



Nutr.io - Multi-platform application for diabetics' nutritional choices

Progress Report

Authors:

| | | |
|-----------------------|-----------------------|--------------------------|
| Pedro Pires | Miguel Luís | David Albuquerque |
| 42206 | 43504 | 43566 |
| A42206@alunos.isel.pt | A43504@alunos.isel.pt | A43566@alunos.isel.pt |

Tutor:

Fernando Miguel Gamboa de Carvalho
mcarvalho@cc.isel.pt

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42206 - Pedro Miguel Sequeira Pires

Signature: _____

43504 - Miguel Filipe Paiva Luís

Signature: _____

43566 - David Alexandre Sousa Gomes Albuquerque

Signature: _____

Tutor: Fernando Miguel Gamboa de Carvalho

Signature: _____

Abstract

The idea that every field of study can be digitalized in order to ease monotonous tasks is continuously growing in the modern world. Our project aims to tackle the field of Type 1 diabetes, given its growing prevalence in the world.

One of those monotonous tasks is the count and measurement of carbohydrates in meals used to administer the correspondent amount of insulin, along with their blood levels, to maintain a healthy lifestyle. A task that heavily relies on having access to food databases and realize of how many portions a meal has - usually by using a digital balance or doing estimations.

Eating in restaurants is the perfect example that showcases a gap in this field, that our project, Nutr.io, aims to fill. Most nutritional applications do not provide data for restaurants' meals, such as MyFitnessPal, nor does the user bring his digital balance from home - resulting in a faulty carbohydrate count and therefore the administration of an incorrect insulin dose.

The main goal of this project is to design a system that offers a way to facilitate difficult carbohydrate measurement situations, like in restaurants. To that end, a system that stores meals' nutritional information will be developed, where users can use and calibrate its data with their feedback.

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Chapter 1

Introduction

This document is intended to give an update on the project's progress made to this date.

Its main goal is to report that the project is progressing according to the initial plan, previously stated in the project's proposal.

The report will also state the issues encountered during this time period, mentioning the decisions the group made to solve them. This might also include changes in the accorded initial plan, that the group found relevant for the project's progress efficiency.

The diagrams and schemas developed for this project are shown when approaching the respective topic, however there is an appendix where is disposed additional information about the project, having references pointing to it when necessary.

Chapter 2

Project development

2.1 Roadmap

According to the proposed plan, the group managed to fulfill almost all the objectives that were planned to be accomplished by this time - a relational database, a working HTTP server and a prototype Android application that can make requests to the server and use its information to display lists and detailed views.

However, as it will be detailed in the next section, the group faced some issues that caused slight drawbacks, such as the relational database conception, which had to be redesigned multiple times due to the project's requirements.

In this report's appendix there are disposed two project schedules: the initial one, also present in the project's proposal, and the actual one, which has the actual progress made to this date with the corrects starting and ending dates of each concluded milestone.

2.2 Issues encountered and updates

This section describes the issues found and the decisions made to overcome them, during the first project modules' development.

2.2.1 Relational database

The group had to redesign the database's conceptual model and relational model multiple times. One of the main issues that supported the main redesign was that the database only supported submissions from the users, while it had to support submissions both from users and APIs.

The other redesigns were related to the database normalization: it was normalized until the third normal form and had to be renormalized one more time because of the mentioned main redesign.

Because of this, the group invested a considerable amount of time on the database's conception, which was not considered in the initial plan. This invested time ended up colliding partially with other time periods that were reserved for other modules.

2.2.2 HTTP server

As mentioned in the project's proposal risks, the HTTP server is very similar to the DAW's project, which is an optional course inside the LEIC programme. Thus some improvements were made and errors were fixed because of the lectioned classes and the first project's delivery in DAW, which helped the group complete the tasks implied by the server's development.

However the server is lacking some functionalities as a result of the time invested in database conception, where the HTTP server depends strongly, causing some drawback to its development.

2.2.3 Android application

As a result of the time invested developing the database and the strong bond between the mobile application and the HTTP server and its completion, the Android app suffered a slight drawback, where only the essential fragments and requests work.

Although it was initially planned that the mobile application was just a prototype by this date, as it is now, the group could not implement more planned features because of the time invested in the other modules.

2.3 Group decisions

Given the previous issues, the group has the conditions to comply with the project's initial plan, with some minor changes.

As stated in the last period of the Android application's subsection, the group strongly agrees that the HTTP server has to be finished as soon as possible, to provide stability to the onward modules and their implementations, being considered a core module in this project.

Subsequently the group will have to invest a few more days in the server's development in order to fulfill the project's requirements.

Alongside with these fulfillments, the group will proceed to add more features to the mobile application, while starting the web application's development, which is compatible with the project's initial plan.

Chapter 3

Results

This chapter shows what has been achieved and developed to this date.

As previously written in the project's roadmap, this project has already a working relational database and a HTTP server, developed with postgresSQL and with kotlin and spring mvc, respectively. The group also managed to achieve, by this date as planned, its first working platform client - the android mobile application, developed with kotlin. This last one, it is still a prototype, so it lacks some features that will be completed during the next weeks.

3.1 Relational database

As a result of multiples redesigns, here is the database's final conceptual model.

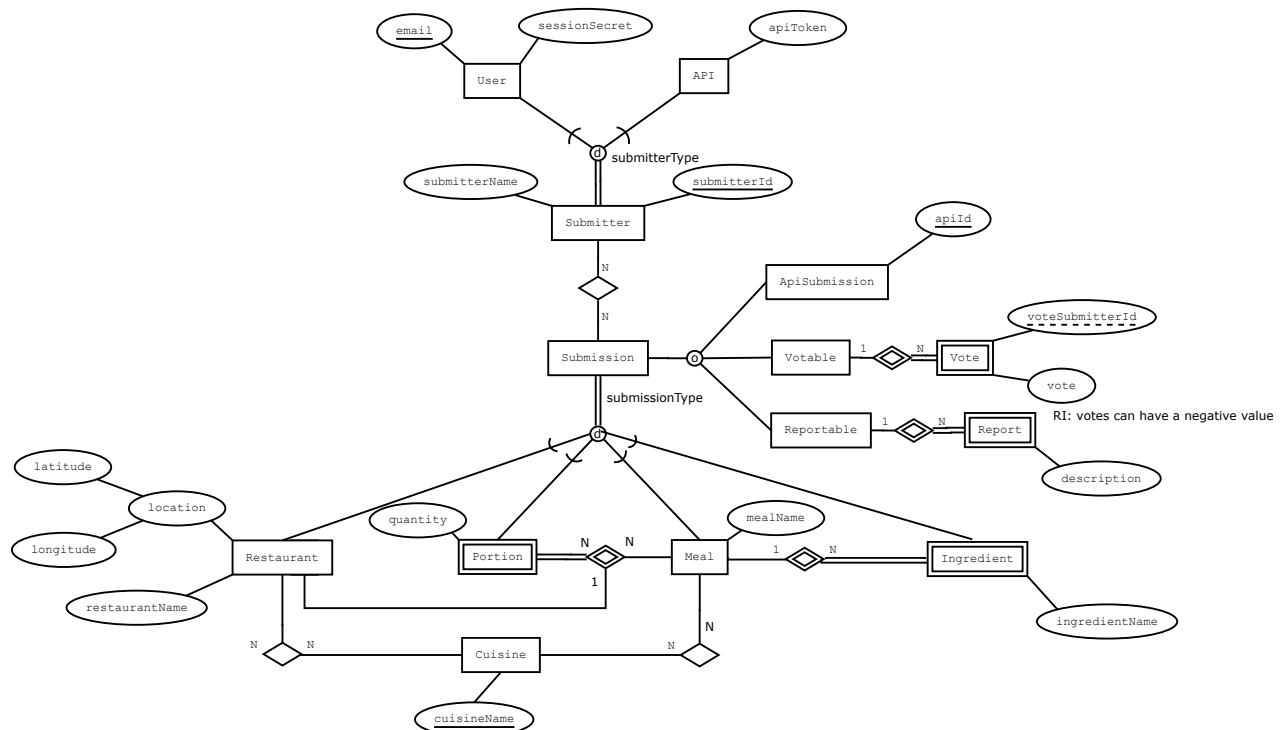


Figure 3.1: Database conceptual model

The database's relational model is present inside this report's appendix.

In the relational model there are tables which are not specified in the conceptual model, those tables are a product from associations between entities, which will, not only facilitate the access queries' construction, as provide useful data to the HTTP server's endpoints.

The best feature of this redesigned model is that the database can filter the user submissions from the API submissions. This is very useful, because when the user tries to associate a meal, that does not exist in the database, to a restaurant, that is already registered in the database, the system will have search for that meal in an external API. When the meal is found, it will be inserted in the database as an API submission, because the data came from an external API.

However if another user inserts this previously inserted meal to another registered restaurant, it will insert as an user's submission, because the data already existed in the database and the user just built the association between the specific meal and the specific restaurant.

This process, which resembles how memory pointers work, provides a high scalability and, cooperatively with the database normalization, lowers the memory usage.

3.2 HTTP server

As previously written in this report, the HTTP server was developed in Kotlin and Spring MVC.

Before starting the server's development, the group had to first define its endpoints and discuss what the client was allowed to request or receive from each one of them. The endpoint table that defines the endpoints and their tasks can be found in the appendix.

After defining the endpoints...

- hypermedia type / response type (siren and application/json)
- errors : application/problem+json

3.3 Android application

Being a prototype, the mobile application has only the core features to work and interact with the HTTP server.

3.3.1 Layout

The group chose to create an application that offers a simple layout to the user, providing accessible menus and a menu drawer, which implies the use of fragments instead of activities.

Each fragment, that has volatile information in it (live data), has a associated view model, that preserves the data while the application is running. As expected, the Android app also has static fragments - fragments which do not receive live data, those do not have any view model associated.

Many fragment that use live data have recycler view lists, which means that for each list there's the need to have an adapter and a view holder, called by the adapter, to bind the live data

to the respective layout elements.

So each list that uses a different model class, creates its own adapter and viewholder for its specific model extending from an abstract adapter and view holder.

3.3.2 HTTP requests

The volley framework was implemented to allow the application to make asynchronous server requests.

As most of the server endpoints send responses in JSON format, the application is using the Jackson library to deserialize and serialize JSON.

Chapter 4

Appendix

This section has disposed additional information of the project, such as project's schedules and other references mentioned in this report.

| Method | Path | Query String | Body parameters | Description |
|--------|-------------------------------------|--|---|---|
| GET | restaurant | int lat, int lon, int skip, int count, String name | | Search for restaurants and their cuisines, based on location or named search |
| GET | restaurant/:id | | | Restaurant's name and cuisines |
| GET | restaurant/:id/meal | int skip, int count | | Restaurant's meals with votes |
| GET | cuisines | int skip, int count | | List possible cuisines |
| GET | ingredients | int skip, int count | | List all possible ingredients and it's id |
| GET | meal/:id | | | Meal's portions and ingredients |
| POST | restaurant | | String name, int lat, int lon, String[] cuisines | Create a new restaurant |
| POST | restaurant/:id/meal | | String name, Object portion, int[] ingredientIds | Create a new restaurant meal, allowing for multiple ingredients (optional), first portion submission (optional) |
| POST | restaurant/:id/meal/:mealId/portion | | Object portion | Creates a restaurant's meal portion |
| POST | restaurant/:id/meal/:mealId/report | | String reason | Create a report on a restaurant's meal |
| POST | restaurant/:id/meal/:mealId/vote | | boolean isPositive | Create a vote on a restaurant's meal |
| POST | restaurant/:id/report | | String reason | Create a report on a restaurant |
| POST | restaurant/:id/vote | | boolean isPositive | Create a vote on a restaurant |
| PUT | restaurant/:id/meal/:mealId/portion | | Object portion | Updates a restaurant's meal portion |
| PUT | restaurant/:id/meal/:mealId/vote | | boolean isPositive | Update a vote on a restaurant's meal |
| DELETE | restaurant/:id | | | Delete user created restaurant, if it wasn't used by the community yet |
| DELETE | restaurant/:id/meal/:id | | | Delete user created restaurant meal, if it wasn't used by the community yet |
| DELETE | restaurant/:id/meal/:mealId/portion | | | Delete user's restaurant's meal portion |
| DELETE | restaurant/:id/meal/:mealId/vote | | | Delete user's restaurant meal vote |
| DELETE | restaurant/:id/vote | | | Delete user's restaurant |

Figure 4.1: Initial plan accorded in the project's proposal

Nutr.io Project Schedule
Instituto Superior de Engenharia de Lisboa

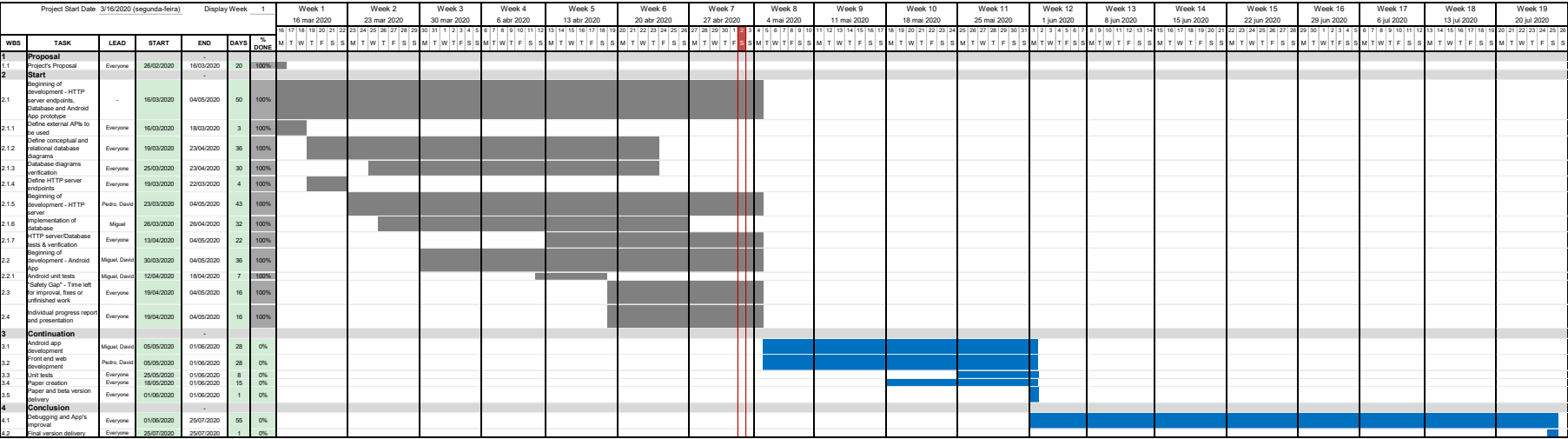


Figure 4.2: Actual plan with the progress updated as of today