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Design and Development of Fitastic Application based on Android Technology

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Abstract: Maintaining body fitness offers many health benefits such as weight control, reducing the risk of heart diseases, and improving mental and mood. However, it is challenging in this era of globalization because the COVID-19 pandemic causes people not to exercise. They are not willing to spend their money to hire a fitness instructor, which will cause them to train with an ineffective plan. Therefore, 'Fitastic' health and fitness application is proposed to be developed. This project used the Agile methodology to develop the 'Fitastic' application which to ensure the development process follows the plan. This application was developed using the Android Studio and Kotlin Programming languages. On a scale measuring the system's usability, the application obtained an 84% overall good rating from the target user after undergoing testing. The application can work efficiently and accomplish all of its goals. The final expectation is that this project would aid the user in maintaining a healthy lifestyle.

Keywords: Android, Health and Fitness, Calorie counter, Running tracker, Workout

1.   Introduction

Fitness is defined as the quality or state of being fit and healthy [1]. Maintaining physical fitness can be achieved by taking proper nutrition, having physical exercise, and sufficient rest. Physical exercise plays a vital role in improving and protecting human health. Many diseases can be avoided by exercising regularly, such as cancer, blood pressure, heart problems, and diabetes [2]. Both exercises need to be implemented together to maintain a healthy body.

COVID-19 appears to be having a significant impact on physical activity (PA) behaviors. The gym centre has become a breakthrough for spreading the virus [3]. Therefore, people refuse to go to public areas such as gyms and fitness centres. Instead, they prefer to exercise at home. A fitness mobile application is necessary because they may not know what daily calories need to be taken daily. They are not willing to spend their money to hire a fitness instructor, which will cause them to train with an ineffective plan. All the fitness applications that appear in the current market do not exist a concept that provides three fitness services into one application and causes the user to use three different applications

to track their fitness. Thus, a mobile application that aims to combine three fitness services together needed to be created and developed. There are three objectives in this project. First, to design and model the content of the 'Fitastic' application based on a structured approach. Second, to develop 'Fitastic' application based on the Android Technology and lastly, to evaluate 'Fitastic' application on the Android platform using functional testing to the target user.

The target users of this application are fitness enthusiasts between the age of 18 to 50. The primary language will be English, but Bahasa Melayu and Mandarin will be supported. This application is developed for a specific platform, and in this case, it is an Android-specific application. The application is designed for mobile devices with Android Kit-kat 5.0 and above. The application is designed and developed using Android Studio. The project consists of four modules: authentication module, calories counter module, anaerobic guide module, and GPS tracker module. For the Authentication module, the user needs to sign up and login into their account first. Users can sign up with email and password or use google email to sign up. Users can record their eating habits every day using this application. Users can search for the name of the food that they want to view and find out the nutrition and calories details on specific food in the Calories Counter module. For the Anaerobic Guide module, users can choose a suitable training program for the workout. In addition, it will provide a countdown timer, video, and audio to guide the user during the workout. Users can track down their aerobic exercise, such as jogging, by using this module. All the information will be recorded after the exercise is complete.

Following the introduction, section 2 describes the related work. Section 3 illustrates the methodology used in this project, the Agile model, consisting of six phases: brainstorming, design, development, implementation and testing, Deployment, and Feedback. This project's analysis and design will also be discussed in section 3. The appendix contains a flowchart, interface design, and a navigation diagram.

2.   Related Work

This section will review the literature on the mobile health and fitness application and compare the existing and proposed application, 'Fitastic' mobile application.

2.1   Mobile Application

A mobile application is a collection of software and programs that operate on a mobile device and assist users with specific tasks. Mobile applications are a relatively new and quickly expanding worldwide information and communication technology component. Mobile applications are simple, download, and run on almost all phones [4]. In 2018, global mobile app sales surpassed $365 billion, and by 2023, paid downloads and in-app advertising are predicted to produce more than $935 billion in income [5].

2.2   Mobile Application Promotes Healthy Lifestyle

Innovative approaches are needed to promote physical activity and healthy lifestyles. The use of smartphones while exercising is one promising innovation. The use of mobile applications may be a promising tool to inspire both physical activity and health [6] [2]. Meanwhile, people should be wary of limiting their daily calorie intake. Instead, users can use the mobile application to calculate the number of calories consumed from the menu and scribble down their calorie intake [7].

Many persuasive applications have been developed to date, with the majority being utilized by individuals for personal gain, including better healthcare and lifestyle [8]. Persuasive applications can improve quality of life and motivate users to change their health habits, such as exercising [9]. Activity tracking, nutrition, and workout applications are the three types of fitness applications commercially available. Users can use an activity monitoring application to track and monitor fitness-related metrics like steps taken, distance runs, and calories burned to improve their habits or stay active [10]. Nutrition applications help individuals control weight, manage chronic conditions, and understand dietary

patterns [11]. In contrast, workout applications provide various sets of exercise guidance to the user to correct posture.

2.3   Comparison of Existing Applications

This section will compare the selected existing applications to the proposed application, 'Fitastic'. Table 1 is based on various factors, including system type, language, navigation, font style, button, module, setting, internet connection, strength, and weakness.

Table 1: Comparison between the existing applications

Element/ Component	MyFitnessPal [12]	Fitness & Bodybuilding [13]	FITFIT [14]	Fitastic, proposed application
Icon				
System Type	Android /IOS	Android /IOS	Android	Android
Purchases	Pay to unlock more features	Pay to unlock more features	Pay to unlock more features	Free to use
Language	15 official languages	English	English	English, Malay, Chinese
Target User	The user who wants to track nutritional and dietary information	The user who wants to do heavy workout routines	The user who wants to do workout routines	The user who wants to track nutritional information, running and do workout routines
Navigation	Moderate	Easy	Easy	Easy
Request Location Permission	No	No	No	Yes
Font Style	Consistent	Consistent	Consistent	Consistent
Button	-Consistent - Clear button label	-Consistent -Many buttons	-Consistent -Clear button label	-Consistent -Clear button label
Module	-Food calories tracker -Meal plan -Notification	-Exercise -Reminder -Meal plan	-Exercise -Body Mass Index	-Food calories tracker -Exercise guide -GPS tracker
Setting	Available	Available	Available	Available
Internet Connection	Require	Not Require	Require	Not Require
Strength	-Provides large food database. -Set goals -Track Calories progress.	-Heavy strength exercise with video support. -List of the effective workouts for every muscle group. -Easy to use.	-Provides very detailed workout guidelines. -Exercise guidance straight to the point. -Built-in timer	-Track calories progress. -Provides very detailed workout guidelines. -Provides GPS tracker for aerobic exercise. -User-friendly interface. -Provides integration between exercise and tracking calories. -Easy to use

Table 1: (cont).

Element/ Component	MyFitnessPal [12]	Fitness & Bodybuilding [13]	FITFIT [14]	Fitastic, proposed application
Weakness	-Does not provide an exercise module. -Less attractive user interface. It-Too wordy. -Too many advertisements.	-The calories tracker is not provided. -Subscription to unlock features. - Too many advertisements.	-Does not provide aerobic workout exercise. -The calories tracker is not provided. -Subscription to unlock features.	-Does not provide a meal plan.

Table 1 compares existing applications and the proposed application 'Fitastic'. As a result, the proposed application will provide three modules and integration to make the fitness and health application more accessible. After that, the user interface design for the proposed application will be more user friendly and attractive than the Calorie-counter MyFitnessPal application. In this proposed application, users do not need to pay for a subscription to unlock more features than other existing applications. It also will provide three languages that are often used for Malaysians. Furthermore, the proposed application will fulfil the needs of maintaining body fitness by consuming proper nutrition and moderate-vigorous physical exercise. Moreover, no advertisement will be given to the user.

3.   Methodology

An agile model is an incremental model created in short periods. Tasks are broken down into smaller iterations or incremental releases, eliminating the need for long-term planning. Each iteration lasts one to four weeks and is thoroughly tested before being released [15]. The Brainstorming phase, Design phase, Development phase, Implementation and Testing phase, Deployment phase, and Feedback phase are the six phases of the Agile model. This model was selected to develop the 'Fitastic' application because it provides more iterations for each phase. For example, each workflow iteration will be counted from the Brainstorming phase to the Feedback phase. The testing can be done frequently to adjust to changing requirements in every iteration, even after the initial [16]. Figure 1 below shows the Agile model.
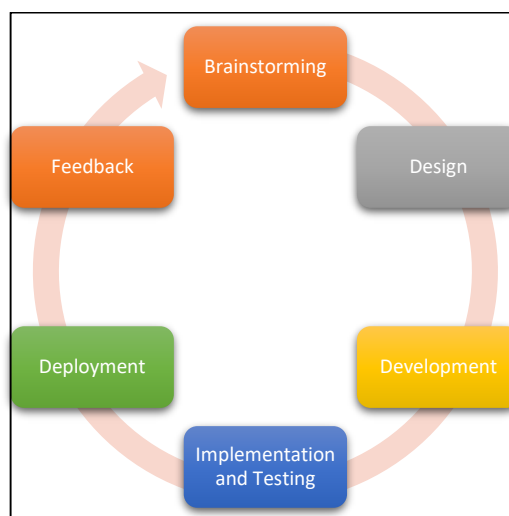

Figure 1: The Agile Model [17]

3.1 Brainstorming phase

This phase includes identifying the requirements to plan the project ahead of time adequately. This knowledge can assess the project's feasibility and technical requirements. After the panel has approved the 'Fitastic' health and fitness application idea, the aim for developing the application should be outlined. Its goal is to fix an issue with some existing applications and add essential features to improve the functionality. The application's target users are designated as people between 18 to 50.This phase determines the specifications needed to develop the 'Fitastic' mobile application. First, the project's initial requirements have been made, such as identifying the introduction, problem statement, objective, scope, expected outcome, project significance, and the project planning. After that, some researches were conducted to compare and analyse the strengths and drawbacks of similar current mobile applications with the proposed mobile application. Then, the development model has been determined, and a Gantt Chart of this project is created at the end of this phase to follow the project timelines.

3.2 Design phase

The design phase begins with an analysis of the requirement specifications such as user requirement, functional requirement, non-functional requirement, hardware and software requirement, followed by the preparation of the system design. The system design includes the application design and storyboard design. It involves developing this mobile application's user experience (UX) and user interface (UI) using the information acquired during the previous phase. This phase consists in developing and designing the 'Fitastic' mobile application's storyboard. Figma is used to prepare the user interfaces for mobile applications. Additionally, Draw.io is used to create the Entity-Relationship Diagram (ERD), Flowchart, Data Flow Diagram, Context Diagram, Navigational Structure, and Content Structure. This mobile application is built for Android smartphones, targeted towards Android users.

3.2.1 User Analysis

User analysis is the process by which the requirements of end-users are determined. An online interview was held with Mr Sek Chee Jong, a professional fitness instructor and nutritionist of 7day Fitness in Kulai, Johor, who is also the project's Subject Matter Expert. Table 2 contains the results of the user analysis. After that, a questionnaire survey of the target users was conducted. The next step is to do a user study, which involves analysing the target users' replies to develop and prioritise new features for the proposed application. The questionnaire was then circulated via Google form to 30 UTHM students.

Table 2: User Analysis

Stakeholder Category	Role in product	Design implication	Action Needed
Subject Matter Expertise	Content consultant expert in the related field	Based on online interviews, Reliable calories calculation and nutrition information	• Use the correct calculation to calculate the user's calories needed. • Use standard nutrition information for all the food products.
		Reliable workout posture and information	• Using the correct image and video for the anaerobic guide module. • Explicit instruction is given based on the image and video.

Table 2: (cont).

Stakeholder Category	Role in product	Design implication	Action Needed
		Easy to navigate	• Contains the bottom navigation bar. • All the buttons shall be in persistent size. • The navigational structure shall not be too complex.
General user	End-user of the system	Based on the questionnaire, Straightforward user interface design	• Using icon and graphical UI elements and the button is not crowded in each interface
		Simple navigation	• All the feedback and response messages must be short and straightforward. • All the buttons must be labelled with suitable icons or text. • Double-click to quit the application.
		Offline database	• An offline database is provided if the target users are held in an environment without an internet connection

3.2.2 Software and Hardware Requirements

This section denotes the software and hardware requirements for both the developer and the end-user.

Table 3: Software and Hardware Requirements for Developer

Requirement	Item	Description
Hardware	Acer Predator Helios 300 PH315-53-58U0	Allow the developer to use Figma and Android Studio to develop the application. Specifications as below: • Operating system: Windows 10 Home • Processor: Intel® Core™ i5 i5-10500H 2.50 GHz Hexa-core (6 Core™) • Display and Graphics: NVIDIA® GeForce® RTX™ 3060 • Memory: 16GB DDR4 SDRAM • Storage: 512GB
	Input and output devices	Allow the developers to interact with the computer via the following methods: • Mouse • Keyboard
Software	Android Studio Arctic Fox 2020.3.1.25	An Integrated Development Environment (IDE) is used to write, test, debug code for Android development, and implement the XML user interface
	Android Emulator	Allow the developer to simulate Android devices on a computer to test the application on various devices and Android API levels.
	Figma	Allow the developer to wireframe the mobile application interfaces and button design.
	Adobe Illustrator 2020	To design the application's logo and graphics that used in the interface.

According to Table 3, the developer requires the software and hardware specified for application development and design.

Table 4: Software and Hardware Requirements for User

Requirement	Item	Description
Hardware	Android mobile phone	Allow the users to install and run the application. Specification as below: • Operating system: Android 5.0 kit-kat (API level 21) • Minimum RAM: 2GB • Internal Storage: 600MB • Resolution: 2240x1080

According to Table 4, the user's software and hardware requirements for adequately running the mobile application.

3.2.3 Functional Requirements

Functional requirements define what the system is capable of doing or how it should behave [18]. Table 5 shows the functional requirements of the 'Fitastic' mobile health and fitness application.

Table 5: Functional Requirements

Modules	Functionalities
Authentication module	• The application should allow users to create an account using Google or email and password. • The application should send a verification email to the users to verify the account information. • The application should deny the login if the user does not verify the email. • The application should allow users to log in with their registered accounts. • The application should show errors with any input error.
Onboarding module	• The application should collect personal data from users such as user's goal, activity level, age, gender, height, and weight. • The application should calculate the calories needed per day. • The application should show errors with any input error.
Calories counter module	• The application should allow users to add consumed food to their meals every day. • The application should allow users to search for the nutrition of food products. • The application should allow users to add custom food products. • The application should show a statistics graph depending on the month and day. • The application should provide users with the ability to delete customised products. • The application should allow users to delete current day products.
Anaerobic guide module	• The application should provide a suitable training program for the workout. • The application should provide a countdown timer, video and audio to guide the user during the workout. • The application should calculate the calories burned in the workout.

Table 5: (cont).

Modules	Functionalities
GPS tracker module	• The application should allow users to track down the total distance, average pacing, calories burned and total time taken after running. • The application should allow users to pause while running. • The application should run in the background.

3.2.4   Non-Functional Requirements

Non-functional requirement for the 'Fitastic' mobile fitness application is discussed and tabulated in terms of Reliability and Availability, Usability, Performance, Security and Localisation. Table 6 describe the non-functional requirements of the proposed application.

Table 6: Non-Functional Requirements

Non-Functional Requirement	Description
Reliability and Availability	• The application should run on the Android mobile platform at a minimum of Android Kit-kat 5.0 and above. • The application should be accessible 24 hours a day.
Usability	• The button in the application should be persistent and finger-friendly. • The application's interface must be intuitive and straightforward to use. • The font type of application should be Palanquin.
Performance	• The application should function with an internet connection and without an internet connection. • The execution process should not take more than 3 seconds to complete.
Security	• The users may access the application with the correct email and password. • The users may verify their email before access into the application. • The application's content should not be editable by the user.
Localisation	• The application will use English, Malay and Chinese languages.

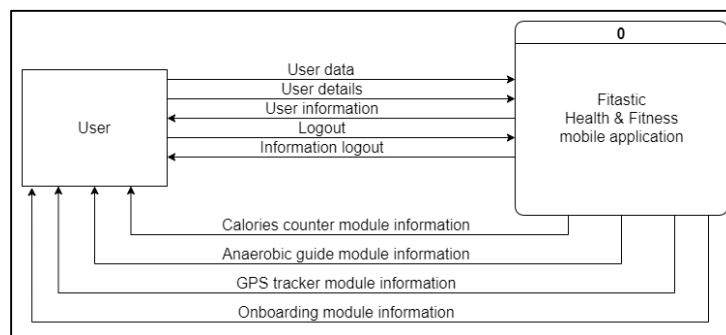### 3.2.5   Context Diagram and Data Flow Diagram

Figure 2: Context Diagram for the proposed application

Figure 2 shows the context diagram for 'Fitastic' health and fitness mobile application. The user will be required to enter their email and password throughout the signup or sign-in process. For the first time user, the onboarding module will present the personal details needed to calculate the daily calories required, such as the user's goal, activity level, gender, age, weight and height. The user is essential to fill up all the personal details. At the navigation bar, the application will display the user's information.

The Calories Counter module information, Anaerobic Guide module information and GPS Tracker information will offer users various ways, including presenting categories and a list of selections. When the user logs out from the application, their account will sign out, and the data will be saved in the database.
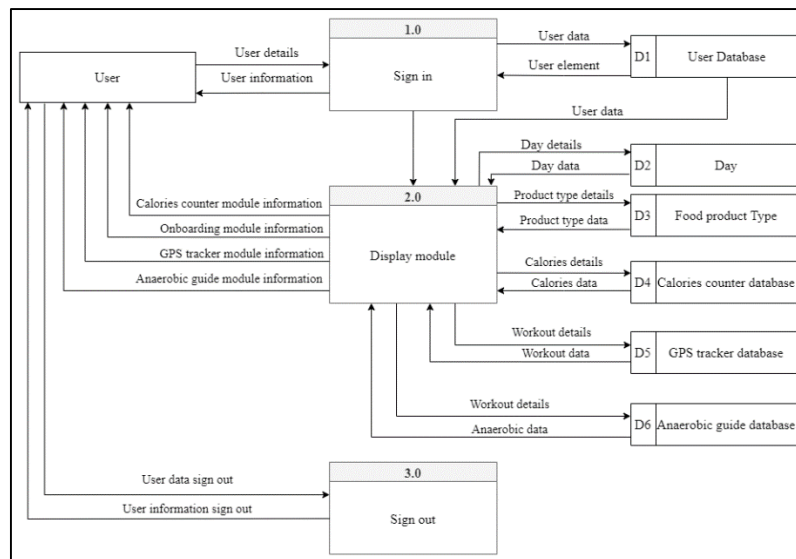

Figure 3: Data Flow Diagram Level 0

Figure 4.7 shows the data flow diagram level 0 of the 'Fitastic' health and fitness mobile application. First of all, the user must fill in the user details such as email and password to log in to the application, and the data will be saved into the user database. For the first-time user, the Onboarding module information is implemented to store the user's details such as gender, height, weight, and age to calculate the calories needed per day, and all the information will be saved in the user database. Next, users can select from three different modules: the Calorie counter module, GPS tracker module, and Anaerobic guide module. There are six databases to store all the information of the user and module. For the Calorie counter module, the user will insert all the food product details into the food product type database. The food product nutrition will be converted into calories and saved inside the calories counter database. The GPS tracker database can record running time, average pace, calories burned, and the total distance from the GPS tracker module. Anaerobic guide database will provide some anaerobic data such as exercise type, calories burned, total time taken for exercise, and sets. After the workout is done, all the workout details will be stored inside the table. The sign-out method allows users to sign out of the application without losing any user data.

3.2.6 Flowchart

Flowcharts assist in analysing, designing, documenting, and managing [19] the 'Fitastic' health and fitness application. The flowchart can be referenced in Appendix B.

3.2.7 Entity Relationship Diagram

An entity-relationship diagram (ERD), alternatively referred to as an entity-relationship model, is a graphical depiction of relationships between individuals, objects, places, concepts, or events [20]. The user entity stores user data such as user ID, email and password. All the personal details that fill in the onboarding module will convert into calories, protein, and card needed per day. The food product type entity stores product data such as product name and product nutrition. The primary key for the food product type entity is foodID. Then, the day entity will keep the food product as a list and the day information such as day, month and year. The water consumed data will also store in this entity. Next, the calories counter DB entity will store all the calories consumed per day. Another entity is GPS tracker

DB, holding all the running exercise details such as total distance, time taken to complete the run, average pace, calories burned, date, and distance. The primary key will be runningID. The last entity is the anaerobic Guide DB used to store all the data after the workout is completed. For example, the exercise name, number of sets, total time taken to finish the exercise, and the calories burned. The Entity Relationship Diagram can be referenced in Appendix A.

3.2.8   Navigational Structure

The navigational structure illustrates how the entire 'Fitastic' application will connect and how the user would travel between different interfaces in the design stage.
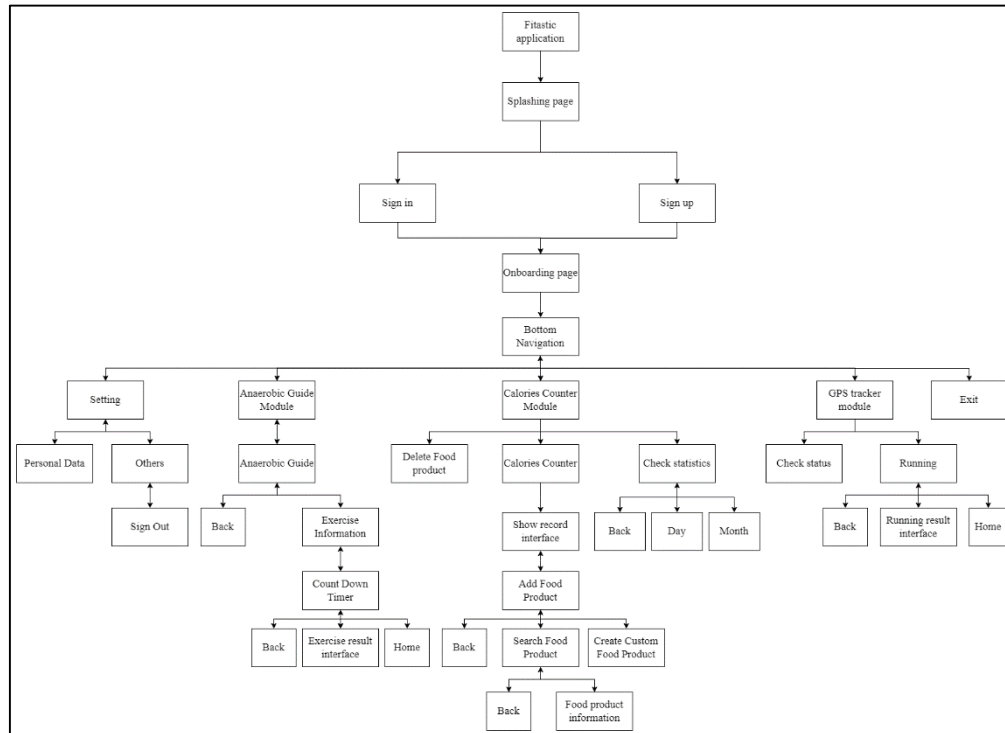

Figure 4: Navigational Structure

The application's navigational structure is depicted in figure 4. Before users sign in to the application, they must create an account. Then, first-time users must enter their personal information on the Onboarding page. After that, users will direct to the bottom navigation bar containing three primary modules: Calories Counter Module, GPS Tracker Module, and Anaerobic Guide module. Finally, the setting will link them to the interface that offers personal data setting or sign out. Based on user analysis, this application's interface design is clear and straightforward. As a result, users may easily learn on how to use this mobile application. The majority of interfaces, such as calories counter interface, have a clear background and icon-based button. Appendix D illustrates several application output interfaces.

3.3   Development

Android Studio is used to build this mobile application following the Design phase. Android applications are composed of two distinct programming languages: front-end and back-end development [21]. Kotlin was chosen as the back-end programming language because it is simple to learn and supports most systems, while XML is used as the front-end programming language. The mobile application's core features and content were developed as a prototype application during the development phase. This phase results in creating images and video assets, a database, and the application interfaces and functionalities.

3.3.1 Development of Graphics

Adobe Illustrator CC 2020 was used to create the graphics used in the application. The graphics for the modules are shown in Figure 5 (a) and (b).
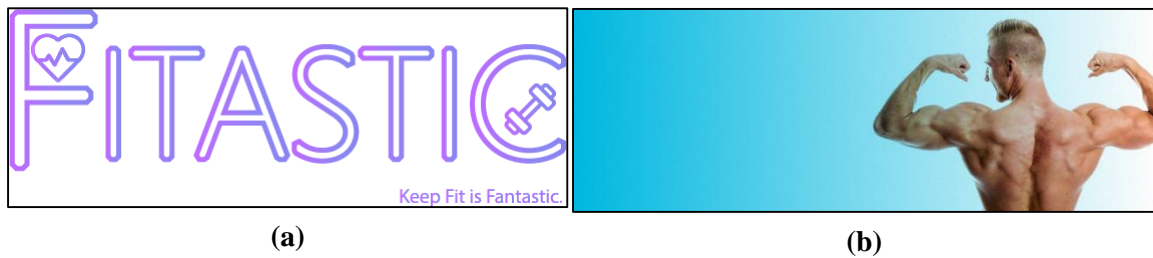

(a)   **(b)**

Figure 5: Logo (a) and Workout program (b)

3.3.2 Development of Modules

This section will cover the integration of user interface and the coding that goes with it, which is done in Android Studio IDE.

(a)   **(b)**   **(c)**

Figure 6: Interfaces of (a) Splash page (b) Sign In page (c) Sign Up Page

Figure 6(a) contains of splashing page that will display about two seconds when the application start. Figure 6(b) shows the sign in page which the user can login using email and password or google email. Figure 6(c) shows the sign up page that required user to input email, password to sign up for an account. Before proceeding to next interface, each of the sections must be filled.
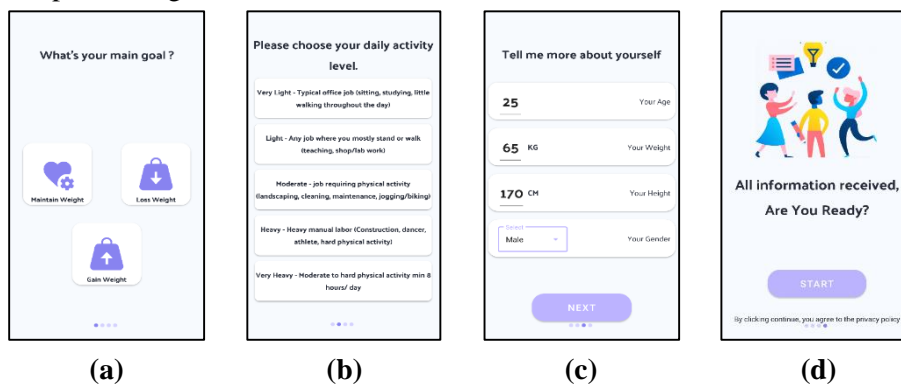

(a)   **(b)**   **(c)**   **(d)**

Figure 7: Interface of Onboarding page

Figure 7 consists of four onboarding page which ask some personal information such as goal, daily activity level, age, weight, height, and gender to calculate the daily calories needed per day.
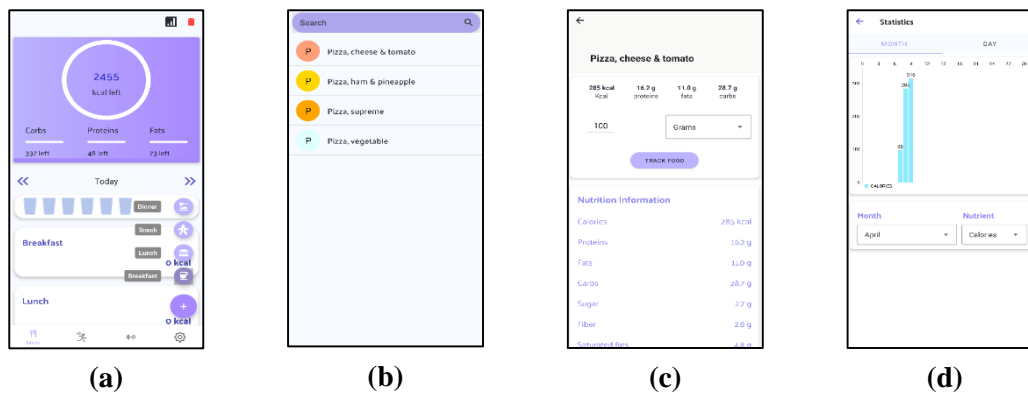
Figure 9: Interfaces of (a) Calories Counter Module page (b) Search page (c) Food details page (d) Statistics page

Figure 8 (a) shows the main page of calories counter module that contain some calories and nutrition information to the user. User can search for their desired food in (b) and check for the food information in (c). User can also check for their history of food intake in statistics page (d).

Figure 8: Interfaces of (a) GPS tracker module page (b) Show tracking target page (c) tracking page (d) statistics page

Figure 8 (a) shows the GPS tracker module's main interface, which consists of the running information and the statistics button. Users can also sort the running information by date, running time, distance, average speed and calories burned. Users can choose the running target such as distance, time and calories burned in (b) and start to tracking the run in (c). The total time, total distance, total calories burned, and average speed will be displayed in (d).
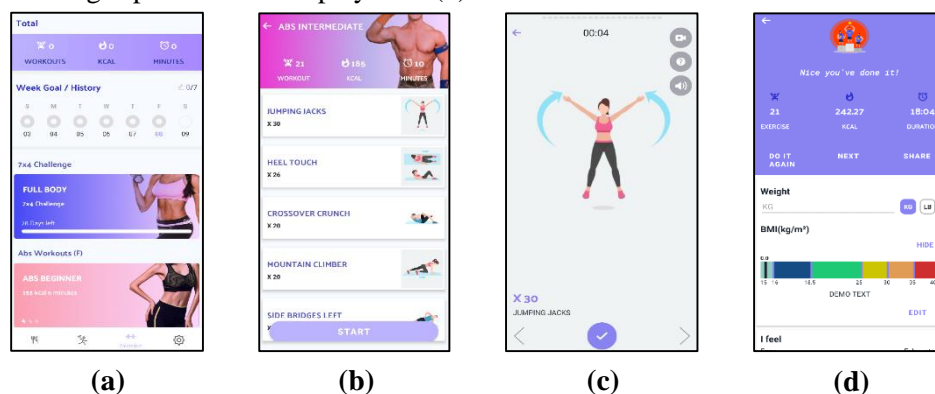

Figure 10: Interface of (a) Anaerobic guide module (b) Workout list page (c) Countdown page (d) Completed exercise page

Figure 10(a) shows the main interface for the anaerobic guide module. This main interface will display a total workout, total calories burned, and total minutes spent in this module. Furthermore, an

array list of exercise sets from the database will display to the user. Users can choose the exercise set and be directed to the exercise information page (b). During the workout, a countdown timer and exercise guide (c) will be provided to the user. Completed exercise page will be displayed after all the exercise is completed.

3.4 Implementation and Testing

After each unit has been evaluated to ensure the design fulfils the system requirements, the testing phase integrates all of the application units developed during the development phase into a complete system. The system was fully tested for errors and failures.

3.4.1 Alpha Testing

Alpha testing was conducted throughout the planning process and up until the project's completion. The button design is examined during alpha tests to ensure that the application functions properly. Table 4 summarizes the results of alpha tests conducted on each button in the 'Fitastic' Application.

Table 6: Result of alpha testing

Tan & Fudzee, Applied Information Technology and Computer Science Vol. 4 No.1 (2023) p. 1-5	Tan & Fudzee, Applied Information Technology and Computer Science Vol. 4 No.1 (2023) p. 1-5	Tan & Fudzee, Applied Information Technology and Computer Science Vol. 4 No.1 (2023) p. 1-5	Tan & Fudzee, Applied Information Technology and Computer Science Vol. 4 No.1 (2023) p. 1-5	Tan & Fudzee, Applied Information Technology and Computer Science Vol. 4 No.1 (2023) p. 1-5
Sign In & Sign Up	Sign in Button	Sign in successful and navigate to Onboarding Interface / Calories Tracker Interface.	Function well.	No need.
	Registration Button	Navigate to Sign up Interface.	Function well.	No need.
	Google Login Button	Navigate to Google Login API.	Function well.	No need.
	Sign up Button	Show successful messages and navigate back to the Sign-in Interface.	Function well.	No need.
Calories Counter	Statistics Button	Navigate to the Calories Counter Statistics sub-module.	Function well.	No need.
	Delete Button	Navigate to the Delete Product sub-module.	Function well.	No need.
	Floating Button	Five small buttons: Dinner, Snack, Lunch, and Breakfast will display and navigate the Search Product Interface.	Function well.	No need.
	Search Bar	Display search results after an input.	Function well.	No need.
	Choose From My Product Button.	Navigate to My Product Interface.	Function well.	No need.
	Create A New Custom Product Button	Navigate to Add Product Interface.	Function well.	No need.
	More Options Button	Open additional info window.	Function well.	No need.
	Tick Floating Button	Save the product and navigate to the Search product interface.	Function well, but empty input can accept.	Empty input cannot be accepted

Table 7: (cont).

Tan & Fudzee, Applied Information Technology and Computer Science Vol. 4 No.1 (2023) p. 1-5	Tan & Fudzee, Applied Information Technology and Computer Science Vol. 4 No.1 (2023) p. 1-5	Tan & Fudzee, Applied Information Technology and Computer Science Vol. 4 No.1 (2023) p. 1-5	Tan & Fudzee, Applied Information Technology and Computer Science Vol. 4 No.1 (2023) p. 1-5	Tan & Fudzee, Applied Information Technology and Computer Science Vol. 4 No.1 (2023) p. 1-5
	Back Button	Back to the previous interface.	Function well.	No need.
	Product Button	Navigate to the Product detail interface, respectively.	Function well.	No need.
	Track Food Button	Receive data and navigate back to the previous interface.	Function well.	No need.
GPS Running Tracker Module	Statistics Button	Navigate to Tracker Statistics Interface.	Function well.	No need.
	Run Floating Button	Navigate to the Tracking interface.	Function well.	No need.
	Go Button	Navigate to the Tracking interface.	Function well.	No need.
	Cancel Button	Navigate to the cancel run dialogue and press yes to cancel the run.	Function well.	No need.
	Pause Button	Pause the tracking service.	Function well.	No need.
	Resume Button	Resume the tracking service.	Function well.	No need.
	Finish Button	Save the data and navigate back to the main interface.	Function well.	No need.
	Back Button	Back to the previous interface.	Function well.	No need.
Anaerobic Guide Module	A week and History Button	Navigate to the History interface.	Function well.	No need.
	List of Workout Button	Navigate to the Workout List interface.	Function well.	No need.
	Start Button	Navigate to Rest Interface.	Function well.	No need.
	Left and Right Button	Navigate to the next or previous workout.	Function well.	No need.
	Video Button	Direct to Youtube for video instruction.	Function well.	No need.
	Sound Button	Mute or unmute the sound.	Function well.	No need.
	Do it Again Button	Navigate back to the first exercise.	Function well.	No need.
	Share Button	Navigate to the share menu.	Function well.	No need.
	Next Button	Back to the main interface.	Function well.	No need.

3.5   Deployment

The APK file for the 'Fitastic' mobile application is developed and generated in this phase using Android Studio. Furthermore, effective testing should be conducted to reveal previously undetected bugs and issues following the development phases of the mobile application. This project is being evaluated using alpha testing techniques. Alpha testing is undertaken using the predefined test plan after running the APK file onto ten mobile phones. Then, it may determine whether the application modules actual outcomes match the intended results or not.

3.5.1 Building Application in Android Based

This section will describe how to create an APK file for the application depicted in the figures below. The figures illustrate the process of creating the APK file step by step.
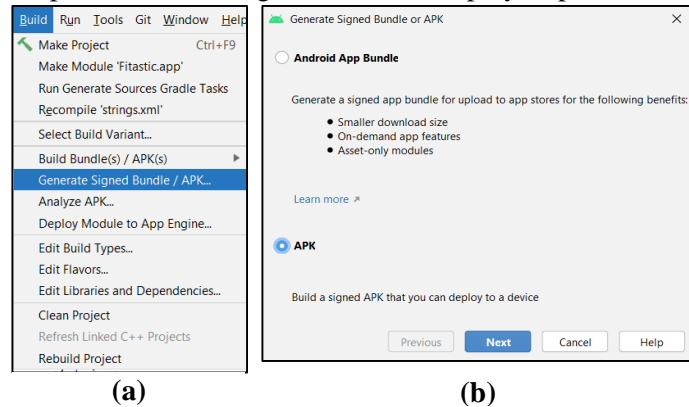

(a)   **(b)**

Figure 11: (a) Step to Generate signed bundle / APK (b) Generate Signed Bundle or APK Window

Figure 11 (a) shows the steps to generate a signed bundle or APK. Click Build > Generate Signed Bundle /APK will be directed to the Generate Signed Bundle or APK window in (b). The developer must choose the APK option and press next to proceed.
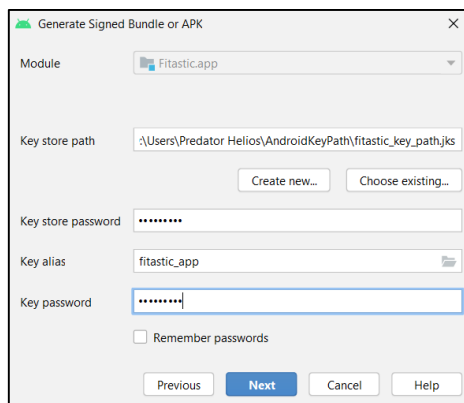

Figure 12: Step for inserting key store password and key password

Developers need to set up the key store password and key password to generate a Signed Bundle or APK, including new releases and updates. Two options are debugging and release, which are given to the developer. Release variants are chosen in this case because the application needs to release to the public.
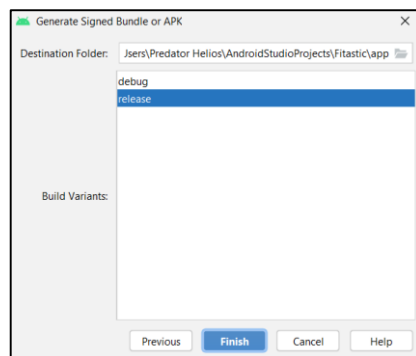

Figure 13: Build Variants Window

729

3.6   Feedback

This 'Fitastic' application must be beta-tested with target users to ascertain contentment and gather input throughout the feedback phase. Google Forms were constructed to obtain feedback from target users regarding the 'Fitastic' application's interface, content, functionality, and usability. This study is aimed at individuals between the ages of 18 to 50, and this is to ascertain that the project's objectives have been met.

4.   Result and Discussion

This section will assess the application's beta testing outcomes, including acceptability and functionality testing. Beta testing was carried out with the assistance of target users. To collect and analyse data from them, a set of questionnaires was built using Google Forms. Ten participants participated in the beta tests. In Google Form, there were three sections: personal information, Level of User Acceptance, and Functionality Testing. Ten respondents aged 18 to 50 years old took part in the questionnaire.

There are seven out of ten respondents (70%) are male, while the left three of them are female respondents (30%). The majority of respondents are 24 to 29 years old (40%), followed by 18 to 23 years old (30%) and 10 % of respondents aged 30 to 35, 36 to 40, 41 to 45, respectively.

The user acceptability test employs the system usability scale (SUS), on which strongly disagree equals 1, disagree equals 2, neutral equals 3, agree equals 4 and strongly agree equals 5. The first question's analysis, asks respondents to scale whether the application is simple to use or not. The bulk of the customers reported that the application is straightforward. Seven out of ten users (70%) agreed the application is simple to use, and two users (20%) strongly agreed the application is simple to use. In contrast, only one user (10%) said the application is simple to level is moderate. The second question asks the user whether the interface design is pleasing or not. Four out of ten (40%) strongly agree that the application is well-designed, whereas six users (60%) agree that the interface design is attractive. The third question asks the users whether the font size and style in the application can be read easily or not. Half of the users (50%) strongly agreed that the font size and style could be read easily, while others (50%) agreed with the statement.

Moreover, the fourth question is whether the application provides an easy way to perform application functions. 40% of respondents, or four out of ten, strongly agreed that the application provides an easy way to achieve the function. Six out of ten users (60%) thought that the complexity of functions was easy.

The fifth question is whether the user enjoys using the application features. All respondents agreed with the statement, and three out of ten (30%) strongly agreed with the statement. Furthermore, the sixth question is whether the application is running smoothly without crashing or lagging in the user's device. Eight out of ten users (80%) agreed that the application ran smoothly on their device, while one (10%) strongly agreed with the statement. However, one user (10%) said the application's stability is moderate. Additionally, the seventh question asks whether the error message will show if the user entered the wrong information, as illustrated in Figure 5.50. three out of ten users (30%) strongly agree that the error message functions well, whereas seven (70%) agree with the statement. Moreover, the eighth question is whether the user can track their calories through the application. 80% of respondents, or eight out of ten, agreed that the application provides an easy way to perform the function. Two out of ten users (20%) strongly agreed with the statement. The nineth question is whether the user can do a workout with the assistance of a timer in the application. Half of the users (50%) agreed that the application helped them do workouts, while one (10%) strongly agreed with the statement. However, four users (10%) said the functionality of the workout module is moderate. Lastly, the final question asks the user whether they can track their running details in the application. three out of ten users (30%)

strongly agree that the GPS tracker module functions well, whereas seven (70%) agree with the statement.

Table 8: System Usability Scale

Respondent	Question										Total Marks
	1	2	3	4	5	6	7	8	9	10	
1	3	4	5	4	5	4	4	5	3	4	41
2	4	4	4	4	4	4	4	4	4	4	40
3	4	5	4	5	4	5	4	4	3	4	42
4	4	5	4	4	5	4	5	4	4	4	43
5	4	5	4	5	4	4	4	4	5	4	43
6	4	4	5	4	4	4	4	5	4	4	42
7	5	4	5	5	5	4	5	4	4	5	46
8	4	5	4	5	4	3	4	4	3	4	40
9	5	4	5	4	4	4	5	4	4	5	44
10	4	4	5	4	4	4	4	4	3	5	41
Total Score											422

$$System\ Usability\ Scale = \frac{Total\ Marks}{Overall\ Total\ Marks} \times 100\% = \frac{422}{500} \times 100\% = 84.4$$
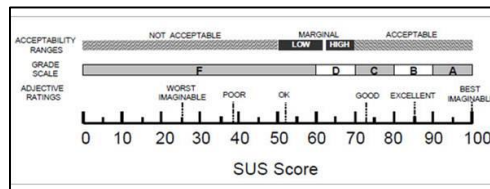

Figure 14: System Usability Scale

As shown in Table 7, all beta testing data have been collected. The two test areas of user acceptance level and functionality testing are analysed using the system usability scale methods shown in the Equation above. The scale of system usability used to establish the acceptability ranges is depicted in Figure 11. In a nutshell, the program's overall percentage of usability is 84.4 percent, indicating that the application is well acceptable.

Respondents were also interested in the number of calories they consume through meals. This feature encourages them to be more mindful of their daily caloric consumption. This application's layout is straightforward and intuitive. Nonetheless, several users have also provided suggestions for the application's enhancement. For example, this application should investigate additional capabilities such as enabling step counter or meal plan to track their fitness more effectively.

5. Conclusion

Finally, the 'Fitastic' Health and Fitness Application was successfully constructed. This application has accomplished all the goals and improved the health and fitness of its users. The application allows users to track their daily calories intake, anerobic and aerobic exercise. This application was established and developed on scheduled based on a well-planned Agile methodology, and user testing revealed the intended outcome. Additionally, the application's strengths and weaknesses were uncovered through unit testing and user testing. For example, this application lacks a fitness counter to detect the step of everyday. However, the SUS score of this application is 84.4%, indicating that users were pleased with the application's usability. Finally, several suggestions for future enhancements were made for a better version of the 'Fitastic' Application.
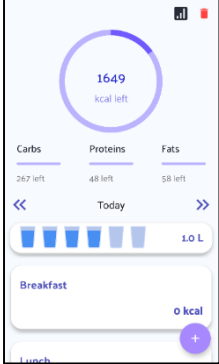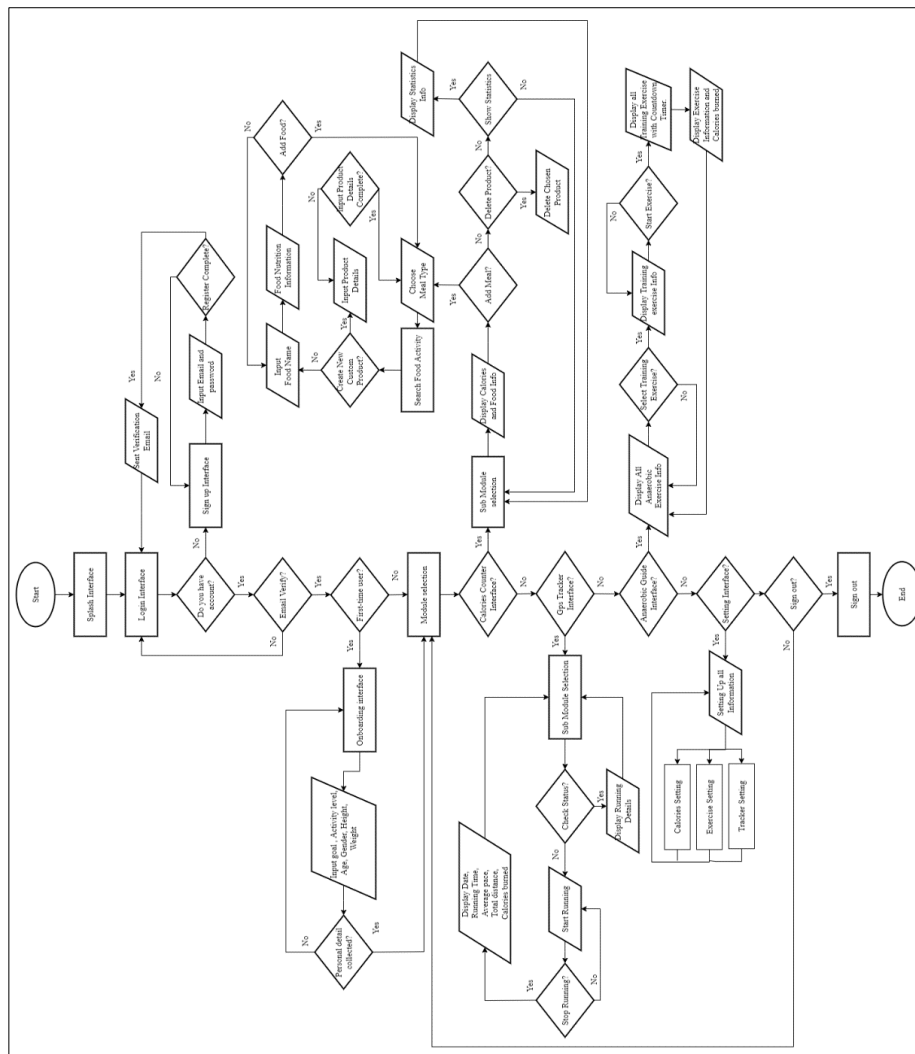
Acknowledgement

Appendix A: Entity Relationship Diagram
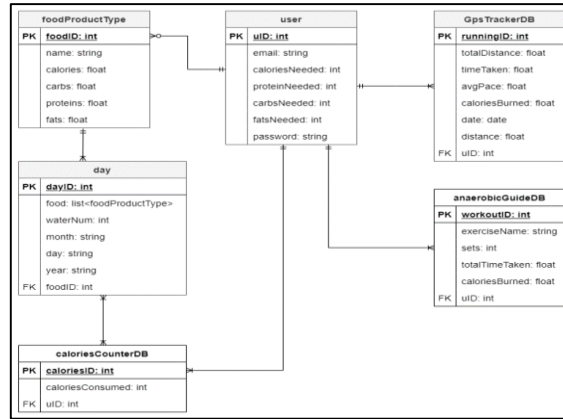
Appendix B: Flow Chart

Appendix D: 'Fitastic' Health and Fitness Application output interfaces

Interface	Authentication Module	Calorie Counter Module	GPS Tracker Module	Anaerobic Guide Module
Output				

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