



IT Service Request System

by

Mr. Vorrarit Luengwattanakij

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

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

November 2003

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Project Title IT Service Request System

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Academic Year November 2003

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

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ABSTRACT

This project is about analysis and design of the new system for IT service request system of GE Capital Thailand, which is a leading financial solutions provider with a focus on consumer and commercial finance. At the beginning of project, the interview and information collection are conducted to prepare business and technical requirements. The analysis of the existing system is done to recognize the current problem and limitation of the existing system. The middle stage of the system is to design a new system to solve the problems found in the first stage. The structured analysis and design is applied in this project. Entity diagrams and dataflow diagrams are designed to guide programmers in the implementation stage.

The candidate solutions are proposed and comparison is made. The best solution which comes up with efficiency and cost saving is then selected. The selected solution is based on client-server architecture using Microsoft Windows 2000 as server operating system and connects to client workstations through local area network. The solution is developed using Java Server Page running on Apache Tomcat 4.1.24 and Microsoft SQL database is used as a database management system. This combination is economical and covers for projected future expansion for the company. The new system uses distributed processing. All departments and branch offices can leverage the existing network to connect to the server as an intranet server. They can use the browser installed with the operating system to browse the system and make IT service requests.

ACKNOWLEDGEMENTS

Several people have made important contributions to this project, whose efforts are acknowledged and thankful.

First, The writer would like to thank Dr. Boonyarit Pokrud, the project advisor for his assistance and suggestion to this project. He would also like to thank all the lecturers in MS (CIS) course for their knowledge and expertise, which are found useful in developing this project.

Secondly, sincere thanks go to Mr. Settaporn Churatn, Initiative Senior Manager of GE Capital Thailand for the information and other officers who have provided collaboration to study the company system. Finally, he also thanks his friends in MS (CIS) course for their suggestion and help.

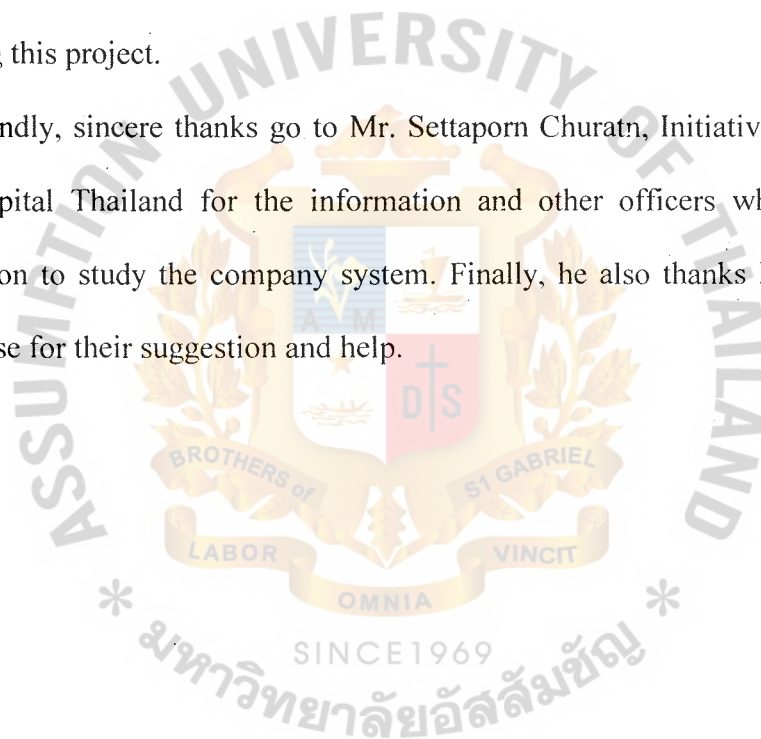


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I. INTRODUCTION

1.1 Background of the Project

In this project, the existing IT service request procedure are studied and analyzed and all the systems and users requirements for a new IT Service Request Systems are collected in order to design a computer based service request systems.

GE Capital Thailand is a leading consumer finance provider in Thailand, employing over 2,000 people. GE Capital is a premier provider of auto-loans and personal loans, and the leader in store credit cards and international bankcard. Nowadays, the competition among consumer finance providers is high. We need more flexibility and speed to adjust marketing plan in response to competition. In response to business requirements, IT department needs to provide a faster and more accurate service to the users. As the number of employees had reached over 2,000 people, we need a systematic record of customer requests and traceable approval and service fulfillment.

IT department had provided many kinds of services to our customers, partners and employees such as computer hardware, software, personal identities etc. Each kind of service needs different information to provide the accurate and fast services. If the department can reduce these problems, we can provide an overall satisfactory toward our company. Marketing department can have a quick response to the competition while IT service team can work comfortably, because all works are organized and traceable.

1.2 Objectives of the Project

With the main key of success, the accuracy and speed of IT service are very important. The company needs an effective computerized system to address these requests. The objectives of the project are as follows:

- (a) To analyze the current problem of the existing system.
- (b) To design a computer-based information system for a new system.
- (c) To reduce scattered paper work.
- (d) To reduce the time for document flow.
- (e) To shorten operation time in the request approval.
- (f) To support the future expansion of the company.

1.3 Scope of the Project

IT service request system is aimed to collect information about all IT service requests, approval and reasons. The request date and time, approval date and time, completion date and time and the requesters' names and departments are collected so that we can generate management reports. We can use the information from the reports to analyze and improve the quality of services later on.

This project covers the analysis and design of a proposed system for GE Capital's IT service request system, which includes the following functions.

(1) System Administration

This function related to overall infrastructure of the system.

Employee, requests and request categories information are managed here.

(2) Authentication

This part of the system related to the authentication and authorization of this system. It is required to automatically list the requests for each login

user. This function will track the authorization whether the user has the right to view the requests or assign the approval or not.

(3) Request Submission

This part of the system deals with the procedure in submitting a new request. User has to choose a correct category to point to a specific request form for each requested job, so that the job owner can have enough information to complete the requested job.

(4) Request Approval

This function is responsible for the approval from line managers and job owners. Line managers and job owners can choose to approve or reject the requests. Additional comments on the decision can be specified for clarifying the decisions.

(5) Generating Report

This part of the system is responsible for the report generating for manager review and analysis. Information can be used to further improve the quality of services and to improve the satisfaction towards the system.

1.4 Project Plan

The schedule of this system development project and the Gantt chart of the project are shown in Figure 1.1.

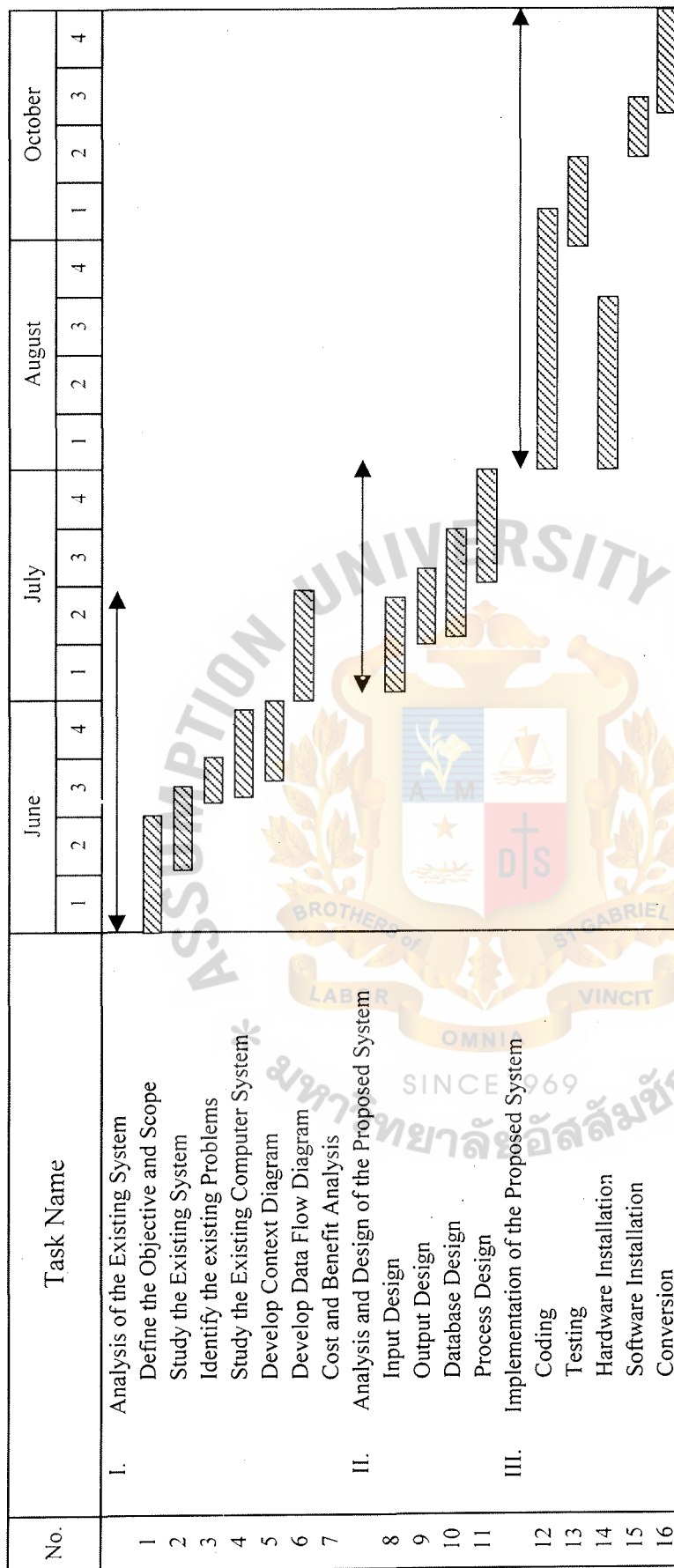


Figure 1.1. Project Plan for IT Service Request System.

II. THE EXISTING SYSTEM

2.1 Background of the Organization

GE Capital (Thailand) Ltd. a wholly owned subsidiary of US-based GE Capital Services, is a leading financial solutions provider with a focus on Consumer and Commercial Finance, employing over 2,000 people in Thailand. GE Capital is the premier provider of auto-loans and personal loans, and is a leader in store credit cards and international credit cards (bankcards).

Auto Finance: Provides automobile hire purchase financing and leasing to individuals and corporations in Thailand by GE Capital Auto Lease Plc. (GECAL). 100% owned by GE Capital GECAL, currently has more than 140,000 customers.

Store Credit Cards: Provides store credit cards to leading retailers.

Central card, managed by General Card Services Ltd., a joint venture between GE Capital and Central Group, for payment of products and services.

Tesco Lotus card provided through Tesco Lotus Card Services Ltd., a joint venture between GE Capital and Tesco Lotus for payment at 33 Tesco Lotus stores nationwide.

Installment Finance: Offers consumers installment financing for consumer electronic, household appliances, audio-visual equipment, office automation, mobile phone equipment and office furniture. Products include: First Choice and Power Buy

Personal Loans: Cash loans are offered to customers through QuikCash for customers nationwide, and 'Central Personal Loan' for Central Department Store customers.

International Credit Card: A 50:50 joint venture with Bank of Ayudhya in Krungsriayudhya Card Company Limited to provide Krungsri Visa cards and Master cards.

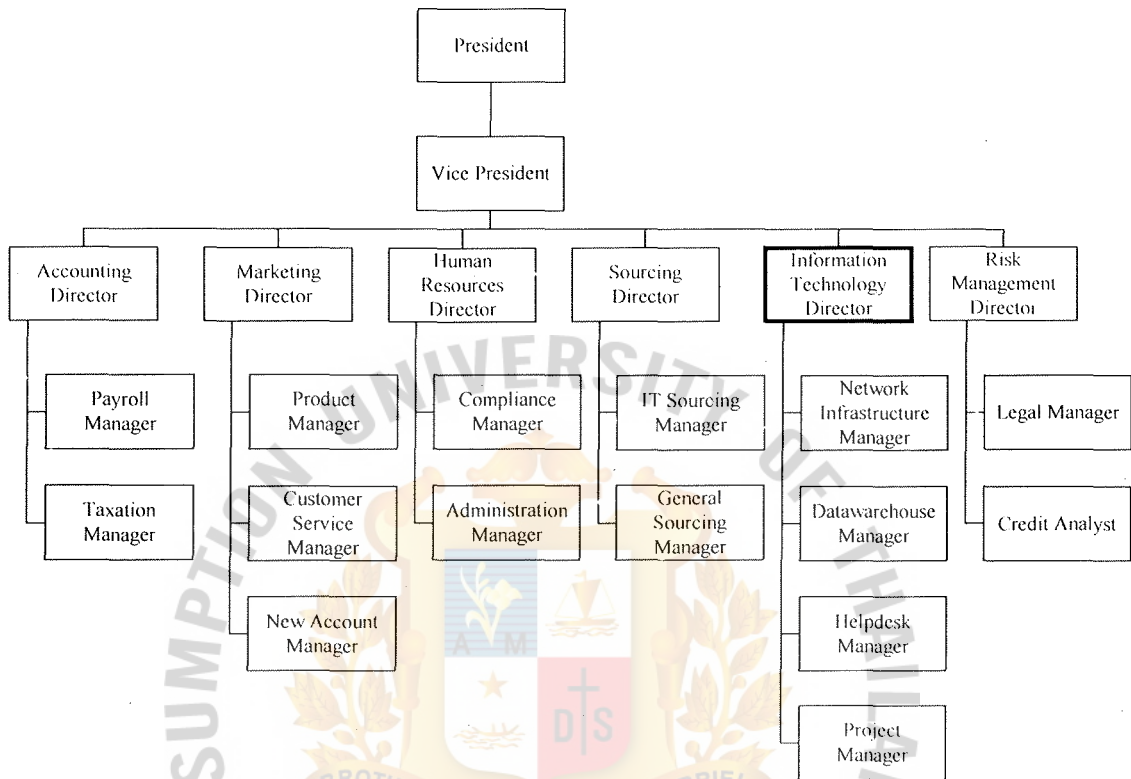


Figure 2.1. Organization Chart of the Company.

2.2 Existing Business Function

In the current system, GE Capital Thailand has been using traditional manual system for the IT service request system, that is all of the IT service requests are based on paper works. Request data are stored in papers and transferred by helpdesk staff. User comes to helpdesk division to ask for a specific request form. The appropriate request form will be selected for specific request type. Requester will fill in the form and submit it to line manager for approval. The form will be submitted to helpdesk staff. Approved job will be transferred to job owner by helpdesk. Helpdesk will notify the requester when the requested job is finished.

Requester can ask the status for a specific request through helpdesk staff. Helpdesk staff will search the status of a specific request from work in process file and report to the requester. Helpdesk staffs also have the responsibility to prepare weekly report for the completed jobs to the management executive. Figure 2.2 depicts level 1 data flow diagram for the existing system.

The applications of computer in the existing system are just for word processing, spreadsheet jobs and eventually end with manual processing. In the existing system, there are 5 helpdesk staffs for supporting IT service request. All workstations were installed Microsoft Windows 98 and Microsoft Office 97.



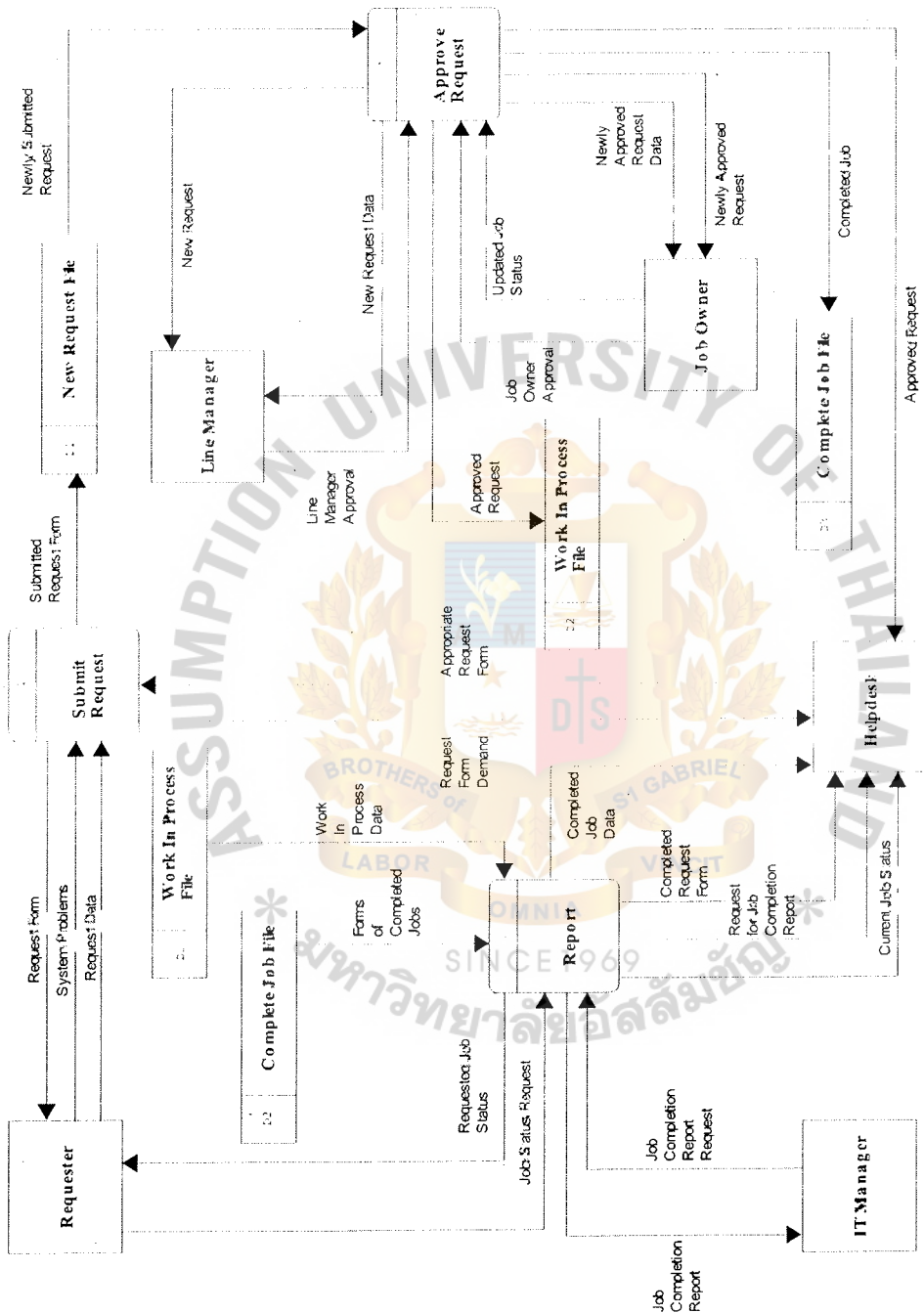
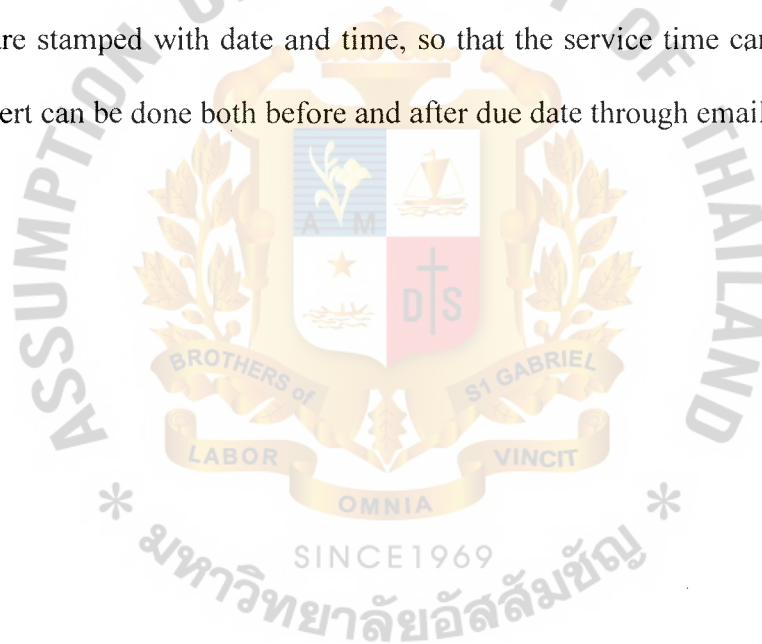


Figure 2.2. Level 1 Data Flow Diagram of the Existing System.

2.3 Current Problems and Areas of Improvement

Due to the amount of employees, paper based IT service request can be troublesome. Helpdesk division as the center for the system supporters and the users need to maintain a lot of request documents. Job status is difficult to be tracked. Email notification on job completion is difficult to implement.

To provide a centralized IT service request system, so that the users can make all requests they want, request forms are needed to be kept in a central location. The data are stored in centralized database with adequate tracking information. All requests and responses are stamped with date and time, so that the service time can be tracking and control. Alert can be done both before and after due date through email.



III. THE PROPOSED SYSTEM

3.1 System Specification

As there are a lot of stakeholders in this project, we have to gather the requirements from all of them. Those stakeholders are helpdesk division, some potential requesters, line managers and job owners. The discovery of requirements from user will guarantee the satisfaction towards the systems and the understanding of the system in all views. After conducting interview session with all related persons from management level to operational level, we can classify the requirements as follows:

- (1) User-friendly interface screens for ease of operation by users. Unnecessary information is hidden from the users.
- (2) All the request and approval data are collected into a database management system so that they can be retrieved at anytime.
- (3) The reports of new requests, incoming requests, approved requests and completed jobs are generated automatically both through emails and online reports.
- (4) Management reports can be generated based on specified period.
- (5) The system must be able to operate with minimal setup processes on both clients and server.
- (6) Service level agreement can be specified to control the quality of services.

3.1.1 Input Design

Although one of the most important parts in the system design is input design, most programmers tend to oversee the important of input design. A good input design can help both reduce human error and reduce operation time.

The responsibility of input design includes the screen design, document form and document flow. The functions are to input data entry, validation, adding, editing, and deleting information.

The user interface screen layout of the proposed system is shown in Appendix C and the document forms are shown in Appendix D.

3.1.2 Database Design

One aspect of a good system is to be easily manipulated on the data such as insertion, modification, and deletion along with easy access and maintenance of a logically coherent collection of data pertaining to different objects, a relational database system has been proposed.

The principle of database design is based on relational database concept. The reason to adopt relational database concept is because relational database is the effective tool to organize data. Relational database supports the user requirement of transaction such as inserting, updating, deleting and searching data. Another reason is this methodology is widely used nowadays. Therefore, it is easy to find people to maintain this part of the system.

The database design of the proposed system is divided into three parts as follows.

- (1) ER Diagram of the Proposed System (shown in Figure 3.4.).
- (2) Database Design of the Proposed System (shown in Appendix C).

3.1.3 Network Design

The design of network topology of IT service request system will be based on client/server model. Each client is connected to the server through local area network. Client should be able to connect to the server with little or no installation requirement. This will provide the flexibility to the system administrator to provide additional clients to the system.

The star topology will be applied for the internal topology at headquarter, because there are few numbers of computers used in this department. The details of the network model will be shown in Figure 3.1 and Figure 3.2 and the hardware configuration for this new network architecture will be shown in Figure 3.3.



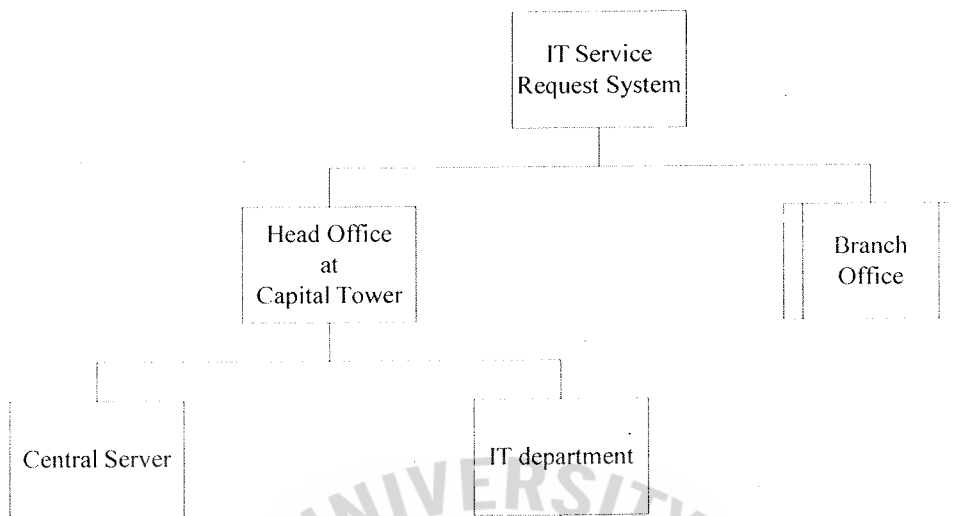


Figure 3.1. Location Decomposition Diagram.

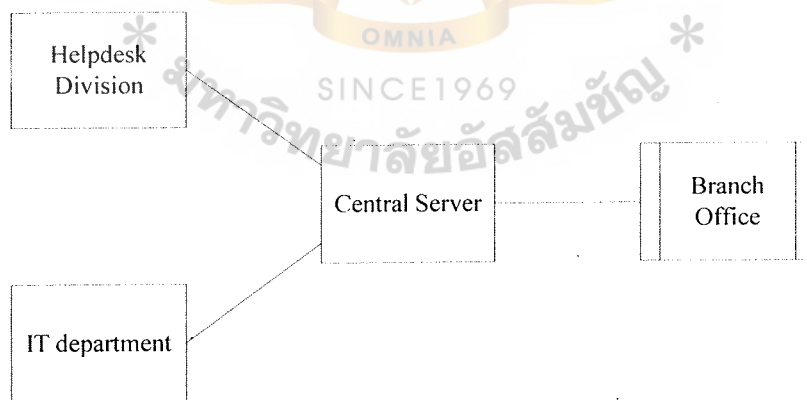


Figure 3.2. Location Connectivity Diagram.

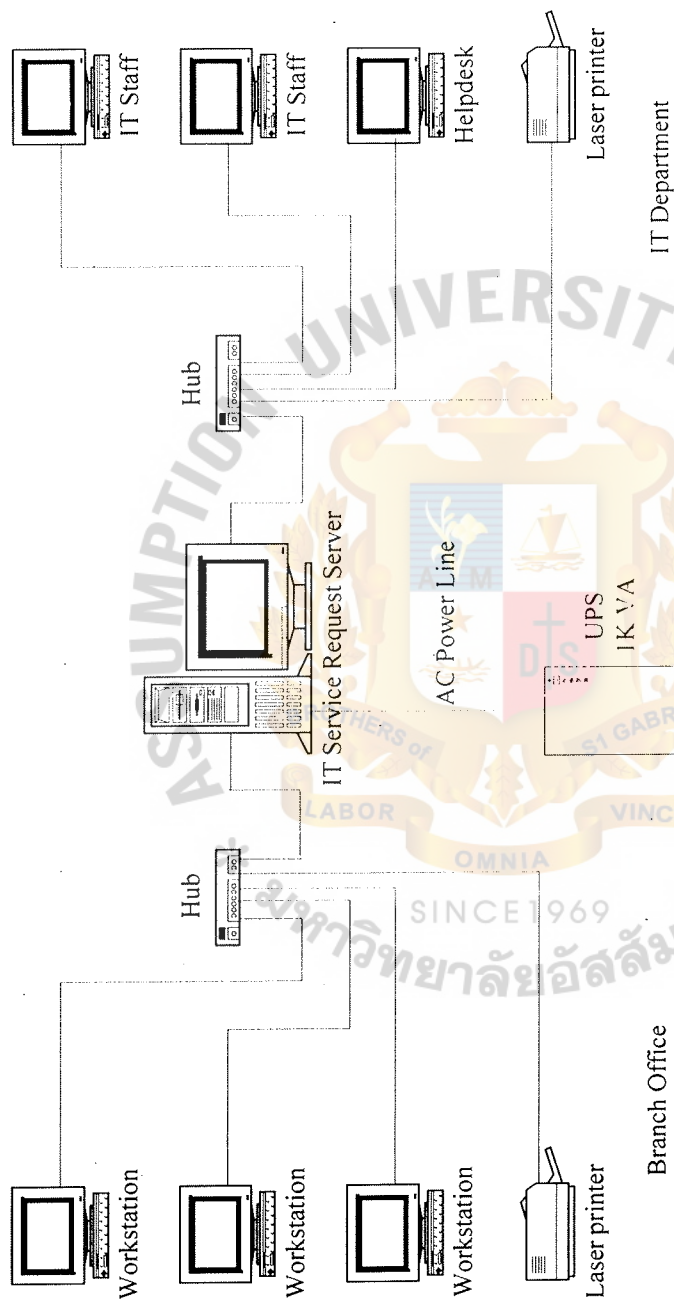


Figure 3.3. Hardware Configuration for Network Architecture.

3.1.4 Candidate System Analysis

(1) Candidate System Matrix

According to the requirements gathered from system users, we can conclude those requirements into three candidate solutions. The candidates will be compared in term of portion of system computerized, benefits, servers and workstations, software tools needed, application software, method of data processing, output devices, input devices and storage devices.

Candidate Solution 1:

This solution is based on the client/server application using Microsoft Visual Basic link to Microsoft SQL database management system. Microsoft Visual Basic is a development tool that is very popular and widely used today. Therefore it is easy to find expertise to develop and maintain the system. The development cost can be cheaper than the other development tools. Microsoft SQL database management system is a widely used database and a corporate selected database management system, so we can have a centralized administration from data warehouse division.

Candidate Solution 2:

This solution is based on web-based application using ASP.net links to Oracle database management system. ASP.net is a new technology from Microsoft as a replacement for the old ASP. The advantages of ASP.net are easiness of use, flexibility, and easiness to build add-on functions. Although the language structure is quite similar to Visual Basic, the developers need some time to get familiar with the new functions and

features. This solution is tied to Microsoft Windows solutions, so web server has to be Microsoft Internet Information Server.

Candidate Solution 3:

This solution is based on web-based application using JSP on Apache Tomcat links to Microsoft SQL database management system. JSP is a server side scripting language based on Java language of Sun Microsystems. JSP is an open technology based on J2EE web container specification. There is a lot of J2EE web container implementation such as Apache Tomcat, Sun One Web server, IBM Websphere etc. Those web servers can be run on many platforms e.g. Microsoft Windows, Unix and Linux.



Table 3.1 Candidate System Matrix.

| Characteristics | Candidate 1 | Candidate 2 | Candidate 3 |
|---|--|--|---|
| Portion of System Computerized Brief description of that portion of the system that would be computerized in this candidate. | Developing system with client/server application connecting through LAN. | Developing the system with web-based application connecting through LAN | Same as candidate 2 |
| Benefits Brief description of the business benefits that would be realized for this candidate. | Solution contains security. Lower cost for technician and maintenance. | Solution covers for future development, flexible for change and cheap. | Same as candidate 2 |
| Servers and Workstations A description of the servers and workstations needed to support this candidate. | Pentium IV 1 GHz. MS-Windows 2000 Server. MS-Windows 2000 Professional Edition on Pentium III 733 MHz as clients' machine. | Same as candidate 1 | Same as candidate 1 |
| Software Tools Needed Software tools needed to design and build the candidate (e. g., database management system, emulators, operating systems, languages, etc.). Not generally applicable if applications software packages are to be purchased. | MS Visual Basic for customization of application, Seagate Crystal Report for report preview and printing and MS SQL database server. | Internet Information Server as Web server, MS Visual Studio .NET as development tool and MS SQL database server. | Apache Tomcat 4.1.24 as Web server, Macromedia Dreamweaver MX as development tool and MS SQL database server. |
| Application Software A description of the software to be purchased, built, accessed, or some combination of these techniques. | Custom Solution. | Same as candidate 1 | Same as candidate 1 |
| Method of Data Processing Generally some combination of: on-line, batch, deferred batch, remote batch, and real-time. | Client/Server via LAN | Web Browser. | Same as candidate 2 |
| Output Devices and Implications A description of output devices that would be used, special output requirements, (e.g. network, preprinted forms, etc.), and output considerations (e.g., timing constraints). | Xerox Phaser 3110 | Same as candidate 1 | Same as candidate 1 |
| Input Devices and Implications A description of Input methods to be used, input devices (e.g., keyboard, mouse, etc.), special input requirements, (e.g. new or revised forms from which data would be input), and input considerations (e.g., timing of actual inputs). | Mouse/Keyboard | Same as candidate 1 | Same as candidate 1 |
| Storage Devices and Implications Brief description of what data would be stored, what data would be accessed from existing stores, what storage media would be used, how much storage capacity would be needed, and how data would be organized. | Oracle Database | Same as candidate 1 | Same as candidate 1 |

(2) Feasibility Analysis

Necessary data for the feasibility study can be gathered through interviews. The interview is directly related to the problem or opportunity being suggested. The system analyst typically interviews those requesting help and directly concerned with the decision-making process and management. The purpose of the feasibility analysis is to identify candidate solutions, analyze and recommend a target system that will be designed and implemented.

After the alternative candidate solutions have been identified, each candidate is analyzed for feasibility against four sets of criteria: those are operational feasibility, technical feasibility, schedule feasibility, and economic feasibility. The best alternative will be recommended to system owners for approval. The approved solution becomes the basis for general and detailed design. As the result in Table 3.2, Feasibility Analysis Matrix, the highest rank, which is candidate 2, is selected as our system solution.

To each candidate, the analysis team analyzes the estimated cost of candidate solutions, payback period analysis of the candidate solutions, and the net present value analysis of candidate solutions. Details are illustrated in Appendices A and B respectively.

Table 3.2 Feasibility Analysis Matrix.

| Feasibility Criteria | Wt. | Candidate 1 | Candidate 2 | Candidate 3 |
|--|------|---|---|---|
| <p>Operational Feasibility</p> <p>Functionality. A description of to what degree the candidate would benefit the organization and how well the system would work.</p> <p>Political. A description of how well received this solution would be from user management, user, and organization perspective.</p> | 30% | <p>This solution can fully support the requirements, but it may require some training to use the application.</p> <p>Score: 85</p> | <p>This solution can fully support the requirements. Because the easiness of web-based application screen, training may not be required.</p> <p>Score: 90</p> | <p>Same as candidate 2</p> <p>Score: 90</p> |
| <p>Technical Feasibility</p> <p>Technology. An assessment of the maturity, availability (or ability to acquire), and desirability of the computer technology needed to support this candidate.</p> <p>Expertise. An assessment to the technical expertise needed to develop, operate, and maintain the candidate system.</p> | 25% | <p>Although Microsoft Visual Basic is easy to develop, the data and presentation are tied together. It would be difficult to maintain.</p> <p>Score: 85</p> | <p>ASP.NET is quite easy to develop but some how need some more training.</p> <p>Score: 85</p> | <p>JSP is not difficult, but only small number of developers is available. The development needs some expertise.</p> <p>Score: 85</p> |
| <p>Economic Feasibility</p> <p>Cost to develop:</p> <p>Payback period (discounted):</p> <p>Net present value:</p> <p>Detailed calculations:</p> | 35% | <p>605,200 Baht</p> <p>4 Years 10 Months</p> <p>12,695.61 Baht</p> <p>Score: 80</p> | <p>717,700 Baht</p> <p>2 Years 6 Months</p> <p>596,883.27 Baht</p> <p>Score: 85</p> | <p>600,700 Baht</p> <p>2 Years 1 Months</p> <p>713,883.27 Baht</p> <p>Score: 90</p> |
| <p>Schedule Feasibility</p> <p>An assessment of how long the solution will take to design and implement.</p> | 10% | <p>2 Months</p> <p>Score: 90</p> | <p>Same as candidate 1</p> <p>Score: 90</p> | <p>Same as candidate 1</p> <p>Score: 90</p> |
| Ranking: | 100% | 83.75 | 87.00 | 88.70 |

*The highest score will be picked as our solution.

3.1.5 Application Architecture

According to the requirements gathered from various users, the system that will be implemented should follow these 3 basic architectures:

(1) Network Architecture:

The system should apply client/server-computing model, so that it supports centralization of data and flexibility of adding clients. We will use Microsoft Windows 2000 Server Edition as the operating system on the server.

(2) Data Architecture:

We are going to use MS SQL database as a database management system in this system because MS SQL database is a corporate selected database. We have used it in most of the company applications. We have a central expertise in MS SQL database administration and tuning. Database will be backup on daily basis through the normal process of data center division.

(3) Interface Architecture:

User interface will be designed in order to provide the easiness to understand and use for users. The flow of screens and inputs will be designed in order to accelerate the usage for faster operation.

(4) Process Architecture:

The whole system will be developed by Java Server Page hosted on Jakarta Tomcat 4.1.24. The connection to the database will be managed by MS SQL JDBC driver.

3.2 System Design

After making the analysis related to the existing system and the feasibility study for the new system, the system design process for the new system started. The first step is to study the data element which will be used in the system and making the data model. The following is the detail analysis for data model:

3.2.1 Data Modeling

The first element needs to be designed is data model in order to define, organize and document business data requirements that must be stored in the database. Entity relationship diagram is the most popular and simplest logical data modeling technique.

- (1) Entity Discovery: The first task in entity relationship modeling is to discover the fundamental entities in the system. We discovered the entities from interviewing with the users and studying the existing request forms. Discovered entities for the system are:
 - (a) Employee
 - (b) Department
 - (c) Job form
 - (d) Request category
 - (e) Requested job
 - (f) Hardware purchasing request
 - (g) Software purchasing request
 - (h) Telephone service request
 - (i) System account request
- (2) Building Data Model: The next task in data modeling is to create context data model. Context data model contains those discovered entities and their

relationships. After completing this task, this ERD communicates the following:

- (a) EMPLOYEE makes a request by creating REQUESTED JOB.
- (b) EMPLOYEE can be line manager for zero or more EMPLOYEE.
- (c) EMPLOYEE can responsible for zero or more JOB FORM.
- (d) EMPLOYEE can give line manager approval for the REQUESTED JOB that contain his identity as line manager.
- (e) EMPLOYEE can give job owner approval for the REQUESTED JOB that contain his identity as job owner.
- (f) Each REQUESTED JOB can be classified into PURCHASE HARDWARE, PURCHASE SOFTWARE, TELEPHONE SERVICE or SYSTEM ACCOUNT.
- (g) Each JOB FORM can be listed in one or more REQUEST CATEGORY.

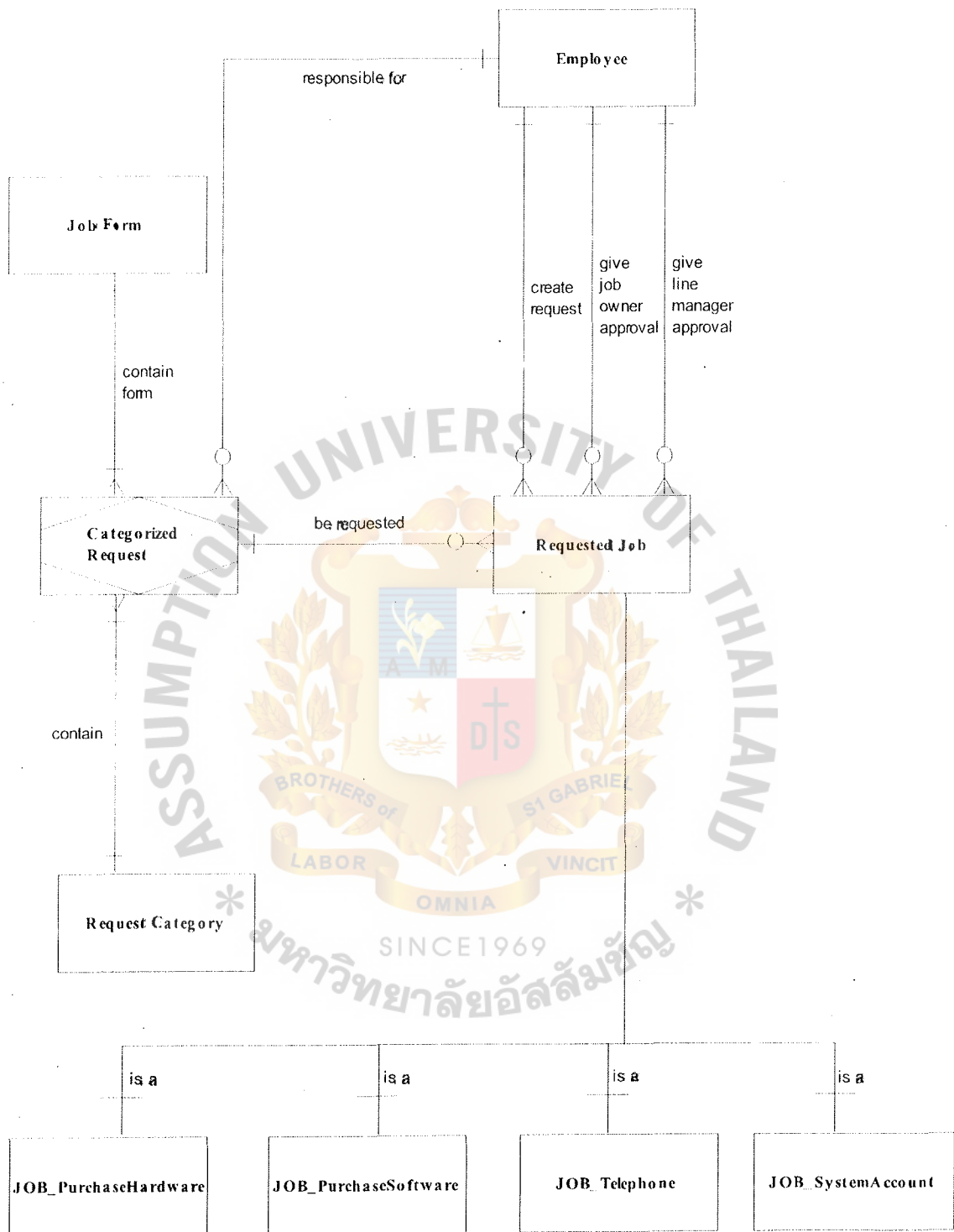


Figure 3.4. Context Data Model.

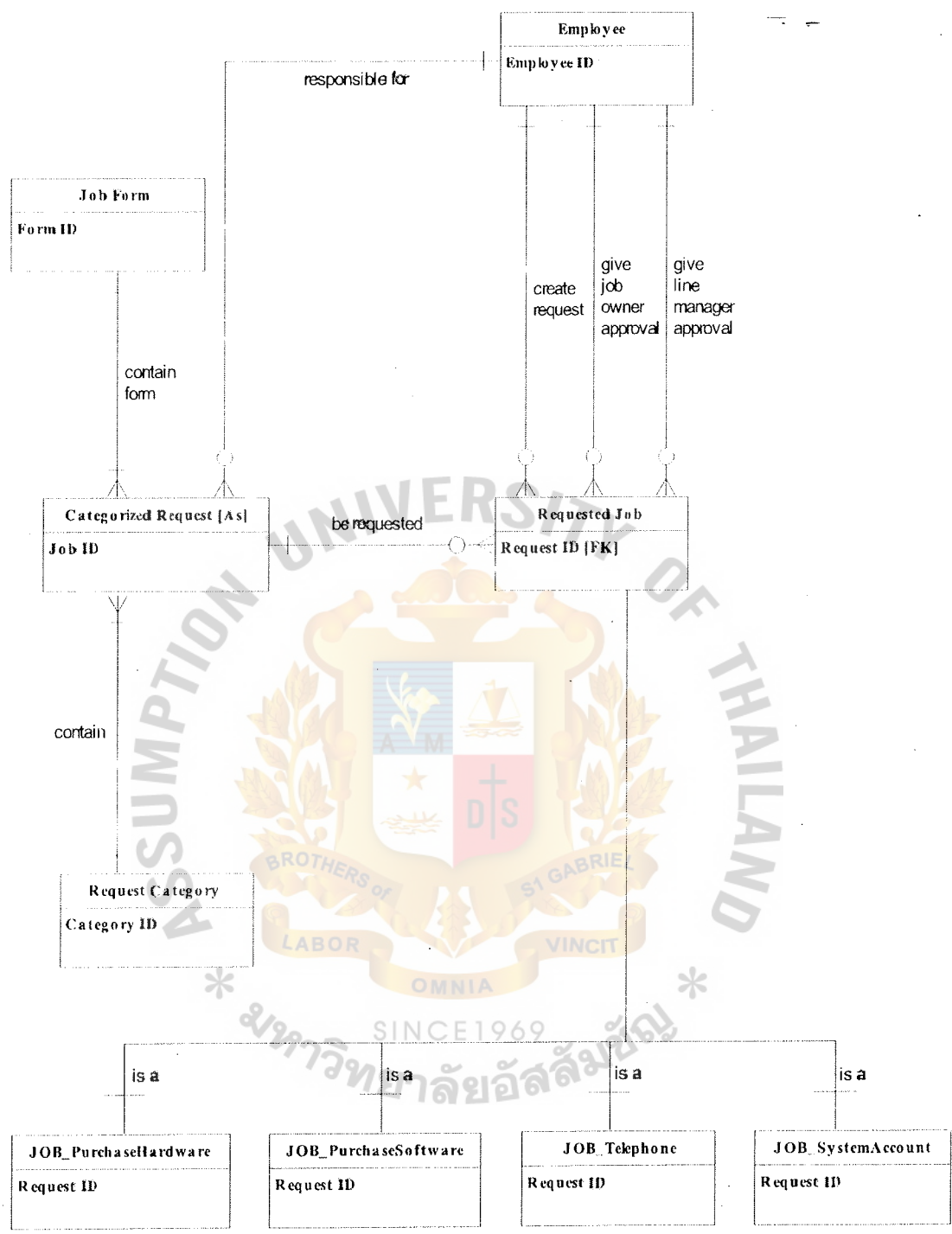


Figure 3.5. Key Based Data Model.

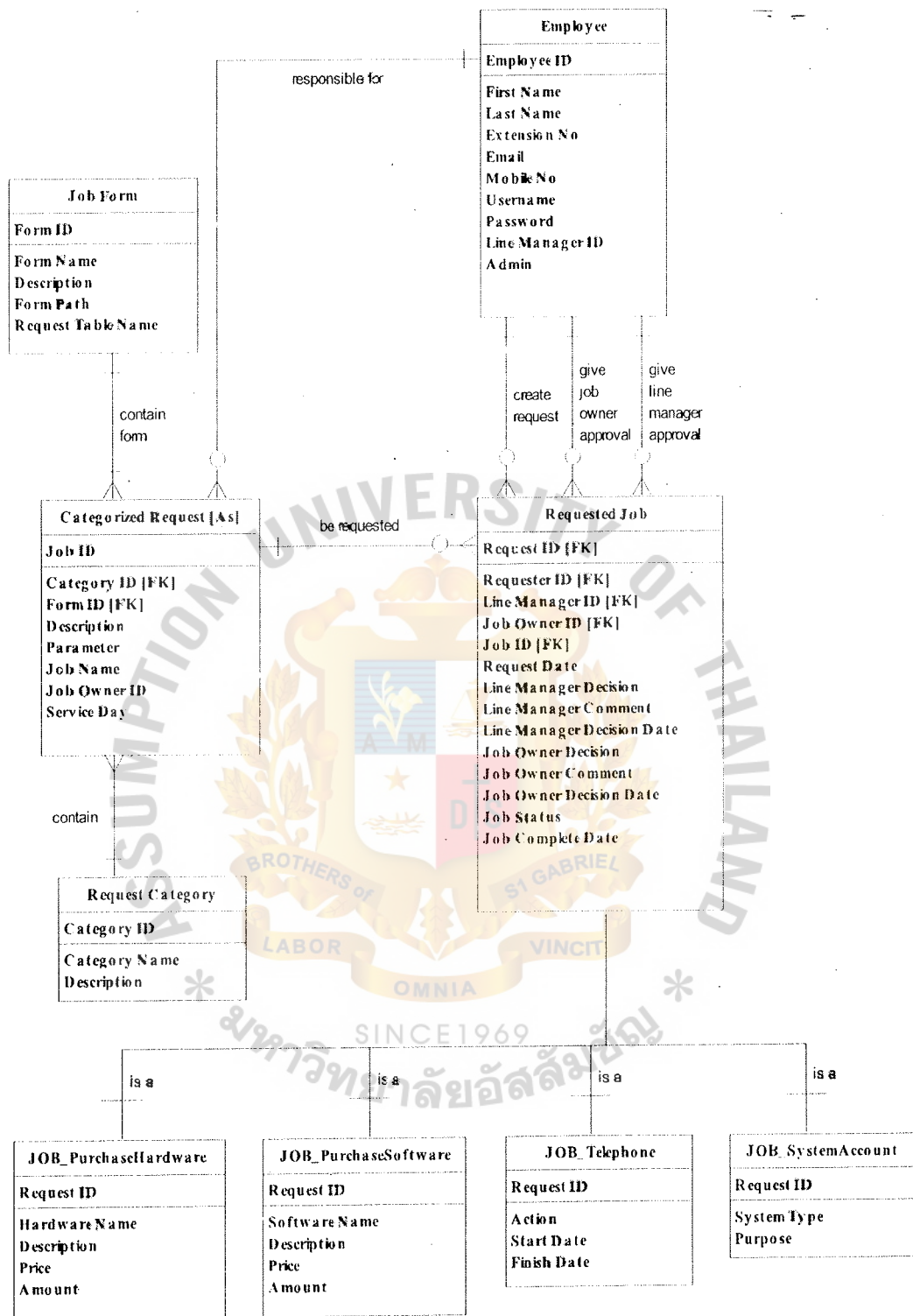


Figure 3.6. Fully Attributed Data Model.

3.2.2 Data Flow Diagram

Data flow diagram depicts the flow of data discovered from data modeling. The system diagrams consist of:

- (1) Context Diagram
- (2) Functional Decomposition Diagram
 - (a) Administration
 - (b) Authentication
 - (c) Request Submission
 - (d) Request Approval
 - (e) Generating Report

Data Flow Diagram (DFDs) will have the process in itself, Data Store, External Entity and the arrow, which represents data flows. The symbol sets for DFDs that has been used throughout the project is the Gane and Sarson notation.

Context diagram in Figure 3.7 represents the scope and boundary of the project. The main process is IT service request system, which interacts with external agents such as requester, line managers and job owners.

Functional diagram in Figure 3.8 represents the top-down processes required by the system. This can be used as outline for drawing data flow diagrams.

System diagram in Figure 3.9 represents the overall events for the system by drawing in to a single diagram.

From the above data models and the data flow diagrams, we can effectively communicate business requirements between the users and the programmers. After the process model is completed, the system owner and system users in the business side can clarify what they have and what they want the system to be.

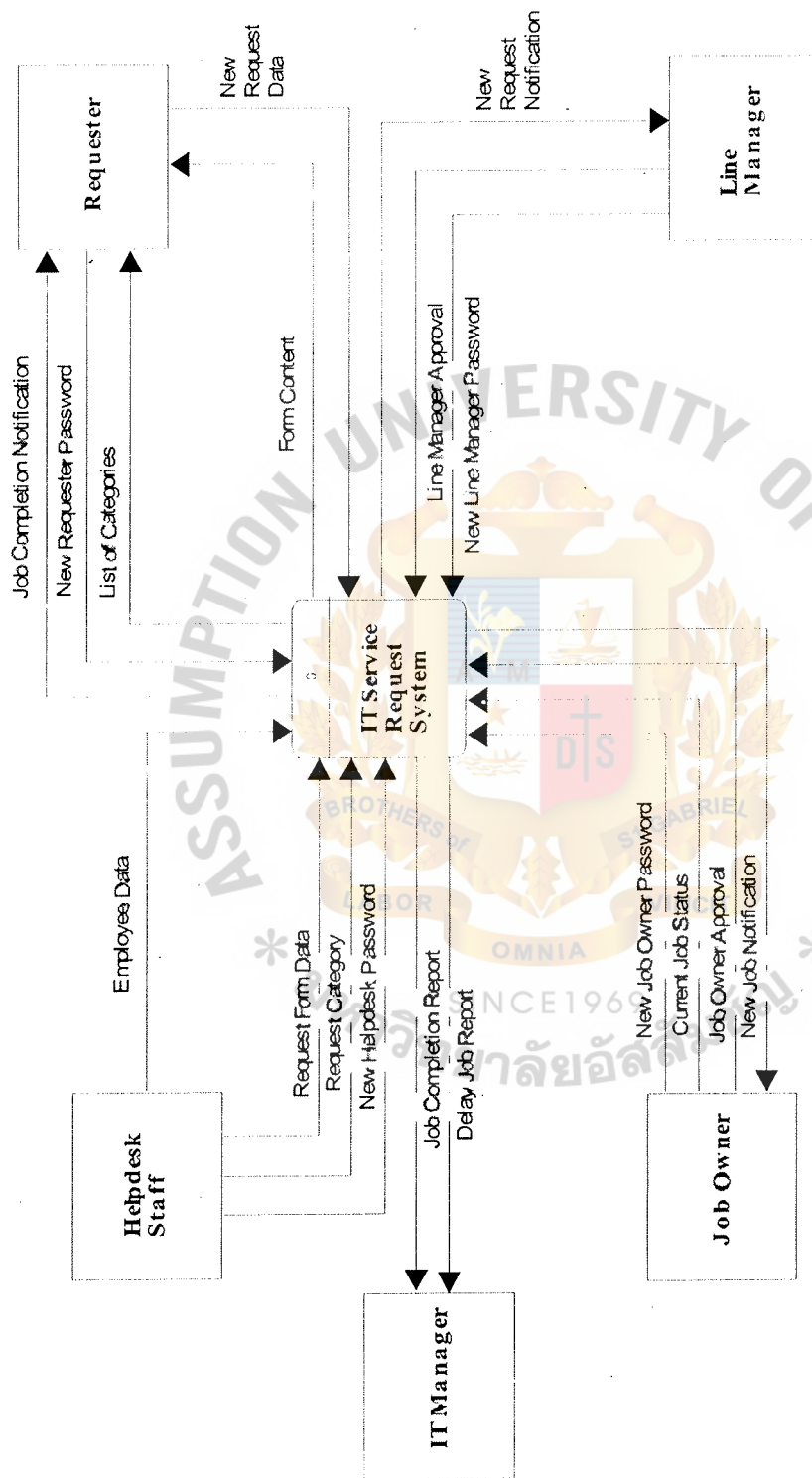


Figure 3.7. Context Diagram of the Proposed System.

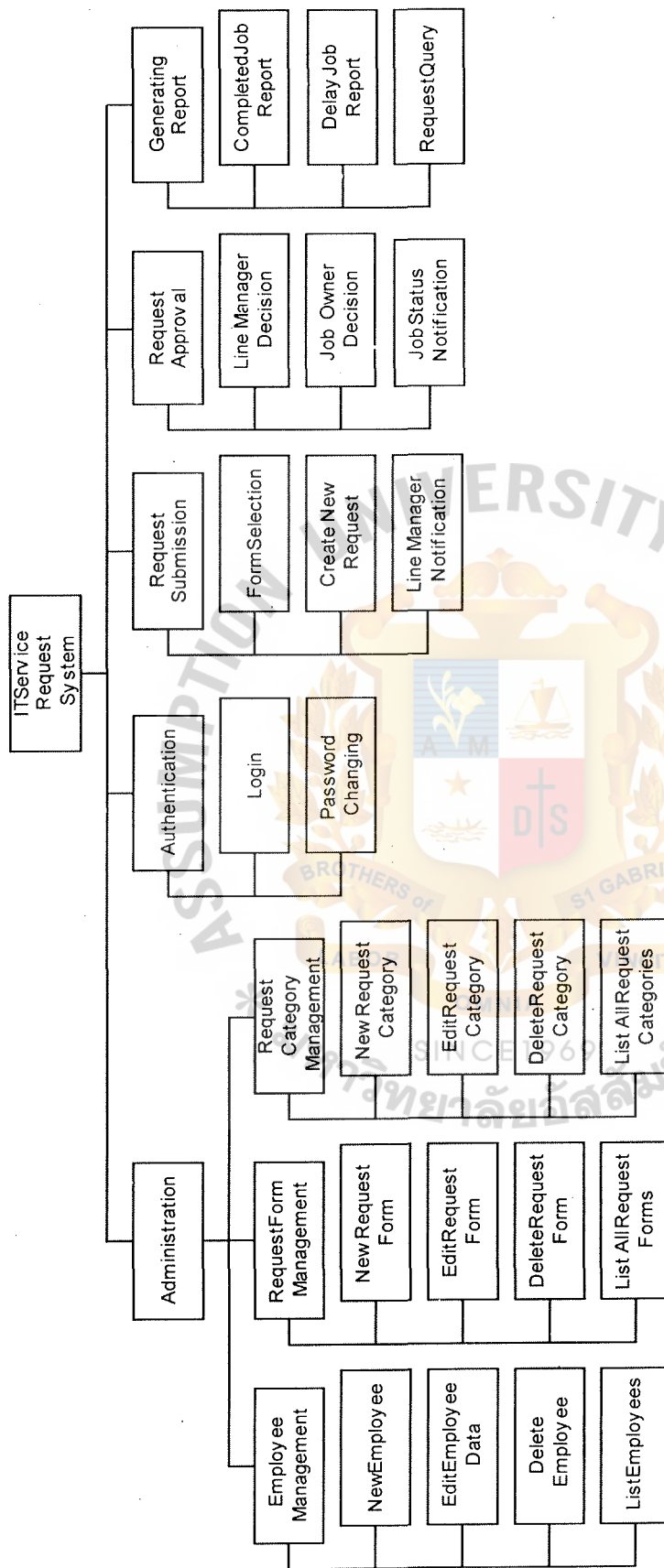


Figure 3.8. Functional Decomposition Diagram of the Proposed System.

3.3 Hardware and Software Requirements

According to corporate requirements, all servers in the company should install Microsoft Windows 2000 Server Edition as an operating system. We need a higher capability hardware specification to operate the system. Today we can obtain high capability hardware at a lower price because of the advancement in semiconductor industry.

Table 3.3. The Hardware Specification for the Server.

| Hardware | Specification |
|-------------------|--------------------|
| CPU | Pentium IV 1.5 GHz |
| Cache | 256 KB or higher |
| Memory | 1 GB (2 X 512 MB) |
| Hard Disk | 80 GB |
| CD-Rom Drive | 52 X speed |
| Floppy Disk Drive | 1.44 MB |
| Network Adapter | Ethernet 10-Base T |
| Display Adapter | SVGA card |
| Display | 15" monitor |
| UPS | 1KVA |

Table 3.4. The Software Specification for the Server.

| Software | Specification |
|----------------------|-------------------------------|
| Operating System | Microsoft Windows 2000 Server |
| Database Server | Microsoft SQL Server |
| Web Server | Apache Tomcat 4.1.24 |
| Java Development Kit | Java 1.4.1 |

Client machines should have enough capability to run Microsoft Windows 2000 Professional Edition as an operating system. The hardware and software specification for each client machine are shown in Tables 3.5 and 3.6 respectively.

Table 3.5. The Hardware Specification for Each Client Machine.

| Hardware | Specification |
|-----------------|--------------------|
| CPU | Pentium III 1 GHZ |
| Cache | 512 KB |
| Memory | 128 MB |
| Hard Disk | 20 GB |
| CD-Rom Drive | 52X |
| Floppy Drive | 1.44 MB |
| Network Adapter | Ethernet 10-Base T |
| Display Adapter | SVGA card |
| Display | 17" SVGA monitor |
| UPS | 1 KVA |

Table 3.6. The Software Specification for Each Client Machine.

| Software | Specification |
|----------------------|--------------------------------------|
| Operating System | MS Windows 2000 Professional Edition |
| Application Software | MS Internet Explorer 6 |

3.4 Security and Control

Security and control are divided to 3 types as follows:

3.4.1 Operational Security

This type of security protects hardware and software from either intentional or inadvertent threats. At this level of security, 3 more securities can be classified as follows:

- (1) Hardware security
 - (a) Controlling access to the computer room.
 - (b) Backup data frequently and storing back UPS in a fireproof.
 - (c) UPS are used in order to prevent the damage occurring from electricity problems.
- (2) Software security
 - (a) It can use for protection of data from unauthorized or non-privileged users.
- (3) Password security
 - (a) User should enter the username and correct password before using the system and key “logout” after exit the program. System Administration will control the environment in accessing any application of each user.
 - (b) The users should change their passwords frequently and do not let others know their password.

3.4.2 Data Security

- (1) Data will be backup everyday in order to prevent data loss and to make a recovery when data are damaged.
- (2) Restrict access to certain data items such as read only data access.

- (3) Security logs of all changes made to data items.

3.4.3 User Security

- (1) Personnel staffs should be trained about the skill in using some hardware in order to prevent human errors.
- (2) Inform users to know the danger of computer viruses and the procedures to manage and prevent them.

3.5 Cost-Benefit Analysis

3.5.1 Cost of Current System

The current system is operated manually with 5 operation staffs. The cost of the existing system can be divided into fixed cost and operating cost. The fixed cost consists of five desktop computers. All of them are installed Microsoft Windows 98 and Microsoft Office 97. The operating cost consists of five operation staffs, papers and miscellaneous expenses. The total accumulated cost for 5 years is 4,055,512.70 Baht. The calculation is based on the inflation rate at 3.5%.

Table 3.7. Cost of Existing System, Baht.

| Cost Items | Years | | | | |
|--|-------------------|-------------------|-------------------|-------------------|-------------------|
| | 1 | 2 | 3 | 4 | 5 |
| Fixed Cost | | | | | |
| Personal Computer with UPS 5 units @ 28,000 | 140,000.00 | - | - | - | - |
| MS Windows 98 5 units @ 1,400 | 7,000.00 | - | - | - | - |
| MS Office 97 5 units @ 2,000 | 10,000.00 | - | - | - | - |
| Total Fixed Cost | 157,000.00 | - | - | - | - |
| Operating Cost | | | | | |
| <u>Salary Cost:</u> | | | | | |
| Operation Staff 5 persons @ 12,000 | 720,000.00 | 745,200.00 | 771,282.00 | 798,276.87 | 826,216.56 |
| <u>Office Supplies and Miscellaneous Cost:</u> | | | | | |
| Paper Per Annual | 5,000.00 | 5,175.00 | 5,356.13 | 5,543.59 | 5,737.62 |
| Miscellaneous Per Annual | 2,000.00 | 2,070.00 | 2,142.45 | 2,217.44 | 2,295.05 |
| Total Annual Operating Cost | 727,000.00 | 752,445.00 | 778,780.58 | 806,037.90 | 834,249.22 |
| Total Manual System Cost | 884,000.00 | 752,445.00 | 778,780.58 | 806,037.90 | 834,249.22 |

Table 3.8. Five Years Accumulated Cost of Existing System, Baht.

| Year | Total Manual Cost | Accumulated Cost |
|--------------|---------------------|------------------|
| 1 | 884,000.00 | 884,000.00 |
| 2 | 752,445.00 | 1,636,445.00 |
| 3 | 778,780.58 | 2,415,225.58 |
| 4 | 806,037.90 | 3,221,263.48 |
| 5 | 834,249.22 | 4,055,512.70 |
| Total | 4,055,512.70 | |

3.5.2 Cost for Computerized System

For the proposed system, the fixed costs are development costs, which contain the following items:

- (1) Personal cost is the cost from hiring system analyst, programmers, graphics designer and database specialist.
- (2) Hardware cost is the cost for new hardware to operate the proposed system.

- (3) Software cost is the cost of software that is required for system development and operation.

The operating cost consists of five operation staffs, papers and miscellaneous expenses. The total accumulated cost of computerized system for development and operation for 5 years is 3,491,069.11 Baht. The cost analysis for computerized system also uses 3.5% inflation rate.

Table 3.9. Cost of Computerized System, Baht.

| Cost Items | | Years | | | | |
|--|--------------------|--------------|------------|------------|------------|------------|
| | | 1 | 2 | 3 | 4 | 5 |
| <u>Fixed Cost</u> | | | | | | |
| Computer Server | 1 units @ 120,000 | 120,000.00 | - | - | - | - |
| Personal Computer | 3 units @ 28,000 | 84,000.00 | - | - | - | - |
| MS Windows 2000 Server | 1 units @ 51,000 | 51,000.00 | - | - | - | - |
| MS Windows 2000 Prof. | 3 units @ 8,200 | 24,600.00 | - | - | - | - |
| Printer | 1 units @ 10,000 | 10,000.00 | - | - | - | - |
| DBMS | 1 units @ 99,000 | 99,000.00 | - | - | - | - |
| Adobe Photoshop7 | 1 units @ 31,500 | 31,500.00 | - | - | - | - |
| Macromedia Dreamweaver | 1 units @ 18,000 | 18,000.00 | - | - | - | - |
| Total Fixed Cost | | 600,700.00 | - | - | - | - |
| <u>Operating Cost</u> | | | | | | |
| <u>Salary Cost:</u> | | | | | | |
| Operation Staff | 3 persons @ 14,000 | 504,000.00 | 521,640.00 | 539,897.40 | 558,793.81 | 578,351.59 |
| <u>System Maintenance:</u> | | | | | | |
| 1 Year maintenance | 1 unit @ 30,000 | 30,000.00 | 31,050.00 | 32,136.75 | 33,261.54 | 34,425.69 |
| <u>Office Supplies and Miscellaneous Cost:</u> | | | | | | |
| Paper | Per Annual | 3,000.00 | 3,105.00 | 3,213.67 | 3,326.15 | 3,442.57 |
| Miscellaneous | Per Annual | 2,000.00 | 2,070.00 | 2,142.45 | 2,217.44 | 2,295.05 |
| Total Annual Operating Cost | | 539,000.00 | 557,865.00 | 577,390.28 | 597,598.93 | 618,514.90 |
| Total System Cost | | 1,139,700.00 | 557,865.00 | 577,390.28 | 597,598.93 | 618,514.90 |

Table 3.10. Five Years Accumulated Computerized System, Baht.

| Year | Total Computerized Cost | Accumulated Cost |
|-------|-------------------------|------------------|
| 1 | 1,139,700.00 | 1,139,700.00 |
| 2 | 557,865.00 | 1,697,565.00 |
| 3 | 577,390.28 | 2,274,955.28 |
| 4 | 597,598.93 | 2,872,554.21 |
| 5 | 618,514.90 | 3,491,069.11 |
| Total | 3,491,069.11 | - |

3.5.3 Tangible Benefits

Tangible benefits are the benefits that can be measured into quantitative values.

By implementing the proposed system, the company will achieve benefits as follows:

- (1) Reduce transportation cost due to unmanaged service scheduling.
- (2) The system supporters can work efficiently because the requested jobs are well organized.
- (3) Reduce the communication costs by using centralized online system.

Table 3.11. Tangible Benefits, Baht.

| Cost Items | Cost |
|----------------------------------|------------|
| Driver | 108,000.00 |
| System Supporter Overtime Paid | 330,000.00 |
| Communication Cost | 200,000.00 |
| Reduction of Paper Works | 150,000.00 |
| Reduction of Transportation Cost | 68,000.00 |
| Total | 856,000.00 |

3.5.4 The Comparison of the System Costs between Computerized System and Manual System

After conducting the feasibility study for the proposed system and the existing system, we found that the computerized system has a lower rate of increasing in expenses than the manual system.

Table 3.12. Comparison of the System Costs, Baht.

| Year | Accumulated Cost | |
|------|------------------|---------------------|
| | Current System | Computerized System |
| 1 | 884,000.00 | 1,139,700.00 |
| 2 | 1,636,445.00 | 1,697,565.00 |
| 3 | 2,415,225.58 | 2,274,955.28 |
| 4 | 3,221,263.48 | 2,872,554.21 |
| 5 | 4,055,512.70 | 3,491,069.11 |

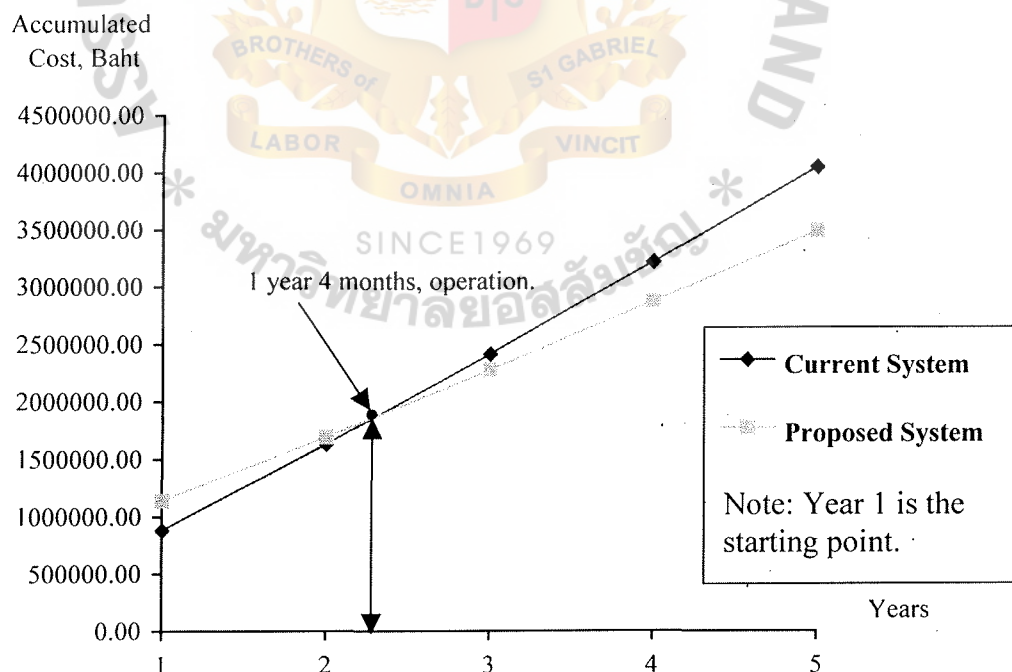


Figure 3.10. The Comparison of the System Costs.

IV. PROJECT IMPLEMENTATION

4.1 Overview of Project Implementation

After finishing system analysis and design phase, we need to implement the system into action. System implementation is the plan and orderly conversion from current existing system into the proposed system. This process includes application development, hardware and software installation, testing and conversion.

During implementation phase, problems, which have not been anticipated during the study and design phase, may be occurred. The solutions to these problems usually require modification of the design. The development team must prepare to solve all unexpected problems.

4.2 Test Plan

After programming, we need to test the whole system. The test is to ensure that the system can perform full function according to the system requirements and specification. If the system has bugs or cannot fully perform the required functions, we need to rollback the implementation.

(1) Network Testing

The purposes of this test are to check the connectivity, functionality and security of the network.

(2) Program Testing

The purposes of this test are to validate the functionality of the program and to reveal errors in program. The program will be executed to check the correctness in data entry, processing and output. Some errors such as few design errors, programming errors, procedural errors, or oversights have been found during program testing, minor modifications in

design and programming are also required to complete the system test and to satisfy users' requirements.

(3) Database Testing

To test the new databases for use by the new system by generating test data for database tables and load tables with sample data.

(4) Recovery Testing

This test is to check the backup and restore of data in order to prevent the lost of data due to system failure.

(5) Human Testing

The purpose of this test is to check the employee after finishing a training session whether they can work with the new system and can handle the problems that may be occurred.

4.3 Conversion

Direct conversion is the conversion methodology to be used in conversion plan because the existing system is manual system. The proposed system could be installed while the existing is still working. Whenever the new system has been successfully installed, the system transfer will be made to the new system.

4.3.1 Installation

(1) Hardware Installation

According to the Cost/Benefit Analysis section in Chapter 3, the hardware specifications for server computer and client computer has been previously defined. It is needed to install the server with Pentium IV 1.5 GHz and memory of 1 GB (2 X 512 MB) and to upgrade the existing desktop computers to the new specification and also to procure the additional client computers.

(2) Software Installation

The software specifications defined in the previous chapter will be the guideline to make a software installation for the new system.

4.3.2 Users Training

In order to enable all users to well understand this system, the background knowledge of IT service request system is required. The team decides to train the user by using on-the-job training method for helpdesk and service support staffs because there are few people to operate the system. For other departments, they can send their representatives to join a training session.

The training course contains of the following topics:

- (1) System Overview and Demonstration
- (2) Detailed Functions of System
- (3) Application Interface
 - (a) Data Entry
 - (b) Data Inquiry
 - (c) Data Assertion (Insert/Update/Delete)
 - (d) Output of Data in Forms and Reports
- (4) Error and Solution
- (5) Problem Identifying Method

4.3.3 System Maintenance

The back up procedure has to be periodically operated. This is to prevent the loss or damage of data or any unexpected events. When the lag of the system occurs, the computer staff also has to be in charge for tuning the performance. However, this case rarely occurs because of the capability of the software and hardware specification. Ever if it is necessary, system could be rebooted and with the capability of DBMS the system

could be rolled back or in emergency case, the computer staff should keep in touch with software and hardware vendors for support.

The original application source code must be kept in a safe place to protect against source code modification. However, it should be duplicated more than one copy. In case of emergency, the computer staff can re-copy from the original version. To modify the source code, we recommend setting up a test server to test the output and the functionality of the related modules.



V. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

This computerized system is designed under the concept of utilizing the computer system to increase company's performance, benefits, reduce human errors and especially reduce the cost of production to compete with competitors.

IT Service Request System is developed to support the users to manage service requests. The existing system is a manual system, which has a lot of problems e.g. too much paperwork, delay of works and human errors. The proposed system aims to support the existing problems and support the growth of the organization.

By implementing the proposed system, the company can achieve benefits from investment in computer hardware and software. Those benefits can be summarized as follows:

- (1) One stop system service portal. The user can find all the systems services in this system e.g. telephone service, system account service, networking service, hardware and software purchasing, etc.
- (2) Improved service response time by providing online request form and automatic request/approval notification.
- (3) Reduce time in organizing request document by providing searching and sorting mechanism through database management system.
- (4) Because of dramatic reduction in report generation, manager can quickly analyze quality of services and resource planning.

From the cost-benefit analysis, the payback period for the proposed system is 2 years and 1 month, return on investment is 25.17% and net present value is 713,883.27 Baht for five years compared to the existing system which has the payback period of 4

years and 4 months, return on investment of 0.67% and net present value of 21,318.78 Baht for five years.

Another critical function is the management report. This function will be used to make an analysis to improve the performance to compete with competitors.

Table 5.1 shows the time used in each process of the proposed system compared with the existing system. The existing system requires more time in the manual process of data entry and calculation. The computer system reduces the time in the manual process from 19 hours to 3 hours. In summary, it is concluded that the proposed system is more efficient and effective than the existing system.

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

| Process | Existing System | Proposed System |
|-------------------------------|-----------------|-----------------|
| Requesting Process | 15 mins. | 5 mins. |
| Line Manager Approval Process | 4 hrs. | 30 mins. |
| Job Owner Approval Process | 10 hrs. | 30 mins. |
| Job Closing Process | 72 hrs. | 72 hrs. |
| Reporting Process | 5 hrs | 30 mins |

(1) Request Process:

Requesting process is the stage that requester makes service request. By making the electronic forms, requesters can easily acquire the correct request forms by browsing from their web browsers. The forms are created with clean and clear user interface in order to make them easy for the users.

(2) Line Manager Approval Process:

In the proposed system, line managers will receive E-mail notifications of the incoming requests as soon as the requests are submitted.

They can access the requests promptly by clicking at the link provided by the notification E-mail.

(3) Job Owner Approval Process:

In the proposed system, job owners will receive E-mail notifications of the approved requests as soon as the requests are approved. They can access the requests promptly by clicking at the link provided by the notification E-mail.

(4) Job Closing Process:

This process is the stage in which job owners finish the requested jobs and notify to the requesters. Although the request flow and request notification have been quickly processed by computer, most jobs are not automated by the computer. There still need time to process those physical works.

(5) Reporting Process:

Predefined reports can be promptly created for those management officers, because all the data are collected into database management system. Customized reports can be easily created by using SQL statements.

5.2 Recommendations

The proposed system can be used to add additional request form into the system by copying the code from the existing form. The system can be extended to support other kinds of requests such as purchase requisition form, absent form and human resource requisition.

The logic of document flow can be modified to support a more complex workflow. Anyway, the organization information needs to be implemented into the system as well.



APPENDIX A

FINANCIAL ANALYSIS FOR EXISTING SYSTEM

Table A.1. Cost of the Existing System, Baht.

| Cost items | Description | Amount | Unit Price | Price | Years | | | | |
|--------------------|----------------------|--------|------------|------------|------------|------------|------------|------------|------------|
| | | | | | 1 | 2 | 3 | 4 | 5 |
| 1. Fixed Cost: | | | | | | | | | |
| | Personal Computer | 5 | 28,000.00 | 140,000.00 | 140,000.00 | - | - | - | - |
| | MS Windows 98 | 5 | 1,400.00 | 7,000.00 | 7,000.00 | - | - | - | - |
| | MS Office 97 | 5 | 2,000.00 | 10,000.00 | 10,000.00 | - | - | - | - |
| | Subtotal: | | | | 157,000.00 | - | - | - | - |
| | Total Fixed Cost | | | | 157,000.00 | - | - | - | - |
| 2. Operating Cost: | | | | | | | | | |
| | Officers Salary | 5 | 12,000.00 | 60,000.00 | 720,000.00 | 745,200.00 | 771,282.00 | 798,276.87 | 826,216.56 |
| | Paper | | | 5,000.00 | 5,000.00 | 5,175.00 | 5,356.13 | 5,543.59 | 5,737.62 |
| | Miscellaneous | | | 2,000.00 | 2,000.00 | 2,070.00 | 2,142.45 | 2,217.44 | 2,295.05 |
| | Subtotal: | | | | 727,000.00 | 752,445.00 | 778,780.58 | 806,037.90 | 834,249.22 |
| | Total Operating Cost | | | | 727,000.00 | 752,445.00 | 778,780.58 | 806,037.90 | 834,249.22 |
| | Total Manual Cost: | | | | 884,000.00 | 752,445.00 | 778,780.58 | 806,037.90 | 834,249.22 |

Table A.2. Payback Analysis of the Existing System, Baht.

| Cash flow description | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
|---|-------------|-------------|---------------|---------------|---------------|---------------|
| Development cost: | -157,000.00 | | | | | |
| Operation & Maintenance cost: | | -727,000.00 | -752,445.00 | -778,780.58 | -806,037.90 | -834,249.22 |
| Discount factors for 9 % | 1.0000 | 0.9174 | 0.8417 | 0.7722 | 0.7084 | 0.6499 |
| Time-adjusted costs (adjusted to present value): | -157,000.00 | -666,949.80 | -633,332.96 | -601,374.36 | -570,997.24 | -542,178.57 |
| Cumulative time-adjusted costs over lifetime: | -157,000.00 | -823,949.80 | -1,457,282.76 | -2,058,657.12 | -2,629,654.36 | -3,171,832.93 |
| | | | | | | |
| Benefits derived from operation of new system: | 0.00 | 770,000.00 | 796,950.00 | 824,843.25 | 853,712.76 | 883,592.71 |
| Discount factors for 9 %: | 1.0000 | 0.9174 | 0.8417 | 0.7722 | 0.7084 | 0.6499 |
| Time-adjusted benefits (adjusted to present value): | 0.00 | 706,398.00 | 670,792.82 | 636,943.96 | 604,770.12 | 574,246.90 |
| Cumulative time-adjusted benefits over lifetime: | 0.00 | 706,398.00 | 1,377,190.82 | 2,014,134.77 | 2,618,904.89 | 3,193,151.80 |
| | | | | | | |
| Cumulative lifetime time-adjusted costs + benefits: | -157,000.00 | -117,551.80 | -80,091.94 | -44,522.34 | -10,749.47 | 21,318.87 |

Table A.3. Net Present Value of the Existing System, Baht.

| Cash flow description | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Total |
|--|-------------|-------------|-------------|-------------|-------------|-------------|---------------|
| Development cost: | -157,000.00 | | | | | | |
| Operation & Maintenance cost: | | -727,000.00 | -752,445.00 | -778,780.58 | -806,037.90 | -834,249.22 | |
| Discount factors for 9 % | 1.0000 | 0.9174 | 0.8417 | 0.7722 | 0.7084 | 0.6499 | |
| Present value of annual costs: | -157,000.00 | -666,949.80 | -633,332.96 | -601,374.36 | -570,997.24 | -542,178.57 | |
| Total present value of lifetime cost: | | | | | | | -3,171,832.93 |
| | | | | | | | |
| Benefits derived from operation of new system: | 0.00 | 770,000.00 | 796,950.00 | 824,843.25 | 853,712.76 | 883,592.71 | |
| Discount factors for 9 %: | 1.0000 | 0.9174 | 0.8417 | 0.7722 | 0.7084 | 0.6499 | |
| Present value of annual benefits: | 0.00 | 706,398.00 | 670,792.82 | 636,943.96 | 604,770.12 | 574,246.90 | |
| Total present value of lifetime benefits: | | | | | | | 3,193,151.80 |
| | | | | | | | |
| NET PRESENT VALUE OF THIS CANDIDATE: | | | | | | | 21,318.87 |



Table B.1. Cost of the Candidate System 1, Baht.

| Cost Items | Description | Amount | Unit Price | Years | | | | |
|-------------------|----------------------------|--------|------------|--------------|------------|------------|------------|------------|
| | | | | 1 | 2 | 3 | 4 | 5 |
| 1. Fixed Cost | Development Cost | 1 | 120,400.00 | 120,400.00 | - | - | - | - |
| | Computer Server | 1 | 120,000.00 | 120,000.00 | - | - | - | - |
| | Personal Computer | 4 | 28,000.00 | 112,000.00 | - | - | - | - |
| | Printer | 1 | 10,000.00 | 10,000.00 | - | - | - | - |
| | MS Windows 2000 Server | 1 | 51,000.00 | 51,000.00 | - | - | - | - |
| | MS Windows 2000 Prof. | 4 | 8,200.00 | 32,800.00 | - | - | - | - |
| | MS SQL | 1 | 99,000.00 | 99,000.00 | - | - | - | - |
| | MS Visual Studio 6 | 3 | 20,000.00 | 60,000.00 | - | - | - | - |
| | Total Fixed Cost | | | 605,200.00 | - | - | - | - |
| | Operation Staffs | 4 | 14,000.00 | 672,000.00 | 695,520.00 | 719,863.20 | 745,058.41 | 771,135.46 |
| 2. Operating Cost | Paper | | | 3,000.00 | 3,105.00 | 3,213.68 | 3,326.15 | 3,442.57 |
| | Miscellaneous | | | 2,000.00 | 2,070.00 | 2,142.45 | 2,217.44 | 2,295.05 |
| | Maintenance Cost | | | 30,000.00 | 31,050.00 | 32,136.75 | 33,261.54 | 34,425.69 |
| | Total Operating Cost | | | 707,000.00 | 731,745.00 | 757,356.08 | 783,863.54 | 811,298.76 |
| | Total Cost for Candidate 1 | | | 1,312,200.00 | 731,745.00 | 757,356.08 | 783,863.54 | 811,298.76 |

Table B.2. Payback Analysis of the Candidate System 1, Baht.

| Cash flow description | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
|---|-------------|---------------|---------------|---------------|---------------|---------------|
| Development cost: | -605,200.00 | | | | | |
| Operation & Maintenance cost: | | -707,000.00 | -731,745.00 | -757,356.08 | -783,863.54 | -811,298.76 |
| Discount factors for 9 % | 1.0000 | 0.9174 | 0.8417 | 0.7722 | 0.7084 | 0.6499 |
| Time-adjusted costs (adjusted to present value): | -605,200.00 | -648,601.80 | -615,909.77 | -584,830.36 | -555,288.93 | -527,263.07 |
| Cumulative time-adjusted costs over lifetime: | -605,200.00 | -1,253,801.80 | -1,869,711.57 | -2,454,541.93 | -3,009,830.86 | -3,537,093.92 |
| Benefits derived from operation of new system: | 0.00 | 856,000.00 | 885,960.00 | 916,968.60 | 949,062.50 | 982,279.69 |
| Discount factors for 9 %: | 1.0000 | 0.9174 | 0.8417 | 0.7722 | 0.7084 | 0.6499 |
| Time-adjusted benefits (adjusted to present value): | 0.00 | 785,294.40 | 745,712.53 | 708,083.15 | 672,315.88 | 638,383.57 |
| Cumulative time-adjusted benefits over lifetime: | 0.00 | 785,294.40 | 1,531,006.93 | 2,239,090.08 | 2,911,405.96 | 3,549,789.53 |
| Cumulative lifetime time-adjusted costs + benefits: | -605,200.00 | -468,507.40 | -338,704.63 | -215,451.84 | -98,424.90 | 12,695.61 |

Table B.3. Net Present Value of the Candidate System 1, Baht.

| Cash flow description | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Total |
|--|-------------|-------------|-------------|-------------|-------------|-------------|---------------|
| Development cost: | -605,200.00 | | | | | | |
| Operation & Maintenance cost: | | -707,000.00 | -731,745.00 | -757,356.08 | -783,863.54 | -811,298.76 | |
| Discount factors for 9 % | 1.0000 | 0.9174 | 0.8417 | 0.7722 | 0.7084 | 0.6499 | |
| Present value of annual costs: | -605,200.00 | -648,601.80 | -615,909.77 | -584,830.36 | -555,288.93 | -527,263.07 | |
| Total present value of lifetime cost: | | | | | | | -3,537,093.92 |
| | | | | | | | |
| Benefits derived from operation of new system: | 0.00 | 770,000.00 | 796,950.00 | 824,843.25 | 853,712.76 | 883,592.71 | |
| Discount factors for 9 %: | 1.0000 | 0.9174 | 0.8417 | 0.7722 | 0.7084 | 0.6499 | |
| Present value of annual benefits: | 0.00 | 706,398.00 | 670,792.82 | 636,943.96 | 604,770.12 | 574,246.90 | |
| Total present value of lifetime benefits: | | | | | | | 3,193,151.80 |
| | | | | | | | |
| NET PRESENT VALUE OF THIS CANDIDATE: | | | | | | | -343,942.13 |

Table B.4. Cost of the Candidate System 2, Baht.

| Cost Items | Description | Amount | Unit Price | Years | | | | |
|-------------------|------------------------------|--------|------------|--------------|------------|------------|------------|------------|
| | | | | 1 | 2 | 3 | 4 | 5 |
| 1. Fixed Cost | Development Cost | 1 | 147,600.00 | 147,600.00 | - | - | - | - |
| | Computer Server | 1 | 120,000.00 | 120,000.00 | - | - | - | - |
| | Personal Computer | 3 | 28,000.00 | 84,000.00 | - | - | - | - |
| | Printer | 1 | 10,000.00 | 10,000.00 | - | - | - | - |
| | MS Windows 2000 Server | 1 | 51,000.00 | 51,000.00 | - | - | - | - |
| | MS Windows 2000 Professional | 3 | 8,200.00 | 24,600.00 | - | - | - | - |
| | MS SQL | 1 | 99,000.00 | 99,000.00 | - | - | - | - |
| | MS Visual Studio .NET | 3 | 50,000.00 | 150,000.00 | - | - | - | - |
| | Adobe Photoshop 7 | 1 | 31,500.00 | 31,500.00 | - | - | - | - |
| | Total Fixed Cost | | | 717,700.00 | - | - | - | - |
| 2. Operating Cost | Operation Staffs | 3 | 14,000.00 | 504,000.00 | 521,640.00 | 539,897.40 | 558,793.81 | 578,351.59 |
| | Paper | | | 3,000.00 | 3,105.00 | 3,213.68 | 3,326.15 | 3,442.57 |
| | Miscellaneous | | | 2,000.00 | 2,070.00 | 2,142.45 | 2,217.44 | 2,295.05 |
| | Maintenance Cost | | | 30,000.00 | 31,050.00 | 32,136.75 | 33,261.54 | 34,425.69 |
| | Total Operating Cost | | | 539,000.00 | 557,865.00 | 577,390.28 | 597,598.93 | 618,514.90 |
| | Total Cost for Candidate 2 | | | 1,256,700.00 | 557,865.00 | 577,390.28 | 597,598.93 | 618,514.90 |

Table B.5. Payback Analysis of the Candidate System 2, Baht.

| Cash flow description | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
|---|-------------|---------------|---------------|---------------|---------------|---------------|
| Development cost: | -717,700.00 | | | | | |
| Operation & Maintenance cost: | | -539,000.00 | -557,865.00 | -577,390.28 | -597,598.93 | -618,514.90 |
| Discount factors for 9 % | 1.0000 | 0.9174 | 0.8417 | 0.7722 | 0.7084 | 0.6499 |
| Time-adjusted costs (adjusted to present value): | -717,700.00 | -494,478.60 | -469,554.97 | -445,860.77 | -423,339.09 | -401,972.83 |
| Cumulative time-adjusted costs over lifetime: | -717,700.00 | -1,212,178.60 | -1,681,733.57 | -2,127,594.34 | -2,550,933.43 | -2,952,906.26 |
| | | | | | | |
| Benefits derived from operation of new system: | 0.00 | 856,000.00 | 885,960.00 | 916,968.60 | 949,062.50 | 982,279.69 |
| Discount factors for 9 %: | 1.0000 | 0.9174 | 0.8417 | 0.7722 | 0.7084 | 0.6499 |
| Time-adjusted benefits (adjusted to present value): | 0.00 | 785,294.40 | 745,712.53 | 708,083.15 | 672,315.88 | 638,383.57 |
| Cumulative time-adjusted benefits over lifetime: | 0.00 | 785,294.40 | 1,531,006.93 | 2,239,090.08 | 2,911,405.96 | 3,549,789.53 |
| | | | | | | |
| Cumulative lifetime time-adjusted costs + benefits: | -717,700.00 | -426,884.20 | -150,726.64 | 111,495.74 | 360,472.53 | 596,883.27 |

Table B.6. Net Present Value of the Candidate System 2, Baht.

| Cash flow description | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Total |
|--|-------------|-------------|-------------|-------------|-------------|-------------|---------------|
| Development cost: | -717,700.00 | | | | | | |
| Operation & Maintenance cost: | | -539,000.00 | -557,865.00 | -577,390.28 | -597,598.93 | -618,514.90 | |
| Discount factors for 9 % | 1.0000 | 0.9174 | 0.8417 | 0.7722 | 0.7084 | 0.6499 | |
| Present value of annual costs: | -717,700.00 | -494,478.60 | -469,554.97 | -445,860.77 | -423,339.09 | -401,972.83 | |
| Total present value of lifetime cost: | | | | | | | -2,952,906.26 |
| | | | | | | | |
| Benefits derived from operation of new system: | 0.00 | 770,000.00 | 796,950.00 | 824,843.25 | 853,712.76 | 883,592.71 | |
| Discount factors for 9 %: | 1.0000 | 0.9174 | 0.8417 | 0.7722 | 0.7084 | 0.6499 | |
| Present value of annual benefits: | 0.00 | 706,398.00 | 670,792.82 | 636,943.96 | 604,770.12 | 574,246.90 | |
| Total present value of lifetime benefits: | | | | | | | 3,193,151.80 |
| | | | | | | | |
| NET PRESENT VALUE OF THIS CANDIDATE: | | | | | | | 240,245.54 |

Table B.7. Cost of the Candidate System 3, Baht.

| Cost Items | Description | Amount | Unit Price | Years | | | | |
|-------------------|----------------------------|--------|------------|--------------|------------|------------|------------|------------|
| | | | | 1 | 2 | 3 | 4 | 5 |
| 1. Fixed Cost | Development Cost | 1 | 162,600.00 | 162,600.00 | - | - | - | - |
| | Computer Server | 1 | 120,000.00 | 120,000.00 | - | - | - | - |
| | Personal Computer | 3 | 28,000.00 | 84,000.00 | - | - | - | - |
| | Printer | 1 | 10,000.00 | 10,000.00 | - | - | - | - |
| | MS Windows 2000 Server | 1 | 51,000.00 | 51,000.00 | - | - | - | - |
| | MS Windows 2000 Pro. | 3 | 8,200.00 | 24,600.00 | - | - | - | - |
| | MS SQL | 1 | 99,000.00 | 99,000.00 | - | - | - | - |
| | Macromedia Dreamweaver | 1 | 18,000.00 | 18,000.00 | - | - | - | - |
| | Adobe Photoshop 7 | 1 | 31,500.00 | 31,500.00 | - | - | - | - |
| | Total Fixed Cost | | | 600,700.00 | - | - | - | - |
| 2. Operating Cost | Operation Staffs | 3 | 14,000.00 | 504,000.00 | 521,640.00 | 539,897.40 | 558,793.81 | 578,351.59 |
| | Paper | | | 3,000.00 | 3,105.00 | 3,213.68 | 3,326.15 | 3,442.57 |
| | Miscellaneous | | | 2,000.00 | 2,070.00 | 2,142.45 | 2,217.44 | 2,295.05 |
| | Maintenance Cost | | | 30,000.00 | 31,050.00 | 32,136.75 | 33,261.54 | 34,425.69 |
| | Total Operating Cost | | | 539,000.00 | 557,865.00 | 577,390.28 | 597,598.93 | 618,514.90 |
| | Total Cost for Candidate 3 | | | 1,139,700.00 | 557,865.00 | 577,390.28 | 597,598.93 | 618,514.90 |

Table B.8. Payback Analysis of the Candidate System 3, Baht.

| Cash flow description | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
|---|-------------|---------------|---------------|---------------|---------------|---------------|
| Development cost: | -600,700.00 | | | | | |
| Operation & Maintenance cost: | -539,000.00 | -539,000.00 | -557,865.00 | -577,390.28 | -597,598.93 | -618,514.90 |
| Discount factors for 9 % | 1.0000 | 0.9174 | 0.8417 | 0.7722 | 0.7084 | 0.6499 |
| Time-adjusted costs (adjusted to present value): | -600,700.00 | -494,478.60 | -469,554.97 | -445,860.77 | -423,339.09 | -401,972.83 |
| Cumulative time-adjusted costs over lifetime: | -600,700.00 | -1,095,178.60 | -1,564,733.57 | -2,010,594.34 | -2,433,933.43 | -2,835,906.26 |
| | | | | | | |
| Benefits derived from operation of new system: | 0.00 | 856,000.00 | 885,960.00 | 916,968.60 | 949,062.50 | 982,279.69 |
| Discount factors for 9 %: | 1.0000 | 0.9174 | 0.8417 | 0.7722 | 0.7084 | 0.6499 |
| Time-adjusted benefits (adjusted to present value): | 0.00 | 785,294.40 | 745,712.53 | 708,083.15 | 672,315.88 | 638,383.57 |
| Cumulative time-adjusted benefits over lifetime: | 0.00 | 785,294.40 | 1,531,006.93 | 2,239,090.08 | 2,911,405.96 | 3,549,789.53 |
| | | | | | | |
| Cumulative lifetime time-adjusted costs + benefits: | -600,700.00 | -309,884.20 | -33,726.64 | 228,495.74 | 477,472.53 | 713,883.27 |

Table B.9. Net Present Value of the Candidate System 3, Baht.

| Cash flow description | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Total |
|--|-------------|-------------|-------------|-------------|-------------|-------------|---------------|
| Development cost: | -600,700.00 | | | | | | |
| Operation & Maintenance cost: | | -539,000.00 | -557,865.00 | -577,390.28 | -597,598.93 | -618,514.90 | |
| Discount factors for 9 % | 1.0000 | 0.9174 | 0.8417 | 0.7722 | 0.7084 | 0.6499 | |
| Present value of annual costs: | -600,700.00 | -494,478.60 | -469,554.97 | -445,860.77 | -423,339.09 | -401,972.83 | |
| Total present value of lifetime cost: | | | | | | | -2,835,906.26 |
| | | | | | | | |
| Benefits derived from operation of new system: | 0.00 | 770,000.00 | 796,950.00 | 824,843.25 | 853,712.76 | 883,592.71 | |
| Discount factors for 9 %: | 1.0000 | 0.9174 | 0.8417 | 0.7722 | 0.7084 | 0.6499 | |
| Present value of annual benefits: | 0.00 | 706,398.00 | 670,792.82 | 636,943.96 | 604,770.12 | 574,246.90 | |
| Total present value of lifetime benefits: | | | | | | | 3,193,151.80 |
| | | | | | | | |
| NET PRESENT VALUE OF THIS CANDIDATE: | | | | | | | 357,245.54 |



APPENDIX C
DATABASE DESIGN

Table C.1.1. Structure of Categorized Request Table.

| No. | Field Name | Field Type | Index | Unique | Null | Foreign Key to Table | Check | Key Type |
|-----|------------|--------------|-------|--------|------|----------------------|-------|-------------|
| 1 | JobID | Int | Y | Y | | | | Primary Key |
| 2 | CatID | Int | | | | Request Category | | Foreign Key |
| 3 | FormID | Int | | | | Job Form | | Foreign Key |
| 4 | FormParam | Varchar(255) | | | Y | | | Attribute |
| 5 | JobName | Varchar(50) | | | | | | Attribute |
| 6 | JobDesc | Varchar(255) | | | | | | Attribute |
| 7 | JOID | Int | | | | Employee | | Foreign Key |
| 8 | ServiceDay | Int | * | | | | | Attribute |

Table C.2. Structure of Employee Table.

| No. | Field Name | Field Type | Index | Unique | Null | Foreign Key to Table | Check | Key Type |
|-----|------------|-------------|-------|--------|------|----------------------|-------|-------------|
| 1 | EmpID | Int | Y | Y | | | | Primary Key |
| 2 | FirstName | Varchar(50) | | | | | | Attribute |
| 3 | LastName | Varchar(50) | | | | | | Attribute |
| 4 | ExtNo | Varchar(10) | | | | | | Attribute |
| 5 | Email | Varchar(50) | | | | | | Attribute |
| 6 | Mobile | Varchar(10) | | | Y | | | Attribute |
| 7 | Username | Varchar(20) | Y | Y | | | | Attribute |
| 8 | Password | Varchar(20) | | | | | | Attribute |
| 9 | LMID | Int | | | | Employee | | Attribute |
| 10 | Admin | Varchar(1) | | | Y | | | Attribute |

Table C.3. Structure of Purchase Hardware Table.

| No. | Field Name | Field Type | Index | Unique | Null | Foreign Key to Table | Check | Key Type |
|-----|--------------|--------------|-------|--------|------|----------------------|-------|-------------|
| 1 | ReqID | Int | Y | Y | | Requested Job | | Primary Key |
| 2 | HardwareName | Varchar(255) | | | | | | Attribute |
| 3 | Description | Varchar(255) | | | Y | | | Attribute |
| 4 | Price | Double | | | | | | Attribute |
| 5 | Amount | Int | | | | | | Attribute |

Table C.4. Structure of Purchase Software Table.

| No. | Field Name | Field Type | Index | Unique | Null | Foreign Key to Table | Check | Key Type |
|-----|--------------|--------------|-------|--------|------|----------------------|-------|-------------|
| 1 | ReqID | Int | Y | Y | | Requested Job | | Primary Key |
| 2 | SoftwareName | Varchar(100) | | | | | | Attribute |
| 3 | Description | Varchar(255) | | | Y | | | Attribute |
| 4 | Price | Double | | | | | | Attribute |
| 5 | Amount | Int | | | | | | Attribute |

Table C.5. Structure of System Account Table.

| No. | Field Name | Field Type | Index | Unique | Null | Foreign Key to Table | Check | Key Type |
|-----|-------------|--------------|-------|--------|------|----------------------|-------|-------------|
| 1 | ReqID | Int | Y | Y | | Requested Job | | Primary Key |
| 2 | System Type | Varchar(50) | | | | | | Attribute |
| 3 | Purpose | Varchar(255) | | | Y | | | Attribute |

Table C.6. Structure of Telephone Table.

| No. | Field Name | Field Type | Index | Unique | Null | Foreign Key to Table | Check | Key Type |
|-----|------------|-------------|-------|--------|------|----------------------|-------|-------------|
| 1 | ReqID | Int | Y | Y | | Requested Job | | Primary Key |
| 2 | Action | Varchar(50) | | | | | | Attribute |
| 3 | StartDate | Date | | | Y | | | Attribute |
| 4 | FinishDate | Date | | | | | | Attribute |

Table C.7. Structure of Job Form Table.

| No. | Field Name | Field Type | Index | Unique | Null | Foreign Key to Table | Check | Key Type |
|-----|------------------|--------------|-------|--------|------|----------------------|-------|-------------|
| 1 | FormID | Int | Y | Y | | | | Primary Key |
| 2 | FormName | Varchar(50) | | | | | | Attribute |
| 3 | FormDesc | Varchar(255) | | | Y | | | Attribute |
| 4 | FormPath | Varchar(100) | | | | | | Attribute |
| 5 | RequestTableName | Varchar(50) | | | | | | Attribute |

Table C.8. Structure of Request Category Table.

| No. | Field Name | Field Type | Index | Unique | Null | Foreign Key to Table | Check | Key Type |
|-----|------------|--------------|-------|--------|------|----------------------|-------|-------------|
| 1 | CatID | Int | Y | Y | | | | Primary Key |
| 2 | CatName | Varchar(100) | | | | | | Attribute |
| 3 | CatDesc | Varchar(255) | | | Y | | | Attribute |

Table C.9. Structure of Requested Job.

| No. | Field Name | Field Type | Index | Unique | Null | Foreign Key to Table | Check | Key Type |
|-----|-----------------|--------------|-------|--------|------|----------------------|-------|-------------|
| 1 | ReqID | Int | Y | Y | | | | Primary Key |
| 2 | RequesterID | Int | | | | Employee | | Foreign Key |
| 3 | LMID | Int | | | | Employee | | Foreign Key |
| 4 | JOID | Int | | | | Employee | | Foreign Key |
| 5 | JobID | Varchar(50) | | | | Categorized Request | | Foreign Key |
| 6 | ReqDate | Date | | | | | | Attribute |
| 7 | LMDecision | Varchar(1) | | | Y | | | Attribute |
| 8 | LMComment | Varchar(255) | | | Y | | | Attribute |
| 9 | LMDecisionDate | Date | | | Y | | | Attribute |
| 10 | JODecision | Varchar(1) | | | Y | | | Attribute |
| 11 | JOCComment | Varchar(255) | | | Y | | | Attribute |
| 12 | JODecisionDate | Date | | | Y | | | Attribute |
| 13 | JobStatus | Varchar(1) | | | | | | Attribute |
| 14 | JobCompleteDate | Date | | | Y | | | Attribute |



APPENDIX D

WEB INTERFACE DESIGN

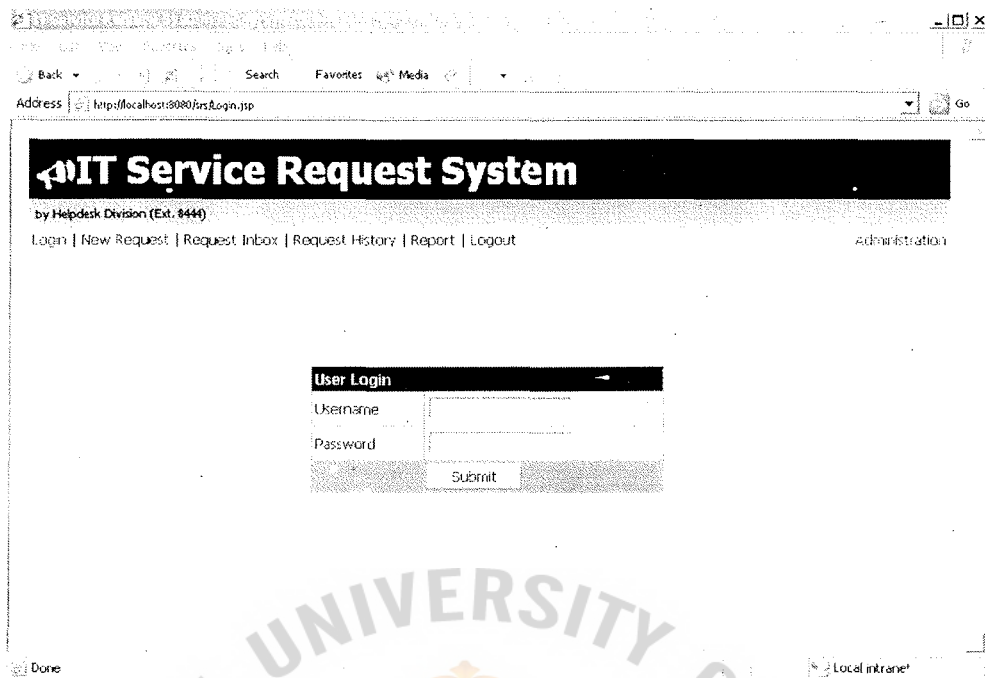


Figure D.1. Login Screen.

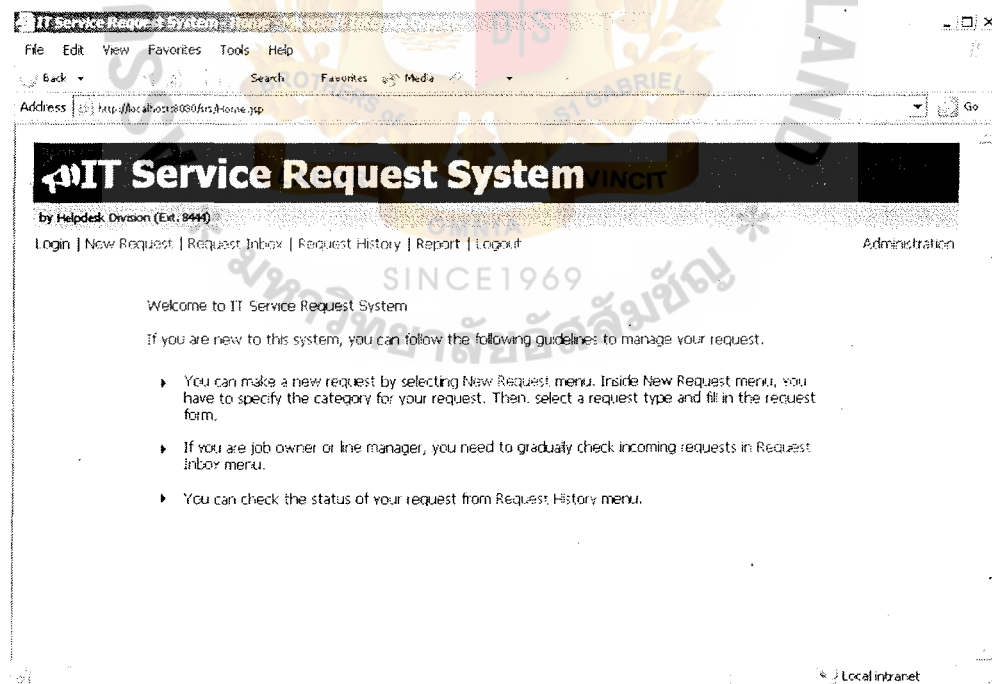


Figure D.2. IT Service Request Homepage.

IT Service Request System
by Helpdesk Division (Ext. 8444)

Login | New Request | Request Inbox | Request History | Report | Logout Administration

Please select a category for your request

Please select a category ▼

Please select a request form

Purchase Desktop PC
High spec. desktop PC Pentium IV 2 Ghz RAM 256 Mb HD 40 Gb Monitor SVGA 17

Purchase Notebook
Notebook for senior manager or above. Pentium4 2Ghz (Mobile CPU) RAM 256 Mb HD 20 Gb

Purchase Printer
HP Deskjet 2800c

Local intranet

Figure D.3. Request Category Selection.

IT Service Request System
by Helpdesk Division (Ext. 8444)

Login | New Request | Request Inbox | Request History | Report | Logout Administration

Purchase Hardware

| | |
|---------------|--------------------------|
| Requester | Vorranit Luengwattanasri |
| Line Manager | Parichut Supachanyarat |
| Job Owner | Pichean Patcha |
| Request Date | |
| Hardware Name | Desktop PC |
| Description | |
| Price / Unit | Baht |
| Quantity | |

SAVE

Done Local intranet

Figure D.4. Purchase Desktop PC Form.

IT Service Request System
by Helpdesk Division (Ext. 8444)

[Login](#) | [New Request](#) | [Request Inbox](#) | [Request History](#) | [Report](#) | [Logout](#) [Administration](#)

Purchase Hardware

| | |
|---------------|--------------------------|
| Requester | Vorrarit Luengwattanakij |
| Line Manager | Panchut Supachariyarak |
| Job Owner | Pichean Patcha |
| Request Date | |
| Hardware Name | Desktop PC |
| Description | for BTS Silom branch |
| Price / Unit | 28000 Baht |
| Quantity | 2 |

Done Local intranet

Figure D.5. Filled Request Form.

IT Service Request System
by Helpdesk Division (Ext. 8444)

[Login](#) | [New Request](#) | [Request Inbox](#) | [Request History](#) | [Report](#) | [Logout](#) [Administration](#)

Request Inbox

| Request No. | Request Type | Requester | Request Date | Commands |
|-------------|---------------------|--------------------------|---------------------|----------------------|
| 11 | Purchase Desktop PC | Vorrarit Luengwattanakij | 2003-07-04 00:11:32 | View |

Local intranet

Figure D.6. Line Manager Inbox.

IT Service Request System - Purchase Hardware

File Edit View Favorites Tools Help

Back Search Favorites Media

Address http://localhost:8080/ars/FormaTestForm.jsp?ReqID=11 Go

IT Service Request System

by Helpdesk Division (Ext. 8444)

Login | New Request | Request Inbox | Request History | Report | Logout Administration

Purchase Hardware

| | |
|-----------------------|-------------------------|
| Requester | Vorarit Luengwattanakij |
| Line Manager | Parichut Supachanyarak |
| Job Owner | Pichean Patcha |
| Request Date | 2003-07-04 00:11:32 |
| Hardware Name | Desktop PC |
| Description | for BTS Silom branch |
| Price / Unit | 28000.00 Baht |
| Quantity | 2 |
| Line Manager Decision | Approve |
| Line Manager Comment | |

SAVE

Done Local intranet

Figure D.7. Line Manager Approval Screen.

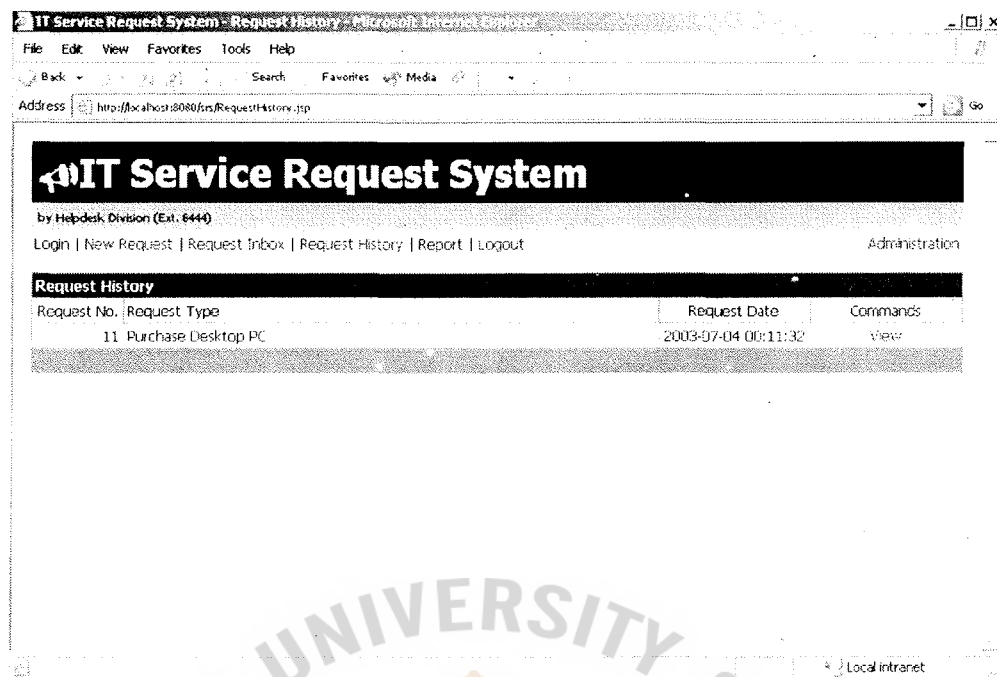


Figure D.9. Request History.

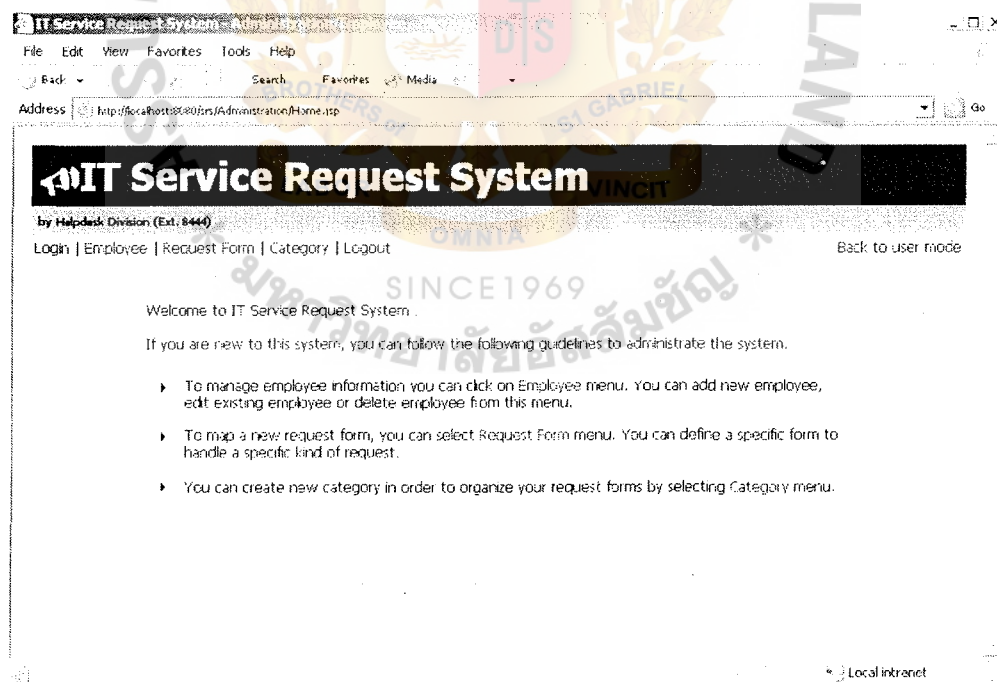


Figure D.10. System Administrator Homepage.

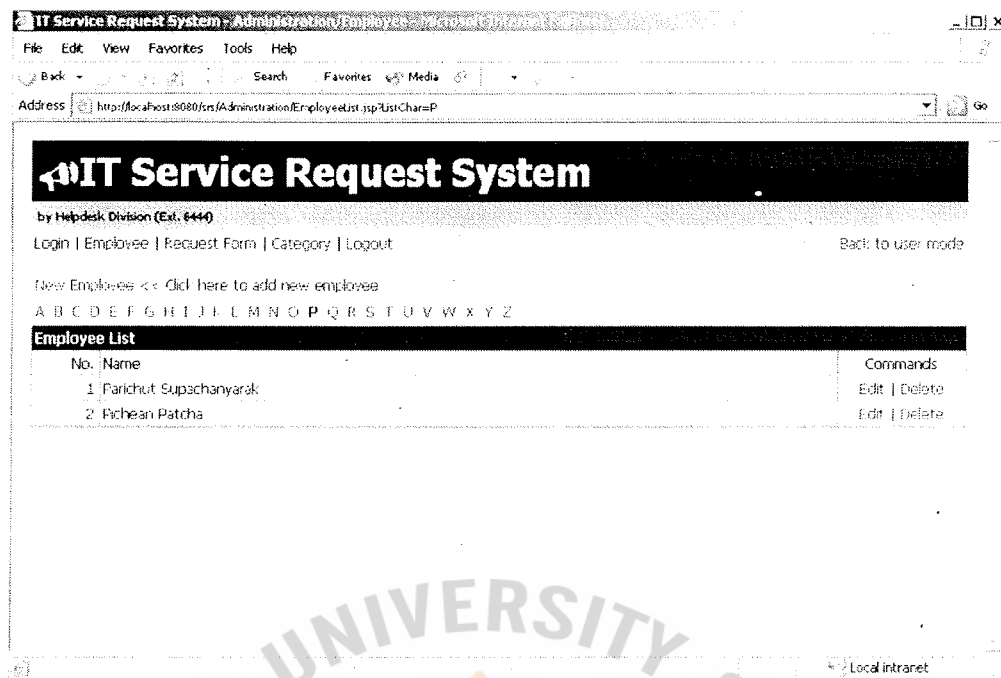


Figure D.11. Employee List.

IT Service Request System
by Helpdesk Division (Ext. 6444)

Login | Employee | Request Form | Category | Logout

Back to user mode

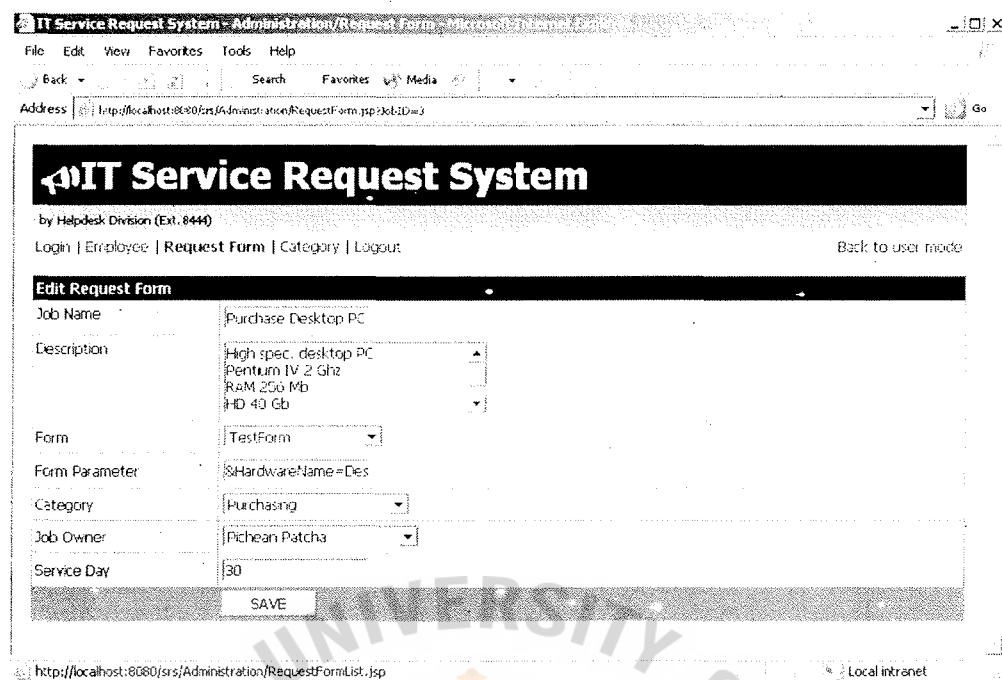
Edit Employee

| | |
|---------------|-------------------------------------|
| First Name | Pichean |
| Last Name | Patcha |
| Ext. No. | 0999 |
| Email Address | pichean@hotmail.com |
| Mobile No. | 012251140 |
| Line Manager | Vorranit Luengwattanakij |
| Admin | <input checked="" type="checkbox"/> |

SAVE

Local intranet

Figure D.12. Edit Employee Profile Form.



IT Service Request System
by Helpdesk Division (Ext. 8444)

Login | Employee | Request Form | Category | Logout [Back to user mode](#)

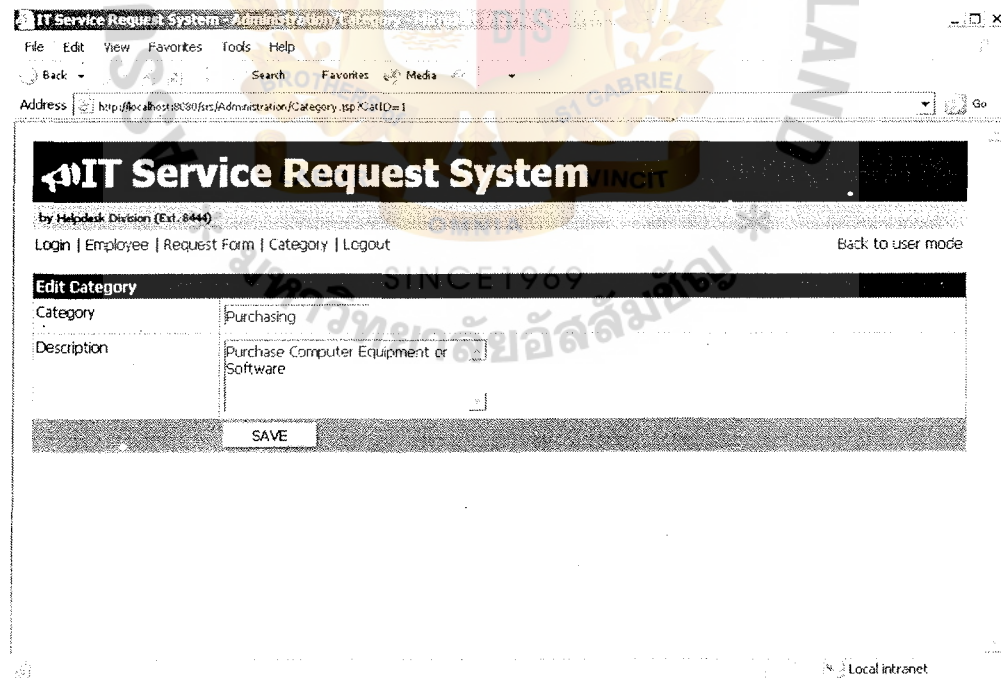
Edit Request Form

| | |
|----------------|---|
| Job Name | Purchase Desktop PC |
| Description | High spec. desktop PC Pentium IV 2 Ghz RAM 256 Mb HD 40 Gb |
| Form | TestForm |
| Form Parameter | %HardwareName=Des |
| Category | Purchasing |
| Job Owner | Pichean Patcha |
| Service Day | 30 |

[SAVE](#)

Address: <http://localhost:8080/srs/Administration/RequestForm.jsp?jobID=3> Local intranet

Figure D.13. Request Form Management.



IT Service Request System /INCIT
by Helpdesk Division (Ext. 8444)

Login | Employee | Request Form | Category | Logout [Back to user mode](#)

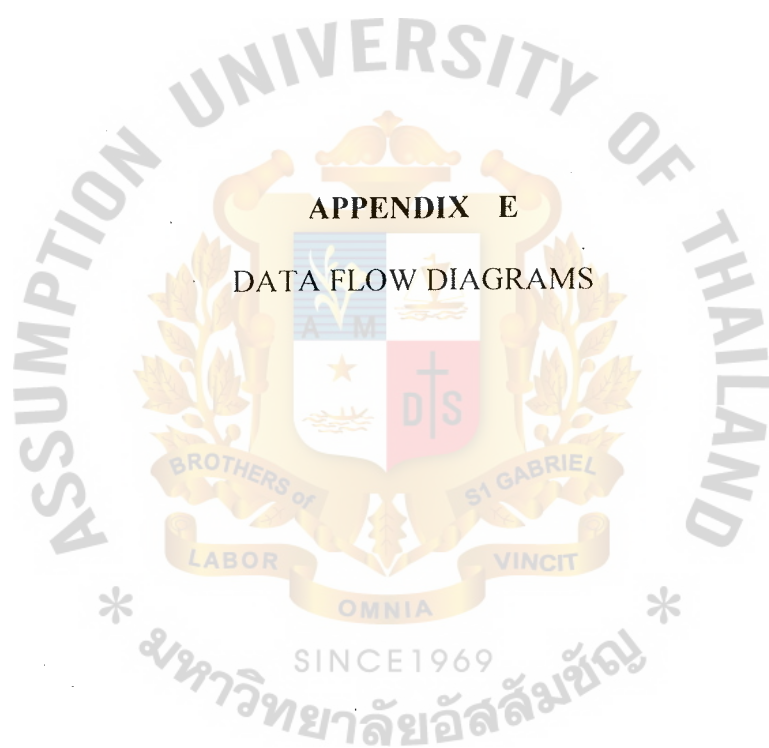
Edit Category

| | |
|-------------|---|
| Category | Purchasing |
| Description | Purchase Computer Equipment or Software |

[SAVE](#)

Address: <http://localhost:8080/srs/Administration/Category.jsp?catID=1> Local intranet

Figure D.14. Category Management.



APPENDIX E

DATA FLOW DIAGRAMS

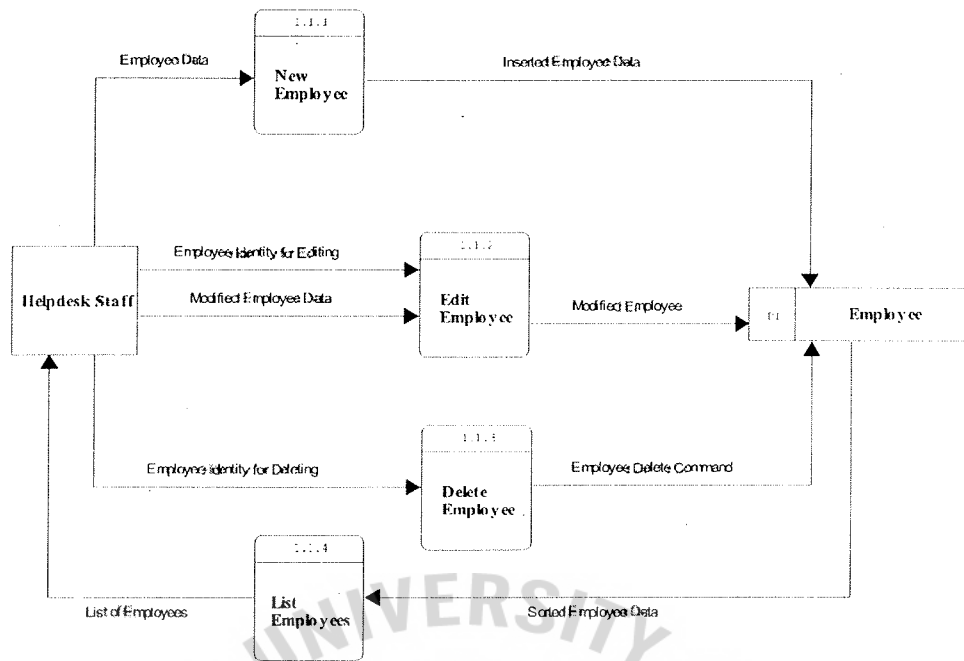


Figure E.1. Data Flow Diagram of Employee Management Process.

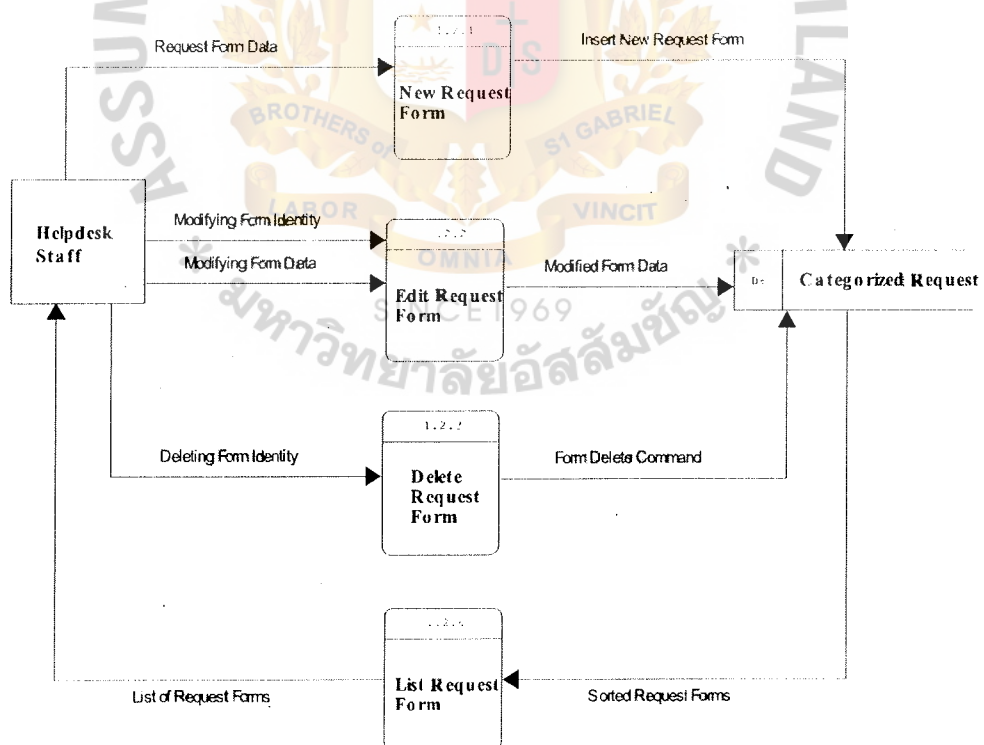


Figure E.2. Data Flow Diagram of Request Form Management Process.

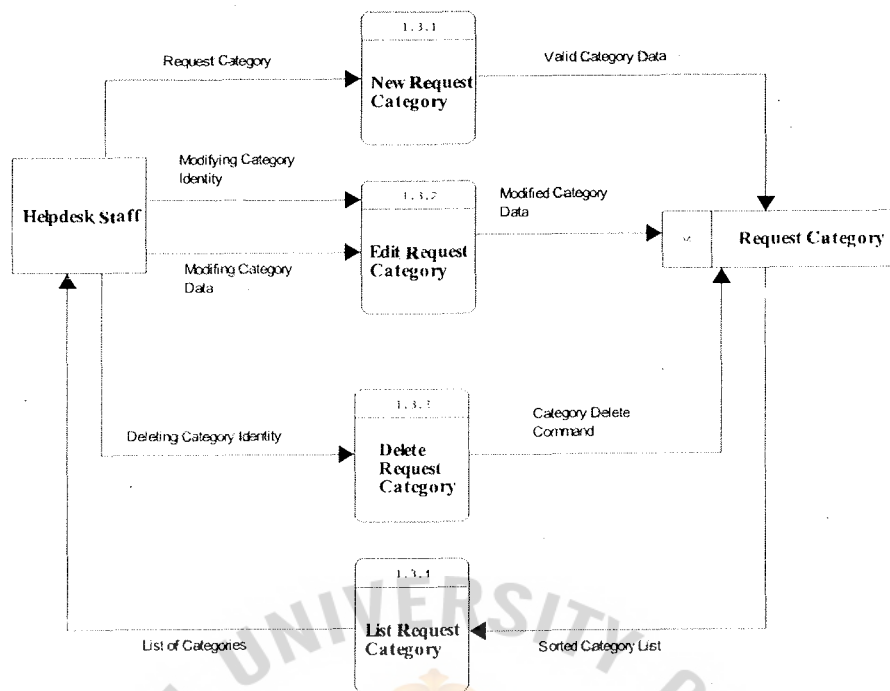


Figure E.3. Data Flow Diagram of Request Category Management Process.

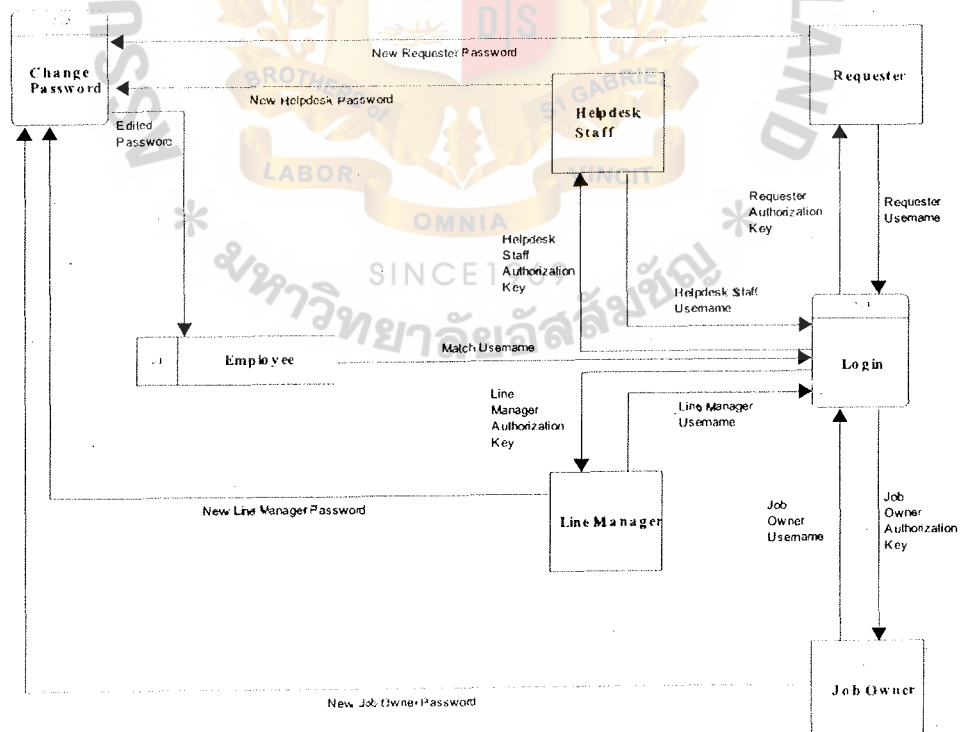


Figure E.4. Data Flow Diagram of Authentication Process.

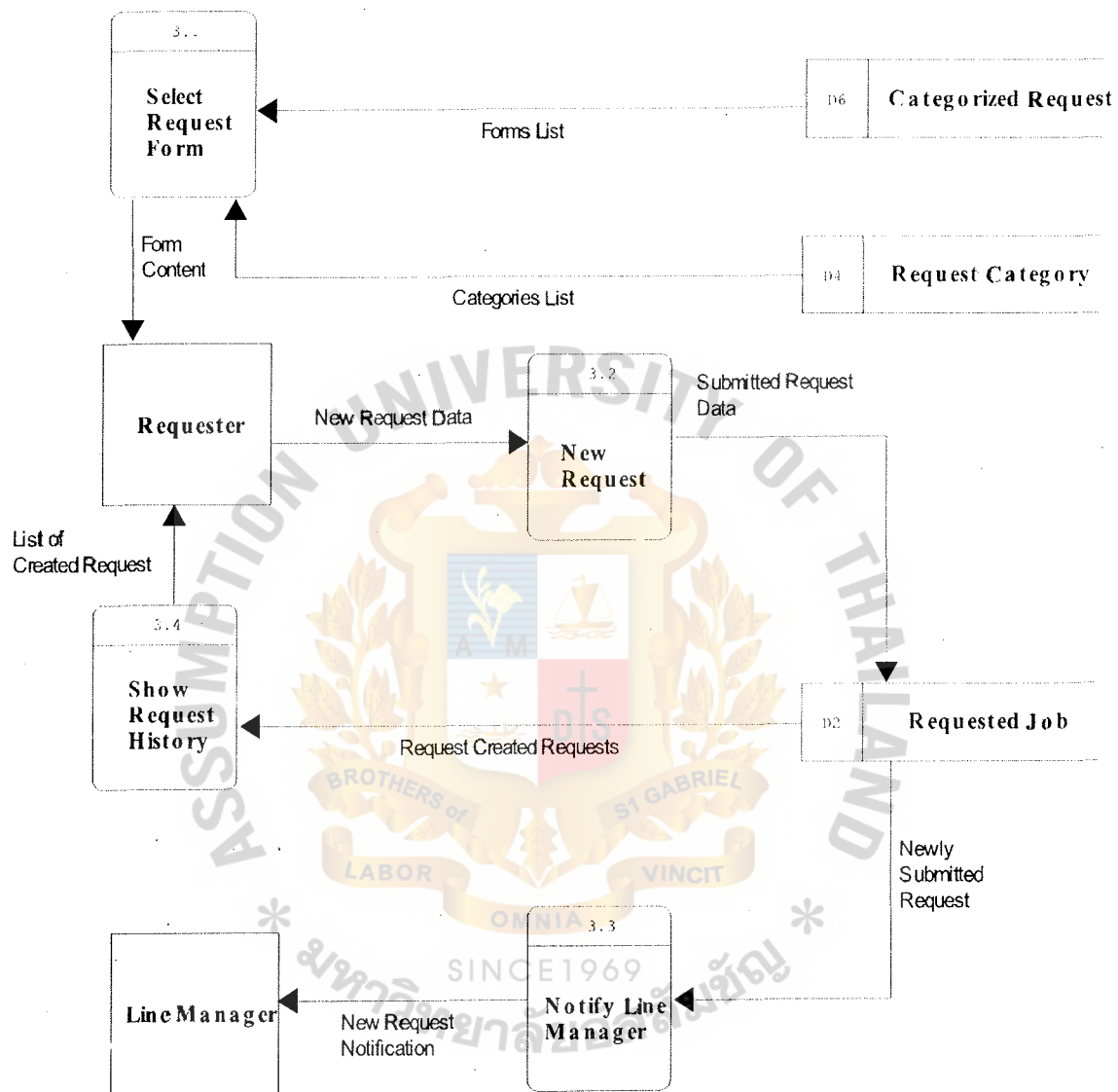


Figure E.5. Data Flow Diagram of Request Submission Process.

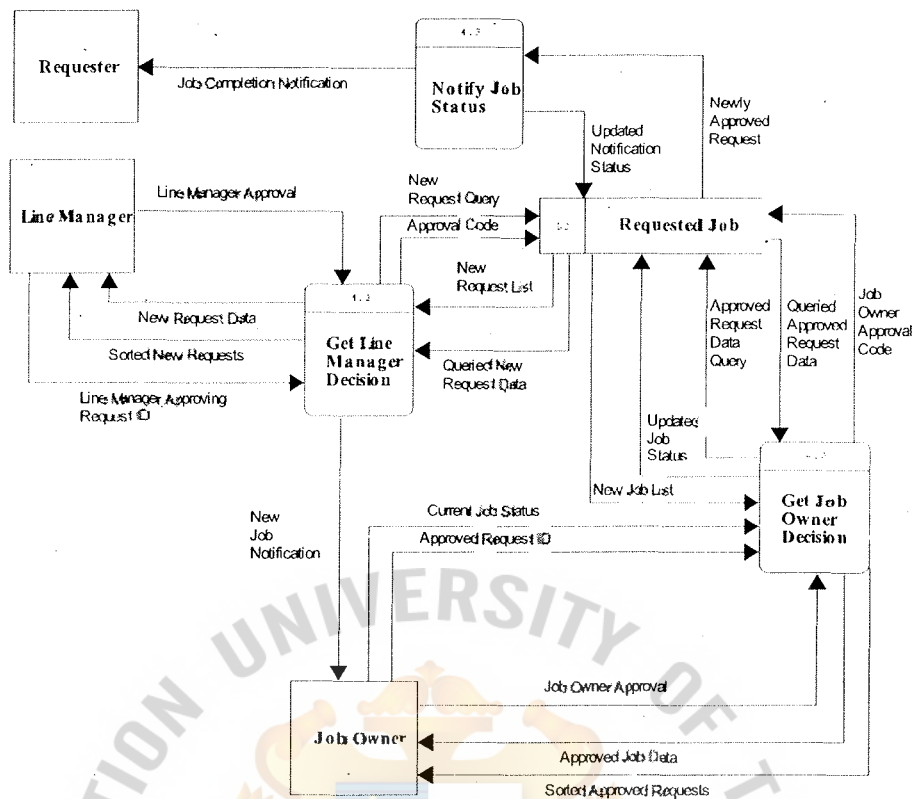


Figure E.6. Data Flow Diagram of Request Approval Process.

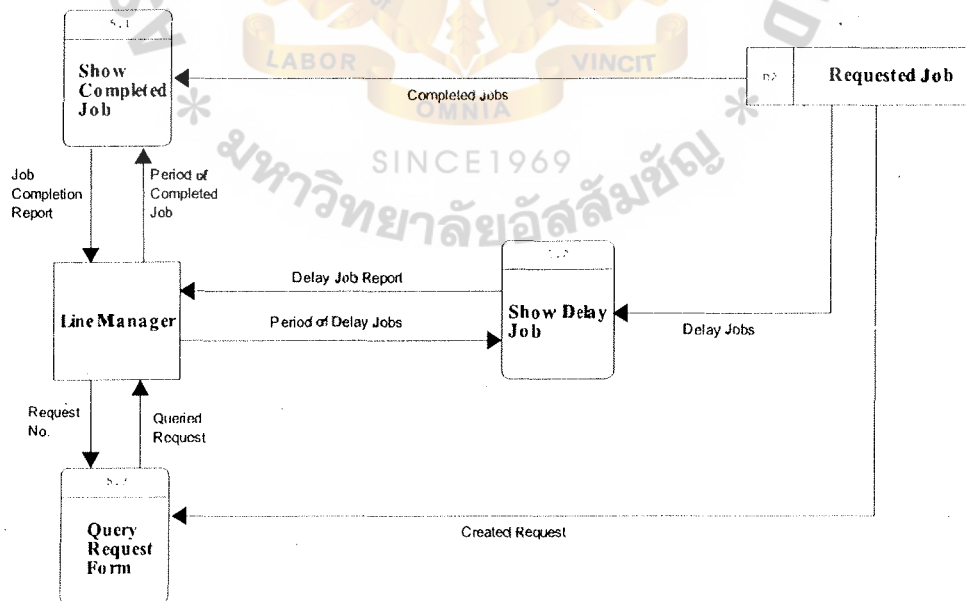


Figure E.7. Data Flow Diagram of Generating Report Process.



APPENDIX F

PROCESS SPECIFICATION

Table F.1. Process Specification of Process 1.1.1.

| Items | Description |
|--------------|--|
| Process Name | New Employee |
| Data In: | Employee Data |
| Data Out: | Inserted Employee Data |
| Process: | 1. Receive employee data 2. Verify employee data 3. Check for duplication 4. Insert employee data |

Table F.2. Process Specification of Process 1.1.2.

| Items | Description |
|--------------|---|
| Process Name | Edit Employee |
| Data In: | Employee Identity for Editing Modified Employee Data |
| Data Out: | Modified Employee |
| Process: | 1. Receive employee identity 2. Receive employee data 3. Verify edited employee data 4. Check for duplication 5. Update employee data |

Table F.3. Process Specification of Process 1.1.3.

| Items | Description |
|--------------|---|
| Process Name | Delete Employee |
| Data In: | Employee Identity for Deleting |
| Data Out: | Employee Delete Command |
| Process: | 1. Receive deleting employee identity 2. Employee deletion |

Table F.4. Process Specification of Process 1.1.4.

| Items | Description |
|--------------|---|
| Process Name | List Employees |
| Data In: | Sorted Employee Data |
| Data Out: | List of Employees |
| Process: | 1. Selecting employee data 2. Generating employee data table |

Table F.5. Process Specification of Process 1.2.1.

| Items | Description |
|--------------|--|
| Process Name | New Request Form |
| Data In: | Request Form Data |
| Data Out: | Insert New Request Form |
| Process: | 1. Receive request form data 2. Verify request form data 3. Insert request form data |

Table F.6. Process Specification of Process 1.2.2.

| Items | Description |
|--------------|--|
| Process Name | Edit Request Form |
| Data In: | Modifying Form Identity Modifying Form Data |
| Data Out: | Modified Form Data |
| Process: | 1. Receive modifying form identity 2. Receive modifying form data 3. Verify modifying form data 4. Update modifying form data |

Table F.7. Process Specification of Process 1.2.3.

| Items | Description |
|--------------|--|
| Process Name | Delete Request Form |
| Data In: | Deleting Form Identity |
| Data Out: | Form Delete Command |
| Process: | 1. Receive form identity 2. Request form deletion |

Table F.8. Process Specification of Process 1.2.4.

| Items | Description |
|--------------|---|
| Process Name | List Request Form |
| Data In: | Sorted Request Forms |
| Data Out: | List of Request Forms |
| Process: | 1. Selecting request form data 2. Generating request form data table |

Table F.9. Process Specification of Process 1.3.1.

| Items | Description |
|--------------|--|
| Process Name | New Request Category |
| Data In: | Request Category |
| Data Out: | Valid Category Data |
| Process: | 1. Receive category data 2. Verify category data 3. Check for duplication 4. Insert category data |

Table F.10. Process Specification of Process 1.3.2.

| Items | Description |
|--------------|---|
| Process Name | Edit Request Category |
| Data In: | Modifying Category Identity Modifying Category Data |
| Data Out: | Modified Category Data |
| Process: | 1. Receive category identity 2. Receive category data 3. Verify edited category data 4. Check for duplication 5. Update category data |

Table F.11. Process Specification of Process 1.3.3.

| Items | Description |
|--------------|--|
| Process Name | Delete Request Category |
| Data In: | Deleting Category Identity |
| Data Out: | Category Delete Command |
| Process: | 1. Receive category identity 2. Category deletion |

Table F.12. Process Specification of Process 1.3.4.

| Items | Description |
|--------------|---|
| Process Name | List Request Category |
| Data In: | Sorted Category List |
| Data Out: | List of Categories |
| Process: | 1. Selecting category data 2. Generating category data table |

Table F.13. Process Specification of Process 2.1.

| Items | Description |
|--------------|--|
| Process Name | Login |
| Data In: | Requester Username Line Manager Username Job Owner Username Helpdesk Staff Username Match Username |
| Data Out: | Requester Authorization Key Line Manager Authorization Key Job Owner Authorization Key Helpdesk Staff Authorization Key |
| Process: | 1. Get username 2. Get password 3. Validate username and password 4. Query match username 5. Generate user authorization key |

Table F.14. Process Specification of Process 2.2.

| Items | Description |
|--------------|--|
| Process Name | Change Password |
| Data In: | New Requester Password New Line Manager Password New Job Owner Password New Helpdesk Password |
| Data Out: | Edited Password |
| Process: | 1. Get new password 2. Validate password 3. Check authorization key 4. Update password |

Table F.15. Process Specification of Process 3.1.

| Items | Description |
|--------------|---|
| Process Name | Form Selection |
| Data In: | Categories List Forms List |
| Data Out: | Form Content |
| Process: | 1. Listing category data 2. Get category identity 3. Listing request form 4. Get form identity 5. Show form content |

Table F.16. Process Specification of Process 3.2.

| Items | Description |
|--------------|---|
| Process Name | New Request |
| Data In: | New Request Data |
| Data Out: | Submitted Request Data |
| Process: | 1. Receive request data 2. Validate request data 3. Insert request data |

Table F.17. Process Specification of Process 3.3.

| Items | Description |
|--------------|---|
| Process Name | Notify Line Manager |
| Data In: | Newly Submitted Request |
| Data Out: | New Request Notification |
| Process: | 1. Selecting new request 2. Read email template 3. Merge email content 4. Send line manager notification email 5. Update line manager notification status |

Table F.18. Process Specification of Process 3.4.

| Items | Description |
|--------------|--|
| Process Name | Show Request History |
| Data In: | Created Requests |
| Data Out: | List of Created Request |
| Process: | <ol style="list-style-type: none"> 1. Get authentication key 2. Selecting submitted requests 3. Submitted requests data table |

Table F.19. Process Specification of Process 4.1.

| Items | Description |
|--------------|--|
| Process Name | Get Line Manager Decision |
| Data In: | Line Manager Approval |
| Data Out: | New Job Notification Approval Code |
| Process: | <ol style="list-style-type: none"> 1. Get authentication key 2. List new requests by authentication key 3. Get new request identity 4. Show new request data 5. Get line manager approval 6. Send job owner notification |

Table F.20. Process Specification of Process 4.2.

| Items | Description |
|--------------|--|
| Process Name | Get Job Owner Decision |
| Data In: | Job Owner Approval |
| Data Out: | Job Status |
| Process: | <ol style="list-style-type: none"> 1. Get authentication key 2. List approved requests by authentication key 3. Get approved request identity 4. Show approved request data 5. Get job owner approval |

Table F.21. Process Specification of Process 4.3.

| Items | Description |
|--------------|--|
| Process Name | Notify Job Status |
| Data In: | Newly Approved Request |
| Data Out: | Job Completion Notification |
| Process: | 1. Get newly approved request 2. Send job completion notification 3. Update notification status 4. Update job completion time |

Table F.22. Process Specification of Process 5.1.

| Items | Description |
|--------------|--|
| Process Name | Show Completed Job |
| Data In: | Completed Jobs Period of Completed Job |
| Data Out: | Job Completion Report |
| Process: | 1. Get start period of completed jobs report 2. Get stop period of completed jobs report 3. Get completed jobs 4. Format completed job report 5. Report completed jobs |

Table F.23. Process Specification of Process 5.2.

| Items | Description |
|--------------|--|
| Process Name | Show Delay Job |
| Data In: | Period of Delay Jobs Delay Jobs |
| Data Out: | Delay Job Report |
| Process: | 1. Get start period of delay jobs report 2. Get stop period of delay jobs report 3. Get delay jobs 4. Format delay job report 5. Report delay jobs |

Table F.24. Process Specification of Process 5.3.

| Items | Description |
|--------------|--|
| Process Name | Query Request Form |
| Data In: | Request No. Created Request |
| Data Out: | Queried Request |
| Process: | 1. Get request number 2. Get created request by request number 3. Report request data. |





IT Service Request System

[Login](#) | [New Request](#) | [Request Inbox](#) | [Request History](#) | [Report](#) | [Logout](#)

| Report of Completed Jobs (Grouped by Category) 1 Sep 2003 - 30 Sep 2003 | | |
|--|--------|------------|
| Category | Amount | Percentage |
| Purchase Hardware | 250 | 26% |
| Purchase Software | 50 | 5% |
| System Account | 580 | 60% |
| Telephone | 74 | 9% |
| Total | 954 | 100% |
| | | |

| Report of Completed Jobs (Grouped by Job) 1 Sep 2003 - 30 Sep 2003 | | |
|---|--------|------------|
| Category | Amount | Percentage |
| Desktop PC | 110 | 12% |
| Monitor | 60 | 6% |
| Modem | 50 | 5% |
| Notebook | 30 | 3% |
| Microsoft Windows 2000 Professional Edition | 15 | 2% |
| Microsoft Windows 2000 Server Edition | 3 | 0% |
| Microsoft Office 2000 | 15 | 2% |
| Norton Antivirus | 15 | 2% |
| Symantec PC Anywhere | 2 | 0% |
| Email Account | 120 | 13% |
| LAN Account | 150 | 16% |
| Loxinfo VPN Account | 310 | 32% |
| Move Telephone Number | 30 | 3% |
| New Telephone Number | 44 | 5% |
| Total | 954 | 100% |
| | | |

Figure G.1. Completed Job Report.

IT Service Request System

[Login](#) | [New Request](#) | [Request Inbox](#) | [Request History](#) | [Report](#) | [Logout](#)

| Report of Delay Jobs (Grouped by Category) 1 Sep 2003 - 30 Sep 2003 | | |
|--|--------|------------|
| Category | Amount | Percentage |
| Purchase Hardware | 25 | 26% |
| Purchase Software | 5 | 5% |
| System Account | 58 | 61% |
| Telephone | 7 | 7% |
| Total | 95 | 100% |

| Report of Delay Jobs (Grouped by Job) 1 Sep 2003 - 30 Sep 2003 | | |
|---|--------|------------|
| Category | Amount | Percentage |
| Desktop PC | 10 | 11% |
| Monitor | 7 | 7% |
| Modem | 0 | 0% |
| Notebook | 8 | 8% |
| Microsoft Windows 2000 Professional Edition | 0 | 0% |
| Microsoft Windows 2000 Server Edition | 0 | 0% |
| Microsoft Office 2000 | 0 | 0% |
| Norton Antivirus | 5 | 5% |
| Symantec PC Anywhere | 0 | 0% |
| Email Account | 40 | 42% |
| LAN Account | 3 | 3% |
| Loxinfo VPN Account | 15 | 16% |
| Move Telephone Number | 7 | 7% |
| New Telephone Number | 0 | 0% |
| Total | 95 | 100% |

Figure G.2. Delay Job Report.

IT Service Request System

[Login](#) | [New Request](#) | [Request Inbox](#) | [Request History](#) | [Report](#) | [Logout](#)

Request No.

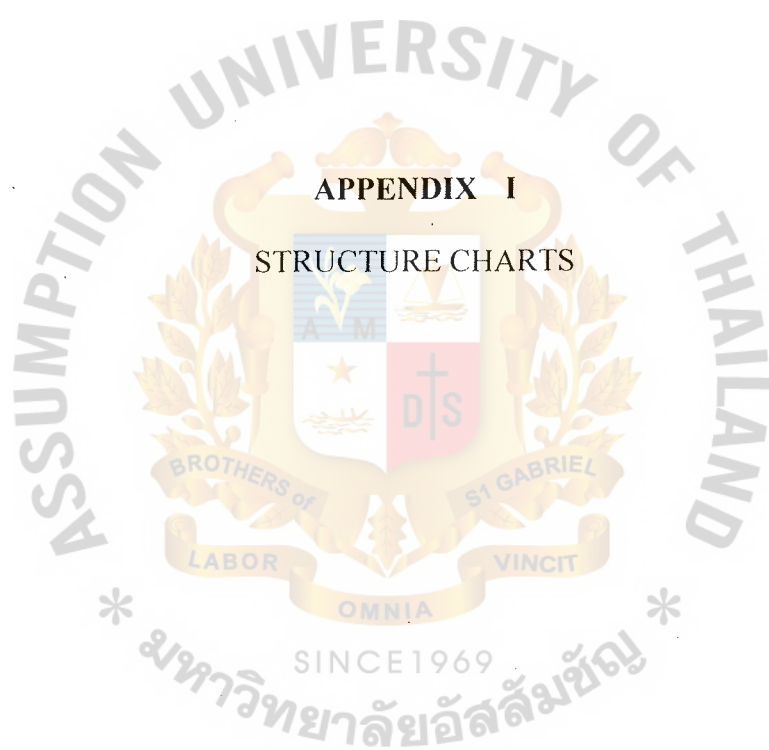
| Request Query Report | |
|-----------------------|---|
| Field | Data |
| Request No. | 30004 |
| Requester | K. Pornchai JaroenkietThiwa (Ext. 8464) |
| Request Date | 15 Sep 2003 |
| Line Manager | K. Supat Piamchokedee (Ext. 8463) |
| Job Name | Purchase Notebook |
| Job Owner | K. Thanawut Pracharatudom (Ext. 6488) |
| Line Manager Decision | Approved - 15 Sep 2003 |
| Job Owner Decision | Approved - 15 Sep 2003 |
| Job Status | Open |
| | |

Figure G.3. Request Query Report.



Table H.1. Data Dictionary of IT Service Request System.

| Field Name | Meaning |
|------------------|--|
| JobID | Running number of categorized request forms. |
| CatID | Running number for each category. |
| FormID | Running number of each request form. |
| FormParam | Specific parameter passed to the request form for form processing. |
| JobName | Name of the categorized request. |
| JobDesc | Description of the categorized request. |
| JOID | Job owner identity for the categorized request. |
| ServiceDay | Service level agreement for the specified job. |
| EmpID | Running number for employee data. |
| FirstName | First name of the employee. |
| LastName | Last name of the employee. |
| ExtNo | Internal telephone extension number. |
| LMID | Line manager of the employee. |
| Username | Username for logging into IT service request system. |
| Password | Password for logging into IT service request system. |
| Admin | Permission flag for administration user. |
| ReqID | Running number for the submitted request. |
| SystemType | The name of the system for the requested system account. |
| Action | Service type for telephone service. |
| StartDate | Beginning date for the telephone service usage. |
| FinishDate | Last date for the telephone service usage. |
| FormPath | Path that contain the request form on the server. |
| RequestTableName | The name of the table to stored the request data for each form. |
| CatName | The name of the categories for a request. |
| CatDesc | The description for each request category. |
| RequesterID | Identity for the job requester. |
| ReqDate | The date that a request is submitted. |
| LMDecision | Line manager decision code for a specific request. |
| LMComment | Line manager comment for a specific request. |
| LMDecisionDate | The date that line manager submits decision. |
| JODecision | Job owner decision code for a specific request. |
| JOComment | Job owner comment for a specific request. |
| JODecisionDate | The date that job owner submits decision. |
| JobStatus | The status for the requested job. |
| JobCompleteDate | The date that the job is closed. |



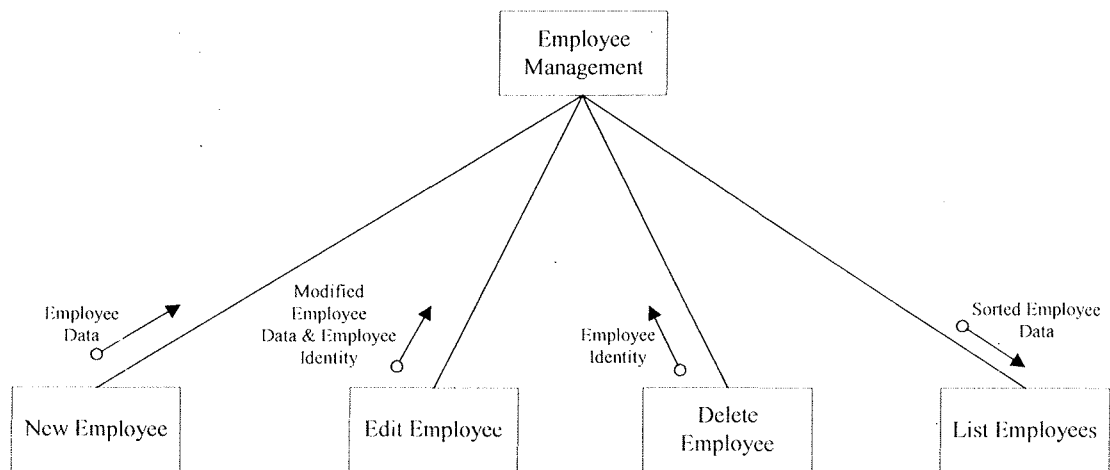


Figure I.1. Structure Chart of Employee Management Process.

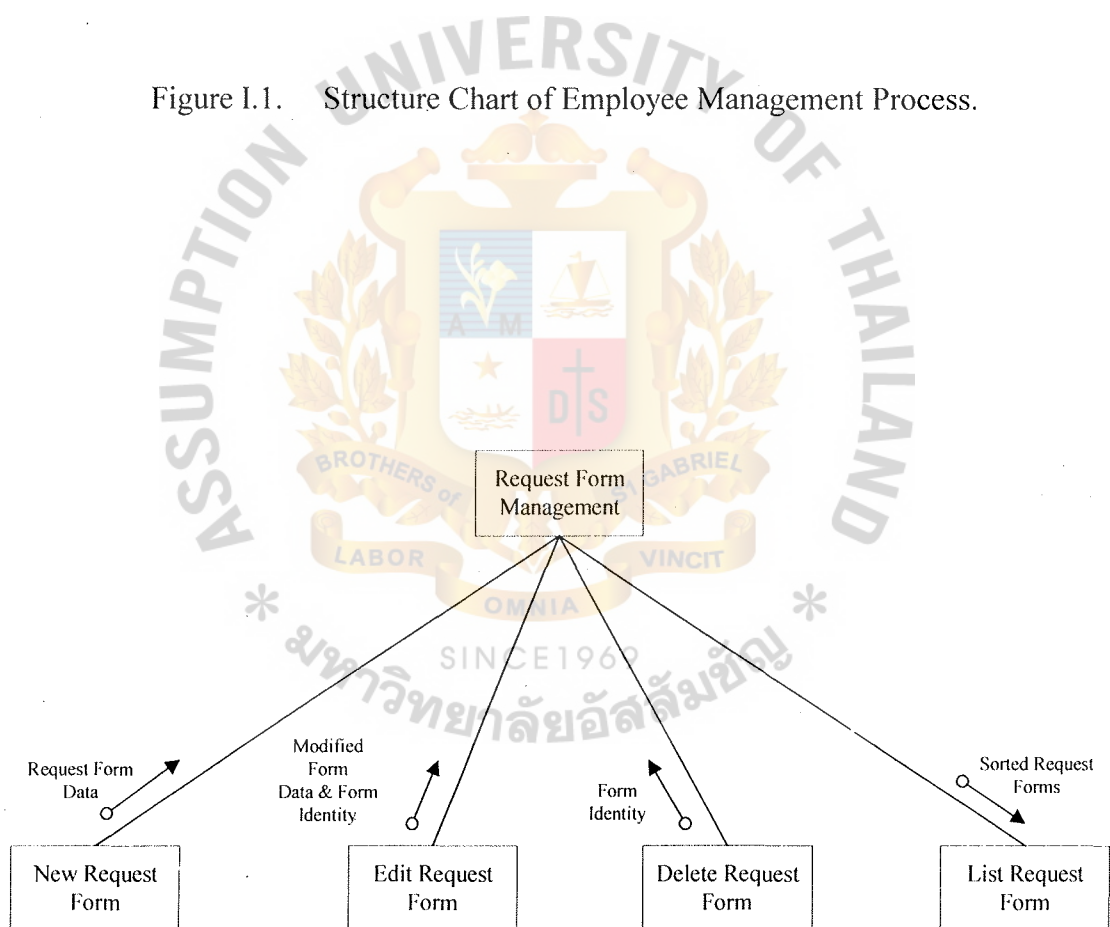


Figure I.2. Structure Chart of Request Form Management Process.

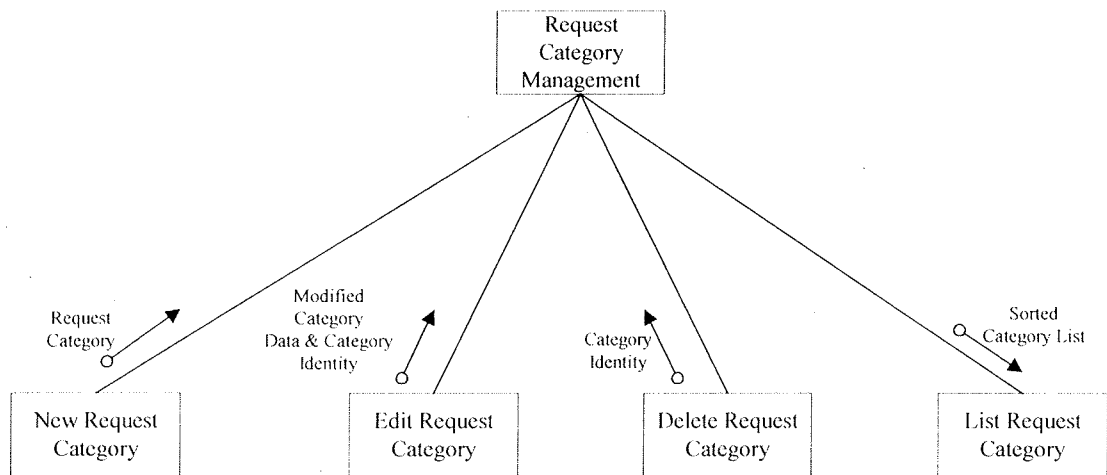


Figure I.3. Structure Chart of Request Category Management Process.

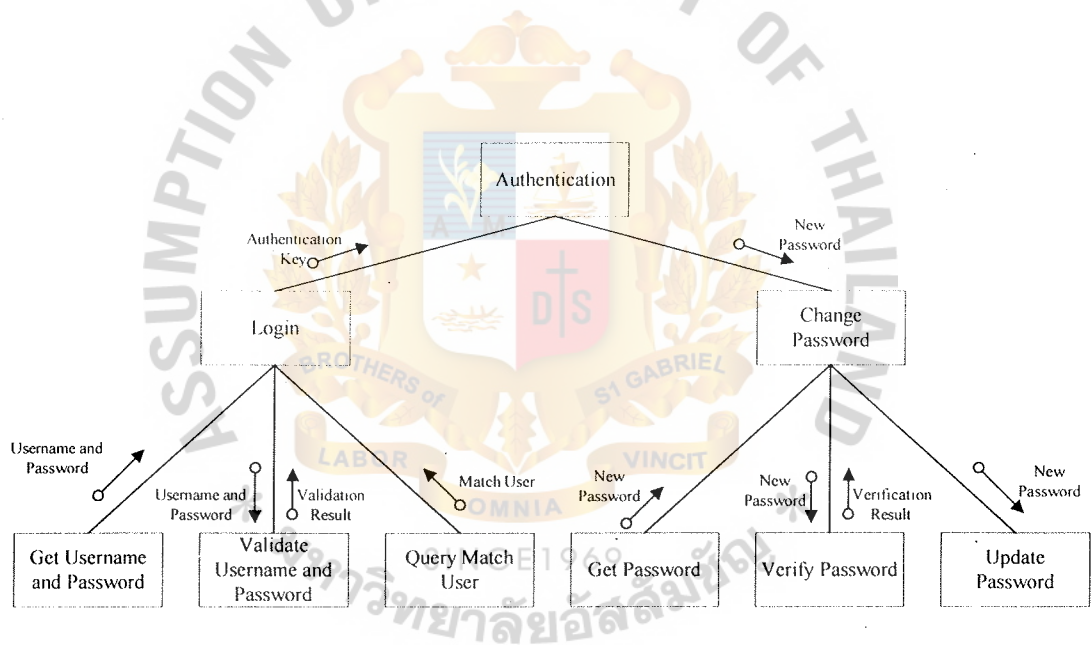


Figure I.4. Structure Chart of Authentication Process.

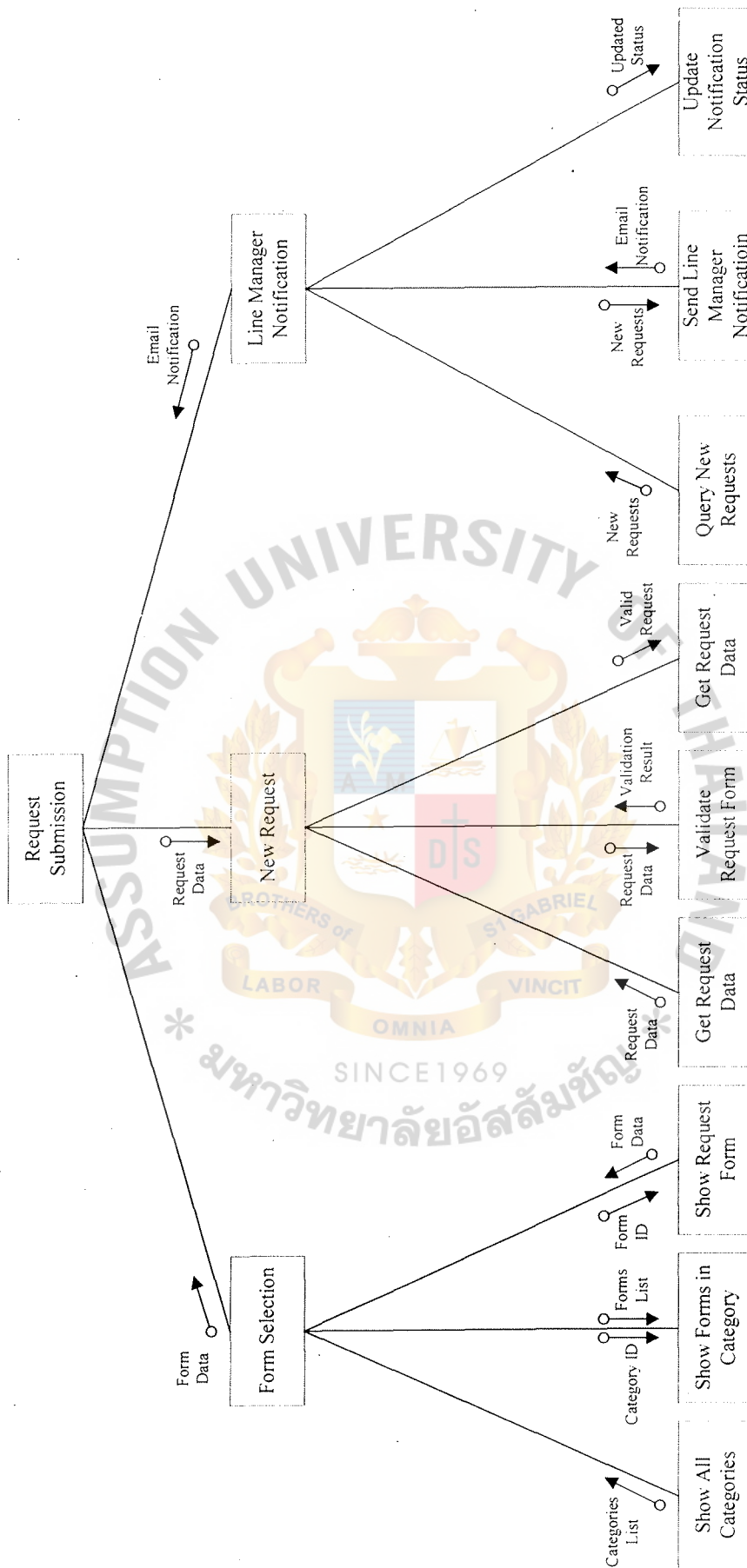


Figure I.5. Structure Chart of Request Submission Process.

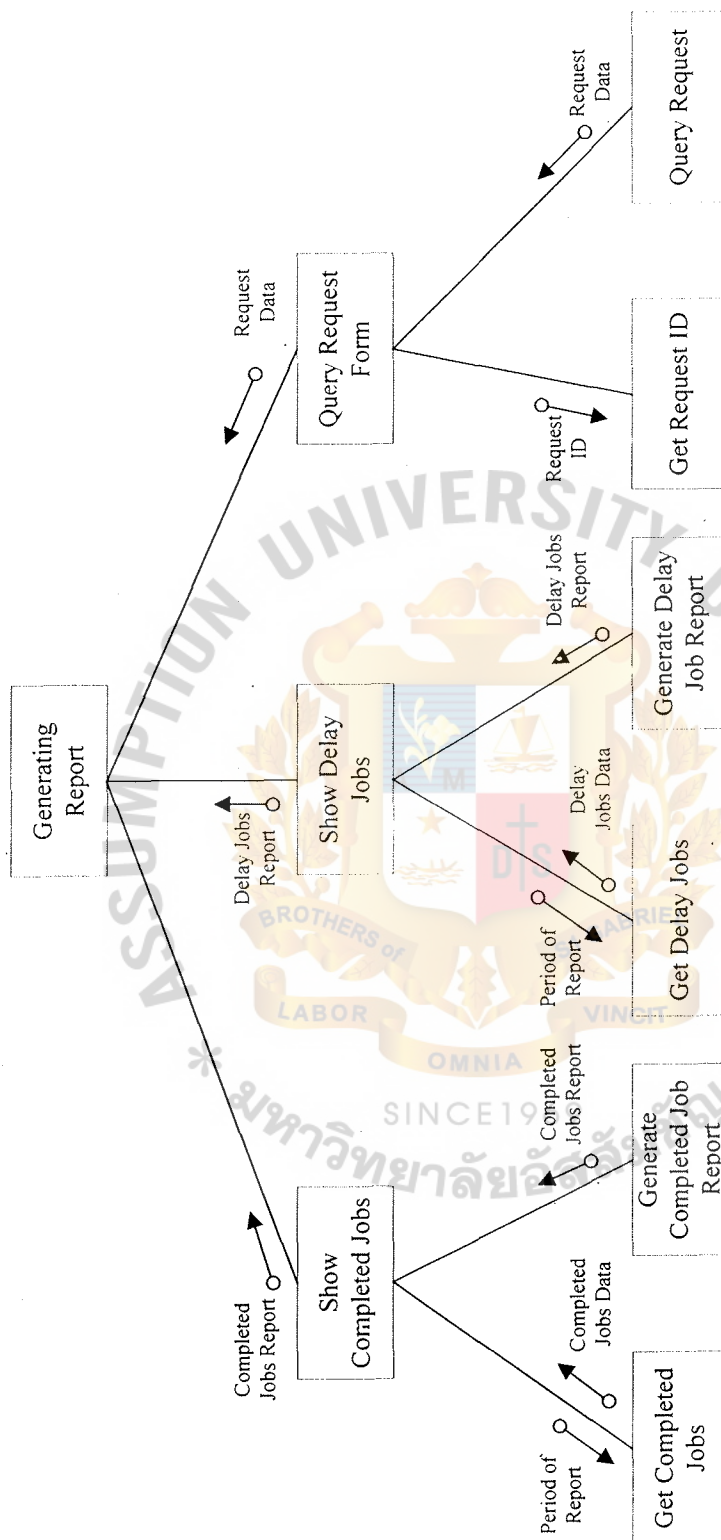


Figure I.7. Structure Chart of Generating Report Process.

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