



Plastic Bag Printing Information System for N.P. Unipack Company

By

Mr. Panich Denrusamitthep

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
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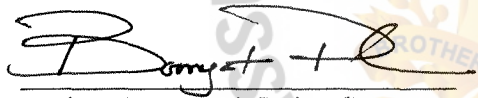
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ABSTRACT

This system development project presents the analysis, design, and implementation of the Plastic Bag Printing Information System for the N.P. Unipack Company, a plastic bag manufacturer. It aims to support better service to replace the existing system in the part of printing plastic file inventory which is now being operated manually by 100% human source. Whenever the files are required to be used, the designated person has to involve for querying the needed files to be processed in the printing plastic operation. And this manual process consumes plenty of time to complete the operation. And it also causes the time consumption problem that delays the related operation within the manufacturing task.

The proposed information system is developed to improve time consumption as the first priority that the existing system could not provides effectively. And it is also replaceable with the designated person who has the duty to keep track of the printing files checking in/out transactions. Furthermore, this system also gives the correctness of data constant because of eliminating data redundancy in many places. The same record from various places will be stored at the center and updated at all times. Others could access to view that updated record instantly, and also be able to update records at all times. Lastly, this system can generate some information that could support the decision making for the senior managers.

This report includes the details of computerization system to be implemented and integrated with the existing organization with lowest effect on working culture of this enterprise. Furthermore, the result of analysis phase has come with the most three potentially feasible solutions. And the cost and benefit analysis is also included to show the cost comparison of operating between the existing system and the proposed system.

ACKNOWLEDGEMENTS

This report will never be completed if there is nobody to help and contribute. So this report is designated to all people who have invested their time and spirit to make this project complete.

First of all, this report is done with good directing and advising by Dr. Boonyarit Pokrud, who is extremely helpful with good guidance, comments, and suggestions whenever some problems occur while developing the project. Basically, the good project is always done with good technique and good strategy in approaching the target. So this line is like a short cut that leads this project to meet the proper clarification of decision making for the good choice to be completed in the requirements and problems.

Secondly, the writer would like to thank all instructors who afforded him good knowledge, experience, and technique of applying ideas to generate the effective system. It is easy to say that knowledge could be found anywhere if we are still alive. But it is hard to analyze and generate the idea of understanding that stuff without good direction to approach them. It could be said that learning is life long but how long it takes the time to get that idea, it depend on the strategy and the approaching method to understand the idea.

Finally, friends are friends. They would never ignore each other. They will always be close to each other to give spirit, cheerful, and some helpful when they need some help.

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I. INTRODUCTION

1.1 Background of the Project

N.P. Unipack Company has been working in the plastic bag industrial since 1983 with a capital investment of 3,000,000 Baht. The major business is to produce a variety of plastic bags such as Mailing Bag, Shopping Bag, Cloth Packaging, Book Packaging, and etc. Those products are made of High Density (HD), Bi-Optical Polypropylene (BOPP), Polyethylene (PE), and Polypropylene (PP). Furthermore, this company also provides the service of printing on the plastic bag according to the customer's order.

In the printing process, it requires many kinds of format files to manipulate each production. And this is the major problem of how to manage the multi-format file manually which is becoming more and more complex.

Nowadays, N.P. Unipack Company has to maintain the files which set of file have multiple formats. And each format of the file must be collected in a specific place which is normally not the same place. For example, file A has three format files CD-Rom, Design-Pattern, and Momite film for plating. From this event, those three kinds of file formats must be kept in a different place due to the size of the file and the file appearance behavior. Whenever staff would like to search the collected file within the store, they have to manually search for them alphabetically from many places. Sometimes, the file is missing because there is no history of keeping track available in the store. Moreover, whenever staff would like to collect the new file in the store, they will just place the new file in the store alphabetically.

From the existing system, the time consumption for searching and placing the file within the store requires much time consumption to operate. So if there is any efficient

file inventory manager, it would be able to reduce the work load of manual managing and time consuming for operation.

In order to be more competitive in the manufacturing industrial market and satisfy the customer, we need to have some system to manage the file within real-time and up-to-date. And the managed systems should deliver less time consumption for managing the file in the file store such as collecting place, searching for the available place, searching for the place of the wanted file, and keeping track of the history of persons who brings files in and out.

1.2 Objectives of the Project

In the file inventory managing, manpower is highly needed to operate. They have to observe the available place for collecting the new coming file, searching for the needed file due to the request, and keeping track of the history of person; who bring and return such files. From this point, the organization has to dedicate one or more persons to take care of file inventory managing. If that person is absent or not able to provide the service at that time, it would affect the overall service of the organization.

The goal of this project is to provide better solution of managerial file inventory system for N.P. Unipack Co., Ltd. And the objective to achieve that goal could be stated as follows: -

- (1) Study the feasibility and potential of the new system to cover the existing problem.
- (2) Understand the existing procedure of operating and management system.
- (3) Analyze and identify the cause of the problem and real requirements.
- (4) Reduce the time consumption in the operating process.
- (5) Be the central online service point for managerial file inventory system

- (6) Automate keeping of record of history for persons who bring the file in and out
- (7) Manage and maintain the inventory space dynamically

1.3 Scope of the Project

In this project, the scope of work is to study, analyze, and design the middle system for managing the file inventory management. The new additional system will cover the part of file inventory management only. It will not cover the part of the manual placing file in the store. The system will only guide and keep track of the file. It is not able to enforce the staff in the store to process the operation to follow the system specifically.

The scopes of works are: -

- (1) Confirm the existing architecture and functions of Kick-off Project – This task aims to make an agreement of the overall scope with the staff in the organization, define the work plan, resource, roles and responsibilities of each person, and deliverable in implementing this project.
- (2) Refine and analyze the requirements – This task is to categorize and to consolidate the adequate requirements due to organization preference. The requirements should include the following items
 - (a) Industrial best practices
 - (b) Integration efficiency
 - (c) Ease of use and flexibility
 - (d) Cost effective
 - (e) Ease of maintenance

- (3) Develop and assess
 - (a) Conduct Proof of Concept – This task conducts the proof of concept by using the beta system assessment to find out the most effective method of implementation and development for the project
 - (b) Conduct Developing System – This task develops and implements the solution to cover the existing problems that occur in the existing environment.
- (4) Provide the training – This task is to provide the training for the using of the system and to make the user familiar with the new environment.

1.4 Deliverables

The deliverables from implementing this project could be described as follows: -

- (1) Data Modeling or Entity Relationship Diagram (ERD)
- (2) Process Modeling
 - (a) Context Diagram
 - (b) Data Flow Diagram (DFD)
- (3) System Specification
 - (a) Hardware Specification
 - (i) Server Computer
 - (ii) Client Computer
 - (iii) Network devices
 - (iv) Additional devices
 - (b) Software Specification
 - (i) Database
 - (ii) Application

- (4) Cost Benefit Analysis
 - (a) Payback Period
 - (b) Net Present Value
- (5) User Interface Design
 - (a) Input design
 - (b) Output design
 - (c) Report design

1.5 Project Plan

- (1) System Analysis Phase
 - (a) Define the objective and scope of the project
 - (b) Study the operation of the existing environment
 - (c) Analyze and identify the core cause of the problem in the existing system
 - (d) Discuss and gather additional features to be built-in the new system
 - (e) Propose the system in the form of Entity Diagram, Data Flow Diagram, and the Cost effective with the benefits of the new system
- (2) System Design Phase
 - (a) Compose the potential system according to the final requirement from the analysis phase
 - (b) Evaluate the potential system to be developed and implemented
 - (c) Provide the physical design for the propose system
 - (i) Data Entity Relationship Diagram
 - (ii) Data Flow Diagram
 - (d) Provide the Interface design for developing
 - (i) Input interface

- (ii) Output interface
 - (iii) Report interface
- (e) Develop the application system
 - (i) Database system
 - (ii) Application system
 - (1) engine
 - (2) interface
- (f) Pack the application into the software package to be ready for the installation
- (3) User Acceptance Test
 - (a) Make the virtual environment for loading test
 - (b) Implement the proposed system on the virtual environment
 - (c) Make the load test
 - (i) Input the data entry
 - (ii) Process the application for loading test
 - (iii) Check the correctness result and mistake for adjustment of the production system
- (4) System Implementation and Integration Phase
 - (a) Database Management System Installation
 - (i) Create the storage space according to the analyzed requirement to ensure enough space for the expected run-time
 - (ii) Install the database management system
 - (iii) Create the database storage
 - (iv) Create the table and relationship for the proposed system
 - (v) Check the correctness of database store creation

- (vi) Up the service of the database management system
- (b) Application System Installation
 - (i) Install the software for each client
 - (ii) Check the data linkage between client and server
- (5) Training Phase
 - (a) Gather free time to each user to be trained
 - (b) Arrange the schedule for each training section
 - (c) Announce the training schedule of each section
 - (d) Train the application and the related system
- (6) Assess and evaluate the performance
 - (a) Assess and evaluate the people ware
 - (b) Assess and evaluate the hardware and software
 - (c) Assess and evaluate the time consumption for the operation

1.6 Expected Results

- (1) Reduce time and cost of information maintaining in printing library system
- (2) Enhance more effective report to be generated to support the specific needs for each user
- (3) Enable the users to access the central share information directly without waiting for the report owner
- (4) Increase the speed of accessing the information and accuracy of information appearing
- (5) Assist the library tracking and gain the accuracy of information level

II. EXISTING SYSTEM

2.1 Background of the Company

Since 1983, being in the plastic bag industry, N.P. Unipack has been established in the plastic bag business with a capital investment of 3,000,000 Baht with the major objective of producing the plastic bag as a part of packaging.

In world wide market, only good qualities of product condition alone does not mean it would lead the intention of the customer to be willing to pay and buy those goods. It has a variety of environment that attract customer to appreciate to purchase goods from the shelf. To be an attractive product, products have to have good packaging that helps itself to be attracted to customer. And it would increase the value of itself when it is compared with the others on the shelf which has normal packaging.

N.P. Unipack Company has a vision on this objective. And it also aims to supply a good and unique format of plastic bag in packaging. So this enterprise strives to keep stepping ahead to develop the unique quality of goods which are a variety of a type of plastic bag packaging as well as supporting the customer with good quality, right packaging type specification due to the type of goods requirement specification, and delivery time which all aim to satisfy the clients needs effectively. Furthermore, this company also expands the type of producing the product of packaging into plastic bag printing which is able to fulfill the higher requirements from clients who wish to have better quality of packaging.

At the present day, the world is not big anymore. Her shape is sliming with the age of communication where globalization provides convenient conditions of remote communication. People could communicate with each other more easily than before. In this age, the business which is able to supply the product before any other competitor

could win the mission of trading. So every organization tries to develop their organization to approach the customers' needs which tend to have unique support and higher quality. In this fierce business, the survivors must be able to supply goods to customer with good condition of time, place, price, unique specification, and quality of such product. In brief, to be competitive with the competitors via the wide market, N.P. Unipack has to have a good management of production operation that could lead the organization to be able to advance and be competitive with the world wide business in the globalization age.

As this commitment, being very important at all times, could not be compromised by even a word, N.P. Unipack Company and every staff are willing to support the professional supplying product with respect to the customers' needs first. And also commit to supply various kinds of unique products for each specific client. These are to satisfy clients' needs as the major need to win the game in the world wide market.

2.1.1 Vision of Strategic Management

From the wide vision policies that are released, the company believes that the stability and benefit of this business make the fortune of business operation. This enterprise has committed to keep:-

- (1) Trusting environment | this is to make good team work that could operate the business process smoothly cooperative and have meaningful opportunity for employees to be innovative plus be enthusiastically involved that lead them to have pride at work.
- (2) Maximize the marketing opportunities | this is to expand and increase the marketing base that has the potential to get customers; both primary and related.

- (3) Support the superior supply | in the long term business, we believe that to be the first in business is easier than maintaining the position of impressive customer choice forever.
- (4) Enhance the power of customer support | by providing wide channel customer support, customer could get the benefit of support anytime and any requirement knowing that it leads them to satisfy us as their first choice.

2.1.2 Type of Products

N.P. Unipack Company has major business in producing proper packaging for the customer needs especially in plastic bags. There are several kinds of plastic bags that are sold in the market such as Mailing Bag, Shopping Bag, Cloth Packaging, Book Packaging, Food Packaging, and etc.

Those products are made of High Density (HD), Bi-Optical Polypropylene (BOPP), Polyethylene (PE), and Polypropylene (PP) which depend on the specification requirement of the packaging properties such as durability, purity, style of pattern, and etc with respect to the objective of each packaging type.

For example, the shopping bag requires having the properties of durability as the first choice, and purity as the second. So the plastic of High Density or HD may suit this requirement because of high strength of durability when it is used to carry things.

Furthermore, N.P. Unipack Company also provides the service of printing on the plastic bag according to the customer's order. For example, the shopping bag may be used as good advertisement when all people carry them around. And the printing could make an illustration, beauty, and etc that would eliminate the disadvantage of plastic which could not bring this type of condition.

2.2 Existing Business Functions

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The business in N.P. Unipack Company could be divided into three major parts. First it is the part of business management which has the duty to take care of the general management, financing, and cooperative operation within the organization. Second, it is the part of manufacturer. In this part, the good has to be managed in queue of production of the product from the coming task to operate. And the last part, is the part of customer management which has to respond to the requirement that customer feeds company. If we could manage the operation within the organization smoothly, it will help and speed up the enquiry from customer.

In the manufacturer management, the company has to face the multiple tasks operating at the same time. They have to keep track of the completing percentage plus the material that are required during manufacturing. This is especially in the printing process which has wide management in the printing pattern library controlling system.

In the printing library controlling system, it requires to have one permanently designated person to manage and keep track of the library. This person has the responsibility to keep track of the printing pattern, soft document, hard document, design, film, and etc. that are manipulated within one printing project. And this person also has to keep track of who is the last person using those files and where those files are stored. This is to enable the function of reporting files status to the owner who is customer.

The inventory and tracking in printing information is very important in the customer service support information which benefits them by reporting rapidly. And it also benefits the organization by keeping track of where the file is and whose file it belongs to. Moreover, the file inventory also benefits in the case of tracking who is the last person who used it and when the file has the problem of using.

In the organization, there are three major departments which is shown in figure 2.1, the organization chart for this enterprise.

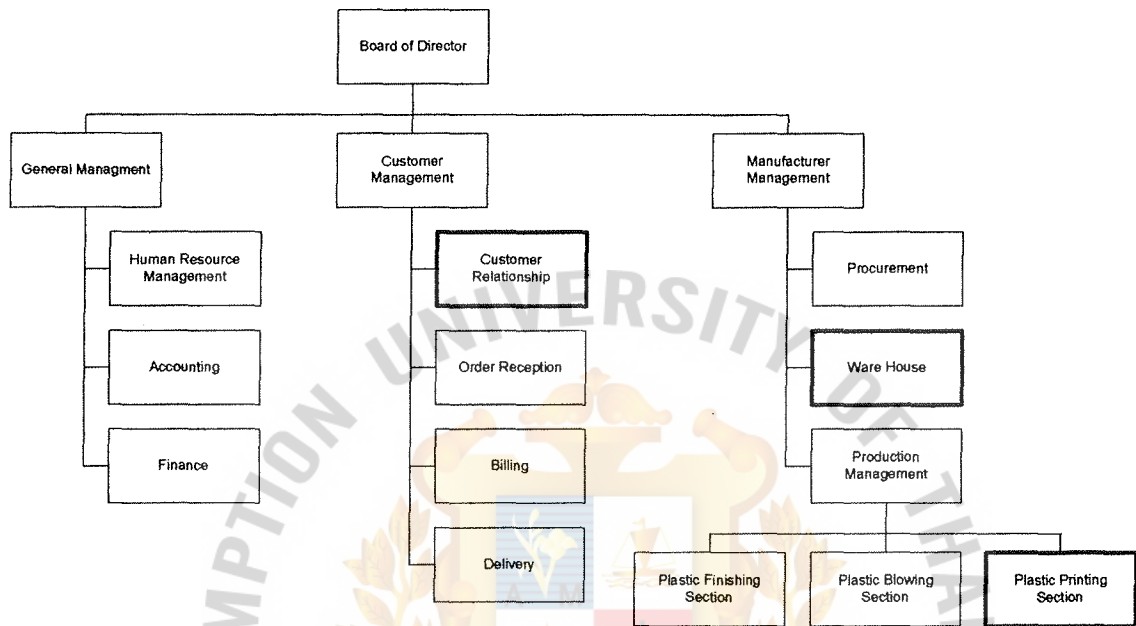


Figure 2.1 Organization Chart of N.P. Unipack Company.

The first department has the duty to take care of the general management which they have to look after three major parts. They are human resource management, accounting, and finance. For the human resource management, general department has to take care of the long term plan and the short term plan such as seasoning employment and benefit that the employee should get. For the accounting and management, it has to provide the tasks for taxation, government policies responding, and the cash flow management within the enterprise. This also includes the salary payment for the employees in the company.

The second department has to look after the customer management. This department has to take care and respond to the requirement of customer. This also includes various services such as order reception, billing, and product delivery service.

In customer relationship, it has to maintain satisfaction of the existing customers plus expanding of new customers that leads us to get more market share. And this also leads us to get more income which enables us to extend the product line in the future that covers the rest of the requirements from customers in the market.

The third department, manufacturer department, has the major responsibility for manufacturer management. This department could be divided into three sections. They are procurement, ware house, and production management. Procurement has to take care of the raw material stock that serves the production unit appropriately. Ware house has to keep track of the finished good stock that is waiting for delivery session. And it also has to respond to the production management to alert the manufacturer management to stop making finished goods in the event that such product line exceeded the stock. Last, it is the section of production management which could divide the management into three sub controls. They are plastic blowing section, plastic printing section, and plastic finishing section.

Plastic printing section has to arrange and keep track of many information of the file that this unit has to manipulate such as hard design pattern, soft design pattern, film, guidance, and printing block. Furthermore, it might have to use 1 to 8 blocks at a time for plastic printing. Therefore, it requires having a file store's staff to keep track of filing management. In printing procedure, it needs to deal with at least three units; they are customer, block making vendor, and the enterprise. And each step of procedure, results in one or more kinds of file format. So this designated person has to keep track of all files; where it is, where it is from, or who is the last holder of that file. Sometimes, general management or customer management department needs to get the flash report (a weekly report) of the printing information to serve the fortune enterprise strategy

planning or customer requirement. Therefore, this unit has to face lots of workload for filling tracking and management.

2.3 Current Problem and Areas for Improvement

The existing environment of the printing information system is done manually by one designated person who has to keep track of the file management. When they have to generate the report for general management or customer management department, this person has to look all over the table and brief the status of each file in the system.

The positive side of manual system is that the organization could identify the point of contact specifically by one designated person who has to provide the information for printing information report. This leads the staff in the organization to be easily contact and get the information directly from the assigned person. This also leads the people within the organization to know where exact interface to cover. The information will be gathered in one single point that could prevent the data tracking redundancy.

However, the manual system causes problems of work load and data accuracy. This system requires one designated person to occupy. And this person has to manipulate numerous numbers of data stores which may lead the assigned person to make mistakes in keeping records easily. Sometimes, the designated person may not be able to attend the daily working hour. So it will lead cooperator within the organization not to get the resource of report and information on tracking the printing. If other persons try to access the record manually, they have to learn how the records are kept which may lead them to lose accurate record tracking and waste time for training. Sometimes, if customer requires accessing the data directly at that time, this unit has to take out some period of time for checking and confirm the status before responding

back the result. It shows that responding time is not done rapidly as the customers wish to be.

Thus, the existing system produces much paperwork, and requires one designated person to encourage. The result could lead to redundant processes, inefficient operation, inflexibility, and bad system scalability.

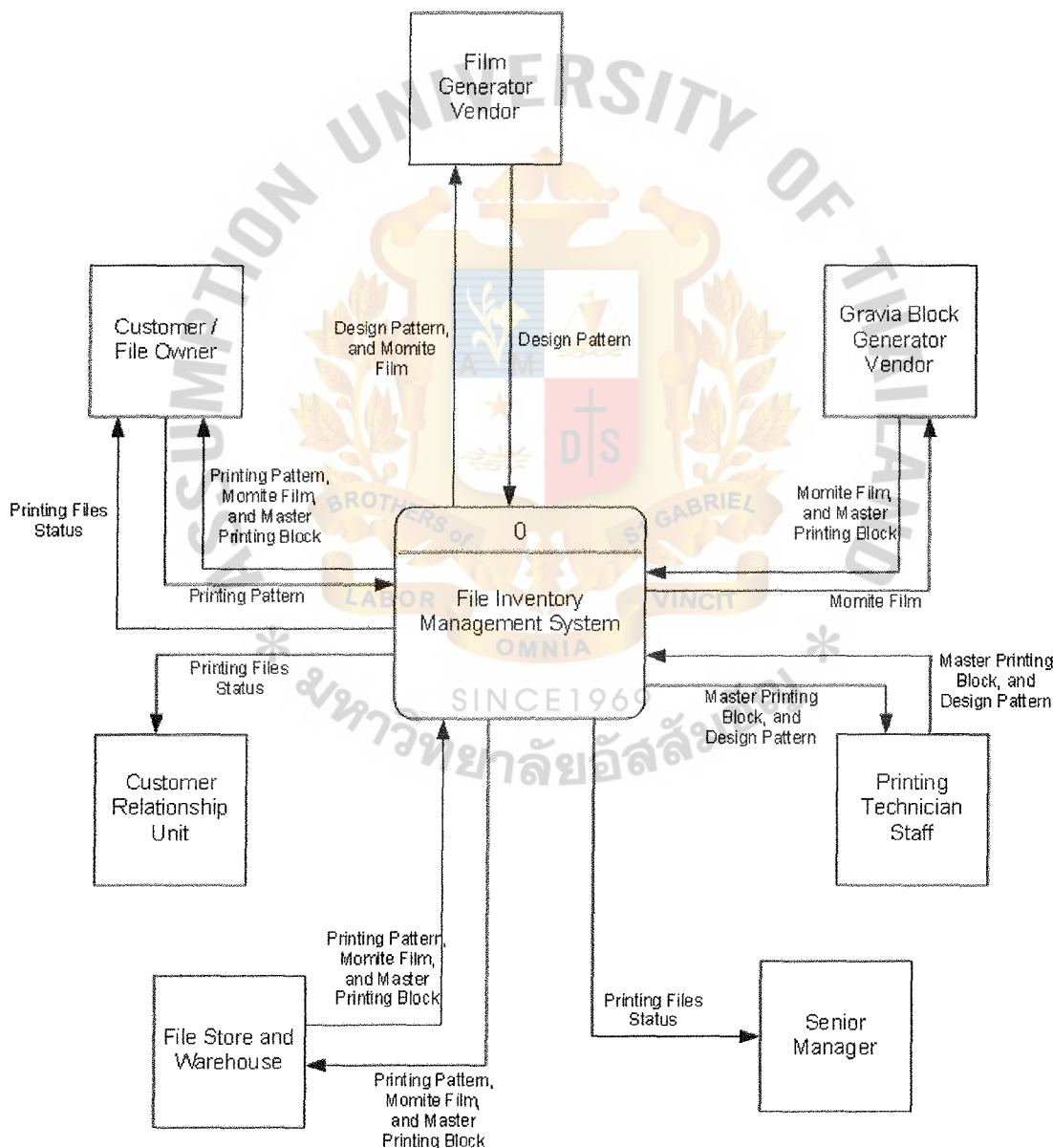


Figure 2.2 Context Level for Data Flow Diagram of the Existing System

Figure 2.2 the context level existing system shows the data flow diagram in the context level for the printing information system in the existing system. In the existing system environment, the file inventory management system has to be manipulated with numbers of external agents such as customer, film generator vendors, gravia block generator vendors, printing technician staff, senior manager, and customer relationship unit. All agents have to rely on this system to run the process and the tracking record of file information.



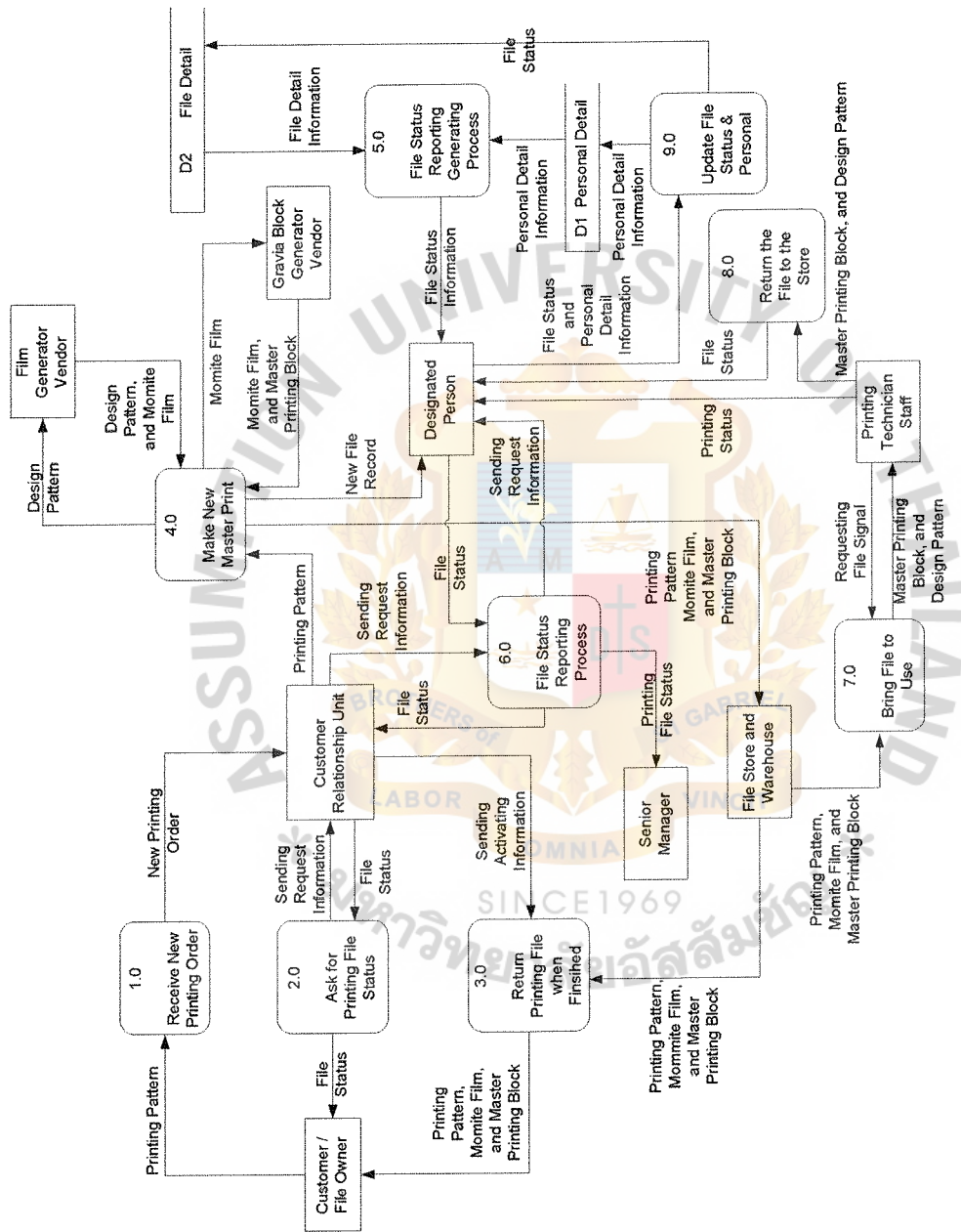


Figure 2.3 Data Flow Diagram of the Existing System

Figure 2.3 shows the data flow of the existing system for the printing information system the present day. From this picture, designated staff that has to response the task of printing information tracking that is really required as the core part of the system. In this environment the data of printing information depends on this guy. This designated person has to manually record the information into the data stores which are the record notes.

Furthermore, there are six major external agents that have to manipulate the printing information system via the data environment. For the information process, it could be briefly described as follows: -

- (1) Customers make the order of plastic printing to the enterprise which initiates the overall process of printing. In this way, customers may make a phone call to customer relationship unit or by any other channel that are provided via the process of new printing order.
- (2) When customer relationship unit receives the printing order, it has to forward the printing information brief to the staff that is designated to response to the task for printing process via the process of Make New Master Print.
- (3) When staff receives the printing information brief, it has to forward to the Film Generator Vendor that produces the printing pattern in film format.
- (4) When the Film Generator Vendor returns the printing design in the film format, the staff has to forward that film to the Gravia Block Generator Vendor to produce the master printing block.
- (5) And after staff receives the master printing block from Gravia Block Generator Vendor, staff will activate the printing technician staff that the master printing block is ready to be used.

- (6) Printing technician staffs have to report to the staff whenever they withdraw that master printing block and other related file to be used while printing the plastic process.
- (7) When the printing process is finished, the printing technicians have to return both master printing block and the related file back to the stores and also report the return status to the staff.

Whenever customer, senior manager, and customer relationship unit request the file status reports, staff has to query all information about that required file information and generate the report manually. For the details of this flow, it could be described as follows: -

- (1) Customers have to send the request to customer unit via the process of Ask For Printing File Status.
- (2) Then customer relationship will forward the request of file information status to the staff via the process of file status reporting process. Furthermore, if senior Manager would like to request for the file status information, he also has to submit the required file status report to staff via file reporting process.
- (3) Staff generates the report by querying the data from personal detail which contains the data of file borrower detail and file detail which contains the data of file available status, place, and file owner.
- (4) And then customer relationship unit or senior manager will receive the report from staff via the process of file status reporting process.
- (5) If reports are initiated to request by customer, customer relation unit has to forward such reports back to customers.

2.4 Current Problems and Areas of Improvement

Even if the existing system could run the information system flows; it has some problems that could not be solved by running the existing information system. In this event, the current problem and the scope of improvement would be as follows: -

- (1) From the existing environment, the information system is managed manually. So it could easily make mistakes by human error. Whenever humans have to do the same thing for long time, they may lag concerning the data entry accuracy. This will lead the entire data to be misused. And it also leads the problem of analytical data that is generated from this raw database. The cost of the data entry error could be caused by:
 - (a) Redundant data entry: Sometimes, staff is absent; other people have to manipulate that data directly through data storage which is noted in notebooks. And other staffs who are not directly responsible to maintain this data may not be familiar with the data environment. Whenever, the new record is made, the unfamiliar staff may consider that new record is a new item. So he considers making a new section for that item instead of putting them in the right place that already exists in the notebooks.
 - (b) Lack of data integrity: When humans have to work with the routine job for a long time, they might be exhausted from repeated work. This will lead to make that worker make mistakes in data entry.
- (2) Consumes much time to maintain the system: According to the existing system, the work process is done manually by use of many paper works. This problem is the result of redundant jobs. Moreover the information

record in the paper format could not be kept for a long time for reference in the future, and it is not easy to make them secure.

- (3) Ineffective operation: In the existing system, there is one assigned person who has to take care and keep track of the printing information system. If that staff is absent, it means there will be nobody who can maintain that data directly. It leads to other workers not able to access that data at that time. And it will make lose of customer satisfaction that may also lead the enterprise to loss credit and good image. The brief problem of this section could be described as follows: -

- (a) The printing technician staffs may not be able to search the master printing block by themselves. They require the printing information controller to guide them to a place of master printing block and related files to be used for such printing task.
 - (b) The customer relationship unit has to manipulate the printing information which it is able to access from the printing information controller. It is really difficult if the staff in the customer relationship unit has to access those data directly from the data store which is recorded in numbers of notebooks.
 - (c) The senior manager needs to have the brief report of printing status information that will be the reference for further decision making.
- (4) Data tracking accuracy: At the end of the quarter, the internal auditor needs to check the master printing block and related printing file in the store. And it always has mistakes in data tracking because it does not meet the exact data that are left in the store. This is caused by the lack of data accuracy that is described above.

- (5) The report generating problem: Because of the great number in daily transaction, it leads to the problem of reporting not enough to be up-to-date, inaccurate, and unreliable. The senior manager has to consider the information that is on hand to contain some errors.
- (6) This proposed system tries to cove the problem that exists as mentioned above.



III. PROPOSED SYSTEM

3.1 User Requirements Analysis

In the requirements analysis, we aim to analyze the business requirements and function that are really needed. We do not focus on the technologies or any fantastic features that are available in the present technology market. From the requirements analysis phase, it could answer the question “what the users need actually from the new system”. There are three major compositions in requirements analysis phase.

- (1) Identify the real requirements
- (2) Analyze functional requirements
- (3) Prioritize the requirements

In the project, it should identify the scope of the project to cover the following: -

- (1) Provide a centralized system that hosts the central database
- (2) Provide consistent data and information in the entire database environment
- (3) Provide timely and accurate report for printing information for each user properly

The business function that would effect this implementation of the project can be seen as follows: -

- (1) Customer relationship unit
- (2) Printing information controller staff
- (3) Printing technician staffs
- (4) Senior manager
- (5) Customers
- (6) Vendors

This proposed system aims to enhance the work proficiency and reduce the data redundancy in the existing system. Basically, the new system is based on these following visions: -

- (1) Reduce inconvenience in data accessing
- (2) Reduce responding time for data accessing requirements
- (3) Provide ability of printing information pooling for manipulating within the internal users
- (4) Improve capability and accuracy in printing information tracking
- (5) Supporting data history in file movement both internally and externally in the organization

In this solution, we proposed a computerized system that will facilitate the day-to-day or daily operation transaction work. And the information base is also setup for management instead of the manual system that will be the central database which reduces the data fragment and data redundancy. This is to eliminate the problems of out of control. And it also leads the data environment to be consistent in the entire data entry environment.

In the existing printing information system environment, it could provide certain service but it can not reach the satisfaction that users expect. Furthermore, the amount of files and related printing files are increasing. So the existing system could not provide increasing loads for future situations. And this system could not be scalable in the amount of human resource.

This is because the system needs more data accuracy than data amount maintenance. If we try to add more human resource into the system, maybe we have to plan for the data auditing which may cause the problem of high cost in data controlling.

The area of developing the new system could be concluded in the user requirements as follows: -

(1) Input requirements

- (a) The input form should specify the specific data type that requires to be put clearly in the given specific area
- (b) There should be data integrity check whenever data is put into the given boxes
- (c) It should consume less time in entering the data
- (d) Given data entry box should provide some proper default value such as the present date, etc.

(2) Process requirements

- (a) Provide the function of data tracking and history of file movement
- (b) Support the flash search printing file information status
- (c) Provide the function of editing the place of file store
- (d) Provide the function of keeping the master printing block and the related files detail
- (e) Provide the function of editing the detail of vendor, staff, and etc. that manipulate the master printing block and the related files in the organization

(f) Provide the automated process of report generating

(g) Provide process registering new file and removing the returned file

(3) Output requirements

- (a) Current file store and the status report according to the requirements

- (b) Brief report of the current status of each file that could describe what the related files are, the available status, and the latest place which they are placed at.
 - (c) The user interface must be friendly to be used and manipulated
- (4) Location
- (a) The system allows users within the organization to gain access to the printing information at the appropriate level through the enterprise network.

3.1.1 Data Modeling

This model represents the data relationship network that is manipulated in the printing information system environment. In this section, the data modeling design is done under a logical data model and it will show more detail in the physical data model.

- (1) Logical data model shows the data construction and the relationship between each data table. In this model, the system builder will be able to see what the database looks like which the design is independent to any technical implementation. It aims to accomplish the business requirements.
- (2) Physical data model shows the data construction that is used for building system process. In this level, the data construction will not merely show what and how the database looks like. It also shows and reflects the limitation and the technology choice that is going to be used when the system is built.

Data modeling is a technique that is used to organize database which is used in the information system. The data modeling is sometime called database modeling. Moreover, the entity relationship diagram (ERD) is the data modeling technique that is used to depict data of file inventory, place available in the file store and personal details

that manipulate those files within the enterprise. In terms of data entities and relationships which is described by the data, there are three levels of entity relationship diagram: -

- (1) Context data model: This level shows only the entity and relationship between each data entity. There are seven entities discovered in the system which are Personal Detail, Check In Check Out, Main File, Sub File, Zone, Section, and File Type. Each entity has relationship among them when they are combined together with the entity name in the form of simple business sentences.
- (2) Key-based data model: this level concerns the key-base data attributed that are used for primary key and foreign keys for each data entity. The primary key is the candidate key that is used to identify the tuple (a set of data in data entity) or the record of data in that entity because property of each record must be identifiable uniquely.
- (3) Fully Attributed data model: This data model shows the remaining descriptive attributes and sub setting criteria.

The complete entity relationship diagram of the proposed system is shown in the Appendix A.

3.1.2 Process Modeling

Process modeling is a technique for organizing and documenting the structure and flow of data through a system's processes or the logic, policies, and procedures to be implemented by a system's processor. Furthermore, data flow diagram (DFD) shows the relation between process and data, and in data dictionaries, that formally describe the systems data and used.

In this event, it requires data flow analysis to examine the use of data to carry out specific business processes within the scope of a systems investigation. Moreover, data flow diagrams show the use of data in the system pictorially. And they also show all the essential components in the system and how they fit together. It can be difficult to fully understand a business process through a verbal description alone; data flow diagrams help by illustrating the essential components of a process and the way they interact among them.

To construct the process model, the context diagram is constructed to establish initial project scope of file store and printing information system which is shown in Figure 3.1. The whole system includes seven external agents e.g. Customer, Film Generator Vendors, Gravia Block Generator Vendors, Printing Technical Staff, Senior Manager, File Store, and Customer Relationship Unit.

In the next step, the function decomposition diagram or hierarchy chart shows the top-down functions decomposition and structure of the proposed information system. The functions decomposition diagram is the essential system planning tool that describes the deep down detail of each function component for each function domain.

The context data flow diagram and hierarchy chart will be analyzed and extended into more detail which is described into the form of data flow diagram or DFD. The data flow diagram is drawn to depict the flow of data for each function component in the information system network.

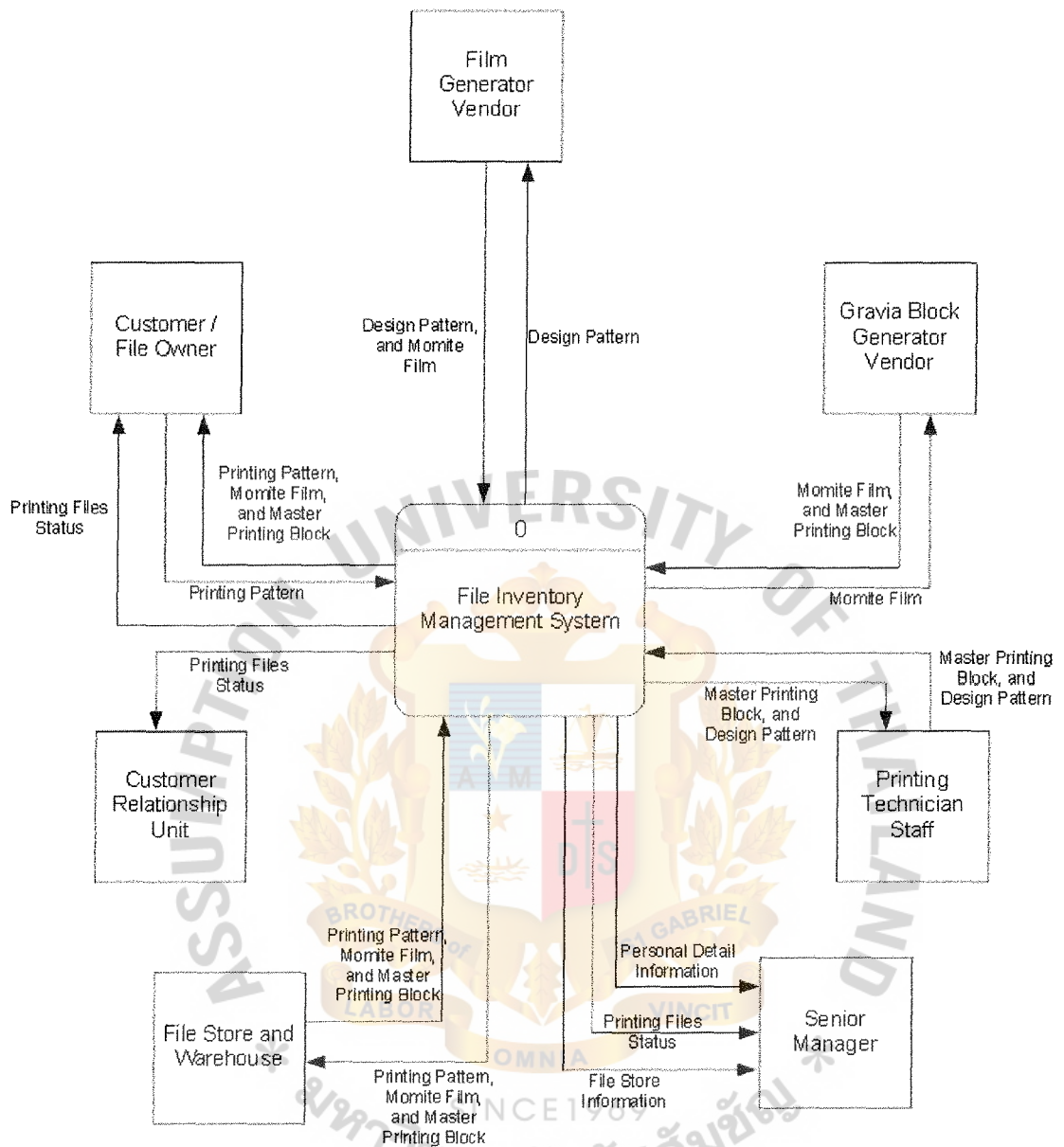


Figure 3.1 Context Level for Proposed System of Data Flow Diagram

The Figure 3.1 shows the context level for proposed system of data flow diagram. In this system, we could see that there are seven external majors which manipulate this information system. They are: -

- (1) Customer (File Owner) - they initiate every printing process task. They will give the printing requirements to the organization via customer relationship.

And they also require asking for the status of printing and percentage of completing during the printing operation.

- (2) Customer Relationship Unit - This unit is an important unit that acts as the bridge between customer and the organization. They will respond to every need of customer and query for the result around organization to satisfy the customer.
- (3) Vendors
 - (a) File generator - This vendor responds to the task of creating the finished printing pattern both in hardcopy and softcopy that is used in creating master printing block.
 - (b) Block generator - This vendor has to receive the finished printing pattern to create the master printing block that the technician staff will use in printing process.
- (4) File Store and ware house - This agent has to take care and maintain all file that are used in the printing. For example, set up the place available for holding printing file, manage and keep track of file check in status.
- (5) Printing Technician staff - The technician staff has the duty to make the plastic print by using the master printing block as the printing master.
- (6) Senior manager - It is normal that managers require getting the over all report of any job and task within the organization that helps them to make decisions of future plans. And it also helps the other to be able to keep track of printing operation status.

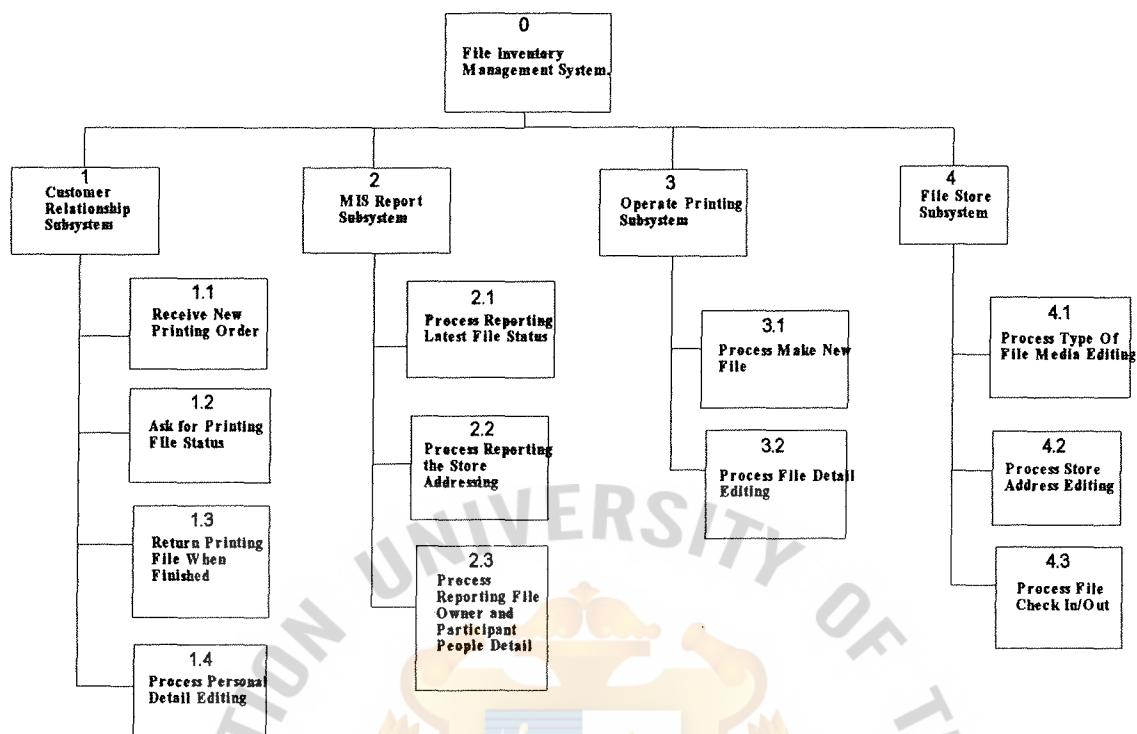


Figure 3.2 Functional Decomposition Diagram of Proposed System

Figure 3.2 shows the functional decomposition diagram of the proposed system of Plastic Bag Printing Information System. From whole system, it could be divided into four major subsystems they are: -

- (1) Customer Relationship Subsystem
- (2) MIS Report Subsystem
- (3) Operate Printing Subsystem
- (4) File Store Subsystem

The customer relationship subsystem aims to provide the service as the bridge between customer and the organization. This unit has to be the contact point of the organization to customer. Most of the time, customer relationship unit has to serve the various services to the customer that could be done by following 4 processes: -

- (1) Receive New Printing Process - This process acts as the first gate for customer who requests to make a plastic printing. Customer relationship unit has to ask for the detail and the printing specification requirements detail before transfer of each printing task to the other unit. All processes of how to receive the new order is done under this process.
- (2) Ask for Printing File Status Process - During the printing process, customer may require asking for the printing progress. This process will be available to provide the service at this point.
- (3) Return Printing File when Finish - Whenever the printing operation is finished, customer relationship has to return all printing file including printing block back to the customer. This process will guide the customer relationship how to return those files back to customer.
- (4) Process Personal Detail Editing - Sometimes, there is a new customer added in. Customer relationship unit has to add, edit, or even delete the customer records. This process provides the service for this need.

Management Information System or MIS Subsystem aims to report the important information about printing operation which could be done by 3 processes: -

- (1) Process Reporting Latest File Status - Most of the time, manager and any other unit request to view the file status of each group that normally takes much time consumption. This process is created to provide the central unit of reporting the present file status of each file group e.g. status of soft file for the printing pattern A, film pattern Momite of printing pattern B, and etc. This process also reports how many formats that each group is available e.g. printing A has draft pattern, finished pattern, soft file in diskette format, printing block, and etc.

- (2) Process Reporting the Store Addressing - It is important to report the area of store addressing which area is available for which format of printing file e.g. draft printing pattern, finished printing pattern (hard copy), finished printing pattern (soft copy) CD diskette, and etc. This report would be useful to let the manager make decisions or forecast the area needed in the future of each season appropriately.
- (3) Process Reporting File Owner and Participant People Detail - This report is useful for every section of the organization to know who are the users or customer in the plastic printing process. These details include name, surname, address, contact point, and etc. which are related to such people. And it is also used as references of the owner of which file, who is the latest person who check in/out those files. Moreover, it would be the central point of the customer information for all sections in the organization.

In the operation of printing subsystem, printing technicians have to manipulate various files for making a plastic printing task. Most of the time, the subsystem needs one designated person to keep track of file check in/out and acquire creating new plastic printing pattern. So the process that requires to complete those jobs in this subsystem are: -

- (1) Process Making New File - Whenever the customer relationship unit forwards the order of plastic printing to this unit, this process will guide the staff in the environment to contact vendors for building the finished printing pattern, printing block, and etc that will be used in the plastic printing process. So it is impossible to let the new comer flow the process of making new files without the good guidance.

- (2) Process File Detail Editing - In one group printing pattern, it may have several kinds of formats such as draft printing pattern, finished printing pattern in hardcopy, softcopy, and etc. So it needs to update the record of each file specifically on how many and what kinds of formats for each printing pattern file are.

File store subsystem is assigned to collect the various files that are manipulated in plastic printing. So it has to manage the space and keep track of file check in/out e.g. who is the latest person who check out the file or check in the file. This is useful to track back the latest person who uses that file and also enhances the process of finding the printing stuff in the file store.

- (1) Process Type of File Media Editing - In the file store, there is a variety of file formats to be maintained within. So it is easier if we could identify how many and what formats are actually available in the store. This also makes the file maintaining easier that leads the staff in the store to be able to keep that format in a suitable place. For example, draft printing pattern, finished printing pattern in hard copy, finished printing pattern in softcopy (diskette, CD-ROM, and etc.), master printing block, and etc.
- (2) Process Store address Editing - This process is used to record the place available in the file store, area, and type of format that is suitable to keep in such area.
- (3) Process File Check In/Out - This process is used to keep track of the check in status of each file in the file store. This tracking will be useful for checking the place and the status of those files where they are.

Furthermore, those processes are worked together and have the relationship among them as it's shown in figure 3.3 data flow diagram of proposed system.

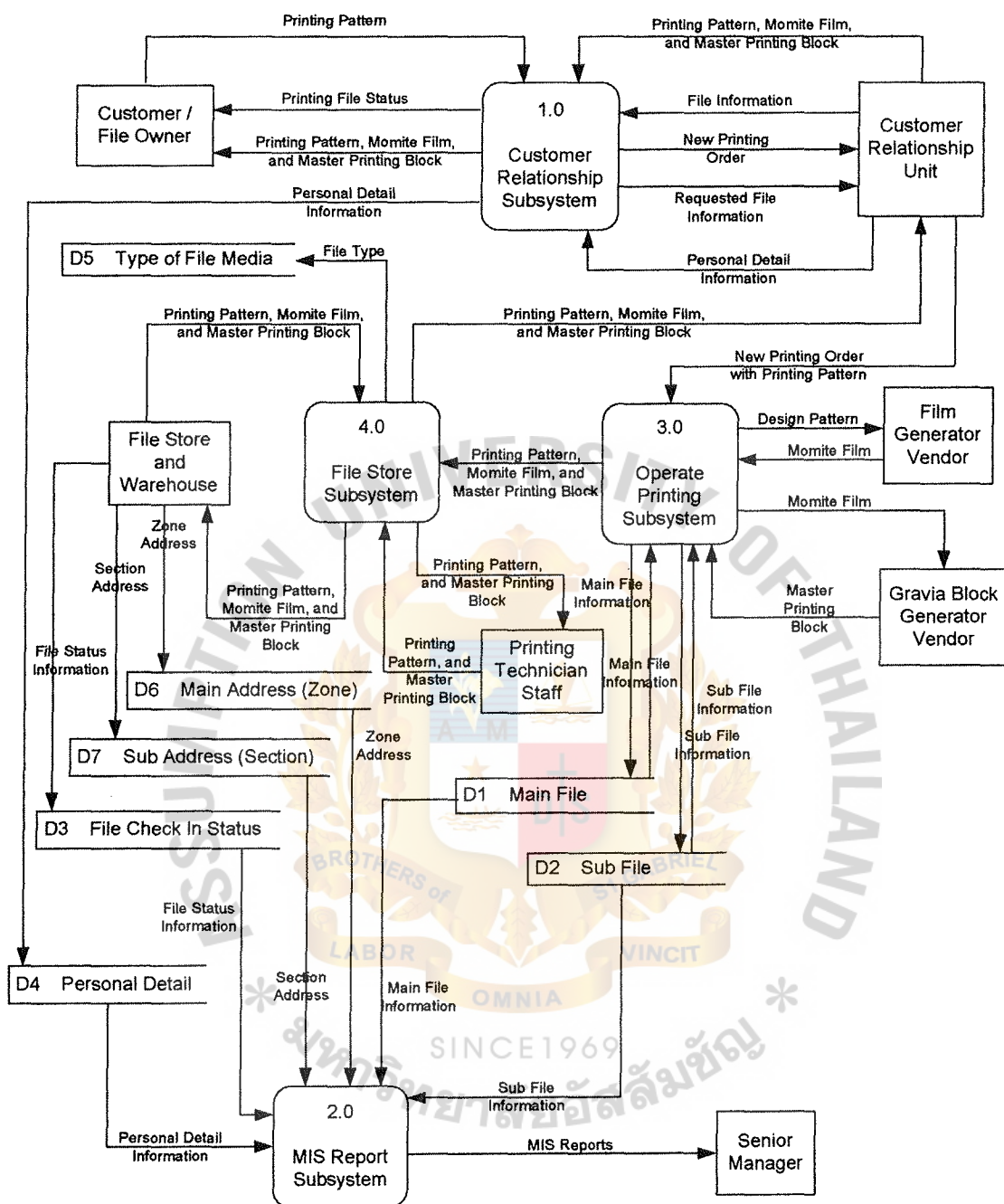


Figure 3.3 Data Flow Diagram of Proposed System

3.2 Decision Analysis

The business requirements analysis could be usually done by various methods to build up the new information system that cover the requirements. Some questions may occur before designing the new system. In contrast, some problems may be found during analysis phase.

- (1) How large the system size be computerized?
- (2) Is it appropriate to build the system by ourselves or purchase software on the shelf?
- (3) Which base system is suited to the organization?
- (4) Which existing information technologies could be applied into our information system?

These questions would be solved within this decision analysis phase, so that this phase is aimed to identify the candidate solutions, analyze the feasible solution, and target the potential solution to be used in the information system.

After identifying candidate solutions, each candidate will be evaluated again in terms of technical feasibility, operational feasibility, and economic feasibility.

3.2.1 Candidate Solution

Brainstorming possible solutions is an approach for identifying candidate solutions. Brainstorming is an effective technique for identifying possible solutions. Brainstorming should encompass solutions that represent buy, build, and a combination of buy and build option. The table 3.1, candidate system matrix, illustrates the candidate system matrix of proposed systems, which is a useful tool for effectively capturing, organizing, and comparing the characteristics for different candidate solutions. There are three candidate solutions that can be defined for the proposed systems as follows: -

- (1) Candidate 1: File Sharing and Application - This candidate has the application that is developed under the Microsoft Visual Basic which allows the developer to formulate the familiar GUI or Graphics User Interface to the users who are familiar with any other Microsoft Windows applications. Moreover, this candidate applies the Microsoft Access file as a central database to the application around the information system environment, and let the client site executes all database instructions. This suit has one huge advantage, it is likely that users are running windows as operating system and using Microsoft Office as an application base. It can be used by almost any user within the environment. A beginner can get to grips with it every easily using the wizard features. And it is also easiest to be understood by user such as the interface between the user and the system. On the other hand, Microsoft Access could not provide good performance to many concurrent users. So it is not appropriate if there are many users who have to manipulate with the database at the same time.
- (2) Candidate 2: 2-Tier Infrastructure Client/Server - This candidate follows the ideas of 2-Tier Infrastructure (Client/Server system). The application of this candidate also is developed under the Microsoft Visual Basic tool like the first candidate. In contrast, this kind of system applies the Microsoft SQL Server 2000 as a central database for the information system. The advantage of using the Microsoft SQL Server 2000 is the system could support the load of many concurrent users and it also has the high performance in executing the complexity database. Moreover, the database server executes all database instructions. For the disadvantage, it may not be easily managed

by any non-technical people. This kind of system requires some people who have enough IT skill to maintain the system smoothly.

- (3) Candidate 3: 3-Tier Infrastructure Client/Application Server/Database Server - This candidate brings the web technology which requires the 3-tier infrastructure of Client/Server solution to accomplish this mission. There are database server, web application server and client. The advantage of this solution is; user could access to the system anywhere anytime via the internet that could access the system. Users can upload the information, submit the query, update the record, or anything through the web interface which is normally familiar to any user. So it could provide the service through the environment at the entire level. On the other hand, this technology requires technicians who have the skills in the web-based infrastructure to maintain the system running smoothly. And it also has the problem of security system since the system has to connect with the internet link which is a wide network. Anybody can gain the access into the system if the protection is not reached at a reasonable point.

For further brief specification of each candidate, please see the attached table 3.1 candidate system matrix.

Table 3.1 Candidates System Matrix.

<u>Characteristics</u>	<u>Candidate 1</u>	<u>Candidate 2</u>	<u>Candidate 3</u>
<u>Portion of system computerized</u> Brief description of the portion for the system that would be computerized in each candidate.	Fully support all relevant units that are involved in the printing information system.	Fully support all relevant units that are involved in the printing information system.	Fully support all relevant units that are involved in the printing information system.
<u>Benefits</u> Brief description of the business benefits that would be realized for each candidate.	The application could be made by use of the existing developing tools.	This candidate has the identical interface like the first candidate but it could provide more number of concurrent users.	This candidate uses the web browser as the media to connect the application via internet. So it is able to let the remote user access to the system via world wide internet access.
<u>Servers and Workstations</u> A description of the servers and workstation needs to support each candidate.	Server : Pentium4 2.66GHz, 256MB ECC, 80GB HD Client : Pentium4 2.66GHz 128MB 40GB HD	Server : Pentium4 2.66GHz, 256MB ECC, 80GB HD Client : Pentium4 2.66GHz 128MB 40GB HD	Server : Pentium4 2.66GHz, 256MB ECC, 80GB HD Client : Pentium4 2.66GHz 128MB 40GB HD
<u>Software tools need</u> Software tool needed that is used to design and build the system (e.g. database management system, emulators, operating system, languages, and etc.) Not generally applicable if applications software packages are to be purchased.	Microsoft Access, Visual Basic Tools	Microsoft SQL 2000 Server, Microsoft Visual Basic Tools	Microsoft SQL 2000 Server, Microsoft Visual Basic Tools, Microsoft InterDev, IIS 5.0

Table 3.1 Candidates System Matrix. (Continued)

<u>Characteristics</u>	<u>Candidate 1</u>	<u>Candidate 2</u>	<u>Candidate 3</u>
<u>Application Software</u> A description of the application software to be purchased, built, accessed, or some combination that is manipulated in each candidate.	<u>Custom solution</u> File Sharing Server and application at the client tier.	<u>Custom solution</u> Database Server and application at the client tier.	<u>Custom solution</u> Database Server, Application Server, and Web Server. Each client connects to the application via any internet browser.
<u>Method of data processing</u> Type of querying for the result in database system for each candidate.	The Microsoft Access file is stored at the server as the central file sharing. And client has to access this file via the network. Each client use Microsoft JET Driver to access	The database of the system is stored at the Microsoft SQL 2000 which is run under the server. Each client merely sends the request for querying the required information.	There are 3 section of the system which is database server, application server, and web server. Each client could access the application through any internet browser

Table 3.1 Candidates System Matrix. (Continued)

<u>Characteristics</u>	<u>Candidate 1</u>	<u>Candidate 2</u>	<u>Candidate 3</u>
	the Microsoft Access File and manipulate with. The load of query for the information is powered by each client. Server serve the service as file sharing only	Server takes the response to query for the information needs and send back to each client. In this method, it is called as 2-tier structure.	to the web server. Web server will present the user interface and submit the required data to the application server for processing. Application server has to request for some needed information from database to process and send back to the web-server. In this method, it is called as 3-tier structure.
<u>Output Devices and Implication</u> A description of output devices that are required to be used in each candidate. This is including the constrains.	Monitor Display and Printing report	Monitor Display and Printing report	Monitor Display and Printing report
<u>Input Devices and Implication</u> A description of input method plus the devices that are required to be used in each candidate.	Keyboard and Mouse	Keyboard and Mouse	Keyboard and Mouse

Table 3.1 Candidates System Matrix. (Continued)

<u>Characteristics</u>	<u>Candidate 1</u>	<u>Candidate 2</u>	<u>Candidate 3</u>
<u>Storage Devices and Implication</u> Brief description of what data would be stored, how data would be accessed, what storage media type to be used, how large of the storing capacity size, and how the data would be organized for each candidate	The Microsoft Access file is stored in the File Server which has the capacity to store at 60GB	Database is managed under Database Server which has the capacity to store at 60GB. Backup the entire database every Sunday 5:00am and Increment backup the database every Monday to Saturday 9:00pm.	Database is managed under Database Server which has the capacity to store at 60GB. Backup the entire database every Sunday 5:00am and Increment backup the database every Monday to Saturday 9:00pm.

3.2.2 Feasibility Analysis Matrix

Feasibility analysis phase could be done before or after each candidate is identified. In this analysis task, it should not focus and be limited by cost and benefits only. And the feasibility analysis matrix is shown in the table 3.2. The following criteria will be used to analyze the most feasible solution for the information system.

- (1) Operational feasibility - It is used to measure how the proposed system solution would affect the user’s working environment, fulfill the user’s requirements and the interface between users and the system. Table 3.1 shows that every candidate could support the current business process smoothly. Moreover, the feasibility study shows that candidate 2 has the highest score in the section of operational feasibility. This is because it has the function of managing the data authorization access better than the other

simple solution which is easy to maintain and it is appropriate with the number of present users.

- (2) Technical feasibility - This session focuses to measure the feasibility of the system in terms of technical practice and technical expertise to design and maintain the system. In this session, the highest ranking is the first candidate which has score of 85marks while the second and the third are the second candidate with 80marks and third candidate with 70marks. The reason why the first candidate has the highest score in this term is because the system of the first candidate is the easiest one to design and maintain. It requires just only a programmer to build a Microsoft access as the database file. And the system could be built in the shortest time. Moreover, it does not require the technician with high skills in IT to maintain whereas the others do. Furthermore, the number of users in the organization is not much. So it does not require having high capacity system to provide the huge concurrent user at the same time like candidate 2 and candidate 3.
- (3) Economic feasibility - This session is used to measure the feasibility of the proposed system in terms of cost-effectiveness. From the feasibility analysis phase, it shows that the first candidate wins the economic feasibility while the others could not. The first candidate needs to be merely invested with 819,500 Baht while the other needs at least 1,140,000 Baht and up. And the terms of payback period is only 2 years and 2 months. It means the system owner does not have to be owned for a longer period.
- (4) Schedule feasibility - This session focuses on the time length of completing the system building. The mark will be given according to the shorter period of time usage in developing the system. The first candidate uses time to

complete the system building at 4 months whereas the others require 6 months to complete. This is due to the complexity of system building.

The table 3.2 shows the completed feasibility analysis matrix for each proposed candidate system. The full details of cost-benefit calculation (Economic Feasibility) are shown in the Appendix C that includes estimated cost, payback period, and the payback period graph of each candidate. At the total score of feasibility analysis, the first candidate has the highest score while the second and third one come second and third. The reason why the first candidate has the highest score are: -

- (1) The amount of users in the organization does not exceed 10 people. If the system uses Microsoft access as the database, it is enough to serve that such amount of user at a time.
- (2) The organization does not require much security within the environment due to the number of users.
- (3) This candidate accomplishes with the ease of use and maintenance. So it does not require hiring the high technical skills to take care of the system.
- (4) If amount of the user grows, this system could scale up to use the Microsoft SQL Server 2000 later because the price of this DBMS may fall down in the future. And the load requirement is now very low.

In addition, Return-On-Investment (ROI) analysis is a technique which is used to compare the lifetime profitability for the proposed solution. It focuses on measuring the relationship between the amount of income and investment over the lifetime. The life time of the winning candidate (candidate 1) could be defined as follow: -

Life time ROI = (Estimated lifetime benefit – Estimated lifetime cost) / Estimated lifetime cost

$$\begin{aligned} &= (6,761,353.15 - 5,923,073.56) / 5,923,073.56 \\ &= 14.15 \% \end{aligned}$$

And the cost of development for the candidate 1 is 819,500 Baht. For the payback period of this candidate is approximately 2 years and 2 months. Furthermore, the net percent value of the 5 years time is 838,279.59 Baht.

In brief, the first candidate is the most appropriate solution that suits the present working environment and the nearest future.

For further information about feasibility analysis, please see the table 3.2. And additional related data please see appendix C.

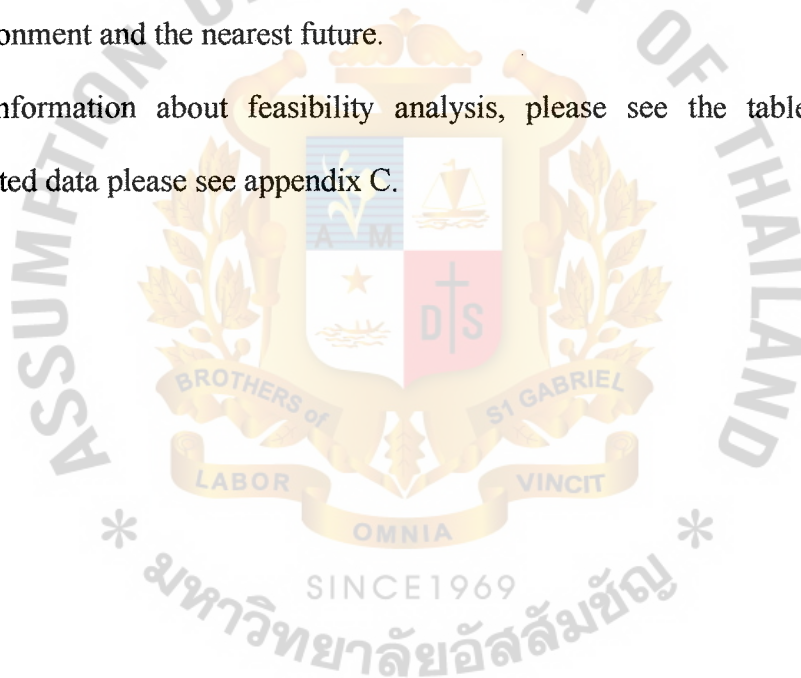


Table 3.2: The Completed Feasibility Analysis Matrix

<u>Feasibility Criteria</u>	<u>Wt.</u>	<u>Candidate 1</u>	<u>Candidate 2</u>	<u>Candidate 3</u>
<u>Operational Feasibility</u> Functionality: A description of what degree that the candidate would benefit the organization and how well the system would work. Political: A description of how well the system would be managed and organize under the existing organization perspective.	30%	Fully support in all detail of business function. But it might be weak in organizing the security for each user level around the organization Score : 80	Fully support like the first candidate. And it also has the better management in organizing the access security for each user level around the organization. Score : 90	Fully support like the first candidate. But it has the problem of information security since the system has to be reachable over the internet link. Score : 70
<u>Technical Feasibility</u> <u>Technology:</u> An assessment of the system maturity, availability, and desirability of the computer technology needs to support the candidate. <u>Expertise:</u> An assessment in the technician expertise needs to support the candidate	25%	Microsoft Access is the easiest kinds of database organizing to be developed for any information system. It can provide the small business environment which the number of user does not exceed 5 users at a time.	Microsoft SQL Server 2000 provides more efficiency in database management. It could serve the vast concurrent users at a time. In contrast, it requires the skillful technician to maintain the system.	The web-based technology needs fewer requirements in the client site. It requires client to have the internet browser to gain the access to the application. On the other hand, it requires some certain complexity of the server site e.g. database server and web-application server. And it also needs an expert

Table 3.2: The Completed Feasibility Analysis Matrix (Continued)

<u>Feasibility Criteria</u>	<u>Wt.</u>	<u>Candidate 1</u>	<u>Candidate 2</u>	<u>Candidate 3</u>
		Score : 85	Score : 80	technician to maintain both database server and web server for the information system environment. Score : 70
<u>Economic Feasibility</u>	35%			
Cost of development (Baht)		Approximately 819,500	Approximately 1,140,000	Approximately 1,616,000
Payback Period		Approximately 2 years	Approximately 4 years	More Than 5 years
Net present value (Baht)		Approximately 838,279.59	Approximately 87,680.08	Approximately -616,190.40
Detail calculation:		See Appendix C Score : 95	See Appendix C Score : 80	See Appendix C Score : 75
<u>Schedule Feasibility</u>	20%			
An assessment of how long the solution will take time to design and implement		Approximately 4 months Score : 100	Approximately 6 months Score : 90	Approximately 6 months Score : 90
Ranking	100%	98.5	93	82.75

3.3 System Design

System design phase focuses on the technical term rather than the system analysis which focuses on the logical view or the business term. This phase concerns all about the technical constrain and technology requirements to be implemented in the proposed system. The business requirements that has been done in the system analysis phase will be transformed into technical focusing that is used to implement as the real information system. The details of each sub system design will be described as follows: -

3.3.1 Structure Design

Structure design is a technique that is used to break down the whole system into system modules in the kind of hierarchy relationship. The system design precedes the system building by two phases. They are: -

- (1) Logical design - This phase shows the major system function plus the additional feature that is manipulated in the business process. And it also shows the relationship among those system functions.
- (2) Physical design - This phase is used to transform the logical view into the physical view of designing which is used in the system building phase. It also shows the technical constraint and others that shape the design into the system.

The structure design guides the system building e.g. programmer, developer, and etc. to build the system that could complete the business requirements specifically. This means the system should be built under the conditions of what business want for input, store, process, and output the information results effectively.

In the design phase, structure chart is used to depict the picture of the structure design that will be in the proposed information system. To design the structure of the system, it requires Data Flow Diagrams or DFDs. This is because the processes

appearing in the DFDs represent the system of each module. In addition, the DFDs design technique shows the flow of data e.g. how data is input, how data is processed, how data is flown to another module, and etc.

Appendix D shows the DFDs that are partitioned into individual transaction module according to the dataflow of in/out between each element.

3.3.2 Process Specification

The purpose of the process specification is to define how each system module processes the data, manipulate the data from input to be the information output. The item of each process consists of process name, data in, process, data out, and attachment. For the further information, please see appendix E process specification.

3.3.3 Data Dictionary

Data dictionary provides a list of data definitions for all data entities, data field, and data store within the developed system. For further details, please see the appendix F data dictionary.

3.3.4 Database Design

In order to get the database schema for database design, the data model (ERD), the logical data model must be transformed into a physical data model that is ready to be implemented. The result of database design is shown in appendix G database design.

3.3.5 Input Interface Design

Input interface is an important role for the data entering. It is used as a gate between the real world and the information system world. Every data that is required to be processed have to be input. And the data input must be done properly. There are two major criteria for data input: -

- (1) How the data is initially captured, entered, and processed.

- (2) The method and technology to be used in data entering.

The basic function of the data input is to accept data entry, verification, validating, editing, adding, deleting, and correcting.

In the interface design, programmers have to beware the proper shape of input type object for each attribute. For the input screen, please see appendix H input interface design.

3.4 Hardware / Software Requirements

This section defines what the hardware and software components needed for the proposed system. This includes all details of any computerized devices, and operating system plus application software.

3.4.1 Hardware Requirements

From the existing environment, those PCs are not connected to each other. There is no area network connectivity. To implement the proposed system, it requires new hardware devices that make the network connectivity possible. And let the data be shared from the central point instead of distributing to each site of the client. This is aimed to eliminate the problem of data redundancy which caused the problem of data maintenance. In the new system, users will not have to update their database manually point-by-point. They could access the central database over the computer network easily. For detail of hardware specification, please see the table 3.3 and 3.4.

Table 3.3: File Server Specification

<u>Devices</u>	<u>Specifications</u>
Processor	
Model	Pentium4 2.66GHz
Cache Memory of Processor	L1 20KB, L2 512KB
Front Side Bus of Processor	800MHz
Primary Memory (RAM)	
Model	256MB ECC
Capacity	256MB with ECC Priority Check
Speed	333MHz
Secondary Memory (Harddisk)	
Model	80GB Ultra ATA (RAID Mode1 x2 Mirror Mode)
Interface	ATA-IDE-133
RPM	7200 rpm
Cache Buffer	8MB
Removable Disk	
Optical Drive	CD-Rom 48x IDE
Disk Drive	Floppy Disk Drive 3.5"
Mainboard	
Chipset	Intel 875G
Harddisk Interface	Raid-ATA-IDE 133 mode 0, 1
Network Interface	10/100/1000base-T
Power Supply	
Model	Enermax
Capacity	300W
Mode	Redundancy Mode (x2) Online Swappable
UPS	
Model	APC Back-UPS Pro
Capacity	2,200VA (Able to supply 300W for 1 Hour)
Mode	Line Interactive, Stabilizer, and Boost Voltage Regulator
Display	
Model	Philips CRT Monitor 15"

Table 3.4: Client PC Specification

<u>Devices</u>	<u>Specifications</u>
Processor	
Model	Celeron 2.66GHz
Cache Memory of Processor	L1 20KB, L2 512KB
Front Side Bus of Processor	800MHz
Primary Memory (RAM)	
Model	128MB
Capacity	128MB
Speed	333MHz
Secondary Memory (Harddisk)	
Model	40GB Ultra ATA
Interface	ATA-IDE-133
RPM	7200 rpm
Cache Buffer	2MB
Removable Disk	
Optical Drive	CD-Rom 48x IDE
Disk Drive	Floppy Disk Drive 3.5"
Mainboard	
Chipset	Intel 875P
Harddisk Interface	ATA-IDE 133
Network Interface	10/100base-T
Power Supply	
Model	Promax
Capacity	200W
UPS	
Model	APC Back-UPS AVR
Capacity	500VA (Able to supply 200W for 30 Minutes)
Mode	Line Interactive
Display	
Model	Philips CRT Monitor 17"

3.4.2 Software Requirements

The software specifications for server software and client software are shown in the table 3.5 and table 3.6.

Table 3.5: Server Software Specification

<u>Software</u>	<u>Specification</u>
Operating System	Microsoft Windows 2000 Server
File Accessing Authorization	Active Directory
Database	Microsoft Access 2000

Table 3.6: Client Software Specification

<u>Software</u>	<u>Specification</u>
Operating System	Microsoft Windows 2000 Workstation
Office Automation Application	Microsoft Office 2000
Database Connecting Driver	Microsoft Access Driver ADO.NET (MDAC 2.8 Microsoft Data Access Components)

3.5 Network Configuration

It is normal if the project task is done under good team work; environment would be better than doing it individually. Network connectivity may be the right answer to accomplish the mission of team work environment. The major objective of the network connection in this proposed system is to share the file that every related user could access. Eventually, the share resources such as printers, file storage, and etc. will be shared. So every authorized user in the working environment could get access of using them right away.

The connection between clients and the server for the database is done over the LAN or Local Area Network which is set to be a gateway to get access to a shared resource over the working environment. Moreover, the network connectivity for this proposed system is aimed to cover the internal connecting only. There is no external network e.g. internet link to be hooked. With this environment, the network belongs to the organization and it is accessible only by organization members, employees, and other authorized users. This network architecture done over this environment is a Network Star Topology that is shown in figure 3.4.

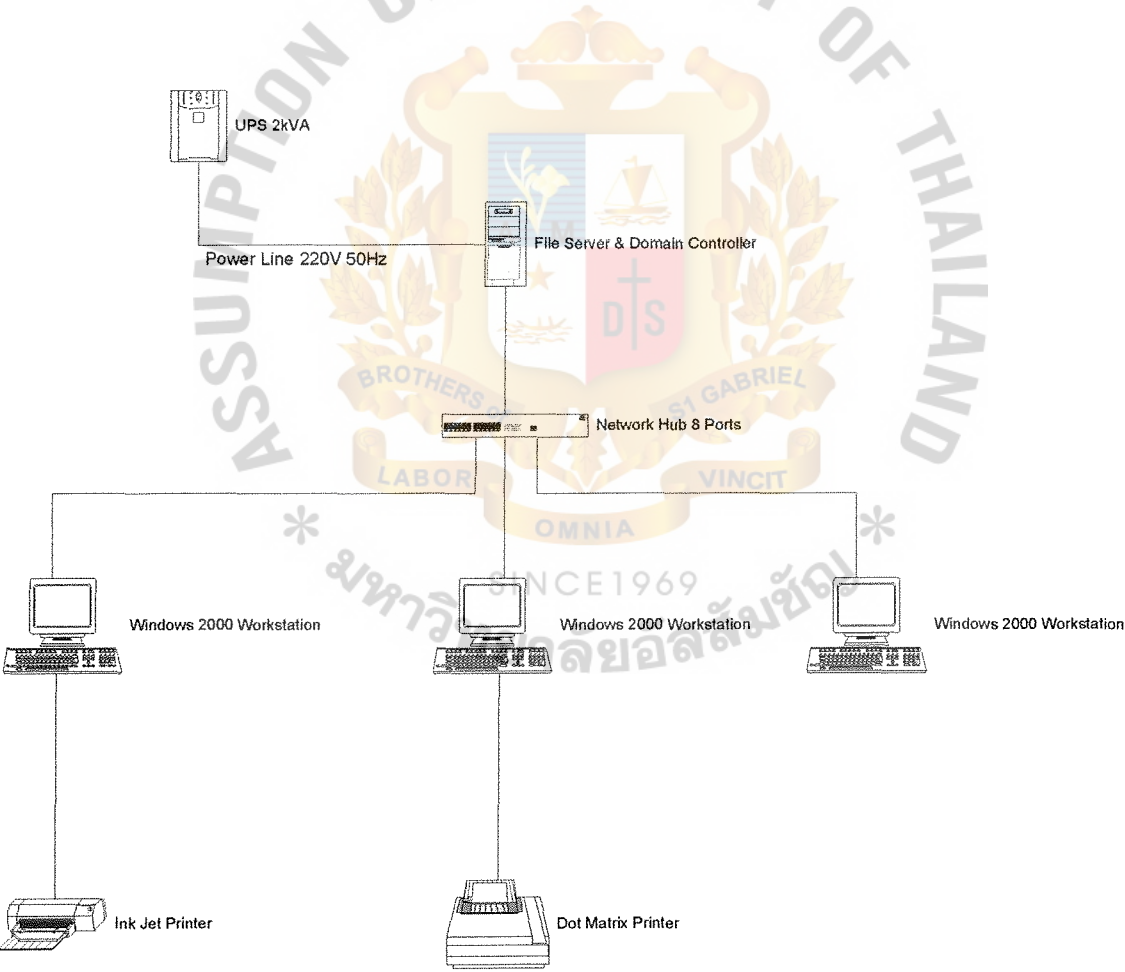


Figure 3.4: Network Configuration of the Proposed System

Table 3.7 Network Peripheral Specification for the Proposed System Security and Control

<u>Network Component</u>	<u>Specification</u>
Network Hub	Switch Network with 8ports available
Wiring Cable	UTP Twisted Pair Category-5
Network Operating System Host	Server Site : Microsoft Windows 2000 Server Client Site : Microsoft Windows 2000 Workstation
Network Interface	Ethernet LAN 10/100-Base-T

3.6 Security and Controls

One of the most important things to be considered in the information system working environment is the security system. It is normal in any working environment that needs to have privacy in working environment from external agents. Therefore, it needs to keep some business secret that is not needed to let any other non-related people to know. And it also needs to prevent the intruder to access those information for any violence. The security strategies are listed as follow: -

- (1) Identification - Each user in the working environment will be assigned with the unique user and password. They will use for accessing the working environment. Whenever users need to access the working environment, they have to identify themselves by signing on the given user and password. Furthermore, password will be changed every 3 months period. This is to maintain the security away from the intruder.
- (2) Authentication In identifying the user, they have to prove themselves by authenticating themselves to the system. In this event, it could be done by

various methods. But the preferable way which is implemented is done by username and password. In the security policy, each user has to change their password every 3 months. This is to ensure that the password which is used to authenticate into the system will not be taken by any intruder easily. And the length of password must be at least 8 characters.

- (3) **Authorization** After the user has been authenticated to the system, system will give proper authorization to gain access to appropriate resource of working environment. For example, the access level of the file store, authorization of share printer usage level, and etc. This is due to the given authorization to each user to gain with. In the proposed system, only the authorized user could gain access to the central Microsoft Database File and manipulating. Some users may have the authorization for reading only. Some users may be able to also write. And some may have higher authorization to give authorization to anyone in the working environment.
- (4) **Physical Security** In the network connection, it has to be secure in both logical view and physical view of network connection. The proposed system is the closed circuit computer networking in physical architecture. On the other hand, this environment may have to connect with the outside network like internet. So it needs proper networking devices to protect the private and secure organization such as Firewall, Net Filter, or etc. This includes the user behavior in the working environment such as smoking permit, because it could cause damage to the computer while they are in the working place.
- (5) **Security Auditing** It is a normal situation that users would like to decrease the security that is to make it easy to use the system. It could be said that the ease-of-use for the system is always opposite security system. The system

with tightly serious security may decrease the working efficiency. Therefore, auditors have the ability to validate and report how the security system should be properly adjusted.

- (6) **Back up and Recovery** Every working environment needs to have the backup plan and supportive second level to ensure that the business process would be operated smoothly. As the data or the business content is the king of every business process, it needs to be maintained with the right technology such as tape backup or any other secondary memory that could be the media to archive the data. This is a serious concern about the environment running. If there is any unexpected event occurring with the data, the business may not be able to continue working as usual which costs unpredictable loss of business. Furthermore, secondary electricity supply is also important to the information system. Because the system needs enough electricity supply to operate the system. This is to ensure that the information system could facilitate the working environment smoothly. It is possible to say that if the power supply is not enough to serve the power consumption of the system; it may damage the system constantly. So it needs UPS to supply the power for the unexpected situation. On the other hand, the proposed system is not required to serve the service 24/7. So it might not require the system to have service redundancy for file sharing. In brief, it requires merely effective data backup process and proper power supply to the system.
- (7) **Other Security** Sometimes, users might make some errors without knowing the correctness. In this case, the error should be corrected immediately such as virus spreading, back door intruder gateway, and etc. These events must

be observed and done under the auditing to prevent unexpected situations cause damage to the organization.

3.7 Cost and Benefit Analysis

Economic feasibility is defined as a cost-benefit analysis. The detail of cost and benefit of the new system is compared with the existing system. Therefore the result of analysis could answer the most costs and benefits of each system. The table and figure of cost and benefit comparison could give a crystal clear view of data comparison between developing system and the existing system. There are two categories of costs which are associated with the cost of system developing and system operating.

System developing costs are usually onetime costs. It charges the system owner at right from the beginning of constructing the system. They include people-ware in developing, training cost, computer devices acquisitioning, and etc.

System operating costs are the costs that the system owner has to pay in every repeated period of life-time system. They include office supplies cost, miscellaneous cost, employment cost, and any other costs that is spent for the operating system.

Moreover, the benefit of the proposed system could be presented in both tangible and intangible terms.

The break-even analysis focuses on the cost among accumulated annual cost & accumulated proposed cost, and payback period of the proposed system. Payback period analysis gives the picture of the benefit over the period the new system runs on the working environment over the existing system. For the details of each, it could be defined as: -

- (1) Cost of the existing system - From the existing system, the business operation is done manually. Staffs who have to manipulate and control the file of printing plastic have to note the address of each file into the book

manually. This causes the problem of finding the file if the other people try to search for the needed file from the book record. So the costs of business operation are most from the operative expenses. The office equipments are what sales officers, inventory officer, and management officer use in their operation. And most of the spending costs for the office operation are paid for the stationary e.g. notebooks, pen, pencil, paper, and etc which are used to operate in the business process. Furthermore, the cost of the existing system is also hidden in some areas which are not able to be measured in the financing criteria, because it depends on the customer satisfaction. Table 3.8 and table 3.9 show the cost of business operating in the existing system. Furthermore, the cost of operating between existing system and the proposed system is very different in the area of operating cost.

- (2) Cost of the proposed system - The proposed system cost is also classified into fixed cost and annual operating cost. The fixed cost includes hardware cost (1 Server Computer, 3 Client PC, and a UPS), software cost (1 Server Operating System, 3 Workstation Operating System, and 3 Office Automation Application), development cost (only the cost of system implementers), maintenance cost (both hardware and software), and implementation cost (installation and training). The annual cost includes salary cost for the employment, and any other miscellaneous costs. For further information, please see that table 3.10 and 3.11.

The proposed system or the computerized system requires some further investment to the existing working environment which includes computer hardware and software. Therefore, they need proper maintenance to maintain good condition of operating the business function. In this case, they need to be paid maintenance fee. In

the first year, the service charge is free but in the later years the service fee is needed. Moreover, the computerized system which is implemented in this phase does not need a high skilled technician to take care of it. It needs only the proper trainee user to cover the system which helps the system owner to reduce the annual cost. As the computerized system needs to be developed to suit the existing working environment, system owner has to invest and pay for the analyzed system construction and building which is just a one-time cost e.g. cost of system analyst, system builder, and computer network builder. These also include the installation cost and training cost.

The new system could reduce the number of working process and also eliminate the cost of operating. Table 3.10 shows that the new system requires having merely one printing file management staff to maintain the printing file in the store. Moreover, it also helps the other workers to access the information about printing file throughout the new system interface instead of getting the information by querying them manually. Eventhough the gap between the business people knowledge and the technical term of information system may make the user to be frightened with the use of information system; system analyst people could facilitate the system owner to build the required system due to business requirements specifically.

Table 3.8: Cost of the Existing System

Cost Items	Year				
	1	2	3	4	5
Fixed Cost					
9 Calculators (@ 2,000 B)	฿3,600.00	฿3,600.00	฿3,600.00	฿3,600.00	฿3,600.00
2 PC (@ 16,000 B)	฿6,400.00	฿6,400.00	฿6,400.00	฿6,400.00	฿6,400.00
Inkjet Printer (@ 8,000 B)	฿1,600.00	฿1,600.00	฿1,600.00	฿1,600.00	฿1,600.00
Dot matrix Printer (@ 7,000 B)	฿1,400.00	฿1,400.00	฿1,400.00	฿1,400.00	฿1,400.00
2 MS Windows License (@9,000 B)	฿3,600.00	฿3,600.00	฿3,600.00	฿3,600.00	฿3,600.00
2 MS Office License (@15,000 B)	฿6,000.00	฿6,000.00	฿6,000.00	฿6,000.00	฿6,000.00
Total Fixed Cost	฿22,600.00	฿22,600.00	฿22,600.00	฿22,600.00	฿22,600.00
Operating Cost					
Employment Fee					
1 Senior Manager @ 20,000 B/month)	฿240,000.00	฿264,000.00	฿290,400.00	฿319,440.00	฿351,384.00
3 Customer Relationship Staff (@ 12,000 B/month)	฿432,000.00	฿475,200.00	฿522,720.00	฿574,992.00	฿632,491.20
3 Printing Technician Staff (@ 12,000 B/month)	฿432,000.00	฿475,200.00	฿522,720.00	฿574,992.00	฿632,491.20
2 Printing File Management (@ 13,000 B/month)	฿432,000.00	฿475,200.00	฿522,720.00	฿574,992.00	฿632,491.20
Office Supplies & Miscellaneous					
Stationary (@ 3,000 B/month)	฿36,000.00	฿39,600.00	฿43,560.00	฿47,916.00	฿52,707.60
Paper (@ 7,000 B/month)	฿84,000.00	฿92,400.00	฿101,640.00	฿111,804.00	฿122,984.40
Utility (@ 4,000 B/month)	฿48,000.00	฿52,800.00	฿58,080.00	฿63,888.00	฿70,276.80
Miscellaneous (@3,500 B/month)	฿42,000.00	฿46,200.00	฿50,820.00	฿55,902.00	฿61,492.20
Total Operating Cost	฿1,746,000.00	฿1,920,600.00	฿2,112,660.00	฿2,323,926.00	฿2,556,318.60
Total Cost of the Existing System	฿1,768,600.00	฿1,943,200.00	฿2,135,260.00	฿2,346,526.00	฿2,578,918.60

Table 3.9 Five-Year-Period of Accumulated Cost for the Existing System

Year	Total Existing Cost	Accumulated Cost
1	฿1,768,600.00	฿1,768,600.00
2	฿1,943,200.00	฿3,711,800.00
3	฿2,135,260.00	฿5,847,060.00
4	฿2,346,526.00	฿8,193,586.00
5	฿2,578,918.60	฿10,772,504.60
Total	฿10,772,504.60	

Table 3.10 Cost of the Proposed System

Cost Items	Year				
	1	2	3	4	5
Fixed Cost					
Hardware					
1 Server PC (80,000 B)	฿16,000.00	฿16,000.00	฿16,000.00	฿16,000.00	฿16,000.00
1 UPS 2.2kVA (25,000 B)	฿5,000.00	฿5,000.00	฿5,000.00	฿5,000.00	฿5,000.00
3 PC (@ 25,000 B)	฿15,000.00	฿15,000.00	฿15,000.00	฿15,000.00	฿15,000.00
7 Calculators (@ 2,000 B)	฿2,800.00	฿2,800.00	฿2,800.00	฿2,800.00	฿2,800.00
Inkjet Printer (@ 8,000 B)	฿1,600.00	฿1,600.00	฿1,600.00	฿1,600.00	฿1,600.00
Dotmatrix Printer (@ 7,000 B)	฿1,400.00	฿1,400.00	฿1,400.00	฿1,400.00	฿1,400.00
Software					
1 MS Windows Server License (@ 120,000 Baht)	฿24,000.00	฿24,000.00	฿24,000.00	฿24,000.00	฿24,000.00
3 MS Windows License (@13,600 B)	฿5,400.00	฿5,400.00	฿5,400.00	฿5,400.00	฿5,400.00
3 Microsoft Data Access Components (free)	-	-	-	-	-
Microsoft Access (@ 9,500)	฿1,900.00	฿1,900.00	฿1,900.00	฿1,900.00	฿1,900.00
3 MS Office License (@15,000 B)	฿9,000.00	฿9,000.00	฿9,000.00	฿9,000.00	฿9,000.00
Development Cost					
1 System Analyst (4months @ 20,000 Baht/month)	฿80,000.00	-	-	-	-
2 Programmers (3months @ 25,000 Baht/month)	฿150,000.00	-	-	-	-
1 Network Specialist (2months @ 30,000 Baht/month)	฿60,000.00	-	-	-	-

Table 3.10 Cost of the Proposed System (Continued)

Cost Items	Year				
	1	2	3	4	5
Maintenance Cost					
Hardware Maintenance	-	฿2,000.00	฿2,000.00	฿2,000.00	฿2,000.00
Software Maintenance	-	฿1,250.00	฿1,250.00	฿1,250.00	฿1,250.00
Implementation Cost					
Training	฿50,000.00	-	-	-	-
System Installation	฿50,000.00	-	-	-	-
Total Fixed Cost	฿472,100.00	฿85,350.00	฿85,350.00	฿85,350.00	฿85,350.00
Operating Cost					
Employment Fee					
1 Senior Manager @ 20,000 B/month)	฿240,000.00	฿264,000.00	฿290,400.00	฿319,440.00	฿351,384.00
2 Customer Relationship Staff (@ 12,000 B/month)	฿432,000.00	฿475,200.00	฿522,720.00	฿574,992.00	฿632,491.20
3 Printing Technician Staff (@ 12,000 B/month)	฿432,000.00	฿475,200.00	฿522,720.00	฿574,992.00	฿632,491.20
1 System Administrator (@ 10,000 B/month)	฿120,000.00	฿132,000.00	฿145,200.00	฿159,720.00	฿175,692.00
1 Printing File Management (@ 13,000 B/month)	฿156,000.00	฿171,600.00	฿188,760.00	฿207,636.00	฿228,399.60
Office Supplies & Miscellaneous					
Stationary (@ 1,500 B/month)	฿18,000.00	฿19,800.00	฿21,780.00	฿23,958.00	฿26,353.80
Paper (@ 5,000 B/month)	฿60,000.00	฿66,000.00	฿72,600.00	฿79,860.00	฿87,846.00
Utility (@ 3,000 B/month)	฿36,000.00	฿39,600.00	฿43,560.00	฿47,916.00	฿52,707.60
Miscellaneous (@3,000 B/month)	฿36,000.00	฿39,600.00	฿43,560.00	฿47,916.00	฿52,707.60
Total Operating Cost	฿1,530,000.00	฿1,683,000.00	฿1,851,300.00	฿2,036,430.00	฿2,240,073.00
Total Cost of the Existing System	฿2,002,100.00	฿1,768,350.00	฿1,936,650.00	฿2,121,780.00	฿2,392,933.00

Table 3.11 Five-Year-Period of Accumulated Cost for the Proposed System.

<u>Year</u>	<u>Total Existing Cost</u>	<u>Accumulated Cost</u>
1	฿2,002,100.00	฿2,002,100.00
2	฿1,768,350.00	฿3,770,450.00
3	฿1,936,650.00	฿5,707,100.00
4	฿2,121,780.00	฿7,828,970.00
5	฿2,392,933.00	฿10,221,903.00
Total	฿10,221,903.00	

- (3) Comparison of system cost - This session focuses on comparing the cost of the system between the existing system and the proposed system if they are being operated in the real working environment. Furthermore, it is analyzed in the kinds of break-event point. And it also shows how the proposed system could save the operating cost for the system owner. The summarized information of the system cost comparison could be viewed at Table 3.12.

Table 3.12 The Cost Comparison between existing system and Proposed system

<u>Year</u>	<u>Accumulated Cost of the Existing System</u>	<u>Accumulated Cost of the Proposed System</u>
1	฿1,768,600.00	฿2,002,100.00
2	฿3,711,800.00	฿3,770,450.00
3	฿5,847,060.00	฿5,707,100.00
4	฿8,193,586.00	฿7,828,970.00
5	฿10,772,504.60	฿10,221,903.00

(4) Benefit Analysis - This section could be defined by two major classifications which are tangible benefits and intangible benefits. The tangible benefits decrease corresponding with the time. It means reducing the excess job process, increasing more amount of business transaction, and decreasing the non-function expending. Intangible benefit analysis could not be measured by the quantifying technique like the tangible disclosing. For example, better service, better community of working place, better decision making, and etc. They could be summarized as follows: -

- (a) Tangible benefits of this project could be measured by the terms of annual cost saving such as salary cost, office suppliers cost, and etc which are possible for long business running and operating time improvement. For the further information about tangible benefits, please see table 3.13

Table 3.13 Tangible Benefits for the Proposed System

Benefit	Price
Cost Saving	
Salary Cost	
1 Printing File Management (@13,000 B/Month)	฿156,000.00
Total Salary Cost	฿156,000.00
Office Supplies Cost	
Stationary (@ 1,500 B/Month)	฿18,000.00
Paper (@ 2,000 B/Month)	฿24,000.00
Utility (@ 1,000 B/Month)	฿12,000.00
Miscellaneous (@ 500 B/Month)	฿6,000.00
Total Office Supplies Cost	฿60,000.00
Total Tangible Benefit	฿216,000.00

- (b) Intangible benefits could be difficult in finding by any measurement method. On the other hand, the proposed system provides the intangible benefits as follows: -
- (i) Providing faster business transaction
 - (ii) Better customer relationship
 - (iii) Better time consumption in search and query for the required file
 - (iv) Better tracking of the file in various format in a shorter time
 - (v) Improving the employee moral
 - (vi) Better decision making

- (5) **Break-even Analysis** It shows the point where the accumulative cost between the existing system and the proposed system meet. Table 3.12 shows the accumulative cost of both existing system and the proposed system which is shown in the figure 3.5. The information shows that the cost of proposed system is lower than the existing at the first year of investing. So it shows that this proposed system could accomplish the mission in term of financing in spending for the first investment and also less cost of operation when it is compared with the existing system.

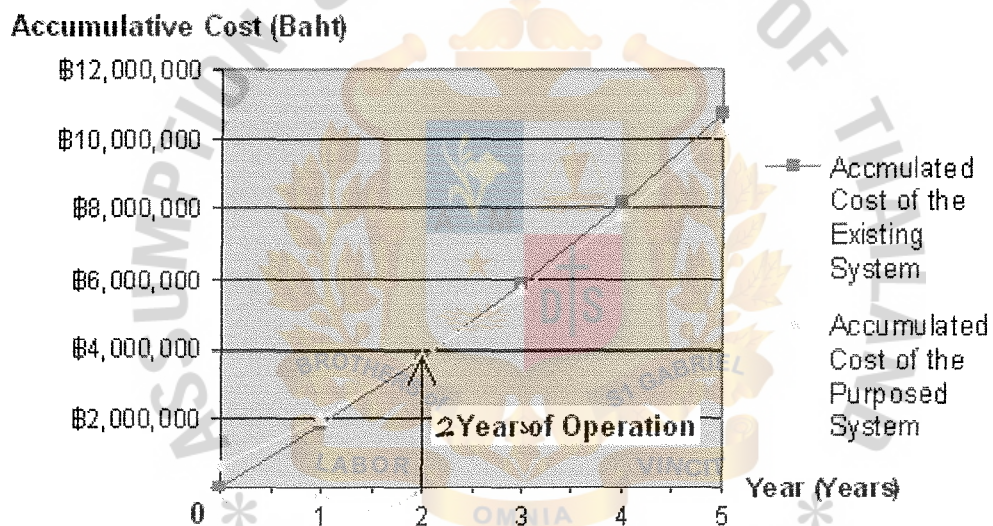


Figure 3.5 The Break-Even Analysis

- (6) **Payback Analysis** is a type of break-even measurement method but it focuses to show the cost effective investment when it is operated over time or the payback period. In this way, it gives the picture of how long the proposed system will lapse. Furthermore, the discount rate is required to calculate. This means it will give the exact picture of the cost at the real time of business operating over the period.

The advantage of payback period analysis is to compute and provide some information about risk investment for the timing investigation of investing in the system.

The acceptance of the project occurs only when the project’s payback period is around 2 years. If the payback period for the system is greater than four years, the information system is considered as a bad investment.

Figure 3.6 shows the graph of the payback period analysis of the proposed system which has been calculated and evaluated in the decision phase. The result of this proposed system shows that the payback period is only two years, which is match with the predefined desirable length of investing. Thus, this project is an acceptable project to be implemented with the return of investing recovery within two years and two months.

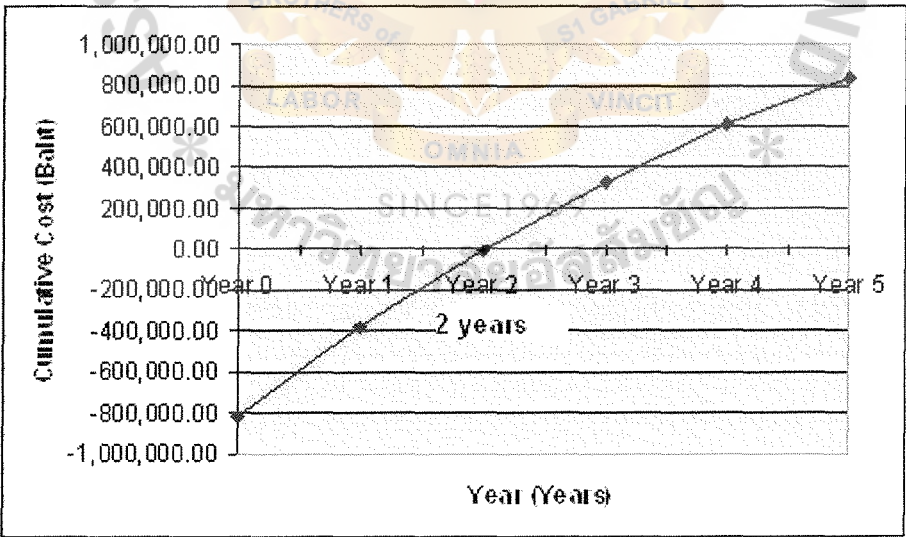


Figure 3.6 Payback Period Analysis of the Proposed System

IV. PROJECT IMPLEMENTATION

This project aims to propose the implementation solution and method of system building. For more information about project implementation, it is shown in the project implementation overview.

4.1 Project Implementation Overview

The implementation phase includes various activities that take place in converting the existing system into the preferred system. Furthermore, it must be essential to provide a reliable system to meet the organization requirements. There are two major stages that are classified for implementing the proposed system.

- (1) Construction Stage - The objective of the construction stage is to develop the expected system sample for demonstrating the working environment to users, and system builder. So they could define that the proposed system could fulfill what they expect or not due to the business requirements. Furthermore, this stage is also set up to ensure that the proposed system which is implemented on computerized system could provide the service to the existing working environment smoothly.
- (2) Delivery Stage - The aim of this stage is to provide smooth migration of the user from the existing environment to the new system. This is to ensure that new working environment could operate with these existing people with least problem. For example, training manual migration plan, system deployment plan, and system evaluating plan.

4.2 Stage of the Project

From the project implementation overview, it could be categorized into 6 more specific details. They are: -

(1) Hardware and Software Acquisition and Installation - In many different sizes of computerized resources, it puts a burden on the analyzer who has the duty to pick and recommend the appropriate hardware, software, and services which are needed to be implemented within the system environment.

(a) Hardware acquisition - According to the proposed system, it requires to have at least two additional personal computers and one server computer station. Furthermore, it requires the electricity stabilizer so it requires having the UPS. And the criteria that is used to define the hardware could be described as follows: -

(i) Determination of Size and Capacity needs - Before making any decision on choosing any product, we have to determine the needs and requirement of the system first. Sometimes, one component is appropriate with some system while it could not fit with the others. So it requires considering the workload and requirement of the system as the first thing. For another feature that should be considered, it is the size of memory, characteristic of the display monitor, communication type, and etc.

(ii) Financial Factor - Purchasing any new device for the organization is a kind of financial investment factor. Every organization tries to get goods with the least cost possible. This

is to reduce the time-cost for payback period and increase the benefit in the future.

(iii) Maintenance support - This is another important factor to be concerned with, because it includes the operating cost. This cost must be paid along the lifetime of the system operating since the system has been installed. So it needs to consider the condition of the maintenance or maintenance agreement what the criteria covered in maintenance of the system. The thing that the analyzers have to keep in mind is that the maintenance cost should not be increased during a specific period of maintenance and response time in the maintenance condition.

(b) Software acquisition - The new system needs new package of software as well. It requires obtaining the licenses from various kinds of software packages such as operating system for the server machine, operating system for the client workstation, office automation software package, file authorizing control system, network operating system management, and etc. Furthermore, the flexibility of the software system includes the ability of system scalable because the system that is standing today maybe transformed into another format in the future. So it would be better if the software that is selected have good ability to be scalable both horizontally and vertically. In this section, it emphasizes the flexibility of data storage format, reporting, data input various able.

(2) Personal training - The new system with the well-design, high quality of analysis, and good plan of maintenance would succeed or fail depending on

how well the users could operate with the new system. Therefore the quality of training the users would be able to lead them involving the new working environment. And it would also help the system owner to accomplish the mission of launching the new system for the organization. Furthermore, the system operators training must include the data preparation (e.g. keypunch methods know how, data entries know how). As a part of their training, the trainer should give basic knowledge of how to cover the problem and list of basic troubleshooting, including name and telephone as a contact point in case of unexpected problems occurring.

On the other hand, user training describes how to use the proposed system for operating their business. This means it must enable the users to use and manipulate the system with some basic configurations to control their daily operation as assigned. For further information of training, see Table 4.1 which illustrates the system activities training of the proposed system.

Table 4.1 The System Training Activities for the Proposed System

<u>Training System Operators</u>	<u>Training User Operator</u>	<u>Training Event</u>
Participants - System Operator - Users Emphasize on - Equipment troubleshooting - Computer-run-time - System maintenance	Participants - All direct and indirect users Emphasize on - Equipment usage - Basic Equipment troubleshooting - Data entering - Data handlerling - Information utilization	From Service & Vendor Provider - Equipment usage and Operation - Software manipulating and Control - System maintenance and Operating - System manual From In-House - Use of system - Basic troubleshooting

- (3) Data and Infrastructure preparation - This section is limited on the preparation of the infrastructure which is built to serve the component of the information system to be placed with computer network, file access facilities, data center room, server housing, electric power resources supply, and etc. Normally, the computer server is placed in a secure place where it must provide high capacity of the computer network link for connecting each client with no bottle neck effect. Furthermore, computer server needs a stable electric power supply for operating. So the server housing must provide the UPS plus some certain secondary power supply in case of shortage power supply in the data center domain. Moreover, it must be clean enough and dust free because server is the place where it keeps and maintain important business information. The data might be lost if the server environment is not clean enough for operating. Backup unit should provide archiving the data in the period of time. And it must be able to process the backup and restore data properly. This is to ensure that the server could run the system as smooth as possible according to the business function requirements. Moreover, client site requires placing the computer in different places such as customer relationship unit, senior manager unit, and filing store warehouse unit. So those areas must provide the computer linkage plus the power supply to feed the computer workstation of each location. On the other hand, these workstations may not require having the UPS in case of unexpected power electricity shortage event. This is because the function of the client does not involve maintaining the database by themselves. And the workstation PC is not needed to be relied upon any other component in the system. Moreover, every wire that is wired over the

working place must be done in good condition e.g. size of the wire for the electricity load, format of the wire for the Ethernet computer link, type of the wire for each location, and etc. Air condition is also important to be concerned because the computer devices will generate some certain heat. If that component reaches some point of heat, it may not be able to operate properly.

- (4) System Testing - The testing strategy is conducted to ensure that the system would operate their assigned work with less error occurring. Furthermore, there are three levels of testing the system which are Stub testing, Unit or Program testing, and System testing.
- (5) Conversion Plan - This is the strategic plan of launching the proposed system to the working environment. And this plan is a must to be planned carefully that is to ensure that the business operating could run as it is in the existing environment. Conversion plan includes the detail of activities which aim to launch the proposed system in the operation place. Each person will be assigned each responsible task along the launching system period. This includes activities schedule of each activity (start and finish time point of each state), based on the existing environment, users familiar with the existing system of business operating. If the system is launched to the environment suddenly with no option of the old working environment, it may resist the people working in the environment to operate their work properly. So it might be better if the proposed system will be launched parallel with the existing system for some period of time until the users are familiar with the proposed system. This is to ensure that the business operation could run with no unexpected event failure. While the proposed

system may not be familiar to operate in the initial state, the existing system will be used as a supported operative choice for running the business operation until the proposed system is familiar to work, manipulate, and operate with. Then the existing system would be stopped in the business operating.



V. CONCLUSION AND RECOMMENDATION

This project indicates itself as a better business operation choice for this organization which emphasizes in the file store warehousing. From the existing system, file store warehouse staff have to keep track of the files over the store manually. It consumes much time to operate with and it is easy to have error if the tracking of the files is not maintained continuously. Sometimes, the operator may make some mistake because of the repeated routine tasks. And the data record is always difficult to be queried manually when the size of record is huge. Furthermore, it may also make the operator create the record again which already exists in the data record and which also causes the problem of data redundancy. This causes the problem of inconsistent data maintenance. Therefore, the system development team has to build up an information service to cover facilities the user for information maintenance which utilizes the work load and simplify the daily operation efficiency.

5.1 Conclusion

From the proposed system, it improves the information flow for the file store warehousing which eliminates the data redundancy and keep the data consistency to be under control. Each file in the store will be updated with the latest available status which assists the file owner and the user to keep track of where they are actually. Furthermore, it also helps the process of making new printing master block that show complement percentage as it is. It saves time for querying the information of the file owner and the status of each file for their location. Furthermore, it also assists the senior manager to get in track of the latest possible information for better decision making.

The selected candidate of the proposed system requires one server computer machine for running the file sharing as file storage center to the working environment.

Furthermore, it also maintains the authorization to the user for each file accessing at the right level gaining authentication. This system requires merely stable server class computer station which is able to handle the Microsoft Windows Server 2000 for file sharing and authorization controlling. And this system also requires the stable electricity power supply. That is why it requires UPS to be a secondary electricity source for the server computer in case of unexpected events. On the other hand, the client personal computer site needs only Microsoft windows workstation 2000 as their operating system. And they do not need the UPS as a secondary power source as the server class does. This is because they do not have to maintain or keep any important data in itself. It is just used as a terminal display between users and the information system from share center and the users. Moreover, users have to manipulate the data from their own client site to the server. They could not operate with the data directly with the server. This is because of the data security policy.

For the system builder, the system is required to be developed and designed under the Microsoft environment which is very familiar to the user's operating. That is why Microsoft Visual Basic is selected as a system developing tool for creating the unique system on this working environment. Furthermore, there is the other product which could be used to develop the system environment on windows such as Borland C, Borland Basic, Borland Delphi, and etc. But it is not the most potential tool to develop the well computing system to be run under the Microsoft environment such as Windows 2000 and Access 2000 database.

For the benefit, saving cost, and time consumption improvement could be proved by the work performance which is already illustrated in the cost and benefit analysis section. According to the analysis, it shows that the proposed system could hit the break even point in the first year by reducing some cost of operating. And it also points that

the long-run operation will increase less than the existing operating system does. Table 5.1 shows the time consumption improvement between existing system and the proposed system comparison.

Table 5.1 System time consumption comparison

Process	Existing System	Proposed System
Classify the File Owner	5 minutes	5 minutes
Retrieve New Printing Order	30 minutes	30 minutes
Forward Printing Pattern	30 minutes	10 minutes
Receive the Finish Master Block	30 minutes	10 minutes
Perform query file location	10 minutes	1 minute
Perform file available status	20 minutes	1 minute
List track of file status VS period and user	3 hours	5 minutes
Return Printing file process	15 minutes	5 minutes

Table 5.1 shows eight processes that are operating over the file store warehousing. Furthermore, it could be summarized as follows: -

- (1) Classify the file owner - From the table, it shows that time consumption between the existing system and the proposed system is the same at 5 minutes. This is because whenever there are new customers coming to the record, data keeper have to compose new profiles on their record which consumes 5-minute-time to enter the detail of customer. Furthermore, the proposed system could operate faster at the query part which will be shown in the later processes. And it also provides the data entry check in case of detecting the wrong format of data entry which causes the user not to be able to manipulate this record of customer later.

- (2) Retrieve New Printing Order - Whenever, customer submit the plastic requirement to the enterprise, staff has to make the understanding for each pattern specifically carefully which consumes much more time to do it. That is why this operation consumes equal 30-minute-time period to process this section. On the other hand, whenever the detail of the printing have to be forwarded, it will be easier to be found because of being well organized from the proposed system.
- (3) Forward Printing Pattern - From the previous process, if the printing order detail is kept by the proposed system, it will be easier to find the needed information and transfer to the vendor for making the master printing block than the existing system which consumes much more time (around 20 minutes).
- (4) Receive the Finish Master Block - In order to receive the master block from vendor, staff has to query for the printing order detail by comparing with the finished master block whether it is correct or not. It could be clarified that the proposed system assist the user for querying the needed information from the system quicker than the existing system which also reduces the time consumption for receiving the finished master block process. In time comparison between the existing system and the proposed system, it shows that proposed system could process this task quicker than the existing system by around 20 minutes.
- (5) Perform query file location - As every process involves this process in their process, this process seems to be to most important and it is also the process which indicates the time consumption improvement to the entire system. As described before, whenever the data record is grown, it will resist the staff to

do the data query manually quickly as before. On the other hand, the well data organizing on the proposed system perform better time consumption in data querying for any information needed which is better than the existing system by around 9 minutes.

- (6) Perform file available status - In case of finding the file in the warehouse; it will be quicker if staff firstly acknowledge the available status instead of finding those in the warehouse manually without any indicator. And it also assists the staff not to search those files whenever the required ones are not available in stock actually. In practice, the existing system takes a 20-minute-time to operate the status list from the record manually whereas the proposed system could process within 1 minute for displaying on screen.
- (7) List track of file status VS period and user - It is normal that senior managers need to get the list of customers plus their file in the enterprise stock. This is used for making the decision. Normally, the existing system takes 3 hours for generating the report manually whereas the proposed system could complete the mission within only 5 minutes.
- (8) Return printing file process - When the printing plastic has been done, file owner or customer may request to get their master printing block back. The file store warehouse staff has to find the location of file manually from the record which takes much time to complete while the proposed system could operate to query the location of the needed file within one minute only. So the staff could go to pick up the file within 4 minutes and do this process in 5 minutes only.

After comparing the entire time consumption between existing system and proposed system, the proposed one could operate the process quicker than the existing

one by 4 hours and 13 minutes. This is shown that the time consumption for operating is reducing and it also shows that the new system could simplify the business process in the entire operation for file store warehousing.

5.2 Recommendation

This project is just an initiation of a long term project for the plastic printing information system. It must be expanded to be more flexible in terms of easy using and the concurrent user for the coming future.

For the database infrastructure of the system, the basic database structure is now fitted to serve the cooperate users in the detail of keeping track information and checking in/out history. The only thing that it needs to be improved is just the concurrent user. It might be better if it is migrated to be running under the real DBMS or database management system, not just a file sharing like Microsoft Access. On the other hand, the reason why this project implements the database on the Microsoft Access is because: -

- (1) The numbers of concurrent users do not exceed 10 people at a time. It means at this number of concurrent users, the file sharing method could provide the information to every 10 nodes at time efficiency without any delaying.
- (2) The enterprise is beginning to invest money on the IT; they would like to test and ensure before relying to work on the computerized system. So this project is a good beginning of IT part for the enterprise

The other features, such as term of ease of use that would be suggested to apply to this project are:-

- (1) Improve the method of entering the data of I.D. number for each printing file in the file store. Basically, this project uses the computerization to

generate the unique I.D. code inside the database. And user has to choose the printing file base on the detail of each file manually. For further development, developer may apply the unique I.D. that is already generated under the database to be the key file instead of entering data manually. They may use the barcode printer to directly print out the I.D. code of each file and post it on them. When staff or any user in the organization would like to withdraw the file, they might enter the data for check in/out by beaming the barcode reader. In one hand, there might be some future technology that could replace the method of inputting the data instead of using bar code. In the near future, it might apply the short radio or a new kind of barcoding technology or any other I.D. recognition technology that could apply to this subsystem for this project.

- (2) Improve the application to be accessible via the internet. Sometimes, customer may want to know the statuses of the printing file status while their files are occupied by this enterprise. It would be better if they could directly access the system to view the status of their file anytime via an internet such as internet browser, or etc. On the other hand, there must be some information security to protect the enterprise data from any intruder around the internet that are seriously dangerous at the present day.
- (3) This system might be applied to keep track of the technician tool check in/out as every manufacturer is now facing the problem of error manual checking. Because this system uses the idea of keeping track from Library System plus the history keeping track, the user could know the history of who brings file in/out since those files are occupied until they are delivered to customer.



APPENDIX A

ENTITY RELATIONSHIP DIAGRAMS

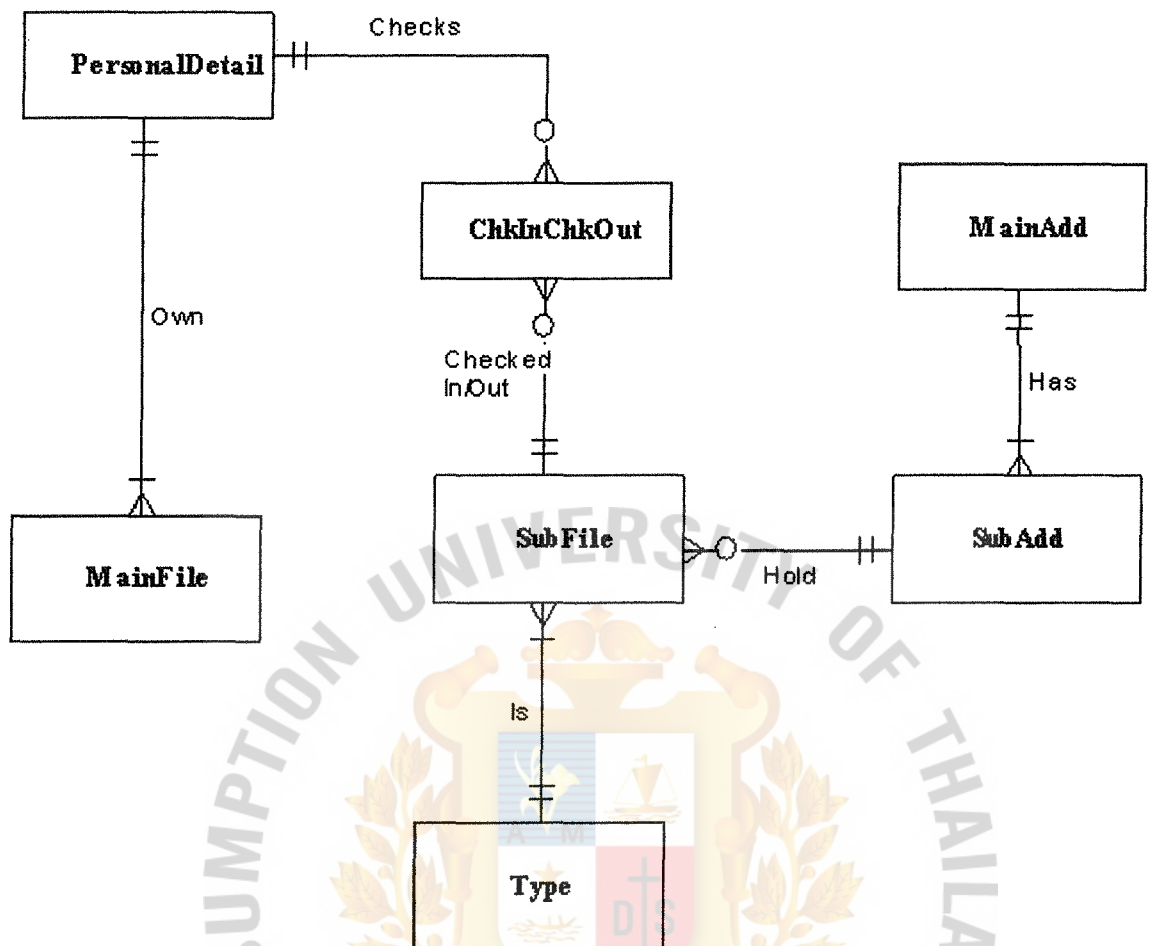


Figure A.1 Context Entity Relationship Diagram of Purposed System

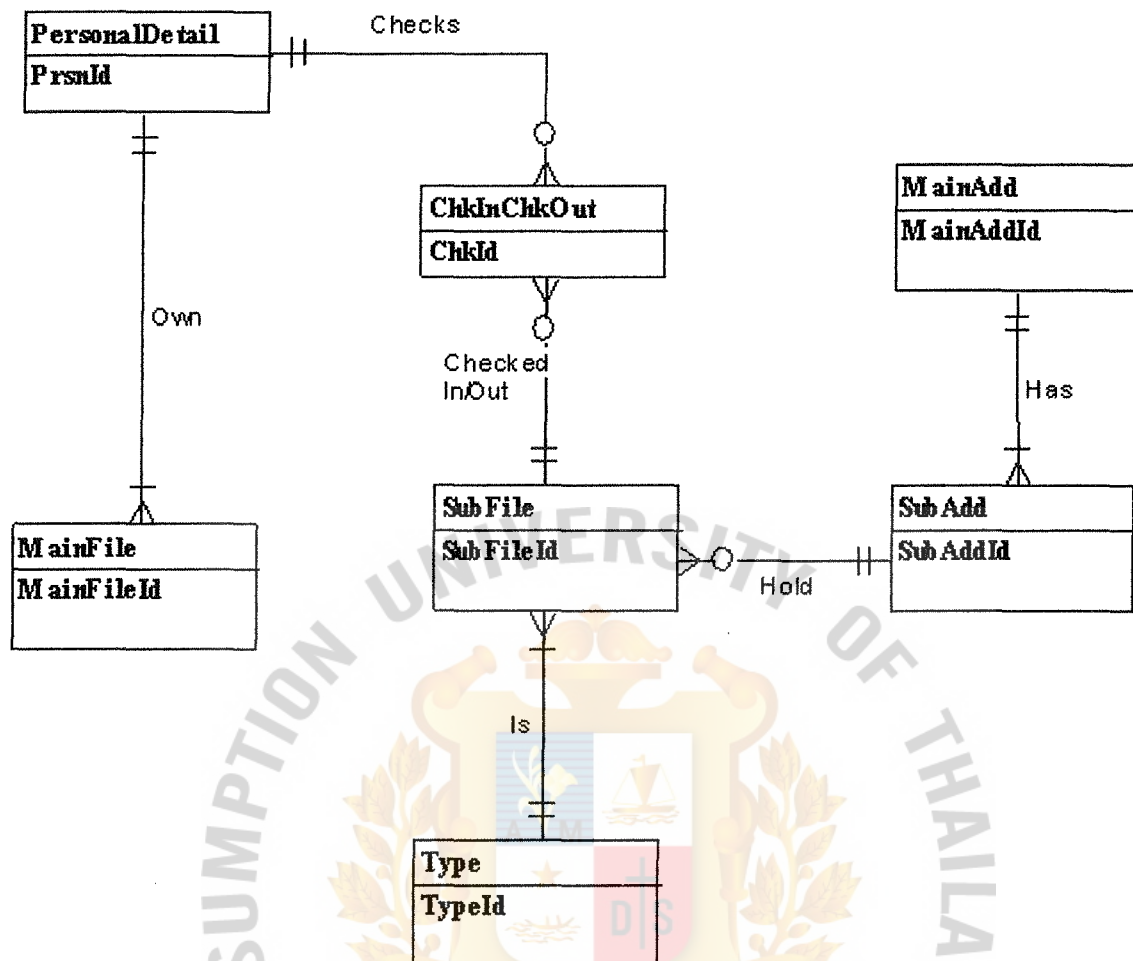


Figure A.2 Key Base Entity Relationship Diagram of Proposed System

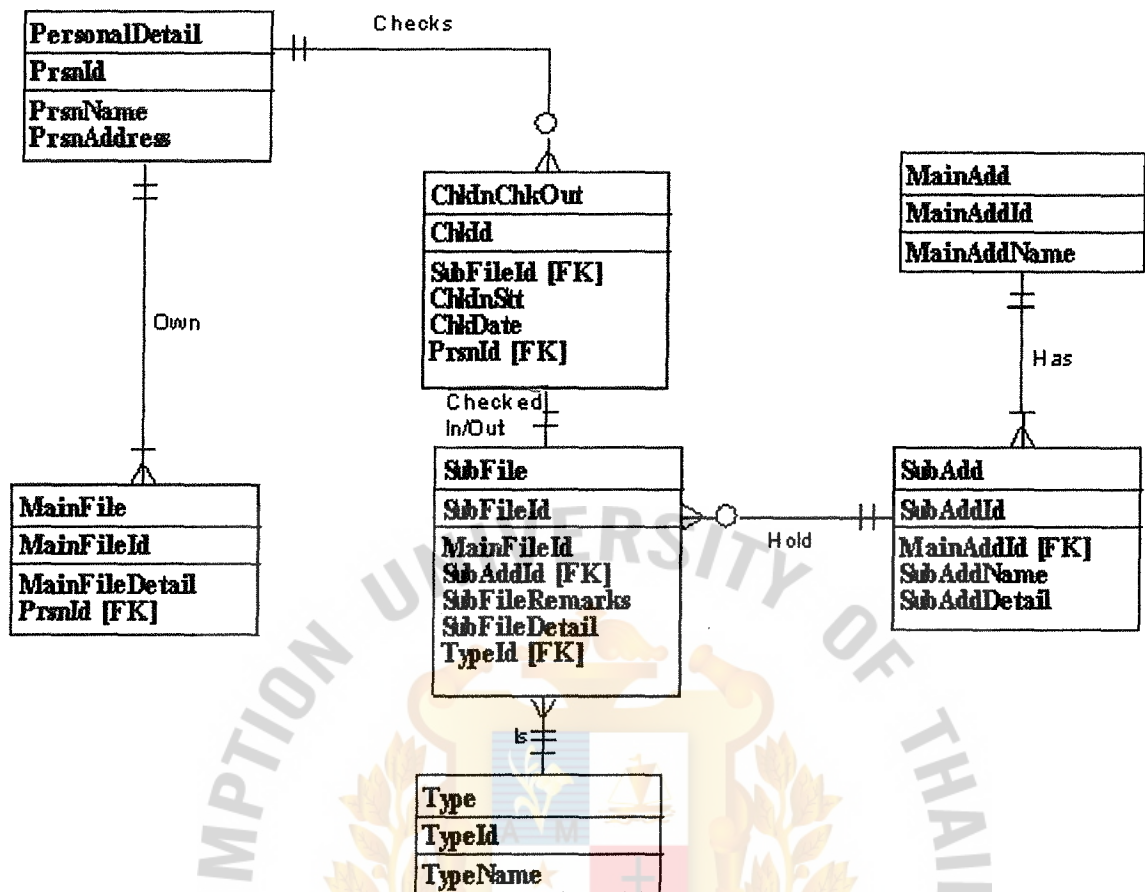


Figure A.3 Fully Attribute Entity Relationship Diagram of Proposed System



APPENDIX B

DATA FLOW DIAGRAMS

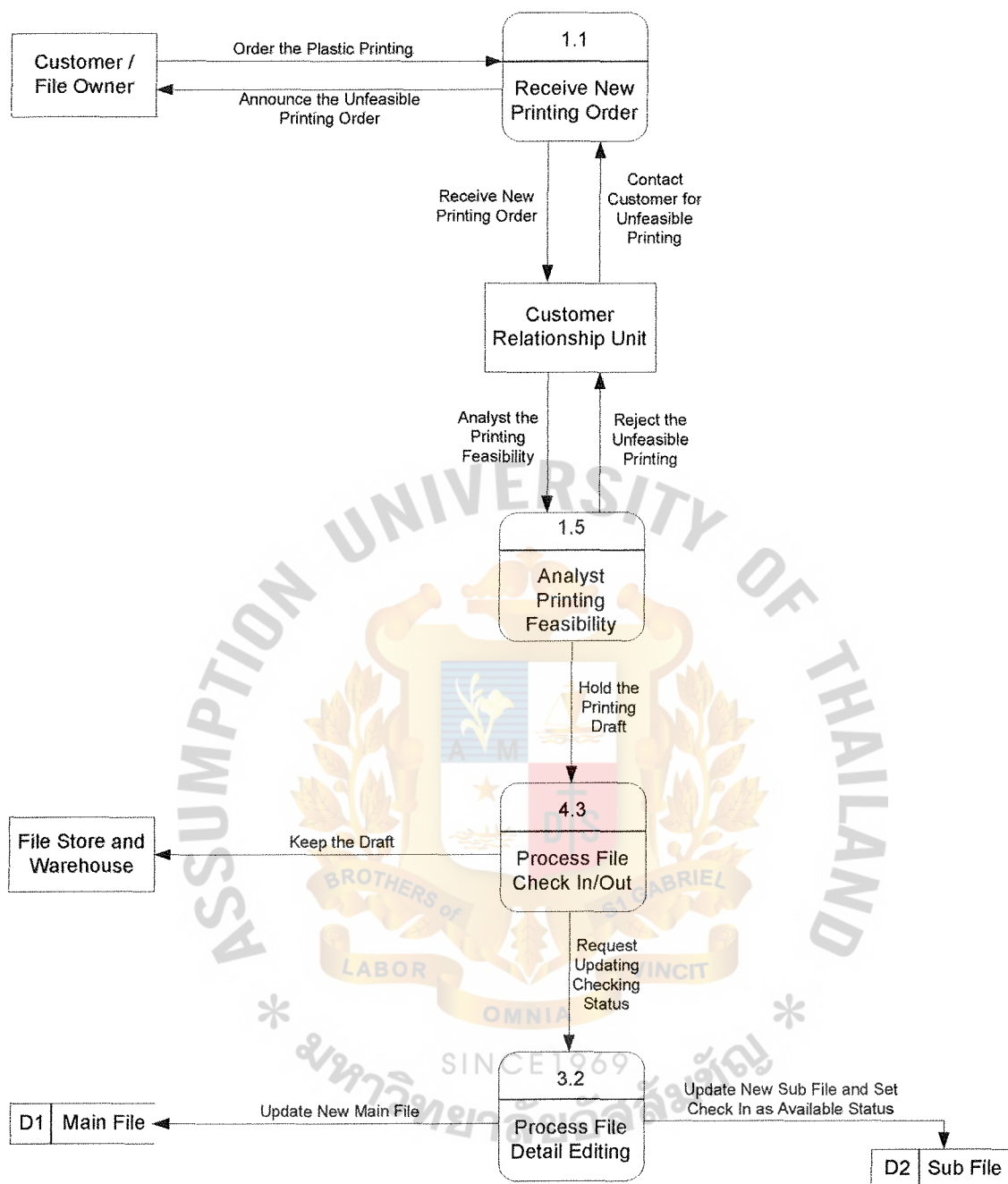


Figure B.1 Data Flow Diagram Level 1 of Receiving New Printing Order.

Figure B.1 shows the dataflow for the process of receiving new printing order from customer. This process requires several sub processes to complete the mission of

receiving new printing order. There are two major sub processes and one sub minor processes which are Receiving New Order Process, Analyst Printing Feasibility, and Process File Check In/Out.

Whenever customer submits the request for new printing plastic pattern, customer relationship has to discuss with the customer how and what the detail of printing that the customer is actually needs. Then the requirement will be analyst to define the feasibility in printing. If that printing order could not be possible to be done, the customer relationship has to contact the customer and announce the problem of printing for correction at the customer site.

After the printing feasibility analysis unit approved the printing, the printing order will be brief and summarize as the draft to be later sent to the vendors for making new printing film and master printing block. At this time, the draft will be hold in the file store until the vendors come to receive them.

For the Main File and Sub File data record, they are used for store and keep the information of the detail of each file. The reason why we have to classify the file detail into two entity is because the main file keep the detail of the major file such as the name of the file, the owner, and etc. whereas sub file is used for keeping the format available e.g. printing draft, printing design pattern, film, and printing master block.

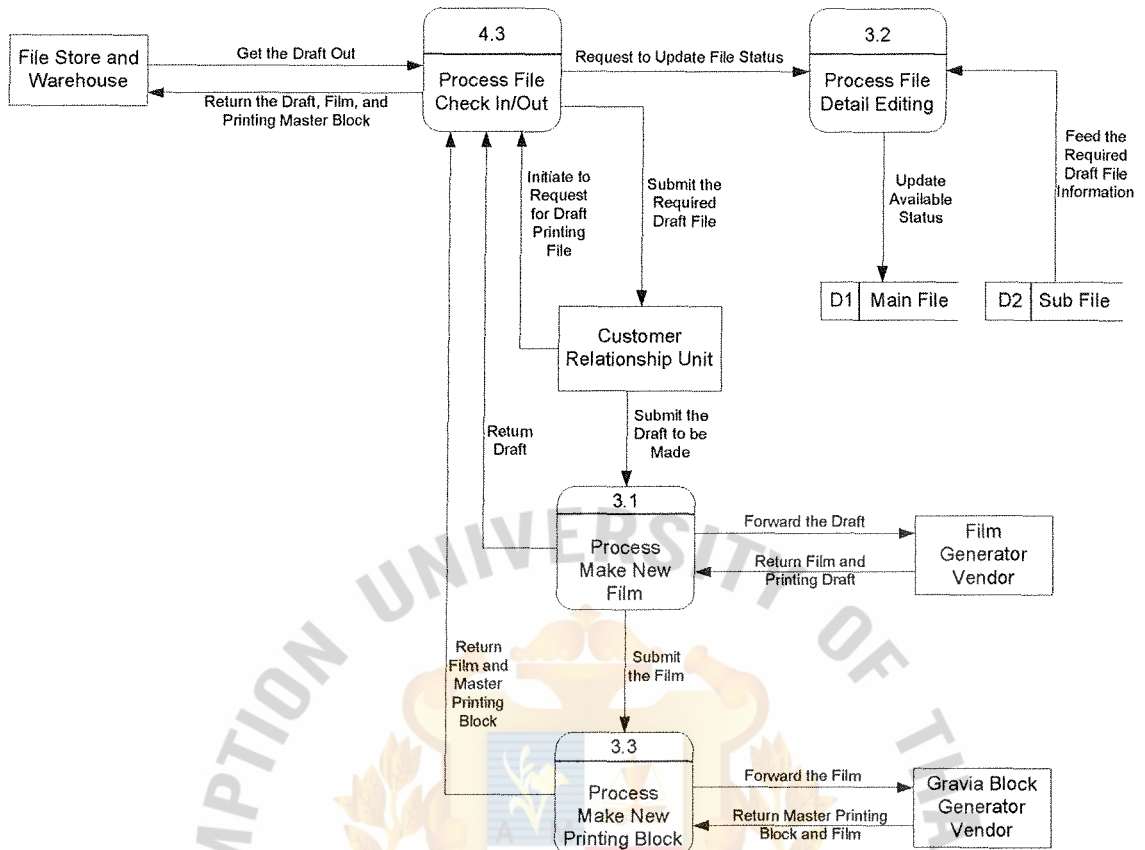


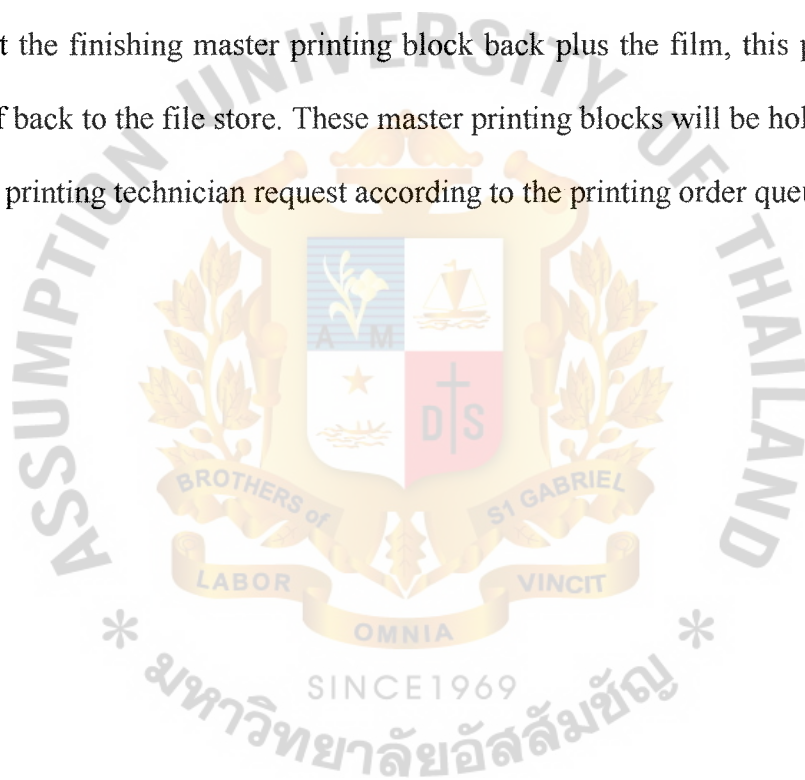
Figure B.2 Data Flow Diagram Level 1 of Making New Printing Master Block.

Figure B.2 shows the data flow diagram for making new printing master block which the enterprise requires the process to generate the master block for printing the plastic. In addition, this process requires two external agents or vendors to cooperate which are film generator vendor and gravia block generator vendor.

First of all, the process is started whenever customer relationship unit bring the printing draft out from the file store. And then film generator come to discuss the detail for printing draft and take them for generating the finishing printing pattern and film. After that, gravia block generator vendor will be called to receive the order of making new master printing block. In this step the vendor will be fed with the film that is going to be the master of printing block.

Furthermore, at each step of making new master printing file, there is something return back to the file store. At the process making new film, this process is made to contact the film generator vendor to conduct the film. After the film generating is done from the vendor, this process will return the printing draft to the file store whereas the film will be forward to the process make new printing master block.

At the process make new printing master block step, the gravia block generator vendor is called to receive the film for making the master printing block. When the vendor submit the finishing master printing block back plus the film, this process will return all stuff back to the file store. These master printing blocks will be hold in the file store until the printing technician request according to the printing order queue.



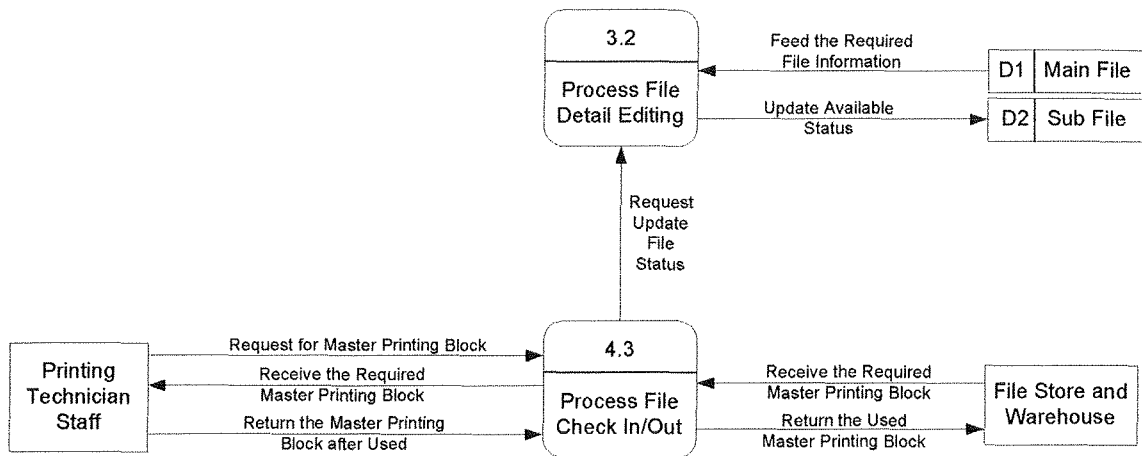


Figure B.3 Data Flow Diagram Level 1 of Printing Plastic.

Figure B.3 shows the data flow diagram of printing plastic process which requires two major sub processes and one additional process from the existing working environment. For the agent, there are two agents which are printing technical staff and file store.

During the printing process, printing technician staff will be alert for the next printing queue from process activating printing which is already exists in the working environment. Then the technician staff will send the request for receiving the required master printing block from file store. During check in/out file, process file detail editing will update the available status to the sub file data store.

Whenever the master printing block is finished using, it will be returned back to file store. This means that they will be hold in the file store until the customer requires picking them back.

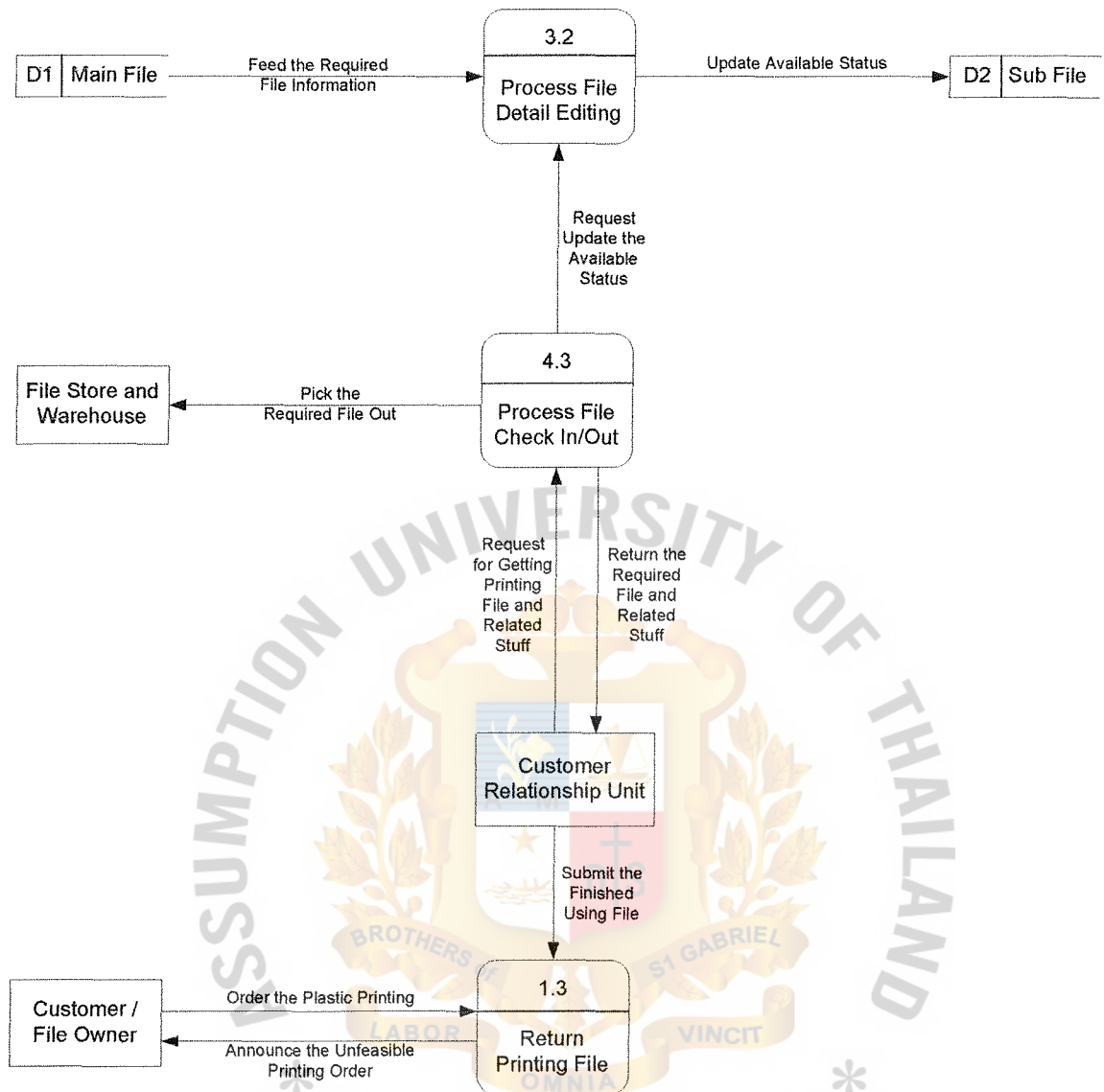


Figure B.4 Data Flow Diagram Level 1 of Returning File and Printing Master Block.

Figure B.4 shows the dataflow diagram of returning file and printing master block. This process will be activated to process whenever the master printing block has been finished using and the product of printing is going to be delivered to the customer. That is why this process needs three major sub processes which is including in the purposed system plus one existing sub process from the manufacturing information system.

Process returning file to customer is initialized by the sub process of alerting sending printing file back to customer which it is already exists in the manufacturer information system. In addition, this process will alert the customer relation unit when that such file are finished using and the printing production is waiting to be delivered to the customer. After that, customer relation unit will request the file store to bring out the needed file, master printing block, and the related stuff. And then they will be return to the customer as well as the printing production is also delivered.



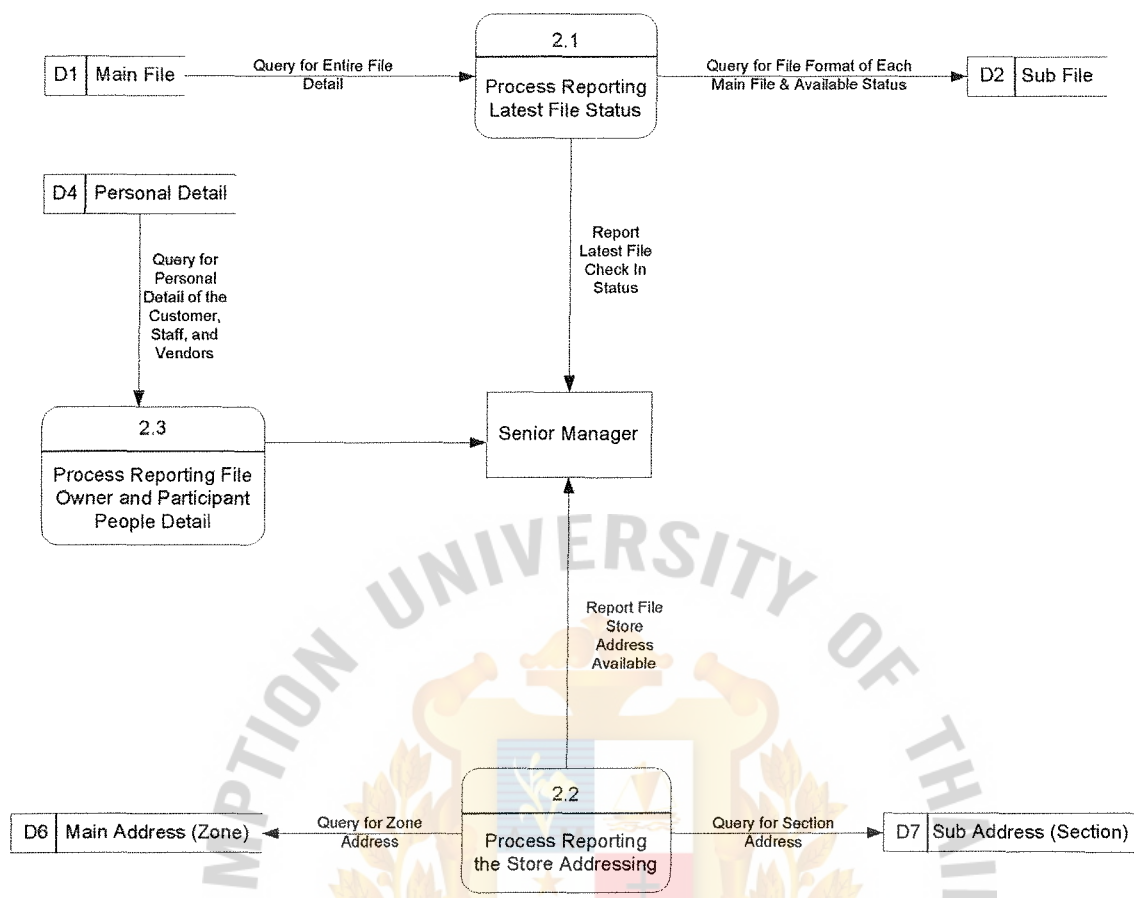


Figure B.5 Data Flow Diagram Level 1 of Reporting Information to Senior Manager.

From the figure B.5, it shows the data flow diagram of reporting the important information to support the senior manager. They need some brief information from overall part of the system that is manipulated in their making decisions. From this subsystem, it is consisted of three sub processes which are process reporting the store addressing, process reporting file owner and participant people detail, and process reporting latest file status.

For the report of file status, it shows the latest file status of each file plus the summarize number of available file and unavailable file. And this report is generated weekly. In contrast, the detail will be shown as each format of each file such as file no.1

may have design pattern, film, cd-rom, and master printing block. From this point, the detail will be shown as each file. Moreover, this detail will be shown when the senior manager requires viewing them only. This is because it is very specific detail and it is not often used for supporting in decision making.

For the report of file owner and participant people, it shows the detail of customer who own the printing file e.g. design plastic printing pattern, film, master printing block. Some customer may have several files which are stored in the enterprise warehouse. And it also shows the detail of participant. For the participant, there are two kinds of participant. Firstly, it is printing technicians. Because the data tracking have to keep the person who brings those files out and get them back to stock. That is why the system requires collecting the information of the printing technicians. Secondly, it is the vendor. This is because when any file has to been checked out or checked in from the warehouse by vendor, the system needs to collect the information of date and time plus the vendor detail. Moreover, the report will be brief as the number of printing technician, vendors, and customer which are using these printing file along the enterprise file store. Furthermore, the report will be generated whenever the senior manager needs.

For the report of store addressing, it shows the place available that is used for containing the printing file in warehouse. This system shows the number of place available for each file format place e.g. space for placing the printing brief design, design pattern, diskettes, cd-rom, and master printing block. In this way, it gives the clear picture for decision making of senior manager to expand or reduce the size of file store.

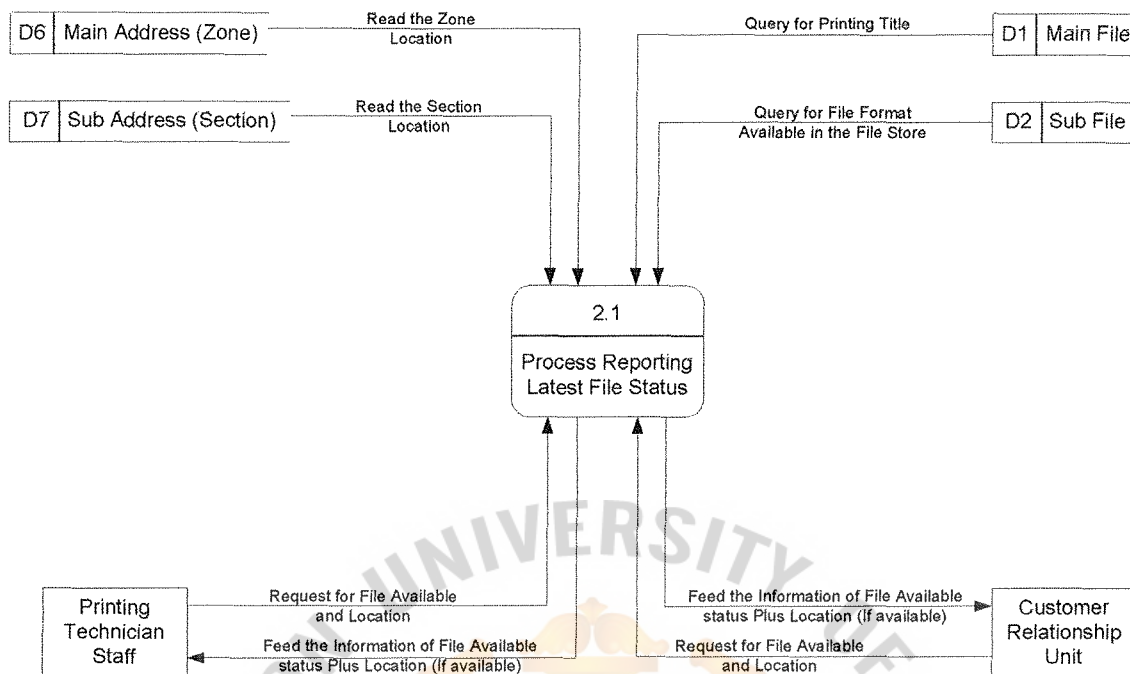


Figure B.6 Data Flow Diagram Level 1 of Querying for File Status.

For the figure B.6, it shows the data flow diagram of querying for the file status. This sub system is used whenever any people within the enterprise requires to look for the available status of that such file plus the place of where it is if that such files are available. Moreover, it will give the information of the available status first. If the available status is yes, it will also show the place of where those files are staying at.

In this subsystem, there is only one sub process which is required to operate processing is Process Reporting Latest File Status. Whenever the external agent e.g. printing technician or customer relation unit requires to request for the information of file available plus the location, the process reporting latest file status begins to query for the needed file title from Main File such as "Printing Job Jaspa 254". And then it will query for the file format available from sub file e.g. design pattern, diskette, master printing block, and etc. which is related to the main file. And then it will query for the latest available status from the file check in status record which this record will keep all

history of each sub file. If the status is available, this process will continue to query for the sub file location from sub file record again. The result that the process gets from sub file will be only the related number which could be found from zone and section record.

Therefore, the process will give the information of required file title, file format which is available in the store and the location of that sub file.



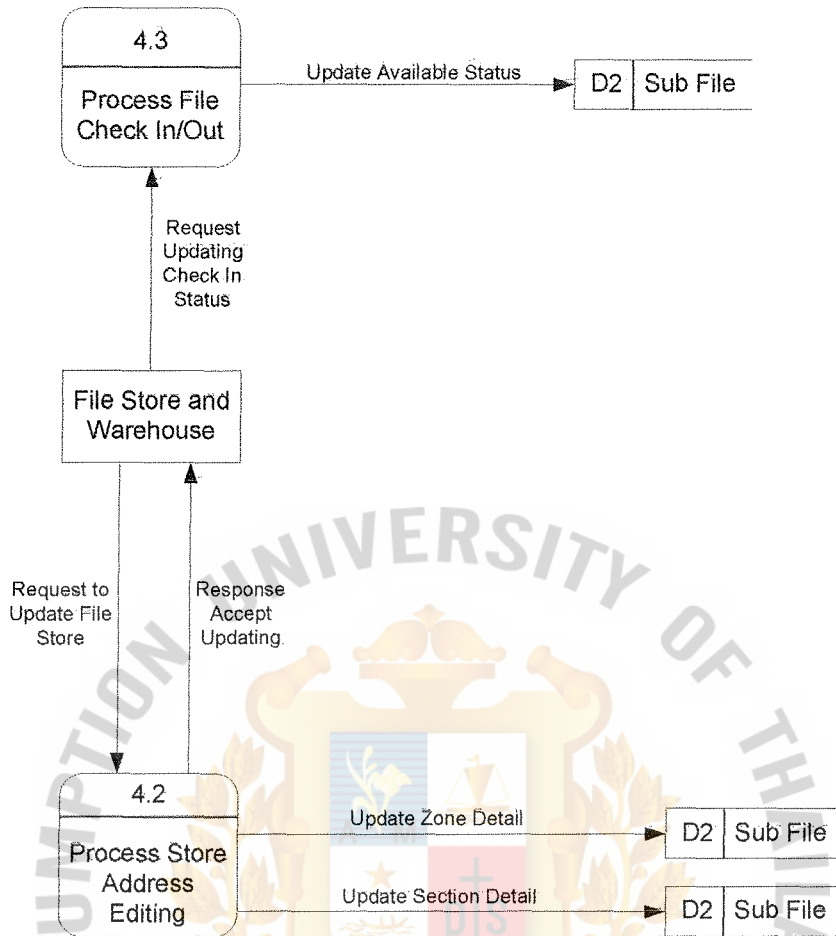


Figure B.7 Data Flow Diagram Level 1 of Floor Management.

For the figure B.7, it shows the data flow diagram of floor management. This subsystem is used to be the interface of inputting the information of file check in or out of each file. And it is also the interface of receiving the information of the place where the file is placed at when any files are checked in. From the picture, this subsystem is consisted of two sub process which are process store address editing and sub process file check in/out.

Sub process File Check In/Out is used to update the available status of each file when they have to been brought in or out from the file store. Moreover, it has to keep

the detail of who bring the file out. This is good for keeping track of borrower of such files.

Sub process Store Address Editing is used to update the location of locating the file in the file store. The detail of file location is divided into two parts. There are zone and section. For example, the file store may have several zones which each zone is the place for locating of each type of file format. And each zone will have several sections or sub zone that is divided the stuff into blocks e.g. first cabinet, second cabinet, and etc.

In the real location, the file store could be divided into 3 major zones which are the places for:

- (1) Printing Plastic Design Brief, Design Pattern
- (2) Soft File (diskette, cd-rom, and etc.)
- (3) Momite Film
- (4) Master Printing Block

And these four zones have numbers of block or section for collecting each file format of each file title.



APPENDIX C

FEASIBILITY ANALYSIS

Estimated Cost of 3 Candidates

Table C.1 Estimated Cost of Candidate 1 (Baht)

<u>Cost Items</u>	<u>Price</u>
Development Cost	
<u>Personal</u>	
1 System Analyst (4months @ 20,000 Baht/month)	80,000.00
2 Programmers (3months @ 25,000 Baht/month)	150,000.00
1 Network Specialist (2months @ 30,000 Baht/month)	60,000.00
Total	290,000.00
<u>Hardware</u>	
1 Server	80,000.00
1 UPS 2.2kVA	25,000.00
3 Client PC (@ 25,000)	105,000.00
Total	210,000.00
<u>Software</u>	
1 Operating System (for server)	120,000.00
3 Operating System (for client @9,000)	45,000.00
1 Database System	9,500.00
3 Office Automation Application (@ 15,000)	45,000.00
Total	219,500.00
<u>Implementation Cost</u>	
Training Cost	50,000.00
Installation Cost	50,000.00
Total	100,000.00
Total Development Cost	819,500.00
Project Annual Operating Cost	
<u>Users</u>	
1 Senior Manager (@ 20,000 Baht)	240,000.00
2 Customer Relationship Staff (@ 12,000 Baht)	288,000.00
3 Printing Technician Staff (@ 12,000 Baht)	432,000.00
Total	960,000.00
<u>Office Supplies & miscellaneous Cost</u>	
Stationary (1,500 Baht/month)	18,000.00
Paper (5,000 Baht/month)	60,000.00
Utility cost (3,000 Baht/month)	36,000.00
Miscellaneous expense (3,000 Baht/month)	36,000.00
Total	150,000.00
<u>Maintenance Cost</u>	
Hardware Maintenance Cost (8,000Baht/ 5years)	8,000.00
Software Maintenance Cost (5,000Baht/ 5years)	5,000.00
Total	13,000.00
Total Project Annual Operating Cost	1,123,000.00
Total Computerized System Cost	1,942,500.00

Table C.2 Estimated Cost of Candidate 2 (Baht)

<u>Cost Items</u>	<u>Price</u>
Development Cost	
<u>Personal</u>	
2 System Analyst (6months @ 20,000 Baht/month)	240,000.00
2 Programmers (5months @ 25,000 Baht/month)	250,000.00
1 Database Specialist (3months @ 20,000 Baht/month)	60,000.00
1 Network Specialist (2months @ 30,000 Baht/month)	60,000.00
<u>Total</u>	<u>610,000.00</u>
<u>Hardware</u>	
1 Server	80,000.00
1 UPS 2.2kVA	25,000.00
3 Client PC (@ 35,000)	105,000.00
<u>Total</u>	<u>210,000.00</u>
<u>Software</u>	
1 Operating System (for server)	51,000.00
3 Operating System (for client @9,000)	27,000.00
1 Database System	47,000.00
3 Office Automation Application (@ 15,000)	45,000.00
<u>Total</u>	<u>170,000.00</u>
<u>Implementation Cost</u>	
Training Cost	50,000.00
Installation Cost	100,000.00
<u>Total</u>	<u>150,000.00</u>
Total Development Cost	1,140,000.00
Project Annual Operating Cost	
<u>Users</u>	
1 Senior Manager (@ 20,000 Baht)	240,000.00
3 Customer Relationship Staff (@ 12,000 Baht)	432,000.00
3 Printing Technician Staff (@ 12,000 Baht)	432,000.00
<u>Total</u>	<u>1,104,000.00</u>
<u>System Support</u>	
1 System Administrator (13,000 Baht/month)	120,000.00
<u>Total</u>	<u>120,000.00</u>
<u>Office Supplies & miscellaneous Cost</u>	
Stationary (1,500 Baht/month)	18,000.00
Paper (3,000 Baht/month)	36,000.00
Utility cost (3,000 Baht/month)	36,000.00
Miscellaneous expense (3,000 Baht/month)	36,000.00
<u>Total</u>	<u>126,000.00</u>
<u>Maintenance Cost</u>	
Hardware Maintenance Cost (8,000Baht/ 5years)	8,000.00
Software Maintenance Cost (10,000Baht/ 5years)	10,000.00
<u>Total</u>	<u>18,000.00</u>
Total Project Annual Operating Cost	1,368,000.00
Total Computerized System Cost	2,508,000.00

Table C.3 Estimated Cost of Candidate 3 (Baht)

<u>Cost Items</u>	<u>Price</u>
Development Cost	
<u>Personal</u>	
2 System Analyst (6months @ 20,000 Baht/month)	240,000.00
2 Programmers/Web Developers (5months @ 25,000 Baht/month)	250,000.00
2 Web Graphics Designers (5months @ 20,000 Baht/month)	200,000.00
1 Database Specialist (3months @ 20,000 Baht/month)	60,000.00
1 Network Specialist (2months @ 30,000 Baht/month)	60,000.00
<u>Total</u>	<u>810,000.00</u>
<u>Hardware</u>	
2 Servers	160,000.00
2 UPS 2.2kVA	50,000.00
3 Client PC (@ 25,000)	75,000.00
<u>Total</u>	<u>285,000.00</u>
<u>Software</u>	
2 Operating System (for server)	102,000.00
3 Operating System (for client @9,000)	27,000.00
1 Database System	47,000.00
Web Service System	Free
3 Office Automation Application (@ 15,000)	45,000.00
<u>Total</u>	<u>221,000.00</u>
<u>Implementation Cost</u>	
Training Cost	50,000.00
Installation Cost	250,000.00
<u>Total</u>	<u>300,000.00</u>
Total Development Cost	1,616,000.00
Project Annual Operating Cost	
<u>Users</u>	
1 Senior Manager (@ 20,000 Baht)	240,000.00
3 Customer Relationship Staff (@ 12,000 Baht)	432,000.00
3 Printing Technician Staff (@ 12,000 Baht)	432,000.00
<u>Total</u>	<u>1,104,000.00</u>
<u>System Support</u>	
2 System Administrator (15,000 Baht/month)	360,000.00
<u>Total</u>	<u>360,000.00</u>
<u>Office Supplies & miscellaneous Cost</u>	
Stationary (1,500 Baht/month)	18,000.00
Paper (2,000 Baht/month)	24,000.00
Utility cost (1,000 Baht/month)	12,000.00
<u>Total</u>	<u>54,000.00</u>
<u>Maintenance Cost</u>	
Hardware Maintenance Cost (16,000Baht/ 5years)	16,000.00
Software Maintenance Cost (40,000Baht/ 5years)	40,000.00
<u>Total</u>	<u>56,000.00</u>
Total Project Annual Operating Cost	1,574,000.00
Total Computerized System Cost	3,190,000.00

Payback Period of 3 candidates

Table C.4 Payback Period for Candidate 1 (Baht)

<u>Cost Items</u>	<u>Year 0</u>	<u>Year 1</u>	<u>Year 2</u>	<u>Year 3</u>	<u>Year 4</u>	<u>Year 5</u>
Development Cost	-819,500.00					
Annual Operating Cost		-1,123,000.00	-1,235,300.00	-1,358,830.00	-1,494,713.00	-1,644,184.30
Discount Factors by 10%	1.000	0.909	0.826	0.751	0.683	0.621
Time Adjust Cost (adjust to present value)	-819,500.00	-1,020,807.00	-1,020,357.80	-1,020,481.33	-1,020,888.98	-1,021,038.45
Cumulative time - adjusted cost over life time	-819,500.00	-1,840,307.00	-2,860,664.80	-3,881,146.13	-4,902,035.11	-5,923,073.56
Benefit derived from operation of the new system	0.00	1,600,000.00	1,696,000.00	1,797,760.00	1,905,625.60	2,019,963.14
Discount Factors by 10%	1.000	0.909	0.826	0.751	0.683	0.621
Time Adjust Cost (adjust to present value)	0.00	1,454,400.00	1,400,896.00	1,350,117.76	1,301,542.28	1,254,397.11
Cumulative time - adjusted cost over life time	0.00	1,454,400.00	2,855,296.00	4,205,413.76	5,506,956.04	6,761,353.15
Cumulative lifetime - adjusted cost + benefit	-819,500.00	-385,907.00	-5,368.80	324,267.63	604,920.94	838,279.59

The net percentage value of the 5 year time for the first candidate is at 838,279.59 Baht.

Table C.5 Payback Period for Candidate 2 (Baht)

<u>Cost Items</u>	<u>Year 0</u>	<u>Year 1</u>	<u>Year 2</u>	<u>Year 3</u>	<u>Year 4</u>	<u>Year 5</u>
Development Cost	-1,140,000.00	-1,368,000.00	-1,504,800.00	-1,655,280.00	-1,820,808.00	-2,002,888.80
Annual Operating Cost						
Discount Factors by 10%	1.000	0.909	0.826	0.751	0.683	0.621
Time Adjust Cost (adjust to present value)	-1,140,000.00	-1,243,512.00	-1,242,964.80	-1,243,115.28	-1,243,611.86	-1,243,793.94
Cumulative time - adjusted cost over life time	-1,140,000.00	-2,383,512.00	-3,626,476.80	-4,869,592.08	-6,113,203.94	-7,356,997.89
Benefit derived from operation of the new system	0.00	1,794,000.00	1,883,700.00	1,977,885.00	2,076,779.25	2,180,618.21
Discount Factors by 10%	1.000	0.909	0.826	0.751	0.683	0.621
Time Adjust Cost (adjust to present value)	0.00	1,630,746.00	1,555,936.20	1,485,391.64	1,418,440.23	1,354,163.91
Cumulative time - adjusted cost over life time	0.00	1,630,746.00	3,186,682.20	4,672,073.84	6,090,514.06	7,444,677.97
Cumulative lifetime - adjusted cost + benefit	-1,140,000.00	-752,766.00	-439,794.60	-197,518.25	-22,689.88	87,680.08

The net percentage value of the 5 year time for the first candidate is at 87,680.08 Baht.

Table C.6 Payback Period for Candidate 3 (Baht)

<u>Cost Items</u>	<u>Year 0</u>	<u>Year 1</u>	<u>Year 2</u>	<u>Year 3</u>	<u>Year 4</u>	<u>Year 5</u>
Development Cost	-1,616,000.00	-1,574,000.00	-1,731,400.00	-1,904,540.00	-2,094,994.00	-2,304,493.40
Annual Operating Cost						
Discount Factors by 10%	1.000	0.909	0.826	0.751	0.683	0.621
Time Adjust Cost (adjust to present value)	-1,616,000.00	-1,430,766.00	-1,430,136.40	-1,430,309.54	-1,430,880.90	-1,431,090.40
Cumulative time - adjusted cost over life time	-1,616,000.00	-3,046,766.00	-4,476,902.40	-5,907,211.94	-7,338,092.84	-8,769,183.24
Benefit derived from operation of the new system						
Discount Factors by 10%	0.00	1,794,000.00	1,973,400.00	2,170,740.00	2,387,814.00	2,626,595.40
Time Adjust Cost (adjust to present value)	1.000	0.909	0.826	0.751	0.683	0.621
Cumulative time - adjusted cost over life time	0.00	1,630,746.00	1,630,028.40	1,630,225.74	1,630,876.96	1,631,115.74
Cumulative lifetime - adjusted cost + benefit	-1,616,000.00	-1,416,020.00	-1,216,128.00	-1,016,211.80	-816,215.74	-616,190.40

The net percentage value of the 5 year time for the first candidate is at -616,190.40 Baht.

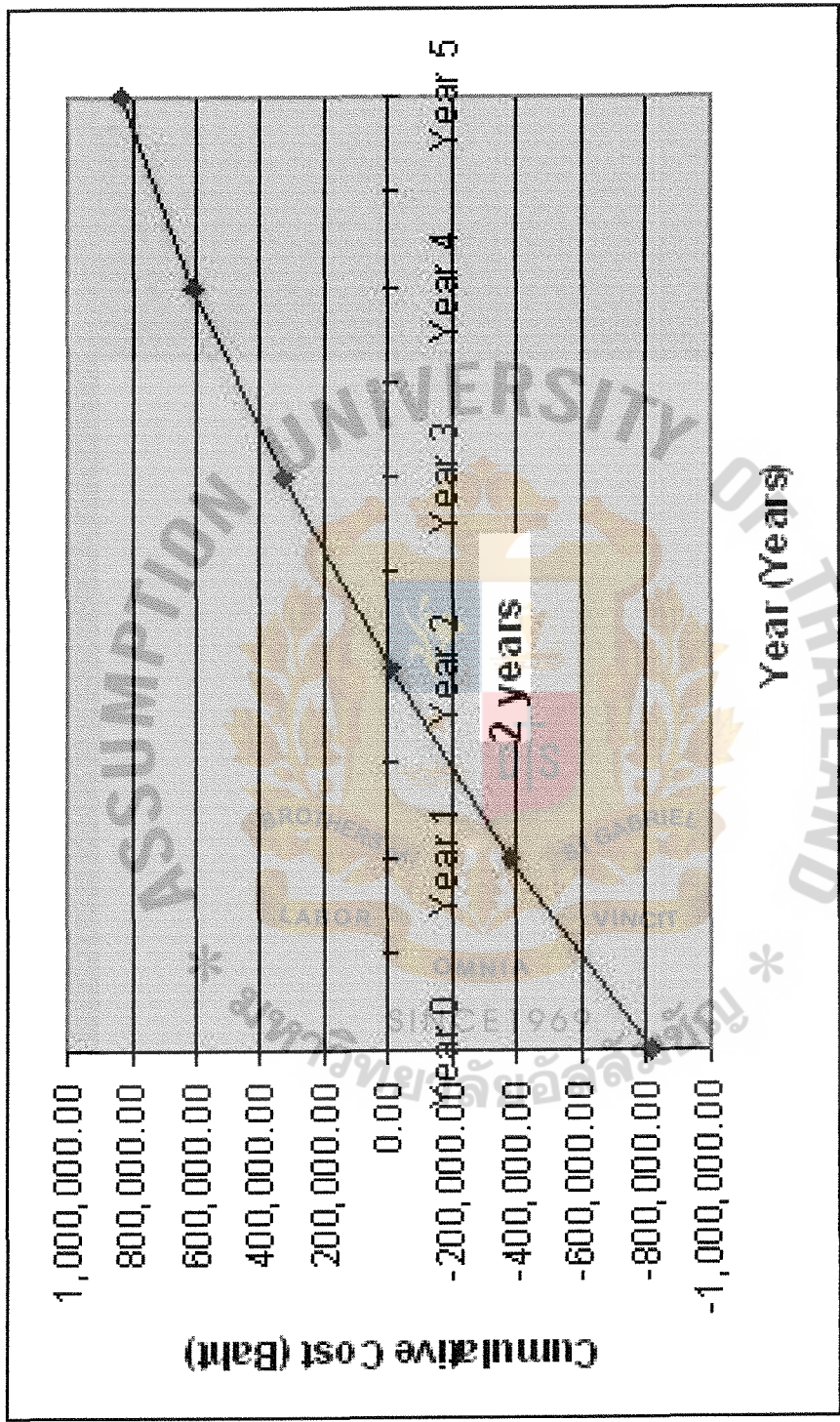


Figure C.1: Payback Period Graph for Candidate 1

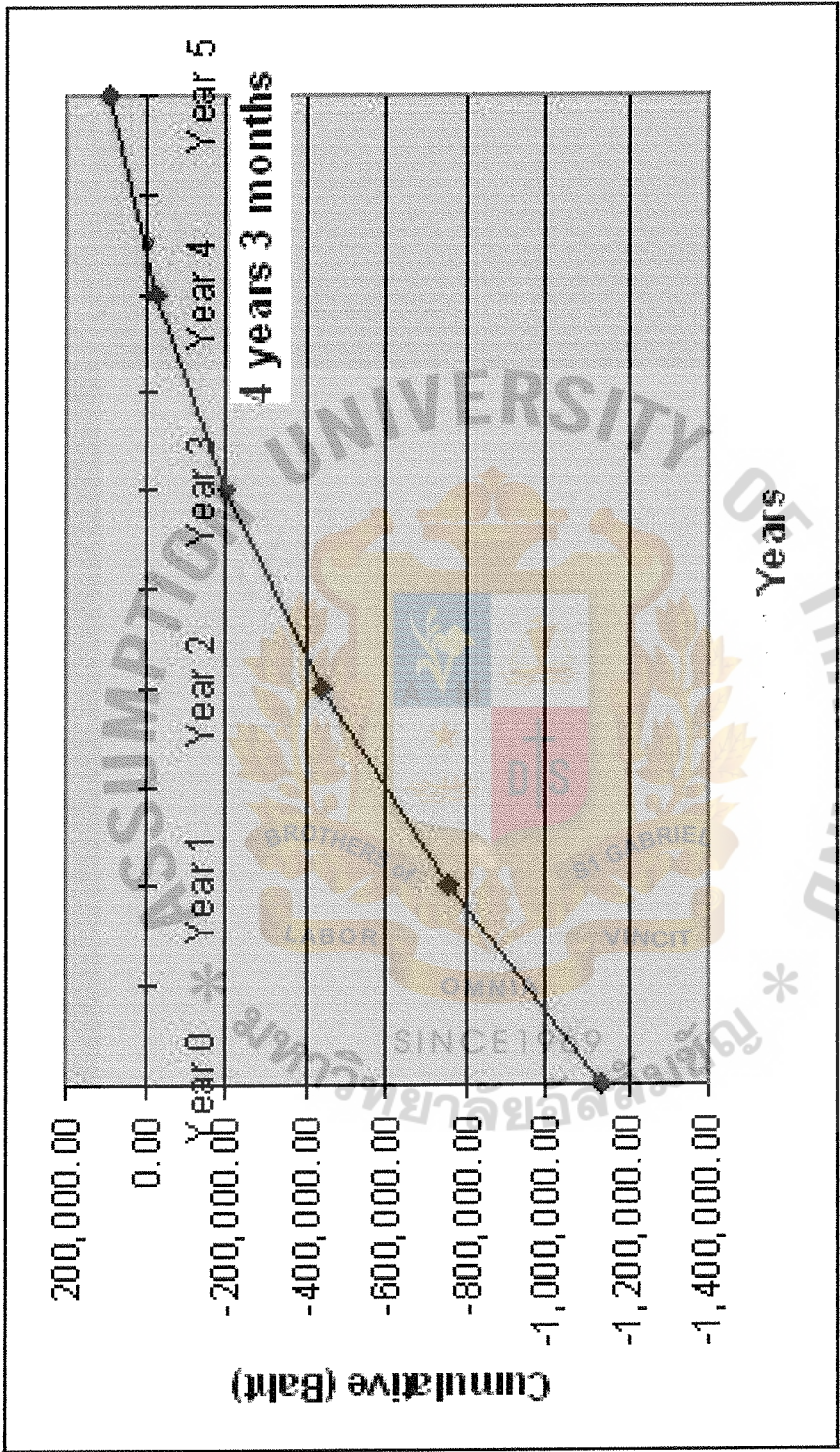


Figure C.2: Payback Period Graph for Candidate 2

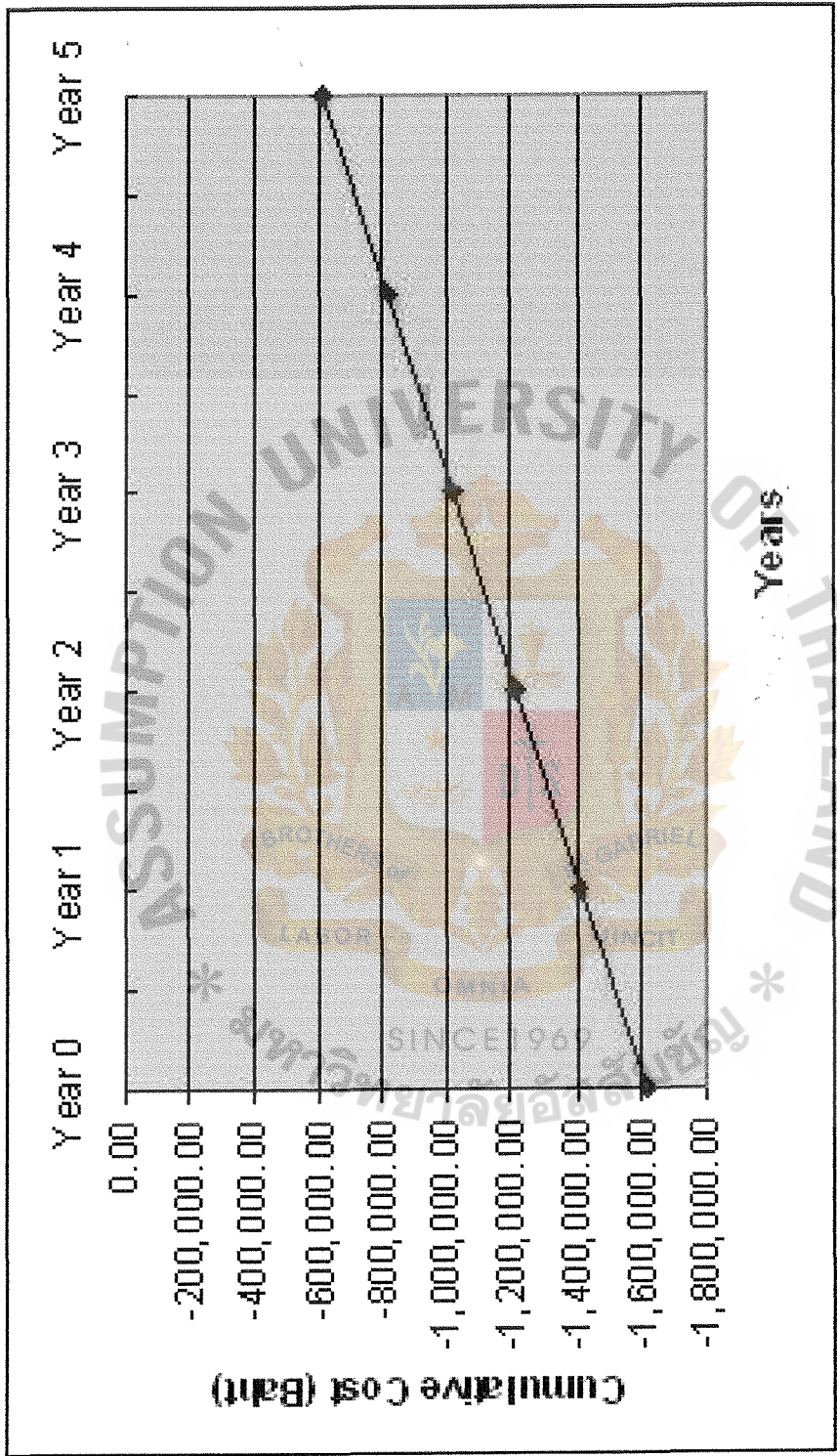


Figure C.3: Payback Period Graph for Candidate 3



APPENDIX D

STRUCTURE CHART

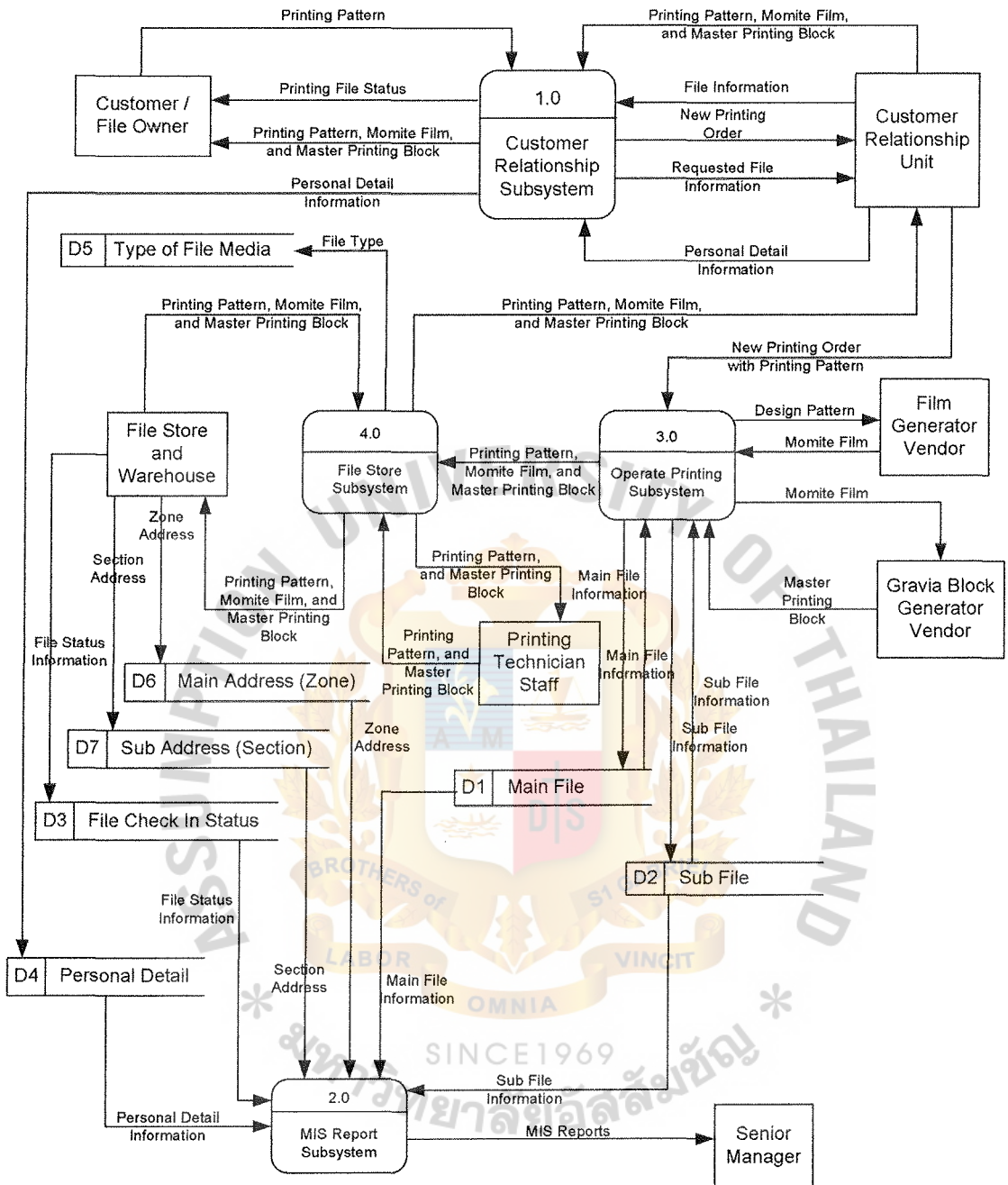


Figure D.1 Logical Data Flow Diagram of Purposed System

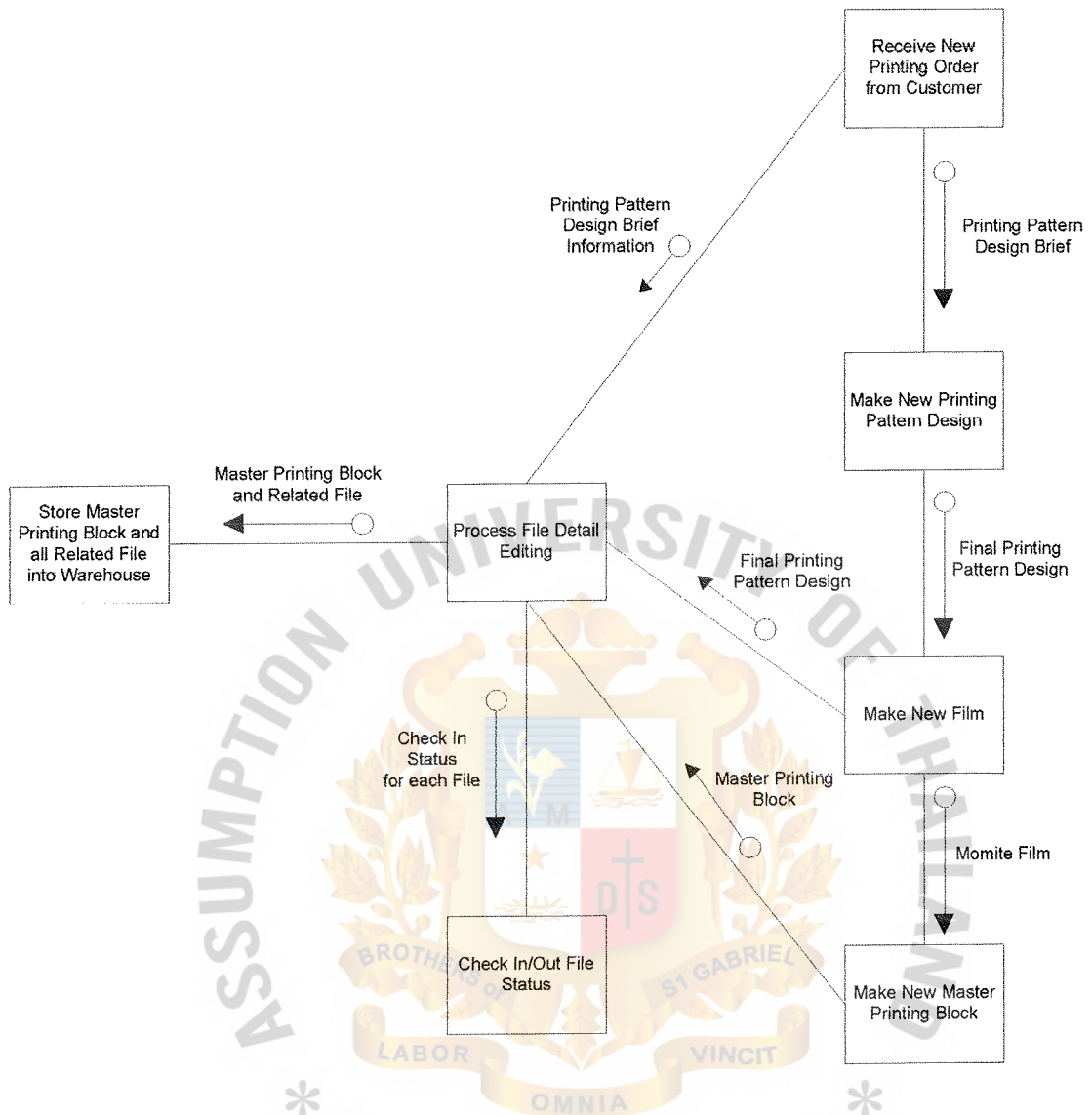


Figure D.3 Structure Chart of Make New Printing File

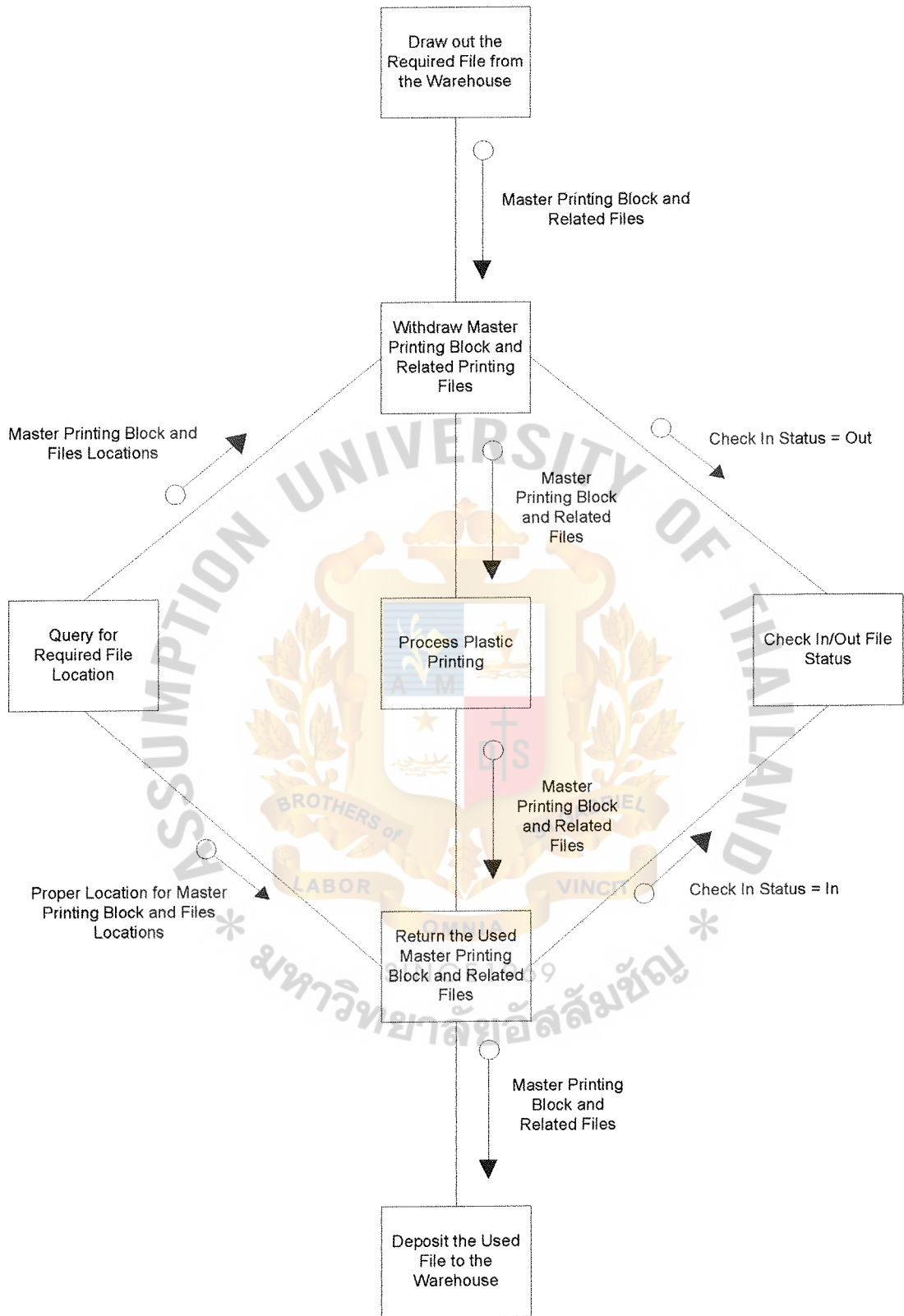


Figure D.4 Structure Chart of Plastic Printing

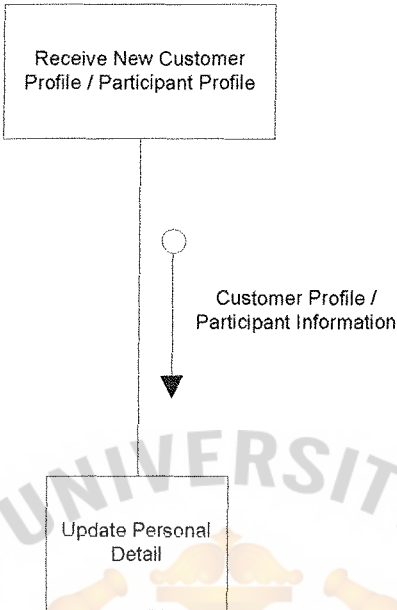


Figure D.5 Structure Chart of Add/Edit/Delete Customer Profile and Participant Information

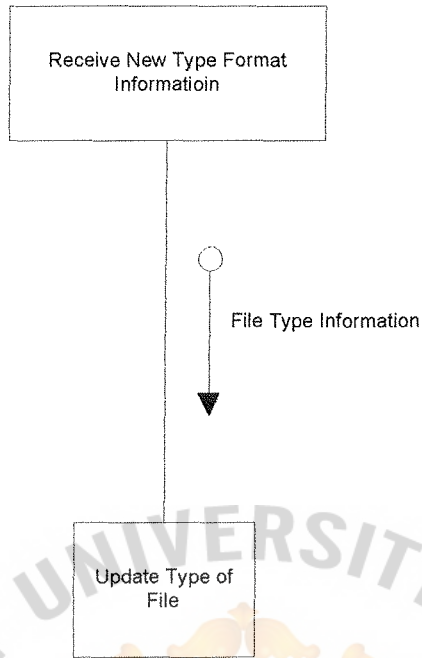


Figure D.6 Structure Chart of Add/Edit/Delete File Format

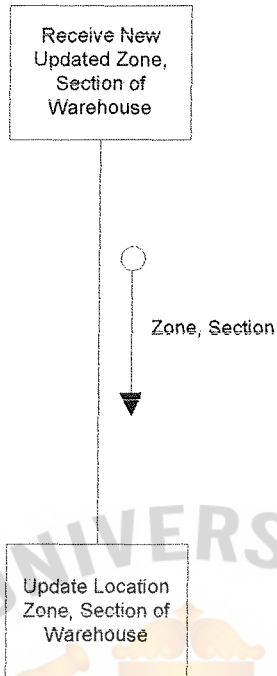


Figure D.7 Structure Chart of Add/Edit/Delete Warehouse Address Information

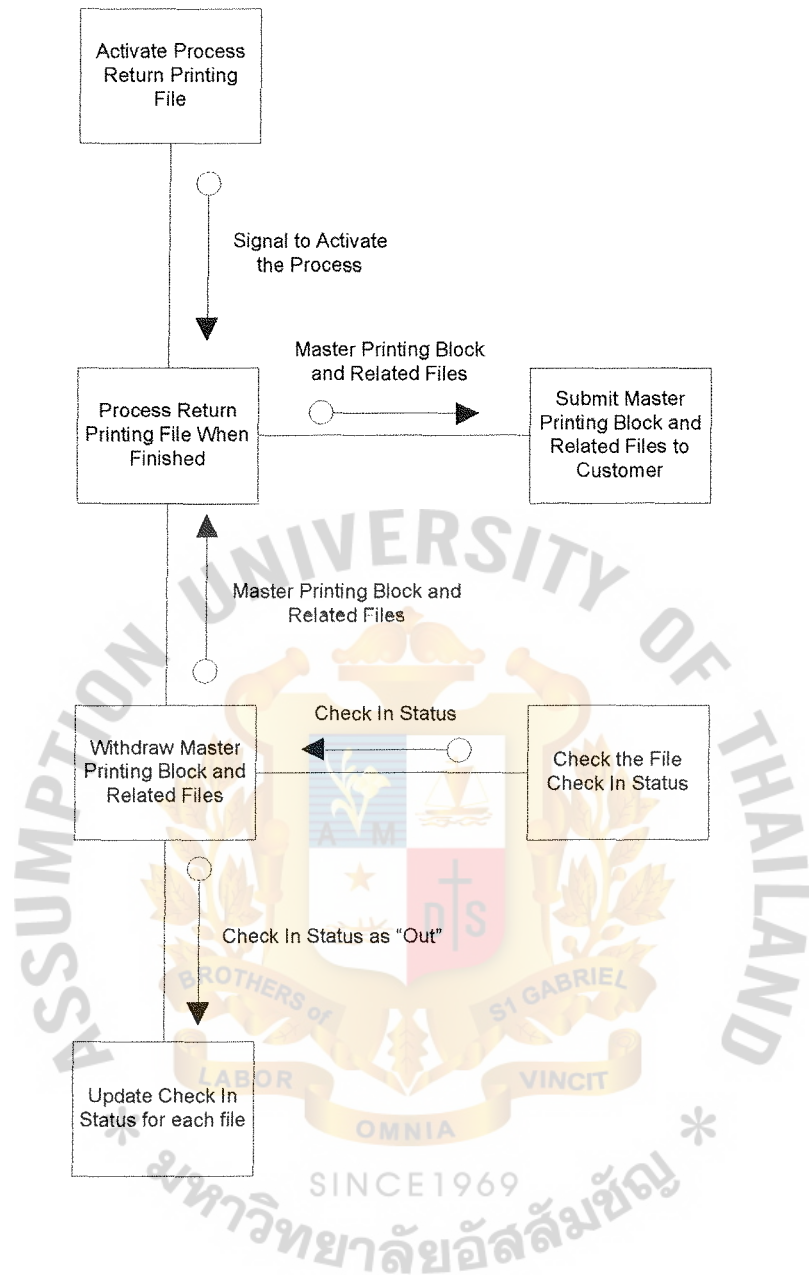


Figure D.8 Structure Chart of Return Master Printing Block and Related File to Customer

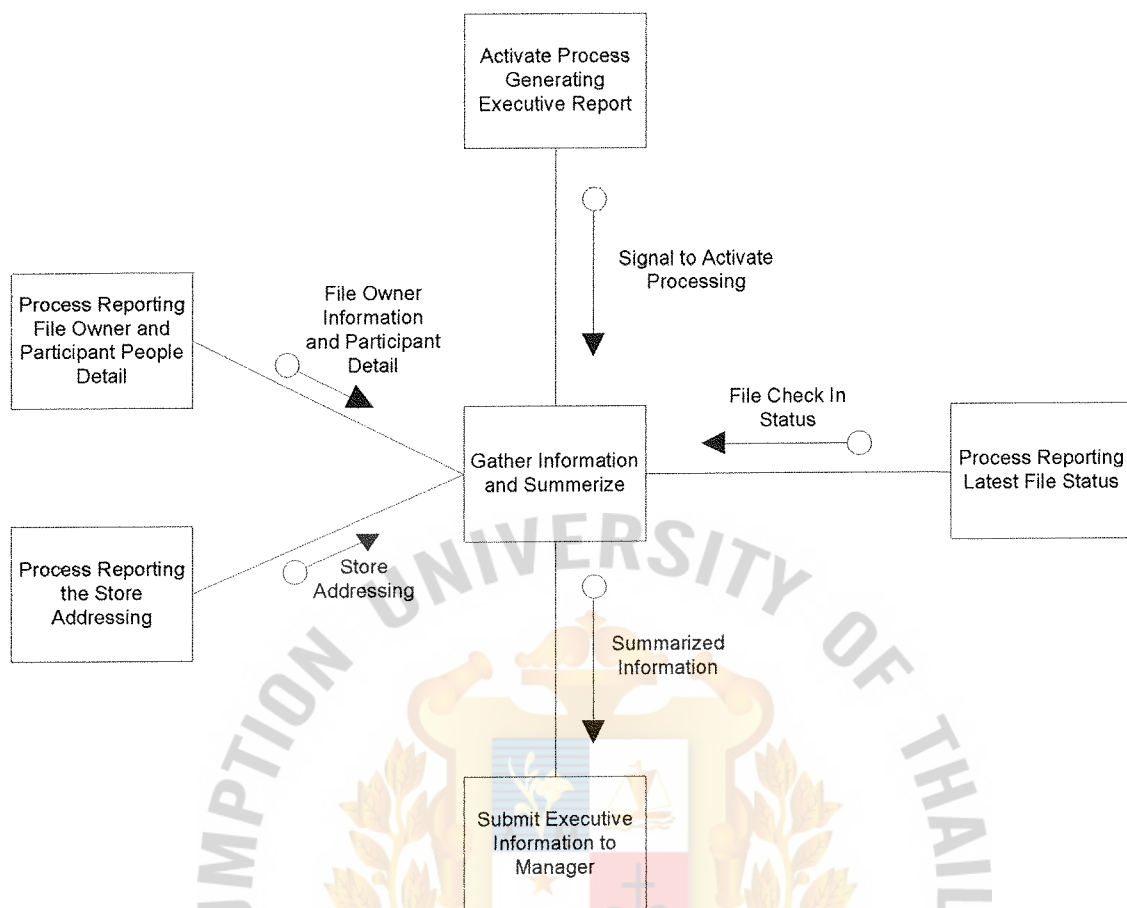


Figure D.9 Structure Chart of Reporting Executive Information



APPENDIX E

PROCESS SPECIFICATION

Table E.1 Process Make New Printing File.

<u>Item</u>	<u>Description</u>
Process	Process Make New Printing File
Data In	Printing Design Brief
Data Out	Final Design Pattern Film Master Printing Block
Process	<ol style="list-style-type: none"> 1. Receive Printing Information Brief from Customer <ul style="list-style-type: none"> - Printing Name Code - Printing Design Needs - Color (Pan Tone) 2. Store the Printing Information Brief <ul style="list-style-type: none"> - Open Process File Detail Editing - Update Name, Owner, and Remarks 3. Create the Printing Design Pattern <ul style="list-style-type: none"> - Forward the Brief to Vendors - Vendor return the Printing Design to Customer Relationship Unit - Discuss about the Printing Design between Customer and Customer Relationship <ul style="list-style-type: none"> - If the design is not satisfied go back to the beginning of step 3 with adding new more detail design specification 4. Store the Printing Design Information <ul style="list-style-type: none"> - Open Process File Detail Editing - Update Size, and Place to be kept 5. Create the Film <ul style="list-style-type: none"> - Forward the Printing Design to Vendor - Vendor return the Printing Design to Customer Relationship Unit - Check the correctness of the printing pattern - If the film is not satisfied go back to the beginning of step 5 with comment of correcting 6. Store the Film Information and Check-In the Printing Design <ul style="list-style-type: none"> - Open Process File Detail Editing - Update Size, and Place to be kept for Film - Send the Printing Design to the Warehouse and update the check-in status 7. Create the Master Printing Block <ul style="list-style-type: none"> - Forward the Film to Vendor - Vendor return the Printing Design to Customer Relationship Unit - If the master printing block is not satisfied, go back to the beginning of step 7 with comment of correcting 8. Store the Master Printing Block and Film <ul style="list-style-type: none"> - Open Process File Detail Editing - Update Size, and Place to be kept for master printing block

Table E.1 Process Make New Printing File. (Continued)

<u>Item</u>	<u>Description</u>
Process	<ul style="list-style-type: none"> - Send the film to the Warehouse and update the check-in status - Send the master printing block to the Warehouse and update the check-in status
Attachment	<ol style="list-style-type: none"> 1. Customer 2. Customer Relationship Unit 3. Vendors 4. File Store (Warehouse) 5. Process File Detail Editing 6. Process File Check In/Out

Table E.2 Process Plastic Printing.

<u>Item</u>	<u>Description</u>
Process	Process Plastic Printing
Data In	Printing Order
Data Out	Printing Order Finish
Process	<ol style="list-style-type: none"> 1. Initialize when the Printing Order is submitted from the manufacturing control 2. Withdraw the Required File to be Printed <ul style="list-style-type: none"> - Query for required file location - Let the printing technician walk to the file location place - If they could be found, check the status as Check Out 3. Printing Process <ul style="list-style-type: none"> - Printing technician take the master printing block and related file to operate on their printing operation 4. Return the Used File back to the Store <ul style="list-style-type: none"> - Query for appropriate location for the used file - Let the printing technician take that file to the setting location - if they could be placed in the area, check the status as Check In
Attachment	<ol style="list-style-type: none"> 1. Printing Technician 2. Process File Check In/Out 3. Process File Detail Editing

Table E.3 Process Add/Edit/Delete Customer Profile and Participant Information.

<u>Item</u>	<u>Description</u>
Process	Process Add/Edit/Delete Customer Profile and Participant Information
Data In	Customer Profile/Participant Information
Data Out	n/a
Process	<ol style="list-style-type: none"> 1. Receive Customer Profile or Participant Information to be updated <ul style="list-style-type: none"> - Customer Name or Participant Name (e.g. vendors, technician staff, and etc.) - Contact Detail 2. Update the information <ul style="list-style-type: none"> - Open Process Personal Detail Modification - Press Add button if the new record will be added otherwise type the required customer name or participant name that is required to be updated or delete - If that record is going to be deleted, press delete button - Type the new name into the Name textbox - Type the contact detail into the detail memo box - Click OK button to save the data. Otherwise click "Cancel" button to cancel this update
Attachment	1. Customer Relationship Unit

Table E.4 Process Add/Edit/Delete File Format.

<u>Item</u>	<u>Description</u>
Process	Process Add/Edit/Delete File Format
Data In	File Format Information
Data Out	n/a
Process	<ol style="list-style-type: none"> 1. Receive the required file format to be updated <ul style="list-style-type: none"> - File Type (e.g. cd-rom, diskette, DVD-ROM, momite-film, pattern design, master printing block, and etc.) 2. Update/Delete the File Format available <ul style="list-style-type: none"> - Open Process Type of File Media Editing - Click "Add" button if the new file format is going to be added. Otherwise type the required file format to be edited or delete into the "Look for" textbox and then click "Go" - Type the file format into the "File Format" textbox. Otherwise click "Delete" button to erase this file format from the system. - Click "OK" button to save the record. Otherwise click "Cancel" to cancel the modification.
Attachment	1. Customer Relationship Unit or Printing technician

Table E.5 Process Add/Edit/Delete Warehouse Address Information.

<u>Item</u>	<u>Description</u>
Process	Process Add/Edit/Delete Warehouse Address Information
Data In	File Format Information
Data Out	n/a
Process	<ol style="list-style-type: none"> 1. Receive new Updated Zone, Section of Warehouse <ul style="list-style-type: none"> - Zone Information (e.g. zone A, zone B, zone Cabinet CD rack, and etc.) - Section Information (e.g. section deck 1, deck 2, and etc.) 2. Update/Delete the File Format available <ul style="list-style-type: none"> - Open Process Store Address Editing - Click "Add" button in the Zone area if the new zone is going to be added. Otherwise type the required zone to be edited or delete into the "Look for" textbox and then click "Go" - Type the Zone into the "Zone" textbox. Otherwise click "Delete" button to erase this file format from the system. - Click "Add" button in the Section area if the new section is going to be added. Otherwise Choose the wanted section to be edited - Type the section into the section table - Click "OK" button to save the record. Otherwise click "Cancel" to cancel the modification.
Attachment	1. Customer Relationship Unit or Printing technician

Table E.6 Process Return Printing File.

<u>Item</u>	<u>Description</u>
Process	Process Return Master Printing Block and Related Files to Customer
Data In	Signal to Activate Processing
Data Out	Master Printing Block and Related File to Customer status
Process	<ol style="list-style-type: none"> 1. Activate the Process Return Printing File when the printing process is finished <ul style="list-style-type: none"> - This step sends the signal to activate the process whenever <ol style="list-style-type: none"> a. printing is completely successfully done b. the customer come to pick the file or product is going to be delivered to customer 2. Process Return the Master Printing Bock and Related File <ul style="list-style-type: none"> - Withdraw the master printing block and related file <ol style="list-style-type: none"> a. checks the available status. If it is unavailable, inform the printing status and terminate the process b. check the location of master printing block and related files c. bring the master printing block and related file to customer relationship unit - Update the check In status as "Out" 3. Submit the Master Printing Block and Related Files to Customer
Attachment	<ol style="list-style-type: none"> 1. Customer 2. Customer Relationship Unit 3. Process File Check In/Out 4. Process Reporting Latest File Status

Table E.7 Process Report Executive Information.

<u>Item</u>	<u>Description</u>
Process Name	Process Report Executive Information
Data In	Signal to Activate Processing
Data Out	Summarized Information for Executive Manager
Process	<div>1. Activate the Process Reporting Executive Information</div> <div>2. Gather Information and Summerize</div> <div> - Gather File Owner and Participant Information</div> <div> + Request File Owner and Participant Information</div> <div> + Process Return the Required Information</div> <div> - Gather Store Addressing</div> <div> + Request Store Addressing</div> <div> + Process Return the Required Information</div> <div> - Gather Latest Files Status</div> <div> + Request Latest File Check In Status</div> <div> + Process Return the Required Information</div> <div> - Summarize the Report</div> <div>3. Submit the Executive Information</div>
Attachment	<div>1. Senior Manager</div> <div>2. Process Reporting File Owner and Participant People Detail</div> <div>3. Process Reprinting the Store Addressing</div> <div>4. Process Reprinting Latest File Status</div>



APPENDIX F
DATA DICTIONARY

Table F.1 Data Dictionary of Plastic Printing Information System.

<u>Field Name</u>	<u>Definition</u>
24/7	A strategy of running the computerization system which is set the goal to run the environment over 24 hours a day, 7 days a week with minimum expected downtime for a year
99.999%	An expected uptime for the computerization for a year that the expected downtime must not be exceed 5 minutes a year
Application Server	A computer base server that is dedicated to process the application central. Normally, the application that is running under this server has the duty to process the raw data from database to be the expected information
Bi-Optical Polypropylene Bag	A kind of plastic bag which is normally used to pack the product that is emphasize to be shown on the shelf
CD-Rom	A media that contain the printing design pattern
Check In	Represent the arrival status for each printing file
Check Out	Represent the leaving status for each printing file
Customer Relationship Unit	The staff who represent the enterprise contacting point
Customers	They are the people who own the printing file
Database Server	A computer base server that is dedicated to process the DBMS
DBMS	Database Management System is the system where it maintains the database for the information system
Design-Pattern	A pattern which is used to be a guide or a line for plastic printing
File Format	Type of the printing file that the enterprise manage and keep track within the organization
File Server	A central place where it maintains the computerize file and manage the authenticate plus authorization to be appropriate for each user
File Sharing	A method of share files over the computer network. In this project, it could be done over the tcp/ip over the microsoft protocol
File Store or Warehouse	A place where it maintains the printing file that is being occupied by the enterprise
High Density Bag	A kind of plastic bag which is able to contain the stuff with high weight

Table F.1 Data Dictionary of Plastic Printing Information System. (Continued)

<u>Field Name</u>	<u>Definition</u>
Main Add	The Main Add or Zone, the major address that is used as the reference in the file store or warehouse
Master Printing Block	In the plastic printing process, it requires the master printing block which is come by the format of Gravia Block
Momite Film	A media that contain the printing design pattern which it is important to be used in the process of generating the master printing block
Participant	List of people who is authorized to manipulate the printing file in the file store or warehouse
Polyethylene Bag	A kinds of plastic bag which is able to contain the stuff with high weight and requires to be seen inside clearly
Polypropylene Bag	A kind of plastic bag which is able to contain the product with some certain heat
Printing Technician	A technical staff who takes care of plastic printing process manufacturing
Section	The minor address that is divided from the Zone
Senior Manager	A person who take the response to make the decision making over the organization
Sub Add	The Sub Add or Section, the minor address that is divided from the Zone
Vendors	Vendors are the business cooperator who receives the enterprise's task to process which the organization could not complete. In this event, there are two type of vendors that the enterprise is now using such as Film Generator, and Gravia Block Generator.
Web Server	A computer base server that is dedicated to run the web service that client could access to view the information
Workstation	The computer station that the authenticated user have the right to access the information system
Zone	The major address that is used as the reference in the file store or warehouse



APPENDIX G

DATABASE DESIGN

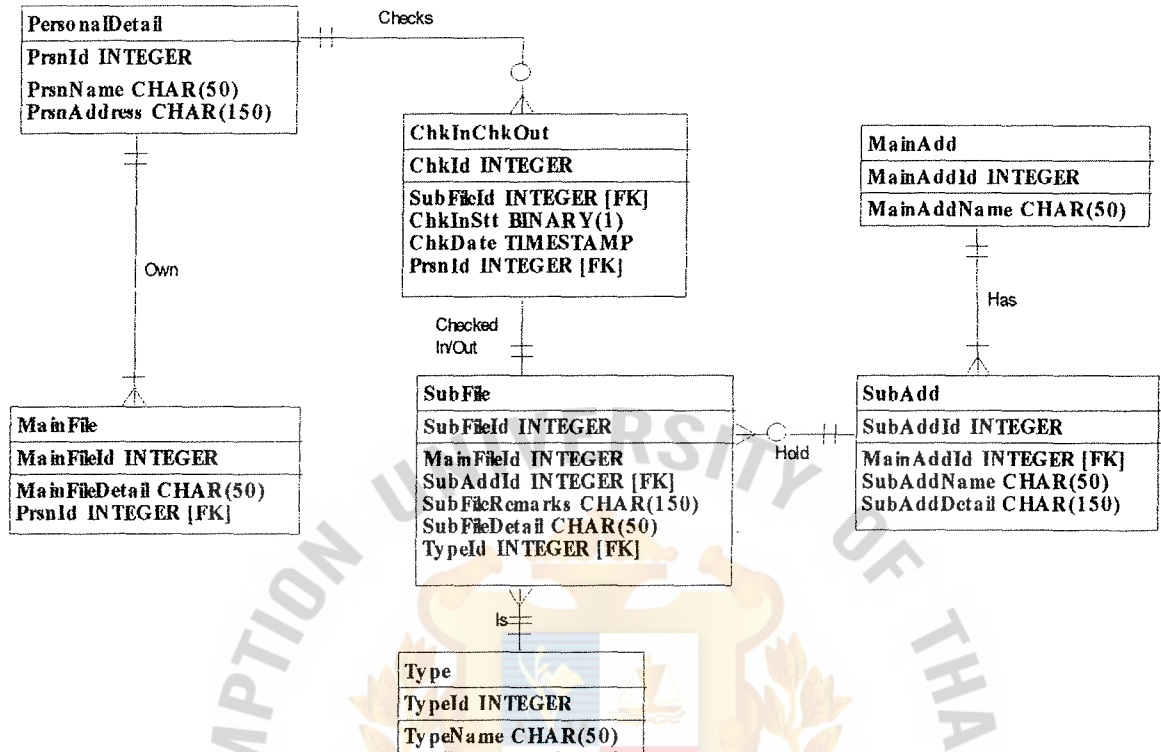


Figure G.1 Physical Entity Relationship Diagram for the Purposed System.

From the figure G.1, it shows the physical entity relationship diagram for the purposed system of this project. Furthermore, below this lines are the texts of all entity relationship which is used to initiate the database entity in DBMS.

Detailed Listing -- Alphabetically
All Entries -- Entity Relationship

Checked In/Out

Relationship

Attached Object(s):

SubFile

Checked In/Out

MIN: 0 MAX: many

ChkInChkOut

[Checked In/Out]

MIN: 1 MAX: 1

Foreign Key(s):

SubFile 'Checked In/Out' ChkInChkOut

SubFileId -> SubFileId

On Delete Restrict

On Update Restrict

On Insert or Child Row Restrict

Location:

Check

Date Last Altered: 4/2/2004

Date Created: 4/2/2004

Checks

Relationship

Attached Object(s):

PersonalDetail

Checks

MIN: 0 MAX: many

ChkInChkOut

[Checks]

MIN: 1 MAX: 1

Foreign Key(s):

PersonalDetail Checks ChkInChkOut

On Delete Restrict

On Update Restrict

On Insert or Child Row Restrict

Location:

Check

Date Last Altered: 4/2/2004

Date Created: 4/2/2004

Detailed Listing - Alphabetically
All Entries -- Entity Relationship

ChkDate Data Element

Data element attributes

Storage Type: Time
Length: 8
Null Type: Null

Location:

Entity --> ChkInChkOut

Date Last Altered: 4/2/2004

Date Created: 4/2/2004

ChkId Data Element

Data element attributes

Storage Type: Integer 4
Length: 1024
Null Type: Identity

Location:

Entity --> ChkInChkOut

Date Last Altered: 4/2/2004

Date Created: 4/2/2004

ChkInChkOut Entity

Description:

Maintain the check in / check out of each file and the person who check the file

Composition:

ChkId : Integer 4
SubFileId : SubFileId
ChkInStr : Binary
ChkDate : Time
PrsnId : Integer 4

Primary Key:

Index Name: Generated by VAW
Column(s): ChkId [ASC]

Foreign Key(s)

PersonalDetail " ChkInChkOut
 PrnId -> PrnId
On Delete Restrict
On Update Restrict
On Insert of Child Row Restrict

PersonalDetail "Checks" ChkInChkOut
On Delete Restrict
On Update Restrict
On Insert of Child Row Restrict

PersonalDetail " ChkInChkOut
 PrnId -> PrnId
On Delete Restrict
On Update Restrict
On Insert of Child Row Restrict

SubFile "Checked In/Out" ChkInChkOut
 SubFileId -> SubFileId
On Delete Restrict
On Update Restrict
On Insert of Child Row Restrict

Location:

Check

Attached relationships on Check:

[Check:]	MIN: 1 MAX: 1
PersonalDetail	
[Checked In Out]	MIN: 1 MAX: 1
SubFile	

Date Last Altered: 4/2/2004

Date Created: 4/2/2004

ChkInSt

Data Element

Data element attributes

Storage Type: Binary
Length: 1
Null Type: Not Null

Detailed Listing - Alphabetically
All Entries -- Entity Relationship

Location:

Entity -->

ChkInChkOut

Date Last Altered: 4/2/2004

Date Created: 4/2/2004

Has

Relationship

Attached Objects:

MainAdd

Has

MIN: 1 MAX: many

SubAdd

[Has]

MIN: 1 MAX: 1

Foreign Key(s):

MainAdd Has SubAdd

MainAddId --> MainAddId

On Delete Restrict

On Update Restrict

On Insert of Child Row Restrict

Location:

Check

Date Last Altered: 4/2/2004

Date Created: 4/2/2004

Hold

Relationship

Attached Objects:

SubAdd

Hold

MIN: 0 MAX: many

SubFile

[Hold]

MIN: 1 MAX: 1

Foreign Key(s):

SubAdd 'Hold' SubFile

SubAddId --> SubAddId

On Delete Restrict

On Update Restrict

On Insert of Child Row Restrict

Location:	
Check	
Date Last Altered: 4/2/2004	Date Created: 4/2/2004

Is	Relationship
Attached Objects:	
Type	
Is	MIN: 1 MAX: many
SubFile	
[Is]	MIN: 1 MAX: 1
Foreign Keys:	
Type Is: SubFile	
TypeId => TypeId	
On Delete Restrict	
On Update Restrict	
On Insert of Child Row Restrict	
Location:	
Check	
Date Last Altered: 4/2/2004	Date Created: 4/2/2004

MainAdd	Entity
Description:	
Main add shows the zone of store	
Composition:	
MainAddId Integer 4	
MainAddName Char	
Primary Key:	
Index Name:	Generated by VAW
Columns:	MainAddId [ASC]

Detailed Listing - Alphabetically
All Entries -- Entity Relationship

Location:

Check

Attached relationships on Check:

Has
SubAdd

MIN: 1 MAX: many

Date Last Altered: 4/2/2004

Date Created: 4/2/2004

MainAddId

Data Element

Data element attributes:

Storage Type: Integer 4
Length: 1024
Null Type: Identity

Location:

Entity --> MainAdd
Entity --> SubAdd

Date Last Altered: 4/2/2004

Date Created: 4/2/2004

MainAddName

Data Element

Data element attributes:

Storage Type: Char
Length: 50
Null Type: NotNull

Location:

Entity --> MainAdd

Date Last Altered: 4/2/2004

Date Created: 4/2/2004

MainFile	Entity
<i>Description:</i> File set name (in one set, there are several sub file which is available in various format)	
<i>Composition:</i> MainFileId : Integer 4 MainFileDetail : Char PrnId : Integer 4	
<i>Primary Key:</i> Index Name: Generated by VAW Column(s): MainFileId [ASC]	
<i>Foreign Key(s):</i> PersonalDetail 'Own' MainFile PrnId --> PrnId On Delete Restrict On Update Restrict On Insert of Child Row Restrict	
<i>Location:</i> Check: Attached relationships on Check: [Own] PersonalDetail Date Last Altered: 4/2/2004 Date Created: 4/2/2004	
MainFileDetail	Data Element
<i>Data element attributes:</i> Storage Type: Char Length: 50 Null Type: Null	

Detailed Listing - Alphabetically
All Entries -- Entity Relationship

Location:	
Entity -->	MainFile
Date Last Altered: 4/2/2004	Date Created: 4/2/2004

MainFileId	Data Element
Data element attributes	
Storage Type:	Integer 4
Length:	1024
Null Type:	Identity
Location:	
Entity -->	MainFile
Entity -->	SubFile
Date Last Altered: 4/2/2004	Date Created: 4/2/2004

Own	Relationship
Attached Objects:	
PersonalDetail	
Own	MIN: 1 MAX: many
MainFile	
[Own]	MIN: 1 MAX: 1
Foreign Keys:	
PersonalDetail 'Own' MainFile	
PrmId --> PrmId	
On Delete Restrict	
On Update Restrict	
On Insert of Child Row Restrict	
Location:	
Check	
Date Last Altered: 4/2/2004	Date Created: 4/2/2004

PersonalDetail	Entity
<i>Description:</i>	
Hold the information of the file owner, staff, file borrower, and vendors	
<i>Composition:</i>	
PrmId : Integer 4 PrmName : Char PrmAddress : Char	
<i>Primary Key:</i>	
Index Name: Generated by VAW Column(s): PrmId [ASC]	
<i>Location:</i>	
Check Attached relationships on Check:	
Check:	MIN: 0 MAX: many
CHKInCHKOut	
Own	MIN: 1 MAX: many
MamFile	
Date Last Altered: 4/2/2004 Date Created: 4/2/2004	
PrmAddress:	Data Element
<i>Data element attributes</i>	
Storage Type:	Char
Length:	150
Null Type:	NotNull
<i>Location:</i>	
Entity -->	PersonalDetail
Date Last Altered: 4/2/2004 Date Created: 4/2/2004	

Detailed Listing -- Alphabetically
All Entries -- Entity Relationship

PrimId	Data Element
Data element attributes	
Storage Type:	Integer 4
Length:	1024
Null Type:	Identity
Location:	
Entity -->	PersonalDetail
Entity -->	MainFile
Entity -->	ChkInChkOut
Date Last Altered	4/2/2004
Date Created:	4/2/2004
PrimName	Data Element
Data element attributes	
Storage Type:	Char
Length:	50
Null Type:	NotNull
Location:	
Entity -->	PersonalDetail
Date Last Altered	4/2/2004
Date Created:	4/2/2004
SubAdd	Entity
Description:	
Sub address shows the detail of the section in the store	
Composition:	
SubAddId : Integer 4	
MainAddId : Integer 4	
SubAddName : Char	
SubAddDetail : Char	
Primary Key:	
Index Name:	Generated by VAW

Column(s): SubAddId [ASC]

Foreign Key(s):

MainAdd Has SubAdd
MainAddId --> MainAddId
On Delete Restrict
On Update Restrict
On Insert of Child Row Restrict

Location:

Check
Attached relationships on Check:

Hold	MDC: 0 MAX: many
SubFile	
[Has]	
MainAdd	MDC: 1 MAX: 1

Date Last altered: 4/2/2004 Date Created: 4/2/2004

SubAddDetail Data Element

Data element attributes:

Storage Type: Char
Length: 150
Null Type: Null

Location:

Entity --> SubAdd

Date Last altered: 4/2/2004 Date Created: 4/2/2004

SubAddId Data Element

Data element attributes:

Storage Type: Integer 4
Length: 1024
Null Type: Identity

Detailed Listing - Alphabetically
All Entries -- Entity Relationship

Location:

Entity --> SubAdd
Entity --> SubFile

Date Last Altered: 4/2/2004

Date Created: 4/2/2004

SubAddName

Data Element

Data element attributes:

Storage Type: Char
Length: 50
Null Type: NotNull

Location:

Entity --> SubAdd

Date Last Altered: 4/2/2004

Date Created: 4/2/2004

SubFile

Entity

Description:

Various format file that are the set of the main file set

Composition:

SubFileId : SubFileId
MainFileId : Integer 4
SubAddId : Integer 4
SubFileRemarks : Char
SubFileDetail : Char
TypeId : Integer 4

Primary Key:

Index Name: Generated by VAW
Column(s): SubFileId [ASC]

Foreign Key(s):

SubAdd 'Hold' SubFile
SubAddId -> SubAddId
On Delete Restrict

Detailed Listing -- Alphabetically
All Entries -- Entity Relationship

On Update Restrict
On Insert of Child Row Restrict

Type 'Id' SubFile
TypeId --> TypeId
On Delete Restrict
On Update Restrict
On Insert of Child Row Restrict

Location:

Check
Attached relationships on Check:

Checked In/Out	MIN: 0 MAX: many
ChkIn/ChkOut	
[Hold]	MIN: 1 MAX: 1
SubAdd	
[Is]	MIN: 1 MAX: 1
Type	

Date Last Altered: 4/2/2004 Date Created: 4/2/2004

SubFileDetail Data Element

Data element attributes:

Storage Type:	Char
Length:	50
Null Type:	Null

Location:

Entity --> SubFile

Date Last Altered: 4/2/2004 Date Created: 4/2/2004

SubFileId Data Element

Data element attributes:

Storage Type:	Integer 4
Length:	1024
Null Type:	NotNull

Detailed Listing -- Alphabetically
All Entries -- Entity Relationship

Location:

Data Element --> SubFile:SubFileId
Data Element --> ChkInChkOut:SubFileId

Date Last Altered: 4/2/2004 Date Created: 4/2/2004

SubFileId Data Element
ChkInChkOut:SubFileId

Data element attributes

Domain: SubFileId
Storage Type: Integer 4
Length: 1024
Null Type: Identity

Location:

Entity --> ChkInChkOut

Date Last Altered: 4/2/2004 Date Created: 4/2/2004

SubFileId Data Element
SubFile:SubFileId

Data element attributes

Domain: SubFileId
Storage Type: Integer 4
Length: 1024
Null Type: Identity

Location:

Entity --> SubFile

Date Last Altered: 4/2/2004 Date Created: 4/2/2004

SubFileRemark: Data Element

Data element attributes

Storage Type: Char
Length: 150

Date: 29/5/2004
Time: 21:59:48

Project: DFD

Page: 15

Detailed Listing - Alphabetically
All Entries - Entity Relationship

Null Type:		NotNull	
Location:			
Entity -->		SubFile	
Date Last Altered: 4/2/2004		Date Created: 4/2/2004	

Type	Entity		
Description:			
File type shows the detail of the format file			
Composition:			
TypeId : Integer 4			
TypeName : Char			
Primary Key:			
Index Name:			
Column(s):			
Location:			
Check:			
Attached relationships on Check:			
Is:		Generated by VAW	
SubFile		TypeId [ASC]	
MIN: 1 MAX: many			
Date Last Altered: 4/2/2004		Date Created: 4/2/2004	

TypeId	Data Element*		
Data element attributes:			
Storage Type:		Integer 4	
Length:		1024	
Null Type:		Identity	

Detailed Listing -- Alphabetically
A# Entries -- Entity Relationship

Location:

Entity -->	Type
Entity -->	SubFile

Date Last Altered: 4/2/2004 Date Created: 4/2/2004

TypeName Data Element

Data element attributes

Storage Type:	Char
Length:	50
Null Type:	NotNull

Location:

Entity -->	Type
------------	------

Date Last Altered: 4/2/2004 Date Created: 4/2/2004





APPENDIX H

USER INTERFACE DESIGN



Figure H.1 Input Interface for File Detail Modification.

This window is used to input, edit, update, and delete the printing file work group of each task. From the figure, it shows several printing task such as MAC, Mias, and etc. In addition, the textbox of file name is used to indicate the Project Name, and the File Owner is used to indicate the owner of this file which is normally the customers of the enterprise. Moreover, one group file printing work project may have several file formats so it could be attached by pressing “Edit Format Available” button.

Figure H.2* Interface for File available of the major printing file.

From the File Detail Editing window, when it is used to collect the major file or the printing task, it is normally to have several formats for each printing project task. This window is used to indicate each format such as Pattern Design, Master Printing Block, and etc. Furthermore, it is also used to maintain the information of where the file is staying at. And it also uses to collect the check in status. User could access to view and edit the latest check in status by pressing “View Check In Status” button.

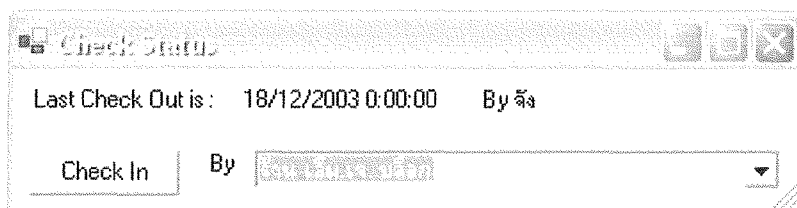


Figure H.3 Interface for Checking Status.

This window is used to view and update the check in status plus the person who bring the file in or out from the store. It also shows the last check in or check out person.



Personal Detail Modification

Look for : Go

บริษัท โรงพิมพ์ตะวันออก
บริษัท สยามคิตกิ้นท่า จำกัด
ร้าน เอ็ม.เจ. บล็อก
ห้างหุ้นส่วนจำกัด ช่วยกันผลิตเฟื่องฟู
ห้างหุ้นส่วนจำกัด ชัยนนท์ บล็อก
ห้างหุ้นส่วนจำกัด บางไทร

<< < ห้างหุ้นส่วนจำกัด เอ็น.พี. ยูนิแม็ค > >>

Detail

Name :

Contact detail :
291 หมู่2 ซอยเอ็น.พี. บ้านคลองสวน พระสมุทร
เจดีย์ สมุทรปราการ 10290
โทร 02-8158931 ถึง 4
Fax 02-815-8935

Add Delete

Help OK Cancel

Figure H.4 Interface for Add/Edit/Update the Personal Detail Modification.

This window is used to collect the information of the customer profile, vendors profile and also the any other participant such as printing technical staff, customer relationship staff, and etc. This information will be used as the reference for the person who bring the file in or out from the store.

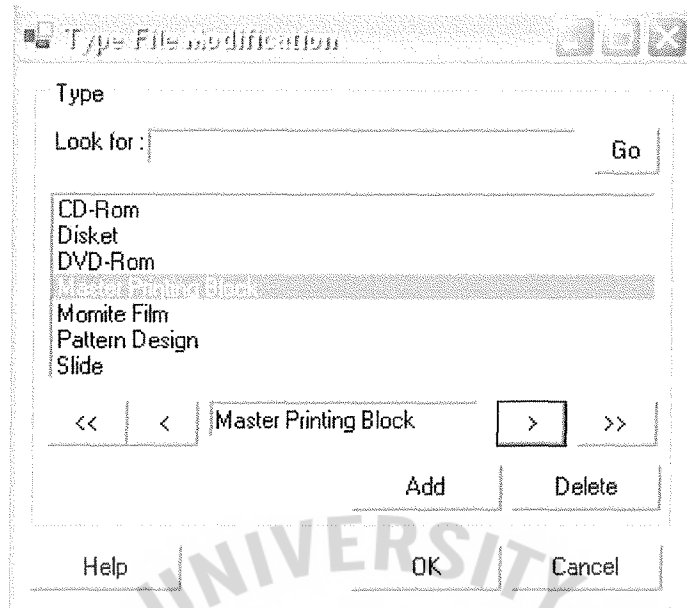


Figure H.5 Interface for Add/Edit/Delete the File Format Type.

This window is used to edit the list of file format type that is used within the organization. Furthermore, the format type is used as the reference in the File available of the major printing file that is shown in the Figure H.2.

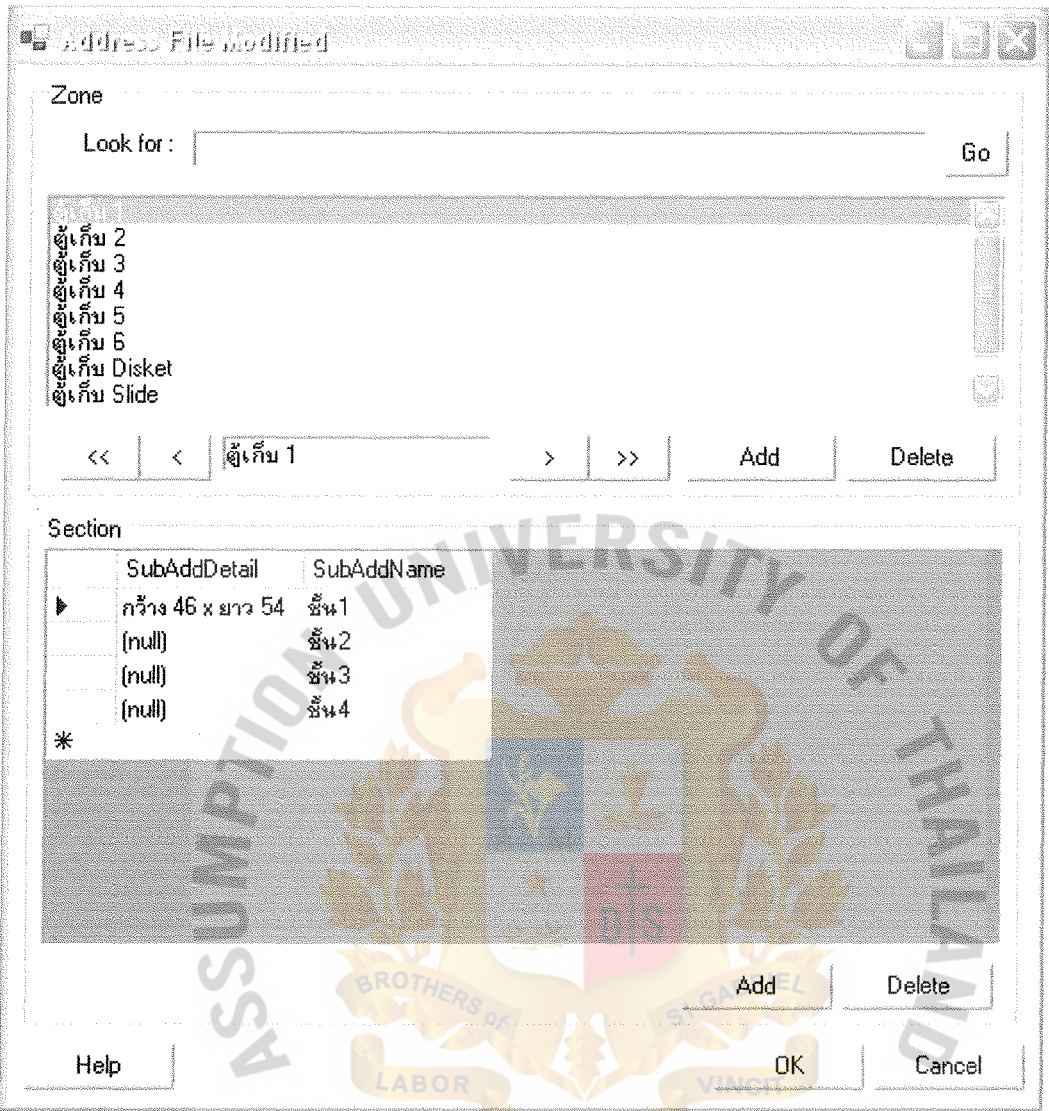


Figure H.6 Interface for Updating the Address Available in the File Store.

This window is used to add, update, and delete the location such as zone, section in the file store that is used as the reference for the file location placing in the File available of the major printing file that is shown in the Figure H.2.

Furthermore, every window of the inputting interface, user could filter the information that they need by use of “look for”. This text box is used to fill in the text or the record that the user is looking for. User can merely put some part name or file name that they are looking for and then press “Go” button.



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Date: 10/5/2003

Latest File Status Report

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Number of File are in the store (Check In) 150 pieces
Number of File are not in the store (Check Out) 45 pieces

File Name	Format	Check In/Out	By	Remarks
Mac	Pattern Design	in	Chainon Block Ltd., Part	
	Momite Film	in	Chainon Block Ltd., Part	For Blue Color
	Momite Film	in	Chainon Block Ltd., Part	For Red Color
	Momite Film	in	Chainon Block Ltd., Part	For Gree Color
	Momite Film	in	Chainon Block Ltd., Part	For Black Color
	CD-Rom	in	Chainon Block Ltd., Part	
	Master Printing Block	out	Mr. Sukon (Technician Printing Staff)	For Blue Color
	Master Printing Block	out	Mr. Sukon (Technician Printing Staff)	For Red Color
	Master Printing Block	out	Mr. Sukon (Technician Printing Staff)	For Gree Color
	Master Printing Block	out	Mr. Sukon (Technician Printing Staff)	For Black Color
Mias	Pattern Design	in	M.J. Block Ltd., Part	
Next	Pattern Design	in	Chainon Block Ltd., Part	
	Momite Film	in	Chainon Block Ltd., Part	
	CD-Rom	in	Chainon Block Ltd., Part	
	Master Printing Block	in	Chainon Block Ltd., Part	
Ogawa	Pattern Design	in	Chainon Block Ltd., Part	
	Momite Film	in	Graphics Work Co., Ltd.	
	Momite Film	out	Graphics Work Co., Ltd.	For Correction
	Momite Film	out	Graphics Work Co., Ltd.	For Correction

Figure I.1 Latest File Status Report

Number of Customer
 105
 Number of Vendors
 4
 Number of Staff
 10

Type	Name	Remarks
Customer	หจก. ธนวงศ์วิไล บริษัท คัดส์ ซอยส์ จำกัด บริษัท เวสต์เวลส์การ์เมนท์ จำกัด บริษัท เอเซียพลาสติกอุตสาหกรรมบรรจุภัณฑ์ จำกัด บริษัท อังเคิล ฟิลด์ จำกัด บริษัท บี. แอล. อินเตอร์มาร์ท จำกัด บริษัท เดอะควอลิตี้ไวร์ จำกัด บริษัท เจริญศิลป์พลาสติกพรีนติ้ง จำกัด บริษัท รอยัลอินเตอร์สตริส <ไทยแลนด์> จำกัด<มหาชน> บริษัท ทิศเหนือการทอ จำกัด บริษัท เลิฟเบิร์ต จำกัด บริษัท ดรากอนแพ็คเกจจิ้ง จำกัด บริษัท โรงพิมพ์ตะวันออก จำกัด (มหาชน) บริษัท สีโอดู อินเตอร์เทรด จำกัด บริษัท พรินต์ ดีไซน์ จำกัด หจก. ธนาทรัพย์การ์เมนท์ บริษัท สดเสไทยยะลา จำกัด หจก. วอเตอร์มาร์คไทยชัยพลาซ่า หจก. ศรีเจริญการ์เมนท์	

Figure I.2 Personal Detail Report.

Number of Using Space	105
Number of Available Space	95
Number of Total Space	200

Type of Placing Location	Number of Using Space	Number of Available Space	Number of Total Space
CD-Rom	15	5	20
Diskette	14	6	20
Master Printing Block	32	33	65
Momite Film	32	33	65
Pattern Design	12	18	30
Total	105	95	200

Figure I.3 Location Available Report.

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Top Ten Check In/Out Files

Date: 10/5/2003

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Rack	File Name	Format	Remarks
1	Mac	Master Printing Block	For Blue Color
2	Mac	Master Printing Block	For Red Color
3	Mac	Master Printing Block	For Green Color
4	Mac	Master Printing Block	For Black Color
5	Next	Master Printing Block	
6	Ogawa	Master Printing Block	
7	EdNet	Master Printing Block	For Green Color
8	EdNet	Master Printing Block	For Red Color
9	Isuzu	Master Printing Block	For Red Color
10	Isuzu	Master Printing Block	For White Color

Figure I.4 Top Ten Check In/Out Files.

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Top Ten Customer

Date: 10/5/2003

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Rack	Customer
1	บริษัท ทิศเหนือการทอ จำกัด
2	บริษัท บางไทร จำกัด
3	บริษัท เบนโลจิสติก จำกัด
4	บริษัท โรงพิมพ์ตะวันออก จำกัด (มหาชน)
5	บริษัท วี.เอ็น. พลาสติก
6	บริษัท ตริเพชร อีซูซุ จำกัด
7	บริษัท รอยัลอินดัสเตรียล (ประเทศไทย) จำกัด
8	บริษัท ควอลิตี้ไวท์ จำกัด
9	ห้างหุ้นส่วนจำกัด เอเซียพลาสติก
10	บริษัท เอส.ซี. กรีน จำกัด

Figure I.5 Top Ten Customer.

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