**Case Study: Restaurant Management System**

**Context:**

You are required to develop a console-based Restaurant Management System using Core Java. The application will allow restaurant staff to manage menu items, process orders, and perform various business operations related to restaurant management. The application will utilize Java Collections for storing menu items and order information, implement Object-Oriented Programming principles, and include exception handling to manage potential errors.

**Requirements:**

**Features:**

1. **Add and Remove Menu Items:**
   * Allow administrators to add new menu items to the menu.
   * Allow administrators to remove menu items.
2. **Update Menu Item Details:**
   * Allow administrators to update details of existing menu items, such as price and availability.
3. **Search for Menu Items:**
   * Allow users to search for menu items by name or category.
   * Display the search results with menu item details.
4. **Process Orders:**
   * Allow users to place orders for menu items.
   * Update menu item availability and order status accordingly.

**Classes and Objects:**

1. **MenuItem Class:**
   * Attributes: id, name, category, price, available (boolean indicating if the item is available).
   * Methods: Constructors, getters and setters, toString method.
2. **Order Class:**
   * Attributes: id, menuItemId, quantity, orderTime, status (pending, preparing, ready, served).
   * Methods: Constructors, getters and setters, toString method.
3. **RestaurantManager Class:**
   * Attributes: HashMap<Integer, MenuItem> menuItems, ArrayList<Order> orders.
   * Methods:
     + addMenuItem(MenuItem item): Adds a new menu item to the menu.
     + removeMenuItem(int itemId): Removes a menu item from the menu.
     + updateMenuItem(int itemId, MenuItem updatedItem): Updates details of an existing menu item.
     + searchMenuItems(String keyword): Searches for menu items based on the keyword.
     + placeOrder(int itemId, int quantity): Places an order for a menu item.
     + processOrder(int orderId): Processes an order (updates status and menu item availability).
     + Helper methods for input validation and exception handling.

**Deliverables:**

1. Complete source code for the Restaurant Management System.
2. Documentation including:
   * How to run the application.
   * Instructions for each feature.
   * Explanation of the exception handling implemented.
3. A brief report on the application design and how Object-Oriented principles were applied.