

# **E-Glamour Mall: An Interactive Cosmetics E-Commerce System**

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## **ABSTRACT**

"E-GlamourMall" is a multimedia e-commerce platform tailored for makeup beginners, focusing on emerging Chinese cosmetics brands. It offers a user-friendly online environment that simplifies the shopping experience, addressing the challenges novices face in traditional shopping settings, particularly social anxiety. Key features include user registration, login/logout, personal information management, product search and filtering, and detailed product views with multimedia content. A unique feature is the Virtual Lipstick Try-On tool, allowing users to upload photos and try different lipstick shades virtually. This interactive tool enhances decision-making and user engagement by providing a realistic product preview. Developed using agile methodology, "E-GlamourMall" quickly adapts to user feedback and market trends, ensuring a responsive and modern user experience. The platform not only facilitates an engaging shopping experience but also promotes young Chinese brands globally, enhancing their visibility and accessibility.

## INTRODUCTION

In today's beauty economy, cosmetics have gone from a luxury to a necessity in People's Daily lives, especially for younger consumers. There are so many brands and products on the market that the choice is dizzying. The proliferation of such items poses quite a challenge for younger consumers, especially those new to cosmetics and those with social anxiety, who may find the experience of shopping in physical stores intimidating and stressful.

The motivation for the development of "E-GlamourMall" is to see the potential of this vast market and untapped opportunities. Our project aims to simplify the selection process and provide a more accessible entry point for newcomers to cosmetics. This platform specifically selects those emerging, young Chinese cosmetics brands that are full of innovation and authenticity and can attract the attention of young consumers.

The challenges young customers face in the cosmetics retail industry are multifaceted. From how to choose among numerous options, to how to make informed purchasing decisions without actually having access to the product, to the fact that the management and transaction processes of cosmetics retail can be complex and intimidating for newcomers, it can all lead to a trial-and-error approach that is both inefficient and a waste of money.

As one of the solutions to these challenges, "E-GlamourMall" offers a user-friendly interface that simplifies the decision-making process with efficient search, filter, add to cart and comment capabilities. The platform is not only a gateway to explore and buy cosmetics but also a means to educate and inform users through detailed product information and immersive multimedia elements. One of the standout features is the cutting-edge VR lipstick try-on capability, which allows users to virtually test different shades on their own image, providing a realistic and personalized shopping experience.

This interactive tool, alongside informative graphics, animation, and videos, helps users make confident purchasing decisions without the need for physical samples.

For administrators, "E-GlamourMall" provides a complete set of management tools to streamline the operation of cosmetics retail, from product placement to order fulfillment and customer interaction. These tools are designed to facilitate seamless interactions between platforms, users, and brands.

The value of E-GlamourMall lies in its ability to bridge the gap between young consumers and the cosmetics industry. By fostering a welcoming and easily accessible online environment, this platform not only cultivates the confidence of makeup beginners, but also increases the visibility of emerging brands on a global scale. Overall, "E-GlamourMall" is more than just an e-commerce site; It is a catalyst for empowerment and discovery in the dynamic field of cosmetics retail.

## **RESEARCH METHODOLOGY**

In the development of the "E-GlamourMall" system, we used an agile development model to ensure that the platform can quickly adapt to changes in the cosmetics market and the special needs of our target users - makeup beginners and social phobic people. At the beginning of the project, we will convene a meeting of the project team and stakeholders to ensure that the vision, goals and expectations of the project are agreed upon. We then gather detailed demand information through user research, focus group discussions and market analysis, with a special focus on the needs of makeup beginners and the characteristics of emerging niche brands in China. Based on this information, we will develop a high-level project planning roadmap that Outlines key milestones and iteration cycles, with special emphasis on the functionality initially brought online to address the core requirements identified in the problem statement. In the design and prototype phase, we create user portraits, design a user-friendly interface for our target

user group, and develop a preliminary prototype of the "E-GlamourMall". This prototype will cover both the user system and the management system, showing features such as search, filtering, adding to shopping cart, and viewing reviews. In this way, we can ensure that at the end of each iteration cycle, we can adjust the direction based on user feedback, continuously improve the product, and quickly bring it to market.

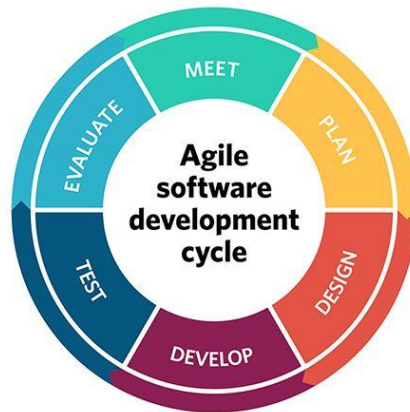


Figure 1 Methodology

## RESULTS AND DISCUSSION

The development of a comprehensive multimedia information e-commerce platform "E-GlamourMall," specifically catering to the needs and preferences of makeup beginners, has been successfully completed, with all documentation finalized. During the development process, E-GlamourMall was created using the PHP front-end framework, its scripting language JavaScript, and the styling language CSS. The MySQL database was utilized to ensure data integrity and reliability, adhering to the MVC design architecture. Python Flask was used to create all backend services for the system, including virtual lipstick try-on functionality.

Providing detailed product information, including descriptions, prices, and user reviews, allows users to make informed choices based on their preferences and budget. Personalized product recommendations help users quickly find products they are

interested in, reducing decision fatigue. The virtual lipstick try-on feature enhances user engagement by allowing them to visualize different lipstick colors on their photos, increasing confidence in their purchase decisions. Transparent product information and user reviews increase customer trust and satisfaction, leading to higher retention rates and positive word-of-mouth. Personalized recommendations reduce product search overwhelm, making the shopping experience more enjoyable and efficient. A management data dashboard helps collect and analyze customer preferences, allowing timely adjustments to product offerings and marketing strategies. Efficient feedback mechanisms enable administrators to respond quickly to user needs, improving satisfaction. Simplified system usability through a user-friendly interface and convenient tools, such as global search and one-click product details, makes system functions easy to use for both users and administrators, reducing the learning curve and improving overall efficiency.

E-GlamourMall specifically targets makeup beginners, especially young users confused about cosmetics choices, and individuals with social phobia who find it difficult to purchase cosmetics offline. It also provides Chinese niche cosmetics brands with an effective online sales platform, allowing brands to provide product information to administrators for processing and publishing via email, online forms, or spreadsheets. Key user functions include user registration, login, and logout, personal information modification, product search and filter, detailed product views, shopping cart management, payment processing, order viewing, product reviews, and viewing mall announcements. Additionally, a virtual lipstick try-on feature allows users to try different lipstick colors on uploaded photos. Administrative functions include user, product, and order management, announcement management, and global search capabilities.

After the user registers and logs in, he can see the main page, including the page navigation bar and the main promotional image as shown in Figure 2.

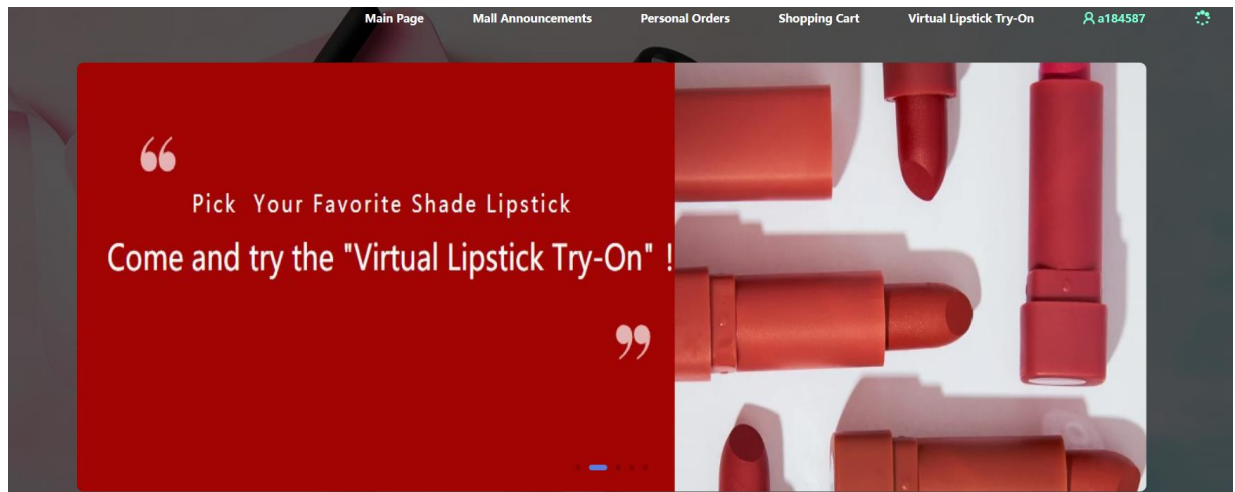


Figure 2 home page

Scroll down on the home page to see the filter options shown in Figure 3, including price filter and category filter.

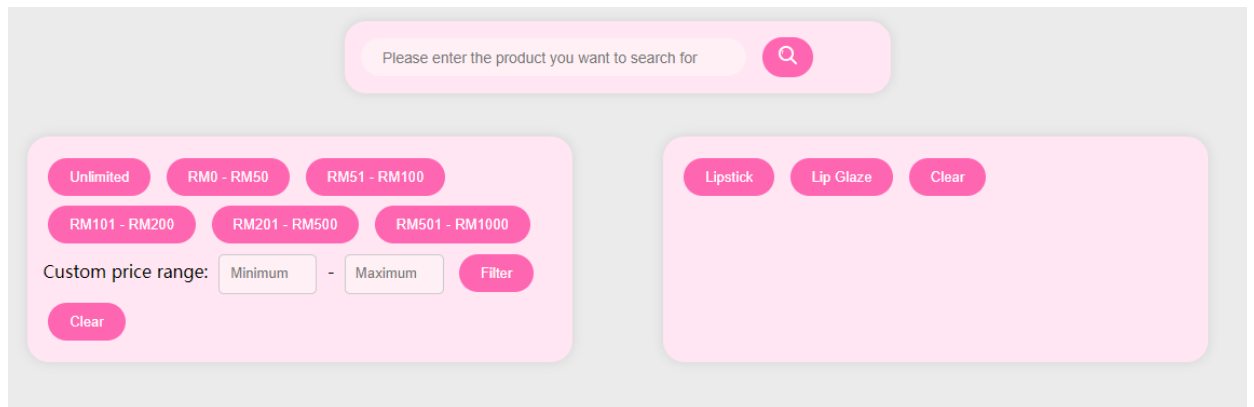


Figure 3 Home Filter Items

Part of the home page is the Products display interface shown in Figure 4.

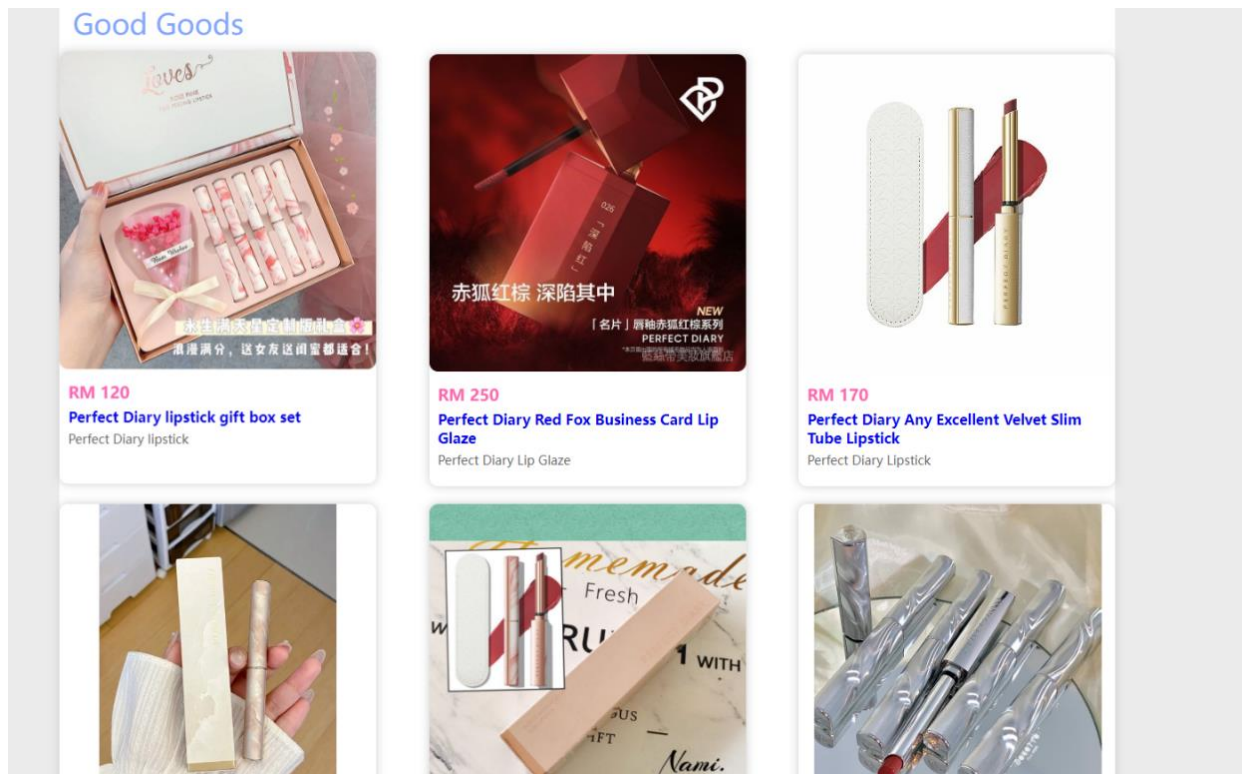


Figure 4 Products display interface

Click any of the Products shown in Figure 4 to see the product details page shown in Figure 5.

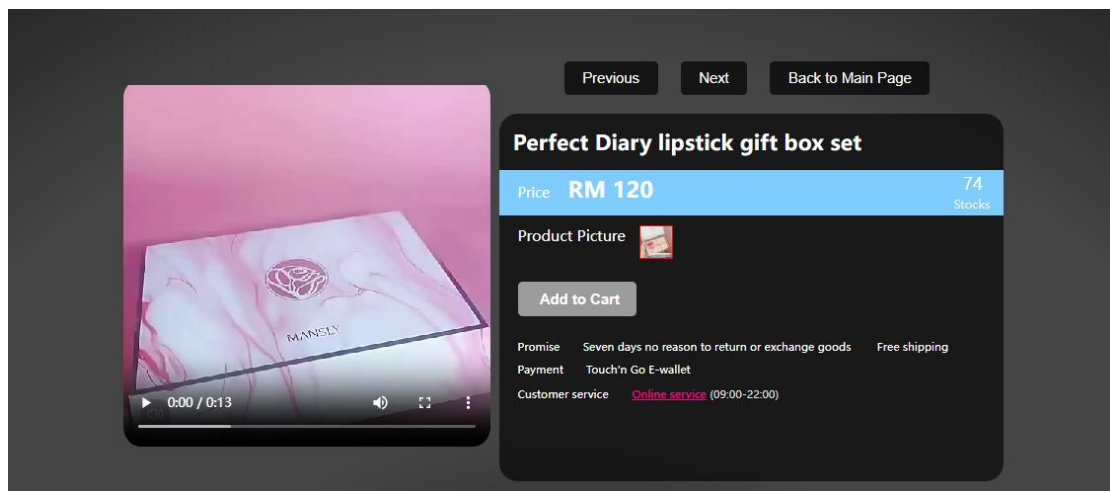


Figure 5 product details page

Scroll down the product details shown in Figure 5 to view the detailed image of the product as shown in Figure 6.

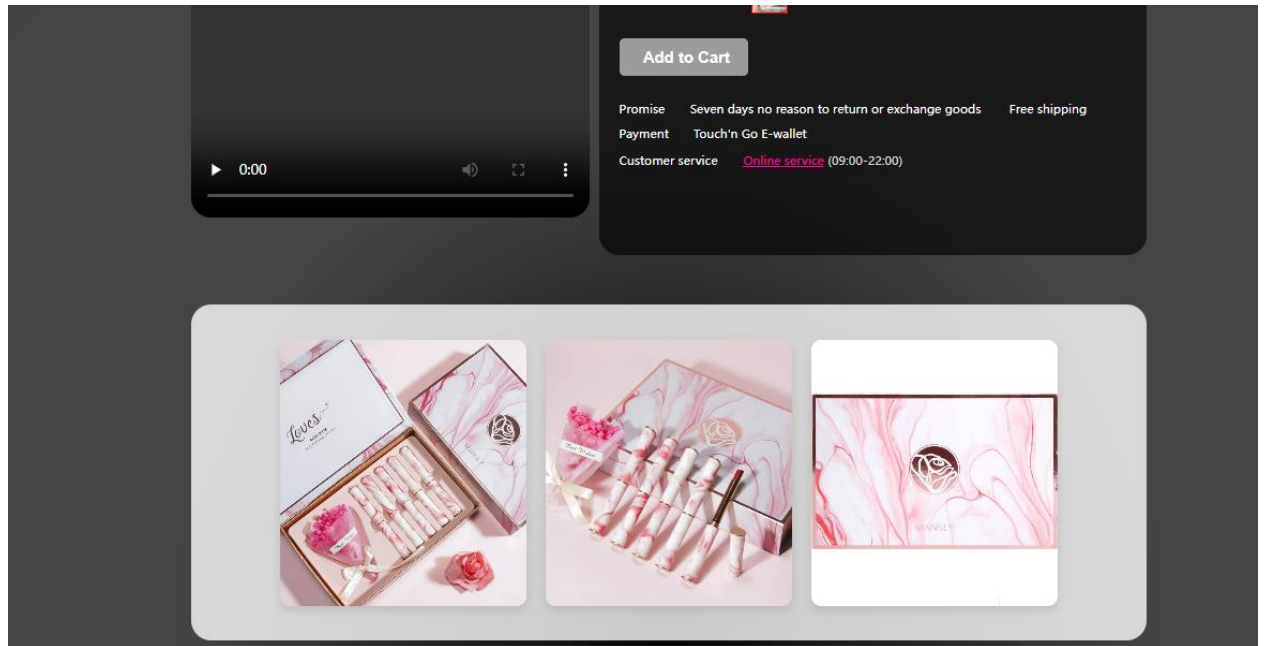


Figure 6 detailed image of the product

By scrolling down the product details shown in Figure 6, you can view comments from other users on this product as shown in Figure 7. The comments can be in the form of pictures or videos.



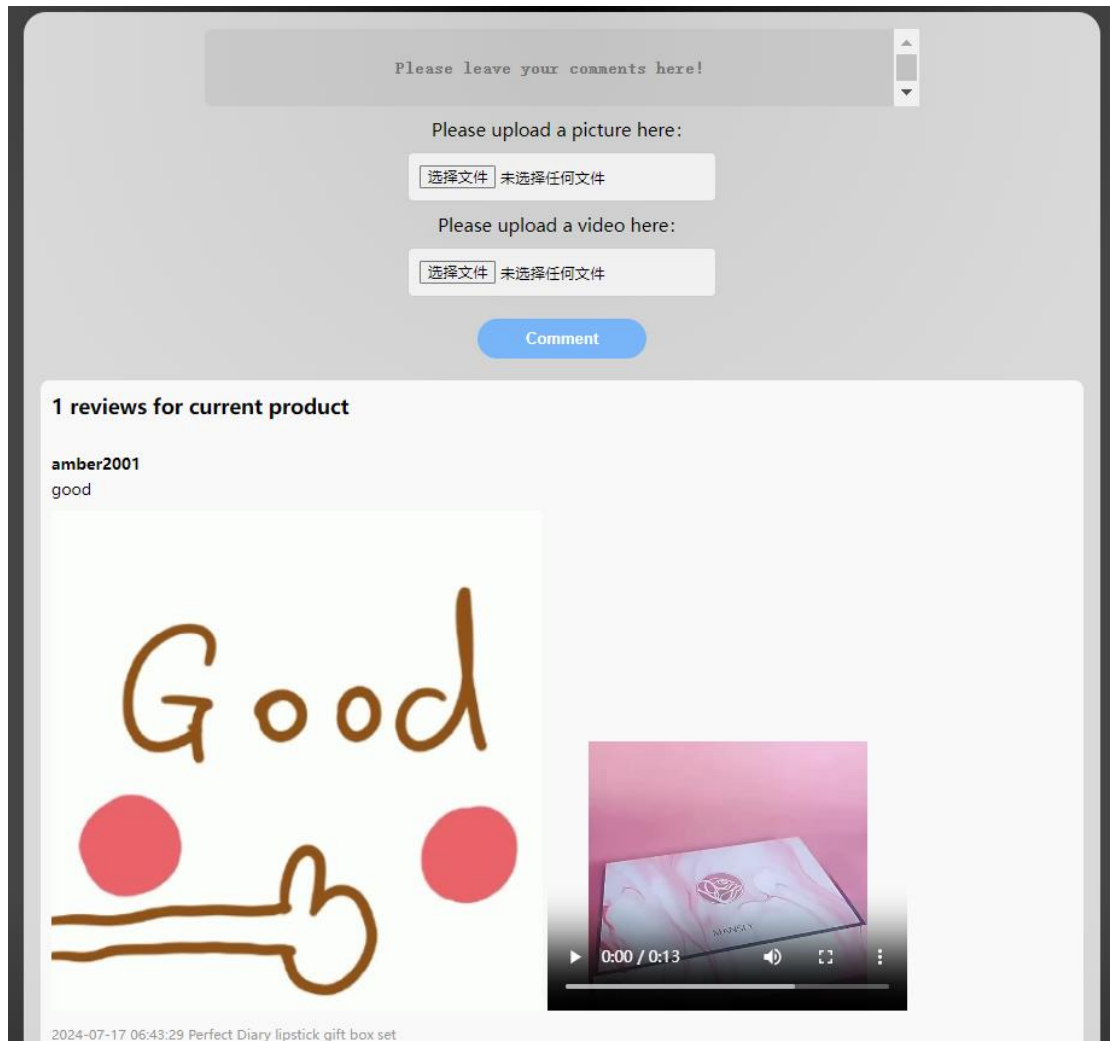


Figure 7 comments of the product

Click Announcement in the navigation bar as shown in Figure 2 to view the announcement page published by the administrator.

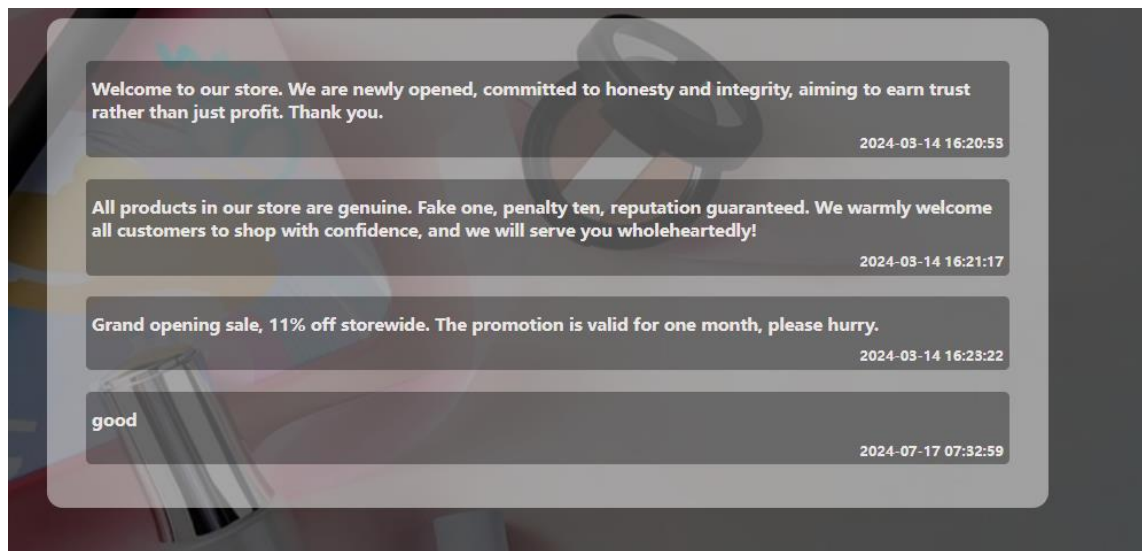


Figure 8 announcement page

When you click on the shopping cart in the navigation bar as shown in Figure 2, the system will display the shopping cart interface as shown in Figure 9, which is empty at this time because the user has not added any products.

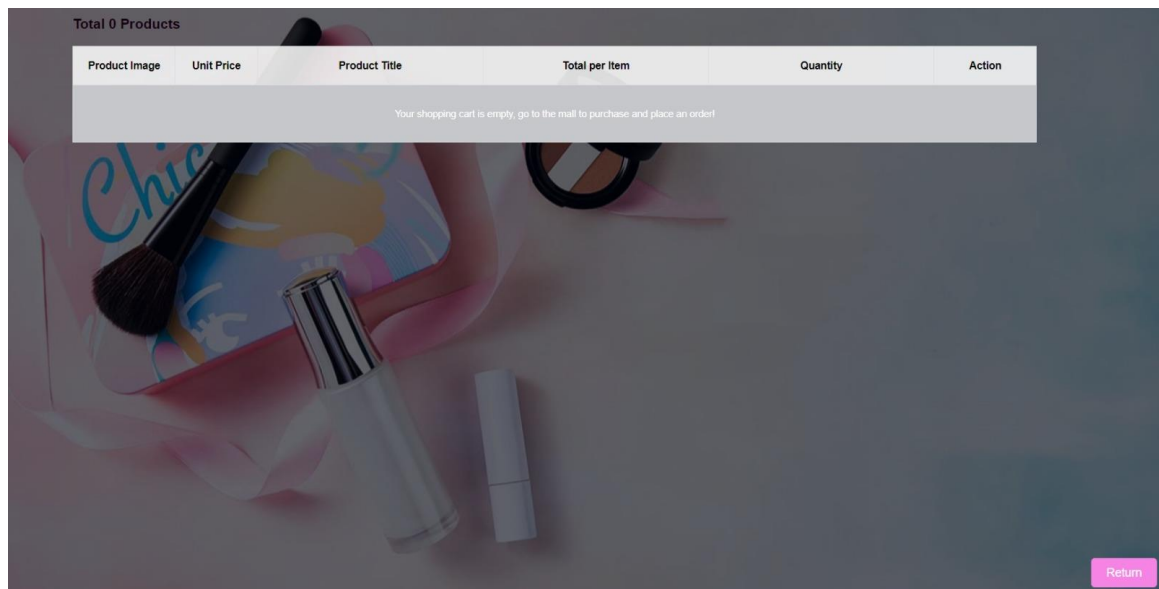


Figure 9 Shopping cart page

When you click the add shopping cart button in the details shown in Figure 4, the system will display the shopping cart interface shown in Figure 10.

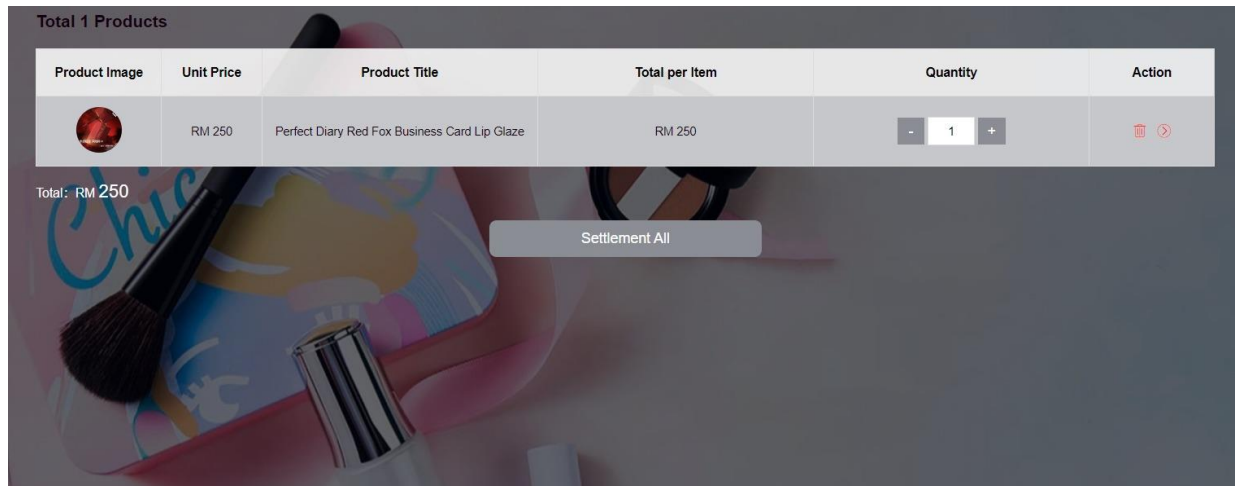


Figure 10 Shopping cart page(edit)

When you click the shopping cart button shown in Figure 10, the system jumps to the shopping cart interface and displays the shopping cart interface shown in Figure 11.

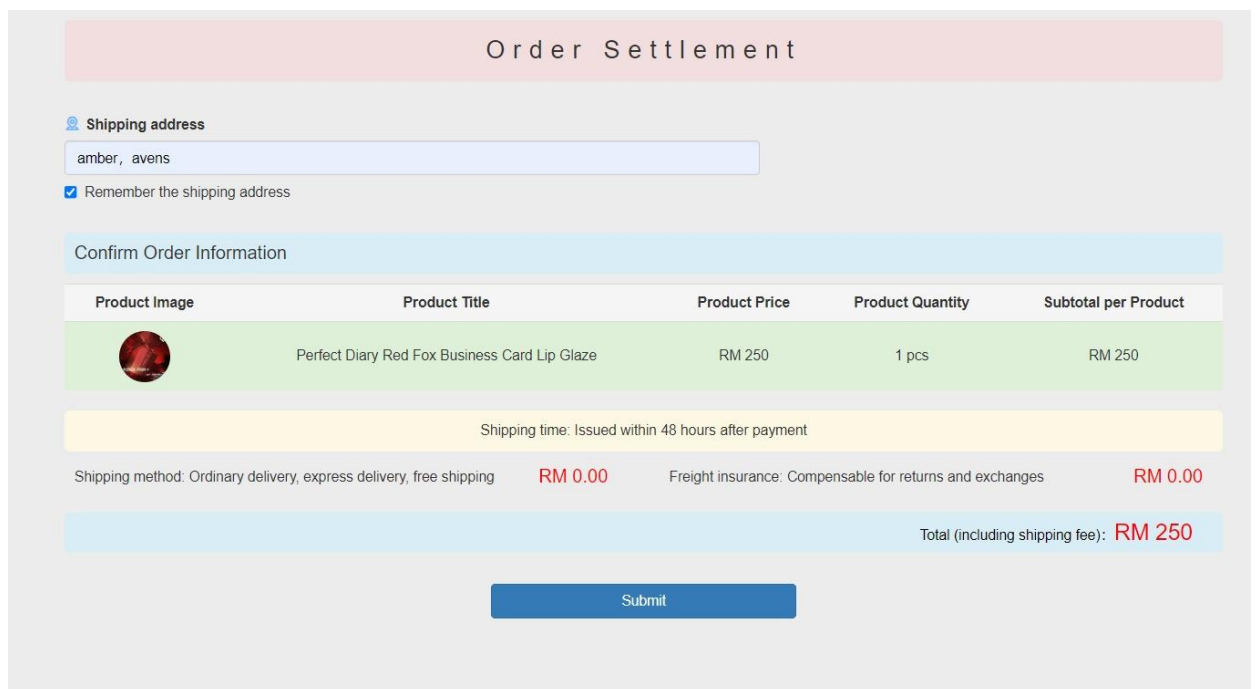


Figure 11 Order settlement page(edit)

When you click on the checkout in the shopping cart shown in Figure 11, the system displays success and jumps to the successful interface and asks the user whether they need payment information as shown in Figure 12.

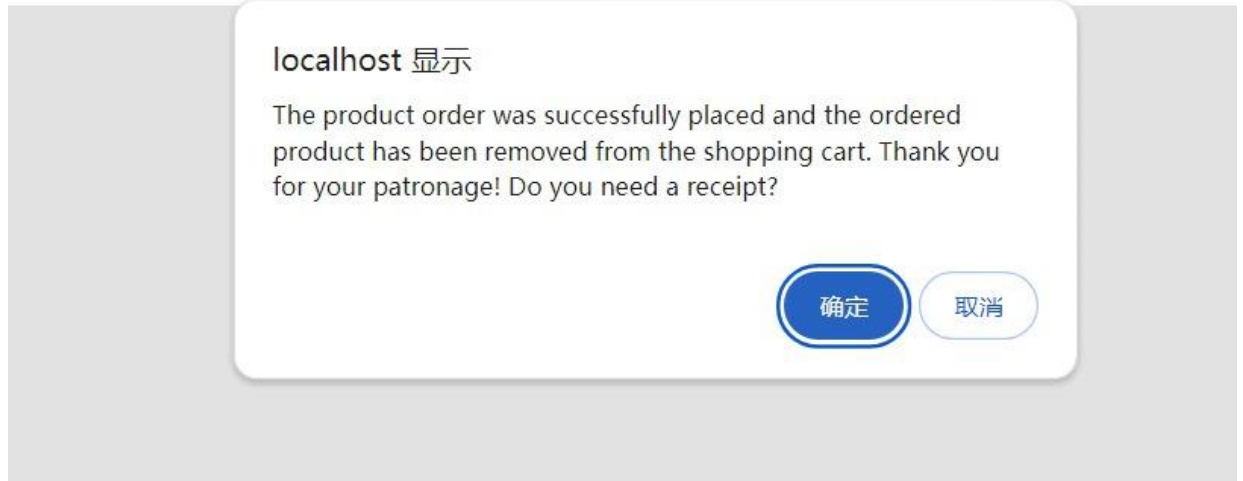


Figure 12 Order settlement successful(edit)

When the user needs the option shown in Figure 12, the system will generate receipts based on the order the user just submitted, as shown in Figure 13.

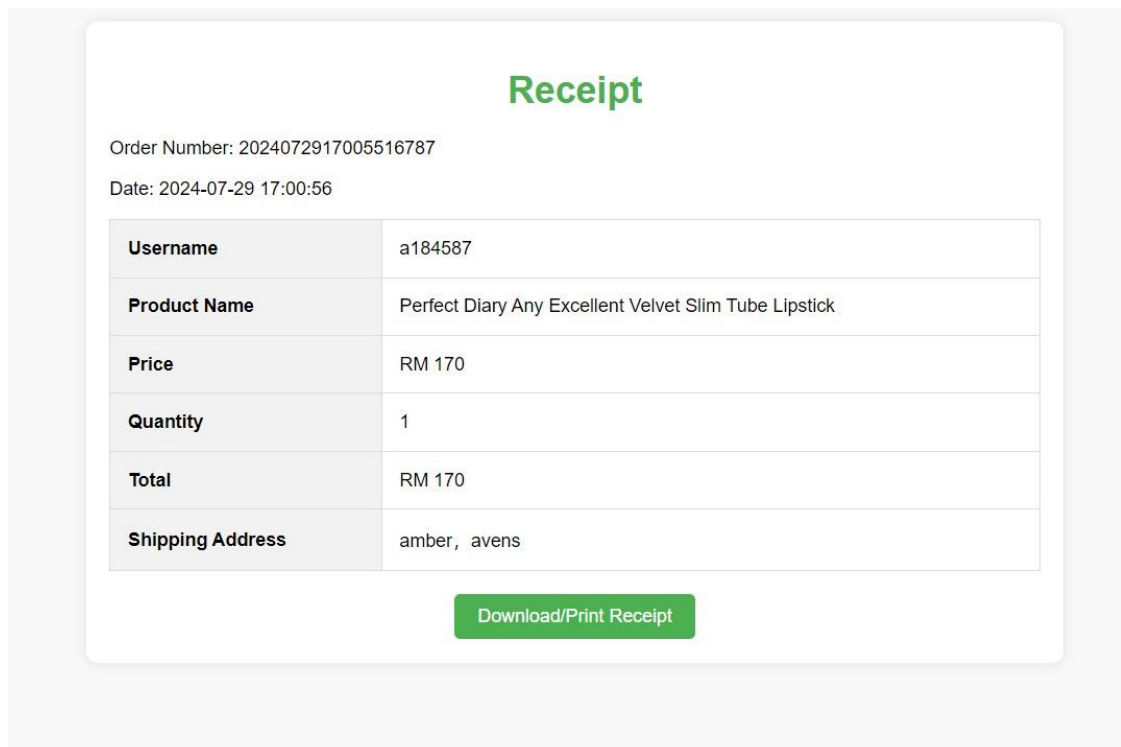
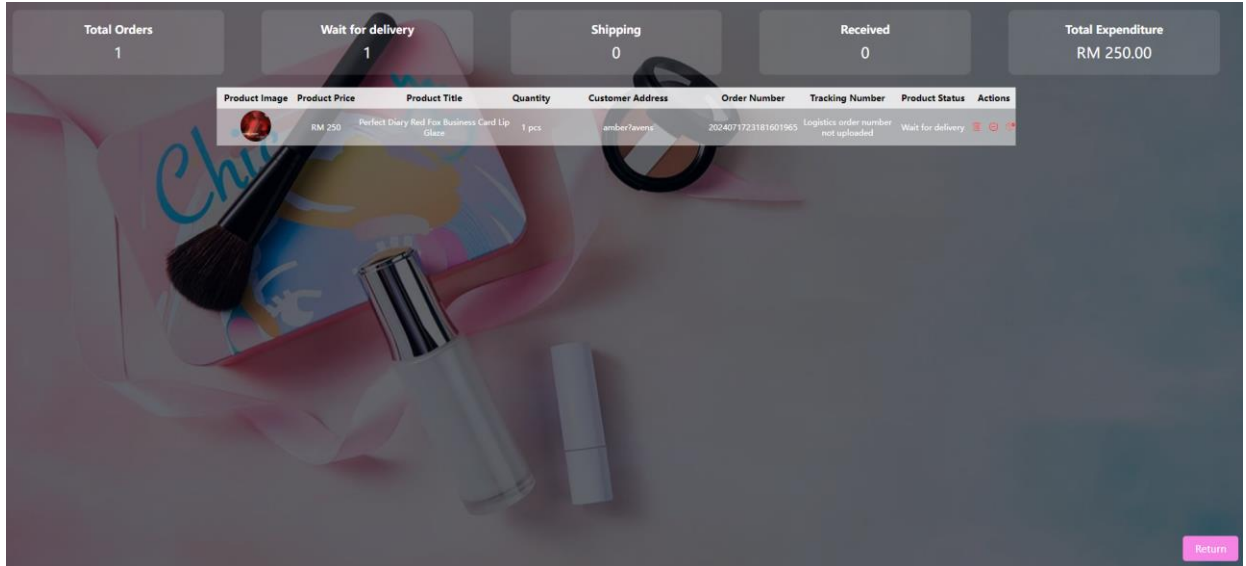






Figure 13 Order receipt(edit)

By clicking Personal Orders in the navigation bar shown in Figure 2, you can view all orders that have been paid and processed, including personal information statistics such as the total order quantity and amount, as shown in Figure 14.



Product Image	Product Price	Product Title	Quantity	Customer Address	Order Number	Tracking Number	Product Status	Actions
	RM 250	Perfect Diary Red Fox Business Card Lip Glaze	1 pcs	amber7evens	2024071723181601965	Logistics order number not uploaded	Wait for delivery	  

Summary statistics: Total Orders: 1, Wait for delivery: 1, Shipping: 0, Received: 0, Total Expenditure: RM 250.00

Figure 14 Personal Orders Page

Select Virtual Makeup Trial in the navigation bar shown in Figure 2 to enter the page shown in Figure 15. The user can select and upload a picture or take a photo and upload it. After uploading, select a color, and the system will return the picture after the virtual makeup trial.

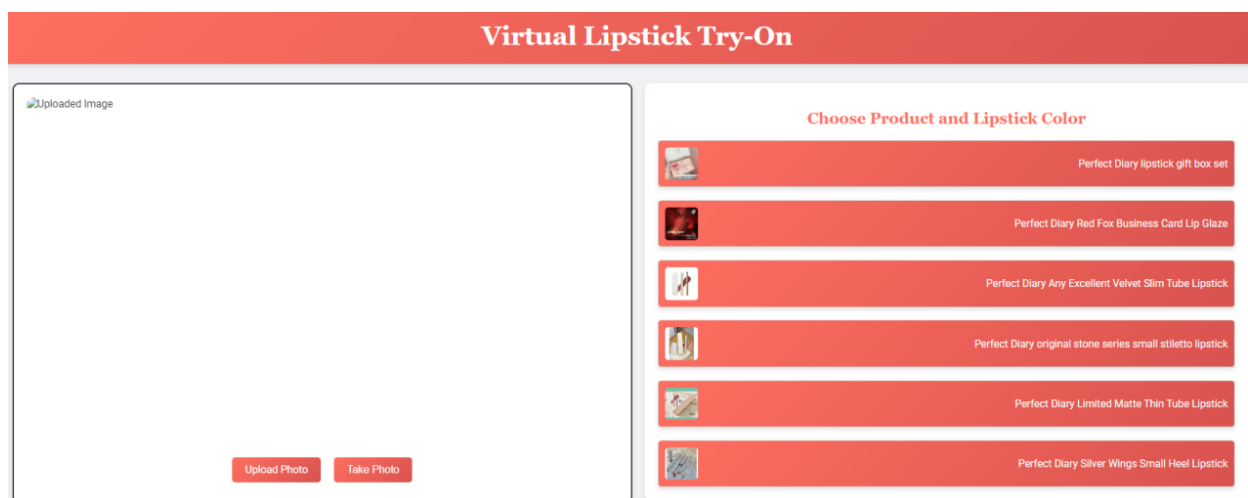


Figure 15 Virtual Makeup Trial Interface

After logging in with the administrator account and password, the system will jump to the administrator main interface as shown in Figure 16.

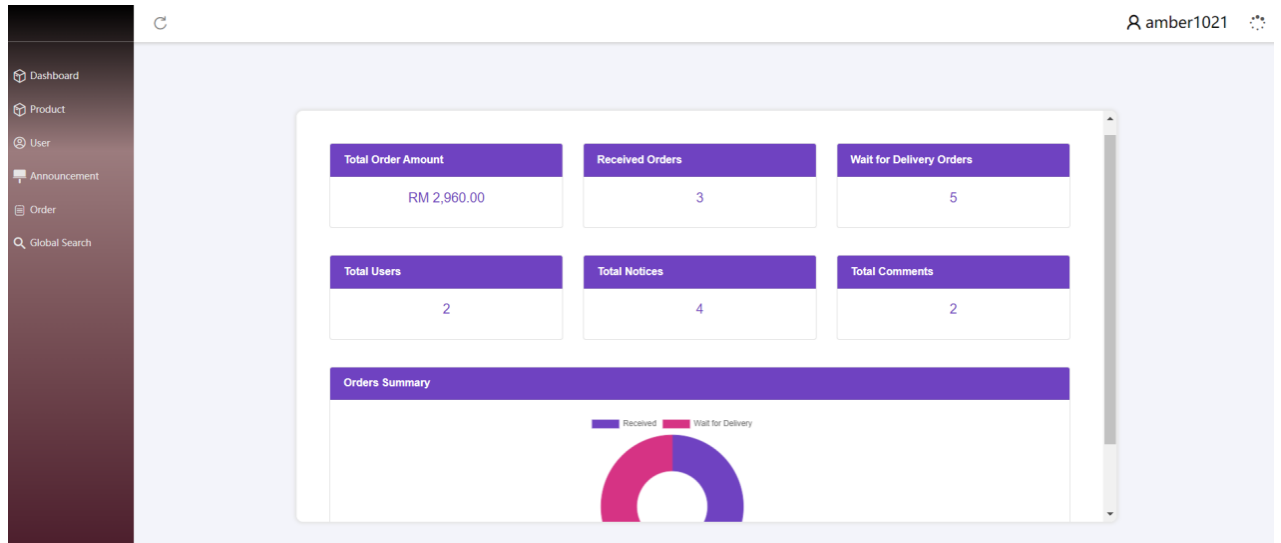


Figure 16 administrator main interface

Selecting Product Management in the administrator main interface shown in Figure 11 will jump to the product management page shown in Figure 17. The administrator can add/modify/delete/remove this product through this page.

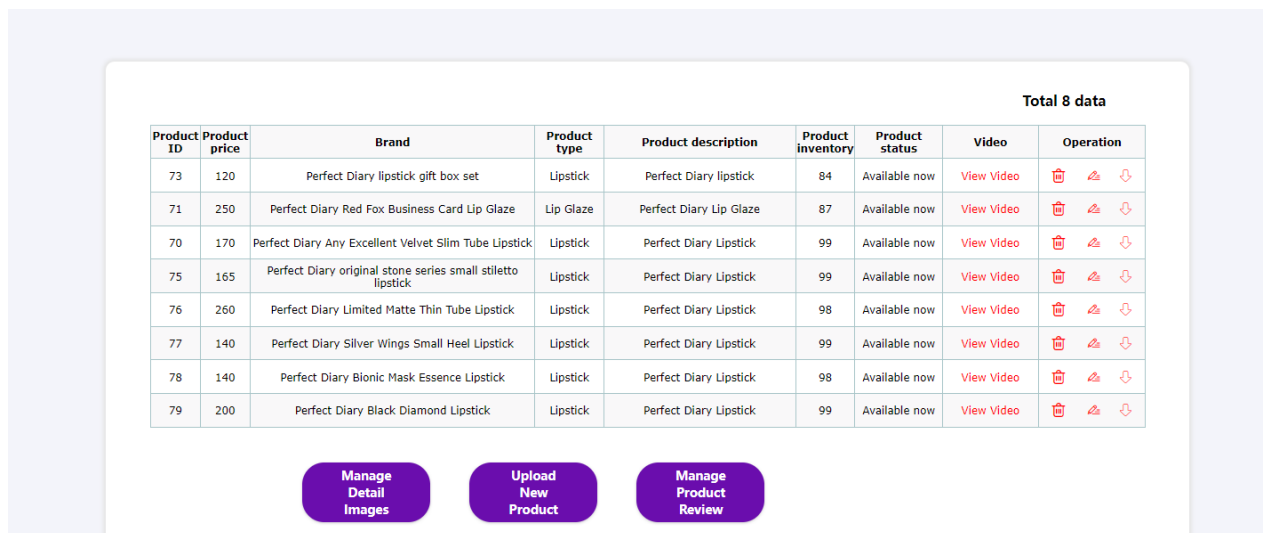
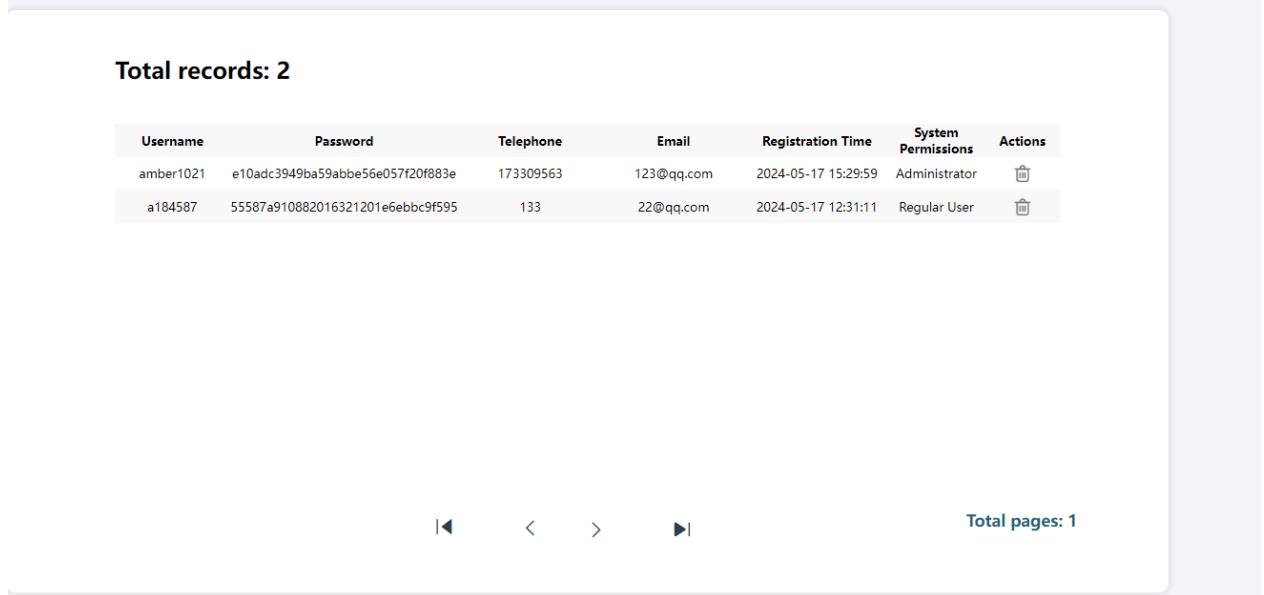


Figure 17 product management page

Selecting User Management in the administrator main interface shown in Figure 11 will jump to the User Management page shown in Figure 18, where the administrator can manage users of the system.



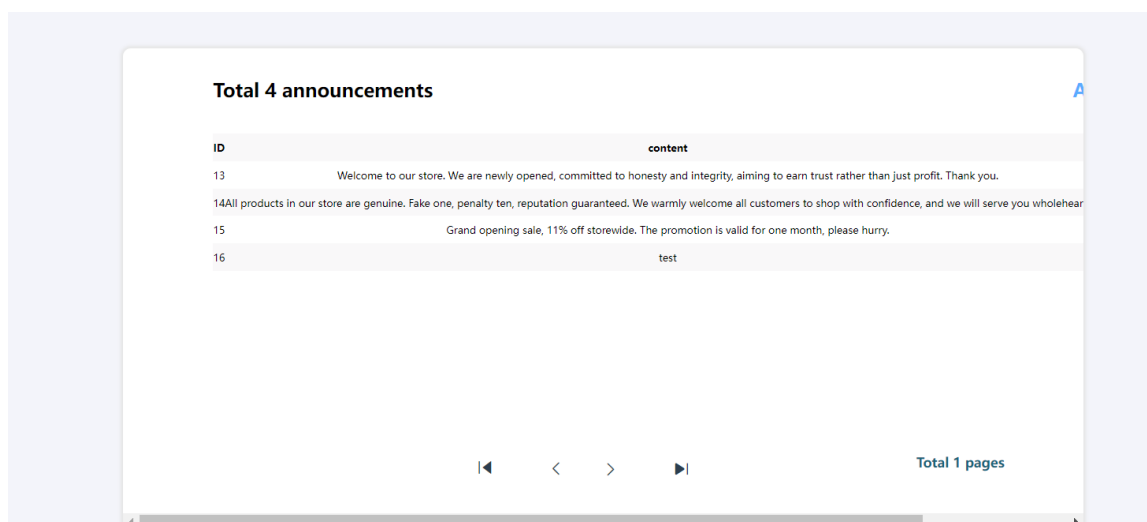
**Total records: 2**

Username	Password	Telephone	Email	Registration Time	System Permissions	Actions
amber1021	e10adc3949ba59abbe56e057f20f883e	173309563	123@qq.com	2024-05-17 15:29:59	Administrator	
a184587	55587a910882016321201e6ebbc9f595	133	22@qq.com	2024-05-17 12:31:11	Regular User	

Navigation: Total pages: 1

Figure 18 User Management

Selecting Announcement Management in the administrator main interface shown in Figure 11 will jump to the Announcement Management page shown in Figure 19, where the administrator can manage announcements for this system.






















**Total 4 announcements**

ID	content
13	Welcome to our store. We are newly opened, committed to honesty and integrity, aiming to earn trust rather than just profit. Thank you.
14	All products in our store are genuine. Fake one, penalty ten, reputation guaranteed. We warmly welcome all customers to shop with confidence, and we will serve you wholeheartedly.
15	Grand opening sale, 11% off storewide. The promotion is valid for one month, please hurry.
16	test

Navigation: Total 1 pages

Figure 19 Announcement Management

Selecting Order Management in the administrator's main interface shown in Figure 11 will jump to the Order Management page shown in Figure 20. The administrator can use this page to manage the user's order, ship the order and upload the tracking number, or cancel the order.

Total 11 orders									
Product Image	Customer	Price	Product Title	Customer Address	Quantity	Order Number	Tracking Number	Order Status	Actions
	a184587	250	Perfect Diary Red Fox Business Card Lip Glaze	amber, avens	1	2024071109054116292	Tracking number not uploaded	Wait for delivery	 
	a184587	120	Perfect Diary lipstick gift box set	amber, avens	1	2024071022314295050	Tracking number not uploaded	Wait for delivery	 
	a184587	600	Perfect Diary lipstick gift box set	amber, avens	5	2024071109051965786	Tracking number not uploaded	Wait for delivery	 
	a184587	500	Perfect Diary Red Fox Business Card Lip Glaze	amber, avens	2	2024071022304926707	Tracking number not uploaded	Wait for delivery	 
	a184587	240	Perfect Diary lipstick gift box set	amber, avens	2	2024070920133864309	Tracking number not uploaded	Wait for delivery	 
	a184587	250	Perfect Diary Red Fox Business Card Lip Glaze	avens	1	2024062221594808896	123456	received	
	a184587	240	Perfect Diary lipstick gift box set	avens	2	2024062216573113787	Order cancelled by buyer	Cancelled	

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Figure 20 Users Orders Management

Selecting global search in the administrator's main interface shown in Figure 11 will jump to the product global search shown in Figure 21. The administrator can use this page to search all orders and products in the system and can search by any keyword or date, which provides convenience for the administrator.

Search Products
Product Search   User Query   Announcement Search   Order Query   Comment Query

**Product ID:**

**Product Title:**

**Product Price:**

**Product Inventory:**

**Release Date:**

Announcements matching search criteria, total of records.

Product ID	Product Title	Product Price	Product Inventory	Release Date

Figure 21 Global Search



## Usability Testing

This report provides a comprehensive overview of the usability testing conducted on the "E-GlamourMall" application. The application aims to offer a seamless shopping experience with features like product browsing, virtual try-ons, and efficient administrative functionalities. The purpose of this testing is to ensure that the application not only meets the functional requirements but also delivers a user-friendly and secure environment for its customers and administrators.

The primary objectives of this usability testing are as follows:

- Functionality Verification:** To ensure that all features of the application function as intended without errors.
- User Experience Enhancement:** To assess and enhance the navigational and operational aspects of the application to ensure ease of use.
- Performance Evaluation:** To measure the application's performance under various conditions to ensure it remains responsive and stable.
- Security Assessment:** To verify that the application adheres to the required security standards, protecting user data from unauthorized access.

The methodology adopted for this usability testing involved a structured approach comprising several key activities:

- Test Planning:** Defining the scope, objectives, and timelines for the testing activities.
- Test Case Development:** Creating detailed test cases for each feature based on their functional and non-functional requirements.
- Execution of Test Cases:** Conducting tests according to the predefined test scenarios and recording the outcomes.
- Issue Documentation:** Logging any deviations from expected results along with detailed issue reports.
- Analysis and Reporting:** Analyzing the test results to identify trends, issues, and areas for improvement.

Participants in the testing process included both potential end-users and professional testers who were asked to perform a series of tasks while observers recorded their interactions with the application. This setup helped to gather valuable insights into user behavior and application performance in real-world scenarios.

Test Case ID	Feature ID	Test Case Description	Objective	Result	Score	Comments
TC-001-001	FD-01	User Registration (customer)	Verify that a user can successfully register	Passed	95/100	Registration process is efficient
TC-002-001	FD-02	User Login (customer)	Verify that the user can successfully log in as a customer	Passed	92/100	Login smooth, minor profile load delay
TC-002-002	FD-02	User Login (Admin)	Verify that the user can successfully log in as an administrator	Passed	90/100	Admin access tested and functional
TC-003-001	FD-03	User Logout	Verify that a user can successfully log out	Passed	98/100	Logout secure and quick

<b>Test Case ID</b>	<b>Feature ID</b>	<b>Test Case Description</b>	<b>Objective</b>	<b>Result</b>	<b>Score</b>	<b>Comments</b>
TC-004-001	FD-04	Modify Personal Information	Verify that a user can successfully modify their personal information	Passed	93/100	Clear options, needs more instructions
TC-005-001	FD-05	Search and Filter Products	Verify that a user can successfully search and filter products	Passed	89/100	Effective search, filters need labels
TC-006-001	FD-06	View Product Details	Verify that a user can successfully view product details	Passed	94/100	Detailed info, slow image load on slow connections
TC-007-001	FD-07	Add to Cart	Verify that a user can add a product to their cart and manage cart items	Passed	91/100	Cart functionality robust

<b>Test Case ID</b>	<b>Feature ID</b>	<b>Test Case Description</b>	<b>Objective</b>	<b>Result</b>	<b>Score</b>	<b>Comments</b>
TC-008-001	FD-08	Checkout and Payment	Verify that a user can check out and make a payment	Passed	88/100	Checkout smooth, payment integration tested
TC-009-001	FD-09	View Orders	Verify that a user can view their orders	Passed	85/100	Order viewing functional
TC-010-001	FD-010	Comment on a Product	Verify that users can comment on a product	Passed	87/100	Comment system works, minor lags reported
TC-011-001	FD-011	View Mall Announcements	Verify that users can view the latest mall announcements	Passed	90/100	Announcements up-to-date and visible
TC-012-001	FD-012	Virtual Lipstick Try-On	Verify that users can use the virtual lipstick try-on feature	Passed	92/100	VR feature engaging and responsive
TC-013-001	FD-013	Manage users (Admin)	Verify that the admin can view and delete users	Passed	94/100	Admin tools for user management effective

Test Case ID	Feature ID	Test Case Description	Objective	Result	Score	Comments
TC-014-001	FD-014	Manage products (Admin)	Verify that the admin can view, edit, delete, and manage product details	Passed	91/100	Product management interface intuitive
TC-015-001	FD-015	Manage Orders (Admin)	Verify that the admin can view, delete, and ship orders	Passed	89/100	Order management streamlined
TC-016-001	FD-016	Manage announcement (Admin)	Verify that the admin can add and delete announcements	Passed	88/100	Announcement management functional
TC-017-001	FD-017	Global Search (Admin)	Verify that the admin can search for products, users, announcements, orders, and comments	Passed	90/100	Global search comprehensive

Table 1 Test Case Summary

The usability testing for "E-GlamourMall" has confirmed that the application performs effectively across all major functionalities with minor areas identified for improvement. The application demonstrates strong performance in both customer-facing and administrative features. Future updates should focus on enhancing user interface elements and optimizing performance to further improve user satisfaction and operational efficiency.

### **Suggestions for improvement**

Improvements are suggested to enhance the system in the future:

- i. Enhanced Security Protocols: Implementing more robust encryption and security audits to protect user data.
- ii. Improved Third-Party Integration: Ensuring smoother integration with payment gateways and other services to enhance user experience.

## **CONCLUSION**

This section discusses the overall conclusions from the development process of the "E-GlamourMall" platform. This project has been designed with the aim of enhancing the shopping experience for cosmetics, focusing on user-friendliness and support for emerging Chinese brands. Key requirements and critical information were identified before the development process to ensure the project could be executed smoothly and meet user needs.

### **Strengths of System**

The developed system has several identified strengths that enhance the functionality and user experience:

- i. User-Friendly Interface: The platform is easy to navigate, making it accessible for beginners and those with social anxiety.
- ii. VR Try-On Technology: This feature allows users to virtually try on products, aiding in their purchase decisions.

### **Limitations of System**

The system also has some limitations that were identified during its development:

- i. Security Challenges: The handling of sensitive user data requires stronger security measures to ensure privacy and trust.
- ii. Integration with Third-Party Services: There are occasional issues with third-party integration, which can affect the overall system performance.

### **ACKNOWLEDGEMENTS**

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