**Objects and their relationships**

Classes:

a) Users: This class represents the users of the online book store system. It includes attributes such as user ID, username, password, and contact information.

b) Books: This class represents the books available in the online store. It includes attributes like book ID, title, author, description, price, and other relevant book details.

c) Categories: This class represents the different categories or genres that books can be classified into. It includes attributes such as category ID and category name.

d) Category\_To\_Book: This class establishes a many-to-many relationship between categories and books. It acts as a connector table that associates each book with one or more categories.

e) Roles: This class defines the different roles or user types within the system, such as customer, manager, employee, and guest. It includes attributes like role ID and role name.

f) Roles\_To\_Users: This class establishes a many-to-many relationship between users and roles. It allows a user to have multiple roles and assigns specific roles to users. This table connects the Users and Roles classes.

g) Orders: This class represents the orders placed by customers. It includes attributes such as order ID, customer ID, order date, and payment information.

h) Order\_Details: This class captures the details of each individual book within an order. It includes attributes like order detail ID, book ID, quantity, and price. The relationship between orders and order\_details is one-to-many, as one order can have multiple order\_details.

Relationships:

Users and Roles: There is a many-to-many relationship between Users and Roles, as a user can have multiple roles, and multiple users can have the same role. The Roles\_To\_Users table acts as a connector, linking users with their assigned roles.

Categories and Books: Similarly, there is a many-to-many relationship between Categories and Books, as a book can belong to multiple categories, and multiple books can fall under the same category. The Category\_To\_Book table serves as a connector, associating books with their respective categories.

Orders and Order\_Details: The relationship between orders and order\_details is one-to-many, as one order can contain multiple order\_details. Each order\_detail represents a specific book within the order, allowing for detailed tracking and fulfillment.

**Functional and non-functional requirements**

Functional Requirements:

User Registration and Authentication:

Users should be able to register for an account with the bookstore.

Users should be able to log in securely using their credentials.

The system should authenticate and authorize users based on their roles and permissions.

Book Search and Browsing:

Users should be able to search for books based on criteria.

The system should provide filtering and sorting options to refine search results.

Users should be able to view detailed book information, including cover images, descriptions, and reviews.

Book Ordering and Checkout:

Authenticated users should be able to add books to their shopping basket.

Users should be able to manage their basket, update quantities, and remove items.

Manager and Employee Management:

Managers should have the ability to manage employee accounts, roles, and permissions.

Employees should be able to manage book inventory, including adding new books, updating information, and removing books.

The system should allow managers and employees to generate reports on sales, stock, and customer analytics.

Non-Functional Requirements:

Performance:

The system should handle a large number of concurrent users and provide fast response times.

Book search and retrieval should be efficient, even with a vast inventory.

Security:

User authentication and personal information should be securely stored and encrypted.

The system should protect against common web vulnerabilities.

Scalability:

The system should be designed to handle increasing numbers of users, books, and transactions without significant performance degradation.

**Use cases**

Guest User:

Search for books: The guest user can search for books based on various criteria.

View book details: The guest user can view the detailed information of a book, including the cover image, description, price, and reviews.

Register for an account: The guest user has the option to register for a customer account to access additional features.

Authenticated Customer:

Log in: The authenticated customer can log in securely using their credentials.

Update profile: The customer can update their profile information, including personal details.

Add books to the basket: The customer can add books to their shopping basket for future purchase.

Manage the basket: The customer can view and modify the contents of their basket, update quantities, and remove books.

Employee:

Log in: The employee can log in securely using their credentials.

Manage book inventory: The employee can add new books to the system, update book information, and remove books that are no longer available.

Manager:

Log in: The manager can log in securely using their credentials.

Manage employee accounts: The manager can create, modify, or delete employee accounts, assign roles and permissions.

Manage book inventory: The manager has the same abilities as an employee to add, update, and remove books from the inventory.