SMART ACADEMIC TIMETABLE REMINDER
FOR FIK UNISZA STUDENT’S IN
HYBRID MOBILE APPLICATION

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(INTERNET COMPUTING)
WITH HONOURS
UNIVERSITI SULTAN ZAINAL ABIDIN

2018
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AUGUST 2018
DECLARATION

This dissertation is submitted as a partial fulfillment for the award of a Bachelor of Computer Science (Internet Computing) with Honours at University of Sultan Zainal Abidin (UniSZA). The results of this work are on my own investigations. All sections of text and results which have been obtained from other sources are full referenced. I understand that cheating and plagiarism constitute a breach of university regulations and will be dealt with accordingly.

Signature: .............................................................

Name: MOHAMAD FAIZ BIN MOHAMAD MOKHTAR

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

This is to confirm that:

The project conducted and the report was under my supervision.

Signature: ……………………………………………

Name: DR. ISMAHAFEZI BIN ISMAIL

Date: …………………………………………………
DEDICATION

First of all, praise to Allah, the Most Gracious and the Most Merciful for blessing and giving me the opportunity to undergo and complete my proposal for final year project, Smart Academic Timetable Reminder for FIK UniSZA Student’s In Hybrid Mobile Application.

I would like to take this opportunity to express my heartiest gratitude to my supportive supervisor, Dr. Ismahafezi Bin Ismail for his motivation, guidance and help throughout my project. Without his time, his support and guidance, it is impossible for me to finish my project successfully. Thank you for the kindness. May Allah bless him.

Besides, I would like to extend my appreciation to my parent (Mohamad Mokhtar Bin Ibrahim and Nor Aziah Binti Mohamad Jidin), my family members and my friends especially to Umi Syafika Binti Muhammad Asri that always been there in my hard and easy times. May Allah protects and bless all of them.

Lastly, thank you to all my lectures who taught me throughout my education from Semester 1 until Semester 6 at University of Sultan Zainal Abidin (UniSZA). May Allah bless all of them.
ABSTRACT

Lecture is one of the things that a student’s university must attends. Timetable of a lecture is one of the requirement for the student known well when and where the class should be held. Not just for student, lecturer also need suitable platform to automatically inform student about class should be go on or be cancel. The class system is not updated and upgraded to the current development using smartphone technology to facilitate students and lecturers. Students also have trouble remembering and getting information about the cancellation of the lecture on a daily basis. Lecturer also did not had a platform to broadcast to all his student about the class cancel. We should use smartphone medium to remind student and lecturer about the class like the Azan Apps. The notification also should have time and location the lecture will be held. The apps can remind student 15 minutes before the class start. And also remind lecturer 30 minutes before the class to system known the lecture still go on or cancel. Student just need to choose what name of his class to system automatically update the notification base on the lecture timetable in the database. End of this development an android application had successfully be created by using IONIC hybrid platform. This development had successfully connect IONIC to MYSQL by using PHP to encode and decode to JSON format.
ABSTRAK

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<td></td>
</tr>
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<th>TITLE</th>
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LIST OF ABBREVIATIONS

GMC  Google Cloud Messaging
SDLC  Software Development Life Cycle
GB  Gigabyte
ERD  Entity Relationship Diagram
DFD  Data Flow Diagram
CD  Context Diagram
PHP  Hypertext Preprocessor
HTML  Hypertext Markup Language
CSS  Cascading Style Sheets
CHAPTER 1

INTRODUCTION

1.1 Project Background

Push Notifications enable app developers to give notice users at any time, users don’t ought to be within the app or using their devices to receive them. With the assistance of some sensible tutorials, push notifications may be enforced terribly straightforward in Ionic that supports each iOS and android. Android uses FCM (Firebase Cloud messaging (FCM) earlier called GCM) and iOS uses APNS for push notification [2]. Figure one show the flow of message to create a push notification.

![Diagram of push notification flow]

Figure 1.1: Push Notification flow [2].
This application is developed to use in smartphone due to the analysis that had been created to calculate total time and likelihood for a student has smartphone and a minimum of had a smartphone. According to a survey titled the buyer measuring instrument conducted by Google and TNS (2014), Malaysia leads the globe in terms of smartphone usage. [3]. Figure a pair of show the usage of smartphone base on programmed / course.

<table>
<thead>
<tr>
<th>Programme</th>
<th>Gender</th>
<th>Mean Smartphone Use (Minutes/Week)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrative Management</td>
<td>Male 21</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Female 39</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total 60</td>
<td></td>
</tr>
<tr>
<td>Computer Science</td>
<td>Male 10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Female 49</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total 59</td>
<td></td>
</tr>
<tr>
<td>Accounting</td>
<td>Male 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Female 55</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total 57</td>
<td></td>
</tr>
</tbody>
</table>

Figure 1.2: Usage of smartphone base on programmed / course [3].

Smart Academic Timetable Reminder is developed mobile application to help users especially UniSZA’s students to get reminded 10 minutes before class started or class had been cancelled by lecturer. Lecturer will get a push notification to update whether the class proceed or had to be cancel and maybe delay for a few minutes. To make this system synchronize we need to have a centralized database for all student had latest changes and latest information about the next lecture.
1.2 Problem Statement

Current academic timetable mobile application and current system of academic timetable has several drawbacks:

1. UniSZA’s students didn’t had existed mobile application to remind theirs’s academic timetable and always be marked late to class.

2. Lecturer didn’t have special platform to inform directly to student about any change of class.

3. Existed mobile timetable required user to insert manually own self about theirs’s academic timetable and not synchronize to each other.

1.3 Objectives

We have identified main objectives of the project. It can be identified as the following:

1. To propose a mobile application that help users especially UniSZA’s students to get reminded 10 minutes before class started or class had been cancelled by lecturer.

2. To develop a platform for lecturer directly tells students if the class will be delay or cancel.

3. To make a centralized database for all student had latest changes and latest information about the next lecture.
1.4 Scope

1.4.1 User

Stakeholder involves:

1. User Level 0 (Student)
   I. Use smartphone to get push notification of academic schedule from database.
   II. Get status lecture notification 10 minutes before the lecture.
   III. Student need to choose which class they will having for this semester.

2. User Level 1 (Lecturer)
   I. Get notification to confirm about the next lecture status and the system will push notification to tell all the student in the lecture.
   II. Can change the time and place if want to make any changes in the academic timetable.
   III. Just using mobile application to use this application.

3. User Level 2 (Organizer)
   I. The organizer need to fill all academic timetable into the system database.
   II. They can manage create, update and delete in the academic timetable.
   III. They need to fill the academic timetable with lecturer name, class name, and time range.
   IV. They need to use official website of this application to enter the information into the database.
1.4.2 Place

Faculty of Informatics and Computing

1.4.3 Project Scope

1. Use Android smart phone for this application

There are a lot of Android smart phone in the market. This smart phone that must be use for this system is smart phone that running Android version 4.4 (KitKat) or later and should allow this application to push notification in user phone.

2. Only for course in Faculty of Informatics and Computing UniSZA

Academic Timetable listed in this mobile application is only for course in Faculty of Informatics and Computing.

1.5 Report Organizing

This report organize each chapter that has on the report. It arranges with refer to the specific format and it easy for readers to understand the whole of report. The report is started with chapter 1 that explains about Introduction, this chapter will explain roughly about this project. The next chapter is chapter 2 Literature Review; this chapter tells more about the study on some references and research for the system development. The chapter 3 Project Modelling and Design are the core part in the development process.
Chapter 2

Literature Review

2.1 Introduction

This chapter will continue with the discussion and idea from previous research, website, application or article that related to the hybrid apps with function of push notification. The idea previous resource or available resource helps to achieve all the objectives of this application.

2.2 Proposed System

Smart Academic Timetable Reminder by using hybrid apps with the future of push notification will be used in Android smart phone. This application is developed to notify students and lecturers for their next class and as a platform for lecturer directly tells students if the class will be delay or cancel by using push notification. This application database will make a centralized database for all student had latest changes and latest information about the next lecture, so this application needs internet to continuously update from database. For the accessibility, student only can get notification about their next class, while for lecturers they can update the status of theirs’s class whether the class proceed or post-pone
and maybe delay for a few minutes. Finally, only administrator can access the database to key in the timetable.

2.3 Hybrid Mobile Application

Hybrid apps are native apps moreover as part web apps. It bridges gap between totally different mobile apps. Like native apps, they sleep in an app store and might take benefits of the various device options out there. A Hybrid application is built using Html, CSS and JavaScript which are web technologies and are executed in the native Hybrid approach uses the browser engine of the device which renders and displays the HTML content in full screen Web view control. Often, corporations build hybrid apps as wrappers for an existing net pages; in this manner, they hope to urge a presence within the app store, while not defrayment important efforts for developing a distinct apps. Hybrid apps additionally extremely popular as a result of they're also permit the cross platform development of mobile apps and so the considerably reduces the event prices of the mobile apps development. The device capabilities are exposed to the hybrid application through an abstraction layer. The abstraction layer exposes the device capabilities as JavaScript Application Programming Interface. Hybrid approach can take the advantage of both browser engine and device capabilities. Hybrid approach can be used for both server backed and standalone applications [1] [8].
2.4 Push Notification using Google Cloud Messaging

Push service is a featured service that is gaining more and more popularity. It allows third-party application servers to actively send data to their installed applications even if the installed application is currently not running. To utilize the push service, the application vendor has to register at the service provider (e.g., Google and Apple). However, the push service provider has no knowledge about the contents of distributed message. Data distributed through the push service are messages that the vendor server wants to notify about. Depending on handling method defined in the installed application, the pushed data may or may not be displayed directly on the screen as notifications [6]. GCM is a service which allows developers to send push messages to Android devices from the server. GCM handles the queuing of the messages as well as delivering those messages to the target applications on the devices. GCM is a free service by Google, and it has no quotas. It is the default push messaging solution for the Android platform [7].

Figure 2.1: Application Architecture
Despite the differences in design and implementation, notification services on existing smartphone platforms can be classified into three types [6]:

1. Pop-up Notification: notifies the user by popping up a notification dialog on screen.
2. Status Bar Notification: adds a notification view as a status bar at the top of screen.
3. Icon Notification: shows notification by making changes on the icon of a sender application in the main menu.

The GCM is a free service and this leads to decreased costs in the messaging services. The GCM server allows up to 4 kb messages and can evidently send small messages including updates and real-time information on weather and sports. For efficient service, GCM requires devices that are running on Android version 2.2 or higher [6].

2.5 Database Structure for Time Table

The analysis of the layer-structure are often merely done by observing every level of the structure one by one so specifying the interrelationships among them. So, the desired data for each level of the layer-structure obtained from the analysis method is summarized in table one. The results of this instance shows that the time table has no overlaps between courses and helps the staff in scheduling their times in a very right method.
To assess the performance of the obtained outcome, we tend to produce perform so-called index function. The index perform could be a perform of the many parameters with the subsequent format: INDEX (array, row_num, coloumn_num), where

1. **array**: Where is the list? The array can be organized either by an absolute reference as ($A$1:$D$3), or by a relative reference as (A1:D3).

2. **row_num**: Which row has the value to be returned?

3. **column_num**: Which column has the value to be returned?

Writing a general formula by that the assessment are going to be done so verifying it for a few given knowledge regarding the time table drawback, the result obtained by this indexed function shows that the proposed ways are worked properly with high performance.

<table>
<thead>
<tr>
<th>Levels</th>
<th>Analysis Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level-0 (Subject)</td>
<td>- Prerequisite subject(s)</td>
</tr>
<tr>
<td></td>
<td>- Type of subject (elective, mandatory, faculty, department, university).</td>
</tr>
<tr>
<td></td>
<td>- Academic level of subject.</td>
</tr>
<tr>
<td></td>
<td>- Total number of sections for every subject.</td>
</tr>
<tr>
<td>Level-1 (Class-room)</td>
<td>- Type of class-room (labs, auditorium).</td>
</tr>
<tr>
<td></td>
<td>- Total number of class-room for each type.</td>
</tr>
<tr>
<td></td>
<td>- Capacity of every class-room.</td>
</tr>
<tr>
<td>Level-2 (Time)</td>
<td>- Slots of time (how many hours are allocated for each section?).</td>
</tr>
<tr>
<td></td>
<td>- Allowed total number of slots at a day.</td>
</tr>
<tr>
<td>Level-3 (Curriculum)</td>
<td>- Total number of subjects under-graduated study plan.</td>
</tr>
<tr>
<td></td>
<td>- The credit hours for each subject.</td>
</tr>
<tr>
<td></td>
<td>- Subject number.</td>
</tr>
<tr>
<td></td>
<td>- Total number of subjects per a subject type.</td>
</tr>
<tr>
<td>Level-4 (Lecturer)</td>
<td>- Defining the staff.</td>
</tr>
<tr>
<td></td>
<td>- Total number of lecturers which could teach a specified subject.</td>
</tr>
<tr>
<td></td>
<td>- A convenient time for a lecturer.</td>
</tr>
<tr>
<td>Level-5 (Student)</td>
<td>- Total number of students.</td>
</tr>
<tr>
<td></td>
<td>- Total number of students that desired to take the subject in the next term and they satisfied the conditions to register it.</td>
</tr>
</tbody>
</table>

Table 2.1: The results of the analyzing process [9].
2.6 Database Structure for Time Table

In this phase it will deliver the information about the study on the past research, current application or system, and the article on the website. This study is more to focus to do the development and guide to the successful project, to come out with the new system or application that will benefits to all user.
CHAPTER 3

METHODOLOGY

3.1 Introduction

In this chapter, it will state the methodology that used to develop this project. Hence of Software Development Life Cycle (SDLC) model that used for the step in the project of Smart Academic Timetable Reminder on phase on every development process. This chapter will explain more detail about every phase that involve on this project development, it also state all the system requirement. In order to ensure the effective of the Smart Academic Timetable Reminder, good planning is a must before the development process begins. In this chapter also will be explains more about system functioning, the method that used to build this project, the designing the database and the interface that are build. Entity Relationship Diagram (ERD), Context Diagram, and Data Flow Diagram for this development is also will be preview in this chapter.
3.2 Analysis Study & Research Paradigm Justification

The phase in SDLC Model are requirement analysis, design, implementation, testing and evolution. All these are related to each other. All the methods and processes undertaken in SDLC Model for this project will be explained as follow:

![SDLC Model](image)

Figure 3.1: Software Development Life Cycle Model [4]

3.3 Planning & Requirement Analysis

In this planning phase, title of the project has been application approved by supervisor and Head of department which I choose to develop the Smart Academic Timetable Reminder. This application is developed for students, lecturer and admin in UniSZA. In this phase problem statement is required to known the suitable requirement to develop the application. The problem having by the lecturer and student to academic schedule such as no special platform to announce if the class cancel or delay and until now there are so mobile application that support for centralize database for schedule that can be used for warn student and lecturer before the class. Writing proposal is needed in this phase to understand more how the system is work and how I going to plan during development
process. From the requirement analysis, I realize the most suitable platform to use this application in by android smart phone so I had choose to develop this application using IONIC methods. Android had prepared all the basic device requirement to run the application successfully with push notification, internet and others.

3.3.1 Hardware and Software Requirement

In the software development process, the requirements such as software and hardware is the most important requirement to ensure that all system development work smoothly without any interruptions and problems. There are several requirements that were used to complete this project which include:

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laptop</td>
<td>Laptop used for documentation and developing mobile application with specification as below:</td>
</tr>
<tr>
<td></td>
<td>Brand : Lenovo Y520</td>
</tr>
<tr>
<td></td>
<td>Processor : Intel 7th Generation i7-7700HQ</td>
</tr>
<tr>
<td></td>
<td>Memory : 8GB DDR4</td>
</tr>
<tr>
<td></td>
<td>Hard Disk : 1TB HDD</td>
</tr>
<tr>
<td></td>
<td>Operating System : Windows 10 64-bit</td>
</tr>
<tr>
<td></td>
<td>Graphic : GTX1050 2GB</td>
</tr>
<tr>
<td>Phone</td>
<td>Android mobile phone to run application</td>
</tr>
<tr>
<td></td>
<td>Brand : OPPO Neo 5</td>
</tr>
<tr>
<td></td>
<td>Processor : Quad core, 1.3 GHz, Cortex A7</td>
</tr>
<tr>
<td>Software</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Windows [5]</td>
<td>Operating system used to store all the applications, documentations, files and tools needed</td>
</tr>
<tr>
<td></td>
<td>Version during Development : Windows 10</td>
</tr>
<tr>
<td>Visual Studio [5]</td>
<td>Platform used to build android-based mobile application</td>
</tr>
<tr>
<td></td>
<td>Version during Development : Visual Studio 2015</td>
</tr>
<tr>
<td>Java JDK [5]</td>
<td>A development environment for building applications, applets, and components using the Java programming language</td>
</tr>
<tr>
<td>Android Studio with Android SDK [5]</td>
<td>A set of development tools used to develop applications for Android platform.</td>
</tr>
<tr>
<td>Lucid Chart</td>
<td>Online platform for sketching figures and diagrams including ERD, DFD and CD</td>
</tr>
<tr>
<td>Web Browser</td>
<td>Development test platform</td>
</tr>
<tr>
<td></td>
<td>Version during Development :</td>
</tr>
<tr>
<td></td>
<td>1. Firefox Quantum 60.0 (64-bit)</td>
</tr>
</tbody>
</table>

Table 3.1: List of Hardware Requirements
<table>
<thead>
<tr>
<th>Software</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Notepad++</td>
<td>Code editing platform</td>
</tr>
<tr>
<td>Bootstrap Studio</td>
<td>Creating responsive websites using the Bootstrap framework.</td>
</tr>
<tr>
<td>XAMPP</td>
<td>Developers to create a local web server for testing and deployment purposes.</td>
</tr>
</tbody>
</table>

Table 3.2: List of Software
3.4 Design

The next stage of Software Development Life Cycle is the Design phase. During this phase, we start the high-level design of the software and applications to be able to deliver each requirement. We have to design Data Flow Diagram Level 0 and 1, context diagram, entity relationship diagram, and a few more to know more detailed about the flow of the application system that are going to develop. After the understand the flow of the system, I make the interface design of the mobile application as mockup for some modules which are login module, push notification module, setting module, and I also make the interface design of bootstrap website as a mockup for admin modules.

3.4.1 Context Diagram

In Context Diagram, it explains the flow of the system based on character and main process that involve on the system functional. It just tells the main function of the system. As we can see from the figure 5, there are 3 actors that involves on this system, the first actor are user that use this system which is student (level 0), He/she must register his detail and subscribe course that taken this semester. The student can view his class schedule and get each class latest status. The second actors that involve on this system are lecturer (level 1). Lecturer must login to the system to get class confirmation notification and send the status to system update to student (level 0). Lecturer also can view his schedule. The third actor that use this system is organizer (Level 2). Organizer must login to the system to manage timetable, manage lecturer and also create course list. And finally admin can view all the report from the system.
Figure 3.2: Context Diagram for Smart Academic Timetable Reminder
3.4.2 Data Flow Diagram Level 0

Figure 3.3 shows DFD Level 0 consist of nine main process which is Manage Admin, Manage Lecturer, Manage Course, Manage Timetable, Verify Login, Student Register, Push Notification, Verify Class Status and View Timetable. There are 3 entities which are Admin, Student and Lecturer. All the information will be store in database which are User, Course Subscribe and Timetable.
3.4.3 Data Flow Diagram Level 1

![DFD Level 1 for Manage Admin](image)

Figure 3.4: Data Flow Diagram Level 1 (Manage Admin)

Figure 3.4 is DFD Level 1 for Manage Admin process. This process is specifically designed for top admin manage all the sub admin. So admin can register in process 1.1 with their requirement information. Admin also need to login every time he want to start any task as an Admin. For the top admin he can update, delete and view all the sub admin list while the sub admin only can update his own profile as Admin.
Figure 3.5 shows DFD Level 1 for Manage Lecturer process. Only admin can create new Lecturer profile in Register Lecturer (2.1) process and update Lecturer profile (2.2). This is to prevent from student get the permission to verify the class status. SO the lecturer will also get the special key to verify his login. Admin also need to classified or subscribe the lecturer with which course his teaching.
Admin need to prepare the list of course that can be subscribe in this process as shown in DFD Level 1 of Manage Course. This is also be specialty to Admin to prevent from lost format code of course that will be used by entire system with the proper code protocol.

Figure 3.7 shows the biggest Admin task to key in and update all the time, day, classroom, and lecturer to specific course.
Figure 3.8 shows the process of Verify Login Password. Student and Lecturer will key in their password into the mobile application and the application had been set to one time login to prevent from user always needs to login and the system can recognize each course that user had subscribe to push notification to the user phone.
Figure 3.9 shows the student need to register his profile to use the application and the information will be stored in User database. Student also need to subscribe each subject that he want to get push notification and the subscribe list will be stored in the course subscribe database. Student do not need to key in what name of subject or the detail of the subject student just need to choose the list of course that had be prepared by the Admin before.
Figure 3.10: Data Flow Diagram Level 1 (Push Notification & Verify Class Status)

Figure 3.10 shows the combination of two processes that related to each other. The first step in this process is the Synchronize subscribe list to timetable list, the lecturer subscribe list will be compared to the timetable to get the time and date and then if the time is 30 minutes before the class start the process will send an unconfirmed timetable status to get Latest Class Status process and will push notification to Lecturer to confirm the class status. After lecturer set the class status via the push notification update class status will update the timetable database. 20 minutes before the class start Synchronize subscribe list to timetable list once more will check whom student that the course and send push notification to the Student.
Figure 3.11 shows the View Timetable process. The process helps the Student and Lecturer to only view the courses they have subscribed to.
3.4.4 Entity Relationship Diagram

Figure 3.12: Entity Relationship Diagram
Table 3.3: Mockup Design.
3.5 Implementation

After the design is chosen, we begin develop the system component which are bootstrap webpage module using PHP, HTML, CSS and JavaScript and also create the database. I choose to use website service is to make the admin easier to key in all the academic schedule into database. For the mobile applications module, IONIC module which is a hybrid mobile application development is the main technique to be used. I choose to use IONIC due to the tutorial supported in online and the

3.6 Testing

Testing is the last phase of the Software Development Life Cycle before the software is used. During testing, we start to test the system against the requirements.

The aim is to find defects within the system as well as verifying whether the application behaves as expected and according to what was documented in the requirements analysis phase or not. The test can be done using a test script to execute each test and verify the results, or using exploratory testing which is more of an experience based approach.

However, it is possible that defects are identified in the testing phase. Once a defect is found, we will identify the details of the issue and if it is a valid defect, it will be fix and create a new version of the software which needs to be verified again. This cycle is repeated until all requirements have been tested and all the defects have been fixed and the software is ready to be used.
3.6 Deployment and Maintenance Phase

It is right to deploy to production where we can use the application once the software has been fully tested and no high priority issues remain in it. If an issue is encountered in the production we will notify it and depending on how severe the issue is, it might either require a hot-fix which is created in a short period of time or if not very severe, it can wait until the next version of the software.

3.7 Summary

The most important thing to make sure the system development process run smooth is methodology. There are many different software development methodology that is good to use to develop a system. However, choosing the right methodology is important because it will affect the work flow of the system development process. The project can be done in time if the right methodology is used to develop a system. Finally, all phase is the methodology used are explained straightly so that it can be understood easily.

In system modelling and design, the detail about the system data flow and entities involved in the system is explained and all the module also being described completely from one module to another. The Data Flow Diagram (DFD) design give an insight about the flow of the system and the explanation about each flow easy to understand while the Entity Relationship Diagram (ERD) and database design give a clear understanding on database of the system and relation between each table.
Chapter 4

IMPLEMENTATION AND RESULT

4.1 Introduction

This section outlines the steps necessary to be the implementation of building Smart Academic Timetable by using IONIC technique which is a hybrid platform for application development. The special and different of this application compare to other is this application is using JSON in PHP document that been upload to server and the application will communicate with the PHP to request something from MYSQL database. After that, in this chapter also will show the steps in create APK file to be install in smartphone.
4.2 IONIC Implementation

<table>
<thead>
<tr>
<th>Command Prompt</th>
<th>Command Prompt (Windows) will be used along the development and run the ionic file either for build APK or run in browser.</th>
</tr>
</thead>
<tbody>
<tr>
<td>NodeJS</td>
<td>One of the requirement in installation of IONIC. Should install the LTS version. Use <code>npm -version</code> and <code>node -version</code> to check the installation is successfully.</td>
</tr>
<tr>
<td>Cordova</td>
<td><code>npm install -g install cordova</code> for installation of cordova.</td>
</tr>
<tr>
<td>Visual Studio Code</td>
<td>In this development Visual Studio Code is been used to code in those file had been created.</td>
</tr>
<tr>
<td>Android Studio SDK</td>
<td>This component is required when build APK file.</td>
</tr>
</tbody>
</table>

4.2.1 Start IONIC project

1. To create the SATiR Ionic Apps: `ionic start satir tabs`  
   Format: ionic start [project name] [template]  
   Tabs is been used to design page with tabs design at the bottom

2. Create new page in Ionic: `ionic generate page intro`  
   Format: ionic generate [type] [pagename]
### 4.3 INTERFACE & CODDING

#### 4.3.1 ADMIN & FACULTY ADMIN

<table>
<thead>
<tr>
<th>4.3.1.1 Index.html (Homepage)</th>
<th>This page is been used online template which is the content is focus on introduce what is SATiR (Smart Academic Timetable). There is button of login for admin login to admin dashboard.</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Index.html" /></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4.3.1.2 Login.html (Login Page)</th>
<th>To make this login page, html form is been used (login.html), the detail fill in form will be send to (login_ver.php) to verify the data base on MySQL data (SELECT username FROM admin WHERE username = '$login_id' and password = '$login_password')). As security session will be added by using (session_start()) after each user success to login, if the user had logout the user can’t short cut to get into dashboard page so they must to login.</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image2.png" alt="Login.html" /></td>
<td></td>
</tr>
</tbody>
</table>
4.3.1.3 Admin Homepage Dashboard

In this page, (login_sec.php) had been include to pass the user detail that can be used to welcome the admin. (echo $login_session;) is been used to print the welcome message with the user’s name or username by using script. Button menu page had been separated from each dashboard page to make us easier to manage so just include the (button.php) and no need to manage button in each page.

4.3.1.4 Manage Admin

“SELECT admin_id, username, password, name, faculty FROM admin” is been used to call all the admin information from database. Loop process also been used to print all the data information.
The add button will be link to (admin_add.php), update button will be link to (admin_update.php) with pass value to the page. `<a href="admin_update.php?admin_id = <?php echo $row['admin_id']; ?>"></a>` is button that been used to recognize which column or identity had been choose to be update. `<a href="../command/admin_delete.php?admin_id=<?php echo $row['admin_id']; ?>"></a>` is command on button for delete the attribute. Those button link with pass special id had been applied to all other manage table in this system.

4.3.1.5 Timetable Dashboard

Concept that must have in each dashboard for admin manage is add, update, view and delete. All those task had been added to this SATiR Manage Dashboard.
4.3.1.6 Course Dashboard

To view data from database, this code is been used to loop and select table to be view.

```php
<?php
$sql = "SELECT * FROM course_basicinfo";
$result = $DBConnect->query($sql);
if ($result->num_rows > 0) {
    while($row = $result->fetch_assoc()) {
        echo "<tr>
            <td>".$row['course_id']."</td>
            <td>".$row['course_name']."</td>
            <td>".$row['faculty']."</td>
            <td>".$row['sem']."</td>
        </tr>
    }
}
```
| 4.3.1.9 Add Function Dashboard |
| Add function, not required the system to pass value between pages, it just submit the form to the MYSQL. Therefore the MYSQL command is not required WHERE condition. |

```sql
using $SQLstring="UPDATE admin SET username='$username', password='$password', name='$admin_name', faculty='$faculty' WHERE admin_id='$id'";
```

```sql
$SQLstring="INSERT INTO admin (username, password, name, faculty) VALUES ('$username', '$password', '$admin_name', '$faculty')";
```
4.3.2 Student and Lecturer

4.3.2.1 Intro Page

*Intro.html*: `<ion-slides>` is used for picture can be slide. `#slider pager` is for the dot at the bottom to inform the user number of pages. `<ngFor>` is a loop in ionic. The “let slide of slides” is to get list of slides from the database. `[style.background-color]` is for the pages can change its background gradiently.
Intro.ts: The loop data is from slides. So the “the slide of slides” in HTML will read line by line. Colors is be used to set the color of the background. You can choose any color by paste the color RGB code to the list.

onSlideChange() class is for known the system current page. This information is important to ionic change its background color. It’s also can be used to hide button and show button skip() while slide the picture.

Let’s Start Button:

intro.html: This button had been set to be view if the slide is find the end of the slides. skip() is been call to function the button. intro.ts the page to be link must be import to the button page. And the setPage function is for the ionic prevent from create back button.
4.3.2.2 Login Page

**login.html**

```html
<ion-item>
  <ion-label>Student ID</ion-label>
  <ion-input type="text" name="student_id" #student_id></ion-input>
</ion-item>

<ion-item>
  <ion-label>Password</ion-label>
  <ion-input type="password" name="password" #password></ion-input>
</ion-item>
```

this form not required to be use the usual HTML form format. But just use ion-input with declare name for it.

Password type is a must to secure the user password.

**login.ts**

```typescript
var headers = new Headers();
headers.append('Accept', 'application/json');
headers.append('Content-Type', 'application/json');
let options = new RequestOptions({headers: headers});
let data = {
  student_id: this.student_id.value,
  password: this.password.value
};
```

As information, ionic can’t directly contact to MYSQL but it’s still can use MYSQL by change it to JSON language.

Data that been send by **login.html** is be declare in **data**.

**login.ts**

```typescript
let loader = this.loading.create(
  {content: 'Processing please wait...'},
};
```

To show the buffer process popup we need this command. We can add duration and setTimeout() function.
login.ts

```typescript
loader.present().then(() => {
    .map(res => res.json())
    .subscribe(res => {
      console.log(res)
      loader.dismiss()
      if(res=="1"){
        let alert = this.alertCtrl.create({
          title: "CONGRATS",
          subTitle: "Welcome Back!",
          buttons: ['OK']
        });
        alert.present();
        window.localStorage.setItem('student_id', this.student_id.value);
      }
    });
});
```

this.http.post('http://faiz296.yayasanypem.com/satir/web_system/mobile_app/login.php', data, options) this command is where the data be send to login.php. and the respond will be verified in if(res=="1"). window.localStorage is used to store data in the system.

login.php

```php
// Access-Control headers are received during OPTIONS requests
if ($_SERVER['REQUEST_METHOD'] == 'OPTIONS') {
  if (!isset($_SERVER['HTTP_ACCESS_CONTROL_REQUEST_METHOD']))
    header("Access-Control-Allow-Methods: GET, POST, OPTIONS");
  if (!isset($_SERVER['HTTP_ACCESS_CONTROL_REQUEST_HEADERS']))
    header("Access-Control-Allow-Headers: \$_SERVER["HTTP_ACCESS_CONTROL_REQUEST_HEADERS"]");
  exit(0);
}

if (isset($data)) {
  $request = json_decode($data);
  $student_id = $request->student_id;
  $password = $request->password;
}
```

This function where the data are receive. And the JSON format had be decode to php format. 

```php
$sql = "SELECT student_id FROM student WHERE student_id = "'"$student_id' and password = "'$password'""; where the login detail be verified.
```
4.3.2.3 Register Page

**register.html**

The build format are same with the concept in login.html.

This page is be built for student only.

**login.ts**

```typescript
  .map(res => res.json())
  .subscribe(res => {
    loader.dismiss();
    if (res == 'registration successful') {
      let alert = this.alertCtrl.create({
        title: 'Registration successful',
        subtitle: res,
        buttons: ['OK']
      });
      alert.present();
      this.navCtrl.push(LoginPage);
    }
  });

this.http.post('http://faiz296.yayasanypem.com/satir/web_system/mobile_app/register.php', data, options) this command is where the data be send to register.php.
register.php

```
$data = file_get_contents("php://input");
if (isset($data)) {
    $request = json_decode($data);
    $name = $request->name;
    $student_id = $request->student_id;
    $password = $request->password;
    $faculty = $request->faculty;
    $sem = $request->sem;
}
```

This function where the data are receive. And the JSON format had be decode to php format. $sql = "'INSERT INTO student (student_id, password, faculty, sem, name) VALUES ('$student_id', '$password', '$faculty', '$sem', '$name')'"; is the command to enter new register to the MYSQL.
4.3.2.4 ClassSub Page

classsub.html

This page will display all the subject that had been subscribe by the student. This data also from MYSQL. This output combine 3 table which is subs_stud, course_basicinfo and course_mpinfo. (click) allow the card to be clicked to view course detail and unsubscribe.

classsub.ts

this.http.post('http://faiz296.yayasanypem.com/satir/web_system/mobile_app/list_classub.php',data,options) this command used to send request to list_classub.php. In this page we had use storage.set() to store latest schedule from database. This code will help student if they don’t have internet. So everytime had internet system automatically update the latest time table to the storage to be used while offline.
Multiple table condition for SQL command is needed to combine all the parent and child table. All the data retrieved from the table will be inserted into array format and passed back to the IONIC with JSON format by using `json_encode`. 
4.3.2.5 Classlist Page

**classList Page**

**classList.html**

This page will display all the subject that can be subscribe by the student. *ngFor is the loop function that call all course list in MYSQL. Subscribe button with class function also be added to help student easily subscribe all the course that he take.

**classList.ts (Request course list)**

```
loader.present().then(() => {
    .map(res => res.json())
    .subscribe(res => {
      loader.dismiss();
      this.items=res.server_response;
      this.filterItems=this.items;
    });
```

**this.http.post('http://faiz296.yayasanypem.com/satir/web_system/mobile_app/fetch_data.php',options) no data need to send. This function is just call the course list from the MYSQL. The data will be view using classlist.html.**
classlist.ts (subscribe a course)

```javascript
  .map(res => res.json())
  .subscribe(res => {
    console.log(res)
    loader.dismiss()
    if(res=='Subscribe successful'){
      let alert = this.alertCtrl.create({
        title:'SUCCESS',
        subtitle:'The subject had been subscribe successfully.',
        buttons: ['OK']
      });
      alert.present();
    }
```

this.http.post('http://faiz296.yayasanypem.com/satir/web_system/mobile_app/subscribe.php', data, options) data that must be send is the student ID to be added in the MYSQL subscribe database as a foreign key with the course ID.

subscribe.php

First thing to be remind is no redundant data, so check the student ID and the course ID if ther are already available in the MYSQL

```sql
$sql = "SELECT subscribe_id FROM subs_stud WHERE course_id = '$course_id' AND student_id='$student_id';";
```

If the data can be add to the subscribe list SQL command that be used is

```sql
$sql = "INSERT INTO subs_stud (course_id, student_id) VALUES ('$course_id', '$student_id')";
```

In make the relationship between ionic and php JSON_DECODE and JSON_ENCODE is important to make both platform understand and can receive each other data.
4.3.2.6 Course-Detail Page

course-detail.html

This page will display clicked course detail and show unsubscribe option if the student don’t want to get any notification of the course anymore. This concept to view the data same with subscribe technique but this page apply *ngIf to choose the clicked course only.

course-detail.ts (Request course detail)

```typescript
loader.present().then(() => {
    .map(res => res.json())
    .subscribe(res => {
      loader.dismiss()
      this.items = res.server_response;
      this.filterItems = this.items;
    }));
});
```

this.http.post('http://faiz296.yayasanypem.com/satir/web_system/mobile_app/fetch_data.php', options) no data need to send. This function is just call the course list from the MYSQL. The data will be view and verified in course-detail.html.
course-detail.ts (unsubscribe a course)

```typescript
  .map(res => res.json())
  .subscribe(res => {
    console.log(res)
    loader.dismiss()
    if(res=="Subscribe successfull"){
      let alert = this.alertCtrl.create({
        title:"SUCCESS",
        subTitle:"The subject had been unsubscribe",
        buttons: ['OK']
      });
      alert.present();
    }
```

this.http.post('http://faiz296.yayasanypem.com/satir/web_system/mobile_app/unsubscribe.php', data, options) data that must be send to select the student ID with course ID to unsubscribe the course. To unsubscribe we just need to delete it from subs_stud table.

unsubscribe.php

Data that be receive which is student ID and course ID had be used to verify which user and course to be unsubscribe. $sql = "DELETE FROM subs_stud WHERE course_id = '$course_id' AND student_id='$student_id'"; we just need this command and the return in JSON_ENCODE to the ionic.
4.3.2.7 Popup function in IONIC

```ts
let alert = this.alertCtrl.create({
  title: "ATTENTION",
  subTitle: "Student ID " + data.student_id + " field is empty",
  buttons: ['OK']
});
```

This function can alert user the system state right now and error.
4.4 TESTING

Testing is a technique and method that are used in order to develop this Halal product verification. Test case testing is used to determine whether each module that are developed in this system are working correctly and parallel with its specification and meet the requirement or not. The tables below show the test cases for several processes of the application.

4.4.1 Test Case Register for SATiR Application

Pre-condition: The user must register their detail to enable them to be in the database to access the system.

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
<th>Expected responses</th>
<th>Pass/fail</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Click “Or create a new account” button</td>
<td>Direct to register form</td>
<td>Pass</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>Fill “Name” field</td>
<td>Validate the field</td>
<td>Pass</td>
<td>Empty field will not be allowed</td>
</tr>
<tr>
<td>3</td>
<td>Fill “Student ID” field</td>
<td>Validate the field</td>
<td>Pass</td>
<td>Empty field will be allowed</td>
</tr>
<tr>
<td>4</td>
<td>Fill “Password” field</td>
<td>Validate the field</td>
<td>Pass</td>
<td>Empty field will not be allowed</td>
</tr>
<tr>
<td>5</td>
<td>Fill “Faculty Name” field</td>
<td>Validate the field</td>
<td>Pass</td>
<td>Empty field will not be allowed</td>
</tr>
<tr>
<td></td>
<td>Fill “Semester” field</td>
<td>Validate the field</td>
<td>Pass</td>
<td>Empty field will not be allowed</td>
</tr>
<tr>
<td>---</td>
<td>----------------------</td>
<td>---------------------</td>
<td>------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>7</td>
<td>Click “Register” button</td>
<td>Validate the field and confirm update</td>
<td>Pass</td>
<td>-</td>
</tr>
</tbody>
</table>

Post-condition:

1. The users are redirected to Login page
2. User detail be added to user database
4.3.2 Test Case Login into SATiR Application

Pre-condition: The user must be already in the database to access the system.

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
<th>Expected responses</th>
<th>Pass/fail</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Click “Let’s Start”</td>
<td>Direct to login form</td>
<td>Pass</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>button</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Fill “username” field</td>
<td>Validate the field</td>
<td>Pass</td>
<td>Empty field will not be allowed</td>
</tr>
<tr>
<td>3</td>
<td>Fill “password” field</td>
<td>Validate the field</td>
<td>Pass</td>
<td>Empty field will not be allowed</td>
</tr>
<tr>
<td>4</td>
<td>Click “Login” button</td>
<td>Validate the field and confirm update</td>
<td>Pass</td>
<td>-</td>
</tr>
</tbody>
</table>

Post-condition:

1. The login detail will be check to user database
2. Verified the user and allow the user to pass
3. Not allow the user and popup error message
CHAPTER 5

CONCLUSION

5.1 Introduction

This chapter will discuss the overall project proposal. The expected result, its contribution and planning for improvement of the result in the implementation phase as well as the conclusion of this project

5.2 EXPECTED RESULT

There are 4 expected result base on objective of the development:

1. The mobile application that help users especially UniSZA’s students to get reminded 10 minutes before class started or class had been cancelled by lecturer.
2. This apps will be a platform for lecturer directly tells students if the class will be delay or cancel.
3. The application had a centralized database for all student had latest changes and latest information about the next lecture.
5.3 PROJECT CONTRIBUTION

This application had been success to make a centralized database for all student had latest changes and latest information about the next lecture by using android mobile application platform. Student just need to register and subscribe all the course that he taken. Lecturer also had a platform to known which class it has today.

Admin also had a web platform to manage all timetable schedule and lecturer. This web platform provide view, update, add, delete to all needed requirement such as for course, timetable, admin, and lecturer.

5.4 PROJECT CONSTRAINTS

“Success is not measured by what you accomplish, but by the opposition you have encountered, and the courage with you have maintained the struggle against overwhelming odds.” (Orison Swett Marden). Every project has its own constrain and limitation. This project also has constraints and limitation. Firstly, the application is developed by using hybrid platform which is IONIC. This platform can’t connect to MYSQL directly and this make it difficult if the database is store in MYSQL platform. So there are multiple way to do the push notification which is using Google Firebase, local notification and trigger the server time. The problem with the firebase is its need to be run manually and use its platform to send the message to the user. This method had be try to be implement in the system but failed to send the notification because the firebase need the application ID. Next is using local notification, the limitation of using this method is timetable that will repeat
every week but the local notification need to be set to its date. This local notification can’t recognize day but can recognize by day. And then use trigger, this method need the server to be always run and trigger the server time with the time in timetable. This method need to use firebase to push the notification. Poor internet also be one of the limitation for the student to get the latest update of schedule.

5.4 PROPOSED FOR FUTURE WORK

This application development will be proceed by developing the application use different platform such as using android studio to prevent from using the hybrid platform. The notification also need to be function either user online or in offline mode. The platform for lecturer also need to be prepared well and upgrade its functionality. By using VR to show the direction of class also will be fun with guide for student to get in class. A chat room of each class also will be a good feature to provide a direct chat between student and lecturer.
References


## APPENDIX

### GANTT CHART FINAL YEAR PROJECT 1

<table>
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<tr>
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