Apartment Information System of SP Apartment

by

Mr. Saharath Lim

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

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

November 2003

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Project Title	Apartment Information System of SP Apartment
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Academic Year	November 2003

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

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ABSTRACT

SP Apartment is one of many service apartments in Bangkok, which provides room renting service for customers. The apartment management process includes reservation and contact management, customer payment, bill, receipt, room management, maintenance management and report management.

Now the business has grown up and the number of customers has increased. The manual system is not efficient to support a lot of transactions.

The current existing SP Apartment Information System is based on a manual system. Most data are stored on paper, while some parts of data are kept in the Microsoft Excel files. The problem of the current system is the time used on input data, slow response and human errors, having high maintenance cost and redundancy of data.

The new proposed SP Apartment Information System, which is a computerized system, is developed to replace the manual system and developed to solve the mentioned problems. The proposed system introduces a new way to handle all apartment management tasks, which are reservation and contact information data entry, room available searching, customers and documents searching, customer payment history, maintenance history and generation of any reports and documents.

The proposed database application system is found to improve the existing operations and solve the problems in the manual system. The proposed information system also gives the company an opportunity to improve the efficiency of processes and will reduce the time to process at the end of the month and decrease the high maintenance cost.

ACKNOWLEDGEMENTS

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I. INTRODUCTION

1.1 Background of the Project

SP Apartment, a medium size apartment for renting service was established in 2002, and is located at Sukhumvit Rd. SP Apartment has room capacity of 400 rooms. The rental fees, utility fees and telephone fees are calculated every month and the apartment provided in detail to the customers for payment.

SP Apartment uses a manual system or human manner. All data and information are kept in the paper format and some information is kept in MS Excel. The manual system will be replaced by a computerized system within 4 months.

The proposed system is to reduce the manual work, paper work and human work, in order to minimize human errors or mistakes. The proposed system also will reduce data redundancy and reduce the time to process the data at the end of the month with lower maintenance cost, and generate special reports for the apartment manager.

1.2 Objectives of the Project

The main objectives of the project regarding the new proposed SP Apartment Information System are as follows:

(1) To study the current existing SP Apartment system.

(2) To identify the current problems and define user requirements of the SP Apartment System.

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

(4) To eliminate unnecessary paperwork in the existing system.

(5) To design and develop an effective computerized information system for SP Apartment to replace the current existing system, which is manual and cannot handle the work efficiently.

(6) To provide special reports to manager for decision-making.

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

(8) To implement and test the new proposed SP Apartment Information System.

1.3 Scope of the Project

This project is to develop a proposed SP Apartment Information System, which is to replace the current existing SP Apartment System. The scope of the project will cover the major functions of SP Apartment Information System, which consists of room management, check in & check out management, searching customer profile & document, input utility unit, maintenance record and management report for concerned users through a graphic user interface (GUI).

1.4 Deliverables

The deliverables of the project on the proposed SP Apartment Information System are as follows:

(1) Data Modeling (Context Entity-Relation Diagram, Key-Based, and Fully Attributed Diagram).

(2) Process Modeling (Context Diagram and Data Flow Diagram).

(3) System Specification (Hardware & Software Specification).

(4) Cost and Benefit Analysis (Payback Period and Net Present Value).

(5) Input Design (Input screen of proposed system).

(6) Output Design (Report from proposed system).

(7) Test Plan.

(8) Conversion Plan.

1.5 Project Plan

The project is divided into seven phases: preliminary investigation phase, problem analysis phase, requirements analysis phase, decision analysis phase, system design phase, system construction phase and system implementation phase. Each phase plays a role in the problem-solving process. Some phases identify problems, design and implement solutions. The project plan includes operations and supports activities to support the final system. All the activities are to be completed before December 2003.

The project plan is represented in Gantt Chart Figure 1.1 and it shows the series of activities as we have mentioned above, time spent for each activity and project completion date.

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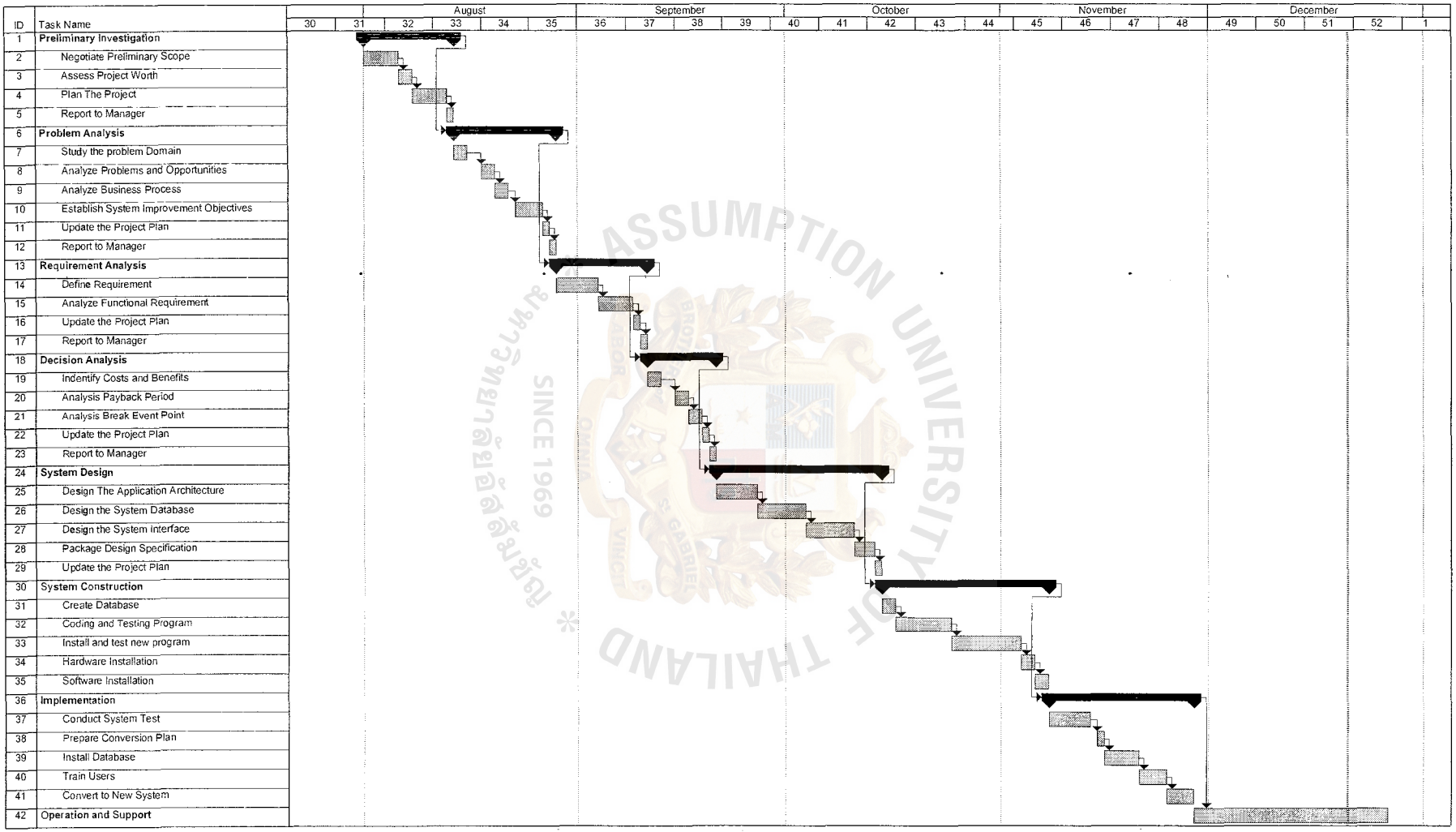

Figure 1.1. Project Plan of Apartment Information System of SP Apartment.

II. THE EXISTING SYSTEM

2.1 Background of the Organization

SP Apartment is a serviced apartment, which offers in renting service and is located on Sukhumvit Rd. near an expressway, BTS station and a lot of department stores. SP Apartment was established in 2002 and has room capacity of 400 rooms.

Business activities of the SP Apartment in the part of information management include renting of the rooms, booking and cancellation, contact information, bills and receipts operation, room maintenance, printing monthly reports and general management.

SP Apartment currently employs about 6 people in the apartment with an average income of about 12 million Baht per year. The apartment is operated under the three departments, which are controlled by management. The organization chart of SP Apartment is shown in Figure 2.1.

The responsibilities of all departments are as follows:

(1) Front office department is responsible for collecting information about customers, rooms, contact information, renting, cancellation, utility unit and searching available rooms for the customers.

(2) Accounting Department is responsible for recoding bills and receipts information, expense information, customer payment history, management of monthly reports and cash flow of the apartment.

(3) Maintenance Department is responsible for maintaining the equipment in the apartment, fixing common equipment within the apartment such as fixing the doors, windows, desks, floor and changing the light tubes, and cleaning the room when customers check in or check out.

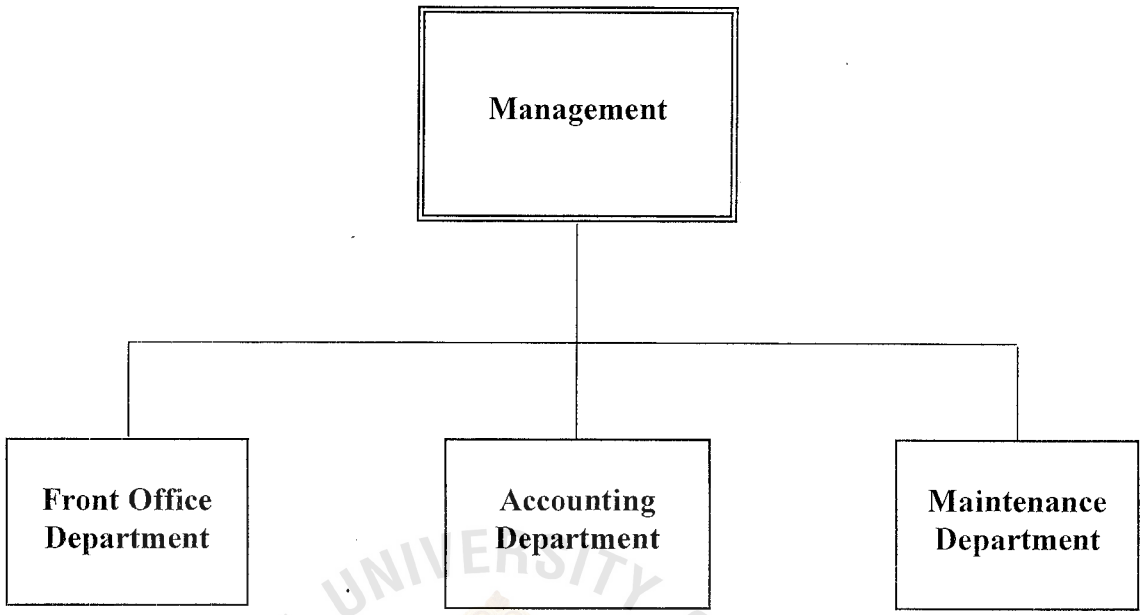

Figure 2.1. Organization Chart of SP Apartment.

2.2 Analysis of the Existing System

In the current working environment, all the works are done manually. The data and information are kept in the paper format and some are stored in MS Excel for calculation of the rental charge and utility meter units. All the apartment tasks are performed in one computer, which is a stand-alone personal computer. The data and information cannot be shared and be input at the end of month. Because the apartment needs to calculate the rental charge and utility unit such as water supply, electric and phone service charge for billing to the customers, we spend a lot of time to create bills and receipts to our customers and we found incorrect input data by the manual system. The existing system, data and information cannot be shared between departments.

The process specification and activity

(1) When customers come to the apartment and ask for the available room, the staff will check the available room in the apartment and tell them the information they need.

(2) If the customers decide to rent the room, they have to fill in the application forms, sign the contract agreement and pay the deposit (For Insurance 1 month and prepaid 2 months) before they move in.

(3) At the end of every month, the staff will record the number of utility units and input to the worksheet and then they prepare the bill with details for the customers.

(4) The customer must pay within the first 5 days of each month. If the customer makes late payment, we will charge 50 Baht per day.

(5) When the accounting department receives payment from customers, they will record the payment transaction and give a receipt to the customer.

(6) In some cases, if the customer informs the staff to repair something, the staff will record the request in the maintenance information and inform the maintenance department to fulfill the customer request.

(7) If the customers decide to move, they must inform the staff a month before they move out.

(8) When customer moves out, the staff will check the period that the customer has rented the room and if any equipment is damage. If they find that the customer has rented less than 4 months the deposit will not be return to the customer or if they find any damage, the insurance amount will be deducted by the value of the damage.

In this section, we will represent how the existing system works, under the manual system in the paper format. Figure 2.2 is the flow of data, which shows the process between customer, front office and accounting department. The management is involved only with report inquiry.

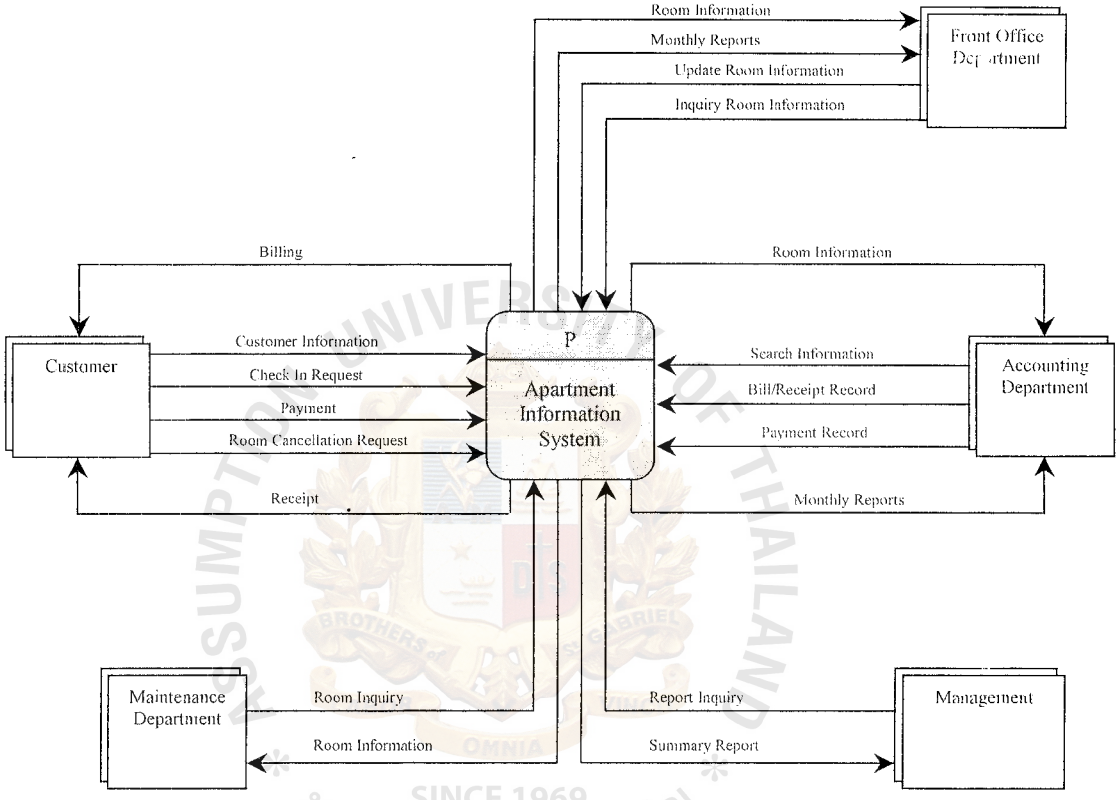

Figure 2.2. Context Data Flow Diagram of the Existing System.

As shown in Figure 2.2, accounting department has to prepare the summary report for the management for decision-making. In case the management or any department wants some information, they have to come to the accounting department's PC to get the apartment information or transactions.

In Figure 2.3, we present the process of the existing system. The data are stored in MS Excel files. The documents, which are released in the form of billing or receipt, can be misunderstood because of unclear handwriting.

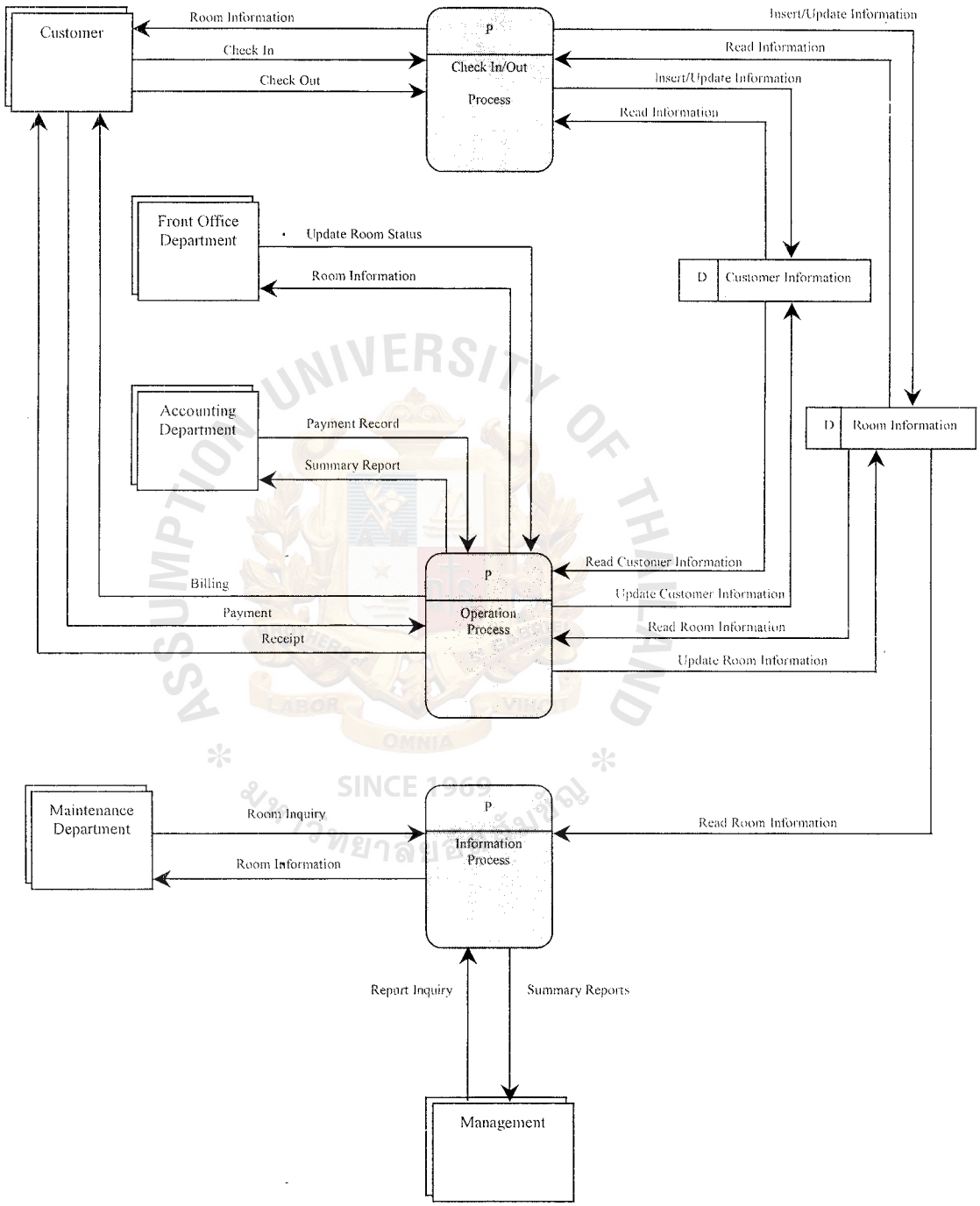

Figure 2.3. Level 0 Data Flow Diagram of the Existing System.

2.3 Current Problems and Areas for Improvement

2.3.1 Current Problems

Current apartment information system is operated manually and causes many problems such as data redundancy and incorrect calculating information. The manual system is not efficient to handle a lot of information and cannot support the business growth.

The existing problems can be categorized as follows:

(1) The problem of data integrity and redundancy

(2) Human error during input process

(3) No information sharing among related units

(4) Inflexible and untimely information searching

(5) Lack of information availability

(6) Lack of security and control on the data storage

(7) Lack of procedure standard

(8) Lack of special summarized reports to analyze the business

2.3.2 Areas for Improvement

The areas for improvement consist of the following:

(1) To improve data integrity and reduce the data redundancy

(2) To reduce human errors by developing an error tracking system

(3) To improve service quality

(4) To improve data security and control

(5) To set standard policy

(6) To provide new report system

(7) To reduce time to process

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Most of the problems occur due to the current process being operated manually. Once the new information system is implemented, it will help to reduce the time spent for updating, searching and accessing information. The computerized information system will generate the special summarized reports for management for decision-making. The information generated from the system will be more reliable and accurate than the existing system.

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III. THE PROPOSED SYSTEM

3.1 System Specification

According to the previous chapter, SP Apartment now requires an effective apartment information system, which will be developed and designed to facilitate in providing information for the management and solve the current problems occurring in the existing manual system.

In order to achieve the target, the new proposed Apartment Information System should have the user requirements as follows:

(1) The system should be developed to design a good database system to eliminate data redundancy.

(2) The system should provide a convenient screen to input data, update data and delete data in suitable form.

(3) The system should facilitate sharing of data, information and computer resource among the concerned users and management.

(4) The system should provide data security and control.

(5) The system should provide the data used for calculating and printing bills including late charge.

(6) The system should print out all bills and receipts for the customers.

(7) The system should generate special summarized report for the management to analyze the business.

(8) The system should provide information searching system to find the document and information.

(9) The system should support users to be interactive with the system in a user-friendly environment.

(10) The system should be easy to change or develop in the future.

3.2 System Design

According to the user requirements in the previous chapter, to gain a better understanding of the new system requirement, the logical model is drawn to depict the system independent of any technical implementation.

In this project, data modeling and process modeling techniques are used to document business requirement. The details of each technique can be explained as follows:

Data modeling

Data modeling is one of techniques that we use to implement the database modeling which is called an entity relationship diagram or ERD. There are three levels of entity relationship diagrams, which are context data model, key based data model and fully attributed data model.

The complete entity relationship diagram of the proposed system is shown in Appendix A.

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The following figure is the context data model of the proposed system.

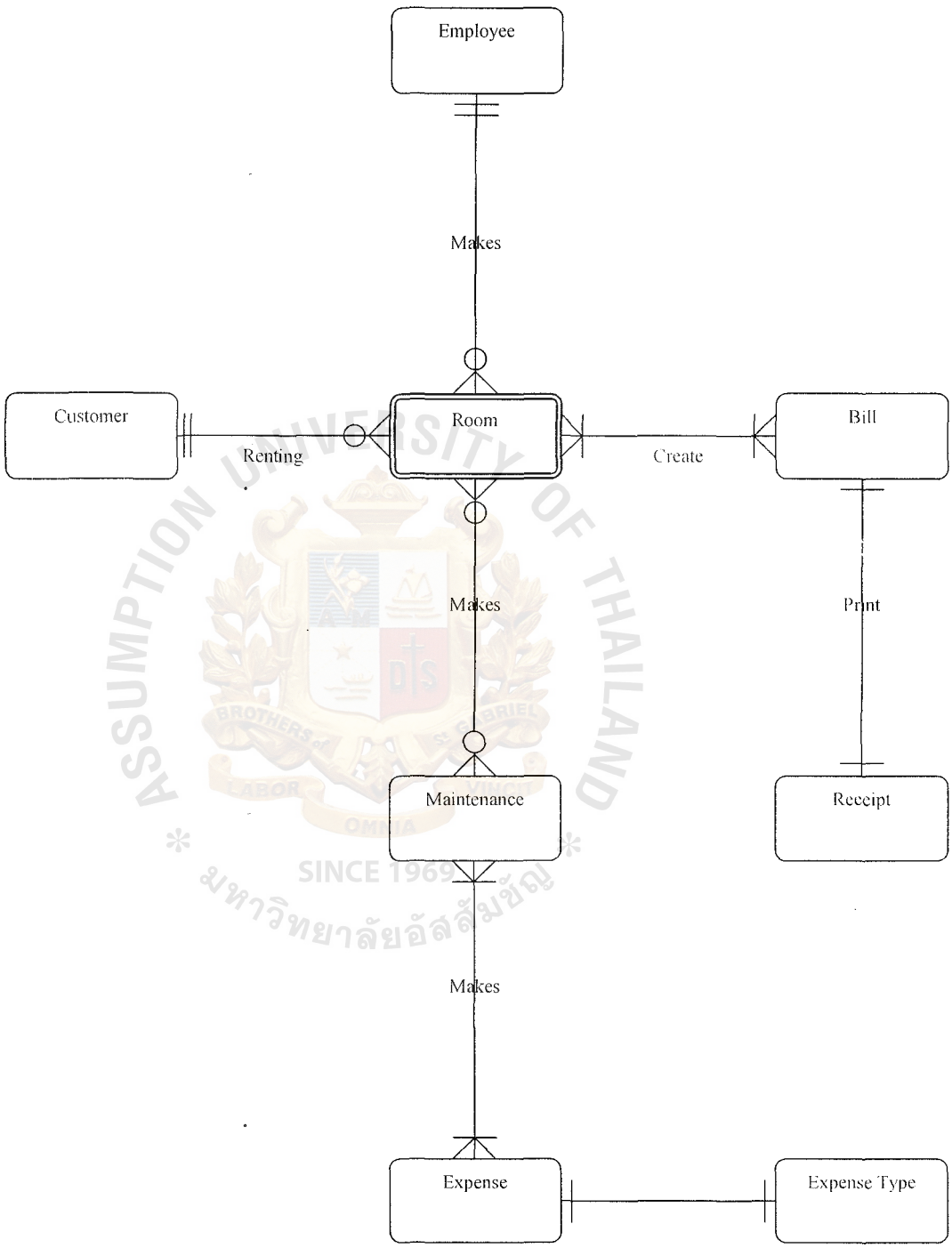

Figure 3.1. Context Data Model of the Proposed System.

Process Modeling

Process Modeling is a technique for organizing and documenting the structure and flow of data through a system's process. This technique is called Data Flow Diagram or DFD. The first diagram of process modeling is Context Data Flow Diagram, which shows the scope of the project and the process between entities.

The following figure is the context data flow diagram of the proposed system.

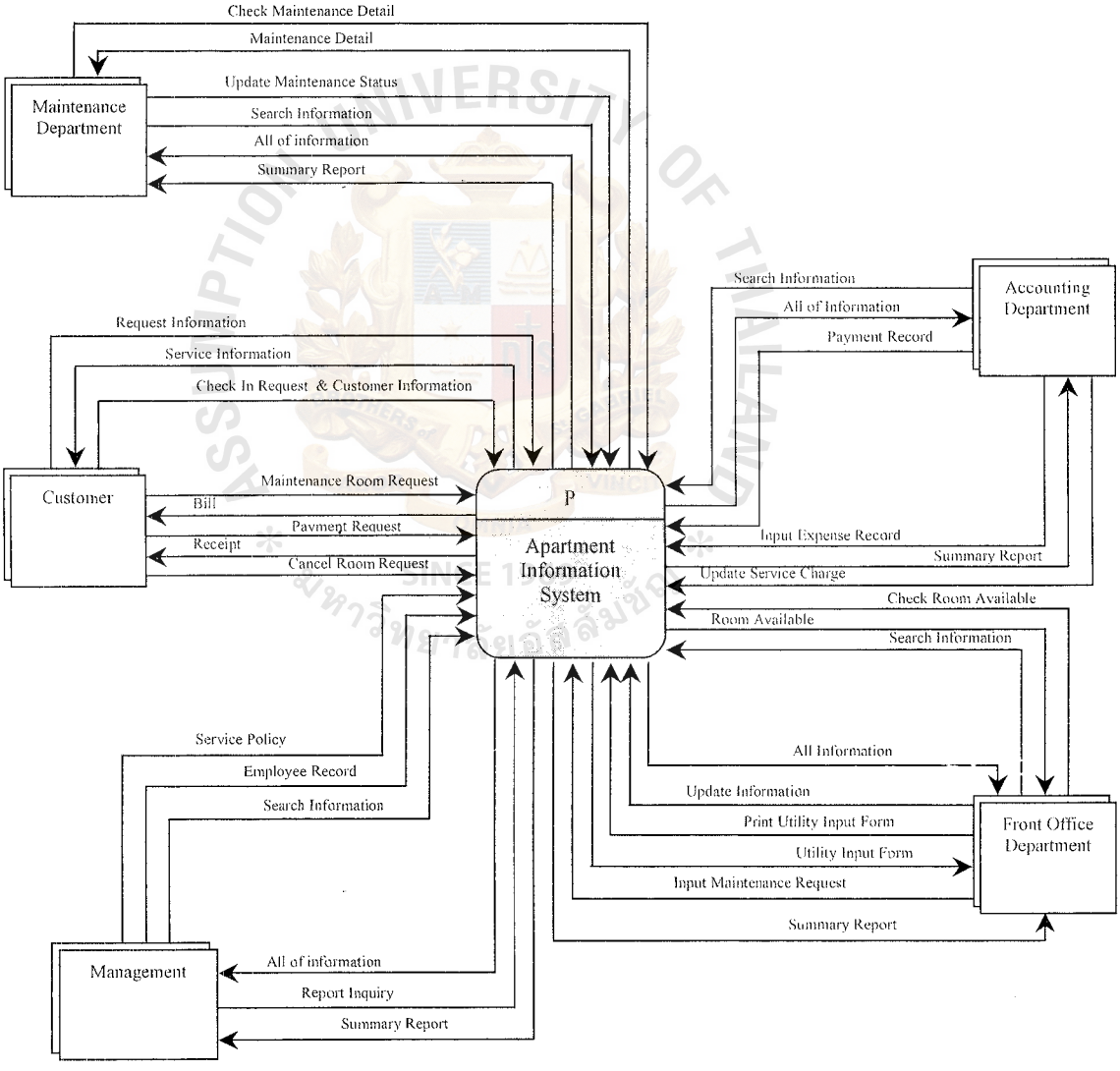

Figure 3.2. Context Data Flow Diagram of the Proposed System.

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The second diagram of process modeling is a functional decomposition diagram that is created to show the top-down functional decomposition and structure of the system.

The functional decomposition diagram of the proposed system is shown in Figure 3.3.

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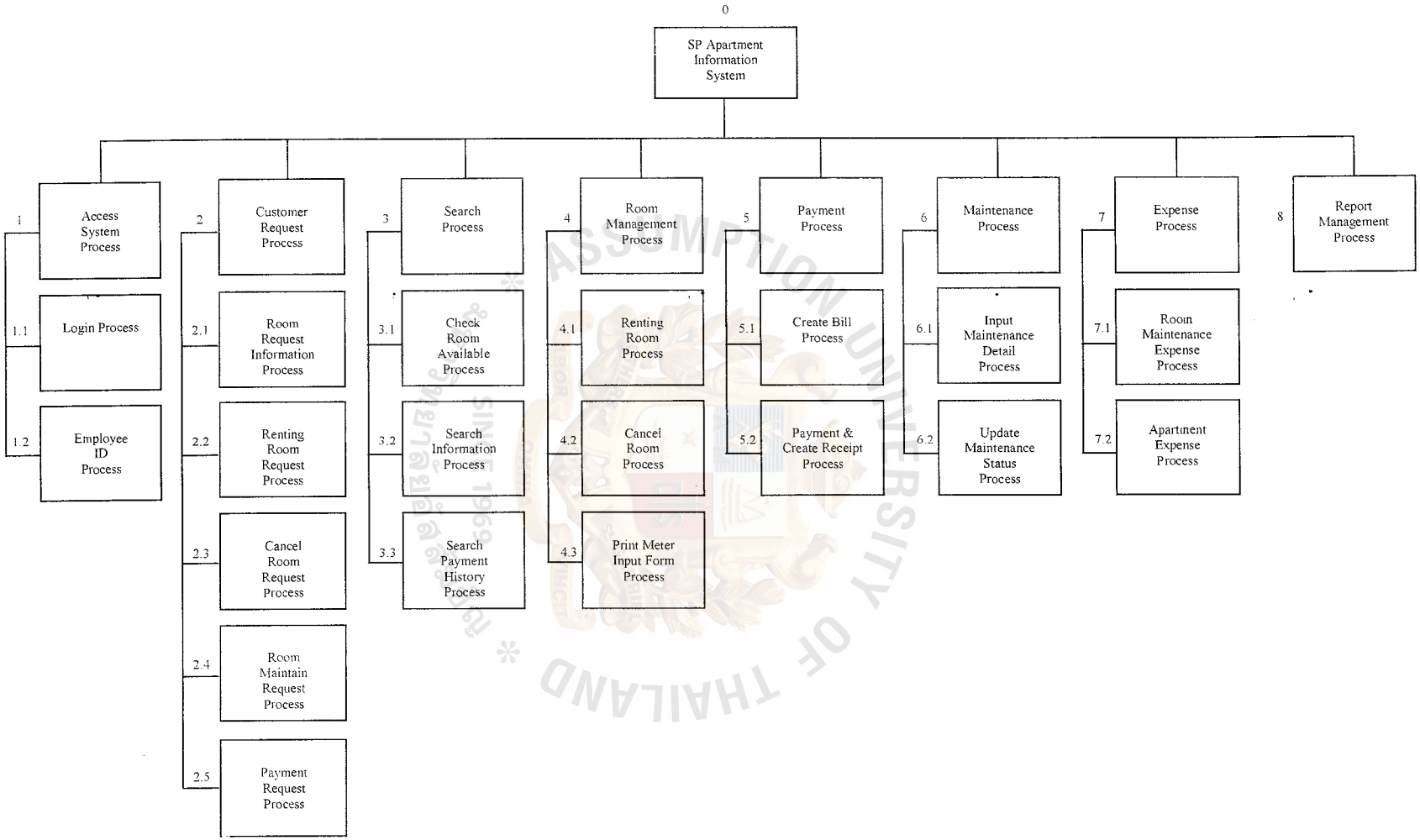

Figure 3.3. Functional Decomposition Diagram of the Proposed System.

After finishing the previous two diagrams, a data flow diagram (DFD) can be drawn to depict the flow of data to, from, and within the system.

A data flow diagram has many levels of the details. The lower the level of data flow diagram, the more details of processes within the system has. The details of each process can be explained briefly as follows:

(1) Access System Process:

This process is created for checking the authorized person to access the system by assigning User ID and password by the management. This process is good for protecting the unauthorized person to access our information and managed the User ID is controlled by the management.

(2) Customer Request Process:

This process shows the customer requirement that they need to do such as requesting to check in or cancel the room at the front office and asking for the information.

(3) Search Information Process:

This process is created for searching the room information, available room, customer information, maintenance information and payment history. This process is useful for all departments in searching all of the information in the system.

(4) Room Management Process:

This process is created for front office staff or authorized person. The process performs creating or updating room information and generating the input form to keep the utility record for keeping in the system.

(5) Payment Process:

This process is created for calculating the service charge, utility usage for payment at the end of the month. This process also creates the bills and receipts for customers to make payment.

(6) Maintenance Process:

This process is created for getting the maintenance details from customer request to repair or for maintenance of the room contents such as lamp, window and door. This process begins with customer request then front office staff input the record to the system and inform to the maintenance department to take action and update status to the system. This process is a good service for customers and useful for planning the maintenance budget for the management.

(7) Expense Input Process:

This process is created for the accounting department to input the expenses such as room maintenance cost and the apartment expenses such as water supply, electricity and telephone. This process is very useful since the management can know the revenue and expense to check the benefit of apartment business.

(8) Report Management Process:

This process is created for generating the report, which is providing information to all departments and management. Also this process will generate the special report necessary to support the job.

Figure 3.4 shows the level 0 data flow diagram of proposed system and lower levels of data flow diagram is shown in Appendix B.

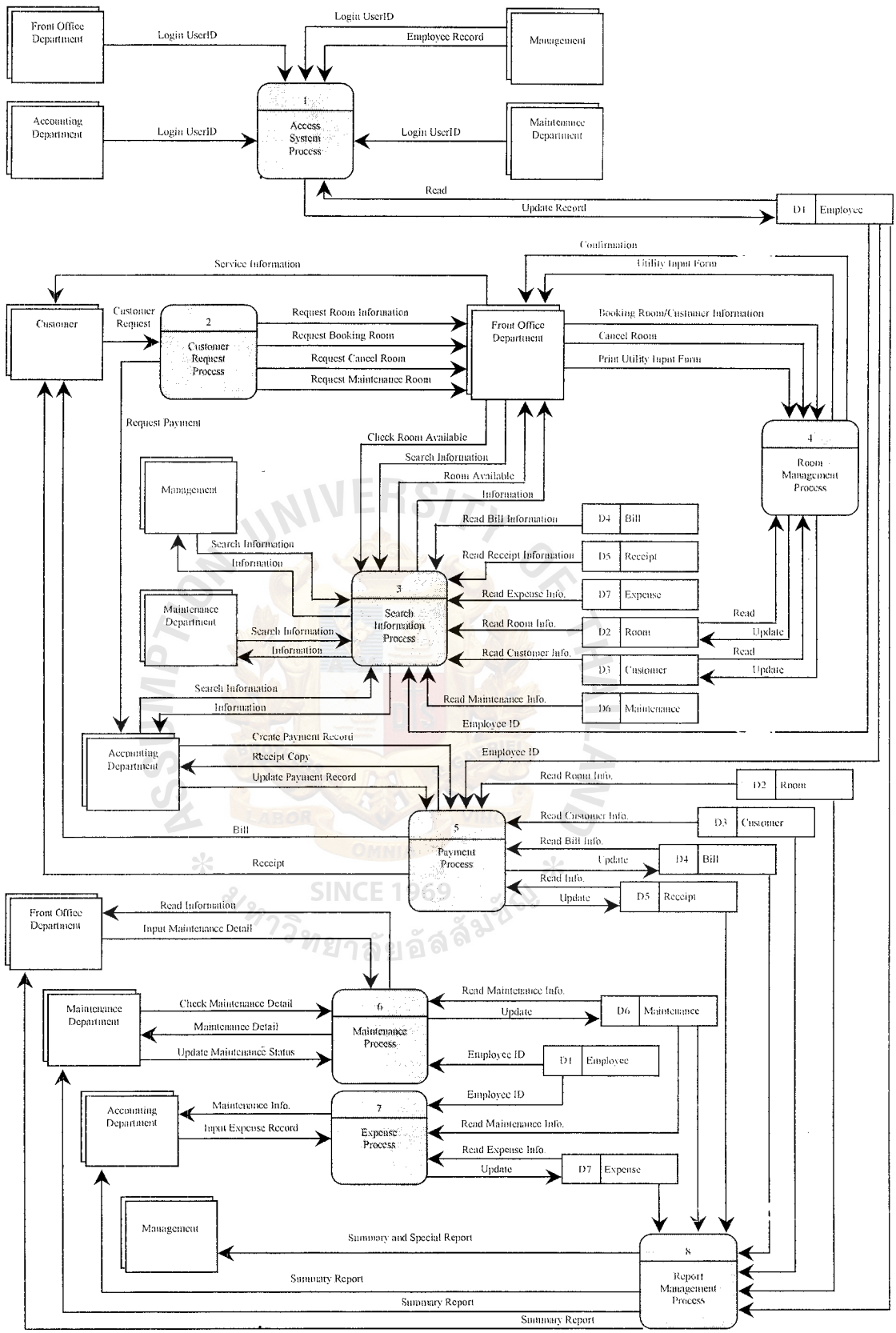

Figure 3.4. Level 0 Data Flow Diagram of the Proposed System.

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Candidate Solutions

Candidate solutions can be identified from the idea and opinion of the development team and users based on the business requirement. Along with reviewing the system specification, the three candidate solutions can be defined for the proposed system.

(1) Candidate 1: Resource Sharing with Local Area Network – File Server

This candidate will design the network architecture to be the file server and development by using the Microsoft Visual Basic to manage the data in the system because a visual style of Microsoft product facilitates the programmer to develop the new application quickly. For network architecture, the file server is used in this candidate to store database, and the client machines execute all database instructions. This means that the entire database and tables may have to be transported to and from the client machines across the network.

This candidate is easy to implement because our development team has experience in visual basic and takes less time to implement the proposed system.

(2) Candidate 2: Two Tiers Client/Server Computing – Database Server

This candidate solution supports the multi-user environment and relational database technology. Database server is used to follow the concept of two-tier client/server computing. As we have mentioned in the candidate 1, visual basic is also used in this candidate as the development tool. The database software is Microsoft SQL Server 2000, relational database management system as database server.

The development team has experience in visual basic and SQL server 2000 and this solution provides the best way of developing and managing the system by introducing the effective development tool and database software.

(3) Candidate 3: Two Tiers Client/Server Computing – Web Database

The network for this solution as we have mentioned in the previous solution, is two-tier client/server computing. Active server page and Microsoft SQL Server 2000 are used in this solution to develop the web-based application as intranet.

This candidate can be implemented quickly because it requires only a web browser to run the developed application but the development team does not have experience in the web based development and the training course is required.

The candidate system matrix of proposed system is shown in Table 3.1.

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Table 3.1. Candidate Systems Matrix.

Characteristics	Candidate 1	Candidate 2	Candidate 3
Method of data processing: A description type of processing.	Client/Server, File Server.	Client/Server, Database Server.	Client/Server, Web Database.
Servers and Workstations: A description of the server and the workstations for candidate.	MS Visual Basic and MS Access 2000.	MS Visual Basic and MS SQL Server 2000.	Internet Information System. 5.0, Internet Explorer and MS SQL Server 2000
Input devices and implications: A description of input methods to be used input devices.	Keyboard and mouse.	Same as candidate 1.	Same as candidate 1.
Storage devices and implications: A description of storage media would be used.	File server with 20GB storage capacity.	MS SQL Server 2000 with 20 GB storage capacity.	Same as candidate 2.
Output devices and implications: A description of output devices to be used.	Display monitor, Printer.	Same as candidate 1.	Same as candidate 1.
Portion of system computerized: A description of the portions of the system that would be computerized in the candidate.	Fully support all department in management process.	Same as candidate 1.	Same as candidate 1.
Benefits: A description of the business benefits that would be realized in the candidate.	Easy to develop the application.	Powerful and enable user perform their tasks more efficiently and effectively.	Quickly implemented and easy to run with client machines.

Feasibility Analysis

After the candidate solutions are identified, the following feasibility analysis and criteria should be taken into consideration when development team wants to select the best solution to implement the system.

(1) Technical feasibility:

It is a measure of the practically of a specific technical solution and the availability of technical resources and expertise. The development team has no experience in web programming hence, candidate 3 is not suitable for this project and both candidate 1and are suitable more than candidate 3.

(2) Operation feasibility:

It is a measure of how well the solution of problems or a specific solution will work in the organization. All the candidates fully support the business process but the candidate 2 is the best because it can be implemented easily and managed tasks more efficiently and effectively.

(3) Economic feasibility:

It is a measure of the cost of project or solution. All the candidates require hardware and system analyst to implement the system.

(4) Schedule feasibility:

It is a measure of how reasonable the project timetable is. Both candidate 1 and candidate 2 take less time to implement the developed system than the candidate 3 because of experience that our development team has. For candidate 3 our development team has to be trained to design web interface and implement web application before they know how to develop.

For all feasibility criteria, the score is then assigned to each feasibility criteria for each candidate and multiplied by the weight, which is expressed in percentage according to their degree of importance. The weight scores of each feasibility criteria are summed up for each candidate to rank the candidate solution of the proposed system.

The result of feasibility analysis is that candidate 2 has the highest score in all of the feasibility. The candidate 2 still has the highest total score and ranks the best solution for proposed system.

The completed feasibility analysis matrix for each candidate is shown in the Table 3.2. And the full details of cost-benefit calculations are shown in Appendix C, which are all candidate cost tables, payback tables, graphs and net present value (NPV) tables.

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Table3.2. Feasibility Analysis Matrix.

Feasibility Criteria	Wt.	Candidate 1	Candidate 2	Candidate 3
Technical feasibility: Technology. The computer technology needed to support this candidate. Expertise. An assessment of the technical expertise needed to develop the candidate system.	30%	The technical staff has full experience in MS Product and the development process can be done easily. MS Visual Basic is a mature technology. Score: 85	The technical staff has full experience in MS Visual Basic and MS SQL server. MS Visual Basic is a mature technology. Score: 90	The technical staff has only MS SQL server experience. Require the training of web design to perform this project Score: 75
Operation feasibility: Functionality. A description of to what degree the candidate would benefit the organization.	30%	Fully support the requirement in term of functionality and business process. Score: 80	Fully support and this candidate performs task more efficiently and effectively. Score: 90	Same as candidate 1 Score: 85
Economic feasibility: Cost to develop: Payback period: Net Present Value: Detailed calculations:	30%	 Approximately 454,000 Baht Approximately 2 years and 10 months Approximately 597,318 Baht See Appendix C: Score: 85	 Approximately 400,000 Baht Approximately 2 years and 7 months Approximately 651,318 Baht See Appendix C: Score: 90	 Approximately 364,000 Baht Approximately 4 years and 10 months Approximately 31,614 Baht See Appendix C: Score: 80
Schedule feasibility: An assessment of how long the solution will take to design and implement.	10%	Approximately 5 months Score: 90	Approximately 5 months Score: 90	Approximately 7 months Score: 80
Ranking	100%	84	90	80

Process Specification

The purpose of process specification is to define and explain what the system does to transform inputs into outputs. It provides the details of the system processes in table format, which is easier to look at all related input, output and relevant process than in a diagram. All specified tables are processes from the logical DFD. The process specifications are shown in Appendix D.

Data Dictionary

To support system design, data dictionary provides a list of terms and definitions for all data items and data stored within the developed system. The data dictionary is shown in Appendix E.

Database Design

According to the data modeling (ERD) in the previous section, the database design is created to capture the input data to be stored into the database files. A normalization technique is used to transform all data in ERD into applicable database. The result of database design is a database structure in table format, which is shown in Appendix F.

Input Design

Input design is the user interface that is designed to capture the information such as customer information, room information, payment record, maintenance record and expense record from the screen and is stored to database. For information that user inputs on the screen, the system will be verify correct data before storing the data to database files, which can protect redundancy and incorrect data. The input design or user interface is shown in Appendix G.

Output Design

Output or report requirement also comes from the dataflow diagram. These system outputs are easily identified and examined through the dataflow that are connected to external entity. The output or reports are shown in Appendix H.

3.3 Hardware and Software Requirements

The proposed system needs two types of computers: Computer for server and computer for client. We have decided to use the Microsoft software, which is widely known in the market and is compatible with the other software.

The computer for server must have the hardware specification, which can run Microsoft Windows NT as operating system and SQL Server 2000 as database management system.

The hardware and software specification for the proposed system are shown in the Table 3.3 and Table 3.4 respectively.

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Table3.3. The Hardware specification for the server computer.

Hardware	Specification
CPU	Pentium IV 1.4 GB or higher
Cache	256KB or higher
Memory	512MB or higher
Hard Disk	20GB or higher
CD-ROM Drive	32x or higher
Floppy Drive	1.44 MB
Network Adapter	Ethernet 10-Base T
Display Adapter	SVGA Cards
Display Monitor	17" Monitor
Printer	Dot Matrix

Table3.4. The Software specification for the server computer.

Hardware	Specification
Operating System	Microsoft Windows NT Server 4.0 (Service Pack4)
Database Management System	Microsoft SQL Server 2000
Application Software	Microsoft Office 2000 Professional

In the SP Apartment Information System, the client machines will have capacity only high enough to run a visual basic database application, which we develop to operate the information system. It however should have specification higher than that,

because it is sometimes used to run other office automation software, such as word processing and excel, for example.

Therefore, in general standard, it should have hardware specification high enough to run Microsoft Windows 2000 Edition and Microsoft Office 2000 Professional Edition. The hardware and software specification for each client machine are shown in the Table 3.5 and Table 3.6 respectively.

Table3.5. The Hardware specification for each client machine.

Hardware	Specification
CPU	Pentium IV 1.0 GB or higher
Cache	256KB or higher
Memory	256MB or higher
Hard Disk	20GB or higher
CD-ROM Drive	32x or higher
Floppy Drive	1.44 MB
Network Adapter	Ethernet 10-Base T
Display Adapter	SVGA Cards
Display Monitor	15" Monitor
Printer	Dot Matrix

Table3.6. The Software specification for each client machine.

Hardware	Specification
Operating System	Microsoft Windows 2000 Professional
Application Software	Microsoft Office 2000 Professional
Application Development Software	Visual Basic 6.0 (Data Application Software)

Other than file and database server and client machines, the connection cannot be established because we do not have any network peripherals. The database application system, however, does not use any network peripherals different from any other general Local Area Network (LAN). The network peripherals of the proposed database application system are shown in the Figure 3.5

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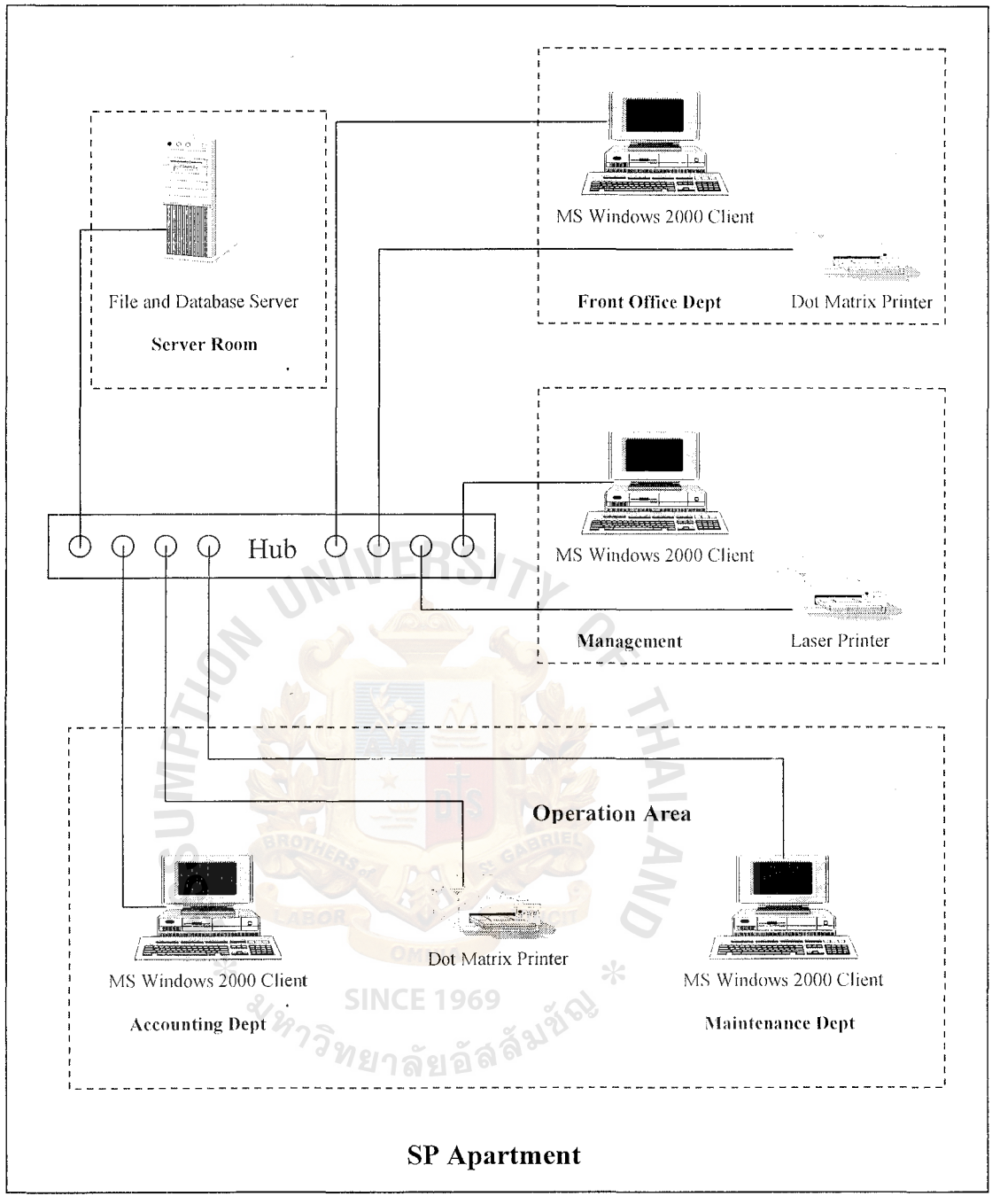

Figure 3.5. The Network Peripherals of New Proposed Database Application System.

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3.4 Security and Control

The following minimum requirements of security standard must be applied to the computerized system to prevent unauthorized access and alteration to the system. Security and control for the proposed system can be listed as follows:

(1) Database Security Control:

The system will have physical database integrity so that the database is immune to physical problem, such as power failures and it is also possible to reconstruct the database if it is destroyed through an unexpected data strophe. The system will have logical database integrity so that the structure of the database is preserved with logical integrity of the database and that any modification to the value of one field will not affect other fields.

The proposed system will have access control to allow the user to access only authorized data and will have user authentication to make sure that every user is positively identified. Another database security is system will have element integrity so that the data contained in each element is accurate.

(2) Identification

The system must have the unique User ID and password to logon to the system, which is assigned or created by the management whose authority is the same as system administrator. The procedure to control the creation of User ID must be setup to ensure the proper verification over the system users.

The user responsibility to the system must be specified in advance before granting authorized level to each user. Every User ID must have an owner, and can prove their existence. In each department, User ID must not

be shared among staff or users. The management is the only one person that can use the Administrator ID of the system to create the User ID for employees to logon to the system.

(3) Authentication:

The password system is required to authenticate the assigned user. The system/security parameter of password feature must be carefully configured to ensure the password is properly defined and monitored. The characteristics of good password feature are the specification of minimum range of password (normally 6 to 8 lengths), non-displaying password on system screen, forces user to change the password automatically when the password is expired in a specified duration, and locking User ID when entering incorrect password more than specified times (normally 3 times). The users must keep their password secretly to prevent unauthorized person to use their password to enter the system and the unauthorized alteration to the system.

(4) Authorization:

The authorized level of each user must be carefully assigned to limit the area of accessing to the system information because of the sensitivity of data and information. The user authorization should be updated when the users resign. These user authorizations have to be reviewed every 6 months to ensure the users have the appropriate authorization in the system.

(5) Backup and Recovery:

The backup and recovery procedures are required to ensure the availability of the system information. The backup may be done on a daily, weekly, or monthly basis according to backup schedule. The recovery

process must be cleared to ensure that all relevant persons know how to restore information from backup media into production.

(6) Virus Protection

Computer viruses are a software program that attaches itself to another program in computer memory or one a disk and spreads from on program to another. Viruses damage data, cause computers to crash, display offending or annoying messages, or lie dormant until the time they are set to be "awaken".

In today's industry, scanning is no longer considered to be an extravagance but a necessity. Computer viruses not only attack your computing environment but also all other computing environments that you contact. Computer viruses can attach and later propagate themselves through disks and files. Should you not take the proper precautions, they could plague your computing environment, resulting in information and hardware losses.

The anti-virus software should be installed at all times. There are several anti-virus programs such as McAfee Virus-Scan, which is most popular shareware. McAfee Scan program detects, identifies and disinfects known windows computer viruses. The program will check memory of the system and data areas of disks for virus infections. If it finds a known virus, in most cases, it will eliminate the virus and fully repair the infected programs to their original conditions.

3.5 Cost and Benefit Analysis

When the proposed system is developed to replace the existing system, the detail of both cost and benefit of the proposed system compared with the existing system must be illustrated. Furthermore, the benefits of the proposed system are presented in both tangible and intangible terms. Finally, the analysis techniques, which are breakeven analysis and payback period, are applied to show the benefits over the cost after the implementation of the proposed system.

(1) The cost of Manual System:

The existing system is operated manually and incurs both fixed cost and annual operating cost. For fixed cost, there is only office equipment cost and for operating cost it includes salary cost, office supplies and miscellaneous cost. The office equipment that our team used in their operation are calculators for calculating all costs that occur in the process and typewriters for doing the report.

To operate the existing system, we require one accountant manager and two accountant staffs to manage the process of financial process, one staff of maintenance department to maintain and repair the room and do other maintenance work, two staff of front office to prepare and serve customers. The details of the existing system cost are summarized in Table 3.7.

Table 3.7. Manual System Cost Analysis, Baht.

Cost Items		Years				
		1	2	3	4	5
Fixed Cost						
Typewriter	1 units@ 5,000	5,000.00	0.00	0.00	0.00	0.00
Calculator	2 units@ 500	1,000.00	0.00	0.00	0.00	0.00
Total Fixed Cost		6,000.00	0.00	0.00	0.00	0.00
Operating Cost						
Salary Cost: 8% increase						
Accounting Manager	1 person @18,000	18,000.00	19,440.00	20,995.20	22,674.82	24,488.80
Staff: 5% increase						
Accounting Staff	2 persons @9,000	18,000.00	18,900.00	19,845.00	20,837.25	21,879.11
Front Office Staff	2 persons @10,000	20,000.00	21,000.00	22,050.00	23,152.50	24,310.13
Maintenance Dept. Staff	1 person @8,000	8,000.00	8,400.00	8,820.00	9,261.00	9,724.05
Total Monthly Salary Cost		64,000.00	67,740.00	71,710.20	75,925.57	80,402.09
Total Annual Salary Cost		768,000.00	812,880.00	860,522.40	911,106.79	964,825.07
Office Supplies and Miscellaneous Cost: Per Annual						
Paper	5% increase	3,000.00	3,150.00	3,307.50	3,472.88	3,646.52
Stationary	10% increase	2,700.00	2,970.00	3,267.00	3,593.70	3,953.07
Utility	10% increase	3,000.00	3,300.00	3,630.00	3,993.00	4,392.30
Miscellaneous	5% increase	2,700.00	2,835.00	2,976.75	3,125.59	3,281.87
Total Annual Office Supplies and Miscellaneous Cost		11,400.00	12,255.00	13,181.25	14,185.16	15,273.76
Total Annual Operating Cost		779,400.00	825,135.00	873,703.65	925,291.95	980,098.82
Total Manual System Cost		785,400.00	825,135.00	873,703.65	925,291.95	980,098.82

Table 3.8. Five Year Accumulated Manual System Cost, Baht.

Year	Total Manual Cost	Accumulated Cost
1	785,400.00	785,400.00
2	825,135.00	1,610,535.00
3	873,703.65	2,484,238.65
4	925,291.95	3,409,530.60
5	980,098.82	4,389,629.43
Total	4,389,629.43	-

(2) The Cost of Computerized System:

The proposed system cost is classified into fixed cost and annual operating cost. Fixed cost includes hardware cost, software cost, people-ware cost, maintenance cost and implementation cost. With the newly computerized system, there is no office equipment cost but it requires some investment in computer hardware and software. The maintenance cost of both hardware and software is also paid to the vendor. The additional salary cost is paid to the people who are involved in the system development process. Before implementing the proposed system, the training and implementation costs are spent according to the budget. The details of the proposed system cost are summarized in Table 3.9.

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Table 3.9. Computerized System Cost Analysis, Baht.

Cost Items		Years				
		1	2	3	4	5
Fixed Cost						
Hardware Cost:						
Computer server cost 1 unit		45,000.00	0.00	0.00	0.00	0.00
Workstation cost 4 units		120,000.00	0.00	0.00	0.00	0.00
Dot Matrix Printer		12,000.00	0.00	0.00	0.00	0.00
Laser Printer		30,000.00	0.00	0.00	0.00	0.00
Total Hardware Cost		207,000.00	0.00	0.00	0.00	0.00
Software Cost:						
System Software Cost		25,000.00	25,000.00	25,000.00	25,000.00	25,000.00
Application Software Cost		12,000.00	12,000.00	12,000.00	12,000.00	12,000.00
Development Application Software Cost		50,000.00	0.00	0.00	0.00	0.00
Total Software Cost		87,000.00	37,000.00	37,000.00	37,000.00	37,000.00
Maintenance Cost:						
Hardware Maintenance Cost (10% increase)		0.00	5,000.00	5,500.00	6,050.00	6,655.00
Software Maintenance Cost (10% increase)		0.00	5,000.00	5,500.00	6,050.00	6,655.00
Total Maintenance Cost		0.00	10,000.00	11,000.00	12,100.00	13,310.00
Implementation Cost:						
Training Cost		15,000.00	0.00	0.00	0.00	0.00
Setup Cost		15,000.00	0.00	0.00	0.00	0.00
Total Implementation Cost		30,000.00	0.00	0.00	0.00	0.00
Total Fixed Cost		324,000.00	47,000.00	48,000.00	49,100.00	50,310.00
Operating Cost						
People ware Cost: (8% increase)						
Salary Cost: 8% increase						
Accounting Manager	1 person @23,000	23,000.00	24,840.00	26,827.20	28,973.38	31,291.25
Staff: 5% increase						
Front Office Staff	1 persons @12,000	12,000.00	12,600.00	13,230.00	13,891.50	14,586.08
Maintenance Dept. Staff	1 person @12,000	12,000.00	12,600.00	13,230.00	13,891.50	14,586.08
Total Monthly Salary Cost		47,000.00	50,040.00	53,287.20	56,756.38	60,463.40
Total Annual Salary Cost		564,000.00	600,480.00	639,446.40	681,076.51	725,560.75
Office Supplies and Miscellaneous Cost:						
Paper	5% increase	4,000.00	4,200.00	4,410.00	4,630.50	4,862.03
Stationary	10% increase	3,000.00	3,300.00	3,630.00	3,993.00	4,392.30
Utility	10% increase	4,000.00	4,400.00	4,840.00	5,324.00	5,856.40
Miscellaneous	5% increase	3,000.00	3,150.00	3,307.50	3,472.88	3,646.52
Total Annual Office Supplies and Miscellaneous Cost		14,000.00	15,050.00	16,187.50	17,420.38	18,757.24
Total Annual Operating Cost		578,000.00	615,530.00	655,633.90	698,496.89	744,318.00
Total Computerized System Cost		902,000.00	662,530.00	703,633.90	747,596.89	794,628.00

Table 3.10. Five Year Accumulated Computerized System Cost, Baht.

Year	Total Computerized Cost	Accumulated Cost
1	902,000.00	902,000.00
2	662,530.00	1,564,530.00
3	703,633.90	2,268,163.90
4	747,596.89	3,015,760.79
5	794,628.00	3,810,388.78
Total	3,810,388.78	-

(3) The comparison of the System Costs between Manual System and Computerized system:

After both the existing system cost and the proposed system cost are identified, the comparison table is constructed to reveal the cost saving after implementing the new proposed system. The figures of the comparison of the system cost are summarized in Table 3.11.

Table 3.11. The Comparison of the System Cost, Baht.

Year	Accumulated Manual Cost	Accumulated Computerized Cost
1	785,400.00	902,000.00
2	1,610,535.00	1,564,530.00
3	2,484,238.65	2,268,163.90
4	3,409,530.60	3,015,760.79
5	4,389,629.43	3,810,388.78

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(4) Benefit Analysis:

The benefit of the proposed system can be classified into tangible and intangible benefit.

Tangible benefits:

The tangible benefits of the proposed system are shown in Table 3.12 and can be grouped into two main categories as follows:

(a) Cost Saving

(b) Operation Time Improvement

Table 3.12. Tangible Benefits of the Proposed System, Baht.

Benefit Item	**Price**
Cost Saving:	
Salary Cost:	
2 Staff of Accounting Dept. (9,000 Baht per month)	216,000.00
1 Staff of Front Office Dept. (10,000 Baht per month)	120,000.00
Bonus Cost:	
2 month bonus for 2 staff of Accounting Dept.	36,000.00
2 month bonus for 1 staff of Front Office Dept.	20,000.00
Other Cost:	
Office supplies and miscellaneous cost (4,000 per month)	48,000.00
Total Cost Saving	512,000.00
Operation Time Improvement:	
2 Staff of Accounting Dept. (Estimate 80% of Salary)	172,800.00
1 Staff of Front Office Dept. (Estimate 80% of Salary)	96,000.00
Total Operation Time Improvement	268,800.00
Total Tangible Benefit	708,800.00

Intangible Benefits:

Intangible benefits of the proposed system are customer satisfaction, better decision-making, and better productivity.

(5) Breakeven Analysis:

Breakeven analysis shows the point where the accumulated cost of the proposed system is equal to the accumulated cost of the existing system. The breakeven point of the proposed system is depicted in Figure 3.6. 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.

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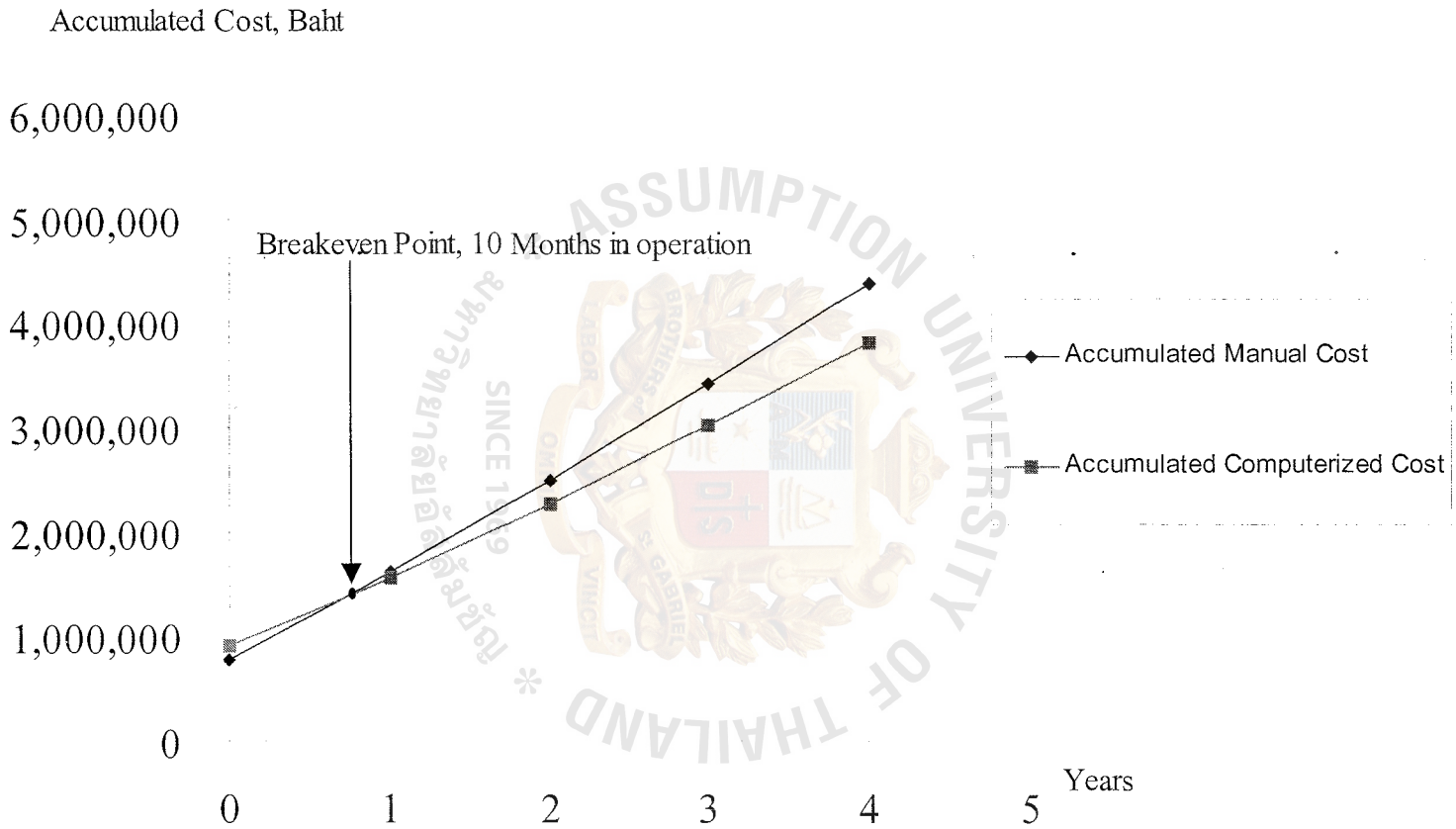

Figure 3.6. Cost Comparison between Manual and Computerized Systems.

(6) Payback Analysis:

The Payback analysis technique is the most popular method for determining if and when an investment will pay for itself. Because system development costs are incurred long before, benefits begin to accrue.

Figure 3.7 illustrates the payback period of the proposed system. The result of payback period is 2 years and 7 months, which is less than the predefined maximum desired payback period (3 years). Thus, this project is acceptable to implement with the return on investment to recover the initial investment within three years. The full details of payback calculation are shown in Table 3.13 and 3.14, and Net Present Value of the proposed system is shown in Table 3.15.

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Table 3.13. Estimated Cost of the Proposed System.

Cost Item	Price
Development Cost:	
Hardware:	
1 File and Database Server	45,000.00
4 Client machines	120,000.00
2 Dot Matrix Printer	12,000.00
1 Laser Printer	30,000.00
Total Hardware Cost	207,000.00
Software:	
1 Server Software	25,000.00
4 Client Software	12,000.00
Total Software Cost	37,000.00
Personnel:	
System Analyst (3 months @ 18,000 Baht/month)	0.00
1 Programmer (3 months @ 12,000 Baht/month)	36,000.00
1 Database Specialist (3 month @ 15,000 Baht/month)	45,000.00
1 Network Specialist (3 month @ 15,000 Baht/month)	45,000.00
Total Personnel Cost	126,000.00
Implementation Cost:	
Training cost	15,000.00
Installation cost	15,000.00
Total Implementation Cost	30,000.00
Total development Cost	400,000.00
Project Annual Operating Cost:	
User:	
1 Accountant Manager (23,000 Baht per month)	276,000.00
1 Front Office Dept. Staff (12,000 Baht per month)	144,000.00
1 Maintenance Dept. Staff (12,000 Baht per month)	144,000.00
Office Supplies and Miscellaneous Cost:	
Paper	3,000.00
Stationary	4,000.00
Utility	3,000.00
Miscellaneous	4,000.00
Maintenance Cost:	
Hardware Maintenance Cost (per year)	5000
Software Maintenance Cost (per year)	5000
Total Project Annual Operating Cost	588,000.00
Total Project Annual Cost	988,000.00

Table 3.14. Payback Period of the Proposed System.

Cost Items	Years					
	0	1	2	3	4	5
Development Cost:	(400,000)					
Annual Operating Cost		(588,000)	(588,000)	(588,000)	(588,000)	(588,000)
Discount Factors for 12%	1.000	0.893	0.797	0.712	0.636	0.567
Time Adjusted Costs (adjusted to present value)	(400,000)	(525,084)	(468,636)	(418,656)	(373,968)	(333,396)
Cumulative time-adjusted cost over life time:	(400,000)	(925,084)	(1,393,720)	(1,812,376)	(2,186,344)	(2,519,740)
Benefit derived from operation of the new system:		708,800	800,000	900,000	1,000,000	1,100,000
Discount Factors for 12%	1.000	0.893	0.797	0.712	0.636	0.567
Time Adjusted Benefits (adjusted to present value)		632,958	637,600	640,800	636,000	623,700
Cumulative time-adjusted benefit over life time:		632,958	1,270,558	1,911,358	2,547,358	3,171,058
Cumulative lifetime time-adjusted cost+benefit	(400,000)	(292,126)	(123,162)	98,982	361,014	651,318

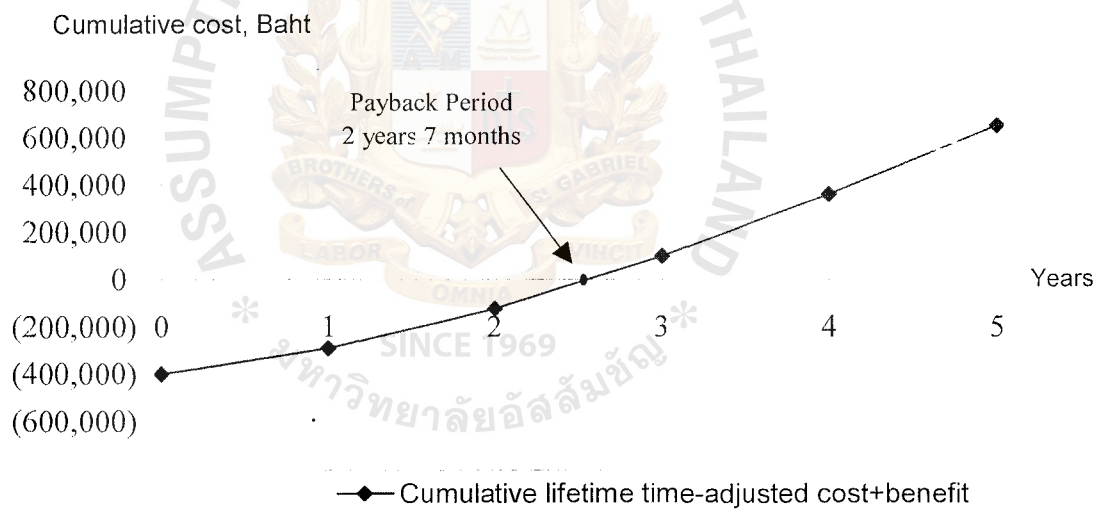

Figure 3.7. Payback Period Analysis of the Proposed System.

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Table 3.15. Net Present Value of the Proposed System.

Cost Items	Years					
	0	1	2	3	4	5
Development Cost:	(400,000)					
Annual Operating Cost		(588,000)	(588,000)	(588,000)	(588,000)	(588,000)
Discount Factors for 12%	1.000	0.893	0.797	0.712	0.636	0.567
Time Adjusted Costs (adjusted to present value)	(400,000)	(525,084)	(468,636)	(418,656)	(373,968)	(333,396)
Cumulative time-adjusted cost over life time:						(2,519,740)
Benefit derived from operation of the new system:		708,800	800,000	900,000	1,000,000	1,100,000
Discount Factors for 12%	1.000	0.893	0.797	0.712	0.636	0.567
Time Adjusted Benefits (adjusted to present value)		632,958	637,600	640,800	636,000	623,700
Cumulative time-adjusted benefit over life time:		632,958	1,270,558	1,911,358	2,547,358	3,171,058
Cumulative lifetime time-adjusted cost+benefit						651,318

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IV. PROJECT IMPLEMENTATION

4.1 Overview of Project Implementation

The system implementation is the planned and orderly conversion from an existing system to the proposed system. The final design should be evaluated first to make sure that the proposed system can meet the objectives and goals, and then other remaining processes will be performed. It can be classified into 7 categories.

(1) Hardware and software acquisitions

(2) Test Plan and results.

(3) System Testing

(4) User Acceptance Test

(5) Installation

(6) Conversion

(7) Training

4.2 Hardware and Software Acquisitions

The proposed system must use newly purchased hardware and software following the specification requirement. The hardware and software should have a guarantee for at least 2 years and 1 year for customer service from the vendor.

4.3 System Testing

The purpose is to validate all programs, input-output, procedures and the database. All programs are tested altogether with the hardware and software. The testing with test data and live data is necessary. Live data are actual data that have already been processed through the existing service system. Testing and modifications will continue until the project team and user are satisfied with the result of the test.

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4.4 User Acceptance Test

The User Acceptance Test is a process that makes sure the programs are correctly run by checking the result. The users are allowed to submit their test cases to verify the effectiveness of the system. All the bugs should be eliminated. The staff should be able to manage all system components smoothly. This test is to get the users' approval and they can examine and test the operations of the system until they are satisfied.

4.5 Installation

The installation of the new system will install both hardware and software for server and client. The vendor will do hardware installation in this project and configuration setup. Software installation involves loading the entire computer program that are written for the new system onto the computer and making them ready for the operations.

4.6 Conversion

Once successful system test and User Acceptance Test have been completed, we can begin preparations to place the proposed system in to operation. This normally involves the conversion from the existing system to new one. The parallel conversion is selected to place the proposed system into operation. Under this approach, both the existing system and the proposed system are operated for same period. This ensures that all major problems in the proposed system have been solved before the existing system is discarded. The existing system will serve as a backup if the new one fails to operate as expected. This strategy minimizes the risk of major flaws in the proposed system causing reparation harm to the apartment. The time for parallel conversion is usually a month, which is one complete invoicing and collecting cycle.

4.7 Training

Training is the final task of the system development team, which is provided to the user. The objective of training is to give more understanding of the proposed system to all relevant users and all users need training before they can begin using the new system.

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V. CONCLUSIONS AND RECOMMENDATION

5.1 Conclusions

The project study indicates that the proposed system introduces a new way to handle and manage the apartment process. This project was implemented from the requirement of SP Apartment to improve the existing system because in the existing system, most of the apartment management processes are done manually. As a result, there are human errors, slow response time to users, high operating cost and salary cost. The project team develops the computerized system to improve the current operation, solve the mentioned problem, reduce the existing problem and satisfy the management's needs. For the proposed system, the information technology is utilized to simplify the apartment management process and increase its efficiency.

The proposed system improves the current operation in terms of both cost and time. It saves cost for the management by reducing department operating cost and time for users in making the apartment transaction. The new computerized one within 6 months will replace the manual system.

Referring to cost and benefit analysis section and cost comparison table, the cost of the existing system is less than the cost of the proposed system. The benefit will be explored and it becomes clear that the new system reaches breakeven point within 10 months of the first year and the payback period of the proposed system is 2 years and 7 months, which is also less than the predefined maximum desired payback period.

The proposed system also spends less time than the existing system for each process. It means that the proposed system is more efficient and effective than the existing system. Table 5.1 shows the comparison of the degree of achievement between the proposed system and the existing system.

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

Process	Existing System	Proposed System
Room Available Searching	10 Minutes	2 Minutes
Information Searching	15 Minutes	2 Minutes
Reserve the Room	10 Minutes	3 Minutes
Data Entry	10 Minutes	5 Minutes
Create Bill	3 Hours	30 Minutes
Create Receipt	15 Minutes	5 Minutes
Maintenance Process	15 Minutes	5 Minutes
Expense Process	15 Minutes	5 Minutes
Cancel the Room	10 Minutes	3 Minutes
Report Generation	3 Hours	20 Minutes

SP Apartment is using the manual system in its operation. Many problems have been found, some information is lost and some information is wrong. Many operations are time. It is difficult to find some information and documents are also mixed up. Apartment Information System was developed under the requirement of the system owner to improve the system from a manual system to be a computerized system to solve the problems.

5.2 Recommendations

At present, information technology plays a very important role in operation of a business. Some people may gain the competitive advantage if they apply the information system in their business properly. This project is an example of applying information system in some business processes.

The new computerized system has been designed to meet the requirements of the management and staff of the SP Apartment. The management team plays an important role in developing the new system. User from each department has to be involved and participate in all activities. The post implementation review is a critical examination of the system after it has been put into production. The evaluation should be conducted one to three months after the implementation.

In addition, the developed system may be expanded by adding to some features to support the related process such as service recording, service calculating, etc. The staff can record the information in each room through client machines in each area, which connects through the main server.

Finally, information technology specialist may implement new features to complete the apartment information system, and this system can be modified to be a standard package for any apartment if more information on their operation is provided and some features such as online connection can be added in the future version.

APPENDIX A

ENTITY RELATIONSHIP DIAGRAM

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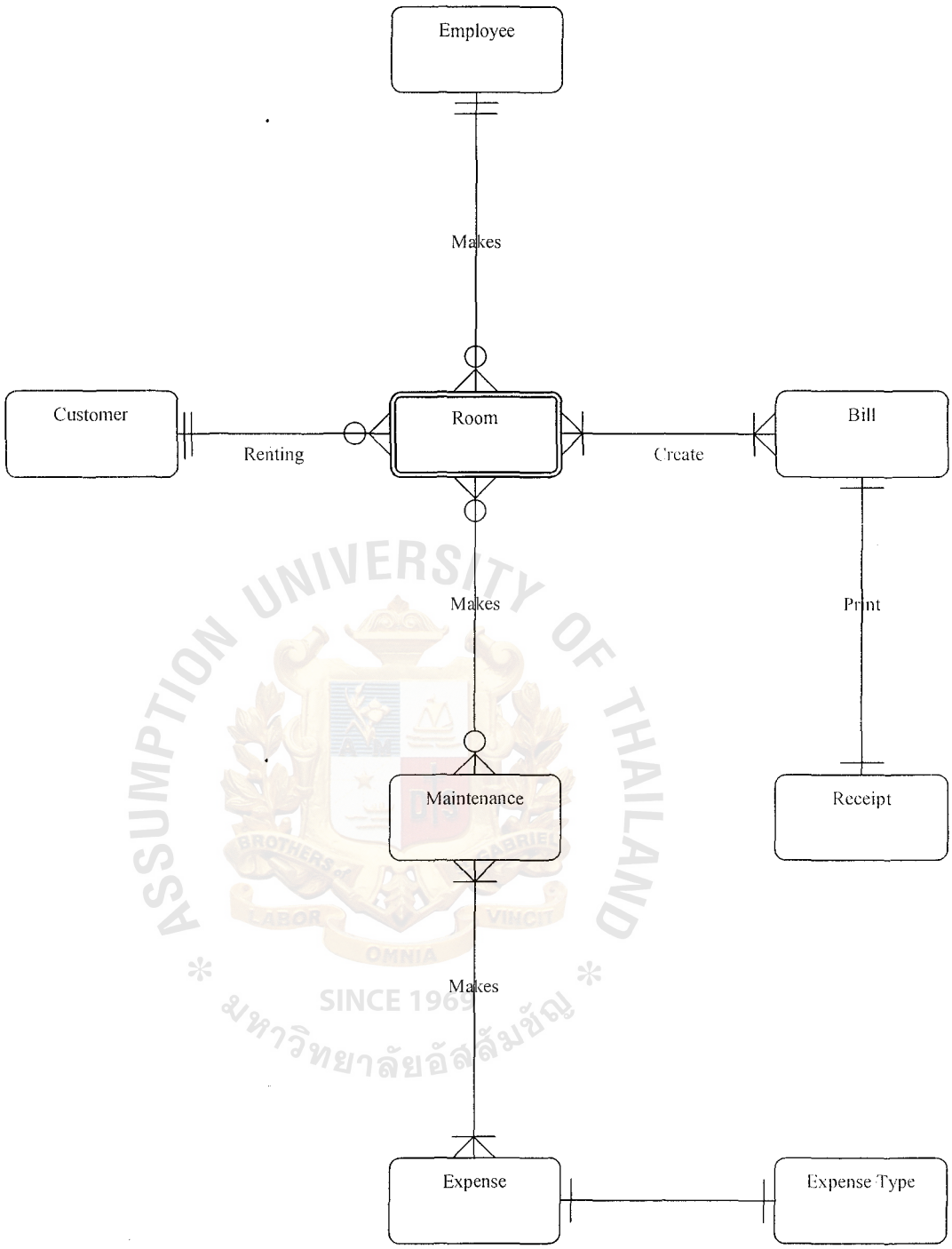

Figure A.1. Context Data Model of the Proposed System.

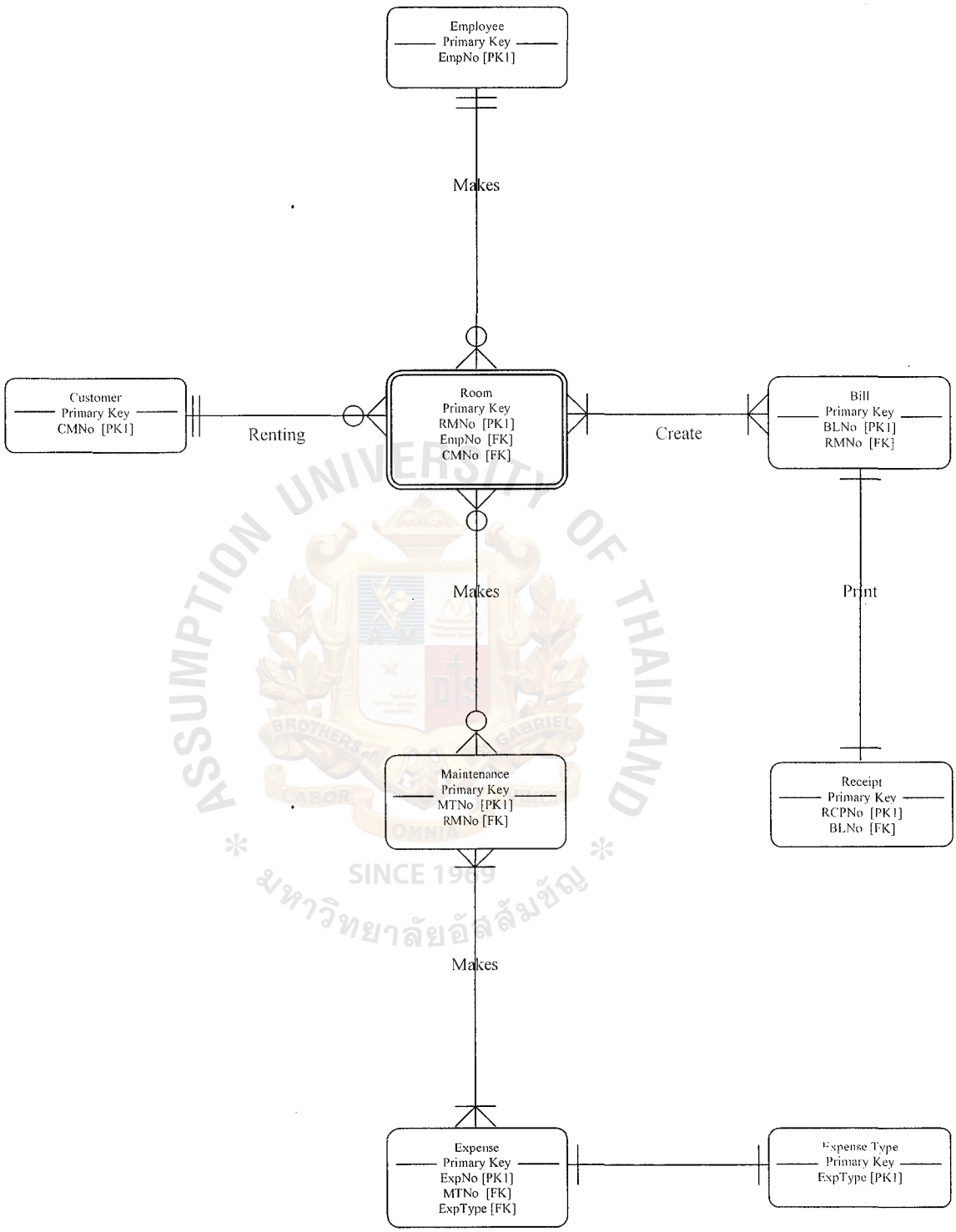

Figure A.2. Key-Based Data Model of the Proposed System.

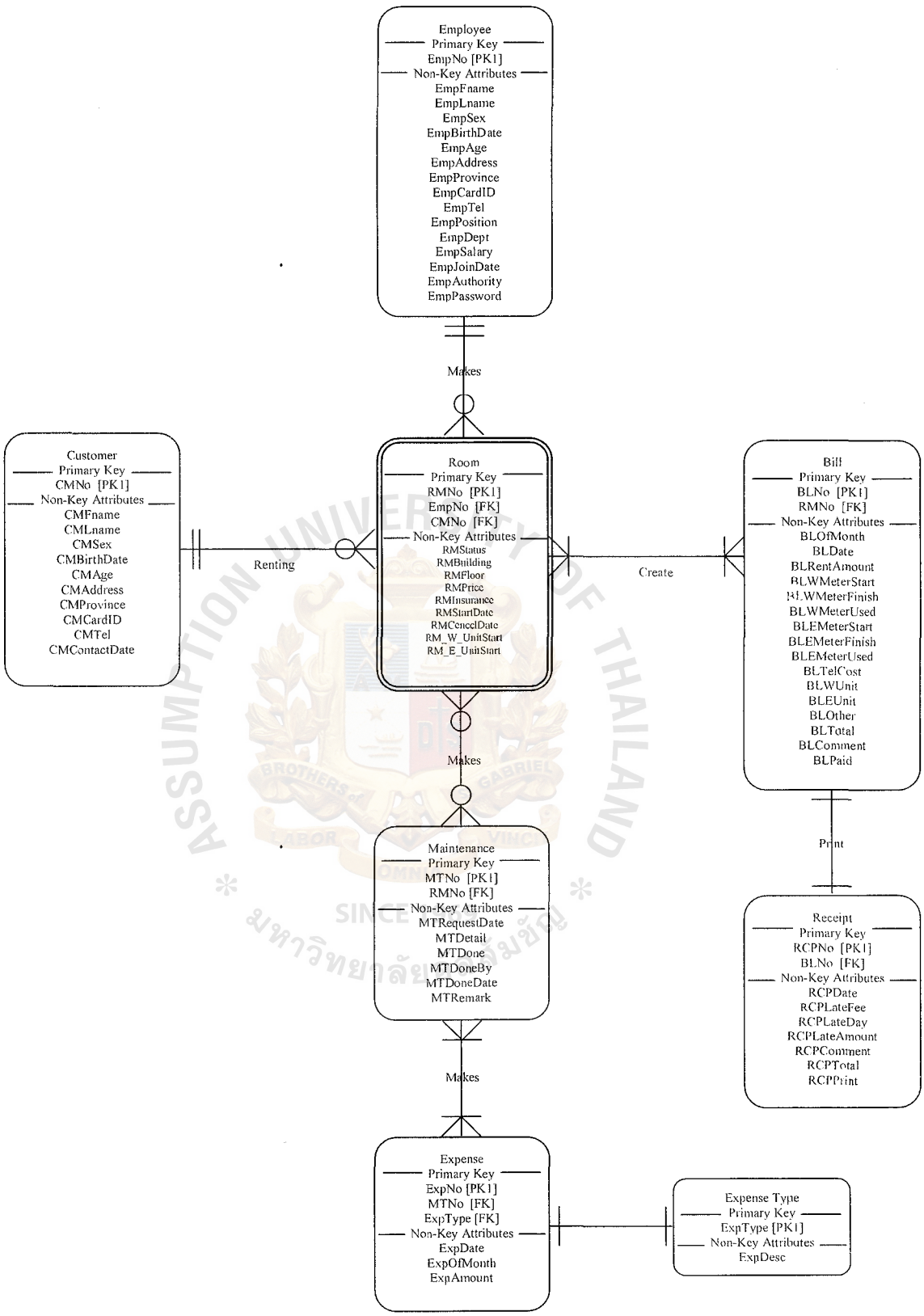

Figure A.3. Fully Attributed Data Model of the Proposed System.

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APPENDIX B

DATA FLOW DIAGRAM

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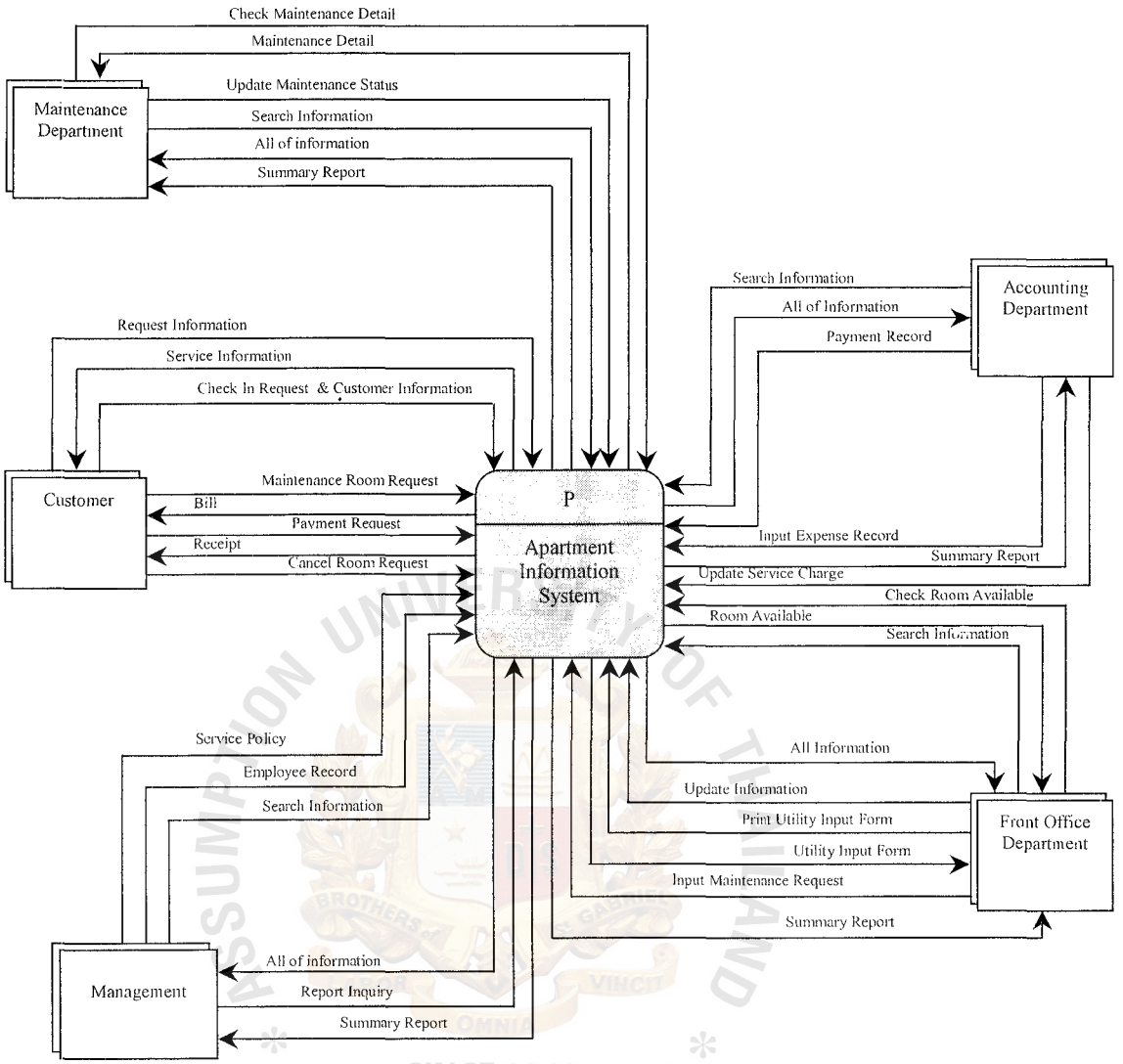

Figure B.1. Context Data Flow Diagram of the Proposed System.

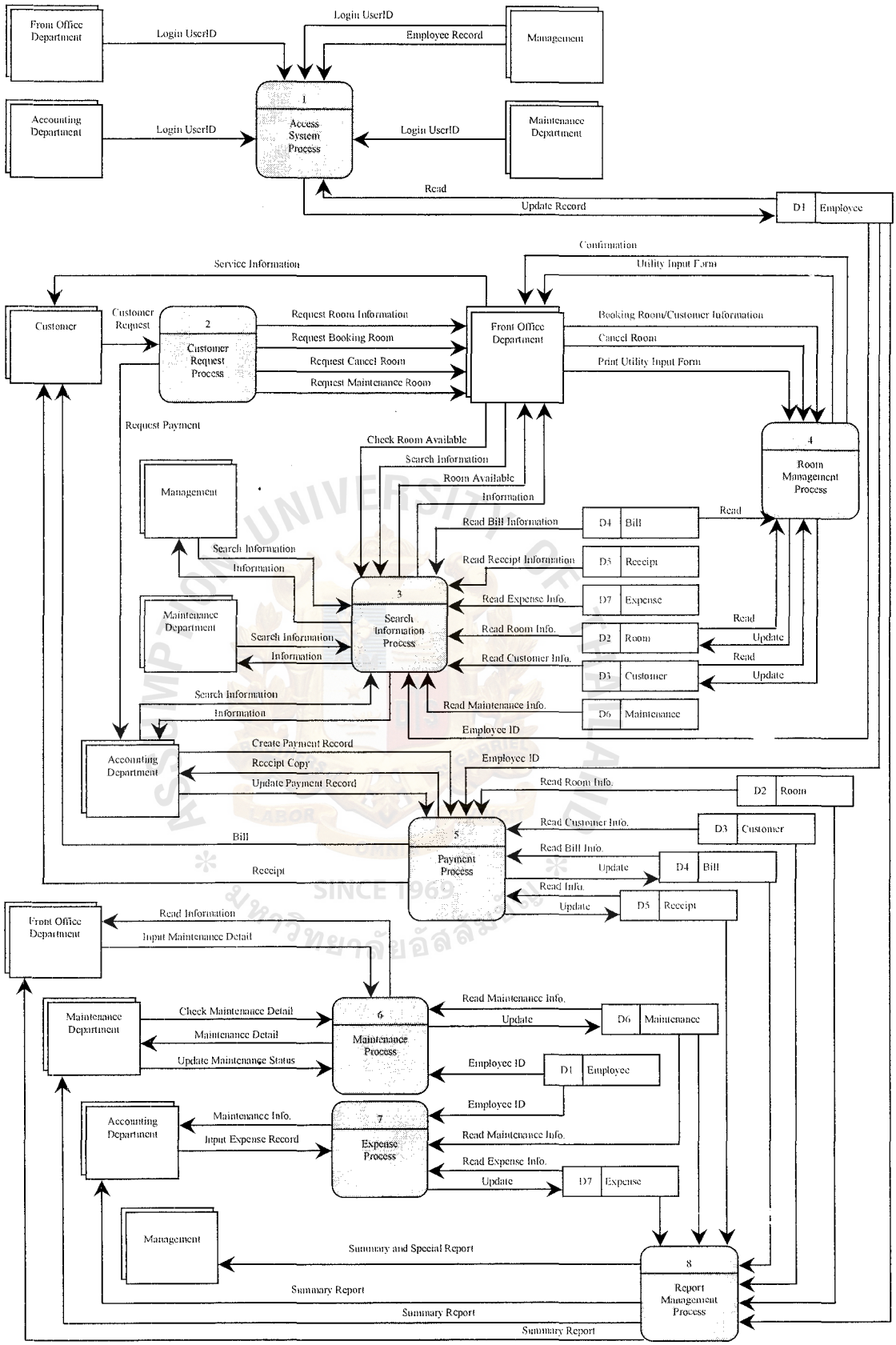

Figure B.2. Level 0 Data Flow Diagram of the Proposed System.

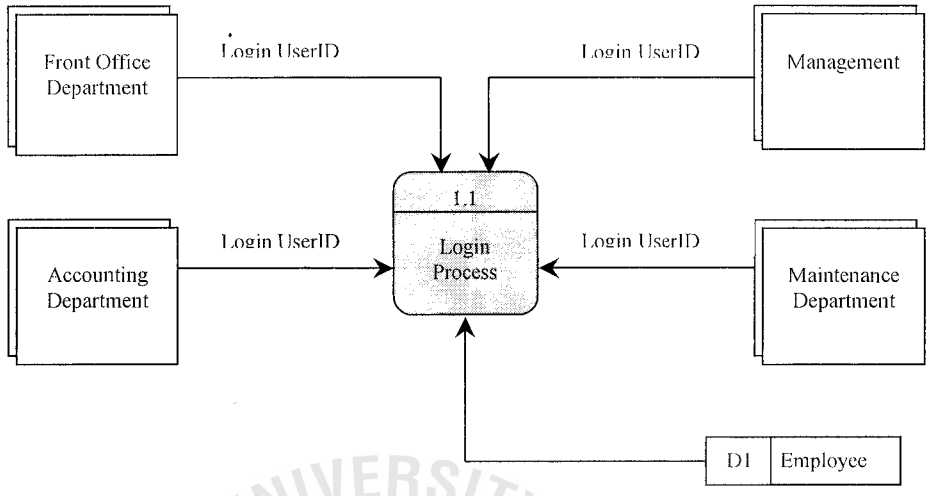

Figure B.3. Level 1 Data Flow Diagram of Access System Process.

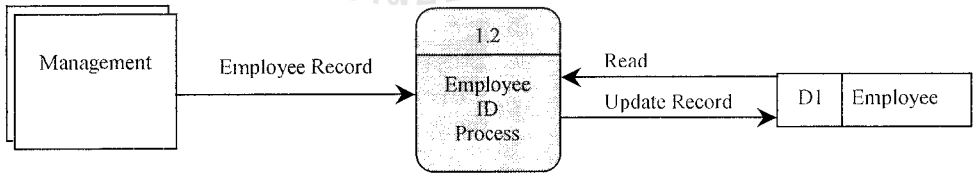

Figure B.4. Level 1 Data Flow Diagram of the Employee ID Process.

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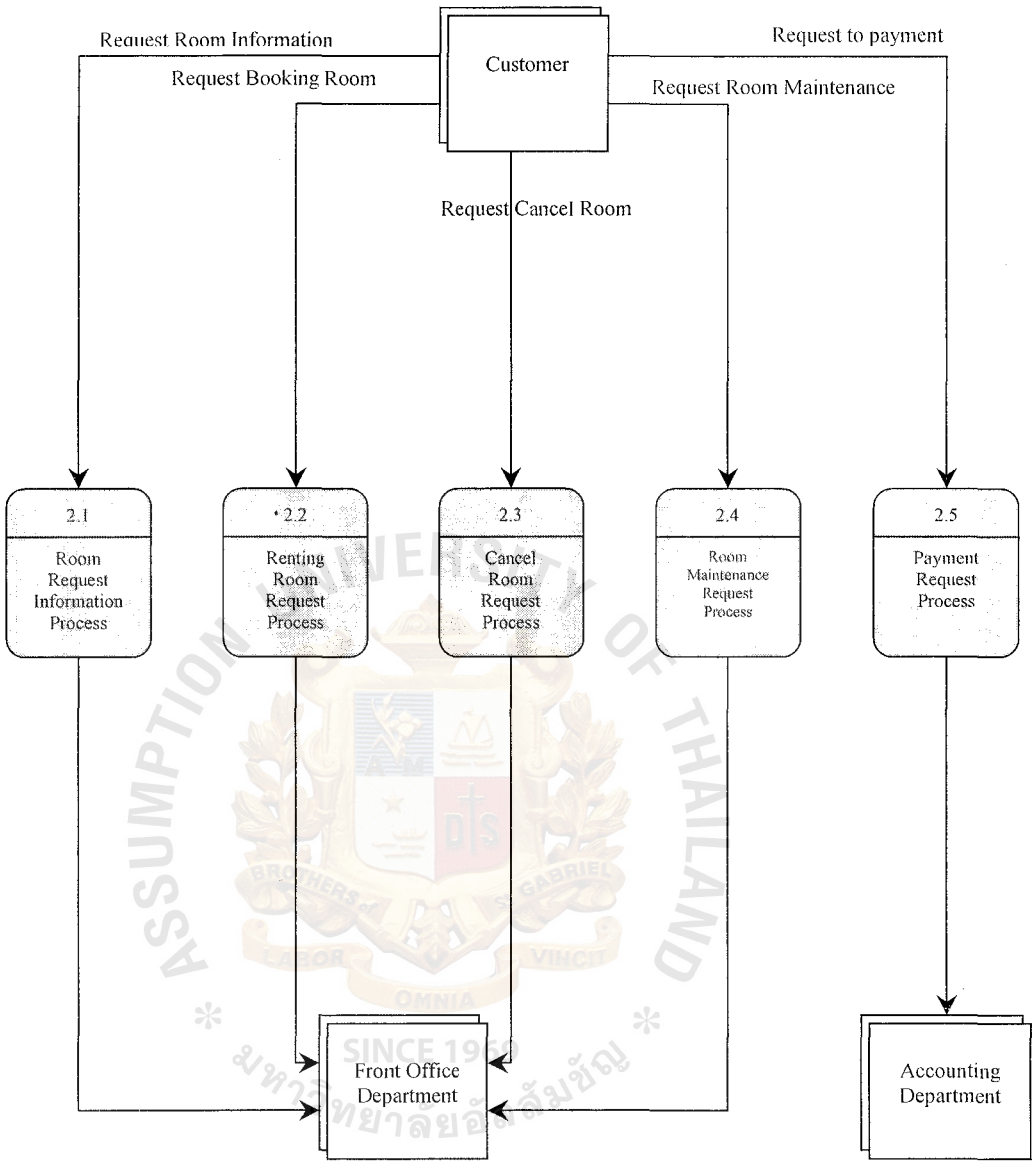

Figure B.5. Level 1 Data Flow Diagram of the Customer Request Process.

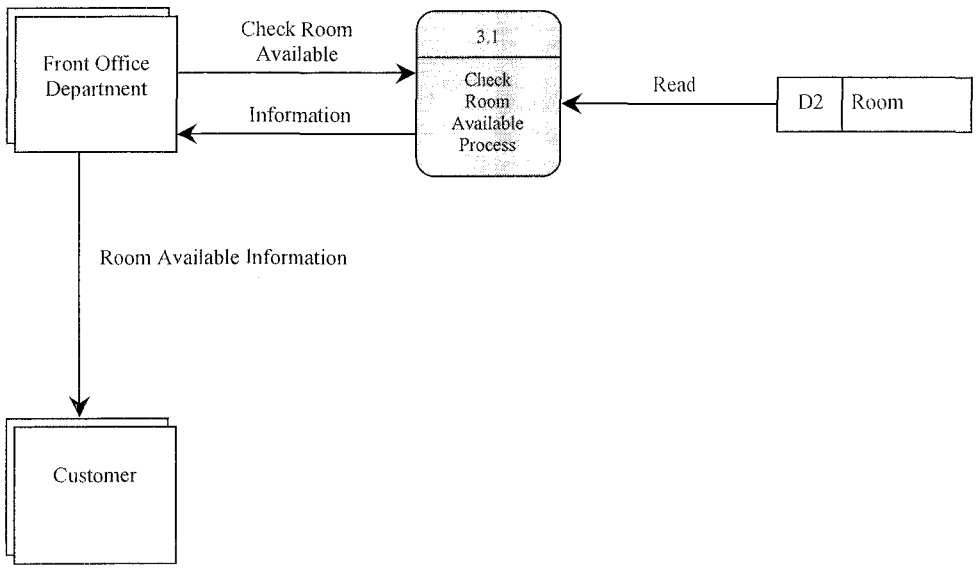

Figure B.6. Level 1 Data Flow Diagram of Check Available Room Process.

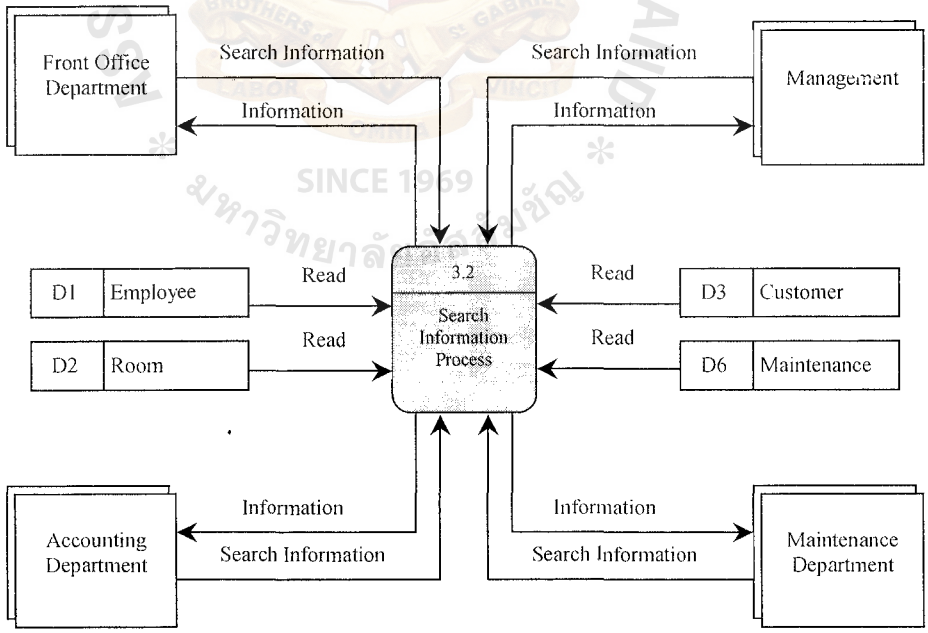

Figure B.7. Level 1 Data Flow Diagram of Search Information Process.

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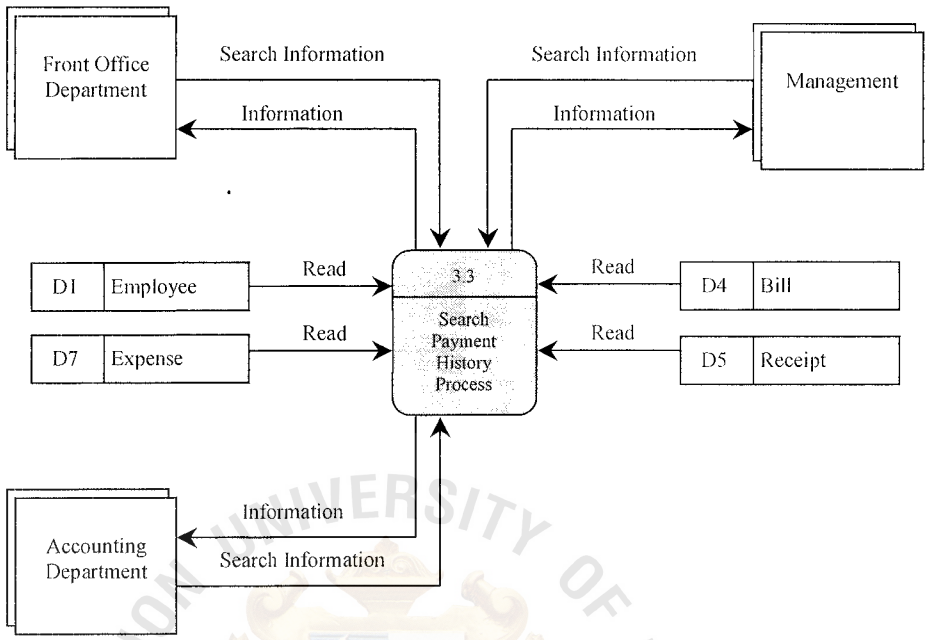

Figure B.8. Level 1 Data Flow Diagram of Search Payment History Process.

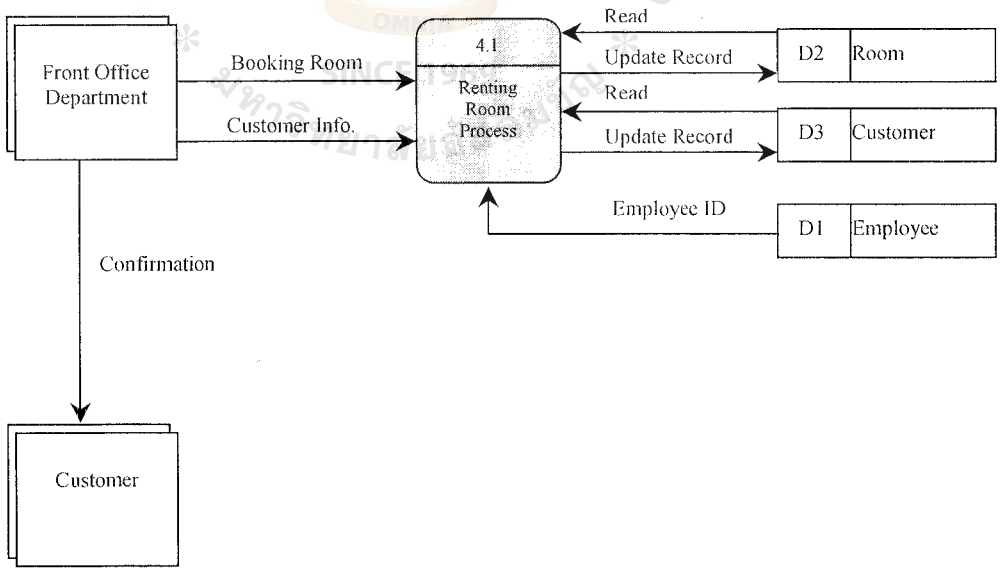

Figure B.9 Level 1 Data Flow Diagram of Booking Room Process

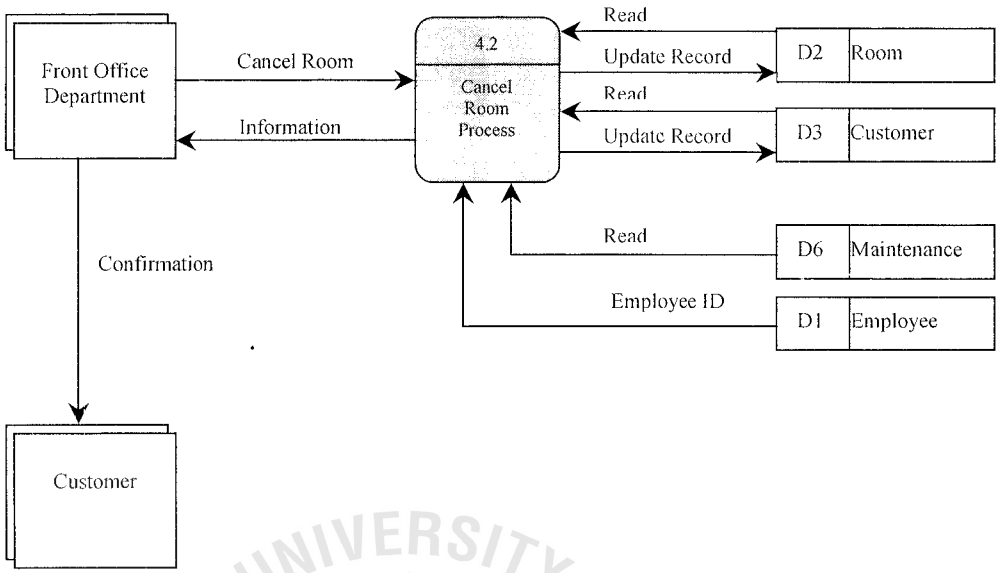

Figure B.10. Level 1 Data Flow Diagram of Cancel Room Process.

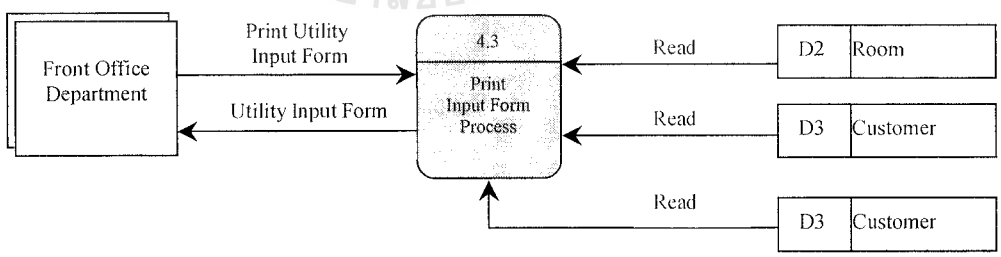

Figure B.11. Level 1 Data Flow Diagram of Print Input Form Process.

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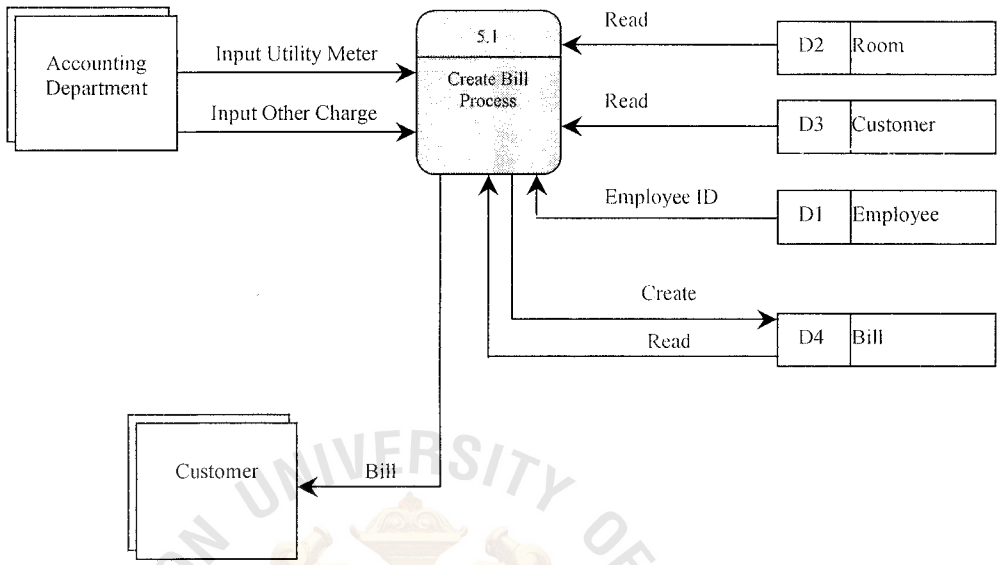

Figure B.12. Level 1 Data Flow Diagram of Create Bill Process.

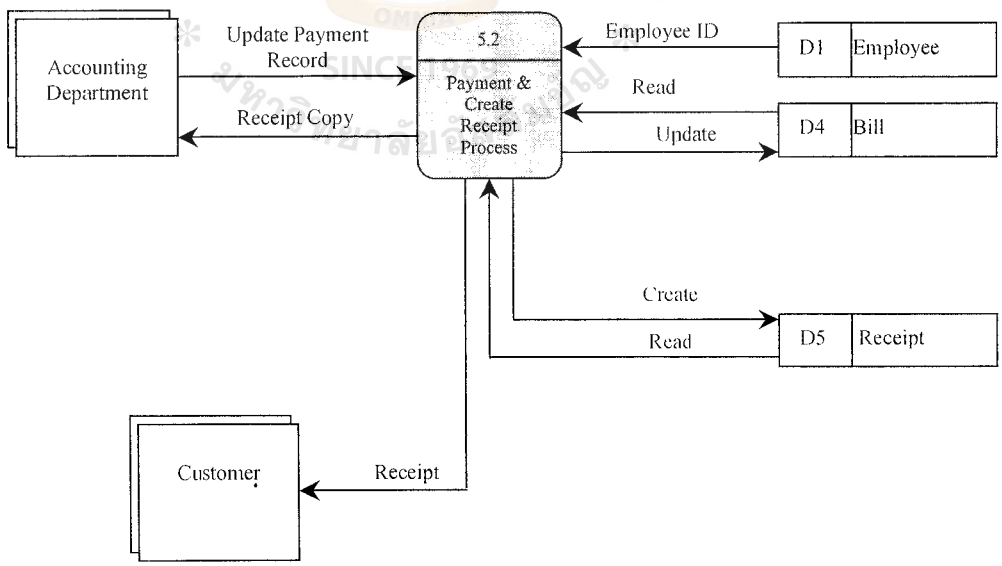

Figure B.13. Level 1 Data Flow Diagram of Payment & Create Receipt Process.

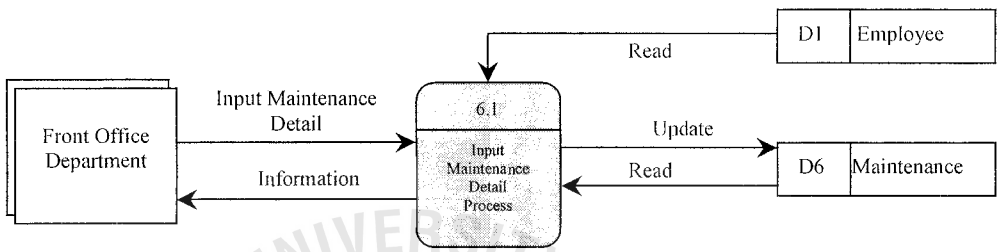

Figure B.14. Level 1 Data Flow Diagram of Input Maintenance Detail Process.

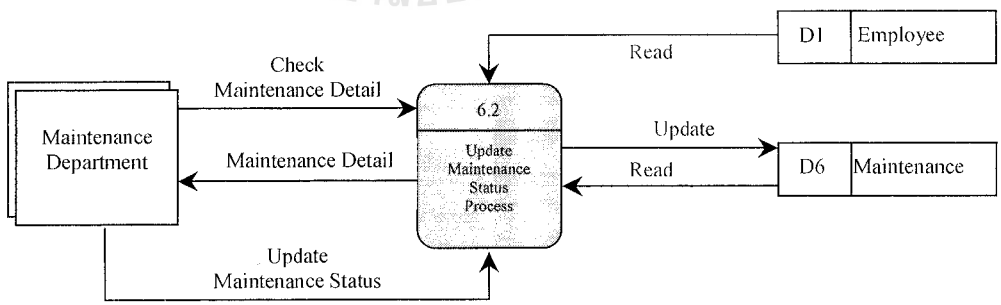

Figure B.15. Level 1 Data Flow Diagram of Update Maintenance Status Process.

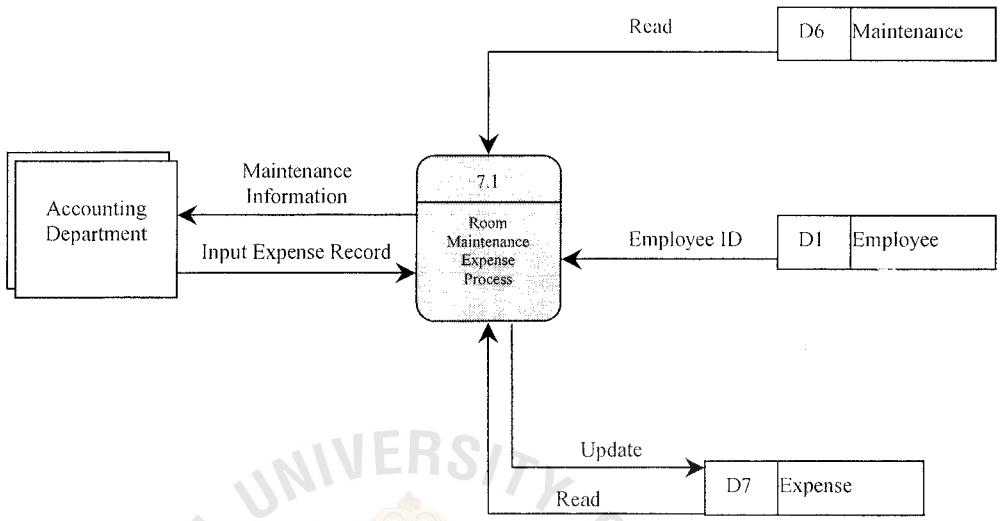

Figure B.16. Level 1 Data Flow Diagram of Room Maintenance Expense Process.

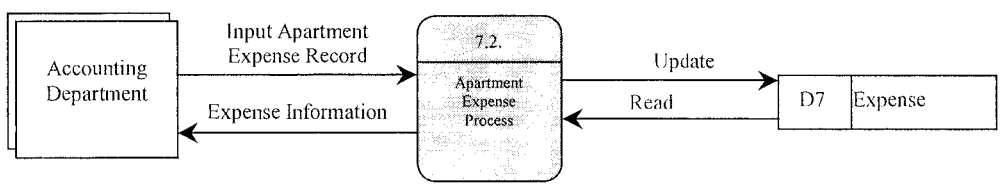

Figure B.17. Level 1 Data Flow Diagram of Input Expense Detail Process.

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APPENDIX C

FEASIBILITY ANALYSIS

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

Cost Item	Price
Development Cost:	
Hardware:	
1 File and Database Server	45,000.00
4 Client machines	120,000.00
2 Dot Matrix Printer	12,000.00
1 Laser Printer	30,000.00
Total Hardware Cost	207,000.00
Software:	
1 Server Software	25,000.00
4 Client Software	12,000.00
Total Software Cost	37,000.00
Personnel:	
1 System Analyst (3 months @ 18,000 Baht/month)	54,000.00
1 Programmer (3 months @ 12,000 Baht/month)	36,000.00
1 Database Specialist (3 month @ 15,000 Baht/month)	45,000.00
1 Network Specialist (3 month @ 15,000 Baht/month)	45,000.00
Total Personnel Cost	180,000.00
Implementation Cost:	
Training cost	15,000.00
Installation cost	15,000.00
Total Implementation Cost	30,000.00
Total development Cost	454,000.00
Project Annual Operating Cost:	
User:	
1 Accountant Manager (23,000 Baht per month)	276,000.00
1 Front Office Dept. Staff (12,000 Baht per month)	144,000.00
1 Maintenance Dept. Staff (12,000 Baht per month)	144,000.00
Office Supplies and Miscellaneous Cost:	
Paper	3,000.00
Stationary	4,000.00
Utility	3,000.00
Miscellaneous	4,000.00
Maintenance Cost:	
Hardware Maintenance Cost (per year)	5,000.00
Software Maintenance Cost (per year)	5,000.00
Total Project Annual Operating Cost	588,000.00
Total Project Annual Cost	1,042,000.00

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

Cost Item	Price
Development Cost:	
Hardware:	
1 File and Database Server	45,000.00
4 Client machines	120,000.00
2 Dot Matrix Printer	12,000.00
1 Laser Printer	30,000.00
Total Hardware Cost	207,000.00
Software:	
1 Server Software	25,000.00
4 Client Software	12,000.00
Total Software Cost	37,000.00
Personnel:	
System Analyst (3 months @ 18,000 Baht/month)	0.00
1 Programmer (3 months @ 12,000 Baht/month)	36,000.00
1 Database Specialist (3 month @ 15,000 Baht/month)	45,000.00
1 Network Specialist (3 month @ 15,000 Baht/month)	45,000.00
Total Personnel Cost	126,000.00
Implementation Cost:	
Training cost	15,000.00
Installation cost	15,000.00
Total Implementation Cost	30,000.00
Total development Cost	400,000.00
Project Annual Operating Cost:	
User:	
1 Accountant Manager (23,000 Baht per month)	276,000.00
1 Front Office Dept. Staff (12,000 Baht per month)	144,000.00
1 Maintenance Dept. Staff (12,000 Baht per month)	144,000.00
Office Supplies and Miscellaneous Cost:	
Paper	3,000.00
Stationary	4,000.00
Utility	3,000.00
Miscellaneous	4,000.00
Maintenance Cost:	
Hardware Maintenance Cost (per year)	5,000.00
Software Maintenance Cost (per year)	5,000.00
Total Project Annual Operating Cost	588,000.00
Total Project Annual Cost	988,000.00

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

Cost Item	Price
Development Cost:	
Hardware:	
1 File and Database Server	45,000.00
4 Client machines	120,000.00
2 Dot Matrix Printer	12,000.00
1 Laser Printer	30,000.00
Total Hardware Cost	207,000.00
Software:	
1 Server Software	25,000.00
4 Client Software	12,000.00
Total Software Cost	37,000.00
Personnel:	
1 System Analyst (3 months @ 18,000 Baht/month)	54,000.00
1 Programmer (3 months @ 12,000 Baht/month)	36,000.00
Database Specialist (3 month @ 15,000 Baht/month)	0.00
Network Specialist (3 month @ 15,000 Baht/month)	0.00
Total Personnel Cost	90,000.00
Implementation Cost:	
Training cost	15,000.00
Installation cost	15,000.00
Total Implementation Cost	30,000.00
Total development Cost	364,000.00
Project Annual Operating Cost:	
User:	
1 Accountant Manager (23,000 Baht per month)	276,000.00
1 Front Office Dept. Staff (12,000 Baht per month)	144,000.00
1 Maintenance Dept. Staff (12,000 Baht per month)	144,000.00
System Support:	
1 Network Specialist (15,000 Baht per month)	180,000.00
Office Supplies and Miscellaneous Cost:	
Paper	3,000.00
Stationary	4,000.00
Utility	3,000.00
Miscellaneous	4,000.00
Maintenance Cost:	
Hardware Maintenance Cost (per year)	5,000.00
Software Maintenance Cost (per year)	5,000.00
Total Project Annual Operating Cost	768,000.00
Total Project Annual Cost	1,132,000.00

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

Cost Items	Years					
	0	1	2	3	4	5
Development Cost:	(454,000)					
Annual Operating Cost	-	(588,000)	(588,000)	(588,000)	(588,000)	(588,000)
Discount Factors for 12%	1.000	0.893	0.797	0.712	0.636	0.567
Time Adjusted Costs (adjusted to present value)	(454,000)	(525,084)	(468,636)	(418,656)	(373,968)	(333,396)
Cumulative time-adjusted cost over life time:	(454,000)	(979,084)	(1,447,720)	(1,866,376)	(2,240,344)	(2,573,740)
Benefit derived from operation of the new system:		708,800	800,000	900,000	1,000,000	1,100,000
Discount Factors for 12%	1.000	0.893	0.797	0.712	0.636	0.567
Time Adjusted Benefits (adjusted to present value)		632,958	637,600	640,800	636,000	623,700
Cumulative time-adjusted benefit over life time:		632,958	1,270,558	1,911,358	2,547,358	3,171,058
Cumulative lifetime time-adjusted cost+benefit	(454,000)	(346,126)	(177,162)	44,982	307,014	597,318

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

Cost Items	Years					
	0	1	2	3	4	5
Development Cost:	(400,000)					
Annual Operating Cost		(588,000)	(588,000)	(588,000)	(588,000)	(588,000)
Discount Factors for 12%	1.000	0.893	0.797	0.712	0.636	0.567
Time Adjusted Costs (adjusted to present value)	(400,000)	(525,084)	(468,636)	(418,656)	(373,968)	(333,396)
Cumulative time-adjusted cost over life time:	(400,000)	(925,084)	(1,393,720)	(1,812,376)	(2,186,344)	(2,519,740)
Benefit derived from operation of the new system:		708,800	800,000	900,000	1,000,000	1,100,000
Discount Factors for 12%	1.000	0.893	0.797	0.712	0.636	0.567
Time Adjusted Benefits (adjusted to present value)		632,958	637,600	640,800	636,000	623,700
Cumulative time-adjusted benefit over life time:		632,958	1,270,558	1,911,358	2,547,358	3,171,058
Cumulative lifetime time-adjusted cost+benefit	(400,000)	(292,126)	(123,162)	98,982	361,014	651,318

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

Cost Items	Years					
	0	1	2	3	4	5
Development Cost:	(364,000)					
Annual Operating Cost		(768,000)	(768,000)	(768,000)	(768,000)	(780,000)
Discount Factors for 12%	1.000	0.893	0.797	0.712	0.636	0.567
Time Adjusted Costs (adjusted to present value)	(364,000)	(685,824)	(612,096)	(546,816)	(488,448)	(442,260)
Cumulative time-adjusted cost over life time:	(364,000)	(1,049,824)	(1,661,920)	(2,208,736)	(2,697,184)	(3,139,444)
Benefit derived from operation of the new system:		708,800	800,000	900,000	1,000,000	1,100,000
Discount Factors for 12%	1.000	0.893	0.797	0.712	0.636	0.567
Time Adjusted Benefits (adjusted to present value)		632,958	637,600	640,800	636,000	623,700
Cumulative time-adjusted benefit over life time:		632,958	1,270,558	1,911,358	2,547,358	3,171,058
Cumulative lifetime time-adjusted cost+benefit	(364,000)	(416,866)	(391,362)	(297,378)	(149,826)	31,614

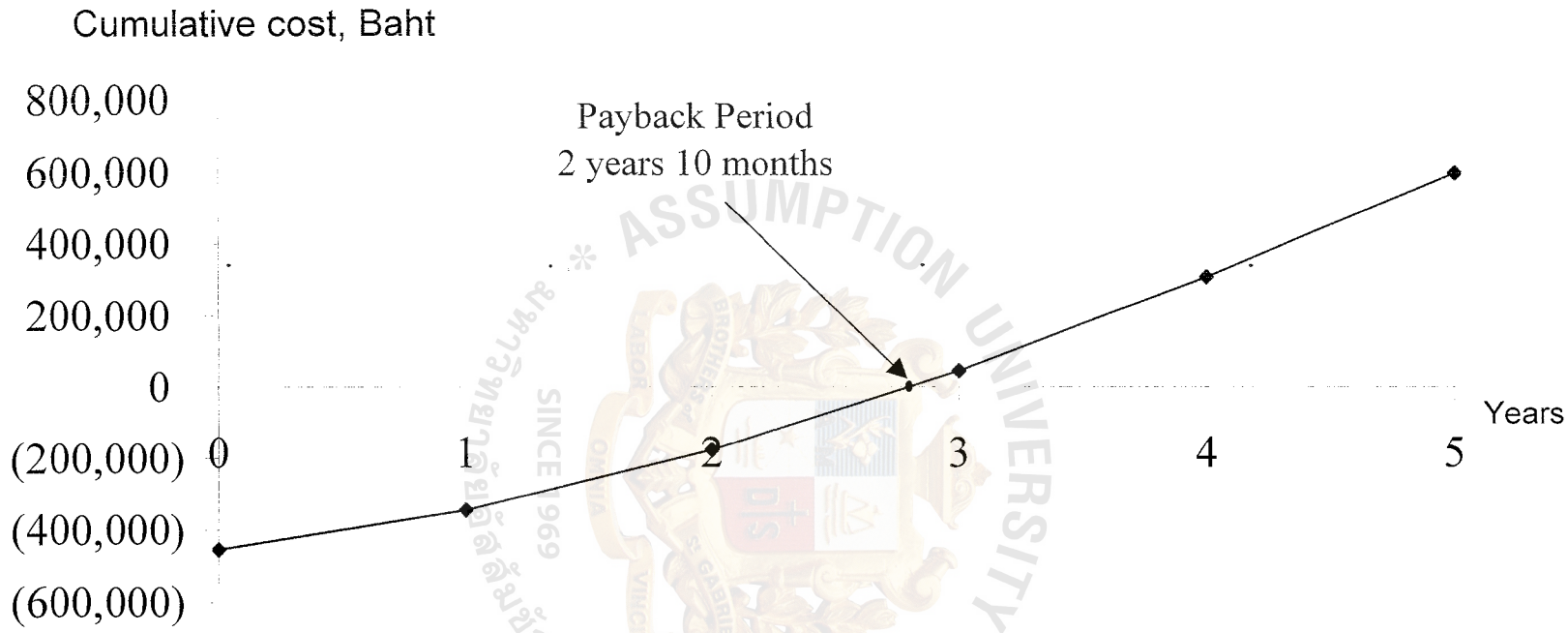

Figure C.1. Payback Period for Candidate 1.

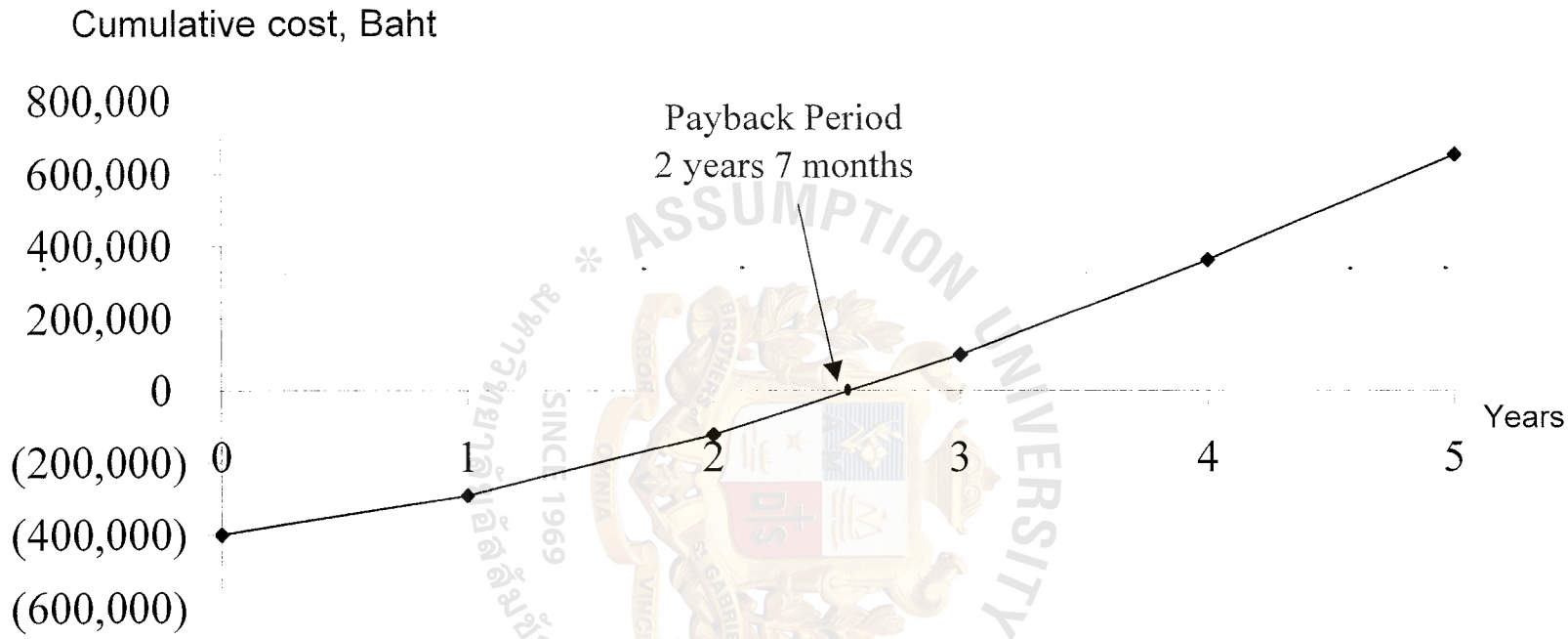

Figure C.2. Payback Period for Candidate 2.

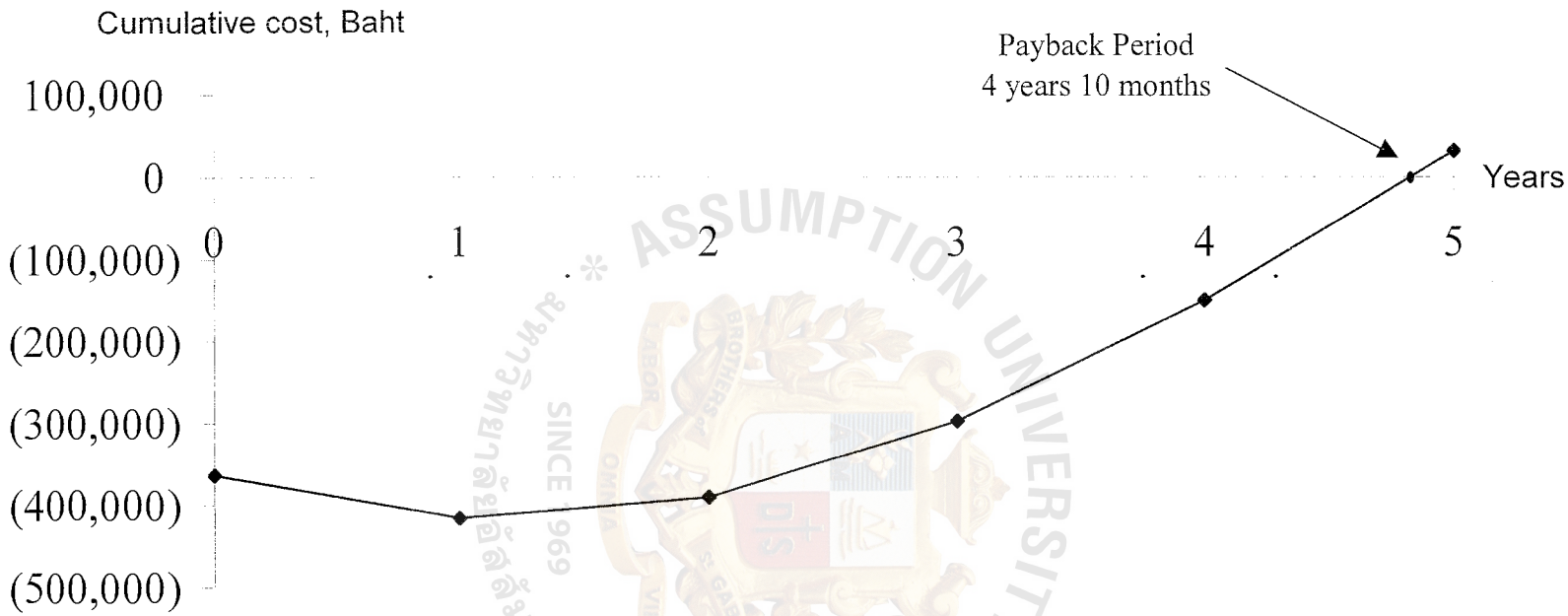

Figure C.3. Payback Period for Candidate 3.

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Table C.7. Net Present Value for candidate 1, Baht.

Cost Items	Years					
	0	1	2	3	4	5
Development Cost:	(454,000)					
Annual Operating Cost		(588,000)	(588,000)	(588,000)	(588,000)	(588,000)
Discount Factors for 12%	1.000	0.893	0.797	0.712	0.636	0.567
Time Adjusted Costs (adjusted to present value)	(454,000)	(525,084)	(468,636)	(418,656)	(373,968)	(333,396)
Cumulative time-adjusted cost over life time:						(2,573,740)
Benefit derived from operation of the new system:		708,800	800,000	900,000	1,000,000	1,100,000
Discount Factors for 12%	1.000	0.893	0.797	0.712	0.636	0.567
Time Adjusted Benefits (adjusted to present value)		632,958	637,600	640,800	636,000	623,700
Cumulative time-adjusted benefit over life time:		632,958	1,270,558	1,911,358	2,547,358	3,171,058
Cumulative lifetime time-adjusted cost+benefit						597,318

Table C.8. Net Present Value for Candidate 2, Baht.

Cost Items	Years					
	0	1	2	3	4	5
Development Cost:	(400,000)					
Annual Operating Cost		(588,000)	(588,000)	(588,000)	(588,000)	(588,000)
Discount Factors for 12%	1.000	0.893	0.797	0.712	0.636	0.567
Time Adjusted Costs (adjusted to present value)	(400,000)	(525,084)	(468,636)	(418,656)	(373,968)	(333,396)
Cumulative time-adjusted cost over life time:						(2,519,740)
Benefit derived from operation of the new system:		708,800	800,000	900,000	1,000,000	1,100,000
Discount Factors for 12%	1.000	0.893	0.797	0.712	0.636	0.567
Time Adjusted Benefits (adjusted to present value)		632,958	637,600	640,800	636,000	623,700
Cumulative time-adjusted benefit over life time:		632,958	1,270,558	1,911,358	2,547,358	3,171,058
Cumulative lifetime time-adjusted cost+benefit						651,318

Table C.9. Net Present Value for Candidate 3, Baht.

Cost Items	Years					
	0	1	2	3	4	5
Development Cost:	(364,000)					
Annual Operating Cost		(768,000)	(768,000)	(768,000)	(768,000)	(780,000)
Discount Factors for 12%	1.000	0.893	0.797	0.712	0.636	0.567
Time Adjusted Costs (adjusted to present value)	(364,000)	(685,824)	(612,096)	(546,816)	(488,448)	(442,260)
Cumulative time-adjusted cost over life time:						(3,139,444)
Benefit derived from operation of the new system:		708,800	800,000	900,000	1,000,000	1,100,000
Discount Factors for 12%	1.000	0.893	0.797	0.712	0.636	0.567
Time Adjusted Benefits (adjusted to present value)		632,958	637,600	640,800	636,000	623,700
Cumulative time-adjusted benefit over life time:		632,958	1,270,558	1,911,358	2,547,358	3,171,058
Cumulative lifetime time-adjusted cost+benefit						31,614

APPENDIX D

PROCESS SPECIFICATION

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Table D.1. Process Specification of Login Process.

Item	Description
Process Name:	Login Process
Data In:	Employee Information
Data Out:	Message Information
Process:	(1) Check the User ID and password with the employee database. (2) If User ID or password is incorrect, show the error message to the user on the screen and count incorrect time. (3) If login incorrect more than 2 times, the application will logoff (4) If User ID and password are correct, the application will show the main menu.
Attachment:	(1) Employee Database (2) Front Office Department (3) Accounting Department

Table D.2. Process Specification of Employee ID Process.

Item	Description
Process Name:	Employee ID Process
Data In:	Employee Information
Data Out:	Message Information
Process:	(1) Check the authority of employee (2) If the authority is management's authority, system can allow updating employee information into the employee table.
Attachment:	(1) Login Process (2) Employee Database (3) Management

TableD.3. Process Specification of Customer Request Process.

Item	Description
Process Name:	Customer Request Process
Data In:	Customer Request Information
Data Out:	Process 2.1 Room Information Request Process Process 2.2 Booking Room Request Process Process 2.3 Cancel Room Request Process Process 2.4 Maintenance Room Request Process Process 2.5 Payment Request Process
Process:	(1) Check the customer request (2) Go to process 2.1-2.5 to follow the customer request (3) If process 2.1-2.4, response by Front Office Department (4) If process 2.5, response by Accounting Department
Attachment:	(1) Customer Information (2) Room Information (3) Front Office Department (4) Accounting Department

TableD.4. Process Specification of Check Room Available Process.

Item	Description
Process Name:	Check Room Available Process
Data In:	Search Room Available Read Room Information (Room Information Database)
Data Out:	Room available information
Process:	(1) Complete search form (2) Query room information from room database
Attachment:	(1) Room Database (2) Customer (3) Front Office Department (4) Search Process

Table D.5. Process Specification of Search Information Process.

Item	Description
Process Name:	Search Information Process
Data In:	Search Room Information Search Customer Information Search Maintenance Information Search Employee Information Read Room Information (Room Database) Read Customer Information (Customer Database) Read Maintenance Information (Maintenance Database) Read Employee Information (Employee Database)
Data Out:	Room Information Customer Information Maintenance Information Employee Information
Process:	(1) Complete Search form (2) Query information from room database, customer database, maintenance database and employee database.
Attachment:	(1) Customer (2) Front Office Department (3) Accounting Department (4) Maintenance Department (5) Management (6) Employee Database (7) Room Database (8) Customer Database (9) Maintenance Database

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TableD.6. Process Specification of Search Financial History Process.

Item	Description
Process Name:	Search Financial History Process
Data In:	Search Bill Information Search Receipt Information Search Expense Information Read Bill Information (Bill Database) Read Receipt Information (Receipt Database) Read Expense Information (Expense Database)
Data Out:	Bill Information Receipt Information Expense Information
Process:	(1) Complete Search Form (2) Query Data Information from bill database, receipt database and expense database
Attachment:	(1) Accounting Department (2) Front Office Department (3) Management (4) Bill Database (5) Receipt Database (6) Expense Database

TableD.7. Process Specification of Renting Room Process.

Item	Description
Process Name:	Renting Room Process
Data In:	Customer renting room request process Customer Information Room Information Employee Information
Data Out:	Room Information Customer Information
Process:	(1) Get customer renting room request from customer (2) Add customer record (3) Verify customer information (4) Change room status and record start meter (5) Print contact form for customer (6) Confirm customer
Attachment:	(1) Customer (2) Front Office Department (3) Renting room request process (4) Employee Database (5) Room Database (6) Customer Database

TableD.8. Process Specification of Cancel Room Process.

Item	Description
Process Name:	Cancel Room Process
Data In:	Customer cancel room request process Customer Information Room Information Employee Information Bill Information Receipt Information Maintenance Information
Data Out:	Room Status Payment Process Confirmation
Process:	(1) Customer request to cancel room (2) Query customer information from customer database (3) Query room information from room database (4) Check bill information from bill database (5) Check maintenance status from maintenance database (6) Check receipt information from receipt database for unpaid amount (7) Submit information to payment process (8) Update room status from renting to available room (9) Confirm the customer
Attachment:	(1) Customer (2) Front Office Department (3) Accounting Department (4) Cancel Room Request Process (5) Employee Database (6) Customer Database (7) Room Database (8) Bill Database (9) Receipt Database (10) Payment Process

Table D.9. Process Specification of Print Meter Input Form Process.

Item	Description
Process Name:	Print meter input form process
Data In:	Room Information Customer Information Last Meter Record (Read from bill database)
Data Out:	Meter Input Form Customer Number Room Number and status Last meter record
Process:	(1) At the end of the month, the front office department query information from 3 databases are customer database, room database and bill database. (2) Check room status (3) Print meter input form for input new meter number (4) Input new meter number into the form and send to accounting department for bill process
Attachment:	(1) Front Office Department (2) Customer Information (3) Room Information (4) Bill Information (Last Month)

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Table D.10. Process Specification of Create Bill Process.

Item	Description
Process Name:	Create Bill Process
Data In:	Customer Information Room Information Employee Information Meter record information (Read from meter input form and record by accounting department)
Data Out:	Bill Bill Information Payment Process Customer Information Room Information
Process:	(1) Input meter record (2) Calculate service charge (3) Calculate total amount (4) Create bill record and add to bill database (5) Print bill for customer
Attachment:	(1) Accounting Department (2) Customer (3) Employee Database (4) Room Database (5) Customer Database (6) Bill Database (7) Payment and create receipt process

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TableD.11. Process Specification of Payment and Create Receipt Process.

Item	Description
Process Name:	Payment and create receipt process
Data In:	Customer request to make payment Bill Information Payment Employee Information
Data Out:	Original Receipt Copy Receipt Update Bill Information Update Receipt Information
Process:	(1) Customer request to payment (2) Query Bill information from bill database (3) Calculate late charge if customer pays late (4) Calculate total amount (5) Update Bill status information (6) Add receipt record to receipt database (7) Print receipt of each bill after receiving the payment for the customer and copy document for accounting department
Attachment:	(1) Customer (2) Accounting Department (3) Payment Request Process (4) Employee Database (5) Bill Database (6) Receipt Database

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Table D.12. Process Specification of Input Maintenance Details Process.

Item	Description
Process Name:	Input Maintenance Detail Process
Data In:	Room maintenance request process Room Information Customer Information Employee Information
Data Out:	Maintenance Information
Process:	(1) Customer request for room maintenance at the front office department (2) Query room information from room database (3) Query customer information from customer database (4) Verify information before creating record (5) Add maintenance record into maintenance database (6) Inform maintenance department to take action
Attachment:	(1) Customer (2) Front Office Department (3) Maintenance Department (4) Room Maintenance Request Process (5) Maintenance Process (6) Employee Database (7) Room Database (8) Customer Database (9) Maintenance Database

Table D.13. Process Specification of Update Maintenance Status Process.

Item	Description
Process Name:	Update Maintenance Status Process
Data In:	Maintenance Information Employee Information
Data Out:	Maintenance Information (Status and detail)
Process:	(1) Maintenance Department query new maintenance request and detail from maintenance database (2) If the maintenance is done, update the maintenance status in maintenance database (3) Submit maintenance information to input room maintenance expense process
Attachment:	(1) Maintenance Department (2) Employee Database (3) Maintenance Database (4) Room maintenance expense process

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Table D.14. Process Specification of Room Maintenance Expense Process.

Item	Description
Process Name:	Room Maintenance Expense Process
Data In:	Maintenance Information Employee Information
Data Out:	Expense Information
Process:	(1) Read maintenance information from maintenance database (2) Calculate expense amount (3) Add expense record into expense database by using the detail of room maintenance
Attachment:	(1) Maintenance Department (2) Accounting Department (3) Employee Database (4) Maintenance Database (5) Expense Database

Table D.15. Process Specification of Apartment Expense Process.

Item	Description
Process Name:	Apartment Expense Process
Data In:	Expense of Apartment Information Employee Information
Data Out:	Expense Information
Process:	(1) Calculate the expense amount before input data (2) Add expense record into expense database by using the detail of apartment expense.
Attachment:	(1) Accounting Department (2) Employee Database (3) Expense Database

Table D.16. Process Specification of Report Management Process.

Item	Description
Process Name:	Report Management Report
Data In:	Read Customer Information from customer database Read Room Information from room database Read Bill Information from bill database Read Receipt Information from receipt database Read Maintenance Information from maintenance database Read Expense Information from expense database Read Employee Information from employee database Report Inquiry
Data Out:	Monthly Report Annually Report Management Report Summary Report
Process:	(1) At the end of the month, generate report for management (2) At the end of the year, generate report for management (3) Report inquiry from management, front office department, accounting department and maintenance department (4) Generate summary report to all related department
Attachment:	(1) Front Office Department (2) Accounting Department (3) Maintenance Department (4) Management (5) Employee Database (6) Room Database (7) Customer Database (8) Bill Database (9) Receipt Database (10) Maintenance Database (11) Expense Database

APPENDIX E

DATA DICTIONARY

ASSUMPTION UNIVERSITY OF THAILAND
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Table E.1. Data Dictionary of Apartment Information Database.

Name	Description
BLComment	Comment in Bill
BLDate	Bill entry date
BLEMeterFinish	Electricity meter finished in bill
BLEMeterStart	Electricity meter started in bill
BLEMeterUsed	Electricity meter used in bill
BLEUnit	Electric amount per unit in bill
BLNo	Bill Number
BLOfMonth	Bill of month
BLOther	Other amount in bill
BLPaid	Flag paid or unpaid in bill
BLRentAmount	Rent amount in bill
BLTelCost	Telephone fee in bill
BLToal	Bill Total amount
BLWMeterFinish	Water meter finished in bill
BLWMeterStart	Water meter started in bill
BLWMeterUsed	Water meter used in bill
BLWUnit	Water amount per unit in bill
CMAddress	Address of customer
CMAge	Age of customer
CMBirthdate	Date of birth customer
CMCardID	ID of customer
CMContactDate	Contact Date of customer
CMFname	First name of customer
CMLname	Last name of customer
CMNo	Customer Number
CMProvince	Province of customer
CMSex	Gender of customer
CMTel	Telephone number of customer
EmpAddress	Address of employee
EmpAge	Age of employee
EmpAuthority	Authority of employee
EmpBirthdate	Birth date of employee
EmpCardID	ID of employee
EmpDept	Department
EmpFname	First name of employee
EmpJoinDate	Employee join date
EmpLname	Last name of employee
EmpNo	Employee Number
EmpPassword	Password to logon
EmpPosition	Position

Table E.1. Data Dictionary of Apartment Information Database (Continued).

Name	Description
EmpProvince	Province of employee
EmpSalary	Employee salary
EmpSex	Gender of employee
EmpTel	Telephone number of employee
ExpAmount	Expense amount
ExpDate	Expense entry date
ExpDesc	Expense description
ExpNo	Expense Number
ExpOfMonth	Expense of month
ExpType	Expense type
MTDetail	Maintenance detail
MTDone	Maintenance status
MTDoneBy	Maintenance done by
MTDoneDate	Maintenance done date
MTNo	Maintenance Number
MTRemark	Maintenance remark
MTRequestDate	Maintenance Request Date
RCPComment	Comment in receipt
RCPDate	Receipt entry date
RCPLateAmount	Late amount
RCPLateDay	Late days
RCPLateFee	Late fee per day
RCPNo	Receipt Number
RCPPrint	Receipt print status
RCPTotal	Total amount in receipt
RM_E_UnitStart	Start electric meter
RM_W_UnitStart	Start water meter
RMBuilding	Building
RMCancelDate	Date of cancel room
RMFloor	Floor
RMInsurance	Insurance for room
RMNo	Room Number
RMPrice	Price of room
RMStartDate	Date of start rent
RMStatus	Room Status

APPENDIX F

DATABASE DESIGN

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TableF.1. Structure of Employee Table.

Name	Description	Type	Size
EmpNo	Employee Number	Character	10
EmpFname	First name of employee	Character	50
EmpLname	Last name of employee	Character	50
EmpSex	Gender of employee	Yes/No	1
EmpBirthdate	Date of Birth employee	Date	8
EmpAge	Age of employee	Number	5
EmpAddress	Address of employee	Character	50
EmpProvince	Province of employee	Character	50
EmpCardID	ID of employee	Character	13
EmpTel	Telephone number of employee	Character	50
EmpPosition	Position	Character	50
EmpDept	Department	Character	50
EmpSalary	Employee salary	Currency	10
EmpJoinDate	Employee join date	Date	8
EmpAuthority	Authority of employee	Character	1
EmpPassword	Password to login	Character	10

TableF.2. Structure of Room Table.

Name	Description	Type	Size
RMNo	Room Number	Character	10
RMStatus	Room Status	Yes/No	1
RMBuilding	Building	Character	50
RMFloor	Floor	Number	2
RMPrice	Price of room	Currency	10
RMInsurance	Insurance for room	Currency	10
RMStartDate	Date of starting rent	Date	8
RMCancelDate	Date of cancellation room	Date	8
RM_W_UnitStart	Start water meter	Number	10
RM_E_UnitStart	Start electric meter	Number	10
CMNo	Customer Number	Character	10
EmpNo	Employee Number	Character	10

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TableF.3. Structure of Customer Table.

Name	Description	Type	Size
CMNo	Customer Number	Character	10
CMFname	First name of customer	Character	50
CMLname	Last name of customer	Character	50
CMSex	Gender of customer	Yes/No	1
CMBirthdate	Birth date of customer	Date	8
CMAge	Age of customer	Number	5
CMAddress	Address of customer	Character	50
CMProvince	Province of customer	Character	50
CMCardID	ID of customer	Character	13
CMTel	Telephone number of customer	Character	50
CMContactDate	Contact Date	Date	8
EmpNo	Employee Number	Character	10

TableF.4. Structure of Bill Table.

Name	Description	Type	Size
BLNo	Bill Number	Character	10
BLOfMonth	Bill of month	Character	2
BLDate	Bill entry date	Date	8
BLRentAmount	Rent amount	Currency	10
BLWMeterStart	Water meter start	Number	5
BLWMeterFinish	Water meter finish	Number	5
BLWMeterUsed	Water meter used	Number	5
BLEMeterStart	Electricity meter started	Number	5
BLEMeterFinish	Electricity meter finished	Number	5
BLEMeterUsed	Electricity meter used	Number	5
BLTelCost	Telephone fee	Currency	10
BLWUnit	Water amount per unit	Number	5
BLEUnit	Electric amount per unit	Number	5
BLOther	Other amount	Currency	10
BLToal	Bill Total amount	Currency	10
BLComment	Comment in Bill	Character	50
BLPaid	Flag paid or unpaid in bill	Yes/No	1
RMNo	Room Number	Character	10
EmpNo	Employee Number	Character	10

TableF.5. Structure of Receipt Table.

Name	Description	Type	Size
RCPNo	Receipt Number	Character	10
BLNo	Bill Number	Character	10
EmpNo	Employee Number	Character	10
RCPDate	Receipt entry date	Date	8
RCPLateFee	Late fee per day	Number	10
RCPLateDay	Late days	Number	10
RCPLateAmount	Late amount	Currency	10
RCPComment	Comment in receipt	Character	50
RCPTotal	Total amount in receipt	Currency	10
RCPPrint	Receipt print status	Yes/No	1

TableF.6. Structure of Maintenance Table.

Name	Description	Type	Size
MTNo	Maintenance Number	Character	10
MTRequestDate	Maintenance Request Date	Date	8
EmpNo	Employee Number	Character	10
RMNo	Room Number	Character	10
MTDetail	Maintenance detail	Character	50
MTDone	Maintenance status	Yes/No	1
MTDoneBy	Maintenance done by	Character	10
MTDoneDate	Maintenance done date	Date	8
MTRemark	Maintenance remark	Character	50

TableF.7. Structure of Expense Table.

Name	Description	Type	Size
ExpNo	Expense Number	Character	10
ExpDate	Expense entry date	Date	8
ExpOfMonth	Expense of month	Character	2
MTNo	Maintenance number	Character	10
ExpType	Expense type	Character	2
ExpAmount	Expense amount	Currency	10
EmpNo	Employee number	Character	10

TableF.8. Structure of Expense Type Table.

Name	Description	Type	Size
ExpType	Expense type	Character	2
ExpDesc	Expense description	Character	50

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PPENDIX G

INTERFACE DESIGN

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Figure G.1. Password Verification.

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Figure G.2. Main Menu.

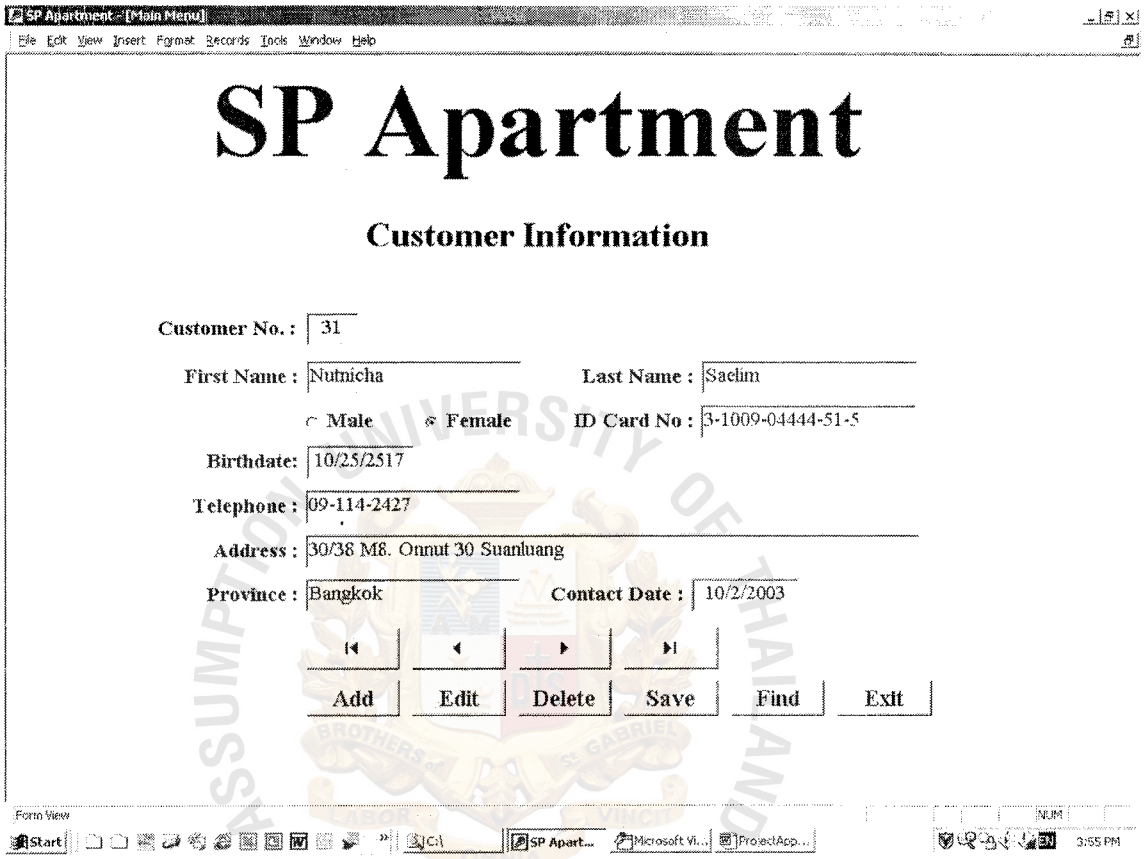

Figure G.3. Customer Information.

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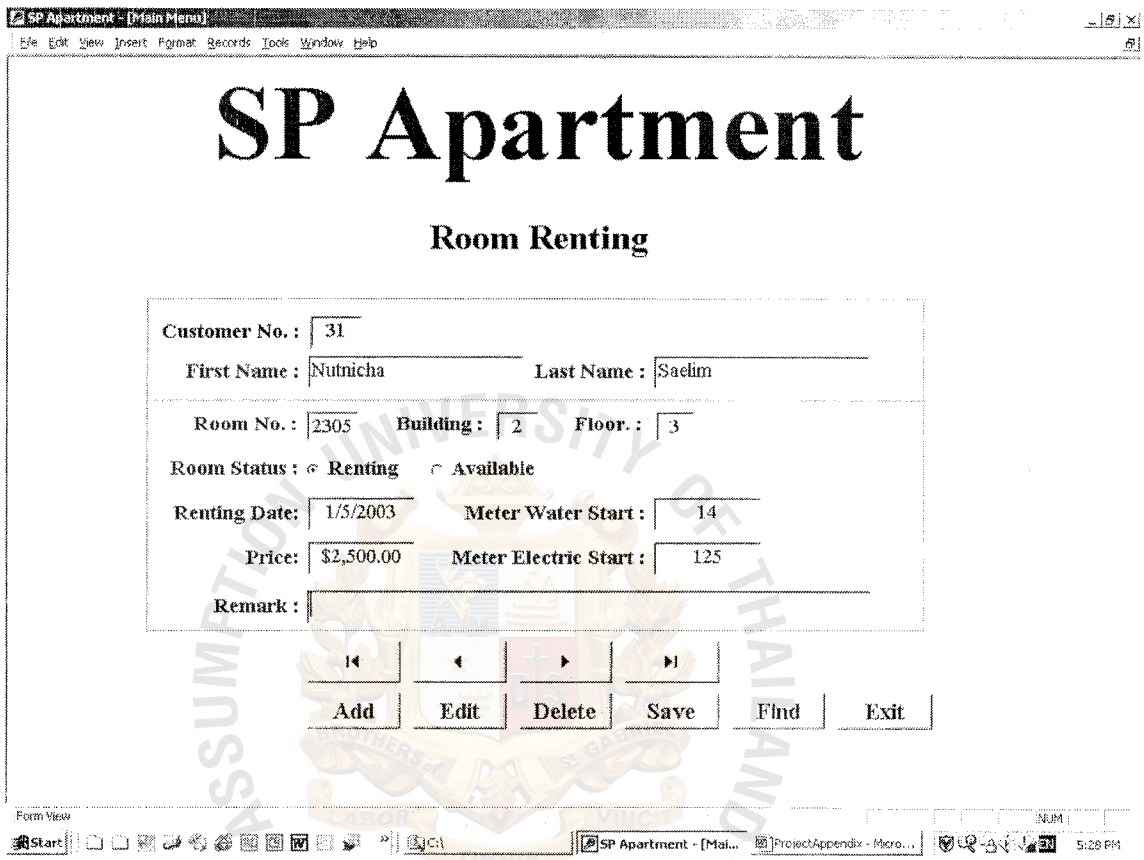

Figure G.4. Room Renting.

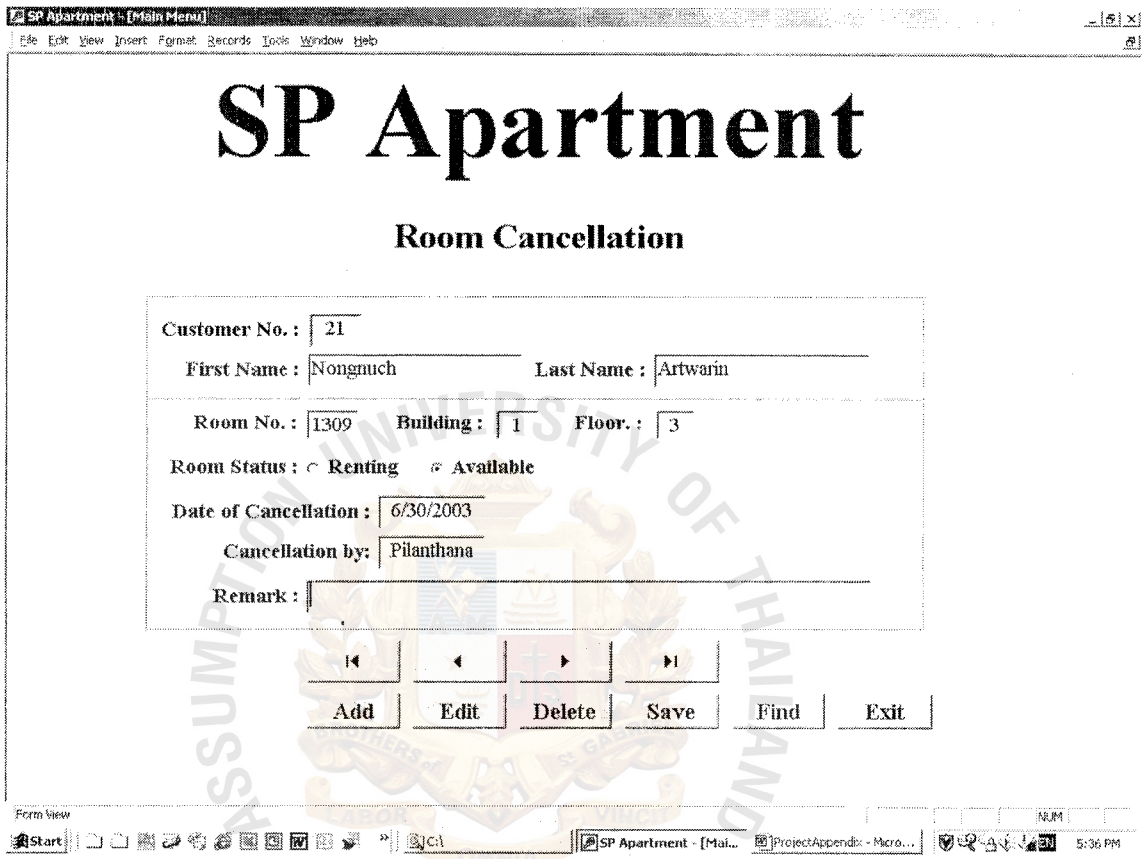

Figure G.5. Room Cancellation.

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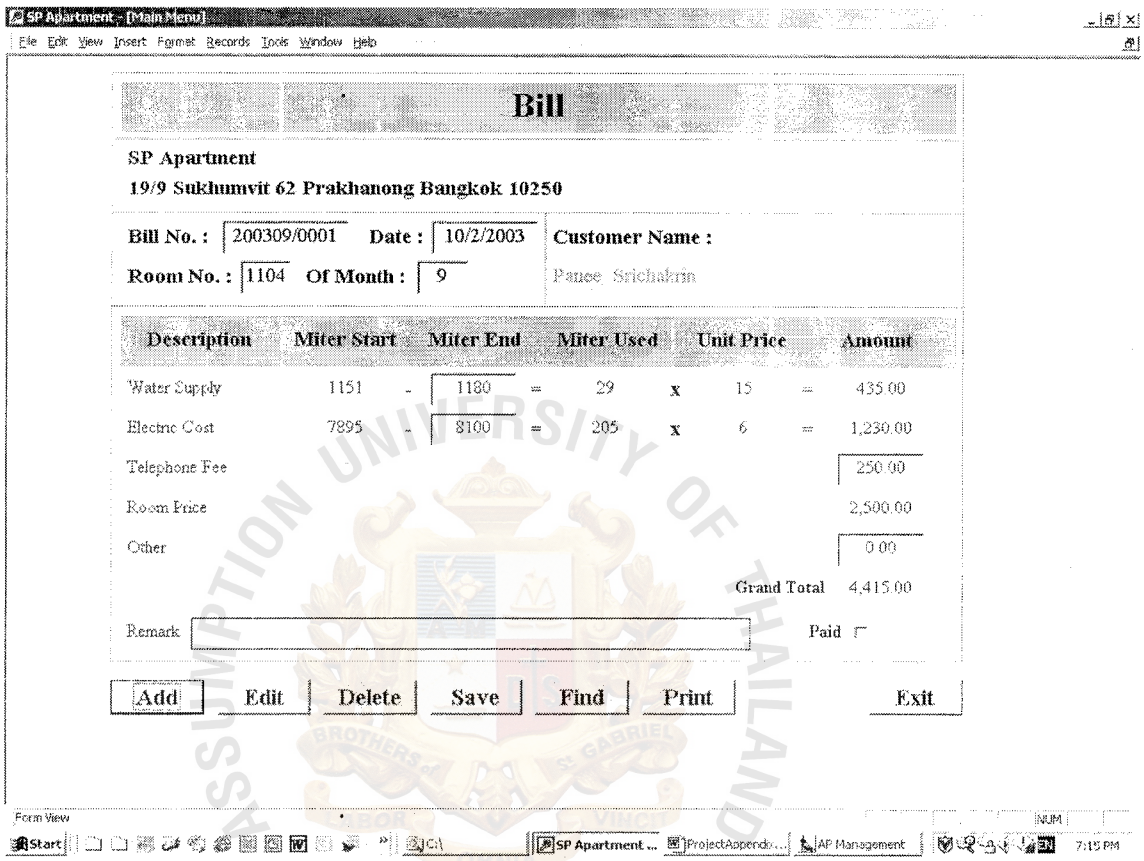

Figure G.6. Bill Entry.

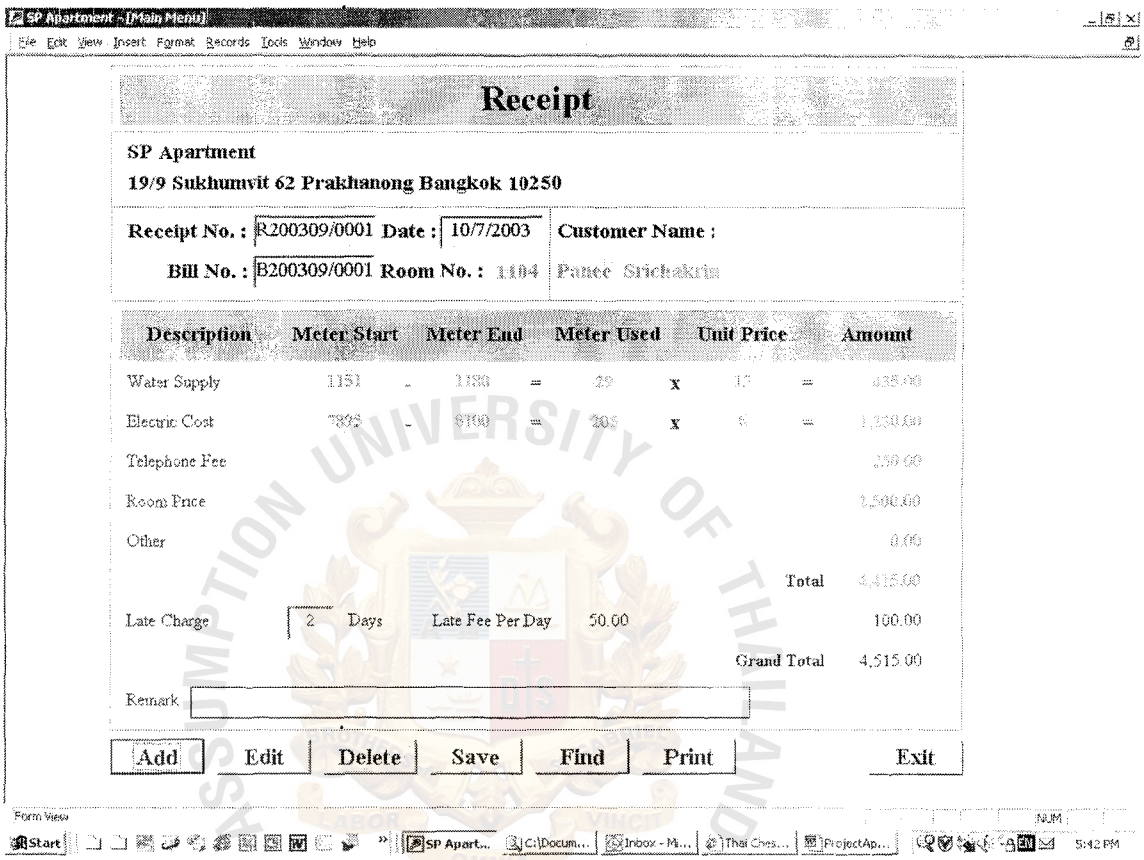

Figure G.7. Payment and Receipt Entry.

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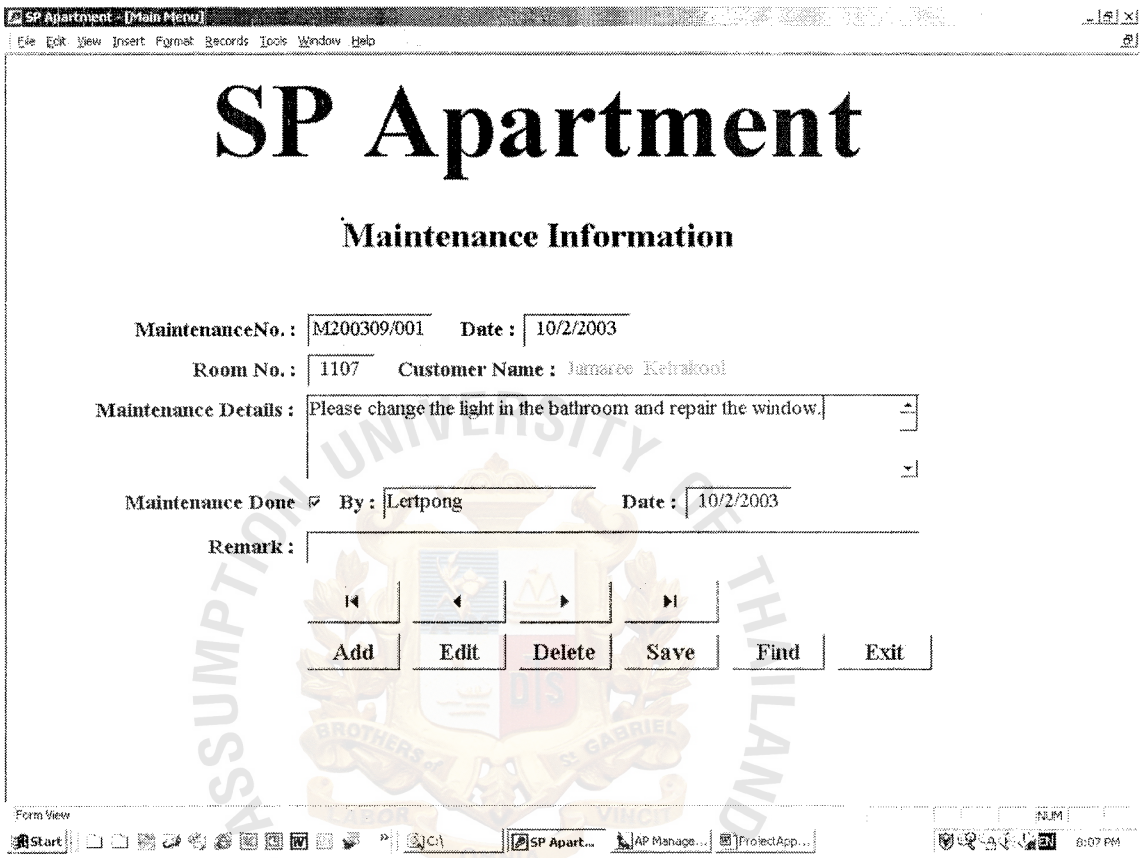

Figure G.8. Maintenance Information.

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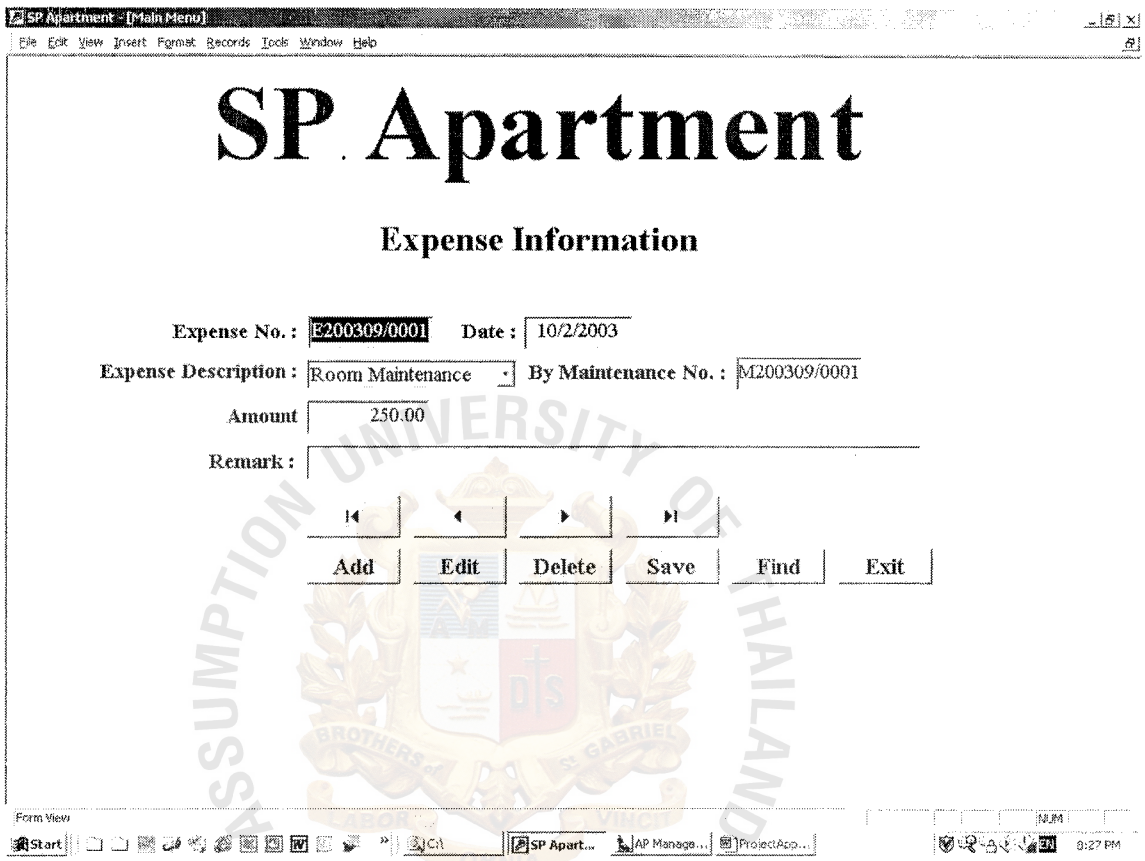

Figure G.9. Expense Information.

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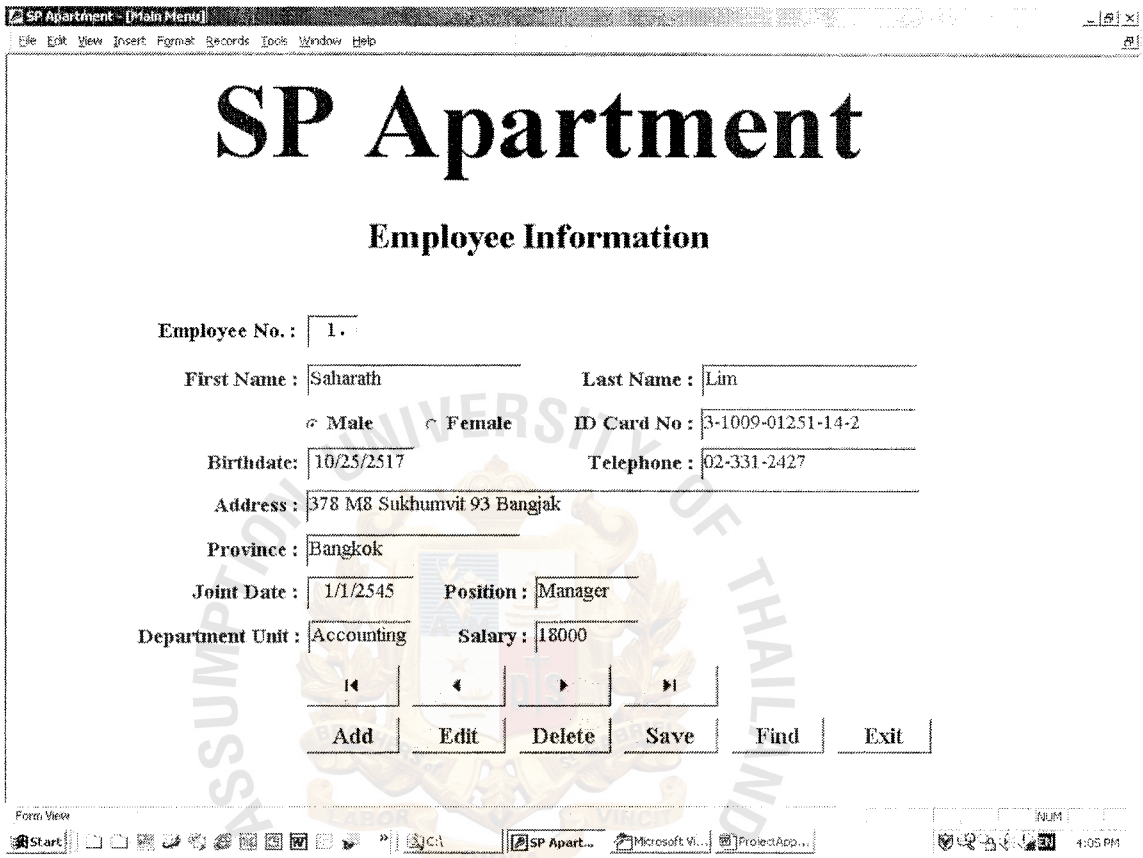

Figure G.10. Employee Information.

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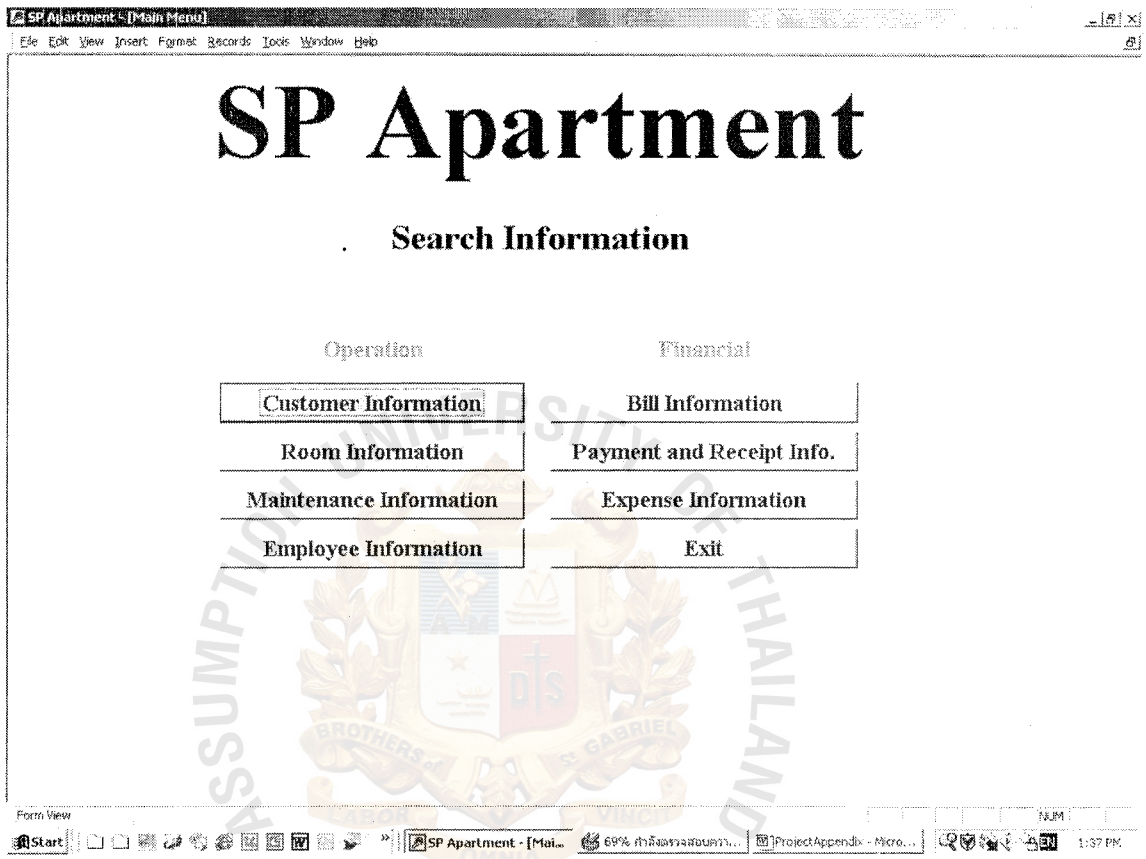

Figure G.11. Search Information.

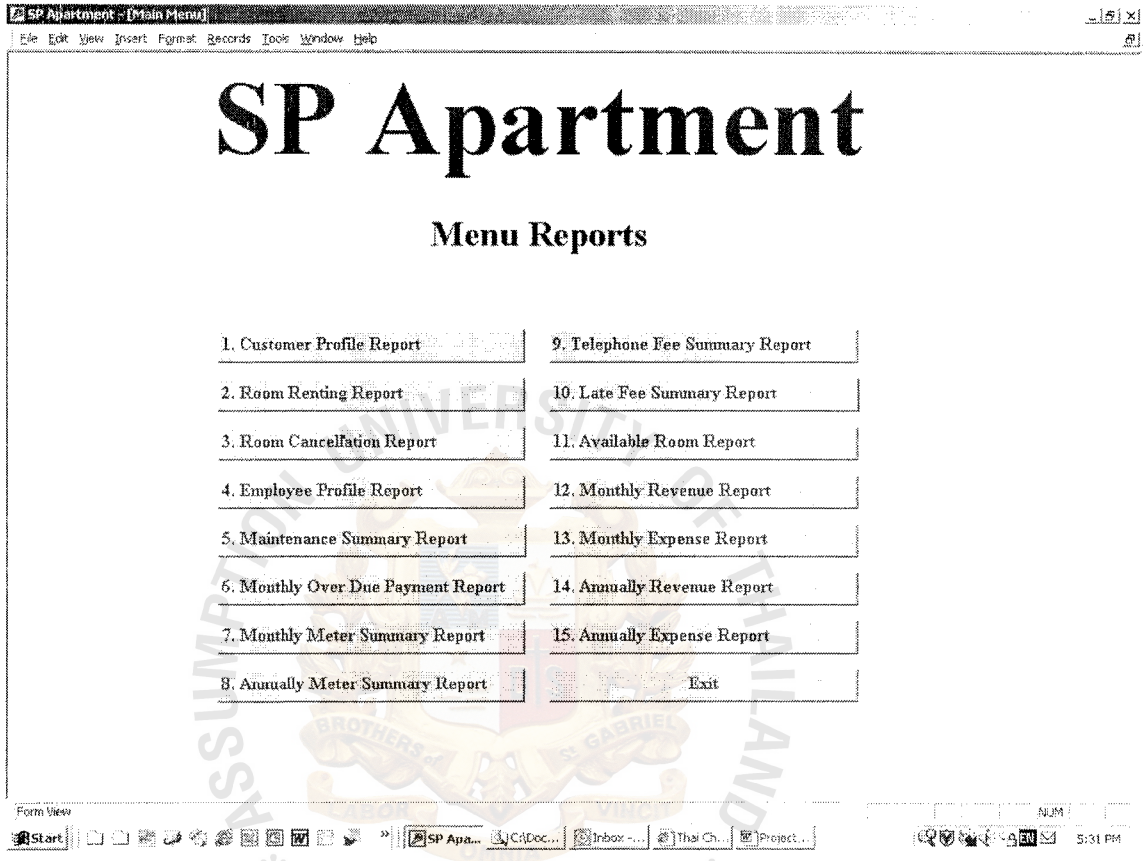

Figure G.12. Menu Reports.

Figure G.13. Print Document Form.

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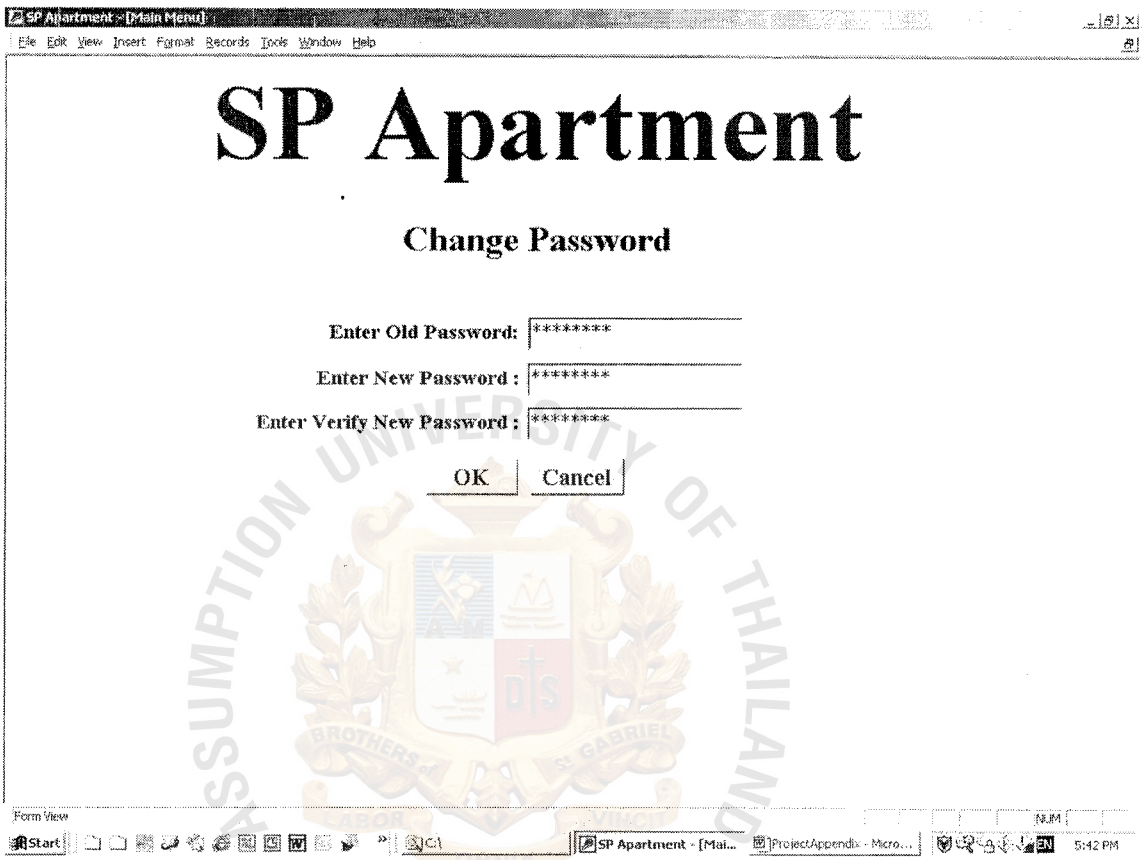

Figure G.14. Change Password.

APPENDIX H

OUTPUT DESIGN

ASSUMPTION UNIVERSITY OF THAILAND
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SP Apartment

Customer Profile Report

Report as of 30 September 2003

No.	Customer Number	Name	Address	Telephone No.	ID Card No.
1	0001	Rafael Melendez	36 Rama4 Klongtoei Bkk 10100	01-753-2418	3-1009-14210-52-1
2	0002	Samir Gupta	378 M7. Onnut10 Suanluang 10250	01-481-3498	3-1001-00154-23-3
3	0003	Pornnapa S	88/9 Soi Mahajamrouen Aumnoi 10160	02-881-4371	3-1009-10245-78-8
4	0004	Panee Srichukrin	777/3 12 Empire Tower, Satorn-Tai Bkk	02-887-5052	3-1004-77899-31-0
5	0005	Vimonporn Hanvong	23 Asok Road Bangkapi Bangkok	02-742-5459	3-1145-88711-01-2
6	0006	Onpatra Boonyapravit	32 Silom Road Bangrak Bangkok	06-500-3517	3-2547-88998-77-1
7	0007	Jamaree Ketrakool	85 Jan Road Chonburi	09-776-6442	3-4978-78654-51-3
8	0008	Nuntiya Kosidapun	41/34 M1. Sukhumvit Road Wattana Bkk	02-223-2346	3-5548-79221-00-0
9	0009	Wongjan Wongsamut	134/39 Rama4 Klongtoiy Bangkok	01-684-7255	3-5478-21690-11-0
10	0010	Varangkana Hirunyasiri	3 M5 Laksi Road Donmuang Bangkok	02-621-1226	3-5479-89866-21-0

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Figure H.1. Customer Profile Report.

SP Apartment

Room Renting Report

Report as of 30 September 2003

No.	Room No.	Building	Floor	Price	Renting Date	Name	Telephone No.	ID Card No.
1	1101	1	1	2500.00	June 1, 2003	Rafael Melendez	01-753-2418	3-1009-14210-52-1
2	1102	1	1	2500.00	June 1, 2003	Samir Gupta	01-481-3498	3-1001-00154-23-3
3	1103	1	1	2500.00	June 1, 2003	Pornnapa S	02-881-4371	3-1009-10245-78-8
4	1104	1	1	2500.00	June 1, 2003	Panee Srichukrin	02-887-5052	3-1004-77899-31-0
5	1105	1	1	2500.00	June 1, 2003	Vimonporn Hanvong	02-742-5459	3-1145-88711-01-2
6	1106	1	1	2500.00	June 1, 2003	Onpatra Boonyapravit	06-500-3517	3-2547-88998-77-1
7	1107	1	1	2500.00	June 1, 2003	Jamaree Ketrakool	09-776-6442	3-4978-78654-51-3
8	1108	1	1	2500.00	June 1, 2003	Nuntiya Kosidapun	02-223-2346	3-5548-79221-00-0
9	1109	1	1	2500.00	June 1, 2003	Wongjan Wongsamut	01-684-7255	3-5478-21690-11-0
10	1110	1	1	2500.00	June 1, 2003	Varangkana Hirunyasiri	02-621-1226	3-5479-89866-21-0

Page 1

Figure H.2. Room Renting Report.

SP Apartment

Room Cancellation Report

Report as of 30 September 2003

No.	Room No.	Building	Floor	Price	Name	ID Card No.	Date of Cancelation	Cancel By
1	1101	1	1	2500.00	Rafael Melendez	3-1009-14210-52-1	August 30, 2003	Saharath
2	1102	1	1	2500.00	Samir Gupta	3-1001-00154-23-3	September 30, 2003	Saharath
3	1103	1	1	2500.00	Pornnapa S	3-1009-10245-78-8	September 30, 2003	Saharath
4	1104	1	1	2500.00	Panee Srichukrin	3-1004-77899-31-0	September 30, 2003	Saharath

Page 1

Figure H.3. Room Cancellation Report.

SP Apartment

Employee Profile Report

Report as of 30 September 2003

No.	Name	Address	Telephone No.	Department	EmpJoinDate
1	Saharath Lim	30/38 M8. Onnut30 Suanluang Bkk 10250	09-114-2427	Management	January 1, 2002
2	Pilantana Muenpakdee	294 Ekachai 109 Bangbon Bkk	09-111-2427	Accounting Dept	January 1, 2002
3	Rommadee Saelim	2 Silom Rd. Bangrak Bkk 10500	02-234-4512	Front Office Dept	February 1, 2002
4	Nutnicha L.	82 Sathorn Road Bangrak Bkk 10500	01-259-3448	Maintenance Dept.	March 1, 2002

Figure H.4. Employee Profile Report.

SP Apartment

Maintenance Report

Report as of 30 September 2003

No.	Maintenance No.	Date	Room No.	Building	Floor	Details	Status	Done By	Date
1	M200303/0001	July 18, 2003	1101	1	1	Repair the door	Done	Nutnicha L.	July 19, 2003
2	M200303/0002	August 15,2003	1105	1	1	Change the lamp	Pending		
3	M200303/0003	August 10,2003	1110	1	1	Clean Up	Done	Nutnicha L.	August 11, 2003

Figure H.5. Maintenance Report.

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SP Apartment

Over due Payment Report

Report as of 30 September 2003

No.	Room No.	Building	Floor	Name	Amount	Day Over Due	Remark
1	1101	1	1	Rafael Melendez	4158.00	2	
2	1102	1	1	Samir Gupta	4300.00	1	
3	1103	1	1	Pornnapa S	4121.00	3	
4	1104	1	1	Panee Srichukrin	3850.00	1	

Page 1

Figure H.6. Over due Payment Report .

SP Apartment

Monthly Revenue Summary Report

Report as of 30 September 2003

Building	Total Room	Amount
1	108	367,428.00
2	114	386,490.00
3	110	379,225.00
Total	332	1,133,143.00

Page 1

Figure H.7. Monthly Revenue Summary Report .

SP Apartment

Annual Revenue Summary Report

Report as of 30 September 2003

Month	Total Room	Amount
Jan-03	328	1,125,131.00
Feb-03	334	1,148,212.66
Mar-03	335	1,154,150.43
Apr-03	340	1,173,876.55
May-03	365	1,262,691.01
Jun-03	351	1,216,759.02
Jul-03	364	1,264,324.17
Aug-03	341	1,186,935.56
Sep-03	332	1,133,143.00
Total		10,665,223.40

Page 1

Figure H.8. Annual Revenue Summary Report.

SP Apartment

Monthly Expense Summary Report

Report as of 30 September 2003

Expense Categories	Amount
Room Maintenance	15,200.00
Electrical	100,000.00
Water Supply	20,000.00
Telephone	85,000.00
Clean Up	7,000.00
Salary	46,000.00
Installment	500,000.00
Other	10,000.00
Total	783,200.00

Page 1

Figure H.9. Monthly Expense Summary Report.

SP Apartment

Annual Expense Summary Report

Report as of 30 September 2003

Expense Months	Amount
Jan-03	773,763.86
Feb-03	787,918.07
Mar-03	790,277.11
Apr-03	802,072.29
May-03	861,048.19
Jun-03	828,021.69
Jul-03	858,689.16
Aug-03	804,431.33
Sep-03	783,200.00
Total	7,289,421.69

Page 1

Figure H.10. Annual Expense Summary Report.

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SP Apartment

Monthly Meter Summary Report

Report as of 30 September 2003

Building	Total Room	Water Supply Unit	Amount	Electric Unit	Amount
1	108	648	9,720	5,940	35,640
2	114	684	10,260	6,270	37,620
3	110	660	9,900	6,050	36,300
Total	332	1,992	29,880	18,260	109,560

Page 1

Figure H.11. Monthly Meter Summary Report.

SP Apartment

Annual Meter Summary Report

Report as of 30 September 2003

Month	Total Room	Water Supply Unit	Amount	Electric Unit	Amount
Jan-03	328	1,968	29,520	18,040	108,240
Feb-03	334	2,004	30,060	18,370	110,220
Mar-03	335	2,010	30,150	18,425	110,550
Apr-03	340	2,040	30,600	18,700	112,200
May-03	365	2,190	32,850	20,075	120,450
Jun-03	351	2,106	31,590	19,305	115,830
Jul-03	364	2,184	32,760	20,020	120,120
Aug-03	341	2,046	30,690	18,755	112,530
Sep-03	332	1,992	29,880	18,260	109,560
Total	3,090	18,540	278,100	169,950	1,019,700

Page 1

Figure H.12. Annual Meter Summary Report.

SP Apartment

Telephone Fees Summary Report

Report as of 30 September 2003

Building	Total Room	Telephone Fee Amount
1	108	29,700
2	114	31,920
3	110	31,900
Total	332	93,520

Page 1

Figure H.13. Telephone Fees Summary Report.

SP Apartment

Late Fees Report

Report as of 30 September 2003

No.	Room No.	Building	Floor	Name	Late Days	Amount	Remark
1	1101	1	1	Rafael Melendez	1	50.00	
2	1103	1	1	Pornnapa S	2	100.00	
3	1104	1	1	Panee Srichukrin	1	50.00	
					Total Late Fee Amount	200.00	

Page 1

Figure H.14. Late Fees Report.

SP Apartment

Available Room Report

Report as of 30 September 2003

No.	Room No.	Building	Floor	Price
1	1218	1	2	2,500.00
2	1307	1	3	2,500.00
3	1412	1	4	2,500.00
4	1504	1	5	2,500.00
5	1603	1	6	2,500.00
6	2302	2	3	2,500.00
7	2407	2	4	2,500.00
8	2502	2	5	2,500.00
9	2616	2	6	2,500.00
10	3201	3	2	2,500.00
11	3313	3	3	2,500.00
12	3413	3	4	2,500.00
13	3519	3	5	2,500.00
14	3610	3	6	2,500.00

Page 1

Figure H.15. Available Room Report.

SP Apartment

Utility Input Form

Report as of 30 September 2003

No.	Room No.	Building	Floor	Name	Last Water Meter	New Water Meter	Last Electric Meter	New Electric Meter	Remark
1	1101	1	1	Rafael Melendez	1421		5421		
2	1102	1	1	Samir Gupta	5410		5584		
3	1103	1	1	Pornnapa S	4103		5411		
4	1104	1	1	Panee Srichukrin	2246		5988		

Page 1

Figure H.16. Utility Input Form.

Bill

SP Apartment
19/9 Sukhumvit 62 Prakhanong Bangkok 10250

Bill No. :	B200309/0001	Date :	10/2/2003	Customer Name :	
Room No.:	1104	Of Month	9	Panee Srichakrin	

Description	Meter Start		Meter End	Meter Used		Unit Price		Amount
Water Supply	1151	-	1180	29	x	15	=	435.00
Electric Cost	7895	-	8100	205	x	6	=	1,230.00
Telephone Fee								250.00
Room Price								2,500.00
Other								0.00
						Grand Total		4,415.00

Remark:

Figure H.17. Bill.

Receipt

SP Apartment
19/9 Sukhumvit 62 Prakhanong Bangkok 10250

Bill No. :	B200309/0001	Date :	10/2/2003	Customer Name :	
Room No.:	1104	Of Month	9	Panee Srichakrin	

Description	Meter Start		Meter End	Meter Used		Unit Price		Amount
Water Supply	1,151	-	1,180	29	x	15	=	435.00
Electric Cost	7,895	-	8,100	205	x	6	=	1,230.00
Telephone Fee								250.00
Room Price								2,500.00
Other								0.00
						Total		4,415.00
Late Chare	2 Days		Late Fee Per Day 50 Baht					100.00
						Grand Total		4,515.00

Remark:

Receipt By : _____ Date : _____

Figure H.18. Receipt.

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