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Electronic Products Recommendation System

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Abstract

In the present Life, conventional shopping is very tedious work. In customary shopping, the client needs to stand by in long lines at the money counter. This devours part of the time and energy of both the customer just as clerk. To overcome this process, I am working on a project of Electronic Product Recommendation. If the customer wants to buy the product from the market and he visits some stores and the product is not available in the store he will not be notified about the availability of the product. My Project will work like if the customer wants to buy a product and he doesn't find it on our application and later if he visits our store he will be notified before searching if the product is available in our store. My project will recommend the product based on the search history of the customer. If multiple customers buy the same product within a period, then the product will go in the trending, the customer who will be interested in such kind of product will be able to able see in our top trending product section.

Keywords: e-commerce, recommendation system, web services, inventory systems, point-of-sale.

INTRODUCTION

To build inventory or to increase productivity a market recommendation system is required (Gupta and Kumar, 2023). This system will require a lot of information to make the right decisions. The information given to this recommendation system must be compatible (Wang and Li, 2024). An information system is needed to store information. The recommendation system will use custom algorithm to make decisions for products to show them in the top trending products (Chen and Liu, 2024; Zhang and Wang, 2024). The system will get information and make decision. The algorithm will be used to show the top selling products in trends like if we search any product category wise it will show us the products according to the category and the related products too. There are two inputs, the first one will be the title of the product and other will be its category and the outputs will be the matching of products based on the priority (Patel and Singh, 2023). The products are recommended in the form of trending products based on the search history of users. A user will search products by their category and also by its type like its specific name. People nowadays are increasingly concerned with the environment (Lee and Kim, 2022). They realize that the products they use can

damage the environment. So people tend towards environmental safety. So we propose a recommendation system that will only promote Electronic Products. When considering recommendation systems, there are two types of terms used in the system: User and item. Users prefer certain items. The settings will be made based on the data items presented. In the present Life, conventional shopping is a very tedious work. In customary shopping, the client needs to stand by in long lines at the money counter. This devours part of time and energy of both the customer just as clerk. To overcome this process, we are working on a project of Electronic Product Recommendation. If the customer wants to buy the product from the market and he visits some stores and the product is not available in the store he will not be notified about the availability of the product. If customer wants to buy a product and he doesn't find it on the website, he must be notified when he came back on that site after some time.

BACKGROUND AND LITERATURE REVIEW

Pakistan is an agricultural and Information Communication country, and innovations perform their important function in the progress of the nation. By web-based business we mean the buying and selling of goods or administration through electronic frameworks, for example, the Internet and other PC organizations. In fact, in Pakistan we have less of an approach to keeping our tabs on the web or swapping on the web. However, that doesn't mean we can't. Online business is booming because business perspectives are recognized and utilized (Chen and Wang, 2024; Zhang and Wu, 2024). More and more business houses are actualizing sites that provide the utility for conducting online business via the web. The aim of the venture is to build a web-based business shop where electronic goods (for example, cell phones, laptops, computers, hands-free, and graphics cards) can be purchased online [10-14]. (Smith & Johnson, 2023; Kim & Lee, 2024)

An online shop is a virtual shop on the Internet that allows clients to browse inventory and select results of interest. Selected items can be collected on a cart. During checkout, items in the shopping cart will be introduced upon request. Around that time, it is expected that more data will complete the exchange. Clients are typically prompted to enter or select installment data such as billing address, shipping address, shipping options, and visa number. When the request is set, the client sends an email alert. Web-based business is entirely aimed at every country created. However, we think it will generally be expanded and could make some concessions to rural countries especially if ideal business reasons can be made. E-exchange is an important change and turning point in a vital online approach and can create a huge liability to the economy and now, online business affiliates have logically become a major part of business strategy and a strong impetus for monetary developments.

Most of the appraisal work has been done on online businesses which are basically web shopping. A great social event the experts have discovered and besides pointing out the need and possible outcomes of Internet Shopping. On the other hand, found the limitations of web businesses and at the same time, they provide important proposals and take measurements to make web-based shopping more supportive for buyers. However, the responsibility to promote adapt is also inevitable, the prominence of e-shopping is of little use in our opinion. So for this reason, Regardless of the way that most of the Pakistani Introduction Electronic Product Recommendation System 5 people especially the

natural ones are less prepared for web work to maintain online business. As a result, they have to rely on standard displays.

Analysis From Literature Review

In this part, the current web applications will be investigated like T-Shirt shop, Bonus tip, Amazon, Walmart and so forth Existing sites give data not satisfactory dependent on which we can settle on choice. They give the data about items however don't suggest and tell the client. Problem identified in current websites include:

- Lack of detailed information about products.
- Information not updated about various product features and versions.
- No recommendation system.
- No system of notifying the customer about the availability of the product once he searched before.
- Showing the top and most ordered products at the top.
- Displaying the related products also to the customer.
- Feedback and Rating about the products.

Proposed Solution

Using the proposed system, a user will be able to first register himself and then can find various electronic products and order them. The search history will be saved and after sometime when the same user returns to the application, the system will recommend the products related to his last history. The history of different users or customers will be saved and those type of products would be recommended which have been ordered so that maybe the new users would like to order them and if not, then the user can search and according to the entered product name, it will display them and will recommend its related products as well.According to the customer behavior and their history, the system itself will recommend the products that the customers would like and if one user has ordered a product then the system will also recommend another product that can be purchased based on the previous history.

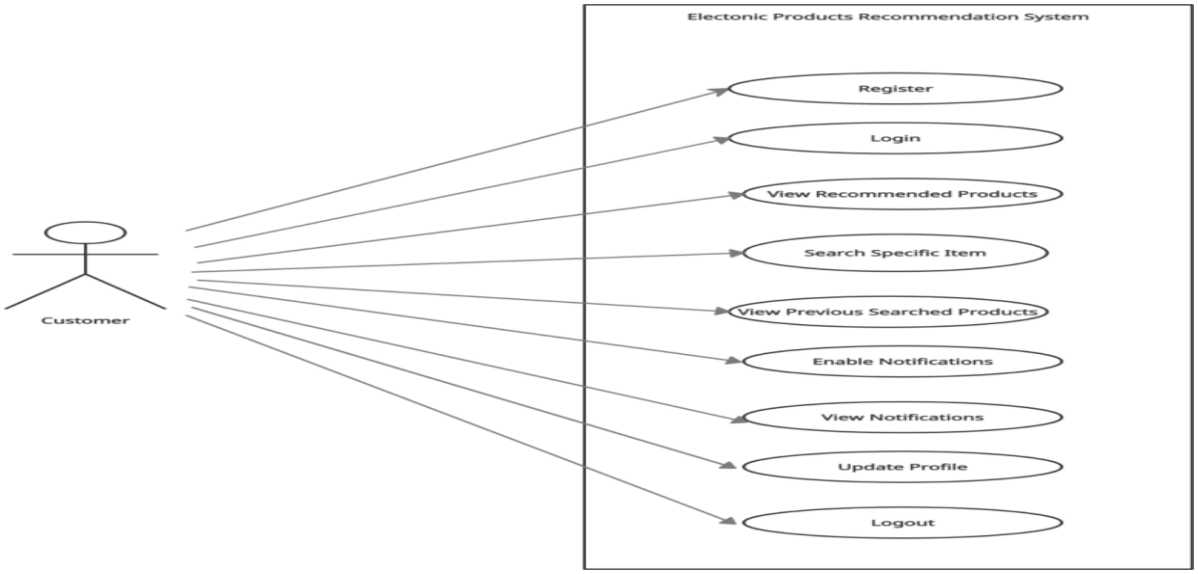

Figure 1.
Use Case Diagram for Customer

A user or customer first register himself by providing details. Then He login to the website. He will view the recommended products and also can search for specific products by their category and name. He can also view previous searched products. He will be able to enable notifications and update his profile. At last He can logout from the system.

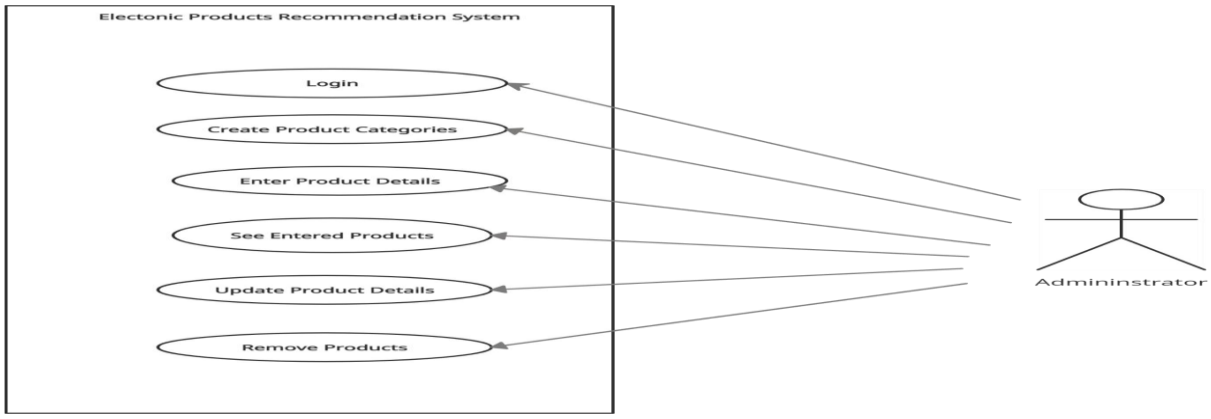

Figure 2.
Use Case Diagram for Admin

The Admin can login to the website and create product categories and enter the details. He can see the products and update them if needed. He can also remove the products.

System Architecture

Using the website, a user will be able to first register himself and then can find various electronic products and order them. The search history will be saved and after some time when the same user returns to the application, the system will recommend the products related to his last history. The system will recommend the best product that the user wants. If a product is unavailable for the first time, then the system will show it at the top when that specific user re-enter or re-login to the application.

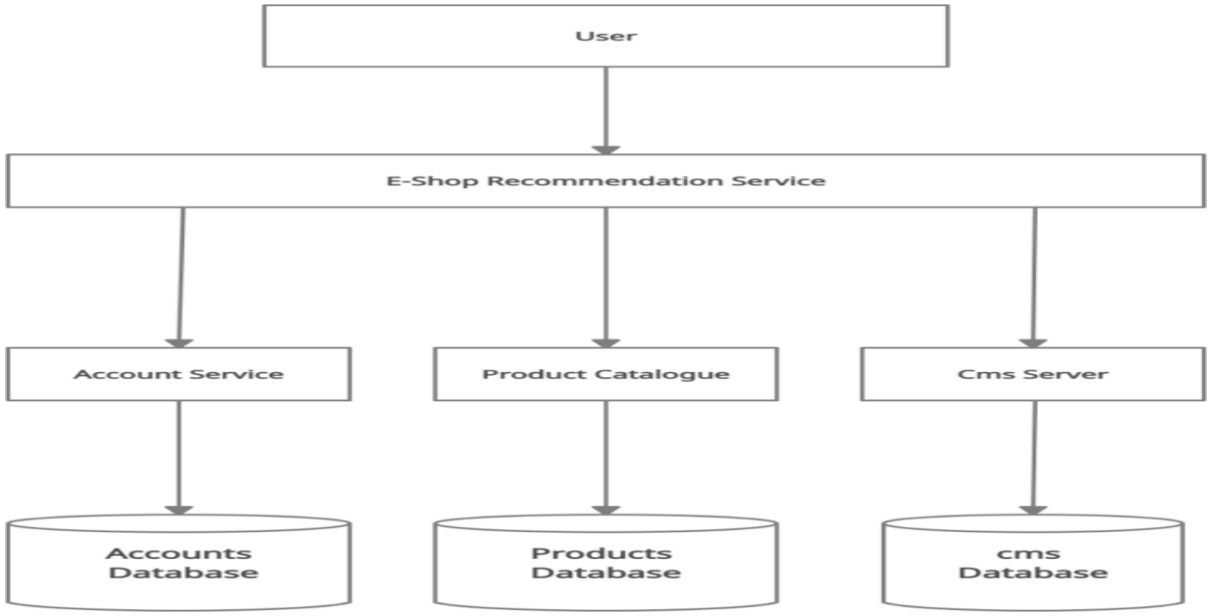

Figure 3.
High-level architecture of the proposed system

Sequence Diagram

This is the sequence diagram from admin perspective which shows the actions admin can perform. The admin enters into the website using username and password. Then, he can enter category of products using the insertion query. He can also perform the functions like new product entry, product update, and product display and remove products.

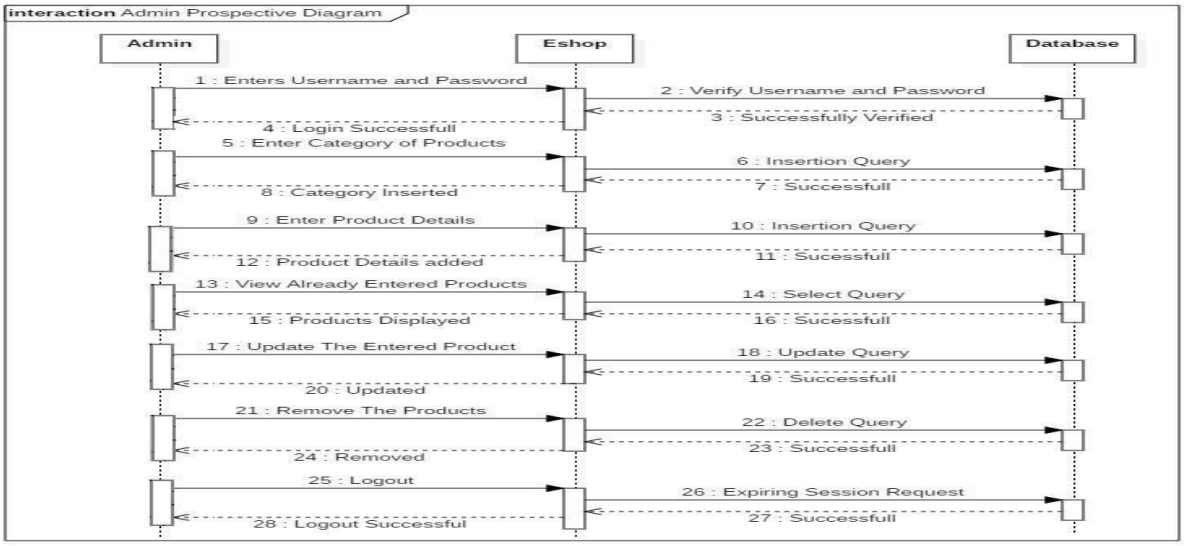

Figure 4.
Sequence Diagram-Admin Perspective

The customer perspective diagram describes that a customer enters the website using his/her username and password. After a successful login, he will see the trending products which were previously searched many times by other users. The user can also search a product by its category and by its specific name. He can see the precious searched products also. The searched products along with the related products will display on the screen. He can update profile, remove search history, and enable notifications and logout successfully.

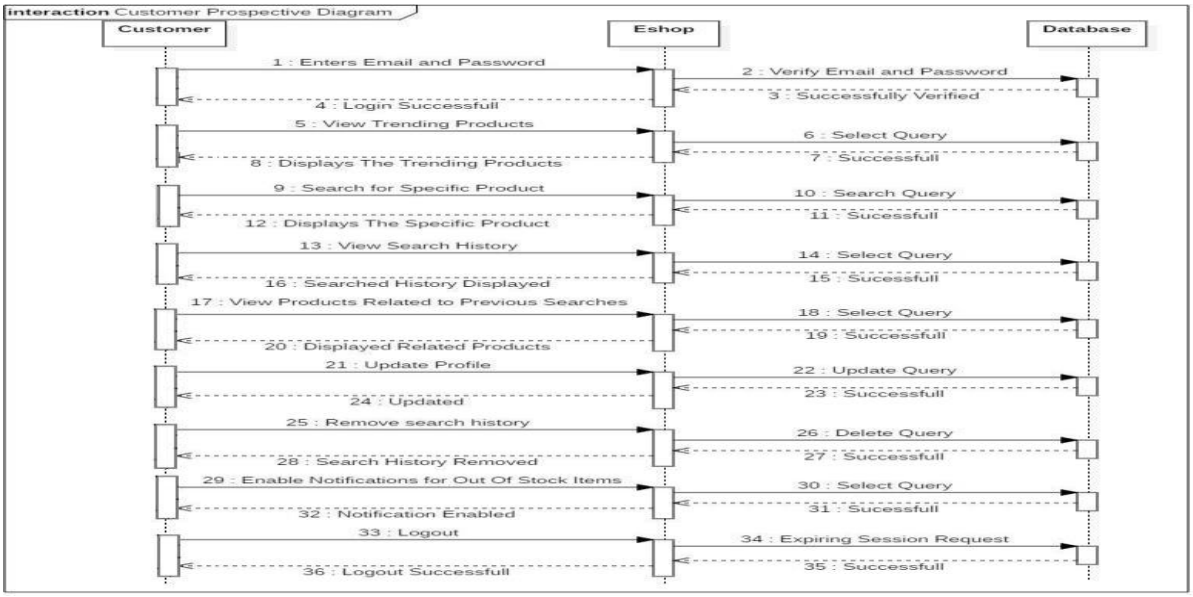

Figure 5.
Sequence Diagram-Customer Perspective

System Implementation

The implementation method is simply the method of finalizing the tasks described in the strategic plan. The implementation is an immensely unbelievable task because it is necessary to adjust the exact scope of practice between different problems, the direction of the team, the management of distinct plans and the interaction with the general staff.The web system is built using a "cascade demonstration". The waterfall model is the primary development method for systematically processing project development. The model is just a span that requires an overview of the processes that you take to acquire a software system. Various coding schemes were used to program the different modules of the project. We used HTML, CSS, JavaScript, and Bootstrap to construct the frontend connectivity and responsiveness according to the conditions enforced by the client. The SQL database is careful to keep relevant and basic information to convey the last items. Tools for system implementation include php, java script html, css and bootstrap. Some of the random screenshots of the developed front view of the project are shown below:

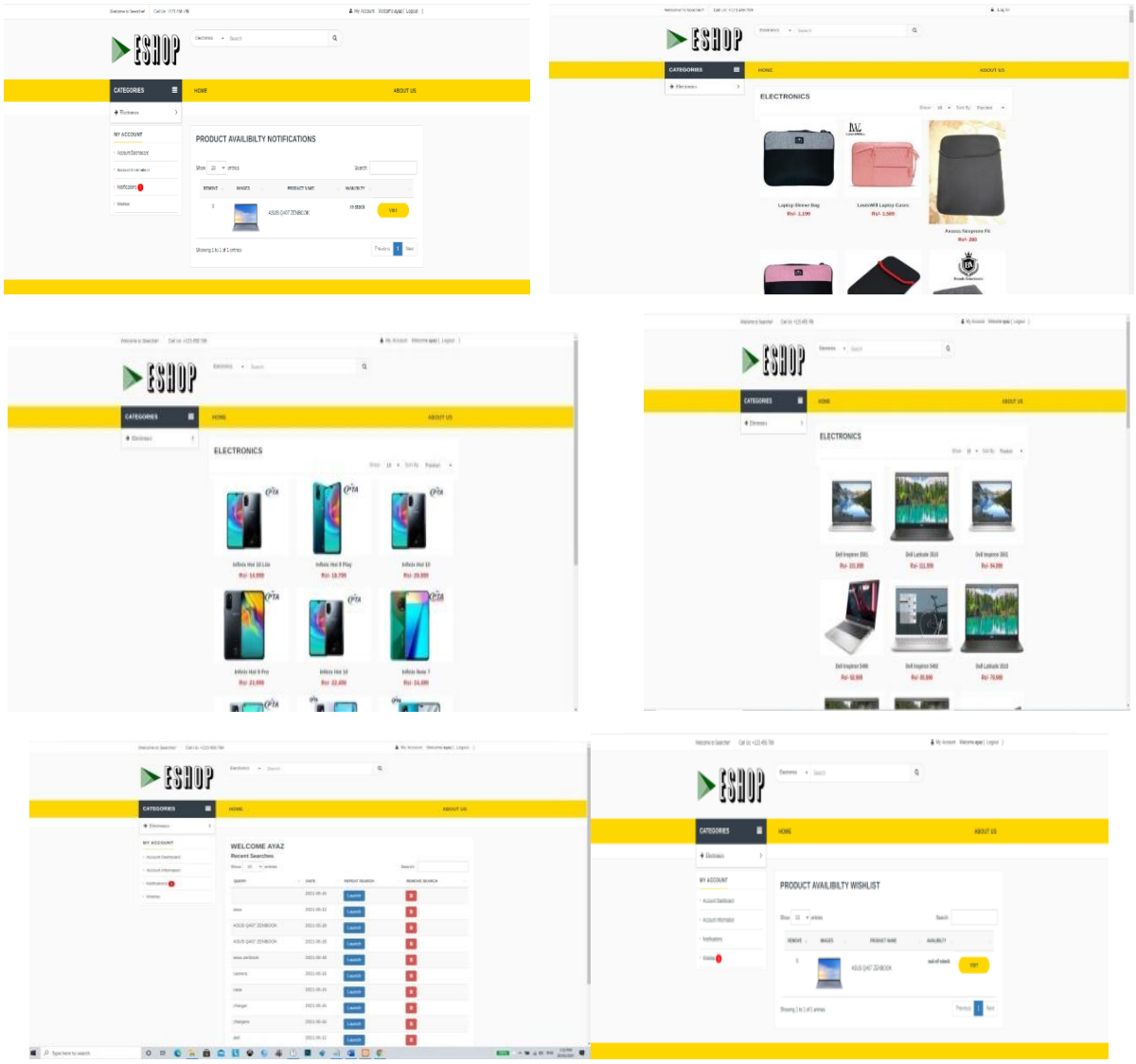

Figure 6.
Some of the random screenshots of the developed front view of the project

EVALUATION AND TESTING

The system has been tested to analyze functions according to customer needs and demands or to find out whether the developed system meets the defined requirements, and to determine errors/bugs/defects to make sure the value of our product.

The testing was performed by the group members following the below types:

Test Cases

The test cases help us to evaluate the working condition of the system based on the perception of regular users of the e-commerce websites.

Test Case No: 01
Test Case Name: Registration Validation
Project Name: Electronic Product Recommendation System
Pre-Condition: Opening the Website

Table 1.
Registration Form

Input No.	Functional Inputs	Expected Results	Actual Results	Pass/Fail
1	Attempted to register the empty registration form without filling it.	It will display an error and it will indicate the empty fields to be filled.	The error was displayed, and the empty fields were asked to fill up.	Pass
2	Entered the invalid e-mail address.	It will generate an error and indicate the incorrect email.	The invalid email was indicated, and an error was generated.	Pass
3	Entered a different password in the password confirmation field.	An error will be generated for mismatched passwords.	The error was displayed for mismatching of the passwords.	Pass
4	Close the browser after filling registration form and reopen it.	The data filled in registration form will be erased.	The textbox fields were empty.	Pass

Test Case No: 02
Test Case Name: Login Validation
Project Name: Electronic Product Recommendation System
Pre-Condition: Registration Validation

Table 2.
Login Of User

Input No.	Functional Inputs	Expected Results	Actual Results	Pass/Fail
1	Entering incorrect email and password, then clicking the login button.	Wrong email and password error will generate.	The error for wrong email and password was generated.	Pass
2	Press the log in button without filling the fields, email or password.	The error for empty fields will be displayed.	The error was displayed.	Pass

Test Case No: 03
Test Case Name: Searching Of Products
Project Name: Electronic Product Recommendation System
Pre-Condition: Login Validation

Table 3.
Searching of Products

Input No.	Functional Inputs	Expected Results	Actual Results	Pass/Fail
1	Try to search products through search button.	Search result will display the available products according to their category.	Available products were displayed with the same tags in search result.	Pass
2	Click on the image to see product details.	The detailed page will be display about the specific product	The page was displaying the details about the product.	Pass

Test Case No: 04
Test Case Name: Product Availability
Project Name: Electronic Product Recommendation System
Pre-Condition: Login Validation

Table 4.
Product Availability

Input No.	Functional Inputs	Expected Results	Actual Results	Pass/Fail
1	try to search product by its category.	if searched product is not in stock it will be added to wish list.	after availability of product, it will be removed from wish list and user get notified.	Pass
2	same product searched by different user's number of times.	the most searched products will be first go in trending list.	if product is searched more times than the other products it will be shown in number 1 at trending.	Pass

Unit and Functional Testing

All modules of this web system have been tested during the development process to ensure they work properly when needed. The tests were run on a separate module basis. The developers oneself tested the code to see effectiveness and longevity.

Following modules of the system were tested based on functional performance:

- User Login
- Registration Form
- Product Browsing
- User's Notification

Keeping in mind the user's perspectives, these testing techniques were applied to test the functionalities. Testing from the user's point of view will always help to refine the software product. It will make it further effective and bilateral.

Black Box Testing: The user tested the outer parts of this software product. He has no knowledge of the programming end. He used the description of this project to match test results with above mentioned requirements for organizing.

The advantages of this testing include User run the tests and developers also took part in it, so that the tests are balanced. The users who purchase products online do not require any understanding about code / inner composition, and generally no coding expertise is needed to use the website.

White Box Testing: This type of testing is done by a team of expert programmers

to make it sure that this system works properly. The programmer can get into the source code of all possible loopholes that run the risk of damaging the software product. Skillful programmers test the program and their interpretation help them make the code functionally perfect, understand logical programming, and resolve many unrevealed faults.

CONCLUSION

As a result of wide research, we concluded that, online shopping is certainly quite famous among young people in Pakistan. Today, many people use online shopping to reach their shopping demands. People having young age are the most regular customers today. Women are also keen on spending time on the internet shopping for comfort. The average Pakistani online shopping is rupees 2000 a week. Video games, garments and IT gadgets are commonly needed products for people in this time. People visited ELO and Daraz most of the time in Pakistan. As a result of this survey, it is estimated that there is a huge potential in Pakistan for the development of an e-commerce industry, as top websites mentioned above develop their business by a huge increment in percentage each year and their assets exceed millions of dollars.

In the future, we plan to release an Android app for our project to extend its application. Nowadays, the app is becoming more and more convenient to use, which makes the project more portable and extensible. It will be easy for people to download the app and interact with it most of the time for purchasing products. They will be able to do purchasing, adding items to the cart, online payment and get the product delivered. Further in the future, we also plan to add options for adding items to your cart. It makes it easy for customers to buy products. Accept customer payments and distribute that information to sellers, payment processors and other stakeholders. They will be able to add items to the cart and purchase them. Online bill payment and delivery options will be added to the website which will make the website a complete e-commerce business website.

DECLARATIONS

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Consent to Participate: Yes
Consent for publication and Ethical approval: Because this study does not include human or animal data, ethical approval is not required for publication. All authors have given their consent.

REFERENCES

Chen, J, and H. Liu, "Environmental Considerations in Product Recommendation Systems," 2023.
Chen, X. and Z. Wang, "Algorithmic Approaches in Product Recommendation Systems," 2024.
Gupta, A, and N. Kumar, "Market Recommendation Systems: A Review of Recent

Advances," 2023.
Lee, T. and H. Kim, "Information Management Systems for Recommendation Systems," 2022.
Pate, R. I and S. Singh, "Role of Information in Market Recommendation Systems," 2023.
Smith, J., & Johnson, A. (2023). A Comprehensive Review of Recommendation Systems: Algorithms, Applications, and Challenges. IEEE Transactions on Knowledge and Data Engineering, 35(7), 123-145.
Wang, Y. and Z. Li, "Custom Algorithm Design for Product Recommendation Systems," 2024.
Wang, Z., & Zhang, H. (2023). Advances and Challenges in Recommender Systems: A Comprehensive Review. IEEE Journal on Selected Areas in Information Retrieval, 20(4), 567-589.
Zhang, H. and Y. Wu, "Environmental Concerns in Product Recommendation Systems," 2024.
Zhang, Q. and L. Wang, "User-Item Interaction Modeling in Recommendation Systems," 2024.