PROJECT INFORMATION SYSTEM OF INDUSTRIAL ENGINEERING

by

Ms. Kanlada Pirojrat

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

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Project Title	Project Information System of Industrial Engineering
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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

Industrial Engineering Co., Ltd. has the specific purpose of industrial type of projects, including building and infrastructure construction. The most important goals are to ensure the up-to-date information and reports for management team to analyze budget plans and cost of projects in order to facilitate the whole system to reach the target. This study covers analysis, design and implementation of Project Information System of Industrial Engineering. It emphasizes on workflow and data flow of time sheet and leaving form.

The current existing Project Information System is based on the manual and some computerized systems. Most of the data are stored on paper, while some parts are kept in the Microsoft Excel and stored in the file server. It requires many administrative staffs to maintain the system. The current existing system face human-error problem and loss of papers.

The new proposed Project Information System will be developed to replace the manual and some computerized information system. This system is designed to reduce errors and provide more efficient up-to-date information and report to the organization. The advantage of the proposed system is the accuracy and the higher speed of process of the requested reports. The proposed system also reduces the number of administrative staffs, solves the problem of manual system and decreases the high maintenance cost. The disadvantage of this system is high investment.

The operating system is Microsoft Windows NT 4.0. All data are kept in SQL Server. The users are accessed through web application.

The improvement of the system enhances achievement in organization goals. Otherwise, it is used for work expansion in the future.

ACKNOWLEDGEMENTS

This project is accomplished as a result of reviews by a number of people, who gave generously of their time and expertise.

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I. INTRODUCTION

1.1 Background of the Project

Industrial Engineering Co. Ltd., one of the building and infrastructure construction businesses in Thailand, is more than 10 years in line. Industrial Engineering has aimed on industrial type of projects, including building and infrastructure construction. The company is not only a general contractor who constructs according to the clients' drawings, but the company also offers the best engineering solution

The main objective of this system is to ensure that the management level will receive the accurate information and reports with less processing time. Basically an information system, Project Information System is quite developed for systematic planning to the project management. The computerized system will calculate the cost of each project and the number of man hours of each project. It also provides the cost benefit of the project. It requires accuracy, correctness and quickness in operation, So The Project Information System is developed to provide for the organization working effectiveness. Moreover, it helps to build the new proposed system to save cost and to be easy to use. It will also improve the level of information security.

1.2 Objectives of the Project

The Objectives of the Project Information System are as follows:

(1) To study and analyze the existing system of the company

(2) To identify users' requirements.

(3) To design new system for Project Information System to improve more effectiveness and efficiency.

(4) To provide up-to-date information and reports for management team to analyze, forecast and plan about project analysis. Accounting needs Project information to calculate cost of man hour. These reports are prepared at regular time like weekly, monthly, etc. These reports are also prepared for specially requested reports.

(5) To generate information for monitoring the performance of employees.

(6) To minimize the company costs and make use of human resources more efficiently.

(7) To assist end-user in having better understanding and knowledge of the workflow.

1.3 Scope of the Project

We study and analyze the existing system in order to identify user's requirements. Then we identify the possible solutions to the problems. This project is designed to reduce errors which usually occurred from the existing system and create online computer-based information system for project information procedures in adding, updating, deleting, and searching. This system will involve with employee information, customer information, project information, Personnel Department, Computer Department, Project Admin Department, Finance & Accounting Department, Mechanical Department, Electrical Department, Sanitary Department, Architect Department, Civil Department, and Draftsman Department. Thus the work must be performed jointly by all of the modules in order to achieve the goals.

The scopes of this project are as follows:

(1) To analyze, design, implement and provide up-to-date document of the Project Information System.

(2) To use Active Server Page as the implementation tool to develop the Project Information System.

(3) To create database of Project Information System.

(4) To provide reports more speedily and accurately for management team in order to analyze, forecast, and plan about project analysis

(5) To provide reports at regular time and upon request.

(6) To generate man-hours to monitor the performance of staffs.

(7) To support transaction from staffs who work at project site.

1.4 Benefits of the Project

The benefits of this project are as follows:

(1) To gain accurate, complete and timely outputs of the Project Information System.

(2) To eliminate the risk to paper lost.

(3) To improve operational workflow to be more systematic, efficient and effective.

(4) To enlarge system capacity and capability of handling the transactions from site of project

(5) To establish a kind of management information system in the company.

(6) To reduce maintenance cost.

1.5 Deliverables

At the end of this project, deliverables can be divided into 2 focuses. The first one focuses on systems analysis, it delivers Entity Relationship Diagram (ER Diagram) for database design, Functional Decomposition with Data Flow Diagram (DFD) for a system design and Local Decomposition with Local Connectivity Diagram for design a network. The other one focuses on systems design, it delivers Physical Entity

Relationship Diagram, Physical Data Flow Diagram, Network Topology Diagram and System Structure. Next, all analyzed models are used to implement a new system, which consists of both software and hardware solution, and cost/benefit analysis. Finally, the deliverables for Project Information System are as follows:

(1) An application that is developed by Active Server Page and SQL Server as a database.

(2) Interface design for input and output screen layout.

(3) The hard copies output such as monthly evaluation of working performance, monthly evaluation of operational performance, list of project connection and status, and etc.

1.6 Project Plan

This project started on Sunday 1 May 2000 and finished on August 31, 2000. This project is based on FAST system development methodology, and covers the background of an organization and project PIECE frame work. From the project schedule, it will be completed in the forth week of August. The project plan is shown in Figure H.1.

(1) Analysis of the Existing System

In the beginning, we defined the objective and scope of Project Information System. Next we study the existing system by reviewing old documents and interviewing the manager and staffs. Then we study the existing computer system in order to plan network design for a new system. Consequently we begin to set up the structure of this project, prepare context diagram, prepare data flow diagram and do cost & benefit analysis.

(2) Analysis and Design of the New System

We design all necessary elements of the system: web interface, report, database, network and program.

(3) Implementation of the New System

We begin to write an application by using Active Server Page and SQL Server. In this stage, we keep testing and debugging all parts of application to get the correctness. Then, we install hardware and software. Finally, I convert an application to evaluate whether it meets the planned objective.

II. THE EXISTNG SYSTEM

2.1 Background of the Organization

Industrial Engineering has been established since 1992 with the original aim on industrial-type of projects. Now, with our full strength of multidiscipline, we had diversified to include building and infrastructure construction. We had turned ourselves from an only engineering design company to a full scope of service company which includes design and construction. We are not only a general contractor who constructs according to the clients' drawings but we also offer best engineering solution from our experienced engineers.

Our philosophy is to combine client's need with the appropriate engineering which concerns the best efficiency technique, economical cost, safety and friendly environment.

The company can provide the services needed for a construction project at any stage of the project or all the stages from blank paper to an operational building and operational factory.

The company can work on any specific aspect that the client wishes or in a turnkey project IE works with the client on each of the aspects. All projects can be broken down into several stages as follows:

Feasibility Studies

(1) To assist the client in making decisions concerning cost and construction.

Preliminary Design

(1) To provide conceptual engineering for process, utilities and equipment involved in the project.

Detail Design

(1) A thorough description of all processes, equipment, materials, arrangements, connections, installations, plans, instructions, etc.

Procurement

(1) The process of acquiring what is needed to construct the project including preparation of bid packages for subcontractors, choosing subcontractors and choosing vendors.

Construction Supervision & Management

(1) To ensure that a project is built according to the design specifications and on schedule.

Construction

(1) Building the structure, facilities, installing the equipment, making piping, electrical, and instrument connections

Commissioning

(1) Testing of processes, equipment, and instrumentation to ensure they meet design specifications and function accordingly

With all in-house full-time working personnel of various disciplines, our clients can expect design coordination, quick response with direct communication of involved persons, design follow-up during construction and other long-term services.

2.2 Existing Business Function

The existing business functions of Project Information System are manual and some computerized. It can be summarized as follows:

Process 1: Staff System

The staffs take one copy of their time sheet form and then make a copy of this paper. The staffs fill in time sheet form: date, time in, time out, number of hours,

number of work hours, project code, type of work description. After that they put it in to the waiting approval time sheet box. A personnel staff fills the time sheet form and examines the correctness. She will compare the time sheet form date and leaving form date. The names of the staffs who do not send the time sheet form in will be announced on a news board. The administrator sends it to the managers who have authority to approve or reject.

Process 2: Project System

This process is to create project information to the database. The status and phase of the project will be updated at this process.

Process 3: Timesheet System

The administrative staffs fill out the data into Microsoft Excel. The project administrative staffs generate monthly reports, yearly report and requested reports such as monthly evaluation of working performance, monthly evaluation of operational performance, list of project connection and status, etc. Then they send those reports to the management team and the customer.

2.3 Current Problems and Areas for Improvement

2.3.1 Current Problems

The existing system is operated by the manual and some computerized systems. The problems are as follows:

(1) Data are kept in several documents and need to be cross-checked to verify correctness.

(2) The paper reports are often lost.

(3) The requested reports are not timely delivered because the information are gathered and summarized manually.

(4) Microsoft Excel hangs.

(5) The operation needs many processes and a lot of time.

(6) It is difficult to maintain.

(7) Data have low security.

(8) Customers and management teams are dissatisfied due to the reports are not delivered in time and are not accurate.

2.3.2 Areas for Improvements

(1) The new proposed Project Information System helps organization reduce human work-hours and paper costs.

(2) The collection of data is more systematic with fast tracking.

(3) The reports are more systematic. The new proposed system provides more reliable and accurate information.

(4) The computerize system generate correct calculation.

2.4 The Existing Computer System

2.4.1 Existing Computer Hardware

Computer 1 unit

(1) CPU Intel Pentium I

(2) RAM 16 MB

(3) Hard Disk 1.2 GB

(4) 1.44 MB Floppy Disk

(5) 14" Color Monitor

(6) Keyboard 104 keys support Windows 95

Printer 1 unit

(1) Printer HP Laser Jet 4L

2.4.2 Software

(1) Microsoft Windows 95

(2) Microsoft Office Version 97 Professional (Thai Edition) (MS Excel)

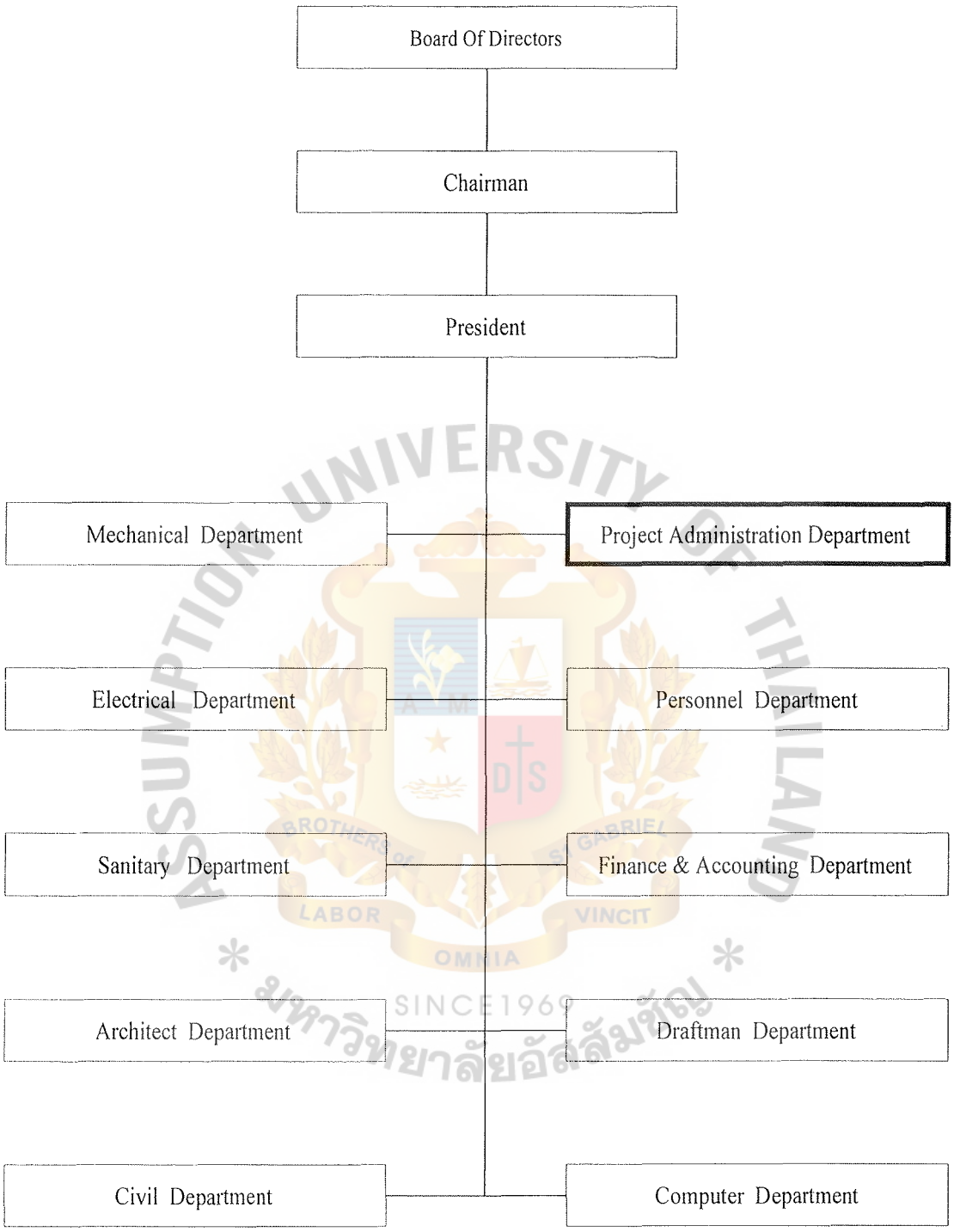


Figure 2.1. Organization Chart.

III. THE PROPOSED SYSTEM

3.1 User Requirement

Based on the current problems and user requirements, the system analysis indicates users' requirements as follows:

(1) Graphic User Interface: The system must be graphic user interface (GUI), so the users can understand and use it easily. The report must be systematic in format.

(2) Less Processing Time: The system can track information and query reports with less processing time.

(3) Security Control: The system can prevent unauthorized access. The system can define the level of access for each task.

(4) Reduce redundancy and inconsistency of data and reports.

(5) The system can provide more reliable and consistent procedures to eliminate errors.

(6) The system can provide up-to-date and accurate information to management team, staffs and customers.

(7) Reduce lost of data by keeping it in a database and making a backup.

3.2 System Design

The proposed system intends to control major activities of project information system. It will be shown by the context diagram as in the appendix. The system will focus on

Process 1: Staff System

This process is to create staff information to the database and to define authorize access for staff. The staff can change their personal information themselves. Special

bonus is determined by department manager at this process. The staff database will be used for other processes.

Process 2: Project System

This process is to create project information to the database. The status and phase of the project will be updated at this process. The process generate list of project connection and status, etc. Then they send those reports to the management team and the customer

Process 3: Timesheet System

This process is to receive the number of work hours from the staffs. It calculates the man hours of the staff. The process generates monthly reports, yearly reports and requested reports such as monthly evaluation of working performance, and monthly evaluation of operational performance.

3.3 Hardware and Software Requirements

3.3.1 Proposed Computer Hardware

Computer 1 unit

(1) IBM Netfinity 3500M10 include

(2) RAM 128 MB

(3) Hard Disk 9.1 GB

(4) 1.44 MB Floppy Disk

(5) 14" Color Monitor

(6) Keyboard 104 keys

Printer 1 unit

(1) Printer HP Laser Jet 4L

Back-up System

(1) Uninterrupted Power Supply (UPS)

3.3.2 Software

(1) Windows NT 4.0

(2) MS SQL Server

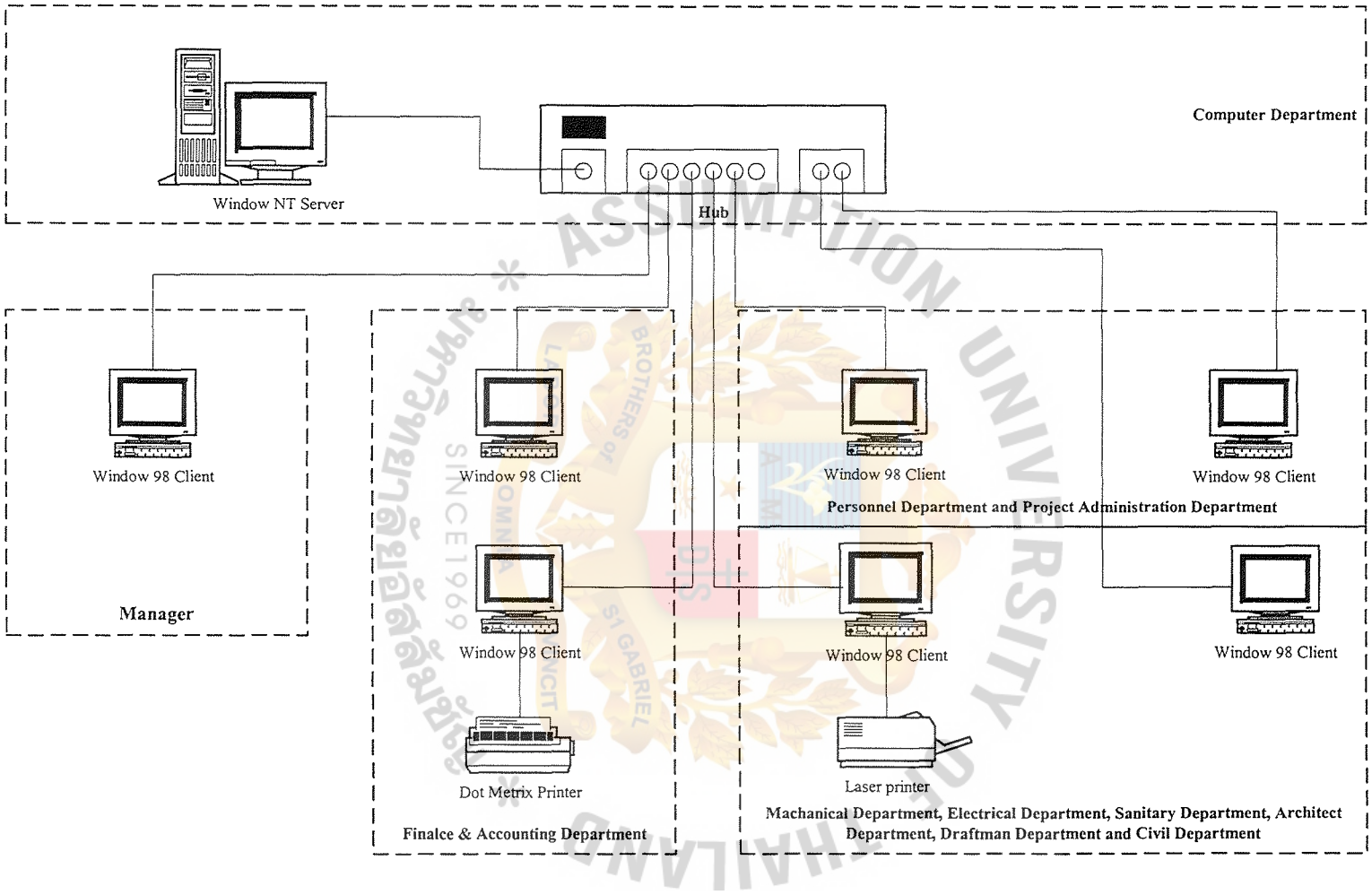


Figure 3.1. The Hardware Configuration of Project Information System.

3.4 Security and Control

Data are expensive, so security is a major issue. There are risks of software, hardware, and human error. The security system and control system helps to ensure that the system runs as planned and the errors are detected and corrected before the system is affected.

The proposed system has the features in preventing errors as the flowing:

(1) Input Validation of data will be checked for accuracy when entered into the system.

(2) Password is used to prevent unauthorized users from accessing the system.

(3) Data and application program must be backed up in a save place.

(4) UPS is used to prevent the risk of power failure.

(5) Controlled totals and consistency checks are a few of many techniques that can be built into the software.

(6) The output controls techniques are used to check the completeness and the accuracy of the data from the output.

(7) The computer must be placed in a safe place.

3.5 Cost/ Benefit Analysis

In definition phase of system analysis, we have to study all possible users requirements in order to find out the best solution for system implementation. The comparison of the costs of the existing system and the proposed system is a major factor to determine whether the proposed system should be implemented or not. There are costs associated with developing the system and there are costs associated with operation system. System development costs are usually onetime costs.

There are three techniques to access economic feasibility, also called cost-effectiveness: payback analysis, return on investment, and net present value. For the project information system:

(1) Payback Period = 0.2 Year

(2) Net Present Value = 202,156.64 baht

Payback analysis technique is a simple and popular method for determining if and when an investment will pay for itself. Because systems development costs are incurred long before benefits begin to accrue, it will take some period for the benefits to overtake the costs. After implementation, we will have incurred additional operating expenses that must be recovered. Payback analysis determines how much time will lapse before accrued benefits overtake accrued and continuing costs. This period of time is called the payback period.

Return on Investment technique (ROI) analysis compares the lifetime profitability of alternative solutions or projects. The ROI for a solution or project is a percentage rate that measures the relationship between the amount the business gets back from an investment and the amount invested.

Net Present Value of an investment alternative is considered the preferred cost-benefit technique by many managers. We initially determine the costs and benefits for each year of the system's lifetime. We need to adjust all the costs and benefits back to present value. After discounting all costs and benefits, subtract the sum of the discounted costs from the sum of the discounted benefits to determine the net present value. If it is positive, the investment is good. If negative, the investment is bad. When comparing multiple solutions or projects, the one with the highest positive net present value is the best investment.

(1) Costs of the Manual System

The costs of manual system is described in Table 3.1. Manual System Cost Analysis.

(2) Costs of the Proposed System

The costs of proposed system is describe in Table 3.3. Proposed System Cost Analysis.

Table 3.1. The Manual System Cost Analysis, Baht.

Cost items	Years				
	1	2	3	4	5
Fixed Cost:					
Hardware Cost:					
Computer Cost	5,000.00	5,000.00	5,000.00	5,000.00	5,000.00
Printer Cost	2,000.00	2,000.00	2,000.00	2,000.00	2,000.00
Total Hardware Cost	8,000.00	8,000.00	8,000.00	8,000.00	8,000.00
Software Cost:					
Window 98	1,176.00	1,176.00	1,176.00	1,176.00	1,176.00
Microsoft Excel	552.00	552.00	552.00	552.00	552.00
Total Software Cost	1,728.00	1,728.00	1,728.00	1,728.00	1,728.00
Total Fixed Cost	18,456.00	18,456.00	18,456.00	18,456.00	18,456.00
Operating Cost					
Salary Cost:					
Project Admin Officer 6 persons@9,000 (increase 5% per year)	54,000.00	56,700.00	59,535.00	62,511.75	65,637.34
Personal Officer 1 person @ 8,000 (increase 5% per year)	8,000.00	8,400.00	8,820.00	9,261.00	9,724.05
Total Monthly Salary Cost	62,000.00	65,100.00	68,355.00	71,772.75	75,361.39
Total Annual Salary Cost	744,000.00	781,200.00	820,260.00	861,273.00	904,336.65
Office Supplies & Miscellaneous Cost:					
Stationary Per Annual	4,000.00	4,120.00	4,243.60	4,370.91	4,502.04
Paper Per Annual	15,000.00	15,450.00	15,913.50	16,390.91	16,882.63
Miscellaneous Per Annual	3,000.00	3,090.00	3,182.70	3,278.18	3,376.53
Utility Per Annual	10,000.00	10,300.00	10,609.00	10,927.27	11,255.09
Ribbon Per Annual	8,640.00	9,072.00	9,504.00	9,936.00	10,368.00
Total Office Supplies & Miscellaneous Cost	40,640.00	42,032.00	43,452.80	44,903.26	46,384.28
Total Operating Cost	784,640.00	823,232.00	863,712.80	906,176.26	950,720.93
Total Existing System Cost	803,096.00	841,688.00	882,168.80	924,632.26	969,176.93

Table 3.2. Five Years Accumulated Existing System Cost, Baht.

Year	Total Existing Cost	Accumulated Cost
1	803,096.00	803,096.00
2	841,688.00	1,644,784.00
3	882,168.80	2,526,952.80
4	924,632.26	3,451,585.06
5	969,176.93	4,420,762.00
Total	4,420,762.00	

Table 3.3. The Proposed System Cost Analysis, Baht.

Cost items	Years				
	1	2	3	4	5
Fixed Cost:					
Hardware Cost:					
Computer Cost	40,000.00	40,000.00	40,000.00	40,000.00	40,000.00
Total Hardware Cost	40,000.00	40,000.00	40,000.00	40,000.00	40,000.00
H/W Maintainance Cost					
Maintainance Cost					
(25% of H/W Cost at 1st year, 3% after 2nd year)	50,000.00	6,000.00	6,000.00	6,000.00	6,000.00
Total Maintainance Cost	50,000.00	6,000.00	6,000.00	6,000.00	6,000.00
Software Cost:					
Windows NT 4.0	9,800.00	6,100.00	6,100.00	6,100.00	6,100.00
MS SQL Server	50,000.00	50,000.00	50,000.00	50,000.00	50,000.00
S/W Maintainance Cost(MS SQL Application)					
Maintainance Cost					
(30% of S/W Cost at 1st year, 3% after 2nd year)	75,000.00	7,500.00	7,500.00	7,500.00	7,500.00
Total Software Cost	134,800.00	63,600.00	63,600.00	63,600.00	63,600.00
Total Fixed Cost	224,800.00	109,600.00	109,600.00	109,600.00	109,600.00
Operating Cost					
Salary Cost:					
System Analyst 1 persons@20,000	20,000.00	22,000.00	24,200.00	26,620.00	29,282.00
(increase 10% per year)					
Computer Staff 2 person @ 12,000	24,000.00	26,400.00	29,040.00	31,944.00	35,138.40
(increase 10% per year)					
Total Monthly Salary Cost	44,000.00	48,400.00	53,240.00	58,564.00	64,420.40
Total Annual Salary Cost	528,000.00	580,800.00	638,880.00	702,768.00	773,044.80
Office Supplies & Miscellaneous Cost:					
Stationary Per Annual	5,900.00	6,077.00	6,259.31	6,447.09	6,640.50
Paper Per Annual	8,500.00	8,755.00	9,017.65	9,288.18	9,566.82
Miscellaneous Per Annual	6,500.00	6,695.00	6,895.85	7,102.73	7,315.81
Utilitiy Per Annual	13,500.00	13,905.00	14,322.15	14,751.81	15,194.37
Toner Per Annual	17,850.00	18,742.50	19,304.78	19,883.92	20,480.44
Total Office Supplies & Miscellaneous Cost	52,250.00	54,174.50	55,799.74	57,473.73	59,197.94
Total Operating Cost	580,250.00	634,974.50	694,679.74	760,241.73	832,242.74
Total Proposed System Cost	805,050.00	744,574.50	804,279.74	869,841.73	941,842.74

Table 3.4. Economic Feasibility Analysis for Project Information System, Baht.

Cost Items	Year 1	Year 2	Year 3	Year 4	Year 5
Total Fixed Cost	224,800.00	109,600.00	109,600.00	109,600.00	109,600.00
Total Operating Cost	580,250.00	634,974.50	694,679.74	760,241.73	832,242.74
Total Proposed System Cost	805,050.00	744,574.50	804,279.74	869,841.73	941,842.74
Discount factor 8%	0.93	0.86	0.79	0.74	0.68
Time adjusted cost (adjusted to present value)	745,416.67	638,352.62	638,463.18	639,359.64	641,002.34
Cumulative time-adjusted cost over life time	745,416.67	1,383,769.29	2,022,232.47	2,661,592.11	3,302,594.45
Cost of using manual system	803,096.00	841,688.00	882,168.80	924,632.26	969,176.93
Discount factor 8%	0.93	0.86	0.79	0.74	0.68
Time adjusted cost (adjusted to present value)	743,607.41	721,611.80	700,294.04	679,632.32	659,605.53
Cumulative time-adjusted cost over life time	743,607.41	1,465,219.20	2,165,513.24	2,845,145.56	3,504,751.09
Time-adjusted cashflow (Initial investment and expected benefit)	-1,809.26	83,259.17	61,830.85	40,272.68	18,603.19
Cumulative life time-adjust cost + benefit	- 1,809.26	81,449.91	143,280.77	183,553.45	202,156.64

Table 3.5. Five Years Proposed System Cost, Baht.

Year	Total Proposed Cost	Accumulated Cost
1	805,050.00	805,050.00
2	744,574.50	1,549,624.50
3	804,279.74	2,353,904.24
4	869,841.73	3,223,745.96
5	941,842.74	4,165,588.70
Total	4,165,588.70	

Table 3.6. The Comparision of the System Costs, Baht.

Year	Accumulated Existing System Cost	Accumulated Proposed System Cost
1	803,096.00	805,050.00
2	1,644,784.00	1,549,624.50
3	2,526,952.80	2,353,904.24
4	3,451,585.06	3,223,745.96
5	4,420,762.00	4,165,588.70

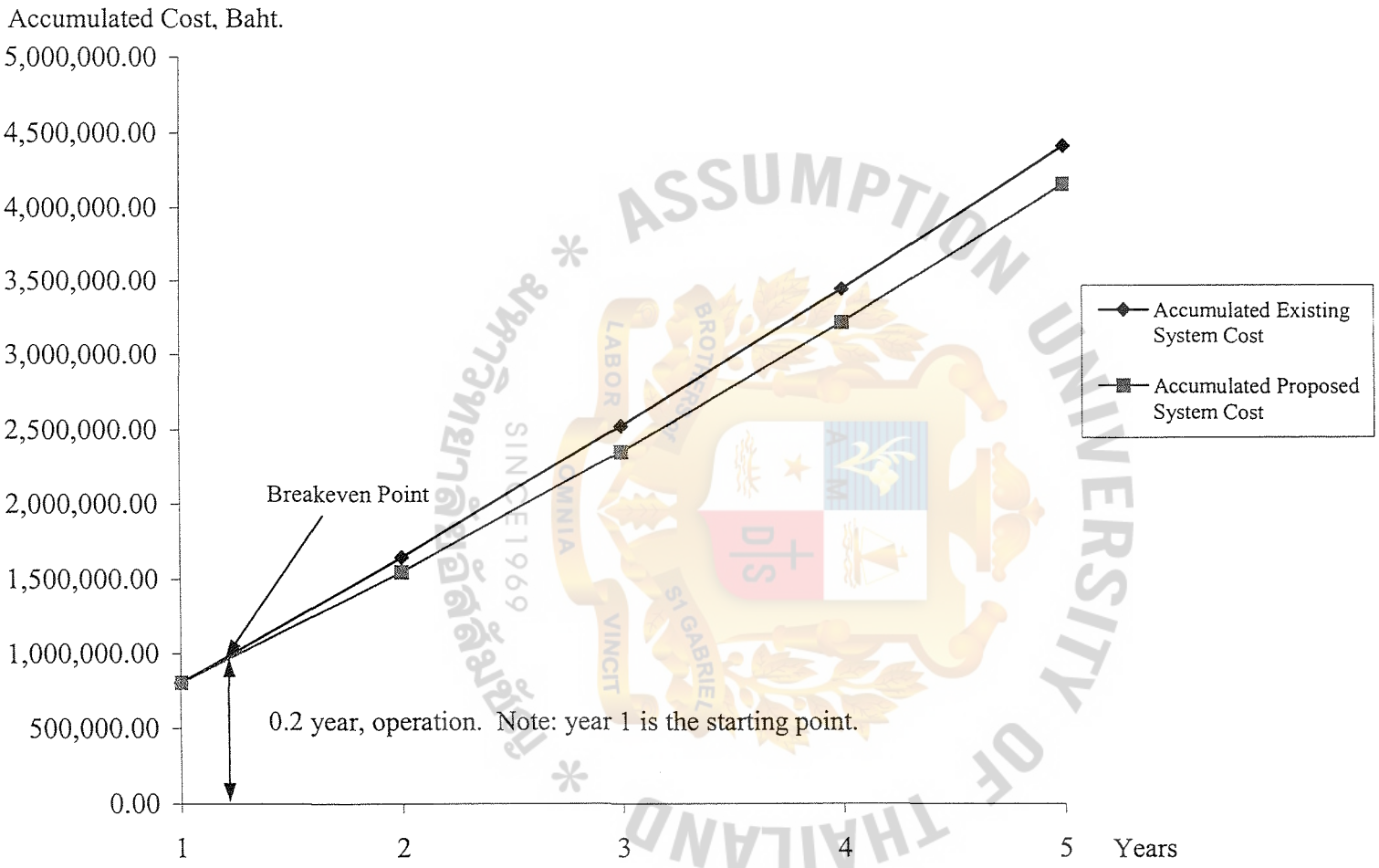


Figure 3.2. Break-even Chart.

IV. PROJECT IMPLEMENTATION

4.1 Overview of Project Implementation

The project implementation is the construction of the proposed system and the delivery of that system into day-to-day operation. It consists of three primary activities: training, conversion, and post-implementation review.

4.1.1 Training

The proposed system requires the users to be trained and provided with user's manual which guided them as to use the proposed system.

4.1.2 Conversion

Conversion is the process of changing from the existing system to the proposed system. Parallel system is the most secured method of converting by running the existing system along with the proposed system. The existing system can take over if errors are found in the new system. Parallel conversion minimizes the risk of major flaws in the proposed system causing irreparable harm to the business. It causes work delays because of double workloads of staffs.

4.1.3 Post implementation review

This review is the process after the system is implemented and conversion is completed. It determines how well the system is working, how it has been accepted and whether adjustments are needed. This is the first source which information is important for the system maintenance requirement.

4.2 Testing

There are many ways to test the program. We select system testing to ensure the completeness, correctness, reliability and maintainability of the project.

(1) Code Testing

It examines the logic of the program. The analysts or programmers test cases performing over instruction in the program or module. In this way every path through the program is tested.

(2) Specification Testing

The analysts or programmers examine the specification indicating what the program should do and how it should perform under various conditions.

(3) Unit Testing

The analysts test the programs. It stresses on each independent module to locate errors.

(4) System Testing

The analysts do not test the software per second. They test the integration of each module in the system. They also detect discrepancies between the system and its original objectives, current specifications, and system documentation.

V. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Industrial Engineering Co., Ltd. provides the services needed for a construction project. They realize the benefit of using the proposed system to replace the existing system. It also enables the company to save expenditure cost.

The proposed system will help project information system track information more efficiently. It provides several benefits such as it saves all over time expense, lists of all projects status, lists of all man-hours of staffs, provides up-to-date and accurate information and provides requested information.

Finally, the proposed system is worth the investment, although the initial cost of the proposed system is higher than the cost of the existing system. As we consider project information system as a resource, much like capital and labor, it reduces the cost of routine paper processing and improves the speed of the decision-making process. It is worth it in the long run as we show in the comparison graph between the proposed system and the existing system in this report.

Table 5.1 shows the performance on each process of the proposed system compared with that of 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 in the manual system. 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
Registration Process	20 mins.	5 mins.
Special Bonus Process	1 hr.	10 mins.
Transaction Process	50 mins.	20 mins.
Add New Project Process	2 mins.	2 mins.
Update Project Process	30 mins.	10 mins.
Receive No. of Work Hours Process	1 hr.	20 mins.
Calculate No. of Work Hours Process	2 hrs.	30 mins.
Total	5 hrs. 42 mins.	1 hr. 37 mins

The description of each process of existing system can be summarized to be 7 processes. Registration Process: add new staff, receive timesheet form, generate new staff report. Special Bonus Process: calculate special bonus, receive special bonus, generate special report. Transaction Process: check timesheet form, change position, change department, change personnel information, generate report. Add New Project Process: add new project. Update Project Process: change status, change phase, print project, generate project report. Receive No. of Work Hours Process: fill no. of work hour data. Calculate No of Work Hours Process: issue work hour report, print work hour report.

The description for each process of proposed system can be summarized to be 7 processes. Registration Process: add new staff, print login and password, generate new staff report. Special Bonus Process: calculate special bonus, receive special bonus, generate special report. Transaction Process: change login name, change password, change position, change department, change personnel information, generate report. Add New Project Process: add new project. Update Project Process: change status, change phase, print project, generate project report. Receive No. of Work Hours Process: fill no. of work hour data. Calculate No of Work Hours Process: issue work hour report, print work hour report.

5.2 Recommendations

The project information system is the most important section of the company, it considered as a tool to develop the company's effectiveness. The project information system is an integrated proposed system in which develop from the existing system. The proposed system achieve more successful and reaches organization goal.

However, a proposed system will support the reporting activities of project administration department, and personal department. It can provide detailed reports, summary report, and exception information to the top management, system support and MIS/EDP. The proposed system is envisioned to streamline the business process, which minimize the response time to all-tracking information and outputs. The change of the system will impact to all users, so we need to create positive thinking. We need to give the information about the new system in the way of how much it will facilitate the users job and problems solving.

Therefore the company has further plan to develop other systems. The short-term plan is internet. The system should be on-line with authorizes access only to the customer in the future. Another development plan is to develop workflow of project 's document. We can use Prolog software or Domino for Doc in order to provide efficiency and full range support all keeping and tracking documents' files and drawing files. These software enable company to use the same database with difference locations. We can view the version-updated of each document. The MIS/EPD section has to setup long term plan for the company IT direction to enhance the entire system to achieve a rapid return on investment from short-term project and long-term business initiatives.

APPENDIX A

DATA FLOW DIAGRAM OF THE EXISTING SYSTEM

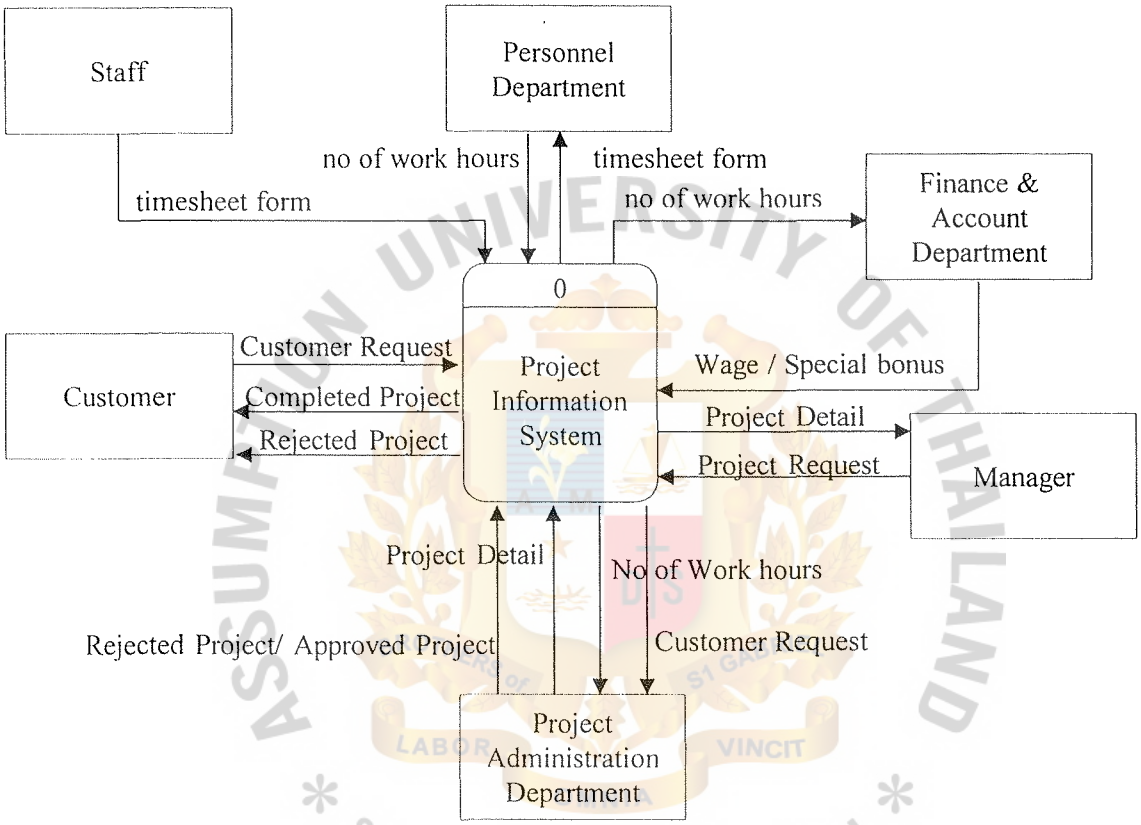


Figure A.1. Context Data Flow Diagram of the Existing System.

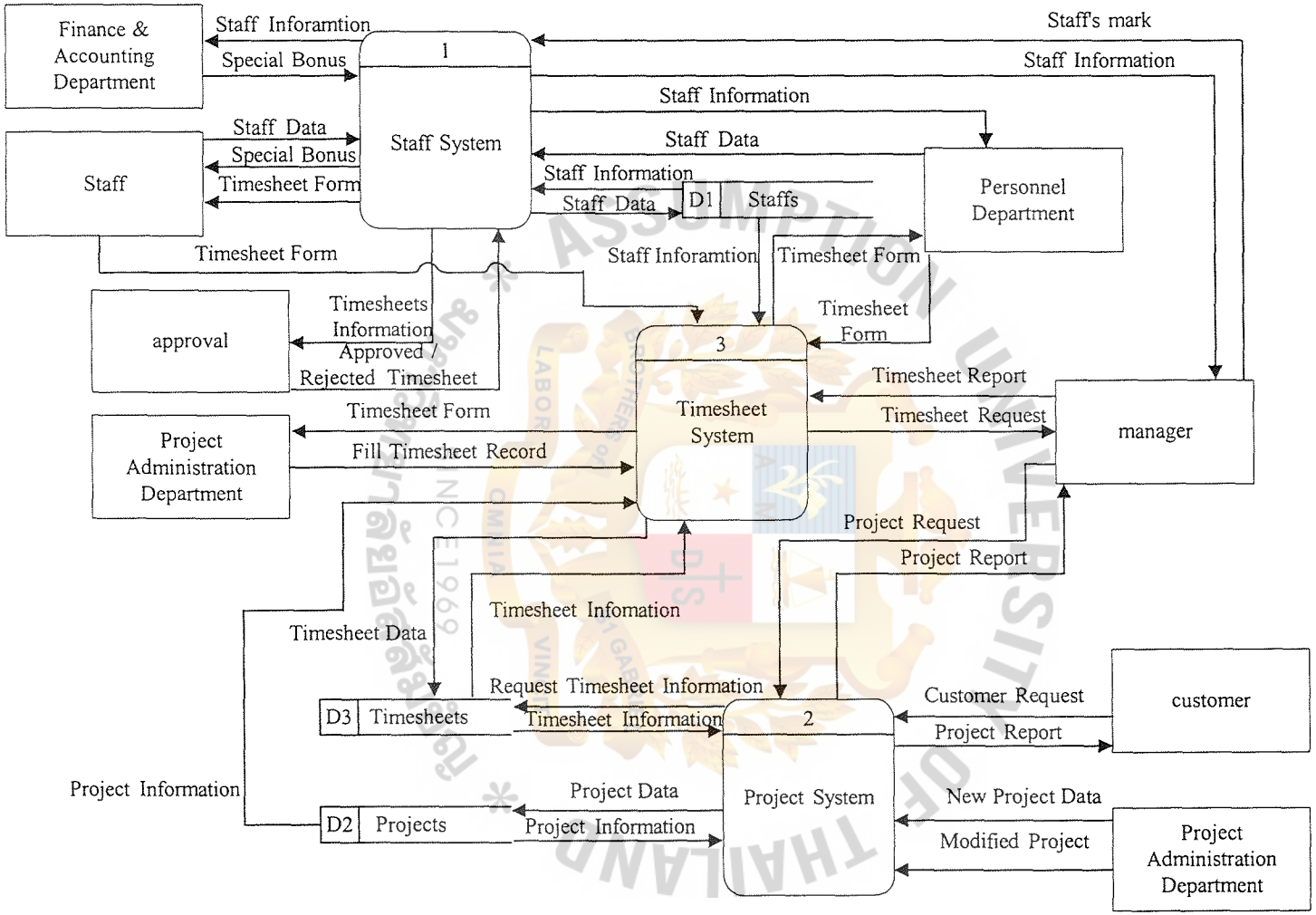


Figure A.2. Level 0 Data Flow Diagram of the Existing Project Information System.

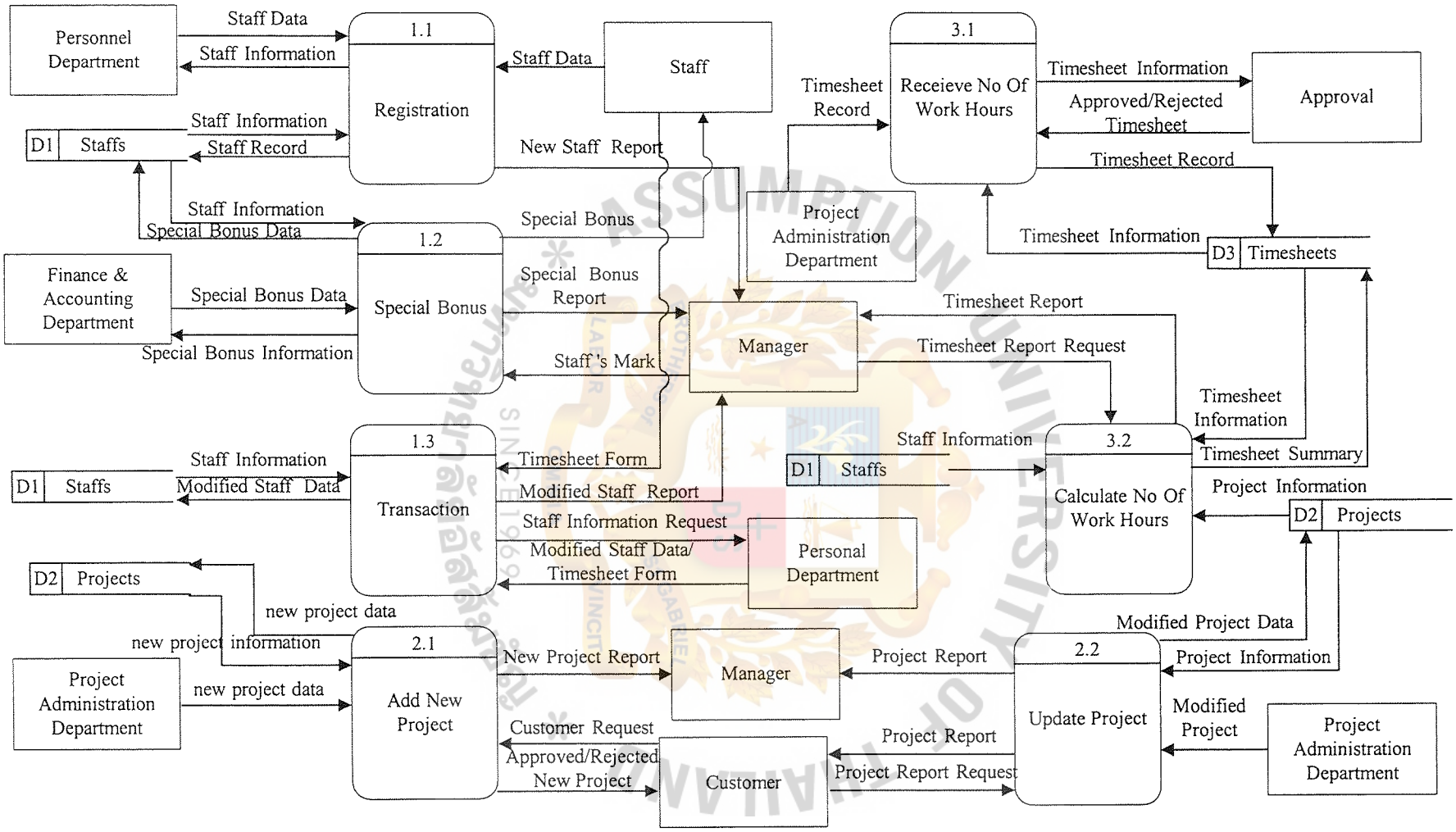


Figure A.3. Level 1 Data Flow Diagram of the Existing Project Information System.

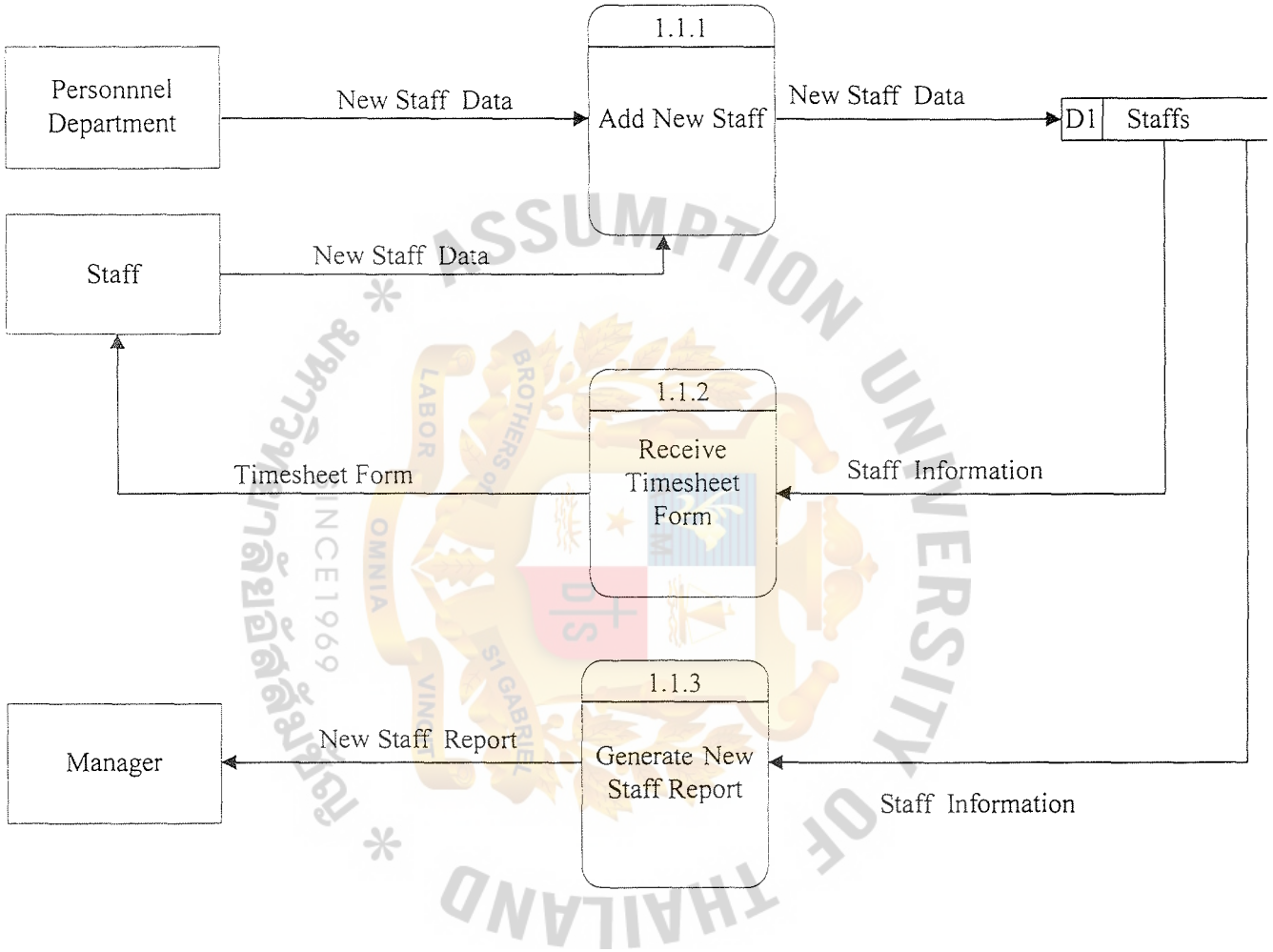


Figure A.4. Level 2 Data Flow Diagram of the Existing Registration Process of Project Information System.

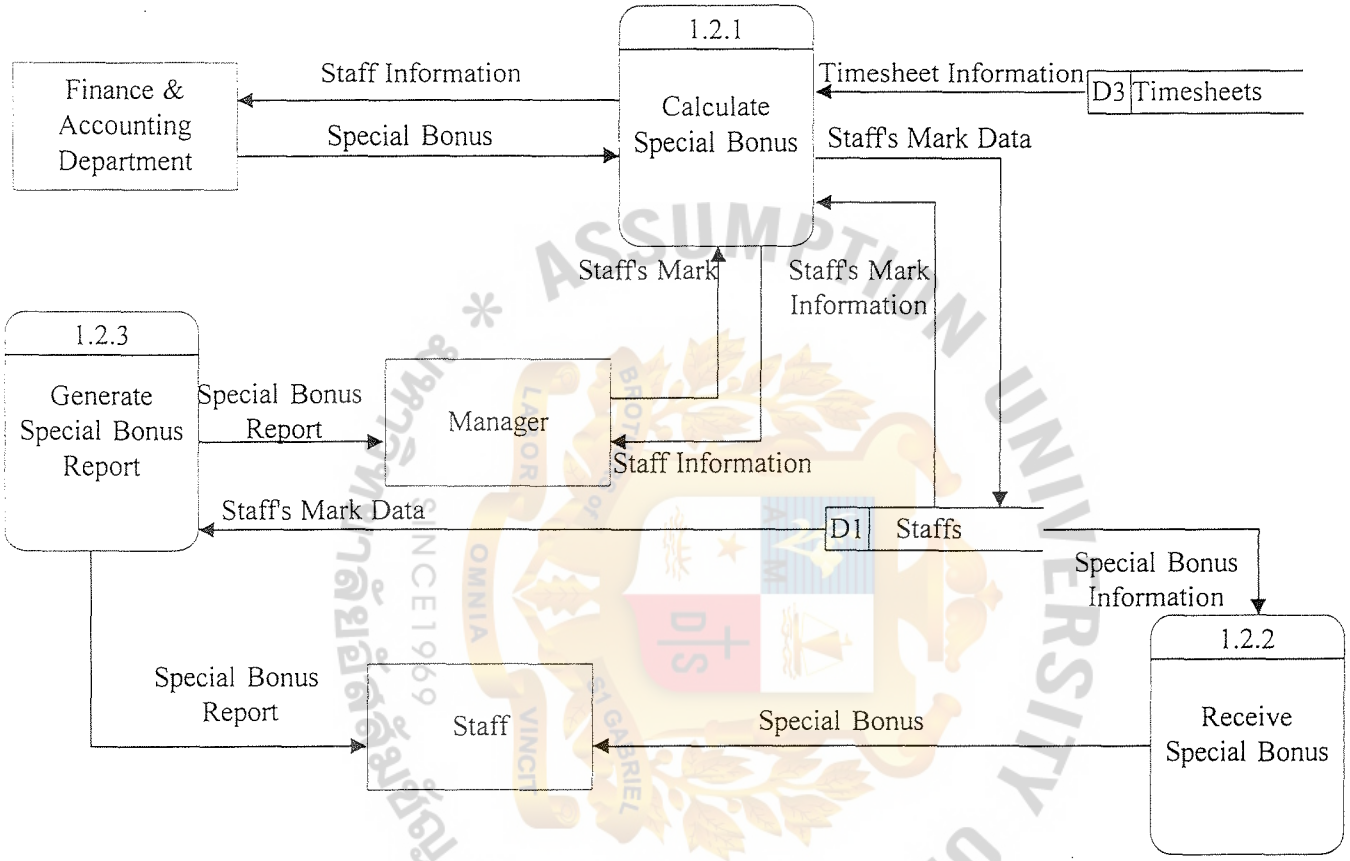


Figure A.5. Level 2 Data Flow Diagram of the Existing Special Bonus Process of Project Information System.

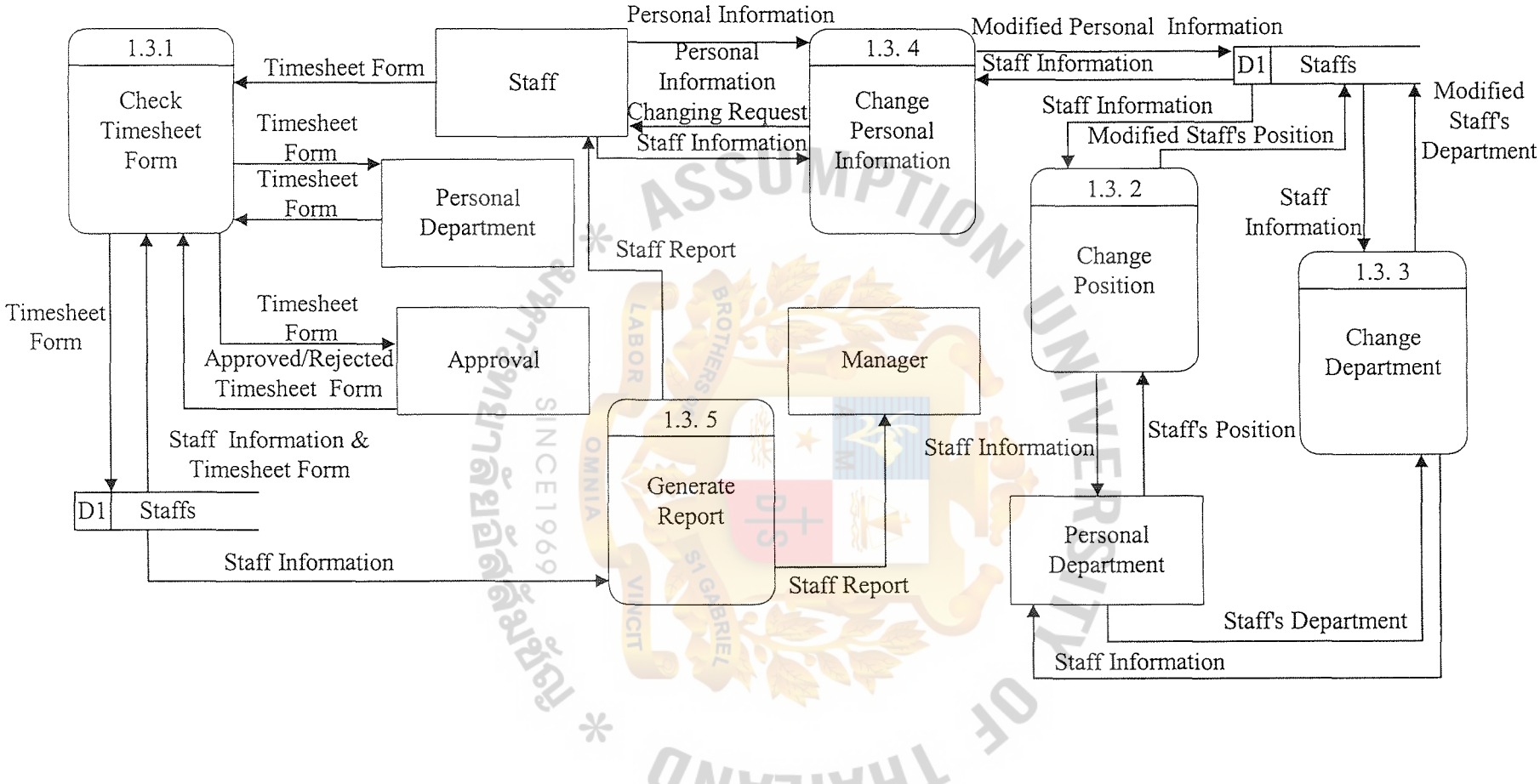


Figure A.6. Level 2 Data Flow Diagram of the Existing Transaction Process of Project Information System.

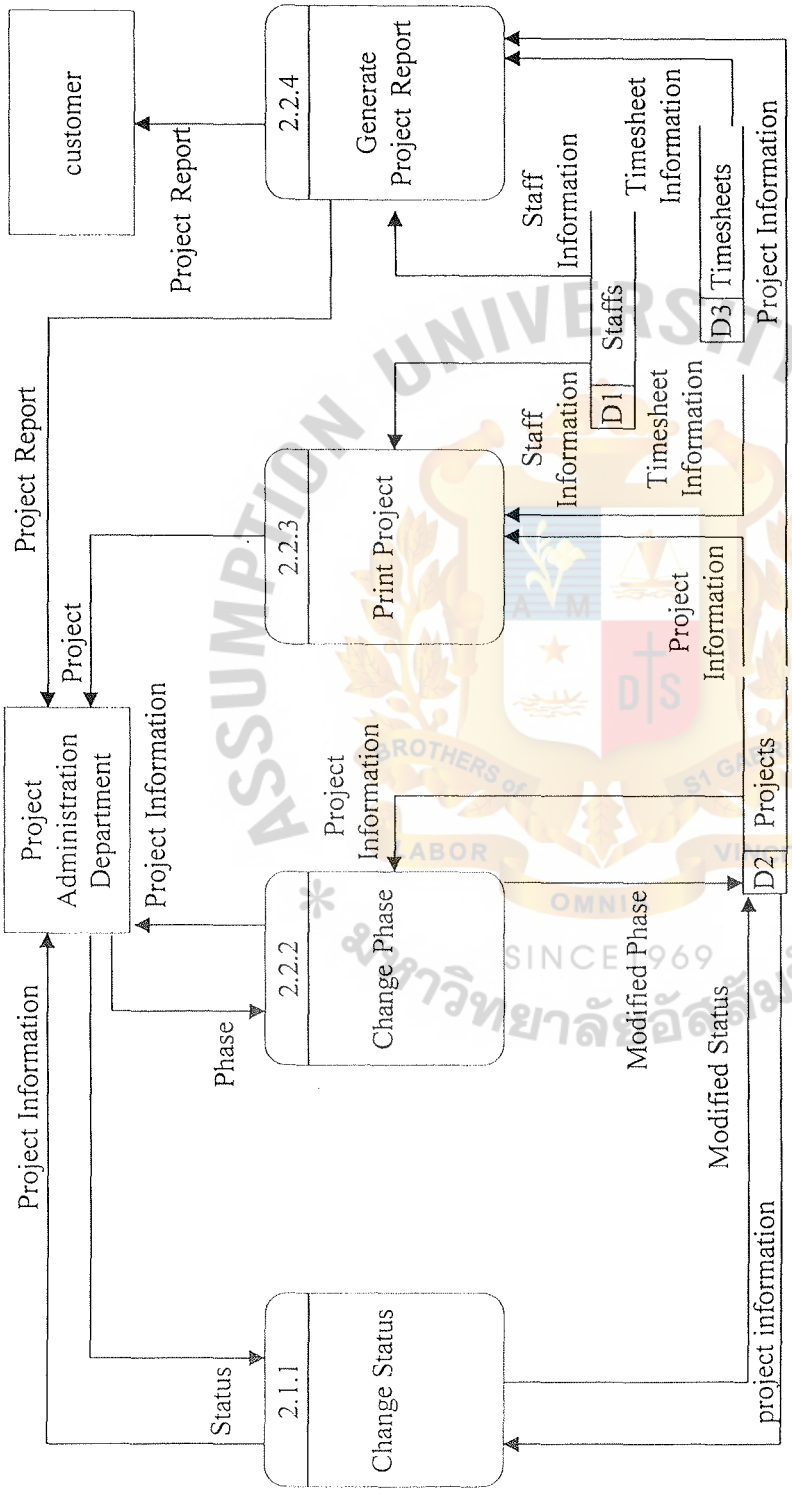


Figure A.7. Level 2 Data Flow Diagram of the Existing Updated Project Process of Project Information System .

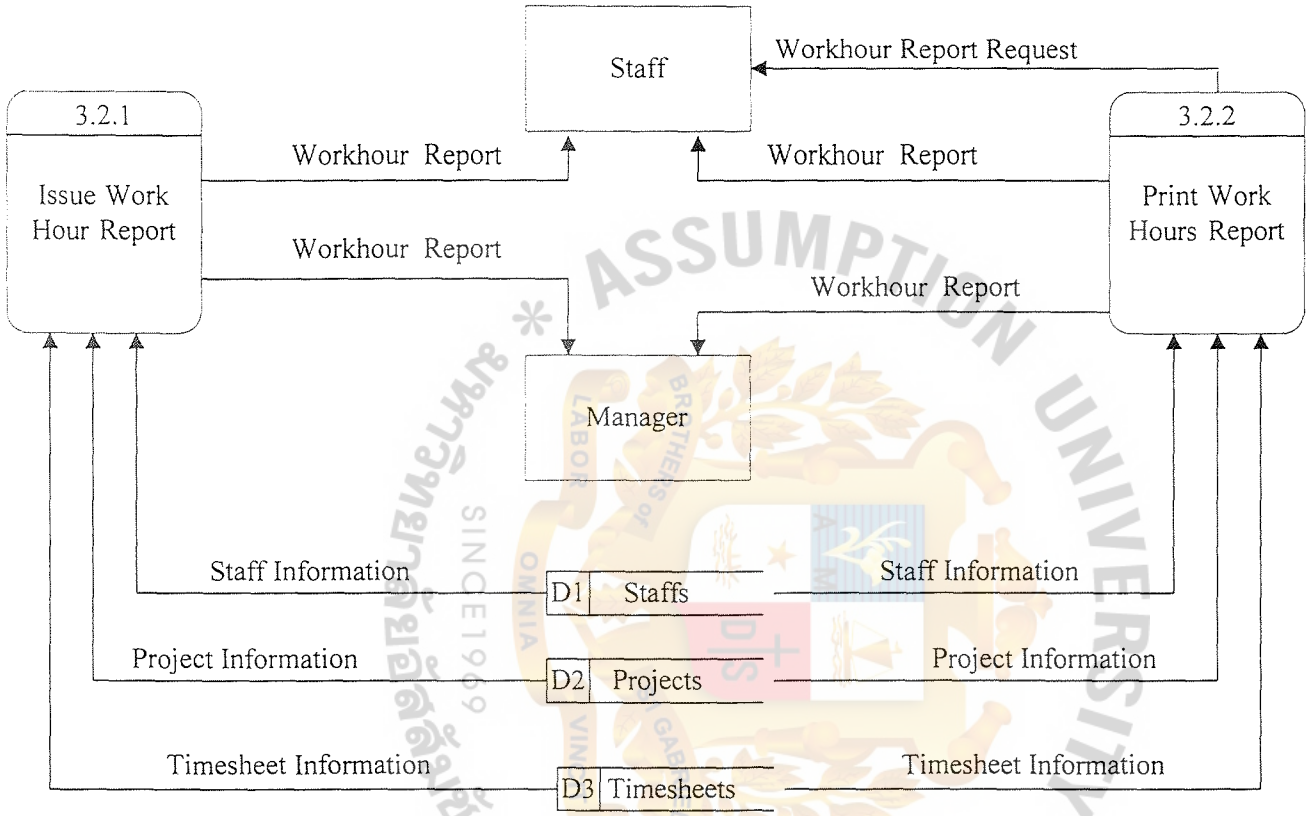


Figure A.8. Level 2 Data Flow Diagram of the Existing Calculate No. of Work Hours Process of Project Information System.

APPENDIX B

DATA FLOW DIAGRAM OF THE PROPOSED SYSTEM

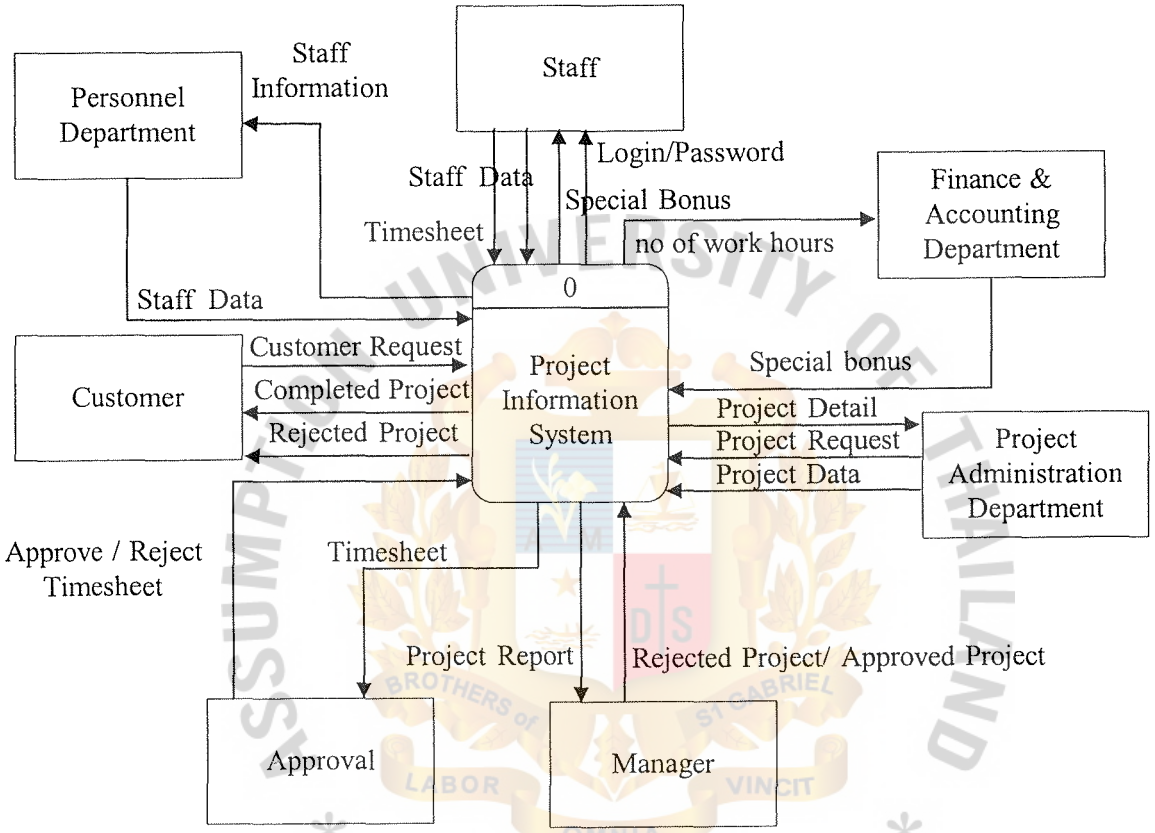


Figure B.1. Context Data Flow Diagram of the Proposed Project Information System.

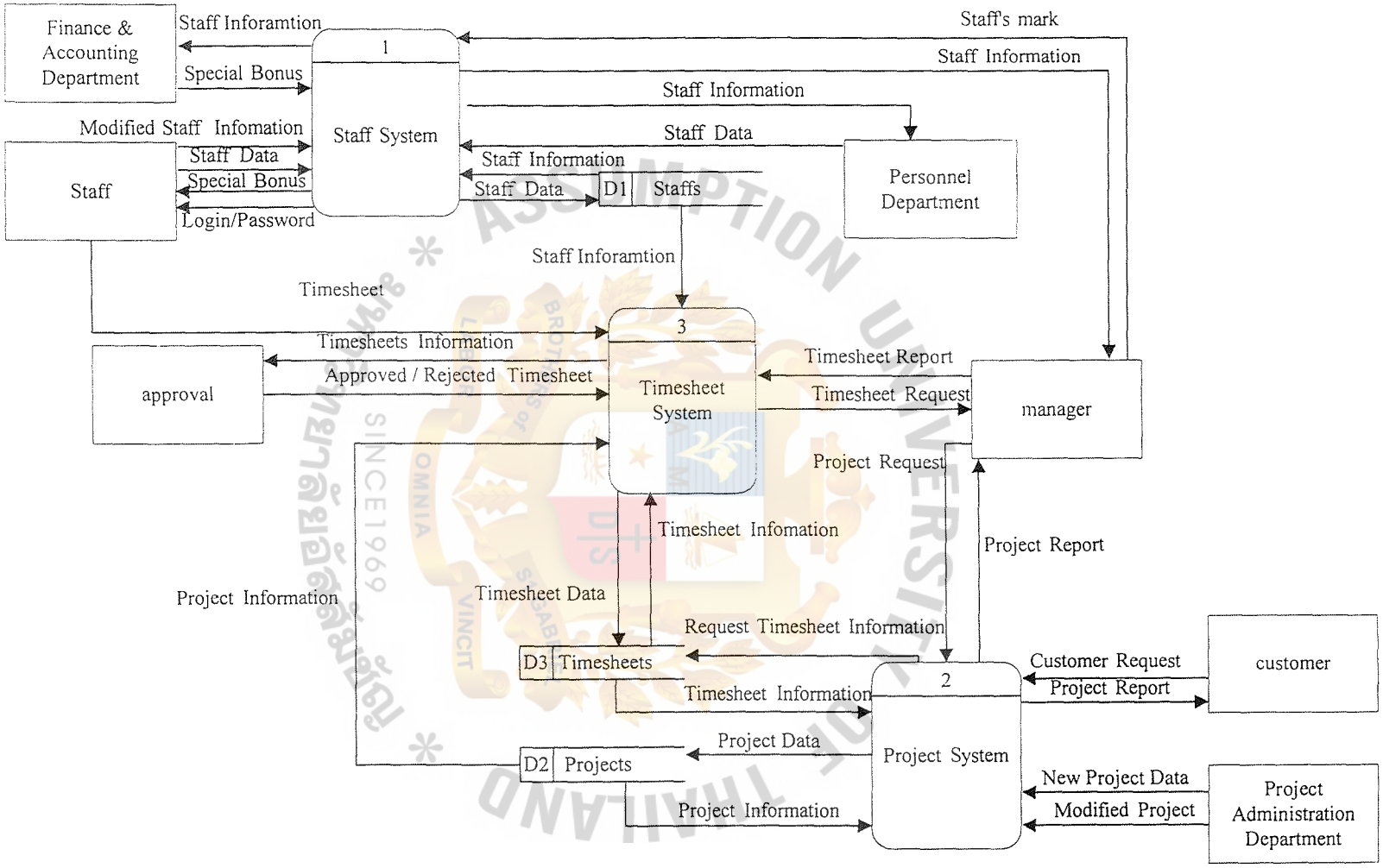


Figure B.2. Level 0 Data Flow Diagram of the Proposed Project Information System.

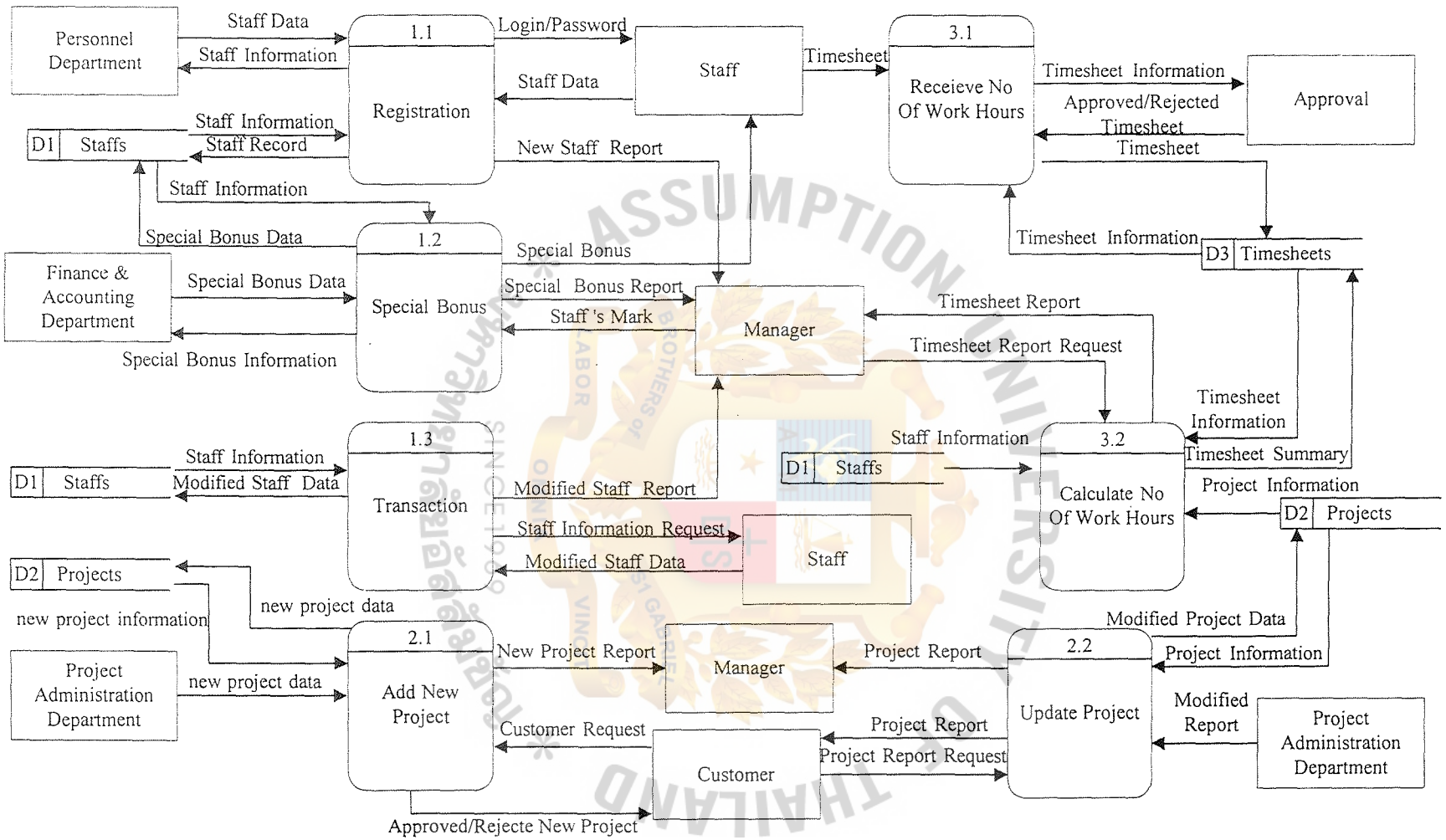


Figure B.3. Level 1 Data Flow Diagram of the Proposed Project Information System.

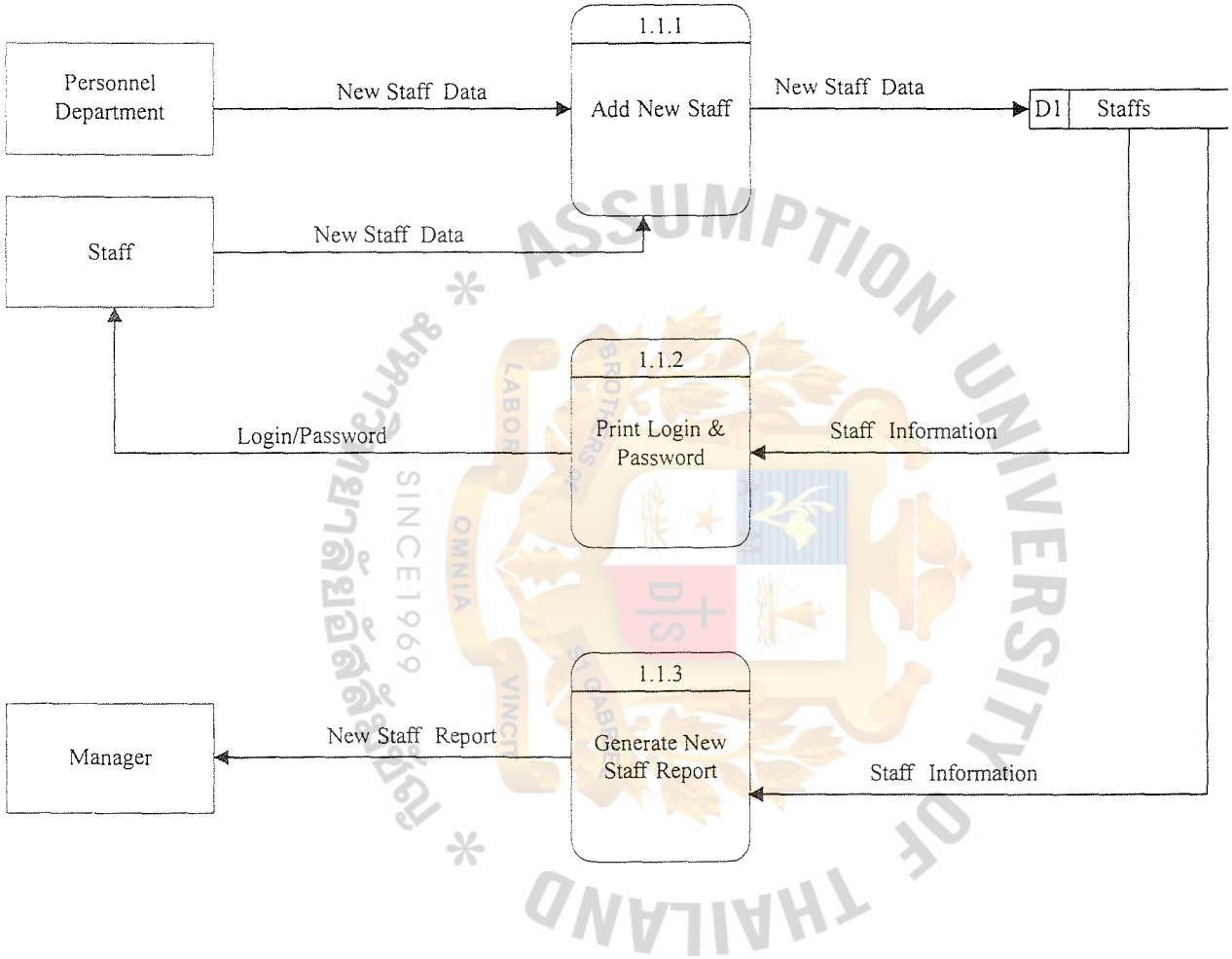


Figure B.4. Level 2 Data Flow Diagram of the Proposed Registration Process of Project Information System.

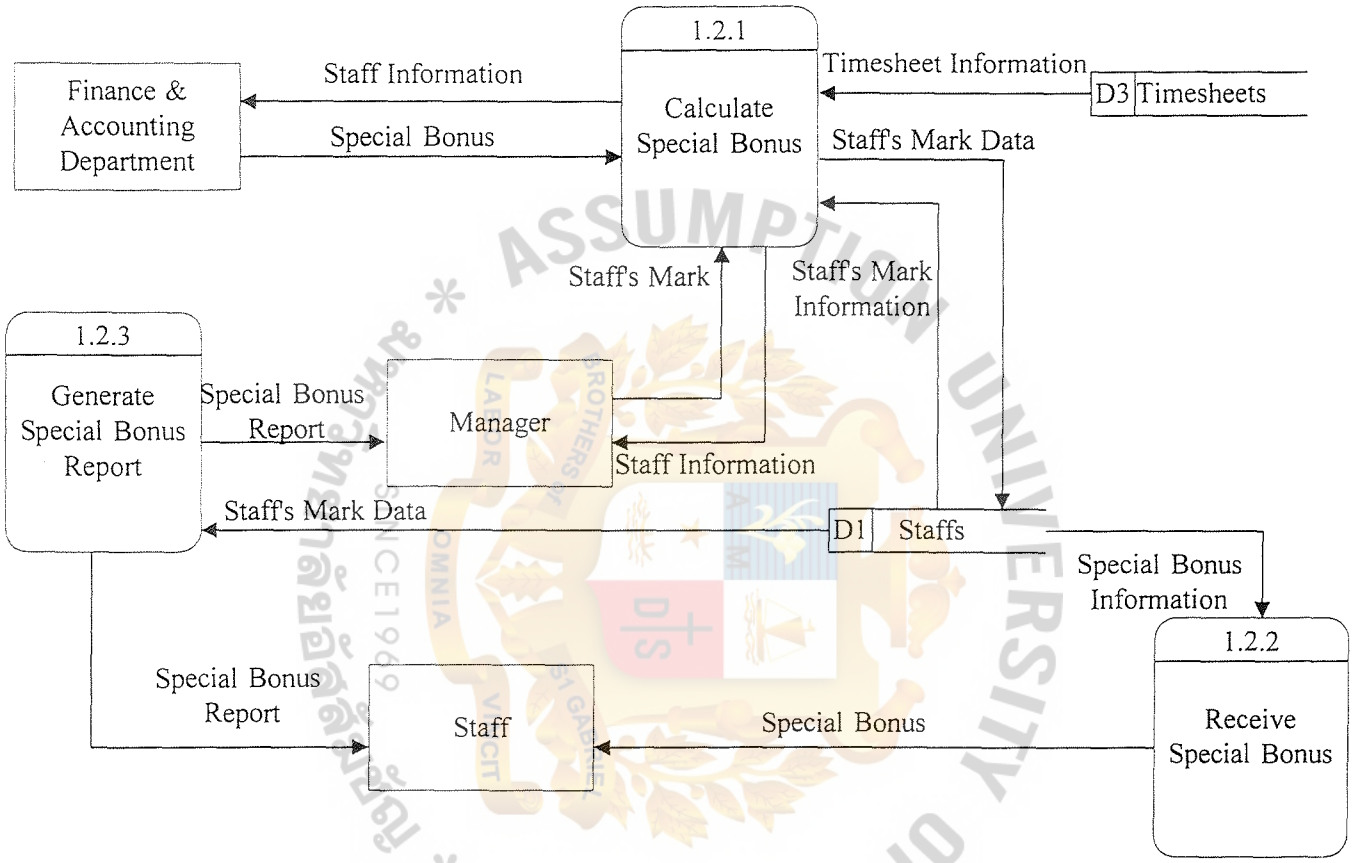


Figure B.5. Level 2 Data Flow Diagram of the Proposed Special Bonus Process of Project Information System.

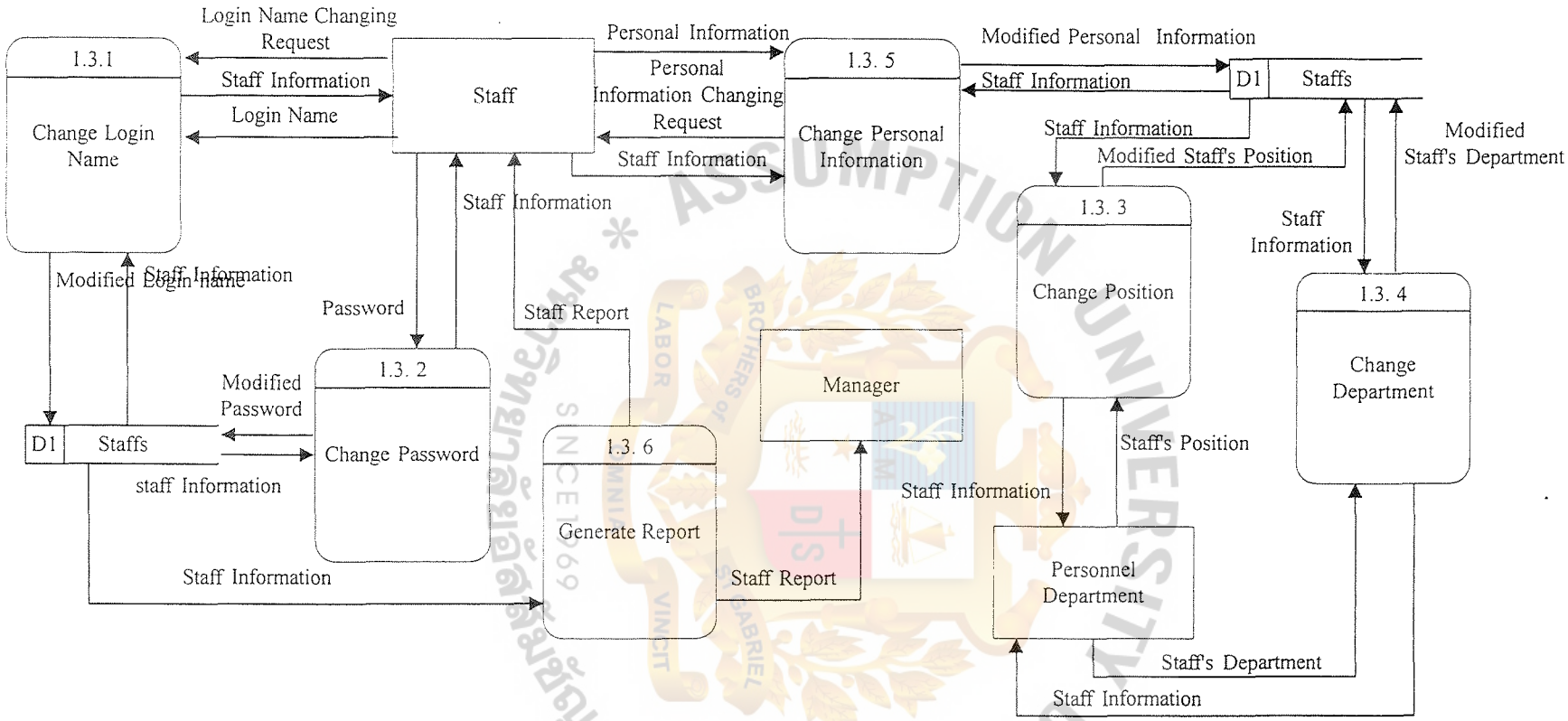


Figure B.6. Level 2 Data Flow Diagram of the Proposed Transaction Process of Project Information System.

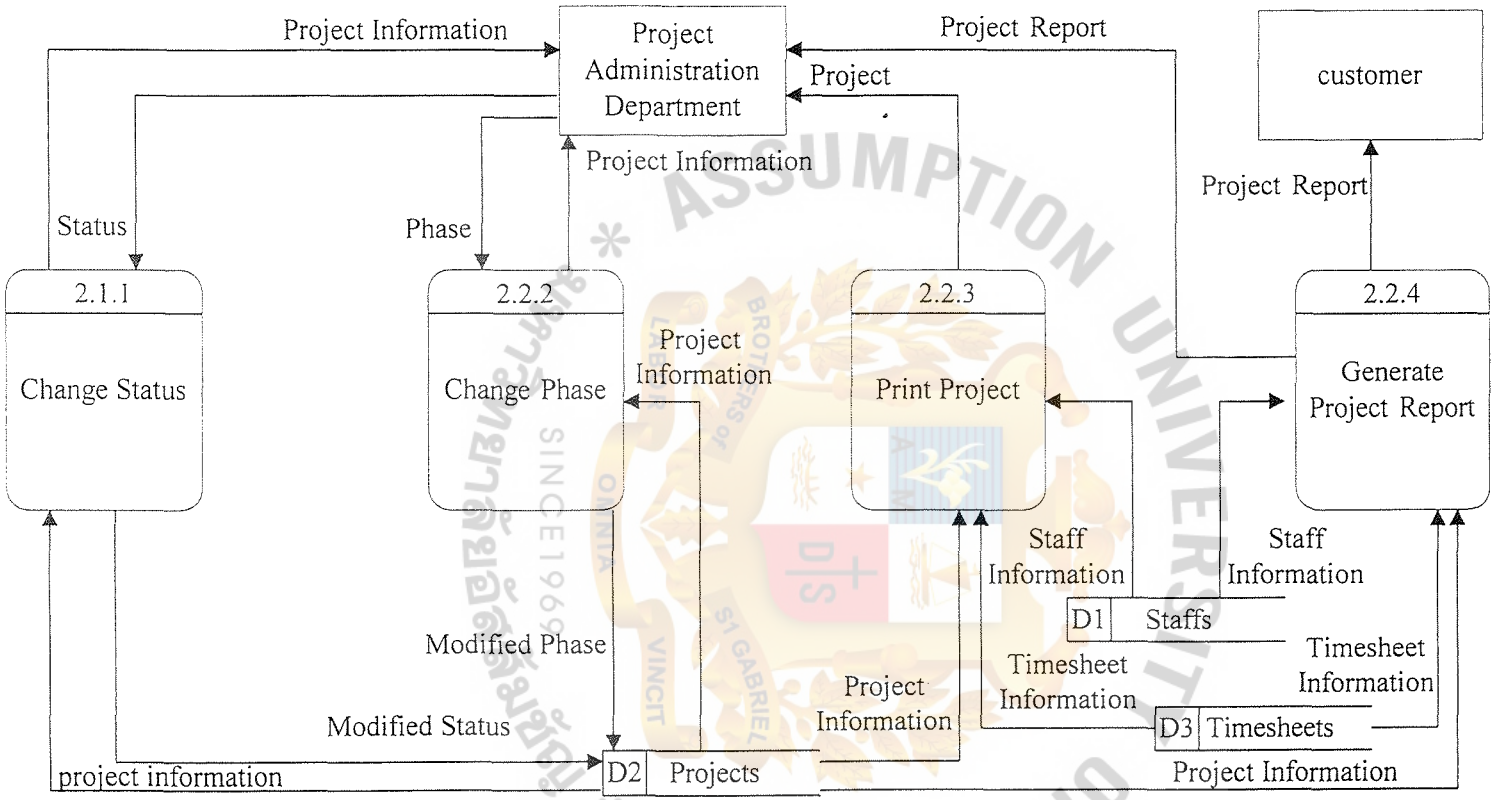


Figure B.7. Level 2 Data Flow Diagram of the Proposed Updated Project Process of Project Information System.

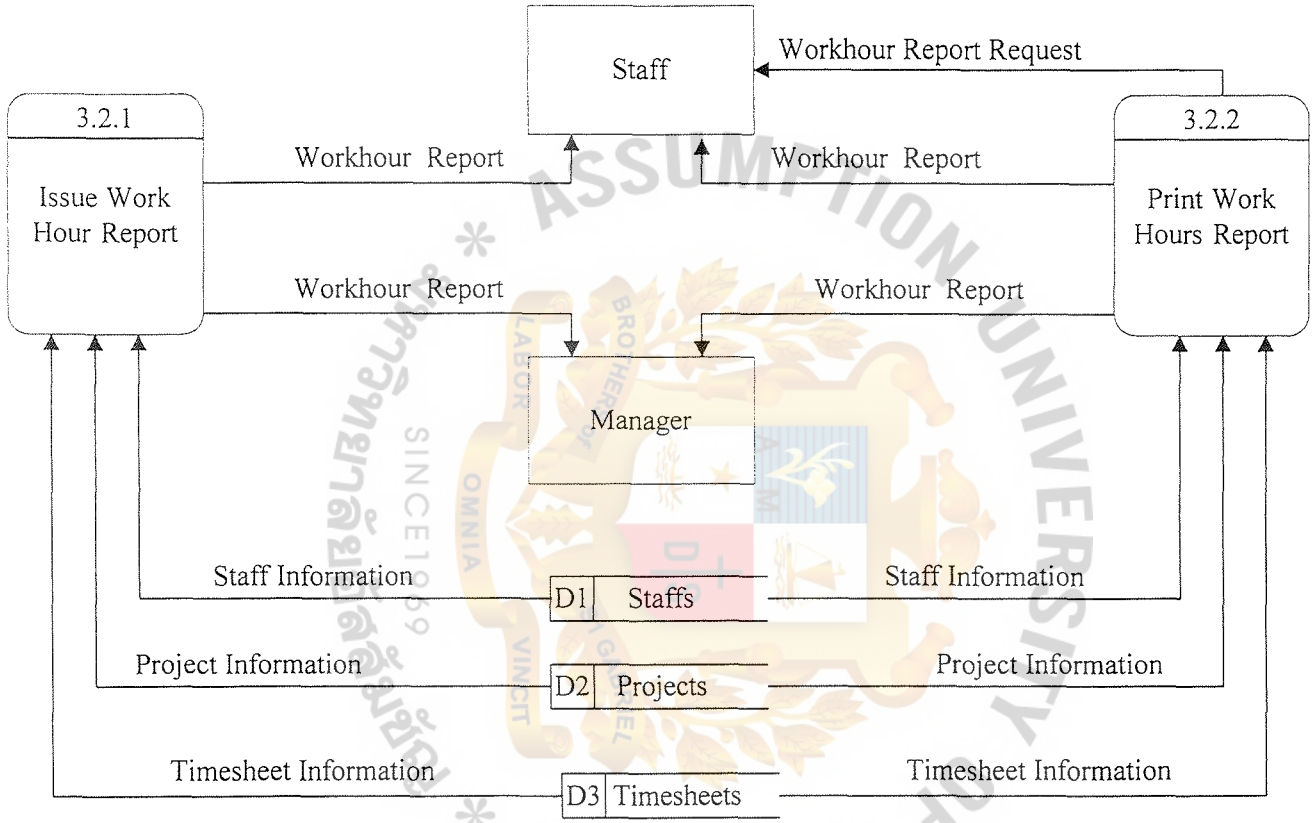


Figure B.8. Level 2 Data Flow Diagram of the Proposed Calculate Number of Work Hours Process of Project Information System.

APPENDIX C

ER DIAGRAM AND DATABASE SCHEMA

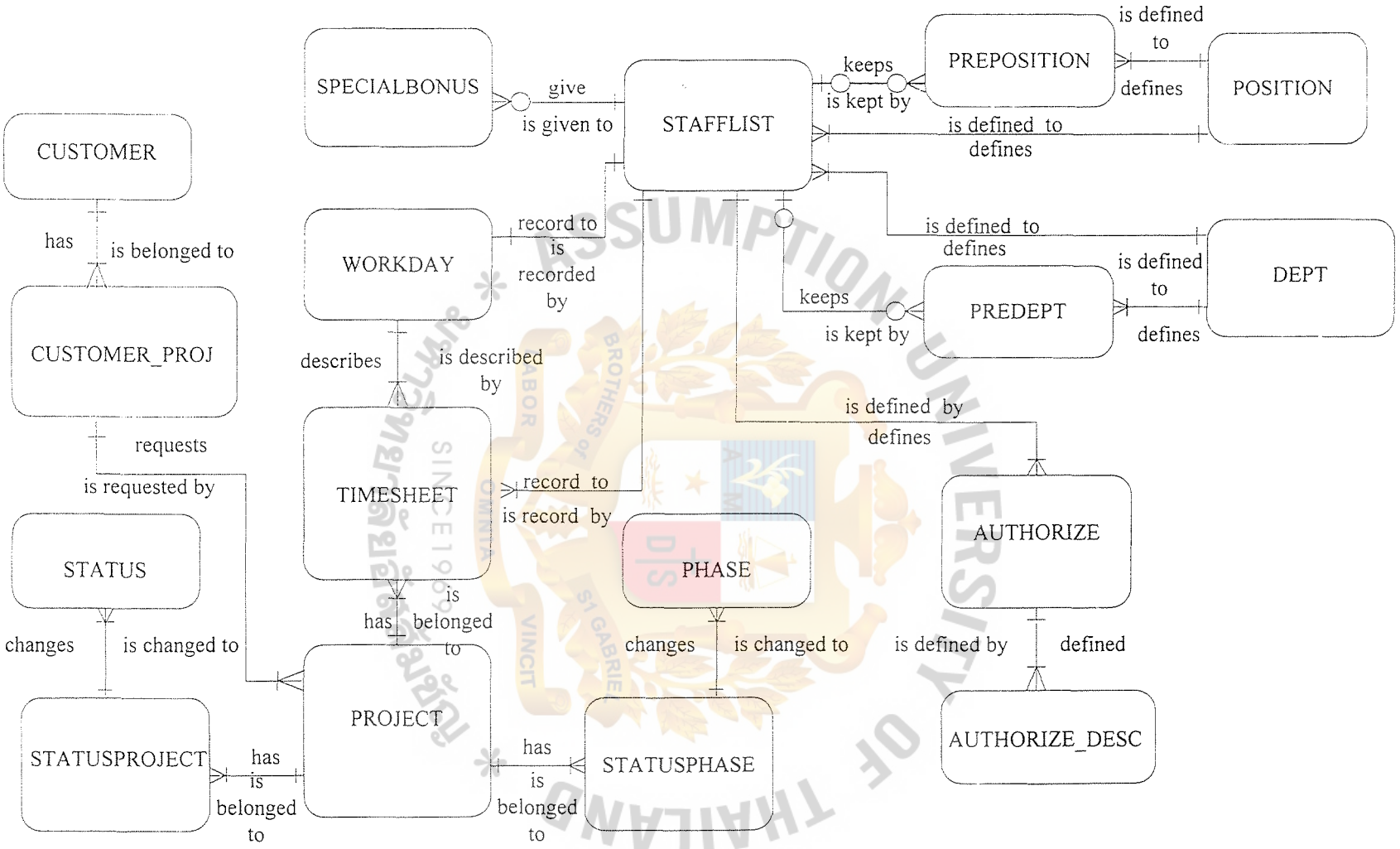


Figure C.1. Context Data Model.

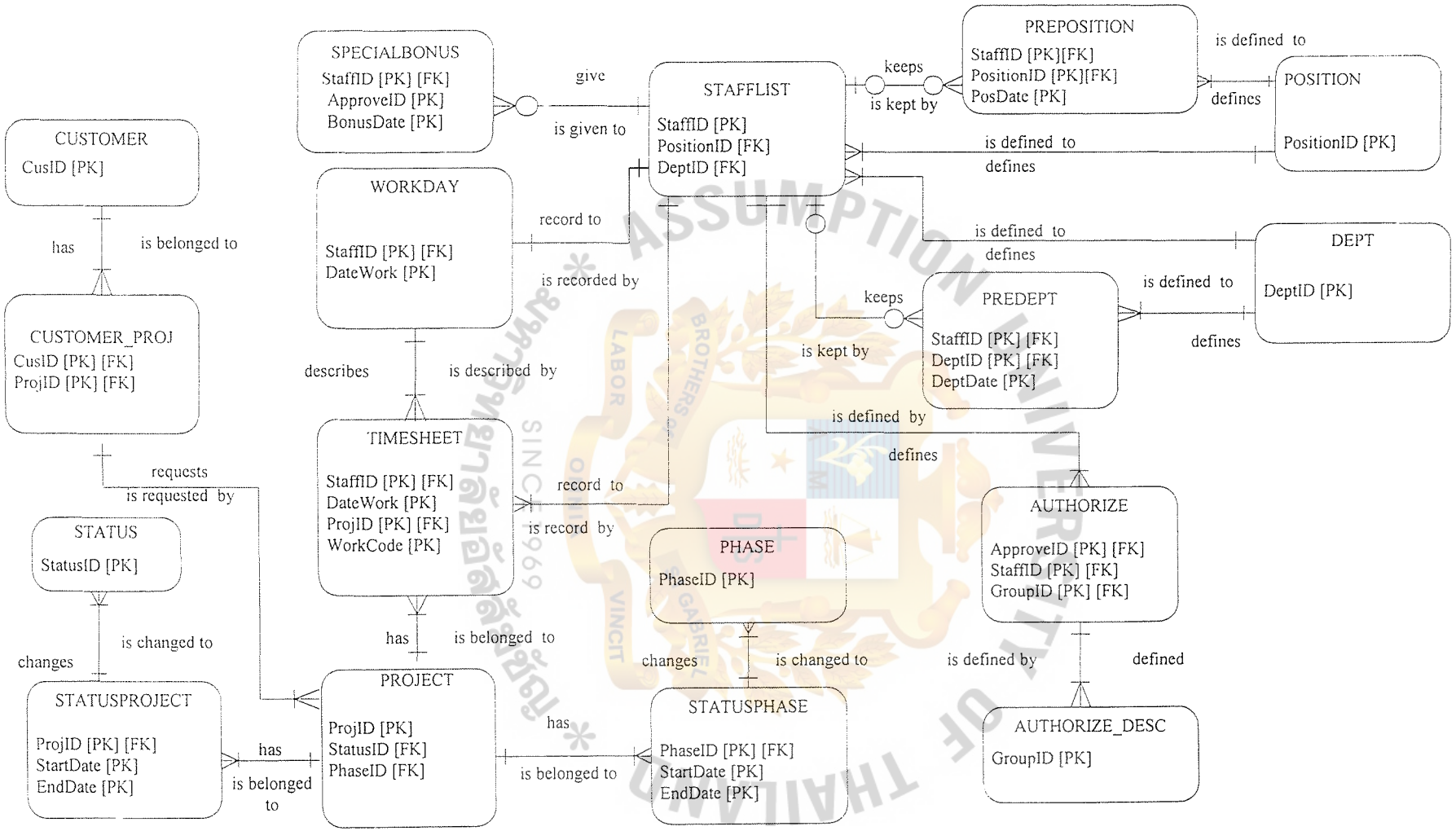


Figure C.2. Key-Based Data Model.

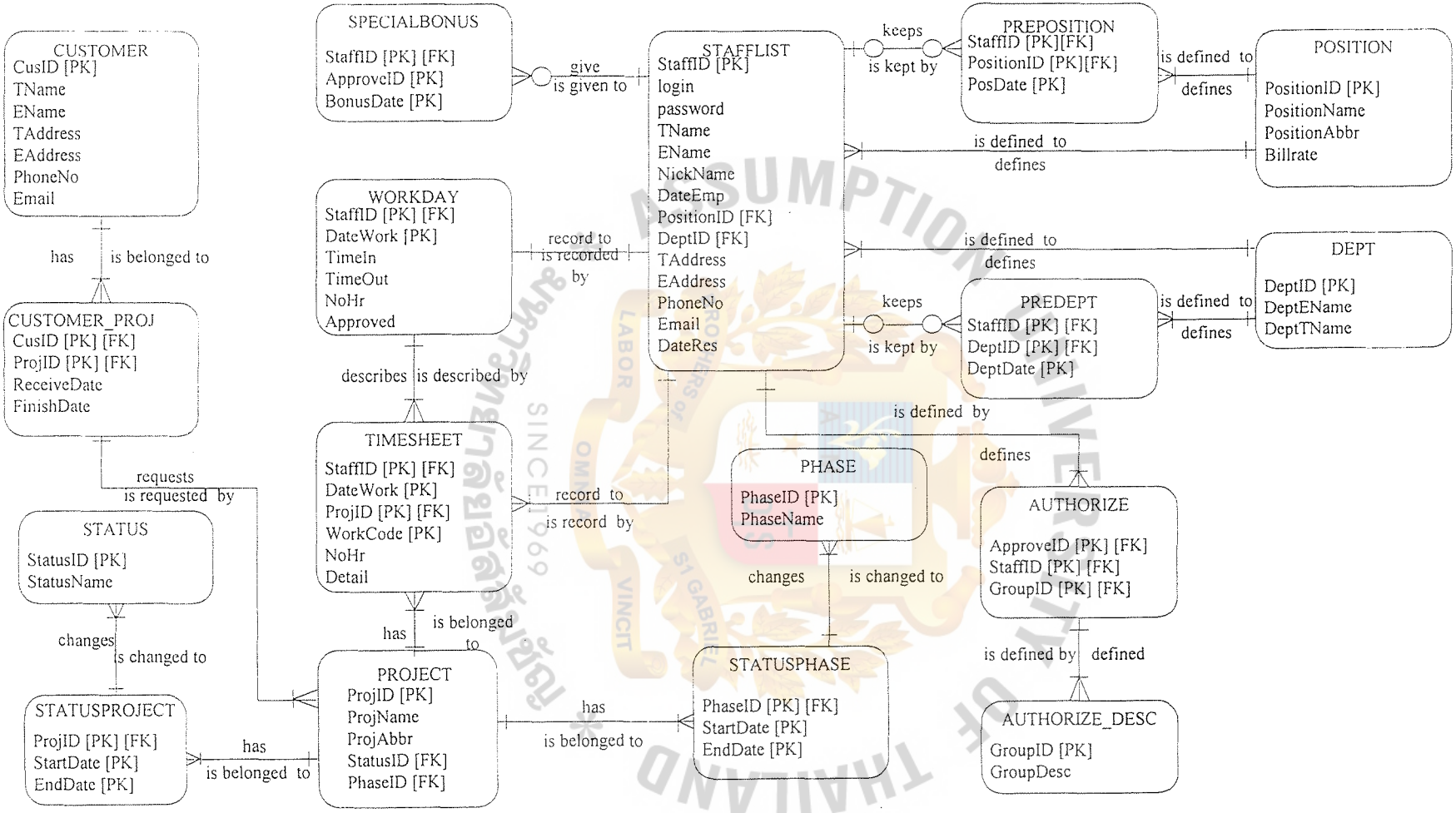


Figure C.3. Fully Attributes Data Model.

Table C.1. Structure of CUSTOMER.

No.	Field Name	Field Type	Index	Unique
1	CusID [PK]	Varchar(3)	Y	Y
2	Tname	Varchar(50)	Y	
3	Ename	Varchar(50)	Y	
4	Taddress	Varchar(100)		
5	Eaddress	Varchar(50)		
6	Phoneno	Varchar(50)		
7	Email	Varchar(50)		

Table C.2. Structure of CUSTOMER_PROJ.

No.	Field Name	Field Type	Index	Unique
1	CusID [PK] [FK]	Int	Y	Y
2	ProjID [PK] [FK]	Varchar(4)	Y	
3	ReceiveDate	Date		
4	FinishDate	Date		

Table C.3. Structure of STATUS.

No.	Field Name	Field Type	Index	Unique
1	StatusID [PK]	Varchar(2)	Y	Y
2	StatusName	Varchar(50)	Y	

Table C.4. Structure of STATUSPROJECT.

No.	Field Name	Field Type	Index	Unique
1	ProjectID [PK] [FK]	Varchar(4)	Y	Y
2	StartDate [PK]	Date		
3	EndDate [PK]	Date		

Table C.5. Structure of SPECIALBONUS.

No.	Field Name	Field Type	Index	Unique
1	StaffID [PK] [FK]	Varchar(3)	Y	Y
2	ApproveID [PK]	Varchar(3)	Y	Y
3	BonusDate [PK]	Date	Y	Y

Table C.6. Structure of WORKDAY.

No.	Field Name	Field Type	Index	Unique
1	StaffID [PK] [FK]	Varchar(3)	Y	Y
2	DateWork [PK]	Date		Y
3	TimeIn	Date		
4	TimeOut	Date		
5	NoHr	Float		
6	Approve	Varchar(1)	Y	

Table C.7. Structure of TIMESHEET.

No.	Field Name	Field Type	Index	Unique
1	StaffID [PK] [FK]	Varchar(3)	Y	Y
2	DateWork [PK]	Date		Y
3	ProjID [PK]	Varchar(4)	Y	Y
4	WorkCode [PK]	Varchar(2)		Y
5	NoHr	Float		
6	Detail	Varchar(40)		

Table C.8. Structure of PROJECT.

No.	Field Name	Field Type	Index	Unique
1	ProjID [PK]	Varchar(4)	Y	Y
2	ProjName	Varchar(50)	Y	
3	ProjAbbr	Varchar(5)		
4	StatusID [PK]	Varchar(2)		
5	PhaseID [PK]	Varchar(2)		

Table C.9. Structure of STAFFLIST.

No.	Field Name	Field Type	Index	Unique
1	StaffID [PK]	Varchar(3)	Y	Y
2	Login	Varchar(6)	Y	Y
3	Password	Varchar(6)	Y	Y
4	Tname	Varchar(50)		
5	Ename	Varchar(50)		
6	NickName	Varchar(10)		
7	DateEmp	Date		
8	PositionID [FK]	Int(2)		
9	DeptID [FK]	Int(2)		
10	Taddress	Varchar(80)		
11	Eaddress	Varchar(80)		
12	PhoneNo	Varchar(50)		
13	Email	Varchar(30)		
14	DateRes	Date		

Table C.10. Structure of PHASE.

No.	Field Name	Field Type	Index	Unique
1	PhaseID [PK]	Varchar(3)		Y
2	PhaseName	Varchar(30)	Y	Y

Table C.11. Structure of STATUSPHASE.

No.	Field Name	Field Type	Index	Unique
1	PhaseID [PK] [FK]	Varchar(3)	Y	Y
2	StartDate [PK]	Date		Y
3	EndDate [PK]	Date		Y

Table C.12. Structure of PREPOSITION.

No.	Field Name	Field Type	Index	Unique
1	StaffID [PK] [FK]	Varchar(3)		Y
2	PositionID [PK] [FK]	Int		Y
3	PosDate [PK]	Date		Y

Table C.13. Structure of PREDEPT.

No.	Field Name	Field Type	Index	Unique
1	StaffID [PK] [FK]	Varchar(3)		Y
2	DeptID [PK] [FK]	Int		Y
3	DeptDate [PK]	Date		Y

Table C.14. Structure of AUTHORIZE.

No.	Field Name	Field Type	Index	Unique
1	ApproveID [PK] [FK]	Varchar(3)		Y
2	StaffID [PK] [FK]	Varchar(3)		Y
3	GroupID [PK] [FK]	Int		Y

Table C.15. Structure of AUTHORIZE_DESC.

No.	Field Name	Field Type	Index	Unique
1	GroupID [PK]	Int		Y
2	GroupDesc	Varchar(20)		

Table C.16. Structure of POSITION.

No.	Field Name	Field Type	Index	Unique
1	PositionID [PK]	Int		Y
2	PositionName	Varchar(40)	Y	
3	PositionAbbr	Varchar(6)		
4	Billrate	Float		

Table C.17. Structure of DEPT.

No.	Field Name	Field Type	Index	Unique
1	DeptID [PK]	Int		Y
2	DeptEName	Varchar(50)		
3	DeptTName	Varchar(50)		

APPENDIX D

MODULE SPECIFICATION

MODULE SPECIFICATION

Module No. : M1

Module Name: Registration Process

Purpose/Objective:

(1) To get new staff data

(2) To retrieve staff information

(3) To print login and password

(4) To reject unauthorize access

Input:

(1) New staff data

Output:

(1) Staff information

(2) login and password

Invoker: Module M1 is the invoker of module M2, M3, M6, M7

Callee: It does not have callee because it is the main module

Constraints: This module constraints all information about Special Bonus, Transaction, Receive No of Work Hours, and Calculate No of Work Hours.

Begin:

(1) Get new staff data

(2) Print login and password

(3) Retrieve the staff information

End.

Module No. : M2

Module Name: Special Bonus Process

Purpose/Objective:

(1) To find out good performance of staff

(2) To give special bonus to good performance of staff

Input:

(1) Staff Information

(2) Staff's mark from manager department

Output:

(1) Good performance of staff report

(2) Special bonus payment for staff

Invoker: Module M2 is the invoker to module M1

Callee: Module M2 is the callee of Module M7

Constraints: This module displays the staffs who get mark form manager. If they get 3 points for 3 times, they will get 1 month bonus.

Begin:

(1) Get staff information

(2) Get mark from manager

End.

Module No. : M3

Module Name: Transaction Process

Purpose/Objective:

(1) To update staff information

Input: Modified staff information

Output:

(1) New login name

(2) New password

(3) New position

(4) New department

Invoker: Module M3 is the invoker of module M1

Callee: Module M1

Constraints: This module will perform updated staff information

Begin

(1) Checking for authorize access

(2) Get staff information

(3) Change staff information

Module No. : M4

Module Name: Adding New Project Process

Purpose/Objective:

(1) Create New Project Data

Input: New project data

Output: New project report

Invoker: It does not have invoker

Callee: Module M5

Constraints: This module depends on customer's request and the approval of manager.

Begin:

(1) Customer ask for new project

(2) Approve or reject of new project

(3) Create new project data

End.

Module No. : M5

Module Name: Updated Project Process

Purpose/Objective:

(1) To retrieve project information

(2) To update project information

(3) To generate project report

(4) To print project report

Input:

(1) Project information

(2) Modified project information

Output:

(1) Updated project information

(2) Current project status report

Invoker: Module M5 is the invoker of module M4

Callee: Module M6, M7

Constraints: This module constraints all information about up-to-date project status

Begin:

(1) Retrieve project information

(2) Update project status

(3) Generate project report

(4) Print project report

End.

Module No. : M6

Module Name: Receive No of Work Hours Process

Purpose/Objective:

(1) To retrieve staff information

(2) To retrieve project information

(3) To receive no of work hours

(4) To approve or reject no of work hours report

Input:

(1) No of work hours

Output:

(1) Staff information

(2) login and password

Invoker: Module M6 is the invoker of module M1, M4, M5

Callee: Module M7

Constraints: This module constraints all approved no of work hours record.

Begin:

(1) To retrieve staff information

(2) To retrieve project information

(3) To receive no of work hours

(4) To approve no of work hours record

End.

Module No. : M7

Module Name: Calculate no of work hours Process

Purpose/Objective:

(1) To get man-hours for each staff

(2) To get man-hours for each project

(3) To calculate rate of working hour

(4) To generate report ofr man hours

(5) To print report of man hours

Input:

(1) no of work hours record

(2) staff information

(3) project information

Output:

(1) man-hours of staff

(2) man-hours for each project status

(3) man-hours expenditure for each project

Invoker: Module M7 is the invoker of module M1, M4, M5, M6

Callee: Module M4

Constraints: This module depend on information from more than one module

Begin:

(1) To retrieve staff information

(2) To retrieve project information

(3) To retrieve no of work hours information

(4) To calculate no of man hours and billrate of man hours

End.

APPENDIX E

INPUT SCREEN

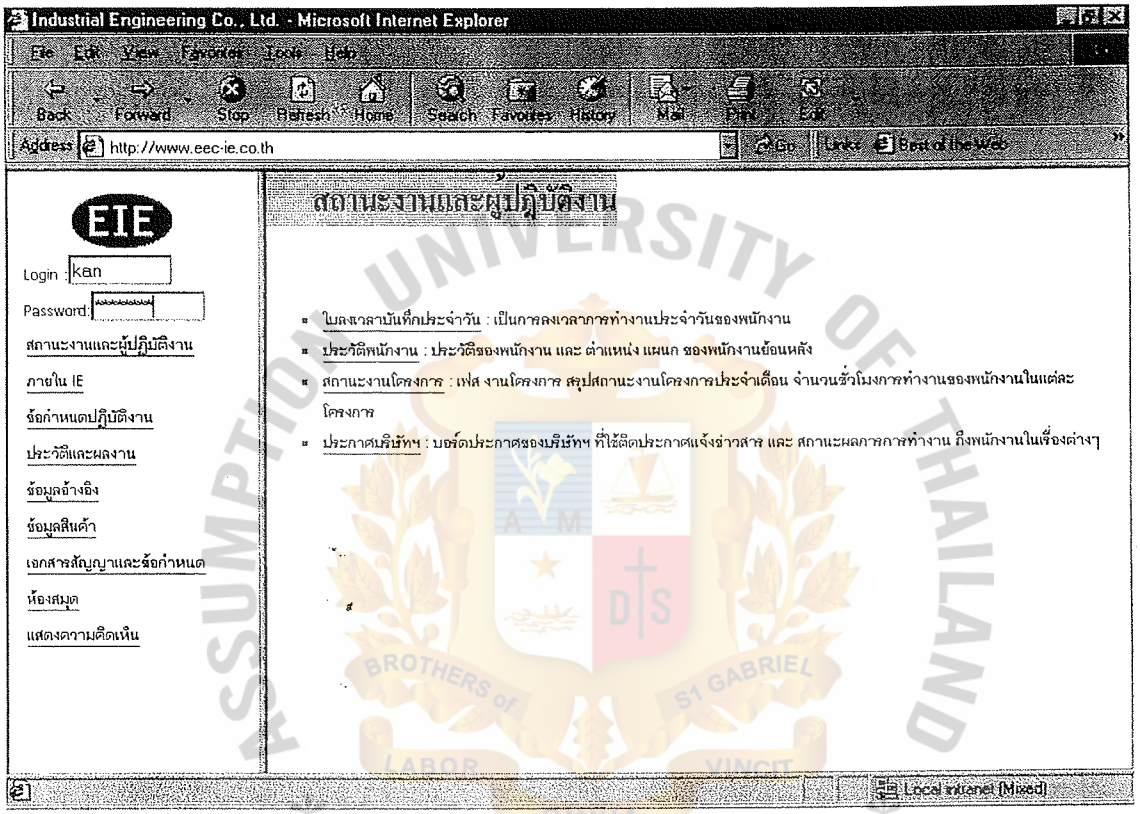


Figure E.1. Menu.

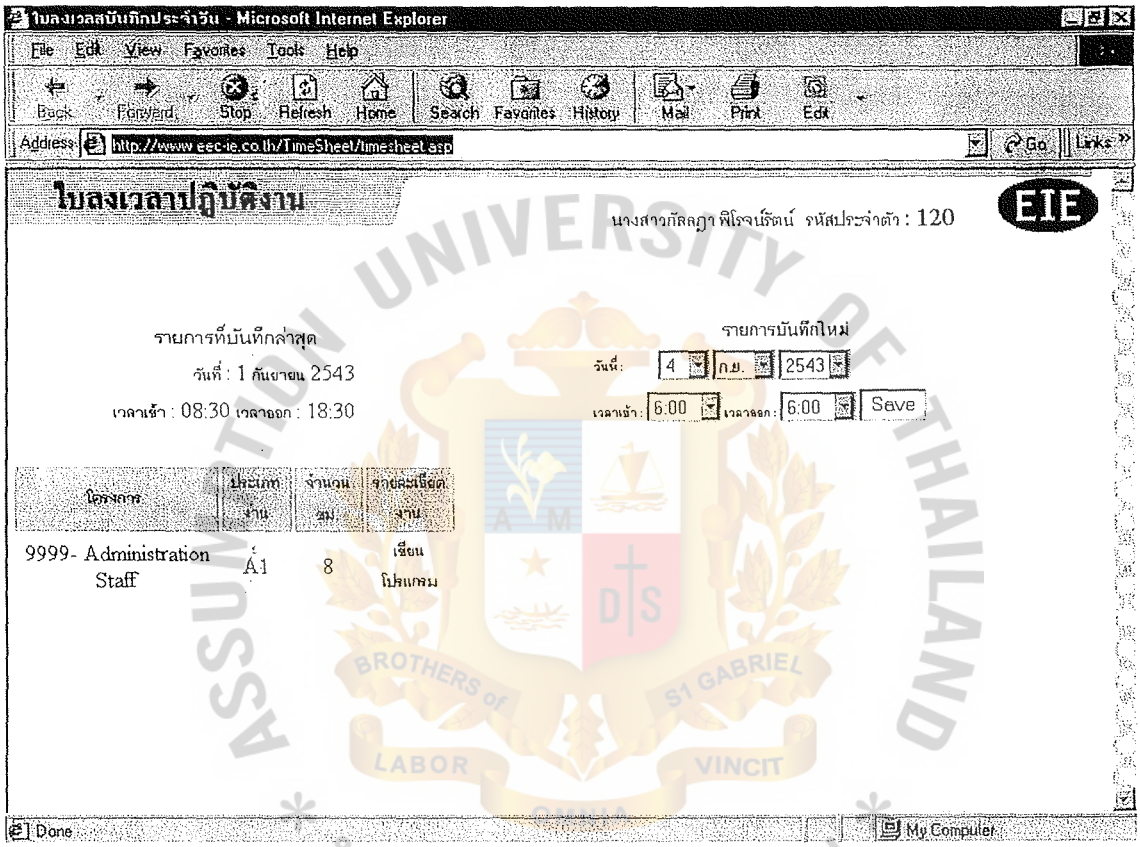


Figure E.2. Timesheet Form.

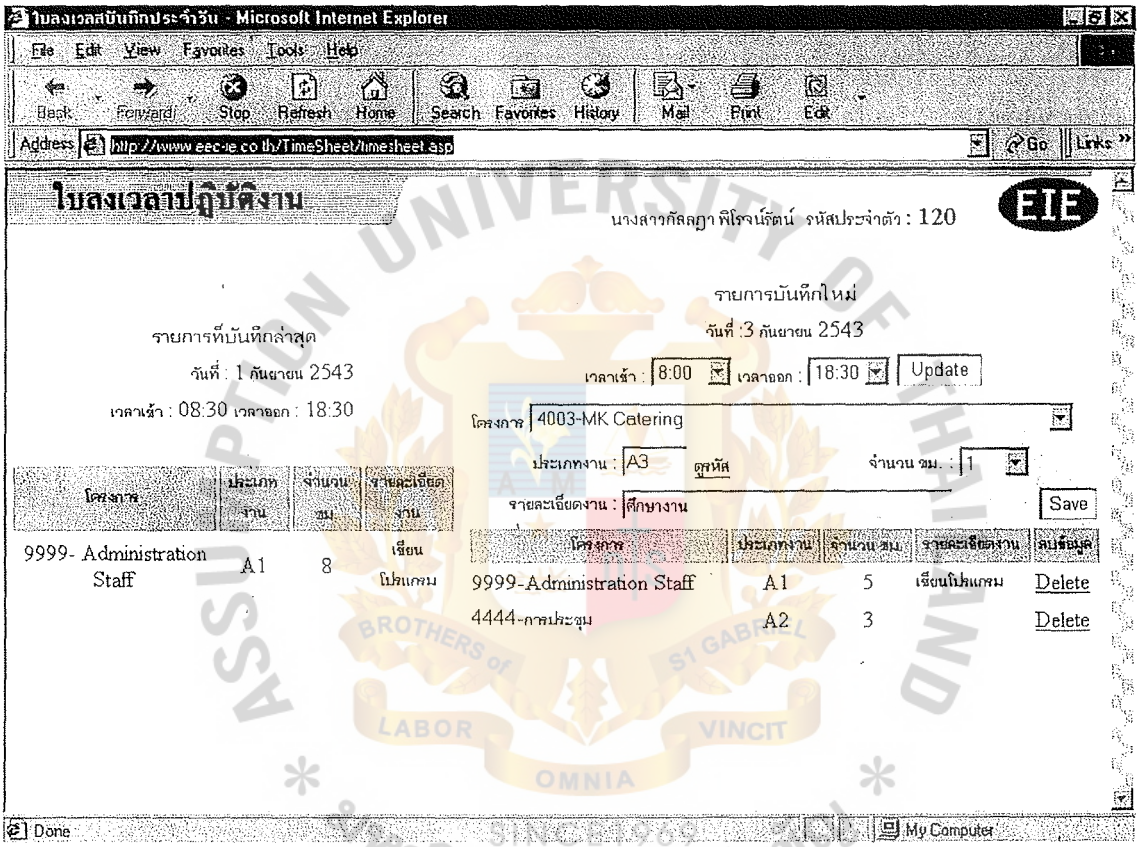


Figure E.3. Timesheet Form.

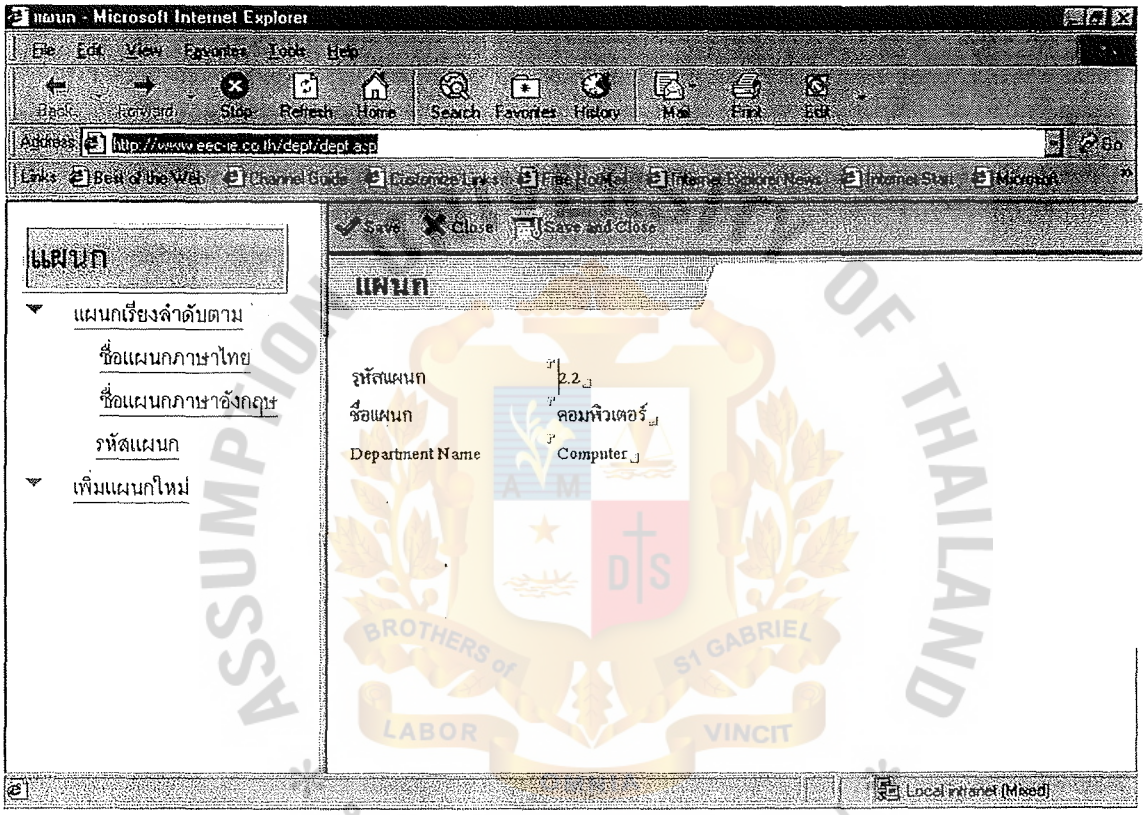


Figure E.4. Department Form.

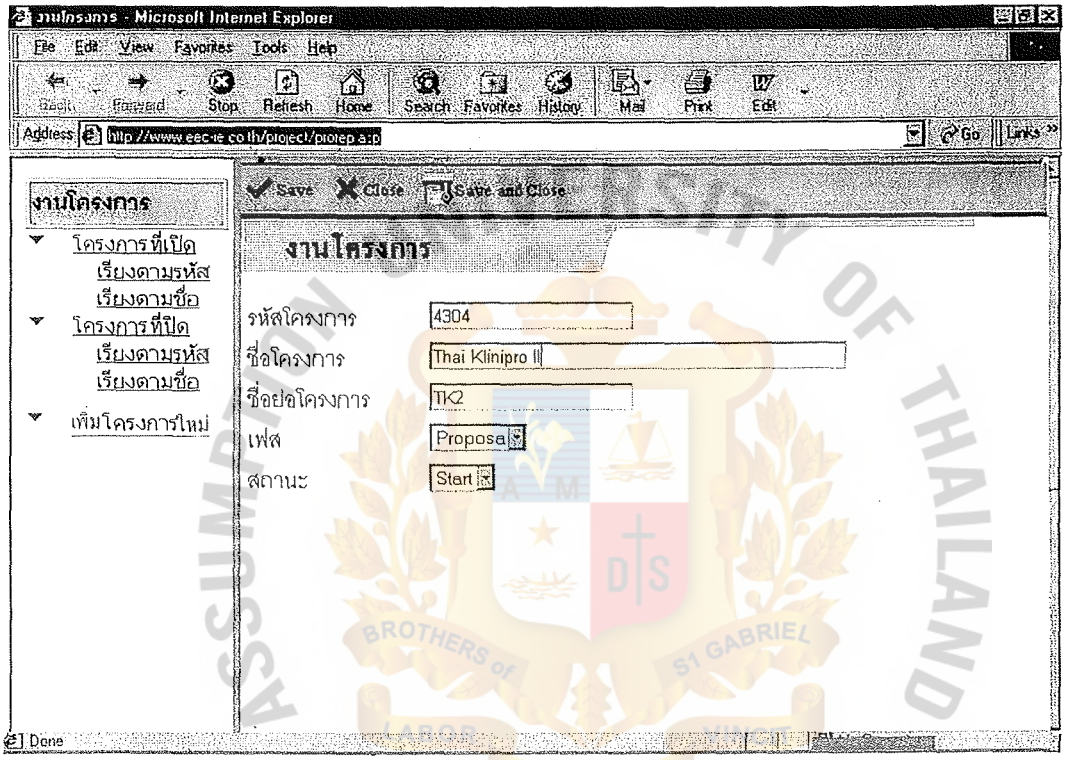


Figure E.5. Project Form.

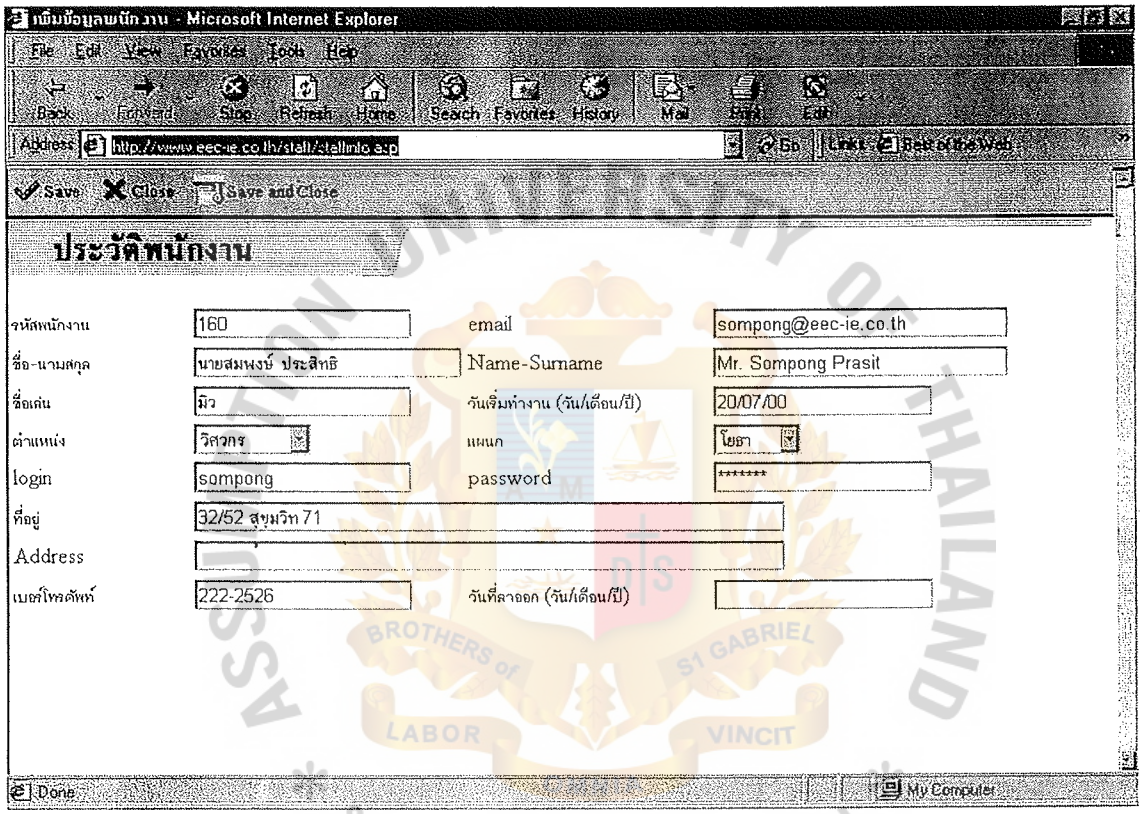


Figure E.6. Add Staff Form.

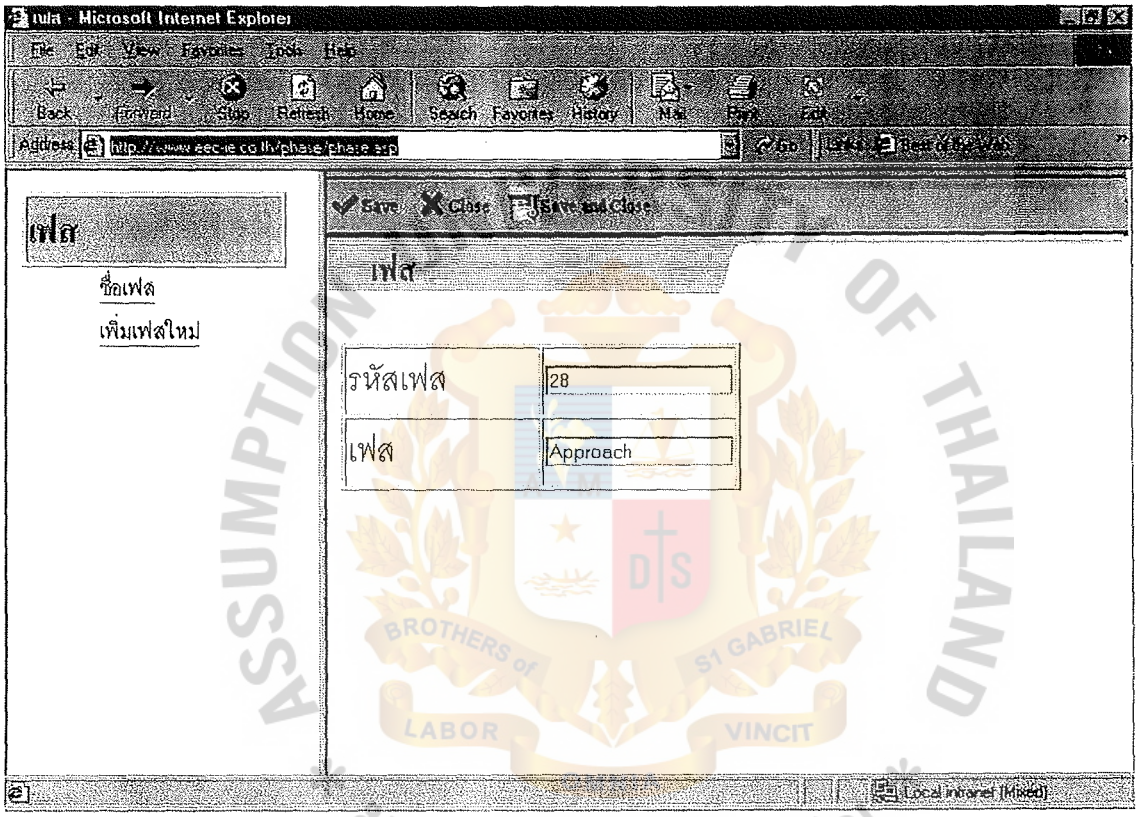


Figure E.7. Add Phase Form.

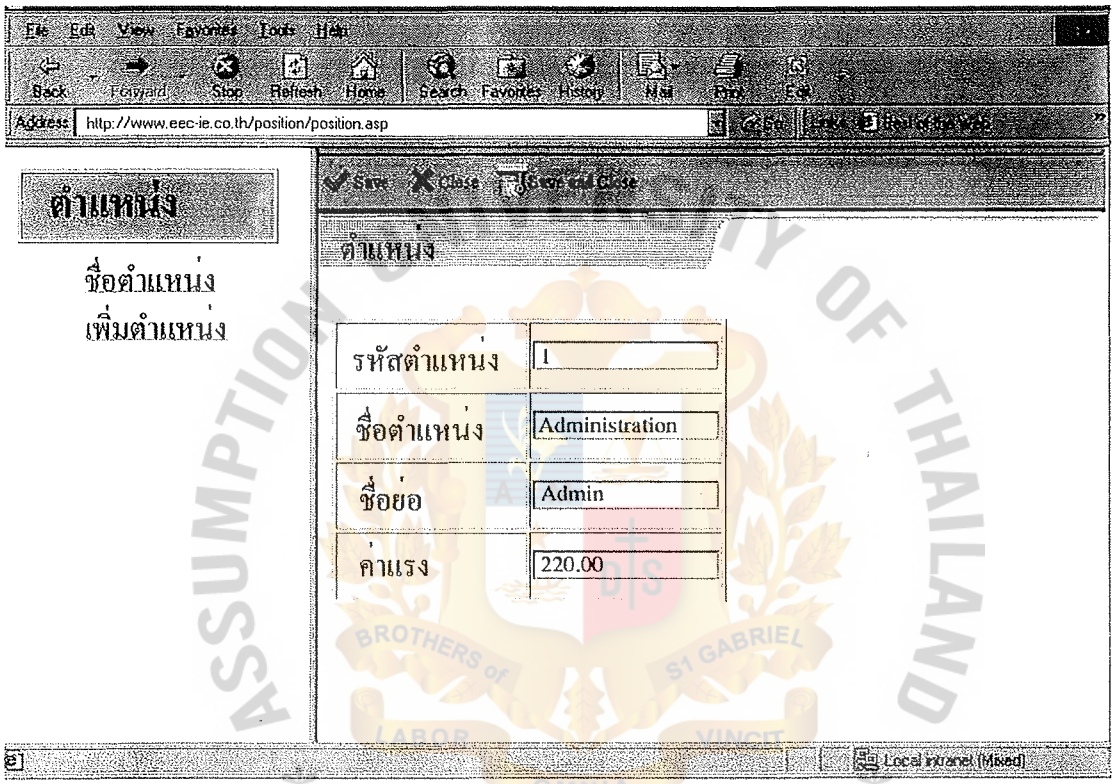


Figure E.8. Position Form.

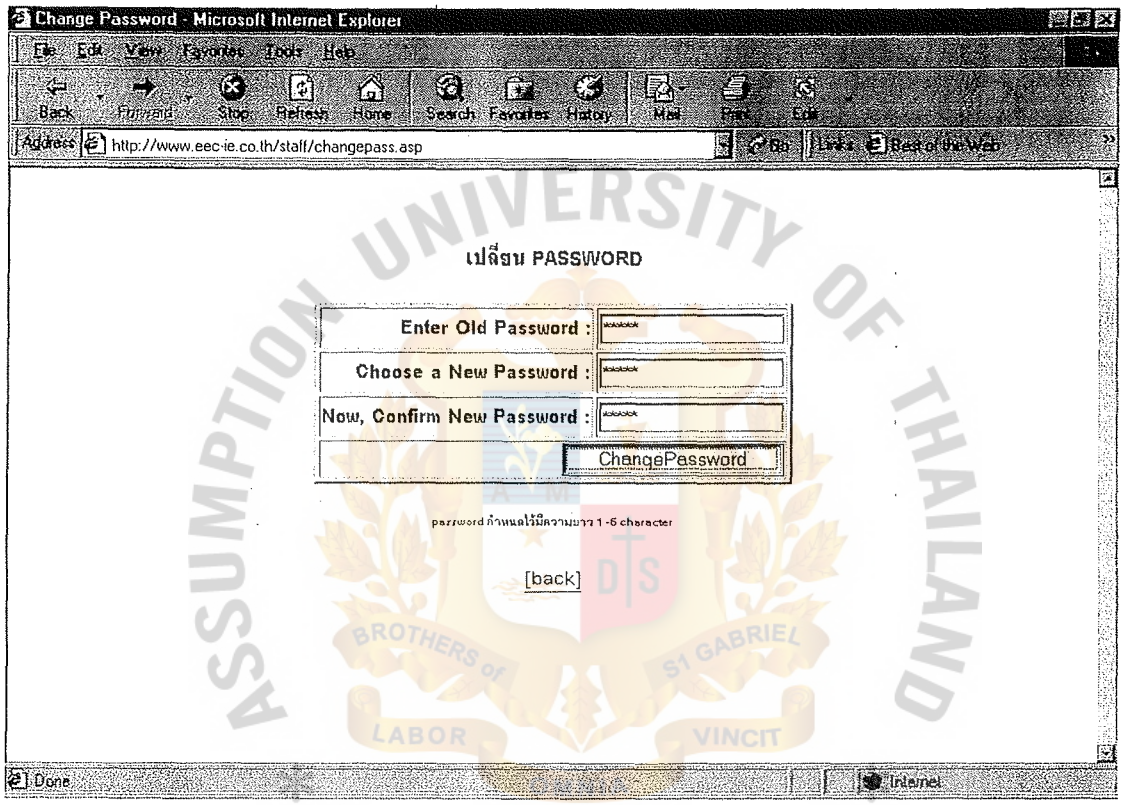


Figure E.9. Change Password Form.

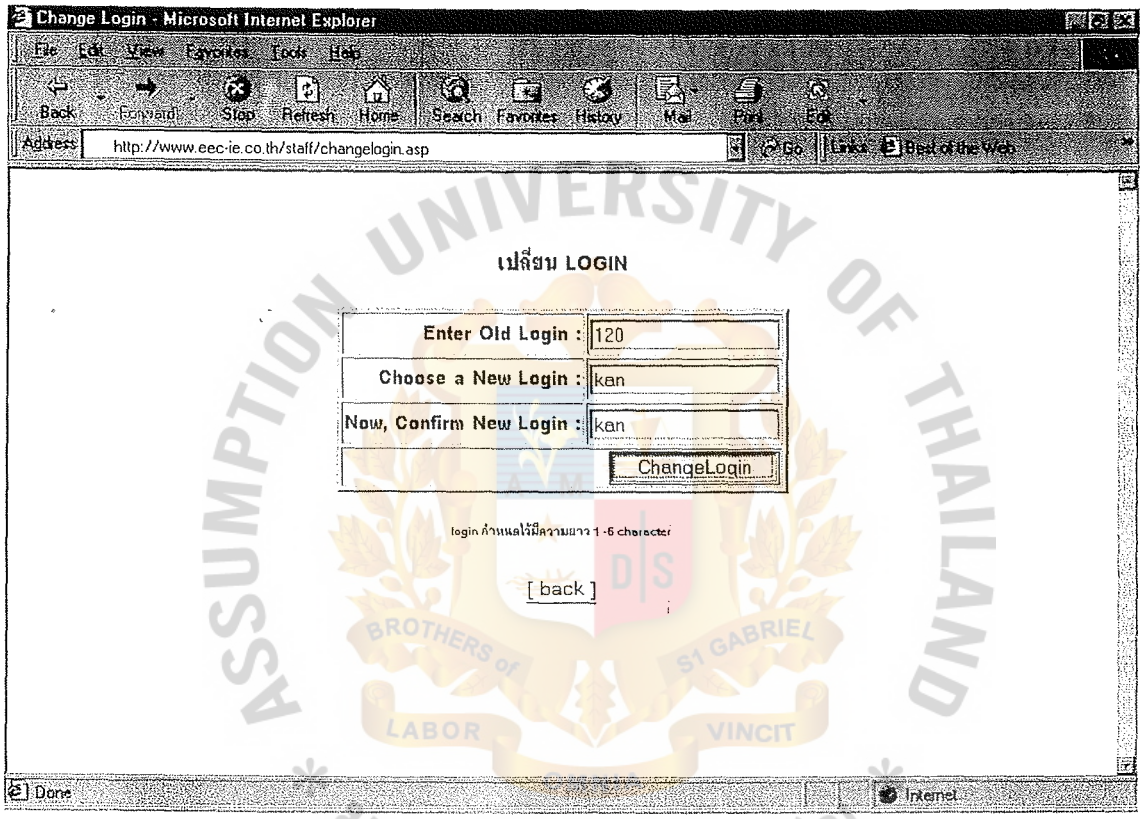


Figure E.10. Change Login Form.

APPENDIX F

OUTPUT DOCUMENTS

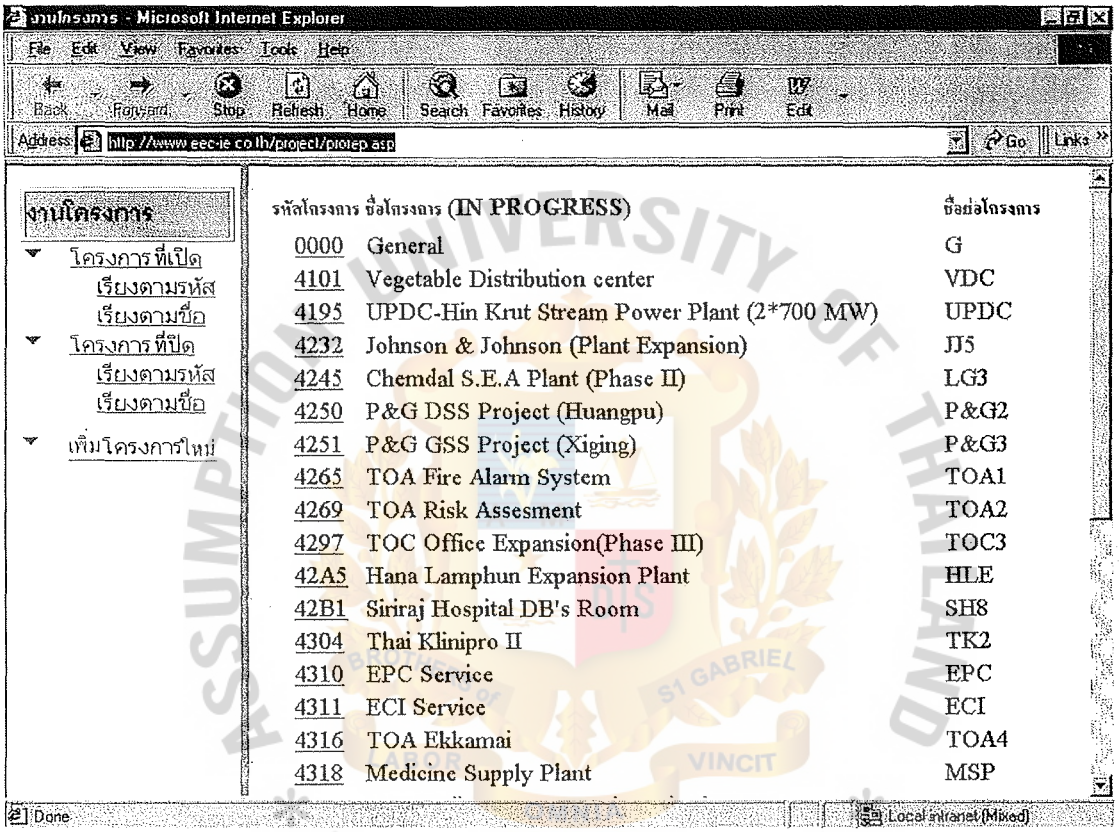


Figure F.1. List of IN Process Project.

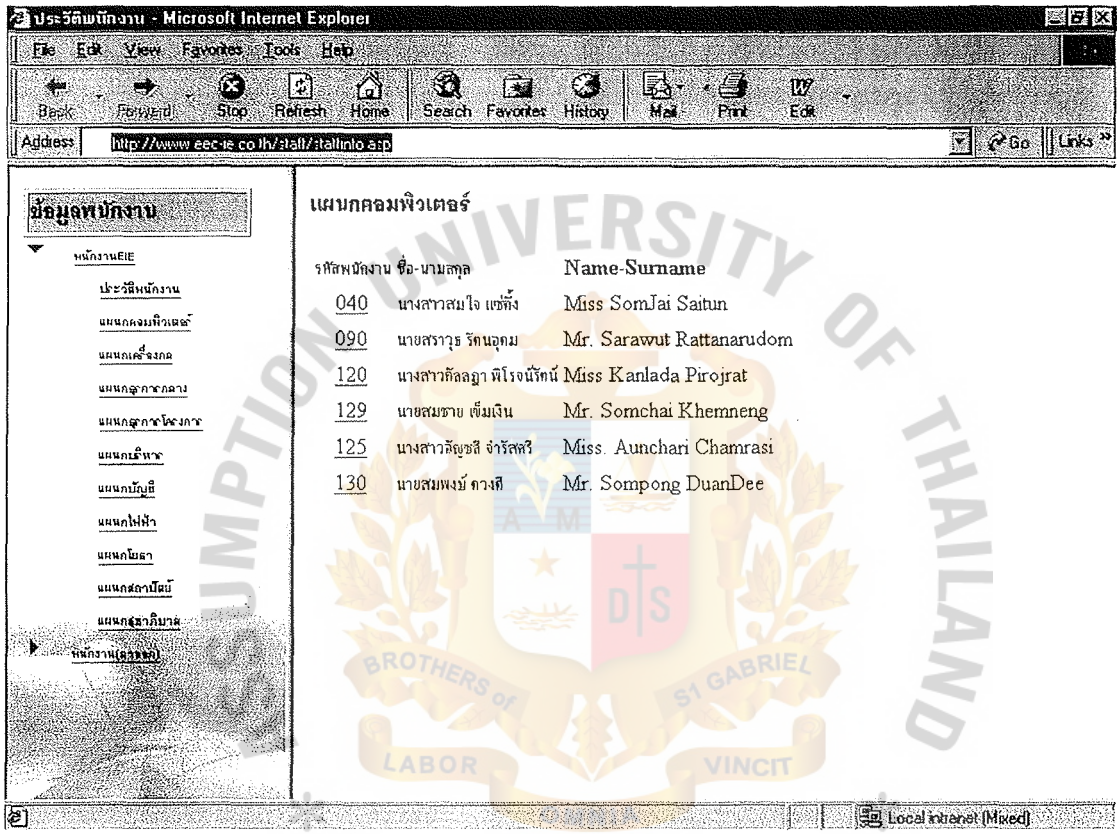


Figure F.2. List of Computer Staff.

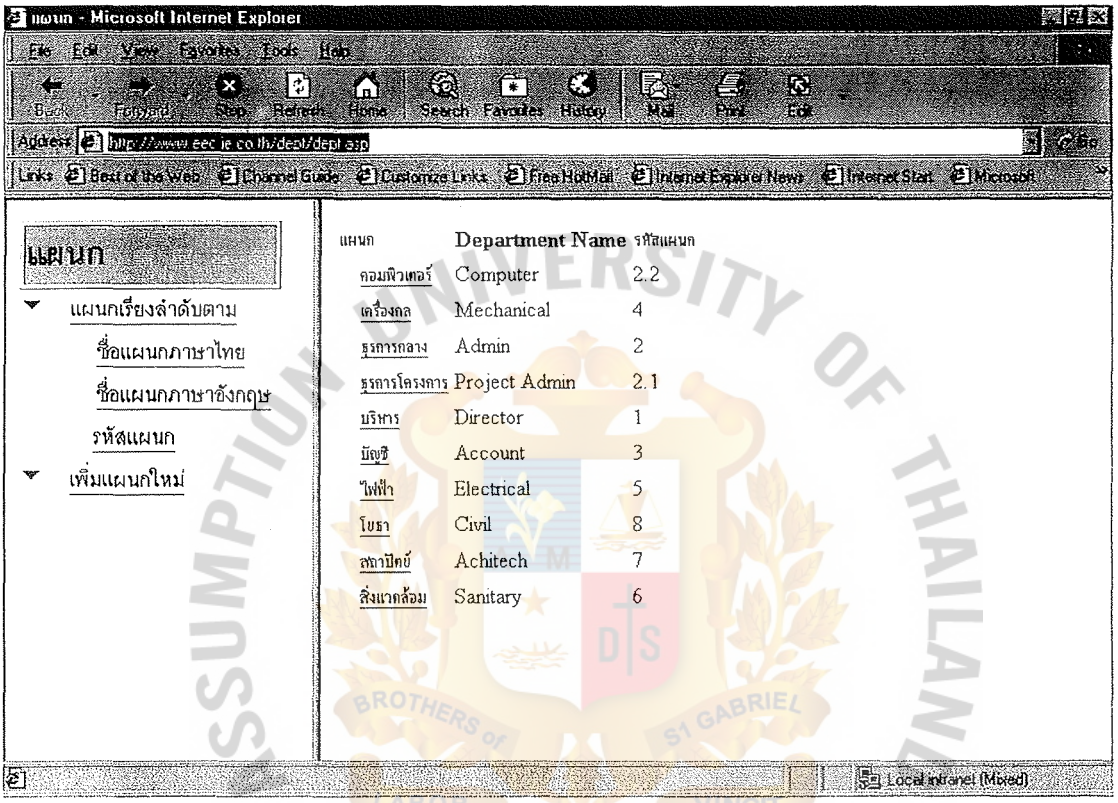
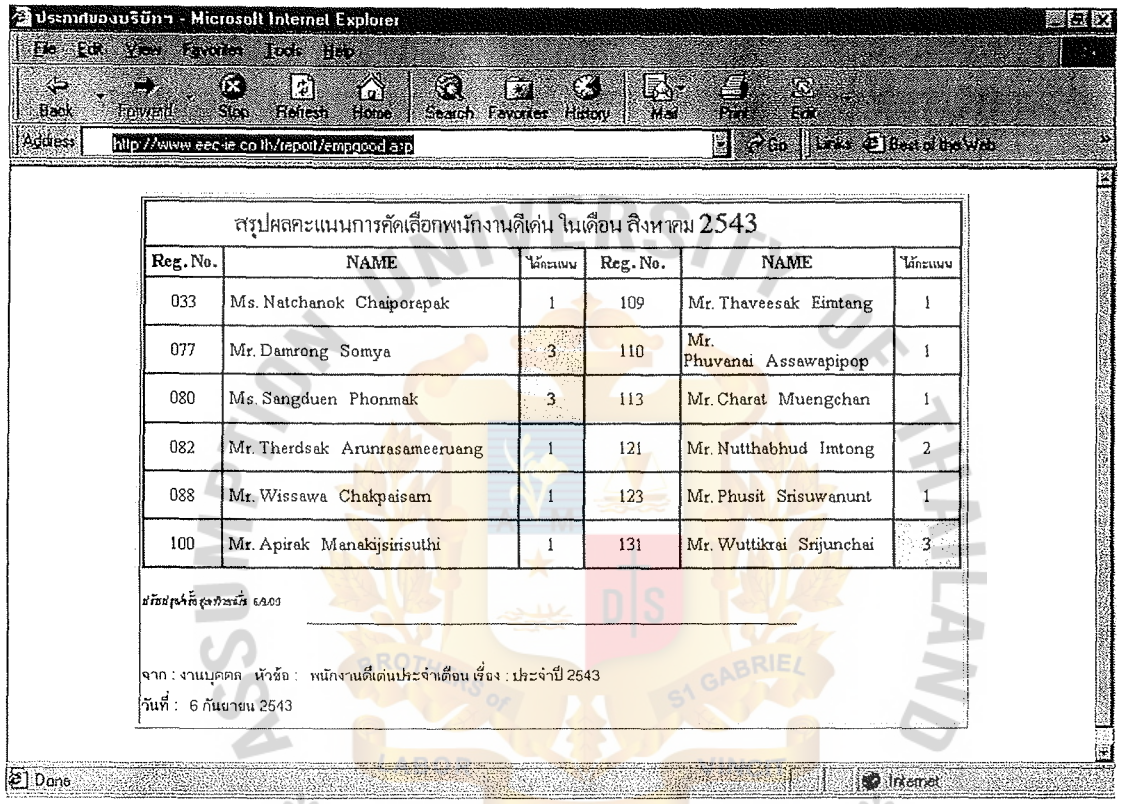


Figure F.3. List of Department.



สรุปผลคะแนนการคัดเลือกพนักงานดีเด่น ในเดือน สิงหาคม 2543

Reg. No.	NAME	ได้คะแนน	Reg. No.	NAME	ได้คะแนน
033	Ms. Natchanok Chaiporepak	1	109	Mr. Thaveesak Eimtang	1
077	Mr. Damrong Somya	3	110	Mr. Phuvanai Assawapipop	1
080	Ms. Sangduen Phonmak	3	113	Mr. Charat Muengchan	1
082	Mr. Therdsak Arunrasameeruang	1	121	Mr. Nutthabhud Imtong	2
088	Mr. Wissawa Chakpaisam	1	123	Mr. Phusit Srisuwanunt	1
100	Mr. Apirak Manakijsirisuthi	1	131	Mr. Wuttikrai Srijunchai	3

จาก : งานบุคคล หัวข้อ : พนักงานดีเด่นประจำเดือน เรื่อง : ประจำปี 2543
วันที่ : 6 กันยายน 2543

Figure F.4. List of Staff's Mark.

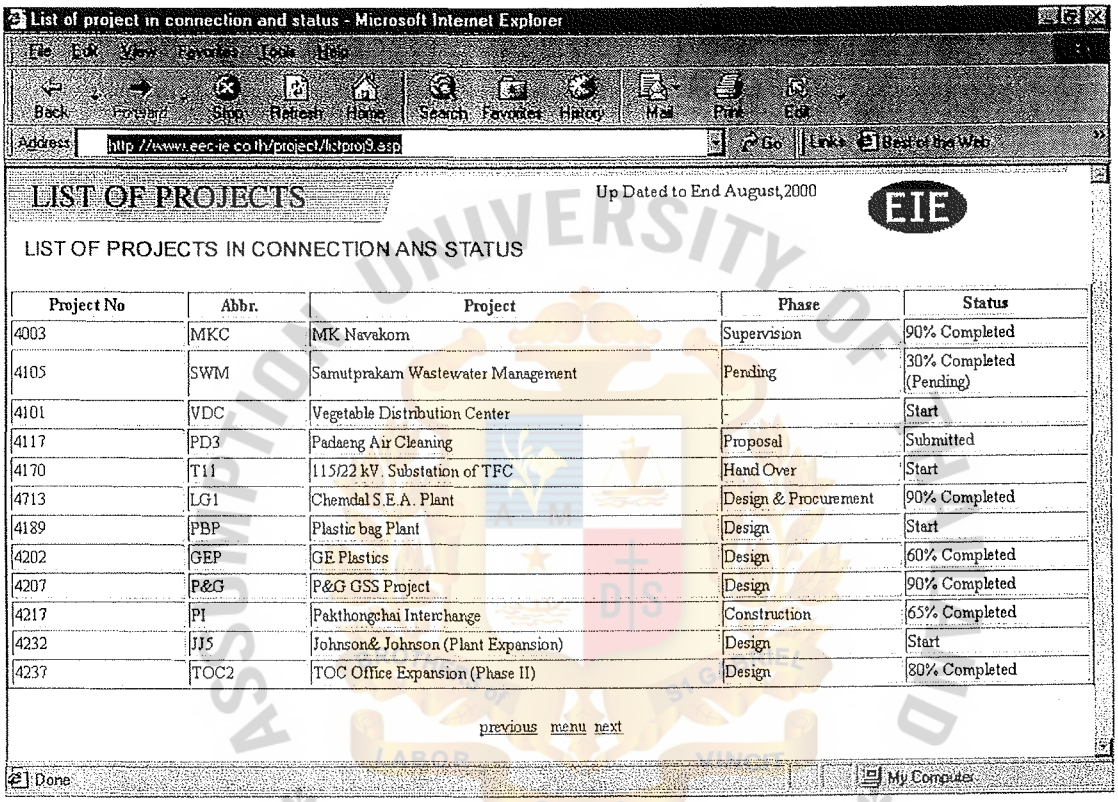


Figure F.5. List of Projects in Connection and Status.

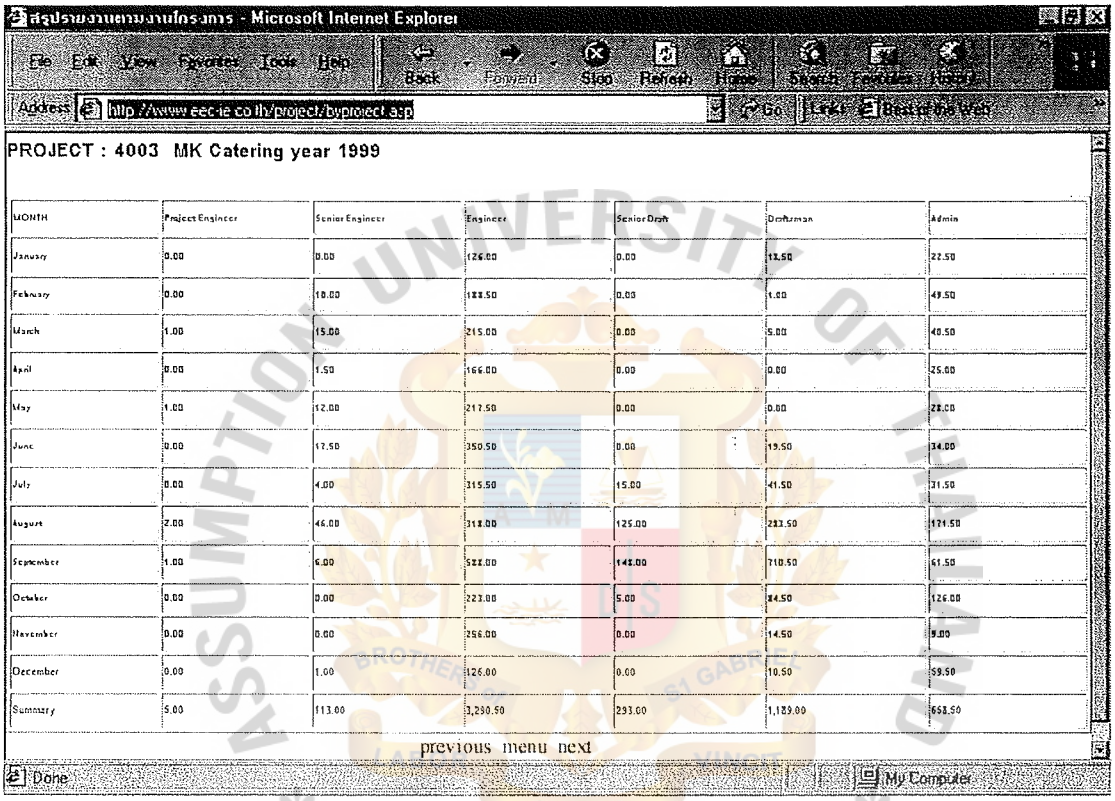


Figure F.6. List of Working Hours by Project.

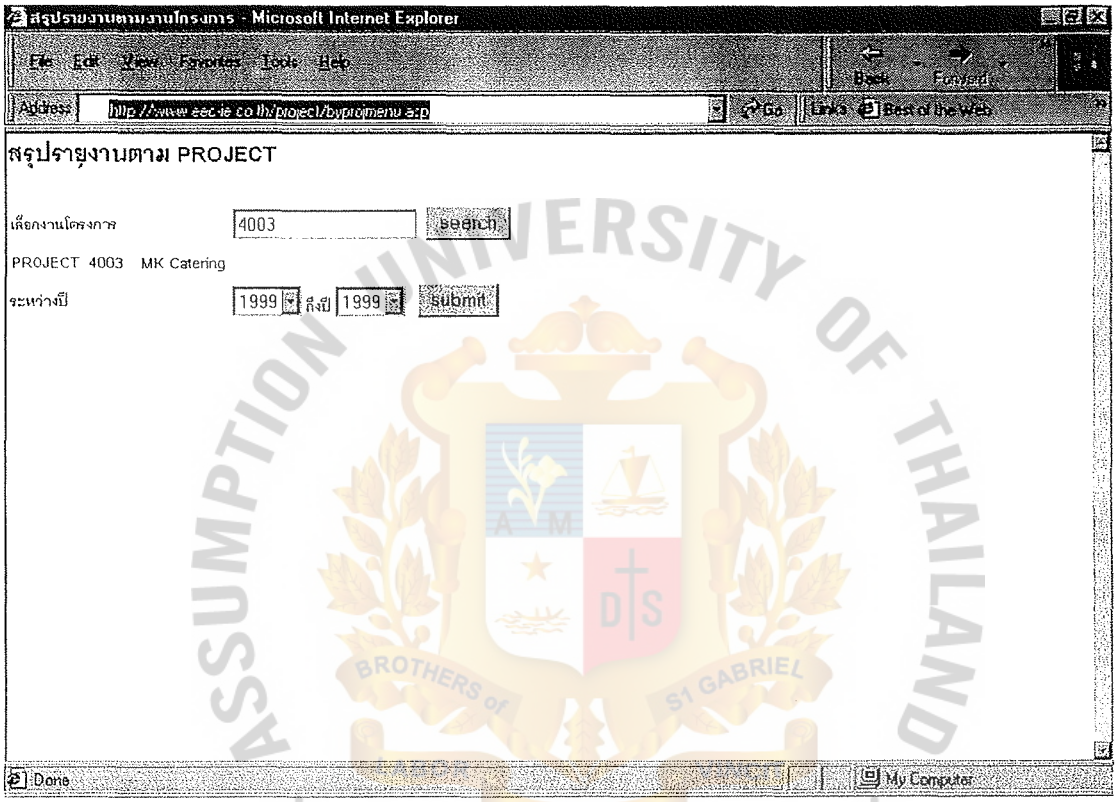


Figure F.7. Project Report Query.

Monthly Evaluation of Working Performance
Month : July, 2000

No.	Project	Project Engineer	Senior Engineer	Engineer	Senior Draftsman	Draftsman	Admin Officer	Total M-H	Total Cost
4003	MK Catering		3.00	126.50		2.50	8.00	140.00	68400.00
4009	Sakchai's House						5.00	5.00	1250.00
4052	Padaeng SO2Treatment			1.50			1.00	2.50	1000.00
4101	Rai Kase Siam	38.00		5.00			38.00	81.00	61400.00
4117	Padaeng Air Cleaning		6.00				1.00	7.00	5050.00
4140	Premier Cars		1.50				3.50	5.00	2075.00
4202	GE Plasstics		61.00	55.50	164.50	286.00	10.50	577.50	239000.00
4207	P&G GSS Project	14.50	89.00	143.50	21.00	261.50	43.50	573.00	260575.00
4235	Hoping Power Station		0.50					0.50	400.00

Figure F.8. Monthly Evaluation Of Working Performance Report.

Working man-hours records
Project : Johnson & Johnson (Plant Expansion)
During Month of July, 2000

No.	Name	Position	Total	Rate	Amount (Baht)
01	Mr. Kittysage Limpichart	Project Manager	16.00	1,500.00	24,000.00
002	Mr. Supcahi Woramusik	Senior Engineer	13.00	1,100.00	14,300.00
017	Mr. Pramuk Lipimongkol	Project Engineer	4.50	900.00	4,050.00
030	Mr. Kumtorn Yongavinsakul	Senior Engineer	1.00	1,100.00	1,100.00
032	Mr. Prajak Phetaime	Design	33.00	400.00	13,200.00
037	Mr. Tawatchai Wongnarakul	Project Engineer	11.50	900.00	10,350.00
039	Miss Watthapron Detchamat	Secretary	7.00	220.00	1,540.00
040	Miss Rattana Panich	Secretary	3.50	220.00	770.00
049	Mr. Navaporn Thangkul	Project Engineer	10.00	900.00	9,000.00
060	Mr. Korakit Kusumaman	Project Engineer	2.50	900.00	2,250.00
080	Miss Songduen Phonmak	Secretary	19.50	220.00	4,290.00
082	Mr. Therdsak Arunrasameeruang	Senior Engineer	2.00	1,100.00	2,200.00
083	Mr. Dumrong Komjornpanitcharoen	Engineer	29.00	600.00	17,400.00
100	Mr. Apirak Manakijsirisuthi	Project Engineer	9.50	900.00	8,550.00
110	Mr. Phuvanai Assawapipop	Secretary	2.00	220.00	440.00
115	Miss Marisa Aunoon	Secretary	0.50	220.00	110.00
02	Ms. Yuwadee Haritaworn	Secretary	7.50	220.00	1,650.00
03	Mr. Phontep Wongsin	Design	24.00	400.00	9,600.00
04	Mr. Weerayut Koomprom	Senior Designer	38.00	450.00	17,100.00
				Total	141,900.00

Figure E.9. Working Man-Hours Records Report.

Monthly Evaluation Of Operation Performance

Month : June, 2000

No.	Project	Phase	Expense
3718	Hana semiconductor IC Packing Facility	Follow	375.00
4003	MK Catering	Supervision	68,400.00
4009	Sakchai's House	Follow	1,250.00
4052	Padaeng SO2Treatment	Follow	1,000.00
4101	Rai Kaset Siam	Follow	61,400.00
4117	Padaeng Air Cleaning	Follow	5,050.00
4140	Premier Cars	Follow	2,075.00
4170	115/22 kV. Substation of TFC	Construction	17,625.00
4173	Chemdal S.E.A. Plant	Design	49,575.00
4179	Fertilizer Plant Modification(Bag FilterII)	Approach	800.00
4202	GE Plasstics	Design	239,000.00
4204	KWC Civil Data Collection and Modification	Construction	10,425.00
4207	P&G GSS Project	Design	260,575.00
4208	Electrical Communication Control & Instrument	Construction	35,300.00
4217	Pakthongchai Interchange	Construction	127,850.00
4218	Warehouse Project (PhaseII)	Design	500.00
4221	TFC Conultant Service (Maintenance)	Consultant	8,400.00
4228	Kamol Archittect (Site Office)	Follow	250.00
4232	Johnson & Johnson (Plant Expansion)	Design	631,025.00
4235	Hoping Power Station	Follow	400.00
4237	TOC Office Expannsion (PhaseII)	Design	64,625.00
4238	Johnson & Johnson ISO 14001	Construction	6,375.00
Total			1,592,275.00

Figure F.10. Monthly Evaluation of Operation Performance Report.

APPENDIX G

DATA DICTIONARY

Table G.1. Data Dictionary.

Field Name	Meaning
Approved	1 mean approve, 2 mean not approve
ApproveID	Approval who have authorize to approve timesheet record
BillRate	The rate of wage for each position
BonusDate	The month that receive mark
CusID	The customer identification
DateEmp	Date that staff employs
DateRes	Date that staff resigns
DateWork	Date of working
DeptEName	Department name (English language)
DeptID	Department Identification
DeptTName	Department name(Thai language)
Detail	Work's detail of staff
Eaddress	Address (English language) for staff and customer
Email	Email address
EndDate	Date of status phase and status project finish
FinishDate	Date that project finish
GroupDesc	The group of authorize access
GroupID	The group of authorize access identification
Login	Login name of staff
NickName	Nickname of staff
NoHr	No of working hours
Password	Password of staff
PhaseID	Phase Identification
PhaseName	Phase name of project
PhoneNo	Telephone number of customer and staff
PositionAbbr	Abbreviation of position
PositionID	Position Identification
PositionName	Position Name
ProjID	Project Identification
ProjName	Project Name
ProjAbbr	Abbreviation of project
ReceiveDate	Date that project is approved to do
StaffID	Staff identification
StartDate	Date that status and phase of project begin
StatusID	Status identification
StatusName	Status name
Taddress	Address of staff and customer (Thai language)
TimeIn	Time that staff arrive office
TimeOut	Time that staff go home
Tname	Thai name of staff and customer

APPENDIX H

PROJECT PLAN

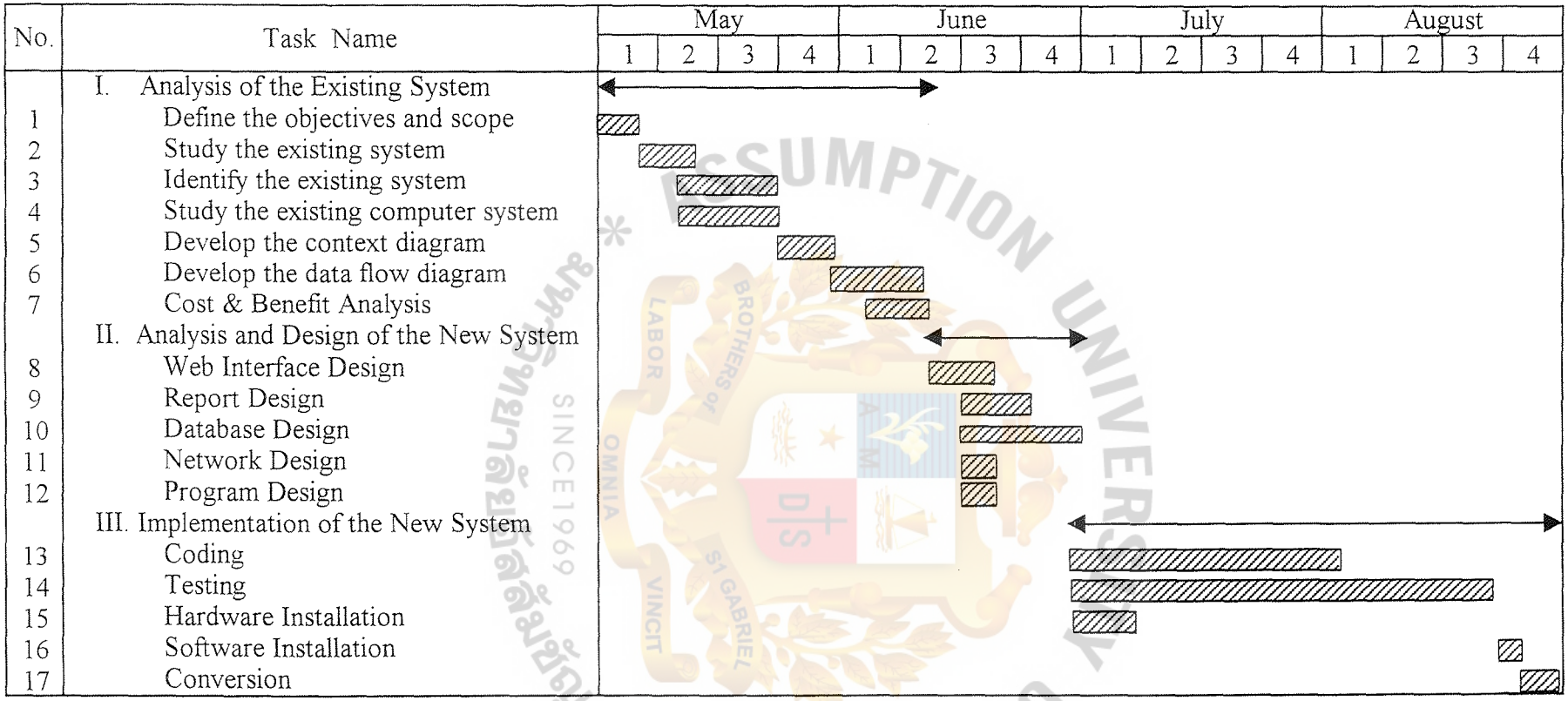


Figure H.1. Project Plan of Project Information System.

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