Nutrition Management System

Project report submitted for

IIIrd Semester DBMS – I Project

By,

Priyanshu Kumawat (211020431)

Sai Prabhat Gubbala (211020442)

Department of Data Science & Artificial Intelligence

Dr. Shyama Prasad Mukherjee

International Institute of Information Technology, Naya Raipur

(A Joint Initiative of Govt. of Chhattisgarh and NTPC)

Email: iiitnr@iiitnr.ac.in**, Tel: (0771) 2474040, Web:** www.iiitnr.ac.in

1.1 ABSTRACT

Tracking your intake is the first step to having a healthy physique. Taking this one step can enable someone to see harmful trends and make wiser decisions.

We are developing a database management system that allows the user to do the same and tracks and stores the daily food intake of a person. Using an API, we will generate automated food nutrition analysis and reports containing charts for the user to visualise his food consumption better.

1.2 ACKNOWLEDGEMENT

The completion of any project involves the efforts of many people. We have been lucky enough to have received a lot of help and support from all quarters during the making of this project, so with gratitude, we take this opportunity to acknowledge all those whose guidance and encouragement helped us emerge successful.

We are thankful for the resourceful guidance, timely assistance, and graceful gesture of our guide **Dr. Srinivas Naik,** Assistant Professor, Department of Computer Science and Engineering who has helped us in every aspect of our project work.

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We express our sincere thanks to our most respected and beloved Vice-Chancellor and Director Sir**, Dr. Pradeep K Sinha**, for supporting us in our academic endeavors.

And last but not the least, we would be very pleased to express our heart full thanks to all the teaching and non-teaching staff of the DSAI department and our friends who have rendered their help, motivation, and support.

Priyanshu Kumawat

Sai Prabhat Gubbala

Declaration

I declare that this written submission represents my ideas in my own words and where others' ideas or words have been included, I have adequately cited and referenced the sources. I also declare that I have adhered to all academic honesty and integrity principles and have not misrepresented, fabricated, or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

Submitted By:

Priyanshu Kumawat (*211020431)*

Sai Prabhat Gubbala (*211020442)*

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Chapter 1

Preamble

1. Introduction

Unfortunately, today's world has become accustomed to a food consumption system that has several negative implications for human health. We have been so pushed by lifestyle changes that we barely have time to consider whether our eating is a healthy diet! One's eating habits have been significantly impacted by globalisation, which has led many individuals to eat fancy, high-calorie fast food items described as "junk food". Research on the potential health risks associated with consuming such high-calorie things has provided insight into how to avoid them. Still, sadly, the steps taken should be more practical. Diseases including obesity, food poisoning, dehydration, heart issues, diabetes mellitus, and arthritis have dramatically increased in developing countries. Unhealthy foods like junk, processed, and high-calorie diets significantly contribute to this trend. Stressing the widespread consumption of unhealthy diets and their adverse effects on human health would help spread health education, which will help people restrict their intake and adopt healthier eating habits for a better quality of life. To raise awareness and provide health education to promote a shift toward healthy eating patterns, information stressing eating behaviours, nutritional diet, and the quality of unhealthy foods, as well as their influence on health and preventive actions, should be provided.

1.1 Motivation

According to the Nutrition Screening Initiative (NSI), 20–60% of senior citizens experience issues at home or are at a high risk of malnutrition. According to the Department of Health, a lack of dietary fibre can result in problems with constipation and poor gastrointestinal motility, which can impact intestinal health. A high-cholesterol diet can increase the risk of heart disease and cause cardiovascular disease. Obesity is likely to be brought on by excessive heat, but a shortage of calories will result in fatigue and irregular body metabolism. Protein deficiency increases the risk of stunting, easy weariness, decreased immune, and other problems. There are significant risk factors for the evolution of cerebrovascular illness, including excessive blood sugar, high

cholesterol, hypertension, and cardiovascular disease. In light of this, the Department of Health will include the management of high blood sugar, high cholesterol, and high blood pressure among its programmes for senior health. No matter what nutrients are consumed in excess or insufficient amounts, health issues will result. And the sole objective of a diet management system is to investigate physiological data for users to assess. Users must calculate their daily nutrition intake to maintain a healthy diet.

1.2 Need for Model

A diet and moderate exercise are the only ways to maintain good health. However, people often need to be more concerned with diet control, as it causes some health problems. The effective ways to remain healthy are by controlling diet and doing exercise. Therefore, understanding their diet ingredient is an important issue.

1.3 Objectives

Tracking your intake is the first step to having a healthy physique. Taking this one step can enable someone to see harmful trends and make wiser decisions.

We are developing a database management system that allows the user to do the same and tracks and stores the daily food intake of a person. Using an API, we will generate automated food nutrition analysis and reports containing charts for the user to visualise his food consumption better.

1.4. Project Overview

1. 1. Databases and database systems are an essential component of daily life in the society of today. The majority of us perform a number of tasks involving database contacts every day. When we go to the bank to deposit or withdraw money, when we book a hotel or airfare, or when we go to the bank, there is a good chance that someone will access a database.
2. The interactions mentioned above are instances of what we might refer to as classic database applications, in which the majority of the application's data is either textual or numeric and is stored and accessed. We will focus on this aspect

of computer application in our project.

3. Databases can be used in many different ways. Some of these include object-oriented databases, relational databases, and file-handling mechanisms.
4. You get a glimpse into the Nutrition management system's reservation management procedure using this program. With the aid of this project, the entire Nutrition Management System procedure is illustrated. It offers the option to add, change, delete, and search nutrition management information.

Chapter 2

Literature Overview

Human nutrition is the process by which nutrients in food are converted into body tissues and supply energy for the whole spectrum of mental and physical functions that comprise human life.

In addition to physiology, biochemistry, and molecular biology, the study of human nutrition is interdisciplinary in nature and draws on disciplines like psychology and anthropology to examine how attitudes, beliefs, preferences, and cultural traditions affect dietary choices. Political science and economics are further impacted by human nutrition as the global society realises and responds to the suffering and demise brought on by undernutrition. Nutritional science's ultimate objective is to increase overall health, lower the risk of chronic illnesses like cancer and cardiovascular disease, as well as to avoid the traditional nutritional deficiencies.

Chapter 3

Functional Requirements

1. 1 A web application that tracks users' diets is provided.
2. Users can keep track of their height, weight, and nutritional information.
3. Users can browse analytical charts to see how their weight has changed more clearly.

4. Users can set up personalised goals to achieve their ideal weight at the pace they choose.
5. calculation of target calories for achieving goals and maintenance calories.
6. The user's medical history can be saved.
7. By adding meals, enable the user to keep track of their calories.
8. Provide users with access to a sizable database of recipes via API so they may add predefined customised meals.
9. Permit users to develop own recipes as well.
10. Users can view the nutrition information on the item through "My plate," along with extra details.
11. a tool that allows you to record your health on a specific day.

Chapter 4

Methodology

4.1 Existing Method

The procedure is time-consuming and encourages indolence. This strategy is more prone to errors and occasionally uses ad hoc methods to address various problems. Since getting information from files is not a simple process, it could be challenging for a user to rapidly retrieve any outdated data or information. Since everything is done manually, if a record is lost, the agency is solely accountable. The current approach has some drawbacks, including:

1. The process of providing accurate information is time-consuming.
2. Less dependable and maintainable data
3. Information secret might not be retained due to the clear facts on paper.
4. Manually submitted information cannot be trusted.

4.2 Proposed Solution

The suggested remedy is computer-based, user-friendly, and straightforward to keep. This makes it possible to safely retain records for a very long time and effortlessly.

An nutrition management system is simply a menu-driven programme. These formats were developed with user requirements in mind. The user will have a quick and easy manner to operate as a result.

- **Relational model:** Relational Model represents how data is stored in a Relational Database. A relational database stores data in the form of relations (tables). The Nutrition Management interface website will have different databases that will store the details about every user and nutrition information. The basic operations to be supported by the model include creating, reading, updating, and deleting operations.
- **Creation:** The model will support the creation of new profiles for a user which will be based on authentication.
- **Updation:** The updation of different meals can be marked as done or not done by the user with special access for the updating operation.
- **Read:** The variation in weight can be tracked from the user dashboard after authentication.
- **Deletion:** Meals and notes can be added and deleted from the database.

We have created a web interface along with the SQL database. A user can open our website and can log in with the help of the username and password. After verification, the person can enter the meal name, and then they can see all the information regarding their meal and calorie consumption.

Steps/Phases of the project required for completion of the project

- Working on the RDBMS model, we need to create different tables for different purposes like Login/ Register, a table that stores user's health reports. The table will be created with the primary key.
- Storing the Data in the tables of the Database by entering the details.
- Linking these tables with one another as required, using Foreign Key.

- Maintaining the Database and updating/recording entries.
- Creating the Schema of the health database and ER-Model.

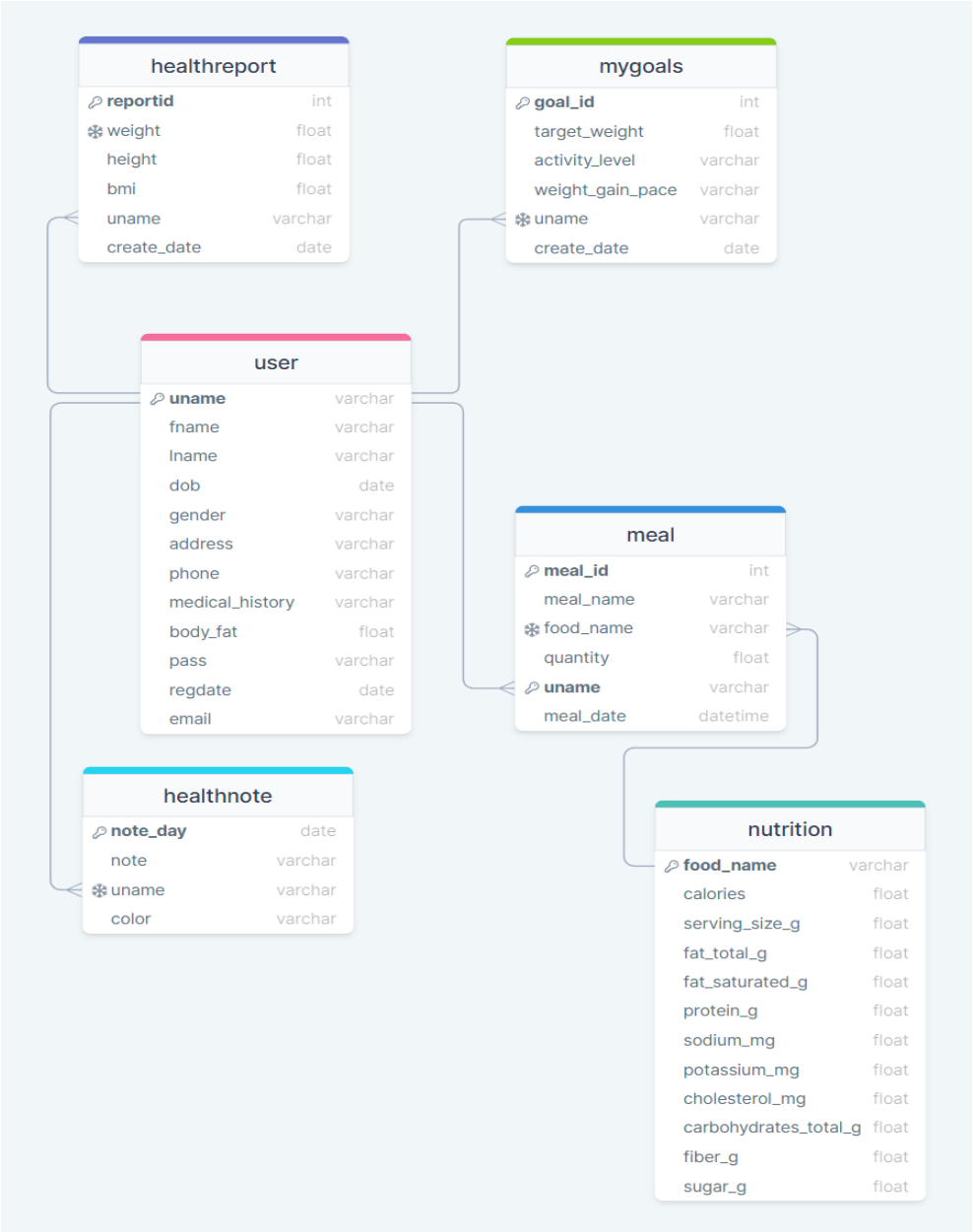

Fig I. Schema Diagram of the Nutrition Management System

- The table is in 1NF since all attributes are atomic.
- The table is in 2NF since there is no partial dependency.
- Table is in 3NF due to the absence of any transitive dependency.

4.3 Implementation

The steps for the development of our project are as follows:

1. **Development of Front-End:** We have developed the design of the website. The implementation part started with the creation of a website using HTML5, CSS3, and JavaScript. Different static and dynamic pages are developed for users as well as the admin.
2. **Development of Back-End:** We have used the Django framework along with MySQL database to perform CRUD operations for insertion, deletion, updating and scanning of data from the database.
3. **Integrating Front-end with Back-end:** Setting up proper paths and displaying the appropriate data on the front-end using POST/GET requests. We have also used Data Visualization tools.
4. **Deployment of the website:** Finally, we have deployed our website onto a local host available for users

4.4 Entity - Relationship Diagram

An entity–relationship model (ER model) describes interrelated things of interest in a specific domain of knowledge. An ER model is composed of entity types and specifies relationships that can exist between instances of those entity types. In engineering, an ER model is formed to represent things that a business needs to remember to perform business processes. Consequently, the ER model is an abstract data model that defines data implemented in a relational database.

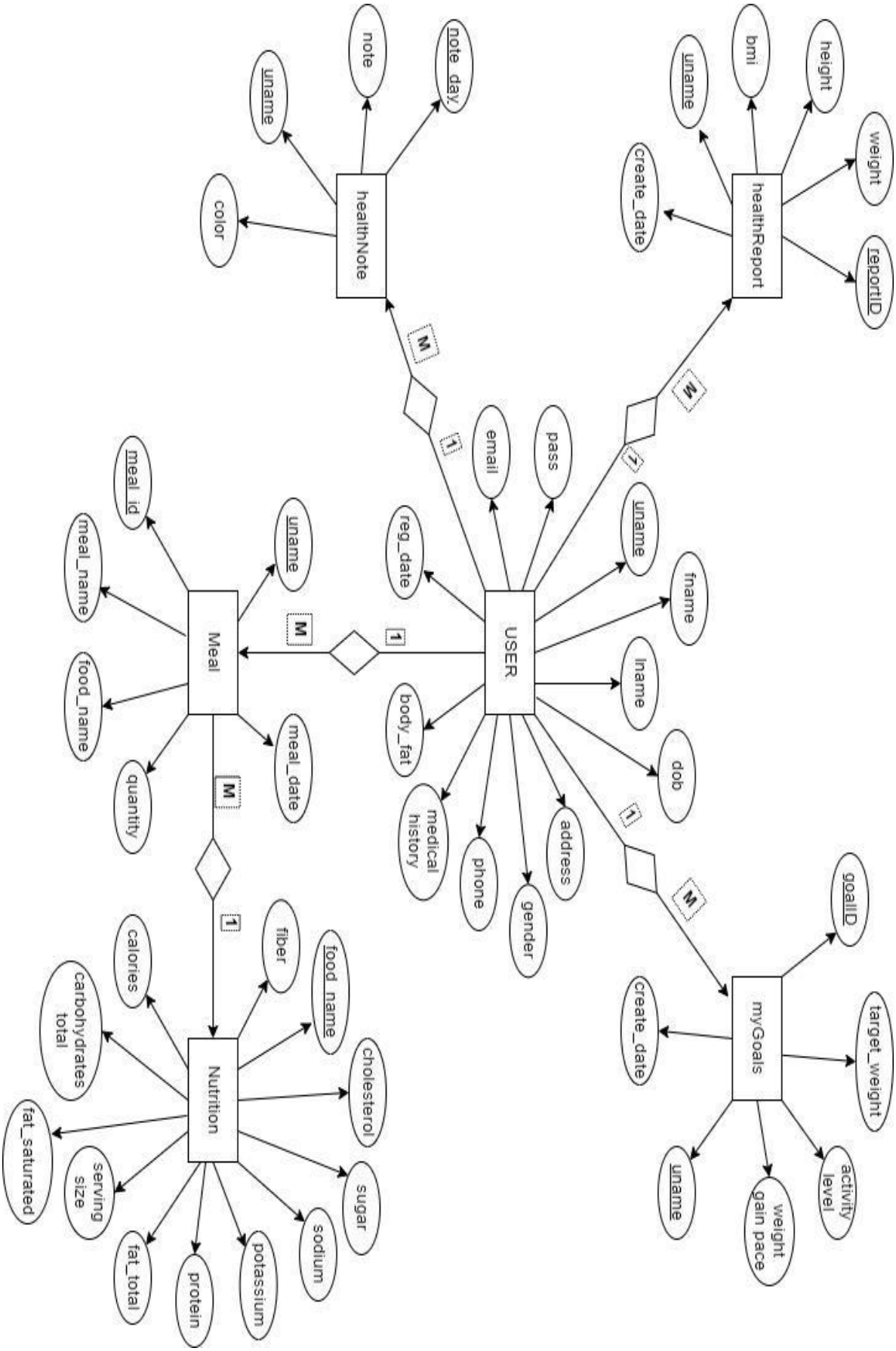

Fig II: ER Diagram

Chapter 5

Results

The project is compiled and executed on a local host on a browser. Some screenshots are present hereto show the working of the application.

Screenshots:

Add meal tab allows the user to add meals whose details are fetched by API and is able to track calories consumed.

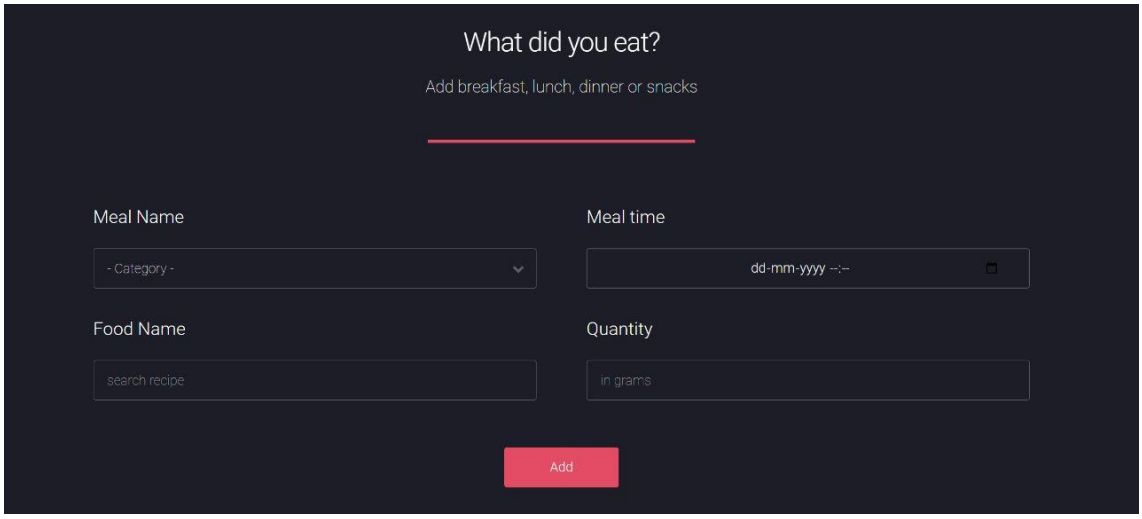

Fig III: Adding the meal information by user

Nutrition at a glance can be viewed for a recipe.

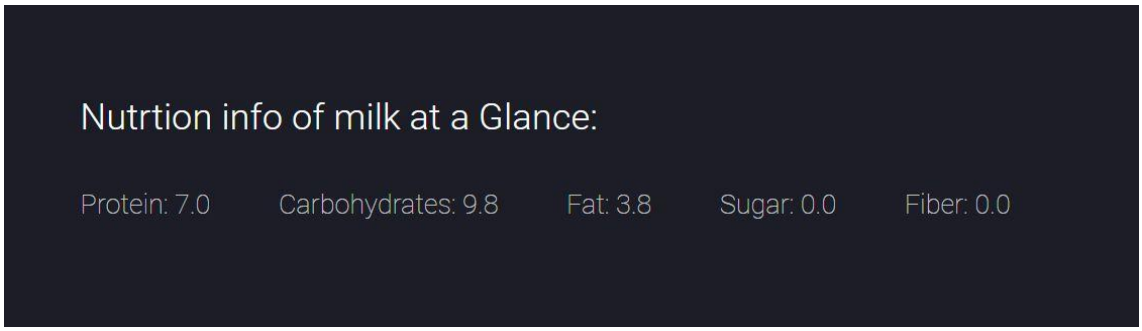

Fig IV: Nutritional values of a recipe

User can add health notes for a particular day

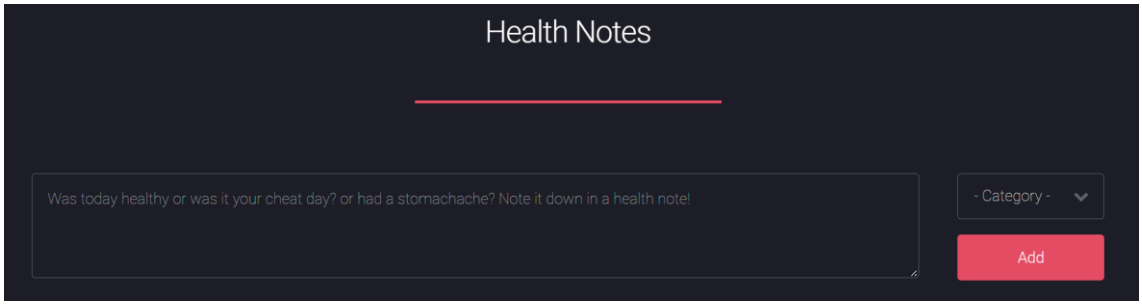

Fig V: Creating a health note

Notes of any day can be viewed easily

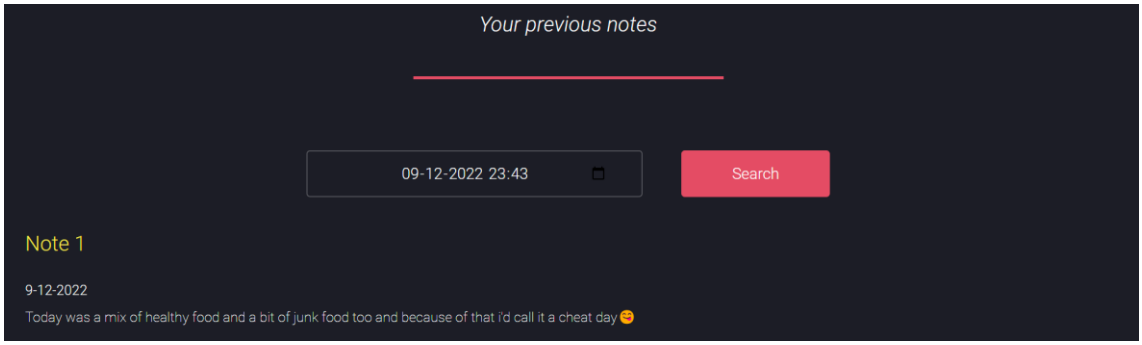

Fig VI: Health Note on a specified date

The meals tracked all day is display in a categorised fashion

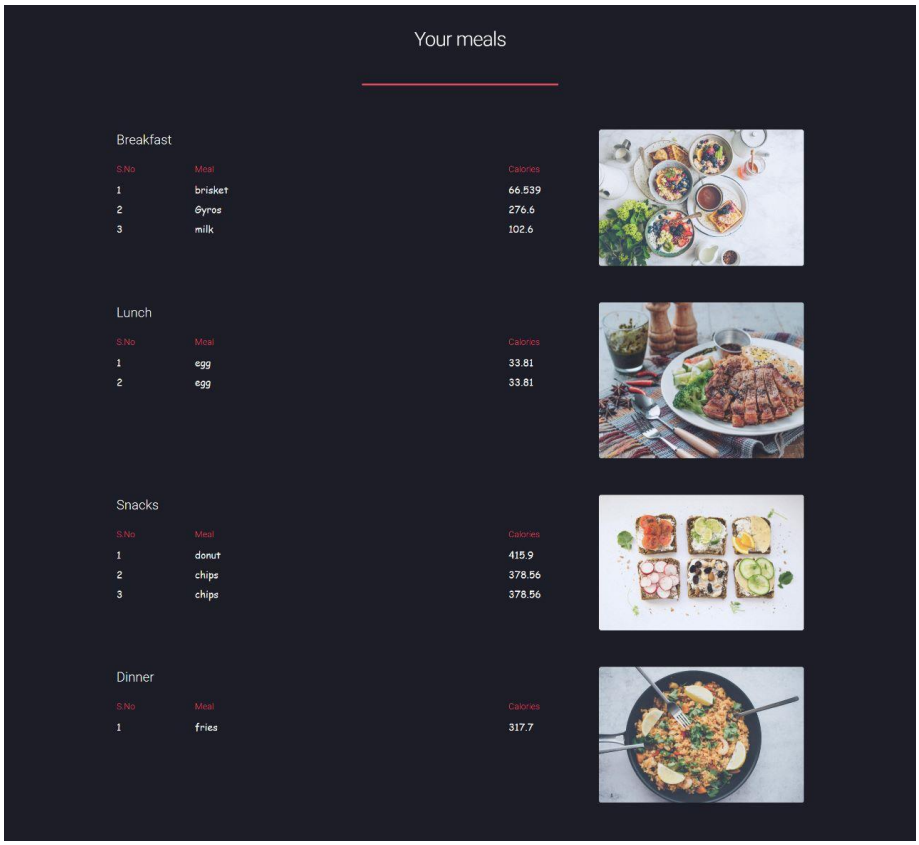

Fig VII: Meals of the User

Chapter 6

Conclusions

Planned approach toward working: The tracking of nutrition management will be well-planned and organized. The data will be stored efficiently with optimal disk space consumption in data stores which will help in the retrieval of information as well as its storage under resource constraints.

Accuracy: The level of accuracy in the proposed system will be higher. All operations would conform to integrity constraints and correctness and it will be ensured that whatever information is received at or sent from the center is accurate.

Reliability: The reliability of the proposed system will be high due to the above-mentioned reasons. This comes from the fact that only the data which conforms accuracy clause would be allowed to commit back to the disk. Other properties like transaction management and rollback during system or power failure etc get automatically taken care of by the SQL systems, which is undoubtedly an excellent choice of the DBMS system. Properties of atomicity, consistency, isolation, and data security are intrinsically maintained.

6.1 Future Enhancement

No redundancy: In the proposed system it will be ensured that no repetitionof information occurs; neither on physical storage nor on a logical implementation level. This economizes on resource utilization in terms of storage space. Also even in the case of concurrent access, no anomalies occur, and consistency is maintained. In addition to all this, principles of normalization have been endeavors to be followed.

Immediate retrieval of information: The main objective of the proposed system isto provide a quick and efficient platform for the retrieval of information, and queries allowed by the database.

Even further automation: To completely eliminate human error factor.

References

1. *https://api-ninjas.com/api/nutrition* - The Nutrition API extracts nutrition information from text using natural language processing. From food blogs to menus to recipes, it can read any text and calculate the corresponding nutrition data.

2. *https://www.youtube.com/watch?v=6OBmNgHoSY8&list=PLlMRDyqy-nUianTebmZdZUdvQLpJJUp8y* - Comprehensive guide on integrating api

3. *https://html5up.net/* - Useful predefined css rules

4. *https://drawsql.app/* - Creational of nutritional schemas

5. *https://app.diagrams.net/-* Creation of flowcharts and ER diagrams

6. *https://docs.djangoproject.com/en/4.1/* - Official documentation for django

ANNEXURE

Functional Dependencies and Normalization

1. User :

   R = (uname, fname, lname, dob, email, pass, gender, phone, address, reg_date, body_fat, medical history)

   FDs:

   a. uname -> fname, lname, dob, email, pass, gender, phone, address, reg_date, body_fat, medical history

   b. phone -> fname, lname, dob, email, pass, gender, phone, address, reg_date, body_fat, medical history

   c. email -> fname, lname, dob, email, pass, gender, phone, address, reg_date, body_fat, medical history

Primary Key : uname

Candidate Keys : (uname), (email), (phone)

Prime Attributes : uname, email, phone

Table is in 1NF since all attributes are atomic.

Table is in 2NF since there is no partial dependency.

Table is in 3NF due to absence of any transitive dependency.

2. Meal :

   R = (meal_id, uname, meal_name, food_name, meal_date, quantity)

   FDs:

   a. (meal_id, uname) -> meal_name

   b. (meal_id, uname) -> food_name

   c. (meal_id, uname) -> meal_date

   d. (meal_id, uname) -> quantity

Primary Key : (meal_id, uname)

Candidate Key: (meal_id, uname)

Prime Attributes : meal_id, uname

Table is in 1NF since all attributes are atomic.
Table is in 2NF since there is no partial dependency.
Table is in 3NF due to absence of any transitive dependency.

3. Nutrition :

R = (food_name, serving size, calories, protein, carbohydrates total, cholesterol, fat_total, fat_saturated, fibre, sugar, sodium, potassium)

FDs:

a. food_name -> serving size, calories, protein, carbohydrates total, cholesterol, fat_total, fat_saturated, fibre, sugar, sodium, potassium

Primary Key : food_name
Candidate Key : (food_name)
Prime Attribute : food_name

Table is in 1NF since all attributes are atomic.
Table is in 2NF since there is no partial dependency.
Table is in 3NF due to absence of any transitive dependency.

4. healthReport :

R = (reportID, uname, height, weight, bmi, create_date)

FDs:

a. (reportID, uname) -> height
b. (reportID, uname) -> weight
c. (reportID, uname) -> bmi
d. (reportID, uname) -> create_date

Primary Key : (reportID, uname)
Candidate Key : (reportID, uname)
Prime Attribute : reportID, uname

Table is in 1NF since all attributes are atomic.
Table is in 2NF since there is no partial dependency.

Table is in 3NF due to absence of any transitive dependency.

5. myGoals:

R = (goalID, uname, create_date, target_weight, weight gain pace, activity level)

FDs:

a. (goalID, uname) -> create_date

b. (goalID, uname) -> target_weight

c. (goalID, uname) -> weight gain pace

d. (goalID, uname) -> activity level

Primary Key : (goalID, uname)

Candidate Key : (goalID, uname)

Prime Attribute : goalID, uanme

Table is in 1NF since all attributes are atomic.

Table is in 2NF since there is no partial dependency.

Table is in 3NF due to absence of any transitive dependency

6. healthNote:

R = (note_day, uname, note, color)

FDs:

a. (note_day, uname) -> note

b. (note_day, uname) -> color

Primary Key : (note_day, uname)

Candidate Key : (note_day, uname)

Prime Attribute : note_day, uname

Table is in 1NF since all attributes are atomic.

Table is in 2NF since there is no partial dependency.

Table is in 3NF due to absence of any transitive dependency.