

Development of Interactive Piano Educational Software for Music Learning

By

LIM WEI SIONG

A REPORT

SUBMITTED TO

Universiti Tunku Abdul Rahman

in partial fulfillment of the requirements

for the degree of

BACHELOR OF INFORMATION SYSTEMS (HONS)

INFORMATION SYSTEM ENGINEERING

Faculty of Information and Communication Technology

(Perak Campus)

MAY 2015

REPORT STATUS DECLARATION FORM

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DECLARATION OF ORIGINALITY

I declare that this report entitled “**Development of Interactive Piano Educational Software for Music Learning**” is my own work except as cited in the references. The report has not been accepted for any degree and is not being submitted concurrently in candidature for any degree or other award.

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I would like to express my sincere thanks and appreciation to my supervisors, Dr. Doris Wong Hooi Ten who has given me this bright opportunity to engage in an Piano Learning mobile application development project. It is my first step to establish a piano application in android version. A million thanks to you.

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ABSTRACTS

This project is a piano learning mobile application development project for education and practice purpose. It will provide the knowledge and theory of piano music for students to learn. Piano exercises and practices can be found with different kind of music theory such as note reading exercise, chords reading exercise, ear training exercise and some intervals, scales and chords quiz. By using this mobile application, students that study piano course can understand the concept of piano learning more effectively.

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List of Abbreviations

Figure Number	Title
EPL	Eterno Pocket Lesson
APP	Mobile Application
CS6	Creative Suit 6

CHAPTER 1: PROJECT BACKGROUND

Chapter 1: Project Background

1.1 Background

Eterno Pocket Lesson (EPL) is a piano learning mobile application (app) for android. It is created to provide some useful piano practices and exercise for students that study in Eterno Music Centre. The EPL app content is based on Eterno Music Centre teaching method and piano course syllabus, which is teaching quick and ‘shortcut’ method for beginner level instead of learning music theory first.

Learning piano in normal way means pianist must learn some music theory before starting to learn how to play piano. Learning music elements such as pitch, rhythm, harmony and form need to put some effort and time to understand them. If pianist do not know much music theory and are playing some music, pianist may encounter a difficulty in processing those music note mentally and separately, it will slow down pianist ability to perform. However, there is another way to play piano which is put more effort on reading the music note position and play that note without knowing much music theory, which is suitable for the people who willing to play piano without learning much on music theory.

When teaching ‘shortcut’ way and chording to young piano students, Eterno Music Centre can skip the long-winded theory explanation and chord charts that may need a few weeks to understand the theory before starting to play piano, which is also called as “shortcut” way to learn piano. With EPL app, it provides well-suited piano syllabus and lessons for students to learn and practice piano effectively by using smartphone or tablet at anywhere and anytime.

1.2 Problem Statement and Motivation

- **Lack of application that suit the syllabus of the teaching plan**

Eterno Music Center provide an easy and “shortcut” piano courses for students who willingly learn piano with “shortcut” method, which is focus less on musical theory and focus more on easy way to learn piano, such as chord learning method. Many piano-learning application from smartphone and tablet are based on music theory. Students need to understand the music theory such as music note (C,D,E,F,G,A,B,C) to play the piano applications or games, which is totally not suitable for the Eterno Music Center teaching style. The teaching method of Eterno Music Center will be greatly improved if there is an application that matched the piano course syllabus.

- **Lack of motivation in learning music theory**

Many classical teachers will stress the importance of music theory and being able to read sheet music. In traditional way, learning musical theory is very important to catch up all the basic concepts of piano keyboard in order to become a great pianist. However, the language of sheet music notation is difficult to understand for beginner student. It may take 2 to 4 weeks to pick up the music theory basics. Many beginner piano learner will ends up skipping the music theory session and lose interest in learning piano.

- **Lack of chance to practice piano**

To learn piano, most of the teacher will recommend their students to buy and have their own piano at home for practices, which means that those students can either practice piano at home or in music centre. If those students eager to practice piano but they does not have piano surround them, they does not have chance to practice. As a result, they cannot practice piano at anywhere, anytime.

- **Lack of well-designed tutorial application**

There are not many existing music theory mobile application that provide good design and text-to-speech functionality about piano theory lessons. Most of the music theory lessons in mobile application contains text and graphic, as well as some animation but the lessons is poorly design. Besides, it is lack of voice-over functionality for piano theory lesson. The problem occur if the users are kids because kids may seem hard to focus on the lesson with long paragraph music theory. Voice-over tutorial makes the learning process more attractive, interesting and not easy to get bored while reading the music theory lesson.

1.3 Proposed Solution

Eterno Pocket Piano (EPP) will allow users to practice piano and use it as alternative tools for practicing piano outside of home or music centre. The app include virtual piano keyboard, piano tutorial lesson, challenge, quizzes, making your own note and quiz , and provide some mini games that help users to improve their piano skills.

In order to practice piano anywhere and anytime, EPL provide virtual piano keyboard with realistic piano sound, multiple key press enable and able to toggle octave numbers on the keyboard. Besides that, user can learn how to play piano in a quick and easy way such as chord teaching method through tutorial and lessons. The lessons include voice-over functionality, which study the lessons with voice-over describing the significance of the scenes being presented.

Moreover, EPL will provide some piano practice through games such as sight reading exercise, chords reading exercise and some intervals, scales and chords quiz. Creating your own note to help us to focus on what is important in what we are learning and reading after the music lesson class is provided in EPL, which allow user to create their

CHAPTER 1: PROJECT BACKGROUND

own personal note and record of what they learnt. Finally, delight and challenge yourself with your own quiz is also doable by using EPL to create your own quizzes.

1.4 Project Scope

The scope of the project is the development of interactive piano educational mobile application that allow user to practice piano anywhere and anytime according to the piano course syllabus and teaching plan of Eterno Music Center.

1.5 Project Objective

- To provide a 'quick way' piano learning practices app
- To provide an mobile app for students to practice piano anywhere, anytime
- To practice piano in interactive way through quizzes
- To create an application with well-designed tutorial and lessons that suits the piano course syllabus

Chapter 2: Literature Review

2.1 Review of Existing Mobile Application

2.1.1 Music Theory Lessons FREE

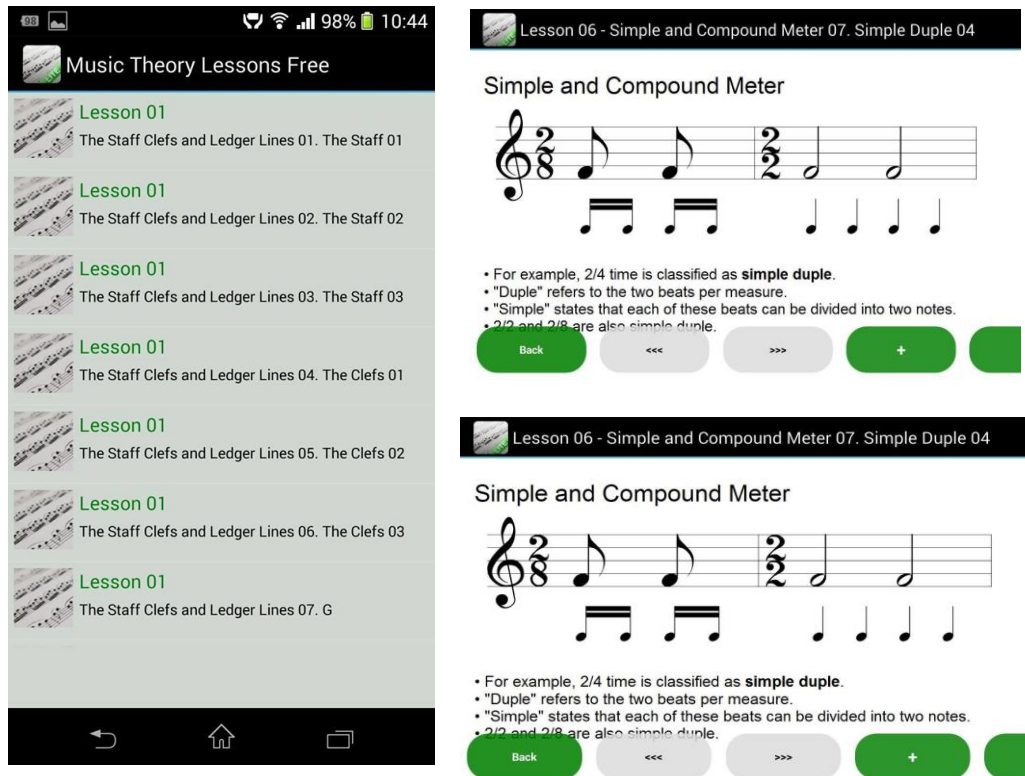


Figure 2.1: Screenshots of Music Theory Lessons Free

Music Theory Lessons FREE is an electronic music theory for mobile. It contains 16 lessons and has rich content about music theory such as staff, clefs, ledgers, note duration, measures and time signature, and more.

Music Theory Lessons FREE allows user to read and view the basic music theory. It is best for people who want to learn basic music theory before jumping to start playing piano. Thus, it is suitable for beginner pianist.

2.1.2 ScaleNet

ScaleNet is a “mobile Music Theory learning environment” for the young-or beginner musician. It was developed by two college professors who employed network modelling to help clarify how many of the basic concepts in music are connected by simple, interrelated patterns. (ScaleNet 2014)

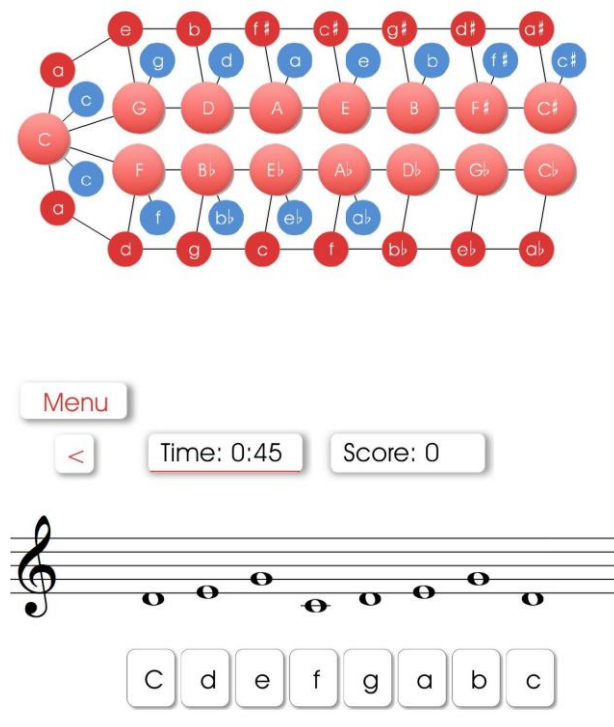


Figure 2.2: Screenshots of ScaleNet

ScaleNet provides interactive music theory learning through quiz and exercises. The content includes note identification, simple or complex key relationship and some sight-reading game. Besides that, the interface is simple and allow user to focus more on musical process and ideas. The game selection menu shows the key and harmonic relationship, as a result, player is able to identify and understand the relationship of key, relative minor and parallel minor from the game selection menu design. Moreover, post-game statistics can be found after finish the game which allow the user to track

CHAPTER 2 LITERATURE REVIEW

2.1.3 Perfect Ear

Perfect Ear is an android app for musicians who want to improve their ability to hear and identify sounds such as chords, notes and intervals. It comes with 7 different kind of hearing exercises. The exercises are presented in list and it can store previous results that tested before. Perfect Ear provide 3 instrument that allow user to choose, which are piano, guitar and bass guitar. Besides that, it also has ‘interval singing’ mode which allow user to play his or her recorded sound to musical instrument sound. However, it is not suggested for beginners due to some musical jargon in the app that need to understand before playing the app.

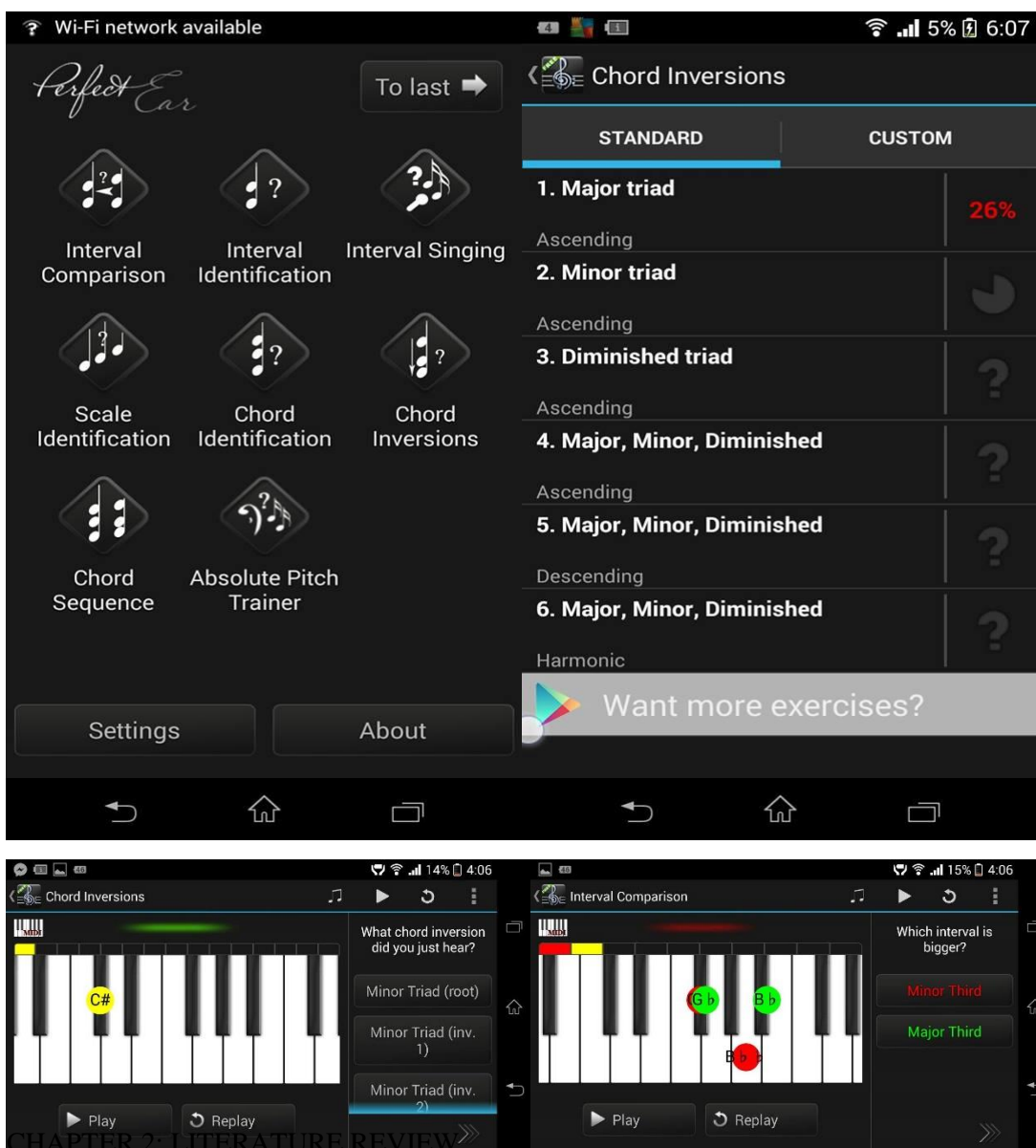


Figure 2.3: Screenshots of Perfect Ear

2.1.4 Music Theory Academy

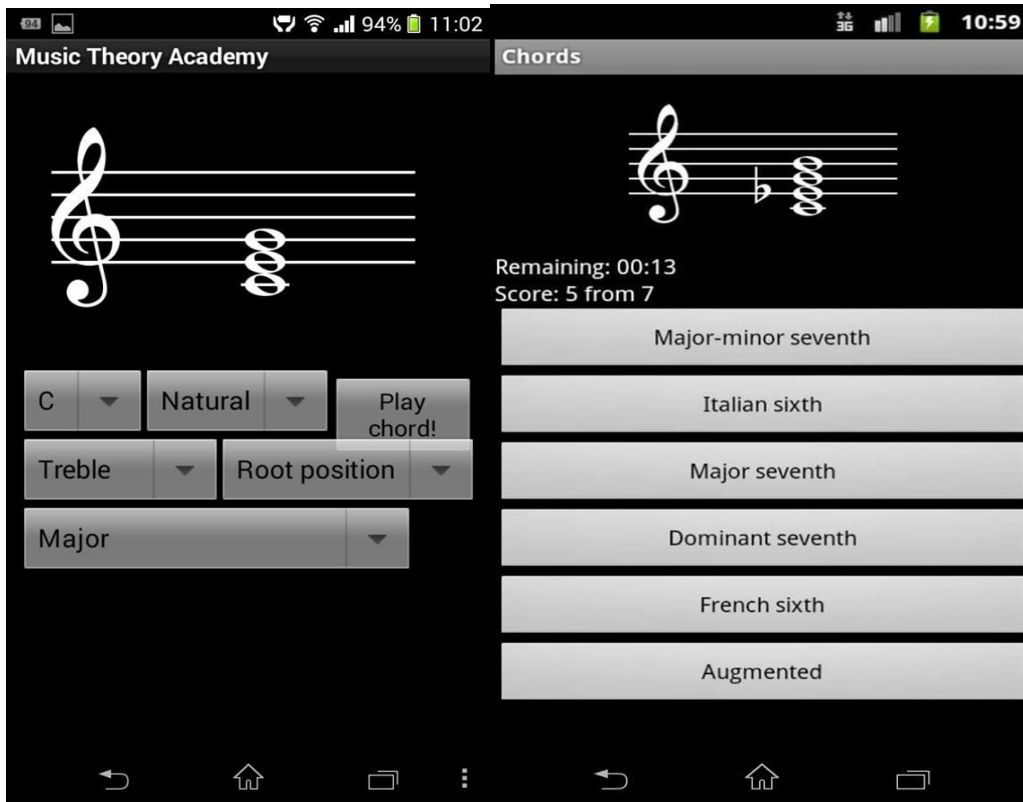


Figure 2.4: Screenshots of Music Theory Academy

Music Theory Academy is a mobile application for standard chords, intervals and key signatures practices. The development of the app is supervised by a musicologist. It contains simple interface, music theory reference and quiz. The main functionality of Music Theory Academy Basic is to test the user knowledge and speed with quizzes, such as chords quiz, intervals quiz, and key signatures quiz. However, it does not have quiz difficulty setting which allow user to choose the difficulty of the quiz. It contains a lot of difficult music theory exercises. Thus, beginner is not recommend to use this app due to high difficulty of music theory exercises.

CHAPTER 2: LITERATURE REVIEW

2.1.5 C-Sharply



Figure 2.5: Screenshots of C-Sharply

C-Sharply is a mobile application that provide ear, music theory and sight reading practices. The user can choose three different kind of practices which are treble clef only, bass clef only or both treble clef and bass clef (also called as mixed clef). Challenge practices can be found in C-Sharply with five different exercises, such as note identification, chord identification, major key signature identification, generic interval identification and specific interval identification.

CHAPTER 2: LITERATURE REVIEW

2.2 Critical Remarks

2.2.1 System Comparison

Table 2.1: Table of application criteria comparison

Criteria	Music Theory Lessons FREE	ScaleNet	Perfect Ear	Music Theory Academy	C-sharply	EPL
Music Theory Lesson	✓			✓		✓
Listening Practice			✓		✓	
Sight Reading Practice		✓		✓	✓	✓
Store Previous Record			✓		✓	✓
Show Correct Answer			✓		✓	✓
Chord Learning Method			✓		✓	✓
Suitable for beginner	✓	✓	✓		✓	✓

CHAPTER 2: LITERATURE REVIEW

2.2.2 Criteria Explanation

Table 2.2: Table of Criteria Explanation

Criteria	Elaboration
Music Theory Lesson	The application contains music theory chapter such as staff, clefs, ledgers, note duration, measures and time signature, and more.
Listening Practice	The application contains ear training exercises.
Sight Reading Practice	The application contains music sight reading training exercises.
Store Previous Record	The application can store the highest marks of each practice for future reference.
Show Correct Answer	The application will show the correct answer to user if the user answer wrongly in practices.
Chord Learning Method	The application will use chord learning method to learn piano instead of using traditional method.
Suitable for Beginner	The application is suitable for beginner user.

CHAPTER 2: LITERATURE REVIEW

2.2.3 Advantages and Disadvantages of System

Table 2.3: Table of Advantages and Disadvantages of System

Advantages	Disadvantages
------------	---------------

Music Theory Lessons FREE	<ul style="list-style-type: none"> - Easy to use - Suitable for beginner - Slide by slide lesson 	<ul style="list-style-type: none"> - No background music - No voice-over functionality - No exercises provided
ScaleNet	<ul style="list-style-type: none"> - Good interface design - Easy to use - Clear instruction manual 	<ul style="list-style-type: none"> - Does not provide piano practices - No background music - No correct answer given
Perfect Ear	<ul style="list-style-type: none"> - Easy to use - Clear instruction manual - Able to create own exercise 	<ul style="list-style-type: none"> - Answer given was not clear
Music Theory Academy	<ul style="list-style-type: none"> - Details reference provided - Chord quiz provided 	<ul style="list-style-type: none"> - Hard to use - Not suitable for beginner - No correct answer given - No background music
C-sharply	<ul style="list-style-type: none"> - Easy to use - Provide clear answer and explanation - Suitable for beginner - Provide different difficulty of practices 	<ul style="list-style-type: none"> - No reference provided - No piano practice exercise
CHAPTER 2: LITERATURE REVIEW		
	<ul style="list-style-type: none"> - Good interface design 	

2.2.4 Comparison Analysis

There are two applications **contain music theory lesson** which are Music Theory Lessons FREE and Music Theory Academy. User can use both of the music app to learn music theory but the difficulty of music theory for both app are different. Music Theory Lessons FREE is mainly focus on basic piano music theory and is suitable for beginner

user. On the other hand, Music Theory Academy is more focus on music theory reference and high difficulty of quizzes. User need to understand the basic concept of music theory in order to learn effectively by using Music Theory Academy app. However, both of the applications does not provide voice-over functionality for the lessons.

ScaleNet, Music Theory Academy and C-Sharply **provide sight reading practice**. User can enhance their sight reading skill, which is used for read the music sheet and play piano at the same time, to play piano more smoother and without hiccup.

Perfect Ear and C-Sharply **provide listening reading practice** to user which allow user to hear and listen and answer the question according to the piano sound played from app. The different between Perfect Ear and C-Sharply is user can press ‘repeat’ button to hear the question again but C-Sharply will play the piano sound once only and user must answer the question afterward. So, C-sharply user must listen to the piano sound played carefully when the practice started and if the user miss to hear the sound played, user will unable to answer the question correctly.

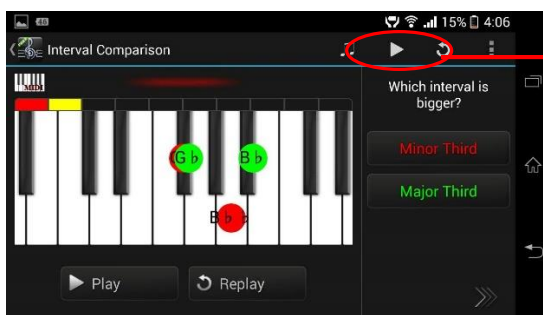
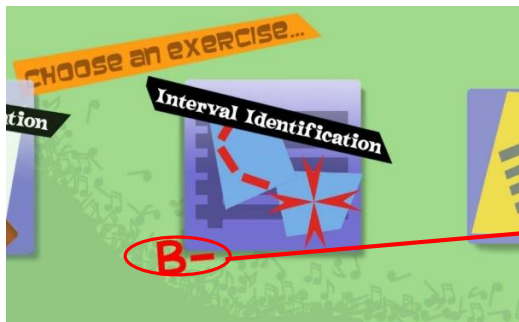


Figure 2.6: Screenshots of Perfect Ear

CHAPTER 2: LITERATURE REVIEW

Perfect Ear and C-Sharply **contain storing and retrieving previous record feature**, which allow user to check the highest marks for each exercise the user practice before. It is good to user as reference because the user can know their understanding on specific lessons based on the highest marks record. Nonetheless, ScaleNet and Music Theory Academy does not provide this feature. Thus, user cannot review back their previous records on practices whether they are doing better this time or worse. User needs to manually write down their precious record on a paper and it is troublesome.

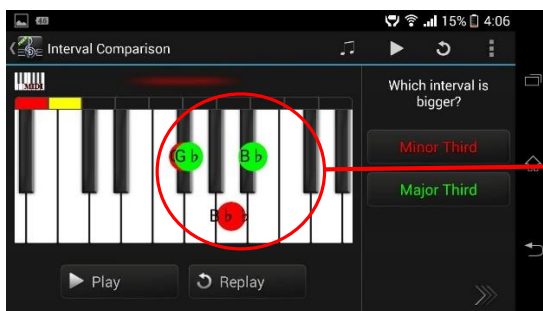


User can check the highest marks record at practice selection menu.

Figure 2.7: Screenshots of C-Sharply

Perfect Ear and C-Sharply **provide correct answer** to user immediately if user answer wrongly so the user will not make the same mistake again and again, which will improve the learning pace and allow user study and practice the music theory question effectively. On the other hand, for ScaleNet and Music Theory Academy, if the user answer wrongly, the application will not show the correct answer and it is not allow user proceed to next question. The user need to select the correct answer in order to continue to next question, which means that the user cannot proceed to next question unless the user answers the question correctly or times out. This is a bad practice for beginner user because the user cannot learn music theory effectively due to no correct answer is given when the user answer wrongly.

CHAPTER 2: LITERATURE REVIEW



Green color represents correct answer and red color represents wrong answer.

Figure 2.8: Screenshots of Perfect Ear

Most of the application are **suitable for beginner** user except Music Theory Academy. Music Theory Lessons FREE, ScaleNet, Perfect Ear, and C-sharply need very basic

music and piano knowledge and user can use those application without any problem as well as practice and quiz in the app. Music Theory Academy does not provide music theory level for beginner to learn music and piano theory because user needs to know some basic music theory in order to use Music Theory Academy application.

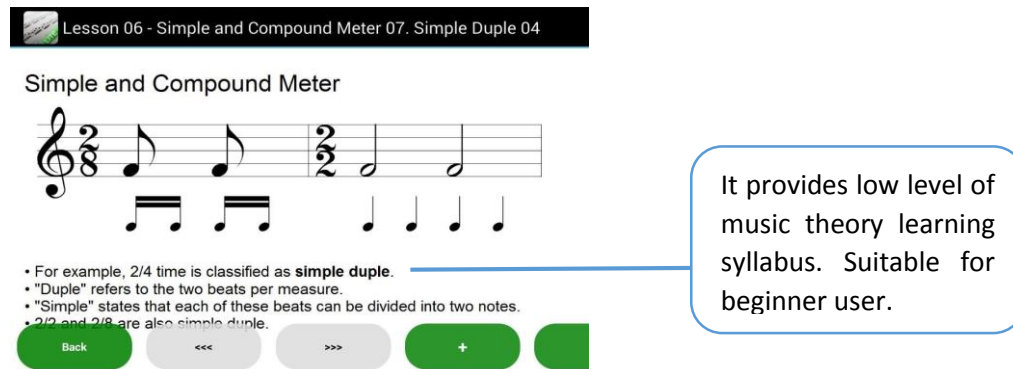


Figure 2.9: Screenshots of Music Theory Lessons Free

CHAPTER 2: LITERATURE REVIEW

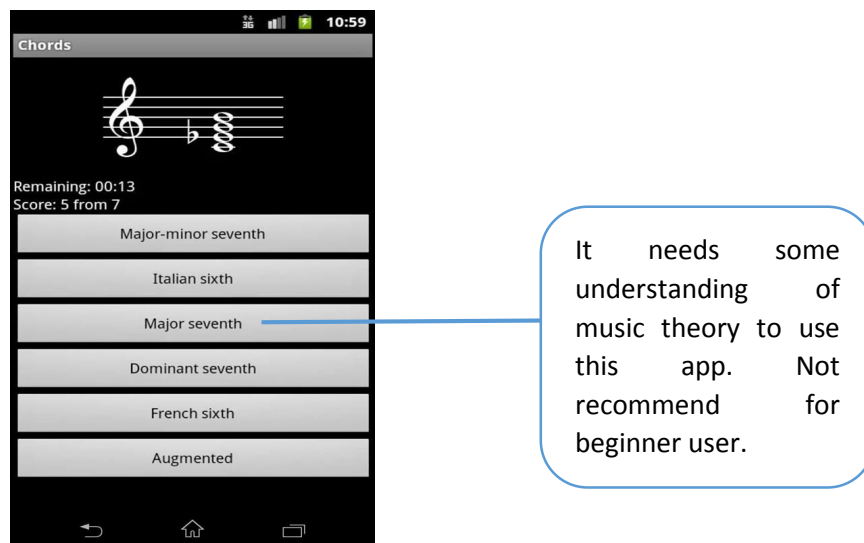


Figure 2.10: Screenshots of Music Theory Academy

For Perfect Ear and C-Sharply application, it has its unique purpose which provide a variety of some basic music theory lessons for user in **chord and key learning method**. If compare to Eterno Music Centre current problem, which lack of suitable teaching syllabus in mobile application, Perfect Ear and C-Sharply provide well-suited piano syllabus and lessons for students to learn chord learning method and practice piano

effectively. Based on the music note given from question, user need to select and answer the correct pitch or choices. However, it does not provide user to answer the correct key through piano key.

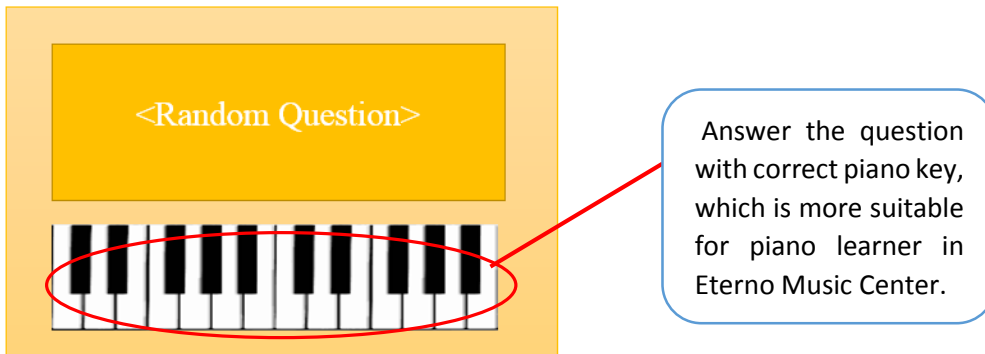


Figure 2.11: Screenshot of EPI

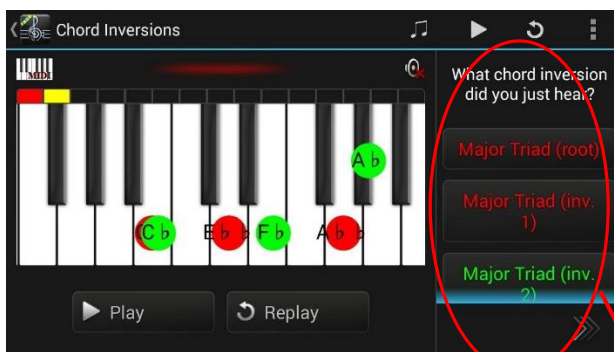


Figure 2.12: Screenshots of Perfect Ear Quiz



Figure 2.13: Screenshots of C-Sharply Quiz

Chapter 3: Method/Technologies Involved

3.1 Methodology

This project will implement Prototyping Methodology as software development methodology, which works on a prototype, tested and then reworked and modified according to the feedback of the clients, what need to be added, and what should be removed. The basic idea of prototyping methodology is to build a prototype before a design or coding can proceed. It ensures that the end users constantly work with the system to minimise the misunderstanding of requirements of the desired system.

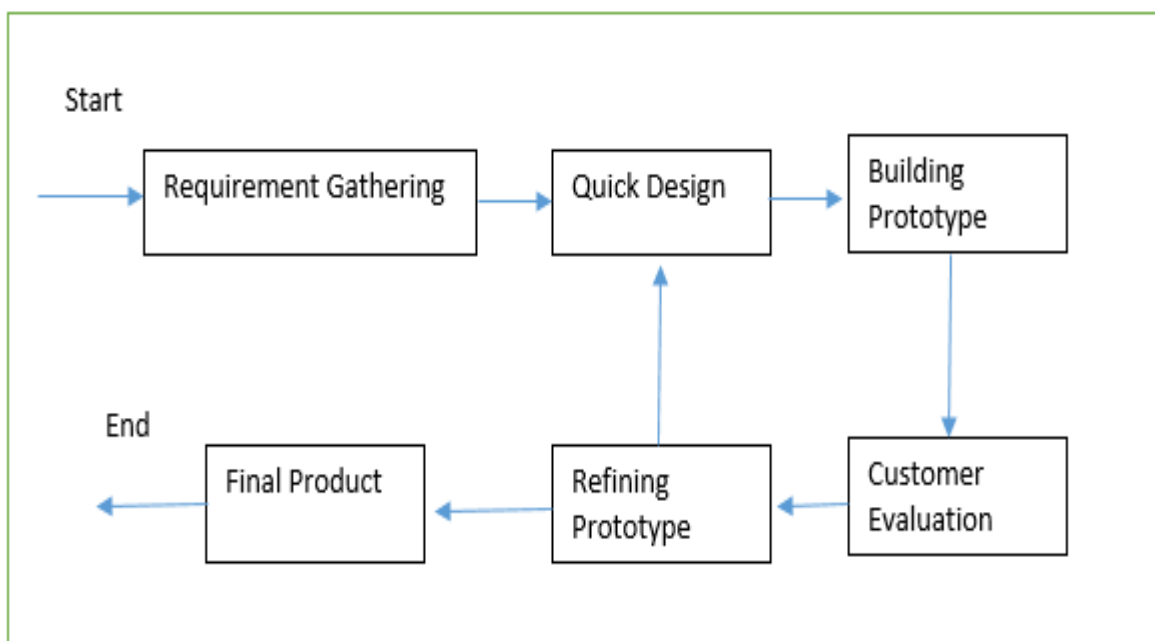


Figure 3.1.1: Flow of prototyping methodology

By using prototyping methodology to our project, user are actively involved in the development. We need to gather the client requirement on what they want and what they need for their music centre courses and carefully check the learning syllabus is correct, as well as the style of interface design of the system. After prototype is build and show to the user, quicker user feedback is available and missing functionality and feature can be identified easily. Overall, it can effectively **reduce risk of failure to minimum**, which means that we can easily avoid the misunderstanding on client requirements

CHAPTER 3: METHOD/ TECHNOLOGIES INVOLVED

Designing a few prototype to let client try and test the system with feedback and comments is needed to make sure the requirements of the desired system is correct, especially the learning syllabus of Eterno Music Center. The first prototype is constructed from the preliminary design and let user to try and test. The second prototype is constructed by modifying the first prototype based on the feedback of client to produce a better and satisfied prototype. The preceding steps are iterated as many times as necessary, until the clients are satisfied on the final prototype represents as final product.

EPL will build and release apk format file to user for installing the application in android OS phone. Eterno Music Centre students can download the piano learning mobile app into their smartphone or tablet to practice by copying the apk file into their smartphone or download it through Google Play.

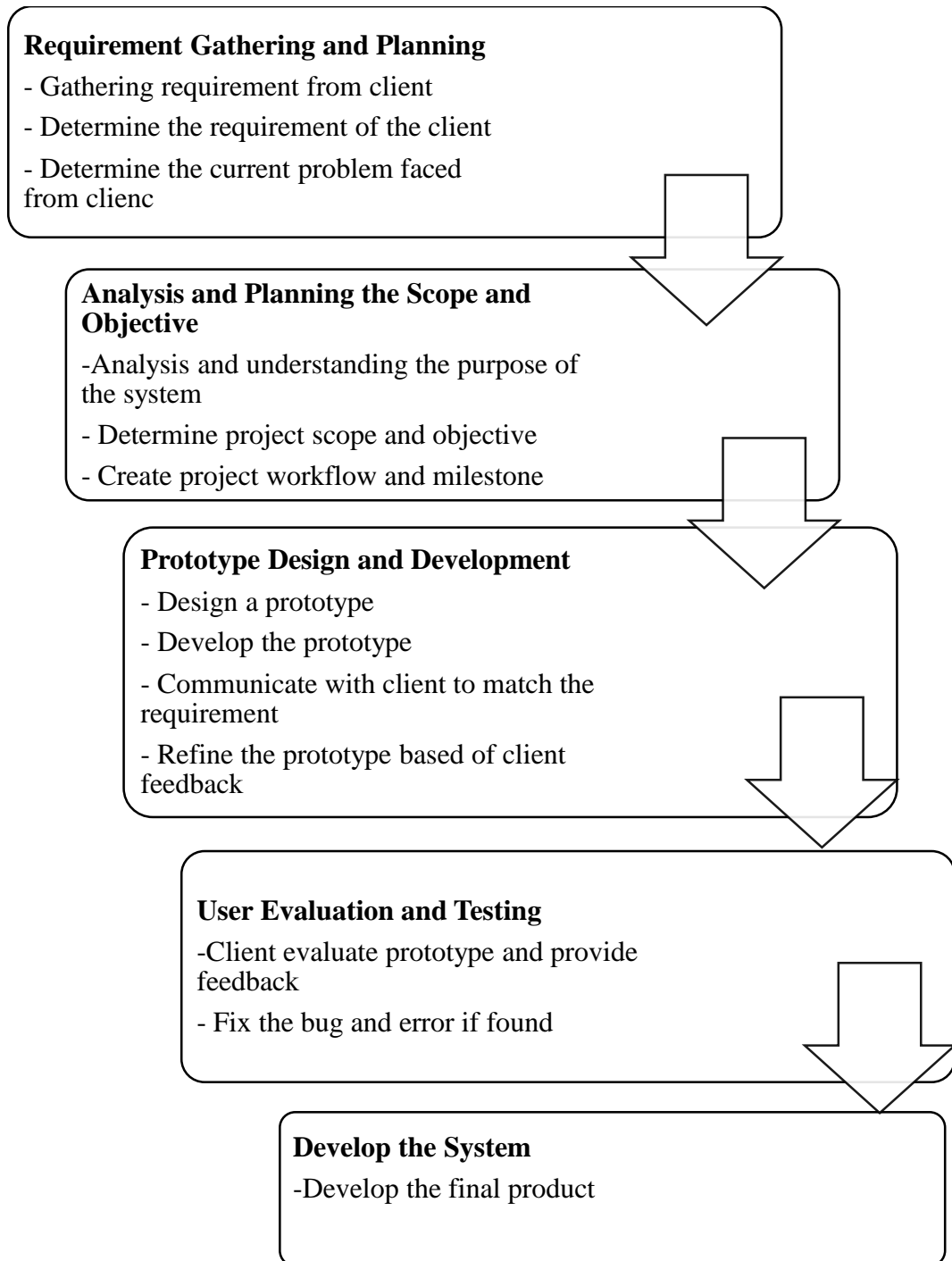


Figure 3.1.2: Flow of prototyping methodology in Detail

3.2 System Requirement

3.2.1 User Requirement

- User should be able to view and read different type of piano lesson
- User should be able to choose two types of piano exercise question which are timed-mode practice and marathon-mode practice.
- User should be able to select different practise style which are practice mode and challenge mode.
- User should be able to select the practice option from practice mode
- User should be able to select the challenge question from challenge mode selection list.
- User should be able to configure such as toggle on or off the background music, sound effect and erased current stored data.
- User should be able to view the current score of the practice while the quiz ended.
- User should be able to view the current high score of the practice while the quiz ended.
- User should be able to view every quiz type score details.

3.2.2 Functional Requirement

- The system shall allow user to choose the piano lesson they want to learn from lesson selection menu.
- The system shall provide some voice teaching method from piano lesson.
- The system shall allow user to select timed-mode practice question and marathon-mode practice question.
- The system shall provide two different mode of piano practice which are normal mode and challenge mode.
- The system shall allow user to select their question option.
- The system shall allow user to make configuration on the music application settings such as toggle on or off the background music, sound effect and erased current stored data.
- The system shall store current score of the practice while the quiz ended.
- The system shall store current high score of the practice while the quiz ended.
- The system shall allow user to view score details for each quiz type.

- The system stores the highest score for each types of challenges and exercises in database.
- The developer can maintain and update the system by reinstall the current system.

3.2.3 Non-Functional Requirement

- Performance: The response time of the system must be fast and smooth.
- Reliability: No error will encounter while user is using the application.
- Ease of use: A good design interface should be constructed with easy control and friendly user interface.
- Accurate: Suitable learning syllabus of music lessons and correct answers from exercises should be provided in the application.’

CHAPTER 3: METHOD/ TECHNOLOGIES INVOLVED

3.3 Software and Hardware Requirements

3.3.1 Software Requirements

- Eclipse Luna

An open source IDE, mostly provided in Java, used for create mobile application activity with Android SDK plug-in

- Android Studio 1.3

Android Studio is an official IDE for Android application development and it is suitable for Android developer to develop Android version of app with flexible Gradle-based build system.

- Adobe Flash Professional

A multimedia authoring software used to create mobile application and other embedded devices

- Adobe Photoshop CS6

A design software used to create or edit bitmap graphic.

- Audacity 2.0.2

An open source sound editor to record voice-over and sound effect.

- Visual Paradigm /Microsoft Project

A program that used to document and organise chart, procedure and system.

3.3.2 Hardware Requirements

- Personal Computer

System type: Laptop

Processor: 2.3 GHz Intel Core i5

Installed memory: 8GB 1333 MHz DDR3

- Microphone

To record voice-over narrator and sound effect

- Smartphone

Model: Sony Xperia V

Android Version: 4.3 Jelly Bean

CHAPTER 3: METHOD/ TECHNOLOGIES INVOLVED

3.4 Implementation Issues and Challenges

There are several issues and challenges faced during the implementation of this project. One of the most challenge issue is the changes of IDE of the development tool. Google announced that Eclipse Android Developer Tools will ended their support at the end of

April 2015 after Android Studio 1.2 released and announced by Google itself. The first preview of Android Studio 1.2 was fairly unusable and many bugs and errors can be found from Android Studio 1.3. So, EPL project will be developed with Eclipse IDE tools. However, after announcing a new patch and new version of Android Studio at the end of July 2015, which is Android Studio 1.3, Android's own developer site advises to stop using Eclipse and move to Android Studio. In short, choosing which IDE tools to develop EPL project is one of the problem during the implementation of this project.

For EPL application system, it is an android application and does not support other platform such as iOS platform. If any user is willingly to use EPL in their smartphone or tablet, he or she needs to have an android platform mobile device in order to install and run the application. Challenge appears when deciding which platform should we focus, or we focus on other main platform which are android, windows phone, iOS and blackberry platform. As a result, we decide to develop an android m-leaning application due to many user owns android platform mobile device in Malaysia.

Another issue about EPL is language used. EPL is a English language mobile application and it does not have other language in EPL such as Malay language and Chinese language. English is global language and the learning syllabus in Eterno Music Centre is using English language terms to understand the music term and theory. So, selecting English language as the main language in EPL is the best choice.

We faced challenge while designing EPL interface. To provide the best view performance of the application, EPL support horizontal view instead of vertical view. The main view of the screen is horizontal view, which means user must rotate their mobile device while using EPL. When loading the page in vertical view, EPL application will switch to horizontal view and user must use EPL in horizontal view to play this application.

3.5 Timeline

Task Name	Duration	Start	Finish
Planning	9 days	Mon 12/1/15	Thu 22/1/15
Identify Project Title	1 day	Mon 12/1/15	Mon 12/1/15
Project title background study	4 days	Tue 13/1/15	Fri 16/1/15
Identify Problem Statement	2 days	Mon 19/1/15	Tue 20/1/15
Identify Project Scope and Objective	2 days	Wed 21/1/15	Thu 22/1/15
Analysis & Design	27 days	Fri 23/1/15	Mon 2/3/15
Study Music Theory Concept	7 days	Fri 23/1/15	Mon 2/2/15
Study Music Center Business Process	7 days	Fri 23/1/15	Mon 2/2/15
Review Similar System	7 days	Fri 23/1/15	Mon 2/2/15
Study the difference between Systems	7 days	Fri 23/1/15	Mon 2/2/15
Define Business Requirement	7 days	Tue 3/2/15	Wed 11/2/15
Use Case Diagram	8 days	Thu 12/2/15	Mon 23/2/15
System Flow Diagram	5 days	Tue 24/2/15	Mon 2/3/15
FYP1 Documentation Preparation	4 days	Tue 3/3/15	Fri 6/3/15
FYP1 Documentation Submission	0 days	Fri 6/3/15	Fri 6/3/15
Implementation	20 days	Mon 9/3/15	Fri 3/4/15
Coding	20 days	Mon 9/3/15	Fri 3/4/15
Bug Fixing	15 days	Mon 16/3/15	Fri 3/4/15
Testing	2 days	Fri 3/4/15	Mon 6/4/15
Evaluation	6 days	Mon 6/4/15	Mon 13/4/15
FYP1 Presentation Preparation	5 days	Mon 6/4/15	Fri 10/4/15
FYP1 Presentation	0 days	Fri 10/4/15	Fri 10/4/15
Evaluate the system	5 days	Tue 7/4/15	Mon 13/4/15
Release the application	0 days	Mon 13/4/15	Mon 13/4/15

Figure 3.5.1: Timeline of Final Year Project 1

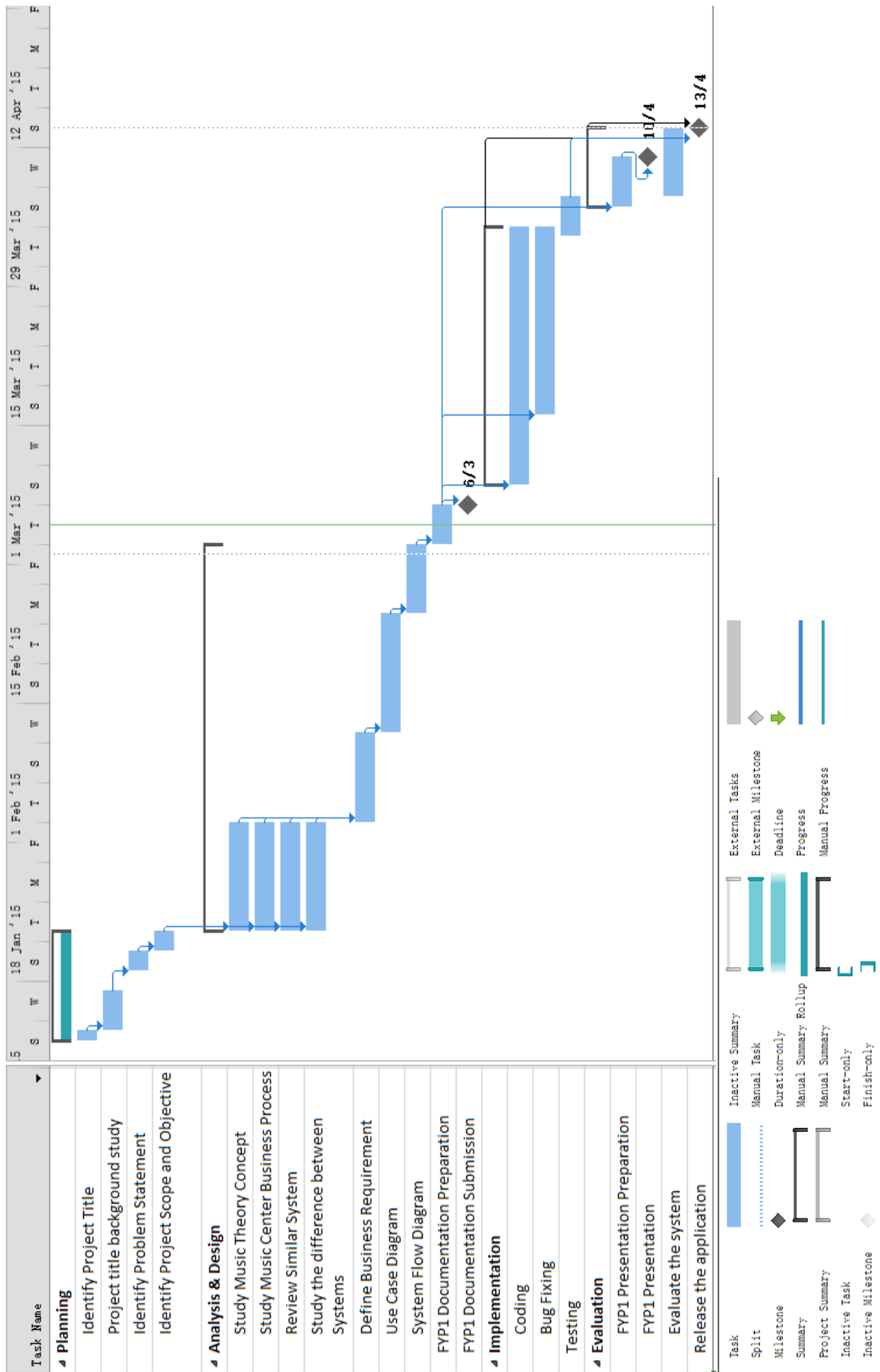


Figure 3.5.2: Timeline of Final Year Project 1

CHAPTER 3: METHOD/ TECHNOLOGIES INVOLVED

Task Name	Duration	Start	Finish
Planning	9 days	Mon 8/6/15	Thu 18/6/15
Identify Project Title	1 day	Mon 8/6/15	Mon 8/6/15
Project title background study	4 days	Tue 9/6/15	Fri 12/6/15
Identify Problem Statement	2 days	Mon 15/6/15	Tue 16/6/15
Identify Project Scope and Objective	2 days	Wed 17/6/15	Thu 18/6/15
System Prototype 1	32 days	Thu 18/6/15	Fri 31/7/15
Analysis & Design	32 days	Fri 19/6/15	Mon 3/8/15
Study Music Theory Concept	3 days	Wed 1/7/15	Fri 3/7/15
Study Music Center Business Process	2 days	Fri 19/6/15	Mon 22/6/15
Review Similar System	2 days	Fri 19/6/15	Mon 22/6/15
Study the difference between Systems	1 day	Fri 19/6/15	Fri 19/6/15
Define Business Requirement	1 day	Mon 6/7/15	Mon 6/7/15
Use Case Diagram	1 day	Tue 7/7/15	Tue 7/7/15
System Flow Diagram	1 day	Wed 8/7/15	Wed 8/7/15
Implementation	20 days	Wed 8/7/15	Tue 4/8/15
Coding	20 days	Wed 8/7/15	Tue 4/8/15
Bug Fixing	15 days	Wed 8/7/15	Tue 28/7/15
Testing	2 days	Tue 28/7/15	Wed 29/7/15
Evaluation	1 day	Wed 29/7/15	Wed 29/7/15
Evaluate the system	2 days	Wed 29/7/15	Thu 30/7/15
System Prototype 2	16 days	Thu 30/7/15	Thu 20/8/15
Analysis & Design	3 days	Thu 30/7/15	Mon 3/8/15
Identification of Errors	3 days	Thu 30/7/15	Mon 3/8/15
Solve Errors and Bugs in Design	0 days	Mon 3/8/15	Mon 3/8/15
Implementation	10 days	Tue 4/8/15	Mon 17/8/15
Coding	12 days	Tue 4/8/15	Wed 19/8/15
Bug Fixing	10 days	Tue 4/8/15	Mon 17/8/15
Testing	0 days	Mon 17/8/15	Mon 17/8/15
Evaluation	2 days	Mon 17/8/15	Tue 18/8/15
Evaluate the system	2 days	Mon 17/8/15	Tue 18/8/15
System Prototype 3	15 days	Mon 10/8/15	Fri 28/8/15
Analysis & Design	3 days	Mon 10/8/15	Wed 12/8/15
Identification of Errors	7 days	Mon 10/8/15	Tue 18/8/15
Solve Errors and Bugs in Design	7 days	Mon 10/8/15	Tue 18/8/15
Implementation	10 days	Wed 12/8/15	Tue 25/8/15
Coding	10 days	Wed 12/8/15	Tue 25/8/15
Bug Fixing	10 days	Wed 12/8/15	Tue 25/8/15
Testing	2 days	Mon 24/8/15	Tue 25/8/15
Evaluation	2 days	Tue 25/8/15	Wed 26/8/15
Evaluate the system	2 days	Tue 25/8/15	Wed 26/8/15
Release the application	1 day	Thu 27/8/15	Thu 27/8/15
FYP2 Presentation Preparation	3 days	Thu 27/8/15	Mon 31/8/15
FYP2 Presentation	0 days	Mon 31/8/15	Mon 31/8/15

Figure 3.5.3: Timeline of Final Year Project 2

CHAPTER 3: METHOD/ TECHNOLOGIES INVOLVED

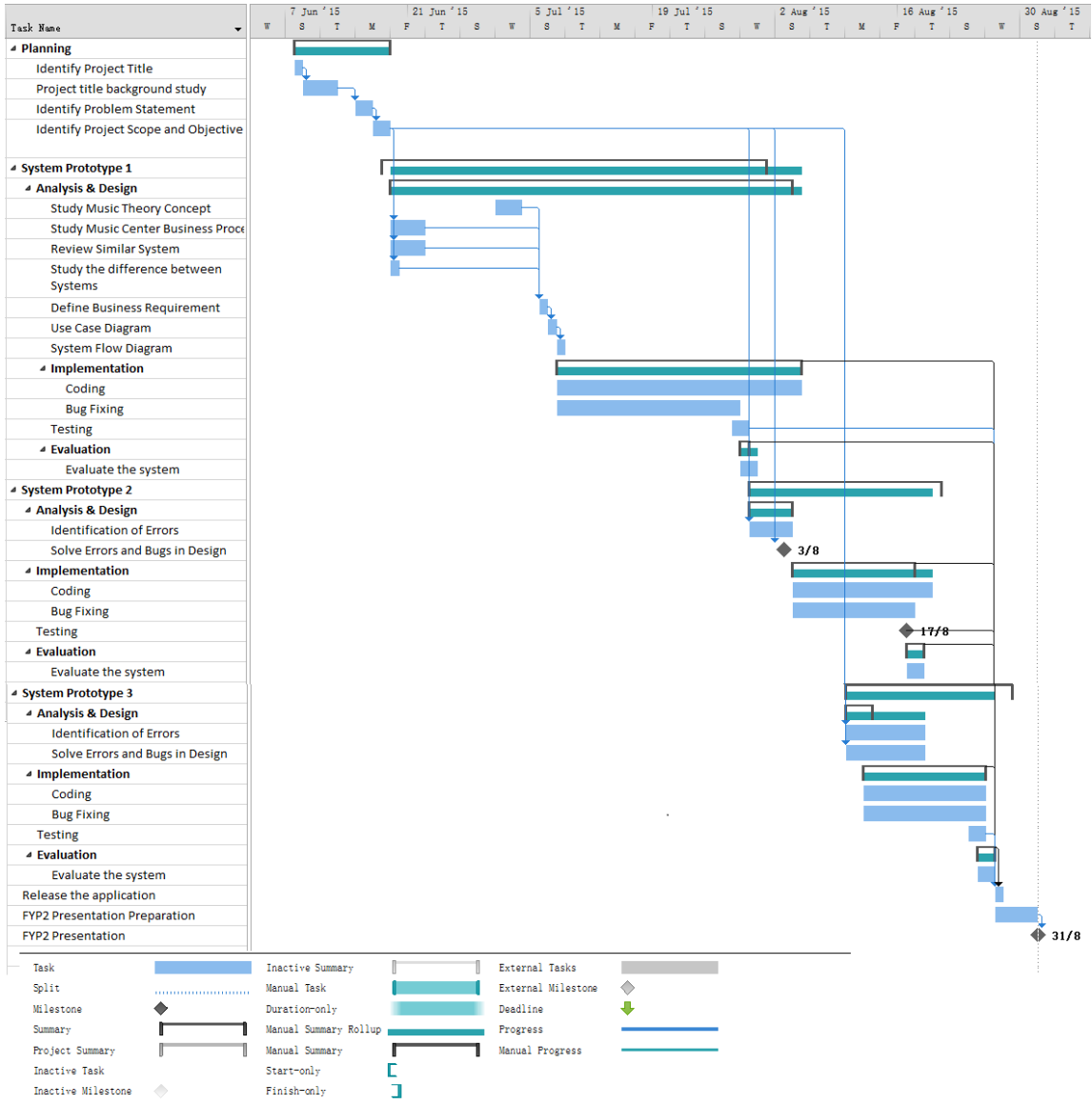


Figure 3.5.4: Timeline of Final Year Project 2

Chapter 4: System Design

4.1 Use-case Diagram

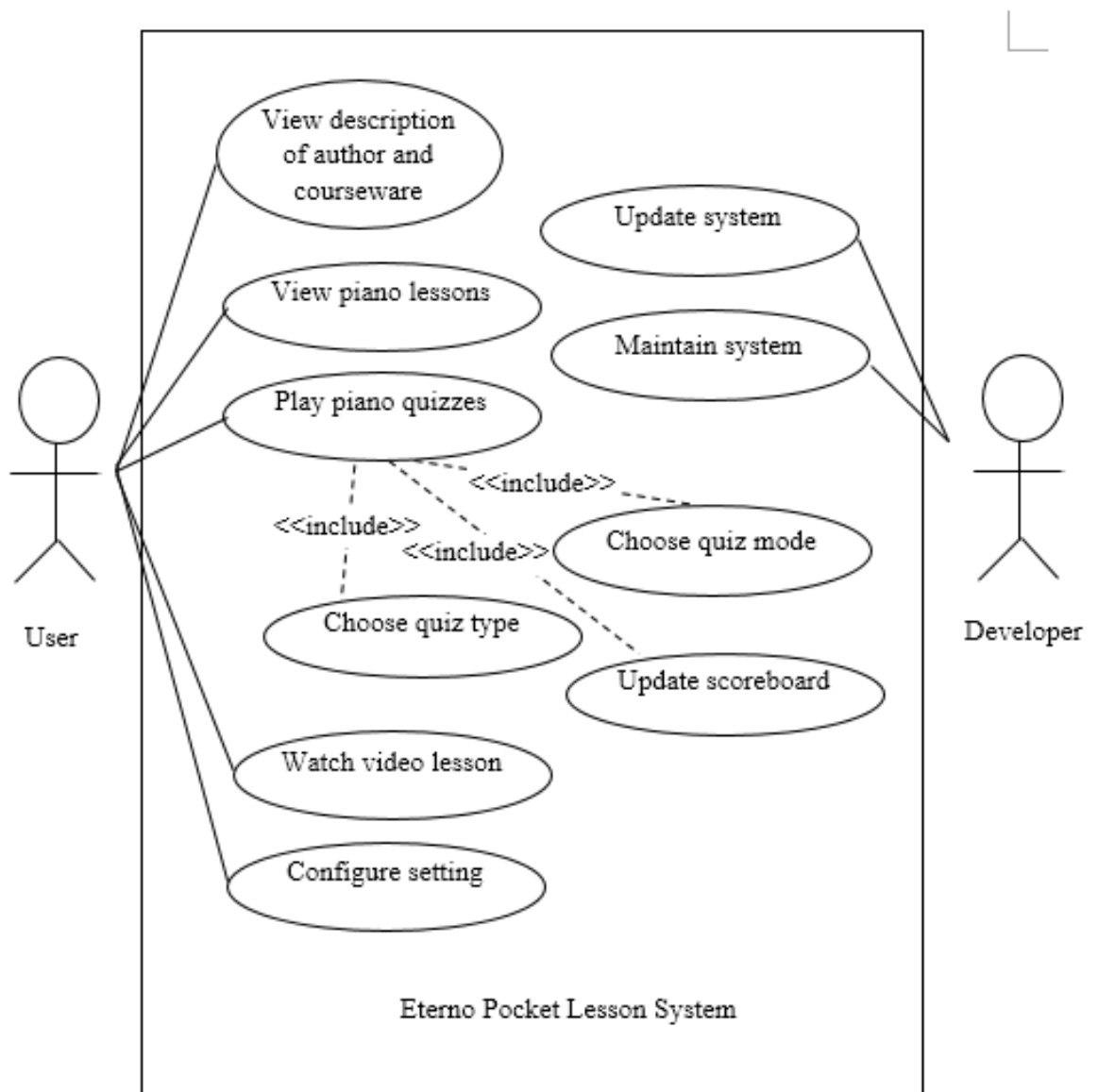


Figure 4.1: Use-case Diagram of EPL System

4.2 Use Case Description

Table 4.2.1: Use case description about view description of author and courseware

Use Case Name: View description of author and courseware	ID: 1	Importance Level: High
Primary Actor: User	Use Case Type: Details, Essential	
Stakeholders and Interests:		
User – wants to view the author and courseware details		
Brief Description:		
This use case describe how user view the author and courseware details.		
Trigger: User wants to view author and courseware details		
Type: External		
Relationships:		
Association: User		
Include: -		
Extend: -		
Generalization: -		
Normal Flow of Events:		
<ol style="list-style-type: none"> 1. User select “About us” button 2. System will change to selected activity and show the author and courseware details. 		
Sub Flows:		
Not applicable		
Alternate /Exceptional Flows:		
Not applicable		

Table 4.2.2: Use case description about view piano lessons

Use Case Name: View piano lessons	ID: 2	Importance Level: High
Primary Actor: User	Use Case Type: Details, Essential	
Stakeholders and Interests:		
User – wants to view the piano lesson		
Brief Description:		
This use case describe how user view the piano lesson		
Trigger: User wants to view the piano lesson		
Type: External		
Relationships:		
Association: User		
Include: -		
Extend: -		
Generalization: -		
Normal Flow of Events:		
<ol style="list-style-type: none"> 1. User select “Lesson” button 2. System will change to selected activity and display the lesson list provided. 3. User select the lesson they want. 4. System will display the details of selected lesson. 		
Sub Flows:		
Not applicable		
Alternate /Exceptional Flows:		
Not applicable		

Table 4.2.3: Use case description about play piano quizzes

Use Case Name: Play piano quizzes	ID: 3	Importance Level: High
Primary Actor: User	Use Case Type: Details, Essential	
Stakeholders and Interests:		
User – wants to play the piano quizzes		
Brief Description:		
This use case describe how user plays the piano quizzes		
Trigger: User wants to play the piano quizzes		
Type: External		
Relationships:		
Association: User		
Include: - Choose quiz type, Choose quiz mode, Update scoreboard		
Extend: -		
Generalization: Practise Mode, Challenge Mode		
Normal Flow of Events:		
<ol style="list-style-type: none"> 1. User select the quizzes type. 2. If user wants to practice quizzes The S -1: Practise Mode is performed 3. If user wants to challenge quizzes The S -2: Challenge Mode is performed 		
Sub Flows:		
S -1: Practise Mode		
<ol style="list-style-type: none"> 1. User select the practice quiz mode. 2. User select the practice quiz type 3. System generate quizzes according to the user selection. 4. User select the possible answer. 5. System calculate the score gained by user and display the score 6. System repeat to generate quizzes until user quit the practice mode. 		
S -2: Challenge Mode		
<ol style="list-style-type: none"> 1. User select the challenge quiz mode. 2. System search and display the list of challenge quiz type according to the mode selected. 3. User select the challenge quiz type from the list. 4. System generate and display the quizzes. 5. User select possible answer. 6. System calculate the score gained by user and display the score. 7. System end the quizzes after condition achieved. 8. System display the final score. 9. System update the score. 		
CHAPTER 4: SYSTEM DESIGN		
Alternate /Exceptional Flows:		
Not applicable		

Table 4.2.4: Use case description about watch video lessons

Use Case Name: Watch video lessons	ID: 4	Importance Level: High
Primary Actor: User	Use Case Type: Details, Essential	
Stakeholders and Interests:		
User – wants to view the piano video lesson		
Brief Description:		
This use case describe how user view the piano lesson		
Trigger: User wants to view the piano video lesson		
Type: External		
Relationships:		
Association: User		
Include: -		
Extend: -		
Generalization: -		
Normal Flow of Events:		
<ol style="list-style-type: none"> 1. User select video button 2. System load the video. 3. User play the video. 4. System start to play the video. 		
Sub Flows:		
Not applicable		
Alternate /Exceptional Flows:		
Not applicable		

Table 4.2.5: Use case description about setting configuration

Use Case Name: Configure setting	ID: 5	Importance Level: High
Primary Actor: User	Use Case Type: Details, Essential	
Stakeholders and Interests:		
User – wants to configure the settings of the application		
Brief Description:		
This use case describe how user configure the settings of the application		
Trigger: User wants to configure the settings of the application		
Type: External		
Relationships:		
Association: User		
Include: -		
Extend: -		
Generalization: -		
Normal Flow of Events:		
<ol style="list-style-type: none"> 1. User select settings button 2. System load the video. 3. User manage the settings configuration. 4. System update the configuration. 		
Sub Flows:		
Not applicable		
Alternate /Exceptional Flows:		
Not applicable		

Table 4.2.6: Use case description about update system

Use Case Name: Update System	ID: 6	Importance Level: High
Primary Actor: Developer	Use Case Type: Details, Essential	
Stakeholders and Interests:		
Developer – wants to update the system to newer version		
Brief Description:		
This use case describe how developer update the system to newer version		
Trigger: Developer wants to update the system to newer version		
Type: External		
Relationships:		
Association: Developer		
Include: -		
Extend: -		
Generalization: -		
Normal Flow of Events:		
<ol style="list-style-type: none"> 1. Developer update the system. 2. System delete the old version of application and replace and reinstall with new version. 		
Sub Flows:		
Not applicable		
Alternate /Exceptional Flows:		
Not applicable		

Table 4.2.7: Use case description about maintain system

Use Case Name: Maintain system	ID: 7	Importance Level: High
Primary Actor: Developer	Use Case Type: Details, Essential	
Stakeholders and Interests:		
Developer – wants to maintain the system		
Brief Description:		
This use case describe how developer maintain the system		
Trigger: Developer wants to maintain the performance of system Type: External		
Relationships:		
Association: Developer Include: - Extend: - Generalization: -		
Normal Flow of Events:		
<ol style="list-style-type: none"> 1. Developer found glitch, bugs or intent to insert new information (eg:lesson) to the system. 2. Developer update the system. 3. System delete the old version of application and replace and reinstall with new version. 		
Sub Flows:		
Not applicable		
Alternate /Exceptional Flows:		
Not applicable		

4.3 System Flow Diagram

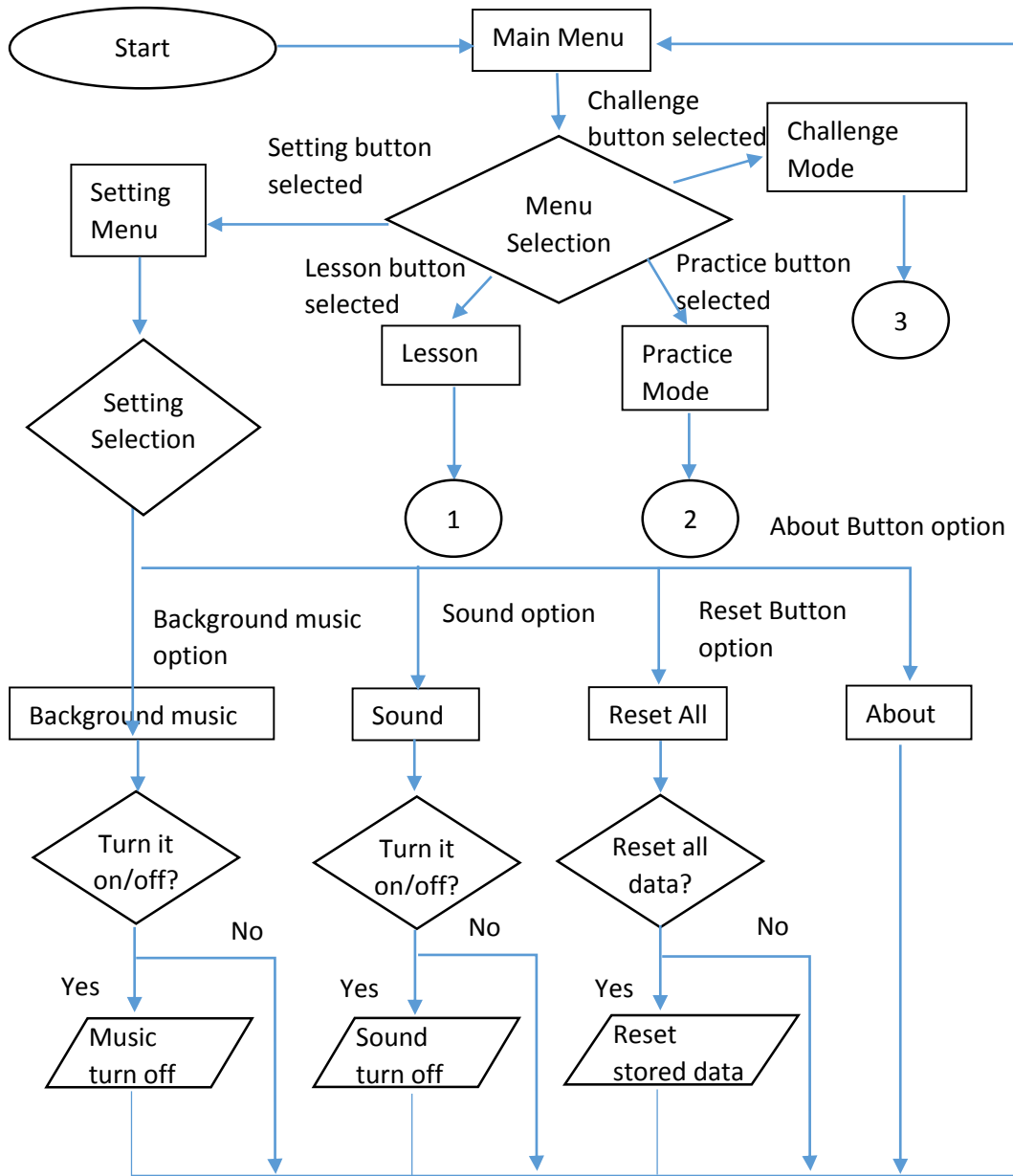


Figure 4.3.1: System Flow Diagram of EPL (part 1)

CHAPTER 4: SYSTEM DESIGN

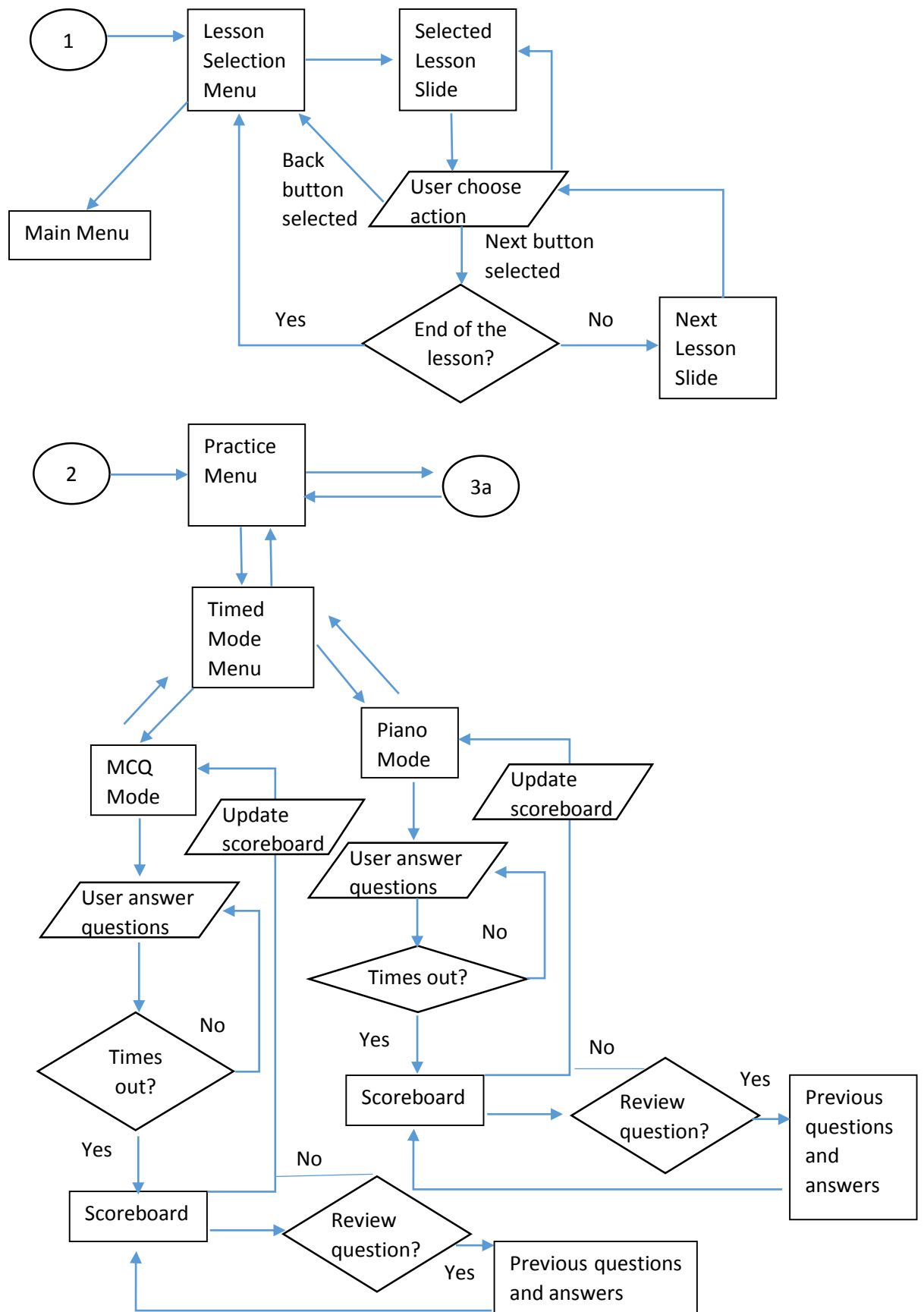


Figure 4.3.1: System Flow Diagram of EPL (part 2)

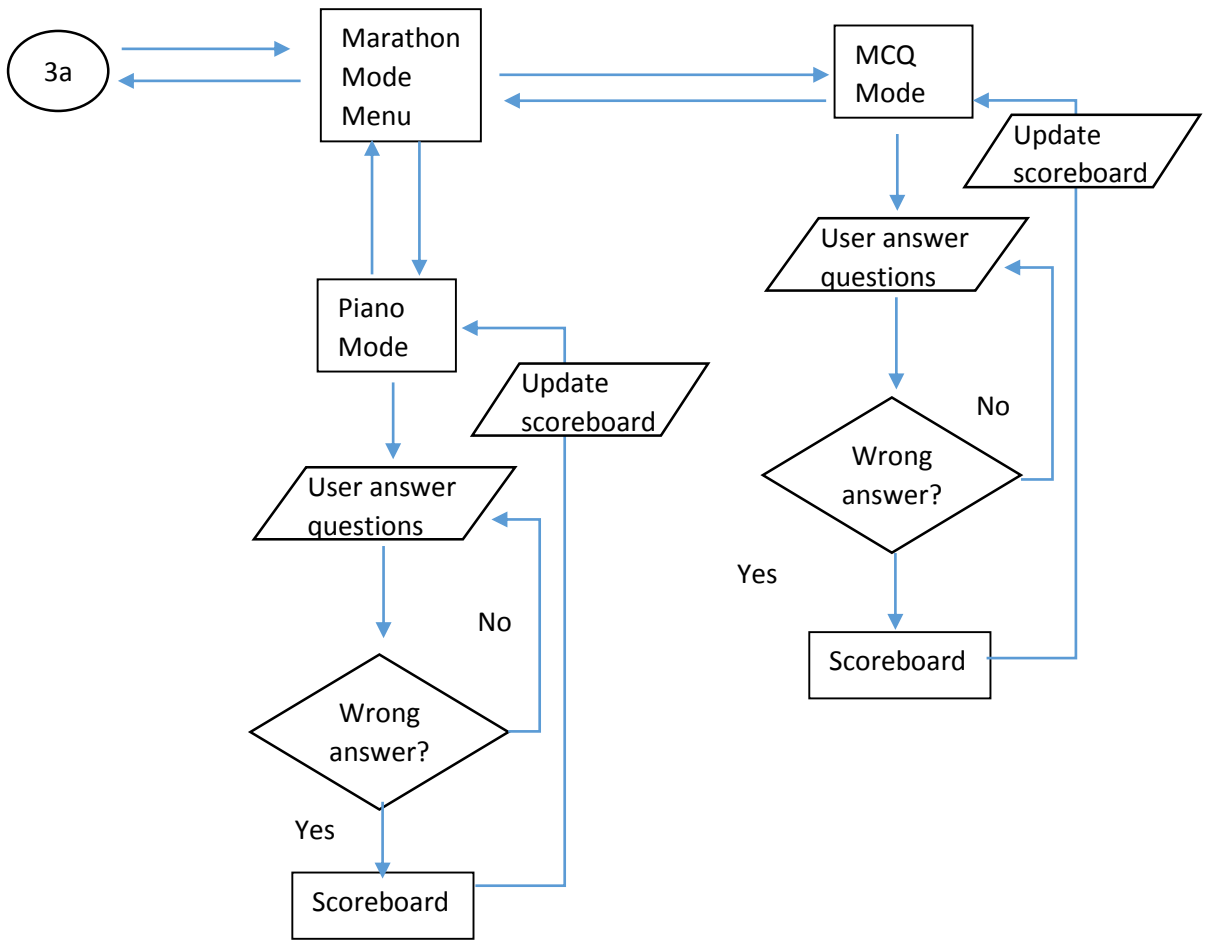
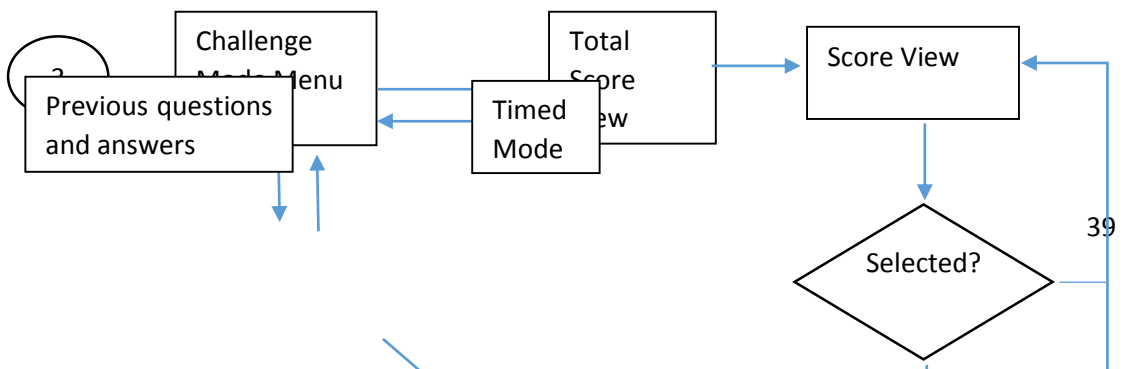


Figure 4.3.3: System Flow Diagram of EPL (part 3)



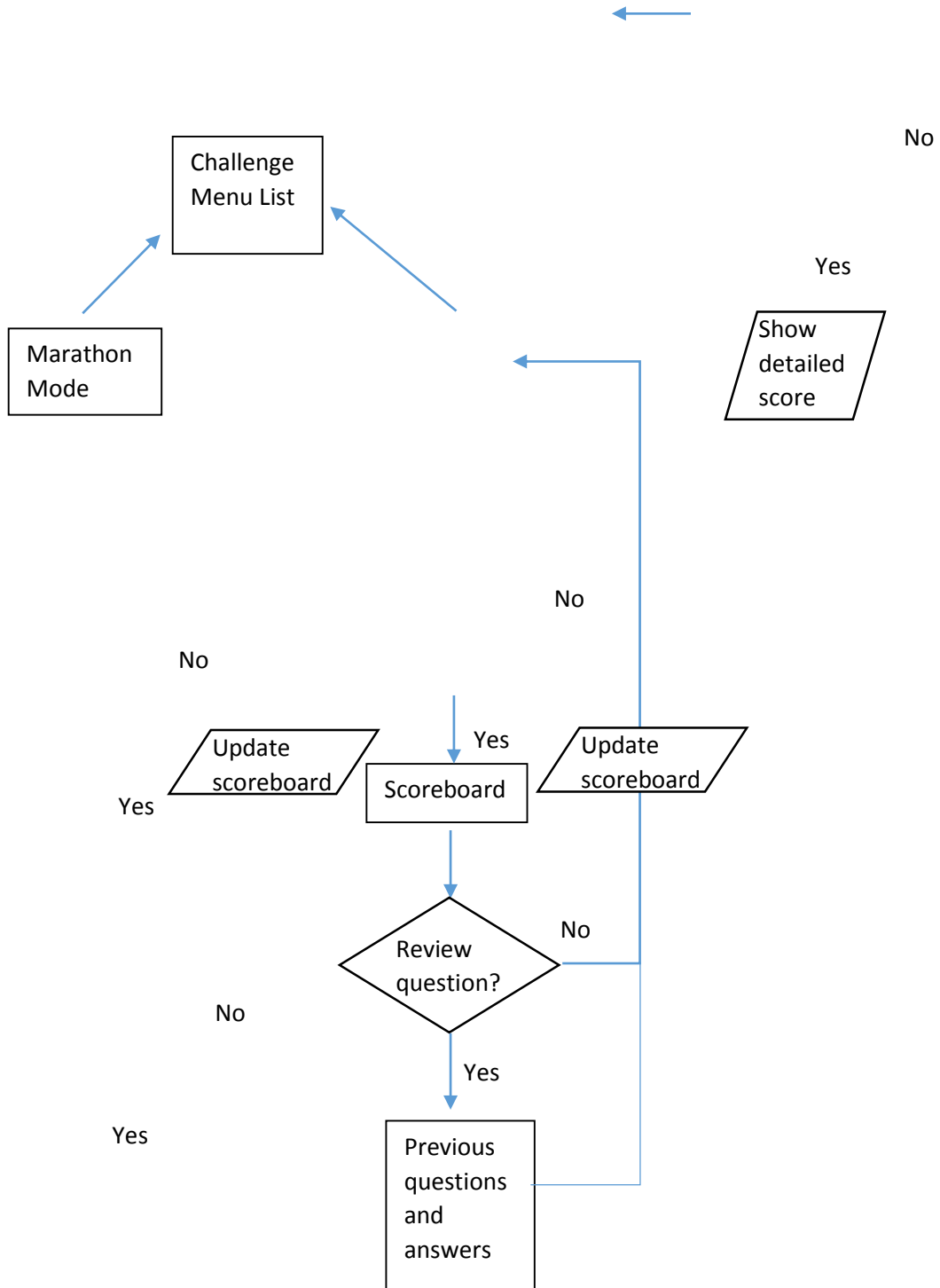


Figure 4.3.4: System Flow Diagram of EPL (part 4)

CHAPTER 4: SYSTEM DESIGN

When user starts the application, user will enter main menu of the application. User can select music lesson, practice mode, challenge mode and setting. By selecting the setting option, user can configure the background music and sound effect to turn on or off. User allows to reset the stored data in setting option also. Moreover, user can select “About” option to view the basic information about this application and developer information. After finish the configuration, user will return to main menu.

The “Lesson” button (1) will lead user to lesson selection menu, which allow user to choose which lesson the user want to learn and view. When lesson is selected and the selected lesson note is displayed, user can click “Next” button for more continuous lesson note about the selected lesson. When the lesson slide end or user clicked “Back” button, the app will jumps to lesson selection menu and user can select another lesson to learn music theory.

The “Practice” button (2) will lead user to practice mode selection menu, which allow user to practice piano skill with two mode, marathon mode and timed mode. Marathon mode and timed mode provide two types of quiz, which are multiple choice question style mode and piano key style mode.

When multiple choice question style mode is selected, user will enter to that selected question style quiz. After that, it will random generate a question for user to answer with 2 possible answers. If user select the correct answer, the next question will random generate until the user click “Back” button. If user select the wrong answer, it will shows the correct answer to user and the next question will random generate after user finish checking the answer. User need to click “Back” button to return to practice mode menu for more type of listening practice.

When piano key question style mode is selected, the application will bring user to piano key question style quiz which will random generate a question for user to answer with a piano key set with 12-key as possible answers. If user select the correct answer, the next question will random generate until the user click “Back” button. If user select the wrong answer, it will shows the correct answer to user and the next question will random generate after user finish checking the answer. User need to click “Back” button to return to practice mode menu for more type of listening practice.

When user select “Timed Mode”, user need to answer as many question as possible in limited of time. If the time given is finished, scoreboard will shows up and allow user

to review the result. Same as marathon mode, it provides two question style which are multiple choice and piano key question style. The difference between marathon mode and timed mode is timed mode contain timer which user needs to answer as many question as he or she can before timer end. If times out, it will display the total score and stop quizzes.

When user select “Challenge” mode, user is able to solve the particular challenge. Each challenge has a condition to beat and complete it. After finishing the challenge, scoreboard will shows up and lets user to review his or her result. “Review Previous Question” button if selected in scoreboard windows, it will allows user to review the questions that answered by user. If user finish checking the previous question or scoreboard, user can click “Next” button to back to the normal mode menu.

Chapter 5: System Implementation

5.1 Graphical User Interface

Graphical User Interface(GUI) is an important factor to make the app success in market. The app's user interface is everything that user can see and interact with. Thus, to attract user attention, developer must put more effort in graphical user interface and make the user interface interesting and suitable for everyone.

Layout

The layout of EPL is landscape layout, which is more suitable for piano type of mobile application due to the piano key. When the application started, EPL will display in landscape layout. EPL does not support portrait layout and it will not display any portrait layout view even user rotate their smartphone. In order to view minimum piano key with correct scale size, mobile application with portrait layout will display smaller 12 piano key while landscape layout has many screen space to display 12 piano key and the piano key can display in larger and wider scale which allow user to press more accurately and easily.

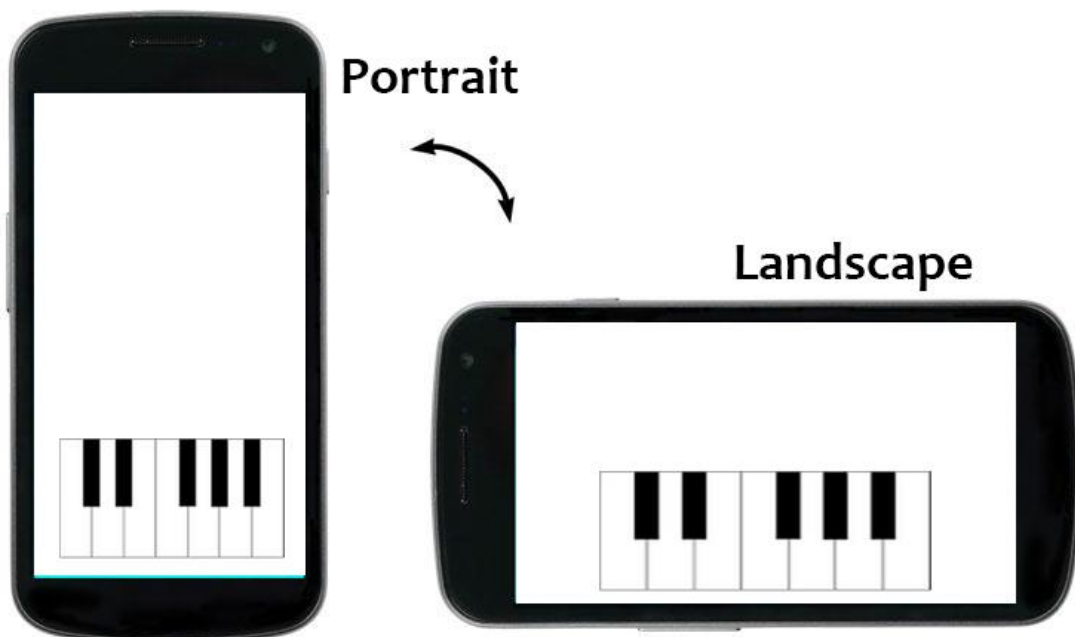


Figure 5.1.1: Portrait and Landscape of mobile application

CHAPTER 5: SYSTEM IMPLEMENTATION

Background Design

All the background images that can be seen in EPL are edited personally. First, find some suitable and clear images and material. After that edit and combine those images by using Adobe Photoshop software. Next, cropping the images, adjusting the color balance of the images, filtering and modifying layer by layer and export the picture into .jpg or .png format. Finally, import those background images into EPL and display it.

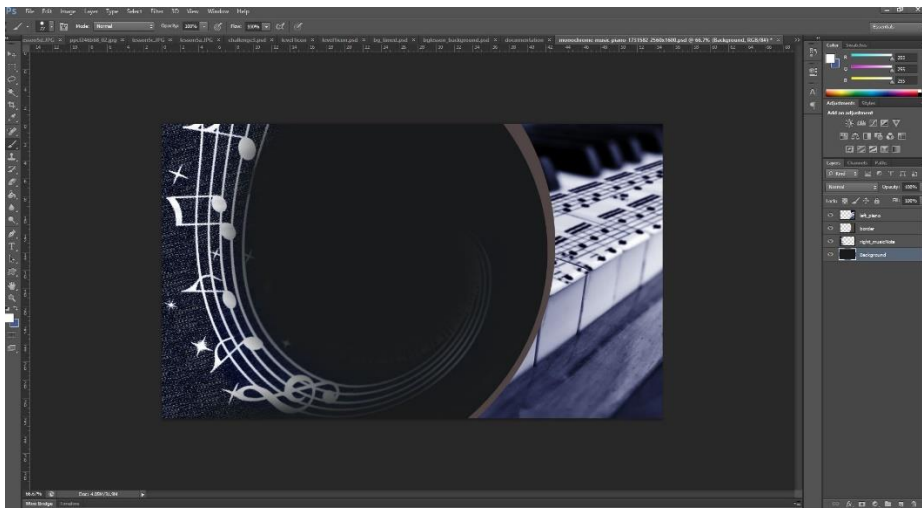


Figure 5.1.2: Background Design with Adobe Photoshop

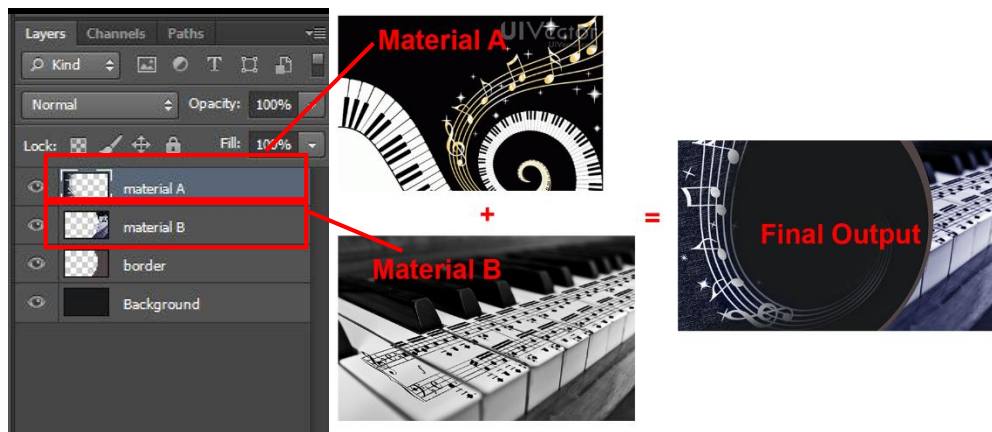


Figure 5.1.3: Design Background Image layer by layer

CHAPTER 5: SYSTEM IMPLEMENTATION

Button design

For button design, EPL use the combination of image button and normal button to display in EPL application. Normal button is a button that provided in android studio by default that allow developer enter text into the button. Image button is used to display a button with linking to the image resource that can be pressed or clicked by user.

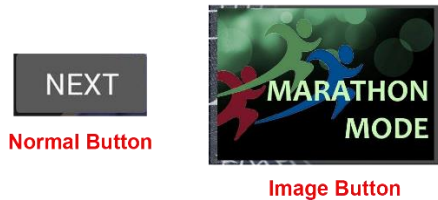


Figure 5.1.4: Difference between normal button and image button

To create an image button, designer needs to prepare the image source before starting to create image button.

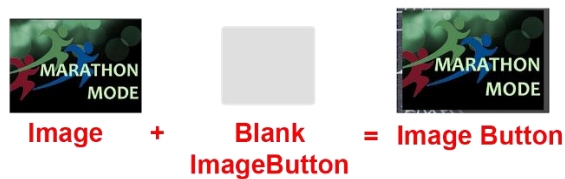
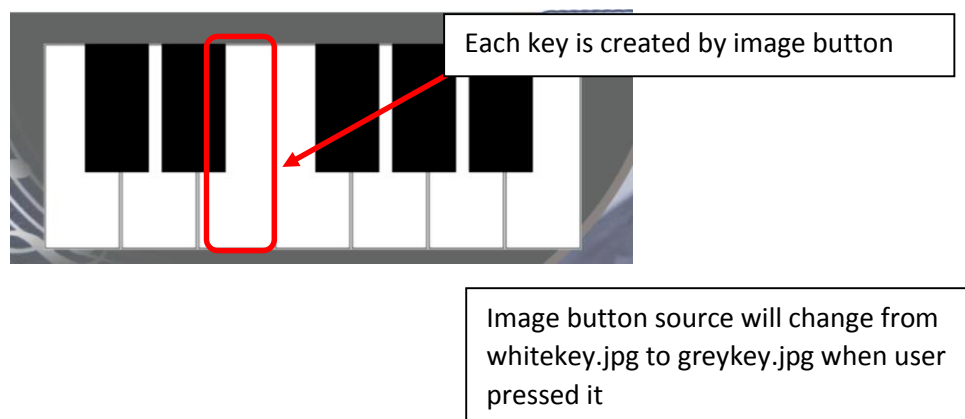


Figure 5.1.5: Combination of image and ImageButton

For piano key button design, it is created by using bunch of image button with black and white images. Designer must set the images shown based on the condition of the event such as “while pressed” or “while released”. Every single action done by user will change the source of the image button. Every single piano key will call onClick

CHAPTER 15. SYSTEM IMPLEMENTATION



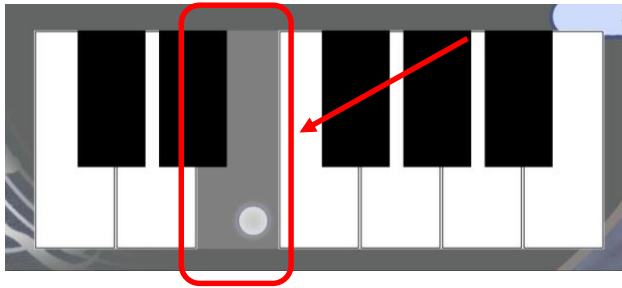


Figure 5.1.6: Difference between button pressed and button released

Text

Text is one of the most common multimedia elements in mobile application because it can transfer the meaning by using text easily and those content is viewed on a range of media of the viewer's choosing. For a smartphone user, the screen of the device is small and it limited the performance to read and view text in smartphone screen. To provide the best "typographic experience" on smartphone devices, selecting text font is a very critical step to do. In EPL application, we use sans serif as the body text font type instead of using serif font type.

A serif font type letter include some extra little stroke, little curves, at the ends of letters. A sans serif does not include any stroke and it looks cleaner.



Figure 5.1.7: Difference between sans serif font and serif font

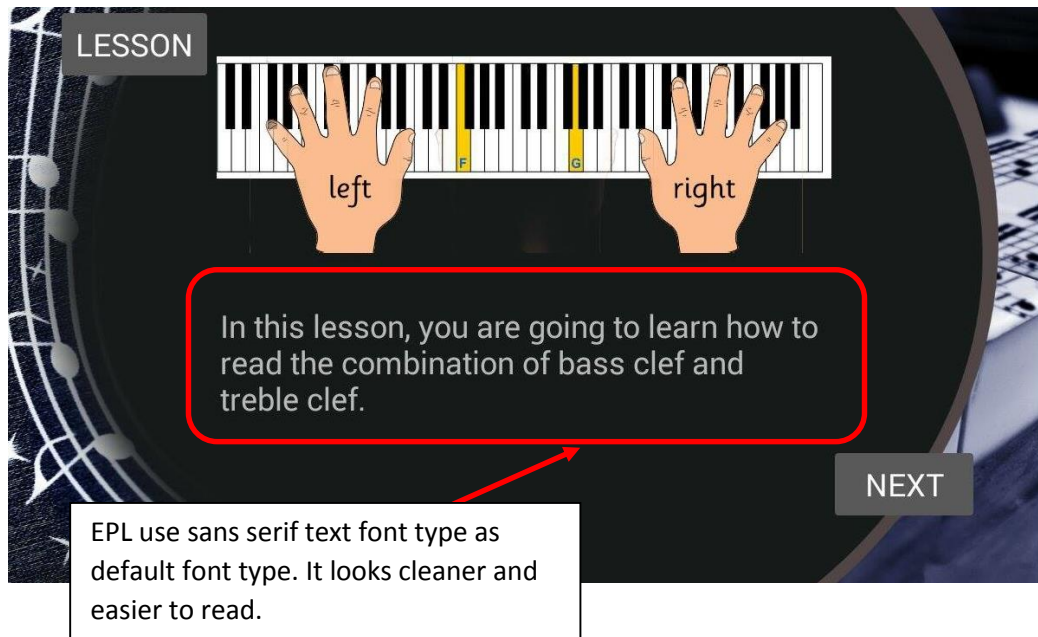


Figure 5.1.8: EPL use sans serif text font type as default font type

Sound

For piano learning application, the sound effects that used to develop are piano key sound. Each piano key sound played with a MP3 sound format when the piano key button pressed. MP3 sound format is compression, which is the main draw that made MP3 very popular because compression reduces the file size of the song, or any audio data. Lesser file size means smaller application file size, which make the MP3 as sound format the best choice to use.

CHAPTER 5: SYSTEM IMPLEMENTATION

Animation

Animation in EPL is created by using Adobe Flash software. With the help from timeline feature and frames by frames method that provided in Adobe Flash, it makes designer create animation faster and easier. After creating the animation, it will export into .gif image format.

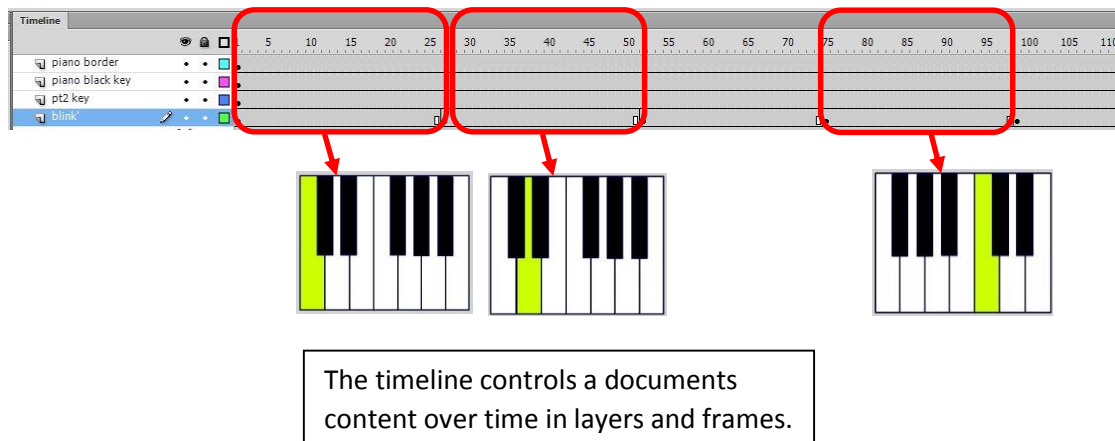


Figure 5.1.9: Create animation with timeline

CHAPTER 5: SYSTEM IMPLEMENTATION

5.2 Android API and Storage

Android API

Android provides a rich application framework that allows developer to develop android applications, which called as API(application programming interface). Before developing android application, choosing a suitable and correct targeted API level. Each API level consists of a core set of packages and classes that help developers to develop mobile application. As the API level increase, functionally adds up but some of it will deprecated.

Choosing correct API is very important because it may affect your application functionality. For example, choosing a lower API level may support more devices, even old smartphone devices, but gain less functionality such as swiping feature.

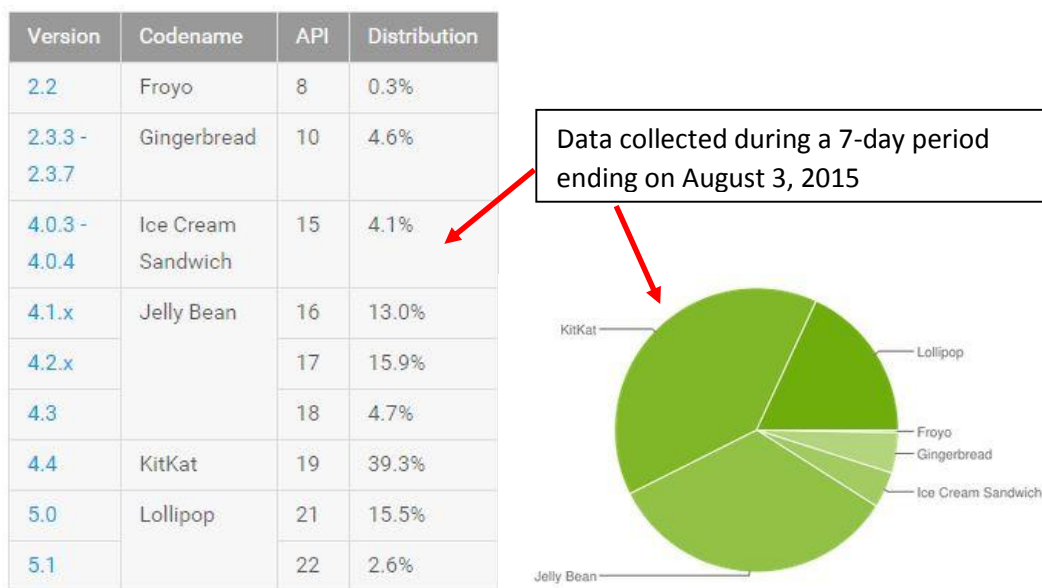


Figure 5.2.1: Android API popularity on August 3, 2015

As shown in figure above, Jelly Bean and KitKat (version 4.1 to version 4.4) of API is the most common API used for android user.

For EPL mobile application, we choose Jelly Bean as our targeted version to develop it. For Android upgrades, not all android smartphone can be upgraded. Some phones are simply too old to run modern versions of Android. Thus, selecting high and new Android version to develop is not a smart choice to do. By selecting Jelly Bean (Version 4.1.x, API 16) that announced on June 27, 2012, EPL can support most of the 3-years-old android mobile devices as Jelly Bean is not yet outdated and it still a very common Android version used by Android user.

Storage Option

Android provides many ways to store and save application data and values such as shared preferences, internal storage, external storage, SQLite Database and network connection.

Types of storage	Description
Shared Preferences	Stored private primitive data in key-value pairs.
Internal Storage	Store private data on the device memory
External Storage	Store public data on the shared external storage.
SQLite Database	Store structured data in a private database.
Network Connection	Store data on the web with your own network server.

Table 5.2.2 Type of Storage and description

For EPL application, shared preferences is chosen as storage option that allows to save and retrieve persistent key-value pairs of primitive data types. It can save any primitive data such as Booleans, floats, integer, longs and strings. Shared preferences allows a quicker and simpler access to data and it is more comfortable to use when keeping small amounts of data. EPL is a small project and all it needs is used to store score value and settings value. Thus, shared preferences is a good decision to use as storage option.

CHAPTER 5: SYSTEM IMPLEMENTATION

5.3 Printscreen and Function Description

5.3.1 Main Menu



Figure 5.3.1: Main Menu of EPL

Main Menu page will show when EPL start running. It is the first page of the apps. It shows the title of the application on top of the app. It provides the link to major module which are lesson module, practice module and challenge module.

There are 4 image button in Main Menu which are LESSON, PRACTICE, CHALLENGE and SETTINGS. Each image button will brings user to the selected module.

LESSON button will link to “Lesson Selection” activity which provide some useful lessons for beginner pianist to learn some basic music and piano theory.

PRACTICE button will link to “Practice Selection” activity which allow user to practice piano with quizzes that provided in EPL.

CHALLENGE button will link to “Challnege Selection” activity which allow user to challenge the quizzes created in EPL.

SETTINGS button will link to “Settings Configuration” activity and allow user to configure the settings of the app.

CHAPTER 5: SYSTEM IMPLEMENTATION

5.3.2 Lesson Selection Menu

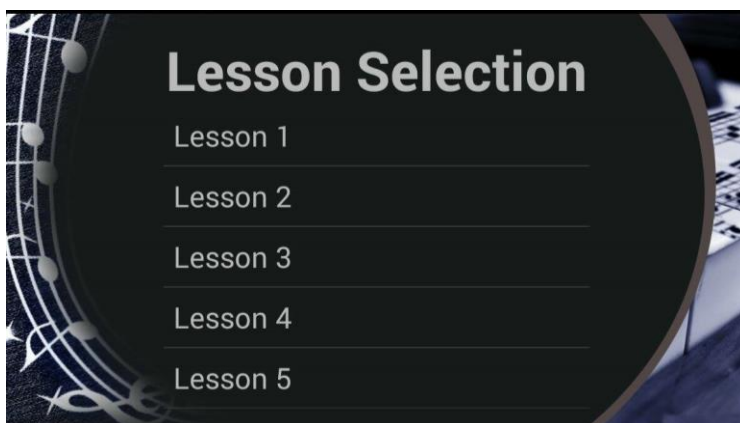


Figure 5.3.2: Lesson Selection Menu of EPL

Lesson selection menu allows user to select which lesson they wish to view in details that provided in EPL. Select any lesson will bring user to the lesson page view.

5.3.3 Lesson Page

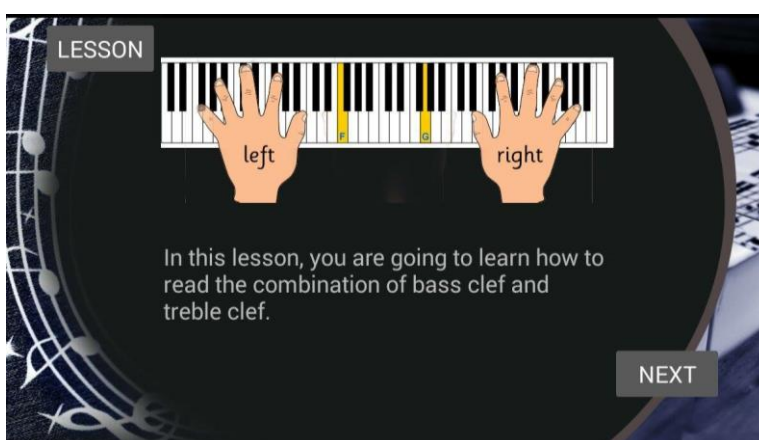


Figure 5.3.3: Lesson Page of EPL

CHAPTER 5: SYSTEM IMPLEMENTATION

After selecting any lesson from lesson selection menu, EPL will bring user to lesson page. The lesson page will load the lesson details according to the selected lesson. There are three buttons available in lesson page which are LESSON button, NEXT button and BACK button.

LESSON button will bring user return to lesson selection menu.

NEXT button will load next slide of the lesson.

BACK button will load the previous slide of the lesson.

5.3.4 Practice Selection Menu (Quiz mode selection)



Figure 5.3.4: Practice Selection of EPL

After selecting PRACTICE button from main menu, it will bring user to practice selection menu page. Practice selection menu includes two steps which are quiz mode selection and quiz type selection. Quiz mode selection will let user to choose two mode which are MARATHON MODE and TIMED MODE.

MARATHON MODE will generate quizzes that allow user to keep answering the question until user answer wrongly. No result will be shown since it is just a practice session.

TIMED MODE will generate quizzes that allow user to answer question in a limited of time. The time period in practice mode is 30 seconds. Results will display after times out.

CHAPTER 5: SYSTEM IMPLEMENTATION

5.3.5 Practice Selection Menu (Quiz type selection)



Figure 5.3.5: Practice Selection Menu Quiz Type Selection of EPL

After selecting quizzes mode which are marathon mode and timed mode, user must choose the quiz type in order to continue. There are two quiz type available in EPL, which are multiple choice question and piano key type question.

MULTIPLE CHOICE quizzes will allow user to answer the question with two possible answer.

PIANO KEY quizzes will allow user to answer the question with 12-key piano.

CHAPTER 5: SYSTEM IMPLEMENTATION

5.3.6 Practice Quiz Page (Piano Key style)

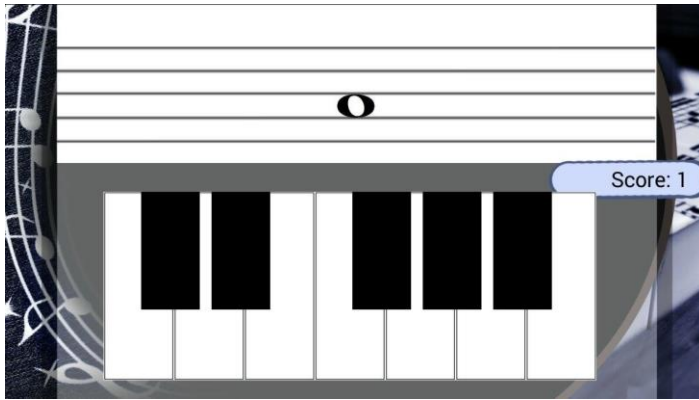


Figure 5.3.6: Practice Quiz Page with piano key style of EPL

If user select marathon mode and piano key quiz style, EPL will brings user to practice quiz page with piano key style. The question is above of the piano key, which will generate question in music sheet. Score will be recorded if user answer correctly.

5.3.7 Practice Quiz Page (Multiple Choice style)

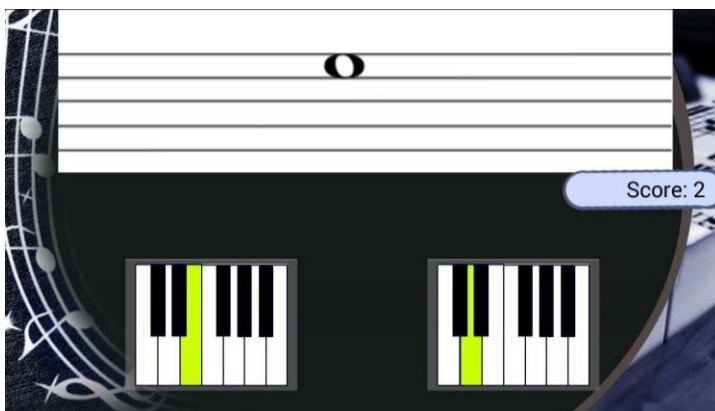


Figure 5.3.7: Practice Quiz Page with multiple choice style of EPL

CHAPTER 5: SYSTEM IMPLEMENTATION

If user select marathon mode and multiple choice quiz style, EPL will brings user to practice quiz page with multiple choice style. The question is above of the possible answer, which will generate question in music sheet. Possible answer will display as piano image with key pressed. Choose correct image according to the question generated. Score will be recorded if user answer correctly.

5.3.8 Challenge Selection Menu

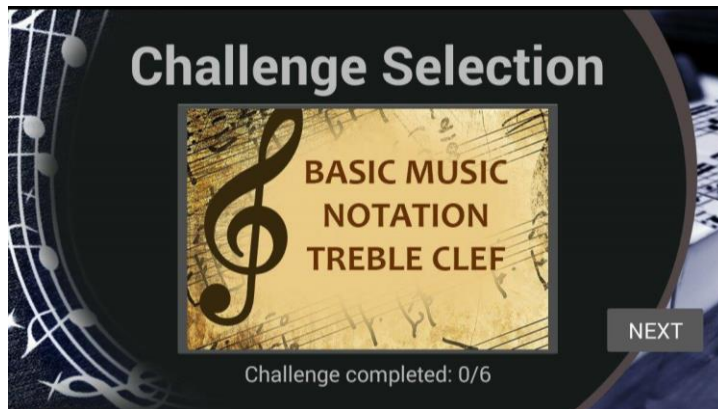


Figure 5.3.8: Challenge Selection Menu of EPL

If user select challenge mode in main menu, EPL will brings user to challenge selection page. In challenge selection page, user must choose one of the challenge title in order to continue. There are two button available which are NEXT and BACK button to view each challenge title.

CHAPTER 5: SYSTEM IMPLEMENTATION

5.3.9 Challenge Level Selection Menu

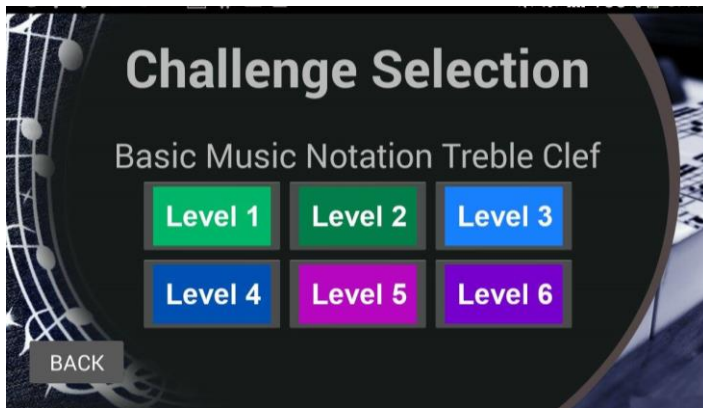


Figure 5.3.9: Challenge Selection Level Menu of EPL

After selecting challenge title in challenge selection menu, EPL will bring user to challenge level selection menu. Each challenge has different level. The higher the level, the harder the question and the question type is different for each level. Pressed BACK button will lead user back to challenge selection menu.

5.3.10 Challenge Quiz

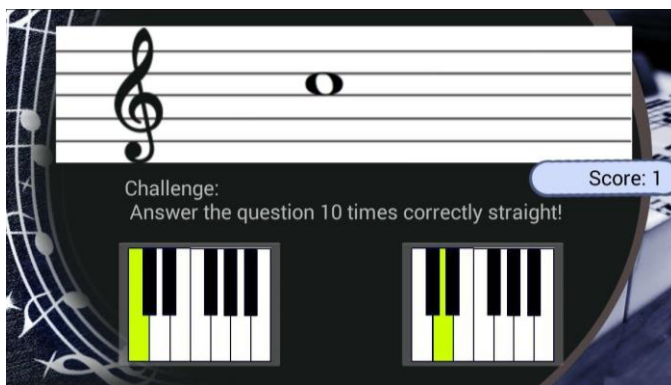


Figure 5.3.10: Challenge quiz of EPL

CHAPTER 5: SYSTEM IMPLEMENTATION

After selecting challenge title and challenge level, it will lead user to the challenge quiz page. Before the quiz started, it will display challenge description and condition to complete the particular challenge. If user complete the challenges, score will be recorded and updated.

5.3.11 Settings Configuration Menu

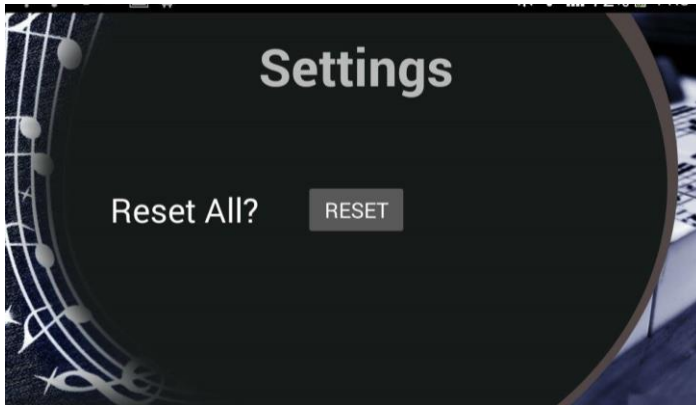


Figure 5.3.11: Setting Configuration Menu of EPL

Settings Configuration menu allows user to reset all data by pressing reset button.

5.4 Project Review and Testing



Figure 5.4.1: Main Menu

Activity: Main Menu				
Id	Description	Input	Output	Success?
1	Lesson button	Pressed	Move to lesson selection menu	Yes
2	Practice button	Pressed	Move to practice selection menu	Yes
3	Challenge button	Pressed	Move to challenge selection menu	Yes
4	Settings button	Pressed	Move to settings configuration menu	Yes

Table 5.4.1: Main Menu Page Testing

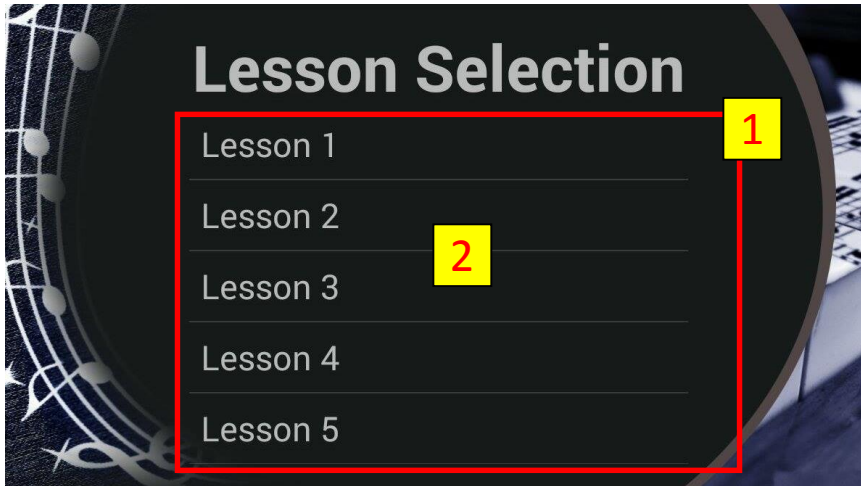


Figure 5.4.2: Lesson Selection

Activity: Lesson Selection				
Id	Description	Input	Output	Success?
1	Lesson ListView	-	List of available lesson	Yes
2	Select a lesson	Pressed	Move to selected lesson	Yes

Table 5.4.2: Lesson Selection Page Testing

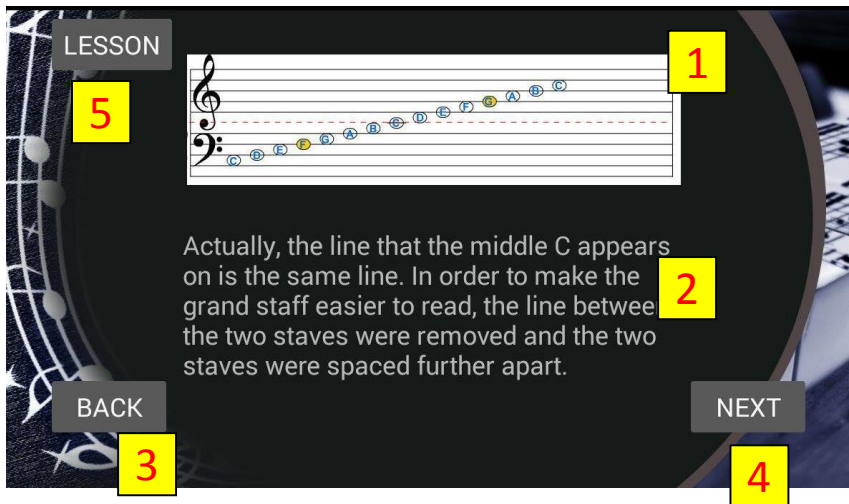


Figure 5.4.3: Lesson

Activity: Lesson				
Id	Description	Input	Output	Success?
1	Lesson image imageview	-	Display lesson image	Yes
2	Lesson description textview	-	Display lesson in text	Yes
3	Back button	Pressed	Move to previous slide	Yes
4	Next button	Pressed	Move to next slide	Yes
5	Lesson button	Pressed	Back to lesson selection menu	Yes

Table 5.4.3: Lesson Page Testing

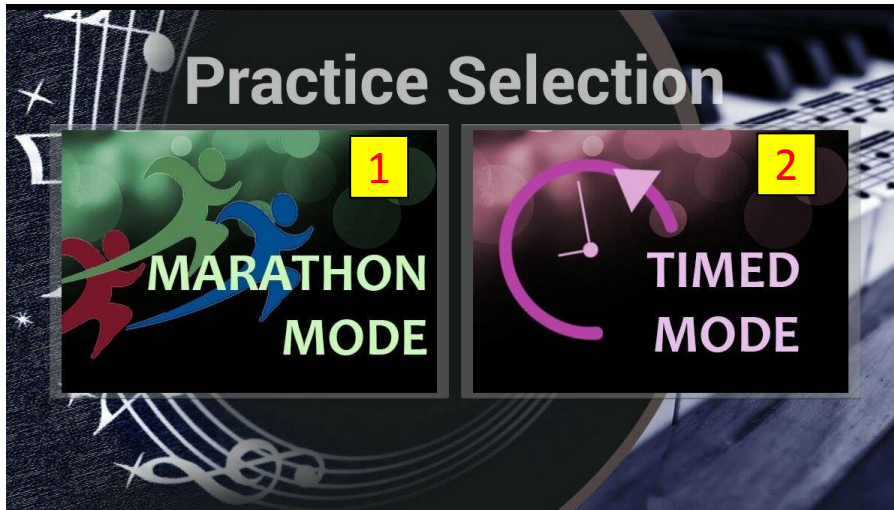


Figure 5.4.4: Practice Selection Step 1

Activity: Practice Selection Step 1				
Id	Description	Input	Output	Success?
1	Marathon Mode imagebutton	Pressed	Display available marathon quiz style	Yes
2	Timed Mode imagebutton	Pressed	Display available timed quiz style	Yes

Table 5.4.4: Practice Selection Step 1 Testing Result

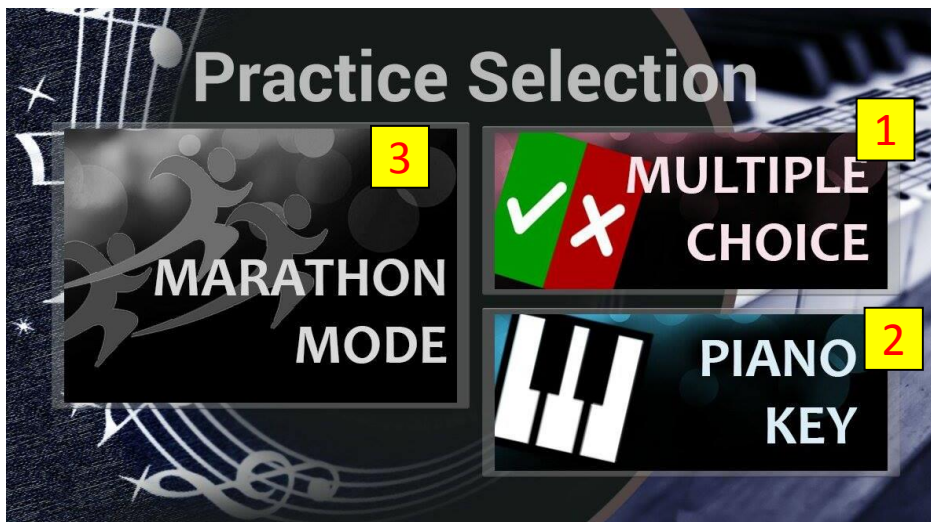


Figure 5.4.5: Practice Selection Step 2 for Marathon Mode

Activity: Practice Selection Step 2 (Marathon mode)				
Id	Description	Input	Output	Success?
1	Multiple Choice quiz style imagebutton	Pressed	Display available marathon quiz style	Yes
2	Piano Key quiz style imagebutton	Pressed	Display available timed quiz style	Yes
3	Marathon Mode imagebutton	Pressed	Back to Mode selection (step 1)	Yes

Table 5.4.5: Practice Selection Step 2 for Marathon Mode Page Testing Result



Figure 5.4.6: Practice Selection Step 2 for Timed Mode

Activity: Practice Selection Step 2 (Timed mode)				
Id	Description	Input	Output	Success?
1	Multiple Choice quiz style imagebutton	Pressed	Display available marathon quiz style	Yes
2	Piano Key quiz style imagebutton	Pressed	Display available timed quiz style	Yes
3	Timed Mode imagebutton	Pressed	Back to Mode selection (step 1)	Yes

Table 5.4.6: Practice Selection Step 2 for Timed Mode Page Testing Result

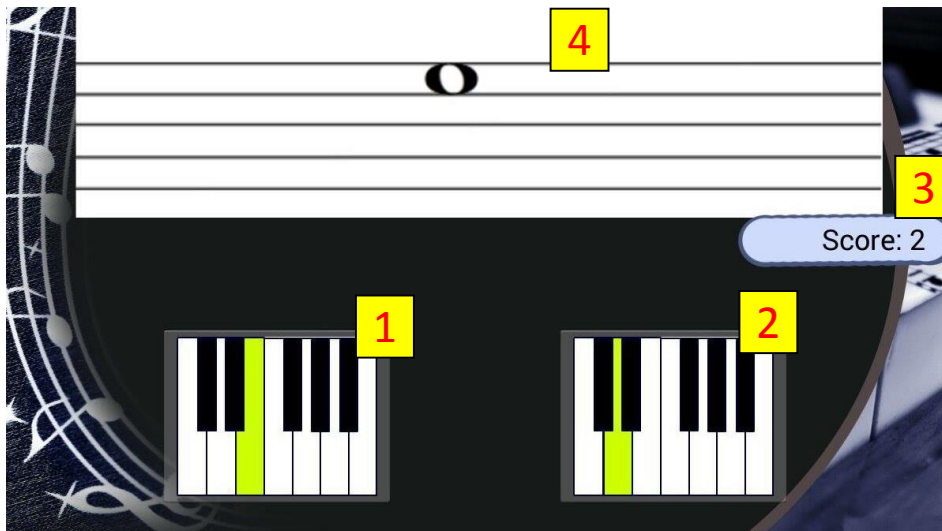


Figure 5.4.7: Practice Marathon Mode Multiple Choice Style Quiz

Activity: Practice Marathon Mode Multiple Choice Style Quiz				
Id	Description	Input	Output	Success?
1	Left answer imagebutton	Pressed	Update score and generate next question	Yes
2	Right answer imagebutton	Pressed	Update score and generate next question	Yes
3	Score textview	-	Display current score	Yes
4	Question	-	Display correct question	Yes

Table 5.4.7: Practice Marathon Mode Multiple Choice Style Quiz Page Testing Result

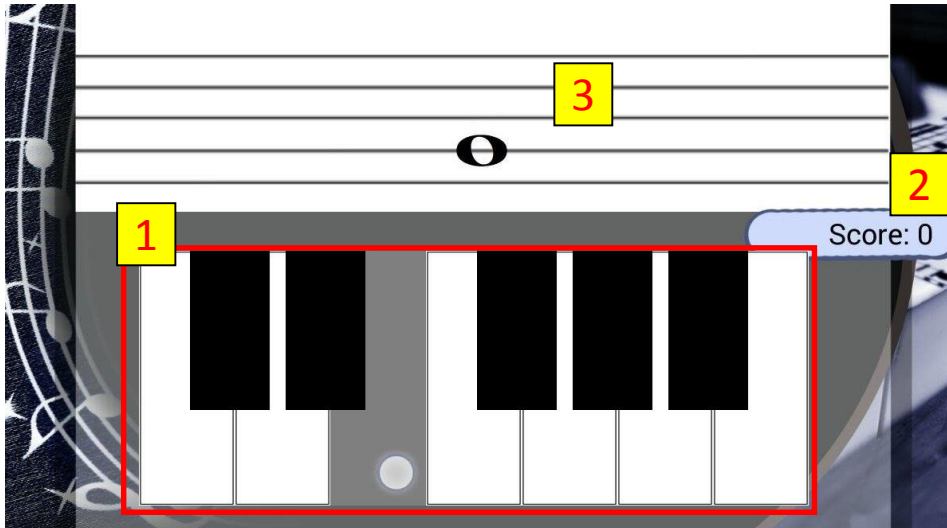


Figure 5.4.8: Practice Marathon Mode Piano Key Style Quiz

Activity: Practice Marathon Mode Piano Key Style Quiz				
Id	Description	Input	Output	Success?
1	Piano key imagebutton	Pressed	Update score and generate next question	Yes
2	Score textview	-	Display current score	Yes
3	Question	-	Display correct question	Yes

Table 5.4.8: Practice Marathon Mode Piano Key Style Quiz Page Testing Result

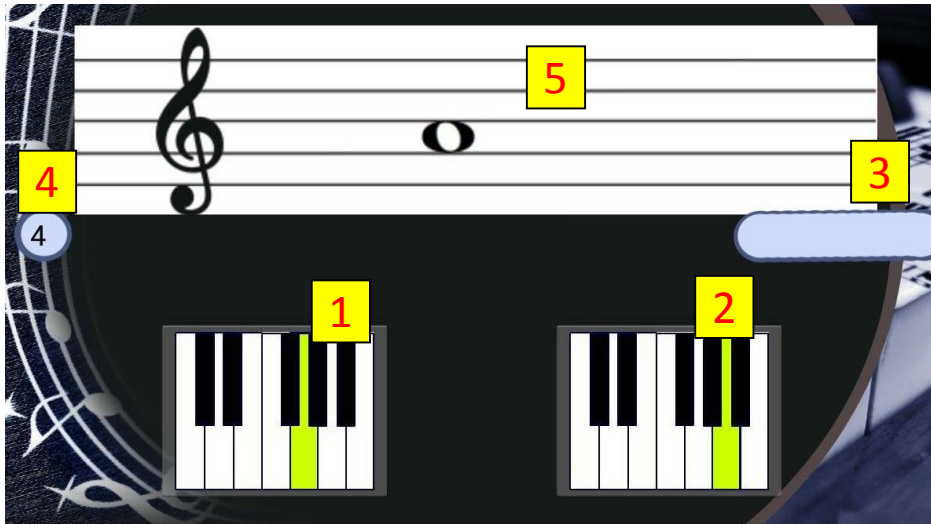


Figure 5.4.9: Practice Timed Mode Multiple Choice Style Quiz

Activity: Practice Timed Mode Multiple Choice Style Quiz				
Id	Description	Input	Output	Success?
1	Left answer imagebutton	Pressed	Update score and generate next question	Yes
2	Right answer imagebutton	Pressed	Update score and generate next question	Yes
3	Score textview	-	Display current score	Yes
4	Timer textview	-	Display remaining time available	Yes
5	Question	-	Display correct question	Yes

Table 5.4.9: Practice Timed Mode Multiple Choice Style Quiz Page Testing Result

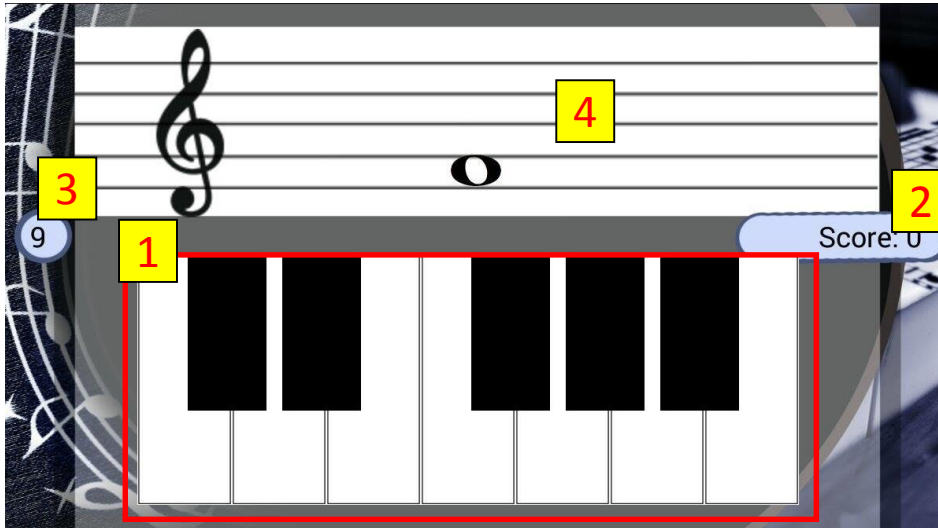


Figure 5.4.10: Practice Timed Mode Piano Key Style Quiz

Activity: Practice Timed Mode Piano Key Style Quiz				
Id	Description	Input	Output	Success?
1	Piano key imagebutton	Pressed	Update score and generate next question	Yes
2	Score textview	-	Display current score	Yes
3	Timer textview	-	Display remaining time available	Yes
4	Question	-	Display correct question	Yes

Table 5.4.10: Practice Timed Mode Piano Key Style Quiz Page Testing Result

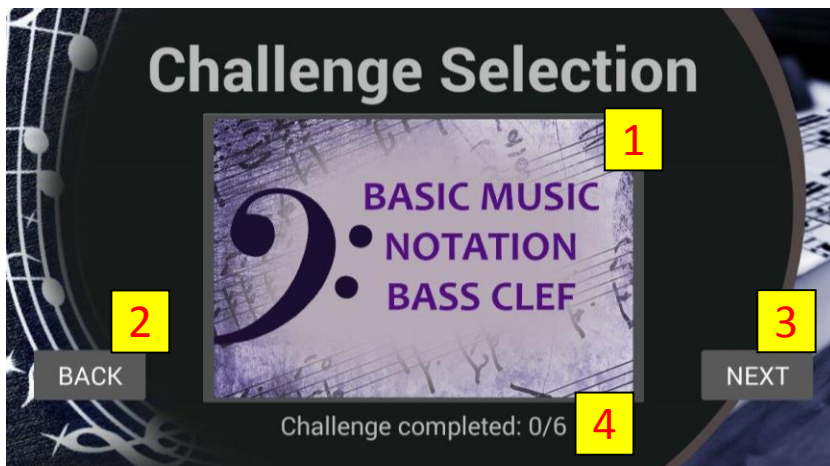


Figure 5.4.11: Challenge Selection

Activity: Challenge Selection				
Id	Description	Input	Output	Success?
1	Challenge title imagebutton	Pressed	Move to selected challenge level menu	Yes
2	Back button	Pressed	Display previous challenge	Yes
3	Next button	Pressed	Display next challenge	Yes
4	Total challenge completed textview	-	Display correct value of completed challenge	Yes

Table 5.4.11: Challenge Selection Page Testing Result

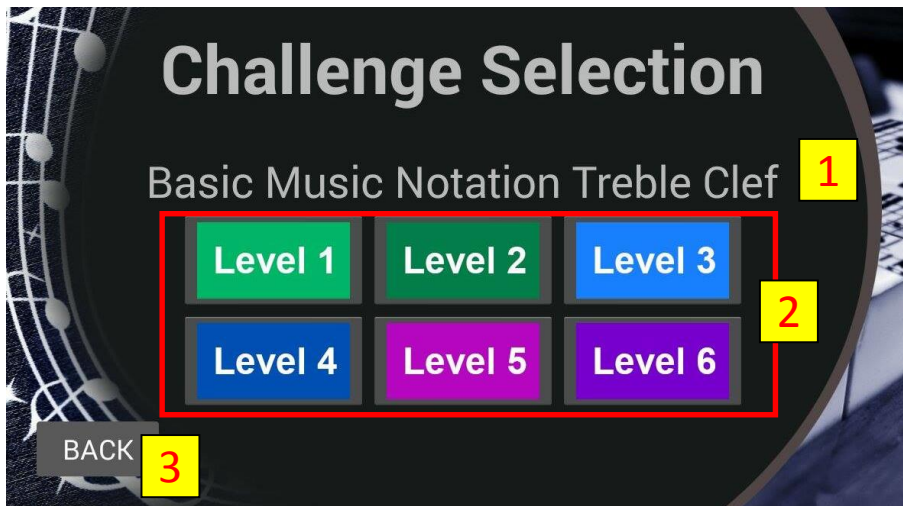


Figure 5.4.12: Challenge Level Selection Menu

Activity: Challenge Level Selection Menu				
Id	Description	Input	Output	Success?
1	Challenge title	-	Display current challenge title	Yes
2	Level button	Pressed	Move to selected level challenge	Yes
3	Back button	Pressed	Back to challenge selection menu	Yes

Table 5.4.12: Challenge Level Selection Menu Page Testing Result

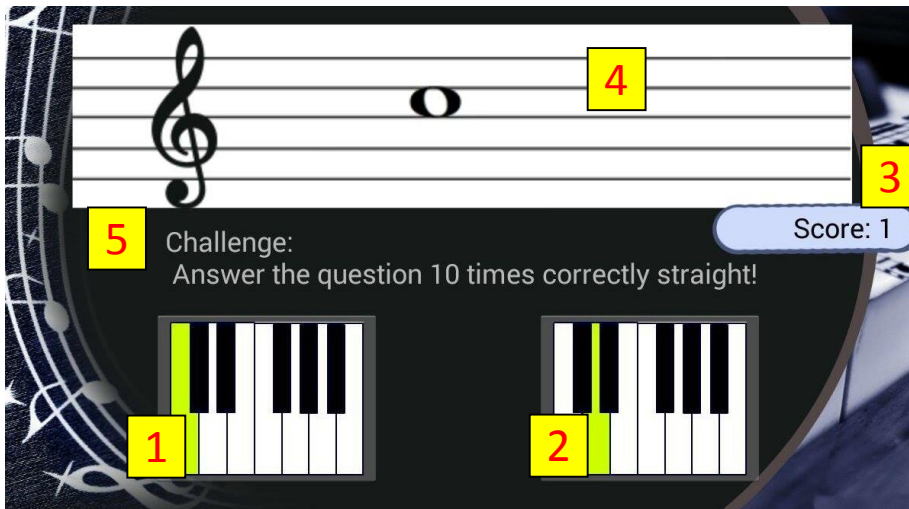


Figure 5.4.13: Challenge level quiz (Multiple Choice style)

Activity: Challenge Level Quiz				
Id	Description	Input	Output	Success?
1	Left answer imagebutton	Pressed	Update score and generate next question	Yes
2	Right answer imagebutton	Pressed	Update score and generate next question	Yes
3	Score textview	-	Display current score	Yes
4	Question	-	Display correct question	Yes
5	Challenge description	-	Display correct challenge description	Yes

Table 5.4.13: Challenge Level Quiz Page Testing Result

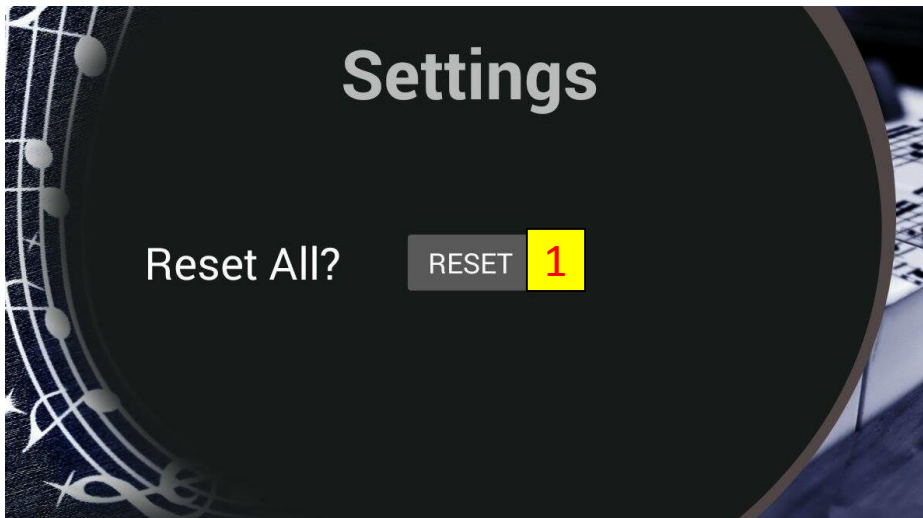


Figure 5.4.14: Settings Configuration Menu

Activity: Settings Configuration Menu				
Id	Description	Input	Output	Success?
1	Reset Button	Pressed	Erased and reset all data	Yes

Table 5.4.14: Settings Configuration Menu Page Testing Result

Chapter 6: Conclusion

This project goal is to develop an interactive piano educational mobile application that allow user to practice listening and sight reading skills of piano anywhere and anytime according to the piano course syllabus and teaching plan of Eterno Music Center. The product of the project, The EPL app content is based on Eterno Music Centre teaching method and piano course syllabus, which is teaching quick and ‘shortcut’ method for beginner level instead of learning music theory first.

Eterno Pocket Lesson (EPL) is suitable for beginner student who take piano course in Eterno Music Centre and willingly to learn piano in quick and simple way without understanding much on music theory. Piano tutor can use EPL mobile application to increase the effectiveness in teaching piano lesson by using the piano exercises in EPL. Thus, EPL lessons and exercises must have a positive relationship with piano course syllabus and teaching method of Eterno Music Center.

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