# **System Design Documentation**

## **Overview**

This document provides an overview of the system design for the Shopping Cart Management API. The API facilitates shopping cart activities, including CRUD operations on items, user authentication via OAuth 2.0, and storage in a relational database.

## **ICE Model**

### **Interface**

#### Endpoints

****User Authentication****

* + **/account/login** - GET: Initiates the user login process.
  + **/account/google-response** - GET: Handles the Google authentication response.

****Shopping Cart Management****

* + **/shoppingcart/items** - GET: Retrieves shopping cart items for the authenticated user.
  + **/shoppingcart/items/{itemId}** - GET: Retrieves details of a specific shopping cart item.
  + **/shoppingcart/items** - POST: Adds a new item to the shopping cart.
  + **/shoppingcart/items/{itemId}** - PUT: Updates details of a specific shopping cart item.
  + **/shoppingcart/items/{itemId}** - DELETE: Removes a specific item from the shopping cart.

### **Authentication**

* The system uses OAuth 2.0 for user authentication.
* Google is the chosen authentication provider.

### **Swagger Interface**

* Swagger UI is integrated for API interaction and documentation.

## **Control**

### **Controllers**

****AccountController****

* + Manages user authentication using Google.
  + Initiates the login process and handles the Google authentication response.

****ShoppingCartController****

* + Manages CRUD operations on shopping cart items.
  + Uses hard-coded user ID for demonstration purposes.

## **Entity**

### **Database**

****User****

* + Represents a registered user.
  + Stores user details and authentication tokens.

****ShoppingCartItem****

* + Represents an item in the shopping cart.
  + Includes metadata and an optional attached image.

****ShoppingCart****

* + Represents the user's shopping cart.
  + Associated with the User entity.

## **Additional Features**

****Rate Limiting Middleware****

* + Protects the API against abuse by implementing rate limiting.
  + Configuration: Limit = 10 requests per minute.

****Logging****

* + Logs operations performed by the API.
  + Integrated with **ILogger** for debugging and error tracking.

****Database Context****

* + Utilizes Entity Framework Core for data access.
  + Configured to use MS SQL Server.

****Swagger Documentation****

* + Integrates Swagger for API documentation and interaction.

## **Instructions for Reviewers**

1. The project is hosted on GitHub and is publicly accessible.
2. Authentication issues with Google Console via Swagger UI are acknowledged but not resolved due to time constraints.

## **Conclusion**

This system design documentation provides insights into the architecture, components, and additional features of the Shopping Cart Management API. It serves as a reference for developers, reviewers, and stakeholders involved in the project.