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PrÃľsentÃľ en vue de l'obtention du diplÃ´me d'

IngÃľnieur en GÃľnie .....

Option ...

Conception et dÃľveloppement d'une application

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To my family and all my beloved.

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Abstract

My graduation project consists in creating a web application that contains listings of hotels, restaurants and any place available in the Google places API and allows registered users to create reviews about these places as well as rate these places following some specific criteria like the use of renewable energy and the use of recyclable materials.. The web app also provides a REST API that is being used by a mobile app developed separately. Part of the project also consists of deploying the app to the cloud.

Keywords

Python - Django - Sustainable Tourism - REST API - Amazon Web Services - Ratings

Introduction

The internet is full of tourism platforms that list hotels, restaurants and similar tourism related services. To name a few of them we can cite as notable examples: Tripadvisor, Trivago and Kayak. There is literally tens of these platforms, from different countries and in different shapes and colours. However all of the existing platforms only let users write "general" reviews about the listed places, and the visitors can only distinguish between those places based on either the prices or the "general" reviews. It turns out that thereâĂŹs also a market for people who are interested in "sustainable tourism" and donâĂŹt mind paying more for an eco-friendly vacation. Sustainable tourism is defined as "tourism that respects local people, the traveller, cultural heritage and the environment" by UNESCO, you think of it as "fairtrade" and "organic" but for the travel sector.

One Planet Rating (OPR) was created to fill this void and serve this portion of tourists by listing the same places while focusing on sustainability instead of price. One Planet Rating is a newly founded social startup based in Stockholm, with a portion of its team members working remotely (partially including myself). The startup is in itâĂŹs very early stages, itâĂŹs main product/service is the web application described in this report.The companyâĂŹs service isnâĂŹt released to the public yet. The company thrives to have an impact and aims, with its services, to help achieve some of the United NationsâĂŹ Sustainable Development Goals (UN SDGs) like:

- UN SDG 8: "Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all".
- UN SDG 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss"

- UN SDG 13: "Take urgent action to combat climate change and its impacts by regulating emissions and promoting developments in renewable energy.

OPR is a tourism platform that is sustainability focused, it allows people from around the world to rate and review touristic services based on how much they respect the earth. The long term goal of OPR is to promote the movement of sustainable tourism and incite people to be more responsible during their trips, and eventually help protect the environment and the community. OPR also emphasizes on transparency as it doesnâĂŹt participate in writing the reviews and ratings, it only provides a playground for all people to express themselves freely.

In this report weâĂŹll briefly cover the state of the art and market analysis of the project. In the first chapter weâĂŹll go through the requirements and specifications. The second chapter covers the design aspect of the project. The third chapter covers the development and deployment aspects of the project.

CHAPTER 1

State of the art

Many online tourism platforms exist today, we can consider these platforms as âĂIJindirect competitorsâĂİ because they offer an alternative functionality to OPR, but what makes the most difference is the target market. Some of these major platforms are Tripadvisor(Fig.1), Trivago(Fig.2) and Momondo(Fig.3). As shown in the following screenshots, all of those platforms focus on the general ratings and the price. They offer very similar functionalities but in different layouts.

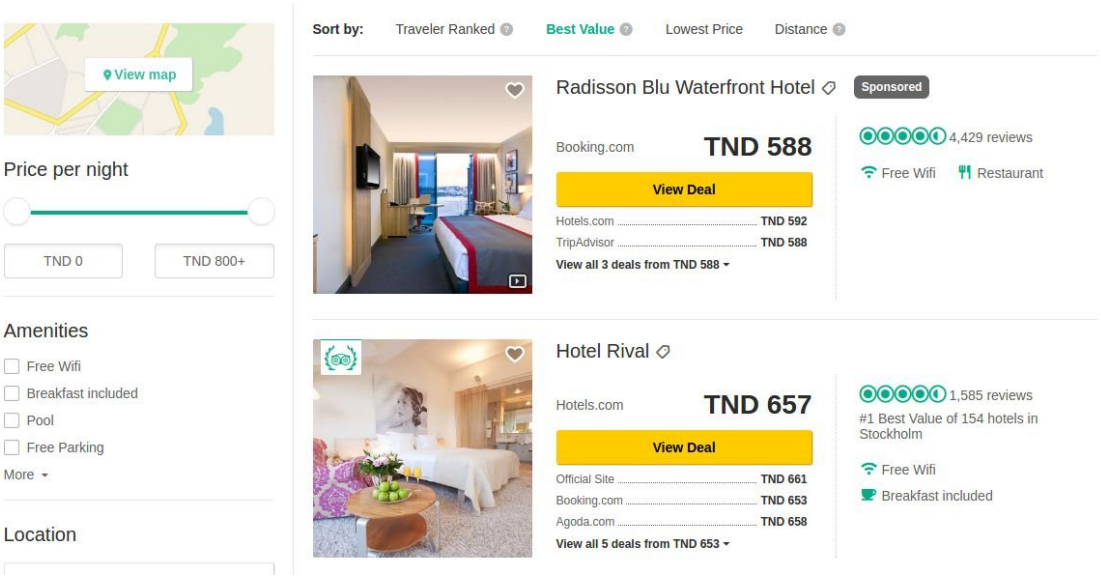


Figure 1.1: screenshot of Tripadvisor

Trip advisor, which is the world leader in the tourism sector provides hotel booking and listing of tourism establishments. The company is based in the United States, and it also offers other related services like tourism focused forums. The platform also allows users to search for and book flight tickets.

Figure 1.2: screenshot of search results for Trivago

In contrast, the Germany based company, Trivago, only focuses on hotels. Trivago is the leader hotel search engine in Germany. Though trivago only lists hotels, it is owned by Expedia, which owns and operates more than 200 websites that offer diverse services in the tourism and travel sectors.

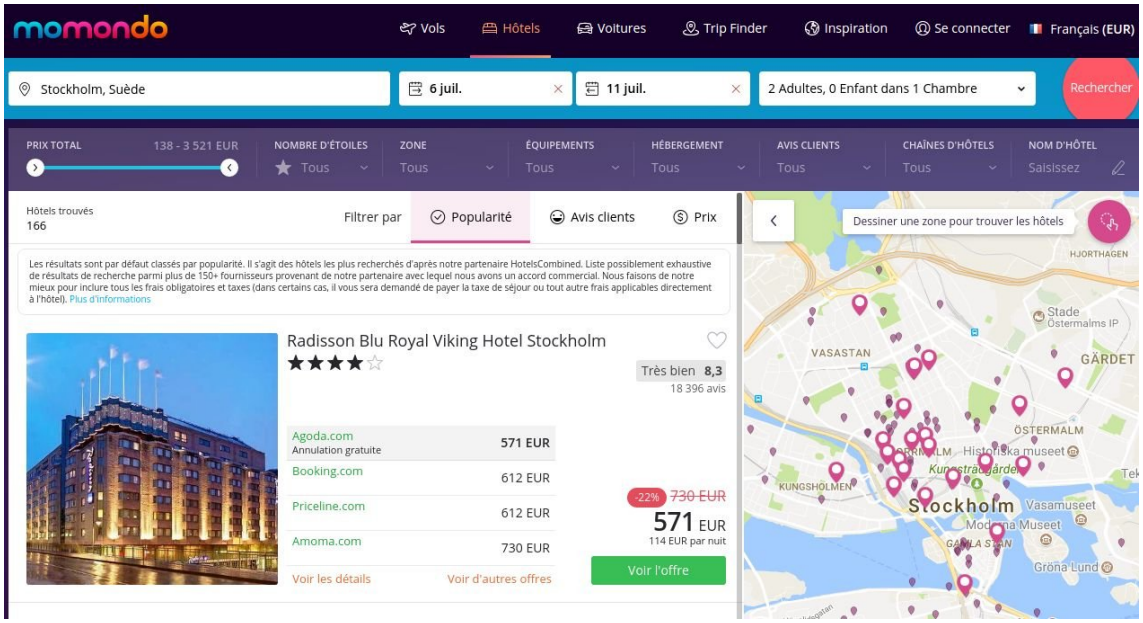


Figure 1.3: screenshot of Momondo

Momondo is also a similar service which, in addition to listing hotels, also provides flight booking and car rental services. Another interesting thing about Momondo is that itâĂŹs based in Scandinavia, and this makes of it a local competitor.

Another thing to note is that most of these âĂIJindirect competitorsâĂİ are booking websites while OPR is not. OPRâĂŹs goal is to promote the sustainable places and punish the unsustainable ones.

The following table shows more in detail the difference between OPR and the above-mentioned competitors:

Funtionality	Tripadvisor	Trivago	Momondo	OPR
Search hotels	YES	YES	YES	YES
Search restaurants	YES	NO	NO	YES
Search activities and other places	YES	NO	NO	YES
Search for flights	YES	NO	YES	NO
Search for flights	NO	NO	YES	NO
Booking service	YES	YES	YES	NO
General ratings	YES	YES	YES	YES
Sustainabilityratings	NO	NO	NO	YES

Table 1.1: comparison of tourism platforms

Another category of competitors includes magazines, blogs and expert websites (like shown in Fig.4) that promote some specific sustainable places. Those are also indirect competitors because they rely on expertsâĂŹ advice on their reviews which tend to be not very trustworthy. OPRâĂŹs content will be completely user generated, because most people believe more in reviews created by peers and want to be part of the content creation. OPR will only be the intermediary between content creators and content consumers, and will not participate in content creation.

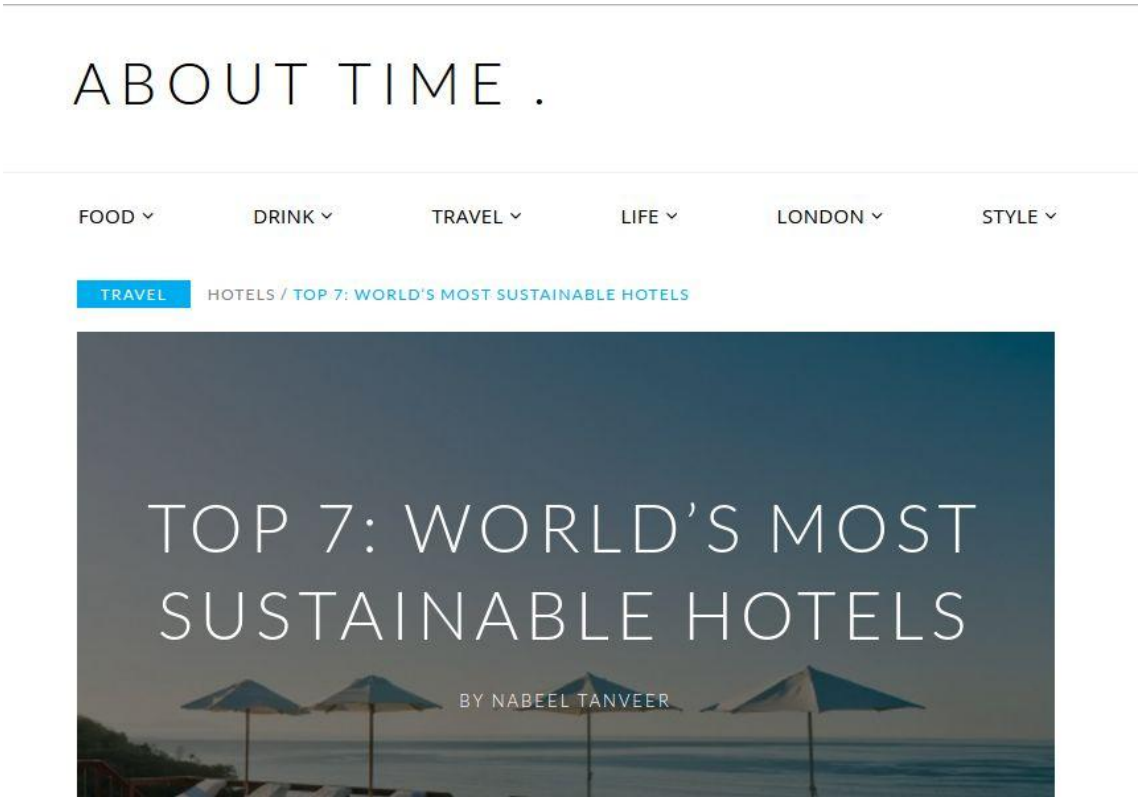


Figure 1.4: example of an expert blog

1.1 Formalism

During the work on this project we used the following formal methods:

UML

We used UML (Unified Modeling Language)for describing and modeling the specifications of the project. UML is very flexible and versatile. UML is also one of the best choices for modeling because it is very popular and widely used across the globe, which makes of it easier to grasp by other people. Most software engineers are probably familiar with it.

Agile scrum

We used the agile scrum methodology because it is the most convenient method to the project. Every week we have a sprint where we define the goals of that week from the backlog. This methodology turned to be very efficient, especially that the project consists in developing a prototype, which requires continuous thinking and customization. Agile scrum allowed us to customize the project while working on it.

CHAPTER 2

Specifications

2.1 Actors

2.1.1 Internal actors

User
Anybody who accesses OPR Ratings via App or Web is a User. As opposed to âĂIJMemberâĂİ (see below) this does not require any log-on, or creation of a OPR Profile. A User can search for specific places and read reviews of those places.

Member
OPR Members are Users who sign up to use OPRâĂŹs services with a Profile. A User needs to be logged in, to be acting as a Member. A member can do everything a User can do, in addition to the ability of posting their own reviews and ratings.

Manager
In addition to the permissions that a Member has, an Admin has the permission to Create, Read, Update and Delete (CRUD) Ads, reviews and rating categories.

Admin
The admin is responsible of managing the users, he has the permission to CRUD users.

2.1.2 External actors

Google places service
Google places API is called for every search to look for relevant places based on provided location.
The API provides us with :
Basic information (Name, address..), Photo, GoogleâĂŹs place_id (unique identifier)

Google maps service
Google Maps API provides us with a map pointing at the specific location based on the locationâĂŹs place_id we retrieve from Google Places API

Gmail service
GoogleâĂŹs Gmail is used to send the emails to users.

2.2 Functionalities' overview

The main functionality of the platform is to allow members to read and post reviews and ratings about some specific places. Obviously this implies that they need to be able to register and login to the platform. Users should also be able to search for a specific place by a keyword. And since OPR is all about sustainability-related reviews, the platform offers the possibility to rate establishments based on multiple criteria. The platform also has a mobile app, and this implies that the web based app should provide an API to supply the mobile app with the data.

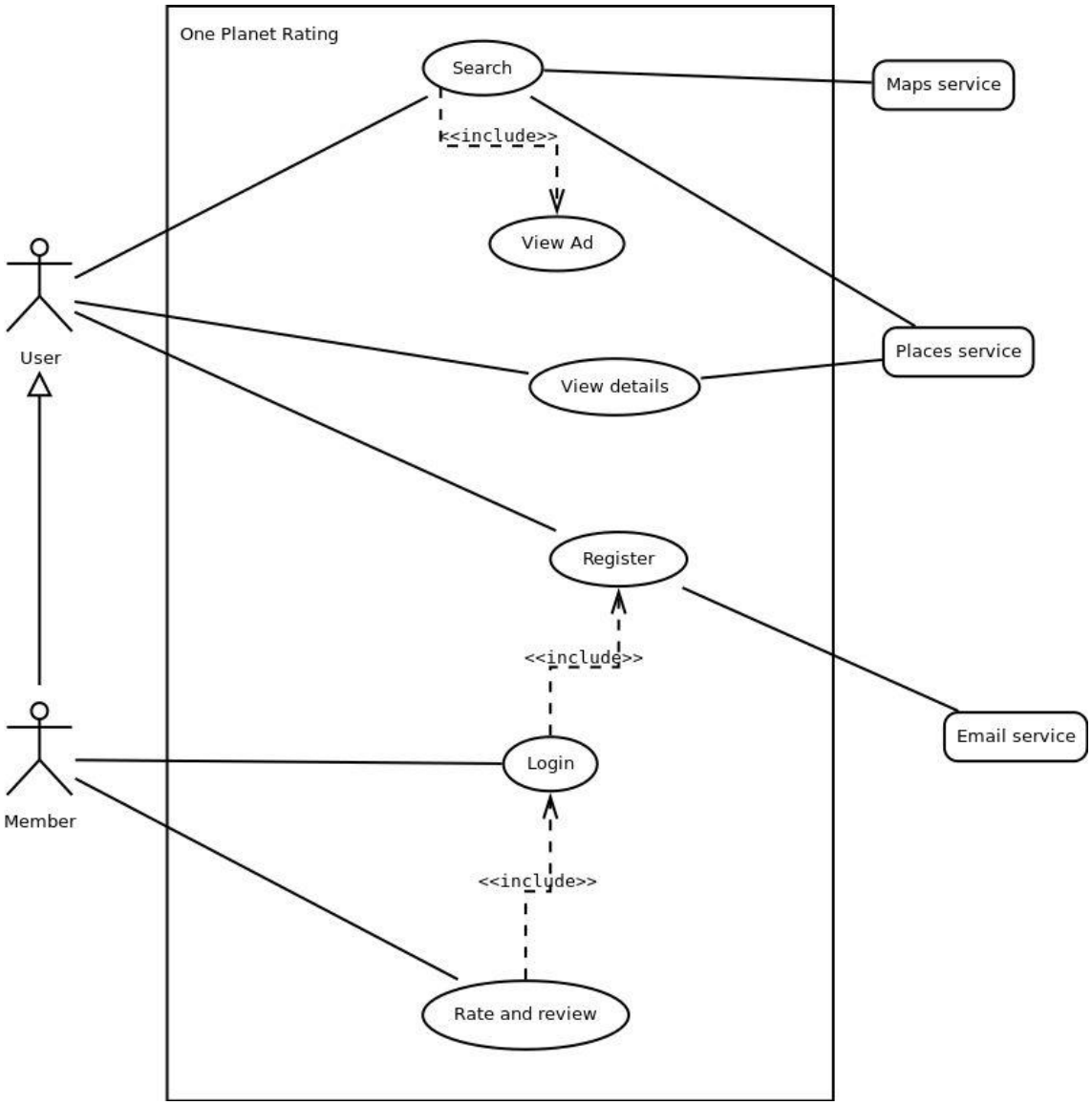


Figure 2.1: general usecase diagram

As shown in the use case diagram, any user can use the app to search and view the details of a place. The search functionality pulls data from Google places service, and shows a map using Google maps service. When a user registers, he becomes a member. During the registration process Gmail service is used to send a confirmation email. The member can then login to his profile and becomes able to rate and review places.

2.2.1 Register

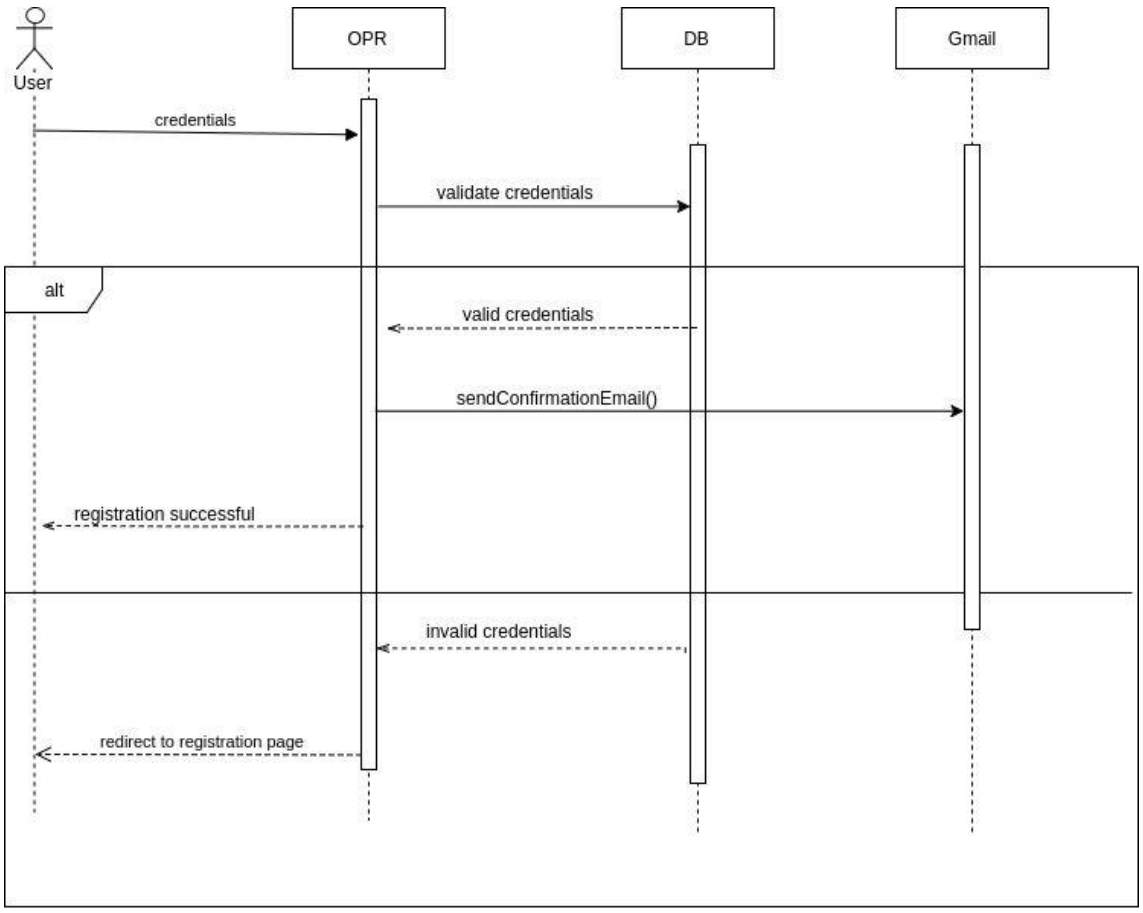


Figure 2.2: registration sequence diagram

Title	Registration
Author	Moetaz Ben Charrada
Version	1.0
Objectives	Allows users to register and create an account
Actors	User - OPR - Gmail
Pre-conditions	The user should be on the registration page The user must not be already registered.
Post-conditions	The user becomes registered (member)
Story	1. The user enters his username 2. The user enters his email 3. The user enters his password 4. The user re-enters his password 5. The user submits the form
Alternative story	The functionality is accessed through the mobile app instead of a browser.
Exceptional story	If the user enters an email thatâĂŹs already in the DB, the user will be prompted to enter a different email. If the user enters a password thatâĂŹs not compliant to the security constraints, he will be prompted to enter a different password

Table 2.1: Registration description

2.2.2 Login

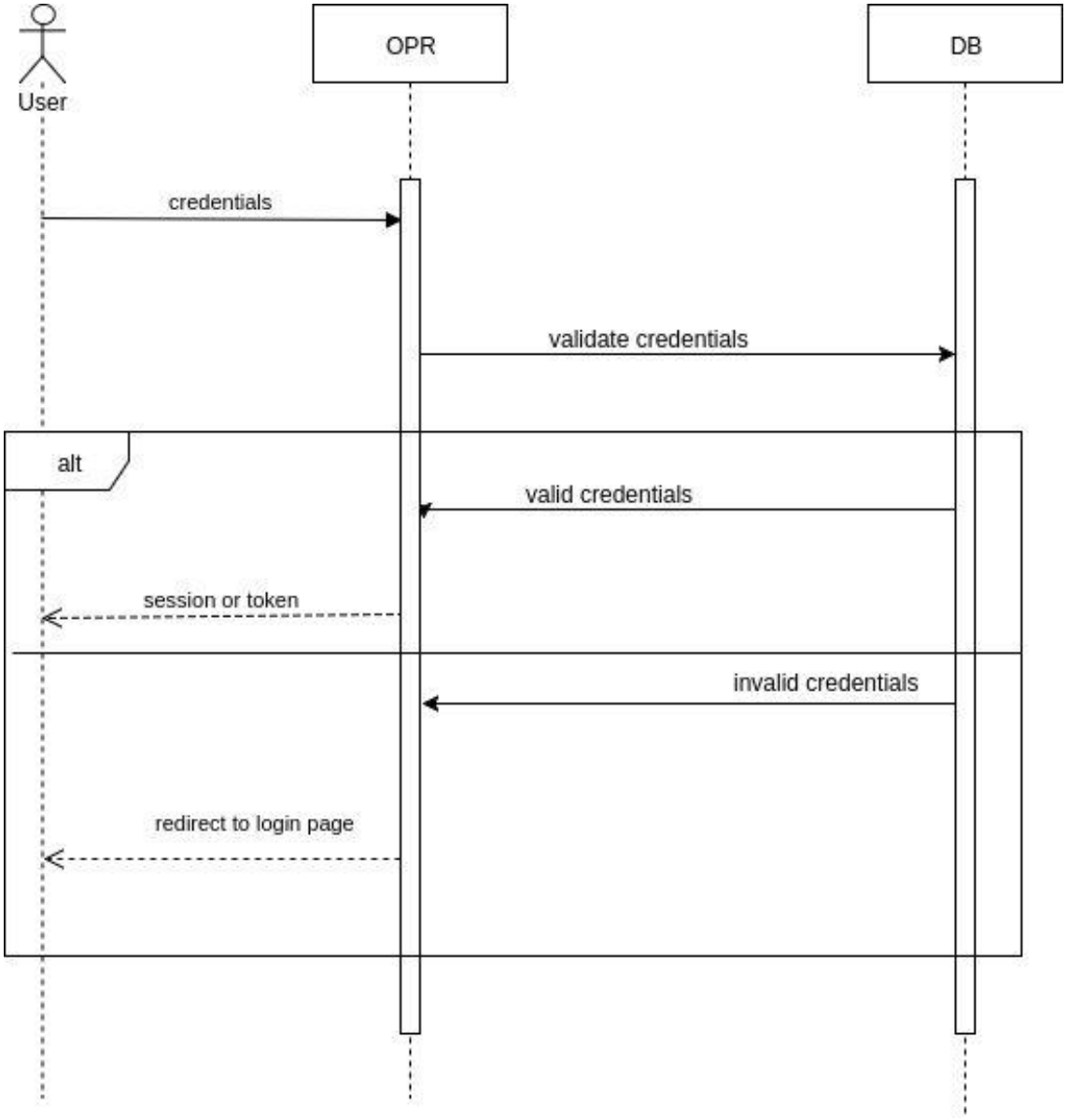


Figure 2.3: login sequence diagram

Title	Login
Author	Moetaz Ben Charrada
Version	1.0
Objectives	Allows users to login and access his account
Actors	User - OPR
Pre-conditions	The user should be a registered member. The user must not be already logged in.
Post-conditions	The user becomes authenticated. The user can then post reviews.
Story	1. The user enters his username 2. The user enters his password 3. The user submits the form
Alternative story	The functionality is accessed through the mobile app instead of a browser. (Through the REST API)
Exceptional story	If the user enters incorrect credentials, he will be prompted to try to login again.

Table 2.2: login description

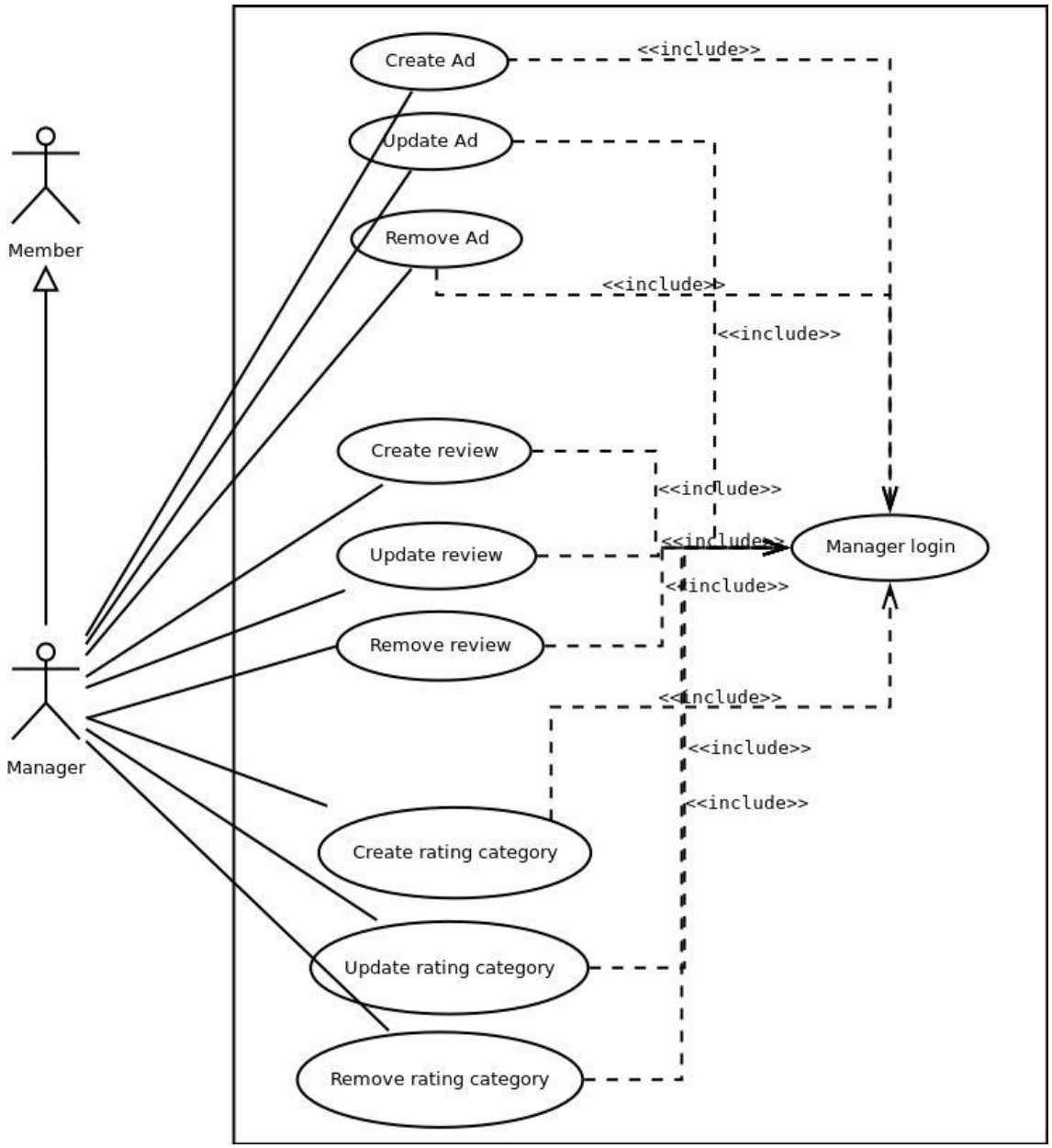


Figure 2.4: manager usecase diagram

A manager, is a member with additional privileges. An admin can create, update and delete: ads, reviews and rating-categories.

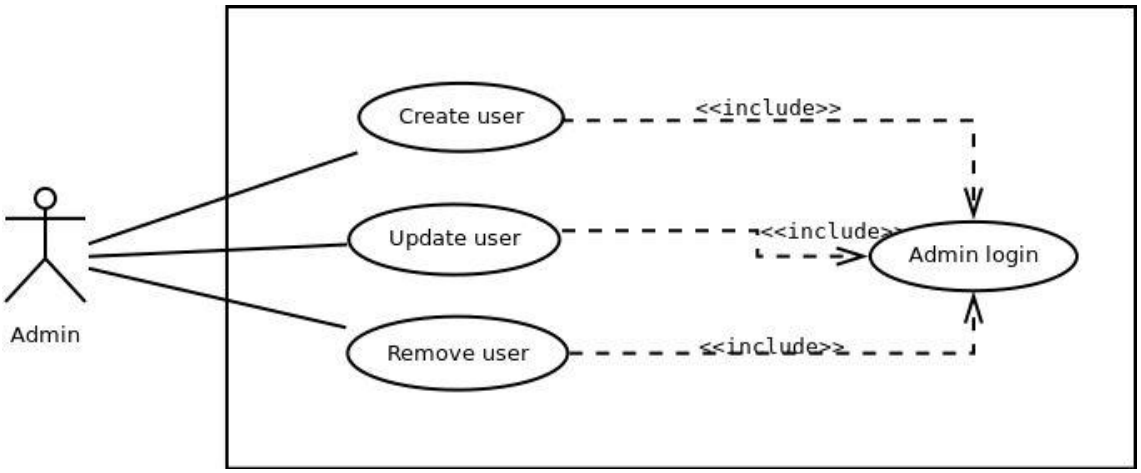


Figure 2.5: admin usecase diagram

CHAPTER 3

Design & architecture

3.1 Physical architecture

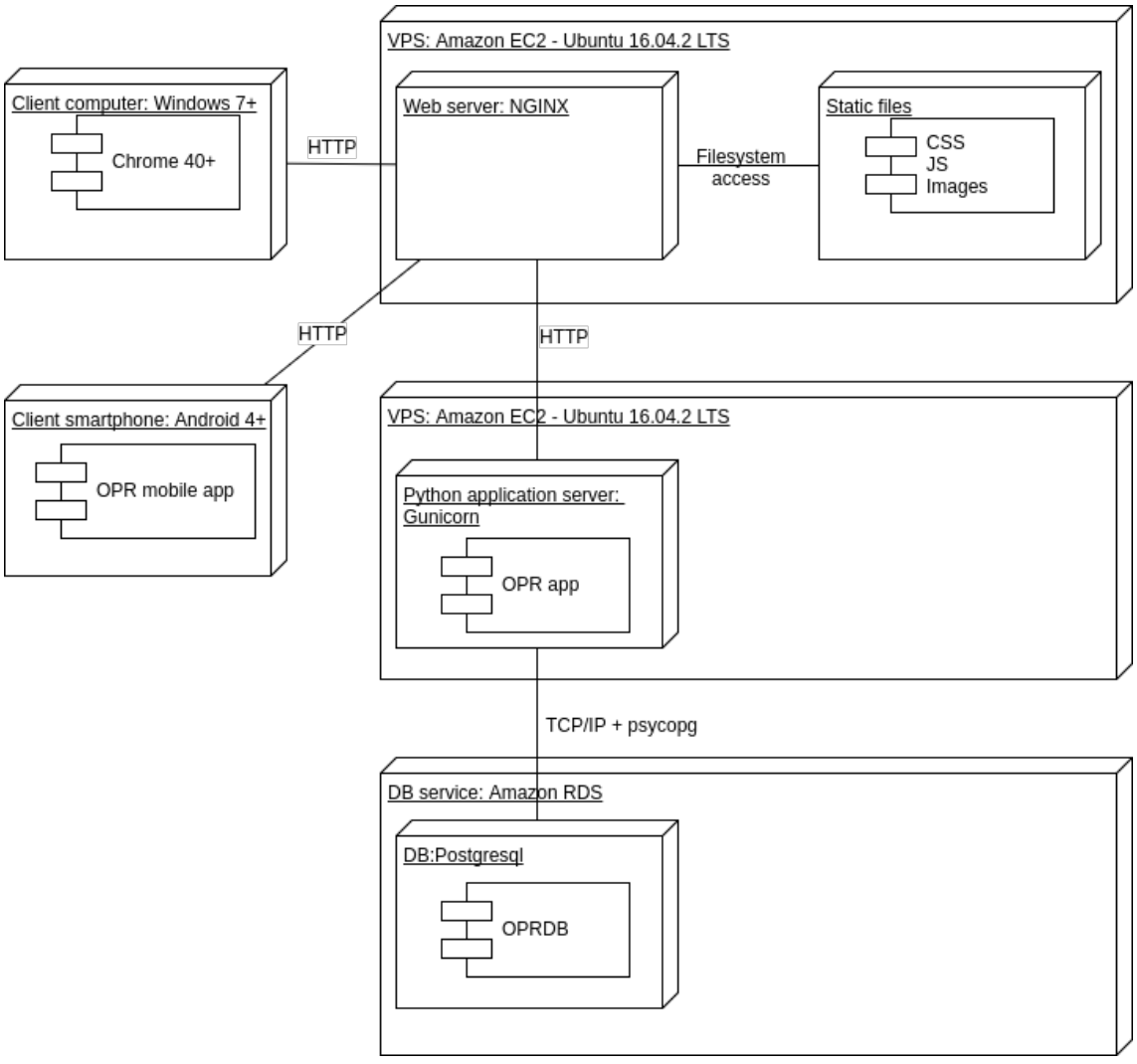


Figure 3.1: The app's physical architecture

3.2 Logical architecture

The architecture used is a mix of MVC + 3 Tiers.

3 Tiers
3 Tiers was used to separate the data, logic and the client from each other. Each of those three tiers is a separate, standalone entity. This provides more security, because if one of the tiers gets attacked the other tiers remain intact. This also provides some sort of interoperability because we can change one of the tiers without touching the other ones.

MVC
MVC architecture was used in the server level. MVC architecture facilitates code visibility and maintainability because the architecture is well known and one can easily predict and understand the functionality of each of its components. MVC also has the advantage of loose coupling, which also offers interoperability as explained in the example of 3 Tiers above.

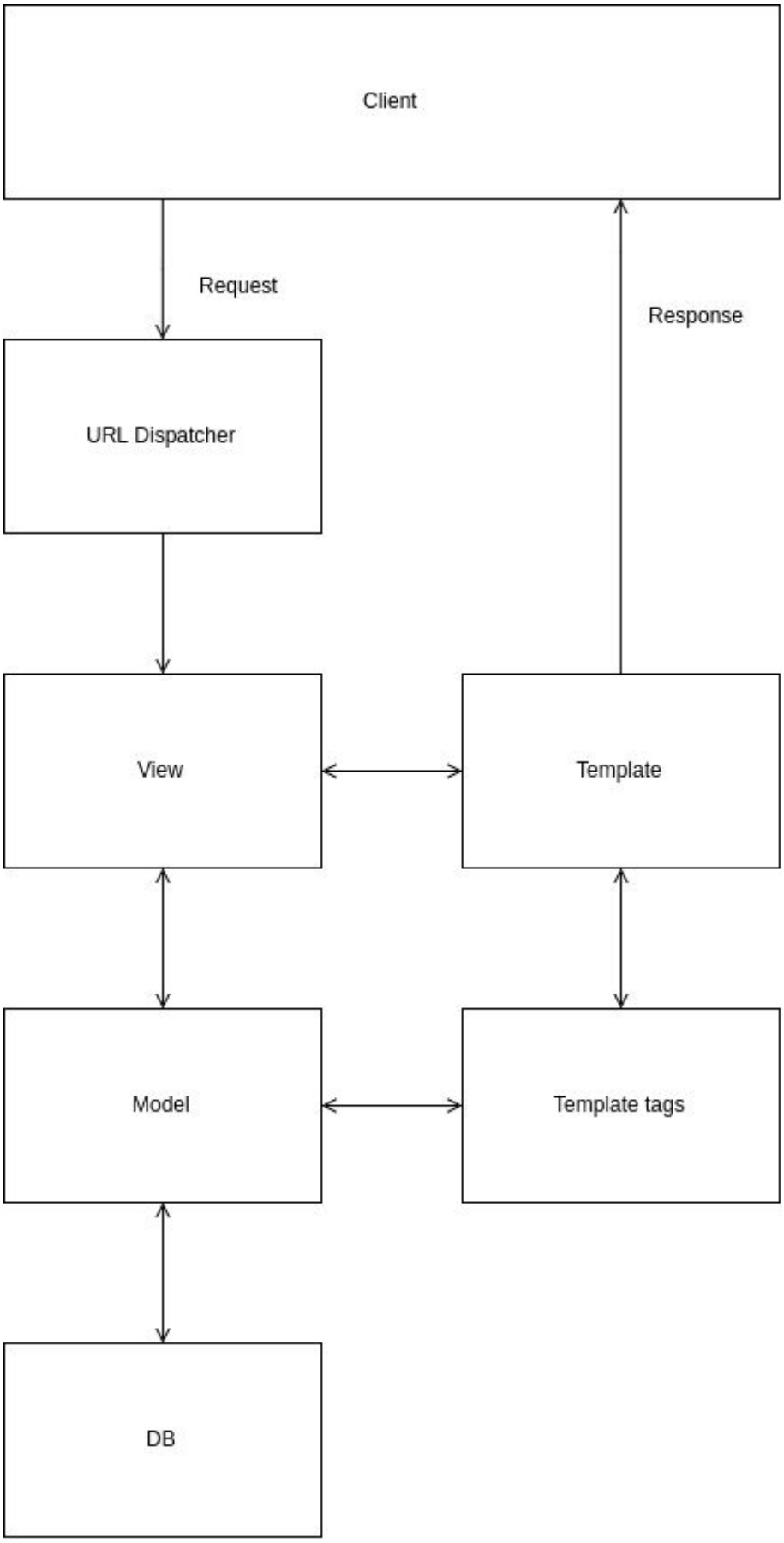


Figure 3.2: The app's logical architecture

3.3 Modular architecture

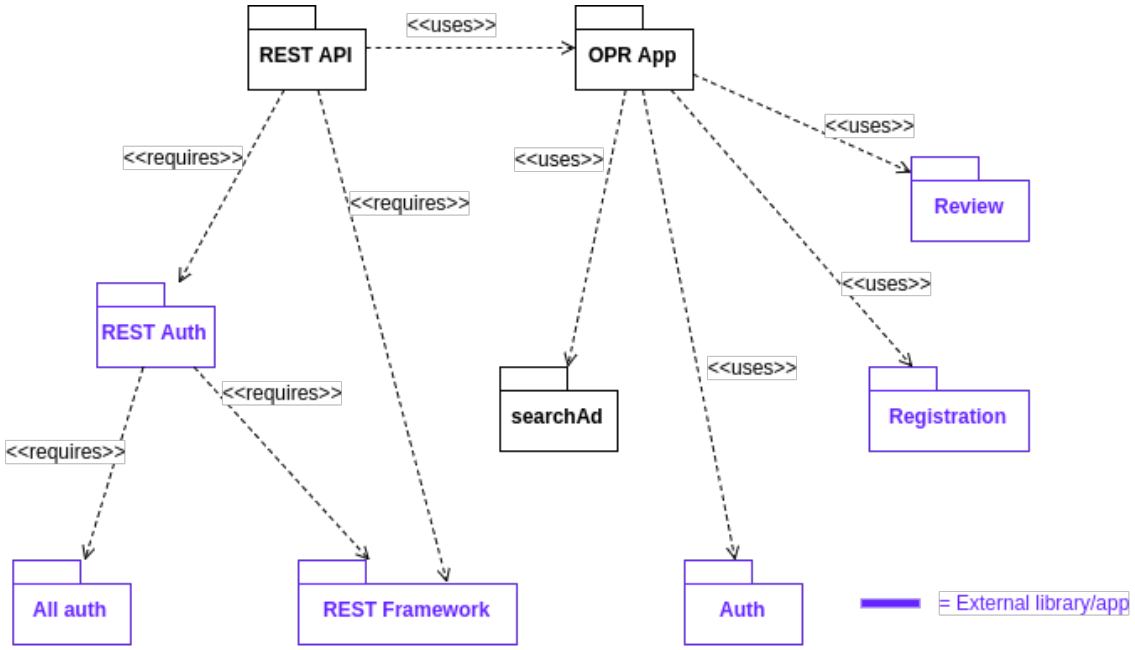


Figure 3.3: The app's modular architecture

During my work on the project I tried my best to reuse existing code instead of re-writing what already exists and is ready to use. Thus Most of the modules shown in the diagram are external libraries. My work consists of creating the following modules: OPR App, REST API and searchAd.

3.4 Modules

3.4.1 searchAdModule

This is a standalone library that offers the possibility to create and show ads either from a local source (the userâĂŹs DB) or from an external source (like Google Adsense).

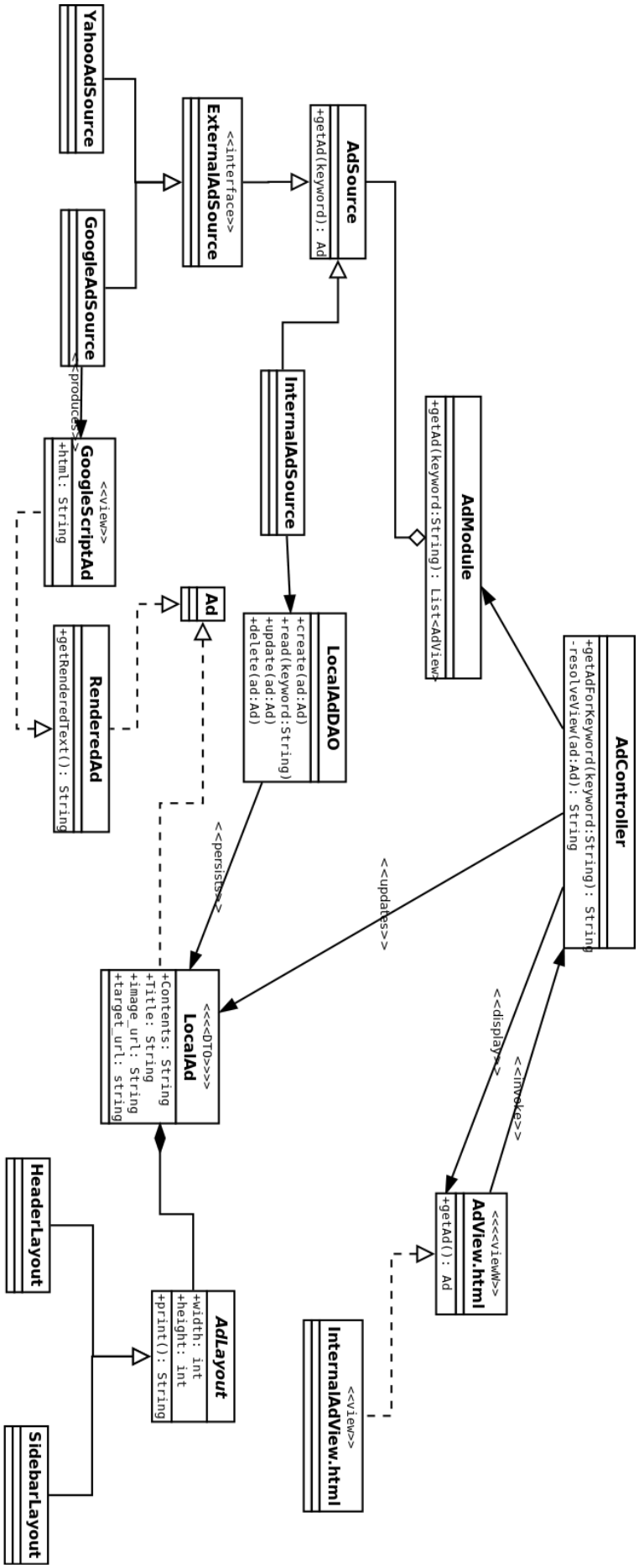


Figure 3.4: searchAd class diagram

The searchAd module is designed following the MVC architecture. The AdController is the entrypoint for the module, it allows the user to get an ad based on a keyword. It also contains a private method resolveView() that shows the ad in html format to be directly injected in the view.
The ExternalAdSource allows to get ads from external sources like Google AdWords. ItâĂŹs made in a way to make it easily extensible with other external sources. In fact all we have to do is create a new class inheriting the ExternalAdSource class and containing the url to the ads service.
In case the ads are not pulled from an external source, theyâĂŹre stored in the local database as LocalAd. The LocalAd model contains a title, content, target_url and image_url.

3.4.2 OPR app module

this is the main app, it contains the business logic for searching and rating places. ItâĂŹs also where most of the other libraries are integrated and linked together.

Search

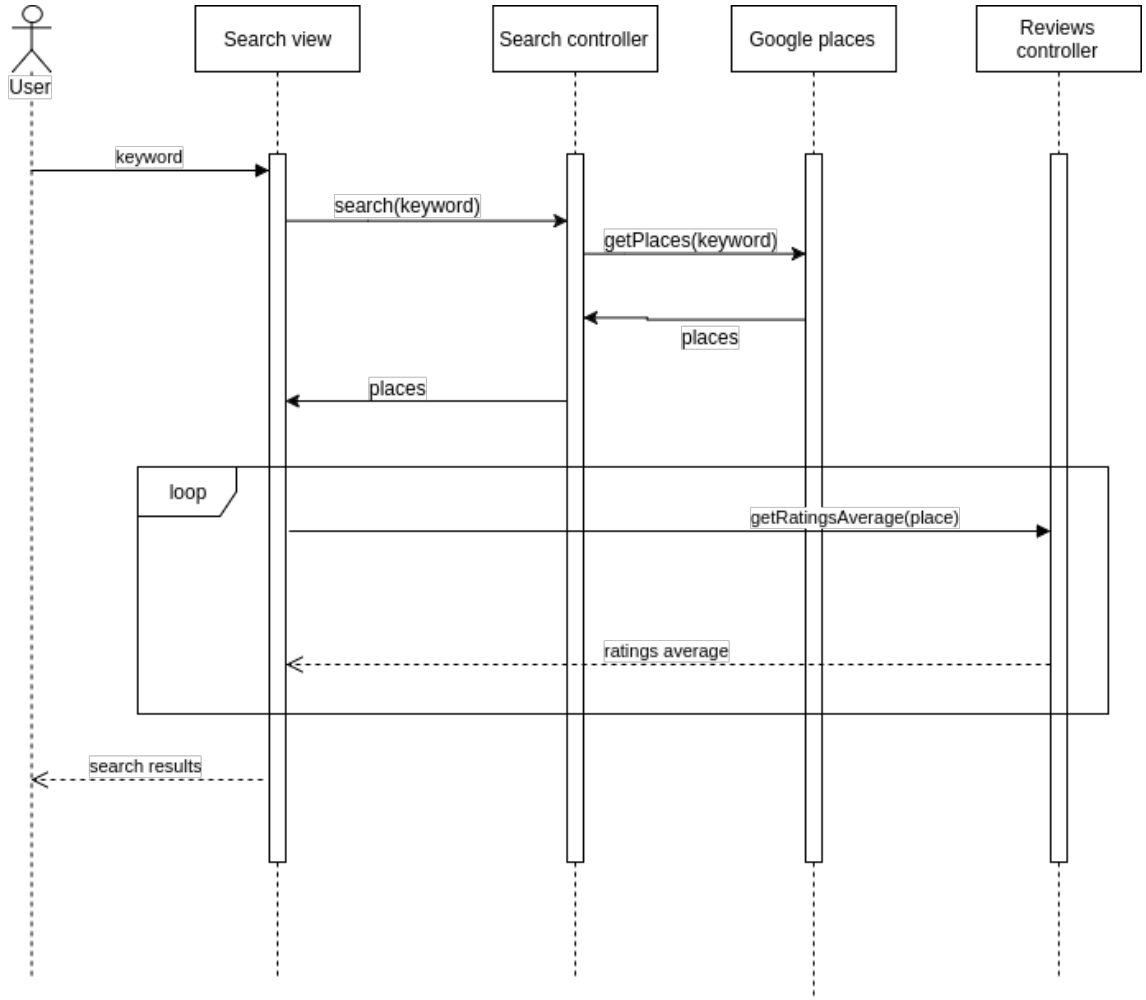


Figure 3.5: search sequence diagram

Title	Search
Author	Moetaz Ben Charrada
Version	1.0
Objectives	Allows users to search for a specific place.
Actors	User - OPR - Places service
Pre-conditions	The user should be on a page where there's a search bar.
Post-conditions	The user finds places related to his keywords, and may click to check the details of that place.
Story	1. The user enters keywords related to the place he's looking for 2. The user selects the type of place 3. The user submits the form
Alternative story	The functionality is accessed through the mobile app instead of a browser. (Through the REST API)

Table 3.1: search description

View details

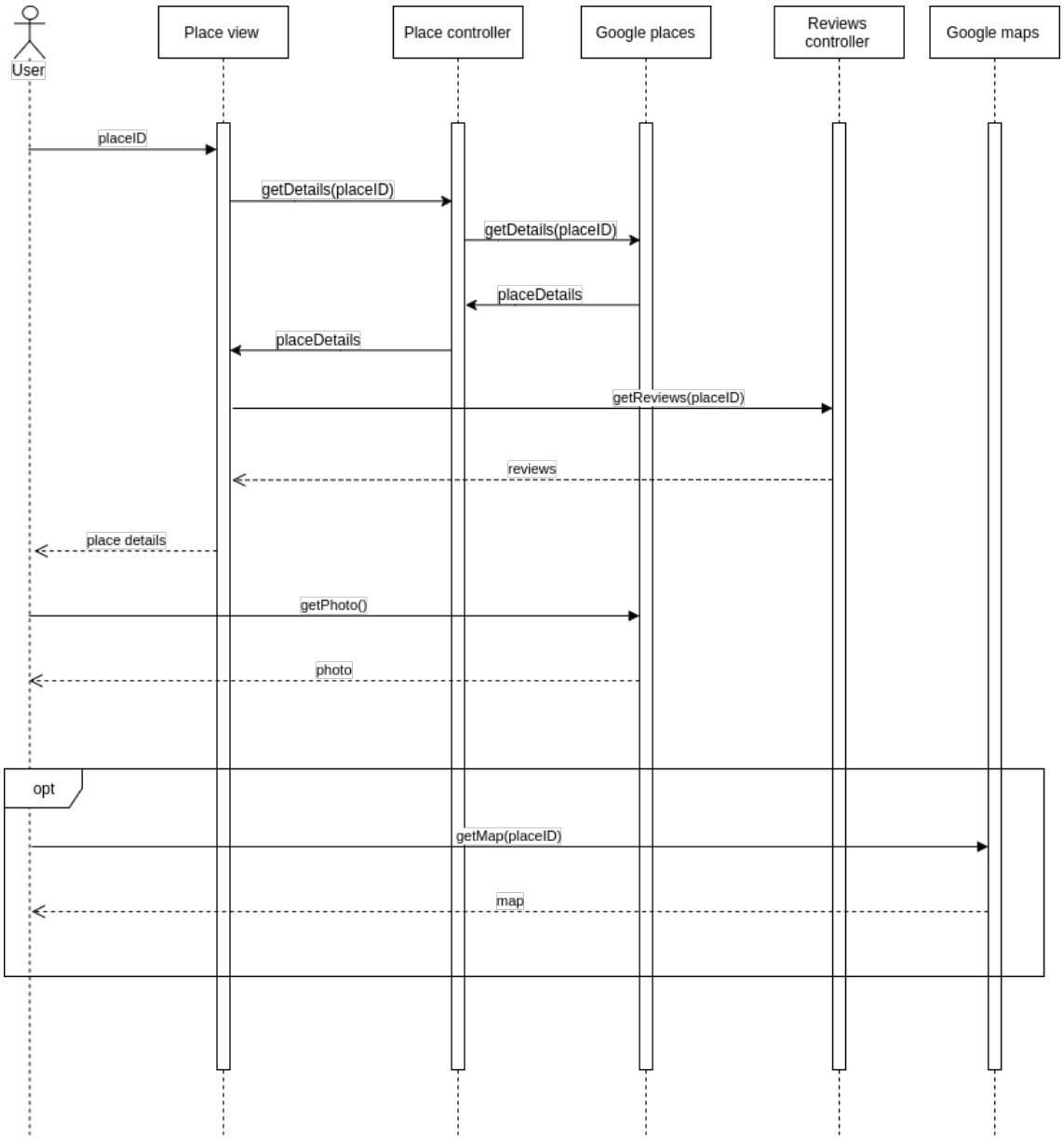


Figure 3.6: view-details sequence diagram

Title	View details
Author	Moetaz Ben Charrada
Version	1.0
Objectives	Allows users to view the details and reviews of a specific place
Actors	User - OPR - Places service - Maps service
Pre-conditions	The user should have searched for the place before.
Post-conditions	The user sees the details and reviews of the place and can possibly post a review about it.
Story	1. The user clicks on one of the places he found in the search view. 2. OPR app will then get the details of that place from Google places service, get the map from Google maps service. 3. The data is combined with the local reviewsâĂŹ data and is sent back to the user.
Alternative story	The functionality is accessed through the mobile app instead of a browser. (Through the REST API)

Table 3.2: view-details description

Review a place

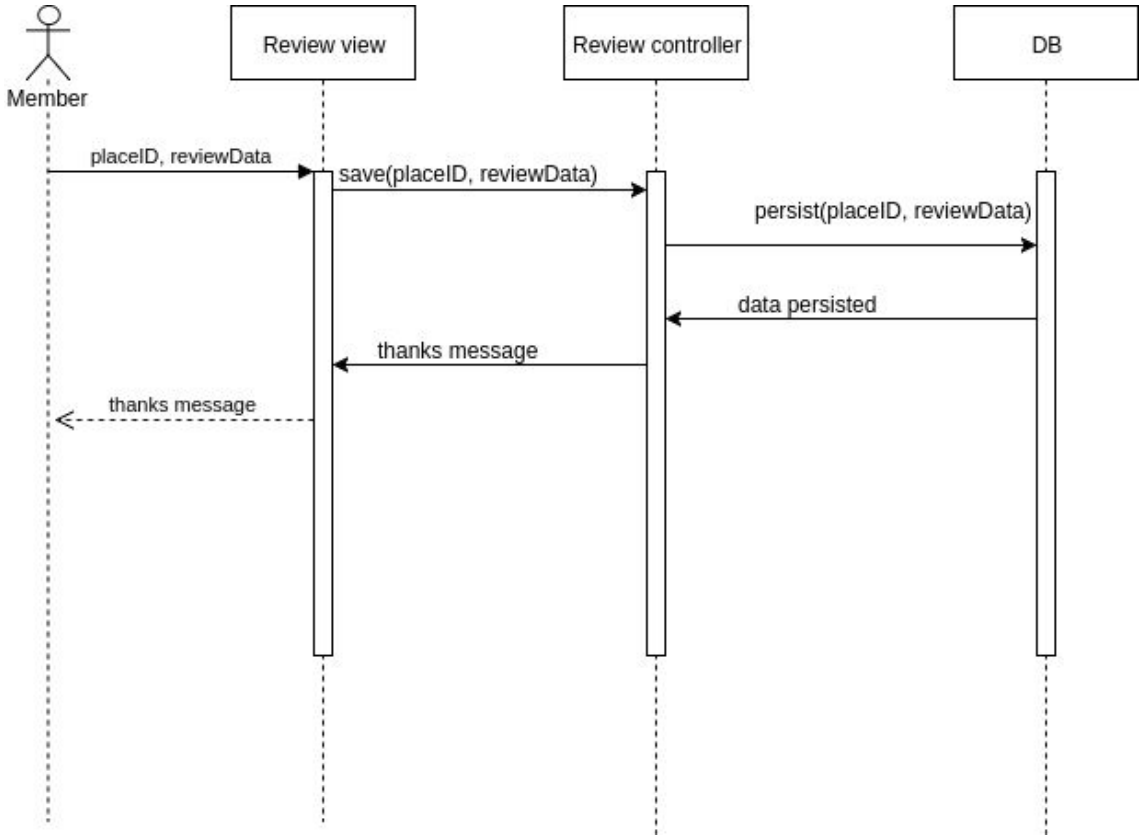


Figure 3.7: review a place sequence diagram

Title	Review a place
Author	Moetaz Ben Charrada
Version	1.0
Objectives	Allows users to post a review about a specific place
Actors	User - OPR
Pre-conditions	The user should be authenticated to be able to post a review.
Post-conditions	The user creates a review. The review becomes visible to the public.
Story	1.The user enters his review data 2.The user submits the form. 3.The review data is saved to the database. 4.A thanks message is shown to the user.
Alternative story	The functionality is accessed through the mobile app instead of a browser. (Through the REST API)
Exceptional story	If the user tries to post a review while heâĂŹs not authenticated. He is redirected to the login page.

Table 3.3: review a place description

Note that a user can only post a review if he is logged in. The process is explained in the following interaction diagram:

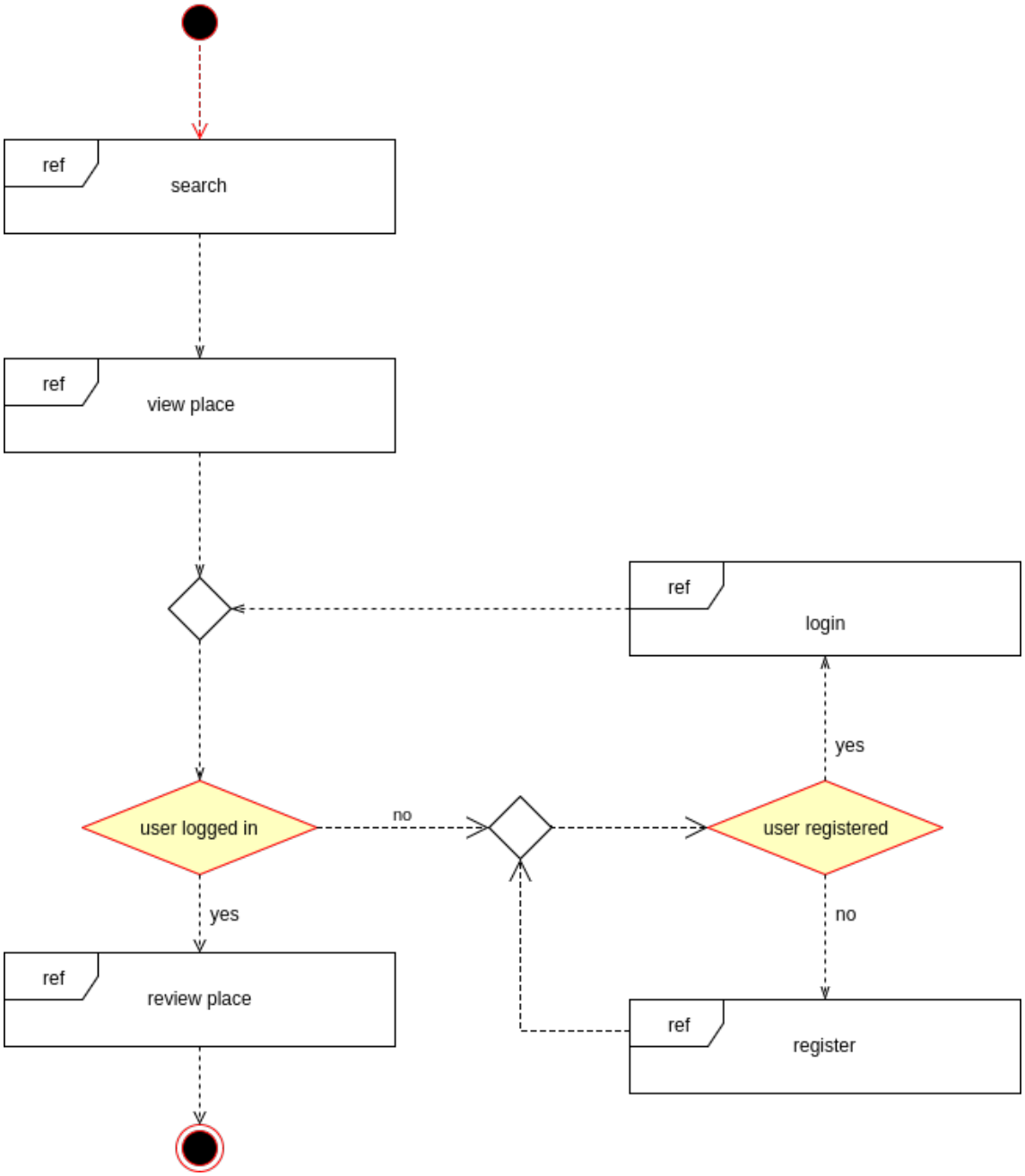


Figure 3.8: interaction overview diagram

3.4.3 REST API module

This is a sort of a wrapper for OPR App that provides a REST API interface, to be used by the mobile app.
For the REST API Module, I worked using the backwards approach; I started by writing the documentation of the functionalities first.

The services provided by the API are:

- Login
- Register
- Logout
- Search for places
- Get place details
- Get reviews
- Add review

The functions that require the transfer of critical data were designed to use the HTTP POST method because itâĂŹs more secure and it is the standard for this type of operations, for instance we used POST for the authentication and registration functions. We also chose HTTP POST for posting reviews, because it contains the authentication token, which is critical data, and it contains the reviewâĂŹs text, whose size might exceed the GET data size limit.
As for the other functionalities we used HTTP GET methods. One of the benefits of using GET here is that you can share and bookmark links easier when the data is included in the URL.

Login
Authenticate the user with the system and obtain the auth_token

Request

Method	URL
POST	api/accounts/login/

Type	Params	Values
POST	username	string
POST	password	string

Response

Status	Response
200	{ "auth_key": <auth_key> } auth_key (**string**) - all further API calls must have this key in headerx
401	{"error":"Incorrect username or password."}
500	{"error":"Something went wrong. Please try again later."}

Register

Create and add a new user to the app

Request

Method	URL
POST	api/accounts/register/

Type	Params	Values
POST	username	string
POST	Password	String
POST	email	string

Response

Status	Response
200	{ "status": “success” }
500	{"error":"Something went wrong. Please try again later."}

Logout

Log out the current user

Request

Method	URL
POST	api/accounts/logout/

Type	Params	Values
POST	auth_key	string

Response

Status	Response

200	{
	"status": “success”
	}

500	{"error":"Something went wrong. Please try again later."}

Search for places

Search for hotels, restaurants or activities

Request

Method	URL
GET	api/search/

Type	Params	Values
GET	type	string
GET	keyword	string

Example:
api/search/?type=hotel&type=restaurant&keyword=stockholm

Response

Status	Response

200	**Response will be an object containing the list of places with their id, name, average rating, number of ratings, image.**
	{
	"places": [
	{
	"place_id": "qsdf6r45",
	"image":
	"https://maps.googleapis.com/maps/api/place/photo?maxheight=
	00&photoreference=v2d5qsd",
	"name": "Radisson Blu Stockholm",
	"avg_rating": "3.7",
	"ratings_count": "125"
	},
	{
	"place_id": "fsqd1qs887",
	"image":
	"https://maps.googleapis.com/maps/api/place/photo?maxheight=
	00&photoreference=g88s9d",
	"name": "Marriott Stockholm",
	"avg_rating": "4.1",
	"ratings_count": "354"
	}
	],
	"places_count": 2
	}

500	{"error":"Something went wrong. Please try again later."}

Get place details

Get the the details of a specific place using itâĂŹs place_id

Request

Method	URL
GET	api/place/

Type	Params	Values
GET	place_id	string

Response

Status	Response
200	{ "place_id": "qsdf6r45", "image": "https://maps.googleapis.com/maps/api/place/photo?maxheight= 00&photoreference=v2d5qsd", "name": "Radisson Blu Stockholm", "avg_ratings": ["general": "3.7", "environmental": "3", "social": "2", "cultural": "5", ...], "ratings_breakdown": [["Very poor", 0, 0.0], ["Poor", 0, 0.0], ["Acceptable", 1, 25.0], ["Good", 1, 25.0],

	<pre>["Outstanding", 2, 50.0]]
	,
	"ratings_count": "125",
	"description":{
	"address":"stockholm, sweden",
	...
	}
	}</pre>

500	{"error":"Something went wrong. Please try again later."}

In the ratings_breakdown, ["Outstanding", 2, 50.0] means there is 2 votes for outstanding, which count for 50% of the total number of votes

In the ratings_breakdown, âĂŃ ["Outstanding", 2, 50.0] means there is 2 votes for outstanding, which count for 50

Get reviews

Get the reviews of a place using itâĂŹs place_id

Request

Method	URL
GET	api/reviews

Type	Params	Values
GET	place_id	string
GET	page	number

Reviews will be split into pages containing X reviews each.

Example:
api/reviews?place_id=qsdf6r45&page=1

Response

Status	Response
200	{ "place_id": "qsdf6r45", "page": "1", "total_reviews_count": "1025", "reviews_in_page":"50", "reviews": [{ "review_id": "12", "author": {

	"User_id": "lmkjsqdf"
	"name": "John Doe",
	"image": "http://opr.com/user/1655/image.jpg"
	},
	"date": "May 3, 2017, 2:15 p.m.",
	"review": {
	"title": "clean, solar powered hotel",
	"visit_date": "May 1, 2017",
	"text": "Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco",
	"type": "business",
	"ratings": {
	"general": "4",
	"environmental": "4",
	"energy": "5",
	"water": "1",
	...
	}
	}
	},
	...
	]
	}

500	{"error":"Something went wrong. Please try again later."}

Add review

Add a new review to a place

Request

Method	URL
POST	api/addreview

Type	Params	Values
POST	auth_key	string
POST	user_id	string
POST	place_id	string
POST	visit_date	string
POST	title	string
POST	text	string
POST	type	string
POST	general	number
POST	environmental	number
POST	energy	number
POST	...	

Response

Status	Response

200	{
	"status":"success"
	}

500	{"error":"Something went wrong. Please try again later."}

CHAPTER 4

Implementation

4.1 Technology choices

Frontend
For the front-end I used HTML/CSS/JS with JQuery library because it facilitates basic functionalities like DOM manipulation.
I also used twitterâĂŹs Bootstrap in order to use itâĂŹs prebuilt components like the buttons. The app is responsive but has some responsiveness-bugs; I didnâĂŹt fix these because of time constraints and because the front-end is being redesigned by a professional designer anyway.

Backend

The programming language used is Python, with the framework Django.
After careful thought I went with this choice because of several factors, including but not limited to:

- Portability: this stack is cross-platform and can run on linux as well as windows
- Lots of tools out of the box: this choice offers:
  - Runtime + Web framework
  - Package manager (PIP)
  - A database to test with (sqlite)
  - A lightweight development server

  - Unit testing library

- Integrated ORM
- Lots of libraries and ready-to-use components
- Abundant support and documentation
- Stability and reliability
- Scalability
- Great community

This boils down to creating a prototype quickly with this technology stack; we can get a lot done in little time. Timing is a crucial part of this project, especially in this phase (prototyping).

Database

While comparing multiple databases, I ended up with two of the most popular databases to compare between: MySQL and PostgreSQL.
The following table shows some differences of how things work in MySQL vs. in PostgreSQL.

	MySQL	PostgreSQL
CREATE INDEX	Entire table is locked for writes	Entire table is locked for writes.But PSQL has âĂIJCREATE INDEX CONCURRENTLYâĂİ that permits the creation of index without locking the entire table (but itâĂŹs slower)
Adding new column	Entire table data needs to be rewritten	Instantaneous
Connection model	One thread/connection: Easy to create but hard to monitor and manage	One process/connection: Easier to monitor and manage

Table 4.1: MySQL vs PostgreSQL

I decided to use PostgreSQL as a database because of the previous comparison and because itâĂŹs well supported by Django.
This choice is in someway influenced by the previous choice.

Server

I used an Ubuntu 16.04 LTS Virtual Private Server for hosting the project. Ubuntu has a great community and support, is reliable, and the Long Term Support (LTS) version remains maintained for 5 years, so we wonâĂŹt have to worry about upgrading the system for five years.
Ubuntu is based on Debian, which is one of the most stable Linux distributions ever.
The provider of the VPS is Amazon Web Service (AWS). I used AWS because it offers a free tier during the first year of use, and because it has extensive capabilities beyond offering a simple VPS. One of the capabilities that interested me the most is the ease of scaling and setting up load balancers for the project.

Web Server

I had the choice between Apache HTTP Server and NGINX.
Both of them are great web servers and have great communities and support, and both of them are open source as well.
I went with NGINX because itâĂŹs better performance-wise and is taking over Apache.

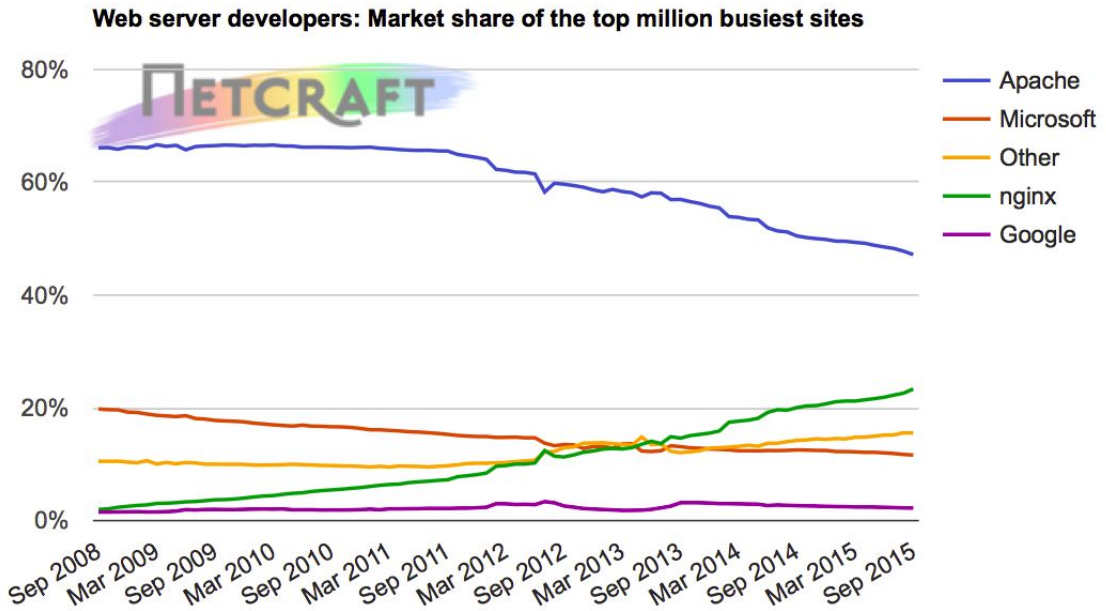


Figure 4.1: Chart showing how nginxâĂŹs user base is growing while apacheâĂŹs is regressing

Python Application server

I used Gunicorn as application server because it is the most popular and the best supported server.

Additional Frameworks/libraries

Django-rest-framework
Django-rest-framework (DRF) supports the creation of REST APIs on top of Django. This framework is djangoâĂŹs standard tool to create REST APIs.

Django-allauth
This is a library addressing authentication, registration, account management and social authentication

Django-rest-auth
This library makes the previously mentioned library (allauth) accessible via REST API

Django-review
This is a library facilitating the creation of reviews and ratings. I found multiple libraries offering reviews-related functionalities. I chose this library because itâĂŹs kept updated and is backed by a company.

4.2 Screenshots

4.2.1 Web interface

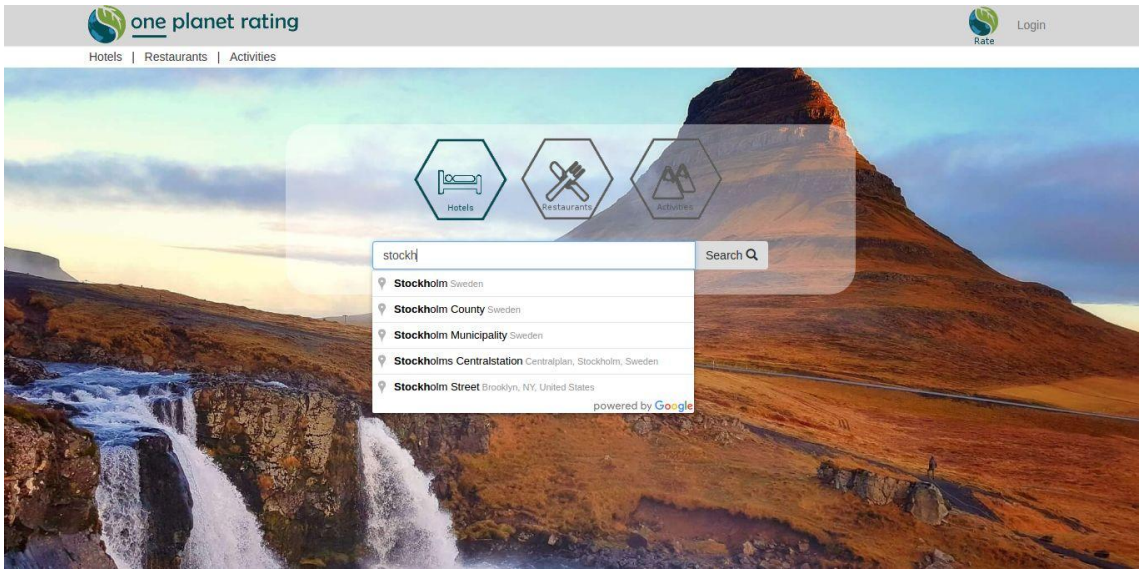


Figure 4.2: the landing screen of the app

When first accessed, the app shows the previous landing page. From there the user is able to search for a place using the search bar.
The user is also to access the login screen from there.
Other functionalities include listing the popular and trending hotels using the links in the top left corner, but these functionalities havenâĂŹt been implemented yet.

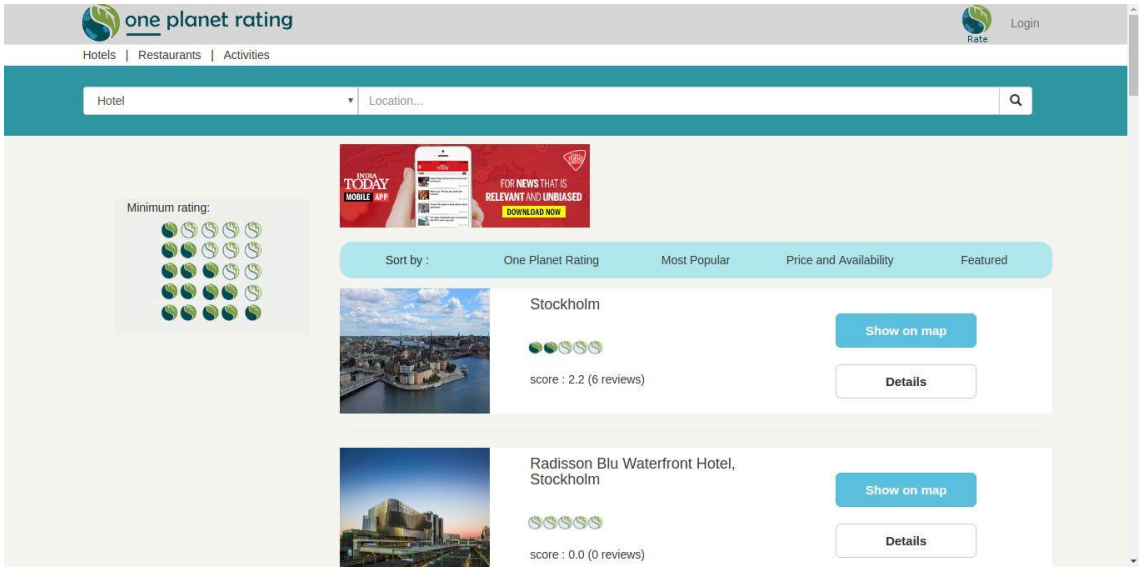


Figure 4.3: search screen

After the landing page, when a user searches for a place he will get redirected to this search screen which includes the results retrieved from GoogleâĂŹs places service. The search results include the name and the picture (from google) as well as the number of reviews and the average score from the reviews posted on OPR.

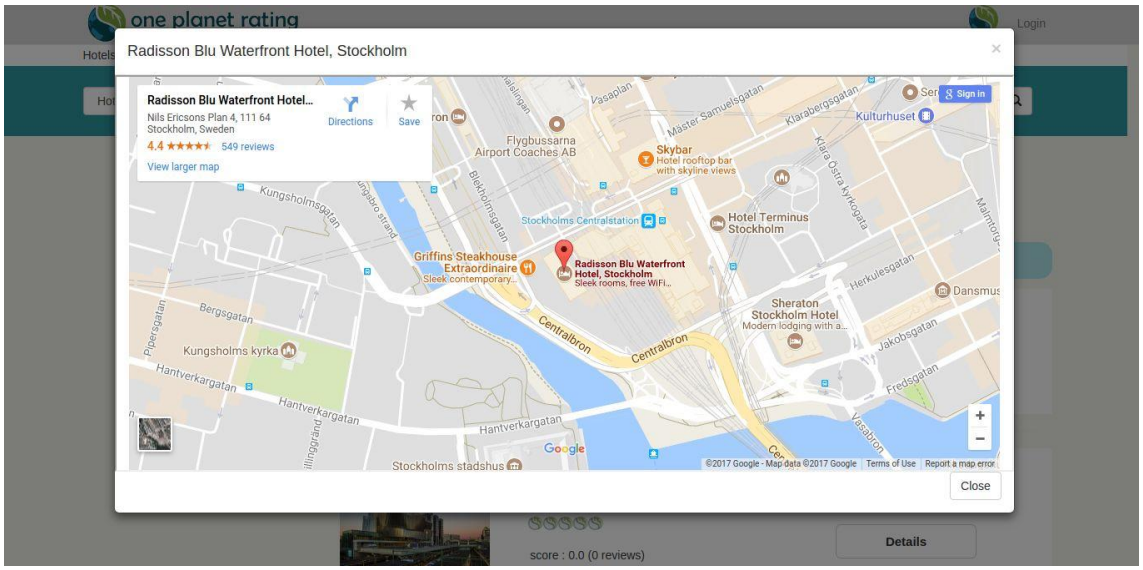


Figure 4.4: showing the location of a place on the map

From the search screen, the user is able to click the âĂIJshow on mapâĂİ button to see the selected place on Google maps. The map is shown in a modal view in order for the user not to quit OPRâĂŹs site.

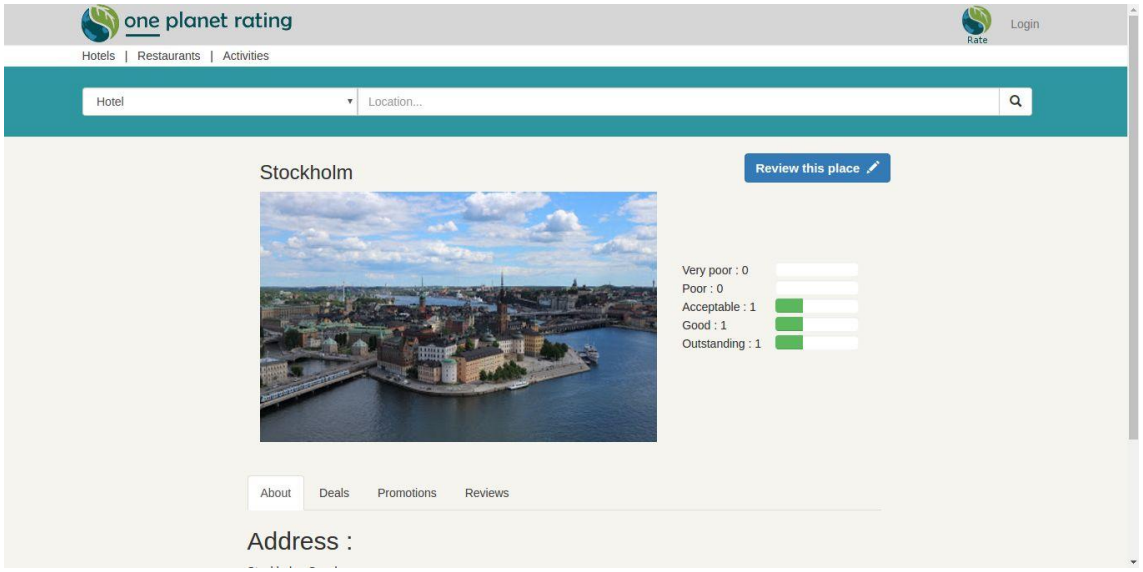


Figure 4.5: place details

When the user selects a place to see its details, heâĂŹs shown this screen; it contains the name, picture and basic details of the place. This same screen also contains the reviews and a chart showing the numbers and proportions of ratings.

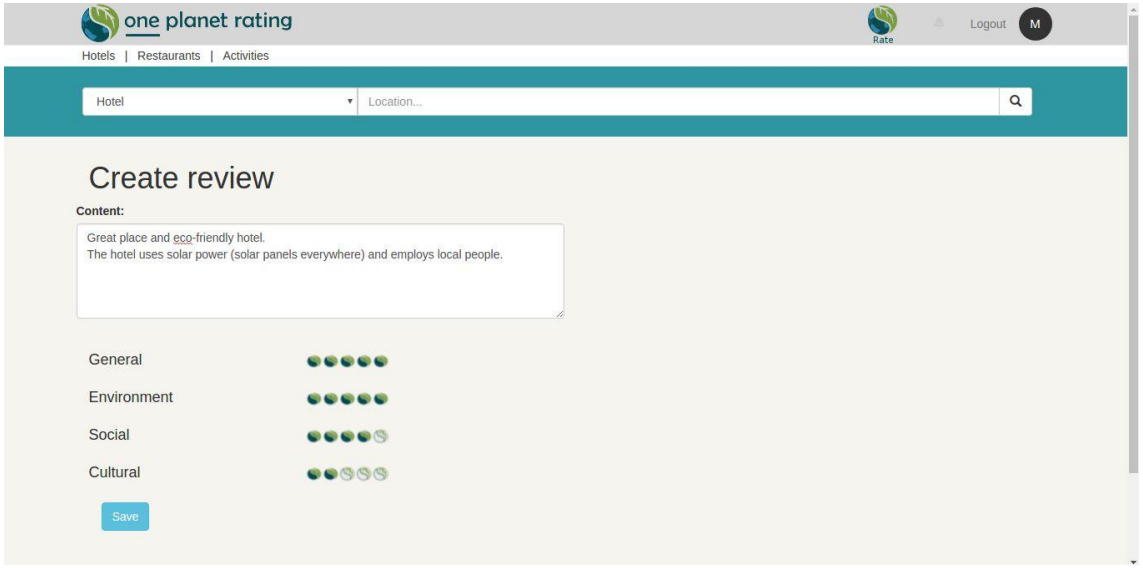


Figure 4.6: Creating a review

When the user chooses to create a review, the app first checks whether heâĂŹs logged in.
If not, the user is redirected to the login screen, otherwise this form appears. The

form allows the user to enter a text review as well as ratings following specific criteria.

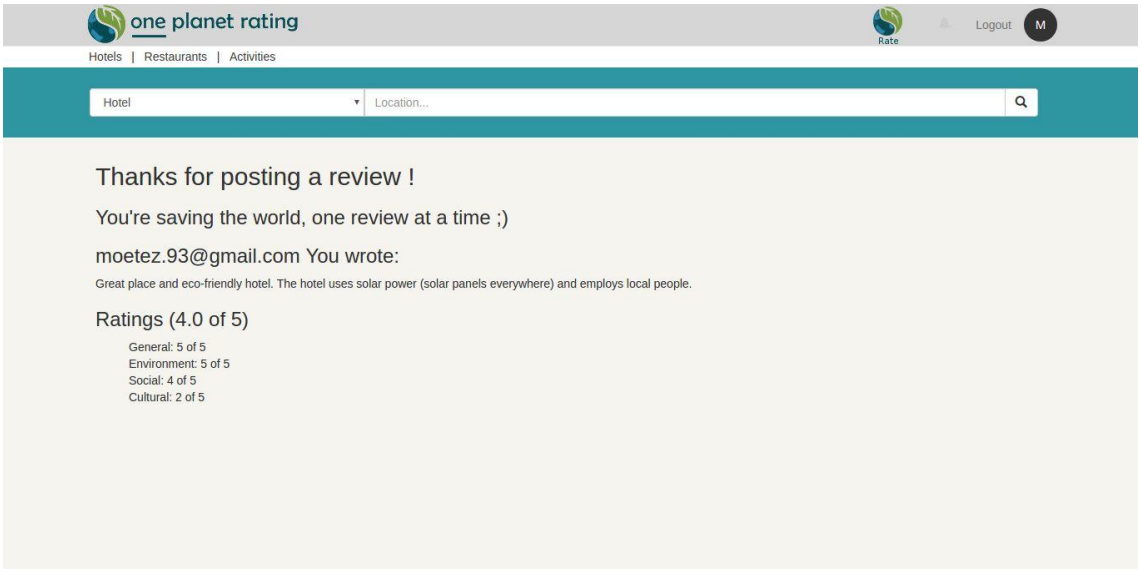


Figure 4.7: Thanks screen

After a member posts a review successfully, heâĂŹs shown a thanks screen.

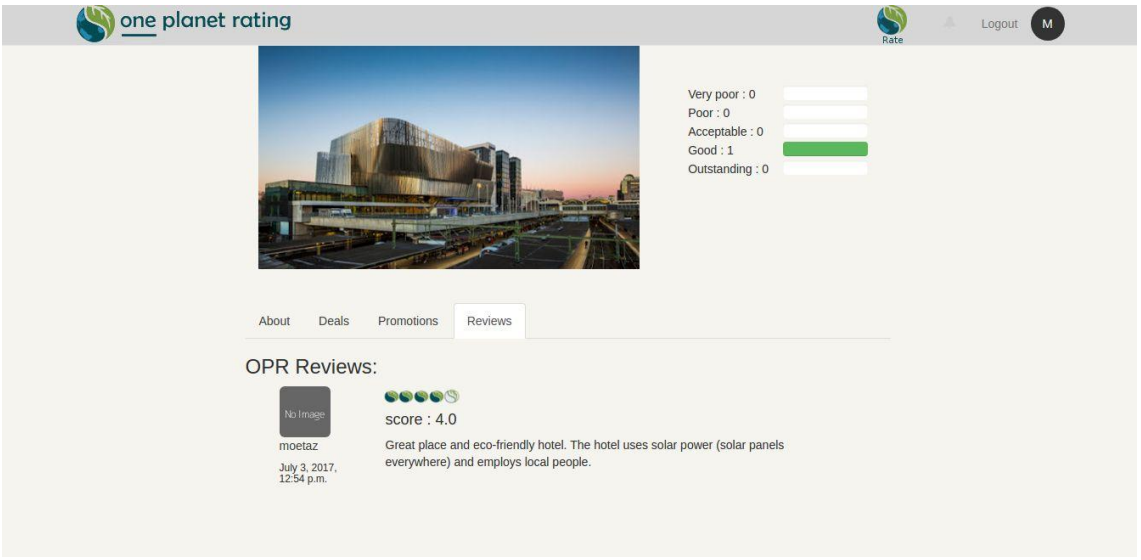


Figure 4.8: Showing a review

After a review is added, it is displayed as in this screenshot. The score, text, username and date are currently shown. Other features are being added like the userâĂŹs photo and the categorized ratings.

4.2.2 API

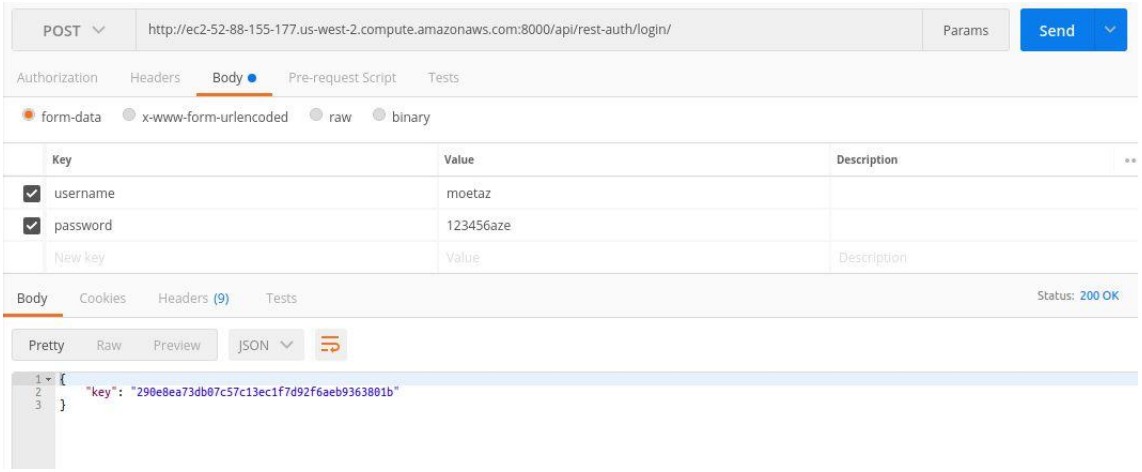


Figure 4.9: API Login

This screenshot shows an example of a login request through the REST API.

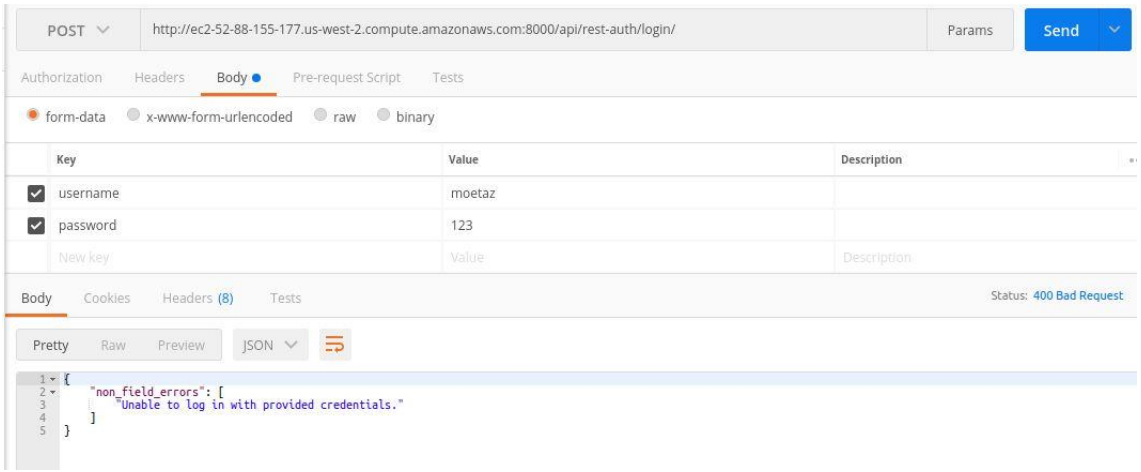


Figure 4.10: API Login failure

In case of failure (wrong credentials), an error message is sent back to the user.

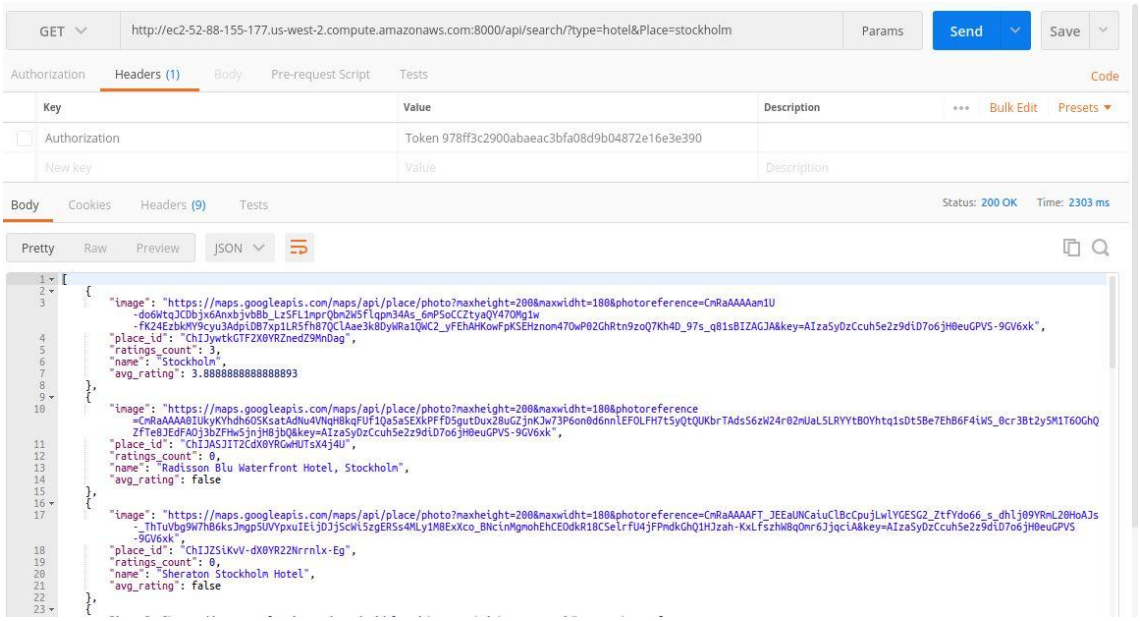


Figure 4.11: API search request

This screenshot shows the response to a search query. The query includes as parameters the type of place (hotel, restaurant..) as well as a keyword to specify the location.

The response contains the name, image, place_id, ratings count , and the average rating.

The name and image are displayed as is. The ratings count and the average rating, however, are used to display the globes/stars next to each place in the results list. The place_id is used to get the placeâĂŹs map or the placeâĂŹs details.

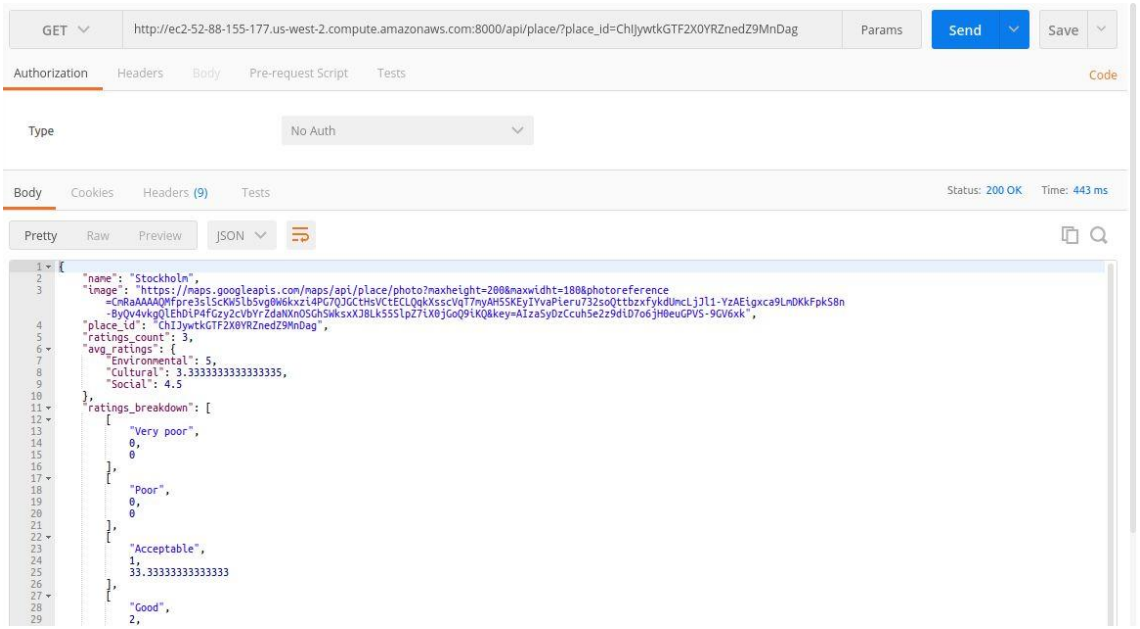


Figure 4.12: API search request

When requesting the details of a place, the request includes the place_id of the place. Obviously the response includes the name and image of the place, it also includes the number and averages of ratings. It also contains the ratings breakdown, which consists of the proportions of the ratings arranged by the number of stars (0 star = very poor, 1 star = poor...)

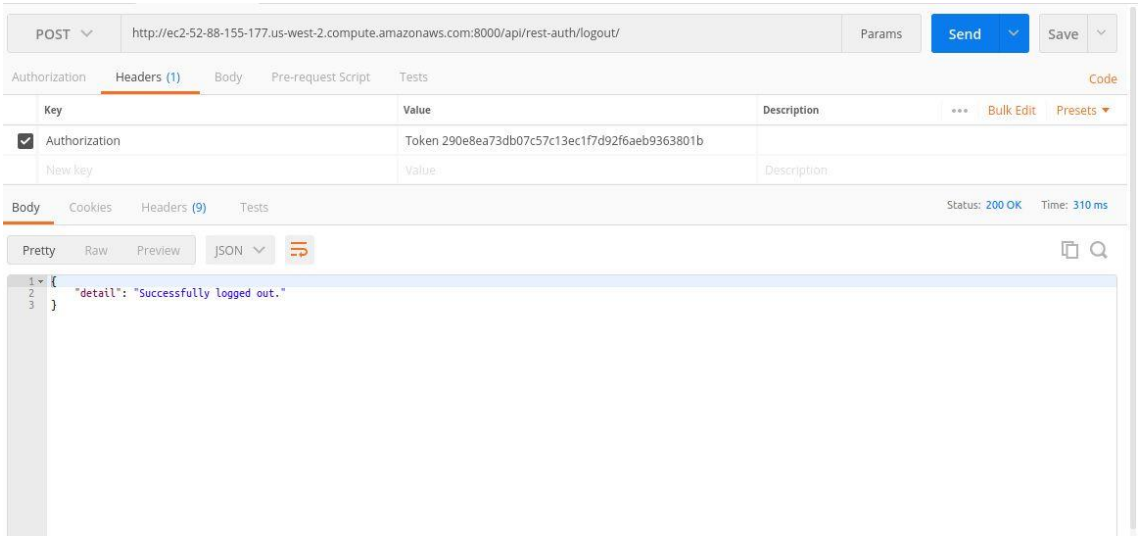


Figure 4.13: Logout API call

This screenshot shows a successful logout call. The authentication is based on an authorization token stored in the DB. After logging out, that token is deleted.

4.3 Deployment

AWS EC2 Security setup

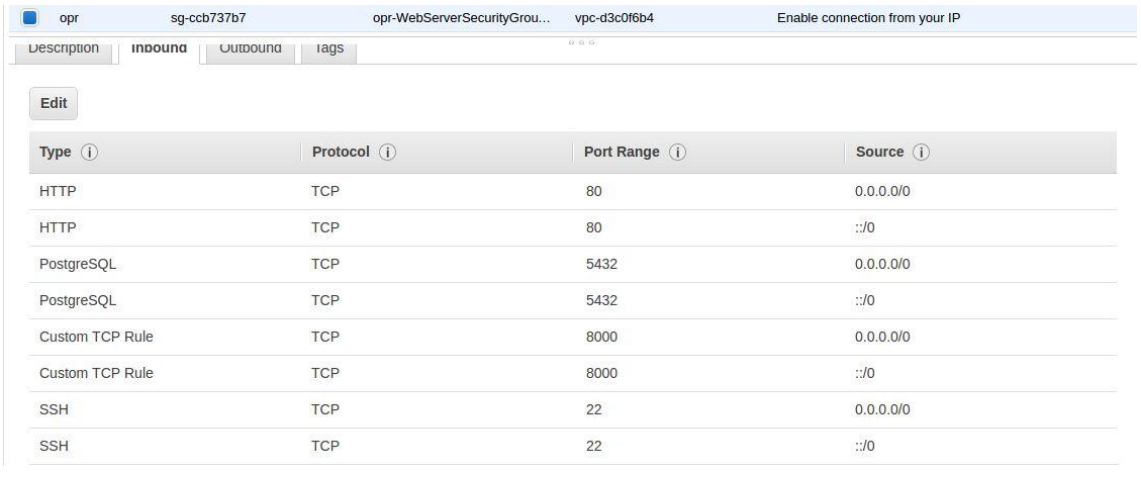


Figure 4.14: AWS EC2 allowed inbound traffic

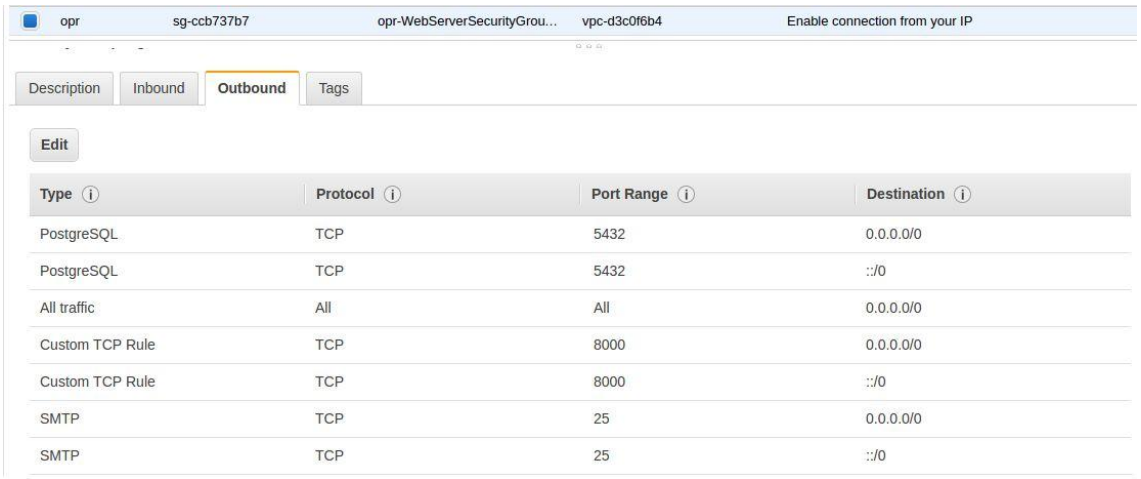


Figure 4.15: AWS EC2 allowed outbound traffic

A problem I encountered during the deployment is to get the server to reply for requests. In the beginning I was even unable to ssh into the VPS. It turned out, for security reasons AWS blocks all incoming and outcoming traffic.

AWS RDS setup

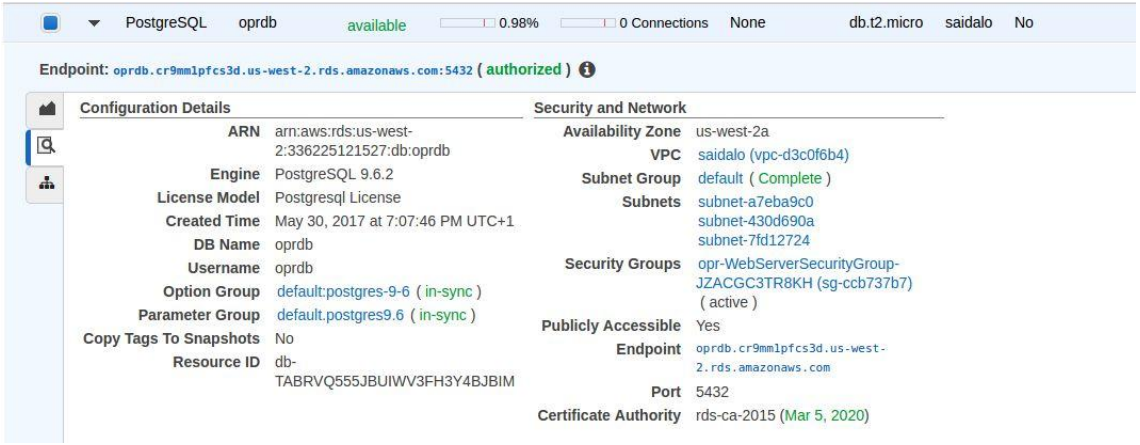


Figure 4.16: AWS RDS setup

I used AWS RDS for hosting the database because security wise itâĂŹs better approach to host the database separately from the app. Another advantage of AWS RDS is that it automatically creates backups of the DB.
First I hosted a local db for testing purposes then I moved the same DB to RDS.

NGINX setup

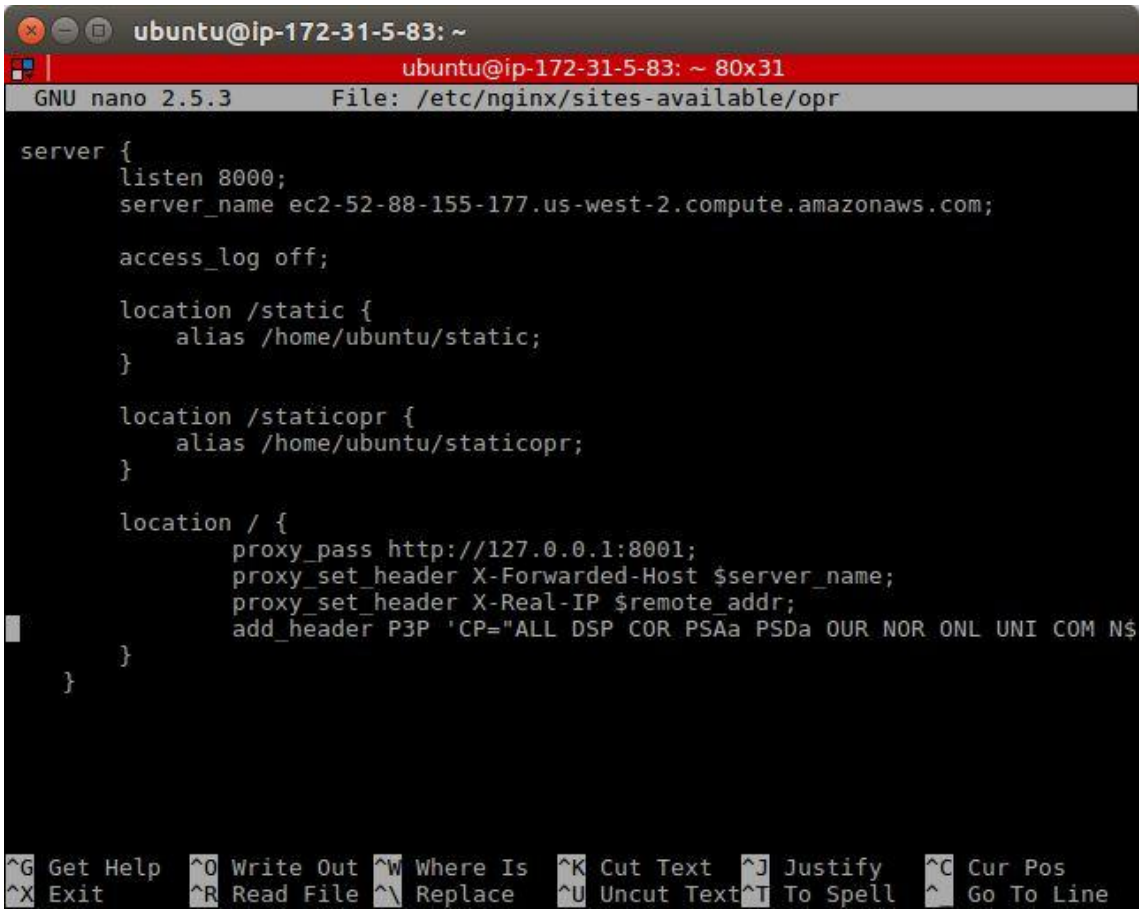
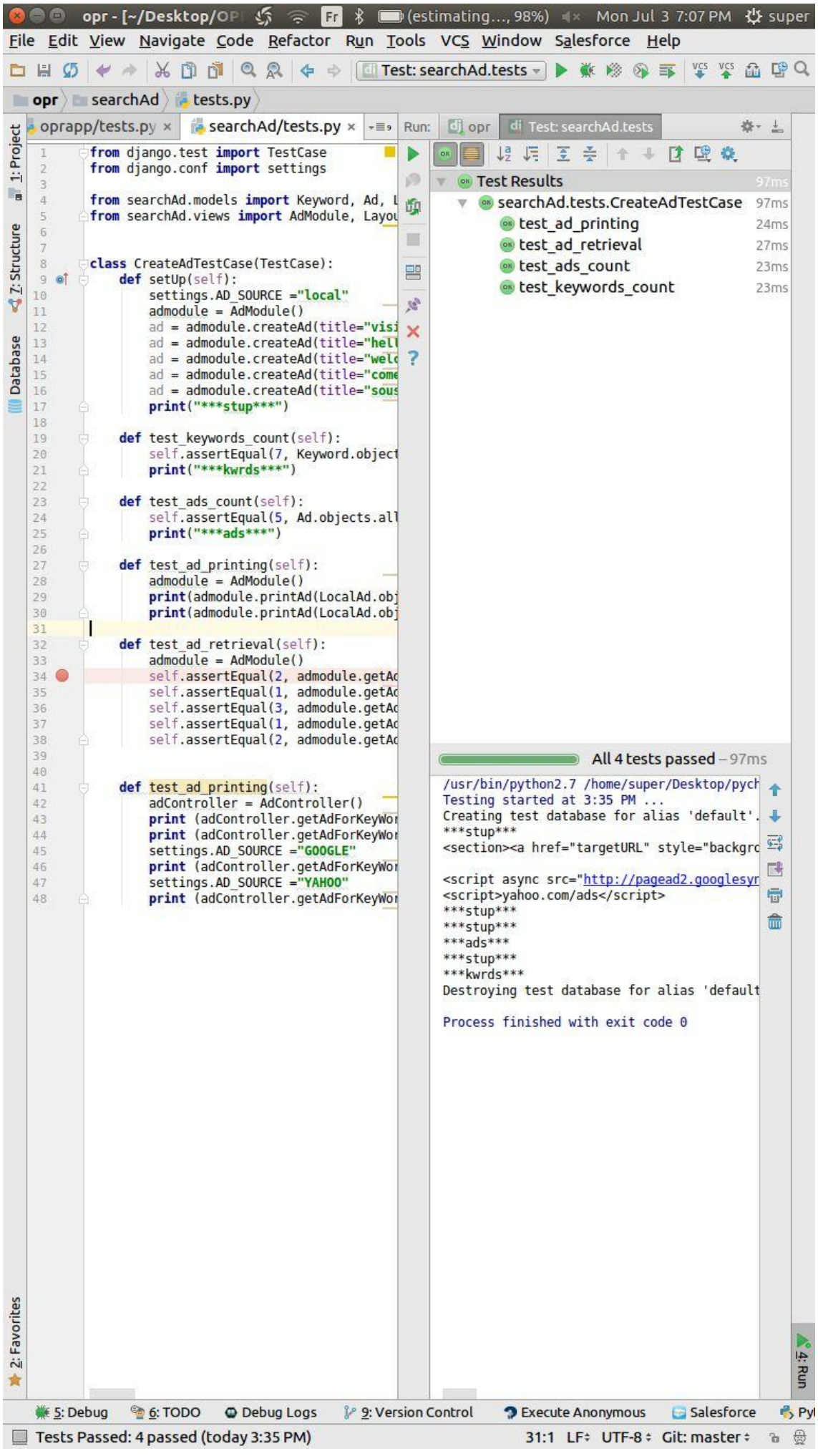


Figure 4.17: NGINX setup

NGINX is the entrypoint to the app. ItâĂŹs also the web server used to serve the app. NGINX was setup to listen on port 8000 and to serve the static files like the images and css (practically every url pointing to /static). In case of non static files, NGINX redirects the request to gunicorn which is the python server thatâĂŹs serving the app.

4.4 Testing

For the development of searchAd module, which is a sort of standalone library, I also created unit tests for it.
The unit tests ensure that the code works correctly, and helps verify that the code didnâĂŹt break after some changes. This provides better quality and saves more time.


opr - [~/Desktop/OP
(estimating..., 98%)
Mon Jul 3 7:07 PM
super
File Edit View Navigate Code Refactor Run Tools VCS Window Salesforce Help
Test: searchAd.tests
opr searchAd tests.py
oprapp/tests.py
searchAd/tests.py
Run:
opr
Test: searchAd.tests
Test Results 97ms
searchAd.tests.CreateAdTestCase 97ms
test_ad_printing 24ms
test_ad_retrieval 27ms
test_ads_count 23ms
test_keywords_count 23ms
All 4 tests passed – 97ms
/usr/bin/python2.7 /home/super/Desktop/pych
Testing started at 3:35 PM ...
Creating test database for alias 'default'.
stup
<section><a href="targetURL" style="backgrc
<script async src="http://pagead2.googlesyr
<script>yahoo.com/ads</script>
stup
stup
ads
stup
kwrds
Destroying test database for alias 'default
Process finished with exit code 0
1: Project
7: Structure
Database
2: Favorites
4: Run
5: Debug
6: TODO
Debug Logs
9: Version Control
Execute Anonymous
Salesforce
Tests Passed: 4 passed (today 3:35 PM)
31:1 LF UTF-8 Git: master

I also tested the performance of the app (load speed) using googleâĂŹs Pagespeed Insights, and I got some amazing results:

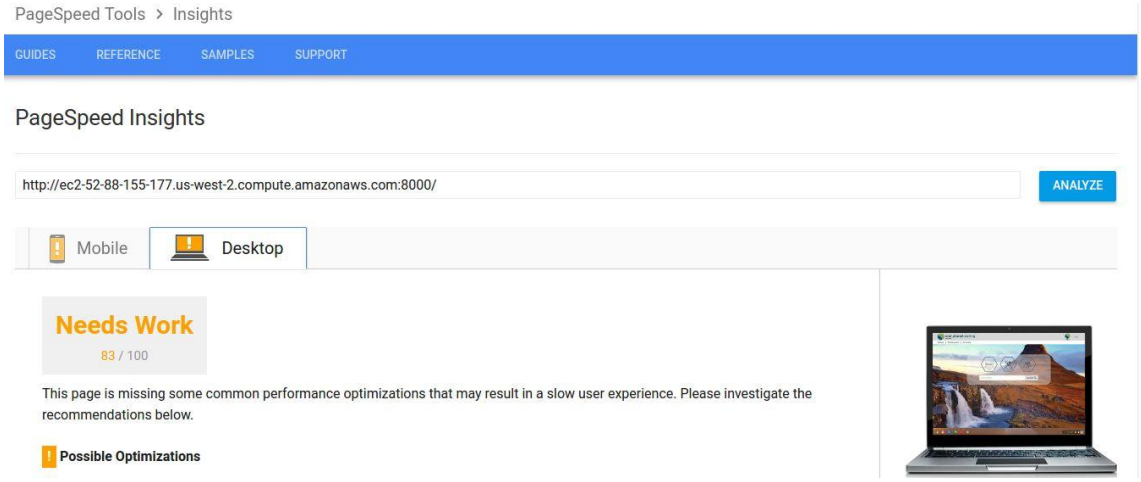


Figure 4.19: landing page speed test

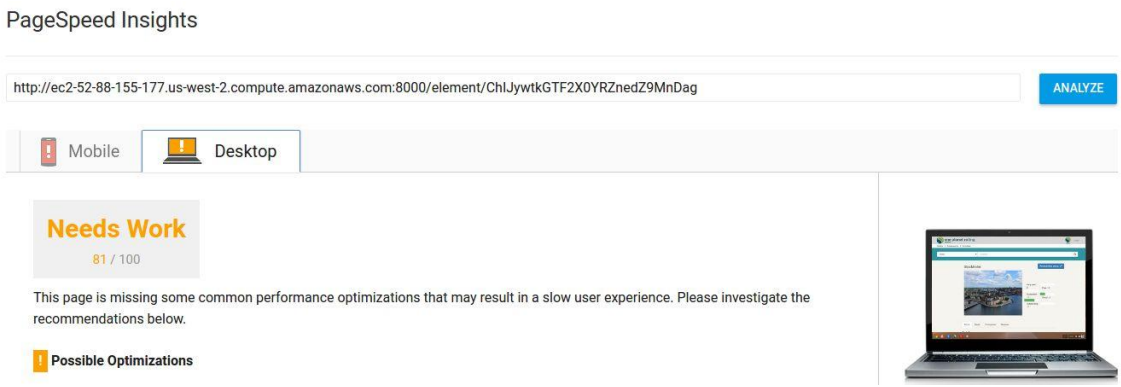


Figure 4.20: details page speed test

Below is included the result for the same test applied to facebook.com for comparison purposes:

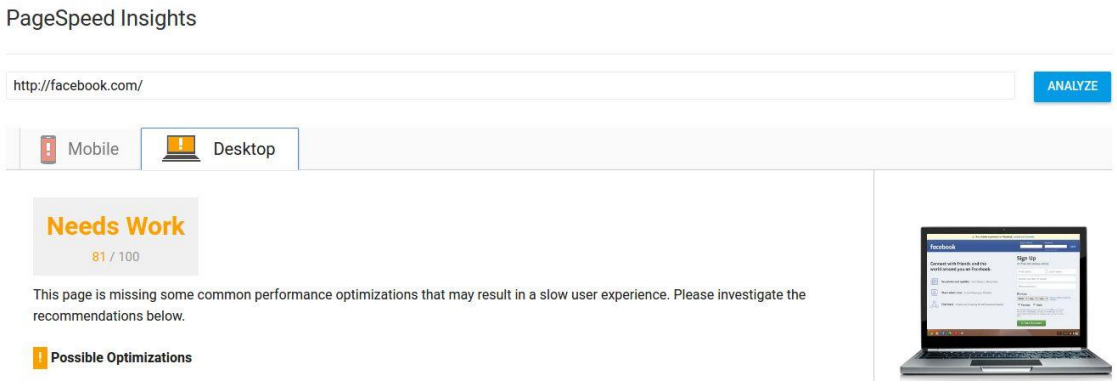


Figure 4.21: facebook page speed test

I also tested the performance of the app using blazemeter. I tested the service with 50 simultaneous virtual users and the results were good.

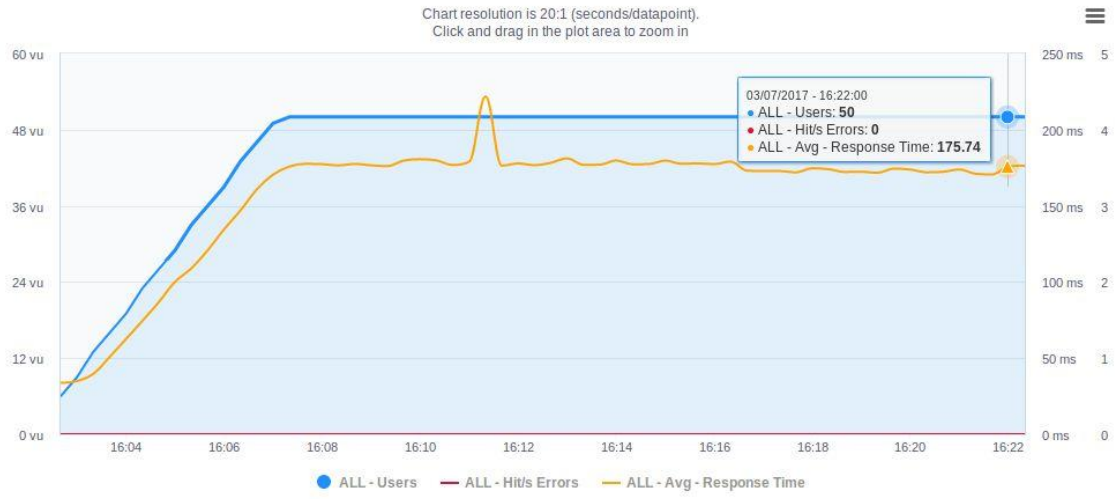


Figure 4.22: concurrent users test

With 50 simultaneous users the response time was 170ms which is okay. Note that the performance is influenced by the performance amazonâĂŹs server, which is very limited but easily scalable. For the development, I went with a low-performance server instance because of budgetary reasons, but we can scale up easily later when we need to. The used instance is an AWS EC2 t2.micro with the following specs:

- RAM: 1 GB
- vCPUs: 1

4.5 Work environment

All of the development was made on my personal laptop which has the following specs:

- RAM: 8GB
- CPU: Intel core i7
- OS: Ubuntu 16.04 LTS

During the development I used the IDE PyCharm. For version control we used Git, hosted on BitBucket. Communication was all held on Slack. The diagrams were

made using Dia and draw.io

In the beginning of the project I also did some graphic design using GIMP, which is an open source and free alternative to photoshop. I also used InvisionApp to create an interactive prototype using the mockups I designed. Chrome developer tools were used extensively for debugging and tweaking the frontend. Postman was used to test the REST requests for the API. PythonâĂŹs unittest was used for the unit tests.