CERTIFICATION OF APPROVAL

Intelligent Football Management Information System

(IFMIS)

by

Mohd Syahmi Syazwan bin Zahari

A project dissertation submitted to the

Business Information Systems Programme

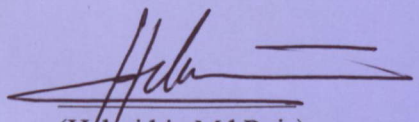
Universiti Teknologi PETRONAS

in partial fulfillment of the requirement for the

BACHELOR OF TECHNOLOGY (Hons)

(BUSINESS INFORMATION SYSTEMS)

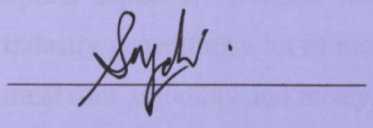
Approved by,



(Helmi bin Md Rais)

CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work in my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.



MOHD SYAHMI SYAZWAN BIN ZAHARI

Intelligent Football Management Information System (IFMIS)

by

Mohd Syahmi Syazwan bin Zahari
Universiti Teknologi PETRONAS
Computer and Information Sciences Department

Abstract

Sports especially football has millions of fans across the globe, emerging into an industry generating a lot of money. For a football league to be interesting, every element must runs smoothly and nicely. One of the components that falls under the responsibility of the organizer is to produce good fixtures for the matches. It has to be able to fulfill all the constraints and yet it is a convenience for all who involved, including the followers that will be watching the matches. And that is why this system is introduced. On top of that, this system will provide a platform to attempt for a near paperless league organization in the case of study, UniversitiTeknologi PETRONAS (UTP). Fully integrated profiling function will enable the players and managers to have a new experience of creating and forming the teams online. Apart from that, as any system is expected to be, this system will ease almost all process in a football league; teams and officials registration, auto generated forms and reports, up-to-date league standing, effective information dissemination, and team management. The system will save a lot of time of both organizers and participants and information management is to be considerably improved.

ACKNOWLEDGEMENT

Praise to Allah the Most Gracious the Most Merciful for His blessings I finally managed to finish this Final Year Project. First of all, thank you to my parents and family for without their continuous support I would not make it successfully to this final level of my undergraduate studies.

My highest gratitude goes to my supervisor; Mr Helmi bin Md Rais for his guidance and support as well as willingness to share experience and knowledge throughout the whole period of completing my Final Year Project. All the lessons and learning; whether work related or non-work related will always be remembered.

Not forgotten, respected lecturers since my foundation year until this very final year – thanks for all the knowledge shared, advices, and the encouragement. To fellow friends; thank you for helping me with anything with regard to the project – the unusually complicated algorithm and codes, completing surveys, and sharing of related information.

To Universiti Teknologi PETRONAS, it is a great experience to have a chance to study and live here. To my sponsor – PETRONAS, thank you for the opportunity. Lastly, to whoever involved in the course of completing this Final Year Project; directly or indirectly, thank you very much.

Table of Contents

List of Figures

List of Tables

List of Charts

CHAPTER 1

INTRODUCTION

1.1 Background

Sports have been more than an entertainment now (Kendall, Knust, Ribeiro, and Urrutia, 2010). It has emerged as an industry with millions of fans worldwide; turning it as a promising money-machine venture to jump in. One of the most popular types of sports is football. Every four years, Football World Cup will be organized attracting loads of viewers worldwide. And for the nation hosting one of the largest sporting event in the world, it anticipates a good effect in term of political, psychological, sociological, cultural and economical of its country (Hagn and Maening, 2007).

1.2 Sports Scheduling

Whenever a sports competition is organized, there will be a need for a schedule or a timetable. In big tournament, scheduling plays a major role economically as large amount of its revenue comes from selling rights to broadcast to TV networks which in return demand for most attractive games to be scheduled at certain dates and times (Rasmussen and Trick, 2008). On the other hand, all teams of a tournament requires good schedule for a good game-play in essence that the schedule allocate fair home and away matches, sufficient breaks, as well as cost-effective for travelling.

1.3 Intelligent Football Management Information System

Intelligent Football Management Information System (IFMIS) is a web-based system developed to manage a football league competition. While the system aims to serve any football league upon completion, most of the scenarios during system development are based on UniversitiTeknologi PETRONAS League (UTP League); an annual football league for students and staff of UTP.

As the name suggests, the system is intended for coming out with a management information system that will ease every party involves in the tournament. The stakeholders of this system have been identified as:

i) The league organizers and management committee members
ii) The team managers
iii) The players (participants)
iv) UniversitiTeknologi PETRONAS
v) System developer

A complete system will be able to serve two most important functions; profiling and scheduling. Profiling in essence keeps the records of each and every players, managers and referees involved in the tournament. The managers will be able to recruit players to be in their team based on the database in the system. While scheduling on the other hand acts as an 'engine' that will generate schedule for the tournaments based on the constraints and requirements specified during the development process. Nevertheless, the system will still include other elements of information management for both league organizer and team managers. It will be able to handle every information-related activities of the tournament from registration until the tournament is over. Further particulars regarding the working principles of the system is detailed out in Chapter 3: Methodology.

1.4 Problem Statement

The author has examined the current way of how UTP League is being organized every single year. Based on the interview conducted, many respondents; the organizer, the participants, and the public,agree to the idea of creating a website to manage most of the processes involved in organizing the tournament. Below are some problems and concerns hoped to be tackled with the establishment of the website:

i) Go paper-less

It is how the way today's world operates; go paper-less. In corporate world, many paper-based business activities have been re-engineered to be paper-less. Therefore, this website will convert the current conventional pen-and-paper method of registration process to online registration process. This way, the organizer may use the advantage of Internet connection owned by every student in the university. Every registration received will be stored in the database and thus, easing the further processes.

ii) Information dissemination

Another way of looking information handling of a tournament is through which the information is being disseminated to the target group; either the competing teams or the league followers. Taking example of UTP League 2010, the information of the league displayed in its website as shown in Figure 1 (in this case, it used blog) was not timely updated and even worse, the league standing was updated only up until round forty out of forty-seven rounds in total.

35	3/4/2011	Zephyrs	1	1	East Coast	A
36		Halluuu	0	2	Kaiser	B
37	6/4/2011	Goliath	1	2	Blackhawk	A
38		Rasta	6	0	Halluuu	B
39	8/4/2011	Kaiser	1	4	Cemac	A
40		Cantana	0	0	Ace	H
41	15/4/2011	Winner A			Runner Up B	A
42		Winner C			Runner Up D	B
43	17/4/2011	Winner D			Runner Up C	A
44		Winner B			Runner Up A	B
45	23/4/2011	Winner 41			Winner 42	A
46	24/4/2011	Winner 43			Winner 44	A
47	29/4/2011	Winner 45			Winner 46	A

Figure 1: Snapshot from http://utpsoccerleague11.blogspot.com

iii) Attracting teams outside of UTP

Apart from the internal UTP League, UTP is scheduled to organize an open tournament this year. It means that this tournament will be joined by teams from outside of UTP. Using this website, promotion is more widened which will result of more teams to join the tournament. Apart from that, registration function provided by this website will ease the registration which can be done anywhere, anytime, as long as the participants are connected with the Internet.

iv) Fixtures generation

It is agreed that schedule plays an important role for a football league. While the schedule could be developed manually, it is much easier to set up a system capable of generating a good fixture for the tournament. Furthermore, the system could eliminate or at least reduce the tendency of error compared to coming out with a manually generated tournament timetable. In addition, lots of time could be saved and be spent on other more important things of the tournament.

1.5 Objectives

The main objective of this research is to come out with a working web-based system capable of handling and providing all the vital information of a football tournament. It aims to ease all the process and activities involved related with data collection, manipulation and dissemination. In addition, this study aims for following specific objectives:

- A system that integrates the data from the organizer and the participating teams in an efficient and effective way.
- A system that will ease the organizer in disseminating relevant information of the tournament such as the current league standing to the league audience.
- A system with an ability to generate tournament fixture which satisfy the given constraints while be able to fulfill the basic needs of the participants.

1.6 Scope of Study

Most of the professional football leagues held even anywhere in the world comply with the rules and regulations by FédérationInternationale de Football Association (FIFA) or translated in English as International Federation of Association Football. FIFA acts as the international governing body of association football, futsal and beach football. In Malaysian context, the governing body is Football Association of Malaysia (FAM) which has become a full-fledge member of FIFA in 1956.

In the process of developing this system, UTP League will be used as the case study. As UTP League is in compliance to every rules and regulations by FAM and FIFA, the system aims to be able to serve any professional football league. In term of the system, it will cover every angle of league management. While the core of the system would be profiling and scheduling, several other elements must be included to support the two main scopes as depicted in Figure 2 below.

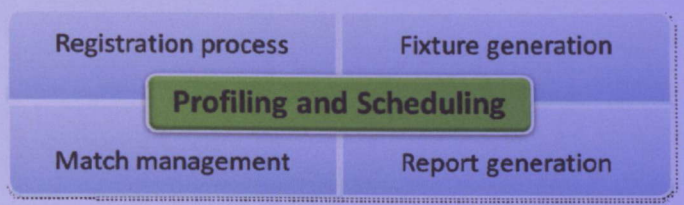


Figure 2: Scope of the project

i. Tournament management: Managing the registration of teams, players and officials.
ii. Fixture generation: Create fixture calendar for the league. It includes location and important details for each match.
iii. Match management: Register player selection for each match and produce auto-generated forms for match result and report, player status, and to compile match results and reports.
iv. Report: Generate league standing table and to display match results, scorer, top scorer, cards, etc.

1.7 Limitations of the Study

There are a number of limitations affecting the research. For one, a complete and thorough study of the subject matter especially in the algorithm approach requires a high time commitment. However since the research period is very short, it is limiting the study in term of time frame.

CHAPTER 2

LITERATURE REVIEW

This chapter mainly discusses on the general idea of Intelligent Football Management Information System (IFMIS). There will be few subtopics under this chapter which each of them will address and discuss several important keywords in this paper.

2.1 Football

Merriam-Webster dictionary defines football as any of several games played between two teams on a usually rectangular field having goalposts or goals at each end and whose object is to get the ball over a goal line, into a goal, or between goalposts by running, passing, or kicking. There are several variations of football like American football, Australian Rules football, Canadian football, and few others.

In this paper however, the context is on association football; commonly referred to as football or soccer. Britannica Encyclopedia describes football as game in which two teams of 11 players, using any part of their bodies except hands and arms, try to maneuver the ball into the opposing team's goal. Only the goalkeeper is permitted to handle the ball and may do so only within the penalty area surrounding the goal. The team that scores more goals wins.*(Refer to Figure 1)*

FédérationInternationale de Football Association (FIFA) internationally has been accepted as the highest governing body for football, futsal and beach football. It is the one to make major decision regarding any changes to rules and regulations of the sports. It is also the one responsible for the most awaited and biggest football event in the world, Football World Cup, a battle-field for the best 32 countries' football teams all over the world. Next Football World Cup will be held in Brazil in 2014.

Britannica Encyclopedia also ranked football as the world's most popular ball game when measured in term of number of participants and spectators. The reasons being are this sports is playable almost anywhere; from official football field as shown in Figure 3 to gymnasiums, streets, playgrounds, parks, or even beaches. It is also simple in principle and requires minimum equipment. FIFA too supports the premise by giving out statistics on football. At the turn of 21st century there are approximately 250 million football players and over 1.3 billion people "interested" in football. During 2010 World Cup finals, the combined television audience reached more than 26 billion.

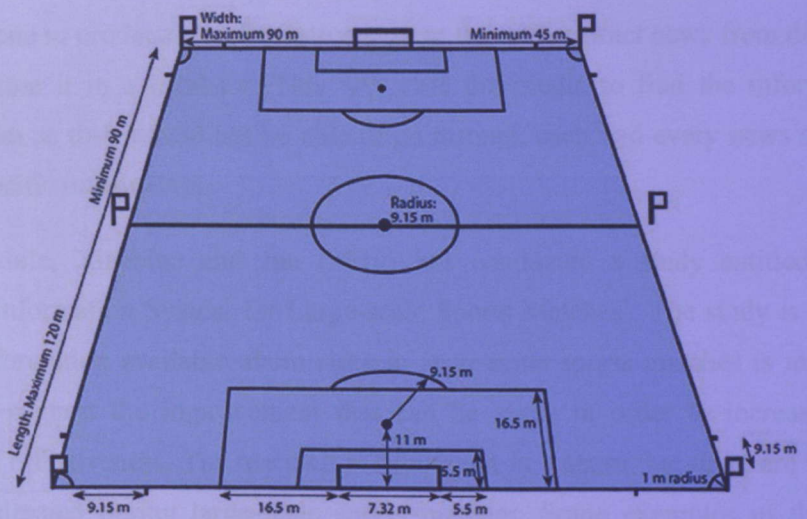


Figure 3: A football field

In Malaysia, the governing body for football in Malaysia is Football Association of Malaysia (FAM). FAM was founded in 1933. It became an Asian Football Confederation (AFC) in 1954 and later in 1956, it became a full-fledge member of FIFA. In Malaysian context, several football leagues and championships were conducted every year. Some of the leagues are Liga Super Malaysia (Malaysia Super League), LigaPerdana Malaysia (Malaysia Premiere League) and Liga FAM (FAM League). While for the championships, there are competitions between states and clubs in search for Piala Malaysia (Malaysia Cup) and PialaSumbangsih (Sultan Haji Ahmad Shah Cup). Piala Malaysia for the record is the longest-running football competitions in Asia. The tournament began in 1921, then known as Malaya Cup.

2.2 Football Management Information System

A journal by Trisuwannawat and Chayawan (2010) has focused on database design for a football league by taking Thai Football league as the case study. Database is an important element that an information system should have. This study aims to gather all the relevant data regarding Thai Football league from the past to be investigated and verified by the experts and hence, to increase the efficiency and for cost benefits.

Another study by Yang and Li (2007) on the other hand information system in term of information extraction; taking Beijing 2008 Olympic Games as the case study. The study is done to produce an information system that will extract news from different sources and store it in a database. This will ease the media to find the information relevant to them as they would not be able to go through each and every news sources just to find specific information.

Meanwhile, Xianbiao and Jun (2010) has conducted a study entitled 'Risk Management Information System for Large-scale Sports Matches'. The study is mainly about how information available about risks in large-scale sports matches is managed and hence to suggest the improvement that can be made in order to increase their efficiency and effectiveness. The research is significant in a sense that there are various risks to be tolerated during large-scale sports matches. Some examples of that are: violent acts of overexcited audiences, casualties for disrepair of gymnasium and others.

This paper however will make use of management information system concept mostly in term of profiling and records during matches. Creation of profile for every players, managers and referees requires a well-designed database (Described further in Chapter 3: Methodology). Apart from profiling, the information handled includes matches records, registration of officials, and standing tables.

All these elements of management information systems if successfully achieved in the system will surely ease the management of the tournament and most importantly all the related information is secured safely and can be used as future reference. Next in step, knowledge management components can be applied to the information in the database in order to gain patterns or statistical data for further exploration.

2.3 Sports League

Nowadays, professional sports league is no more a cheap entertainment (Kendall, Knust, Ribeiro, &Urrutia, 2010). It has become a multimillion business for some people. A great deal of money has been invested in term of players, broadcasts, advertising and others; generating tons of revenue for the investors (Wei, Fujimura, Wei, & Ding, 2010). This scenario has therefore increases the importance and needs for the leagues to be scheduled efficiently. And scheduling a tournament or a league is not easy as many constraints involved in it like logistic, organizational, economical, and fairness issues.

2.4 Sports Competition Scheduling

As a result, sports competition scheduling (SCS) has become more significant in research area since past few decades. The researches largely intensive on almost all sports held on league basis and round-robin tournament play (Guangdong, Ping, &Qun, 1997). In general, the researches that have been conducted may use certain sports or leagues as their real life case study while some others conducted studies on how a certain algorithm approach is used to settle the problem of SCS. Researches in these two particular fields have become more extensive by time as sports itself has grown rapidly year by year.

Moreover, different types of sports have different timetabling requirements. In the league of table-tennis for example, timetabling on the basis of regular dates is not applicable (Schonberger, Mattfeld, &Kopfer, 2000). Scheduling a league is not an easy task. It must fulfill many constraints on time which include the number of games of every pair of teams, the limits of number of consecutive home or away games for every team, all pair of teams must have meet each other in the first half of the season, and et cetera (Yang, Huang, &Horng, 2002).

While the research by Schonberger, Mattfield and Kopfer has focused on one type of sports, another study done by Hun, Yeng and Chien (2010) was dedicated to finding an optimized professional sports scheduling based on the shortest travelling cost. The study was scoped to planning the timetable and defined on how the competing teams are going to plan the route.

Another research (Nurmi, K. 2010), has outlined four major reasons for the increasing number of studies in sports scheduling. The four reasons are:

i) Introduction of the travelling tournament problem.
ii) Evolution in computers allows microcomputers to be powerful enough to involve in sports scheduling.
iii) Development of new efficient algorithmic techniques to tackle previously unsolvable problems.
iv) Sports leagues now are more organized than ever.

2.5 Programming Algorithm Approach

Above all, the most important element in SCS is actually the programming algorithm approach being used. The reason for quite a number of researches done in this area is to find the most effective algorithm; or at least improve it in order to solve the addressed problem. There are several algorithm approaches that has been introduced or used by the researchers. Some of them include evolutionary algorithm (Yang, Huang, &Horng, 2002), (While &Barone, 2007), genetic algorithm (GAs) (Schonberger, Mattfeld, &Kopfer, 2000), tabu search (Costa, 1995), ant algorithms (Crauwels&Van Oudheusden, 2003) and constraint-based programming (Juan, Ramli, & Ibrahim, 2011). Different algorithms do not mean that one is superior or better than another. However, the algorithm used is very dependent on the suitability of it to carter the problem emphasized in the research.

CHAPTER 3

METHODOLOGY

In this chapter, the author will discuss the system in the point of view of system life cycle development (SDLC). There is quite a number SDLCs. For the development of this system, the author chose to adopt Rapid Application Development (RAD) model of SDLC. Prior to that however, there will be a little explanation on the research design for this system.

3.1 Research Design

The method used in conducted the research is constructive research. Figure 4 below shows the flow of a constructive research. Applying this method guides the research in a direction that eases the eases the system development later on. First step is to conduct an extensive study on the literatures related to league information system as well as league scheduling. Since this area has existed since few decades back, many journals has been established. However, journals of recent years are in the higher priority.

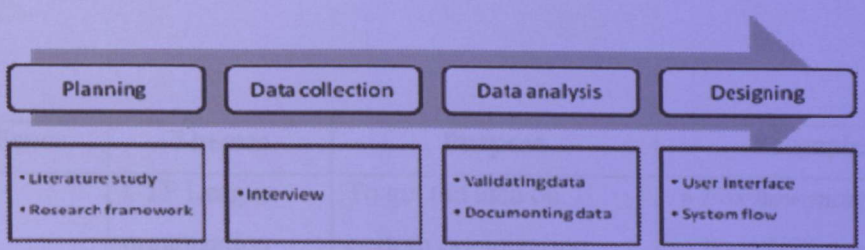


Figure 4: Flow of a constructive research

Even though research design is established for this study, the research element for this project is quite minimal. Reason being is that this system is developed based on solid requirements from the project champions. They have specific functions to be included in the system according to the nature of the tournaments they are handling. The research will be useful during the development of the scheduling engine.

Since the early development for the system is scoped to UTP League, general overview and details of the league must be available. One of the methods to collect all the related details is by interviewing the coordinator of the league. All the information gathered is then analyzed and organized accordingly to be turned into system requirement. Based on the requirement, a system is designed to fulfill the requirement of the league management information system in UTP League context.

3.2 Method for Data Collection

Of many methods to collect data, face-to-face interview is considered as one the best. Selected participants for the interview are the ones that involves directly with UTP League; the organizers and participants. Other possible participants would be random selection of students in order to know the point of view from the followers of UTP League. Main objective of the interview is to collect relevant information about UTP League. Listed in Table 1 below are the themes, purposes and few examples of questions of the interview:

Audience	Themes	Purpose	Examples
Organizer	UTP League organization structure	To get the idea on custom organization UTP League	• *For how many years have UTP League been organized?* • *How organizing team is set-up?*

	UTP League description	To obtain details on UTP League	• *How many teams are allowed to join UTP League?* • *How long is the duration of the league?*
	Technology used	To collect data on the degree on automation using computers in UTP League	• *How the fixtures are generated?* • *What type of database is used?*
	Information dissemination	To know how information is being shared to everyone	• *How do you spread the information?* • *Who is responsible about the information?*
Organizer Participant Community	Challenges faced	To address the challenges faced by the custom organization/participant	• *What are the challenges in organizing / participating in UTP League?* • *How to overcome the challenges?*

Table 1: Themes, purposes and samples of questions of interview

3.3 System Development Life Cycle

On the other hand, in term System Development Life Cycle (SDLC), Rapid Application Development (RAD) model is used. RAD, shown in Figure 5 below was chosen as it was developed to serve system development with constraints in timing while emphasizing prototype rather than planning and analysis. It is compressed into a sequence of short, iterative development cycles (Berger, Baynon-Davies, & Cleary, 2000). On top of that, system development using RAD gives few advantages; ease of implementation, improved user satisfaction and shorter time-to market (Daud, Bakar, and Rusli, 2010).

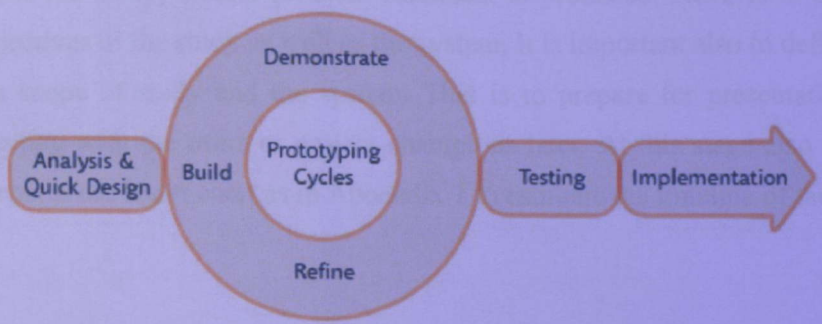


Figure 5: Rapid Application Development Model

3.4 Planning and Data Gathering Phase

The first phase in system development is the planning and data gathering phase. This phase is very important as it will determine many essential components of the system that will be developed. Subcomponents below show in details the steps taken by the author during planning and data gathering phase.

3.4.1 Redefining the Topic

Redefining the topic includes to come out with more detailed background study. From the study, a solid problem statement is produced. Next, is to outline the objectives of the study as well as the system. It is important also to define clearly the scope of study and the system. This is to prepare for presentation during meeting with the users or project champions later. At this stage also the author prepares the Gantt chart as in Appendix 1 to estimate the timeline of the project.

3.4.2 Determine User Requirements

Idea redefining was done without any request from the real user yet. Therefore, after the idea has been accepted to be a viable project title, the idea was then further been roughly detailed out to be presented. After getting some input for user requirement, only then the final objectives and scopes will be established. In general, the main objective of this project is clear; to produce a web-based system that will be able to manage the coming football leagues in UTP. Other objectives are several functions that are expected to be included in the system being profiling and scheduling to be the major functions that must be included. The scope was also established together with the time constraints. This system must be fully functional by the time next football tournament is organized in UTP which scheduled to be in mid-2012.

3.5 Analysis Phase

The second step in system development is the analysis phase. As the name suggests, analysis phase is the part where user requirements are being scrutinized in term of feasibilities and others.

As the author receives the requests and details for the systems directly from the project champions, it is quite easy to identify the requirements for the system. The project champions of this project are:

1) MrHelmi bin M. Rais (Project Supervisor)

2) MrFaiz (Organizer of Vice Chancellor Cup 2012)

3) MrBadrolzaman (Organizer of UTP League 2012)

In RAD model of SDLC, analysis is quite simple. Few basic flowcharts were prepared and presented to the project champions. Based on the initial presentation, improvements were done here and there and the author may go straight to the next phase.

3.6 Design Phase

As the result of the analysis phase, the author comes out with the designs for the system. It includes the design of the graphical user interface, the conceptual, and the system architecture of the system.

3.6.1 Graphical User Interface

Since the very beginning, the author and the project champions have come to a mutual understanding that the graphical user interface (GUI) for this website may be developed later after all the functionalities are all working. Therefore, the GUI is very minimalistic in term of design. However, every detail and property are properly labeled and be made user-friendly.

3.6.2 Conceptual Design

One of the most important diagrams that have to be produced by the author in order to ease the understanding of the audience on how the system is going to be developed is the flowcharts. Several flowcharts were produced at the beginning and as time goes by, they were all further improved in order to enhance the functionalities of the website. These flowcharts show the process flow of the system. It basically shows the data, processes and decisions involved.

Another important design is the database design. At the beginning, the author expected that this website will only involve less than five tables. Nevertheless, as more functionalities being added-up the database grows to a few more tables. As the result, the database design defining the relationship among the tables has to be detailed up very carefully.

All the designs were created using Microsoft Visio 2010 software. The outcome of the conceptual design will be further discussed in Chapter 4.

3.6.3 Physical Design

Physical design refers to the nature of how the system is being developed. It encompasses the technology used, the software, the hardware and the database. Table 2 below shows the tool/element used in developing this project.

No.	Tool/Element	Software/Platform
1	ASP.NET development	Microsoft Visual Web Developer 2008 Express Edition
2	Web design	HTML
3	Programming language	Visual Basic (VB.NET)
4	Database	Microsoft Access 2010

Table 2: Tools used to develop IFMIS

3.6.4 System Architecture

IFMIS is developed as a website in order to fulfill its objective of being an effective medium to disseminate information. The website is integrated with database. This database serves as the place where all the information and data are stored. While the database holds the tables and fields, the manipulation of the information contained in it is programmed in the system.

When this website is deployed later, only the owner of the server where all the files are located may access all the original files and database. Owner in this context is not referring to the admin of IFMIS, but the IT Staff of UTP. Further details about this will discussed in access level topic in Chapter 4.

3.7 Prototyping Cycle Phase

Even though this there is interview session conducted while doing the research for this project, the most significant and important thing is fulfilling the user requirements. Research element in this project is at minimum level as the users already have specific requirements for this system. As the system is being developed, meetings with the project champions are conducted time by time. This situation enables the system to be developed along with the process of refining the functionalities further.

The development of this system uses 'functionalities first, graphical user interface (GUI) later' approach. It means that the system is developed with minimal GUI in the first place. As example, emphasize is given to working buttons and links rather than the position and color of them. GUI will be refined later after all the functions has been included and working properly.

Weekly meeting is set to be on every Friday in order to present the updates and progress of the system development. The session will also be used to correct any functionality which seems to be unsuitable with the league constraints. Once the current requirement is fulfilled, next step and functionalities will be outlined to be developed. This process iterates until all the desired functions has been completed and ready to be deployed. Therefore, interaction between the developer and the project champions is vital in order to come with the anticipated system. Figure 6 below shows the prototyping cycles.

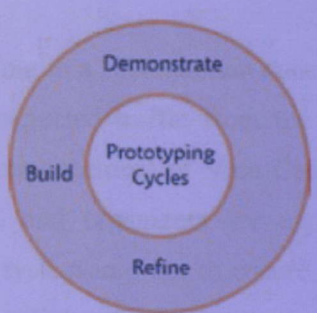


Figure 6: Prototyping cycles consisting build, demonstrate and refine

3.8 Testing Phase

Test on the system will be done once the system has been fully completed. Ideally, the testing process should be conducted in two environments. The first one is on the personal computer itself; where the system is being developed. And the second one is in the real web environment (if deployed later). All the functions will be tested in order to detect for any bug on the system. Testing on the integrity of the links in the database is one of the crucial tests that the system must pass. If everything is bug-free, the system will then be hosted in the real web environment. Some glitches are expected when first it is transferred to the web as the links and connections especially on the database have to be recreated.

However, prior to deployment, several testing must be conducted to other stakeholders as well; especially the project champions and expected users. There are a few tests that have been done. Some of them include:

- Acceptance testing: To verify whether or not it meets specific customer requirements.
- Functional testing: To validate that the website conforms to its specification and correctly performs all its required functions.
- System usability testing: To test the website on users.

3.9 Implementation Phase

This web-based system will be put in a UTP domain once it is proved to be bug-free and robust enough to handle the expected traffic from the users. The implementation is expected to begin with the commencement of Vice Chancellor Cup 2012 in February 2012. The players, managers, and organizers are expected to fully utilize all the functionalities available in the system in order to ensure a smooth sailing of the system and hence to the tournament will be a platform to test the ability of the system in handling a real football tournament.

CHAPTER 4

RESULTS AND DISCUSSION

This chapter will discuss about the outcome from several research conducted in earlier stage of the website development. It will include the outcome of the preliminary research conducted as well as the user requirements; the proposed solution, the diagrams, types of users, and functionalities of the system. The later part of this chapter will then discuss about the system development.

4.1 UTP League

The research procedure mainly involves interviews with the current and past organizers of UTP League. The purpose is to get the information about UTP League. The interview process has been discussed in Chapter 3. One of the interviews was conducted with Mr Badrolzaman, a staff of UTP Co-Curricular (Sports) Unit who is also the person in charge for previous years' UTP League. From the interview, the author gained a clear view about UTP League's structure.

UTP League is an annual soccer tournament held for UTP students and staff. It is organized by Co-Curriculum (Sports) Unit of UTP in collaboration with Sekretariat Rakan Muda UTP. Usually, it will be organized in the first semester of each study year. UTP League is actually quite static in term of organization. Not to point that it is negative. It simply means that every year, the components of the tournament have not changed much.

4.1.1 Tournament Style

Every year, there will be 20 teams to compete in the tournament. Those 20 teams are divided into four groups; A, B, C and D, five teams in each group assigned randomly. In the first round, each team will be matched-up against all teams in their groups. Therefore, each team will play four matches in the first round. Points are given based on standard 3-1-0 system. Using this system, three points were awarded for each win, one point for draw, and no point for lose. At the end of the first round, if two teams are level on points it is decided by goal difference which is goals scored minus goals conceded and whoever has the highest total wins.

Winners and first runner-ups of each group will be qualified to move on to the quarter-final round. There will be four matches in the quarter-final round and four winners of the matches will compete in the semi-finals. Of four teams in semi-final round, two winning team will play against each other in the final round and the winner will be crowned as the UTP League Champion of that particular year. Chart 1 below illustrates the course of the tournament from the quarter-finals to the final round.

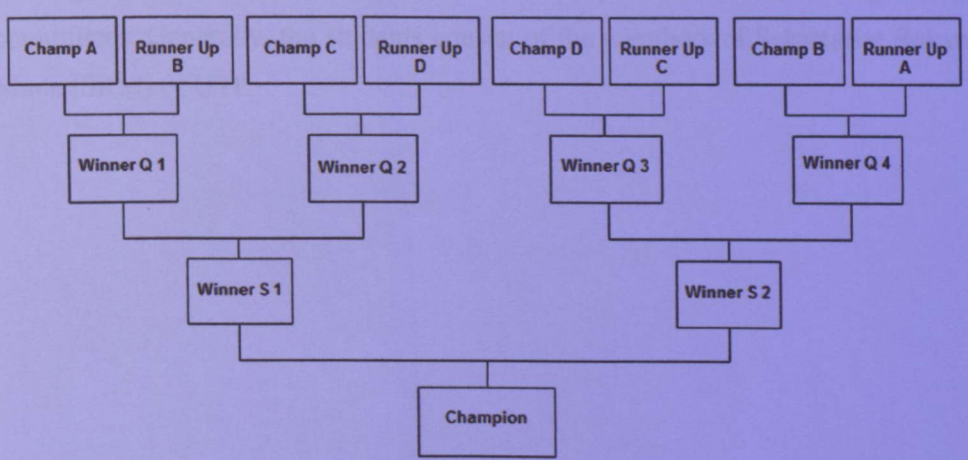


Chart 1: Quarter-finals to the final round match course

4.1.2 Duration

UTP League tournament usually lasts for about ten weeks. Two matches will be held every Friday, Saturday, and Sunday evening for each week after commencement of the tournament.

4.1.3 Fixtures

As the number of teams playing in UTP League for each year is fixed to 20 teams, the fixtures for UTP League is quite static too. The organizer owns a template which will be used every year for generating the tournament fixtures. With 20 teams playing, there will be 47 matches in total; 40 matches of the first round, four matches of quarter-final round, two matches of semi-finals, and lastly one final match. Figure 4 below shows the template used by the organizer to come out with the fixtures for UTP League.

4.1.4 Organizing Committees

Helping the staff of UTP Co-Curricular Unit (Sports) are students organizing committees. Generally, the students consist of the members of Sekretariat Rakan Muda (SRM) of UTP.

NO.	Team 1			Team 2	GROUP
1	A1			A2	A
2	B1			B2	B
3	C1			C2	C
4	D3			D4	D
5	A3			A4	A
6	B3			B4	B
7	C3			C4	C
8	D1			D2	D
9	A5			A1	A
10	B5			B1	B
11	C5			C1	C
12	A2			A3	A
13	B2			B3	B
14	D1			D3	D
15	D5			D4	D
16	A4			A1	A
17	A3			A5	A
18	C2			C3	C
19	D4			D1	D
20	C4			C5	C
21	B3			B5	B
22	A5			A4	A
23	D3			D5	D
24	B4			B1	B
25	D1			D5	C
26	D2			D4	D
27	A4			A2	A
28	C4			C1	D
29	B5			B2	B
30	A1			A3	A
31	C1			C3	C
32	B1			B3	B
33	D5			D2	D
34	B4			B5	B
35	A2			A5	A
36	C5			C2	C
37	B2			B4	B
38	C3			C5	C
39	C2			C4	C
40	D2			D3	D
41	Winner A			Runner Up B	Q1
42	Winner C			Runner Up D	Q2
43	Winner D			Runner Up C	Q3
44	Winner B			Runner Up A	Q4
45	Winner 41			Winner 42	S1
46	Winner 43			Winner 44	S2
47	Winner 45			Winner 46	FINAL

Figure 7: Template of fixtures for UTP League

4.2 Proposed Solution

In order to tackle the problem statement specified earlier in Chapter 1, a website will be developed. The website (refers to IFMIS project) is expected to address two major element in organizing a football tournament; in this case UTP League and Vice Chancellor Cup. The two elements are 1) Profiling, and 2) Scheduling. The ultimate goal for this project is for the developed website to be deployed using *utp.edu* domain and hence be accessible by everyone.

4.3 Functionalities of IFMIS

One good thing about developing IFMIS is that the project champion is very clear on the requirements for the website. Therefore, it is quite easy for the author to outline clear functionalities of the website desired by them. After a few meeting and refinements, there will be four main functionalities of the website; 1) Tournament management, 2) Fixture generation, 3) Matches management, and 4) Report. Figure 8 below shows the detail sub-functions of each functionalities.

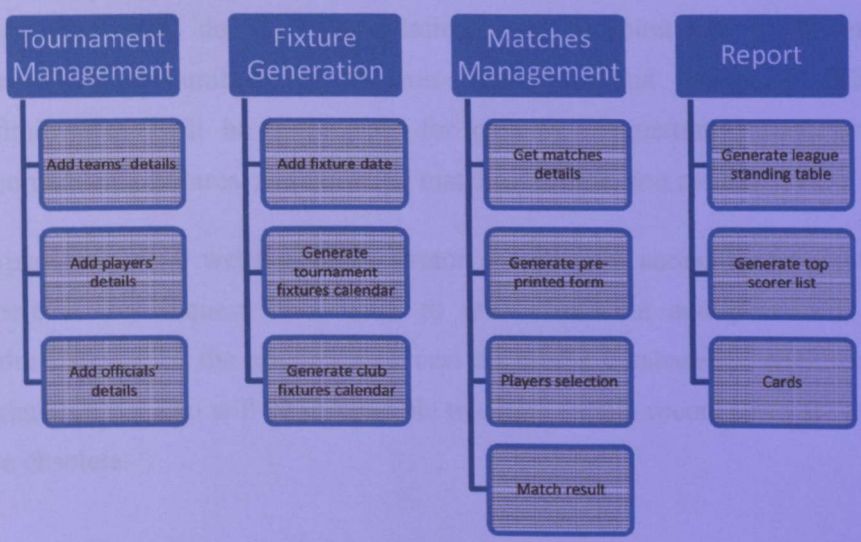


Figure 8: Expected functionalities of IFMIS

4.4 Types of Users

Before going any further into the system, the author has to understand who the users or the audience of this website will be. Only then it will be easier to anticipate the expected full design of the website that need to be developed. This website user should consist of four different types.

4.4.1 The Public

The public simply means the crowd that visit the website just to get information regarding the leagues or tournaments handled by the website. For most of the time, they are looking for the matches' schedules and the league standing. The visitors of this type should have access limited to viewing only. No username and password are required.

4.4.2 The Website Administrator

Website administrator would probably has the access to most of the functions that other users do not. Web administrator's account will be given to the organizing committee. It requires username and password. The web administrator will be responsible for creating league/tournament, generating tournament's fixtures, and inputting matches' scores, and cards.

Apart from that, website administrator should gain access to the database. If there is any request from users to reset username and password, website administrator has the privilege to access the master database and reset them. Web administrator also will be responsible to delete certain record when it is found to be obsolete.

4.4.3 The Player

The players have to create a player account in order for their name to appear in the list of players. The players have to be chosen by any team manager in order for them to join any team. Once they have joined a team, other managers will not be able to offer them a place in their team anymore. And the players will be able to see their teammates together with their playing positions. Players will only be able to view, not making any changes to their teammates.

4.4.4 The Team Manager (personal)

Just like the players, team managers have first to create a team manager account. Once the account is created, only then they will be able to create a team under any tournament. The team created will have its own username and password and that team account will be used to manage the team instead of this personal profile. So, basically the manager will own two profiles; personal and team.

4.4.5 The Team

Usually, only the manager will have the access to this account; unless, the manager trusts anybody else to have the access too. Once the managers have created this team account, they may start hunting for their players by offering them a place in their team. Managers will have the privilege of assigning their players according to position and whether or not they will be playing for the match.

4.4.6 The Official

The officials refer to the referees and other officials involve in the tournament. They are required to register themselves in the system because their name and position has to be appeared in the system for tasks delegation during the tournament.

4.5 System Flow

In general, the flow of the system starts when it is decided that a tournament will be held and is created in the system by the website administrator. Then, the system will be opened for registration of players, managers, and officials. When the registration period has been closed, the web administrator is responsible for grouping process, generating fixture, and assigning appropriate officials during the tournament.

During the tournament, administrator (part of the organizer) will have the responsible to provide forms to be used during the tournament and also to update the scores and cards into the system. The system will automatically rank the teams according to the points gained and display the result in league standing table. Figure 8 summarizes the flow of the system in general.

However, the flowchart as shown in Figure 9 does not reflect the flow for specific user like the players, managers, officials or even the administrator itself. Therefore this subtopic is further divided into following smaller points explaining in detail the flow for each and every user of the system. The explanation will be supported by a few flowcharts for easier understanding. For registered users like the players, team managers, and officials, the system flows showed assume that they have completed the registration process and the flow is for subsequent visits.

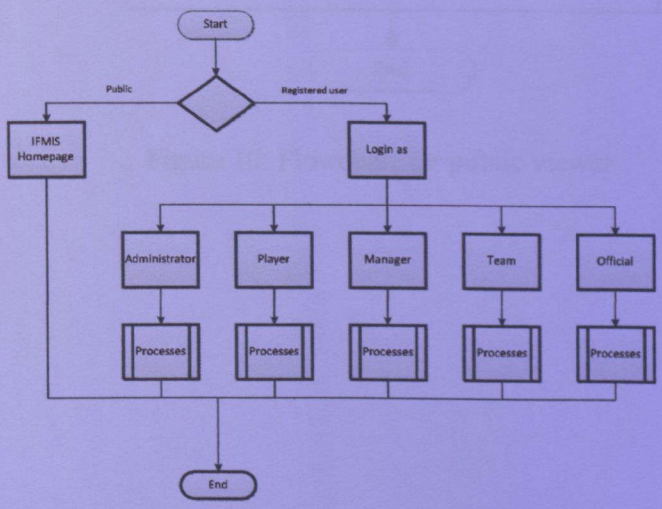


Figure 9: General flowchart for IFMIS

4.5.1 System Flow for Public

System flow for public user is the simplest of all. It does not involve any process or data transfer. However, every registered user has to arrive at this page first before being able login. Figure 10 below show a simple system flow for public viewer.

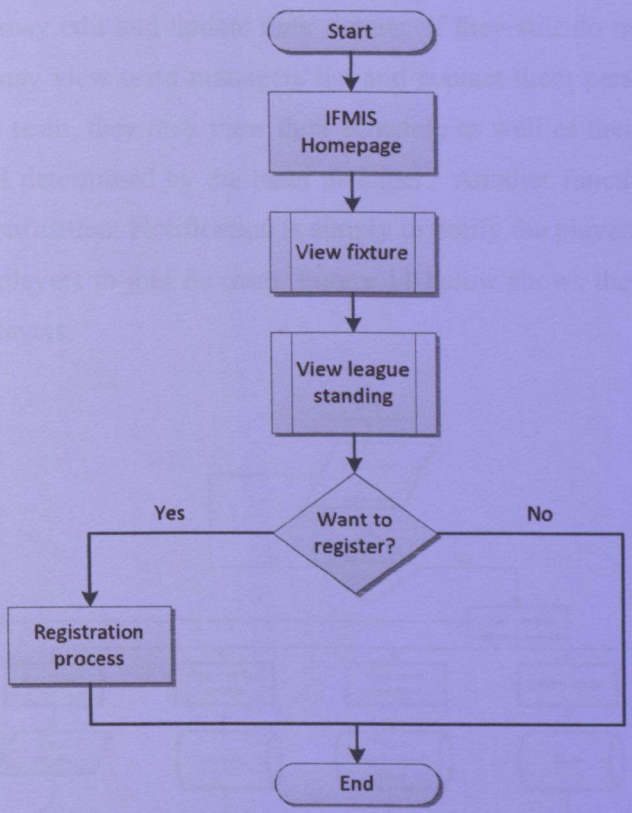


Figure 10: Flowchart for public viewer

4.6.2 System Flow for Player

As registered users, players have to enter their own username and password for every visit in order to access their personalized account. If the username matches the password, the system will display their details. If they detected any wrong detail, they may edit and update their details. If they still do not belong to any team, they may view team managers list and contact them personally later. For players with team, they may view their schedule as well as their teammates and positions; all determined by the team manager. Another function accessible by players is notification. Notification is simply to notify the players if any team has offered the players to join its team. Figure 11 below shows the system flow for registered players.

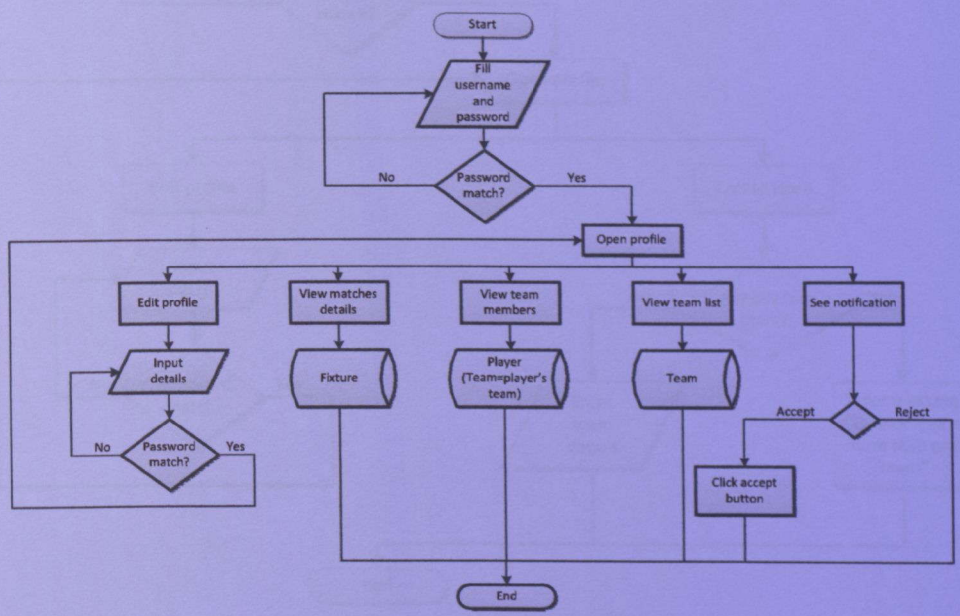


Figure 11: Flowchart for registered players

4.5.3 System Flow for Team Manager (personal)

This is meant for the team manager logging in using personal account, not the team account. What the users can do is to edit their personal details if there is any correction to make and also to create a team. One user should only be able to create and manage only one team for a tournament. Figure 12 below shows the system flow.

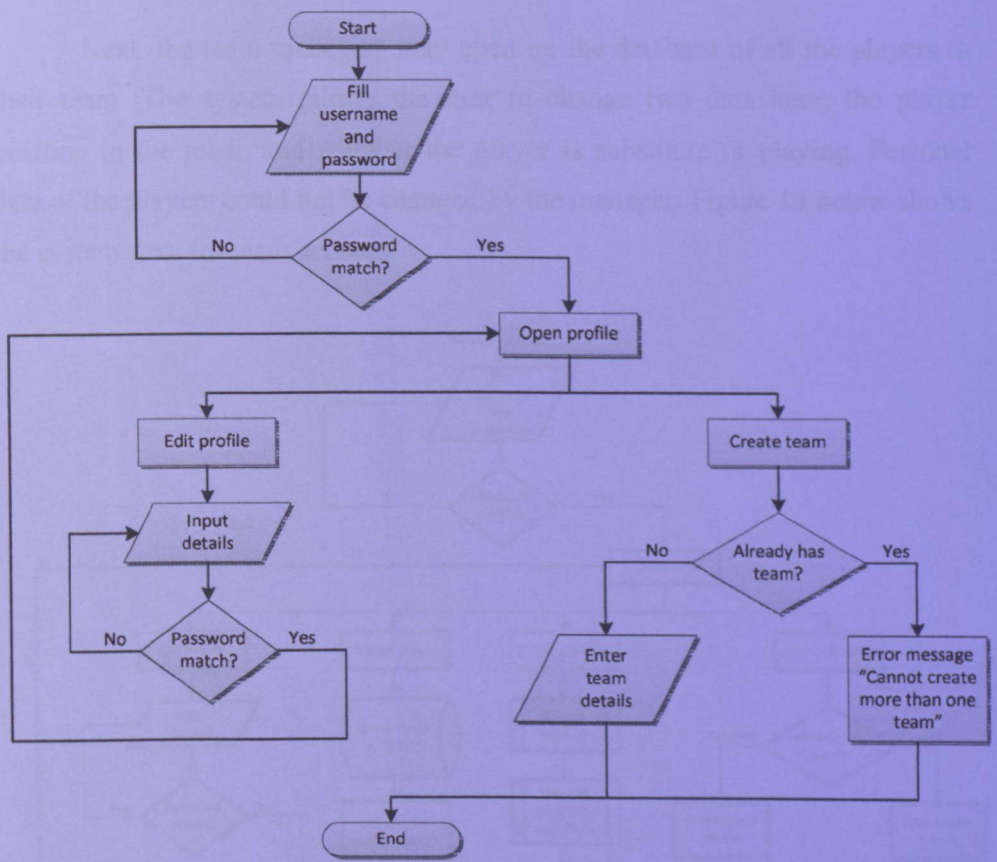


Figure 12: Flowchart for personal account of managers

4.5.4 System Flow for Team

As explained earlier, the original person having access to this team account is only that team's manager. Therefore, after logging in into the team profile, the team manager may open the database of all players. The database however will show only the players whose still do not join any team yet. The managers may select any players they want and the players will be notified. If the players accept the offer, the team manager has to approve first before the players are confirmed to be in their team.

Next, the team managers may open up the database of all the players in their team. The system allows the user to change two data here; the player position in the team, and whether the player is substitute or playing. Personal data of the players could not be changed by the manager. Figure 13 below shows the system flow for team account.

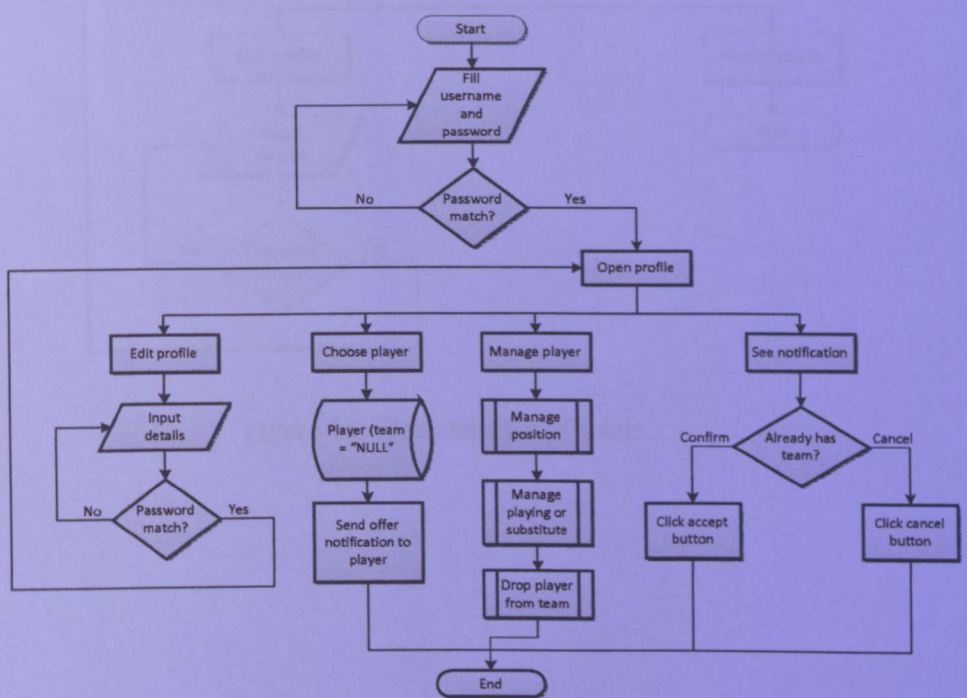


Figure 13: Flowchart for team account

4.5.5 System Flow for Official

Provided correct username and password, officials will be redirected to their profile. From the main account page, the officials can only change their profile details. In addition, they may view the league standing as well as the fixtures for the tournament. Part of the fixtures is personalized to the referee to see which matches they involve in. Figure 14 below shows the system flow for officials.

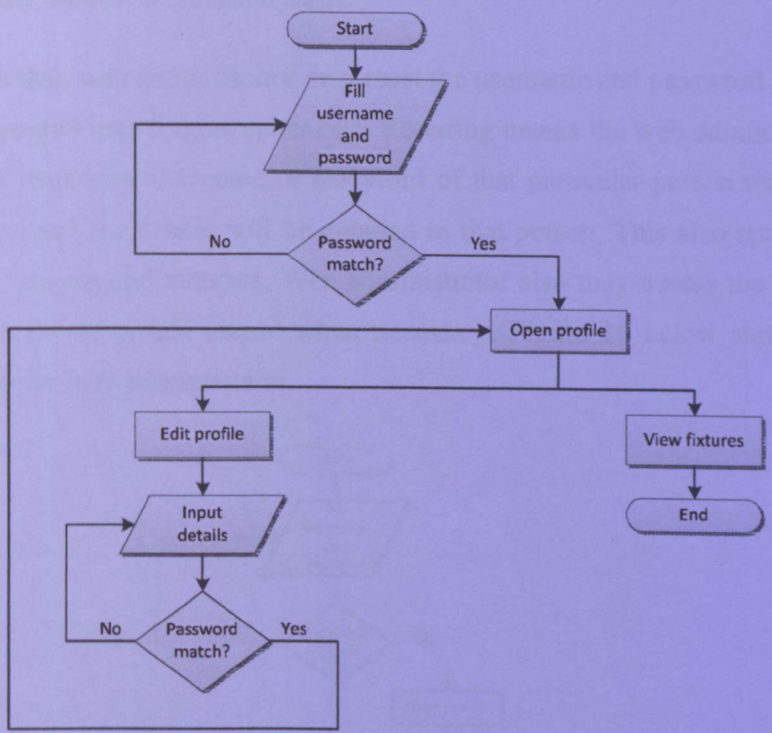


Figure 14: Flowchart for officials

4.5.6 System Flow for Website Administrator

First of all, web administrator is in charge for creating a league or a tournament. After certain period where players and managers registered themselves and the team managers recruit players for their team, web administrator will generate the fixtures based on available teams. Web administrator will then assign each match to dates, pitches and referee in-charge. After each match, web administrator will update teams' scores, scorers and cards.

Apart from that, web administrator may reset the username and password in case of any registered user forgets either one. Resetting means the web administrator will assign temporary username or password of that particular person record in the database and the details will be emailed to that person. This also applies to the teams, leagues and matches. Web administrator also may access the master database to delete certain record when necessary. Figure 15 below shows the system flow for web administrator.

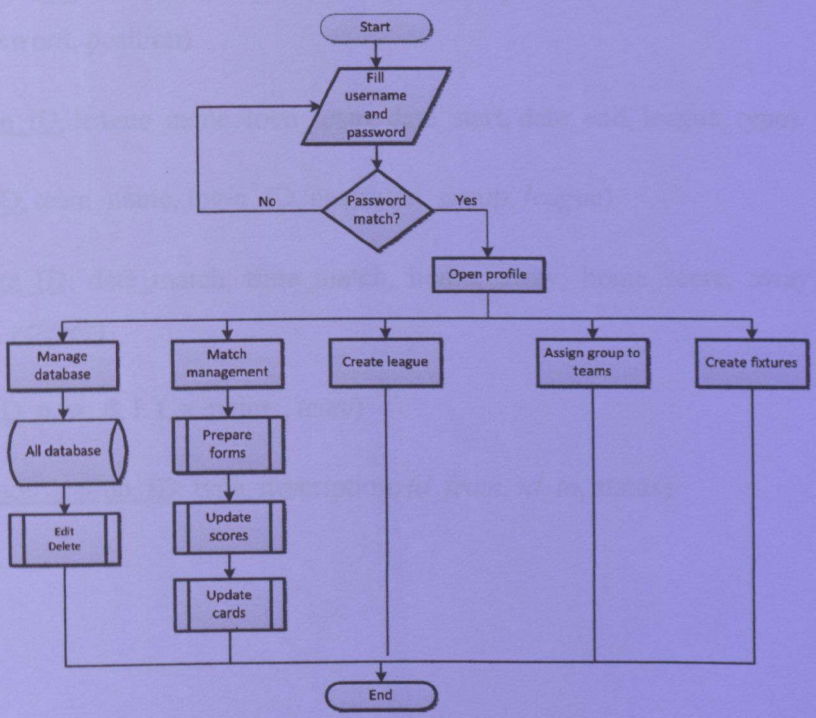


Figure 15: Flowchart for web administrator

4.6 Database Design

Database is one of the most important elements in this project. The database's size increases significantly in term of the number of tables as more functionality was added to the system. IFMIS is connected to a database named MyFyp developed using Microsoft Access. The database contains eight tables connected to each other. Below is the list of the tables together with their field names. While Figure 16 that follows shows the database entity relationship diagram (ERD) model.

Player_profile (ID, fullname, ic_number, phone1, phone2, email, weight, height, username, password, position, playing, *team*)

Manager_profile (ID, fullname, ic_number, phone1, phone2, email, weight, height, username, password, *team*)

Official_profile (ID, fullname, ic_number, phone1, phone2, email, weight, height, username, password, position)

League (league_ID, league_name, total_team, date_start, date_end, league_type)

Team (team_ID, team_name, login_ID, password, group, *league*)

Fixture (fixture_ID, date_match, time_match, home, away, home_score, away_score, venue, league, *referee*)

Table (table_ID, p, w, d, l, f, a, points, *team*)

Notification (notification_ID, type, description, *id_from*, *id_to*, status)

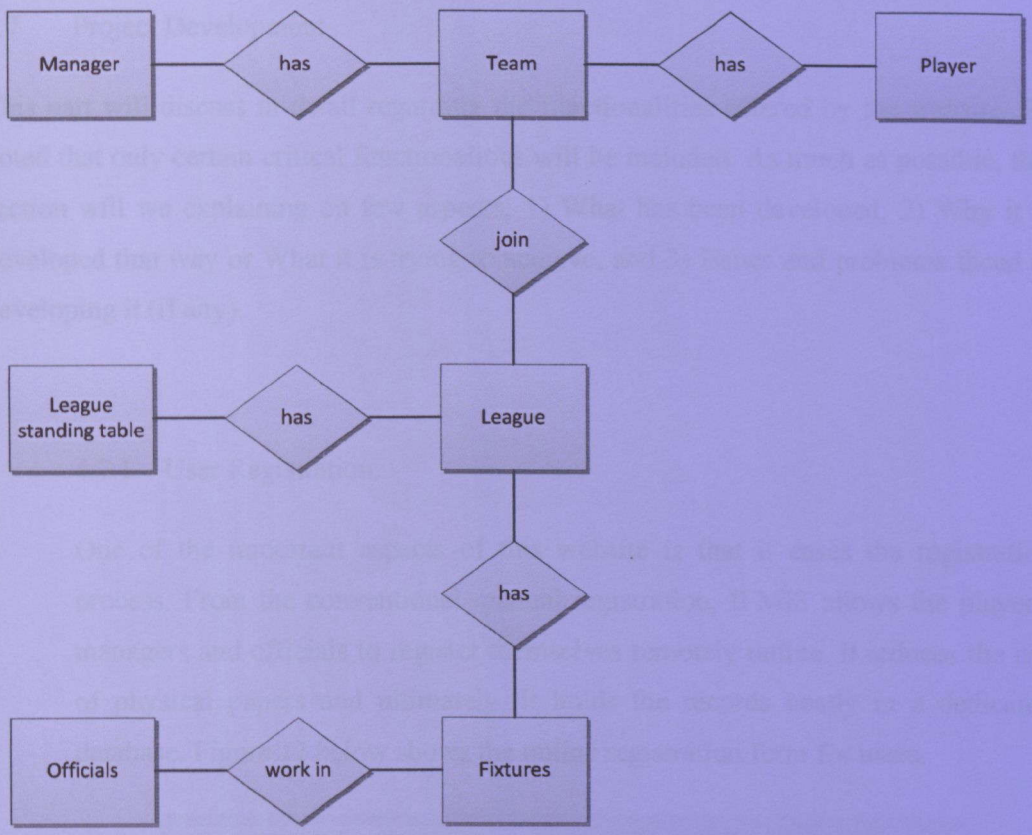


Figure 16: ERD Model for IFMIS' database

4.7 Project Development

This part will discuss in detail regarding the functionalities offered by the website. Be noted that only certain critical functionalities will be included. As much as possible, this section will we explaining on few aspects; 1) What has been developed, 2) Why it is developed that way or What it is trying to achieve, and 3) Issues and problems faced in developing it (if any).

4.7.1 User Registration

One of the important aspects of this website is that it eases the registration process. From the conventional manual registration, IFMIS allows the players, managers and officials to register themselves remotely online. It reduces the use of physical papers and ultimately, it holds the records neatly in a dedicated database. Figure 17 below shows the online registration form for users.

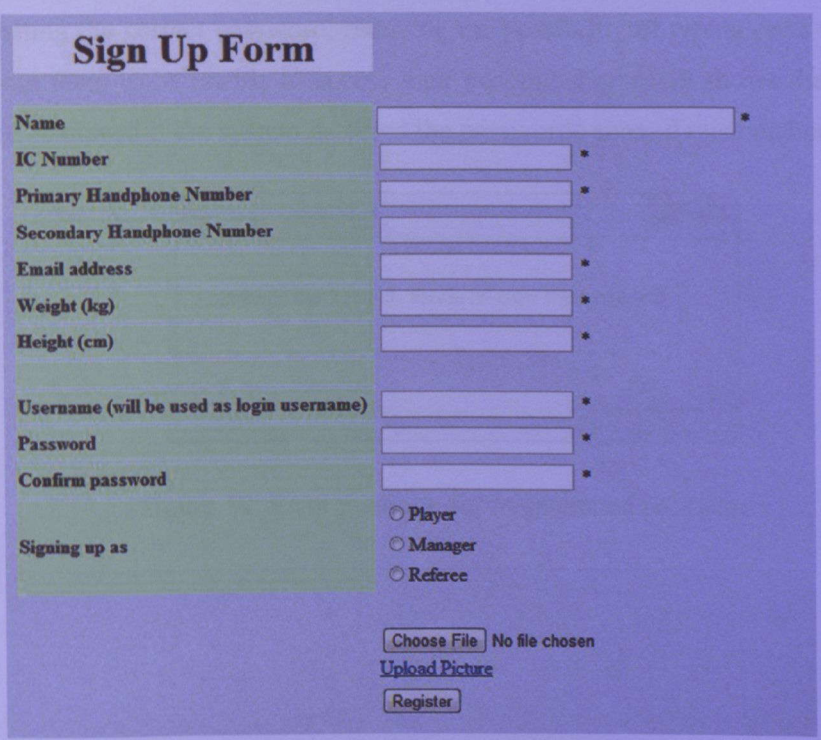


Figure 17: Online sign up form

Every field is made compulsory; marked with asterisk, except for the second contact number. Failure to fill compulsory fields will trigger a pop-up window reminding the user to make sure that all compulsory fields are filled. Figure 18 below shows the error message.

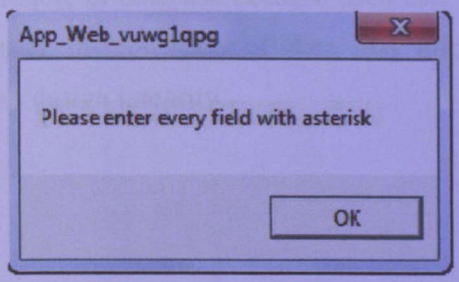


Figure 18: Error message for incomplete registration form

Apart from that error checking mechanism, users wish to register are required to enter desired password for two times. This is to make sure that they are inputting the correct password; reducing the possibility of typing error which will cause them to be unable to access their account. Figure 19 shows the error message displayed if the system detected the passwords entered mismatched.

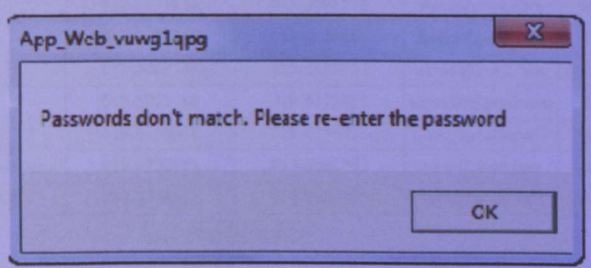


Figure 19: Error message for mismatched passwords

As shown in Figure 16, this registration form contains radio button field labeled as '*Signing up as*'. The options available are player, manager, or referee. User's choice will determine where the entered details will be saved in; either in Player_profile table, Manager_profile table, or Official_profile table. These users were separated in term of table in database because each user contains different fields. It is also for easier manipulation of data and information; without compromising the database design integrity.

4.7.2 Choosing Players

Another advantage of using IFMIS over the conventional way of organizing a football tournament is that it allows the manager to offer any player a place in the team. Using team account, the manager is able to see the list of all registered players that still do not belong to any team yet. Therefore, if the manager is interested in any player, the manager has the chance to offer the player a place in the team. Figure 20 shows the interface displayed when the manager wishes to offer a place to the players.

Name	Telephone Number 1	Telephone Number 2	Email Address	Weight	Height	Select
Faizal bin Ghazali	019-5123828	013-5993766	faizal@gmail.com	80	156	☐
Kasim bin Selamat	017-9278246	019-6726813	kasim@gmail.com	67	172	☐
Ashraf bin Hamzah	013-9088765	019-5431712	ashraf@gmail.com	49	156	☐
Ainuddin bin Mohamad	013-5993766	019-5123828	ainuddin@gmail.com	80	167	☐
Lim Wen Shen	019-8756311	019-6726813	lim@gmail.com	49	172	☐
Mustafa Kamal Hilmi bin Mahamad Anuar	019-6726813	013-9088765	tapo@gmail.com	80	167	☐
Khairul Hakimi bin Nazri	019-8756311	013-9088765	kerol@gmail.com	56	156	☐

Confirm Selection

Figure 20: List of all player without team yet

To ease the manager who wishes to offer many players at one go, the manager chooses the players by ticking the checkbox at the end of each row. After selection, the manager has to press the 'Confirm Selection' button to send the selected players the offer notification.

4.7.3 Notification

Next functionality to be discussed is the so-called notification system. This simple notification system serves only to notify both the players and teams regarding their offer status. To ease the understanding, there will be series of figures below.

As shown in Figure 20 previously, the team may offer any player they are interested to be in their team. Once the offer is submitted, the players may view the offer in their profile under notification page, as show in Figure 21 below. It shows that the player, John, has been offered by team Perak.

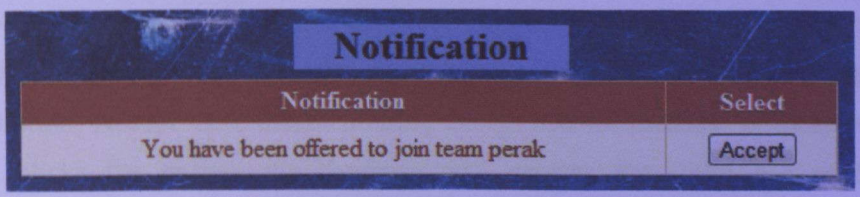


Figure 21: Offer notification from team Perak to John

To accept the offer, John has to click on the accept button. Why there is no reject button for John to reject the offer? Actually, any offer received by the player will stay in the notification page. Everything will only be deleted whenever the player accepts any offer from any team. Reason being is that; 1) The database manipulation is quite complicated; 2) The player will surely join any team sooner or later; and lastly, 3) The notification function serves only prior to joining any team. After that, it serves no purpose anymore.

If John accepts the offer from Perak, the team will be notified and take note that John is not yet a member of Perak. Figure 22 below shows the notification seen by Perak when John accepts the offer.

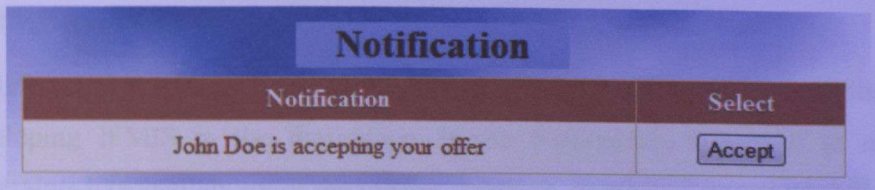


Figure 22: Notification for the team when the player accepted the offer

John will only belongs to team Perak after the team click on 'Accept' button shown in Figure 22. That is the way the team confirmed the position of John in the team. On that note, this simple notification system is basically on first-come-first-serve basis. On the other hand, Figure 23 below shows the notification received by John after Perak has confirmed his position in the team. The button 'Accept' here means nothing except that for database purpose; when John clicks the button, the database will capture that John has read the notification. No further notification will take place.

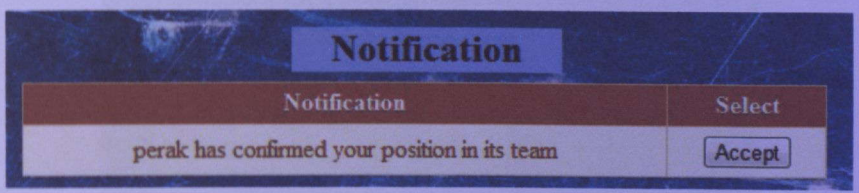


Figure 23: The team has confirmed player's position in the team

This notification system still has lots to be improved. The author knows that there are some glitches and weaknesses of this notification which should be tackled in order to have a perfect football management system. Holding it back from being 100% efficient is that because it is based on the database, which is usually not very suitable for implementing a rapid changing data of the same field like notification system. Nevertheless, for a basic functionality, this notification system serves its purpose very well.

4.7.4 Generating Fixtures

Finding suitable algorithm to generate fixtures is one of the main objectives for developing IFMIS in the first place. If the fixtures are subjected to many constraints like availability of the pitches, referees, home and away matches, and so many others, the algorithm can be very complex and will consume a lot of effort and time to be developed.

For this project however, minimal constraints were allocated, suitable for the scale of its intended usage. It does not include home and away matches (though stated so) and the most important constraint being tackled is to eliminate two consecutive matches for a team. The algorithm is on Attachment 1. Figure 25 below shows the "Generate Fixture" page where the website administrator needs to choose the league and starting date.

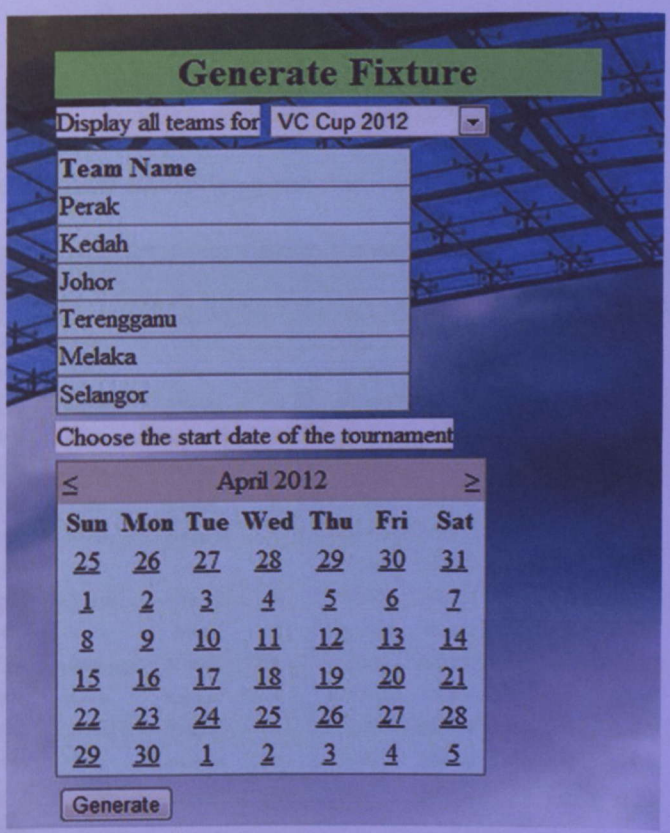


Figure 24: Choosing league and starting date to generate fixtures

Figure 25 below shows the result of schedules generated for VC Cup 2012 with six competing teams. Figure 26 that follows shows the full fixtures together with the date and venue of the matches except for the referee which will be assigned manually at this stage of development due to some constraints. Matches are set at two matches per day.

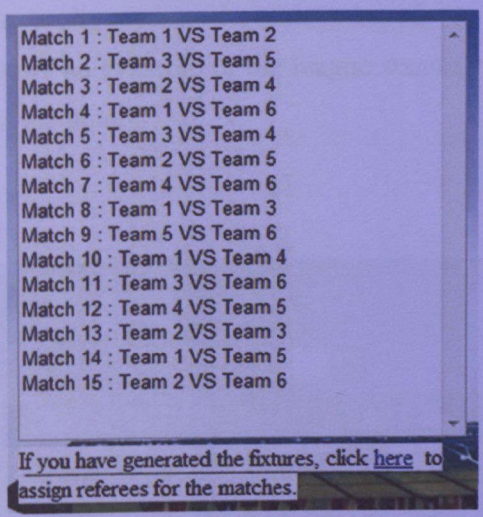


Figure 25: Raw schedules generated when six teams are competing

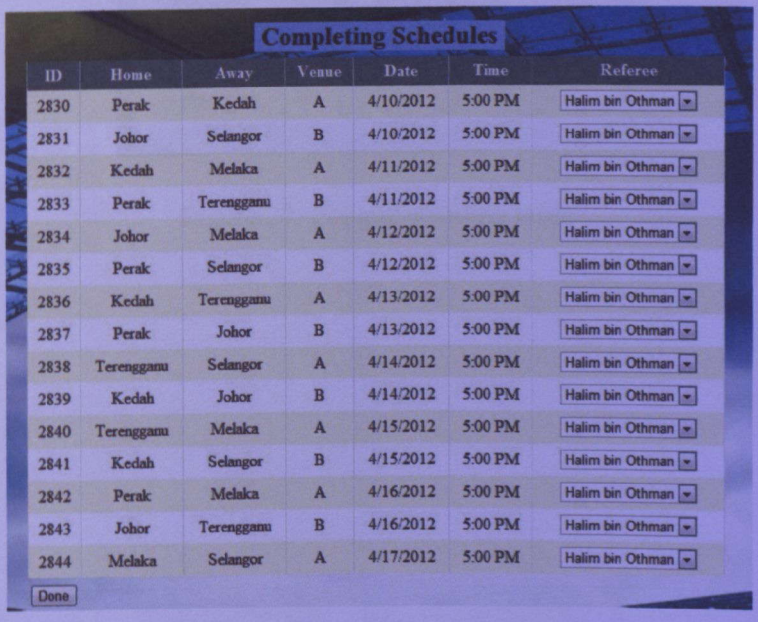


Figure 26: Full fixtures generated

4.7.5 League Table

Lastly, as any other tournament offers, IFMIS will display the league standing table available to be viewed by everyone; public and registered users. The teams' points will be updated after each match when the committee members inputted the scores into the database. Simple arithmetic algorithm will be used in order for the system to automatically update the points based on the standard pointer system. Figure 25 shows an example of the league standing table. As usual, it is being sorted based on the points.

Table

VC Cup 2012

Team	P	W	D	L	F	A	Points
Perak	4	3	1	0	12	3	10
Melaka	4	3	0	1	8	4	9
Johor	4	2	2	0	7	2	8
Kedah	4	2	1	1	10	9	7
Terengganu	4	1	3	0	9	3	6
Selangor	4	1	2	1	6	2	5

Figure 27: League standing table

4.8 Results of Testing

As mentioned in the methodology chapter, there are three testing conducted; 1) Acceptance testing, 2) Functional testing and 3) System usability testing.

4.8.1 Acceptance Testing

Acceptance testing was conducted to verify whether or not the system developed meets specific customer requirement which in this case refers to one the project champions, Mr Helmi bin Md Rais. As regular meetings were always conducted with him, this test uses any responses, comments and critics he give from the meetings. Basically, the parameters of this test are the expected functionalities of this system. Table 3 below shows the result of the test as of this report is written.

No	Function	Result
1	Add teams' details	Completed
2	Add players' details	Completed
3	Add officials' details	Completed
4	Add fixture date	Completed
5	Generate tournament fixtures calendar	Completed for round robin
6	Generate club fixtures calendar	Completed
7	Get matches details	Completed
8	Generate pre-printed form	To be completed
9	Players selection	Can be improved
10	Match result	Completed
11	Generate league standing table	Completed
12	Generate top scorer list	To be improved
13	Cards	To be improved

Table 3: Results of acceptance testing

4.8.2 Functional Testing

Functional testing was done in order to validate that the website conforms to its specification and correctly performs all its required functions. This testing was conducted in more depth compared to acceptance testing. The author as the developer conducted this test. The parameters are based on the functions that can be performed by each of the user type. Table 4 below shows the result of the testing as of this report is written.

No	Function	Result
Website Administrator Account		
1	Create league	Completed
2	Generate fixtures	Completed for round robin
3	Generate fixtures manually	Completed
4	Assign group	Completed
5	Assign referee	Completed
6	Enter score	To be associated with top scorer and cards.
7	Manage all data in database (Edit & Delete)	Completed
Player Account		
8	Edit profile	Completed
9	Find manager	Completed
10	Open team	Completed
11	Notification	Completed
12	My matches	Completed
13	Open league table	Completed
Manager Account (Personal)		
14	Edit profile	Completed
15	Create team	Completed

Team Account		
16	Open player database	Can be improved
17	Choose player	Can be improved
18	My team matches	Completed
19	League standing	Completed
20	Notification	Completed
Official Account		
21	Edit profile	Completed
Public View		
22	To view public information	To improve top scorer list and cards
General Critical Functions		
23	Logout	Completed
24	Sign up forms	Completed

Table 4: Results of functional testing

4.8.3 System Usability Testing

According to Sauro, System Usability Scale (SUS) created by John Brooke in 1986 is the most used questionnaire for measuring perceptions of usability. To test the usability of this system, the author used the aforementioned SUS. It is most regretted that to the date this report is written, the football league scheduled to be held is still postponed. Therefore, the author has to revise the planning of getting the players, managers and organizers of the tournament to test this system. The next best thing is to get some colleagues of different background with regard to football knowledge and familiarity to test the system using SUS. A total of nine respondents are used in this testing process.

SUS requires the respondents to give scale of (1) to (5) towards ten items. The ten items in SUS cover a variety aspect of system usability, which includes the need of support, training, and complexity which leads to having a high level of validity for determining the usability of a system. The items are:

1. I think that I would like to use this system frequently
2. I found the system unnecessarily complex
3. I thought the system was easy to use
4. I think that I would need the support of a technical person to be able to use this system
5. I found the various functions in this system were well integrated
6. I thought there was too much inconsistency in this system
7. I would imagine that most people would learn to use this system very quickly
8. I found the system very cumbersome to use
9. I felt very confident using the system
10. I needed to learn a lot of things before I could get going with this system

Each item in SUS will be accompanied by the following format of scale as shown in Figure 28 below.

Strongly Disagree 1	2	3	4	Strongly Agree 5
○	○	○	○	○

Figure 28: Scale of SUS

The score of SUS is calculated as follows:

- For odd items: subtract one from the user response.
- For even-numbered items: subtract the user responses from 5
- This scales all values from 0 to 4 (with four being the most positive response).
- Add up the converted responses for each user and multiply that total by 2.5. This converts the range of possible values from 0 to 100 instead of from 0 to 40.

Chart 2 below shows the score of each SUS item responded by the nine respondents. In another perspective, the total score is 81.136. In SUS, this score is not percentage. Score above 68 is considered above average. Referring to percentile rank graph provided by Sauro, score of 81.136 is converted to around percentile rank of 90%. In simpler words, the score shows that usability and learnability have been successfully achieved in meeting the objective.

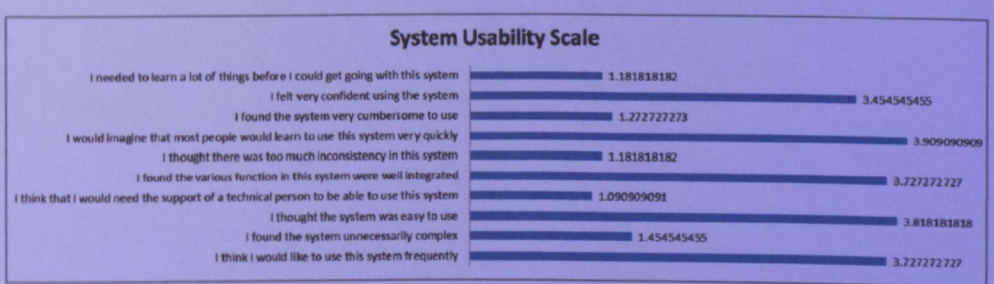


Chart 2: System Usability Scale score for IFMIS

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 Conclusion

To conclude, Intelligent Football Management Information System is developed by giving emphasize on two main things; profiling and scheduling. However, other important elements of football management information system are also included. Even though the fixtures for UTP League has been quite static, the system has been equipped with some dynamic elements for generating fixtures in order for this system to be able to be used by other league as well.

As for the benefit of using the information management system, it is hoped that by implementing the system, more time could be saved and information would be disseminate more efficiently and hence the quality of the league would increase significantly. Information and communication technology especially the Internet is everywhere today. Every organization is moving towards more automated and electronic transaction nowadays; so should football league management in UniversitiTeknologi PETRONAS.

5.2 Recommendations and Future Work

For a system being developed in such a short period of time, there are few additions may be plugged to the project for further improvement. First of all is to put more constraints into the algorithm to generate the schedules. As more constraints set up, it is hoped that the system will be more effective and the tournament will be more organized. Extensive research is required for that to be realized but yet it is not impossible.

The second one is in term of more reliable notification system as discussed in Chapter 4 earlier. Maybe database-based notification system is not really suitable. There has to be a more appropriate platform or technology that can be used for a better notification system. If that happens, then the notification will become more useful and can be used to other situation as well.

And the last recommendation is to add more functionality to the system. There are more actually for a football management information system to be efficient and effective. As example, virtual chatroom; for easier communication, articles and news update; for more informative website, and also more automated functions in order to make it more commercial, maximize the available technology, and reduce the dependency on manual tasks.

REFERENCES

Berger, H., Beynon-Davies, P., & Cleary, P. (2004).The utility of a rapid application development (rad) approach for a large complex information systems development.

Costa, D. (1995).An evolutionary tabu search algorithm and the NHL scheduling problem.*Infor-Information Systems and Operational Research, 33*(3), 161-178.

Crauwels, H., & Van Oudheusden, D. (2003).Ant colony optimization and local improvement.*Workshop of Real-Life Applications of Metaheuritics, Antwerp,*

Daud, N. M. N., Bakar, N. A. A. A., &Rusli, H. M. (2010). Implementing rapid application development (RAD) methodology in developing practical training application system.*Information Technology (ITSim), 2010 International Symposium in, , 3* 1664-1667.

football (2011). In Encyclopædia Britannica, Inc. Retrieved December 3, 2011, from Encyclopedia Britannica Online: http://www.britannica.com/EBchecked/topic/550852/football

football (2011). In Merriam-Webster Dictionary. Retrieved December 3, 2011, from Merriam-Webster Online: http://www.merriam-webster.com/dictionary/football

Hagn, F., &Maennig, W. (2008). Employment effects of the football world cup 1974 in germany.*Labour Economics, 15*(5), 1062-1075.

Huang, G., Ling, P., & Wang, Q. (2007). A hybrid metaheuristic ACO-GA with an application in sports competition scheduling. *Software Engineering, Artificial Intelligence, Networking, and Parallel/Distributed Computing, 2007.SNPD 2007. Eighth ACIS International Conference on, , 3* 611-616.

Hung, J. C., Chien, M. K., & Yen, N. Y. (2011).Intelligent optimization scheduling algorithm for professional sports games.*Ubi-Media Computing (U-Media), 2011 4th International Conference on,* 285-289.

Ji, X.,&Xie J. (2010). Risk management information system for large-scale sports matches. *E-Product E-Service and E-Entertainment (ICEEE), 2010 International Conference on,* pp. 1-3.

Jih, T. Y., Hsien-Da, H., &Jorng-Tzong, H. (2002). Devising a cost effective baseball scheduling by evolutionary algorithms. *Evolutionary Computation, 2002.CEC '02. Proceedings of the 2002 Congress on, , 2* 1660-1665.

Juan, S. C., Ramli, R., & Ibrahim, H. (2011).A hybrid constraint-based programming approach to design a sports tournament scheduling. *European Journal of Scientific Research, 49*(1), 39-48.

Kendall, G., Knust, S., Ribeiro, C. C., &Urrutia, S. (2010). Scheduling in sports: An annotated bibliography. *Computers & Operations Research, 37*(1), 1-19.

Nurmi, K., Goossens, D., Bartsch, T., Bonomo, F., Briskorn, D., Duran, G., et al. (2010).A framework for scheduling professional sports leagues. *IAENG Transactions on Engineering Technologies, American Institute of Physics, 5*, 1428.

Rasmussen, R. V., & Trick, M. A. (2008).Round robin scheduling–a survey. *European Journal of Operational Research, 188*(3), 617-636.

Sauro, J. (2011). *Measuring Usability With The System Usability Scale (SUS).*In Measuring Usability. Retrieved April 11, 2012, from: http://www.measuringusability.com/sus.php

Schonberger, J., Mattfeld, D. C., &Kopfer, H. (2000). Automated timetable generation for rounds of a table-tennis league. *Evolutionary Computation, 2000. Proceedings of the 2000 Congress on, , 1* 277-284 vol.1.

Trisuwannawat, C., Chayawan, C., &Thammakoranonta, N. (2010). Designing database for a football league: A case study of thai football league. *Computer Science and Information Technology (ICCSIT), 2010 3rd IEEE International Conference on, , 5.* pp. 359-363.

Wei, W., Fujimura, S., Wei, X., & Ding, C. H. (2010).A hybrid local search approach in solving the mirrored traveling tournament problem.*Industrial Engineering and Engineering Management (IE EM), 2010 IEEE 17Th International Conference on,* 620.

While, L., &Barone, L. (2007).Super 14 rugby fixture scheduling using a multi-objective evolutionary algorithm.*Computational Intelligence in Scheduling, 2007.SCIS '07. IEEE Symposium on,* 35-42.

Yonggui, Y., & Lei, L..(2007). Research on sports game news information extraction. *Natural Language Processing and Knowledge Engineering, 2007.NLP-KE 2007. International Conference on,* pp. 96-101.

APPENDICES

Appendix 1

Course: Final Year Project 1
Project title: Intelligent Football Management Information System (IFMIS)
Project by: Mohd Syahmi Syazwan bin Zahari (12034)
Start/End date: Week 1 (26 September 2011) - Week 14 (30 December 2011)

	Week													
Taks	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
Selection of supervisor														
Submission of proposal														
Proposal approval by research cluster														
Research class														
Preliminary research work														
System development														
- System overview														
- Gathering user requirements														
- Development: Profiling														
Submission of extended proposal														
Proposal defense														
Submission of Interim Draft Report														
Submission of Interim Report														
Submission of Technical Report														

Course: Final Year Project 2
Project title: Intelligent Football Management Information System (IFMIS)
Project by: Mohd Syahmi Syazwan bin Zahari (12034)
Start/End date: Week 1 (26 January 2012) - Week 14 (27 April 2012)

	Week													
Taks	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
System development														
- *Profiling*														
- *Scheduling*														
- *Graphical User Interface*														
- *Finalized design*														
Testing														
Dissertation writing														
Deadlines:														
Progress report submission														
Pre-SEDEX											4-Apr			
Soft bound dissertation submission												12-Apr		
SEDEX													17-18 Apr	
VIVA Presentation														25-Apr
Technical report submission														26-Apr

Appendix 2

```
ProtectedSub btnGenerate_Click(ByVal sender AsObject, ByVal e As
System.EventArgs) Handles btnGenerate.Click
      Dim team As Integer
      Dim match As Integer = 0
      Dim r1, r2 As Integer
      Dim count As Integer = 0
      Dim a, b As Integer
      Dim result, result2, result3, result4, result5, result6 As String
      Dim result7, result8 As Integer
      Dim counterString As String
      Dim dateMatch As Date
      Dim league As String
      Dim con As Boolean = False
      Dim Gen As System.Random
      Gen = New System.Random(My.Computer.Clock.TickCount)

      team = GridView2.Rows.Count

      dateMatch = Date.Parse(Calendar1.SelectedDate)
      dateMatch = dateMatch.AddDays(-1.5)

      league = DropDownList5.SelectedValue

      Dim cons = New
OleDbConnection("Provider=Microsoft.Jet.OLEDB.4.0;Data Source="&
Server.MapPath("team.mdb"))
      Dim cmd As OleDbCommand
      Dim sql As String
      Dim objcmd As New OleDbCommand

      a = 1
      While a < team
            match = match + a
            a = a + 1

      End While

      'to run the unschedule matches
      Dim s(match - 1, 2) As Integer
      Dim counter As Integer = 1

      a = 1
      While a < team
            b = a + 1
            While b <= team
                  s(counter - 1, 0) = a
                  s(counter - 1, 1) = b

                  result = System.Convert.ToString(s(counter - 1, 0))
                  result2 = System.Convert.ToString(s(counter - 1, 1))
                  counterString = System.Convert.ToString(counter)
                  counter = counter + 1
```

```
                b = b + 1

            End While
            a = a + 1

        End While


        ' to run scheduled matches
              con = False
        While con = False
              a = 0
        While a < 5
            ' swapping pairs randomly  before start scheduling
            r1 = Gen.Next(1, match).ToString
            r2 = Gen.Next(1, match).ToString

            swap(s(r1, 0), s(r2, 0))
            swap(s(r1, 1), s(r2, 1))

            a = a + 1
        End While

        con = True
        count = 0
        a = 1
        While a <= team

            b = 0
            While b < match

                If s(b, 0) = a Or s(b, 1) = a Then
                    count = count + 1

                Else
                    count = 0

                End If

                If count = 2 Then
                    con = False
                    Exit While

                End If
                b = b + 1
            End While

            a = a + 1
        End While

End While

'Displaying result

a = 1
While a <= match
            result4 = System.Convert.ToString(s(a - 1, 0))
```

```
            result7 = (s(a - 1, 0)) - 1
            result5 = System.Convert.ToString(s(a - 1, 1))
            result8 = (s(a - 1, 1)) - 1
            counterString = System.Convert.ToString(a)

            result6 = "Match " + counterString + " : Team " + result4 +
" VS Team " + result5
            lstResult.Items.Add(result6)

            For i = 0 To GridView2.Rows.Count - 1
                  If result7 = i Then
                    result4 = GridView2.Rows(i).Cells(0).Text.ToString
                  End If

                  If result8 = i Then
                    result5 = GridView2.Rows(i).Cells(0).Text.ToString
                  End If

            Next
            dateMatch = dateMatch.AddDays(0.5)

            If a Mod 2 <> 0 Then
                sql = "INSERT INTO fixture ([home], [home_score],
[away], [away_score], [date_match], [time_match], [venue], [league],
[referee]) VALUES ('"& result4 &"', 0, '"& result5 &"', 0, '"&
dateMatch &"', '5:00 PM','A','"& league &"','Empty')"

            Else
                sql = "INSERT INTO fixture ([home], [home_score],
[away], [away_score], [date_match], [time_match], [venue], [league],
[referee]) VALUES ('"& result4 &"', 0, '"& result5 &"', 0, '"&
dateMatch &"', '5:00 PM','B','"& league &"','Empty')"

            EndIf
            cmd = New OleDbCommand(sql, cons)

            cons.Open()
            objcmd = New OleDbCommand(sql, cons)
            objcmd.ExecuteNonQuery()
            cons.Close()

            a = a + 1
      EndWhile

EndSub

PrivateSub swap(ByRef a AsInteger, ByRef b AsInteger)
' swaps the values, and swaps for all corresponding columns after that
to keep each column together
      Dim temp, temp2 AsInteger
      temp = a
      temp2 = b

      b = temp
      a = temp2

EndSub
```