

IBM – NALAIYA THIRAN PROJECT

SMART FASHION RECOMMENDER APPLICATION

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ABSTRACT

In recent years, the textile and fashion industries have witnessed an enormous amount of growth in fast fashion. On e-commerce platforms, where numerous choices are available, an recommendation system is required to sort, order, and efficiently convey relevant product content or information to users. Image-based fashion recommendation systems (FRSs) have attracted a huge amount of attention from fast fashion retailers as they provide a personalized shopping experience to consumers. With the technological advancements, this branch of artificial intelligence exhibits a tremendous amount of potential in image processing, parsing, classification, and segmentation. Despite its huge potential, the number of academic articles on this topic is limited. The available studies do not provide a rigorous review of fashion recommendation systems and the corresponding filtering techniques. To the best of the author's knowledge, this is the first scholarly article to review the state-of-the-art fashion recommendation systems and the corresponding filtering techniques. In addition, this review also explores various potential models that could be implemented to develop fashion recommendation systems in the future.

Fashion is perceived as a meaningful way of self-expressing that people use for different purposes. It seems to be an integral part of every person in modern societies, from everyday life to exceptional events & occasions. Fashionable products are highly demanded, and consequently, fashion is perceived as a desirable and profitable industry. Although this massive demand for fashion products provides an excellent opportunity for companies to invest in fashion-related sectors, it also faces different challenges in answering their customer needs.

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1. INTRODUCTION

PROJECT OVERVIEW

Clothing is a kind of symbol that represents people's internal perceptions through their outer appearance. It conveys information about their choices, faith, personality, profession, social status, and attitude towards life. Therefore, clothing is believed to be a nonverbal way of communicating and a major part of people's outer appearance . Recent technological advancements have enabled consumers to track current fashion trends around the globe, which influence their choices . The fashion choices of consumers depend on many factors, such as demographics, geographic location, individual preferences, interpersonal influences, age, gender, season, and culture . Moreover, previous fashion recommendation research shows that fashion preferences vary not only from country to country but also from city to city . The combination of fashion preferences and the abovementioned factors associated with clothing choices could transmit the image features for a better understanding of consumers' preferences .

PURPOSE

There is currently no existing system that is capable of recommending clothes based on the occasion. Different occasions call for different clothing. Moreover, a lot of fashion is based on the color combinations of outfits. A person with no or little fashion sense will have a hard time to decide on clothes that leave a lasting impression. The proposed Fashion Recommendation System is intended to be used by individual users in order to store images of the clothes that they own in what is called a digital wardrobe and also to get recommendations by the system on what clothes to wear for a given occasion. The main aim of the project is to recommend the most appropriate clothes for a given occasion based on the clothes existing in the user's wardrobe to relieve the user of the burden of making decisions about what clothing to wear. Such a system should be capable of helping someone who has no fashion sense to wear clothes that leave a good impression on others. The system should be such that it is easily accessible and easy to take advantage of the various features that it provides. One of the features should be the ability to store images that the user uploads into a wardrobe. A wardrobe is a very useful entity that the user can use to view and manage the images of clothes that they have uploaded. This feature can also be used by the recommendation algorithm to recommend the clothes. Another feature is the classification of the type and color of the clothing that is uploaded by the user.

2. LITERATURE SURVEY

EXISTING PROBLEM:

In existing system only simple web application and their rating has been implemented in existing system, An ecommerce product recommendation engine is a piece of technology that displays recommended products to shoppers throughout your store. It uses machine learning to get smarter and show increasingly relevant products to shoppers based on their interests and previous browsing behaviour

REFERENCES:

1. Global Info Research: Global Fast Fashion Apparel Market 2021 by Key Countries, Companies, Type and Application. Global Info Research, Hong Kong, 2021.
2. Hou, M., Wu, L., Chen, E., Li, Z., Zheng, V. W., & Liu, Q.: Explainable fashion recommendation: A semantic attribute region guided approach. In Proceedings of the 28th Twenty-Eighth International Joint Conference on Artificial Intelligence, 2019; pp. 4681- 4688.
3. Hidayati, S. C., Hsu, C. C., Chang, Y. T., Hua, K. L., Fu, J., & Cheng, W. H.: What Dress Fits Me Best? Fashion Recommendation on the Clothing Style for Personal Body Shape. In Proceedings of the 26th ACM International Conference on Multimedia (MM '18). Association for Computing Machinery, New York, NY, USA, 2018; pp. 438-446.
4. Wang, H., Wang, N., & Yeung, D. Y.: Collaborative Deep Learning for Recommender Systems. In Proceedings of the 21th CM SIGKDD International Conference on Knowledge Discovery and Data Mining, New York, 2015; pp. 1235- 1244.

PROBLEM STATEMENT DEFINITION

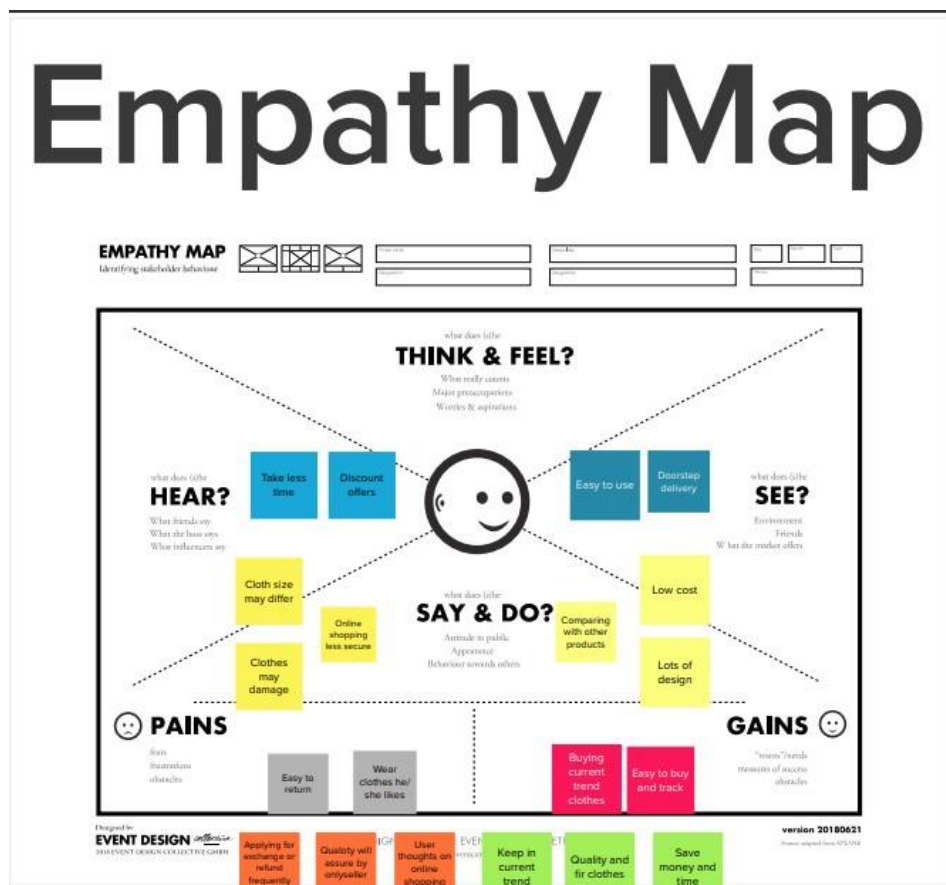
The personal information collected by recommenders raises the risk of unwanted exposure of that information. Also, malicious users can bias or sabotage the recommendations that are provided to other users. In recent years, the textile and fashion industries have witnessed an enormous amount of growth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

- The problem of the work is to design static web applications deployments with customer deployment
- Lack of interaction between application and user
- User need to navigate across multiple pages to choose right product
- Confusion in choosing product
- Lack of sales
- Complex User Interface.
- Lack of proper guidance.

3.IDEATION & PROPOSED SOLUTION

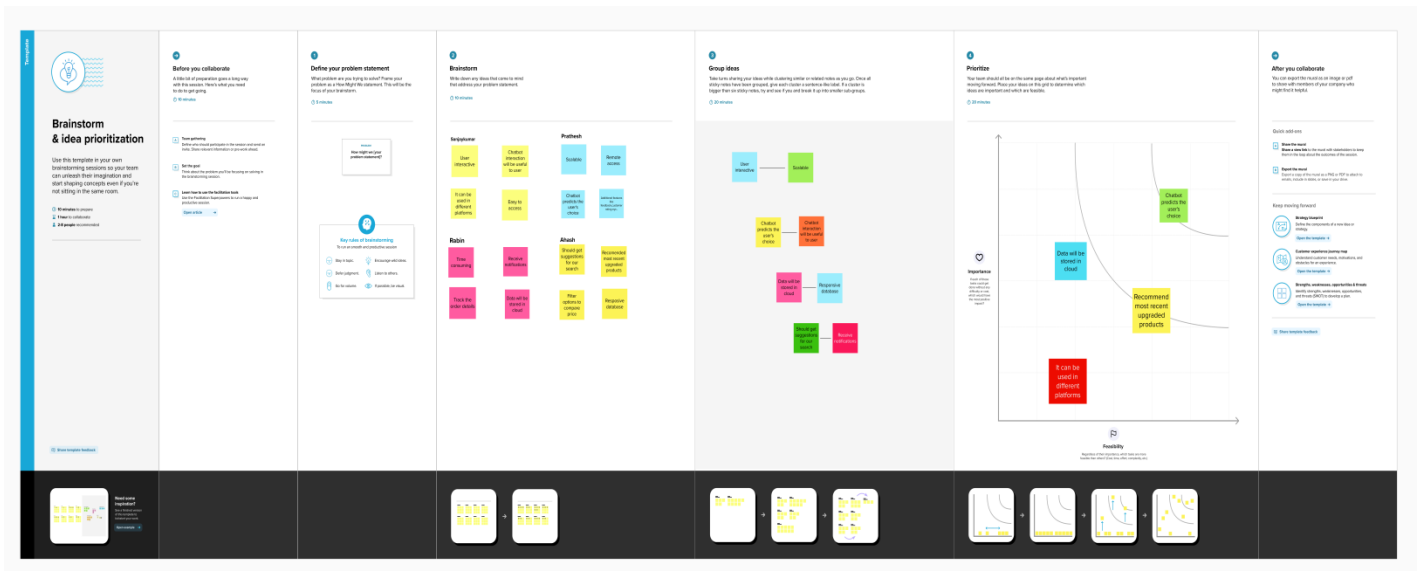
EMPATHY MAP CANVAS:

An empathy map is a simple, easy-to-digest visual that captures knowledge about a user's behaviours and attitudes. It is a useful tool to help teams better understand their users. Creating an effective solution requires understanding the true problem and the person who is experiencing it. The exercise of creating the map helps participants consider things from the user's perspective along with his or her goals and challenges. An empathy map is a collaborative tool teams can use to gain a deeper insight into their customers.



IDEATION & BRAINSTROMING:

A group problem-solving technique that involves the spontaneous contribution of ideas from all members of the group. The mulling over of ideas by one or more individuals in an attempt to devise or find a solution to a problem.



PROPOSED SOLUTION:

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	<ul style="list-style-type: none"> • Absence of interaction between the client and app • User required to navigate across multiple pages to choose the desired product. • Confusion in choosing a correct product • Complex User Interface. • Lack of Customer Support
2.	Idea / Solution description	<p>By using the Smart fashion recommender application:</p> <ul style="list-style-type: none"> • Enhance customer interaction and services. • Effective recommendation of products. • Recommendation within a single page via chatbot • Reduce Customer error • Proper guidance to access the application
3.	Novelty / Uniqueness	<ul style="list-style-type: none"> • The customer will talk to Chat Bot regarding the Products. Get the recommendations based on information provided by the user • Instead of searching manually a chatbot will help to find the right product effectively, with this feature user can save time and it is an easy process, chat keep sending a notification about new collections
4.	Social Impact / Customer Satisfaction	<ul style="list-style-type: none"> • The customer are provided with the fashion clothes they are seeking for using chat Bot. • The model can recommend products that are more suitable to the customer. • Directly do online shopping based on customer

5.	Business Model (Revenue Model)	<ul style="list-style-type: none"> • The customer purchase the product that are provided by chat Bot and generate avenue • Better experience and Feasibility.
6.	Scalability of the Solution	<ul style="list-style-type: none"> • The application can increase scalability by providing various kinds of product that the users looking for. • Storing user preferences along with the product in the browser cookie will enable it to provide a response instantly and allows for fetching related products.

PROBLEM SOLUTION FIT:

Project Title: Smart Fashion Recommendation Application

Project Design Phase-I - Solution Fit Template

Team ID: PNT2022TMID45305

Define CS, fit into CC	1. CUSTOMER SEGMENT(S) Who is your customer? I.e. working parents of 3-5 y. o. kids.	6. CUSTOMER CONSTRAINTS What constraints prevent your customers from taking action or limit their choices of solutions? I.e. spending power, budget, no cash, network connection, available services.	5. AVAILABLE SOLUTIONS Which solutions are available to the customers when they face the problem or need to get the job done? What have they tried in the past? What pros & cons do these solutions have? I.e. pen and paper.	Explore AS, differentiate
	The Customers are adult and children	Money and Network connection	Online Shopping gives new collections pros : easy to use cons : customer confused when have lost of collections	

Focus on J&P, TR, BC, BE, understand NC	2. JOBS-TO-BE-DONE / PROBLEMS Which jobs-to-be-done (or problems) do you address for your customers? There could be more than one; explore different.	9. PROBLEM ROOT CAUSE What is the real reason that this problem exists? What is the back story behind the need to do the job? I.e. customers have to do it because of the change in regulations.	7. BEHAVIOUR What does your customer do to address the problem and get the job done? I.e. directly related: find the right solar panel installer, calculate usage and benefits; indirectly associated: customers spend free time on volunteering work (i.e. Greenpeace).	Focus on J&P, TR, BC, BE, understand NC
	User hard to find Trending fashion clothes	Customers need to be with new fashions for current trends	Customers spend the time to find the new fashion clothes	

Identify strong TR & EM	3. TRIGGERS What triggers customers to act? I.e. seeing their neighbor installing solar panels, reading about a more efficient solution in the news.	10. YOUR SOLUTION If you are working on an existing business, write down your current solution first, fill in the canvas, and check how much it fits reality. If you are working on a new business proposition, then keep it blank until you fill in the canvas and come up with a solution that fits within customer limitations, solves a problem and matches customer behavior.	8. CHANNELS of BEHAVIOUR 8.1 ONLINE What kind of actions do customers take online? Extract online channels from #7. 8.2 OFFLINE What kind of actions do customers take offline? Extract offline channels from #7 and use them for customer development.	Identify strong TR & EM
	Seeing neighbor dressing styles		ONLINE : Customers buy the new clothes OFFLINE : Customers will use the clothes	
4. EMOTIONS: BEFORE / AFTER How do customers feel when they face a problem or a job and afterwards? I.e. lost, insecure -> confident, in control - use it in your communication strategy & design.		Make a chatbot Assistant for shopping with customers and send notifications when new collections arrived		

4.REQUIREMENT ANALYSIS

FUNCTIONAL REQUIREMENT:

Following are the functional requirements of the proposed solution.

No.	Functional Requirement	Sub Requirement
1	User Registration	Registration through Form
2	User Interaction	Interact through the Chat Bot
3	Buying Products	Through the chat Bot Recommendation
4	Track Products	Ask the Chat Bot to Track the Orders
5	Return Products	Through the chat Bot
6	New Collections	Recommended from chat Bot

NON-FUNCTIONAL REQUIREMENTS:

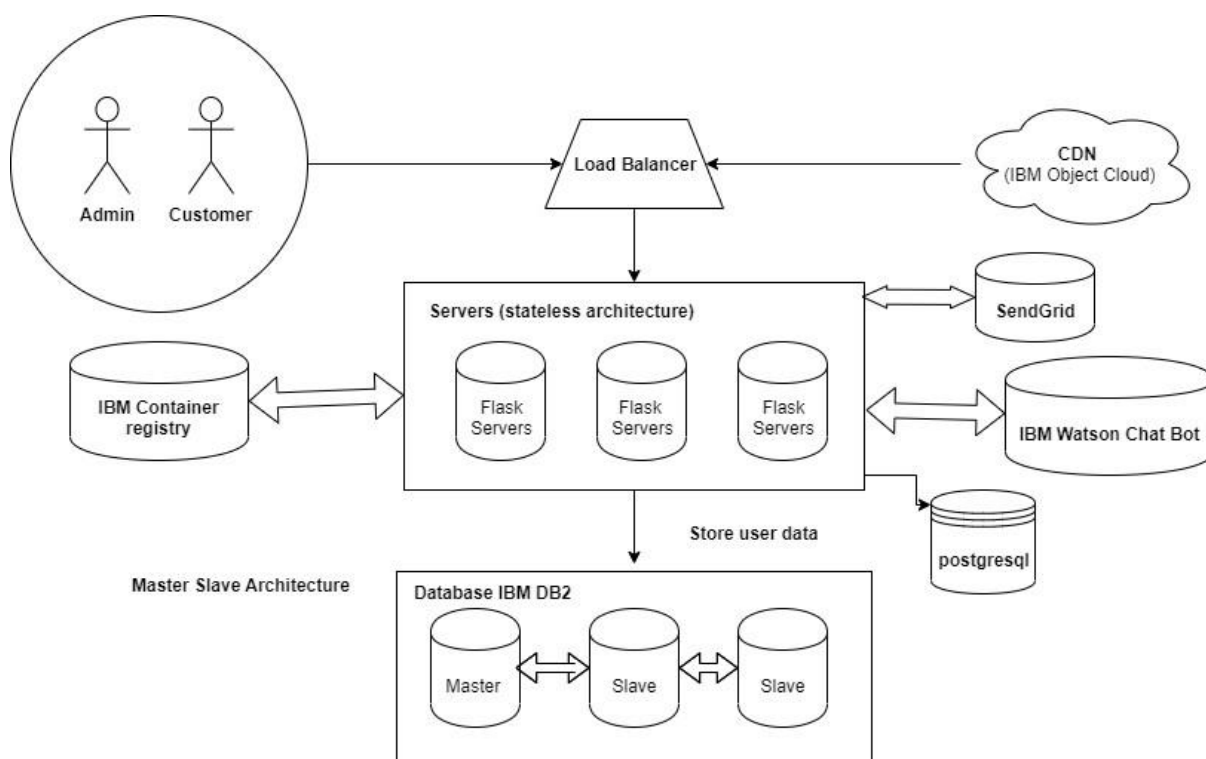
Following are the non-functional requirements of the proposed solution.

No.	Non-Functional Requirement	Description
1	Usability	Using Android or IOS or windows applications.
2	Security	The user data is stored securely in IBM cloud.
3	Reliability	The Quality of the services are trusted.
4	Performance	Its Provide smooth user experience.
5	Availability	The services are available for 24/7.
6	Scalability	It is easy to scale the size of users and products.

5.PROJECT DESIGN

DATA FLOW DIAGRAMS:

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



SOLUTION & TECHNICAL ARCHITECTURE:

We have developed a new innovative solution through which you can directly do your online shopping based on your choice without any search. It can be done by using the chatbot. In this project you will be working on two modules:

- Admin
- User

The solution is implemented in such a way as to improve the interactivity between customers

and applications. The chatbot sends messages periodically to notify offers and preferences.

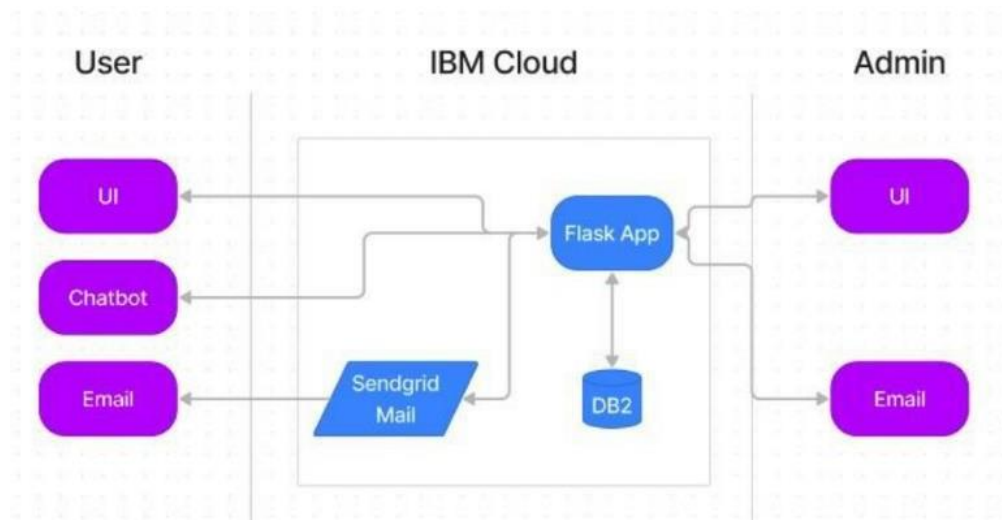


Table-1 : Components & Technologies:

S.No	Component	Description	Technology
1.	User Interface	user interaction with application e.g. Web UI & Chatbot	HTML, CSS, Bootstrap JavaScript
2.	Application Logic	Logic for a process in the application	Python - Flask
3.	Email Service	For verify user and mail ads	SendGrid
4.	Chatbot	Get details from user and store	IBM Watson Assistant
5.	Cloud Database	Database Service on Cloud	IBM D32
6.	Infrastructure (Server / Cloud)	Application Deployment on Cloud System	Docker, Cloud Foundry, Kubernetes, etc.

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	Used Web technologies	HTML, CSS, JS, Python, Flask
2.	Security Implementations	User verification through Email Service	Sendgrid
3.	Scalable Architecture	Run the app in Local and Cloud System	Docker and Kubernetes
4.	Availability	Justify the availability of application (e.g. use of load balancers, distributed servers etc.)	Docker, IBM Cloud
5.	Performance	Design consideration for the performance of the application (number of requests per sec, use of Cache, use of CDN's etc.)	IBM Cloud, Kubernetes Cluster, Container Registry

USER STORIES :

User Stories

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Web user)	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.		High	Sprint-1
	Login	USN-2	As a user, I can log into the application by entering email or User name & password which I had registered	I can access my account / dashboard	High	Sprint-1
	Dashboard	USN-3	As a user, I can explore the web page to find the latest fashion and details about those products	I am able to like or dislike the new ideas that showcased	Medium	Sprint-2
	Assistant	USN-4	As a user, I can use the personal assistant offered by the website to make my job easier	It is completely an extra choice	Low	Sprint 3
Customer Care Executive	Request	USN-5	If any problem occurred or any doubts you can contact Customer care executive		High	Sprint 4

6.PROJECT PLANNING & SCHEDULE

SPRINT PLANNING & 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 <ul style="list-style-type: none"> • 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 Pains & 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 Diagram and 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

SPRINT DELIVERY SCHEDULE:

Sprint	Functional Requirement (Epic)	User story number	User story /Task	Story points	Priority	Team Members
Sprint-1	User Panel	USN-1	The user will login into the website and go through the products available on the website	20	High	Sanjaykumar T Prathesh T Rabin R Ahash V
Sprint-2	Admin Panel	USN-2	The role of the admin is to check out the database about the stock and have a track of all the things that the users are purchasing.	20	High	Sanjaykumar T Prathesh T Rabin R Ahash V
Sprint-3	Chat Bot	USN-3	The user can directly talk to chatbot regarding the products .Get the recommendations based on information provided by the user	20	High	Sanjaykumar T Prathesh T Rabin R Ahash V
Sprint-4	Final Delivery	USN-4	Container of applications using Docker Kubernetes and deployment the applications. create the documentation and final submit the application	20	High	Sanjaykumar T Prathesh T Rabin R Ahash V

Sprint	Total story points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Date(Actual)	Release
Sprint-1	20	6 Days	24 OCT 2022	29 OCT 2022	20	29 OCT 2022	
Sprint-2	20	6 Days	31 OCT 2022	05 NOV 2022	20	05 NOV 2022	
Sprint-3	20	6 Days	07 NOV 2022	12 NOV 2022	20	12 NOV 2022	
Sprint-4	20	6 Days	14 NOV 2022	19 NOV 2022	20	19 NOV 2022	

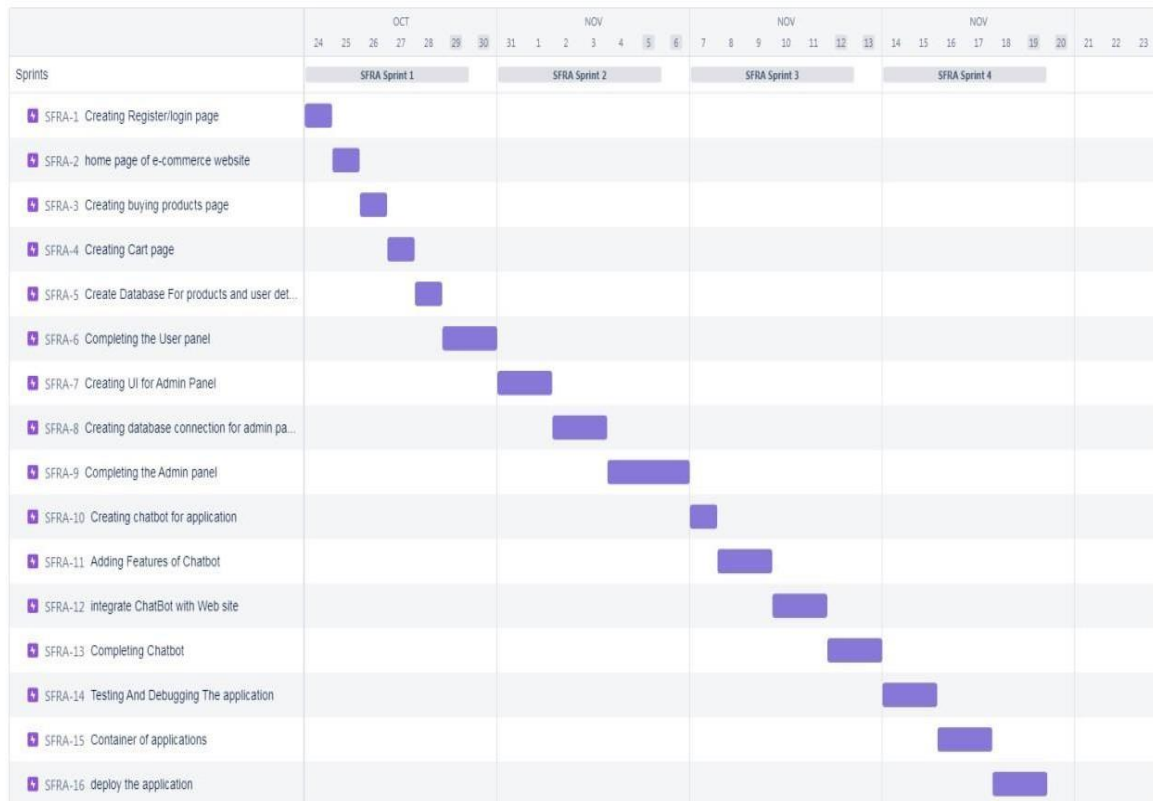
Velocity:

Imagine we have a 10-day sprint duration, and the velocity of the team is 20 (points per sprint). Let's calculate the team's average velocity (AV) per iteration unit (story points per day)

$$AV = \frac{\text{sprint duration}}{\text{velocity}} = \frac{20}{10} = 2$$

6.1 REPORTS FROM JIRA:

Burndown Chart:



7. CODING & SOLUTIONING

7.1 FEATURE-1:

Index.html:

```
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <meta http-equiv="X-UA-Compatible" content="IE=edge">
  <meta name="viewport" content="width=device-width, initial-scale=1.0">
  <title>Fashion website</title>
  <link rel="stylesheet" href="style.css">
  <link rel="stylesheet" href="fontawesome-free-5.15.3-web/css/all.min.css">
  <link rel="stylesheet" href="https://cdnjs.cloudflare.com/ajax/libs/slick-carousel/1.8.1/slick.css">
</head>
<body>
  <header class="header">
    <a href="#" id="logo">your <span>logo</span></a>
    <nav class="navbar">
      <a href="#">home</a>
      <a href="#">women</a>
      <a href="#">men</a>
      <a href="#">chatbot</a>
      <a href="#">contact</a>
    </nav>
    <div class="icons">
      <div class="fas fa-bars" id="menu-bar"></div>
      <div class="fas fa-shopping-cart" id="shop-cart"></div>
      <div class="fas fa-search" id="search-bar"></div>
    </div>

    <div class="search-box">
      <input type="search" placeholder="search here">
    </div>
    <!-- shopping cart -->

    <div class="shopping-cart">
      <div class="shopping-box">
        <i class="fas fa-times"></i>
        
        <div class="shop-content">
          <h3>online shopping</h3>
          <span class="quantity">1</span>
          <span class="multiply">*</span>
          <span class="multiply">$3.00</span>
        </div>
      </div>
      <div class="shopping-box">
        <i class="fas fa-times"></i>
        
        <div class="shop-content">
          <h3>online shopping</h3>
          <span class="quantity">1</span>
          <span class="multiply">*</span>
          <span class="multiply">$3.00</span>
        </div>
      </div>
      <div class="shopping-box">
```

```

        <i class="fas fa-times"></i>
        
        <div class="shop-content">
            <h3>online shopping</h3>
            <span class="quantity">1</span>
            <span class="multiply">*</span>
            <span class="multiply">$3.00</span>
        </div>
    </div>
</div>

<!-- shoping cart ended -->

</header>

<!-- main background image -->
<div class="main-background">
    <div class="left-back"></div>

    <div class="left-back">

        <div class="left-inner">
            <div class="right-content">
                <h1>summer <br> collection</h1>
                <p>Lorem ipsum dolor sit amet consectetur adipisicing elit. Sequi ad temporibus aliquid eos debitis alias
repudiandae inventore voluptatem, non, dolores optio suscipit dicta porro itaque cum necessitatibus obcaecati aperiam
possimus.</p>
                <i class="fas fa-heart"></i>
            </div>
            <div class="right-content">
                <div class="inner-main-content">
                    <h1>Special offer</h1>
                    <p>black sleeves</p>
                    <span>$3</span>
                    <span>$3</span>
                    <a href="#" class="shopnow-btn">Shop now</a>
                </div>
            </div>
        </div>

    </div>

</div>

</div>

<!-- main background image ended-->

<!-- gallery -->
<div class="gallery">
    <h1>our gallery</h1>

    <div class="main-gallery">
        <div class="inner-gallery">
            
            
        </div>
    </div>

```

```

    <div class="inner-gallery">
      <div class="girl">
        
      </div>

    </div>
    <div class="inner-gallery">
      
      
    </div>
  </div>

<!-- gallery ende-->
<!-- banner start -->
<div class="banner">
  <div class="inner-banner">
    
  </div>
  <div class="inner-banner">
    <h1>we offer brand new style</h1>
    <p>Lorem ipsum dolor sit amet consectetur, adipisicing elit. Molestias quam corporis, nihil, numquam ipsa aut
    distinctio magnam quidem totam ipsam itaque blanditiis omnis repudiandae ea neque exercitationem vel natus
    molestiae.</p>
    <a href="#" id="shope-now">shop now</a>
  </div>
</div>
<!-- banner start ended -->

<!-- products type -->

<div class="products-type">
  <h1>products type</h1>
<div class="main-product">
  <div class="inner-product">
    
    <a href="#" id="shop-now">shop now</a>
  </div>

  <div class="inner-product">
    
    <a href="#" id="shop-now">shop now</a>
  </div>

  <div class="inner-product">
    
    <a href="#" id="shop-now">shop now</a>
  </div>
</div>

</div>

<!--products type ended -->

<!-- featured products -->

<div class="products-type">

```



```
<h1>featured products</h1>
```

```
<div class="featured-product slides">
  <div class="featured-inner-product">
    
    <a href="#" id="shop-now">shop now</a>
  </div>

  <div class="featured-inner-product">
    
    <a href="#" id="shop-now">shop now</a>
  </div>

  <div class="featured-inner-product">
    
    <a href="#" id="shop-now">shop now</a>
  </div>

  <div class="featured-inner-product">
    
    <a href="#" id="shop-now">shop now</a>
  </div>

  <div class="featured-inner-product">
    
    <a href="#" id="shop-now">shop now</a>
  </div>

  <div class="featured-inner-product">
    
    <a href="#" id="shop-now">shop now</a>
  </div>
</div>
```

```
</div>
```

```
<!-- featured products ended -->
```

```
<!-- our blogs and news -->
```

```
<div class="our-blog">
  <h1>our blogs and news</h1>

  <div class="main-blog">

    <div class="inner-blog">
      
      <p>This is secret about fashion people</p>
    </div>

    <div class="inner-blog">
      
      <p>This is secret about fashion people</p>
    </div>

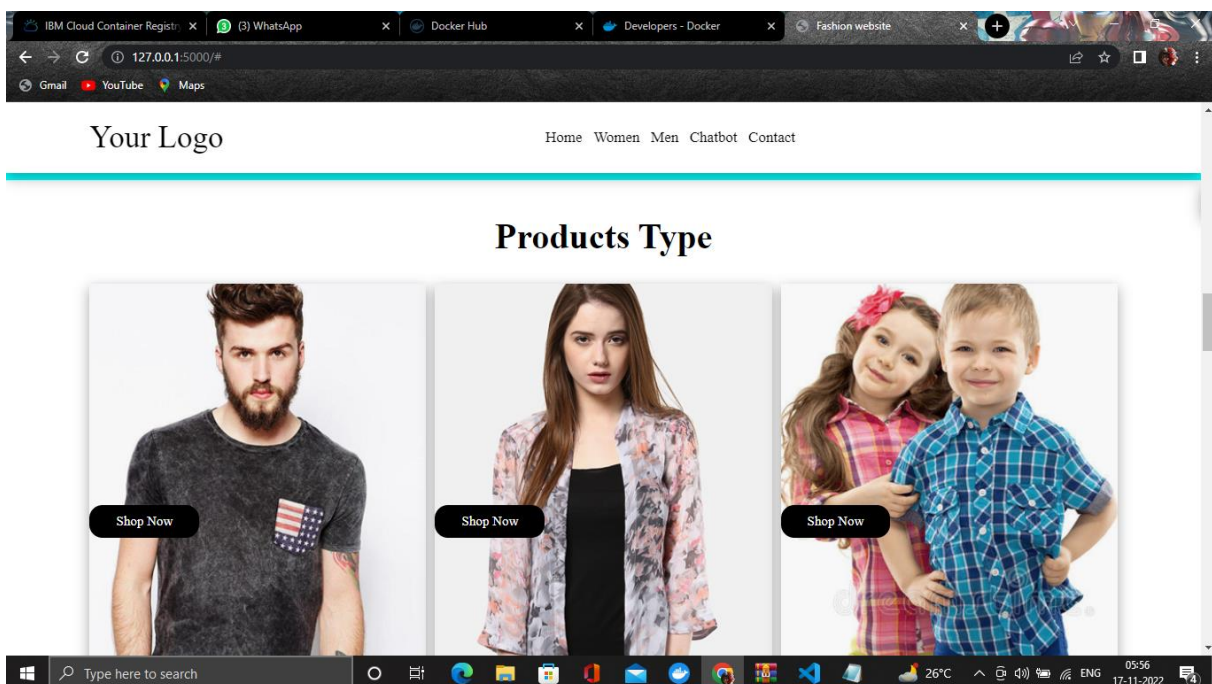
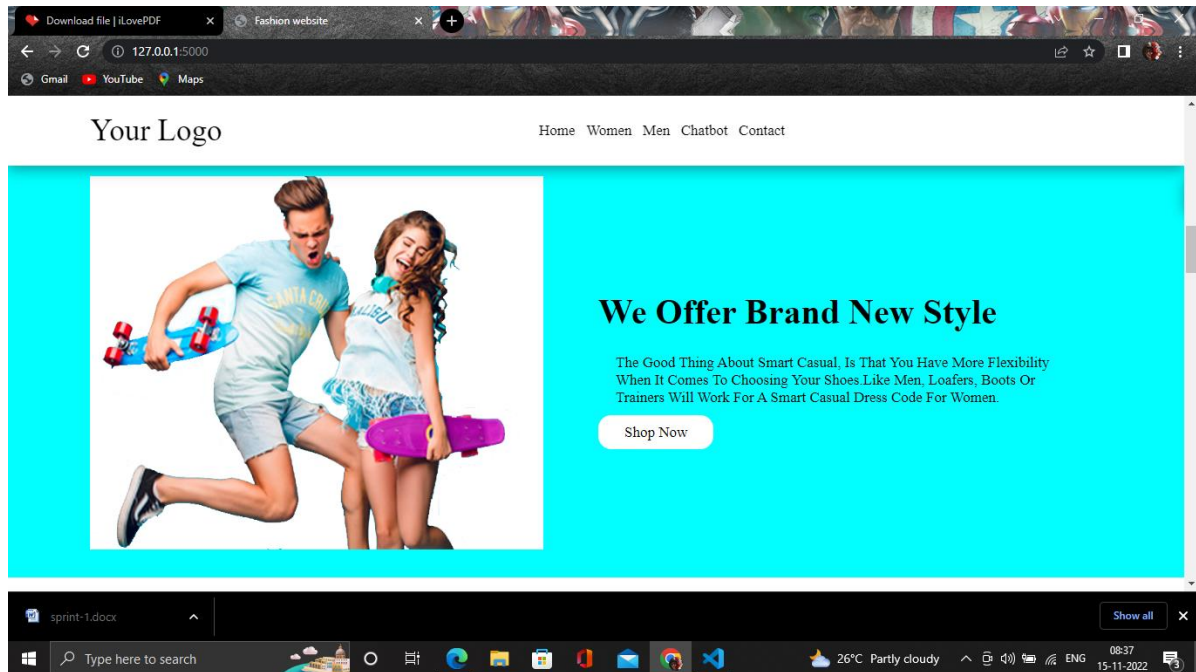
  </div>
</div>
```

```

</div>
</div>
<script src="https://code.jquery.com/jquery-3.6.0.min.js" integrity="sha256-
/xUj+3OJU5yExlq6GSYGGShk7tPXikynS7ogEvDej/m4=" crossorigin="anonymous"></script>

<script src="https://cdnjs.cloudflare.com/ajax/libs/slick-carousel/1.8.1/slick.min.js"></script>
<script src="script.js"></script>
</body>
</html>

```



FEATURE 2:

Style.css:

```
:root{
  --maincolor:#c4c9cd;
  --seondcolor:#dbdbe2;
}

*{
  margin: 0;
  padding: 0;
  box-sizing: border-box;
  transition: .2s;
  outline: none;
  text-transform: capitalize;
  text-decoration: none;
}
html{
  font-size: 62.5%;
  scroll-behavior: smooth;
}
.header{
  position: fixed;
  top: 0;
  left: 0;
  right: 0;
  display: flex;
  justify-content: space-between;
  align-items: center;
  padding: 2rem 7%;
  background-color: white;
  box-shadow: rgba(0, 0, 0, 0.35) 0px 5px 15px;
  z-index: 100000;
}
.header #logo{
  font-size: 3.5rem;
  color: black;
}
.navbar a{
  color: black;
  font-size: 1.7rem;
  margin-left: 1rem;
}
.navbar a:hover{
  background-color: var(--maincolor);
  color: white;
  border-radius: 10px;
  padding: 1rem 3rem;
}
.icons div{
```

```

    font-size: 2rem;
    margin-left: 1rem;
    color: black;
    cursor: pointer;
}
.icons div:hover{
    background-color: var(--maincolor);
    color: white;
    border-radius: 10px;
    padding: 1rem 3rem;
}
#menu-bar{
    display: none;
}

.search-box.active{
    left: 40%;
}
.search-box{
    position: absolute;
    top: 110%;
    left: 100%;
    width: 50%;
    right: 2rem;
}
.search-box input{
    padding: 1.5rem 2rem;
    width: 100%;
    border-radius: 15px;
    border: 0;
    box-shadow: rgba(0, 0, 0, 0.35) 0px 5px 15px;
}
.shopping-cart.active{
    left: 70%;
}
.shopping-cart{
    position: absolute;
    top: 110%;
    width: 40rem;
    right: 2rem;
    left: 100%;
    background: white;
}
.shopping-box{
    position: relative;
    display: flex;
    align-items: center;
    padding: .5rem;
}
.shopping-box img{
    width: 150px;

```

```

}
.fa-times{
  position: absolute;
  top: 50%;
  right: 2rem;
  transform: translateY(-50%);
  font-size: 2rem;
  cursor: pointer;
}
.fa-times:hover{
  color: var(--maincolor);
}
.shop-content h3{
  font-size: 1.7rem;
  padding: .5rem;
}
.shop-content span{
  margin: .5rem;
  font-size: 1.7rem;
}

.navbar.active{
  left: 0;
}

.main-background{
  background: url(images/background.png);
  background-size: cover;
  background-position: center;
  margin-top: 6%;
  width: 100%;
  height: 100vh;
  background-repeat: no-repeat;
  display: flex;
  justify-content: center;
  align-items: center;
  flex-wrap: wrap;
  gap: 15px;
}
.left-back{
  flex: 1 1 45rem;
}
.right-content h1{
  font-size: 50px;
  letter-spacing: 3px;
}
.left-inner{
  display: flex;
  justify-content: center;
  align-items: center;
  gap: 15px;
}

```

```

    flex-wrap: wrap;
}
.right-content{
    flex:1 1 30rem;
}
.right-content p{
    font-size: 1.5rem;
}
.right-content i{
    font-size: 2rem;
}
.inner-main-content{
    background: black;
    padding: 2rem 2rem;
}
.inner-main-content h1{
    color: white;
}
.inner-main-content p{
    color: white;
    font-size: 1.5rem;
    padding: .5rem 0;
}
.inner-main-content span{
    color: white;
    font-size: 1.7rem;
    margin-right: 1rem;
}
.shopnow-btn{
    display: block;
    padding: 1rem 2rem;
    background-color: white;
    width: 40%;
    border-radius: 15px;
    color: black;
    font-size: 1.7rem;
}
.gallery{
    padding: 2rem 7%;
}
.gallery h1{
    font-size: 40px;
    text-align: center;
    padding: 1rem 0;
}
.main-gallery{
    display: flex;
    flex-wrap: wrap;
    justify-content: center;
    align-items: center;

```

```

    gap: 1px;
}
.inner-gallery{
    flex: 1 1 300px;
}
.inner-gallery img{
    width: 100%;
}
.banner{
    padding: 3rem 7%;
    display: flex;
    flex-wrap: wrap;
    justify-content: center;
    align-items: center;
    gap: 5px;
    background: cyan;
}

.inner-banner{
    flex: 1 1 45rem;
}
.inner-banner img{
    width: 90%;
}
.inner-banner h1{
    font-size: 40px;
    padding: .5rem 0;
}
.inner-banner p{
    font-size: 1.7rem;
    padding: 2rem;
}
.inner-banner a{
    padding: 1rem 3rem;
    background: white;
    color: black;
    font-size: 1.7rem;
    text-align: center;
    margin-top: .5rem;
    border-radius: 15px;
}
.products-type{
    padding: 3rem 7%;
}
.products-type h1{
    font-size: 40px;
    text-align: center;
    padding: 1rem 0;
}
.main-product{
    display: flex;

```

```

    justify-content: center;
    align-items: center;
    gap: 10px;
    flex-wrap: wrap;
    padding: 2rem 0;
}
.inner-product{
    flex: 1 1 300px;
    position: relative;
    box-shadow: rgba(0, 0, 0, 0.35) 0px 5px 15px;
}
.inner-product img{
    width: 100%;
}
.inner-product a{
    position: absolute;
    left: 0;
    top: 50%;
    padding: 1rem 3rem;
    background: black;
    color: white;
    font-size: 1.5rem;
    border-radius: 15px;
    z-index: 1000000;
}
.slick-slide{
    margin: 0 10px;
}
.featured-inner-product{
    position: relative;
}
.featured-inner-product a{
    position: absolute;
    left: 0;
    top: 50%;
    padding: 1rem 3rem;
    background: black;
    color: white;
    font-size: 1.5rem;
    border-radius: 15px;
    z-index: 10000;
}
.our-blog{
    padding: 3rem 7%;
}
.our-blog h1{
    font-size: 40px;
    text-align: center;
}

```



```

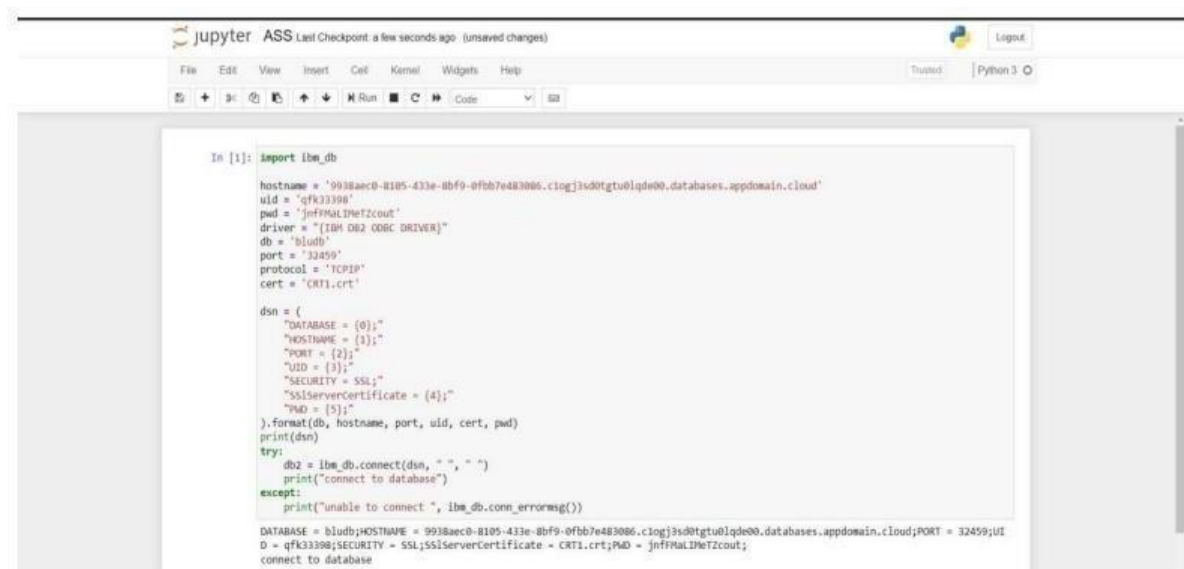
.main-blog{
  display: flex;
  justify-content: center;
  align-items: center;
  flex-wrap: wrap;
  padding: 2rem 0;
  gap: 15px;
}
.inner-blog{
  flex: 1 1 45rem;
  position: relative;
}
.inner-blog p{
  width: 50%;
  background: white;
  color: black;
  font-size: 1.5rem;
  padding: 1rem;
  position: absolute;
  bottom: 0%;
  left: 20%;
  border-radius: 15px;
  text-align: center;
}

@media (max-width:768px) {
  html{
    font-size: 50%;
  }
  #menu-bar{
    display: initial;
  }
  .header{
    padding: 2rem;
  }
  .navbar{
    position: absolute;
    top: 100%;
    width: 50rem;
    background: var(--maincolor);
    height: 100vh;
    left:100%;
  }
  .navbar a{
    display: block;
    color: white;
    background: black;
    margin: 3rem;
    padding: 1.5rem;
    border-radius: 15px;
    width: 45rem;
  }
}

```

```
}  
.slick-slide img{  
  width: 100%;  
}  
}
```

DATABASE SCHEMA:



The image shows a Jupyter Notebook interface with a code cell containing Python code for connecting to a database. The code defines variables for hostname, uid, pwd, driver, db, port, protocol, and cert. It then constructs a DSN string and uses it to connect to the database. The output of the code is displayed below the cell.

```
In [1]: import ibm_db

hostname = '9938aec0-8105-433e-8bf9-0fbb7e483086.clogj3sd0tgu0lqde00.databases.appdomain.cloud'
uid = 'qfk33398'
pwd = 'jnfPMaI2c0ut'
driver = "[IBM DB2 ODBC DRIVER]"
db = 'bludb'
port = '32459'
protocol = 'TCP/IP'
cert = 'CRT1.crt'

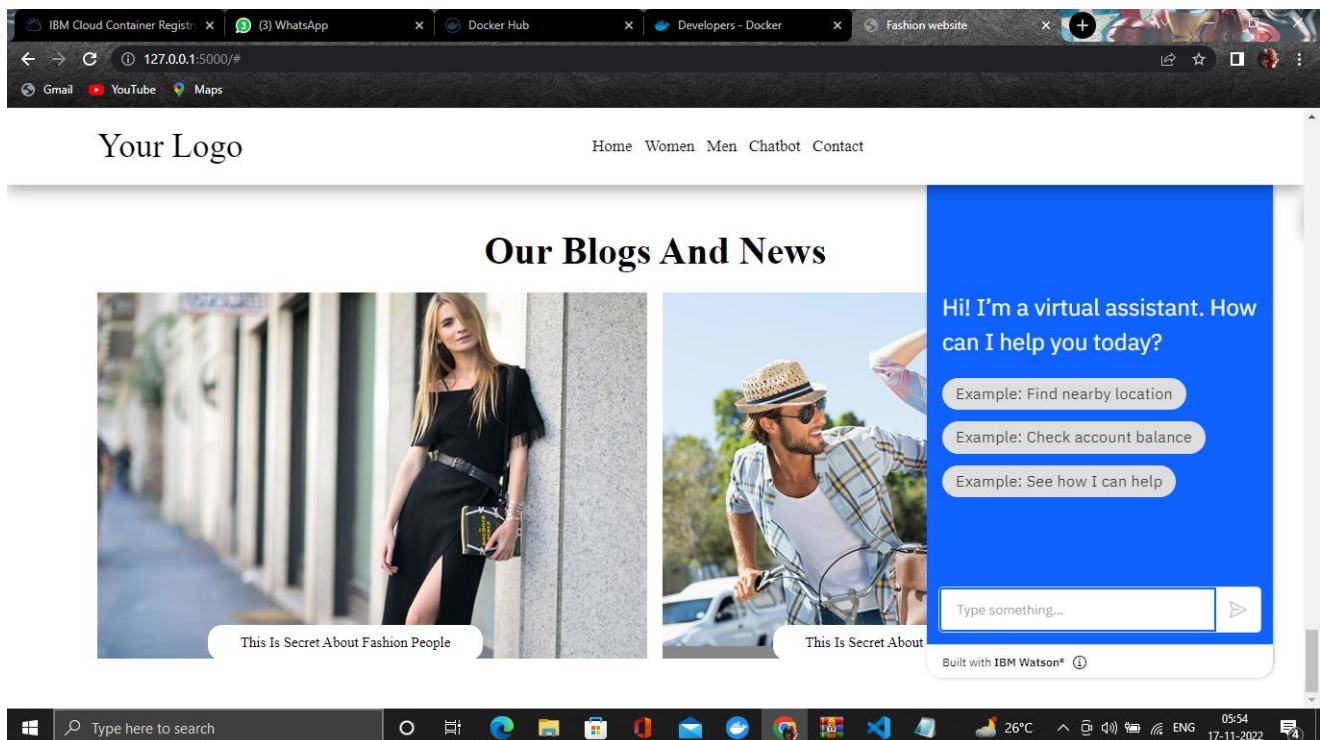
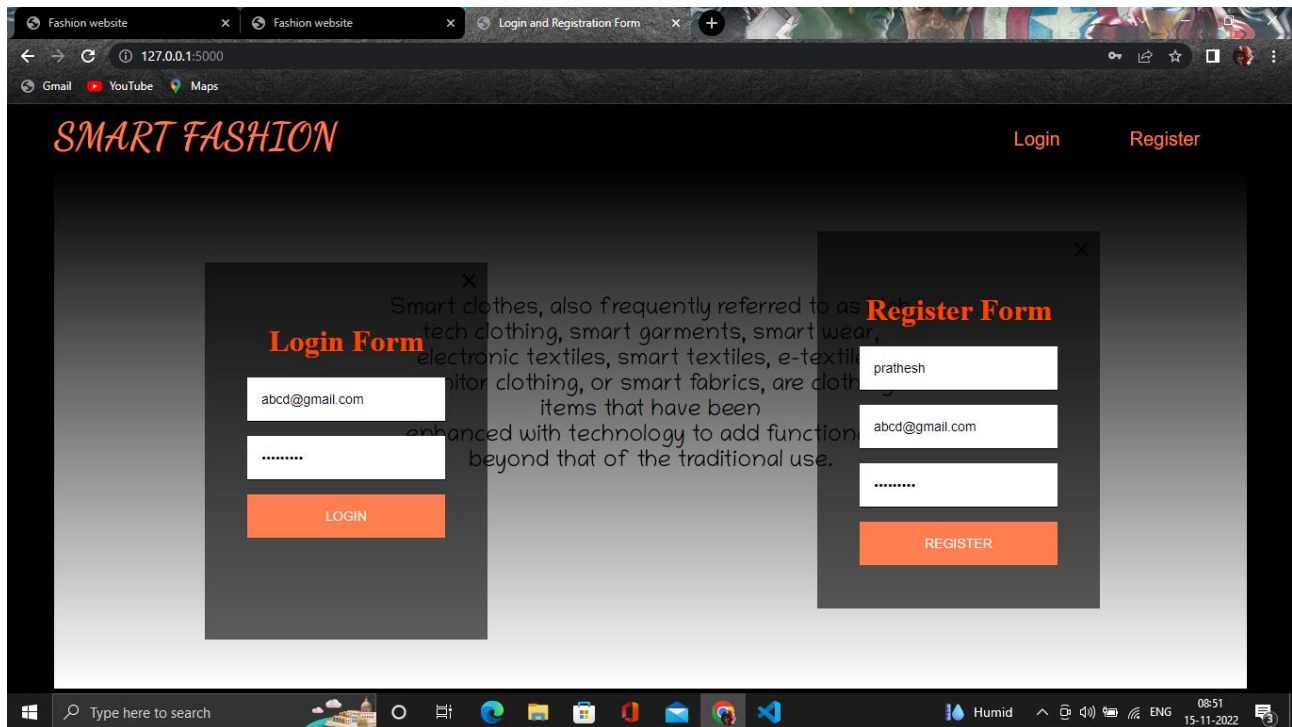
dsn = (
    "DATABASE = {0};"
    "HOSTNAME = {1};"
    "PORT = {2};"
    "UID = {3};"
    "SECURITY = SSL;"
    "SSLServerCertificate = {4};"
    "PWD = {5};"
).format(db, hostname, port, uid, cert, pwd)
print(dsn)

try:
    db2 = ibm_db.connect(dsn, "", "")
    print("connect to database")
except:
    print("unable to connect ", ibm_db.conn_errormsg())

DATABASE = bludb;HOSTNAME = 9938aec0-8105-433e-8bf9-0fbb7e483086.clogj3sd0tgu0lqde00.databases.appdomain.cloud;PORT = 32459;UID = qfk33398;SECURITY = SSL;SSLServerCertificate = CRT1.crt;PWD = jnfPMaI2c0ut;
connect to database
```

8. TESTING

8.1 TEST CASES:



PERFORMANCE METRICS:

The performance of a recommendation algorithm is evaluated by using some specific metrics that indicate the accuracy of the system. The type of metric used depends on the type of filtering technique. Root Mean Square Error (RMSE), Receiver Operating Characteristics (ROC), Area Under Cover (AUC), Precision, Recall and F1 score is generally used to evaluate the performance or accuracy of the recommendation algorithms.

Root-mean square error (RMSE). RMSE is widely used in evaluating and comparing the performance of a recommendation system model compared to other models. A lower RMSE value indicates higher performance by the recommendation model. RMSE, as mentioned by [61], can be as represented as follows:

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

where, N_p is the total number of predictions, p_{ui} is the predicted rating that a user u will select an item i and r_{ui} is the real 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 as represented as 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 of recommended items expressed as percentages.

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

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

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

F1 Score. F1 score is an indicator of the accuracy of the model and ranges from 0 to 1, where a value close to 1 represents higher recommendation or prediction accuracy. It represents precision and recall as a single metric and can be as represented as follows:

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

Coverage. Coverage is used to measure the percentage of items which are recommended by the algorithm among all of the items.

Accuracy. Accuracy can be defined as the ratio of the number of total correct recommendations to the total recommendations provided, which can be as represented as follows:

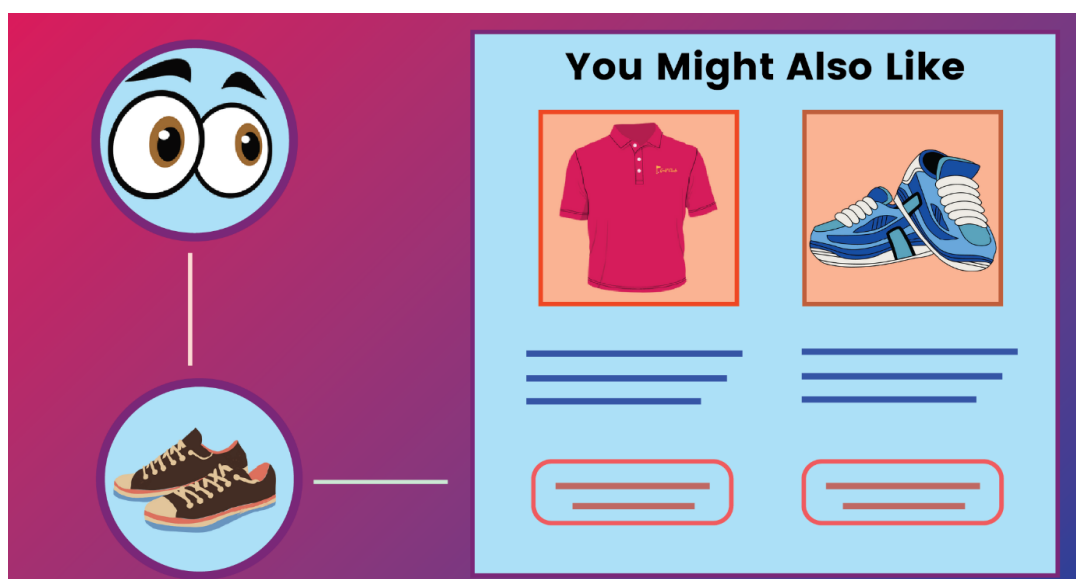
10.ADVANTAGES & DISADVANTAGES

ADVANTAGES:

- Smart fashion recommender application is the user friendly.
- With the help of chatbot user can find the products very easily.
- This application used to discover the product based on the user's choice, very easily and quickly.
- It have ability to reduce transaction costs for consumers, and increase revenue for retailers.

DISADVANTAGES:

- It need active internet connection.
- Privacy concerns.
- Too many choices.
- Cold-start problem.



11. CONCLUSION

The Fashion Recommendation System is mainly used to recommend the best possible outfit combinations to a user who has no fashion sense based on their wardrobe . It may not always provide the best possible outfit to wear for an occasion as the system is dependent completely on the clothes present in the user's wardrobe. Also another reason is that fashion is highly dependent on the time period. However the system does a great job in inculcating a fashion sense among the users and can provide the best recommendations based on the user's wardrobe. Since the system is implemented as a website, it is very easy for the end users to access as well as use. The scope of this system can be expanded by including the ability to detect the various design and patterns on clothing, and to increase the number of occasions.

12. FUTURE SCOPE

In the future, to implement this recommendation system to be extended to include male and non-binary fashion items including apparel, footwear, accessories etc. This work can further be enhanced to predict fashion items based on the skin colour and weather conditions.

Future research should concentrate on including time series analysis and accurate categorization of product images based on the variation in colour, trend and clothing style in order to develop an effective recommendation system. The proposed model will follow brand-specific personalization campaigns and hence it will ensure highly curated and tailored offerings for users. Hence, this research will be highly beneficial for researchers interested in using augmented and virtual reality features to develop recommendation systems.

13. APPENDIX

SOURCE CODE:

LOGIN:

```
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <title>Login and Registration Form </title>
  <link rel="stylesheet" href="style2.o.css">
  <link
href="https://fonts.googleapis.com/css2?family=Chilanka&family=Dancing+Script:wght@700&display=swap"
rel="stylesheet">
</head>
<body>
  <div class="full-page">
    <div class='navbar'>
      <div class='logo'>
        <a href='#"><h1>WELCOME STUDENTS</h1></a>
      </div>
      <nav>
        <ul id='MenuItems'>
          <li><button class='loginbtn'onclick="document.getElementById('login-form').style.display='block'"
style="width:auto;">Login</button></li>
          <li><button class='loginbtn'onclick="document.getElementById('register-
form').style.display='block'" style="width:auto;">Register</button></li>
        </ul>
      </nav>
    </div>
    <div class="sub-page">
      <div class="overlay"></div>
      <div class="text">
        <p>Home education, also known as home schooling, involves education your children at home
instead of in the traditional classroom environment.<br> Home education offers a range of benefits, <br>as
well as challenges, for both parents and children.</p>
      </div>
    </div>
    <div id='login-form' class="login-page">
      <div class="form-box">
        <span onclick="document.getElementById('login-form').style.display='none'"
class="close">&times;</span>
        <div class="form">
          <form class='login-form', action="validate.php", method="post">
            <h1 class="main-heading">Login Form</h1>
            <input type="text" name='emailid' placeholder="Email ID", required/>
            <input type="password" name='password' placeholder="password",
required/>
            <button>LOGIN</button>
          </form>
        </div>
      </div>
    </div>
    <div id="register-form" class='register-page'>
```

```

<div class="form-box1">
  <span onclick="document.getElementById('register-form').style.display='none'"
class="close">&times;</span>
  <div class="form1">
    <form class='register-form', action="registration.php", method="post">
      <h1 class="main-heading">Register Form</h1>
        <input type="text" name='user'placeholder="user name" required/>
        <input type="text" name='emailid'placeholder="email-id" required/>
        <input type="password"name='password' placeholder="password"
required/>
        <button>REGISTER</button>
      </form>
    </div>
  </div>
</div>
</body>
</html>

```

GITHUB LINK:

<https://github.com/IBM-EPBL/IBM-Project-45113-1660728327>

DEMO VIDEO LINK:

<https://youtu.be/8TJI1g2xnus>