



CS 413

**Software Engineering Project Management
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**CAR MARKET
SOFTWARE REQUIREMENT SPECIFICATION**

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1. Introduction

In this report, the features and behaviour of the software application called Car Market will be introduced. The report includes a variety of elements that attempt to define the intended functionality required by the customer to satisfy their different expectations.

1.1 Purpose

With Car Market, we tried to analyze other rival products in the market and came up with some features that we thought would create a trustworthy, easy and better trading environment for regular users and we will try to make it as user friendly as possible to make any person be able to use the product without any background experience.

1.2 Scope

Scope of Car Market is to develop a user-friendly car trading platform with added features for the system to be able to compete with the already existing ones on the market. Car Market application is for posting cars to sell, search for cars to buy and communicate between buyers and sellers in order to create a trustworthy trading environment.

1.3 Definitions, acronyms and abbreviations

User: In the case of Car Market, user can be either a car buyer or a car seller. They will be both signed up as users of the system.

Online Auction and Bidding: If the owner of the car decides to sell with an online auction and a buyer can choose to bid on that car. When the time given for the online auction expires, highest bid wins and can buy the car with that price.

1.4 Overview

Car Market is an online car trading platform that aims to have user-friendly functionalities and profitable ways to make it appealing for any customer. This document will explain in detail the product, user characteristics, constraints, dependencies and specific requirements such as external interfaces and system features. Also, performance requirements, design constraints and system attributes will be covered.

2. Overall Description

Car Market is a candidate to become the ideal portal for this kind of businesses. There are rivals in the market that provides this marketing/dealing platform at the moment, but with the Car Market website, it is planned to add some more important features to make the best impression on customers experiences. Car Market allows users to create their own profiles in order to do some advertisements with the purpose of selling their own cars. Without a profile, a user will not be able to make biddings or directly contact post's owner for their questions of the posted car. Users will be able to follow some posts and get notifications in case of a price decrease. Searching through posts can be done easily with the use of tags, filtering and sorting. Like mentioned before, a car can be bought directly with the price fixed by the owner or an online auction can be held. User would have three options if he/she decided on a car; they could directly accept the price fixed by the owner, they could try to make some deals through direct messaging or the last option is by giving a bid and wait to be the highest bidder and win the auction. After the buying/selling process finishes, users will be able to rate and comment on another user they did the dealing with. This will be helpful for further trading by the same users since this will be counted as the "reliability rate" of the seller. Alongside with the "bidding" feature of the systems, users can also offer car exchange. If both users have at least one car in their account, they might consider exchanging, if there is an extra cost to one of the cars that extra will be offered as well as the trade procedure.

Users can be categorized as "buyers" and "sellers" by the system. Buyers can create a "wishlist" so that Car Market can make some suggestions to the user according to their needs. Also, depending on their search history and the cars they are generally interested in, the system might also put up some recommendations to have a better user experience. Sellers can put up posts of the autos they are planning to sell, they also need to provide some contact information, or they might choose the option to only make direct-messaging available.

As Car Market, we will also offer some professional drivers to deliver the purchased car to the new owner. With the notary work, the seller can give authority to the drivers and trading businesses can be done very easily.

2.1. Product Perspective

Car Market is aimed to be a web-based self contained application with simple mechanisms to make it user-friendly. The origin of the product actually comes from the rivals that are already existing in the market but the main differences with Car Market is that with the new featured added to the system trading and searching for cars will be as easy as it can get and any type of user can use the application with ease.

2.2. Product Functions

Car market has two function bundles which are account functions and post functions. Account functions perform all functionalities that is related to membership of website. Post functions perform functionalities related to interaction of a user and car sale post.

Account functions are register, login and profile update. Register function takes user credentials and if credentials are applicable then it saves the user into the system. Register function is required to run login function successfully. Login function takes username and password, and if inputs are correct, then retrieve the user information from the system. Profile update function requires both register and login functions as prerequisite. To be able to run profile update function successfully, user needs to be logged in the website. Then he/she can update the credentials, other account information, and his/her car sale posts.

Post functions are search, comment, bidding, and rate. Search function reduce the car sale post list with the chosen filters and keywords. It is independent from other functions therefore can be used by any user without any prerequisite. Comment function is used for sharing thoughts on the car sale posts and another user's profile page. When comment function successfully run, comment save into the system therefore other users even without login can be see it. However to be able to run comment function successfully user has to logged in the website so login function is prerequisite of comment function. Bidding function runs when user try to bid a car sale with auction option. Same as the comment function, bidding function also has login function as prerequisite. Rate function is used for giving score for the users based on their sale posts. Same as comment and bidding, rate function is also needs to be run by logged in users. When rate function successfully run, score of rated user will be updated. Score of a user can be seen by any user without login requirement.

2.3. User Characteristics

Our target users for this platform will be everyday people who are looking to buy cars and people who want to sell cars. Since our aim users are regular people, our application will not require any specific knowledge, education level or technical expertise. Thus, our application will be designed in a way that every type of user will be able to interact comfortably.

2.4. Constraints

Legal Constraints:

- There will be a legal constraint about prices of cars. For example, only Turkish lira can be used in order to sell and buy a car, if the car belongs to Turkey.
- A user cannot buy a car from another country.
- There will be an auditing constraints to meet minimum government or financial standards.

Sustainability Constraints:

- The system will be adaptable for future updates on different platforms.

Security Constraints:

- Users of client software can define and change the password in order to prevent other users' access.
- Users of server software can define and change the password in order to prevent other any outside access.
- There will be some security constraints in order to prevent customers' data when they type their card number and password.

Reliability Constraints:

- For getting more accurate data, the photos of the cars will be checked.
- Tested and trusted software will be used.
- The drivers to deliver the car will be hired professionals in order to create a trustworthy purchasing environment.

Implementation Constraints:

- For a collaborative contribution, GitHub platform will be used.
- The software will have server-client architecture.

Technical Constraints:

- Response time will be less than five seconds.

- The software will support all browsers including mobile and mini browsers.
- The server will support intense online traffics.

2.5. Assumptions and dependencies

Assumptions:

- Sellers will not struggle when using the advanced search, the system with all of its components will work perfectly.
- The system will be trustworthy when counting the honesty scores of the sellers.
- There will be improvements according to the given feedback of the system.
- A seller who is in trouble can reach Call Center members without any problem.
- Each user will have a access to the internet and supported browser on their pc/phone.
- All browser that users use will support HTML standards.

3. Specific Requirements

3.1 External Interface Requirements

This section will describe the interface requirements of the Car Market system. We emphasize the way the user shall interact with the system as well as define required hardware interfaces and communication interfaces required by the software for data transaction.

3.1.1 User Interfaces

The user interfaces of the system are separated into two parts which are web page interface and responsive mobile interface. The interface of the web page has a search tab integrated on constant menu on the top with login buttons. In search bar, user can specify the mode and brand of car. If users are logged in to the system, login buttons on the constant menu replaced with account, posts, purchases, notifications, messages and favorite posts buttons. Main frame will be filled with the recommended car posts and last clicked posts. On the search result screen, the results will be ordered with respect to relevance. Filters are provided on the left of the page. If users selects one of them, search results are displayed based on filters in a list view. If the user clicks on an item from the list, the properties and photos of the car is shown on the page. Also, buttons that are bid, follow, message and buy will be placed. User can make an offer through this button if auction is

available. The user can observe the price changes or validness of the advertisement with the help of the favorites. On the seller side, the users can give a post to Car Market via sell car by filling the information about the sale. User can observe the status of delivery process through purchases segment. In purchases, user's shopping details will be listed and if users selects delivery by driver help, status of driver will be also reflected.

The mobile application has the same functionality however the interface will be changed. Top menu and search bar will be hidden in the left. Also, profile, posts, purchases and all these segments will be also hidden. All of them appears by swiping to left it on the screen. All pages will be provided in a responsive manner such that, our web site will be compatible with each type resolution.

3.1.2 Hardware Interfaces

There will be two types of the system with respect to where it runs. First one is regular web page and can run any web browser on pc. Second one is smartphone browsers. It can be run on any smartphone whose mini browser supports HTML and our standards. The web application does not write information directly to the user's computer or phone, instead uses online database which is stored on a network server. The user's device transfers and receives data from the server by using simple network protocols. All systems' data are stored in the server's database which stores the data on a cloud. Also, server will store the web page files.

3.1.3 Software Interfaces

The web application requires proper and secured payment API for money transactions. Payment API takes card information and the price then send them to the bank server. Server returns success if the payment is occurred and money transaction between users completes. System also uses 3-D Secure version 2.0 for more security.

Database API requires for a properly configured data. The system uses mysql database and to make any modification on database, system sends API requests. If the database API call returns success message, system tell user action is succeed and redirect him/her if necessary. The server has to at least have mysql version 8.0.

Since our application works on web, users operating systems are not a crucial factor for us. However operating system should run all the required softwares like mysql database therefore it should be at the latest version. Website runs on the browser therefore the client browser should be at least one of the following versions of the common browsers: Google

Chrome 65, Mozilla Firefox 60, Safari 11, Opera 52, Microsoft Edge 16, and latest version of other browsers. Updated browsers guarantees running the website without any error or performance loss.

3.1.4 Communication Interfaces

All data transaction between the server and computer and the mobile phones will use the TCP/IP networking protocol. This network is open and accessible from the internet 24 hours with authorized user credentials.

3.2 System Features

3.2.1. Posting a Car for Sale

3.2.1.1 Introduction/Purpose of Feature

Posting car for sale is the main feature of the system. System allows users share information of the car they want to sell. Each car sale has a unique page in the system. This page contains the car information which user enters before posting the sale, and user information which is automatically added. The user can put any type, model, brand of car for sale. Additionally, car information is not limited by any specifications therefore user can write anything he/she wants to say about the car in the information section. He/she can also add media files like photos or videos of the car. The sale post page can be seen and entered until the user who post it remove. Purpose of this feature is forming seller side of online car transaction in an easy way.

3.2.1.2 Stimulus/Response Sequence

Posting a car for sale consist of sections which are logging in the website, entering information, entering price. Car sale needed user information because potential buyers will contact with the user who is selling the car. Also other users will visit at the profile page of the seller for user rate and comments of other users. After logged in, seller has to give some information about the car and enter a price. Car information cannot be empty but it depends on the user which informations includes in. Price is also cannot be empty and auction option can be chosen for alongside the actual price.

After these requirements are fulfilled, user can post the sale into the system. System add new page into the system and return success message which redirect the user to the post page. Then the post page becomes available for everyone.

3.2.1.3 Associated Functional Requirements

3.2.1.3.1 Login Function

After user logged in the website with his/her username and password, system allow the user to control his/her profile page and posts. To be able to connect the car sale post with the seller user, system shall use the login credentials therefore login function is required for the posting car for sale feature.

3.2.2. Direct Message

3.2.2.1 Introduction/Purpose of Feature

Direct message is a communication tool for users to talk each other privately. Direct messages can only be seen by the sender and receiver. It has a simple interface for ease of use. The purpose of direct messaging is to provide users a channel that they can talk about confidential topics such as exchanging personal information between each other or bargaining on the car price. To be able to send and receive direct messages, user has to login to the system.

On the other hand to prevent spamming and undesirable messages users can block other users from sending direct messages.

3.2.2.2 Stimulus/Response Sequence

To be able to use direct message both sender and receiver has to be a user of the system. Therefore the first section of the direct message process is logging into the website. Then user will fill the receiver username, title, and body parts of the message. After filled all parts user can send the message. When user send or receive a message, message panel is updated and new message is shown at the bottom. Additionally, website show notification of new messages for user when logged in.

3.2.2.3 Associated Functional Requirements

3.2.2.3.1 Login Function

Login function is the only requirement for direct messaging. It takes the user credentials and return success result if the credentials are correct. Login function is required by both sides of direct messaging because the communication is only between the sender and receiver. Only they should be able to see the messages and send new messages.

3.2.3. Search Car Sale Post

3.2.3.1 Introduction/Purpose of Feature

The car sale posts are listed as the latest added to the front. However users can easily search any type of model, brand car by filtering the post list. They can filter by words, tags, or filter options that is listed on the side. Filter options includes brands, age of car, categories, type of car, etc. Based on the filter the post list is limited with suitable ones therefore users can easily search for specific cars that are fulfill their requirements.

Moreover users can sort the post list by the price, added time, and filtering options like age of car. Sorting for each selection has two cases: incremental or decremental. Incremental sort the list from lowest to highest, and decremental is vice versa.

Purpose of search feature is make it effortless for users to search cars that has desired properties in their information section or price section.

3.2.3.2 Stimulus/Response Sequence

User searches his/her requirements by choosing on the filter list or entering words. System scans the post list and excludes the ones that are not satisfy the filters or contain the searched words in their information section. To have a successful search result, car sale posts should be created with the correct properties and related words in the information section. System returns the filtered sale list and show on the user browser. It automatically sort the result list by name in ascending order.

3.2.4 Auction

3.2.4.1 Introduction/Purpose of Feature

Auction is a pricing feature alongside the actual price of a car. Auction time span is chosen by the user while posting car sale. During auction time span, all users can bid for the

car and at the end of the period, the last bidder becomes the buyer. Auction option allows a user to bid a price that can be lower than the actual buying price of a car. However it is not a certainty that bidding price will be lower than actual buying price because users might increase the price by bidding same or more than actual buying price. Moreover same as the real life auctions, new bid has to be more than the previous one.

The purpose of auction feature is giving users an option to buy and sell a car at a lower price. Auction is advantageous both for seller and buyer, because buyer can buy at a lower price if he/she does not need to buy immediately. On the other hand if seller is not in a hurry, he/she can put room like discount by choosing his/her lower limit as bidding starting price. This helps the seller because he/she does not need to post the same car again and again while lowering the price.

3.2.4.2 Stimulus/Response Sequence

Auction feature has same process sections as posting car for sale feature. The only difference is choosing auction option on the sale creation page and filling the base bidding price and time span. It consist of sections logging in the website, entering information, entering entering base price and entering time interval.

After these requirements are fulfilled, user can post the sale into the system with the auction option. Same as the post car sale feature, system add the new post into the database and return success message which redirect the user to the post page.

3.2.5. Driver Helper

3.2.5.1 Introduction/Purpose of Feature

One of the difficulties for buying a car from another city is bringing it. It takes time and some people might not have enough time travel to another city and come back. It may be even result as the user only looks cars sold in his/her city. However driver helper feature provides users a driver who will bring the car to the buyer. Driver can also be authorized for all formal transaction process like notarisation. It is an additional service that is paid by the buyer. Drivers are contractual and trusted employees of the company therefore users can benefit from this service without any concern. Purpose of this feature is ease and speed up buying a car for users.

3.2.5.2 Stimulus/Response Sequence

After the sale is completed and both the seller and buyer agreed on everything, buyer should chose the driver helper service. Then driver goes to the seller and take the car from him/her. Then driver travels to the given address by the buyer. Deliver time will be based on the distance between cities but driver hands over the car to the buyer as soon as possible. Buyer should pay the driver fee when choosing driver helper service and give all information required by driver like buyer's information, sellers's information. System shows to the user estimated time that driver will bring the car and driver's information. Then with all the required information request is sent to the assigned driver by system.

3.3 Performance Requirements

- Car Market web application shall add no more than 5 seconds of perceivable overhead time to any necessary web and database transaction time.
- The response time of a search should not exceed 2 seconds 100% of the time.
- If the system loses the connection to the Internet or the system gets some strange input, the user should be informed in 3 seconds 100% of the time.
- Selecting a picture should only take one click 100% of the time.
- Car Market web application will be available and accessible for 7/24 hours if there is a Wi-Fi connection.
- The number of expected simultaneous user should be at least 100. System and database should be able to deal with 100 users at the same time.
- The server should have a powerful CPU in order to handle multiple users at the same time.
- Web application should work on any platform even with slower internet connection so it should be a lightweight web app for a better performance on the user side.

3.4 Design Constraints

- System's hard drive space should be no more than 20 MB.
- The Operating System memory occupied by the application should not be more than 20 MB.
- The system should use a MySQL database.
- The version of the Operating System should be at least 6.1.7600 or higher.

3.5 Software System Attributes

3.5.1 Reliability

- Car Market's system should store and retrieve information accurately as provided by the user.
- If a user's session times out, any task which figures future dependent information shall be cancelled.
- The system should give the right result on a search.

3.5.2 Availability

- As long as there is an internet connection, the system will be available for 7/24 hours. In case of an unexpected event, there will be backups for database and servers.
- The system shall allow users to restart the application in case of a failure.

3.5.3 Security

- To provide security of the communication between system and server, the messages should be encrypted for log-in communications to disable others to get user-name and password from those messages.
- If an admin tries to log in to the web portal with a non-existing account then the admin should not be logged in. The admin should be notified about log-in failure.
- If a user wants to create an account and the desired username is occupied, the user should be asked to choose a different username.
- Admins username will not be allowed to contain his real name in order to provide security.

3.5.4 Maintainability

- The application should be easy to extend. The code should be written in a way that it favours implementation of new functions in order to be implemented easily.
- The application should be testable. Test environments should be built for the application to allow testing of the applications different functions.

3.5.5 Portability

- The system should run on Windows Server 2003.

- The system should conform to HTML standards to support different browsers such as Internet Explorer, Opera and so forth.
- Unix implementation should be portable to any version of Unix that supports the user interface libraries used.

3.6 Other Requirements

3.6.1 Help System Requirements

- The system should provide specific guidelines to the user.
- For the implementation of online user help, link and search fields should be provided.