RAMAIAH UNIVERSITY OF APPLIED SCIENCES

Assignment

Course Code	CSC402A
Course Name	Web Architecture and Application Development
Programme	B.Tech
Department	CSE
Faculty	FET

Name of the Student	Satyajit Ghana
Reg. No.	17ETCS002159
Semester/Year	07/2021
Course Leader(s)	Mrs. Sahana P Shankar

Declaration Sheet

Student Name	Satyajit Ghana		
Reg. No	17ETCS002159		
Programme	B.Tech	Semester/Year	07/2021
Course Code	CSC402A		
Course Title	Web Architecture and Application Development		
Course Date		to	
Course Leader	Mrs. Sahana P Shankar		

Declaration

The assignment submitted herewith is a result of my own investigations and that I have conformed to the guidelines against plagiarism as laid out in the Student Handbook. All sections of the text and results, which have been obtained from other sources, are fully referenced. I understand that cheating and plagiarism constitute a breach of University regulations and will be dealt with accordingly.

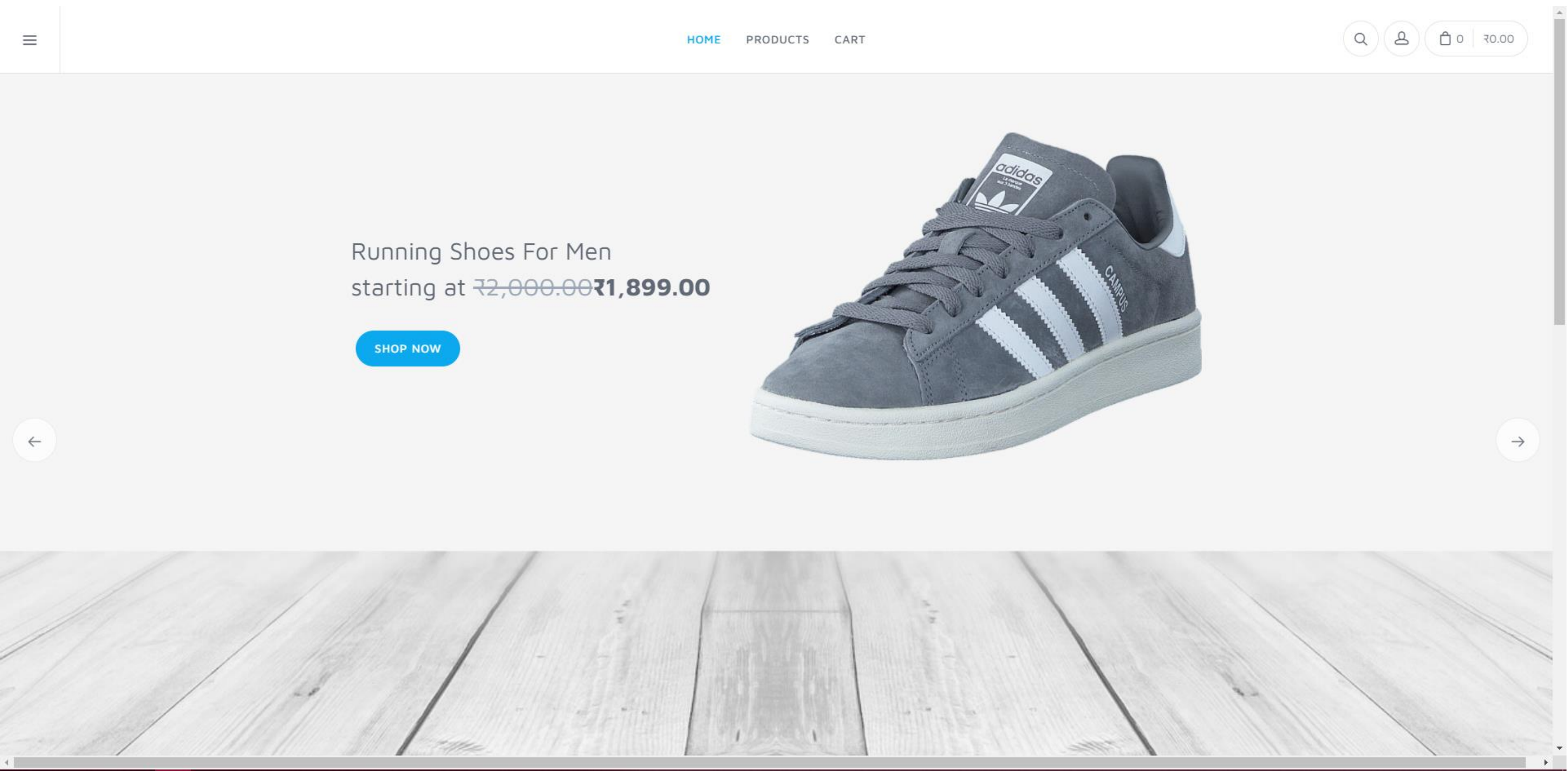
Signature of the Student		Date	
Submission date stamp (by Examination & Assessment Section)			

Signature of the Course Leader and date	Signature of the Reviewer and date

Contents

1 Question 1

Solution to Question No. 1



The deployed website can be viewed/tested at https://projekt-plutus.herokuapp.com/

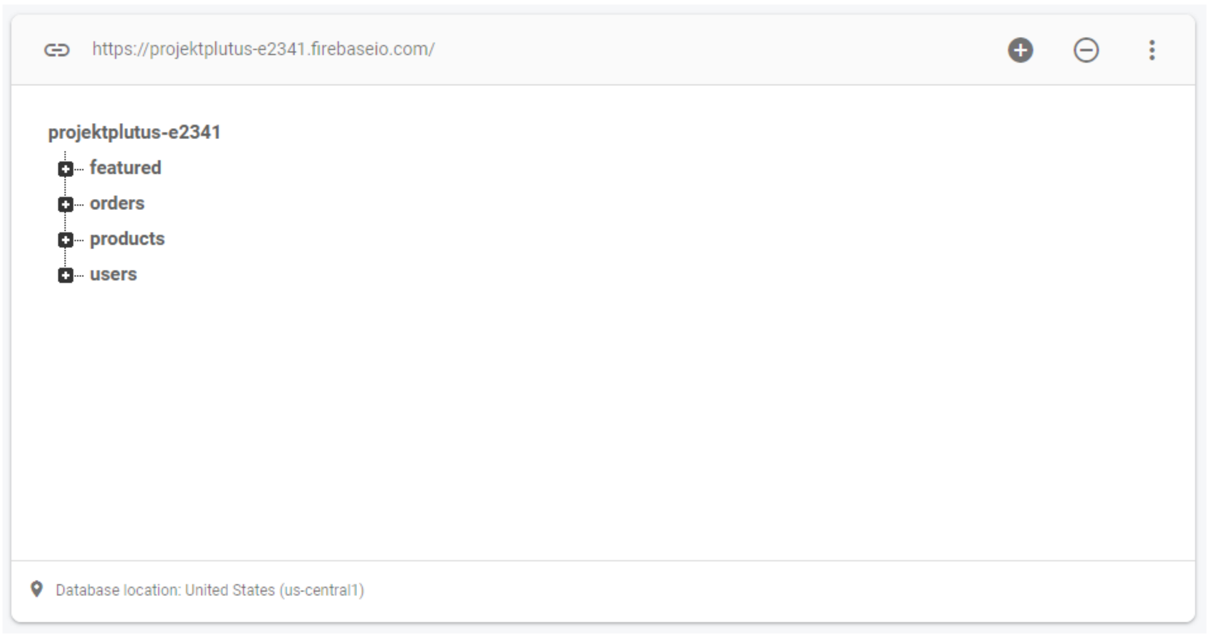
The source code can be viewed at https://github.com/satyajitghana/ProjektPlutus/

1.1 Implementation of database with justification of relationships

For implementing the database Firebase Realtime Database was used, The Firebase Realtime Database is a cloud-hosted database. Data is stored as JSON and synchronized in real-time to every connected client.

The Realtime Database is a NoSQL database and as such has different optimizations and functionality compared to a relational database. The Realtime Database API is designed to only allow operations that can be executed quickly.

The reason to choose a NoSQL database was to make the database more flexible, suppose we would like to add another field to the product later in the future, it won't be possible in an SQL database due to its limitation, but we can do it in NoSQL!, below is the outline of the keys present in the database. Below are the root keys in our database.

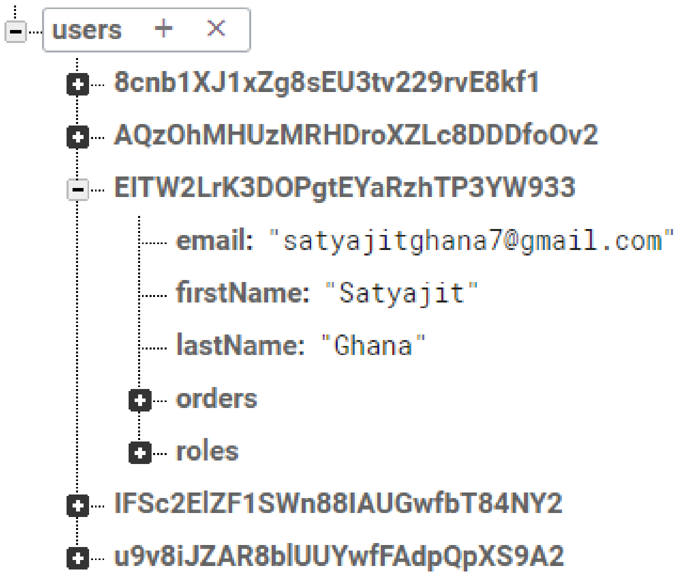

https://projektplutus-e2341.firebaseio.com/

```
projektplutus-e2341
 + featured
 + orders
 + products
 + users
```

Database location: United States (us-central1)

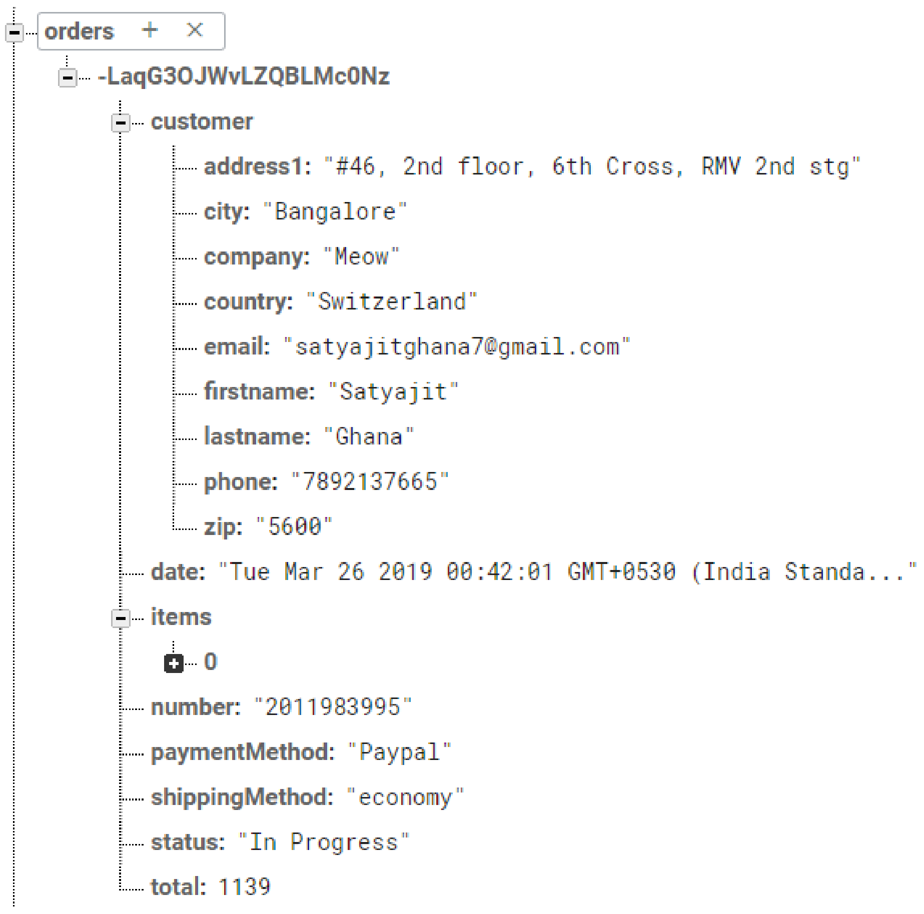
Users

These are both the admin and the normal users, they are identified using a unique id, and their access level is identified by the roles key



```
- users
    + 8cnb1XJ1xZg8sEU3tv229rvE8kf1
    + AQzOhMHUzMRHDroXZLc8DDDfoOv2
    - EITW2LrK3DOPgtEYaRzhTP3YW933
        email: "satyajitghana7@gmail.com"
        firstName: "Satyajit"
        lastName: "Ghana"
        + orders
        + roles
    + IFSc2ElZF1SWn88IAUGwfbT84NY2
    + u9v8iJZAR8blUUYwfFAdpQpXS9A2
```

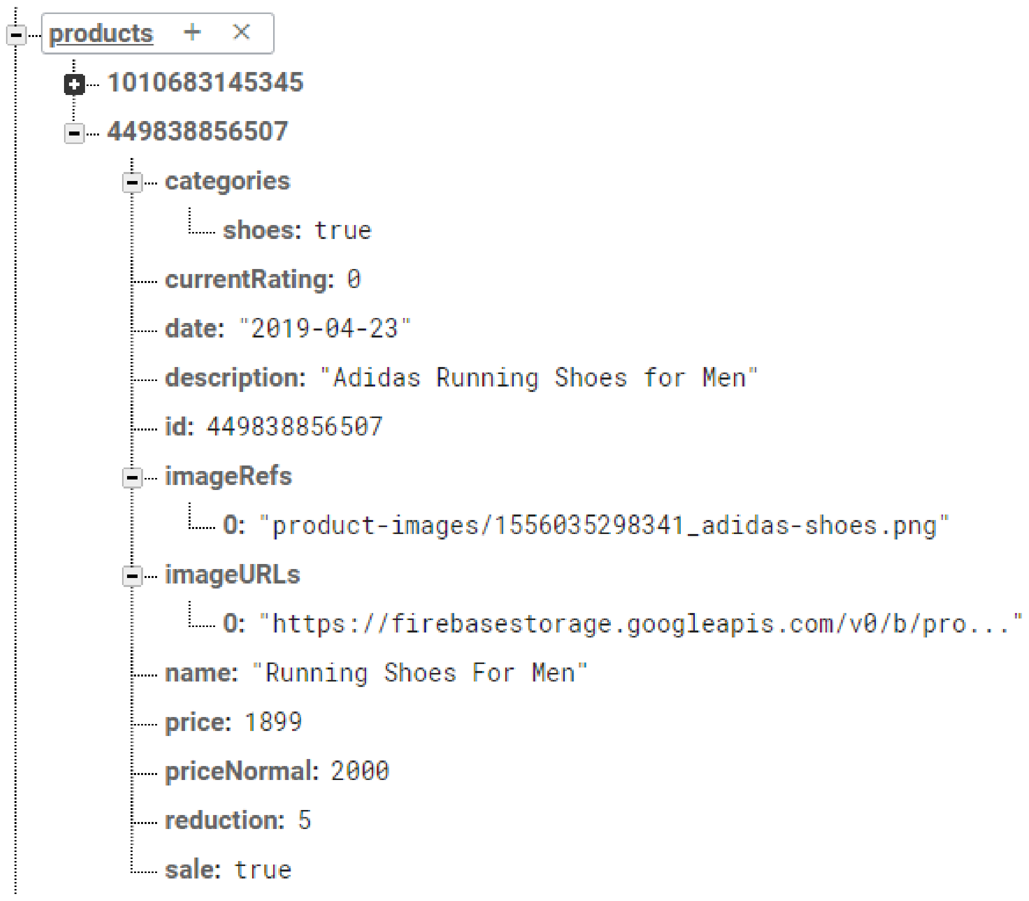
Each of the customer has a copy of their order they have made, we have already seen that there is a orders key in the root key, replication actually helps in Firebase Databases, although it takes up more space, it makes it easier to index items, let's suppose we would like to retrieve all orders of a specific user, then instead of filtering the root orders key, we can simply query the specific user' order in their key.



```
orders + ×
  -LaqG3OJWvLZQBLMc0Nz
    customer
      address1: "#46, 2nd floor, 6th Cross, RMV 2nd stg"
      city: "Bangalore"
      company: "Meow"
      country: "Switzerland"
      email: "satyajitghana7@gmail.com"
      firstname: "Satyajit"
      lastname: "Ghana"
      phone: "7892137665"
      zip: "5600"
    date: "Tue Mar 26 2019 00:42:01 GMT+0530 (India Standa..."
    items
      0
    number: "2011983995"
    paymentMethod: "Paypal"
    shippingMethod: "economy"
    status: "In Progress"
    total: 1139
```

Products

This key stores all the products available in our website, along with its rating, description, product image, price, discounted price, etc.

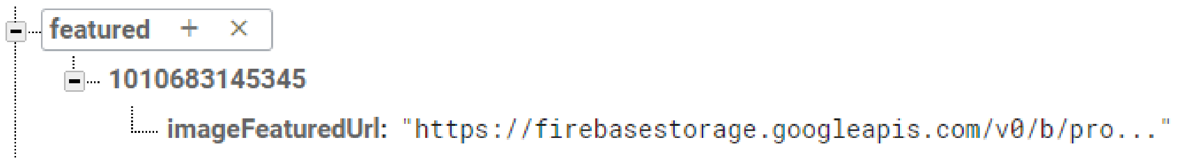


```
products
  1010683145345
  449838856507
    categories
      shoes: true
    currentRating: 0
    date: "2019-04-23"
    description: "Adidas Running Shoes for Men"
    id: 449838856507
    imageRefs
      0: "product-images/1556035298341_adidas-shoes.png"
    imageURLs
      0: "https://firebasestorage.googleapis.com/v0/b/pro..."
    name: "Running Shoes For Men"
    price: 1899
    priceNormal: 2000
    reduction: 5
    sale: true
```

Each of the product is identified by its id, which is also the key of the product

Featured

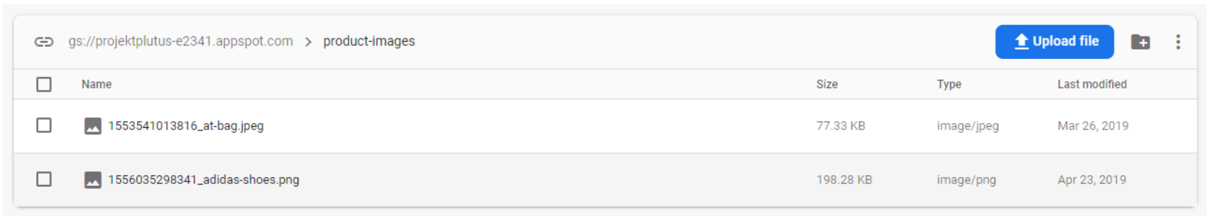
Featured are the products that show up in the landing page of the website



```
featured
  1010683145345
    imageFeaturedUrl: "https://firebasestorage.googleapis.com/v0/b/pro..."
```

Storage

All of the products, have some images associated with them, these images are stores in Firebase Storage, the public URL from this is used in the database, so the client can query and fetch the image to be displayed for that product.

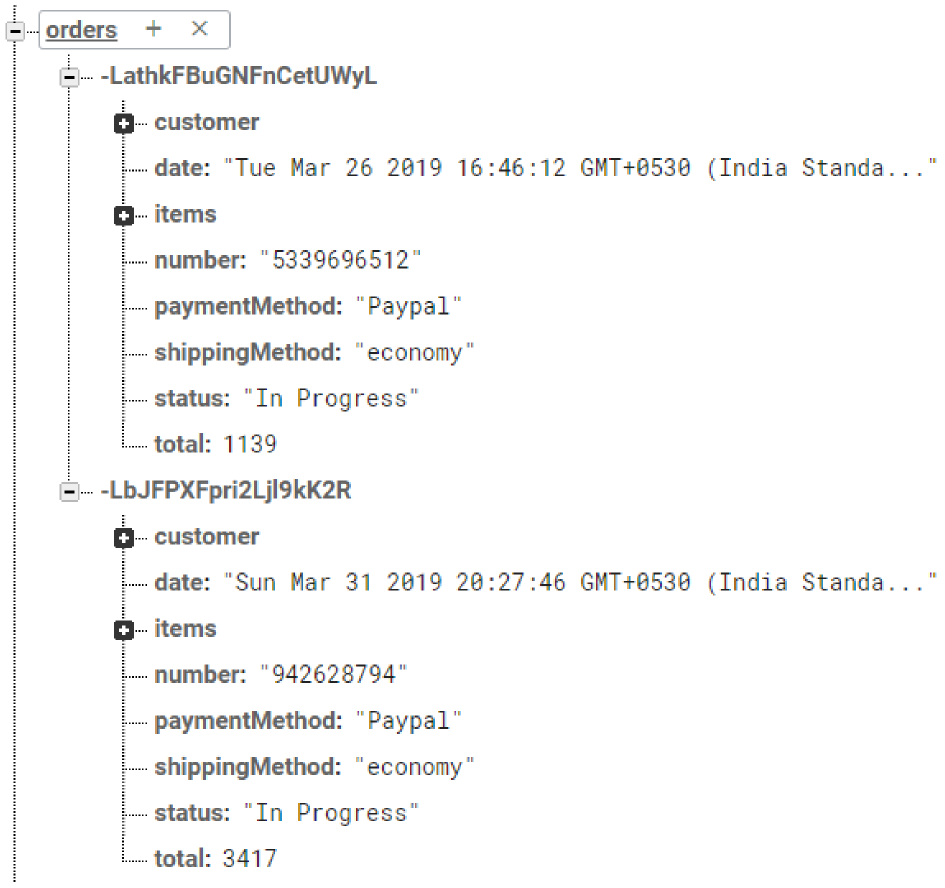

gs://projektplutus-e2341.appspot.com > product-images

Upload file

Name	Size	Type	Last modified
1553541013816_at-bag.jpeg	77.33 KB	image/jpeg	Mar 26, 2019
1556035298341_adidas-shoes.png	198.28 KB	image/png	Apr 23, 2019

Orders

This key holds all the orders placed by all of the users, this can be used by the merchants to calculate their total sales, profits, etc. Each of the order is identified by its key, and the value contains the attributes of the order as discussed in Assignment 1.


```
orders
  -LathkFBuGNFnCetUWyL
    customer
    date: "Tue Mar 26 2019 16:46:12 GMT+0530 (India Standa..."
    items
    number: "5339696512"
    paymentMethod: "Paypal"
    shippingMethod: "economy"
    status: "In Progress"
    total: 1139
  -LbJFPXFpri2Ljl9kK2R
    customer
    date: "Sun Mar 31 2019 20:27:46 GMT+0530 (India Standa..."
    items
    number: "942628794"
    paymentMethod: "Paypal"
    shippingMethod: "economy"
    status: "In Progress"
    total: 3417
```

1.2 Implementation of user registration

The UI/HTML can be viewed at

https://github.com/satyajitghana/ProjektPlutus/tree/master/src/app/account

We'll discuss some of the core logic involved here,

Since we are using `angularfire2` we can leverage their API's directly to authenticate users using Firebase Auth

`auth.service.ts`

```
public emailSignUp(email: string, password: string) {
  return this.afAuth.auth
    .createUserWithEmailAndPassword(email, password)
    .then(
      (user) => {
        console.log(user.user);
        this.updateNewUser(user.user);
      },
      (error) => {
        throw error;
      }
    );
}

emailLogin(email: string, password: string) {
  return this.afAuth.auth.signInWithEmailAndPassword(email, password).then(
    (user) => {
      this.updateNewUser(user);
    },
    (error) => {
      throw error;
    }
  );
}

public signOut() {
  this.afAuth.auth.signOut();
  this.messageService.add('You have been logged out.');
}
public updateProfile(userData: User) {
  this.updateExistingUser(userData);
  this.messageService.add('User profile has been updated!');
}

public updatePassword(password: string) {
  return this.afAuth.auth.currentUser
    .updatePassword(password)
    .then(() => {
      this.messageService.add('Password has been updated!');
    })
    .catch(function(error) {
      throw error;
      });
  }

  public updateEmail(email: string) {
    return this.afAuth.auth.currentUser
      .updateEmail(email)
      .then(() => {
        this.updateExistingUser({ email: email });
        this.messageService.add('User email have been updated!');
      })
      .catch(function(error) {
        throw error;
      });
  }

  private updateNewUser(authData) {
    const userData = new User(authData);
    const ref = this.db.object('users/' + authData.uid);
    ref
      .valueChanges()
      .pipe(
        take(1)
      )
      .subscribe((user) => {
        if (!user) {
          console.log(userData);
          ref.update(userData);
        }
      });
  }
```

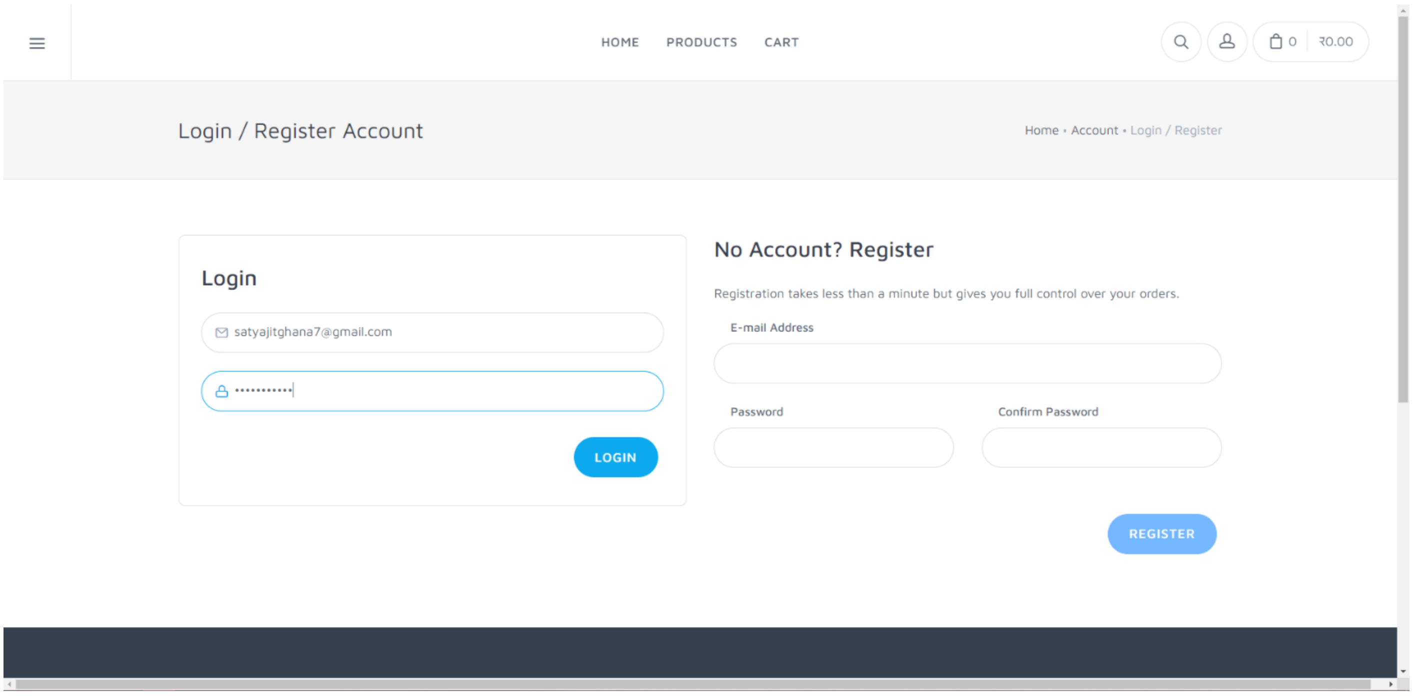
user.model.ts

```
export interface Roles {
  admin: boolean;
}

export class User {
  public email: string;
  public photoURL?: string;
  public roles?: Roles;
  public firstName?: string;
  public lastName?: string;
  public password?: string;
  public orders?: object;
  public confirmPassword?: string;
  public uid?: string;

  constructor(authData) {
    this.email = authData.email;
    this.firstName = authData.firstName ? authData.firstName : '';
    this.lastName = authData.lastName ? authData.lastName : '';
    this.roles = {
      admin: false
    };
  }
}
```

Here is the UI for User Login/Registration



HOME PRODUCTS CART

0 ₹0.00

Login / Register Account

Home • Account • Login / Register

Login

satyajitghana7@gmail.com

•••••••••••

LOGIN

No Account? Register

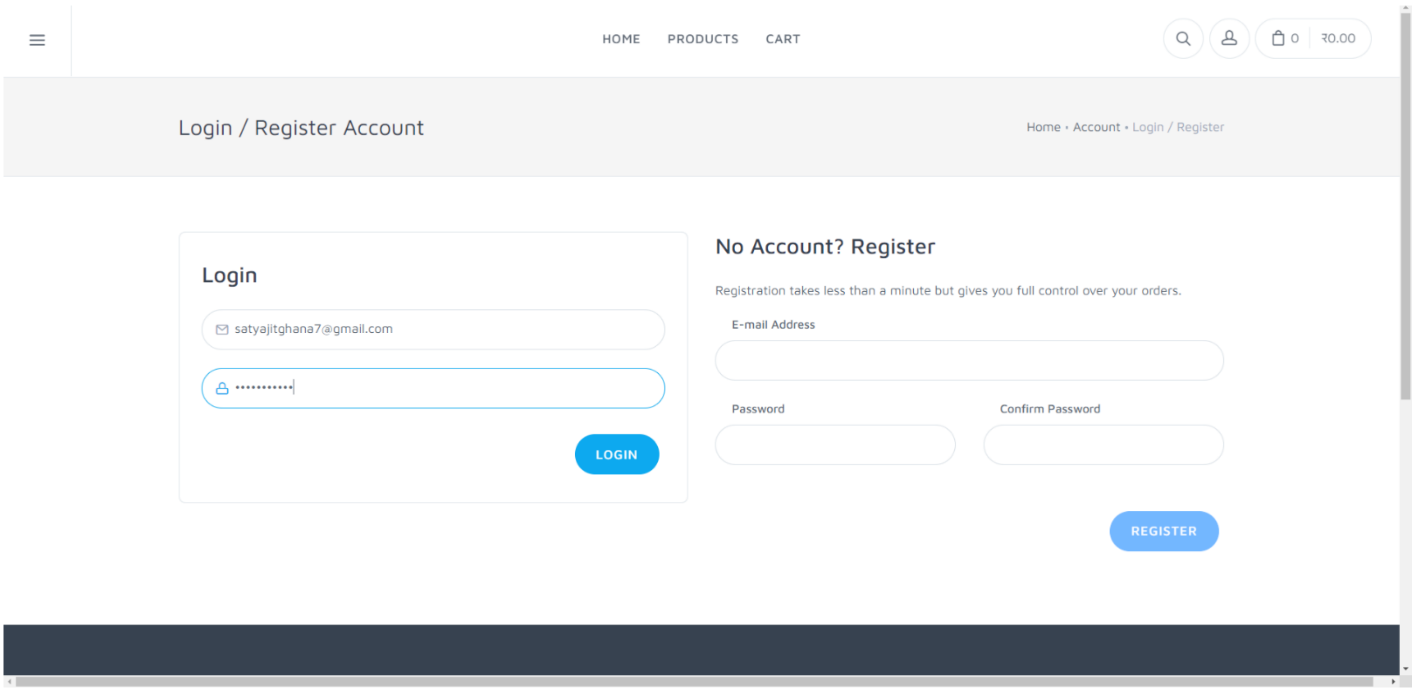
Registration takes less than a minute but gives you full control over your orders.

E-mail Address

Password

Confirm Password

REGISTER



HOME PRODUCTS CART

0 ₹0.00

Login / Register Account

Home • Account • Login / Register

Login

satyajitghana7@gmail.com

•••••••••••

LOGIN

No Account? Register

Registration takes less than a minute but gives you full control over your orders.

E-mail Address

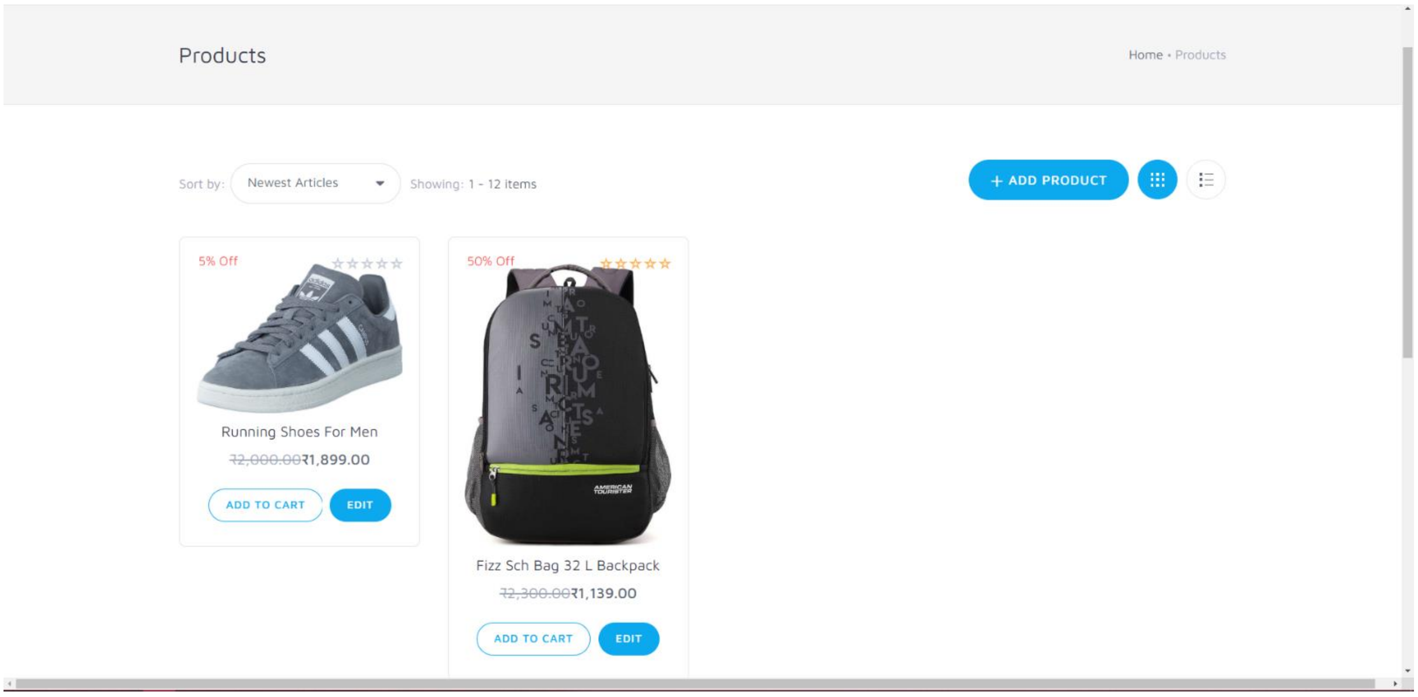
Password

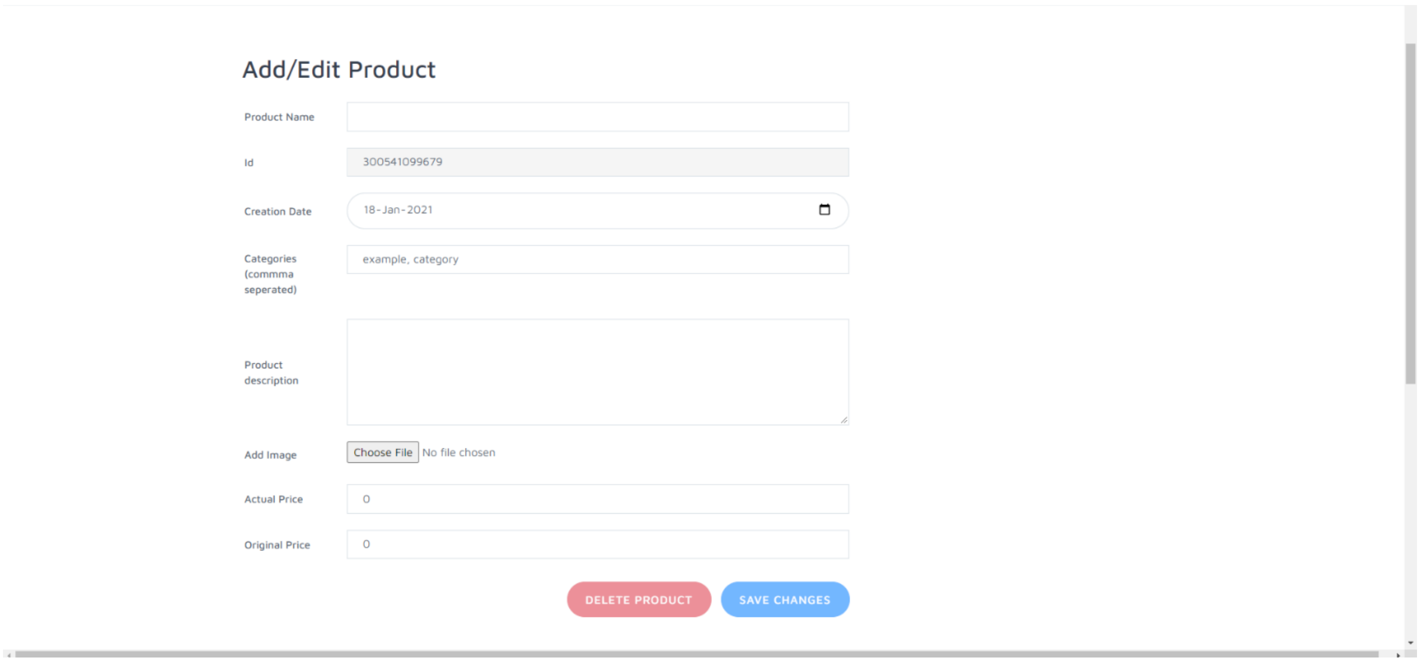
Confirm Password

REGISTER

1.3 Implementation of product management

New Products can be added to the website by the merchant using this feature



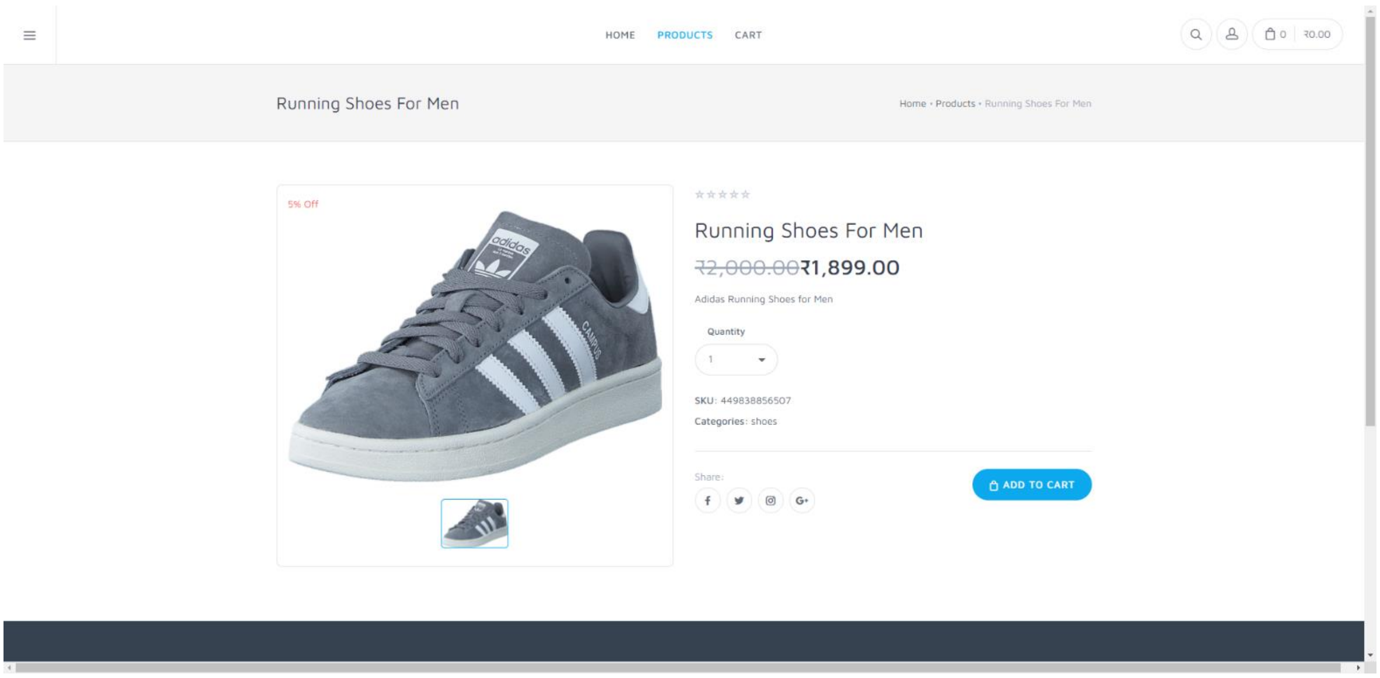

Add/Edit Product

Product Name	
Id	300541099679
Creation Date	18-Jan-2021
Categories (commma seperated)	example, category
Product description	
Add Image	Choose File No file chosen
Actual Price	0
Original Price	0

1.4 Implementation of sports accessories reservation for user

This shows the Product Purchase flow,

The user browser for a product, selects it, and then there's an option to ADD TO CART



Running Shoes For Men

Running Shoes For Men

~~₹2,000.00~~₹1,899.00

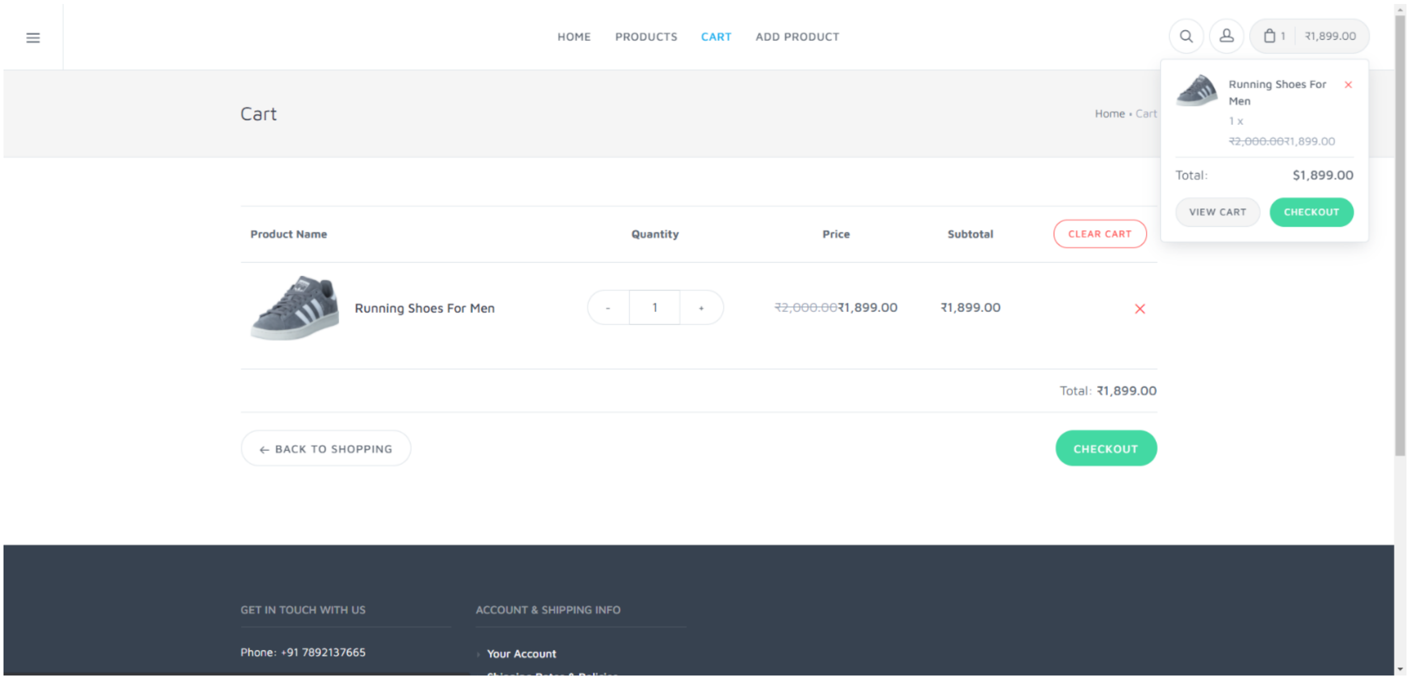
Adidas Running Shoes for Men

Quantity: 1

SKU: 449838856507

Categories: shoes

Clicking it adds the product to the cart at the top right



Cart

Running Shoes For Men
1 x
~~₹2,000.00~~₹1,899.00

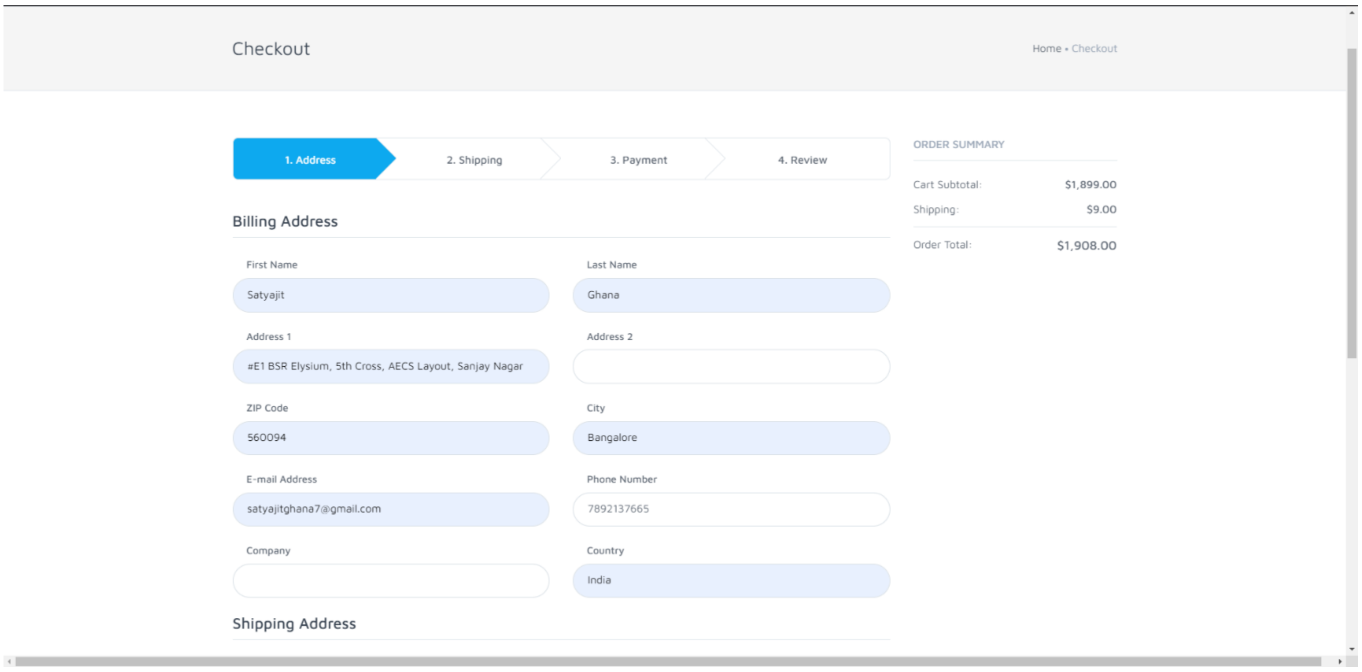
Total: $1,899.00

Product Name	Quantity	Price	Subtotal	
Running Shoes For Men	1	~~₹2,000.00~~₹1,899.00	₹1,899.00	×

Total: ₹1,899.00

Phone: +91 7892137665

Now all the details for the Checkout are asked to the user, like Address, ZIP Code, City, Email, Phone Number, Company, Country



ORDER SUMMARY

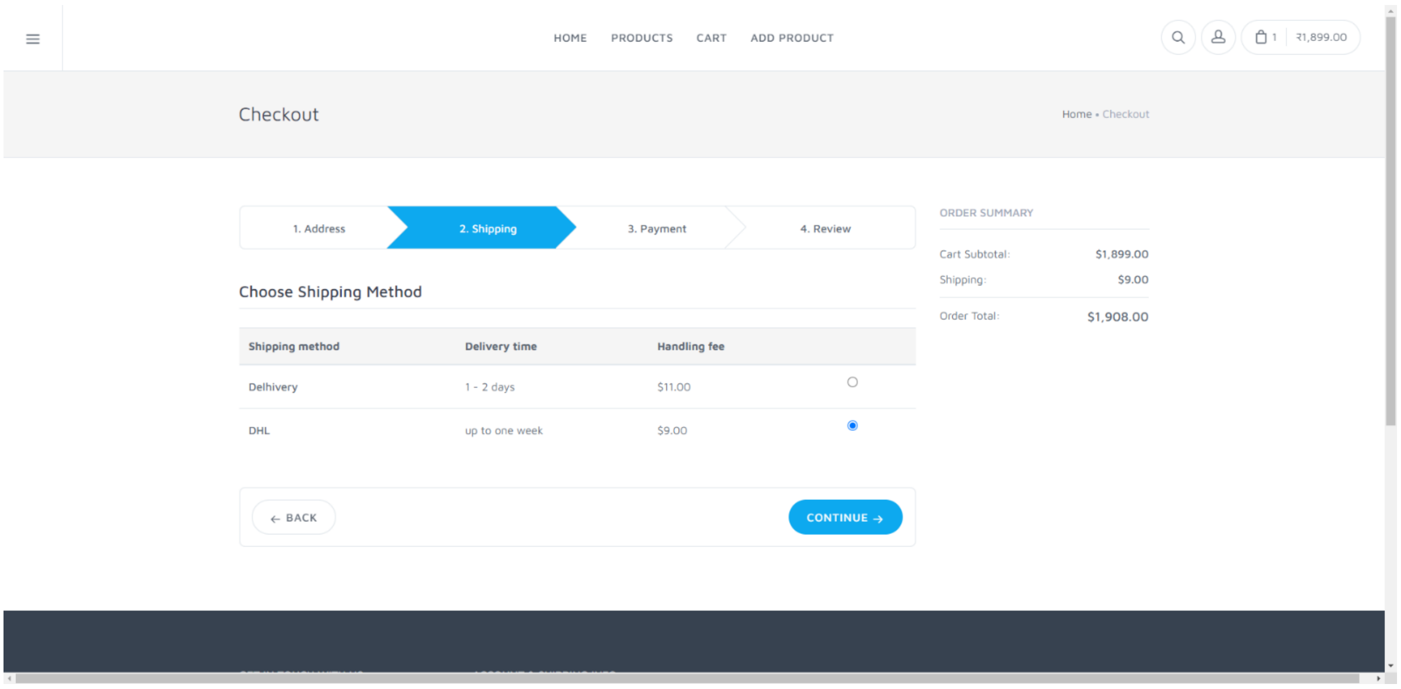
Cart Subtotal:	$1,899.00
Shipping:	$9.00
Order Total:	$1,908.00

Billing Address

First Name: Satyajit	Last Name: Ghana
Address 1: #E1 BSR Elysium, 5th Cross, AECS Layout, Sanjay Nagar	Address 2:
ZIP Code: 560094	City: Bangalore
E-mail Address: satyajitghana7@gmail.com	Phone Number: 7892137665
Company:	Country: India

Shipping Address

Now the Shipping method can be selected,



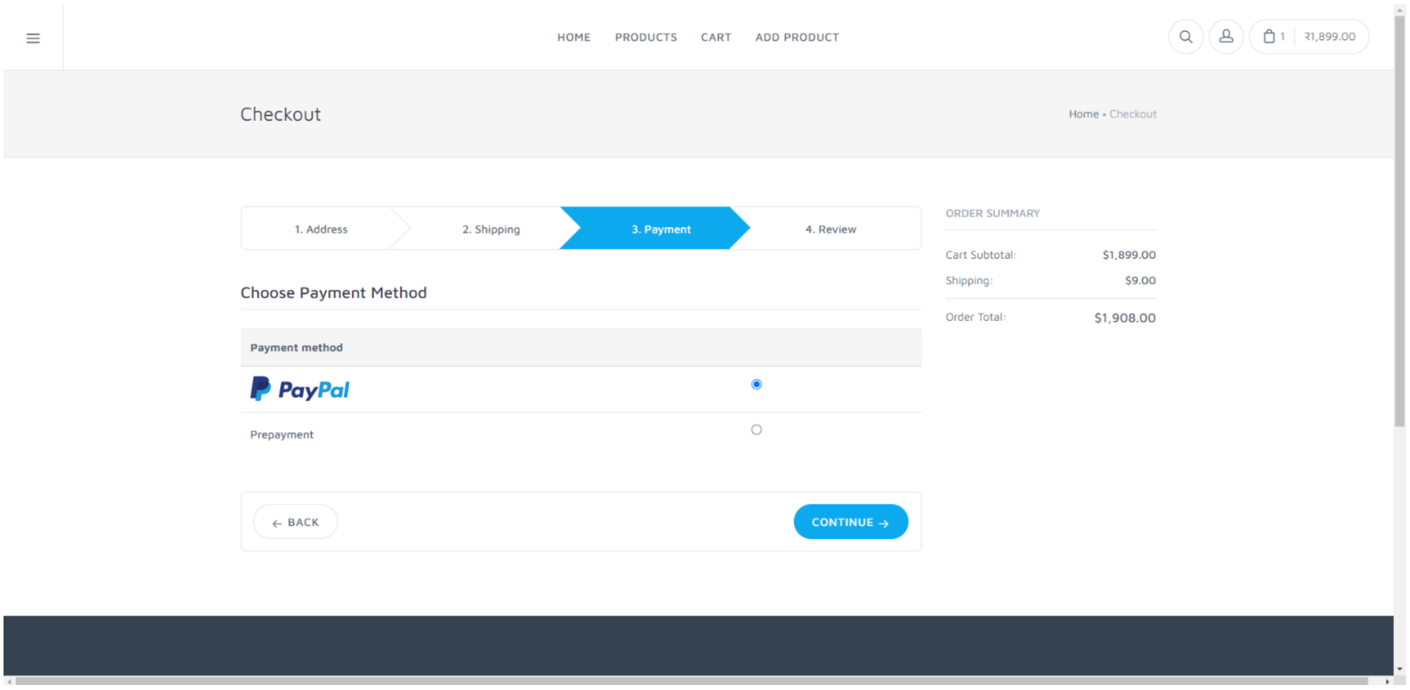
ORDER SUMMARY

Cart Subtotal:	$1,899.00
Shipping:	$9.00
Order Total:	$1,908.00

Choose Shipping Method

Shipping method	Delivery time	Handling fee	
Delhivery	1 - 2 days	$11.00	○
DHL	up to one week	$9.00	●

Once that is done, use user has to pay using PayPal



Checkout

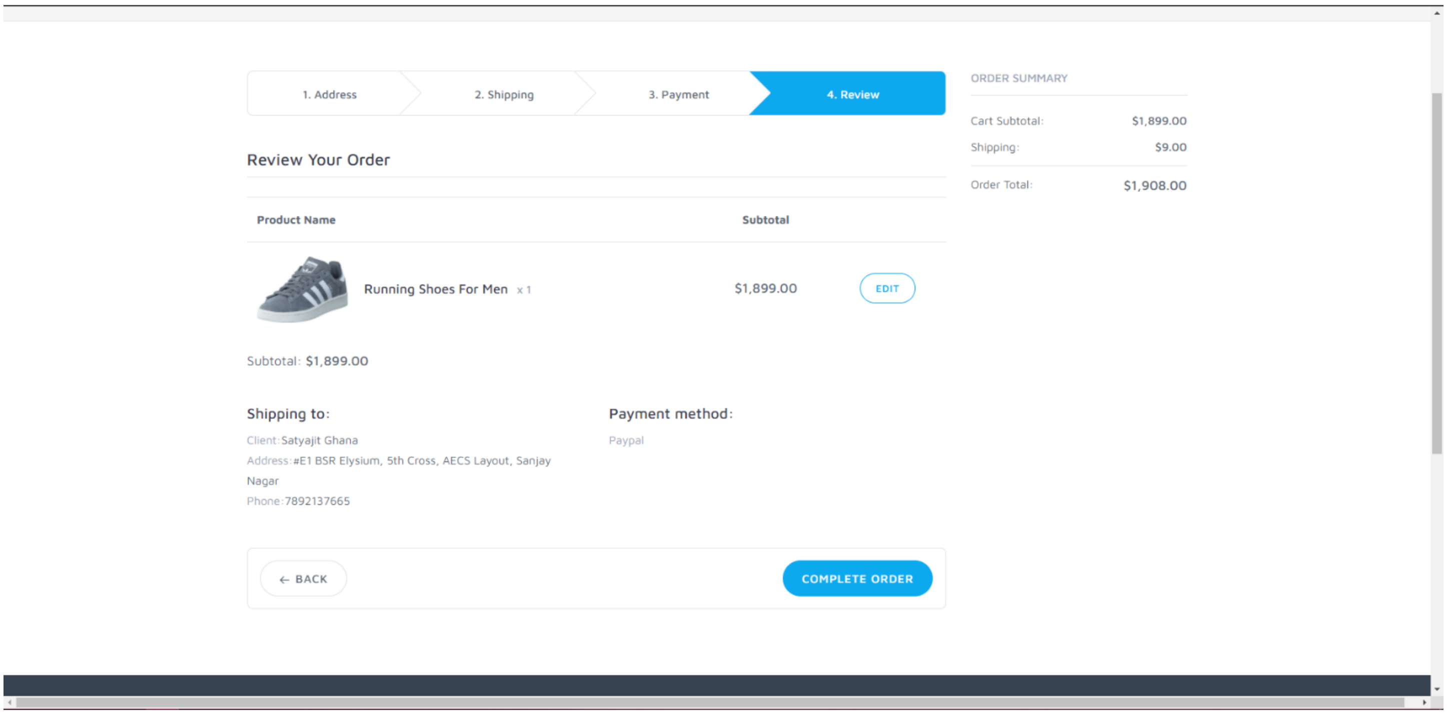
Choose Payment Method

Payment method	
PayPal	●
Prepayment	○

ORDER SUMMARY

Cart Subtotal:	$1,899.00
Shipping:	$9.00
Order Total:	$1,908.00

Once the payment method is selected, a final checkup is show, which shows the shipping address, product details, total price, and payment method.



Review Your Order

Product Name	Subtotal
Running Shoes For Men x 1	$1,899.00

Subtotal: $1,899.00

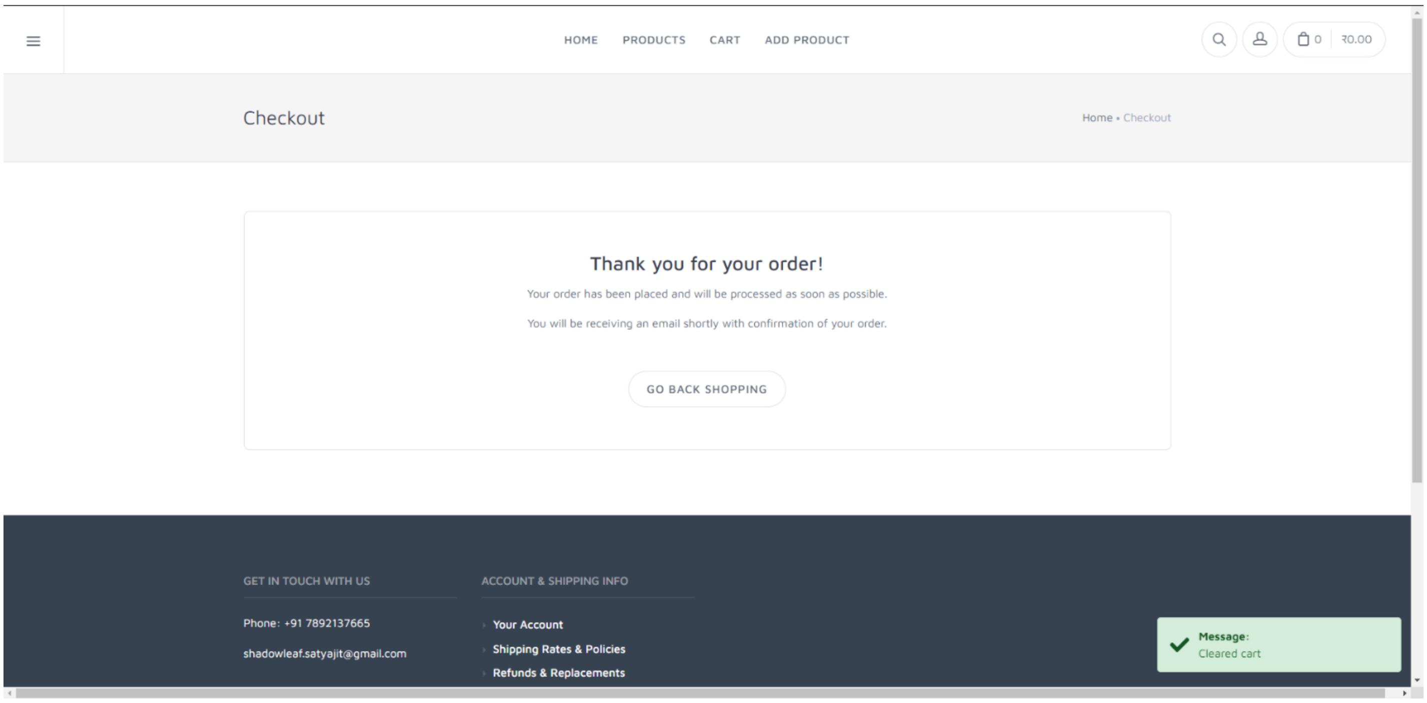
Shipping to:
Client: Satyajit Ghana
Address: #E1 BSR Elysium, 5th Cross, AECS Layout, Sanjay Nagar
Phone: 7892137665

Payment method:
Paypal

ORDER SUMMARY

Cart Subtotal:	$1,899.00
Shipping:	$9.00
Order Total:	$1,908.00

Once payment is done, payment confirmation is shown



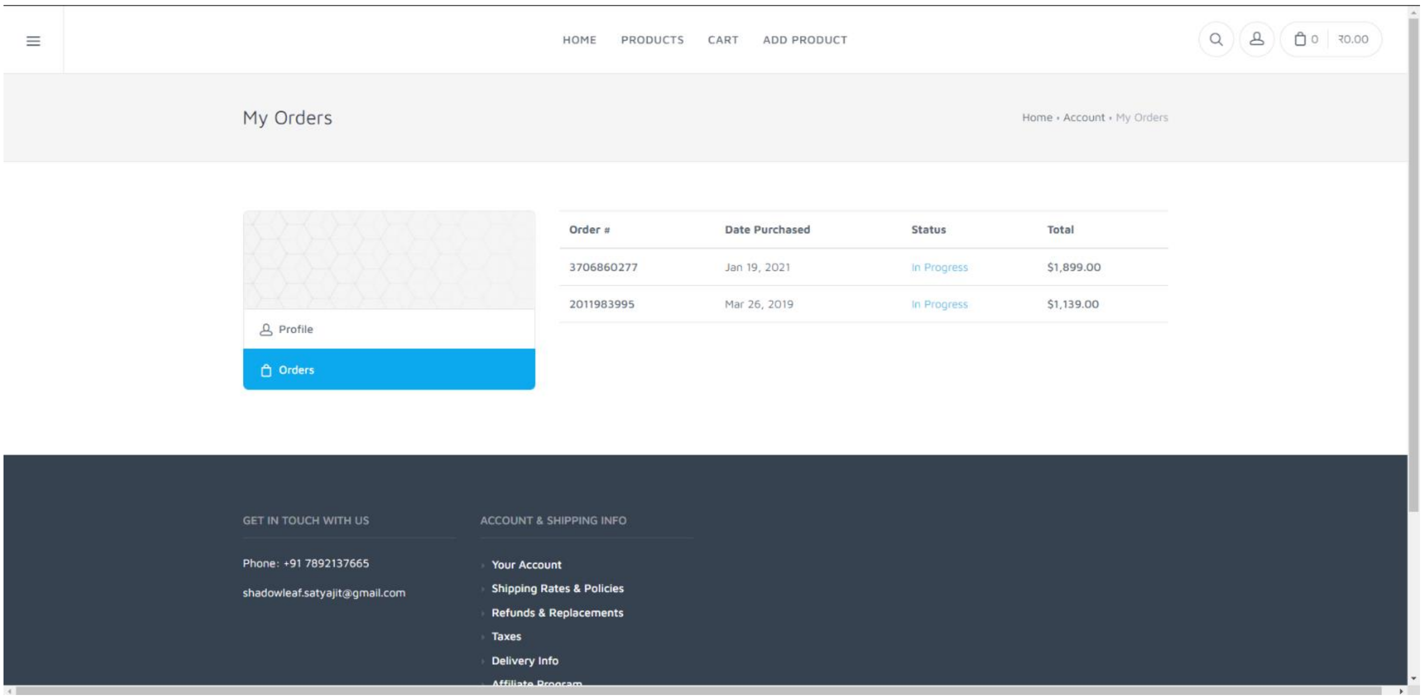
Thank you for your order!

Your order has been placed and will be processed as soon as possible.

You will be receiving an email shortly with confirmation of your order.

Message:
Cleared cart

And the user can then view the order in their profile.



Order #	Date Purchased	Status	Total
3706860277	Jan 19, 2021	In Progress	$1,899.00
2011983995	Mar 26, 2019	In Progress	$1,139.00

Implementation Specifics

The UI/HTML can be viewed at

https://github.com/satyajitghana/ProjektPlutus/tree/master/src/app/checkout

The cart is implemented by using an Injectable Service that keeps track of the products in the cart, and updates the total cart price as and when the products are added to the cart.

```
@Injectable()
export class CartService {
  // Init and generate some fixtures
  private cartItems: CartItem[];
  public itemsChanged: EventEmitter<CartItem[]> = new EventEmitter<CartItem[]>();

  constructor(private messageService: MessageService) {
    this.cartItems = [];
  }

  public getItems() {
    return this.cartItems.slice();
  }

  // Get Product ids out of CartItem[] in a new array
  private getItemIds() {
    return this.getItems().map(cartItem => cartItem.product.id);
  }

  public addItem(item: CartItem) {
    // If item is already in cart, add to the amount, otherwise push item into cart
    if (this.getItemIds().includes(item.product.id)) {
      this.cartItems.forEach(function (cartItem) {
        if (cartItem.product.id === item.product.id) {
          cartItem.amount += item.amount;
        }
      });
      this.messageService.add('Amount in cart changed for: ' + item.product.name);
    } else {
      this.cartItems.push(item);
      this.messageService.add('Added to cart: ' + item.product.name);
    }
    this.itemsChanged.emit(this.cartItems.slice());
  }

  public addItems(items: CartItem[]) {
    items.forEach((cartItem) => {
      this.addItem(cartItem);
    });
  }

  public removeItem(item: CartItem) {
    const indexToRemove = this.cartItems.findIndex(element => element === item);
    this.cartItems.splice(indexToRemove, 1);
    this.itemsChanged.emit(this.cartItems.slice());
    this.messageService.add('Deleted from cart: ' + item.product.name);
  }

  public updateItemAmount(item: CartItem, newAmount: number) {
    this.cartItems.forEach((cartItem) => {
      if (cartItem.product.id === item.product.id) {
        cartItem.amount = newAmount;
      }
    });
    this.itemsChanged.emit(this.cartItems.slice());
    this.messageService.add('Updated amount for: ' + item.product.name);
  }

  public clearCart() {
    this.cartItems = [];
    this.itemsChanged.emit(this.cartItems.slice());
    this.messageService.add('Cleared cart');
  }

  public getTotal() {
    let total = 0;
    this.cartItems.forEach((cartItem) => {
      total += cartItem.amount * cartItem.product.price;
    });
    return total;
  }

}
```

Source: `https://github.com/satyajitghana/ProjektPlutus/tree/master/src/app/cart`

Each of the Order is tied to a Customer, with the following Schema

```
export class Customer {
  constructor(
    public firstname: string = '',
    public lastname: string = '',
    public address1: string = '',
    public address2: string = '',
    public zip: number = null,
    public city: string = '',
    public email: string = '',
    public phone: string = '',
    public company: string = '',
    public country: string = ''
  ) {}
}
```

And an Order has the following Schema

```
export class Order {
  constructor(
    public customer: Customer = null,
    public items: CartItem[] = null,
    public total: number = null,
    public status: string = '',
    public number: string = '',
    public date: string = new Date().toISOString().split('T')[0],
    public shippingMethod: string = '',
    public paymentMethod: string = ''
  ) {}
}
```

`Source: https://github.com/satyajitghana/ProjektPlutus/tree/master/src/app/models`

We can now look into how Forms are handled, below is the Address Components that manages the address fields during checkout

```
@Component({
  selector: 'app-checkout-address',
  templateUrl: './address.component.html',
  styleUrls: ['./address.component.scss']
})
export class AddressComponent implements OnInit, OnDestroy {
  private authSubscription: Subscription;
  @Input() public user;
  public formAddress: FormGroup;
  public countries: string[];

  constructor(
    private checkoutService: CheckoutService,
    private authService: AuthService
  ) {}

  ngOnInit() {
    this.initFormGroup();
  this.authSubscription = this.authService.user.subscribe((user) => {
    if (user) {
      this.user = user;
      this.initFormGroup();
    }
  });
}

private initFormGroup() {
  this.countries = ['India'];
  this.formAddress = new FormGroup({
    firstname: new FormControl(
      this.user && this.user.firstName,
      Validators.required
    ),
    lastname: new FormControl(
      this.user && this.user.lastName,
      Validators.required
    ),
    address1: new FormControl(null, Validators.required),
    address2: new FormControl(null),
    zip: new FormControl(null, [
      Validators.required,
      Validators.pattern(/^\d\d\d\d\d\d$/)
    ]),
    city: new FormControl(null, Validators.required),
    email: new FormControl(
      this.user && this.user.email,
      Validators.email
    ),
    phone: new FormControl(null),
    company: new FormControl(null),
    country: new FormControl({ value: this.countries[0], disabled: false })
  });
}

public onContinue() {
  this.checkoutService.setCustomer(this.formAddress.value);
  this.checkoutService.nextStep();
}

// Debug: Fill Form Helper MEthod
public onFillForm(event: Event) {
  event.preventDefault();
  this.formAddress.setValue({
    firstname: 'Satyajit',
    lastname: 'Ghana',
    address1: '14th street, 6th cross',
    address2: 'AECS Layout',
    zip: 560094,
      city: 'Bangalore',
      email: 'shadowleaf.satyajit@gmail.com',
      phone: '+917892137665',
      company: '',
      country: 'India'
    });
  }

  ngOnDestroy() {
    this.authSubscription.unsubscribe();
  }
}
```

Source:

https://github.com/satyajitghana/ProjektPlutus/blob/master/src/app/checkout/address/

Bibliography

1. RUAS SDF Lab Manuals, and Assignment of 4th semester, Satyajit Ghana, 17ETCS002159, 2018

2. ProjektPlutus – Satyajit Ghana – SDF Lab final implementation of Online Shopping Website using Angular 6, AngularFirebase and Bootstrap.

3. https://firebase.google.com/docs/database

4. https://projekt-plutus.herokuapp.com/