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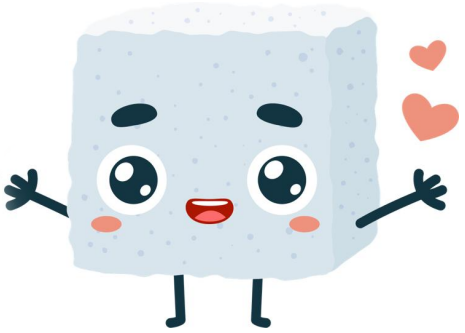
كلية الحاسبات وتقنية المعلومات
جامعة الملك عبدالعزيز

# SUKARY

YOUR ULTIMATE APPLICATION TO EDUCATE YOUR KID



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Instructors: Dr. Samar Alkhuraiji & Dr. Nojoud Alshehri

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| 21/9/2021 | 0.1 | Work on phase 2 | All members participated |
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# Table of Content

## Project Name: Sukary

## Project ID: 4

# Phase 1: Project Description

## 1.1 Introduction

Diabetes or Diabetes mellitus is a long lasting chronic disease that occurs when the patient's pancreas is not able to produce or make a good use of the hormone insulin, which is important to make the body cells get energy from the glucose that exist in the food we eat. When the glucose rate remains high in the blood with no regulation, it affects the patient's body with several damages like kidney failure and osteoporosis.

Through the years, scientists did not find specific reasons why some people get diabetes and others don't, but there are many possible reasons such as environmental and lifestyle factors, genetics and family history, removing or damaging the pancreas, and hormonal diseases.

There are three types of diabetes, type1 is when the body's immune system attacks the cells that produce insulin, thus pancreas will not make insulin, thus the body will always need to take insulin, this type is commonly diagnosed in children and young adults. Type2 is when the body is unable to use insulin well and it is common between adults, it can be moderated with healthy diet and physical activities. The third type is Gestational diabetes which can be diagnosed during pregnancy, and it usually disappears after pregnancy.

In our project, we will focus on the first type of diabetes, which usually affects children, so we will build an application with " Sukary" fictional character that combines nutritional and sports education appropriate for the health of the child and a stimulating environment with the participation of other children with diabetes.

## 1.2 Project Organization

Our team contains the following members to complete the project:

- Lameer Shamsaldeen, project manager.
- Rehab Nuhayd, public relations and coordination.
- Samanh Ibrahim Alsaeed, designer.
- Nada Balsharaf, designer.
- Miraz Ahmed Badrais, programmer.

Firstly, we will present the idea of the project and the problems we want to solve. then, the proposed solutions to these problems. Also, we will define the project goals, and make a clear idea of what is included in the project and excluded. Then we will move into the next stage to determine the requirements for the project, and the necessary data

collection for analysis. In the third phase, we will design the UML class diagram with its relations. The designing of the Sequence diagram, State diagram and Activity diagram will be in the fourth phase. Finally, we will test the performance of the project.

## 1.3 Problem Description

Diabetes is one of the most common diseases around the world, and the number of people infected with it increases with time. It also attacks children, especially the first type of it. So far, the main causes of infection are not known, but there are many genetics and unhealthy diets, and others.

Therefore, many children affected by the disease need awareness and a special health care provider to confront the disease and live a normal lifestyle that does not differ from their peers, in addition to the fact that there are few parents who can deal with the disease properly and appropriately so the child would not feel different from others and provides him a natural and healthy lifestyle.

## 1.4 Project Goal

The main goal is to build an application that serves children with diabetes. Our application Sukary aims to facilitate dealing with children with diabetes, as well as motivate and encourage them to compete among themselves by collecting the most points per month to present them with a prize according to their scores. We also aim to raise awareness and educate children about diabetes and give them a place where they can find help and support.

## 1.5 Project Objectives

- Enable the feature of creating an account for the child, adding his friends and following them, so that the competition among them increases, they can also collect points, and according to their scores, prizes will be available in the gift store.
- The application provides information on diabetes type 1 for children that will benefit and support the child to become self-reliant.
- The application provides a carb calculator to allow the child to eat a variety of foods, increase the child's sense of control and manage diabetes.
- The application helps children learn the daily sports that are suitable for them according to their daily needs.
- Display an interactive table list shows the carb found in various types of food in create my meal.
- Link the application with the Saudi Children's Diabetes Charity Association in

order to publish the events and activities that are held for children's diabetes.

## 1.6 Project Scope

Generally, our system is a medical, educational application which focuses on diabetes children. The main functionality is to encourage, support diabetes children and educate them about the diabetes disease in simple and enjoyable ways.

### 1.6.1 Included

- Create a profile.
- Add friends.
- Mini games simplify forbidden and permitted habits, with rewarded points when the child wins.
- According to the weight, height and age in the profile the system provides suitable sports for the child, while providing some information about the sport.
- Compete with friends by achieving the highest score.
- Display a top 10 list according to the highest score.
- The system notificate the child about events and activities in the Saudi Children's Diabetes Charity and awards them for participation.
- Carb calculator which calculates the amount of consumed carb to control sugar blood and allow the child to create his/her daily meals, eat a variety of food, and increase the child's sense of control.

### 1.6.2 Excluded

- Notifications that remind of taking insulin.
- Notifications that remind of making insulin tests daily.
- Link Glucose meters to record and track blood sugar rate.
- Booking appointments with doctors.
- Determine the needed amount of insulin dose.

## 1.7 Sources of Domain Analysis Information

The data and information we collected in this project relies on the domain experts: Doctors, Health Ministry website and other sources such as members of diabetes local charity organization and scientific articles on the internet. Along with our knowledge of people who suffer from this disease and in the latest tools made for diabetes from surroundings.

Similar existing projects to our project are Sukary and Lenny. , such that both

are made to educate the children with diabetes about their disease and raise their awareness in simple and fun ways.

### 1.8 System's Stakeholders

Everyone affected by this project including children with diabetes, their parents and local charity organizations that are interested in educating and raising awareness of children with diabetes and their parents.

# Phase 2: Business Requirements Specifications

## 2.1 Requirements

### 2.1.1 Functional requirements

R1: The system shall ask the users to login

R1.1: The system shall allow the users to edit profiles.

R1.2: The system shall allow the user to view friends list in the profile.

R2: The system shall allow the users to add each other through:

R2.1: The system shall allow the user to add friends by their username.

R2.2: The system shall allow the user to add friends from shared educational mini games.

R2.3: The system shall allow the users to add each other from the top10 list.

R3: The system provide carb calculator in Create my Meal

R3.1: The system shall generate a random amount of carbs.

R3.2: The system shall ask the user to create a meal with that specific amount of carbs

R3.3: The system provides a list of food for the user to choose from.

R3.4: The system shall allow the user to drag items from the food list and drop them into the meal box.

R3.5: The system calculates the carbs of the items in the box, and compares the amount of carbs as requested.

R4: The system shall allow the users to play mini games.

R4.1: The system shall allow the users to choose games.

R4.2: The system shall allow the users to leave games.

R5: The system count the gained points for each user by several ways:

R5.1: Playing mini games.

R5.2: After each use of ‘Create my meal’.

R5.3: After confirmation of participation in the Saudi Children's Diabetes Charity events by the charity administrator.

R6: The system shall allow the users to view the top10 list.

R7: The system shall suggest suitable sports to the users.

R7.1: The system shall update sport according to information in the profile.

R8: The system shall allow the user to redeem points in the Gifts Store

R8.1: The system shall view an option to the user to redeem the points in the Gifts Store.

R8.2: The system shall allow the user to choose a gift from the Gifts Store.

R8.3: The system shall subtract the cost of the chosen gift from the user's total points.

### 2.1.2 Non-functional requirements

R1: The system shall allow up to 2000 users to use the application at the same time.

R2: The system shall be able to keep the privacy of the user's information.

R3: The system shall be available in English and Arabic.

R4: The system shall be user-friendly.

R5: The system shall be able to respond within 5 seconds

R6: The system shall be able to recover from a failure within one day.

R7:The system shall notificate the user about:

R7.1: Reaching a targeted number of points (multiples of 500).

R7.2: Events of  Saudi Children's Diabetes Charity.

R7.3: Daily reminder to use the app.

R8: The system shall allow redeem points in the gift store after reaching the minimum number of points which is 500 points.

R9: The system shall generate random games depending on:

R9.1:  The system generates Games suitable for children 4+ years.

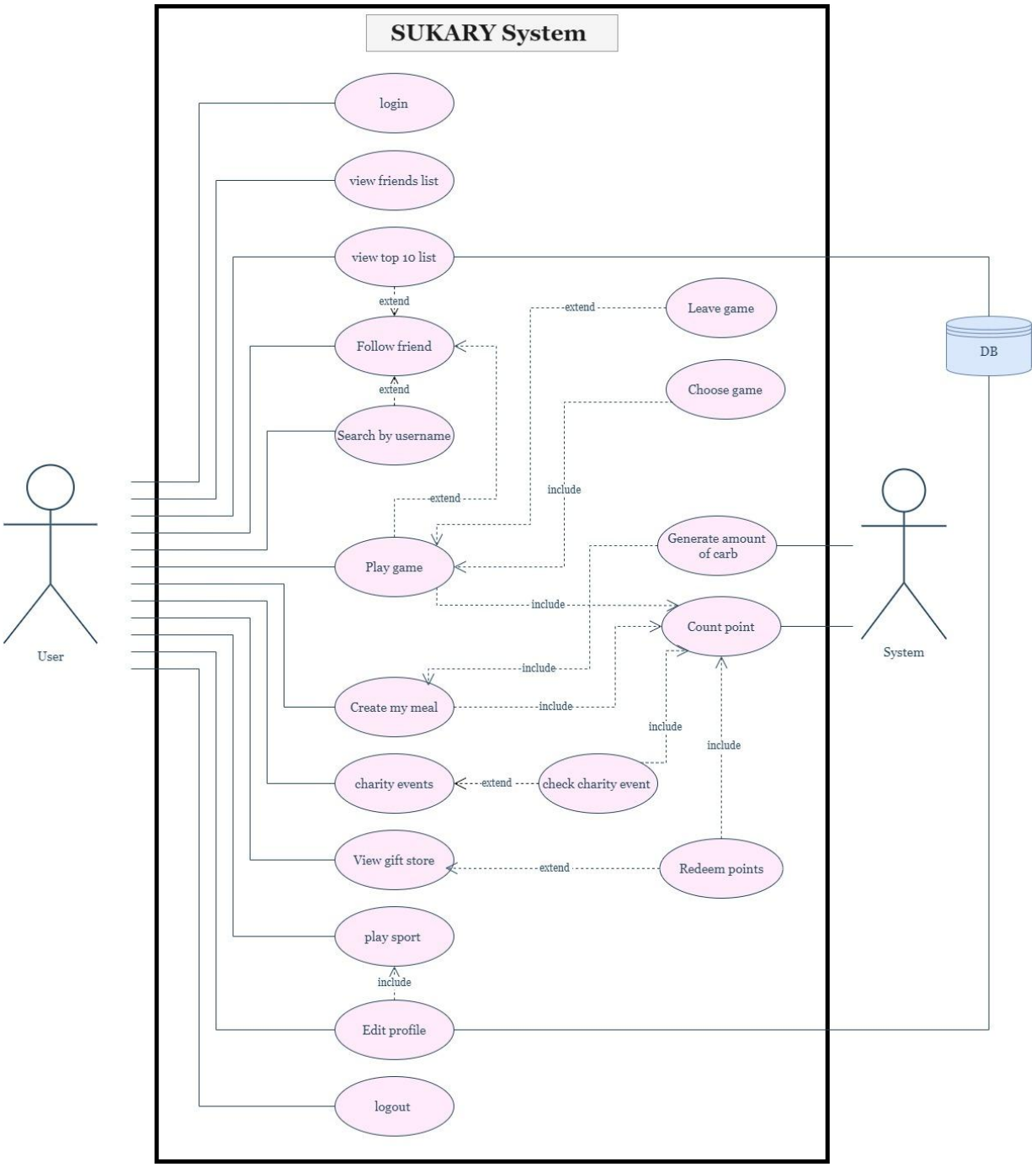
R9.2: The system shall not allow a game to exceed 5Mb.

## 2.2 Techniques for gathering data

The way we used to collect the data is to do research. We concluded from the

research the most prevalent types of diabetes among children and what the diabetic needs, such as learning how to calculate carbohydrates, In addition, information about type 1 diabetes is given in a way that is not suitable for children to learn about the disease and how to deal with it. And this is one of the most important reasons for building the application.

## 2.3 Utilize Use Case Model



## 2.4 Four main use case description

### 2.4.1 Use case1

| | | |
|---|---|---|
| **Use case name** | Follow friend | |
| **Scenario** | Follow friends to increase competition between them. | |
| **Triggering event** | friend is added to the friends list. | |
| **Brief description** | A user can follow other users through multiple ways to make them able to play mini games together. | |
| **Actors** | User | |
| **Related use cases** | 1. Search by username.<br>2. View top 10 list.<br>3. Play game.<br>4. View friends list | |
| **Stakeholders** | User (children with diabetes). | |
| **Precondition** | The user must be at any condition of the related use cases, a follow button exist for:<br>1. each user in the top 10 list.<br>2. if a user is found after searching by its username.<br>3. When joining a game. | |
| **Postcondition** | A friend is followed by the user. | |
| **Flow of activities** | **Actor** | **System** |
| | (when a user searches for a friend by username. )<br>1- Click the 'search friends ' button.<br>2- Enter his/her username .<br>3- Click the button "Follow" | (when a user searches for a friend by username. )<br>1.1- The system displays a space to enter the username.<br><br>2.1- The system shows the result of search and the button of "Follow" friend.<br><br>3.1- The system adds a friend in the "Following" part of the user. |
| | (When the user clicks on the top ten list)<br>1- Click the button "Follow" beside each user on the top ten. | 1.1- The system adds a friend in the "Following" part of the user. |
| | ( When user join a game )<br>1-Click the button " Follow | 1.1- The system adds a friend in the "Following" part of the |

| | | |
|---|---|---|
| | Friend " top of the game interface. | user. |
| **Exception condition** | 1. Wrong entry of a user name to search for.<br>2. Fail to follow other users due temporary system failure. | |

### 2.4.2 Use case2

| | | |
|---|---|---|
| **Use case name** | Play game | |
| **Scenario** | Play a game to get information about diabetes. | |
| **Triggering event** | Play mini educational games. | |
| **Brief description** | Mini educational games for users to educate them about diabetes and what it is, ways to deal with it, bad and good habits. | |
| **Actors** | User. | |
| **Related use cases** | 1. Join game.<br>2. Leave game.<br>3. Count point. | |
| **Stakeholders** | User(children with diabetes). | |
| **Precondition** | The user must click the 'games' tab. | |
| **Postcondition** | 'play again' or 'exit' buttons appear, and a point is added to the user's score. | |
| **Flow of activities** | **Actors** | **System** |
| | 1. click the 'games' button.<br>2. click on the desired game to play.<br>3. start playing | 1.1. list of games appears.<br>2.1(show list of friends to add or play with?<br>3. the system will add a point score. |
| **Exception condition** | 1. Game won't start due to system error or network error. | |

### 2.4.3 Use case3

| | | |
|---|---|---|
| **Use case name** | Create a meal | |
| **Scenario** | Create a meal to practice managing crab amounts in meals. | |
| **Triggering event** | Calculate carb using Create a meal. | |
| **Brief description** | The system generates a random amount of carbs then request the user to create a meal with the same amount of carbs, drag an item from the food list, each item has a picture of the food and the amount of carbs it contains, to meal box to check whether it matches the entered amount. | |
| **Actors** | User, System | |
| **Related use cases** | Count point, Generate random amount of carb. | |
| **Stakeholders** | User (children with diabetes). | |
| **Precondition** | The user must click on the 'Create a Meal' tab, the system will generate a random amount of carbs. | |
| **Postcondition** | Total amount of carb of food is calculated and shown, the system checks if it matches the requested amount, then adds a point to the score. | |
| **Flow of activities** | **Actors** | **System** |
| | 1. Click the 'Create my meal' button.<br>2. Drag food from the food list<br>3. Drop into the meal box | 1.1 The system a random amount of carb<br>1.2 The system shows a list of food.<br>2.1 The amount of carb on the chosen food is calculated and shown to the user. |
| **Exception condition** | 1. The user does't find a specific type of food. | |

### 2.4.4 Use case4

| | | |
|---|---|---|
| **Use case name** | View gift store | |
| **Scenario** | View gift store to redeem points. | |
| **Triggering event** | Redeem points to get a gift from the gift store . | |
| **Brief description** | The gift store has multiple digital gifts that the user can exchange with his point when reaching the allowed limit of points. | |
| **Actors** | User. | |
| **Related use cases** | Redeem point, Count point. | |
| **Stakeholders** | User (children with diabetes). | |
| **Precondition** | The user must be on the gift store page with the allowed limit of points. | |
| **Postcondition** | A gift is gained, and the system reduces the exchanged points from the score. | |
| **Flow of activities** | **Actors** | **System** |
| | 1. Click on 'gift store' button.<br>2. Choose a gift.<br>3. Click on replace points. | 1.1 Store page is shown with points score and list of gifts.<br>3.1 Reduce points from score. |
| **Exception condition** | 1. The user score did not reach the limit of chosen gift.<br>2. The system failed to exchange points with the chesen gift. | |

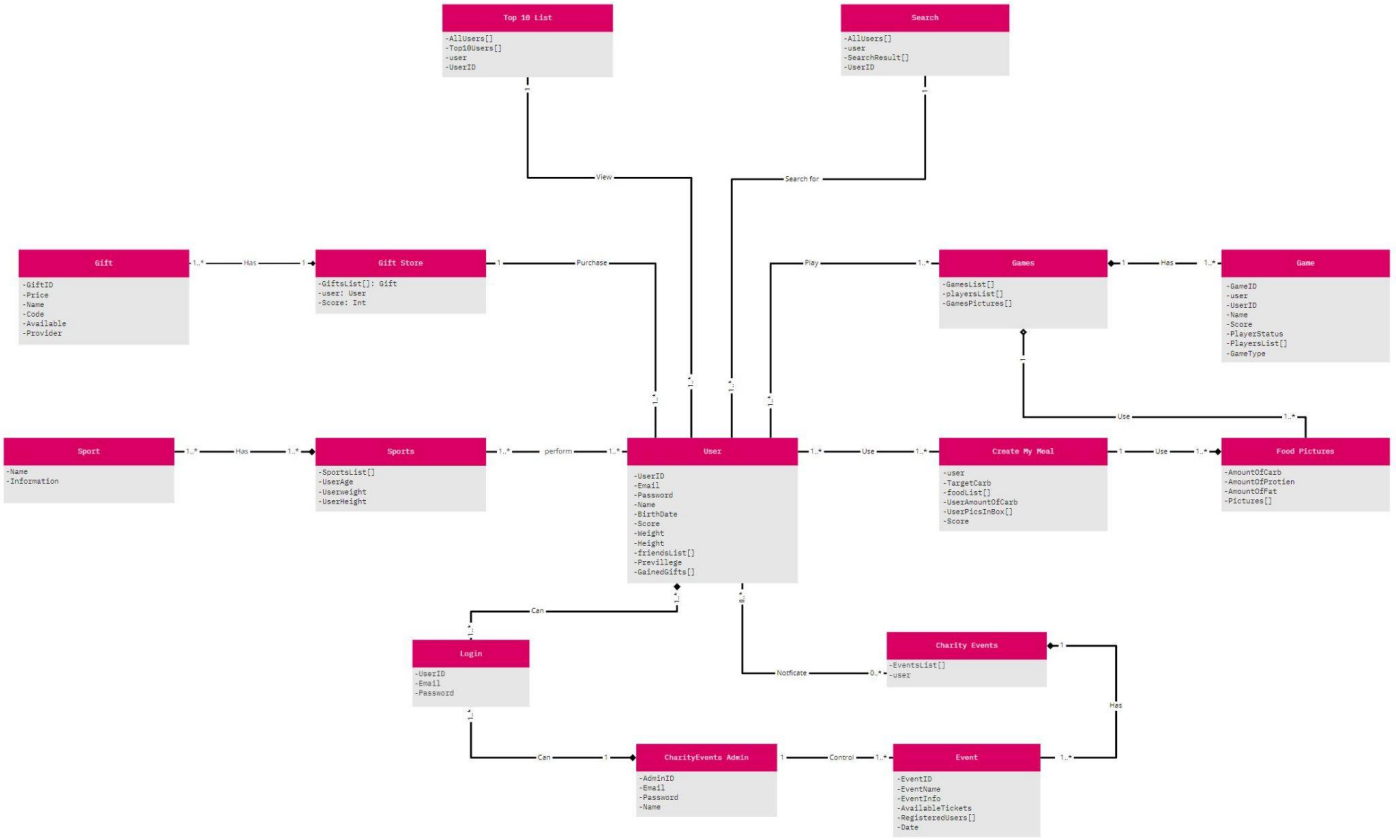
## 2.5 Difficulties & risk analysis in the domain

1. Difficulties communicating with children with diabetes1.
2. Requirements change through the project duration.
3. Difficulty in defining gifts and the type of gifts offered.
4. The difficulty of choosing the best way for a child to learn how to calculate carbohydrates in his meal.
5. The difficulty of choosing the best way to educate children about diabetes.
6. The difficulty of choosing the appropriate information about diabetes that can not be different from one child to another to use in the mini game.

# Phase 3: Design and Structuring

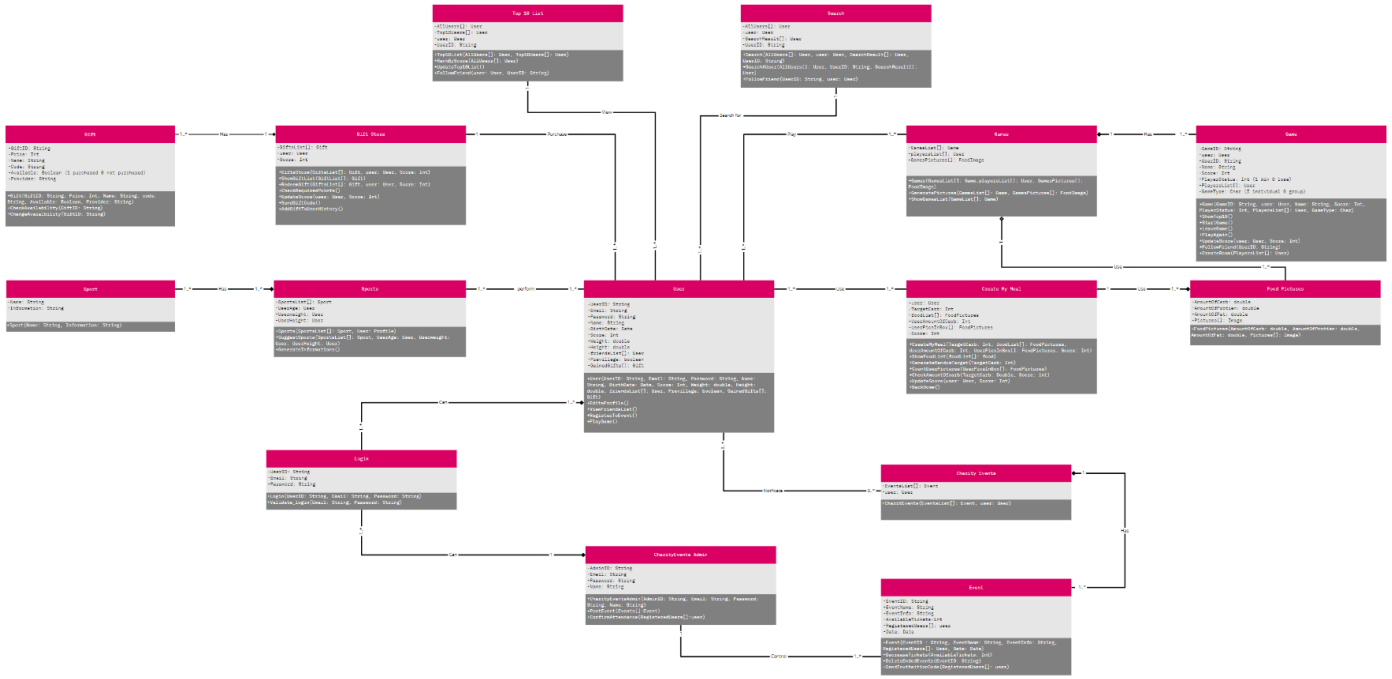
## 3.1 Domain Model Diagram

Click here to view the Domain Model diagram.



## 3.2 UML Class Diagram

[Click here to view the Uml Class diagram.]



### 3.2.1 Association and Multiplicity

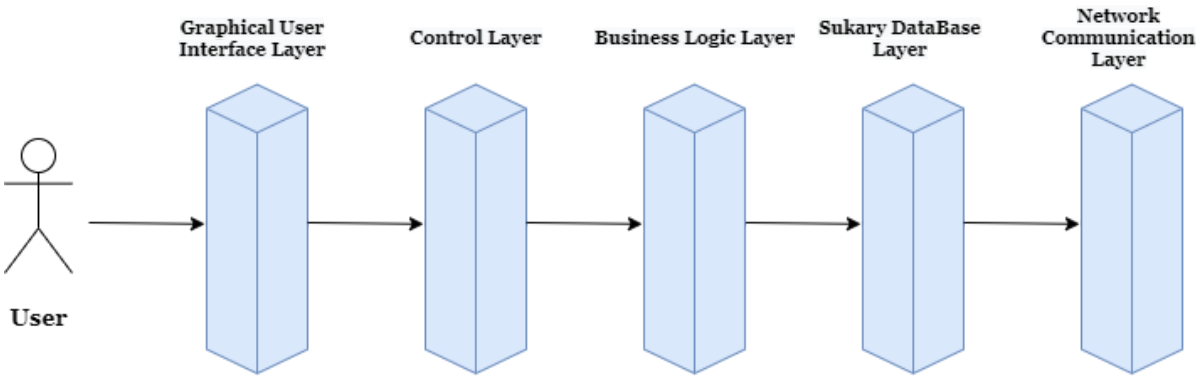
1) Between User class and Create My Meal class.
    - One or more create my meal used by one or more user.
2) Between User class and Search .
    - One or more user search for one search.
3) Between User class and Games class
    - One or more user play on one or more games.
4) Between User class and Sports class .
    - One or more user perform one or more sports.
5) Between User class and Gift Store class
    - One or more user purchase one from a gift store.
6) Between User class and Top 10 List class
    - One or more user view one top 10 list
7) Between User class Charity Events class
    - No user or more notificate from charity events.
    - No charity events or more notificate a user.

### 3.2.2 Generalization

In our UML diagram we don't have a generalization relationship.

## 3.3 System Architecture

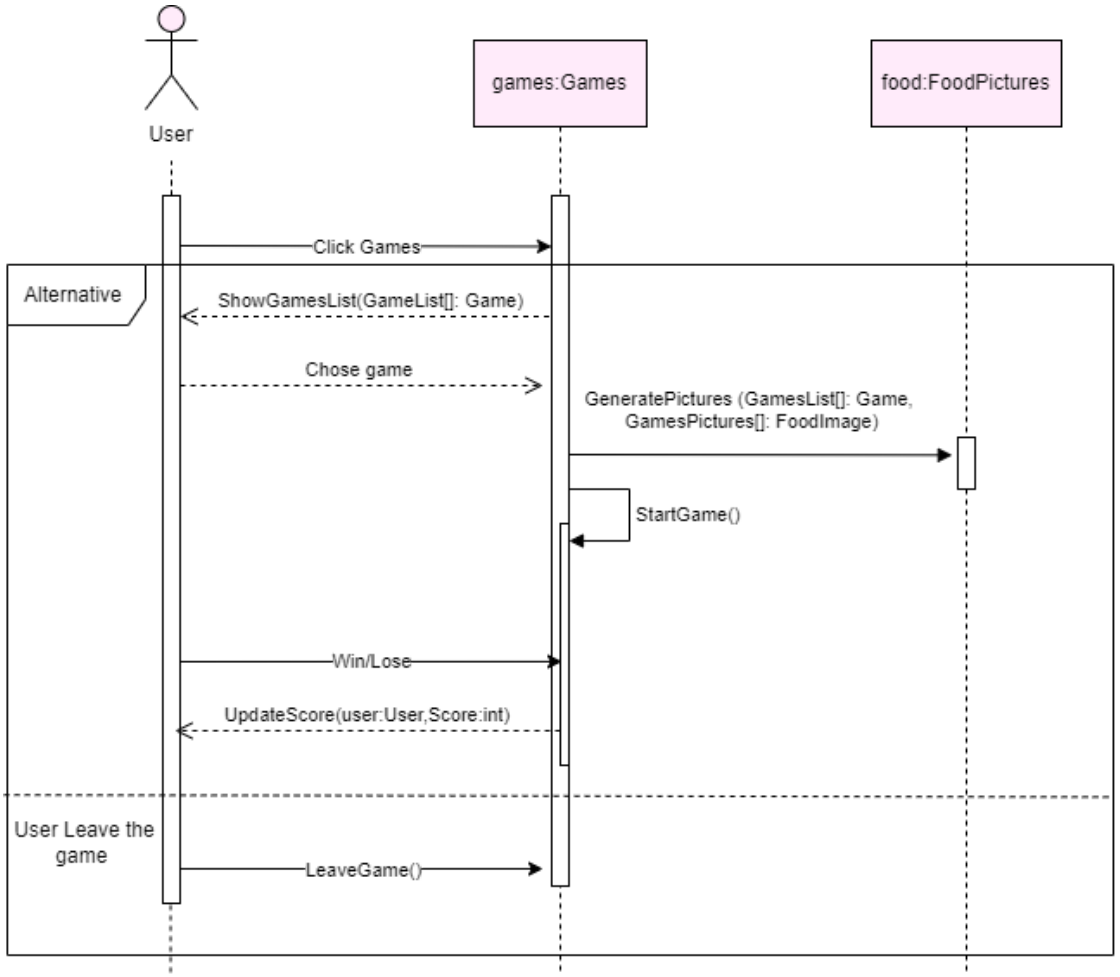
Sukary is an interactive system, as it requires user interaction in all its offered features thus, we choose N-Tier architecture to represent our system.



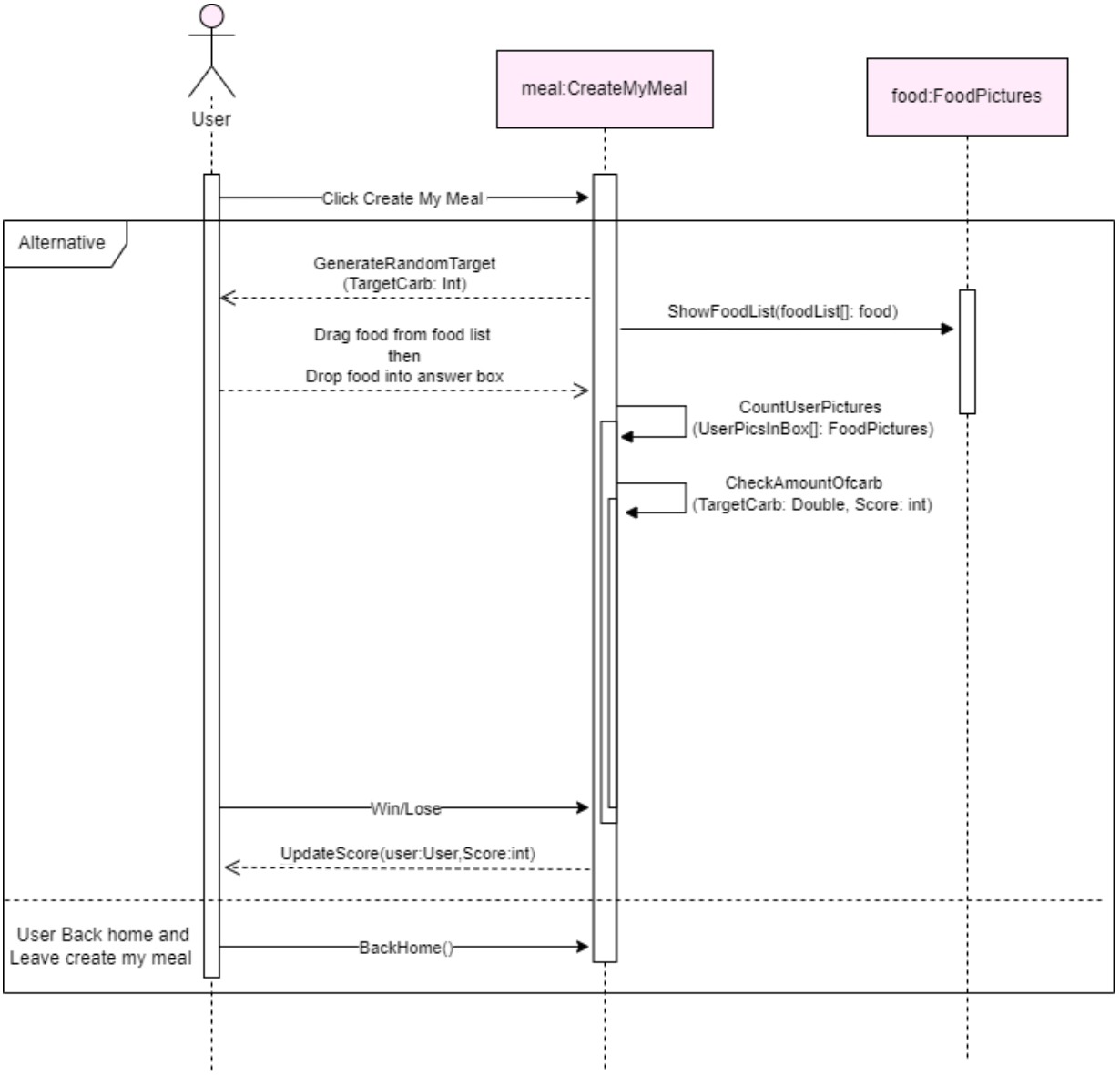

# Phase 4: Modelling, Interaction & Behaviour

## 4.1 Sequence Diagram

### 4.1.1 Use Case2: Play game

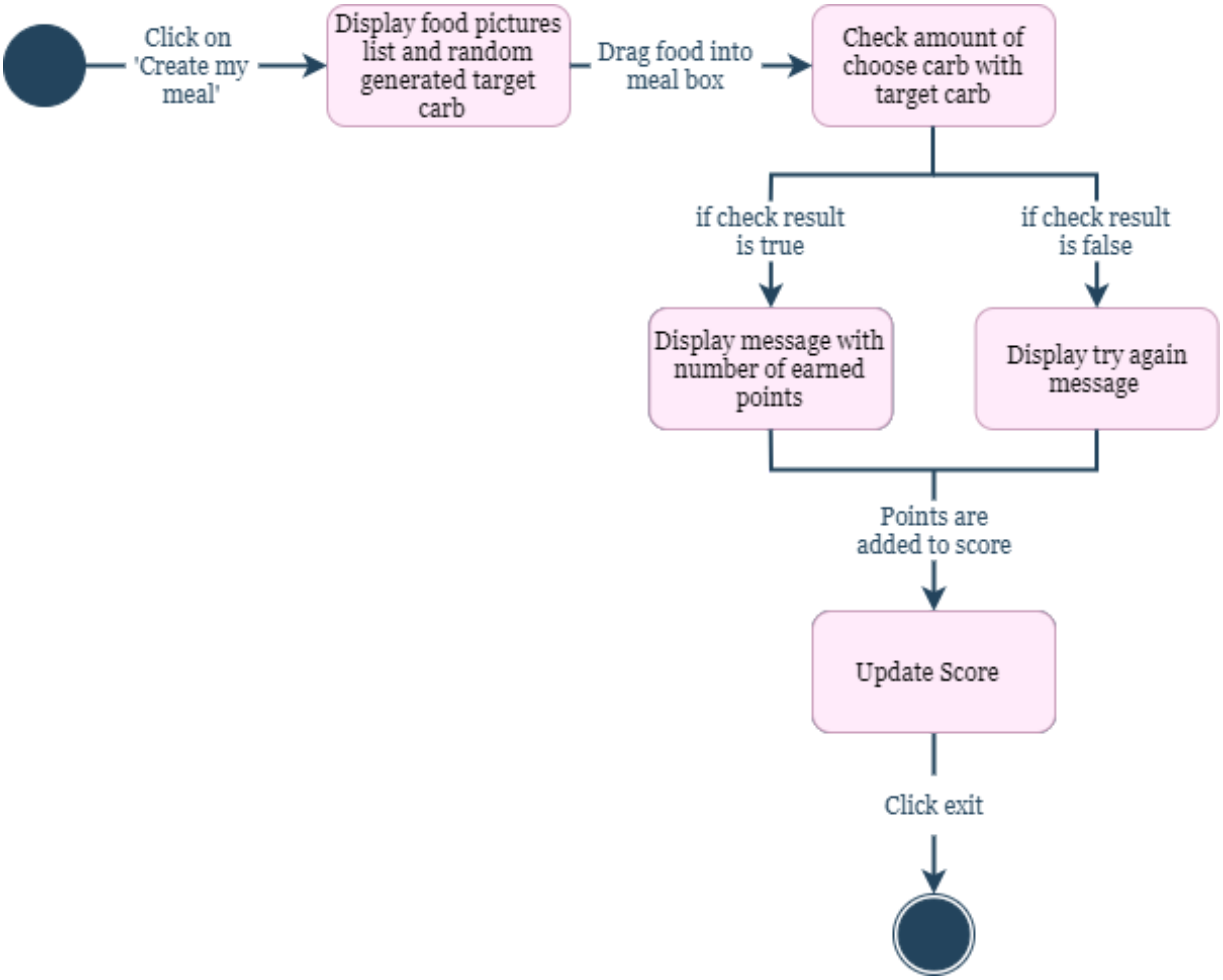


### 4.1.2 Use Case3: Create my meal



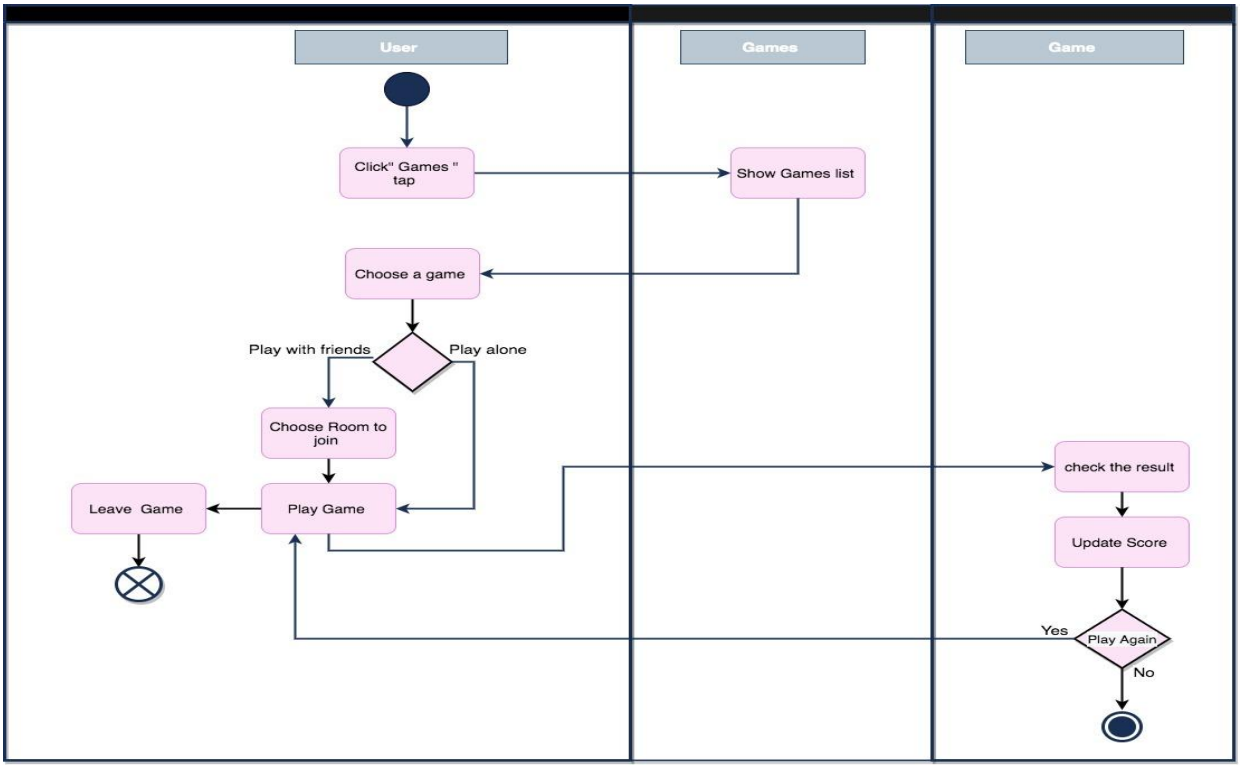
## 4.2 State Diagram

### 4.2.1 Use Case3: Create my meal

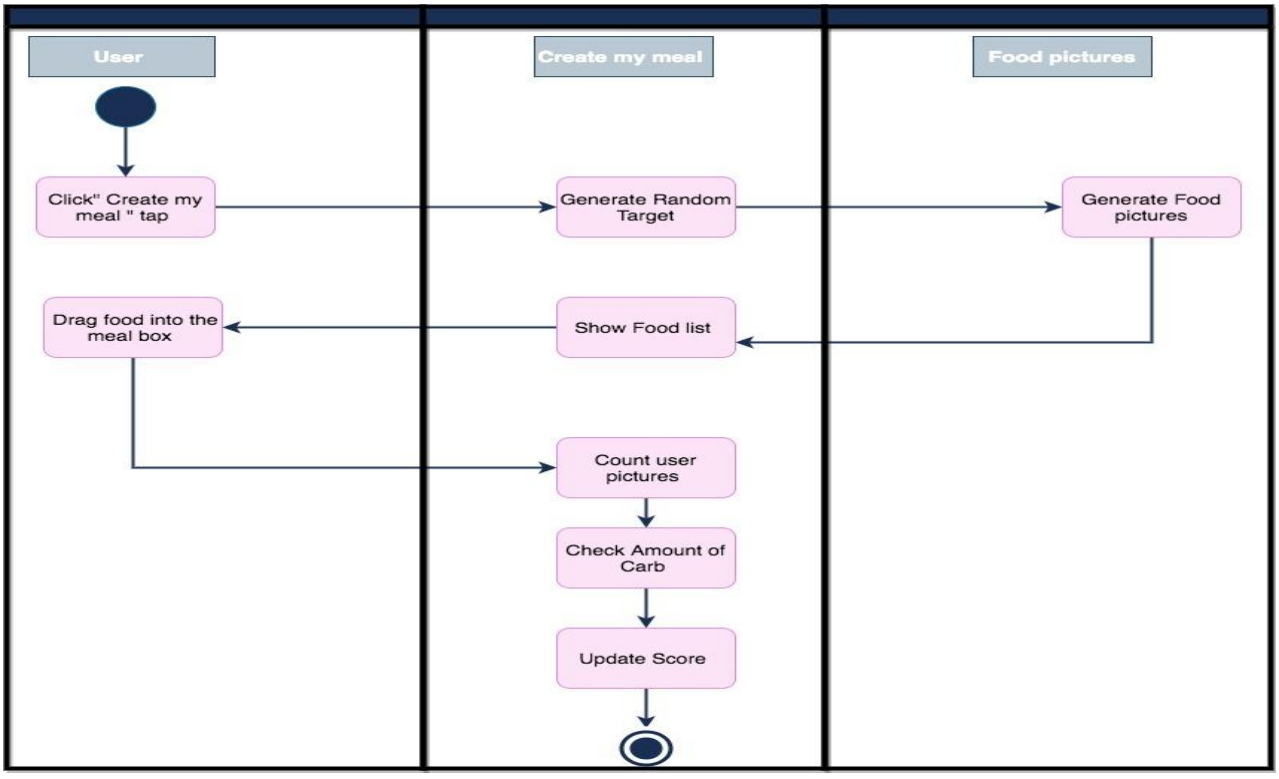


## 4.3 Activity Diagram

### 4.3.1 Use Case2: Play Game

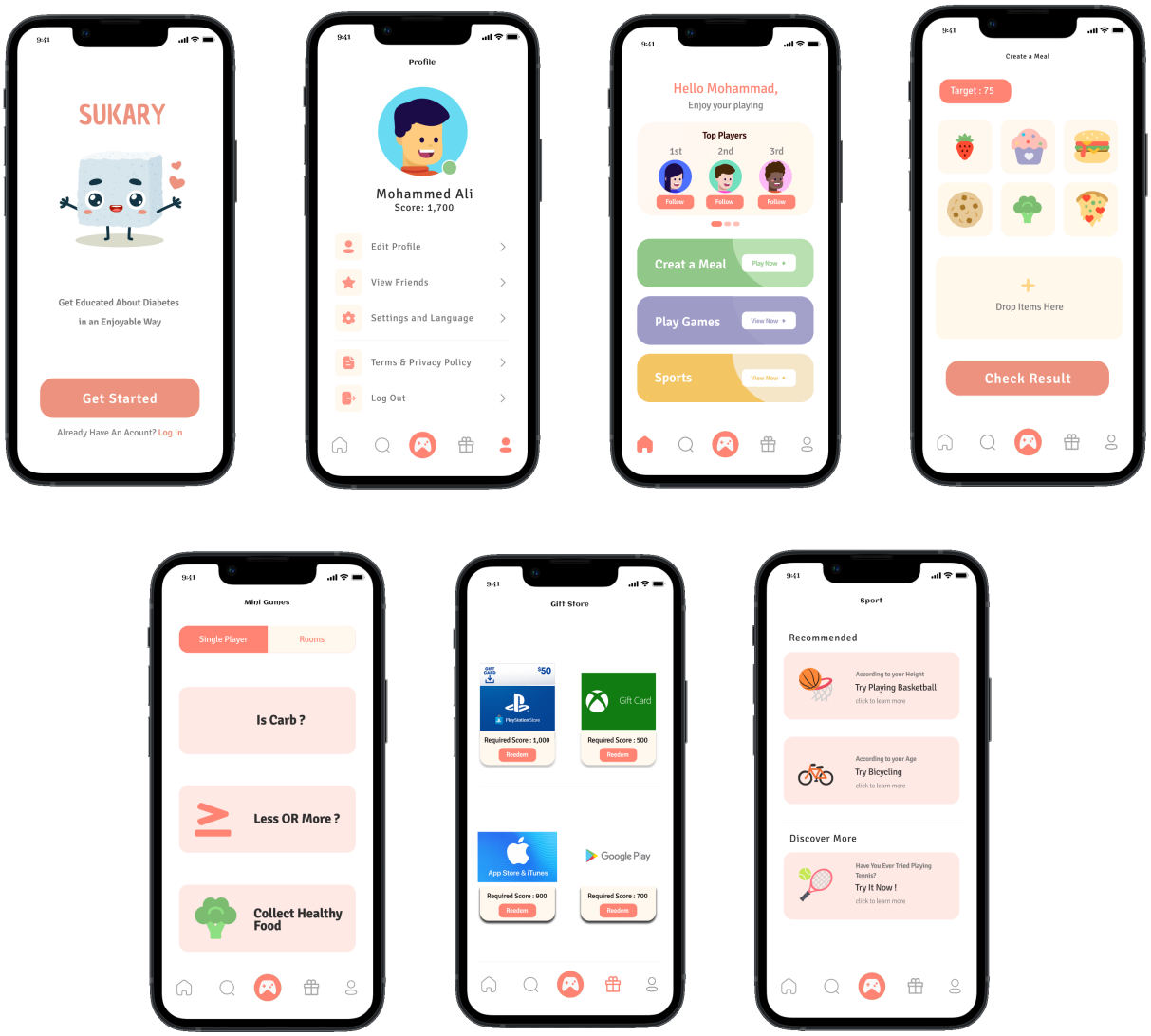



### 4.3.2 Use Case3: Create my meal



## 4.4 Prototype

Here are some prototypes we designed our application:




to view all Prototypes: [click here]

## 4.5 Testing

### 4.5.1 Objective

Measure the success of the system to ensure that the system works properly and all functionalities. Also, to ensure the design of the system is user-friendly.

### 4.5.2 Testing Strategy

The main aim of testing is to ensure that the system meets the functional and non-functional requirements. Also, to detect errors and bugs. Our functionalities to be tested are Play game, Create a meal, and View gift store. The pass criteria is if the system must result in the expected response, otherwise, the test fails.

### 4.5.3 Test plan 1

**System:** Sukary application
**Test case name:** Play game
**Precondition:** The user downloads the application open and login

| Test case ID | Test scenario | Test case description | Test steps | Test data | Expected result | Actual result | Pass/ Fail |
|---|---|---|---|---|---|---|---|
| 1 | User play game is valid | The user opens the application and play game | 1. log into the system<br>2. click on the 'play games' tab<br>3. select a game type<br>4. select a game from list<br>5. click on start game | Username: Mohammed Password: 1234 game type: rooms search room: xxm1 | User is playing successfully | As expected | Pass |
| 2 | User play game is invalid | The user opens the application and play game | 1. log into the system<br>2. click on the 'play games' tab<br>3. select a game type<br>4. select a game from list<br>5. click on start game | Username: Mohammed Password: 1234 game type: rooms search room: xxm | Unsuccess showing an error message 'room not found' | As expected | Pass |

**Postcondition:** user played a game

### 4.5.4 Test plan 2

**System:** Sukary application
**Test case name:** Create a meal
**Precondition:** The user downloads the application open and login

| Test case ID | Test scenario | Test case description | Test steps | Test data | Expected result | Actual result | Pass/ Fail |
|---|---|---|---|---|---|---|---|
| 1 | The user create a meal is valid | The user opens the application and create a meal | 1. log into the system<br>2. click on the 'create a meal' tab<br>3. drag and drop food picture depend on the target<br>4. click on check result | Username: Mohammed<br>Password: 1234<br>Target: won | The user is creating a meal successfully and got points | As expected | Pass |
| 2 | The user create a meal is invalid | The user opens the application and create a meal | 1. log into the system<br>2. click on the 'create a meal' tab<br>3. drag and drop food picture depend on the target<br>4. click on check result | Username: Mohammed<br>Password: 1234<br>Target: lose | Unsuccess showing a message 'It's ok you can try again' | As expected | Pass |

**Postcondition:** user created a meal

### 4.5.5 Test plan 3

**System:** Sukary application
**Test case name:** View gift store
**Precondition:** The user downloads the application open and login

| Test case ID | Test scenario | Test case description | Test steps | Test data | Expected result | Actual result | Pass/Fail |
|---|---|---|---|---|---|---|---|
| 1 | User view gift store is valid | The user opens the application and views the gift store | 1. log into the system<br>2. click on the 'gift store' tab<br>3. select a gift<br>4. click on redeem | Username: Mohammed<br>Password: 1234<br>Redeem: a gift by points | User redeem points successfully and got a gift | As expected | Pass |
| 2 | User view gift store is invalid | The user opens the application and views the gift store | 1. log into the system<br>2. click on the 'gift store' tab<br>3. select a gift<br>4. click on redeem | Username: Mohammed<br>Password: 1234<br>Redeem: a gift by points | Unsuccess showing a message 'Sorry, you don't have enough points' | As expected | Pass |

**Postcondition:** user viewed gift store

### 4.5.6 Approach

The testing approach that was used was Black Box testing and was chosen black box testing because it focuses on testing the functionality and behavior rather than implementation testing. Input and deliverables are specified for each test case.

## References


- International diabetes federation https://idf.org/

- Saudi diabetes & endocrine association https://sdea.org.sa/
- Saudi charitable association of diabetes http://alsukkary.com/
- National institute of diabetes and digestive and kidney diseases https://www.niddk.nih.gov/health-information/diabetes/overview