PROJECT REPORT

Object Oriented Programming Lab (CSL-210)

PROJECT TITLE:

GemCrafts Solution

BS (CS) – 2B

Group Members

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Abstract

This report details the design and implementation of an Online Jewelry Business Management System developed using Java Swing and Object-Oriented Programming (OOP) principles, integrated with a MySQL database. The system aims to provide a comprehensive solution for managing key operations of an online jewelry store, including customer management, inventory control, order processing, and sales reporting. It features a user-friendly graphical interface, secure login functionalities, and ensures efficient data persistence and retrieval for both administrative staff and customers. The primary objective is to streamline business processes, enhance operational efficiency, and provide valuable insights for business growth.

Introduction

The advent of e-commerce has transformed traditional retail, and the jewelry industry is no exception. Online jewelry businesses require robust and efficient management systems to handle their unique operational challenges, such as diverse inventory, intricate order tracking, and sensitive customer data. This project addresses these needs by developing a desktop-based application that offers a centralized platform for managing an online jewelry store. Built with Java's powerful Swing framework for the user interface and leveraging a relational database for data management, the system is designed to be intuitive for administrators and reliable for business operations. It focuses on simplifying complex tasks, from updating product stock to tracking customer orders, ultimately aiming to improve overall business performance and customer satisfaction.

Problem Statement

Traditional manual methods or fragmented systems for managing an online jewelry business often lead to several challenges:

- **Inefficient Inventory Management:** Difficulty in accurately tracking diverse jewelry items, leading to stockouts, overstocking, or discrepancies between physical and reported inventory.
- **Cumbersome Customer Management:** Lack of a centralized system for customer information, making it hard to manage customer details, track interactions, or personalize services.
- **Manual Order Processing:** Prone to errors, delays, and a lack of real-time visibility into order statuses, impacting customer satisfaction.
- **Limited Sales Analysis:** Absence of tools for generating sales reports and analytics, hindering informed decision-making regarding popular products, sales trends, and marketing strategies.
- **Data Security and Consistency:** Risks associated with unsecured data storage and inconsistent data across different operational aspects.

This project seeks to resolve these issues by providing an integrated, automated system that streamlines these critical business functions, enhances data accuracy, and supports better

decision-making.

Methodology

The project adopted a structured software development approach, primarily focusing on **Object-Oriented Programming (OOP)** principles and the **Model-View-Controller (MVC) architectural pattern** (implicitly, given the separation of GUI forms, database interactions, and business logic classes).

- **Requirement Analysis:** Initial phase involved understanding the core functionalities required for an online jewelry business, such as customer management, inventory, order processing, and reporting.
- **System Design:**
    - **Database Design:** A relational database (MySQL) was designed with tables for `customers`, `items` (jewelry products), `orders`, and `order_items`, and `admin` to store user credentials.
    - **Class Design (OOP):** Core business entities like `Customer`, `JewelryItem` (or `Product`), `Order`, `OrderItem`, and `User` (and `Admin`) would be modeled as Java classes, encapsulating their data and behavior. Inheritance could be used for different jewelry types or user roles.
    - **User Interface (UI) Design:** Java Swing was chosen for the graphical user interface. NetBeans IDE's GUI builder was extensively utilized for rapid UI development, allowing for drag-and-drop component placement and automated code generation.
- **Implementation:**
    - **GUI Development:** Forms such as `Login.java`, `Main.java`, `CustomerManagementForm.java`, `ManageInventory.java`, `orderForm1.java`, `OrderManagementForm.java`, `salesgraphs.java`, and `splashScreen.java` were implemented using Swing components and event handling.
    - **Database Integration:** JDBC (Java Database Connectivity) was used to establish connections with the MySQL database. `PreparedStatement` was employed for all data manipulation queries (INSERT, UPDATE, DELETE) to prevent SQL injection, and `Statement` for simple `SELECT` operations. A `DBConnection` utility class centralized database connection management for reusability.
    - **Business Logic:** Logic for CRUD operations, input validation, order calculation, and data retrieval for reports was implemented behind the GUI forms, interacting with the database.
- **Testing:** Each module and functionality (e.g., customer add, inventory update, order creation) was tested to ensure it met the specified requirements and handled errors gracefully. Exception handling (`try-catch` blocks) was implemented for database operations and input validation.

Project Scope

The current scope of this "GemCrafts Solutions Project" includes the following key modules and functionalities:

- **User Authentication:**
  - `splashScreen.java`: Provides a loading animation and initial branding.
  - `Login.java`: Secure login functionality for administrators based on credentials stored in an `admin` table in the database.
- **Main Dashboard:**
  - `Main.java`: Serves as the central navigation hub after login, providing access to various management modules.
- **Customer Management:**
  - `CustomerManagementForm.java`: Allows administrators to perform full CRUD operations (Create, Read, Update, Delete) on customer records in the database. Includes basic input validation.
- **Inventory Management:**
  - `ManageInventory.java`: Enables administrators to add new jewelry items, view existing stock, update product details (e.g., price, quantity, description), and remove items from the inventory.
- **Order Processing & Management:**
  - `orderForm1.java`: Facilitates the creation of new customer orders. This likely involves selecting items, specifying quantities, and processing the order.
  - `OrderManagementForm.java`: Provides administrative tools for viewing all orders, updating their statuses, searching for specific orders, and generating receipts. It also supports deleting orders.
- **Sales Reporting:**
  - `salesgraphs.java`: Generates visual sales reports using JFreeChart, providing insights into total sales per item (as indicated by the SQL query to `order_items` and `items` tables), aiding business analysis.

UML Diagram

Conclusion

The GemCraft Solution's Project successfully addresses key operational challenges faced by e-commerce jewelry businesses. By leveraging Java Swing for an interactive GUI and JDBC for robust database integration, the project provides a centralized platform for managing customers, inventory, and orders, along with basic sales reporting. The application demonstrates the practical application of Object-Oriented Programming principles, enhancing code reusability, maintainability, and scalability. While the current implementation covers essential functionalities, future enhancements like payment gateway integration, advanced analytics, and a comprehensive customer portal would further strengthen its utility and market readiness. This project serves as a solid foundation for a comprehensive business management solution in the e-commerce jewelry domain.