Department of Computer Science

CPSC 304 Project Cover Page

Milestone #: 2

Date: October 15 2024

Group Number:

Name	Student Number	CS Alias (Userid)	Preferred E-mail Address
Alex Luo	17603341	k7i1t	alexluo602@gmail.com
Jerrold Huang	26238998	k5l2e	zhonghan.huang@outlook.com
Jason Liao	67122887	V3d9u	jasonliao999@gmail.com

By typing our names and student numbers in the above table, we certify that the work in the attached assignment was performed solely by those whose names and student IDs are included above. (In the case of Project Milestone 0, the main purpose of this page is for you to let us know your e-mail address, and then let us assign you to a TA for your project supervisor.)

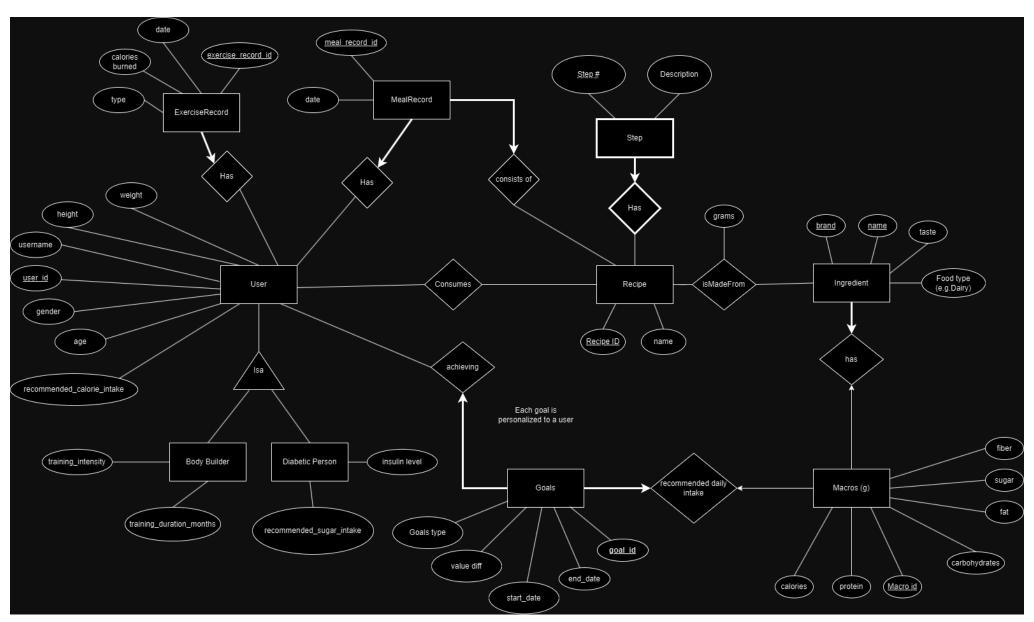
In addition, we indicate that we are fully aware of the rules and consequences of plagiarism, as set forth by the Department of Computer Science and the University of British Columbia

Department of Computer Science

2. Brief Summary:

- Personal health management app for daily macro intake logging and monitoring
- Track different goals based on the user's situation (height, weight, etc.)
- Guidance on recipes based on a users' health situation

3. ER Diagram:



Department of Computer Science

Changes to the ER Diagram:

- Renamed **achieves** relationship between user and goals to **achieving** (user is currently working towards the goal)
- We kept total participation on the goals side because we believe that each goal is personalized to a user, and is something the user created.
- We added a **recommended_calorie_intake** attribute to user, which is useful to decide which recipe to make, and also generates more interesting FDs that we can normalize
 - o This is just the general recommended calories for a specific body type to maintain current weight and health
 - This differs from recommended daily intake between goals and macros, because that's a recommended macros intake based on the goal you're trying to achieve, which may be different
- We added training duration months to Body Builder, which helps give more depth to the body builder entity
- We added a **recommended_sugar_intake** to diabetic person to help any diabetic person in deciding what meal they want to make based on their sugar levels.

4. Relational Models

Macros (macro_id: INT, fiber: INT, sugar: INT, fat: INT, carbohydrates: INT, protein: INT, calories: INT)

Primary Key: macro_id Candidate Key: macro_id

ForeignKey:

Ingredient (name: VARCHAR(255), brand: VARCHAR(50), taste: VARCHAR(255), food_type: VARCHAR(50), macro_id: INT);

Primary Key: (name, brand) Candidate Key: (name, brand)

ForeignKey: macro_id references Macros(macro_id) Constraints: macro_id NOT NULL and UNIQUE

Department of Computer Science

MealRecord (meal_record_id: INT, date: DATE, user_id: INT, recipe_id: INT)

Primary Key: meal_record_id Candidate Key: meal_record_id

ForeignKey: user id references User(user id), recipe id references Recipe(recipe id)

Constraints: user id NOT NULL, recipe id NOT NULL

Goals(goal_id: INT, start_date: DATE, end_date: DATE, goals_type: VARCHAR(100), value_diff: DECIMAL(5,2), user_id: INT, macro_id: INT)

Primary Key: goal_id Candidate Key: goal id

ForeignKey: user_id references User(user_id), macro_id references Macro(macro_id)

Constraints:

user id NOT NULL.

macro_id NOT NULL and UNIQUE

ExerciseRecord (excercise_record_id: INT, date: DATE, calories_burned: INT, type: VARCHAR(10), user_id: INT)

Primary Key: exercise_record_id Candidate Key: exercise_record_id

ForeignKey: user id references User(user id)

Constraints: user id NOT NULL

Department of Computer Science

Recipe(recipe_id: INT, name: VARCHAR(25))

Primary Key: recipe_id Candidate Key: recipe_id

ForeignKey:

Constraints: name NOT NULL

Consumes (recipe id: INT, user id: INT,)

Primary Key: (recipe_id, user_id)
Candidate Key: (recipe_id, user_id)

ForeignKey: recipe_id references Recipe(recipe_id), user_id references User(user_id)

Constraints:

Step (step number: INT, description: VARCHAR(55), recipe id: INT)

Primary Key: (step_number, recipe_id)
Candidate Key: (step_number, recipe_id)

ForeignKey: recipe_id references Recipe(recipe_id)

Constraints:

User (weight: DECIMAL(5,2), height: DECIMAL(5,2), user_id: INT, username: VARCHAR(15), gender: VARCHAR(15), age: INT, recommended calorie intake: INT)

Primary Key: user id

Candidate Keys: user_id, username

ForeignKey:

Constraints: username UNIQUE and NOT NULL

Department of Computer Science

BodyBuilder(training_intensity: DECIMAL(5,2), training_duration_months: INT, body_builder_id: INT)

Primary Key: body_builder_id Candidate Key: body_builder_id

ForeignKey: body builder id references User(user id)

Constrain:

DiabeticPerson(insulin level: DECIMAL(5,2), diabetic person id: INT, recommended sugar intake: INT)

Primary Key: diabetic_person_id Candidate Key: diabetic_person_id

ForeignKey: diabetic person id references User(user id)

Constraints:

5. Functional Dependencies

User:

- username → user id, weight, height, gender, age, recommended calorie intake
- user_id → username, weight, height, gender, age, recommended_calorie_intake
- (body, weight, height, age) → recommended_calorie_intake

DiabeticPerson:

- insulin level → recommended sugar intake
- diabetic_person_id → insulin_level, recommended_sugar_intake

Macros:

macro_id → fiber, sugar, fat, carbohydrates, protein, calories

Department of Computer Science

Ingredient:

- (name, brand) → taste, food_type, macro_id
- name → food type
 - Rationale: name doesn't determine taste because we want taste to be brand specific (e.g. one brand saltier than the other)

MealRecord:

meal_record_id → date, user_id, recipe_id

Goals:

goal_id → start_date, end_date, goals_type, value_diff, user_id, macro_id

ExerciseRecord:

• excercise_record_id → date, calories_burned, type, user_id

Recipe:

 $\bullet \quad recipe_id \to name$

Step:

• (step_number, recipe_id) → description

BodyBuilder:

- body_builder_id → training_intensity, training_duration_months
- training_duration_months → training_intensity

Consumes:

• Only trivial functional dependencies

Department of Computer Science

Fails 3nf:

- DiabeticPerson:
 - insulin level → recommended sugar intake
- User:
 - height, weight, age, gender → recommended macro intake
- BodyBuilder
 - training_timeline → training_intensity
- Ingredient
 - o name → food_type

6. Normalization

• Note: Decompose each table separately (e.g. DiabeticPerson assumes User hasn't been decomposed yet)

Decomposition of DiabeticPerson:

Original Table:

DiabeticPerson(insulin_level: DECIMAL(5,2), diabetic_person_id: INT, recommended_sugar_intake: INT)

Primary Key: diabetic_person_id Candidate Key: diabetic_person_id

ForeignKey: diabetic_person_id references User(user_id)

Constraints:

Functional Dependencies:

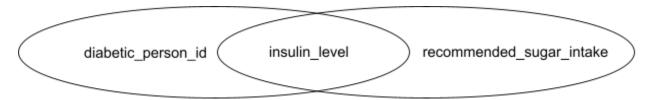
- $\bullet \quad insulin_level \to recommended_sugar_intake$
- diabetic_person_id → insulin_level, recommended_sugar_intake

Closures:

• {diabetic person id} += {diabetic person id, insulin level, recommended sugar intake}

Department of Computer Science

• {insulin_level} += {recommended_sugar_intake, insulin_level}



Decomposed tables:

RecommendedSugarByInsulin(<u>insulin_level</u>, recommended_sugar_intake) DiabeticPersonInfo(diabetic_person_id, insulin_level)

DiabeticPersonInfo(diabetic_person_id: INT, insulin_level: DECIMAL(5,2))

Primary Key: diabetic_person_id Candidate Key: diabetic_person_id

ForeignKey: diabetic_person_id references User(user_id),

insulin_level references RecommendedSugarByInsulin(insulin_level)

RecommendedSugarByInsulin (insulin_level: DECIMAL(5,2), recommended_sugar_intake: INT)

Primary Key: insulin_level Candidate Key: insulin_level

Department of Computer Science

Decomposition of User

Original Table:

User (weight: DECIMAL(5,2), height: DECIMAL(5,2), user_id: INT, username: VARCHAR(15), gender: VARCHAR(15), age: INT, recommended_calorie_intake: INT)

Primary Key: user id

Candidate Keys: user id, username

ForeignKey:

Constraints: username UNIQUE and NOT NULL

Functional Dependencies

- username → user_id, weight, height, gender, age, recommended_calorie_intake
- user id → username, weight, height, gender, age, recommended calorie intake
- (gender, weight, height, age) → recommended_calorie_intake

Closures

- {user_id} += {user_id, username, height, weight, age, gender,recommended_calorie_intake}
- {username} += {user_id, username, height, weight, age, gender,recommended_calorie_intake}
- {height,weight,age,gender} += {height,weight,age,gender,recommended calorie intake}

user_id, username, height, weight, age, gender height, weight, age, gender recommended_calorie_intake

Decomposed Tables:

UserInfo(user_id: INT, username: VARCHAR(15), weight: DECIMAL(5,2), height: DECIMAL(5,2), gender: VARCHAR(15), age: INT)

Department of Computer Science

Primary Key: user id

Candidate Keys: user id, username

ForeignKey: (height, weight, gender, age) references RecommendedCaloriesForBodyType(height, weight, gender, age)

Constraints: username UNIQUE and NOT NULL

RecommendedCaloriesForBodyType(weight: DECIMAL(5,2), height: DECIMAL(5,2), gender: VARCHAR(15), age: INT,

recommended_calorie_intake: INT)

Primary Key: (height, weight, gender, age)
Candidate Key: (height, weight, gender, age)

ForeignKey: Constraints:

Decomposition of BodyBuilder

Original Table:

BodyBuilder(training_intensity: DECIMAL(5,2), training_duration_months: INT, body_builder_id: INT)

Primary Key: body_builder_id Candidate Key: body_builder_id

ForeignKey: body builder id references User(user id)

Constrain:

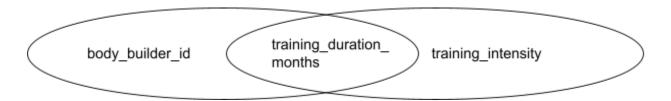
Functional Dependencies

- body builder id → training intensity, training duration months
- training_duration_months → training_intensity

Closures

- {body builder id } += {body builder id, training intensity, training duration months}
- {training_duration_months} += {training_duration_months, training_intensity}

Department of Computer Science



Decomposed Tables:

BodyBuilderInfo (<u>body_builder_id</u>, training_duration_months)
RecommendedTrainingIntensity (training_duration_months, training_intensity)

BodyBuilderInfo (body_builder_id: INT, training_duration_months: INT,)

Primary Key: body_builder_id Candidate Key: body_builder_id

ForeignKey: body builder id references User(user id),

training_duration_months references RecommendedTrainingIntensity (training_duration_months)

RecommendedTrainingIntensity (training_duration_months: INT, training_intensity: DECIMAL(5,2))

Primary Key: training_duration_months Candidate Key: training_duration_months

Department of Computer Science

Decomposition of Ingredient

Original Table:

Ingredient (name: VARCHAR(255), brand: VARCHAR(50), taste: VARCHAR(255), food_type: VARCHAR(50), macro_id: INT);

Primary Key: (name, brand) Candidate Key: (name, brand)

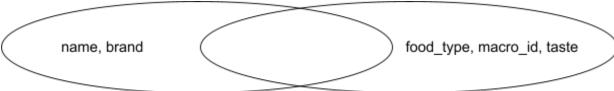
ForeignKey: macro_id references Macros(macro_id) Constraints: macro_id NOT NULL and UNIQUE

Functional Dependencies

- (name, brand) → taste, food_type, macro_id
- name → food type

Closures

- {name, brand} += {name, brand, taste, food_type, macro_id}
- {name} += {name, food_type}



Decomposed Tables:

IngredientInfo (name: VARCHAR(255), food_type: VARCHAR(50))

Primary Key: name Candidate Key: name

ForeignKey: Constraints:

Department of Computer Science

IngredientByBrand (name: VARCHAR(255), brand: VARCHAR(50), taste: VARCHAR(255), macro_id: INT)

Primary Key: (name, brand) Candidate Key: (name, brand)

ForeignKey: macro_id references Macros(macro_id), name references IngredientInfo(name)

Constraints: macro_id NOT NULL and UNIQUE

Already in 3nf

Macros (macro id: INT, fiber: INT, sugar: INT, fat: INT, carbohydrates: INT, protein: INT, calories: INT)

Primary Key: macro_id Candidate Key: macro_id

ForeignKey:

MealRecord (meal_record_id: INT, date: DATE, user_id: INT, recipe_id: INT)

Primary Key: meal_record_id Candidate Key: meal_record_id

ForeignKey: user id references User(user id), recipe id references Recipe(recipe id)

Constraints: user_id NOT NULL, recipe_id NOT NULL

Department of Computer Science

Goals(goal_id: INT, start_date: DATE, end_date: DATE, goals_type: VARCHAR(100), value_diff: DECIMAL(5,2), user_id: INT, macro_id: INT)

Primary Key: goal_id Candidate Key: goal_id

ForeignKey: user_id references User(user_id), macro_id references Macro(macro_id)

Constraints:

user_id NOT NULL.

macro_id NOT NULL and UNIQUE

ExerciseRecord (excercise_record_id: INT, date: DATE, calories_burned: INT, type: VARCHAR(10), user_id: INT)

Primary Key: exercise_record_id Candidate Key: exercise_record_id

ForeignKey: user_id references User(user_id)

Constraints: user_id NOT NULL

Recipe(recipe_id: INT, name: VARCHAR(25))

Primary Key: recipe_id Candidate Key: recipe_id

ForeignKey:

Constraints: name NOT NULL

Department of Computer Science

Consumes (recipe_id: INT, user_id: INT,)

```
Primary Key: (recipe_id, user_id)
Candidate Key: (recipe_id, user_id)
ForeignKey: recipe_id references Recipe(recipe_id), user_id references User(user_id)
Constraints:
```

Step (step number: INT, description: VARCHAR(55), recipe id: INT)

```
Primary Key: (step_number, recipe_id)
Candidate Key: (step_number, recipe_id)
ForeignKey: recipe_id references Recipe(recipe_id)
Constraints:
```

7. Final SQL DDL Statements

• Note: Oracle doesn't support ON UPDATE, but we will include it for grading purposes

```
CREATE TABLE IngredientInfo (
name VARCHAR(255),
food_type VARCHAR(50),
PRIMARY KEY(name),
)

CREATE TABLE IngredientByBrand (
name VARCHAR(255),
brand VARCHAR(50),
taste VARCHAR(255),
macro_id INT NOT NULL,
PRIMARY KEY(name, brand),
```

```
FOREIGN KEY(macro id) REFERENCES Macros (macro id),
  FOREIGN KEY(name) REFERENCES IngredientInfo (name),
  UNIQUE macro id
CREATE TABLE Macros (
  macro_id INT,
  fiber INT,
  sugar INT,
  fat INT,
  carbohydrates INT,
  protein INT,
  calories INT,
  PRIMARY KEY(macro id)
CREATE TABLE MealRecord (
  meal record id INT,
  date DATE,
  user id INT NOT NULL,
  recipe id INT NOT NULL,
  PRIMARY KEY(meal record id),
  FOREIGN KEY (user id) REFERENCES UserInfo(user id)
     ON DELETE NO ACTION
     ON UPDATE CASCADE.
  FOREIGN KEY (recipe id) REFERENCES Recipe(recipe id)
     ON DELETE NO ACTION
     ON UPDATE CASCADE
CREATE TABLE Goals(
  goal id INT,
```

```
start date DATE,
  end date DATE,
  goals type VARCHAR(100),
  value diff DECIMAL(5,2),
  PRIMARY KEY(goal id),
  user id INT NOT NULL,
  macro_id INT NOT NULL,
  UNIQUE macro id,
  FOREIGN KEY(user id) REFERENCES UserInfo (user_id)
     ON DELETE SET NULL
     ON UPDATE CASCADE,
  FOREIGN KEY(macro id) REFERENCES Macro(macro id)
CREATE TABLE ExerciseRecord (
 excercise record id INT,
 date DATE,
 calories burned INT,
 type VARCHAR(10),
 user id INT NOT NULL,
 PRIMARY KEY(excercise record id),
 FOREIGN KEY (user id)
     REFERENCES UserInfo (user id)
     ON DELETE NO ACTION
     ON UPDATE CASCADE
CREATE TABLE Recipe(
  recipe id INT,
  name VARCHAR(25) NOT NULL,
  PRIMARY KEY(recipe id)
```

```
CREATE TABLE Consumes (
  recipe id INT,
  user id INT,
  PRIMARY KEY(recipe_id, user_id),
  FOREIGN KEY(recipe id) REFERENCES Recipe(recipe id),
  FOREIGN KEY(user id) REFERENCES UserInfo (user id)
CREATE TABLE Step (
  step number INT.
  description VARCHAR(55),
  recipe id INT,
  PRIMARY KEY(step number, recipe id),
  FOREIGN KEY(recipe id)
     REFERENCES Recipe(recipe id)
     ON DELETE CASCADE
CREATE TABLE UserInfo (
 user id INT,
 username VARCHAR(15) UNIQUE NOT NULL,
 weight DECIMAL(5,2),
 height DECIMAL(5,2),
 gender VARCHAR(15),
 age INT,
 PRIMARY KEY (user id)
 FOREIGN KEY (height, weight, gender, age)
     REFERENCES RecommendedCaloriesForBodyType(height, weight, gender, age)
CREATE TABLE RecommendedCaloriesForBodyType (
 weight DECIMAL(5,2),
```

```
height DECIMAL(5,2),
 gender VARCHAR(15),
 age INT,
 recommended calorie intake INT,
 PRIMARY KEY (height, weight, gender, age)
CREATE TABLE BodyBuilderInfo (
  body builder id INT,
  training duration months INT,
  PRIMARY KEY (body builder id),
  FOREIGN KEY (body builder id) REFERENCES User(user id),
  FOREIGN KEY (training duration months)
      REFERENCES RecommendedTrainingIntensity (training duration months)
CREATE TABLE RecommendedTrainingIntensity (
  training duration months INT,
  training intensity DECIMAL(5,2),
  PRIMARY KEY (training duration months)
CREATE TABLE DiabeticPersonInfo (
  diabetic person id INT,
  insulin level DECIMAL(5,2),
  PRIMARY KEY (diabetic person id).
  FOREIGN KEY (diabetic person id) REFERENCES UserInfo (user id),
  FOREIGN KEY (insulin level) REFERENCES RecommendedSugarByInsulin(insulin level)
CREATE TABLE RecommendedSugarByInsulin (
  insulin level DECIMAL(5,2),
  recommended sugar intake INT,
```

```
Department of Computer Science
```

```
PRIMARY KEY (insulin_level)
```

8. Populating the tables

```
IngredientInfo
```

```
INSERT INTO IngredientInfo (name, food_type)
VALUES ('Tomato', 'Vegetable'),
    ('Chicken Breast', 'Meat'),
    ('Parmesan Cheese', 'Dairy'),
    ('Basil', 'Herb'),
    ('Olive Oil', 'Fat');
```

IngredientByBrand

BodyBuilderInfo

```
INSERT INTO BodyBuilderInfo (body_builder_id, training_duration_months)
VALUES (1, 7),
(2, 8),
(3, 9),
(4, 10),
(5, 11);
```

RecommendedTrainingIntensity

INSERT INTO RecommendedTrainingIntensity (training duration months, training intensity)

```
VALUES (7, 50),
         (8, 60),
         (9, 70),
         (10, 80),
         (11, 90);
Macros
INSERT INTO Macros (macro id, fiber, sugar, fat, carbohydrates, protein, calories)
VALUES (1, 5, 10, 8, 25, 12, 250),
(2, 3, 5, 10, 30, 15, 300),
(3, 4, 12, 7, 22, 11, 275),
(4, 6, 9, 9, 28, 13, 290),
(5, 2, 4, 5, 18, 8, 200);
MealRecord
INSERT INTO MealRecord (meal record id, date, user id, recipe id)
VALUES (1, '2024-10-15', 1, 1),
(2, '2024-10-12', 2, 2),
(3, '2024-10-11', 3, 4),
(4, '2024-10-10', 1, 5),
(5. '2024-10-09', 2, 1);
Goals
INSERT INTO Goals (goal id, start date, end date, goals type, value diff, user id, macro id)
VALUES (1, '2024-10-01', '2024-12-31', 'Weight Loss', 5.50, 1, 1),
(2, '2024-10-01', '2024-12-31', 'Weight Loss', 5.50, 2, 2),
(3, '2024-10-01', '2024-12-31', 'Weight Loss', 5.60, 3, 3),
(4, '2024-10-01', '2024-12-31', 'Weight Gain', 5.70, 4, 4),
(5, '2024-10-01', '2024-12-31', 'Weight Gain', 5.50, 5, 5);
ExerciseRecord
INSERT INTO ExerciseRecord (excercise record id, date, calories burned, type, user id)
VALUES (1, '2024-10-15', 300, 'Running', 1),
       (2, '2024-10-11', 300, 'Walking', 2),
```

```
(3, '2024-10-12', 500, 'Weight Lifting', 3),
       (4, '2024-10-13', 700, 'Running', 4),
       (5, '2024-10-14', 100, 'Swimming', 5),
Recipe
INSERT INTO Recipe (recipe id, name)
VALUES
  (1,'Chicken Salad'),
  (2, 'Protein Smoothie'),
  (3, Fried Rice),
  (4, 'Steak Frites'),
  (5, 'Fettucine Alfredo')
Consumes
INSERT INTO Consumes (recipe id, user id)
VALUES
  (1, 1),
  (2, 2),
  (3, 3),
  (4, 4),
  (5, 5);
Step
INSERT INTO Step (step number, description, recipe id)
VALUES
  (1, 'Marinate chicken breasts', 1),
  (2,'Grill the chicken until cooked.', 1),
  (3,'Chop vegetables for the salad.', 1),
  (4,'Mix all the ingredient.', 1);
INSERT INTO Step (step number, description, recipe id)
VALUES
  (1, 'Add frozen fruits to the blender', 2),
```

Department of Computer Science

```
(2,'Add water, protein powder,milk', 2),
  (3,'Blend until smooth', 2);
INSERT INTO Step (step number, description, recipe id)
VALUES
  (1, 'Cook rice, or use day-old rice', 3),
  (2, 'stir-fry diced vegetables and protein in a hot pan.', 3),
  (3, 'then season with soy sauce', 3);
INSERT INTO Step (step number, description, recipe id)
VALUES
  (1, 'Season steak, cook to preference.', 4),
  (2,'Fry potatoes until crispy.', 4),
  (3,'Butter bath the steak', 4);
INSERT INTO Step (step number, description, recipe id)
VALUES
  (1, 'Cook pasta until al dente.', 5),
  (2,'Simmer cream, add cheese.', 5),
  (3,'Toss pasta in sauce.', 5);
UserInfo
INSERT INTO UserInfo(user id, username, weight, height, gender, age)
VALUES
  (1, John Doe the 1st', 70.00, 175, 'Male', 30),
  (2, John Doe the 2nd', 80.00, 180, 'Male', 27),
  (3, John Doe the 3rd', 90.00, 177, 'Male', 22),
  (4, John Doe the 4th', 77.00, 185, 'Male', 26),
  (5, Janine Doe the 5th', 60.00, 170, 'Female, 32);
```

RecommendedCaloriesForBodyType

Department of Computer Science

(9.80, 20);

```
INSERT INTO RecommendedCaloriesForBodyType (weight, height, gender, age, recommended calorie intake)
VALUES (70.00, 175, 'Male', 30, 2500),
  (80.00, 180, 'Male', 27, 2600),
  (90.00, 177, 'Male', 22, 2700),
  (77.00, 185, 'Male', 26, 2600),
  (60.00, 170, 'Female, 32, 2000);
DiabeticPersonInfo
INSERT INTO DiabeticPersonInfo (diabetic person id, insulin level)
VALUES
  (1, 5.00),
  (2, 6.50),
  (3, 7.80),
  (4, 9.20),
  (5, 9.80);
RecommendedSugarByInsulin
INSERT INTO RecommendedSugarByInsulin (insulin level, recommended sugar intake)
VALUES
  (5.00, 55),
  (6.50, 45),
  (7.80, 35),
  (9.20, 25),
```