BLOOD BANK MANAGEMENT SYSTEM USING RULE-BASED METHOD

FAZLIN LIYANA BINTI MOHAMMED WADZIR

BACHELOR OF COMPUTER SCIENCE
(SOFTWARE DEVELOPMENT)
UNIVERSITI SULTAN ZAINAL ABIDIN
2017
BLOOD BANK MANAGEMENT SYSTEM USING RULE-BASED METHOD

FAZLIN LIYANA BINTI MOHAMMED WADZIR

Bachelor of Computer Science (Software Development)
Faculty of Informatics and Computing
Universiti Sultan Zainal Abidin, Terengganu, Malaysia

MAY 2017
DECLARATION

I hereby declare that this report is based on my original work except for quotations and citations, which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Sultan Zainal Abidin or other institutions.

________________________________
Name : Fazlin Liyana Binti Mohammed Wadzir

Date : .................................................
CONFIRMATION

This is to confirm that:
The research conducted and the writing of this report was under my supervision.

________________________________
Name : Dr Syarilla Iryani Binti Ahmad Saany
Date : .................................................
DEDICATION

In the name of Allah, Most Gracious, Most Merciful.

Alhamdulillah with blessed from Allah to ease this project to be completed. I would like to express my sincere thanks and dedicate to my beloved supervisor of this Final Year Project, Dr Syarilla Iryani Binti Ahmad Saany for this suggestion or ideas and also the valuable guidance and advice that encourage me to complete the system successfully.

I would like to thank also to all lecturers and ISMSK(PP) group members who helped me directly and indirectly in many ways. I would like to express my gratitude to my father, Mohammed Wadzir Bin Yusoff and my mother, Rosliza Binti Abd Rahman, siblings and friends for giving me support and encouragement to complete this project and to propose this project as Final Year Project.
ABSTRACT

With the increasing of the population of Malaysian and revolution of the new technologies, Blood Bank Management System plays an important role in the blood bank as blood is the necessity to everyone. This proposed system of the Blood Bank Management System is a web-based system intends to manage the records of blood donors and replacing the blood donor red card called Certificate. Through the manual system of keeping the blood donation records, it is quite difficult to maintain the details of the donors and their donations as reference because the data can be lost or redundant. In case of critical blood demand in one time, broadcasting the message should be done to all donors with the respected blood group. Moreover, to increase the engagement of the blood donor towards the blood donation campaign, this system will send notification message to all donors respected to their postcode of address registration. For both cases, rule-based method is chosen to solve the problem which will restrict to certain donors to manage their schedule for the next blood donation by considering their blood group, eligibility to donate, postcode, last date of donation and type of blood donation allowed. The system also provide calculation for the total of blood packets which already stored into the blood bank according to each of the blood type which are A+, A-, B+, B-, AB+, AB-, O+ and O- will be keep updated. Finally, through this system it is hoped that can helped the blood bank hospital administration to make a fast and effective decision through managing the blood donation management activities in more systematically way.
ABSTRAK

untuk membuat keputusan yang cepat dan berkesan melalui mengurus sesuatu aktiviti pengurusan derma darah dengan lebih sistematik.
CONTENTS

DECLARATION i
CONFIRMATION ii
DEDICATION iii
ABSTRACT iv
ABSTRAK v
CONTENTS vi
LIST OF TABLES vii
LIST OF FIGURES xvi
LIST OF ABBREVIATIONS xv

CHAPTER I INTRODUCTION
1.1 Introduction 1
1.2 Problem statement 2
1.3 Objectives 3
1.4 Scopes 3
1.5 Limitation of Work 4
1.6 Report Structure 4

CHAPTER II LITERATURE REVIEW
2.1 Introduction 6
2.2 Blood Donation System For Online Users 7
2.3 Online Blood Donation Reservation And Management System in Jeddah 9
2.4 A Study on Blood Bank Management 11
2.5 Blood Donor Classification Using Neural Network and Decision Tree Techniques 12
2.6 Rule-Based Decisions Support System for Morphological Rehabilitation of Watercourse. 13
CHAPTER III  METHODOLOGY

3.1  Introduction  14

3.2  Methodology Justification  15

3.3  Project Life Cycle
   3.3.1  Requirement Gathering  16
   3.3.2  Design  17
   3.3.3  Implementation  17
   3.3.4  Testing  17
   3.3.5  Deployment  18

3.4  System Design
   3.3.1  Framework Design  18
   3.3.2  Architecture Design  19
   3.3.3  Interface Design  22
   3.3.4  Process Model  26
   3.3.5  Data Model  27
   3.3.6  Algorithms  34

3.5  Summary  36

REFERENCE  37
# LIST OF TABLES

<table>
<thead>
<tr>
<th>TABLE</th>
<th>TITLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1</td>
<td>BloodBank Table</td>
<td>19</td>
</tr>
<tr>
<td>3.2</td>
<td>Campaign Table</td>
<td>19</td>
</tr>
<tr>
<td>3.3</td>
<td>Donation Table</td>
<td>20</td>
</tr>
<tr>
<td>3.4</td>
<td>Donor Table</td>
<td>20</td>
</tr>
<tr>
<td>3.5</td>
<td>Notification Table</td>
<td>21</td>
</tr>
<tr>
<td>3.6</td>
<td>Staff Table</td>
<td>21</td>
</tr>
<tr>
<td>3.7</td>
<td>User Table</td>
<td>22</td>
</tr>
<tr>
<td>FIGURE</td>
<td>TITLE</td>
<td>PAGE</td>
</tr>
<tr>
<td>--------</td>
<td>----------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>1.1</td>
<td>The Common Problem in Certificate</td>
<td>2</td>
</tr>
<tr>
<td>2.1</td>
<td>Homepage of the Blood Donation System</td>
<td>7</td>
</tr>
<tr>
<td>2.2</td>
<td>Homepage of Online Blood Donation and Management System in Jeddah</td>
<td>9</td>
</tr>
<tr>
<td>3.1</td>
<td>Incremental Model System Development Life Cycled</td>
<td>14</td>
</tr>
<tr>
<td>3.2</td>
<td>Framework of Blood Bank Management System</td>
<td>18</td>
</tr>
<tr>
<td>3.3</td>
<td>Index interface</td>
<td>23</td>
</tr>
<tr>
<td>3.4</td>
<td>Administrator interface</td>
<td>23</td>
</tr>
<tr>
<td>3.5</td>
<td>Interface for Registering a New Blood Bank Staff</td>
<td>24</td>
</tr>
<tr>
<td>3.6</td>
<td>Blood Bank Staff interface</td>
<td>24</td>
</tr>
<tr>
<td>3.7</td>
<td>Donor interface</td>
<td>25</td>
</tr>
<tr>
<td>3.8</td>
<td>Context Diagram for Blood Bank Management System</td>
<td>26</td>
</tr>
<tr>
<td>3.9</td>
<td>DFD Level 0 for Blood Bank Management System</td>
<td>27</td>
</tr>
<tr>
<td>3.10</td>
<td>DFD Level 1 for Process 1.0</td>
<td>28</td>
</tr>
<tr>
<td>3.11</td>
<td>DFD Level 1 for Process 2.0</td>
<td>29</td>
</tr>
<tr>
<td>3.12</td>
<td>DFD Level 1 for Process 3.0</td>
<td>29</td>
</tr>
<tr>
<td>3.13</td>
<td>DFD Level 1 for Process 4.0</td>
<td>30</td>
</tr>
<tr>
<td>3.14</td>
<td>DFD Level 1 for Process 5.0</td>
<td>30</td>
</tr>
<tr>
<td>3.15</td>
<td>DFD Level 1 for Process 6.0</td>
<td>31</td>
</tr>
<tr>
<td>3.16</td>
<td>ERD for Blood Bank Management System</td>
<td>33</td>
</tr>
</tbody>
</table>
## LIST OF ABBREVIATIONS / TERMS / SYMBOLS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CD</td>
<td>Context Diagram</td>
</tr>
<tr>
<td>DFD</td>
<td>Data Flow Diagram</td>
</tr>
<tr>
<td>ERD</td>
<td>Entity Relationship Diagram</td>
</tr>
<tr>
<td>FYP</td>
<td>Final year project</td>
</tr>
<tr>
<td>BBMS</td>
<td>Blood Bank Management System</td>
</tr>
</tbody>
</table>
LIST OF APPENDICES

<table>
<thead>
<tr>
<th>APPENDIX</th>
<th>TITLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Appendix 1</td>
<td>80</td>
</tr>
<tr>
<td>B</td>
<td>Appendix 2</td>
<td>81</td>
</tr>
<tr>
<td>C</td>
<td>Appendix 3</td>
<td>82</td>
</tr>
<tr>
<td>D</td>
<td>Appendix 4</td>
<td>83</td>
</tr>
</tbody>
</table>
CHAPTER I

INTRODUCTION

1.1 Project Background

Blood Bank Management System is a web-based system used by the hospital blood bank or blood centre. The system serves as a medium for public to increase their awareness and to promote the importance of blood donation especially in saving lives. The system also provides many functions for the hospital staffs to manage the blood packets and campaign that have been created. This system also has an ability to keep track of donor records and the status of blood stock in the blood bank. The system is also able to alert the donors about the critical blood needed by broadcasting the message to donors about the case.

The goal of this project is to computerize the blood bank management system in a hospital blood bank in order to manage the records of blood donors, blood donation campaign announcement and broadcast message about critical blood demand to donors.

Besides that, all information has been kept in the database and the user who wants to retrieve it is restricted only by the authorized user.
1.2 Problem Statement

Currently, the computer-based in blood bank management has not widely used in Malaysia. Mostly, it is done manually. The first problem is to search for blood donation records. Staffs of the hospital have to search one-by-one and it may takes a lot of time. Besides that, the paper records can be lost or undefined. Donors also faced the same problem for their donation records recorded in Certificate. Secondly is about location of blood donation campaign and planning. Donor usually heard the location for blood donation campaign from friends or family and cannot plan well for next donation. The staffs of the hospitals are having difficulty to make report for total blood packet by monthly basis. Missing and duplicate blood donation information records make the count inaccurate and this will be problem to detect critical blood demand.

Figure 1.1: The common problem in Certificate
1.3 Objectives

1. To propose a system that records blood donation as the alternative to replace the traditional way of recording Red Book Certificate.

2. To design a web-based system which generate blood donation reports which is organized and clear to be viewed by users.

3. To test the system works and its capability of notifying the campaign and broadcast blood critical demand to donor using rule-base method.

1.4 SCOPES

The scope for this system is divided into four (4) which are administrator scope, blood bank staff scope, donor scope and location scope.

1.4.1 Administrator Scope
i. Manage staff registration

1.4.2 Blood Bank Staff Scope
i. Manage blood donation
ii. Manage donor
iii. Manage blood bank
iv. Manage campaign
v. Manage notification of campaign and critical blood demand (Rule-based module)
vi. Generate report

1.4.3 Donor Scope
i. Manage registration and profile
ii. View blood donation records
iii. Receive notification of campaign and blood critical demand

1.4.4 Location Scope
Location of blood donation campaign is only around Terengganu.

1.5 LIMITATION OF WORK
There are some limitations of work since the proposed system is only covers certain aspects.

i. The system allows the blood donation campaign location only around Terengganu.
ii. Designing as a web-based system, donor receives notification about critical blood demand when online.

1.6 REPORT STRUCTURE
This thesis is organized in five (5) chapters. The first chapter of this thesis is

CHAPTER I: INTRODUCTION. The project introduction, problem statement, objectives, scope and limitation of work are well stated.
The second chapter is **CHAPTER II: LITERATURE REVIEW**, the research problem and research method for Rule-Based. Apart from that, the reviews of the existing system also are being discussed in this chapter.

The third chapter is **CHAPTER III: METHODOLOGY** will elaborate on and the advantages of the model chosen. This research is using an incremental model system development life cycled. This chapter will discuss on the technical part of the system such as the framework of the system, Context Diagram (CD), Entity Relationship Diagram (ERD) and Data Flow Diagram (DFD). Besides that, database and interface of the system are also being explained.

The fourth chapter is **CHAPTER IV: IMPLEMENTATION AND RESULT**, include the introduction of implementation and testing, and the testing approach used to test the functionality of the system.

And the last chapter is **CHAPTER V: CONCLUSION**, the whole thesis is concluded and this section contains the explanation about the achievement, constraint and future work of the blood bank management system.
CHAPTER II

LITERATURE REVIEW

2.1 Introduction

In the literature review, the chapter discusses about the previous journal and research paper. The information that has been collected is on what method and what contributions that the research have been achieved in improving the uses of blood bank management system.
2.2 Blood Donation System For Online Users

This journal paper is about the development of blood donation system which has web-based matcher that acts as server to match donors and patient pair compatibly by using rule-based knowledge. The system is designed to process as follows: two types of users are allowed in this system, the donor type and the patient type. For donor account, as input, the donor needs to enter the information needed for patient to inquire necessary blood. Then the matcher decided to accept the donation of donor or not by using their rules based knowledge.

Advantages of the system is:

1. Use the concept of web matcher which matches the donors’ blood group and patients’ blood group by using rule based knowledge.
2. This system provides communication between the Blood Donors and Patients compatibly through questionnaire.
2.3 Online Blood Donation Reservation And Management System in Jeddah

Figure 2.2: Homepage of Online Blood Donation and Management System in Jeddah

This paper is about a web-based system which aims to educate the community on the benefits of blood donation, develop a Web-Based Blood Bank System to manage the records of donors and recipients, and persuade voluntary blood donation, to access information about blood type and the distribution of the blood in various hospitals in Jeddah, based on the hospital needs. The Waterfall Methodology is used to develop and build the web-based blood bank. The system is developed by using HTML, PHP, and MySQL as a database system to manage and store the data. The system targets three types of user which are the public who wants to donate blood, the recipients who need the donated blood, and the hospitals who that work as an intermediary to manage the communication between the donors and recipients.
There are a few advantages of the system which are as follows:

1. Each hospital can register on the website and make its own account that contains information about the hospital which are the blood types needed and the blood types available.

2. Make it easier for donors to find the appropriate recipients to whom to donate blood by searching in the website by blood type so that a list of hospitals that need that blood type will appear.

3. Make it easier for recipients to find the appropriate donors by searching in the website by his blood type so that a list of hospitals that have that blood type will appear.

4. Hospitals, donors, and recipients can add their own comments in the feedback section about the website.
2.4 A Study on Blood Bank Management

The journal paper concerning on Blood Bank Information System which helps to manage the records of donors and patients at a blood bank. The system will allow the authorized blood bank officer to login using a secret password and easily manage the records of the blood donors and the patients in need of blood. The main objective of this application is to automate the complete operations of the blood bank as it needs to maintain hundreds of thousands of records.

There are various modules available for the system such as user login screen that enables user to enter the user password and login name to enter application. Others are menu form, donor registration, donor blood test, recipient management, blood management, blood stock and blood reservation module.

The advantages of the system would be as follows:

1. Access to the system secured by login.
2. Search facility for finding blood donors based of various search criteria.
3. Search facility for finding Patients (acceptors) based of various search criteria.
2.5 Blood Donor Classification Using Neural Network and Decision Tree Techniques

The paper is about the pattern of blood donors’ behaviours based on factors influencing blood donation decision is conducted using online questionnaire. These factors, i.e., altruistic values, knowledge in blood donation, perceived risks, attitudes towards blood donation, and intention to donate blood, are analysed to find out the possibilities for individuals to become blood donors. The surveyed data are used for machine learning techniques of Artificial Intelligence to classify the blood donor group into donors and non-donors. Then, the accuracy testing of the surveyed information is conducted using the Artificial Neural Network (ANN) and Decision Tree techniques in order to predict from a series of individual blood behaviour data whether or not each individual is a donor.

The results indicate that the accuracy, precision, and recall values of ANN technique are higher than those of the Decision Tree technique.

The advantages of the study are:

1. It uses the technique of data mining in classifying the blood donor groups such as Decision Tree and Artificial Neural Network.

2. Find the probability that user will become donor or non-donor by using both techniques and make comparison to which has the highest accuracy.
2.6 Rule-Based Decisions Support System for Morphological Rehabilitation of Watercourse.

Rule-based decision support system (DSS) has been developed to assist decision maker in preparing the EU program of measures. The rehabilitation of morphological structure of small and medium sized watercourses in Germany is the main objective. The lack of quantitative data and knowledge is the main obstacle in hydro-morphological modelling. Apart from that, the DSS manipulates the decision making process in a qualitative manner based on the knowledge of the experts. The acquired knowledge is used to formulate a “if-then” rules to solve the modelling problems. The develop DSS enables decision maker to select any watercourse in the German state of North Rhine-Westphalia (NRW), investigate the feasibility of different rehabilitation measures, predict the impact on the morphological structure and prepare a program of morphological measure including cost estimations.

As stated above, the advantages of Rule-Based method is:

1. The DSS manipulates the decision-making processing a qualitative manner based on the knowledge of expert.
2. The develop DSS enables decision makers to select any watercourse in German state.

The disadvantage of using the Rule-Based method is:

The main problems of expert-based decision-making process are the scarcity of such experts and the enormous amount of data to be handled.
CHAPTER III

METHODOLOGY

3.1 Introduction

Figure 3.1 shows the incremental models that are chosen in developing this project. This model has been selected because project can be developed through cycle of phase. The development of the project is that it must follow the phase that is a phase at a time. If there is any correction, it can be done in the middle of the process. Incremental model included five phases which are requirement analysis, design, implementation and unit testing, integration and system testing and operation.

Figure 3.1 Incremental Model System Development Life Cycled.
3.2 Methodology Justification

The incremental model is chosen to develop this project because of these some factor

I. Security

The model is more organized and easy to understand the flow

II. Flexibility

Allow to have changes happen in the middle of the process, the system still can be implemented and proceed so that all the modules that want to be achieved is success

III. Saves time

As the system that is developed using the cyclic model, the developing of the project can be continuously done although there is some error in the middle of the process
3.3 Project Life Cycle

3.3.1 Requirement Gathering

Requirement gathering is the first step for this methodology for the project. On this phase, all requirements are gathered together so that all of the needed requirement can be stated, analyse and process. All the requirements will be analyse if it is suitable to develop the system. Also on this phase, all the materials that are required have been prepared.

I. Hardware

   a) Personal Computer (PC)

II. Software

   a) Google Chrome
   b) Notepad ++
   c) XAMPP
   d) Microsoft Office
   e) MySQL server Workbench
3.3.2 Design

This is the Second stage that used so that the flow of the project will be successful. After gather all the important information related to the project, a framework is develop to show the flow of the system so that this system flow will be easily understand.

In this phase, a design of context diagram, data flow diagram (DFD) and entity-relationship diagram (ERD) is used to show the flow of the system specifically.

3.3.3 Implementation

After all information has been gathered and the design has been created, we will start to develop the system to make sure that it is able to use by different user. Then, will the dietary suggestion system suggest the best diet plan for the user.

3.3.4 Testing

At this phase, the system will be tested. If there is any error occur or detected, it must be solved at this phase and if there any changes made, it need to be re-implement back to design phase to make sure that the flow of the system is not affected.
3.3.5 Deployment

After the system is free from error and bugs, the system will then be deployed for market. The testing that takes place will approve the validity of the system for marketing. By then, it is mandatory to monitor the system time to time to make sure that if any changes had to be done, it is noticed.

3.4 System Design

3.4.1 Framework Design

![Diagram of Framework of Blood Bank Management System]

Figure 3.2: Framework of Blood Bank Management System
Figure 3.1 shows about the framework of the system which consists of entities involves, the flow of the system generally and site of the implementation of rule-based method.

3.4.2 Architecture Design

3.4.2.1 BloodBank Table

![BloodBank Table Image]

Table 3.1: BloodBank Table

In Table 3.1, there are four variables consists in the table which are BloodSeriesNo, BloodType, DateUpdate and DateExpire.

3.4.2.2 Campaign Table

![Campaign Table Image]

Table 3.2: Campaign Table

In Table 3.2, there are seven variables consists in the table which are CampaignID, CampaignDate, TimeStart, TimeEnd, Place, CampaignAddress and Postcode. CampaignID is the primary key for this table.
3.4.2.3 Donation Table

Table 3.3: Donation Table

In Table 3.3, there are seven variables consists in the table which are DonorID, dateDonate, BloodType, DonationType, Amount, BloodSeriesNo, Place. BloodSeriesNo is the primary key for this table.

3.4.2.4 Donor Table

Table 3.4: Donor Table

In Table 3.4, there are twelve variables consists in the table which are DonorID, DonorName, DonorAddress, DonorAddress2, DonorPostcode, BloodType, Rhesus, DonorContact, DonorDOB, DonorGender, DonorWeight, DonorEligibility. DonorID is the primary key for this table.
### 3.4.2.5 Notification Table

In Table 3.5, there are nine variables consists in the table which are NotificationID, NotificationMsg, DonorID, CampaignID, Postcode, BloodType, lastDonate, DonationType, and DonorEligibility. NotificationID is the primary key for this table.

### 3.4.2.6 Staff Table

In Table 3.6, there are seven variables consists in the table which are StaffID, StaffName, StaffAddress, StaffAddress2, StaffPostcode, StaffContact and StaffGender. StaffID is the primary key for this table.
### 3.4.2.7 User Table

In Table 3.7, there are four variables consists in the table which are UserID, UserPassword, image, and imageName. UserID is the primary key for this table.

#### Table 3.7: User Table

<table>
<thead>
<tr>
<th>#</th>
<th>Name</th>
<th>Type</th>
<th>Collation</th>
<th>Attributes</th>
<th>Null</th>
<th>Default</th>
<th>Extra Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>UserID</td>
<td>varchar</td>
<td>latin1_swedish_ci</td>
<td>No None</td>
<td>Change Drop Primary Unique Index Spatial Fulltext More</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>UserPassword</td>
<td>varchar</td>
<td>latin1_swedish_ci</td>
<td>No None</td>
<td>Change Drop Primary Unique Index Spatial Fulltext More</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>image</td>
<td>image</td>
<td></td>
<td>Yes NULL</td>
<td>Change Drop Primary Unique Index Spatial Fulltext More</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>imageName</td>
<td>varchar</td>
<td>latin1_swedish_ci</td>
<td>Yes NULL</td>
<td>Change Drop Primary Unique Index Spatial Fulltext More</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 3.4.3 Interface Design

The goal of user interface is to create a communication display between system and user. In this proposed project, user will interact with the system using 100 percent interface display. The interface design should lead user to understand the flow of the system. Many aspect need to be consider in designing the interface so that the interface will be able to guide user all the way throughout the system. An interface design should consider about user friendly aspect for the user, make sure that user understand what need and what not to be inserted in the field on the interface display. Also, the consistency of the interface which means the locations of the button, color schemes, etc.
Figure 3.3: Index interface

Figure 3.3 shows the index interface of the Blood Bank Management System before user can either login or register.

Figure 3.4: Administrator interface

Figure 3.4 shows the Administrator interface which provide field to manage his profile and manage staff.
Figure 3.5: Interface for registering a new blood bank staff

Figure 3.5 shows the interface for administrator to fill in form for registering new staff into the system.

Figure 3.6: Blood bank staff interface

Figure 3.6 shows the interface for blood bank staff to perform their tasks such as managing campaign.
Figure 3.7: Donor interface

Figure 3.7 shows the interface made for Donor. Donor can perform their tasks such as view the records of their blood donation.
3.4.4 Process Model

3.4.4.1 Context Diagram (CD)

The Blood Bank Management System consists of 3 entities which are Administrator, Blood Bank Staff and Donor. All of these entities need to login into the system before able to access their interface. Admin can make registration of the blood bank staff into the system. The Staff is able to manage staff details, manage blood donation, manage notification consists of campaign and critical blood demand and view report. As for Donor can view the blood donation record, view the notification consists of campaign and critical blood demand and view report.
3.4.5 Data Model

3.4.5.1 Data Flow Diagram (DFD) Level 0

Figure 3.9: DFD Level 0 for Blood Bank Management System
A Data Flow Diagram (DFD) is a graphical representation of a flow of data through a system. In figure 3.8, there are seven processes involved. Processes in this system are manage blood bank staff, manage blood donation, manage campaign, manage blood bank, manage notification, manage donor, manage report. There six data store involved which is blood bank staff, donation, campaign, blood bank, notification, and donor data store.

3.4.5.2 Data Flow Diagram (DFD) Level 1

Figure 3.10: DFD Level 1 for process 1.0

Figure 3.10 shows the detail process for administrator to manage blood bank staff. In managing the staff, administrator is able to register new staff and delete staff. The detail of blood bank staff is stored in blood bank staff data store.
Figure 3.11: DFD Level 1 for process 2.0

Figure 3.11 shows the detail process for blood bank staff to manage blood donation. In managing the blood donation, blood bank staff is able to add blood donation, update blood donation and delete blood donation. The detail of the blood donation is stored in donation data store.

Figure 3.12: DFD Level 1 for process 3.0
Figure 3.12 shows the detail process for blood bank staff to manage campaign. In managing the campaign, the staff is able to add campaign, update campaign and delete campaign. The detail of the campaign is stored in campaign data store.

Figure 3.13: DFD Level 1 for process 4.0

Figure 3.13 shows the detail process for blood bank staff to manage blood bank. In managing the blood bank, the staff is able to add blood quantity and update the blood quantity. The detail of the blood bank is then stored in blood bank data store.
Figure 3.14: DFD Level 1 for process 5.0

Figure 3.14 shows the detail process for blood bank staff to manage notification. In managing the notification, the staff is able to send campaign notification and broadcast critical blood demand to be sent to donor. The detail of notification is then stored in notification data store.

![DFD Level 1 for process 5.0](image)

Figure 3.15: DFD Level 1 for process 6.0

Figure 3.15 shows the detail process for donor to manage donor. In managing donor, the donor is able to register, update donor and delete donor. The detail of the donor is then stored in donor data store.
3.4.5.3 Entity Relationship Diagram (ERD)

Figure 3.15 shows the entity relational diagram of the system. This diagram shows the database and their entity that involve in the process for the system. All the updated data in the data store is self-updated by user. In the diagram, we can see several lookup tables that is to be inferred by the system.
Figure 3.16: ERD for Blood Bank Management System
3.4.6 Algorithms

3.4.6.1 Theory of Rule-Based

The rule-based system itself uses a simple technique: It starts with a rule-base, which contains all of the appropriate knowledge encoded into If-Then rules, and a working memory, which may or may not initially contain any data, assertions or initially known information. The system examines all the rule conditions (IF) and determines a subset, the conflict set, of the rules whose conditions are satisfied based on the working memory. Of this conflict set, one of those rules is triggered (fired). Which one is chosen is based on a conflict resolution strategy. When the rule is fired, any actions specified in its THEN clause are carried out. These actions can modify the working memory, the rule-base itself, or do just about anything else the system programmer decides to include. This loop of firing rules and performing actions continues until one of two conditions are met: there are no more rules whose conditions are satisfied or a rule is fired whose action specifies the program should terminate.
3.4.6.2 Rule-based Implementation for Broadcasting Critical Blood Demand

```
BEGIN
  $Blood = $row['BloodType'];
  $Date = $row['date']
  // Get the critical blood type and date

  SELECT BloodType, DonorEligibility FROM table Donor WHERE DonorEligibility = 'E'
  $Eligible = $row['DonorEligibility']
  $DonorB = $row['BloodType']
  // Get only Donor who eligible to donate

  IF ($DonorB == $Blood)
    THEN SELECT DISTINCT donationType FROM Donation
      IF donationType = 'Wholeblood'
        THEN SELECT DISTINCT lastDonation FROM Donation
          Add 3 month to generate new date
          $Correct = new date => $Date

          // Condition that need to be fulfilled
          DonorEligibility = 'E';
          BloodType = $Blood;
          lastDonation = $Correct;

    BROADCAST message to Donor

END
```
3.5 Summary

This chapter explained about the methodology that being used by Blood Bank Management System Using Rule Based method to store database on blood donation and making notification on campaign and critical blood demand. It has explained the requirement of hardware and software that are being used along the development of the system.
REFERENCES

Webpages


[2] How to draw Bar Graph using data from MySQL table and PHP | ChartJS  
   https://www.youtube.com/watch?v=mmz79gH0l6c

Journal


Appendix

Gantt Chart

Fyp 1