

T.C.
HASAN KALYONCU UNIVERSITY



Online Auction Application

GRADUATION PROJECT REPORT

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FACULTY OF ENGINEERING
COMPUTER ENGINEERING DEPARTMENT

Online Auction Application

GRADUATION PROJECT
IN
COMPUTER ENGINEERING

By

Chill

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Graduation Project

in

Computer Engineering

Hasan Kalyncu University

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Name of the Project: Online Auction Application

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Exam Date: 01-13-2021

We hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. We also declare that, as required by these rules and conduct, we have fully cited and referenced all material and results that are not original to this work.

Mahir Tekin Erdensan R meysa Kutlu Abdullah Burhan Bařaran

ABSTRACT

ERDENSAN, Mahir Tekin

KUTLU, R meysa

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Bitirme Projesi, Bilgisayar M hendisliđi Tez Y neticisi:  đr.G r. Mustafa Bı akcı Nisan 2021

We will discuss the plans, technologies, system designs, and application operation in this article, which are all essential for the application's growth. We will describe the ecosystem we have developed in the following sections of our paper. Our main goal in launching this app is to contribute to the industry's development by making it simple for interested users to engage in auctions.

In the past, auction catalogs were only sent to a select group of collectors and art enthusiasts. Our online auction app ensures that consumers have a safe and stable auction experience. All collectors, users who want to start collections, and users who want to sell their items will be able to participate in auctions without difficulty and purchase the item they want via auction thanks to our application. We hope that by using the auction system, users will be able to dispose of their products in a secure, simple, and quick manner. One of the key goals of our application is to ensure the authenticity and reliability of auctioned product offers while also reducing the possibility of fraud. It also aims to have a level playing field for users bidding. For personal verification, our application provides users' TR identification number, phone number, e-mail address, and other information. taking advantage of their expertise We assume that these checks should be performed only before users build or bid on auctions.

In the world we want to build, users should be able to openly watch and comment on auctions without having to share any personal details. We built our application around security and freedom dynamics based on this knowledge.

ÖZET

ERDENSAN, Mahir Tekin

KUTLU, Rümeyza

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Bitirme Projesi, Bilgisayar Mühendisliği Tez Yöneticisi: Öğr.Gör. Mustafa Bıçkıcı Nisan 2021

Bu raporda uygulamanın geliştirilmesi için gerekli olan planlardan, teknolojilerden, sistem tasarımlarından ve uygulamanın işleyişinden bahsedeceğiz. Raporumuzun sonraki kısımlarında, size oluşturduğumuz ekosistemi açıklayacağız.

Bu uygulamayı çıkartmaktaki en büyük arzumuz, ilgilenen kullanıcıların kolaylıkla bir müzayedeye katılabilmesiyle sektörün büyümesine katkı sağlamak. Eskiden müzayedede, evlerinin yalnızca sınırlı sayıda koleksiyoncu ve sanatsevere gönderdiği kataloglardı. Çevrimiçi müzayedede uygulamamız, kullanıcılarına güvenli bir açık artırma oturumu sağlamaktadır. Uygulamamız sayesinde bütün koleksiyoncular, koleksiyon yapmak isteyen kullanıcılar ve ellerindeki eşyaları satmak isteyen kullanıcılar zorluk yaşamadan müzayedelere katılabilecek ve istediği eşyayı açık artırım ile sata alabileceklerdir.

Bu uygulama ile birlikte, uygulamamızı kullanan kullanıcılara satmak istedikleri eşyalarını güvenli, kolay ve hızlı bir şekilde, açık artırma usulünü kullanarak elden çıkarmalarına olanak sağlamayı hedefliyoruz. Uygulamamızın ana amaçlarından biri, açık artırmaya çıkan bir ürün için gelen tekliflerin doğruluğunu ve güvenilirliğini sağlamak ve dolandırıcılık riskini erken aşamada engellemek. Ayrıca teklif veren kullanıcılar için adil bir ortam oluşturmaya çalışmaktadır.

Uygulamamız, şahıs doğrulaması için kullanıcıların TC kimlik numarası, telefon numarası, e-posta vs. bilgilerinden yararlanmakta. Bu doğrulamaların sadece kullanıcıların bir açık artırma oluştururken veya bir açık artırmaya teklif sunmadan önce yapılmasına gerektiğine inanıyoruz. Oluşturmak istediğimiz ortamda kullanıcıların kişisel bilgilerini paylaşmadan özgürce istedikleri müzayedeleri izleyebilmelerini ve yorum yapabilmelerini istiyoruz. Bu bilgiler altında uygulamamızı güvenlik ve özgürlük dinamikleri altında geliştirdik.

Table of Contents

ABSTRACT	7
ÖZET	8
1. INTRODUCTION.....	12
1.1 Purpose and Scope	12
1.2 Problem Statement	12
1.3 Solution Statement	13
1.4 Contribution.....	13
2. LITERATURE REVIEW	14
2.1 Why do people need this application?	14
2.2 What is the reason for the application?	14
2.3 What does this app do?	15
2.4 What Are Similar Applications?.....	16
2.4.1 Foundation.app	16
2.4.2 PeraMezat	16
2.4.3 eBay.....	16
3. SOFTWARE REQUIREMENT SPECIFICATION	17
3.1 Introduction.....	17
3.1.1 Aim.....	17
3.1.2 Target Group and Reading Recommends	17
3.1.3 Product Scope	17
3.1.4 References	18
3.1.4.1 What is Django?	18
3.1.4.2 What is Web Browser?	18
3.1.4.3 What is PIP?	18
3.1.4.4 What is MYSQL?	18
3.1.4.5 What is CloudFlare	18
3.1.4.6 What is SSL?	18
3.2 Common Description.....	19
3.2.1 Common Statement	19
3.2.1.1 System Interfaces	19
3.2.1.2 Interfaces	19
3.2.1.3 Hardware Interfaces	19
3.2.1.4 Software Interfaces.....	20

3.2.1.5	Network Communication Interfaces	20
3.2.1.6	Memory Constraints	20
3.2.1.7	Browser Compatibility	20
3.2.1.8	Site Adaptation Requirements	21
3.3	Product Functions	22
3.3.1	First Impression	22
3.3.2	Membership Login.....	22
3.3.3	Declaring the Type of Product.....	22
3.4	User Features	23
3.5	Limitations	23
3.6	Assumptions and Dependencies	24
3.7	The Requirements	24
3.8	Particular Requirements.....	25
3.8.1	User Requirements	25
3.8.1.1	User Registration.....	25
3.8.1.2	User Validation	25
3.8.1.3	User Login.....	26
3.8.1.4	Chatting	26
3.8.1.5	Comments.....	26
3.8.1.6	Starting a Auction.....	26
3.8.1.7	Updating Auctions.....	26
3.8.1.8	Finding a Auction.....	27
3.8.1.9	Discussing a Auction.....	27
3.8.1.10	Defining of Auction Method	27
3.8.1.11	Making a Bid for Auction	27
3.8.2	System Requirements	28
3.8.2.1	User Registration.....	28
3.8.2.2	User Validation	28
3.8.2.3	User Login.....	28
3.8.2.4	Starting a Auction.....	29
3.8.2.5	Bidding a Auction	29
3.8.2.6	Listing Auctions	29
3.8.3	Non Functional Requirements	29
3.8.3.1	Performance Requirements	29

3.8.4	Functional Requirements	30
REFERENCES	31

1. INTRODUCTION

This part is the part that allows us to understand the project.

1.1 Purpose and Scope

Our app aims to give people the opportunity to purchase items they want safely through auctions and to provide financial benefits through selling products they don't need at a price that is possibly higher than their value.

1.2 Problem Statement

Web services and applications have influenced information exchange and expanded its usage as a result of the widespread use of the Internet, and web applications that allow for several transactions are the subject of attacks because they include different information such as personal information, bank account information, and corporate information. The safety of these environments is inextricably linked to the safety of web applications. When it comes to security threats, OWASP (Open Web Application Security Project) stands out as the most detailed company. OWASP maintains a list of the most significant web vulnerabilities based on data from different security organizations in order to improve the security of software and web applications. SQL Injection is ranked first in the top 10 web application vulnerabilities study published in this list. Authentication tokens are usually sent over the network and are stored on both the frontend and backend. An intruder may exploit this flaw to manipulate user-supplied data in order to manipulate backend SQL statements.

When user input (Login, Registration, Message, and Comment Fields) is sent to an interpreter as part of a command or query, the interpreter is tricked into running unwanted commands and gaining access to unauthorized data. As a consequence, the attacker has the ability to inject malicious content into weak spots. Many of the information on the websites, including confidential details such as username and password, can be read from the website's database, and its data can be updated, as well as database management operations. Broken Authentication and Session Management is another form of vulnerability. For each valid session, websites usually create session cookies and session IDs. In web applications, session cookies are used to differentiate one user from another. Furthermore, the user's credit card numbers, and so on. It can contain crucial information, such as. This transparency is caused by the application's identity and session management features not being implemented. An attacker could hijack a session and gain unauthorized access to the device if they exploited this vulnerability, and there are several others like it.

1.3 Solution Statement

Users who want to sell their products via auctions can find it difficult to attract buyers based on this information. Unlike physical auctions, our application offers the items that users wish to sell to a larger number of customers. While publishing the product he wants to sell in our app, the user can add a price, description, and images to reach more customers. It can quickly categorize the commodity it wishes to sell so that only the appropriate buyers receive it. When we consider the customers' perspective, our application allows them to quickly find the goods they want and securely sell them. Buyers can explicitly ask the seller questions about the product without bidding, or they can disagree with other users about it. The competitive factor among auction participants is taken into account by our application, which ensures its reliability. To prevent malicious software from attempting to expose user information, such as SQL injection our application employs 256-bit SSL encryption

1.4 Contribution

We save time because users can quickly locate the items they are searching for on the app. This is advantageous to the consumer because we have a free application. It's a huge plus that the customer can choose the product he or she wants from a large number of options.

2. LITERATURE REVIEW

In this project, our goal is to provide our users with a platform where they can easily sell their items or buy the items they need. The most important issue for us in these buying and selling transactions is to provide our users with an environment where they can make a fast, reliable and easy transaction. Preliminary research on the subject is presented in this section.

2.1 Why do people need this application?

Because physical auctions are often an expensive event, these auctions are mostly held for famous and valuable art, historical artifacts or inventions. Such auctions usually take place in a public and crowded environment, especially due to the COVID-19 epidemic that has affected the whole world in the current period, such crowded events are prohibited by the authorities of the country where the event will be held. In short, our application both creates an auction environment for low volume sales and allows these transactions to be carried out without any physical contact. People are trying to avoid such crowded and physical contact activities that have become dangerous especially with this epidemic.

2.2 What is the reason for the application?

Nowadays, with the widespread use of the internet, such shopping sectors have started to become digital. The purpose of our online auction application is to provide an environment where people can sell their items through an auction in the easiest and most reliable way. In addition, to create an extra source of income for users who make sales through our application by establishing a marketplace for sellers.

2.3 What does this app do?

Users can access this application whenever they want, using the devices they want. Our application can be accessed with any internet browser. Our users can add products 24/7 or participate in any auction. In order to sell a product in our application or to send an offer for a product, the user must be registered in the system and have already confirmed the necessary information. The buyers can offer the products they want to bid, as they want, within the framework of the necessary conditions, and they can withdraw their offers whenever they want. Buyers can protect their privacy while making bids and can participate in auctions held with open bidding method by hiding their personal information from other users.

When starting an auction, the seller can choose two types of procedures. The first of these is the open offer method, where participation is open to everyone and the offers made for the product are shared with the public. This method is generally used for small volume sales, buyers can view other offers and make their own offers by comparing these offers. The other method we offer to our users is the closed mail method. In this method, while the buyers send an offer to the product they want to send a bid to, if the product is put up for sale by closed mail, the information of the bidder and the bidder is hidden from the public and from the seller and is shared only with the seller after the auction is completed. In this method, the main purpose is to protect the confidentiality of buyers and offerers in high volume sales. Sellers who want to put a product up for auction must specify the required title, description, categories, photo, start date of the auction, starting bid, end date of the auction and end criteria of the auction when starting the auction. The seller can edit this information later and cancel the auction if she/he wishes. Using this information, the application creates an auction under the selected categories in the system and tracks this auction until it is canceled or until the auction reaches the end criteria. The user with the highest bid wins the auctions that reach the end criteria. The application removes the bid of the winning user and makes the user who made the next highest bid a winner, as long as the user who won the auction does not pay within 1 day. After the payment of the winning buyer, the system waits for the seller to deliver the product to the buyer, and the auction is terminated after the buyer confirms that the product has been received.

Our application observes payment and shipping transactions in order to ensure that these buying and selling transactions are carried out in the most reliable way and that there is no risk of fraud. If the winner makes a payment, this payment is held and transferred to the seller if the buyer approves the product. The seller must ship the product within 1 week after the buyer payment. In case of not shipping, the seller's evaluation score is reduced and the payment made by the buyer is refunded.

2.4 What Are Similar Applications?

There are many online auction applications on the Internet. Below are a few similar examples.

2.4.1 Foundation.app

Foundation is an online auction site where artists and art lovers meet. It is used to discover and invest in creative digital artworks. [1]

2.4.2 PeraMezat

It is an online auction site where Ottoman, European antiques and various collections are established to bring together collectors and those who want to make collections. Users can buy an antique item of their choice by bidding at the auction with a certain time created by the website.[2]

2.4.3 eBay

eBay is the world's most comprehensive auction and online sales site, founded in 1995. Having entered the market only with the online auction model during the first years of its establishment, eBay later became the most popular sales platform by offering different sales models. Thanks to eBay, billions of people can get rid of their extra items in their closets and contribute to their budgets. [3]

3. SOFTWARE REQUIREMENT SPECIFICATION

3.1 Introduction

In this software requirement specification section, we will talk about background and minimum requirements for online auction application.

3.1.1 Aim

Online auction application aims to make a environment for his user that easily sell or buy products. In the same time with help of online payment methods, application create a comfortable and secure way to build a market place. Another important features of online auction application are control over scams and frauds with from identity authentication using user Tc. identification number, phone number and email addresses. With this features all fake users and scams will be blocked. Inside our website all collectors easily can find the valuable items.

3.1.2 Target Group and Reading Recommends

It can be used with the readers of item collectors and selling owners who aim to see this project from a real life example by reading the scope of application. Web developers will refer to the general idea and flow of the project's architectural design. The person responsible for managing this project development will refer to this document to manage each of this team.

3.1.3 Product Scope

The target of the project as stated above, our purpose is aim to make an environment for people that wants to buy or sell products with online auctions. The price of starting bid will have declared buy sellers. Bidders and seller can argue with each other for prices.

3.1.4 References

In reference part we will talk about outside technologies we have been used.

3.1.4.1 What is Django?

Django, is a high-end web framework developed with Python programming language. Django has been developed by talented developer and now publishing by Django Software Foundation. [4]

3.1.4.2 What is Web Browser?

Web Browser(s), help us to connect with WWW (World Wide Web). When a user wants to access a webpage, web browser sent a requests to the server and prints returned data to users. Web Browser works as a decoder like a bridge between user and server. [5]

3.1.4.3 What is PIP?

Pip, is a packet installer and management app has been developed with using Python programming language. Pip firstly developed by Ian Bicking [6] and licensed under MIT license. Pip is an open source project and up to the present there are already 527[7] developer has been worked on pip development.

3.1.4.4 What is MYSQL?

MySQL, is a database management system developed with using c++ and c programming languages. For non-commercial user, MySQL published with under GPL license. MySQL has 38.9%[9] market share on database management.[13]

3.1.4.5 What is CloudFlare

Cloudflare, inc. USA based, established in July 2009. It is a content distribution network encryption protocol used in 81.2% [10] of websites. Cloudflare encrypts user information such as password, electronic mail, username, phone number and ipaddress with SSL (3.1.4.6) using a reverse proxy server in the connection between the backend and frontend of websites.[12]

3.1.4.6 What is SSL?

SSL, is an encryption protocol used in data traffic between computer networks, designed and developed to provide secure communication. 51.8% of the websites on the Internet use this protocol. [11]

3.2 Common Description

This section will provide background information on our online auction application. We will provide information about the external systems of our application. We will explain how we take advantage of some of the technologies that our application uses while working.

3.2.1 Common Statement

We can compare our website with apps in the similar apps section. Let's start with eBay, which is among those we've listed. EBay is a global brand that sells to different countries of the world or offers the opportunity to buy products from different countries. Our site will be a nationwide brand, and buying and selling transactions will take place within the country. We also have things in common and one of them is that users can find products from any area they want and buy or sell these products wherever they are in the country. Another feature is that it is possible to find valuable products / artifacts, books, clothes, even toys on our site. Last but not least, auction and security. In order to participate in the auction on eBay, we need to create an account and enter certain information about our own account, such as username, password, credit card information. This feature is also valid on our site. Users can participate in auctions by passing certain authentication stages.

3.2.1.1 System Interfaces

In online auction application, there's only one dependency that is going to be used to manage auctions and look for their ending criteria. Except that, the system will be independent.

3.2.1.2 Interfaces

In this section, we will detail all the interfaces that support while development of our online auction application.

3.2.1.3 Hardware Interfaces

Our system uses different hardware interfaces at the back-end and front-end. We have to maintain a consensus of servers in the backend that grows in proportion to the number of users of our application. Considering the current number of users, we are using a VDS system that will run our background system. The environments and software required for the operation of the application we developed in this VDS system are provided by the hosting company. Since we do not perform any operation or data storage on the front-end hardware interface, it does not create a big problem.

3.2.1.4 Software Interfaces

We are developing our application on two sides. Back-end and Front-end, we use different technologies and software languages to develop and implement our application in these areas. For Back-end we are using latest stable version of Django 3.2. Also we are using Python 3 officially recommended by Django. In every step of development, we are taking advantage of latest version of Visual Studio Code version 1.55.0. In Visual Studio Code we are taking help of freelance developer's extensions. For manage Online Auction Application databases we are using MySQL 8.0.

3.2.1.5 Network Communication Interfaces


We are using different HTTP protocols for communication on Back-end and Front-end for our Online Auction Application. We use CloudFlare SSL (3.1.4.5 and 3.1.4.6) protection in all API requests to secure the communication between this frontend and the backend, which is one of the most important points of web applications, and to observe the safety of our users. Communications between Back-end and Front-end are usually about registering, logging in, adding products, submitting offers, etc. We use CRUD, i.e. Create, Read, Update, Delete methods in many important data exchanges. In all data transactions, a CRUD transaction sent from the frontend to the back is answered with a data package, and these packets are made readable in web browsers by using HTML with the frontend programming language.


3.2.1.6 Memory Constraints

Since our application is a website, it can be easily accessed from any device running a web browser. Users need a minimum of 256-512MB of ram.

3.2.1.7 Browser Compatibility

	Desktop						Mobile						Library
	Chrome	Edge	Firefox	Internet Explorer	Opera	Safari	WebView Android	Chrome Android	Firefox for Android	Opera Android	Safari on iOS	Samsung Internet	Node.js
ES6	32	12	29	No	19	8	4.4.3	32	29	19	8	2.0	0.12.0

 Full support

 No support

3.2.1.8 Site Adaptation Requirements

Because of we develop our Online Auction App with using Django, Django makes this parts easier.

3.3 Product Functions

In this section we will detail how we describe the system's handler for users. We will introduce important issues for our users such as money back, sending offers, offer times.

3.3.1 First Impression

Users will be welcomed with the introduction page of our application. It will explain the system to users in a short, clear and understandable way with visuals.

- Application features will be explained to the user with help of illustrations.
- User will be given forward-looking explanations and instructions.
- The user will be explained what they can do with the application.

3.3.2 Membership Login

The user needs to be authenticated by the system to bid or create a new auction.

- Users must enter their personal information into the system.
- Each user must have a unique password and e-mail address.
- User can login with using his/her own password and e-mail address. If he has a trouble while logging in, he can reset his/her password with his/her e-mail.
- When the user logs in successfully, the system redirects the user to the home page.
- The users cannot start an auction or bid on any auction for any product while unregistered. Unregistered users can follow the auctions organized by open bid method.

3.3.3 Declaring the Type of Product

Auctions often contain a wide variety of products. With our online auction application, we offer various categories for our users to put their products. All freedoms on product categorization are on to our user. The user determines the starting bid, category and ending criteria for the auction. The user can hold different auction sessions for different products at the same time.

- The products for auction are listed on our website.
- Users can list auctions according to the category they want
- Users can add their favorites to the products. Each product shows how many favorites and statistics.

3.4 User Features

Our Online Auction Application can make transactions 24/7. The end criteria and end time of each auction are determined according to the seller's request. The seller can change the information of the product in the auction or end the auction. Users can message or comment on the product with other buyers or the seller during the auction session. The use of the application is free for users, the system does not restrict or redirect any users. The reliability of buyers participating in the auction is measured by the previous purchases of the participating buyer. Buyers can send bids to the auctions they want, but buyers with a confidence vote of less than 3 cannot send any bids. Sellers can auction the products they want, but if the seller has not completed the requirement in past sales transactions, the confidence vote decreases. A seller with a confidence vote of less than 3 cannot start an auction for any product.

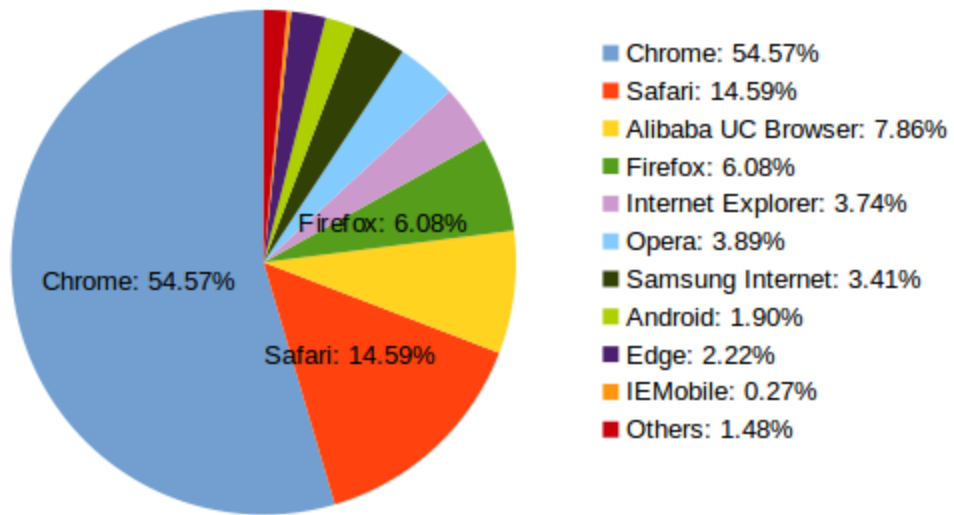
3.5 Limitations

- All users using any web browser can access the Online Auction Application anytime, anywhere.
- Users who want to create an auction or submit a bid to an auction in the Online Auction Application must be registered and identity verification verified.
- Users can view and comment on the products they want after registrationRegistered users who want to put a product up for auction or to submit a bid for a auction must identity verification verified.
- After users who want to verify his/her identity verification should enter their Turkish Identity Number, phone number and e-mail, the system tries to confirm this information. After the confirmation process, the user's confidence is increased to 10 points.
- These data must be provided by the user, the system cannot randomly generate any data.

3.6 Assumptions and Dependencies

Since our application is a website, general traffic will be provided through web browsers. Since our application operates as a website, it will work on any device that supports a web browser.

World web browser market share in October 2017 on all devices



Source: StatCounter.com

As seen in this picture, Chrome holds half of the web browser market share. Considering this information, we focus on development through the chrome browser.

3.7 The Requirements

















In this section we will talk about the general requirements of our application. The system needs some requirements for user account management, offer management and product management. For example, our application requires Turkish Identity Number verification to prevent fraud, scams and bot accounts. We ensure that there is not more than one account with the same Turkish Identity Number. The main purpose here is to try to create a fair and reliable environment for our users without extra account and fake accounts.


3.8 Particular Requirements


In this section, we will divide the general requirements section into two parts. We will examine the general requirements under the user requirements and system requirements..

3.8.1 User Requirements

Users can easily use our application on any device with a web browser that supports HTML5 and ES6 javascript. Specific versions of some browsers commonly used on the Internet are in the figure down below.

													
	 Chrome	 Edge	 Firefox	 Internet Explorer	 Opera	 Safari	 WebView Android	 Chrome Android	 Firefox for Android	 Opera Android	 Safari on iOS	 Samsung Internet	 Node.js
ES6	32	12	29	No	19	8	4.4.3	32	29	19	8	2.0	0.12.0

 Full support

 No support

3.8.1.1 User Registration

Users must to have a private session to perform certain operationsFor example, they need to be registered in the system to sell an item, to bid on an auction, to comment on an auction, or to ask a question to the seller.

3.8.1.2 User Validation

Even if users are registered, we require users to identity verification in order to prevent any fraud and bot accounts. To complete this identity verification, users must verify their Turkish Identity Number, E-mail address and phone number. Users who have not yet been verified will not be able to create an auction for any product or submit a bid to an auction.

3.8.1.3 User Login

Previously registered users can log in to the system from any device or log out whenever they want.

3.8.1.4 Chatting

Users can chat with any user they want. Users can comment on any auction or a product among themselves. Users who want to use this feature must be registered in the system and verify their identity verification.

3.8.1.5 Comments

Registered users can comment on an item and auction they want and socialize with other buyers in the comments. Comments can be deemed harmful and users can be reported and controlled by the administrator.

3.8.1.6 Starting a Auction

Registered and identity verification verified users can start auctions for the products they want. When starting an auction, the seller is obliged to enter some identifying information for the product he/she wants to sell by the auction. Identifying information such as a product title, product description, product photo and product tags for the product the seller wants to sell must be provided before the auction begins. The seller of the auction must add various dates and information to the system to manage the auction. In order to start an auction, the seller must specify the auction start bid, the auction start date, end date, and end criteria. In addition, when the user starts the auction, two different methods should be selected, the open bid method or the closed envelope method.

3.8.1.7 Updating Auctions

Sellers can revise their auction products at any time. For example, if the user has entered incorrect information about the product features they want to sell, they can update this information. The user cannot make any changes that will disturb the course of the auction. The seller cannot make any changes to the auction start date, end date, start bid, auction method and auction end criteria.

3.8.1.8 Finding a Auction

Buyers can participate in the auctions they want to participate, with a special token created for the auction, or they can reach the auction they want by filtering the product tags or browsing between categories. For use this features there is no need to be registered user.

3.8.1.9 Discussing a Auction

Users can use the comment feature of the auction to initiate a discussion with other bids or other users for an auction they wish to discuss. Before a user can comment on an auction, he/she must first register.

3.8.1.10 Defining of Auction Method

When creating an auction, the seller can create the auction using two different methods.

- Open Bid Method: The auction is open to the public and anyone can bid for the auction as they wish.
- Closed Envelope Method: The auction begins publicly, but all bids are kept until the end of the auction, taking into account the safety of the bidder from the seller and other bidders.

3.8.1.11 Making a Bid for Auction

Before a user can bid on the auction, he / she needs to verify his/her identify verfaction (3.8.1.2). Users who have completed their identity verification can place a bid above the starting bid price in ongoing auctions. Users can submit bids to the auctions held with open bidding method, by hiding their identities or open to the public.

3.8.2 System Requirements

This section contains some detailed pieces of information about user requirements in terms of system requirements.

3.8.2.1 User Registration

- Registration Page; will have e-mail, password, password repeat, user and phone number sections.
- The application will check whether these fields are checked or not. If any of them are empty, a error message will be sent to the user.
- E-mail and user name information will be scanned in the system, if a user previously registered with the same information is found, the user will be warned.
- When the registration is completed, users will be transferred to the identify verification page.

3.8.2.2 User Validation

- Registered users will be asked to identify verification according to their wishes.
- Email verification will be done first on the identity verification page.
- An e-mail containing a code will be sent to the user for e-mail verification and the code will be verified.
- After the e-mail verification, the user will be asked if they want to verify their phone and Turkish identity number.
- Thus who want to verift ther identity will be verify

3.8.2.3 User Login

- In login page; will have e-mail and password and login sections
- The application will check whether these fields are checked or not. If any of them are empty, a error message will be sent to the user.
- The e-mail and password information entered by the user will be scanned in the system and, if correct, the user will be directed to the home page.

3.8.2.4 Starting a Auction

- The seler can use the start a new auction page to start a new auction.
- The seller must enter product details such as product title, product description, product image, product tags to start an auction on the Start new auction page.
- In order to start a new auction, the seller must enter the start date, method, end date, start bid and end criteria related to the management of the auction on the start new auction page.
- When the user presses the save button after entering all the information, this information is saved in the database via API.

3.8.2.5 Bidding a Auction

- When a buyer wants to send a bid for an auction, he/she must click send a new bid button on auction page.
- The buyer must enter a price for his/her bid on the send a new bid page.
- After the bid is saved, the bid is added to the bids list according to the method of the auction and saved with the database via API.

3.8.2.6 Listing Auctions

- The auctions that are not yet completed are listed on the homepage under various categories and tags.
- When the buyer clicks on a listed product, the user will be directed to the product page.
- Products remain in the list until the auction is completed, completed products are removed from the lists.

3.8.3 Non Functional Requirements

This section will explain all of the non-functional requirements.

3.8.3.1 Performance Requirements

Approximately 99.9% of user requests are answered within 1.5 seconds on average without any packet loss. Because of we are using cloudflare system and cloudflare has a proxy server at Turkey, local users will access to the Online Auction Application with having 40 ms ping and 0% packet loss. We support our users 24/7 with the hosting provider we cooperate with.

With the API we created, we can response the 10 requests of our users per second. The API can respond to an average of 10,000 requests per day.

3.8.4 Functional Requirements

- User must verify his/her identity to start an auction or to bid on an auction. The app supports non-identity verified users to comment on auctions.
- The application supports non-registered users to view open auctions
- Users can list auctions by category
- Users can list auctions according to their tags
- When sellers start an auction, they can invite others with the special token created for his/her auction.
- Users can update their personal information
- Users can change their passwords and phone numbers
- Sellers can cancel auctions
- Sellers can change their auction information
- Buyers can bid on the product they want
- Buyers can withdraw their bids at any time.

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