
Timetable Mobile Application

Oskar Ciebien

B.Sc.(Hons) in Computing in Software Development

MARCH 30, 2022

Final Year Project

Advised by: Mr. Martin Hynes

Department of Computer Science and Applied Physics
Galway-Mayo Institute of Technology (GMIT)



Contents

1	Introduction	5
1.1	Layout of the Dissertation	5
1.2	Goal of the Project	6
1.3	Chapter Conclusion	6
2	Context	7
2.1	Overview	7
2.2	Chapter Conclusion	7
3	Methodology	8
3.1	Overview	8
3.2	Approach	8
3.3	Meetings	8
3.3.1	Meetings at the Beginning	8
3.3.2	Regular Meetings	8
3.4	Source Control	9
3.4.1	Why was it picked?	9
3.4.2	What are the Advantages?	9
3.4.3	What are the Disadvantages?	10
3.5	Tools	10
3.6	Chapter Conclusion	10
4	Technology Review	11
4.1	Overview	11
4.2	Technologies Used	11
4.2.1	Node	11
4.2.2	React Native	11
4.2.3	Firebase	12
4.2.4	Android Studio	12
4.3	Chapter Conclusion	12

5	System Design	13
5.1	Overview	13
5.2	Web Application	13
5.3	Android Application	13
5.4	Chapter Conclusion	13
6	System Evaluation	14
6.1	Overview	14
6.2	Graphical User Interface Testing	14
6.3	End to End Testing	15
6.4	Functional Testing	16
6.5	Chapter Conclusion	16
7	Conclusion	17
7.1	Overview	17
7.2	Context and Objectives	17
7.3	Evaluation	17
7.3.1	Improvements	17
7.3.2	Downfalls	17
7.3.3	Overall	17
7.4	Chapter Conclusion	17

About this project

Abstract This project is a Timetable Application developed for Mobile Devices. It differs from some of the other timetable applications currently available on the App Store and Google Play Store, because it has a common and a reliable security feature. This feature is the Google Two Factor Authentication. The user can disable or enable this feature at their own discretion. This Timetable Application also has a customisation feature which is the dark mode. This dark mode allows the user to switch between dark and light modes in the app. It changes the application theme colours from dark to light and vice versa. This feature will provide ease of use at any time of the day. Most importantly this mobile application will have easy to use Front-End interface. With a menu at the bottom of the screen with options to be picked from. In the application the user will have many screens to choose from. The Timetable screen, which displays the weekly schedule. The settings screen which offers settings in relation to the securities and the choice of theme within the application as well as account options. There is also the main menu screen which displays the information about the application and the author of the application. I have used React Native to develop this application and Firebase for the Back-End of this Timetable Application, which will store all of the user information, settings, and timetable data. The database merges whenever an internet connection is established with the device. The database that I have used is also real-time, which allows for instant display of data when it has been modified.

Authors Oskar Ciebien is a final year student at Atlantic Technological University (ATU) formerly known as Galway-Mayo Institute of Technology (GMIT). Currently pursuing a Bachelor of Science (Honours) in Computing in Software Development.

Chapter 1

Introduction

This is the introduction of the dissertation. Which outlines the layout of the dissertation, the objectives of the project and the scope.

1.1 Layout of the Dissertation

The following chapters will cover different aspects of the dissertation:

- **Chapter 1 - Introduction** - Chapter 1 which is the current chapter, will describe the project objectives, the aim of the project, briefly describe the project itself, the background and the scope.
- **Chapter 2 - Context** - Chapter 2 will explain the planning of the project.
- **Chapter 3 - Methodology** - This chapter will discuss the approach on the project, the tools used while developing the project, source control, the types of testing and research done.
- **Chapter 4 - Technology Review** - Chapter 3 will provide a review on all the technologies and the languages that have been used.
- **Chapter 5 - System Design** - Will describe the project as a whole, the design and applications developed.
- **Chapter 6 - System Evaluation** - Will discuss the types of testing that have been carried out while developing the application.
- **Chapter 7 - Conclusion** - The final chapter will go over the evaluation, objectives, downfalls and the improvements that could have been done on the project.

1.2 Goal of the Project

The goal of this project was to create a Timetable application, which would differ from most of the timetable applications currently available on Google Play Store or Apple App Store.

The project will also allow the user to register and log in using email and password. Thanks to this authentication individual information from that account will be saved to a database and could be accessed on any device after logging into the account.

The goal of the timetable was to be editable with or without an internet connection, but to sync whenever an internet connection would be established.

At the start the initial idea was to develop a mobile timetable application and to publish it on Google Play Store, as the application is mainly targeted at Android Devices. This idea will hopefully come true, as the application will most likely stay updated and worked on after submission.

1.3 Chapter Conclusion

Chapter 2

Context

2.1 Overview

2.2 Chapter Conclusion

Chapter 3

Methodology

3.1 Overview

This methodology chapter will describe the various methodologies that have been used in developing this project. It goes over the Approach, Meetings the Source Control and the Tools that have also been used. Additionally it will go over some Research methods that were taken into account before making decisions.

3.2 Approach

3.3 Meetings

The project meetings were scheduled weekly. They were attended by both the supervisor and myself. They were all carried on-line as it was more comfortable. The meetings were under fifteen minutes long.

3.3.1 Meetings at the Beginning

The early meetings were based on the planning and possible ideas for the project. The project timeline and the project design brief has been done during those meetings. These early stage meetings took a couple of weeks.

3.3.2 Regular Meetings

Regular meetings consisted of:

- Current progress of the project.
- The problems encountered.
- Feedback from the supervisor.
- Plans for the following week.
- Changes in the project brief or weekly project timeline.

3.4 Source Control

The source control used during the development of this project was **Git** with the hosting provider **GitHub**.

3.4.1 Why was it picked?

This was the preferred source control as it is the most preferred and used source control in the industry. As well as all the student's project are based on GitHub which serve as the student's portfolio for the future.

3.4.2 What are the Advantages?

Git

One of Git's advantages is how distributed it is. Instead of using one repository, each of the developers has their own local repository and a history of commits [1]. This makes it fast, scalable and easier to work with.

Git is one of the most popular version controls. Thanks to that, nearly all developers have had experience with Git and will not have to learn it from the beginning [1].

GitHub

The Pages that it offers allows developers to showcase their projects and portfolios on a static page for free. They can be customised as the developers would like it with the paid themes [2].

GitHub can be accessed anywhere. Whether it is from a phone, windows PC or a Mac. Windows and Mac code sharing is simple and they can both do

the same actions. While users can only access it on the phone only to view the repositories and projects [2].

3.4.3 What are the Disadvantages?

Git

Git is an excellent tool, but it also has some disadvantages.

One disadvantage of this piece of software is that it is slower on Windows machines [3]. Which could be a big downside for power users of Windows machines when using Git for development.

Git also does not support binary files [3], which could be important for some developers.

GitHub

With Git having some disadvantages, and GitHub uses Git, this also shows that it does have some bad sides as well.

As any other service provider websites, GitHub also provides services, but not all are free. For users that do require a lot of repositories, teams etc. this could mean that they will be forced to buy a plan [4].

Since GitHub is a website. Any websites sometimes might encounter an error or update where the website will have to be put on a downtime for some time. This could create some problems and inconvenience when trying to push code up onto a repository online. Especially when working in a team.

3.5 Tools

3.6 Chapter Conclusion

Chapter 4

Technology Review

4.1 Overview

In this chapter, the different types of technologies that have been used while developing this project will be discussed with reasoning why they have been picked over the alternatives.

4.2 Technologies Used

4.2.1 Node

4.2.2 React Native

React Native is a JavaScript based framework. Facebook has released React Native in 2015 and it is still maintaining it. React Native combines native development with React, hence the name React Native. React Native code is written in JavaScript but it is then rendered with native code for a given device [5].

React Native also offers a great feature called "Fast Refresh", this feature allows for as the name suggests a fast refresh while developing an application. The application refreshes on saving a file, without the need of restarting the application [5].

4.2.3 Firebase

4.2.4 Android Studio

Android Studio is a great piece of technology which provides tools for building applications for any Android Device [6]. It also offers many emulators which are based on real devices such as Google Pixel phones and different versions of Android such as KitKat, Oreo etc.

I have used Android Studio for my android emulator. I have used the Google Pixel 4 XL with Android version 11 and API 30. Android Studio is a great program, not only it allows for building apps, but also it has emulators.

4.3 Chapter Conclusion

Chapter 5

System Design

5.1 Overview

This chapter goes over the system design for the project. Since React Native allows for developing many applications with one code, this chapter will also go over the two types of applications this project was developed for.

5.2 Web Application

5.3 Android Application

5.4 Chapter Conclusion

Chapter 6

System Evaluation

6.1 Overview

This chapter will discuss the types of testings that were involved while developing the application. This way it will analyse various aspects of the project.

6.2 Graphical User Interface Testing

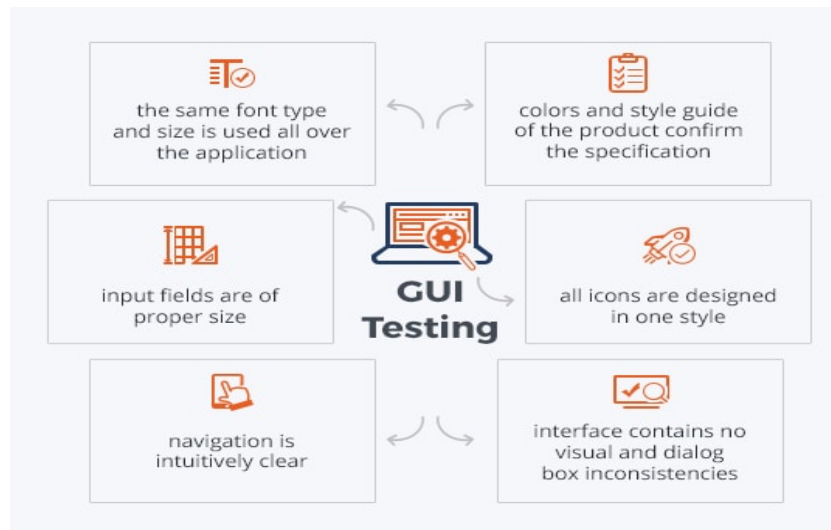


Figure 6.1: Example of GUI Testing. Adapted from [7].

Graphical User Interface Testing tests a piece of software with a Graphical User Interface (GUI). The piece of software that is being tested can have buttons, areas of text input, menus, text etc [8]. These tests can be performed using certain software tools or by developers and designers opinion. It depends what is being developed.

In this project I have used Graphical User Interface Testing to test all of the components at the Front-End of my project. I have tested to see if the buttons are of the right size and at the correct position. I had to make sure that all Front-End components match the style of my application and do not overlap each other. I have completed this type of testing by going using my opinion on the elements of the Front-End.

6.3 End to End Testing



Figure 6.2: Example of End to End Testing. Adapted from [9].

End to End Testing is a very important part of testing. It is used in order to test the functionality and performance of a piece of software . The idea of this test is to pretend what a real user experience would look like while using the application [10].

In my project I have put myself into the mindset of a user and tested the application as I would like it to work as a user of the application. During

testing, I have checked if I was given the right feedback to my actions. I have tested if I could retrieve the right information as well as send the right information to the other systems of the projects which for example were the Authentication and the Real-time Database.

6.4 Functional Testing



Figure 6.3: Example of Functional Testing. Adapted from [11].

Functional Testing is a type of black-box testing. It tests the functions of a software project, by giving the software inputs and testing the outputs. The tests are strictly focused on the functionality and not the software used to develop the piece of software, hence it is a type of black-box testing [12].

I have used Functional Testing in this project by testing each function one by one. This was a lengthy process, but thanks to that I was able to see what I have done wrong or not yet implemented so that a specific function could work as expected.

6.5 Chapter Conclusion

Chapter 7

Conclusion

7.1 Overview

This is the last chapter of this dissertation it will conclude all the other chapters. Discuss the objectives and analysis of the project and also mention any downfalls or problems encountered as well as the improvements that could be made in the future.

7.2 Context and Objectives

7.3 Evaluation

7.3.1 Improvements

7.3.2 Downfalls

7.3.3 Overall

7.4 Chapter Conclusion

Bibliography

- [1] Atlassian, “Why git for your organization.”
- [2] CodeInstitute, “What is github?.”
- [3] P. Pedamkar, “Introduction to git.”
- [4] J. Clancy, “The advantages and disadvantages of using github.”
- [5] R. Native, “React native.”
- [6] A. Studio, “Android studio.”
- [7] U-Tor, “Gui testing: What, why, how?.”
- [8] I. Banerjee, B. Nguyen, V. Garousi, and A. Memon, “Graphical user interface (gui) testing: Systematic mapping and repository,” *Information and Software Technology*, vol. 55, no. 10, pp. 1679–1694, 2013.
- [9] A. R. Chowdhury, “All you need to know about end to end testing.”
- [10] SmartBear, “Combine api and ui testing for confidence at every layer of your application.”
- [11] C. Technologies, “Functional testing.”
- [12] Wikipedia, “Functional testing.”