



## Help Desk System for IT Support

by

Ms. Jariya Visuthikarn

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

August, 2001

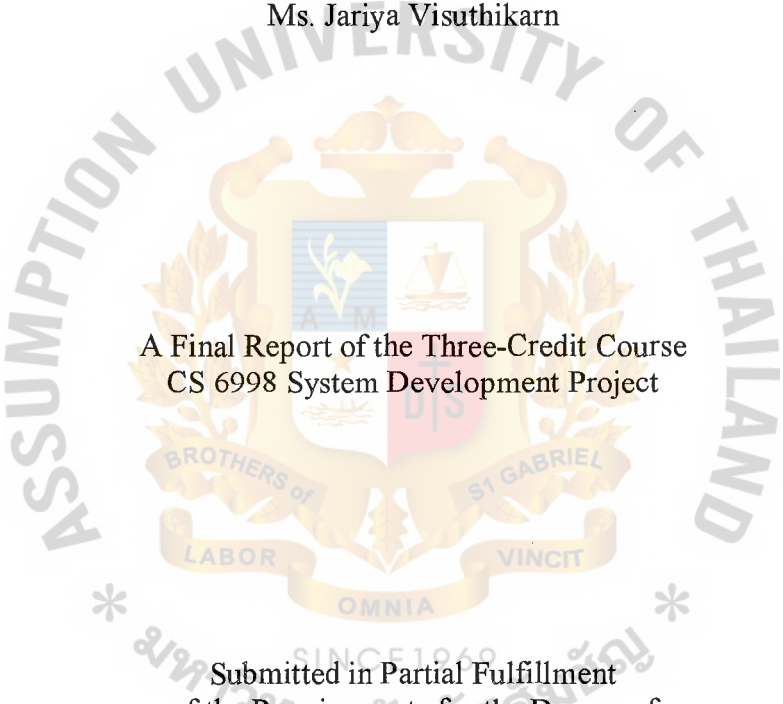


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Project Title                      Help Desk System for IT Support

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

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## ABSTRACT

This system development project presents the analysis, design and implementation of the help desk and support system for ABC Motor Company Ltd. The main objective of the development is to create a new system that allows the company to effectively control the help desk operations and technical support functions.

The project begins with a study of the existing system which is a manual system. The analysis and design of the new system is carried out using the structure methodology such as data flow diagram, entity relationship diagram, etc. The main problem of the existing system is that gathering information for decision making is complex and time consuming. In worst case, some information cannot be obtained, and it consequently leads to a business loss.

The new system is designed to capture data and transactions, which occur in daily business operation of the help desk and the support team. These data and transactions are then analyzed and used for supporting decision making of the management. The new computerized system is implemented to replace the existing manual system. The new system helps to greatly increase the throughput and improve the efficiency of help desk and support operations, as indicated in the summary of degree of achievement. The worthiness of the new system is reflected by the satisfactory results obtained from the cost analysis of breakeven and payback periods. The new system is web-based and always available, which helps users to conveniently contact the help desk and the support team at any time from any location.

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## I. INTRODUCTION

### 1.1 Background of the Project

Currently, the existing manual systems used by many organizations cause difficulties to system management and also affect end users. The system used by the help desk and the technical support team of ABC Operations (Thailand) Co., Ltd. ABC Motor Company is also a manual system. ABC Motor Company is widely known as an international automotive company which emphasizes on total quality management (TQM). The senior management of the company also has a very high regard for information technology. This new proposed system has been developed to fully utilize the computer's capability. As such, it will have a positive effect on on-line operations and it will also disseminate information between the company and its networks more efficiently. The computer help desk and technical support team have two of the most important support functions within the organization and deal with all ABC Motor department users. The help desk and technical support team are responsible for providing solutions for computer problems, information/database management and to assist other users on various issues. Currently, practices are manual, this creates a large amount of paperwork and inefficiencies. Each day request forms and application modification forms are processed in an inefficient manner, this is due to the request and approval format. It also causes a communication breakdown and makes it difficult for users to contact the help desk to request for services. In addition, a large amount of storage space is required for document keeping.

This project proposal has been developed in order to increase the productivity and efficiency of the help desk and technical support team, reduce service times, enhance in-



house customer satisfaction, meet end user system requirements, simplify end user contact, improve task completion status checks and reduce the cost of document storage.

## **1.2 Objectives of the Project**

- (1) To provide a new communication channel between the help desk and users.
- (2) To eliminate paper work and lead-time, of help desk operations.
- (3) To improve productivity and efficiency of daily operations.
- (4) To keep a history of transactions.
- (5) To maintain a knowledge base for future requirements.
- (6) To manage and prioritize the incoming system requirements effectively and allow users to check the queue/status of their requests (access will be available no matter where they are via the Internet).

## **1.3 Scope of the Project**

This project was derived in order to increase the productivity and efficiency of both the help desk and the technical support team. Both operations serve all ABC Motor department users and all ABC Motor Company entities in Thailand. As it is one of the most important support functions and essentially drives all communication networks as well as all information technology, the scope of this project is crucial in the future development of ABC Motor Company in Thailand. The action items are as follows:

- (1) Submission of user requirements for submission are performed via a web page instead of making a telephone call and supplying documentation. The system will automatically alert the support team after submission.
- (2) Provide dedicate communication channel and efficient system via a web page on the company Intranet.
- (3) Enable users to check the queue and status of their requests via Web Page.

- (4) Generate daily and monthly reports for the management (for system evaluation).

#### 1.4 Deliverables

The desired result of this project is to Support System Web Access via ABC Intranet. (The Web Page will be developed using Dreamweaver 4, Flash 5. The DBMS will be implemented using Microsoft SQL Server 7.0 and Microsoft Access.

- (1) The input screens:
  - (a) User login.
  - (b) Main menu for Support system.
  - (c) Change password screen.
  - (d) Problem request screen.
  - (e) Request for QAD MFGPRO screen.
  - (f) Requisition screen.
  - (g) Online approval screen.
  - (h) Technical support menu.
  - (i) View task menu.
- (2) The output screens:
  - (a) User profile screen.
  - (b) Password change result.
  - (c) Job submitted result.
  - (d) List of transactions screen.
- (3) The reports:
  - (a) Daily transaction report.
  - (b) Monthly transaction report.
  - (c) Pending task report.

- (d) In progress task report.
- (e) Completed task report.
- (f) Summary report, service time per request/month.
- (g) Summary report, number of calls per month.

### **1.5 Expected Result**

After implementing, the new support system will help to eliminate all manual processes, reduce inefficiencies and increase the productivity of the Information Technology Team. It will also enhance company operations as follows:

- (1) Increase efficiency of the communication between help desk, support team and users.
- (2) Assist in streamlining the operations of the company.
- (3) Reduce the requirement and storage space for documents.
- (4) Provide user satisfaction and the fast problem solving on a daily basis.
- (5) Reduce human errors.
- (6) Keep track of the records of service requests and determine type of service, time usage, and solutions.
- (7) Easy for users to contact help desk for services via Web Page access e.g. check queue and status of their requests.
- (8) Eliminate cost of paper work and storage space.
- (9) Prevent a loss of communication and information between the help desk and users.



## **II. THE EXISTING SYSTEM**

### **2.1 Background of the Organization**

In 1903 Mr. Henry Ford started producing and selling ABC automobiles in Detroit, Michigan State, in the U.S.A. At this time, ABC Motor Co. Ltd. has become the world's second largest automotive manufacturer, whose auto sales are approximately 6.5 million cars per year and staff members employed worldwide are more than 350,000. At present, ABC's factories are scattered in six continents around the world. They produce various types of automobiles to the customer market in more than 200 nations in which consist of drivers requiring high-quality cars that are well worth purchasing and are guaranteed from manufacturers. ABC Sales & Service (Thailand) Co., Ltd. is found in July 1996 to look after all ABC marketing and sales activities. In Thailand, it controls nationwide sales distribution, causing ABC to be able to closely study Thai consumers' demands, so that ABC owners expectations can be exceeded and owning a ABC will be a fantastic experience. To achieve this goal, only qualified people are employed to work at ABC Operations (Thailand) Co., Ltd.

ABC Operations (Thailand) Co., Ltd. (organization is shown in Figure 2.1) is one of the ABC Company Groups located in Thailand. It has been established since 1996 and offers general services to other sales, manufacturing and finance company of ABC networks as following; ABC Sales and Service (Thailand), PRIMUS Leasing Co., Ltd, Auto Alliance (Thailand) Co., Ltd. and so on. There are seven-service functions in the company:

- (1) Customer Service
- (2) Marketing Service
- (3) Government Affairs

- (4) Process Leadership Office: PLO can handle every aspect of company infrastructure computing needs including:
- (a) Infrastructure support (PC Desktop, laptop, workstation, printers, Intel server administration)
  - (b) Special applications installation, configuration, consulting.
  - (c) Systems integration projects (Global client, care applications, hardware turnover).
  - (d) Asset management, coordination with facilities, and making sure that infrastructure components (server, pc, network) are running correctly.
- (5) Finance
- (6) Human Resource
- (7) Accounting and Treasury



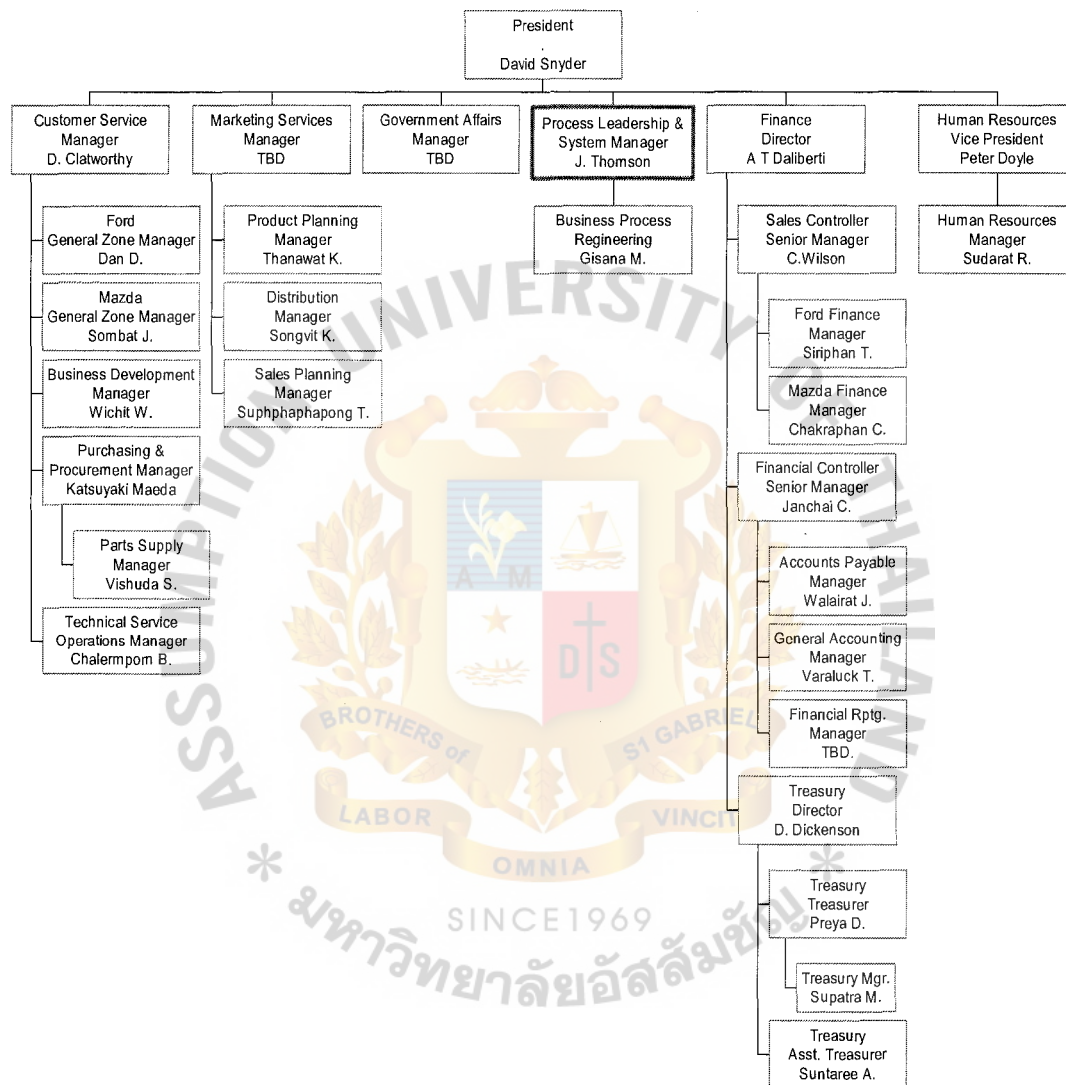


Figure 2.1. ABC Operations (Thailand) Co., Ltd Organization Chart.



## 2.2 Description of the Existing Information Technology Support

The existing system of the company relies on a manual system. The manual system is inefficient and the full effectiveness of the Help Desk and Technical Support Team is not achieved. A large amount of paperwork such as request forms, application modification forms are processed unnecessarily. This practice is time consuming and uses a large amount of expensive paper and space. Below are responsibilities:

- (1) Waste storage space for documents: many users' requirements (paper works) are kept in files but there is no space available for those files. Therefore, all files are kept at Data Safe, which increase the company expense.
- (2) High number of call to Help Desk and Technical Support: We are complained regarding to our service such as there is no support staff to pick up the call and delay support, etc. since there are one helpdesk and two technical supports per 500 – 600 users.
- (3) Operation time consume: Take much more time to flow the documents to each approval since PLO has been moved to the new work place, separately from the users. So users have to wait longer.

Hence, this project has been developed in order to increase the efficiency and reduce the completion time of each user's request. This will be achieved as follows:

- (a) Support totally 500 users.
- (b) Problem about PC hardware and software.
- (c) Maintain application: modify program, coding, develop system
- (d) Maintain and back up of database
- (e) Provide consultancy and advices about computer usage to users
- (f) Computer/ Information Technology Training

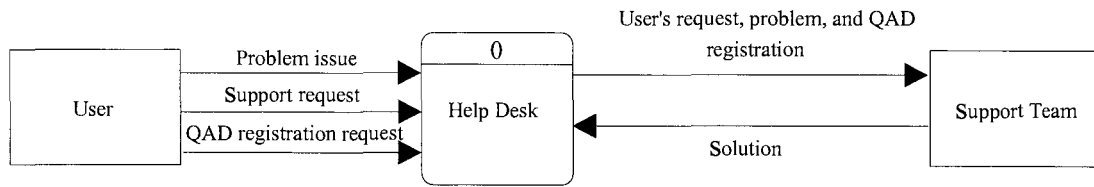


Figure 2.2. Context Diagram of the Existing System.

Figure 2.2 illustrates context diagram of the existing system. The main purpose of our system is respond to problem issue, support request, QAD registration request, and solution.

QAD software is a comprehensive supply-chain-enabled enterprise solution that includes manufacturing, distribution, purchasing, and financial management applications within an open systems environment. Therefore, QAD will be used as abbreviation hereinafter.

### 2.3 Existing Problems

Current service levels present the following issues:

- (1) Poor customer service
- (2) Non-systematic approach to reach the support team, there is only a phone or a visit
- (3) Users do not know how to approach the help desk
- (4) Users try to dominate other queues
- (5) User are not satisfied with the service handling and complicated process.
- (6) Service quantity and quality are not measurable
- (7) No transaction history and knowledge base record for future references
- (8) Not a GUI system and inconvenient for users
- (9) Intermediate knowledge of help desk is not sufficient to manage the requirements

- (11) Loss of communication and documents caused by human errors
- (12) Waste of storage space for document filing
- (13) A lot of time consumption to manage and solve each technical problem



### **III. THE PROPOSED SYSTEM**

At this phase, the information from the key-management interview is gathered to define the fundamental requirements. It is the beginning of the detailed analysis and design. The conversion of ideas to realities requires the methods and resources to transform the system from the analysis state to the actual operation.

The objectives of this phase are shown as follows:

- (1) To review the requirements of the information gathered for Process Leadership Office.
- (2) To produce the benefit analysis and the formulation of the computerized support system.
- (3) To produce the details for the new control, the procedure, and the workflow.

#### **3.1 User Requirements**

##### **3.1.1 Input Requirements**

- (1) Only authorized users can access the system.
- (2) When a new transaction is entered, the system must alert the support team
- (3) User should take less time to enter the required information.
- (4) The system must verify the correct data type entered into the database.
- (5) The system must provide appropriate default value for some data field for easier data input.

##### **3.1.2 Processing Requirements**

- (1) Log problem ticket.
- (2) Queuing with ability to prioritize /critical /important of ticket.
- (3) Keep historical data for future reference
- (4) Allow ticket pooling and direct assignment to support team.



- (5) Real time search/inquiry/access/notification to user and support team.
- (6) Easy access from end users with ease of use
- (7) Secure authentication and comply with ABC authentication method.
- (8) Keep records for statistic used for analyzing service performance.
- (9) Notify news /announcement /policy to users.
- (10) Secure from intruders.
- (11) Notify support team via email.
- (12) Work with all major browsers, accessible from Internet and Intranet.
- (13) Connect to SQL database Server 7.0 as well as other databases such as employee database.
- (14) Can do simple workflow.
- (15) Support registration process.
- (16) Platform independence, avoid proprietary tools.
- (17) Provide software /application /download.
- (18) Provide facilities for a user to securely post /distribute /share information with others.

### 3.1.3 Output Requirements

- (1) The system must generate date and time to be automatically recorded for a transaction.
- (2) The staffs must be able to view the transactions such as completed task, pending task, and task in progress from the computer at any time.
- (3) Take less time to obtain the required information such as quantity in stock, supplier details, product details etc.
- (4) The system must provide easy to use graphical user interface to the users.
- (5) The system must generate daily, monthly, yearly reports.

- (6) The system must be able to show historical data.
- (7) Users should take less time to access the required information.

### 3.2 System Design

In this phase, the information collected earlier is used to accomplish the logical design of the information tracking system. The accurate data-entry procedures, the effective input, the user interface, the files and the output are designed.

During the design phase, the flexibility, the maintainability and the expandability should be considered. The system's procedures should be able to meet new requirements over a period of time and they should be open-ended to allow for growth.

DFD Level I of Support System: Consists of the following processes: change password, new problem request, generate problem request transaction, new QAD registration, new requisition, generate requisition transaction, generate report per month. These processes exchange data from employee, problem\_list, problem, QAD, requisition. Monthly report finally goes to system manager for performance evaluation.

DFD level II process of change password: Consists of the following processes: verify old password (password must be at least 6 character long). After password has been successfully changed, the new password will be automatically recorded in the employee table.

DFD level II process of new problem request: Consists of the following processes: select problem list, generate status, and generate start date. Update problem request from user to problem table and also automatically generate start date and start time.

DFD level II process of generate problem request transaction: Consists of the following processes: assign support and generate finish date & time. Distributes tasks to each supporter, after tasks have completed; the transactions will be updated to problem table. This process also generates finish date and time to the transactions.

DFD level II process of new QAD registration: Consists of the following process: update status and generate start date. Update QAD registration transaction from user to QAD table and also automatically generate start date to the transaction.

DFD level II process of generate QAD registration transaction: Consists of the following processes notify to approver, verify security group, assign supporter, notify to user and generate finish date. Retrieve QAD registration transaction from QAD table to notify to approver for approve then verify to correct security group. After approving or denying, the transaction will be updated to the table. If denied, the user will be alerted. If approved, the supporter will be alerted. Finally the completed transaction will be recorded to the table with generated finish date.

DFD level II process of new requisition: Consists of the following processes: update status and generate start date. Update requisition transaction from user to requisition table and also automatically generate start date to the transaction.

DFD level II process of generate requisition transaction: Consists of the following processes: notify to approver, assign supporter, notify to user and generate finish date. Retrieve requisition transaction from requisition table to notify to approver for approval. After approval or rejection, the transaction will be recorded in the table. If rejected, the user will be alerted. If approved, the supporter will be alerted. Finally the completed transaction will be recorded in the table with generated finish date.

### 3.2.2 Data Dictionary

Defines each data and procedure in the data flow diagram. Object types, which are discussed, are data flows. Data Dictionary is shown in Appendix B.

### 3.2.3 User Interface Design

The user interface design is the design of the entire interface screens for the proposed system. The user interface design is represented in Appendix C.

The web pages for the new support system are created using Dreamweaver 4.0 and Flash 5. There are a total of 13 screens which are home page, login screen, change password screen, problem request screen, request for QAD MFGPRO screen, requisition screen, online approve screen, technical support menu, view task menu, user profile screen, password change result, job submitted result, and list of transactions screen.

#### 3.2.4 Output Reports

The output reports are the reports generated by the proposed system. The output reports are shown in Appendix D.

#### 3.2.5 File Layout

The file design includes decisions about the nature and contents of the files themselves. It shows the field name, field type, and length of field and number of decimal places for numeric field. The file layout is shown in Appendix E.

Those seven tables describing the file layout are employee file layout, problem file layout, problem\_list file layout, requisition file layout, QAD file layout, approver file layout, and supporter file layout.

#### 3.2.6 Structure Chart

The structure charts are used to graphically depict a modular design of a program. They are shown in Appendix F.

#### 3.2.7 Entity Relationship Diagram

Entity-relation diagram defines how each data entity relates to the others. Entity relationship diagram is shown in Appendix G.

#### 3.2.8 Process Specification

The process specification defines what each process does and relates to the others. The process specification is shown in Appendix H.

### 3.2.9 Candidate Matrix

The candidate matrix is to evaluate the alternative candidate solutions according to their economic, operational, technical, and schedule feasibility. The candidate matrix is shown in Appendix I.

### 3.2.10 System Workflow

The system workflow is workflow concept of help desk support system. The system workflow is shown in Appendix J.

## 3.3 Hardware and Software Requirements

The hardware and software specifications for the proposed system are as follows:

### 3.3.1 Hardware and Software Requirements

Hardware requirements:

- (1) Server 1 Set
  - (a) CPU Intel Pentium III XEON processor 1GHz.
  - (b) Main Board
  - (c) Display Adapter 64 MB
  - (d) SD RAM 512MB BUS 150MHz
  - (e) Hard Disk 40 GB
  - (f) CASE ATX
  - (g) CD ROM 52X
  - (h) Monitor 17" Digital super VGA
  - (i) Mouse, Keyboard
  - (j) 19 inch Rack and Accessories
  - (k) UPS 5 KVA



## Software requirements

- (1) Operating system – Microsoft Window 2000 Server
- (2) Website Development – Macromedia Dreamweaver 4 and Flash 5

### 3.4 Network Specification

The objective of this network is to share resources such as database and multiple users can access the system through Web-site simultaneously, controlling or using the system from different locations.

In this project the network system at ABC Motor Company is already available. The system is designed to use Bus Topology that uses Hub to the center of the connecting workstations. (Please refer to the Figure 3.1).

The components of the network configuration are defined as follows:

Network Topology:	Bus
Interconnection:	Hub 8 ports
Wiring and cable:	UTP 4 pairs category 5
Server:	PCs. File Server
Workstations:	PCs
Network operation:	Microsoft Windows NT
Network interface card:	Ethernet LAN card 10/100 MBPS

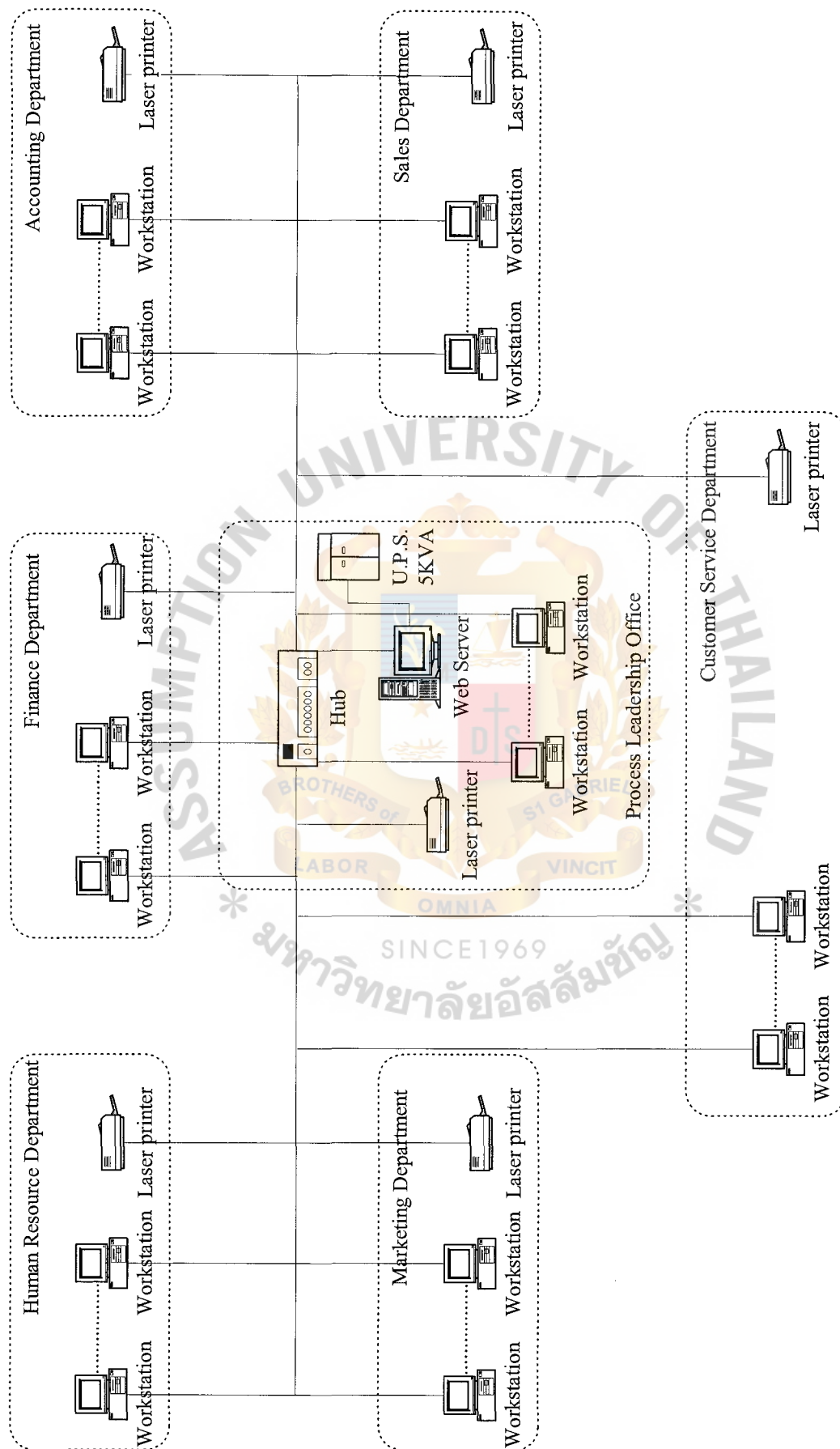


Figure 3.1. Network Configuration of the Proposed System.

### 3.5 Security and Control

#### 3.5.1 User Access Control

The user identification (CDSID) and passwords are assigned to the authorized users. When a user log in, the system asks for both user ID and password. The system allows a user to log in only if that user's CDSID is known and the correct password is entered.

#### 3.5.2 Other Security

Staffs have to back up the important data daily to prevent disasters. Data correction must be made immediately after discovering the errors on the report. The historical and current data report must be kept in categorized file for management planning. A virus-checking program will be installed for scanning viruses before running the programs. The staff will update programs every month.

### 3.6 Cost-Benefit Analysis

The cost and benefit analysis is the crucial part to consider in the investment of the new system. Benefits must be returned in the most effective way for using the proposed system. There are two categories of cost which can be briefly described as follows:

#### Direct Cost

- (a) Hardware and application cost of the computerized system.
- (b) System support and maintenance cost for hardware and software.
- (c) System development and implementation cost staff.

#### Indirect Cost

- (a) User training and development.
- (b) System production

### 3.6.1 Cost Analysis

The most important thing is to evaluate the cost analyze hardware and application as well as operation cost, which the company must invest for the fundamental business of improving and using the computerized system for the proposed system. However, we must have a standard criteria to adjust and measure both hardware and software as below:

- (a) Technology support for Web Server.
- (b) Life cycle of technology change
- (c) Convenience and available expansion and modification.
- (d) User interface between the user and the support team

The following is the hardware and software's solution that has been chosen according to the new proposed system requirements. We classify cost of the proposed system into three subcategories. They are investment costs, implementation costs and annual operating costs.

Expenses

Fixed cost

(1) Investment cost	
Hardware cost	Baht
Web Server 1 set	170,000
Software cost	4,000
Total investment cost	174,000
(2) Implementation cost	Baht
Workshop training for user	60,000
Total implementation cost	60,000

	Baht
Total fixed cost	234,000
Annual operating cost	Baht
Web server maintenance	20,000
Miscellaneous	10,000
Total annual operating cost	30,000

### Benefits

#### Intangible and Tangible Benefits

The proposed system provides the following tangible and intangible benefits:

Table 3.1. Intangible and Tangible Benefits.

Tangible Benefits	Intangible Benefits
(1) Reduce Personnel	(1) Increase operating efficiency and productivity.
(2) Reduce Overtime Expenses	(2) Reduce data redundancy and data collection time.
(3) Reduce Stationary & Paper Usage	(3) Provide accurate and timely information
(4) Reduce Personnel & Fringe Benefit	(5) Decrease human error.
	(6) Efficient management control.
	(7) Prepare short and long term reports
	(8) Prevent loss of information.
	(9) Provide better communication between help desk and staff

### 3.6.2 Cost Comparison

The development of the system consumes a long-term investment that represents the sizeable outlays that commit the company to some course of action. Procedures are



needed to analyze and select it properly. Attention must be given to measure relevant cash flow and apply appropriate decision-making techniques. The capital budget is the process of evaluating and selecting the long-term investment in consistency with the company's goal of owner wealth maximization. There are two most popular capital budget techniques which are pay back period and net present value. The break-even analysis is also considered.

#### (1) Break-even Analysis

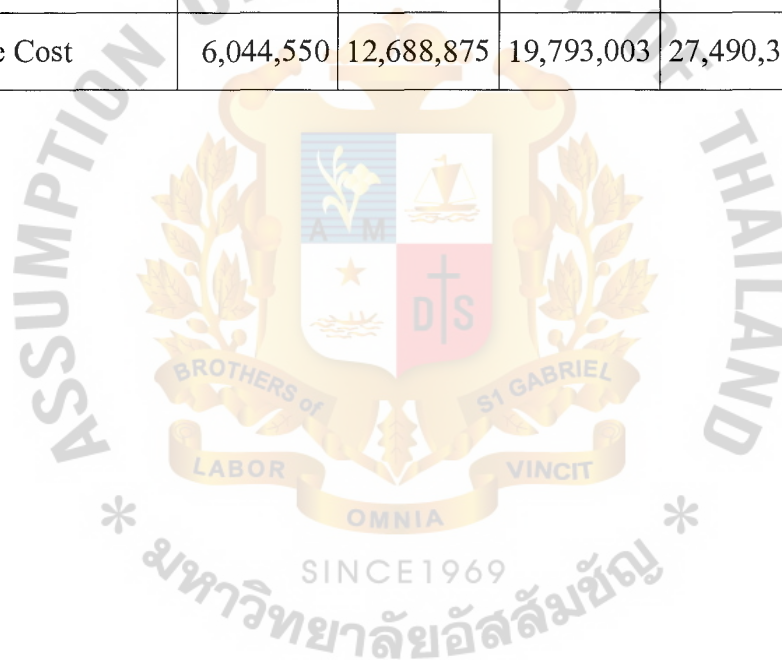
The cost of the existing system is shown in Table 3.2 and the cost of the proposed is shown in Table 3.3. The break-even analysis indicates the differences of the two systems as shown in Table 3.4.

Table 3.2. Total Cost of the Current System, Baht.

Cost Items	Year 1	Year 2	Year 3	Year 4	Year 5
1. Personnel Cost	4,500,000	4,950,000	5,445,000	5,989,500	6,588,450
2. Overtime expenses.	506,250	556,875	612,563	673,819	741,201
3. Stationery & Paper usage expenses	20,000	22,000	24,200	26,620	29,282
4. Personnel & fringe benefit expenses	1,125,000	1,237,500	1,361,250	1,497,375	1,647,113
Total	6,151,250	6,766,375	7,443,013	8,187,314	9,006,045
Cumulative Cost	6,151,250	12,917,625	20,360,638	28,547,951	37,553,996

Table 3.3. Total Cost of the Proposed System, Baht.

Cost Items	Year 1	Year 2	Year 3	Year 4	Year 5
1. Personnel Cost	4,380,000	4,818,000	5,299,800	5,829,780	6,412,758
2. Overtime expenses.	492,750	542,025	596,228	655,850	721,435
3. Personnel & fringe benefit expenses	1,095,000	1,204,500	1,125,000	1,125,000	1,125,000
4. Fixed Cost	46,800	46,800	46,800	46,800	46,800
5. Variance cost	30,000	33,000	36,300	39,930	43,923
Total	6,044,550	6,644,325	7,104,128	7,697,360	8,349,916
Cumulative Cost	6,044,550	12,688,875	19,793,003	27,490,363	35,840,279



Note: The cost-effective comparison between the current system and the proposed system is shown in the Table 3.4.

Table 3.4. Cost Comparison between the Current and Proposed System, Baht.

Cost Items	Years				
	1	2	3	4	5
<u>Current System</u>					
1. Personnel Cost	4,500,000	4,950,000	5,445,000	5,989,500	6,588,450
2. Overtime expenses.	506,250	556,875	612,563	673,819	741,201
3. Stationery & Paper usage expenses	20,000	22,000	24,200	26,620	29,282
4. Personnel & fringe benefit expenses	1,125,000	1,237,500	1,361,250	1,497,375	1,647,113
Total	6,151,250	6,766,375	7,443,013	8,187,314	9,006,045
Cumulative Cost	6,151,250	12,917,625	20,360,638	28,547,951	37,553,996
<u>Proposed system:</u>					
1. Personnel Cost	4,380,000	4,818,000	5,299,800	5,829,780	6,412,758
2. Overtime expenses.	492,750	542,025	596,228	655,850	721,435
3. Personnel & fringe benefit expenses	1,095,000	1,204,500	1,125,000	1,125,000	1,125,000
4. Fixed Cost	46,800	46,800	46,800	46,800	46,800
5. Variance cost	30,000	33,000	36,300	39,930	43,923
Total	6,044,550	6,644,325	7,104,128	7,697,360	8,349,916
Cumulative Cost	6,044,550	12,688,875	19,793,003	27,490,363	35,840,279

Note: The Cost-effective comparison between the Proposed System & the Existing System is shown in Figure 3.2 below

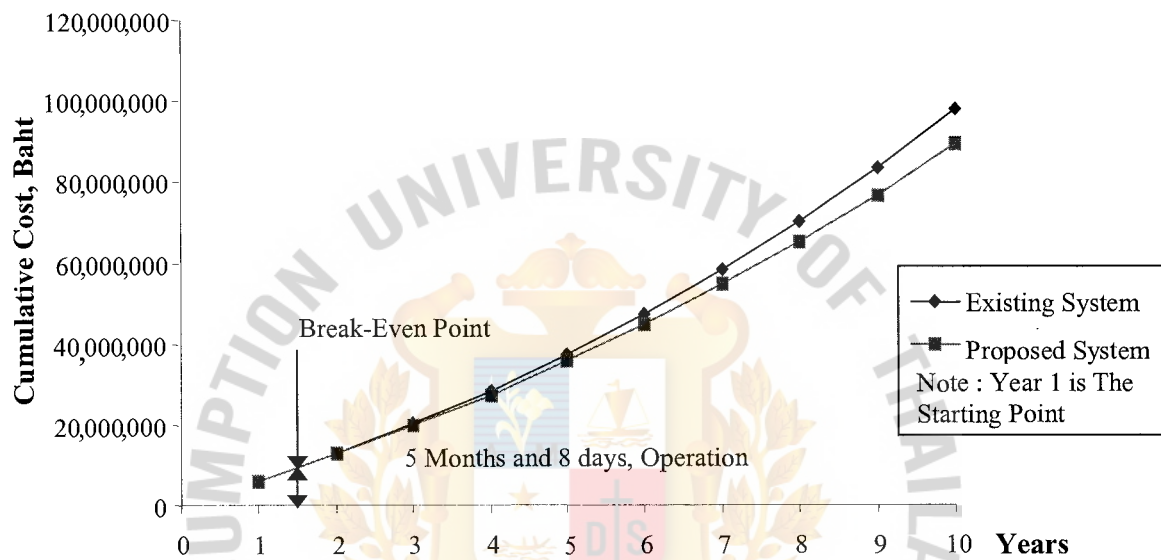


Figure 3.2. Cost-effective Comparisons between the Proposed & the Existing Systems.

## (2) Payback Analysis

System development costs are incurred before benefits begin to accrue, so it will take some time for the benefits to overtake the cost. This period of time is called the 'payback period'. Payback analysis determines how much time will lapse before accrued and continuing costs. With adjusted cost and benefits at discount rate of 12% to account for the time value of money, the payback period of the proposed system is approximately 3 months and 23 days (please refer to Table 3.5 and Figure 3.3)





Table 3.5. Payback Analysis for the Proposed System, Baht.

Cost Items	Years					
	0	1	2	3	4	5
Development cost	-39,000	-39,000	-39,000	-39,000	-39,000	-39,000
Variance cost	-	-30,000	-33,000	-36,300	-39,930	-43,923
Discount factor for 12%	1.000	0.893	0.797	0.712	0.636	0.567
Time-adjusted cost	-39,000	-61,617	-57,384	-53,614	-50,199	-47,017
Cumulative time-adjusted cost over life time	-39,000	-100,617	-158,001	-211,615	-261,814	-308,831
Benefits derived from operation of new system	-	183,500	201,850	222,035	244,239	268,662
Discount factor for 12%	1.00	0.89	0.80	0.71	0.64	0.57
Time-adjusted cost	0.00	163,866	160,874	158,089	155,336	152,331
Benefits	0.00	163,866	324,740	482,829	638,164	790,496
Cumulative lifetime-adjusted cost + benefit	-39,000	85,866	207,740	326,829	443,164	556,496

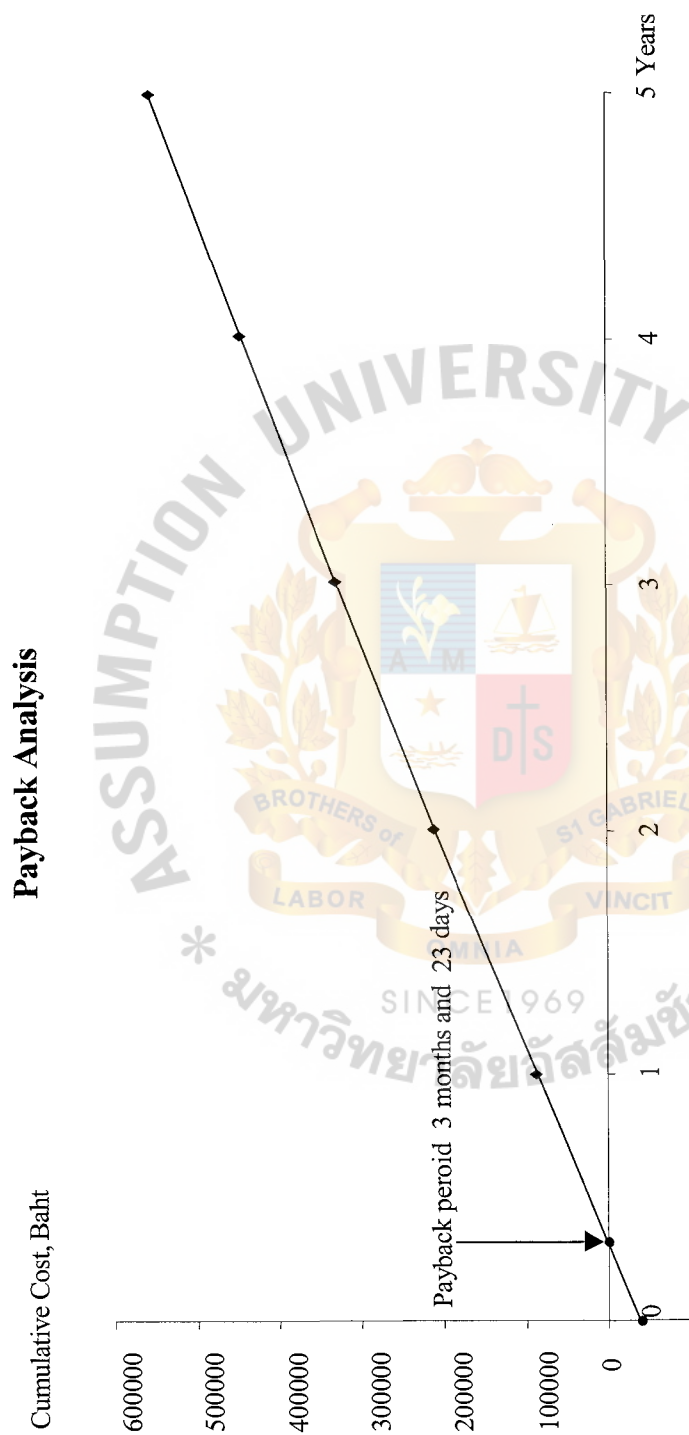


Figure 3.3. Payback Analysis for the Proposed System.

### (3) Net Present Value Analysis

The net present value of an investment alternative is considered the preferred cost-benefit technique. The net present value calculation is shown Table 3.6 on the next page. The calculation has produced a net present value of 457,295.81 Baht. This means that if we invest 457,295.81 Baht at 12 percent for five years, we will make the same profit that we would make by implementing this proposed information system.

### (4) Return on Investment Analysis

The return on investment (ROI) analysis technique compares the lifetime profitability for any project. The ROI for any potential project is calculated as follows:

$$\text{ROI} = (\text{Estimated lifetime benefits} - \text{Estimated lifetime costs}) / \text{Estimated lifetime costs}$$

Therefore, the ROI for our project will be:

$$\begin{aligned}\text{ROI} &= (790,496 - 308,831) / 308,831 \\ &= 1.5633 \times 100 \text{ or } 156.33\%\end{aligned}$$

So, the lifetime ROI for the project is 156.33% Tables 3.5 Shows the details:

Table 3.6. Net Present Value Analyses for the Proposed System, Baht.

Cost Items	Years						
	0	1	2	3	4	5	Total
Development cost	-39,000	-39,000	-39,000	-39,000	-39,000	-39,000	
Variance cost	0	-30,000	-33,000	-36,300	-39,930	-43,923	-308,831
Discount factor for 12%	1.000	0.893	0.797	0.712	0.636	0.567	
Present value of annual cost	-39,000	-61,617	-57,384	-53,614	-50,199	-47,017	
Total present value of lifetime cost							
Benefits derived from operation of new system	0.00	183,500	201,850	222,035	244,239	268,662	
Discount factor for 12%	1.00	0.89	0.80	0.71	0.64	0.57	790,496
Present value of annual cost	0.00	163,866	160,874	158,089	155,336	152,331	
Total present value of lifetime cost							
Net present value							418,116

## IV. IMPLEMENTATION

There are a number of critical success factors that need to be addressed to guarantee a successful implementation of the information system. These are as follows:

- (1) Composition of the working team both business and tactic.
- (2) Organizational agreement and momentum for change.
- (3) Well defined business and computer plans.
- (4) Understanding the existing human resource pool.
- (5) Setting up an implementation plan and time frame for the company.
- (6) Identify the best training program that fits with the company.
- (7) Establishing the documentation standards to be adopted for the duration of the project and all ensuring projects.
- (8) Definition of an organization structure to best fit the future management and the operational needs.
- (9) Defining the implementation plan in stages.

The system implementation consists of two phases: construction phase and delivery phase. The activities of each phase are described below:

### 4.1 Construction Phase

#### 4.1.1 Build and Test Database

Databases are the resources that will share the written program. So building and testing database must precede other programming activities. The activities are described below:

- (1) Review the technical design statement for database design requirements.



- (2) Production databases that could contain representative data for testing database tables must be located. If not, test data for database tables must be generated.
- (3) Create the database.
- (4) Load tables with sample data.
- (5) Review and correct database schema that might be needed for future references.

#### 4.1.2 Writing and Testing New Program

Program will be developed in-house. Testing will be at the sub-testing and unit testing level. The system level testing will be conducted in delivery phase. The activities are summarized below:

- (1) Revision of design specifications.
- (2) Developing the detailed programming plans.
- (3) Coding.
- (4) Conducting stub and unit testing.
- (5) Updating program documentation for future reference.
- (6) Placing the reusable components in the software library.

## 4.2 Delivery Phase

The delivery phase contains system testing, training and conversion plan.

### 4.2.1 System Testing

All custom-built programs, software packages and any existing programs that comprise with the new system must be tested to ensure that they all work together without any error. This phase includes the following:

- (1) Obtain system test data.

- (2) Perform tests to check that all programs are working properly together, making appropriate revisions as needed and testing it again.
- (3) Record any modifications.
- (4) Ensure that all software packages, custom-built programs and any existing programs have been installed and that unit testing has been completed.

#### 4.2.2 User Training

The in-house training will be conducted for several days in order to educate and improve personnel computer skills. Users will be given on the job training of to use the new system. This will provide training and documentation to system users to prepare them for a smooth transition to the new system. Topics to be included in the training are shown below:

- (1) Computer concept.
- (2) Hardware introduction.
- (3) Software functions review.
- (4) Data processing procedures.
- (5) System features and functions.
- (6) File setup, report and output.
- (7) System supervising and practicing.

#### 4.2.3 Conversion Plan

Parallel strategy is used by this project. This strategy is less risky and is able to compare results with the existing system. The duplication of efforts to users is required. During this phase, training for the user may be continued on need basis. Any kind of error and problem might arise and must be fully corrected.

### 4.3 Project Plan

This project started in April 2001 and was completed in July 2001. The time schedule for the project is presented by a Gantt chart Figure 4.1.



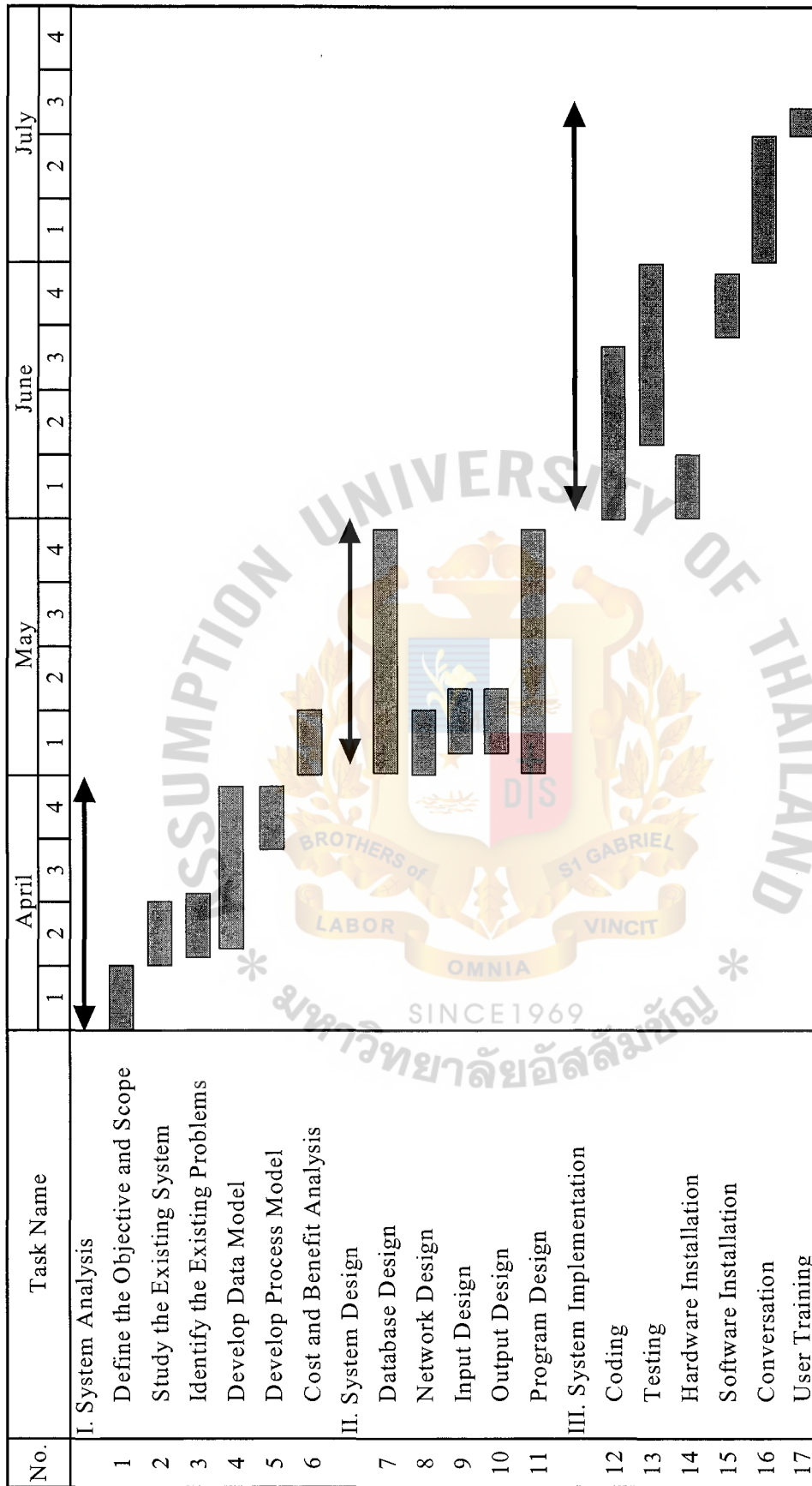


Figure 4.1. Project Plan of Support System for ABC Operations (Thailand) Co., Ltd.

## V. CONCLUSIONS AND RECOMMENDATIONS

### 5.1 Conclusions

This new computerized system is developed to analyze, design and implement the "Support System" for Process Leadership Office (PLO) in ABC Motor Company (Thailand) to facilitate the routine tasks of employees, eliminate the complexity of passing documents, provide better service to users and improve the handled transactions. In the existing system, most activities are performed manually which causes the company to face many problems in handling the transactions like excessive use of paper, loss of communication, incapability to search for records or information for users.

The new system is designed to meet the requirements of the users and the technical support team. It could provide a better service to the users and help the technical support team to do their routine tasks quickly and effectively. In addition, the new web base application helps the PLO to handle the transactions more efficiently and conveniently than before.

There are several parties involved in the developing of the proposed system. First, the system owner should see the importance of the computer information system and allocate the budget for this system. Second, the system users should provide useful information since they are the ones who actually use this system.

The proposed system is developed using Window 2000, MS SQL Sever 7.0, Dreamweaver 4.0 and Flash 5 etc. MS SQL Server 7.0 is a powerful database tool that is easy to maintain and contains many powerful features. Window 98 provides good graphical user interface with ease of use. The existing business problems in the firm could be removed by the new system.

This investment will perform the systematic approach manner connecting each department. The incurred cost and benefit indicates the possibility in the corrective investment resulting in a better planning information and data integrity and consistency. The payback period of 3 months 23 days and break-even time of 5 months 8 days are the key indicators to the management for a new system investment. The training course is included in the implementation for the staff in order to make the system operates successfully. The corrective action should be done before the situation becomes more inflexible.

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

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

Process	Existing System	Proposed System
Prepare new requisition/QAD	20 mins	10 mins
Report problem	15 mins/couldn't reach	5 mins
Work flow for requisition/QAD	2 days/Loss	20 mins
Monthly report	3 hrs	5 mins
Transaction tracking	25 mins	5 mins
Total	2 days and 4 hours	45 mins



The proposed system takes less time than the existing system according to the following reasons:

- (1) Prepare new requisition: User fills the form in web page not paper form anymore.
- (2) Report problem: User reports problem via Intranet instead of making a phone call.
- (3) Work flow for requisition/QAD: Work flow operates via Intranet instead of delivery paper form between 2 buildings.
- (4) Monthly report: The system generates report instead of manually.
- (5) Transaction tracking: The transaction can be retrieved from database instead of manually tracking.

## **5.2 Recommendations**

In every step of the system development, the technical support team and other users should involve and participate since they could gradually get to be familiar to the new system. The proposed system is designed to meet users and support team needs. The system tends to use the program that is easy for the users to use and operate. The person in charge of the computer system must be knowledgeable and experienced; he/she/they must be audited regularly.

The new process and business function should be managed and updated carefully in the future to cope with any business change. Once the new information system has been installed and the conversion performed, the user may still require training as-needed basis. We should anticipate and expect problems and be prepared to correct them. We should also monitor the user's usage of the information system, consider what users like and dislike, pattern of user usage, shortcut opportunities to improve systems overall performance and so on. This system is designed to be the Client /Server system

that can be used to interact within and outside the company. By the way, we have to test the proposed system and get feedback from the users before it is launched to the real use.

In short, we need to pay serious attention to the information system and its use by the users. The information system is prepared to maintain, fix and enhance as the need and opportunity becomes available. Further improvement must be strictly concerned in the same direction to gain the maximum income.





## APPENDIX A

### CONTEXT AND DATA FLOW DIAGRAMS

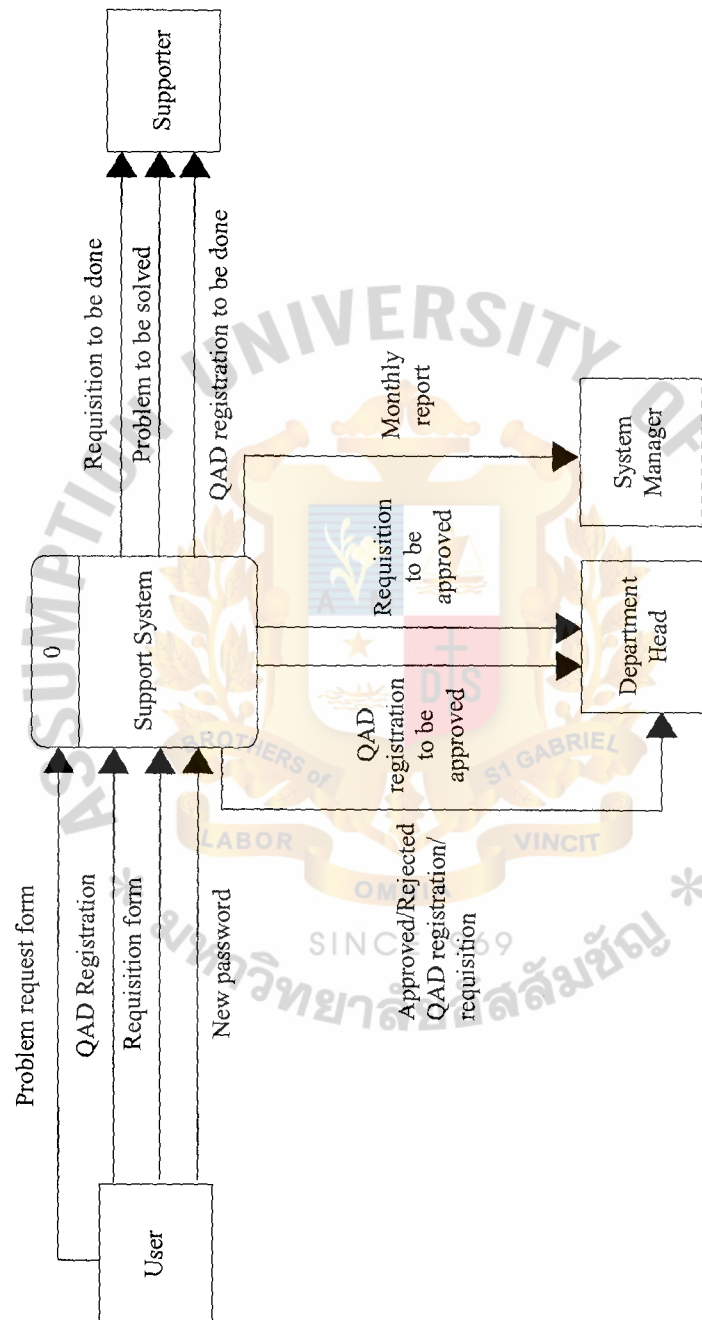


Figure A.1. Context Level DFD (Level 0) for Support System.

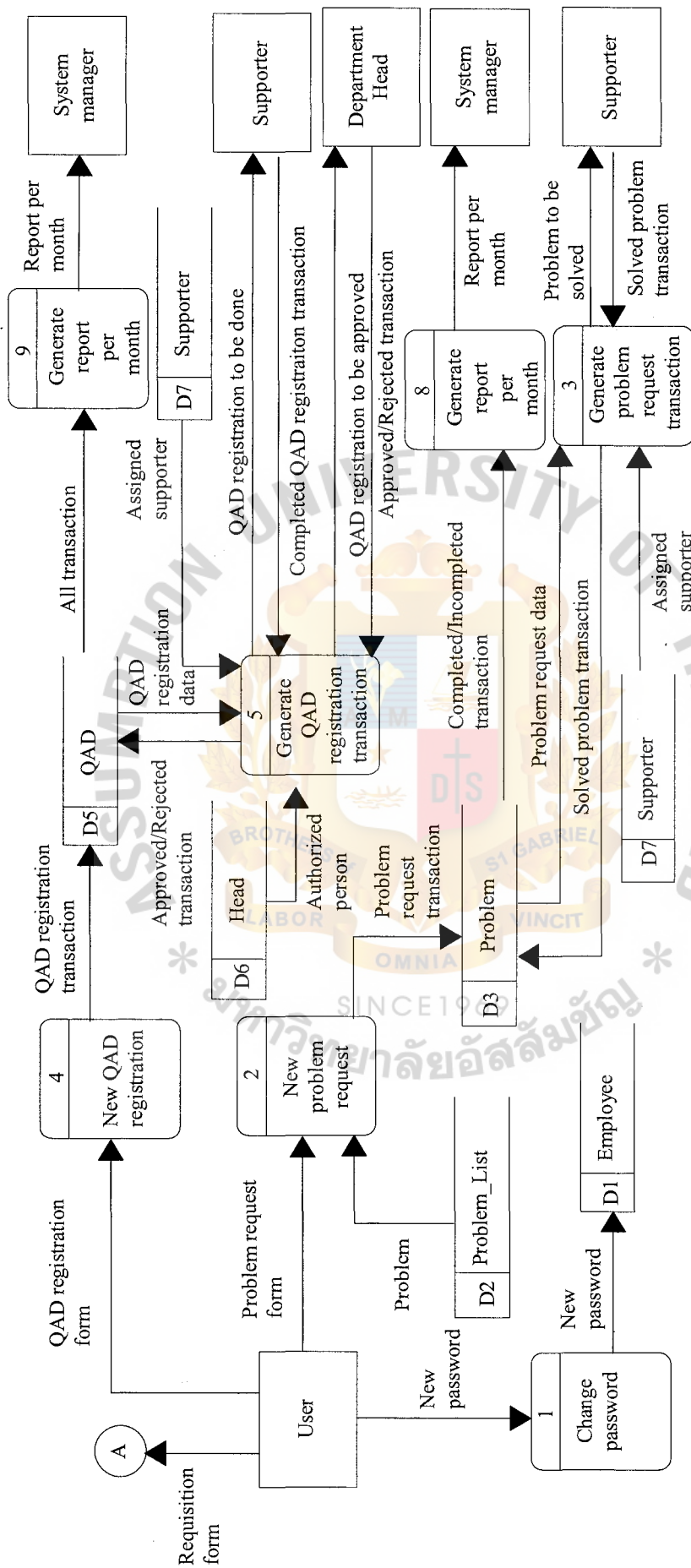


Figure A.2. First Level Explosion for Support System.

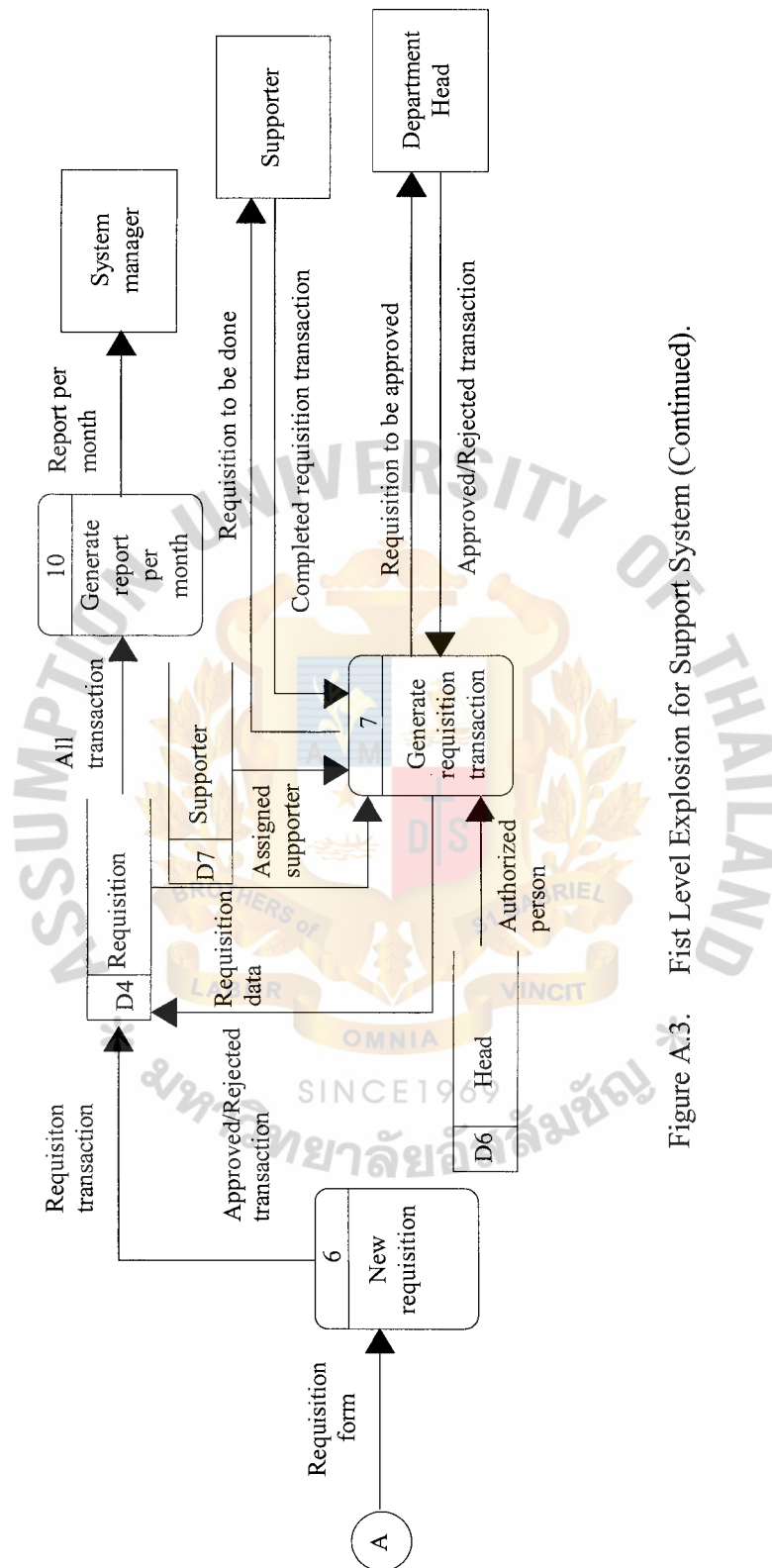


Figure A.3. First Level Explosion for Support System (Continued).



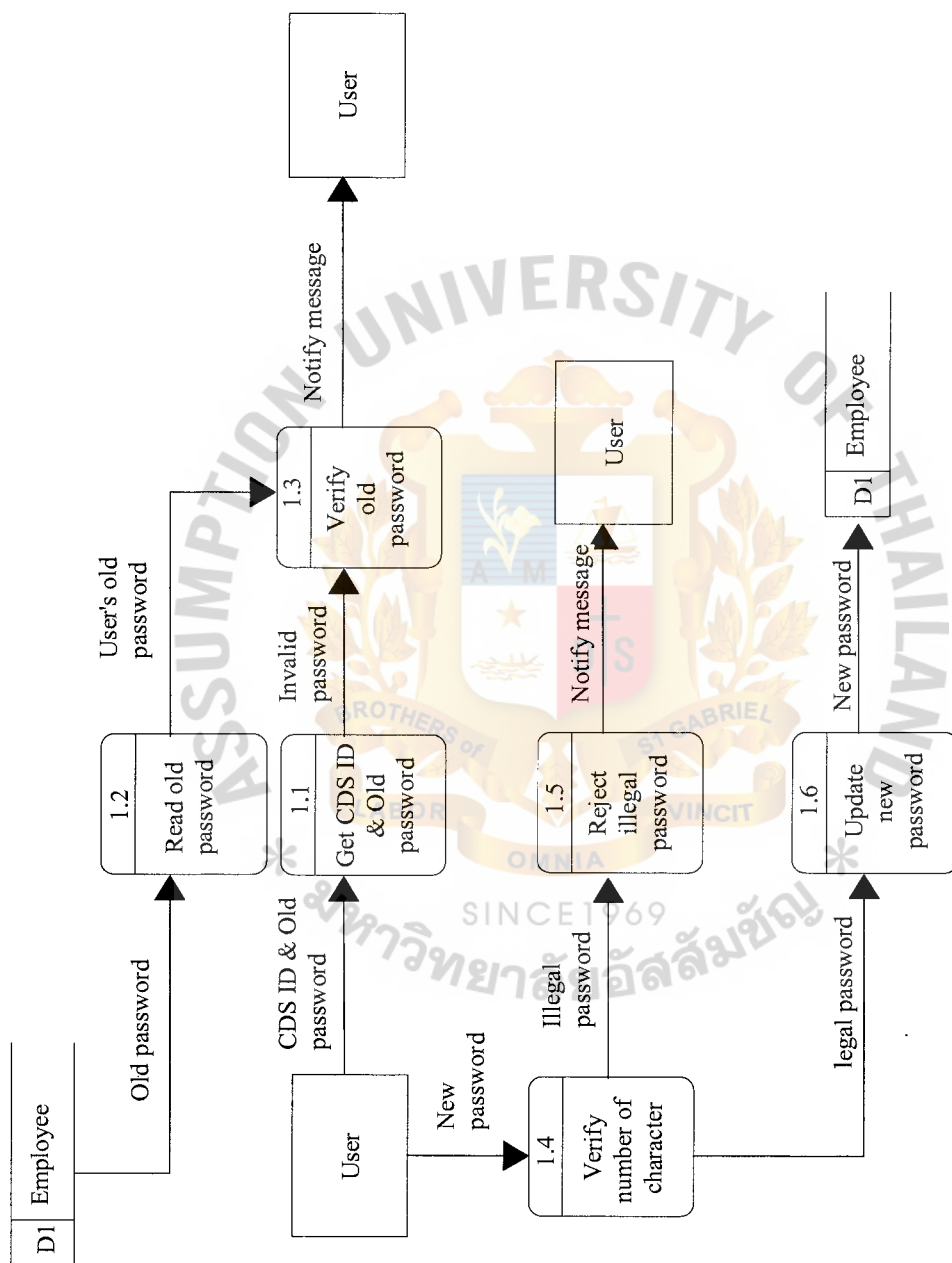


Figure A.4. Second Level Explosion of Process 1 (Change Password).

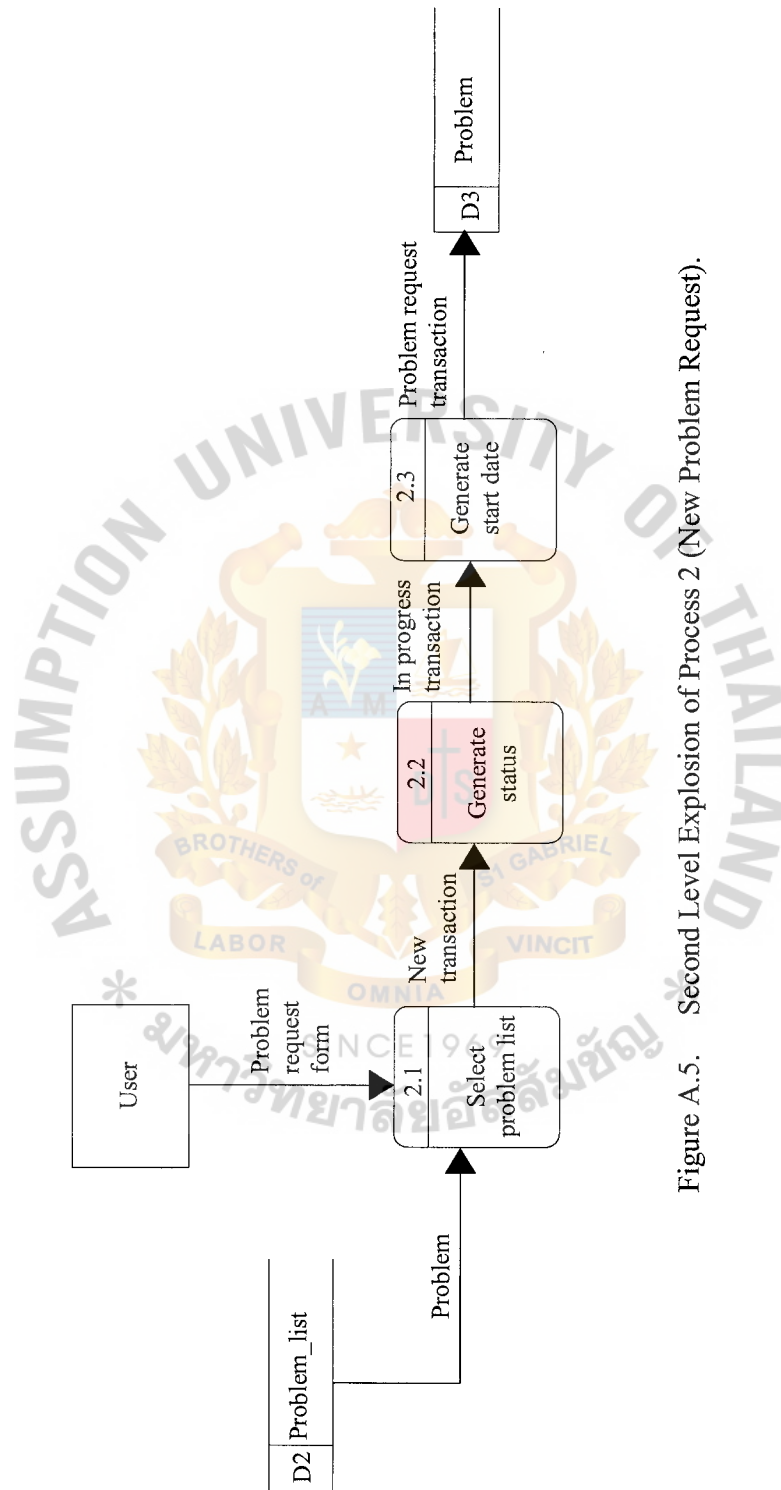


Figure A.5. Second Level Explosion of Process 2 (New Problem Request).

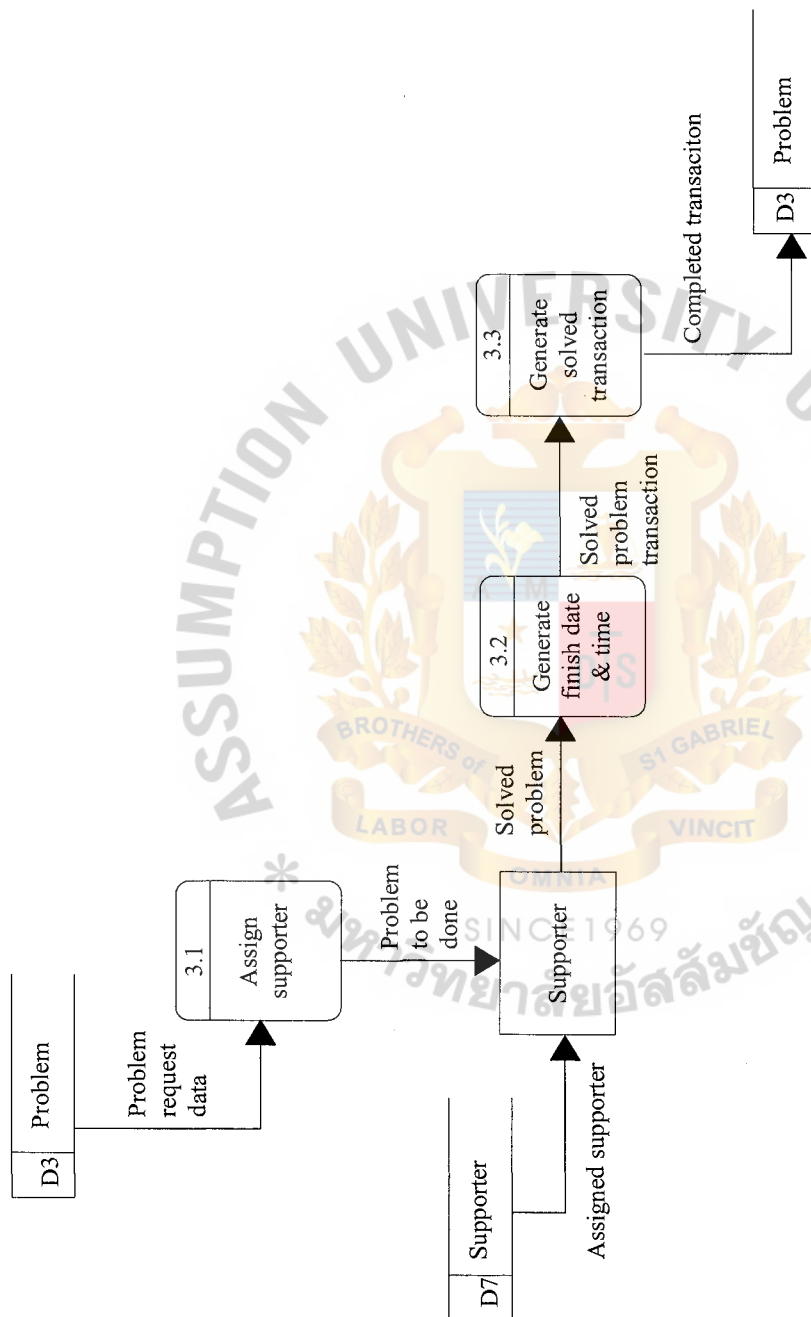


Figure A.6. Second Level Explosion of Process 3 (Generate Problem Request Transaction).

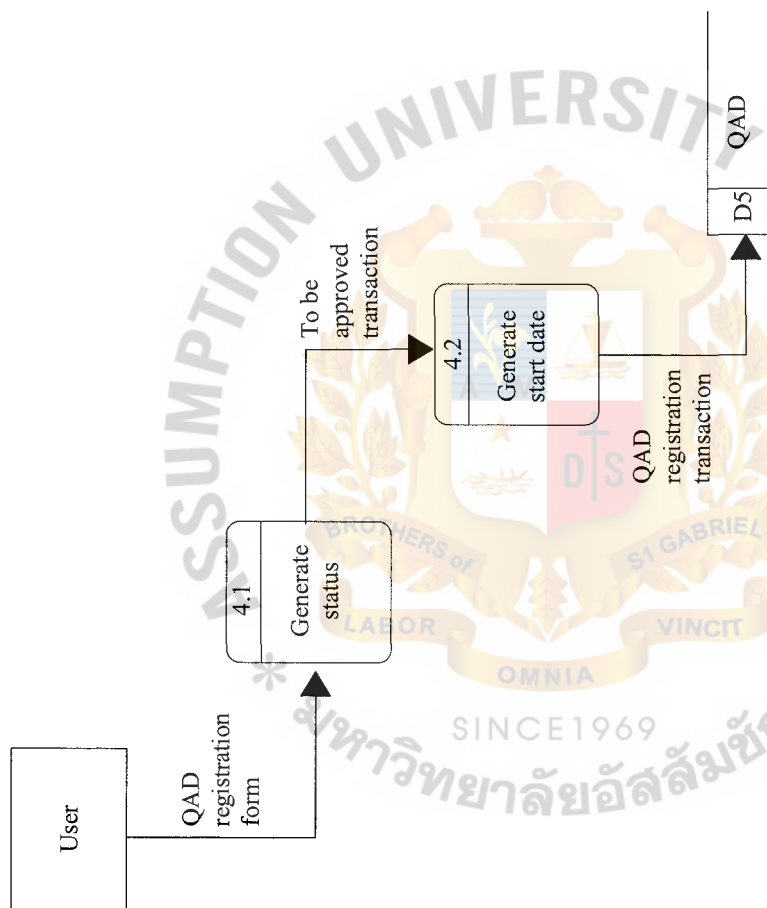


Figure A.7. Second Level Explosion of Process 4 (New QAD Registration).

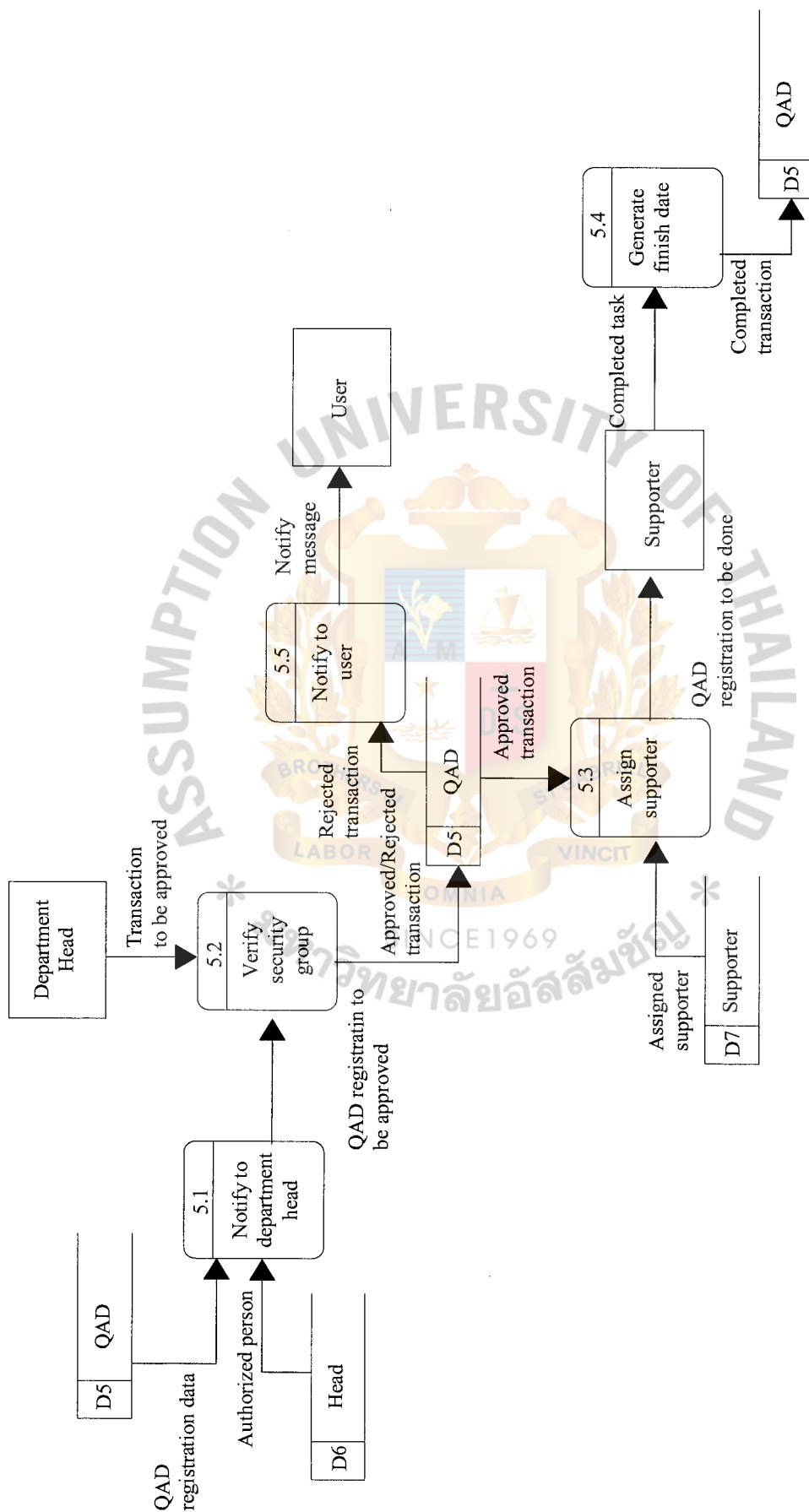


Figure A.8. Second Level Explosion of Process 5 (Generate QAD Registration Transaction).

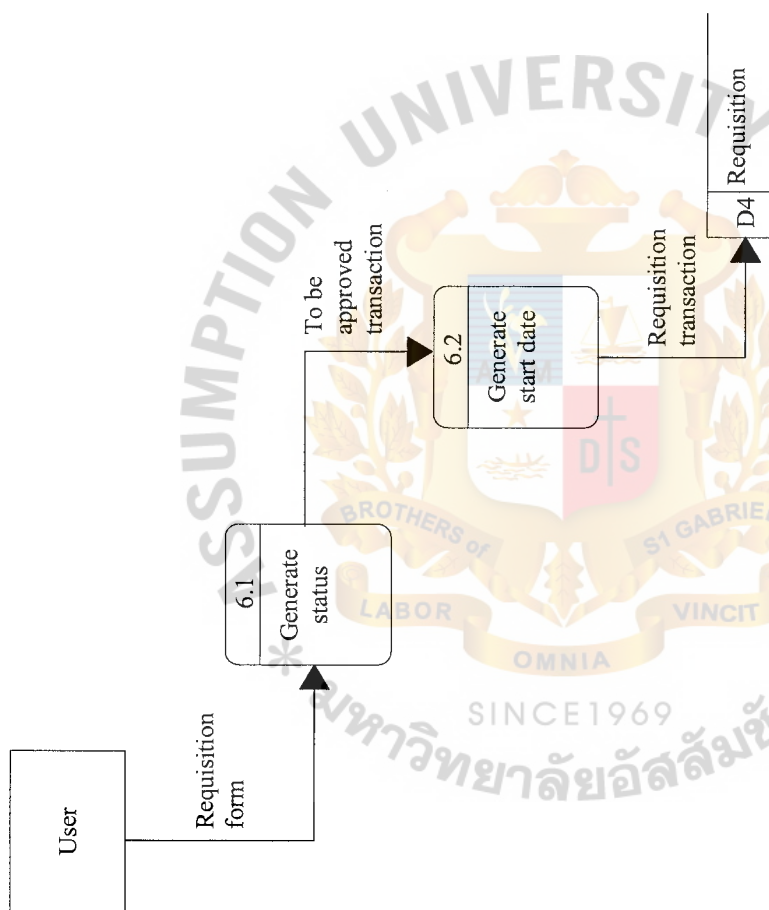


Figure A.9. Second Level Explosion of Process 6 (New Requisition).



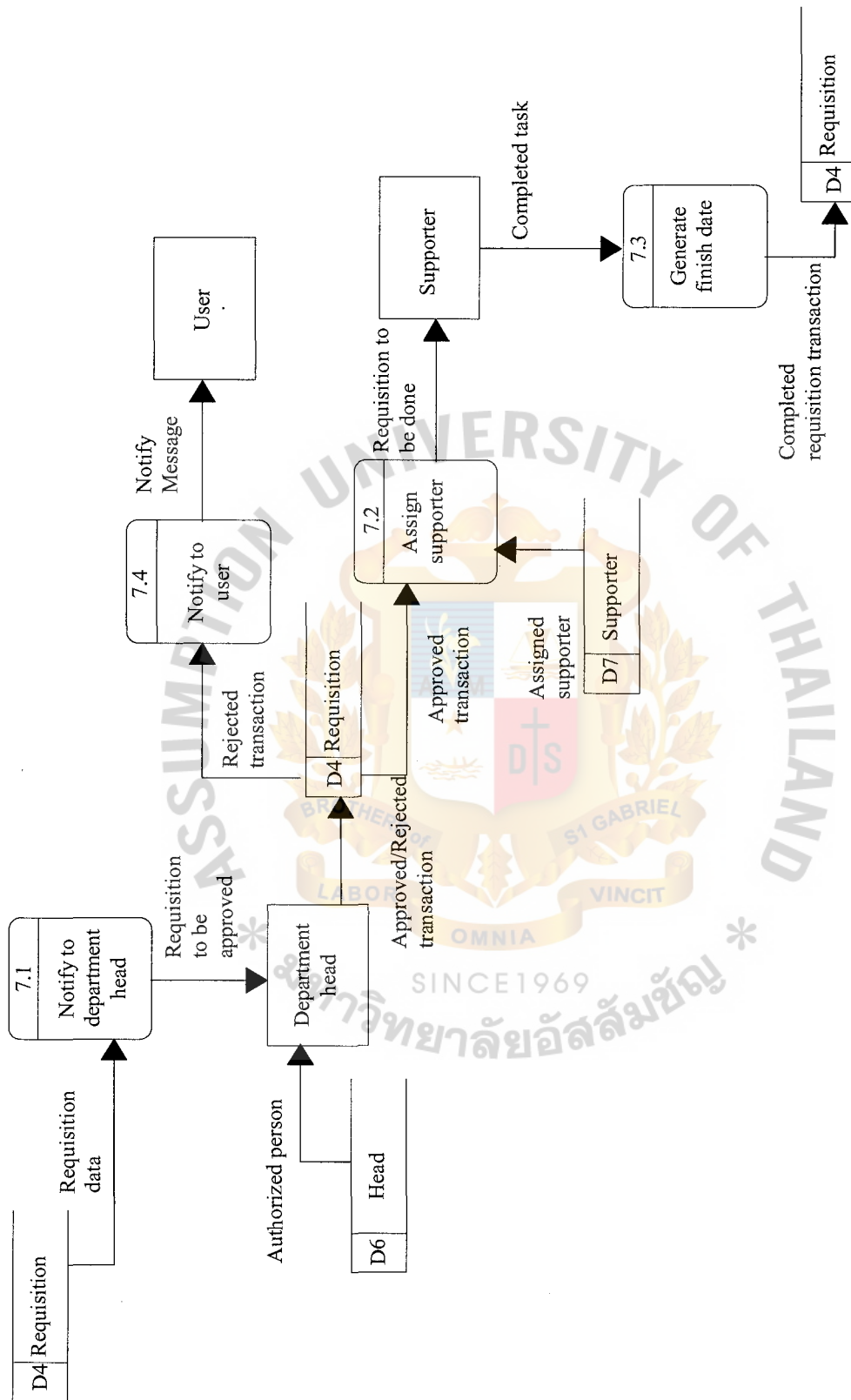


Figure A.10. Second Level Explosion of Process 7 (Generate Requisition Transaction).



## APPENDIX B

### DATA DICTIONARY

## DATA DICTIONARY

All transaction	=	All transaction of QAD jobs to generate monthly report.
Approved transaction	=	Transaction that is approved.
CDSID & old password	=	User ID & password to authenticate themselves.
Completed/Incomplete transaction	=	Transactions to generate monthly report.
Completed QAD registration transaction	=	Transaction that is completed by supporter.
Completed requisition transaction	=	Transaction that is completed by supporter.
Completed task	=	Completed task before update finish date.
Completed transaction	=	Completed task after update finish date.
Illegal password	=	New password that is against the system rule.
In progress transaction	=	Transaction that is solved.
Invalid password	=	Incorrect log in password.
Legal password	=	New password that isn't against the system rule.
New password	=	Password that user needs to use instead of old password.
New transaction	=	Transaction supplied from the user.
Notify message	=	Alert messages inform every operation that the user performs with the system.
Old password	=	User's old password in database.
Problem	=	Type of problem.

Problem request data	=	Transaction that will be assigned to supporter.
Problem request form	=	Form sent to the help desk report user's problem containing user's information and description of the problem.
Problem to be done	=	Job that is assigned to supporter.
Problem to be solved	=	Problem that is assigned to supporter.
Problem transaction	=	Problem data recorded to problem data store.
QAD registration data	=	Transaction that will be assigned to supporter.
QAD registration form	=	Form sent to the help desk request to access database such as create new user and grant permission to the user or modify the user to grant more permission or delete user.
QAD registration to be approved	=	Transaction waiting to be approved.
QAD registration to be done	=	Job that is assigned to supporter.
QAD transaction	=	QAD data recorded to QAD data store.
Rejected transaction	=	Transaction that is not approved.
Requisition data	=	Transaction that will be assigned to supporter.
Requisition form	=	Form sent to the help desk request for e-mail register, new PC, create share drive etc.
Report per month	=	Report quantity of jobs of support team per month
Requisition to be approved	=	Transaction waiting to be approved.
Requisition to be done	=	Job that is assigned to supporter.
Requisition transaction	=	Requisition data recorded to requisition data store.

Solved problem = Completed transaction before update finish date and time.

Solved problem transaction = Completed transaction to be recorded to problem data store.

To be approved transaction = Transaction waiting to be approved.

User's old password = Old password from Employee data store to compare user's log in password.





**APPENDIX C**

**USER INTERFACE DESIGN**



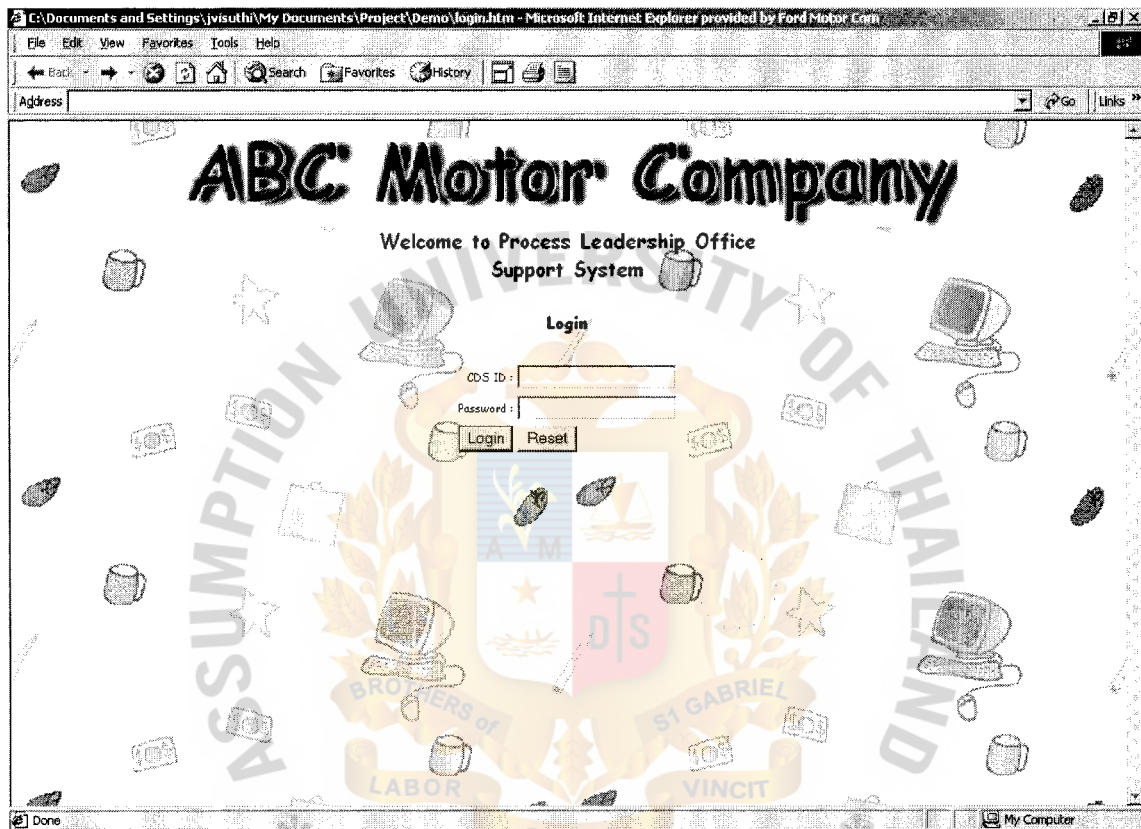


Figure C.1. Log in Screen.

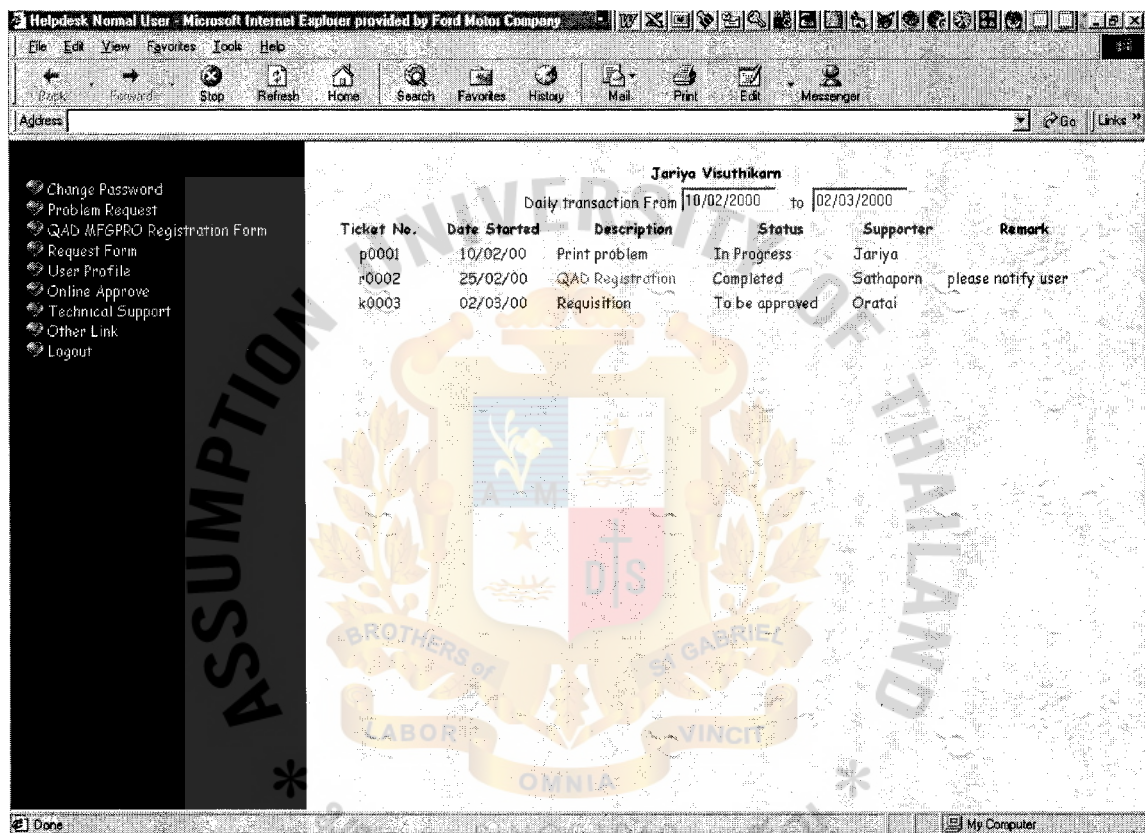


Figure C.2. User Profile Screen.

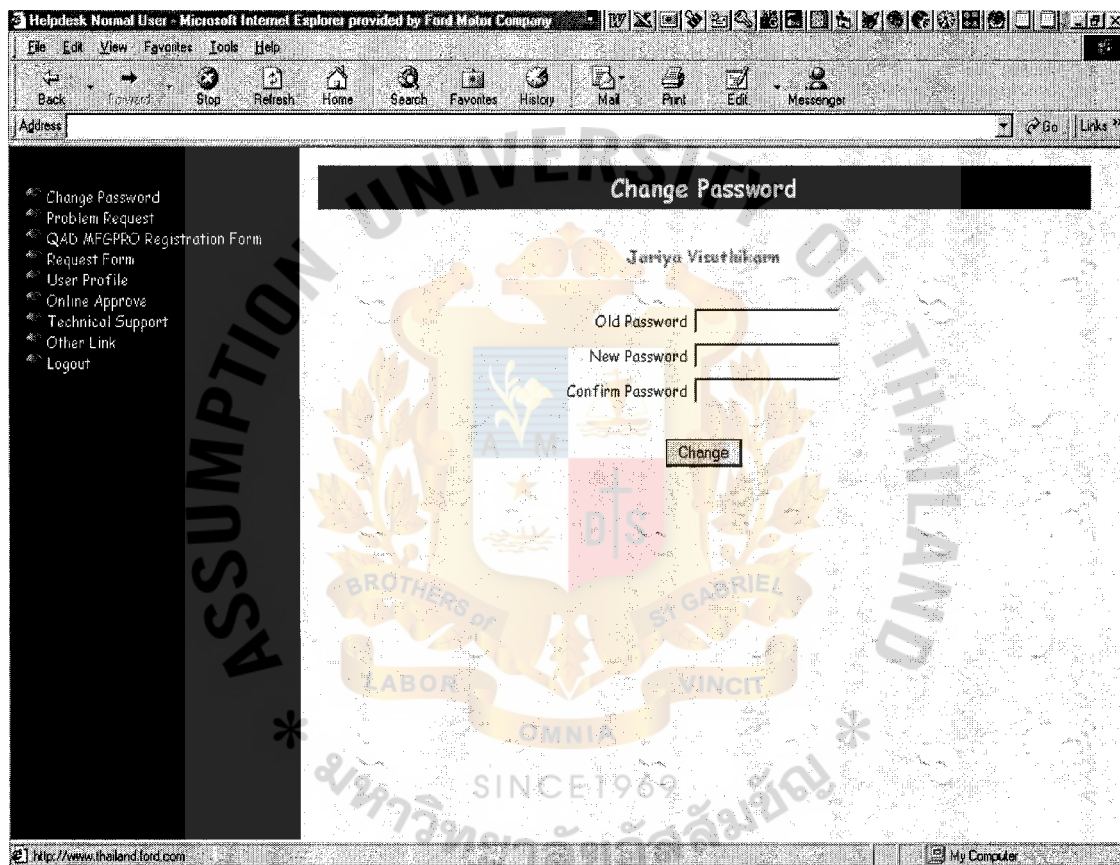


Figure C.3. Change Password Screen.



Figure C.4. Password Successfully Changed Screen.



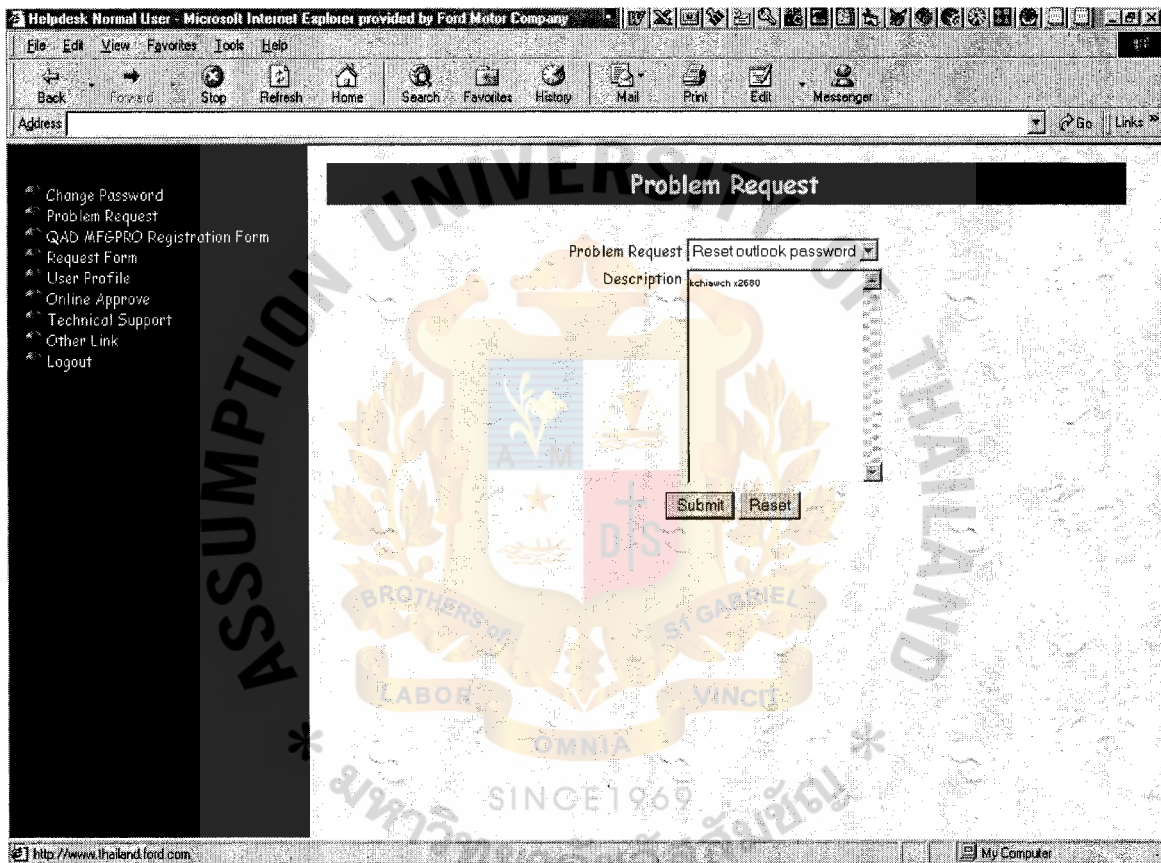


Figure C.5. Enter Problem Request Screen.

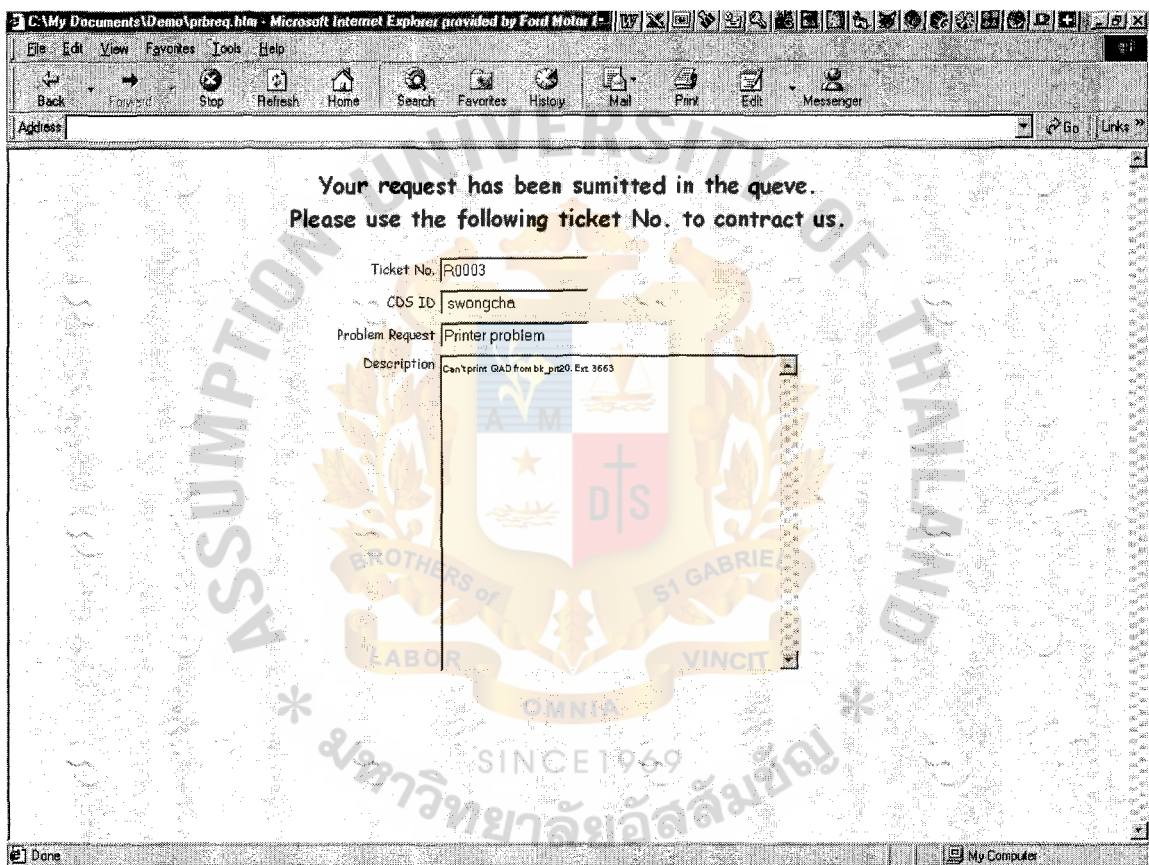


Figure C.6. View Problem Request Result Screen.



Helpdesk Normal User - Microsoft Internet Explorer provided by Ford Motor Company

File Edit View Favorites Tools Help

Back Forward Stop Refresh Home Search Favorites History Mail Print Edit Messenger

Address  Go Links

[Change Password](#)  
[Problem Request](#)  
[QAD MFGPRO Registration Form](#)  
[Request Form](#)  
[User Profile](#)  
[Online Approve](#)  
[Technical Support](#)  
[Other Link](#)  
[Logout](#)

### QAD MFGPRO Registration Form

cdsid:

Action:

Database	Security Group
<input checked="" type="checkbox"/> (4) FSST-VH	sg1, sys, gr2
<input checked="" type="checkbox"/> (3) FOT	nr2, ge1
<input type="checkbox"/> (6) FOT-PT	
<input type="checkbox"/> (21) AAT	
<input type="checkbox"/> (61) VTL	
<input type="checkbox"/> (10) PLC	
<input type="checkbox"/> (11) PFC	
<input type="checkbox"/> (52) MST-VH	
<input type="checkbox"/> (71) VCT	
<input type="checkbox"/> Test of	

Approver:

http://www.thailand.ford.com My Computer

Figure C.7. Enter/View QAD Registration Screen.

Helpdesk Normal User - Microsoft Internet Explorer provided by Ford Motor Company

File Edit View Favorites Tools Help

Back Forward Stop Refresh Home Search Favorites History Mail Print Edit Messenger

Address

Request Form

Change Password  
Problem Request  
QAD MFGPRO Registration Form  
Request Form  
User Profile  
Online Approve  
Technical Support  
Other Link  
Logout

CDS ID: achitpoo

☐ E-mail Register 2 Days after approved  
☐ New PC 20 Days after approved  
☐ New note book 20 Days after approved  
☐ New printer 20 Days after approved  
☐ Create share drive List member name and access right  
☒ LCD projector for meeting Specific location date, time, pre-loaded S/W  
☒ Note book for meeting Specific location, date, time, pre-loaded S/W  
☐ Other

Job Detail: Howbrandt Hotel on June 20, 2001 - June 22, 2001

Approver: Derek

Submit Reset

Done My Computer

Figure C.8. Enter/View Request Form Screen.

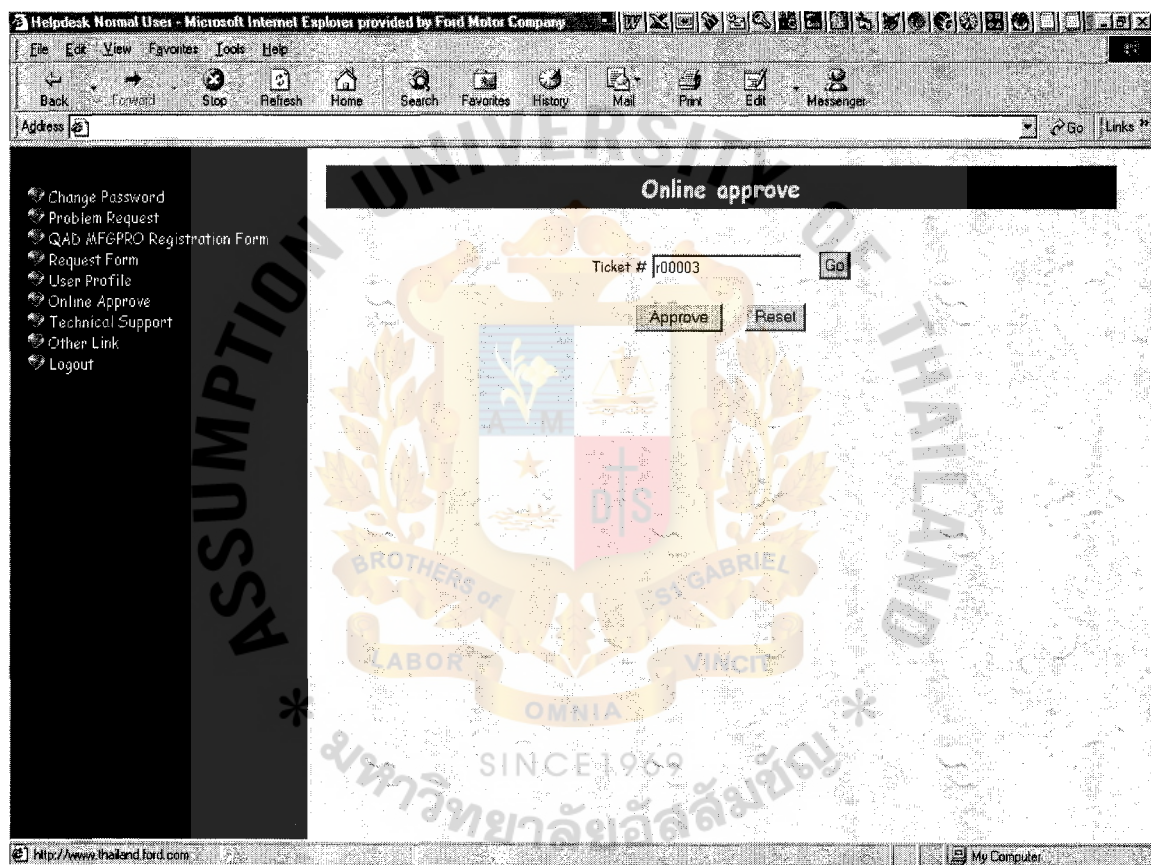


Figure C.9. Online Approve Screen.

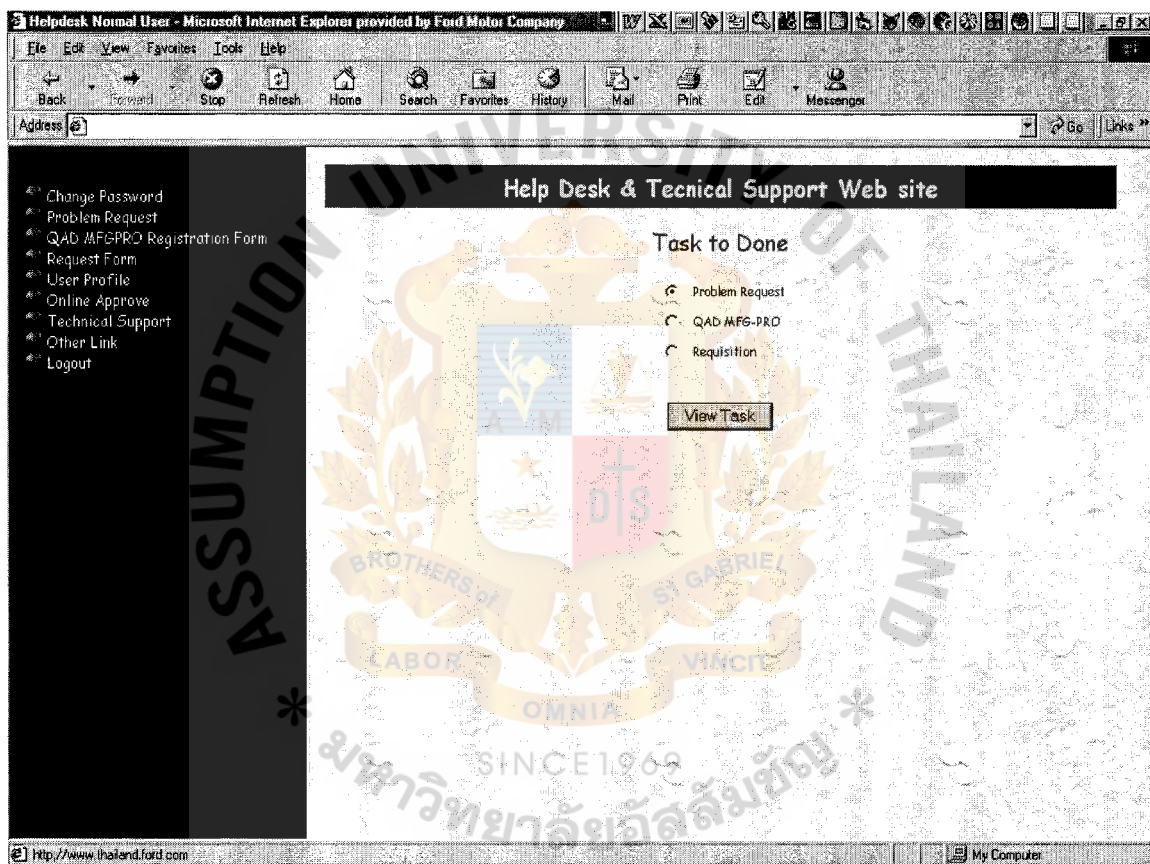


Figure C.10. View Task to Be Done for Help Desk and Technical Support.



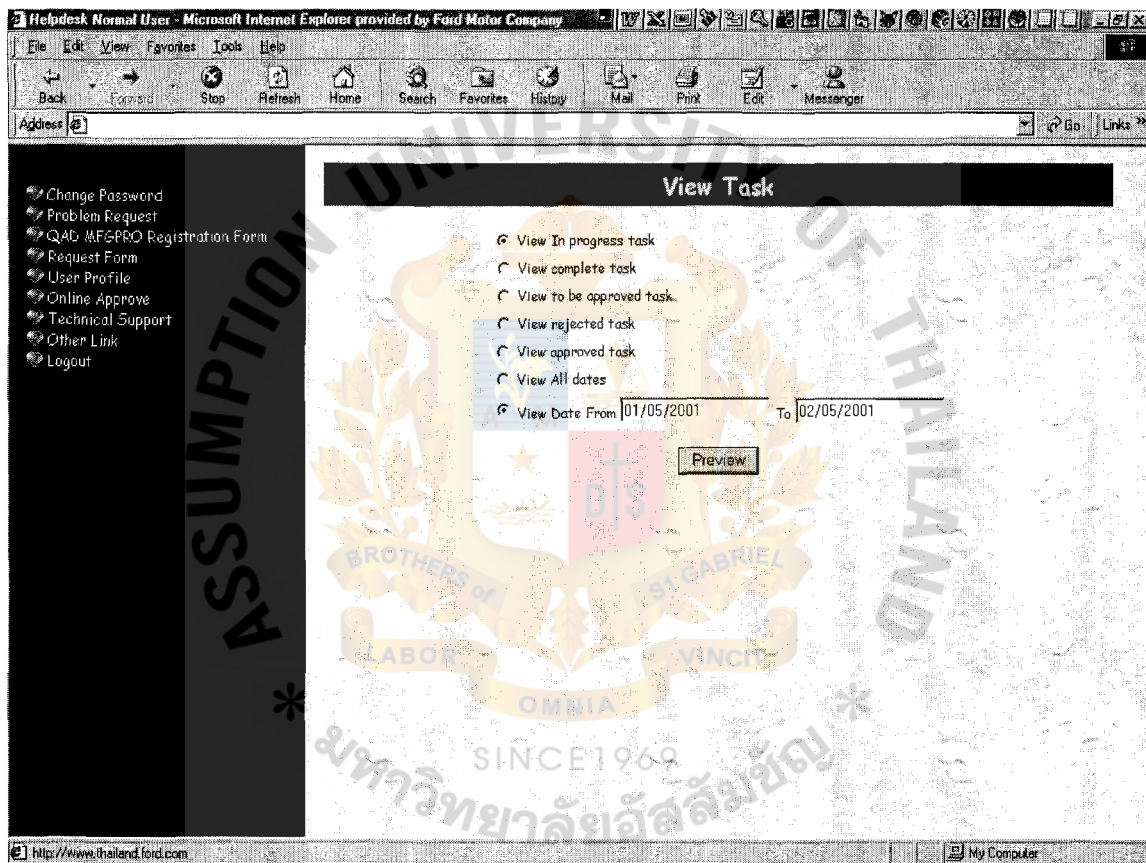


Figure C.11. View Task by Categories Screen.



**APPENDIX D**  
**OUTPUT REPORTS**



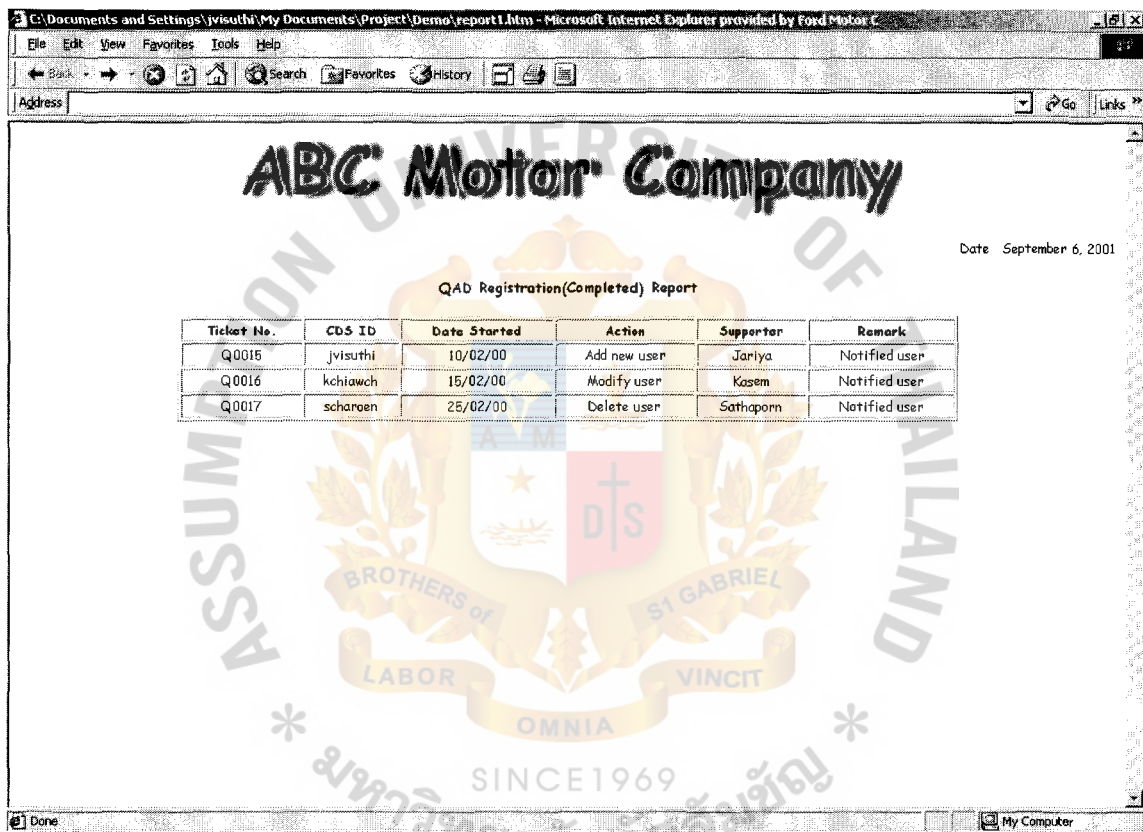


Figure D.1. QAD Registration (Completed) Report.

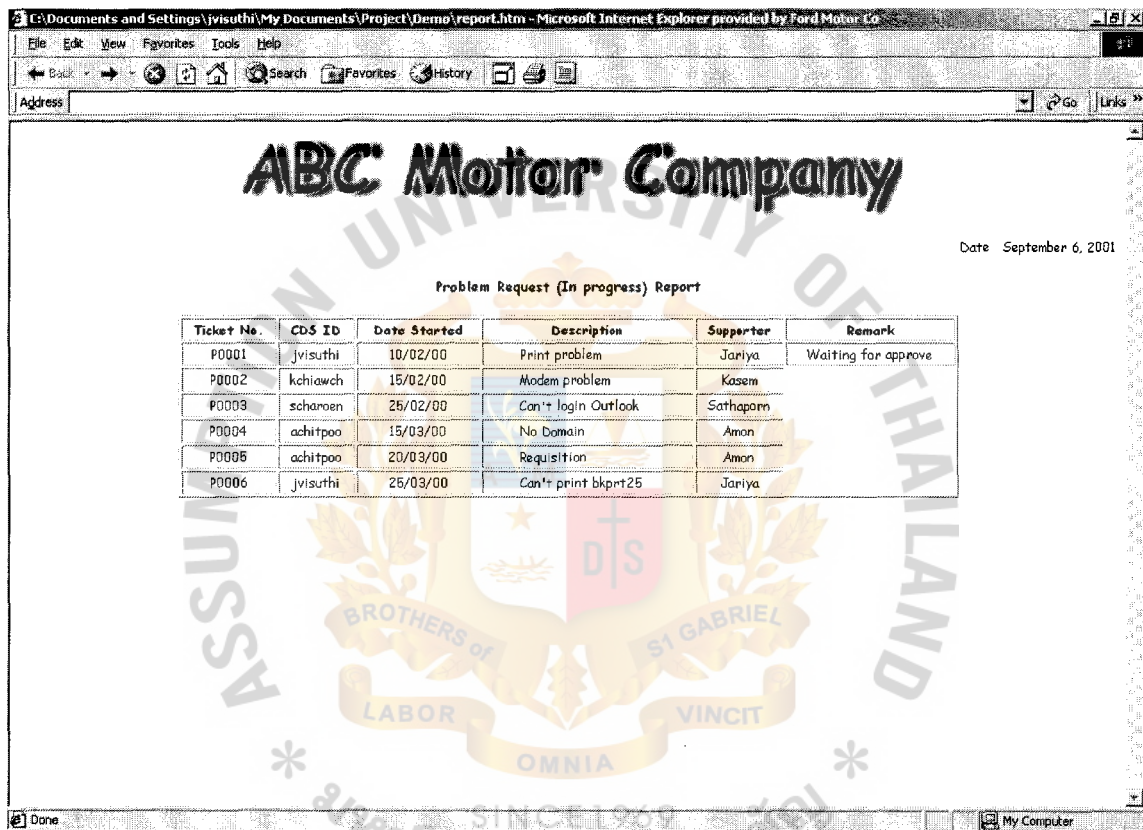


Figure D.2. Problem Request (In Progress) Report.

Microsoft Internet Explorer provided by Ford Motor Ltd.

Address

# ABC Motor Company

Date September 6, 2001

Requisition (To be approved) Report

Ticket No.	CDS ID	Date Started	Supporter	Remark
R0001	jvisuthi	11/03/00	Jariya	
R0002	kchiawch	26/03/00	Kasem	
R0003	scharoen	20/04/00	Sathaporn	
R0004	achitpoo	18/06/00	Amon	
R0005	achitpoo	20/08/00	Amon	
R0006	jvisuthi	25/11/00	Jariya	
R0007	kchiawch	25/01/01	Kasem	

Done My Computer

Figure D.3. Requisition (to be Approved) Report.

Top Twenty Report - Microsoft Internet Explorer provided by Ford Motor Company

File Edit View Favorites Tools Help

Back Forward Stop Refresh Home Search Favorites History Print Discuss Messenger

Address

Top Twenty Ranking Report

Date: August 14, 2001

Rank	CDS ID	Total
1	jchonlav	66
2	cbenjati	63
3	snittiku	56
4	achitpoo	56
5	esatchak	50
6	adaliber	50
7	gkana	49
8	jsittinu	48
9	dsappaon	43
10	gjatites	38
11	wyongyai	36
12	leknotch	30
13	yanusasa	30
14	msringam	24
15	fakana	22
16	gorchaiy	22
17	hchuenbu	14
18	bsoendor	8
19	asitakal	5
20	warsasen	5

Done My Computer

Figure D.4. Top Twenty Ranking Report.

Summary User's Problem - Microsoft Internet Explorer provided by Ford Motor Company

File Edit View Favorites Tools Help

Back Forward Stop Refresh Home Search Favorites History Print Discuss Messenger

Address | | Go Links

Summary Problem of Ranking Report

Date August 14, 2001

Wiwatchai Arsasen

PTicket	Problem	Description	Date	Supporter
P00020	Can't print	Can't print FOCUS to bk_prt25	26-May-00	Jariya
P00012	Can't logon to the network	Domain password is incorrect	26-May-00	Jariya
P00016	Can't login to outlook	Reset outlook password	30-May-00	Sathaporn
P00022	Can't login to the network	Domain password is incorrect	26-Jul-00	Sathit
P00035	Can't print	Printer work offline	10-Aug-00	Seksan
P00065	Outlook problem	Undelivered to the destination	01-Sep-00	Warangkool
Total				6

Done My Computer

Figure D.5. Summary Problem of Ranking Report.



Report Problem - Microsoft Internet Explorer provided by Ford Motor Company

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites History

Address

**Maintenance Ranking Report**

Date September 26, 2001

Rank	Hardware	Total
1	Printer Server bkprt03	25
2	bk_prt42	20
3	bk_prt13	20
4	bk_prt18	19
5	Barcode Printer	19
6	bk_prt23	15
7	bk_prt12	10
8	Scanner (PLC)	8
9	Cisco 1700 (Dealer network)	7
10	bk_prt23	5
11	Cisco 3600 (Company network)	1

Done My Computer

Figure D.6. Maintenance Ranking Report.



Printer Problem - Microsoft Internet Explorer provided by Ford Motor Company

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites History

Address

Summary Printer Problem of Ranking Report

Date September 26, 2001

BK PRT23

PTicket	Problem	Date	Supporter
P00011	Paper jam	25-Apr-00	Jariya
P00043	Fusing error	13-May-00	Jariya
P00076	Upper tray doesn't work	30-May-00	Sathaporn
P00101	Upper tray doesn't work	1-Jun-00	Sathaporn
P00123	Printer work offline	2-Jun-00	Sekson
P00200	Print out only half page	30-Jul-00	Warangkool
	Total		6

ASSUMPTION UNIVERSITY OF THAILAND

BROTHERS of S1 GABRIEL

LABOR OMNIA VINCIT

SINCE 1969

\* มหาวิทยาลัยอัสสัมชัญ \*

Done My Computer

Figure D.7. Summary Printer Problem of Ranking Report.



**APPENDIX E**  
**FILE LAYOUTS**

Table E.1. Employee File Layout.

File Name: Employee				
Caption	Field name	Data type	Size	Default
CDSID	CDSID <PK>	Character	8	Null
Name	Name	Character	20	Null
Lastname	Lastname	Character	20	Null
Gender	Gender	Character	1	Null
Status	Status	Character	8	Null
Salary_Gr	Salary_Gr	Character	3	Null
Company	Company	Character	5	Null
Password	Password	Character	15	Null
Head_ID	Head_ID	Character	8	Null

Table E.2. Problem\_list File Layout.

File Name: Problem_list				
Caption	Field name	Data type	Size	Default
P_ID	P_ID <PK>	Character	3	Null
Problem	Problem	Character	25	Null

Table E.3. Problem File Layout.

File Name: Problem				
Caption	Field name	Data type	Size	Default
P_ticket	Problem	Character	5	Null
CDSID	CDSID <PK>	Character	8	Null
P_ID	P_ID	Character	3	Null
Description	Description	Character	60	Null
Start_date	Start_date	Date	8	Null
Start_time	Start_time	Time	8	Null
Status	Status	Character	10	Null
Supp_ID	Supp_ID	Character	8	Null
Finish_date	Finish_date	Date	8	Null
Finish_time	Finish_time	Time	8	Null
Remark	Remark	Character	50	Null

Table E.4. Requisition File Layout.

File Name: Requisition				
Caption	Field name	Data type	Size	Default
R_ticket	R_ticket <PK>	Character	5	Null
CDSID	CDSID	Character	8	Null
E-mail	E-mail	True/False	1	Null
Notebook	Notebook	True/False	1	Null
Printer	Printer	True/False	1	Null
Sh_drive	Sh_drive	True/False	1	Null
LCD	LCD	True/False	1	Null
Nb_m	Nb_m	True/False	1	Null
Other	Start_time	True/False	1	Null
Detail	Status	Character	70	Null
Start_date	Supp_ID	Date	8	Null
Supp_ID	Supp_ID	Character	8	Null
Head_ID	Head_ID	Character	8	Null
Finish_date	Finish_date	Time	8	Null
Status	Status	Character	15	Null
Remark	Remark	Character	50	Null

Table E.5. QAD File Layout.

File Name: QAD				
Caption	Field name	Data type	Size	Default
Q_ticket	Q_ticket <PK>	Character	5	Null
CDSID	CDSID	Character	8	Null
Action	Action	Character	20	Null
FSST_VH	FSST_VH	True/False	1	Null
FS_GR	FS_GR	Character	20	Null
FOT	FOT	True/False	1	Null
FOT_GR	FOT_GR	Character	20	Null
AAT	AAT	True/False	1	Null
AAT_GR	AAT_GR	Character	20	Null
VTI	VTI	True/False	1	Null
VTI_GR	VTI_GR	Character	20	Null
PLC	PLC	True/False	1	Null
PLC_GR	PLC_GR	Character	20	Null
PFC	PFC	True/False	1	Null
PFC_GR	PFC_GR	Character	20	Null
MST	MST	True/False	1	Null
MST_GR	MST_GR	Character	20	Null
Test	Test	True/False	1	Null
Test_GR	Test_GR	Character	20	Null
Satart_date	Satart_date	Date	8	Null
Supp_ID	Supp_ID	Character	8	Null
Head_ID	Head_ID	Character	8	Null
Finish_date	Finish_date	Date	8	Null
Status	Status	Character	15	Null
Remark	Remark	Character	50	Null



Table E.6. Approver File Layout.

File Name: Approver				
Caption	Field name	Data type	Size	Default
Head_ID	Head_ID <PK>	Character	8	Null
Name	Name	Character	20	Null
Latename	Lastname	Character	20	Null

Table E.7. Supporter File Layout.

File Name: Supporter				
Caption	Field name	Data type	Size	Default
Supp_ID	Supp_ID <PK>	Character	8	Null
Name	Name	Character	20	Null
Latename	Lastname	Character	20	Null

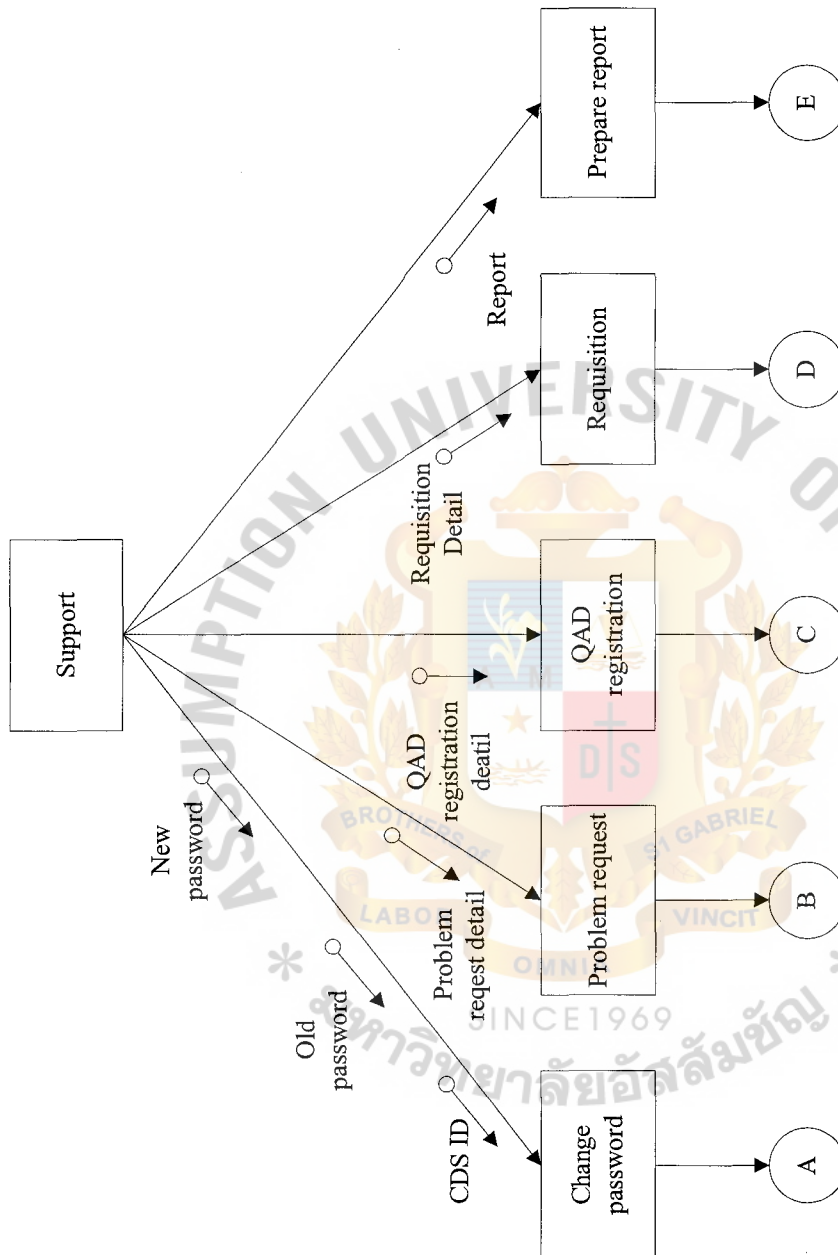


Figure F.1. Structure Chart - Support System.

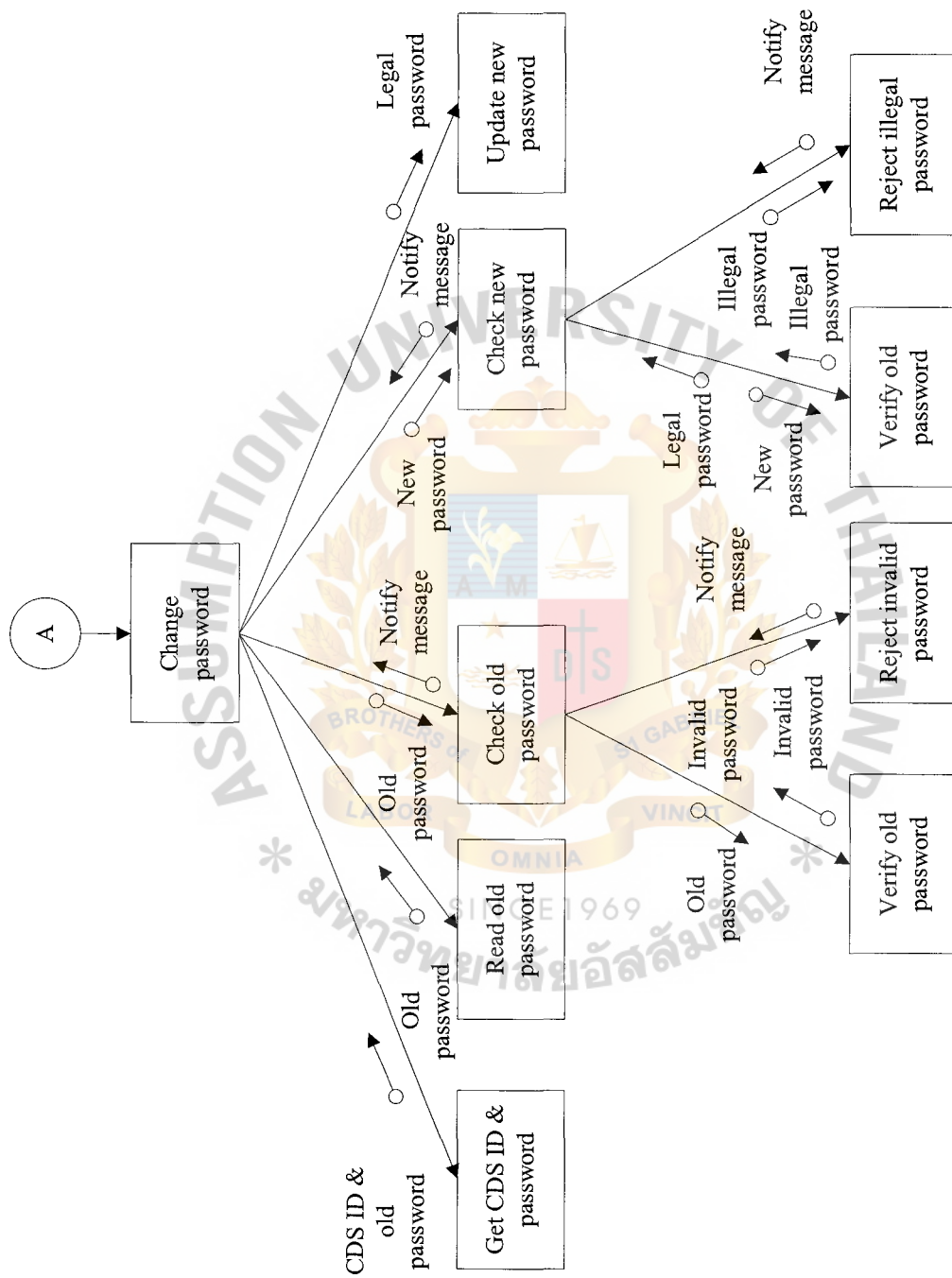


Figure F.2. Structure Chart - Change Password.



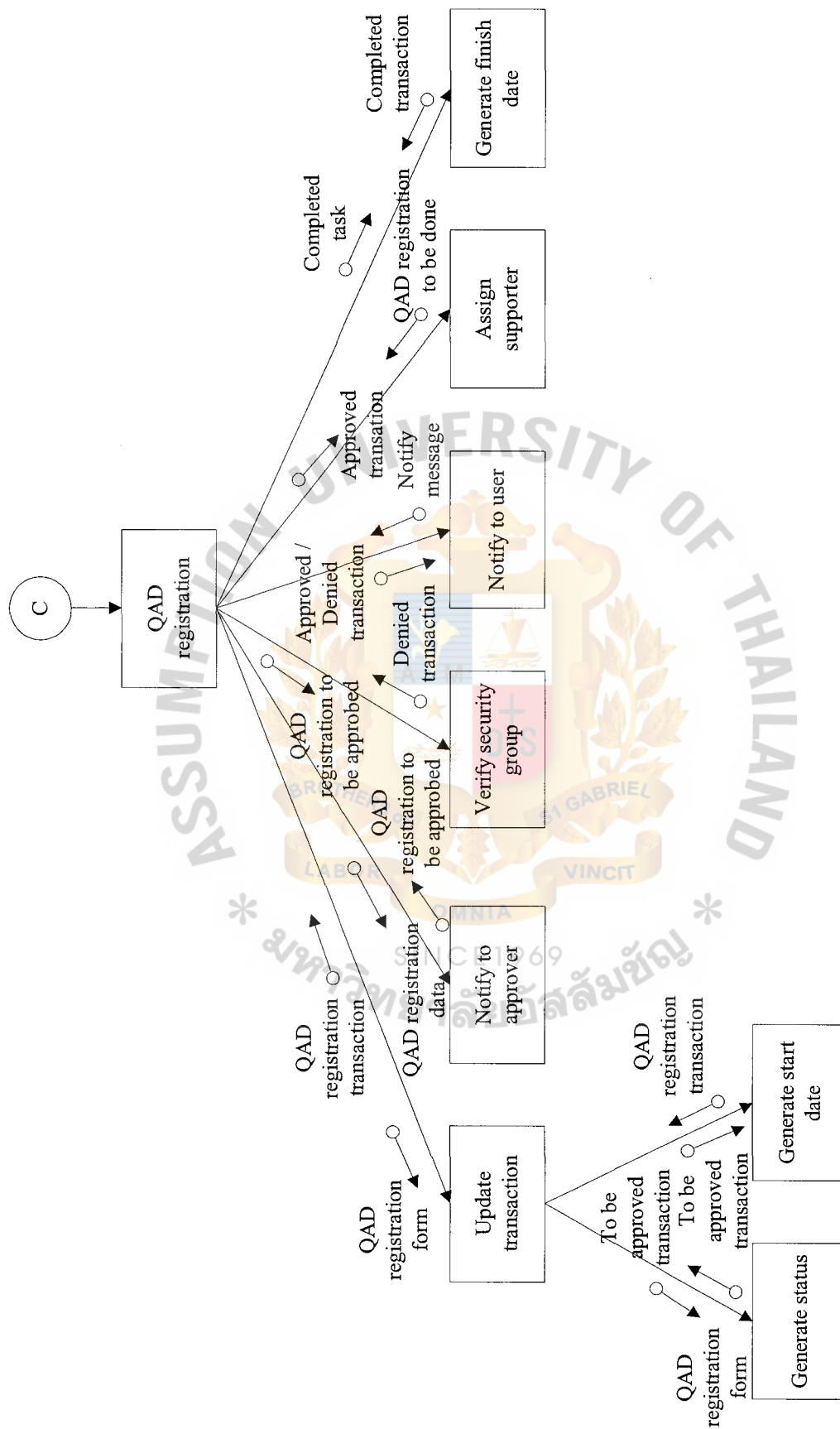


Figure F.4. Structure Chart - QAD Registration.

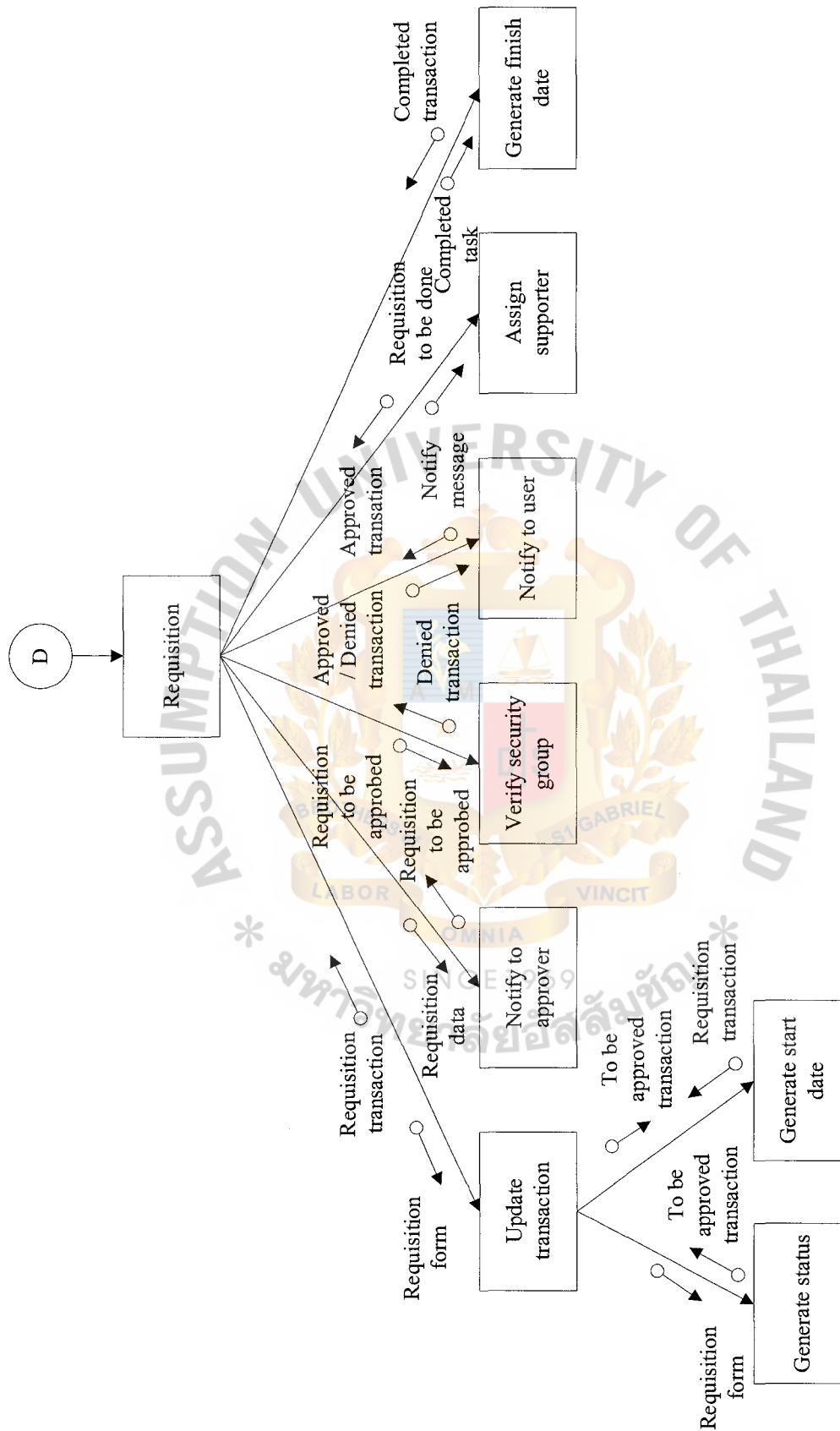
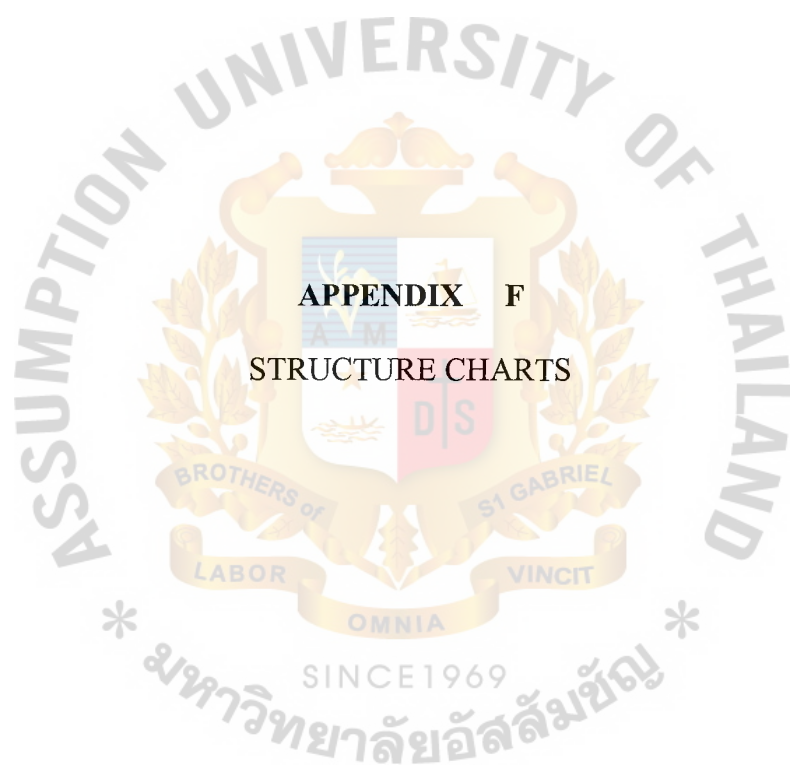


Figure F.5. Structure Chart - Requisition.





**APPENDIX F**  
**STRUCTURE CHARTS**



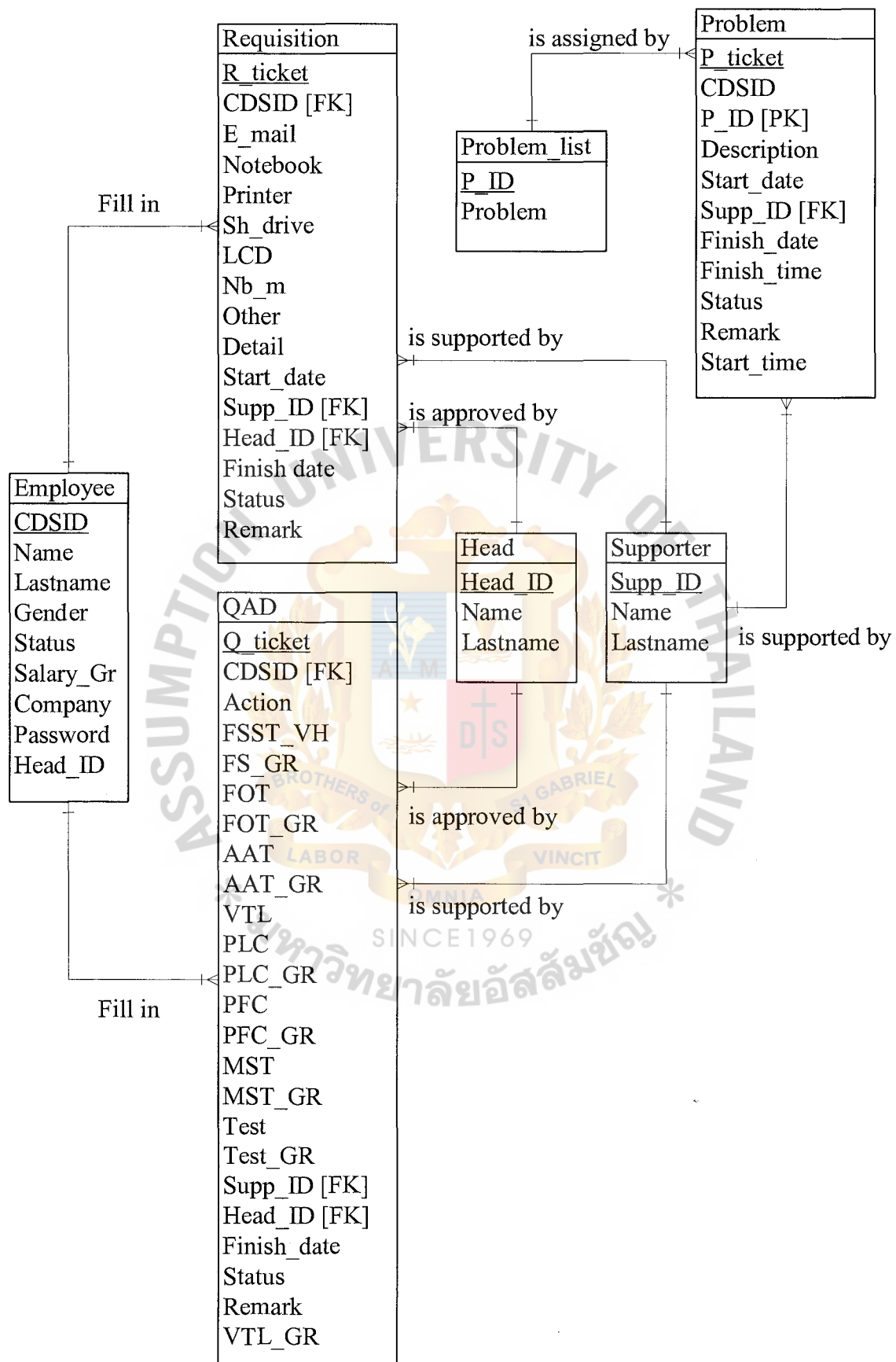


Figure G.1. Fully Attributed Data Model.



**APPENDIX H**  
**PROCESS SPECIFICATIONS**

Table H.1. Process Specification of Process 1.1.

Items	Descriptions
Process Name:	Get CDS ID & Old Password
Data In:	CDS ID & Old Password
Data Out:	Invalid Password
Process	Get CDS ID & old password from the user
Attachment	(1) User (2) Process Verify Old Password

Table H.2. Process Specification of Process 1.2.

Items	Descriptions
Process Name:	Read Old Password
Data In :	Old Password
Data Out:	User's Old Password
Process	(1) Read password from the employee table (2) Send old password to compare with the input password
Attachment	(1) Data Store Employee (2) Process Verify Old Password

Table H.3. Process Specification of Process 1.3.

Items	Descriptions
Process Name:	Verify Old Password
Data In:	Invalid Password
Data Out:	Notify Message
Process	(1) Compare input password to the password from the employee table (2) E-mail alert to the user if password is incorrect
Attachment	(1) Process Get CDS ID & Old Password (2) User

Table H.4. Process Specification of Process 1.4.

Items	Descriptions
Process Name:	Verify number of character
Data In:	New Password
Data Out:	(1) Illegal Password (2) Legal Password
Process	(1) Get new password from the user (2) Verify number of character of new password
Attachment	(1) User (2) Reject Illegal Password (3) Update New Password

Table H.5. Process Specification of Process 1.5.

Items	Descriptions
Process Name:	Reject Illegal Password
Data In:	Illegal Password
Data Out:	Notify Message
Process	(1) Terminate process change password if it illegal (2) e-mail alert to the user
Attachment	(1) Process Verify Number of Character (2) User

Table H.6. Process Specification of Process 1.6.

Items	Descriptions
Process Name:	Update New Password
Data In:	Legal Password
Data Out:	New password
Process	(1) Get the legal password (2) Update legal password to employee table
Attachment	(1) Process Verify Number of Character (2) Data Store Employee



Table H.7. Process Specification of Process 2.1.

Items	Descriptions
Process Name:	Select Problem List
Data In:	(1) Problem (2) Problem Request Form
Data Out:	New Transaction
Process	(1) Get problem description from the user (2) Retrieve subject of the problem from Problem_list table
Attachment	(1) Data Store Problem_List (2) User (3) Process Generate Status

Table H.8. Process Specification of Process 2.2.

Items	Descriptions
Process Name:	Generate Status
Data In:	New Transaction
Data Out:	In Progress Transaction
Process	(1) Get new problem transaction (2) Update "in progress" status to the transaction
Attachment	(1) Process Select Problem List (2) Process Start Date

Table H.9. Process Specification of Process 2.3.

Items	Descriptions
Process Name:	Generate Start Date
Data In:	In Progress Transaction
Data Out:	Problem Request Transaction
Process	(1) Get in progress transaction and automatic generate start date to the transaction (2) Update the transaction to the problem table
Attachment	(1) Process Start Date (2) Data Store Problem

Table H.10. Process Specification of Process 3.1.

Items	Descriptions
Process Name:	Assign Support
Data In:	Problem Request Data
Data Out:	Problem To Be Done
Process	(1) Get problem from the problem table (2) Assign the problem to the supporter
Attachment	(1) Data Store Problem (2) Supporter

Table H.11. Process Specification of Process 3.2.

Items	Descriptions
Process Name:	Generate Finish Date & Time
Data In:	Solved Problem
Data Out:	Solved Problem Transaction
Process	(1) Get the completed transaction from the supporter (2) Generate finish date & time to the transaction
Attachment	(1) Supporter (2) Process Generate Solved Transaction

Table H.12. Process Specification of Process 3.3.

Items	Descriptions
Process Name:	Generate Solved Transaction
Data In:	Solved Problem Transaction
Data Out:	Completed Transaction
Process	(1) Calculate time consumed of the transaction (2) Update the transaction to the problem table
Attachment	(1) Generate Finish Date & Time (2) Data Store Problem

Table H.13. Process Specification of Process 4.1.

Items	Descriptions
Process Name:	Generate Status
Data In:	QAD Registration Form
Data Out:	To Be Approved Transaction
Process	(1) Get QAD registration from the user (2) Update "to be approved" status to the transaction
Attachment	(1) User (2) Process Generate Start Date

Table H.14. Process Specification of Process 4.2.

Items	Descriptions
Process Name:	Generate Start Date
Data In:	To Be Approved Transaction
Data Out:	QAD Registration Transaction
Process	(1) Get "to be approved transaction" (2) Generate current date to the transaction (3) Update the transaction to the QAD table
Attachment	(1) Generate Start Date (2) Data Store QAD

Table H.15. Process Specification of Process 5.1.

Items	Descriptions
Process Name:	Notify To Department Head
Data In:	QAD Registration Data
Data Out:	QAD Registration To Be Approved
Process	(1) Retrieve the QAD transaction from the QAD table (2) Send the transaction to the department head
Attachment	(1) Data Store QAD (2) Head

Table H.16. Process Specification of Process 5.2.

Items	Descriptions
Process Name:	Verify Security Group
Data In:	Transaction To Be Approved
Data Out:	Approved / Rejected Transaction
Process	(1) Get the transaction to check access right (2) Update approved or rejected transaction to the QAD table
Attachment	(1) Head (2) Data Store QAD

Table H.17. Process Specification of Process 5.3.

Items	Descriptions
Process Name:	Assign Supporter
Data In:	Approved Transaction
Data Out:	QAD Registration To Be Done
Process	(1) Retrieve the approved transaction from the QAD table (2) Assign the transaction to the right supporter
Attachment	(1) Data Store QAD (2) Supporter

Table H.18. Process Specification of Process 5.4.

Items	Descriptions
Process Name:	Generate Finish Date
Data In:	Completed Task
Data Out:	Completed Transaction
Process	(1) Get the transaction from the supporter (2) Update the finish date to the transaction (3) Update the transaction to the QAD table
Attachment	(1) Supporter (2) Data Store QAD

Table H.19. Process Specification of Process 5.5.

Items	Descriptions
Process Name:	Notify To User
Data In:	Rejected Transaction
Data Out:	Notify Message
Process	(1) Retrieve the rejected transaction from the QAD table (2) E-mail notify to the user
Attachment	(1) Data Store QAD (2) User

Table H.20. Process Specification of Process 6.1.

Items	Descriptions
Process Name:	Generate Status
Data In:	Requisition Form
Data Out:	To Be Approved Transaction
Process	(1) Get Requisition from the user (2) Update "to be approved" status to the transaction
Attachment	(1) User (2) Process Generate Start Date

Table H.21. Process Specification of Process 6.2.

Items	Descriptions
Process Name:	Generate Start Date
Data In:	To Be Approved Transaction
Data Out:	Requisition Transaction
Process	(1) Get to be approved transaction (2) Generate start date to the transaction (3) Update the transaction to the requisition table
Attachment	(1) Generate Start Date (2) Data Store Requisition

Table H.22. Process Specification of Process 7.1.

Items	Descriptions
Process Name:	Notify To Department Head
Data In:	Requisition Data
Data Out:	Requisition To Be Approved
Process	(1) Retrieve the requisition transaction from the requisition table (2) Send the transaction to the approver
Attachment	(1) Data Store Requisition (2) Department Head

Table H.23. Process Specification of Process 7.2.

Items	Descriptions
Process Name:	Assign Supporter
Data In:	Approved Transaction
Data Out:	Requisition To Be Done
Process	(1) Retrieve the approved transaction from the requisition table (2) Assign the transaction to the right supporter
Attachment	(1) Data Store Requisition (2) Supporter

Table H.24. Process Specification of Process 7.3.

Items	Descriptions
Process Name:	Generate Finish Date
Data In:	Completed Task
Data Out:	Completed Requisition Transaction
Process	(1) Get the transaction from the supporter (2) Update the finish date to the transaction (3) Update the transaction to the requisition table
Attachment	(1) Supporter (2) Data Store Requisition



Table H.25. Process Specification of Process 7.4.

Items	Descriptions
Process Name:	Notify To User
Data In:	Denied Transaction
Data Out:	Notify Message
Process	(1) Retrieve the denied transaction from the requisition table (2) E-mail notify to the user
Attachment	(1) Data Store Requisition (2) User





**APPENDIX I**  
**CANDIDATE MATRIX**

Table I.1. Partially Completed Candidate Matrix.

Characteristics	Candidate 1	Candidate 2	Candidate 3
Portion of System Computerized.	Help Desk System is designed and developed by system analyst.	To be hired a software house to develop a software package.	To be purchased package for Help Desk System.
Benefit	Fully support user requirement.	Same as candidate 1.	This solution can be implemented quickly because it is a purchased solution.
Server and Workstations.	XEON server, Window 2000 server and Pentium III, Window 2000 Professional for clients.	Technially architecture dictates Pentium Pro, Window NT class server and Pentium III, Window NT workstations (clients).	Same as candidate 1.
Software Tools Needed.	Dreamweaver 4, Flash 5 and MS-SQL 7.0 to provide report writing and integration.	MS Visual Basic 6.0 and MS Access 2000.	Oracle 2000 Developer.
Application Software.	Custom Solution..	Same as candidate 1.	Package Solution.
Method of Data Processing.	Client/Server	Same as candidate 1.	Same as candidate 1.
Output Devices and Implications.	HP 4100N department laser printers (existing).	Same as candidate 1.	Same as candidate 1.
Input Devices and Implications.	Keyboard, mouse, HP scanjet 6200C and digital camera cannon powershot A50 (existing).	Keyboard and mouse.	Same as candidate 2.
Storage Devices and Implications.	MS-SQL Server 7.0 DBMS with 200 GB. RAID 5 capability.	MS Access 2000 DB with 200 GB. RAID 5 capability.	Oracle 2000 DBMS with 200 GB. RAID 5 capability.

Table I.2. Partially Completed Feasibility Matrix.

Feasibility Criteria	Weight	Candidate 1	Candidate 2	Candidate 3
Operational Feasibility Functionality and Political	30%	Fully supports user required functionality. Score : 100	Same as candidate 1 Score : 100	Same as candidate 1 Score : 100
Technical Feasibility Technology	30%	System analyst and programmer are trained by specialist. The training courses are Dreamweaver4 ,Flash 5 and MS-SQL 7.0.	There is monthly charges from outside system analyst.	to be purchased a software package.
Expertise		Dreamweaver 4, Flash 5 and MS-SQL 7.0 Score : 95	Required to hire expertise to maintain the system. Score : 80	Required to hire expertise to maintain the system. Score : 50
Economic Feasibility Cost to develop: Payback period: Net present value: ROI: Detailed calculations :	30%	234,000 Baht. 3 months and 23 days. 418,116 Baht. 156.00% See table I.3. and I.4. Score : 90	384,000 Baht. 1.2 Years 237,303 Baht. 42.90% See table I.5. and I.6. Score : 60	334,020 Baht. 9 Months. 275,663 Baht. 53.54% See table I.7. and I.8. Score : 85
Schedule Feasibility	10%	9 - 12 months Score : 80	9 months Score : 85	Less than 2 months Score : 95
Ranking	100%	93.5	80.5	80

Table I.3. Payback Analysis for Candidate 1, Baht.

Cost Items	Years					
	0	1	2	3	4	5
Development cost	-39,000	-39,000	-39,000	-39,000	-39,000	-39,000
Variance cost		-30,000	-33,000	-36,300	-39,930	-43,923
Discount factor for 12%	1.000	0.893	0.797	0.712	0.636	0.567
Time-adjusted cost	-39,000	-61,617	-57,384	-53,614	-50,199	-47,017
Cumulative time-adjusted cost over life time	-39,000	-100,617	-158,001	-211,615	-261,814	-308,831
Benefits derived from operation of new system	-	183,500	201,850	222,035	244,239	268,662
Discount factor for 12%	1.00	0.89	0.80	0.71	0.64	0.57
Time-adjusted benefit	0.00	163,866	160,874	158,089	155,336	152,331
Benefits	0.00	163,866	324,740	482,829	638,164	790,496
Cumulative lifetime-adjusted cost + benefit	-39,000	85,866	207,740	326,829	443,164	556,496

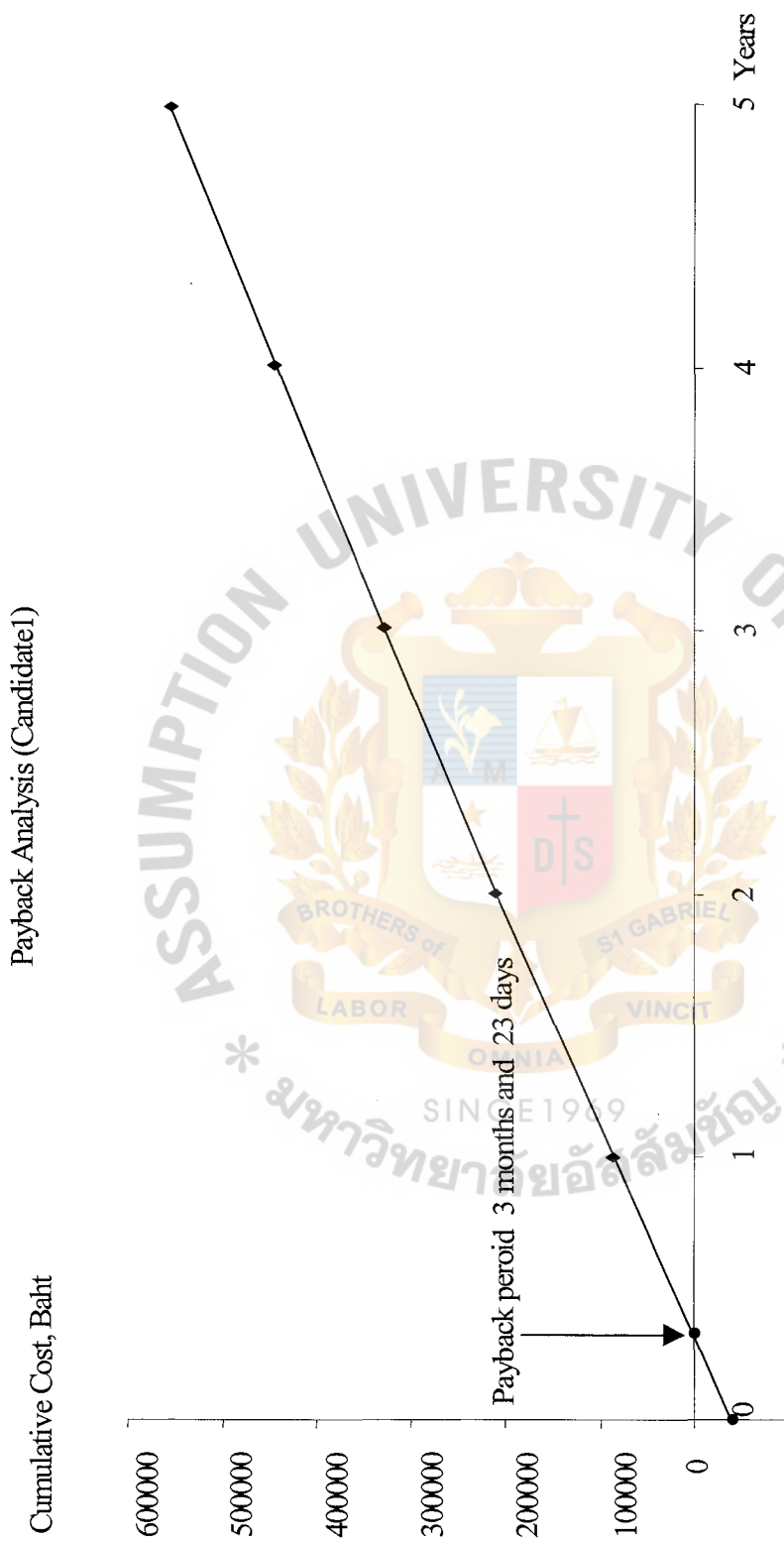


Figure I.1. Payback Analysis for Candidate 1.



Table I.4. Net Present Value Analysis for Candidate 1, Baht.

Cost Items	Years						
	0	1	2	3	4	5	Total
Development cost	-39,000	-39,000	-39,000	-39,000	-39,000	-39,000	
Variance cost	0	-30,000	-33,000	-36,300	-39,930	-43,923	-308,831
Discount factor for 12%	1.000	0.893	0.797	0.712	0.636	0.567	
Present value of annual cost	-39,000	-61,617	-57,384	-53,614	-50,199	-47,017	
Total present value of lifetime cost							
Benefits derived from operation of new system	0.00	183,500	201,850	222,035	244,239	268,662	
Discount factor for 12%	1.00	0.89	0.80	0.71	0.64	0.57	790,496
Present value of annual cost	0.00	163,866	160,874	158,089	155,336	152,331	
Total present value of lifetime cost							
Net present value							418,116

$$\begin{aligned} \text{ROI} &= (790,496 - 308,831) / 308,831 \\ &= 1.56 * 100 = 156\% \end{aligned}$$

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

Cost Items	Years					
	0	1	2	3	4	5
Development cost	-64,000	-64,000	-64,000	-64,000	-64,000	-64,000
Variance cost		-60,000	-66,000	-72,600	-79,860	-87,846
Discount factor for 12%	1.000	0.893	0.797	0.712	0.636	0.567
Time-adjusted cost	-64,000	-110,732	-103,610	-97,259	-91,495	-86,097
Cumulative time-adjusted cost over life time	-64,000	-174,732	-278,342	-375,601	-467,096	-553,193
Benefits derived from operation of new system	-	183,500	201,850	222,035	244,239	268,662
Discount factor for 12%	1.000	0.893	0.797	0.712	0.636	0.567
Time-adjusted benefit	0	163,866	160,874	158,089	155,336	152,331
Benefits	0	163,866	324,740	482,829	638,165	790,496
Cumulative lifetime-adjusted cost + benefit	-64,000	-10,867	46,398	107,228	171,069	237,303

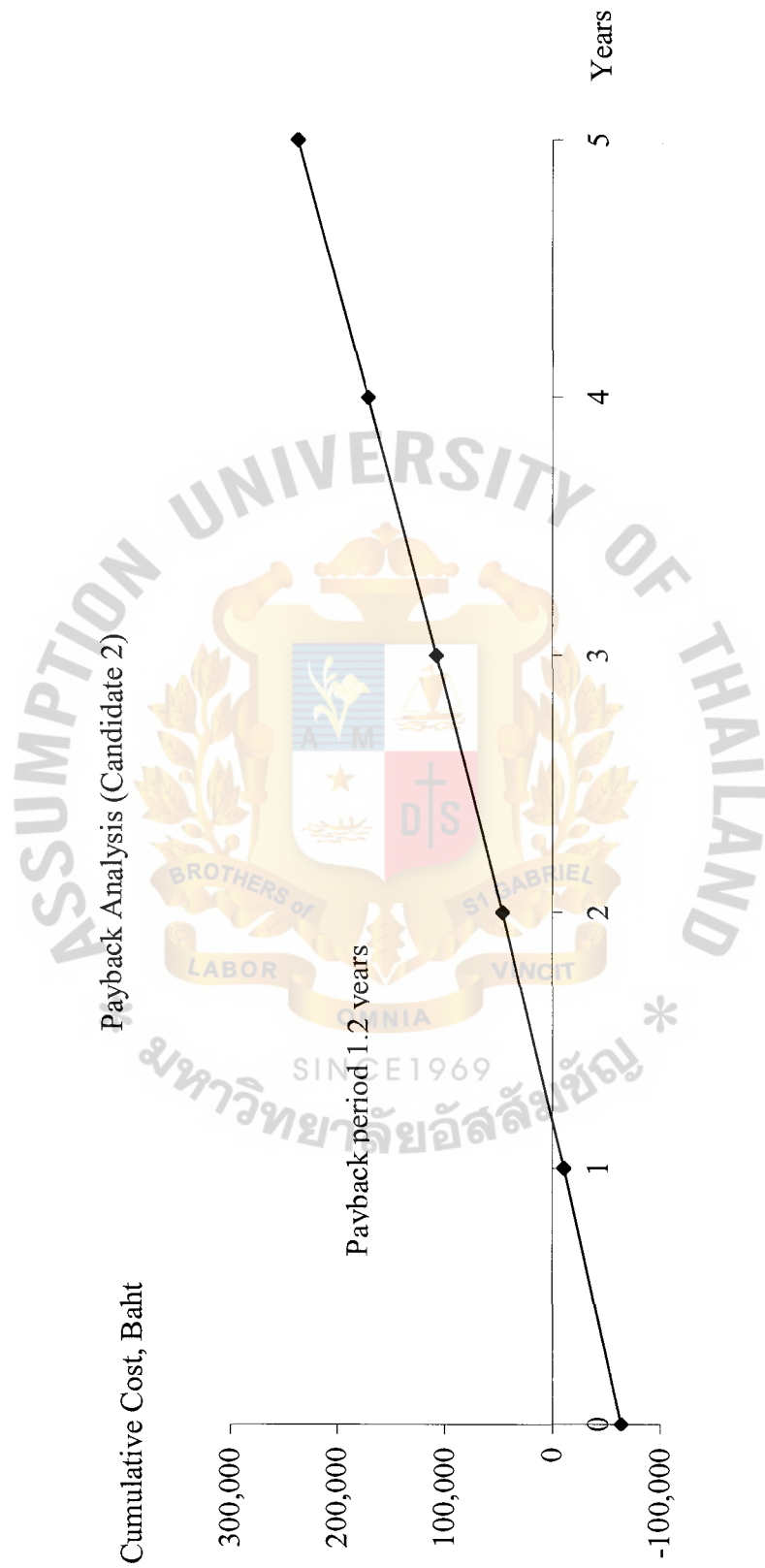


Figure I.2. Payback Analysis for Candidate 2.

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

Cost Items	Years					
	0	1	2	3	4	5
Development cost	-64,000	-64,000	-64,000	-64,000	-64,000	-64,000
Variance cost	0	-60,000	-66,000	-72,600	-79,860	-87,846
Discount factor for 12%	1.000	0.893	0.797	0.712	0.636	0.567
Present value of annual cost	-64,000	-110,732	-103,610	-97,259	-91,495	-86,097
Total present value of lifetime cost						
Benefits deivered from operation of new system	0	183,500	201,850	222,035	244,239	268,662
Discount factor for 12%	1.00	0.89	0.80	0.71	0.64	0.57
Present value of annual cost	0	163,866	160,874	158,089	155,336	152,331
Total present value of lifetime cost						
Net present value						237,303

$$\begin{aligned} \text{ROI} &= (790,496 - 553,193)/553193 \\ &= 0.4290 * 100 = 42.90 \% \end{aligned}$$

Table I.7. Payback Analysis for Candidate 3, Baht.

Cost Items	Years					
	0	1	2	3	4	5
Development cost	-55,670	-55,670	-55,670	-55,670	-55,670	-55,670
Variance cost		-30,000	-33,000	-36,300	-39,930	-43,923
Discount factor for 12%	1.000	0.893	0.797	0.712	0.636	0.567
Time-adjusted cost	-55,670	-76,503	-70,670	-65,483	-60,802	-56,469
Cumulative time-adjusted cost over life time	-55,670	-132,173	-202,843	-268,326	-329,128	-385,597
Benefits derived from operation of new system		183,500	201,850	222,035	244,239	268,662
Discount factor for 12%	1.000	0.893	0.797	0.712	0.636	0.567
Time-adjusted cost	0	163,866	160,874	158,089	155,336	152,331
Benefits	0	163,866	324,740	482,829	638,165	790,496
Cumulative lifetime-adjusted cost + benefit	-55,670	31,692	121,897	214,503	309,037	404,899

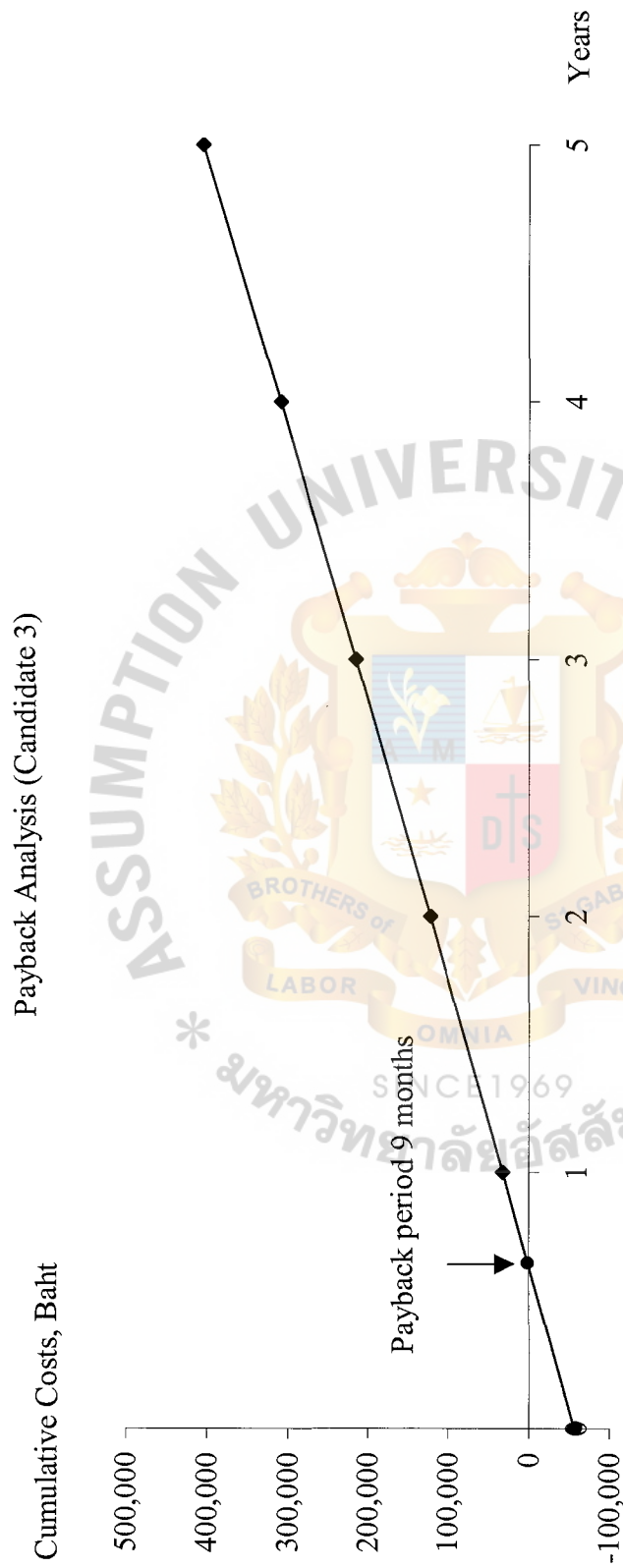


Figure I.3. Payback Analysis for Candidate 3.







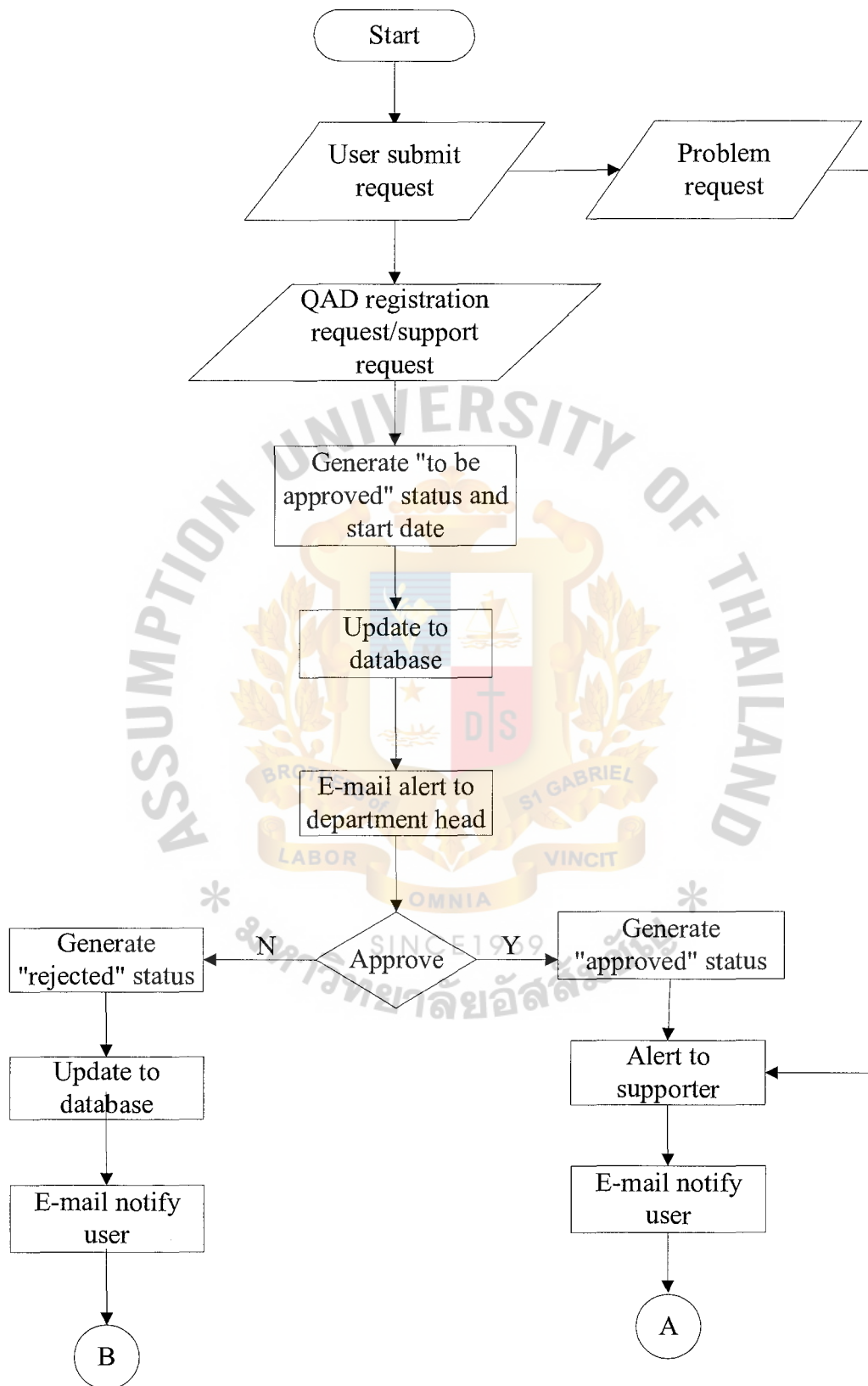


Figure J.1. System Workflow.

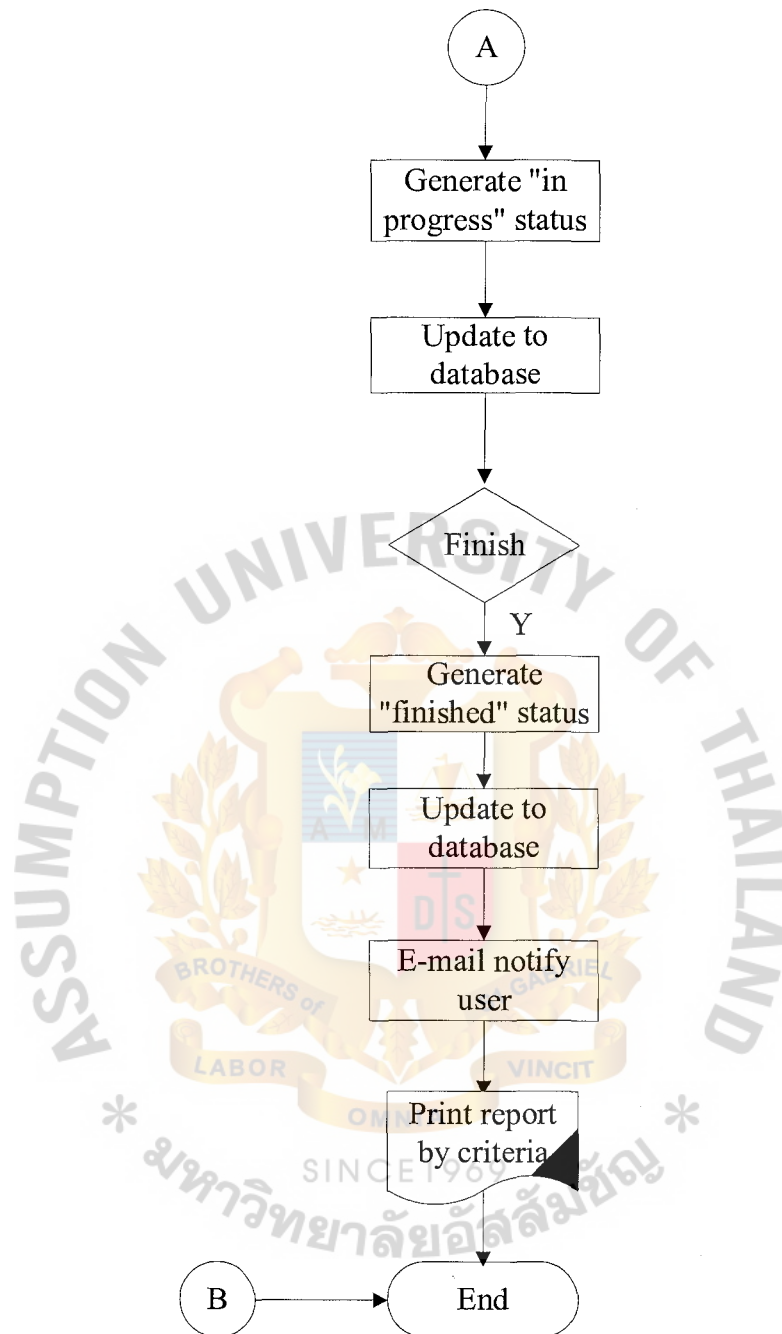


Figure J.2. System Workflow (Continued).

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