APARTMENT RENTAL INFORMATION SYSTEM

by

Mr. Thanandon Supachokeauychai

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

March 2001

MS (CIS)
133301
St. Gabriel's Library, Au

Apartment Rental Information System

by
Mr. Thanandon Supachokeauychai

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

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS of St GABRIEL
LABOR VINCIT OMNIA
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

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

March 2001

Project Title	Apartment Rental Information System
Name	Mr. Thanandon Supachokeauychai
Project Advisor	Air Marshal Dr. Chulit Meesajjee
Academic Year	March 2001

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.

Approval Committee:

AM Chulit Meesajjee

(Air Marshal Dr. Chulit Meesajjee)
Dean and Advisor

(Prof.Dr. Srisakdi Charmonman)
Chairman

(Asst.Prof.Dr. Vichit Avatchanakorn)
Member

(Assoc.Prof. Somchai Thayarnyong)
MUA Representative

March 2001

ABSTRACT

Data has been accepted as one of the very important factors when doing business. In fact, many businesses use data to educate, evaluate, plan, develop, and control their working functions in order to survive than to be in an advantageous position. Imagine how leading universities can carry their works without computer networks installed. It is so curious to see many leading hotels still handle their jobs without computer networks involved. Luxurious service apartments also, without exception, consist of similar functions as hotel business. They provide room rental service, room service, information, restaurant to room tenants. Furthermore, some big service apartments also provide other related services such as airport pickup and delivery to foreign customers, snooker service, internet, convenience store, swimming pool, etc. With all these related functions, it is important for management to look for alternative solutions to monitor business activities. The main objective of this project is to streamline the working functions of big scale apartments to speed up customer check-in and check-out processes, which is the heart of service business. The second objective is to reduce error or mistake in customer expenses calculation due to lost billing, late billing delivery. We present an idea of implementing computing network in Parinthip Mansion, our business model, to show how a business can adopt information technology to their utmost benefit.

We start by surveying problems and areas for improvement. We then modify business work flow via computing network, discuss about information technology architecture, propose hardware and software requirements, analyze cost and benefit of the proposed system, design database, and finally provide conclusions and recommendations at the end of this project report.

ACKNOWLEDGEMENTS

The writer wishes to take this opportunity to thank Air Marshal Dr. Chulit Meesajjee, the advisor of this project, for his comments and recommendations throughout this course of work.

He would like to thank all other committee members, Prof.Dr. Srisakdi Charmonman, Asst.Prof.Dr. Vichit Avatchanakorn, Assoc.Prof. Somchai Thayarnyong, for providing him an opportunity to pursue this project. He is also grateful to all the lecturers in the MS(CIS) program for providing him their valuable knowledge during his study at this university.

He extends his sincere thanks to Mr. Parin Rujirawilai, General Manager of Parinthip Mansion, for providing him useful information required for this project study. Mr. Pornchai Sinthanamongkol, Sales Engineer, Jaton Corporation (Thailand), for his assistance on hardware and software information provided to him.

Finally, the writer thanks his family and friends for all their encouragement and support during his program study.

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

St. Gabriel's Library

TABLE OF CONTENTS

Chapter			Page
ABSTRACT			i
ACKNOWLEDGEMENTS			ii
LIST OF FIGURES			v
LIST OF TABLES			ix
I.	INTRODUCTION		1
	1.1	Background of the Project	2
	1.2	Objectives of the Project	3
	1.3	Scope of the Project	4
II.	THE EXISTING SYSTEM		6
	2.1	Background of the Company under Study	6
	2.2	Existing Business Functions	8
	2.3	Current Problems	9
	2.4	Areas for Improvement	12
III.	THE PROPOSED SYSTEM		15
	3.1	User Requirements	15
	3.2	Improved Workflow	16
	3.3	Information Technology Architecture	45
	3.4	Hardware and Software Requirements	47
	3.5	Cost Vs. Benefit Analysis	51
	3.6	Database Design	57

ASSUMPTION UNIVERSITY OF THAILAND
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

Chapter			Page
IV.	SYSTEM IMPLEMENTATION		62
	4.1	Programming	62
	4.2	System Testing	62
	4.3	Installing Plan	63
	4.4	Training Procedures	63
	4.5	Documentation	64
	4.6	Security and Control	64
V.	CONCLUSIONS AND RECOMMENDATIONS		66
	5.1	Conclusions	66
	5.2	Recommendations	68
APPENDIX	A	DATA DICTIONARY OF THE PROPOSED SYSTEM	69
APPENDIX	B	PROTOTYPING SCREEN INPUTS OF THE PROPOSED SYSTEM	74
APPENDIX	C	SAMPLE SCREEN QUERIES OF THE PROPOSED SYSTEM	90
APPENDIX	D	SAMPLE OUTPUT REPORTS OF THE PROPOSED SYSTEM	103
APPENDIX	E	PROCESS SPECIFICATION	118
APPENDIX	F	STRUCTURE CHARTS	131
BIBLIOGRAPHY			143

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

LIST OF FIGURES

Figure		Page
1.1	Project Plan for the Apartment Rental Information System	5
2.1	Organization Chart of Parinthip Mansion	13
2.2	Context Data Flow Diagram of the Existing System	14
3.1	Context Data Flow Diagram of the Proposed System	23
3.2	Functional Decomposition Diagram of the Proposed System	24
3.3	Event Diagram: Reservation Request	25
3.4	Event Diagram: Reservation Cancellation	26
3.5	Event Diagram: Generate Adhoc Report for Room Reservation	27
3.6	Event Diagram: Registration Request	28
3.7	Event Diagram: Generate Adhoc Report for Room Registration	29
3.8	Event Diagram: In-house Service Request	30
3.9	Event Diagram: In-house Service Cancellation	31
3.10	Event Diagram: Generate Adhoc Report for In-house Service	32
3.11	Event Diagram: Snooker Service Pending	33
3.12	Event Diagram: Generate Adhoc Report for Snooker Service Pending	34
3.13	Event Diagram: Input Room Expenses	35
3.14	Event Diagram: Generate Adhoc Report for Room Expenses	36
3.15	Event Diagram: Restaurant Service Pending	37
3.16	Event Diagram: Generate Adhoc Report for Restaurant Service Pending	38
3.17	Event Diagram: Internet Service Pending	39
3.18	Event Diagram: Generate Adhoc Report for Internet Service Pending	40
3.19	Event Diagram: Room Check-out Request	41

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

Figure		Page
3.20	Event Diagram: Generate Adhoc Report for Room Check-out	42
3.21	System Diagram of the Proposed System (Page 1)	43
3.22	System Diagram of the Proposed System (Page 2)	44
3.23	Network Configuration of the Proposed Computerized System	50
3.24	Cost Comparison between Existing and Proposed Systems	53
3.25	Graph Displaying Payback Period of the Proposed System	56
3.26	Entity Relationship Diagram	59
3.27	Logical Database Schema of the Proposed System	60
3.28	Physical Database Schema of the Proposed System	61
B.1	Password Screen When Accessing the Program	74
B.2	Welcome Screen	74
B.3	Main Menu Screen of the Apartment Rental Information System	75
B.4	First Level of Add New Item Menu	76
B.5	Second Level of Add New Item Menu	77
B.6	First Level of Edit Item Menu	78
B.7	Second Level of Edit Item Menu	79
B.8	Customer's Information Form	80
B.9	Room Reservation Form	81
B.10	Customer Service's Request Form	82
B.11	Employee's Information Form	83
B.12	Registration Form	84
B.13	Room Update Form	85
B.14	Restaurant Service Form	86
B.15	Room Expenses Form	87

ASSUMPTION UNIVERSITY OF THAILAND
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

Figure		Page
B.16	Snooker Service Form	88
B.17	Internet Service Form	89
B.18	Room Deposit Form	89
C.1	First Level of Query Menu	90
C.2	Second Level of Query Menu	91
C.3	Third Level of Query Menu	92
C.4	Fourth Level of Query Menu	93
C.5	Name Required When Employee's Details Query Activated	94
C.6	Last Name Required after Employee's Name Has Been Input	94
C.7	Partial Result of Employee's Details Query	94
C.8	Name Required When Rent History Query Activated	95
C.9	Last Name Required after Customer's Name Has Been Input	95
C.10	Result of Rent History Query	95
C.11	Name Required When Customer's Details Query Activated	96
C.12	Last Name Required after Customer's Name Has Been Input	96
C.13	Partial Result of Customer's Details Query	96
C.14	Name Required When Room Reservation Query Activated	97
C.15	Last Name Required after Customer's Name Has Been Input	97
C.16	Partial Result of Room Reservation Query	97
C.17	Room Number Required When Room Registration Query Activated	98
C.18	Partial Result of Room Registration Query	98
C.19	Name Required When Room Deposit Query Activated	99
C.20	Last Name Required after Customer's Name Has Been Input	99
C.21	Result of Room Deposit Query	99

ASSUMPTION UNIVERSITY OF THAILAND
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

Figure		Page
C.22	Partial Result of Total Room Available Query	100
C.23	Partial Result of Total Room Occupied Query	101
C.24	Result of Room 28 sqm. Available Query	102
C.25	Partial Result of Room 28 sqm. Occupied Query	102
D.1	Monthly Salary Pay Report	103
D.2	Employee's Monthly Salary Detail Report (Page 1)	104
D.3	Employee's Monthly Salary Detail Report (Page 2)	105
D.4	Employee's Monthly Salary Detail Report (Page 3)	106
D.5	Employee's Monthly Salary Detail Report (Page 4)	107
D.6	Employee's Monthly Salary Detail Report (Page 5)	108
D.7	Employee's Monthly Salary Detail Report (Page 6)	109
D.8	Reservation Report	110
D.9	Registration Report	111
D.10	Customer Service Report	112
D.11	Room Expenditure Charges Report	113
D.12	Snooker Charge Report	114
D.13	Internet Service Pending Report	115
D.14	Restaurant Service Pending Report	116
D.15	Room Check-out Report	117
F.1	Structure Chart for Room Reservation Process	131
F.2	Structure Chart for Reservation Cancellation Process	132
F.3	Structure Chart for Room Registration Process (Monthly Reserved Customer)	133

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

Figure		Page
F.4	Structure Chart for Room Registration Process (Daily & Package Reserved Customer)	134
F.5	Structure Chart for Room Registration Process (Monthly Walk-in Customer)	135
F.6	Structure Chart for Room Registration Process (Daily Walk-in Customer)	136
F.7	Structure Chart for In-house Service Process	137
F.8	Structure Chart for In-house Service Cancellation Process	138
F.9	Structure Chart for Snooker Service Pending Process	139
F.10	Structure Chart for Restaurant Service Pending Process	140
F.11	Structure Chart for Internet Service Pending Process	141
F.12	Structure Chart for Check-out Process	142

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

LIST OF TABLES

Table		Page
2.1	Monthly Charge for Room Rental	7
3.1	Existing System Cost Analysis	51
3.2	Proposed System Cost Analysis	52
3.3	Discounted Payback Analysis for Client-Server of the Proposed System	55
5.1	Degree of Achievement of the Proposed System	67
E.1	Process Specification of Process 1.1.1	118
E.2	Process Specification of Process 1.1.2	118
E.3	Process Specification of Process 1.1.3	119
E.4	Process Specification of Process 1.2.1.1	119
E.5	Process Specification of Process 1.2.1.2	120
E.6	Process Specification of Process 1.2.1.3	121
E.7	Process Specification of Process 1.2.1.4	122
E.8	Process Specification of Process 1.2.2	122
E.9	Process Specification of Process 1.3.1	123
E.10	Process Specification of Process 1.3.2	123
E.11	Process Specification of Process 1.3.3	124
E.12	Process Specification of Process 1.4.1	124
E.13	Process Specification of Process 1.4.2	125
E.14	Process Specification of Process 1.5.1	125
E.15	Process Specification of Process 1.5.2	125
E.16	Process Specification of Process 1.6.1	126
E.17	Process Specification of Process 1.6.2	126

ASSUMPTION UNIVERSITY OF THAILAND
มหาวิทยาลัยอัสสัมชัญ
SINCE1969

Table		Page
E.18	Process Specification of Process 1.7.1	127
E.19	Process Specification of Process 1.7.2	127
E.20	Process Specification of Process 1.8.1	128
E.21	Process Specification of Process 1.8.2	129
E.22	Process Specification of Process 1.8.3	130

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS of St GABRIEL
LABOR VINCIT OMNIA
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

I. INTRODUCTION

For big Apartment Rental services in Bangkok, the business itself can be classified as a part of the service industry similar to hotel business, some even have more complicated functions than the hotel business. One example is that while the hotel has only one or two kinds of customers who stay and pay on a daily or package service, most big apartments have at least three kinds of customers; daily basis, packages, and monthly customers. The service industry, especially hotel and accommodation business, plays a significant role in the country's economy; that is, it provides comfort to travelers, business people, and room tenants (especially the Apartment Rental business). By nature humans are different both physically and mentally including the needs in things. That is why we have several classes of hotels and accommodations to satisfy different kinds of needs. Apartment Rental ranges in size from small with basic services available such as room rental to five star apartments similar to medium up to big scale hotels with good interior design and full facility to attract customers.

The size and functions of five star apartments consist of numbers of facilities such as Room rental service, Room service – room cleaning, bedsheet replacement, laundry, etc., Building maintenance, Reception & Information service, Swimming pool, Snooker club, Mini-mart, Restaurant, and Security. In order to manage all these functions effectively, management teams must pay attention to the way to monitor all related activities and how to control incomes and expenses in each function. Setting up good and effective Information System (IS.) in the organization, to help the executives and managers monitor all the major functions taking place within the business, can help reduce the risk of loss income and unnecessary spending, which in turn will lead to the rise in business cost. The IS. used in the business should help interrelate components

working together to collect, process, store, and disseminate information to support decision making, coordination, control, analysis, and visualization of the executive and manager with streamline reports, but at the same time must be able to track for detailed information. In the meantime, a good system should also provide users with ease of use, easy to understand, and effective tracking control.

1.1 Background of the Project

At present, Apartment rental service in Bangkok is becoming more aggressively competitive. Due to the number of competitors in the market and the nature of the service business, the key to survive successfully in this business, especially in the time of economic downturn, not only depends on marketing strategy to acquire enough customers to meet the minimum number of rent rooms occupied (the number of rooms occupied by the customers must be at least 70-75% in order for the business to generate enough income to compensate with its expenses). At the same time how effectively and efficiently the manager can control business expenses to plug the loophole should also be considered. The process cycle of apartment rental normally includes, as mentioned previously; Reservation service, Registration, Refundable rent deposit, Room returning procedure. Furthermore, other services may be included in the facility such as Restaurant, Minimart, Snooker Louge, Internet service, and provide information inquiry service to customers.

Under the present situation, there should be a system that can provide enough information for the users in order for them to perform daily activities smoothly, and as a result help speed up customer services.

The Information System that this project intends to study is called Apartment Rental Information System (ARIS.). The project will analyze the existing system of the

business using one company as the model under study. At the same time this project will seek an effective solution to provide smooth flow and accuracy of relevant data.

Even though this project study is based on a big scale apartment, which has more complicated functions than small and medium size apartments, it provides a broader view of apartment business that can be adopted by any apartment business regardless of its size. Furthermore, the system should give some idea to business executives to focus more on analyzing data as well as provide timely information for problem solving.

1.2 Objectives of the Project

(1) To analyze the existing system by using one business as a model under study, and provide a better solution (if necessary) that will improve the efficiency and effectiveness of apartment rental operations.

(2) To determine the information requirements of the management teams and staffs by interviewing and investigating hard data.

(3) To design a model of computer-based information system that can reduce manual work and produce reports that cover major aspects needed by the management team and relevant users.

(4) To search how to use Information System to transform data into useful information that in turn will help support and improve the day-to-day operations in apartment rental business, as well as fulfilling the problem-solving and decision-making information needs of business executives.

(5) To estimate and compare cost and benefit between the existing and the proposed systems.

(6) To make decision whether the proposed system is worth developing, or the problem worth solving.

(7) To create a prototyping model of Apartment Rental System that can be used by interested persons.

1.3 Scope of the Project

Since the major source of income and problems originate from the Apartment Rental section, the project will focus on improving the workflow between this section and other relevant sections (Snooker, Restaurant, and Internet). By linking and sharing relevant data about customer, it is hope to speed up and provide accurate data for the Reservation, Check in, and Check out processes. At the same time, the project intends to improve the current database of customers in the Apartment Rental section so that it can be shared efficiently among relevant sections. Another area this project tries to improve is how to provide GM with streamline reports of the Apartment Rental section, and if possible with employee's spending which is one of the major cost of business operation.

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

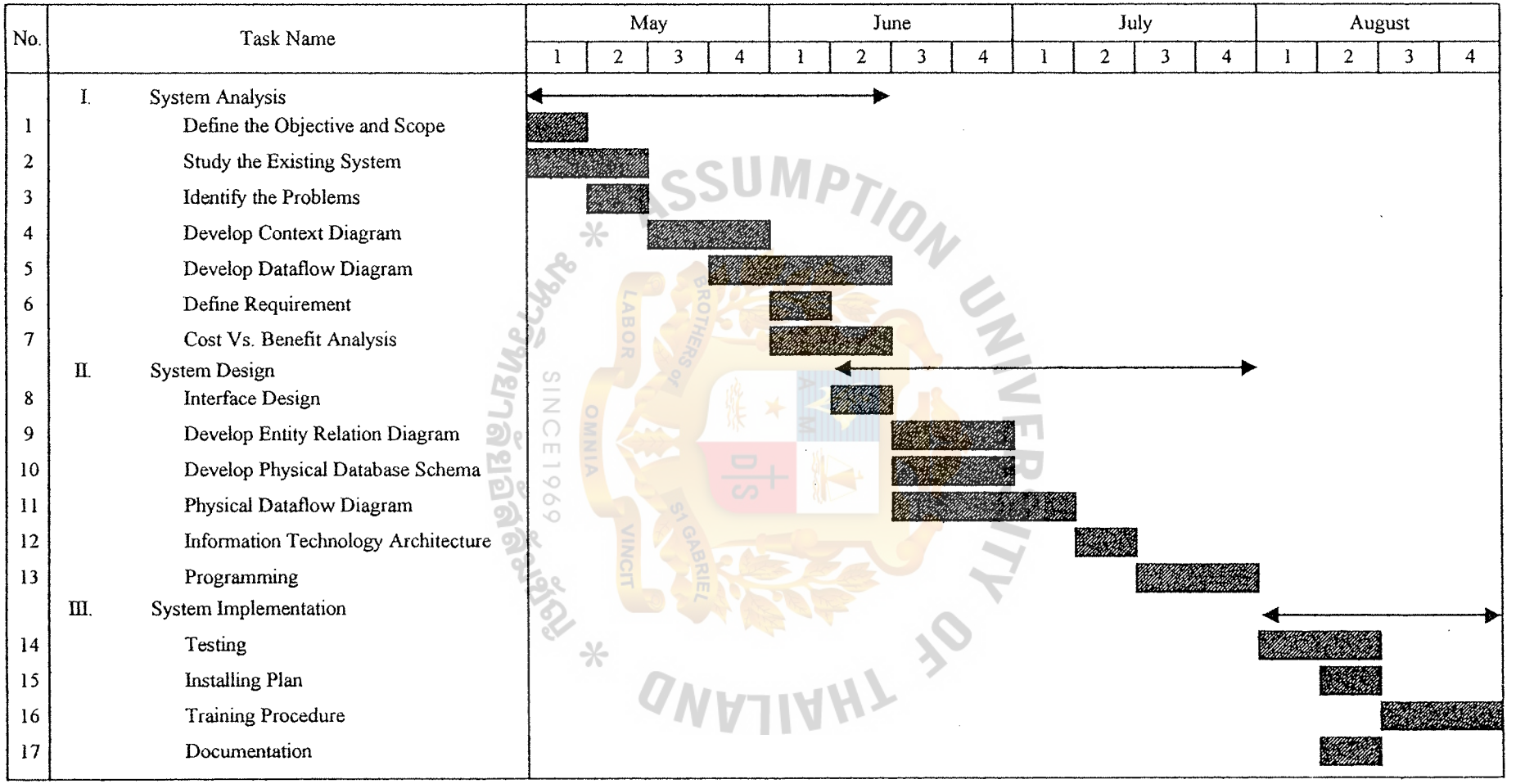


Figure 1.1. Project Plan for the Apartment Rental Information System.

II. THE EXISTING SYSTEM

2.1 Background of the Company under Study

Parinthip Mansion is a family owned luxury apartment business established in 1996 with an initial capital investment of 55 million Baht. Located in the heart of Bangkok Metropolis, it is easily accessed from both Ratchadapisek and Viphavadee-Rungsit Roads. It consists of several facilities including swimming pool, snooker club, mini-mart, and restaurant with internet café section. Members of the family run all of business functions, which can be divided roughly into 7 sections. They are as followings:

(1) Apartment Rental Service

(2) Finance and Accounting

(3) Swimming Pool

(4) Snooker Club

(5) Mini-mart

(6) Restaurant

(7) Security

The Apartment can accommodate up to 98 rooms with each room fully furnished with luxurious furniture – bed, sofa, make-up table, closet, electricity equipment, air conditioner, refrigerator, satellite television, telephone, and modern amenities.

Building Facility consists of Elevator, Swimming Pool, Snooker Club, Thai and Satellite TV Channels, Close circuit TV monitors, including Room Cleaning service, Laundry shop, Mini-mart, Restaurant & Internet, and Free car park.

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

There are three kinds of standard rent options that can be chosen:

(1) 3 day package (1,800 Baht) including

3 nights stay, Airport pickup and delivery, 3 breakfast for one person, and 30 minutes free internet each day.

(2) Special Rates with Free Breakfast plus 30 minutes free internet (500 Baht/Night).

(3) Monthly Charge based on the following table:

Table 2.1. Monthly Charge for Room Rental.

Room Type	Monthly Rates
Studio Room 28 sqm.	4,600 Baht/Month
Studio Room 30 sqm.	5,000 Baht/Month
Studio Room 32 sqm.	5,400 Baht/Month
Twin Room 56 sqm.	9,200 Baht/Month
Twin Room 60 sqm.	10,000 Baht/Month
Twin Room 64 sqm.	10,800 Baht/Month

* Prices are subject to change

* Room Deposit 15,500 Baht/Room

* Main Entrance Key Card 100 Baht/Key

* Bed Sheet 400 Baht/sheet

In addition, Snooker Club is available 24 hours a day with the following rates

* 60 Baht/Hour (Weekday)

* 80 Baht/Hour (Weekend and Holiday)

Business's clients consist of several types of people ranging from Business executives, Tourists, and Students. Apart from signing contracts with several tour companies, which bring in the tourists, the company also advertises in several

magazines and newspapers. Recently, the management team has been considering a new channel of introducing the business to global clients by creating a homepage affiliated with asiatraval.com to make it known to the world.

2.2 Existing Business Functions

The Company divides its functions and responsibilities into 7 major sections. On a weekly basis each section must report to the General Manager (GM), who looks after all of the activities in general, except the Apartment Rental section which must produce reports on a daily basis. The report contents are different among sections depending on their functions. GM has the duties of reporting to the Executive Committee the performance of the business, including carrying out the policy assigned by the Executive Committee. Apart from routine reports, GM may propose recommendations, problems, and solution to the Executive Committee. The followings are a summary of functions and responsibilities of the 7 sections.

Apartment Rental is responsible for Room rental service (daily, package, and monthly rents) including all related activities such as Information about places to visit, Room Cleaning, Laundry Service, Oversea Telephone, and Facsimile Service. The section must cross check with relevant sections (Snooker, Restaurant, and Internet) whether customer has any unpaid account remaining with them when checking out. This involves collection of customer bills from the relevant sections. The section must produce and present reports to the GM on a daily basis. The reports contain information about the number of rooms occupied and available, daily room reservation, daily room registration, daily room checkout, and daily income. Occasionally, GM may ask for specific reports such as Registration comparison from the past three weeks.

Finance and Accounting plans and controls the use of finance and budget allocation to other sections, including producing all legal financial documents.

Swimming Pool provides swimming pool service to customers free of charge, including pool cleaning, maintenance of all pool equipment such as Filtering machine, Chemical (Chlorine, Soda Ash), and takes care of customer's safety.

Snooker Club provides snooker service to customers and visitors. The section must produce and present reports about their income and expenses to the GM on a weekly basis, including aggregation of customer bills and sends them out to the Apartment Rental section on a daily basis.

Mini-mart sells convenience and consumer products and must produce and present reports about their income and expenses to the GM on a weekly basis.

Restaurant serves foods and beverages with reasonable prices. The Internet Café is also available. The service rates for Internet are 60 Baht for the first 30 minutes, and 50 Baht for every 30 Minutes thereafter. The section must produce and present reports about their income and expenses to the GM on a weekly basis, including aggregation of customer bills and sends them out to the Apartment Rental section on a daily basis.

Security takes care of all security in and around the facility.

2.3 Current Problems

To resolve the problems, one must understand the problems they plan to solve. Since there are many functions running in the business and many of them are cross activities, many problems exist in the company due to current workflow. The following are all the problems pertaining.

(1) One of the most concerning parts is that the business lacks effective solution to retain customer's information. Even though the present system at the main lobby does keep customer records in a file format on the computer, the incorrect structure of the file causes waste of storage space and time consuming when searching for particular information. This may stem from

people who created this database did not analyze all the entities and attributes thoroughly, or did not understand the normalization process when designing this database.

(2) Due to the first problem, there are many data that are kept redundantly in the system. For example, customer name alone has been recorded in three separated files, and if one of the files spell the name incorrectly the system users can not find the particular record he/she wants. As the file gets bigger, the longer time is required serving customer.

(3) Similar to hotel business, the company allows their customers to transfer their service fees from other sections (Snooker, Restaurant, and Internet) to their room account, which will be collected later. But since there is no network of database among relevant sections, it is very difficult for other sections apart from the Apartment Rental Service to verify whether their clients are current customers of the business. The only procedure used to verify the clients is by asking them to present their room key card which is not a polite way to do. Moreover, this procedure is prone to scam since sometimes not every customer retains the key with him or her at all times. Someone may claim that he/she is the customer who forgets to bring out the key and signing the bill which might turn out to be a hoax.

(4) When a current customer checks out, it is necessary for the Apartment Rental Section to cross check with the relevant sections whether the customer has any unpaid accounts remaining with them. This is done by collecting all the bills concerning the customer. All the bills are usually sent to the Apartment Rental section on a daily basis before 9.00 A.M. Collection of bills this way sometimes creates problem. For example, if a

MS (CIS)
St. Gabriel's Library, Au
1726 e.1

customer requests to check out early in the morning but he/she has signed some bills yesterday evening, there is no way for the Apartment Rental section to know of this transaction unless cross checking with every other section which are very time consuming and error prone. In fact, the company is now facing with the problem of uncollected billing due to mistakes in billing calculation and delay in billing delivery. This problem usually becomes even more serious when there is group tour checkouts early in the morning because there is not enough time for service workers to cross check with all related sections for unpaid accounts.

(5) Due to the current system that requires routine daily reports from the Apartment Rental section, the company executives found that there are high costs spending on print materials i.e. continuous paper, A4 paper, printer ink cartridge, and printer maintenance. Moreover, the report contents do not cover all required data as needed by the manager. Some of the data need to be printed out first to acquire information to re-input back into computer for report creation. This method of report generation frequently produces mistakes due to re-input of the same data.

(6) Because customer records are kept in the file environment method, it is very complicated and takes times to generate ad hoc reports to the General Manager. For instance, to compare Reservation, Registration, and Checkout from the past three weeks, the service workers must input command on each of the three files to obtain needed information, then take out specific data from those files into MS. Excel spread sheet to create specific report. This results in high cost spending on over time payment for service workers.

2.4 Areas for Improvement

It has been said, "the cost of acquiring a new customer has been estimated to be five times that of retaining an existing customer". There are no other times to prove this expression more real than in this present situation. The company should try to retain their current customers as much as possible by speeding up their customer services in all related areas, including resolving the customer verification procedure in Restaurant, Snooker Club, and Internet sections. At the same time, the new system should provide capability to produce routine reports if needed. This could result in cost reduction on over time payment for data workers who must spend extra time checking and producing daily routine reports as well as specific reports as required by the General manager.

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS of St GABRIEL
LABOR VINCIT OMNIA
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

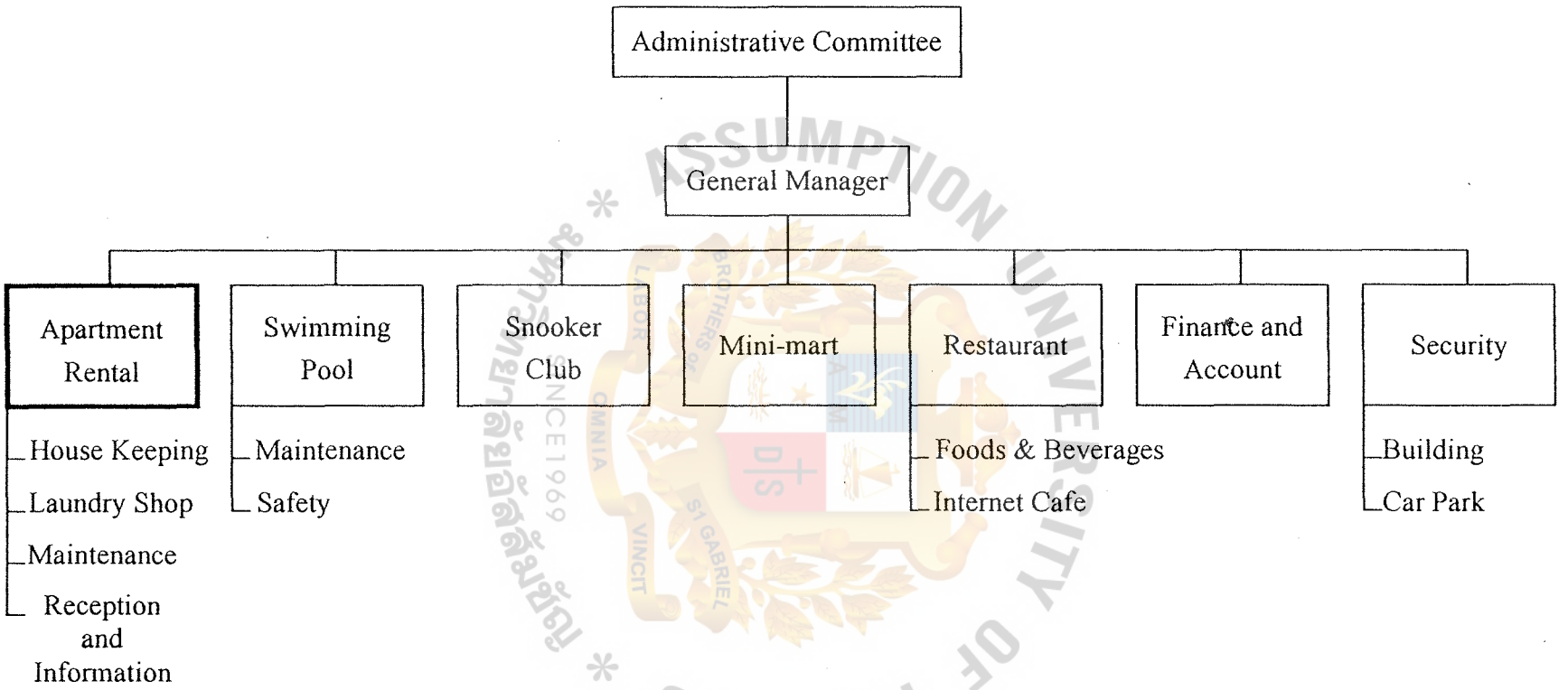


Figure 2.1. Organization Chart of Parinthip Mansion.

St. Gabriel's Library

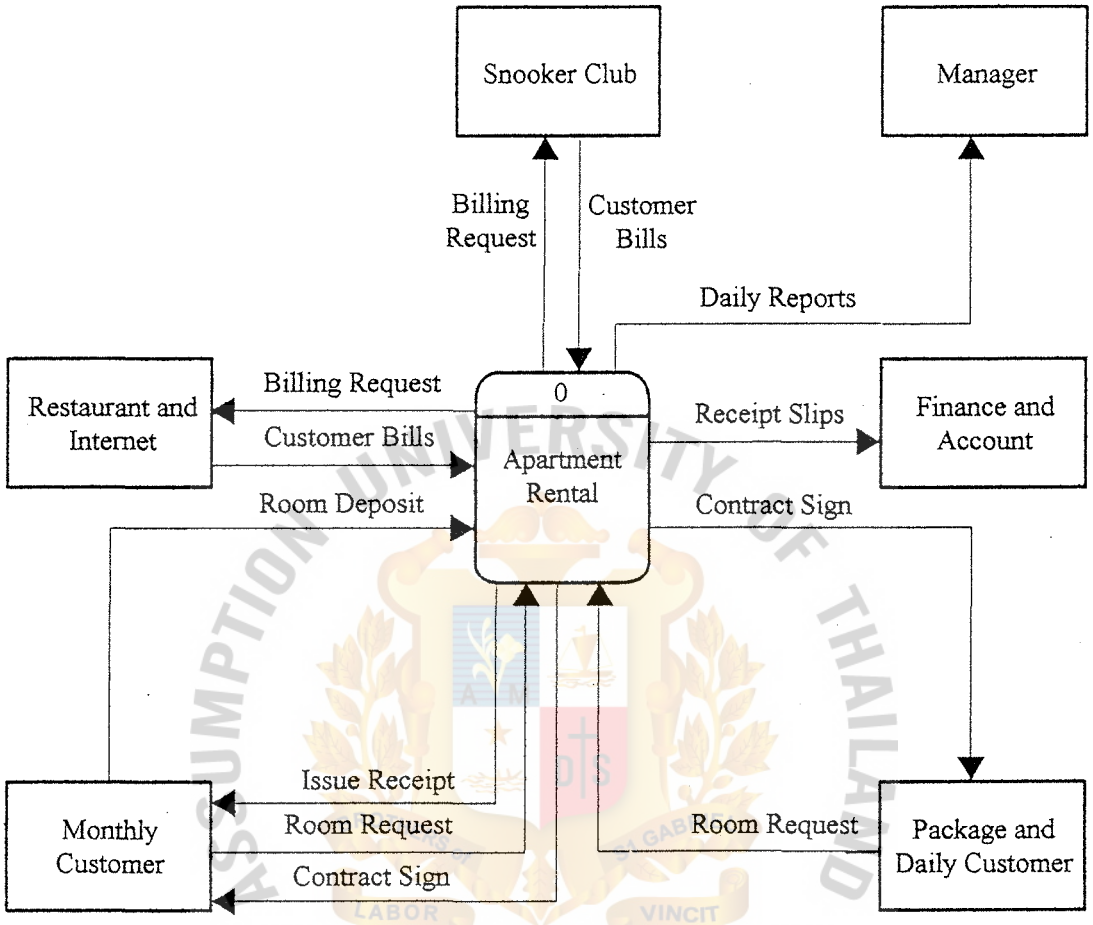


Figure 2.2. Context Data Flow Diagram of the Existing System.

III. THE PROPOSED SYSTEM

The decision of a customer to stay with what apartment, especially middle and high level clients, rests not only on location, facility, size, and rental fee, but also on their convenience and speed of service received from the business as well. To help business retaining their good relationship with a customer, it is necessary for the business to provide fast and satisfying service to them. This section will focus on improving the current workflow of the business as well as user requirements. We will also design the new database to be used in the new system.

3.1 User Requirements

From past discussion, we can now classify the user requirements as follows:

(1) The new system must be centralized, online, and provide real time information access to all relevant sections. It must also provide capability for users to make changes to the information.

(2) The new system must eliminate conflict of information about customers.

(3) The efficiency of the system must support concurrent users, provides data query and edit by several users at the same time without tardiness and still retain completeness and correctness of data.

(4) The new system must provide for flexibility. Data can be adjusted to suite user requirements and information change.

(5) The new system must be capable of separating users by providing read, write, and update services of data among groups of user.

(6) The new system must be able to generate adhoc reports for the users.

(7) The new system must provide security to data including replication and synchronization of data.

3.2 Improved Workflow

To be in line with the new system, we have improved the current workflow of the business to make it more convenient for service workers to obtain customer data. The new system depends less on paper verifications, but more on computer system. The paper verification will be needed only when required by customer.

In order to improve the performance of services to customer including the customer verification method, we will first need to design logical data flow of the system. We have modified current context data flow diagram by providing capability of the system to verify customer data to Restaurant and Internet, and Snooker Club sections. At the same time the Apartment Rental section will be able to aggregate all pending expenses of customer without having to wait for billing documents from the relevant sections. Manager will be able to query data and receive adhoc reports from the system without having to wait for routine daily reports; thus he can act quickly to take action. (Figure 3.1)

We also provide functional decomposition diagram (Figure 3.2) to give a big picture of all the functions we see fit in the new system. Row two from the top describes the functions. Under row two are all related activities or events that belong to each function in the new system.

For each event we give the following explanation.

Reservation Request (Figure 3.3):

(1) Customer makes room reservation via telephone or reception.

(2) Reception checks for room available from Table Room.

(3) Reception checks customer rent history from Table Rent History.

(4) Reception checks customer data from Table Customer.

(5) Reception updates information in Table Reservation.

(6) Reception confirms room reservation to customer.

Reservation Cancellation (Figure 3.4):

(1) Customer requests room cancellation via telephone or Reception.

(2) Reception verifies room reservation from Table Reservation.

(3) Reception terminates room reservation in Table Reservation.

(4) Reception confirms room cancellation to customer.

(5) Reception updates information in Table Room.

Generate Adhoc Report for Room Reservation (Figure 3.5):

(1) The system validates information from Table Reservation.

(2) The system generates adhoc report for room reservation in accordance with the condition set forth by the general manager.

Registration Request for Reserved Customer (Monthly) (Figure 3.6):

(1) Customer requests for room check-in via reception.

(2) Reception verifies room reservation from Table Reservation.

(3) Reception verifies customer data from Table Customer.

(4) Reception checks room available from Table Room.

(5) Reception marks room occupied in Table Room.

(6) Reception updates information in Table Customer.

(7) Reception registers customer in Table Registration.

(8) Reception has customer sign contract.

(9) Reception collects room deposit from customer and update information in Table Room Deposit.

(10) Reception issues receipt to customer.

Registration Request for Reserved Customer (Daily & Package) (Figure 3.6):

(1) Customer requests for room check-in via reception.

(2) Reception verifies room reservation from Table Reservation.

(3) Reception verifies customer data from Table Customer.

(4) Reception checks room available from Table Room.

(5) Reception marks room occupied in Table Room.

(6) Reception updates information in Table Customer.

(7) Reception registers customer in Table Registration.

(8) Reception has customer sign contract.

Registration Request for Walk-in Customer (Monthly) (Figure 3.6):

(1) Customer requests for room check-in via reception.

(2) Reception checks customer rent history from Table Rent History.

(3) Reception verifies room reservation from Table Reservation.

(4) Reception checks room available from Table Room.

(5) Reception marks room occupied in Table Room.

(6) Reception verifies customer data from Table Customer.

(7) Reception updates information in Table Customer.

(8) Reception registers customer in Table Registration.

(9) Reception has customer sign contract.

(10) Reception collects room deposit from customer and update information in Table Room Deposit.

(11) Reception issues receipt to customer.

Registration Request for Walk-in Customer (Daily & Package) (Figure 3.6):

(1) Customer requests for room check-in via reception.

(2) Reception checks customer rent history from Table Rent History.

(3) Reception verifies room reservation from Table Reservation.

(4) Reception checks room available from Table Room.

(5) Reception marks room occupied in Table Room.

(6) Reception verifies customer data from Table Customer.

(7) Reception updates information in Table Customer.

(8) Reception registers customer in Table Registration.

(9) Reception has customer sign contract.

Generate Adhoc Report for Room Registration (Figure 3.7):

(1) The system validates information from Table Registration.

(2) The system generates adhoc report for room registration in accordance with the condition set forth by the general manager.

In-house Service Request (Figure 3.8):

(1) Customer requests for room service via reception.

(2) Reception verifies room registration from Table Registration.

(3) Reception checks for service schedule from Table Customer Service.

(4) Reception records for schedule service for customer in Table Customer Service.

(5) Reception confirms service record to customer.

In-house Service Cancellation (Figure 3.9):

(1) Customer requests for room service cancellation via reception.

(2) Reception verifies service from Table Customer Service.

(3) Reception terminates service in Table Customer Service.

(4) Reception confirms service cancellation to customer.

ASSUMPTION UNIVERSITY OF THAILAND
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

St. Gabriel's Library

Generate Adhoc Report for In-house Service (Figure 3.10):

(1) The system validates information from Table Customer Service.

(2) The system generates adhoc report for in-house service in accordance with the condition set forth by the general manager.

Snooker Service Pending (Figure 3.11):

(1) Customer requests to transfer snooker service to their room account via service worker.

(2) Service worker verifies room registration from Table Registration.

(3) Service worker records transferred expenses into Table Snooker Service.

Generate Adhoc Report for Snooker Service Pending (Figure 3.12):

(1) The system validates information from Table Snooker Service.

(2) The system generates adhoc report for snooker service pending in accordance with the condition set forth by the general manager.

Input Room Expenses (Figure 3.13):

(1) When it is deadline to fill room expenses (water, electricity, and telephone charges), for example at the end of month or when customer checks out, reception records all expenses in Table Room Expenses.

Generate Adhoc Report for Room Expenses (Figure 3.14):

(1) The system validates information from Table Room Expenses.

(2) The system generates adhoc report for room expenses in accordance with the condition set forth by the general manager.

Restaurant Service Pending (Figure 3.15):

(1) Customer requests to transfer restaurant service to their room account via service worker.

(2) Service worker verifies room registration from Table Registration.

(3) Service worker records transferred expenses into Table Restaurant Service.

Generate Adhoc Report for Restaurant Service Pending (Figure 3.16):

(1) The system validates information from Table Restaurant Service.

(2) The system generates adhoc report for restaurant service pending in accordance with the condition set forth by the general manager.

Internet Service Pending (Figure 3.17):

(1) Customer requests to transfer internet service to their room account via service worker.

(2) Service worker verifies room registration from Table Registration.

(3) Service worker records transferred expenses into Table Internet Service.

Generate Adhoc Report for Internet Service Pending (Figure 3.18):

(1) The system validates information from Table Internet Service.

(2) The system generates adhoc report for internet service pending in accordance with the condition set forth by the general manager.

Room Check-out Request for Customer (Daily & Package) (Figure 3.19):

(1) Customer requests for room checkout via reception.

(2) Reception verifies pending expenses from Table Snooker Service.

(3) Reception verifies pending expenses from Table Internet Service.

(4) Reception verifies pending expenses from Table Restaurant Service.

(5) Reception verifies expenses from Table Room Expenses.

(6) Reception verifies expenses from Table Customer Service.

(7) Reception collects room payment from customer.

(8) Reception issues receipt to customer.

(9) Reception marks room checkout in Table Registration.

(10) Reception marks for room available in Table Room.

(11) Reception updates information in Table Rent History.

Room Check-out Request for Customer (Monthly) (Figure 3.19):

(1) Customer requests for room checkout via reception.

(2) Reception verifies pending expenses from Table Snooker Service.

(3) Reception verifies pending expenses from Table Internet Service.

(4) Reception verifies pending expenses from Table Restaurant Service.

(5) Reception verifies expenses from Table Room Expenses.

(6) Reception verifies expenses from Table Customer Service.

(7) Reception verifies room deposit from Table Room Deposit.

(8) Reception returns room deposit to customer.

(9) Reception collects rent fee from customer.

(10) Reception issues receipt to customer.

(11) Reception marks room checkout in Table Registration.

(12) Reception marks for room available in Table Room.

(13) Reception updates information in Table Rent History.

(14) Reception updates information in Table Room Deposit.

Generate Adhoc Report for Room Check-out (Figure 3.20):

(1) The system validates information from Table Registration.

(2) The system generates adhoc report for room checkout in accordance with the condition set forth by the general manager.

Figures 3.21 and 3.22 show system diagram of the proposed system when we put all related events together as one big system. These event diagrams will be used as the working procedure for the new system. We hope this new data flow provides better service in terms of speed and accuracy of data to customer.

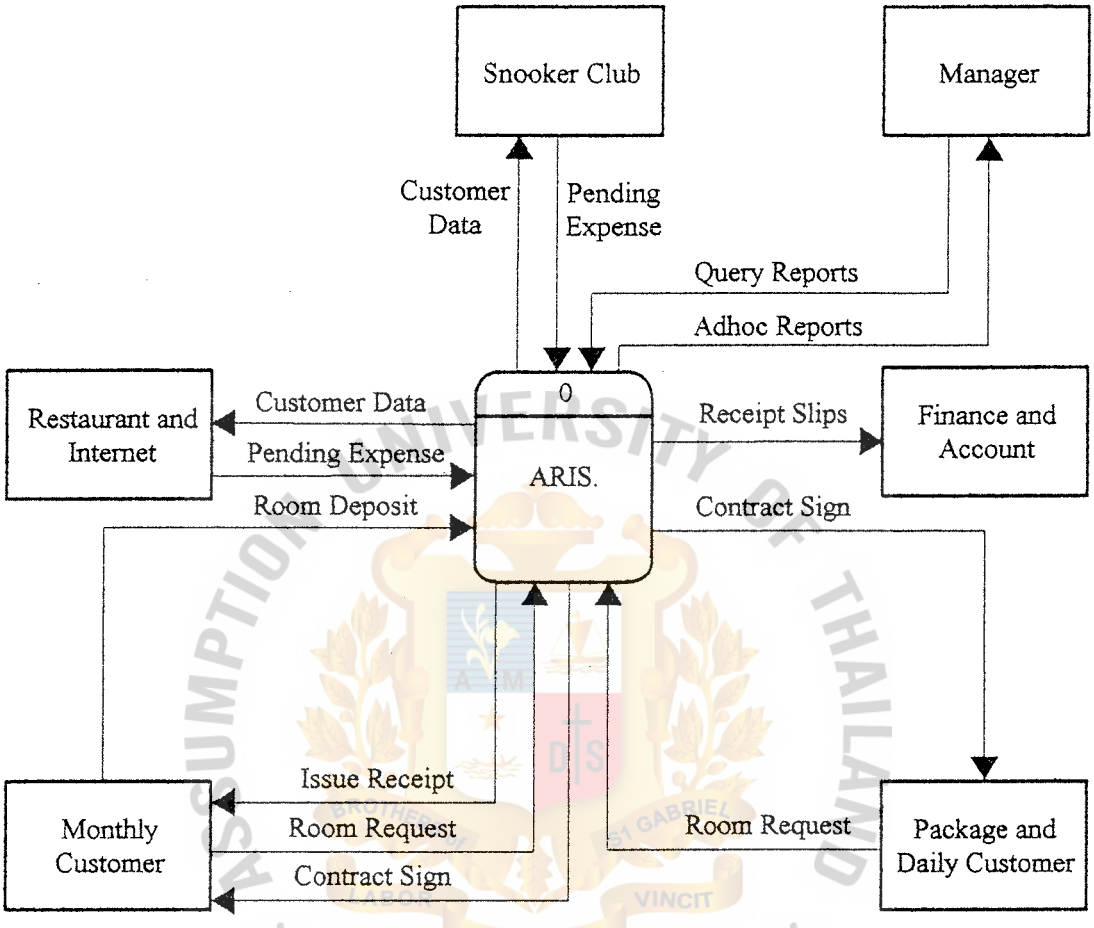


Figure 3.1. Context Data Flow Diagram of the Proposed System.

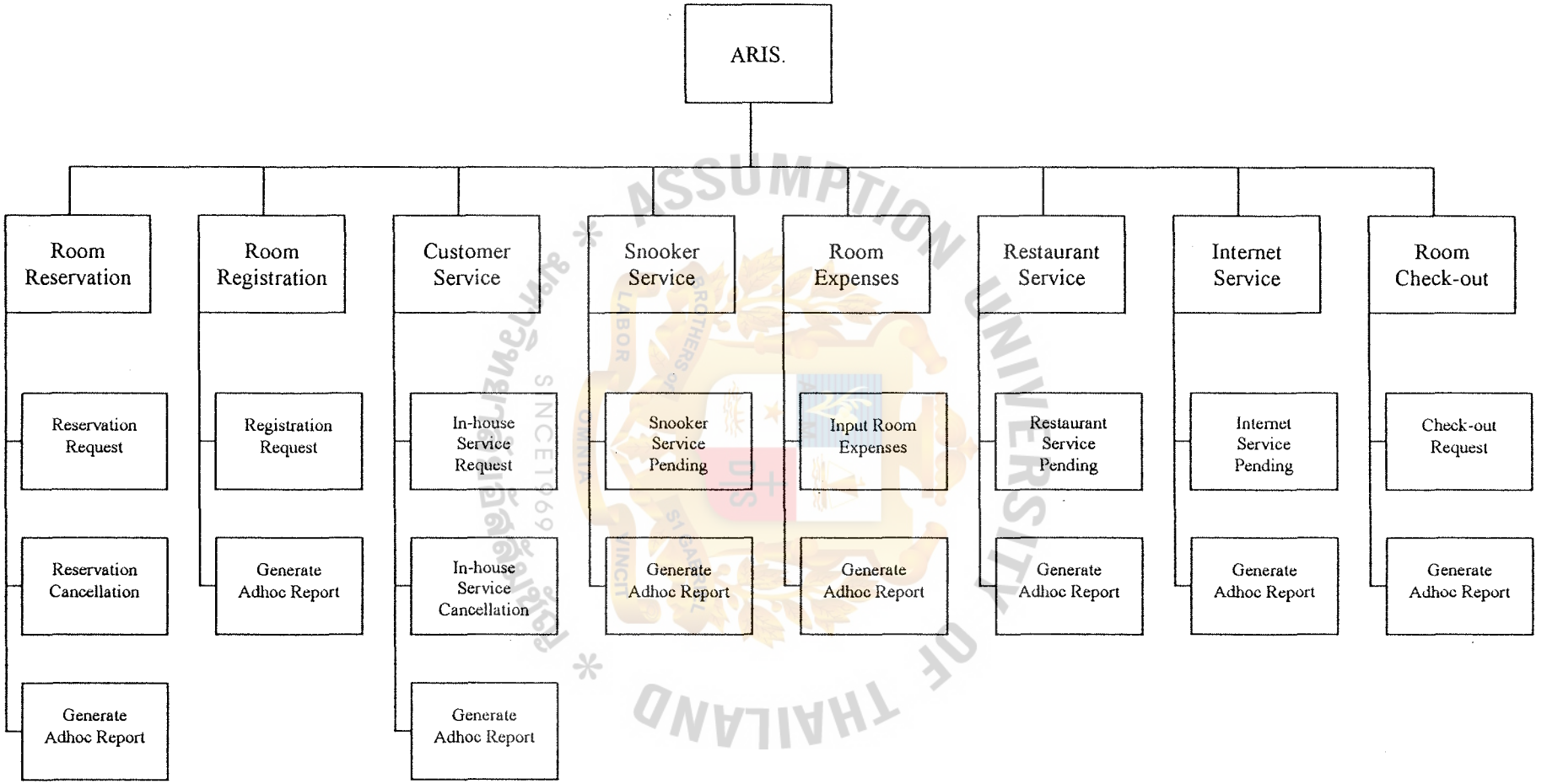


Figure 3.2. Functional Decomposition Diagram of the Proposed System.

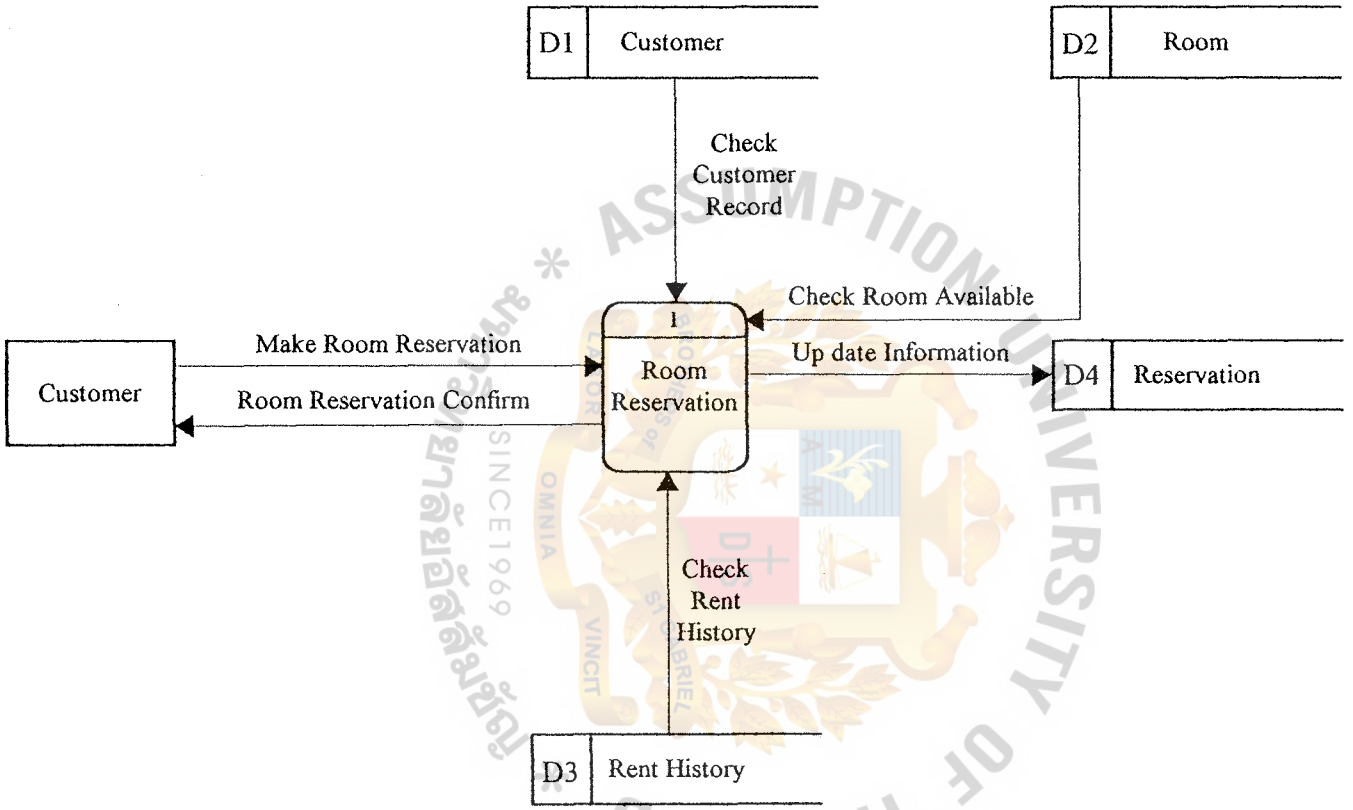


Figure 3.3. Event Diagram: Reservation Request.

St. Gabriel's Library

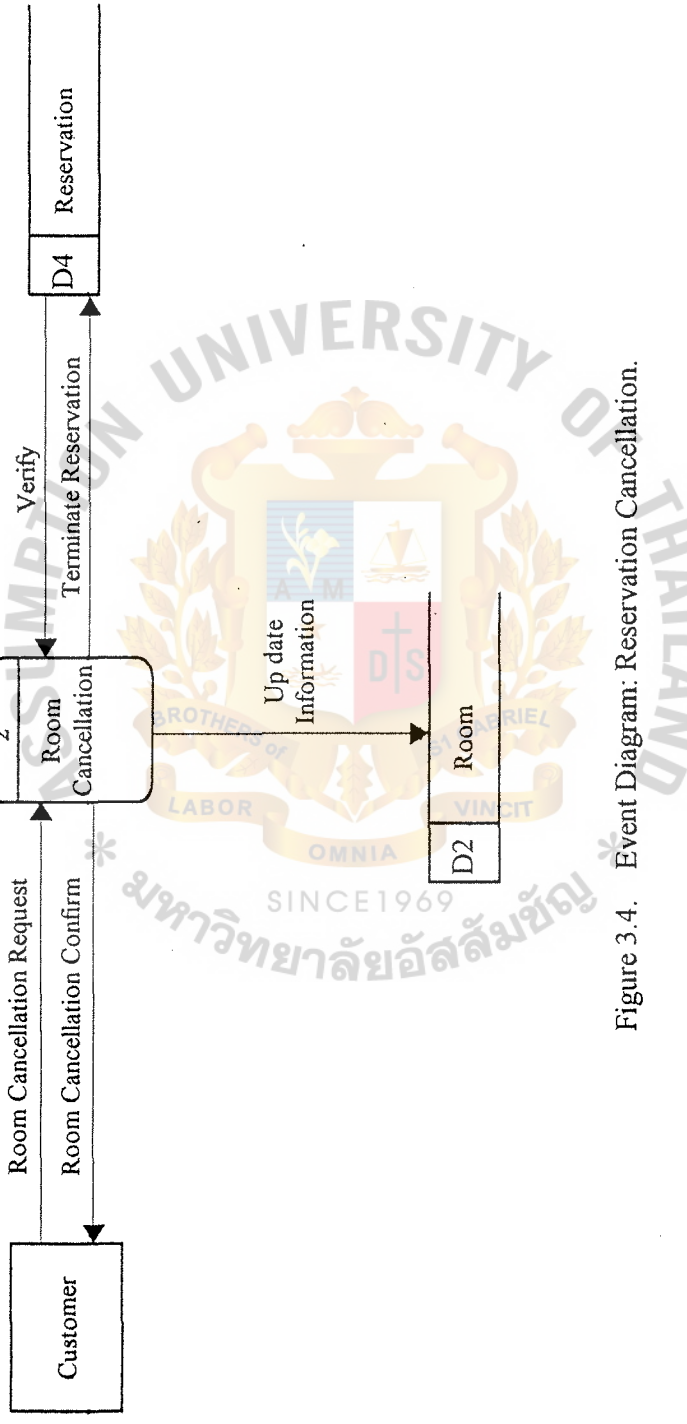


Figure 3.4. Event Diagram: Reservation Cancellation.

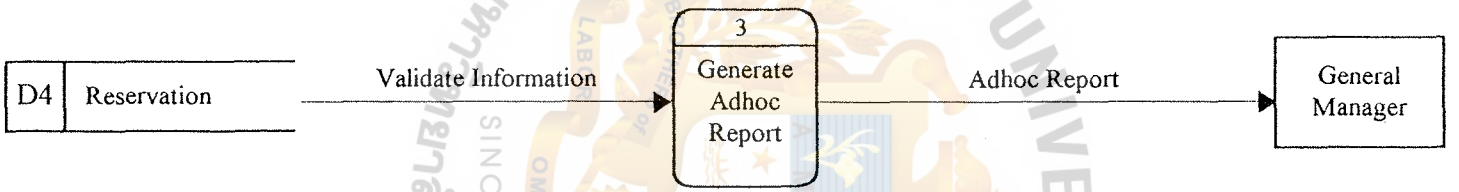


Figure 3.5. Event Diagram: Generate Adhoc Report for Room Reservation.

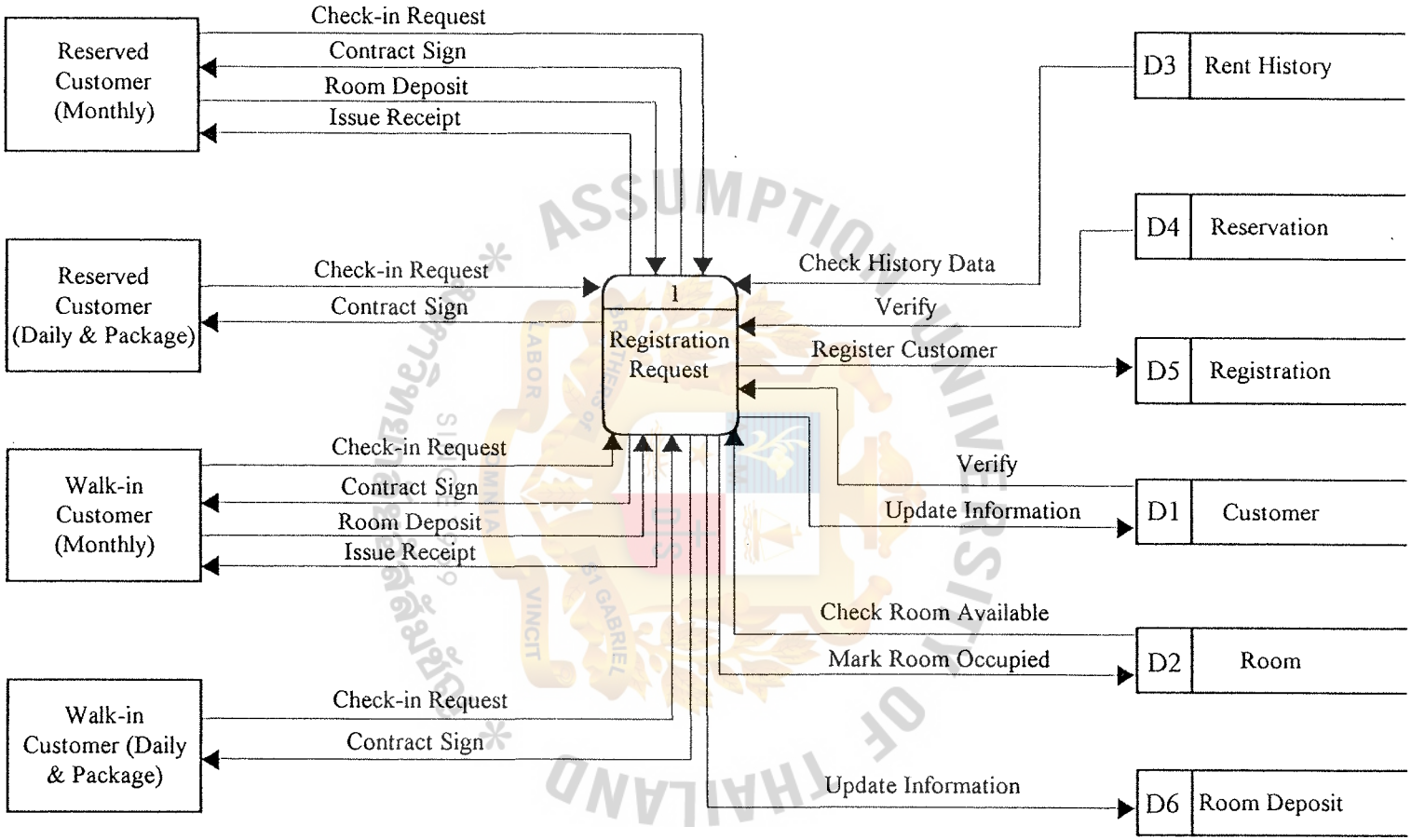


Figure 3.6. Event Diagram: Registration Request.

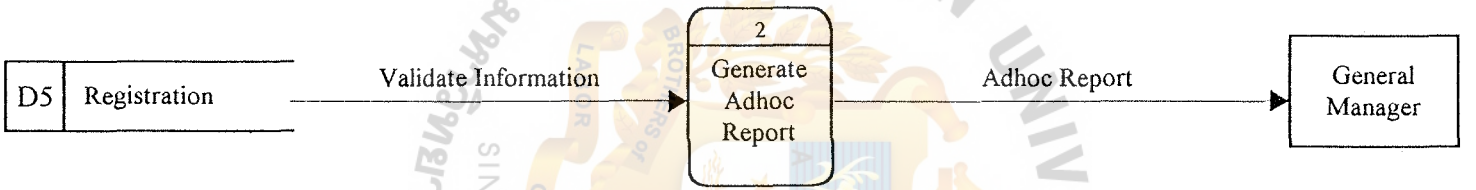


Figure 3.7. Event Diagram: Generate Adhoc Report for Room Registration.

St. Gabriel's Library

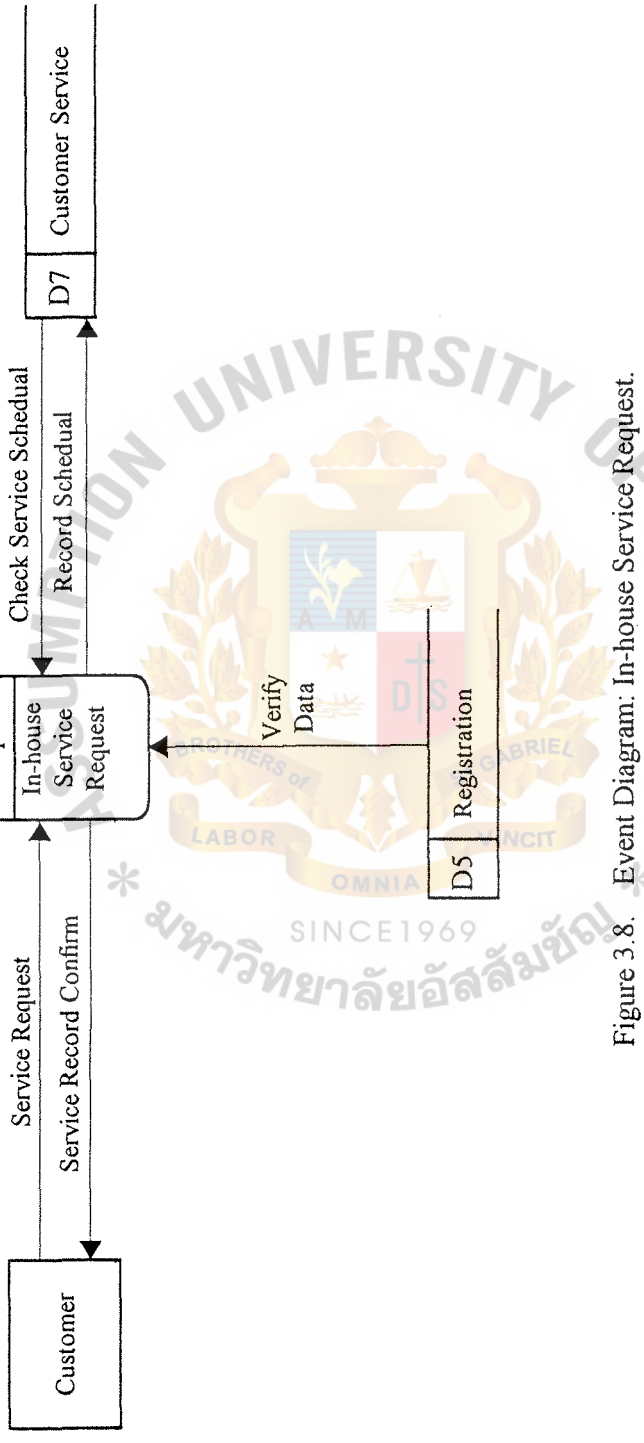


Figure 3.8. Event Diagram: In-house Service Request.

ASSUMPTION UNIVERSITY OF THAILAND
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

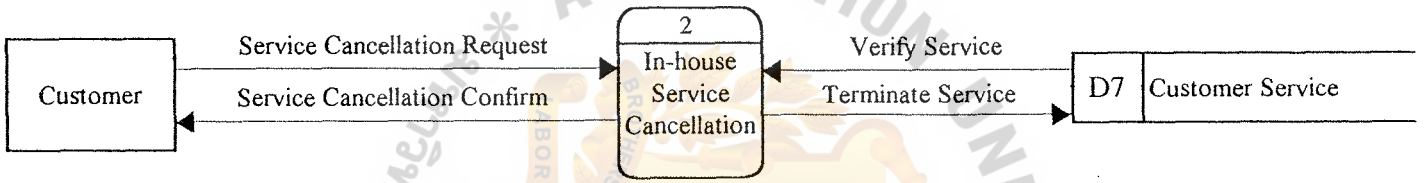


Figure 3.9. Event Diagram: In-house Service Cancellation.

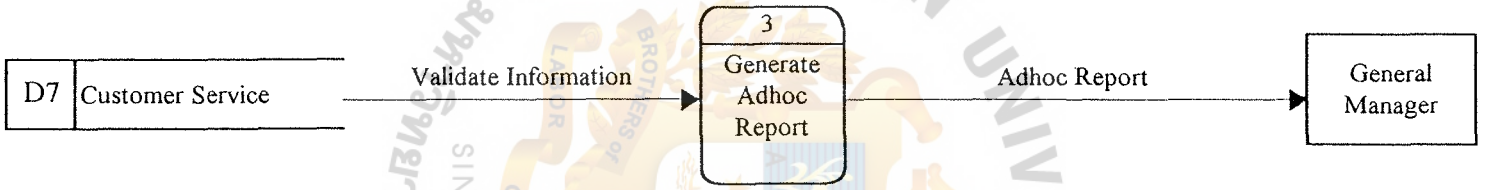


Figure 3.10. Event Diagram: Generate Adhoc Report for In-house Service.

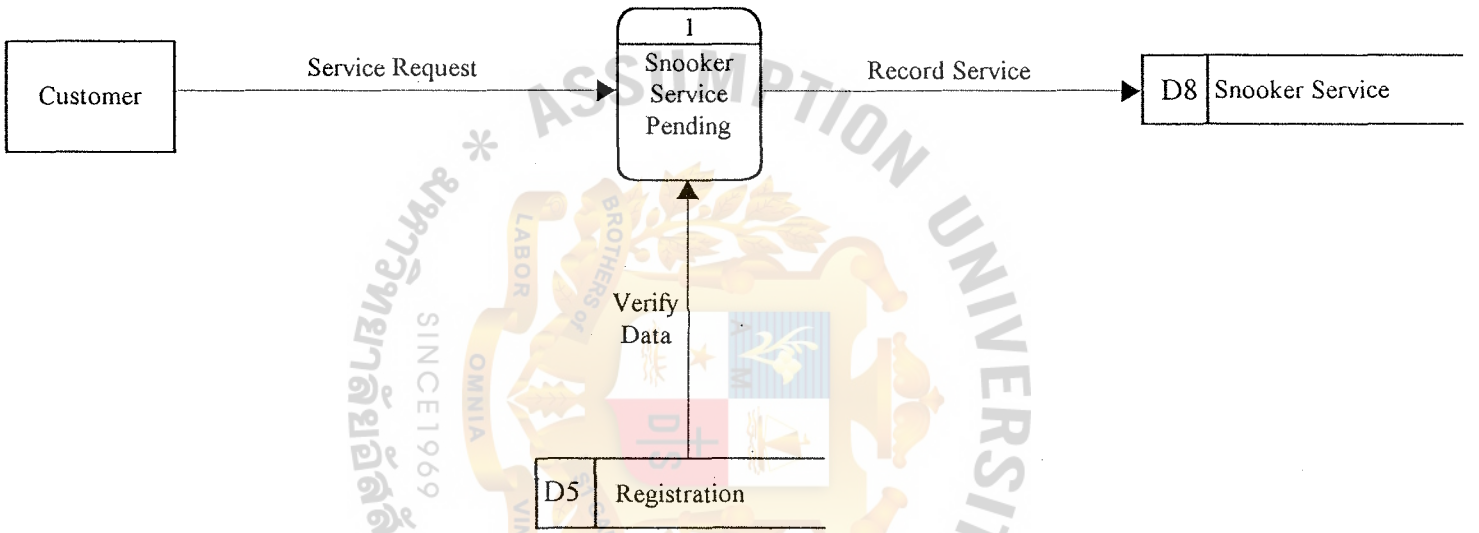


Figure 3.11. Event Diagram: Snooker Service Pending.

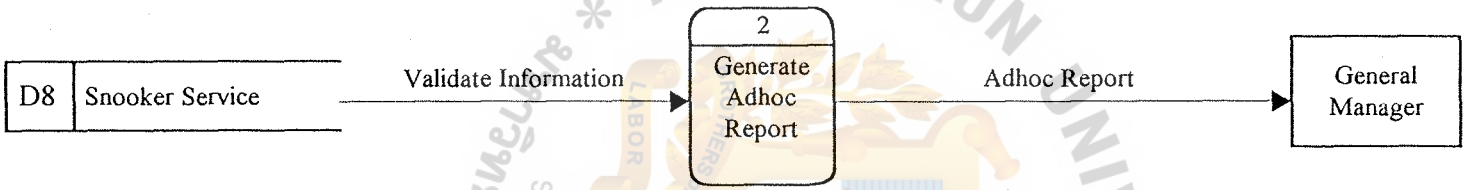


Figure 3.12. Event Diagram: Generate Adhoc Report for Snooker Service Pending.

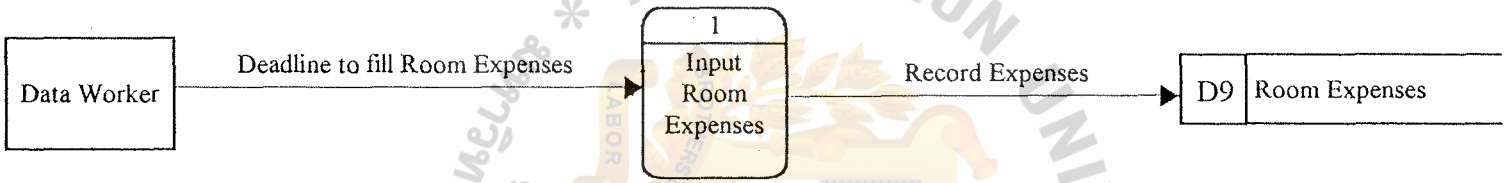


Figure 3.13. Event Diagram: Input Room Expenses.

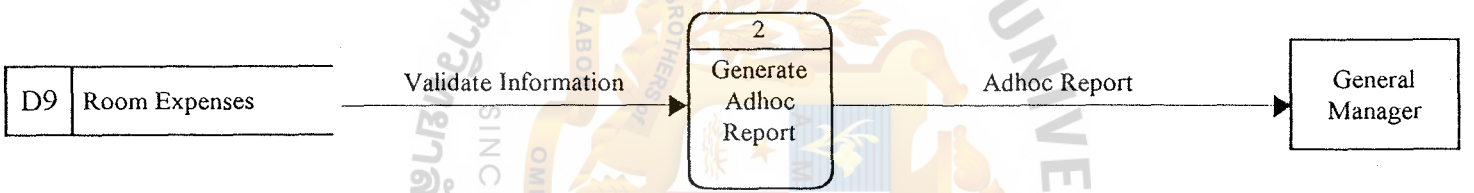


Figure 3.14. Event Diagram: Generate Adhoc Report for Room Expenses.

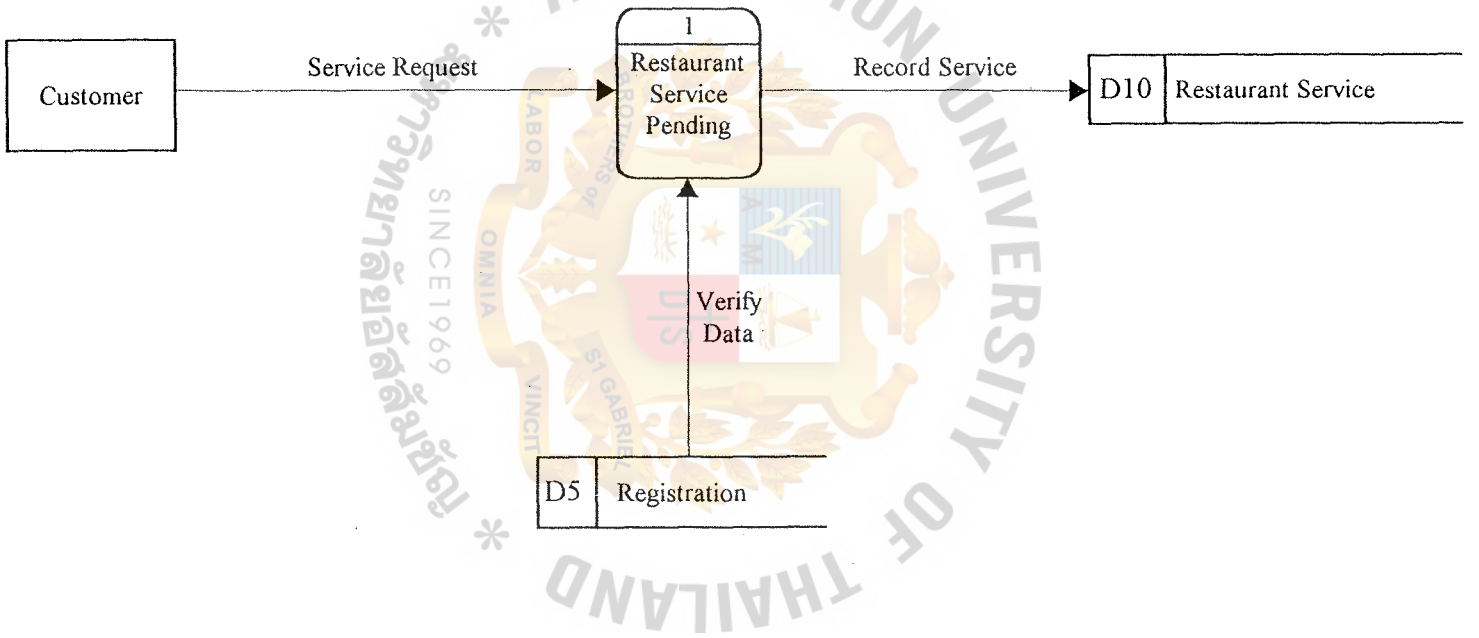


Figure 3.15. Event Diagram: Restaurant Service Pending.

St. Gabriel's Library

Figure 3.16. Event Diagram: Generate Adhoc Report for Restaurant Service Pending.

ASSUMPTION UNIVERSITY OF THAILAND
มหาวิทยาลัยอัสสัมชัญ
SINCE1969

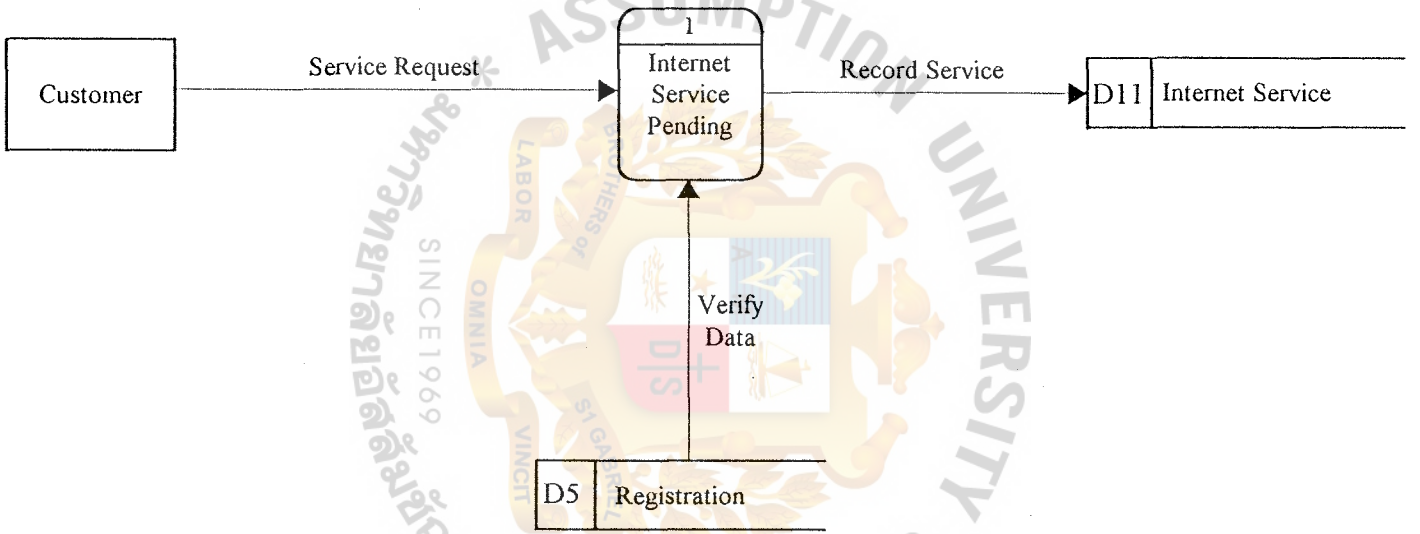


Figure 3.17. Event Diagram: Internet Service Pending.

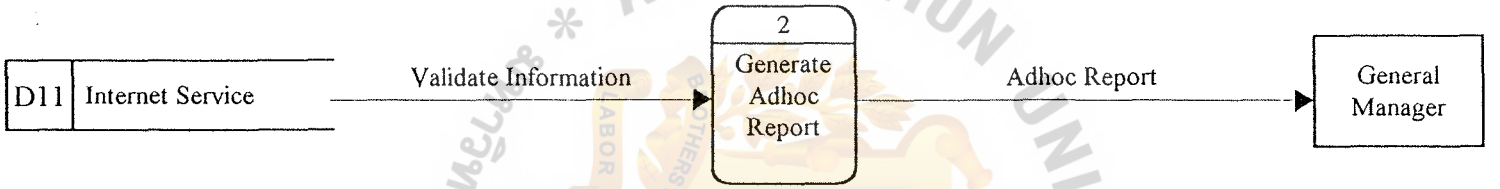


Figure 3.18. Event Diagram: Generate Adhoc Report for Internet Service Pending.

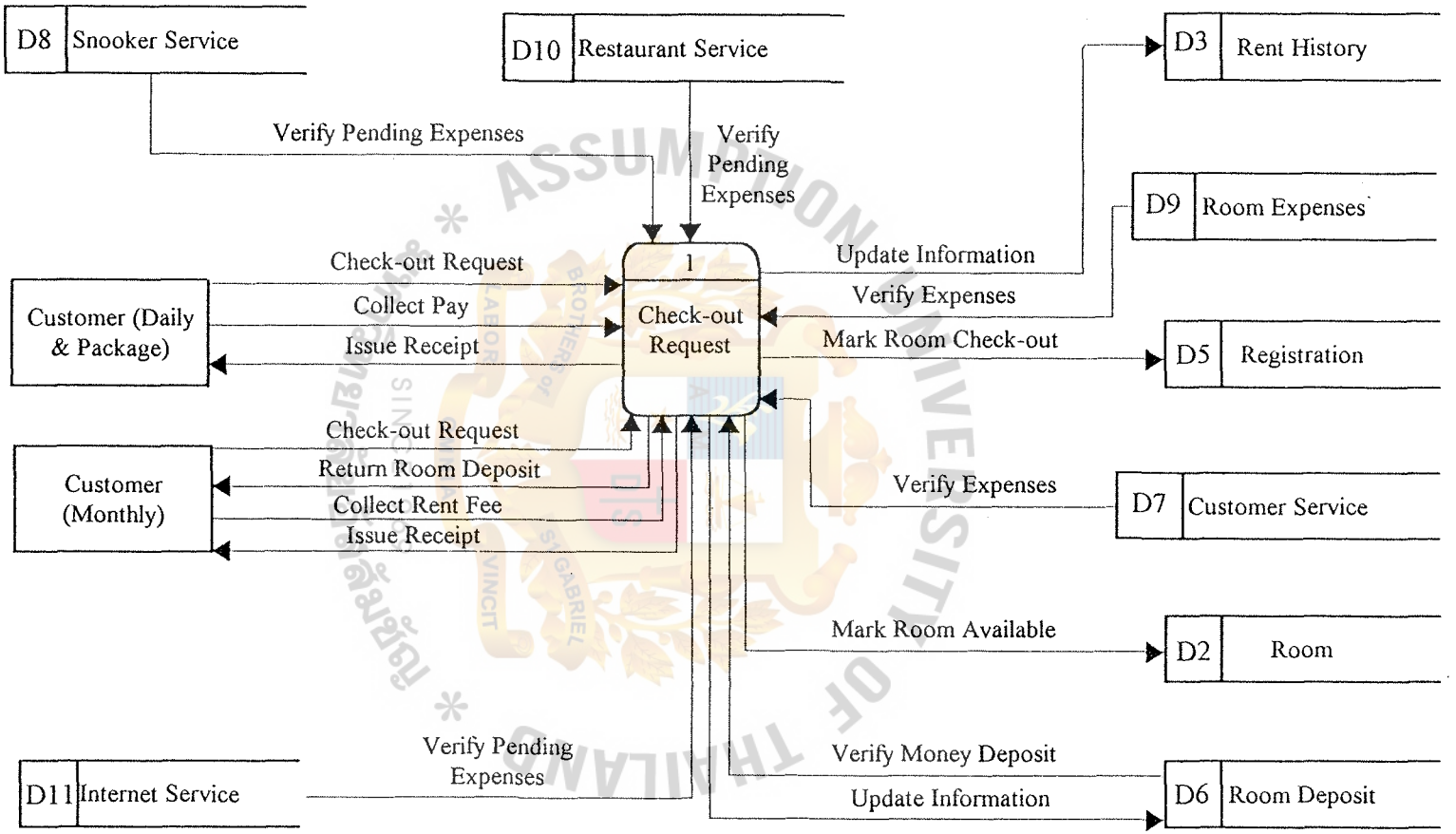


Figure 3.19. Event Diagram: Room Check-out Request.

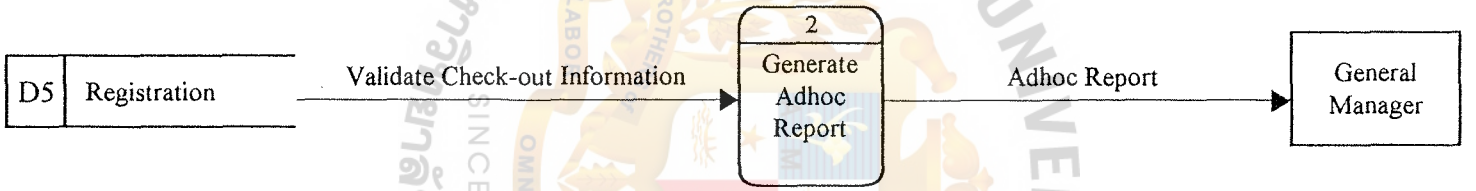


Figure 3.20. Event Diagram: Generate Adhoc Report for Room Check-out.

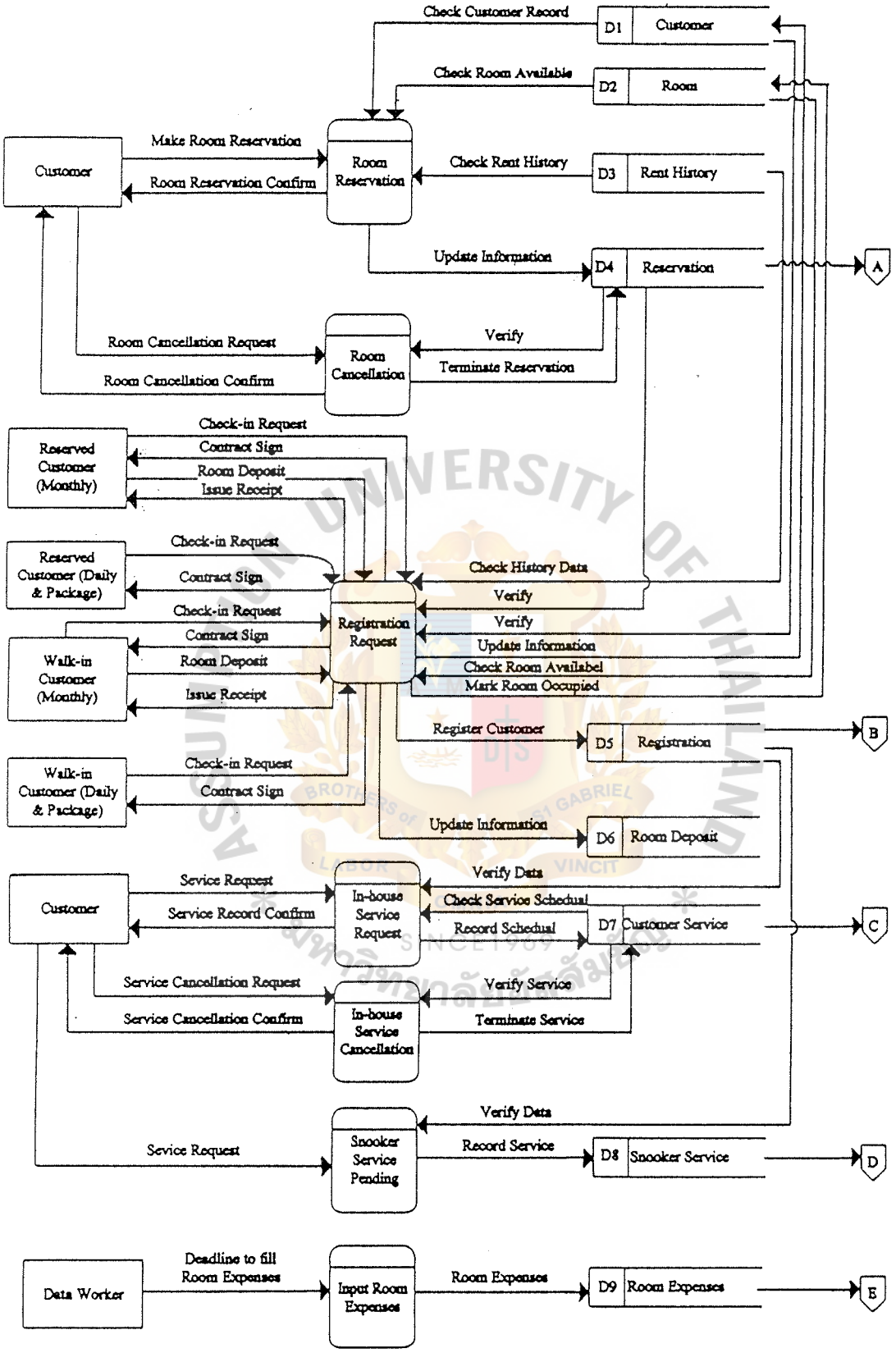


Figure 3.21. System Diagram of The Proposed System (Page 1).

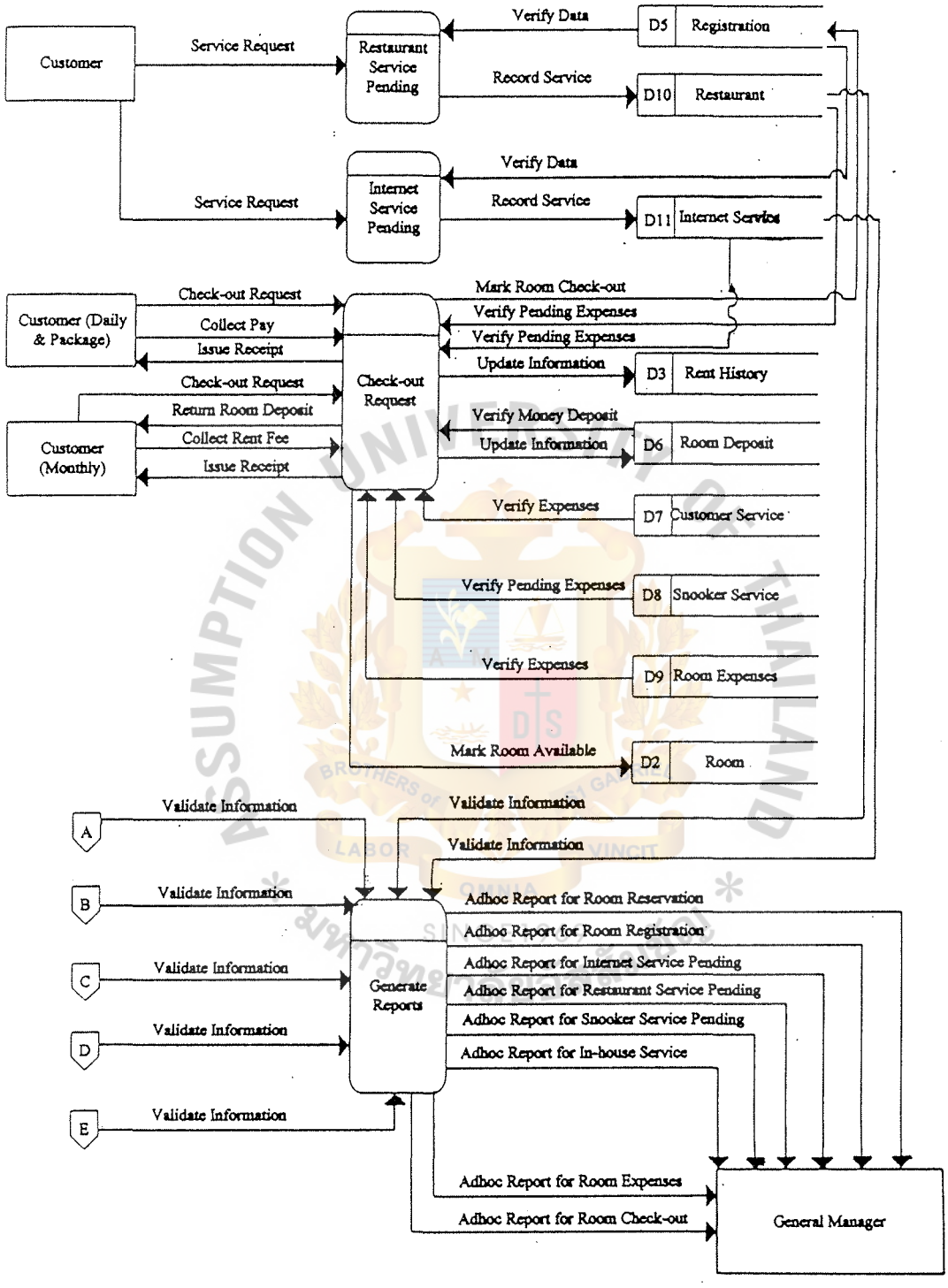


Figure 3.22. System Diagram of The Proposed System (Page 2).

3.3 Information Technology Architecture

Before we make decisions on Hardware and Software requirements, let's consider first on information technology architecture that will be implemented on the new system. Since new alternatives are continuously evolving, we will focus on the latest technology but at the same time will not neglect cost and possibility to implement the system. In other words, we will look for the best technology that we think suited most and can be afforded by the business. There are four architectures worth considering.

Network Architecture: Among different kinds of Client/Server Computing, we decided to choose "Distributed Database" or "Two-tiered Client/Server" for the proposed system. Due to the nature of the business, which is a single business unit, LAN with Database server will be the most appropriate networking because they provide less traffic on the network. Each client machine has its own dedicated line connected to the server in a star shape, and requires only one link and one I/O port to connect to the server making it easy to install and reconfigure. The main advantage of the distributed database computing is to separate data and business logic to isolate each from changes to the other, make the data more available to users, and retain the data integrity of centralized computing through centrally managed servers. The Star topology coupled with Unshielded twisted pair cable as the transmission medium appear to be the most effective way for implementing the network. The advantage, among many, that we select star topology is that it requires less cabling needs, and additions, moves, and deletions involve only one connection: between that client and the server. We can also control data at one single point, the server, without concerning about the data being disparate in the system because data has to be sent through the server. At the same time, the use of Unshielded twisted pair is the most cost-effective for a single

building, low-traffic LAN installation because of its inexpensive, well-understood medium.

Data Architecture: We select Microsoft SQL Server 7.0 as the technology of client/server computing. The production version of SQL Server 7.0 is solid and quite refined. Microsoft has provided additional functionality in this production release, such as enhanced replication and data-transfer options, which is found to be quite well. The built-in Online Analytical Processing (OLAP) services are unique to SQL Server and provide an easy-to-use mechanism to analyze multi-dimensional data. The Database Management tools in version 7.0 are very simple to navigate and understand.

Interface Architecture: As stated in the user requirements, we need an on-line data processing to provide update information of customer. On screen display will be built using GUI technology.

Process Architecture: The software development environment used for constructing information applications is MS. Visual Basic for Application 6.0, which provides report writing environment. Furthermore, MS. SQL Server 7.0 provides the OLAP capability that can help develop a variety of enterprise solutions, such as corporate reporting and analysis as well as a data modeling and decision support. OLAP services also offers intelligent aggregations, resulting in smaller databases, improved performance, and shorter initial and incremental load times.

3.4 Hardware and Software Requirements

Hardware Requirements:

(a) Database Server 1 Unit

Specification:

- Compaq ProLiant ML370
- Intel® Pentium® III processor 733MHz/133MHz Front Side Bus (Dual Processors Capability)
- 256KB second level ECC cache per processor
- 256MB ECC SDRAM expand to 2GB
- Maximum internal storage 182GB Wide Ultra2/Ultra3 SCSI Drive Cage
- 4MB Video Memory, 64-bit PCI
- Fast Ethernet NIC 10/100 Wake On LAN
- 32X MAX IDE CD-ROM Drive
- Hot Plug Power Supplied, Hot Plug Fan

* Free 3 Year On-site Service including Labor, Parts, and Fast service response within 4 hours
* Free Pre-Failure Warranty Intel® Pentium® III processor, Memory and Hard Drive
* Free software included: Compaq Insight Manager, SmartStart, Integrated Remote Console (IRC), and Automatic Server Recovery-2 (ASR-2)

(b) Client Computers 6 Units

Specification:

- Compaq Deskpro EN Series Desktop
- Intel® Pentium® III Processor 733MHz
- 820 chipset model (Supports Pentium III/133 256 Kb)
- 128 MB SDRAM
- 15" SVGA. Color Monitor (Non Interlace/EPA Compliance)
- 4.3GB SMART Ultra ATA HDD
- Graphic/Audio

  820 chipset model : Matrox Millennium G400 (16MB)/Integrated AC'97 audio with Compaq PremierSound
- CD-ROM 820 chipset model : 40X Max tray load IDE
- Pre-installed Windows NT Workstation 4.0
- Intelligent Manageability

* 3 Years limited warranty, Parts/Labor/On-site service

  Next Business Day

(c) Printers

- HP Laser Jet 6P (12 P/M A4 paper) 1 Unit
- Epson LQ-670 (Support up to 18" paper width) 1 Unit

(d) UPSs

- Soltec APA-1200 (4 hr. Power Backup) 7 Units

(e) LAN Accessories

- 19" 8-Port Stackable Dual Speed 10/100Mbps Hub 1 Unit
- LAN Card 16 Mbps 6 Units
- Category 5 UTP 200 Metres

St. Gabriel's Library

-	Transceiver cable	50	Metres
-	Printer sharing switch	1	Unit

Software Requirements:

(a) Network Operating System

-	Windows NT Server 4.0 with version pack 10 users	1	Unit

(b) Database Software

-	MS. SQL Server V. 7.0	1	Unit

Figure 3.23 shows network configuration of the proposed computerized system.

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS of St GABRIEL
LABOR VINCIT OMNIA
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

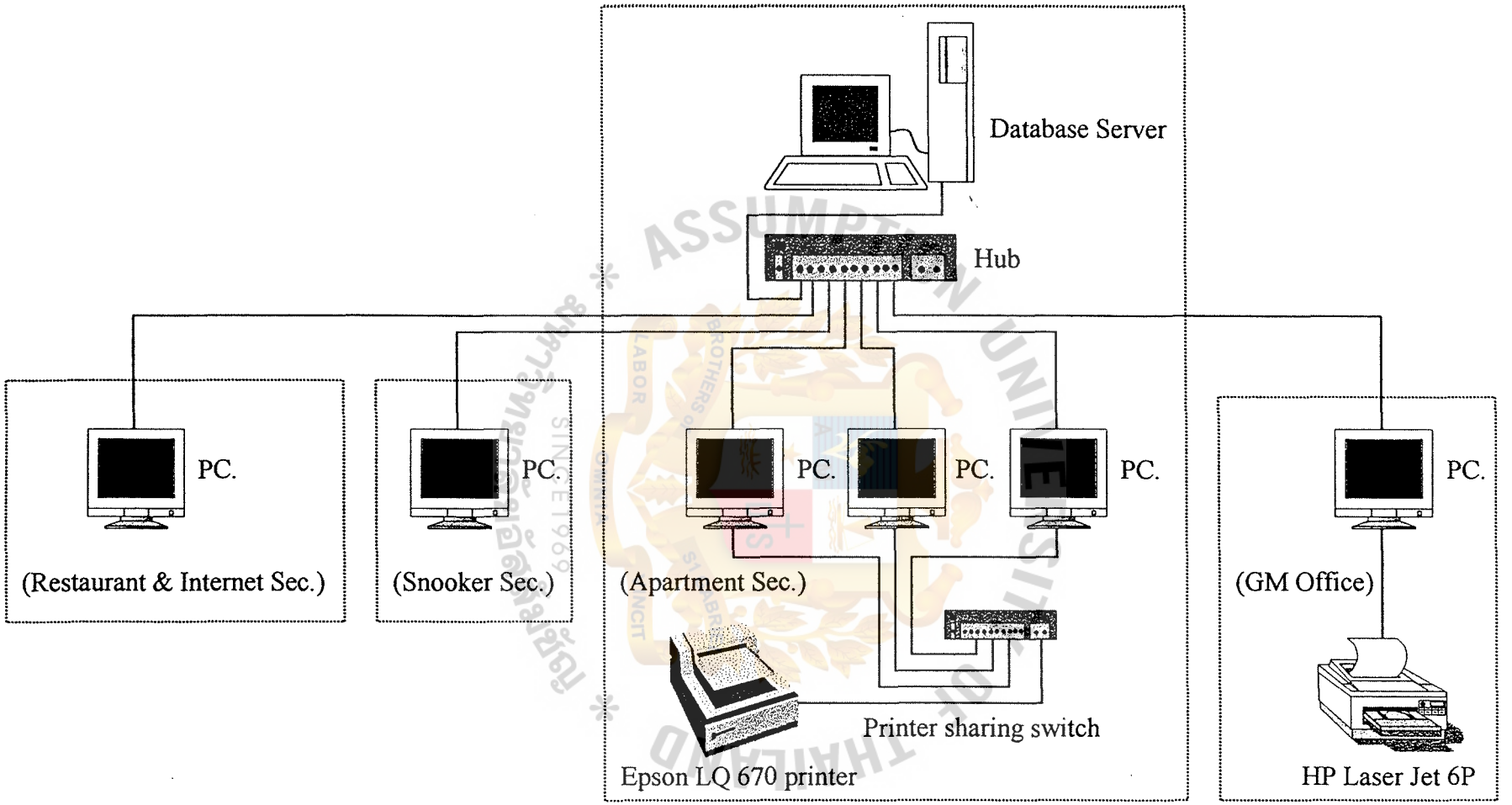


Figure 3.23. Network Configuration of the Proposed Computerized System.

3.5 Cost Vs. Benefit Analysis

(1) Costs of the existing system:

Table 3.1. Existing System Cost Analysis, Baht.

Cost Items	Year 1	Year 2	Year 3	Year 4	Year 5
Operating Costs					
Over time payment costs:					
Accountant	216,000.00	237,600.00	261,360.00	287,496.00	316,245.60
(1 Person@18,000 Baht per month)					
(Average 10% increase per year)					
Finance Officer	144,000.00	158,400.00	174,240.00	191,664.00	210,830.40
(1 Person@12,000 Baht per month)					
(Average 10% increase per year)					
Office Supplies & Miscellaneous Costs:	30,000.00	33,000.00	36,300.00	39,930.00	43,923.00
(Average 10% increase per year)					
Total Operating Costs	390,000.00	429,000.00	471,900.00	519,090.00	570,999.00
Uncollected bills					
Foods and Beverage	240,000.00	264,000.00	290,400.00	319,440.00	351,384.00
(20,000 Baht per month)					
(Average 10% increase per year)					
Internet	24,000.00	26,400.00	29,040.00	31,944.00	35,138.40
(2,000 Baht per month)					
(Average 10% increase per year)					
Snooker	156,000.00	171,600.00	188,760.00	207,636.00	228,399.60
(13,000 Baht per month)					
(Average 10% increase per year)					
Total Costs for Uncollected Bills	420,000.00	462,000.00	508,200.00	559,020.00	614,922.00
Total Costs of Existing System	810,000.00	891,000.00	980,100.00	1,078,110.00	1,185,921.00
Cumulative Costs of Existing System	810,000.00	1,701,000.00	2,681,100.00	3,759,210.00	4,945,131.00

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS OF ST GABRIEL
LABOR OMNIA VINCIT
SINCE 1969

(2) Costs of the proposed system:

Table 3.6. Proposed System Cost Analysis, Baht.

Cost Items	Year 1	Year 2	Year 3	Year 4	Year 5
Fixed Costs					
Development Costs:					
System analysis	30,000.00	-	-	-	-
Programming	20,000.00	-	-	-	-
GUI Design	35,000.00	-	-	-	-
Architecture design	30,000.00	-	-	-	-
Database design	50,000.00	-	-	-	-
Installation & Implementation charge	20,000.00	-	-	-	-
Hardware and Software Costs:					
Database Server (1 Unit@145,000 Baht)	29,000.00	29,000.00	29,000.00	29,000.00	29,000.00
Client Computer (6 Units@78,500 Baht)	94,200.00	94,200.00	94,200.00	94,200.00	94,200.00
HP Laser Jet 6P Printer (1 Unit@32,500 Baht)	6,500.00	6,500.00	6,500.00	6,500.00	6,500.00
Epson LQ-670 Printer (1 Unit@10,500 Baht)	2,100.00	2,100.00	2,100.00	2,100.00	2,100.00
Soltec APA-1200 (7 Units@18,200 Baht)	25,480.00	25,480.00	25,480.00	25,480.00	25,480.00
Hub (1 Unit@11,000 Baht)	11,000.00	-	-	-	-
LAN Card (6 Units@750 Baht)	4,500.00	-	-	-	-
Category 5 UTP (200 Metres@13 Baht)	2,000.00	-	-	-	-
Transceiver Cable (50 Metres@10 Baht)	500.00	-	-	-	-
Printer Sharing Switch (1 Unit@450 Baht)	450.00	-	-	-	-
Windows NT Server 4.0 with version pack 10 users (1 Unit@48,900 Baht)	9,780.00	9,780.00	9,780.00	9,780.00	9,780.00
MS. SQL Server Ver. 7.0 (1 Unit@58,000 Baht)	11,600.00	11,600.00	11,600.00	11,600.00	11,600.00
Training Cost for 10 persons:	25,000.00	-	-	-	-
Total Fixed Costs	407,110.00	178,660.00	178,660.00	178,660.00	178,660.00
Operating Costs					
Utility Cost (Average 2% increase per year)	20,000.00	20,400.00	20,808.00	21,224.16	21,648.64
System Administrator (1 Person@17,000 Baht per month) (Average 10% increase per year)	204,000.00	224,400.00	246,840.00	271,524.00	298,676.40
System Maintenance (Average 10% increase per year)	12,000.00	13,200.00	14,520.00	15,972.00	17,569.20
Total Operating Costs	216,000.00	237,600.00	261,360.00	287,496.00	316,245.60
Total Costs of Proposed System	623,110.00	416,260.00	440,020.00	466,156.00	494,905.60
Cumulative Costs of Proposed System	1,075,430.00	1,491,690.00	1,931,710.00	2,397,866.00	2,892,771.60

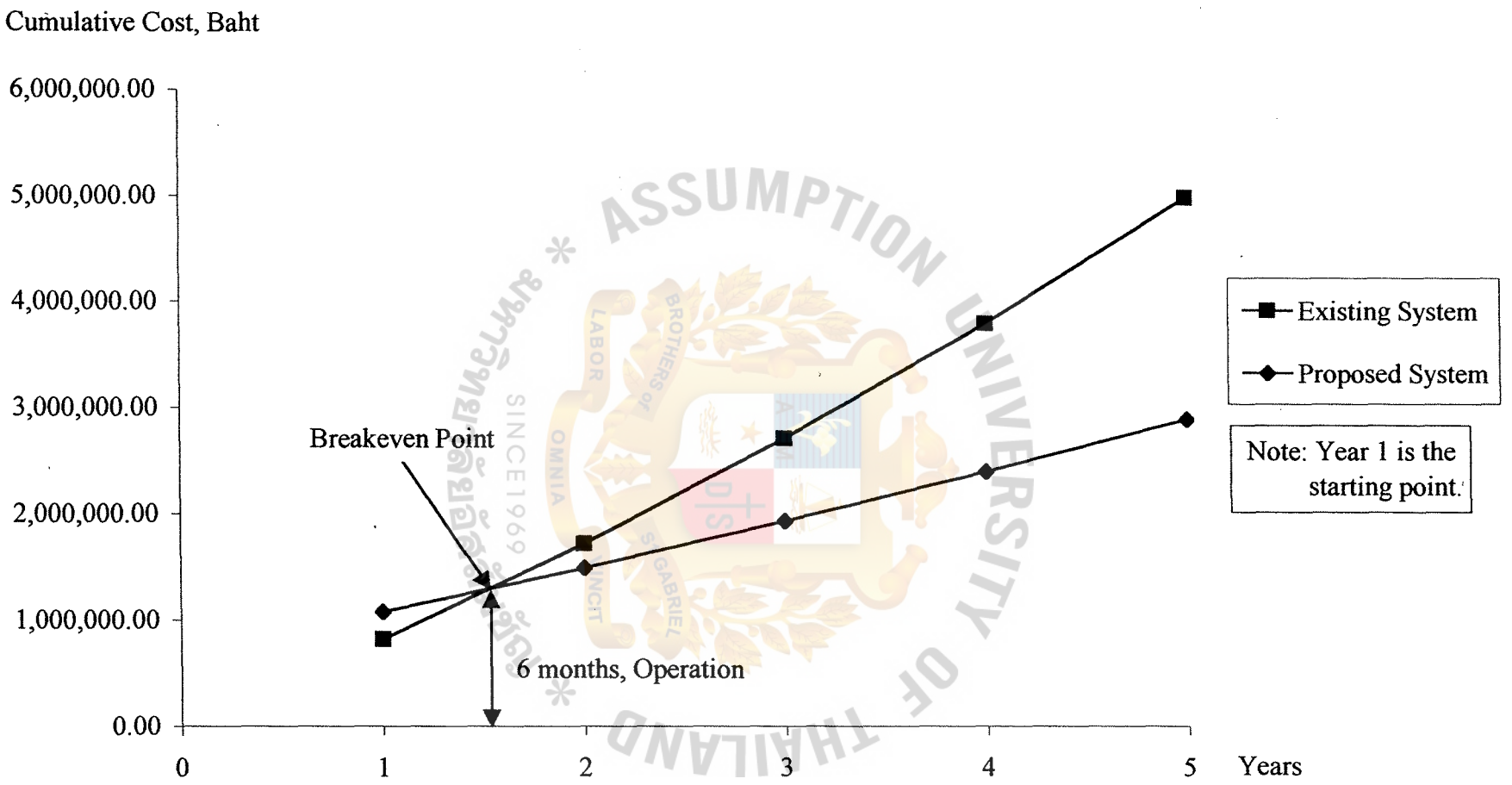


Figure 3.24. Cost Comparison between Existing and Proposed Systems.

(3) Payback period:

The payback period, defined as the expected number of years required to recover the original investment, was the first formal method used to evaluate capital budgeting projects. The shorter the payback period, the better. In this project, we use discounted payback period in which the expected cash flows are discounted by the project's cost of capital. We assume the project lasts about five years.

The following two pages show detailed calculations of Discounted payback analysis of the proposed system and graph. From Table 3.7 we see that by the end of year 2 the cumulative net cash flow becomes positive. Thus, the payback occurred during the 2nd year. The exact payback period can be found as follows:

Payback = Year before full recovery +

(Unrecovered cost at start of year / Cash flow during year)

= 1 + (546,511.90 / (546,511.90+55,392.86))

= 1.907 Years or about 1Year 11 Months

Return on Investment (ROI) for the project is calculated as follows:

ROI = ((NCF (after 5th year) / Estimated lifetime costs) / 5) x 100

= ((2,034,320.11 / 2,253,057.46) / 5) x 100

= 0.1806 x 100 = 18.06 %

Table 3.7. Discounted Payback Analysis for Client-Server of the Proposed System, Baht.

Cost Items	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Cost of the existing system						
Total costs (Average 10% increase per year)	0.00	820,000.00	901,200.00	990,504.00	1,088,722.08	1,196,745.32
Discount factor at 5%	1.000	0.952	0.907	0.864	0.823	0.784
Present value of total costs	0.00	780,952.38	817,414.97	855,634.60	895,694.35	937,681.27
Cumulative present value of all costs (A)	0.00	780,952.38	1,598,367.35	2,454,001.94	3,349,696.29	4,287,377.57
Cost of the proposed system						
Total of fixed costs	1,121,750.00					
Annual operating costs (Average 10% increase per year)	0.00	216,000.00	237,600.00	261,360.00	287,496.00	316,245.60
Discount factor at 5%	1.000	0.952	0.907	0.864	0.823	0.784
Present value of total costs	1,121,750.00	205,714.29	215,510.20	225,772.59	236,523.67	247,786.70
Cumulative present value of all costs (B)	1,121,750.00	1,327,464.29	1,542,974.49	1,768,747.08	2,005,270.76	2,253,057.46
Net cash flow (A - B)	-1,121,750.00	-546,511.90	55,392.86	685,254.86	1,344,425.54	2,034,320.11

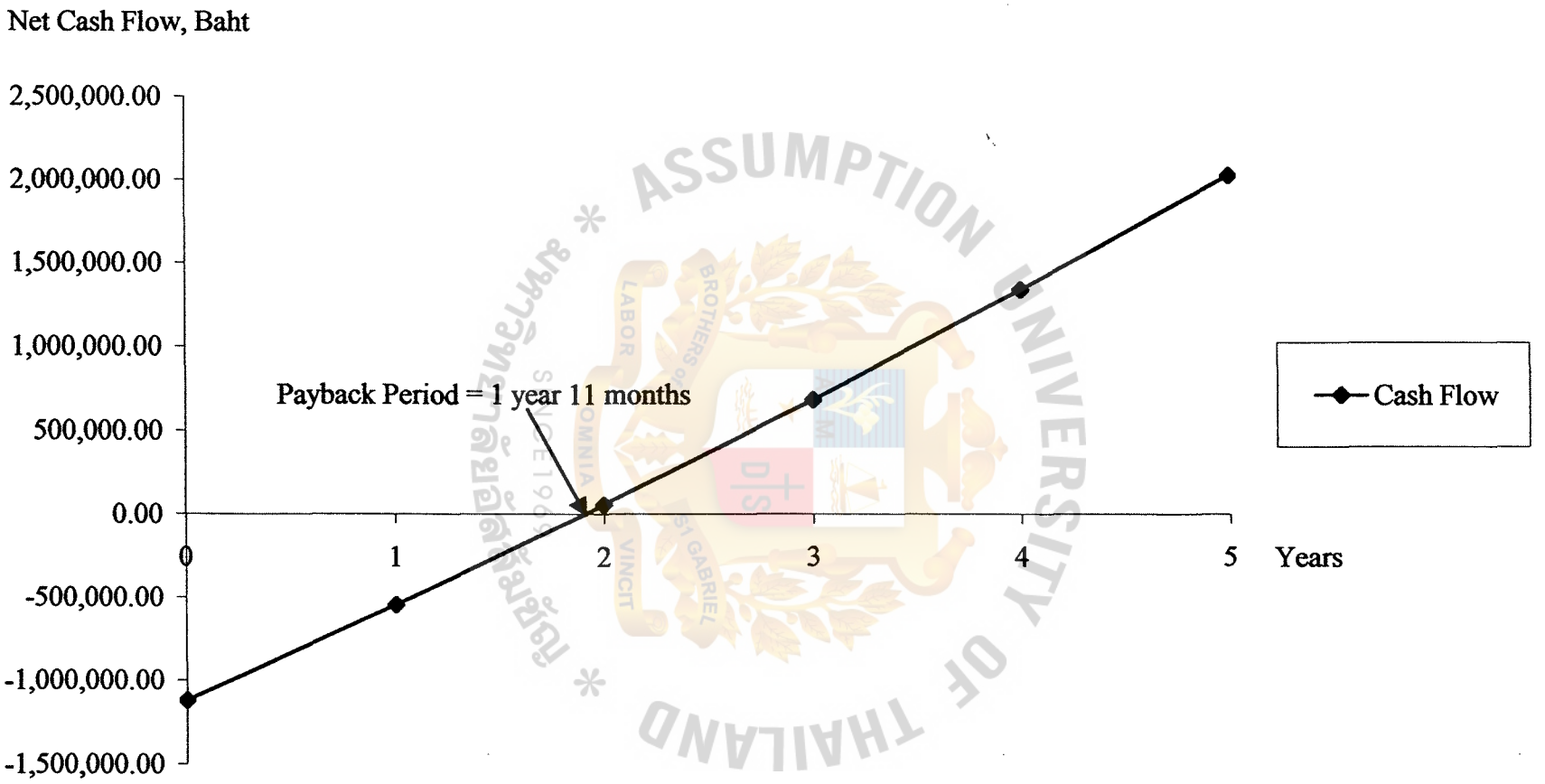


Figure 3.25. Graph Displaying Payback Period of the Proposed System.

3.6 Database Design

Database technology was created so the organization could maintain and use its data as an integrated whole instead of as separate data files. The process we used to design database for the proposed system is in line with the data flow diagram presented earlier. We can now develop a shared data resource that can be used by relevant sections. We first present Entity relationship diagram (Figure 3.26) to show only all entities and their relationships. Then by investigating data requirements, we develop that entity relationship diagram into Logical database schema (Figure 3.27). By further reviewing the Logical database schema, we found that table Customer's Rent History contains redundant data with table Registration, so we delete that table from the schema. The final product after the Normalization process, the Physical database schema, is as shown in Figure 3.28. All of the tables presented in Figure 3.28 have passed Normalization process resulting in data model that is simple, nonredundant, flexible, and adaptable to future needs.

The newly designed database consists of 13 related tables. We divide them into two types of tables; Master tables, and Transaction tables. Master tables are defined as tables that contain static data, which will not be changed from time to time. Examples of master tables are Employee's Address, Employee, Customer, Room, Registration, and Snook Rate tables. Transaction tables are defined as tables that contain contemporary data that can be changed, added, or deleted from time to time. Examples of transaction tables are all the rest of the tables. In this database design we recommend to retain data in transaction tables that can be used as reference data for the benefit of analyzing or arguing them in the future. For instance, Room Expenses, Customer Service, Restaurant Service, Internet Service, and Snooker Service records, should be retain even after they have been used to produce reports to the GM.

St. Gabriel's Library

We provide data dictionary of the proposed system that gives business meaning to entities and attributes in Appendix A. We also present some prototyping screen inputs in Appendix B, sample of screen queries in Appendix C, and sample of reports in Appendix D.

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

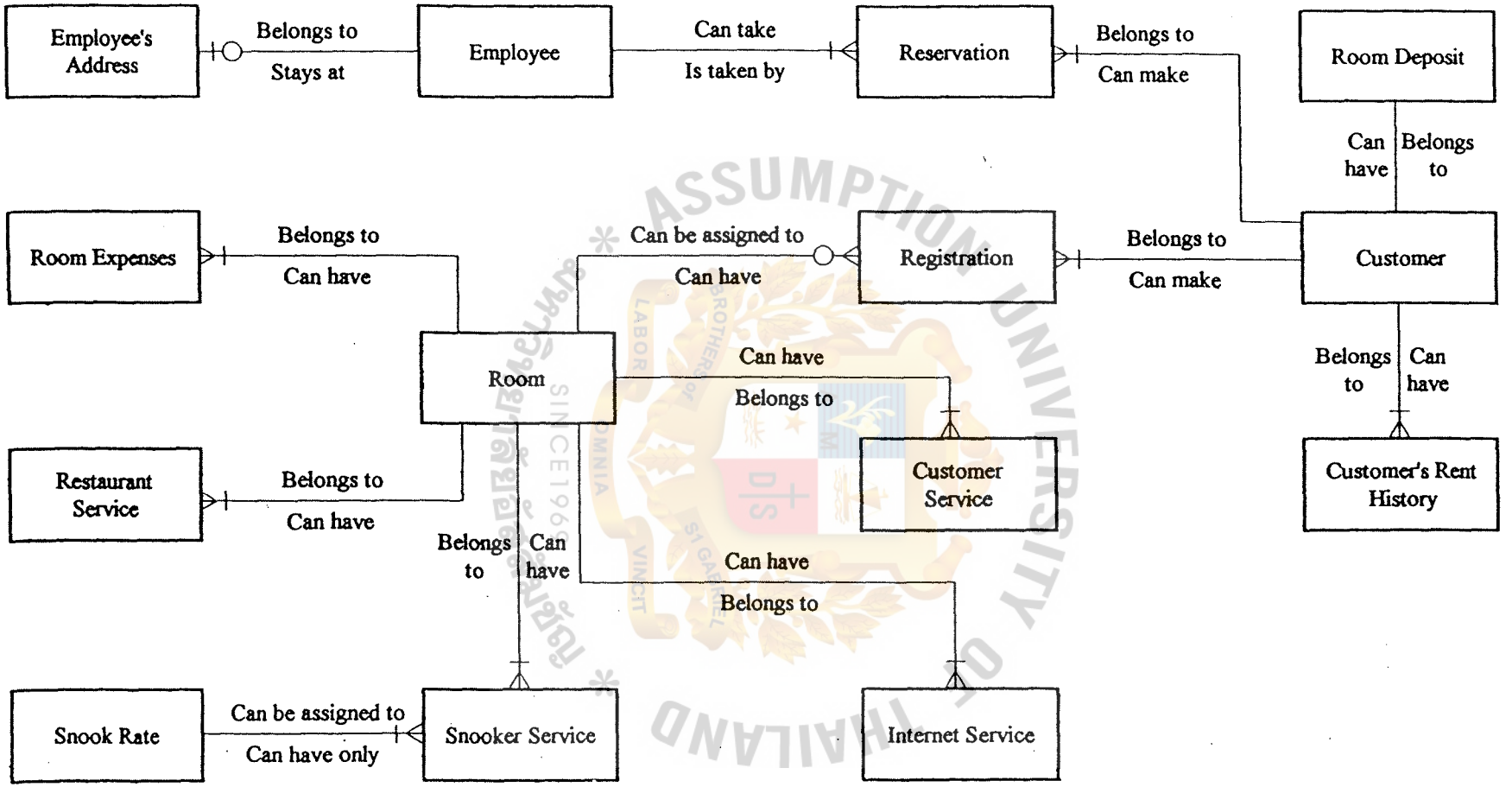


Figure 3.26. Entity Relationship Diagram.

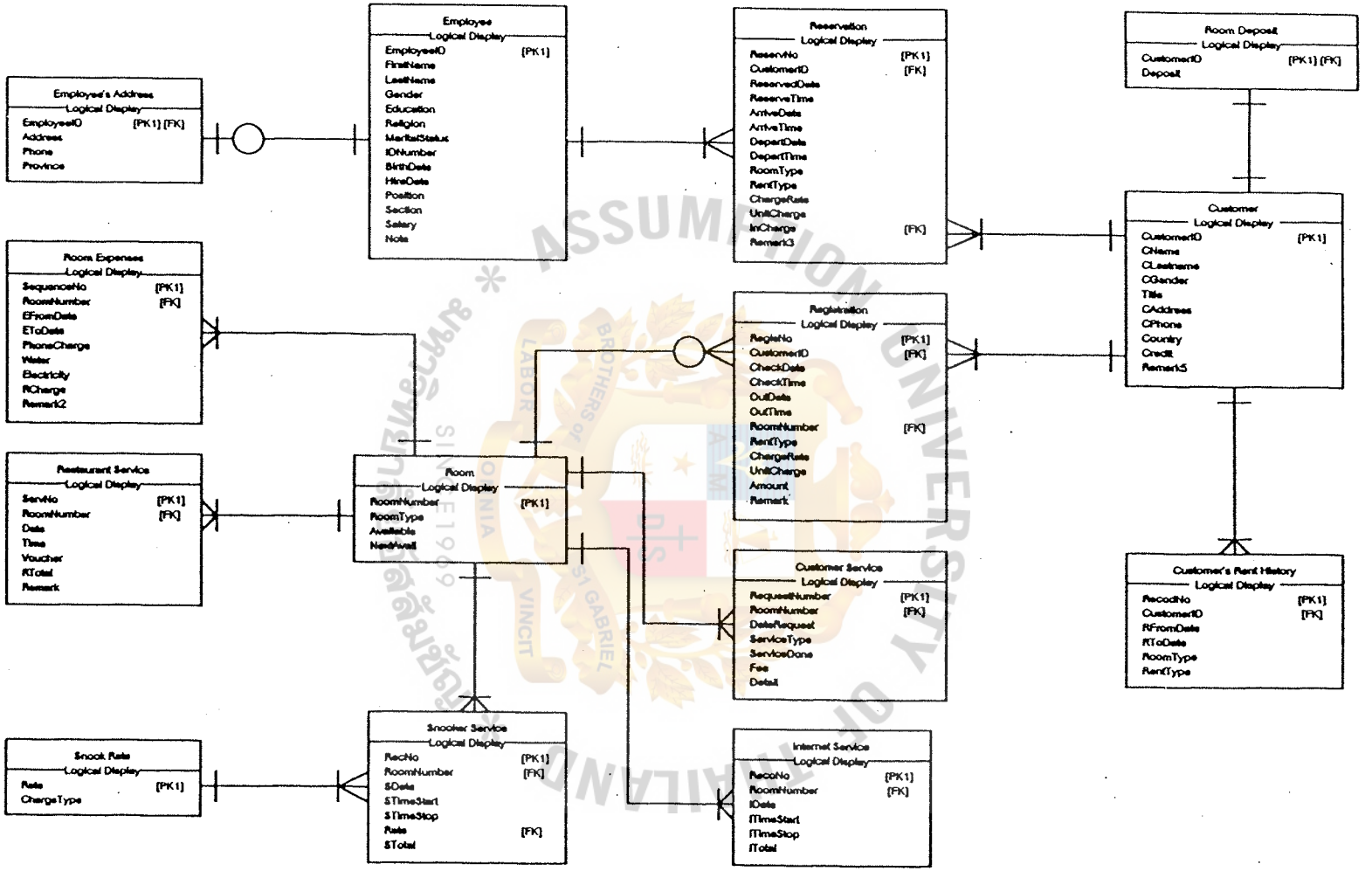


Figure 3.27. Logical Database Schema of the Proposed System.

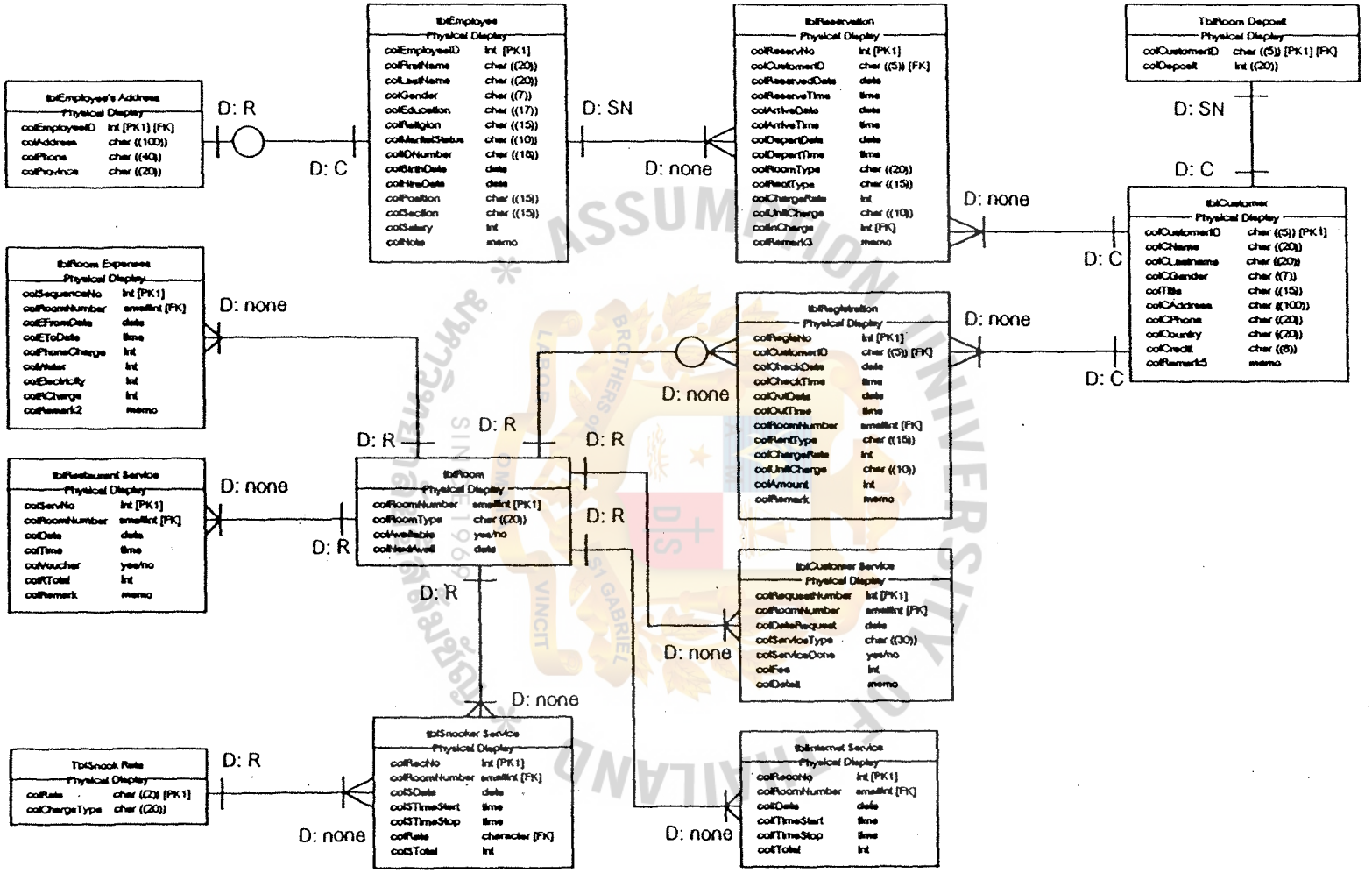


Figure 3.28. Physical Database Schema of the Proposed System.

IV. SYSTEM IMPLEMENTATION

This project presents an abstract idea of implementing an information system in the apartment rental business by trying to merge all related information together as a shared database among related sections in the hope that this will promote more efficiency in doing the business. The main objective of system implementation is to put system into operation. Unfortunately, we can not implement the system in real situations, at least not by the time we present this project. We will instead, in this section, present procedures in implementing the system which involves programming, system testing, installing plan, training procedures, documentation, and security & control.

4.1 Programming

This phase actually overlaps with the system testing phase in which the programmer must do programming and testing one after the other until the program works satisfactorily. Before real programming, we recommend prototyping, which can be done quickly using PC database program such as MS. Access, to let users experience how the system will work in a real situation. This will help reduce or prevent errors or mistakes when designing a program.

4.2 System Testing

Before the system is put into actual operation, it must first be tested. The test should be done both on unit test and system test. Unit test involves testing within the same unit, while system test involves testing for the whole system. Due to the small number of computers in the system of this project and without internetworking involved, we recommend loading program into the server and clients. The test should include the following tests:

(1) Systems performance test to verify throughput and response time.

(2) Peak workload test to see if the system can handle the workload during peak processing periods for instance during group check-in and check-out processes.

(3) Human engineering test whether the system is easy for the users to understand and use.

(4) Backup and recovery test which involves procedures when a data loss situation occurs. The test should include time required to recover from the disaster, comparison of data before and after the recovery.

(5) Methods and procedures test to see if the proposed workflow needs to be modified or improved.

4.3 Installing Plan

The installation includes loading actual database into the new system, connecting the server and client computers together, and planning for the transformation from old system to new system. This phase may include writing special programs to extract data from existing databases and programs to populate the new database, or may require personnel assigned to do data entry for data that needs to be keyed. We recommend running in parallel both existing and new systems for about a month or two before putting away the existing system to ensure that the new system runs smoothly during the test period.

4.4 Training Procedures

At this stage, it is necessary for the company to sacrifice its own staffs' time for application training. Users should be trained to use system properly. They must understand thoroughly which part(s) of the system is under whose responsibility, who has rights of access, modification, deletion, and/or updating the data in the new system.

They must be trained to use equipment and to follow the procedures required of the new system. The system analyst should be involved in this activity because he/she must be the one who takes care of the whole system.

4.5 Documentation

The documentation involves two types of documents; users manual, and database schema & data dictionary. The first document, users manual, provides guideline for system users how to operate the system. The second document, database schema & data dictionary, provides business meaning and structure of database for the users so that they can be able to extract the data as needed.

4.6 Security and Control

This is probably the most important part of network computing. The security and control can be taken into three parts.

(1) Database control: Since the database is the heart of the whole system, it should be treated properly. Password should be implemented in the new system, and must be known only to the users who have the right to use the system. The system must also separate user groups in accordance with the function to which they belong. For example, only the users in the apartment rental section can obtain password to add or modify data in Reservation table. The users in other related sections can only access data in the Reservation table. It is also a good practice for system administrator to assign a new password to system users for every six months or whenever there is a job rotation within the business. Screen saver with password should be assigned among groups of users.

(2) Program and data security: There will be time when programs need to be upgraded and bugs need to be fixed. The system administrator and users

should help identify problems occurred or parts of the program that need to be improved. Database must also be duplicated and synchronized on a daily basis to ensure the security and correctness of data.

(3) Hardware security: The server and client computers, including the printers, must be maintained properly to ensure longevity of the system. Our hardware is protected by limited warranty from the product vendors. However, when the warranty contracts expire, the company should consider to extend the service on a by case basis. The system administrator, under the company approval, should set up the policy to use the machines to all the users involved. The users must practice their use of the machine in accordance with the policy assigned to them.

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

V. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Based on the Cost vs. Benefit analysis of the proposed system, our project pay off could occur within two years after the project is initiated. The initial cost of 1,121,750.00 Baht would be off set by the cost saving from the existing manual system. After one year and eleven months of using the proposed system, the company can expect positive net cash flow, which within five years will amount to 2,034,320.11 Baht or 18.06 % annually for the whole five-year period. We also develop the new workflow to improve Input, Data processing, and Output processes by providing capability of the new system to verify customer's information, room information, customer's pending accounts, customer's rent history, including generating reports to general manager.

When selecting hardware, software, and technology for the proposed system, we focus our attention to latest technology that we think the business can afford. Due to the fast pace in computer technology development, we recommend a high speed computer designed specifically for data server. We chose Compaq because of their reputation in products and service, including the three-year warranty contract offered by the product vendor that will ensure our confidence in the new system for the next three years. Stability of the new system is another thing we also take into consideration. To ensure efficiency of the system, we also add Power Backup to the server and clients to avoid disaster of data if the power outage situation occurred. We also select Windows NT Server 4.0 as the Network operating system, and MS. SQL Server 7.0 as the Database software because of their technology and functionality, including technical support.

The table below shows time performance on each process of the proposed system compared with the existing system.

Table 5.1. Degree of Achievement of the Proposed System.

Process	Existing System	Proposed System
Reservation	10 mins.	5 mins.
Reservation Cancellation	10 mins.	3 mins.
Registration	15 mins.	11 mins.
Pending Expenses Calculation	10 mins.	2 mins.
Checkout	15 mins.	10 mins.
Generate Internal Reports (Apartment Sec.)	3 hrs.	2 mins.
Generate Internal Reports (Other Secs.)	1 hr.	2 mins.
Total	5 hrs.	35 mins.

We can describe degree of achievement on each process as the following:

Reservation, Reservation Cancellation, and Registration for the proposed system can be done together on the same screen without closing and opening files one after the other as required by the existing system, providing faster services to customers.

Pending Expenses Calculation for the proposed system can be obtained directly from the program. Workers need only specify room number and date period to the system. There is no need to acquire billing documents and calculation of pending expenses, which are the main source of error and uncollected income.

Checkout for the proposed system can be done faster as a result of automatic aggregation of customer's pending accounts.

Internal Reports for the proposed system can be obtained directly from the program. GM needs only specify conditions required by the system to obtain reports. Report information that appears on screen will be up to date and can be printed out.

With this assumption, including all of the benefits received from the proposed system, we can conclude that this project is worth developing.

5.2 Recommendations

Hotel and recreation business has been accepted as one of the businesses with high potential to generate income to the country. Moreover, they create varieties of jobs for workers in this industry. After improving the customer database in the business by implementing customer-base system using computer network to connect and share inter-related data among Apartment Rental, Restaurant, and Snooker Club sections, the company should think about possibility of integrating the proposed system with Finance and Accounting section in the future. Integrating the proposed system with current system in Finance and Accounting section can help reduce error and reduce manual work for workers in this section, which in long term may reduce operating cost. As of now, there are many commercial accounting software to choose from, the company should look around and purchase software that can integrate well with the proposed system.

We do believe that Relational database will still remain in the field of database technology for many years ahead because of its easy to understand technology. However, the future trends of database system will expand their reach into the Internet realm. The company should not overlook advertising over the Internet using banners, and email links to popular web sites. One of the opportunities to gain more customers over the Internet is to provide capability for customer to acquire information about room rental fee, room type available, and to reserve room over the Internet.

APPENDIX A

DATA DICTIONARY OF THE PROPOSED SYSTEM

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS of St GABRIEL
LABOR VINCIT OMNIA
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

DATA DICTIONARY OF THE PROPOSED SYSTEM

Entity Name	Business Definition
Employee's Address	Contact address of present employees.
Employee	Information of all present employees.
Customer	Information of former and present customers.
Reservation	Information about past and present room reservation.
Registration	Information about past and present room registration.
Room	Room number and type of room available.
Room Deposit	Information about present monthly customer's room deposit.
Restaurant Service	Information about present customer's foods and beverage service at the Restaurant section transferred to customer account.
Room Expenses	Information about monthly telephone, water, and electricity charges of present customer.
Snooker Service	Information about present customer's snooker service transferred to customer account.
Snook Rate	Charge type for snooker service.
Customer Service	Information about all room services of present customer.
Internet Service	Information about present customer's Internet service transferred to customer account.

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS OF ST GABRIEL
LABOR VINCIT
SINCE1969

Attribute Name	Business Definition
EmployeeID	Identification number of present employees.
Address	Current contact address of present employees.
Phone	Current telephone number of present employees.
Province	Name of the province employee resides.
FirstName	Name of current employees.
LastName	Last name of current employees.
Gender	Gender of current employees.
Education	Highest education level of current employees.
Religion	Name of religion current employees respect to.
MaritalStatus	Marital status of current employees.
IDNumber	Current employee's identification card number.
BirthDate	Date of birth of current employees.
HireDate	Date of hire of current employees.
Position	Position of current employees in the company.
Section	Section in which current employees belong to.
Salary	Present salary of current employees.
Note	Additional detail information of current employees.
CustomerID	Identification number of former and present customers.
CName	Name of customers.
CLastname	Last name of customers.
CGender	Gender of customers.
Title	Title of courtesy of customers.
CAddress	Current contact address of customers.
CPhone	Current telephone number of customers.

ASSUMPTION UNIVERSITY OF THAILAND
OMNIA SINCE1969

Attribute Name	Business Definition
Country	Country of origin of customers.
Credit	Credit rating of customers.
Remark5	Additional detail information of customers.
RentType	Type of rent service available.
ReservNo	Reservation number.
ReservedDate	Date when customer made reservation.
ReserveTime	Time when customer made reservation.
ArriveDate	Date customer expects to arrive.
ArriveTime	Time customer expects to arrive.
DepartDate	Date customer expects to leave.
DepartTime	Time customer expects to leave.
ChargeRate	Rate of charge in monetary term.
UnitCharge	Unit of charge according to RentType.
InCharge	Identification number of employee who took reservation.
Remark3	Additional detail information of room reservation.
RegisNo	Registration number.
CheckDate	Date when customer checks in.
CheckTime	Time when customer checks in.
OutDate	Date when customer expects to leave or has left.
OutTime	Time when customer expects to leave or has left.
RoomNumber	Room number.
Amount	Latest room charge to customers when checkout.
Remark4	Additional detail information of room registration.
Deposit	Room deposit applied to Monthly customers.

ASSUMPTION UNIVERSITY OF THAILAND
SINCE1969

Attribute Name	Business Definition
RoomType	Type of room.
Available	Indication of room occupied and available.
NextAvail	Date when occupied room expected to be available.
ServNo	Sequence number of restaurant service.
Date	Date when customer used service from restaurant that will be transferred to his/her account.
Time	Time when customer used service from restaurant that will be transferred to his/her account.
Voucher	Foods and Beverages coupon given to customers.
RTotal	Amount of Foods and Beverages charge that will be transferred to customer account.
Remark	Additional detail information of restaurant service.
SequenceNo	Sequence number of room expenditure charge.
EFromDate	Start date of room expenditure.
EToDate	Stop date of room expenditure.
PhoneCharge	Total charge of telephone used.
Water	Total charge of water used.
Electricity	Total charge of electricity used.
RCharge	Sum of PhoneCharge, Water, and Electricity.
Remark2	Additional detail information of room expenses.
RecNo	Record number of snooker service.
SDate	Date when customer used snooker service that will be transferred to his/her account.

ASSUMPTION UNIVERSITY OF THAILAND
OMNIA SINCE1969

St. Gabriel's Library

Attribute Name	Business Definition
STimeStart	Time when customer started playing snooker that will be transferred to his/her account.
STimeStop	Time when customer stopped playing snooker that will be transferred to his/her account.
Rate	Code of charge for snooker service.
STotal	Total charge of snooker service.
ChargeType	Type of charge for snooker service that is in accordance with Rate.
RequestNumber	Request number of customer service.
DateRequest	Date when customer requested for room service.
ServiceType	Type of service customer requested.
ServiceDone	Indication of customer service done or undone.
Fee	Service charge for room service request.
Detail	Additional information about customer service.
RecoNo	Record number of internet service.
IDate	Date when customer used internet service.
ITimeStart	Time when customer started using internet service.
ITimeStop	Time when customer stopped using internet service.
ITotal	Service charge for internet service.

ASSUMPTION UNIVERSITY OF THAILAND
SINCE1969

APPENDIX B

PROTOTYPING SCREEN INPUTS OF THE PROPOSED SYSTEM

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS of St GABRIEL
LABOR VINCIT OMNIA
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

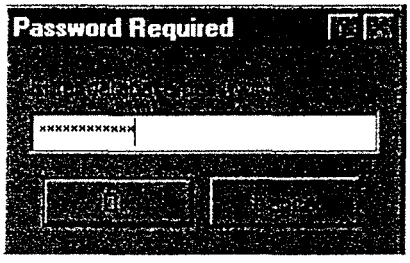


Figure B.1. Password Screen When Accessing the Program.

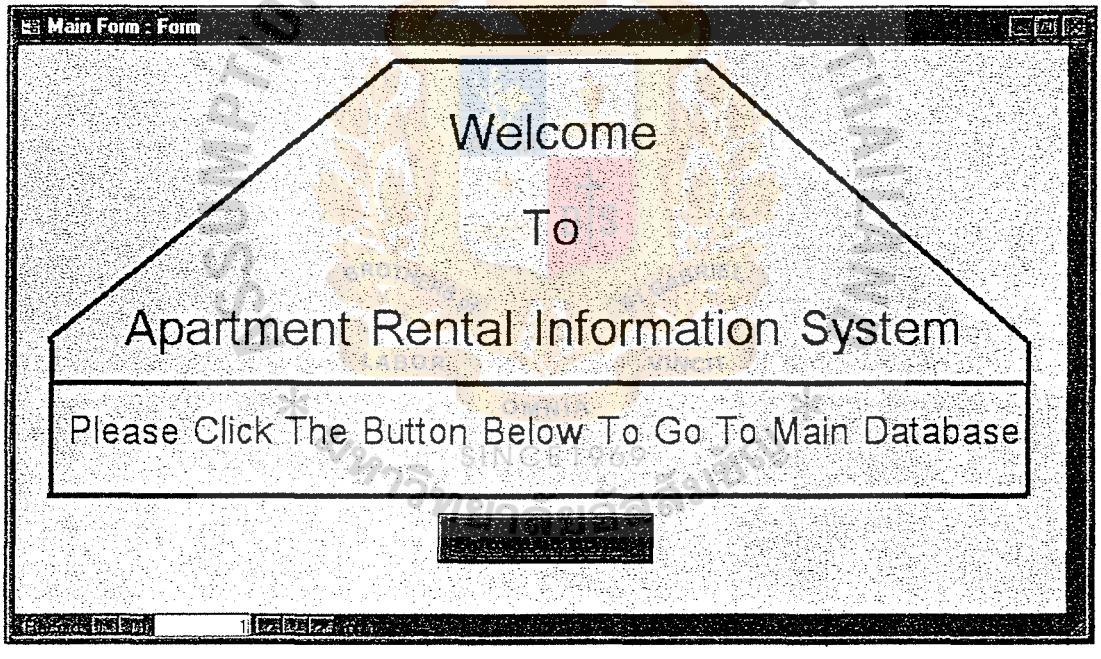


Figure B.2. Welcome Screen.

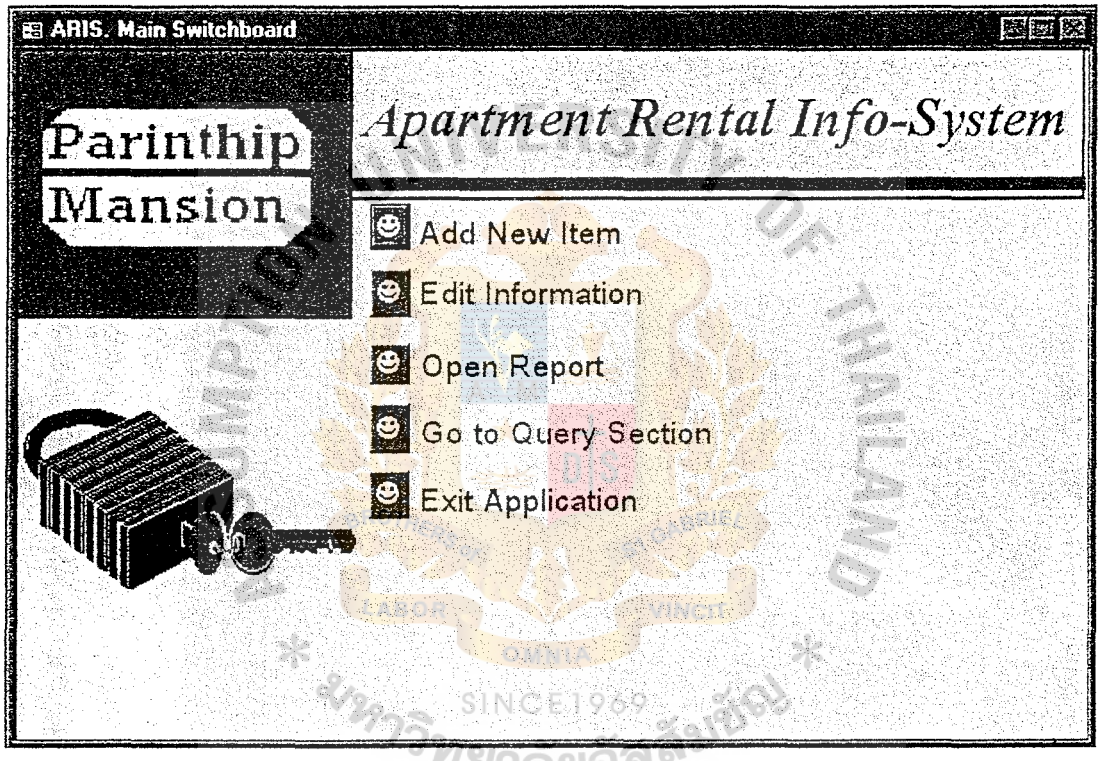


Figure B.3. Main Menu Screen of the Apartment Rental Information System.

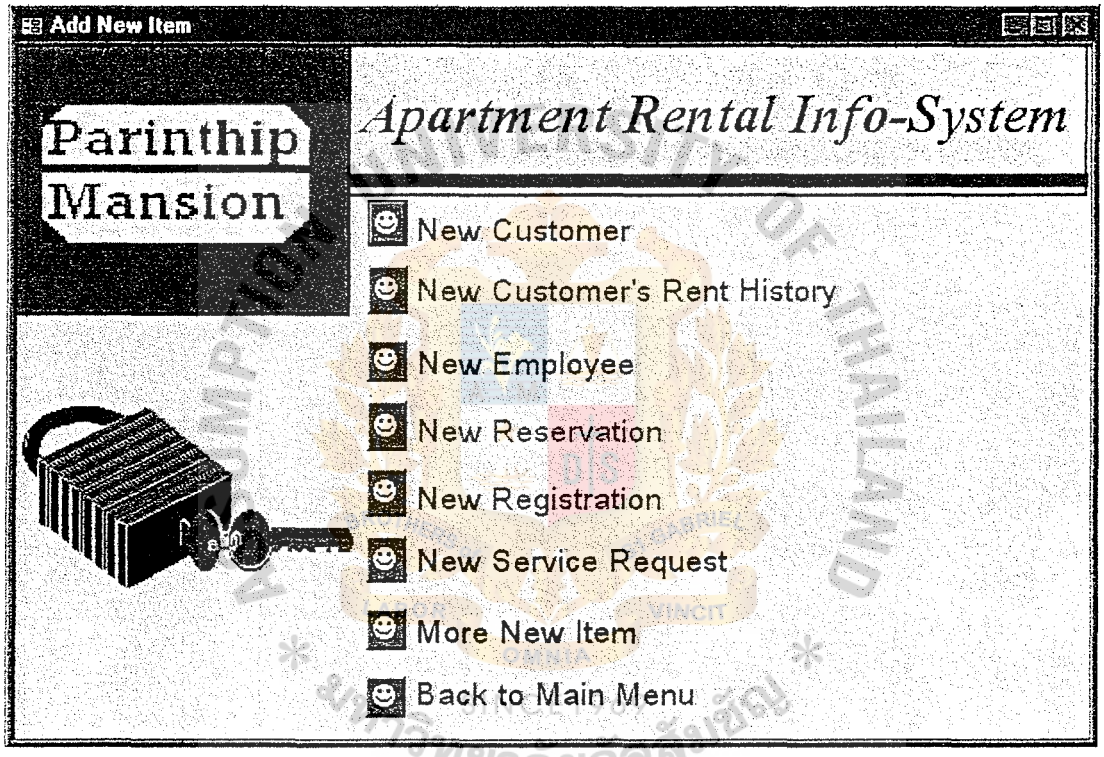


Figure B.4. First Level of Add New Item Menu.

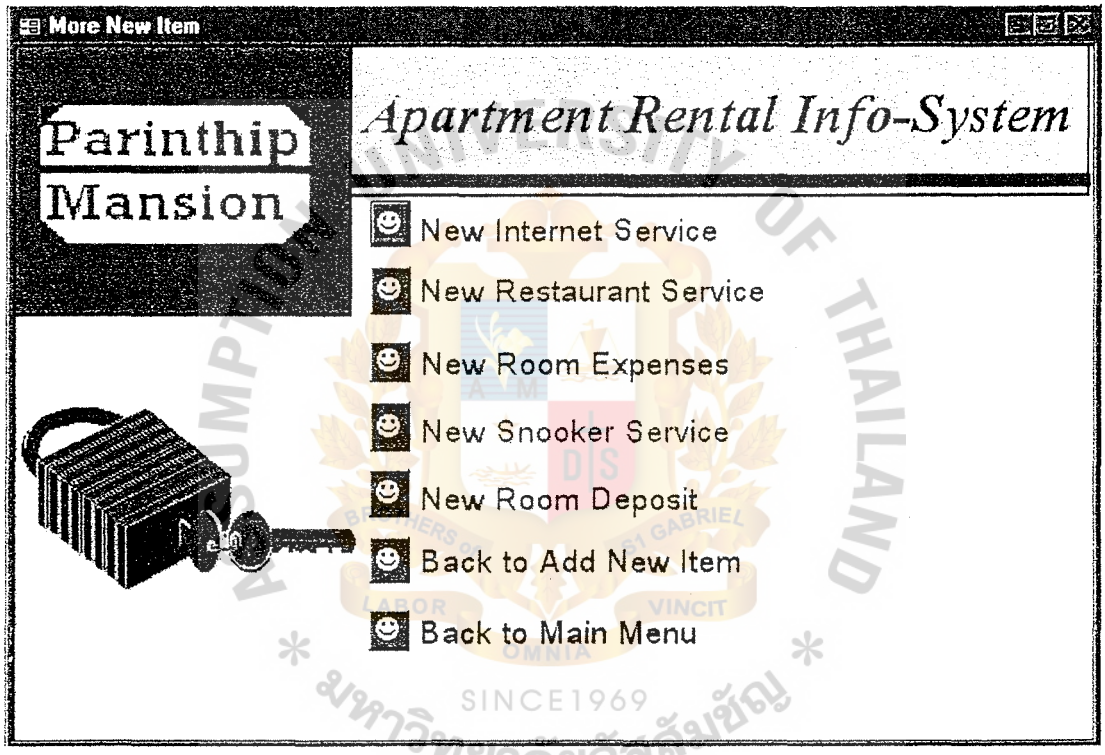


Figure B.5. Second Level of Add New Item Menu.

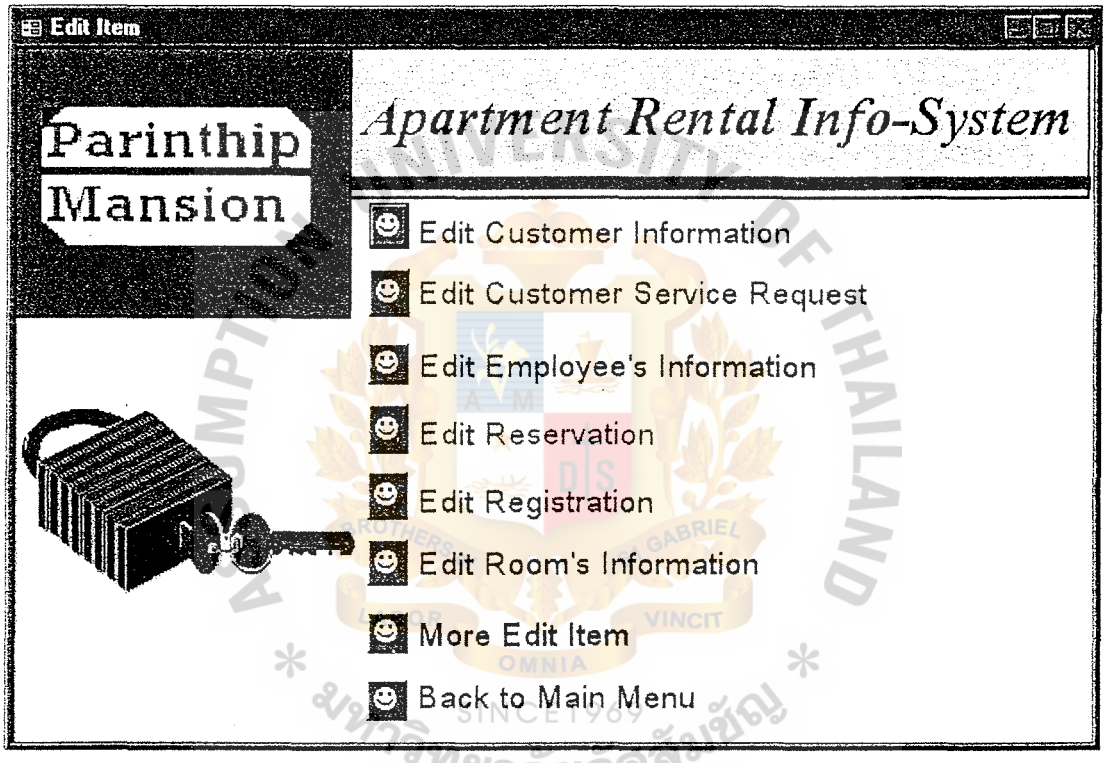


Figure B.6. First Level of Edit Item Menu.

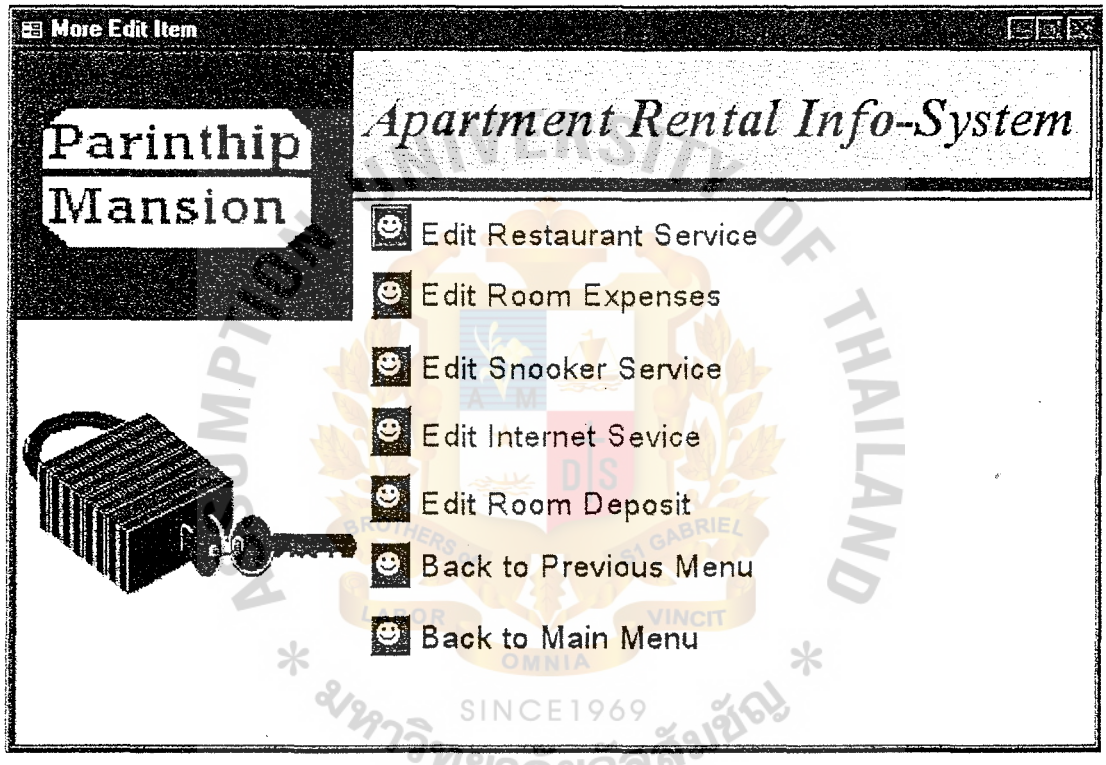


Figure B.7. Second Level of Edit Item Menu.

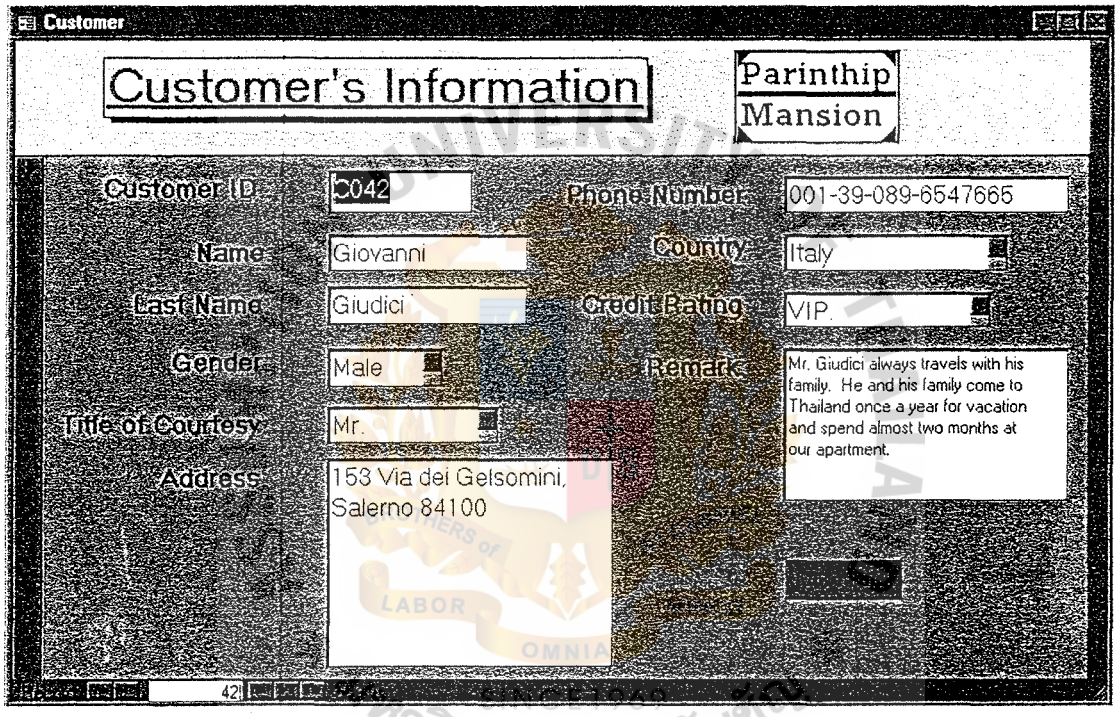
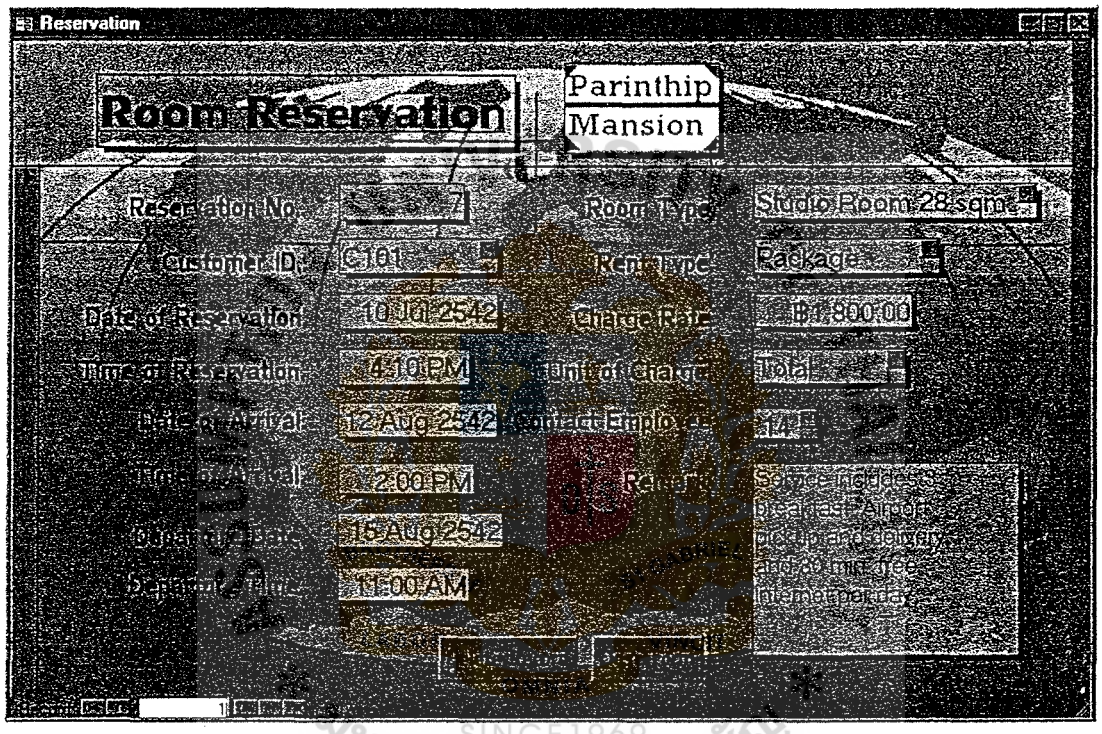


Figure B.8. Customer's Information Form.



SINCE1969
มหาวิทยาลัยอัสสัมชัญ

Figure B.9. Room Reservation Form.

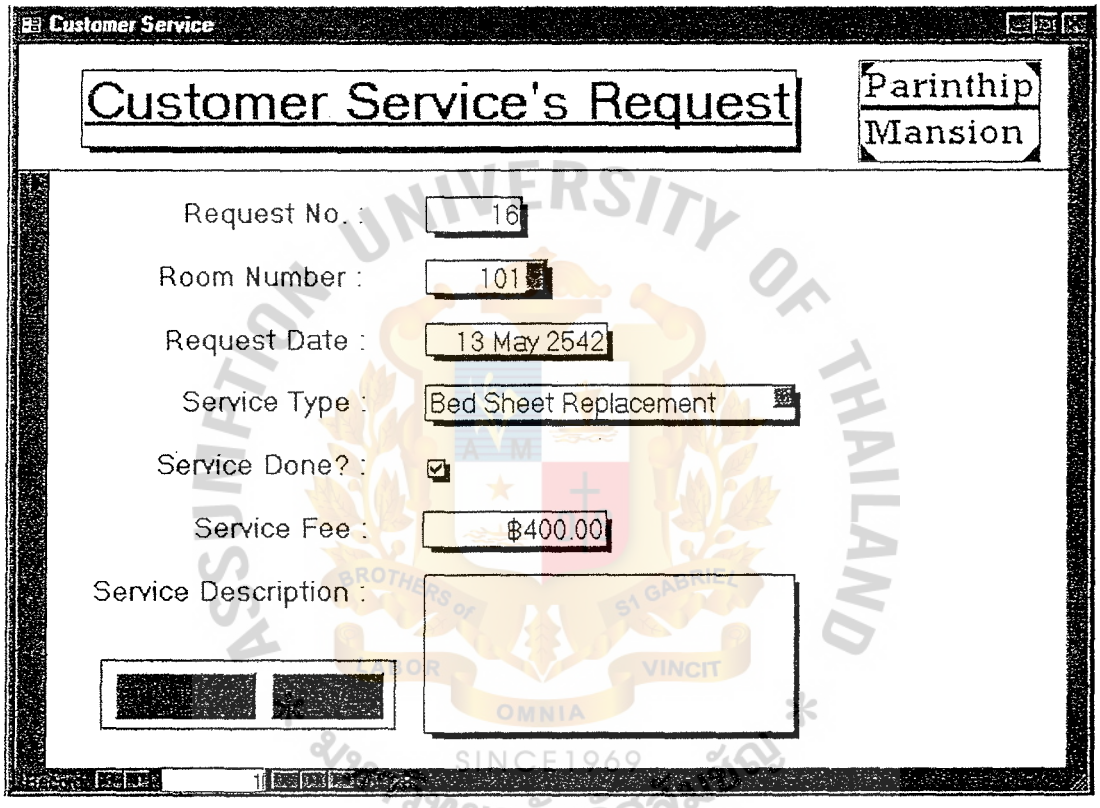


Figure B.10. Customer Service's Request Form.

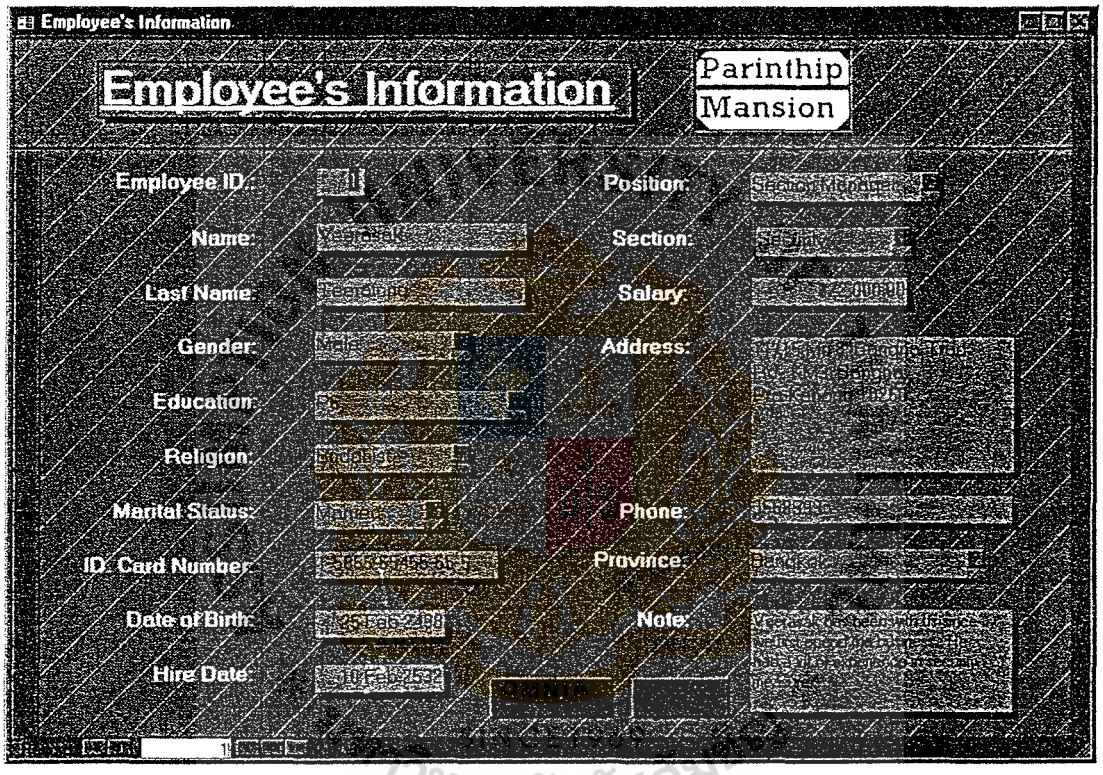


Figure B.11. Employee's Information Form.

St. Gabriel's Library

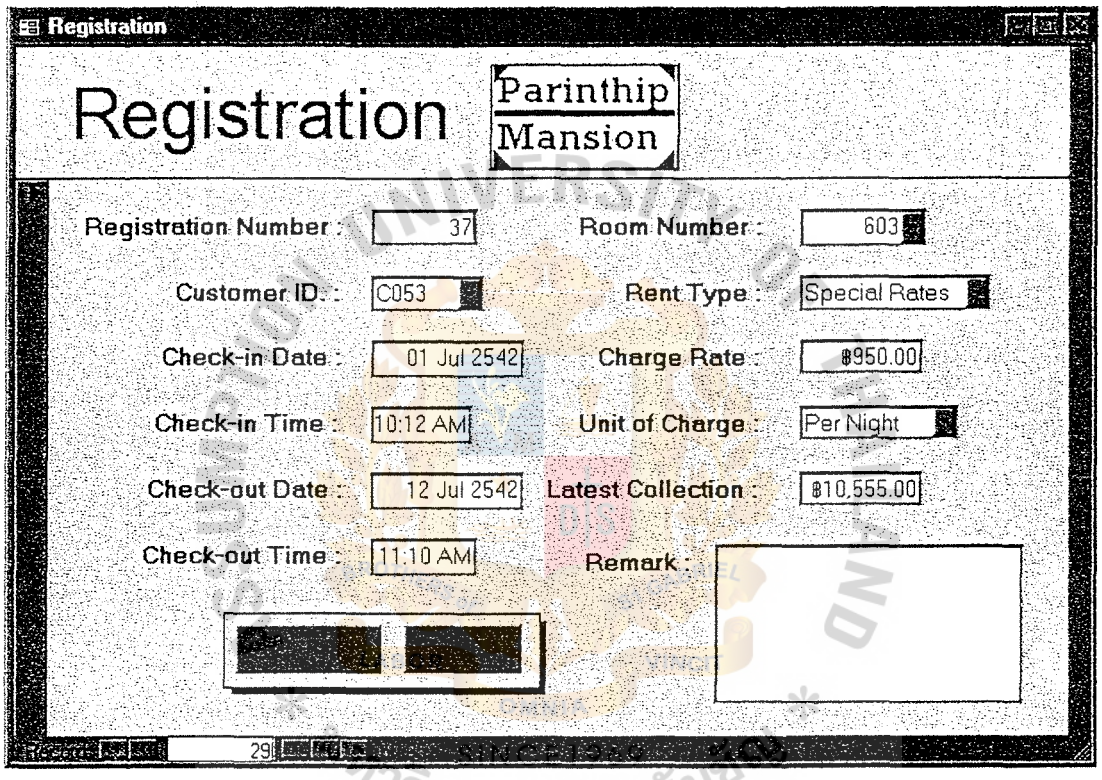
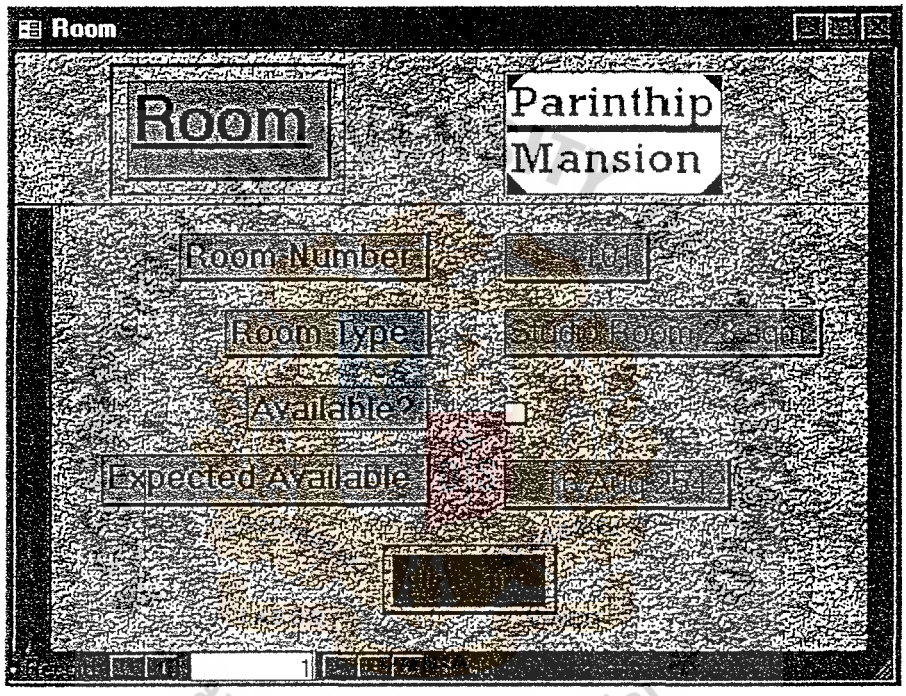


Figure B.12. Registration Form.



SINCE1969
มหาวิทยาลัยอัสสัมชัญ

Figure B.13. Room Update Form.

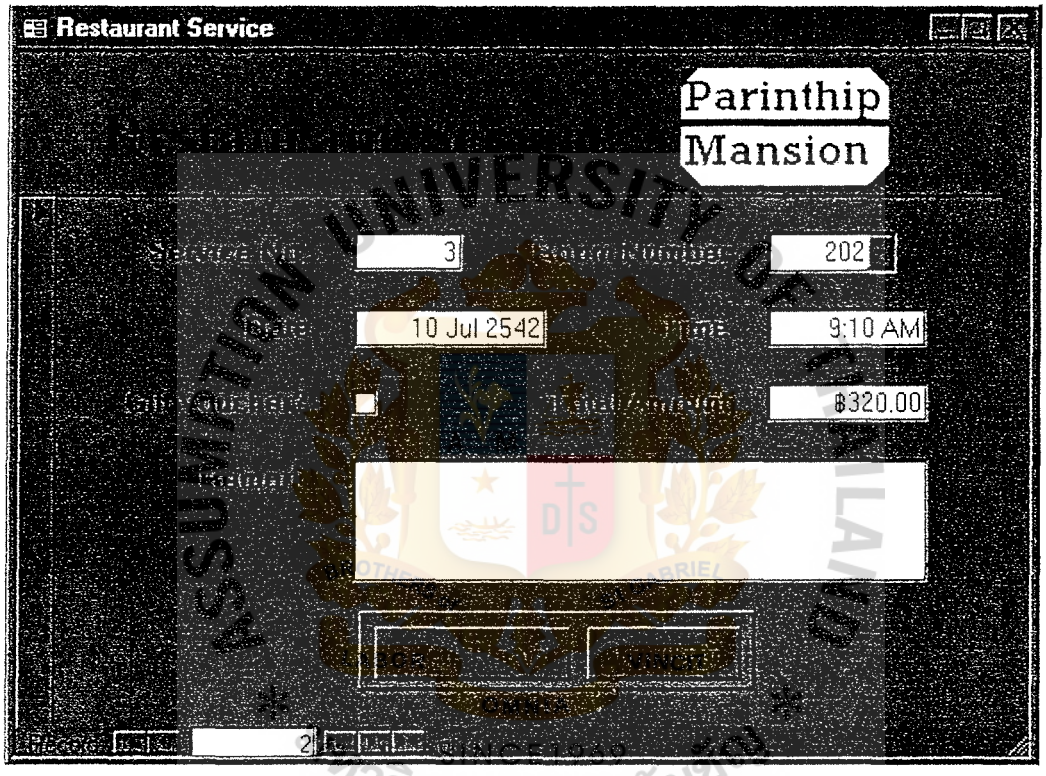


Figure B.14. Restaurant Service Form.

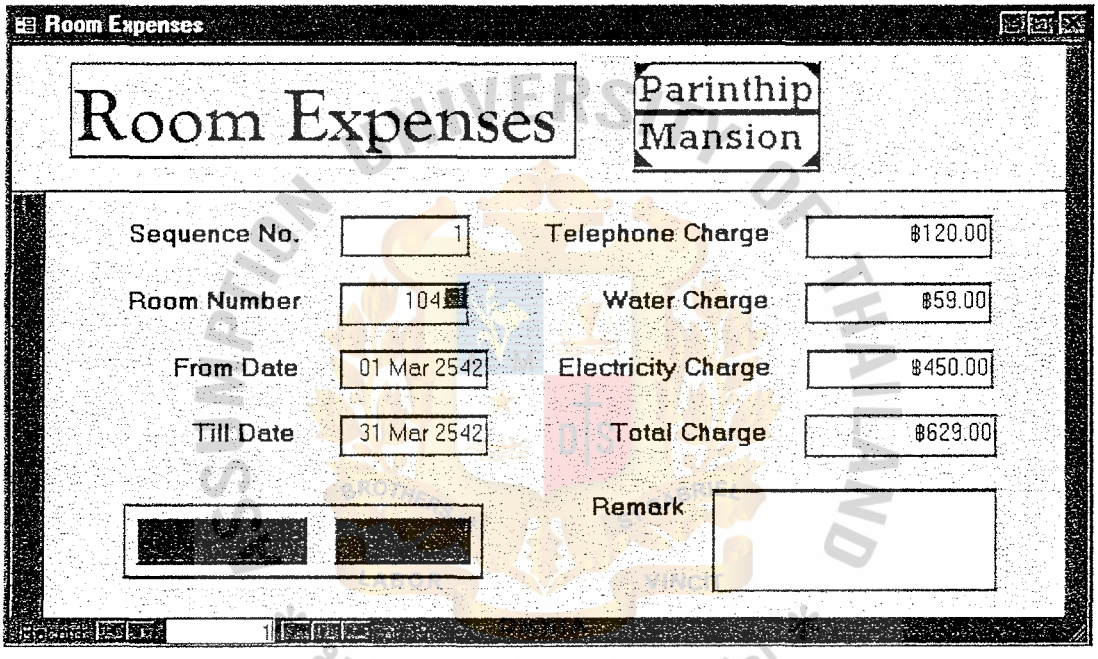


Figure B.15. Room Expenses Form.

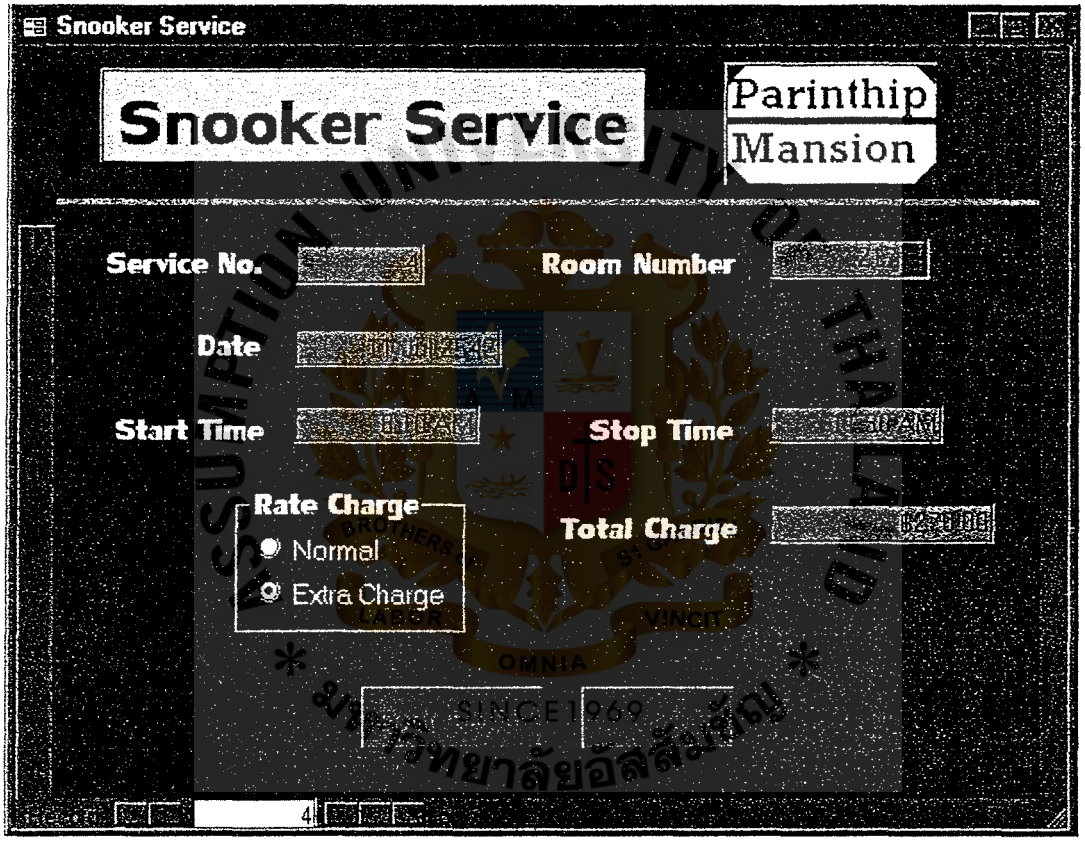


Figure B.16. Snooker Service Form.

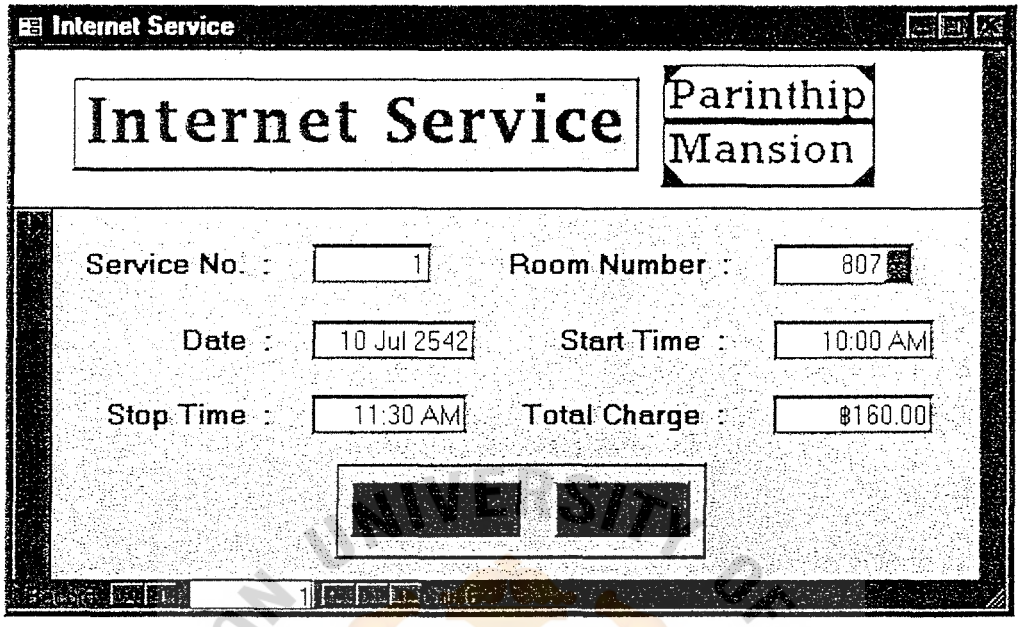


Figure B.17. Internet Service Form.

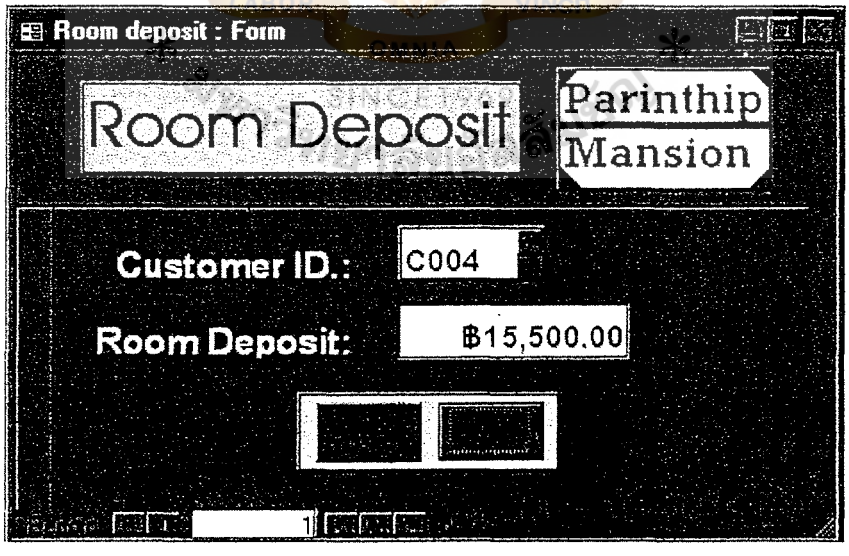


Figure B.18. Room Deposit Form.

St. Gabriel's Library

APPENDIX C

SAMPLE SCREEN QUERIES OF THE PROPOSED SYSTEM

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS of St GABRIEL
LABOR VINCIT OMNIA
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

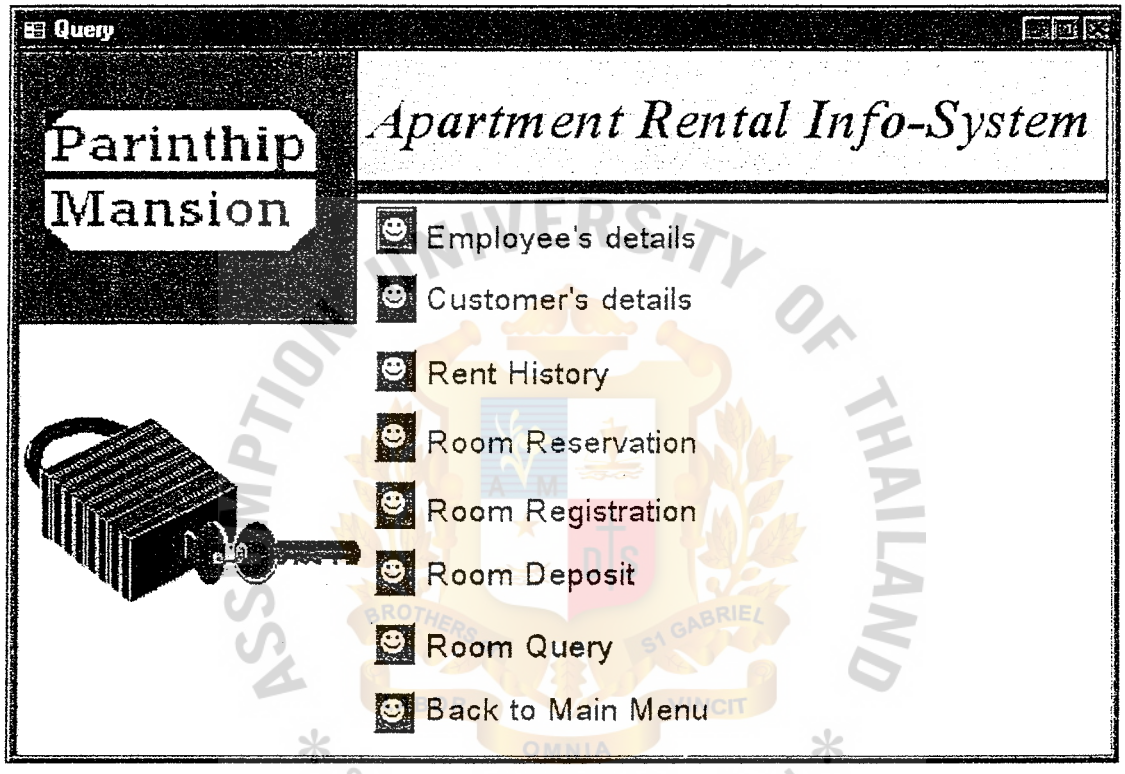


Figure C.1. First Level of Query Menu.

ASSUMPTION UNIVERSITY OF THAILAND
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

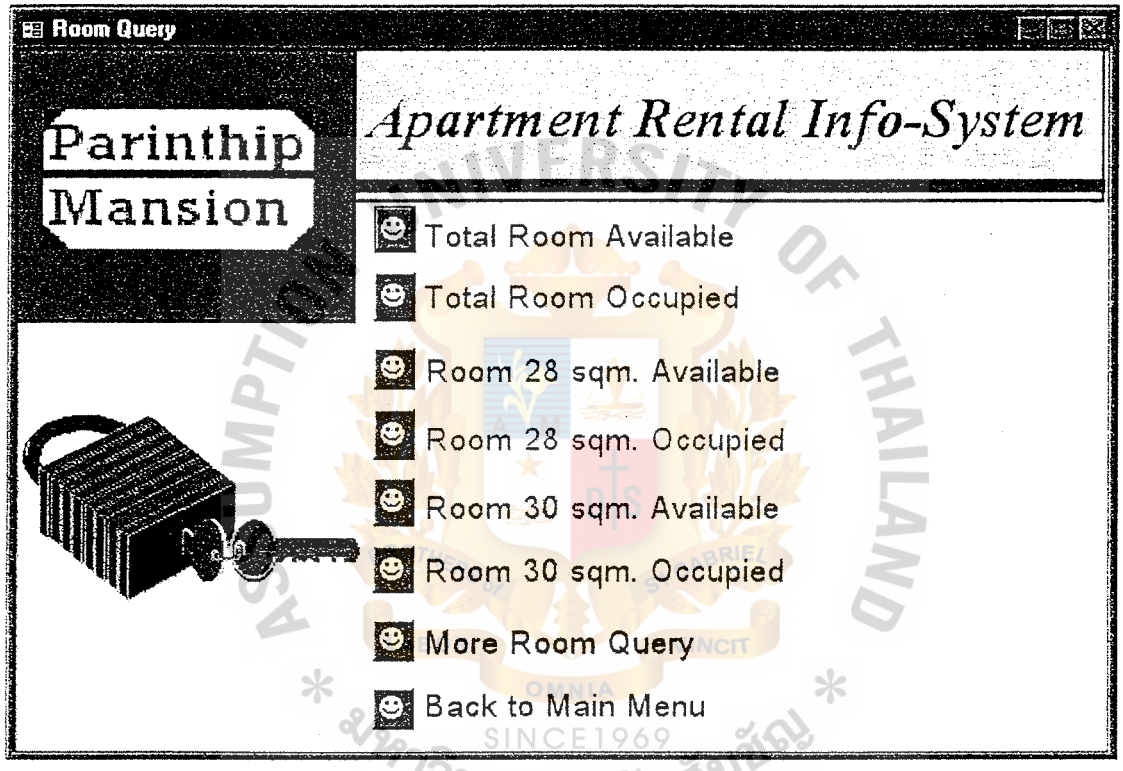


Figure C.2. Second Level of Query Menu.

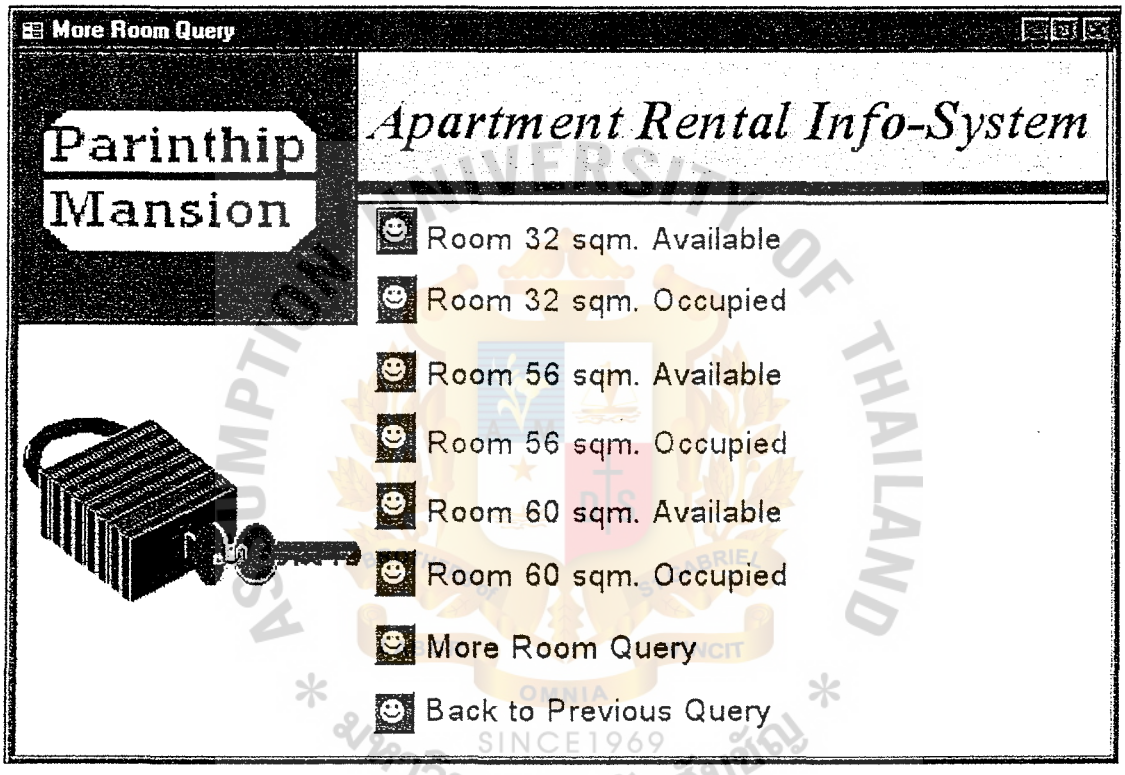


Figure C.3. Third Level of Query Menu.

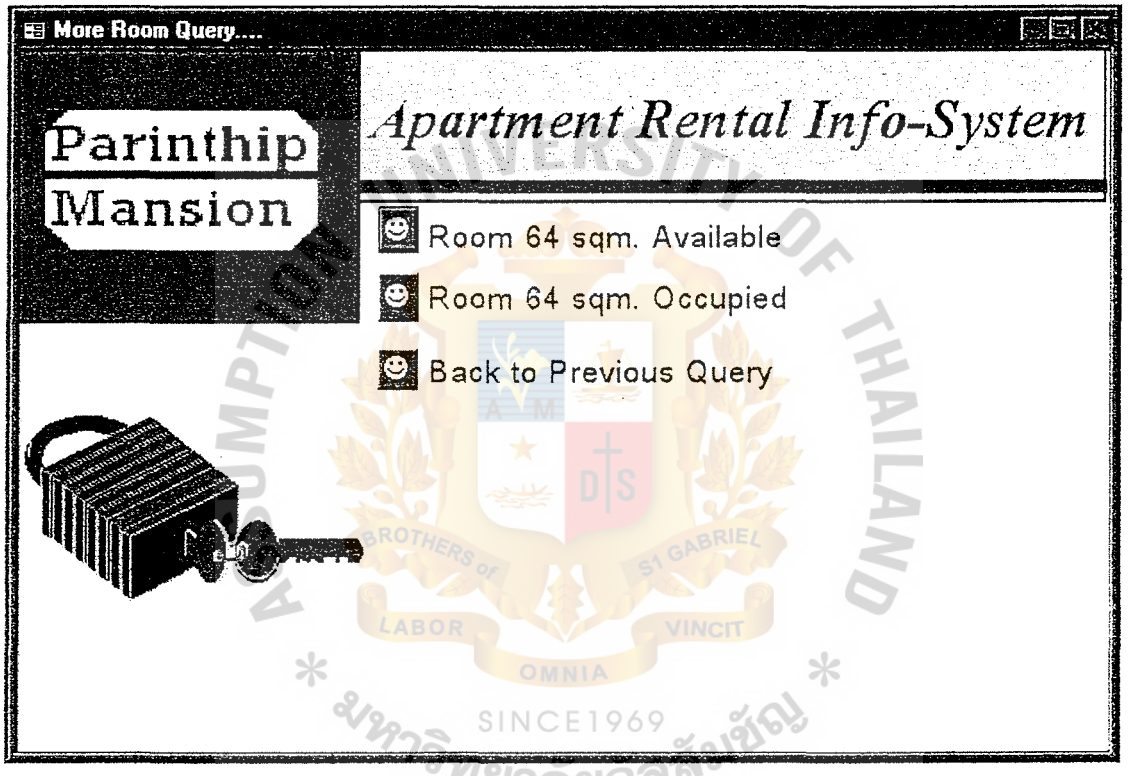


Figure C.4. Fourth Level of Query Menu.

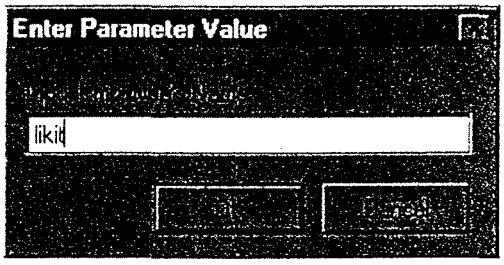


Figure C.5. Name Required When Employee's Details Query Activated.

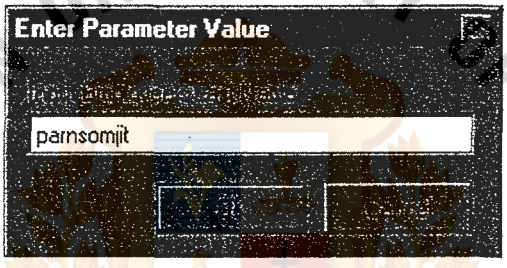


Figure C.6. Last Name Required after Employee's Name Has Been Input.

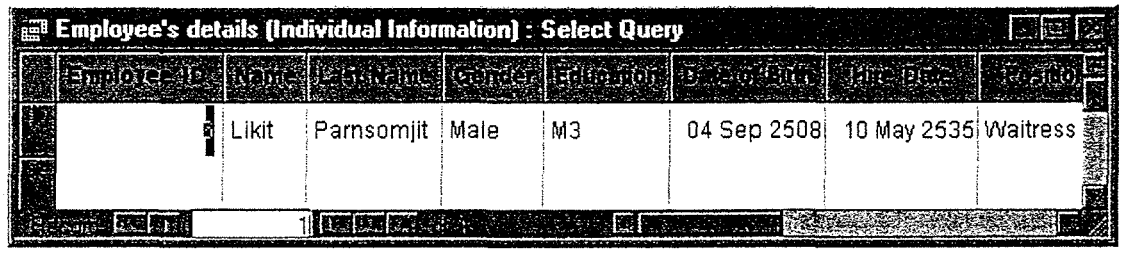


Figure C.7. Partial Result of Employee's Details Query.

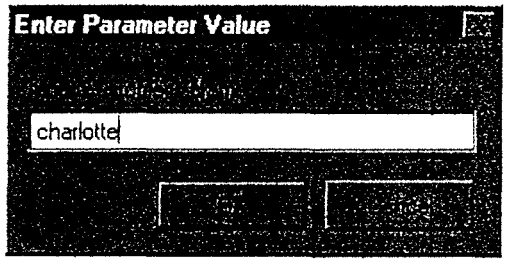


Figure C.8. Name Required When Rent History Query Activated.

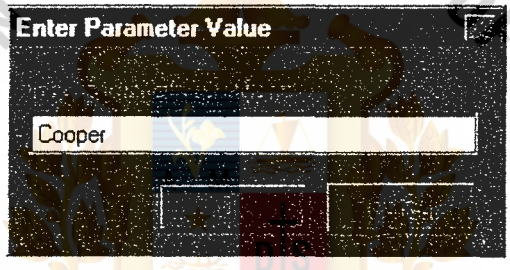


Figure C.9. Last Name Required after Customer's Name Has Been Input.

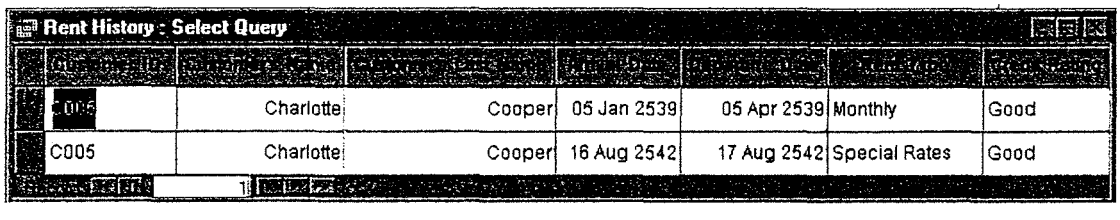


Figure C.10. Result of Rent History Query.

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS of ST GABRIEL
OMNIA
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

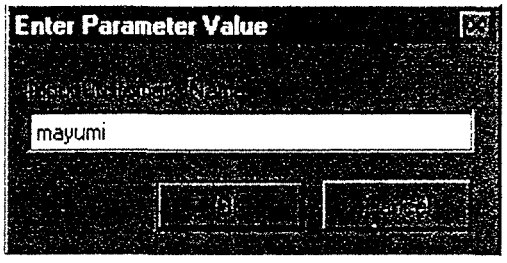


Figure C.11. Name Required When Customer's Details Query Activated.

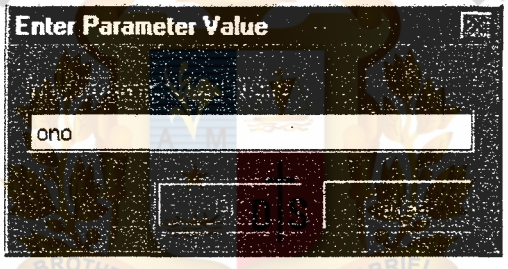


Figure C.12. Last Name Required after Customer's Name Has Been Input.

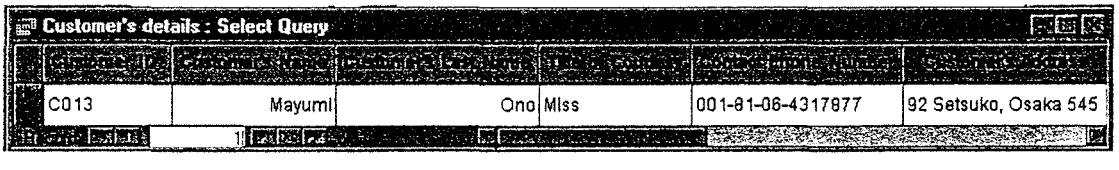


Figure C.13. Partial Result of Customer's Details Query.

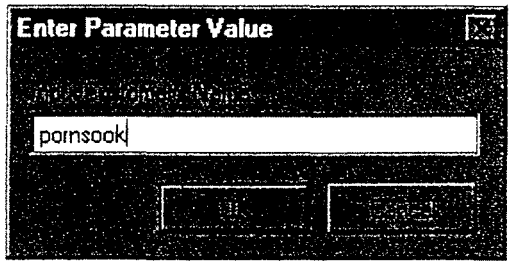


Figure C.14. Name Required When Room Reservation Query Activated.

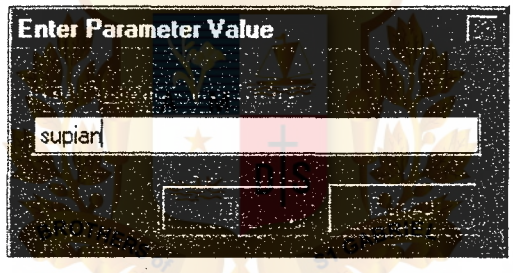


Figure C.15. Last Name Required after Customer's Name Has Been Input.

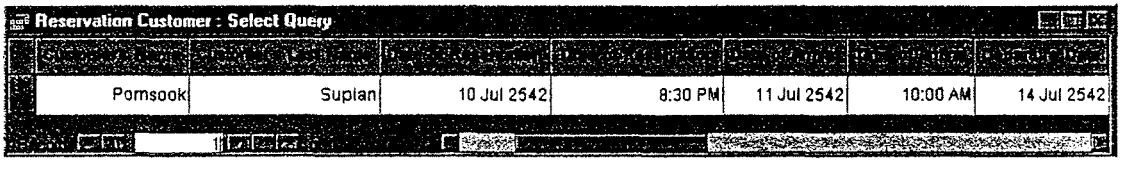


Figure C.16. Partial Result of Room Reservation Query.

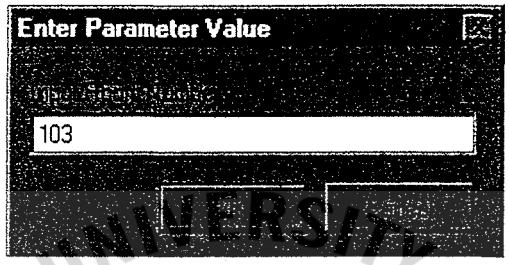


Figure C.17. Room Number Required When Room Registration Query Activated.

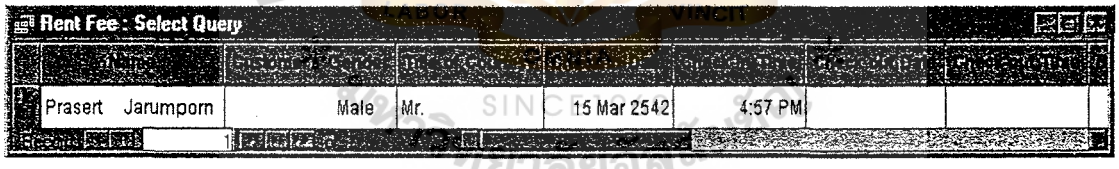


Figure C.18. Partial Result of Room Registration Query.

St. Gabriel's Library

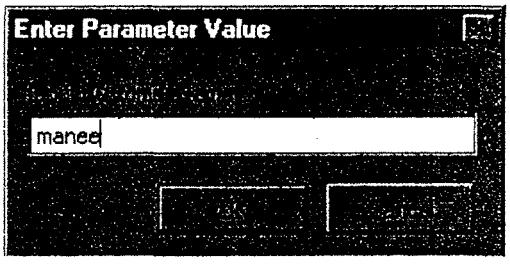


Figure C.19. Name Required When Room Deposit Query Activated.

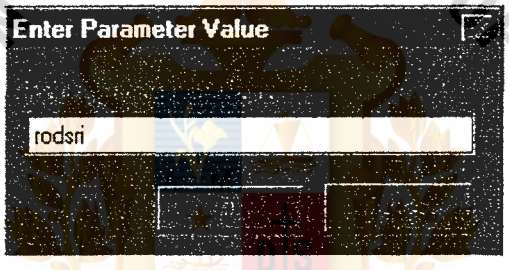


Figure C.20. Last Name Required after Customer's Name Has Been Input.

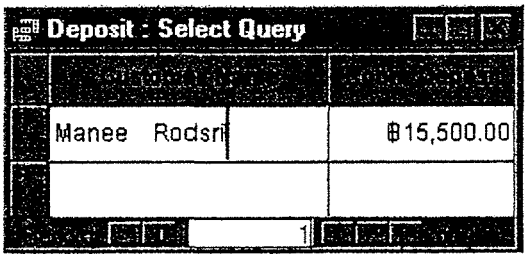


Figure C.21. Result of Room Deposit Query.

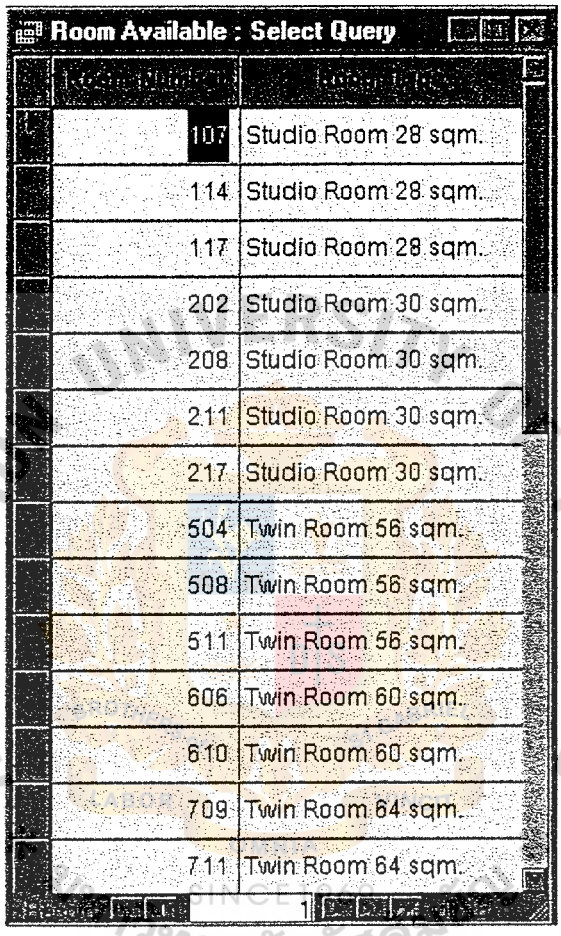


Figure C.22. Partial Result of Total Room Available Query.

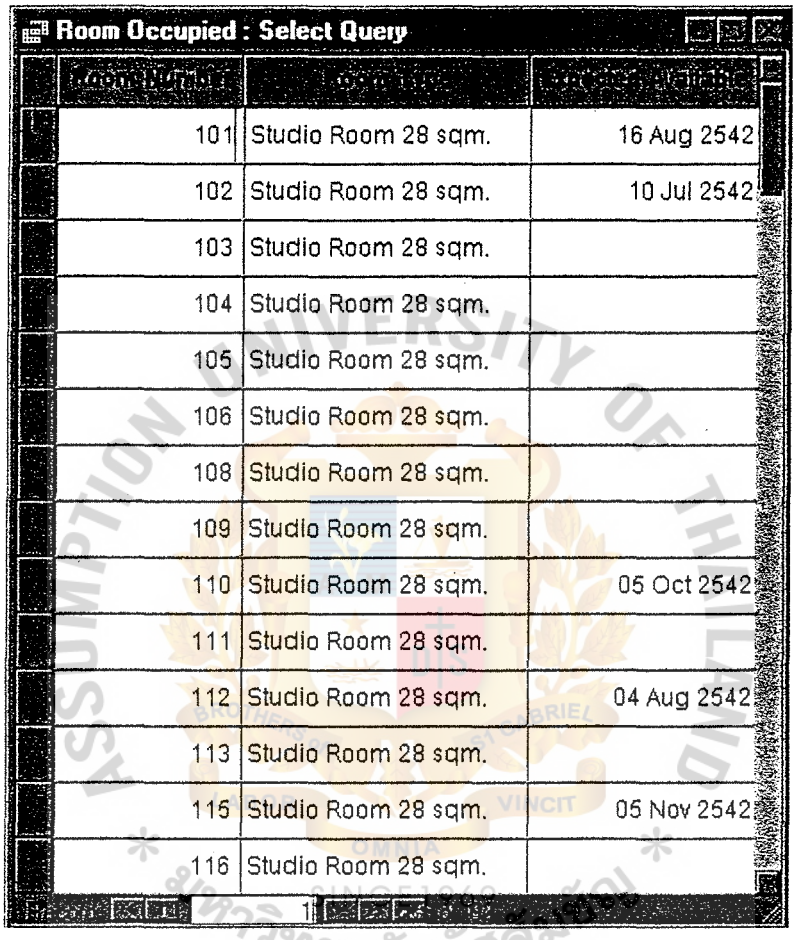


Figure C.23. Partial Result of Total Room Occupied Query.

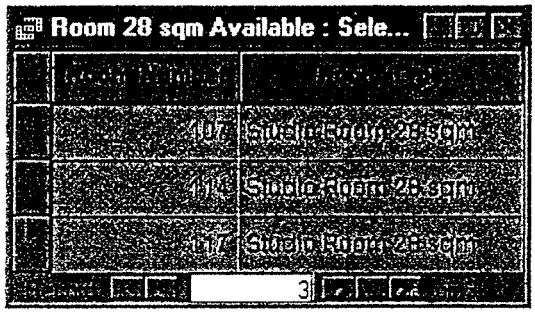


Figure C.24. Result of Room 28 sqm. Available Query.

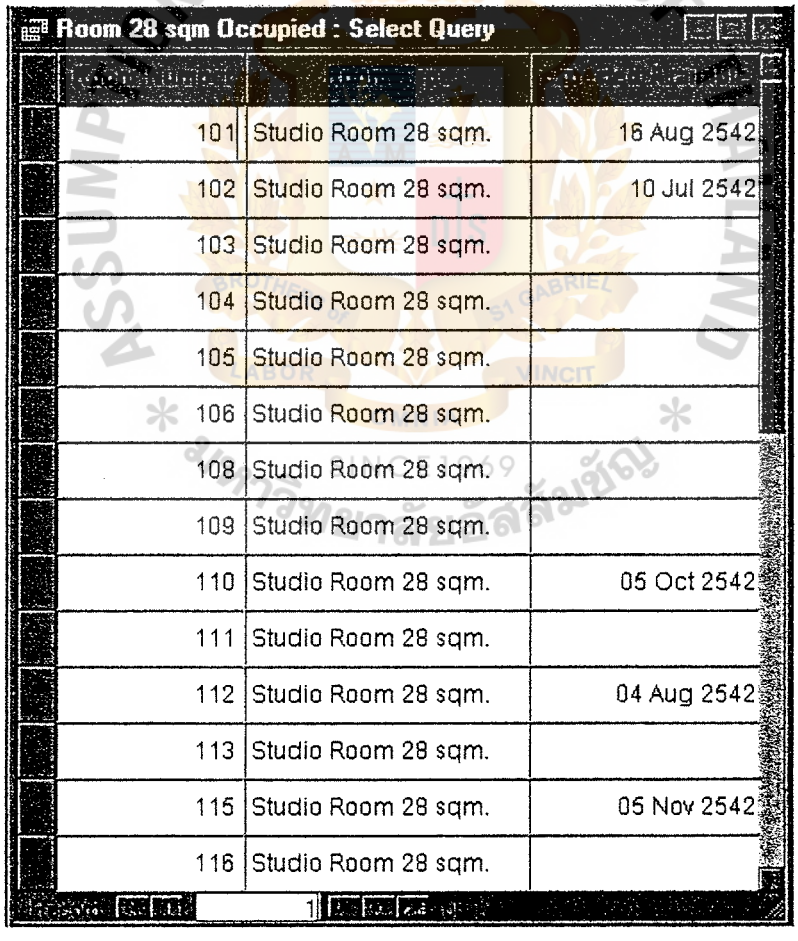


Figure C.25. Partial Result of Room 28 sqm. Occupied Query.

APPENDIX D

SAMPLE OUTPUT REPORTS OF THE PROPOSED SYSTEM

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS of St GABRIEL
LABOR VINCIT OMNIA
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

St. Gabriel's Library

Monthly Salary Pay

Section	Total Pay	Average Pay	Amount Of Employee
Administration	221,100.00	44,220.00	5
Apartment	187,450.00	23,431.25	8
Minimart	29,500.00	14,750.00	2
Pool	50,100.00	16,700.00	3
Restaurant	127,900.00	18,271.43	7
Security	29,700.00	9,900.00	3
Snooker	47,030.00	9,406.00	5
Grand Total, Baht	692,780.00	20,993.33	33

04-Apr-01 11:06 AM Page 1 of 1

Figure D.1. Monthly Salary Pay Report.

Employee's Monthly Salary Detail

Section : Administration

Employee ID.	Name	Last Name	Gender	Education	Position	Salary
16	Thanandon	Supachokeauychai	Male	Master's degree	General Manager	72,000.00
5	Adithep	Jumroonsit	Male	Master's degree	Accountant	53,000.00
2	Adiporn	Montriamornthep	Female	Master's degree	Finance Officer	38,000.00
3	Suporn	Nurak	Male	Bachelor's degree	Finance Officer	35,600.00
27	Hunsa	Janejaiwit	Female	Bachelor's degree	Accountant	22,500.00
					Total, Baht	221,100.00

26-Oct-00 2:10 PM Page 1 of 6

Figure D.2. Employee's Monthly Salary Detail Report (Page 1).

Section : Apartment

Employee ID.	Name	Last Name	Gender	Education	Position	Salary
9	Chaiya	Klubprasit	Male	Master's degree	Section Manager	65,000.00
21	Suthep	Harikulchai	Male	Bachelor's degree	Mechanic	26,000.00
14	Tharathip	Pimonsirikul	Female	Bachelor's degree	Receptionist	22,200.00
18	Pensiri	Sasai	Female	Bachelor's degree	Receptionist	19,400.00
15	Suwan	Kitipao	Male	Diploma	Concierge	15,800.00
11	Boonchuay	Tinakorn	Female	M6	House Keeper	15,500.00
10	Duangjai	Kongsilp	Female	M6	House Keeper	15,300.00

26-Oct-00 2:10 PM Page 2 of 6

Figure D.3. Employee's Monthly Salary Detail Report (Page 2).

29	Dol	Onemud	Female	M6	House Keeper	8,250.00
					Total, Baht	187,450.00

Section : Minimart

Employee ID.	Name	Last Name	Gender	Education	Position	Salary
4	Nipaporn	Dangmechow	Female	Diploma	Section Manager	22,000.00
28	Vichian	Tantisavi	Male	M6	Cashier	7,500.00
					Total, Baht	29,500.00

Section : Pool

Employee ID.	Name	Last Name	Gender	Education	Position	Salary
12	Tianchai	Bunme	Male	Bachelor's degree	Section Manager	35,000.00

26-Oct-00 2:10 PM Page 3 of 6

Figure D.4. Employee's Monthly Salary Detail Report (Page 3).

32	Tongtai	Roopsoong	Male	M6	Pool Security	8,400.00
33	Tasnai	Wongprayoon	Male	M6	Pool Security	6,700.00
					Total, Baht	50,100.00

Section : Restaurant

Employee ID.	Name	Last Name	Gender	Education	Position	Salary
22	Munkong	Julaluck	Male	Diploma	Cook	62,000.00
8	Manoon	Tongsiri	Male	Bachelor's degree	Section Manager	38,000.00
20	Pornpan	Punark	Female	M6	Cashier	9,200.00
6	Likit	Parnsomjit	Male	M3	Waitress	5,800.00

26-Oct-00 2:10 PM Page 4 of 6

Figure D.5. Employee's Monthly Salary Detail Report (Page 4).

13	Sutee	Singchon	Male	M6	Waiter	4,500.00
19	Lumyong	Yada	Female	M3	Waitress	4,300.00
17	Sunee	Thummavanich	Female	M3	Waitress	4,100.00
					Total, Baht	127,900.00

Section : Security

Employee ID.	Name	Last Name	Gender	Education	Position	Salary
1	Veerasak	Teeratong	Male	P6	Section Manager	22,000.00
25	Anucha	Kumpai	Male	P6	Gard	3,900.00
30	Anuphan	Silppreekul	Male	P6	Gard	3,800.00
					Total, Baht	29,700.00

26-Oct-00 2:10 PM Page 5 of 6

Figure D.6. Employee's Monthly Salary Detail Report (Page 5).

Section : Snooker

Employee ID.	Name	Last Name	Gender	Education	Position	Salary
7	Montree	Poomchat	Male	Diploma	Section Manager	18,000.00
31	Kamol	Chutisoot	Male	Diploma	Cashier	9,250.00
24	Siriporn	Choosanit	Female	M3	Marker	7,430.00
26	Prasert	Boonyarat	Male	M6	Marker	6,450.00
23	Arada	Sooksamai	Female	M6	Marker	5,900.00
					Total, Baht	47,030.00
					Grand Total, Baht	692,780.00

02-Nov-00 7:12 PM Page 6 of 6

Figure D.7. Employee's Monthly Salary Detail Report (Page 6).

St. Gabriel's Library

Reservation Report

Reserv. Date	Exp. Arrival	Exp. Departure	Room Type	Rent Type
10-Jul-99				
	11 Jul 2542		Studio Room 30 sqm.	Monthly
	13 Jul 2542		Twin Room 56 sqm.	Monthly
	12 Jul 2542		Studio Room 30 sqm.	Monthly
	12 Jul 2542		Studio Room 30 sqm.	Monthly
	11 Jul 2542	14 Jul 2542	Studio Room 28 sqm.	Package
	12 Aug 2542	15 Aug 2542	Studio Room 28 sqm.	Package
11-Jul-99				
	13 Jul 2542		Twin Room 60 sqm.	Monthly
12-Jul-99				
	13 Jul 2542		Twin Room 64 sqm.	Monthly
13-Jul-99				
	14 Jul 2542		Studio Room 30 sqm.	Monthly
	15 Jul 2542		Studio Room 32 sqm.	Monthly
	15 Jul 2542		Studio Room 32 sqm.	Monthly
14-Jul-99				
	15 Jul 2542	20 Jul 2542	Studio Room 28 sqm.	Special Rates
		Total Room Reserved	12	Room (s)

07-Sep-00 10:31 PM Page 1 of 1

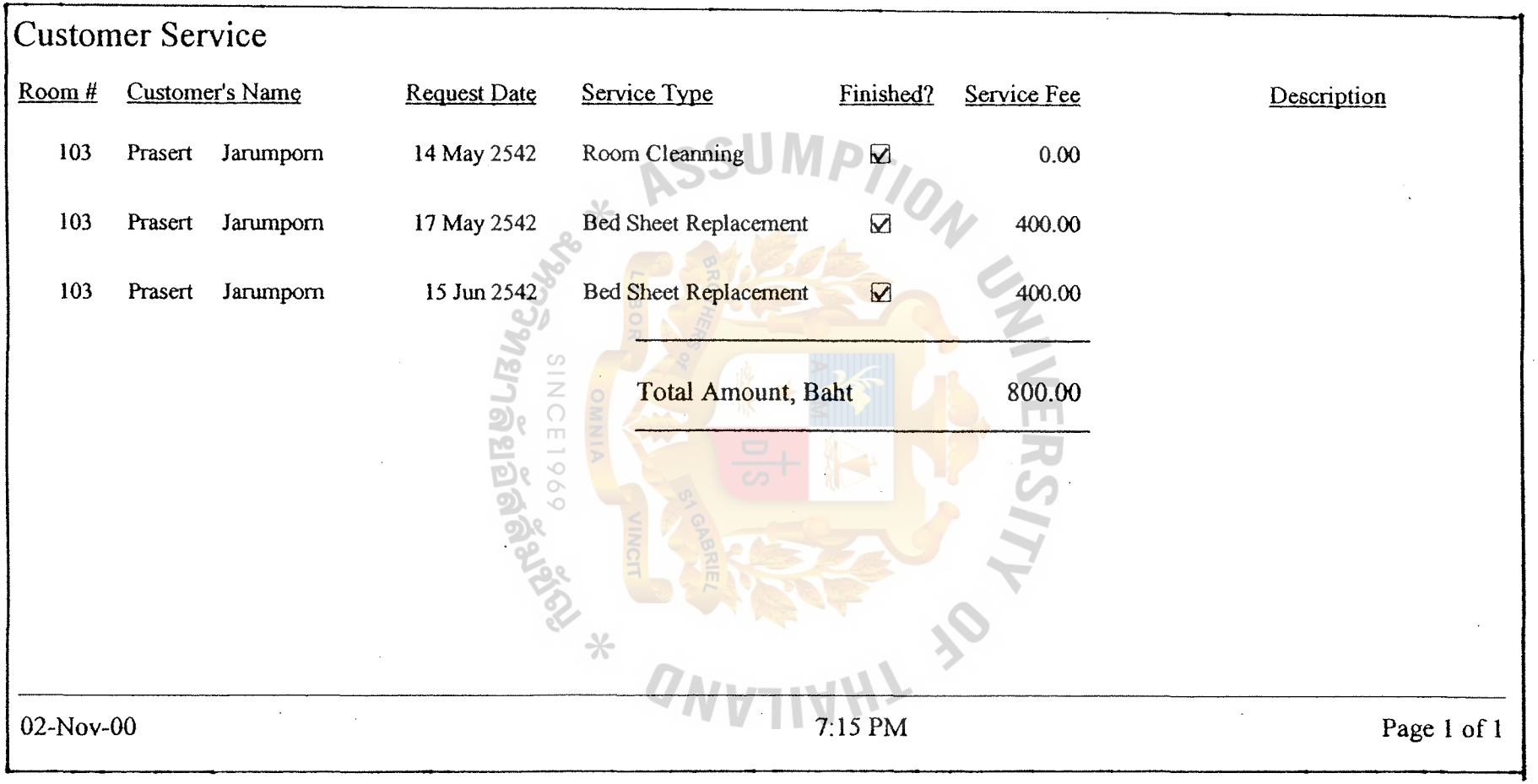
Figure D.8. Reservation Report.

Registration Report

Registration Date	Room Number	Charge Rate	Type of Stay
03-Jul-99			
	113	500.00	Special Rates
	Total no. of room registered for today	1	Room(s)
04-Jul-99			
	105	4,600.00	Monthly
	120	500.00	Special Rates
	Total no. of room registered for today	2	Room(s)
05-Jul-99			
	217	5,000.00	Monthly
	Total no. of room registered for today	1	Room(s)
06-Jul-99			
	707	10,000.00	Monthly
	Total no. of room registered for today	1	Room(s)
	Total no. of room registered for this period	5	Room(s)

07-Sep-00 10:38 PM Page 1 of 1

Figure D.9. Registration Report.



Customer Service

Room #	Customer's Name	Request Date	Service Type	Finished?	Service Fee	Description
103	Prasert Jarumporn	14 May 2542	Room Cleanning	☑	0.00	
103	Prasert Jarumporn	17 May 2542	Bed Sheet Replacement	☑	400.00	
103	Prasert Jarumporn	15 Jun 2542	Bed Sheet Replacement	☑	400.00	
			Total Amount, Baht		800.00	

02-Nov-00 7:15 PM Page 1 of 1

Figure D.10. Customer Service Report.

Room Expenditure Charges Report

Room #	Customer's Name	From Date	Till Date	Telephone	Water	Electricity	Total Charge	Remark
103	Prasert Jarumporn	15 Mar 2542	31 Mar 2542	50.00	150.00	2,100.00	2,300.00	
103	Prasert Jarumporn	01 Apr 2542	30 Apr 2542	60.00	80.00	1,800.00	1,940.00	
103	Prasert Jarumporn	01 May 2542	31 May 2542	63.00	105.00	1,600.00	1,768.00	
103	Prasert Jarumporn	01 Jun 2542	30 Jun 2542	80.00	120.00	1,800.00	2,000.00	
103	Prasert Jarumporn	01 Jul 2542	31 Jul 2542	85.00	112.00	1,850.00	2,047.00	
					Grand Total, Baht		10,055.00	

26-Oct-00 2:18 PM Page 1 of 1

Figure D.11. Room Expenditure Charges Report.

Snooker Charge Report

Room #	Customer's Name	Date	Start Time	Stop Time	Total
103	Prasert Jarumporn	10 Jul 2542	10:30 PM	3:05 AM	360.00
103	Prasert Jarumporn	12 Aug 2542	11:00 PM	12:30 AM	120.00
103	Prasert Jarumporn	14 Aug 2542	10:00 PM	11:30 PM	90.00
				Grand Total, Baht	570.00

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS of St GABRIEL
LABOR VINCIT
OMNIA
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

Figure D.12. Snooker Charge Report.

Internet Service Pending Report

Room #	Customer's Name	Date	Start Time	Stop Time	Total Charge
103	Prasert Jarumporn	07 Aug 2542	8:05 AM	11:00 PM	240.00
103	Prasert Jarumporn	08 Aug 2542	11:00 PM	1:45 AM	300.00
103	Prasert Jarumporn	15 Aug 2542	10:25 PM	11:25 PM	110.00
			Total Amount, Baht		650.00

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

Figure D.13. Internet Service Pending Report.

Foods and Beverage Charge Pending Report

Room	Customer's Name	Date	Time	Voucher ?	Total Amount	Remark
103	Prasert Jarumporn	10 Jul 2542	9:00 AM	☐	560.00	
202	Patchara Hongsowan	10 Jul 2542	9:10 AM	☐	320.00	
120	Liang Selong	10 Jul 2542	9:10 AM	☑	0.00	
113	Loo Mai	10 Jul 2542	9:30 AM	☐	120.00	
			Grand Total, Baht		1,000.00	

26-Oct-00 2:23 PM Page 1 of 1

Figure D.14. Restaurant Service Pending Report.

Checkout Report

Checkout Date	Room Number	Charge Rate	Type of Stay	Collection
14-Jun-00				
	502	9,200.00	Per Month	4,600.00
	Total no. of room checkout for today		1	Room(s)
	Daily collection for room checkout		4,600.00	Baht
15-Jun-00				
	707	10,000.00	Per Month	5,000.00
	701	10,000.00	Per Month	5,000.00
	506	9,200.00	Per Month	4,600.00
	Total no. of room checkout for today		3	Room(s)
	Daily collection for room checkout		14,600.00	Baht
	Total no. of room checkout for this period		4	Room(s)
	Total collection for room checkout for this period		19,200.00	Baht

28-Apr-01 12:38 PM Page 1 of 1

Figure D.15. Room Checkout Report.

APPENDIX E

PROCESS SPECIFICATION

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

St. Gabriel's Library

Table E.1. Process Specification of Process 1.1.1.

Process Name	Reservation Request
Data In:	Customer Registration Room
Data Out:	Reservation
Process:	1. Receive room requirement from customer. 2. Check customer record from Customer table. If there are no any records, ask for customer name and contact telephone number from customer. Assign customer ID., record customer name and contact telephone number to Customer table. 3. Check rent history from Registration table. 4. Check room available from Room table. 5. Record necessary information to Reservation table. 6. Confirm the customer type of room reserved, rent type, rental fee, and date and time of arrival.
Attachment:	* Data Store D1, D2, D4, D5

Table E.2. Process Specification of Process 1.1.2.

Process Name	Reservation Cancellation
Data In:	Reservation
Data Out:	Reservation Room
Process:	1. Receive room cancellation from customer. 2. Verify room reservation in Reservation table. 3. Terminate room reservation in Reservation table. 4. Update information in Room table. 5. Confirm to customer the cancellation of room.
Attachment:	* Data Store D2, D4

Table E.3. Process Specification of Process 1.1.3.

Process Name	Generate Adhoc Report for Room Reservation
Data In:	-
Data Out:	Reservation
Process:	1. GM clicks Reservation Report button on screen. 2. The system asks for start date. GM inputs date. 3. The system asks for end date. GM inputs date. 4. The system validates information from Reservation table and generates Adhoc Report on screen.
Attachment:	* Data Store D4

Table E.4. Process Specification of Process 1.2.1.1.

Process Name	Registration Request for Reserved Customer (Monthly)
Data In:	Customer Room Registration Room Deposit
Data Out:	Reservation Customer Room
Process:	1. Receive room check-in request from customer. 2. Verify room reservation from Reservation table. 3. Verify customer data from Customer table. 4. Check for room available from Room table. Assign room to customer and mark for room occupied in Room table. 5. Update information in Customer table. 6. Input all required data in Registration table. 7. Collect room deposit money from customer and update information in Room Deposit table. 8. Request customer to sign contract, and issue receipt for room deposit to customer. 9. Send receipt slip to Finance and Account section.
Attachment:	* Data Store D1, D2, D4, D5, D6

Table E.5. Process Specification of Process 1.2.1.2.

Process Name	Registration Request for Reserved Customer (Daily & Package)
Data In:	Customer Room Registration
Data Out:	Reservation Customer Room
Process:	1. Receive room check-in request from customer. 2. Verify room reservation from Reservation table. 3. Verify customer data from Customer table. 4. Check for room available from Room table. Assign room to customer and mark for room occupied in Room table. 5. Update information in Customer table. 6. Input all required data in Registration table. 7. Request customer to sign contract.
Attachment:	* Data Store D1, D2, D4, D5

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

Table E.6. Process Specification of Process 1.2.1.3.

Process Name	Registration Request for Walk-in Customer (Monthly)
Data In:	Room Customer Registration Room Deposit
Data Out:	Registration Reservation Room Customer
Process:	1. Receive room check-in request from customer. 2. Verify customer rent history from Registration table. 3. Check for customer data from Customer table, then update information in Customer table. If no customer data found, assign new Customer ID. and input all required data in Customer table. 4. Check for room reservation from Reservation table. 5. Check for room available from Room table. Assign room to customer and mark for room occupied in Room table. 6. Input all required data in Registration table. 7. Collect room deposit money from customer and update information in Room Deposit table. 8. Request customer to sign contract, and issue receipt for room deposit to customer. 9. Send receipt slip to Finance and Account section.
Attachment:	* Data Store D1, D2, D4, D5, D6

ASSUMPTION UNIVERSITY LIBRARY
มหาวิทยาลัยอัสสัมชัญ

Table E.7. Process Specification of Process 1.2.1.4.

Process Name	Registration Request for Walk-in Customer (Daily & Package)
Data In:	Room Customer Registration
Data Out:	Registration Reservation Room Customer
Process:	1. Receive room check-in request from customer. 2. Verify customer rent history from Registration table. 3. Check for customer data from Customer table, then update information in Customer table. If no customer data found, assign new Customer ID. And input all required data in Customer table. 4. Check for room reservation from Reservation table. 5. Check for room availble from Room table. Assign room to customer and mark for room occupied in Room table. 6. Input all required data in Registration table. 7. Request customer to sign contract.
Attachment:	* Data Store D1, D2, D4, D5

Table E.8. Process Specification of Process 1.2.2.

Process Name	Generate Adhoc Report for Room Registration
Data In:	-
Data Out:	Registration
Process:	1. GM clicks Registration Report button on screen. 2. The system asks for start date. GM inputs date. 3. The system asks for end date. GM inputs date. 4. The system validates information from Registration table and generates Adhoc Report on screen.
Attachment:	* Data Store D5

Table E.9. Process Specification of Process 1.3.1.

Process Name	In-house Service Request
Data In:	Customer Service
Data Out:	Registration Customer Service
Process:	1. Receive room service request from customer. 2. Verify room registration from Registration table. 3. Check for service schedule from Customer Service table. Record new service in Customer Service table. 4. Confirm to customer the request has been recorded.
Attachment:	* Data Store D5, D7

Table E.10. Process Specification of Process 1.3.2.

Process Name	In-house Service Cancellation
Data In:	Customer Service
Data Out:	Customer Service
Process:	1. Receive room service cancellation from customer. 2. Verify room service request from Customer Service table. 3. Terminate room service from Customer Service table. 4. Confirm to customer the service has been canceled.
Attachment:	* Data Store D7

ASSUMPTION UNIVERSITY OF THAILAND

Table E.11. Process Specification of Process 1.3.3.

Process Name	Generate Adhoc Report for In-house Service
Data In:	-
Data Out:	Customer Service
Process:	1. GM clicks Customer Service Report button on screen. 2. The system asks for start date. GM inputs date. 3. The systme asks for end date. GM inputs date. 4. The system validates information from Customer Service table and generates Adhoc Report on screen.
Attachment:	* Data Store D7

Table E.12. Process Specification of Process 1.4.1.

Process Name	Snooker Service Pending
Data In:	Snooker Service
Data Out:	Registration
Process:	1. Receive snooker service pending to room account from Customer. 2. Verify room registration from Registration table. 3. Record new pending expense to Snooker Service table.
Attachment:	* Data Store D5, D8

ASSUMPTION UNIVERSITY OF THAILAND
SINCE 1969
มหาวิทยาลัยอัสสัมชัญ

Table E.13. Process Specification of Process 1.4.2.

Process Name	Generate Adhoc Report for Snooker Service Pending
Data In:	-
Data Out:	Snooker Service
Process:	1. GM clicks Snooker Service Report button on screen. 2. The system asks for start date. GM inputs date. 3. The system asks for end date. GM inputs date. 4. The system validates information from Snooker Service table and generates Adhoc Report on screen.
Attachment:	* Data Store D8

Table E.14. Process Specification of Process 1.5.1.

Process Name	Input Room Expenses
Data In:	Room Expenses
Data Out:	-
Process:	1. Record all expenses (water, electricity, and telephone) in Room Expenses table.
Attachment:	* Data Store D9

Table E.15. Process Specification of Process 1.5.2.

Process Name	Generate Adhoc Report for Room Expenses
Data In:	-
Data Out:	Room Expenses
Process:	1. GM clicks Room Expenses Report button on screen. 2. The systme asks for start date. GM inputs date. 3. The system asks for end date. GM inputs date. 4. The system validates information from Room Expenses table and generates Adhoc Report on screen.
Attachment:	Data Store D9

ASSUMPTION UNIVERSITY OF THAILAND
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

Table E.16. Process Specification of Process 1.6.1.

Process Name	Restaurant Service Pending
Data In:	Restaurant Service
Data Out:	Registration
Process:	1. Receive restaurant service pending to room account from Customer. 2. Verify room registration from Registration table. 3. Record new pending expense to Restaurant Service table.
Attachment:	* Data Store D5, D10

Table E.17. Process Specification of Process 1.6.2.

Process Name	Generate Adhoc Report for Restaurant Service Pending
Data In:	-
Data Out:	Restaurant Service
Process:	1. GM clicks Restaurant Service Report button on screen. 2. The system asks for start date. GM inputs date. 3. The system asks for end date. GM inputs date. 4. The system validates information from Restaurant Service table and generates Adhoc Report on screen.
Attachment:	* Data Store D10

ASSUMPTION UNIVERSITY OF THAILAND
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

Table E.18. Process Specification of Process 1.7.1.

Process Name	Internet Service Pending
Data In:	Internet Service
Data Out:	Registration
Process:	1. Receive internet service pending to room account from customer. 2. Verify room registration from Registration table. 3. Record new pending expense to Internet Service table.
Attachment:	* Data Store D5, D11

Table E.19. Process Specification of Process 1.7.2.

Process Name	Generate Adhoc Report for Internet Service Pending
Data In:	-
Data Out:	Internet Service
Process:	1. GM clicks Internet Service Report button on screen. 2. The system asks for start date. GM inputs date. 3. The system asks for end date. GM inputs date. 4. The system validates information from Internet Service table and generates Adhoc Report on screen.
Attachment:	Data Store D11

ASSUMPTION UNIVERSITY OF THAILAND
LABOR OMNIA VINCIT
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

St. Gabriel's Library

Table E.20. Process Specification of Process 1.8.1.

Process Name:	Check-out Request for Customer (Daily & Package)
Data In:	Room Registration
Data Out:	Snooker Service Internet Service Restaurant Service Room Expenses Customer Service Registration
Process:	1. Receive check-out request from customer. 2. Verify room registration from Registration table. 3. Verify pending expenses from Snooker Service table. 4. Verify pending expenses from Internet Service table. 5. Verify pending expenses from Restaurant Service table. 6. Verify expenses from Room Expenses table. 7. Verify expenses from Customer Service table. 8. Collect room payment from customer, and issue receipt. 9. Input room check-out date and check-out time in Registration table. 10. Update information in Room table. 11. Send receipt slip to Finance and Account section.
Attachment:	Data Store D2, D5, D7, D8, D9, D10, D11

ASSUMPTION UNIVERSITY OF THAILAND
LABOR VINCIT OMNIA
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

Table E.21. Process Specification of Process 1.8.2.

Process Name	Check-out Request for Customer (Monthly)
Data In:	Room Room Deposit Registration
Data Out:	Snooker Service Internet Service Restaurant Service Room Expenses Customer Service Room Deposit Registration
Process:	1. Receive check-out request from customer. 2. Verify room registration from Registration table. 3. Verify pending expenses from Snooker Service table. 4. Verify pending expenses from Internet Service table. 5. Verify pending expenses from Restaurant Service table. 6. Verify expenses from Room Expenses table. 7. Verify expenses from Customer Service table. 8. Verify room deposit from Room Deposit table. 9. Return room deposit to customer. 10. Collect room payment from customer, and issue receipt. 11. Input room check-out date and check-out time in Registration table. 12. Update information in Room table. 13. Update information in Room Deposit table. 14. Send receipt slip to Finance and Account section.
Attachment:	Data Store D2, D5, D6, D7, D8, D9, D10, D11

Table E.22. Process Specification of Process 1.8.3.

Process Name	Generate Adhoc Report for Room Check-out
Data In:	-
Data Out:	Registration
Process:	1. GM clicks Room Check-out Report button on screen. 2. The system asks for start date. GM inputs date. 3. The system asks for end date. GM inputs date. 4. The system validates information from Registration table and generates Adhoc Report on screen.
Attachment:	Data Store D5

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS of St GABRIEL
LABOR VINCIT
OMNIA
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

APPENDIX F

STRUCTURE CHARTS

ASSUMPTION UNIVERSITY OF THAILAND
BROTHERS of St GABRIEL
LABOR VINCIT OMNIA
SINCE1969
มหาวิทยาลัยอัสสัมชัญ

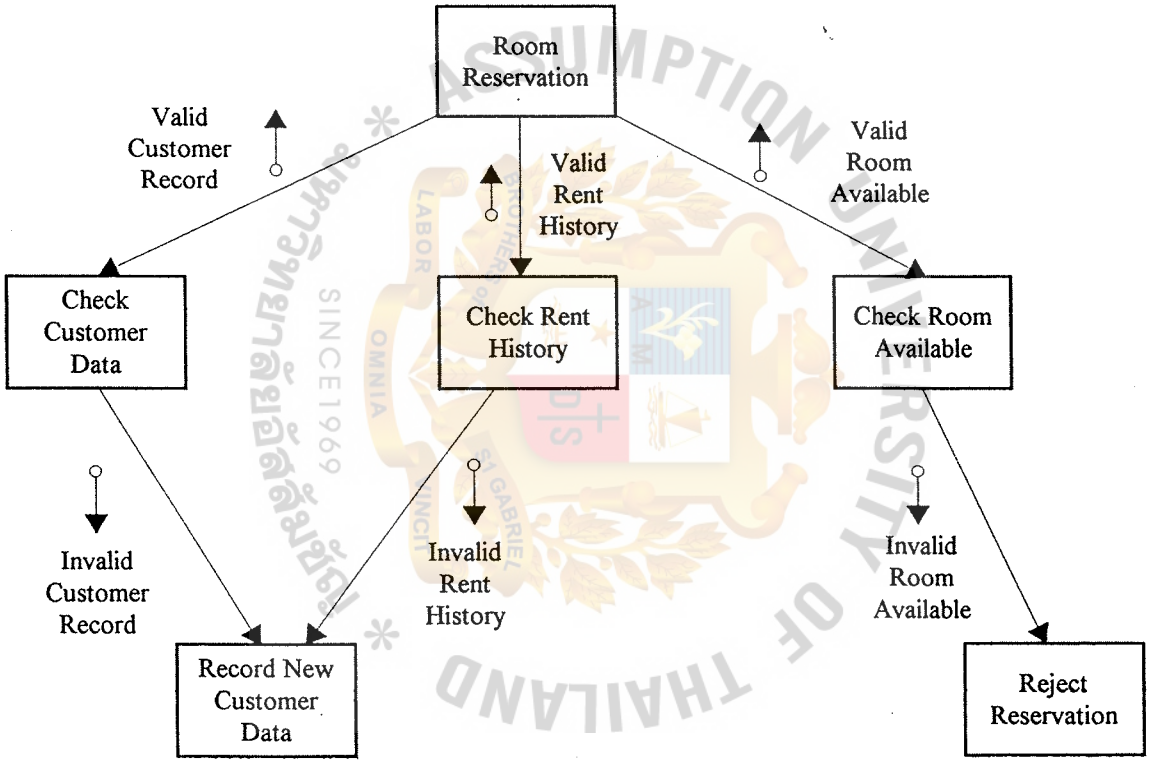


Figure F.1. Structure Chart for Room Reservation Process.

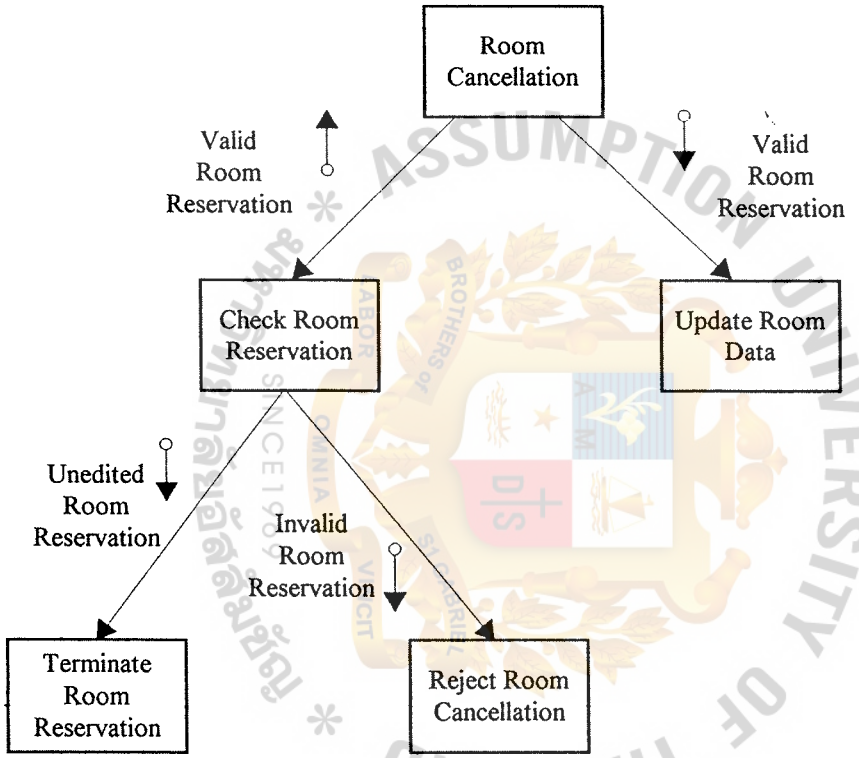


Figure F.2. Structure Chart for Reservation Cancellation Process.

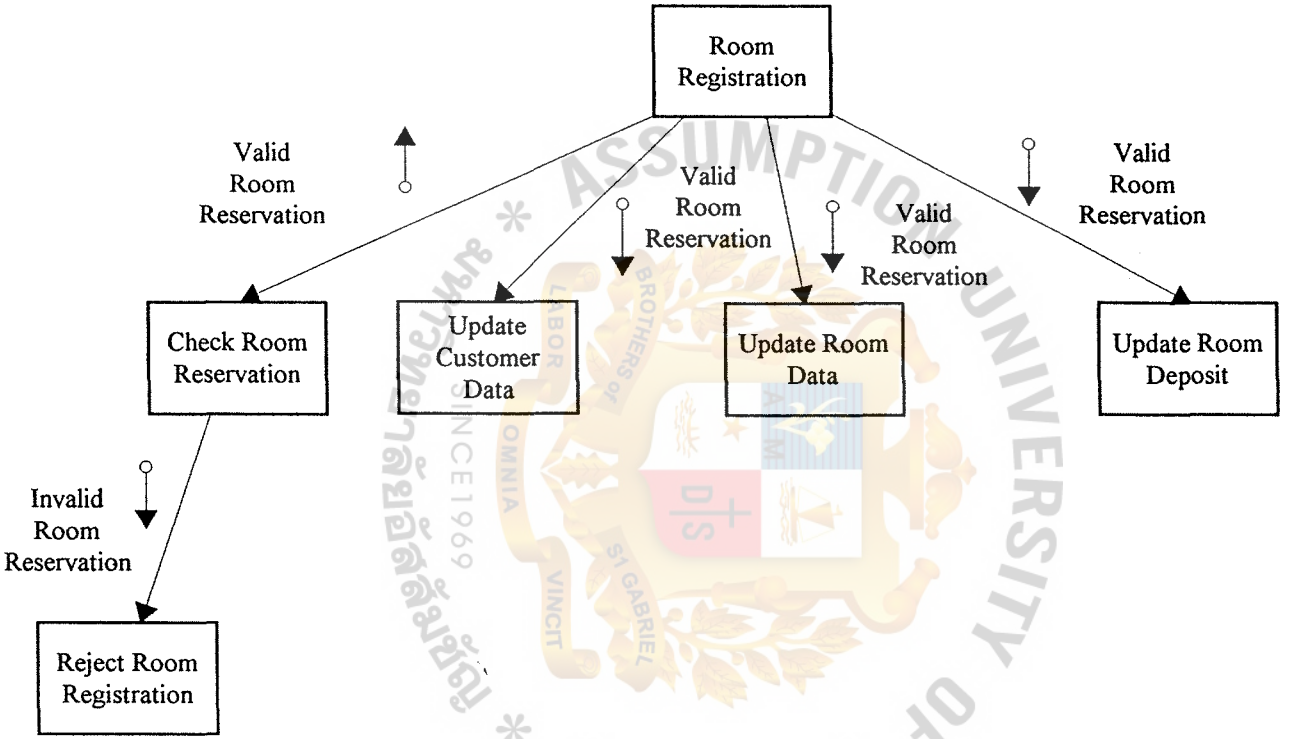


Figure F.3. Structure Chart for Room Registration Process (Monthly Reserved Customer).

St. Gabriel's Library

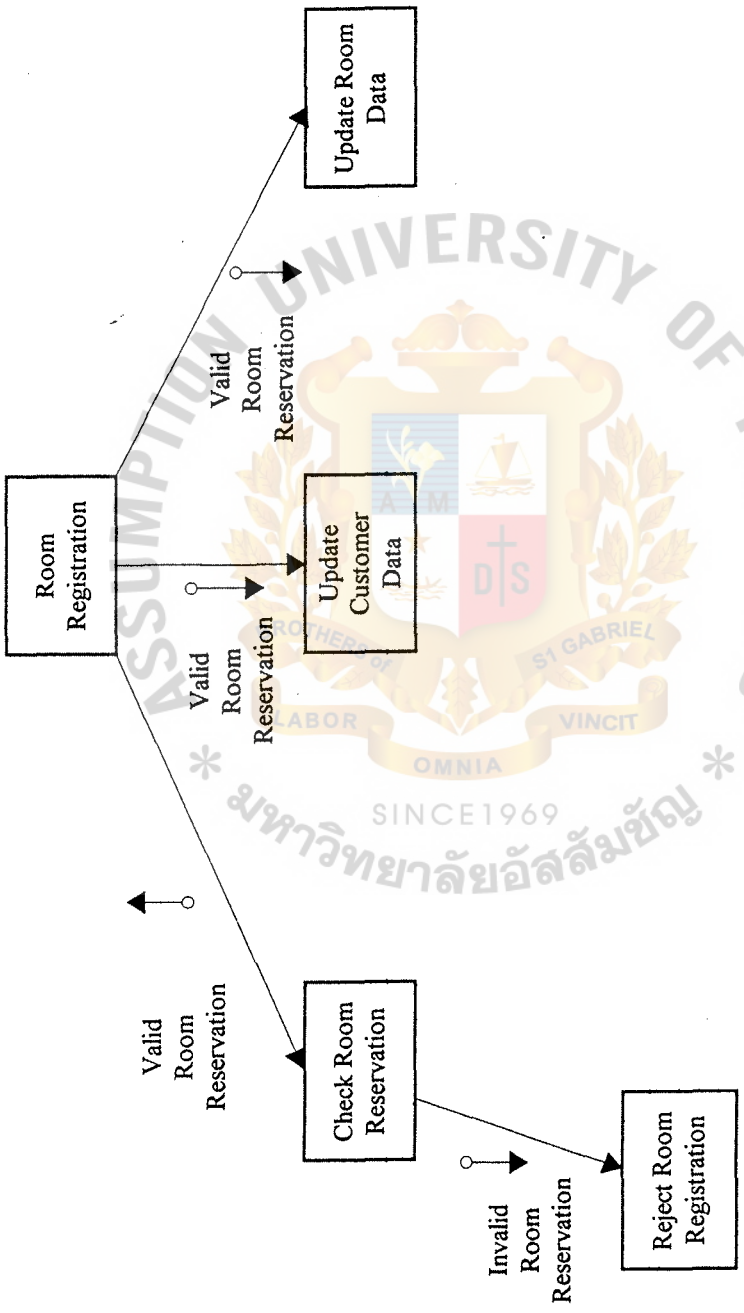


Figure F.4. Structure Chart for Room Registration Process (Daily & Package Reserved Customer).

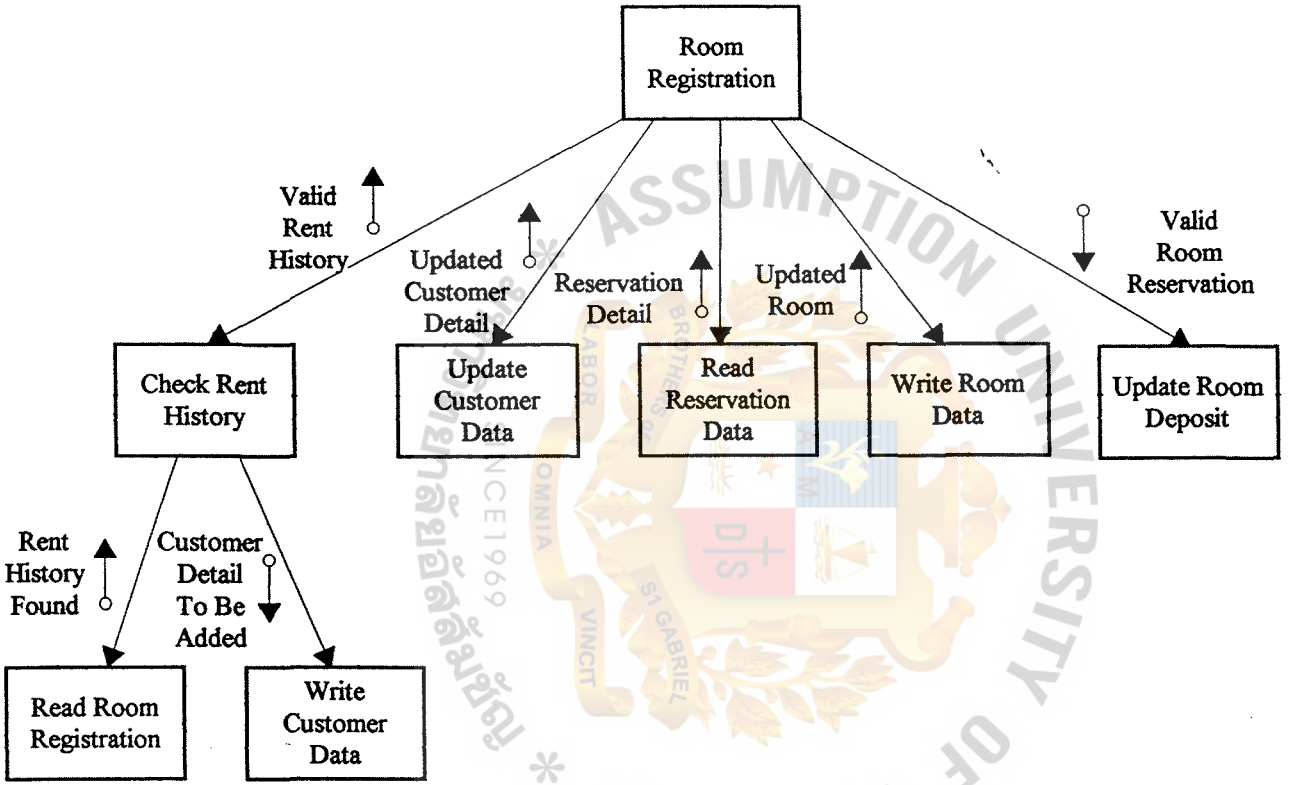


Figure F.5. Structure Chart for Room Registration Process (Monthly Walk-in Customer).

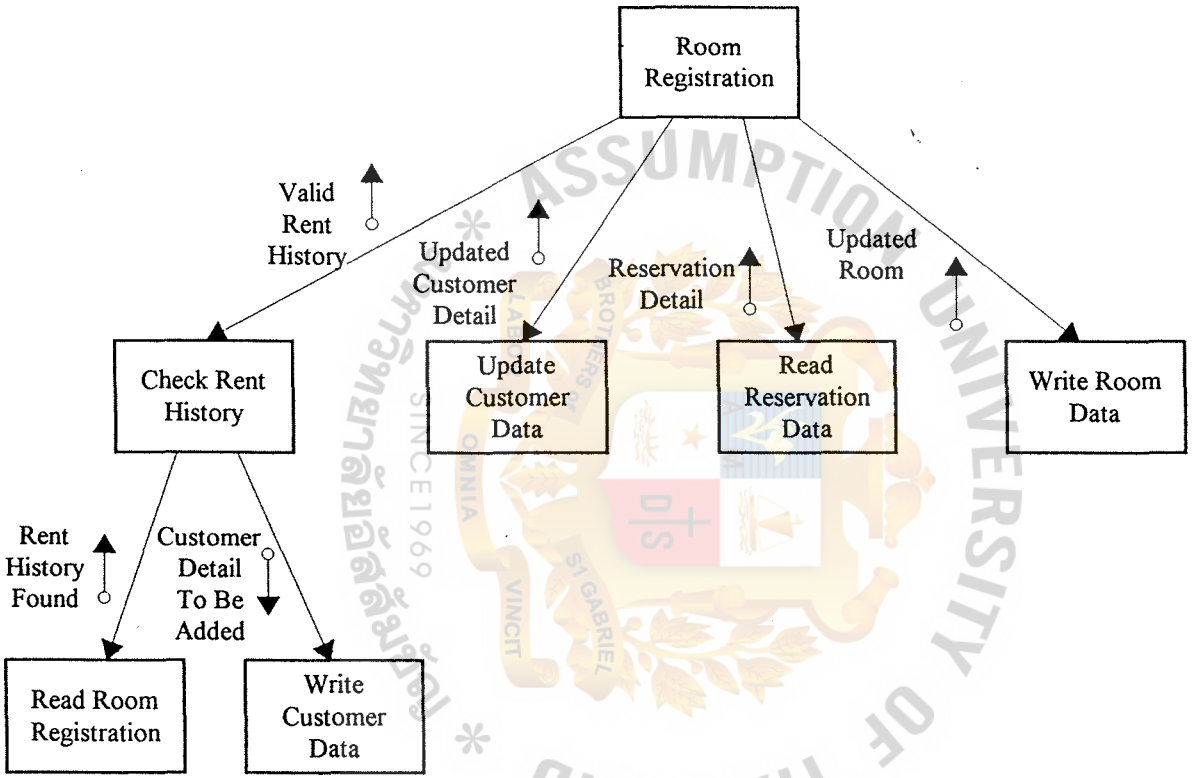


Figure F.6. Structure Chart for Room Registration Process (Daily Walk-in Customer).

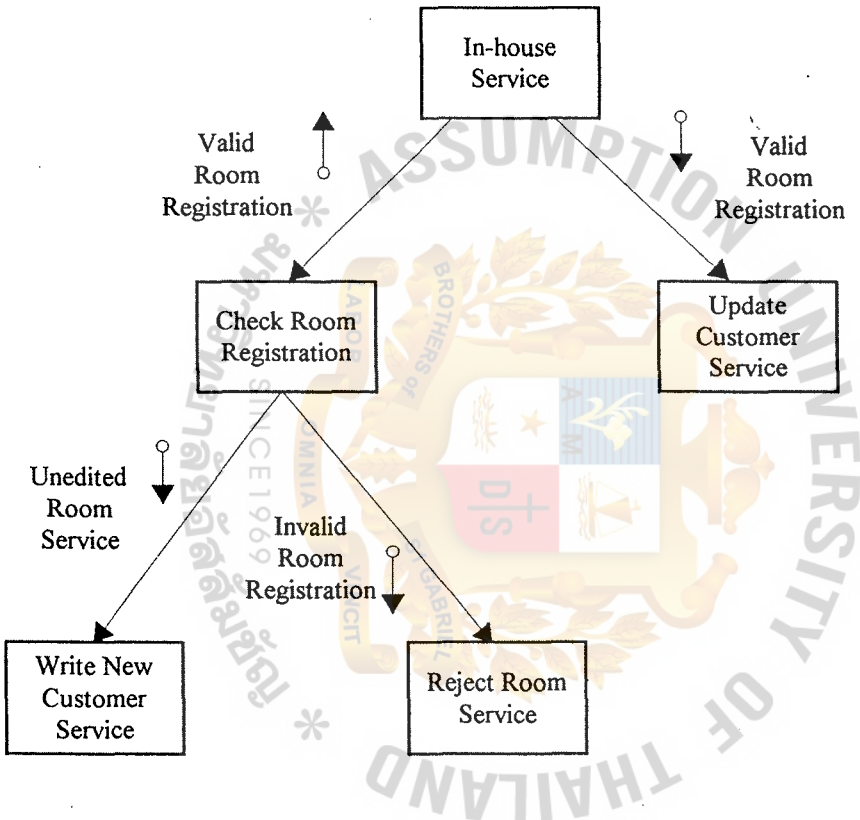


Figure F.7. Structure Chart for In-house Service Process.

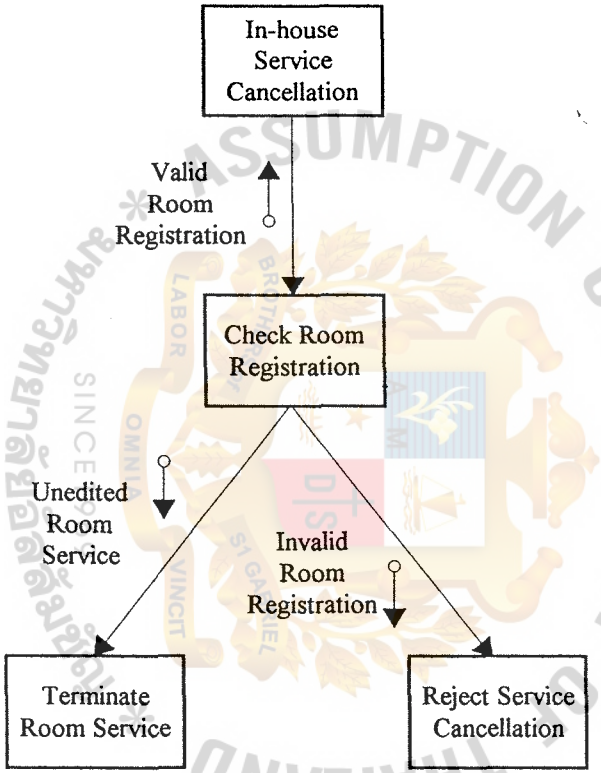


Figure F.8. Structure Chart for In-house Service Cancellation Process.

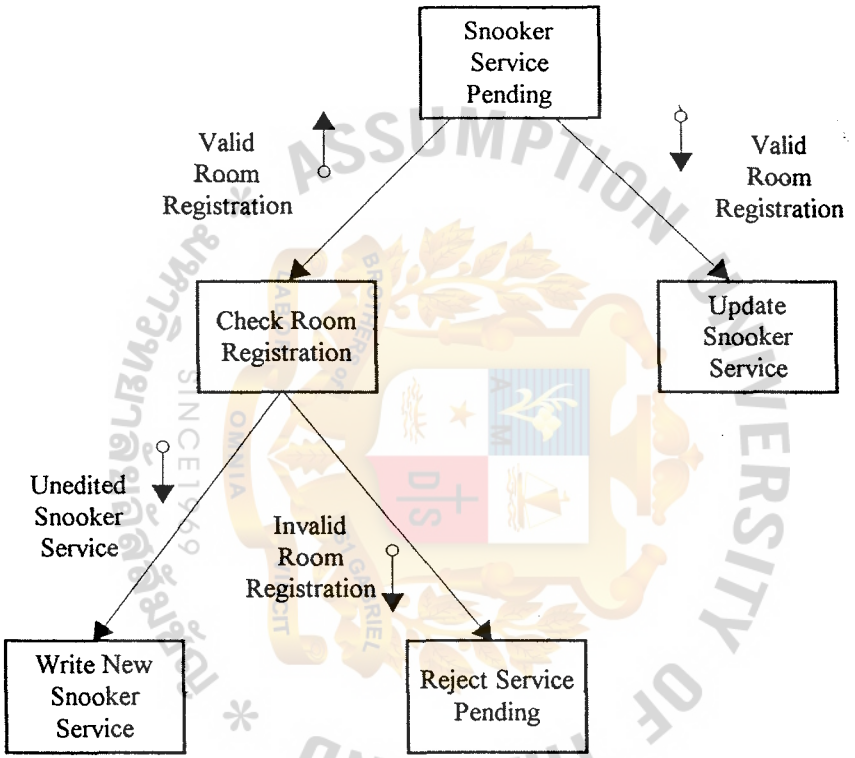


Figure F.9. Structure Chart for Snooker Service Pending Process.

St. Gabriel's Library

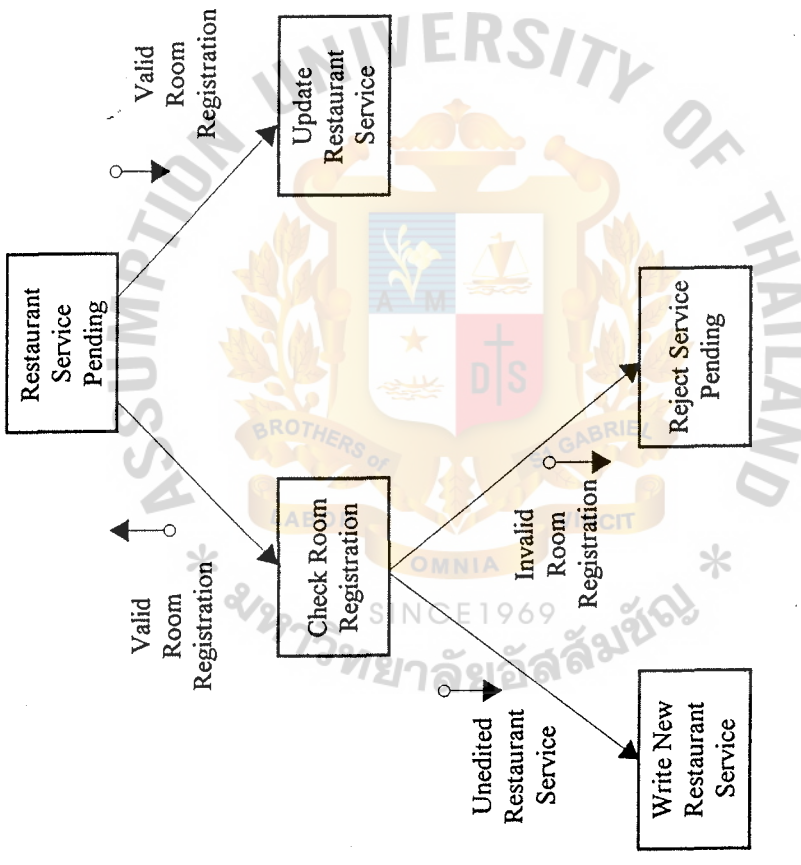


Figure F.10. Structure Chart for Restaurant Service Pending Process.

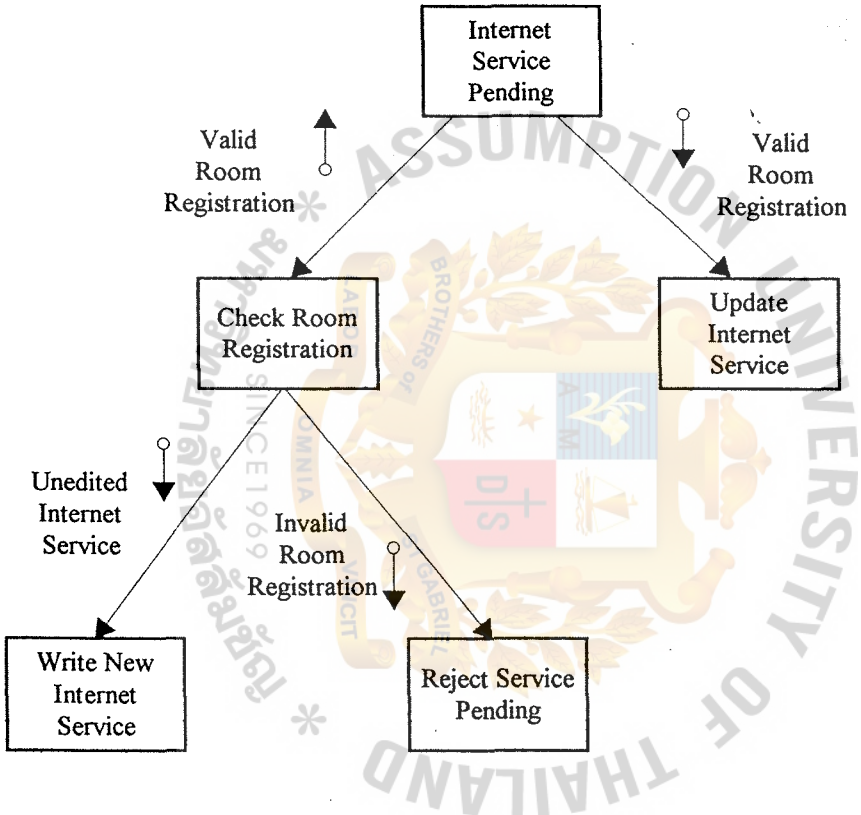


Figure F.11. Structure Chart for Internet Service Pending Process.

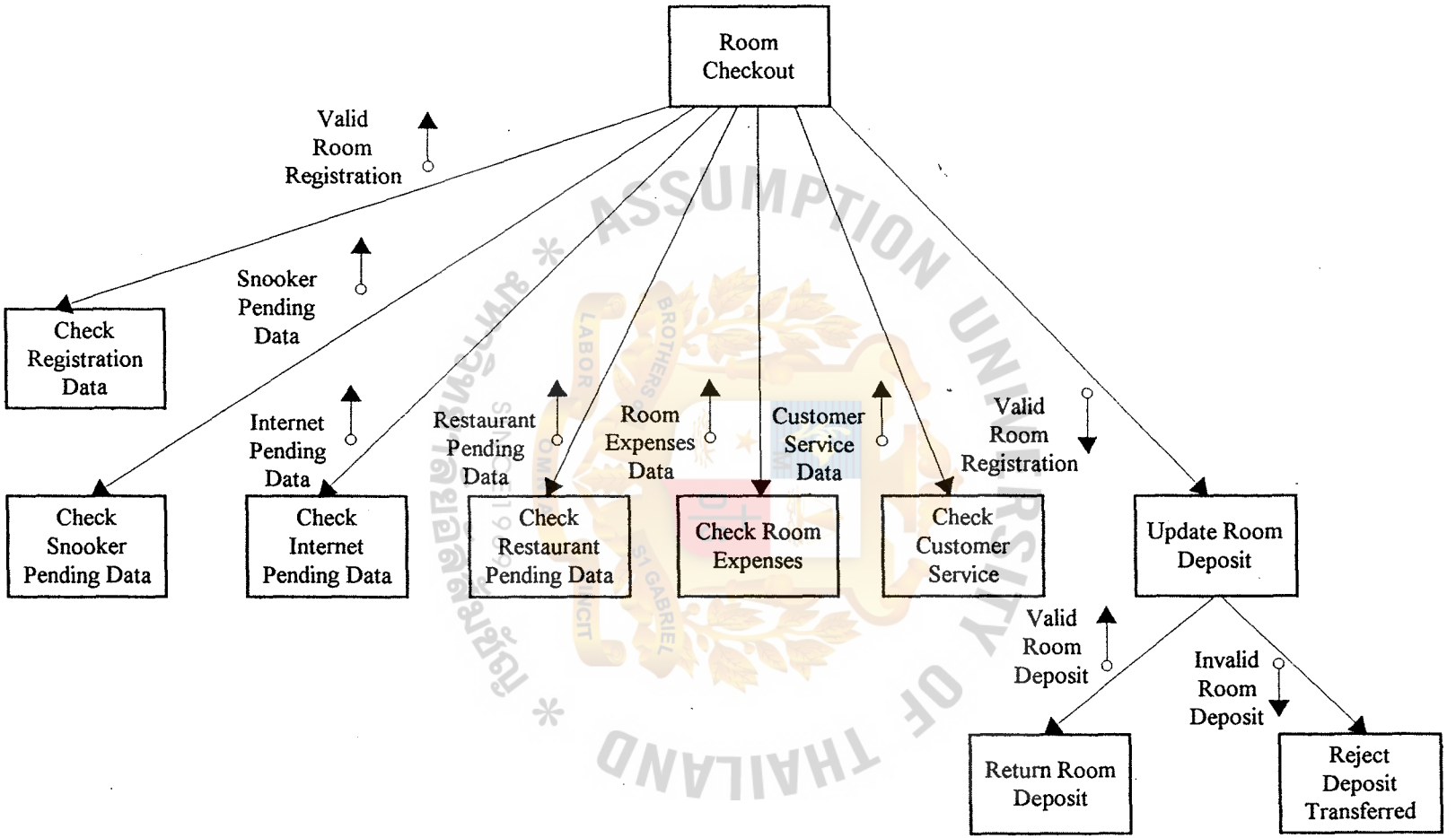


Figure F.12. Structure Chart for Check-out Process.

BIBLIOGRAPHY

1. Batini, Carlo and Stefano Ceri. Conceptual Database Design: An Entity-Relationship Approach. Redwood: The Benjamin/Cummings Publication Company, 1992.

2. Brigham, Eugene F., Louis C. Gapenski, and Michael C. Ehrhardt. Financial Management: Theory and Practice, 9th Edition. San Diego: The Dryden Press, 1999.

3. Date, C. J. An Introduction to Database System, 6th Edition. Philippines: Addison-Wesley Publishing Company, 1995.

4. Date, C. J. and Hugh Darwen. A Guide to The SQL Standard: A User's Guide to The Standard Database Language SQL, 4th Edition. Boston: Addison-Wesley Publishing Company, 1997.

5. Fitzgerald, J. and Andre F. Fitzgerald. Fundamentals of System Analysis. NY: John Wiley & Sons, Inc., 1987.

6. Forouzan, Behrouz, Catherine Coombs, and Sophia Chung Fegan. Introduction to Data Communications and Networking. Madison: McGraw Hill, 1998.

7. Gibson, Michael L. and Hughes T. Cary. System Analysis and Design: A Comprehensive Methodology with CASE. Danvers: Boyd & Fraser Publishing Company, 1994.

8. Kendall, K. E. and Julie E. Kendall. System Analysis and Design, 3rd Edition. New Jersey: Prentice Hall, 1995.

9. Laudon, Kenneth C. and Jane P. Laudon. Management Information System, 6th Edition. New Jersey: Prentice Hall, 1998.

10. Lorie, Raymond A. and Jean-Jacques Daudenarde. SQL and Its Applications. New Jersey: Prentice Hall, 1991.

11. Rob, Peter and Carlos Coronel. Database System: Design, Implementation, and Management. Belmont: Wadsworth Publication Company, 1993.

12. Stallings, William. Local & Metropolitan Area Networks, 5th Edition. New Jersey: Prentice Hall, 1997.

13. Whitten, Jeffrey L. and Lonnie D. Bentley. Systems Analysis and Design Methods, 4th Edition. Madison: McGraw Hill, 1998.

St. Gabriel's Library