



Project Management System
of Aris Design Studio Company

by

Mr. Theepakorn Lunthomrattana

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

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

November 2004

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Project Title Project Management System of Aris Design Studio Company


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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 requirement of the degree of Master of Science in Computer Information System.


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ABSTRACT

This project is a system analysis and design of the Project management system of Aris Design Studio Company. The project aimed to improve the efficiency of business operation. The system analysis and design involves the study of the existing system of the company, analysis of the existing problems, selection of the best alternatives, development of new proposed system, estimation and evaluation of the budget for proposed system, and planning of system implementation.

The current problems of the existing system come from the use of manual system. Manual system cannot support the growth of the company because it cannot handle the large number of transactions. The information inquiry also takes a lot of time and effort. The required information cannot be delivered in time to be used. The operation cost of the manual system is very high and not suitable for long-term business.

The computerized system is introduced to deal with the above problems and increase efficiency of the system. The computerized system is implemented according to system analysis and design theories. Many methods of research are applied for identifying the requirement of users. The proposed system is designed to satisfy customers' needs. The hardware, software, and network are also designed in this project. The system development cost and budget is estimated wisely for investment. Many analysis methods are used in evaluation. The analysis shows that the payback period is not too long, and the accumulated cost of the proposed system is lower than the accumulated cost of the existing system in the long run. The proposed system also delivers many tangible and intangible benefits to the company.

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I. INTRODUCTION

1.1 Background of the Project

Nowadays, there are a lot of residential projects concerning interior design and construction. So there are a lot of people (customer), who decorate their house and look for designers who have the experience that meet their requirement.

Aris Design Studio was opened in year 2002. The existing system of Aris Design Studio is a manual system. All data is kept in paper format. The manual system encounters many problems such as lack of skilled staff, and confusion of the system. To solve these problems, the company needs a fast and reliable system. The manual system cannot accomplish the work for the key success of the company. So, a computerized system has to be developed for the company in order to accomplish the key success of the company.

This project emphasizes on replacing the existing manual system by the new computerized system. This project is performed according to the system analysis and design theory. The system analysis phase is applied to the study of the existing manual system of Aris Design Studio Company. The system design phase is applied to the design of a new computerized system for the company. This project also includes project progression to check progression during the project process in the new computerized system.

1.2 Objectives of the Project

This project aims to bring a new effective computerized system to the company.

There are some objectives of this project to be accomplished as follows:

- (1) To analyze the exiting system of Aris Design Studio and evaluate the performance of the manual system.
- (2) To identify and analyze the problems of the existing system.
- (3) To organize necessary data into properly designed database to reduce paper work.
- (4) To control project process and expense by using a computerized system.
- (5) To develop a new computer information system for Aris Design Studio.

1.3 Scope of the Project

The project emphasizes on the set up of a computer system for office operation of Aris Design Studio Company, including the following:

- (1) Customer Registration Process.
- (2) Project Order Process.
- (3) Project Expense Process.
- (4) Generating Report Process.

1.4 Deliverables

The deliverables of the project on the proposed Project management System for Aris Design Studio are as follows:

- (1) Hardware Specification
- (2) Software Specification
- (3) Process Modeling (Context Diagram and Data Flow Diagram)
- (4) Data Modeling (Context Entity-Relation Diagram, Key-Based, and Fully Attributed Diagram)
- (5) Cost and Benefit Analysis
- (6) Test Plan
- (7) Conversion Plan

1.5 Project Plan

The schedule of computerizing the system takes about 4 months. The project is divided into 8 phases: preliminary investigation phase, problem analysis phase, requirement analysis phase, decision analysis phase, system design phase, system construction phase, implementation phase, and operation and support phase. The first 7 phases can be categorized into 2 main parts as system analysis part and system design part. The first part is aimed to analyze the existing system of the company, identify the problems, and requirements of the company and set up the project plan. This part will take approximately one month. This part includes the first 4 phases, which are preliminary investigation, problem analysis, requirement analysis, and decision analysis.

The second part, which is the design part, will be started as soon as the first part is completed. This part consists of system design phase, system construction phase, and implementation phase. This part aims to design the proposed system and apply the

proposed system to actual business operation. The design phase takes approximately half a month to design the ideal system, which can solve the problem and meet the users' requirement from analysis part. The system construction phase uses a month to set up the actual system from the guideline in design phase. The system will be built and tested again and again in this phase in order to remove all undesirable errors. The last phase is implementation phase, which takes approximately a month. All of the tasks will be performed in the new proposed system. The users will be trained in this phase. The system will be fully run by the new proposed system after all 7 phases are completed.

Finally, operation and support phase, which is excluded from system analysis and design aims to support the system for some period of time. The main task of this phase supports the users to run the business with the new system smoothly and remove undesirable errors that might occur. This phase takes approximately half a month to monitor the system.

The project plan of Aris Design Information System is shown in Table 1.1.

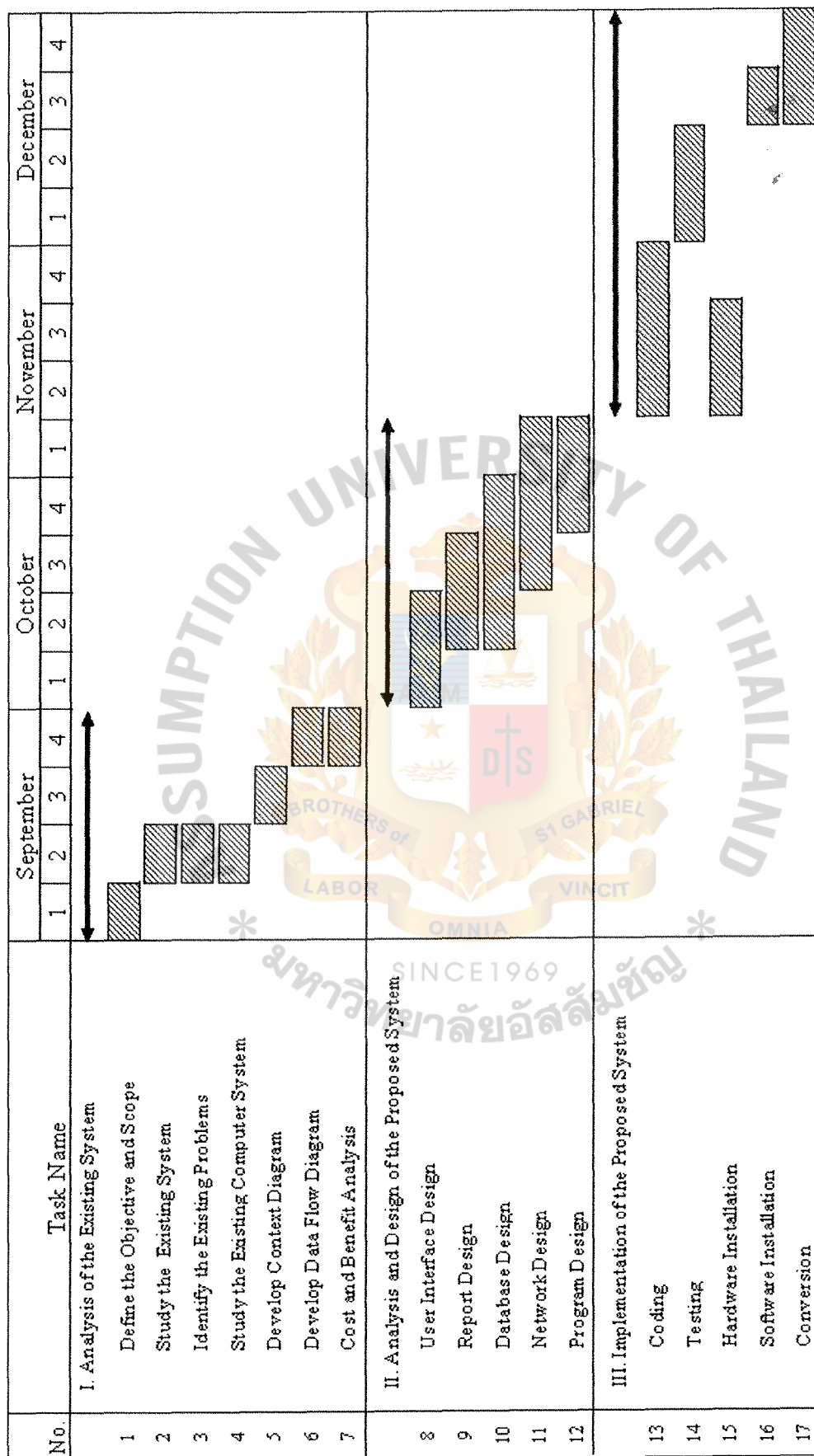


Table 1.1. Project Plan Aris Design Studio Information System.

II. THE EXISTING SYSTEM

2.1 Background of the Organization

Aris Design Studio was established in 2002 as a design company. This company runs the business as a SME business, and now has about 5 staff working in the office, which is located in Bangkok. The company has to design for residential projects only. For the first two years and the company runs the business with unsystematic and nonstandard management, each project design and management controlled by the designers themselves. Therefore, some processes are redundant, slow and unsatisfactory. The throughput is small and the response time is long when a customer calls for project order process. Therefore the computerized system is introduced into the company to increase efficiency and effectiveness of the processes.

The company divides the system into 3 main processes: Customer Registration Process, Project Order Process, and Project Expense Process. The Customer Registration process is responsible to provide service to all customers to give their information in the registration system such as name, address, age, etc. by writing on the paper form of Aris Design Studio. Project order processes is responsible for receiving orders from the customers .The project manager will bring the information to the designer to develop the concept design. The last process is project expense. This process is concerned with the project manager to record the expense of project from the designer .The project designer will record the project expense by the computerized system. The company will record the expense for the whole project and charge it to the customer correctly without non-record expense.

Overall, the process of the existing system that is described above is summarized into the context diagram shown in Figure 2.1.

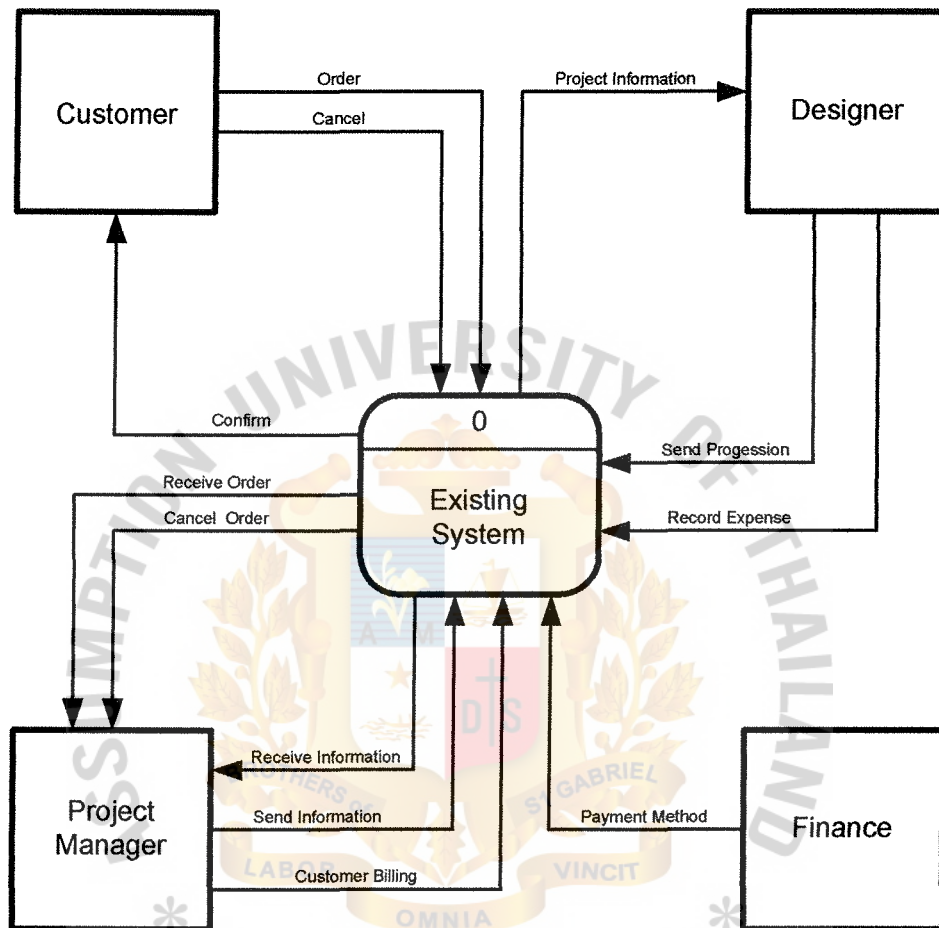


Figure 2.1. Level Context Diagram of Existing System.

2.2 Evaluation of Problems

The manual system that is currently applied in the company brings many problems to the company. According to PIECES analysis, the problems are classified into 6 major types which are performance, information, economics, control, efficiency, and service. All of the problems of the company will be arranged into these 6 main types.

(1) Performance

Performance of the system can be measured by the throughput and the response time of the system. The throughput of the existing system is too low. The number of orders that the system can arrange and confirm to the customer and for applicants to add the information on paper in the period of time is limited. The existing system consumes much more time to complete customer's order, which has effect on the throughput of the system during rush hours. The time between the order submitted and confirmation is too long. The low throughput and slow response time indicate that the performance of the company has problems.

(2) Information or Data

The information is separated into 3 main groups as follows:

(a) Output

The output from the system may not meet requirements because of the errors of people. The information is not in a useful format. Some outputs are not accurate.

(b) Input

The input to the system is not in the format that is easy; it makes errors such as handwriting errors. So input contains errors, which are generated by human.

(c) Stored Data

All the data are stored on paper. Some data are stored redundantly in multiple files of paper. The data is not well organized and is not ready for use. Accidents or vandalisms may occur to the paper, which store the data. The data is not accessible or difficult to search.

(3) Economics

Economic Problem is the major problem of Aris Design Studio because it has to minimize cost and maximize performance by competing with time and opportunity at the same time. Costs in the existing system are too high, and major cost is hard to estimate because some costs are untraceable to the source, so that it is not the best way to operate the company in the long run.

(4) Control and Securities

There is too little control and security in the existing system. As a result of storing data on paper, every employee and unauthorized person can access the data. The data is not adequately edited. And redundantly stored data are inconsistent in different files or database.

(5) Efficiency

The manual system brings some problems, which are related to the company. The staff waste operation time such as in capturing the data redundantly, or processing the data redundantly. The information is generated redundantly and it may waste other people's time, and also waste both materials and office supplies.

(6) Service

There is no standard for the manual system of the company. The system may produce inaccurate, inconsistent, and unreliable results.

2.3 Analysis and Selection of Alternatives

From the analysis of the existing system, the manual system is a major cause of many problems in the company such as too slow operation time, too high operation cost, or unreliable information. In order to solve the problems, the new system is introduced. Before the new system is designed, some factors have to be considered:

(1) Manual System versus Computerized System.

The manual system and computerized system have their own advantages and disadvantages.

Table 2.1. Manual System versus Computerized System.

Criteria	Manual System	Computerized System
Operation Speed	Operation speed is too slow.	Operation speed is fast.
Investment	Investment is very low.	High investment is required to set up the system.
Operation Cost	Operation cost is high and some cost is untraceable to source.	Operation cost is relatively low compared to the manual system.

From Table 2.1, it is seen that the computerized system is more preferable than the manual system because it has more advantages. The computerized system can accelerate operation, reduce overall cost, and increase reliability of data and information.

2.4 Existing Computer System

In the existing system, there is no computer system in Aris Design Studio.

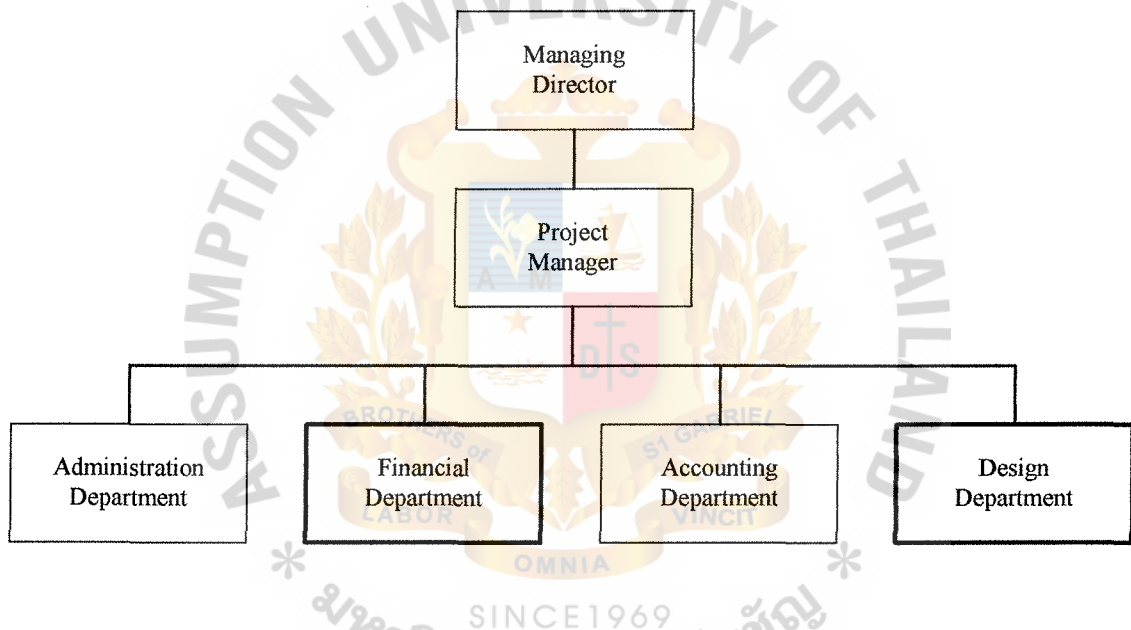


Figure 2.2. Organization Chart Aris Design Studio.

Table 2.1. Manual System versus Computerized System (Continue).

Criteria	Manual System	Computerized System
Maintenance Cost	Maintenance cost is relatively low compared to the computerized system.	Maintenance cost is high.
Data Error	Data contain many errors generated by human or other factors.	Computerized system will check data input to minimize data errors.
Data Redundancy	Manual system generates very high data redundancy.	Computerized system reduces data redundancy in the database.
Data Reliability	Data from the manual system is unreliable and inconsistent.	Computerized system promotes reliability and consistency of data.
Accessibility to data	It is difficult to access data in the manual system.	It is very easy to access or search the required data in the computerized system.
Data Securities	There is too little security in the manual system. Unauthorized persons can access the data.	Data is kept in the computer, which has the security system to protect access from unauthorized persons.
Number of employee Required	Manual system requires more employees compared to the computerized system.	Computerized system minimizes the number of employees to reduce salary.

III. THE PROPOSED SYSTEM

3.1 System Specification

The user requirements are obtained by interviewing, distributing questionnaires and from observation applied to find out the requirement of users. After studying the existing system of the company, problems are discovered. These requirements are the guidelines for system specification. Users' requirements are the expectation from users toward the new system. The user requirements of this company are summarized as follows:

- (1) The proposed system has to shorten the service time for providing service to customers. The time for searching required data has to be minimized. The response time of the system has to be stimulated. Reliable information has to be increased together with the speed of the system.
- (2) Users would like the system to be user-friendly. The system should be easy to use or easy to understand.
- (3) Information should be easy to search. The office of the registrar provides request forms on the screen for project types. The users want to use the information in the forms, such as customer's ID to search for an individual's record.
- (4) The new system has to minimize human errors in inputting of information to the system and the interface has to be well organized and designed. The system has to have some verification functions to validate any input from users.
- (5) The proposed system has to reduce paper work in the office. Any report, which is required by owner, on generated in the screen rather than on paper.

In order to provide the above requirement, system specification is developed. System specification depicts the feature of the proposed system in various aspects as follows:

(1) Computer Hardware

The existing system does not have computer hardware. New computer hardware is set up to support the computerized system and is designed according to the client/server system. There is one database server and two clients in the network. Each computer connects to the server by LAN network.

(2) Database Redesign

The existing system keeps all information on paper. The proposed system keeps the information in the computer rather than on paper. Relational database theory is applied to the database and new relational database tables are designed in order to minimize redundancy of database. The new database system facilitates users to manage the data within the company.

(3) Output, Input, and Interface Redesign

Users require easy-to-use interface for inputting of data. New interfaces specifications aim to meet the requirement of the users. Many common GUI objects such as textbox, list box, combination box, etc are used in the new interface. Each common GUI object is used for different types of data. The new interface can reduce human-generated errors by reducing typing errors. The proposed system has preprinted forms for each output, which can shorten the response time for printing documents.

3.2 System Design

After receiving various requirements of the system, the next phase of the project is system design. The system design of this project primarily focuses on fulfilling the business requirement of Aris Design Studio Company as well as on user friendliness. The new system will be changed from a manual system to a computer-based system. So, system design is an evaluation of alternative solutions and specifications of a detailed computer based system. It is necessary to point out that flexibility and expandability must be concerned for backtrack of previous phases to make corrections or respond to new requirements.

With regard to system design, we should consider feasibility of the system in terms of technical, economic, legal, and timing management and social aspects according to the company's background. It deals with the physical aspects of the system as hardware, software, database and other services.

To gain a better understanding of the new system requirement, a logical model is drawn to depict the system independent of any technical implementation. In this project, data modelling and process modelling techniques are used to document business requirement, and serve as the logical design of the proposed system. The details of each technique can be explained as follows:

Data Modelling

Data modelling is a technique for organizing and documenting a system's data. Data modelling is sometimes called database modelling because a data model is eventually implemented as a database. Data modelling is depicted in a graphical diagram, which is called an entity-relationship diagram, or ERD. There are three levels of entity-relationship diagram: context data model, key-based data model, and fully attributed data model. The context data model represents only the entity and relationship between each entity. There are nine entities, which are discovered in the system: Customers Information, Customer Order Information, Project Information, Expense Information, Project Manager Information, Designer Information, and Progression information. Each entity has a relationship, when combined with the entity name, in the form of simple business sentences or assertions.

In key-based data model, the primary key must be added to each entity to exhibit the unique characteristic of each entity. The foreign key is a primary key of one entity that is contributed to (duplicated in) another entity to identify instances of a relationship. A foreign key (always in a child entity) always matches the primary key (in a parent entity).

The final data model is a fully attributed data model that shows all attributes of each entity. To identify all attributes, it requires understanding of the data attributes for the system. These facts can be discovered through studying the existing reports and documents to be naming standard for attribution.

The following Figure 3.1. is the context data model of the proposed system.

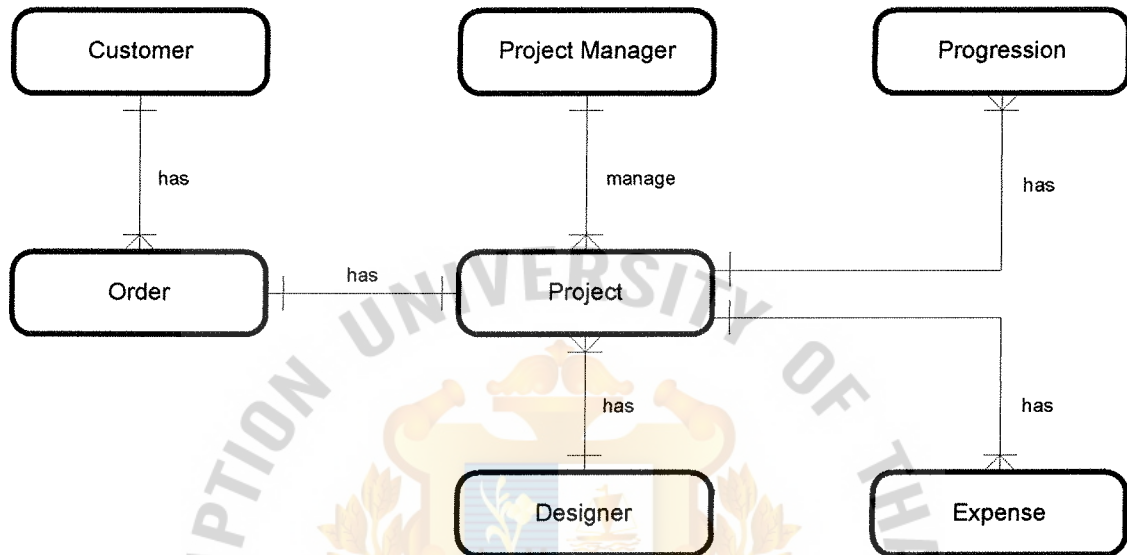


Figure 3.1. Context Data Model of the proposed system.

Process Modelling

Process modelling is a technique for organizing and documenting the structure and flow of data through a system's process and/or the logic, policies, and procedures to be implemented by a system's processes.

Moreover, this phase is related to the input and output designs, both input and output specifications have been derived from user requirements. We, therefore, must be careful to solicit their ideas and suggestions; the input screen must be developed to be user-friendly. The precise format of output and control must be specified to ensure that outputs are not lost, misused, or incomplete.

To construct the process model, the context diagram is first drawn to establish the initial project scope, which defines how the developed system interacts with other systems and the business as a whole. Figure 3.2 illustrates the context diagram of Proposed System. Five external entities, which are Customer, Designer, Finance, and Project Manager, interact with the system.

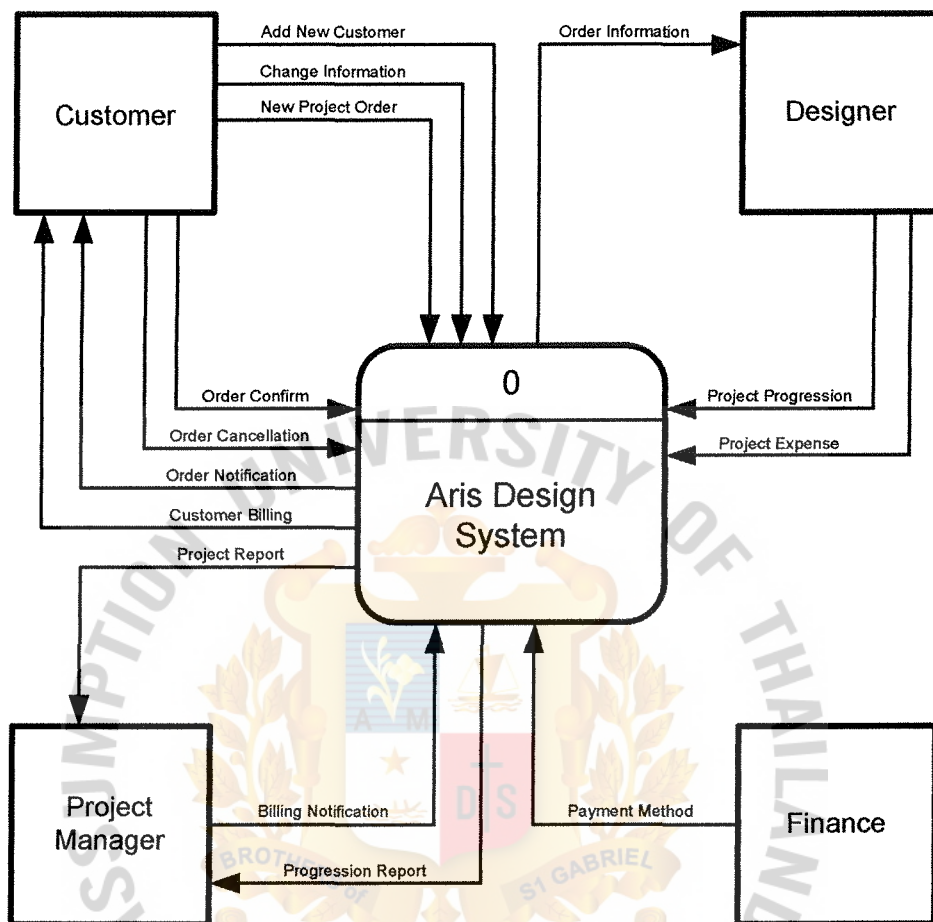


Figure 3.2. Context Data Flow Diagram of Proposed System.

Next, functional decomposition diagram is created to show the top-down functional decomposition and structure of the system. This diagram also serves as an outline for drawing the data flow diagram for better understanding of the system. The functional decomposition diagram of proposed system is shown in Figure 3.3.



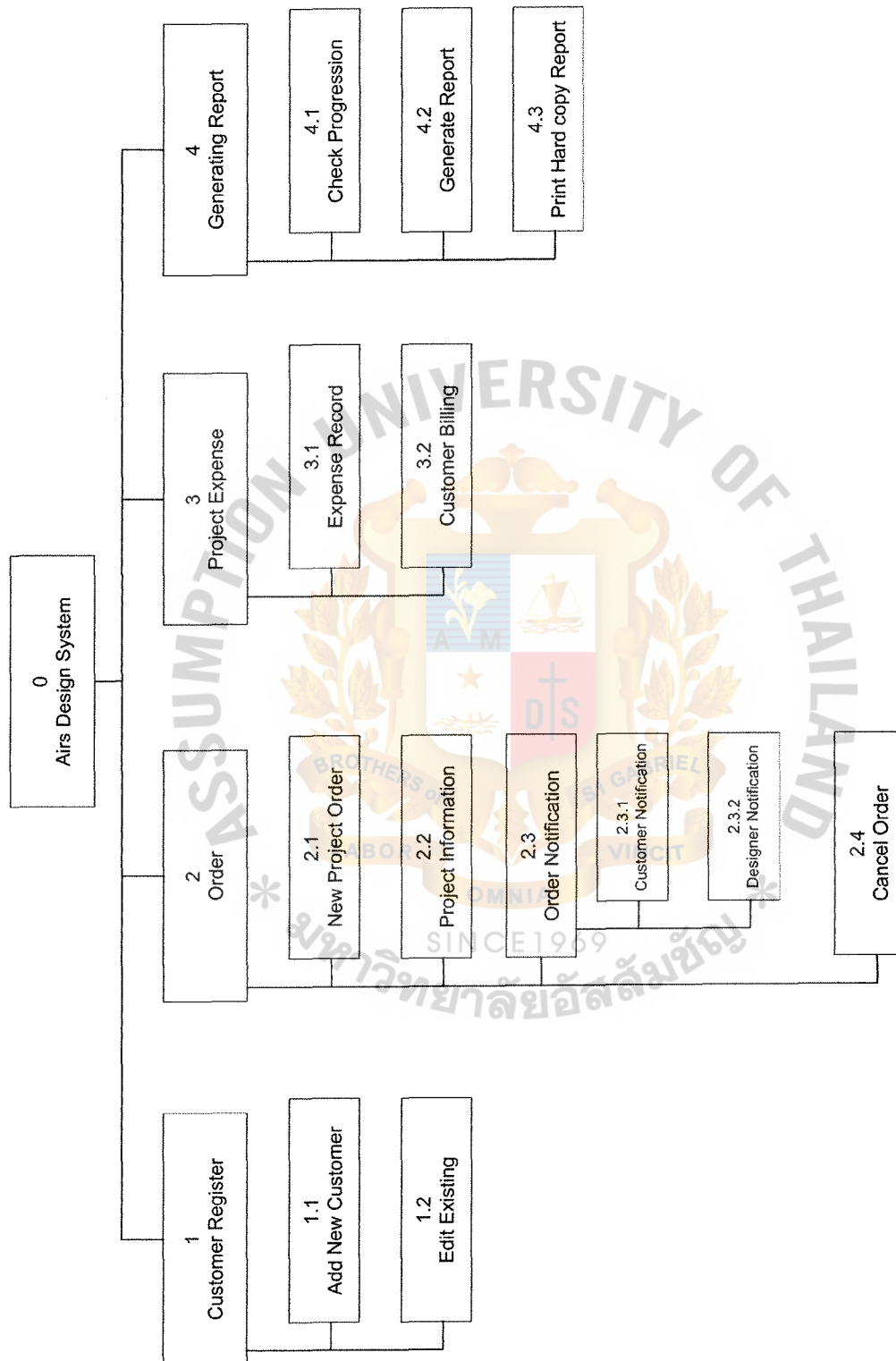


Figure 3.3. Functional Decomposition Diagram of the Purposed system.

After finishing the previous two diagrams, a data flow diagram (DFD) can be drawn to depict the flow of data to, from, and within the system. A data flow diagram has many levels of details. The lower the level of data flow diagram, the more details of processes within the system has. The details of each process can be explained briefly as follows:

(1) Subsystem 1: Customer Register.

This subsystem is created for setting up the identification number of each customer, and add or edit all the information of the customer. Also, information of the model will be kept in the model database.

(2) Subsystem 2: Order.

This subsystem is created for taking customer's orders and input them into the system. The information is gathered from customer's orders that come by mail, phone, and fax. After that the officer will key in the information into the system. Also, order information will be kept in order database. And then the project manager can send the information by mail to the designer so that the company can save paper cost..

(3) Subsystem 3: Project Expense.

This subsystem is created for recording all expense cost for each project. Each cost will appear during the project process and all expenses will be kept in expense database. And the project manager would receive the report and generate billing for the customers.

(4) Subsystem 4: Generating Report.

This process will focus purely on generating various types of reports to the Project manager. These reports are mainly about order, project, and summary, which will be generated both daily and monthly. For the project

manager's purpose, monthly summary report is substantially useful. It will conclude all the orders and match with the designers that get the job from the customer.

Figure 3.4 illustrates level 0 data flow diagram of Proposed System. The lower levels of data flow diagram are shown in Appendix A.



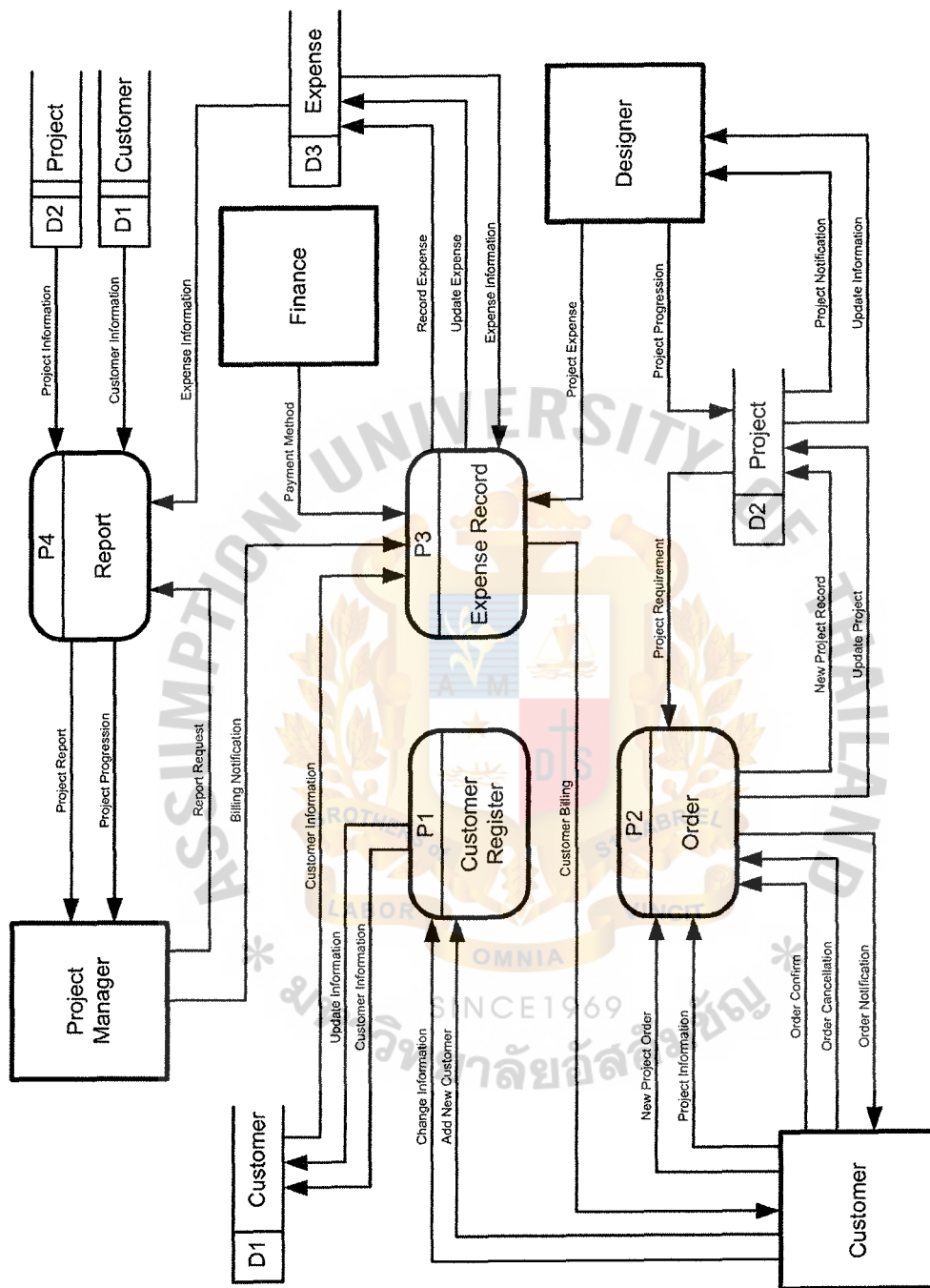


Figure 3.4. Level 0 Data Flow Diagram of the Purposed system.

3.3 Candidate Solutions

In order to accomplish system specifications, various types of solutions are designed as alternatives. There are 3 types of solutions designed for Aris Design Studio Company to set up the Project management System. Each solution is shown as follows:

(1) Package Solution

This solution is designed based on ready-to-use software package, which is available in the market. There are many software packages in the market that are concerned about managing the information of the organization. This solution is developed easily and quickly. The cost of acquiring this solution is relatively cheap when compared with other solutions. However, this solution has one major disadvantage and that is the inflexibility of the solution. The package is designed generally to suit the operating environment of most organizations. However, it cannot specifically match the entire requirements of a specific company. Compatibility of the solution is limited. The package solution has to be modified to satisfy the specific needs of the company.

(2) Custom Solution of MS Access

This is a custom-made application that will be developed by Borland Delphi 7. MS Access 2002 is used to develop the database and software because database of the company is not large. This solution takes a longer time to develop when compared with the previous solution. The development cost is also higher. The advantage of this solution is the flexibility of the solution. The solution is developed specifically to match the entire requirements of the company. The growth and change of the company are also considered when designing the application. The operation cost is reduced but efficiency of operation will increase

(3) Custom Solution with Oracle

This solution uses Borland Delphi 7 as a tool to develop the application and Oracle to develop the database. Oracle supports a larger amount of database than MS Access. The database is stored in the server and processing is done at the client. The application is designed to fit the requirement of the user and it is very flexible and easy to use. The period to develop the application is even longer than the previous solution. The cost of developing this solution is also higher than the previous solution due to the cost of the Oracle Package. The cost of development is too high and the database is too large for the company.

This feasibility analysis helps the company to make a decision to choose the most suitable solution. After all the candidate solutions are identified, feasibility analysis is conducted to weigh each candidate solution with the interested criteria.

The criteria that are used in this feasibility analysis are as follows:

(1) Operational Feasibility

As mentioned earlier, Candidate 2 and Candidate 3 can fulfill this requirement of the user. This criterion measures each candidate whether it fulfills the user's requirement or not.

(2) Technical Feasibility

The level of expertise of the company's user, which is the skills needed for the user is also measured by this criterion. This criterion measures the compatibility of the candidate with the existing technology of the company. In this sense, Candidate 2 gets the highest score in this criterion.

(3) Economic Feasibility

Candidate 2 also gets the highest score in this criterion. The criterion compares all candidates about economic values such as the investment for setting up the system, payback period, or the net present value of the system.

(4) Schedule Feasibility

For this criterion, Candidate 1 gets the highest score. The schedule criterion measures the periods for development of the solution. The longer period gets the lower score.

The feasibility analysis of all candidates is shown in Table 3.1.

Table 3.1. Feasibility Analysis Matrix.

Feasibility Criteria	Wt.	Candidate 1	Candidate 2	Candidate 3
Operational feasibility:	40%	The solution has to be modified to match the requirement of the user. Score: 70	Fully supports user requirement functionally. Score: 95	Same as candidate 2. Score: 95
Technical Feasibility	30%	Programmer is familiar with Microsoft products so this reduces development process.	Programmer is familiar with Microsoft products so this reduces development process.	Oracle is the leading DBMS software that provides high efficiency. But programmers are not familiar with oracle product.

Table 3.1. Feasibility Analysis Matrix (Continue).

Feasibility Criteria	Wt.	Candidate 1	Candidate 2	Candidate 3
		Requires to hire a programmer to modify and integrate the solution with existing system. Score: 65	Requires to train the employees to use the solution. Score: 75	Requires to train the employees to use the solution. Score: 70
Economic Feasibility Cost to develop: Overall cost:	20%	Approximately 417,400 baht Approximately 3,344,234 baht Score: 60	Approximately 505,400 baht Approximately 2,769,168 baht Score: 75	Approximately 524,400 baht Approximately 2,788,168 baht Score: 70
Schedule Feasibility	10%	2 Months Score: 95	8 months Score: 80	10 months Score: 75
Total Score	100%	69.00	82.50	80.50

Process Specification

The purpose of process specification is to define what the system does to transform inputs into outputs. It provides the details of system processes in table format, which is easier to look at all related input, output, and relevant process than in a diagram. All specified tables, which are processes from the logical DFD Process specification are illustrated in Appendix D.

Data Dictionary

To support system design, data dictionary provides a list of terms and definitions for all data items and data stores within the developed system. The data dictionary for entity-relationship diagram is shown in Appendix E.

Database Design

Data modelling (ERD) in the previous section requires some additional process called data analysis to convert the design logical data model into implemented database. In data analysis, a normalization technique is used to transform all data in ERD into applicable database. The result of database design is database structure in table format. The database design is shown in Appendix F.

Output Design

Output requirements also come from the data flow diagram. These system outputs are easily identified and examined through the data flows that are connected to external entity. More details of output design can be gathered from interviewing system users about their output requirements.

3.4 Hardware and Software Requirement

The existing system of the company is a manual system but the proposed system is a computer-based system. Aris Design Studio Company has to purchase new hardware and develop new software.

The hardware and software that the company has to purchase are listed below:

(1) Hardware Requirement

(a) 1 set of database server

Table 3.2. Hardware specification of database server.

Hardware	Specification
CPU	Intel Pentium IV 2.8 G
Motherboard	GIGABYTE GA-8IEXP
RAM	DDR RAM 512 MB
Hard Disk	Seagate 80 GB
CD-ROM	Lite-On 50X
Monitor	Samsung 17"

(b) 2 sets of personal computer

Table 3.3. Hardware specification of client computer.

Hardware	Specification
CPU	Intel Pentium IV 2.8 G
Motherboard	GIGABYTE GA-8IEXP
RAM	DDR RAM 512 MB
Hard Disk	Seagate 80 GB
CD-ROM	Lite-On 50X
Monitor	Samsung 17"

(c) 1 printer :

Dot matrix printer (EPSON LQ 1170 ESC/P 2)

(d) 3 sets of UPS :

UPS 1000VA (Uninterrupted Power Supply)

(e) Scanner

Table 3.4. Software Requirement.

Software Type	Software
Operating System	Microsoft Windows XP
Application Software	<div>Microsoft Office XP<ul style="list-style-type: none">• Microsoft Word• Microsoft Excel• Microsoft Access• Microsoft PowerPoint• Microsoft Outlook</div>

Table 3.5. Hardware Requirement for Set up Network.

Hardware
HUB
LAN Card
Wire

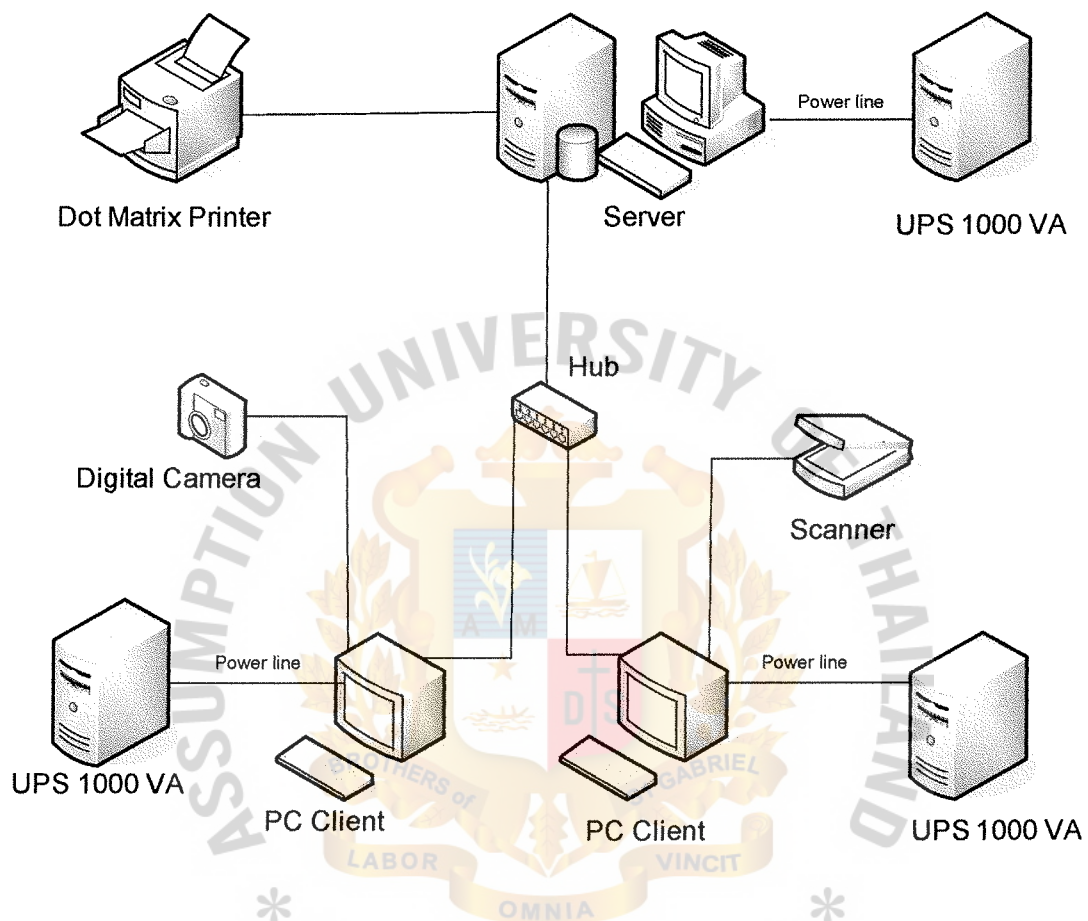


Figure 3.5. Network Configuration of Proposed System.

system cost are summarized in Table 3.6

Table 3.6. Cost of the Existing System.

Cost Items		Years				
		1	2	3	4	5
<u>Fixed Cost</u>						
Electric typewriter	1 units@6000	6,000	-	-	-	-
Calculator	3 units@1,000	3,000	-	-	-	-
Facsimile	1 unit@5000	5,000	-	-	-	-
Telephone	2 units@1200	2,400	-	-	-	-
Camera	1 unit@24000	24,000	-	-	-	-
Total Fixed Cost		40,400	-	-	-	-
<u>Operating Cost</u>						
<u>Salary Cost:</u>						
Manager/Designer	3 person@10,000	360,000	378,000	396,900	416,745	437,582
Administrator	1 person@7000	84,000	88,200	92,610	97,241	102,103
Massager	1 person@7000	84,000	88,200	92,610	97,241	102,103
Total Monthly Salary Cost		54,000	56,700	59,535	62,512	65,638
Total Annual Salary Cost		582,000	611,100	641,655	673,738	707,426
<u>Office Supplies & Miscellaneous Costs:</u>						
Office Supplies	Per Annual	20,000	22,000	24,200	26,620	29,282
Utilities	Per Annual	45,000	49,500	54,450	59,895	65,885
Miscellaneous	Per Annual	25,000	27,500	30,250	33,275	36,603
Total Annual Office Supplies & Misc. Cost		90,000	99,000	108,900	119,790	131,769
Total Annual Operating Cost		672,000	710,100	750,555	793,528	839,195
Total Current System Cost		712,400	710,100	750,555	793,528	839,195

Table 3.7. Five Years Accumulated Manual System Cost, in Baht.

Year	Total Cost	Accumulated Cost
1	712,400	712,400
2	710,100	1,422,500
3	750,555	2,173,055
4	793,528	2,966,583
5	839,195	3,805,778
Total	3,805,778	—

(2) Cost of proposed system

The proposed system is a computerized system. Cost of the proposed system is mainly spent on investment as initial investment. Total cost of proposed system is also categorized into fixed cost and operation cost. The computer system replaces some office equipment, so the cost of the replaced equipment will be removed. Fixed cost includes the computer hardware, software, and network hardware. This investment is paid to the vendor who provides the computer system. There is some office equipment, which cannot be replaced by the computer hardware such as telephone. The other cost is operation cost. As a result of setting up the new computer system, the company can reduce the number of employees. The other operation cost is also reduced. The computer system also brings additional cost to the company. The additional cost is the maintenance cost for maintenance of the computer system.

Table 3.8. Cost of the Proposed System.

Cost Items	Years				
	1	2	3	4	5
Fixed Cost					
Hardware Cost:					
Server Computer	40,000	-	-	-	-
Client Computers	48,000	-	-	-	-
Network Hardware	10,000	-	-	-	-
Office infrastructure					
Digital Camera	24,000	-	-	-	-
Scanner	4,000	-	-	-	-
Telephone 2 units@1200	2,400	-	-	-	-
Facsimile	5,000	-	-	-	-
UPS 1000VA	15,000	-	-	-	-
Printers and Other Peripherals	30,000	-	-	-	-
Total Hardware And Office Infrastructure Cost	178,400	-	-	-	-
Software Cost:					
Operating System Cost	15,000	-	-	-	-
Office Application Cost	42,000	-	-	-	-
Written Software Cost	180,000	-	-	-	-
Total Software Cost	237,000	-	-	-	-
Implementation Cost:					
Training Cost	20,000	-	-	-	-
Setup Cost	70,000	-	-	-	-
Total Implementation Cost	90,000	-	-	-	-
Maintenance Cost		5,000	10,000	15,000	20,000
Total Fixed Cost	505,400	5,000	10,000	15,000	20,000
Operating Cost					
Salary Cost:					
Manager/Designer 2 person@10,000	240,000	252,000	264,600	277,830	291,722
Administrator 1 person@7000	84,000	88,200	92,610	97,241	102,103
Total Monthly Salary Cost	27,000	28,350	29,768	31,256	32,819
Total Annual Salary Cost	324,000	340,200	357,210	375,071	393,825
Office Supplies & Miscellaneous Costs:					
Office Supplies Per Annual	16,000	17,600	19,360	21,296	23,426
Utilities Per Annual	40,000	44,000	48,400	53,240	58,564
Miscellaneous Per Annual	15,000	16,500	18,150	19,965	21,962
Total Office Supplies & Misc. Cost	71,000	78,100	85,910	94,501	103,951
Total Annual Operating Cost	395,000	418,300	443,120	469,572	497,776
Total Proposed System Cost	900,400	423,300	453,120	484,572	517,776

Table 3.9 Five Years Accumulated Cost of Proposed System.

Year	Total Cost	Accumulated Cost
1	900,400	900,400
2	423,300	1,323,700
3	453,120	1,776,820
4	484,572	2,261,392
5	517,776	2,779,168
Total	2,779,168	-

- (3) The Comparison of the System Costs between Computerized System and Manual System:

After both the existing system cost and the proposed system cost are identified, a comparison table is constructed to reveal the cost saving after implementing the new proposed system. Since Aris Design Studio Company has been working manually, everything is recorded on paper. So, operating costs of the computerized system must be higher than the manual system in the first period and will be decreased later as time passes by. Comparison of the system costs are summarized in Table 3.13.

Table 3.10 Cost Comparison of System Costs, in Baht.

Year	Total Cost	Accumulated Cost
1	712,400	900,400
2	1,422,500	1,323,700
3	2,173,055	1,776,820
4	2,966,583	2,261,392
5	3,805,778	2,779,168

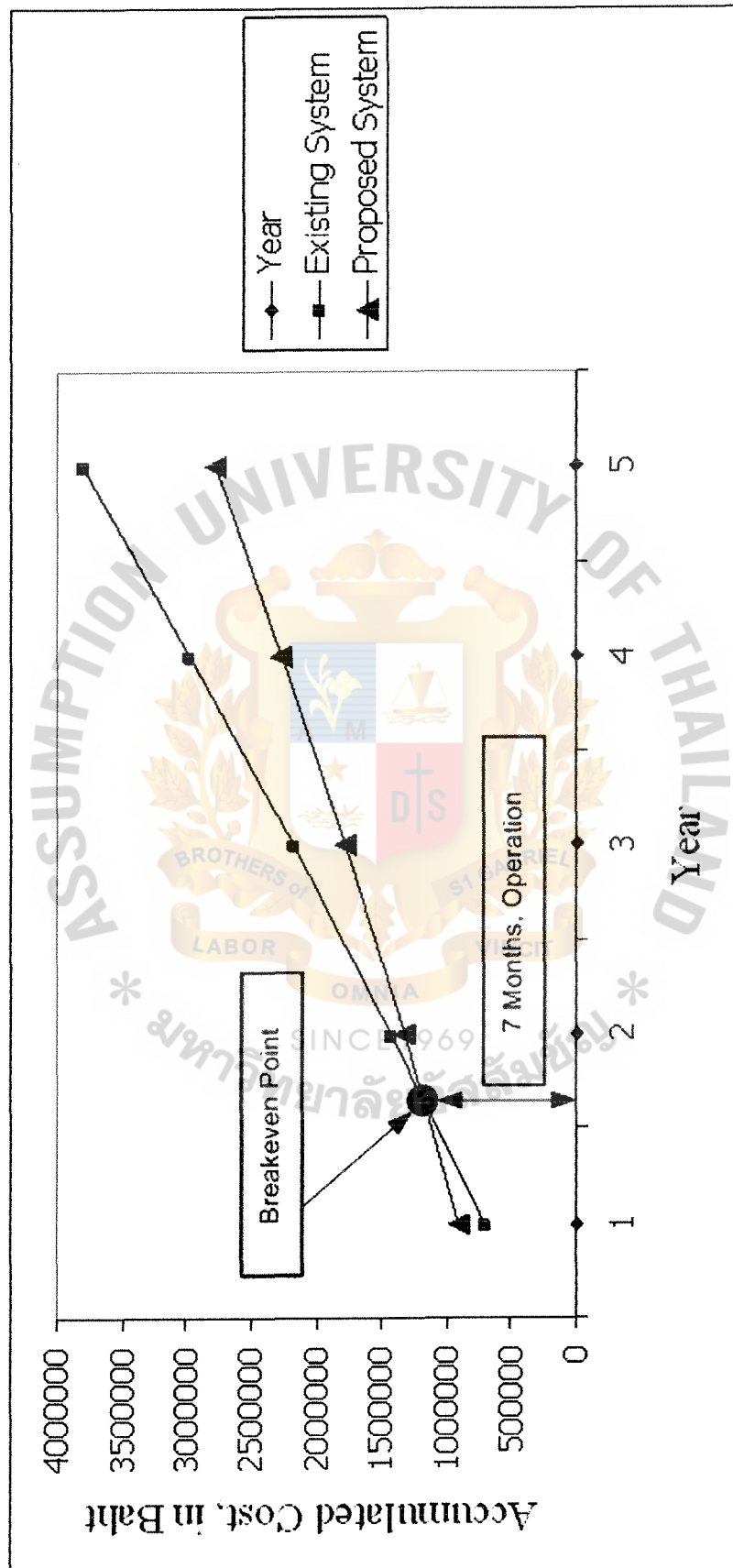


Figure 3.6. Cost Comparisons between Manual and Computerized system.

(4) Benefit Analysis

In the previous section, it can be clearly seen that the total cost of the proposed system in the first year is higher than the total cost of the existing system. Nevertheless, in the following year, the total cost of the proposed system is much lower than the total cost of the existing system. This can happen due to lower operation cost of the proposed system.

The benefit from the proposed system can be categorized into two main types, tangible and intangible benefits which will be described as follows:

- (a) The tangible benefit is the benefit that can be depicted in a quantitative amount. This benefit can be calculated and shown in a numeric form. This is the benefit from increase in sales, increase in performance, as well as decrease in operation cost.

Annual Tangible Benefits (baht) can be estimated as follows:

- (1) Profit on decreased costs 870,000
- (2) Response time decreases 25,000
- (3) Total salary decreases 320,000
- (4) Productivity increases 250,000
- (5) Production error decreases 75,000

Total 1,540,000

- (b) Intangible benefits: The proposed system also brings some benefits that cannot be measured by quantitative value. Customer satisfaction is one kind of intangible benefits of setting up the new proposed system. Customers are concerned only about the response time and the

output of the system. They require only a short response time and reliable output. The proposed system can increase customer satisfaction indirectly by increasing the speed and reliability of the system. Faster speed and more reliable output are results of minimizing data redundancy, increasing security and control of the system, and facilitating processes among relevant units.

(5) Cost-Benefit Evaluation

(a) Break-even Analysis

It is a technique for illustrating the point that the accumulated manual cost equates the accumulated proposed cost. Initially, the cost of the proposed system is higher than the cost of the manual system. The higher cost of the proposed system is a result of the high investment for setting up the computer and network hardware. The accumulated cost of both proposed system and existing system increases over time but the rate of increasing cost of the proposed system is lower than the existing system. The lower rate of increasing cost of the proposed system comes from low operation cost. So, the accumulated cost of the proposed system at the end of the year 5 is lower than the accumulated cost of the existing system. In Figure 3.6, the break-even point can be found to be approximately 7 months.

(b) Payback Period

It is a technique for evaluating the project in a quantitative manner. The payback period shows the point of time that the accumulated benefits can cover the accumulated costs of the project.

The payback period of this project is approximately 1 year and 8 months. This technique provides a rough decision criterion for the manager to make decisions. The illustration of the payback period is shown in Table 3.11 and Figure 3.7:



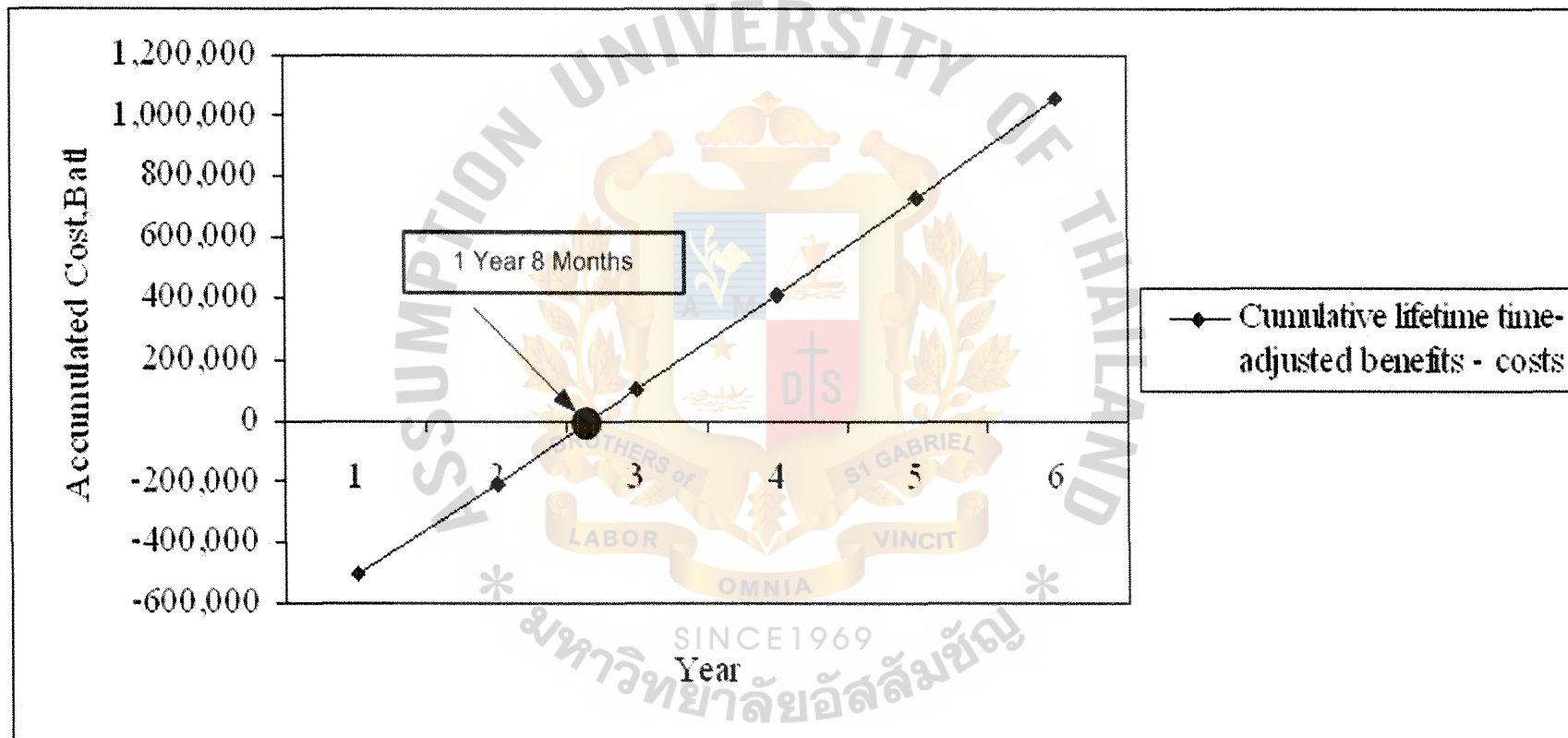


Figure 3.7. Payback Period of the Proposed System.

Table 3.11. Net Present Value for Proposed System, in Baht.

Cash Flow Description	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Develop Cost	-505,400					
Operation & Maintenance Cost		-395,000	-418,300	-443,120	-469,572	-497,776
Discount Factors for 12%	1.000	0.892	0.797	0.711	0.635	0.567
Time-adjusted Costs	-505,400	-352,735	-333,385	-315,502	-298,648	-282,239
Cumulative time-adjusted costs over lifetime	- 505,400	- 858,135	1,191,520	-1,507,022	- 1,805,670	-2,087,909
Benefit derived from operation of new System		730,000	803,000	883,300	971,630	1,068,793
Discount Factors for 12%	1.000	0.892	0.797	0.711	0.635	0.567
Time-adjusted Benefits	0	651,160	639,991	628,026	616,985	606,006
Cumulative time-adjusted benefits over lifetime	0	651,160	1,291,151	1,919,177	2,536,162	3,142,168
Cumulative lifetime time-adjusted benefits - costs	-505,400	- 206,975	99,631	412,155	730,492	1,054,259

(c) Net Present Value (NPV)

Net Present Value is derived from the Estimated Lifetime Benefits minus the Estimated Lifetime Costs. It shows the net amount of money that this project will contribute to the company. The NPV of this project can be calculated as follows:

$$\begin{aligned}\text{NPV} &= \text{Estimated lifetime benefits} - \text{Estimated lifetime costs} \\ &= 3,142,168 - 2,087,909 \\ &= 1,054,259 \text{ baht}\end{aligned}$$

This amount of NPV states that during 5 years of operation, this project will contribute 1,054,259 baht to the company. In other words, if the company invests 1,054,259 baht at 12 percent for five years, the profit will be the same as that of this project.

(d) Return-on-Investment (ROI)

ROI is a percentage rate that measures the relationship between the amount the business gets back from an investment and the amount invested. The lifetime ROI for a project is calculated as follows:

$$\begin{aligned}\text{ROI} &= \text{Net present value} / \text{Estimated lifetime costs} \\ &= 1,054,259 / 2,087,909 \\ &= 50.49\%\end{aligned}$$

IV. PROJECT IMPLEMENTATION

4.1 Overview of Project Implementation

System implementation is planned and orderly conversion from an existing system to the proposed system. The final design should be evaluated first to make sure that the proposed system can meet the desired goals and objectives, and then the other remaining processes will be performed. The typical processes of System Implementation are:

- (1) Hardware and Software acquisition, development and installation:

The proposed system must newly purchase and install both file and database server and clients. The database must also be newly designed for the proposed system.

- (2) Personnel training:

This process is aimed to train the existing users for using the proposed system. The users are trained to operate the proposed system to solve some problems of the proposed system. The objectives of training are to give more understanding of the proposed system.

- (3) Prepare Conversion Plan:

This process is setting up the plan for converting the existing system to the proposed system. The conversion plan is set up like a guideline. The conversion technique is applied to set up the conversion plan.

- (4) Testing:

Testing is conducted to ensure that the proposed system is working properly. Stub testing, unit testing, and system testing are done to fulfill this objective.

(5) Conversion:

Before converting the existing system to the proposed system, the conversion plan must be prepared to serve as a guideline for the entire conversion process.

4.2 Source Code

Written software can be started for coding after acquisition of all hardware and software packages. The proposed program is designed in a module approach, which facilitates the programmer to code the program and test it simultaneously by module (stub testing). After every module is finished, they are combined together as a program and program testing will be conducted to test compatibility and cooperation among each module. After the written software has been coded and tested successfully, it will be installed into the computer hardware.

4.3 Test Plan

The purpose of test plan is to certify that the system is free of errors and ready to be placed in final operation. The test plan can be categorized into three main tests: database testing, network testing and program testing.

- (a) Network testing. The company infrastructure must be built and tested. As the company database must be shared or used or accessed, the company has to ensure that the network that links between the server and 2 clients can work.
- (b) Database testing. The database testing must immediately precede other programming activity because the databases are resources shared by the computer programs to be written. This process is relatively important since

the existing database is in paper form and it must be converted into a computer-based database format. All the data will be kept in the database server.

- (c) Program testing. Testing should not be deferred until after the entire program has been written. There are three levels of testing to be performed: Stub testing, unit or program testing, and systems testing.

Stub testing is the test performed on individual events or modules of a program. A single program that works properly does not mean that it works properly with other modules. Unit or program testing is needed to test all the events and modules as an integrated unit. It is the testing of an entire program. A system testing is performed to test all the set of programs, which should be run through the systems test to make sure one program properly accepts, as input, the output of other programs.

4.4 Conversion

The final process of implementation for the system is to convert the existing system to the new proposed system. The conversion is performed according to the conversion plan, which is set up from earlier processes. Parallel conversion will be applied to this system. Under this approach, both the old and new systems are operated for some time. This ensures that all major problems in the new system have been solved before the old system is discarded. In addition, this approach will help the users to gradually get acquainted to the new system over time.

V. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

This project studies the problems of the existing system of Aris Design Studio Company that is a manual system. Problems occur due to ineffective information system that causes the company to not fully utilize the information to its best use.

The new computerized information system has been introduced to replace the existing one. The new system costs 505,400 baht initially to develop and the accumulated cost over 5 years is 2,769,168 baht. The break-even point would be within 7 months where the accumulated cost of new project equates the accumulated cost of the existing one. Payback period would be around 1 year and 8 months that the net cash flow of the project will turn out to be of positive value. The Net present value and Return on investment are 1,054,259 baht and 50.49% respectively. All of these indicators indicate that this project is worth investing.

This project will also provide many contributions to the companies which are listed as follows:

- (1) Management: the input process is in a standardized format and the data will be stored properly.
- (2) Information Technology: the new system consists of the best combination of hardware, software, and network that will help manage the flow of data in the system.
- (3) Organization: due to better information management, the service time provided to the customers will be lesser. In addition, errors will decrease.
- (4) Information: data retrieval and query system will be much more efficient so that it will take very little time to do such required action.

- (5) Business Solution: with the use of the new system, revenue will increase, so profit increases by 870,000 baht in the first year. Response time will decrease resulting in a monetary benefit of 25,000 baht. Total salary will decrease by 320,000 baht. Productivity increases with a monetary value of 250,000 baht. And finally, production error will decrease which results in the benefit of 75,000 baht.

The degree of achievement of the proposed system is shown in the following table:

Table 5.1. Degree of Achievement of the Proposed System.

Process	Existing System	Proposed System
Data Entry (per record)	10 minutes	5 minutes
Data Calculation (per record)	2 minute	2 seconds
Data Verification (per record)	5 minutes	2 seconds
Search, Inquiry (per one information)	15 minutes	2 minute

From the table, it is obvious that the response time of the proposed system will be much faster than the existing system.

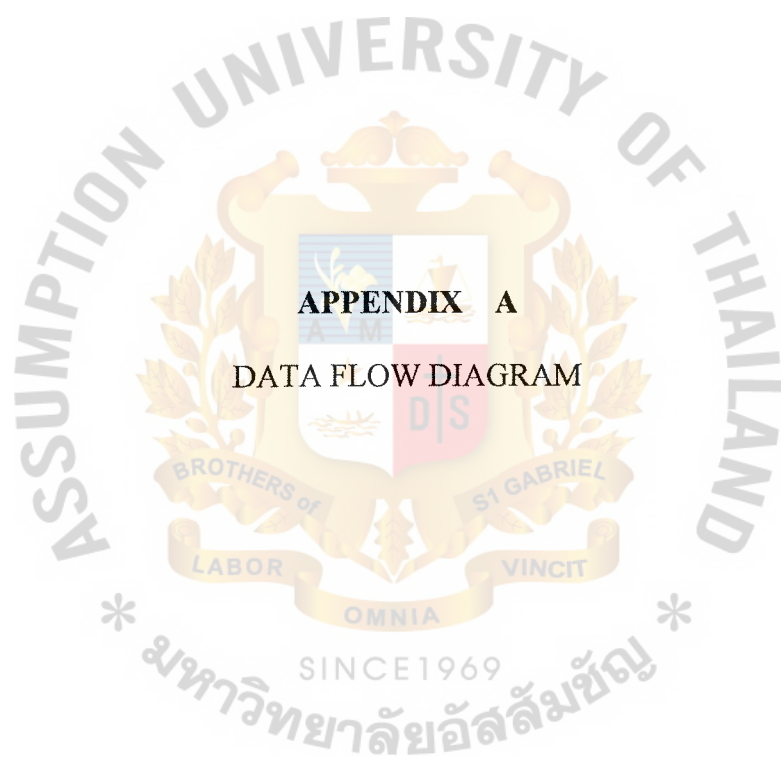
5.2 Recommendations

At present, information technology plays an important role in operating a business. Some people may gain competitive advantage if they apply the information system in their business properly. According to all the reasons mentioned in this report, it is strongly recommended that the new system should be implemented by Aris Design Studio Company. This project is an example of applying information system in some business processes. Management should monitor and study it carefully because it provides valuable information that can be taken into consideration before applying its

concept throughout Aris Design Studio Company.

The new information system for Aris Design Studio Company will also be designed for future change and growth, for example, to use web page implemented by Visio.Net and database implemented by MS Access.





APPENDIX A

DATA FLOW DIAGRAM

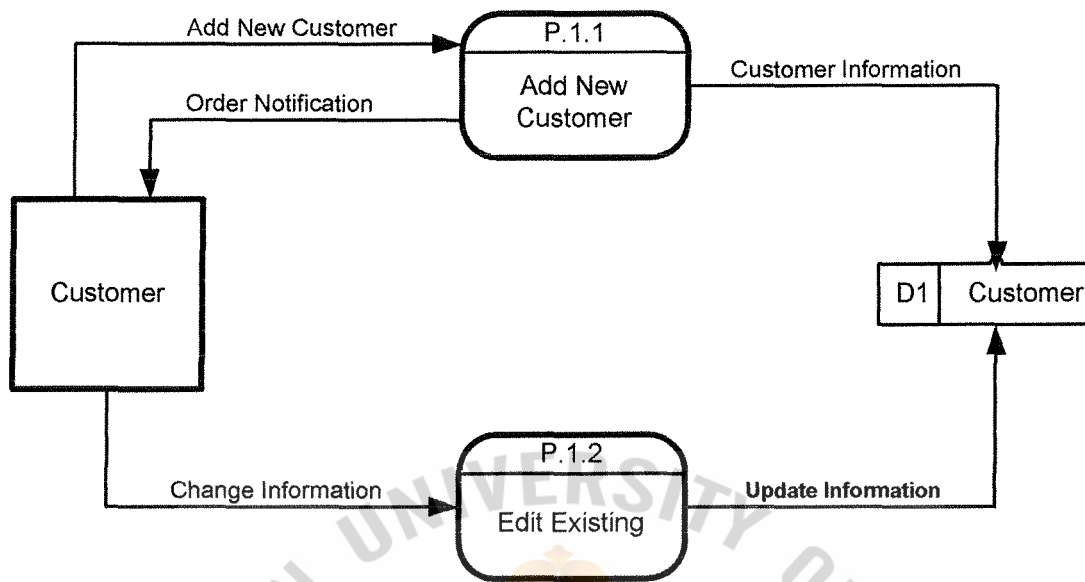


Figure A.1. Level 1 Data Flow Diagram of Customer Register Process.

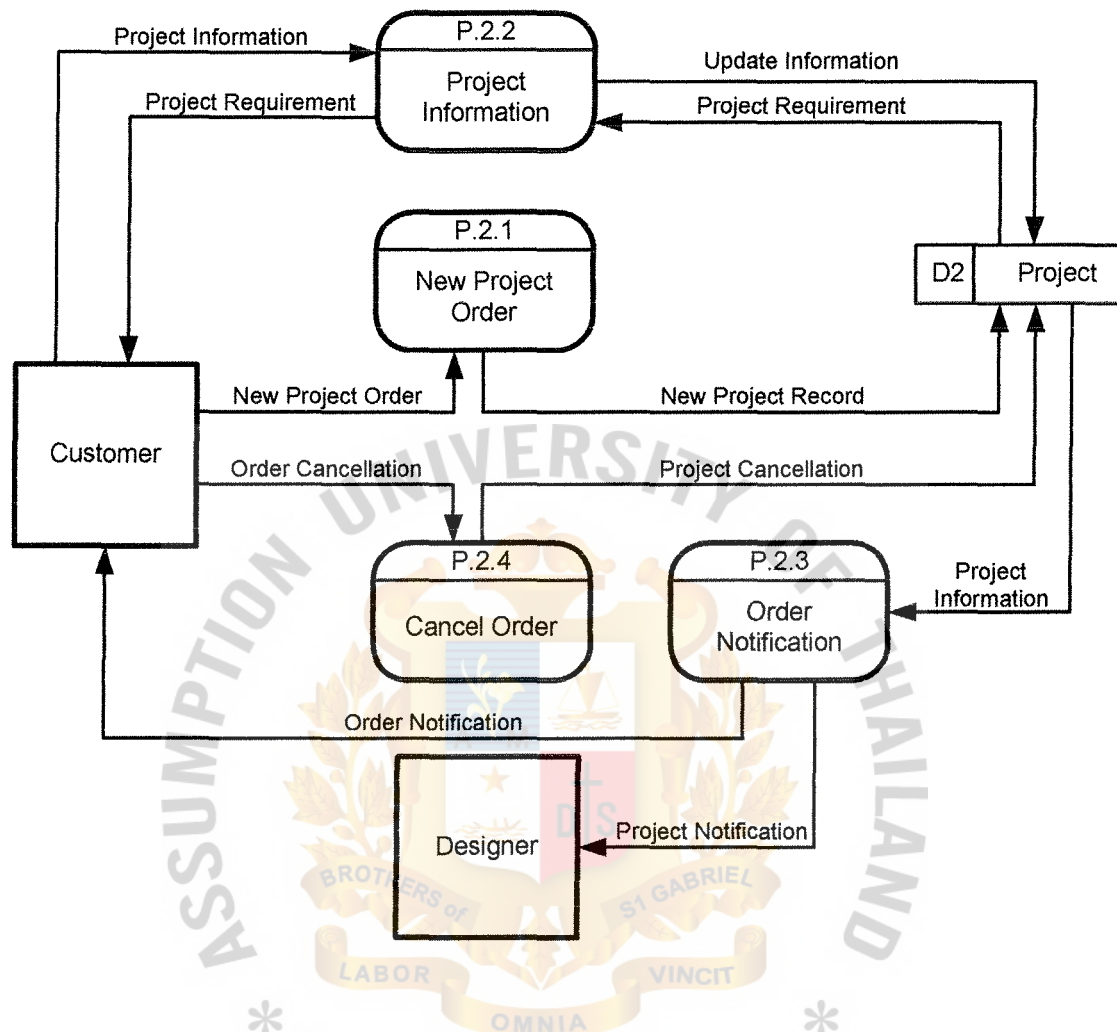


Figure A.2. Level 1 Data Flow Diagram of Order Process.

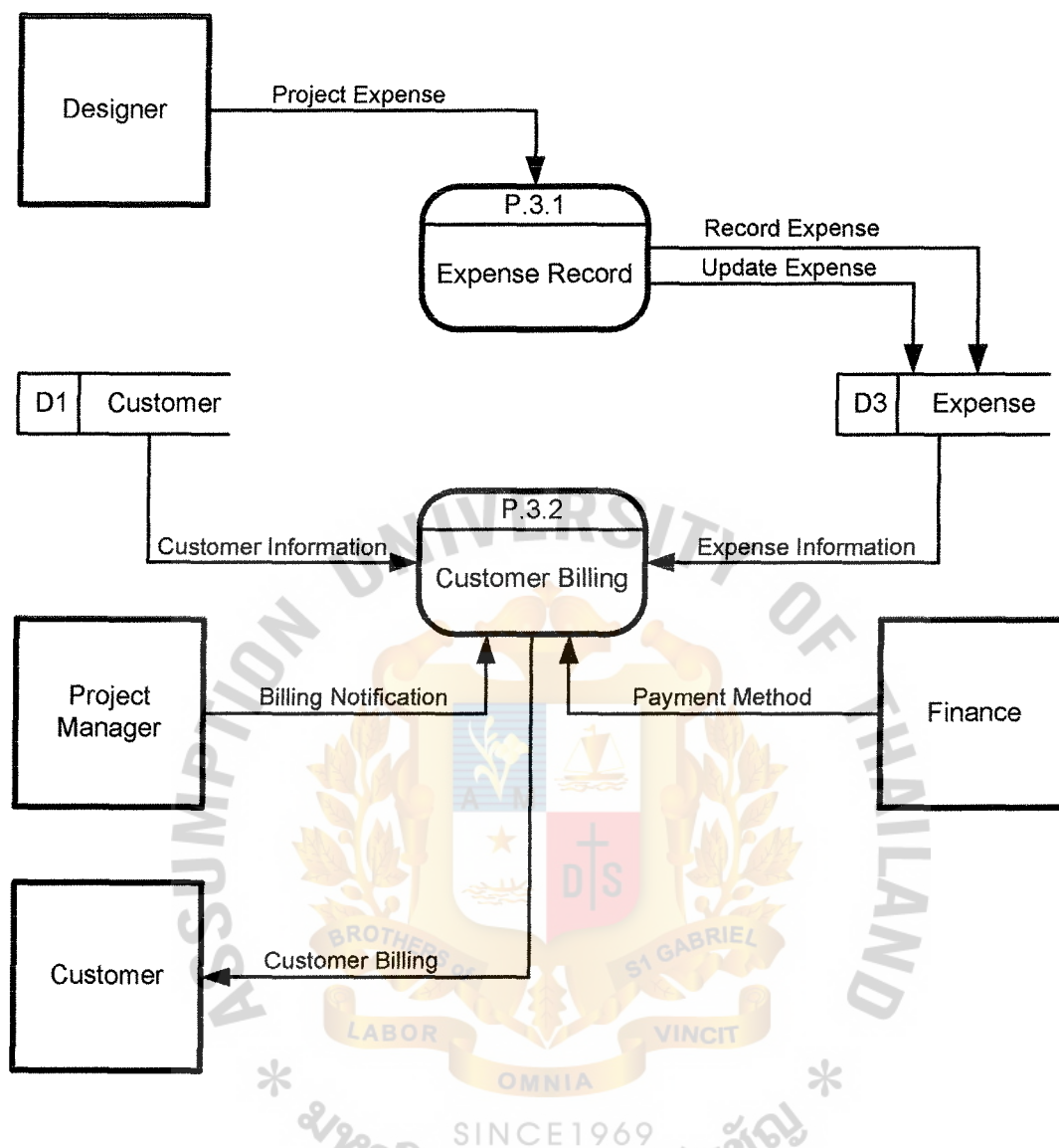


Figure A.3. Level 1 Data Flow Diagram of Project Expense Process.

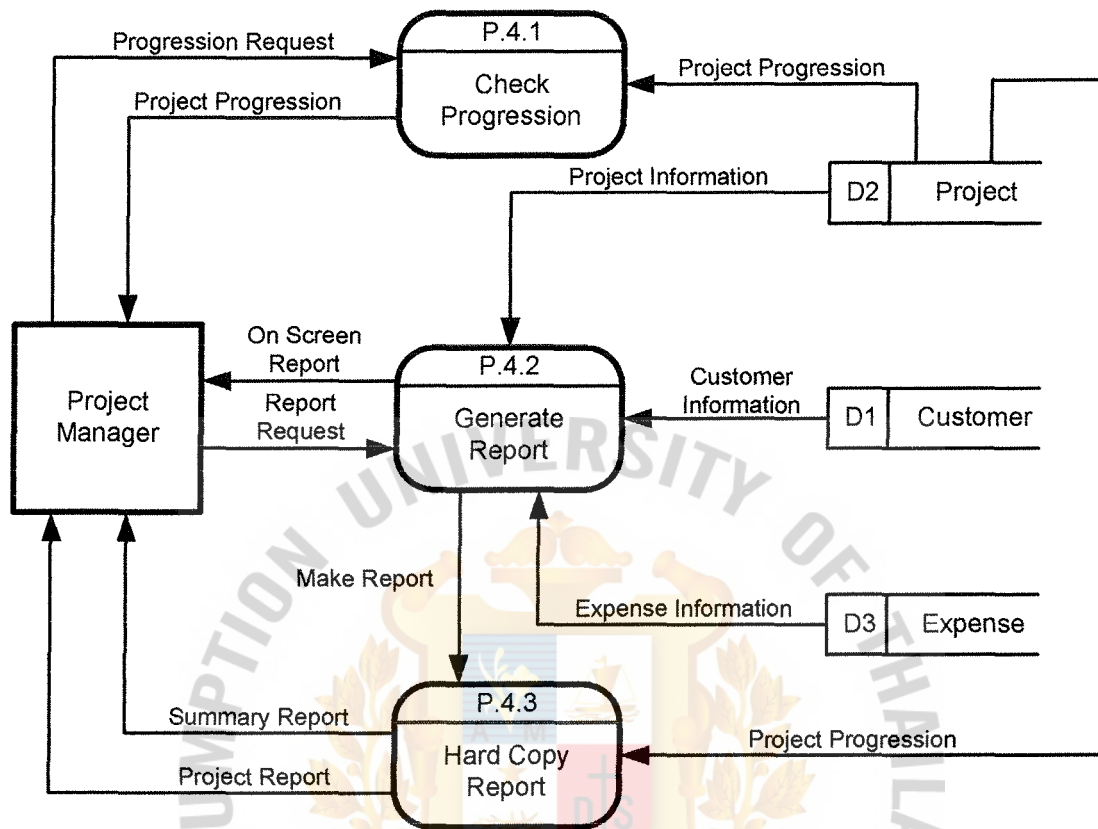
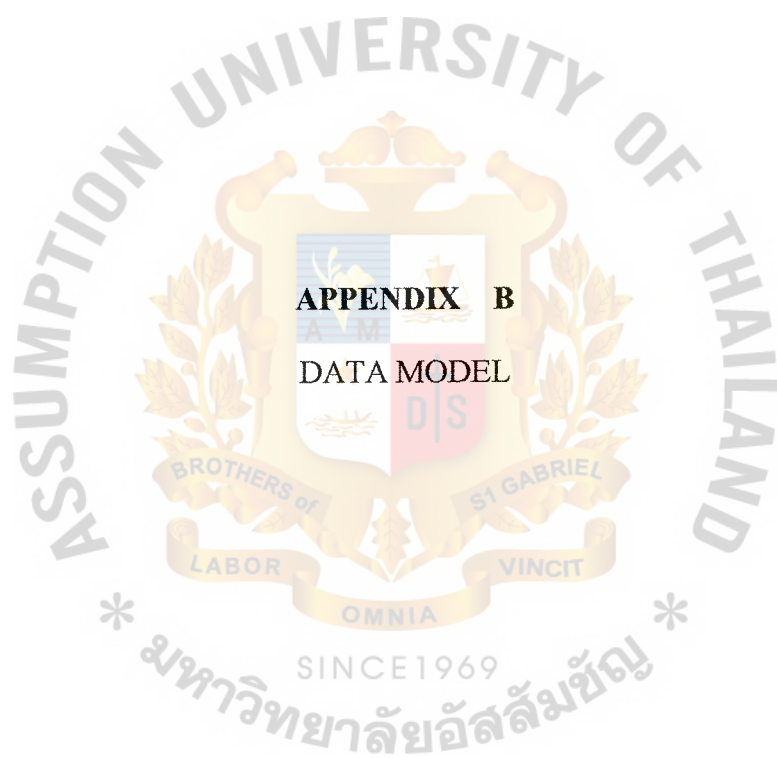


Figure A.4. Level 1 Data Flow Diagram of Generating Report Process.



APPENDIX B

DATA MODEL

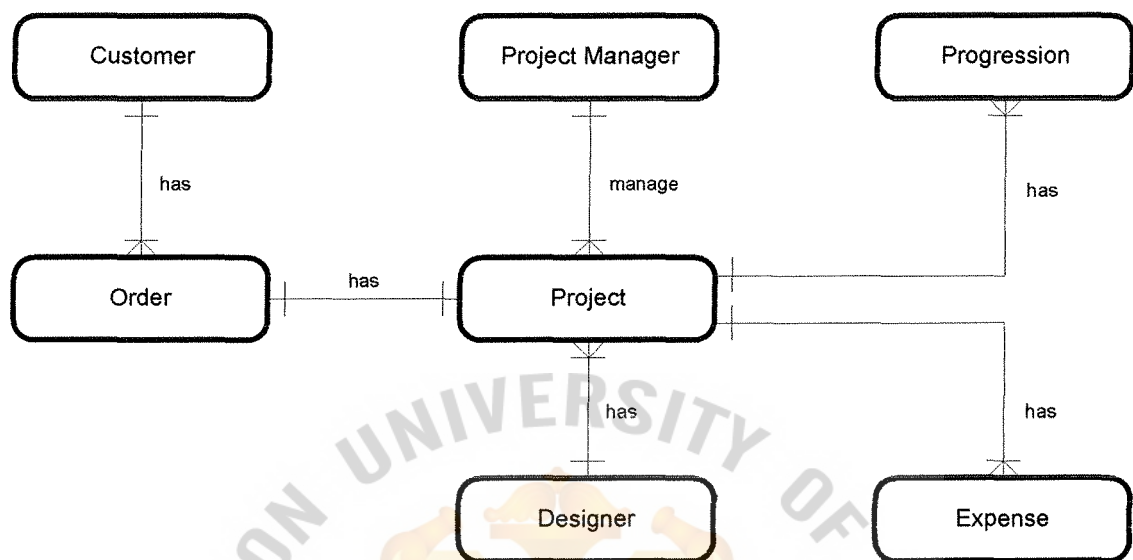


Figure B.1. Context Data Model of the Proposed System.

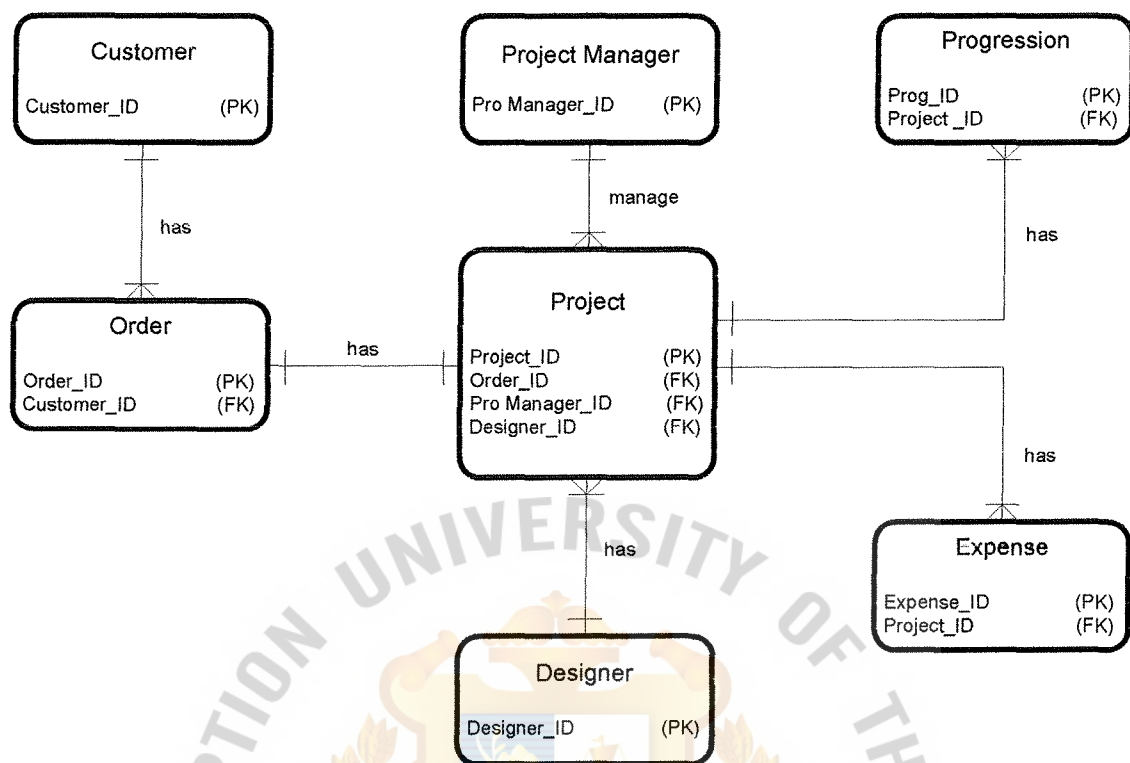


Figure B.2. Key-Based Data Model of the Proposed System.

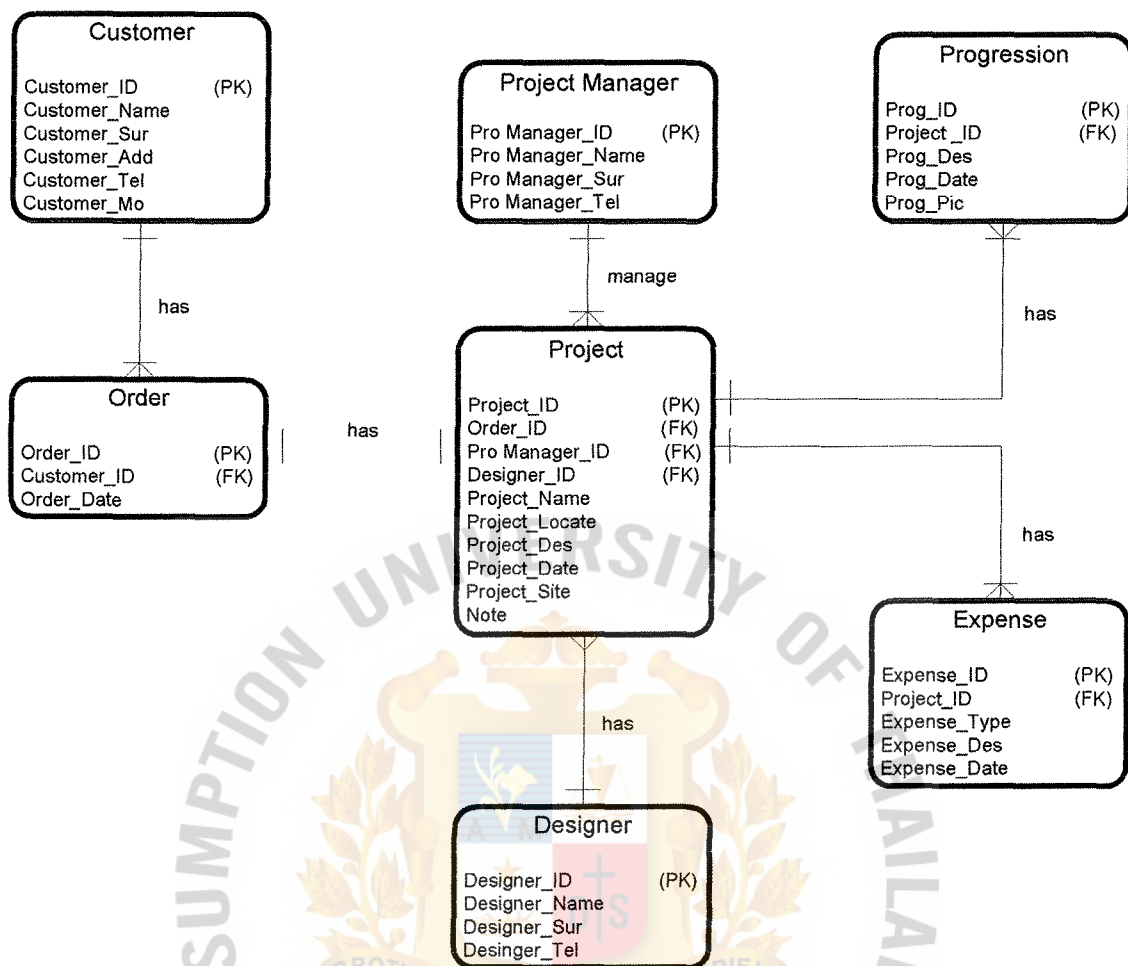


Figure B.2. Fully Attributed Data Model of the Proposed System.



APPENDIX C

FEASIBILITY ANALYSIS

Table C.1. Estimated Cost of Candidate 1, in Baht.

Cost Items	Years				
	1	2	3	4	5
<u>Fixed Cost</u>					
<u>Hardware Cost:</u>					
Server Computer	40,000	-	-	-	-
Client Computers	48,000	-	-	-	-
Network Hardware	10,000	-	-	-	-
<u>Office infrastructure</u>					
Digital Camera	24,000	-	-	-	-
Scanner	4,000	-	-	-	-
Telephone 2 units@1200	2,400	-	-	-	-
Facsimile	5,000	-	-	-	-
UPS 1000VA	15,000	-	-	-	-
Printers and Other Peripherals	30,000	-	-	-	-
Total Hardware And Office Infrastructure Cost	178,400	-	-	-	-
<u>Software Cost:</u>					
Operating System Cost	15,000	-	-	-	-
Office Application Cost	42,000	-	-	-	-
Package Software Cost	120,000	-	-	-	-
Total Software Cost	177,000	-	-	-	-
<u>Implementation Cost:</u>					
Training Cost	12,000	-	-	-	-
Setup Cost	50,000	-	-	-	-
Total Implementation Cost	62,000	-	-	-	-
Maintenance Cost		5,000	10,000	15,000	20,000
Total Fixed Cost	417,400	5,000	10,000	15,000	20,000
<u>Operating Cost</u>					
<u>Salary Cost:</u>					
Manager/Designer 3 person@10,000	360,000	378,000	396,900	416,745	437,582
Administrator 1 person@7000	84,000	88,200	92,610	97,241	102,103
Total Monthly Salary Cost	37,000	38,850	40,793	42,832	44,974
Total Annual Salary Cost	444,000	466,200	489,510	513,986	539,685
<u>Office Supplies & Miscellaneous Costs:</u>					
Office Supplies Per Annual	16,000	17,600	19,360	21,296	23,426
Utilities Per Annual	40,000	44,000	48,400	53,240	58,564
Miscellaneous Per Annual	15,000	16,500	18,150	19,965	21,962
Total Office Supplies & Misc. Cost	71,000	78,100	85,910	94,501	103,951
Total Annual Operating Cost	515,000	544,300	575,420	608,487	643,636
Total Proposed System Cost	932,400	549,300	585,420	623,487	663,636

Table C.2. Estimated Cost of Candidate 2, in Baht.

Cost Items	Years				
	1	2	3	4	5
Fixed Cost					
Hardware Cost:					
Server Computer	40,000	-	-	-	-
Client Computers	48,000	-	-	-	-
Network Hardware	10,000	-	-	-	-
Office infrastructure					
Digital Camera	24,000	-	-	-	-
Scanner	4,000	-	-	-	-
Telephone 2 units@1200	2,400	-	-	-	-
Facsimile	5,000	-	-	-	-
UPS 1000VA	15,000	-	-	-	-
Printers and Other Peripherals	30,000	-	-	-	-
Total Hardware And Office Infrastructure Cost	178,400	-	-	-	-
Software Cost:					
Operating System Cost	15,000	-	-	-	-
Office Application Cost	42,000	-	-	-	-
Written Software Cost	180,000	-	-	-	-
Total Software Cost	237,000	-	-	-	-
Implementation Cost:					
Training Cost	20,000	-	-	-	-
Setup Cost	70,000	-	-	-	-
Total Implementation Cost	90,000	-	-	-	-
Maintenance Cost		5,000	10,000	15,000	20,000
Total Fixed Cost	505,400	5,000	10,000	15,000	20,000
Operating Cost					
Salary Cost:					
Manager/Designer 2 person@10,000	240,000	252,000	264,600	277,830	291,722
Administrator 1 person@7000	84,000	88,200	92,610	97,241	102,103
Total Monthly Salary Cost	27,000	28,350	29,768	31,256	32,819
Total Annual Salary Cost	324,000	340,200	357,210	375,071	393,825
Office Supplies & Miscellaneous Costs:					
Office Supplies Per Annual	16,000	17,600	19,360	21,296	23,426
Utilities Per Annual	40,000	44,000	48,400	53,240	58,564
Miscellaneous Per Annual	15,000	16,500	18,150	19,965	21,962
Total Office Supplies & Misc. Cost	71,000	78,100	85,910	94,501	103,951
Total Annual Operating Cost	395,000	418,300	443,120	469,572	497,776
Total Proposed System Cost	900,400	423,300	453,120	484,572	517,776

Table C.3. Estimated Cost of Candidate 3, in Baht.

Cost Items	Years				
	1	2	3	4	5
<u>Fixed Cost</u>					
<u>Hardware Cost:</u>					
Server Computer	40,000	-	-	-	-
Client Computers	48,000	-	-	-	-
Network Hardware	10,000	-	-	-	-
<u>Office infrastructure</u>					
Digital Camera	24,000	-	-	-	-
Scanner	4,000	-	-	-	-
Telephone 2 units@1200	2,400	-	-	-	-
Facsimile	5,000	-	-	-	-
UPS 1000VA	15,000	-	-	-	-
Printers and Other Peripherals	30,000	-	-	-	-
Total Hardware And Office Infrastructure Cost	178,400	-	-	-	-
<u>Software Cost:</u>					
Operating System Cost	15,000	-	-	-	-
Office Application Cost	42,000	-	-	-	-
Written Software Cost	190,000	-	-	-	-
Total Software Cost	247,000	-	-	-	-
<u>Implementation Cost:</u>					
Training Cost	24,000	-	-	-	-
Setup Cost	75,000	-	-	-	-
Total Implementation Cost	99,000	-	-	-	-
Maintenance Cost		5,000	10,000	15,000	20,000
Total Fixed Cost	524,400	5,000	10,000	15,000	20,000
<u>Operating Cost</u>					
<u>Salary Cost:</u>					
Manager/Designer 2 person@10,000	240,000	252,000	264,600	277,830	291,722
Administrator 1 person@7000	84,000	88,200	92,610	97,241	102,103
Total Monthly Salary Cost	27,000	28,350	29,768	31,256	32,819
Total Annual Salary Cost	324,000	340,200	357,210	375,071	393,825
<u>Office Supplies & Miscellaneous Costs:</u>					
Office Supplies Per Annual	16,000	17,600	19,360	21,296	23,426
Utilities Per Annual	40,000	44,000	48,400	53,240	58,564
Miscellaneous Per Annual	15,000	16,500	18,150	19,965	21,962
Total Office Supplies & Misc. Cost	71,000	78,100	85,910	94,501	103,951
Total Annual Operating Cost	395,000	418,300	443,120	469,572	497,776
Total Proposed System Cost	919,400	423,300	453,120	484,572	517,776

Table C.4. Accumulated Cost of Candidate 1, in Baht.

Year	Total Cost	Accumulated Cost
1	932,400	932,400
2	549,300	1,481,700
3	585,420	2,067,120
4	618,487	2,685,607
5	658,636	3,344,243
Total	3,344,243	-

Table C.5. Accumulated Cost of Candidate 2, in Baht.

Year	Total Cost	Accumulated Cost
1	900,400	900,400
2	426,300	1,323,700
3	453,120	1,776,820
4	479,572	2,256,392
5	512,776	2,769,168
Total	2,769,168	-

Table C.6. Accumulated Cost of Candidate 3, in Baht.

Year	Total Cost	Accumulated Cost
1	919,400	919,400
2	423,300	1,342,700
3	453,120	1,795,820
4	479,572	2,275,392
5	512,776	2,788,168
Total	2,788,168	-

Table C.7. Net Present Value of Candidate 1, in Baht.

Cash Flow Description	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Develop Cost	-417,000					
Operation & Maintenance Cost		-515,000	-544,300	-575,420	-608,487	-643,636
Discount Factors for 12%	1.000	0.892	0.797	0.711	0.635	0.567
Time-adjusted Costs	- 417,000	- 459,380	- 433,807	- 409,124	- 386,389	- 364,942
Cumulative time-adjusted costs over lifetime	- 417,000	- 876,380	-1,309,642	-1,718,765	- 2,105,154	-2,470,096
Benefit derived from operation of new System		730,000	803,000	883,300	971,630	1,068,793
Discount Factors for 12%	1.000	0.892	0.797	0.711	0.635	0.567
Time-adjusted Benefits	0	651,160	639,991	628,026	616,985	606,006
Cumulative time-adjusted benefits over lifetime	0	651,160	1,291,151	1,919,177	2,536,162	3,142,168
Cumulative lifetime time-adjusted benefits - costs	-417,000	- 225,220	- 18,491	200,412	431,008	672,072

Table C.8. Net Present Value of Candidate 2, in Baht.

Cash Flow Description	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Develop Cost	-505,400					
Operation & Maintenance Cost		-395,000	-418,300	-443,120	-469,572	-497,776
Discount Factors for 12%	1.000	0.892	0.797	0.711	0.635	0.567
Time-adjusted Costs	- 505,400	- 352,735	- 333,385	- 315,502	- 298,648	- 282,239
Cumulative time-adjusted costs over lifetime	- 505,400	- 858,135	-1,191,520	-1,507,022	- 1,805,670	-2,087,909
Benefit derived from operation of new System		730,000	803,000	883,300	971,630	1,068,793
Discount Factors for 12%	1.000	0.892	0.797	0.711	0.635	0.567
Time-adjusted Benefits	0	651,160	639,991	628,026	616,985	606,006
Cumulative time-adjusted benefits over lifetime	0	651,160	1,291,151	1,919,177	2,536,162	3,142,168
Cumulative lifetime time-adjusted benefits - costs	-505,400	- 206,975	99,631	412,155	730,492	1,054,259

Table C.9. Net Present Value of Candidate 3, in Baht.

Cash Flow Description	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Develop Cost	-524,000					
Operation & Maintenance Cost		-395,000	-418,300	-443,120	-469,572	-497,776
Discount Factors for 12%	1	0.892	0.797	0.711	0.635	0.567
Time-adjusted Costs	-524,000	-352,735	-333,385	-315,502	-298,648	-282,239
Cumulative time-adjusted costs over lifetime	-524,000	-876,753	-1,210,120	-1,525,622	-1,824,270	-2,106,509
Benefit derived from operation of new System		730,000	803,000	883,300	971,630	1,068,793
Discount Factors for 12%	1	0.892	0.797	0.711	0.635	0.567
Time-adjusted Benefits	0	651,160	639,991	628,026	616,985	606,006
Cumulative time-adjusted benefits over lifetime	0	651,160	1,291,151	1,919,177	2,536,162	3,142,168
Cumulative lifetime time-adjusted benefits - costs	-524,000	-225,593	81,031	393,555	711,892	1,035,659



APPENDIX D

PROCESS SPECIFICATIONS

Table D.1. Process Specification of Add New Customer Process.

Items	Description
Process Name:	Add New Customer
Data In:	Customer Information
Data Out:	Customer ID & Customer Information
Process:	Generate Identification Number for Customer
Attachment:	(1) Customer (2) Customer Information Database

Table D.2. Process Specification of Edit Existing Information Process.

Items	Description
Process Name:	Edit Existing Information
Data In:	Customer ID & Customer Information
Data Out:	Latest Customer Information
Process:	Edit ,Delete Some Information Of Customer
Attachment:	(1) Customer (2) Customer Information Database

Table D.3. Process Specification of New Project Order Process.

Items	Description
Process Name:	New Project Order
Data In:	Customer ID ,Date
Data Out:	Generate Identification Number for Order
Process:	(1) Receive Information Order From Customer. (2) Create Order according to Table No (3) Update Order status to Project Database.
Attachment:	(1) Customer (2) Project Database

Table D.4. Process Specification of Project Information Process.

Items	Description
Process Name:	Project Information.
Data In:	Order ID ,Project Data
Data Out:	Project Information.
Process:	(1) Receive Order ID. (2) Enter Project Data. (3) Update Project Status to Project Database.
Attachment:	(1) Designer (2) Project Information Database

Table D.5. Process Specification of Order Notification Process.

Items	Description
Process Name:	Order Notification.
Data In:	Project ID
Data Out:	Order Notification and Project Notification
Process:	(1) Check Project Information Status. (2) Send Order and Project Notification
Attachment:	(1) Customer (2) Designer

Table D.6. Process Specification of Cancel Order Process.

Items	Description
Process Name:	Cancel Order
Data In:	Customer Cancel ,Customer ID ,and Project ID
Data Out:	Cancel information
Process:	(1) Receive Cancel Information from customer (2) Check Project according to Table No. (3) Delete Project Cancel from Project Database
Attachment:	(1) Customer (2) Project Database

Table D.7. Process Specification of Expense Record Process.

Items	Description
Process Name:	Expense Record
Data In:	Project ID ,Project Expense
Data Out:	Expense information
Process:	(1) Check Project from Project Database. (2) Enter Expense Information. (3) Update Expense Information to Expense Database.
Attachment:	(1) Project Manager (2) Expense Database

Table D.8. Process Specification of Customer Billing Process.

Items	Description
Process Name:	Customer Billing
Data In:	Billing Notification ,Expense and Customer Information
Data Out:	Customer Billing and Payment Method.
Process:	(1) Check table Expense from Expense Database (2) Check Billing Notification (3) Check Customer Information (4) Check Payment Method (5) Generate Billing to Customer
Attachment:	(1) Customer

Table D.9. Process Specification of Check Progression Process.

Items	Description
Process Name:	Check Progression
Data In:	Progression Request
Data Out:	Update Project Progression.
Process:	(1) Check table Progression from Project Database (2) Confirm Latest Update (3) Generate Progression Report
Attachment:	(1) Customer (2) Project Manager

Table D.10. Process Specification of Generate Report Process.

Items	Description
Process Name:	Generate Report
Data In:	Customer, Project, and Expense Information.
Data Out:	On Screen Customer, Project, and Expense Information Report.
Process:	(1) Receive Customer Information Database. (2) Receive Project Information Database. (3) Receive Expense Information Database. (4) Generate Report.
Attachment:	(1) Project Manager.

Table D.11. Process Specification of Print Hard Copy Report Process.

Items	Description
Process Name:	Print Hard Copy Report
Data In:	Make Customer, Project, and Expense Report
Data Out:	Report Customer, Project, and Expense Report.
Process:	(1) Receive Customer Information Report. (2) Receive Project Information Report. (3) Receive Expense Information Report. (4) Print Report.
Attachment:	(1) Project Manager.



APPENDIX E
DATA DICTIONARY

Table E.1. Data Dictionary of the Proposed System.

Field	Meaning
Customer_ID	Customer Identification Number
Custmer_Name	Customer Name
Customer_Sur	Customer Surname
Customer_Add	Customer Address
Customer_Tel	Customer Phone Number
Custmer_Mo	Customer Mobile Phone
Order_ID	Order Identification Number
Order_Date	Order Start Date
Project_ID	Project Identification Number
Project_Name	Project Name
Project_Locate	Project Location
Project_Des	Project Description
Project_Date	Project Start Date
Project_Site	Project Site Picture
Pro Manager_ID	Project Manager Identification Number
Pro Manager_Name	Project Manager Name
Pro Manager_Sur	Project Manager Surname
Pro Manager_Tel	Project Manager Phone Number
Designer_ID	Designer Identification Number
Designer_Name	Designer Name
Designer_Sur	Designer Surname
Designer_Tel	Designer Phone Number
Prog_ID	Project Progression Identification Number
Prog_Des	Project Progression Description
Prog_Date	Project Progression Date
Prog_Pic	Project Progression Picture
Expense_ID	Project Expense Identification Number
Expense_Type	Project Expense Type
Expense_Des	Project Expense Description
Expense_Date	Project Expense Date



APPENDIX F
DATABASE DESIGN

Table F.1. Structure of Customer Table.

Name	Type	Null	Foreign Key To Table	Check	Key Type
Customer_ID	Charater (7)	Not Null	Order Table	-	Primary Key
Customer_Name	Charater (20)	Not Null	-	-	Attribute
Customer_Sur	Charater (50)	Not Null	-	-	Attribute
Customer_Add	Charater (50)	Not Null	-	-	Attribute
Customer_Tel	Number (20)	Not Null	-	-	Attribute
Customer_Mo	Number (20)	Not Null	-	-	Attribute

Table F.2. Structure of Order Table.

Name	Type	Null	Foreign Key To Table	Check	Key Type
Order_ID	Charater (7)	Not Null	Customer Order Table	-	Primary Key
Customer_ID	Charater (7)	Not Null	-	-	Foreign Key
Order_Date	Date	Not Null	-	<01-Sep-2004	Attribute

Table F.3. Structure of Project Table.

Name	Type	Null	Foreign Key To Table	Check	Key Type
Project_ID	Charater (7)	Not Null	Progression/Expense Table	-	Primary Key
Order_ID	Charater (7)	Not Null	-	-	Foreign Key
Pro_Manager_ID	Charater (7)	Not Null	-	-	Foreign Key
Designer_ID	Charater (7)	Not Null	-	-	Foreign Key
Project_Name	Charater (50)	Not Null	-	-	Attribute
Project_Locate	Charater (255)	Not Null	-	-	Attribute
Project_Des	Charater (255)	Not Null	-	-	Attribute
Project_Date	Date	Not Null	-	<01-Sep-2004	Attribute
Project_Site	Image	Not Null	-	-	Attribute
Note	Charater (255)	Null	-	-	Attribute

Table F.4. Structure of Project Manager Table.

Name	Type	Null	Foreign Key To Table	Check	Key Type
Pro Manager_ID	Charater (7)	Not Null	Project Table	-	Primary Key
Pro Manager_Name	Charater (50)	Not Null	-	-	Attribute
Pro Manager_Sur	Charater (50)	Not Null	-	-	Attribute
Pro Manager_Tel	Number (20)	Not Null	-	-	Attribute

Table F.5. Structure of Designer Table.

Name	Type	Null	Foreign Key To Table	Check	Key Type
Designer_ID	Charater (7)	Not Null	Project Table	-	Primary Key
Designer_Name	Charater (50)	Not Null	-	-	Attribute
Designer_Sur	Charater (50)	Not Null	-	-	Attribute
Designer_Tel	Number (20)	Not Null	-	-	Attribute

Table F.6. Structure of Progression Table.

Name	Type	Null	Foreign Key To Table	Check	Key Type
Progression_ID	Charater (7)	Not Null	-	-	Primary Key
Project_ID	Charater (7)	Not Null	-	-	Foreign Key
Prog_Des	Charater (255)	Not Null	-	-	Attribute
Prog_Date	Date	Not Null	-	<01-Sep-2004	Attribute
Prog_Pic	Image	Not Null	-	-	Attribute
Note	Charater (255)	Null	-	-	Attribute

Table F.7. Structure of Expense Table.

Name	Type	Null	Foreign Key To Table	Check	Key Type
Expense_ID	Charater (7)	Not Null	-	-	Primary Key
Project_ID	Charater (7)	Not Null	-	-	Foreign Key
Expense_Type	Charater (50)	Not Null	-	-	Attribute
Expense_Des	Charater (50)	Not Null	-	-	Attribute
Expense_Date	Date	Not Null	-	<01-Sep-2004	Attribute



APPENDIX G

INTERFACE DESIGN

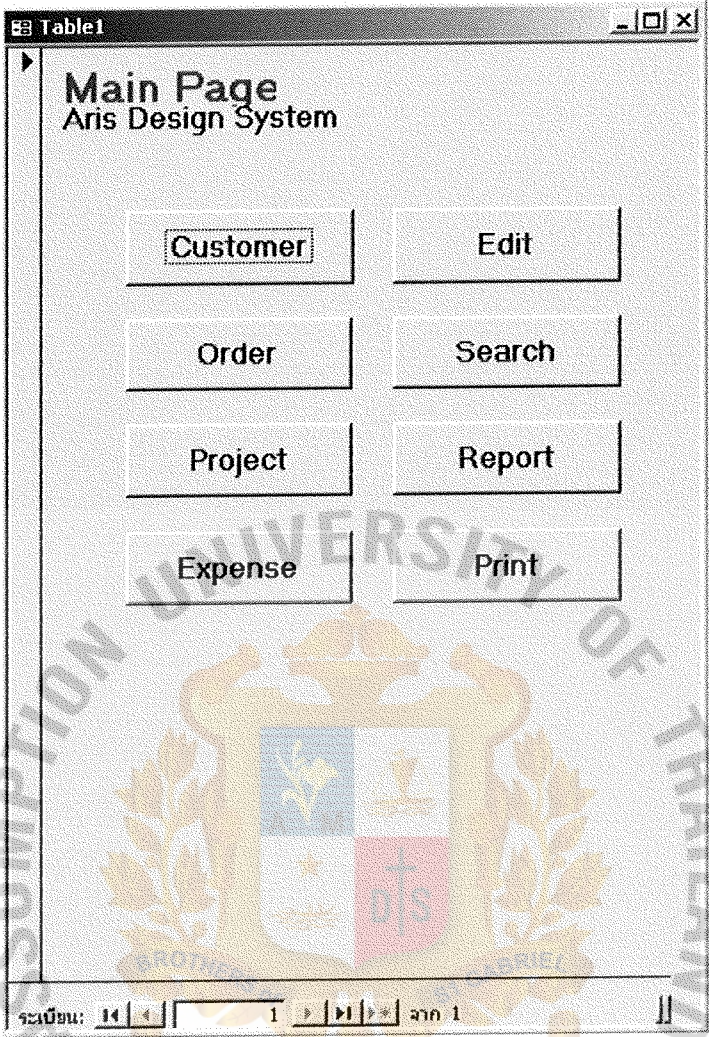


Figure G.1. Main Page Interface.

Table1

Customer Information

Name Last Name

Address

Zip Code Note

Tel Mobile

Add Cancel

ระเบียน: 14 1 จาก 1

Figure G.3. Customer Information Interface.

Table1

Order Information

Order Project Name

Customer ID

Customer Name

Order Date

DD MM YY

Order Note

Add Cancel

รวมเงิน: 1 1

Figure G.4. Order Information Interface.

Table1

Project Information

Project Name

Order ID

Project Manager ID

DesignerID

Project Address

Project Description

Project Date
 DD MM YY

Project Site

สถานะ:

Figure G.5. Project Information Interface.



Aris Design Studio Company

Project List Report

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Page.1

Table H.1. Project List Table.

ID	Order ID	Project Name	Customer Name	Project Locate	Project Date	Project Description
100250	000125	Metropolitan House	คุณ สุรศักดิ์ ภูมิธัมย์กุล	251/15 สาทรใต้ กรุงเทพมหานคร 12420	03/09/04	Retro House Interior Concept
100251	000126	Lila Shop	คุณ หงสกุล ไชยอินทิก	102/10 สุขุมวิทการเคหะ คลองตัน คลองตัน กทม. 10120	08/09/04	Nail Painting Shop
100252	000127	Lawyer Office	คุณ วันชัย ศรีศิริ	245/15 ถ.ลาดพร้าว จัตุจักร กทม. 10400	15/09/04	Reliable Space Concept
100253	000128	Juicy Drink	คุณ พุฒิพร วานิชพันธ์	1222/17 ถ.พระราม 4 คลองเตย คลองเตย กทม. 10110	18/09/04	Colorful Space and Advertising Graphic

Aris Design Studio Company

Summary Report

31/09/04

Page.1

Table H.2. Summary Report Table.

Date	ID	Customer Name	ID	Project Name	Designer Name	Progression	Expense
2/08/04	008	นางสาวไรรรณ พิพัฒน์ชัย	100080	The Resort House	ทีปกร ล้นโพมรัตน์ะ	Finished	40,000
11/08/04	016	นาย ไพฑูย์ วรเดชาวิชัย	100085	Matching Office	พรรยา ธรรมาทองกุล	Finished	25,000
15/08/04	001	นาย กำพล มาศสุวรรณศรี	100090	Gate House	ปีเตอร์ แสงมงคลเลิศศิริ	Finished	55,000
25/08/04	016	Mrs. Madoko Kaisho	100100	Water cliff House	ทีปกร ล้นโพมรัตน์ะ	95%	120,000

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