Introduction to Invigo: Inventory Management System

An Inventory management System is a software that is used to manage the inventory easily.

We named out Inventory Management System Invigo, Invigo basically means to energize or strengthen something. As our Inventory management System energizes the way of managing Inventory, so we named it Invigo

The primary objective of Invigo is to streamline the inventory management process, making it easier and more reliable for users to track, manage, and update inventory data. By providing a user-friendly interface and a range of functionalities, Invigo aims to minimize errors, improve efficiency, and enhance overall productivity in inventory management operations.

Invigo's key features include:

1. Product Management: Allows users to add, edit, and delete products, along with essential details such as Product ID, Name, Quantity, Description, Category, and Price.

2. User Management: Enables administrators to manage user accounts, including adding new users, updating user information, and maintaining user security through password hashing.

3. Customer Management: Provides functionality for adding and managing customer information, including Customer ID, Name, Phone Number, and Email.

4. Category Management: Facilitates the categorization of products by allowing users to define and manage product categories, ensuring better organization and classification of inventory items.

5. Order Management: Simplifies the process of placing orders by allowing users to select customers, choose products, specify quantities, and generate automated calculations for total order amounts.

As we can see that the above features will be helpful for every business organization. Because these are the frequently done tasks by the business organizations. Usage of pen and paper would be minimized and the software will also improve the security, reliability and help the organization to boost their productivity.

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Objective of Invigo: Inventory Management System

We all know that technology has made our lives easier in many different ways. The traditional way of managing inventory was a very hard task to execute properly. Just because we haven't any other way of doing it we used to manage the inventory with pen and papers. The documentation of the papers worked as the database. There were high risk of losing the data because the papers are hard to keep. Suppose a big organization has millions of data, everything is documented on papers. This will take an entire just to keep the records.

Another problem was that the manager of the organization had to deal with a lot of mathematical calculations. Even though they used the calculator, but still it took a decent amount of time. And as we all are human, so mistakes are very easily made by us.

To solve all these problems, we developed the Inventory Management System, Invigo. This software will save time, boost productivity and save the pen and papers. Which is actually a good thing for the environment as well.

Overview of the System:

Invigo was developed using Java Swing for the graphical user interface (GUI) and MySQL for the database, ensuring a robust and user-friendly experience. The system includes features such as product management, user management, customer management, category management, and order placement. Each of these features is designed to make the inventory management process intuitive and efficient.

The development of Invigo was a collaborative effort, completed as part of our Software Development Lab 2 course project. Our team, consisting of I.S.M Rahik and Shahanaz Parvin Chaity, worked very hard to create a system that addresses the core needs of inventory management.

Technologies Used

1. Java Swing: Used for developing the graphical user interface (GUI).

 2. MySQL: Used as the database management system for storing and managing inventory data.

3. JDBC (Java Database Connectivity): Used to connect Java applications with the MySQL database.

Key Functionalities

Invigo offers a range of functionalities to streamline inventory management processes:

1. **Product Management**: Users can add, edit, and delete products. Each product entry includes details such as Product ID, Name, Quantity, Description, Category, and Price. The system ensures that all product information is up-to-date and easily accessible.

2. **User Management**: Administrators can manage user accounts, including adding new users, updating user information, and maintaining user security. Passwords are hashed to enhance security, ensuring that even if the database is compromised, passwords remain protected.

3. **Customer Management**: The system allows for the addition and management of customer information, including Customer ID, Name, Phone Number, and Email. This functionality helps in keeping track of customer details and their interactions with the inventory system.

4. **Category Management**: Users can define and manage product categories, enabling better organization and classification of inventory items. Categories can be created, edited, and deleted as needed, and are used to group products logically.

5. **Order Management**: The order management functionality simplifies the process of placing orders. Users can select customers, choose products, specify quantities, and add items to the order list. The system automatically calculates the total amount based on the selected products and quantities, facilitating accurate order processing and billing.

Login Page of Invigo:

The login page is the entry point of Invigo, serving as a secure gateway for authorized users to access the system. It ensures that only users with valid credentials can enter and interact with the system's functionalities, thereby maintaining the security and integrity of the inventory data.

Design and Functionality

- *User Interface:* The login page is designed using Java Swing, providing a simple yet intuitive interface. It consists of text fields for the user ID and password, and a login button to submit the credentials. The design ensures ease of use, allowing users to quickly and efficiently log into the system.

- **User Authentication:** When a user enters their credentials and clicks the login button, the system validates the information against the records stored in the MySQL database. The login process includes the following steps:

  - **Input Validation:** The system checks that both fields (user ID and password) are filled. If either field is empty, an error message is displayed prompting the user to complete the required fields.
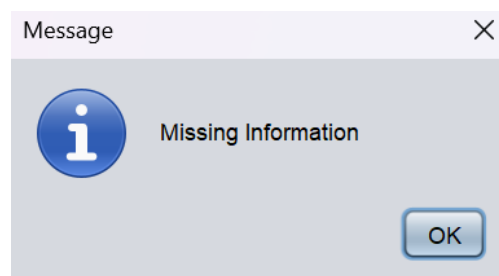
- *Credential Verification:* The entered user ID and password are compared against the stored credentials in the database. Passwords are hashed for security, and the system uses this hash to verify the entered password.

SELECT * FROM usertbl LIM... ×				
Max. rows: 100		Fetched Rows: 2		
#	UName	UPassword	UPhone	UEmail
1	Rahik	ef797c8118f02dfb649607dd5d3f8c762304...	01768879891	ismrahik@gmail.com
2	Chaity	03ac674216f3e15c761ee1a5e255f067953...	01789394611	chaity@gmail.com

- *Access Control:* Based on the credentials, the system determines the user's role (superadmin, admin) and grants appropriate access. Superadmins have the ability to manage other admins, while admins have access to core inventory management functionalities.

Security Features

- *Password Hashing:* To enhance security, user passwords are hashed before being stored in the database. This ensures that even if the database is compromised, the actual passwords remain protected. The system uses a secure hashing algorithm to convert the plain text passwords into hashes.

  These are all hashed passwords that are being showed in the database:

UPassword
ef797c8118f02dfb649607dd5d3f8c762304...
03ac674216f3e15c761ee1a5e255f067953...

- *Error Handling:* The system handles incorrect login attempts gracefully by displaying relevant error messages, such as "Wrong Username or Password." This feedback helps users understand and correct their mistakes without compromising security.
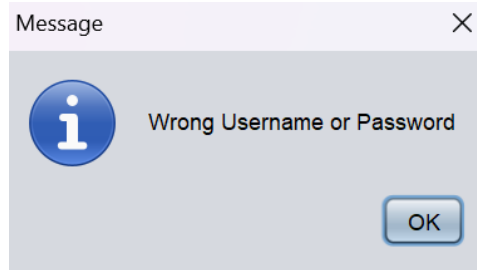
User Experience

The login page is designed to provide a seamless and secure user experience. The simple layout and clear instructions help users quickly log in without confusion. Additionally, error messages are designed to be informative without revealing sensitive information, maintaining the balance between usability and security.

Home Page of Invigo:

The home page of Invigo serves as the central hub from which users can navigate to various functionalities of the Inventory Management System. Upon successful login, users are directed to this page, which provides a comprehensive overview and easy access to all major sections of the system.

Design and Layout

- **User Interface**: Developed using Java Swing, the home page features a clean and intuitive design. It consists of a navigation menu and a main display area. The navigation menu provides quick links to the core functionalities: Product Management, User Management, Customer Management, Category Management, and Order Management.
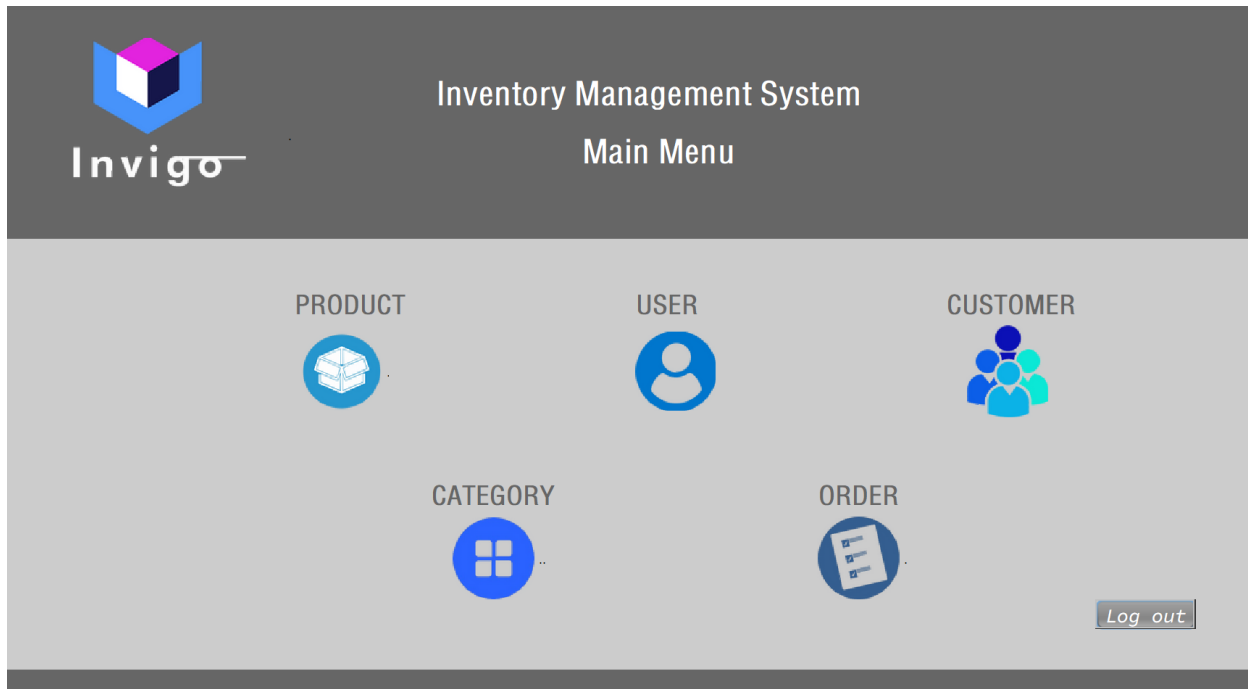
Navigation Menu

The navigation menu is designed to be user-friendly, allowing users to easily switch between different sections of the system. The menu items include:

1. **Product Management**: Provides access to functionalities for adding, editing, and deleting products in the inventory.

2. **User Management**: Allows the superadmin to manage admin accounts, including adding new admins and updating existing ones.

3. **Customer Management**: Enables the addition and management of customer information.

4. **Category Management**: Facilitates the creation and management of product categories.

5. **Order Management**: Streamlines the process of placing and managing customer orders.

Each menu item is clickable and directs the user to the respective section, making navigation seamless and efficient.

User Experience

The home page is designed to enhance user experience by providing a central point of access to all major functionalities. Its intuitive layout ensures that users can easily find and navigate to the desired sections. Additionally, the clean design reduces clutter and focuses on essential elements, making the system more efficient to use.

User Management Page of Invigo:

The User Management Page in Invigo is designed to allow the superadmin to manage admin accounts efficiently. This page provides functionalities for adding new users, updating existing user information, and ensuring user security through password management.

Design and Layout

- **User Interface**: The User Management Page is developed using Java Swing, featuring a clean and organized layout. The page includes a form for adding and editing users, and a table that displays the list of existing users. The design is intuitive, making it easy for the superadmin to navigate and manage user accounts.

Key Functionalities

1. **Add User**:

   - The superadmin can add new admin users to the system.

   - The form for adding a user includes fields for entering the Username, Password, Phone Number, and Email.

   - Once the details are entered, clicking the "Add" button will save the new user to the database.

New User is inserted into the USER LIST:

2. **Edit User**:

- Existing user information can be updated by selecting a user from the table.

- The selected user's details will populate the form fields, allowing the superadmin to make necessary changes.

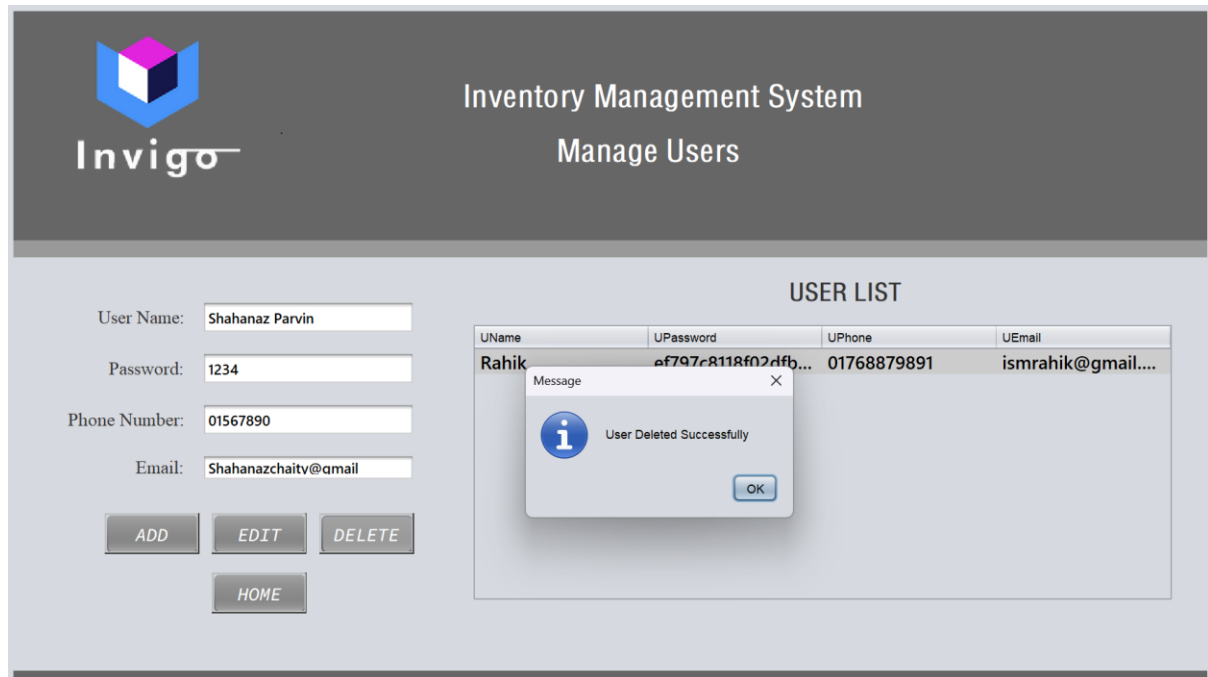- After editing, clicking the "Edit" button will update the user information in the database.
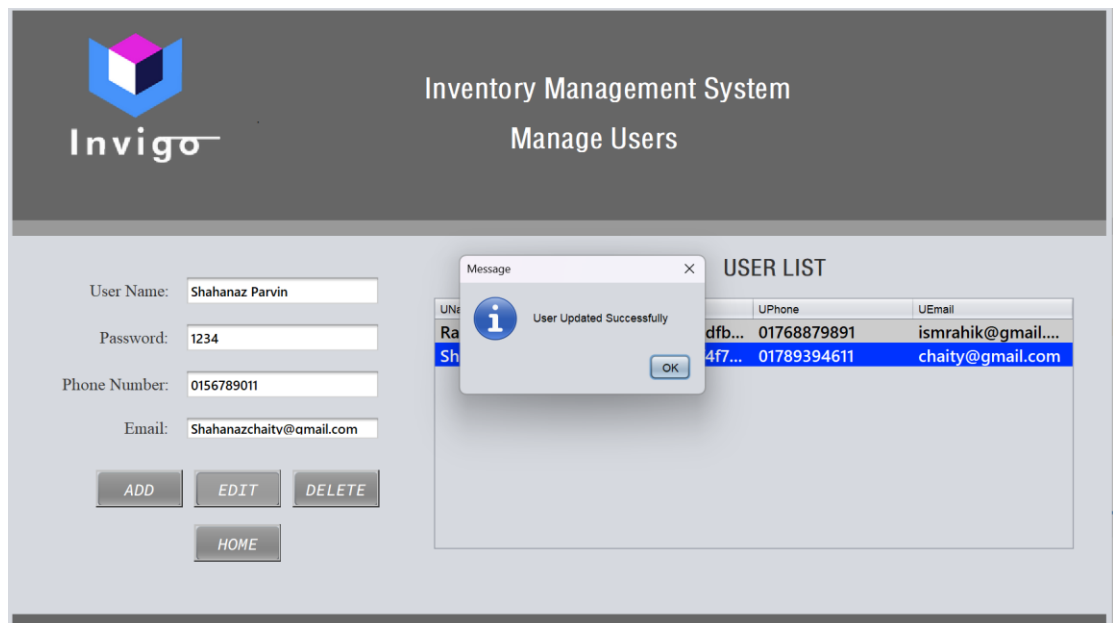
After Clicking on okay, we get to see the updated data that is stored in the database:
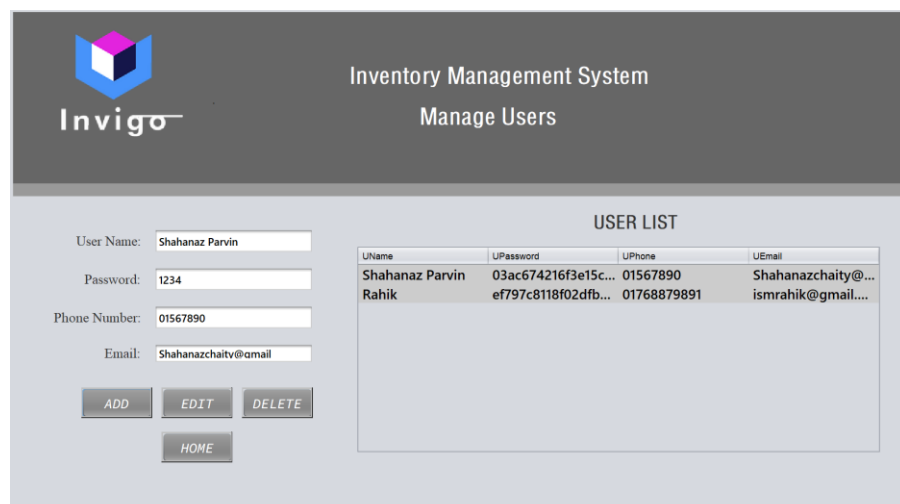
3. **Delete User**:

    - Users can be deleted by selecting a user from the table and clicking the "Delete" button.

Security Features

- **Password Hashing**: User passwords are hashed before being stored in the MySQL database. This ensures that even if the database is compromised, the actual passwords remain secure and protected.

- **Role-Based Access Control**: Only the superadmin has access to the User Management Page. Regular admins do not have the permissions to add, edit, or delete users, ensuring that user management is strictly controlled. This Security Feature is not still implemented in the project but this will be added soon.

User Experience
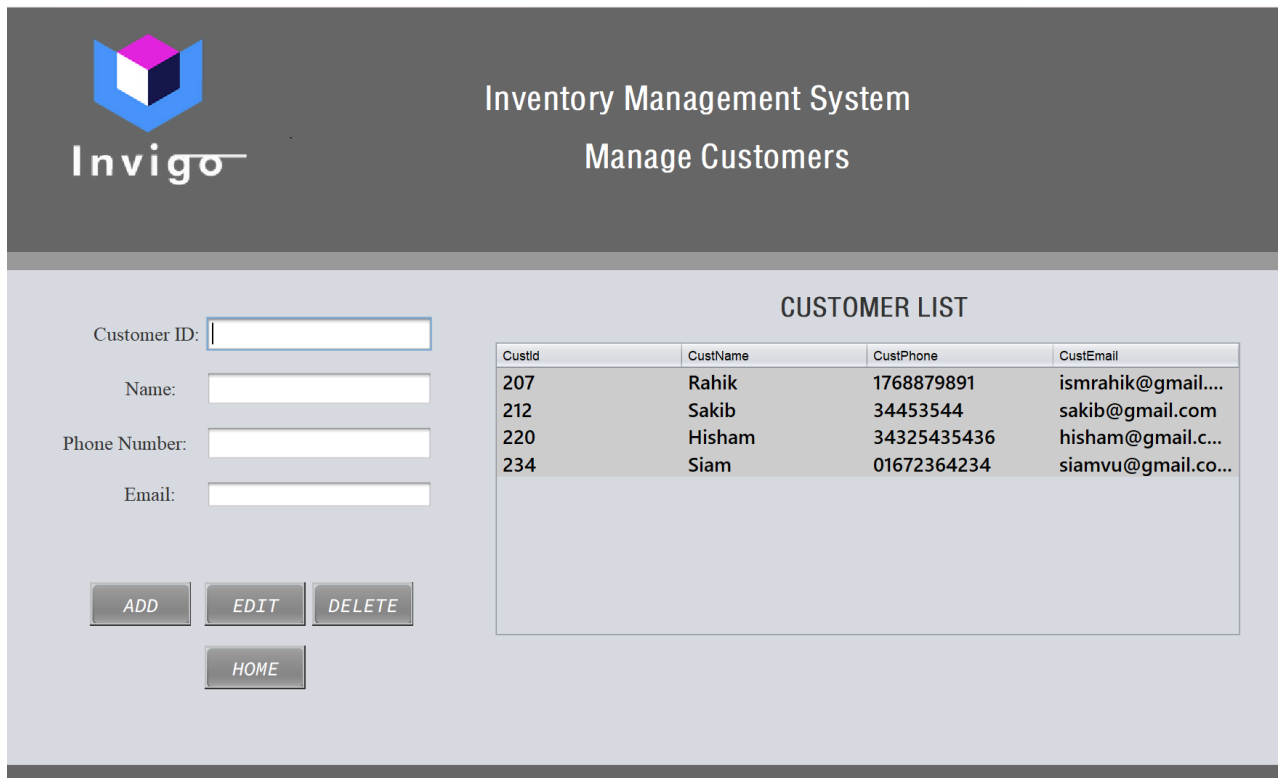
The User Management Page is designed to enhance the superadmin's ability to manage admin accounts efficiently. The clear layout and straightforward forms reduce the complexity of user management tasks, while the security features ensure that user data remains protected.

Customer Management Page of Invigo:

The Customer Management Page in Invigo is designed to efficiently manage customer information. This page provides functionalities for adding new customers, updating existing customer information, and ensuring that customer data is kept up-to-date and accessible.

Design and Layout

- **User Interface**: The Customer Management Page is developed using Java Swing, featuring a user-friendly and organized layout. The page includes a form for adding and editing customers, and a table that displays the list of existing customers. The design ensures that users can easily navigate and manage customer accounts.

Key Functionalities

1. **Add Customer**:

    - Users can add new customers to the system.

    - The form for adding a customer includes fields for entering the Customer ID, Customer Name, Phone Number, and Email.

    - Once the details are entered, clicking the "Add" button will save the new customer to the database.

After Clicking on okay, we get to see the updated data that is stored in the database:

2. **Edit Customer**:

- Existing customer information can be updated by selecting a customer from the table.

- The selected customer's details will populate the form fields, allowing the user to make necessary changes.

- After editing, clicking the "Edit" button will update the customer information in the database.

After Clicking on okay, we get to see the updated data that is stored in the database:

3. **Delete Customer**:

- Customers can be deleted by selecting a customer from the table and clicking the "Delete" button.
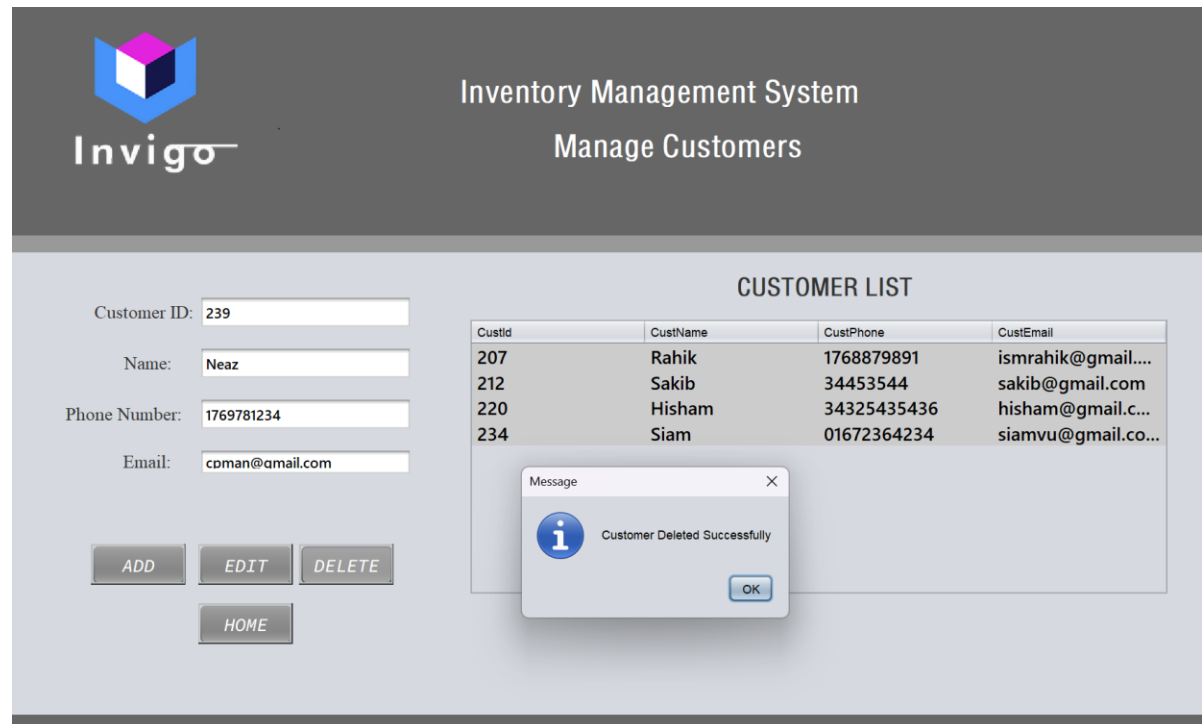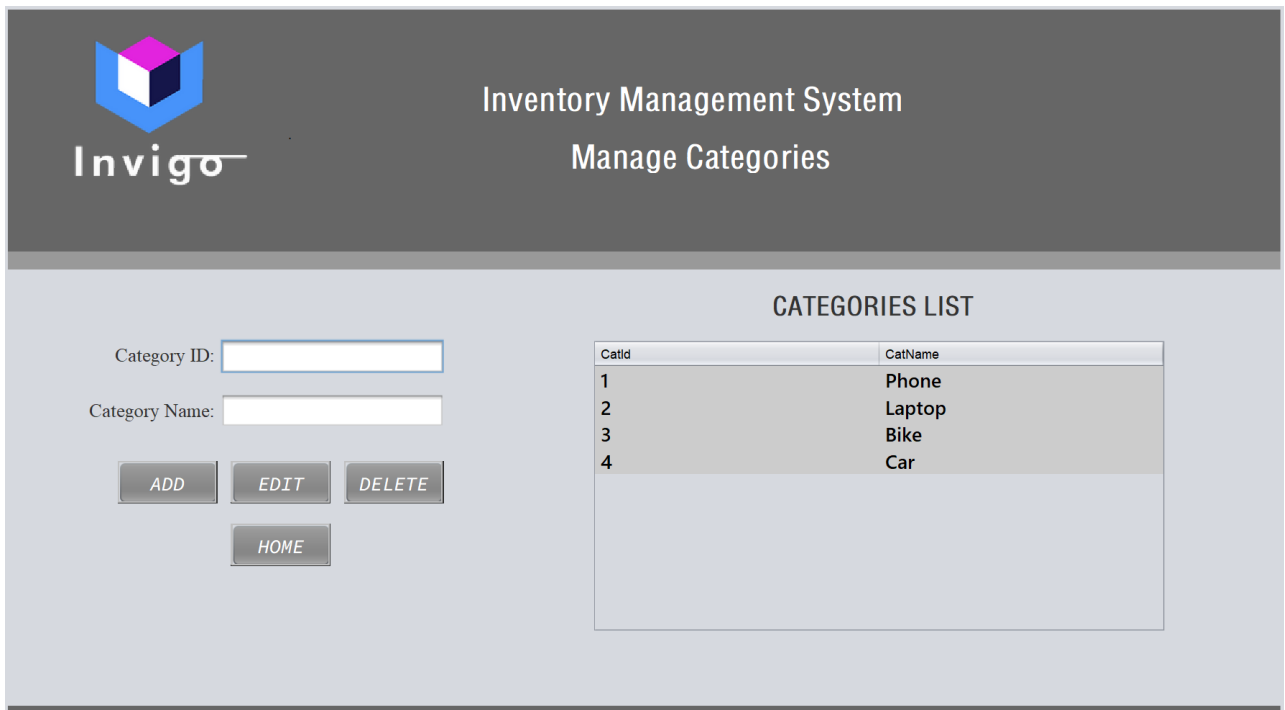

User Experience

The Customer Management Page is designed to enhance the user's ability to manage customer information efficiently. The clear layout and straightforward forms reduce the complexity of managing customer data, while the easy-to-navigate interface ensures a smooth user experience.

Category Management Page of Invigo:

The Category Management Page in Invigo is designed to allow users to efficiently manage product categories. This page provides functionalities for adding new categories, updating existing categories, and organizing inventory items logically.

Design and Layout

- **User Interface**: The Category Management Page is developed using Java Swing, featuring a clean and intuitive layout. The page includes a form for adding and editing categories, and a table that displays the list of existing categories. The design ensures that users can easily navigate and manage product categories.
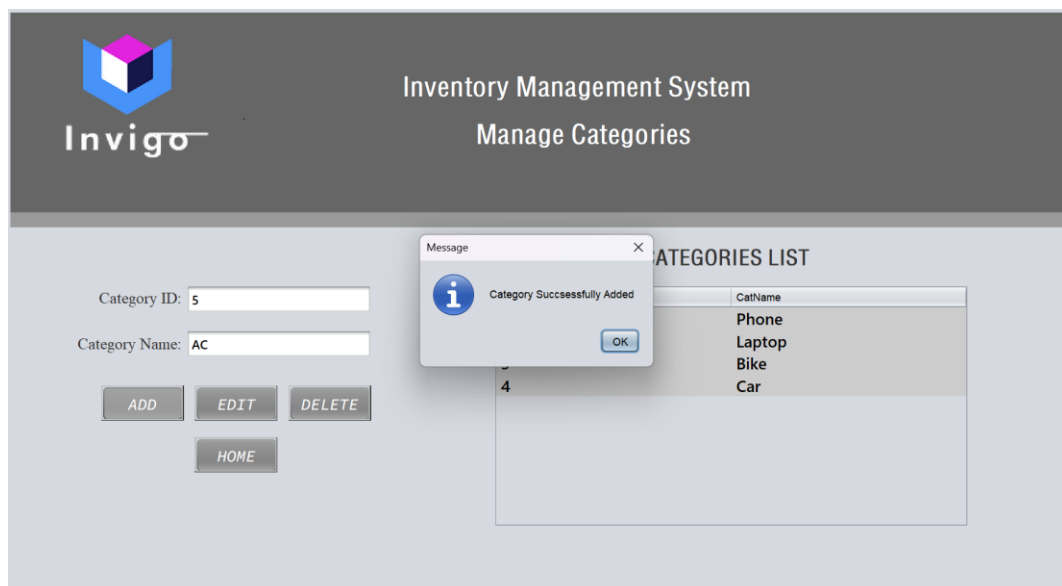
Key Functionalities

1. **Add Category**:

   - Users can add new categories to the system.

   - The form for adding a category includes fields for entering the Category ID and Category Name.

   - Once the details are entered, clicking the "Add" button will save the new category to the database.

After Clicking on okay, we get to see the updated data that is stored in the database:

2. **Edit Category**:

- Existing category information can be updated by selecting a category from the table.

- The selected category's details will populate the form fields, allowing the user to make necessary changes.

- After editing, clicking the "Edit" button will update the category information in the database.

After Clicking on okay, we get to see the updated data that is stored in the database:

3. **Delete Category**:

   - Categories can be deleted by selecting a category from the table and clicking the "Delete" button.

User Experience

The Category Management Page is designed to enhance the user's ability to manage product categories efficiently. The clear layout and straightforward forms reduce the complexity of managing categories, while the easy-to-navigate interface ensures a smooth user experience.

Order Management Page of Invigo:

The Order Management Page in Invigo is designed to streamline the process of placing and managing customer orders. This page provides functionalities for selecting customers, choosing products, specifying quantities, and finalizing orders, making the order processing efficient and accurate.

Design and Layout

- **User Interface**: The Order Management Page is developed using Java Swing, featuring a well-organized and intuitive layout. The page includes lists for customers, products, and orders, as well as fields for specifying order quantities. The design ensures that users can easily navigate through the order process.

Key Functionalities

1. **Customer Selection**:

   - Users can select a customer from the customer list.

   - The list displays relevant customer details such as Customer ID and Name, making it easy to identify the correct customer.

2. **Product Selection**:

   - Users can select products from the product list to add to an order.

   - The list displays product details such as Product ID, Name, and Price, etc.

3. **Add to Order List**:

   - After selecting a product, users specify the quantity and click the "Add to Order List" button.

   - The product and its quantity are added to the order list, and the system automatically calculates the total price.

4. **Order List**:

- The order list displays all the selected products with their quantities and prices.

- The system calculates and displays the total amount for the order.

5. **Place Order**:

- Once all products are added, users can finalize the order by clicking the "Place Order" button.

- The order is saved to the database, and an order confirmation is displayed.

#	OrderId	CustName	OrderDate	Amount
1	1	Rahik	08/03/2024	329,500
2	3	Hisham	08/03/2024	680,000
3	4	Hisham	08/03/2024	680,000
4	6	Sakib	08/03/2024	9,258,000
5	33844	Sakib	26/04/2024	70,000
6	40289	Sakib	22/04/2024	216,000
7	88968	Sakib	22/04/2024	4,500,000

6. **Print Bill**:

- Users have the option to print the bill for the customer.

- The bill includes a detailed list of products, quantities, prices, and the total amount.
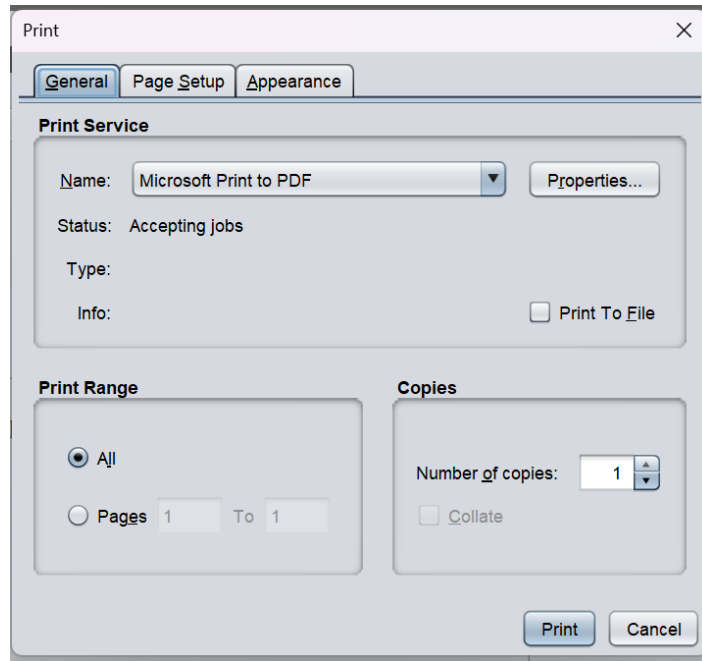
User Experience

The Order Management Page is designed to simplify the order processing workflow. The clear layout and step-by-step process ensure that users can efficiently manage orders. Automated calculations for order totals and an easy-to-use interface enhance the overall user experience.

Security Measures

Ensuring the security of data and user interactions is a paramount concern in Invigo. Various security measures have been implemented to protect the integrity, confidentiality, and availability of the system's data. The following sections outline the key security features integrated into Invigo.

Password Hashing

One of the critical security measures implemented in Invigo is password hashing, which ensures that user passwords are stored securely in the database.

- **Hashing Algorithm**: The SHA-256 hashing algorithm is used to hash user passwords. SHA-256 is a cryptographic hash function that produces a 256-bit hash value, providing a high level of security.

- **Implementation**: When a new user is added, the password is hashed before being stored in the database. This is done using the **hashPassword** method, which converts the password into a secure hash.

Future Work

While Invigo is robust and functional, there are several areas for future enhancements to improve efficiency, user experience, and overall capability.

Enhanced Security

- **Two-Factor Authentication (2FA)**: Adding 2FA for user logins to increase security.

- **Advanced Encryption**: Encrypting sensitive data in the database to enhance data protection.

Expanded Reporting and Analytics

- **Detailed Reports**: Developing comprehensive reports for inventory, sales trends, and customer behavior.

- **Data Visualization**: Integrating charts and graphs to visualize data for easier interpretation.

User Interface and Experience

- **Responsive Design**: Making the interface fully responsive for seamless use on tablets and smartphones.

- **User Customization**: Allowing users to customize their dashboard and settings.

Inventory Optimization

- **Automated Reordering**: Implementing automated reordering based on stock levels.

- **Supplier Management**: Adding features to manage supplier information and track orders.

System Integration

- **Accounting Software Integration**: Integrating with accounting software for automated financial record-keeping.

- **E-commerce Integration**: Synchronizing inventory with e-commerce platforms for accurate stock levels.

Enhanced Order Management

- **Order Tracking**: Adding real-time order tracking features.

- **Bulk Order Processing**: Implementing bulk order processing capabilities.

Advanced Search and Filtering

- **Intelligent Search**: Developing an intelligent search function with various filters.

Faceted Navigation: Enabling refined search results based on multiple attributes.

User Training and Support

In-app Tutorials: Providing in-app tutorials and guides.

Support Chat: Integrating a support chat for real-time assistance.

These are the areas I plan to improve over time.

Conclusion

We have used Java Swing, JDBC and MySQL to make the system. We have also implemented Hashing method to encrypt the password and improve security. Adding, Editing, Deleting Customers, Products are very easy because of the user-friendly interface of the software. Ordering products for a customer and maintain all the records will be a very easy job by using this system. The problems that organizations faced while managing their inventory in the traditional way has been solved by Invigo.

While Invigo is already a powerful tool, there are several areas for future improvement. Enhancements in security, user interface, system integration, and additional functionalities will further elevate the system's effectiveness and user satisfaction.