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Technical Documentation for Car Management App

Overview

The Car Management App is a web-based application that allows users to manage and track their car-related information, including expenses, fuel usage, maintenance schedule, and due maintenance. The application is developed using Java Spring Boot, Thymeleaf and follows the Model-View-Controller (MVC) design pattern.
Technology Stack

1. Java Spring Boot: Used for backend development.
2. Thymeleaf: Used for frontend development.
3. Spring Security: Used for implementing authentication, authorization, and User session management. And securing all endpoints so that only authorized personnel would access it
4. Spring Scheduler: Used for scheduling tasks. (used this to schedule some maintenance task every 3 months)
5. iText, PDF, and JavaMail Libraries: Used for generating and emailing reports.
6. Spring caching which lies between the application and persistence database. It stores the recently used data that reduces the number of database hits as much as possible
7. Spring error handling : ExceptionHandler is a Spring annotation that provides a mechanism to treat exceptions thrown during execution of handlers (controller operations)
8. Spring validation: we used a Validator interface that validate objects. The Validator interface works using an Errors object so that while validating, validators can report validation failures to the Errors object

Architectural Design

The application follows the MVC (Model-View-Controller) design pattern.

- Model: The model represents the application's data structures, primarily implemented using classes in Java. These classes interact with the database to create, read, update, and delete data.
- View: The view represents the user interface of the application, primarily implemented using Thymeleaf templates. The view displays the data provided by the model in a user-friendly format.
- Controller: The controller acts as an intermediary between the model and the view. It handles user inputs and updates the model and view as necessary.
- Helpers: this contain class like the pdf generator , email functionalities and spring error handling

Module Breakdown

1. User Management Module: Handles user registration, login, and logout functionality.
2. Car Management Module: Allows users to add, view, edit, and delete car details.
3. Report Module: Generates a detailed report of expenses, fuel usage, due maintenance, and car details, which are emailed to the user in a PDF format.
4. Scheduling Module: Allows users to schedule maintenance tasks for their car.
5. Due Maintenance Module: Allows users to view pending maintenance tasks and mark them as complete.

Security

Security is implemented using Spring Security. It ensures user data privacy by allowing users to see only their data. All endpoints are secured, and proper authentication, authorization, and session management techniques are implemented.

Performance

Performance is ensured by optimizing the code, minimizing the response time, and effectively managing resources.

Deployment

The project is deployed on railway platform

Maintenance

Regular updates and maintenance are planned post-deployment to ensure the smooth functioning of the application. The Spring Scheduler is used to schedule maintenance tasks every 3 months.