4-Wheel Drive Used Car Dealership

Software Requirement Specification

Fall 2020

Version 2.0

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Revision History

Name	Date	Reason For Changes	Version
4-wheel Drive Used Car Dealership	September 24,2020	Creation of SRS document	1
4-wheel Drive Used Car Dealership	November 12,2020	Added revision history Updated 1.2 by changing the scope of prototype 2 Updated 1.4 by adding new references Updated deployment diagram Updated 2.1.2 user interfaces Update 2.1.3 software interfaces Updated 2.2 use case diagram Added Class diagram Updated 3.2 to include special deals Added signature line	2

1. Introduction

1.1 Purpose

The purpose of this Software Requirement Specification is to outline the requirements and goals of the Four-Wheel Drive Used Car Dealership web application. The requirements and goals included in this document reflect those discussed with our client Jennifer Jin. These requirements and goals are to be met and tested by the end of the Fall 2020 semester for the CSE-4550 Software Engineering Course.

1.2 Scope

The Four-Wheel Drive Used Car Dealership web application allows users to access and view the used cars being sold by this dealership. Employees will have special authorization on the web application to add, delete, or modify the dealership's inventory. Regular users will be able to create and login through custom accounts, search for vehicles, and save favorites.

Prototype 1: The first prototype will consist of a web application that will allow both users and employees to login or create their own custom user accounts, a functional user homepage, a visible vehicle search page, a visible user page for saved favorites, and a visible employee page to modify the inventory. The application will also be able to add vehicles to the database and read data from a database.

Prototype 2: The second prototype will consist of an application that will allow users to search for vehicles through keywords and filters, user accounts will be able to save vehicles to their favorites list, and employee accounts will be able to modify the inventory by removing vehicles, changing vehicle data, and setting/removing vehicles from the special deals list.

1.3 Definitions, Acronyms, and Abbreviations

Algorithm: A finite sequence of well-defined, computer-implementable instructions, typically to solve a class of problems or to perform a computation.
Cloud Firestore: A flexible, scalable database for mobile, web, and server development from Firebase and Google Cloud Platform.

Computer: A machine that can be instructed to carry out sequences of arithmetic or logical operations automatically via computer programming. These include desktops and laptops.

CSS: Cascading Style Sheets is a style sheet language used for describing the presentation of a document written in a markup language such as HTML.

Firebase: A platform developed by Google for creating mobile and web applications.

Homepage: The primary page of the web application.

HTML: Hypertext Markup Language is the standard markup language for documents designed to be displayed in a web browser.

HTTP: Hypertext Transfer Protocol. A session layer protocol for distributed, collaborative, hypermedia information systems.

Internet Browser: A software application for accessing information on the World Wide Web.

Javascript: A programming language that conforms to the ECMAScript specification.

Real-time Web Database: A database system that uses real-time processing to handle workloads whose state is constantly changing.

SRS: This document, the Software Requirements Specification (SRS), that illustrates the functional and non-functional requirements of the 4-Wheel Drive Used Car Dealership web application.

UID: Unique Identifier used by Firebase Authentication. Each user account created is given a UID.

User: Someone who uses the web application.

User Credentials: A user's username and password used to sign into their account.

Web Application: An application software that runs on a web server. Web applications are accessed by the user through a web browser with an active internet connection.

1.4 References

Google, *Firebase*, ver. 7.21.0. [Online]. Available: https://firebase.google.com/, Accessed on: Sep. 28, 2020

IEEE Software Engineering Standard Committee, "IEEE Std 830-1998, IEEE Recommended Practice for Software Requirements Specification", October 20, 1998.

Microsoft, *Visual Studio Code*, ver. 1.50.1. [Online]. Available: https://code.visualstudio.com/, Accessed on: Sep. 28, 2020.

1.5 Overview

The following information provided in this document is intended to provide additional details about the web application as well as provide the details of the use, functionality, and plans for the 4-Wheel Drive Used Car Dealership web application.

The second section of this document provides an overview of the application and how it works by describing how the software systems are integrated and their constraints.

The third section of this document specifies the requirements of this web application. It demonstrates specific components of the software, iterations of software interfaces, design constraints, and system requirements.

2. Overall Description

2.1 Product Perspectives

2.1.1 System interfaces (deployment diagram)
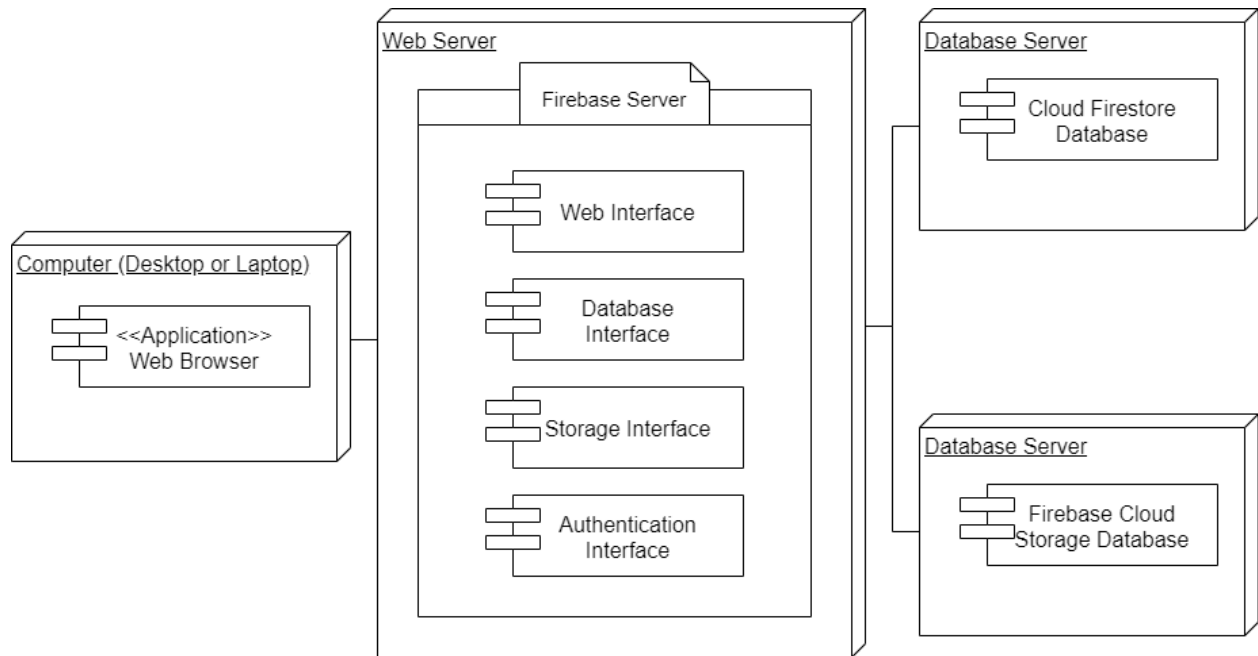
The major components of this web application include the Firebase web server which contains the web interface, database interface, and authorization interface, the Cloud Firestore database which provides a real-time database, and the computer device itself to view the web application

2.1.2 User interfaces

Regular User - Signed Out

Upon connecting to the 4-Wheel Drive Used Car Dealership web application, users will be taken to the web application's home screen. The home screen displays the company's logo and name along with a variety of components for the user to interact with. These include a button to the Login page, a button to the About Us screen, a keyword search bar that leads to a Search Results screen, a button to the company's full inventory, a small showcase of vehicles with special deals, and a section containing the company's name, address, hours, and contact information.

The Login screen displays the company's logo as well as a field to sign in using an email, password, and login button. In this same field, there are two links: one that leads to a Reset Your Password screen to change a user's password if they forgot it and are unable to log into their account, and one that leads to a Create Account screen that allows users to create an account if they do not already have an account. The Create Account screen displays the company's logo as well as a form for the user to input information needed to create their own unique account, such as their email and password.

The Reset Password screen displays the company's logo, text instructions on resetting one's password, a form for the user to input their email, and a "Send Email Verification" button. Upon pressing the button, a verification email will be sent to the input email. Upon clicking a link provided in that email, the user will be brought to a page supplied to Firebase where they can then change their password.

The About Us page displays information about the company, such as a small explanation of their business and beliefs, their store location, store hours, and contact information.

Upon inputting keywords into the search option on the homepage, the user will be brought to the Search Results screen. This screen displays a search bar with the input keywords, a filter option, and the vehicles found that match the keywords input into the search bar.

The Full Inventory page is similar to the Search Results screen. This screen displays a search bar, filter, and all the vehicles currently for sale.

Upon clicking any vehicle displayed under theSearch Results screen, Full Inventory screen, or showcase section on the homescreen, users will be taken to a Vehicle Details page that displays further information on that selected vehicle.

Regular User - Signed In
Similar to the Regular User - Signed Out interface, the Regular User - Signed In may view the same screens. At the homepage, signed in users will be able to view a "My Favorites" button in addition to the features visible to a Signed Out user.

The My Favorites screen displays the vehicles that the user has saved as their favorites as well as delete buttons that a user may use to remove that vehicle from their favorites.

The Vehicle Details page displays the same information as a Signed Out user but with the addition of a "Save to Favorites" button that allows Signed In users to save that vehicle to their account.

Employee User

Similar to the Regular User - Signed Out interface, the Employee User may view the same screens. At the homepage, Employee Users will be able to view a "Add Vehicle" button in addition to the features visible to a Signed Out user.

The Add Vehicle screen displays a form that allows an Employee User to input data about a vehicle. A submit button will add this data to the vehicle database. Employees have the option to set a vehicle as a special deal.

The Vehicle Details screen displays the same information as a Signed Out user but with the addition of a "Modify Data" button, a "Delete" button that will remove that vehicle from the database, and a button that sets or removes that vehicle as a special deal.

The Modify Data screen displays a form like the one found under the Add Vehicle screen. This form will be filled in with the data already in the database for the vehicle. Employee Users will be able to modify that data and update it to the database through a "Submit" button.

2.1.3 Software interfaces

There are two major software interfaces used in this project

1. **Visual Studio Code** is used to work on the web application's source code.
2. **Firebase Server** is used to handle HTTP requests sent from a user's computer. The Firebase Server runs using an Occupancy Web Server which includes two interfaces:
   a. **Authentication** - which stores users emails, usernames, and passwords and assigns each created account with a UID.
   b. **Cloud Firestore Database** - a real-time web database which stores and organizes user and vehicle information
   c. **Firebase Cloud Storage Database** - an object storage service to store images, audio, video, or other user-generated content.

2.1.4 Communication interfaces

A communication interface exists between a user's web browser and the Firebase Server. The user's web browser establishes an HTTP connection with the Firebase Server which can then relay back to the user's web browser.

2.1.5 Memory

The Firebase Server limits hosted web applications to 1GB of storage, 10GB downloads, and 100 simultaneous connections. This limitation is a result of Firebase Server being a free service for anyone to use.

2.1.6 Operation

The Firebase Server will be required to be active during all activities performed on the web application. Firebase is a service provided by Google Inc. that runs active servers 24/7 with adequate data protection.

2.2 Product Functions (use case diagram)

This web application allows users to interact with the website of a used car dealership by searching for vehicles and interacting with their account. Employees, in addition to searching for vehicles, may add, delete, or modify vehicles.
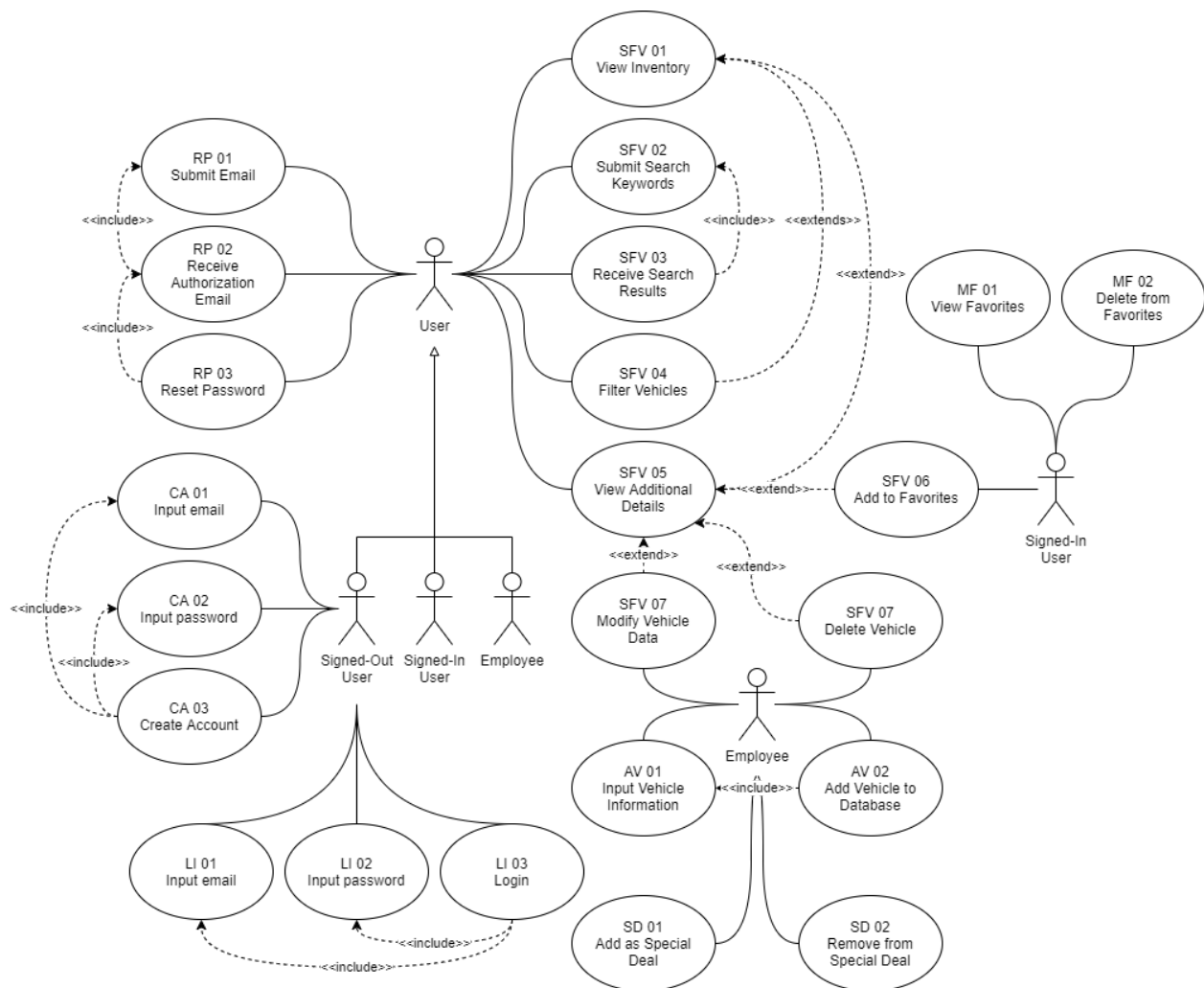
2.3 User Characteristics

The use case diagram shows that users will be able to reset their password through submitting their email and receiving an authorization email, as well as search for vehicles through keywords. Once vehicles matching the keywords have been found, the user may filter results or view additional details. Signed-out users are able to create their own account by inputting their email and password, as well as login by inputting their email and password. Signed-in users are able to add vehicles to their favorites, and then are able to view those favorites or delete them. Employee users may modify the data of vehicles, delete vehicles from the database, or add vehicles by inputting vehicle data. The intended demographics of the 4-Wheel Drive Used Car Dealership application encompasses all individuals who are interested in searching for used cars to buy as well as companies interested in cutting costs through the use of e-business technologies and media platforms.

2.4 Constraints

1. Learning unfamiliar technologies and languages such as HTML, CSS, Javascript, Firebase Server, and Cloud Firestore Database.
2. Setting up a server and database through Firebase.
3. Learning efficient search algorithms.
4. Learning to work with team members effectively and efficiently.
5. Learning how to properly design and develop an application in a professional setting.

2.5 Assumptions and Dependencies

1. A user's computer has a web browser and internet access.
2. A user will be competent in navigating a web application and reading English.
3. Firebase and Cloud Firestore features will be functional at all times.

2.6 Class Diagram

The following class diagram describes the structure of the system in terms of classes and objects.
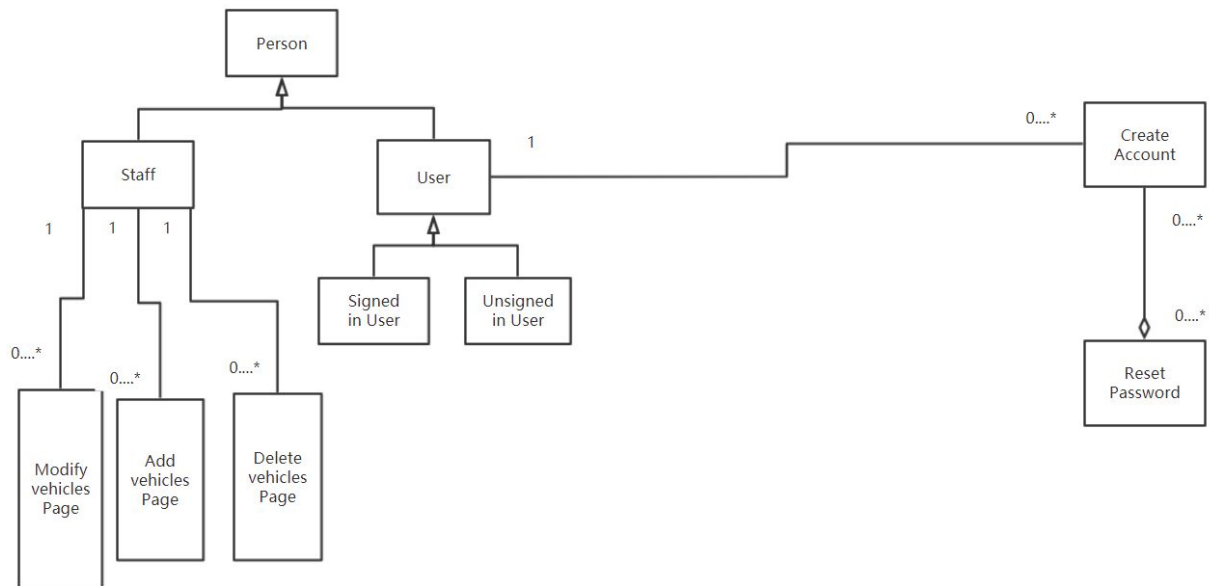
3. Specific Requirements

3.1 External interface requirements

3.1.1 User interfaces

The user interfaces will consist of graphical elements and text in the web application. Details regarding these interfaces are found in Section 3.2.

3.1.2 Hardware interfaces

A user will need access to a computer with a monitor, mouse/touchpad, and keyboard to interact with the web application.

3.1.3 Software interfaces

The 4-Wheel Drive Used Car Dealership web application communicates with the Firebase Server to retrieve and save information from the user and vehicles in the store's inventory using Cloud Firestore's database. The web application must also communicate with the Firebase Server to request web page information.

3.1.4 Communication interfaces

The Firebase Server must communicate with a user's web browser and computer in order to send and receive user and vehicle information.

3.2 Functional requirements

3.2.1 Regular User - Signed Out

3.2.1.1 Homepage (Figure 1):

If a user is not already logged into the web application, the homepage will be the first to load.

(Figure 1: Homepage)

3.2.1.2 Login (Figure 2):
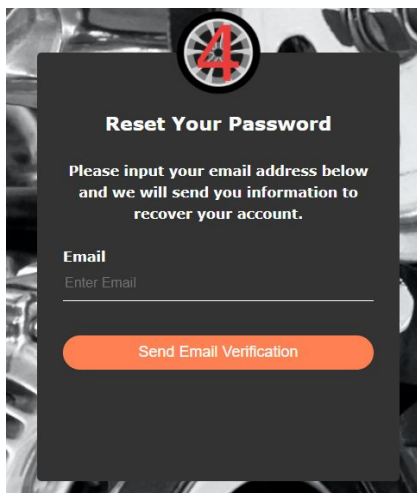
If a user clicks on the "Login" link in Figure 1, they will be brought to the Login screen (Figure 2). This screen allows a user to sign into their account using their email and password.
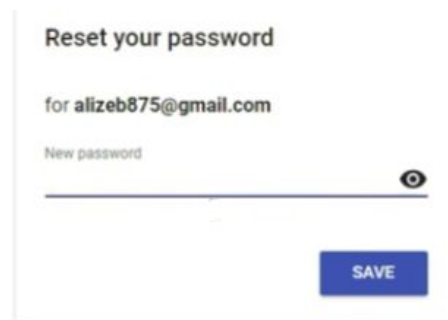
(Figure 2: Login)

3.2.1.3 Reset Your Password (Figure 3a and 3b):

If a user forgets their password, they may click on the "Lost your password?" link in Figure 2. This link will bring the user to the Reset Your Password screen (Figure 3a) where they can then submit their email. Through Firebase, a verification email will be sent to the user's email. The link included in this email will bring the user to a page (Figure 3b) provided by Firebase to reset their password.
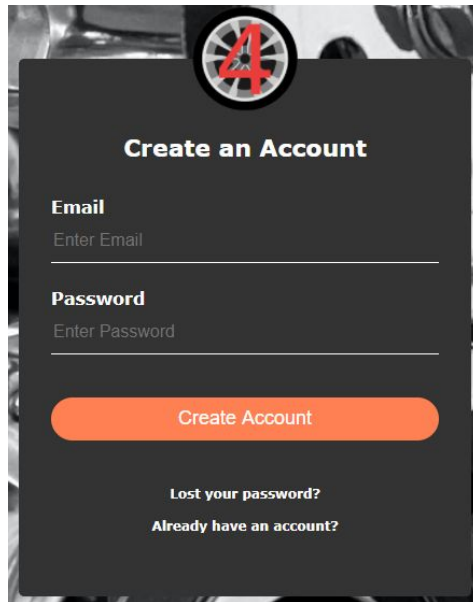
(Figure 3a: Send Email Verification)

(Figure 3b: Reset Password)

3.2.1.4 Create Account (Figure 4):
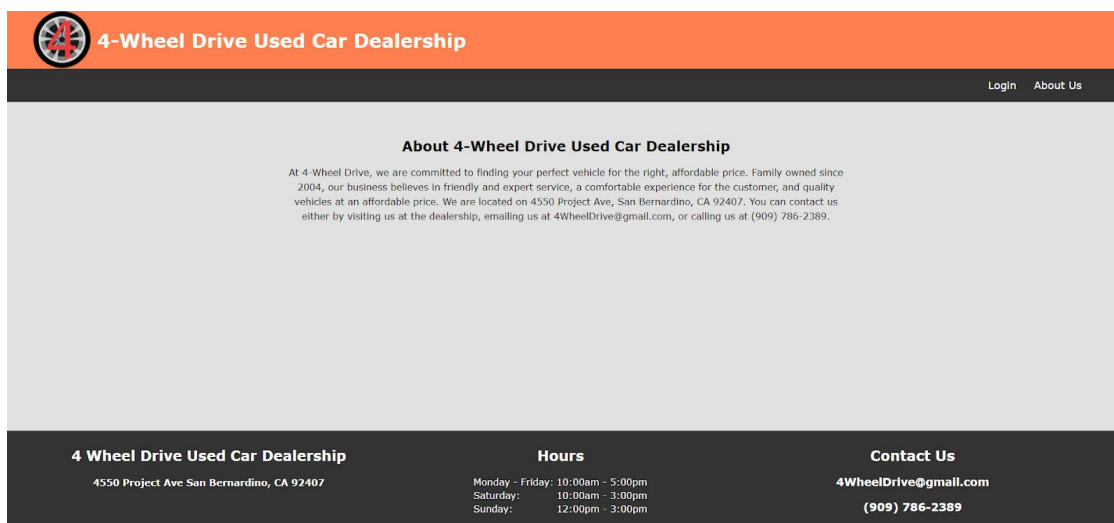
If a user does not have an account, they may click on the "Don't have an account?" link in Figure 2. This link will bring the user to the Create Account screen (Figure 4) where users can submit their email and password in order to create an account.

(Figure 4: Create Account)

3.2.1.5 About Us (Figure 5):

If the "About Us" link is clicked in Figure 1, the user will be brought to the About Us screen (Figure 5). This screen displays information about the company, including the company's beliefs and contact information.

(Figure 5: About Us)
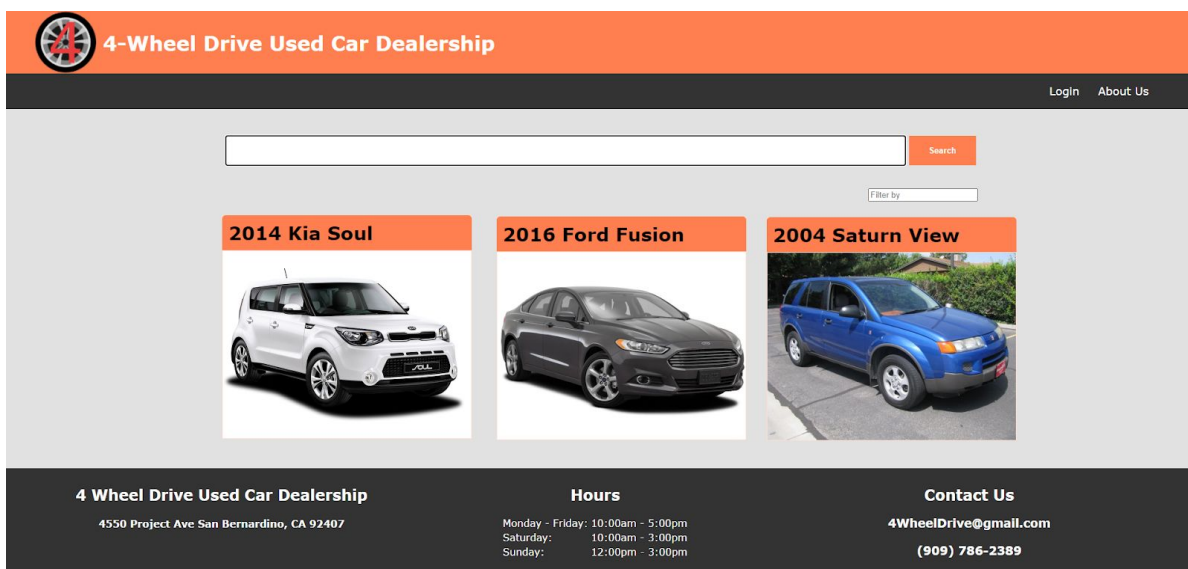
3.2.1.6 Search Results (Figure 6):

Once a user inputs keywords into the search field in Figure 1, they will be brought to the Search Results screen (Figure 6). This screen displays the vehicles found that match the keywords input in the search field as well as a filter.
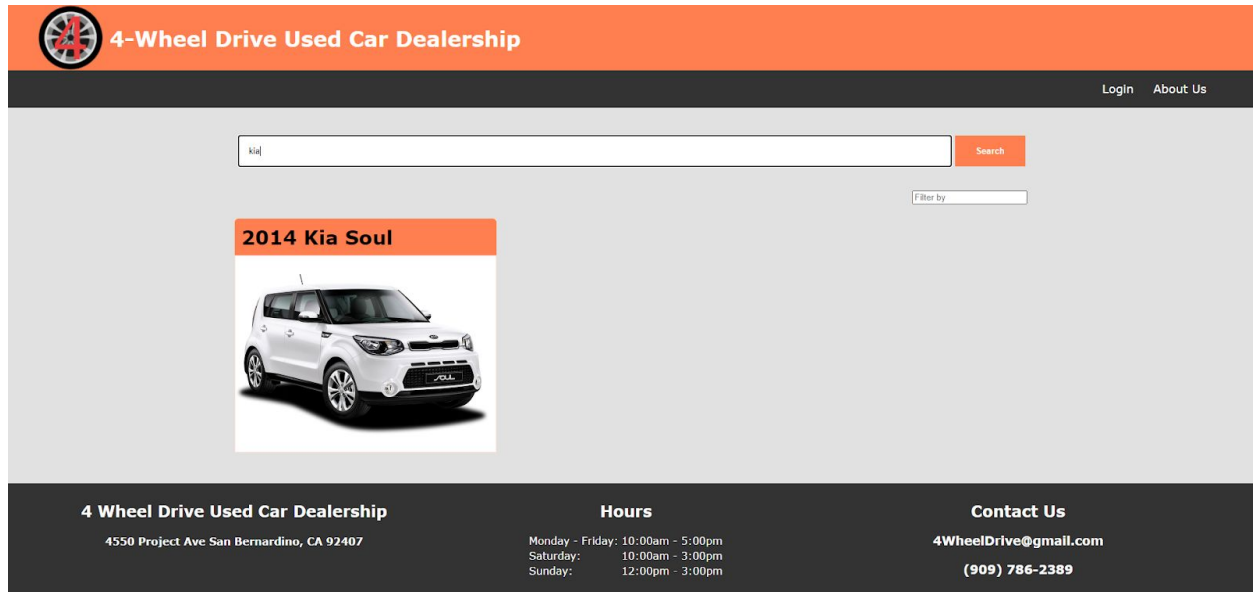
(Figure 6: Search Results)

3.2.1.6 Full Inventory (Figure 7):

If a user clicks on the "See Our Full Inventory" button in Figure 1, they will be brought to the Full Inventory screen (Figure 7). This screen displays the store's full inventory as well as a search feature and filter feature.

(Figure 7: Full Inventory)

3.2.1.7 Vehicle Details (Figure 8):

If a user clicks on a vehicle either under the "Special Deals" section in Figure 1, under the Search Results screen, or under the Full Inventory screen, the user will be brought to the Vehicle Details screen (Figure 8). This screen displays further information about the vehicle as well as the store's contact information.
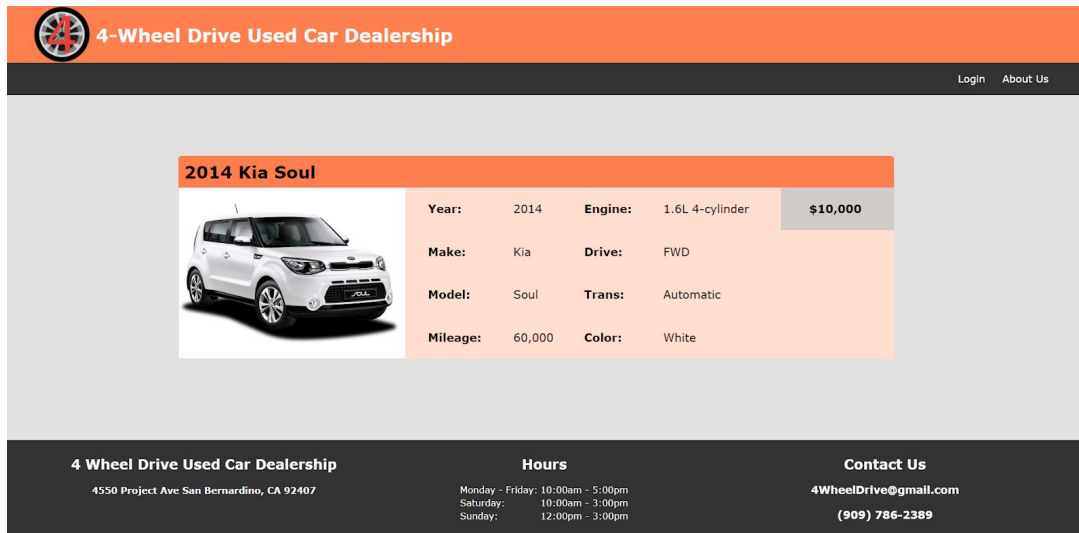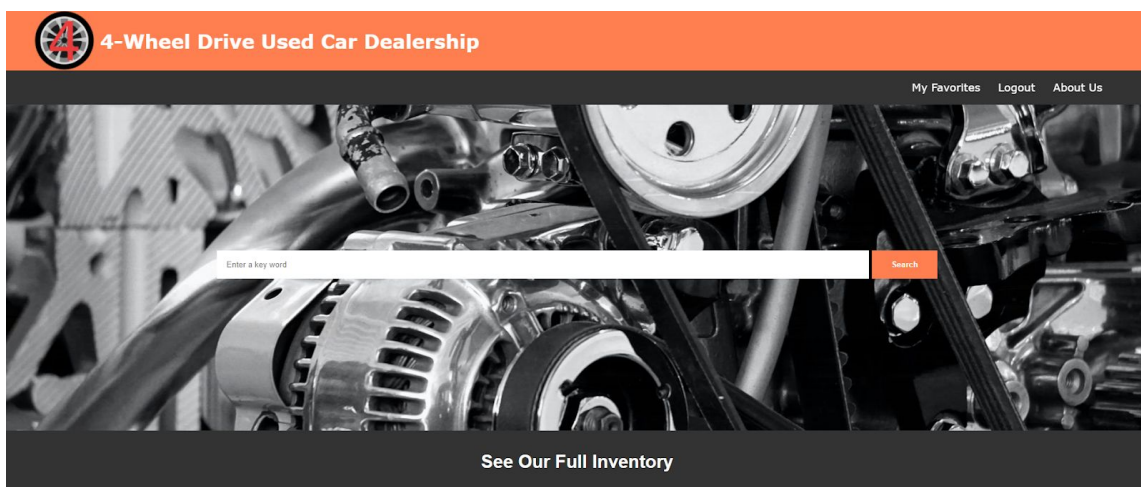

(Figure 8: Vehicle Details)

3.2.2 Regular User - Signed-In

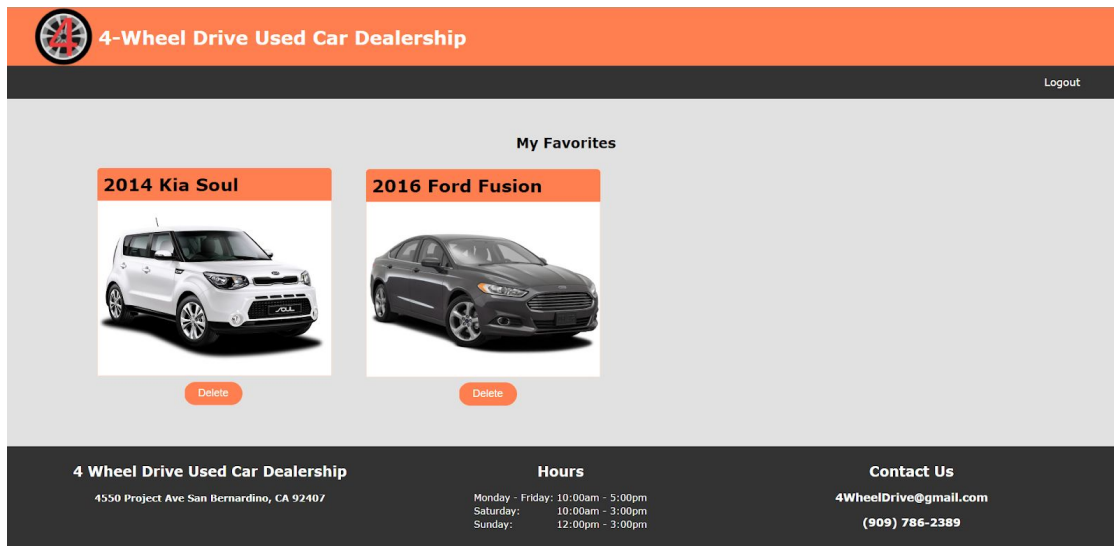### 3.2.2.1 Signed In Homepage (Figure 9):

After signing in, the user will be brought to the Homepage where they have the additional option to view their account through the "My Favorites" link or log out through the "Logout" button.

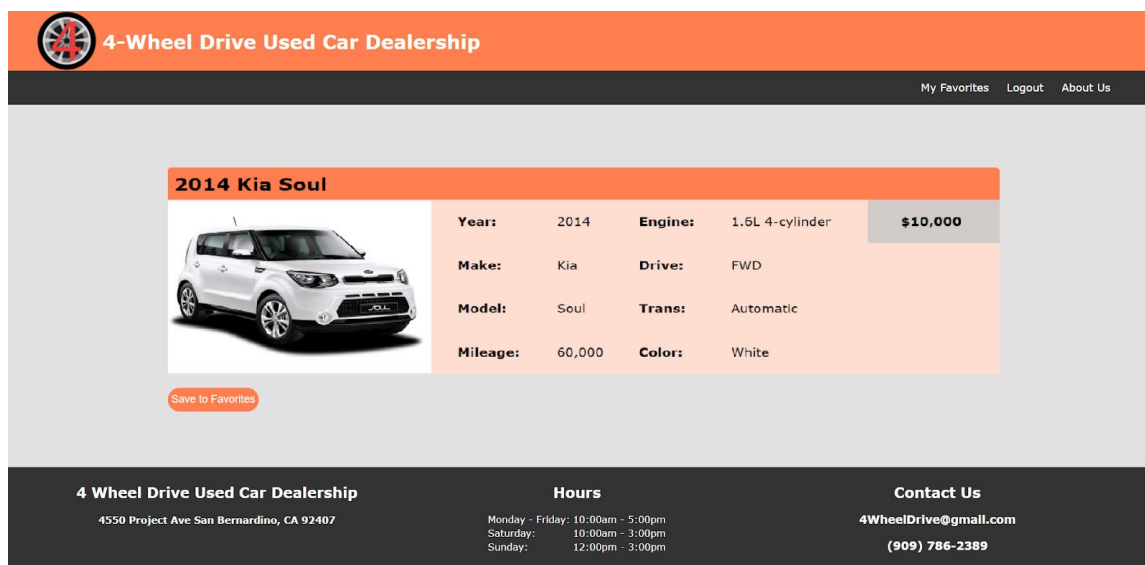(Figure 9:Signed-In Homepage)

3.2.2.2 My Favorites (Figure 10):

If a user clicks on the "My Favorites" link in Figure 9, they will be brought to the My Favorites screen (Figure 10). This screen displays the user's saved vehicles. In this list, users may either view the vehicle's details, bringing them to the Vehicle Details (Figure 11) screen, by clicking on the vehicle or users may remove the vehicle from their favorites list.

(Figure 10: My Favorites)

3.2.2.3 Signed-In Vehicle Details (Figure 11):

If a user is signed in, in addition to seeing a vehicle's information displayed in Figure 8, users will have the option to save that vehicle to their favorites list.
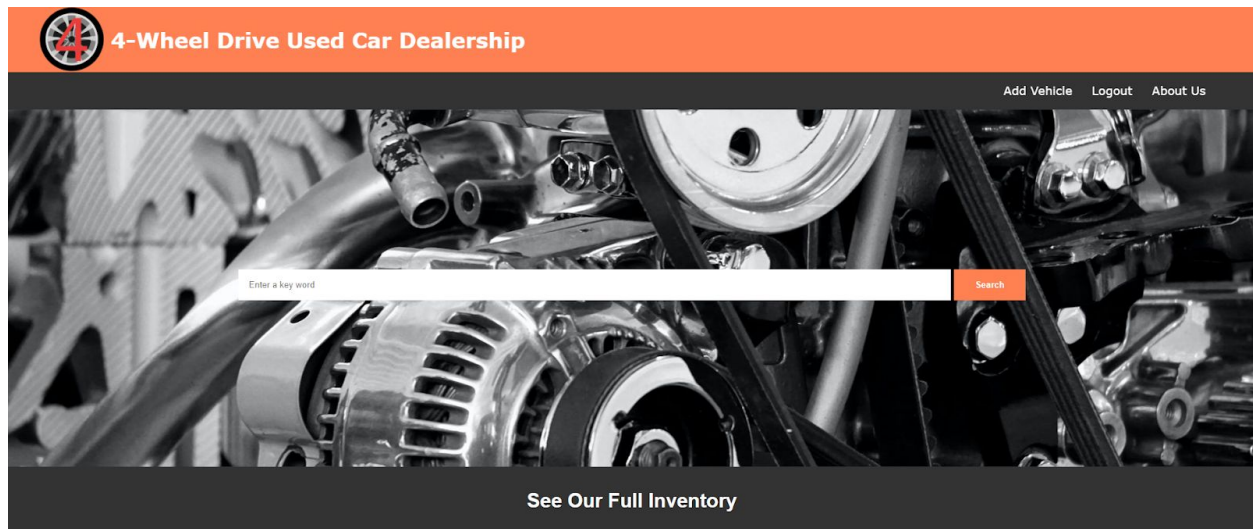

(Figure 11: Vehicle Details for Signed-In Users)

3.2.3 Employee User

3.2.3.1 Employee Homepage (Figure 12):

After signing in with an employee level account, the user will be brought to the Homepage where they have the additional option to modify the store's inventory through the "Add Vehicle" link.

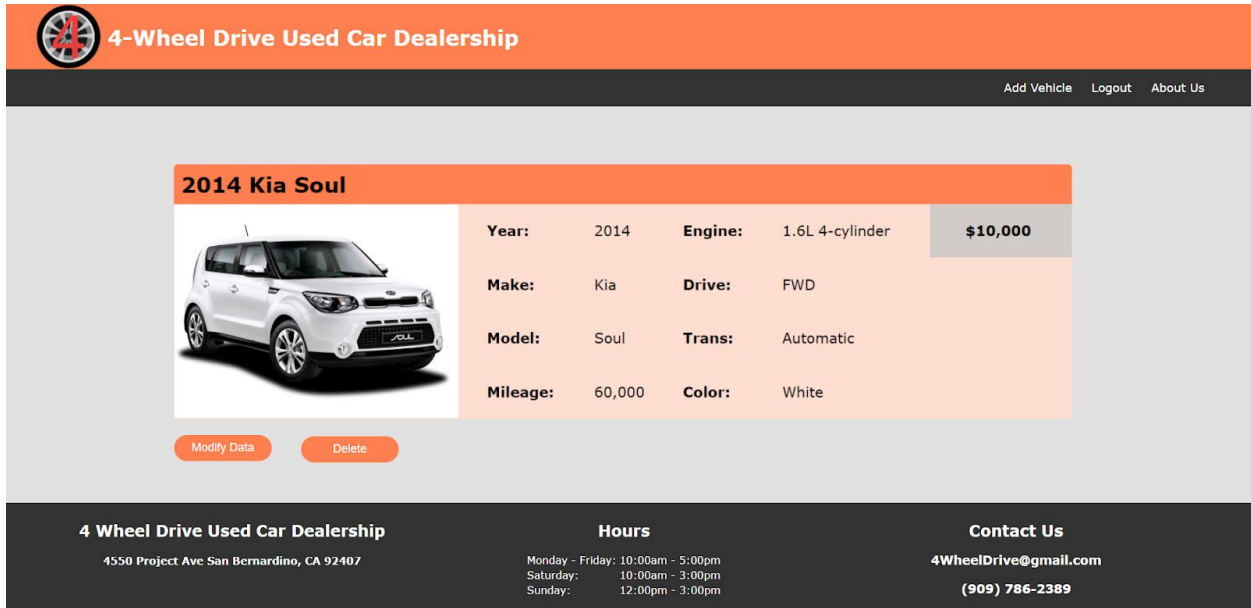(Figure 12: Employee Homepage)

3.2.3.2 Add Vehicle (Figure 13):

If an employee user clicks on the "Add Vehicle" link in Figure 12, they will be brought to the Add Vehicle screen. This screen allows employees to add vehicles to the database and optionally set them as a special deal.

(Figure 13: Add Vehicle)

3.2.3.3 Employee Vehicle Details (Figure 14):

If a user is signed in with an employee account, in addition to seeing a vehicle's information displayed in Figure 8, an employee will have the option to modify that vehicle's data through the "Modify Data" link, delete the vehicle from the store's database through the "Delete" button, or add a vehicle to the special deals list.

(Figure 14: Employee Vehicle Details)

3.2.3.4 Modify Data (Figure 15):

If an employee user clicks on the "Modify Data" link in Figure 14, they will be brought to the Modify Data screen. This screen will display the vehicle's current data and allow the user to change that data.

(Figure 15: Modify Data)

3.3 Performance requirements

The Firebase server must be able to update user and vehicle information in real-time as to provide users with accurate information and a functional user experience. Additionally, the search algorithm implemented must work in a timely manner and provide accurate results.

3.4 Design constraints

A user's computer must use an internet browser and be connected to the internet in order to view and interact with the application. Additionally, internet access is required to send and retrieve information from the Cloud Firestore database. Without internet access, a user will not be able to view or interact with the application.

3.5 Software system attributes

3.5.1 Reliability

Measures will be taken to that the web application is reliable and that user data will be secure. Ensuring that the web application is reliable entails a smooth, functional user experience. Ensuring that user data will be secure entails that only those who are authorized to view user information will be able to do so and that only employee accounts will have access to manipulate the inventory database.

3.5.2 Error Handling

Errors will be displayed when applicable throughout the web application to inform users on bad input or server issues. Messages will be displayed in the user interface space detailing the type of error.

3.5.3 Ease of Use

The web application will be designed in an intuitive and easy to navigate style. Users will easily be able to move from one page to another and backtrack when necessary. Additionally, users should not be allowed to get stuck on any one page; there will always be a link implemented to bring the user back to the homepage.

Signature: _____

Date: _____