Human Resource Information System for Mthai Estate Co., Ltd.

by

Ms. Nipaporn Chokesamerboon

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

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

March 2002
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March 2002
Project Title: Human Resource Information System for Mthai Estate Co., Ltd.
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Academic Year: March 17, 2002

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

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ABSTRACT

Nowadays, the information system provides the communication and analytical power that every organization needs for conducting trade and managing their businesses. The benefit of computerized system is to support management decision-making, which helps the firm gain strategic planning at low risk.

The purpose of this project is to design a new system that lead the company to have more opportunity to growth and expansion by the computerized system. The study of this project begins with the required definition and analysis of the existing system. The problems occurring from the existing system are inadequate to handle many volumes of inventory and there are too many errors in manual operations.

The new computerized system is developed by Delphi and Microsoft Access, in order to manage all tasks of the Human Resource Department, which are Leave and Attendance, Employee Information, Training Record, Benefit, Appraisal and Recruitment with accuracy, punctuality and effectiveness.

To apply the computerized system to business functions in terms of time, accuracy, and relevant information, the company would be able to increase sales, gain market share and compete with the other competitors.
ACKNOWLEDGEMENTS

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I. INTRODUCTION

1.1 Background of the Project

The purpose of this project is focused to study and analyze the Human Resource Information System which in its current existing system is simple and traditionally manual, of Mthai Estate Co., Ltd. The project will identify the requirements, solve the current problems and design a proper system for better performance and increase the effectiveness to administer employees’ information.

The proposed system will provide more accuracy and efficiency to the system. All these are easier to manage the information and convenience for the administrator.

1.2 Objectives of the Project

(1) To study and analyze the existing Human Resource Information System.

(2) To identify the problems in the existing information system.

(3) To analyze the problems, the causes and find out the solutions for those problems.

(4) To design the computerized Human Resource Information System that is suitable and effective to the work process of the organization by reducing scattered paper work and shorten operating time.

(5) To standardize the data management and transference system.

1.3 Scope of the Project

The Human Resource Information System of Mthai Estate Co., Ltd. involves gathering the related data of the recruitment process, the updates of training activities including the results and evaluations of each employee, and the work time checking for further year-end performance evaluation.
In the existing system, all mentioned affairs are handled by manual processes. The data in workflow is mostly kept in hard copy documents and its quantity will be dramatically increased from time to time which makes it more difficult in sorting and seeking the information. The department generated many human errors, which give negative consequences later.

The proposed system will offer the solution by implementing a computerized system. So the department will increase their efficiency in information management. The company also gets the benefits that can cut off the loss from human errors and damaged documents. The computerized system’s scope will cover the managing of recruitment data, employee information, training activity record and work time checking.

1.4 Deliverables

The deliverables of the project are as following:

(1) Project and System Scope

We study the scope of project and system in order to gain more understanding towards the system and its boundary.

(2) Business Requirements

Business requirements are listed in order to build up the system to suit the users’ work process and work environment.

(3) System Objectives

System objectives enable us to understand the goals of the system.

(4) Technology Requirements

Technology requirements are hardware and software specification of the system.

(5) Design Requirements
The design requirement indicates the proper design of the data flow, process and database.

(6) Design Specifications

Design specifications yield process specification, which indicate the workflow of input and output of the process.

(7) Human Resource Information System

The complete computerized system of Human Resource Information System that is ready to facilitate the activities in the department.

1.5 Project Plan

The schedule of this proposed system development is shown in Figure 1.1.
<table>
<thead>
<tr>
<th>No.</th>
<th>Task Name</th>
<th>September</th>
<th>October</th>
<th>November</th>
<th>December</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Analysis of the Existing System</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Define the Objective and Scope</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Study the Existing System</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Identify the Existing Problems</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Study the Existing Computer System</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Develop Context Diagram</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Develop Data Flow Diagram</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Cost and Benefit Analysis</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I.</td>
<td>Analysis and Design of the Proposed System</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Web Interface Design</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Report Design</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Database Design</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Network Design</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Program Design</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II.</td>
<td>Implementation of the Proposed System</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Programming/Coding</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Program Testing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Hardware Installation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Software Installation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Data Conversion</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 1.1. Project Plan of Human Resource Information System.
II. THE EXISTING SYSTEM

2.1 Background of the Business

Mthai Estate Co., Ltd. is a leading estate developer in Thailand. The company has over 25 years of experience in developing high-quality building projects with full attention to all details. Its projects emphasize good locations in the suburbs of Greater Bangkok, a rapidly growing area. Mthai Estate's main business operation is developing new land and residential units.

The company intends to continue to achieve this objective by:

(1) Locating its developments in locations within Greater Bangkok which have the benefit of convenient road access to Central Bangkok.

(2) Pricing its building competitively for the predominantly middle income sector, which it targets as potential purchasers.

(3) Building high quality buildings which include communal recreational facilities and benefits from a comprehensive after-sale services.

(4) Marketing and advertising aggressively to create strong name recognition for the company.

(5) Designing developments and properties to meet the requirements of predominantly middle-income sector, which is targeted by being based on the company’s own market research and sales experience.

(6) Providing a reasonable profit to the shareholders of the company.

(7) Providing its staff and workers with a safe and stimulating work environment that encourages personal-development and excellence in performance.

The organization chart will be shown in Figure 2.1.
Figure 2.1. The Organization Chart of Mthai Estate Co., Ltd.
2.2 **Analysis of Existing System and Business Functions**

The organization comprises of 7 departments, which are Site, Purchase Department, Cost Control Department, Accounting Department, Payroll Department, Human Resource Department, and Computer Department.

(1) Management level

(2) Functional level which comprised of 7 departments i.e. Site, Purchase Department, Cost Control Department, Accounting Department, Payroll Department, Human Resource Department, and Computer Department.

(3) Operational Level

Existing Human Resource Information System of Mthai Estate Co., Ltd.

Human Resource Department has to perform the following tasks:

(1) Recruitment Management

(2) Employee Information Management

(3) Leave and Attendance Management

(4) Benefit Plan Management

(5) Appraisal Planning

(6) Process Report

As long as any department have a job vacancy, they will send a job description to Human Resource department that is responsible to seek the qualified applicants, and also have to proceed the recruitment if there are no available proper applicants stored in database.

Each applicant submits the application form to the officer of Human Resource Department and he or she will have 2 stages of interview with a purpose to screen out for the prospective employees, firstly from the officer of Human Resource Department, and the final interview from representative of the relevant department. The data, which
is related to the interviewing process, is kept accordingly by humans in the pile of document.

Human Resource department collects each employees’ information such as name, surname, address, education, work experience, etc. also including information of training experience along with the benefit information of each employee. The training records are kept for future reference, to help Human Resources Department make the decision regarding proper training program from Training Department that should be implemented and which employees need to be trained.

The training record of each employee indicates the history of training of a certain employee over a period of time. Human Resource officers have to keep the training data updated.

There are many advantages of gathering the employees’ training information. The big point is to enhance the overall performance and productivity of the company’s operation, which is based on employees’ numerous skills in producing the work output. The company also intends to constantly provide the training courses to the employees in order to keep track of the technology change and utilize it in the production. The officers collect the manager’s evaluation on each employee and analyze the proper training course for the employees.

Human Resource also checks the time attendance, leave and late of each employee. Those information can be collected from the daily time card system and the officer has to manually gather those information and put them together for generating monthly report. Leave information is given by the employees themselves.

The information mentioned earlier, that the Human Resources Department officers keep, can be used together to determine the appraisal plan.
The context data model includes the fundamental or independent entities that were previously discovered and their relationships. Figure 2.2 presents the context data model of the existing system by using an entity relationship diagram. And the data flow diagram level 0 will be shown in Figure 2.3 respectively.

Figure 2.2. Context Diagram of The Existing System.
Figure 2.3. Data Flow Diagram Level 0 of The Existing System.
2.3 Current Problems of the Existing System and Area of Improvement

Although Mthai Estate Co., Ltd. has a computer department, the company still handles the activities operated under Human Resource Department and other manually.

According to the performance, we can list the problems occurred by implementing a manual system as the following:

(1) Human errors and unorganized working process

Difficult to read handwriting, repeating works and overlapping responsibility create possibly wrong, not updated data.

(2) Delay of work flow

With existing system, it definitely takes quite a bit of time to process the data into required information such as, input data from the document to computer system many times, and delay of data transfer between department.

(3) Data Handling

The existing system generates huge amounts of papers, which finally leads to data handling problems. The officers of Human Resource Department are facing a difficult time looking up into those documents for a single data and how to organize the data properly. Over time, the document is damaged.

(4) Data usage

The company has expanded with an increasing number of employees, so has the data. The department has to manage and schedule very well to try to meet with the demand of the data request, yet it is not good enough. Therefore, the process of implementing the computerized system will be a savior.
(5) Data controlling

Without proper data specification, the overall operation is generating unnecessarily excessive data and absolutely data redundant.

(6) Security

Security cannot be held effectively in this manner of the operation.
III. THE PROPOSED SYSTEM

3.1 User Requirement

User requirement is a set of necessary specifications that the new system must deliver to the organization in order to satisfy the users. We have gathered the user requirement as listed in the following section.

1. The system will perform effectively and correctly

   The new system must be based on computers to handle the data and information regarding the employees submitted.

2. Providing correct data with high speed and perfect response service

   The new system must provide responsiveness to the organization when asked for reports or answers to any particular query with better performance.

3. The system must provide updated and corrected information

   The new system must organize the data more efficiently, eliminating the redundant data and provide the most up-to-date correct information.

4. The system must provide user friendly interface

   The new system must have user friendly interface to interact with the users to ease up the activities.

5. The system must provide the useful information

   The system must provide useful information in an organized format for the Human Resource department and Managing Director for future planning.
(6) Security must be ensured

Security is an important issue, which must be concerned. The new system will be representing the usage of computerized method; it is a must that the security is ensured since the information will be reached easier and faster.

3.2 Candidate Solution

There are 3 solutions that we have to make decision; which is the best for this company by comparing their cost and benefit of its efficiency.

(1) Outsourcing the proposed software from the specialist

(2) Purchase the instant software package

(3) Develop by Computer Department

The Candidate System Matrix and The Feasibility Analysis Matrix for Human Resource Information System will shown in Table 3.1. and Table 3.2.
Table 3.1. The Candidate System Matrix.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Candidate 1</th>
<th>Candidate 2</th>
<th>Candidate 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portion of System Computerized</td>
<td>The new human resource record system would be developed by the outsource company according to the users’ requirements.</td>
<td>The new human resource record system would be applying by the instant software</td>
<td>Research and develop by computer department to satisfy all users’ requirements</td>
</tr>
<tr>
<td>Benefits</td>
<td>This solution can be implemented quickly because it is a tailor made solution. And it is also complete the other needed functions.</td>
<td>This solution can be implemented quickly because it is a purchased solution.</td>
<td>Fully supports user requirements in business processes for the company. Plus more efficient performance with Payroll Department and Training Department.</td>
</tr>
<tr>
<td>Application Software</td>
<td>Software package</td>
<td>Software package</td>
<td>Custom solution</td>
</tr>
<tr>
<td>Method of data processing</td>
<td>Clients/Server (method)</td>
<td>Stand Alone</td>
<td>Clients/Server (method)</td>
</tr>
<tr>
<td>Input Devices and Implications</td>
<td>Keyboard &amp; Mouse</td>
<td>Keyboard &amp; Mouse</td>
<td>Keyboard &amp; Mouse</td>
</tr>
<tr>
<td>Storage Devices and Implications</td>
<td>Hard Disk SCSI 40 GB</td>
<td>Hard Disk SCSI 40 GB</td>
<td>Hard Disk SCSI 40 GB</td>
</tr>
</tbody>
</table>
Table 3.2. The Feasibility Analysis Matrix

<table>
<thead>
<tr>
<th>Feasibility Criteria</th>
<th>Weight</th>
<th>Candidate 1</th>
<th>Candidate 2</th>
<th>Candidate 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operational Feasibility</td>
<td>20%</td>
<td>Almost requirements are met this software package which combine the tools together. It can support the Human Resource System.</td>
<td>This software package is supported only Human Resource Department. Moreover, it will not fully meet all requirements and it cannot modify the internal program. The human resource software is the legacy system: DOS, which is difficult to use than the Windows based system.</td>
<td>Using LAN, we can share the heavy load of processing tasks by separating work to the different computer. Fully supports user required functionality. It's possible to alter the source code of the program to fulfill users' requirement in the future.</td>
</tr>
<tr>
<td>Technical feasibility</td>
<td>30%</td>
<td>-Easy Graphic User Interface and many options provided.</td>
<td>-Easy Graphic User Interface.</td>
<td>-Easy Graphical User Interface.</td>
</tr>
<tr>
<td>-Technology</td>
<td></td>
<td>-Providing full feature of object oriented programming.</td>
<td>-The software is the application that it cannot modify to meet further requirement in the future. The software company will set up the system and training class for the staff, also have the manual to support the usage.</td>
<td>Require hardware specialist to set up the network and for the application. It requires a training and knowledge of database.</td>
</tr>
<tr>
<td>-Expertise</td>
<td></td>
<td>Require hardware specialist to set up the network and for the application. It requires a training and knowledge of database.</td>
<td>Require hardware specialist to set up the network and for the application. It requires a training and knowledge of database.</td>
<td>Require hardware specialist to set up the network and for the application. It requires a training and knowledge of database.</td>
</tr>
<tr>
<td>Economic Feasibility</td>
<td>40%</td>
<td>Approximately 1,713,300 Baht</td>
<td>Approximately 1,413,300 Baht</td>
<td>Approximately 1,630,300 Baht</td>
</tr>
<tr>
<td>-Cost of develop</td>
<td></td>
<td>Approximately 1 Year</td>
<td>Approximately 4 Years</td>
<td>Approximately 1 Year</td>
</tr>
<tr>
<td>-Payback Period (discounted)</td>
<td></td>
<td>See Appendix H</td>
<td>See Appendix H</td>
<td>See Appendix H</td>
</tr>
<tr>
<td>-Detailed Calculations</td>
<td></td>
<td>Score: 85</td>
<td>Score: 20</td>
<td>Score: 90</td>
</tr>
<tr>
<td>Schedule Feasibility</td>
<td>10%</td>
<td>About 3-5 Months</td>
<td>Less than 1 Month</td>
<td>About 3-5 Months</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Score: 90</td>
<td>Score: 100</td>
<td>Score: 95</td>
</tr>
<tr>
<td>Ranking</td>
<td>100%</td>
<td>87</td>
<td>48</td>
<td>95.5</td>
</tr>
</tbody>
</table>

Score: 100 Score: 60 Score: 100
In this project we choose the candidate solution 3 to develop the proposed system because of its flexibility, efficiency and it can also get the early payback period.

3.3 System Design

Accordingly, we have chosen the candidate solution 3 to develop as the proposed system. The system design will be described in this part.

The proposed system consists of 6 processes as follows:

(1) Process Leave and Late Attendance Information
(2) Process Employee Information
(3) Process Benefit
(4) Process Appraisal
(5) Process Recruitment
(6) Process Report

The Context Diagram of the Proposed System will show in Figure 3.1. And the Data Flow Diagram Level 0 of the Proposed System will show in Figure 3.2.
Figure 3.1. Context Diagram of The Proposed System.
Figure 3.2. Data Flow Diagram of The Proposed System.
The proposed system will deliver the following inputs and outputs.

Input

1. Application Forms
2. Interview Result
3. Benefit Petition
4. Employee Data
5. Training Details
6. Training Result
7. Attendance Checking Record
8. Leave Checking Record
9. Evaluation Details

Output

1. Attendance Report
2. Employee Information Report
3. Benefit Report
4. Appraisal Plan Report
5. Applicant Report

Database of the proposed system

1. Late – records daily late data of employee.
2. Overtime – records daily overtime data of employee.
4. Employee Record – contains information of employee.
5. Training Record – concerns information of each trained employee.
Appraisal Record – keeps appraisal information of each employee.

Evaluation – includes evaluation information by manager to each employee performance.

Applicant Record – obtains information of applicant.

Interview Result – keeps interview result of the applicant.

Recruitment – keeps information of proper applicant.

3.4 Hardware and Software Requirement

System Specification

The proposed system is responsible for handling and managing the data and activities held by the Human Resource Department to interact better internally and externally. The system specifications are as follows:

1. One Intranet server
2. Four Client Workstations
3. LAN with star topology
4. Client/Server Computing
5. Microsoft Windows 2000 Advanced Server as server operating system
6. Microsoft Windows 2000 Professional as client operating system
7. Delphi as a programming language of the system
8. UPS for electricity failure

The Hardware and Network Configuration will show in Figure 3.3.
Figure 3.3. Hardware and Network Configuration.
<table>
<thead>
<tr>
<th>Hardware</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU</td>
<td>Pentium IV 1.5G, or higher</td>
</tr>
<tr>
<td>Cache</td>
<td>256 KB or higher</td>
</tr>
<tr>
<td>Memory</td>
<td>512 MB or higher</td>
</tr>
<tr>
<td>Hard Disk</td>
<td>SCSI 40 GB or higher</td>
</tr>
<tr>
<td>CD-ROM Drive</td>
<td>48X or higher</td>
</tr>
<tr>
<td>Floppy Drive</td>
<td>1.44 MB</td>
</tr>
<tr>
<td>Network Adapter</td>
<td>Ethernet 100-Base T</td>
</tr>
<tr>
<td>Display Adapter</td>
<td>SVGA card</td>
</tr>
<tr>
<td>Display</td>
<td>15” monitor</td>
</tr>
<tr>
<td>Printer</td>
<td>Dot Matrix and Laser</td>
</tr>
<tr>
<td>UPS</td>
<td>UPS Leonics Green III 500(VA)</td>
</tr>
</tbody>
</table>

Estimated Price = 152,000 Baht

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU</td>
<td>Pentium III 750, or higher</td>
</tr>
<tr>
<td>Cache</td>
<td>256 KB or higher</td>
</tr>
<tr>
<td>Memory</td>
<td>128 MB or higher</td>
</tr>
<tr>
<td>Hard Disk</td>
<td>20 GB or higher</td>
</tr>
<tr>
<td>CD-ROM Drive</td>
<td>48X or higher</td>
</tr>
<tr>
<td>Floppy Drive</td>
<td>1.44 MB</td>
</tr>
<tr>
<td>Network Adapter</td>
<td>Ethernet 100-Base T</td>
</tr>
<tr>
<td>Display Adapter</td>
<td>SVGA card</td>
</tr>
<tr>
<td>Display</td>
<td>15” SVGA monitor</td>
</tr>
<tr>
<td>Network cable and equipment</td>
<td>UTP Cable, Switching Hub</td>
</tr>
</tbody>
</table>
Estimated Price  =  148,300 Baht
Total Hardware Cost  =  305,300 Baht (included Magnetic Time Card Machine)

Table 3.5. The Software Specification for Intranet Server.

<table>
<thead>
<tr>
<th>Software</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating System</td>
<td>Microsoft Windows 2000 Advanced Server</td>
</tr>
<tr>
<td>Application Server</td>
<td>Microsoft Active Server Pages</td>
</tr>
<tr>
<td>Database Server</td>
<td>Microsoft Access 2000</td>
</tr>
<tr>
<td>Anti-virus</td>
<td>Mcafee Virus Scan</td>
</tr>
</tbody>
</table>

Table 3.6. The Software Specification for Each Client Machine.

<table>
<thead>
<tr>
<th>Software</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating System</td>
<td>Microsoft Windows 2000 Professional</td>
</tr>
<tr>
<td>Web browser</td>
<td>Microsoft Internet Explorer 5.5 or higher</td>
</tr>
<tr>
<td>Application Software</td>
<td>Microsoft Office 2000 Professional Edition</td>
</tr>
<tr>
<td>Anti-virus</td>
<td>Mcafee Virus Scan</td>
</tr>
</tbody>
</table>

Table 3.7. The Software Specification for Each Client Machine.

<table>
<thead>
<tr>
<th>Software</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development Tool</td>
<td>- Delphi 6</td>
</tr>
<tr>
<td></td>
<td>- Microsoft Visual Interdev</td>
</tr>
</tbody>
</table>

Total Software Cost =  211,000 Baht

3.5  Security and Controls of the Proposed System

Security is listed as one of the user requirements. The proposed system will cover many important areas of Human Resource Department, therefore it is required that security is conducted properly to prevent following incidents:
(1) Unauthorized access to change the information in any form.

(2) Virus from external elements.

(3) The electronic damage which could cost tremendous information loss.

The prevention means are realized and they are as follows:

(1) It is compulsory to pass the user ID and password checking before entering the system to prevent unauthorized access.

(2) Installing the virus detection software.

(3) Installing UPS to protect the information loss while electronic damage occurs.

(4) Back up the system periodically

The system can keep records of log files whenever user access to the system. Therefore, when some unfavorables occur, it is impossible to go back and find out what is the problem.

3.6 Cost and Benefit Analysis

Cost Analysis

Types of cost to be taken into consideration are:

(1) Development Cost

The starting cost of the organization to implement the proposed system, it is comprised of Hardware and Software cost including the cost of hiring system analyst and programmer.

(a) Hardware Cost 305,300 Baht
(b) Software Cost 211,000 Baht
(c) Personnel
(d) System Analyst (40 hours @ 800 Baht) 32,000 Baht
(e) Programmer (90 hours @ 600 Baht) 54,000 Baht
(f) Training Cost  
20,000 Baht 

Total Development Costs  
622,300 Baht 

(2) Operating Cost  

The monthly costs involved, for instance, salary for personnel officers, and system maintenance.  

Maintenance Cost  
8,000 Baht 

(3) Others  

Office equipment and office supplies are categorized in this section.  

Miscellaneous  
4,000 Baht 

Total Projected Costs  
634,300 Baht 

Benefit Analysis  

Tangible benefit  

(1) Personnel  

The existing system has 8 personnel officers to run and operate the Human Resource Department with the cost estimated monthly as 96,000 Baht(@12,000). The proposed system cuts down the personnel cost by hiring only 6 officers, which costs 72,000 monthly (@12,000). So in the first year, the proposed system can save the personnel cost up to 24,000 per month and the organization can save the personnel officers cost drastically in the following years.  

Reduce cost of human labor  

(12 @ 24,000 Baht/month)  
288,000 Baht/year 

(2) Operational  

Reduce paper usage and stationary  

(12 @ 5,000 Baht/month)  
60,000 Baht/year
Reduce cost of overtime

(12 @ 7,000 Baht/month) 84,000 Baht/year

Total Annual Tangible Benefits 432,000 Baht

Intangible benefit

(1) Reduce work load of personnel staff
(2) Reduce the stressful environment
(3) Improve response time
(4) Improve the quality of the personnel work
(5) Data is correct and up-to-date ready to service the routine and ad-hoc demand.
(6) Data is well organized with less redundancy
(7) Improve the decision making
(8) The overall performance of the department satisfies the organization
(9) Decrease the level of error

Cost Comparison

Comparing the cost of two systems, the current system and the proposed system are summarized and shown in Table 3.8. From the implementation of break-even analysis as shown in Figure 3.4, we have seen the different costs between two systems in full view. These represent the time when the benefit is equal to the investment cost. There is one factor that reflected cost; is time value of money. Some of the costs of a system will be accrued after implementation and the benefits of the new system will be accrued in the future; so that should be adjusted both costs and benefits to current baht. The break-even point is 1 year. From the point of 1 year onward, the new system will be more economical than the existing system because of labor savings and operating cost saving.
Table 3.8. Cost Comparison between the Existing System and Proposed System, Baht.

<table>
<thead>
<tr>
<th>Cost Items</th>
<th>Years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td><strong>Existing System:</strong></td>
<td></td>
</tr>
<tr>
<td>Staff (increase 5% per year)</td>
<td>1,152,000</td>
</tr>
<tr>
<td>Operating Cost (increase 5% per year)</td>
<td>108,000</td>
</tr>
<tr>
<td>Utility Cost (increase 5% per year)</td>
<td>60,000</td>
</tr>
<tr>
<td><strong>Total Cost</strong></td>
<td>1,320,000</td>
</tr>
<tr>
<td><strong>Cumulative Cost</strong></td>
<td>1,320,000</td>
</tr>
<tr>
<td><strong>Proposed System:</strong></td>
<td></td>
</tr>
<tr>
<td>Hardware Cost</td>
<td>61,060</td>
</tr>
<tr>
<td>Software Cost</td>
<td>42,200</td>
</tr>
<tr>
<td>Implement Cost</td>
<td>21,200</td>
</tr>
<tr>
<td>Staff (increase 5% per year)</td>
<td>864,000</td>
</tr>
<tr>
<td>Operating Cost (increase 5% per year)</td>
<td>96,000</td>
</tr>
<tr>
<td>Utility Cost (increase 5% per year)</td>
<td>48,000</td>
</tr>
<tr>
<td><strong>Total Cost</strong></td>
<td>1,132,460</td>
</tr>
<tr>
<td><strong>Cumulative Cost</strong></td>
<td>1,132,460</td>
</tr>
</tbody>
</table>
Table 3.9. Cumulative Cost of the Existing System and Proposed System, Baht.

<table>
<thead>
<tr>
<th>Year</th>
<th>Cumulative Existing Cost</th>
<th>Cumulative Proposed Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1,320,000.00</td>
<td>1,630,300.00</td>
</tr>
<tr>
<td>2</td>
<td>2,706,000.00</td>
<td>2,688,700.00</td>
</tr>
<tr>
<td>3</td>
<td>4,161,300.00</td>
<td>3,800,020.00</td>
</tr>
<tr>
<td>4</td>
<td>5,689,365.00</td>
<td>4,966,906.00</td>
</tr>
<tr>
<td>5</td>
<td>7,293,833.00</td>
<td>6,192,136.00</td>
</tr>
</tbody>
</table>
Figure 3.4. Break-even Chart Analysis.

Note: Year "1" is the starting point.
Payback Analysis

The payback period is determined from original investment divided by annual net cash inflow as formula is shown below. The number of years or how much time will lapse before accrued benefits overtake accrued and continuing cost. After implementation, you will incur additional operating expenses that must be recovered.

\[
\text{Number of years to payback} = \frac{\text{Original investment}}{\text{Annual net cash inflow}}
\]

The payback period of the proposed system is 1 year. It will take about 1 year to pay back the initial investment. Figure 3.5 will show Payback Chart Analysis and payback period calculation will be shown in Table 3.10.
<table>
<thead>
<tr>
<th>Year 0</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Development cost:</strong></td>
<td><strong>Operation &amp; maintenance cost:</strong></td>
<td><strong>Discount factors for 12%:</strong></td>
<td><strong>Time-adjusted costs (adjusted to present value):</strong></td>
<td><strong>Cumulative time-adjusted costs over lifetime:</strong></td>
<td><strong>Benefits derived from operation of new system:</strong></td>
</tr>
<tr>
<td>-622,300</td>
<td>-96,000</td>
<td>1,000</td>
<td>-622,300</td>
<td>-622,300</td>
<td>-622,300</td>
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<tr>
<td></td>
<td></td>
<td>0.997</td>
<td></td>
<td>-116,368</td>
<td></td>
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<td>0.943</td>
<td></td>
<td>-96,000</td>
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<tr>
<td></td>
<td></td>
<td>0.893</td>
<td></td>
<td>-85,728</td>
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<tr>
<td></td>
<td></td>
<td>1.000</td>
<td></td>
<td>-708,028</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>0.977</td>
<td></td>
<td>-788,365</td>
<td></td>
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<td></td>
<td></td>
<td>0.943</td>
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<td>-66,162</td>
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<td>0.917</td>
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<td></td>
<td>0.917</td>
<td></td>
<td>-70,679</td>
<td></td>
</tr>
</tbody>
</table>
Cumulative Cost

Payback Period
1 Year

Figure 3.5. Payback Period for the Proposed System.
Net Present Value (NPV)

Net Present Value is a sophisticated capital budgeting technique, which is calculated by subtracting the project’s initial investment cost from the present value of cash inflows discounted at a rate to the firm’s cost of capital. The formula for net present value is:

\[
\text{Net present value} = \text{Present value of expected cash flows} - \text{Initial investment cost}
\]

The Net Present Value calculation will be shown in Table 3.11.

If NPV is more than zero, the project should be accepted. If NPV is less than zero, the project should be rejected. After NPV calculation, it is positively valued at 701,633 Baht and therefore, the proposed system should be accepted.
Table 3.11. Net Present Value Analysis, Baht.

<table>
<thead>
<tr>
<th>Cost Items</th>
<th>Year 0</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development cost:</td>
<td>-622,300</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operation &amp; maintenance cost:</td>
<td>-96,000</td>
<td>-100,800</td>
<td>-105,840</td>
<td>-111,132</td>
<td>-116,688</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discount factors for 12%:</td>
<td>1.000</td>
<td>0.893</td>
<td>0.797</td>
<td>0.712</td>
<td>0.636</td>
<td>0.567</td>
<td></td>
</tr>
<tr>
<td>Present value of annual costs:</td>
<td>-622,300</td>
<td>-85,728</td>
<td>-80,337</td>
<td>-75,358</td>
<td>-70,679</td>
<td>-66,162</td>
<td>-1,000,564</td>
</tr>
<tr>
<td>Total present value of lifetime costs:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-1,000,564</td>
</tr>
<tr>
<td>Benefits derived from operation of new system:</td>
<td>0</td>
<td>432,000</td>
<td>453,600</td>
<td>476,280</td>
<td>500,094</td>
<td>525,099</td>
<td>525,099</td>
</tr>
<tr>
<td>Discount factors for 12%:</td>
<td>1.000</td>
<td>0.893</td>
<td>0.797</td>
<td>0.712</td>
<td>0.636</td>
<td>0.567</td>
<td></td>
</tr>
<tr>
<td>Present value of annual benefits:</td>
<td>0</td>
<td>385,776</td>
<td>361,519</td>
<td>339,111</td>
<td>318,060</td>
<td>297,731</td>
<td>297,731</td>
</tr>
<tr>
<td>Total present value of lifetime benefits:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1,702,197</td>
</tr>
<tr>
<td>Net Present Value:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>701,633</td>
</tr>
</tbody>
</table>
IV. PROJECT IMPLEMENTATION

4.1 Overview of Project Implementation

The implementation of the proposed system is initiated by surveying the current existing system. We identify tasks, data flows, and inmost predicaments in order to comprehend and eliminate these problems. Thereafter, we attain the project scope and objectives, then we are able to write down the user requirements accordingly.

The next step is to design the system. We define the candidate solutions and choose the best candidates based on the most remunerative one by committing cost-benefits analysis. Afterwards, we design the database, interface, and output as user requirements.

The last step, we construct and test the system prototype to find any possible difficulties and errors that might arise from the proposed system. We also need to train the users and the human resource department officers, to comprehend the newly installed test system. And if there is no problem found after running the production test to search for obstacles, we can officially inaugurate this new system to the department.

Overview of the project implementation is as follows:

(1) System Analysis
(2) System Design
(3) System Implementation
   (a) Program Coding
   (b) Program Testing
   (c) Program Training
   (d) Program Conversion
4.2 System Analysis

In system analysis phase, we summarize in-depth underlying problems of the current existing manual system, and we use that information in preparing the project. We study the flow of the data along with the basic processes of the organization and we additionally obtain the user requirements.

4.3 System Design

At this phase, we choose the most remunerative one from available candidate solutions. Then, we proceed to design input, output and user interface to meet user requirements.

4.4 System Implementation

To complete the proposed system, we have to create a real program, which is compatible with the user requirements and given environment.

The tools that we select are Delphi and Microsoft Visual Interdev. Programmers create user-friendly interface by Delphi and make a linkage to the database. With flexibility features of Delphi, users can send queries, making reports, easily and effectively organizing the entirely information.

After creating a program, hardware, software and office components are put together to demonstrate the real coding environment and construct a prototype system. We run the test to check whether the proposed system is running smoothly with the entire environment.

4.4.1 Program Coding

As mentioned, we choose Delphi to be our interface and language controlling database.

We have to design an appropriate database structure to support the inclusive proposed system. Thereafter, we start program coding at each module of the system,
firstly, Leave and Attendance function, which is integrated with the time card system. We program this function in a way that the program can retrieve the employee’s ID card information from the time card system daily. Then we finish programming in Employee Information, Benefit management, Training, Recruitment, and Report processing, then we proceed to merge each module into complete single application.

4.4.2 Program Testing

It’s the time to demonstrate the testing procedure for analyzing and evaluating the overall performance of the system. We must commit the test thoroughly in order to obtain complete summary of the test program. The stages of testing are listed below.

(1) Sub Testing

Programmer conducts this test to look for any possible hidden bug of the program.

(a) Code testing

This test is demonstrated to check the program execution.

(b) Module testing

This test is demonstrated to check the performance of each module of the program.

(c) Specification testing

This test is demonstrated to check the module whether it covers the specification.

(2) System Testing

When we assemble every module of the program to function as a complete set, this test is demonstrated to check the system integrity.
(3) Special System Testing

The final test is conducted for optimum performance evaluation, we determine how the system performs under the peak load job circumstance, recovery test, storage test, human performance test.

4.4.3 Program Training

In order to maximize the overall performance after the inauguration of system, it is very important to ensure that users are sufficiently knowledgeable to manage the system. It is obligatory that users be familiar with the new system before operating full function. The training will last one-week so if there are any unexpected errors found, they can be resolved in time.

4.4.4 Program Conversion

Parallel conversion will be designed; it is the strategy where the existing system and the proposed system are implemented simultaneously for a certain period of time. This plan is organized and operated to ensure that the new system could be flawless by the time the organization deploys the new system to its full extent.

According to the fact that the existing is manual, it is not likely to be such an easy process in converting the existing system into a fully computerized one. The routine activities and personnel officers need to be well prepared, additionally, there might occur some unforeseen damage, so it is suggested to implement conversion plan.

The parallel conversion plan is estimated to take one month to complete before the new system can be fully deployed.
5.1 Conclusions

The Degree of Achievement of the proposed system compared with the existing system

Table 5.1. shows the comparison of usage time between existing manual system and computerized system. According to the table, each process that is handled by existing manual system is more time consuming than process which is handled by the computerized system. The completely computerized system can eliminate unnecessary steps in a process and because of its efficiency to reduce time consuming.

<table>
<thead>
<tr>
<th>Process</th>
<th>Existing System</th>
<th>Proposed System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Record Leave and Attendance</td>
<td>2 Hours</td>
<td>30 Minutes</td>
</tr>
<tr>
<td>Process Benefit Information</td>
<td>1 Hour</td>
<td>5 Seconds</td>
</tr>
<tr>
<td>Process Employee Information</td>
<td>45 Minutes</td>
<td>3 Minutes</td>
</tr>
<tr>
<td>Process Generate Report</td>
<td>50 Minutes</td>
<td>4 Seconds</td>
</tr>
<tr>
<td>Query</td>
<td>30 Minutes</td>
<td>2 Seconds</td>
</tr>
</tbody>
</table>

The existing manual system in Human Resource Department is becoming not likely to be practical and productive as the information has been swelling and even more complex than before. Human Resource Officers are having such a difficult time to go through the files in hard copy format looking for a particularly needed information. While the process takes a lot of time to complete, errors also arise easily.

Usually, the existing manual system is responsible in handling data of Employee information, Leave and Attendance information, Benefit information, Appraisal plan, Training information, and Report production. Each process is involved with an
enormous amount of paper. Human resource officers find it strenuous in keeping all this information up-to-date. Evidently, for instance, in processing employee information and training activities, the data must be accurate and current for proper data analysis in determining the appropriate training session.

The data of Leave and Attendance is dramatically increasing because of pulsate human errors from daily process that Human Resource officers have to manage data every single day. It is considerably inextricable to obtain few records out of big pile of papers organized in manual behavior in limited amount of time. With the perpetual problems, as mentioned, brings difficulty to processing report as required.

Introduced problems as mentioned above can be figured out by establishing the newly proposed system. With the hand of computerization, errors are finally eradicated and operating every function will be improved, comfortable and less troublesome. The proposed system can manage the bulk of data very well since the data will be kept in the database and users feel free to retrieve the data any time they wish.

Keeping the data up-to-date will be no longer a laborious task to do so. Users will find it easily and less time consuming in updating the data in the database through the user-friendly interface. To give an example, Leave and Attendance data are gathered everyday, the ability to retrieve data directly from the punching machine will cut off the excessive effort in collecting those data in existing manual system. Every function will be automated, therefore, data processing will have yielded very less response time, when compared to the existing manual system, which enables the highly effective overall performance to happen.
5.2 Recommendations

It takes time before Human Resource officers can be familiar and able to operate the new system smoothly so prior training is needed along with intensive monitoring in the very beginning of the new system. And as we designed the parallel conversion, it needs to keep conducting the manual system until the new system is running well all the whole operation.

The capable new system is able to utilize the information for periodic analysis, future reference and report. It is very easy and convenient to choose the proper employees that need to be trained, also proceed with the recruitment from proper applicants, which are stored in database and generate report as required.

In expectation that in the very near future, the company will expand and, to have the entire process running effectively at the bigger frame, the company should prepare the plan on increasing the computer usage. When the new system starts, partial financial information will be accessed to facilitate the work of Payroll Department at some level. Therefore, the company might consider constructing the wholly computerized payroll information system after Human Resource Information System is well organized. The company can also consider adopting a computerized system to the other department.

The company also has to take care of regarding the issue of system security in terms of authorization and electricity failure. The system must be highly secure, so the password authentication policy is motivated. Also consideration of the policy of system back up at an appropriate period of time.
APPENDIX A
DATA FLOW DIAGRAM
Figure A.1. Data Flow Diagram of Process Leave and Attendance.
Figure A.2. Data Flow Diagram of Process Employee Information.
Figure A.3. Data Flow Diagram of Process Benefit Information.
Figure A.5. Data Flow Diagram of Process Recruitment Information.
Add employee record
Location:
DFD of Update Employee File ( 0 )
Source: Add New employee record ( Process )
Dest: Employee Record ( Data Store )

Added Applicant Record
Location:
DFD of Update Applicant n Employee File ( 0 )
Source: Write New Applicant Record to Employee ( Process )
Dest: Employee Record ( Data Store )

Applicant and Interview Info.
Location:
DFD of Gather Data Entry ( 0 )
Source: Enter Applicant Detail and Interview Data ( Process )
Dest: Transform Function of Gather Data ( Process )

Applicant and Interview Record to be stored
Location:
DFD of Gather Data Entry ( 0 )
Source: Transform Function of Gather Data ( Process )
Dest: Store Applicant and Interview Result ( Process )

Applicant Data
Location:
DFD of Approval Update ( 0 )
Source: Applicant Record ( Data Store )
Dest: Read Applicant Detail ( Process )

Applicant Detail
Location:
DFD of Process Recruitment Info. ( 0 )
Source: Applicant ( External Entity )
Dest: Process Gather Date Entry ( Process )

DFD of Gather Data Entry ( 0 )
Source: Applicant ( External Entity )
Dest: Enter Applicant Detail and Interview Data ( Process )

DFD of Update Applicant n Employee File ( 0 )
Source: Applicant Record ( Data Store )
Dest: Read Applicant List ( Process )

48
Applicant Info.

Location:

**Context of Proposed System ( CONTEXT )**

Source: Applicant ( External Entity )

Dest: Human Resource Record System ( Process )

**DFD of Proposed System ( 0 )**

Source: Process Recruitment ( Process )

Dest: Applicant Record ( Data Store )

**DFD of Process Recruitment Info. ( 0 )**

Source: Process Gather Date Entry ( Process )

Dest: Applicant Record ( Data Store )

**DFD of Approval Update ( 0 )**

Source: Read Applicant Detail ( Process )

Dest: Transform Function of Approval ( Process )

**DFD of Proposed System ( 0 )**

Source: Applicant ( External Entity )

Dest: Process Recruitment ( Process )

---

Applicant Qualification and Interview Result

Location:

**Context of Proposed System ( CONTEXT )**

Source: Human Resource Record System ( Process )

Dest: Applicant ( External Entity )

---

Applicant Record

Location:

**DFD of Process Recruitment Info. ( 0 )**

Source: Applicant Record ( Data Store )

Dest: Process Approval Update ( Process )

**DFD of Update Applicant n Employee File ( 0 )**

Source: Read Applicant List ( Process )

Dest: Transaction Center of Update Files ( Process )

---

Applicant Record to be Added

Location:

**DFD of Update Applicant n Employee File ( 0 )**

Source: Process of Applicant Record Creation ( Process )

Dest: Write New Applicant Record to Employee ( Process )

---

Applicant Record to be Deleted

Location:

**DFD of Update Applicant n Employee File ( 0 )**

Source: Process of Applicant Record Deletion ( Process )

Dest: Delete Applicant Record ( Process )

---

49
Applicant Record to be Stored

Data Flow

Location:

DFD of Approval Update (0)
Source: Transform Function of Approval (Process)
Dest: Store Recruitment Data (Process)

Applicant Record to be Updated

Data Flow

Location:

DFD of Update Applicant n Employee File (0)
Source: Process of Applicant Record Updating (Process)
Dest: Update Applicant Record to Employee (Process)

Appraisal Data

Data Flow

Location:

DFD of Process Appraisal Report (0)
Source: Appraisal (Data Store)
Dest: Read Appraisal Data (Process)

Appraisal Info.

Data Flow

Location:

DFD of Proposed System (0)
Source: Process Appraisal Info. (Process)
Dest: Appraisal (Data Store)

DFD of Process Appraisal Info. (0)
Source: Appraisal (Data Store)
Dest: Process Appraisal Report and Answer (Process)

Appraisal Record

Data Flow

Location:

DFD of Process Appraisal Report (0)
Source: Read Appraisal Data (Process)
Dest: Transform Function of Process Report (Process)

Appraisal Result

Data Flow

Location:

DFD of Process Appraisal Info. (0)
Source: Process Appraisal (Process)
Dest: Appraisal (Data Store)
**Appraisal Update**

**Location:**

**DFD of Process Appraisal (0)**

**Source:** Transform Function of Process Appraisal (Process)

**Dest:** Store Record (Process)

---

**Approval**

**Location:**

**DFD of Process Recruitment Info. (0)**

**Source:** Managing Director or Related Manager (External Entity)

**Dest:** Process Approval Update (Process)

---

**Approval Updated Detail**

**Location:**

**DFD of Process Recruitment Info. (0)**

**Source:** Process Approval Update (Process)

**Dest:** Recruitment (Data Store)

---

**Benefit Detail**

**Location:**

**DFD of Proposed System (0)**

**Source:** Employee (External Entity)

**Dest:** Process Benefit (Process)

---

**Benefit Record**

**Location:**

**DFD of Process Benefit Info. (0)**

**Source:** Financial Compensation (Data Store)

**Dest:** Process Benefit Report and Answer (Process)

---

**Benefit Record to be Printed**

**Location:**

**DFD of Process Benefit Report (0)**

**Source:** Transform Function of Process Benefit Report (Process)

**Dest:** Print Benefit Report and Answer (Process)

---

**Daily Attendance Info.**

**Location:**

**DFD of Process Leave n Attendance (0)**

**Source:** Employee (External Entity)

**Dest:** Process Record Daily Attendance (Process)

**DFD of Process Attendance Checking (0)**

**Source:** Employee (External Entity)
Dest: Read Daily Attendance (Process)

Daily Attendance Info. to be stored
Location: DFD of Process Attendance Checking (0)
Source: Transform Function of Attendance Checking (Process)
Dest: Store Attendance Data (Process)

Daily Attendance Record
Location: DFD of Process Attendance Checking (0)
Source: Read Daily Attendance (Process)
Dest: Transform Function of Attendance Checking (Process)

Daily Check Out Time
Location: DFD of Process Leave n Attendance (0)
Source: Process Record Daily Attendance (Process)
Dest: Overtime (Data Store)

Daily Late Detail
Location: DFD of Process Leave n Attendance (0)
Source: Process Record Daily Attendance (Process)
Dest: Late (Data Store)

Daily Late Info.
Location: DFD of Proposed System (0)
Source: Process Record Leave and Attendance (Process)
Dest: Late (Data Store)

Daily Leave and Attendance Checking
Location: DFD of Proposed System (0)
Source: Employee (External Entity)
Dest: Process Record Leave and Attendance (Process)
Daily Leave Info. Data Flow

Location:

DFD of Proposed System ( 0 )
Source: Process Record Leave and Attendance ( Process )
Dest: Leave ( Data Store )

DFD of Process Leave n Attendance ( 0 )
Source: Leave ( Data Store )
Dest: Process Leave and Attendance Report and Answer ( Process )

DFD of Process Leave Checking ( 0 )
Source: Enter Leave Info. ( Process )
Dest: Transform Function of Record Leave Info. ( Process )

Daily Overtime Info. Data Flow

Location:

DFD of Proposed System ( 0 )
Source: Process Record Leave and Attendance ( Process )
Dest: Overtime ( Data Store )

Deleted Applicant Record Data Flow

Location:

DFD of Update Applicant n Employee File ( 0 )
Source: Delete Applicant Record ( Process )
Dest: Applicant Record ( Data Store )

Deleted employee record Data Flow

Location:

DFD of Update Employee File ( 0 )
Source: Delete employee record ( Process )
Dest: Employee Record ( Data Store )

Employee Data Data Flow

Location:

DFD of Gather Employee Detail ( 0 )
Source: Employee ( External Entity )
Dest: Enter Employee Detail ( Process )

DFD of Update Employee File ( 0 )
Source: Employee Record ( Data Store )
Dest: Read Employee Detail ( Process )

DFD of Process Employee Report ( 0 )
Source: Employee Record ( Data Store )
Dest: Read Employee Data ( Process )

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Employee Detail Data Flow

Location:

DFD of Proposed System (0)
Source: Employee (External Entity)
Dest: Process Employee Info. (Process)

DFD of Process Employee Info. (0)
Source: Employee (External Entity)
Dest: Process Employee Detail (Process)

DFD of Process Appraisal Report (0)
Source: Employee Record (Data Store)
Dest: Read Employee Info. (Process)

DFD of Update Applicant n Employee File (0)
Source: Employee Record (Data Store)
Dest: Read Employee List (Process)

Employee Info.

Location:

Context of Proposed System (CONTEXT)
Source: Employee (External Entity)
Dest: Human Resource Record System (Process)
Source: Human Resource Record System (Process)
Dest: Payroll Department (External Entity)
Source: Human Resource Record System (Process)
Dest: Other Department (External Entity)

DFD of Proposed System (0)
Source: Process Employee Info. (Process)
Dest: Employee Record (Data Store)
Source: Employee Record (Data Store)
Dest: Training Department (External Entity)

DFD of Process Employee Info. (0)
Source: Process Employee Detail (Process)
Dest: Employee Record (Data Store)
Source: Employee Record (Data Store)
Dest: Process Update Employee File (Process)
Source: Employee Record (Data Store)
Dest: Process Employee Report and Answer (Process)

Employee Late Record

Location:

DFD of Proposed System (0)
Source: Late (Data Store)
Dest: Payroll Department (External Entity)

Employee Leave Record

Location:

DFD of Proposed System (0)
Source: Leave (Data Store)
Dest: Payroll Department (External Entity)
Employee Overtime Record

Location:
- **DFD of Proposed System** (0)
  - Source: Overtime (Data Store)
  - Dest: Payroll Department (External Entity)

Employee Record

Location:
- **DFD of Gather Employee Detail** (0)
  - Source: Enter Employee Detail (Process)
  - Dest: Transform Function of Gather Detail (Process)
- **DFD of Update Employee File** (0)
  - Source: Read Employee Detail (Process)
  - Dest: Transaction Center of Update Detail (Process)
- **DFD of Process Employee Report** (0)
  - Source: Read Employee Data (Process)
- **DFD of Process Appraisal Report** (0)
  - Source: Read Employee Info. (Process)
  - Dest: Transform Function of Process Report (Process)
- **DFD of Update Applicant Employee File** (0)
  - Source: Read Employee List (Process)
  - Dest: Transaction Center of Update Files (Process)

Employee Record and if Requested Report and Answer

Location:
- **DFD of Process Employee Info.** (0)
  - Source: Process Employee Report and Answer (Process)
  - Dest: Employee Info. Management Section (External Entity)

Employee Record to be Added

Location:
- **DFD of Update Employee File** (0)
  - Source: Process to Add New employee record (Process)
  - Dest: Add New employee record (Process)

Employee Record to be Deleted

Location:
- **DFD of Update Employee File** (0)
  - Source: Process to Delete employee record (Process)
  - Dest: Delete employee record (Process)
Employee Record to be Printed
Location: DFD of Process Employee Report (0)
Dest: Print Employee Record and Answer (Process)

Employee Record to be Stored
Location: DFD of Gather Employee Detail (0)
Source: Transform Function of Gather Detail (Process)
Dest: Store Employee Detail (Process)

Employee Record to be Updated
Location: DFD of Update Employee File (0)
Source: Process to Update employee record (Process)
Dest: Updated employee record (Process)

Evaluation Info.
Location: DFD of Process Appraisal (0)
Source: Evaluation (Data Store)
Dest: Read Evaluation Data (Process)
DFD of Process Appraisal Report (0)
Source: Evaluation (Data Store)
Dest: Read Evaluation Record (Process)

Evaluation Record
Location: DFD of Process Appraisal (0)
Source: Read Evaluation Data (Process)
Dest: Transform Function of Process Appraisal (Process)
DFD of Process Appraisal Report (0)
Source: Read Evaluation Record (Process)
Dest: Transform Function of Process Report (Process)

Evaluation Result from Manager Dept.
Location: DFD of Proposed System (0)
Source: Evaluation (Data Store)
Dest: Process Appraisal Info. (Process)
DFD of Process Appraisal Info. (0)
Source: Evaluation (Data Store)
Financial Compensation Detail
Location:
<table>
<thead>
<tr>
<th>DFD of Process Financial Compensation (0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source: Employee (External Entity)</td>
</tr>
<tr>
<td>Dest: Enter Financial Compensation Record (Process)</td>
</tr>
</tbody>
</table>

Financial Compensation Entry
Location:
<table>
<thead>
<tr>
<th>DFD of Process Benefit Info. (0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source: HR Officer (External Entity)</td>
</tr>
<tr>
<td>Dest: Process Financial Compensation (Process)</td>
</tr>
</tbody>
</table>

Financial Compensation Info.
Location:
<table>
<thead>
<tr>
<th>DFD of Process Benefit Info. (0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source: Process Update Balance of Financial Compensation (Process)</td>
</tr>
<tr>
<td>Dest: Financial Compensation (Data Store)</td>
</tr>
<tr>
<td>Source: Process Financial Compensation (Process)</td>
</tr>
<tr>
<td>Dest: Financial Compensation (Data Store)</td>
</tr>
</tbody>
</table>

Financial Compensation Record
Location:
<table>
<thead>
<tr>
<th>DFD of Process Financial Compensation (0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source: Enter Financial Compensation Record (Process)</td>
</tr>
<tr>
<td>Dest: Transform Function of Financial Compensation (Process)</td>
</tr>
</tbody>
</table>

Financial Compensation to be Stored
Location:
<table>
<thead>
<tr>
<th>DFD of Process Financial Compensation (0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source: Transform Function of Financial Compensation (Process)</td>
</tr>
<tr>
<td>Dest: Store Financial Compensation (Process)</td>
</tr>
</tbody>
</table>
Financial Related Info. of Employee

Context of Proposed System (CONTEXT)
Source: Payroll Department (External Entity)
Dest: Human Resource Record System (Process)

Interview Comment and Result

DFD of Proposed System (0)
Source: Interviewer (External Entity)
Dest: Process Recruitment (Process)
Source: Process Recruitment (Process)
Dest: Managing Director (External Entity)

Interview Data

DFD of Gather Data Entry (0)
Source: Interviewer (External Entity)
Dest: Enter Applicant Detail and Interview Data (Process)

DFD of Approval Update (0)
Source: Interview (Data Store)
Dest: Read Interview Result (Process)

Interview Info.

DFD of Proposed System (0)
Source: Process Recruitment (Process)
Dest: Interview Result (Data Store)

Interview Info.

DFD of Approval Update (0)
Source: Read Interview Result (Process)
Dest: Transform Function of Approval (Process)

Interview Result Detail

DFD of Process Recruitment Info. (0)
Source: Process Gather Date Entry (Process)
Dest: Interview Result (Data Store)
Interview Result Info.
Location:

<table>
<thead>
<tr>
<th>Data Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>DFD of Process Recruitment Info. (0)</td>
</tr>
<tr>
<td>Source: Interview Result (Data Store)</td>
</tr>
<tr>
<td>Dest: Process Approval Update (Process)</td>
</tr>
</tbody>
</table>

Interviewer Comment Result
Location:

<table>
<thead>
<tr>
<th>Data Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>DFD of Process Recruitment Info. (0)</td>
</tr>
<tr>
<td>Source: Interviewer (External Entity)</td>
</tr>
<tr>
<td>Dest: Process Gather Date Entry (Process)</td>
</tr>
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</table>

Late Info.
Location:

<table>
<thead>
<tr>
<th>Data Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>DFD of Process Appraisal Info. (0)</td>
</tr>
<tr>
<td>Source: Late (Data Store)</td>
</tr>
<tr>
<td>Dest: Process Appraisal (Process)</td>
</tr>
<tr>
<td>DFD of Process Leave n Attendance Report (0)</td>
</tr>
<tr>
<td>Source: Late (Data Store)</td>
</tr>
<tr>
<td>Dest: Read Late File (Process)</td>
</tr>
<tr>
<td>DFD of Process Appraisal (0)</td>
</tr>
<tr>
<td>Source: Late (Data Store)</td>
</tr>
<tr>
<td>Dest: Read Late Info. (Process)</td>
</tr>
</tbody>
</table>

Late Record
Location:

<table>
<thead>
<tr>
<th>Data Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>DFD of Process Leave n Attendance Report (0)</td>
</tr>
<tr>
<td>Source: Read Late File (Process)</td>
</tr>
<tr>
<td>Dest: Transform Function of Process Leave and Attendance Report (Process)</td>
</tr>
<tr>
<td>DFD of Process Appraisal (0)</td>
</tr>
<tr>
<td>Source: Read Late Info. (Process)</td>
</tr>
<tr>
<td>Dest: Transform Function of Process Appraisal (Process)</td>
</tr>
</tbody>
</table>

Leave and Attendance Info.
Location:

<table>
<thead>
<tr>
<th>Data Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Context of Proposed System (CONTEXT)</td>
</tr>
<tr>
<td>Source: Human Resource Record System (Process)</td>
</tr>
<tr>
<td>Dest: Payroll Department (External Entity)</td>
</tr>
</tbody>
</table>

Leave and Attendance Record and if Requested Report and Answer
Location:

<table>
<thead>
<tr>
<th>Data Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>DFD of Process Leave n Attendance (0)</td>
</tr>
<tr>
<td>Source: Process Leave and Attendance Report and Answer</td>
</tr>
</tbody>
</table>
(Process)
Dest: Payroll Department (External Entity)
Source: Process Leave and Attendance Report and Answer (Process)
Dest: Employee Info. Section (External Entity)

----------------------------------------

Leave and Attendance Record to be Printed
Data Flow
Location:

DFD of Process Leave n Attendance Report (0)
Dest: Print Leave and Attendance Report (Process)

----------------------------------------

Leave and Attendance Report
Data Flow
Location:

Context of Proposed System (CONTEXT)
Source: Human Resource Record System (Process)
Dest: Employee (External Entity)
DFD of Process Leave n Attendance (0)
Source: Process Leave and Attendance Report and Answer (Process)
Dest: Employee (External Entity)

----------------------------------------

Leave Info.
Data Flow
Location:

DFD of Process Leave n Attendance (0)
Source: Process Leave Info. (Process)
Dest: Leave (Data Store)
DFD of Process Appraisal Info. (0)
Source: Leave (Data Store)
Dest: Process Appraisal (Process)
DFD of Process Leave n Attendance Report (0)
Source: Leave (Data Store)
Dest: Read Leave File (Process)
DFD of Process Appraisal (0)
Source: Leave (Data Store)
Dest: Read Leave Info. (Process)

----------------------------------------

Leave Info. added by HR Officer
Data Flow
Location:

DFD of Process Leave n Attendance (0)
Source: Human Resource Officer (External Entity)
Dest: Process Leave Info. (Process)
Leave Record
Location:

**DFD of Process Leave n Attendance Report (0)**
Source: Read Leave File (Process)
Dest: Transform Function of Process Leave and Attendance Report (Process)

**DFD of Process Appraisal (0)**
Source: Read Leave Info. (Process)
Dest: Transform Function of Process Appraisal (Process)

---

Leave Record to be stored
Location:

**DFD of Process Leave Checking (0)**
Source: Transform Function of Record Leave Info. (Process)
Dest: Store Leave Info. (Process)

---

List of Applicant to be Employee
Location:

**DFD of Process Recruitment Info. (0)**
Source: Update Applicant File and Employee (Process)
Dest: Employee Record (Data Store)

---

Medical Data Submission
Location:

**DFD of Process Collect Request (0)**
Source: Employee (External Entity)
Dest: Enter Medical Info. (Process)

---

Medical Info.
Location:

**DFD of Proposed System (0)**
Source: Process Benefit (Process)
Dest: Medical Treatment (Data Store)

**DFD of Process Benefit Report (0)**
Source: Medical Treatment (Data Store)
Dest: Read Medical Treatment Info. (Process)

---

Medical Record
Location:

**DFD of Process Collect Request (0)**
Source: Enter Medical Info. (Process)
Dest: Transform Function of Collect Request (Process)

**DFD of Process Benefit Report (0)**
Source: Read Medical Treatment Info. (Process)

Medical Record to be Stored
Location:
DFD of Process Collect Request (0)
Source: Transform Function of Collect Request (Process)
Dest: Store Medical Info. (Process)

Medical Treatment and Financial Compensation Data
Location:
DFD of Update Benefit Data (0)
Source: Financial Compensation (Data Store)
Dest: Read Financial Compensation Data (Process)

Medical Treatment and Financial Compensation Record
Location:
DFD of Update Benefit Data (0)
Source: Read Financial Compensation Data (Process)
Dest: Transaction Center of Update Benefit (Process)

Medical Treatment Data
Location:
DFD of Update Benefit Data (0)
Source: Medical Treatment (Data Store)
Dest: Read Medical Treatment Data (Process)

Medical Treatment Info.
Location:
DFD of Process Benefit Info. (0)
Source: Medical Treatment (Data Store)
Dest: Process Update Balance of Financial Compensation (Process)
Source: Medical Treatment (Data Store)
Dest: Process Benefit Report and Answer (Process)

Medical Treatment Record
Location:
DFD of Process Benefit Info. (0)
Source: Process Collect Request (Process)
Dest: Medical Treatment (Data Store)
DFD of Update Benefit Data (0)
Source: Read Medical Treatment Data (Process)
Dest: Transaction Center of Update Benefit (Process)
Overtime Info.

Location:

**DFD of Process Leave n Attendance** (0)
- **Source:** Overtime (Data Store)
- **Dest:** Process Leave and Attendance Report and Answer (Process)

**DFD of Process Appraisal Info.** (0)
- **Source:** Overtime (Data Store)
- **Dest:** Process Appraisal (Process)

**DFD of Process Leave n Attendance Report** (0)
- **Source:** Overtime (Data Store)
- **Dest:** Read Overtime File (Process)

**DFD of Process Appraisal** (0)
- **Source:** Overtime (Data Store)
- **Dest:** Read Overtime Data (Process)

Overtime Record

Location:

**DFD of Process Leave n Attendance Report** (0)
- **Source:** Read Overtime File (Process)
- **Dest:** Transform Function of Process Leave and Attendance Report (Process)

**DFD of Process Appraisal** (0)
- **Source:** Read Overtime Data (Process)
- **Dest:** Transform Function of Process Appraisal (Process)

Perspective Training Employee Info.

Location:

**Context of Proposed System** (CONTEXT)
- **Source:** Human Resource Record System (Process)
- **Dest:** Training Department (External Entity)

Record to be Added

Location:

**DFD of Update Benefit Data** (0)
- **Source:** Process to Add Benefit Record (Process)
- **Dest:** Write New Benefit Record (Process)

Record to be Deleted

Location:

**DFD of Update Benefit Data** (0)
- **Source:** Process to Delete Benefit Record (Process)
- **Dest:** Delete Benefit Record (Process)
Record to be Printed
Location:
- DFD of Process Appraisal Report (0)
  Dest: Print Appraisal Report and Answer (Process)

Record to be Updated
Location:
- DFD of Update Benefit Data (0)
  Source: Process to Update Benefit Record (Process)
  Dest: Modify Benefit Record (Process)

Recruitment Data
Location:
- DFD of Process Recruitment Report (0)
  Source: Recruitment (Data Store)
  Dest: Read Recruitment Data (Process)

Recruitment Detail
Location:
- DFD of Update Applicant n Employee File (0)
  Source: Recruitment (Data Store)
  Dest: Read Recruitment Detail (Process)

Recruitment Info.
Location:
- DFD of Process Recruitment Info. (0)
  Source: Recruitment (Data Store)
  Dest: Read Recruitment Data (Process)
  Source: Update Applicant File and Employee (Process)
  Dest: Process Recruitment Report and Answer (Process)

Recruitment Record
Location:
- DFD of Update Applicant n Employee File (0)
  Source: Read Recruitment Detail (Process)
  Dest: Transaction Center of Update Files (Process)
- DFD of Process Recruitment Report (0)
  Source: Read Recruitment Data (Process)
  Dest: Transform Function of Process Report (Process)
Recruitment Record and if requested Report and Answer Data Flow
Location:
DFD of Process Recruitment Info. (0)
Source: Process Recruitment Report and Answer (Process)
Dest: HR Department (External Entity)

Recruitment Record to be Printed Data Flow
Location:
DFD of Process Recruitment Report (0)
Dest: Print Recruitment Report (Process)

Recruitment Request and Performance Evaluation Report Data Flow
Location:
Context of Proposed System (CONTEXT)
Source: Other Department (External Entity)
Dest: Human Resource Record System (Process)

Recruitment Result Data Flow
Location:
DFD of Proposed System (0)
Source: Process Recruitment (Process)
Dest: Recruitment (Data Store)

Request Benefit Submission Data Flow
Location:
DFD of Process Benefit Info. (0)
Source: Employee (External Entity)
Dest: Process Collect Request (Process)

Request for Report and Query Data Flow
Location:
Context of Proposed System (CONTEXT)
Source: Managing Director (External Entity)
Dest: Human Resource Record System (Process)

Requested Appraisal Report and Answer Data Flow
Location:
DFD of Process Appraisal Info. (0)
Source: Process Appraisal Report and Answer (Process)
Dest: Managing Director (External Entity)
Source: Process Appraisal Report and Answer (Process)
Dest: Payroll Department (External Entity)
Requested Attendance Report and Answer

Location:
DFD of Process Leave and Attendance
Source: Process Leave and Attendance Report and Answer (Process)
Dest: Managing Director (External Entity)

Requested Benefit Report and Answer

Location:
DFD of Process Benefit Info
Source: Process Benefit Report and Answer (Process)
Dest: Managing Director (External Entity)

Requested Employee Report and Answer

Location:
DFD of Process Employee Info
Source: Process Employee Report and Answer (Process)
Dest: Managing Director (External Entity)

Requested Recruitment Report and Answer

Location:
DFD of Process Recruitment Info
Source: Process Recruitment Report and Answer (Process)
Dest: Managing Director (External Entity)

Requested Report and Answer

Location:
Context of Proposed System (CONTEXT)
Source: Human Resource Record System (Process)
Dest: Managing Director (External Entity)

Salary Detail

Location:
DFD of Process Appraisal Info
Source: Employee Record (Data Store)
Dest: Process Appraisal Report and Answer (Process)

Salary Rate

Location:
DFD of Proposed System
Source: Employee Record (Data Store)
Dest: Process Appraisal Info (Process)
Salary Rate Change
Location: DFD of Process Appraisal Info
Source: Process Appraisal (Process)
Dest: Employee Record (Data Store)

Store Applicant Record
Location: DFD of Gather Data Entry
Source: Store Applicant and Interview Result (Process)
Dest: Applicant Record (Data Store)

DFD of Approval Update
Source: Store Recruitment Data (Process)
Dest: Recruitment (Data Store)

Store Interview Record
Location: DFD of Gather Data Entry
Source: Store Applicant and Interview Result (Process)
Dest: Interview Result (Data Store)

Stored Appraisal Record
Location: DFD of Process Appraisal
Source: Store Record (Process)
Dest: Appraisal (Data Store)
Source: Store Record (Process)
Dest: Employee Record (Data Store)

Stored Employee Record
Location: DFD of Gather Employee Detail
Source: Store Employee Detail (Process)
Dest: Employee Record (Data Store)

Stored Financial Compensation Record
Location: DFD of Process Financial Compensation
Source: Store Financial Compensation (Process)
Dest: Financial Compensation (Data Store)
Stored Late Record
Location:
DFD of Process Attendance Checking ( 0 )
Source: Store Attendance Data ( Process )
Dest: Late ( Data Store )

Stored Leave Record
Location:
DFD of Process Leave Checking ( 0 )
Source: Store Leave Info. ( Process )
Dest: Leave ( Data Store )

Stored Medical Record
Location:
DFD of Process Collect Request ( 0 )
Source: Store Medical Info. ( Process )
Dest: Medical Treatment ( Data Store )

Stored Overtime Record
Location:
DFD of Process Attendance Checking ( 0 )
Source: Store Attendance Data ( Process )
Dest: Overtime ( Data Store )

Training Course Info.
Location:
Context of Proposed System ( CONTEXT )
Source: Training Department ( External Entity )
Dest: Human Resource Record System ( Process )

Training Detail
Location:
DFD of Proposed System ( 0 )
Source: Process Employee Info. ( Process )
Dest: Training Record ( Data Store )

Training Info.
Location:
DFD of Process Appraisal ( 0 )
Source: Training Record ( Data Store )
Dest: Read History Training Data ( Process )
Training Record Data Flow

Location: DFD of Process Appraisal (0)
Source: Read History Training Data (Process)
Dest: Transform Function of Process Appraisal (Process)

Training Record of Employee
Location: DFD of Process Appraisal Info. (0)
Source: Training Record (Data Store)
Dest: Process Appraisal (Process)

Transaction of Applicant Creation
Location: DFD of Update Applicant n Employee File (0)
Source: Transaction Center of Update Files (Process)
Dest: Process of Applicant Record Creation (Process)

Transaction of Applicant Deletion
Location: DFD of Update Applicant n Employee File (0)
Source: Transaction Center of Update Files (Process)
Dest: Process of Applicant Record Deletion (Process)

Transaction of Applicant Updating
Location: DFD of Update Applicant n Employee File (0)
Source: Transaction Center of Update Files (Process)
Dest: Process of Applicant Record Updating (Process)

Transaction of employee record Creation
Location: DFD of Update Employee File (0)
Source: Transaction Center of Update Detail (Process)
Dest: Process to Add New employee record (Process)

Transaction of employee record Deletion
Location: DFD of Update Employee File (0)
Source: Transaction Center of Update Detail (Process)
Dest: Process to Delete employee record (Process)
Transaction of employee record Updating Data Flow
Location:
- DFD of Update Employee File (0)
  - Source: Transaction Center of Update Detail (Process)
  - Dest: Process to Update employee record (Process)

Transaction of Medical Treatment and Financial Compensation Creation Data Flow
Location:
- DFD of Update Benefit Data (0)
  - Source: Transaction Center of Update Benefit (Process)
  - Dest: Process to Add Benefit Record (Process)

Transaction of Medical Treatment and Financial Compensation Deleting Data Flow
Location:
- DFD of Update Benefit Data (0)
  - Source: Transaction Center of Update Benefit (Process)
  - Dest: Process to Delete Benefit Record (Process)

Transaction of Medical Treatment and Financial Compensation Updating Data Flow
Location:
- DFD of Update Benefit Data (0)
  - Source: Transaction Center of Update Benefit (Process)
  - Dest: Process to Update Benefit Record (Process)

Update Employee Record Data Flow
Location:
- DFD of Process Employee Info. (0)
  - Source: Process Update Employee File (Process)
  - Dest: Employee Record (Data Store)
- DFD of Update Employee File (0)
  - Source: Updated employee record (Process)
  - Dest: Employee Record (Data Store)

Updated Applicant Record Data Flow
Location:
- DFD of Update Applicant n Employee File (0)
  - Source: Update Applicant Record to Employee (Process)
  - Dest: Employee Record (Data Store)
Figure C.1. Data Flow Diagram of Process: Attendance Checking.
A = Daily Attendance Detail
B = Daily Late Detail
C = Daily Overtime Detail
D = Daily Leave Detail

Read Daily Leave and Attendance

Record Leave and Attendance

Transform Function of Record Leave and Attendance

B, C, D

Store Data

Figure C.2. Structure Chart of Process Attendance Checking.
Figure C.3. Data Flow Diagram of Process Leave and Attendance Report.
A = Existing Late Information
B = Existing Overtime Information
C = Existing Leave Information
D = Leave and Attendance Report
E = Summary of Attendance Report

Figure C.4. Structure Chart of Process Leave and Attendance Report.
APPENDIX C
STRUCTURE CHART
Figure C.5. Data Flow Diagram of Process Update Employee File.
Figure C.6. Structure Chart of Process Update Employee File.
Figure C.7. Data Flow Diagram of Process Training Record.
A = Training Course Info.
B = Employee Info.
C = Training Record Info.

Figure C.8. Structure Chart of Process Training Record.
Figure C.9. Data Flow Diagram of Process Employee Report.
A = Employee Information
B = Training Record Information

Figure C.10. Structure Chart of Process Employee Report.
Figure C.11: Data Flow Diagram of Process Benefit.
Figure C.12. Structure Chart of Process Benefit.

A = Benefit Detail
B = Medical Data
C = Financial Compensation Data

Process Benefit

A) Verify Benefit Data
B) Calculate Benefit Data
C) Store Benefit Data
Figure C.13. Data Flow Diagram of Process Update Benefit Data.
Figure C.14. Structure Chart of Process Update Benefit Data.
3.2.2 Medical Info.

3.2.3 Financial Compensation Info.

Figure C.15. Data Flow Diagram of Process Benefit Report.
A = Medical Treatment Information
B = Financial Compensation Information

Figure C.16. Structure Chart of Process Benefit Report.
Figure C.17. Data Flow Diagram of Process Appraisal.
A = Evaluation Detail
B = Existing Overtime Information
C = Training Record Information
D = Existing Leave Information
E = Existing Late Information
F = Appraisal Update Data

Figure C.18. Structure Chart of Process Appraisal.
Figure C.19. Data Flow Diagram of Process Appraisal Report.
Figure C.20. Structure Chart of Process Appraisal Report.
Figure C.21. Data Flow Diagram of Process Match Recruitment Requisition.
A = Applicant Detail
B = Recruitment Requisition
C = Applicant Data

Figure C.22. Structure Chart of Match Recruitment Requisition.
Figure C.23. Data Flow Diagram of Process Approval Update.
Figure C.24. Structure Chart of Process Approval Update.
Figure C.25. Data Flow Diagram of Process Update Applicant and Employee File.
Figure C.26. Structure Chart of Process Update Applicant and Employee File.
Figure C.27. Data Flow Diagram of Process Recruitment Report.
Figure C.28. Structure Chart of Process Recruitment Report.

A = Interview Data
B = Applicant Information
C = Employee Record Information

Read Interview Data
Read Applicant Data
Read Employee Record
Generate Report

A, B, C
APPENDIX D

PROCESS SPECIFICATION
Human Resource Record System
Description:
Context Diagram of the Proposed System
Process No.: 0
Location:

Context of Proposed System (CONTEXT)
Input Flows:
Employee Info.
Financial Related Info. of Employee
Applicant Info.
Training Course Info.
Request for Report and Query
Recruitment Request and Performance Evaluation Report
Output Flows:
Leave and Attendance Info.
Employee Info.
Applicant Qualification and Interview Result
Perspective Training Employee Info.
Requested Report and Answer
Employee Info.
Leave and Attendance Report

Enter Financial Compensation Record
Process No.: 1
Location:
DFD of Process Financial Compensation (0)
Input Flows:
Financial Compensation Detail
Output Flows:
Financial Compensation Record

Enter Leave Info.
Process No.: 1
Location:
DFD of Process Leave Checking (0)
Output Flows:
Daily Leave Info.

Process Appraisal
Process No.: 1
Location:
DFD of Process Appraisal Info. (0)
Input Flows:
Late Info.
Overtime Info.
Leave Info.
Training Record of Employee Evaluation Result from Manager Dept.
Output Flows:
Appraisal Result
Salary Rate Change

Process Collect Request
Process No.: 1
Location:
DFD of Process Benefit Info. (0)
Input Flows:
Request Benefit Submission
Output Flows:
Medical Treatment Record

Process Employee Detail
Process No.: 1
Location:
DFD of Process Employee Info. (0)
Input Flows:
Employee Detail
Output Flows:
Employee Info.

Process Gather Date Entry
Process No.: 1
Location:
DFD of Process Recruitment Info. (0)
Input Flows:
Applicant Detail
Interviewer Comment Result
Output Flows:
Applicant Info.
Interview Result Detail

Process Record Leave and Attendance
Description:
To gathering daily information of leave and attendance from the time card system and leave letter for evaluation and report.
Process No.: 1
Location:
DFD of Proposed System (0)
Input Flows:
Daily Leave and Attendance Checking
Output Flows:
Daily Late Info.
Daily Overtime Info.
Daily Leave Info.

Process Record Daily Attendance
Process No.: 1
Location:

DFD of Process Leave n Attendance (0)
Input Flows:
  Daily Attendance Info.
Output Flows:
  Daily Late Detail
  Daily Check Out Time

Enter Employee Detail
Process No.: 1
Location:

DFD of Gather Employee Detail (0)
Input Flows:
  Employee Data
Output Flows:
  Employee Record

Read Applicant Detail
Process No.: 1
Location:

DFD of Approval Update (0)
Input Flows:
  Applicant Data
Output Flows:
  Applicant Info.

Read Employee Detail
Process No.: 1
Location:

DFD of Update Employee File (0)
Input Flows:
  Employee Data
Output Flows:
  Employee Record

Read Evaluation Data
Process No.: 1
Location:

DFD of Process Appraisal (0)
Input Flows:
  Evaluation Info.
Output Flows:
Evaluation Record

Read Employee Data
Process No.: 1
Location:

DFD of Process Employee Report (0)
Input Flows:
Employee Data
Output Flows:
Employee Record

Read Late File
Process No.: 1
Location:

DFD of Process Leave and Attendance Report (0)
Input Flows:
Late Info.
Output Flows:
Late Record

Read Medical Treatment Info.
Process No.: 1
Location:

DFD of Process Benefit Report (0)
Input Flows:
Medical Info.
Output Flows:
Medical Record

Read Recruitment Detail
Process No.: 1
Location:

DFD of Update Applicant n Employee File (0)
Input Flows:
Recruitment Detail
Output Flows:
Recruitment Record

Read Recruitment Data
Process No.: 1
Location:

DFD of Process Recruitment Report (0)
Input Flows:
Recruitment Data
St. Gabriel's Library, Au

Output Flows:
Recruitment Record

Read Medical Treatment Data
Process No.: 1
Location:
DFD of Update Benefit Data (0)
Input Flows:
Medical Treatment Data
Output Flows:
Medical Treatment Record

Read Daily Attendance
Process No.: 1
Location:
DFD of Process Attendance Checking (0)
Input Flows:
Daily Attendance Info.
Output Flows:
Daily Attendance Record

Read Appraisal Data
Process No.: 1
Location:
DFD of Process Appraisal Report (0)
Input Flows:
Appraisal Data
Output Flows:
Appraisal Record

Enter Medical Info.
Process No.: 1
Location:
DFD of Process Collect Request (0)
Input Flows:
Medical Data Submission
Output Flows:
Medical Record

Enter Applicant Detail and Interview Data
Process No.: 1
Location:
DFD of Gather Data Entry (0)
Input Flows:
Applicant Detail
Interview Data
Output Flows:
Applicant and Interview Info.

-----------------------------------------------

Process Leave Info.
Process No.: 2
Location:
DFD of Process Leave n Attendance (0)
Input Flows:
Leave Info. added by HR Officer
Output Flows:
Leave Info.

-----------------------------------------------

Read Employee List
Process No.: 2
Location:
DFD of Update Applicant n Employee File (0)
Input Flows:
Employee Detail
Output Flows:
Employee Record

-----------------------------------------------

Read Overtime Data
Process No.: 2
Location:
DFD of Process Appraisal (0)
Input Flows:
Overtime Info.
Output Flows:
Overtime Record

-----------------------------------------------

Read Interview Result
Process No.: 2
Location:
DFD of Approval Update (0)
Input Flows:
Interview Data
Output Flows:
Interview Info.

-----------------------------------------------

Read Financial Compensation Info.
Process No.: 2
Location:
DFD of Process Benefit Report ( 0 )

Input Flows:
Financial Compensation Info.

Output Flows:
Financial Compensation Record

Transaction Center of Update Detail

Process No.: 2

Location:
DFD of Update Employee File ( 0 )

Input Flows:
Employee Record

Output Flows:
Transaction of employee record Updating
Transaction of employee record Creation
Transaction of employee record Deletion

Transform Function of Attendance Checking

Process No.: 2

Location:
DFD of Process Attendance Checking ( 0 )

Input Flows:
Daily Attendance Record

Output Flows:
Daily Attendance Info. to be stored

Transform Function of Financial Compensation

Process No.: 2

Location:
DFD of Process Financial Compensation ( 0 )

Input Flows:
Financial Compensation Record

Output Flows:
Financial Compensation to be Stored

Transform Function of Gather Detail

Process No.: 2

Location:
DFD of Gather Employee Detail ( 0 )

Input Flows:
Employee Record

Output Flows:
Employee Record to be Stored

Transform Function of Process Employee Report

Process No.: 2
Location:

DFD of Process Employee Report (0)
Input Flows:
Employee Record
Output Flows:
Employee Record to be Printed

Transform Function of Record Leave Info.
Process No.: 2
Location:

DFD of Process Leave Checking (0)
Input Flows:
Daily Leave Info.
Output Flows:
Leave Record to be stored

Transform Function of Process Report
Process No.: 2
Location:

DFD of Process Recruitment Report (0)
Input Flows:
Recruitment Record
Output Flows:
Recruitment Record to be Printed

Transform Function of Gather Data
Process No.: 2
Location:

DFD of Gather Data Entry (0)
Input Flows:
Applicant and Interview Info.
Output Flows:
Applicant and Interview Record to be stored

Transform Function of Collect Request
Process No.: 2
Location:

DFD of Process Collect Request (0)
Input Flows:
Medical Record
Output Flows:
Medical Record to be Stored
Read Financial Compensation Data

Process No.: 2
Location:

DFD of Update Benefit Data (0)

Input Flows:
Medical Treatment and Financial Compensation Data
Output Flows:
Medical Treatment and Financial Compensation Record

Read Employee Info.

Process No.: 2
Location:

DFD of Process Appraisal Report (0)

Input Flows:
Employee Detail
Output Flows:
Employee Record

Process Employee Info:

Description:
Manage information of employee including related information.

Process No.: 2
Location:

DFD of Proposed System (0)

Input Flows:
Employee Detail
Output Flows:
Employee Info.
Training Detail

Process Financial Compensation

Process No.: 2
Location:

DFD of Process Benefit Info. (0)

Input Flows:
Financial Compensation Entry
Output Flows:
Financial Compensation Info.

Process Update Employee File

Process No.: 2
Location:

DFD of Process Employee Info. (0)

Input Flows:
Employee Info.
Output Flows:
Update Employee Record

Process Approval Update
Process No.: 2
Location:
DFD of Process Recruitment Info. (0)
Input Flows:
Applicant Record
Interview Result Info.
Approval
Output Flows:
Approval Updated Detail

Read Overtime File
Process No.: 2
Location:
DFD of Process Leave n Attendance Report (0)
Input Flows:
Overtime Info.
Overtime Record
Output Flows:
Requested Overtime Record

Process Appraisal Report and Answer
Process No.: 2
Location:
DFD of Process Appraisal Info. (0)
Input Flows:
Appraisal Info.
Salary Detail
Output Flows:
Requested Appraisal Report and Answer

Store Medical Info.
Process No.: 3
Location:
DFD of Process Collect Request (0)
Input Flows:
Medical Record to be Stored
Output Flows:
Stored Medical Record
DFD of Approval Update (0)

Input Flows:
- Applicant Info.
- Interview Info.

Output Flows:
- Applicant Record to be Stored

Read Leave File

Process No.: 3
Location:

DFD of Process Leave n Attendance Report (0)

Input Flows:
- Leave Info.

Output Flows:
- Leave Record

Read History Training Data

Process No.: 3
Location:

DFD of Process Appraisal (0)

Input Flows:
- Training Info.

Output Flows:
- Training Record

Read Evaluation Record

Process No.: 3
Location:

DFD of Process Appraisal Report (0)

Input Flows:
- Evaluation Info.

Output Flows:
- Evaluation Record

Process Employee Report and Answer

Process No.: 3
Location:

DFD of Process Employee Info. (0)

Input Flows:
- Employee Info.

Output Flows:
- Requested Employee Report and Answer
- Employee Record and if Requested Report and Answer
Process to Add New Employee Record

Process No.: 3
Location:

DFD of Update Employee File (0)
Input Flows:
- Transaction of employee record Creation
Output Flows:
- Employee Record to be Added

---

Process Benefit

Description:
To collect information involved with medical benefit and updating information of each employee's financial compensation.

Process No.: 3
Location:

DFD of Proposed System (0)
Input Flows:
- Benefit Detail
Output Flows:
- Medical Info.
- Financial Compensation Info.

---

Store Applicant and Interview Result

Process No.: 3
Location:

DFD of Gather Data Entry (0)
Input Flows:
- Applicant and Interview Record to be stored
Output Flows:
- Store Applicant Record
- Store Interview Record

---

Store Attendance Data

Process No.: 3
Location:

DFD of Process Attendance Checking (0)
Input Flows:
- Daily Attendance Info. to be stored
Output Flows:
- Stored Late Record
- Stored Overtime Record

---

Store Financial Compensation

Process No.: 3
Location:
DFD of Process Financial Compensation (0)
Input Flows:
Financial Compensation to be Stored
Output Flows:
Stored Financial Compensation Record

Store Employee Detail
Process No.: 3
Location:
DFD of Gather Employee Detail (0)
Input Flows:
Employee Record to be Stored
Output Flows:
Stored Employee Record

Read Applicant List
Process No.: 3
Location:
DFD of Update Applicant n Employee File (0)
Input Flows:
Applicant Detail
Output Flows:
Applicant Record

Process Leave and Attendance Report and Answer
Process No.: 3
Location:
DFD of Process Leave n Attendance (0)
Input Flows:
Daily Leave Info.
Daily Late Info.
Overtime Info.
Output Flows:
Leave and Attendance Record and if Requested Report and Answer

Process Update Balance of Financial Compensation
Process No.: 3
Location:
DFD of Process Benefit Info. (0)
Input Flows:
Medical Treatment Info.
Output Flows:
Financial Compensation Info.

Print Recruitment Report
Process No.: 3
Location:
DFD of Process Recruitment Report (0)
Input Flows:
Recruitment Record to be Printed

Print Employee Record and Answer
Process No.: 3
Location:
DFD of Process Employee Report (0)
Input Flows:
Employee Record to be Printed

Process to Add Benefit Record
Process No.: 4
Location:
DFD of Update Benefit Data (0)
Input Flows:
Transaction of Medical Treatment and Financial Compensation Creation
Output Flows:
Record to be Added

Process Benefit Report and Answer
Process No.: 4
Location:
DFD of Process Benefit Info. (0)
Input Flows:
Benefit Record
Medical Treatment Info.
Output Flows:
Requested Benefit Report and Answer

Process to Update employee record
Process No.: 4
Location:
DFD of Update Employee File (0)
Input Flows:
Transaction of employee record Updating
Output Flows:
Employee Record to be Updated
Store Recruitment Data
Process No.: 4
Location:
- DFD of Approval Update (0)
  Input Flows:
  Applicant Record to be Stored
  Output Flows:
  Store Applicant Record

Transform Function of Process Leave and Attendance Report
Process No.: 4
Location:
- DFD of Process Leave and Attendance Report (0)
  Input Flows:
  Overtime Record
  Late Record
  Leave Record
  Output Flows:
  Leave and Attendance Record to be Printed

Transform Function of Process Report
Process No.: 4
Location:
- DFD of Process Appraisal Report (0)
  Input Flows:
  Employee Record
  Appraisal Record
  Evaluation Record
  Output Flows:
  Record to be Printed

Transaction Center of Update Files
Process No.: 4
Location:
- DFD of Update Applicant n Employee File (0)
  Input Flows:
  Employee Record
  Recruitment Record
  Applicant Record
  Output Flows:
  Transaction of Applicant Creation
  Transaction of Applicant Updating
  Transaction of Applicant Deletion
Process Recruitment Report and Answer

Process No.: 4
Location:

DFD of Process Recruitment Info. (0)
Input Flows:
Recruitment Info.
Output Flows:
Recruitment Record and if requested Report and Answer
Requested Recruitment Report and Answer

Process Appraisal Info.

Process No.: 4
Location:

DFD of Proposed System (0)
Input Flows:
Salary Rate
Evaluation Result from Manager Dept.
Output Flows:
Appraisal Info.

Read Leave Info.

Process No.: 4
Location:

DFD of Process Appraisal (0)
Input Flows:
Leave Info.
Output Flows:
Leave Record

Print Benefit Report and Answer

Process No.: 4
Location:

DFD of Process Benefit Report (0)
Input Flows:
Benefit Record to be Printed

Print Leave and Attendance Report

Process No.: 5
Location:

DFD of Process Leave and Attendance Report (0)
Input Flows:
Leave and Attendance Record to be Printed
Process to Delete employee record
Process No.:  5
Location:

**DFD of Update Employee File** (0)

- **Input Flows:**
  - Transaction of employee record Deletion
- **Output Flows:**
  - Employee Record to be Deleted

---

Read Late Info.
Process No.:  5
Location:

**DFD of Process Appraisal** (0)

- **Input Flows:**
  - Late Info.
- **Output Flows:**
  - Late Record

---

Process to Update Benefit Record
Process No.:  5
Location:

**DFD of Update Benefit Data** (0)

- **Input Flows:**
  - Transaction of Medical Treatment and Financial Compensation
- **Output Flows:**
  - Record to be Updated

---

Process Recruitment
Process No.:  5
Location:

**DFD of Proposed System** (0)

- **Input Flows:**
  - Interview Comment and Result
  - Applicant Info.
- **Output Flows:**
  - Applicant Info.
  - Interview Comment and Result
  - Interview Detail
  - Recruitment Result

---

Process of Applicant Record Creation
Process No.:  5
Location:

**DFD of Update Applicant n Employee File** (0)
Input Flows:
Transaction of Applicant Creation
Output Flows:
Applicant Record to be Added

Print Appraisal Report and Answer
Process No.: 5
Location:
DFD of Process Appraisal Report (0)
Input Flows:
Record to be Printed

Transform Function of Process Appraisal
Process No.: 6
Location:
DFD of Process Appraisal (0)
Input Flows:
Training Record
Overtime Record
Evaluation Record
Leave Record
Late Record
Output Flows:
Appraisal Update

Process to Delete Benefit Record
Process No.: 6
Location:
DFD of Update Benefit Data (0)
Input Flows:
Transaction of Medical Treatment and Financial Compensation Deleting
Output Flows:
Record to be Deleted

Process of Applicant Record Updating
Process No.: 6
Location:
DFD of Update Applicant n Employee File (0)
Input Flows:
Transaction of Applicant Updating
Output Flows:
Applicant Record to be Updated
Add New employee record
Process No.: 6
Location:
DFD of Update Employee File (0)
Input Flows:
Employee Record to be Added
Output Flows:
Add employee record

Store Record
Process No.: 7
Location:
DFD of Process Appraisal (0)
Input Flows:
Appraisal Update
Output Flows:
Stored Appraisal Record
Stored Appraisal Record

Updated employee record
Process No.: 7
Location:
DFD of Update Employee File (0)
Input Flows:
Employee Record to be Updated
Output Flows:
Update Employee Record

Write New Benefit Record
Process No.: 7
Location:
DFD of Update Benefit Data (0)
Input Flows:
Record to be Added

Process of Applicant Record Deletion
Process No.: 7
Location:
DFD of Update Applicant n Employee File (0)
Input Flows:
Transaction of Applicant Deletion
Output Flows:
Applicant Record to be Deleted
Modify Benefit Record  
Process No.: 8  
Location: 

DFD of Update Benefit Data (0)  
Input Flows: 
Record to be Updated

Write New Applicant Record to Employee  
Process No.: 8  
Location: 

DFD of Update Applicant n Employee File (0)  
Input Flows: 
Applicant Record to be Added 
Output Flows: 
Added Applicant Record

Delete employee record  
Process No.: 8  
Location: 

DFD of Update Employee File (0)  
Input Flows: 
Employee Record to be Deleted 
Output Flows: 
Deleted employee record

Update Applicant Record to Employee  
Process No.: 9  
Location: 

DFD of Update Applicant n Employee File (0)  
Input Flows: 
Applicant Record to be Updated 
Output Flows: 
Updated Applicant Record

Delete Benefit Record  
Process No.: 9  
Location: 

DFD of Update Benefit Data (0)  
Input Flows: 
Record to be Deleted
Delete Applicant Record

Process No.: 10
Location:

**DFD of Update Applicant n Employee File (0)**

Input Flows:
- Applicant Record to be Deleted

Output Flows:
- Deleted Applicant Record
APPENDIX E
DATABASE DESIGN
Figure E.1. Entity Relationship Diagram.
Medical Treatment: Amount

Data element attributes
Domain: Int
Storage Type: Undefined
Location: Attributive Entity --> Medical Treatment

Applicant Address
Applicant: Applicant Address

Data element attributes
Domain: VarChar
Storage Type: Undefined
Location: Entity --> Applicant

Applicant Birth Date
Applicant: Applicant Birth Date

Data element attributes
Domain: Date
Storage Type: Undefined
Location: Entity --> Applicant

Applicant Education
Applicant: Applicant Education

Data element attributes
Domain: VarChar
Storage Type: Undefined
Location: Entity --> Applicant

Applicant Gender
Applicant: Applicant Gender

Data element attributes
Domain: VarChar
Storage Type: Undefined
Location:
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<td>Data Element</td>
</tr>
<tr>
<td>Interview::Applicant ID</td>
<td>Data element attributes</td>
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<td>Storage Type:Undefined</td>
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<td>Location:Entity --&gt; Interview</td>
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<td>Location:Entity --&gt; Applicant</td>
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<td>Data Element</td>
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<td>Applicant Province</td>
<td>Data Element</td>
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<td>Applicant::Applicant Province</td>
<td>Data element attributes</td>
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<tr>
<td>Data Element</td>
<td>Domain</td>
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<td>VarChar</td>
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<td>VarChar</td>
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<tr>
<td>Applicant Work Experience</td>
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Appraisal Date

Appraisal::Appraisal Date
Data element attributes
  Domain: Date
  Storage Type: Undefined
  Location:
    Attributive Entity --> Appraisal

Appraisal No

Appraisal::Appraisal No
Data element attributes
  Domain: VarChar
  Storage Type: Undefined
  Location:
    Attributive Entity --> Appraisal

Appraisal Rate

Appraisal::Appraisal Rate
Data element attributes
  Domain: Date
  Storage Type: Undefined
  Location:
    Attributive Entity --> Appraisal

Approval

Secure Group::Approval
Data element attributes
  Domain: VarChar
  Storage Type: Undefined
  Location:
    Entity --> Secure Group

Approved By

Recruitment::Approved By
Data element attributes
  Domain: VarChar
  Storage Type: Undefined
  Location:
    Entity --> Recruitment

Approved Date

Recruitment::Approved Date
Data element attributes
  Domain: Date
  Storage Type: Undefined
  Location:
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<tr>
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Location:
Entity --> Secure Group

Cause Description
Medical Treatment::Cause Description
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Location:
  Attributive Entity --> Medical Treatment

Checkout Time
Overtime::Checkout Time
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Location:
  Entity --> Overtime

Company Information
Secure Group::Company Information
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  Entity --> Secure Group
  Create

Date
Location:
  Data Element --> Applicant::Applicant Birth Date
  Data Element --> Appraisal::Appraisal Date
  Data Element --> Appraisal::Appraisal Rate
  Data Element --> Employee::Employee Birth Date
  Data Element --> Employee::Employee Hired Date
  Data Element --> Evaluation::Evaluation Date
  Data Element --> Interview::Interview Date
  Data Element --> Late::Late Date
  Data Element --> Late::Arrive Time
  Data Element --> Leave::Leave Date
  Data Element --> Leave::Leave From
  Data Element --> Leave::Leave To
  Data Element --> Medical Treatment::Record Date
  Data Element --> Medical Treatment::Hospital
  Data Element --> Overtime::Overtime Date
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Employee Address 1
Employee::Employee Address 1
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Employee Address 2
Employee::Employee Address 2
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Employee Birth Date
Employee::Employee Birth Date
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Storage Type: Undefined
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Employee Department
Employee::Employee Department
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Storage Type: Undefined
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Employee Education
Employee::Employee Education
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Storage Type: Undefined
Location: Attributive Entity --> Employee

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Employee Gender

Data element attributes
Domain: VarChar
Storage Type: Undefined
Location: Attributive Entity --> Employee

Employee Hired Date

Data element attributes
Domain: Date
Storage Type: Undefined
Location: Attributive Entity --> Employee

Employee ID

Data element attributes
Domain: VarChar
Storage Type: Undefined
Location: Attributive Entity --> Appraisal

Attendance::Employee ID

Data element attributes
Domain: VarChar
Storage Type: Undefined
Location: Attributive Entity --> Attendance

Evaluation::Employee ID

Data element attributes
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<tbody>
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Employee ID
Data element attributes
- Domain: VarChar
- Storage Type: Undefined
- Location: Associative Entity --> Secure User

Employee Management
Data element attributes
- Domain: VarChar
- Storage Type: Undefined
- Location: Entity --> Secure Group

Employee Name
Data element attributes
- Domain: VarChar
- Storage Type: Undefined
- Location: Attributive Entity --> Employee

Employee Position
Data element attributes
- Domain: VarChar
- Storage Type: Undefined
- Location: Attributive Entity --> Employee

Employee Postcode
Data element attributes
- Domain: VarChar
- Storage Type: Undefined
- Location: Attributive Entity --> Employee
Employee Province

Employee::Employee Province
Data element attributes
Domain: VarChar
Storage Type: Undefined
Location: Attributive Entity --> Employee

Employee Salary

Employee::Employee Salary
Data element attributes
Domain: VarChar
Storage Type: Undefined
Location: Attributive Entity --> Employee

Employee Social No

Employee::Employee Social No
Data element attributes
Domain: VarChar
Storage Type: Undefined
Location: Attributive Entity --> Employee

Employee Status

Employee::Employee Status
Data element attributes
Domain: VarChar
Storage Type: Undefined
Location: Attributive Entity --> Employee

Employee Surname

Employee::Employee Surname
Data element attributes
Domain: VarChar
Storage Type: Undefined
Location: Attributive Entity --> Employee

Employee TAX ID

Employee::Employee TAX ID
Data element attributes
Domain: VarChar
Storage Type: Undefined
Location:
Employee Tel No

Employee::Employee Tel No

Data element attributes
- Domain: VarChar
- Storage Type: Undefined
- Location:

Attributive Entity --> Employee

Employee Work Experience

Employee::Employee Work Experience

Data element attributes
- Domain: VarChar
- Storage Type: Undefined
- Location:

Attributive Entity --> Employee

Evaluation

Evaluation::Evaluation

Data element attributes
- Domain: VarChar
- Storage Type: Undefined
- Location:

Entity --> Evaluation

Evaluation By

Evaluation::Evaluation By

Data element attributes
- Domain: VarChar
- Storage Type: Undefined
- Location:

Entity --> Evaluation

Evaluation Date

Evaluation::Evaluation Date

Data element attributes
- Domain: Date
- Storage Type: Undefined
- Location:

Entity --> Evaluation

Evaluation No

Evaluation::Evaluation No

Data element attributes
- Domain: VarChar
- Storage Type: Undefined

Data Element
Financial Compensation Max

Financial Compensation::Financial Compensation Max
Data element attributes
Domain: Int
Storage Type: Undefined
Location:
Attributive Entity --> Financial Compensation

Financial Compensation No

Financial Compensation::Financial Compensation No
Data element attributes
Domain: VarChar
Storage Type: Undefined
Location:
Attributive Entity --> Financial Compensation

Group Description

Secure Group::Group Description
Data element attributes
Domain: VarChar
Storage Type: Undefined
Location:
Attributive Entity --> Secure Group

Group ID

Secure Group::Group ID
Data element attributes
Domain: VarChar
Storage Type: Undefined
Location:
Attributive Entity --> Secure Group

Group ID

Secure User::Group ID
Data element attributes
Domain: VarChar
Storage Type: Undefined
Location:
Attributive Entity --> Secure User
Group Management
Secure Group::Group Management
Data element attributes
  Domain: VarChar
  Storage Type: Undefined
  Location:
    Entity --> Secure Group

Hospital
Medical Treatment::Hospital
Data element attributes
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  Storage Type: Undefined
  Location:
    Attributive Entity --> Medical Treatment
    Int
    Location:
      Data Element --> Financial Compensation::Financial Compensation
    Max
    Data Element --> Medical Treatment::Amount

Interview
Secure Group::Interview
Data element attributes
  Domain: VarChar
  Storage Type: Undefined
  Location:
    Entity --> Secure Group

Interview Comment
Interview::Interview Comment
Data element attributes
  Domain: VarChar
  Storage Type: Undefined
  Location:
    Entity --> Interview

Interview Date
Interview::Interview Date
Data element attributes
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  Storage Type: Undefined
  Location:
    Entity --> Interview
Interview No

Data element attributes

Domain: VarChar
Storage Type: Undefined
Location:

Entity --> Interview

Interview Result

Data element attributes

Domain: VarChar
Storage Type: Undefined
Location:

Entity --> Interview

Interviewer

Data element attributes

Domain: VarChar
Storage Type: Undefined
Location:

Entity --> Interview

Late Date

Data element attributes

Domain: Date
Storage Type: Undefined
Location:

Entity --> Late

Late No

Data element attributes

Domain: VarChar
Storage Type: Undefined
Location:

Entity --> Late

Leave

Secure Group: Leave

Data element attributes

Domain: VarChar
Storage Type: Undefined
Location:
### Secure Group

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Leave To

Data element attributes
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Storage Type: Undefined
Location:
Entity --> Leave

Medical Treatment No

Data element attributes
Domain: VarChar
Storage Type: Undefined
Location:
Attributive Entity --> Medical Treatment

Overtime Date

Data element attributes
Domain: Date
Storage Type: Undefined
Location:
Entity --> Overtime

Overtime ID

Data element attributes
Domain: VarChar
Storage Type: Undefined
Location:
Entity --> Overtime

Password

Data element attributes
Domain: VarChar
Storage Type: Undefined
Location:
Associative Entity --> Secure User

Record Date

Data element attributes
Domain: Date
Storage Type: Undefined
Location:
Attributive Entity --> Medical Treatment
Recruitment No.

Data element attributes
- Domain: VarChar
- Storage Type: Undefined

Location:
- Entity --> Recruitment

Time

Data element attributes
- Location:
  - Data Element --> Overtime::Checkout Time
  - Data Element --> Attendance::Arrive Time
  - Data Element --> Attendance::Leave Time

Trainer

Data element attributes
- Location:
  - Attributive Entity --> Training Description

Training Course ID

Data element attributes
- Location:
  - Associative Entity --> Training

Training Course No

Data element attributes
- Location:
  - Attributive Entity --> Training Description

Training Date

Data element attributes
- Location:
Associative Entity --> Training

Training Description Data Element
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  Data element attributes
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  Location:
     Attributive Entity --> Training Description
Training Management Data Element
  Secure Group: Training Management
  Data element attributes
  Domain: VarChar
  Storage Type: Undefined
  Location:
     Entity --> Secure Group

User ID Data Element
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  Data element attributes
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  Location:
     Associative Entity --> Secure User

User Management Data Element
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  Data element attributes
  Domain: VarChar
  Storage Type: Undefined
  Location:
     Entity --> Secure Group

VarChar Data Element
  Location:
     Data Element --> Applicant::Applicant No
     Data Element --> Applicant::Applicant Name
     Data Element --> Applicant::Applicant Surname
     Data Element --> Applicant::Applicant Gender
     Data Element --> Applicant::Applicant Social No
     Data Element --> Applicant::Applicant Address1
     Data Element --> Applicant::Applicant Address2
     Data Element --> Applicant::Applicant Province
     Data Element --> Applicant::Applicant Postcode
     Data Element --> Applicant::Applicant Tel No
| Data Element --> | Secure Group::User Management |
| Data Element --> | Secure Group::Group Management |
| Data Element --> | Secure Group::Company Information |
| Data Element --> | Secure Group::Approval |
| Data Element --> | Secure Group::Employee Management |
| Data Element --> | Secure Group::Training Management |
| Data Element --> | Secure Group::Benefit Management |
| Data Element --> | Secure Group::Leave |
| Data Element --> | Secure Group::Interview |
| Data Element --> | Secure User::User ID |
| Data Element --> | Secure User::Password |
| Data Element --> | Secure User::Employee ID |
| Data Element --> | Secure User::Group ID |
| Data Element --> | Training::Employee ID |
| Data Element --> | Training::Training Course ID |
| Data Element --> | Training Description::Training Course No |
| Data Element --> | Training Description::Trainer |
| Data Element --> | Training Description::Training Description |
| Data Element --> | Attendance::Attendance ID |
| Data Element --> | Attendance::Employee ID |
| Data Element --> | Interview::Interviewer |
Table E.1. Applicant.

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<td>Applicant Surname</td>
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<td>Applicant Birth Date</td>
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<td>Applicant Address 1</td>
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Table E.2. Appraisal.

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Table E.3. Attendance.

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<td>Date/Time</td>
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Table E.4. Employee.

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Table E.5. Evaluation.

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Table E.6. Financial Compensation.

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Table E.7. Interview.

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### Table E.8. Late.

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<tr>
<th>Field Name</th>
<th>Type</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Late No</td>
<td>Long Integer</td>
<td>4</td>
</tr>
<tr>
<td>Employee ID</td>
<td>Text</td>
<td>7</td>
</tr>
<tr>
<td>Late Date</td>
<td>Date/Time</td>
<td>8</td>
</tr>
<tr>
<td>Arrive Time</td>
<td>Date/Time</td>
<td>8</td>
</tr>
</tbody>
</table>

### Table E.9. Leave.

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Type</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leave No</td>
<td>Long Integer</td>
<td>4</td>
</tr>
<tr>
<td>Employee ID</td>
<td>Text</td>
<td>7</td>
</tr>
<tr>
<td>Leave Date</td>
<td>Date/Time</td>
<td>8</td>
</tr>
<tr>
<td>Leave Reason</td>
<td>Text</td>
<td>200</td>
</tr>
<tr>
<td>Leave From</td>
<td>Date/Time</td>
<td>8</td>
</tr>
<tr>
<td>Leave To</td>
<td>Date/Time</td>
<td>8</td>
</tr>
</tbody>
</table>
Table E.10. Medical Treatment.

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Type</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical Treatment No</td>
<td>Long Integer</td>
<td>4</td>
</tr>
<tr>
<td>Employee ID</td>
<td>Text</td>
<td>7</td>
</tr>
<tr>
<td>Record Date</td>
<td>Date/Time</td>
<td>8</td>
</tr>
<tr>
<td>Hospital</td>
<td>Text</td>
<td>15</td>
</tr>
<tr>
<td>Cause Description</td>
<td>Text</td>
<td>50</td>
</tr>
<tr>
<td>Amount</td>
<td>Currency</td>
<td>8</td>
</tr>
</tbody>
</table>

Table E.11. Overtime.

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Type</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overtime ID</td>
<td>Long Integer</td>
<td>4</td>
</tr>
<tr>
<td>Employee ID</td>
<td>Text</td>
<td>7</td>
</tr>
<tr>
<td>Overtime Date</td>
<td>Date/Time</td>
<td>8</td>
</tr>
<tr>
<td>Checkout Time</td>
<td>Date/Time</td>
<td>8</td>
</tr>
</tbody>
</table>
### Table E.12. Recruitment.

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Type</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recruitment No</td>
<td>Text</td>
<td>7</td>
</tr>
<tr>
<td>Applicant No</td>
<td>Text</td>
<td>8</td>
</tr>
<tr>
<td>Approved Date</td>
<td>Date/Time</td>
<td>8</td>
</tr>
<tr>
<td>Approved Result</td>
<td>Yes/No</td>
<td>1</td>
</tr>
<tr>
<td>Approved by</td>
<td>Text</td>
<td>8</td>
</tr>
</tbody>
</table>

### Table E.13. Secure Group.

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Type</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group ID</td>
<td>Text</td>
<td>50</td>
</tr>
<tr>
<td>GroupDesc</td>
<td>Text</td>
<td>255</td>
</tr>
<tr>
<td>UserMgt</td>
<td>Yes/No</td>
<td>1</td>
</tr>
<tr>
<td>GroupMgt</td>
<td>Yes/No</td>
<td>1</td>
</tr>
<tr>
<td>CpnInfo</td>
<td>Yes/No</td>
<td>1</td>
</tr>
<tr>
<td>Approval</td>
<td>Yes/No</td>
<td>1</td>
</tr>
<tr>
<td>EpmMgt</td>
<td>Yes/No</td>
<td>1</td>
</tr>
<tr>
<td>TrainingMgt</td>
<td>Yes/No</td>
<td>1</td>
</tr>
<tr>
<td>BenefitMgt</td>
<td>Yes/No</td>
<td>1</td>
</tr>
<tr>
<td>Leaving</td>
<td>Yes/No</td>
<td>1</td>
</tr>
<tr>
<td>Interview</td>
<td>Yes/No</td>
<td>1</td>
</tr>
</tbody>
</table>
### Table E.14. Secure User.

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Type</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>UserID</td>
<td>Text</td>
<td>8</td>
</tr>
<tr>
<td>Password</td>
<td>Text</td>
<td>50</td>
</tr>
<tr>
<td>Employee ID</td>
<td>Text</td>
<td>7</td>
</tr>
<tr>
<td>Group ID</td>
<td>Text</td>
<td>8</td>
</tr>
</tbody>
</table>

### Table E.15. tblCpnConfig (Table of Company Configuration).

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Type</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>cpnName</td>
<td>Text</td>
<td>25</td>
</tr>
<tr>
<td>cpnDesc</td>
<td>Text</td>
<td>200</td>
</tr>
<tr>
<td>cpnAddr 1</td>
<td>Text</td>
<td>50</td>
</tr>
<tr>
<td>cpnAddr 2</td>
<td>Text</td>
<td>50</td>
</tr>
<tr>
<td>cpnPhone</td>
<td>Text</td>
<td>15</td>
</tr>
<tr>
<td>cpnFax</td>
<td>Text</td>
<td>15</td>
</tr>
<tr>
<td>cpnEmail</td>
<td>Text</td>
<td>50</td>
</tr>
<tr>
<td>cpnArrvTime</td>
<td>Date/Time</td>
<td>8</td>
</tr>
<tr>
<td>cpnLveTime</td>
<td>Date/Time</td>
<td>8</td>
</tr>
<tr>
<td>cpnMinApsRate</td>
<td>Long Integer</td>
<td>4</td>
</tr>
<tr>
<td>cpnMaxApsRate</td>
<td>Long Integer</td>
<td>4</td>
</tr>
</tbody>
</table>
Table E.16. Training.

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Type</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employee ID</td>
<td>Text</td>
<td>7</td>
</tr>
<tr>
<td>Training Course ID</td>
<td>Text</td>
<td>10</td>
</tr>
<tr>
<td>Training Date</td>
<td>Date/Time</td>
<td>8</td>
</tr>
</tbody>
</table>

Table E.17. Training Description.

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Type</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training Course No</td>
<td>Text</td>
<td>10</td>
</tr>
<tr>
<td>Trainer</td>
<td>Text</td>
<td>50</td>
</tr>
<tr>
<td>Training Description</td>
<td>Text</td>
<td>50</td>
</tr>
</tbody>
</table>
APPENDIX F
OUTPUT DESIGN
**Mthai Estate**

**Attendance Report**

**March, 2002**

<table>
<thead>
<tr>
<th>Employee ID:</th>
<th>1001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name:</td>
<td>Worakorn Kuruwongwattana</td>
</tr>
<tr>
<td>Leave:</td>
<td>3 Days</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Date</th>
<th>Reason</th>
<th>From</th>
<th>To</th>
</tr>
</thead>
</table>

**OverTime:** 1:15 Hour(s)

<table>
<thead>
<tr>
<th>Date</th>
<th>Checkout Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>4/3/2002</td>
<td>18:30</td>
</tr>
<tr>
<td>5/3/2002</td>
<td>17:45</td>
</tr>
</tbody>
</table>

**Late Time:** 1:15 Hour(s)

<table>
<thead>
<tr>
<th>Date</th>
<th>Checkout Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/3/2002</td>
<td>8:40</td>
</tr>
<tr>
<td>12/3/2002</td>
<td>8:35</td>
</tr>
</tbody>
</table>

Figure F.1. Attendance Report.
**Mthai Estate**  
*Employee Information Report*  
*March, 2002*

<table>
<thead>
<tr>
<th><strong>Employee ID</strong></th>
<th>1001</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name</strong></td>
<td>Worakorn Kuruwongwattan</td>
</tr>
<tr>
<td><strong>Birth Date</strong></td>
<td>7/1/1980</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td>Male</td>
</tr>
<tr>
<td><strong>Status</strong></td>
<td>Single</td>
</tr>
<tr>
<td><strong>Social No</strong></td>
<td>125402251</td>
</tr>
</tbody>
</table>

| **Address**    | 125 Moo.5 Bangkhen Khwang Ladyao |
| **Province**   | Bangkok |
| **Post Code**  | 10110 |
| **Telephone**  | 02-7745859 |

| **Work Experience** | 1 year at TTN Group as system administrator |

| **Education**   | Adv. Diploma |
| **Hired Date**  | 15/1/2000 |
| **Position**    | Programmer |
| **Department**  | HR |
| **Salary**      | 25,000 |
| **TAX ID**      | 10245584210 |

<table>
<thead>
<tr>
<th><strong>Training Record</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Course ID</strong></td>
</tr>
<tr>
<td><strong>Description</strong></td>
</tr>
<tr>
<td><strong>Trainer</strong></td>
</tr>
<tr>
<td><strong>Training</strong></td>
</tr>
</tbody>
</table>

Figure F.2. Employee Information Report.
### Mthai Estate

**Benefit Information Report**

**March, 2002**

**Employee ID:** 1001  
**Name:** Worakorn Kuruwongwattana  
**MAX Financial Compensation:** 25,000

### Medical Treatment details

<table>
<thead>
<tr>
<th>Record</th>
<th>Hospital</th>
<th>Cause description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/3/2002</td>
<td>ราพีปโตร</td>
<td>ฟังค์ชั่นไต.orig</td>
<td>15,000.00</td>
</tr>
<tr>
<td>22/3/2002</td>
<td>ราพีปโตร</td>
<td>ใช้ขวัตร</td>
<td>250.00</td>
</tr>
</tbody>
</table>

**Total Medical**  
15,250.00

### Financial Compensation Credit Balance

9,750.00

---

Figure F.3. Benefit Information Report.
<table>
<thead>
<tr>
<th>ID</th>
<th>Name – Surname</th>
<th>Salary</th>
<th>Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>1001</td>
<td>Worakorn Kuruwongwattana</td>
<td>25,000</td>
<td>HR</td>
</tr>
<tr>
<td>1002</td>
<td>Titipong Aramsee</td>
<td>30,000</td>
<td>Accounting</td>
</tr>
</tbody>
</table>

Figure F.4. Appraisal Plan Report.
Mthai Estate
Applicant Information Report
March, 2002

 Applicant No:  1

Name:  ศุภริญา ไกรราษฎ์
Social No:  1254022478
Birth Date:  1/12/1960
Gender:  Female
Address:  102 ถนนแจ้งวัฒนะ  ต.ปากเกร็ด  
อ.ปากเกร็ด  จ.นนทบุรี  11120
Telephone No:  02-9609658
Work Experience:
1 ปีที่บ.ไทรการ์มิลส์
Education:  นิติศาสตร์บัณฑิต
TAX ID:  15245584448
Interview Date:  10/10/2000
Comment:  Good vision in organization

☑️  Result

Approved Date:  
Approved by:

☐  Approved

Figure F.5. Applicant Information Report.
Mthai Estate

Executive Report
(Summary Report for Management)

Attendance Report (Jan-Mar 2002)

Figure F.6. Summary of Attendance Report.
Mthai Estate

Executive Report
(Summary Report for Management)

Benefit Report (Jan-Mar 2002)

Figure F.7. Summary of Benefit Report.
Mthai Estate

Executive Report
(Summary Report for Management)

Appraisal Report (Jan-Mar 2002)

Figure F.8. Summary of Appraisal Report.
Executive Report
(Summary Report for Management)

Recruitment Report (Jan-Mar 2002)

Figure F.9.1. Summary of Recruitment Report.
Mthai Estate

Executive Report
(Summary Report for Management)

Employee Turnover Report (Jan-Mar 2002)

Annualized Employee Turnover Rate
(Regular, Full-Time Employees)

Note: Qtr = Quadrant

Figure F.9.2. Summary of Employee Turnover Rate Report.
**Human Resources Management System**

| System | Employee | Attendance | Benefit | Applicant | Evaluation | Help |

*Figure G.1. Main Page.*
Figure G.2. System Menu.
Figure G.3. Employee Menu.
Figure G.4. Attendance Menu.
Figure G.5. Benefit Menu.
Figure G.6. Applicant Menu.
Figure G.7. Appraisal Menu.
Figure G.8. Authentication Page.

Figure G.9. User Management Page.
Figure G.10. Change Password Page.

Figure G.11. Employee Information Page.
Figure G.12. Employee Information Page – Add Page.
Figure G.13. Employee Information Page - Search Page.
Figure G.14. Attendance Information Page

(Attendance Information and Search).
Figure G.15. Late Information Page (Late Information and Search).
Figure G.16. Overtime Information Page (Overtime Information and Search).
Figure G.17. Leave Information Page

(Leave Information and Search)
### Figure G.18. Medical Information Page.

<table>
<thead>
<tr>
<th>Medical Treatment No.</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Employee ID</td>
<td>1001</td>
</tr>
<tr>
<td>Name</td>
<td>Worakorn</td>
</tr>
<tr>
<td>Surname</td>
<td>Kuruwongwattana</td>
</tr>
<tr>
<td>Date</td>
<td>10/9/3087</td>
</tr>
<tr>
<td>Hospital</td>
<td></td>
</tr>
<tr>
<td>Cause Description</td>
<td></td>
</tr>
<tr>
<td>Amount</td>
<td>15000</td>
</tr>
</tbody>
</table>

**Add**  **Delete**  **Update**  **Close**
Figure G.19. Financial Compensation Page.
Figure G.20. Applicant Information Page.
Figure G.21. Applicant Information Page – Search Page.
Figure G.22. Interview Page
(Comment and Interview Result).
Figure G.23. Recruitment Page.
Figure G.24. Training Record Page.
Figure G.25. Evaluation Information Page.
Figure G.26. Appraisal Information Page.

Figure G.27. Web Page of Online Application Form.
Mthai Estate

Leave Letter

Please fill in this form

- Date
- Employee ID
- Date of Leave
- Reason of Leave
- Period of Leave

Figure G.28. Web Page of Online Leave Letter.

Mthai Estate

Medical Treatment Petition

Please fill in this form

- Employee ID
- Date
- Place of Treatment
- Symptom
- Expense

Figure G.29. Web Page of Online Medical Treatment Petition.
APPENDIX H

FINANCIAL ANALYSIS OF EACH CANDIDATE SOLUTION
Table H.1. Estimated Costs and Benefits for Candidate Solution 1, Baht.

<table>
<thead>
<tr>
<th>Cost Items</th>
<th>Years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td><strong>Existing System:</strong></td>
<td></td>
</tr>
<tr>
<td>Staff (increase 5% per year)</td>
<td>1,152,000</td>
</tr>
<tr>
<td>Operating Cost (increase 5% per year)</td>
<td>108,000</td>
</tr>
<tr>
<td>Utility Cost (increase 5% per year)</td>
<td>60,000</td>
</tr>
<tr>
<td>Total Cost</td>
<td>1,320,000</td>
</tr>
<tr>
<td><strong>Cumulative Cost</strong></td>
<td>1,320,000</td>
</tr>
<tr>
<td><strong>Proposed System:</strong></td>
<td></td>
</tr>
<tr>
<td>Hardware Cost</td>
<td>61,060</td>
</tr>
<tr>
<td>Software Development Cost</td>
<td>80,000</td>
</tr>
<tr>
<td>Maintenance Cost</td>
<td>0</td>
</tr>
<tr>
<td>Staff (increase 5% per year)</td>
<td>864,000</td>
</tr>
<tr>
<td>Operating Cost (increase 5% per year)</td>
<td>96,000</td>
</tr>
<tr>
<td>Utility Cost (increase 5% per year)</td>
<td>48,000</td>
</tr>
<tr>
<td>Total Cost</td>
<td>1,149,060</td>
</tr>
<tr>
<td><strong>Cumulative Cost</strong></td>
<td>1,149,060</td>
</tr>
</tbody>
</table>
Table H.2. Payback Analysis of Candidate Solution 1, Baht.

<table>
<thead>
<tr>
<th>Cost Items</th>
<th>Year 0</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development cost:</td>
<td>-400,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operation &amp; maintenance cost:</td>
<td></td>
<td>-116,000</td>
<td>-121,800</td>
<td>-127,890</td>
<td>-134,284</td>
<td>-140,998</td>
</tr>
<tr>
<td>Discount factors for 12%:</td>
<td>1.000</td>
<td>0.893</td>
<td>0.797</td>
<td>0.712</td>
<td>0.636</td>
<td>0.567</td>
</tr>
<tr>
<td>Time-adjusted costs (adjusted to present value):</td>
<td>-400,000</td>
<td>-103,588</td>
<td>-97,074</td>
<td>-91,057</td>
<td>-85,404</td>
<td>-79,945</td>
</tr>
<tr>
<td>Cumulative time-adjusted costs over lifetime:</td>
<td>-400,000</td>
<td>-503,588</td>
<td>-600,662</td>
<td>-691,719</td>
<td>-777,123</td>
<td>-857,068</td>
</tr>
<tr>
<td>Benefits derived from operation of new system:</td>
<td>0</td>
<td>432,000</td>
<td>453,600</td>
<td>476,280</td>
<td>500,094</td>
<td>525,099</td>
</tr>
<tr>
<td>Discount factors for 12%:</td>
<td>1.000</td>
<td>0.893</td>
<td>0.797</td>
<td>0.712</td>
<td>0.636</td>
<td>0.567</td>
</tr>
<tr>
<td>Time-adjusted benefits (adjusted to present value):</td>
<td>0</td>
<td>385,776</td>
<td>361,519</td>
<td>339,111</td>
<td>318,060</td>
<td>297,731</td>
</tr>
<tr>
<td>Cumulative time-adjusted benefits over lifetime:</td>
<td>0</td>
<td>642,960</td>
<td>1,004,479</td>
<td>1,343,591</td>
<td>1,661,650</td>
<td>1,959,381</td>
</tr>
<tr>
<td>Cumulative life time-adjusted costs + benefits:</td>
<td>-622,300</td>
<td>139,372</td>
<td>403,817</td>
<td>651,872</td>
<td>884,527</td>
<td>1,102,313</td>
</tr>
<tr>
<td>Cost Items</td>
<td>Year 0</td>
<td>Year 1</td>
<td>Year 2</td>
<td>Year 3</td>
<td>Year 4</td>
<td>Year 5</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
</tr>
<tr>
<td>Development cost:</td>
<td>-400,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operation &amp; maintenance cost:</td>
<td></td>
<td>-116,000</td>
<td>-121,800</td>
<td>-127,890</td>
<td>-134,284</td>
<td>-140,998</td>
</tr>
<tr>
<td>Discount factors for 12%:</td>
<td>1.000</td>
<td>0.893</td>
<td>0.797</td>
<td>0.712</td>
<td>0.636</td>
<td>0.567</td>
</tr>
<tr>
<td>Present value of annual costs:</td>
<td>-400,000</td>
<td>-103,588</td>
<td>-97,074</td>
<td>-91,057</td>
<td>-85,404</td>
<td>-79,945</td>
</tr>
<tr>
<td>Total present value of lifetime costs:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benefits derived from operation of new system</td>
<td>0</td>
<td>432,000</td>
<td>453,600</td>
<td>476,280</td>
<td>500,094</td>
<td>525,099</td>
</tr>
<tr>
<td>Discount factors for 12%:</td>
<td>1.000</td>
<td>0.893</td>
<td>0.797</td>
<td>0.712</td>
<td>0.636</td>
<td>0.567</td>
</tr>
<tr>
<td>Present value of annual benefits:</td>
<td>0</td>
<td>385,776</td>
<td>361,519</td>
<td>339,111</td>
<td>318,060</td>
<td>297,731</td>
</tr>
<tr>
<td>Total present value of lifetime benefits:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net Present Value:</td>
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</table>
Table H.4.  Estimated Costs and Benefits for Candidate Solution 2, Baht.

<table>
<thead>
<tr>
<th>Cost Items</th>
<th>Years</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td><strong>Existing System:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Staff (increase 5% per year)</td>
<td>1,152,000</td>
<td>1,209,600</td>
<td>1,270,080</td>
<td>1,333,584</td>
<td>1,400,263</td>
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<tr>
<td>Operating Cost (increase 5% per year)</td>
<td>108,000</td>
<td>113,400</td>
<td>119,070</td>
<td>125,024</td>
<td>131,275</td>
</tr>
<tr>
<td>Utility Cost (increase 5% per year)</td>
<td>60,000</td>
<td>63,000</td>
<td>66,150</td>
<td>69,458</td>
<td>72,930</td>
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<tr>
<td>Total Cost</td>
<td>1,320,000</td>
<td>1,386,000</td>
<td>1,455,300</td>
<td>1,528,065</td>
<td>1,604,468</td>
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<tr>
<td>Cumulative Cost</td>
<td>1,320,000</td>
<td>2,706,000</td>
<td>4,161,300</td>
<td>5,689,365</td>
<td>7,293,833</td>
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<td><strong>Proposed System:</strong></td>
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<td></td>
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</tr>
<tr>
<td>Hardware Cost</td>
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<td>61,060</td>
<td>61,060</td>
<td>61,060</td>
</tr>
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<td>Software Development Cost</td>
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<tr>
<td>Maintenance Cost</td>
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<td>20,000</td>
<td>20,000</td>
<td>20,000</td>
<td>20,000</td>
</tr>
<tr>
<td>Staff (increase 5% per year)</td>
<td>864,000</td>
<td>907,200</td>
<td>952,560</td>
<td>1,000,188</td>
<td>1,050,197</td>
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<tr>
<td>Operating Cost (increase 5% per year)</td>
<td>96,000</td>
<td>100,800</td>
<td>105,840</td>
<td>111,132</td>
<td>116,689</td>
</tr>
<tr>
<td>Utility Cost (increase 5% per year)</td>
<td>48,000</td>
<td>50,400</td>
<td>52,920</td>
<td>55,566</td>
<td>58,344</td>
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<td>Total Cost</td>
<td>1,089,060</td>
<td>1,159,460</td>
<td>1,212,380</td>
<td>1,267,946</td>
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<tr>
<td>Cumulative Cost</td>
<td>1,089,060</td>
<td>2,248,520</td>
<td>3,460,900</td>
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Table H.5. Payback Analysis of Candidate Solution 2, Baht.

<table>
<thead>
<tr>
<th>Cost Items</th>
<th>Year 0</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development cost:</td>
<td>-100,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operation &amp; maintenance cost:</td>
<td>-96,000</td>
<td>-100,800</td>
<td>-105,840</td>
<td>-111,132</td>
<td>-116,688</td>
<td></td>
</tr>
<tr>
<td>Discount factors for 12%:</td>
<td>1.000</td>
<td>0.893</td>
<td>0.797</td>
<td>0.712</td>
<td>0.636</td>
<td>0.567</td>
</tr>
<tr>
<td>Time-adjusted costs</td>
<td>-100,000</td>
<td>-85,728</td>
<td>-80,337</td>
<td>-75,358</td>
<td>-70,679</td>
<td>-66,162</td>
</tr>
<tr>
<td>(adjusted to present value):</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cumulative time-adjusted costs</td>
<td>-100,000</td>
<td>-185,728</td>
<td>-266,065</td>
<td>-341,423</td>
<td>-412,102</td>
<td>-478,264</td>
</tr>
<tr>
<td>over lifetime:</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benefits derived from operation of new system:</td>
<td>0</td>
<td>432,000</td>
<td>453,600</td>
<td>476,280</td>
<td>500,094</td>
<td>525,099</td>
</tr>
<tr>
<td>Discount factors for 12%:</td>
<td>1.000</td>
<td>0.893</td>
<td>0.797</td>
<td>0.712</td>
<td>0.636</td>
<td>0.567</td>
</tr>
<tr>
<td>Time-adjusted benefits</td>
<td>0</td>
<td>385,776</td>
<td>361,519</td>
<td>339,111</td>
<td>318,060</td>
<td>297,731</td>
</tr>
<tr>
<td>(adjusted to present value):</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cumulative time-adjusted benefits</td>
<td>0</td>
<td>642,960</td>
<td>1,004,479</td>
<td>1,343,591</td>
<td>1,661,650</td>
<td>1,959,381</td>
</tr>
<tr>
<td>over lifetime:</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cumulative life time-adjusted</td>
<td>-100,000</td>
<td>457,232</td>
<td>738,414</td>
<td>1,002,168</td>
<td>1,249,548</td>
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<td>costs + benefits:</td>
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</table>
Table H.6. Net Present Value Analysis of Candidate Solution 2, Baht.

<table>
<thead>
<tr>
<th>Cost Items</th>
<th>Year 0</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development cost:</td>
<td>-400,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-1,000,564</td>
</tr>
<tr>
<td>Operation &amp; maintenance cost:</td>
<td></td>
<td>-116,000</td>
<td>-121,800</td>
<td>-127,890</td>
<td>-134,284</td>
<td>-140,998</td>
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</tr>
<tr>
<td>Discount factors for 12%:</td>
<td>1.000</td>
<td>0.893</td>
<td>0.797</td>
<td>0.712</td>
<td>0.636</td>
<td>0.567</td>
<td></td>
</tr>
<tr>
<td>Present value of annual costs:</td>
<td>-400,000</td>
<td>-103,588</td>
<td>-97,074</td>
<td>-91,057</td>
<td>-85,404</td>
<td>-79,945</td>
<td></td>
</tr>
<tr>
<td>Total present value of lifetime costs:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-1,000,564</td>
</tr>
<tr>
<td>Benefits derived from operation of new system:</td>
<td>0</td>
<td>432,000</td>
<td>453,600</td>
<td>476,280</td>
<td>500,094</td>
<td>525,099</td>
<td></td>
</tr>
<tr>
<td>Discount factors for 12%:</td>
<td>1.000</td>
<td>0.893</td>
<td>0.797</td>
<td>0.712</td>
<td>0.636</td>
<td>0.567</td>
<td></td>
</tr>
<tr>
<td>Present value of annual benefits:</td>
<td>0</td>
<td>385,776</td>
<td>361,519</td>
<td>339,111</td>
<td>318,060</td>
<td>297,731</td>
<td></td>
</tr>
<tr>
<td>Total present value of lifetime benefits:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1,702,197</td>
</tr>
<tr>
<td>Net Present Value:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>701,633</td>
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</table>
Table H.7. Estimated Costs and Benefits for Candidate Solution 3, Baht.

<table>
<thead>
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<th>Cost Items</th>
<th>Years</th>
</tr>
</thead>
<tbody>
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<td></td>
<td>1</td>
</tr>
<tr>
<td><strong>Existing System:</strong></td>
<td></td>
</tr>
<tr>
<td>Staff (increase 5% per year)</td>
<td>1,152,000</td>
</tr>
<tr>
<td>Operating Cost (increase 5% per year)</td>
<td>108,000</td>
</tr>
<tr>
<td>Utility Cost (increase 5% per year)</td>
<td>60,000</td>
</tr>
<tr>
<td><strong>Total Cost</strong></td>
<td>1,320,000</td>
</tr>
<tr>
<td><strong>Cumulative Cost</strong></td>
<td>1,320,000</td>
</tr>
<tr>
<td><strong>Proposed System:</strong></td>
<td></td>
</tr>
<tr>
<td>Hardware Cost</td>
<td>61,060</td>
</tr>
<tr>
<td>Software Cost</td>
<td>42,200</td>
</tr>
<tr>
<td>Implement Cost</td>
<td>21,200</td>
</tr>
<tr>
<td>Staff (increase 5% per year)</td>
<td>864,000</td>
</tr>
<tr>
<td>Operating Cost (increase 5% per year)</td>
<td>96,000</td>
</tr>
<tr>
<td>Utility Cost (increase 5% per year)</td>
<td>48,000</td>
</tr>
<tr>
<td><strong>Total Cost</strong></td>
<td>1,132,460</td>
</tr>
<tr>
<td><strong>Cumulative Cost</strong></td>
<td>1,132,460</td>
</tr>
</tbody>
</table>
Table H.8. Payback Analysis, Baht.

<table>
<thead>
<tr>
<th>Cost Items</th>
<th>Year 0</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development cost:</td>
<td>-622,300</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operation &amp; maintenance cost:</td>
<td>-96,000</td>
<td>-100,800</td>
<td>-105,840</td>
<td>-111,132</td>
<td>-116,688</td>
<td></td>
</tr>
<tr>
<td>Discount factors for 12%:</td>
<td>1.000</td>
<td>0.893</td>
<td>0.797</td>
<td>0.712</td>
<td>0.636</td>
<td>0.567</td>
</tr>
<tr>
<td>Time-adjusted costs (adjusted to present value):</td>
<td>-622,300</td>
<td>-85,728</td>
<td>-80,337</td>
<td>-75,358</td>
<td>-70,679</td>
<td>-66,162</td>
</tr>
<tr>
<td>Cumulative time-adjusted costs over lifetime:</td>
<td>-622,300</td>
<td>-708,028</td>
<td>-788,365</td>
<td>-863,723</td>
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<tr>
<td>Benefits derived from operation of new system:</td>
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<td>432,000</td>
<td>453,600</td>
<td>476,280</td>
<td>500,094</td>
<td>525,099</td>
</tr>
<tr>
<td>Discount factors for 12%:</td>
<td>1.000</td>
<td>0.893</td>
<td>0.797</td>
<td>0.712</td>
<td>0.636</td>
<td>0.567</td>
</tr>
<tr>
<td>Time-adjusted benefits (adjusted to present value):</td>
<td>0</td>
<td>385,776</td>
<td>361,519</td>
<td>339,111</td>
<td>318,060</td>
<td>297,731</td>
</tr>
<tr>
<td>Cumulative time-adjusted benefits over lifetime:</td>
<td>0</td>
<td>642,960</td>
<td>1,004,479</td>
<td>1,343,591</td>
<td>1,661,650</td>
<td>1,959,381</td>
</tr>
<tr>
<td>Cumulative life time-adjusted costs + benefits:</td>
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<td>-65,068</td>
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<td>479,868</td>
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<td>958,817</td>
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</table>

<table>
<thead>
<tr>
<th>Cost Items</th>
<th>Year 0</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development cost:</td>
<td>-622,300</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operation &amp; maintenance cost:</td>
<td></td>
<td>-96,000</td>
<td>-100,800</td>
<td>-105,840</td>
<td>-111,132</td>
<td>-116,688</td>
<td></td>
</tr>
<tr>
<td>Discount factors for 12%:</td>
<td>1.000</td>
<td>0.893</td>
<td>0.797</td>
<td>0.712</td>
<td>0.636</td>
<td>0.567</td>
<td></td>
</tr>
<tr>
<td>Present value of annual costs:</td>
<td></td>
<td>-622,300</td>
<td>-85,728</td>
<td>-80,337</td>
<td>-75,358</td>
<td>-70,679</td>
<td>-66,162</td>
</tr>
<tr>
<td>Total present value of lifetime costs:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-1,000,564</td>
</tr>
<tr>
<td>Benefits derived from operation of new system</td>
<td>0</td>
<td>432,000</td>
<td>453,600</td>
<td>476,280</td>
<td>500,094</td>
<td>525,099</td>
<td></td>
</tr>
<tr>
<td>Discount factors for 12%:</td>
<td>1.000</td>
<td>0.893</td>
<td>0.797</td>
<td>0.712</td>
<td>0.636</td>
<td>0.567</td>
<td></td>
</tr>
<tr>
<td>Present value of annual benefits:</td>
<td></td>
<td>385,776</td>
<td>361,519</td>
<td>339,111</td>
<td>318,060</td>
<td>297,731</td>
<td></td>
</tr>
<tr>
<td>Total present value of lifetime benefits:</td>
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<td></td>
<td></td>
<td></td>
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<td>1,702,197</td>
</tr>
<tr>
<td>Net Present Value:</td>
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<td></td>
<td></td>
<td></td>
<td>701,633</td>
</tr>
</tbody>
</table>


