

TripLap: Planning Application for Travellers

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Abstract

The current article describes the project proposal for the discipline of Annotation Languages and Data Processing.

The project will focus on the development of a software application, specifically for use on smaller devices, such as smartphones and tablets. The app target group are travellers who wish to manage their travel whilst on the move. The user, with a destination in mind, will be presented with a suggestion of places, in the selected city, from which they can choose the ones that better suite their preferences. Having the activities chosen, they can be rearranged in order to better fit the trip agenda.

This manuscript also describes related state-of-the-art, system requirements, the chosen architecture, the selected data sources, a calendar for the app development and an application overview.

The document concludes with a brief discussion and next steps analysis.

1 Introduction

The Travel and Tourism sector has been growing globally [1]. Therefore, the availability of an application that can guide and help the tourists while traveling and visiting new cultures of all around the world is more timely than ever.

The aim of this project is the study and implementation of a way to apply to this need.

As a first step, we did a detailed analysis of current available solutions, by going through a list of competitors, analyse their strengths and weaknesses and take our conclusions. This step is explained in section 2.

After working on the state-of-the-art, the authors proceeded with the section 3, in which

the system requirements of the application were defined.

The next step was the creation of the section 4. This one was used to explain the planned architecture for the system, based on the requirements previously delineated.

Afterwards, an analysis of the type of data needed for the project was performed, as well as a search for providers of this data. This is explained in more detail in the section 5.

A description of the plan to ensure an efficient and optimal time management can be found in section 7. Meanwhile, in section 6 there is a brief overview of the visual designs of the application.

There is also a section 8 with a discussion of the challenges faced during the development of this project and, finally, in section 9 the conclusions related to the project.

1.1 Motivation

The main motivation for this project was derived from the personal need the authors of this project have experienced in the past. Understanding that the application can benefit several others who have similar experiences, the authors decided that this would be the perfect opportunity to develop a software application that goes along with our needs that we strongly believe are the same as other travellers.

1.2 Objectives

For this project, the authors pretend to develop a user-friendly and time-efficient mobile application that allows them to carefully plan their trips. The main features of this application can be summarised in the following points:

- Allow the users to select a city and a time frame in which their trips are planned to occur;
- Supply to the users relevant information about the weather and places to visit during the trip;
- Give detailed information about points of interest, restaurants, shops and hotels of the previously select cities;
- Give the users the possibility to filter the points of interest, restaurants and hotels;
- Show the best route through the use of a map for all the places chosen in each day of the trip;
- Advise about possible problems the user may face with regards to weather conditions and places availability;

2 State-of-the-art

Several other applications are already available for similar purposes as the ones described in this document. In the following paragraphs the authors present some of these together with a critical analysis of the features and functionalities they believe that are important in this type of solutions.

I Love Aveiro [2] is a prototype for an application that aims at augmenting the experience of a traveller to the fullest when visiting Aveiro, Portugal. Everything, from the colours to the font of the letter used was deliberated, in order to transmit to the users the idea of a youthful and modern city. The prototype for this app contained a list with the main points of interest in Aveiro and some default routes that a user could take throughout the city. It also allows them to create their own tracks, to filter the places in the city and add some of these to their favourites. Finally, it also possesses an achievement section which introduces some kind of gamification to the prototype.

YOGO [3] is a trip planning application idea. As the description suggests, it provides the user with useful information about destinations from

all over the world and helps managing their time and budget during the journey. Besides this, since the target group is the young generation from 18 to 38 years old, the prototype promotes a strong community bond. It also contains lists with points of interests, allows the users to manage and create trip plans, search for places and flights and lastly maintain a chat with the people who are planning to travel with you.

TripScout [4] is a travel guide application that brings to travellers the recommendations from publishers and local bloggers. It gives to the users the opportunity to find the best places, which are ranked and rated by these influencers, while still being able to add plans to their trip.

Taking into account the previous paragraphs, the group believes that all of these prototypes and applications have interesting features that could be relevant for TripLap. This app helps planning city visits of several days, allowing to assign, for each place, multiple time windows. The application also combines the selection of places to visit with the best route between them.

3 System Requirements

The system to be developed should be able to handle the gathering of data from multiple sources and in different formats according to their source, which in our case can be restaurants, weather, shops, hotels and points of interest APIs. The system will also have a set of user requirements, which will be discussed in the next subsection.

3.1 User Requirements

There are several necessary user requirements to fulfill the application objectives and these can be found in table 2.

4 Solution Architecture

For the development of the server it was chosen *Node.js* with the *Express* framework, providing features for managing requests and routes. These tools allow the creation of a RESTful API

which will cluster data from four other APIs (OpenWeatherMap API, Zomato API, Amadeus API, Foursquare API) retrieving only meaningful data to the client, in JSON format. More information about this sources of data in Section 5. To prevent multiple equal requests to the external APIs the group decided to use a cache system.

On the client side, a framework named *React Native* will be used to develop the mobile application. Besides that, *Redux* was chosen to allow the centralization of the application's state. Also, a local storage system will be used to store the planned trips in the user's mobile phone.

To help the development process of the client we take advantage of *Expo Cli* which allows for a multi platform development.

All the requests to APIs are done using *Axios*, which is a promise based HTTP client *Node.js*.

A summarised schema of the architecture can be found in figure 1.

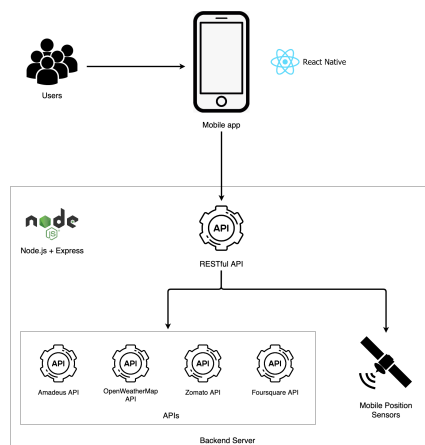


Figure 1: System architecture

5 Data source

An essential part of this work is the access to data as location, weather, interests, among others. To ensure this access, several data sources will be used as described in the following paragraphs. All the used APIs use JSON as the format for their responses.

5.1 Mobile Position Sensors

The positions sensors from the mobile phone will be used to locate the user in the map so that the application can better advise the user with places to visit near them.

5.2 Weather API

The application will have access to a public weather platform, named OpenWeatherMap¹, to inform and recommend, based on weather forecasts, which places they should and should not visit. For example, if rain is expected on the day of the travel, the application will suggest the user to avoid visiting open spaces.

5.3 Restaurants API

The Zomato API² will be used to fetch data from nearby restaurants such as the name, location, rating, average cost, type of cuisine and availability for reservations.

5.4 POI API

The mobile application will use the Foursquare API³ to search points of interest in the selected destinations or the current location of the users. It will also suggest them with the top tourist attractions, such as museums, monuments, gardens, etc.

5.5 Hotels API

To look for hotels, the application will be using the Amadeus API⁴. This data source will give, not only the name of the hotel, but also the contacts, amenities, the rating, price range and some simple suggestions for hotel stay.

5.6 Shops API

In order to present the shops in a city, the Foursquare API³ will also be used. In this case, it will provide the application with data about

¹<https://openweathermap.org/api>

²<https://developers.zomato.com/api>

³<https://developer.foursquare.com/>

⁴<https://developers.amadeus.com/>

all kind of shops, from supermarkets to drug-stores and from shopping malls to bakeries.

5.7 Google Maps

Due to the low limit of free usage that the Google Maps API has and since the React Native Community provides and maintains a free package for Google Maps⁵ to be used on mobile applications, the authors opted to use this package instead of the API to show the best route of a trip.

6 Application Overview

In this section the views of the application shown in Annexes 10.2 are explained in detail.

Image 2 shows the splash screen. This is an introduction page to the mobile application. It covers the whole screen and contains the name of the app and its logo.

Image 3 displays a simple screen where the user can input either their current location or the city they plans to travel to and the date frame in which their planned trip will occur. It also contains a button that takes the user to their previously planned trips that can be seen in image 6.

Image 4 shows how to select the start and end date of the trip pointed in the previous paragraph. As it is visible, those two days are highlighted and the days between are slightly too.

Image 5 presents the main application screen. This one allows the user to see the most essential information about the planned trip, such as the city, date frame and weather conditions. It also allows the user to access Points of Interest, Restaurants, Shops, Hotels and, finally, access to the full plan of the trip.

Image 6 lists all the previous planned trips by the user. They are able to click on one of those trips, which will take them to the main page (image 5). In addition, they can remove the trips no longer needed.

Image 7 shows the full plan of a trip, with the places to visit organised by the days. A user is able to rearrange the plan and remove those places. Besides this, the user is also warned about problems that might arise (image 8). Furthermore, it is possible to be forwarded to a map with the route for a specific day (image 9) by tapping the map button in that day.

Image 8 is an example of a warning that is displayed to the users. The warnings can either be related to inappropriate weather conditions for the places planned to visit or to the possibility of some of those places not being available at the day of the visit.

Image 9 displays a map with the suggested trip route. It is possible to choose between driving or walking when planning the itinerary.

Image 10 lists Points of Interest. By checking and unchecking each of those points, the users can add (image 13) or remove them from their trip plan, respectively. Besides that, this page contains a button that opens the filters (image 11).

Image 11 shows the filter possibilities for the POIs. As it can be seen, this type of places can be filtered by Arts and Entertainment, Outdoors and Recreation, Events and, finally, Nightlife Spots. The list of POIs shown afterwards is affected by the applied filters.

Image 12 lists Restaurants. By checking and unchecking each of those restaurants, the users can add (image 13) or remove them from their trip plan, respectively. Besides that, this page contains a button that opens the filters (image 14).

Image 13 shows how the users can select the day in which they would like to visit the previously selected place.

Image 14 displays the filter possibilities for the restaurants and hotels. As it can be seen, these types of places can be filtered by rating and/or price. The list of restaurants or hotels shown afterwards is affected by the applied filters.

Image 15 shows how the list of Shops is displayed. By checking and unchecking each of those shops, the users can add (image 13) or remove them from their trip plan, respectively.

⁵<https://github.com/react-native-community/react-native-maps>

Image 16 presents how the list of Hotels is displayed. By checking and unchecking each of these hotels, the users can add (image 13) or remove them from their trip plan, respectively. Besides that, this page contains a button that opens the filters (image 14).

Image 17 provides the user with more detailed information about a place. The information displayed depends on whether the place is a POI, a restaurant, a shop or a hotel.

7 Development plan

In order to develop this project, we defined several checkpoints based on the course deadlines. This information can be found in the Table 1.

Task	Deadline
Project Proposal	11.03.2020
Project setup, integration	25.03.2020
Architecture and Prototype (Presentation and Discussion)	16.04.2020
Architecture and Prototype (Deliverable)	22.04.2020
RESTful API Development	24.04.2020
Mobile App Development	24.05.2020
Final handout	27.05.2020

Table 1: *Project checkpoints deadlines*

8 Discussion

During the development of the mobile application the group faced some moments of deliberation, in which we endeavoured to choose the best course of action.

The first approach taken was regarding the question on whether or not a database should be used, since some kind of data storage is essential in the context of the application. After some discussion, this alternative was perceived as being time-consuming and overkill for the context of this course. To solve this problem, a simpler alternative - and currently in use - is to make use of the device's local storage. This approach will correspond to the application needs and it is also easy to implement.

Some challenges emerged when choosing which APIs would better suits the application.

These problems mainly consist of three areas: paid subscription, low free request limit and low area coverage. All the major APIs available would either be a paid service or, when being "free", they would have a low quota request before an upgrade is required. Also, most APIs have the recurring problem of only being focused on big cities, lacking data, sometimes nonexistent in many places.

The chosen weather API only gives a weather forecast up to five days, which will affect the planning of trips that extend further than that.

Another unexpected problem that appeared and in the meanwhile has been solved was the fact that Amadeus API was down for a few days.

Although the APIs chosen are less restrictive than the others available on the market, they all have some kind of limitations regarding the number of requests done. To solve this issue, a mock server simulating the API will be used in the development stage and a cache system will be implemented in production, storing previously made requests.

9 Conclusions

This article presented the project theme and the respective objectives of the application. All the sources from which the group will retrieve data were described in its appropriate section, as well as a development calendar. Moreover, detailed user requirements and a visual prototype were provided, which reflect the full functionalities and the graphical interface the application should have in the final version of development.

As a final conclusion for this document, the team concluded that using external APIs added more value to the final product. However they can eventually cause problems in the normal behaviour of the application, for instance if they have issues or are unavailable for a long time considering that the mobile application extremely relies on these APIs. Despite this, the group believes that a successful application can

be achieved in the end.

References

- [1] World Travel and Tourism Council. Travel and tourism continues strong growth above global gdp. <https://www.wttc.org/about/media-centre/press-releases/press-releases/2019/travel-tourism-continues-strong-growth-above-global-gdp>. Accessed in march, 2020.
- [2] Tiago Bastos. I Love Aveiro. <https://www.behance.net/gallery/83473811/Mobile-App-I-Love-Aveiro>. Accessed in march, 2020.
- [3] Julie Truong. YOGO - Trip Planner App. <https://www.behance.net/gallery/78632553/YOGO-Trip-Planner-App>. Accessed in march, 2020.
- [4] TripScout, Inc. TripScout Travel App & Trip Planner. <https://tripscout.co/>. Accessed in april, 2020.

10 Annexes

10.1 User Requirements

User Stories	Description
US01 - Search city	As a user, I want to search for a city so that I can select my trip destination.
US02 - Select the trip date	As a user, I want to select dates so that I can select my trip start date and end date.
US03 - Home-page	As a user, I want to see the homepage with access to feature like points of interest, restaurants, shops and hotels so that I can search in each of these features and see my trip plan.
US04 - Planned trips	As a user, I want to see my previously planned trips so that I can access the trip plans whenever I need.
US05 - Remove planned trips	As a user, I want to be able to remove a planned trip so that I only keep the trips I will need.
US06 - Trip plan	As a user, I want to see a plan for each trip so that I see what is scheduled for each day of each trip.
US07 - Trip warning	As a user, I want to be notified with warnings about weather conditions and occurrences that may affect my plan so that I may rearrange and improve the trip plan.
US08 - Trip map	As a user, I want to see a route for each day of the trip so that I can visit all places in the best possible order.
US09 - List POI	As a user, I want to see a list of points of interest for a specific city so that I can select which ones I want to visit.
US10 - List restaurants	As a user, I want to see a list of restaurants for a specific city so that I can select which ones I am interested in.
US11 - List shops	As a user, I want to see a list of shops for a specific city so that I can select which ones I am interested in.
US12 - List hotels	As a user, I want to see a list of hotels for a specific city so that I can select which ones I am interested in.
US13 - Filter restaurants and hotels	As a user, I want to be able to filter the list of restaurants and hotels by rating and price range so that I can easily find the ones that fit me best.
US14 - Filter POIs	As a user, I want to be able to filter the list of points of interest by Arts and Entertainment, Outdoors and Recreation, Nightlife Spot and Events so that I can easily find the categories that fit me best.
US15 - Detailed information	As a user, I want to see more detailed information about each point of interest, restaurant, shop and hotel so that I can make the wisest choice.
US16 - Add place	As a user, I want to add a place to visit on a specific day of my trip so that I add it to my plan.
US17 - Remove place	As a user, I want to remove a place from my plan so that I can only keep in the trip the places I truly want to visit.
US18 - Rearrange trip	As a user, I want to be able to rearrange the plan of my trip so that I can move each of the plans between days.
US19 - Route mode	As a user, I want to be able to select between walking or driving when seeing a route for my plan so that I can choose the most appropriate route for me.

US20 - Weather prediction	As a user, I want to see a weather prediction for the selected city during the selected days so that I can choose the most appropriate places to visit.
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Table 2: *User Stories*

10.2 Mockups



Figure 2: *Splash screen*

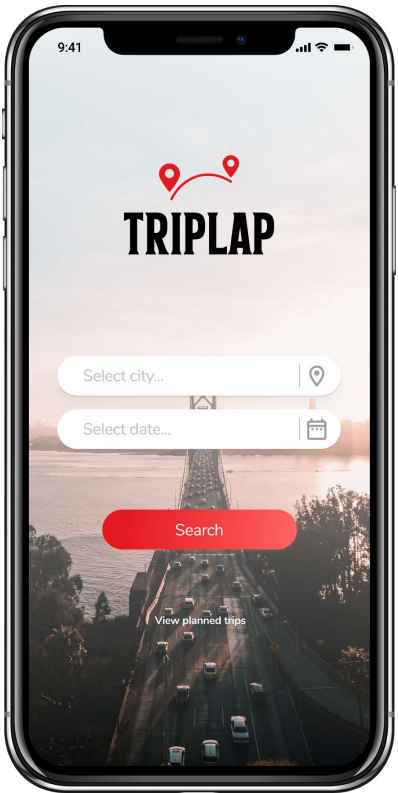


Figure 3: Search screen



Figure 4: Select date range pop-up

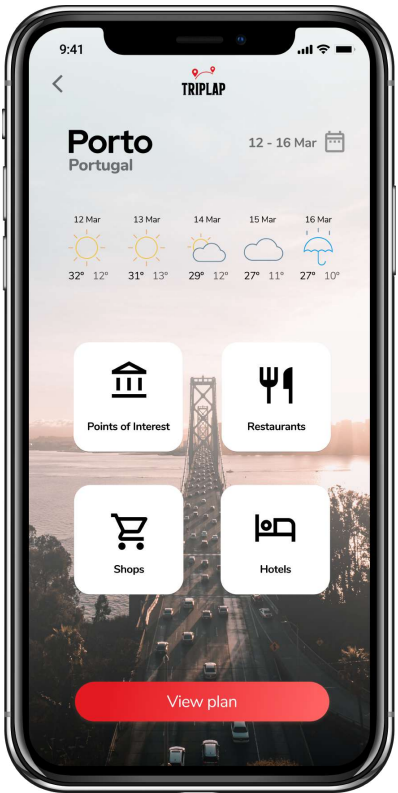


Figure 5: Trip main screen

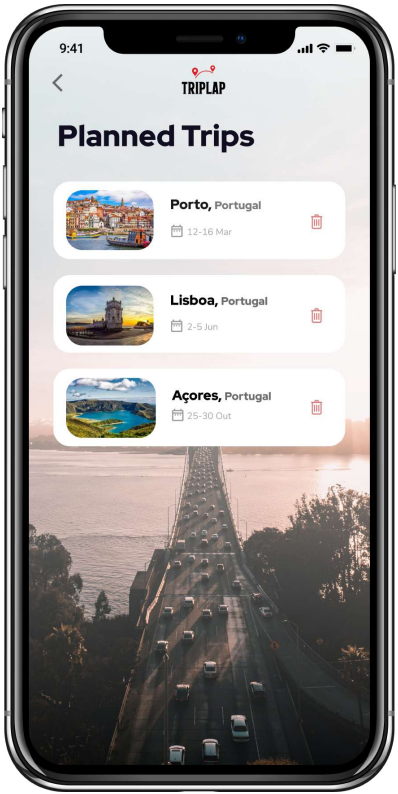


Figure 6: Planned trips screen

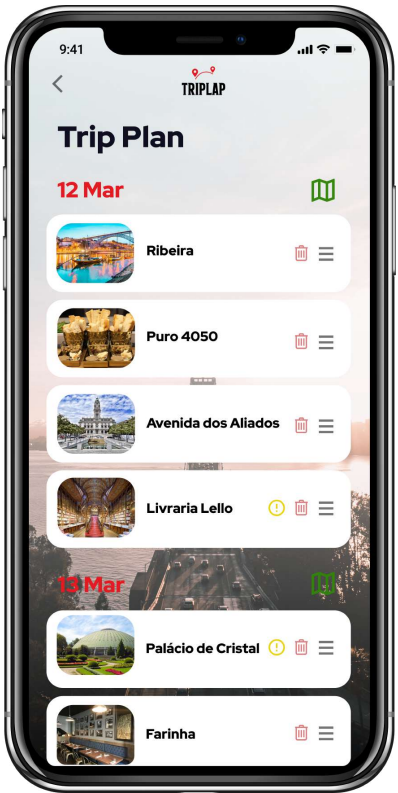


Figure 7: Trip plan screen

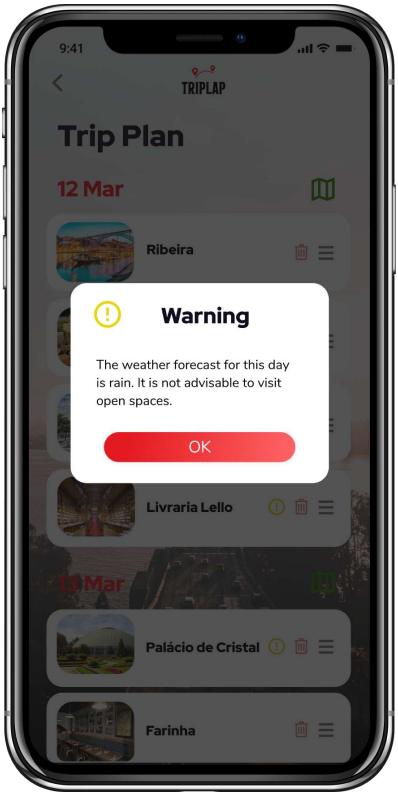


Figure 8: Warning pop-up

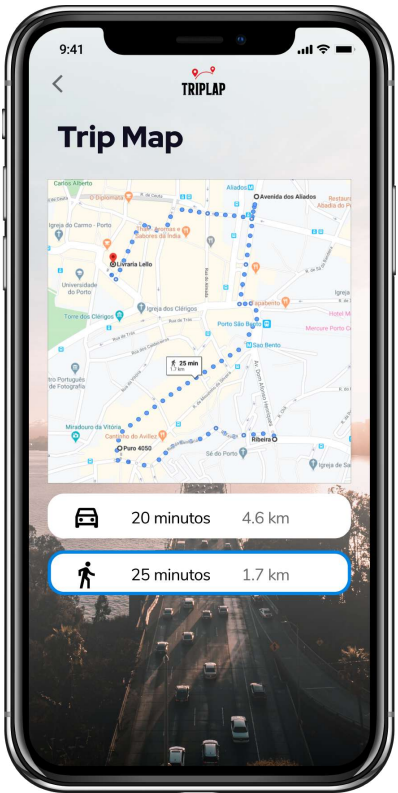


Figure 9: Trip map screen



Figure 10: List of points of interest screen

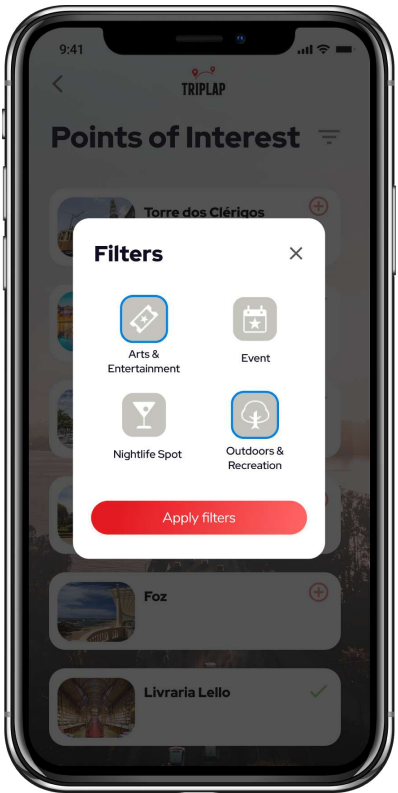


Figure 11: Filter points of interest pop-up

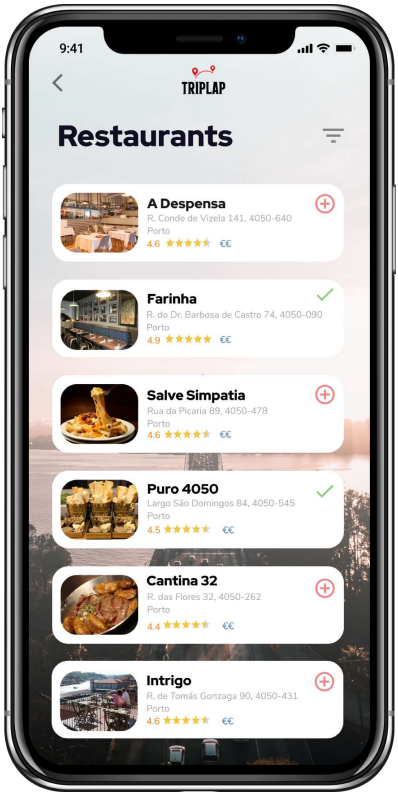


Figure 12: List of restaurants screen

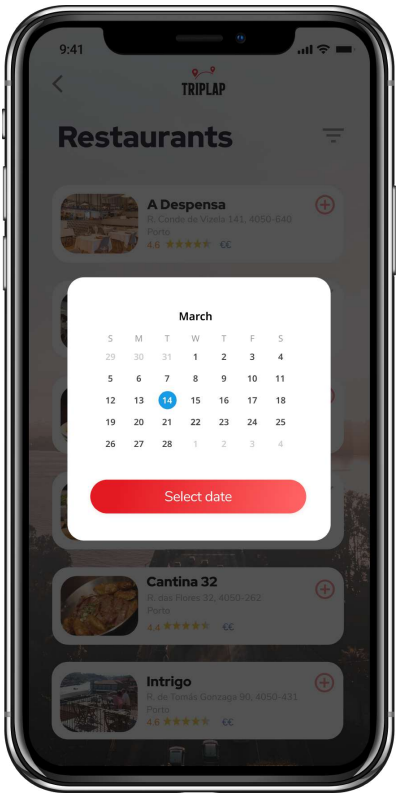


Figure 13: Select date for a place pop-up

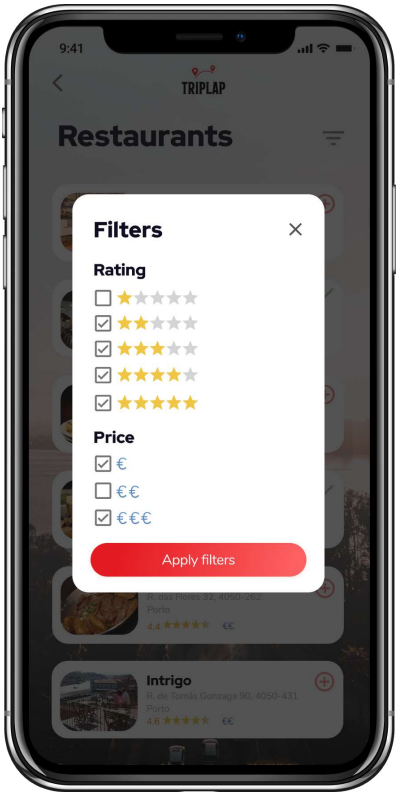


Figure 14: Filter restaurants and hotels pop-up

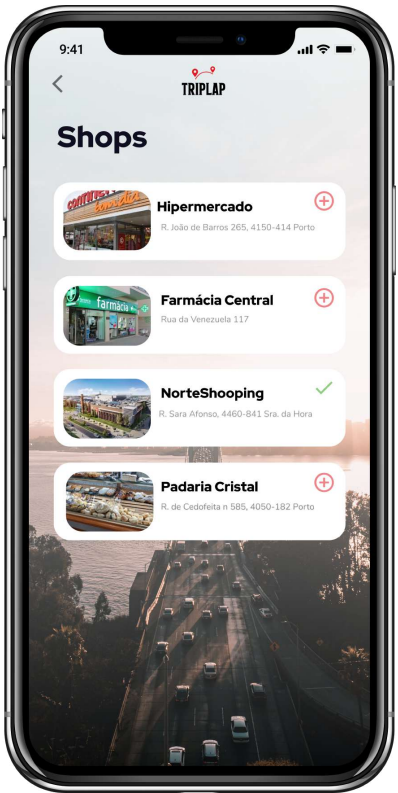


Figure 15: List of shops screen

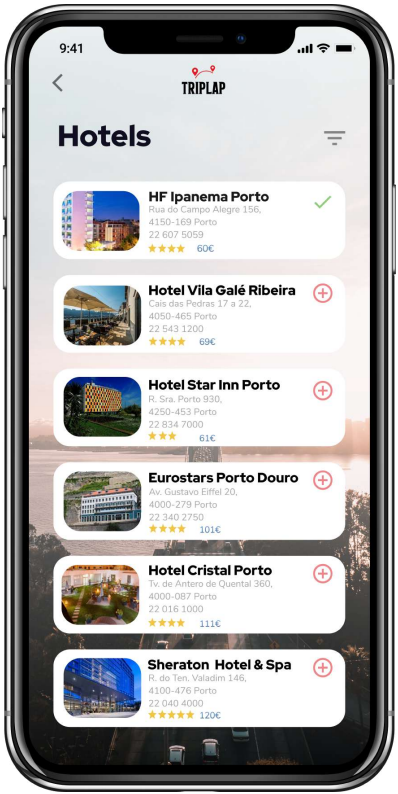


Figure 16: List of hotels screen

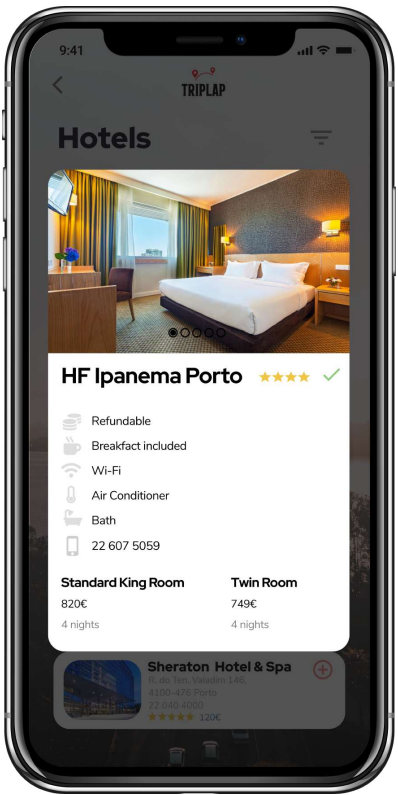


Figure 17: Detailed information of a place pop-up