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Master Thesis

**Open source Visualization tool for available complicated
and combined services - products near-me**

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Abstract

Living in the 21-century technology plays a big part in humans' life. It has evolved and has affect almost every field of science, and every part of our day to day experience. Computers have played a big role for the rise of the technology as they are the instruments which people use to enhance their quality of life. By using the term computers we don't only mean the personal computers and or laptops or smart devices that people use to connect to the web, but we also mean televisions, frizzes, cars, trains etc., everything that uses some kind of computer or computer chip to properly operate.

Websites and mobile applications nowadays help as connect and interact with the web, so we can search for any type of information we need, as well as help as get in touch with other people and communicate. Through the internet, with the help of the websites, businesses can set up their own e-commerce website and sell their products and services online and reach a wider audience, since anyone from anywhere can see what the business has to offer. Business can create their own websites and applications or be a part of existing ones. Comparison websites allow people to view different kind of business at the same time or view the same products that exist in different kind of business, so they can think and decide where they will shop at.

This master thesis presents a website which was been developed with React.js and Spring boot. The purpose of the website is to help users have a better experience in finding any type of business or service that exists in their town. Therefore after the users inputs some parameters and filters the end result for them will be to view all the available businesses, that are registered to the platform, Then users will be able to select one of their liking and view it in a virtual map or view more information's such as products, services, weekly schedule or even get in contact by messaging them.

Σύνοψη

Ζώντας στον 21 αιώνα η τεχνολογία παίζει ένα σημαντικό ρόλο στην ζωή των ανθρώπων. Έχει εξελιχθεί και έχει επηρεάσει σχεδόν κάθε τομέα επιστήμης, και έχει επηρεάσει αρκετά κάθε μέρος της καθημερινότητας μας. Οι υπολογιστές έχουν καταβάλει μεγάλο ρόλο στην άνοδο της τεχνολογίας, καθώς είναι τα εργαλεία που χρησιμοποιούν οι άνθρωποι για να βελτιώσουν την ποιότητα ζωής τους. Χρησιμοποιώντας τον όρο υπολογιστές δεν εννοούμε μόνο τους προσωπικούς υπολογιστές, τους φορητούς υπολογιστές ή τις έξυπνες συσκευές που χρησιμοποιούν οι άνθρωποι για να συνδεθούν στον διαδίκτυο, αλλά εννοούμε επίσης τηλεοράσεις, ψυγεία, αυτοκίνητα, τρένα κ.λπ., ότι δηλαδή χρησιμοποιεί κάποιο είδος υπολογιστή ή τσιπ υπολογιστή για να λειτουργήσει σωστά.

Οι ιστότοποι και οι εφαρμογές για κινητές συσκευές βοηθούν στη σύνδεση και την αλληλεπίδραση με τον διαδίκτυο, ώστε να μπορούμε να αναζητήσουμε οποιοδήποτε είδος πληροφορία χρειαζόμαστε, καθώς και να έρθουμε σε επαφή με οποιονδήποτε άλλο άνθρωπο και να επικοινωνήσουμε. Μέσω του Διαδικτύου, και με τη βοήθεια των ισότοπων, οι επιχειρήσεις μπορούν να δημιουργήσουν τη δική τους ιστοσελίδα ηλεκτρονικού εμπορίου και να πουλήσουν τα προϊόντα και τις υπηρεσίες τους στο διαδίκτυο και να προσεγγίσουν ένα ευρύτερο κοινό, καθώς οποιοσδήποτε από οπουδήποτε μπορεί να δει τι έχει να προσφέρει η επιχείρηση. Οι επιχειρήσεις μπορούν να δημιουργήσουν τους δικούς τους ιστότοπους και εφαρμογές ή να είναι μέρος είδη υπαρχόντων. Οι ιστότοποι σύγκρισης επιτρέπουν στους χρήστες να βλέπουν ταυτόχρονα διαφορετικές επιχειρήσεις ή να βλέπουν τα ίδια προϊόντα που υπάρχουν σε διαφορετικές επιχειρήσεις, ώστε να μπορούν να σκεφτούν και να αποφασίζουν από πού θα κάνουν αγορές.

Αυτή η κύρια εργασία παρουσιάζει έναν ιστοσελίδα που αναπτύχθηκε με React.js και Spring boot. Ο σκοπός του ιστοσελίδας είναι να βοηθήσει τους χρήστες να έχουν καλύτερη εμπειρία στην εύρεση οποιαδήποτε είδους επιχείρησης ή υπηρεσίας που υπάρχει στην πόλη τους. Επομένως, αφού οι χρήστες εισάγουν κάποιες παραμέτρους και φιλτράρουν, το τελικό αποτέλεσμα για αυτούς θα είναι να βλέπουν όλες τις διαθέσιμες επιχειρήσεις, οι οποίες είναι εγγεγραμμένες στην πλατφόρμα. Στη συνέχεια, οι χρήστες θα μπορούν να επιλέξουν μία από τις προτεινόμενες επιχειρήσεις και να την δουν σε ένα εικονικό χάρτη ή να προβάλουν περισσότερες πληροφορίες, όπως προϊόντα, υπηρεσίες, εβδομαδιαίο πρόγραμμα ή ακόμη και επικοινωνία μέσω μηνυμάτων.

Table of Content

Acknowledgements	1
Abstract	2
Σύνοψη	3
1 Introduction.....	8
1.1 Synopsis.....	9
1.2 Motivation	10
1.3 Objectives	10
1.4 Outline	11
2 Background.....	13
2.1 E-Commerce.....	14
2.1.1 Advantages & Disadvantages.....	15
2.2 Comparison Websites	16
2.3 E-WOM, B2B & B2C E-Commerce	17
2.3.1 E-WOM.....	17
2.3.2 B2B & B2C	17
2.4 State of the art Implementations.....	18
3 System Analysis & Design. FindMe.....	23
3.1 FindMe Textual Description Analysis.....	23
3.2 FindMe System Analysis.....	24
3.2.1 Requirements List and Main Requirement Diagram.....	24
3.2.2 Frontend requirement diagram	27
3.2.3 Backend requirement diagram	28
3.2.4 Repository requirement diagram.....	28
3.3 FindMe System Design	29
3.3.1 Component Diagram	30
3.3.2 Use case.....	31
3.3.3 Activity Diagram.....	31
3.3.4 Sequence Diagrams	32
3.3.5 Entity Relationship Diagram (ERD)	34
3.4 Technologies used for FindMe	35
3.4.1 React.js	36
3.4.2 Spring boot.....	37
3.4.3 MySQL.....	38
4 Pilot implementation.....	40
4.1 Pilot Implementation Methodology.....	40

4.2	Pilot Implementations Use Case Scenarios	41
4.2.1	Simple User	43
4.2.2	Business / Service owner.....	49
4.2.3	Admin of the platform.....	55
4.3	Responsive Implementation	56
5	Conclusion & Future Work.....	58
5.1	Conclusion.....	58
5.2	Future work	59
	References	61

List of Figures

Figure 1 Main Requirement Diagram	26
Figure 2 Front-end Requirement Diagram	27
Figure 3 Backend Requirement Diagram	28
Figure 4 Repository Requirement Diagram	29
Figure 5 Component Diagram	30
Figure 6 Use Case Diagram	31
Figure 7 Activity Diagram	32
Figure 8 First Sequence Diagram	33
Figure 9 Second Sequence Diagram	33
Figure 10 Third Sequence Diagram	34
Figure 11 ERD	35
Figure 12 React example	36
Figure 13 MySQL example	39
Figure 14 Homepage	41
Figure 15 Log In	42
Figure 16 Register	42
Figure 17 Results	43
Figure 18 Register User selection	44
Figure 19 Business Information	48
Figure 20 Create New Business	50
Figure 21 Admin Page	56

List of Tables

Table 1 Requirement List.....	26
Table 2 Spring-Boot example	38
Table 3 Simple User.....	45
Table 4 Virtual Map	47
Table 5 Products & Services	48
Table 6 User Messages.....	49
Table 7 Update, Add, Delete Basic Information.....	51
Table 8 Schedule	52
Table 9 Manage Products.....	53
Table 10 Manage Services	54
Table 11 Business Owner Messages	55
Table 12 Responsive Implementation	57

1 Introduction

Over the last decade technology has evolved tremendously and has affected almost each and every field, from business, industries, farming, schools, and higher education. Computers, smartphones and smart devices in general have become an important part of our daily life and people nowadays depend on them to function (better) and complete their daily tasks easier. Whenever people want to complete a task, they have the possibility to search the worldwide web to find a solution for their problem, as well as giving them the chance, by posting anything on their own, to help someone else. So, any task can be done with the use of technology and the help of internet.

With the rise of internet and the World Wide Web (WWW). we are able to use those platforms to connect and exchanges data through the web. Web platforms, websites or apps compose a big part and play a huge role, because they provide as with unlimited information in a variety of ways. Email websites exist to write and receive e-mails (electronic mails), government websites to gather all legal information, bank websites to view the balance and transactions, educational purposed websites and from all the different categories the most popular and well known, are the e-commerce [1].

A website is the first and most significant medium for knowledge dissemination. Its creation includes a variety of considerations, including the CMS (Content Management System), used to execute processing and publishing, the provision of partnerships and interconnections with social networks and public web resources, as well as the reuse of data from other sources. Websites have undergone fundamental changes in terms of architecture, creation, and deployment as main platforms for communication and distribution. Web Developers create all of the web pages and apps we use to make our lives easier. Web development is usually not concerned with the design of a website, rather, it is primarily concerned with the programming and coding component, which is the primary reason for the website's functionality [2][3] .

Internet infrastructure is at the heart of e-commerce. The star of the show is perhaps Internet technology, and information technology in general. E-commerce would be almost non-existent without the Internet. E-commerce is rising at a fast pace in this internet era. In certain ways, companies are resorting to also provide an e-commerce-based equivalent [4][5] . Electronic commerce, also known as e-commerce, covers a large variety of goods and service-related online market operations. It's commonly synonymous with online buying and selling or other trade requiring the transfer of possession or rights to access products or services over a computer-mediated network. E-commerce has evolved from its origins as a mechanism for internet

shopping transactions into something much larger in this comparatively short period. E-commerce has evolved into a forum for media and modern, exclusive services and capabilities that aren't available nowhere else [4][5][6] .

Choosing the best e-commerce approach can be difficult for both, firms and individuals. The best approach will help a business become a market leader. However, the incorrect approach loses time, effort, and market share. A website that is badly designed draws no interest and generates little new revenue [7].

1.1 Synopsis

People use E-Commerce websites and websites overall for various practices in their everyday life. Thus, with this implementation they don't have to go through various websites and URLs, but they are able to find them all in one place, which makes their life easier and less time consuming. Websites and other applications in general should be easy to use, and just with a few actions the users should be able to experience their navigation to their desired result.

As S. Pastore [2] refers to, there are two common ways for developing applications, desktop based or mobile based apps. The main difference is that mobile applications are only for mobile or tables, machines which primarily use an android or iOS operating system. On the other hand a website, if developed correctly, by making it responsive and making it mobile friendly, it can be used regardless of the operating system which the user prefers to use.

This thesis introduces the development of a responsive website which is basically a platform that will host information about other e-commerce websites and general services that are offered. All the information that is available is stored in a repository. This data is uploaded individually from the users that owns a business with an e-commerce website or a service, or the users that wishes to promote their business/service. The development has two separate implementations, one for the front-end that is built primarily with React.js, which is a JavaScript framework, as well as some extra libraries which were installed with the help of node.js. The backend was built with Spring boot, which is a java framework and includes some extra libraries as well. Finally, for the data a repository was created with the help of MySQL. Therefore, the back-end application is communicating with the database and the font-end with the help of some end-point calls with the backend.

1.2 Motivation

The motivation for my Master thesis was to design a responsive website, that would allow users to find any type of business or any kind of service they are looking for, closed to them. I wanted to experiment with web development, by developing the front-end application as well as the backend of the website, with the help of some of the most popular programming languages like React.js and Spring boot. The development for the website would be composed by two applications, one for creating the website itself and another for storing data in the repository and doing any kind of service that the front-end website would require. Designing this website would help users locate what they search for in only one website, rather than exploring all the web.

1.3 Objectives

The main objective of this thesis was to create a website, that would serve as a tool for users with the intension of finding any kind of business or service that exists in the application. The implementations of the front-end and back-end are going to be opensource, so anyone can access the source code and use it to expand it or alter it as they wish.

To begin with, there are 3 roles that a user can perform on the website. The first objective is a simple user, searching for anything they want, the second is for the user to be a business owner and promote their business and the third objective is to be the administrator of the website. For the first two, anyone can register to proceed with either role but if you wish to be an administrator you must be the handler of the website. Therefore, once the user has entered the website, he/she is able to search their desired business-service by choosing a city, and/or the type of business/service they want and after view all the available results. Furthermore, the parameters of city and type are not mandatory, so the user could view every business that is register to the platform. The goal is for the user to view something specific they are interested in, near their location, or any kind of business nearby them. Except the city and the type of business/service , after the initial result, the user can use additional filters, like the rating of the users, or if a business is open at that time as well as how close the business is to his location, with a feature called NearMe, that is calculated by meters. Also, the users will not only be able to see what kind of businesses are closed to them, but they will be able to view them on a map, so they can visually see where they are. Also, the users are able take a look at the products or services that a business has to offer and some extra information about that business. For a user to be able to register their business or service in the platform, in the register form the user will select “business owner” and

after clicking register the user will be redirected to forms, to fill out information about his business/service.

1.4 Outline

In this sub-section the outline of the master thesis is going to be presented. Thus, what key features of each section are going to be displayed

- **Section 1 “Introduction”:**

The Introduction section covers a short introduction of the term’s technology, internet, website, e-commerce and includes the Synopsis, Motivation, Objectives and the Outline for this master thesis.

- **Section 2 “Background”:**

The second section describes the background research that was made for the master thesis. In this section the e-commerce term will be described as well as its advantages and disadvantages. Following, some search is done about comparison websites. Electronic word of mouth, business to business and business to customer commerce. Lastly, some State-of-the-art implementations are presented and some of their key features are highlighted.

- **Section 3 “FindMe: System Analysis & Design”:**

The third section covers the overall analysis of the applications that were developed. Thus, this section consists of the System Analysis and System Design of the applications and it also mentions a Textual Description Analysis of the website and the technologies that were used to build the platform.

- **Section 4” Pilot Implementation”:**

The fourth sections represents and displays a pilot implementation of the application. It starts off with a pilot implementation methodology and it is followed by the pilot implementation use case scenarios. There are three scenarios, one for each of the three types of users. Therefore, the second subsection is divided in 3 more section: Simple user, Business / Service owner and the Admin of the platform.

- **Section 5 “Conclusion & future work”:**

The final section presents the results of this Master Thesis in a Conclusion sub-section and it also showcases some additions and alterations that could be made in the Future work sub-section for the FindMe website.

2 Background

Internet networking and Internet-based services are now accessible to more people around the world than ever before, thanks to the ever-increasing spread of high-speed Internet networks. As a part of this diffusion process, Internet technologies have revolutionized interactions for both enterprises and end users. The impact of the Internet on (lower) transaction costs and expanded competition are well known [8].

The Internet has evolved from a direct means of networking into a global trading platform. Web addresses are used by service organizations all over the world, to engage in this digital reality. Because of the internet's potential to provide rich content to its customers, websites have developed into a modern medium for market value generation. Rich content on their websites is an important aspect of running a profitable service business. Customers are more pleased when companies are able to offer high-quality content on their websites. A website that can provide a lot of information, can help a company easily engage with its customers, about itself, its goods, and services [9].

E-business is characterized an digitally enabled commercial transactions, between and within companies and individuals, involving computer systems under the management of the company. Nowadays, 'e' is gaining ground, and most, if not all, items are being digitally powered. As a result, it's critical to distinguish between various modes of trade or industry, that include the 'e' dimension. It can be classified into various categories depending on the type of relationship that exists between different sides of commerce. Sending information, sharing data between a manufacturer, vendor, and trading partner, gaining new clients, conquering markets, and hosting teleconferences are all examples of e-business [10][11].

E-business is made up of different aspects:

- ❖ e-commerce
- ❖ e-learning
- ❖ e-banking
- ❖ e-enterprise
- ❖ e-government
- ❖ e-economy
- ❖ e-society

The definition e-business can be applied to a variety of situations. E-business may be part of a larger corporate technology plan that includes the use of technologies to boost a company's

productivity. Companies may conduct part of their business online, or use technology to enhance internal or external knowledge, sharing in this situation. E-business is a model concept that focuses on the Internet and keeps its "physical" impact on the industry and conventional customer service to a bare minimum [11].

2.1 E-Commerce

E-commerce relates to the use of the internet to perform corporate dealings or management tasks. Owing to the widespread usage of e-commerce models and technologies in today's market climate, a modern trend known as dynamic e-business has arisen to advance ecommerce applications, by simplifying business engagement over the internet. E-commerce operations may be carried out with the aid of websites [12].

Electronic commerce poses a number of intriguing research issues for both theoretical and scientific economists. Traditional markets depend heavily on the confidence built up over time and through personal relationships. Electronic markets, on the other hand, are more anonymous [13]. The digital economy has emerged as a result of the expansion of globalization. As an electronic alternative to the conventional way of doing business or trading, new ideas such as electronic business (e-Business) or electronic commerce (e-Commerce) have arisen. Firms had to follow modern market models to compete in a globally competitive economy, focused on information technology and telecommunications. Under these circumstances, e-commerce became a reality in today's corporate world, as well as a means for every organization to achieve commercial success [14].

E-commerce has undergone significant growth in recent decades, becoming profoundly important to enterprises around the world. Technology is progressing at a breakneck pace these days as a result of globalization, pushing all businesses to embrace emerging technologies. E-commerce plays and will continue to play a significant part in the economy, forcing an increasing number of businesses to alter their market strategies [14].

A well-designed e-commerce website not only increases the value of the product or service being sold, but it also increases the value of the company. As a result, in order to get the highest return on investment, it's important for an organization to select the right growth approach. The wide range of e-commerce models and implementations, ranging in scale from local shops to multinational exchanges, necessitates a wide range of implementation methodologies and approaches. Ecommerce apps, like many other types of information systems, are designed to support one or more business processes. As a result, their strategy must be in accordance with

the general strategic agenda of the company, as well as the particular procedures involved. E-commerce websites must be built in a coordinated way due to their high expense and difficulty [12][15].

2.1.1 Advantages & Disadvantages

E-commerce has grown over the last years and has become a significant part of selling and buying products and services overall. As everything, e-commerce has its advantages and its disadvantages. The advantages and disadvantages will be displayed below.

Advantages

- ❖ Because there are no physical stores, there are no lines for people to wait [16][17].
- ❖ Since everything is conducted via the internet, no physical stores are needed for the business, therefore it lowers the cost of possible rent [16][17][18].
- ❖ Because everything is conducted through the e-commerce websites, there is no time limit, thus, the costumers can shop whenever they want [17][18].
- ❖ Ecommerce companies may list a wide variety of products and there are no restrictions on shelf space or shop size [16][18].
- ❖ Since there are no real stores, consumers can buy from any point of the world through a website [16][17][18].

Disadvantages

- ❖ No physical store means that there is no interaction between the customer and the salesperson, which could be not one hundred percent satisfying for the costumer, considering any further questions about the product that is for sale [16][18].
- ❖ Internet Access is Needed To engage in ecommerce, you'll need more than just an interface device; you'll also need Internet access [16][17][18].
- ❖ An Internet Access System is Needed. E-commerce can only be done using an Internet-connected device, like a computer or a smartphone, devices which not all potential customers are able to afford [16][17].
- ❖ Costumers run the risk of identity theft and plenty other security risks, when their personal data are collected by ecommerce companies, as well as running Businesses ,the

risk of phishing attacks and other types of security theft [16][17][18].

- ❖ Fraud Credit card theft impacts, both customers and companies. Few negative forecasters expect that fraud will lead to the downfall of online commerce [17][18].
- ❖ Goods are not always being delivered on time. If shopping is about immediate gratification, so customers may be left empty-handed after making an order on an ecommerce website for a period of time [16][17][18].

2.2 Comparison Websites

Comparison websites, also known as aggregators, do not sell products themselves. It is a search engine that any possible buyer/shopper can use to filter and compare prices, features and reviews as well as many different criteria. It allows the consumer to save a lot of money by straight leading them to the cheapest price for the desired outcome. Comparison websites are able to collect data straight from merchants. Comparison websites make their money in a number of ways like getting paid through advertising and/or commission payments when user click through and purchase a product or request information [19].

Price comparison websites (PCWs) or Comparison-Shopping websites (CSWs) have evolved as a vital decision-making mechanism, for both buyers and sellers. They provide buyers with the opportunity to compare buying options based on price, product specifications, as well as retailer credibility. They provide sellers with more valuable and reliable knowledge about prospective buyers and their needs, which can have a significant effect on revenue. In reality, comparison-shopping websites initiate connections between consumers and retailers, resulting in more competitive markets through raising price awareness and product features, as well as enabling companies to deliver better value and more consistent pricing [20][21].

Comparison websites are a part of e-commerce ecosystem along with online shoppers, online vendors, and upstream agents. People used to find goods and services they wanted through newspapers and public advertising in the past, friends and family were also a strong source of knowledge. People nowadays, typically conduct their search on the Internet. CW provides decision-making tools that allow consumers to compare their buying choices based on price, product functionality, and retailer credibility. Consumers can conveniently compare a vast range of possible choices and select the most satisfactory one by using CW [22].

2.3 E-WOM, B2B & B2C E-Commerce

This sub-section will describe and define the meanings of E-WOM, B2B and B2C, which role they play and how they affect an e-commerce website and its stability. Businesses are influenced a lot, and they try to adapt to costumers changes and needs, as much they possible can.

2.3.1 E-WOM

Consumers used to rely heavily on word of mouth (WOM), as a source of knowledge in the past. In today's digital world, there is a more sophisticated form of WOM, known as e-Word of mouth, that a buyer can consult before making a purchase decision (e-WOM). E-WOM is a digital version of WOM, that has a broader reach than WOM. As technology progresses, the majority of people now use the Internet to look up information about a product or business, which results in the rise of e-WOM. E-WOM becomes more trustworthy as people who share word of mouth about a product, are not compensated to have real experiences, rather than being tied to a single brand. People are more likely to believe and have their own opinions of goods or services, after receiving knowledge from e-WOM. As a consequence, E-WOM may have a positive or a negative impact on customer buying intent, by affecting their purchasing choice to buy, or not buy [23][24][25].

Consumers, especially young ones, are becoming more mindful of the goods and services they buy and consume these days. Rather than focusing entirely on the product ads, they often search at prior consumer feedback, before making a buying decision. The reason that today's customers value, customer mouth to mouth more, is because it is an unpaid source and, in most cases, an unbiased review based on their own experience. From a managerial standpoint, e-WOM among customers is critical because it might have a positive or negative impact on them. Since a good e-WOM is an honest unpaid opinion from a former client, it can influence customers and will influence them to buy or not. Meanwhile, a negative e-WOM would have a huge effect, not only on potential consumers, but also on current customers, who will turn to a new product or service [24][25].

2.3.2 B2B & B2C

Ecommerce is most often described as a web-based catalog from which consumers can purchase goods and suppliers can collect payments. The two of the most popular e-commerce

forms are Business to Business and Business to Consumer [26].

Business-to-business (B2B) refers to transactions that take place amongst companies, such as between a manufacturer and a wholesaler, or a wholesaler and a retailer. B2B has the potential to save or make money for a business [26][10].

Business-to-Consumer (B2C), also known as Business-to-Customer refers to practices in which companies provide goods and/or services to end customers. The purchase happens at a business e-commerce website, where the customer orders the product and pays for it via the internet [10][27].

The geographical area and/or population of a city, or country, restricts the market size of business to consumer sellers. The business to business market, on the other hand, applies to businesses that provide goods and services to businesses, rather than directly to customers as in the B2C. Furthermore, B2B transactions are usually more complicated than B2C sales, with higher order prices, faster sales times, and longer sales cycles [28].

2.4 State of the art Implementations

Before starting the development of this master thesis, a research about other big website and platforms was made. E-commerce websites like Amazon or eBay, that users are able to buy directly from them, were included in the research as well as websites promoting products that businesses carry, like skrouz.gr, 4ty.gr which after their initial search users are redirected to the e-commerce website of a specific product were also added and the most similar to my implementation also platforms providing services like Doctoranytime.gr, Tripadvisor.com, Yelp.com that users can use to get some information about specific topics and perform various actions were added and investigated because some of their actions were intriguing. Therefore, in this sub-section some similar implementation will be represented, some of their features and key aspects will be described.

Amazon

Amazon, started as a small online retailer and has since grown to become a globally recognized brand. When an organization moves internationally and gains a significant amount of leverage on a wide scale, it is said to be globalizing. The e-commerce juggernaut Amazon hasn't always been the oppressor it is now. It began as an online bookseller in the summer of 1995 and has since grown to become one of the largest e-commerce companies in the world

[29][30]. Amazon has not only been able to accomplish anything and everything a customer might ask for, but it has also been able to extend its offerings through subscription-based mediums and excellent customer support. Amazon became a major force and rapidly globalized as its speed and sales increased. When a company gains such a strong international presence that it starts to operate on a multinational basis, this is referred to as globalization. Amazon is playing a leading role in both, price and service because of its strong partnerships with distributors, delivery centers, and other providers [29][31].

Amazon.com is constantly in search of technical advancements in order to meet the demands of its consumers. As a result, the company developed its own cutting-edge digital technologies, which helped it, to incorporate an effective customer experience management framework by monitoring customer shopping behavior and providing suggestions on related goods that a customer may choose, to purchase based on user recognition. As a result, the consumer awareness feature not only aids consumers in their purchasing decisions, but it also raises the likelihood of up- or cross-buying, boosting the company's overall profitability [14][30].

Amazon's tremendous growth in the United States is unlikely to be replicated elsewhere. In both brick and mortar and online sales, the shopping industry in the United States is volatile and ever-changing. This has resulted in a major growth of e-commerce, called the "Amazon Effect." Amazon has not only dominated in the US, but it does, however, dominate the playing field in Europe as it entered the European market in 1998.

eBay

After its establishment in 1995, eBay has grown to become the most popular online auction site, with millions of items traded every day. eBay does not offer goods, it merely functions as a forum for sellers to post auctions and bid on them. Users already purchase and sell items from people around the country and around the world on auction sites like eBay. Despite the addition of several new venues, the electronic bazaar places a strain on some of the existing market's pillars.

Many websites have some sort of credibility scheme. The eBay system is with no doubt the largest and most well-known. At any given time, eBay has millions of products available for bidding. Users will leave comments on each other's experiences, using eBay's reputation system. The mechanism is transaction-based, which means that two participants must have finished an auction before leaving reviews on each other. Following the auction, the buyer and seller have the option of rating each other's results with a 1 (positive), a 0 (neutral), or a 1 (poor) (negative).

Users can also leave a one-line text message, and people who have been scored can respond to comments that they think are unjust [13][32][33].

Yelp

Yelp.com is a website that was established in 2004 and helps users to leave any kind of feedback about restaurants and other companies. People are able to read comments and reviews and post them on Yelp. To be able to write a review, a user must first create a free Yelp account, which involves registering a valid email address. Each user will then be able, for example to score any restaurant, from one to five stars and leave a text rating about it. If a review is posted, anybody who wishes to, will be able without being charged to read it on the platform. Readers will come across different kind of feedbacks when doing a restaurant search, in which the reader is attempting to learn about the consistency of various restaurants [34][35].

Visitors to Yelp will search for a business by name or category, and then read the several reviews written for that particular business online. Individuals will then be able to read what other people think about a business and determine whether or not to visit that business. Yelp.com helps users to experiences between themselves, while still seeking information from a number of outlets.

Yelp is unique! Not being owned or financially supported by business owners, but showing the preference each simple user has, who as well has no financially winning for the ratings. As a result, Yelp.com provides businesses with an ability to discover what consumers are pleased with or on the other hand what they would want to see changed. Yelp and its customers will also have a quite big impact on whether a business succeeds or fails [36].

TripAdvisor

TripAdvisor first appeared in 2004 as a platform for the travel industry. This user-generated content website hosts a multitude of feedback describing travelers' encounters with hotels, restaurants, and tourist attractions. TripAdvisor, the world's largest travel platform, delivers a range of content targeted at both customers and companies, and it is actively introducing new services and functionality to address the changing demands of travelers and tourism providers [37][38].

TripAdvisor has become increasingly popular with both visitors and managers due to its large amount of details. Tourists can read the thoughts of millions of ordinary tourists all over the

world. They should also look at the popularity ranking, which is calculated using an algorithm that takes into account user's feedbacks, as well as other written sources, including guidebooks and newspaper papers.

Visitors may locate the most fascinating tourist attraction or the most famous restaurant. This is linked to the bubble ranking, which is a 1–5 measure, where one bubble represents a bad experience and five bubbles represents an outstanding experience. This scale is to be used by all reviewers to summarize their reviews. Along with this ranking, users will share their thoughts on the success of a restaurant, hotel, or tourist attraction or travel experiences. As a result, reading and reviewing feedback will aid in the development of a company [38].

Skroutz

Skroutz is a website that allows users to compare retail prices around different shops in the Greek market. It is thought to be Greece's biggest product price search engine. Skroutz has many categories to choose. From technology items up to home products as well as fashion clothing are among all the available the products. Skroutz essentially is a website platform that compares different types of products from any kind of business that has been registered to the website. A user can search the item of desire and after by selecting it, the user can view all the businesses that are offering this desired product listed, comparing the price they have it on, including what the shipping cost would be, as well as where the business is located and the business rating. Expect those information users can see a description of the product if available, the characteristics of it, then the users also can view reviews from other users and view a section with questions of interacting users about the same specific product.

Furthermore, a user can put any product he likes in their wish list which they can access later in their favorite section and also rate any business they like with starts from 1-5, with 1 being the lowest and 5 the highest. At last for a business to be able to promote their products they will have to have their own e-shop or be featured in Skroutz if they wish. After they complete a register form and follow all the steps needed, they can be visible for the users.

Doctoranytime

Doctoranytime is Greece's biggest online health provider. Choosing this provider, you will be able to select the doctor you want, while still booking free appointments online, conveniently, and safely. Users have access to Doctoranytime at no cost. Each doctor's pricing policy is entirely

his responsibility, and the consumer has no extra financial pressure.

At Doctoranytime, for the user to find the best doctor / health professional or diagnostic all the user needs to do is follow some simple steps. Starting the users select in the inputs, the specialty of the doctor or health professional they are looking for, the area they live in and their Insurance Fund (public or private). Afterwards, the user can choose a doctor based on their location, the cost, the availability, and the doctor's resume. After booking an appointment, the user will receive a confirmation from the doctor for the appointment. The platform also supports live online chat with a doctor, and the users can book a video call as well if they need.

You will learn everything you need to know about a doctor and his practice methods by visiting his personal profile, which includes things like: Specialization, Insurance companies, Curriculum vitae, Studies, Publications, Discrimination, as well as Members of Associations.

4ty

4ty.gr is one of Greece's electronic business guide and one of the most popular portals, bringing the business world closer to customers and supporting Greek companies in the most cost-effective and reliable way possible. 4ty was formed in December 2008 with the aim of providing businesses with fast and cost-effective internet marketing. 4TY.GR's mission is to offer customized internet services to small, medium, and large businesses in order to improve their competitiveness, brand reputation, and marketplace in general by using the internet's strength.

This website-portal is meant to provide promotion resources to licensed entrepreneurs' members of the guide as well as information to travelers about the professionals they need in particular circumstances. All businesses, regardless of legal type or financial scale, as well as freelancers, are eligible to participate in the directory. User can search any business that's registered on the platform and view they available information about them. Searching can be done by profession, business type, brand name and desired location.

3 System Analysis & Design. FindMe

As we mentioned in previous section, the goal of this master thesis was to create a website that would act as a tool for anyone to use and be able to search and find any type of business or service of his selection. Thus, the third section is composed from a Textual Description Analysis of the application, the System Analysis where a requirement list and diagram are presented and described, followed by the description of the System Design that consists of a use-case diagram, component diagram, activity diagram, sequence diagrams and a ERD diagram. Last, the technologies used to build both of the applications will be shown and described.

3.1 FindMe Textual Description Analysis

For the designing of a web platform or website like this one, the development was split in to two applications. One part was the visual part that the end user would see, the frontend of the applications, and the other was the backend that connected with the repository and performed various actions, like making http requests able to happen and updating table fields.

The first step to begin was to draw the requirement list of the application, to determine what features and actions would be performed in the application. Therefore, some research was made to understand what other similar implementation where doing, what similar features to use and how to differentiate from them. To start the development of both the applications, the design of the database schema and defining the relations between the tables had to be done. That was done, so there could be a rough estimation of how the database would look and what was going to be needed to display after in the frontend. The decision of how the tables would look and react was made after the research in similar implementations, thus features, actions and relations were added and removed to the standards that were originally set.

Next step was to partly build the backend based on the relations that have been made with the database's tables. Because one of Spring Boot's functionality is that the classes represent the tables of the database, we began with that and applied it. Next, we created some functions and services, applied it to the controllers and created the first endpoints, or else http requests, to get or alter data from the database and send back the corresponding response. There was in mind, that when we would start developing the frontend some alterations might be possible, so some level of abstractions was integrated for feature updates.

The development of the frontend application started with React.js and with the help of some external libraries. As the development was in progress, we found it necessary that some changes had to be done to the database and simultaneously to the backend. Changes were either adding

extra fields to some tables or altering existing ones. Therefore, after a while the development of both frontend and backend was done at the same period.

As the development was ongoing the introduction of GitHub was made. Both projects were uploaded to GitHub in separate GitHub repositories, so some backups would be available in case something went wrong. Likewise, the MySQL database was extracted to make some backups. Another reason for uploading the code to a GitHub repository was because after all it is an open-source software.

Starting the development everything was done locally in a personal computer and at the end everything was uploaded to a server to run at all times. The server was provided by Nile Game lab at Hellenic Mediterranean University.

3.2 FindMe System Analysis

The intention of developing this project was to create a platform that would help people find any type of business or service that is located in their area. The thought was to create a website which will host any kind of services that can be provided and help the people with their everyday life. Thus, instead of searching in different places the users are able to find everything in one place. The only drawback is that for a business to be found the owner has to register it to the website.

3.2.1 Requirements List and Main Requirement Diagram

The Requirement List is a list of specifications that you can store and maintain. You will also get a general rundown of the system's specifications. A requirement diagram depicts specifications or portions of requirements that have been applied to a system or program. It is based on the Object Management Group's (OMG) System Modeling Language (SysML) and, as opposed to a pure textual description of specifications, it facilitates an interpretation of interrelationships.

As you will see in Table 1 the Requirement list for the application can be seen. The Table 1 below presents the title and description of its requirement.

Requirement List

Requirement	Title	Description
REQ1	Frontend	The frontend is the presentational layer that a user will view.
REQ2	Backend	The backend refers to the data access layer of the software.
REQ3	Repository	The repository is essentially the place where our data is held, it mostly is a SQL database.
REQ4	User Authentication	The user can be authenticated and redirected to the desired path. That can either be possible by signing in or by signing up tin the application.
REQ5	User Roles	A user on the website for the moment can have one of the following 3 roles. <ul style="list-style-type: none"> • ROLE_USER • ROLE_MODERATOR • ROLE_ADMIN
REQ6	Http Requests	Http request are essential because this is how the frontend “talks” to the backend and get the required data.
REQ7	Dynamic Content	The content of the website is dynamic so any information, product, schedule etc. can be changed by the owner.
REQ8	Business/Services	Any kind of business or service can be found in the platform, but the owner has to register it for it to be available.
REQ9	Initial Searching variables	When the user wants to find a business or service initially, he selects if he wants the city and the type to view the results
REQ10	Extra Searching Filters	After the results are shown there are some extra filters for the user to be used to optimize his searching,

REQ11	User Location	For the user to use the NearMe filter and for him to be shown in the map the user's locations is needed.
REQ12	Virtual Map	A virtual map exists so the user can view his locations and the location of the selected business.
REQ13	Hardware	Because the platform is a website, the hardware needed is basically any smart device that has a screen an internet connection.

Table 1 Requirement List

The main requirement diagram for the application “FindMe” is composed from the first three requirements of the requirement list we saw above. Therefore, the Frontend, Backend and Repository make up the website/application because they are the most important components.

As we see bellow at Figure 1 the main requirement is represented:

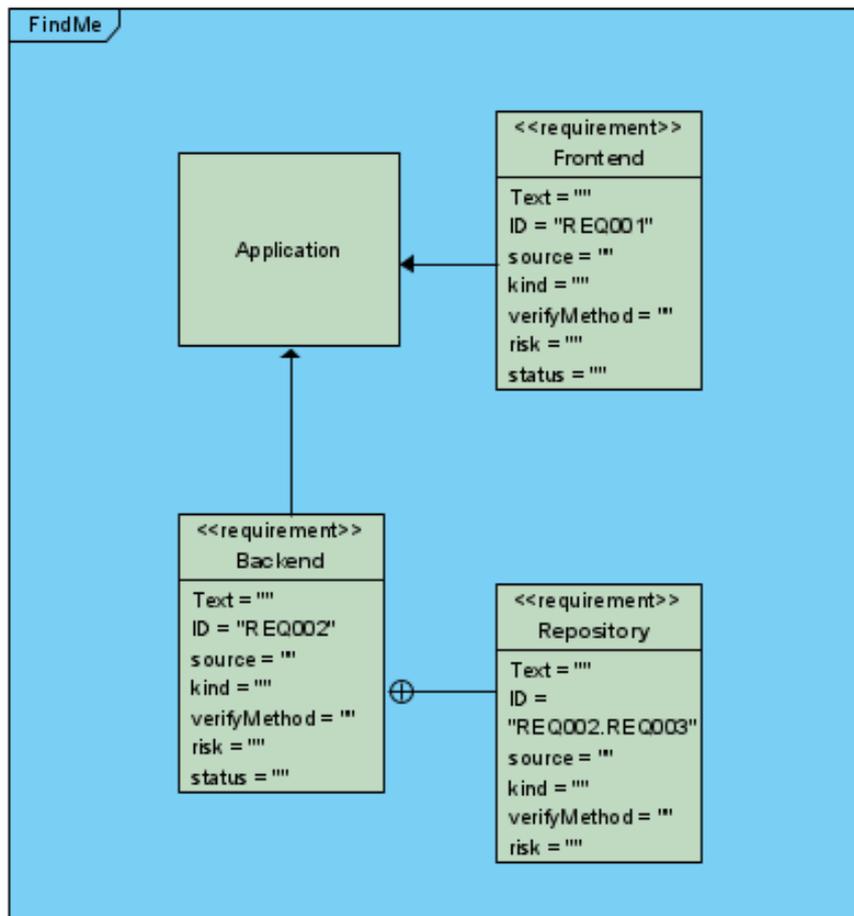


Figure 1 Main Requirement Diagram

As shown at Figure 1 the main requirement for FindMe is constructed by the Application which has the frontend, backend and the repository, that is connected to the backend. The Application component is the most significant, because it's the result of all the important requirements that the websites needs to operate. The Frontend shows a visual representation of every components and how they react between them. The backends' job is to execute the necessary services at any time. At last the repository is the one that stores all the information.

3.2.2 Frontend requirement diagram

In the Figure 2 shown below you can see the requirement diagram of the frontend, for the application. The front end basically displays the User Interface and User Experience. All the graphical components needed are attached, such as is the responsiveness of the application, its styling which is done through the CSS, and the customization based on a user's role.

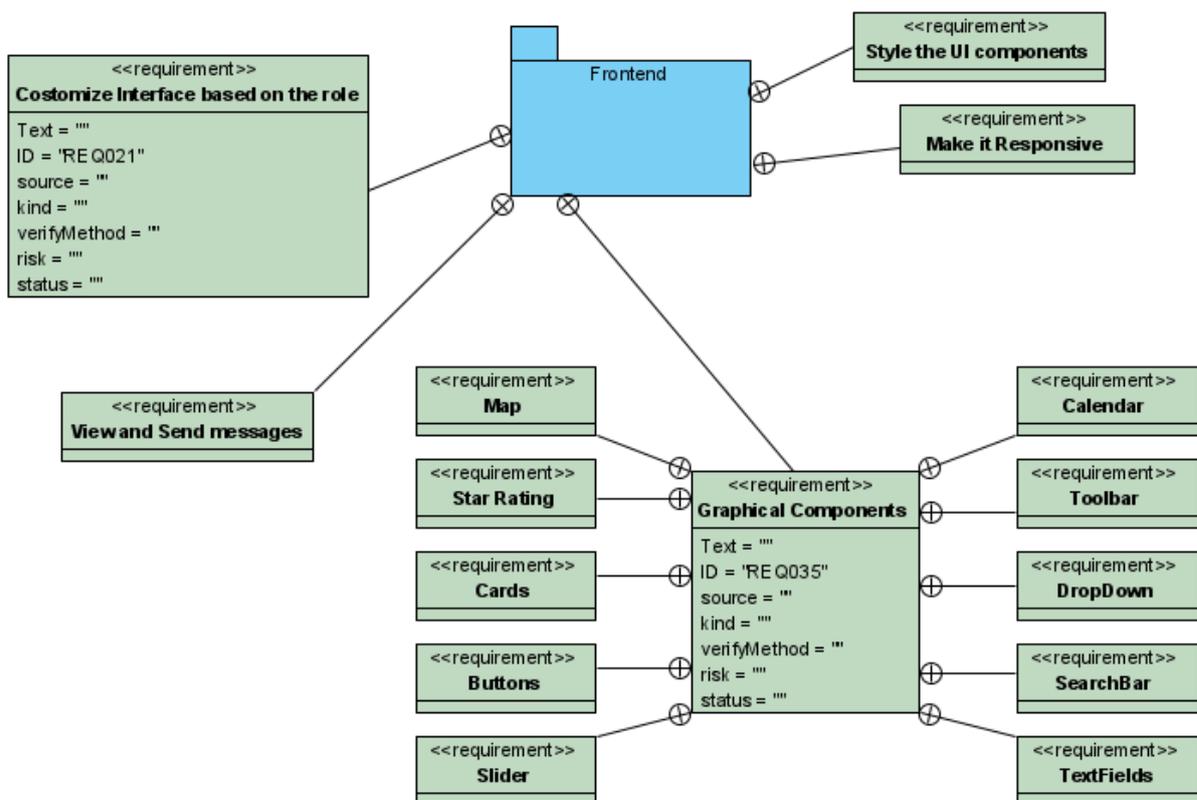


Figure 2 Front-end Requirement Diagram

3.2.3 Backend requirement diagram

In Figure 3 below the backend requirement diagram can be seen. The diagram is composed from the ‘Authenticate User’ which has two requirements, the ‘Take user status’ and ‘Update User status’. Those requirements all take care of authenticating a user and updating his status if needed. Then the back end has to connect with the repository, for this reason the requirement ‘Connect to Repository exists’. At last in the backend we create all the tables of repository and we perform actions to them, either by adding or updating or deleting or viewing results. This happens by connecting with the ‘Create Repository Tables’ and ‘Perform all actions’.

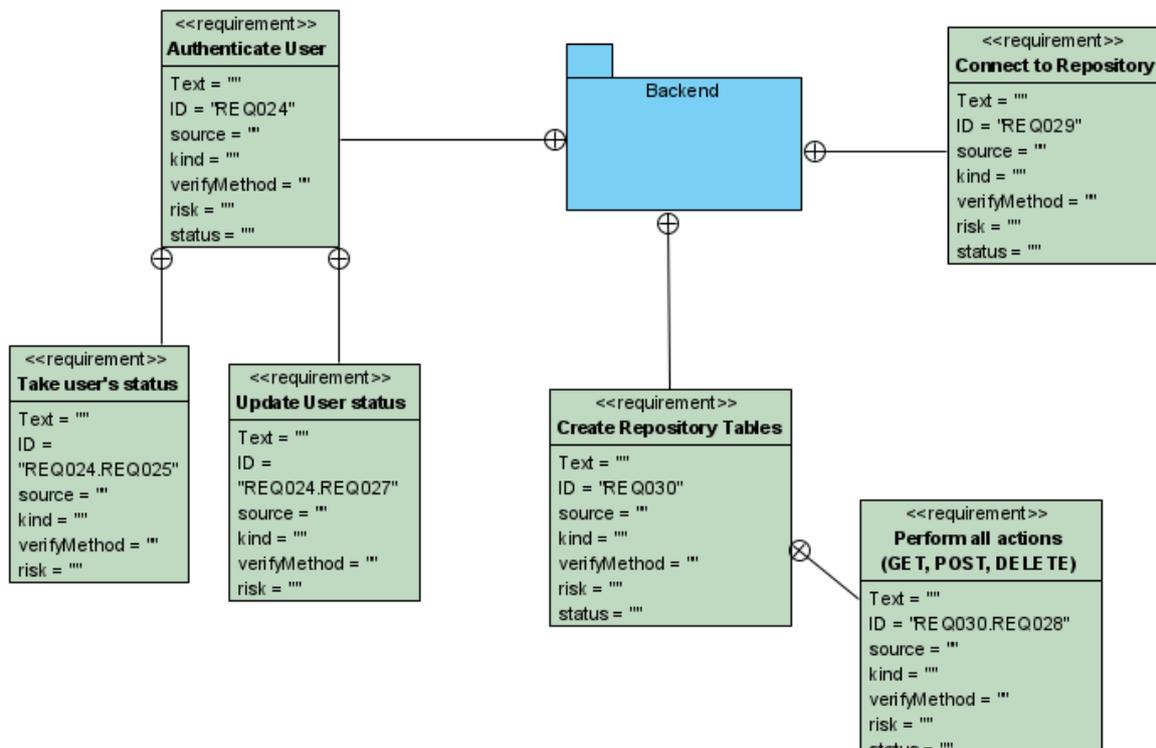


Figure 3 Backend Requirement Diagram

3.2.4 Repository requirement diagram

Finally, in Figure 4 we have the repository requirement diagram that has the ‘Create SQL database’ where we create our MySQL database that has the ‘Create tables’ for all the necessary tables which in its turn has the ‘Insert values into table’ and ‘Define relationships between tables’. The values in the tables are inserted from the backend by Post or Update method that have occurred in the frontend.

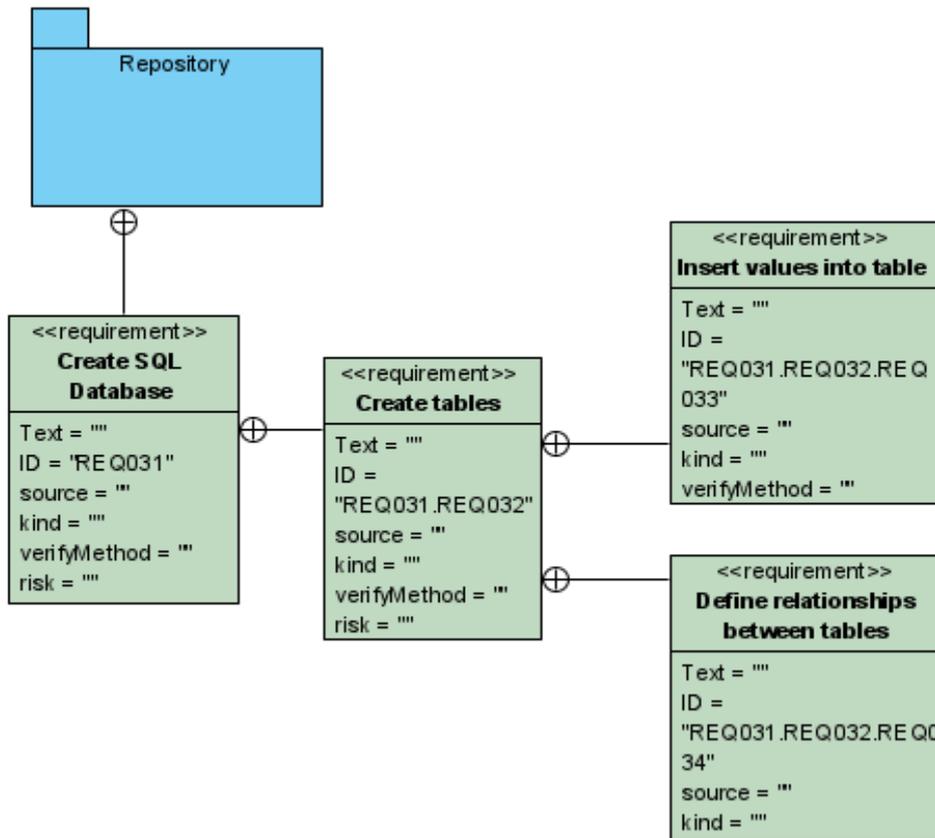


Figure 4 Repository Requirement Diagram

3.3 FindMe System Design

In the System Design sub-section, we'll see how the implementation was constructed, using a variety of Unified Modeling Language (UML) diagrams. For object-oriented modeling and documentation, the Unified Modeling Language (UML) is the de-facto normative modeling language. Since the various UML diagrams each represent a different feature of the same program under construction, they are not distinct, but rather heavily reliant on one another in a variety of ways [39].

The diagrams that the application will be model after are:

- Component Diagram
- Use Case
- Activity Diagram
- Sequence Diagram
- Entity Relationship Diagram (ERD)

3.3.1 Component Diagram

Component diagrams are applied to model the functional aspects of object-oriented systems. They are used for visualizing, defining, and recording component-based systems, as well as for forward and reverse engineering, to create executable systems. Component diagrams are basically class diagrams that concentrate on the elements of a system and are often used to model a system's static implementation view.

In Figure 5 below the component diagram of the application is displayed. The 'Frontend', 'Backend' and 'Database' are the main components of the application. For the application to be seen, we need a web browser. After for the frontend to be modular and responsive some extra libraries are needed, and for the frontend to communicate with the back end a library is needed, in order to handle http requests. At last, the back end connects with the repository so the data can be handled.

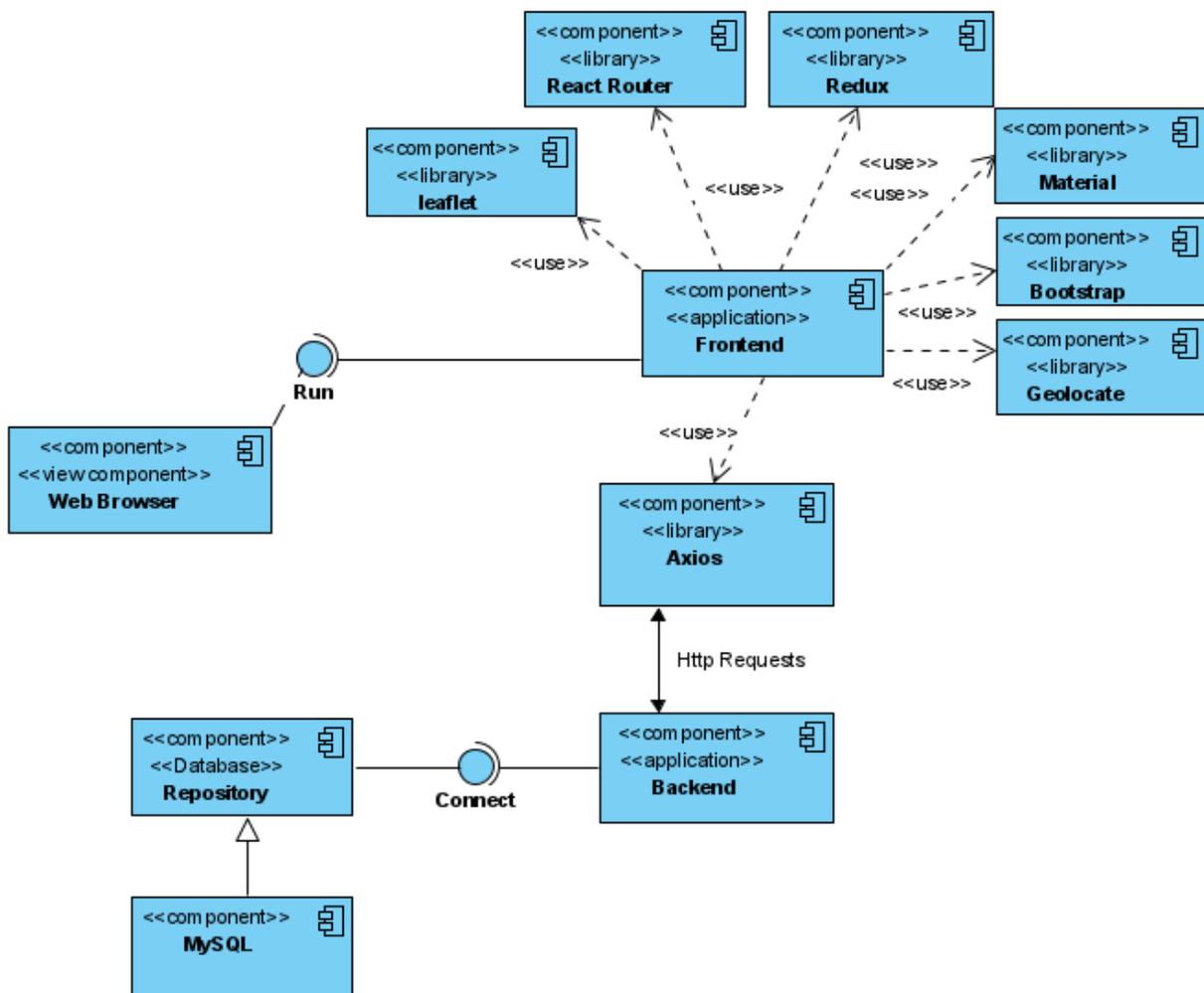


Figure 5 Component Diagram

3.3.2 Use case

The primary type of system/software specifications for an undeveloped software application is a Use Case diagram (UML). The desired action “what”, is defined in use cases, not the actual way of achieving it “how”. Once established, use cases can be represented both textually and visually.

In Figure 6 bellow a use case for the application is described. A user that can either be a Simple user or a Business Owner by signing up or registering, or the user can be an admin, that is the website’s manger. If the user is a simple user then he will search for desired businesses and select one, to view anything he wants about it. If he is a business owner, then he is able to make any kind of change to it, and if he is the administrator, he can delete any business he desires.

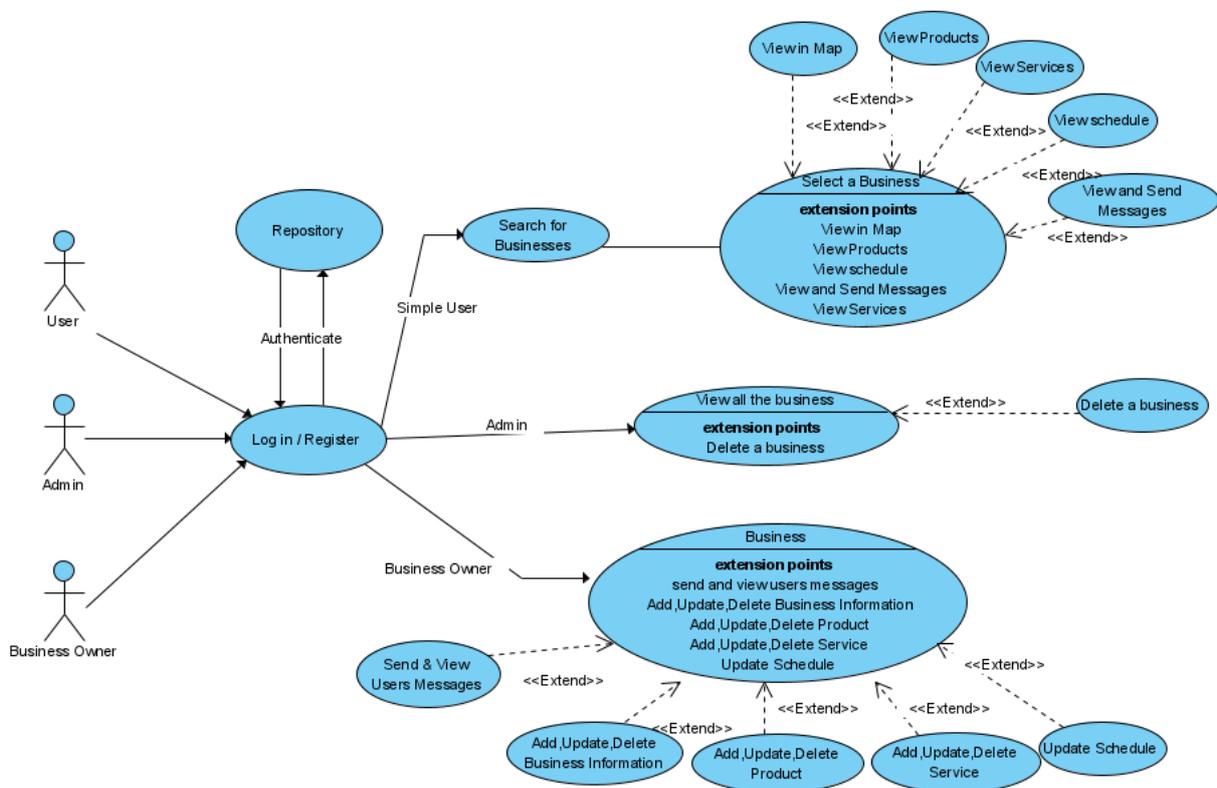


Figure 6 Use Case Diagram

3.3.3 Activity Diagram

Another important behavioral diagram, in the UML diagram, is the activity diagram which is used to illustrate complex elements of the system. An activity diagram is a more sophisticated variant of a flow chart which represents the flow of information from one activity to the next. At various levels of abstraction, task diagrams illustrate how tasks are organized to deliver a

function.

Figure 7 shows the activity diagram that represents the flow of the website and how it operates. As the user opens the website and wants to proceed, he/she has to sign in, and depending on his role he will be able to perform different tasks. If he is a simple user, he will find a business of his choice, otherwise if he is a business owner, he will perform different actions to his business. The role of admin is not registrable and only the website’s manager/administrator has access to it.

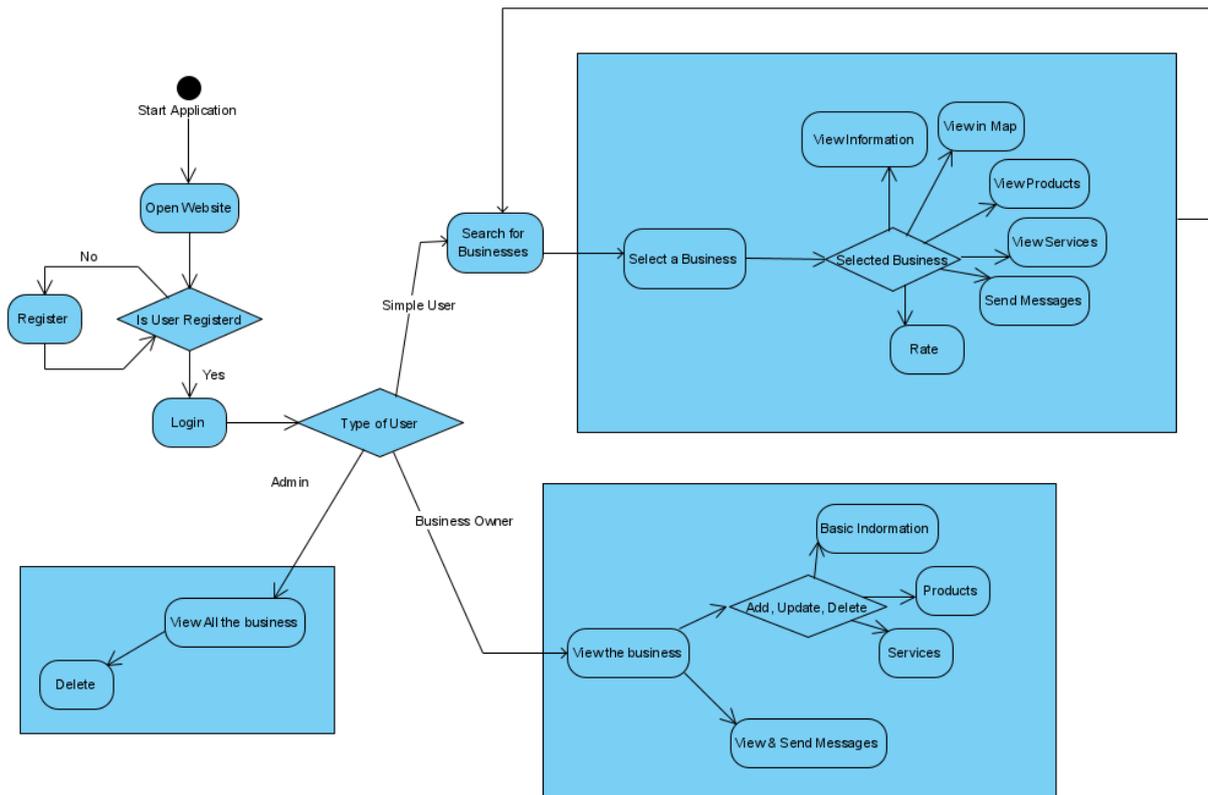


Figure 7 Activity Diagram

3.3.4 Sequence Diagrams

Sequence Diagrams show how operations are carried out. They identify the interaction around objects in a collaborative setting. Sequence Diagrams are time-focused and visually depict the order of an interaction, by using the vertical axis of the diagram to represent time as well as messages sent and received.

In the first sequence diagram in Figure 8 we can see a user first searching for businesses and after reviewing the results, selecting one of them. After that, he views the chosen business in a virtual map, then the user goes back to the previously available businesses and selects a different one, to view its products.

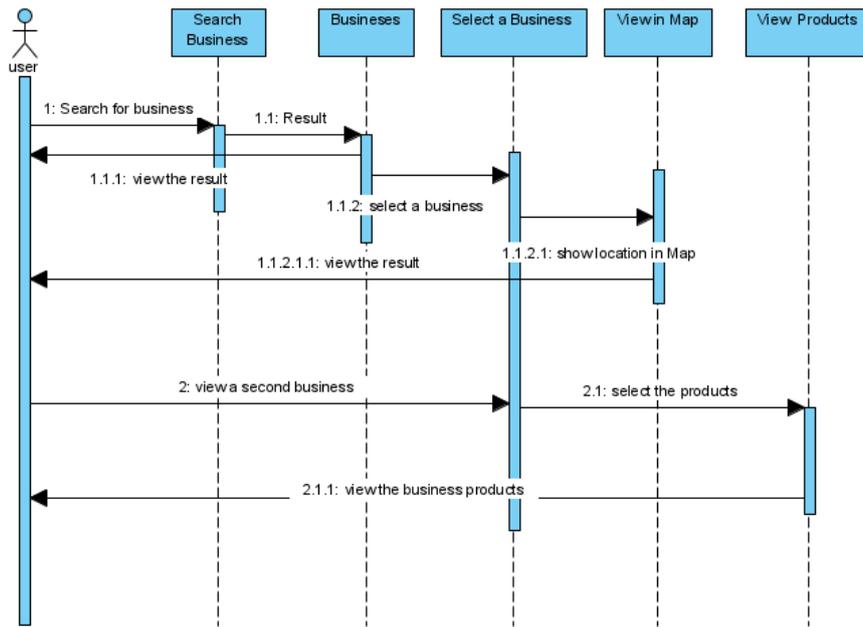


Figure 8 First Sequence Diagram

In the second sequence diagram in Figure 9 we can see a business owner entering the website and firstly viewing his business. After that, he changes a schedule hour in a day and sees the change. The next action he takes is to add a new product to his business being followed by sending some messages to different users and viewing the exchanged messages.

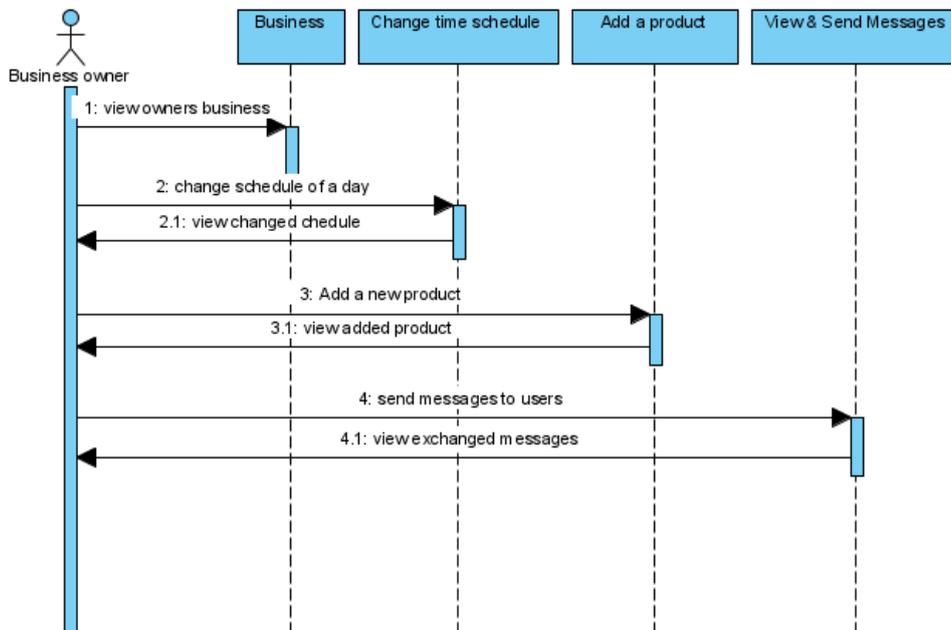


Figure 9 Second Sequence Diagram

In the third sequence diagram in Figure 10 we can see the admin’s flow. As the admin of the website the user is able to first view all the available businesses and afterwards decide, to remove one business from the platform and view the changes.

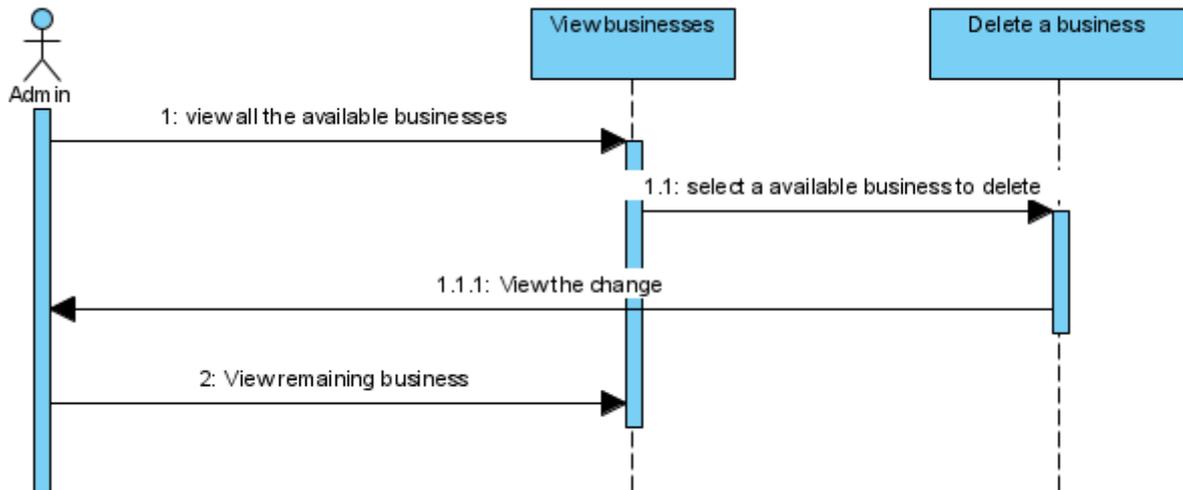


Figure 10 Third Sequence Diagram

3.3.5 Entity Relationship Diagram (ERD)

The Entity Relationship Diagram, also known as the ERD, ER Diagram, or ER model, is a type of database design structural diagram. The major entities within the system scope, as well as the inter-relationships among these entities, are visualized using different symbols and connectors in an ERD.

Figure 11 below describes the database schema and how the different relations of the tables work. How tables are connecting to each other, what variables are stored in each table and what tables share the same attributes. As you can see the business table dominates all the others by being the focal point of the database but let as keep in mind that the users table is significant as well.

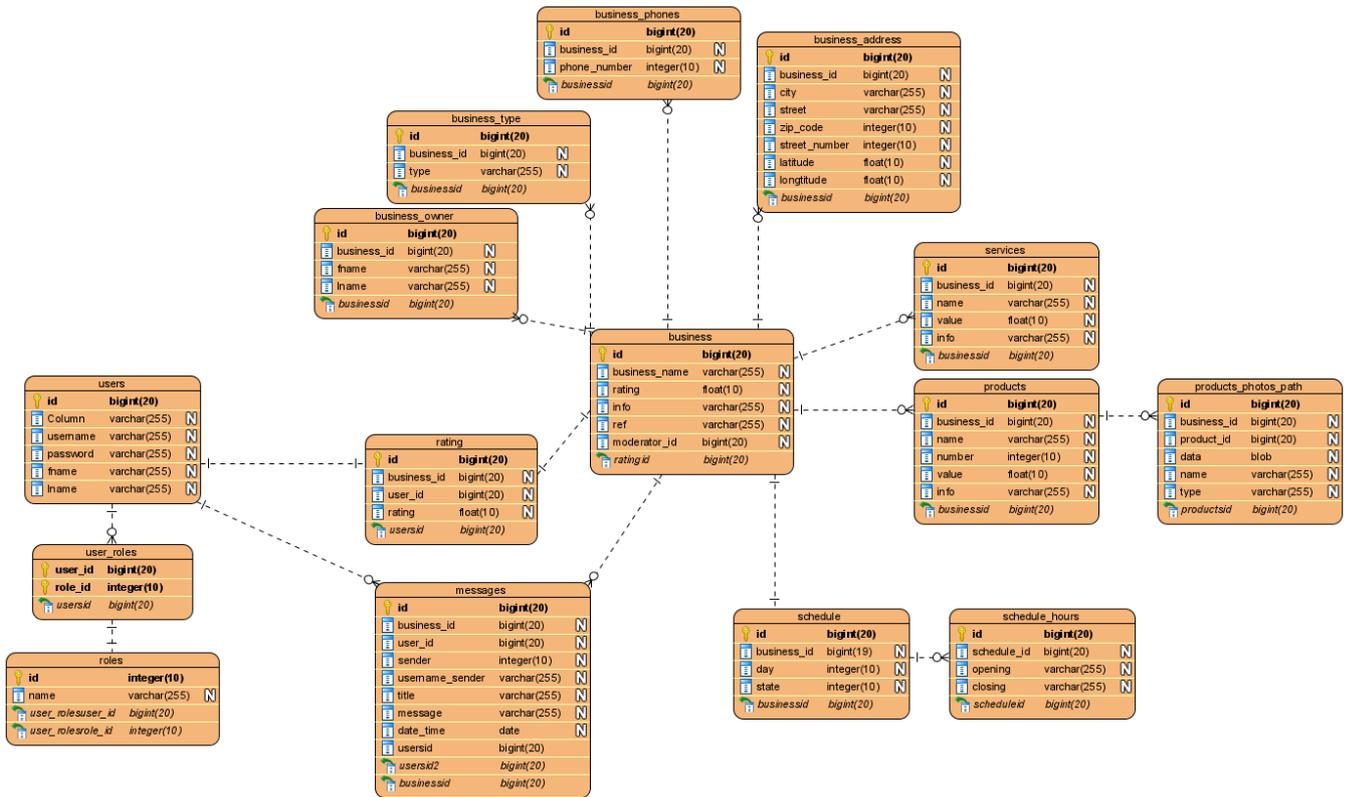


Figure 11 ERD

3.4 Technologies used for FindMe

This master thesis was quite challenging because there were many learning curves to understand how these technologies work, and how they would operate between each other. Therefore, it was compelling to learn technologies that are well established and have a continuous support from the community as well as being up to date with the state-of-the-art technologies. After finishing on the research which of the technologies were the most popular, as well as having a big community support and also being able to support each other, a decision was made.

Technologies used are:

- **React.js** for the design and development of the components of the front-end application. There were also some external libraries used to enhance the application they will be described later
- **Spring boot** for the development of the backend and the making the connection with the repository. Also, some libraries that will be described were used.
- **MySQL** for the use of the repository saving the data.

3.4.1 React.js

React.js is a popular open-source JavaScript framework. React was developed by Facebook engineers, to address the difficulties that come with designing dynamic user interfaces with changing datasets. React was born in Facebook's ad industry, where they were using a standard client-side Model-View-Controller architecture [40]. However, since React is only dealing with state management and rendering the state to the DOM, building React implementations typically requires the use of third-party routing libraries. In conclusion, React.js is a very powerful framework and with the help of external libraries anyone can build a top website.

```
import React from 'react';
import ReactDOM from 'react-dom';

class Test extends React.Component {
  render() {
    return <h1>Hello World!</h1>;
  }
}

ReactDOM.render(<Test />, document.getElementById('root'));
```

Figure 12 React example

To download and install any kind of libraries in a react project it will be accomplished with the help of Node.js, that is primarily used for these situations. Node.js is a cross-platform, open-source back-end JavaScript runtime environment that uses the V8 engine to execute JavaScript code outside of a web browser. Node.js allows developers to use JavaScript to create command-line tools and server-side scripting, which involves executing scripts on the server before sending the page to the user's device.

In this thesis React was used for the frontend part of the application with the help of some external libraries:

- ❖ **React Router:** Is a powerful routing library designed on top of React, that allows you to easily connect new screens and flows to your website, while maintaining the URL in touch with what's on the page.
- ❖ **Redux:** Redux is a JavaScript library for handling device state that is open-source. It's most widely used in conjunction with libraries like React, to build user interfaces.
- ❖ **Axios:** Axios.js is a powerful tool for making HTTP requests to fetch or save data and can be used in Node as well as in a browser.
- ❖ **react-bootstrap / material-ui:** Both of them are open-source libraries that help by making the website user interface more responsive and making the CSS sites easier to

handle.

- ❖ **react-geolocate / leaflet, react-leaflet:** Geolocate is a library which is capable to locate each user's position in the world, by giving the users latitude and longitude. Leaflet is library that gives a as a component, a visual representation of a map. So, those libraries work together to show where a user is located.

Therefore, with the help of react and the libraries that were added, the frontend of the thesis were developed. With Axios, Data was exchanged with the backend to fetch data for the selected business/services and save some of the user preferences. Bootstrap and Material help with the UI of the website, by building some of the components. Finally, with geolocate and leaflet we showed the position of the user in the world and the selected business that he wanted to view.

3.4.2 Spring boot

The Spring Framework has existed for more than a decade and has established itself as the de facto standard framework for Java application development. Spring is an open-source, well-known and commonly used Java platform, for developing web and enterprise applications. Spring is a dependency injection container that allows you to customize beans in a variety of ways, including XML, annotations, and JavaConfig. The Spring architecture has grown increasingly over time by meeting the needs of modern business applications such as stability, big data handling, batch processing, collaboration with other frameworks, and so on. Spring and its sub-projects established themselves as a viable forum for developing enterprise applications [41][42].

In this thesis spring boot was used to develop the backend applications of the platform by performing some actions. Some dependencies were used to help the project and meet its needs.

The dependencies used were:

- ❖ spring-boot-starter-data-jpa,
- ❖ spring-boot-starter-security,
- ❖ mysql-connector-java,
- ❖ spring-boot-starter-jdbc,
- ❖ jjwt,
- ❖ spring-boot-maven-plugin

For security and authentication, we used a security dependency. For connecting to the repository we use the MySQL dependency in order to be able to perform actions like GET, POST, PUT. Mainly, this application job was to create the database infostructure, connect with it and then perform any HTTP endpoint that the website needed to be handled.

```
package com.master.messages;

import com.fasterxml.jackson.annotation.JsonFormat;

import javax.persistence.*;
import java.util.Date;

@Entity
@Table(name = "messages")
public class Messages {

    @Id
    @GeneratedValue(strategy = GenerationType.IDENTITY)
    private Long id;
    private Long businessId;
    private Long userId;
    private Integer sender;
    private String username_sender;
    private String title;
    private String message;

    @JsonFormat(pattern="yyyy-MM-dd HH:mm:ss")
    private Date date_time;

    public Messages() {}

    public Messages(Long businessId, Long userId, Integer sender, String username_sender, String title, String message, Date date_time) {
        this.businessId = businessId;
        this.userId = userId;
        this.sender = sender;
        this.username_sender = username_sender;
        this.title = title;
        this.message = message;
        this.date_time = date_time;
    }
}
```

(a)

```
package com.master.messages;

import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.http.HttpStatus;
import org.springframework.http.ResponseEntity;
import org.springframework.web.bind.annotation.*;

import java.util.List;

import static java.util.Objects.isNull;

@RestController
@CrossOrigin
@RequestMapping("/api/messages")
public class MessageController {

    @Autowired
    MessageService messageService;

    // view messages between user and a business
    @GetMapping("/view/{userId}/{businessId}")
    public ResponseEntity<?> listMessagesUserBus(@PathVariable Long userId, @PathVariable Long businessId){
        List<Messages> messages = messageService.listMessagesUserBusiness(userId, businessId);
        if (messages.isEmpty()){
            return new ResponseEntity<>( HttpStatus.OK);
        }
        return new ResponseEntity<>(messages, HttpStatus.OK);
    }
}
```

(b)

Table 2 Spring-Boot example

3.4.3 MySQL

MySQL, a Structured Query Language is a widely used open source SQL database management system, created, distributed, and maintained by Oracle Corporation. MySQL maintains a hierarchical data collection and operates in all the platforms like Windows, Linux, Unix etc... The MySQL database allows you to add, view and process data contained in your database. MySQL stores data in a different table. Database systems are structured into speed-optimized physical files. The logic model, with artifacts such as databases, tables, views, rows, and columns, provides a modular development platform [43].

Start the command-line tool `mysql` and select a database:

```
1 shell> mysql your-database-name
```

To create and populate the example table, use these statements:

```
1 CREATE TABLE shop (  
2   article INT UNSIGNED DEFAULT '0000' NOT NULL,  
3   dealer CHAR(20) DEFAULT '' NOT NULL,  
4   price DECIMAL(16,2) DEFAULT '0.00' NOT NULL,  
5   PRIMARY KEY(article, dealer));  
6 INSERT INTO shop VALUES  
7   (1, 'A', 3.45), (1, 'B', 3.99), (2, 'A', 10.99), (3, 'B', 1.45),  
8   (3, 'C', 1.69), (3, 'D', 1.25), (4, 'D', 19.95);
```

After issuing the statements, the table should have the following contents:

```
1 SELECT * FROM shop ORDER BY article;  
2 +-----+-----+-----+  
3 | article | dealer | price |  
4 +-----+-----+-----+  
5 | 1 | A | 3.45 |  
6 | 1 | B | 3.99 |  
7 | 2 | A | 10.99 |  
8 | 3 | B | 1.45 |  
9 | 3 | C | 1.69 |  
10 | 3 | D | 1.25 |  
11 | 4 | D | 19.95 |  
12 +-----+-----+-----+
```

Figure 13 MySQL example

MySQL was used as a repository for this development. In the backend we connect with the SQL database and there we perform actions that affect it. The various actions are composed from selecting rows from tables by deleting, adding and updating them.

4 Pilot implementation

In the previous section we presented the system analysis of the application by showing off the requirement list and diagrams, and presenting various UML diagrams that showcase the application in use and finally we described the technologies that were used to make those application possible to develop.

This chapter will start by demonstrating the Pilot Implementation Methodology, being followed by a pilot implementation for every use case scenario of the application. The cases are divided accordingly into roles that a user can have and their different behaviors. The case of a user being just a user, the user being a business owner or last, him being the administrator of the website. Lastly, the responsiveness off the application will be described in the last subsection of this section.

4.1 Pilot Implementation Methodology

After the system was developed and evaluated, as well as the UML diagrams were defined, the next step was to start developing the platform and the applications needed. As a result, it was defined that the platform needed two main applications, one for the frontend and one for the backend, the search for the technologies started. Once those technologies were also addressed, a learning curve needed to take place before starting to develop the main applications. Therefore, prior to the main development some smaller in size projects were developed, to figure out how these technologies operated and interacted with each other. After a small period of time of getting more familiar with it, finally it was time to start with the main development and because learning never stops, any extra feature needed would be applied to them and tested for their usage and usefulness.

Thus, the development of the applications was made about the same period and was ongoing with changes and alterations in both, and in addition some changes to the database were made too. After some meetings with my supervising professor we took a decision for me to stop the development, as it had met all the goals we had set for the application as well as in the proposal and start writing the text that would complete thesis project. Because a website is never completed and can always be updated by adding new features or by improving existing ones after the thesis end, some extensions to the website will be done, like to add and provide more actions for all the types of users.

To conclude the application that exists and runs is tested as much as possible and backups were made to both the applications using GitHub and for the database by exporting it. Finally,

to make sure that the application that exists and runs is tested as much as possible, as well as backups are made to both of the applications by using GitHub and for the database by exporting it. Therefore, for future reference anyone could implement it for them self's and expand it, as it is an open-source software.

4.2 Pilot Implementations Use Case Scenarios

In this sub-section a Pilot Implementation will be represented for each use case scenario there is. All the unique features for each one will be shown and described, so anyone can understand how they work.

The use case scenarios are:

- Simple User
- Business or Service Owner
- Admin of the platform

These three use case scenarios for the time being makes it possible for the user at this point, to use each time only one of them , forcing the user if he wishes to be a user and business owner, to have to separate accounts. As discussed in the future work section this function will change. Users can not be Admin's unless they operate the website.

Before analyzing each scenario, there are some actions that can be done without logging in the web site. Those actions can be made by anyone just by entering the website. The first thing someone faces when entering is the home page as seen in Figure 14 below.



Figure 14 Homepage

This is the website's landing page for anyone who wants to visit it. For the time being the website supports only the Greek language, therefore everything is going to be displayed in that language. But as described in the future work sub-section, this is going to change in the future and support more than one language. After viewing the website, a user can perform two actions. One, go to the log in page and sign in like it's displayed in Figure 15, or proceed to the register form and create a new account like displayed in Figure 16.

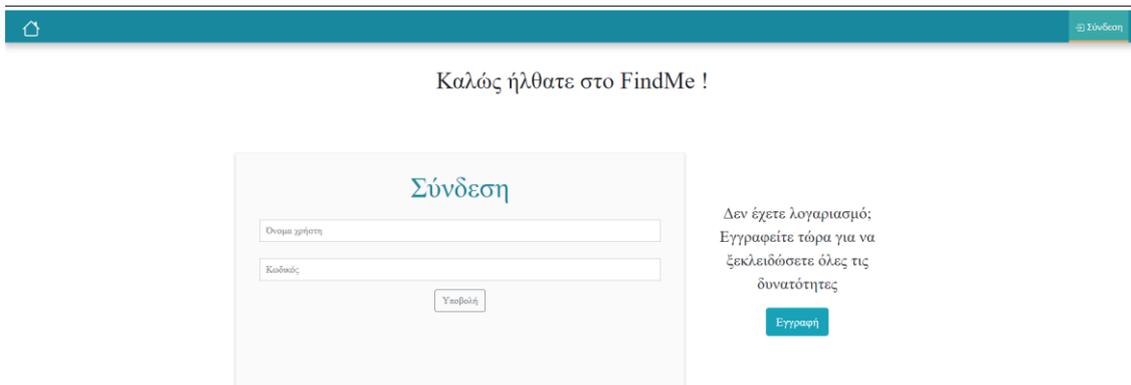


Figure 15 Log In

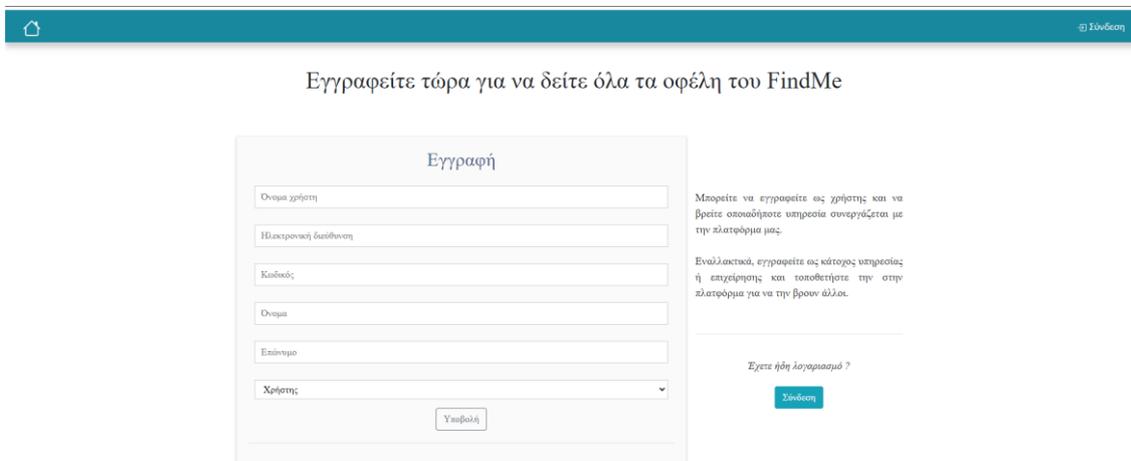


Figure 16 Register

Secondly the user can search and find any type of business or service he desires, as seen in the top of Figure 17, at the dropdowns and the search bar. In this case the results for his initial search will show below, but at this time the only thing he can do is view the initial information of the business and view them their position in the map. If the user wishes to enter one business, he/she has to log in to view more details about them.

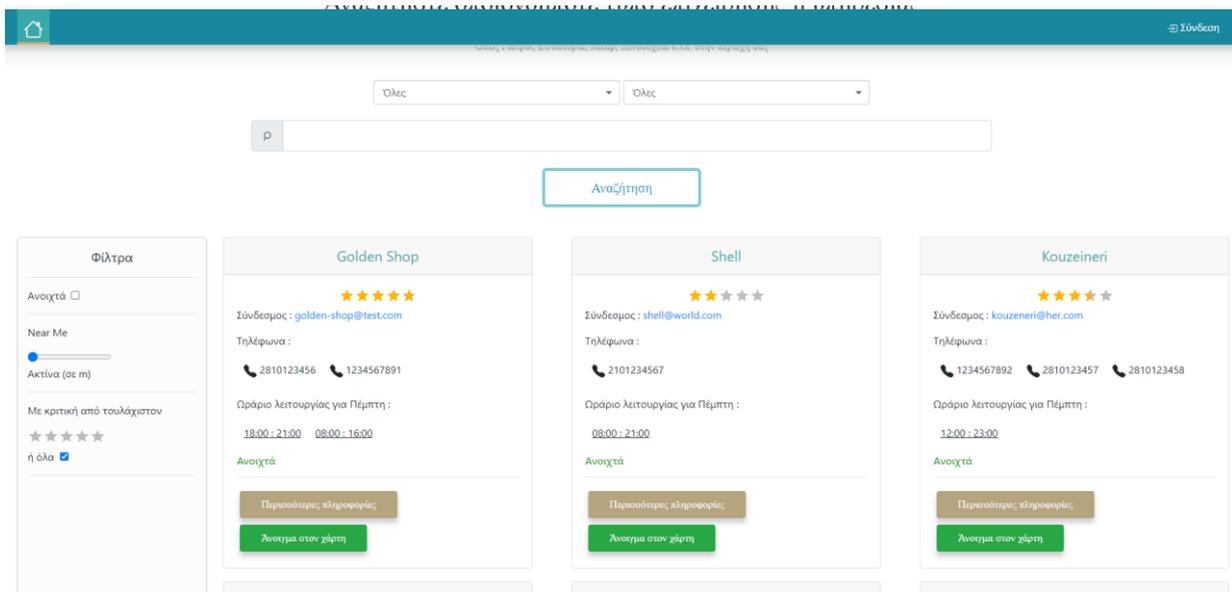


Figure 17 Results

To conclude, for the user to take the full advantages of the platform they have to first log-in to the website and proceed, depending also at the role they have. Thus, in the following sub-sections the action of each role will be displayed.

4.2.1 Simple User

For a user to be identified as a normal simple user at the registration form, he has to decide first what kind of user he chooses to be, as seen in Figure 18. The option of being a simple user, or as will be described in the next sub-section being a business-owner and setting up his own e-commerce business. In the first case scenario after the user has successfully registered as a normal simple user, he will be able to proceed and search for whatever he desires.

Εγγραφή

Όνομα χρήστη

Ηλεκτρονική διεύθυνση

Κωδικός

Όνομα

Επώνυμο

Χρήστης

Χρήστης

Διαχειρηστής Επιχείρησης

Figure 18 Register User selection

After a user signs in, he will be redirected to the homepage where he will be able to find the desired business or service he is looking for. Hence, the user after entering the desired preference for the city and the business, by pressing the search button the result will appear, if the kind of business he is searching for exists on this platform. As mentioned in sections before, entering a desired city, or a type of business or service is not mandatory, and the result will simply show whatever exists in the conditions the user has set.

As you see in Table 3 Simple User below, (a) is the place where the users select the city as well as the type of business or by inputting what type of business, they want in the input field below. Followed by the search button and the result will show after clicking it as we see in Table 3 Simple User (b). At Table 3 Simple User (c) we can see all the extra filters users can use to narrow down and adjust the result set.

For this version we have three filters. First, we have a checkbox to show us what businesses are open the time that the users are browsing. But for this to work, the business owners must have set the weekly schedule, or else their business will not appear. The second filter is a feature called “Near Me” where the users select how close to their location, they want the business to be. This feature works within a radius from their location and is counted in meters and it has a minimum of 1000 meters, a maximum of 50000 meters and some in between. Once again for this to be able to work, the owners of the business must have set an address, or addresses for their business, with latitude and longitude. This feature works also in the virtual map, as it draws a circle with the user being in the middle, and it will be showcased later in this sub-section. The last filter is a star-based system that is defined from the rating of the businesses. For this filter to

show results, other users must have rated the businesses so it can work properly. If users haven't rated at all a business, it will display the proper message or else the rating of it. To summarize, all the filters can work one by one, or combined and their goal is to take the result set that has been given, from the type and city, and narrow it down to help the find what he wants.

At last at Table 3 Simple User (d) is how every business is presented. Here, some basic attributes are shown before entering them for more information. The name of the business is displayed, then the reference e-commerce or e-service website is displayed, the available telephone numbers if available, the schedule hours for the current day and the active status, if a business is open or closed. Besides that, there also two buttons, one for displaying the desired business in a map and one for viewing more information's for the selected business.

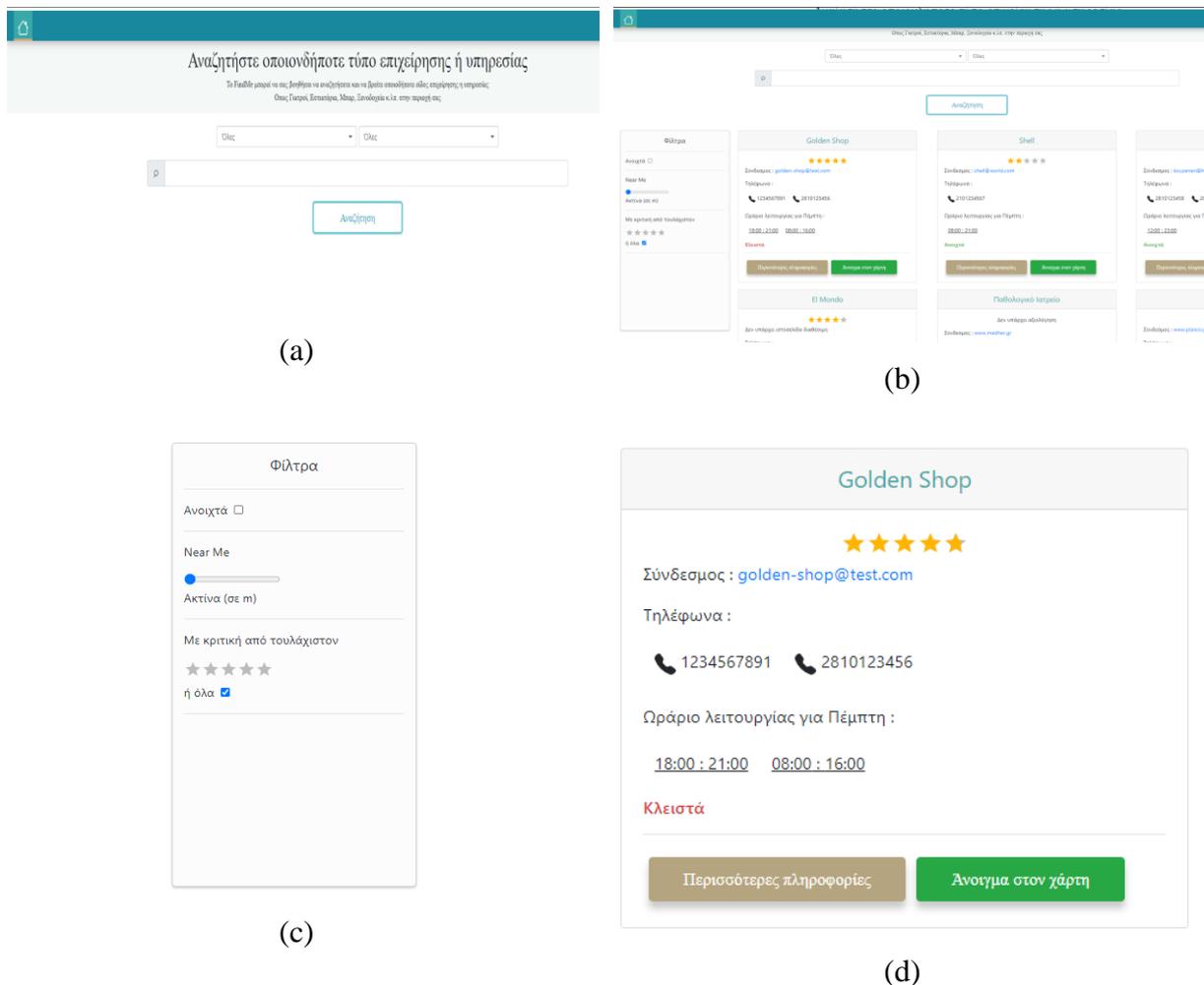
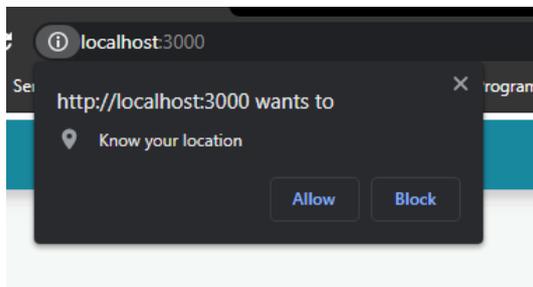


Table 3 Simple User

Users can view the business in a virtual map, regardless of their status. Therefore, anyone can see where a business is located in relation to their location. After the users select to view a business in a virtual map, they will be confronted with something that looks like Table 4 Virtual Map below. At Table X (c) a standard map can be seen with a blue marker that indicates the

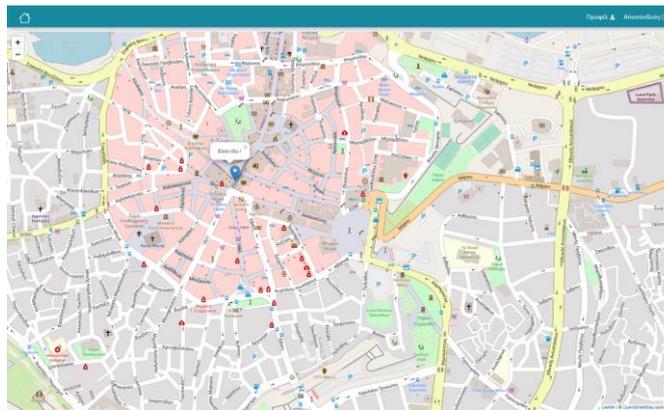
location of the user. For the location of the user to be shown, the user has to accept in the browser for the location to be accessible like Table 4 Virtual Map (a) and (b) demonstrates. At Images (d) and (e) of Table X you can see some green markers, that indicate the location of the business. It can either be one or more, it depends from the addresses that the owner has register for his/her business. When the user clicks at a business marker it will display a pop up, that will have the rating of the business, the address and the postal code. At last image (f) of Table 4 Virtual Map shows the user being in the center of a circle, that suggests that the user has used the FindMe filter and has chosen in what radius he wants to find a business. At this example we can see that the same business has two different markers but only one meets his desired radius, therefore its inside the circle.



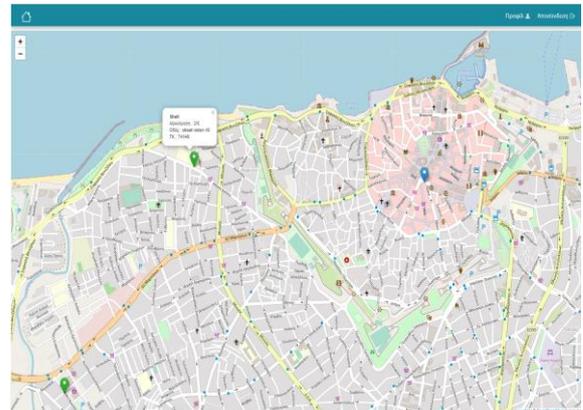
(a)



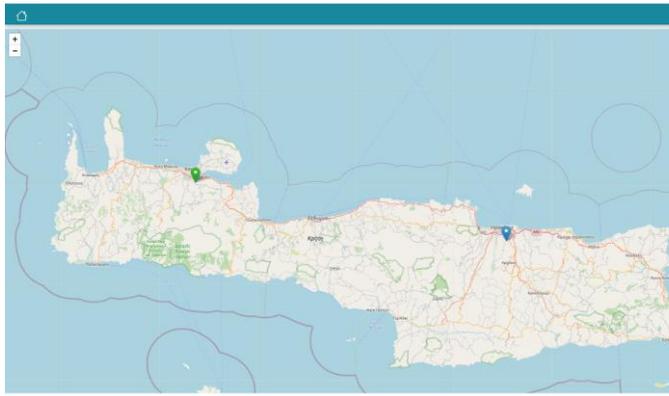
(b)



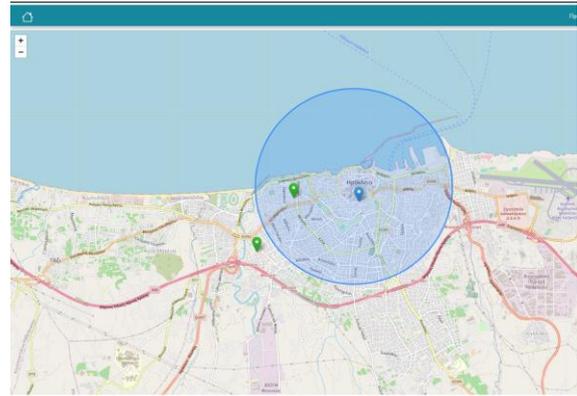
(c)



(d)



(e)



(f)

Table 4 Virtual Map

If the user chooses to click view more information as seen at image (d) at Table 3 Simple User, he will be redirected to the selected business. The user there, can perform some actions.

Those actions are:

- View information about the business
- View available products.
- View available services.
- Send message to the selected business.

Just as Figure 19 below shows, the first that the user encounters is the general information of the selected business. This information includes a field of general information of the business, that is described in a few words, like the names of the owners, the weekly schedule, the available telephones, the reference website, the available addresses and the rating that the user has given.

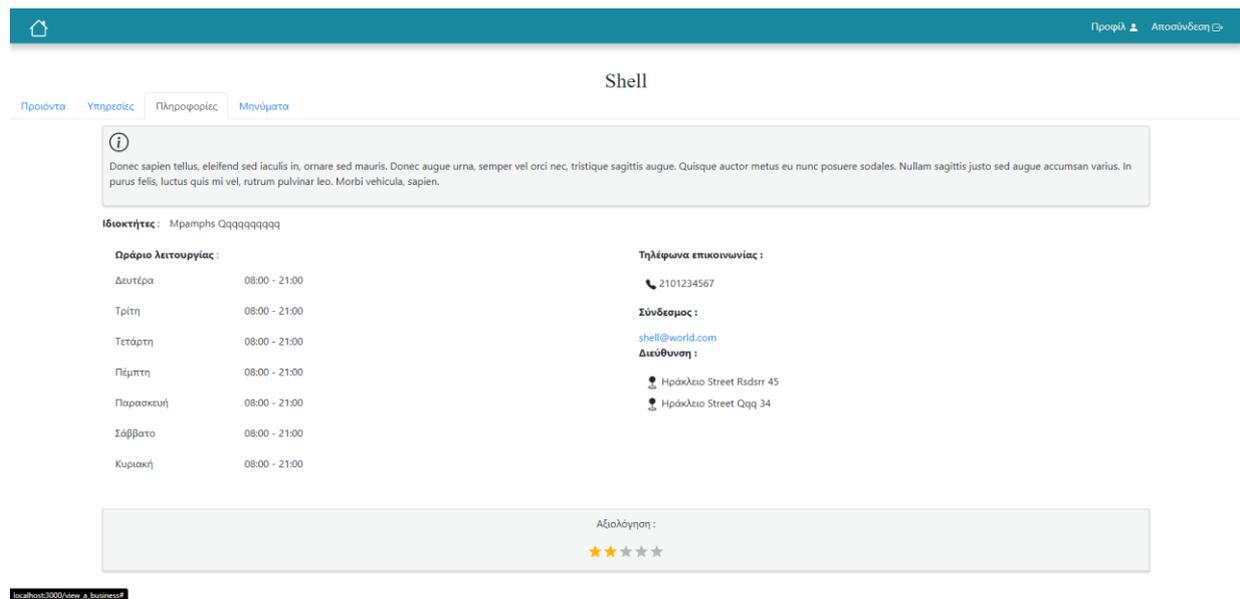
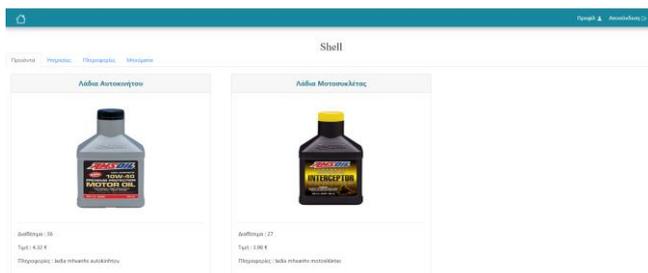


Figure 19 Business Information

After the initial encounter, the users can choose the steps that they wish to perform. In the first two, as we also see at Table 5 Products & Services (a) (b), the users can view the products and services that the business has registered. For the products we can see the availability, the cost, some information about the product and also some images of it. For the services we can see the cost and some information about what the service provides. A business doesn't necessarily have to have both products and services, it can either have one of them or both and also as many as they wish.



(a)



(b)

Table 5 Products & Services

The last action that the users can make is send messages with the selected business. If no messages have been sent, a related message will appear like image (a) at Table 6 User Messages. In the other case if multiple messages have been sent, the users are able to view the entire history, like the example shown at image (b) at Table 6 User Messages.

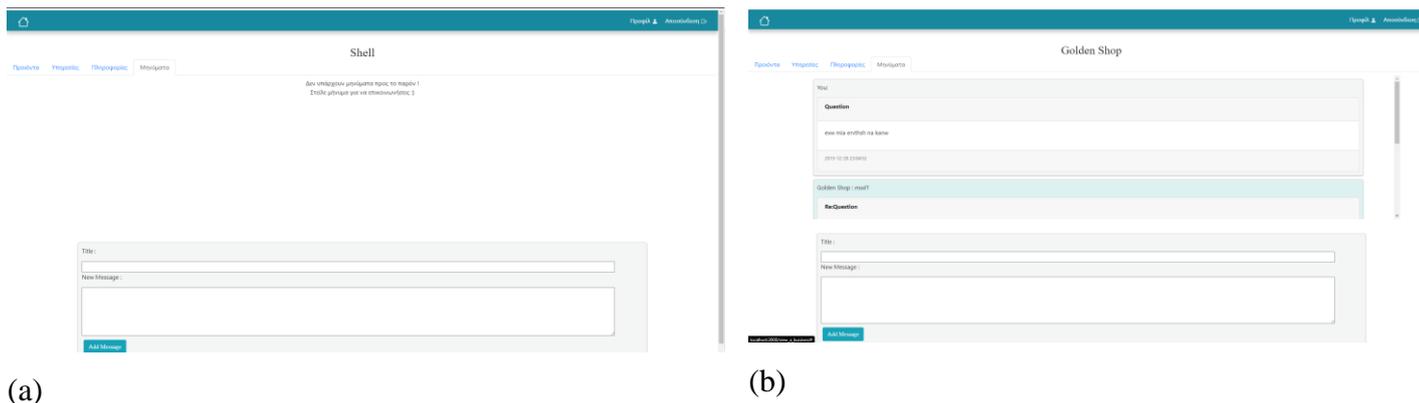


Table 6 User Messages

Another action that a user can do is visit the profile page, which is accessible left from the log out option, as seen in previous images. Currently, the profile page only displays the information of the user and no action can be made so it is under construction. Users can visit it, but they are not able to perform any tasks. The profile page as described in the future work in a later subsection, is going to be more interactive and will have a use.

4.2.2 Business / Service owner

For this use case scenario, a user sign's in as a business owner, which gives him the opportunity to manage his own business. The, the owner can portray the products and services that the business has to offer even if the user owns an e-commerce website. The goal is your business to be seen in a separate platform together with other businesses as well, and to showcase what the business has to offer and in case the user is interested, to then visit the business website. Also, if a business owner doesn't own their own website, the owner can promote their products and services.

In this scenario there are two steps, the first step is done by every business owner one time after they register as a business owner. This step is referring in the creation of their business on this platform. This is done by entering the name, some information and the reference site for their business. All this data can be changes after they move to the second step. So, the second step refers to the continuous management of their business. There the owners can perform any kind of actions that are possible. For this reason, this scenario has to sub-scenarios, the New Business / Service Owner and Existing Business / Service Owner.

4.2.2.1 New Business / Service Owner

As said above, when the users register as a business owner, the first thing they are confronted with is the page of the Figure 20 below. It is the first step, which essentially creates the business at the platform. This form consists of three fields, one for the business name, another for some information's of the business and a third about the reference website. All the fields can be adjusted in the feature in the next phase.

The screenshot shows a web interface for creating a new business or service. At the top, there is a teal header bar with a home icon on the left and the text 'Αποσύνδεση' on the right. Below the header, the main heading is 'Create new Business or Service'. Underneath this heading, there is a subtitle 'First step for creating your new Business / Service' and a smaller instruction 'Add Business name, Information and your Reference Site'. The form itself is a light gray box containing three input fields: 'Business Name', 'Information', and 'Reference Site'. A green button labeled 'Create Business' is positioned at the bottom left of the form.

Figure 20 Create New Business

4.2.2.2 Existing Business / Service Owner

After a user has registered as a business owner and has successfully completed the first step for their business, the user can perform certain actions to their business, to make it completer and more presentable for the users to go through.

The business owner can:

- Update Business name, information, reference site
- Add and Delete: owner name, telephone, address, type
- Set weekly schedule
- Add, Update, Delete products
- Add, Update, Delete services
- Read and Send messages

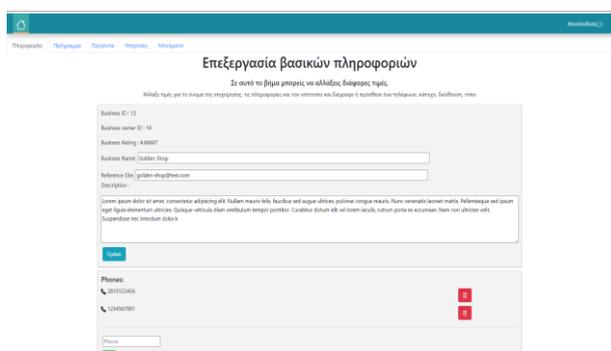
As the business owner has signed up and has already complete the first step, the owner will

be redirected to the component that processes the basic component. As you also see at images (a) and (b) at Table 7 Update, Add, Delete Basic Information the owner can update the field of the business name, the information of the business, the reference website and view the rating of his business, if it exists.

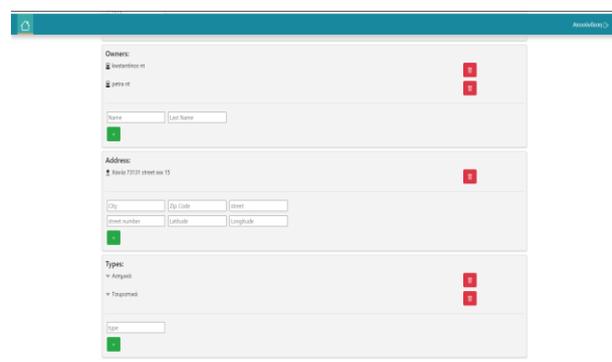
Next, he can add or delete any of the following:

- ❖ Owner’s names
- ❖ Telephones
- ❖ Addresses
- ❖ Type of business

Any of the above described, the owner can add as many as he wishes and is not obligated to have fields on them. It is though preferred as it is useful for the users upon their searching.



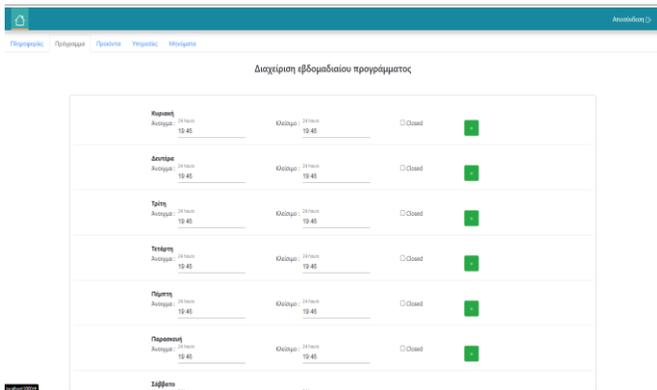
(a)



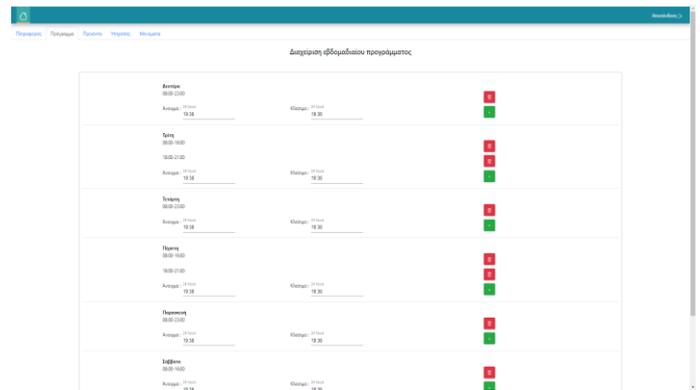
(b)

Table 7 Update, Add, Delete Basic Information

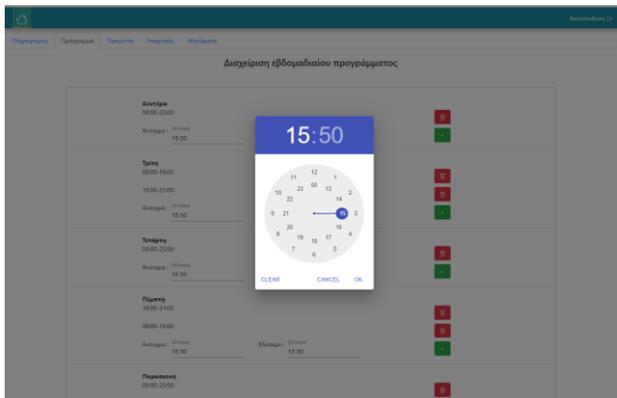
Another action a user can perform, is that of setting up and modifying the weekly schedule of the business. This action can be found under schedule and gives the owner the ability to modify the weekly schedule. The action here that can be done, are add a schedule timeframe, which will consist of the opening and closing time of the business, in a day for every day, but the owner can add as many timeframes as he likes, as long as the values are valid. Another action the owner can do is to set the business to be closed for a day by click, a checkbox and adding it. As said, the owner can change his original weekly schedule, by clicking the delete button for an existing timeframe and adding another one or more. At Table 8 Schedule we can see in the figures some examples at how the customization of the weekly schedule works.



(a)



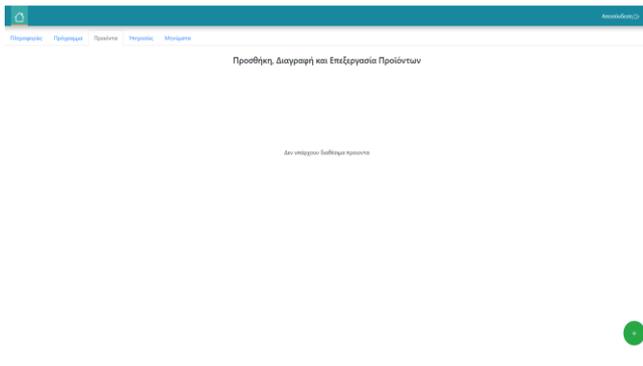
(b)



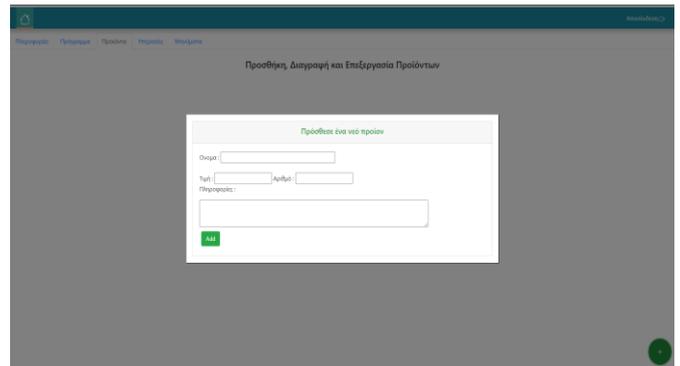
(c)

Table 8 Schedule

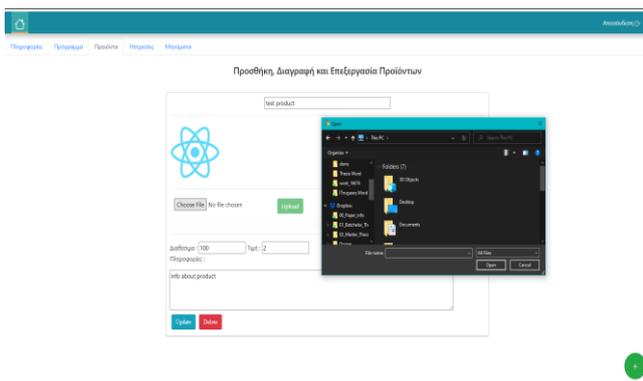
An essential action that the owner can perform is the management of the products. Starting off, if the business does not provide any product, it's not required to add one to his business. Then, the owner can add a new product or update an existing. To add a new product there is a add button at the bottom of the right corner as seen at image (a) of Table 9 Manage Products, that the owners selects. Then a modal appears for inputting some information about the product. The owners add the name, value, quantity and the description, an example is shown at Table 9 Manage Products (b). Then, the user can upload some images for any product and delete them if he chooses afterwards. Further, the owner can update a product by changing any field and clicking the update button or even delete a product if they wish for it to be no longer visible. Actions like those can be seen at images (c) and (d) at Table 9 Manage Products.



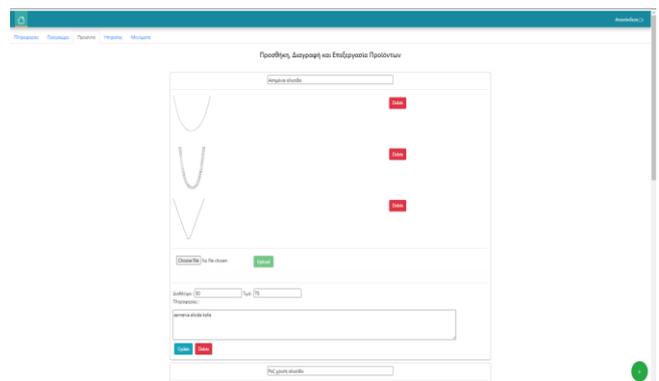
(a)



(b)



(c)



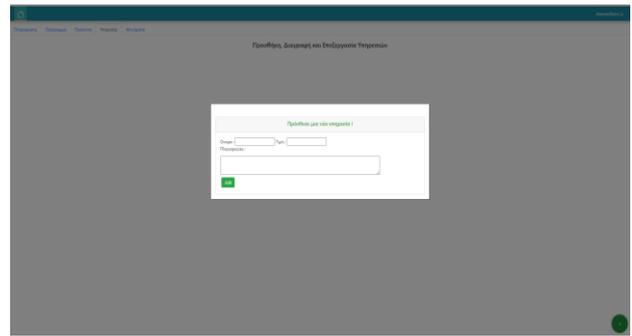
(d)

Table 9 Manage Products

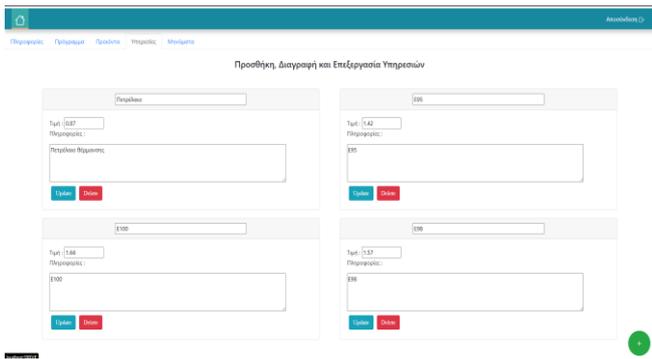
Another essential action is for the owner to add any service that the business might offer. Again, like the products, if the business does not offer any, it's not mandatory. The main difference between the products, is that the service is something that the business has to offer, therefore there is no field for quantity. An example would be for a doctor providing a regular checkup, where the checkup has a value but not a quantity. A business can offer as many services as possible. To add a new service, the owners can add one by selecting the button on the right bottom and filling out the fields. All the services can be updated in any of the existing fields they have, or to be deleted if they are not supported any longer. Representation of the system managing the services can be found at the images of Table 10 Manage Services.



(a)



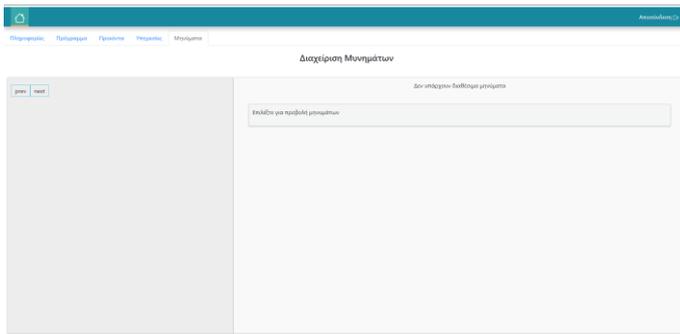
(b)



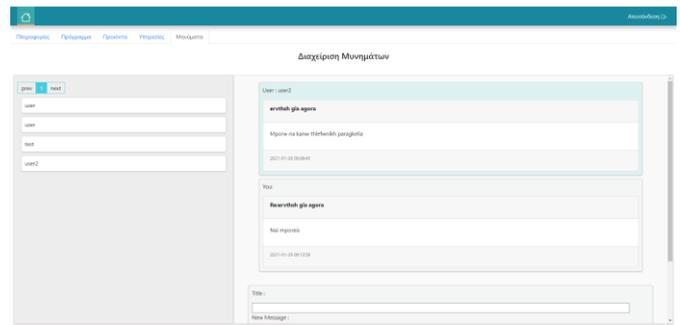
(c)

Table 10 Manage Services

A last feature that the platform has to offer is for users to send any kind of messages to the business. Therefore, the owners are able to view all the messages of the different users. Unlike a user that sends a message at one business at the time. The owner of a business is able to read and respond to all the messages that they receive from all the users that have send them. As seen at images (a)(b) of Table 11 Business Owner Messages, the message system is different from a simple user. The system is composed of two parts, one of viewing the usernames of the users that have send the message, and then by clicking on their username the message can be viewed at the right. There the owner can view their conversation and send a new message if they choose.



(a)



(b)

Table 11 Business Owner Messages

4.2.3 Admin of the platform

A last role that the application supports, is the one of the admin. The admin essentially should be able to moderate the website and apply changes wherever its needed or not. For this thesis an admin role was added, but because the focus was more on the other roles, the actions that a admin can take is that, of deleting any business he desired and find unfit. In the future the role of the administrator will change, and more actions will be added to that case so it will be more re presentable for an administrator of a website.

As Seen in Figure 21 below, the admin can view all the existing businesses, with the business id and the owner id which essentially is the id of the user. Then the admin can click the delete button and delete at once all the business of the owner. Therefore, when the owner log's in, the business will have been deleted and he/she will be in the first step and have the opportunity of building another business if they wish.

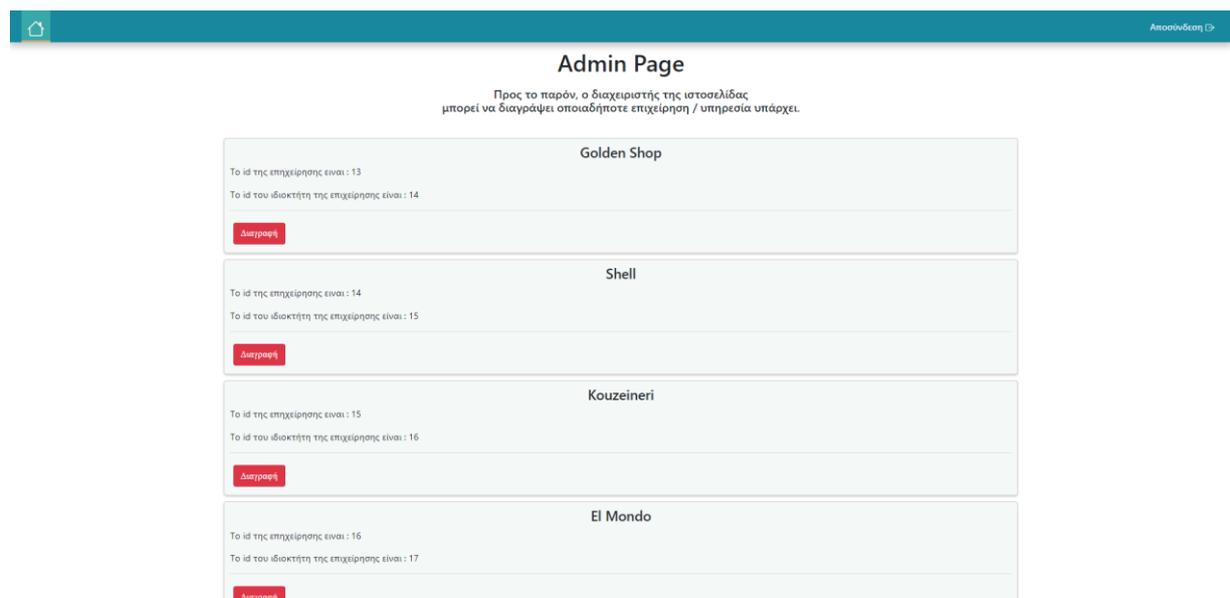
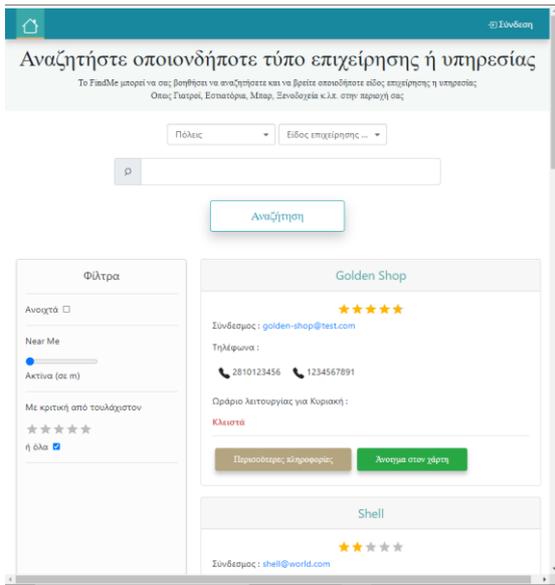


Figure 21 Admin Page

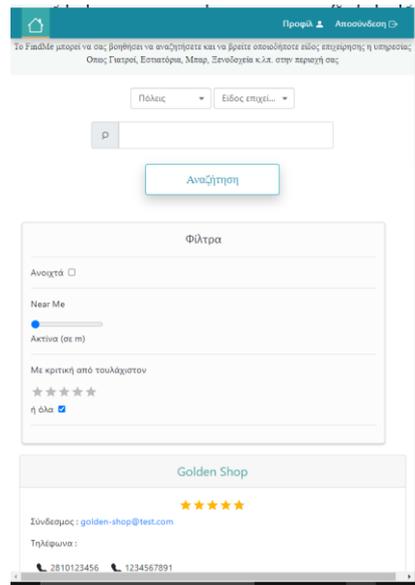
4.3 Responsive Implementation

Nowadays, most of the applications that exist have two different applications for their implementation. Those essentially are, one in the form off a website and another for android, iOS smart devices. In big companies and programming firms it is easier to develop separate applications, that would take all the advantages of the platforms that are being built in. Nevertheless, because this was an implementation of a master thesis, to build all the different application, except pressure of time, it would also be a problem in with the knowledge of building all the different applications with the different kind of programming languages.

Thus, a decision was made to build a website, that would also be responsive to as many devices as it could. Therefore, the components would be resizable depending to the screen resolution that the user would have. Also, because most of the smart phones support a browser, the users could browse the application from there and use it. At Table 12 Responsive Implementation, images (a) and (b) display the application in smaller size screens and you can see the components shifted on other places and images (c), (d), (e), (f) display the application in a mobile environment hence the application has a level of responsiveness.



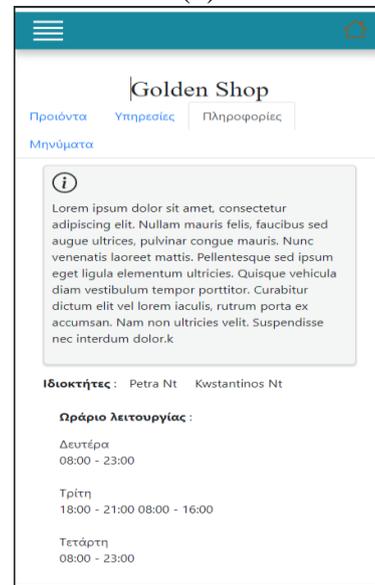
(a)



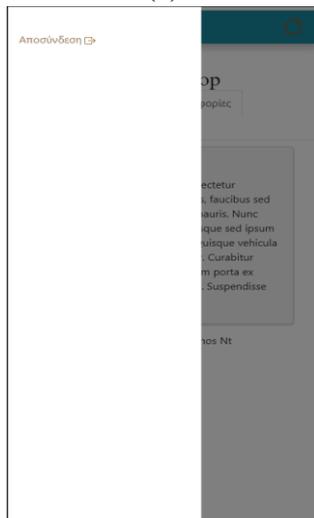
(b)



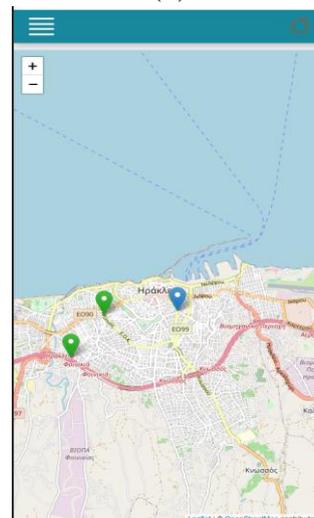
(c)



(d)



(e)



(f)

Table 12 Responsive Implementation

5 Conclusion & Future Work

The final section of this thesis will refer to the conclusion and final thoughts of it, as well as some words about the future work that could be done to extend the application and make it more attractive for users.

5.1 Conclusion

E-commerce websites and services work together to monitor application connectivity and communicate online networks, business associates as well as consumers, in a cost-effective manner over the internet. Individuals and businesses can also keep various roles and e-business resources over the internet, which can be integrated through internal business processes or exchanged with trading partners, thanks to the new web services standards and innovations. Therefore, almost all the businesses attempt to create their e-commerce website, or be a part of an already existing one, with goal to help boost their reputation and sales.

Taking everything into consideration, it was a great experience developing this master thesis project. The concept of the project isn't something entirely original or groundbreaking, although it has some unique feature. One of the strongest points of it was to learn some technologies that are dominating at this time and are commonly used by many programmers and companies and will hopefully help the process of finding a job in the programming world a bit easier. Therefore, building it was challenging as said in previous chapters because of the learning curve it needed it. Also, a difference from other implementations that are similar to it, is that's an open-source software and is accessible by anyone just by downloading the source code from GitHub.

In conclusion the purpose of this applications called "FindMe", is to help people find any kind of business or service they desire in one platform, without to search around the internet for hours. The application doesn't only find the available business, but also provides a visual representation in a map, as well as the possibility to send messages to this particular business, view all its products as well as the services it provides and afterwards if the user is interested to redirect to their e-commerce website to continue his purchase. The only drawback at this point is, that for the business to be accessible, the business has to be uploaded from the business or service owners.

5.2 Future work

Developing and improving a website is not an easy task and in generous it really never stops because there are always ways to improve and upgrade it, by knowing that for the development of a website it needs more than just building an application. Most custom websites are composed from a frontend application one or more backend applications or API's and one or more types of repositories.

Therefore, some goals were set for this project, to have a meaning of developing as well as for the project to have a purpose. Nevertheless, as already said it can always be improved by either fixings bugs and errors that were never found or change the user interface by making it more user friendly, or by adding and introducing new features to the website. For this reason, there is for sure some future work that has to be done to improve the quality of the website and make it better.

Features that could changes and added are:

- Better user interface UI. As this project was being developed, the most attention was given in the functionality of it, particularly in building both the applications and passing the needed. Thus, a future work is definitely going to be, by upgrading the User Interface and making it more user friendly.
- Favorite products, services option. Another future improvement will be the addition of a favorite option that will be displayed in the products and services and could be viewed afterword's in the profile page.
- Profile Page. At the time being the application has a very simple profile page that only displays information about the user, without that any further actions can be done. In the feature the profile page will be updated and will display some information about the user, that would be updateable. It would also display the favorite products and services and could also hold the messages with the conversation that have been made with already existing businesses.
- Algorithm for presenting the most viewed and relevant businesses. One more feature that could be added is for a user to view his most viewed businesses and besides that the ones that are relevant to them.
- More filters after the initial search. At this point the application after its initial search, based on the city and type of business, there are three extra filters that restrict the result

set. Hence, some more filters could be added to give a better experience to the user.

- More actions for a admin. A possible future update would be for the admin to have more actions than deleting a business as a hole.
- Multiple roles for a user. At this moment a user has only one role. The user can either be a simple user browsing for business, a business owner managing a business or the administrator of the website. The desired outcome would be that a user can manage his own business but at the same time search for other business for himself instead of making a second account.
- Add more information to business and services. Another change could be, that the business could offer more information than the basic that they have. At time being, in a business, the user can view products, services, the schedule of the business, phones, addresses, owners, the reference website and also send messages to the site.
- Multiple languages support. The application supports and displays are only offering the Greek language in this existing version. A future update would be to support multiple languages.

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