

FEDERAL UNIVERSITY OF TECHNOLOGY - PARANÁ
ACADEMIC DEPARTMENT OF INFORMATICS
BACHELOR IN COMPUTER SCIENCE

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TRAVEL GUIDE SYSTEM: SOCIAL NETWORK FOR TRAVELLERS

WORK OF CONCLUSION COURSE

PONTA GROSSA - PR

2018

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Work of Conclusion Course presented as a partial requirement to obtain the of bachelor in Computer Science from the Academic Department of Informatics in the Federal University of Technology in Paraná.

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PONTA GROSSA - PR

2018



Ministério da Educação
Universidade Tecnológica Federal do Paraná
Câmpus Ponta Grossa

Diretoria de Graduação e Educação Profissional
Departamento Acadêmico de Informática
Bacharelado em Ciência da Computação



TERMO DE APROVAÇÃO

TRAVEL GUIDE SYSTEM: SOCIAL NETWORK FOR TRAVELLERS

por

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Este Trabalho de Conclusão de Curso (TCC) foi apresentado em 30 de outubro de 2018 como requisito parcial para a obtenção do título de Bacharel em Ciência da Computação. O candidato foi arguido pela Banca Examinadora composta pelos professores abaixo assinados. Após deliberação, a Banca Examinadora considerou o trabalho aprovado.

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ACKNOWLEDGEMENTS

A special thanks to my supervisor, Professor Rogério Ranthum for the support, knowledge, and experience he shared and which helped immensely in accomplishing this work. Many Thanks to Professor Richard Ribeiro and Professor Augusto Foronda who evaluated the work with all interest and willing to share knowledge and suggestions for improving the project and therefore make it available for public use. I also thank the entire course coordination and especially the professors who made it possible to actually reach this point, Professor Erikson Morais and Professor Helyane Borges.

ABSTRACT

AZIZ, Bassam. **Travel Guide System: Social Network for Travellers**. 2018. 79 p. Work of Conclusion Course (Bachelor in Computer Science) - Federal University of Technology - Paraná. Ponta Grossa, 2018.

Among numerous social networks and applications on the *web* environment, there is hardly a tool that allows travellers to communicate based on a content related to their trips and destinations. There's also a difficulty finding social and cultural events around a visited destination. This work proposes a *web* platform that aims to provide a communication channel between travellers, independently of their location, through segmented and location based content through various functionalities. The platform allows users to plan, create and publish trips with one or more destinations. In addition, it allows to post questions and comments that are location based. On the other side of the platform, users are able to find cultural and travel related events based on location. They are able to locate other travellers and trips planned by other users and communicate with them through messages. Furthermore, users are able to read and comment on posts and questions created by other users. In addition to the location based content, the interface of the platform provides a map, where users can visualise the location of the mentioned items and trip routes on an interactive map. In order to achieve these functionalities, integrations were implemented with external APIs, of which Google Maps, Meetup, Facebook APIs are the most important. Other technologies used for developing the platform are the web-application framework Ruby on Rails, Javascript, and relational databases.

Key words: Travelling. Social Network. Web Platform.

RESUMO

AZIZ, Bassam. **Travel Guide System: Social Network for Travellers**. 2018. 79 f. Trabalho de Conclusão de Curso (Bacharelado em Ciência da Computação) - Universidade Tecnológica Federal do Paraná. Ponta Grossa, 2018.

Entre as diversas redes sociais e aplicativos existentes no ambiente *web*, dificilmente é encontrada uma ferramenta que permita aos viajantes se comunicarem com base nos conteúdos relacionados às suas viagens e destinos, também é difícil encontrar eventos sociais e culturais nos destinos visitados. Este trabalho, então, propõe uma plataforma *web* com o intuito de criar um canal de comunicação entre viajantes, independentemente de suas localizações, através de várias funcionalidades utilizando conteúdos segmentados baseados nas localizações. A plataforma permite que usuários possam planejar, criar e publicar viagens com um ou mais destinos, além de postar perguntas e comentários baseados na localização. A plataforma também possibilita que usuários procurem eventos culturais no destino visitado, localizem outros viajantes e viagens criadas por estes, e se comuniquem entre si através de troca de mensagens na própria plataforma. Usuários também podem ler e comentar em postagens e perguntas criadas por outros usuários. Além de conteúdo baseado em localizações, a interface gráfica da plataforma apresenta um mapa, no qual usuários podem visualizar a localização dos itens mencionados (eventos, viajantes, perguntas e comentários) e rotas de viagens de forma interativa. Para alcançar essas funcionalidades, integrações foram implementadas com APIs externas, sendo as APIs do Google Maps, Meetup e Facebook as mais importantes. Outras tecnologias utilizadas para o desenvolvimento da plataforma foram o framework Ruby on Rails, Javascript e bancos de dados relacionais.

Palavras-chave: Viajar. Rede Social. Plataforma Web.

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1 INTRODUCTION

Two principal concerns for a traveller are transportation and hospitality. Today, in the early 21st century, the most common method to find transportation, such as bus and airline tickets, and a place to stay, such as hotel and hostels, is via Internet. Due to the numerous online websites and web applications that offer information and instant reservations, a traveller has started to abandon travel agencies and to use those online resources, where more choices can be found and compared easily, and hence, the user can choose more efficiently the best fit for her/his transportation and hospitality.

Moreover, other online platforms tend to offer another type of information for travellers. Some offer instant currency exchange rates, other offer weather and climate information, touristic places to visit such as museums and parks, in addition to cost and product prices at a particular place, which helps a traveller estimate a total budget for the trip.

This work proposes a new platform in the form of a social network that aims for providing travellers with an interactive tool that allows them to better know the place they are visiting, and also enable them to communicate and exchange culture with locals of the visited place. The platform provides that communication channel through listing cultural events and activities, in addition to people interested in culture exchange and their spoken languages, so that they can interact with others in the same language.

In this work, divided in chapters and sessions, the most relevant points to the development of this platform are discussed. One of the most essential points are the evolution of the Internet, from its early days to the era of powerful Internet accessing smartphones. There will also be discussed the consequences of the Internet evolution and how that affected the web development process and emergence of numerous tools and frameworks that facilitate building a website and publishing it online. Furthermore, the work discusses the revolution in communication methods between people and the emergence of social media and social network and how they became an essential communication tool in our daily life.

2 THEORETICAL REFERENCE

2.1 INTERNET

When it comes to developing a new website, platform or any kind of online software, it's both relevant and important to study the evolution of the Internet and technologies involved, in order to better understand how it evolved during the past years and in which direction it tends to follow in the next decades. Furthermore, understanding how in a few years some technologies have suddenly become essential in our daily lives might be an inspiration when analysing a new piece of software. Hence, this chapter will go through the history of the Internet from its early years as a new invention until the technological revolution it has impacted.

Internet can be given both objective technical definitions as well as subjective definitions that would depend on the topic discussed as in what the Internet is used for and how it reflects on the subject. For instance, Internet was defined by Dennis & Khan (2012) in their article as "a system architecture that has revolutionized communications and methods of commerce by allowing various computer networks around the world to interconnect. Sometimes referred to as a 'network of networks' " (Brittanica Online, 2017). Also, according to Shklovski et al. (2012), "The Internet is first and foremost a communication technology, with the potential to change people's social interaction." (SHKLOVSKI et al., 2012, p.766).

Looking at both definitions and recalling the context where the term 'computer' was referred to, it becomes clear that during the past few decades, the use of computers, Internet and computing technology in general has suffered a dramatic change. The computer, initially invented and perceived as a calculating device, thanks to the Internet, has become the most common means of communication.

Looking at the Internet today as the principal environment used for communication and information sharing through numerous websites and applications, it would be interesting to take a look back at its history and understand better how it's evolved and revolutionized the whole information technology.

2.1.1 An Evolution

The Internet, has emerged in 1969 in the U.S. defence department, where researchers had started experimenting methods that would enable more than one computer to communicate with each other. The Advanced Research Projects Agency Network (ARPANET) was the first wide area packet switching network and it had succeeded in connecting four different computers at separate sites at U.S. universities and research institutes, where the use of the new creation was exclusive only for scientists (West's Encyclopedia of American Law, 2017).

Later on, The US department of Defence's Advanced Research Projects Agency (ARPA) has dedicated more research and put on a larger team of computer scientists whose mission was to conduct more experiments on computer networking. Vinton Cerf and Robert Kahn who were researchers at ARPA and were considered two of the principal architects of the Internet had then decided to expand the ARPANET into a wider system of interconnected networks that would later become known as the Internet we know today (ABBATE, 2000).

The initial objective of ARPA behind building the Internet was to provide a secure means of communication between organizations involved in defence-related research (HERTZBERG, 2001). Afterwards, when the idea of networks began to spread, more parties, groups and companies started to take interest in the subject with the purpose of improving and influencing the evolution of the Internet.

The National Science Foundation took over responsibility for the Internet in the 1980s, when ARPA willingly gave it up, only to turn the network over to private businesses in the 1990s. And far from the American centers of networking, at the CERN physics laboratory in Geneva, Tim Berners-Lee took advantage of the Internet's unique capabilities to invent an application that he called the World Wide Web (ABBATE, 2000, p.3).

Abbate then explains that inventing the Internet from the very beginning was not simply a story of a few heroic researchers who built it. On the contrary, many individuals, organizations were involved along the way of constructing the Internet we know today; some with personal goals, others wanted take part in building something for the future, which resulted in both collaborations between some parties, and

conflicts between others.

It was the 1990s when the World Wide Web (www) was introduced to the world. It's the technology that allowed the transmission of text, and different forms of multimedia (pictures, audios, videos) via the interface known as web pages. It was then when the Internet became more accessible and more popular for the general population. People had discovered the power of the Internet, where they could communicate, see common content, and share information at long distances via electronic mail (e-mails). (West's Encyclopedia of American Law, 2017).

2.1.2 Then a Revolution

The idea of posting a content in the form of text and pictures somewhere, where anyone, independently of their location, can have access to it was an ideal fit for the newspaper industry. HTTP (HyperText Transfer Protocol), the protocol used by the World Wide Web, allowed transmitting that content in the form of HTML (HyperText Markup Language) documents, which in turn is the responsible for formatting the content inside web pages. The new technology might have surprised the population at first, but it was not too long before the industry took advantage of it. The American newspaper Columbus Dispatch was the first to successfully adopt the Internet as a new medium for distributing the newspaper's content. By 1999, more than 4,900 different newspapers around the world were on the web with a digital version of their printed papers in a new form called web pages (WEBER, 2012).

Nevertheless, the web was not limited only for the use of newspapers. Technically any organization or individual was capable of posting a web page on the Internet and sharing the hyperlink to that page, so that people could access it via that link on the Internet. Some individuals started posting and sharing personal diaries, thoughts and commentaries, and that's when 'blogs' or 'weblog' or 'web log' came out. However, it would require a lot of expertise with technology; from formatting and styling the content to posting it online on the web, then maintaining the website.

Open Diary was the first platform to offer a solution for blog writers. Founded in October 1998, the new technology offered users a free space, in addition to online publishing options and tools for hosting their blog on the web. Furthermore, Open Diary allowed users and members to post commentaries on the work of other

members. After a few months, 25,000 diaries were hosted on Open Diary (WEBER, 2012).

In Figure 1 we can see the user interface of the Open Diary platform. We can also notice the simplicity of the interface, and how it was not much of a concert at the time.

Figure 1: The Open Diary Interface

Welcome to The Open Diary, the first interactive online diary community on the Internet. We are currently home to **2,571 online diaries**.

Message from The DiaryMaster
News on stats, site enhancements, and more...

Fresh Entries Made Daily
Diaries that have been updated today.

Diaries By Name
[A](#) [B](#) [C](#) [D](#) [E](#) [F](#) [G](#) [H](#) [I](#) [J](#) [K](#) [L](#) [M](#) [N](#)
[O](#) [P](#) [Q](#) [R](#) [S](#) [T](#) [U](#) [V](#) [W](#) [X](#) [Y](#) [Z](#) [~](#) <#>
Diaries listed by the author's name.

Diaries By Number of Entries
[5 and under](#) [6 - 10](#) [11 - 20](#) [21 - 30](#) [31 and over](#)
Diaries by how many entries they hold.

Diaries By Age
[under 17](#) [17](#) [18 - 19](#) [20 - 24](#) [25 - 29](#)
[30 - 34](#) [35 - 39](#) [40 - 49](#) [50 - 59](#) [over 59](#)
Diaries listed by author's age.

Diaries By Place
[A](#) [B](#) [C](#) [D](#) [E](#) [F](#) [G](#) [H](#) [I](#) [J](#) [K](#) [L](#) [M](#)
[N](#) [O](#) [P](#) [Q](#) [R](#) [S](#) [T](#) [U](#) [V](#) [W](#) [X](#) [Y](#) [Z](#)
Diaries listed by the author's location.

Search The Open Diary :

Now supporting **multiple-word** searches!

[The me that you know, he has some broken thoughts](#)
by Maj_Kusinagi

I could love this diary just for the **titles of the entries**, but there's so much more. For one thing, whenever I stand in line at the bank now, I picture people **sucking on lobster tails**.

[Past Editor's Choices](#)

Who **Where**

Dent	Trailer
Ranma	Somewhere Out tHerE...
Woodthrush	San Francisco
star	earth
Orfeo	
Summer	midwest
Caroline	Seattle
mcweary	West coast
Griffin	Oz
claire	Hong Kong
SoCal Frank	
Adele	Canada

[50 Most Recent Entries](#)

Source: <https://web.archive.org/web/19990125101830/http://www.opendiary.com/>

While newspapers were restricted to their routines and journalistic hierarchy, blogs had more liberty for writers and individuals who wanted to share their opinions and thoughts and comment on others'. A new form of communication and interaction had already started to emerge. It was only the beginning of a new revolution, the revolution of social media.

2.1.3 Web 2.0

In 1997, a new type of websites had appeared online, thanks to SixDegrees.com this type of site is now referred to as Social Networking Site (SNS). The new platform allowed users to create personal profile pages and enabled them to connect with others through these profiles. Soon after SixDegrees, many have adopted and improved the idea, and the web now had started to host more and more SNSs. Five years later, it was Friendster.com with its 300,000 users.

In 2004, a new concept had emerged, called "Web 2.0", during a brainstorming session held by two companies in the field of information technology, O'Reilly and MediaLive. The purpose of the conference was to discuss the web and the new platforms and applications getting popular, while others "crashing" due to the diminishing use. Analysing those surviving websites, the term "Web 2.0" was mentioned to refer to a possible new model or maybe a collection of some determined characteristics in common that would describe those sites and guarantee the success, but still, it was not yet determined what exactly is web 2.0. "In the year and a half since, the term "Web 2.0" has clearly taken hold, with more than 9.5 million citations in Google. But there's still a huge amount of disagreement about just what Web 2.0 means," (O'REILLY, 2005).

Web 2.0 referred to the "web as a platform" of interaction between developers and users through interactive blogs, applications, and social networks. (CIRIBELI & PAIVA, 2011). Weber also believes that the success of SNSs was mostly because of the technology of Web 2.0, which he referred to as the platforms that provided functionalities which in turn allowed consumers, to participate and interact online between one another.

As this work proposes a new idea for an online platform that can also be considered a kind of a social network platform, according to the concept of Ellison & Boyd, (2013), which will be discussed in the next chapter, it was essential to have a look at the evolution of the Internet during the past few decades in order to better understand how it's quickly evolved from a simple network transmitting data between merely four computers at ARPA to today's network of networks that is connecting the entire world.

2.2 SOCIAL MEDIA OR SOCIAL NETWORK ?

The objective of this chapter is to answer two essential questions. First, why develop another social network as a solution to the problem this work proposes to solve? And the second, which will justify the answer of the first, why social network and social media platforms are very successful?

Social Media and Social Networks provide users and consumers with content that interest them. It's the job of marketers and content makers to figure out how to reach their audience online through social media. According to Casey (2016), different audience is targeted and reached by different content from different parties. It's one of the principal reasons that explains the shocking numbers when looking at social media access graphs. In addition to content, social networks satisfy users' desire for connectivity and communication while enabling them to be content creator themselves, which generates more interactivity and collaboration (MCFARLAND AND PLOYHART, 2015).

In order to have a better idea of how much social network platforms are accessed, we can observe the two figures illustrated below, figure 2 and figure 3.

Figure 2 shows the 10 most accessed social network platforms and the number of unique users who accessed them only via smartphones in a single month, September, 2016.

Figure 2: 10 most accessed social networks on smartphones

RANK	PLATFORM	SEPTEMBER 2016 (UA)
1	Facebook	178.8 M
2	Instagram	91.5 M
3	Twitter	82.2 M
4	Pinterest	69.6 M
5	LinkedIn	60.1 M
6	Snapchat	52.6 M
7	Google+	49.2 M
8	Wordpress.com	37.4 M
9	Reddit.com	26.5 M
10	Tumblr	24.6 M



Source: <http://www.jenx67.com/wp-content/uploads/2017/01/2016-nielsen-social-media-report.pdf>

Figure 3 shows the 10 most accessed social network platforms and the number of unique users who accessed them only via desktop computers in a single month, September, 2016.

Figure 3: 10 most accessed social networks on desktop computers.

RANK	PLATFORM	SEPTEMBER 2016 (UA)
1	Facebook	90.2M
2	Twitter	32.7 M
3	Pinterest	26.5 M
4	Blogger	22.5 M
5	Instagram	20.4 M
6	LinkedIn	20.1 M
7	Wordpress.com	16.6 M
8	Tumblr	12.8 M
9	Google+	12.1 M
10	Reddit.com	10.8 M



Source: <http://www.jenx67.com/wp-content/uploads/2017/01/2016-nielsen-social-media-report.pdf>

Although often used as synonyms, sometimes confused for one another or thought to refer to the same thing, social media and social network are two different terms. Ellison and Boyd (2013) could introduce the difference between both terms in their paper, using a bit of history of how both emerged:

The global system of networked computers, servers and routers known as the Internet has transformed many aspects of modern society and social interaction. The online distribution of goods and services, for instance, has influenced almost every industry and has radically transformed many. Alongside commerce-oriented technological development has been a rise in what has been termed “social media.” One of the most significant developments connected to social media is the rise of social network sites (SNSs), such as Facebook, LinkedIn, MySpace, Cyworld, and Google Plus. Although sites of this nature first emerged around 1997, they rose to cultural significance as a phenomenon in 2003, when Friendster first attracted mass media attention. Less than a decade later, millions of people of all ages across the globe have joined SNSs (Anderson & Bernoff, 2010). In the U.S., 65 percent of Internet-using United States (US) adults report using social network sites such as Facebook, MySpace, or LinkedIn (Madden & Zickuhr, 2011). (ELLISON & BOYD, 2013).

And they added a more clear definition of what exactly a social network

referred to in 2007:

In the early stages of this phenomenon, terminology varied widely with the interchangeable use of “social networking sites,” “online social networks” or even simply, “social networks” to refer to a diffuse—and sometimes improbable—range of sites and services. In 2007 we attempted to stabilize the discussion by offering a definition of social network sites:

web-based services that allow individuals to (1) construct a public or semi-public profile within a bounded system, (2) articulate a list of other users with whom they share a connection, and (3) view and traverse their list of connections and those made by others within the system. (boyd and Ellison, 2007). (ELLISON & BOYD, 2013).

In other words, social media is the actual technology that allows users to create and exchange content over the web, while a social network is the structure described above and on which a web service is built. Seeing as how technology grows exponentially during these last years, this ten-year old definition is no more accurate than the definition of a telephone ten years ago. Besides that, and on the contrary of one may think, technologies are every day more available and more accessible for almost everyone to use and learn how to use. The thing that makes it hard to define what a specific technology is, everyone is basically free to use a technology in whichever way they see fit. In the same paper of Ellison and Boyd, they provide a great example for that practice:

As SNSs proliferate and evolve, defining what constitutes a social network site becomes increasingly challenging. Some of the features that initially distinguished them have faded in significance, while others have been reproduced by other genres of social media. Media sharing websites, gaming sites, and locative media all encourage participants to list contacts and “Friends,” making this affordance a poor criterion for distinguishing between social network sites and other genres. Meanwhile, other features, such as media streams like Facebook’s “News Feed,” have emerged as more salient components of the SNS user experience. Blurring things further, open application programming interfaces (APIs) and other platform technologies have enabled countless third-party websites to develop on top of social network sites or to integrate the social graph from popular social network sites into other tools and sites. Search engines and news sites surface Facebook and Twitter content, while MySpace allows people to use their Facebook credentials on MySpace, blurring the distinction between the two sites. In short, the technical affordances that define a social network site have become increasingly fluid. Of course, people’s practices, expectations, and social norms have also co-evolved alongside the technical features and social interaction opportunities. (ELLISON & BOYD, 2013).

Along the way of the evolution of what we know today as social networks, a lot have changed: features, security control, profile and its kinds (personal profile, pages, groups), content, and many other factors. Because of those factors and their

changes, many third-party technologies and different kinds of social network sites have started to emerge all with varying values of those factors: different kinds of content published by different types of profiles under different security/privacy control levels and with a variety of possible functions and features available to apply to that content, which in return attract different users with different purposes.

In 2007, the three defining features of a social network site appeared to be the profile, the connections lists, and the functional ability to traverse those connections. As social network sites have evolved, the salience of these features has shifted. Most notably, the role of the profile has changed, as media streams have increasingly taken a more prominent role and the activity of “updating” has become less burdensome. Meanwhile, the articulation of contacts has become more central, both because of the rise of media streams and because of third-party technologies that incorporate the “social graph” as a way of organizing content. In contrast, the act of traversing did not change from a technical perspective, but became less central over time. (ELLISON & BOYD, 2013).

SNSs first became available in 1997 with the introduction of SixDegrees. Since that time, a plethora of sites have been developed and gone extinct (for a review, see boyd and Ellison, 2007; Heidemann et al., 2012). Several SNSs have attracted a global user base (e.g. Facebook, Google+, MySpace), whereas others serve niche audiences such as specific demographic groups (e.g. BlackPlanet, MiGente), interest groups (e.g. Goodreads), or a particular nation (e.g. Renren). Facebook boasts the largest number of members worldwide in recent years with an estimated 750million users during 2011 (Wikle and Comer, 2012); as of March 2014, the company estimated an average of 802 million daily users (Facebook, 2014). (RAINS & BRUNNER, 2015).

2.2.1 Why Social Media?

In quite a simple way McFarland explains why social media has emerged as a technology and a tool. According to her, the emergence of social media was somehow natural as a tool among many others that humans have needed and therefore invented to satisfy their natural desire for forming relationships and communications with others. Moreover, the same tool that was developed to satisfy a need, has evolved so much that it revolutionized the way people connect, communicate, and develop relationships (BEAL & STRAUSS, 2008; DERKS & BAKKER, 2013).

Humans are social animals, and the propensity to seek and form relationships with others is deeply embedded into our DNA. Early in our history we formed into small packs of roving hunter gatherers based upon common hunting techniques. The birth of agriculture

allowed the development of geographically stable communities. Advancements such as alphabets, printing presses, telephones, airplanes, and email continued to fulfill humans' appetite for social interaction and communication. In each major transition, the human need for building social relationships both created, and were further stimulated by, technological changes that facilitated interaction: hunting tools, agriculture, air travel, and the Internet. In turn, in each transition, the social context within which people interacted and communicated changed as well. (MCFARLAND et al, 2015, p.1653)

We are in the midst of yet another social revolution stimulated by the interaction between the human desire for connectivity and technology. Social media are digital platforms that facilitate information sharing, user-created content, and collaboration across people (Elefant, 2011). Social media include networking sites such as Facebook, YouTube, and LinkedIn (Kaplan & Haenlein, 2010; Lenhart, Purcell, Smith, & Zichuhr, 2010). This technology has revolutionized the way people connect, communicate, and develop relationships (Beal & Strauss, 2008; Derks & Bakker, 2013). Social media also have the potential to revolutionize organizational behavior. (MCFARLAND et al, 2015, p.1653)

Social media being part of the solution this work proposes, discussing some related points was essential. This chapter has clarified some definitions and concepts involved in social media, reviewed and justified the surge in the use of these platforms and websites. In addition, the most accessed and popular social networks and some precise numbers were illustrated and showed how much these platforms are actually used.

The next chapter will discuss web development as the tool used to build the social networks, and how it evolved and impacted the improvement and evolving of these platforms. Furthermore, how the mobile devices becoming Internet accessing devices also affected the process of web development.

2.3 WEB DEVELOPMENT

This section will address more about the process of web development, highlighting the principal concepts and stages it went through as a result of the emergence of social media and the strong rise in web access via mobile devices such as mobile phones and tablets, in addition to other factors.

Since the creation of the Internet, and more precisely after the appearance of the Web 2.0 technology and the urge to use social network platforms, the process of evolving in the world of web development had not been slowing down. Technologies, tools, and best practices have been in continuous improving and the web has been

hosting more and more websites and platforms every day.

The web has become a mainstream source for both communication and interaction, and for information retrieval. This fact has resulted in an even stronger need for the web. It's become necessary for almost every new business to invest in technology and web development in order to be online and hence reach the target audience.

The huge amount of new tools, technologies, frameworks, and programming languages in the industry of web development has made it, in a way, both more difficult and easier for individuals and organizations who needed, for one reason or another, to use the power of web. While some tools such as Content Management Systems (CMS) offered an easy-to-use interface to build and publish a simple website with no need of expertise in the field of computing and programming, for others who needed to build a more complex online platform with a bigger system behind it, it was more complicated deciding which technologies to use and which are best fit for their need, especially if the same did not have much knowledge or experience in the field.

In the beginning, the only means to accessing the web was via web browsers on a desktop computer. Another turning point which Web development has went through was the rise in mobile devices usage. Mobile phones were used for other purposes rather than web access, such as phone calls and text messages. Then, mobile phones started to turn into powerful Internet accessing devices, and the process of web development had to adapt to that fact, considering all Internet accessing devices when it comes to implementing a website or an online platform (ZAKAS, 2013).

2.4 STATE OF THE ART

There are numerous social network platforms on the web. There are also different types of social networks, and each type serves a different goal, offers a different service, has a different use or targets different audiences. In this section, we will take a closer look at some existent social networks and review some similarities and differences between them. In a separate session, we will discuss how and what the platform this paper proposes can offer differently from what the current social

networks already do.

2.4.1 Existent Solutions

In Powell's words (2009, p.19), "[...] different types of networks exist for different audiences and different purposes [...]". And she explains, "each network is created with different uses and users in mind". She also emphasizes the importance of understanding the differences between the different types of social networks, which helps to better benefit from each. Following is a shortlist of the most known social networks, along with their main uses and main audiences in order to help with a better understanding of those differences.

2.4.1.1 Facebook

Being on top of the list as the most accessed social network with almost double the quantity of unique users of the second (Twitter) in figure 2 and almost three times the same of figure 3, Facebook, according to Powell (2009), has a growth rate of more than 250,000 new users per day.

Facebook is mostly used for keeping both a user's personal and professional network easily accessible as being able to chat, create chat groups, accessing their profiles, pictures, videos, and seeing their status updates. Additionally, Facebook is commonly used for building groups that would usually be related to a specific product, service or a common interest between the group members.

2.4.1.2 Twitter

The third on the list of figure 2 and the second of the list of figure 3, Twitter is quite different from Facebook both in functionalities and audience. The major function of Twitter is a tool called 'tweets', that is, basically a short message of at most 280 characters that a user posts. A user also "follows" other users in order to see their tweets. Twitter is commonly used by individuals, politicians and organizations to provide statements, information and news. "Corporations, including Cisco Systems and Whole Food Markets, use the tool to provide product and service information, and NASA used the system to announce the discovery of ice on Mars by the Phoenix

Mars Lander.” (POWELL, 2009, p.25).

Another popular tool of Twitter is what's called 'hashtags'. Hashtags are specific words that are shown highlighted in a tweet and they generally refer to a pre defined topic or subject. And since a tweet can not be more than 280 characters, barely 6 sentences, hashtags become helpful in that matter, as they can refer to topics using a single word, and “followers” will know what that is.

Undoubtedly, Twitter has also been influencing politics in many spots of the world. Parmelee and Bichard discuss that subject deeper in their book “Politics and the Twitter Revolution - How Tweets Influence the Relationship between Political Leaders and the Public” (2012).

2.4.1.3 LinkedIn

Another social network, distinct from the two above in audience and usage, and generally utilized for different purposes is LinkedIn. The general public of LinkedIn is mostly professionals, employers, and entrepreneurs looking for jobs, recommendations and hoping to build and expand their professional network (POWELL, 2009).

A user's profile page on LinkedIn is also differentiated, as it focuses on professional skills, interests and experiences, which helps the platform's intelligence match other professionals from the same business or academic field.

Using LinkedIn, a user can find job offers, or offer a job, meet other professionals, and check business related updates, news and events.

2.4.1.3 Couchsurfing

Couchsurfing is the most relevant social network to the one proposed in this work. Couchsurfing provides a connection between travellers who are seeking a place to stay in their destination, and locals who are willing to host travellers in their place of residence. The platform is a great tool that encourages a cultural exchange. The platform however has become more targeted for one purpose, which is finding hosts or places to stay while travelling.

2.4.2 WHY THE NEED OF A NEW SOCIAL NETWORK?

Reviewing the above sections and chapters, it's clearer now how the numerous social media and social networks can be completely different in use and purpose, although they might appear similar or alternatives for the same tool. They may share a very similar interface and basic functions, but share different goals, and hence attract different audience.

This work, therefore, proposes another social network with the objective of connecting travellers all over the world. Researches and statistics have shown that the bigger percentage of both social networks users, as well as travellers are from the same age group (25 - 34 years old). The new social network targets travellers both with local and international destinations and aims to connect them with locals from the destination, provide them with a guide of cultural and local activities that would help better communicate with the customs and culture of the destination. It will allow travellers of the same destination to communicate and share information about the location, in addition to pictures and videos, besides tips and advices.

That allows, in addition to, a deeper cultural exchange and diversity, more awareness and security, as travellers will be able to receive helpful information from locals who would, naturally, have a better knowledge of the destination.

3 NEW PLATFORM FOR TRAVELLERS

The previous chapter has discussed and introduced with examples different types of social networks, comparing their different uses and audiences. Also, the chapter was concluded with a brief idea of the project this work proposes.

This chapter, however, will introduce in deeper details a new web platform, that is a social network with the goal of helping travellers and natives connect and exchange cultural value and experiences around the world.

In the following sections, we will introduce the structure of the application in the form of entities, and the functionalities implemented and how users would interact with the system through these entities, achieving the main goal of this work. In addition, all the technologies and tools used for building, and testing this platform will also be illustrated and explaining the role and importance of each, in order to achieve the final product.

3.1 SYSTEM STRUCTURE

The main idea is that users, whether travellers or natives, could communicate through shared content. That content is served and shared over the platform in several forms. Some of which are organising and posting planned trips, asking questions and receiving answers about a specific destination, following cultural events happening around a destination, and sharing personal travel history.

The chapter will illustrate how this content is structured through the platform and how the data is modelled and saved in a relational database. The following sections will discuss the most important data entities and more specifically the data they represent. After that, it will be able possible to see how the data is all connected, showing all the database tables, attributes, and associations between them using an ER diagram of the database.

3.1.1 Principle Entities

The data used through the system is structured in database tables. For now, we could refer to these tables as entities. Entities represent a real life being such as a

user, a question, or a place. Follows a list of the principal entities used in this platform:

User profiles.

1. Events.
2. Trips.
3. Questions & answers.

Each of these entities is associated to a place, which in turn is another entity. The place could be an address, city, a country, or any form of location that could be defined by a latitude and a longitude. Using those coordinates, a place can be shown on the map using a single marker, referencing the related entity (user, event, trip, question).

In other words, the application allows users to create, share and visualise locations of other users, or cultural events or trips, or any other entity that might have a location associated to it. In the following sections, we will have a more clear illustration of each of these entities, of which the system consists and understand how users would actually interact with them.

3.1.1.1 User Profiles

The idea is the same among all other social networks, a user profile represents a real life person with variations in the amount and type of information about the real person. The basic information are a profile picture, name, and a bio about the person, through which other users can visualise and have a brief idea about the person.

In this project, the target audience of users are travellers, and hence, the information travellers would be looking for about other travellers would naturally involve travelling experiences, previous destination a person have been to, where the person have lived in the past, and where the person lives at the moment, in addition to some general interests and favourite places, which give a better knowledge of the person.

Furthermore, nowadays, due to the excessive use of popular social networks such as Facebook, Twitter, and LinkedIn, a link to a public profile on one or more of these platforms became a principal piece of information and a reference to the

person and almost an evidence that the person in question is legit. Consequently, on this platform, a user can create a public profile, fill in, and share the following information:

1. Profile picture.
2. Name, and last name.
3. Email address.
4. Title.
5. Birthdate
6. Bio (a small brief about the user).
7. The place the person grew up (city, country).
8. Things, in the form of information tags, related to the place this person grew up, and which they can be asked about.
9. The place the person lives at the moment (city, country).
10. Things, in the form of information tags, related to the place this person lives, and which they can be asked about.
11. Things the person is willing to share.
12. Things the person is willing to offer.
13. Whether or not the person can host a traveller at home.
14. A link to public profiles on other popular social networks (Facebook, Twitter, LinkedIn).

3.1.1.2 Events

The Event entity represents a real life event/meeting. Users are able to view a list of cultural events happening around a chosen place (a region, a city,.. etc). The most important information associated to an event are the location where the event is taking place, and the date and time of the event.

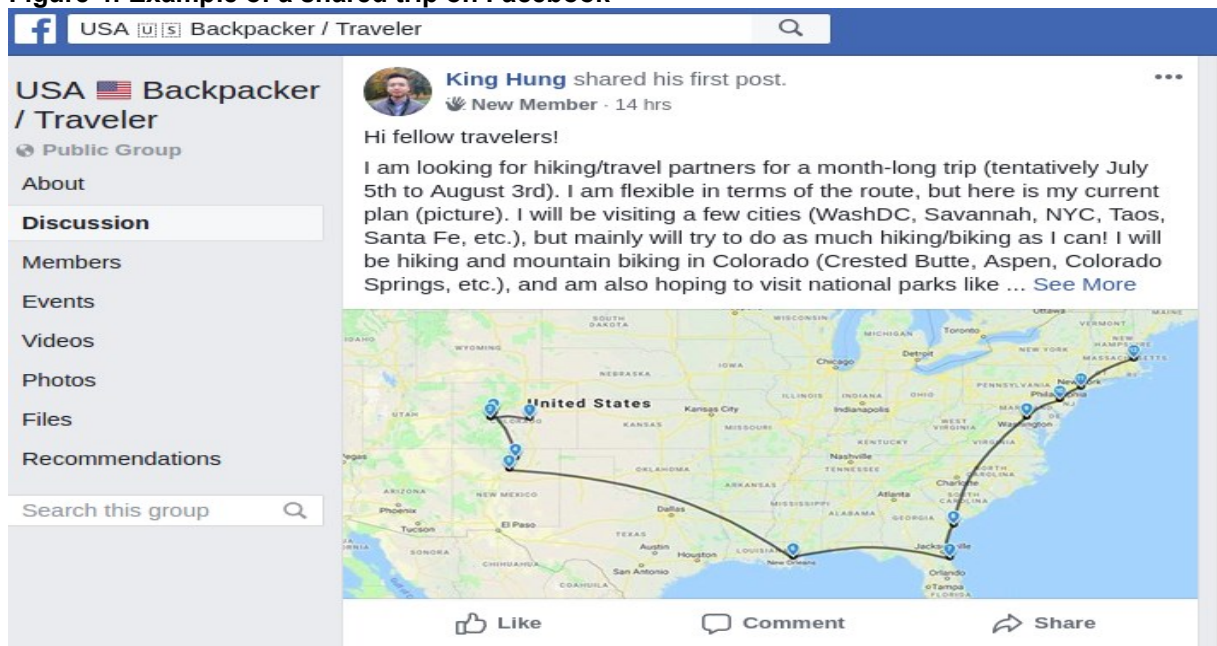
In addition, the events listed in the system are also posted in other places over the Internet, such as official website of the event or the event organizer, other social networks, or specialized platforms for events. Therefore, a link to the original event is also provided, in which a user can access all the information of that event. This way, the focus is directed to providing a reference to cultural and travel related events for users around the world, without actually involving or interfering in the organization of those events.

3.1.1.3 Trips

There are many forums and groups over social networks, where people try to share their planned trips, asking for travelling companions or for information about routes and destinations. One of methods to do so is simply describing the trip in writing, explaining where the person plans to start and which destinations they would pass through. Another method is using a digital map, usually *google maps* (Google's tool ¹, and considered the most popular and used tool for digital maps). The user can choose a starting point for the trip, check points, and an ending point, and the tool will draw a visual route over the map passing through these points. The user then can share this route as an image over the other forums and social networks, which is visually easier to understand and read than text.

Follows in figure 4 an example of a shared trip on a group for travellers on Facebook. Firstly, the user used google's maps tool to create a route through the places they intend to go through during the trip. Then, the screen was saved as an image, and attached with the post, along with a briefing text about the trip and the reason for sharing it on Facebook.

Figure 4: Example of a shared trip on Facebook



Source: <https://www.facebook.com/groups/USAbackpackerTraveler/permalink/936736733173460/>

¹ <https://www.google.com.br/maps>

This proposed platform unites the advantages of both tools. Users are able to, both, create their planned trip, registering all the destinations they plan to pass by and draw a visual route over the map for easier visualization. In addition, they are able to share this trip along with a description of their choosing. Furthermore, they are able to attach more information to their trips and destinations, such as their means of transportation, things they look for in one of their destinations, or things they are willing to offer or share during their trips.

3.1.1.4 Questions and Answers

A common way for travellers to share information about trips and destinations is forums. Forums are a simple and an effective tool for this purpose, where users could post their questions and wait to receive a response from another user who might have the information or have been through the same experience in question.

This is another tool provided in this project, a forum. However, questions in such forums most focused on travelling usually are related to a location. For example, a person would ask for tips about transportation from one city to another, or about touristic places in a specific region. As questions posted on common forums are merely provided in the form of text, it becomes potentially difficult for other users to search, locate, or categorize posts related to a specific place.

In order to solve this problem, the forum tool implemented in this project provides a way, in which users are able to choose and associate a location to their post. The location is chosen using an autocomplete search tool provided by Google in a way, by which the location selected is associated to a longitude and a latitude coordinates and could be pointed on a map, also provided by Google, by a single marker. Later on, users are easily able to locate posts, questions, and answers related to a specific location. By merely searching for the area in question, the system would provide a list of all posts that had been associated to the locations in or near the area searched for.

3.1.2 The Database Model

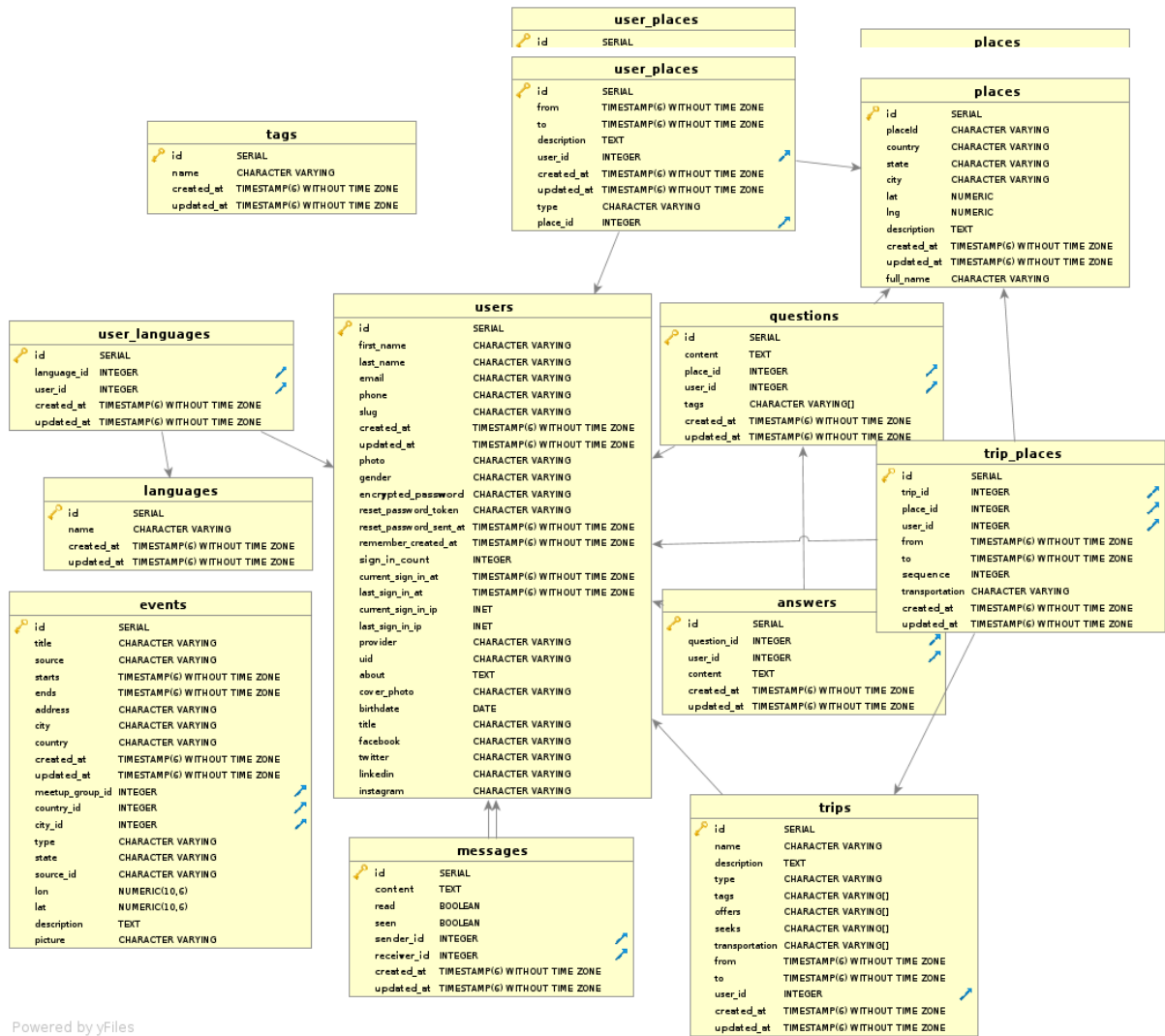
This section shows all the database tables used in the system separately, the data they represent, the attributes of each entity, the relationships and how the data is stored, organized and manipulated among them. The attributes/columns of each table could be divided in two categories; informative category which represent real world information about the entity such as name, title, birthdate; and a technical category which represents keys and unique identifiers used as references and associations to other data stored in the database.

All tables contain three basic attributes/columns created by default by the Rails Framework (the framework used to build the web application);

- Id: which is the sequential primary key of the table. Represents a unique user and can not be null.
- Created_at: represents the date and time at which the record was first created.
- Updated_at: represents the date and time at which the record was last updated.

Figure 5 below shows the Entity Relationship Diagram (ERD) of the proposed system. The ERD contains all tables used in the platform, their attributes, and the associations between them.

Figure 5: Entity Relationship Diagram (ERD) of the system



Powered by yFiles

Source: the author

3.1.3 Tables

Follows a list of the database tables used in this platform and a brief about the use of each, in addition to an explanation about some of the most important attributes on which the system depends:

3.1.3.1 Users

Represents the users logged in the platform using an email and a password, and is responsible for maintaining the user's personal information such as their name, email, password, profile picture, etc.

Another important attribute is the slug attribute, which is used by an external library called FriendlyId. This library uses the slug column to save a unique identifier for each user based on the value of the first name attribute. Therefore and as each user has a different unique value for a slug, this value is used in a url to open the page of the corresponded user (eg: "http://localhost/users/lucas" where "lucas" is the value of the slug attribute).

This is to facilitate accessing the page of a specific user without exposing the sequential primary key (Id) of the user in the url. The library FriendlyId also handles repetitions. As it uses the first name of the user as a basis for generating the slug value, two users could have the same first name. In this case the Friendly Id library generates a unique token and concatenates it to the slug. In the previous example for instance, if a new user was created with the same value for a first name (Lucas), the library will generate a new slug such as "lucas-abc123" and so the url for this user becomes "http://localhost/users/lucas- abc123".

3.1.3.2 Trips

Responsible for maintaining the information about the planned trips created by the users. The information of the trip include a start and end dates, tags (things) that the user is willing to offer/share and tags (things) that the user would be looking for during the trip, and means of transportation used along the trip.

3.1.3.3 Questions

Responsible for maintaining the questions/posts created by the users. The most important attributes of this table are the "content" (the question text), and the "tags", which are keywords attached by the user to indicate what the question is about.

3.1.3.4 Answers

Maintain the answers or comments created by users as a response to the questions. Every answer is related to a specific question.

3.1.3.5 Messages

Maintains the content of the messages exchanged between users. Every message is represented by a sender user, a receiver user, and the content of the message.

3.1.3.6 Languages

Contains a list of languages that are used as suggestions for the users filling in the languages they speak.

3.1.3.7 Tags

Contains a list of tags or keywords that are created and used as suggestions for users filling in tags related to their questions and trips.

3.1.3.8 Places

Every time the user creates a question related to a specific place or a trip with specific destinations, they choose a place on the map. This table is responsible for maintaining those places chosen by the users. A place is represented by a unique placeld retrieved by the google maps places API, a latitude, longitude, city, state, and a country. A place chosen on the map could be anything from a full address to a country.

3.1.4 Join Tables

Join tables represent a many-to-many relationships between entities. A join table has at least two foreign keys referencing two tables, each record is a unique set

of foreign keys. In other words, there cannot be two records with the same foreign keys values, each record is unique in representing a relationship between two records from two different tables. Follows a list of join tables used through the system.

3.1.4.1 User places

Users can fill in places where they grew up, where they currently live, and places they have already visited. This table is responsible for maintaining the data about these places and the type of each place. Each record of this table refers to a single user and a single place.

3.1.4.2 Trip_places

Each trip can consist of multiple places. This table is responsible for maintaining the data about the places of each trip. A trip place refers to a single trip and a single place.

3.1.4.3 User_languages

Users can fill in multiple languages they speak in their profile. This table is responsible for maintaining the languages spoken by each user. A record in this table is represented by a single user and a language.

3.1.5 Associations

This section will list and explain every association between two tables through the database model, in order to better clarify the structure of the built system and the relationship between entities. Each relationship is represented by an arrow in the ER Diagram (Figure 5).

3.1.5.1 Users ← Trips

This is a One-to-Many relationship as a single user is able to create more than one trip on the platform. Therefore the table Trips contains a foreign key “user_id” which indicates the owner user of each trip.

3.1.5.2 Users ← Questions

Another One-to-Many relationship where “one” is the user and “many” is questions. A single user is able to ask or post as many questions as needed, and hence the table questions contains a foreign key “user_id”, where the id (primary key) of the user who created the question is stored.

3.1.5.3 Users ← Answers

The user is also able to post many answers/comments both for a single question or multiple questions using a One-to-Many relationship. Therefore, every answer created belongs to a user. Another foreign key “user_id” is used in the table answers to store the id of the user who posted the answer.

3.1.5.4 Users ← Messages

This is a double One-to-Many relationship. A user can send as many messages as needed, which also means that another user would receive these messages. In other words, two One-To-Many relationships between users and messages are needed. The first relationship represents the messages that one user sends, and the other represents the messages a user receives. Consequently two foreign keys are used in the table messages: “sender_id” where the id of the sending user is stored, and “receiver_id” where the id of the receiving user is stored. For a simpler explanation, a message belongs to two users, a sender through the key “sender_id” and a receiver through the “receiver_id”.

3.1.5.5 Users ← User_places and Places ← User_places

These are the two relationships through the join table “user_places”. A join table between two tables consists of two foreign keys referencing the two tables through two one-to-many relationships. The table user_places references the table ‘users’ through the foreign key ‘user_id’ and the table ‘places’ through the foreign key ‘place_id’ maintaining all the places of all users in one table.

3.1.5.6 Users ← User_languages and Languages ← User_languages

These are two more relationships concerning the join table “user_languages” which maintains all the languages of all users in one table. A language can be chosen by many users and a user can choose many languages, therefore each record consists of a unique set of two foreign keys referencing the users tables through a one-to-many relationship and the languages tables through another one-to-many relationship.

3.1.5.7 Trips ← Trip_places and Places ← Trip_places

The join table ‘trip_places’ represents the many-to-many relationship between the entity ‘trips’ and the entity ‘places’ through two one-to-many relationships; one between ‘trip_places’ and ‘trips’ through the foreign key ‘trip_id’ and another between ‘trip_places’ and places through the foreign key ‘place_id’ maintaining all the places of all trips in one table.

3.1.5.8 Questions ← Answers

This is a one-to-many relationship between the table ‘questions’ (one) and the table ‘answers’ (many), meaning that one question could be answered many times, and hence each record in the table ‘answers’ refers to a question through the foreign key ‘question_id’.

3.2 FUNCTIONALITIES

This section will illustrate the functionalities needed for the implemented system in order to achieve the final proposed platform. Those functionalities are basically the points of interaction between the user and the platform, where users can access, create and manipulate data. We will also have a look at each of the system functionalities and how they are represented using the CRUD cycle and user stories.

3.2.1 CRUD

CRUD stands for Create, Read, Update, Delete, which are the four basic operations used to handle some specific data entity when working with databases. For instance, looking at the Entity “Trip” viewed in the previous section, the four functions would be described as follows:

- Create: Inserting a new trip with new data for the trip attributes in the database.
- Read: Fetching a specific trip from the database and displaying it.
- Update: Altering one or more of an already existent trip in the database.
- Delete: Removing a specific already created trip from the database.

Looking at the example above, and the entities in the previous section, the functionalities implemented in the proposed web platform are a way for users to be able to share their own information and view others’, such as trips, questions, personal information which are represented by data entities, stored in a database and are handled by the CRUD process.

3.2.2 User Stories

User story is a high level scenario describing, in the context of a web application, how the user would interact with the software and to serve which purpose. User stories facilitates identifying the requirements of a software in terms of the necessary functionalities to be implemented and used by a user. Writing a user story could follow different formats. For the proposed software, user stories are

written in the "role-feature-reason" format:

As a <role>, I want <feature> so that <reason>

In this format, the <role> is the kind of person interacting with the software, <feature> is the action taken by the person, and <reason> is the purpose for which the action is being taken. Follows a table of the user stories describing the functionalities required for the proposed software following the previous format, along with the corresponding CRUD operation:

Table 1: User stories required for the proposed web platform.

#	Role	Feature	Reason	Entity	CRUD Operation
1	As a user	I want to login	So that I can share my information	User	Create
2	As a user	I want to logout	So that I can exit the platform	User	Update
3	As a user	I want to search for users in a specific location	So that I can review other travellers in that location	User	Read
4	As a user	I want to open my profile	So that I can review my information	User	Read
5	As a user	I want to edit my personal information	So that I can update to the right information	User	Update
6	As a user	I want to view the place i grew up	So that I can review the place i grew up	UserPlace	Read
7	As a user	I want to edit the place i grew up	So that I can update this to the right information	UserPlace	Create/Update
8	As a user	I want to view the place i live now	So that I can review the place i live now	UserPlace	Read
9	As a user	I want to edit the place i live now	So that I can update this to the right information	UserPlace	Create/Update

10	As a user	I want to add a new trip to my profile	So that I can share a new trip with other travellers	Trip	Create
11	As a user	I want to view one of my trips	So that I can review the trip information	Trip	Read
12	As a user	I want to search for trips in a specific location	So that I can review other people's trips in that location	Trip	Read
13	As a user	I want to edit one of my trips	So that I can update the trip information	Trip	Update
14	As a user	I want to add a new destination in one of my trips	So that I can update my trip destinations	TripPlace	Create
15	As a user	I want to view a trip destinations	So that I can review the trip destinations	TripPlace	Read
16	As a user	I want to edit one of my trip destinations	So that I can update one of my trip destinations	TripPlace	Update
17	As a user	I want to remove one of my trip destinations	So that I can update my trip destinations	TripPlace	Delete
18	As a user	I want to create a new question	So that I can get answers to the question	Question	Create
19	As a user	I want to view a question i posted	So that I can review the question i posted	Question	Read
20	As a user	I want to search for questions in a specific location	So that I can review the questions asked by other people in that location	Question	Read

21	As a user	I want to edit a question i posted	So that I update/fix the question I posted	Question	Update
22	As a user	I want to delete a question i posted	So that I can remove the question from my profile	Question	Delete
23	As a user	I want to post an answer to a question	So that I can answer another user's posted question	Answer	Create
24	As a user	I want to read the answers of a question	So that I can review the answers created by me and other users to a specific question	Answer	Read
25	As a user	I want to edit an answer i posted to a question	So that I can update/fix my answer	Answer	Update
26	As a user	I want to delete an answer i posted to a question	So that I can remove the answer from the question answers	Answer	Delete

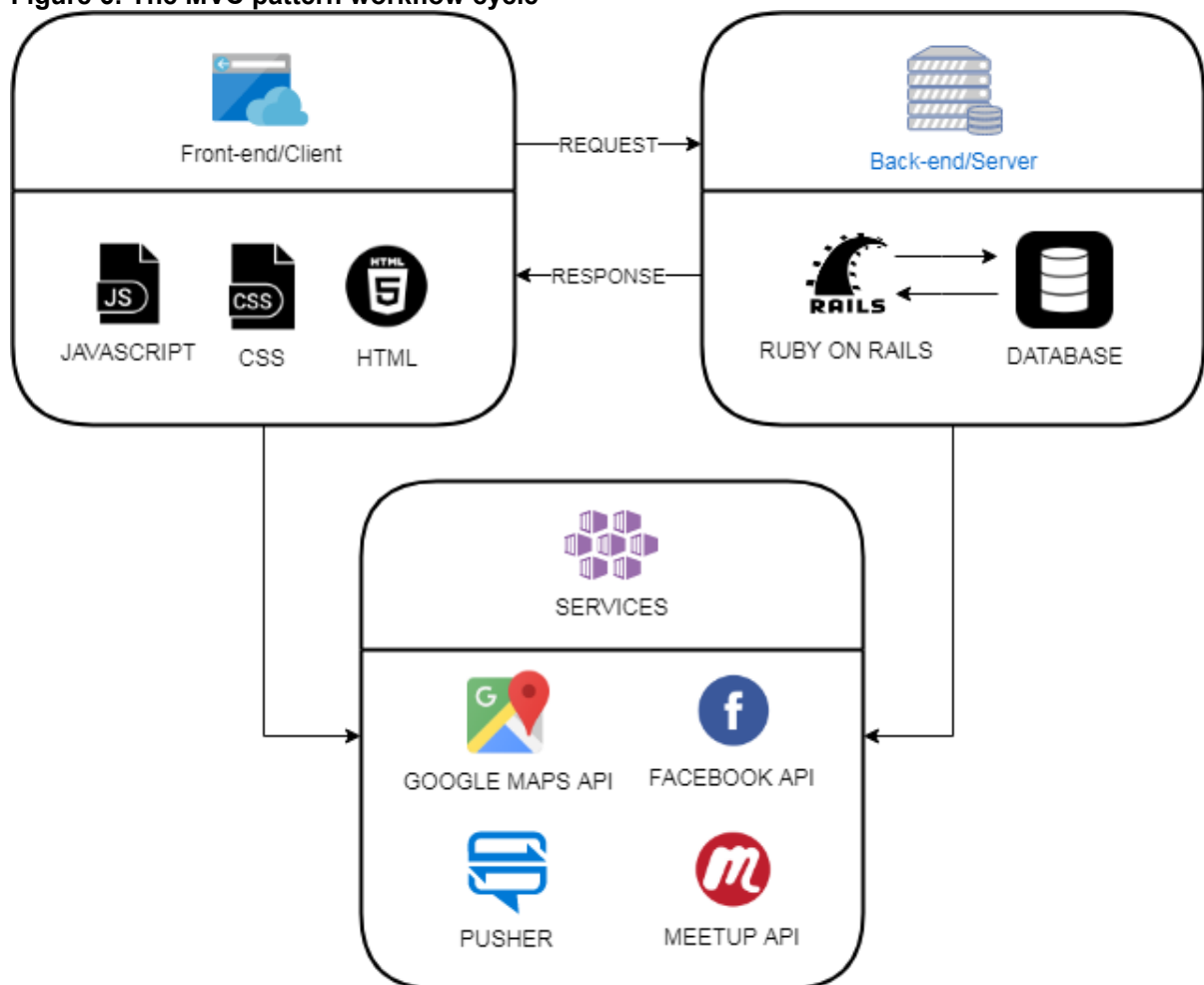
Source: the author

Table 1 listed above shows the user stories which represent the required functionalities for the proposed system from the perspective of a user, along with the concerned Entity and the corresponding CRUD operation. The following chapter will take a look at the technologies and tools used to implement those functionalities through a web platform.

4 TECHNOLOGIES & TOOLS

This chapter will look at each technology, tool, and service that were utilized for structuring, and implementing the proposed system and web platform. Some of these technologies are web-application framework, architectural pattern, web services, RDMS (Relational Database Management System), programming languages, external libraries, and services. Follows a list of those with the description and usage of each. In addition, and for better understanding of the system architecture, the diagram below, shown in figure 6, illustrates the different components and tools used through the system, and they are connected to each other.

Figure 6: The MVC pattern workflow cycle



Source: the author

4.1 WEB AND WEB APPLICATIONS

Based on the information provided in the second chapter about social networks, web, and Internet, building a social network depends naturally on the Internet which allows users all over the world to communicate and share content. Moreover, Internet has become a tool that almost every tourist tends to use for searching information and tips for their travel planning and destinations. Therefore, the proposed system is a web based platform like any of the already existent social networks discussed in chapter 2.

Web-based applications provide many privileges both for consumers and developers. No surprise, more and more web applications are built and used every day. Not too long ago we started to use web applications for banking, emailing, messaging, socializing, all thanks to the ease, velocity, and location independence the web provides. Consumers, for instance, do not need to download or install heavy applications, neither update their already installed applications every time a new feature or a bug is fixed in the application. Furthermore, the ability of smartphones in accessing web applications just as efficiently as personal computers has empowered the accessibility of web applications even more. Now with mobile phones and web applications, consumers are able to check their emails, order a taxi, check near restaurants and more, independently of the time and location. All that is needed is a web browser supporting platform and an Internet connection.

As for developers building web applications, they do not have to worry about the perfect bug free final version before launching the application. Due to the ease of deploying, developers can actually deploy an MVP (Minimum Viable Product), and then continue to adding features, fix bugs, update layouts without worrying about users who might not install the new updates and stay with old versions. Deploying is merely the process of updating the application code on the hosting server. Now what users need to do to guarantee they are using the latest version of the application is refresh the page on their browsers (GAMBLE, et al, 2010).

Gamble et al (2010) confirms, web-based applications enjoy the following advantages:

- Easier to distribute
- Easier to deploy
- Easier to maintain

- Platform-independent
- Accessible from anywhere

Continuing this chapter, the following sections will illustrate in more details how the proposed web platform is built, the web-application framework, programming language and the tools used to build it.

4.2 WEB-APPLICATION FRAMEWORKS

With all the advantages of web-based software discussed in the previous section, many tools started to emerge to facilitate the process of web development - the process of developing a web application. Since all web applications have a lot in common: they all use html pages, use the same protocols, need a database access layer, assumptions were made and tools and libraries were built based on those assumptions. The goal in this process is always providing developers with as much as possible of what they need in order to build a web application, and hence help them focus on developing application specifics.

One of the principle tools used in the process of web development is the web-application framework. A framework, based on the definition of Gamble et al (2010), is a collection of tools and libraries provided with a complete infrastructure on which a web application is to be built. In other words, a framework provides a developer with some parts of the applications already built, instead of having to start from scratch. Although selecting a framework is a personal choice, and each framework has advantages and disadvantages, there are some standards for a good framework which Gamble et al. (2010) has defined in his book "Beginning Rails 4":

1. *Full stack*: A framework should provide all the components needed to build a complete web application without having to manually include and install many basic libraries or doing a lot of standard configuration.
2. *Open Source*: A good framework should be open source and licensed. License examples include the Berkeley Software Distribution (BSD) license and the Massachusetts Institute of Technology (MIT) license.
3. *Cross-platform*: A framework should be equally compatible with all platforms.
4. *Has a place for everything*: The framework should offer a complete structure

and a clear set of conventions which eliminates a lot of manual work and allows to focus on productivity.

5. *Has a database abstraction layer*: The framework should work with any database engine without having to write a single database specific code. In other words, the developer should be able to switch to any database engine during the development process without having to change much configuration or rewrite a lot of code, but simply by pointing to the new database engine and credentials.
6. *Has a community*: Finally, a good framework that is commonly used by many developers will naturally have an online community for support, which helps through discussing best practices and quickly reporting bugs and solving them, which in turn eliminates possible confusions and hence allows a smooth and productive development process.

4.3 RUBY ON RAILS

The previous section has illustrated what is a web-application framework as a tool and discussed some concepts and standards of a good framework. In this section we will introduce the framework used to build the proposed platform, its structure, request cycle and some of its most important tools and advantages.

4.3.1 RAILS

Rails is a web-application framework used to build structured web applications using a programming language called *Ruby*. Rails is also an open source framework that is licensed by MIT. The framework follows a set of concepts which together give Rails a certain popularity. Those concepts include *Agility*, and DRY (Don't Repeat Yourself) which means that code and configuration should not be mentioned or stored in more than one place through the software.

4.3.2 RUBY

Ruby is a programming language like many others used to write many kinds of

software, including web applications. However, in web applications ruby is most commonly used along with Rails. In Ruby on Rails, Rails has taken advantage of Ruby and created a DSL (*domain-specific language*) which is integrating the programming language so well that it might look like the language has been designed originally for building web applications and being used by the Rails framework. GAMBLE et al (2010) resumes the advantages of ruby in four points:

- An interpreted, object-oriented scripting language
- Elegant, concise syntax
- Powerful metaprogramming features
- Well suited as a host language for creating DSLs

4.3.3 MVC

MVC is a software architecture pattern that aims to separate the concerns of an application into three different components:

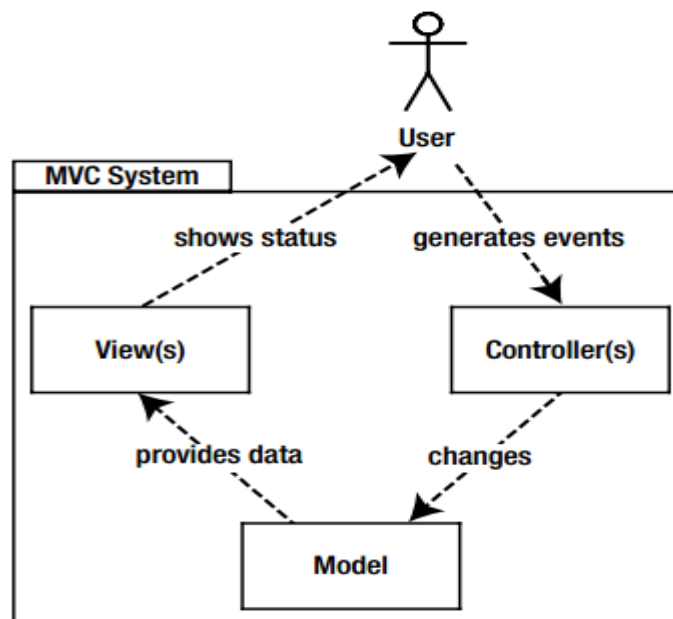
- Model: Models represent real-life objects, the data of an application. They are also responsible for defining the logic and rules of how to manipulate that data.
- View: Views are where the data represented by the models are visualised to the user through the user interface. They are the point of interaction between final users and the application.
- Controller: Controllers are the link between the view and the model. They handle the users' requests through the actions they perform on the views and direct the data accordingly to the responsible models. On the other side, they send the data back from the model to the views where users can see and perform more requests.

Dividing the application into these three components results in a highly reusable and easy to maintain code. As web applications constantly suffer changes, feature increments and fixes, It's vital to separate business logic, data access, and presentation code. That way, it becomes way easier to edit and update any component of the application without having impacts and resulting bugs in another component. A change in the model does not impact the view, and an update in the view does not reflect on the mode. In a practical example, with MVC, it's not only possible, but also simple to build more than one application that use data from the

same database using the same models without having to rewrite all the business logic again, and simply by fetching the right data, and lay it off different views, which is the case with building RESTful APIs.

In order to better understand the MVC Pattern, let's first have a look at an illustrative diagram of its workflow in figure 7.

Figure 7: The MVC pattern workflow cycle



Source: Gamble et al (2010)

As seen in figure 7, here is what happens, step by step, when a user makes a request to the application built in the MVC pattern:

- The user makes a request to the application by interacting with the user interface (e.g., clicks a button to view the profile of another user)
- The request is redirected to the corresponding controller action.
- The controller receives the request and accesses the model for the requested data
- The model returns the requested data to the controller
- The controller renders the requested data in an updated view for the user

4.3.4 MVC AND RUBY ON RAILS IN ACTION

Now that Ruby on Rails and the way MVC works are understood, let's have a look at how the pattern is employed and used inside the framework, and the structure, of models, controllers and views in the real application. Using Ruby on Rails, we can find three essential directories in the source code of the project: models, views and controllers representing the three components of the pattern MVC.

- Models

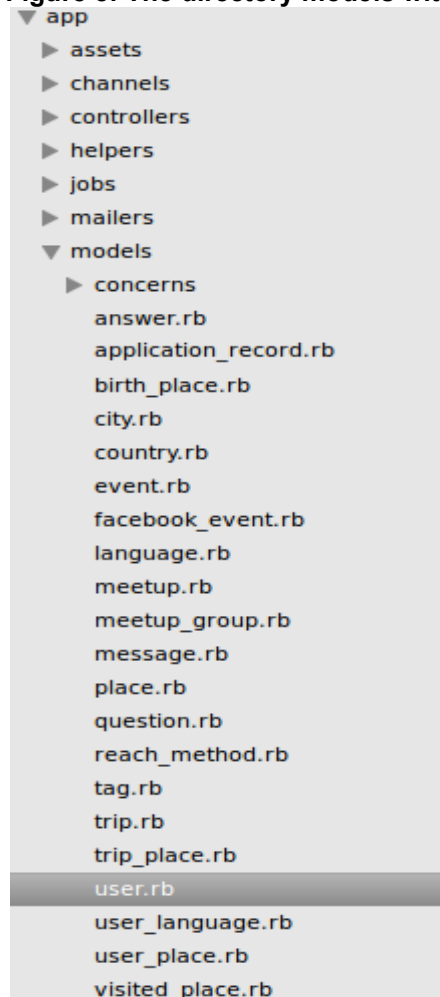
In this directory we can find all the models of the application. Models are the access point to the database in the application. Each model represents a table in the database. The model User for example represents the corresponding table users in the database used by the application, and is responsible for accessing and manipulating data in this table. In practice, an instance of the class User represents a row in the table, and its attributes are the same as those of the table. The model also contains all the methods, validations, associations and rules used for operating on the data of the corresponding table. The models directory might also contains other classes that do not necessarily map to tables such as inherited classes.

Earlier in this chapter, one of the most important characteristics of a good framework was discussed. That is providing a database abstraction layer. This is what provides the behaviour of the models discussed above, where tables are represented by model classes and table columns by class objects attributes. In Rails, this layer is achieved by the use of a powerful library called *Active Record*.

Active Record is an object-relational mapping (ORM) library that is responsible for handling the access to the database by the application and mapping its tables to Ruby classes referred to as Models. One of the biggest advantages of Active Record is that no configuration is required for mapping a database table to a model. All is needed is following the naming convention of Rails. For example, if we have a table named users, the corresponding model should be named User and the class will automatically be mapped to the table.

Figure 8 shows the models directory of the application through the overall architecture, and inside, we can see all the models files of the application with the extension “rb” (Ruby file).

Figure 8: The directory models with all the models of the application



Source: the author

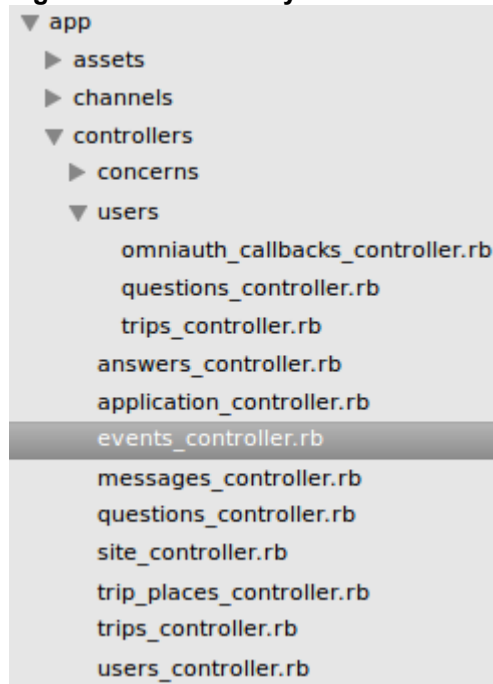
- **Controllers**

In an MVC application, controllers receive the requests from the client side, the views, process them usually by contacting the models, whether by sending or retrieving data from the database and responding back to the views. These requests could be mapped to one of the CRUD operations, as seen in the previous chapter. A controller in Rails consists of what's called *actions*. These actions are what process the CRUD operation on the model. Rails define seven standard actions (index, show, new, create, edit, update,

and destroy). Following Rails' standard naming convention and structure, a controller should be performing operations on its corresponding model. For example, the model User is used by the controller "users_controller".

Figure 9 shows the controllers directory of the application and the structure of classes inside. Again, we can notice all the controllers files are written in Ruby with the extension "rb".

Figure 9: The directory controllers and its structure in the application



Source: the author

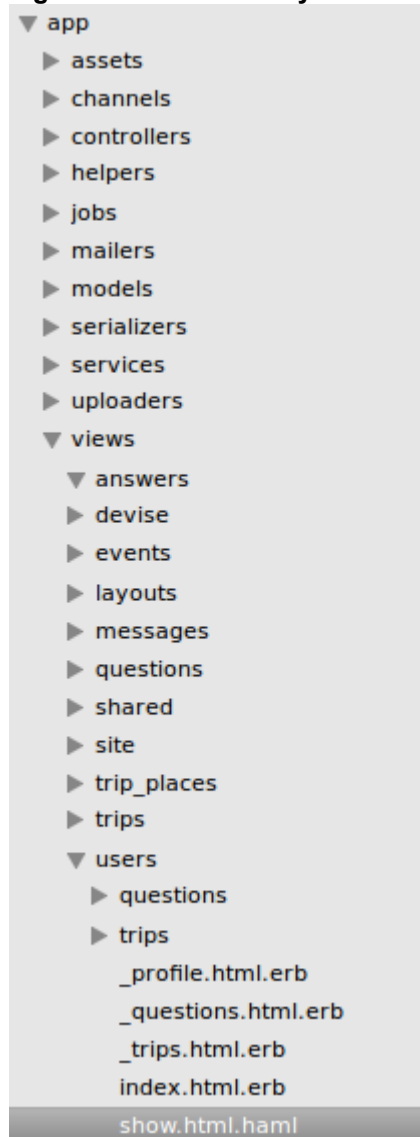
- Views

This directory in the application includes all the views of the application which are the templates that form the visual part of the application, the user interface. The views in Rails are usually html pages mixed with ruby code that is responsible for rendering data that came originally from the model through the view. For example, a profile page of a user with all the information of that user throughout the page, name, picture, email, etc. Rails also provides a naming convention for the views which provides a well-organized and structured application, and less code and configuration to map controllers to views. Following the standards of the framework, a controller should have a corresponding folder with the same name in the views directory. This folder will contain all the views related to the controller. For example, the users

controller will have a directory 'views/users', and there we can find all the templates for a user's page, creating a new user, a list of user, etc.

Figure 10 shows the structure of the third component of the MVC pattern, the views directory in the application, with every directory inside referring to a model in the models directory and a controller in the controllers directory. Inside each sub directory we can find the corresponding views of the controller.

Figure 10: The directory views with all the views of the application



Source: the author

4.3.5 Request/Response Complete Cycle

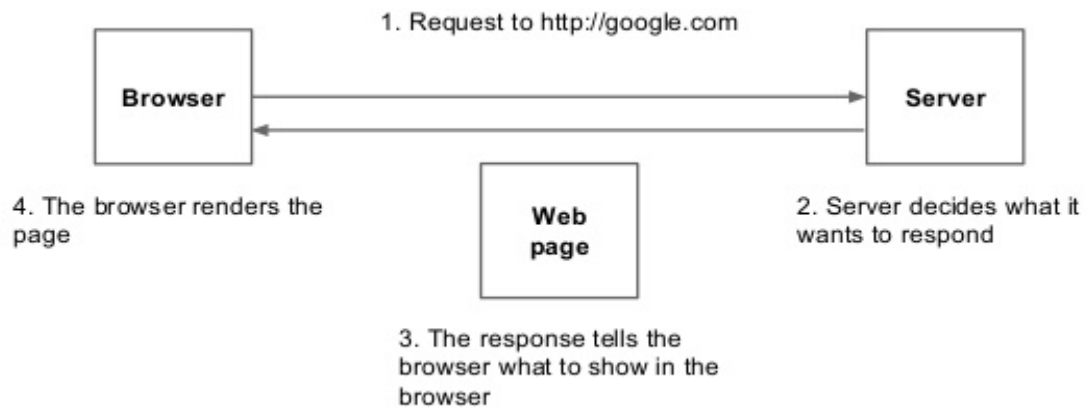
When a request is performed in the user's browser and Before it reaches the MVC cycle of the application and is handled by the appropriate controller, the request goes through other steps first. These steps are handled in three levels:

- Client-Server

Web applications work through a request-response cycle between the client and the server. The client makes a request to the server, and the server responds to the client with a response. Requests and responses need to have some kind of pattern, syntax, and rules in order to facilitate communication between clients and servers. In this case, this pattern used in web applications is called HTTP. the client makes the HTTP request to the server and receives the HTTP response. In the proposed work, the users consume the web application through a web browser (e.g., Google Chrome, Firefox) where they type the address (e.g.,). In that moment, the browser makes the http request to the server where the google application resides and is responsible for sending back the http response to the browser. In that case the response is the HTML page of google.com.

Each of the client and server has their own responsibilities. The client for example, handles the user interface and user interactions and data visualisation. On the other hand, server is the computer that handles the application, database, data processing and background jobs among other responsibilities, and most importantly is responsible for handling requests, processing them and sending back the responses. Follows a diagram that illustrates the request-response cycle between the client and the server in figure 11.

Figure 11: The request-response cycle between web browser and web server.



Source: <https://www.pcmec.com/article/this-is-how-a-web-page-appears-in-your-browser/>

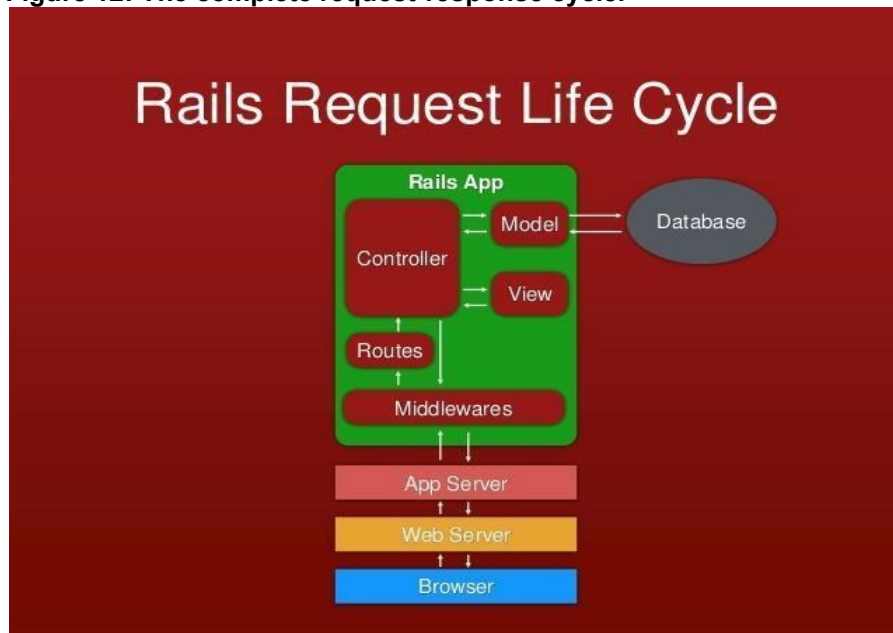
- Web server/App server

In the web context when we say ‘server’ we usually refer to the web server where lies the web application and the database. However, on the server side there’s also what’s called an Application server which is responsible for running the application on the web server, loading the code and keeping it in memory waiting for redirected requests from the web server. When the request reaches the web server, such as Apache and Nginx, and recognizes that the request should be handled by the application, the web server redirects the request to the app server running the application, which in turn redirects it to the Rails application.

- Rails

On this level, when the Rails application receives the request from the App server, the Rails Router which is the frontline of the application checks for the right controller and the right action to send the request to. At this point, the MVC cycle begins, and afterwards, the response goes back to the web server through the app server which sends the response back to the client, which is the user’s browser in this case. Follows in Figure 12, an illustration of the complete request/response cycle at all levels.

Figure 12: The complete request-response cycle.



Source: <https://www.slideshare.net/mechanicles/rails-request-middlewares>

4.4 POSTGRESQL

As discussed in the previous sections, the Rails framework is compatible with several Relational Database Management Systems (RDMS). As per the proposed web application, the database system used is PostgreSQL which is a powerful open source system commonly used with the Rails framework. Creating and modifying the database tables is possible through another PostgreSQL tool which provides a user interface called PgAdmin.

Another way to manipulate database tables is through another feature of ActiveRecord inside the Rails Framework called Migrations. Migrations provide a way for creating and altering the database schema maintaining the database alteration history. This also allows the application to be aware of its database schema while being database independent. By using the Rails Migrations, all the database tables, associations, indexes could be built by a Rails command.

4.5 JAVASCRIPT, JQUERY AND AJAX

The previous sections have discussed most of the tools used on the server

side to build the web application. This section however will start discussing one of the most important tools used on the client side that allows a better user experience by making the user interface of the application more responsive and interactive and hence allows for a faster navigation.

Javascript is a programming language that runs on the client side and which web browsers support and able to interpret. Javascript is used to manipulate HTML elements on the web page in real time. It is also able to listen to events triggered by the browser and by use actions such as a page load, a button click, and a form submit. When such events are detected by Javascript, it can be used to trigger other actions and give a response to the user that his action has been listened to and executed successfully. For instance, it can open up an alert with a message saying “Your form has been submitted successfully” when the user submits a form. Another important use for javascript is validations. While we can use javascript for positive responses when an action is triggered by the user and executed successfully, we can also use it to check if form fields are filled correctly before submitting the form to the server side, and showing illustrative texts instantly to correct the wrong field (e.g., the text “Enter a valid Email address” when an email field is required).

One of the most commonly used libraries of Javascript in web pages is called JQuery. This library is used exclusively to facilitate manipulating elements in a web page, altering texts and colors, removing elements, creating others, and also listening to events and implementing Ajax calls to the server.

Ajax call is another way of making a request to the server side just like opening a new url in the browser. Ajax however is able to configure the request and handling the response before showing it in the browser. And above all, ajax is mostly used for making asynchronous requests, which means, a user doesn't have to wait for a page to load, or a request to be processed while the browser is frozen. That way, the web page will always be responsive to the user while making previous requests the user has executed in the background. The user will be able to search for events in a specific city for instance, and while ajax is processing the request, the user is still able to send and receive messages from another user.

These tools and many others have become essential for building any web application: Javascript, JQuery, validations, ajax. And no difference, they were also put to use in building the proposed application in this work.

4.6 CSS

CSS or Cascading Style Sheets is a language used to style HTML pages and elements in terms of positions, colors, sizes, etc. CSS is another tool that has become essential in web applications due to its light weight and large compatibility among web browsers, not to mention the need to style web to become more clear and user friendly. While using CSS is essential, it could also be time consuming, as we need to style every element, in every page with positions and styles. From here, some ready-to-use style sheets started to emerge with the objective of facilitating the process of styling web pages using CSS by following a pattern of styles through all the pages of an application.

One of these CSS frameworks is *Materialize* (<https://materializecss.com/>) which is based on Google's designs and layouts. Materialize also provides some ready to use snippets of javascript, animations, layouts, and templates ready to integrate in a web application.

4.7 FACEBOOK API

As discussed above, the proposed application follows the main standards of a social network which demands for users to login the application in order to be visualised for other users and hence be able to communicate with them. A user has to fill in some essential information such as full name, email, location, picture, in addition to other optional information such as a biography, birthdate and information about previous trips and visited places. In the same time and according to the statistics shown in the second chapter, the social network Facebook has become one of the most used social networks on the Internet, which means that a lot of users who would use this application and other applications and website over the Internet might also have a facebook account.

Facebook has then developed and made available for free an API to be used by other applications that would allow users to login by simply connecting their Facebook account and permitting that the application accesses and imports their facebook information, stores it in the application database without needing to fill in information the users already have stored in their facebook account, all using a single

button click “Login using Facebook”. By clicking this button, facebook will ask the user if they would permit this application to access and import their facebook account information such as name, email, picture, and location. Once the user permits the application to do so, the application automatically stores their imported information and logs the user in the application allowing them to fill in further optional information or go on to using the platform and connecting with other users.

4.8 GOOGLE MAPS

Google maps is a platform built by Google that provides a number of tools, APIs and SDKs for using and manipulating maps, searching for and visualising places on a map, calculating distances and routes between two points among other functionalities. Many of the functionalities of this application is based on maps, as the main objective is to find and communicate with other travellers, events trips and tips created by other users nearby based on one’s location.

This application has made use of four of the tools provided by Google Maps Platform. One of the advantages google also provides is a clear documentation along with examples and guides on how to use their tools. All of these four tools are free to integrate in a web application, however some of them are only free for a limited number of requests measured by the Maps Platform. Follows the four tools along with a description of the usage of each and the resource for their documentation:

- Maps JavaScript API

This API provides a way for displaying a customized map on a web page in the application. The Javascript API also allows for many flexible customizations such as map types (roadmap, satellite, hybrid, and terrain), map styles, colors, content, and sizes among other customizations.

- Places API

After displaying a map inside a web page, a user would need to search for places and people in order to locate them on the map. Searching for a place such as a city or a state could be a lot more complicated if it weren’t for this API as more than one place could have the same names and users would

have to correctly type the place they are searching for in a specific language. The Places API provides an autocomplete search for places. It's able to provide suggestions in all languages while the user is typing the name of place in the search box. Once a user clicks on the desired place out of the list of suggestions provided, The Place API is able to locate, mark and position it in the middle of the map along with a customized radius and zoom around the marker.

In this case, once the place is chosen, the application starts searching for and locating results in and around the chosen place such as: travellers, questions, and events. The API in this situation allows choosing the option "smart" for the radius depending on the amount and distribution of the results found, and hence allowing the users to see all the results around.

- Geocoding API

The main use of this API is to extract geographic coordinates (latitude and longitude) from a place, or an address. The coordinates of the searched place are then used for locating events, other users, and more within the boundaries of the map displayed on the page. Firstly, we extract the coordinates of the center of the map, then we can calculate the coordinates at two opposite corners of the map. By then we have a defined the boundaries of the map defined and are able to search for entities within these boundaries.

- Directions API

This API is used exclusively with the Trips Entity, making it possible to create and visualise trips with multiple destinations by drawing a route passing by all the destinations on the map. By passing an array of ordered locations in the request to the API, it calculates the destinations between the locations and sends back a response with an object that is then used to draw the route on the map through all the destinations in the same order requested.

4.9 MEETUP API

MeetUp is a web platform that allows users all over the world to create and

publish events of all kinds. The result is a tool for people to search for events of a specific category happening in a specific location, and the platform lists all events with the search criteria. MeetUp also provides an API for other applications to be able to integrate with it and list search for events via API requests and list the results in their web pages.

In this application, the MeetUp API was used to fetch a list of all kinds of cultural related events in a specific location. When a user chooses the place in the search box using the Places API described above, and clicks on the 'Events' tab looking for events in that chosen place, the application requests a list of events in and within a specific radius of the chosen location from the MeetUp API, and once the API sends back the results, they are listed for the users to visualise. A user can click on one of the events in the list for more details. In that situation, the user is redirected to the event page on the MeetUp.com platform.

5 RESULTS

Reviewing all the existent social networks discussed in the second and third chapter such as Facebook and the traveller groups and other tools used as alternatives to achieve a level of communication between travellers in order to share trips, tips and all kinds of travelling related information, we can come to the conclusion that a specific tool designed to serve this purpose is needed.

In the previous chapters we came across a new web platform in the form of a social network that would allow travellers around the world to communicate in the context of a location. Natives, residents and visitors are finally able to locate each other using a simple search by location. As a result, they are able to exchange information, ideas, common interests, and cultures. Furthermore, using the same search by location tool, users are able to locate cultural events and trips planned by other users around the location, which provides an even more specific context for communication between users, which other tools designed for similar purposes may lack. And finally, users can also search for posts and questions asked by other travellers and residents about the searched location. This helps to prevent information redundancy as we see for example in Facebook groups in repeated posts about the same information, due to the lack of location specific posts.

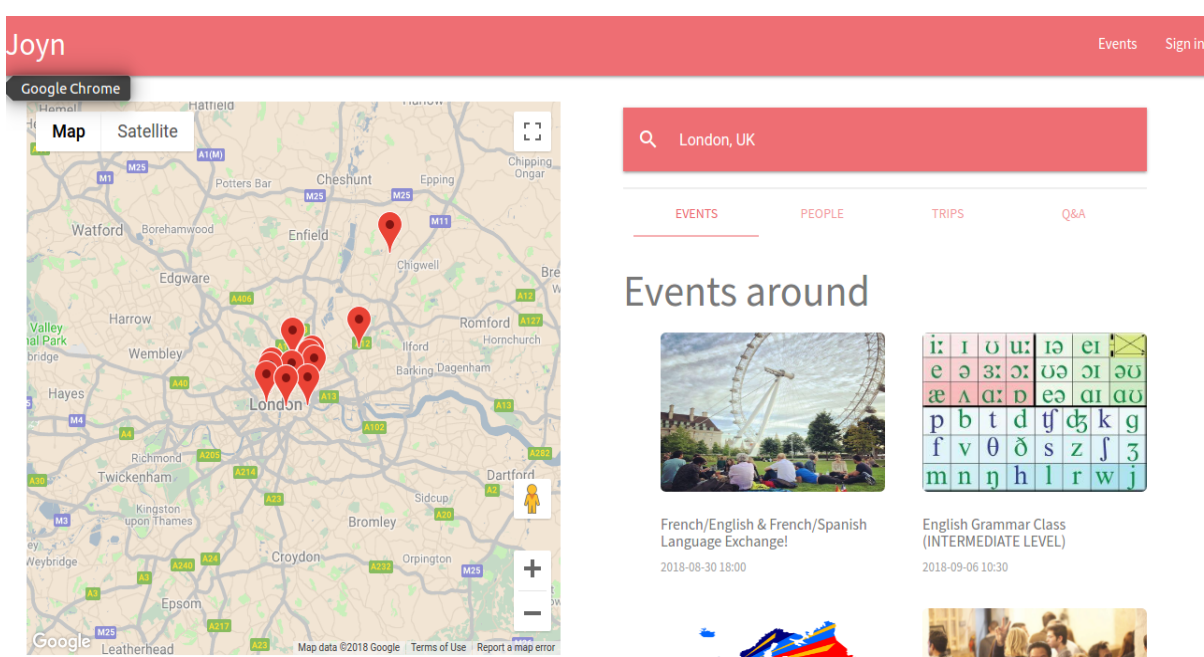
6 USER INTERFACE

This chapter will review the pages of the developed web platform explaining the functionalities and usage of the components of each page.

6.1 HOME PAGE

This is the principal and first web page of the platform. The interface is shown in Figure 13 below, and follows a detailed description of its components and functionalities.

Figure 13: Home page of the platform - Events tab



Source: the author.

Follows a list of the components this page:

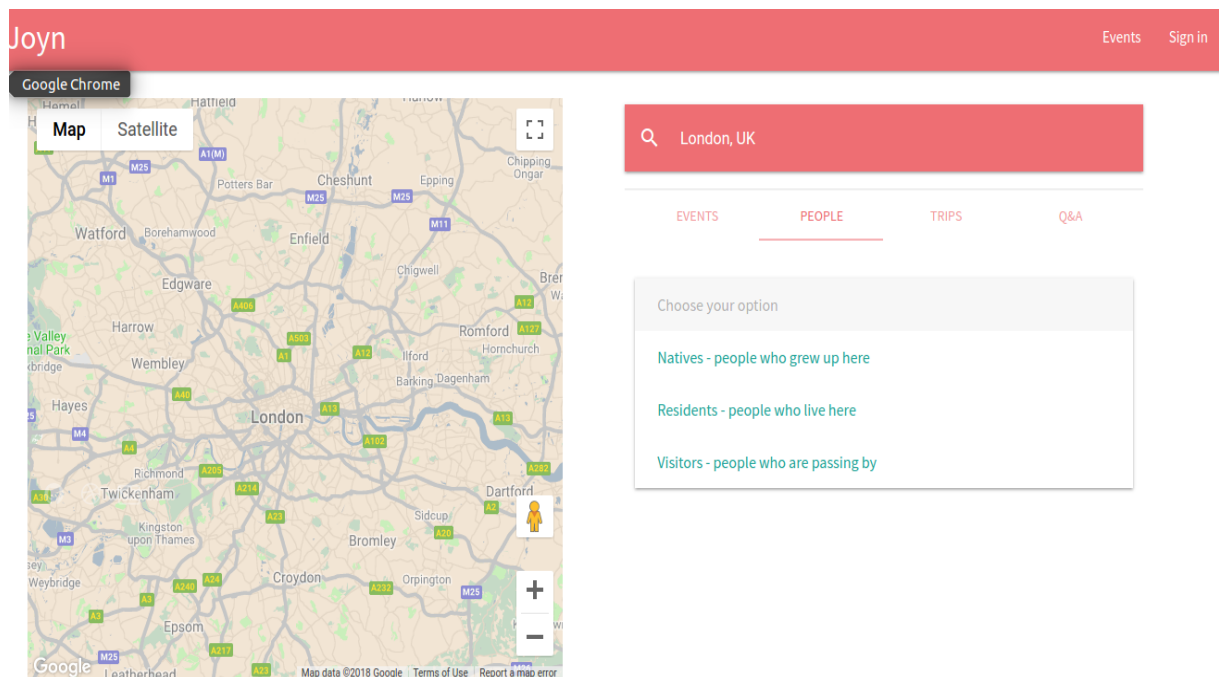
- In the top-right corner of the page we can find the *Sign in* Button which leads to the page for signing up and signing in which will be illustrated later on in this chapter.
- On the left half of the page we can see an integrated map from the Google Maps JavaScript API, where the results of the search operation will be shown as markers.

- On the right half of the page there's a search box with a placeholder "Enter a location" where the user can start digitizing the city, state or country name, and then choose a location from the suggestions list provided by the Google Places API. In this example we are using the city London, UK as an example.
- Below the search box there are four tabs for categorizing the search results:
 - Events: When the Events tab is clicked on (selected by default as it's the first tab in the sequence), a list of events around the city is listed below. Each event in the list is represented by an image, title, date and time. By clicking on an event, the system redirects to the official event page on the MeetUp platform.
 - People: Inside this tab there are three options for categorizing people around the searched location: Natives, Residents and visitors (shown in Figure 14). By clicking on one of these options, the system identifies and lists people who are in the area for the chosen purpose (Figure 15 is an example for choosing the option 'Natives'). Each person in the list is represented by the user's profile picture, the location and a message button. By clicking on which button, the messaging screen opens for sending a message to the selected person (shown in Figure 16). In order to send a message, however, the user must be logged in the platform (the signing in page is shown in a following section).
 - Trips: In this tab the user can find the trips planned and created by other users near or around the searched location. When clicked on the 'Trips' tab, a list of the relevant trips is listed as shown in Figure 17. For each trip in the list the system shows the profile picture and the name of the user who is planning this trip, in addition to a messaging button for contacting that user. Furthermore, the system shows the first and last destination of the trip, and the start and ending dates. By clicking on a trip, the trip route is drawn on the map on the left side of the page going through all the destinations of the trip. Each stop through the route is represented by a marker with a letter in the alphabetical order in order to illustrate the sequence of destinations during the trip.
 - Q&A: The results shown in this tab are questions and posts made by users related to a specific location. For instance, a user can post a

question asking about the weather in London. Then that question will be shown in the Q&A tab when a user searches for London. Below the question there's a text box for other people to be able to respond or comment on the question. There's also an arrow icon next to the question, which when clicked on, all the answers to that question are listed below. In addition, by clicking on the profile picture of the user who asked or answered the question, the messaging screen will be opened for both users to exchange messages about further details and contact. An example is shown in Figure 18.

As mentioned above, we can see in Figure 14 below inside the "PEOPLE" tab the three categories of people to list around the chosen location: Natives, Residents and visitors.

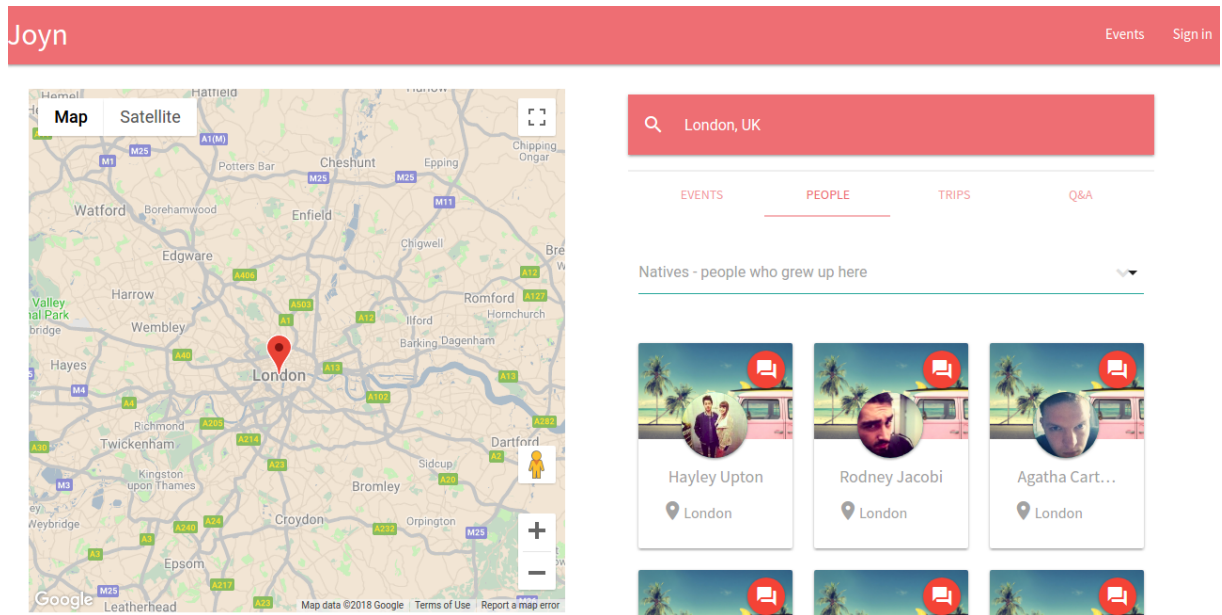
Figure 14: Home page - People tab - Select button with options



Source: the author.

Figure 15 shows the screen when the user chooses the "Natives" option. The system lists the users who subscribed in the system with the chosen location as their home town.

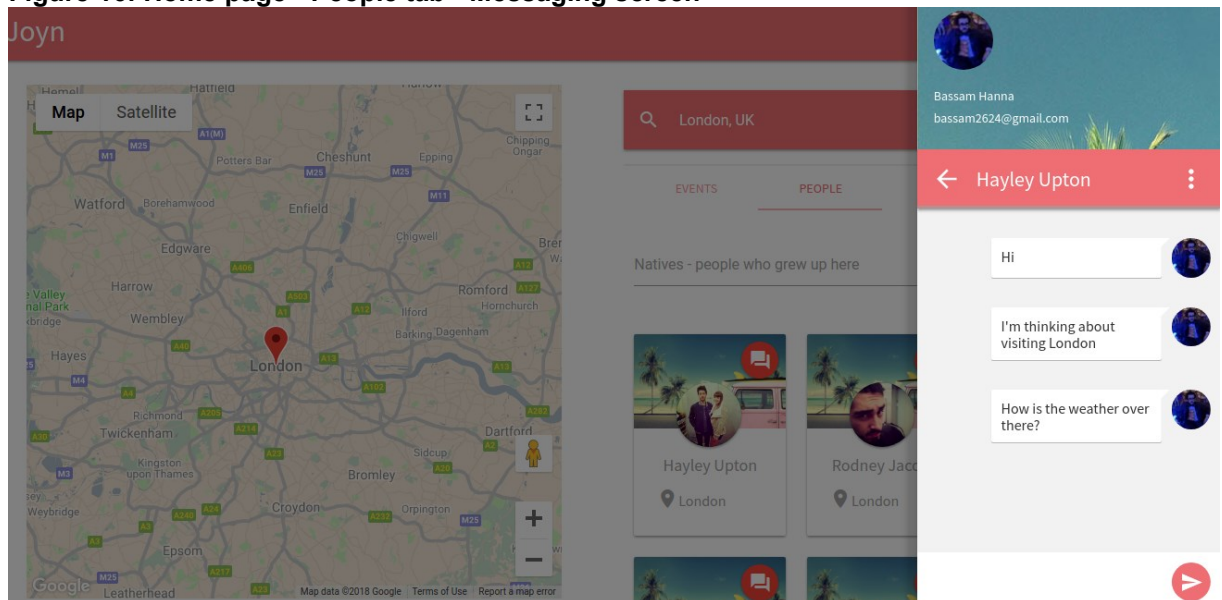
Figure 15: Home page - People tab - Option: Natives



Source: the author.

Figure 16 below shows the messaging screen which appears when the user clicks on the message icon on a specific user to exchange messages with them.

Figure 16: Home page - People tab - Messaging screen



Source: the author.

Figure 17 shows the screen of the third tab in sequence "Trips". In this screen, the interface lists the trips registered by other users and which pass by the searched destination in the home screen.

Figure 17: Home page - Trips tab

The screenshot shows the 'Trips in the area' section with the following details:

User	Trip Title	Origin	Origin Date	Destination	Destination Date
Theodore Erdman	Work Trip in London	London	05/02/2019	York	21/02/2019
Fabian Marks	Vacation in England	Liverpool	01/01/2019	Norwich	19/01/2019

Source: the author.

The fourth and last tab in sequence, “Q&A”, is shown in Figure 18. In this screen, the user can see a list of questions/posts created by other users and associated to this particular location digitized in the search box.

Figure 18: Home page - Q&A tab

The screenshot shows the 'Q&A about this area' section with the following details:

User	Question/Post	Answer/Response
Bassam Hanna	Hi, I'm going to London in July. I'm looking for travel companions and recommendations on places to visit.	answer or comment here
Theodore Erdman	You should visit the British Museum, and the Royal Academy of Arts.	
Fabian Marks	Hey, I live in London, message me if you need anything	

Source: the author.

6.2 SIGN IN PAGE

By clicking on the Sign in button in the top right corner in the header of the

page, the user is redirected to the signing in page shown in Figure 19. If the user had already created an account, they can simply log in by entering their email and password and clicking the Login button. However, if the user does not have an account yet, they can create a new one by clicking the Sign Up button which redirects the user to the sign up page illustrated in the following section. Users can also sign in and sign up using their Facebook account, by clicking on “Sign in with Facebook” button.

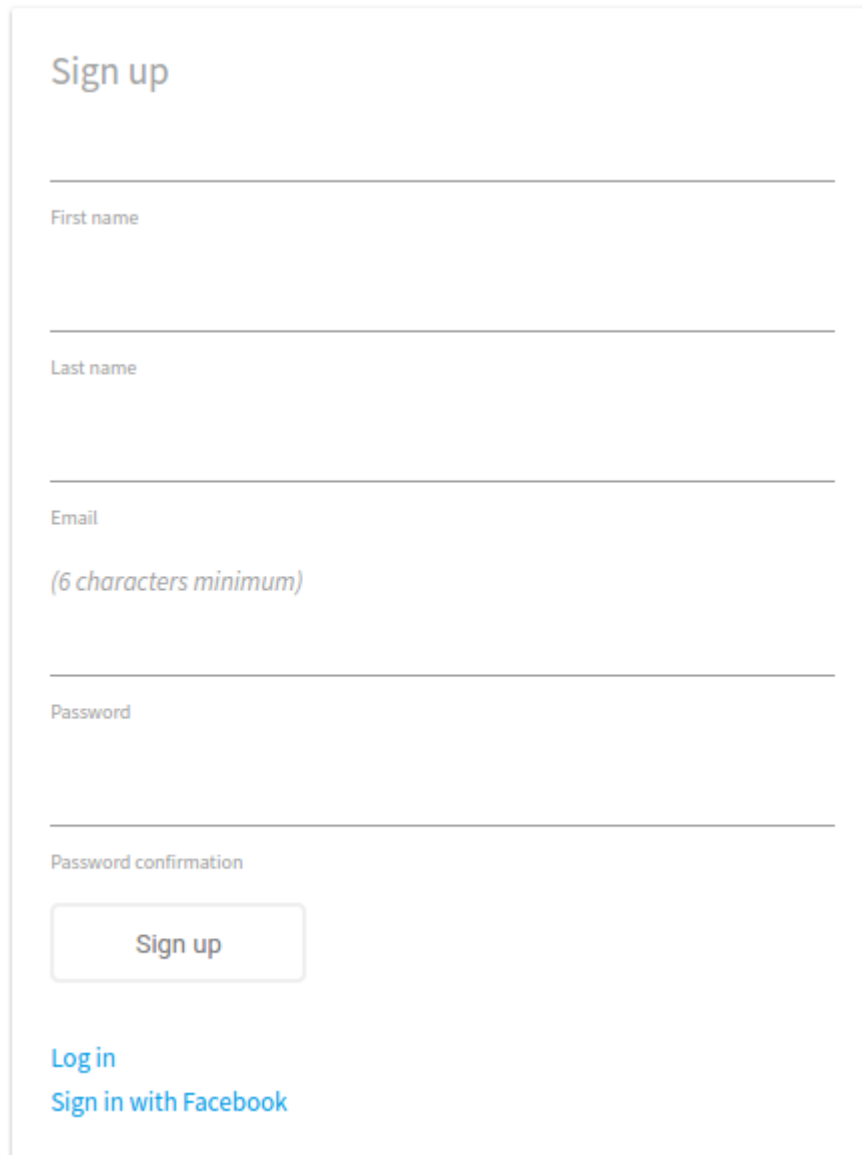
Figure 19: Sign in page

Source: the author.

6.3 SIGN UP PAGE

As seen in the previous section, a user can sign up in the platform and create a new account by clicking on the Sign up button in the Sign in page shown in Figure 19. The user is then redirected to the Sign Up page shown in Figure 20. In this page the user signs up by filling in his first name, last name, email and password and clicking the “Sign Up” button. Another alternative for signing up instead of filling in this form is by clicking the “Sign in with Facebook” button and the same information will be imported from the user’s Facebook account.

Figure 20 below shows the interface of the sign up screen of the platform. It is only necessary to fill in these few fields for an initial registration in the platform. More information can be filled in later in the profile page.

Figure 20: Sign Up page

The image shows a sign-up form with the following elements:

- Sign up** (title)
- First name** (input field)
- Last name** (input field)
- Email** (input field) with a note: *(6 characters minimum)*
- Password** (input field)
- Password confirmation** (input field)
- Sign up** (button)
- [Log in](#) (link)
- [Sign in with Facebook](#) (link)

Source: the author.

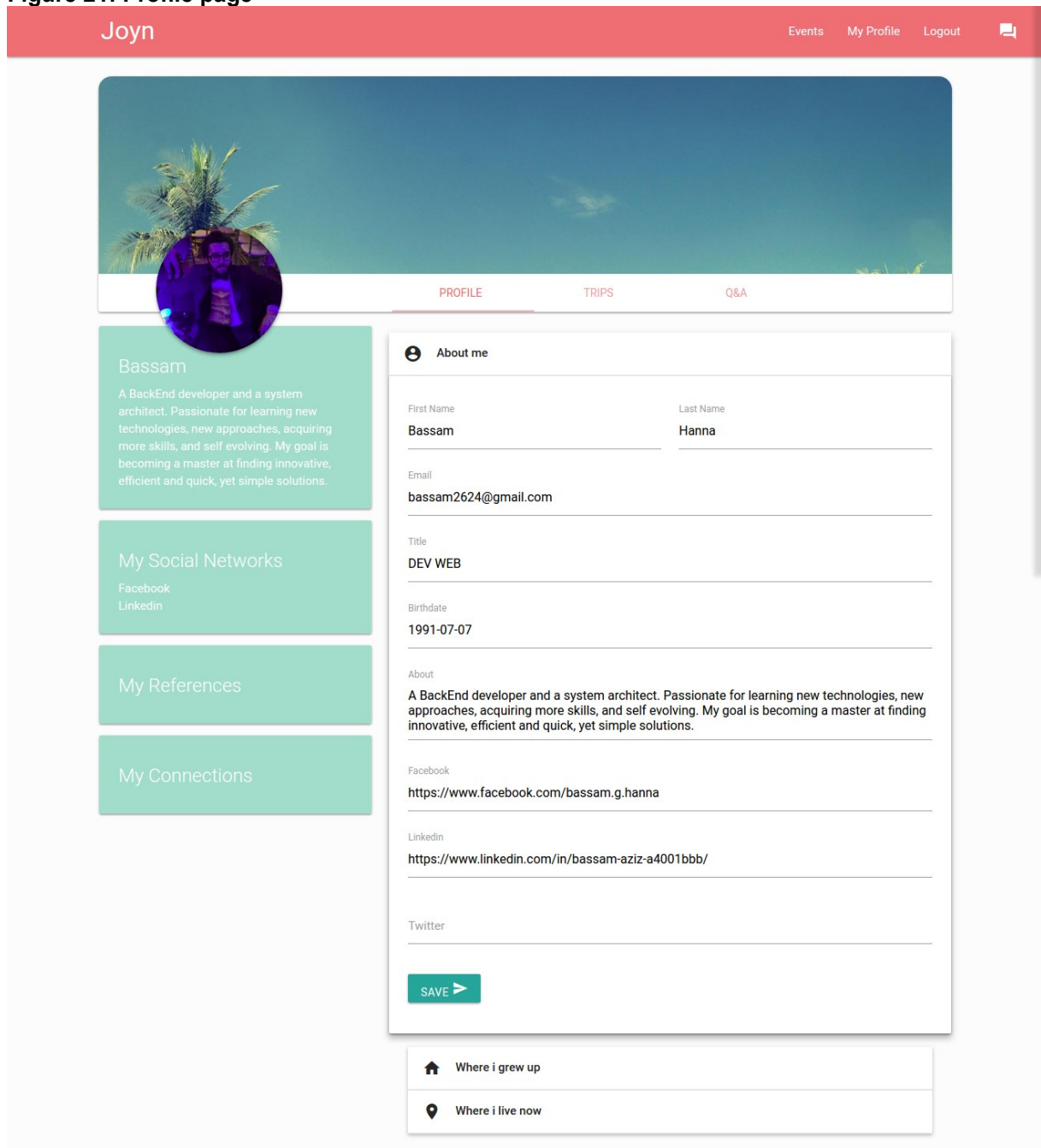
6.4 PROFILE PAGE

Once a user signs up, they can access their profile page and update their information. When the user is signed in, the system shows a 'My Profile' and a 'Logout' button in the header of all the pages besides the messaging button. The messaging button opens the messaging screen where the user can find all his message history.

The 'My Profile' button leads to the user's profile page shown in Figure 21.

The profile page consists of three main tabs:

Figure 21: Profile page



Source: the author.

- Profile: This screen contains the user's profile picture and personal information. The personal information include first and last name, email, title, birthdate, bio, and social network links. There's also two more important components in this screen which are: where the user is from and where the user lives at the moment. These information are used later to locate the users

in the search by location in the home page discussed in the previous section and categorizing natives and residents in a specific location. Figure 22 and 22 show how those two components are filled in. Besides the location, the user can also fill in some tags for what information he can provide for travellers and things he can offer and share and if he can host a traveller in his home.

- **Trips:** This screen is for users to create their planned trips for other users to be able to visualise them in the search by location in the home screen. The first element in this page is a select button “My Trips” for the user to visualise one of his previously created trips or choose to create a new trip. The screen for creating or updating a previously created trip is shown in Figure 24. Firstly, the user sees a form for filling in basic information about the trip such as: title, brief, tags, things that the traveller seeks, offers or shares, and the means of transportation to be used during the trip. The following part contains a list of destinations on the right side along with an “Add a new destination” form, and a map on the left side with the route drawn through all the destinations listed on the right side as shown in Figure 24. In this part, the user can create as many destinations as needed, update them, and change the order of destinations, and the map will always be updated with the new route. In order to add a new destination, the user needs to fill in the name of the city, dates of arrival and departure, and the mean of transportation used to arrive at the new destination, and then hits the save button.
- **Q&A:** Similarly, to the Trips screen, there’s a “My Questions” button for the user to visualise his previously created questions or click the “+ New Question” button. Follows a screen for filling in information about the question as shown in Figure 25. In order to create a new question, the user simple fills in the question or post itself, add a location to attach the question to, and can also fill in some tags which is an optional field.

Figure 22 shown below illustrates the interface for the form “Where I grew up” in the profile page, where users can fill in information about their hometown.

Figure 22: Profile page - where I grew up form

Joyn Events My Profile Logout

PROFILE TRIPS Q&A

Bassam
A BackEnd developer and a system architect. Passionate for learning new technologies, new approaches, acquiring more skills, and self evolving. My goal is becoming a master at finding innovative, efficient and quick, yet simple solutions.

My Social Networks
Facebook
LinkedIn

My References

My Connections

About me

Where i grew up

London, UK

city Country
London United Kingdom

People can ask me about..

places to go × museums × parks × +Tag

SAVE >

Where i live now

Source: the author.

On the same page, the profile page, there is another form with the title “where i live now” shown in figure 23. In this form users can fill in information about the city/country where they are residents.

Figure 23: Profile page - Where I live now form

The screenshot shows a user profile page on the 'Joyn' platform. The profile belongs to Bassam, a BackEnd developer. The 'Where I live now' form is filled with 'Bristol, UK'. The form includes sections for tags like 'restaurants', 'bars', 'coffeeshops', 'food', 'beers', 'conversations', 'hangouts', 'a place to sleep', 'rides', and 'tour around the city'. A toggle switch for 'Can you host a traveller at this place?' is set to 'Yes'.

Profile Information:

- Name:** Bassam
- Bio:** A BackEnd developer and a system architect. Passionate for learning new technologies, new approaches, acquiring more skills, and self evolving. My goal is becoming a master at finding innovative, efficient and quick, yet simple solutions.
- Social Networks:** Facebook, LinkedIn
- References:**
- Connections:**

Where I live now Form:

- City:** Bristol
- Country:** United Kingdom
- People can ask me about..**
 - restaurants
 - bars
 - coffeeshops
 - +Tag
- I can share..**
 - food
 - beers
 - conversations
 - hangouts
 - +Tag
- I can offer..**
 - a place to sleep
 - rides
 - tour around the city
 - +Tag
- Can you host a traveller at this place?**
 - No
 - Yes
- SAVE** >

Source: the author.

Figure 24 shows the screen of the second tab on the profile page, “Trips”, where users can create, plan, and manage their trips.

Figure 24: Profile page - Trips screen

The screenshot displays the 'Trips' screen on the Joyn profile page. At the top, there is a red navigation bar with the 'Joyn' logo and links for 'Events', 'My Profile', 'Logout', and a notification icon. Below the navigation bar is a profile section with a circular profile picture and three tabs: 'PROFILE', 'TRIPS', and 'Q&A'. The 'TRIPS' tab is active, and a green bar below it says 'MY TRIPS' with a dropdown arrow.

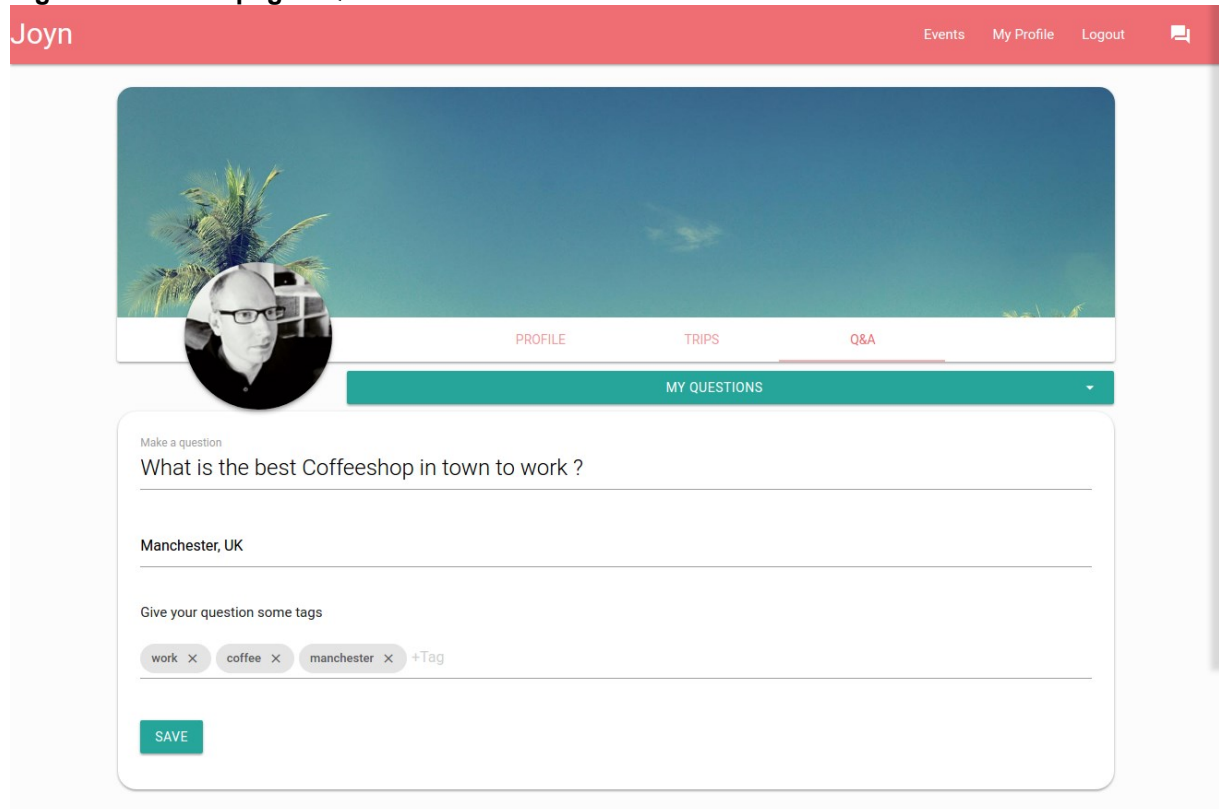
The main content area is a form for creating a new trip. It starts with a text input field for the trip name, which contains 'Work Trip in London'. Below this is a section for tags with the text 'Give your trip some tags' and several tag buttons: 'work', 'london', 'manchester', 'roadtrip', and '+Tag'. The 'About' section has a text input field containing 'I'm going on a work trip and can offer a ride from londo to Manchester and york'. The 'I'm Looking for' section has a tag button 'companions' and '+Tag'. The 'I can share/offer' section has tag buttons 'rides', 'beers', 'culture', 'souvenirs', and '+Tag'. The 'Choose the transportation means during your trip' section has a dropdown menu currently set to 'Car (on my own)'. A green 'SAVE' button is at the bottom left of the form.

Below the form is a map of the United Kingdom showing a route from London (A) to Manchester (B) and York (C). To the right of the map is a detailed view of the trip. It lists the destinations: London, Manchester, and York, with an option to 'Add a new destination'. Below this, it shows 'Hull, UK' with a text input field. The 'city' field contains 'Hull' and the 'Country' field contains 'United Kingdom'. The 'from' date is 'Jan 29, 2019' and the 'to' date is 'Feb 04, 2019'. The transportation means dropdown is also set to 'Car (on my own)'. A green 'SAVE' button is at the bottom of this section.

Source: the author.

The third and last tab of the profile page is “Q&A”. when clicked on this tab, users will see the screen shown in figure 25. In this screen, users can create and publish their post or question and associate it to a particular location.

Figure 25: Profile page - Q&A screen



Source: the author.

7 DIFFICULTIES

Due to the complexity and the fact that the proposed system makes use of many external services and APIs, some difficulties were essentially faced during the process of structuring and implementing the system. One of the obstacles that need to be mentioned is calculating the routes of the trips created by the users, and showing it on the map. Unfortunately, in order for the Google Directions API to calculate the route between two or more destinations, it requires the transportation method used during the trip. However, the API does not accept an alternative for a "Flight" mode of transportation, which limits the choices to only ground means of transportation. That restricts the user to only create trips through destinations that are only reachable by land. Furthermore, users are not able to create trips from country to another, for example, in two different continents.

8 CONCLUSION

This work represents the project of developing a web platform with the intent of providing travellers, independently of their locations, with a tool, which they can use to communicate, locate each other, share content with common interest, and plan and share trips. The main problem for which this work presents a solution is that natives, residents and visitors of a specific destination can hardly know about each other, which limits the experience of travellers to only touristic and popular places, in addition to the miss of a cultural and social exchange.

Based on the theoretical research provided in chapter 2 and focused on the history of Internet, the web, and social networks, it's been decided to implement the solution in the form of a web platform with a social media structure. The main idea of this solution is to provide a system that is able to segment and categorize content (travellers, events, trips, and posts) by location and data tags. This method will help users of the platform to localize relevant content easily and efficiently using a simple search by destination (city, region, state or country). By achieving that, users are then able to find cultural and local events, meet other fellow travellers and natives, plan and share trips with each other, post questions, tips and photos, all based on location.

The platform consists of two sides for users: one for the user to create content, and the other is to localize content created by other users. Users are able to create a public profile with personal information, and travel history. They are also able to create and publish trips through more than one destination, and create questions, posts, and comments related to a specific destination. On the other side of the platform, users can perform a search by destination, and localize cultural events, people (travellers and natives), trips, and questions and tips posted by other users. All the content localized in the search results is also shown on a map where users are able to visualise in an interactive way.

In order to achieve the full functionality of the platform, various technologies, tools and external APIs were utilized. The system was developed using the web-application framework Ruby on Rails, together with the relational database PostgreSQL. Other technologies were used to provide a user friendly and interactive interface such as CSS, Javascript, AJAX. For the location based content and the

interactive map provided in the user interface, integrations with the Google Maps API were implemented. In addition, The MeetUp API was used to provide a list of cultural events and activities in a particular destination.

In addition to all the functionalities implemented in the current version of the platform discussed in this work, there are more ideas for more services that the platform could provide travellers and allow them to have richer experiences in their trips in an interactive and secure way.

9 FUTURE WORK

Social networks and web platforms are full of opportunities to expand their functionalities and the services they provide. As the main goal of the proposed platform is to facilitate communication between travellers, a principle functionality to be yet implemented is a reference system. Since users will be able to make connections with new people, security is always an issue. One way to provide security and trust between users is using references. That method is used by many platforms today that involve new connections between people. For instance, two of the platforms that are commonly used and are based on the reference system are Couchsurfing and Airbnb. The idea is to allow a user who made a connection in the real world with another user through the platform, whether by going to the same event, sharing a ride, or a trip, to publish a reference about his experience with the other user. That way, new users can see that a person is trusted and has already shared other experiences with other travellers.

In addition, the functionalities of sharing rides when two users are sharing the same road is to be improved in order to provide users with more facility and details about shared roads, times, and specific destinations. Another functionality to be improved is for natives and residents who are willing to host travellers in their homes. There's already a web platform that provides that service and is commonly used which is CouchSurfing. However this platform does not provide an official API for integration, there could possibly be a negotiation for providing one, and hence integrating their service in the platform provided in this work.

While travelling and crossing borders between different countries and Municipalities, a traveller is likely to have limited access to Internet at many times, one important feature to be explored in the future is providing users with offline content. An example of this is provided by Google Maps, where users can download offline maps. Afterwards, even with Internet access, they are able to navigate and calculate directions and routes within the range of the downloaded map. Luckily, Google has recently provided a technology called PWA (Progressive Web App)² that would allow implementing such features of downloading offline content using service workers. The main idea is that users are able to download all content associated to the location to be visited in the future, so that would be able to access events, maps,

² <https://developers.google.com/web/progressive-web-apps/>

questions and all information without the need of an Internet connection.

Privacy and data protection is another important matter, when it comes to user generated content and information. Users must always have total control over their data and personal information, as they are the owner of those data. They should as well be able to delete their data at any time and be provided with a clear terms of service of the platform. Privacy terms and standards, therefore, are to be explored and declared for the users of the platform.

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