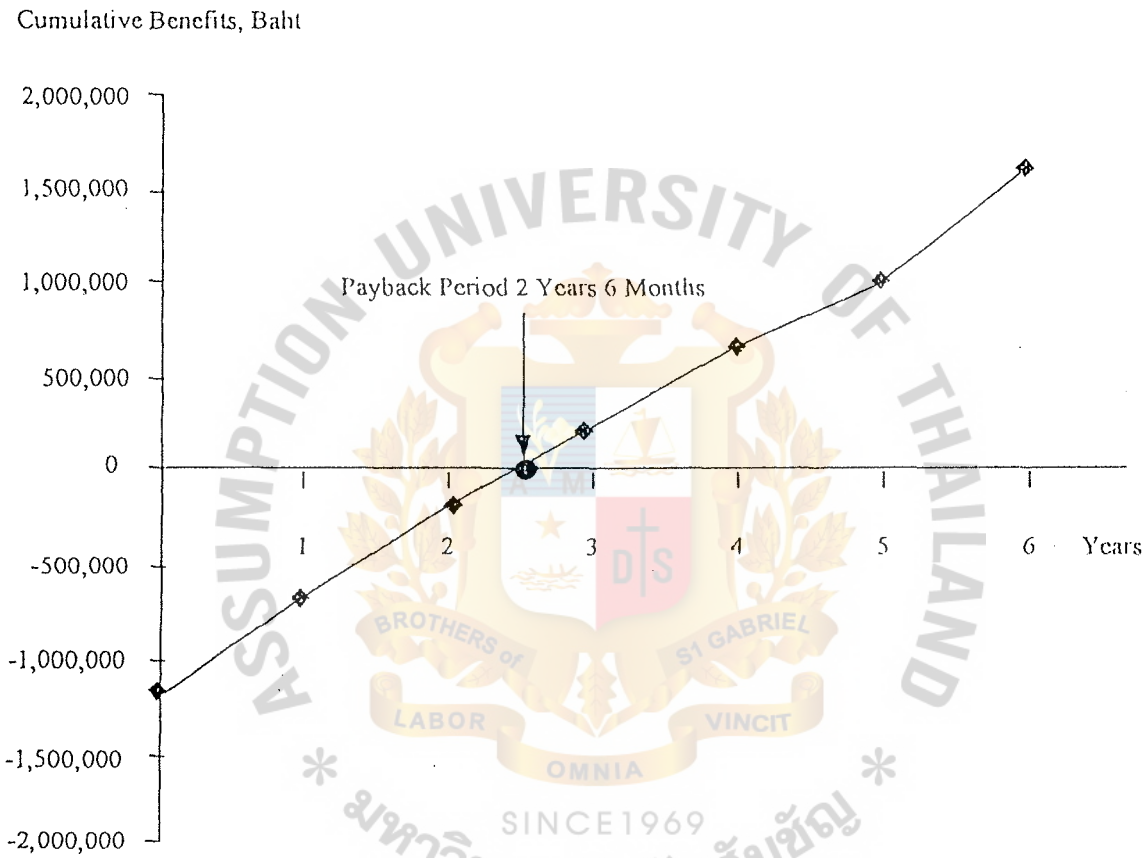

Figure I.3. Payback Period of Candidate 3.

Table I.9. Net Present Value Analysis for Candidate 3, Baht.

Cash flow description	Year0	Year1	Year2	Year3	Year4	Year5	Year6	Total
Development cost:	(1,217,500)							
Operation & maintenance cost:		(225,250)	(250,000)	(270,000)	(290,000)	(310,000)	(330,000)	
Discount factors for 12%:	1.000	0.893	0.797	0.712	0.636	0.567	0.507	
Present value of annual costs:	(1,217,500)	(201,148.25)	(199,250)	(192,240)	(184,440)	(175,770)	(167,310)	
Total present value of lifetime costs:								(2,337,658.25)
Benefits derived from operation of new system:	0	800,000	850,000	900,000	950,000	1,000,000	1,500,000	
Discount factors for 12%:	1.000	0.893	0.797	0.712	0.636	0.567	0.507	
Present value of annual benefits:	0	714,400	677,450	640,800	604,200	567,000	760,500	
Total present value of lifetime benefits:								3,964,350.00
Net Present Value of This Alternative:								1,626,691.75

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