



Condominium Management Information System

by

Mr. Ekarin Varutbangkul

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 System
Assumption University

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Project Title Condominium Management Information System

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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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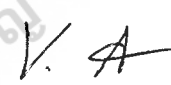
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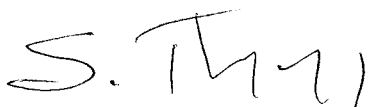
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July 2000

ABSTRACT

This project is implemented to improve the efficiency of the existing system in Fair Tower, a condominium that belongs to G.O.S. Limited Partnership, by designing a new computerized system to replace the old manual system in front office. Therefore, this project is aimed at providing a computerized system for the staff at the front desk in order to carry out their work more efficiently and accurately.

The proposed system handles most information management in this condominium such as customer information, room information, service information room sale, room renting, bills and receipts operations, and reports for general manager.

From the expectation that there will be numerous new customers in the future since this condominium is only 100 meters from Lotus Supercenter (Sukhumvit 50 Road) and the BTS railway station (On Nut), this proposed system is very essential for this condominium and it also helps to reduce cost in the long term.

ACKNOWLEDGEMENTS

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He extends his sincere thanks to Miss Rungtip Suwannakart, General Manager of Fair Tower for her timely assistance and information provided to him while carrying out the data collection required for his project.

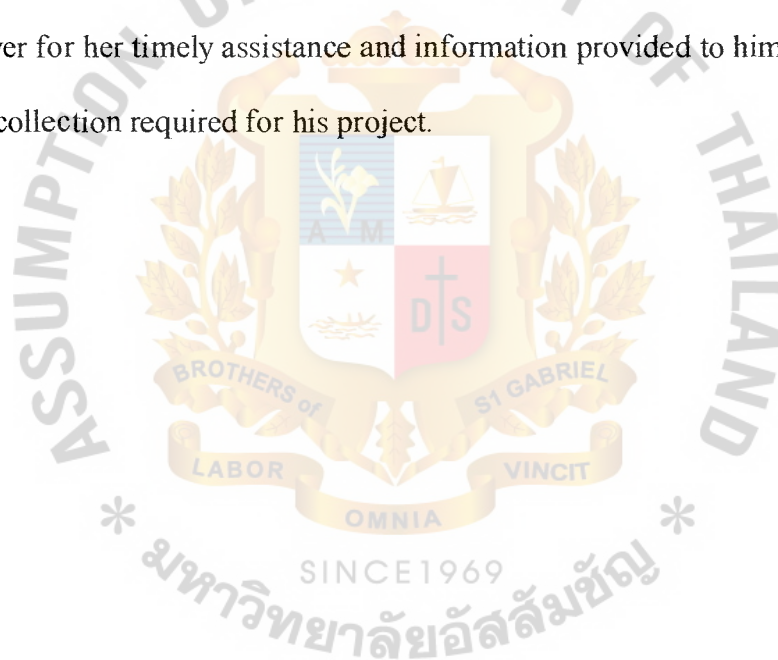


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I. INTRODUCTION

1.1 Background of the Project

Every organization needs system development, so that they can maximize their profit, save their resources, and minimize the problems. Since the existing system is manual system, and it causes many problems such as it is very difficult to maintain, retrieve, and update the information, this project is initiated to analyze and study the existing system, identify the requirements, and design a new system that supports these requirements and can solve or minimize the current problems.

The front office is the information center of this condominium. If the manual system in the front office is replaced by the computerized system, the organization will receive numerous benefits, such as the officers can be reduced, the information is more accurate and less redundant, and the information is much easier to be maintained, retrieved, and modified.

1.2 Objectives of the Project

The objectives of the project can be classified as follows:

- (1) To study and analyze the existing system
- (2) To identify the problems in the existing system
- (3) To identify the business requirements
- (4) To design and develop a new computerized system that can support the requirements and solve or minimize current problems for the Condominium Management Information System

1.3 Scope of the Project

The scope of the project can be classified as follows:

- (1) Analyze the existing system
- (2) Study all requirements of the proposed system
- (3) Design database, process, and interface for the proposed system
- (4) Analyze and compare cost and benefit of the existing and the proposed systems

1.4 Deliverables

The deliverables for the project are as follows:

- (1) Hardware and software requirements
- (2) Cost / Benefit Analysis
- (3) Essential diagram such as ERD, and DFD
- (4) Database design
- (5) Data dictionary
- (6) Interface design
- (7) Report design
- (8) Process specification

1.5 Project Plan

The plan of this system development project is shown in Figures 1.1 and 1.2.

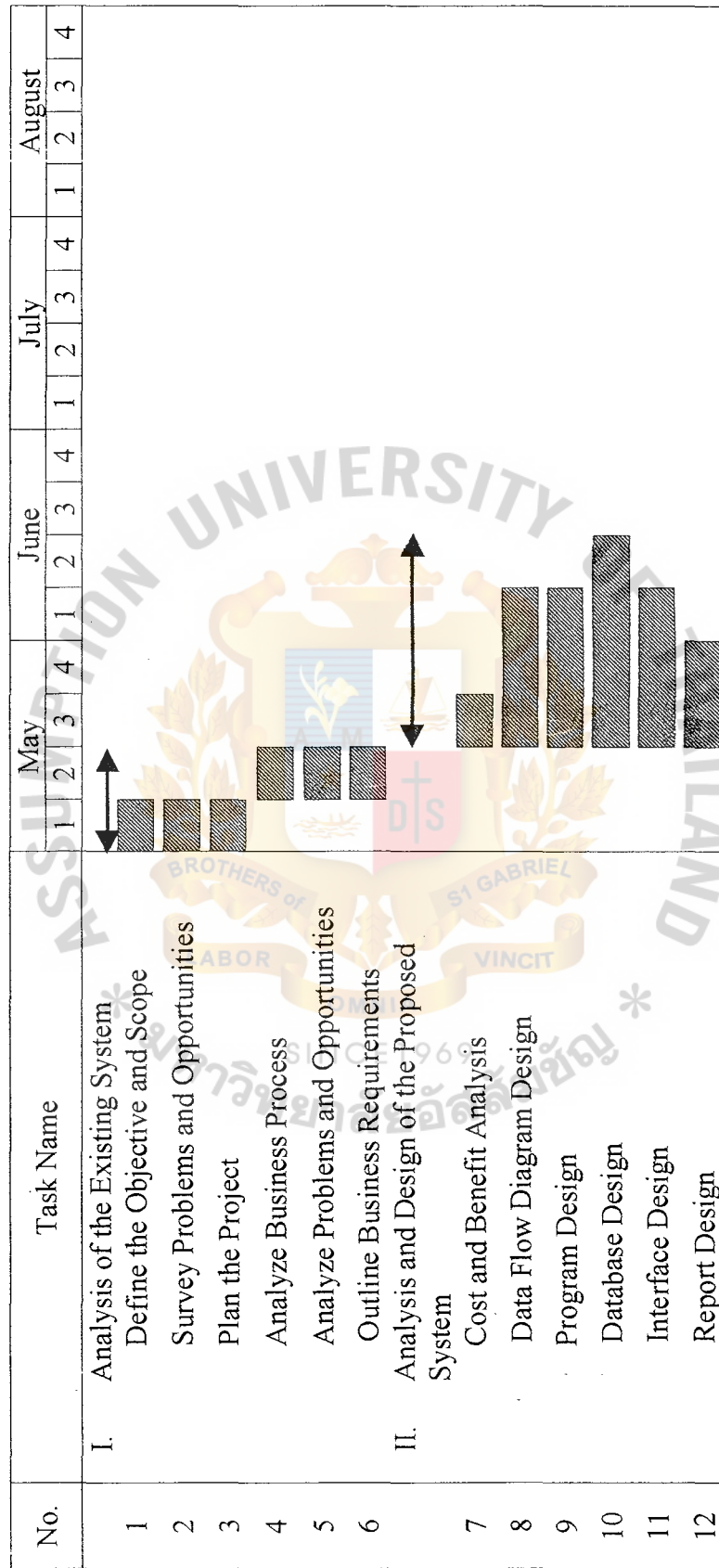


Figure 1.1. Gantt Chart for System Development.

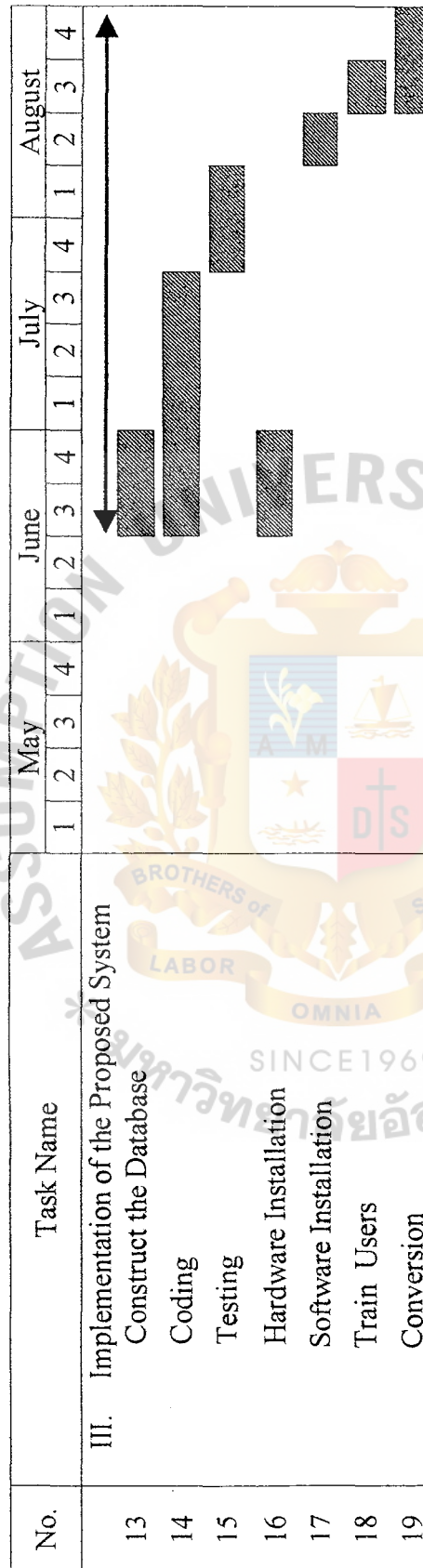


Figure 1.2. Gantt Chart for System Development (Continued).

II. THE EXISTING SYSTEM

2.1 Background of the Organization

Fair Tower (Figure 2.1) is a condominium that belongs to G.O.S. Limited Partnership. This condominium has 120 unfurnished rooms both for sale and renting since 1996. It is located on Sukhumvit 50 Road, which is a very good location, since there are the entrance and exit of an express way (Ekamai-Ram Indra), Lotus Supercenter, and the BTS railway station (On Nut) near to the condominium.

Business activities of Fair Tower in the part of information management include sale and renting of the room, cancellation (for renting), bills and receipts operation, and printing monthly reports for general manager.

Fair Tower currently employs about 9 people in the condominium with an average income of about 10 millions Baht per year. The organization of Fair Tower consists of 3 levels of Top-Down Hierarchy. The Organization chart of Fair Tower is shown in Figure 2.2.

- (1) Shareholder level: Shareholders have the conferences with the general manager twice a year.
- (2) Management level: At this level, there is only one general manager who is responsible for all activities in the condominium.
- (3) Operational level: At this level, there are 3 departments: Front Office, Housekeeper, and Maintenance.

The responsibilities of all departments are as follows:

- (1) Front Office is responsible for collecting information about rooms, customers (buyers and tenants), sale, renting, cancellation (for renting), monthly expenses (bills), receipts, and monthly reports.

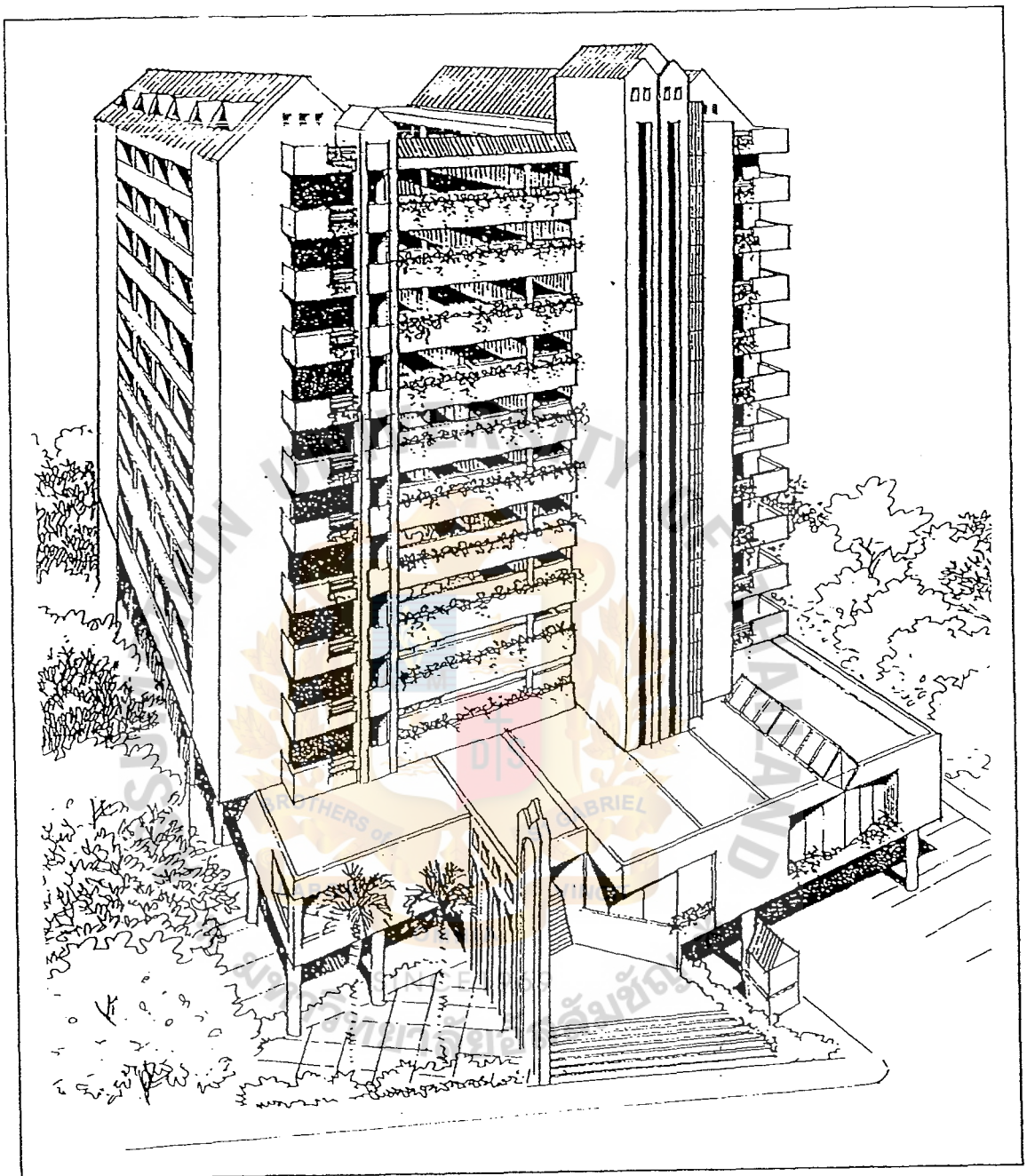


Figure 2.1. Fair Tower.

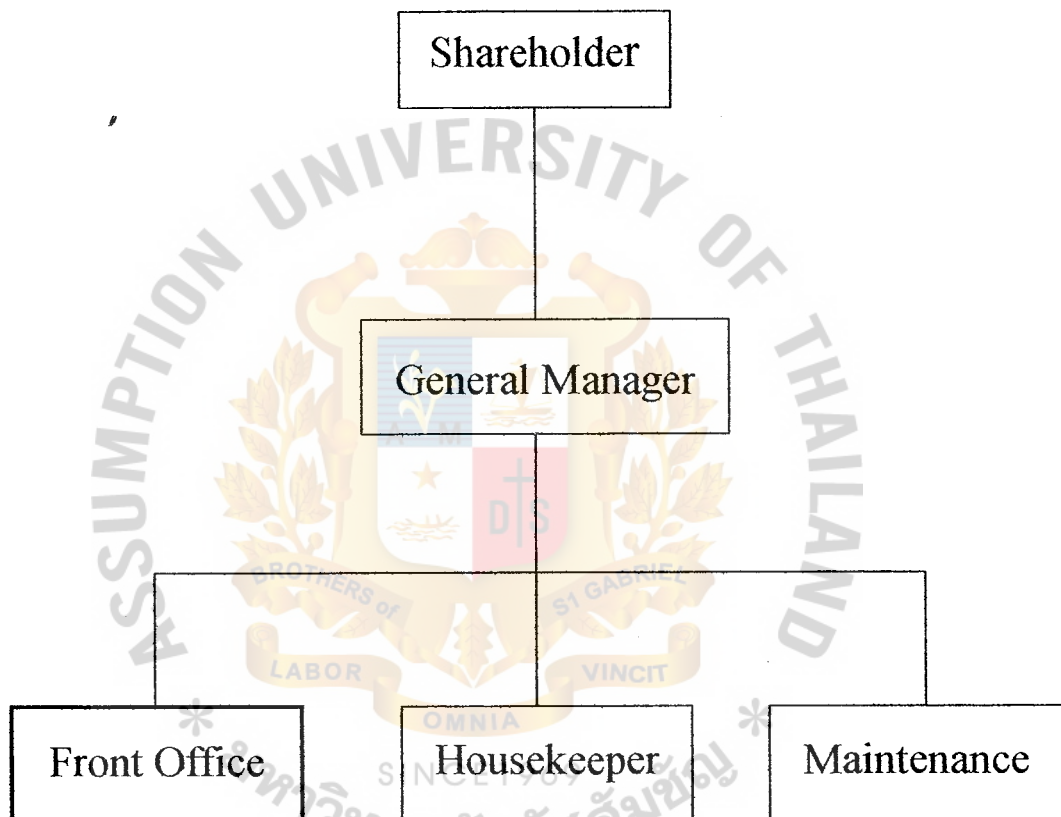


Figure 2.2. Fair Tower Organization Chart.

- (2) Housekeeper is responsible for servicing and cleaning within the condominium.
- (3) Maintenance is responsible for common fixing within the condominium, such as fixing the elevators, changing the light tubes, and maintaining the public pool at the first floor.

2.2 Analysis of the Existing System

When a customer (buyer or tenant) asks for an available room, the Front Officer will give him or her the information and look for the available rooms.

The rooms are in 2 wings. (Wing A, and Wing B) The rooms are categorized into 4 groups:

- (1) Typical Unit (80 m²)
- (2) Special Unit (90 m²)
- (3) Luxury Typical Unit (108 m²)
- (4) Luxury Special Unit (118 m²)

The information of all rooms is shown in Figure 2.3 and Figure 2.4.

The expenses for each month are as follows:

- (1) Rental charge (for tenants)
- (2) Common facility expense
- (3) Extra charge (service charge)

Note

- (1) Every month both the room owners (buyers) and the tenants have to pay the common facility expense. This expense depends on the size of their room (Baht/m²).

UNIT SECTION WING "A"											
11F 118 m ²	11E 108 m ²	11D 108 m ²	11C 108 m ²	11B 108 m ²	11A 118 m ²						
10F 90 m ²	10E 80 m ²	10D 80 m ²	10C 80 m ²	10B 80 m ²	10A 90 m ²						
9F 90 m ²	9E 80 m ²	9D 80 m ²	9C 80 m ²	9B 80 m ²	9A 90 m ²						
8F 90 m ²	8E 80 m ²	8D 80 m ²	8C 80 m ²	8B 80 m ²	8A 90 m ²						
7F 90 m ²	7E 80 m ²	7D 80 m ²	7C 80 m ²	7B 80 m ²	7A 90 m ²						
6F 90 m ²	6E 80 m ²	6D 80 m ²	6C 80 m ²	6B 80 m ²	6A 90 m ²						
5F 90 m ²	5E 80 m ²	5D 80 m ²	5C 80 m ²	5B 80 m ²	5A 90 m ²						
4F 90 m ²	4E 80 m ²	4D 80 m ²	4C 80 m ²	4B 80 m ²	4A 90 m ²						
3F 90 m ²	3E 80 m ²	3D 30 m ²	3C 80 m ²	3B 80 m ²	3A 90 m ²						
2F 90 m ²	2E 80 m ²	2D 80 m ²	2C 80 m ²	2B 80 m ²	2A 90 m ²						

Note

A, F (Except 11th floor)

A, F (11th floor)

B, C, D, E (Except 11th floor)

B, C, D, E (11th floor)

: Special Unit

: Luxury Special Unit

: Typical Unit

: Luxury Typical Unit

Figure 2.3. The Information of the Rooms in Wing A.

11G	118 m ²	11H	108 m ²	11J	108 m ²	11K	108 m ²	11L	108 m ²	11M	118 m ²
10G	90 m ²	10H	80 m ²	10J	80 m ²	10K	80 m ²	10L	80 m ²	10M	90 m ²
9G	90 m ²	9H	80 m ²	9J	80 m ²	9K	80 m ²	9L	80 m ²	9M	90 m ²
8G	90 m ²	8H	80 m ²	8J	80 m ²	8K	80 m ²	8L	80 m ²	8M	90 m ²
7G	90 m ²	7H	80 m ²	7J	80 m ²	7K	80 m ²	7L	80 m ²	7M	90 m ²
6G	90 m ²	6H	80 m ²	6J	80 m ²	6K	80 m ²	6L	80 m ²	6M	90 m ²
5G	90 m ²	5H	80 m ²	5J	80 m ²	5K	80 m ²	5L	80 m ²	5M	90 m ²
4G	90 m ²	4H	80 m ²	4J	80 m ²	4K	80 m ²	4L	80 m ²	4M	90 m ²
3G	90 m ²	3H	80 m ²	3J	80 m ²	3K	80 m ²	3L	80 m ²	3M	90 m ²
2G	90 m ²	2H	80 m ²	2J	80 m ²	2K	80 m ²	2L	80 m ²	2M	90 m ²

UNIT SECTION WING "B"

Note

G, M (Except 11th floor)
 G, M (11th floor)
 H, J, K, L (Except 11th floor)
 H, J, K, L (11th floor)

: Special Unit
 : Luxury Special Unit
 : Typical Unit
 : Luxury Typical Unit

Figure 2.4. The Information of the Rooms in Wing B.

- (2) In some case, the tenants or the room owners may want some service from the housekeeper or the maintenance department in their private area. The service charge (extra charge) will be added to their monthly bill.
- (3) If the customers decide to buy or rent a room, they must sign the application form, and the contract.
- (4) If the tenants decide to make a room cancellation, the tenants must inform the officer a month before they move out.
- (5) For monthly payments, Customers must pay within the 10th of each month.
- (6) If a tenant has the unpaid payment of more than 30,000 Baht, he or she will be forced to leave the room and pay for all the unpaid payment.
- (7) If a buyer has the unpaid payment of more than 10,000 Baht, he or she will be notified to pay for all the unpaid payment. If that buyer does not pay for all the unpaid payment in a month after the notification, the general manager will proceed with legal proper procedure later.

2.3 Current Problems and Areas for Improvement

All information management in Fair Tower is performed manually, so there are many problems as follows:

- (1) It is very difficult to generate many reports in each month.
- (2) Some information is not accurate since there are human errors.
- (3) It is very difficult for data retrieving, and updating.
- (4) It consumes resources and time

The above problems can be solved by implementing a computerized system to replace the existing manual system. The proposed system will improve efficiency in all areas and also solve the existing problems.

III. THE PROPOSED SYSTEM

3.1 System Specification

Condominium Management Information System is the proposed system which is developed and designed to facilitate in providing information for the management. In addition, this system will serve all user requirements and increase efficiency of the operations. The user requirements are as follows:

- (1) This system should be easy to use.
- (2) This system should help to reduce paper work and working time.
- (3) This system should calculate all charges or expenses automatically.
- (4) This system should print all bills and receipts of each month.
- (5) This system should help to prepare various reports.
- (6) This system should help to reduce data redundancy in the system.
- (7) This system should reduce mistakes from collecting, reading, updating, and deleting data.

3.2 System Design

Condominium Management Information System is the computerized system that can serve the user requirements and support most operation tasks. The main function of the system is to maintain all the information about rooms, customers, and payment.

For the proposed system, the processes (data flow diagrams) are designed as shown in Appendix A, and the data dictionary and process specification are shown in Appendixs B and C. Entity relationship diagram and database design are shown in Appendix D. The interface and report design are shown in Appendixs E and F.

The proposed system will cover the following input and output:

Input

- (1) Customer Information
- (2) Room Information
- (3) Room Cancellation
- (4) Service Charge Information
- (5) Payment

Output

- (1) Buyer Information Report
- (2) Tenant Information Report
- (3) Room Type Information List
- (4) Monthly Room Status Report
- (5) Monthly Available Room List
- (6) Monthly Service Charge Report
- (7) Monthly Sales and Renting Report
- (8) Monthly Room Cancellation Report
- (9) Monthly Over Due Payment Report
- (10) Monthly Warning Report
- (11) Bill
- (12) Receipt

3.3 Hardware and Software Requirement

Hardware

The proposed system needs only one personal computer. The hardware requirements are as follows:

Table 3.1. The Hardware Specification.

Hardware	Specification	Price (Baht)
Case	Medium Case	2,500
Mother Board	ASUS P3C2000 ATX Board ChipSet i820 Slot-1	5,400
CPU	Intel Pentium III 700 MHz Slot-1	16,500
Memory	Hitachi SDRAM-133MHz 128 MB	4,250
Harddisk	Quantum LM 20.5 GB IDE DMA/66, 7200rpm	6,900
Floppy Drive	1.44 MB	550
CD-ROM Drive	Creative 52x IDE	1,950
Backup Drive	IOMEGA ZipDrive USB 250 MB	6,800
Mouse	Standard Mouse	300
Keyboard	Standard Keyboard 104 keys	250
Display Adaptor	S3 Savage4 RAM 16 MB AGP 2x	1,850
Display	Monitor MAG 570FD 15" Flat Trinitron	6,950
Printer	Epson LQ-670 Dot Matrix	15,900
UPS	Leonic GREEN 500 VA	2,650
Total Cost		72,750

Software

The software requirements are as follows:

Table 3.2. The Software Specification.

Software	Specification	Price (Baht)
Operating System	Microsoft Windows 2000 Professional	14,000
Application Software	Microsoft Office 2000	30,000
Programming Tool	Microsoft Visual Basic 6	2,000
Virus Protection Software	McAfee Virus Scan	1,850
Total Cost		47,850

3.4 Security and Control

Security of the System

Security is one of the necessary aspects. The system requires security system and procedure to protect it from:

- (1) Inaccuracy of data from unauthorized person
- (2) Errors from system failure, which come from program failure, electronic failure, hardware failure
- (3) Virus Intrusion

The following security methods are proposed in this system:

- (1) User name and password for software security and for limited authorized users to given areas
- (2) Use UPS to prevent loss from electronic power failure
- (3) Use virus protection software
- (4) Use tapes backup to ensure no data loss in case of hardware malfunction or during periods of maintenance or breakdown
- (5) User must attain adequate training session for system usage

System Control

- (1) Input control: Use software built-in function to check the validity of the input and keep the original document in the storage place for future reference
- (2) Output control: Software setting already controls output control, which standardizes output report.

3.5 Cost / Benefit Analysis

3.5.1 Cost Comparison and Break-Even Analysis

(1) Costs of the Existing System

Table 3.3. The Existing System Cost Analysis.

Cost items	Years				
	1	2	3	4	5
<u>Fixed Cost</u>					
Type writer 2 units@7,000	14,000	-	-	-	-
Calculator 3 units@700	2,100	-	-	-	-
Total Fixed Cost (Baht)	16,100	-	-	-	-
<u>Operating Cost</u>					
Staff:					
Clerk 3 persons@9,000	27,000	28,350	29,768	31,256	32,819
Total Annual Salary Cost (Baht)	324,000	340,200	357,216	375,072	393,828
Office Supplies & Miscellaneous Cost:					
Stationary Per Annual	5,000	5,250	5,513	5,788	6,078
Paper Per Annual	10,000	10,500	11,025	11,576	12,155
Miscellaneous Per Annual	5,000	5,250	5,513	5,788	6,078
Total Annual Office Supplies & Miscellaneous Cost	20,000	21,000	22,051	23,152	24,311
Utility Cost	5,000	5,250	5,513	5,788	6,078
Total Annual Operating Cost (Baht)	349,000	366,450	384,780	404,012	424,217
Total Existing System Cost (Baht)	365,100	366,450	384,780	404,012	424,217

Table 3.4. Five Years Accumulated Existing System Cost.

Year	Total Existing System Cost (Baht)	Accumulated Cost (Baht)
1	365,100	365,100
2	366,450	731,550
3	384,780	1,116,330
4	404,012	1,520,342
5	424,217	1,944,559
Total	1,944,559	

(2) Costs of the Proposed System

Table 3.5. The Proposed System Cost Analysis.

Cost items	Years				
	1	2	3	4	5
Fixed Cost					
Total Hardware Cost (Baht)	14,550	14,550	14,550	14,550	14,550
Total Maintenance Cost (Baht)	-	-	-	11,692	7,717
Total Software Cost (Baht)	9,570	9,570	9,570	9,570	9,570
Implementation Cost:					
Coding and Testing Cost (Baht)	30,000	-	-	-	-
Training Cost	10,000	-	-	-	-
Set up Cost	10,000	-	-	-	-
Total Implementation Cost (Baht)	50,000	-	-	-	-
Total Office Equipment Cost (Baht)	20,000	-	-	-	-
Total Fixed Cost (Baht)	94,120	24,120	24,120	35,812	31,837
Operating Cost					
People-Ware Cost:					
Clerk 2 persons@10,000	20,000	21,000	22,050	23,153	24,310
Total Annual Salary Cost (Baht)	240,000	252,000	264,600	277,836	291,720
Office Supplies & Miscellaneous Cost:					
Stationary Per Annual	8,000	8,400	8,820	9,261	9,724
Paper Per Annual	4,000	4,200	4,410	4,631	4,862
Miscellaneous Per Annual	10,000	10,500	11,025	11,576	12,155
Total Annual Office Supplies & Miscellaneous Cost	22,000	23,100	24,255	25,468	26,741
Utility Cost	10,000	10,500	11,025	11,576	12,155
Total Annual Operating Cost (Baht)	272,000	285,600	299,880	314,880	330,616
Total Proposed System Cost (Baht)	366,120	309,720	324,000	350,692	362,453

Table 3.6. Five Years Accumulated Proposed System Cost.

Year	Total Proposed System Cost (Baht)	Accumulated Cost (Baht)
1	366,120	366,120
2	309,720	675,840
3	324,000	999,840
4	350,692	1,350,532
5	362,453	1,712,985
Total	1,712,985	

St. Gabriel's Library

- (3) The Comparison of the Costs between the Existing System and the Proposed System

Table 3.7. The Comparison of the System Costs.

Year	Accumulated Existing System Cost (Baht)	Accumulated Proposed System Cost (Baht)
1	365,100	366,120
2	731,550	675,840
3	1,116,330	999,840
4	1,520,342	1,350,532
5	1,944,559	1,712,985



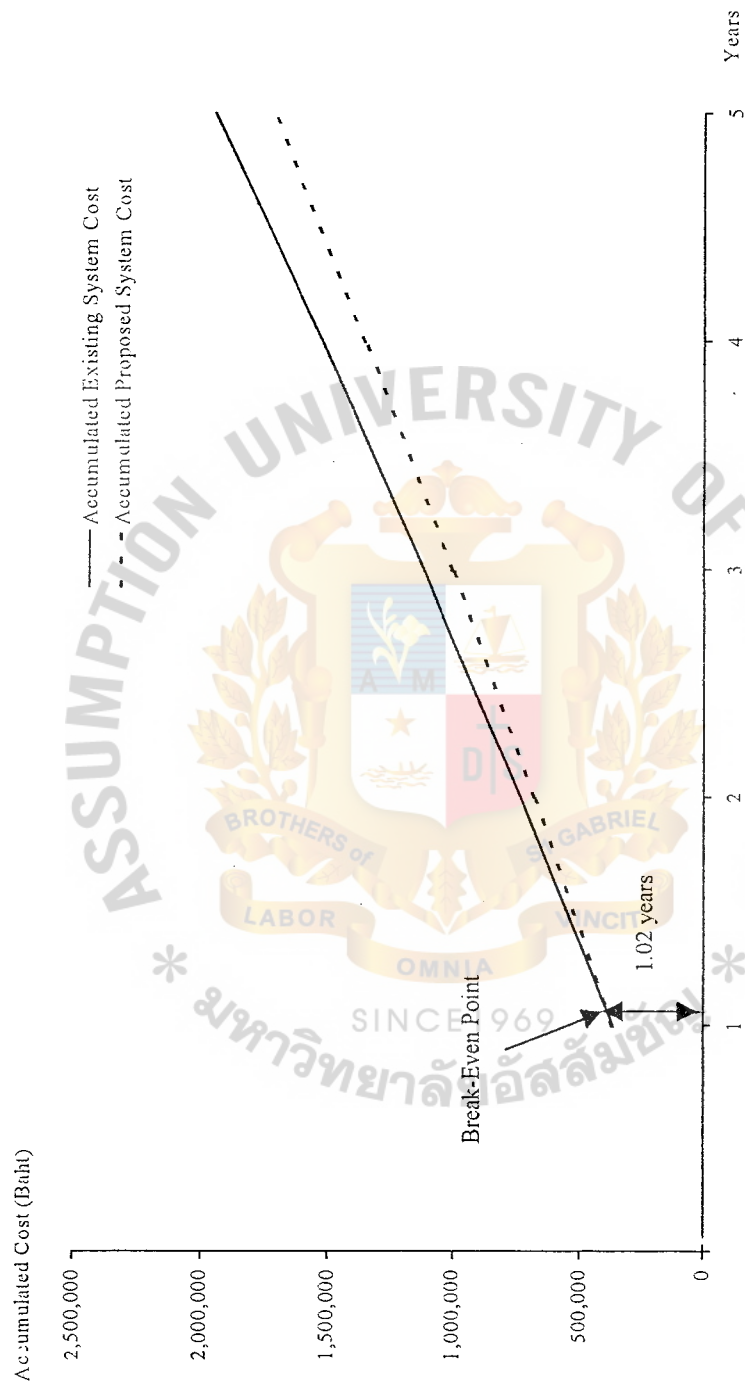


Figure 3.1. Break-Even Chart for the Systems.

3.5.2 Benefit Analysis

(1) Tangible benefits

Cost reduction is the main benefit of the proposed system. The resource utilization will be more efficient.

$$\begin{aligned}\text{Staff salary that can be saved} &= ((9,000*3)-(10,000*2))*12 \\ &= 84,000 \text{ Baht/year}\end{aligned}$$

(2) Intangible Benefits

- (a) The manipulated information is more accurate than that of the existing system.
- (b) The format of output is formal than that of the existing system.
- (c) It is easier and quicker to search for the required information.
- (d) It is easier and quicker to produce the reports.

3.5.3 Payback Analysis

Table 3.8. Cost and Benefit Analysis.

Cost items	Years				
	1	2	3	4	5
Total Cost Invested for the Proposed System (Baht)	94,120	24,120	24,120	35,812	31,837
Accumulated Cost Invested for the Proposed System (Baht)	94,120	118,240	142,360	178,172	210,009
Total Benefit from the Proposed System (Baht)	84,000	88,200	92,610	97,241	102,103
Accumulated Benefit from the Proposed System (Baht)	84,000	172,200	264,810	362,051	464,154

Table 3.9. The Comparison of the Accumulated Cost Invested for the Proposed System and Accumulated Benefit from the Proposed System.

Year	Accumulated Cost (Baht)	Accumulated Benefit (Baht)	Accumulated (Benefit-Cost) (Baht)
1	94,120	84,000	-10,120
2	118,240	172,200	53,960
3	142,360	264,810	122,450
4	178,172	362,051	183,879
5	210,009	464,154	254,145

Calculation

- (1) Since the accumulated (benefit-cost) is negative in year 1 and is positive in year 2, payback period is between year 1 and year 2
- (2) The difference between the accumulated (benefit-cost) of year 1 and year 2 is 64,080 baht, so we can find the number of the months after year 1 that is the payback point as follows:

$$10,120 / 64,080 = 0.16$$
- (3) So the payback period is 1.16 years

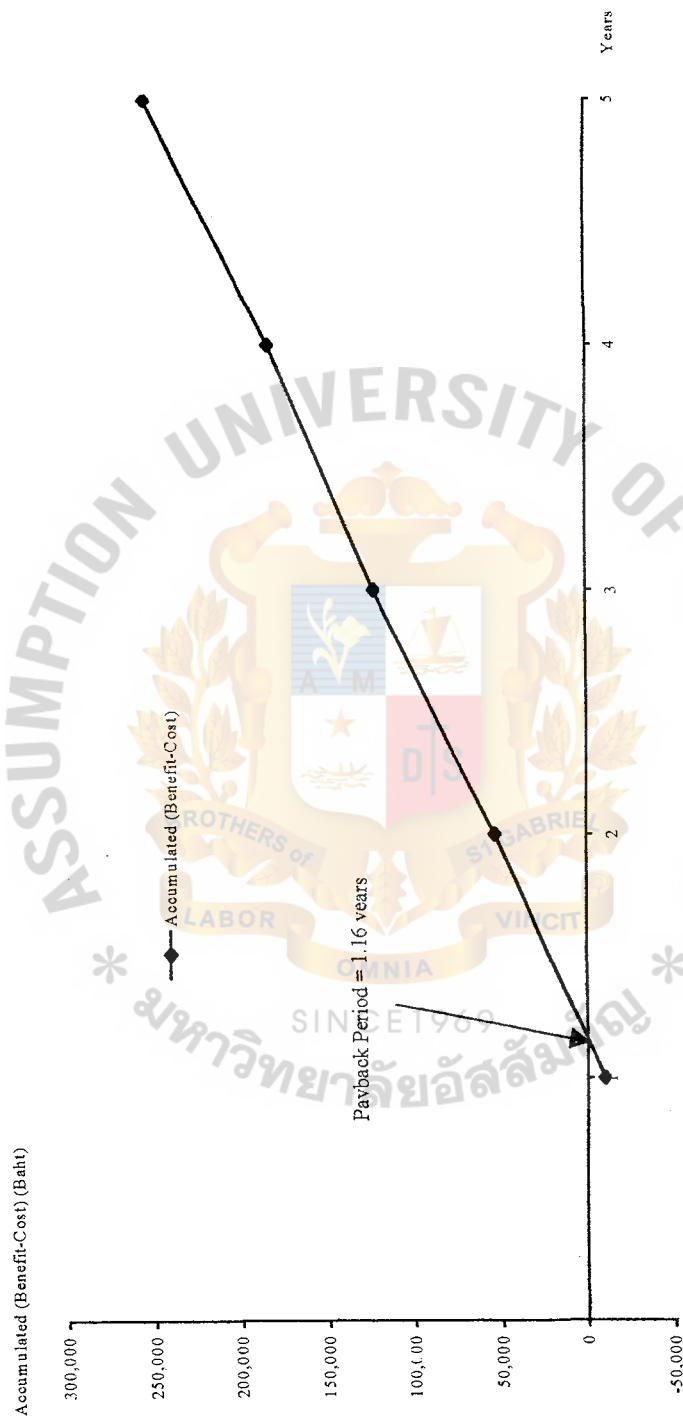


Figure 3.2. Payback Chart for the System.

IV. PROJECT IMPLEMENTATION

4.1 Overview of Project Implementation

The implementation consists of three stages, which are separate and distinct and distinct tasks that must be performed in sequential order.

(1) Programming

In this stage, the application programs are written in order to perform whatever business is being computerized.

(2) Testing

Functional testing, testing backup system and all hardware

(3) Installation

Installing a completed system software on the hardware and operating it

After these 3 stages, two more steps are needed:

(1) Training

This is a necessary job. If the system works but the staffs cannot use it, that system is useless.

(2) Documentation

Although the staffs have passed the training course, they still need the user guide for some cases. The programmers that will develop this system in the future also need a document that describes the process, data stores, data flow, and data dictionary of this system.

4.2 Test Plan

Testing is very important for the development of the proposed system because it can be used to discover hidden failure, bug, error, and any needed requirement that cannot be discovered at the design stage.

These are the required steps for testing:

- (1) Stub testing or unit testing

The test performed on individual modules.

- (2) Integration testing

The modules that have been stub tested are tested as integrated unit.

- (3) System testing

This test ensures that application programs written in isolation work properly when they are integrated into the total system.

- (4) Hardware testing

This test ensures that application programs can be operated on the hardware without any problem.

- (5) Recovery testing

This testing is an important testing for the proposed system. It should be tested before the actual event occurs, so that we can know whether any difficulty has occurred.

4.3 Conversion

Parallel conversion is used. Both the old and the new systems are operated for some time period. This is done to ensure that all the major problems in the new system have been solved before the old system is discarded.

V. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Degree of Achievement of the Proposed System Compared with that of the Existing System

Table 5.1 shows the time spent on each process of the proposed system compared with that of the existing system. It shows that each process of the proposed system takes less time than does each process of the existing system, which has to pass many manual work steps. This table shows that the proposed system is more efficient than the existing system.

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

Process	Existing System	Proposed System
Reserve the Room	15 Minutes	10 Minutes
Cancel the Room	10 Minutes	3 Minutes
Create Bill	5 Hours	30 Minutes
Create Receipt	15 Minutes	3 Minutes
Create Report	10 Hours	30 Minutes
Total	15 Hours and 40 Minutes	1 Hour and 16 Minutes

Fair Tower is using the manual system in its operation. Many problems have been found. Some information is lost. Some information is wrong. Many operations are time consuming. It is difficult to find some information or produce various kinds of report. Some documents are mixed up with the other documents.

Condominium Management Information System is developed under the requirements of the system owner to improve the system from a manual system to be a computerized system to solve the problem listed above.

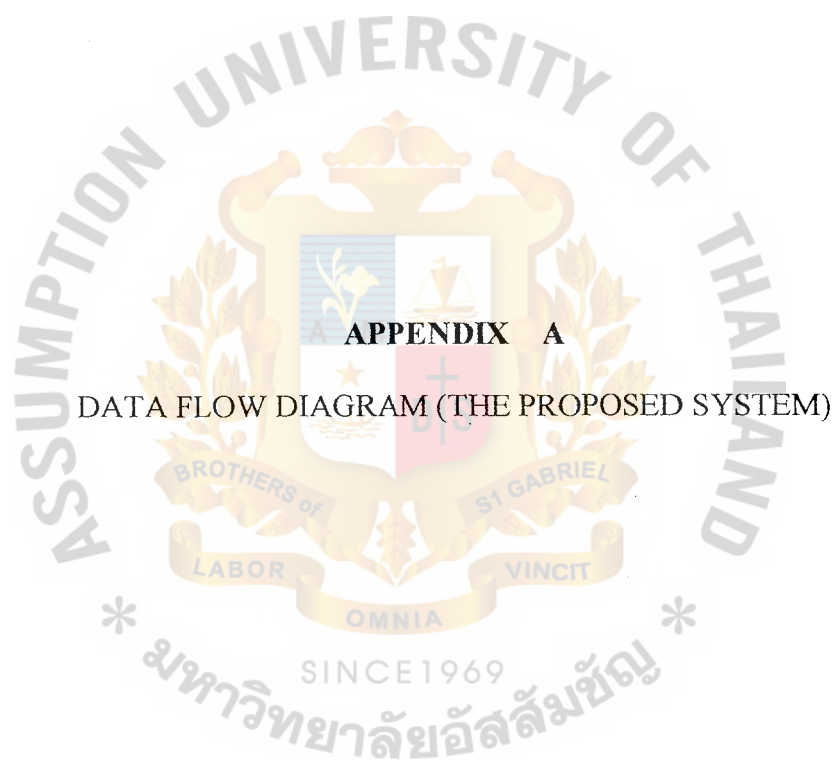
5.2 Recommendations

After implementing the proposed system, the existing system should be kept running for a while until we make sure that there is no problem occurring in the proposed system.

The training program is planned for the system users. The training program will help the users not only to operate the system more efficiently, but also to create new ideas for further modification or expansion of the system. If the users do not have the knowledge about computer usage, this system cannot be operated.

User authorities should be a major concern in the system. The system should enable the users to set the passwords that they need for security.

In the future, this system should be connected to maintenance and housekeeper department by using LAN so that the data can be shared and the paper work can be reduced.



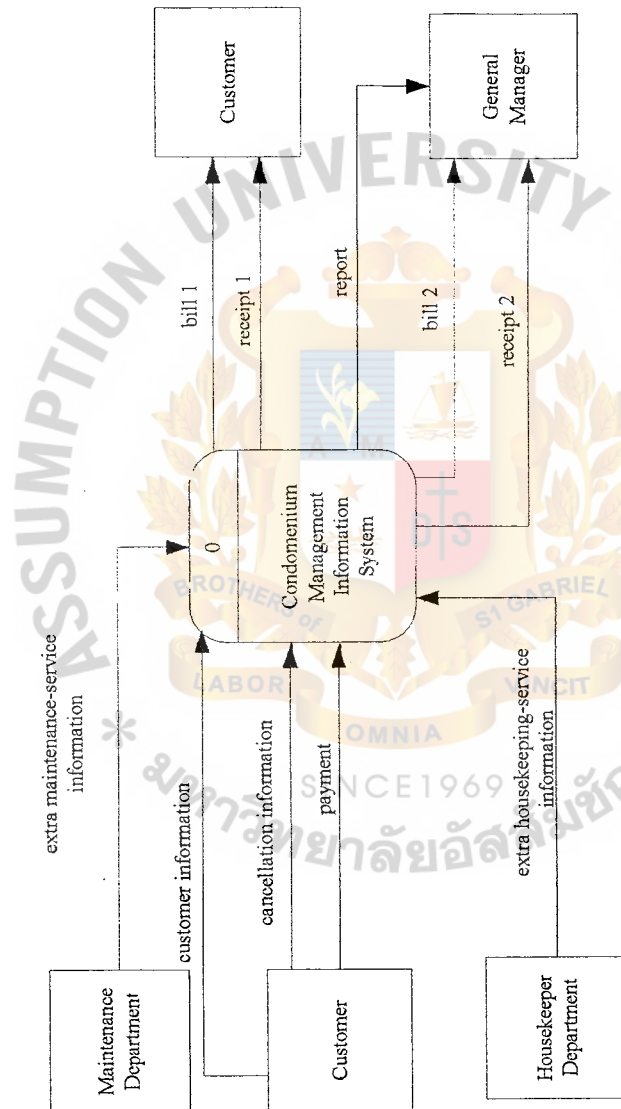


Figure A.1. Context Diagram of the Proposed System.

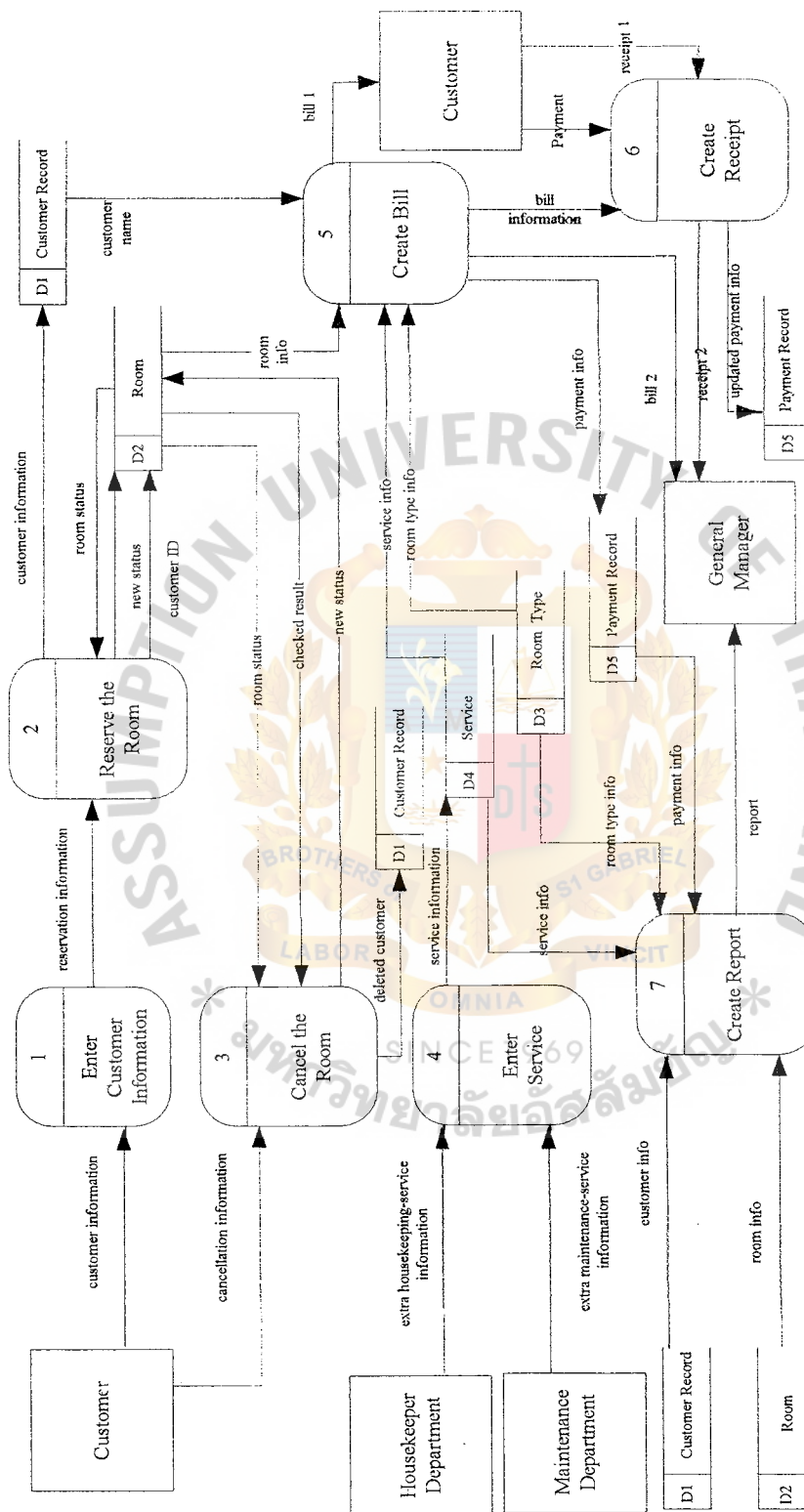


Figure A.2. Data Flow Diagram Level 0 of the Proposed System.

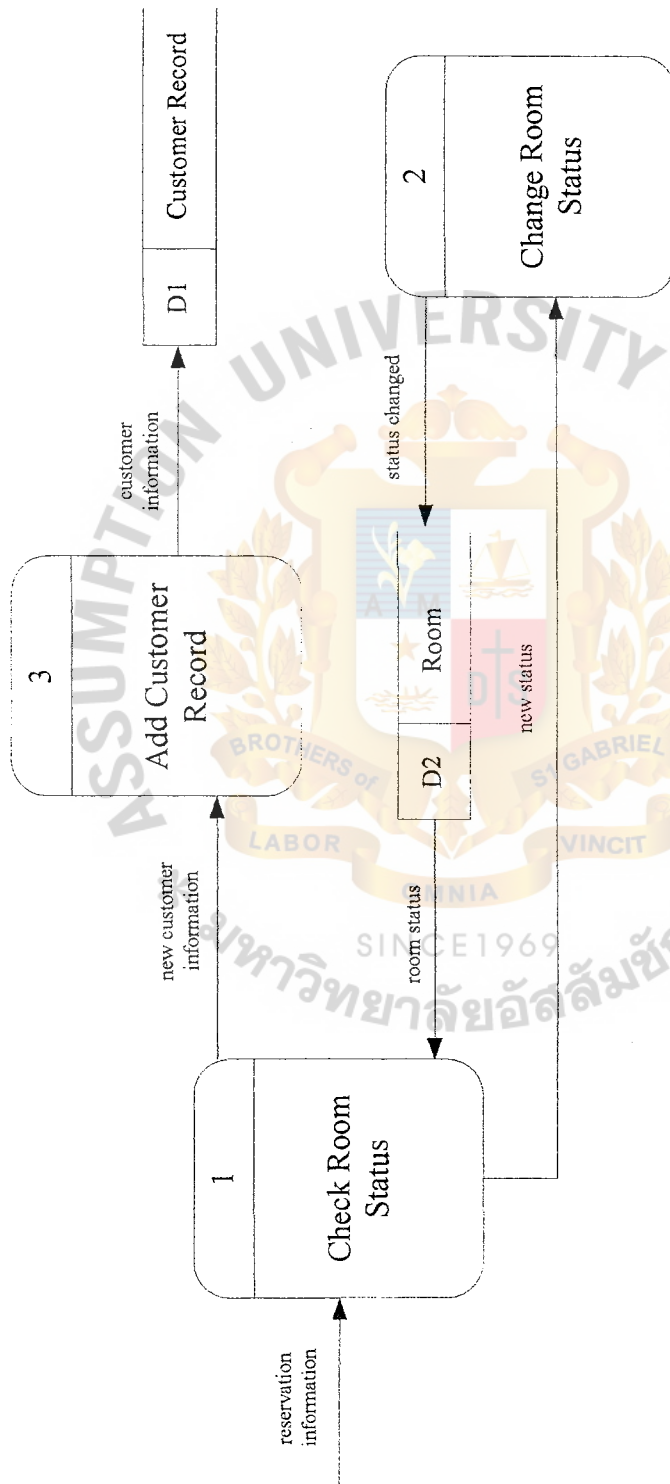


Figure A.3. Process 2 Level 1 Reserve the Room.

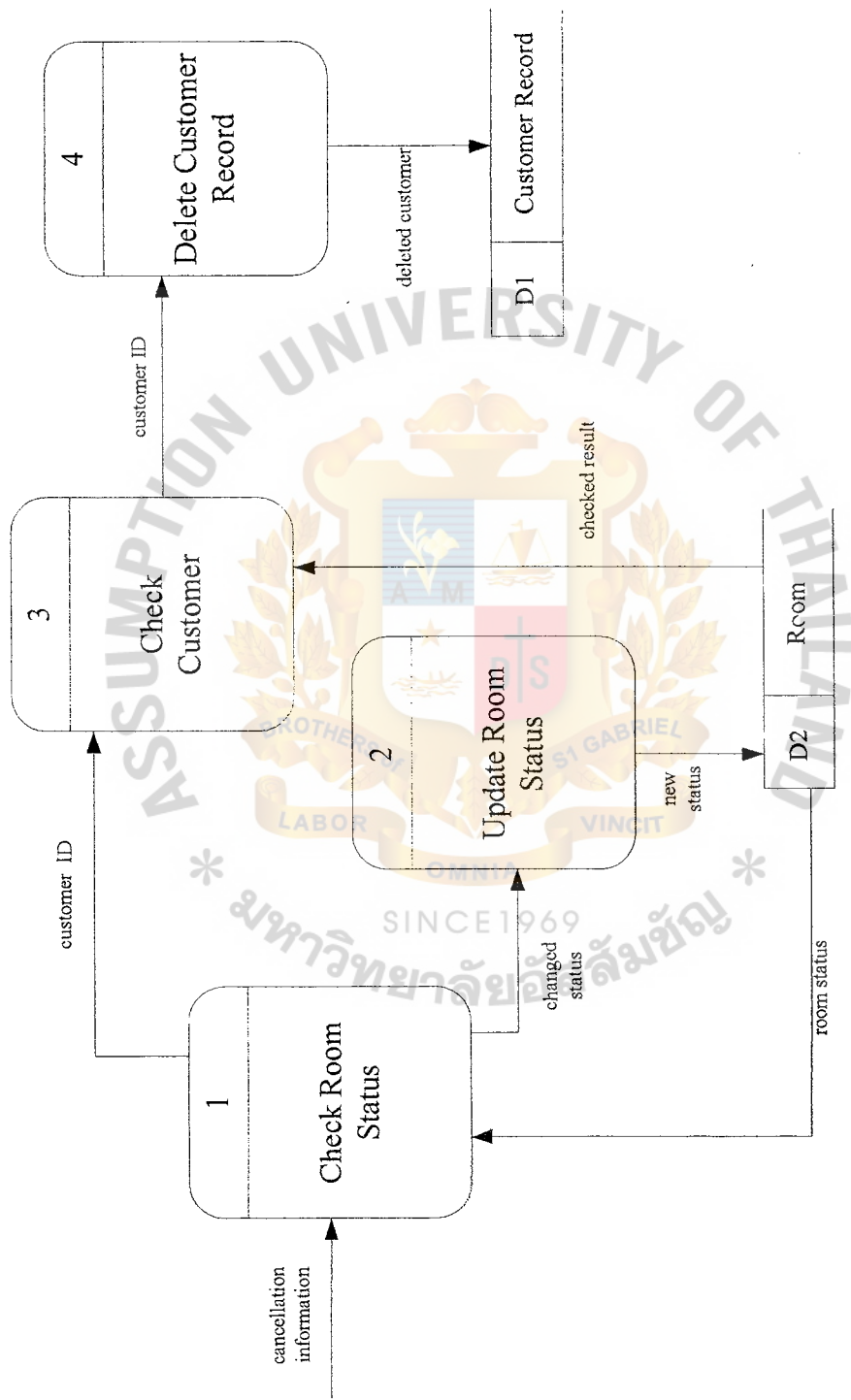


Figure A.4. Process 3 Level 1 Cancel the Room.

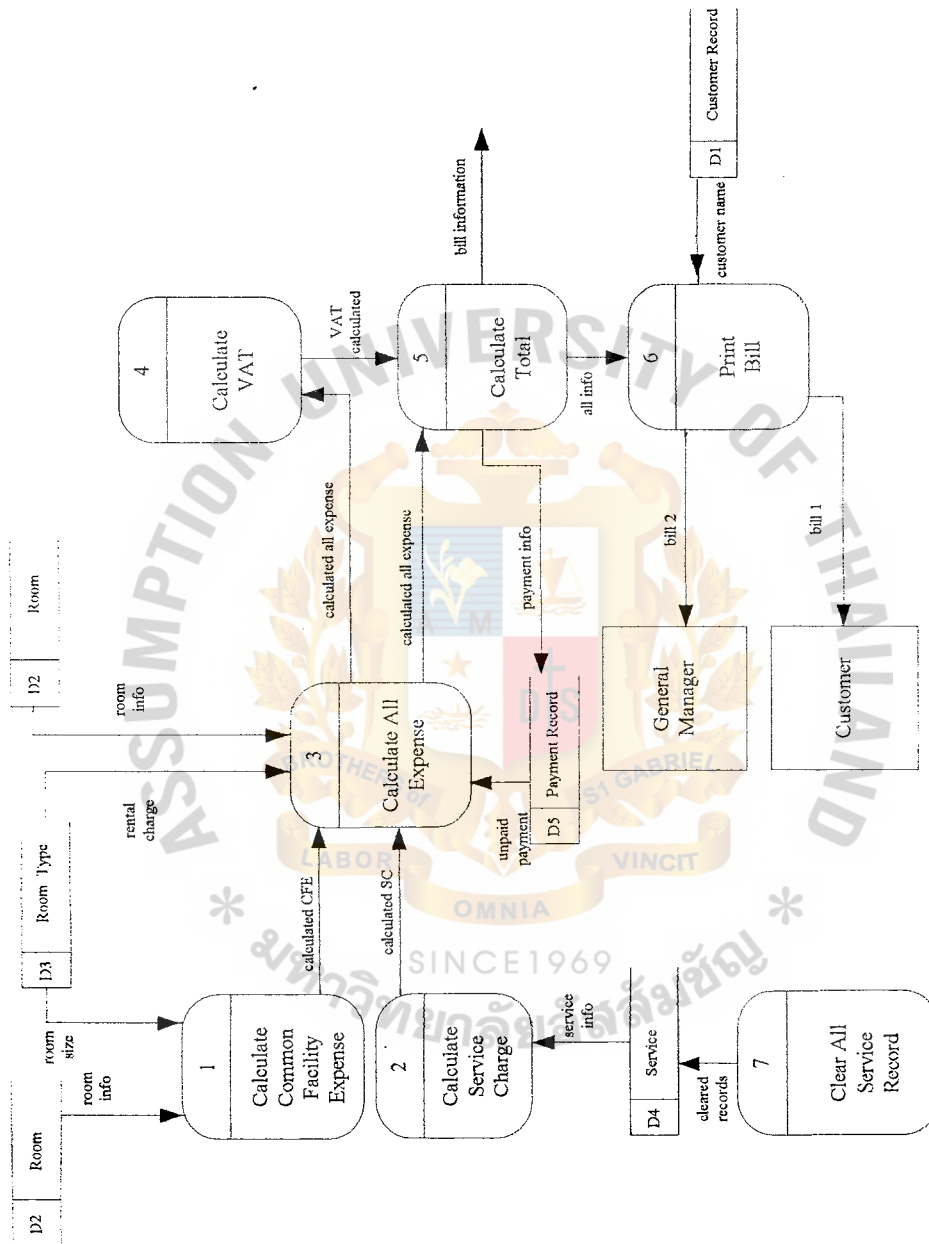


Figure A.5. Process 5 Level 1 Create Bill.

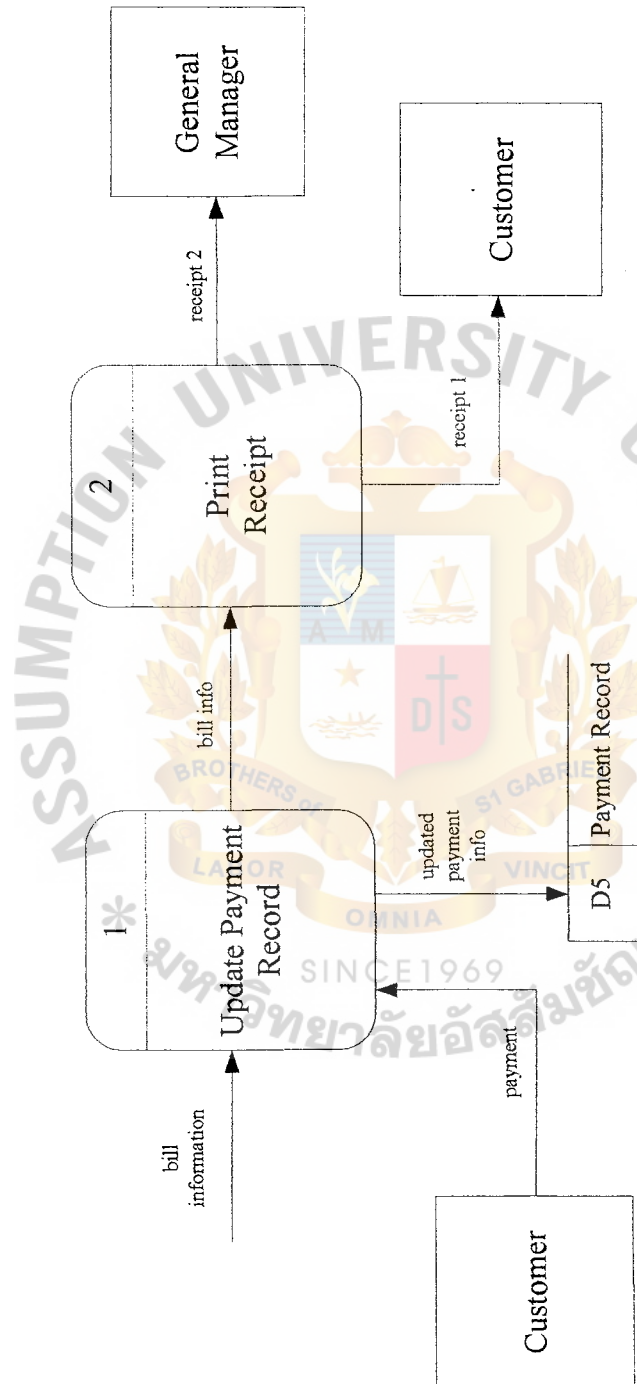


Figure A.6. Process 6 Level 1 Create Receipt.



DATA DICTIONARY

Data Flow

1. all info = all information about the bill to be printed
2. bill 1 = the first copy of the bills that are sent to the customers every month
3. bill 2 = the second copy of the bills that are sent to the general manager
4. bill info = the information in the bill that is used to create the receipt
5. bill information = the information in the bill that is used to update the payment record
6. calculated all expense = all expenses in the month excluding VAT
7. calculated CFE = common facility expense that is calculated from the room size of each room
8. calculated SC = service charges that are calculated for each room per month
9. cancellation information = information needed from tenant to cancel the room renting
10. cleared records = all service records that are reset every month after they are calculated in the bill of each month
11. customer ID = customer's citizen identification number
12. customer info = customer information that is used to create the report
13. customer information = customer information that is kept in the database
14. customer name = the name of each customer
15. extra housekeeping-service information = the information about service that will be charged at the end of each month, such as laundry and room cleaning service

16. extra maintenance-service information = the information about maintenance service that will be charged at the end of each month
17. new customer information = the information of new customer that will be kept in the database
18. new status = the room status after the change
19. payment = amount of money paid by the customer
20. payment info = the information about payment that is kept in the database
21. receipt 1 = the first copy of the receipts that are provided to the customers after receiving their payment
22. receipt 2 = the second copy of the receipts that are sent to the general manager
23. rental charge = rental charge of each room of each month
24. report = various kinds of report that are sent to the general manager every month
25. reservation information = the formation used to reserve the room, such as customer information, room information, and contract information
26. room ID = identification of each room
27. room info = the information about each room
28. room size = the size of each room
29. room status = the status of each room
30. room type info = the information about each room type
31. room type No. = identification number of each room type
32. service info = the information about services that is used to calculate the expense in each month and to create reports
33. service information = the service information that is kept in the database
34. status changed = the room status that has been changed

- 35. unpaid payment = total payment that is not paid excluding VAT
- 36. updated payment info = the new payment information that is kept in the database after receiving the payment from the customer
- 37. VAT calculated = VAT calculated from all expenses

Data Store or File

1. D1 Customer Record

This file includes information about the customer, which includes (ID card No. + First Name + Last Name + Gender + Birth Date + Address + Tel No. + Emergency Contact Name + Emergency Contact Tel No.)

2. D2 Room

This file includes information about the room, which includes (Room ID + Room Type No. + Wing + Room Status + ID card No.)

3. D3 Room Type

This file includes information about the room type, which includes (Room Type No. + Room Type Name + Room Size + Rental Charge)

4. D4 Service

This file includes information about the service, which includes (Service No. + Service Type + Amount + Room ID)

5. D5 Payment Record

This file includes information about payment, which includes (Room ID + Monthly Payment + Unpaid Payment)



APPENDIX C
PROCESS SPECIFICATION

St. Gabriel's Library

PROCESS SPECIFICATION

Table C.1. Process Specification of Process 1.

Process Name:	Enter Customer Information
Data In:	customer information
Data Out:	reservation information
Process:	(1) Get necessary customer information
Attachment:	(1) Customer (2) Process 2 Reserve the room

Table C.2. Process Specification of Process 2.

Process Name:	Reserve the Room
Data In:	reservation information room status
Data Out:	customer information customer ID new status
Process:	(1) Process 2.1 Check Room Status (2) Process 2.2 Change Room Status (3) Process 2.3 Add Customer Record
Attachment:	(1) Process 1 Enter Customer Information (2) Data Store D1 Customer Record (3) Data Store D2 Room

Table C.3. Process Specification of Process 2.1.

Process Name:	Check Room Status
Data In:	reservation information room status
Data Out:	new customer information new status room ID
Process:	(1) Check for the status of the room needed to reserve
Attachment:	(1) Process 1 Enter Customer Information (2) Process 2.2 Change Room Status (3) Process 2.3 Add Customer Record (4) Data Store D2 Room

Table C.4. Process Specification of Process 2.2.

Process Name:	Change Room Status
Data In:	new status
Data Out:	status changed
Process:	(1) Change room status from available to be rented or sold
Attachment:	(1) Process 2.1 Check Room Status (2) Data Store D2 Room

Table C.5. Process Specification of Process 2.3.

Process Name:	Add Customer Record
Data In:	new customer information
Data Out:	customer information
Process:	(1) Add new customer information into Data Store D1 Customer Record
Attachment:	(1) Process 2.1 Check Room Status (2) Data Store D1 Customer Record

Table C.6. Process Specification of Process 3.

Process Name:	Cancel the Room
Data In:	cancellation information checked result room status
Data Out:	customer ID deleted customer new status room status
Process:	(1) Process 3.1 Check Room Status (2) Process 3.2 Update Room Status (3) Process 3.3 Check Customer (4) Process 3.4 Delete Customer Record
Attachment:	(1) Customer (2) Data Store D1 Customer Record (3) Data Store D2 Room

Table C.7. Process Specification of Process 3.1.

Process Name:	Check Room Status
Data In:	cancellation information room status
Data Out:	changed status customer ID room ID
Process:	(1) Check room status to be canceled that it is rented or not
Attachment:	(1) Customer (2) Data Store D2 Room (3) Process 3.2 Update Room Status (4) Process 3.3 Check Customer

Table C.8. Process Specification of Process 3.2.

Process Name:	Update Room Status
Data In:	changed status
Data Out:	new status
Process:	(1) Update room status from rented to be available
Attachment:	(1) Process 3.1 Check Room Status (2) Data Store D2 Room

Table C.9. Process Specification of Process 3.3.

Process Name:	Check Customer
Data In:	checked result customer ID
Data Out:	customer ID
Process:	(1) Check that the customer own or rent the other room or not
Attachment:	(1) Process 3.1 Check Room Status (2) Process 3.4 Delete Customer Record (3) Data Store D2 Room

Table C.10. Process Specification of Process 3.4.

Process Name:	Delete Customer Record
Data In:	customer ID
Data Out:	deleted customer
Process:	(1) Delete customer information from Data Store D1 Customer Record
Attachment:	(1) Process 3.3 Check Customer Record (2) Data Store D1 Customer Record

Table C.11. Process Specification of Process 4.

Process Name:	Enter Service
Data In:	extra housekeeping-service information extra maintenance-service information
Data Out:	service information
Process:	(1) Get the service information
Attachment:	(1) Housekeeper Department (2) Maintenance Department (3) Data Store D4 Service

Table C.12. Process Specification of Process 5.

Process Name:	Create Bill
Data In:	customer name room info room type info service info
Data Out:	bill 1 bill 2 bill information customer ID room ID room type No. payment info
Process:	(1) Process 5.1 Calculate Common Facility Expense (2) Process 5.2 Calculate Services Charge (3) Process 5.3 Calculate All Expense (4) Process 5.4 Calculate VAT (5) Process 5.5 Calculate Total (6) Process 5.6 Print Bill
Attachment:	(1) Data Store D1 Customer Record (2) Data Store D2 Room

Table C.12. Process Specification of Process 5 (Continued).

Process Name:	Create Bill
Attachment:	(3) Data Store D3 Room Type (4) Data Store D4 Service (5) Data Store D5 Payment Record (6) Customer (7) General Manager (8) Process 6 Create Receipt

Table C.13. Process Specification of Process 5.1.

Process Name:	Calculate Common Facility Expense
Data In:	room info room size
Data Out:	calculated CFE room ID room type No.
Process:	(1) Calculate the common facility expense of each room
Attachment:	(1) Data Store D2 Room (2) Data Store D3 Room Type (3) Process 5.3 Calculate All Expense

Table C.14. Process Specification of Process 5.2.

Process Name:	Calculate Services Charge
Data In:	service info
Data Out:	calculated SC room ID
Process:	(1) Calculate the common facility expense of each room
Attachment:	(1) Data Store D4 Service (2) Process 5.3 Calculate All Expense

Table C.15. Process Specification of Process 5.3.

Process Name:	Calculate All Expense
Data In:	calculated CFE calculated SC room info unpaid payment
Data Out:	calculated all expense room ID room type No.
Process:	(1) Calculate all expense for each room in each month
Attachment:	(1) Data Store D2 Room (2) Data Store D3 Room Type (3) Data Store D5 Payment Record (4) Process 5.1 Calculate Common Facility Expense (5) Process 5.2 Calculate Services Charge (6) Process 5.4 Calculate VAT (7) Process 5.5 Calculate Total

Table C.16. Process Specification of Process 5.4.

Process Name:	Calculate VAT
Data In:	calculated all expense
Data Out:	VAT calculated
Process:	(1) Calculate VAT for each bill
Attachment:	(1) Process 5.3 Calculate All Expense (2) Process 5.5 Calculate Total

Table C.17. Process Specification of Process 5.5.

Process Name:	Calculate Total
Data In:	calculated all expense
Data Out:	all info all information payment info
Process:	(1) Calculate all expenses including VAT
Attachment:	(1) Process 5.3 Calculate All Expense (2) Process 5.4 Calculate VAT (3) Process 5.6 Print Bill (4) Process 6.1 Update Payment Record (5) Data Store D4 Payment Record

Table C.18. Process Specification of Process 5.6.

Process Name:	Print Bill
Data In:	all info customer ID customer name
Data Out:	bill 1 bill 2 customer ID room ID
Process:	(1) Print bill of each room in each month
Attachment:	(1) Process 5.5 Calculate Total (2) Data Store D1 Customer Record (3) Data Store D2 Room (4) Customer (5) General Manager

Table C.19. Process Specification of Process 6.

Process Name:	Create Receipt
Data In:	bill information payment
Data Out:	receipt 1 receipt 2 updated payment info
Process:	(1) Create receipt for each bill
Attachment:	(1) Process 5 Create Bill (2) Data Store D5 Payment Record (3) Customer (4) General Manager

Table C.20. Process Specification of Process 6.1.

Process Name:	Update Payment Record
Data In:	bill information payment
Data Out:	bill info updated payment info
Process:	(1) Update Data Store D5 Payment Record after receiving the payment
Attachment:	(1) Process 5.5 Calculate Total (2) Process 6.2 Print Receipt

Table C.20. Process Specification of Process 6.1 (Continued).

Process Name:	Update Payment Record
Attachment:	(3) Data Store D5 Payment Record (4) Customer

Table C.21. Process Specification of Process 6.2.

Process Name:	Print Receipt
Data In:	bill info
Data Out:	receipt 1 receipt 2
Process:	(1) Print receipt of each bill after receiving the payment
Attachment:	(1) Process 6.1 Update Payment Record (2) Customer (3) General Manager

Table C.22. Process Specification of Process 7.

Process Name:	Create Report
Data In:	customer info payment info room info room type info service info
Data Out:	report
Process:	(1) Create report from information in the database
Attachment:	(1) Data Store D1 Customer Record (2) Data Store D2 Room (3) Data Store D3 Room Type (4) Data Store D4 Service (5) Data Store D5 Payment Record (6) General Manager



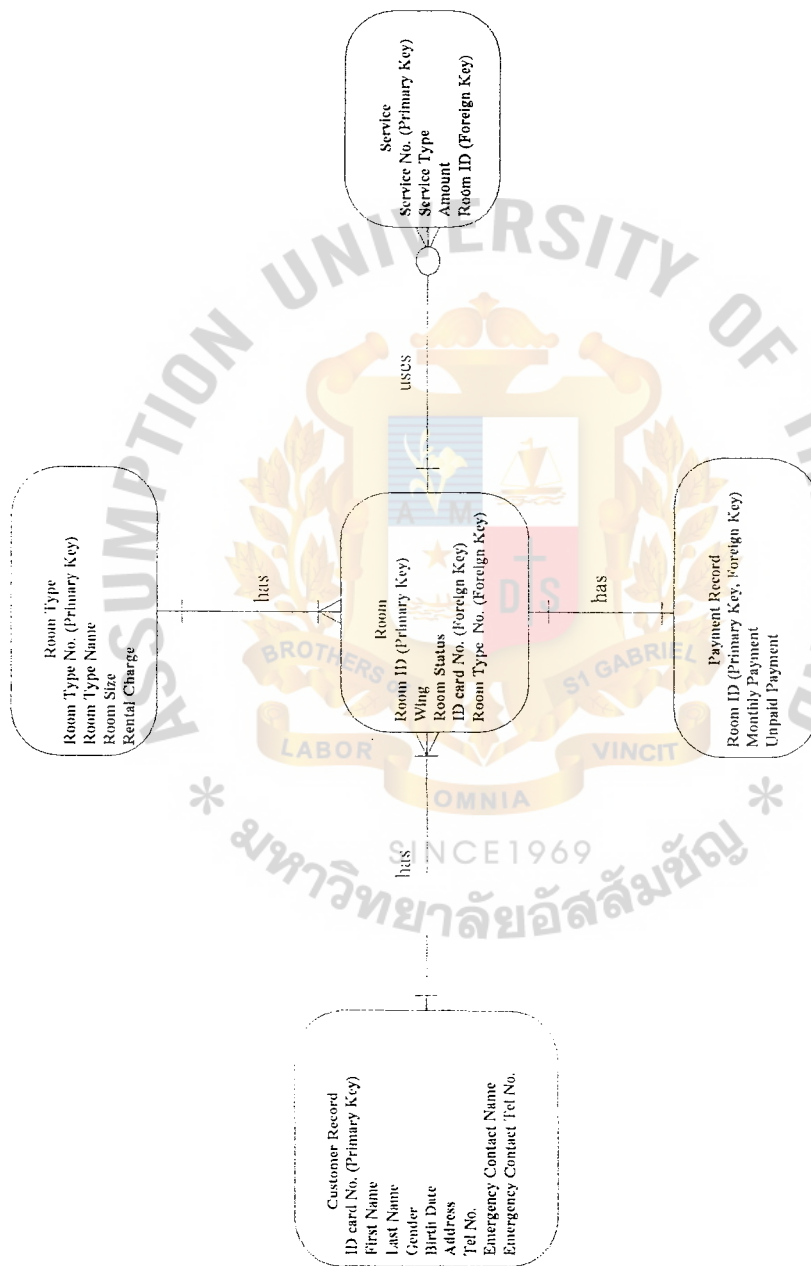


Figure D.1. Fair Tower Entity Relationship Diagram.

Data Store D1

Table D.1. Structure of Customer Record Table.

No.	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to Table	Check	Key Type
1	ID card No.	Char (13)	Y	Y				Primary Key
2	First Name	Char (10)	Y		Y			Attribute
3	Last Name	Char (20)			Y			Attribute
4	Gender	Char (1)			Y		M or F	Attribute
5	Birth Date	Date			Y			Attribute
6	Address	Char (45)			Y			Attribute
7	Tel No.	Char (11)			Y			Attribute
8	Emergency Contact Name	Char (10)			Y			Attribute
9	Emergency Contact Tel No.	Char (20)			Y			Attribute

Data Store D2

Table D.2. Structure of Room Table.

No.	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to Table	Check	Key Type
1	Room ID	Char (3)	Y	Y				Primary Key
2	Wing	Char (1)			Y		A or B	Attribute
3	Room Status	Char (1)	Y		Y		A or R or S	Attribute
4	ID card No.	Char (13)	Y		Y	Customer Record		Foreign Key
5	Room Type No.	Char (1)	Y		Y	Room Type	Between 1 and 4	Foreign Key

Data Store D3

Table D.3. Structure of Room Type Table.

No.	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to Table	Check	Key Type
1	Room Type No.	Char (1)	Y	Y			Between 1 and 4	Primary Key
2	Room Type Name	Char (20)			Y			Attribute
3	Room Size	Int			Y			Attribute
4	Rental Charge	Real			Y			Attribute

Data Store D4

Table D.4. Structure of Service Table.

No.	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to Table	Check	Key Type
1	Service No	Char (4)	Y	Y				Primary Key
2	Service Type	Char (1)			Y			Attribute
3	Amount	Real			Y			Attribute
4	Room ID	Char (3)			Y	Room		Foreign Key

Data Store D5

Table D.5. Structure of Payment Record Table.

No.	Field Name	Field Type	Index	Unique	Nullable	Foreign Key to Table	Check	Key Type
1	Room ID	Char (3)	Y	Y		Room		Primary Key and Foreign Key
2	Monthly Payment	Real			Y			Attribute
3	Unpaid Payment	Real			Y			Attribute



APPENDIX E

INTERFACE DESIGN

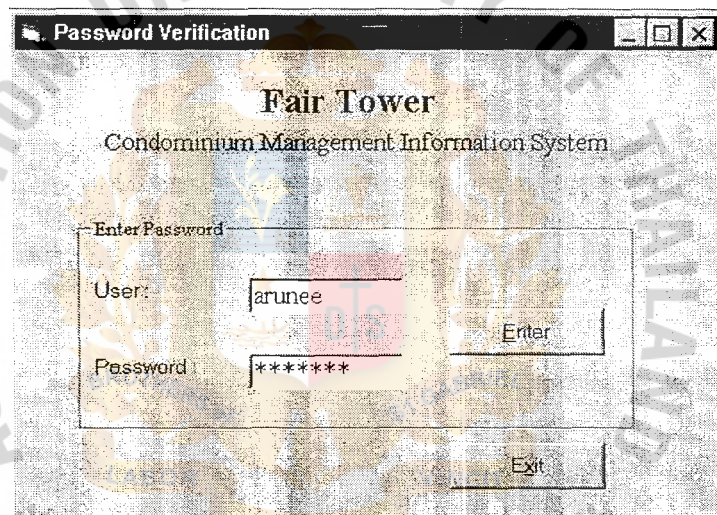


Figure E.1. Password Verification.

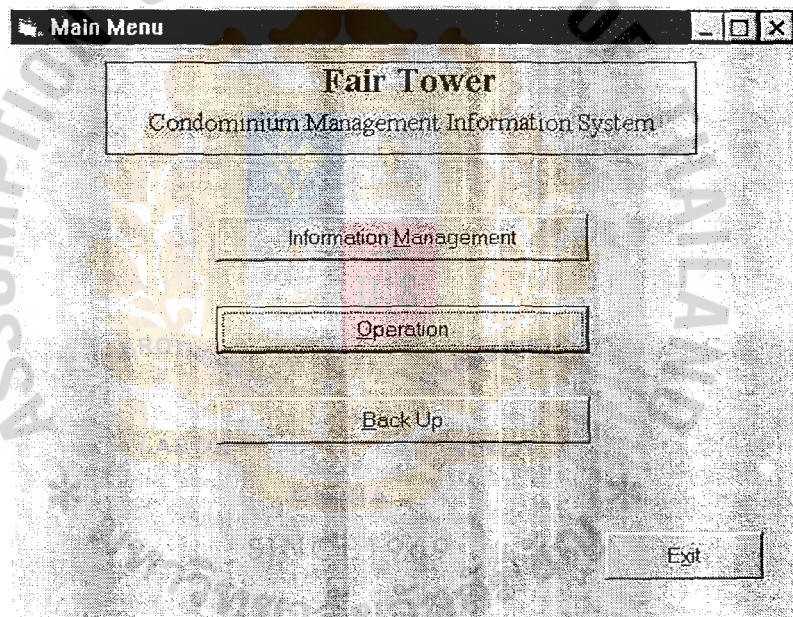


Figure E.2. Main Menu.

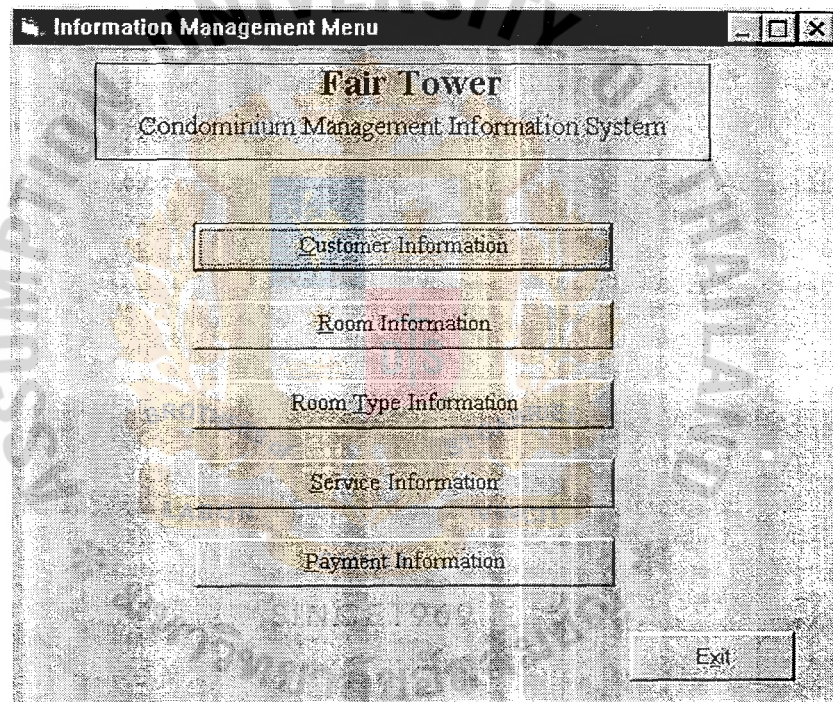


Figure E.3. Information Management Menu.

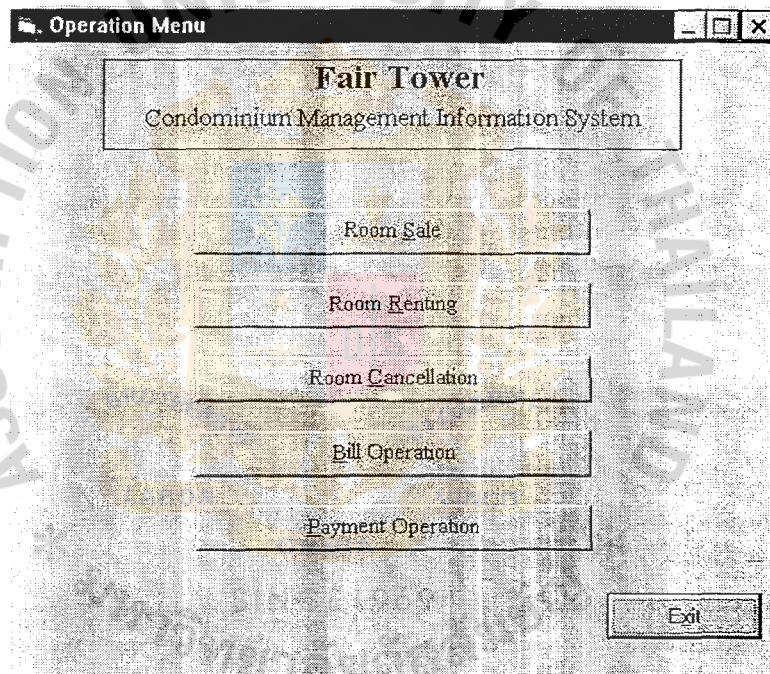


Figure E.4. Operation Menu.

Customer Information

Customer:
ID Card No.: 3100902468397

First Name: Kitt Last Name: Nantasukkasem

Birth Date: 28/04/72 Gender:
☒ Male ☐ Female

Tel.: 2160685

Address: 26/1 Soi Chula 44 Rama4 Rd Pratumwan Bangkok 10330

Emergency Contact Name: Orawan

Emergency Contact Tel: 3924715

Navigation: << 3100902468397 >>>

Buttons: Add Edit Delete Exit

Figure E.5. Customer Information.

Room Information

Room

Room ID: 2A

Wing: A B

Room Type No: 1 2 3 4

Room Status: Sold

ID Card No: B100902468397

2A

Add Edit Delete Exit

Figure E.6. Room Information.

Room Type Information

Room Type

Room Type No: 2

Room Type: Typical Unit

Room Size: 90 m²

Rental Charge: 9000.00 Baht

2

Add Edit Delete Exit

Figure E.7. Room Type Information.

The screenshot shows a window titled "Service Information" with a standard Windows-style title bar. Inside the window, there is a section labeled "Service" containing several input fields and a list box. The fields are: "Service No." with the value "0015", "Service Type" with a dropdown menu showing "Cleaning the room", "Room ID" with the value "6G", and "Service Charge" with the value "500.00" and the unit "Baht". Below these fields is a list box containing the value "0015" with navigation buttons (back, forward, first, last). At the bottom of the window are four buttons: "Add", "Edit", "Delete", and "Exit".

Field	Value
Service No.	0015
Service Type	Cleaning the room
Room ID	6G
Service Charge	500.00 Baht

Figure E.8. Service Information.

Payment Information

Payment

Room ID: 6G

Monthly Payment: 11556.00 Baht

Unpaid Payment: 11556.00 Baht

Navigation: << 6G >>

Buttons: Add Edit Delete Exit

Figure E.9. Payment Information.

Room Sale

Room ID:

ID Card No:

First Name: Last Name:

Birth Date: Gender: ☒ Male ☐ Female

Tel:

Address:

Emergency Contact Name:

Emergency Contact Tel:

Figure E.10. Room Sale.

Room Renting

Room ID: 3C

ID Card No: 3100478931256

First Name: Chinnawat Last Name: Srirojjanapinyo

Birth Date: 24/06/74 Gender: ☒ Male ☐ Female

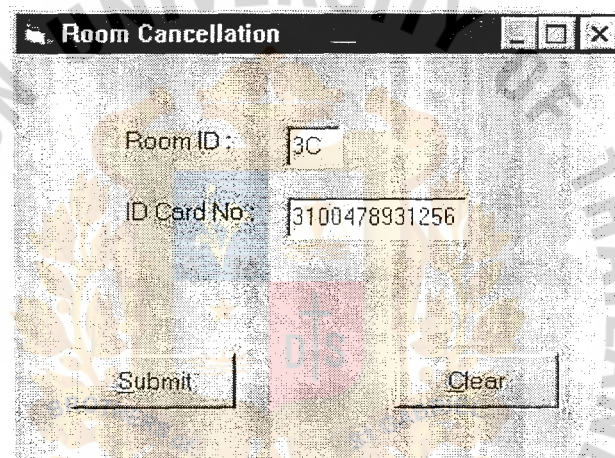
Tel: 2216767

Address: 21/6 Rama6 Rd. Rong-Meung Pratumwan Bangkok 10330

Emergency Contact Name: Usa

Emergency Contact Tel: 7161014

Figure E.11. Room Renting.



A screenshot of a software window titled "Room Cancellation". The window has a standard Windows-style title bar with minimize, maximize, and close buttons. Inside the window, there are two text input fields. The first field is labeled "Room ID:" and contains the text "3C". The second field is labeled "ID Card No:" and contains the text "3100478931256". Below these fields are two buttons: "Submit" on the left and "Clear" on the right. The background of the window is a textured, light-colored pattern. A large, semi-transparent watermark of the Assumption University of Thailand logo is visible behind the window. The logo features a circular emblem with a cross and the text "ASSUMPTION UNIVERSITY OF THAILAND" around it. Below the emblem is a banner with the Latin motto "LABOR OMNIA VINCIT" and the Thai text "มหาวิทยาลัยอัสสัมชัญ" (Mahavithayalai Assumption).

Room ID:	3C
ID Card No:	3100478931256
Submit	Clear

Figure E.12. Room Cancellation.

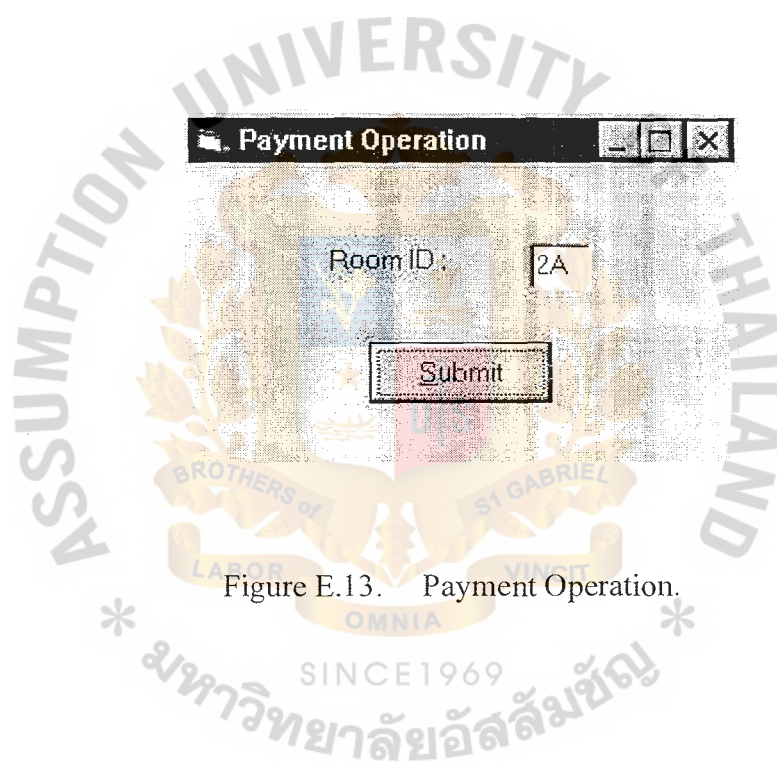


Figure E.13. Payment Operation.



APPENDIX F
REPORT DESIGN

FAIR TOWER

Buyer Information Report

Date: 30/03/2000

Room ID	Name	Address	ID card No.	Telephone No.
2A	Kitti	26/1 Soi Chula 44 Rama4 Rd Pratumwan Bangkok 10330	3100902468397	2160685
5D	Pat	217 Charoenkrung Rd. Danbatri Pomprab Bangkok 10100	3100503486583	2212264
911	Kasem	45/6 Sukhumvit3 Rd. Klong-Toey Prakanong Bangkok 10110	3100405756721	2533689

Figure F.1. Buyer Information Report.

FAIR TOWER

Tenant Information Report

Date: 30/03/2000

Room ID	Name	Address	ID card No.	Telephone No.
3C	Chinnawat Srirojjanapinyo	21/6 Rama6 Rd. Rong-Meung Pratumwan Bangkok 10330	3100478931256	2216767
5B	Sakolkij Trakamchatree	822/27 Ban-Moh Rd. Wang-Boorapa Pranakorn Bangkok 10200	3100678501315	2873735
6G	Jetr Tammawiboonsri	1860/26 Chareonkrung68 Rd. Bangkoelacm Bangkok 10120	3100678245863	2121261

Figure F.2. Tenant Information Report.

FAIR TOWER

Room Type Information List

Date: 30/03/2000

Room ID	Room Type	Wing	Size(m ²)
2A	Special Unit	A	90
3C	Typical Unit	A	80
5B	Typical Unit	A	80
5D	Typical Unit	A	80
6G	Special Unit	B	90
9H	Typical Unit	B	80
7F	Special Unit	A	90
11A	Luxury Special Unit	A	118
11C	Luxury Typical Unit	A	108

Figure F.3. Room Type Information List.

FAIR TOWER

Monthly Room Status Report

Date: 30/03/2000

Room ID	Room Status	Customer
2A	Sold	Nuntasukkasem
3C	Rented	Kitti
5B	Rented	Chinnawat Srirojjanapinyo
5D	Sold	Sakolkij
6G	Rented	Pat
9H	Sold	Dechanuwong
7F	Available	Jetr
11A	Available	Tammawiboonsri
11C	Available	Kasem
		Deerungroj

Figure F.4. Monthly Room Status Report.

FAIR TOWER

Monthly Available Room List (Classified by Room Type)

Date: 30/03/2000

Room Type	Room ID	Wing
Typical Unit	2D	A
Typical Unit	4E	A
Typical Unit	6L	B
Special Unit	6A	A
Special Unit	10M	B
Luxury Typical Unit	11C	A
Luxury Typical Unit	11H	B
Luxury Typical Unit	11K	B
Luxury Special Unit	11A	A

Figure F.5. Monthly Available Room List (Classified by Room Type).

FAIR TOWER

Monthly Service Charge Report

Date: 30/03/2000

Room ID	Service No.	Service Type	Amount (Baht)
2A	0046	Cleaning the room	500.00
2A	0164	Laundry	200.00
3C	0279	Laundry	250.00
5B	0387	Cleaning the room	500.00
5D	0028	Cleaning the room	500.00
5D	0872	Laundry	100.00
6G	0573	Maintenance	150.00
9H	0397	Cleaning the room	500.00

Figure F.6. Monthly Service Charge Report.

FAIR TOWER

Monthly Sales and Renting Report

Date: 30/03/2000

Room ID	Room Status	Customer
2A	Sold	Kitti Nuntasukkasem
5D	Sold	Pat Dechanuwong
9H	Sold	Kasem Deerungroj
3C	Rented	Chinnawat Srirojjanapinyo
5B	Rented	Sakolkij Trakarnchatree
6G	Rented	Jetir Tammawiboonsri

Figure F.7. Monthly Sales and Renting Report.

FAIR TOWER

Monthly Room Cancellation Report

Date: 30/03/2000

Room ID	Customer	Total unpaid payment (Baht)
3C	Chinnawat Srirojjanapinyo	-
5F	Sakolkij Trakarnchatree	-
6G	Jetr Tammawiboonsri	11556.00

Figure F.8. Monthly Room Cancellation Report.

FAIR TOWER
Monthly Over Due Payment Report

Date: 11/04/2000

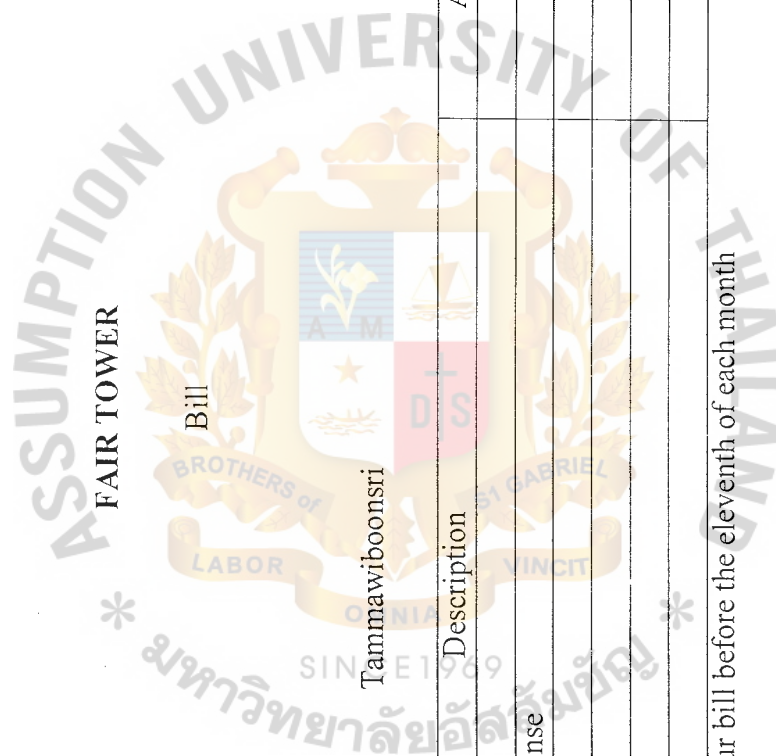
Room ID	Customer	Over Due Payment (Last Month)	Total Unpaid Payment (Baht)
3C	Chinnawat Srirojjanapinyo	10272.00	10272.00
5B	Sakolkij Trakarnchatree	10272.00	20544.00
6G	Jetr Tamawiboonsri	11556.00	11556.00

Figure F.9. Monthly Over Due Payment Report.

ASSUMPTION UNIVERSITY
FAIR TOWER
MONTHLY WARNING REPORT
Date: 11/04/2000

Room ID	Room Status	Customer	Total Unpaid Payment (Baht)
3C	Rented	Chinnawat Srirojjanapinyo	30816.00
5B	Rented	Sakolkij Trakarnchatree	30816.00
6G	Rented	Jetr Tammawiboonsri	34668.00
2A	Sold	Kitti Nuntasukkasem	11556.00
5D	Sold	Pai Dechanuwong	10272.00
9H	Sold	Kasem Deerungroj	10272.00

Figure F.10. Monthly Warning Report.



FAIR TOWER

Bill

Date: 30/03/2000

Room ID 6G
Customer Jetr

Tammawiboonsri

Description	Amount (Baht)
Rental charge	9000.00
Common facility expense	1800.00
Services charge	-
Unpaid payment	10800.00
VAT (7%)	1512.00
Total	23112.00

- Please pay for your bill before the eleventh of each month

Figure F.11. Bill.

FAIR TOWER
 370 Sukhumvit 50 Rd., Prakanong Bangkok 10250
 Tax Payer ID. 4107043335

Receipt / Tax Invoice

Date: 07/04/2000

Room ID
 Customer

6G
 Jetr

Tammawiboonsri

Description	Amount (Baht)
Rental charge	9000.00
Common facility expense	1800.00
Services charge	-
Unpaid payment	10800.00
VAT (7%)	1512.00
Total	23112.00

Collector

Authorize Signature

Figure F.12. Receipt.

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