IBM– NALAIYATHIRANPROJECT

SMARTFASHIONRECOMMENDER APPLICATION

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ABSTRACT

Fashion is perceived as a meaningful way of self-expressing that people use for differentpurposes. It seems to be an integral part of every person in modern societies, from everydaylife to exceptional events and occasions. Fashionable products are highly demanded, andconsequently, fashion is perceived as a desirable and profitable industry. Although thismassive demand for fashion products provides an excellent opportunity for companies toinvest in fashion-related sectors, it also faces different challenges in answering their customerneeds.

In recent years, the textile and fashion industries have witnessed an enormous amount ofgrowth in fast fashion. On e-commerce platforms, where numerous choices are available, anefficient recommendation system is required to sort, order, and efficiently convey relevantproduct content or information to users. Smart Fashion Recommender Application haveattracted a huge amount of attention from fast fashion retailers as they provide a personalizedshopping experience to consumers. Smart Fashion Recommender Application have beenintroducedto address these needs.

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1. INTRODUCTION

PROJECTOVERVIEW

The Fashion industry is one of the larger industries around the world. One of the things thathas remained constant throughout human civilization is humans covering their bodies with apiece of cloth. Initially, this cloth was worn as protection from the harsh climates of thoseages. Later on, as we humans learned to fend for ourselves from the unforgiving climates, thecloth started to serve a different purpose. Fashion these days showcases the individuality ofthe person. There are many things that can be saidabout a person based on their fashionsense.

PURPOSE

There is currently no existing system that is capable of recommending clothes based on theoccasion. Different occasions call for different clothing. Moreover, a lotof fashion is basedon the color combinations of outfits. A person with no or little fashion sense will have a hardtimetodecideonclothesthatleavealastingimpression.TheproposedFashionRecommendation System is intended to be usedby individual users in order to store imagesoftheclothesthattheyowninwhatiscalledadigitalwardrobeandalsotogetrecommendations by the system on what clothes to wear for a given occasion. The main aimof the project is to recommend the most appropriate clothes for a given occasion based on theclothes existing in the user's wardrobe to relieve the user of the burden of making decisionsabout what clothing towear. Such a system should be capable of helping someone who hasno fashion sense to wear clothes that leave a good impression on others.The system shouldbe such that it is easily accessible and easy to take advantage of the various features that itprovides. One of the features should be the ability to store images that the user uploads into awardrobe. A wardrobe is a very useful entity that the user can use to view and manage theimagesofclothesthattheyhaveuploaded.Thisfeaturecanalsobeusedbytherecommendation algorithm to recommend the clothes. Another feature is the classification ofthe type and color of the clothing that is uploaded by the user. The system should be capableofhandlingthe 4 basicclothingtypes:Shirt, T-Shirt, Pants and Shoes.

2. LITERATURESURVEY

EXISTINGPROBLEM:

In existing system only simple web application and their rating has been implementedin existing system, An ecommerce product recommendation engine is a piece of technologythat displays recommended products to shoppers throughoutyour store. It uses machinelearning to get smarter and show increasingly relevant products to shoppers based on theirinterestsand previous browsingbehavior

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2. Hou, M., Wu, L., Chen, E., Li, Z., Zheng, V. W., & Liu, Q.:Explainable fashionrecommendation: A semantic attribute region guided approach. In Proceedings of the28th Twenty-EighthInternational Joint Conference onArtificialIntelligence, 2019;pp. 4681-4688.
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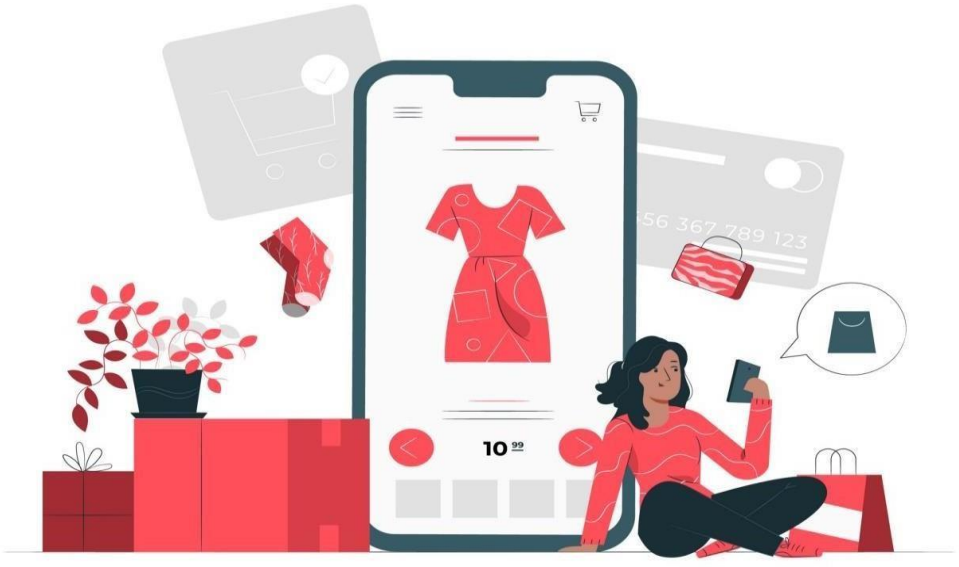
PROBLEMSTATEMENTDEFINITION

The personal information collected by recommenders raises the risk of unwanted exposure ofthat information. Also, malicious users can bias or sabotage the recommendations that areprovided to other users.In recent years, the textile and fashion industries have witnessed anenormous amount of growth in fast fashion. On e-commerce platforms, where numerouschoices are available, an efficient recommendation system is required to sort, order, andefficientlyconveyrelevant product content or information tousers.

- Theproblemoftheworkistodesignstaticwebapplicationsdeploymentswithcustomerdeployment
- Lackofinteractionbetweenapplicationanduser
- Userneedtonavigateacross multiplepages tochooseright product
- Confusionin choosingproduct
- Lackofsales
- ComplexUserInterface.
- Lackofproperguidance.



3.IDEATION&PROPOSEDSOLUTION

EMPATHYMAPCANVAS:

An empathy map is a simple, easy-to-digest visual that captures knowledge about a user'sbehaviours and attitudes. It is a useful tool to helps teams better understand their users.Creating an effective solution requires understanding the true problem and the person who isexperiencing it. The exercise of creating the map helps participants consider things from theuser'sperspectivealongwithhisorhergoalsandchallenges.Anempathymapisacollaborativetool teamscan usetogainadeeper insight intotheircustomers.

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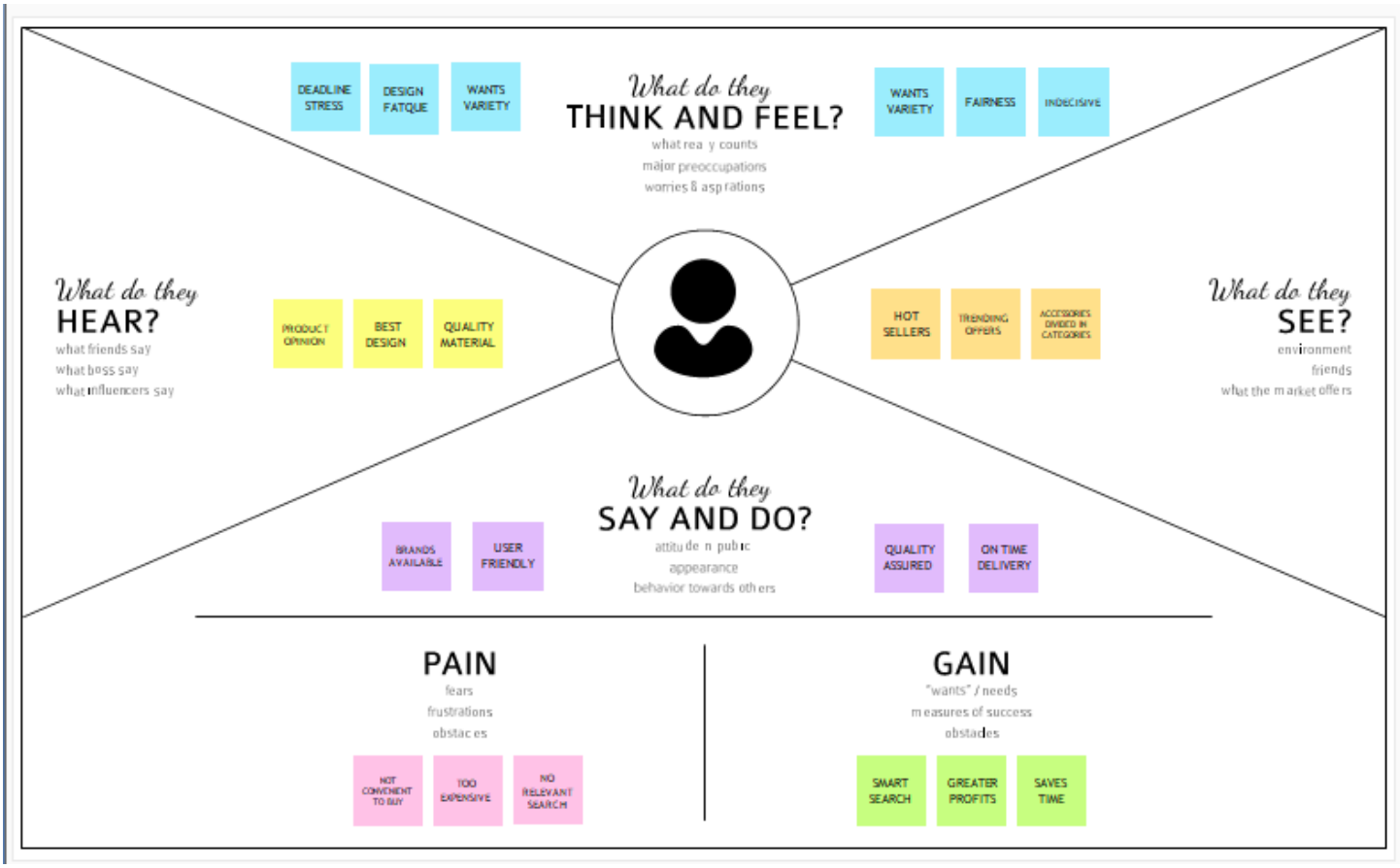
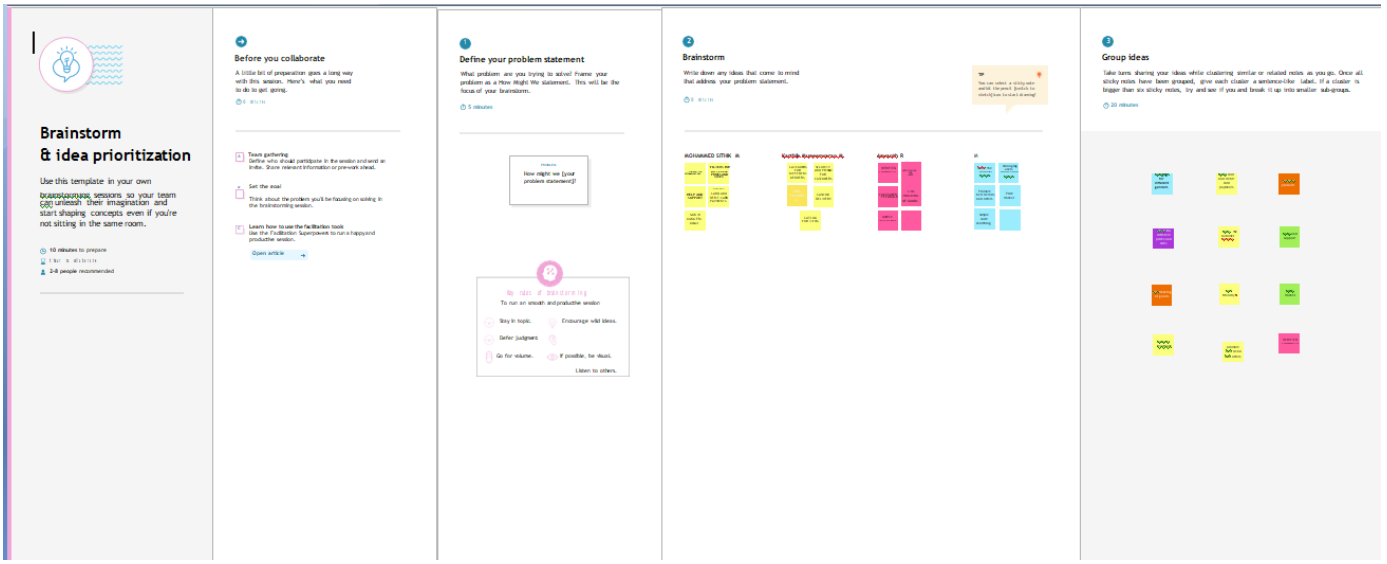
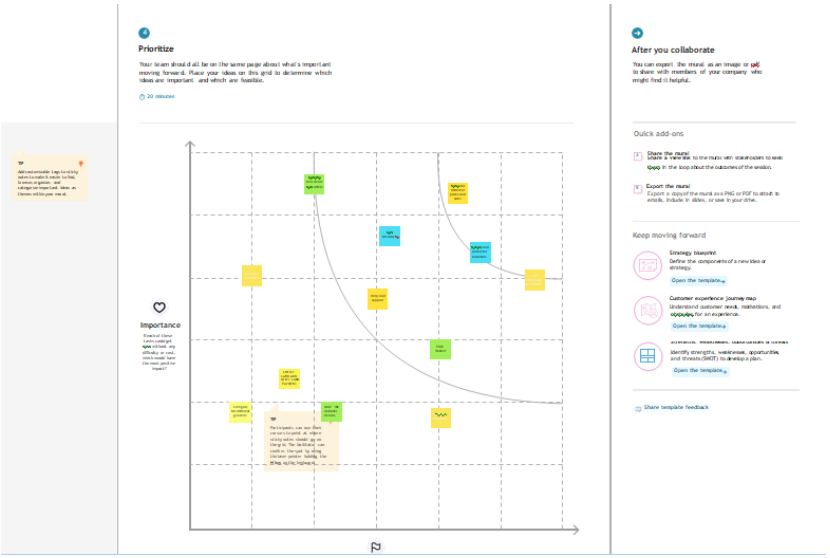


IDEATION&BRAINSTROMING:

A group problem-solving technique that involves the spontaneous contribution of ideas fromall membersofthegroup.

The mulling over of ideas by one or more individuals in an attempt to devise or find asolutionto aproblem.

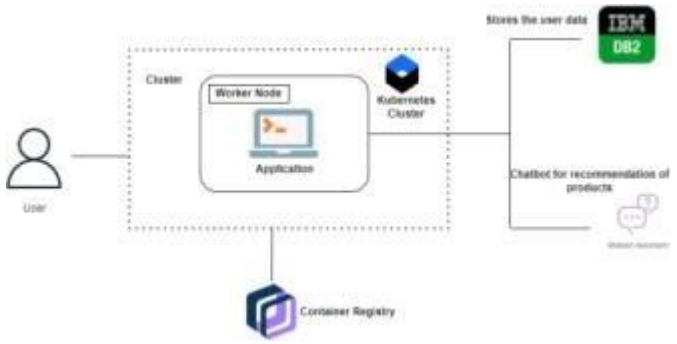




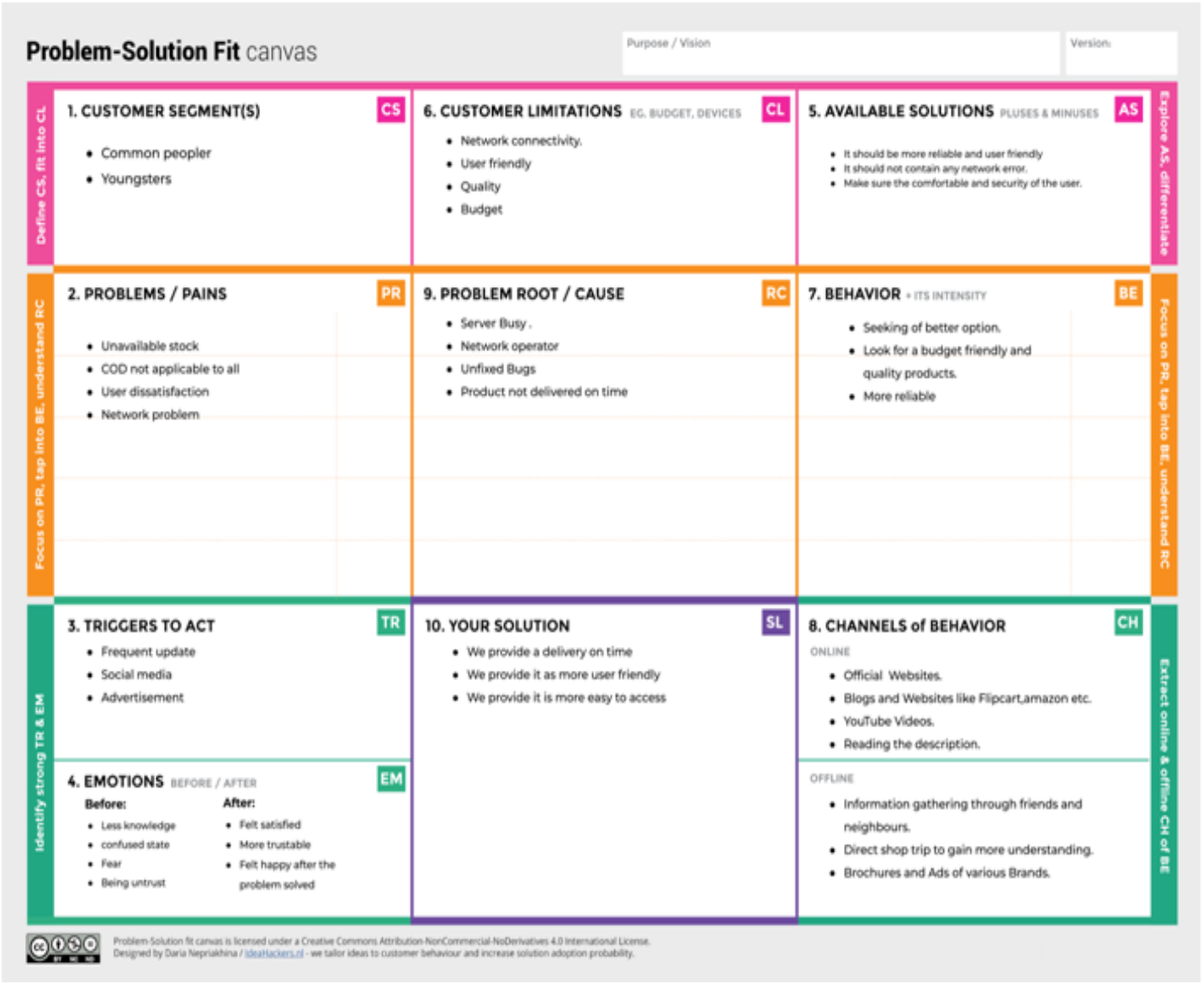
PROPOSEDSOLUTION:

SMARTFASHIONRECOMMENDERAPPLICATION

S.NO.	PARAMETER	DESCRIPTION
1.	**Problemstatement(problem To besolved)**	• InE-commercewebsites,usersneedtosearch forproducts and navigate across screens to view theproductand order product. • A new innovative solution came up through whichcandirectlymakeonline shoppingbasedonthechoiceoftheuser without anysearch. • It can be done by using the chatbot which can beachievedbyasmartfashionrecommenderapplication.
2.	**Idea/solutiondescription**	• Thesmartfashionrecommenderapplicationleveragesth e use of a chatbot to interact with the users, gatherinformation about their preferences, and recommendsuitableproducts to the users. • User can be able to mention their preferences byinteractingwith chatbot. • Theusermustreceiveanotificationonordercon firmation/failure. • Thechatbotmust gatherfeedbackfromtheuserattheend oforder confirmation
3.	**Novelty/Uniqueness**	• Chatbotasksandlearnsfromuserpreferencewhichreco mmends appropriate products to the user withoutmaking them search through various filters whichreducestimeand thusincreases sales. • Instead of searching manually a chatbot will help tofindtherightproducteffectively,withthisfeature usercan save time and it is an easy process, chat keepsendinganotification aboutnewcollections
4.	**Social impact/Customersatisfa ction**	• Feedback from the user at the end of the session orafter placing an order is one of the most importantfactors in deriving customer satisfaction and providingbetterservices. • Themodelcanrecommendproductsthataremoresuit ableto thecustomer. • Directlydoonlineshoppingbasedon customer

		choicewithoutanysearch. • Itcanalso savealotoftime.
5.	**Buisness** **model(Revenuemodel)**	• Due to market dynamics and customer preferences,thereisalargevocabularyofdistinctfashionproducts,aswell as high turnover. • Thisleadstosparsepurchasedata,whichchallengesthe usageoftraditional recommendersystems. • BetterexperienceandFeasibility. 
6.	**Scalabilityofthesolution**	• The solution can be made scalable by using microservice architecture provided that each server isresponsibleforcertainfunctionalityoftheapplication. • Storinguserpreferences alongwiththeproductinthebrowser cookie will enable it to provide a responseinstantlyand allows for fetchingrelated products. • Thescalabilitycanbe increasedbyincreasingthenumber of products and also the accuracy of theproductsuggestions

PROBLEMSOLUTIONFIT



4.REQUIREMENTANALYSIS

FUNCTIONALREQUIREMENT:

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Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	**Sign up**	Register by using mobile number/ Register by using email id.
FR-2	**User Verification**	Verify via Email Verify via OTP
FR-3	**Login**	Login by using username / password
FR-4	**Profile Updation**	Update the profile details like Name,Gender, Age ,Address & mobile number ,etc,.
FR-5	**Chatbot**	Chatbot is useful to search products , view offers,discounts and stock availability. It is also used to solve queries and issues.
FR-6	**Ordering the product**	After confirming the product , buy the product via Cash on Delivery or online transactions.
FR-7	**Tracking the ordered Product**	After ordering the product , track the delivery via link received to your registered mobile number through SMS or registered email id.
FR-8	**Logout**	After receiving the product ,user can logout the account when he/she needs

NON-FUNCTIONALREQUIREMENTS:

SMARTFASHIONRECOMMENDERAPPLICATION

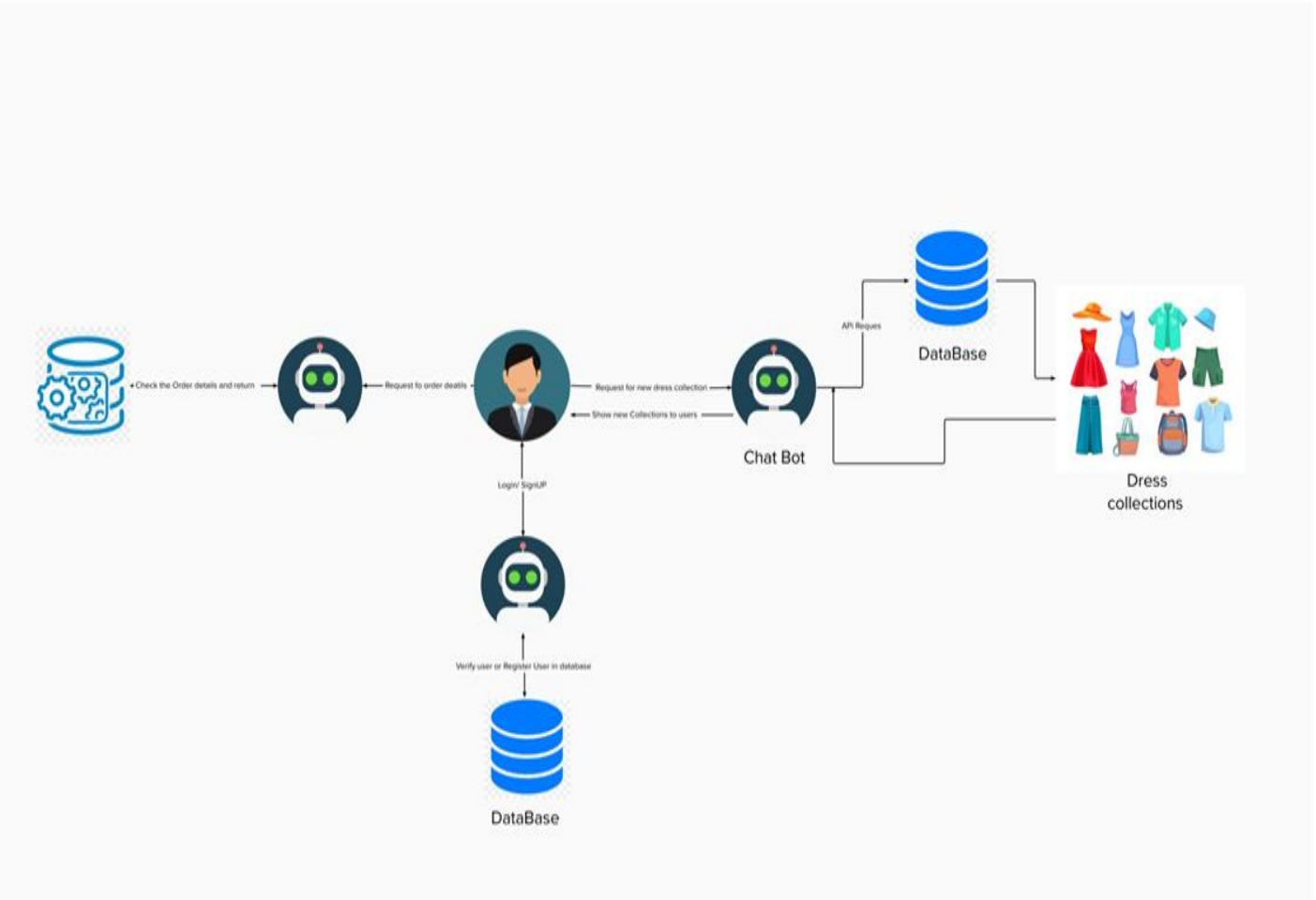
Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	The application will be designed in such a way that any user can easily navigate through it and user can easily view , order and track the product until delivery.(Easy and Compact design.)
NFR-2	**Security**	Using of SSL (Secure Socket Layer) certificate (Python Flask to Cloud connect) will provide security to the project. The user details will be kept as more secure.
NFR-3	**Reliability**	To make sure the application doesn't go down due to network traffic and the details entered in this application is kept as highly confidential, so it is highly reliable.
NFR-4	**Performance**	It focus on loading the application as quickly as possible irrespective of the number of users/integrator traffic.
NFR-5	**Availability**	This application will be available to all users (network connectivity is necessary) at any given point of time. Users can access the chatbot for raising any queries/ questions.
NFR-6	**Scalability**	Chatbot can be very useful during festival season to know about offers and discounts. It will be helpful whenever we make online shopping.

5. PROJECTDESIGN

DATAFLOWDIAGRAMS:

A Data Flow Diagram (DFD) is a traditional visual representation of the information flowswithin a system. A neat and clear DFD can depict the right amount of the system requirementgraphically. It shows how data enters and leaves the system, what changes the information,andwheredatais stored.



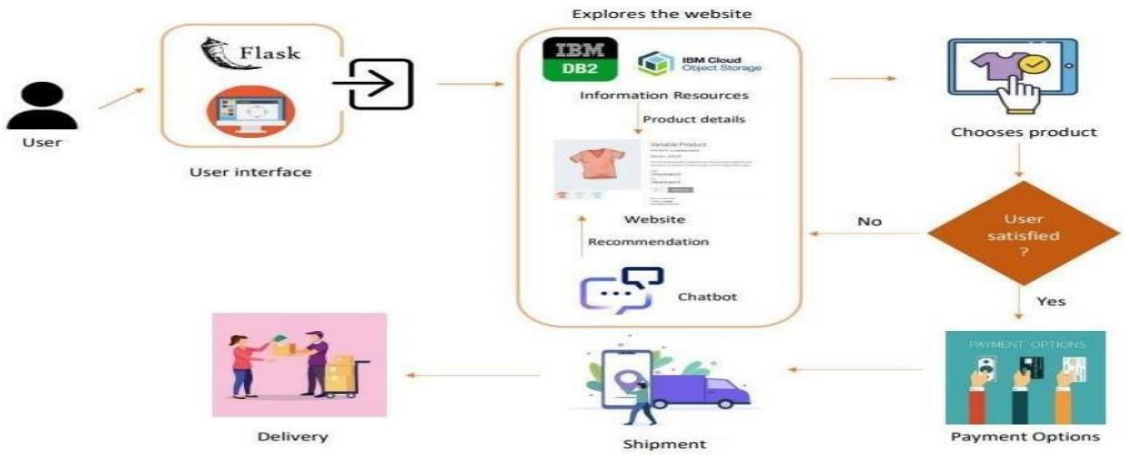
SOLUTION&TECHNICALARCHITECTURE:

We have developed a new innovative solution through which you can directly do your onlineshopping based onyourchoice without any search. Itcan be done by using the chatbot.Inthisprojectyou will beworkingon two modules:

• Admin

• User

Instead of searching for products in the search bar and navigating to individual products tofind required preferences, this project leverages the use of chatbots to gather all requiredpreferences and recommend products to the user. The solution is implemented in such a wayastoimprovetheinteractivitybetweencustomersandapplications.Thechatbotsendsmessages periodically to notify offers and preferences. For security concerns, this applicationuses a token to authenticate and authorize users securely. The token has encoded user id androle.Basedontheencodedinformation,access totheresourcesisrestricted tospecificusers.



USERSTORIES:

Use the below template to list all the user stories for the product.

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user)	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	I can access my account / dashboard	High	Sprint-1
		USN-2	As a user, I will receive confirmation email once I have registered for the application	I can receive confirmation email & click confirm	High	Sprint-1
		USN-3	As a user, I can register for the application through Facebook	I can register & access the dashboard with Facebook Login	Low	Sprint-2
		USN-4	As a user, I can register for the application through Gmail		Medium	Sprint-1
	Login	USN-5	As a user, I can log into the application by entering email & password	I can access my data by login	High	Sprint-1
	Dashboard	USN-6	As a user , I can view the dashboard and by products		High	Sprit -2
Customer (Web user)	Registration / Login	USN-7	As a user, I can register for the application by entering my email, password, and confirming my password.	I can access my account / dashboard		Sprint -1
Customer Care Executive	Contact with Customers	USN-8	As a Customer customers care executive, I solve the customer Requirements and feedback	I can receive calls from customers	High	Sprint-1

Administrator	Check stock and Price , orders	USN_9	As a Administrator , I can Check the database And stock details and buying and selling prices	I am the administrator of the company	High	Sprint -2

6. PROJECTPLANNING&SCHEDULE

SPRINTPLANNING&ESTIMATION:

Milestones	Activities	Description
Project Development Phase	Delivery of Sprint – 1,2,3,4	To develop the code and submit the developed code by testing it
Setting up App environment	Create IBM Cloud account	Signup for an IBM Cloud account
	Create flask project	Getting started with Flask to create project
	Install IBM Cloud CLI	Install IBM Command LineInterface
	Docker CLI Installation	Installing Docker CLI on laptop
	Create an account in send grid	Create an account in sendgrid. Use the service as email integration to our application for sending emails
Implementing web Application	Create UI to interact with Application	Create UI · Registration page · Login page · View products page · Add products page
	Create IBM DB2 & connect with python	Create IBM DB2 service in IBM Cloud and connect with python code with DB
Integrating sendgrid service	Sendgrid integration with python	To send emails form the application we need to integrate the Sendgrid service
Developing a chatbot	Building a chatbot and Integrate to application	Build the chatbot and Integrate it to the flask application
Deployment of App in IBMCloud	Containerize the App	Create a docker image of your application and push it to the IBM container registry
	Upload image to IBM container registry	Upload the image to IBM container registry
	Deploy in kubernetes cluster	Once the image is uploaded to IBM Container registry deploy the image to IBM Kubernetes cluster

Ideation Phase	Literature Survey	Literature survey on the selected project & information gathering
	Empathy Map	Prepare Empathy map to capture the user Panis & Gains, prepare list of problem statement
	Ideation	Organizing the brainstorming session and priorities the top 3 ideas based on feasibility & Importance
Project Design Phase I	Proposed Solution	Prepare proposed solution document which includes novelty, feasibility of ideas, business model, social impact, Scalability of solution
	Problem Solution Fit	Prepare problem solution fit document
	Solution Architecture	Prepare solution architecture document
Project Design Phase II	Customer Journey	Prepare customer journey map to understand the user interactions & experience with the application
	Functional requirement	Prepare functional & non functional requirement document
	Data Flow Diagram	Prepare Data Flow Diagramand user stories
	Technology architecture	Draw the technology architecture diagram
Project Planning Phase	Milestones & Activity list	Prepare milestones and activity list of the project
	Sprint Delivery Plan	Prepare sprint delivery plan

SPRINTDELIVERYSCHEDULE:

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story points	Priority	Team Members
Sprint-1	Setting up App environment	USN-1	As a user, I can register in ICTA Academy and create IBM cloud account.	2	High	Shaamik J Sudhashini S
Sprint-1		USN-2	As a user, I will create a flask project	1	Low	Nikhila J Sudhashini S
Sprint-1		USN-3	As a user, I will install IBM Cloud CLI	2	Medium	Shaamik J Sudhashini S Nikhila J
Sprint-2	Setting up App environment	USN-4	As a user, I can install Docker CLI	1	Low	Yogeswaran S Vigneshwaran M
Sprint-2		USN-5	As a user, I will Create an account in sendgrid	2	Medium	Vigneshwaran M Sudhashini S

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	18	6 Days	24 Oct 2022	29 Oct 2022	24	29 Oct 2022
Sprint-2	18	6 Days	31 Oct 2022	05 Nov 2022	24	05 Nov 2022
Sprint-3	18	6 Days	07 Nov 2022	12 Nov 2022	24	12 Nov 2022
Sprint-4	18	6 Days	14 Nov 2022	19 Nov 2022	24	19 Nov 2022

Velocity

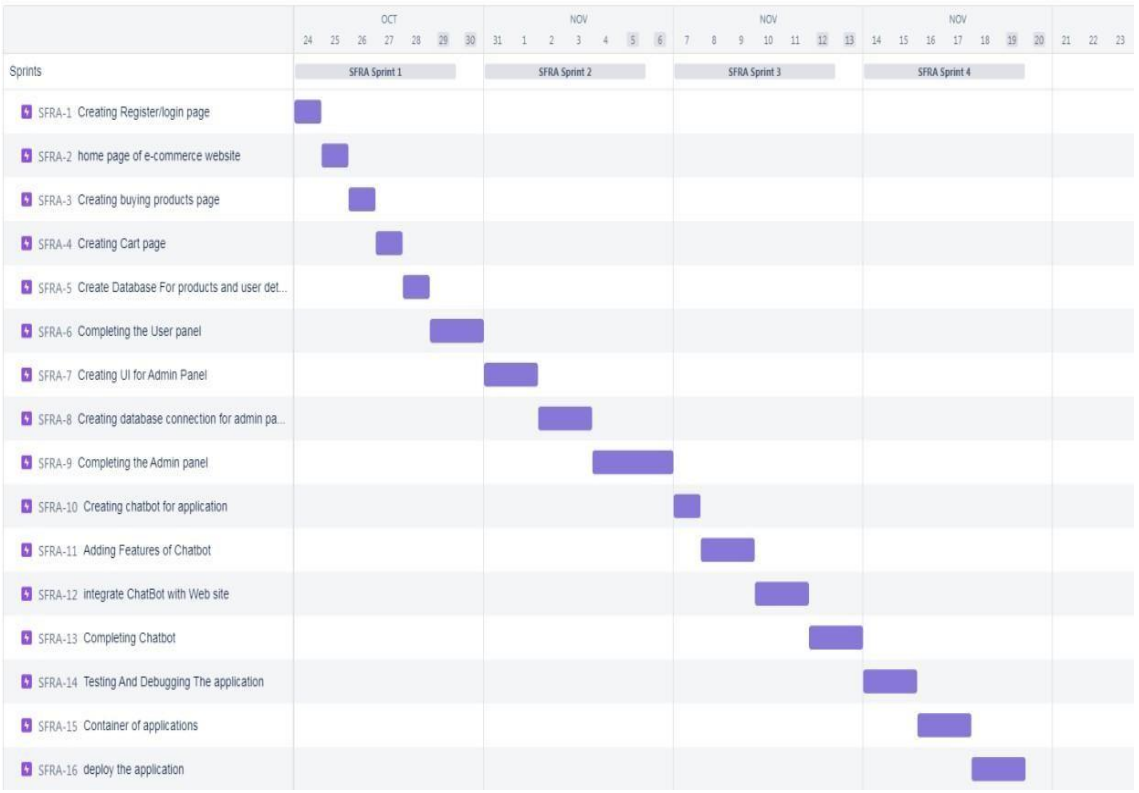
Imagine we have a 6-day sprint duration, and the velocity of the team is 18(points per sprint). Let's calculate the team's average velocity (AV) per iteration unit (story points per day)

$$AV = \text{Sprint Duration} / \text{Velocity}$$

$$AV = 24/6 = 4$$

REPORTSFROMJIRA:

Burndown Chart:



7. CODING&SOLUTIONING

FEATURE-

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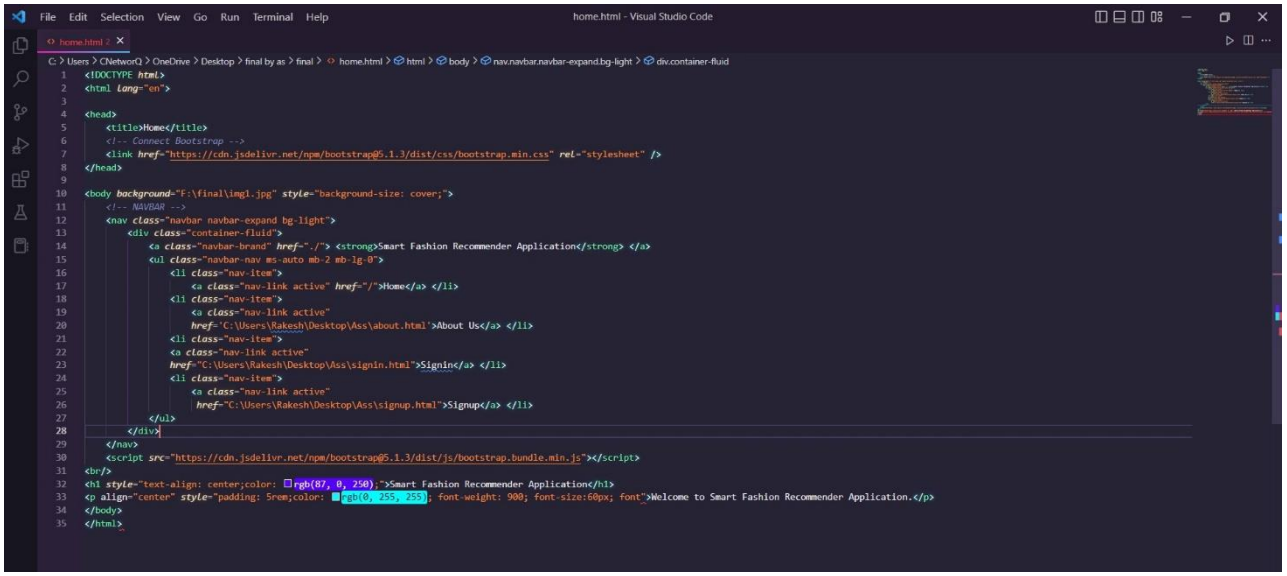

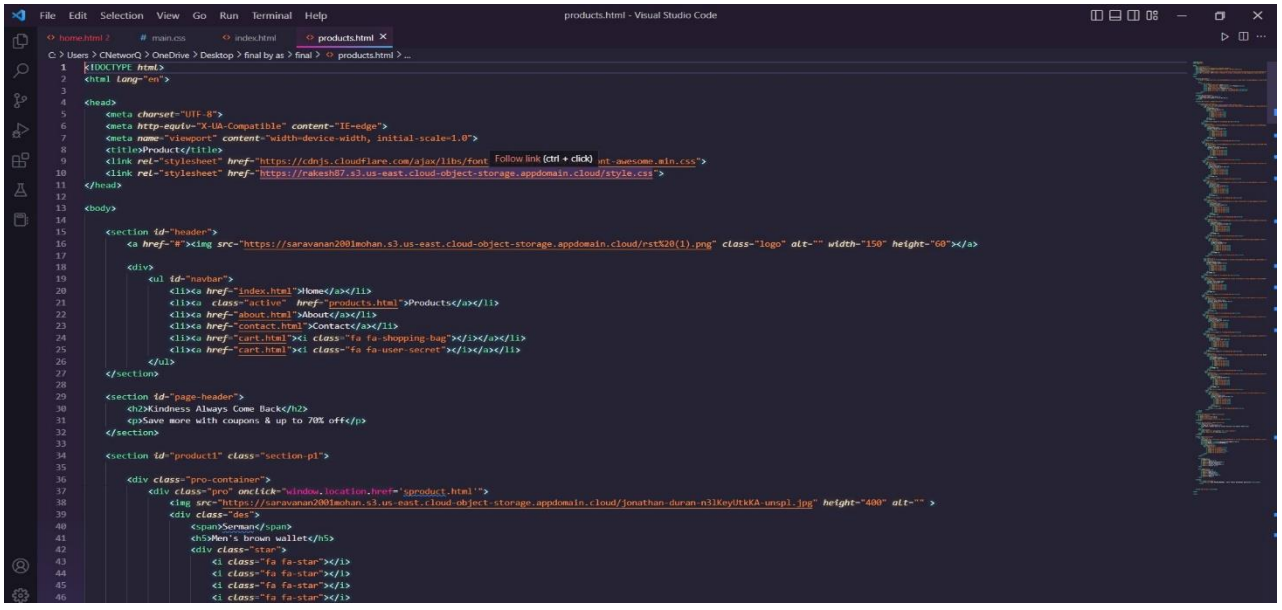

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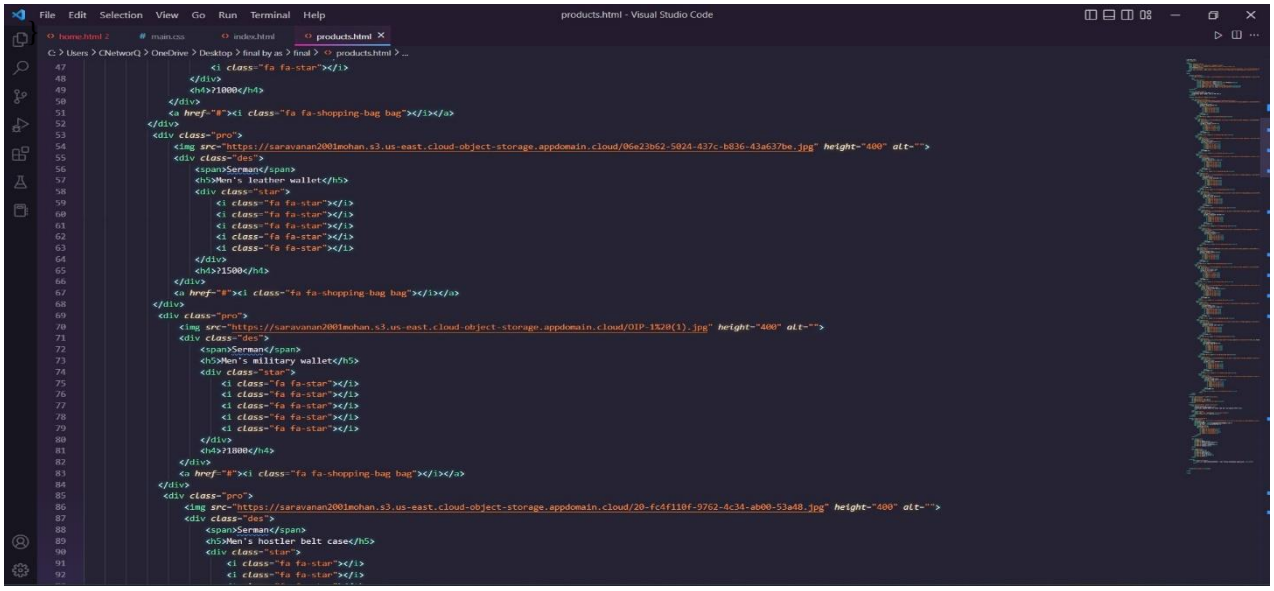

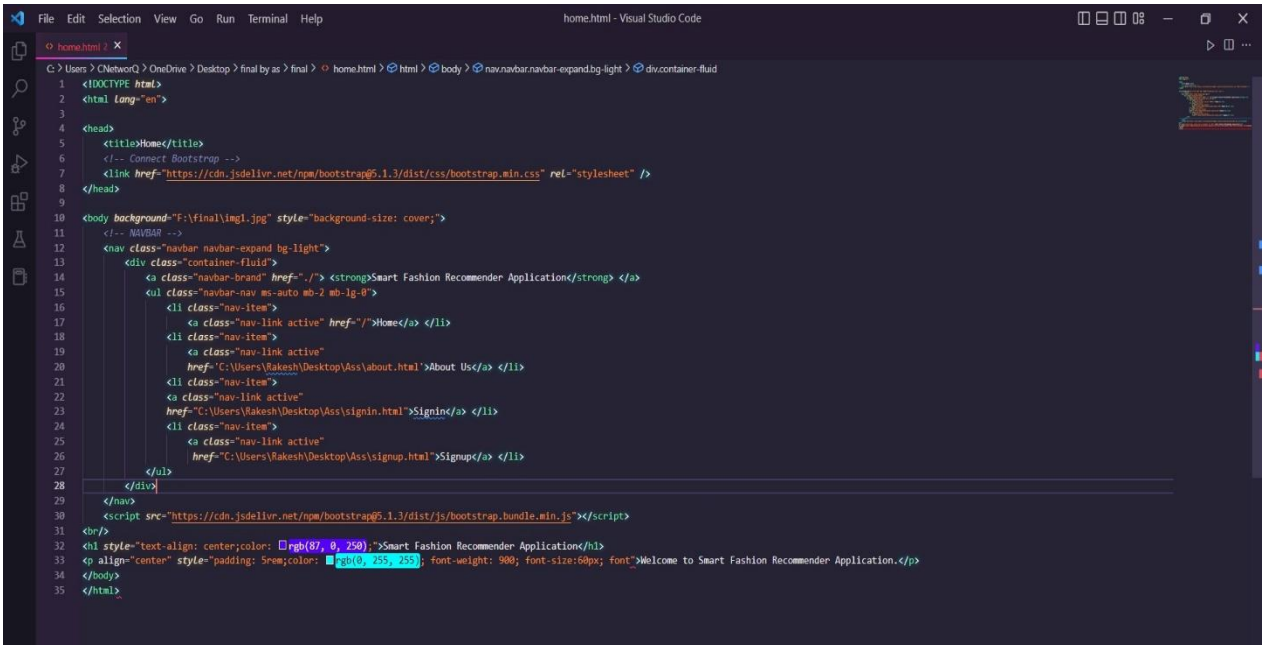

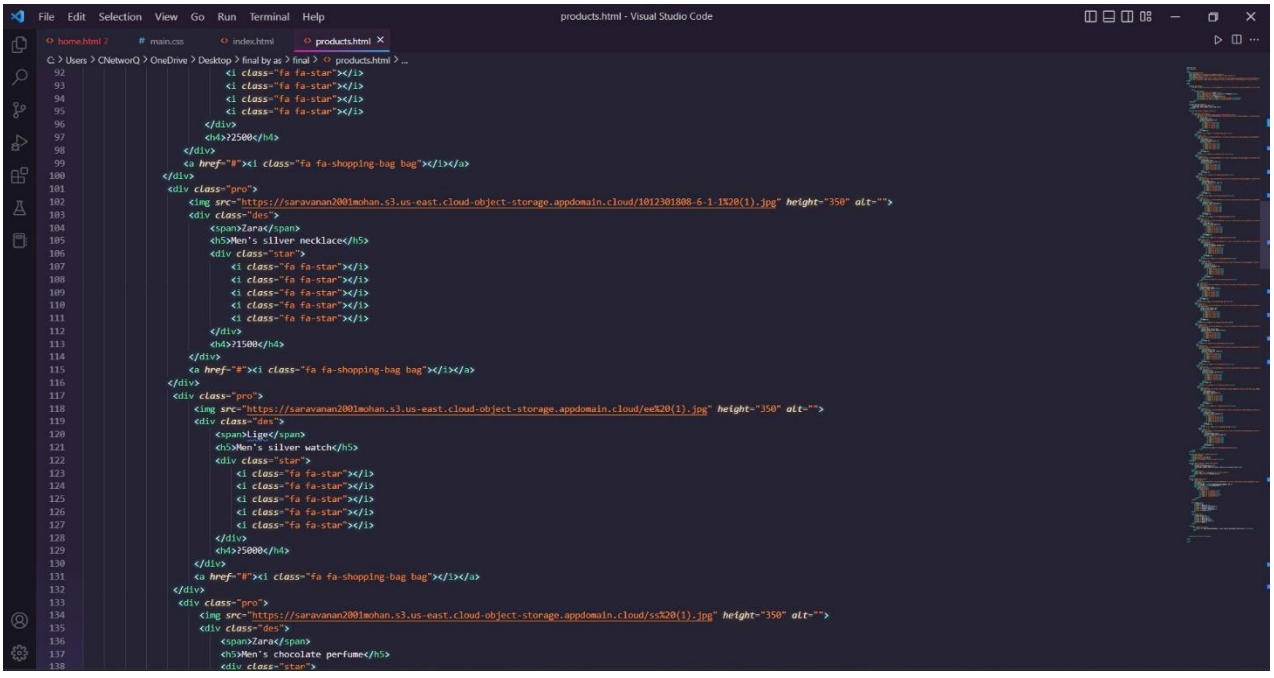

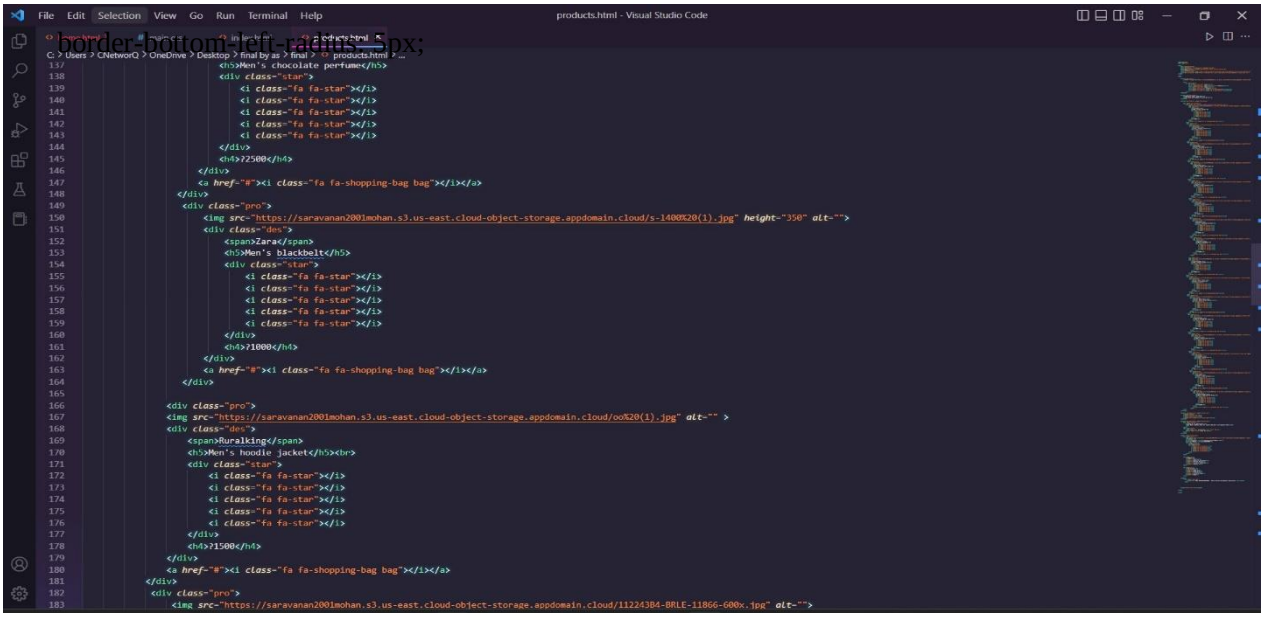
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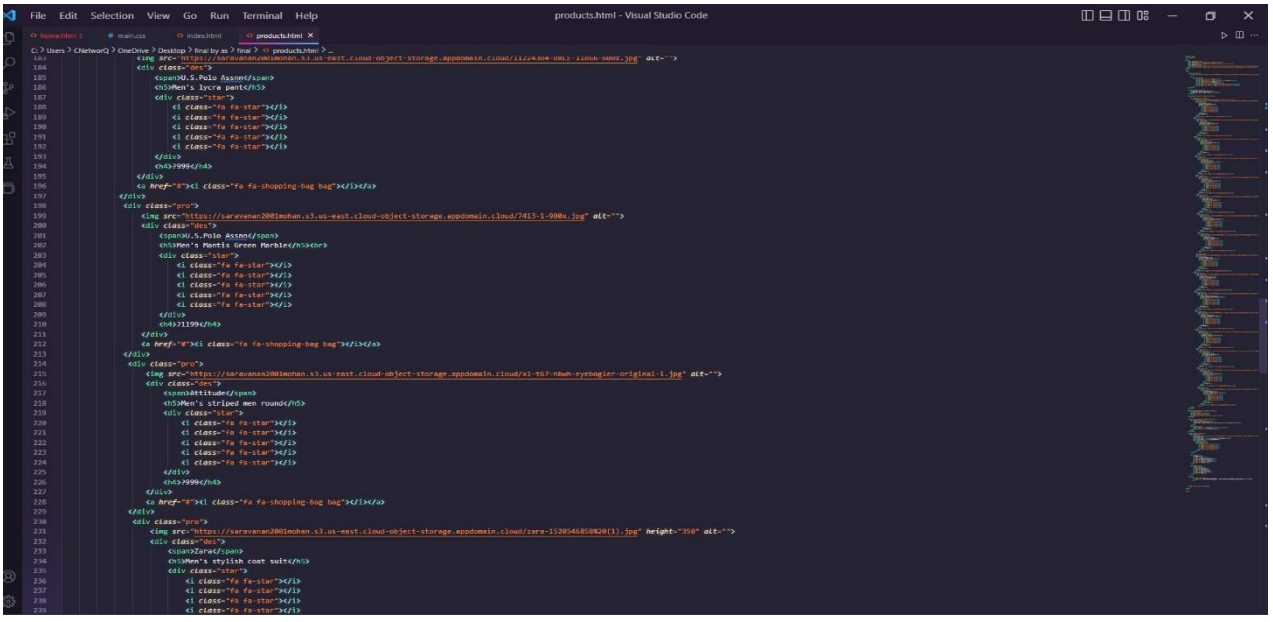

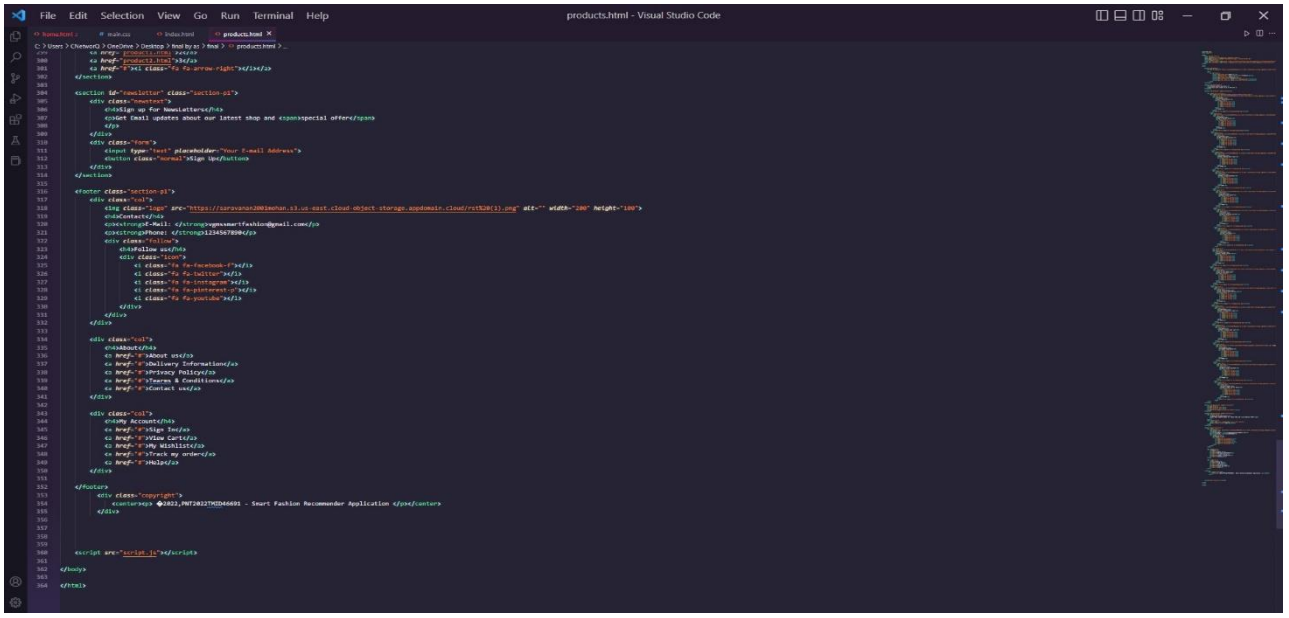

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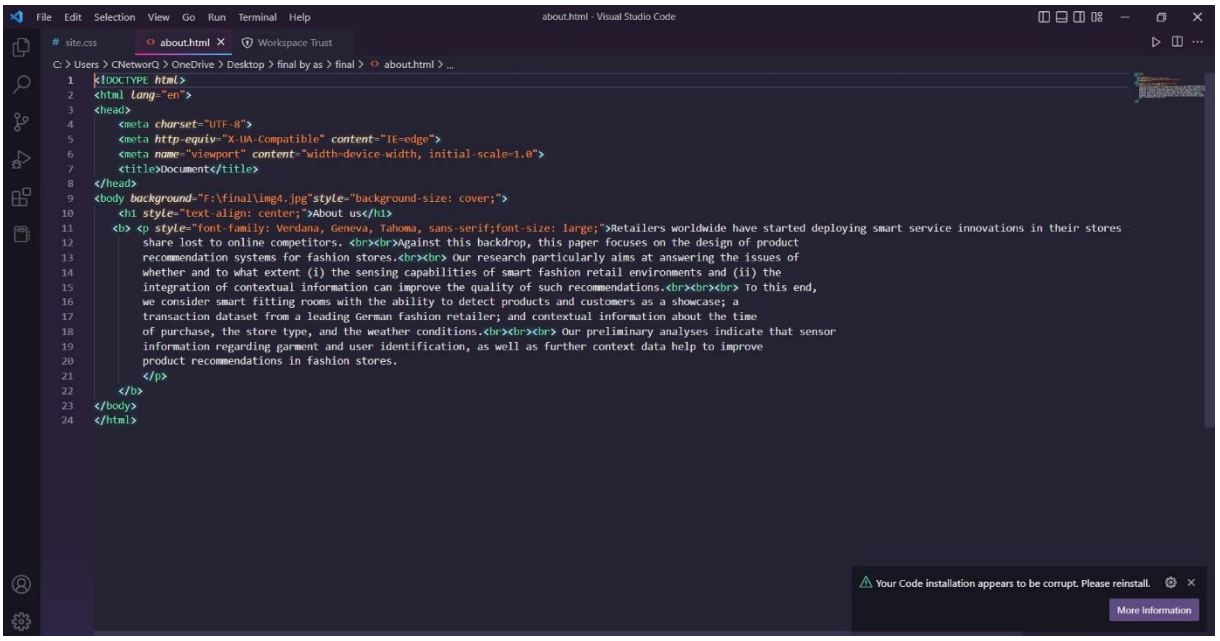

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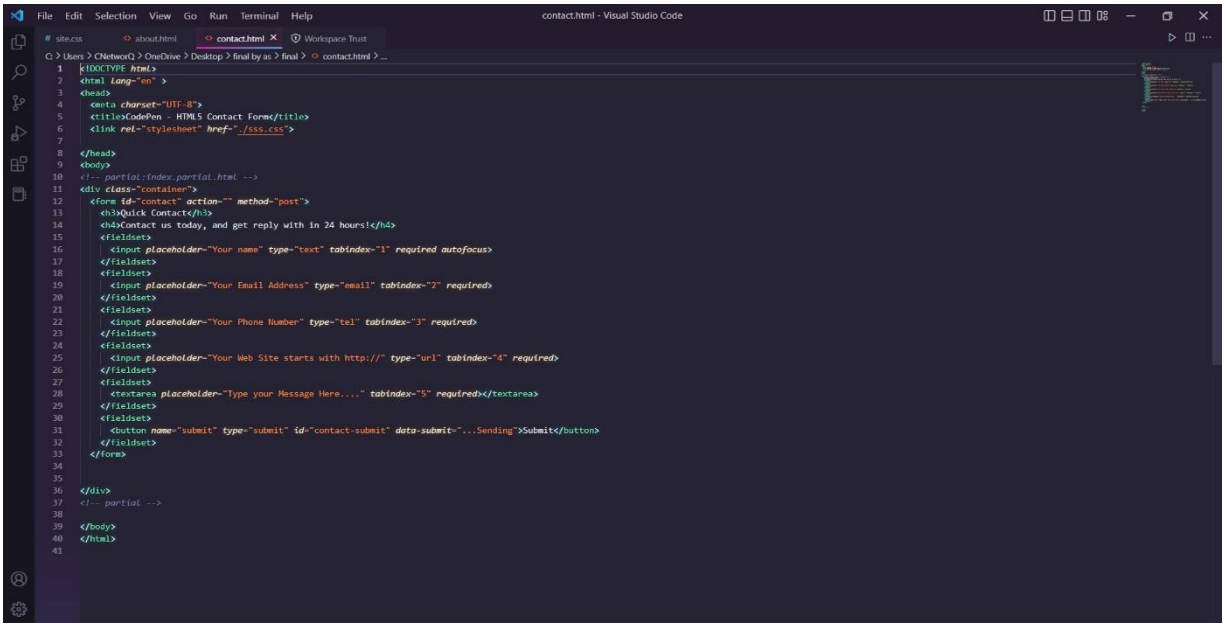

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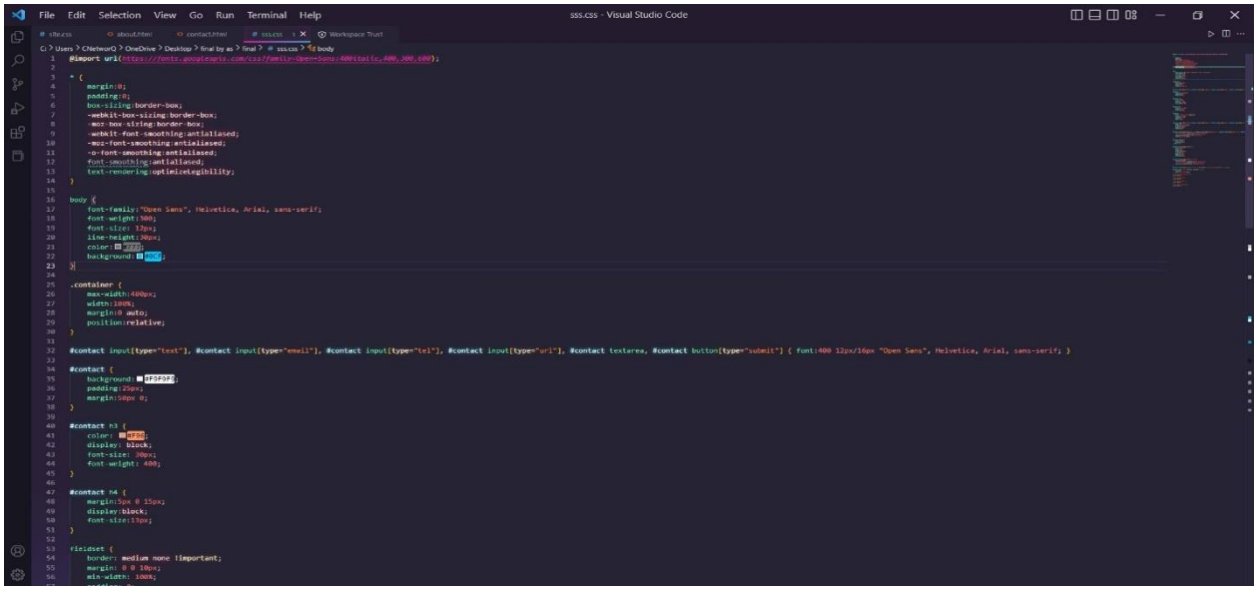
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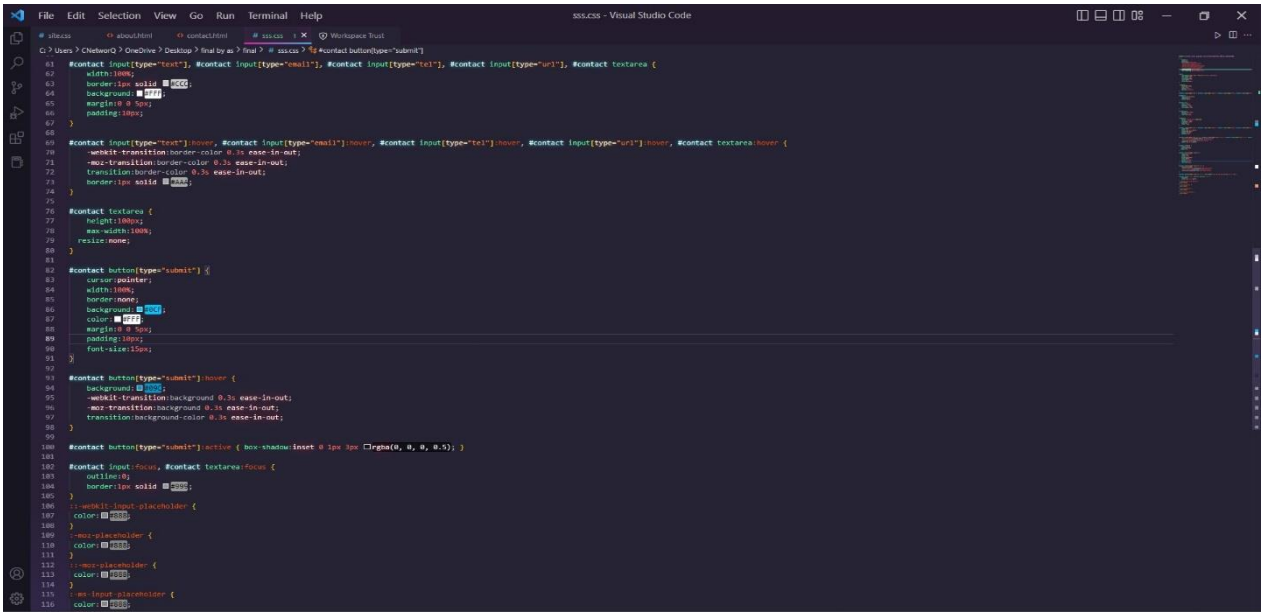
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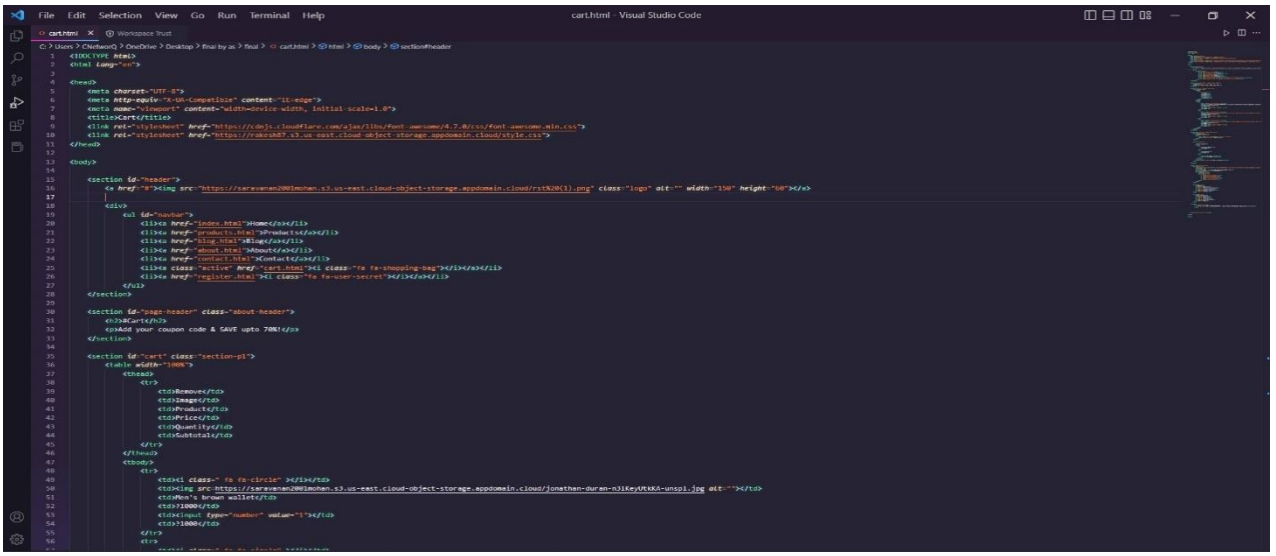
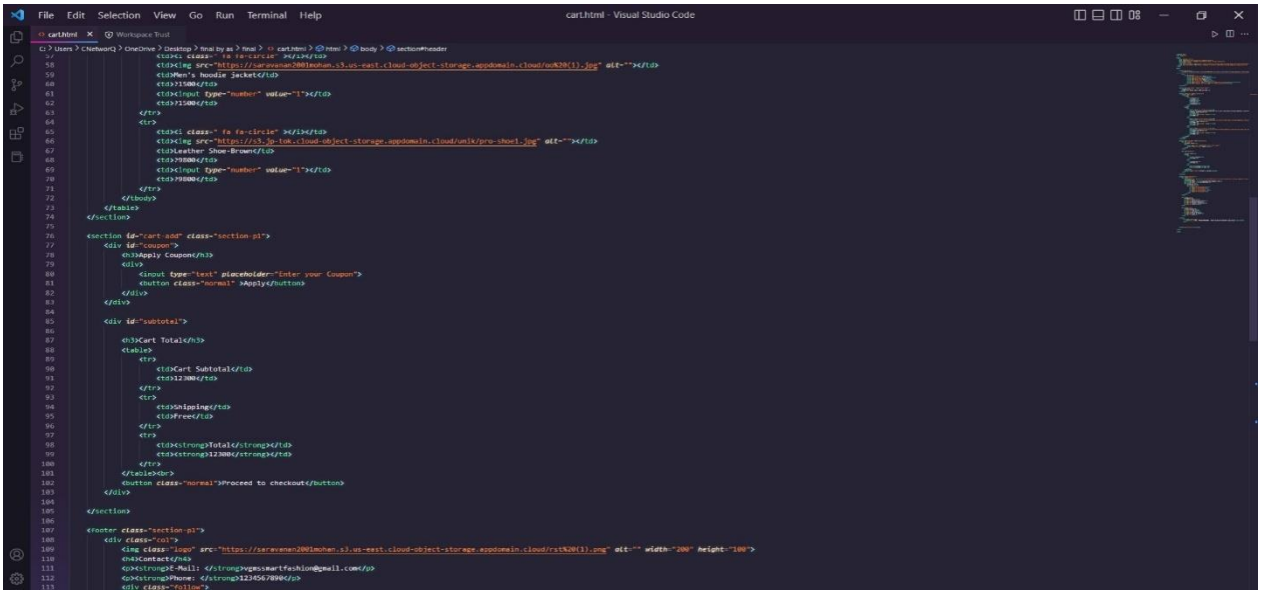
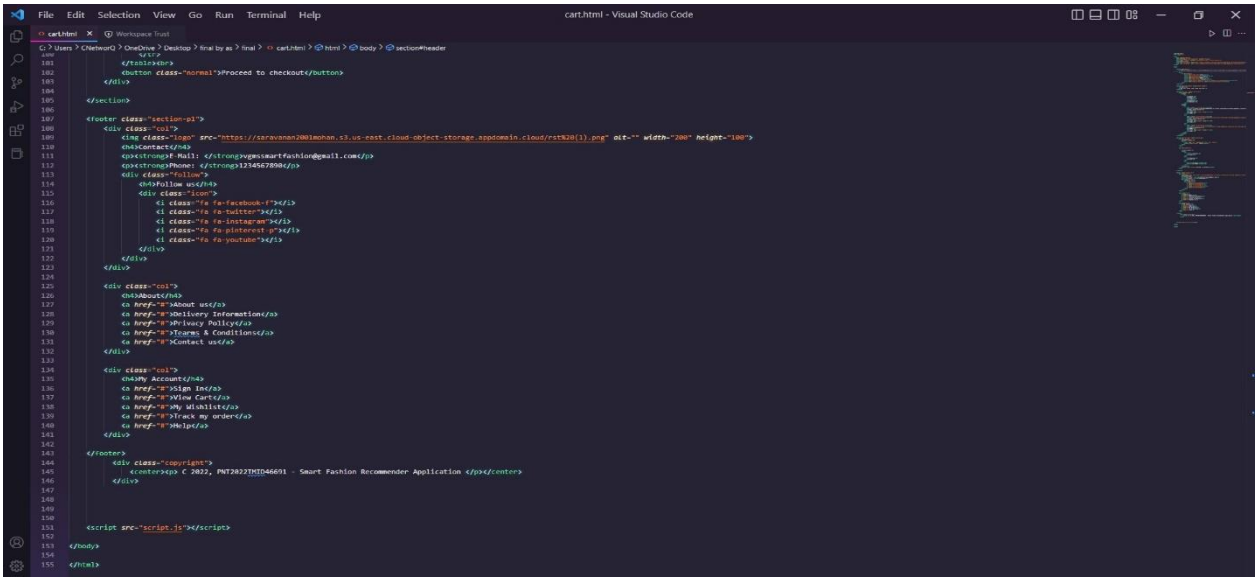
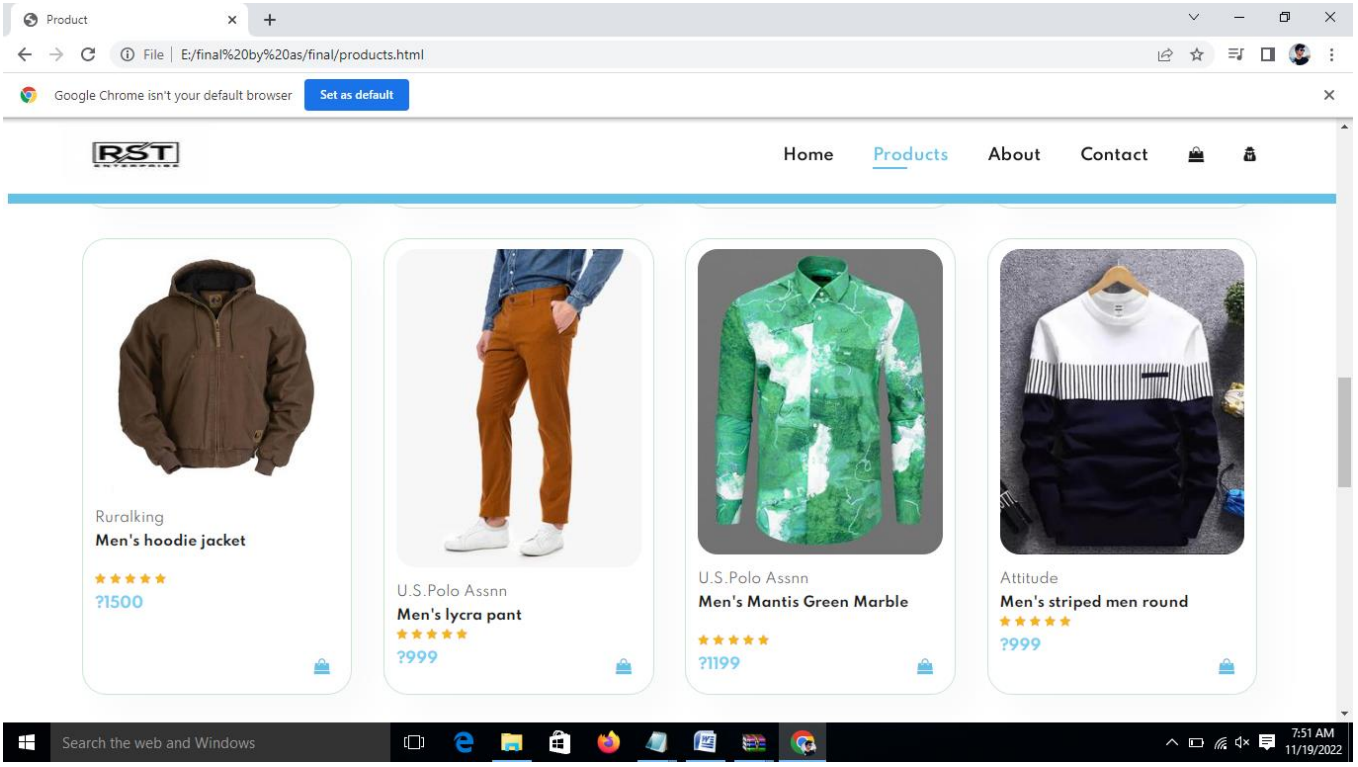
CART.HTML







OUR WEB PAGE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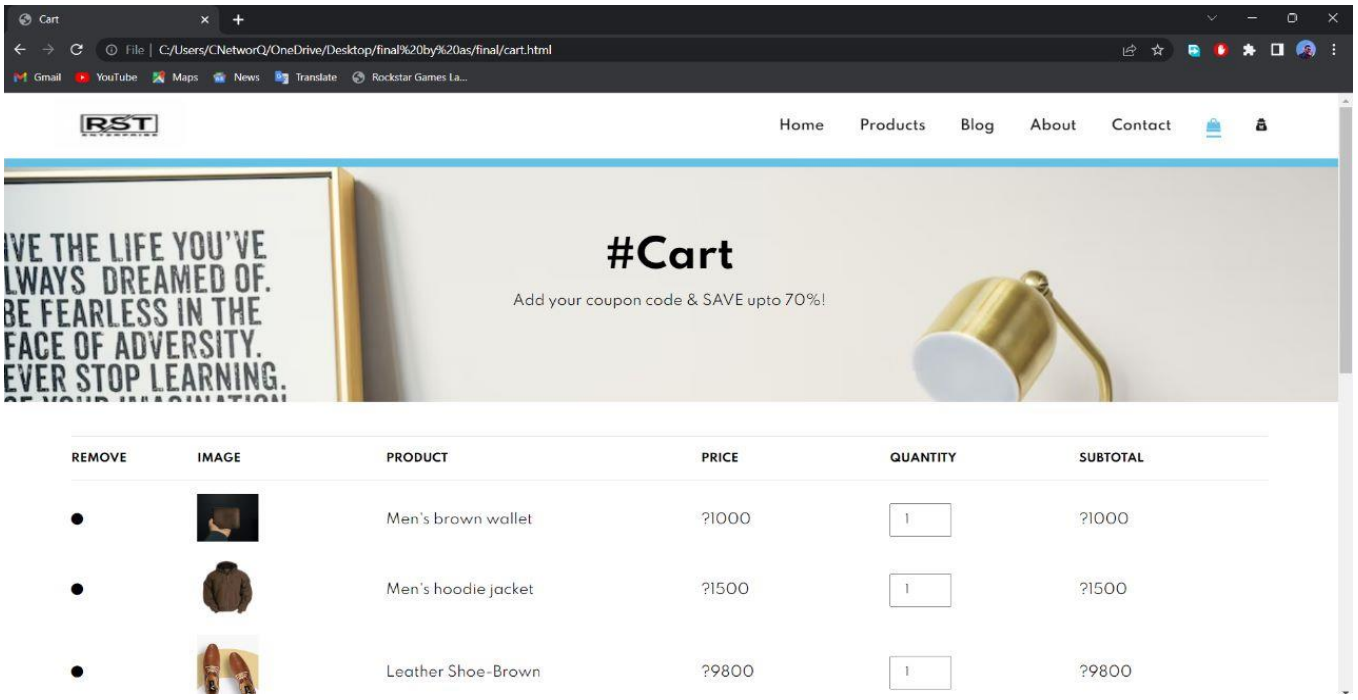
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Add your coupon code & SAVE upto 70%!
REMOVE
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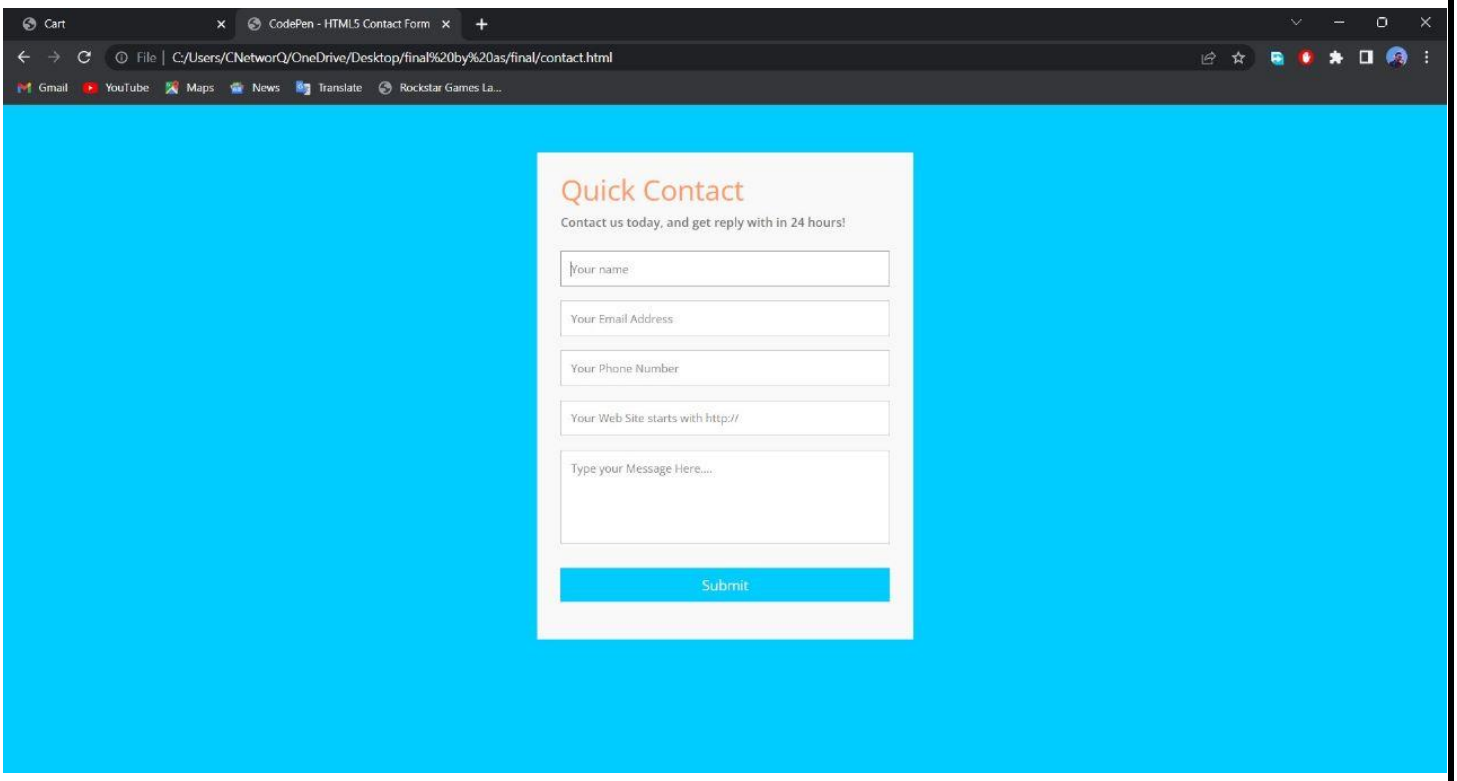
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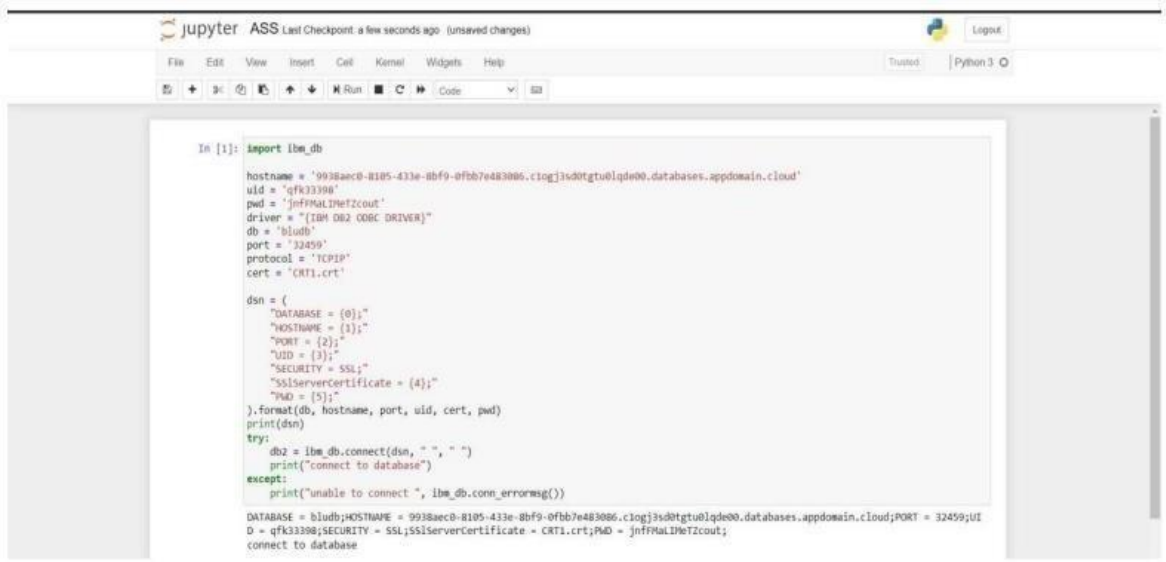
Maps
News
Translate
Rockstar Games La...
Quick Contact
Contact us today, and get reply with in 24 hours!
Your name
Your Email Address
Your Phone Number
Your Web Site starts with http://
Type your Message Here....
Submit

DATABASE SCHEMA:



8. TESTING

8.1TESTCASES:

1. PurposeofDocument

The purpose of this document is to briefly explain the test coverage and openissuesofthe[ProductName]projectatthetimeofthereleasetoUserAcceptance Testing (UAT).

2. DefectAnalysis

Thisreport showsthenumberofresolvedorclosedbugsateachseveritylevel,andhowtheywere resolved

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
ByDesign	10	4	2	3	20
Duplicate	1	0	3	0	4
External	2	3	0	1	6
Fixed	11	2	4	20	37
NotReproduced	0	0	1	0	0
Skipped	0	0	0	0	0
Won'tFix	0	0	0	0	0
Totals	24	14	13	26	77

3. TestCaseAnalysis

Thisreport shows thenumberof test casesthat havepassed, failed,anduntested

Section	TotalCases	NotTested	Fail	Pass
Print Engine	7	0	0	7
ClientApplication	51	0	0	51
Security	2	0	0	2
OutsourceShipping	3	0	0	3
ExceptionReporting	9	0	0	9
FinalReportOutput	4	0	0	4
VersionControl	2	0	0	2

9. RESULTS

PERFORMANCEMETRICS:

The performance of a recommendation algorithm is evaluated by using some specific metricsthat indicate the accuracy of the system. The type of metric used depends on the type offiltering technique. Root Mean Square Error (RMSE), Receiver Operating Characteristics(ROC),Area UnderCover(AUC),Precision,RecallandF1scoreisgenerally usedtoevaluatethe performanceor accuracyof the recommendation algorithms.

Root-mean square error (RMSE). RMSE is widely used in evaluating and comparing theperformance of a recommendation system model compared to other models. A lower RMSEvalueindicateshigherperformancebytherecommendationmodel.RMSE,asmentionedby[61], can beas represented asfollows:

$$RMSE = \sqrt{\frac{1}{N_p}\sum_{u,i}(p_{ui} - r_{ui})^2} \quad (1)$$

where, N_p is the total number of predictions, p_{ui} is the predicted rating that a user u will selectanitem i and $r_{ui}$is thereal rating.

Precision. Precision can be defined as the fraction of correct recommendations or predictions(known as True Positive) to the total number of recommendations provided, which can be asrepresentedas follows:

$$Precision = \frac{True\ Positive\ (TP)}{True\ Positive\ (TP) + False\ Positive\ (FP)} \quad (2)$$

It is also defined as the ratio of the number of relevant recommended items to the number ofrecommendeditemsexpressed as percentages.

Recall. Recall can be defined as the fraction of correct recommendations or predictions(knownasTruePositive)tothetotalnumberofcorrectrelevantrecommendationsprovided,

whichcanbeas representedasfollows:

$$Recall = \frac{True\ Positive\ (TP)}{True\ Positive\ (TP) + False\ Negative\ (FN)} \quad (3)$$

It is also defined as the ratio of the number of relevant recommended items tothe totalnumberof relevant itemsexpressedas percentages.

F1 Score. F1 score is an indicator of the accuracy of the model and ranges from 0 to 1, wherea value close to 1 represents higher recommendation or prediction accuracy. It representsprecisionand recall asasinglemetricand can be as representedasfollows:

$$F1\ score = 2 \times \frac{Precision * Recall}{Precision + Recall} \quad (4)$$

Coverage. Coverage is used to measure the percentage of items which are recommended bythealgorithm amongallof theitems.

Accuracy.Accuracycanbedefinedastheratioofthenumberoftotalcorrectrecommendations to the total recommendations provided, which can be as represented asfollows:

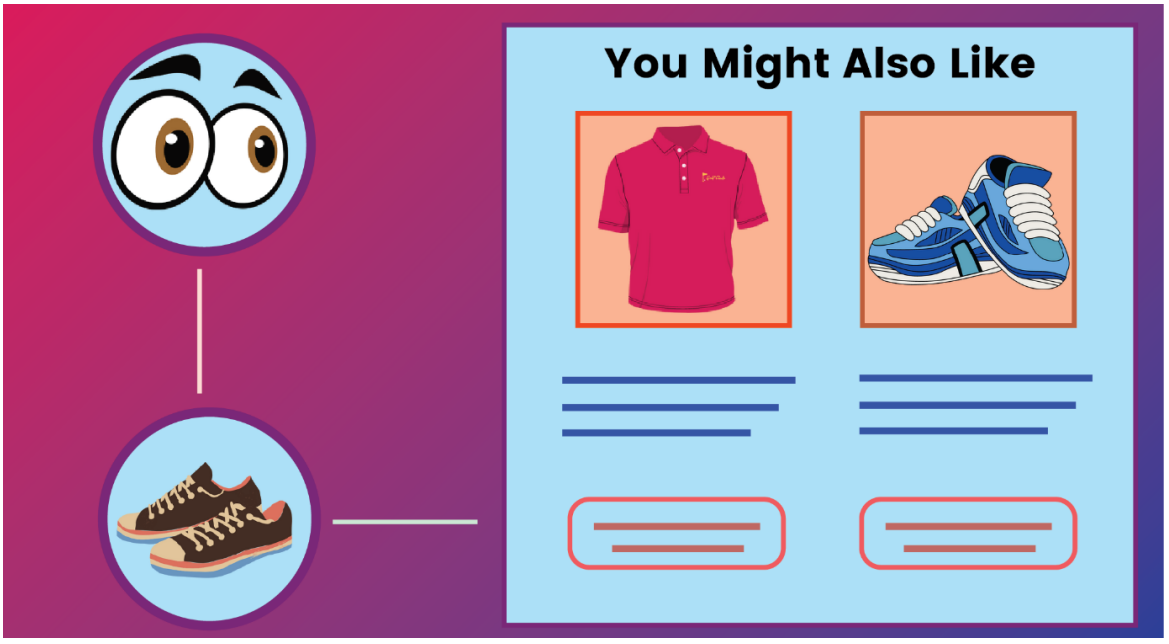
10. ADVANTAGES &

DISADVANTAGESADVANTAGES:

- Smartfashionrecommenderapplicationistheuserfriendly.
- Withthehelpofchatbotusercandfind theproductsveryeasily.
- This application used to discover the product based on the user's choice , very easilyandquickly.
- Ithaveabilityto reducetransactioncosts forconsumers,andincreaserevenueforretailers.

DISADVANTAGES:

- Itneedactiveinternet connection.
- Privacyconcerns.
- Toomanychoices.
- Cold-startproblem.



11. CONCLUSION

The Fashion Recommendation System is mainly used to recommend the best possible outfitcombinations to a user who has no fashion sense based on their wardrobe . It may not alwaysprovide the best possible outfit to wear for an occasion as the system is dependent completelyon the clothes present in the user's wardrobe. Also another reason is that fashion is highlydependent on the time period. However the system does a great job in inculcating a fashionsenseamongtheusersandcanprovidethebestrecommendationsbasedontheuser'swardrobe . Since the system is implemented as a website, it is very easy for the end users toaccess as well as use. The scope of this system can be expanded by including the ability todetectthevariousdesignandpatternsonclothing,andtoincreasethenumberofoccasions.

12. FUTURESCOPE

In the future, to implement this recommendation system to be extended to include male andnon-binary fashion items including apparel, footwear, accessories etc. This work can furtherbeenhanced topredict fashion itemsbased onthe skin colourand weatherconditions.

Futureresearchshouldconcentrateonincludingtimeseriesanalysisandaccuratecategorization of product images based on the variation in colour, trend and clothing style inorder to develop an effective recommendation system. The proposed model will followbrand-specific personalizationcampaignsandhence itwillensure highly curated andtailored.offerings for users. Hence, this research will be highly beneficial for researchers interested inusingaugmented and virtualrealityfeatures todevelop recommendationsystems.

13. APPENDIX

GITHUB

GITHUBLINK:

https://github.com/IBM-EPBL/IBM-Project-6649-1658834176.git