SCHOOL OF
COMPUTING

S.LAHARI SAI

CH.SC.U4CSE24143

OBJECT ORIENTED PROGRAMMING (23CSE111)

LAB RECORD

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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 - S.LAHARI SAI*** 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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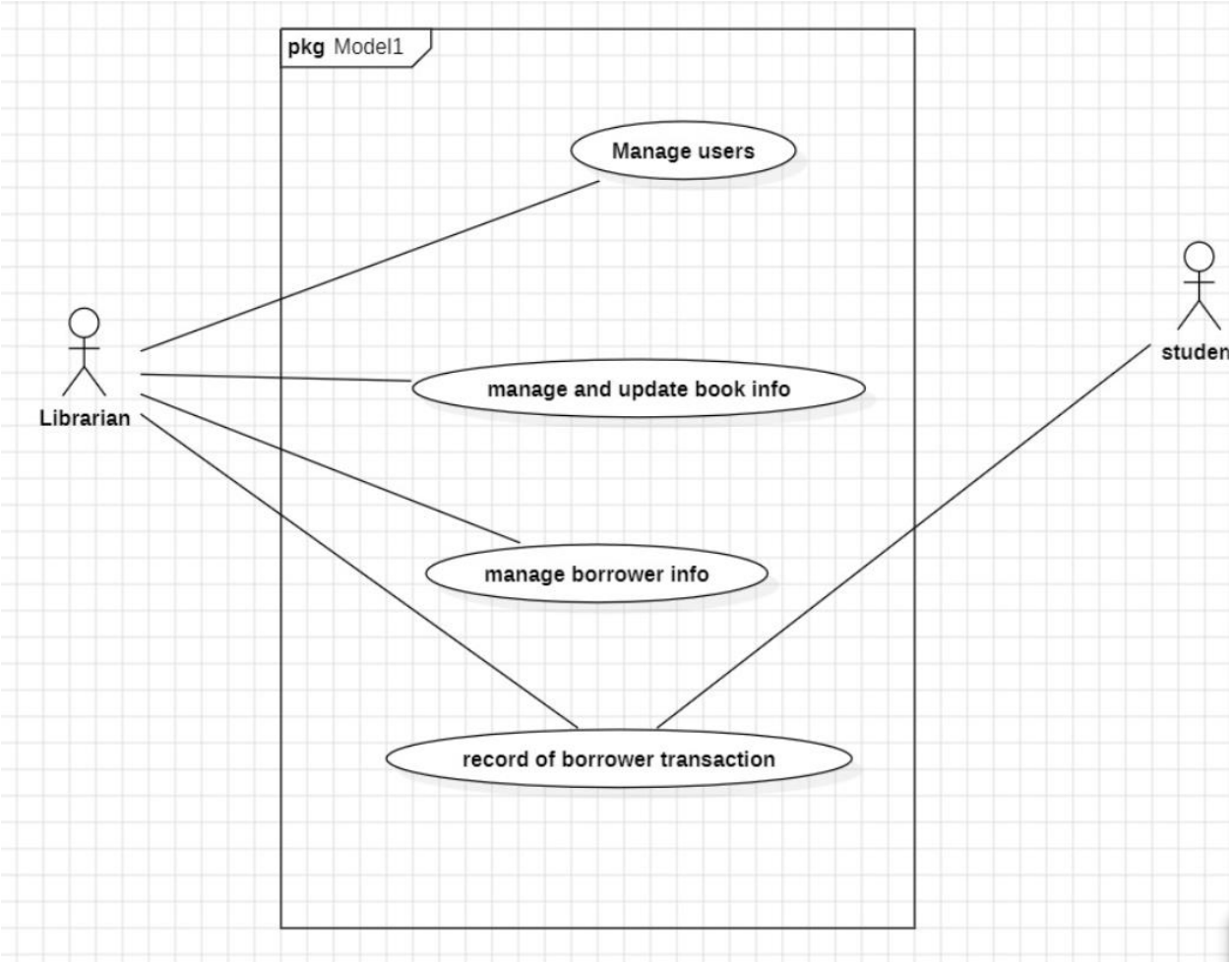
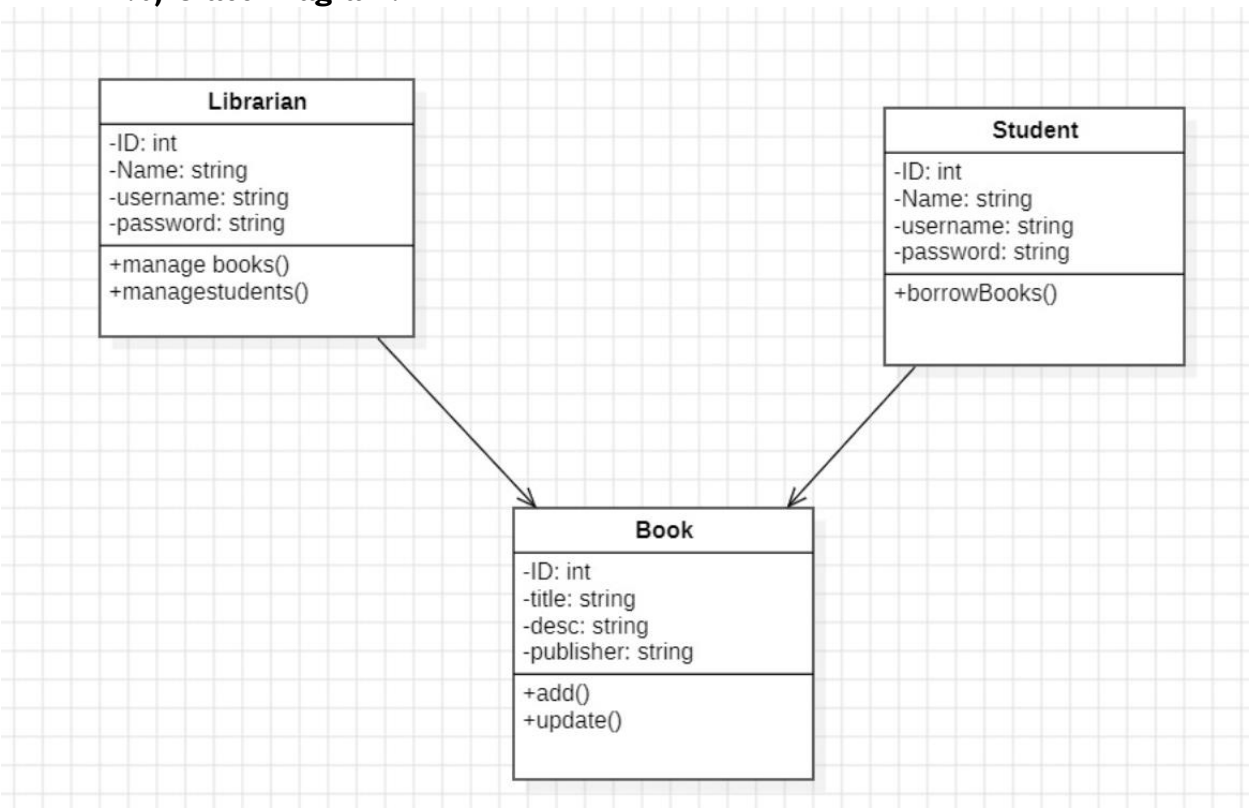
UML DIAGRAMS

1. REFERENCE CENTER

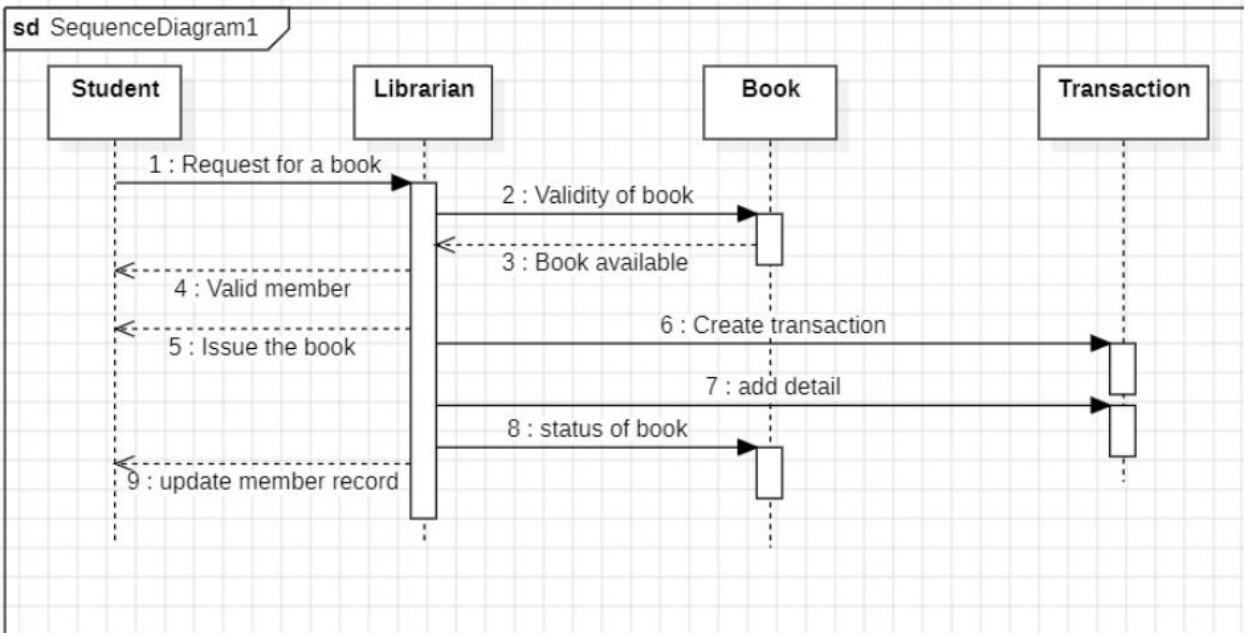
1.a) Use Case Diagram:



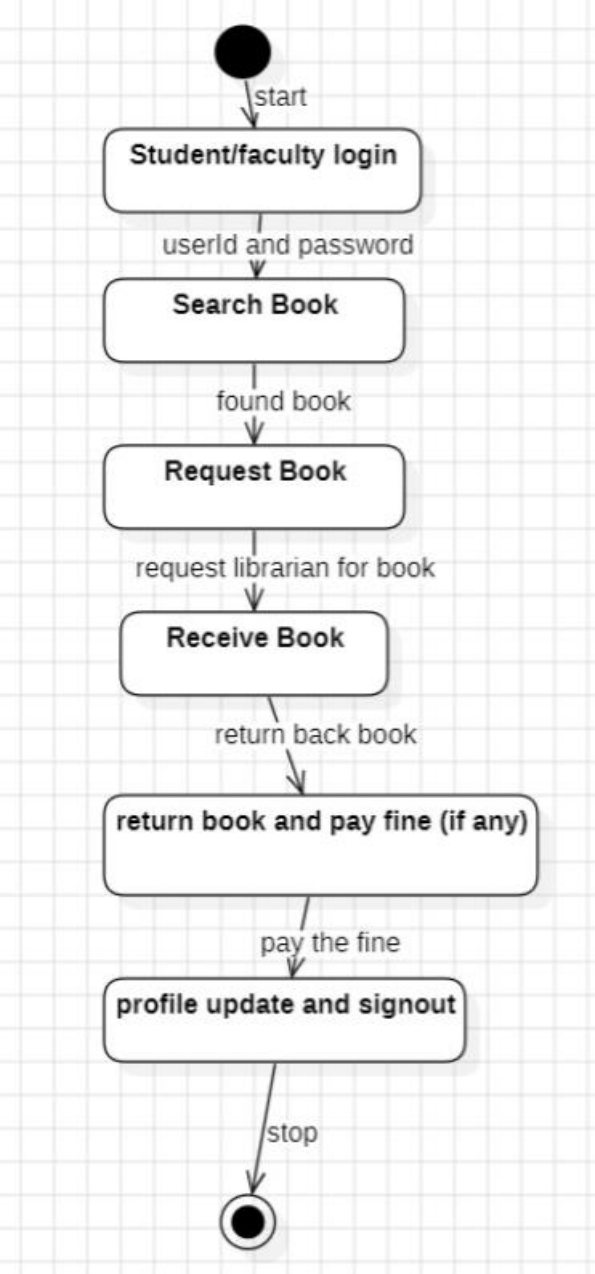
1.b) Class Diagram:



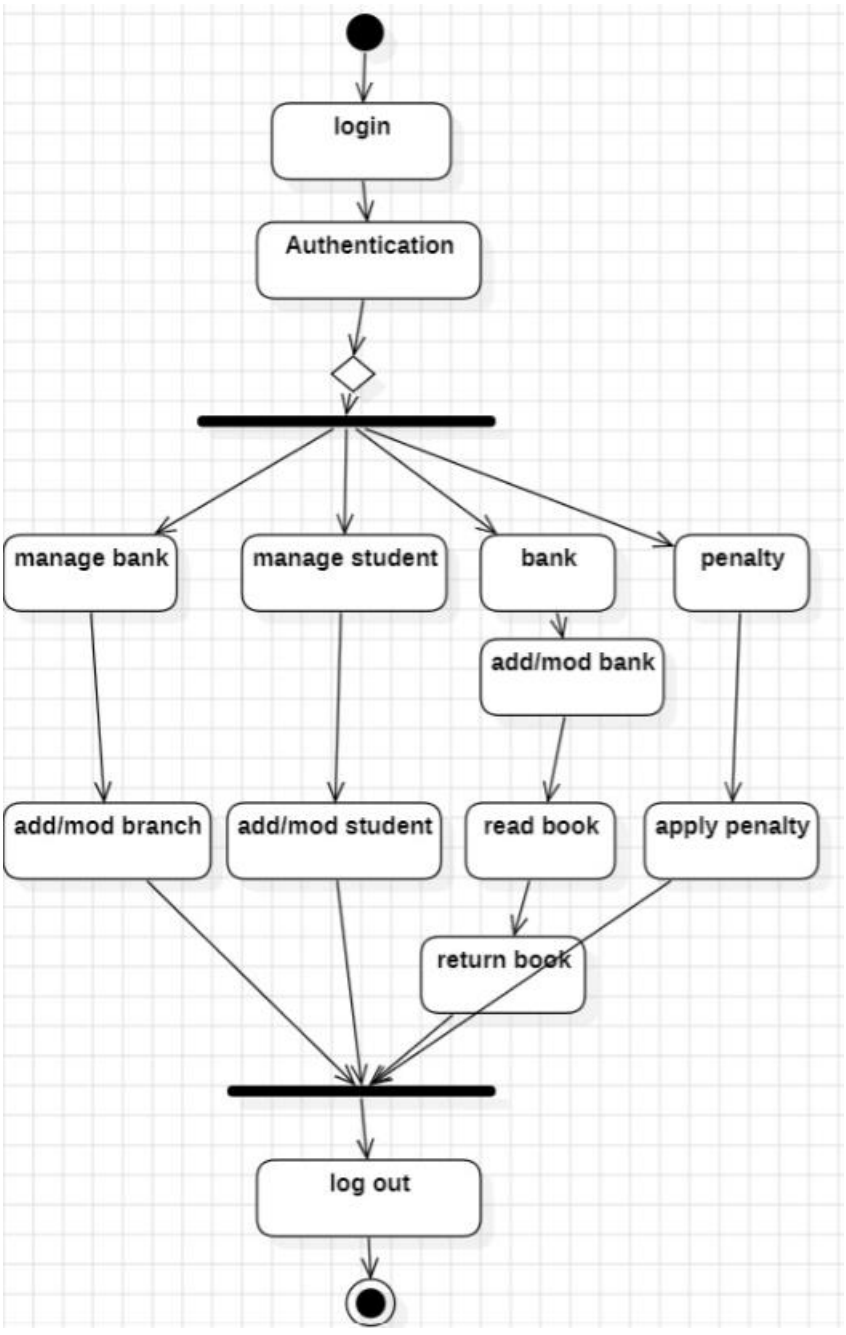
1.c) Sequence Diagram:



1.d) Activity Diagram:

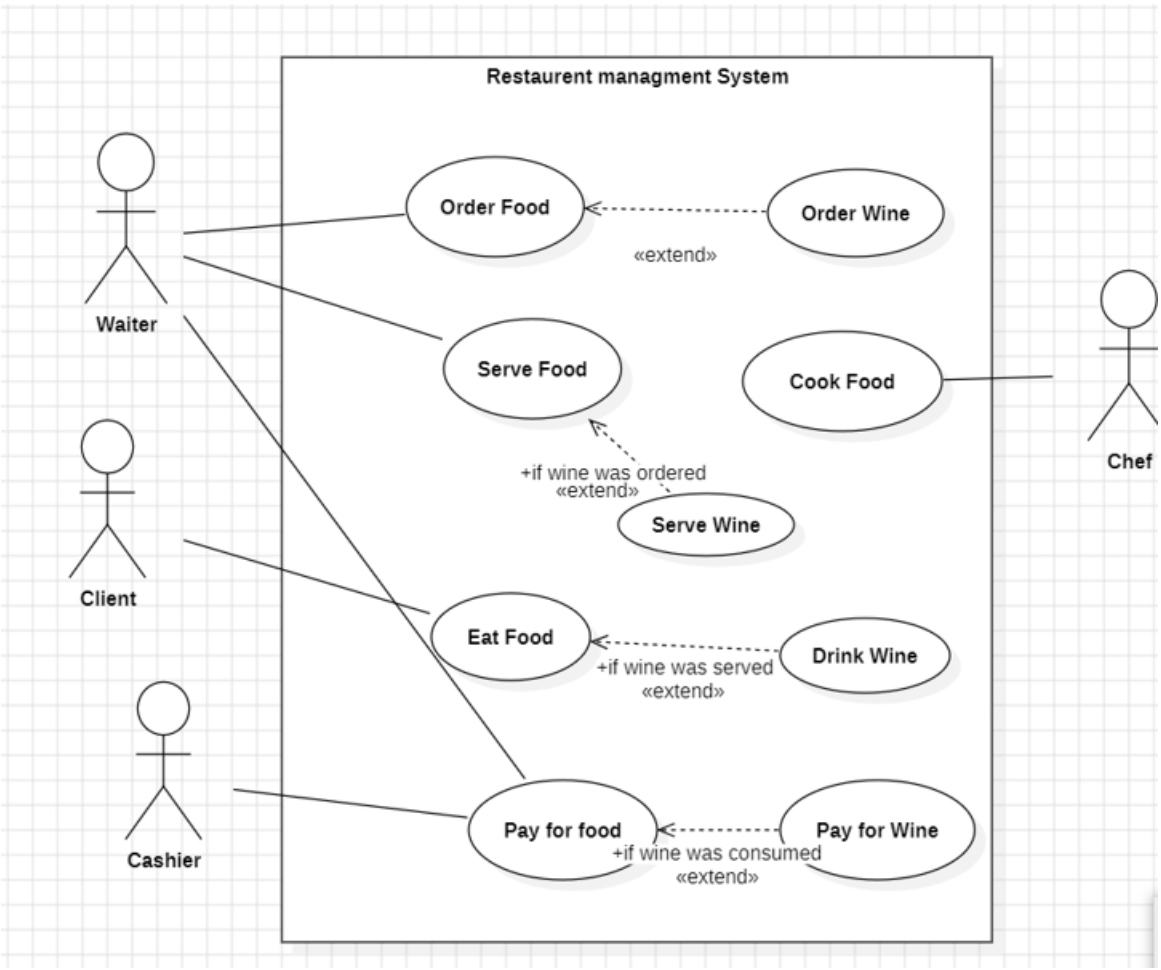


1.e) State-Activity Diagram:

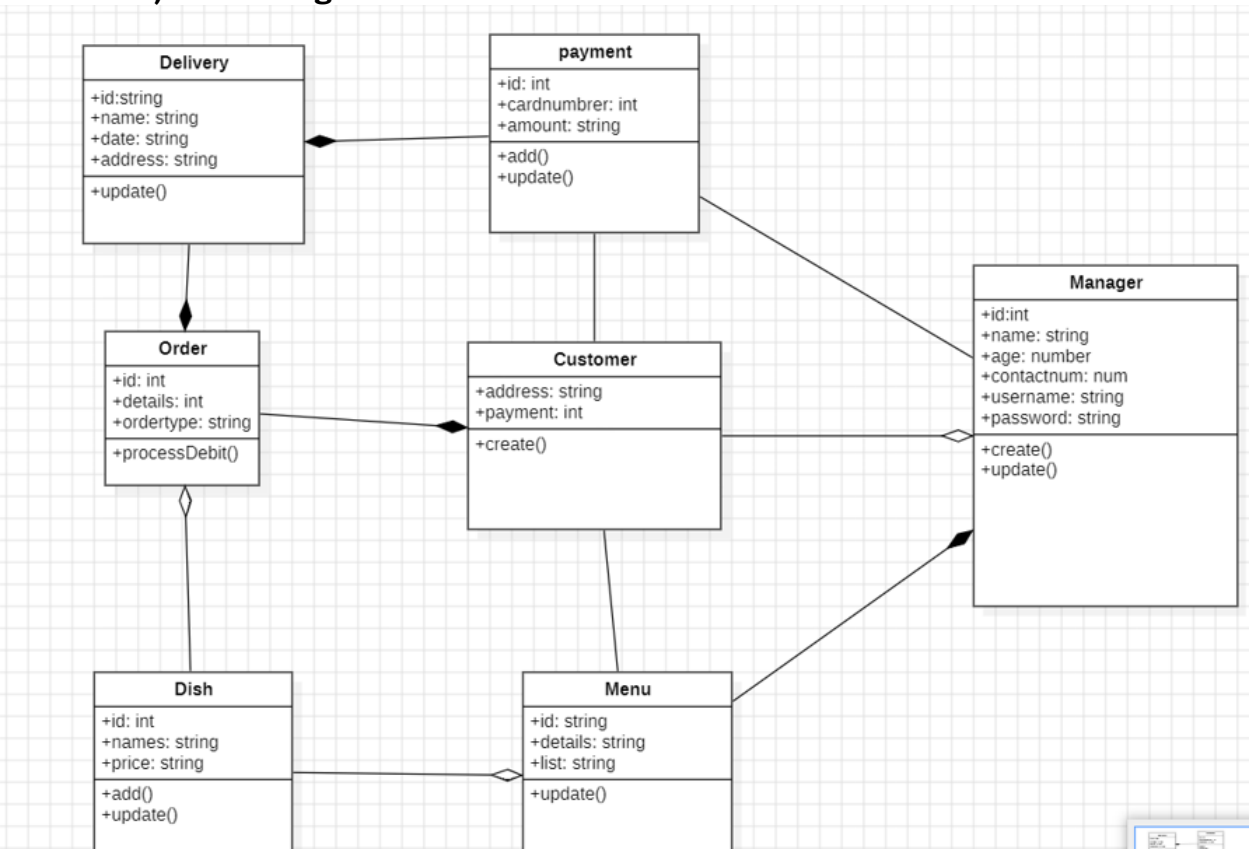


2. CAFE

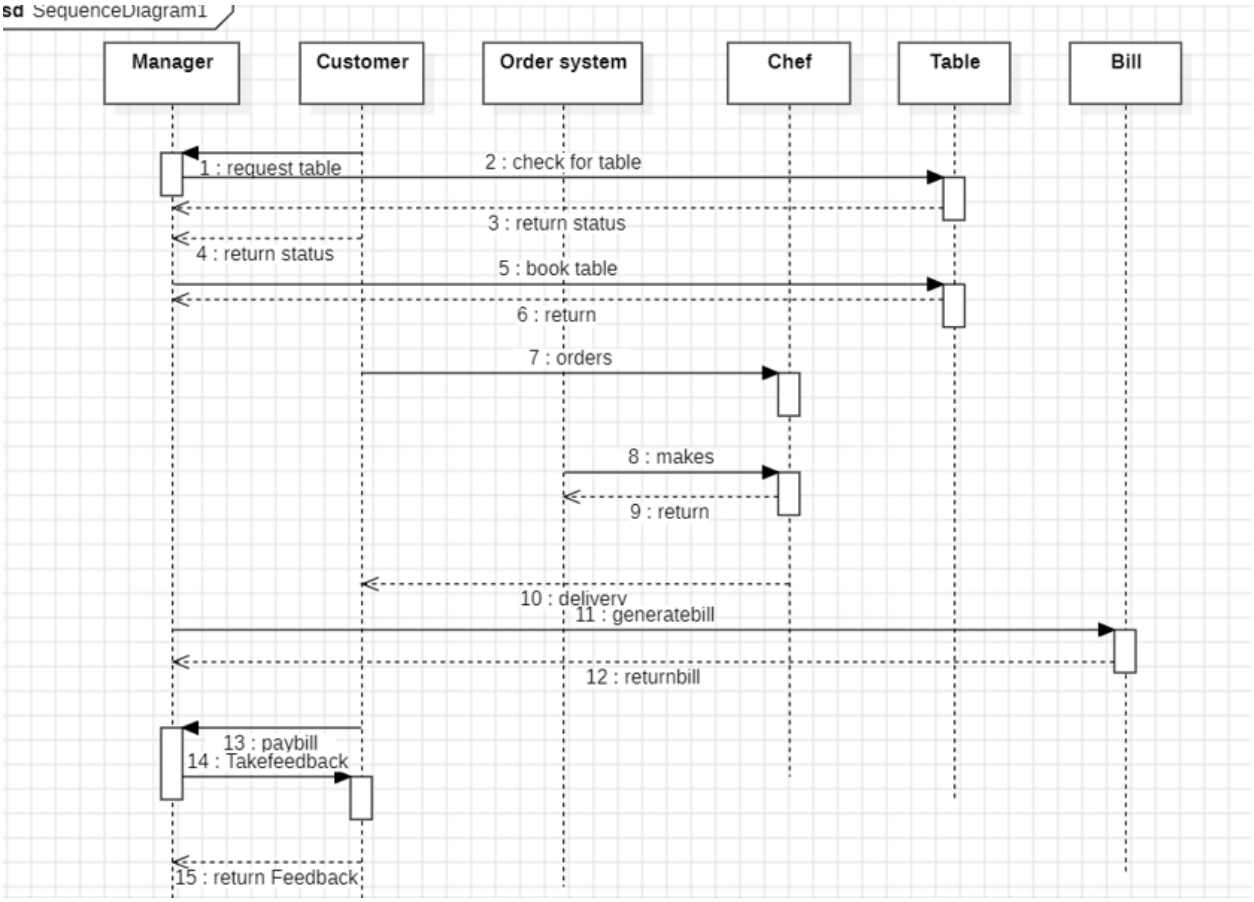
2.a) Use Case Diagram:



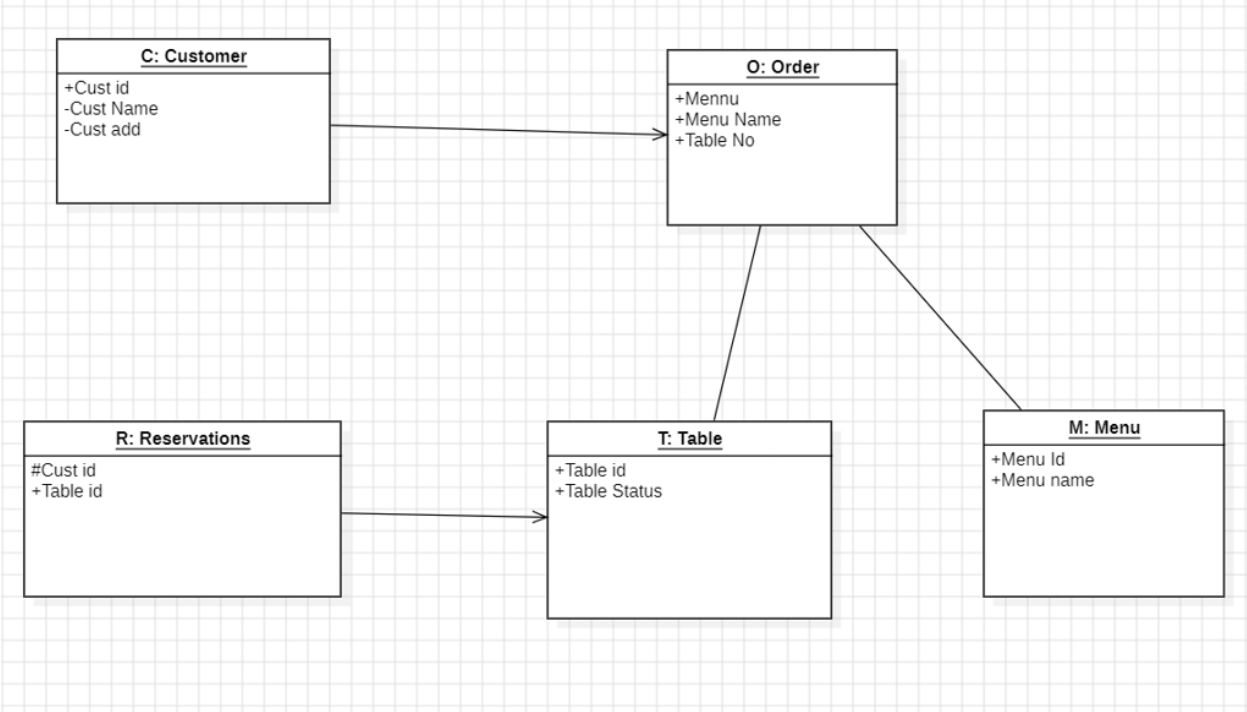
2.b) Class Diagram:



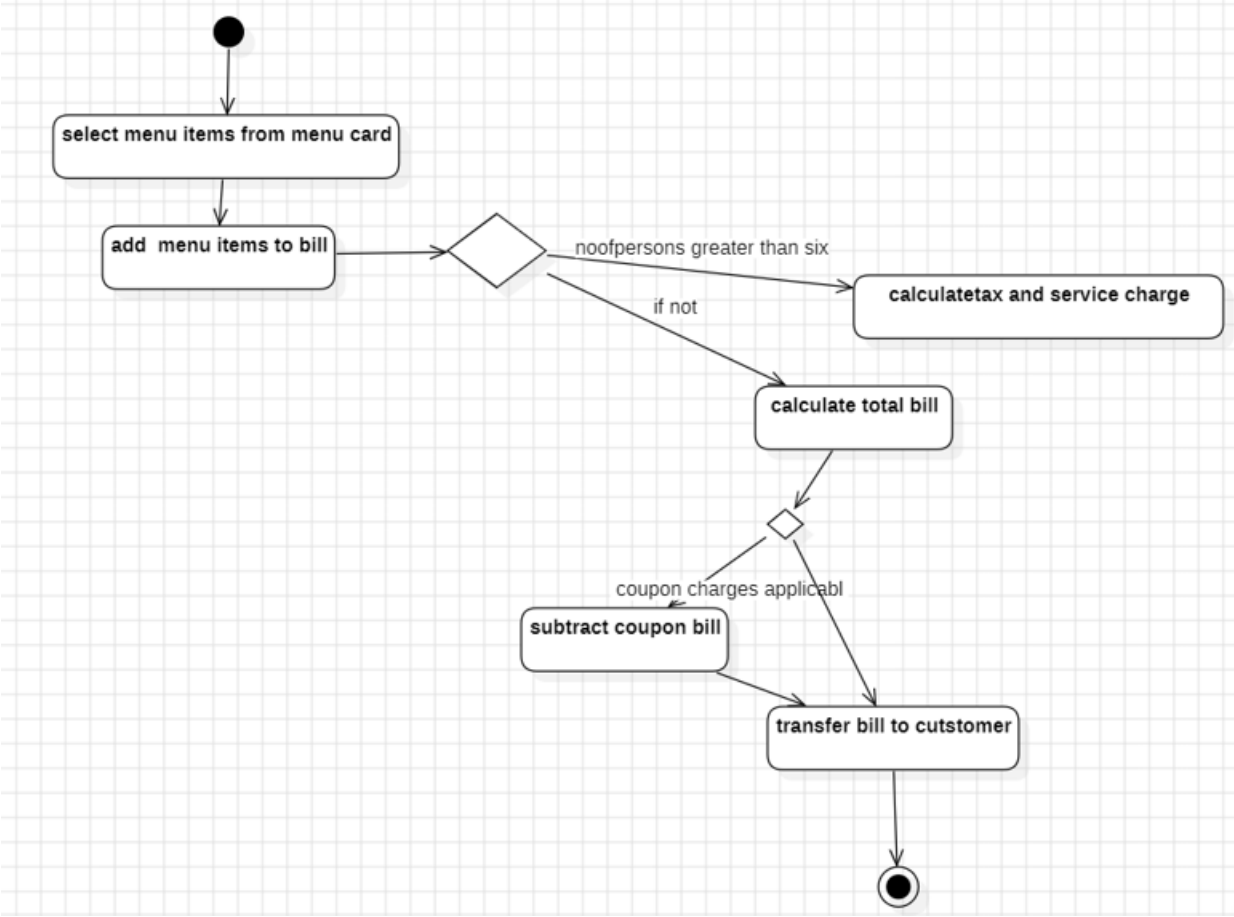
2.c) Sequence Diagram:



2.d) Object Diagram:



2.e) State-Activity Diagram:



3. Basic Java Programs

3.a) Amount:

Code:

```
class Account {
    double balance;

    public Account(double balance) {
        this.balance = balance;
    }

    public void displayBalance() {
        System.out.println("Balance: " + balance);
    }
}
class SavingsAccount extends Account {
    public SavingsAccount(double balance) {
        super(balance);
    }


    public void displayBalance() {
        System.out.println("Savings Account Balance: " + balance);
    }
}

public class Amount {
    public static void main(String[] args) {
        SavingsAccount account = new SavingsAccount(5000);
        account.displayBalance();
    }
}
```

Output:

```
C:\Users\HP\Documents\java programs>javac Amount.java

C:\Users\HP\Documents\java programs>java Amount.java
Savings Account Balance: 5000.0
```

3.b) Transport:

Code:

```
class Vehicle {
    public void type() {
        System.out.println("This is a vehicle");
    }
}
class Car extends Vehicle {
    public void type() {
        System.out.println("This is a car");
    }
}

public class Transport {
    public static void main(String[] args) {
        Car car = new Car();
        car.type();
    }
}
```

Output:

```
C:\Users\HP\Documents\java programs>javac Transport.java

C:\Users\HP\Documents\java programs>java Transport.java
This is a car
```

3.c) Carnivorous:

Code:.

```
class Animal {
        private String name;
        public Animal(String name) {
           this.name = name;
    }
        public void makeSound() {
           System.out.println(name + " makes a sound.");
    }
        public String getName() {
           return name;
    }
}
class Dog extends Animal {
        public Dog(String name) {
           super(name);
    }
        public void makeSound() {
           System.out.println(getName() + " barks.");
    }
}

public class Carnivorous {
        public static void main(String[] args) {
           Dog dog = new Dog("Buddy");
           dog.makeSound();
           Animal animal = new Animal("Generic Animal");
           animal.makeSound();
    }
}
```

Output:

```
C:\Users\HP\Documents\java programs>javac Carnivorous.java

C:\Users\HP\Documents\java programs>java Carnivorous.java
Buddy barks.
Generic Animal makes a sound.
```

3.d) Work:

Code:

```
class Employee {
    String name;

    public Employee(String name) {
        this.name = name;
    }

    public void work() {
        System.out.println(name + " is working");
    }
}

class Manager extends Employee {
    public Manager(String name) {
        super(name);
    }

       public void work() {
        System.out.println(name + " is managing the team");
    }
}

public class Work {
    public static void main(String[] args) {
        Manager manager = new Manager("Alice");
        manager.work();
    }
}
```

Output;

```
C:\Users\HP\Documents\java programs>javac Work.java

C:\Users\HP\Documents\java programs>java Work.java
Alice is managing the team
```

3.e) Study:

Code:

```
class Book {
    String title;

    public Book(String title) {
        this.title = title;
    }

    public void display() {
        System.out.println("Book Title: " + title);
    }
}


class EBook extends Book {
    public EBook(String title) {
        super(title);
    }

       public void display() {
        System.out.println("E-Book Title: " + title);
    }
}

public class Study {
    public static void main(String[] args) {
        EBook ebook = new EBook("Java Programming");
        ebook.display();
    }
}
```

Output:

```
C:\Users\HP\Documents\java programs>javac Study.java

C:\Users\HP\Documents\java programs>java Study.java
E-Book Title: Java Programming
```

3.f) Account:

Code:

```
class BankAccount {
    double balance;

    public BankAccount(double balance) {
        this.balance = balance;
    }

    public void deposit(double amount) {
        balance += amount;
    }

    public void displayBalance() {
        System.out.println("Bank Account Balance: " + balance);
    }
}


class CheckingAccount extends BankAccount {
    public CheckingAccount(double balance) {
        super(balance);
    }

    public void displayBalance() {
        System.out.println("Checking Account Balance: " + balance);
    }
}

public class Account {
    public static void main(String[] args) {
        CheckingAccount account = new CheckingAccount(1000);
        account.deposit(500);
        account.displayBalance();
    }
}
```

Output:

```
C:\Users\HP\Documents\java programs>javac Account.java

C:\Users\HP\Documents\java programs>java Account.java
Checking Account Balance: 1500.0
```

3.g) Measurements:

Code:

```
class Room {

    double length, width;


    public Room(double length, double width) {
        this.length = length;
        this.width = width;
    }


    public double calculateArea() {
        return length * width;
    }
}


class RoomWithHeight extends Room {

    double height;


    public RoomWithHeight(double length, double width, double height) {
        super(length, width); // Call the parent class constructor
        this.height = height;
    }


    public double calculateVolume() {
        return calculateArea() * height;
    }
}

public class Measurements {
    public static void main(String[] args) {

        RoomWithHeight room = new RoomWithHeight(5, 4, 3);


        double area = room.calculateArea();
        System.out.println("Room Area: " + area + " square meters");


        double volume = room.calculateVolume();
        System.out.println("Room Volume: " + volume + " cubic meters");
    }
}
```

Output:

```
C:\Users\HP\Documents\java programs>javac Measurements.java

C:\Users\HP\Documents\java programs>java Measurements.java
Room Area: 20.0 square meters
Room Volume: 60.0 cubic meters
```

.

3.h)ArmstrongNumber

```
import java.util.Scanner;

public class ArmstrongNumber {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter a number: ");
        int num = scanner.nextInt();

        int originalNum = num;
        int result = 0;
        int digits = String.valueOf(num).length();

        while (num != 0) {
            int remainder = num % 10;
            result += Math.pow(remainder, digits);
            num /= 10;
        }

        if (result == originalNum) {
            System.out.println(originalNum + " is an Armstrong number.");
        } else {
            System.out.println(originalNum + " is not an Armstrong number.");
        }

        scanner.close();
    }
}
```

Output:

```
C:\Users\HP\Documents\java programs>javac ArmstrongNumber.java

C:\Users\HP\Documents\java programs>java ArmstrongNumber.java
Enter a number: 20
20 is not an Armstrong number.
```

3.i)Art:

Code:

```
class Shape {
    public void draw() {
        System.out.println("Drawing a shape");
    }
}


class Circle extends Shape {

    public void draw() {
        System.out.println("Drawing a circle");
    }
}

public class Art {
    public static void main(String[] args) {
        Circle circle = new Circle();
        circle.draw();
    }
}
```

Output:

```
C:\Users\HP\Documents\java programs>javac Art.java

C:\Users\HP\Documents\java programs>java Art.java
Drawing a circle
```

3.j):Sounds:

Code:

```
class Animal {
  public void animalSound() {
    System.out.println("The animal makes a sound");
  }
}

class Pig extends Animal {
  public void animalSound() {
    System.out.println("The pig says: wee wee");
  }
}

class Dog extends Animal {
  public void animalSound() {
    System.out.println("The dog says: bow wow");
  }
}

class Sounds {
  public static void main(String[] args) {
    Animal myAnimal = new Animal();
    Animal myPig = new Pig();
    Animal myDog = new Dog();
    myAnimal.animalSound();
    myPig.animalSound();
    myDog.animalSound();
  }
}
```

Output:

```
C:\Users\HP\Documents\java programs>java Sounds.java
The animal makes a sound
The pig says: wee wee
The dog says: bow wow
```