



PANDA MALL

Functional Specifications and Methodology

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1. Introduction

During the COVID-19 pandemic online apparel shopping stores, in Pakistan, have grown exponentially in number. One major challenge for customers is that at any given time there are hundreds of stores to buy from, which makes shopping a tedious task. With advancement in machine learning and data science, an obvious solution is a recommendation system which assist the buyers in decision similar to how Netflix [2] provides a recommendation system for its subscribers to choose the best movies.

The goal of this project is to develop an automated system that can scrape and collect data on clothing products, then optimize and analyze it using Artificial Intelligence and Data Science to make recommendations based on user preferences and purchase history.

Our primary focus will be on gathering data by registration or automatic scraping, processing the data, and displaying the recommendations in a user-friendly online interface.

We will also keep track of each user's previous purchases in order to improve over time.

1.1 Purpose of this Document

This document's goal is to provide a comprehensive overview of the project. The paper will serve as a guide for the development team in terms of what should be executed. This would also clarify all of the project's functional and non-functional requirements. The document would contain a thorough description of the use cases as well as the system architecture. In addition, some insight into how the system would look in its final form. The database specifies what information must be stored in order to operate the system. This article also includes information on the hardware and software requirements.

1.2 Intended Audience

The intended audience of Panda Mall are the clothing brand owners and online shoppers of clothing products. The aim is to facilitate both shoppers and brands to get the experience of a shopping mall online.

1.3 Definitions, Acronyms, and Abbreviations

Panda Mall: Name of the product

Product: A fashion product for sale from a specific brand

Store: A seller registered on Panda Mall to sell products

Filters: A parameter to narrow down choices of products

2. General Description

2.1 User Characteristics

The End Users are classified into two groups namely the Administrator and Vendor/Store owners. The General Users will be publicly everyone. The Administrator will approve/reject products and can edit the products as well. The Store owner will register themselves to our website first. Then they will be able to add, update, view and remove products. The General Users can register themselves by creating a new account. They can buy products on the profile-based recommendations and also by using specific filters provided. They can also maintain their profile and manage brands in their favorites section.

2.2 Domain Overview

Panda Mall aims to ease the tedious task of web surfing and scrolling social media pages just to find the right product for purchase. Studies [1] show that this problem of “choice-overload” can be “detrimental” and lead to indecision, unsatisfactory experience.

Panda Mall website will be Artificially Intelligent (AI) based which uses a content-based Recommendation System (RS) model to filter out a manageable few best option to buy from, for a customer, based on their preferences, purchase history and feedback. Data about brands and products will be obtained from:

- i. Websites of brands directly.
- ii. Registration at Panda Mall.

The results obtained from the model will be presented in a simplified web interface along with all the necessary information for customers to make a buying decision with ease

3. Functionality

3.1 Functional Requirements

3.1.1 Functional requirements for Users

- System will allow user to login by authenticating user login credentials.
- System will allow user to create a new account by providing required information.
- System will allow user to reset password via email.
- System will allow user to logout.
- System will allow user to edit profile.
- System will display clothing products based on user's profile.
- System will allow user to filter out products based on Type.
- System will allow user to filter out products based on Sizes.
- System will allow user to filter out products based on Colors.
- System will allow user to filter out products based on Waists.
- System will allow user to filter out products based on Price Range.
- System will allow user to filter out products based on Discount factor.
- System will allow user to filter out products based on Brands.
- System will allow user to view selected product details.
- System will allow user to buy product by redirecting to respected page.
- System will allow user to add products to favorites.
- System will allow user to give feedback on the product bought.

3.1.2 Functional requirements for Administrators

- Administrators can approve/reject products.
- Administrators can update products.
- Administrators can view products.

3.1.3 Functional requirements for Stores

- Stores can add products.
- Stores can update products.
- Stores can view products.
- Stores can remove products.

3.2 Non-Functional Requirements

3.2.1 Availability

System will be available for the users for at-least 160 hours a week.

3.2.2 Usability

System will have an intuitive design.

- Our system interface will be easy to learn and user interactive. A rookie will require at-most 5 seconds to learn the interface.

3.2.3 Reliability

System will show the result of the desired filter within 3 seconds.

3.2.4 Scalability

System will ensure there will be no significant performance degrade for at-most 100 users.

3.2.5 Data Integrity

System will ensure user's personal data is not tempered by unauthorized source.

3.2.6 Performance

- All data views are paginated to allow limited and required information to prevent long load times.

3.3 Assumptions

- Users should have basic knowledge of using computer and web browsers.
- Reliable internet connection should be available for the user.

4. System Architecture

Following is the diagram representing the system architecture of our project:

Level 1:

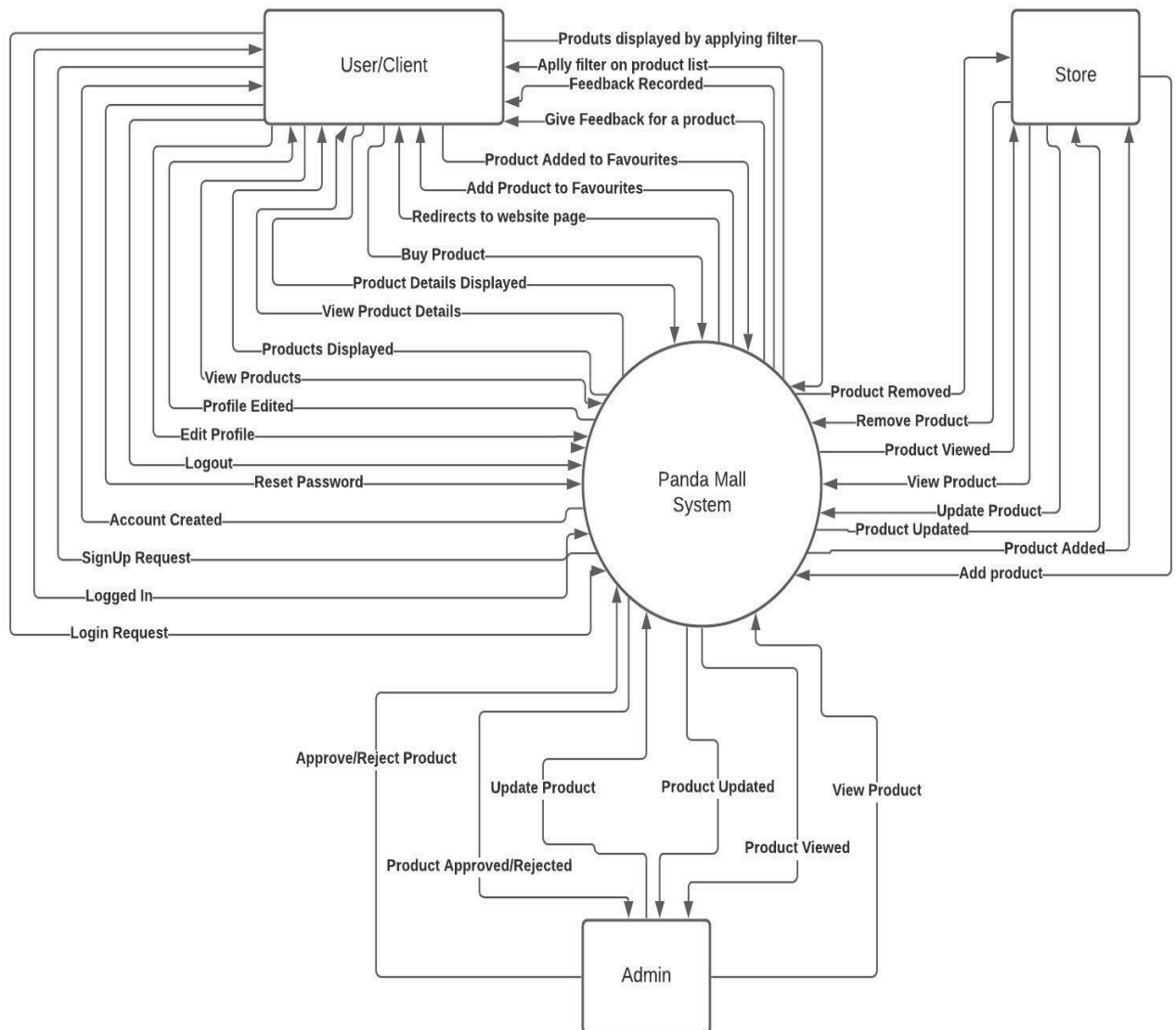


Figure 1: Level 1 System Architecture
This is the level 1 diagram of system architecture

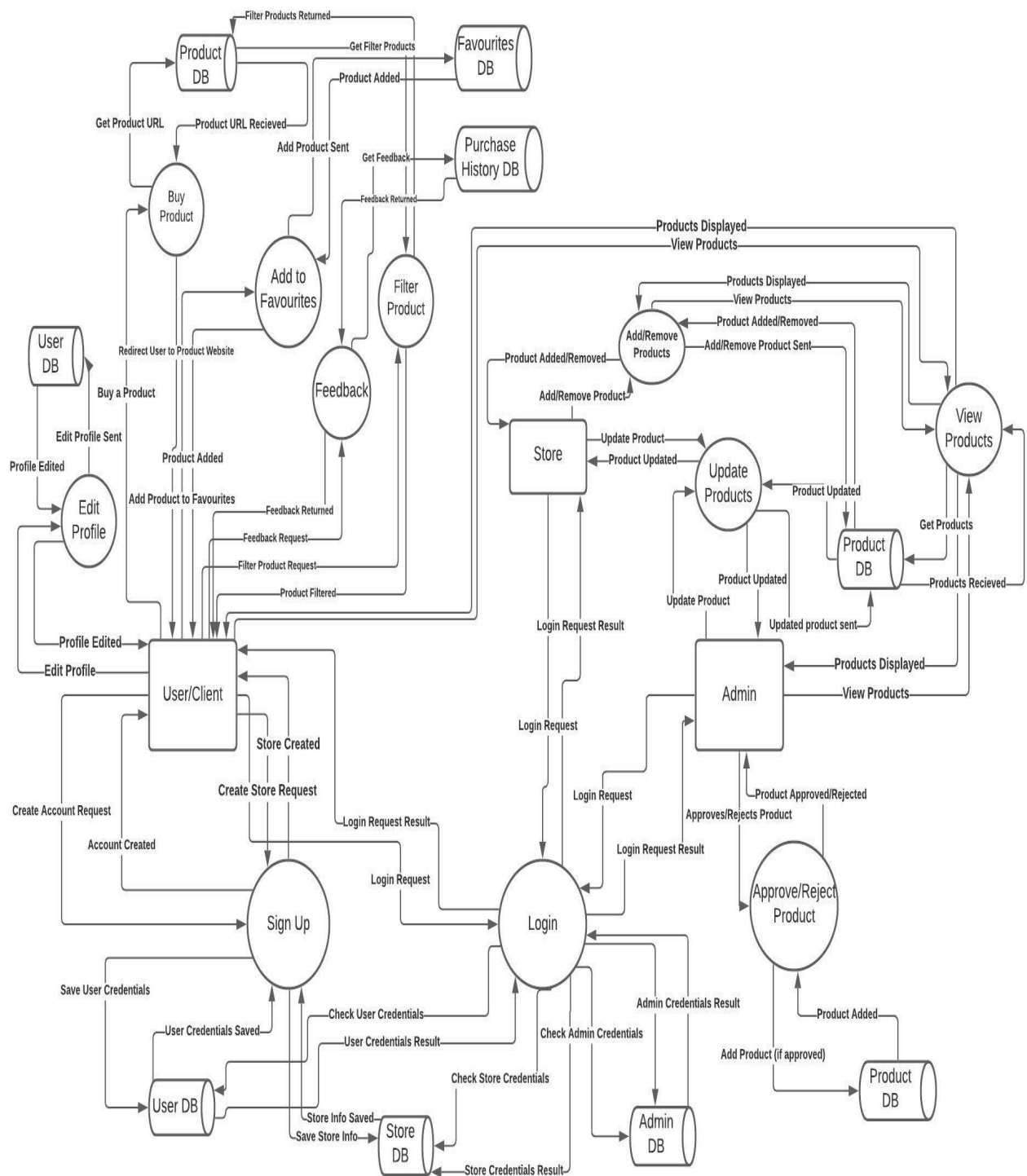
Level 2:

Figure 2: Level 2 System Architecture
This is the level 2 diagram of system architecture

5. Use Cases

5.1 Login Account

Name	Login Account		
Actors	Client, Admin, Store Owner		
Summary	User will be able to login into account.		
Pre-Conditions	User should be registered in the system. User should not already be logged in.		
Post-Conditions	User shall be logged in successfully.		
Special Requirements	None		
Basic Flow			
Actor Action		System Response	
1	User opens the login page.	2	System displays Login page asking for username and password.
3	User enters valid login credentials and press login button.	4	System verifies the user credentials, establishes session and redirects the user to the home page.
Alternative Flow			
Actor Action		System Response	
3	User enters invalid login credentials and presses the login button.	4-A	System prompts the error message: <i>Incorrect username or password entered.</i>

5.2 Create Account

Name	Create Account		
Actors	Client		
Summary	User will be able to create a new account by providing the required information.		
Pre-Conditions	User clicked on Sign-up button from the login page.		
Post-Conditions	User’s account shall be created successfully.		
Special Requirements	None		
Basic Flow			
Actor Action		System Response	
1	User clicks on the Sign-up button from the Login page.	2	System displays Sign-up page asking for required information.
3	User enters valid information and presses submit button.	4	System verifies the information, creates a new account and redirects the user to the login page.

Alternative Flow			
Actor Action		System Response	
3	User enters invalid information and presses submit button.	4-A	System prompts the error message: <i>Incorrect/Missing required information</i>

5.3 Reset Password

Name	Reset Password		
Actors	Client		
Summary	User will be able to reset his/her account password.		
Pre-Conditions	User should have an existing account. User clicked on “Forget Password?” button from Login page.		
Post-Conditions	User shall receive reset password request on his/her email.		
Special Requirements	None		
Basic Flow			
Actor Action		System Response	
1	User clicks on the “Forget Password?” button from the Login page.	2	System displays a prompt asking for user’s username.
3	User enters username and presses submit button.	4	System verifies the username, sends an email to the respective user account and redirects the user to the login page.
Alternative Flow			
Actor Action		System Response	
3	User enters invalid username and presses submit button.	4-A	System prompts the error message: <i>Username not found</i>

5.4 Logout

Name	Logout		
Actors	Client		
Summary	User will be able to logout his/her account.		
Pre-Conditions	User should have logged in. User clicked on “Logout” button from Home page.		
Post-Conditions	User shall be logged out.		
Special Requirements	None		
Basic Flow			
Actor Action		System Response	
1	User clicks on the “Logout?” button	2	System will logout the user and redirect

	from the home page.		the user to Login page.
No Alternative Flow			

5.5 Edit Profile

Name	Edit Profile		
Actors	Client		
Summary	User will be able to edit his/her profile.		
Pre-Conditions	User should have logged in. User clicked on “Edit Profile” button from Home page.		
Post-Conditions	User’s profile shall be updated.		
Special Requirements	None		
Basic Flow			
Actor Action		System Response	
1	User clicks on the “Edit Profile” button from the Home page.	2	System displays a new page containing user’s current information.
3	User edits his/her profile by providing valid information and presses update button.	4	System validates the information, updates his/her profile and redirects the user to the Home page.
Alternative Flow			
Actor Action		System Response	
3	User enters invalid profile information and presses update button.	4-A	System prompts the error message: <i>Information provided is incorrect.</i>

5.6 View Product Details

Name	View Product Details		
Actors	Client		
Summary	User will be able to view the details of the selected product.		
Pre-Conditions	User should have logged in. User should have clicked on a “Details” button.		
Post-Conditions	Users shall be to see the product details.		
Special Requirements	None		
Basic Flow			
Actor Action		System Response	
1	User clicks on the “Details” button from the Home page.	2	System displays a pop-up containing product details.

No Alternative Flow

5.7 Buy Product

Name	Buy a Product		
Actors	Client		
Summary	User will be able to buy a product from the respected brand’s website.		
Pre-Conditions	User must be logged in. User must have clicked on “Detail” button for the selected product.		
Post-Conditions	System will redirect user to the respective brand website.		
Special Requirements	None		
Basic Flow			
Actor Action		System Response	
1	User clicks on the “Buy” button located in the product details.	2	System redirects the user to the respected link of the product.
No Alternative Flow			

5.8 Add to Favorites

Name	Add to favorites								
Actors	Client								
Summary	User will be able to add a product to his/her favorites list.								
Pre-Conditions	User must be logged in. Selected product should not be in the favorites list								
Post-Conditions	System will update the favorites list by adding a product.								
Special Requirements	None								
Basic Flow									
<table><tr><th colspan="2">Actor Action</th><th colspan="2">System Response</th></tr><tr><td>1</td><td>User clicks on the “Favorites” icon from the selected product.</td><td>2</td><td>System adds the product to his/her favorites list.</td></tr></table>		Actor Action		System Response		1	User clicks on the “Favorites” icon from the selected product.	2	System adds the product to his/her favorites list.
Actor Action		System Response							
1	User clicks on the “Favorites” icon from the selected product.	2	System adds the product to his/her favorites list.						
No Alternative Flow									

5.9 Remove from favorites

Name	Remove from favorites		
Actors	Client		
Summary	User will be able to remove a product from his/her favorites list.		
Pre-Conditions	User must be logged in. Selected product should be in the favorites list		
Post-Conditions	System will update the favorites list by removing a product.		
Special Requirements	None		
Basic Flow			
Actor Action		System Response	
1	User clicks on the “Favorites” icon from the selected product.	2	System will remove the product from his/her favorites list.
No Alternative Flow			

5.10 View favorites list

Name	View favorites list		
Actors	Client		
Summary	User will be able to view favorites list.		
Pre-Conditions	User must be logged in.		
Post-Conditions	User shall be able to view his/her favorites list.		
Special Requirements	None		
Basic Flow			
Actor Action		System Response	
1	User clicks on the “View favorites” button from the home page.	2	System redirects the user to the new page containing a list of user’s favorite items. If there are no products in the favorites list then an empty list will be displayed.
No Alternative Flow			

5.11 Filter Product by Type

Name	Filter product by type																
Actors	Client																
Summary	User will be able to filter out products based on product type.																
Pre-Conditions	User must be logged in.																
Post-Conditions	User will be able to view filtered product list.																
Special Requirements	Reliability (filtering takes less than 3 seconds).																
Basic Flow																	
<table><tr><th colspan="2">Actor Action</th><th colspan="2">System Response</th></tr><tr><td>1</td><td>User clicks on the “Filter” button from the home page.</td><td>2</td><td>System displays a dropdown menu containing different types of filters.</td></tr><tr><td>3</td><td>User selects the “Type” filter from the dropdown menu.</td><td>4</td><td>System displays a pop-up of types for clothing products e.g. (Men’s T-Shirts, Men’s Polo Shirts, Men’s Trousers).</td></tr><tr><td>5</td><td>User selects a type from the pop-up window.</td><td>6</td><td>System reloads the home page and displays the products based on the user’s filtering criteria.</td></tr></table>		Actor Action		System Response		1	User clicks on the “Filter” button from the home page.	2	System displays a dropdown menu containing different types of filters.	3	User selects the “Type” filter from the dropdown menu.	4	System displays a pop-up of types for clothing products e.g. (Men’s T-Shirts, Men’s Polo Shirts, Men’s Trousers).	5	User selects a type from the pop-up window.	6	System reloads the home page and displays the products based on the user’s filtering criteria.
Actor Action		System Response															
1	User clicks on the “Filter” button from the home page.	2	System displays a dropdown menu containing different types of filters.														
3	User selects the “Type” filter from the dropdown menu.	4	System displays a pop-up of types for clothing products e.g. (Men’s T-Shirts, Men’s Polo Shirts, Men’s Trousers).														
5	User selects a type from the pop-up window.	6	System reloads the home page and displays the products based on the user’s filtering criteria.														
No Alternative Flow																	

5.12 Filter Product by Size

Name	Filter product by size		
Actors	Client		
Summary	User will be able to filter out products based on product sizes.		
Pre-Conditions	User must be logged in.		
Post-Conditions	User will be able to view filtered product list.		
Special Requirements	Reliability (filtering takes less than 3 seconds).		
Basic Flow			
Actor Action		System Response	
1	User clicks on the “Filter” button from the home page.	2	System displays a dropdown menu containing different types of filters.

3	User selects the “Size” filter from the dropdown menu.	4	System displays a pop-up of sizes for clothing products e.g. (Small, Large).
5	User selects a size from the pop-up window.	6	System reloads the home page and displays the products based on the user’s filtering criteria.
No Alternative Flow			

5.13 Filter Product by Color

Name	Filter product by color		
Actors	Client		
Summary	User will be able to filter out products based on product color.		
Pre-Conditions	User must be logged in.		
Post-Conditions	User will be able to view filtered product list.		
Special Requirements	Reliability (filtering takes less than 3 seconds).		
Basic Flow			
Actor Action		System Response	
1	User clicks on the “Filter” button from the home page.	2	System displays a dropdown menu containing different types of filters.
3	User selects the “Color” filter from the dropdown menu.	4	System displays a pop-up of colors for clothing products e.g. (Red, Green).
5	User selects a color from the pop-up window.	6	System reloads the home page and displays the products based on the user’s filtering criteria.
No Alternative Flow			

5.14 Filter Product by Waist

Name	Filter product by waist		
Actors	Client		
Summary	User will be able to filter out products based on product waist.		
Pre-Conditions	User must be logged in.		
Post-Conditions	User will be able to view filtered product list.		
Special Requirements	Reliability (filtering takes less than 3 seconds).		
Basic Flow			
Actor Action		System Response	
1	User clicks on the “Filter” button from the home page.	2	System displays a dropdown menu containing different types of filters.
3	User selects the “Waist” filter from the dropdown menu.	4	System displays a pop-up of waists for clothing products e.g. (30-inch, 32-inch).
5	User selects a waist from the pop-up window.	6	System reloads the home page and displays the products based on the user’s filtering criteria.
No Alternative Flow			

5.15 Filter Product by Price Range

Name	Filter product by price range.		
Actors	Client		
Summary	User will be able to filter out products based on product price range.		
Pre-Conditions	User must be logged in.		
Post-Conditions	User will be able to view filtered product list.		
Special Requirements	Reliability (filtering takes less than 3 seconds).		
Basic Flow			
Actor Action		System Response	
1	User clicks on the “Filter” button from the home page.	2	System displays a dropdown menu containing different types of filters.
3	User selects the “Price” filter from the dropdown menu.	4	System displays a pop-up of price range for clothing products e.g. (Rs. 1200-1800, Rs. 750-1000).
5	User selects a price range from the pop-up window.	6	System reloads the home page and displays the products based on the user’s filtering criteria.
No Alternative Flow			

5.16 Filter Product by Discount Factor

Name	Filter product by discount factor		
Actors	Client		
Summary	User will be able to filter out products based on product discount factor.		
Pre-Conditions	User must be logged in.		
Post-Conditions	User will be able to view filtered product list.		
Special Requirements	Reliability (filtering takes less than 3 seconds).		
Basic Flow			
Actor Action		System Response	
1	User clicks on the “Filter” button from the home page.	2	System displays a dropdown menu containing different types of filters.
3	User selects the “Discounted” filter from the dropdown menu.	4	System displays a pop-up of Discount range for clothing products e.g. (20% - 30% off).
5	User selects a Discount range from the pop-up window.	6	System reloads the home page and displays the products based on the user’s filtering criteria.
No Alternative Flow			

5.17 Approve Products

Name	Approve product		
Actors	Admin		
Summary	Admin will be able to see the details of a product and approve it to be published on the website		
Pre-Conditions	Admin should be logged in the system and also on products list view page in the manage products section		
Post-Conditions	Product is approved or rejected.		
Special Requirements	There should be an approval request pending.		
Basic Flow			
Actor Action		System Response	
1	Admin click on a store in manage products section.	2	Redirect the admin to a page showing all products of the store. Pending approval ordered on top.
3	Click on a particular product	4	Display all the attributes of the product.
5	Admin click on approve button at the bottom	6	System will approve the product and publish on the website and notify the store.
7	Admin click exit button.	8	Display list of products.
Alternative Flow			

Actor Action		System Response	
5	Admin click on reject button alongside the approve button.	6-A	System will not publish the product on the website and notify the store.

5.18 Suspend Product

Name		Suspend product	
Actors		Admin	
Summary		Admin will be able to view and terminate a published product.	
Pre-Conditions		Admin should be logged in the system and also on products list view page in the manage products section.	
Post-Conditions		System will immediately suspend the product from the website.	
Special Requirements		Product must already be published	
Basic Flow			
Actor Action		System Response	
1	Admin click on a store in manage products section.	2	Redirect the admin to a page showing all products of the store. Pending approval ordered on top.
3	Click on a particular product	4	Display all the attributes of the product.
5	Click on “terminate” button at the bottom.	6	System suspends the product and exit product view page.
No Alternative Flow			

5.19 View Product

Name		View products	
Actors		Admin	
Summary		Admin will be able to see the attribute of a product	
Pre-Conditions		Admin should be logged in the system and also on manage products section.	
Post-Conditions		System will display the attributes and values of the product.	
Special Requirements		None	
Basic Flow			
Actor Action		System Response	
1	Admin click on store entry in the table ordered based on approval requests.	2	System will display the list of products sold by the store.
3	Admin click on a particular product from the table.	4	System will display the attributes and values of the product.
No Alternative Flow			

5.20 View home page

Name	View home page		
Actors	Stores		
Summary	User will be able to see all the products of their store.		
Pre-Conditions	User should be logged in.		
Post-Conditions	User successfully view all of their products		
Special Requirements	None		
Basic Flow			
	Actor Action	System Response	
1	Store user logins successfully	2	System loads the home page with a list view of all products
Alternative Flow			
1	User clicks on the home from the navigation bar.	2-A	System loads the home page with a list view of all products

5.21 Add product

Name		Add product	
Actors		Stores	
Summary		User will be able to add products to their stores.	
Pre-Conditions		User should be on logged in.	
Post-Conditions		User added product to store successfully.	
Special Requirements		None	
Basic Flow			
Actor Action		System Response	
1	User clicks on Add product.	2	Create new product page is displayed, showing product detail, product description, product category, gallery and attachments needed to be filled.
3	User enters the details and press add button.	4	System checks the necessary fields needed to be filled and create that product and set “pending approval” for the product. System prompts the success message: <i>Product sent for approval.</i> Redirects the user back to home page.
Alternative Flow			
Actor Action		System Response	
3	User miss important fields and press save.	4-A	System highlighted the required fields in red and prompts the error message:

			<i>Please fill required fields!</i>
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5.22 Delete a product

Name		Delete a product	
Actors		Store	
Summary		User will be able to delete a product from store.	
Pre-Conditions		User should be on logged in.	
Post-Conditions		User deleted a product successfully.	
Special Requirements		None	
Basic Flow			
Actor Action		System Response	
1	User select a product(s) from the home page.	2	System records the selections.
3	User clicks on the delete button.	4	System pops a small window with a warning.
5	User selects, “I’m sure” button.	6	System deletes the selected products and prompts the successful message: <i>Products removed Successfully.</i>
Alternative Flow			
Actor Action		System Response	
5	User clicks “No” button.	6-A	System returns to the home page.

5.23 Update product

Name		Update product	
Actors		Store	
Summary		User will be able to update the attribute values of a product from store like price or availability.	
Pre-Conditions		User should be on logged in.	
Post-Conditions		User updated a product attribute value successfully.	
Special Requirements		None	
Basic Flow			
Actor Action		System Response	
1	User select a product from the home page.	2	System records the selection.
3	User clicks on the update button.	4	System displays an editable product form with values pre-filled.
5	User enters the details and press update button.	6	System checks the necessary fields needed to be filled and create that product and set “pending approval” for

			the product. System prompts the success message: <i>Product sent for approval.</i> Redirects the user back to home page.
Alternative Flow			
Actor Action		System Response	
5	User miss important fields and press save.	6-A	System highlighted the required fields in red and prompts the error message: <i>Please fill required fields!</i>
5	User clicks 'cancel'	6-A	Redirects the user back to home page.

5.24 Give Feedback

Name	Give feedback		
Actors	Client		
Summary	User will be able to give feedback on products bought.		
Pre-Conditions	User should be logged in. User should have bought the product. User should be on the product details page.		
Post-Conditions	User's feedback will be stored.		
Special Requirements	None		
Basic Flow			
Actor Action		System Response	
1	User will give feedback for the bought product by using star ratings.	2	System will store user's feedback in the database.
No Alternative Flow			

6. Graphical User Interfaces

6.1 Admin panel

This GUI shows login page for an admin.

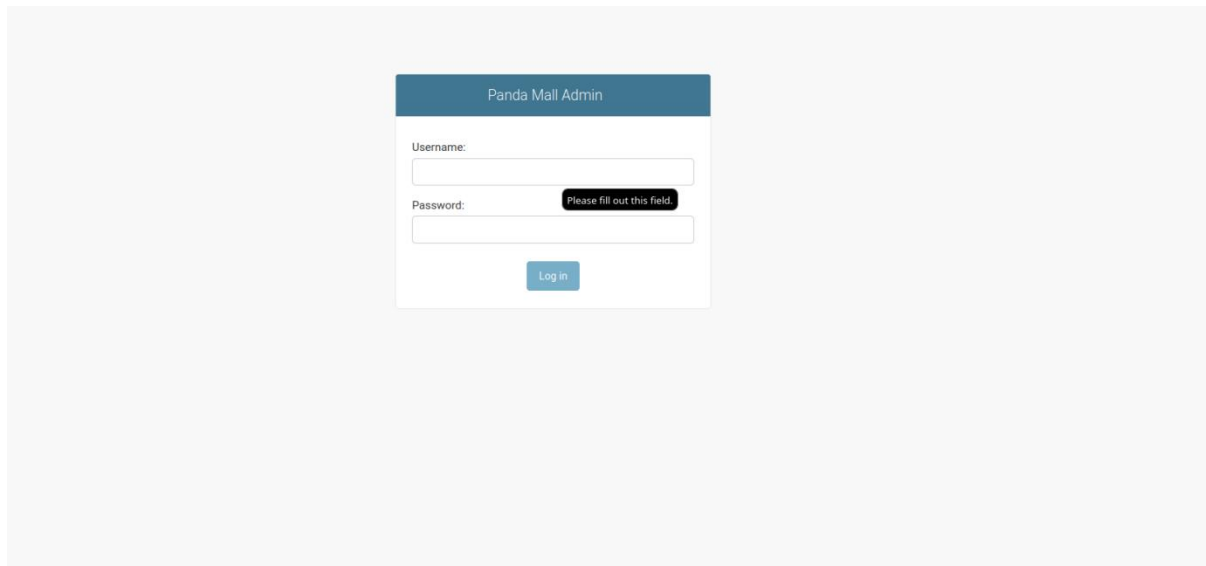


Figure 3: Login Screen
Admin panel login screen.

This GUI shows the “Manage Products” section of the admin panel.

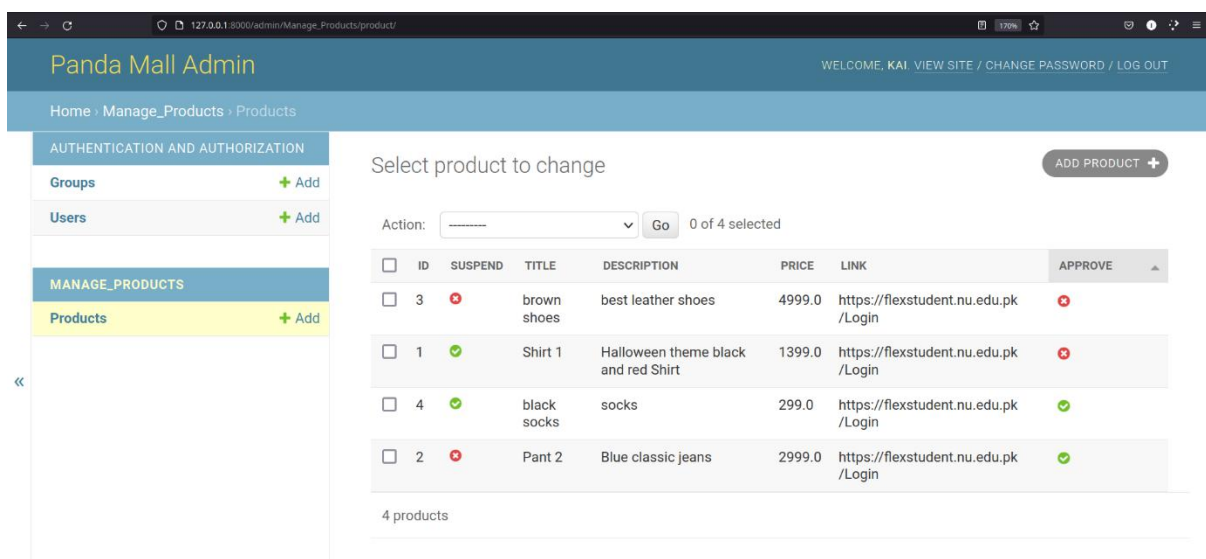


Figure 4: Manage Products
Manage Products Section

This GUI shows the edit page where an admin can approve, reject or suspend a product.

Change product

brown shoes

Title: brown shoes

Description: best leather shoes

Price: 4999.0

☐ Suspend

Link: https://flexstudent.nu.edu.pk/Login

☐ Approve

Buttons: Delete, Save and add another, Save and continue editing, SAVE

Figure 5: Update product page
Update product page at admin panel

6.2 Store GUI

This GUI shows the home page of a store.

Products

Select	SKU	Title	Description	Price	Link	Approval
<input checked="" type="checkbox"/>	4869	Black Shirt	Best Black Shirt	999	Product Page	Yes
<input type="checkbox"/>	5869	blue jeans	Best blue jeans	2999	Product Page	Pending
<input type="checkbox"/>	6869	Brown Shoes	Best Brown Shoes	5999	Product Page	Rejected
<input type="checkbox"/>	4869	Black Shirt	Best Black Shirt	999	Product Page	Yes
<input type="checkbox"/>	4869	Black Shirt	Best Black Shirt	999	Product Page	Yes

Navigation: Previous | 1 | **2** | 3 | Next

Buttons: Add Product, Update Product, View Product, Delete Product

Figure 6: Store home page
Store home page

This GUI shows the delete pop up window before a product is deleted.

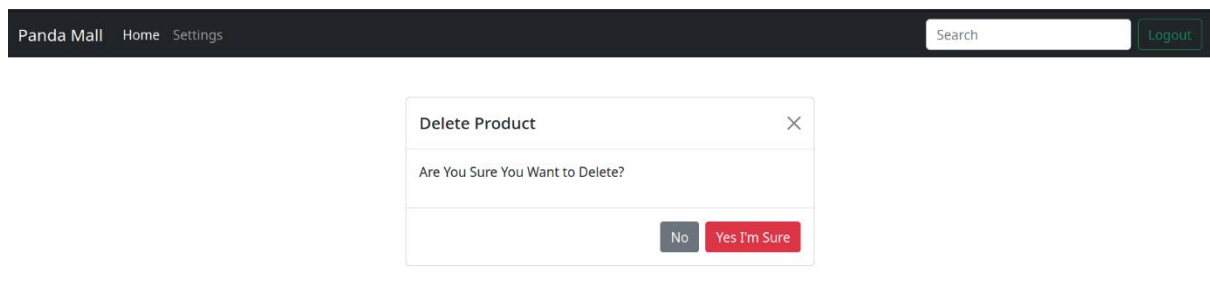


Figure 7: Pop up window
Pop up window when delete button clicked

This GUI shows the details of a product and allows to edit the product. This GUI is same for add products and update as the latter has prefilled values.

A screenshot of a web application interface showing the 'Edit Product' form. The top navigation bar is identical to the previous screenshot. Below it, the form is titled 'Edit Product'. It contains several input fields: 'SKU' with the value '3569', 'Title' (empty), 'Description' (empty), 'Price' (empty), and 'Link' with the value 'https://flexstudent.nu.edu.pk/Login'. Below these fields is a 'Controls' section with a checkbox labeled 'Disable Product'. At the bottom left of the form, there is a dark button labeled 'Save Changes'.

Figure 8: Edit product
Edit product page for store type user

6.3 Login GUI

This GUI shows the login page of our website.

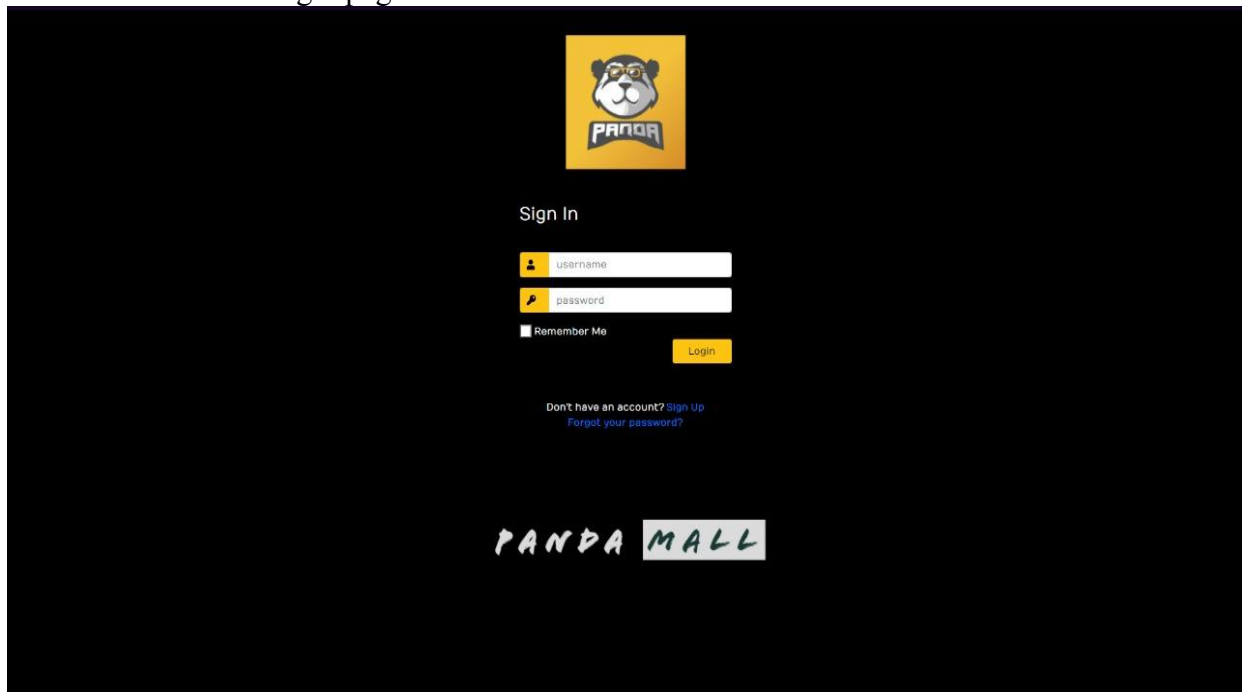


Figure 9: Login page
Website's login page

6.4 Sign Up GUI

This GUI shows the Sign-Up page of our website.

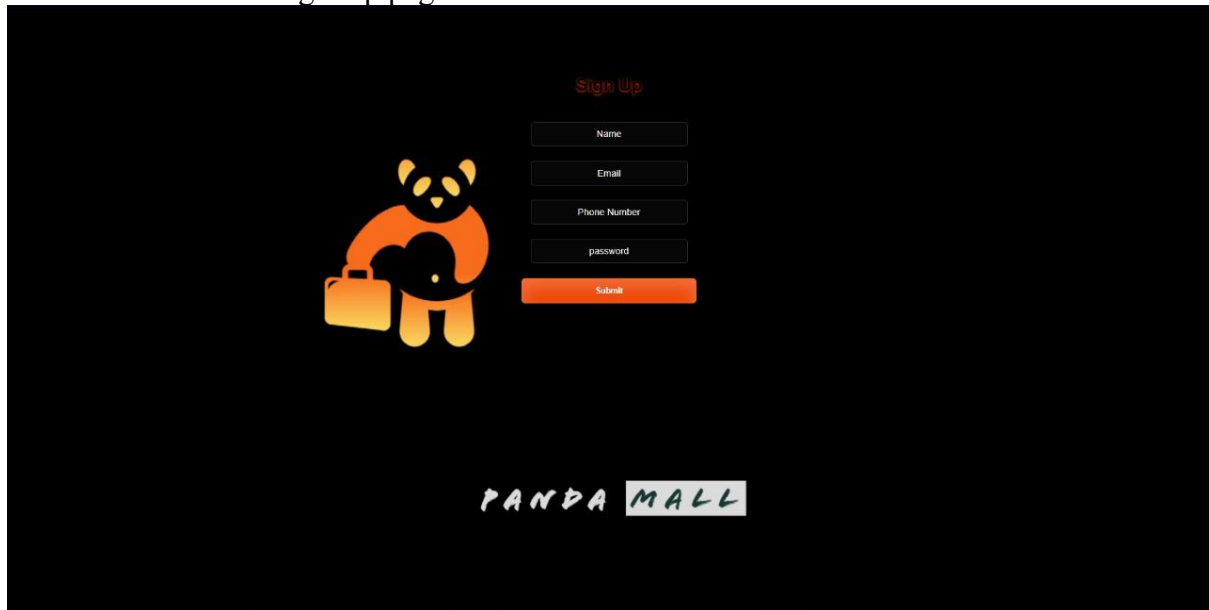


Figure 10: Sign Up page
Website's sign-up page

6.5 User/Client Pages GUI

This GUI shows the favourites page of our website. All of user's favourites products are placed on this page.

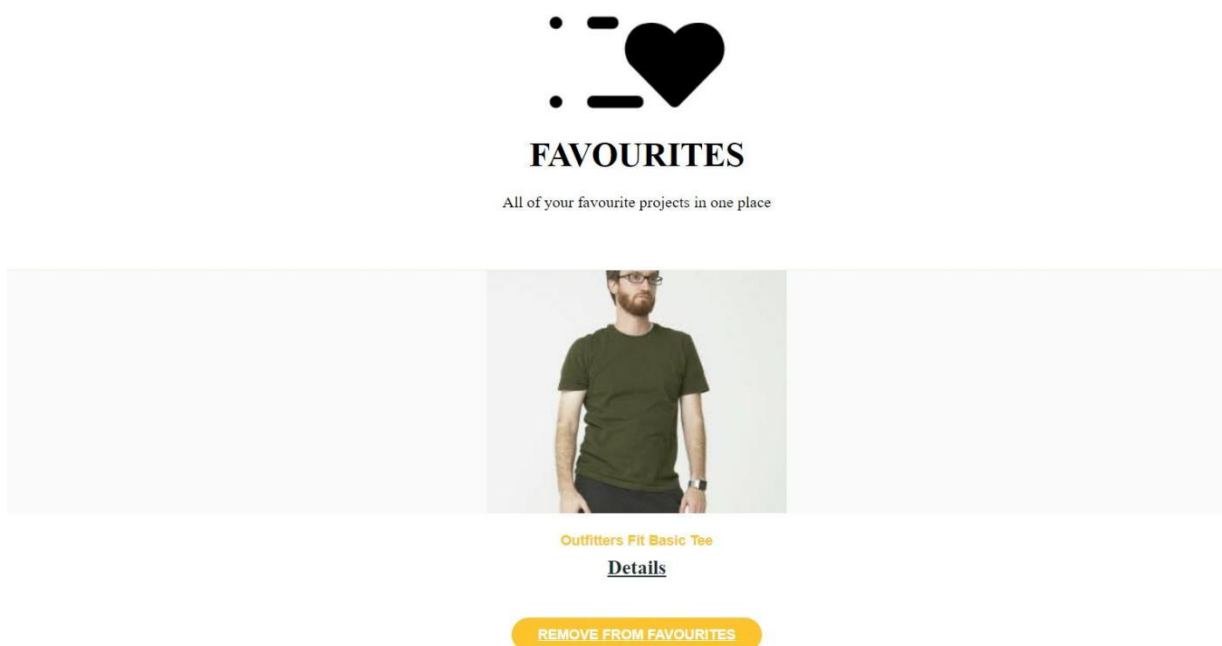


Figure 11: Favorite's page
Website's favourites page

This GUI shows the product details pop up window of our website. From this page we can buy a product along with viewing its details. Moreover, we can give feedback of a product that we have bought.

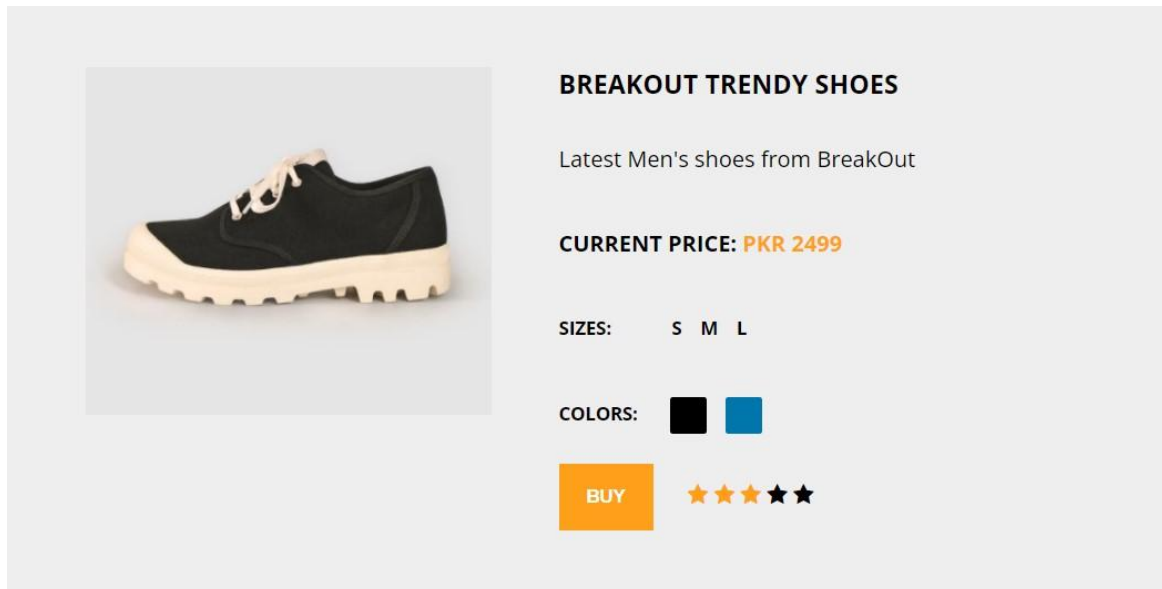


Figure 12: Product Details page
Products Detail page

This GUI shows the Home page for the user where user can see products to buy from. User can add product to favorite's list, can see the details of the product. Also, user can use filters to filter out specific product. User can also search a specific product and also can see his profile.

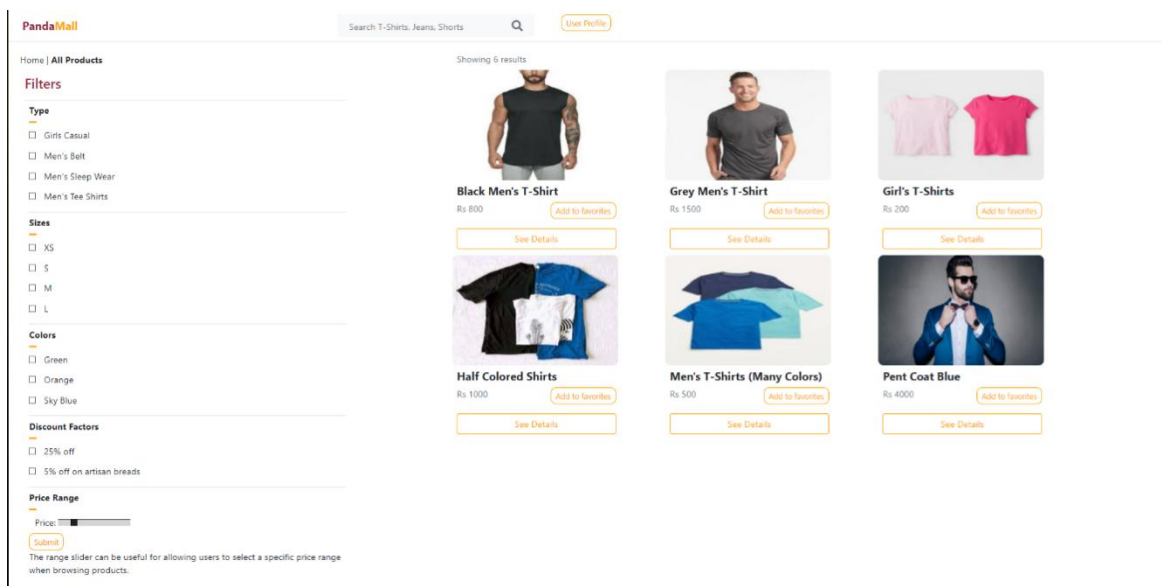


Figure 13: Home Page
Home page containing products

This GUI shows the User's profile where he can see his information. User can access feedback page and favorite's page from here as well. Also user can sign out from here as well.



Figure 14: Profile page
Profile containing user information

7. Database Design

7.1 ER Diagram

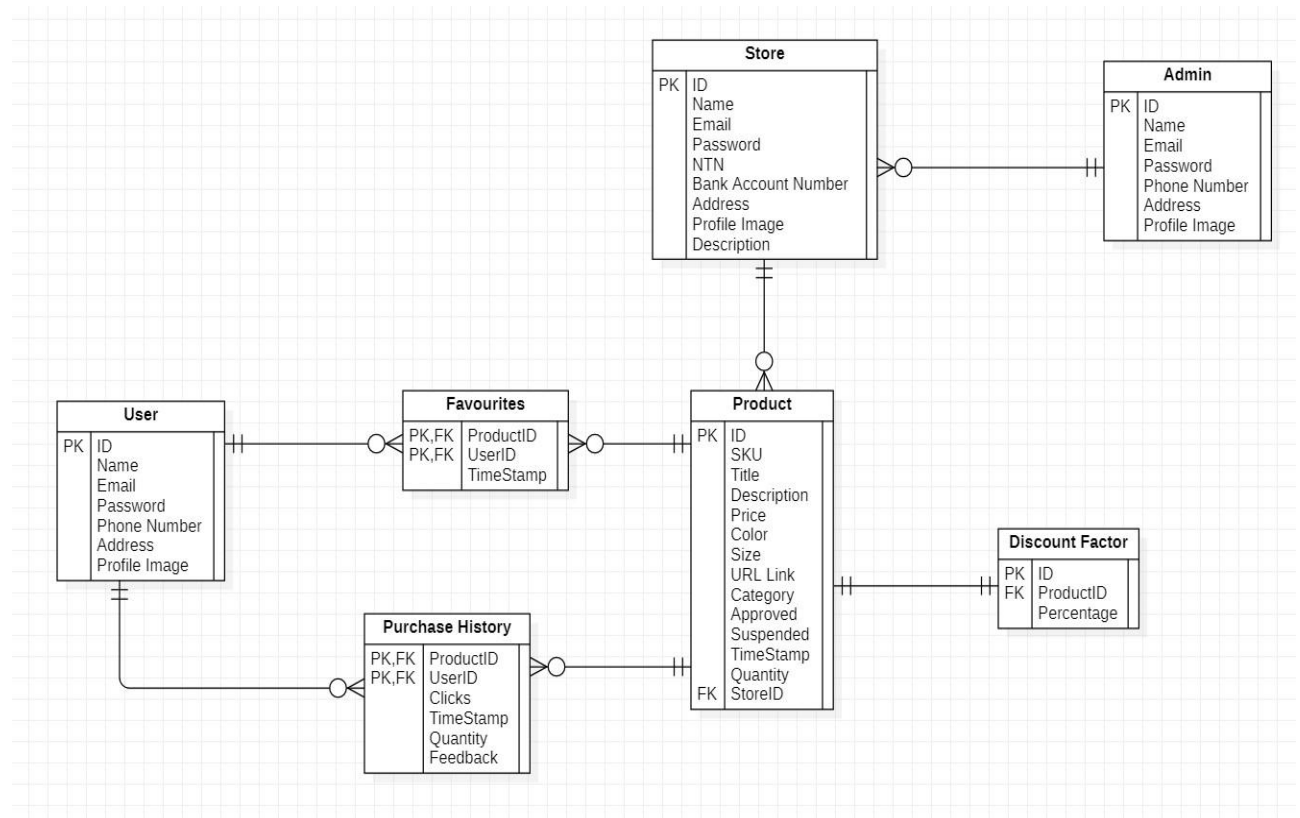


Figure 15: ER Diagram

This shows the ER Diagram of our system database

7.2 Data Dictionary

7.2.1 User

Table 1: User Data Dictionary
This is the data dictionary of user.

Fields	Data Types	Example
ID	Long	1992
Name	String	Ben White
Email	String	benwhite@gmail.com
Password	String	ArsenalFC
Phone Number	String	0321-xxxxxxx
Address	String	852-B Milaad St, Block B Faisal Town, Lahore, Punjab 54770
Profile Image	String	myWebsite.com/proiflepic.jpg

7.2.2 Favourite

Table 2: Favourites Data Dictionary
This is the data dictionary of favourites.

Fields	Data Types	Examples
ProductID (FK from ID of Product table)	Long	221
UserID (FK from ID of Product table)	Long	1919
TimeStamp	datetime	2016-12-21 00:00:00.000

7.2.3 Product

Table 3: Product Data Dictionary
This is the data dictionary of Product.

Fields	Data Types	Examples
ID	Long	23
SKU	String	K91919
Title	String	Shorts
Description	String	Any description
Price	Float	99.99
Color	String	Red
Size	String	Medium
URL	String	My-website.com/product=10
Category	String	Men
Approved	Boolean	True
Suspended	Boolean	False
TimeStamp	DateTime	2016-12-21 00:00:00.000
Quantity	Int	10
StoreID (FK)	Long	101

7.2.4 Purchase History

Table 4: Purchase History Data Dictionary
This is the data dictionary of Purchase History.

Field	Data Types	Examples
ProductID (PK, FK)	Long	23
UserID (PK, FK)	Long	12
Clicks	Int	20
TimeStamp	DateTime	2016-12-21 00:00:00.000
Quantity	Int	15
Feedback	String	Great Product

7.2.5 Store

Table 5: Store Data Dictionary
This is the data dictionary of Store.

Field	Data Types	Examples
ID	Long	7
Name	String	Tayyab
Email	String	tayyab@gmail.com
Password	String	Qwerty1234
NTN	String	231242134-9
Bank Account Number	String	HQM21HJ819
Address	String	134 A Muslim Town
Profile Image	String	myWebsite.com/proiflepic.jpg
Description	String	Detailed Info

7.2.6 Admin

Table 6: Admin Data Dictionary
This is the data dictionary of Admin.

Fields	Data Types	Examples
ID	Long	23
Name	String	Tayyab
Email	String	tayyab@gmail.com
Password	String	Tayyabqwerty
Phone Number	String	03401913211
Profile Image	String	myWebsite.com/proiflepic.jpg

7.2.7 Discount Factor

Table 7: Discount Factor Data Dictionary
This is the data dictionary of Discount.

Field	Data Types	Examples
ID	Long	3
ProductID (FK)	Long	29
Percentage	Float	70.1

8. Risk Analysis

A recommendation system using filtering algorithm can be exposed to several problems with some risks attached to them.

- Overflow of client requests on the server side can result in server being unable to handle the client load. As result client will face delays in his/her requests.
- Server could crash due to a software issue which will result in clients not getting a response from server.
- Server can be at the end of a natural disaster that can result in server's hardware fault.
- There could be an internet disconnectivity issue where the server is located that can result in server not responding to client requests.
- There could be DDoS (Distributed Denial of Service) attack at server side that can again result in server not responding to client requests.
- Our website can be a victim of "Name Jacking" that can result in our client traffic being diverted from our server.
- "SQL Injection" can also be a possible threat to our database as it can result in our valuable information being stolen from our database.

9. System Requirements

9.1 Hardware Requirements

- A IOT device that supports a browser.
- Internet connection should have at least 1Mbps.
- A web server to host our website.

9.2 Software Requirements

- Web browser in the system.

10. References

- [1] Reutskaja, E., Lindner, A., Nagel, R. et al. “Choice overload reduces neural signatures of choice set value in dorsal striatum and anterior cingulate cortex.” *Nature Human Behavior*, vol 2, no. 925–935, Oct, 2018. [Online serial]. Available: <https://doi.org/10.1038/s41562-018-0440-2> [Accessed Sept. 30, 2021]
- [2] David Chong, “Deep Dive into Netflix’s Recommender System”, *towardsdatascience.com*, Apr. 30, 2020. [Online]. Available: <https://towardsdatascience.com/deep-dive-into-netflixs-recommender-system-341806ae3b48> [Accessed Nov. 2, 2021].