PROJECT REPORT

ON

Electronics Vendor Online Store

Submitted By:

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Submitted To:

Dr. Bo Li

DBMS DESIGN (CSC 511)

Abstract

In today’s fast-changing business environment, it is extremely important to be able to respond to client needs most effectively and promptly. If your customers wish to see your business online and have instant access to your products or services apart from the physical stores. Electronics Vendor is an e-commerce web application, which retails various electronic products/gadgets grouped by product type based on the manufacturer.

This project allows viewing various products available and enables registered users to buy desired products instantly using a checkout option, payment can be done using a credit card, and can place an order by using the Cash on Delivery (Pay Later) option. This project provides easy access to Administrators and Managers to view orders placed using Pay Later and Instant Pay options. To develop an e-commerce website, several Technologies must be studied and understood.

These include multi-tiered architecture, server, and client-side scripting techniques, implementation technologies such as angular, spring boot, programming language (such as Java), and relational databases using PostgreSQL. This is a project to develop a basic website with the above-mentioned technologies where a consumer is provided with a shopping cart application and to know about the technologies used to develop such an application.

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1. Problem Description

The application is an electronics vendor that runs both a Web site and a chain of many physical stores. The company databases are to be redesigned in such a way that the operations are carried out. The goal of this project is to develop an e-commerce website that performs the following operations:

- Any member can register and view available products.
- Only registered members can buy multiple products regardless of quantity.
- Products can be added to the cart and can be checked out from there using a credit card.
- Contact Us page is available to contact Admin for queries.
- There are three roles available: Visitor, User, and Admin.
- Visitors can view available products.
- Users can view and purchase products.
- An Admin has some extra privileges including all privileges of visitors and users.
- Admin can add products, edit product information, and add/remove the product.
- All the roles have a login possibility.

2. Database Design

a) Entity-Relationship Diagram

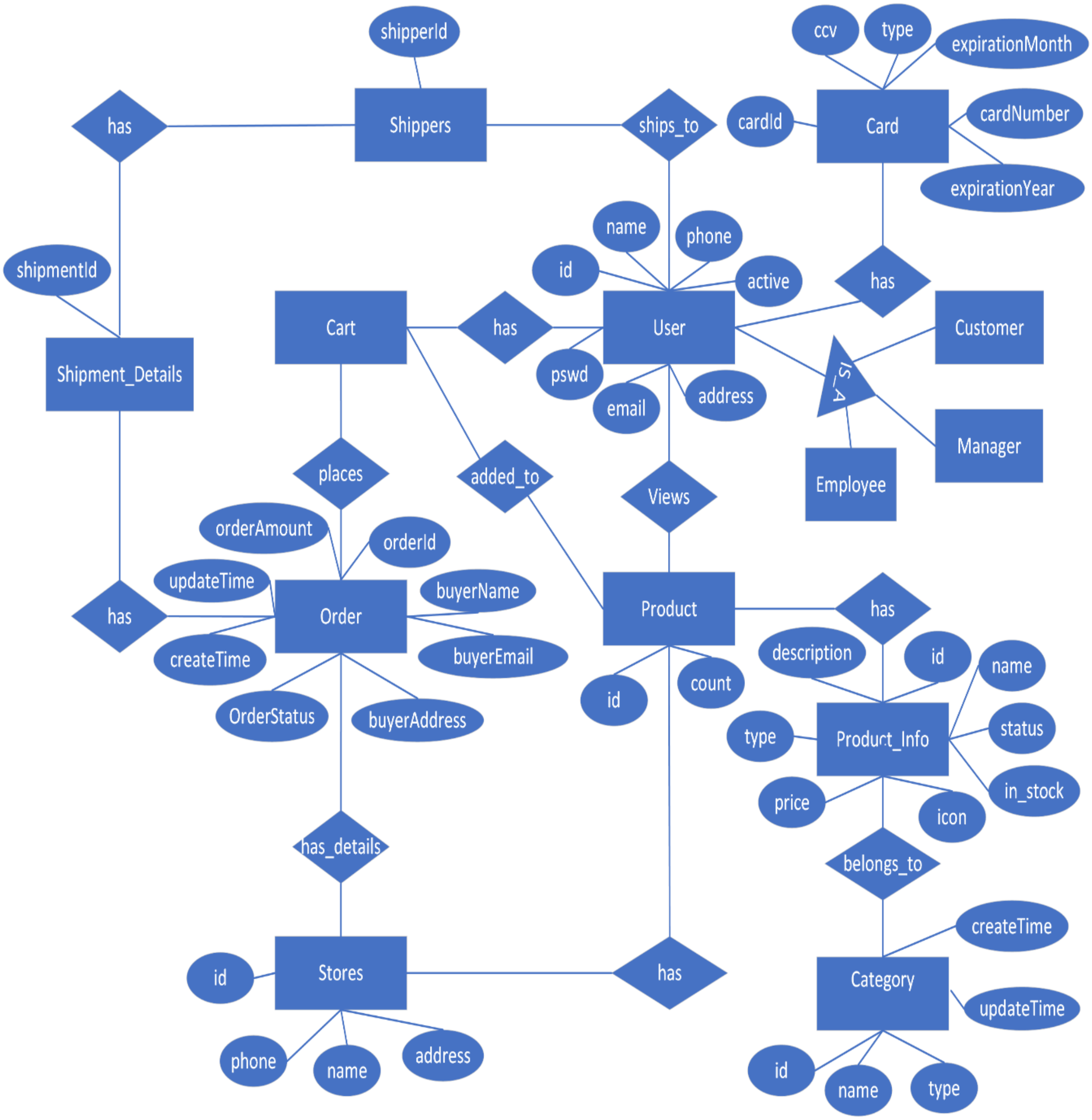
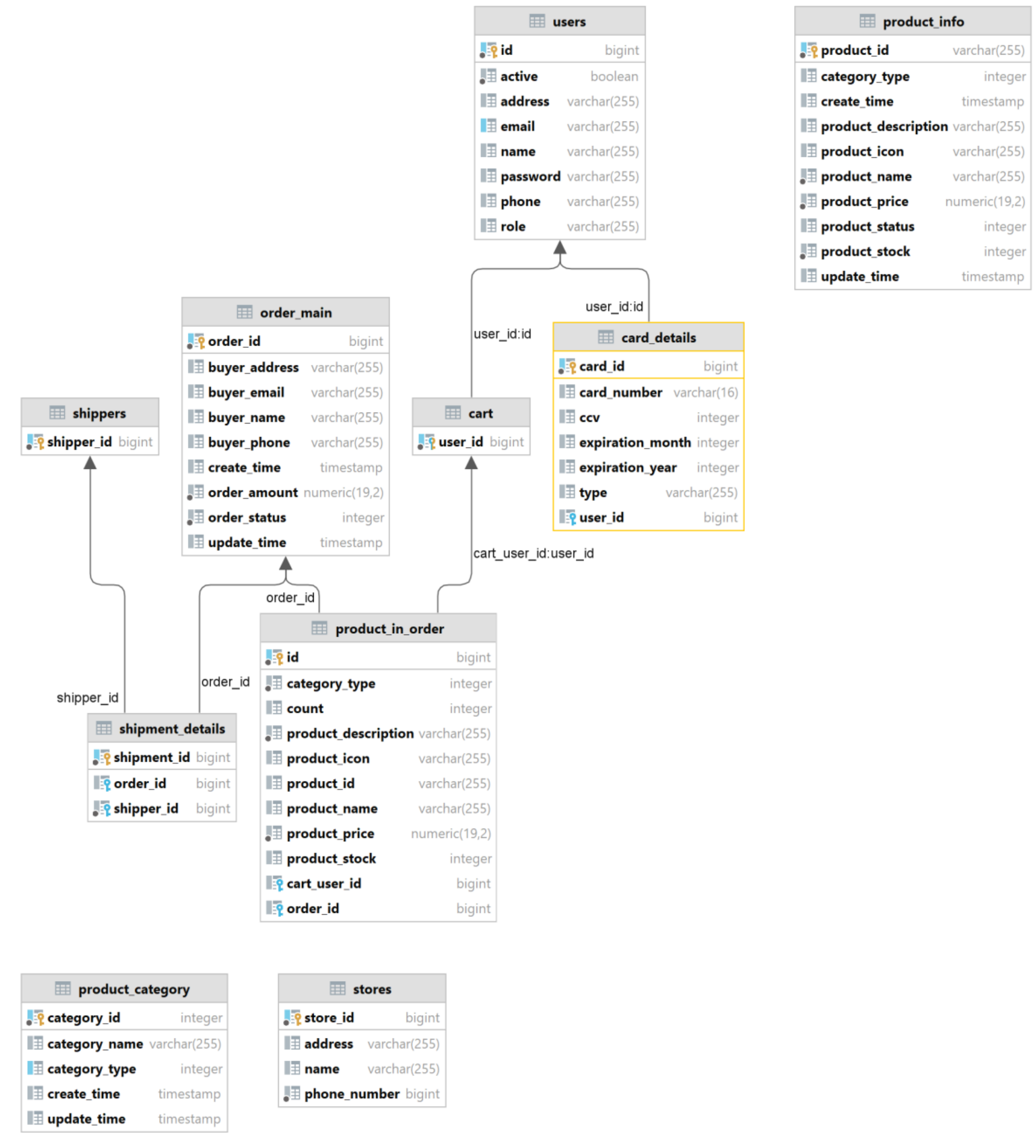


Figure1: Entity-Relationship Diagram of Electronic Vendor Online Store



users	
id	bigint
active	boolean
address	varchar(255)
email	varchar(255)
name	varchar(255)
password	varchar(255)
phone	varchar(255)
role	varchar(255)

product_info	
product_id	varchar(255)
category_type	integer
create_time	timestamp
product_description	varchar(255)
product_icon	varchar(255)
product_name	varchar(255)
product_price	numeric(19,2)
product_status	integer
product_stock	integer
update_time	timestamp

order_main	
order_id	bigint
buyer_address	varchar(255)
buyer_email	varchar(255)
buyer_name	varchar(255)
buyer_phone	varchar(255)
create_time	timestamp
order_amount	numeric(19,2)
order_status	integer
update_time	timestamp

shippers	
shipper_id	bigint

cart	
user_id	bigint

card_details	
card_id	bigint
card_number	varchar(16)
ccv	integer
expiration_month	integer
expiration_year	integer
type	varchar(255)
user_id	bigint

product_in_order	
id	bigint
category_type	integer
count	integer
product_description	varchar(255)
product_icon	varchar(255)
product_id	varchar(255)
product_name	varchar(255)
product_price	numeric(19,2)
product_stock	integer
cart_user_id	bigint
order_id	bigint

shipment_details	
shipment_id	bigint
order_id	bigint
shipper_id	bigint

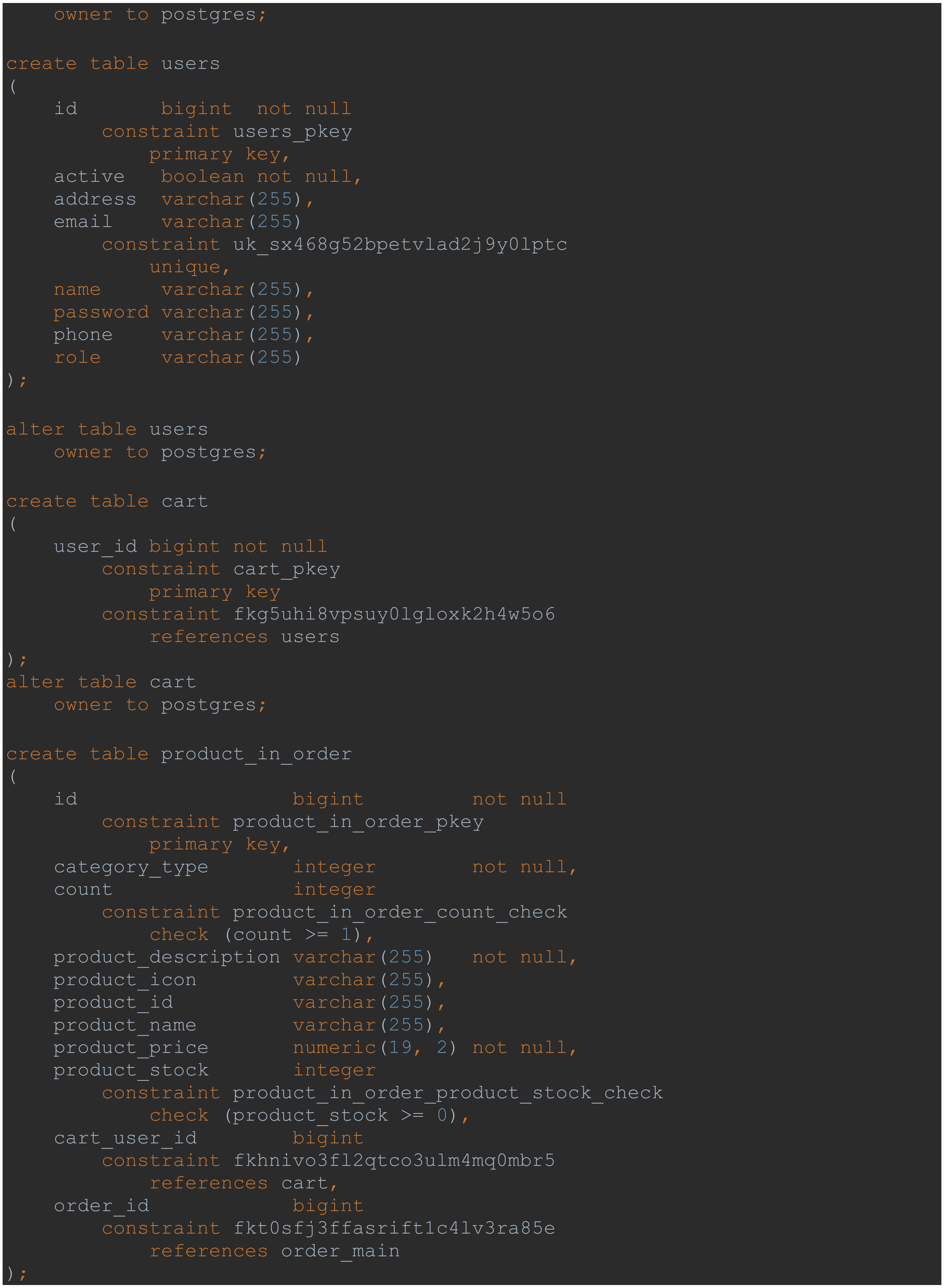
product_category	
category_id	integer
category_name	varchar(255)
category_type	integer
create_time	timestamp
update_time	timestamp

stores	
store_id	bigint
address	varchar(255)
name	varchar(255)
phone_number	bigint

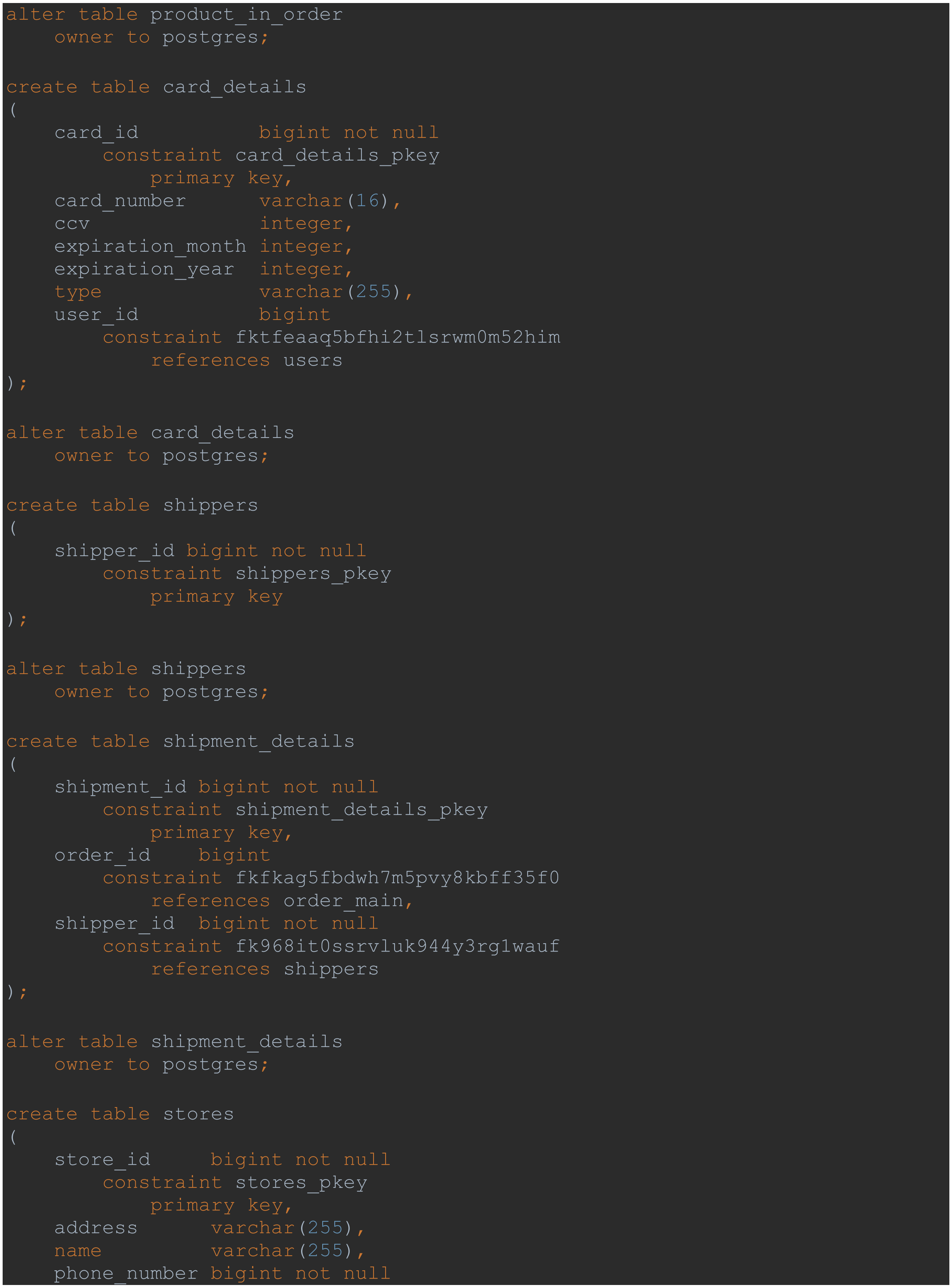
Figure2: Entity-Relationship Diagram of Electronic Vendor Online Store

b) Relational Schema

```
create table order_main
(
    order_id      bigint            not null
        constraint order_main_pkey
            primary key,
    buyer_address varchar(255),
    buyer_email   varchar(255),
    buyer_name    varchar(255),
    buyer_phone   varchar(255),
    create_time   timestamp,
    order_amount  numeric(19, 2)    not null,
    order_status  integer default 0 not null,
    update_time   timestamp
);

alter table order_main
    owner to postgres;

create table product_category
(
    category_id   integer not null
        constraint product_category_pkey
            primary key,
    category_name varchar(255),
    category_type integer
        constraint uk_6kq6iveuim6wd90cxo5bksumw
            unique,
    create_time   timestamp,
    update_time   timestamp
);

alter table product_category
    owner to postgres;

create table product_info
(
    product_id          varchar(255)   not null
        constraint product_info_pkey
            primary key,
    category_type       integer default 0,
    create_time         timestamp,
    product_description varchar(255),
    product_icon        varchar(255),
    product_name        varchar(255)   not null,
    product_price       numeric(19, 2) not null,
    product_status      integer default 0,
    product_stock       integer        not null
        constraint product_info_product_stock_check
            check (product_stock >= 0),
    update_time         timestamp
);

alter table product_info
```



```
    owner to postgres;

create table users
(
    id       bigint  not null
        constraint users_pkey
            primary key,
    active   boolean not null,
    address  varchar(255),
    email    varchar(255)
        constraint uk_sx468g52bpetvlad2j9y0lptc
            unique,
    name     varchar(255),
    password varchar(255),
    phone    varchar(255),
    role     varchar(255)
);

alter table users
    owner to postgres;

create table cart
(
    user_id bigint not null
        constraint cart_pkey
            primary key
        constraint fkg5uhi8vpsuy0lgloxk2h4w5o6
            references users
);
alter table cart
    owner to postgres;

create table product_in_order
(
    id                  bigint         not null
        constraint product_in_order_pkey
            primary key,
    category_type       integer        not null,
    count               integer
        constraint product_in_order_count_check
            check (count >= 1),
    product_description varchar(255)   not null,
    product_icon        varchar(255),
    product_id          varchar(255),
    product_name        varchar(255),
    product_price       numeric(19, 2) not null,
    product_stock       integer
        constraint product_in_order_product_stock_check
            check (product_stock >= 0),
    cart_user_id        bigint
        constraint fkhnivo3fl2qtco3ulm4mq0mbr5
            references cart,
    order_id            bigint
        constraint fkt0sfj3ffasrift1c4lv3ra85e
            references order_main
);
```



```sql
alter table product_in_order
    owner to postgres;

create table card_details
(
    card_id          bigint not null
        constraint card_details_pkey
            primary key,
    card_number      varchar(16),
    ccv              integer,
    expiration_month integer,
    expiration_year  integer,
    type             varchar(255),
    user_id          bigint
        constraint fktfeaaq5bfhi2tlsrwm0m52him
            references users
);

alter table card_details
    owner to postgres;

create table shippers
(
    shipper_id bigint not null
        constraint shippers_pkey
            primary key
);

alter table shippers
    owner to postgres;

create table shipment_details
(
    shipment_id bigint not null
        constraint shipment_details_pkey
            primary key,
    order_id    bigint
        constraint fkfkag5fbdwh7m5pvy8kbff35f0
            references order_main,
    shipper_id  bigint not null
        constraint fk968it0ssrvluk944y3rg1wauf
            references shippers
);

alter table shipment_details
    owner to postgres;

create table stores
(
    store_id     bigint not null
        constraint stores_pkey
            primary key,
    address      varchar(255),
    name         varchar(255),
    phone_number bigint not null
);

alter table stores
    owner to postgres;
```

3. Implementation Details

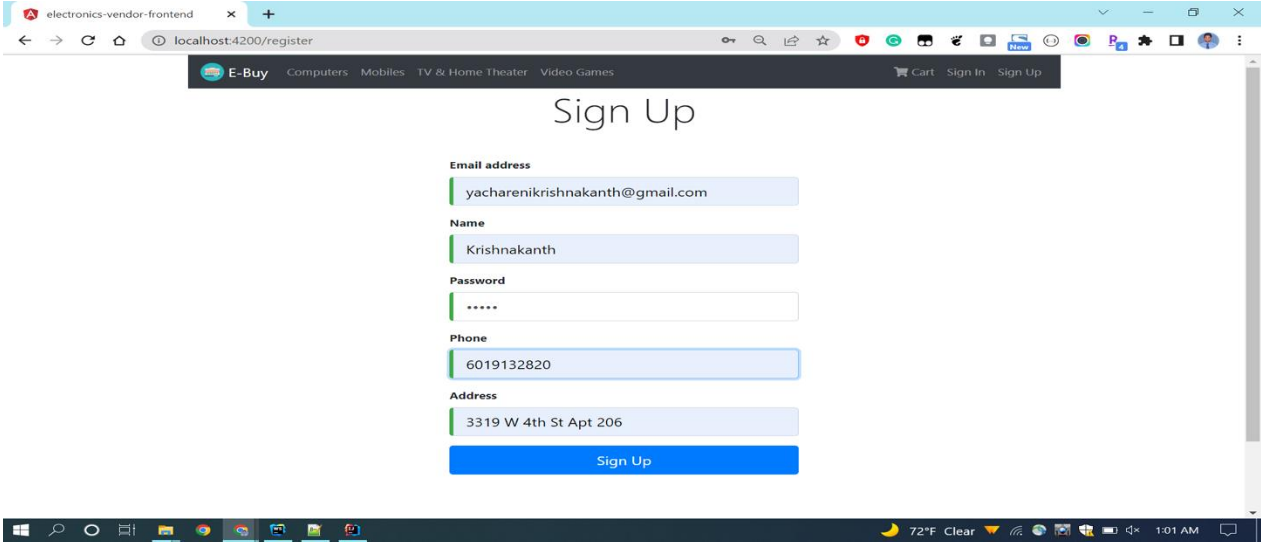
Anyone can view this electronic vendor portal and available products, but every user must login by his/her Username and password to purchase or order products. Unregistered members can register by navigating to the registration page. Only Admin will have access to modify roles, by default developer can only be an ‘Admin.’ Once a user registers on the site, his default role will be ‘User.

To build any web application using Angular and spring boot we need a programming language such as Typescript, Java, and so on. TypeScript code cannot be natively interpreted by browsers. So, if the code was written in TypeScript, it gets compiled and converted into JavaScript was the language used to build this application. For the client browser to connect to the **tomcat** as the Web Server. PostgreSQL was used as a back-end database since it is one of the most popular databases, and it provides fast data access, easy installation, and simplicity.

A good shopping cart design must be accompanied by user-friendly shopping cart application logic. It should be convenient for the customer to view the contents of their cart and to be able to remove or add items to their cart. The shopping cart application described in this project provides a few features that are designed to make the customer more comfortable. This project helps in understanding the creation of an interactive web page and the technologies used to implement it. The design of the project, which includes the Data Model and Process Model illustrates how the database is built with different tables, how the data is accessed and processed from the tables. The building of the project has given me precise knowledge about how Angular Spring and PostgreSQL are used to develop a website, how it connects to the database to access the data, and how the data and web pages are modified to provide the user with a shopping cart application.

4. Running Results and Analysis

Sign up: A new user can create an account using the sign-up page.



Email address: yacharenikrishnakanth@gmail.com

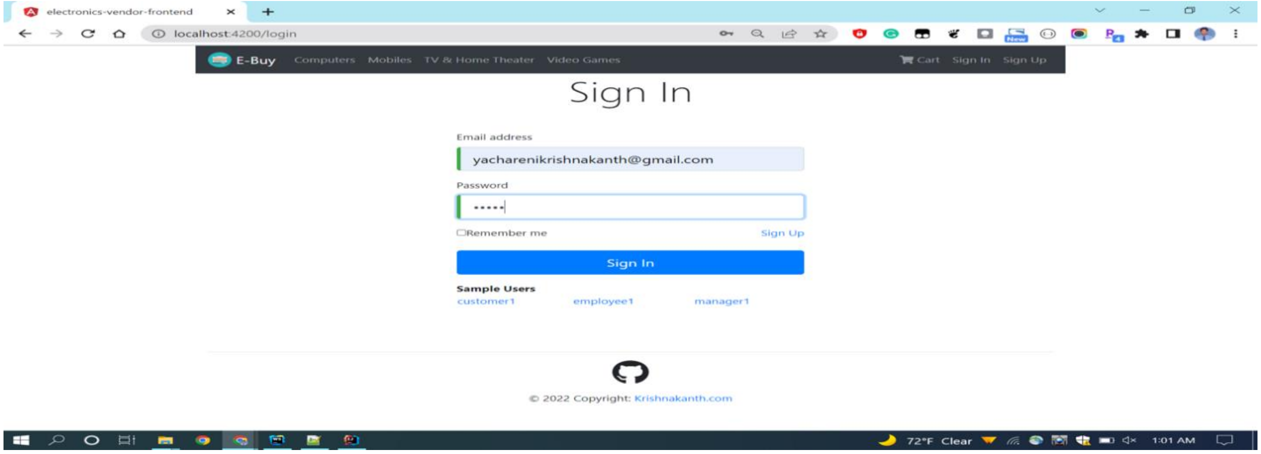
Name: Krishnakanth

Password: •••••

Phone: 6019132820

Address: 3319 W 4th St Apt 206

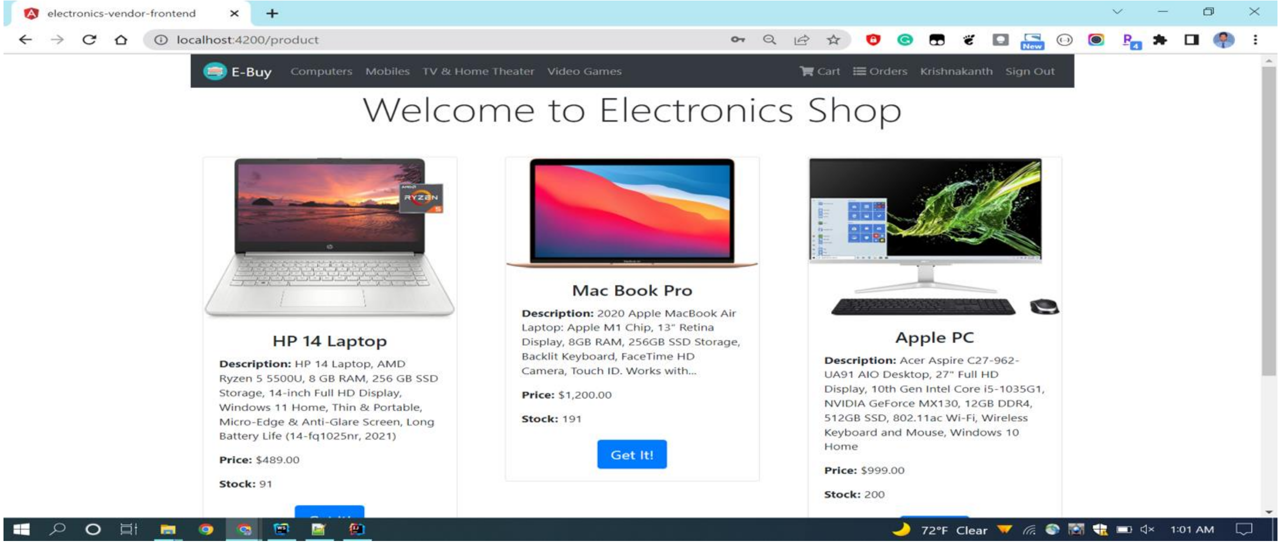
Sign In: Once the account is created successfully, he/she can login using their email id and password.



Email address: yacharenikrishnakanth@gmail.com

Password: •••••

Home Page: Once a user logs in to the website, a home page with multiple electronic gadgets is seen with the price and available stock. Items are categorized into their respective categories. (Example: Laptop, Mobile and Desktop)



Welcome to Electronics Shop

HP 14 Laptop

Description: HP 14 Laptop, AMD Ryzen 5 5500U, 8 GB RAM, 256 GB SSD Storage, 14-inch Full HD Display, Windows 11 Home, Thin & Portable, Micro-Edge & Anti-Glare Screen, Long Battery Life (14-fq1025nr, 2021)

Price: $489.00

Stock: 91

Mac Book Pro

Description: 2020 Apple MacBook Air Laptop: Apple M1 Chip, 13" Retina Display, 8GB RAM, 256GB SSD Storage, Backlit Keyboard, FaceTime HD Camera, Touch ID. Works with...

Price: $1,200.00

Stock: 191

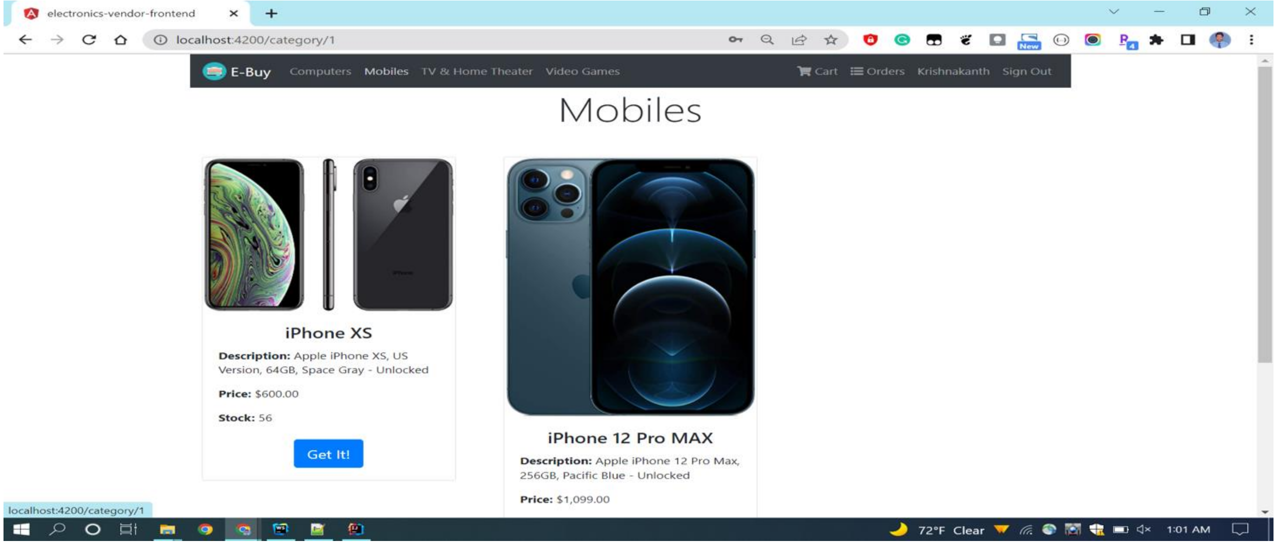
Apple PC

Description: Acer Aspire C27-962-UA91 AIO Desktop, 27" Full HD Display, 10th Gen Intel Core i5-1035G1, NVIDIA GeForce MX130, 12GB DDR4, 512GB SSD, 802.11ac Wi-Fi, Wireless Keyboard and Mouse, Windows 10 Home

Price: $999.00

Stock: 200

Every tab is categorized with the title.



Mobiles

iPhone XS

Description: Apple iPhone XS, US Version, 64GB, Space Gray - Unlocked

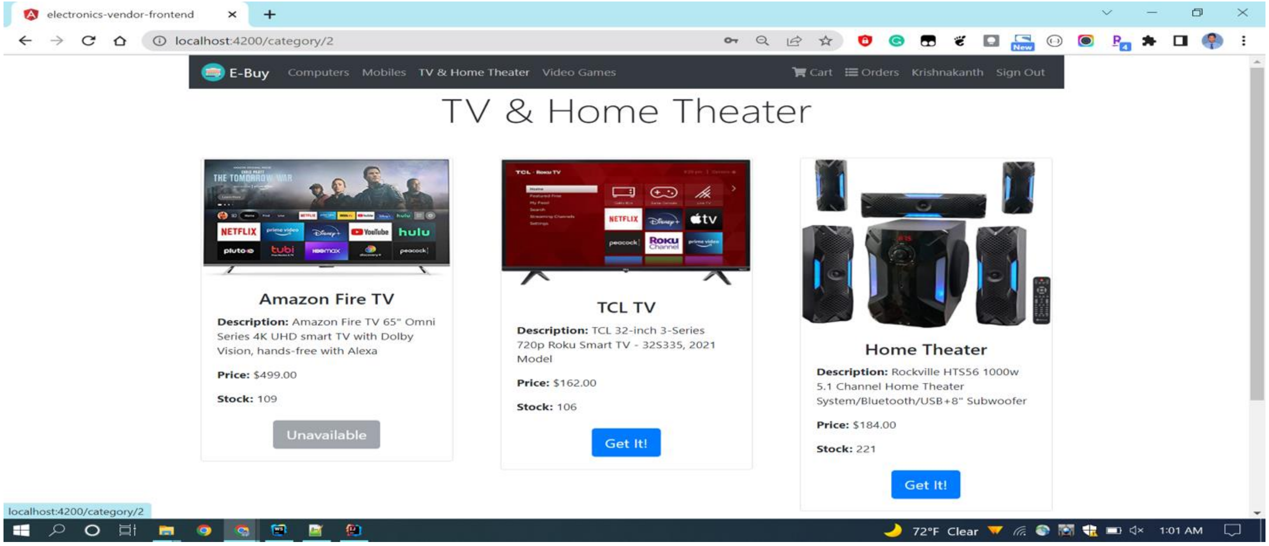
Price: $600.00

Stock: 56

iPhone 12 Pro MAX

Description: Apple iPhone 12 Pro Max, 256GB, Pacific Blue - Unlocked

Price: $1,099.00



TV & Home Theater

Amazon Fire TV

Description: Amazon Fire TV 65" Omni Series 4K UHD smart TV with Dolby Vision, hands-free with Alexa

Price: $499.00

Stock: 109

TCL TV

Description: TCL 32-inch 3-Series 720p Roku Smart TV - 32S335, 2021 Model

Price: $162.00

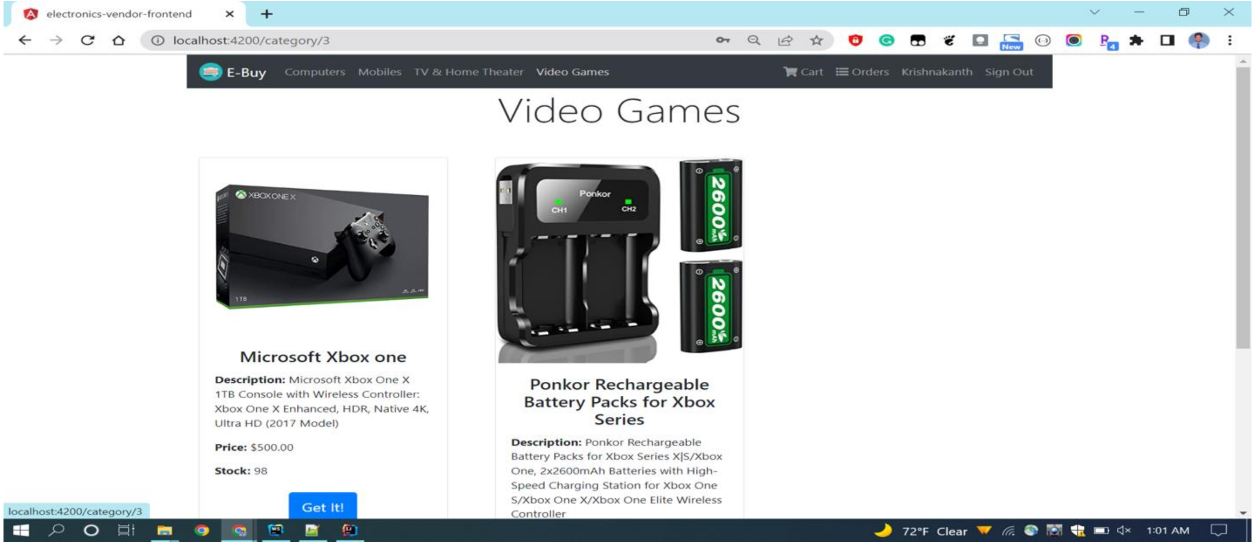
Stock: 106

Home Theater

Description: Rockville HTS56 1000w 5.1 Channel Home Theater System/Bluetooth/USB+8" Subwoofer

Price: $184.00

Stock: 221



Video Games

Microsoft Xbox one

Description: Microsoft Xbox One X 1TB Console with Wireless Controller: Xbox One X Enhanced, HDR, Native 4K, Ultra HD (2017 Model)

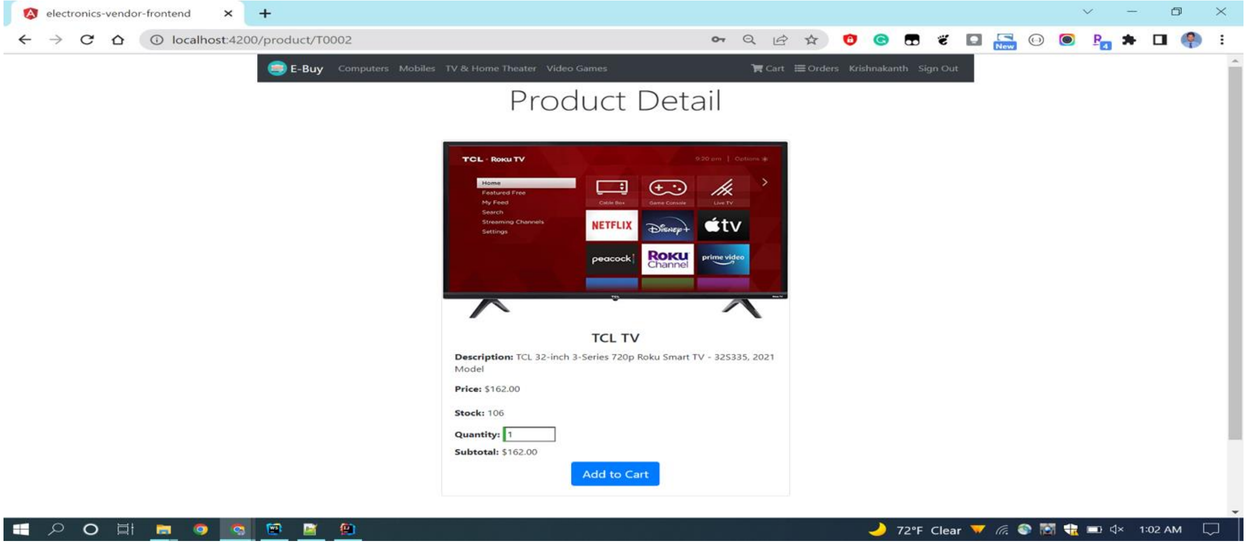
Price: $500.00

Stock: 98

Ponkor Rechargeable Battery Packs for Xbox Series

Description: Ponkor Rechargeable Battery Packs for Xbox Series X|S/Xbox One, 2x2600mAh Batteries with High-Speed Charging Station for Xbox One S/Xbox One X/Xbox One Elite Wireless Controller

Get IT: There is an option available “Get It,” which gives an option to select the quantity and add to the cart.



Product Detail

TCL TV

Description: TCL 32-inch 3-Series 720p Roku Smart TV - 32S335, 2021 Model

Price: $162.00

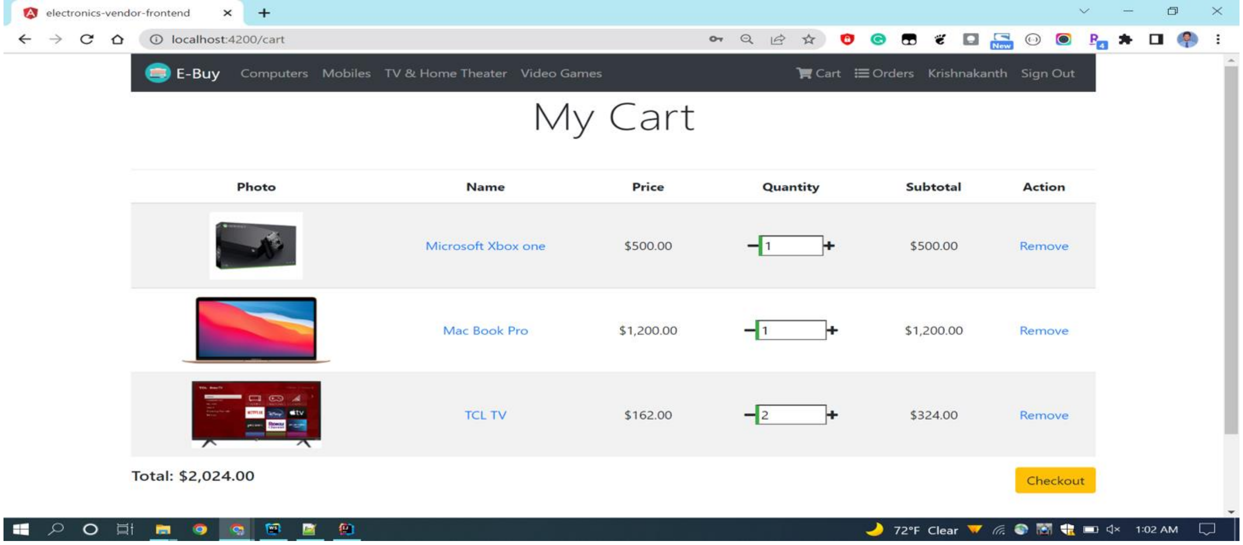
Stock: 106

Quantity: 1

Subtotal: $162.00

Add to Cart

Cart: The items added by the user can be seen in the Cart Icon[option].



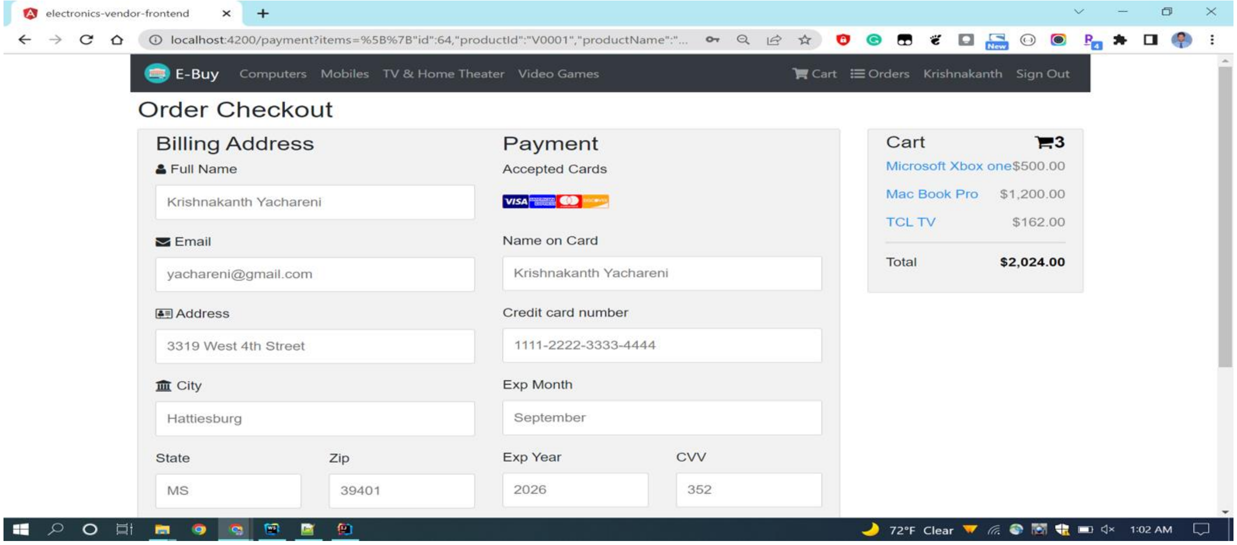
My Cart

Photo	Name	Price	Quantity	Subtotal	Action
	Microsoft Xbox one	$500.00	− 1 +	$500.00	Remove
	Mac Book Pro	$1,200.00	− 1 +	$1,200.00	Remove
	TCL TV	$162.00	− 2 +	$324.00	Remove

Total: $2,024.00

Checkout

Checkout: Once the user selects the checkout option, he/she must enter the billing details and the card information. The total amount to be paid will be displayed on the side.


electronics-vendor-frontend
localhost:4200/payment?items=%5B%7B"id":64,"productId":"V0001","productName":"...
E-Buy
Computers
Mobiles
TV & Home Theater
Video Games
Cart
Orders
Krishnakanth
Sign Out
72°F Clear
1:02 AM

Order Checkout

Billing Address

Full Name: Krishnakanth Yachareni

Email: yachareni@gmail.com

Address: 3319 West 4th Street

City: Hattiesburg

State: MS

Zip: 39401

Payment

Accepted Cards

Name on Card: Krishnakanth Yachareni

Credit card number: 1111-2222-3333-4444

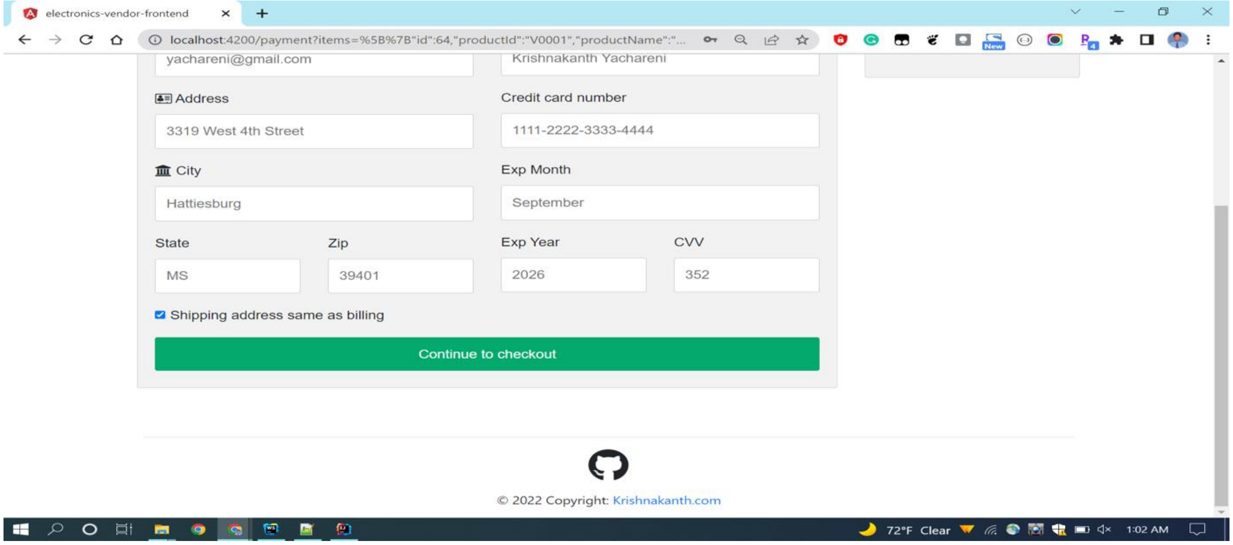
Exp Month: September

Exp Year: 2026

CVV: 352

Cart 3

Microsoft Xbox one	$500.00
Mac Book Pro	$1,200.00
TCL TV	$162.00
Total	**$2,024.00**


electronics-vendor-frontend
localhost:4200/payment?items=%5B%7B"id":64,"productId":"V0001","productName":"...
72°F Clear
1:02 AM

yachareni@gmail.com

Krishnakanth Yachareni

Address: 3319 West 4th Street

Credit card number: 1111-2222-3333-4444

City: Hattiesburg

Exp Month: September

State: MS

Zip: 39401

Exp Year: 2026

CVV: 352

☑ Shipping address same as billing

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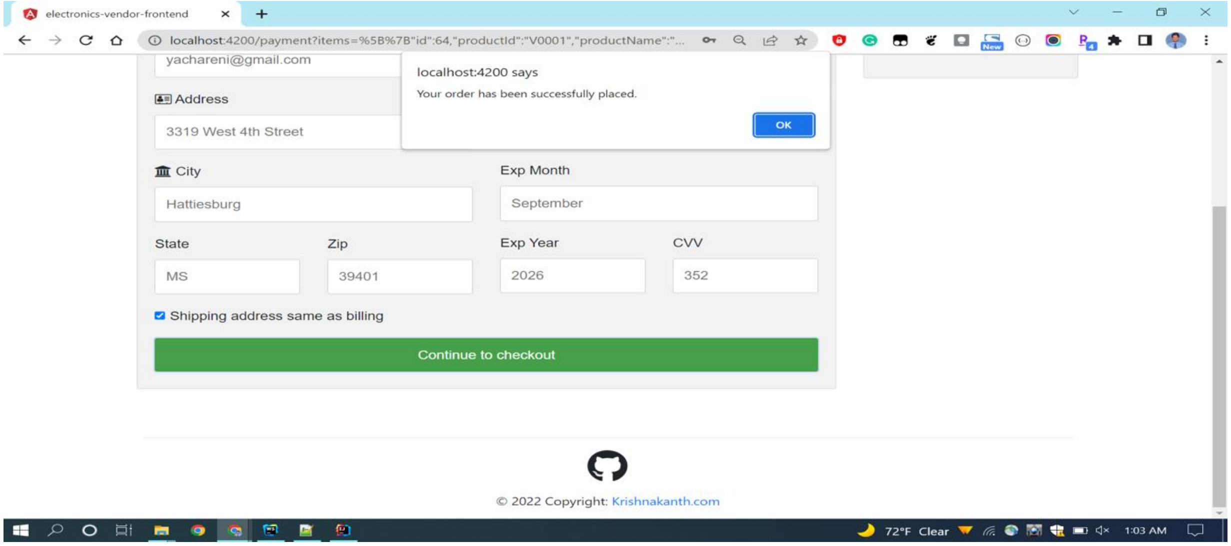
Successful: If the order is successful, then a popup is shown saying the order is successful.


electronics-vendor-frontend
localhost:4200/payment?items=%5B%7B"id":64,"productId":"V0001","productName":"...

yachareni@gmail.com

Address

3319 West 4th Street

localhost:4200 says

Your order has been successfully placed.

OK

City	Exp Month
Hattiesburg	September

State	Zip	Exp Year	CVV
MS	39401	2026	352

☑ Shipping address same as billing

Continue to checkout

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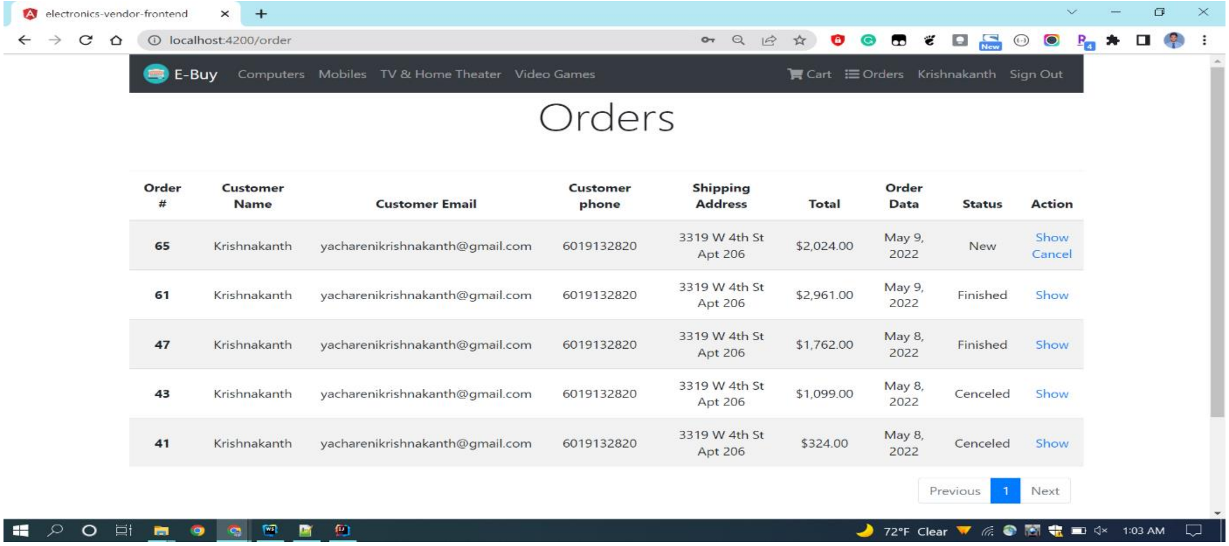
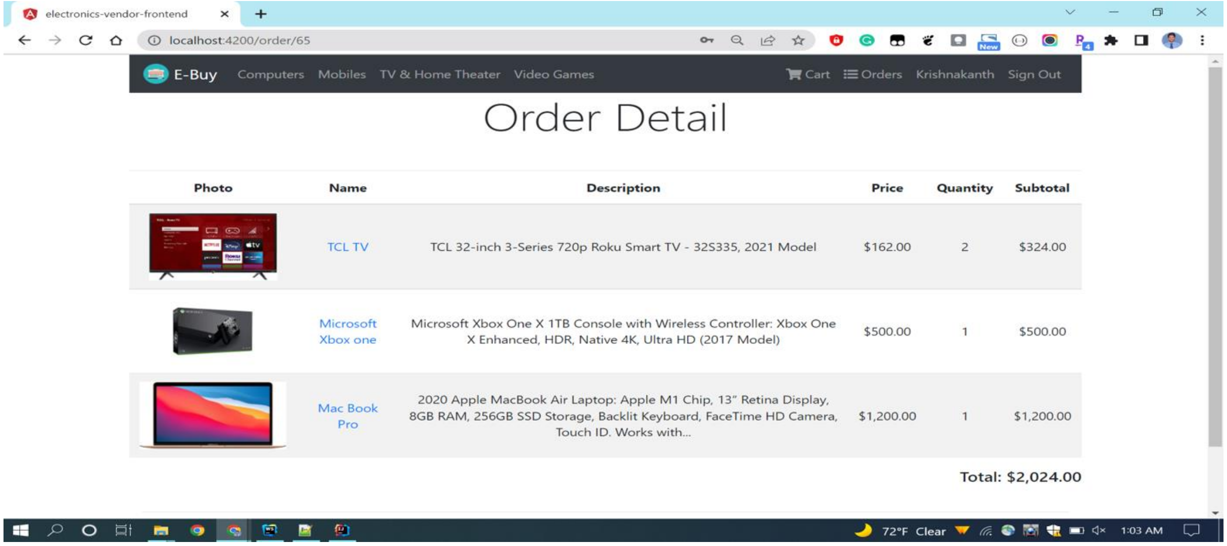
Order Status: The status of the order can be seen in the orders section, the Admin must approve the orders which are placed. If successful, then the action will be seen as **"finished,"** else **"Cancelled."**



Orders

Order #	Customer Name	Customer Email	Customer phone	Shipping Address	Total	Order Data	Status	Action
65	Krishnakanth	yacharenikrishnakanth@gmail.com	6019132820	3319 W 4th St Apt 206	$2,024.00	May 9, 2022	New	Show Cancel
61	Krishnakanth	yacharenikrishnakanth@gmail.com	6019132820	3319 W 4th St Apt 206	$2,961.00	May 9, 2022	Finished	Show
47	Krishnakanth	yacharenikrishnakanth@gmail.com	6019132820	3319 W 4th St Apt 206	$1,762.00	May 8, 2022	Finished	Show
43	Krishnakanth	yacharenikrishnakanth@gmail.com	6019132820	3319 W 4th St Apt 206	$1,099.00	May 8, 2022	Canceled	Show
41	Krishnakanth	yacharenikrishnakanth@gmail.com	6019132820	3319 W 4th St Apt 206	$324.00	May 8, 2022	Canceled	Show

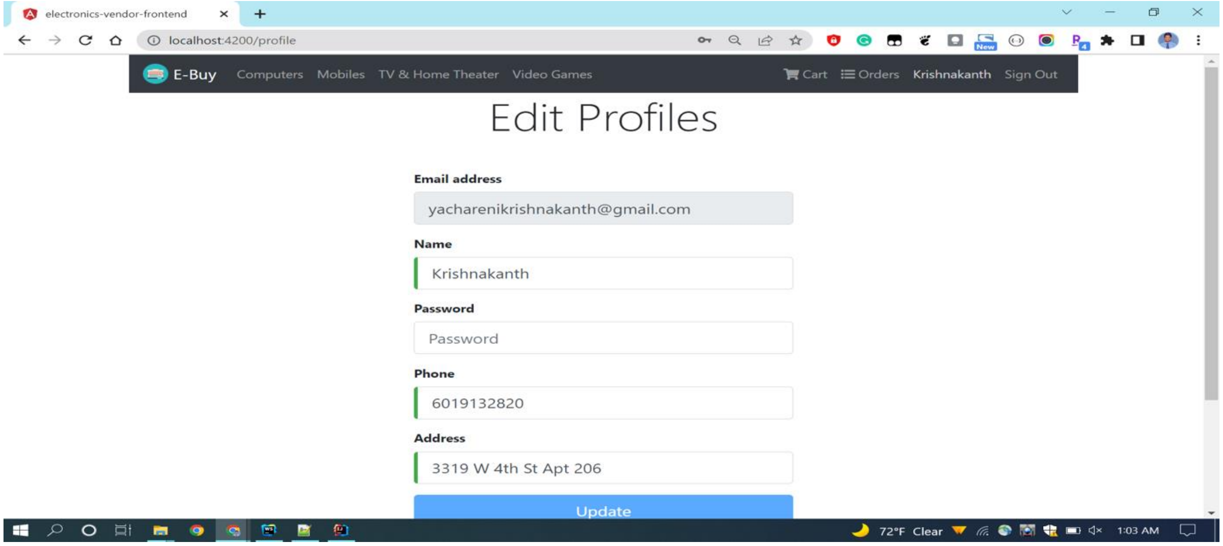


Order Detail

Photo	Name	Description	Price	Quantity	Subtotal
	TCL TV	TCL 32-inch 3-Series 720p Roku Smart TV - 32S335, 2021 Model	$162.00	2	$324.00
	Microsoft Xbox one	Microsoft Xbox One X 1TB Console with Wireless Controller: Xbox One X Enhanced, HDR, Native 4K, Ultra HD (2017 Model)	$500.00	1	$500.00
	Mac Book Pro	2020 Apple MacBook Air Laptop: Apple M1 Chip, 13" Retina Display, 8GB RAM, 256GB SSD Storage, Backlit Keyboard, FaceTime HD Camera, Touch ID. Works with...	$1,200.00	1	$1,200.00

Total: $2,024.00

Admin Login: There is an option for the admin to login and do the required actions on the ordered items.



Edit Profiles

Email address

yacharenikrishnakanth@gmail.com

Name

Krishnakanth

Password

Password

Phone

6019132820

Address

3319 W 4th St Apt 206

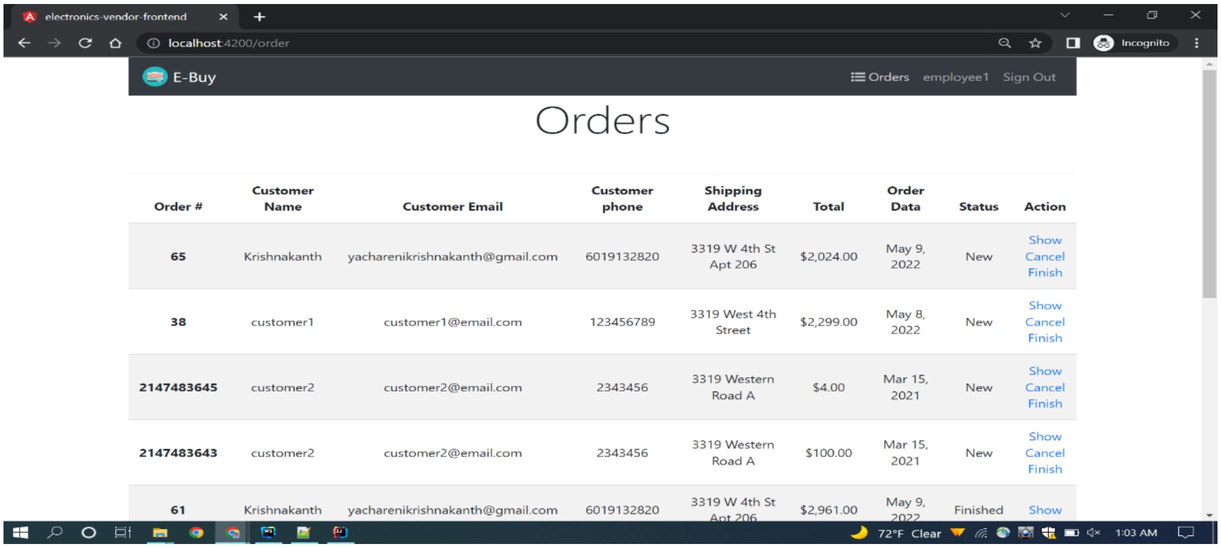
Update

Orders Page: All the items placed by multiple users can be seen in Admin orders page. There will be 3 options available for the admin: **"Show, Cancel and Finish."**

Show: Admin can view the item and the description of the product.

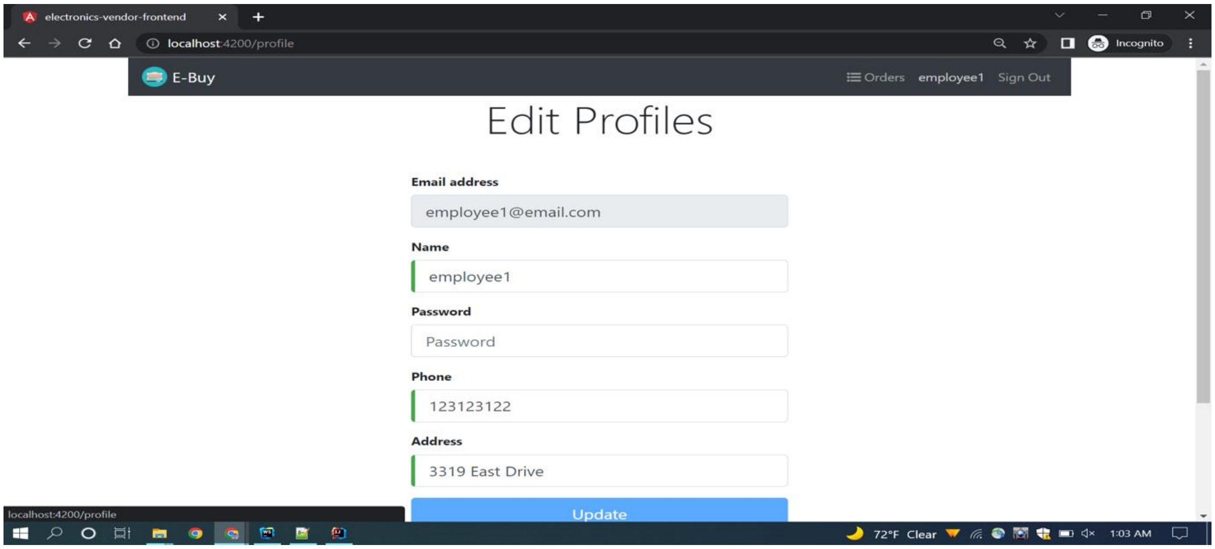
Cancel: The cancel option disproves the item placed by the user. This can happen if the product goes out of stock.

Finish: If everything goes well with the order, then the admin can approve the order by clicking finish. Then the item goes into shipping.



Orders

Order #	Customer Name	Customer Email	Customer phone	Shipping Address	Total	Order Data	Status	Action
65	Krishnakanth	yacharenikrishnakanth@gmail.com	6019132820	3319 W 4th St Apt 206	$2,024.00	May 9, 2022	New	Show Cancel Finish
38	customer1	customer1@email.com	123456789	3319 West 4th Street	$2,299.00	May 8, 2022	New	Show Cancel Finish
2147483645	customer2	customer2@email.com	2343456	3319 Western Road A	$4.00	Mar 15, 2021	New	Show Cancel Finish
2147483643	customer2	customer2@email.com	2343456	3319 Western Road A	$100.00	Mar 15, 2021	New	Show Cancel Finish
61	Krishnakanth	yacharenikrishnakanth@gmail.com	6019132820	3319 W 4th St Apt 206	$2,961.00	May 9, 2022	Finished	Show



Edit Profiles

Email address
employee1@email.com

Name
employee1

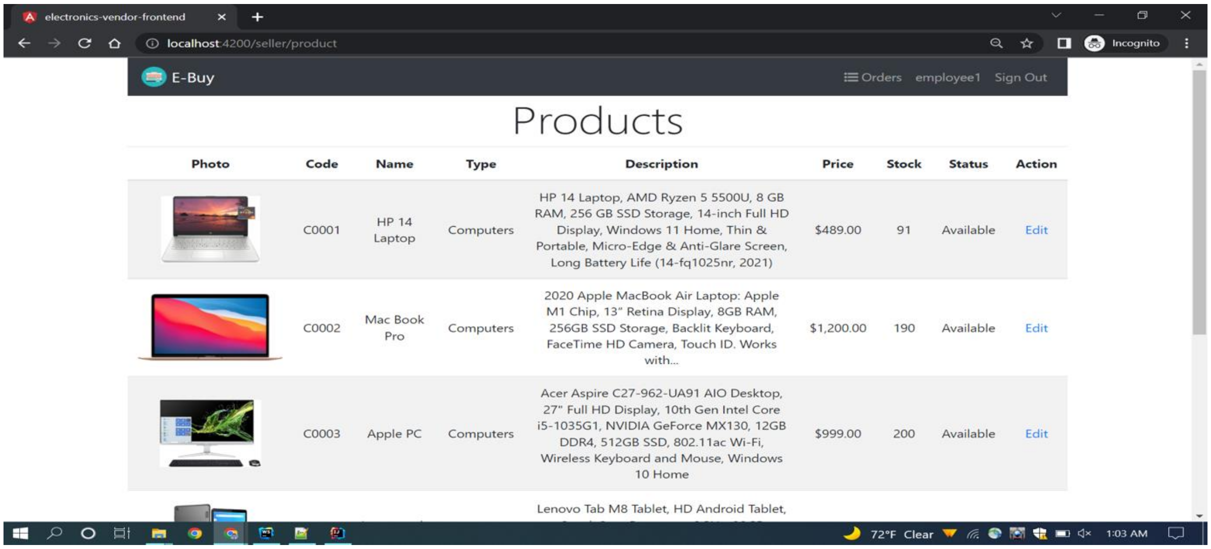
Password
Password

Phone
123123122

Address
3319 East Drive

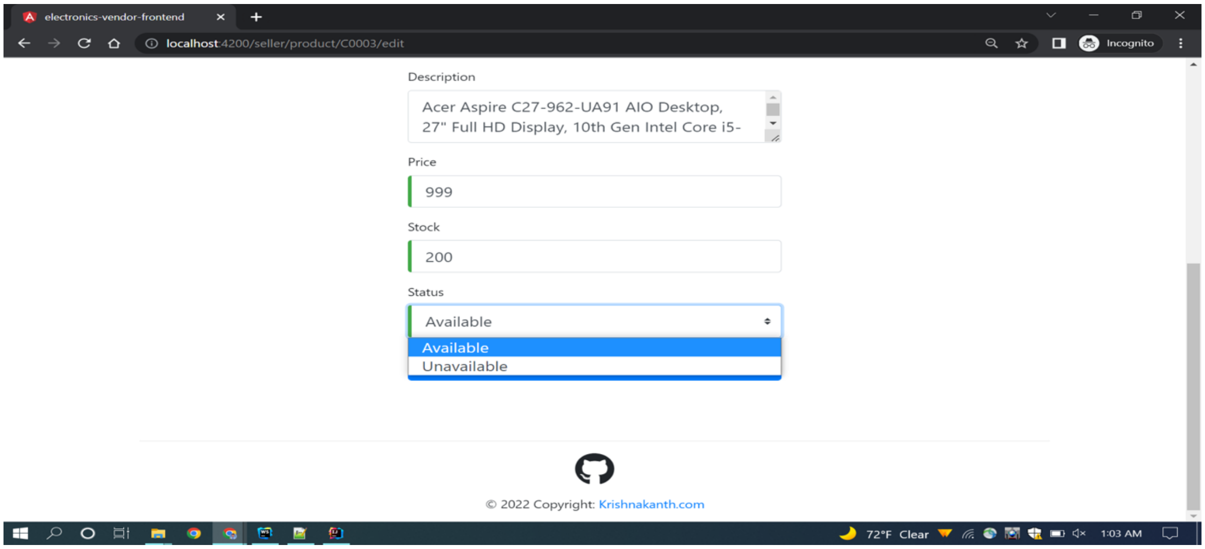
Update

Availability: The admin holds the right to change the availability options of the items. If an item comes into stock, then admin can change the option to available. This can be done using the actions button given below. This option will be available for each individual item.



Products

Photo	Code	Name	Type	Description	Price	Stock	Status	Action
	C0001	HP 14 Laptop	Computers	HP 14 Laptop, AMD Ryzen 5 5500U, 8 GB RAM, 256 GB SSD Storage, 14-inch Full HD Display, Windows 11 Home, Thin & Portable, Micro-Edge & Anti-Glare Screen, Long Battery Life (14-fq1025nr, 2021)	$489.00	91	Available	Edit
	C0002	Mac Book Pro	Computers	2020 Apple MacBook Air Laptop: Apple M1 Chip, 13" Retina Display, 8GB RAM, 256GB SSD Storage, Backlit Keyboard, FaceTime HD Camera, Touch ID. Works with...	$1,200.00	190	Available	Edit
	C0003	Apple PC	Computers	Acer Aspire C27-962-UA91 AIO Desktop, 27" Full HD Display, 10th Gen Intel Core i5-1035G1, NVIDIA GeForce MX130, 12GB DDR4, 512GB SSD, 802.11ac Wi-Fi, Wireless Keyboard and Mouse, Windows 10 Home	$999.00	200	Available	Edit
				Lenovo Tab M8 Tablet, HD Android Tablet,				


electronics-vendor-frontend
localhost:4200/seller/product/C0003/edit
Incognito
72°F Clear
1:03 AM

Description

Acer Aspire C27-962-UA91 AIO Desktop, 27" Full HD Display, 10th Gen Intel Core i5-

Price

999

Stock

200

Status

Available

Available
Unavailable

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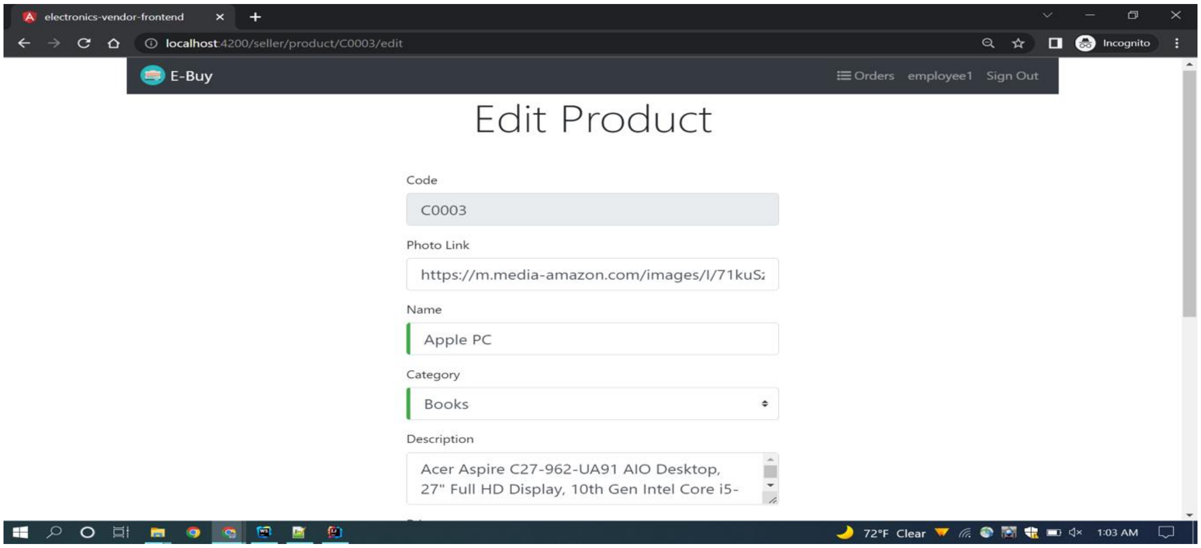

electronics-vendor-frontend
localhost:4200/seller/product/C0003/edit
Incognito
E-Buy
Orders
employee1
Sign Out
72°F Clear
1:03 AM

Edit Product

Code
C0003

Photo Link
https://m.media-amazon.com/images/I/71kuS

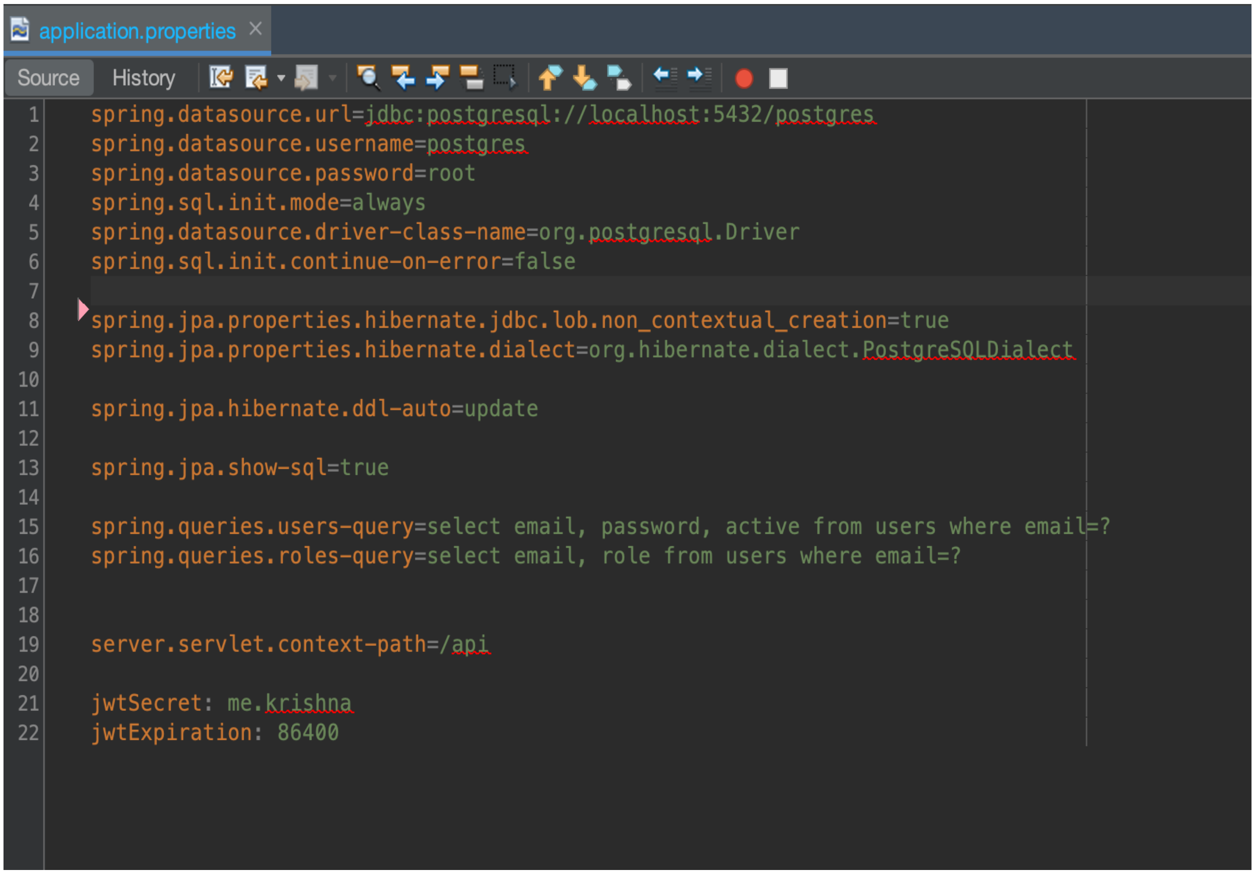
Name
Apple PC

Category
Books

Description
Acer Aspire C27-962-UA91 AIO Desktop, 27" Full HD Display, 10th Gen Intel Core i5-

Code Snippets:

Properties file for the Java Spring Boot to configure the DataSource, JPA and JWT credentials.



```
spring.datasource.url=jdbc:postgresql://localhost:5432/postgres
spring.datasource.username=postgres
spring.datasource.password=root
spring.sql.init.mode=always
spring.datasource.driver-class-name=org.postgresql.Driver
spring.sql.init.continue-on-error=false

spring.jpa.properties.hibernate.jdbc.lob.non_contextual_creation=true
spring.jpa.properties.hibernate.dialect=org.hibernate.dialect.PostgreSQLDialect

spring.jpa.hibernate.ddl-auto=update

spring.jpa.show-sql=true

spring.queries.users-query=select email, password, active from users where email=?
spring.queries.roles-query=select email, role from users where email=?


server.servlet.context-path=/api

jwtSecret: me.krishna
jwtExpiration: 86400
```

5. Conclusion

Developing the web project from the initial stage to the final product for the electronics vendor online store helped us to understand how well all the components in a certain application must be integrated to get the best possible experience. We came to know that creating a database from scratch is an incredibly challenging task, but with good knowledge of the database, a genuine application can be achieved. When designing this project, we learned how Java Database Connection works and how Spring Boot initially makes it easy to set up the database from scratch. The Java Persistence API of Java is very handy and easy to use. With the help of JPA's full API of Crud Repository and other Paging and Sorting Repository, we could perform these operations very easily. We also learned how important it is to design the ER diagram and relational schemas before the development of the database to understand the complexities before.

6. **Contributions**

S. No	Student	Contribution Area
1.	Krishnakanth Yachareni	Front End Application Development, Back End API, Database design
2.	Vishnu Prasad Koduri	Project documentation Report, ER design
3.	Shreejit Bhattarai	Backend API Development, Support in documentation, Relational schema design

7. References

1. Avi Silberschatz, Henry F. Korth, S. Sudarshan, Database System Concepts, seventh edition, McGraw Hill, 2019
2. https://www.baeldung.com/spring-boot
3. https://angular.io/
4. https://spring.io/projects/spring-boot
5. https://www.postgresql.org/