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E-Commerce Management System

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Data 201

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1. Introduction

The rapid growth of e-commerce has significantly transformed how businesses manage and organize their data. With millions of customers, transactions, and reviews being generated daily, efficient data management has become essential for the success of online shopping platforms. This project focuses on designing and analyzing a robust e-commerce database using MySQL to address the challenges associated with data management in this dynamic sector.

The objective of this project is to develop a database solution that enhances inventory management, tracks sales trends, and supports strategic decision-making for e-commerce platforms. By creating a system that is both functional and intuitive, this project aims to streamline operations for sellers, managers, and other stakeholders, while improving the overall shopping experience for customers.

The report will outline the methodology used to design and implement a comprehensive database system tailored specifically for e-commerce platforms. The integration of user interface elements, such as login pages, customer order histories, and seller portals, demonstrates how functionality and usability are balanced to meet the diverse needs of all users.

This project highlights the importance of robust database design in supporting the operational efficiency and scalability required in modern e-commerce platforms, ensuring that businesses can adapt to the evolving demands of the digital marketplace.

2. Application Design

2.1 Operation Module:

2.1.1 Customer Operation:

This platform makes it easy for users to browse and shop by allowing them to sort products by price or filter by category. Whether you're looking for books, electronics, or food and beverages, you can quickly narrow down your options. The product table shows the essential details, such as the product ID, category, description, and price. Plus, you can easily add items to your cart with just a plus button click. The feature enhances the shopping experience by helping users easily navigate through a variety of products, enabling them to find items based on their preferences, whether by price or product category.

The cart summary is an e-commerce platform. The user can view the price, quantity, and a delete option for each item in their cart. At the bottom, the total cost of the cart is displayed, which is initially \$0.00. There are options to proceed with “Checkout,” “Save,” or “Close” the cart. This interface provides a clean and simple way for users to review their selected items and finalize their purchases.

The order history page, where users can see the status of their past orders. Each order is listed with an order ID, status (e.g., “In progress” or “On the way”), the ordered date, shipped date, and total cost. Below each order, the user can see the details of the purchased items, including product name, unit price, quantity, review score, and a button to “Write a Review” for the product. This feature helps users track their previous purchases and provides the option to leave feedback.

2.1.2 Seller Operation:

Orders Page

The Orders page helps sellers track and manage their orders. It includes key details like order ID, product category, product name, status, price, and quantity. Sellers can filter orders by category, such as books, clothing, or toys, making it easy to find specific products.

A useful feature of this page is the ability to update the order status. Sellers can mark orders as “In Progress”, “On the Way”, or “Order Delayed” to keep customers informed and manage shipping efficiently. The page also displays important dates, like the order date, approval date, and delivery timelines, helping sellers stay organized.

The Order Details section shows a breakdown of products for each order, including product names, categories, prices, and quantities. Buttons like “Ship Order” and “Order Delay” make it simple to update orders quickly. Those functionalities are essential for effective shipping and inventory management.

Customers Page

The Customers page makes it easy to manage customer information. Sellers can search for customers using their ID, first name, last name, or order status. The page displays details like emails, phone numbers, and zip codes, which can be used for customer communication or promotions.

This page also helps sellers identify frequent customers and offer them special deals or promotions to build loyalty. If a customer has an issue, like a shipping delay, sellers can quickly

pull up their order history in the Customer Orders Details section, which shows order status, quantity, and delivery dates.

The Delete Customer button allows sellers to remove duplicate accounts or inactive customers, keeping the database clean and organized.

Payments Page

The Payments page provides sellers with a clear overview of payment information. Sellers can search for payments using order ID, customer name, or payment type (like PayPal, Venmo, or credit card). The page shows key details, including installments and payment values, making it easy to track financial transactions.

This data helps sellers identify trends, like which payment methods are most popular or how much customers are spending. The Order Items section gives a detailed view of the products purchased, including categories, quantities, prices, and order dates.

By analyzing this information, sellers can see which products are performing well and which payment methods customers prefer. This page helps sellers make smarter financial decisions and improve their overall business.

2.1.3 Manager Operation:

Seller information preview: Managers can review all the sellers and view all the detailed information such as first name, last name, order sells, and also their address information.

Modifying seller information: Managers are able to update, delete, search, and create new sellers on this page. Moreover, they can see the products each seller sells.

2.2 Analytical Module

This section is designed for the manager to oversee the e-commerce platform's general performance and should help in informed decisions on how to increase profits or improve the customer's shopping experience.

2.2.1 Product Sales Over Time:

The system provides a “Sales Over Time” dashboard in the Manager Portal, which delivers a detailed visualization of sales trends over specific time periods. Managers can analyze product sales by month, or year to identify growth patterns, seasonal trends, and sales spikes. This capability empowers managers to make informed decisions about promotions, restocking schedules, and long-term sales strategies.

2.2.2 Payment Value Over Time:

Our system also provides a “Payment Value Over Time” dashboard, which gives insights into the trends of the payments and the revenue generated over time. It allows managers to track payment values across various time periods-such as monthly and yearly and further filter those by cash, credit, or online transactions. This helps identify revenue streams, detect abnormal patterns of payments, and assess the effectiveness of payment methods for cash flow optimization and better financial planning.

3. Database Design

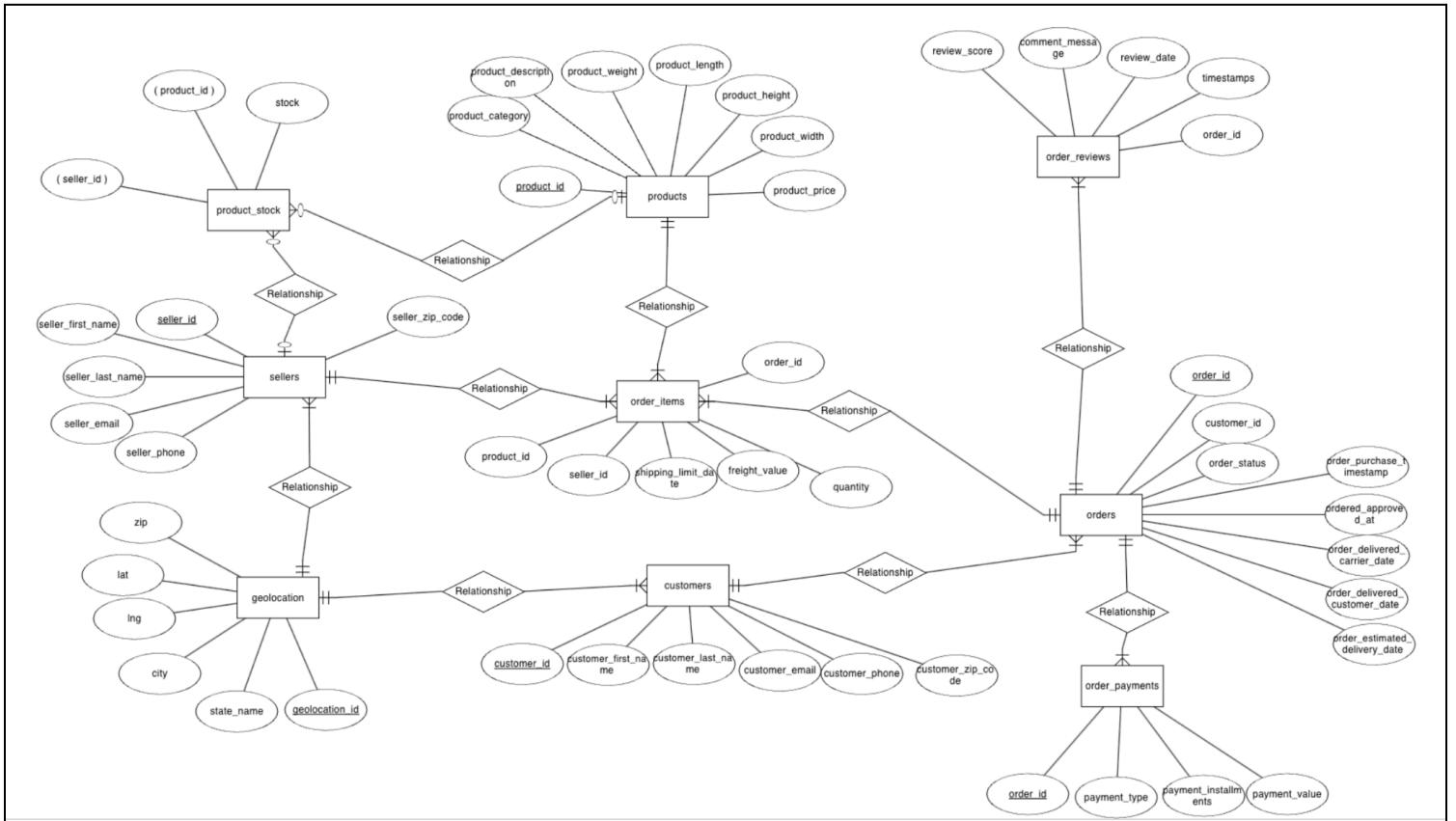


Figure 1: ER Diagram

The figure 1 ER diagram represents a relational database for an e-commerce system, showing all of the detailed entities and the relationships between 9 tables such as orders, order reviews, order items, products, product stocks, sellers, customers, payments, and geolocation.

The products table, which stores product details such as product ID, description, category, price, dimensions, and weight, has a one-to-many relationship with the `product_stock` table which enables inventory tracking. Moreover, it also has a many-to-many relationship with the `order_items` table through a bridge table to log product sales in multiple orders.

The seller's table contains seller information, including ID, name, email, phone number,

and ZIP code, and shares a one-to-many relationship with both the product_stock table for managing inventory and the order_items table for tracking seller-related order details.

The customers table holds customer details like ID, name, email, and ZIP code, and has a one-to-many relationship with the orders table, where each customer can place multiple orders.

Additionally, the orders table can track order status, timestamps for purchase, approval date, and delivery dates, and customer IDs, and has a one-to-many relationship with the payments table to manage multiple payments for each order. It also has a one-to-many relationship with the order_reviews table, allowing customers to leave one review per order.

Lastly, the geolocation table has a one-to-many relationship with sellers and customers via ZIP codes, enabling location-based mapping using attributes like latitude, longitude, city, and state.

3.1 Operational Database

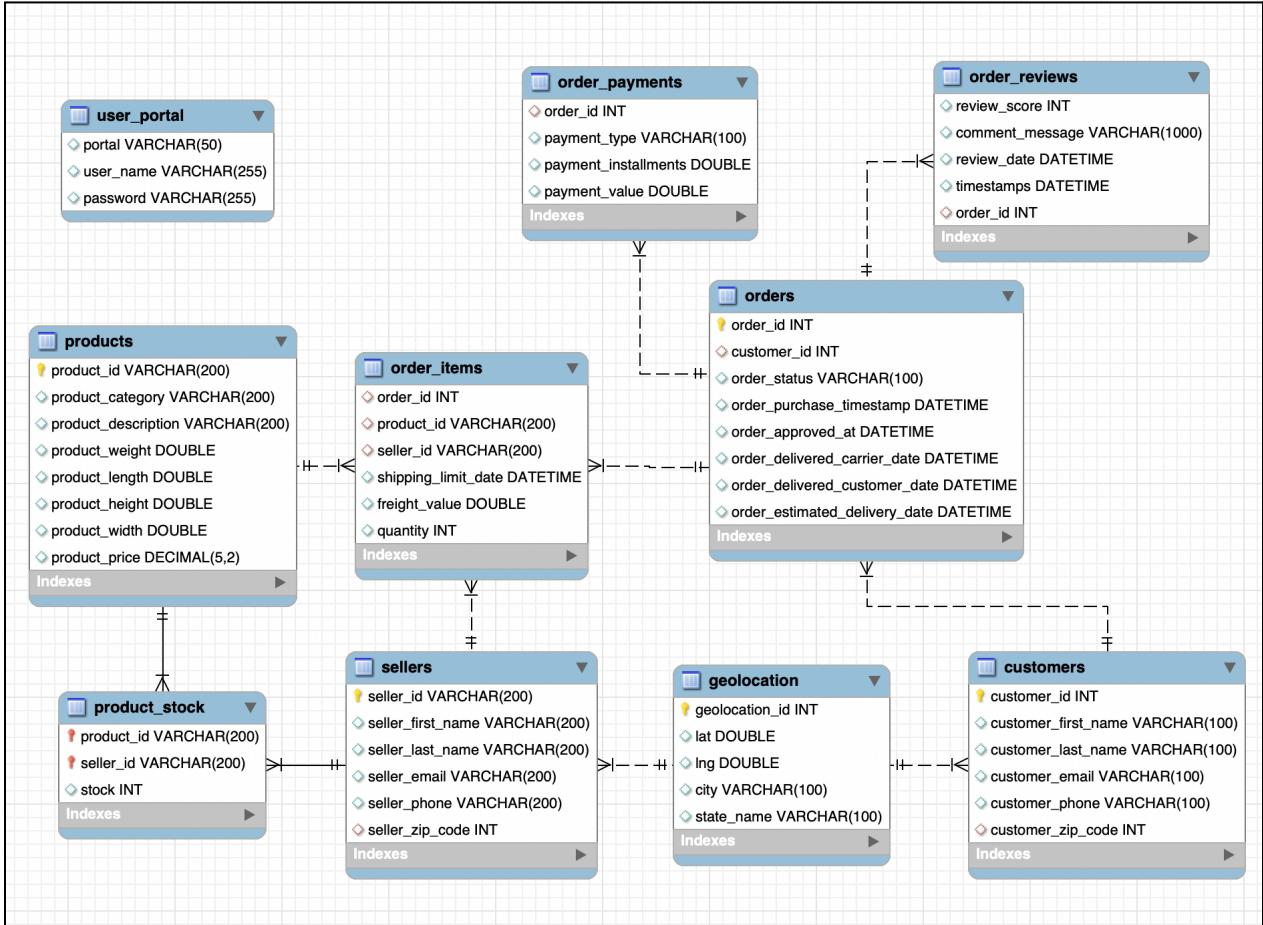


Figure 2: EER Diagram (Operational Database)

This Enhanced Entity-Relationship (EER) diagram illustrates the structure of an operational database for an e-commerce platform, showing how different entities are interconnected. It includes the `user_portal` table, which stores user information such as usernames and passwords. The `products` table holds details about each product, including its ID, description, dimensions, and price. The `product_stock` table tracks the stock levels for each product and links products to their respective sellers. The `sellers` table contains information about the platform's sellers, such as their ID, contact details, and location. The `orders` table represents customer orders, storing order status, timestamps, and delivery dates. `Order_items` connects orders with products, specifying the quantity and shipping details for each item. The `order_payments` table stores payment information, and the `order_reviews` table stores review information. The `geolocation` table stores location information, and the `customers` table stores customer information. Relationships are indicated by lines connecting the entities, showing the cardinality and direction of each relationship.

`order_payments` table manages payment details, including payment type, installments, and amounts. The `order_reviews` table stores customer feedback for products, including ratings and comments. The `customers` table contains personal information about customers, while the `geolocation` table tracks customer addresses, including their city, state, and geographic coordinates. The relationships depicted in the diagram, such as one-to-many between `customers` and `orders`, and many-to-many between `orders` and `products`, ensure efficient management of e-commerce operations, from product inventory and customer details to order processing and reviews.

3.2 Analytical Database

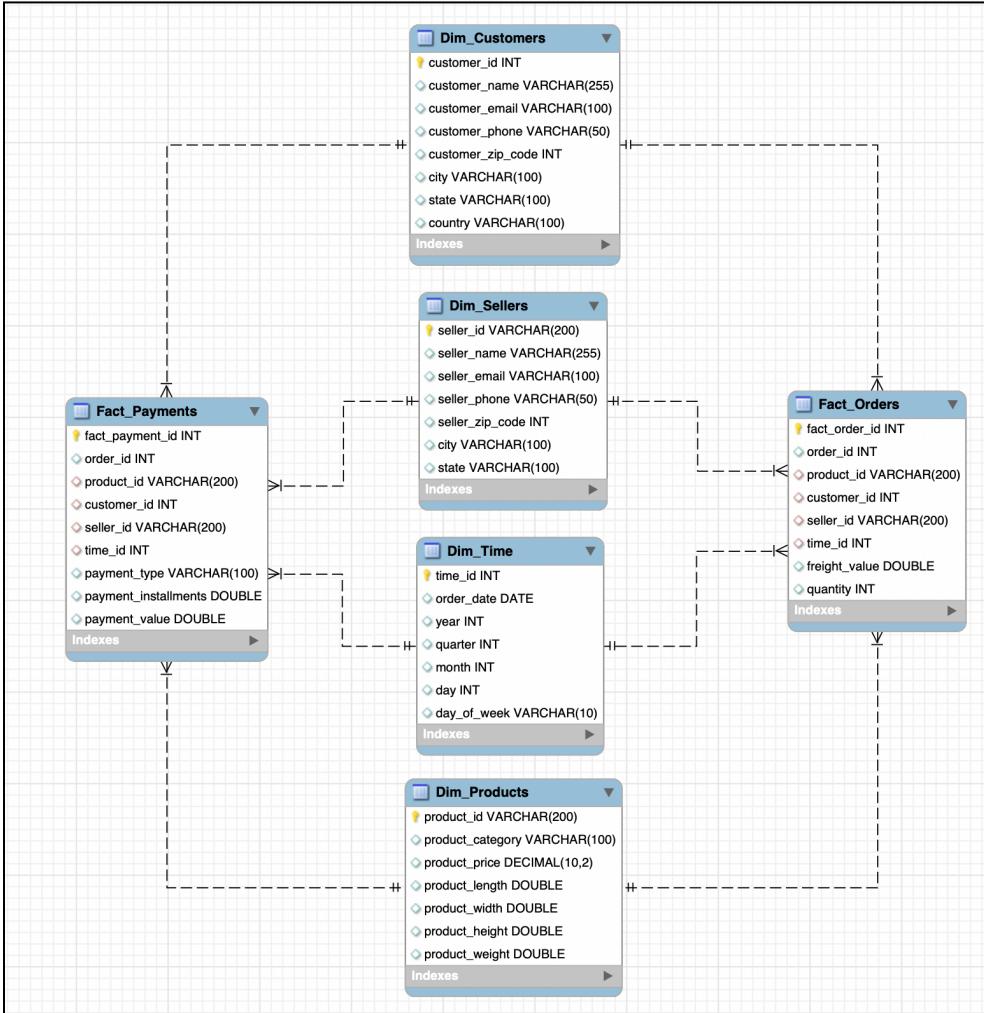


Figure 3: EER Diagram (Analytical Database)

This Enhanced Entity-Relationship (EER) diagram represents the star schema of a data warehouse for an e-commerce platform, focusing on key aspects such as orders, payments, customers, sellers, and products. The fact tables—Fact_Payments, Fact_Orders, and Fact_Time—are linked to various dimension tables like Dim_Customers, Dim_Sellers, Dim_Products, and Dim_Time. The Dim_Customers table stores detailed customer information such as ID, name, email, phone number, and address. The Dim_Sellers table includes details about sellers, such as their ID, name, contact information, and location. The Dim_Products table

describes each product's attributes, including its ID, category, price, and dimensions. The Dim_Time table tracks time-related data, including order dates, year, quarter, month, and day. The Fact_Payments table records payment details like type, value, and installments, while the Fact_Orders table stores order specifics, including product, quantity, and freight value, along with links to customers, sellers, and time. This star schema allows for efficient analysis by simplifying complex queries and enabling fast data retrieval, making it ideal for tracking order performance, payment trends, product sales, and customer behavior on the platform.

4. Working on the Operational Module

Customers are the primary users of the platform, focused on exploring and purchasing products. They can browse and search for products that interest them, place orders, and review their order history. These functionalities are designed to provide customers with a seamless shopping experience, enabling them to easily find products, make purchases, and track their past transactions for future reference or reviews.

Sellers manage the backend operations related to their products and customers. They have access to browse orders, customer details, payment information, and order items to keep track of their business activities. Sellers can also delete customer accounts when necessary and adjust order statuses like on the way and delayed to ensure accurate updates are provided to customers. Their role is very important in maintaining product availability, order fulfillment, and customer satisfaction.

Managers oversee the overall operations and seller with customer activities on the platform. They can view and adjust seller information and access dashboards to monitor performance metrics and trends. This role focuses on maintaining the integrity of the seller database, ensuring all seller details are up-to-date, and using analytics to support strategic decision-making and improve platform efficiency.

5. Specifications and Usability of Operational Module

5.1 Log-in Page:

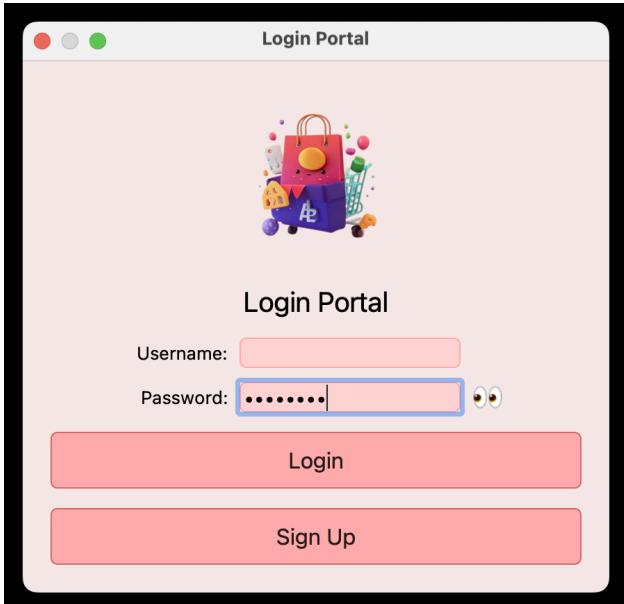


Figure 4: Login page with hide password

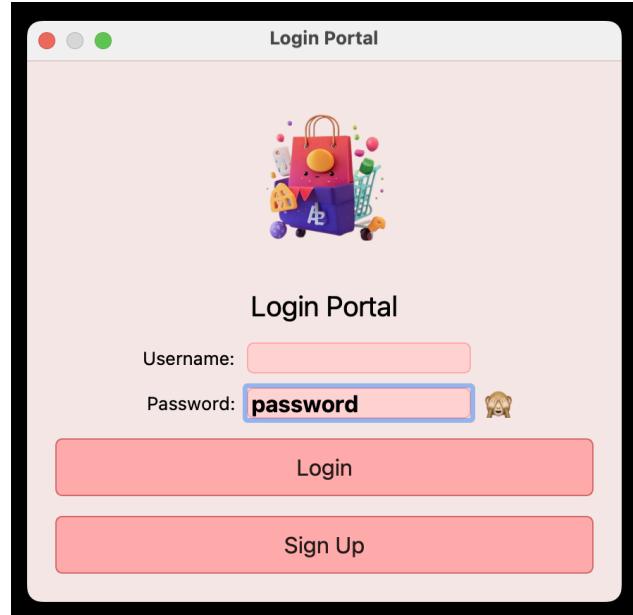


Figure 5: Login page with unhide password

The **Login Page** serves as the gateway to the system. Each role (customers, sellers, and managers) has a unique username and password to ensure security, allowing only authorized users to access their accounts. Additionally, the password field includes a toggle option (represented by the monkey covering its eyes image) that allows users to show or hide the entered password. This feature helps users verify their password input in case of uncertainty while maintaining privacy.

5.2 Signup Page:

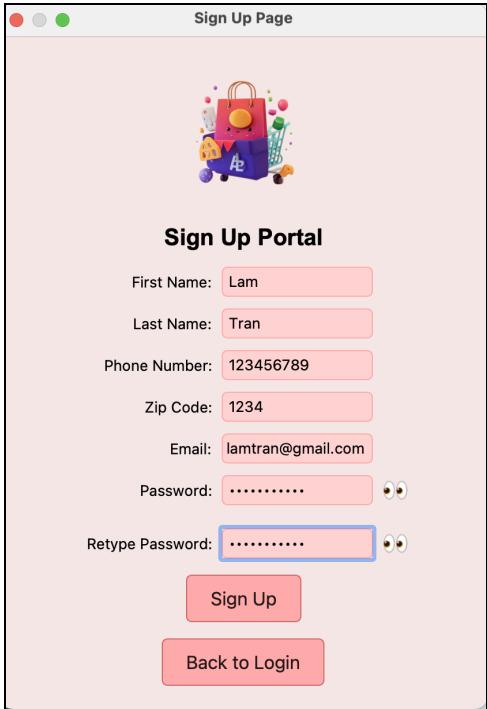


Figure 6: Inputs for Signup

A zoomed-in view of the password input fields. It shows two fields: "Password" containing "password123" and "Retype Password" also containing "password123". Each field has an eye icon to its right. The "Retype Password" field is highlighted with a blue border.

Figure 7: Password and confirm password

In figure 6, the Sign-Up Page allows new users to create an account by filling in required details such as their first name, last name, phone number, ZIP code, and email address. Figure 7 shows that the users are also prompted to create a password and confirm it by retying in the “Retype Password” field. The page includes a password toggle option to view passwords and retype passwords similarly to the Login Page. Once all fields are completed, users can click the “Sign Up” button to register and their account will be added to the database server or use the “Back to Login” button to return to the login page if they already have an account. This simple design ensures an easy and secure registration process.

5.3 Customer Portal:

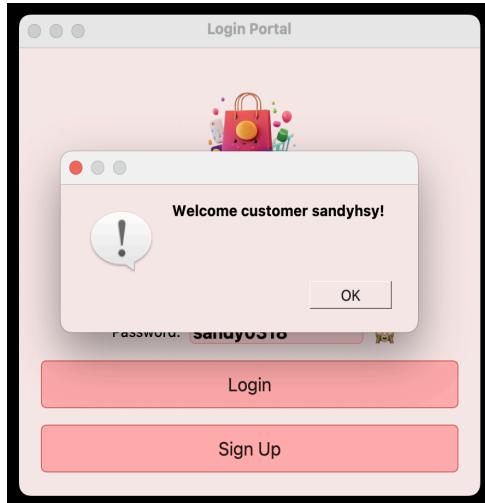


Figure 8 : Successful login into the customer account
(use username as sandyhsy@gmail.com and password as sandy0318)

The customer can perform four operations: add items to the cart and proceed with checkout, track past orders and check new ones, and provide comments for the orders they have placed.

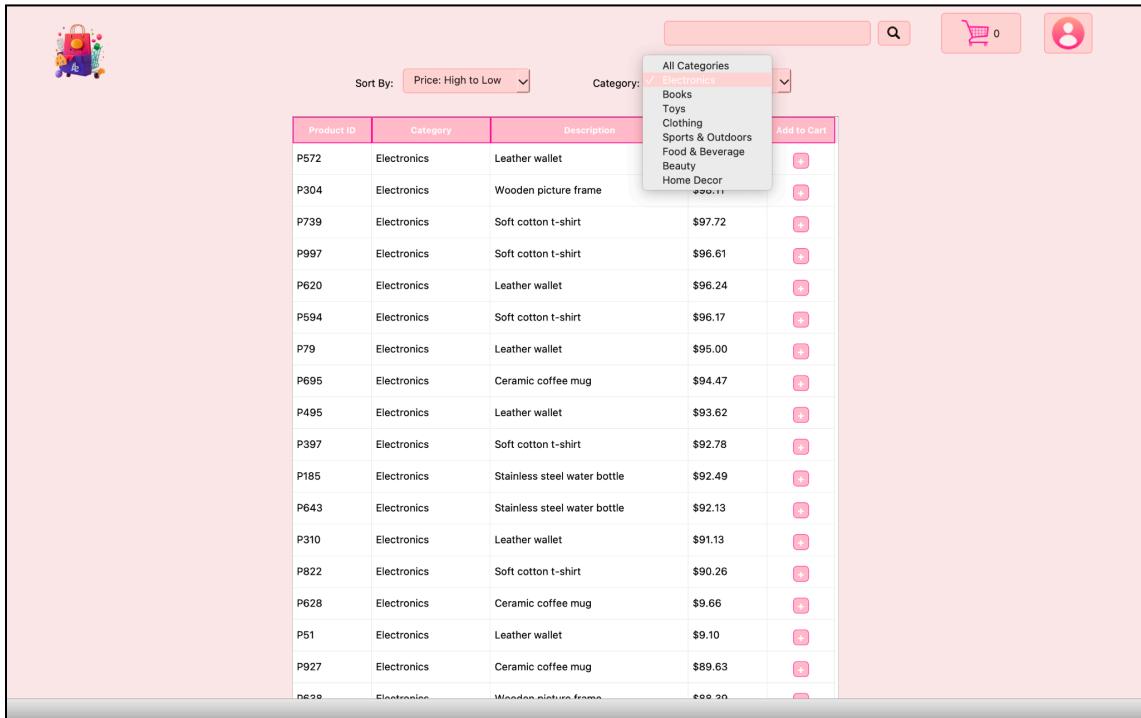
A screenshot of the main order window. At the top, there are filters for "Sort By: Price: High to Low" and "Category: All Categories". Below is a table of products:

Product ID	Category	Description	Price	Add to Cart
P650	Books	Stainless steel water bottle	\$99.93	
P920	Clothing	Wooden picture frame	\$99.90	
P479	Books	Ceramic coffee mug	\$99.71	
P877	Food & Beverage	Wooden picture frame	\$99.40	
P404	Toys	Leather wallet	\$99.36	
P410	Beauty	Wooden picture frame	\$99.18	
P824	Sports & Outdoors	Leather wallet	\$99.04	
P541	Sports & Outdoors	Stainless steel water bottle	\$98.76	
P572	Electronics	Leather wallet	\$98.76	
P320	Clothing	Wooden picture frame	\$98.72	
P640	Beauty	Leather wallet	\$98.46	
P928	Food & Beverage	Stainless steel water bottle	\$98.42	
P226	Sports & Outdoors	Ceramic coffee mug	\$98.38	
P602	Food & Beverage	Soft cotton t-shirt	\$98.38	
P619	Toys	Soft cotton t-shirt	\$98.35	
P418	Clothing	Wooden picture frame	\$98.34	
P304	Electronics	Wooden picture frame	\$98.11	
D410	Food & Beverage	Leather wallet	\$98.10	

Figure 9:
Main order
window

5.3.1 Orders

Step 1: Filter and Sort Products by Price



A screenshot of a web-based product listing interface. At the top, there are navigation icons for a shopping bag, search, cart (0), and user profile. Below these are two dropdown menus: "Sort By: Price: High to Low" and "Category: Electronics". A dropdown menu for "Category" is open, showing a list of categories: All Categories, Electronics, Books, Toys, Clothing, Sports & Outdoors, Food & Beverage, Beauty, and Home Decor. The "Electronics" option is selected. The main content area is a table with columns: Product ID, Category, Description, Price, and Add to Cart. The table lists various products, all categorized under Electronics, sorted by price from highest to lowest. The first few rows include P572 (Leather wallet, \$98.76), P304 (Wooden picture frame, \$98.11), P739 (Soft cotton t-shirt, \$97.72), P997 (Soft cotton t-shirt, \$96.61), P620 (Leather wallet, \$96.24), P594 (Soft cotton t-shirt, \$96.17), P79 (Leather wallet, \$95.00), P695 (Ceramic coffee mug, \$94.47), P495 (Leather wallet, \$93.62), P397 (Soft cotton t-shirt, \$92.78), P185 (Stainless steel water bottle, \$92.49), P643 (Stainless steel water bottle, \$92.13), P310 (Leather wallet, \$91.13), P822 (Soft cotton t-shirt, \$90.26), P628 (Ceramic coffee mug, \$9.66), P51 (Leather wallet, \$9.10), and P927 (Ceramic coffee mug, \$89.63). The last row shows a total of \$600.20.

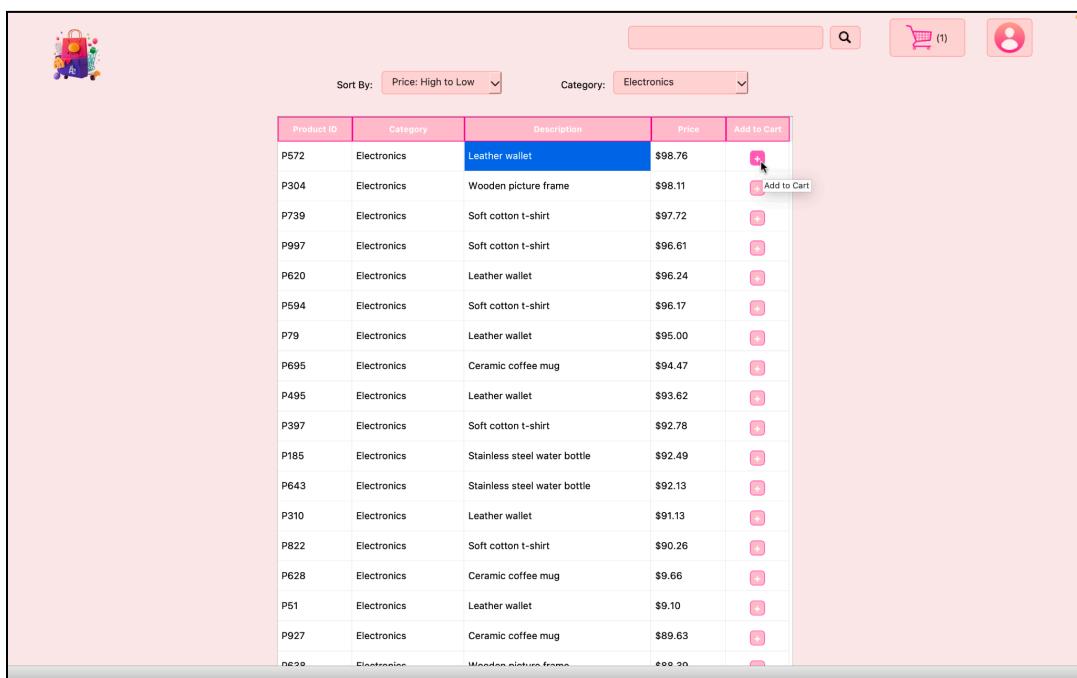
Product ID	Category	Description	Price	Add to Cart
P572	Electronics	Leather wallet	\$98.76	
P304	Electronics	Wooden picture frame	\$98.11	
P739	Electronics	Soft cotton t-shirt	\$97.72	
P997	Electronics	Soft cotton t-shirt	\$96.61	
P620	Electronics	Leather wallet	\$96.24	
P594	Electronics	Soft cotton t-shirt	\$96.17	
P79	Electronics	Leather wallet	\$95.00	
P695	Electronics	Ceramic coffee mug	\$94.47	
P495	Electronics	Leather wallet	\$93.62	
P397	Electronics	Soft cotton t-shirt	\$92.78	
P185	Electronics	Stainless steel water bottle	\$92.49	
P643	Electronics	Stainless steel water bottle	\$92.13	
P310	Electronics	Leather wallet	\$91.13	
P822	Electronics	Soft cotton t-shirt	\$90.26	
P628	Electronics	Ceramic coffee mug	\$9.66	
P51	Electronics	Leather wallet	\$9.10	
P927	Electronics	Ceramic coffee mug	\$89.63	
Total: \$600.20				

Figure 10:
Filtering and
Sorting
Products by
Category and
Price

In Step 1, filter the product category to “Electronics” and sort the items by “Price: High to Low.”

The “Sort By” function enables users to arrange the products based on selected criteria, in this case, displaying the most expensive items first.

Step 3: Add Items to Cart



A screenshot of the same product listing interface as Figure 10. The "Category" dropdown is now set to "Electronics". The "Add to Cart" button for the first item, P572 (Leather wallet, \$98.76), is highlighted with a blue selection bar. The cursor is hovering over this button. The rest of the interface and data are identical to Figure 10.

Product ID	Category	Description	Price	Add to Cart
P572	Electronics	Leather wallet	\$98.76	
P304	Electronics	Wooden picture frame	\$98.11	
P739	Electronics	Soft cotton t-shirt	\$97.72	
P997	Electronics	Soft cotton t-shirt	\$96.61	
P620	Electronics	Leather wallet	\$96.24	
P594	Electronics	Soft cotton t-shirt	\$96.17	
P79	Electronics	Leather wallet	\$95.00	
P695	Electronics	Ceramic coffee mug	\$94.47	
P495	Electronics	Leather wallet	\$93.62	
P397	Electronics	Soft cotton t-shirt	\$92.78	
P185	Electronics	Stainless steel water bottle	\$92.49	
P643	Electronics	Stainless steel water bottle	\$92.13	
P310	Electronics	Leather wallet	\$91.13	
P822	Electronics	Soft cotton t-shirt	\$90.26	
P628	Electronics	Ceramic coffee mug	\$9.66	
P51	Electronics	Leather wallet	\$9.10	
P927	Electronics	Ceramic coffee mug	\$89.63	
Total: \$600.20				

Figure 11: Add
items to Cart

The “Add to Cart” function allows users to add items to their shopping cart by clicking the “+” button next to each product in the list. This feature enables easy selection and purchase of products.

Step 4: Review and Finalize Cart

The screenshot shows a shopping cart interface with a pink-themed design. At the top, there are navigation icons for a shopping bag, search, and user profile. Below that, sorting and filtering options are present: "Sort By: Price: High to Low" and "Category: Electronics". The main area displays a table titled "Cart Items" containing the following data:

Product ID	Category	Description	Price	Quantity	Delete
P572	Electronics	Leather wallet	\$98.76	1	<input type="button" value="Delete"/>
P304	Electronics	Wooden picture frame	\$98.11	1	<input type="button" value="Delete"/>
P739	Electronics	Soft cotton t-shirt	\$97.72	1	<input type="button" value="Delete"/>
P79	Electronics	Leather wallet	\$95.00	1	<input type="button" value="Delete"/>

At the bottom of the cart view, the total price is shown as "Total: \$389.59", followed by "Check Out", "Save", and "Close" buttons. A modal window is partially visible at the bottom, showing a list of items with quantity input fields:

P628	Electronics	Ceramic coffee mug	\$9.66	<input type="text" value="2"/>	<input type="button" value="Delete"/>
P51	Electronics	Leather wallet	\$9.10	<input type="text" value="1"/>	<input type="button" value="Delete"/>
P927	Electronics	Ceramic coffee mug	\$89.63	<input type="text" value="1"/>	<input type="button" value="Delete"/>
P629	Electronics	Wooden picture frame	\$99.20	<input type="text" value="1"/>	<input type="button" value="Delete"/>

Figure 12:
Review and
Finalize
Cart

In Step 4, users review the items added to their cart, including product details, prices, and quantities. The total price is displayed at the bottom, and users have the option to delete items, adjust quantities, or proceed to checkout by clicking the “Check Out” button.

Step 5: Adjust Item Quantity in Cart

This screenshot shows the same shopping cart interface as Figure 12, but with a focus on adjusting item quantities. In the cart view, the quantity for the first item (P572, Leather wallet) has been increased from 1 to 2, as indicated by the highlighted "2" in the quantity column. The other items remain at quantity 1. The total price at the bottom of the cart view is now "Total: \$488.35".

Figure 13:
Adjusting Item
Quantity in the
Cart

In Step 5, users can modify the quantity of items in their cart by adjusting the number next to each product. For example, the quantity of the “Leather wallet” has been increased from 1 to 2, updating the total price accordingly.

Step 6: Complete the Checkout Process

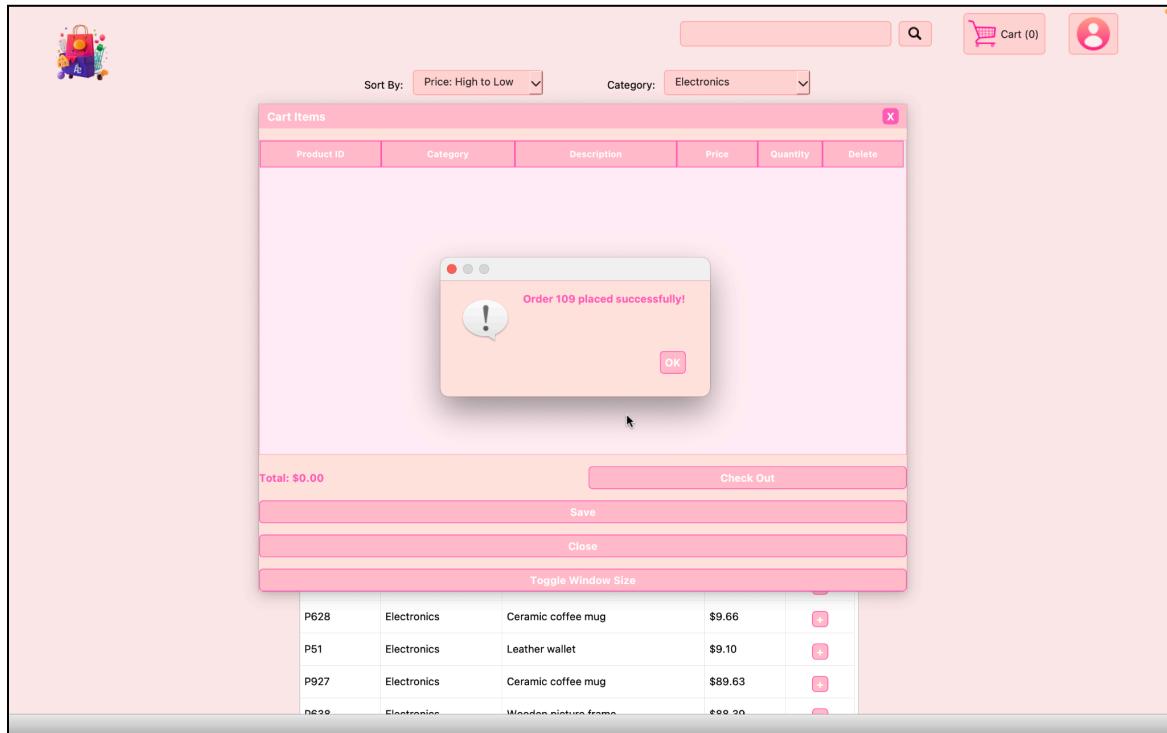


Figure 14:
Order
Confirmation
After
Checkout

In Step 6, after clicking the “Check Out” button, the system processes the order and displays a confirmation message indicating that the order has been placed successfully. The cart is cleared, and the total price is reset to \$0.00.

5.3.2 Order History

Step 1: Accessing Order History

The screenshot shows a product catalog for Electronics. The user has selected the 'Electronics' category. A dropdown menu is open from a user icon in the top right corner, with 'Order History' highlighted.

Product ID	Category	Description	Price	Add to Cart
P572	Electronics	Leather wallet	\$98.76	[Add to Cart]
P304	Electronics	Wooden picture frame	\$98.11	[Add to Cart]
P739	Electronics	Soft cotton t-shirt	\$97.72	[Add to Cart]
P997	Electronics	Soft cotton t-shirt	\$96.61	[Add to Cart]
P620	Electronics	Leather wallet	\$96.24	[Add to Cart]
P594	Electronics	Soft cotton t-shirt	\$96.17	[Add to Cart]
P79	Electronics	Leather wallet	\$95.00	[Add to Cart]
P695	Electronics	Ceramic coffee mug	\$94.47	[Add to Cart]
P495	Electronics	Leather wallet	\$93.62	[Add to Cart]
P397	Electronics	Soft cotton t-shirt	\$92.78	[Add to Cart]
P185	Electronics	Stainless steel water bottle	\$92.49	[Add to Cart]
P643	Electronics	Stainless steel water bottle	\$92.13	[Add to Cart]
P310	Electronics	Leather wallet	\$91.13	[Add to Cart]
P822	Electronics	Soft cotton t-shirt	\$90.26	[Add to Cart]
P628	Electronics	Ceramic coffee mug	\$9.66	[Add to Cart]
P51	Electronics	Leather wallet	\$9.10	[Add to Cart]
P927	Electronics	Ceramic coffee mug	\$89.63	[Add to Cart]
P620	Electronics	Wooden picture frame	\$99.20	[Add to Cart]

Figure 15:
Accessing Order History from User Menu

In this step, click on the user icon located in the top right corner of the screen. A dropdown menu will appear with options such as "Order History" and "Log Out." Click on "Order History" to view your past orders.

Step 2: Search and Order Detail View

The screenshot shows a list of past orders. The user has selected the first order, which is currently 'in progress'. Below the order list, there is a detailed view of the selected order showing individual items and their details.

Order ID	Order Status	Ordered Date	Shipped Date	Total
109	in progress	2024-12-17 23:41:54	None	\$1,953.40
106	in progress	2024-12-12 17:33:11	None	\$99.71
105	On the way	2024-12-12 12:16:39	None	\$93.19
104	Order Delayed	2024-12-11 22:08:49	None	\$800.85
103	On the way	2024-12-02 10:58:58	None	\$0.00
102	in progress	2024-12-01 17:04:05	None	\$0.00

Product ID	Product Name	Unit Price	Quantity	Review Score	Review Comment	Action
1 P572	Leather wallet	\$98.76	2	No Review	No Comments	
2 P304	Wooden picture frame	\$98.11	1	No Review	No Comments	
3 P739	Soft cotton t-shirt	\$97.72	1	No Review	No Comments	
4 P79	Leather wallet	\$95.00	1	No Review	No Comments	Write a Review

Figure 16:
Viewing Order Details

This feature allows users to search for specific orders using the “Search orders...” field at the top. After entering a search term, the results are displayed in the first table, which shows key details like order ID, order status (such as “In Progress,” “Shipped,” or “Delivered”), ordered date, shipped date, and total amount. The order status is updated as the seller processes the order. When a user clicks on a specific row in the first table, the second table below dynamically updates to show detailed information about the selected order, including product details, quantity, review score, and review comments. The user can also choose to write a review for the products listed.

5.3.2 Order Review

Step 3: Writing a Product Review

The screenshot displays a mobile application interface for managing orders and reviews. At the top, there is a search bar labeled "Search orders...". Below it is a table with columns: Order ID, Order Status, Ordered Date, Shipped Date, and Total. The table contains six rows of order data. Row 109 is highlighted with a blue background, indicating it is the selected order. The "Order Status" column for row 109 shows "In progress".

Order ID	Order Status	Ordered Date	Shipped Date	Total
109	In progress	2024-12-17 23:41:54	None	\$1,953.40
106	In progress	2024-12-12 17:33:11	None	\$99.71
105	On the way	2024-12-12 12:16:39	None	\$93.19
104	Order Delayed	2024-12-11 22:08:49	None	\$800.85
103	On the way	2024-12-02 10:58:58	None	\$0.00
102	In progress	2024-12-01 17:04:05	None	\$0.00

Below the order table is a large pink rectangular area. At the bottom of this area is a table with columns: Product ID, Product Name, Unit Price, Quantity, Review Score, Review Comment, and Action. It lists four products:

Product ID	Product Name	Unit Price	Quantity	Review Score	Review Comment	Action
1 P572	Leather wallet	\$98.76	2	No Review	No Comments	
2 P304	Wooden picture frame	\$98.11	1	No Review	No Comments	
3 P739	Soft cotton t-shirt	\$97.72	1	No Review	No Comments	
4 P79	Leather wallet	\$95.00	1	No Review	No Comments	Write a Review

At the very bottom of the screen is a pink footer bar with a "Back" button.

*Figure 17:
Writing a Product
Review"*

In this view, after selecting an order, the product details are displayed in the second table. Each product includes information such as product name, unit price, quantity, review score, and review comments. For each product that has not been reviewed, the user has the option to write a review. By clicking the “Write a Review” button in the “Action” column, the user can provide their feedback, rating, and comments for the order.

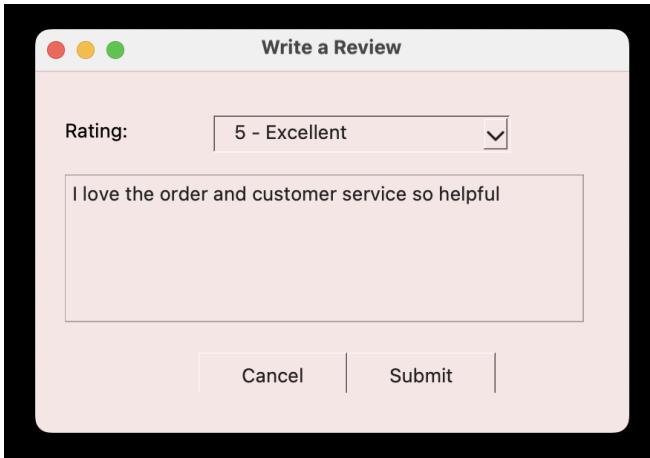


Figure 18: Writing and Submitting a Review

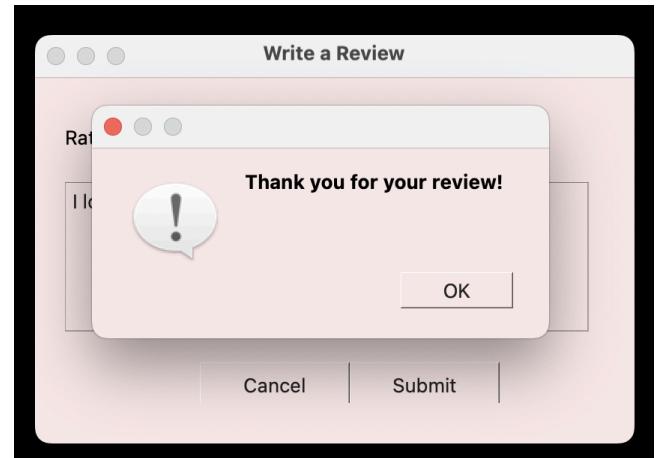


Figure 19: Review Submission Confirmation

In Figure 18, the user is filling out the review form, where they can select a rating (e.g., 5 - Excellent) and write their comments about the product. The “Cancel” and "Submit" buttons are available, allowing the user to either discard or submit the review.

In Figure 19, after clicking “Submit,” a confirmation message appears, thanking the user for their review. If the user attempts to submit the review without providing any comments or a rating, a warning will appear, indicating that the review cannot be submitted until it is properly filled out.

The screenshot shows a web-based application interface. At the top, there's a header bar with three colored dots (red, yellow, green) on the left and the text "Order History" on the right. Below the header is a search bar with the placeholder "Search orders...".

The main content area contains two tables. The first table, titled "Order History", has columns: Order ID, Order Status, Ordered Date, Shipped Date, and Total. It lists six orders with the following data:

Order ID	Order Status	Ordered Date	Shipped Date	Total
109	in progress	2024-12-17 23:41:54	None	\$1,953.40
106	in progress	2024-12-12 17:33:11	None	\$99.71
105	On the way	2024-12-12 12:16:39	None	\$93.19
104	Order Delayed	2024-12-11 22:08:49	None	\$800.85
103	On the way	2024-12-02 10:58:58	None	\$0.00
102	in progress	2024-12-01 17:04:05	None	\$0.00

The second table, titled "Product Reviews", has columns: Product ID, Product Name, Unit Price, Quantity, Review Score, Review Comment, and Action. It lists four products with the following data:

Product ID	Product Name	Unit Price	Quantity	Review Score	Review Comment	Action	
1	P572	Leather wallet	\$98.76	2	5	I love the order and customer service so helpful	
2	P304	Wooden picture frame	\$98.11	1	5	I love the order and customer service so helpful	
3	P739	Soft cotton t-shirt	\$97.72	1	5	I love the order and customer service so helpful	
4	P79	Leather wallet	\$95.00	1	5	I love the order and customer service so helpful	Write a Review

At the bottom of the page is a navigation bar with a "Back" button.

Figure 20: Viewing Updated Review Information After Submission

After submitting the review, the new review information (such as the review score and review comment) is updated in the “Review Score” and “Review Comment” columns for each respective product in the order. In the displayed view, each product now shows a rating of 5 stars and the review comment “I love the order and customer service is so helpful.” These updated details are shown in the second table after the review submission.

5.4 Seller Portal:

Sellers mainly responsible for inventory management and reviewing all of the order details, the customer information and payments for each order of each customer. Seller Portal includes 3 main pages such as Order, Customers and Payments with different interactive buttons.

5.4.1 Order Page:

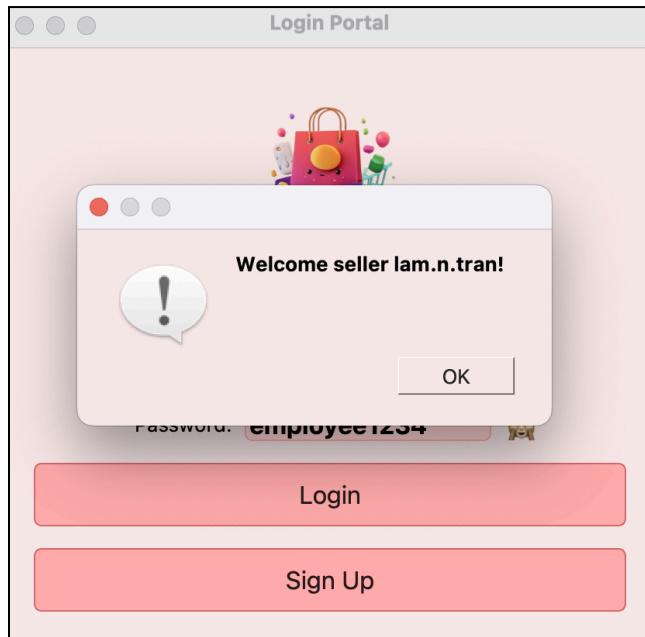


Figure 21a: Successful login into the seller account

(use username as **lam.n.tran@sjtu.edu** and password as **employee1234**)

Figure 21b shows the Order Page in the Seller Portal that provides a comprehensive overview of all orders, enabling sellers to efficiently track and manage them. The page displays the important order details such as Order ID, status, ordered date, order approved date, carrier delivery date, customer delivery date, and estimated delivery date which allows sellers to

monitor the progress of each order. Sellers can also filter orders with three different options such as Order ID, Product Category, and Order Status to quickly locate specific records. Below the main table, the Order Details section provides more detailed, product-level information including Product ID, category, name, price, and quantity, for each selected order. The page also features actionable buttons like “Ship Order” and “Order Delay” to update the order status as needed, ensuring smooth order processing and effective customer communication.

ID	Status	Ordered Date	Order Approved Date	Carrier Delivery Date	Customer Delivery Date	Estimated Delivery Date
1	delivered	2017-10-02 10:56:33	2017-10-02 11:07:15	2017-10-04 19:55:00	2017-10-10 21:25:13	2017-10-18 00:00:00
1	delivered	2017-10-02 10:56:33	2017-10-02 11:07:15	2017-10-04 19:55:00	2017-10-10 21:25:13	2017-10-18 00:00:00
2	delivered	2018-07-24 20:41:37	2018-07-26 03:24:27	2018-07-26 14:31:00	2018-08-07 15:27:45	2018-08-13 00:00:00
2	delivered	2018-07-24 20:41:37	2018-07-26 03:24:27	2018-07-26 14:31:00	2018-08-07 15:27:45	2018-08-13 00:00:00
3	delivered	2018-08-08 08:38:49	2018-08-08 08:55:23	2018-08-08 13:50:00	2018-08-17 18:06:29	2018-09-04 00:00:00
4	delivered	2017-11-18 19:28:06	2017-11-18 19:45:59	2017-11-22 13:39:59	2017-12-02 00:28:42	2017-12-15 00:00:00
5	delivered	2018-02-13 21:18:39	2018-02-13 22:20:29	2018-02-14 19:46:34	2018-02-16 18:17:02	2018-02-26 00:00:00
5	delivered	2018-02-13 21:18:39	2018-02-13 22:20:29	2018-02-14 19:46:34	2018-02-16 18:17:02	2018-02-26 00:00:00
6	delivered	2017-07-09 21:57:05	2017-07-09 22:10:13	2017-07-11 14:58:04	2017-07-26 10:57:55	2017-08-01 00:00:00

Product ID	Product Category	Product Name	Product Price	Quantity
P120	Toys	Ceramic coffee mug	\$29.91	3
P295	Clothing	Soft cotton t-shirt	\$69.52	9

Figure 21b: Main order page

The Seller Portal interface is shown. On the left, a vertical sidebar has a circular icon with a shopping bag and balloons, followed by three menu items: 'Orders', 'Customers', and 'Payments'. The main content area is titled 'Seller Portal' and features a 'Log Out' button in the top right. Below the title are search filters: 'Order ID: 1', 'Product Category: All', 'Order Status: All', a search icon, and a 'Clear All' button. The main section is divided into two tables. The first table, 'Orders', has columns: ID, Status, Ordered Date, Order Approved Date, Carrier Delivery Date, Customer Delivery Date, and Estimated Delivery Date. It contains two rows for Order ID 1, both marked as 'delivered'. The second table, 'Order Details', has columns: Product ID, Product Category, Product Name, Product Price, and Quantity. It lists two products: P120 (Toys, Ceramic coffee mug, \$29.91, 3) and P295 (Clothing, Soft cotton t-shirt, \$69.52, 9).

ID	Status	Ordered Date	Order Approved Date	Carrier Delivery Date	Customer Delivery Date	Estimated Delivery Date
1	delivered	2017-10-02 10:56:33	2017-10-02 11:07:15	2017-10-04 19:55:00	2017-10-10 21:25:13	2017-10-18 00:00:00
1	delivered	2017-10-02 10:56:33	2017-10-02 11:07:15	2017-10-04 19:55:00	2017-10-10 21:25:13	2017-10-18 00:00:00

Product ID	Product Category	Product Name	Product Price	Quantity
P120	Toys	Ceramic coffee mug	\$29.91	3
P295	Clothing	Soft cotton t-shirt	\$69.52	9

Figure 22: Search order using order id

Figure 22 shows the Search Order by Order ID feature in the Seller Portal that allows sellers to quickly find specific orders by entering the Order ID. It displays all key information specific for that searched order id from both orders and order details tables.

The Search Order by Product Category feature in the Seller Portal allows sellers to filter orders based on specific product categories, such as toys, electronics, or clothing. This makes it easy to focus on orders containing certain types of products. The filtered results display relevant order details, including status, dates, and delivery information, along with the Order Details section showing product-specific information like Product ID, name, price, and quantity. This feature simplifies managing and reviewing category-specific orders efficiently.

The Seller Portal interface displays a search results page for orders. On the left, there's a sidebar with icons for Orders, Customers, and Payments. The main area has a header with 'Seller Portal' and a 'Log Out' button. Below the header are search filters: 'Order ID' (text input), 'Product Category' (dropdown with options like All, Electronics, Books, Clothing, Sports & Outdoors, Food & Beverage, Beauty, Home Decor), 'Order Status' (dropdown with All selected), and a search icon. A 'Clear All' button is also present. The main content area shows a table titled 'Orders' with columns: ID, Status, Ordered Date, Order Approved Date, Carrier Delivery Date, Customer Delivery Date, and Estimated Delivery Date. The table contains 10 rows of order data. Below the table is a section titled 'Order Details' with a single row showing Product ID P720, Product Category Toys, Product Name Stainless steel water bottle, Product Price \$87.61, and Quantity 2.

Figure 23: Search order using product category

Figure 24 shows the Search Order by Order Status feature which allows sellers to filter orders by their current status like shipped, in progress, delivered, or all. The filtered results provide essential details, including the ordered date, approval date, carrier delivery date, and estimated delivery date, enabling sellers to efficiently track and manage orders at various stages.

The Seller Portal interface displays a search results page for orders. On the left, there's a sidebar with icons for Orders, Customers, and Payments. The main area has a header with 'Seller Portal' and a 'Log Out' button. Below the header are search filters: 'Order ID' (text input), 'Product Category' (dropdown with All selected), 'Order Status' (dropdown with All selected), and a search icon. A 'Clear All' button is also present. The main content area shows a table titled 'Orders' with columns: ID, Status, Ordered Date, Order Approved Date, Carrier Delivery Date, Customer Delivery Date, and Estimated Delivery Date. The table contains 1 row of order data. The 'Order Status' dropdown is expanded to show options: All, delivered, in process, shipped, and in progress.

Figure 24: Search order using order status

The Seller Portal interface displays two side-by-side search results pages for orders. Both pages have a similar layout with a sidebar on the left and a header with 'Seller Portal' and a 'Log Out' button. The search filters are identical: 'Order ID' (text input), 'Product Category' (dropdown with All selected), 'Order Status' (dropdown with All selected), and a search icon. A 'Clear All' button is also present. The main content area shows tables titled 'Orders' with columns: ID, Status, Ordered Date, Order Approved Date, Carrier Delivery Date, Customer Delivery Date, and Estimated Delivery Date. The left table shows several orders with different statuses (delivered, in progress, on the way, etc.). A tooltip on one of the 'In Progress' orders states: 'Only orders with status 'In Progress' can be delayed.' The right table shows a subset of orders. A tooltip on one of the 'Delayed' orders states: 'Order ID 102 status updated to 'Order Delayed''. Both tables include a 'Ship Order' and 'Order Delay' button at the bottom.

The image displays two screenshots of the Seller Portal interface. Both screenshots show a sidebar on the left with icons for Orders, Customers, and Payments. The main area is titled "Seller Portal".

Screenshot 1 (Left):

- Header:** Order ID: [input], Product Category: All, Order Status: All, Search icon, Clear All, Log Out.
- Orders Section:**
 - Table: ID, Status, Ordered Date, Order Approved Date, Carrier Delivery Date, Customer Delivery Date, Estimated Delivery Date.
 - Data: 95 delivered, 96 delivered, 97 delivered, 98 delivered, 99 delivered, 100 delivered, 101 In progress, 102 In progress, 103 In progress.
 - Message: Only orders with status 'In Progress' can be shipped.
 - Action: OK button.
- Order Details Section:**

Product ID	Product Category	Product Name	Product Price	Quantity
- Buttons:** Ship Order, Order Delay.

Screenshot 2 (Right):

- Header:** Order ID: [input], Product Category: All, Order Status: All, Search icon, Clear All, Log Out.
- Orders Section:**
 - Table: ID, Status, Ordered Date, Order Approved Date, Carrier Delivery Date, Customer Delivery Date, Estimated Delivery Date.
 - Data: 95 delivered, 96 delivered, 97 delivered, 98 delivered, 99 delivered, 100 delivered, 101 On the way, 102 In progress, 103 In progress.
 - Message: Order 101 status updated to 'On the way'.
 - Action: OK button.
- Order Details Section:**

Product ID	Product Category	Product Name	Product Price	Quantity
P650	Books	Stainless steel water bottle	\$99.99	1
P240	Food & Beverage	Ceramic coffee mug	\$13.69	2
P796	Food & Beverage	Stainless steel water bottle	\$14.74	1
- Buttons:** Ship Order, Order Delay.

Orders						
ID	Status	Ordered Date	Order Approved Date	Carrier Delivery Date	Customer Delivery Date	Estimated Delivery Date
86	delivered	2017-12-08 09:42:43	2017-12-09 02:49:54	2017-12-11 15:19:04	2017-12-19 18:43:35	2018-01-03 00:00:00
13	delivered	2018-06-07 10:06:19	2018-06-09 03:13:12	2018-06-11 13:29:00	2018-06-19 12:05:52	2018-07-18 00:00:00
92	delivered	2017-09-19 22:17:15	2017-09-20 07:55:14	2017-09-22 17:23:09	2017-10-10 18:43:53	2017-10-13 00:00:00
49	delivered	2018-07-29 11:24:17	2018-07-29 11:44:19	2018-07-30 13:47:00	2018-08-02 22:09:11	2018-08-13 00:00:00
10	delivered	2017-07-29 11:55:02	2017-07-29 12:05:32	2017-08-10 19:45:24	2017-08-16 17:14:30	2017-08-23 00:00:00
10	delivered	2017-07-29 11:55:02	2017-07-29 12:05:32	2017-08-10 19:45:24	2017-08-16 17:14:30	2017-08-23 00:00:00
24	delivered	2018-01-08 07:55:29	2018-01-08 08:07:31	2018-01-24 23:16:37	2018-01-26 17:32:38	2018-02-21 00:00:00
10	delivered	2017-07-29 11:55:02	2017-07-29 12:05:32	2017-08-10 19:45:24	2017-08-16 17:14:30	2017-08-23 00:00:00
102	Order Delayed	2024-12-01 17:04:05	None	None	None	None

Figure 25, 26, 27: Modify the order status to on the way or order delayed.

Figure 25, 26, 27 shows the Modify Order Status feature in the Seller Portal which allows sellers to update the status of orders to either “On the Way” or “Order Delayed”. Sellers can only change the status for orders currently marked as “In Progress”, as indicated by the yellow warning notification. Once updated, the system provides a confirmation message for the new status with the exclamation mark. This functionality ensures sellers can manage order progress efficiently while keeping customers informed about their order’s current status. The updated order information should be available immediately on the table and the database server.

5.4.2 Customer Page:

Figure 28 shows the Customer Page in the Seller Portal which allows sellers to view and manage customer information efficiently. Sellers can search for customers using filters like Customer ID, first name, last name, or order status. The displayed results include key details such as email, phone number, and ZIP code, providing all necessary information for customer interactions. Moreover, the Customer Orders Details table at the bottom displays order history, including order ID, status, ordered date, delivery dates, and quantity which allows sellers to track customer purchases and address any issues quickly. This page ensures streamlined customer management and improved service.

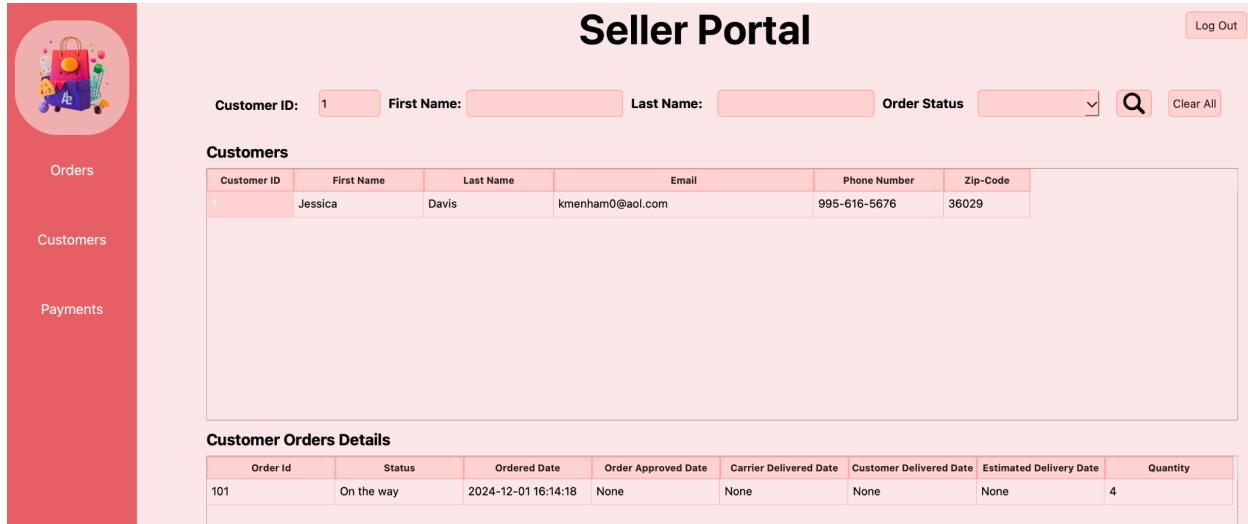
The screenshot shows the Seller Portal's customer management interface. On the left, a vertical sidebar features three navigation items: 'Orders' (with a shopping bag icon), 'Customers' (with a person icon), and 'Payments' (with a credit card icon). The main content area has a header 'Seller Portal' and a 'Log Out' button. Below the header is a search bar with fields for 'Customer ID', 'First Name', 'Last Name', 'Order Status', a dropdown menu, a search icon, and a 'Clear All' button. The 'Customers' section contains a table with columns: Customer ID, First Name, Last Name, Email, Phone Number, and Zip-Code. The table lists 19 entries, each with a unique ID and names like Kevin Taylor, David Johnson, etc. The 'Customer Orders Details' section below shows a table with columns: Order Id, Status, Ordered Date, Order Approved Date, Carrier Delivered Date, Customer Delivered Date, Estimated Delivery Date, and Quantity. It lists one entry for Order ID 29, which is marked as 'delivered'. At the bottom of the main content area is a 'Delete Customer' button.

Customer ID	First Name	Last Name	Email	Phone Number	Zip-Code
11	Kevin	Taylor	bcorreaa@topsy.com	658-947-9614	26152
12	David	Johnson	gvanhalenb@virginia.edu	494-443-9051	44460
13	Kevin	Davis	ldroverc@mit.edu	321-123-7658	24602
14	Michael	Johnson	jbeddoesd@ow.ly	343-570-1962	2914
15	Sarah	Williams	sgammonse@patch.com	209-667-9129	47331
16	Michael	Johnson	crysdalef@wordpress.com	532-368-0148	27921
17	Sarah	Moore	mbuckleighg@simplemachines.org	979-424-9132	78405
18	David	Jones	jshipstonh@admin.ch	984-699-6153	61430
19	David	Wilson	ddibsoni@ed.gov	171-933-8835	66087

Order Id	Status	Ordered Date	Order Approved Date	Carrier Delivered Date	Customer Delivered Date	Estimated Delivery Date	Quantity
29	delivered	2018-05-02 11:45:38	2018-05-03 12:55:01	2018-05-10 16:16:00	2018-05-16 20:56:24	2018-05-23 00:00:00	None

Figure 28: Main customer page

From figure 29 to 32, similarly to the Orders page, Customer page also has an option to search for specific customers using customer id, first name, last name, and order status(delivered, in progress, shipped) which can search all the customer information and their order details.



The screenshot shows the Seller Portal interface. On the left, there's a vertical sidebar with three options: 'Orders' (with a shopping bag icon), 'Customers' (with a person icon), and 'Payments'. The main area is titled 'Seller Portal' and features a search bar at the top with fields for 'Customer ID' (containing '1'), 'First Name' (containing 'Jessica'), 'Last Name' (containing 'Davis'), 'Order Status' (a dropdown menu), a search icon, and a 'Clear All' button. Below the search bar is a section titled 'Customers' with a table showing one row of data. The table columns are 'Customer ID', 'First Name', 'Last Name', 'Email', 'Phone Number', and 'Zip-Code'. The single row contains values: 1, Jessica, Davis, kmenham0@aol.com, 995-616-5676, and 36029. At the bottom, there's another section titled 'Customer Orders Details' with a table showing one row of data. The table columns are 'Order Id', 'Status', 'Ordered Date', 'Order Approved Date', 'Carrier Delivered Date', 'Customer Delivered Date', 'Estimated Delivery Date', and 'Quantity'. The single row contains values: 101, On the way, 2024-12-01 16:14:18, None, None, None, None, and 4.

Figure 29: Search customer by customer id



This screenshot shows the same Seller Portal interface as Figure 29, but with a different search query. The search bar now contains 'First Name: Emily'. The rest of the interface remains the same, including the sidebar with 'Orders', 'Customers', and 'Payments' options, and the 'Seller Portal' title. The 'Customers' section shows a table with multiple rows of data for customers named Emily. The columns are 'Customer ID', 'First Name', 'Last Name', 'Email', 'Phone Number', and 'Zip-Code'. The rows include: (7, Emily, Davis, adegiorgio6@weibo.com, 120-336-9693, 19034), (24, Emily, Brown, shuxhamn@furl.net, 431-217-7374, 27950), (31, Emily, Johnson, arainfordu@cam.ac.uk, 202-958-5990, 87112), (32, Emily, Wilson, aasifv@hp.com, 669-602-6833, 47344), (40, Emily, Smith, bjelk13@hostgator.com, 796-660-4743, 30152), (41, Emily, Jones, heddies14@ucoz.ru, 488-474-4323, 64126), (46, Emily, Wilson, mberisford19@loc.gov, 245-509-7176, 93449), (55, Emily, Moore, ddrys dalli@yahoo.com, 894-445-8780, 85546), and (76, Emily, Brown, gatlee23@yahoo.com, 038-137-8120, 75237).

Figure 30: Search customer by first name

Customer ID:	First Name:	Last Name:	Order Status																																																												
Customers <table border="1"> <thead> <tr> <th>Customer ID</th> <th>First Name</th> <th>Last Name</th> <th>Email</th> <th>Phone Number</th> <th>Zip-Code</th> </tr> </thead> <tbody> <tr><td>1</td><td>Jessica</td><td>Davis</td><td>kmenham0@aol.com</td><td>995-616-5676</td><td>36029</td></tr> <tr><td>6</td><td>John</td><td>Davis</td><td>emandrake5@t-online.de</td><td>036-786-3727</td><td>33440</td></tr> <tr><td>7</td><td>Emily</td><td>Davis</td><td>adegiorgio6@weibo.com</td><td>120-336-9693</td><td>19034</td></tr> <tr><td>13</td><td>Kevin</td><td>Davis</td><td>ldroverc@mit.edu</td><td>321-123-7658</td><td>24602</td></tr> <tr><td>20</td><td>Michael</td><td>Davis</td><td>mmuffenj@slate.com</td><td>225-639-5025</td><td>80203</td></tr> <tr><td>28</td><td>Michael</td><td>Davis</td><td>rbibbier@stanford.edu</td><td>318-517-2754</td><td>29505</td></tr> <tr><td>29</td><td>Rachel</td><td>Davis</td><td>lgilkss@google.co.uk</td><td>691-780-7976</td><td>4461</td></tr> <tr><td>30</td><td>Michael</td><td>Davis</td><td>atofanellit@behance.net</td><td>733-305-6265</td><td>78643</td></tr> <tr><td>33</td><td>Rachel</td><td>Davis</td><td>eswainw@wordpress.com</td><td>798-407-0139</td><td>98403</td></tr> </tbody> </table>				Customer ID	First Name	Last Name	Email	Phone Number	Zip-Code	1	Jessica	Davis	kmenham0@aol.com	995-616-5676	36029	6	John	Davis	emandrake5@t-online.de	036-786-3727	33440	7	Emily	Davis	adegiorgio6@weibo.com	120-336-9693	19034	13	Kevin	Davis	ldroverc@mit.edu	321-123-7658	24602	20	Michael	Davis	mmuffenj@slate.com	225-639-5025	80203	28	Michael	Davis	rbibbier@stanford.edu	318-517-2754	29505	29	Rachel	Davis	lgilkss@google.co.uk	691-780-7976	4461	30	Michael	Davis	atofanellit@behance.net	733-305-6265	78643	33	Rachel	Davis	eswainw@wordpress.com	798-407-0139	98403
Customer ID	First Name	Last Name	Email	Phone Number	Zip-Code																																																										
1	Jessica	Davis	kmenham0@aol.com	995-616-5676	36029																																																										
6	John	Davis	emandrake5@t-online.de	036-786-3727	33440																																																										
7	Emily	Davis	adegiorgio6@weibo.com	120-336-9693	19034																																																										
13	Kevin	Davis	ldroverc@mit.edu	321-123-7658	24602																																																										
20	Michael	Davis	mmuffenj@slate.com	225-639-5025	80203																																																										
28	Michael	Davis	rbibbier@stanford.edu	318-517-2754	29505																																																										
29	Rachel	Davis	lgilkss@google.co.uk	691-780-7976	4461																																																										
30	Michael	Davis	atofanellit@behance.net	733-305-6265	78643																																																										
33	Rachel	Davis	eswainw@wordpress.com	798-407-0139	98403																																																										

Figure 31: Search customer by last name

Customer ID:	First Name:	Last Name:	Order Status																																																														
<input checked="" type="checkbox"/> delivered <input type="checkbox"/> in process <input type="checkbox"/> shipped <input type="checkbox"/> in progress Q Clear All																																																																	
Customers <table border="1"> <thead> <tr> <th>Customer ID</th> <th>First Name</th> <th>Last Name</th> <th>Email</th> <th>Phone Number</th> <th>Zip-Code</th> </tr> </thead> <tbody> <tr><td>49</td><td>Sarah</td><td>Miller</td><td>adudenev1c@paypal.com</td><td>138-822-9279</td><td>34953</td></tr> <tr><td>548</td><td>Michael</td><td>Taylor</td><td>ckynmanf7@cpanel.net</td><td>731-074-7104</td><td>61525</td></tr> <tr><td>775</td><td>Kevin</td><td>Taylor</td><td>rdefilippisli@google.pl</td><td>137-492-6977</td><td>63466</td></tr> <tr><td>980</td><td>Laura</td><td>Miller</td><td>yandreir7@purevolume.com</td><td>557-189-5350</td><td>50138</td></tr> <tr><td>856</td><td>Sarah</td><td>Jones</td><td>dkaesmakersnr@tripod.com</td><td>163-390-9428</td><td>97223</td></tr> <tr><td>956</td><td>Emily</td><td>Moore</td><td>cfazackerleyqj@state.tx.us</td><td>117-200-2999</td><td>31546</td></tr> <tr><td>175</td><td>David</td><td>Smith</td><td>mluca4u@fda.gov</td><td>831-807-8972</td><td>91501</td></tr> <tr><td>646</td><td>Laura</td><td>Williams</td><td>kmorinhx@who.int</td><td>928-570-1321</td><td>98843</td></tr> <tr><td>562</td><td>David</td><td>Miller</td><td>bgrewarfl@googl</td><td>079-792-3193</td><td>32145</td></tr> </tbody> </table>						Customer ID	First Name	Last Name	Email	Phone Number	Zip-Code	49	Sarah	Miller	adudenev1c@paypal.com	138-822-9279	34953	548	Michael	Taylor	ckynmanf7@cpanel.net	731-074-7104	61525	775	Kevin	Taylor	rdefilippisli@google.pl	137-492-6977	63466	980	Laura	Miller	yandreir7@purevolume.com	557-189-5350	50138	856	Sarah	Jones	dkaesmakersnr@tripod.com	163-390-9428	97223	956	Emily	Moore	cfazackerleyqj@state.tx.us	117-200-2999	31546	175	David	Smith	mluca4u@fda.gov	831-807-8972	91501	646	Laura	Williams	kmorinhx@who.int	928-570-1321	98843	562	David	Miller	bgrewarfl@googl	079-792-3193	32145
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Figure 32: Search customer by order status

Figure 33, 34 illustrates the Delete Customer functionality in the Seller Portal which allows sellers to remove customer records from the database. Upon selecting a customer and clicking the "Delete Customer" button, a confirmation dialog appears, asking for confirmation to proceed. If confirmed, the customer is deleted, and a deleted success message is displayed. This feature helps sellers manage their customer database by removing duplicate or inactive accounts, ensuring the information remains accurate and up-to-date.

Seller Portal

Customer Orders Details

Order Id	Status	Ordered Date	Order Approved Date	Carrier Delivered Date	Customer Delivered Date	Estimated Delivery Date	Quantity
41	Pending	2023-09-15	2023-09-15	2023-09-15	2023-09-15	2023-09-15	1

Customer Orders Details

Order Id	Status	Ordered Date	Order Approved Date	Carrier Delivered Date	Customer Delivered Date	Estimated Delivery Date	Quantity
41	Pending	2023-09-15	2023-09-15	2023-09-15	2023-09-15	2023-09-15	1

Customer Orders Details

Order Id	Status	Ordered Date	Order Approved Date	Carrier Delivered Date	Customer Delivered Date	Estimated Delivery Date	Quantity
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Customer Orders Details

Order Id	Status	Ordered Date	Order Approved Date	Carrier Delivered Date	Customer Delivered Date	Estimated Delivery Date	Quantity
41	Pending	2023-09-15	2023-09-15	2023-09-15	2023-09-15	2023-09-15	1

Figure 33, 34: Delete customer functionality

5.4.3 Payment Page:

Figure 35 shows the Payment Page in the Seller Portal which provides a detailed overview of payment transactions. Sellers can filter payments by Order ID, customer name, or payment type (e.g., PayPal, credit card, cash). The displayed details include installments, payment values, and customer information such as first name, last name, and customer ID. Additionally, the Order Items section at the bottom provides product-specific details, including category, description, quantity, price, and order date, for each payment. This page helps sellers track financial transactions and analyze customer payment preferences efficiently. This data can also be useful for the business and financial department to find the trend or the preferable payment method.

The screenshot shows the Seller Portal main payment page. On the left, there is a vertical sidebar with icons for Orders, Customers, and Payments. The main area has a title 'Seller Portal' at the top right. Below it are search fields for Order ID, First Name, Last Name, and Payment Type (with a dropdown menu showing 'All'), along with a search icon and a 'Clear All' button. A 'Log Out' button is also in the top right corner. The 'Payment Details' section contains a table with 11 rows of payment information, including columns for Order ID, First Name, Last Name, Customer ID, Payment Type, Installments, and Payment Value. Below this is a 'Order Items' section with a table showing two items: a Soft cotton t-shirt and a Ceramic coffee mug, with details like Product Category, Product Description, Quantity, Price, and Order Date.

Order ID	First Name	Last Name	Customer ID	Payment Type	Installments	Payment Value
1	Sarah	Miller	49	PayPal	1.505977	\$715.41
2	Michael	Taylor	548	PayPal	3.271178	\$323.64
4	Laura	Miller	980	PayPal	9.963696	\$161.20
5	Sarah	Jones	856	credit card	8.321274	\$307.35
6	Emily	Moore	956	debit card	6.570563	\$563.33
8	David	Smith	175	Venmo	10.690754	\$890.10
9	Laura	Williams	646	cash	11.882959	\$66.99
10	David	Miller	562	cash	9.843979	\$1,416.44
11	Sarah	Williams	599	debit card	7.683244	\$587.36

Order ID	Product Category	Product Description	Quantity	Price	Order Date
6	Food & Beverage	Soft cotton t-shirt	9	\$6.25	2017-07-09 21:57:05
6	Toys	Ceramic coffee mug	7	\$72.44	2017-07-09 21:57:05

Figure 35: Main payment page

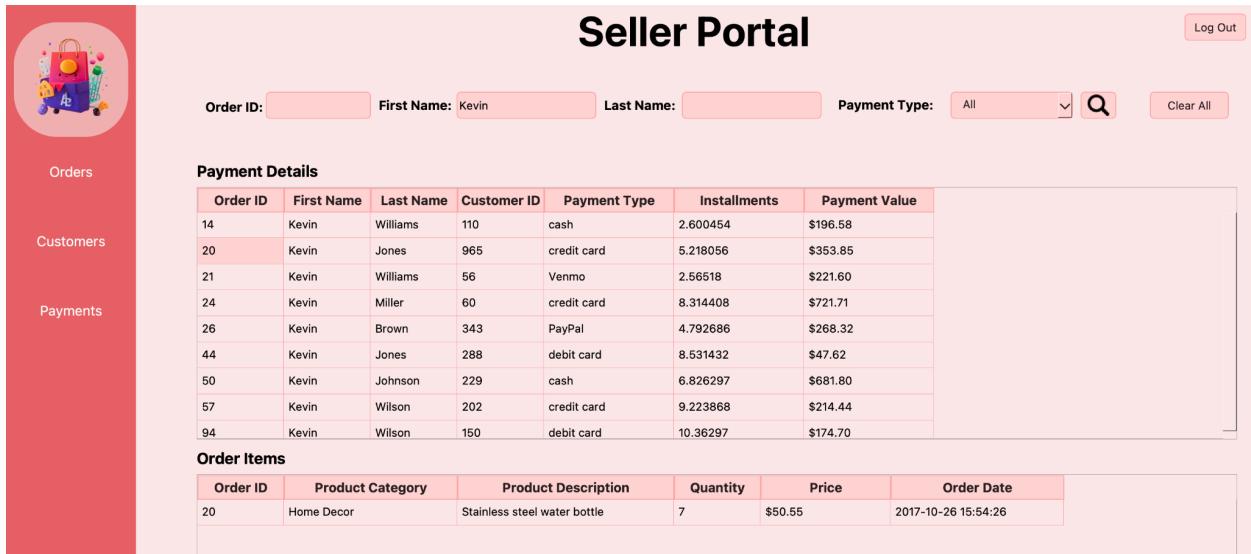
Similarly, figure 36 to 39 shows the payment page that also has options to filter the payment details through order id, customer last name, first name and payment type. And for each payment details, there is also a table below that shows the order items which includes order id, product category or name, product description, quantity of that product, its price, order date to support the transaction area.

The screenshot shows the Seller Portal search payment by order id page. The sidebar and top navigation are identical to Figure 35. The search bar now has 'Order ID: 1' entered. The 'Payment Details' section shows a single row for Order ID 1, with Sarah Miller as the customer. The 'Order Items' section shows two items: a Ceramic coffee mug and a Soft cotton t-shirt, with their respective details.

Order ID	First Name	Last Name	Customer ID	Payment Type	Installments	Payment Value
1	Sarah	Miller	49	PayPal	1.505977	\$715.41

Order ID	Product Category	Product Description	Quantity	Price	Order Date
1	Toys	Ceramic coffee mug	3	\$29.91	2017-10-02 10:56:33
1	Clothing	Soft cotton t-shirt	9	\$69.52	2017-10-02 10:56:33

Figure 36: Search payment by order id



Seller Portal

Log Out

Order ID: First Name: Last Name: Payment Type: Clear All

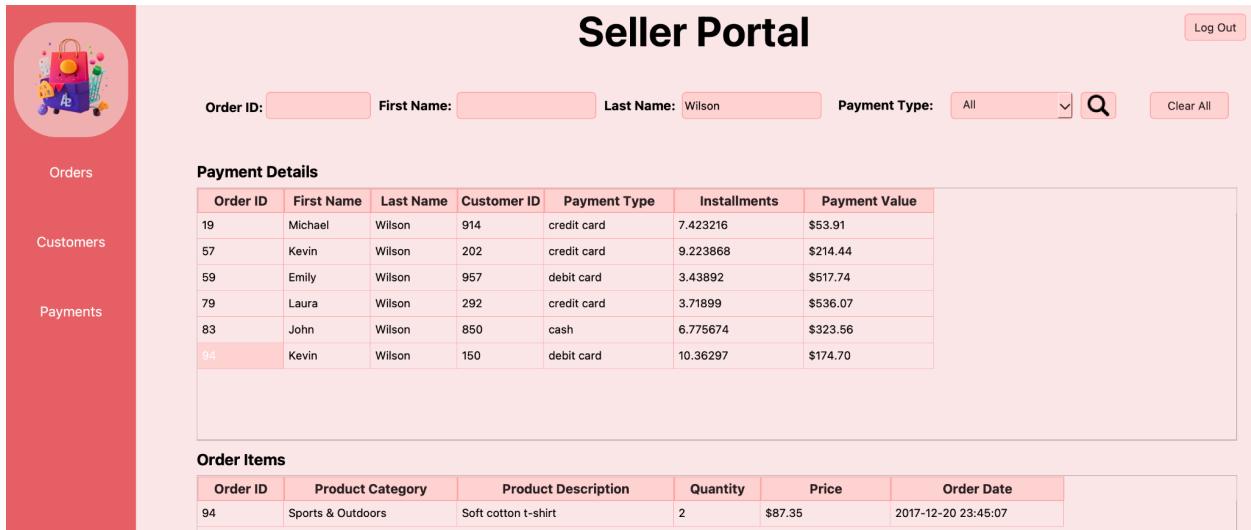
Payment Details

Order ID	First Name	Last Name	Customer ID	Payment Type	Installments	Payment Value
14	Kevin	Williams	110	cash	2.600454	\$196.58
20	Kevin	Jones	965	credit card	5.218056	\$353.85
21	Kevin	Williams	56	Venmo	2.56518	\$221.60
24	Kevin	Miller	60	credit card	8.314408	\$721.71
26	Kevin	Brown	343	PayPal	4.792686	\$268.32
44	Kevin	Jones	288	debit card	8.531432	\$47.62
50	Kevin	Johnson	229	cash	6.826297	\$681.80
57	Kevin	Wilson	202	credit card	9.223868	\$214.44
94	Kevin	Wilson	150	debit card	10.36297	\$174.70

Order Items

Order ID	Product Category	Product Description	Quantity	Price	Order Date
20	Home Decor	Stainless steel water bottle	7	\$50.55	2017-10-26 15:54:26

Figure 37: Search payment by customer first name



Seller Portal

Log Out

Order ID: First Name: Last Name: Payment Type: Clear All

Payment Details

Order ID	First Name	Last Name	Customer ID	Payment Type	Installments	Payment Value
19	Michael	Wilson	914	credit card	7.423216	\$53.91
57	Kevin	Wilson	202	credit card	9.223868	\$214.44
59	Emily	Wilson	957	debit card	3.43892	\$517.74
79	Laura	Wilson	292	credit card	3.71899	\$536.07
83	John	Wilson	850	cash	6.775674	\$323.56
94	Kevin	Wilson	150	debit card	10.36297	\$174.70

Order Items

Order ID	Product Category	Product Description	Quantity	Price	Order Date
94	Sports & Outdoors	Soft cotton t-shirt	2	\$87.35	2017-12-20 23:45:07

Figure 38: Search payment by customer last name

The Seller Portal interface features a sidebar on the left with icons for Orders, Customers, and Payments. The main area has a title 'Seller Portal' and a 'Log Out' button. It includes search fields for Order ID, First Name, Last Name, and Payment Type, with a dropdown menu for payment types like All, PayPal, credit card, debit card, Venmo, and cash. Below these are two tables: 'Payment Details' and 'Order Items'. The 'Payment Details' table shows three rows of data with columns for Order ID, First Name, Last Name, Customer ID, Payment Type, Installments, and Payment Value. The 'Order Items' table shows two rows of data with columns for Order ID, Product Category, Product Description, Quantity, Price, and Order Date.

Order ID	First Name	Last Name	Customer ID	Payment Type	Installments	Payment Value
19	Michael	Wilson	914	credit card	7.423216	\$53.91
57	Kevin	Wilson	202	credit card	9.223868	\$214.44
79	Laura	Wilson	292	credit card	3.71899	\$536.07

Order ID	Product Category	Product Description	Quantity	Price	Order Date
79	Toys	Leather wallet	1	\$43.77	2018-08-26 22:04:34
79	Beauty	Leather wallet	5	\$98.46	2018-08-26 22:04:34

Figure 39: Search payment by payment type

5.5 Manager Portal:

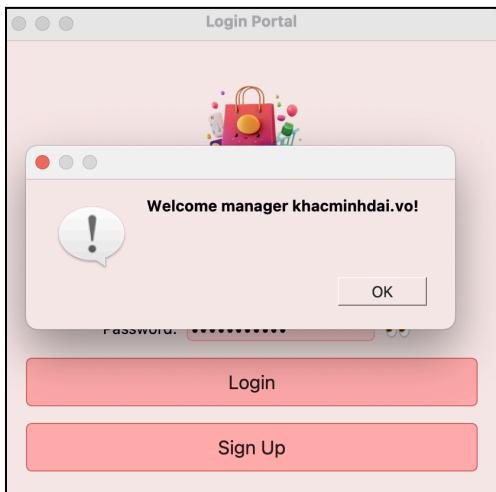


Figure 40: Successful login into the manager account
(use username as **khacminhdai.vo@sjtu.edu** and
password as **manager1234**)

5.5.1 Seller Information Page

Seller ID	First Name	Last Name	Order Count
S65	Rachel	Davis	6
S478	Jessica	Johnson	2
S502	Laura	Jones	2
S668	John	Williams	2
S108	Michael	Johnson	1
S11	Laura	Williams	1
S12	David	Williams	1
S121	David	Johnson	1
S129	Daniel	Moore	1
S144	David	Brown	1
S149	David	Miller	1
S159	Michael	Williams	1
S16	Jessica	Moore	1
S161	Michael	Williams	1
S167	Kevin	Johnson	1
S17	Daniel	Miller	1
S171	Daniel	Davis	1
S176	Daniel	Smith	1

Seller ID	Email	Phone	Zipcode	City	State
1 S65	lbriance1s@nytimes.com	028-621-5213	64421	Amazonia	Missouri

*Figure 41:
Seller Information
and Details in
Manager Portal*

The Manager Portal's Seller Information page allows the user to view a list of sellers with their ID, first

and last names, and the number of orders they have processed, displayed in the first table. When a seller's name is clicked, the Sellers Detail table below updates to show more detailed information about that seller, including their email, phone number, zip code, city, and state. This provides an organized and interactive way for the manager to quickly access both summary and detailed information for each seller.

5.5.2 Modify Page

*Figure 42:
Modify Seller
Information and Products*

in Manager Portal

The Modify Page in the Manager Portal is designed to help manage seller information and associated products. It consists of three main sections: Search, Seller Information, and Products. In the Search section, the manager can search for a seller by selecting their name from a dropdown menu or by entering their Seller ID, first name, or last name, with a "Search" button to initiate the search. The Seller Information section allows the manager to update existing seller details or create a new seller profile, with editable fields for the seller's First Name, Last Name, State, City, Phone, and Email. Action buttons like "Clear Fields," "Update Seller," "Create Seller," and "Delete Seller" provide options to modify or delete seller information. The Products section displays a table of the seller's associated products, including product ID, category, description, and price, and shows a "No Products!" message if the seller has no products listed. This page streamlines seller management by enabling easy search, modification of seller details, and management of their product listings.

5.5.2.1 Update Seller

Step 1: Selecting Seller

The screenshot shows the Manager Portal Modify page. On the left, there is a sidebar with icons for Seller, Modify, Sales and Customer, and Product and Operations. The Modify icon is selected. The main area has a title 'Manager Portal' at the top. On the left, under 'Seller Information', there is a dropdown menu titled 'Select Seller' with a list of names. Below it are input fields for 'First Name', 'Last Name', and 'State'. To the right, there are fields for 'Seller ID', 'First Name', 'Last Name', 'City', 'Phone', and 'Email'. At the bottom of this section are four buttons: 'Clear Fields', 'Update Seller', 'Create Seller', and 'Delete Seller'. At the very bottom, there is a table with one row showing '1 No Products!'.

ID	Category	Description	Price
S702 Daniel Brown			
S246 Daniel Brown			
S74 Daniel Brown			
S147 Daniel Brown			
S725 Daniel Brown			
S794 Daniel Brown			
S106 Daniel Brown			
S875 Daniel Brown			
S917 Daniel Brown			
S657 Daniel Davis			
S979 Daniel Davis			
S122 Daniel Davis			
S771 Daniel Davis			
S923 Daniel Davis			
S228 Daniel Davis			
S273 Daniel Davis			
S735 Daniel Davis			
S765 Daniel Davis			
S301 Daniel Johnson			
S141 Daniel Johnson			
S460 Daniel Johnson			
S88 Daniel Johnson			
S968 Daniel Johnson			
S232 Daniel Johnson			
S515 Daniel Johnson			
S644 Daniel Johnson			
S825 Daniel Johnson			
S741 Daniel Jones			
S300 Daniel Jones			
S629 Daniel Jones			
S720 Daniel Jones			
S209 Daniel Jones			

Figure 43:

Step 1 - Selecting Seller in Manager Portal

The “Select Seller” feature allows the manager to choose a seller from a dropdown list of available sellers, which then populates their information in the fields for modification or updating.

Step 2: Seller Information and Confirmation of Selected Seller ID

The screenshot shows the Manager Portal interface. On the left, there's a vertical sidebar with icons for Seller, Modify, Sales and Customer, Product and Operations, and Exit. The main area has a title "Manager Portal" and a search bar with "All Sellers" and a dropdown showing "S762 Daniel Brown". Below this is a "Seller Information" form with fields for First Name (Daniel), Last Name (Brown), City (Mertens), State (Texas), Phone (323-826-9791), and Email (eharlick15@clickbank.net). A modal dialog box is centered over the form, displaying "Selected Seller ID: S762" with an exclamation mark icon and an "OK" button. At the bottom of the page, there's a table titled "Products" with one item listed:

ID	Category	Description	Price
1 P763	Clothing	Stainless steel water bottle	7.33

Figure 44:
Seller
Information
and ID
Confirmation

After clicking the search icon, the seller's information is displayed in the form fields, including their first name, last name, city, phone number, and email. Additionally, a pop-up

window appears, confirming the selected seller's ID (in this case, S762), ensuring that the correct seller has been selected. The user can then proceed with updating or managing the seller's details.

Step 3: Edit the Seller's Email Address

The screenshot shows the Manager Portal interface. On the left, a vertical sidebar lists navigation options: Seller (selected), Modify, Sales and Customer, Product and Operations, and Exit. The main area is titled "Manager Portal". At the top, there are search fields for "All Sellers" (S762 Daniel Brown), "Seller ID", "First Name", "Last Name", and a "Clear Fields" button. Below this is the "Seller Information" section, which includes fields for First Name (Daniel), Last Name (Brown), City (Mertens), Phone (323-826-9791), State (Texas), and Email (danielbrown@clickbank.net). There are also "Update Seller", "Create Seller", and "Delete Seller" buttons. A "Products" section shows a table with one item: ID P763, Category Clothing, Description Stainless steel water bottle, and Price 7.33. The "Email" field is highlighted with a blue border and a cursor is visible inside it.

Figure 45:
Editing
Seller
Email
Address

In this step, the manager can modify any information for the selected seller. In this case, the email address is being updated from “echarlick5@clickbank.net” to “danielbrown@clickbank.net.” The manager can make similar changes to other fields, such as the seller’s name, phone number, and city, using the editable fields in the Seller Information section. After making the desired changes, the manager can click “Update Seller” to save the modifications.

Step 4: Click Update Seller

A screenshot of a web-based application interface. At the top, there's a navigation bar with a dropdown menu and some icons. Below it is a form section with a light pink background. On the left, there's a vertical sidebar with a dropdown menu. In the main area, there are several input fields and buttons. One input field is labeled "Email" and contains the value "danielbrown@clickbank.net". Below the input fields are four buttons: "Clear Fields", "Update Seller" (which has a blue outline and is highlighted), "Create Seller", and "Delete Seller".

Figure 46: Step 4 - Updating Seller Information

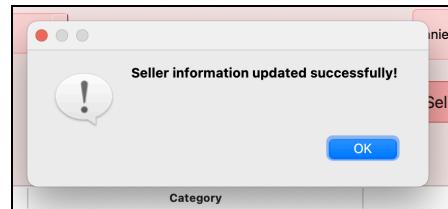


Figure 47: Seller Information Update Confirmation

After clicking the "Update Seller" button, the manager's modifications to the seller's information are saved. A confirmation pop-up window appears, notifying the manager that the seller's information has been successfully updated. This provides clear feedback that the changes have been applied. The updated seller details remain visible on the page, confirming that the update was successful.

5.5.2.1 Create New Seller

The Manager Portal interface shows the 'Seller Information' section. On the left sidebar, there are four main categories: Seller (selected), Modify, Sales and Customer, and Product and Operations. Under Seller, there is a sub-menu with icons for Seller, Modify, Sales and Customer, Product and Operations, and Exit. The main area has a search bar labeled 'All Sellers' and dropdown fields for 'Seller ID', 'First Name', and 'Last Name'. Below these are input fields for 'First Name' (Daniel), 'Last Name' (Lee), 'City' (San Diego), 'Phone' (123-456-789), 'State' (California), and 'Email' (daniellee@gmail.com). At the bottom are buttons for 'Clear Fields', 'Update Seller', 'Create Seller' (which is highlighted with a blue border), and 'Delete Seller'.

Figure 48: Creating a New Seller

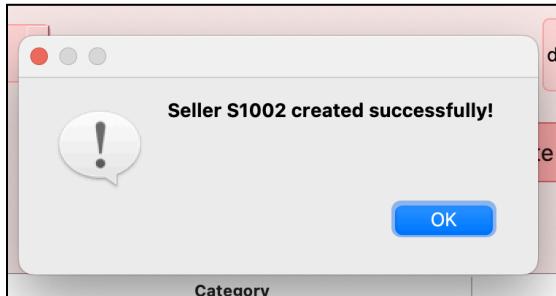


Figure 49: New Seller Creation Confirmation

S507 Daniel Jones
S503 Daniel Jones
S1002 Daniel Lee
S797 Daniel Miller

Figure 50: New Seller Added to the Select Seller Dropdown

In this step, the manager fills out the necessary information for a new seller, including the seller's first name, last name, city, state, phone number, and email. After completing the form, the manager clicks the "Create Seller" button. A pop-up window then appears, confirming that the seller (in this case, Seller ID S1002) has been successfully created. The new seller's information

is also displayed in the “All Sellers” dropdown list, indicating that the new seller has been added to the system.

5.5.2.2 Delete Seller

The Manager Portal interface shows the "Seller Information" section. It includes fields for First Name (Daniel), Last Name (Lee), City (San Diego), Phone (123-456-789), Email (daniellee@gmail.com), and a "Delete Seller" button. A sidebar on the left provides navigation links for Seller, Modify, Sales and Customer, Product and Operations, and Exit.

Figure 51:
Deleting a
Seller

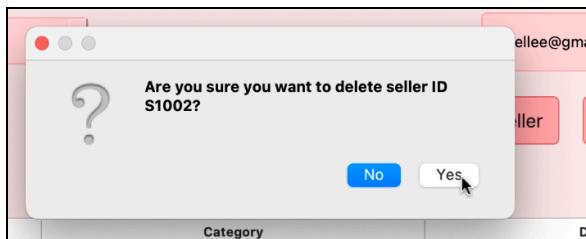


Figure 52: Seller Deletion Confirmation

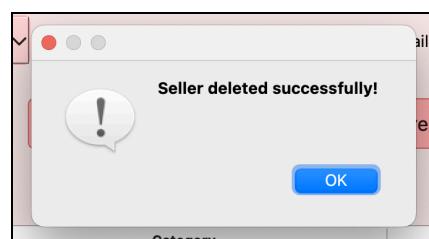


Figure 53: Seller Deletion Success

In this step, the manager selects a seller (S1002 Daniel Lee) from the dropdown and decides to delete the seller. After clicking the "Delete Seller" button, a confirmation pop-up window appears, asking if the manager is sure they want to delete the selected seller. Upon confirming by clicking "Yes," another pop-up window appears, notifying the manager that the seller has been deleted successfully.

5.5.3 Sales and Customer Insight

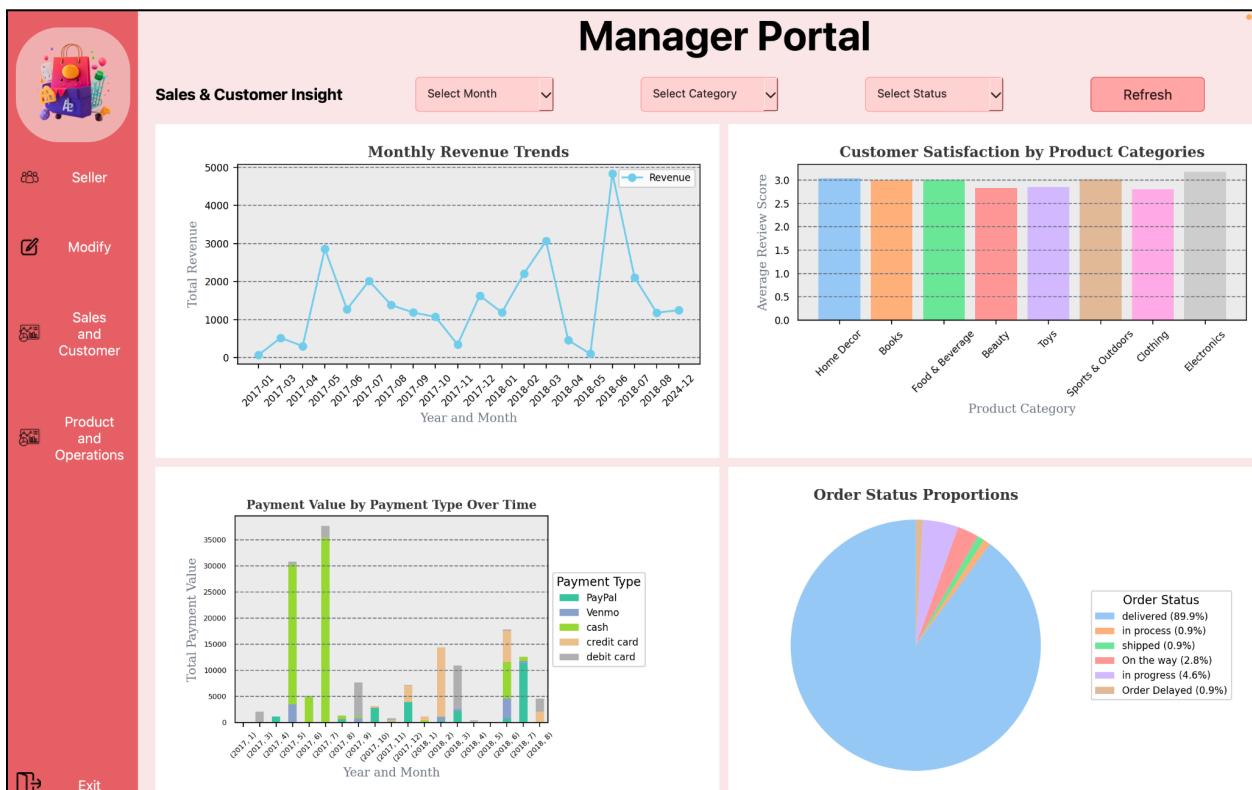


Figure 54: Sales and Customer Insights - No Filters Applied

The Sales and Customer page in the Manager Portal offers various visual insights related to sales performance and customer satisfaction. It includes a Monthly Revenue Trends line chart to track total revenue generated per month, helping the manager identify fluctuations and peak revenue periods. The Customer Satisfaction by Product Categories bar chart displays average customer review scores across different categories such as Home Decor, Books, Food & Beverage, Beauty, Toys, Sports & Outdoors, Clothing, and Electronics, providing valuable insights into customer satisfaction. The Payment Value by Payment Type Over Time bar chart illustrates the total payment value for different payment types (PayPal, Venmo, cash, credit card, and debit card) across months, offering insight into popular payment methods over time. The

Order Status Proportions pie chart breaks down the proportions of orders by their current status, including categories like “delivered,” “in process,” and “shipped.” The page also features dropdown menus to filter data by Month, Category, and Status, along with a Refresh button to update the displayed information. This page enables the manager to analyze and track key sales metrics and customer feedback in an easily understandable visual format.

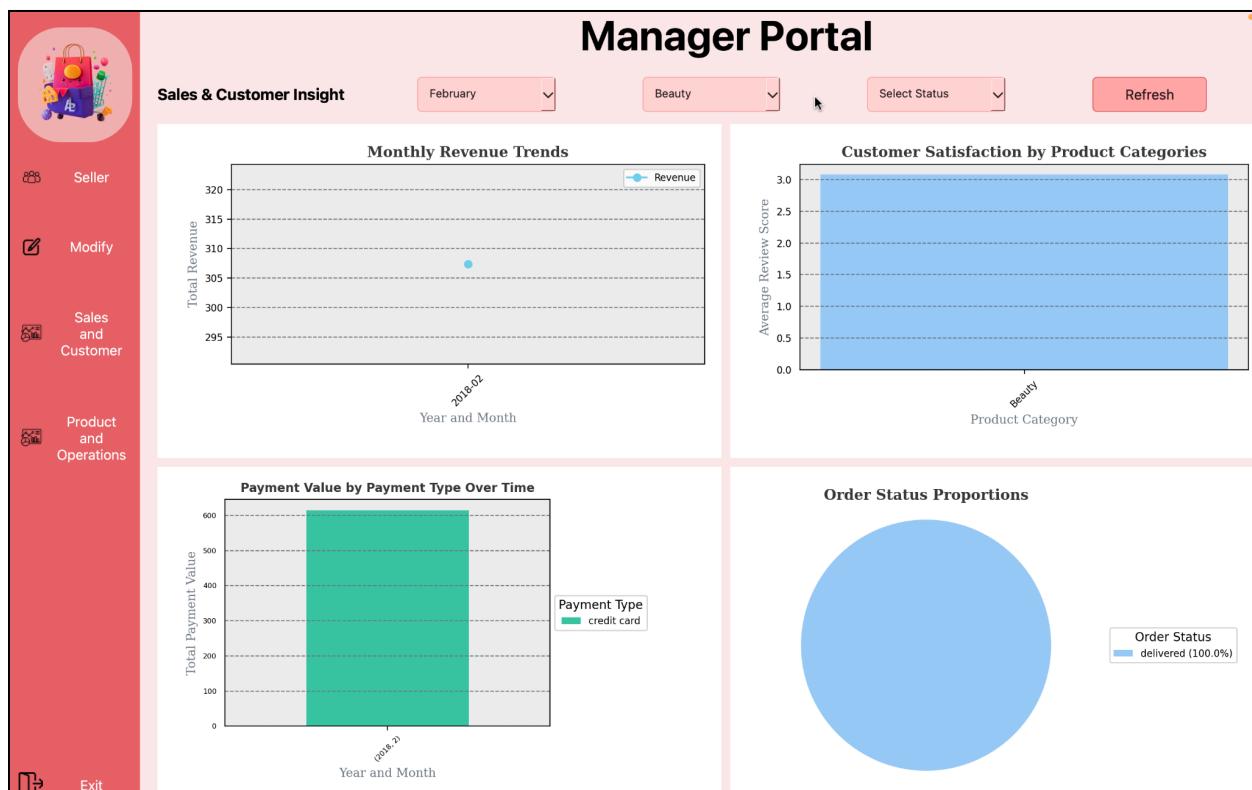


Figure 55: Sales and Customer Insights with February and Beauty Filter

After selecting February as the month and Beauty as the product category, the Sales and Customer Insight page updates to display data specific to these choices. The Monthly Revenue Trends graph now shows the total revenue for February 2018, approximately 310, allowing the manager to track revenue performance for that month. The Customer Satisfaction by Product Categories bar chart reflects an average review score close to 3 for the Beauty category, providing insight into customer satisfaction for Beauty products during the selected period. The

Payment Value by Payment Type Over Time chart indicates that credit cards were the predominant payment method in February 2018, with a high payment value for this method. The Order Status Proportions pie chart reveals that 100% of the orders for this selection have been marked as "delivered," giving the manager a clear view of the order fulfillment status. The Refresh button can be clicked to update the visualizations with new filter selections, allowing for tailored and focused data analysis based on the chosen month and product category.

5.5.4 Product and Operations

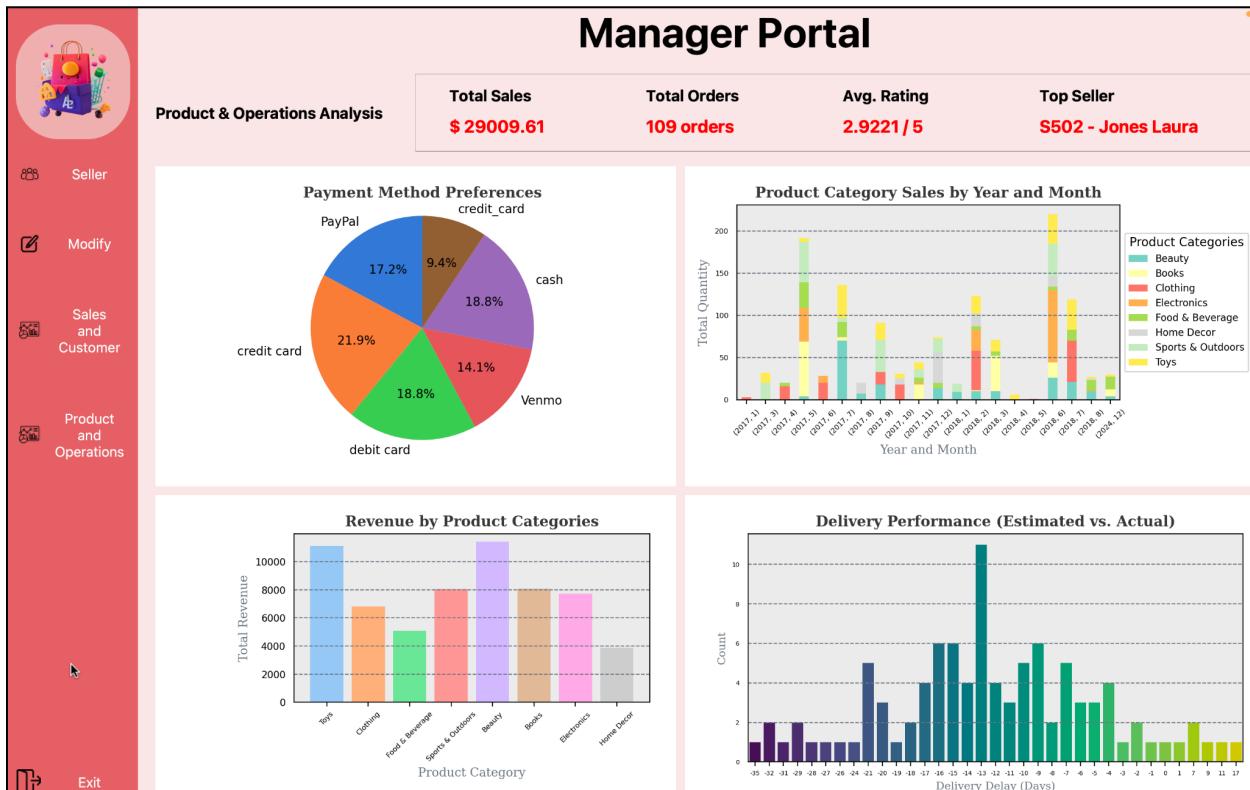


Figure 56: Product and Operations Analysis

The Product and Operations page in the Manager Portal provides detailed insights into product sales, payment preferences, and delivery performance. It includes a Payment Method Preferences pie chart, which shows the distribution of payment methods used by customers, with credit cards being the most popular. The Product Category Sales by Year and Month bar chart

tracks sales by product category over time, with different colors representing categories like Beauty, Books, and Clothing, allowing the manager to analyze monthly sales trends. The Revenue by Product Categories bar chart highlights total revenue generated by various product categories, such as Toys and Clothing, giving a snapshot of the most profitable categories. Additionally, the Delivery Performance (Estimated vs. Actual) bar chart compares estimated delivery times with actual delivery delays, helping assess the efficiency of the delivery process. The top section of the page also displays key metrics, including Total Sales, Total Orders, Average Rating, and the Top Seller, providing an overview of performance indicators. This page allows the manager to effectively monitor and analyze product performance, customer payment preferences, and delivery efficiency.

6. Summary for Operational Module

- **Customer Operations:**
 - **Login and Dashboard:** Customers can log in to access a personalized dashboard, which enables them to track both past and current orders, place new orders, and submit reviews.
 - **Orders:** Customers can place new orders by adding up to 8 different products to their cart. They can filter products by price, either from low to high or high to low. In the cart, customers have the option to adjust item quantities or remove items. The system automatically generates a unique order_ID for efficient tracking of each order.
 - **Order History:** Customers can view the details and status of their past orders. They can also provide feedback and ratings for the products they have received, contributing to the review process for future buyers.

- **Seller Operations:**

- **Order:** allows sellers to view and manage their orders, including order status, delivery dates, and product details. Sellers can filter orders by order ID, product category, or status, and take actions such as shipping orders or marking order delays directly from the portal.
- **Customers:** allows sellers to view and manage customer information, including customer IDs, names, contact details, and order statuses. Sellers can also access customer order details such as order ID, status, delivery dates, and quantities, with options to delete customer records.
- **Payment:** The Payment Details page displays customer payment information, including order IDs, payment types, installments, and payment values, along with a section for Order Items that shows product categories, descriptions, quantities, prices, and order dates, allowing for efficient order and payment tracking.

- **Manager Operations:**

- **Seller:** displays a list of sellers with their Seller ID, First Name, Last Name, and Order Count. Selecting a seller shows detailed information such as their email, phone number, zip code, city, and state.
- **Modify:** allows the manager to manage seller information by selecting a seller from a dropdown or entering their details manually. The page includes options to update, create, or delete sellers, with a section displaying the seller's products, though no products are shown in this instance.

7. Summary of Analytical Module

The Sales and Customer and Product and Operations sections of the Manager Portal offer comprehensive visual insights and key metrics, enabling managers to effectively track business performance, customer satisfaction, and operational efficiency.

- **Sales and Customer:** provides visual insights into key metrics, including monthly revenue trends, customer satisfaction by product categories, payment values by payment type over time, and order status proportions. The page also includes filters for selecting the month, category, and order status, allowing the manager to analyze specific data more effectively.
- **Product and Operations:** provides key insights into sales and operations, including a breakdown of payment method preferences, product category sales by year and month, revenue by product categories, and delivery performance comparing estimated versus actual delivery times. The page also highlights total sales, total orders, average rating, and the top seller for quick performance monitoring.

Both sections in the Manager Portal give managers a clear and detailed picture of the business, allowing them to easily track sales, customer trends, and how efficiently the operations are running. By using these insights, managers can make smarter decisions that enhance customer satisfaction, optimize processes, and drive better sales results.

8. Technical Aspects

No.	File	Type	Comments
1	data201.py	Python	Python database utilities file
2	picture	File	Icon pictures
3	sqlmaster.ini	Config File	Database Config File (Operational)
4	sqlmaster_wh.ini	Config File	Database Config File (Analytical)
5	sqlmaster.sql	SQL Dump	Operational DB Dump
6	sqlmaster_wh.sql	SQL Dump	Analytical DB Dump
7	login_page.py	Python	Login Portal Function
8	login_page.ui	Qt5 UI File	Login Portal Dialog
9	sign_up.py	Python	Sign Up Portal Function
10	sign_up.ui	Qt5 UI File	Sign Up Portal Dialog
11	shared.py	Python	Database and Signup/Login Portal utilities
12	customer_home.py	Python	Customer Portal Function
13	customer_home.ui	Qt5 UI File	Customer Portal Dialog
14	customer_order_history.py	Python	Order History Function
15	customer_order_history.ui	Qt5 UI File	Order History Dialog
16	customer_review_window.py	Python	Review Window Function
17	customer_review_window.ui	Qt5 UI File	Review Window Dialog
18	seller_portal.py	Python	Seller Portal Function
19	seller_portal.ui	Qt5 UI File	Seller Portal Dialog
20	manager_portal.py	Python	Manager Portal Function
21	manager_portal.ui	Qt5 UI File	Manager Portal Dialog

9. Database Technical Details

9.1 ETL

9.1.1 Creating tables

```
DROP TABLE IF EXISTS Fact_Orders;
DROP TABLE IF EXISTS Fact_Payments;
DROP TABLE IF EXISTS Dim_Products;
DROP TABLE IF EXISTS Dim_Customers;
DROP TABLE IF EXISTS Dim_Sellers;
DROP TABLE IF EXISTS Dim_Time;
```

```
-- Dim_Time
CREATE TABLE Dim_Time (
    time_id INT AUTO_INCREMENT PRIMARY KEY,
    order_date DATE,
    year INT,
    quarter INT,
    month INT,
    day INT,
    day_of_week VARCHAR(10)
);
```

```
-- Dim_Customers
CREATE TABLE Dim_Customers (
    customer_id INT PRIMARY KEY,
    customer_name VARCHAR(255),
    customer_email VARCHAR(100),
    customer_phone VARCHAR(50),
    customer_zip_code INT,
    city VARCHAR(100),
    state VARCHAR(100),
    country VARCHAR(100) DEFAULT 'USA'
);
```

```
-- Dim_Sellers
CREATE TABLE Dim_Sellers (
    seller_id VARCHAR(200) PRIMARY KEY,
    seller_name VARCHAR(255),
    seller_email VARCHAR(100),
    seller_phone VARCHAR(50),
    seller_zip_code INT,
    city VARCHAR(100),
    state VARCHAR(100)
);
```

```
-- Dim_Products
CREATE TABLE Dim_Products (
    product_id VARCHAR(200) PRIMARY KEY,
    product_category VARCHAR(100),
    product_price DECIMAL(10, 2),
    product_length DOUBLE,
    product_width DOUBLE,
    product_height DOUBLE,
    product_weight DOUBLE
);
```

```
-- Fact_Orders
CREATE TABLE Fact_Orders (
    fact_order_id INT AUTO_INCREMENT PRIMARY KEY,
    order_id INT,
    product_id VARCHAR(200),
    customer_id INT,
```

```

    seller_id VARCHAR(200),
    time_id INT,
    freight_value DOUBLE,
    quantity INT,
    FOREIGN KEY (product_id) REFERENCES Dim_Products(product_id),
    FOREIGN KEY (customer_id) REFERENCES Dim_Customers(customer_id),
    FOREIGN KEY (seller_id) REFERENCES Dim_Sellers(seller_id),
    FOREIGN KEY (time_id) REFERENCES Dim_Time(time_id)
);

-- Fact_Payments
CREATE TABLE Fact_Payments (
    fact_payment_id INT AUTO_INCREMENT PRIMARY KEY,
    order_id INT,
    product_id VARCHAR(200),
    customer_id INT,
    seller_id VARCHAR(200),
    time_id INT,
    payment_type VARCHAR(100),
    payment_installments DOUBLE,
    payment_value DOUBLE,
    FOREIGN KEY (product_id) REFERENCES Dim_Products(product_id),
    FOREIGN KEY (customer_id) REFERENCES Dim_Customers(customer_id),
    FOREIGN KEY (seller_id) REFERENCES Dim_Sellers(seller_id),
    FOREIGN KEY (time_id) REFERENCES Dim_Time(time_id)
);

```

9.1.2 ETL

Usage	Code
Importing packages	<pre> import pandas as pd from datetime import datetime import mysql.connector </pre>
Connecting to different schemas	<pre> src_conn = mysql.connector.connect(host="localhost", user="root", password="sandy0318", database="asqlmaster_project") tgt_conn = mysql.connector.connect(</pre>

	<pre> host="localhost", user="root", password="sandy0318", database="assign9") </pre>
Extract data function	<pre> def extract(query, connection): """Extract data from source database.""" return pd.read_sql(query, connection) </pre>
Load DataFrame into the target table	<pre> def load_data(df, table_name, connection): """Load DataFrame into the target table.""" cursor = connection.cursor() for _, row in df.iterrows(): placeholders = ", ".join(["%s"] * len(row)) columns = ", ".join(row.index) query = f"INSERT INTO {table_name} ({columns}) VALUES ({placeholders})" try: cursor.execute(query, tuple(row)) except mysql.connector.Error as e: print(f"Error inserting row into {table_name}: {e}") connection.commit() cursor.close() </pre>
Retrieve Product Details	<pre> products_query = """ SELECT product_id, product_category, product_price, product_length, product_width, product_height, product_weight FROM products; """ </pre>
Retrieve Customer Details and Location	<pre> customers_query = """ SELECT c.customer_id, CONCAT(c.customer_first_name, ' ', c.customer_last_name) AS customer_name, c.customer_email, c.customer_phone, g.city, g.state_name AS state, c.customer_zip_code FROM customers c JOIN geolocation g ON c.customer_zip_code = g.zip; """ </pre>
Retrieve Seller Details and Location	<pre> sellers_query = """ SELECT s.seller_id, CONCAT(s.seller_first_name, ' ', s.seller_last_name) AS seller_name, s.seller_email, s.seller_phone, g.city, g.state_name AS </pre>

	<pre> state, s.seller_zip_code FROM sellers s JOIN geolocation g ON s.seller_zip_code = g.zip; """ </pre>
Retrieve Order and Product Details	<pre> orders_query = """ SELECT o.order_id, o.customer_id, ot.seller_id, ot.product_id, ot.freight_value, ot.quantity, o.order_purchase_timestamp FROM orders o JOIN order_items ot ON o.order_id = ot.order_id; """ </pre>
Retrieve Payment and Order Details	<pre> payments_query = """ SELECT o.order_id, o.customer_id, s.seller_id, oi.product_id, op.payment_type, op.payment_installments, op.payment_value, o.order_purchase_timestamp FROM orders o JOIN order_payments op ON o.order_id = op.order_id JOIN order_items oi ON o.order_id = oi.order_id JOIN sellers s ON s.seller_id = oi.seller_id; """ </pre>
Extract Data	<pre> products_df = extract(products_query, src_conn) customers_df = extract(customers_query, src_conn) sellers_df = extract(sellers_query, src_conn) orders_df = extract(orders_query, src_conn) payments_df = extract(payments_query, src_conn) </pre>
Time Dimension Transformation	<pre> # Transformations for Dim_Time time_data = pd.DataFrame({ "order_date": pd.to_datetime(orders_df["order_purchase_timestamp"]), }) time_data["year"] = time_data["order_date"].dt.year time_data["quarter"] = time_data["order_date"].dt.quarter time_data["month"] = time_data["order_date"].dt.month time_data["day"] = time_data["order_date"].dt.day time_data["day_of_week"] = time_data["order_date"].dt.day_name() time_data["time_id"] = time_data.index + 1 </pre>
Merge time_id with orders and payments	<pre> orders_df = orders_df.merge(time_data[["time_id", "order_date"]], left_on="order_purchase_timestamp", right_on="order_date", how="left").drop(columns=["order_date"]) </pre>

```

payments_df = payments_df.merge(time_data[["time_id",
"order_date"]],  

                                left_on="order_purchase_timestamp",
                                right_on="order_date",  

                                how="left").drop(columns=["order_date"])

```

Load Data

```

load_data(products_df, "Dim_Products", tgt_conn)
load_data(customers_df, "Dim_Customers", tgt_conn)
load_data(sellers_df, "Dim_Sellers", tgt_conn)
load_data(time_data[["time_id", "order_date", "year", "quarter",
"month", "day", "day_of_week"]], "Dim_Time", tgt_conn)
load_data(orders_df[["order_id", "product_id", "customer_id",
"seller_id", "time_id", "freight_value", "quantity"]],  

          "Fact_Orders", tgt_conn)
load_data(payments_df[["order_id", "product_id", "customer_id",
"seller_id", "time_id", "payment_type", "payment_installments",
"payment_value"]], "Fact_Payments", tgt_conn)

src_conn.close()
tgt_conn.close()

```

9.1.3 Queries (Operation DB)

Usage	Query
Populate sellers table in Manager Portal	<pre> SELECT s.seller_id, s.seller_first_name, s.seller_last_name, COUNT(i.seller_id) AS order_count FROM sellers s LEFT JOIN order_items i ON s.seller_id = i.seller_id GROUP BY s.seller_id, s.seller_first_name, s.seller_last_name ORDER BY order_count DESC; </pre>
Display Seller Details in Manager Portal	<pre> SELECT s.seller_id, s.seller_email, s.seller_phone, s.seller_zip_code, g.city, g.state_name FROM sellers s JOIN geolocation g ON g.geolocation_id = s.seller_zip_code WHERE s.seller_id = %s; </pre>

Populate Sellers Dropdown in Manager Portal	<pre>SELECT DISTINCT seller_id, CONCAT(seller_first_name, ' ', seller_last_name) AS full_name FROM sellers ORDER BY full_name;</pre>
Populate States in Manager Portal	<pre>SELECT DISTINCT state_name FROM geolocation ORDER BY state_name;</pre>
Populate Cities in Manager Portal	<pre>SELECT DISTINCT city FROM geolocation ORDER BY city;</pre>
Update Cities based on State in Manager Portal	<pre>SELECT DISTINCT city FROM geolocation WHERE state_name = %s ORDER BY city;</pre>
Search for Sellers in Manager Portal	<pre>SELECT seller_id, seller_first_name, seller_last_name, seller_email, seller_phone FROM sellers WHERE (%s IS NULL OR seller_id = %s) AND (%s IS NULL OR seller_first_name LIKE %s) AND (%s IS NULL OR seller_last_name LIKE %s);</pre>
Update Seller from Dropdown in Manager Portal	<pre>SELECT seller_id, seller_first_name, seller_last_name, seller_email, seller_phone FROM sellers WHERE seller_id = %s</pre>
Display Seller Information in Manager Portal	<pre>SELECT DISTINCT city, state_name FROM geolocation WHERE geolocation_id = (SELECT seller_zip_code FROM sellers WHERE seller_id = %s);</pre>
Display the seller product in Manager Portal	<pre>SELECT p.product_id, p.product_category, p.product_description, p.product_price FROM products p JOIN product_stock ps ON ps.product_id = p.product_id JOIN sellers s ON ps.seller_id = s.seller_id WHERE s.seller_id = %s;</pre>
Fetch ZIP code based on city and state in Manager	<pre>SELECT geolocation_id FROM geolocation WHERE city = %s AND state_name = %s;</pre>

Portal	
Update seller information in Manager Portal	<pre>UPDATE sellers SET seller_first_name = %s, seller_last_name = %s, seller_email = %s, seller_phone = %s, seller_zip_code = %s WHERE seller_id = %s;</pre>
Delete Seller in Manager Portal (With deleting all the constraints)	<pre>SELECT COUNT(*) FROM products p JOIN product_stock ps ON ps.product_id = p.product_id WHERE seller_id = %s", (seller_id,); DELETE FROM products p JOIN product_stock ps ON ps.product_id = p.product_id WHERE seller_id = %s", (seller_id,); SELECT COUNT(*) FROM product_stock WHERE seller_id = %s", (seller_id,); DELETE FROM product_stock WHERE seller_id = %s", (seller_id,); DELETE FROM sellers WHERE seller_id = %s", (seller_id,);</pre>
Create new Seller in Manager Portal	<pre>SELECT geolocation_id FROM geolocation WHERE city = %s AND state_name = %s LIMIT 1; INSERT INTO sellers (seller_id, seller_first_name, seller_last_name, seller_email, seller_phone, seller_zip_code) VALUES (%s, %s, %s, %s, %s, %s);</pre>
Creating new seller id in Manager Portal	<pre>SELECT seller_id FROM sellers WHERE seller_id REGEXP '^S[0-9]+';</pre>
Populate order status in Manager Portal	<pre>SELECT DISTINCT order_status FROM orders ORDER BY order_status;</pre>
Display chart Revenue trend in Manager Portal	<pre>SELECT DATE_FORMAT(order_purchase_timestamp, '%Y-%m') AS year_and_month, SUM(payment_value) AS total_revenue FROM orders JOIN order_payments ON orders.order_id = order_payments.order_id</pre>

	<pre> GROUP BY DATE_FORMAT(order_purchase_timestamp, '%Y-%m') ORDER BY year_and_month; </pre>
Customer Satisfaction in Manager Portal	<pre> SELECT products.product_category, AVG(order_reviews.review_score) AS avg_review_score FROM products JOIN order_items ON products.product_id = order_items.product_id JOIN orders ON order_items.order_id = orders.order_id JOIN order_reviews ON orders.order_id = order_reviews.order_id GROUP BY products.product_category; </pre>
Payment Value Over Time in Manager Portal	<pre> SELECT products.product_id as product_id, orders.order_id as order_id, Month(orders.order_purchase_timestamp) as month FROM products JOIN order_items ON products.product_id = order_items.product_id JOIN orders ON orders.order_id = order_items.order_id WHERE {conditions}; </pre>
Order Status proportion in Manager Portal	<pre> SELECT orders.order_status, COUNT(*) AS status_count FROM orders JOIN order_items ON order_items.order_id = orders.order_id JOIN products ON products.product_id = order_items.product_id WHERE {conditions} GROUP BY orders.order_status; </pre>
Total sales in Manager Portal	<pre> SELECT SUM(payment_value) AS total_sales FROM order_payments </pre>
Total orders in Manager Portal	<pre> SELECT COUNT(*) AS total_orders FROM orders; </pre>
Avg rating in Manager Portal	<pre> SELECT AVG(review_score) AS avg_rating FROM order_reviews; </pre>
Top seller in Manager Portal	<pre> SELECT CONCAT(s.seller_id, ' - ', s.seller_last_name, ' ', s.seller_first_name) AS top_seller FROM sellers s JOIN order_items oi ON oi.seller_id = s.seller_id </pre>

	<pre> JOIN orders o ON o.order_id = oi.order_id JOIN order_payments op ON op.order_id = o.order_id GROUP BY s.seller_id ORDER BY SUM(op.payment_value) DESC LIMIT 1; </pre>
Payment Method preferences in Manager Portal	<pre> SELECT payment_type, COUNT(*) AS count FROM order_payments GROUP BY payment_type; </pre>
Revenue by product categories in Manager Portal	<pre> SELECT p.product_category, SUM(op.payment_value) AS total_revenue FROM products p JOIN order_items oi ON p.product_id = oi.product_id JOIN orders o ON oi.order_id = o.order_id JOIN order_payments op ON o.order_id = op.order_id GROUP BY p.product_category; </pre>
Delivery_Performance in Manager Portal	<pre> SELECT DATEDIFF(order_delivered_customer_date, order_estimated_delivery_date) AS delivery_delay, COUNT(*) AS count FROM orders WHERE order_delivered_customer_date IS NOT NULL GROUP BY delivery_delay; </pre>

9.1.4 Queries (Analytical DB)

Usage	Query
Populate month for dropdowns in Manager Portal	<pre> SELECT DISTINCT month FROM Dim_Time ORDER BY month; </pre>
Populate product category in Manager Portal	<pre> SELECT DISTINCT product_category FROM Dim_Products ORDER BY product_category; </pre>
Payment Value Over Time in Manager Portal	<pre> SELECT d_t.year, d_t.month, f.payment_type, SUM(f.payment_value) AS total_payment_value FROM Fact_Payments f JOIN Dim_Time d_t ON f.time_id = d_t.time_id </pre>

	<pre> GROUP BY d_t.year, d_t.month, f.payment_type ORDER BY d_t.year, d_t.month, total_payment_value DESC; </pre>
Product Sales Over Time in Manager Portal	<pre> SELECT d_t.year, d_t.month, d_p.product_category, SUM(f.quantity) AS total_quantity, SUM(f.freight_value) AS total_freight_value FROM Fact_Orders f JOIN Dim_Products d_p ON f.product_id = d_p.product_id JOIN Dim_Time d_t ON f.time_id = d_t.time_id GROUP BY d_t.year, d_t.month, d_p.product_category ORDER BY d_t.year, d_t.month, d_p.product_category; </pre>

10. References

10.1. Works Cited

- [1] **Terencicp.** “E-Commerce Dataset by Olist as an SQLite Database.” Kaggle, [2024], <https://www.kaggle.com/datasets/terencicp/e-commerce-dataset-by-olist-as-an-sqlite-database?select=olist.sqlite>
- [2] **Mockaroo.** Mockaroo - Random Data Generator. Mockaroo, 2023, <https://www.mockaroo.com/>
- [3] **SimpleMaps.** ZIP Code Visualizations. SimpleMaps, 2023, <https://simplemaps.com/resources/zip-code-visualizations>.
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10.2. Application Design

The tools and libraries used during the development process include the following:

Development Tools:

- Python (Primary programming language)
- MySQL Workbench (Database management)
- PyQt Designer (GUI development)
- ERD Plus (ER diagram design)
- Visual Studio Code (Code editor and IDE)

Additional Python Packages:

- Pandas – For data manipulation and analysis
- NumPy – For numerical computations
- Matplotlib – For data visualization
- Seaborn – For advanced statistical visualizations
- PyQt5 and PyQt5-Tools – For building graphical user interfaces
- MySQL Connector for Python – To connect Python with MySQL databases