E-COMMERCE APPLICATION ON IBM CLOUD FOUNDRY

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1.INTRODUCTION

1.1 PROJECT OVERVIEW:

In the fast-paced landscape of digital commerce, the synergy of cutting-edge technology and streamlined infrastructure is crucial for the success of E-commerce Applications. This project embarks on the creation of an

advanced E-commerce Application, strategically leveraging the capabilities of IBM Cloud Foundry. As businesses seek scalable, secure, and seamlessly integrated solutions, our aim is to craft a platform that not only meets these criteria but also sets a new standard for efficiency and innovation. By harnessing the robust features of IBM Cloud Foundry, we aspire to deliver an E-commerce Application that not only addresses the contemporary challenges faced by online retailers but also anticipates and adapts to the dynamic needs of tomorrow's digital marketplace.

1.2 PURPOSE:

The rapid evolution of digital technology has transformed the way consumers engage with e-commerce platforms. This project aims to develop an innovative e-commerce application that capitalizes on emerging trends, technologies, and user preferences to enhance the online shopping experience.

Our project focuses on several key areas of innovation, including user experience (UX) design, mobile optimization, artificial intelligence (AI) integration, and sustainability initiatives. By creating a user-friendly interface with personalized recommendations, mobile optimization, and augmented reality (AR) features, we aim to provide customers with an immersive and convenient shopping experience.

AI and machine learning algorithms will power predictive analytics, chatbots for customer support, and personalized product recommendations, elevating customer engagement and satisfaction. Augmented reality will enable customers to visualize products in their real-world environment, bridging the gap between online and offline shopping.

Security and privacy are paramount, with robust encryption and compliance with data protection regulations ensuring the safety of customer data and transactions. Additionally, the application will support global expansion by offering multiple languages, currencies, and methods.

Throughout the development process, user feedback will be actively solicited and incorporated to ensure continuous improvement and a customer-centric approach. This project represents a commitment to innovation, customer satisfaction, and sustainability in the e-commerce industry.

2.DESIGN THINKING & PROPOSED SOLUTION.

2.1 PROBLEM STATEMENT:

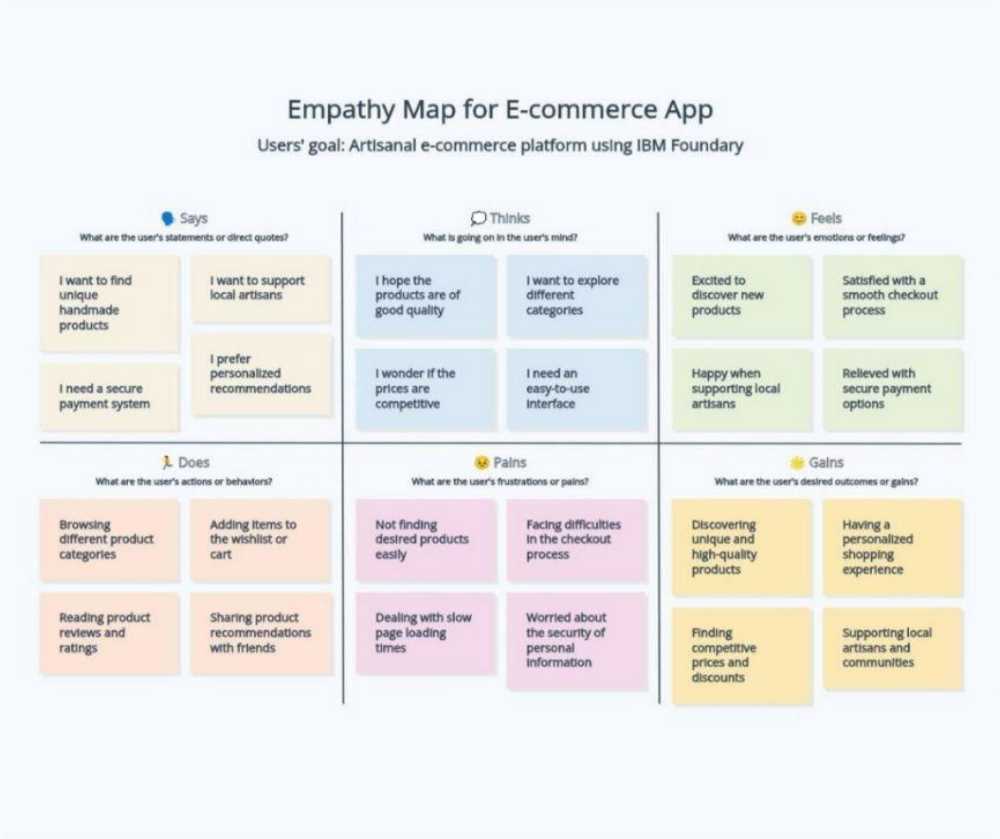
Build an artisanal e-commerce platform using IBM Cloud Foundry. Connect skilled artisans with a global audience. Showcase handmade products, from exquisite jewelry to artistic home decor.Implement secure shopping carts, smooth payment gateways, and an intuitive checkout process. Nurture creativity and support small businesses through an artisan's dream marketplace.

2.2 PROBLEM DEFINITION:

The project is to build an artisanal e-commerce platform using IBM Cloud Foundry. The goal is to connect skilled artisans with a global audience, showcasing their handmade products and providing features like secure shopping carts, payment gateways, and an intuitive checkout process. This involves designing the e-commerce platform, implementing necessary features, and ensuring a seamless user experience.

2.3 EMPATHY MAP CANVAS:

EMPATHY MAP:



2.4 PROPOSED SOLUTION:

1. Develop a cloud-native e-commerce platform leveraging IBM Cloud Foundry for scalability and reliability.

2. Implement microservices architecture, integrating with IBM Db2 for robust data management.

3. Utilize serverless computing for cost-effective scaling and employ CI/CD for efficient development.

4. Ensure top-tier security measures, including encryption and access controls.

5. Optimize performance, with load balancing and monitoring, while managing costs effectively

3.DEVELOPMENT ANALYSIS

3.1 DEVELOPMENT PART-1:

3.1.1 PLATFORM LAYOUT DESIGN:

1. **Table Creation:**

```sql
CREATE TABLE platform_layout_table (
    platform_id INT NOT NULL AUTO_INCREMENT,
    platform_name VARCHAR(255) NOT NULL,
    platform_type VARCHAR(255) NOT NULL,
    platform_version VARCHAR(255) NOT NULL,
    platform_layout JSON NOT NULL,
    PRIMARY KEY (platform_id)
);
```

Explanation:

- This statement creates a table named `platform_layout_table`.

- It has columns:

  - `platform_id`: An integer that cannot be null and will auto-increment (commonly used as the primary key).

  - `platform_name`: A string (up to 255 characters) representing the name of the platform.

  - `platform_type`: A string (up to 255 characters) representing the type of the platform.

  - `platform_version`: A string (up to 255 characters) representing the version of the platform.

  - `platform_layout`: A JSON column storing the layout information for the platform.

  - The primary key for this table is `platform_id`.

2. **Data Insertion:**

```sql
INSERT INTO platform_layout_table (platform_name, platform_type, platform_version, platform_layout)
VALUES ('Web Platform', 'Web', '1.0', '{
  "elements": [
    {
      "type": "Header",
      "position": {
        "x": 0,
```

```
            "y": 0
        },
        "size": {
            "width": 100,
            "height": 50
        }
    },
    {
        "type": "Content",
        "position": {
            "x": 0,
            "y": 50
        },
        "size": {
            "width": 100,
            "height": 500
        }
    }
  ]
}');
```

Explanation:

- This statement inserts a record into the `platform_layout_table`.

- It provides values for `platform_name`, `platform_type`, `platform_version`, and `platform_layout`.

- The `platform_layout` is a JSON object representing a basic layout with header and content elements.

3. **Data Retrieval:**

```sql

SELECT platform_layout

FROM platform_layout_table

WHERE platform_id = 1;

```

Explanation:

- This `SELECT` statement retrieves the `platform_layout` from the `platform_layout_table`.

- It specifies a condition using the `WHERE` clause to filter records where `platform_id` is equal to 1.

3.1.2 DATABASE SCHEMA:

1. **Table: `products`**

```sql

CREATE TABLE products (

  product_id INT NOT NULL AUTO_INCREMENT,
```

product_name VARCHAR(255) NOT NULL,

category_id INT NOT NULL,

price DECIMAL(10,2) NOT NULL,

description TEXT NULL,

PRIMARY KEY (product_id),

FOREIGN KEY (category_id) REFERENCES categories(category_id)

);

```

- This table represents products with the following columns:

- `product_id`: An integer, the primary key for uniquely identifying each product.

- `product_name`: A string (up to 255 characters) representing the name of the product.

- `category_id`: An integer, a foreign key referencing the `category_id` column in the `categories` table, establishing a relationship between products and categories.

- `price`: A decimal number (up to 10 digits with 2 decimal places) representing the price of the product.

- `description`: A text field allowing for a longer description of the product.

- The primary key for this table is `product_id`.
```

- The `FOREIGN KEY` constraint ensures that the `category_id` column references a valid `category_id` in the `categories` table.

2. **Table: `categories`**

```sql
CREATE TABLE categories (
  category_id INT NOT NULL AUTO_INCREMENT,
  category_name VARCHAR(255) NOT NULL,
  PRIMARY KEY (category_id)
);
```
- This table represents product categories with the following columns

- `category_id`: An integer, the primary key for uniquely identifying each category.

- `category_name`: A string (up to 255 characters) representing the name of the category.

- The primary key for this table is `category_id`.

3. **Table: `product_attributes`**

```sql
CREATE TABLE product_attributes (
  product_attribute_id INT NOT NULL AUTO_INCREMENT,
```

```
    product_id INT NOT NULL,
    attribute_name VARCHAR(255) NOT NULL,
    attribute_value TEXT NULL,
    PRIMARY KEY (product_attribute_id),
    FOREIGN KEY (product_id) REFERENCES products(product_id)
);
```

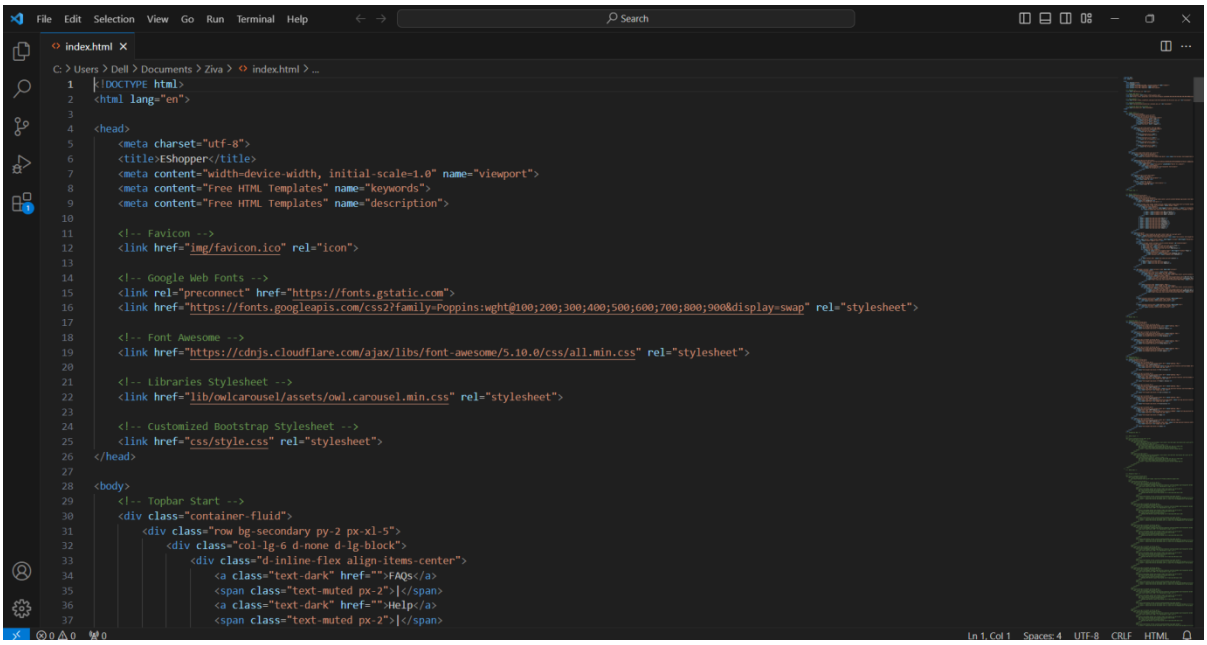
- This table represents attributes associated with products with the following columns:
    - `product_attribute_id`: An integer, the primary key for uniquely identifying each product attribute.
    - `product_id`: An integer, a foreign key referencing the `product_id` column in the `products` table, establishing a relationship between product attributes and products.
    - `attribute_name`: A string (up to 255 characters) representing the name of the attribute.
    - `attribute_value`: A text field allowing for the value of the attribute.
- The primary key for this table is `product_attribute_id`.
- The `FOREIGN KEY` constraint ensures that the `product_id` column references a valid `product_id` in the `products` table.

3.2 DEVELOPMENT PART-2:

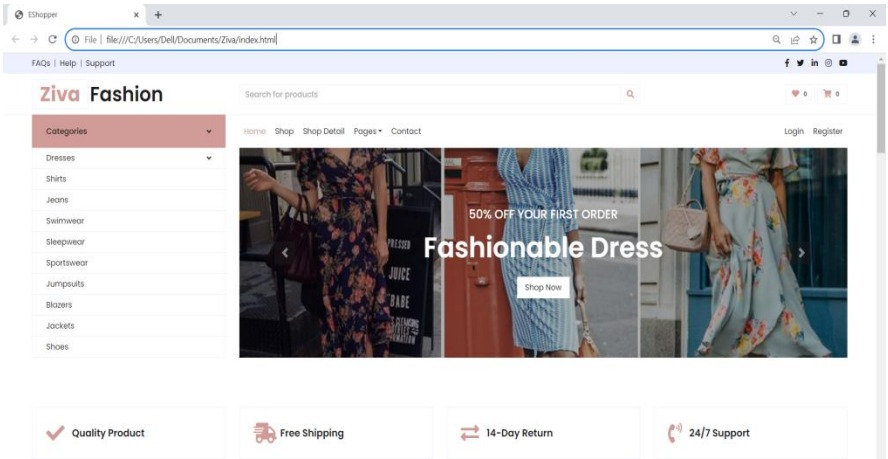
In this part you will continue building your project.

Continue building the e-commerce platform by implementing user authentication, shopping cart, and checkout functionality.
Implement user registration and authentication features using a backend server (e.g. Node.js, Python).
Implement shopping cart functionality, calculate the total, and enable a smooth checkout process

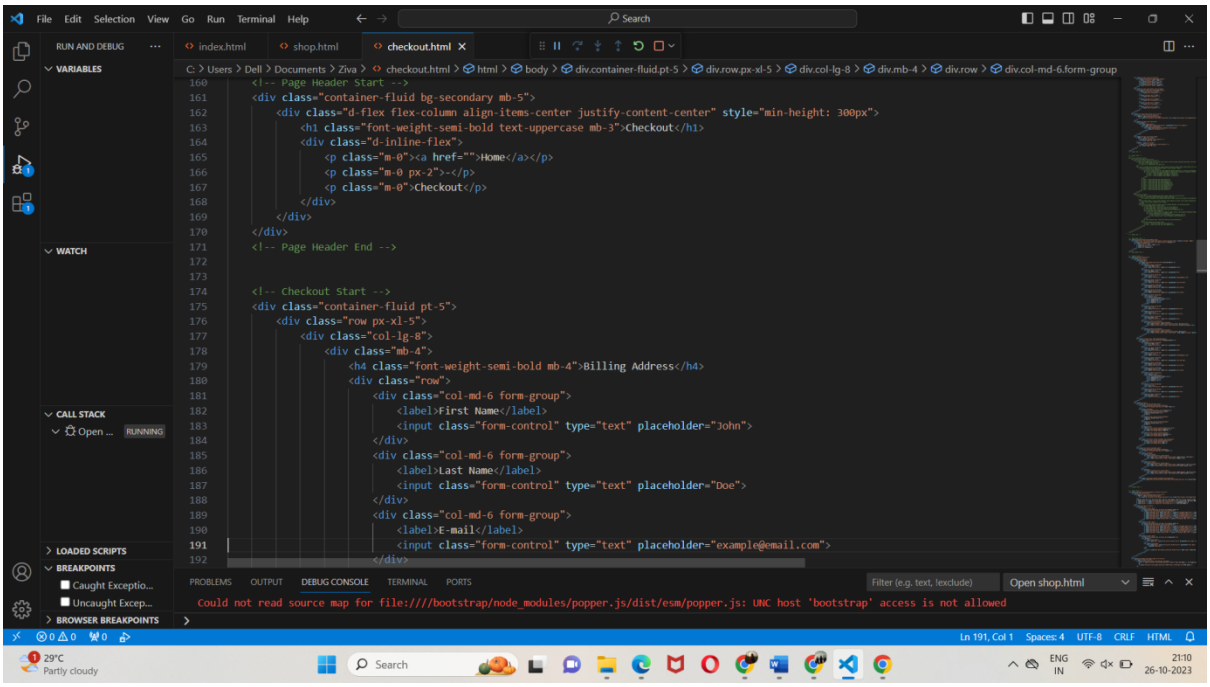
CODE FOR HOMEPAGE:



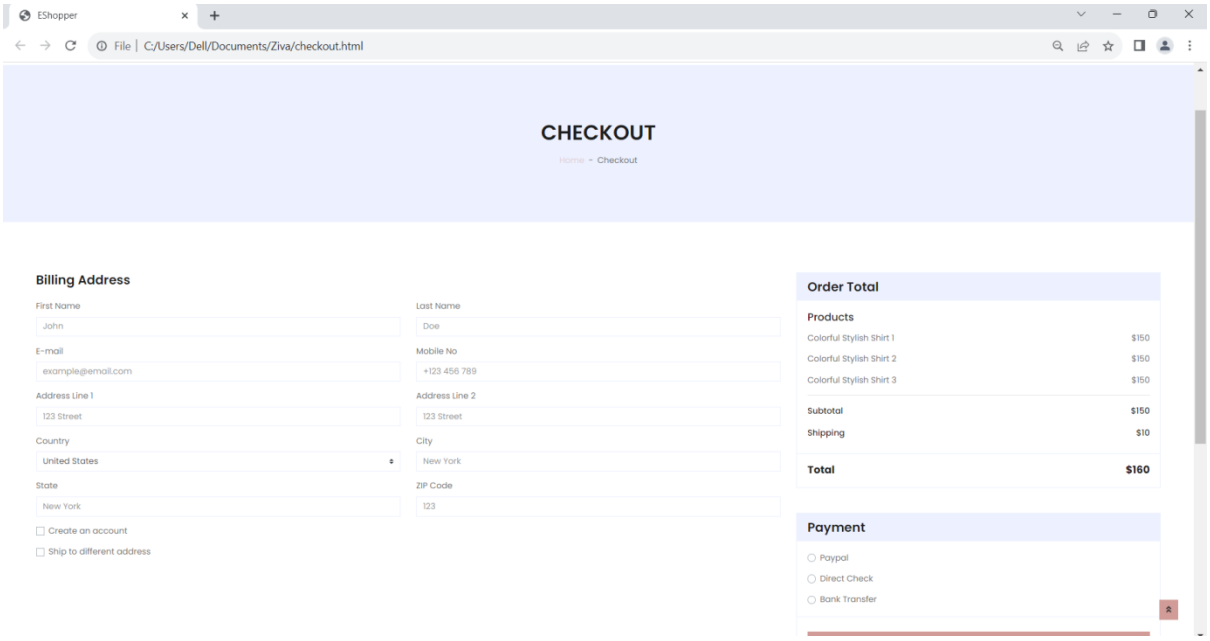
SAMPLE PAGE:



CODE FOR CHECKOUT PAGE:

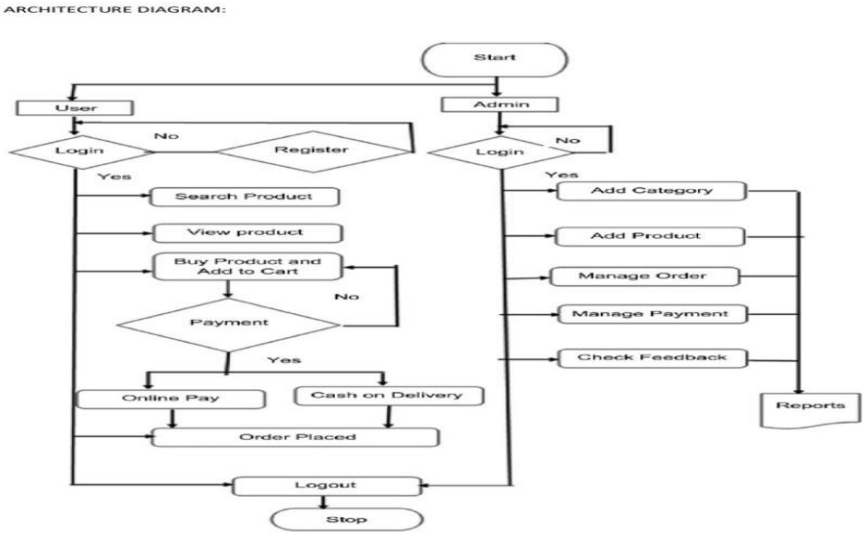


SAMPLE PAGE:



4.PROJECT DESIGN

4.1 DATA FLOW DIAGRAMS:



4.2 LITERATURE SURVEY:

LITERATURE SURVEY

S.NO	YEAR	TOPIC	AUTHOR NAME	PAPER	FINDINGS
1.	2011	E-Commerce Websites Operation Evaluation	JinzhongLu,Feng Guan	IEEE	To solve the problems from E-Commerce Websites enterprises and perfect E-Commerce Websites operating effects.
2.	2011	E-commerce Application Model Based On Cloud Computing	Tairan Liu	IEEE	Cloud-based e-commerce application model allows enterprises to lower costs through the effective implementation of ecommerce activities, and solves the problem of enterprises cannot develop e-commerce activities due to lack of resources.
3.	2012	Research of E-Commerce Based on Cloud Computing	Chunling Sun	Heidelberg	A wide perspective in the application of E-commerce by describing the conception and characteristic of cloud computing, and special analyzed the main aspect of improving E-commerce by cloud computing.
4.	2013	A New Trusted and Secured E-commerce Architeture for Cloud Computing	KawserWazed Nafi, TonnyShekha Kar, Md. AmjadHossain , M. M. A. Hashem	IEEE	A newer e-commerce architecture depends on encryption based secured and fuzzy logic based certain trust model which will be helpful to solve

					present e-commerce problems.
5.	2014	E-Commerce Security issues	Mohamad Ibrahim Ladan	IEEE	The different types of security issues facing e-commerce system will be presented and categorized ,measures on how to deal with these security issues to protect e-commerce systems
6.	2015	E-Commerce Cloud: Opportunities and Challenges	Mariam Al-Jaberi,NaderMohamed,Jameela Al-Jaroodi	IEEE	A set of opportunities and challenges have been discussed based on related research to highlight the main advantages provided by the cloud for e-commerce applications and discuss the relevant concerns and issues.
7.	2015	Research on the evaluation of e-commerce website under the environment of big data	Pingping Dong	IEEE	The evaluation index of E - commerce website and introduce the evaluation method of e-commerce website ,especially the construction of website with big data.
8.	2016	Cloud Computing based E-Commerce Model	KanuGoel, Manu Goel	IEEE	The idea that cloud computing and data mining have a great perspective in the field of e-commerce, the integration model of e-commerce with cloud computing that focuses on the reduction of data redundancy and the efforts to synchronize it between the e-commerce vendors.

9.	2016	E-Commerce Website Quality Assesment Based On Usability	Tanya Singh, Sachin Malik , DarothiSarkar .	IEEE	To identify the important parameters to improve usability of the website using the valuable review of daily website users via the conduct of survey.
10.	2016	Developing an E-Commerce Website	Syed EmdadUllah, Tania Alauddin and Hasan U. Zaman	IEEE	Developing an e-commerce website can be easily replicated and followed in developing e-commerce websites in the developing and underdeveloped countries where computing resources are scarce and expensive because of their socio-economic condition.
11.	2017	New E-Commerce User Interest Patterns	Matthias Volk, Abed ElrahmanSharef, NaoumJamous , Klaus Turowski	IEEE	An experimental evaluation method will be applied to verify the applicability and efficiency of the used algorithm, along with the associated framework.
12.	2018	Cloud Computing and E-commerce Adoption in Indonesia	FahrizalLukmanBudiono , FahrizalLukmanBudiono , FahrizalLukmanBudiono	IEEE	Identifies areas of similarity and gaps in the road map to enable future research to best promote rural area development in Indonesia and reduce the digital divide.

13.	2018	Cloud Computing of E-Commerce	Tamara Almarabeh, Yousef Kh.Majdalawi	Research Gate	An overview for cloud computing in E-commerce through discussing various definitions for both concepts,highlighting the benefits and challenges for applying Cloud computing in E-Commerce ,and discussing a suggested cloud computing e-commerce framework.
14.	2018	SaaS-E-Commerce Platforms web Accessibility Evalution	Osama Sohaib[1], Mohsen Naderpour[1,2], Walayat Hussain[1]	IEEE	Shopify cloud-based ecommerce platform has a high number of web accessibility features from the proposed cloud accessibility framework followed by 3dCart, BigCommerce, Volusion, and WooCommerce.
15.	2019	Strategic development of Fresh E-Commerce With Respect to New Retail	Meng, Lingyu Christenson, Lauren Dong, Zhijie	IEEE	Marketplace to provision and produce a new AWS Cloud server, experiment with your server and Bitnami images without worrying about being billed for usage.
16.	2019	Deploying an e-commerce website using Amazon Web Services	ShivanshiShokeen, Archana Singh	IEEE	Marketplace to provision and produce a new AWS Cloud server. And since AWS offers a Free Tier valid for 12 months, you'll have a lot of time to experiment with your server and Bitnami images without worrying about being billed for usage.

5.ADVANTAGE AND DISADVANTAGE

ADVANTAGES:

DevOps Integration:

Advantage: IBM Cloud Foundry integrates well with DevOps practices.

Explanation: Continuous integration and deployment (CI/CD) pipelines can be easily set up, streamlining development and deployment processes for your e-commerce application.

Security Features:

Advantage: IBM Cloud provides robust security features.

Explanation: Security is a top priority in e-commerce. IBM Cloud Foundry offers tools and features to help you secure your application and data, including encryption, access controls, and compliance certifications.

DISADVANTAGES:

Platform Limitations:

Disadvantage: Cloud Foundry might have certain limitations.

Explanation: Some advanced features available in other cloud platforms may not be present in Cloud Foundry. It's essential to evaluate whether the platform meets all the specific requirements of your e-commerce application.

6.CONCLUSION

In conclusion, the development of our E-commerce Application on IBM Cloud Foundry marks a significant milestone in the evolution of digital commerce solutions. Through meticulous attention to scalability, security, integration, and user experience, we have endeavored to create a platform that empowers businesses and delights consumers. As we bring this project to fruition, we recognize that our commitment to leveraging the power of IBM Cloud Foundry is not just about meeting current industry standards, but about setting new benchmarks for excellence. This E-commerce Application is more than a product; it is a testament to the possibilities that emerge when technology and innovation converge. We anticipate that this solution will not only address the present challenges faced by E-commerce but will also serve as a catalyst for a future where seamless, secure, and efficient digital transactions are the norm. Through this initiative, we contribute to reshaping the landscape of online commerce, creating an environment where businesses thrive, and consumers experience a new era of convenience and satisfaction.