DATE: 24-02-2023 **EXPERIMENT NO** 6 **REGISTER NO**: 2162014

VEHICLE SIMULATOR

AIM:

Suppose you are developing a simple game, that involves various types of vehicles. each vehicle has a unique name, maximum speed and a method to move(drive/ride,etc). To represent these different types of vehicles in your game, you decide to create hierarchy of classes using inheritance. you also decide to use an interface which defines method for moving each type of vehicle.

PROGRAM:

```
/**
 *
 * @author 2162014
 */
import java.util.Scanner;

// Define the interface for moving vehicles
interface Moveable {
   void move();
}

// Define the base Vehicle class
class Vehicle {
   String name;
   int maxSpeed, fuelLevel, xPosition, yPosition;

   public Vehicle(String name, int maxSpeed) {
      this.name = name;
      this.maxSpeed = maxSpeed;
      this.fuelLevel = 100; // initialize fuel level to 100
      // initialize position to (0, 0)
      this.xPosition = 0;
      this.yPosition = 0;
   }

   public void display() {
      System.out.println("\n*Vehicle Information*");
      System.out.println("\tName: " + name);
      System.out.println("\tMax Speed: " + maxSpeed);
      System.out.println("\tFuel Level: " + fuelLevel);
      System.out.println("\tPosition: (" + xPosition + ", " + yPosition + ")");
   }
}

// Define a Car class that extends Vehicle and implements Moveable
class Car extends Vehicle implements Moveable {
```

```
  public Car(String name, int maxSpeed) {
    super(name, maxSpeed);
  }

  public void move() {
    Scanner cread = new Scanner(System.in);
    System.out.println("\n*Car Simulation*\n");
    System.out
        .println("*Instructions* \n\tUse keys 'w', 'a', 's', 'd' to move the car " + name + " or
'x' to exit");
    while (fuelLevel > 0) {
      System.out.print("\nEnter key: ");
      char move = cread.next().charAt(0);
      switch (move) {
        case 'w':
          System.out.println("\tAction: Moved " + name + " forward");
          fuelLevel -= 5;
          yPosition += 1;
          break;
        case 'a':
          System.out.println("\tAction: Turned " + name + " left");
          fuelLevel -= 2;
          xPosition -= 1;
          break;
        case 's':
          System.out.println("\tAction: Moved " + name + " backward");
          fuelLevel -= 5;
          yPosition -= 1;
          break;
        case 'd':
          System.out.println("\tAction: Turned " + name + " right");
          fuelLevel -= 2;
          xPosition += 1;
          break;
        case 'x':
          System.out.println("\tAction: Exited car simulation");
          return;
        default:
          System.out.println("\nInvalid Input Error: Valid keys are 'w', 'a', 's', 'd', and 'x'");
      }
      System.out.println("\t*Car Status*");
      System.out.println("\t\tPosition: (" + xPosition + ", " + yPosition + ")");
      if (fuelLevel < 0)
        System.out.println("\t\tFuel Level: " + 0);
      else
```

```
            System.out.println("\t\tFuel Level: " + fuelLevel);
        }
        System.out.println("\nEmpty Fuel Status: " + name + " is out of fuel!");
    }
}

// Define a Boat class that extends Vehicle and implements Moveable
class Boat extends Vehicle implements Moveable {
    public Boat(String name, int maxSpeed) {
        super(name, maxSpeed);
    }

    public void move() {
        Scanner bread = new Scanner(System.in);
        System.out.println("\n*Boat Simulation*\n");
        System.out.println(
                "Instructions: \n\tUse keys 'w', 'a', 's', 'd' to move the boat " + name
                        + " or 'x' to exit simulation");
        while (fuelLevel > 0) {
            System.out.print("\nEnter key: ");
            char move = bread.next().charAt(0);
            switch (move) {
                case 'w':
                    System.out.println("\tAction: Moved " + name + " forward");
                    fuelLevel -= 5;
                    yPosition += 1;
                    break;
                case 'a':
                    System.out.println("\tAction: Turned " + name + " left");
                    fuelLevel -= 2;
                    xPosition -= 1;
                    break;
                case 's':
                    System.out.println("\tAction: Moved " + name + " backward");
                    fuelLevel -= 5;
                    yPosition -= 1;
                    break;
                case 'd':
                    System.out.println("\tAction: Turned " + name + " right");
                    fuelLevel -= 2;
                    xPosition += 1;
                    break;
                case 'x':
                    System.out.println("\tAction: Exited boat simulation");
                    return;
```

```
            default:
                System.out.println("\nInvalid Input Error: Valid keys are 'w', 'a', 's', 'd', and 'x'");
        }
        System.out.println("\t*Boat Status*");
        System.out.println("\t\tPosition: (" + xPosition + ", " + yPosition + ")");
        if (fuelLevel < 0)
            System.out.println("\t\tFuel Level: " + 0);
        else
            System.out.println("\t\tFuel Level: " + fuelLevel);
    }
    System.out.println("\nEmpty Fuel Status: " + name + " is out of fuel!");
  }
}

// Define a Plane class that extends Vehicle and implements Moveable
class Plane extends Vehicle implements Moveable {
  int altitude;

  public Plane(String name, int maxSpeed) {
    super(name, maxSpeed);
    altitude = 0; // initialize altitude to 0
  }

  public void move() {
    Scanner pread = new Scanner(System.in);
    System.out.println("\n*Plane Simulation*\n");
    System.out.println(
        "Instructions: \n\tUse keys 'w', 'a', 's', 'd', 'q', 'z' to move the plane " + name
            + " or 'x' to exit simulation");
    while (fuelLevel > 0) {
      System.out.print("\nEnter key: ");
      char move = pread.next().charAt(0);
      switch (move) {
        case 'w':
          System.out.println("\tAction: Moved " + name + " forward");
          fuelLevel -= 5;
          yPosition += 1;
          break;
        case 'a':
          System.out.println("\tAction: Turned " + name + " left");
          fuelLevel -= 2;
          xPosition -= 1;
          break;
        case 's':
          System.out.println("\tAction: Moved " + name + " backward");
```

```
                fuelLevel -= 5;
                yPosition -= 1;
                break;
            case 'd':
                System.out.println("\tAction: Turned " + name + " right");
                fuelLevel -= 2;
                xPosition += 1;
                break;
            case 'q':
                System.out.println("\tAction: Climbed " + name);
                altitude += 500;
                fuelLevel -= 10;
                break;
            case 'z':
                System.out.println("\tAction: Descended " + name);
                altitude -= 500;
                fuelLevel -= 10;
                break;
            case 'x':
                System.out.println("\tAction: Exited plane simulation");
                return;
            default:
                System.out.println("\nInvalid Input Error: Valid keys are 'w', 'a', 's', 'd', 'q', 'z',
and 'x'.");
            }
            System.out.println("\t*Plane Status*");
            System.out.println("\t\tAltitude: " + altitude);
            System.out.println("\t\tPosition: (" + xPosition + ", " + yPosition + ")");
            if (fuelLevel < 0)
                System.out.println("\t\tFuel Level: " + 0);
            else
                System.out.println("\t\tFuel Level: " + fuelLevel);
        }
        System.out.println("\nFuel Status: " + name + " is out of fuel!");
    }
}

// Define the main class that creates and moves the vehicles
public class VehicleGame {
    public static void main(String[] args) {
        int choice;
        Scanner gread = new Scanner(System.in);
        System.out.println("\nWelcome to the Vehicle Simulator!");
        do {
            System.out.println("\nChoose vehicle");
```

```
        System.out.println("\t1. Car \n\t2. Boat \n\t3. Plane \n\t4. Quit");
        System.out.print("Enter Choice: ");
        choice = gread.nextInt();
        switch (choice) {
            case 1:
                System.out.println("\nYou have chosen car!");
                System.out.print("Enter the name of your car: ");
                String carName = gread.next();
                System.out.print("Enter the maximum speed of your car: ");
                int carMaxSpeed = gread.nextInt();
                Car car = new Car(carName, carMaxSpeed);
                car.display();
                car.move();
                break;
            case 2:
                System.out.println("\nYou have chosen boat!");
                System.out.print("Enter the name of your boat: ");
                String boatName = gread.next();
                System.out.print("Enter the maximum speed of your boat: ");
                int boatMaxSpeed = gread.nextInt();
                Boat boat = new Boat(boatName, boatMaxSpeed);
                boat.display();
                boat.move();
                break;
            case 3:
                System.out.println("\nYou have chosen plane!");
                System.out.print("Enter the name of your plane: ");
                String planeName = gread.next();
                System.out.print("Enter the maximum speed of your plane: ");
                int planeMaxSpeed = gread.nextInt();
                Plane plane = new Plane(planeName, planeMaxSpeed);
                plane.display();
                plane.move();
                break;
            case 4:
                break;
            default:
                System.out.println("Invalid Choice Error: Valid choices are 1, 2, 3, and 4.");
                break;
        }
    } while (choice < 4);
    System.out.println("\nUntil next time!\n");
  }
}
```

RESULTS:

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```
PS C:\Users\ashva\                                                    > java VehicleGame

Welcome to the Vehicle Simulator!

Choose vehicle
        1. Car
        2. Boat
        3. Plane
        4. Quit
Enter Choice: 1

You have chosen car!
Enter the name of your car: 2162014
Enter the maximum speed of your car: 300

*Vehicle Information*
        Name: 2162014
        Max Speed: 300
        Fuel Level: 100
        Position: (0, 0)

*Car Simulation*

*Instructions*
        Use keys 'w', 'a', 's', 'd' to move the car 2162014 or 'x' to exit

Enter key: w
        Action: Moved 2162014 forward
        *Car Status*
                Position: (0, 1)
                Fuel Level: 95

Enter key: a
        Action: Turned 2162014 left
        *Car Status*
                Position: (-1, 1)
                Fuel Level: 93

Enter key: a
        Action: Turned 2162014 left
        *Car Status*
                Position: (-2, 1)
                Fuel Level: 91
Enter key: s
        Action: Moved 2162014 backward
        *Car Status*
                Position: (-2, 0)
                Fuel Level: 86

Enter key: d
        Action: Turned 2162014 right
        *Car Status*
                Position: (-1, 0)
                Fuel Level: 84

Enter key: d
        Action: Turned 2162014 right
        *Car Status*
                Position: (0, 0)
                Fuel Level: 82

Enter key: w
        Action: Moved 2162014 forward
        *Car Status*
                Position: (0, 1)
                Fuel Level: 77

Enter key: x
        Action: Exited car simulation
```

```
Choose vehicle
        1. Car
        2. Boat
        3. Plane
        4. Quit
Enter Choice: 2

You have chosen boat!
Enter the name of your boat: you
Enter the maximum speed of your boat: 60

*Vehicle Information*
        Name: you
        Max Speed: 60
        Fuel Level: 100
        Position: (0, 0)

*Boat Simulation*

Instructions:
        Use keys 'w', 'a', 's', 'd' to move the boat you or 'x' to exit simulation

Enter key: w
        Action: Moved you forward
        *Boat Status*
                Position: (0, 1)
                Fuel Level: 95

Enter key: w
        Action: Moved you forward
        *Boat Status*
                Position: (0, 2)
                Fuel Level: 90

Enter key: d
        Action: Turned you right
        *Boat Status*
                Position: (1, 2)
                Fuel Level: 88

Enter key: d
        Action: Turned you right
        *Boat Status*
                Position: (2, 2)
                Fuel Level: 86

Enter key: s
        Action: Moved you backward
        *Boat Status*
                Position: (2, 1)
                Fuel Level: 81
```

```
Enter key: w
        Action: Moved you forward
        *Boat Status*
                Position: (2, 2)
                Fuel Level: 76

Enter key: a
        Action: Turned you left
        *Boat Status*
                Position: (1, 2)
                Fuel Level: 74
```

```
Enter key: a
        Action: Turned you left
        *Boat Status*
                Position: (0, 2)
                Fuel Level: 72

Enter key: a
        Action: Turned you left
        *Boat Status*
                Position: (-1, 2)
                Fuel Level: 70

Enter key: s
        Action: Moved you backward
        *Boat Status*
                Position: (-1, 1)
                Fuel Level: 65

Enter key: s
        Action: Moved you backward
        *Boat Status*
                Position: (-1, 0)
                Fuel Level: 60

Enter key:
x
        Action: Exited boat simulation
```

```
Choose vehicle
        1. Car
        2. Boat
        3. Plane
        4. Quit
Enter Choice: 3

You have chosen plane!
Enter the name of your plane: world
Enter the maximum speed of your plane: 600

*Vehicle Information*
        Name: world
        Max Speed: 600
        Fuel Level: 100
        Position: (0, 0)

*Plane Simulation*

Instructions:
        Use keys 'w', 'a', 's', 'd', 'q', 'z' to move the plane world or 'x' to exit simulation

Enter key: w
        Action: Moved world forward
        *Plane Status*
                Altitude: 0
                Position: (0, 1)
                Fuel Level: 95

Enter key: w
        Action: Moved world forward
        *Plane Status*
                Altitude: 0
                Position: (0, 2)
                Fuel Level: 90
```

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```
Enter key: w
        Action: Moved world forward
        *Plane Status*
                Altitude: 0
                Position: (0, 3)
                Fuel Level: 85

Enter key: q
        Action: Climbed world
        *Plane Status*
                Altitude: 500
                Position: (0, 3)
                Fuel Level: 75

Enter key: d
        Action: Turned world right
        *Plane Status*
                Altitude: 500
                Position: (1, 3)
                Fuel Level: 73

Enter key: d
        Action: Turned world right
        *Plane Status*
                Altitude: 500
                Position: (2, 3)
                Fuel Level: 71

Enter key: a
        Action: Turned world left
        *Plane Status*
                Altitude: 500
                Position: (1, 3)
                Fuel Level: 69

Enter key: a
        Action: Turned world left
        *Plane Status*
                Altitude: 500
                Position: (0, 3)
                Fuel Level: 67

Enter key: a
        Action: Turned world left
        *Plane Status*
                Altitude: 500
                Position: (-1, 3)
                Fuel Level: 65
```

```
Enter key: s
        Action: Moved world backward
        *Plane Status*
                Altitude: 500
                Position: (-1, 2)
                Fuel Level: 60

Enter key: s
        Action: Moved world backward
        *Plane Status*
                Altitude: 500
                Position: (-1, 1)
                Fuel Level: 55
```

```
Enter key: q
        Action: Climbed world
        *Plane Status*
                Altitude: 1000
                Position: (-1, 1)
                Fuel Level: 45

Enter key: x
        Action: Exited plane simulation

Choose vehicle
        1. Car
        2. Boat
        3. Plane
        4. Quit
Enter Choice: 4

Until next time!
```