



**SCHOOL OF  
COMPUTING**

**DEVADHARSHAN S**  
**CH.SC.U4CSE24113**  
**OBJECT ORIENTED PROGRAMMING**  
**(23CSE111)**  
**LAB RECORD**



**SCHOOL OF  
COMPUTING**

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**BONAFIDE CERTIFICATE**

This is to certify that the Lab Record work for 23CSE111- Object Oriented Programming Subject submitted by **CH.SC.U4CSE24113 – DEVADHARSHAN S** in “**Computer Science and Engineering**” is a Bonafide record of the work carried out under my guidance and supervision at Amrita School of Computing, Chennai.

This Lab examination held on

Internal Examiner 1

Internal Examiner 2

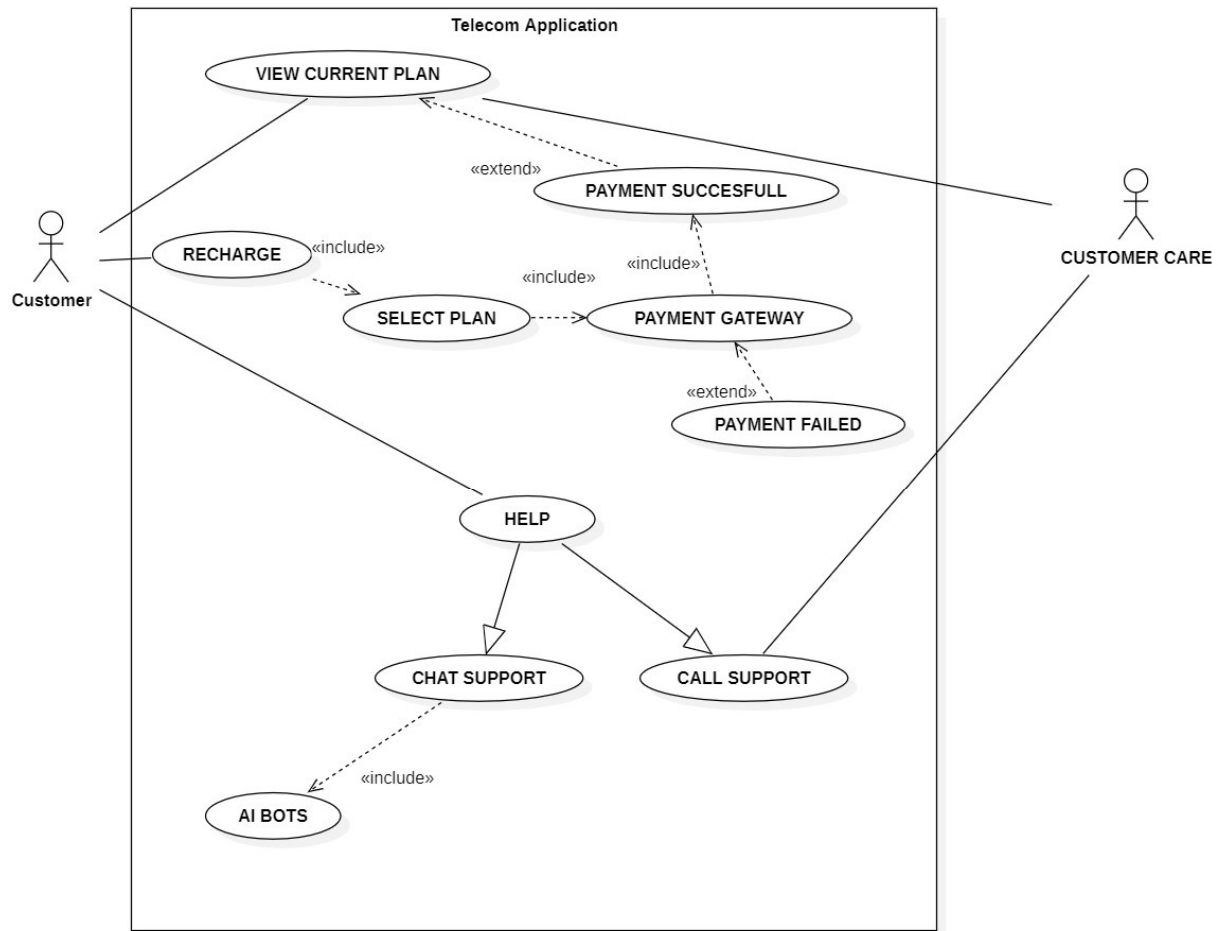
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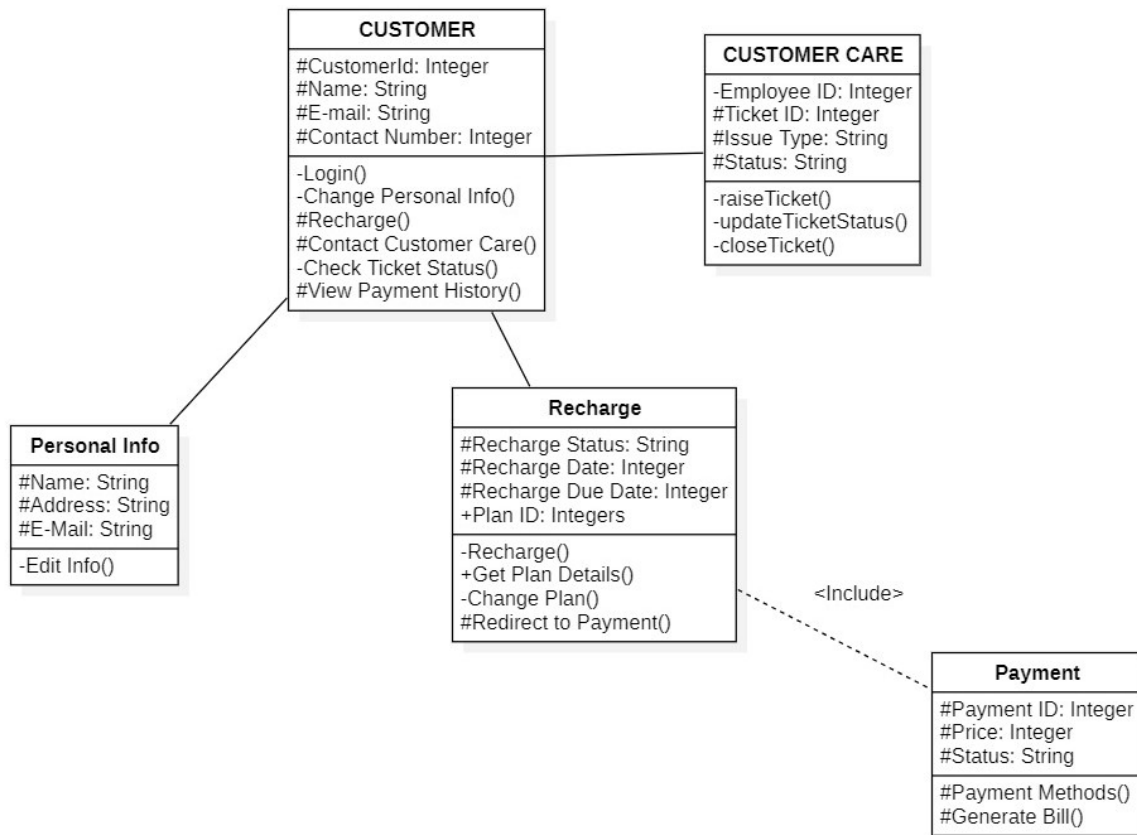
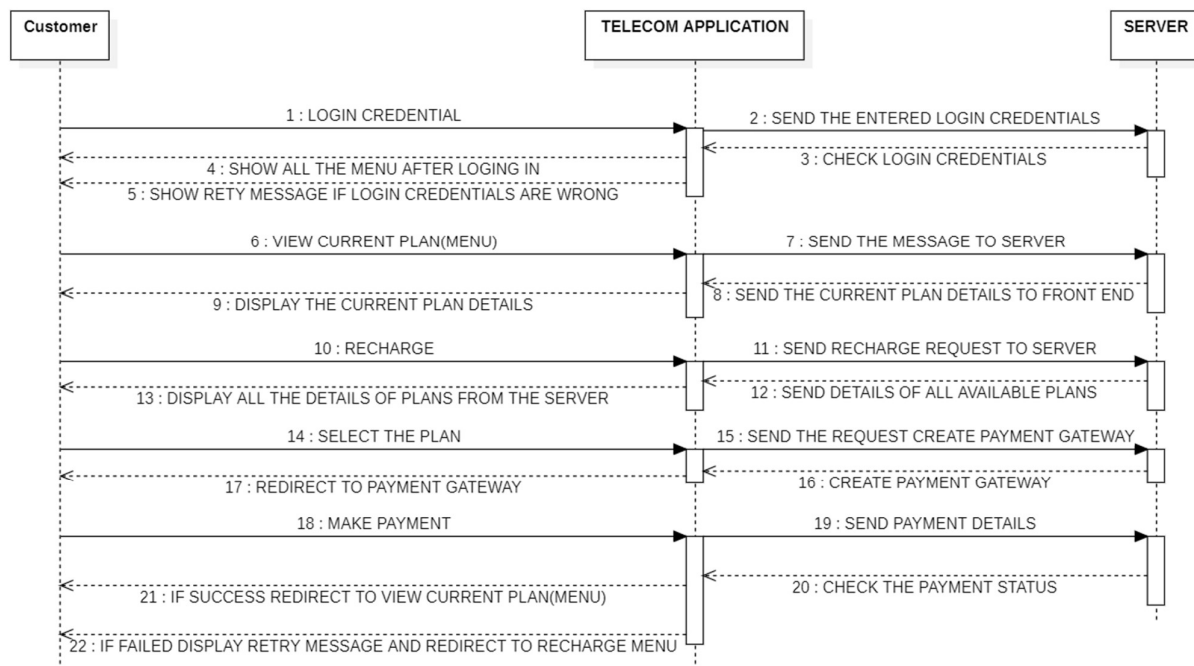
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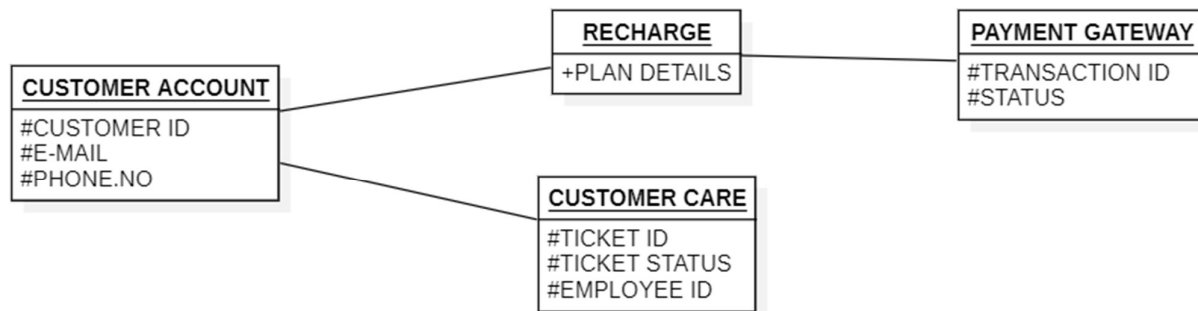
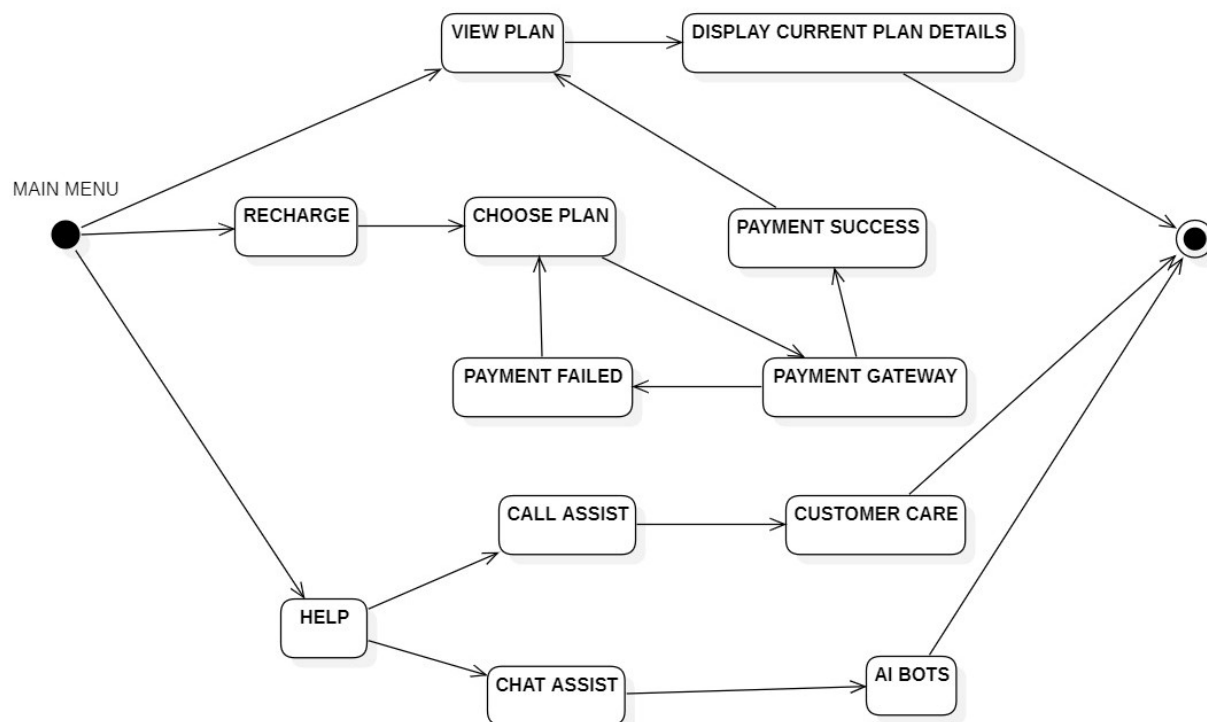
# UML DIAGRAMS

## 1.TELECOM APPLICATION

### 1.a) Use Case Diagram:

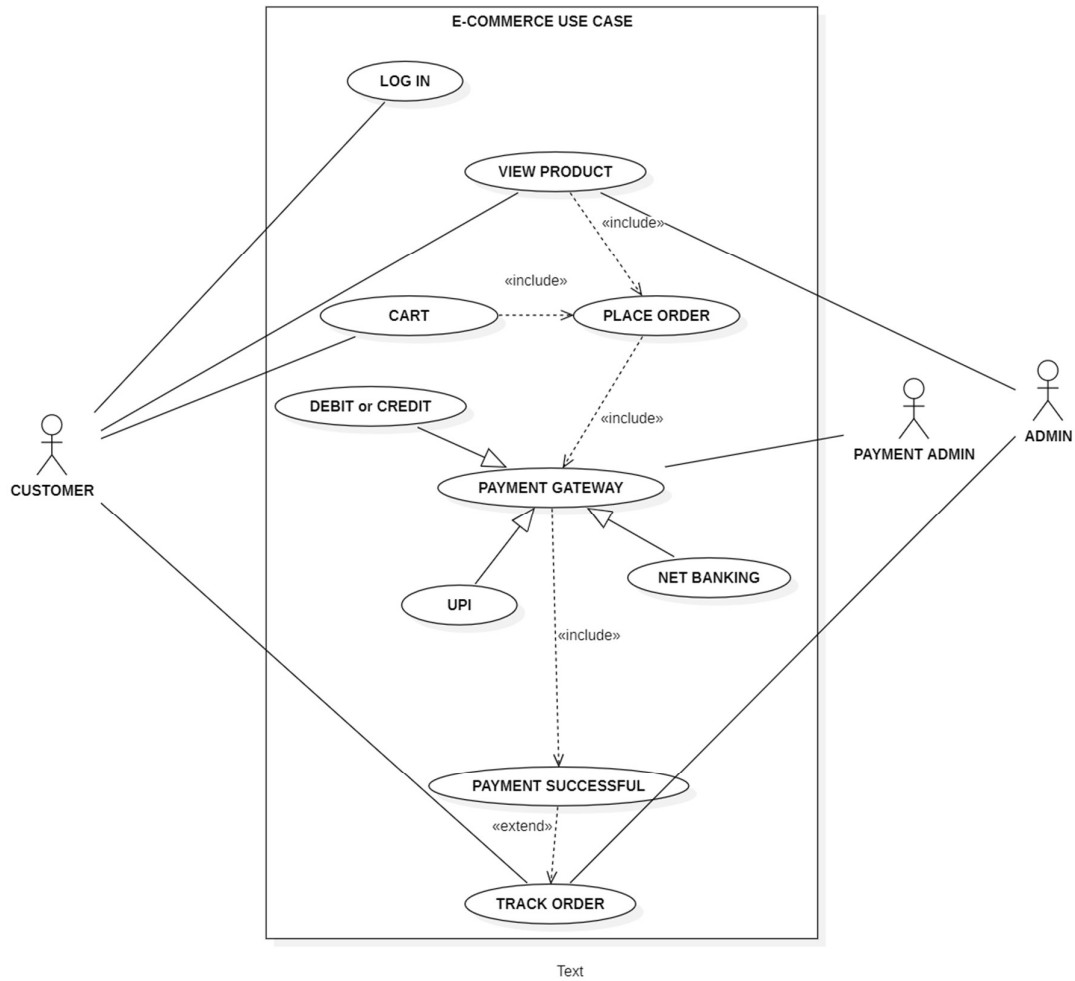


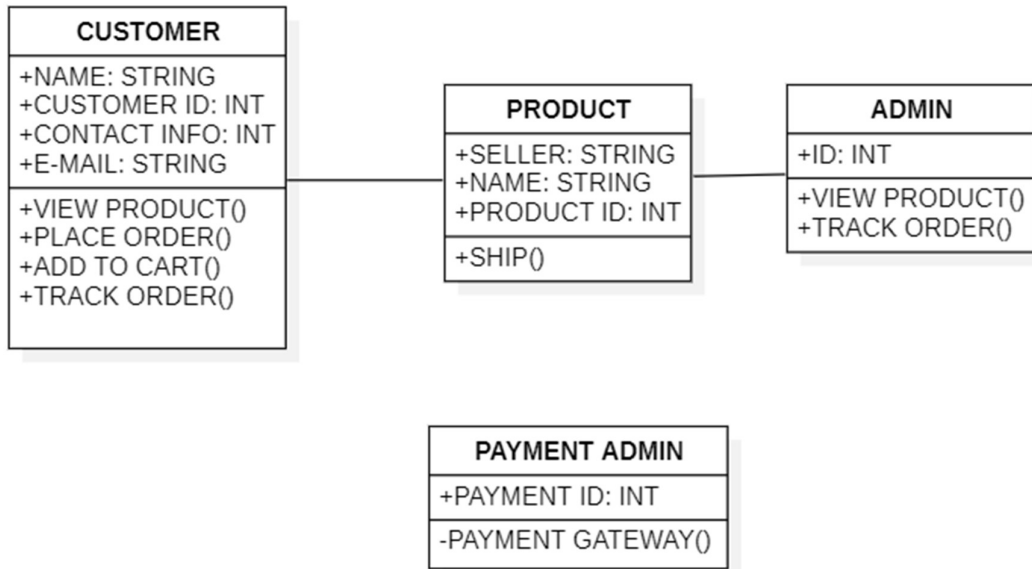
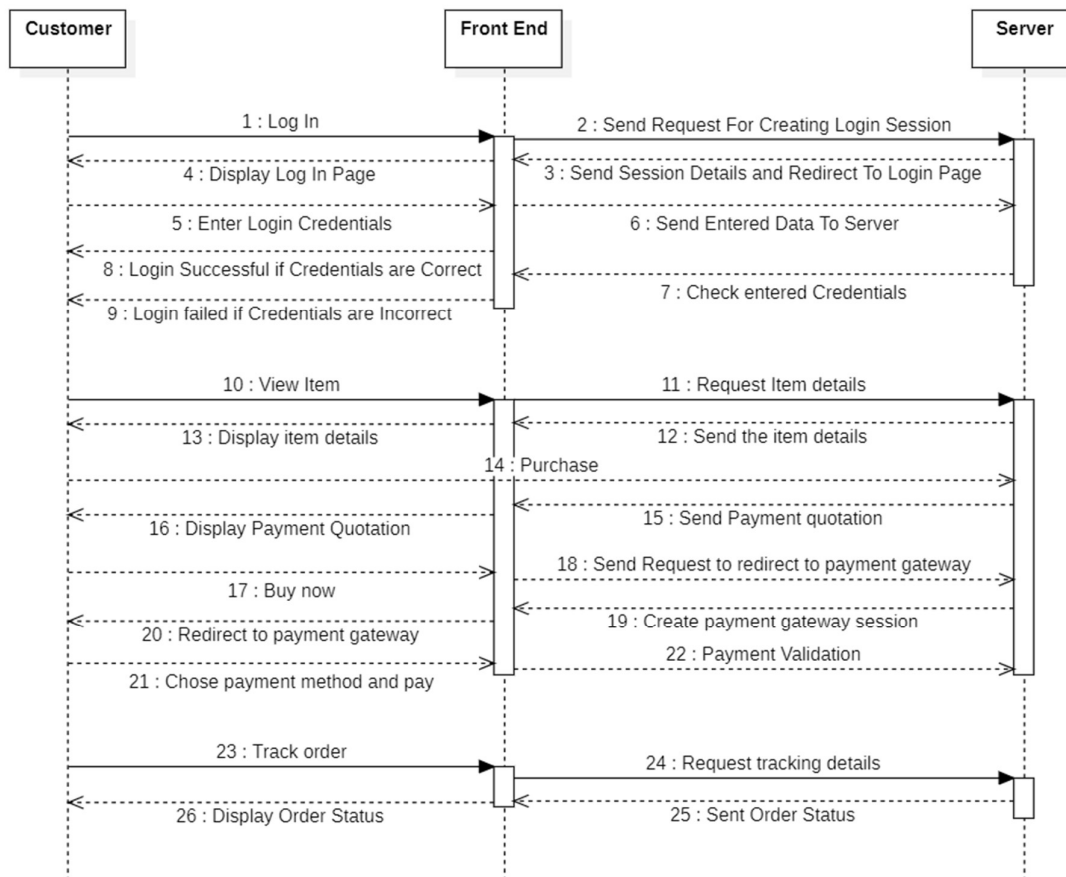
**1.b) Class Diagram:****1.c) Sequence Diagram:**

**1.d) Object Diagram:****1.e) State-Activity Diagram:**

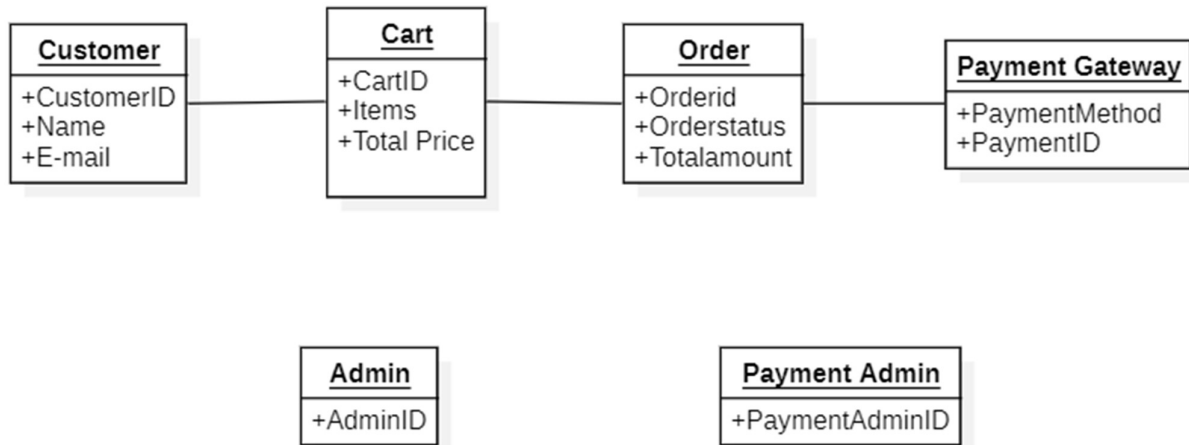
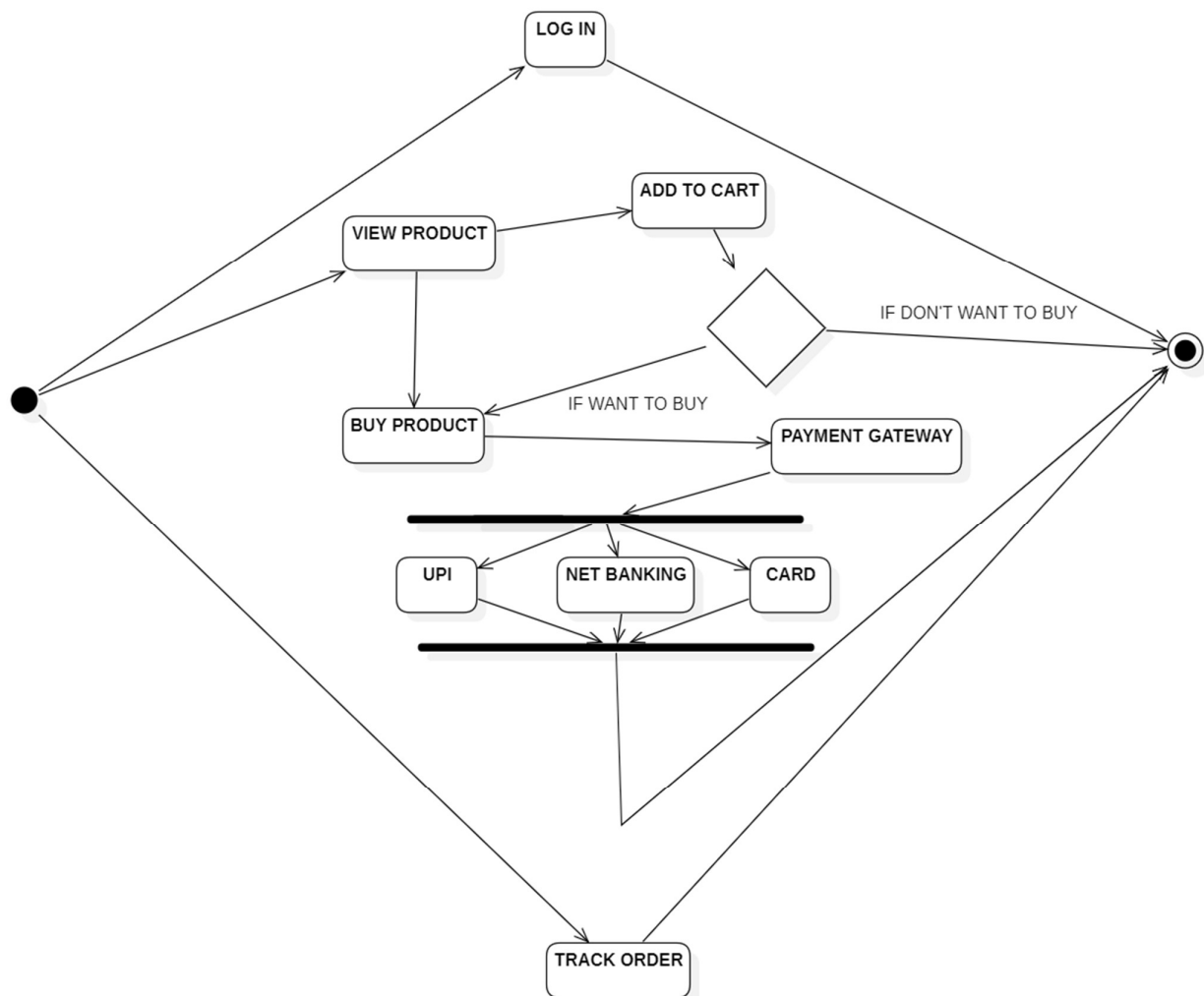
## 2. E-COMMERCE APPLICATION

### 2.a) Use Case Diagram:



**2.b) Class Diagram:****2.c) Sequence Diagram:**



**2.d) Object Diagram:****2.e) State-Activity Diagram:**

## 3.Basic Java Programs

### 3.a) Armstrong Number:

**Code:**

```
public class ArmstrongNumber {  
    public static void main(String[] args) {  
        int num = 153; int original = num; int sum = 0;  
        while (num != 0) {  
            int digit = num % 10;  
            sum += digit * digit * digit;  
            num /= 10;  
        }  
        if (sum == original) {  
            System.out.println(original + " is an Armstrong  
number.");  
        } else {  
            System.out.println(original + " is not an Armstrong  
number.");  
        }  
    }  
}
```

**Output:**

```
PS D:\OOP\Exp 3 Basic Java Programs> javac ArmstrongNumber.java  
PS D:\OOP\Exp 3 Basic Java Programs> java ArmstrongNumber.java  
153 is an Armstrong number.  
PS D:\OOP\Exp 3 Basic Java Programs> |
```

### 3.b) Sum of Even, Odd Digits:

**Code:**

```
public class EvenOddSum {  
    public static void main(String[] args) {  
        int evenSum = 0; int oddSum = 0; int limit = 10;  
        for (int i = 1; i <= limit; i++) {  
            if (i % 2 == 0) {  
                evenSum += i;  
            } else {  
                oddSum += i;  
            }  
        }  
        System.out.println("Sum of even numbers from 1 to " + limit  
+ ": " + evenSum);  
        System.out.println("Sum of odd numbers from 1 to " + limit +  
": " + oddSum);  
    }  
}
```

**Output:**

```
PS D:\OOP\Exp 3 Basic Java Programs> javac EvenOddSum.java  
PS D:\OOP\Exp 3 Basic Java Programs> java EvenOddSum.java  
Sum of even numbers from 1 to 10: 30  
Sum of odd numbers from 1 to 10: 25  
PS D:\OOP\Exp 3 Basic Java Programs> |
```

### 3.c) Factorial:

**Code:**

```
public class Factorial {  
    public static void main(String[] args) {  
        int num = 5;  
        int factorial = 1;  
        for (int i = 1; i <= num; i++) {  
            factorial *= i;  
        }  
        System.out.println("Factorial of " + num + " is " +  
factorial);  
    }  
}
```

**Output:**

```
PS D:\OOP\Exp 3 Basic Java Programs> javac Factorial.java  
PS D:\OOP\Exp 3 Basic Java Programs> java Factorial.java  
Factorial of 5 is 120  
PS D:\OOP\Exp 3 Basic Java Programs> |
```

### 3.d) Fibonacci Series:

**Code:**

```
public class FibonacciSeries {  
    public static void main(String[] args) {  
        int n = 10, first = 0, second = 1;  
        System.out.print("Fibonacci Series: " + first + ", " +  
second);  
        for (int i = 2; i < n; i++) {  
            int next = first + second;  
            System.out.print(", " + next);  
            first = second;  
            second = next;  
        }  
    }  
}
```

**Output;**

```
PS D:\OOP\Exp 3 Basic Java Programs> javac FibonacciSeries.java  
PS D:\OOP\Exp 3 Basic Java Programs> java FibonacciSeries.java  
Fibonacci Series: 0, 1, 1, 2, 3, 5, 8, 13, 21, 34  
PS D:\OOP\Exp 3 Basic Java Programs> |
```

### 3.e) LCM Calculator:

**Code:**

```
public class LCMCalculator {  
    public static void main(String[] args) {  
        int a = 12; int b = 18;int lcm;  
        int gcd = a;  
        int tempB = b;  
        while (tempB != 0) {  
            int temp = tempB;  
            tempB = gcd % tempB;  
            gcd = temp;  
        }  
        lcm = (a * b) / gcd;  
        System.out.println("LCM is " + lcm);  
    }  
}
```

**Output:**

```
PS D:\OOP\Exp 3 Basic Java Programs> javac LCMCalculator.java  
PS D:\OOP\Exp 3 Basic Java Programs> java LCMCalculator.java  
LCM is 36  
PS D:\OOP\Exp 3 Basic Java Programs> |
```

### 3.f) Number Pattern:

**Code:**

```
public class NumberPattern {  
    public static void main(String[] args) {  
        int n = 5;  
        for (int i = 1; i <= n; i++) {  
            for (int j = 1; j <= i; j++) {  
                System.out.print(j + " ");  
            }  
            System.out.println();  
        }  
    }  
}
```

**Output:**

```
PS D:\OOP\Exp 3 Basic Java Programs> javac NumberPattern.java  
PS D:\OOP\Exp 3 Basic Java Programs> java NumberPattern.java  
1  
1 2  
1 2 3  
1 2 3 4  
1 2 3 4 5  
PS D:\OOP\Exp 3 Basic Java Programs> |
```

### 3.g) Palindrome Check:

**Code:**

```
public class PalindromeCheck {  
    public static void main(String[] args) {  
        int num = 121; int original = num; int reversed = 0;  
        while (num != 0) {  
            int digit = num % 10;  
            reversed = reversed * 10 + digit;  
            num /= 10;  
        }  
        if (original == reversed) {  
            System.out.println(original + " is a palindrome.");  
        } else {  
            System.out.println(original + " is not a palindrome.");  
        }  
    }  
}
```

**Output:**

```
PS D:\OOP\Exp 3 Basic Java Programs> javac PalindromeCheck.java  
PS D:\OOP\Exp 3 Basic Java Programs> java PalindromeCheck.java  
121 is a palindrome.  
PS D:\OOP\Exp 3 Basic Java Programs> |
```



### 3.h) Prime Checker:

**Code:**

```
public class PrimeChecker {  
    public static void main(String[] args) {  
        int num = 29;  
        boolean isPrime = true;  
        if (num <= 1) {  
            isPrime = false;  
        } else {  
            for (int i = 2; i * i <= num; i++) { // Removed  
Math.sqrt()  
                if (num % i == 0) {  
                    isPrime = false;  
                    break;  
                }  
            }  
        }  
        if (isPrime) {  
            System.out.println(num + " is a prime number.");  
        } else {  
            System.out.println(num + " is not a prime number.");  
        }  
    }  
}
```

**Output:**

```
PS D:\OOP\Exp 3 Basic Java Programs> javac PrimeChecker.java  
PS D:\OOP\Exp 3 Basic Java Programs> java PrimeChecker.java  
29 is a prime number.
```

### 3.i) Reverse Number:

**Code:**

```
public class ReverseNumber {  
    public static void main(String[] args) {  
        int num = 12345, reversed = 0;  
        while (num != 0) {  
            int digit = num % 10;  
            reversed = reversed * 10 + digit;  
            num /= 10;  
        }  
        System.out.println("Reversed Number: " + reversed);  
    }  
}
```

**Output:**

```
PS D:\00P\Exp 3 Basic Java Programs> javac ReverseNumber.java  
PS D:\00P\Exp 3 Basic Java Programs> java ReverseNumber.java  
Reversed Number: 54321
```

### 3.j) Sum of Digits:

**Code:**

```
public class SumOfDigits {  
    public static void main(String[] args) {  
        int num = 9876; int sum = 0;  
        while (num != 0) {  
            sum += num % 10;  
            num /= 10;  
        }  
        System.out.println("Sum of digits: " + sum);  
    }  
}
```

**Output:**

```
PS D:\OOP\Exp 3 Basic Java Programs> javac SumOfDigits.java  
PS D:\OOP\Exp 3 Basic Java Programs> java SumOfDigits.java  
Sum of digits: 30  
PS D:\OOP\Exp 3 Basic Java Programs> |
```