Design and Implementation of Mobile Applications - Polaris project VINCENZO MANTO, ROBERT MEDVEDEC

Design Document

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1 Introduction

1.1 Purpose

This document provides a detailed description, mainly of the architecture and the UI, of the 'Polaris' mobile application.

'Polaris' application is a system used to enhance travelling experience through idea sharing among people, exploration of other users' travels, documentation and easy manipulation of trip destinations and ideas. The system itself is made so the user has every single information regarding his travel in one place, without having to remember or worry about any details.

'Polaris' is mainly a mobile application, with a possibility of being also expanded as a web application in the future.

1.2   Scope

'Polaris' is an application that helps all travellers around the world to easily and efficiently manage their travels and thus enhance their travelling experience. The target audience for this application is everyone who uses a smartphone and has at least some experience in using mobile applications, as some of the patterns and application usages might not be intended for the novices in the field. Thus the target audience ranges from 15 to 50 years old, although there are no strict boundaries.

The application is mainly intended to be used when a user is planning and making their own trip and has a liberty to organize their free time and places to visit.

Another important usage of the application is sharing trip ideas with friends and other users around the world. Planning trips by itself is a daunting and time consuming task, and with the lack of adequate applications on the market, we wanted to create something that is going to allow users to easily share and modify their previous trips and therefore improve the overall travelling experience for others. The most important functions of the application are arranging a trip, finding points of interest in the area, organizing visits to those points, exploring accommodation and restaurants in the area, and crafting your own views of the travel by providing additional comments on the whole experience.

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1.3   Definitions, Acronyms, Abbreviations

1.3.1   Definitions

- **Application**: a computer (mobile) program that is designed for a particular purpose.

- **Smartphone**: a mobile phone that performs many of the functions of a computer, typically having a touchscreen interface, internet access, and an operating system capable of running downloaded apps.

- **Google Maps**: a web mapping service developed by Google, used both as a standalone app and as an integrated mapping solution in most of the apps.

- **iOS**: operating system developed by Apple, used by their portable devices like iPads and iPhones.

- **Android**: most popular operating system for smartphones and tablets, developed by Google and partners.

- **Backend**: the part of a computer system or application that is not directly accessed by the user, typically responsible for storing and manipulating data.

1.3.2   Acronyms

- **API**: Application programming interface, computing interface which defines interactions between multiple software intermediaries

- **UI**: User interface

- **GUI**: Graphical user interface

- **DB**: Database

- **REST**: Representational state transfer - software architectural style used in web services

1.3.3   Abbreviations

- **App**: Application.

1.4   Revision History

- **Version 0.1**: First .tex document created and added all together; 28th December 2021

1.5   Reference Documents

- nothing

2 Overall Description

2.1 Product perspective

2.1.1 Internal structure

2.1.2 Scenarios

Scenario 1

Marco wants to go to a trip to France. His friend, Federico, already went on a trip in a similar area and visited points of interest that Marco likes. Marco asked Federico to tell him all of the places he visited, how did he travel, and the order in which he visited these places. Federico made some notes for Marco, but it still left Marco with the problem of having everything in his phone organized and in one place. That's when Marco found out about the app and asked Federico to put everything he remembers from the trip here. That way Marco had all of the locations in the correct order, as well as comments about certain places and other detailed information all in one place, which allowed him to easier follow the trip during his time in France.

Scenario 2

Rebecca, the friend of Marco and Federico, heard about their trip to France and decided to go there as well. However, she is not as interested into visiting so many French castles like Marco and Federico, and wants to add some other destinations to her trip. However she still wants to keep the first half of the trip, where guys visited the southern part of France. She also uses the app and copies the trip, after which she edits it and replaces castle destinations with beaches on the northern part of the country. She renames the trip and publishes it with a different name. This way Rebecca saved some time and effort on planning the entire first half of the trip, whilst being able to modify the experience in the latter half.

Scenario 3

Giovanna wants to on a trip but she already visited France. She needs some new ideas. By using the "explore" function in the app she finds some of the top rated trips around Europe - her favourite of those is a trip to Iceland. Giovanna follows all of the guidelines in the trip and has an amazing time.

2.2 Product functions

Functions of the system provide easy and intuitive ways to use the app. They are somewhat connected and have overlapping features. Nevertheless, the users may use only certain parts of the system and still get the full functionality they need from the app. These functions are mentioned in several places in the document, but their most thorough explanation can be found here.

2.2.1 Adding a trip

Adding a trip is the most essential part of the system. The function features several parameters and allows for high level of customizability in order to create a fully unique travel experience.
Each point of interest is featured as a specific "destination", although even places that are not regarded as specific destinations can be inserted into a trip. Destination fetching is done through the Google Maps API, with the users also having the ability to add and edit their own destinations. The function features the following:

- Selecting a starting point, that is then connected to the nearest city on the map

- Adding other destinations to the trip

- Writing a trip description

- Adding preferred way of travel between destinations

- Identifying trip price level

- Adding comments to trip destinations

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2.2.2 Editing a trip

Editing a trip can be done on two different types of trips - public or private. If the trip is public, either published by the user editing it or someone else, by starting to editing an exact copy of that trip is created, which can then be published again under different name and different trip ID.
If the trip is private and has not yet been published, then a new trip is not created, but rather the trip ID stays the same. If the trip is then published and edited again, the new edited version of the trip has a new trip ID and is a whole new entity.
Editing a trip features all of the same functions that adding a trip does, which means that everything from a small comment to the whole trip can be changed.

2.2.3 Finding a trip

Finding a trip can be done in several different ways. The first way features a search bar which then searches a trip by the starting point name or by the city which is the closest to that destination. The second way is a search by the trip ID or a hyperlink, which can be directly received from other users. The third way is by accessing a specific user's account page and scrolling through their published trips. Finally, trips can also be found by looking at the interactive map, selecting the area of the desired starting point of the trip, and finding the trip through the distinct trip name and photo.

2.2.4 Following a trip

This function mainly uses a specific trip and sets it as an active trip of the user. This makes it easily accessible by the user at all times by using the bottom navigation bar, and allows him to follow certain steps of the trip without losing progress. This function also allows the user to change the current active trip and still keep the progress of an old trip, so that the progress can be easily restored when that trip is again set as an active trip.

2.2.5 Updating account settings

Only a few settings can be changed in the user account. List is the following:

- Changing a username

- Changing a profile picture

- Switching between dark and light colour scheme

- Setting preferred price level

- Switching between offline mode and online mode

2.2.6 Offline function

The system allows the users to be disconnected from the Internet and still use the app fully. Individual trips can be downloaded and store in the phone internal storage, and then accessed at any time. If any changes are made to the trip during the offline time, a new iteration of the trip gets created and published as soon as the connection is restored and the user has come back to the online mode. Multiple trips can be downloaded and kept in the storage of the phone at all times.

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3   Architectural Design

3.1   Overview

Architectural design of the application is based on the three-layer model used in most applications. The three layers are the presentation layer, or frontend, the application layer, or middleware, and the data layer, or backend. Each of those layers does its own part of the job and communicates with other layers in order to present the correct information to the user.

The architecture is also a typical client-server implementation where server holds the data and the client is accessing it through requests (besides the offline mode where the user stored some of the data from the server locally and is accessing it without using online requests).

3.1.1   Backend architecture

WE HAVE TO SEE WHAT HAPPENS HERE - WHICH BACKEND IMPLEMENTATION WE ARE GOING TO USE

3.1.2   Middleware architecture

In order to connect the data on the server to the screen of the phone and to allow the user to properly see the data, we have implemented a complicated layer of functions and classes in order to create easy-to-use and esthetically pleasing experience for the user.

4   User Interface Design

UI

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