Rabbeshly Station

Software Requirements Specification

V0.4AI
V0.5

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This comprehensive system acts as both an Enterprise Resource Planning (ERP) platform and a marketplace, catering to various sectors of the Libyan car industry and its users. It offers a diverse range of services that benefit various stakeholders, including everyday drivers, mechanics, shop owners, scrapyards, and even the government

1. Products/Scope:
    - 1.1 **Car Station:** A platform for users to manage their car information and share their passion for cars. This includes:
        - 1.1.1 **Car Profile:** Store car details and receive personalized maintenance reminders.
        - 1.1.2 **Suggestions and tips:** for the <owners> car to help preserve the cars value condition, such as: ‘Regular Maintenance reminders’.
        - 1.1.3 **Car-Station Feed:** Share and discuss car-related news and experiences
    - 1.2 **Shop Station:** A point-of-sale (POS) system for shops to manage their business operations, including:
        - 1.2.1 **Shop Profile:** Increase online presence and sales through an online store.
        - 1.2.2 **A.I-driven Assistant:** Optimize sales, purchases, and inventory through data-driven insights.
        - 1.2.3 **Online/On-site Management tools:** Manage sales data, employee accounts, inventory, sales performance, and more.
    - 1.3 **Workshop Station:** An ERP and POS system to manage workshop workflow, including:
        - 1.3.1 **Workshop Profile:** Showcase workshop expertise and work history to attract customers.
        - 1.3.2 **A.I-driven Assistant:** Improve decision-making for parts per-ordering, avoiding unsuitable repairs, and increasing profitability.
        - 1.3.3 **Online/On-site Management tools:** Streamline workflow by managing repairs, providing customer estimates, tracking employee performance, and more.
    - 1.4 **Marketplace:** A customization feed showcasing cars, workshops, scrapyards, and advertisements, allowing users to buy, sell, and promote products and services.
    - 1.5 **Service Station:** The central hub connecting all services, allowing:
        - 1.5.1 **Car owners:** Find nearby workshops based on specialization, previous work, or similar repairs.
        - 1.5.2 **Businesses:** Connect workshops with nearby shops and scrapyards for parts procurement.
        - **1.5.3 Web scrapping:** Gather data on similar items from external platforms like Facebook and eBay.

1.6 **Data Station:** A central data repository for managing:

1.6.1 **Basic data:** Manage business, car, and customer data.

1.6.2 AI data: Gain insights through AI analysis.

1.6.3 Statistical data: Analyze market trends and competitor behavior.

1.6.4 Web scrapped data: Gather data on similar items from external platforms like Facebook and eBay.

1.6.5 Government access: Provide authorized entities with data access for regulatory purposes.

1.2. Audience segments:

1.2.1. **Owners:** Car, shop, workshop, and scrapyard owners.

1.2.2. **Workers:** Mechanics and other workers in shops, workshops, and scrapyards.

1.2.3. **Businesses:** Shops, workshops, and government entities.

1.2.4. **Others:** Individuals passionate about cars.

1.2.5. **B2B Solution seekers:** Businesses looking for solutions to optimize their operations.

1.3. Not Station-like:

1.3.1. Not station-like functionalities:

1.3.1.1 Transfer of ownership and vehicle registration

1.3.1.2 The system won’t handle car-related loans

1.3.1.3 The system won’t provide car insurance

1.3.1.4 Social media features beyond the car-centric feed: While the Car-Station feed allows sharing car-related content, features like friend requests, or non-car-related content wouldn't be part of the system.

1.3.1.5 Car delivery or repair services: The system would connect users with workshops, but wouldn't offer car delivery, towing, or on-site repair services.

1.3.2. Not station-like entities:

1.3.2.1 Non-car-related businesses: This system focuses on the car industry. Entities like restaurants, grocery stores, or other non-car-related businesses wouldn't be included in the marketplace or other functionalities.

1.3.2.2 **Private individuals selling personal items:** While individuals can sell car-related products in the marketplace, selling non-car-related personal items wouldn't be supported.

1.3.2.3 **Non-Libyan entities:** The system is currently targeted toward users and businesses in Libya. International users or businesses wouldn't be included in the initial scope, but would be added in future expansion.

1.3.3. **Not station-like audience:**

1.3.3.1 **Individuals under 18:** The system requires users to be legal adults to register and utilize its services.

1.3.3.2 **Individuals without an internet connection or compatible device:** The system relies on internet access and mobile devices, so individuals without these wouldn't be part of the target audience.

1.3.3.3 **Individuals not interested in cars:** The system focuses on the car industry, so individuals with no interest in cars wouldn't be a primary target audience.

1.5 Overview

1.5.1 **Car Station:** A user-centric platform for managing car information, connecting with other car enthusiasts, and receiving personalized maintenance reminders.

1.5.2 **Shop Station:** A point-of-sale (POS) system for shops to manage sales, inventory, and online presence, boosting their reach and efficiency.

1.5.3 **Workshop Station:** An integrated ERP and POS system for workshops, enabling efficient workflow management, improved customer service, and optimized parts procurement.

1.5.4 **Marketplace:** A customizable feed showcasing cars, workshops, scrapyards, and advertisements, facilitating buying and selling of car-related products and services.

1.5.5 **Service Station:** The central hub connecting all stations, empowering car owners to find suitable workshops based on specialization, previous work, or similar repairs, and enabling workshops to source parts efficiently.

1.5.6 **Data Station:** A central repository for storing and managing all system data, providing insights through AI analysis, statistical data, and web scraping to empower informed decision-making.

2.0 General Description

2.0.1 **Market Conditions:**

2.0.1.1 **Internet Penetration:** Increasing internet access (reaching 70% of the population in Libya) fosters the adoption of software solutions to meet evolving needs.

2.0.1.2 **Business Landscape:** While many businesses use social media (e.g., Facebook) and location services (e.g., Google Maps), they often lack the tools to fully leverage the potential of the internet.

2.0.2 **Technology Gap:**

2.0.2.1 **Uninformed Customers:** Limited knowledge about technology makes finding suitable software solutions challenging.

2.0.2.2 **IT Professional Opportunity:** This lack of awareness creates a market gap for readily accessible and affordable software solutions, with the car industry being a prime example.

2.0.3 **Market Needs:**

2.0.3.1 **Workshop Management:** Existing solutions lack functionality for managing customer car repairs, hindering efficient workflow and customer service.

2.0.3.2 **Shop Management:** Current practices, such as relying on social media for sales and marketing, are not sustainable for long-term growth.

2.0.4 Manual processes and limited technology usage create several challenges:

2.0.4.1 Inefficient workshop operations Limited sales and marketing reach for shops have both lead to intangible losses in sales and customer base

2.0.4.2 Difficulty in managing financial records leading to

2.0.4.2 Lack of transparency and traceability in repair processes

Proposed Solution: Rabbeshly Station :)

- **Combines point-of-sale functionality** *with* **supply chain management features**.
- **Streamlined workflows:** Simplifies workshop operations and customer interactions.
- **Enhanced sales and marketing:** Offers online presence and customer engagement tools.
- **Improved data management:** Facilitates efficient record-keeping and financial management.

2.1 Product Perspective

Many established companies offer functionalities similar to different aspects of my proposed system, although none provide a fully encompassing solution like Rabbeshly Station. Here are what we manage to note:

2.1.1 Garage Management Systems (GMS): These systems like **AutoLeap** and **Shop Boss** primarily focus on workshop management, providing features like appointment scheduling, job tracking, inventory control, and invoicing.

2.1.2 E-commerce Marketplaces: Platforms like **eBay Motors, Autotrader** and **Copart** facilitate buying and selling cars, parts, may in the future expand to the Libyan market, However, they lack functionalities like workshop integration or repair history tracking.

2.1.3 Social media platforms: Platforms like **Facebook Marketplace** can be used for buying and selling car-related items, but lack features specific to the car industry.

2.1.4 Enterprise Resource Planning (ERP) Systems Solutions like **SAP** and **Oracle** offer broader functionalities for managing various aspects of a business, but are typically complex and expensive, making them less suitable for smaller businesses in the car industry.

A perspective many forget to take in consideration is future projects or under-development projects with similar functionalities.

2.1.5 Emerging startups: Given the growing internet penetration, Libyan entrepreneurs might be developing similar solutions focusing on the Libyan market.

2.1.6 Custom-developed software: Some shops or workshops at car dealerships might have opted for custom software solutions tailored to their specific needs made by another company.

2.2 Product Functions

2.2.1 Car Station:

2.2.1.1 Car Profile: Users can store car information, access personalized maintenance reminders, and connect with other car enthusiasts.

2.2.1.2 Suggestions & Tips: The system provides AI-powered suggestions and tips to help users maintain and preserve the value of their cars.

2.2.1.3 Car-Station Feed: Users can share news, pictures, and discussions about their cars within a car-centric social media platform.

2.2.2 Shop Station:

2.2.2.1 Shop Profile: Businesses can create online profiles to showcase their services, reach new customers, and boost their online presence.

2.2.2.2 AI-Driven Assistant: An AI assistant provides sales, purchasing, and inventory management insights to optimize business operations.

2.2.2.3 Online/On-Site POS & Management Tools: Users can access point-of-sale functionalities, manage sales data, employee accounts, inventory, and track sales performance.

2.2.3 Workshop Station:

2.2.3.1 **Workshop Profile:** Workshops can create online profiles to showcase their expertise, work history, and attract new customers.

2.2.3.2 **AI-Driven Assistant:** An AI assistant supports decision-making regarding parts pre-ordering, identifying suitable repair opportunities, and improving overall profitability.

2.2.3.3 **Online/On-Site POS & Management Tools:** Streamline workshop operations by managing repairs, providing customer estimates, tracking employee performance, and managing other relevant data.

2.2.4 Marketplace:

2.2.4.1 **Marketplace Feed:** Users can browse a customizable feed showcasing cars, workshops, scrapyards, and advertisements, facilitating buying and selling of car-related products and services.

2.2.4.2 **Online Payments:** The system can facilitate secure online payments for transactions within the marketplace (optional, depending on implementation).

2.2.5 Service Station:

2.2.5.1 **Service Station Platform Connectivity:** Connects all system components, allowing car owners to find suitable workshops based on various criteria and facilitating parts procurement for workshops from nearby shops or scrapyards.

2.2.6 Data Station:

2.2.6.1 **Data Station Platform Connectivity:** Provides centralized data storage and management for all system functionalities.

User Characteristics

2.1. Owners:

2.1.1 **Car Owners:** Any entity, person or shop that owns a car.
2.1.2 **Shop Owners:** Product selling owners, car parts or cars alike.
2.1.3 **Workshop Owners:** Independent technicians or businesses.
2.1.4 **Scrapyard Owners:** Person who operates or assists at operating the scrap yard.

2.2. Workers:

2.2.1 **Mechanics:** Independent professionals whom are willing to be identified as a portable workshop.
2.2.2 **Workshop Mechanics:** Professionals who work for a workshop owner and at a designated location.
2.2.3 **Scrapyards Mechanics/Workers:** Individuals who run or work at scrapyards.

2.3 Businesses:

2.3.1 **Auto Parts Stores:** Businesses specializing in selling new and used car parts and accessories.
2.3.2 **Car Dealerships:** Businesses selling new and used cars.
2.3.3 **Government Agencies:** Entities responsible for regulating and overseeing the car industry, such as transportation departments or environmental agencies.

2.4 Car Enthusiasts:

2.4.1 **Car Enthusiasts:** Individuals with a strong passion for cars, including:
2.4.2 **Modders:** Individuals modifying and customizing car appearance and performance.
2.4.3 **Painters:** Professionals specializing in car painting and detailing.
2.4.4 **Importers:** Businesses importing specialized car parts, modded cars, or unique car models.
2.4.5 **Influencers:** Social media personalities sharing car-related content and experiences.
2.4.6 **Event Organizers:** Individuals or organizations planning and hosting car shows, races, or other car-related events.

2.5 B2B Solution Seekers:

2.5.1 **Insurance Companies:** Entities seeking data and insights to assess risk and optimize insurance offerings for the car industry.
2.5.2 **Financial Institutions:** Banks and financial institutions looking for data-driven solutions to improve car loan and financing processes.
2.5.3 **Data Analytics Companies:** Businesses seeking access to platform data for market research and trend analysis within the car industry.
2.5.4 **Logistics Companies:** Businesses seeking optimized solutions for car transportation and parts delivery within the ecosystem.
Constraints

2.4 General Constraints:

2.4.1 Hardware Constraints:

2.4.1.1 Device Requirements:

2.4.1.1.1 Minimum Phone Cost: All user roles (Owners, Shops, Workshops, Scrapyards) require a phone costing at least 1200 Libyan dinars (LYD) with an internet connection accessible at least once daily.

2.4.1.1.2 Touchscreen Devices: Workshops are encouraged to use touchscreen devices for improved user experience with the system functionalities.

2.4.1.1.3 Shops: Minimum specifications for Shop computers include 32-bit architecture, 6GB of RAM, a Core i3 processor (5th generation or newer), and Windows 8.1 or 10 operating system.

2.4.2 Software Constraints:

2.4.2.1 Performance and Scalability:

2.4.2.1.1 The system should operate efficiently on low-end devices with minimal features enabled to ensure accessibility for users with limited resources.

2.4.2.1.2 The platform should be built using **No-SQL databases** to accommodate the expected surge in data volume.

2.4.2.1.3 Programming with languages like Go and Rust is recommended to ensure fast system execution.

2.4.3 Integration and Data Acquisition:

2.4.3.1 The platform should seamlessly integrate with APIs from external websites and services to import and display relevant data and content.

2.4.3.2 Web scraping capabilities are required to extract data from various online platforms related to services and items within the car industry.

2.4.4 Compatibility:

2.4.4.1 The platform should be compatible with Windows 8, 10, and Linux operating systems.

2.4.4.2 Support for 32-bit architecture computers is necessary to ensure wider accessibility.

2.4.5 Interface Constraints:

2.4.5.1 **Identity Verification:**

The platform will implement two-factor authentication (2FA) using SMS messages via the "EASYSMS" service provided by "devs.ly".

Integration with the National Database is essential to verify the identity of sellers with relevant government organizations.

2.4.6 Regulatory Constraints:

The system development and operations will adhere to **Libyan Law No.4 of 1990** and any other relevant regulations.

2.4.7 Environmental Constraints:

2.4.7.1 Scrapyards:

Mobile device usage is preferred and encouraged due to the work environment.
Computers should be located indoors and not exposed to the elements.

2.4.7.2 Shops and Workshops:

Touchscreens should be protected with appropriate covers to prevent damage.
Access to the main computer should be restricted to authorized shop owners only.
Computers should be equipped with reliable power supplies to minimize disruptions.

2.5 Assumptions and Dependencies:

2.5.1 User Adoption:

2.5.1.1 Shop Owners:

2.5.1.1.1 High Reliance: Experienced shop owners with existing business challenges are assumed to be more receptive to the system's features and functionalities if presented clearly and offer a user-friendly on-boarding process. Additionally, shop owners who expect a direct return on investment (ROI) or a noticeable increase in sales and inventory management efficiency are more likely to adopt the system.

2.5.1.1.2 Low Reliance: New, inexperienced, or opportunistic shop owners may be hesitant to invest due to:

2.5.1.1.2.1 Limited capital: New businesses might prioritize other investments during the initial stages, putting software implementation on hold.

2.5.1.1.3 Lack of understanding: Inexperienced owners might not fully grasp the system's benefits and may prioritize immediate profits over long-term value and improved customer experience.

2.5.1.1.4 Free alternatives: Some owners might seek free, potentially ill-fitting solutions instead of investing in a tailored system.

2.5.1.2 Scrapyard Owners:

2.5.1.2.1 Low Reliance: Given the established and potentially multi-generational nature of scrapyard management, owners might be less likely to adopt a new system due to:

2.5.1.2.2 Adherence to tradition: Familiarity with existing practices might lead to reluctance to embrace new technology.

2.5.1.2.3 Limited system applicability: The platform's functionalities might not directly address all aspects of scrapyard operations, creating hesitation to invest.

2.5.1.3 Workshop Owners:

2.5.1.3.1 Medium Reliance: The workshop business model in Libya, often focusing on daily cash flow for families rather than

comprehensive accounting practices, might influence system adoption:

2.5.1.3.2 Selective adoption: Workshop owners might primarily value features that enhance customer visibility and engagement, potentially disregarding functionalities requiring additional equipment investment.

2.5.2. Market Conditions:

2.5.2.1 Technology adoption: The overall rate of technology adoption within the Libyan car industry, especially among smaller businesses, could impact user acceptance of the system.

2.5.3. External Dependencies:

2.5.3.1 API integrations: The functionality of the system relies on seamless integration with external APIs like "devs.ly", National Database and T-lync. Any changes or limitations in these external services could require adjustments to the system.

2.5.4. Regulatory Environment:

2.5.4.1 Evolving regulations: New or changing regulations could necessitate modifications to the system to ensure compliance.

2.5.5. User Feedback:

2.5.5.1 Continuous feedback: User feedback throughout the development process and after deployment will be crucial to identify unforeseen challenges and potential needs not addressed by the initial requirements

3. Specific Requirements

3.0.1.1 Car Station Requirements:

3.0.1.1.1 Car Profile:

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introduction

3.0.1.1.1.2 Add Car through taking pictures of it (see later sections for clarity) #2
3.0.1.1.1.3 Add time of regular maintenance #3
3.0.1.1.1.4 Add time and cost of heavy maintenance #4
3.0.1.1.1.5 Add time and cost of Precautionary maintenance #5
3.0.1.1.1.6 Add time and cost of Crash maintenance #6
3.0.1.1.1.7 Add Car Specs #7
3.0.1.1.1.8 Add Car additional pictures #8
3.0.1.1.1.9 Add Car Special specs #9
3.0.1.1.1.10 Add persistent issues or accidents #10
3.0.1.1.1.11 Add Car chassis/vin number #11
3.0.1.1.1.12 Display Total maintenance costs #12
3.0.1.1.1.13 Display Car efficiency #13
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3.1 External Interface Requirements

3.1.1 User Interfaces

3.1.2 Hardware Interfaces

3.1.3 Software Interfaces

3.1.4 Communications Interfaces

3.2 Functional Requirements

3.2.1.1 Car Station Requirements: #1

3.2.1.1.1.Add Car through filling a form #1

- 3.2.1.1.1.1 **Introduction:**
  - The system shall provide a user interface form for adding a car profile. The user shall be able to input the following data:

- 3.2.1.1.1.2 **Inputs:**
  - **Car Make (text):** Mandatory field. User enters the car manufacturer (e.g., Toyota, Volkswagen).
  - **Car Model (text):** Mandatory field. User enters the specific car model (e.g., Corolla, Passat, Tiguan).
  - **Year (number):** Mandatory field. User enters the car's manufacturing year. The system shall implement validation to ensure the entered year is within a reasonable range (e.g., past 15 years).
  - **License Plate Number (text):** Mandatory field. User enters the car's license plate number. The system shall perform validation to ensure the format complies with the user's country regulations (e.g., specific number/letter combination for a particular country).
  - **License Plate Number (text):** Mandatory field. User enters the car's license plate number. The system shall perform validation to ensure the format complies with the user's country regulations (e.g., specific number/letter combination for a particular country).
  - **VIN (Vehicle Identification Number – text):** Mandatory field. User enters the car's unique VIN. The system shall implement validation to check for VIN format (typically 17 characters alphanumeric).
- 3.2.1.1.1.3 **Processing:**
  1. Upon form submission, the system shall validate all entered data for completeness and format compliance according to the specifications mentioned in section 3.2.1.2 Inputs.
  2. If any validation errors occur, the system shall display clear and specific error messages to the user, indicating which fields contain errors and the nature of the error (e.g., "Invalid year format", "License plate number does not meet country standards").
  3. If all data is valid, the system shall attempt to retrieve additional car information (e.g., engine specifications, standard maintenance schedules) using an external API. The specific API to be used and its data parameters shall be defined in a separate document.

4. The system shall store the user-provided car details and any retrieved information from the external API (if successful) in the system's database.
5. The system shall generate a unique identifier for the newly created car profile.

- 3.2.1.1.1.4 **Outputs:**
  - Upon successful car profile creation, the system shall display a confirmation message to the user, informing them that the car has been added.
  - The system shall automatically navigate the user to the newly created car profile within the Car Station interface. This profile shall display the entered information and any retrieved data from the external API (if applicable).
- 3.2.1.1.1.5 **Error Handling:**
  - In case of validation errors (section 3.2.1.3.2), the user shall be provided with the opportunity to correct the errors and resubmit the form.
  - If the external API call for car information fails (section 3.2.1.3.3), the system shall store the user-provided details and provide the user with the following options:
  - Proceed with creating the car profile without additional information.
  - Manually enter missing information about the car (e.g., engine specifications).

3.2.1.1.1.2 Add Car through taking pictures of it (see later sections for clarity) #2

- 3.2.1.1.1.2.1 **Introduction:**
  - This section details the requirements for adding a car profile using the image recognition feature within the Car Station.
- 3.2.1.1.1.1.2 **Inputs:**

- The system shall accept multiple images (at least two recommended) of the car captured using the device camera. The system shall specify supported image file formats (e.g., JPEG, PNG).

- 3.2.1.1.1.2.3 **Processing:**
  - The system shall utilize an image recognition service (details on the service to be specified in a separate document) to extract car make, model, and year from the uploaded images.
  - The system shall employ algorithms to assess the quality and clarity of the uploaded images to ensure a higher success rate for car identification.
  - Based on the extracted information, the system may attempt to retrieve additional car details (e.g., engine specifications) using an external API (refer to Section 3.2.1.1.1.3 for details on external API).
- 3.2.1.1.2.4 **Outputs:**
  - If the image recognition is successful:
    - The system shall display the extracted car information (make, model, year) to the user for confirmation.
      - Upon user confirmation, the system shall proceed to store the details in the database (Section 3.2.1.1.2.5.1).
    - If the image recognition fails to identify the car:
      - The system shall display a message to the user informing them that the car could not be identified from the images.
    - The system shall provide the user with the option to:
      - Retry capturing images with improved clarity.
      - Manually enter the car details.
- 3.2.1.1.2.5 **Error Handling:**
  - **Image Upload Errors:**
    - If the user attempts to upload unsupported file formats or exceeds image size limitations, the system shall display an error message specifying the issue and allowed formats/sizes.
  - **Image Recognition Failure:**
    - If the image recognition service fails to identify the car due to poor image quality or other factors, the system shall handle this as described in Section 3.2.1.1.2.4.2.
  - **External API Failure (Optional):**
    1. If the attempt to retrieve additional car details using the external API fails (refer to Section 3.2.1.1.1.3 for details), the system shall store the user-confirmed car information (make, model, year) and proceed with car profile creation. The user may be informed about the missing information and the option to enter it manually.

3.0.1.1.1.3 Add time of regular maintenance #3

- **3.0.1.1.1.3.1 Introduction:**
  - This section details the requirements for adding a user-specified time interval for regular maintenance reminders within the Car Station. This functionality empowers users to proactively schedule car maintenance based on their car's needs and preferences, promoting preventative care and potentially extending vehicle lifespan.
- **3.0.1.1.1.3.2 Inputs:**
  - The system shall provide a user interface element for users to specify the desired time interval between maintenance reminders. Here are two options to consider:
    - **User-friendly Interface:**
      - Pre-defined options: Offer a set of common time intervals displayed prominently (e.g., 3 months, 6 months, 1 year) to simplify selection for users.
      - Custom value input: Allow users to enter a specific time interval (e.g., in months) through a dedicated field for greater flexibility.
- **3.0.1.1.1.3.3 Processing:**
  - Store the user-provided time interval for regular maintenance reminders in the car's profile within the database (Section 3.2.1.1.2.5.1).
  - Utilize this stored interval to trigger automated notifications reminding the user about upcoming maintenance. This notification system can be integrated with the Car Station's notification center or leverage push notifications on mobile devices.
- **3.0.1.1.1.3.4 Outputs:**
  - Upon successful addition of the time interval, the system shall display a confirmation message to the user. This message should clearly inform them that the chosen reminder frequency has been added to their car profile (e.g., "Maintenance reminders set to notify you every 6 months").
- **3.0.1.1.1.3.5 Error Handling:**

  Invalid Input:

  The system shall implement safeguards to handle potential errors during user input:
    - If the user enters a custom value that falls outside the allowed range (e.g., negative values), the system shall display an error message specifying the issue and providing guidance (e.g., "Please enter a positive value for the reminder interval").
    - The system may define a minimum and/or maximum allowed value for custom intervals to ensure reminders remain practical (e.g., minimum 1 month, maximum 2 years).

  This section incorporates the following aspects based on the Rabbeshly Station project:

3.0.1.1.1.4 Add Time and Cost of Heavy Maintenance #4

- **3.0.1.1.1.4.1 Introduction:**
  This section details the requirements for adding user-specified information about heavy maintenance, including the estimated time frame and associated costs. This functionality allows users to track and plan for major car repairs or servicing that require significant time and resources.
- **3.0.1.1.1.4.2 Inputs:**
  The system shall provide user interface elements for users to specify:
  - **Estimated Time:** This could be a text field where users can enter a duration (e.g., days, weeks) or a calendar date picker for scheduled maintenance.
  - **Estimated Cost:** This could be a text field where users can enter a monetary value. The system may offer an optional field for currency selection.

- **3.0.1.1.1.4.3 Processing:**
  1.Store the user-provided estimated time and cost of heavy maintenance in the car's profile within the database (Section 3.2.1.1.2.5.1).
  2.This information can be used for various purposes, such as:
    - Displaying upcoming heavy maintenance reminders alongside regular maintenance reminders.
    - Factoring in estimated costs when calculating total maintenance costs (Section 3.0.1.1.1.12).
- **3.0.1.1.1.4.4 Outputs:**
  Upon successful addition of the heavy maintenance details, the system shall display a confirmation message to the user. This message should clearly state that the estimated time and cost have been added to the car's profile (e.g., "Heavy maintenance information added: Estimated time - 2 weeks, Estimated cost - $1,000").
- **3.0.1.1.1.4.5 Error Handling:**
  - **Invalid Input:**
    •If the user enters a negative value for estimated time or cost, the system shall display an error message prompting them to enter a valid positive value.
    •The system may define a reasonable range for estimated time (e.g., minimum 1 day, maximum 1 year) to avoid unrealistic entries.

3.0.1.1.1.5 Add Time and Cost of Precautionary Maintenance #5

- **3.0.1.1.1.5.1 Introduction:**
  This section details the requirements for adding user-specified information about precautionary maintenance, including the estimated time frame and associated costs.
  This functionality allows users to proactively plan for preventative servicing that helps maintain the car's condition and potentially avoid future issues.
- **3.0.1.1.1.5.2 Inputs:**
  - **Estimated Time:** Text field or calendar date picker for users to enter the anticipated duration.
  - **Estimated Cost:** Text field with optional currency selection for users to enter the expected cost.
- **3.0.1.1.1.5.3 Processing:**
  - Store the user-provided estimated time and cost in the car's profile database (Section 3.2.1.1.2.5.1).

- Utilize this information for:
- Displaying upcoming precautionary maintenance reminders.
- Factoring into total maintenance cost calculations (Section 3.0.1.1.1.12).

- **3.0.1.1.1.5.4 Outputs:**
  - Confirmation message upon successful addition, similar to Section 3.0.1.1.1.4.4.
- **3.0.1.1.1.5.5 Error Handling:**
  - Implement error handling for invalid user input, following the guidelines in Section 3.0.1.1.1.4.5.

3.0.1.1.1.6 Add Time and Cost of Crash Maintenance #6

- **3.0.1.1.1.6.1 Introduction:**

  This section details the requirements for adding user-specified information about crash maintenance, including the estimated time for repairs and associated costs. This functionality helps users track repairs after accidents.
- **3.0.1.1.1.6.2 Inputs:**
  - **Estimated Time:** Text field or calendar date picker for users to enter the repair duration.
  - **Estimated Cost:** Text field with optional currency selection for users to enter the expected cost.

- **3.0.1.1.1.6.3 Processing:**
  - Store the user-provided estimated time and cost of crash maintenance in the car's profile within the database (Section 3.2.1.1.2.5.1).
  - Optionally, the system may allow users to:
  - Upload pictures of the crash damage to document the incident (consider integration with Section 3.0.1.1.1.8 Add Car additional pictures).
  - Link to a police report or insurance claim (if applicable).
- **3.0.1.1.1.6.4 Outputs:**
  - Upon successful addition of the crash maintenance details, the system shall display a confirmation message to the user. This message should clearly state that the estimated time and cost have been added to the car's profile (e.g., "Crash maintenance information added: Estimated time - 1 month, Estimated cost - $5,000").
- **3.0.1.1.1.6.5 Error Handling:**
  - Follow the error handling guidelines from Section 3.0.1.1.1.4.5 for invalid input (estimated time, cost).

3.0.1.1.1.7 Add Car Specs #7

- **3.0.1.1.1.7.1 Introduction:**
  - This section details the requirements for adding car specifications to the car profile within the Car Station. This information can be beneficial for users to track car details and for the system to provide relevant maintenance suggestions or connect users with compatible workshops.
- **3.0.1.1.1.7.2 Inputs:**
  - The system shall provide user interface elements for users to enter various car specifications, potentially including:
  - Engine type (e.g., ga soline, diesel, hybrid)
  - Engine displacement (e.g., liters)
  - Transmission type (e.g., automatic, manual)
  - Drive type (e.g., front-wheel drive, rear-wheel drive, all-wheel drive)
  - Fuel efficiency (e.g., miles per gallon)
  - Seating capacity
- **3.0.1.1.1.7.3 Processing:**
  - Store the user-entered car specifications in the car's profile within the database (Section 3.2.1.1.2.5.1).
  - This data can be used for various purposes, such as:
  - Displaying car specifications on the user's car profile page.
  - Filtering workshop search results based on compatibility with the car's specifications (assuming workshop data includes compatible car types).
  - Providing targeted maintenance suggestions based on car type and specifications (referencing Data Station - Section 3.0.1.1.2).
- **3.0.1.1.1.7.4 Outputs:**
  - Upon successful addition of car specifications, the system shall display a confirmation message to the user, informing them that the details have been saved to their car profile.
- **3.0.1.1.1.7.5 Error Handling:**
  - Ensuring valid data types are entered (e.g., numbers for engine displacement, fuel efficiency).
  - Defining reasonable value ranges for certain specifications (e.g., minimum and maximum engine displacement based on common car models).

3.0.1.1.1.8 Add Car Additional Pictures #8

- **3.0.1.1.1.8.1 Introduction:**
  - This section details the requirements for adding additional pictures of the car to enhance the car profile within the Car Station. This functionality allows users to showcase their car and potentially provide more details for reference.
- **3.0.1.1.1.8.2 Inputs:**
  - The system shall provide a user interface element, such as a file upload button or drag-and-drop zone, to allow users to select and upload multiple pictures of their car.
- **3.0.1.1.1.8.3 Processing:**
  - Validate the uploaded pictures, ensuring they are in supported image formats (e.g., JPEG, PNG) and within a reasonable size limit to optimize storage and performance.
  - Store the uploaded pictures securely within the system, associating them with the specific car profile in the database.
- **3.0.1.1.1.8.4 Outputs:**

  Upon successful upload, the system shall provide visual confirmation to the user, such as displaying thumbnails or a success message indicating the number of pictures added.
- **3.0.1.1.1.8 Error Handling:**
  - The system shall display informative error messages for upload failures, specifying the issue (e.g., unsupported format, exceeding size limit).
  - The system may offer options to retry uploading with valid pictures or suggest image resizing tools.

3.0.1.1.1.9 Add Car Special Specs #9

- **3.0.1.1.1.9.1 Introduction:**
  This section details the requirements for adding user-specified details about car modifications or special features beyond the standard specifications (Section 3.0.1.1.1.7). This functionality allows users to personalize their car profiles and potentially connect with enthusiasts with similar car interests.
- **3.0.1.1.1.9.2 Inputs:**
  The system shall provide a text field or a dedicated section for users to enter information about car special specs. This could include details like:
  - Aftermarket parts (e.g., performance upgrades, audio systems)
  - Unique features (e.g., sunroofs, custom paint jobs)
  - Any other relevant modifications
- **3.0.1.1.1.9.3 Processing:**
  - The system shall store the user-entered car special specs in the car's profile within the database (Section 3.2.1.1.2.5.1). This information can be used for:
  - Displaying special specs on the car profile page.
  - Potentially filtering search results within the Car Station feed (Section 3.0.1.1.3) based on user interests in specific car modifications.
- **3.0.1.1.1.9.4 Outputs:**
  Upon successful addition of car special specs, the system shall display a confirmation message to the user, informing them that the details have been saved to their car profile.
- **3.0.1.1.1.9.5 Error Handling:**
  The system may not require specific error handling for this section as it deals with free-form text input. However, the system could consider:
  - Setting a character limit to prevent excessively long entries.
  - Offering suggestions for common car modifications based on user input (optional, leveraging Data Station - Section 3.0.1.1.2).

3.0.1.1.1.10 Add Persistent Issues or Accidents #10

- **3.0.1.1.1.10.1 Introduction:**
  This section details the requirements for adding user-reported persistent car issues or past accidents to the car profile. This functionality allows users to track recurring problems and potentially connect with workshops specializing in resolving those issues.
- **3.0.1.1.1.10.2 Inputs:**
  The system shall provide a user interface element for users to report persistent issues or accidents. This could involve:
  - Text field for describing the issue or accident
  - Dropdown menu or selectable options for categorizing the issue (e.g., engine problems, electrical issues, collision damage)
  - Optional upload functionality for pictures related to the issue/accident (consider integration with Section 3.0.1.1.1.8 Add Car additional pictures)
- **3.0.1.1.1.10.3 Processing:**
  - Store the user-reported persistent issue or accident details in the car's profile within the database (Section 3.2.1.1.2.5.1).
  - This information can be used for:
  - Displaying a history of reported issues on the car profile page.

- Potentially recommending workshops that specialize in repairs relevant to the reported issues (assuming workshop data includes repair expertise).

- **3.0.1.1.1.10.4 Outputs:**
  - Upon successful addition of the persistent issue or accident report, the system shall display a confirmation message to the user, informing them that the details have been saved to their car profile.
- **3.0.1.1.1.10.5 Error Handling:**

  The system may not require extensive error handling, but it could:
  - Ensure a minimum character limit in the text field to encourage users to provide some description.

3.0.1.1.1.11 Add Car Chassis/VIN Number #11

- **3.0.1.1.1.11.1 Introduction:**

  This section details the requirements for adding the car's Chassis or Vehicle Identification Number (VIN) to the car profile. The VIN is a unique identifier for the car and can be valuable for retrieving detailed car information and facilitating maintenance tasks.
- **3.0.1.1.1.11.2 Inputs:**

  The system shall provide a dedicated text field for users to enter the car's Chassis or VIN number. The system may:
  - Implement format validation to ensure the entered VIN adheres to the standard 17-character alphanumeric format.
  - Offer an information icon or tooltip explaining the importance of the VIN and where to locate it on the car (e.g., driver's side door jamb).
- **3.0.1.1.1.11.3 Processing:**
  - Store the user-entered VIN securely within the car's profile in the database (Section 3.2.1.1.2.5.1).
  - The VIN can be used for various purposes, such as:
  - Potentially retrieving detailed car information from an external database with user consent (refer to Section 3.2.1.1.1.3 for data privacy considerations).
  - Facilitating tasks like ordering compatible spare parts or scheduling maintenance services at workshops that utilize VIN lookups for specific car models.
- **3.0.1.1.1.11.4 Outputs:**

  Upon successful addition of the VIN, the system shall display a confirmation message to the user, informing them that the VIN has been saved to their car profile.
- **3.0.1.1.1.11.5 Error Handling:**

  The system shall implement error handling for invalid VIN input:
  - If the user enters an incorrect format (less or more than 17 characters, invalid characters), the system shall display an error message prompting them to enter a valid VIN number.
  - The system may offer suggestions for correcting the format (e.g., highlighting incorrect characters).

3.0.1.1.1.12 Display Total Maintenance Costs #12

- **3.0.1.1.1.12.1 Introduction:**
  This section details the requirements for displaying the total estimated maintenance costs associated with a car profile within the Car Station. This functionality provides users with a clear overview of anticipated expenses for regular, precautionary, and potential crash maintenance (Sections 3.0.1.1.1.4, 3.0.1.1.1.5, 3.0.1.1.1.6).
- **3.0.1.1.1.12.2 Inputs:**
  The system shall not require any user input for this functionality.
- **3.0.1.1.1.12.3 Processing:**
  1. Access the car's profile in the database (Section 3.2.1.1.2.5.1).
  2. Retrieve the estimated costs for regular maintenance intervals (Section 3.0.1.1.1.4), precautionary maintenance (Section 3.0.1.1.1.5), and crash maintenance (Section 3.0.1.1.1.6), if provided by the user.
  3. Calculate the total estimated maintenance cost by summing the retrieved values.
- **3.0.1.1.1.12.4 Outputs:**
  The system shall display the calculated total estimated maintenance cost in a clear and prominent location within the car profile interface. This could be a dedicated section labeled "Total Estimated Maintenance Cost" with a numerical value and optional currency symbol.
- **3.0.1.1.1.12.5 Error Handling:**
  The system may not encounter errors in this process, as it retrieves and sums existing data. However, if any of the cost-related sections (3.0.1.1.1.4, 3.0.1.1.1.5, 3.0.1.1.1.6) have errors due to user input, it would be reflected in the total cost calculation.

3.0.1.1.1.13 Display Car Efficiency #13

- **3.0.1.1.1.13.1 Introduction:**
  This section details the requirements for displaying the car's fuel efficiency within the car profile. This information can be beneficial for users to track their car's performance and potentially make informed decisions about fuel consumption.
- **3.0.1.1.1.13.2 Inputs:**
  The system may have two approaches for obtaining car efficiency data:
  - **User Input:** The system can provide a text field where users can enter their car's fuel efficiency (e.g., miles per gallon or liters per kilometer).
  - **External Data Retrieval (Optional):** The system can attempt to retrieve fuel efficiency data from an external database using the car's VIN number (Section 3.0.1.1.1.11) with user consent (refer to Section 3.2.1.1.1.3 for data privacy considerations). This approach requires integration with a reliable car information database.
  - **3.0.1.1.1.13.3 Processing:**
    1. If user input is available, store the entered fuel efficiency data in the car's profile within the database (Section 3.2.1.1.2.5.1).
    2. If enabled and with user consent, attempt to retrieve fuel efficiency data from an external database using the car's VIN.
    3. The system shall prioritize user-entered data over retrieved data, as user input might reflect real-world driving conditions.
    4. If both user input and retrieved data are available, the system may display them both for user reference, allowing them to compare and potentially adjust the user-entered value based on the retrieved information.

- **3.0.1.1.1.13.4 Outputs:**
  The system shall display the car's fuel efficiency data in a clear and user-friendly format within the car profile interface. This could be a dedicated section labeled "Fuel Efficiency" with a numerical value and the corresponding unit (e.g., "25 MPG").
- **3.0.1.1.1.13.5 Error Handling:**
  The system may encounter the following situations and handle them accordingly:
  - **Invalid User Input:** If the user enters an invalid value for fuel efficiency (e.g., negative numbers, non-numeric characters), the system shall display an error message prompting them to enter a valid value.
  - **External Data Retrieval Failure:** If the attempt to retrieve fuel efficiency data from an external database fails due to network issues or database unavailability, the system shall inform the user and display any user-entered data if available.

3.2.1 <Functional Requirement or Feature #1>
3.2.1.1 Introduction
3.2.1.2 Inputs
3.2.1.3 Processing
3.2.1.4 Outputs
3.2.1.5 Error Handling

3.3 Use Cases

3.3.1 Use Case #1

3.3.2 Use Case #2

…
…

3.5 Non-Functional Requirements

Non-functional requirements may exist for the following attributes. Often these requirements must be achieved at a system-wide level rather than at a unit level. State the requirements in the following sections in measurable terms (e.g., 95% of transaction shall be processed in less than a second, system downtime may not exceed 1 minute per day, > 30 day MTBF value, etc).
3.5.1 Performance

3.5.2 Reliability

3.5.3 Availability

3.5.4 Security

3.5.5 Maintainability

3.5.6 Portability