Design Document

for

Smart Health Monitoring Application

Version 1.1 approved

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SKR

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Revision History

Name	Date	Reason For Changes	Version
Winnie Zheng	12/17/2018	Sleep Functionality Updated	1.1

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1 INTRODUCTION

The purpose of this software application is to provide a clear, easy to use, and informative application for users to track and visualize their health information including physical metrics, dietary metrics, and activity metrics.

The intended users of our application will be health and/or fitness conscious individuals. These individuals include, but are not limited to, athletes, dieters, personal trainers, and people looking to live a healthy life. This software application will not be focused on meeting the needs of people not interested in personal health.

It is preferred that these users are familiar with operating and navigating an application on Android.

2 REQUIREMENTS

2.1 User

Each user is associated with one account. Every user is associated with a username and password for login. New users can register for an account by inputting a username, a password, and their physical information.

Each account is associated with a user profile which stores the user's name, sex, height, weight, and age. Users are able to change the information at any time.

2.2 BMI

Using the weight, height, and age stored in the user profile, the BMI level is calculated and displayed.

2.3 Pedometer

The app tracks the number of steps that the user has taken, with the device on their person, and display the count.

2.4 Calorie Intake

User inputs the food that they have consumed, including the suggested nutritional value information, and the application stores it in a database. Users are able to add a new food item at any time.

The total calorie intake is displayed to the user and based on the other information inputted, it warns the user to stop consuming a certain type of food (i.e. tell the user too much sodium has been consumed).

2.5 Hydration

User inputs the amount of water they drink throughout the day and the amount is summed up. The total amount of water they've drank is displayed as a progress bar compared to the daily recommended amount, which is 8 cups.

2.6 Sleep → still in development

User inputs the amount of sleep they've gotten and based on the target amount that they can set in the user profile, the app gives suggestions.

2.7 History → still in development

Application should allow users to track their history.

3 APP DESIGN

3.1 App Behavior

Each individual user has their own account where all their data is kept. If users don't have an account, they are given the option to register for one. Upon logging in, users gain access to all the functionalities.

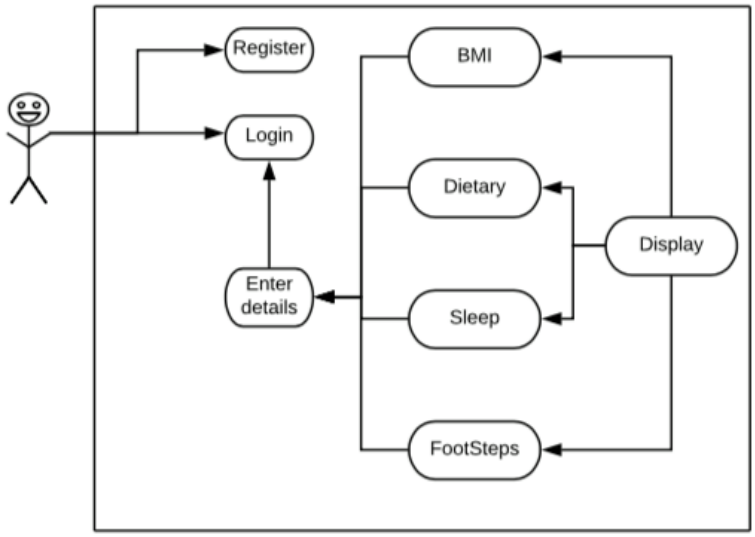

Figure 1: Use Diagram

In order for any of the functionalities to work, however, users must import data such as physical descriptions, diet intakes, and sleep amount. All of the data are used by different subclasses to perform calculations for the desired data, such as BMI, total calorie intake, sleep suggestion, and etc. Once calculated, the data is then displaced to the user.

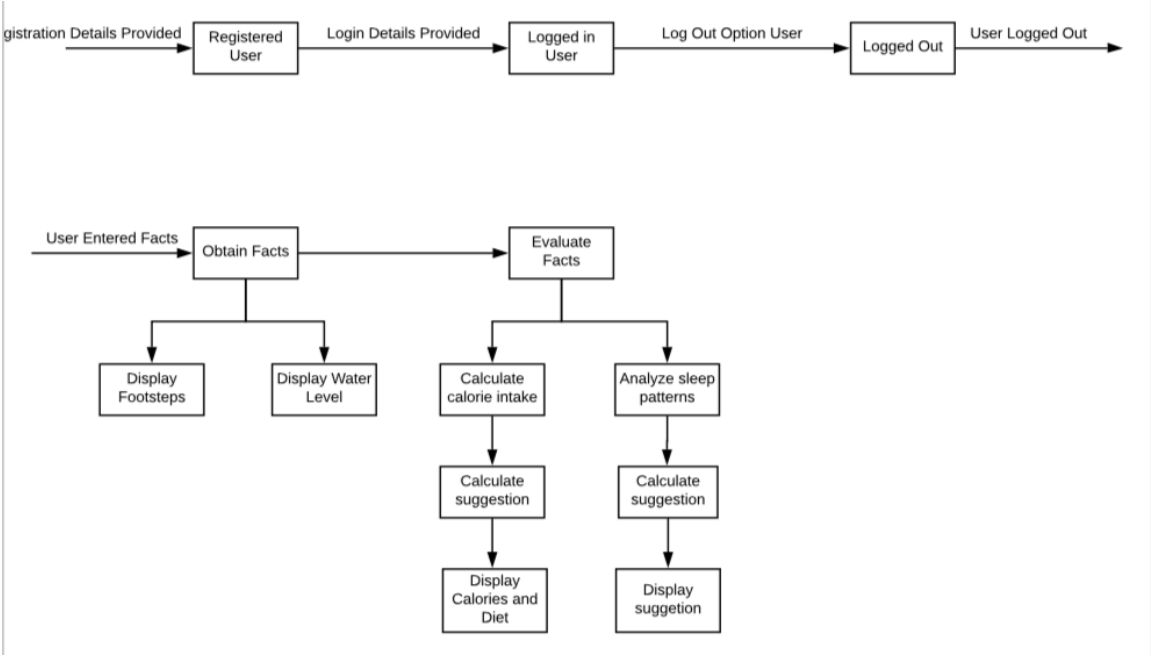

Figure 2: State Diagram

3.2 App Dataflow

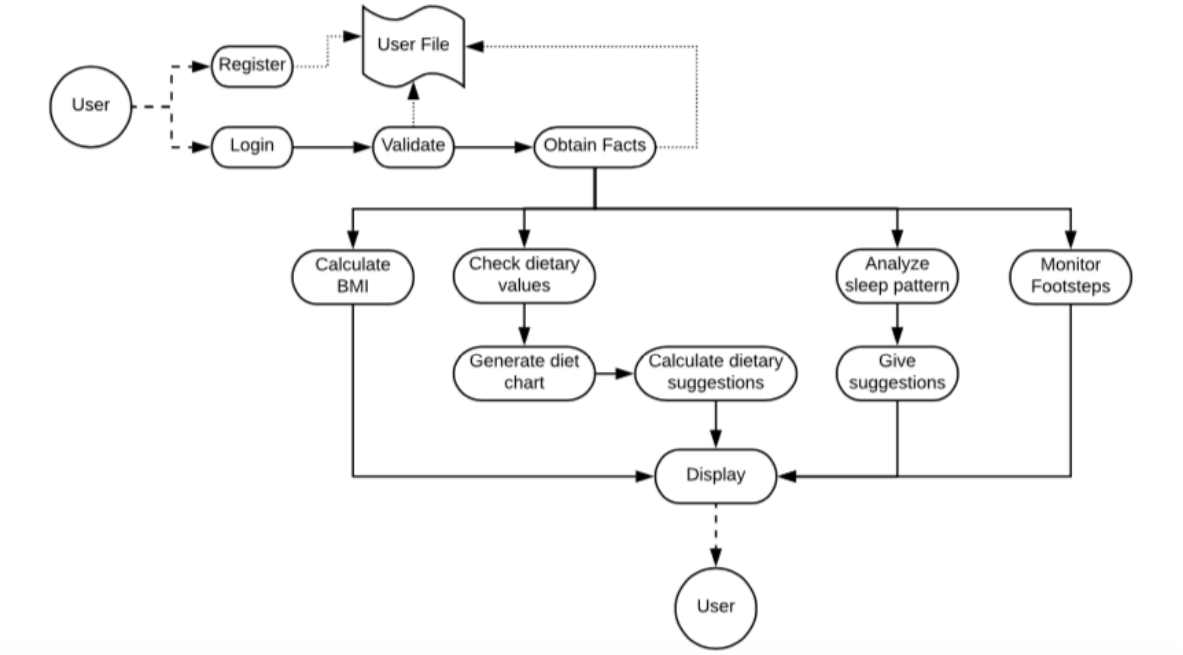

Figure 3: Data Flow Diagram

4 IMPLEMENTATIONS

Figure 4 displays the architectural breakdown of the SKR Personal Health app, where each functionality is its own package.

There are two deviations from the Figure

1. The app is broken into five subsystems instead of four. In the figure, the Calorie subsystem handles both the caloric intake calculations as well as hydration. In the actual application, hydration intake is its own separate subsystem.
2. All the subsystems communicate with each other via a single main class. This main class replaces the Calculate class in the middle of Figure 4.

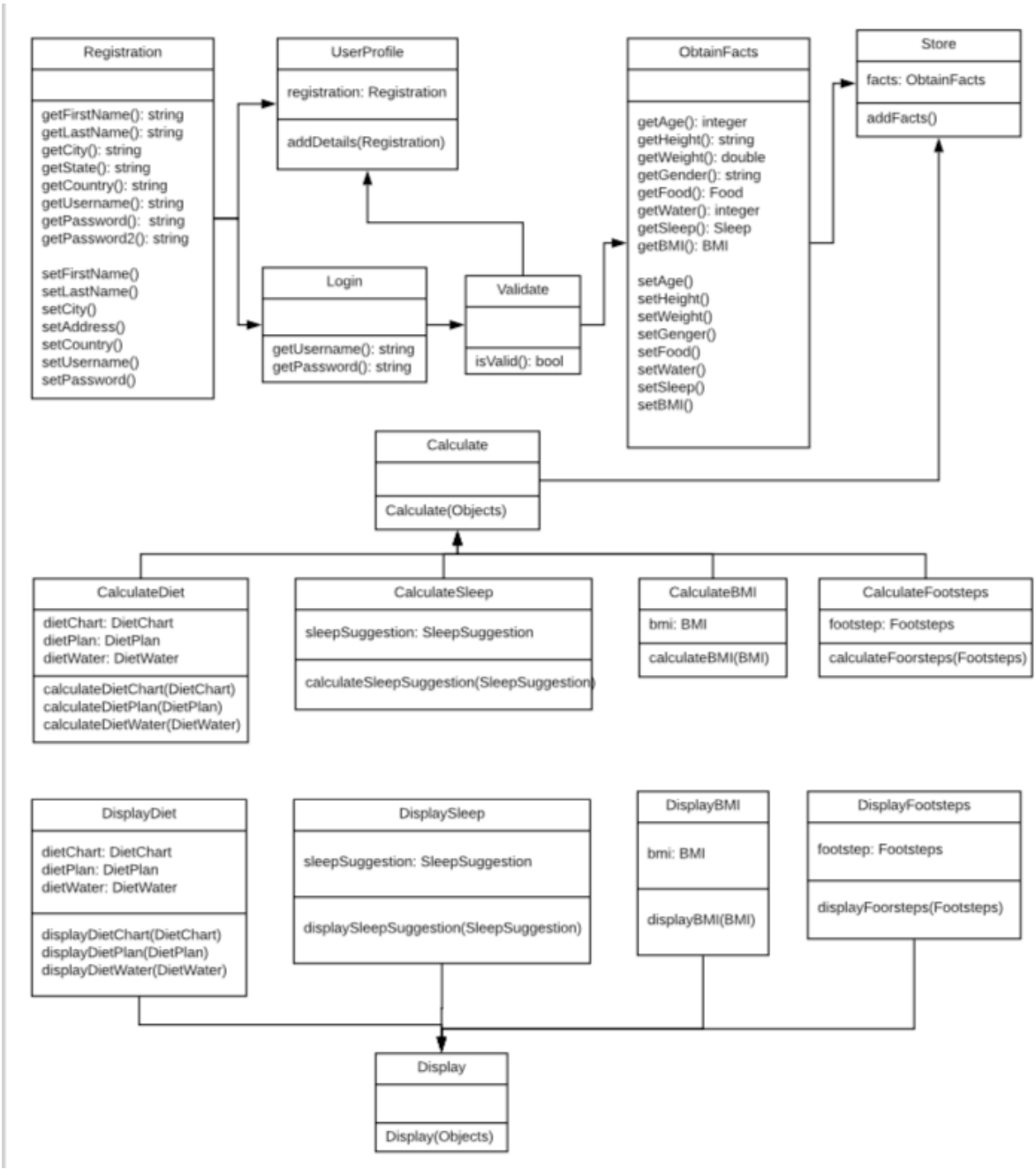

Figure 4: Class Diagram

4.1 User System

When registering the first time, user input their data.

- Buttons are used for gender selection.
- Draggable scale is used for height, weight, ideal weight, and time period.

User can adjust these setting under system preferences in the menu.

4.2 BMI System

The BMI subsystem takes in the user's physical information, which they inputted and are stored in their profile, to calculate BMI.

The BMI is displayed using a gauge. Users can see how their BMI compares to the various range that are appropriate for them.

4.3 Pedometer System

Utilizing the sensors on the android phone, we calculate the user's three-dimensional change in position. If the change is significant enough, defined by a pre-set range, then the movement is considered a step.

The number of steps that the user took is stored as a counter variable. If the movement was a valid step, then the step counter is incremented.

User's steps will be monitor as long as they are logged in and they are not in system preferences frame (where they can change their physical data). The app does not need to be on-screen but must be open in the background and logged in.

4.4 Calorie System

The calorie system involves the usage of the SQLite database package that can be imported in Android Studio. The database is used to create a table that stores a food's name, calorie, total fat, cholesterol, and sodium information. The last three options were included because those are nutritional values that people need to watch out for as consuming too much is detrimental to one's health.

User input the information about the food they have eaten that day. This class has four buttons that serve different functions.

4.4.1 Add

User fill out the five text fields with the corresponding information. When this button is pressed, the new food item is added to the food database.

4.4.2 Delete

This function only requires the user inputting the food name that they wish to remove. Each item in the table is traverse through until the name of the food entered is match with a table entry. The table entry is then deleted from the database.

4.4.3 Update

User fill out the five text fields with the corresponding information. When this button is pressed, the table is traverse through until the name of the food entered is match with a table entry. That entry's calorie, fat, cholesterol, and sodium levels are updated with the new data that the user inputted.

4.4.4 View all

This displays the table for users to see, including the food name, calories, fat, cholesterol, and sodium. The total calories, fat, cholesterol, and sodium intake of all the entries is added and displayed on the bottom.

4.5 Hydration System

User's hydration intake is stored as a counter variable.

On the interface, there is an arch that displayed the user's hydration intake compared to the recommended value, which is eight cups. There is also two buttons, "+" and "—". User press the "+" button to add their hydration intake by cup and "—" to remove intake by cup.

4.6 Sleep → still in development stage

Utilizing the sensors on the android phone, we monitor the changes in the movement of the phone between 9:00 PM and 9:00 AM. If, at any point, the user was not moving for more than 5 minutes, then the application considers the user asleep. The application checks the data from the accelerometer every minute but the user must be at rest for five continuous minutes. At the end of the five minutes, the total sleep time counter will increment by 5 minutes.

In the future, we will be integrating the microphone as well as long as the user gives the app the permission. The microphone will be used to detect breathing patterns and/or snoring to get a more accurate reading of whether the user is actually asleep or just at rest.

4.7 History → still in development stage

There will be a progress bar that lets the user know how many days have passed/remain in the time period that they indicated