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UNIVERSITI
TEKNOLOGI
MARA

LAB ASSIGNMENT 1 & 2

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CSC186 – Object Oriented Programming
Academic Session Mac 2023 – Aug 2023
Lab Assignment 1- Basic Programming

Course Outcomes (CO)	LO1	LO2	LO3
CO1			
CO2	√	√	√
CO3			

Answer the following question.

1. A broadband company, Malaysia SuperBand charges its customers according to the type of package chosen:

Package Type	Internet Quota	Price	Exceed Quota Usage Charge
Basic (B)	6GB	48	RM0.10 every 1MB
Advanced (A)	10GB	88	RM0.05 every 1MB

a) Write the following function: `double calCharge (char, int)`. This function will calculate the charge for internet use. It receives the package type and the amount of data used (in megabyte) as parameters and then calculates and returns the charge.

Example calculation

Package: B
Internet use: 6800 MB (6.8 GB) - exceeds quota
Charge= Basic charge + Extra charge
= 48 + (6800 - 6000) * 0.20
= 48 + 80
Charge= RM 128

Package B
Internet use: 5500 MB (5.5 GB) - does not exceed quota
Charge= Basic charge
= RM48

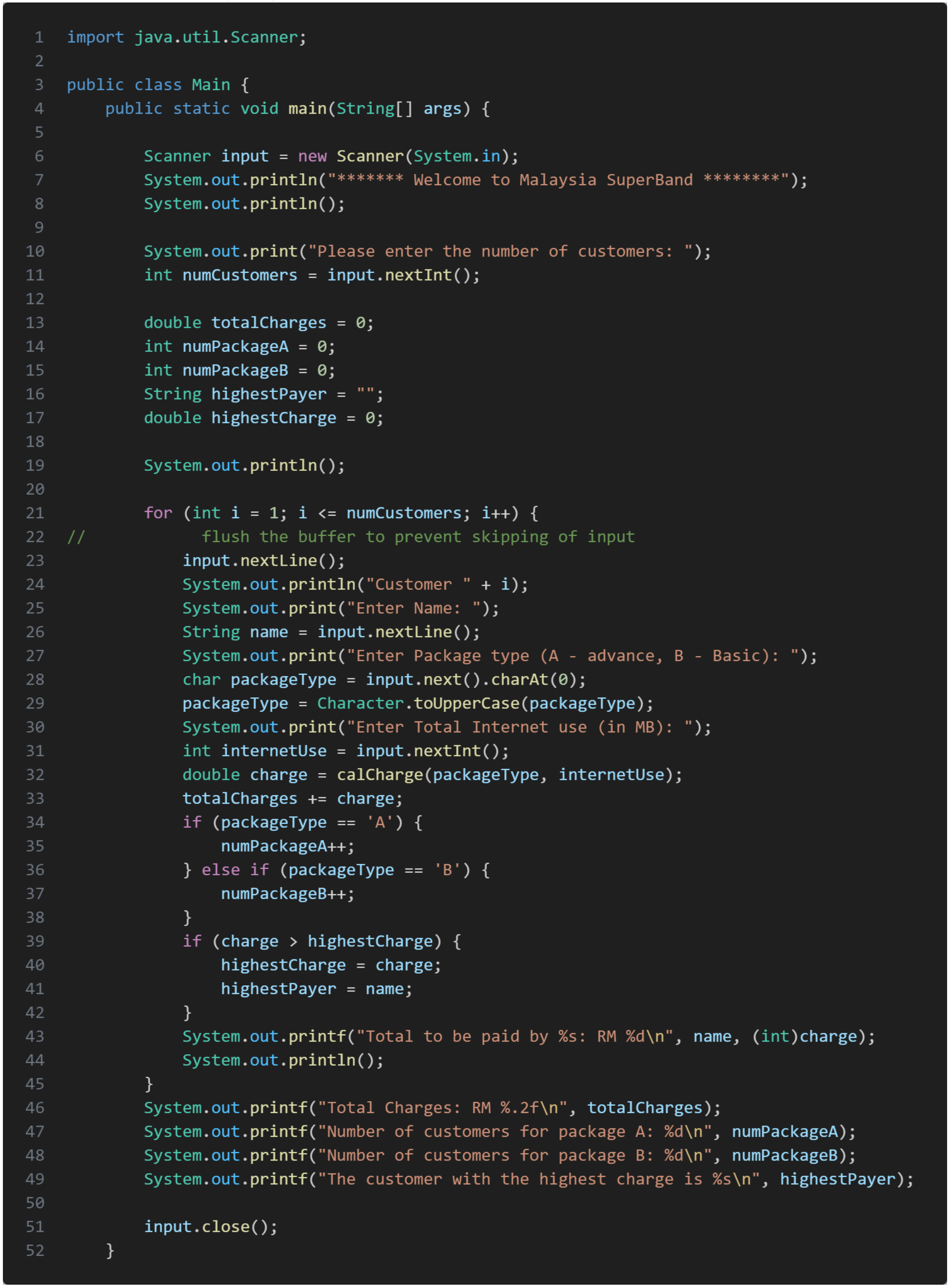
a) Write a Java application program to calculate the bill for Malaysia SuperBand's customers. It starts by asking for the number of customers. For each customer it will then ask for their name, their package type and the amount of data used. It then displays the amount to be paid by the customer. The program will call the function in (a) to perform related tasks.

At the end, the program will display the total amount to be collected from all customers, the number of customers for each package type and the name of the customer who has to pay the highest amount.

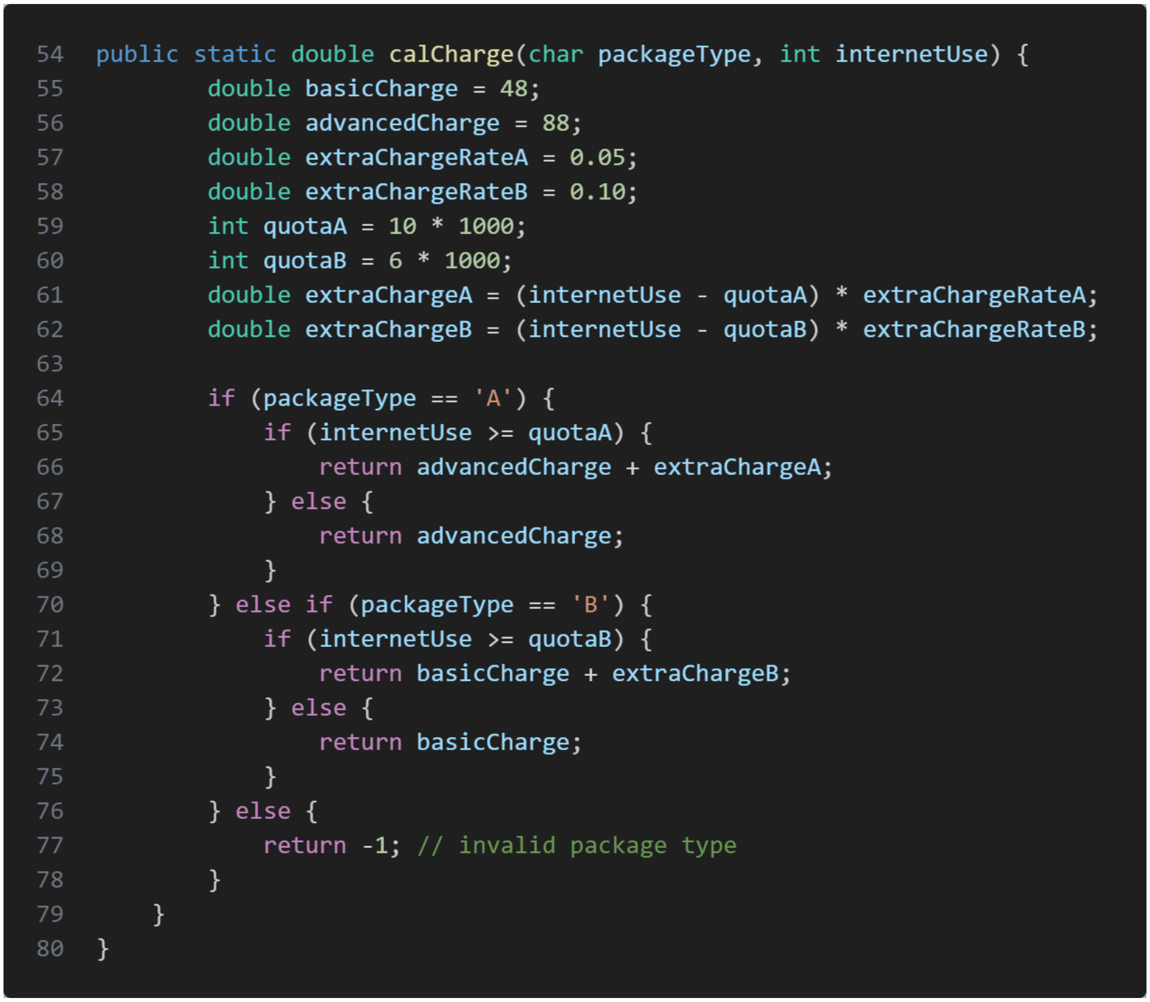
Sample output screen:

```
******* Welcome to Malaysia SuperBand ********


Please enter the number of customers: 20

Customer 1
Enter Name: Abdul Rahman
Enter Package type (A - advance, B - Basic): B
Enter Total Internet use (in MB): 6800
Total to be paid by Abdul Rahman: RM 128

Customer 2:
Enter Name: Siti Hayati
Enter Package type (A - advance, B - Basic): A
Enter Total Internet use (in MB): 9000
Total to be paid by Siti Hayati: RM 88

Customer 3:
Enter Name: Muhammad Ali
Enter Package type (A - advance, B - Basic): A
Enter Total Internet use (in MB): 10000
Total to be paid by Muhammad Ali: RM 138

......
......
......
......

Total Charges: RM .....
Number of customers for package A: ........
Number of customers for package B: ........
The customer with the highest charge is ..............
```

SOURCE CODE - https://pastecode.io/s/6mes2xbb

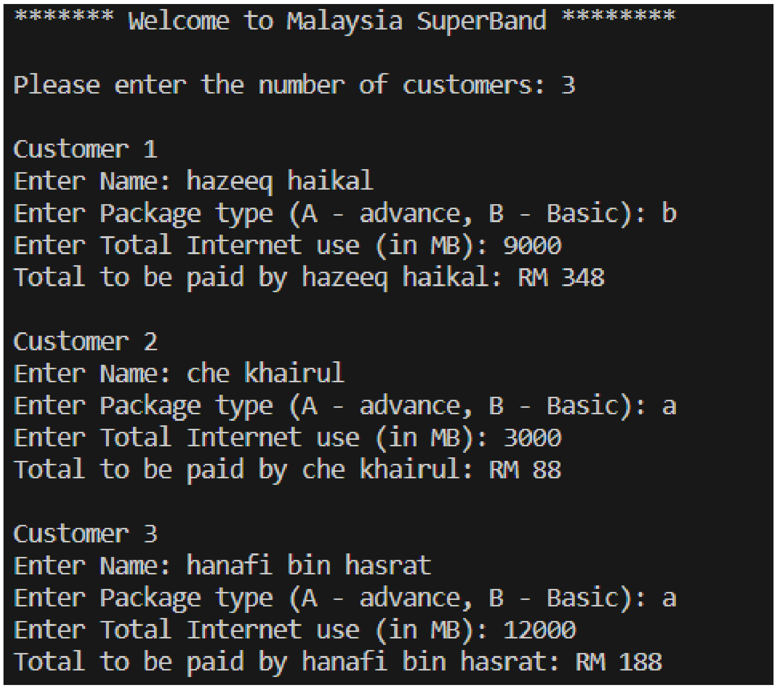


```java
import java.util.Scanner;

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

        Scanner input = new Scanner(System.in);
        System.out.println("******* Welcome to Malaysia SuperBand ********");
        System.out.println();

        System.out.print("Please enter the number of customers: ");
        int numCustomers = input.nextInt();

        double totalCharges = 0;
        int numPackageA = 0;
        int numPackageB = 0;
        String highestPayer = "";
        double highestCharge = 0;

        System.out.println();

        for (int i = 1; i <= numCustomers; i++) {
//            flush the buffer to prevent skipping of input
            input.nextLine();
            System.out.println("Customer " + i);
            System.out.print("Enter Name: ");
            String name = input.nextLine();
            System.out.print("Enter Package type (A - advance, B - Basic): ");
            char packageType = input.next().charAt(0);
            packageType = Character.toUpperCase(packageType);
            System.out.print("Enter Total Internet use (in MB): ");
            int internetUse = input.nextInt();
            double charge = calCharge(packageType, internetUse);
            totalCharges += charge;
            if (packageType == 'A') {
                numPackageA++;
            } else if (packageType == 'B') {
                numPackageB++;
            }
            if (charge > highestCharge) {
                highestCharge = charge;
                highestPayer = name;
            }
            System.out.printf("Total to be paid by %s: RM %d\n", name, (int)charge);
            System.out.println();
        }
        System.out.printf("Total Charges: RM %.2f\n", totalCharges);
        System.out.printf("Number of customers for package A: %d\n", numPackageA);
        System.out.printf("Number of customers for package B: %d\n", numPackageB);
        System.out.printf("The customer with the highest charge is %s\n", highestPayer);

        input.close();
    }
```



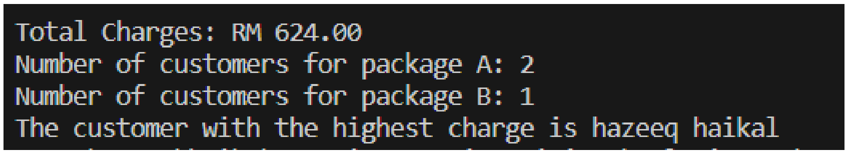
```java
public static double calChange(char packageType, int internetUse) {
        double basicCharge = 48;
        double advancedCharge = 88;
        double extraChargeRateA = 0.05;
        double extraChargeRateB = 0.10;
        int quotaA = 10 * 1000;
        int quotaB = 6 * 1000;
        double extraChargeA = (internetUse - quotaA) * extraChargeRateA;
        double extraChargeB = (internetUse - quotaB) * extraChargeRateB;

        if (packageType == 'A') {
            if (internetUse >= quotaA) {
                return advancedCharge + extraChargeA;
            } else {
                return advancedCharge;
            }
        } else if (packageType == 'B') {
            if (internetUse >= quotaB) {
                return basicCharge + extraChargeB;
            } else {
                return basicCharge;
            }
        } else {
            return -1; // invalid package type
        }
    }
}
```

SAMPLE INPUT



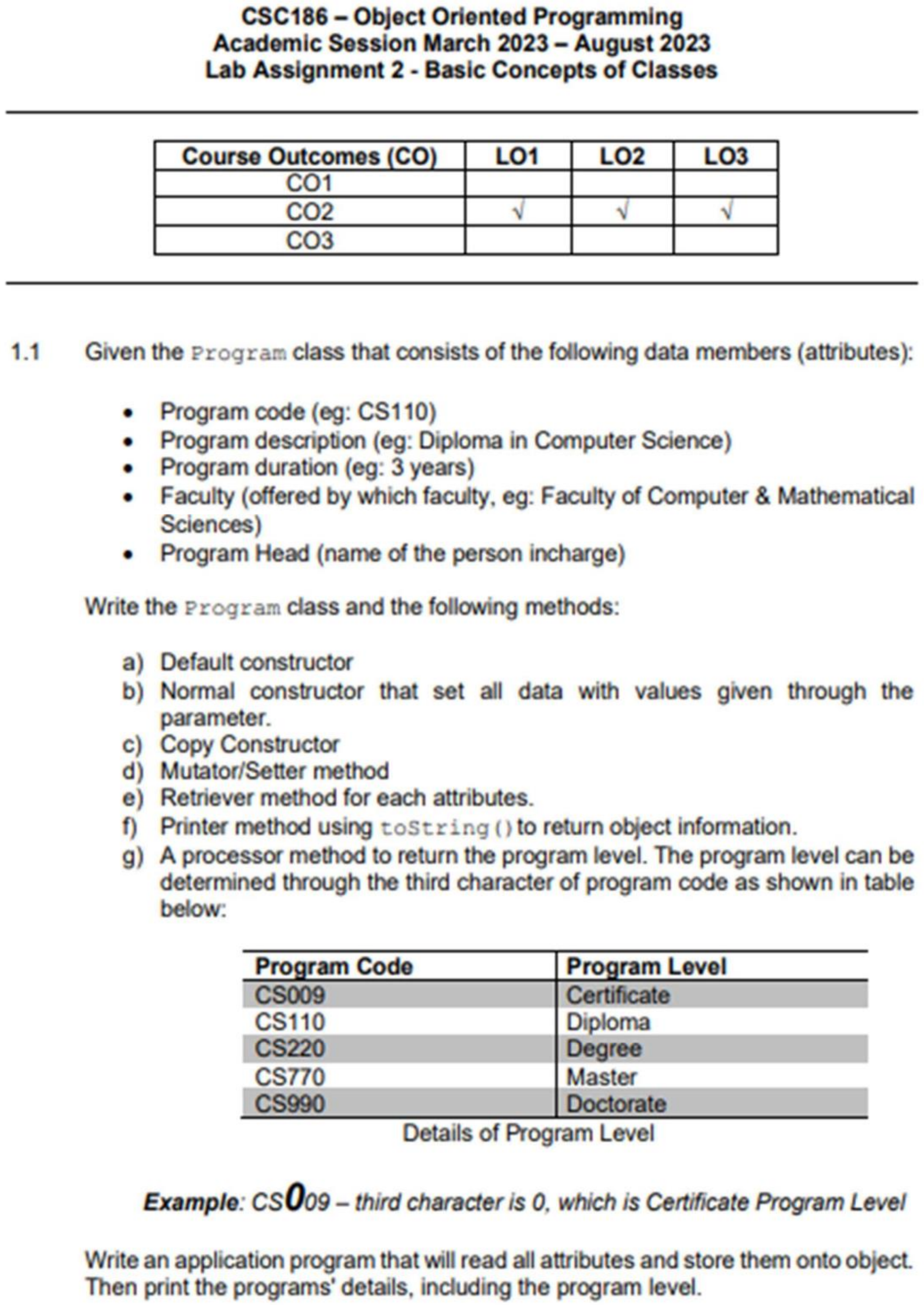
```
******* Welcome to Malaysia SuperBand ********

Please enter the number of customers: 3

Customer 1
Enter Name: hazeeq haikal
Enter Package type (A - advance, B - Basic): b
Enter Total Internet use (in MB): 9000
Total to be paid by hazeeq haikal: RM 348

Customer 2
Enter Name: che khairul
Enter Package type (A - advance, B - Basic): a
Enter Total Internet use (in MB): 3000
Total to be paid by che khairul: RM 88

Customer 3
Enter Name: hanafi bin hasrat
Enter Package type (A - advance, B - Basic): a
Enter Total Internet use (in MB): 12000
Total to be paid by hanafi bin hasrat: RM 188
```

SAMPLE OUTPUT



```
Total Charges: RM 624.00
Number of customers for package A: 2
Number of customers for package B: 1
The customer with the highest charge is hazeeq haikal
```

LAB ASSIGNMENT 2



CSC186 – Object Oriented Programming
Academic Session March 2023 – August 2023
Lab Assignment 2 - Basic Concepts of Classes

Course Outcomes (CO)	LO1	LO2	LO3
CO1			
CO2	√	√	√
CO3			

1.1 Given the `Program` class that consists of the following data members (attributes):

- Program code (eg: CS110)
- Program description (eg: Diploma in Computer Science)
- Program duration (eg: 3 years)
- Faculty (offered by which faculty, eg: Faculty of Computer & Mathematical Sciences)
- Program Head (name of the person incharge)

Write the `Program` class and the following methods:

a) Default constructor
b) Normal constructor that set all data with values given through the parameter.
c) Copy Constructor
d) Mutator/Setter method
e) Retriever method for each attributes.
f) Printer method using `toString()` to return object information.
g) A processor method to return the program level. The program level can be determined through the third character of program code as shown in table below:

Program Code	Program Level
CS009	Certificate
CS110	Diploma
CS220	Degree
CS770	Master
CS990	Doctorate

Details of Program Level

***Example**: CS**0**09 – third character is 0, which is Certificate Program Level*

Write an application program that will read all attributes and store them onto object. Then print the programs' details, including the program level.

1.2 Class `Land` has the following attributes and methods:

Attributes:

- id
- owner name
- house type
- area

Methods:

a) Constructor
b) Normal constructor
c) Copy Constructor
d) Mutator/Setter
e) Accessor/Getter
f) Processor – Calculate tax

The tax on this type of land depends on its area, and the type of the house built on the land as shown in the following table:

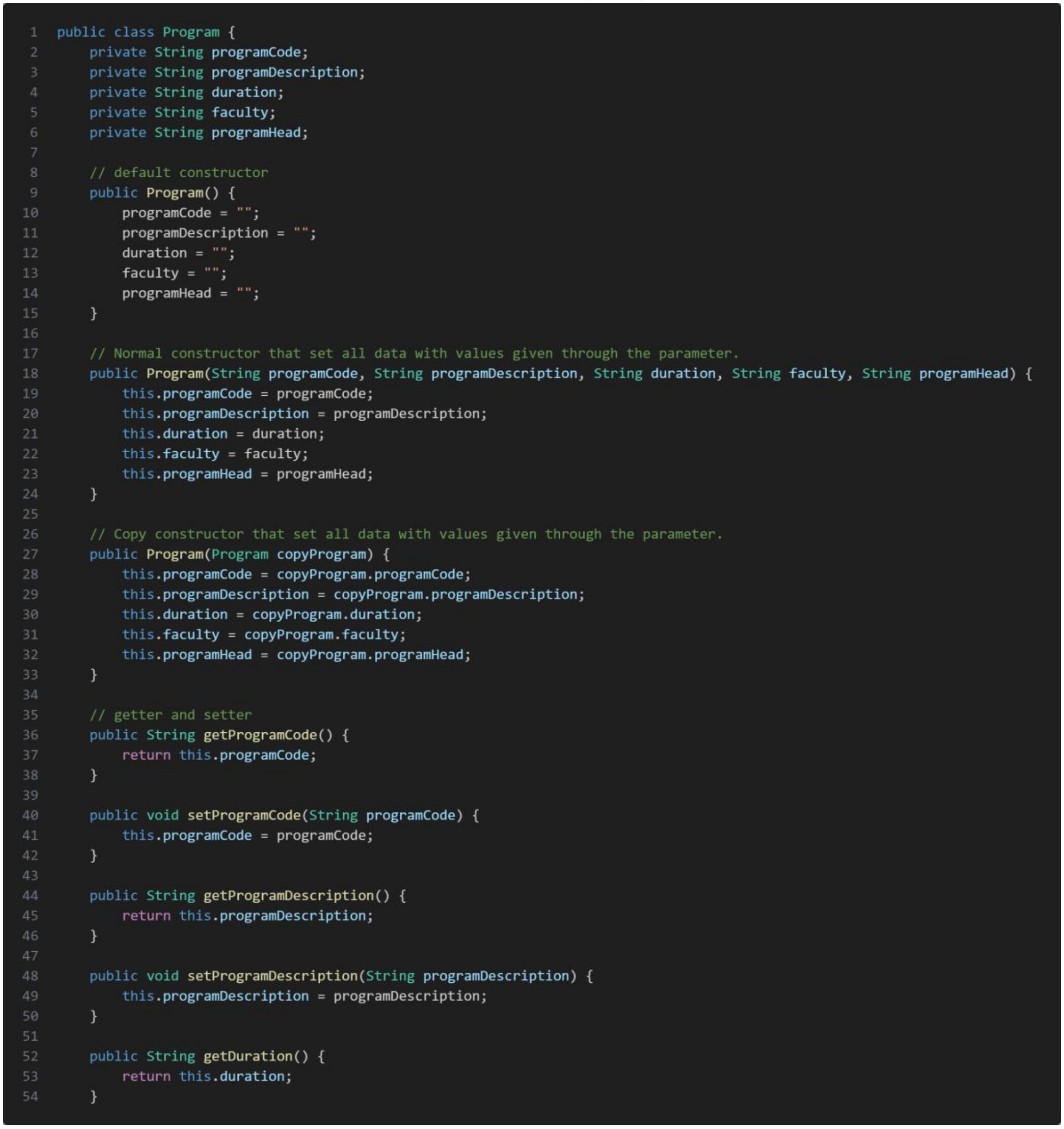
House Type	Description	Tax rate (RM/m^3)
T	Terrace	10
S	Semi-Detached	15
B	Bungalow	20
C	Condominium	30

Details of land

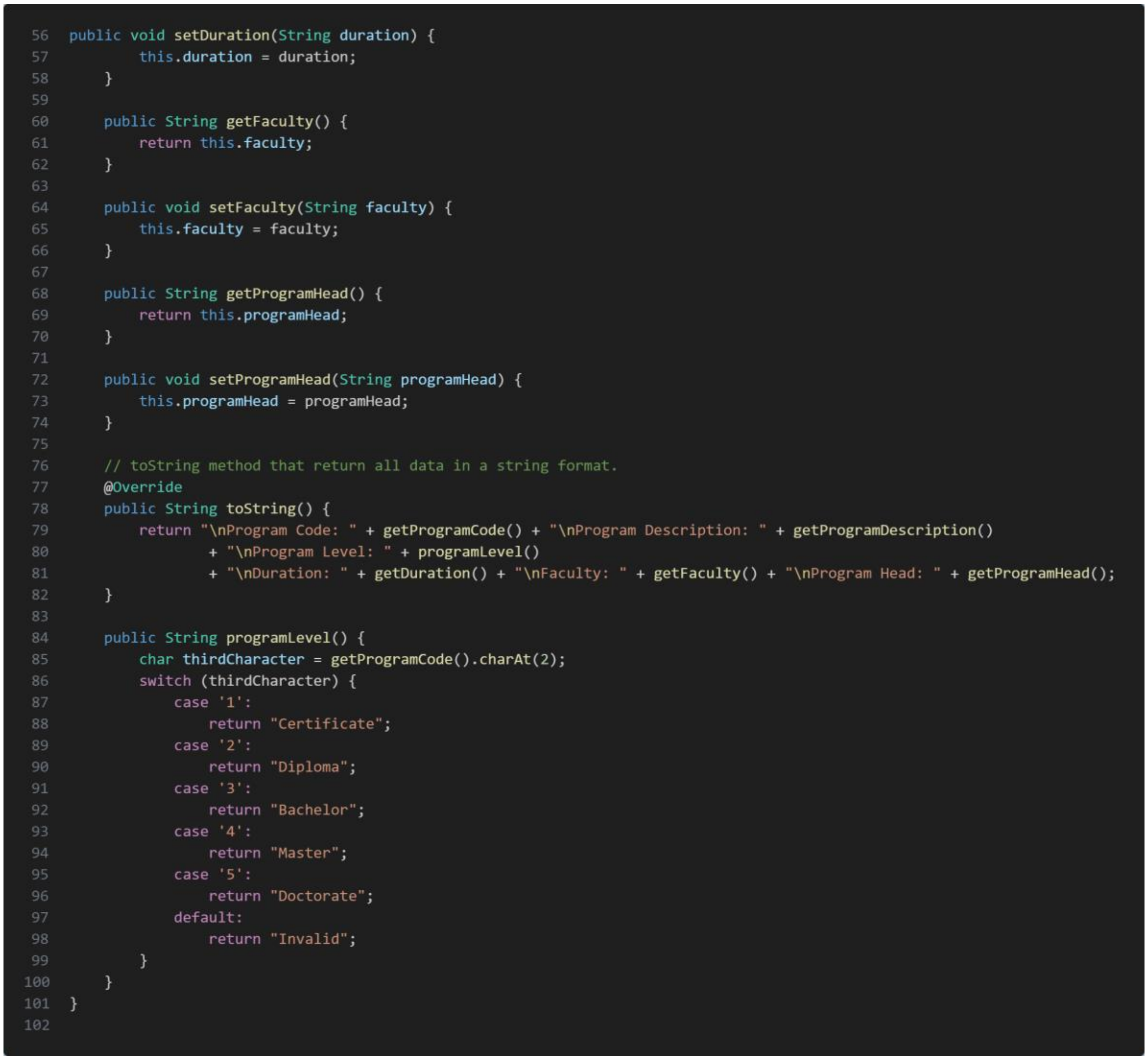
g) Printer to return object information.

Write a program to read the id, owner name, house type, area of land and store them onto object. Then, print the details of land, including the tax price.

SOURCE CODE 1.1 (PROGRAM CLASSES) - https://pastecode.io/s/zzzic6o0

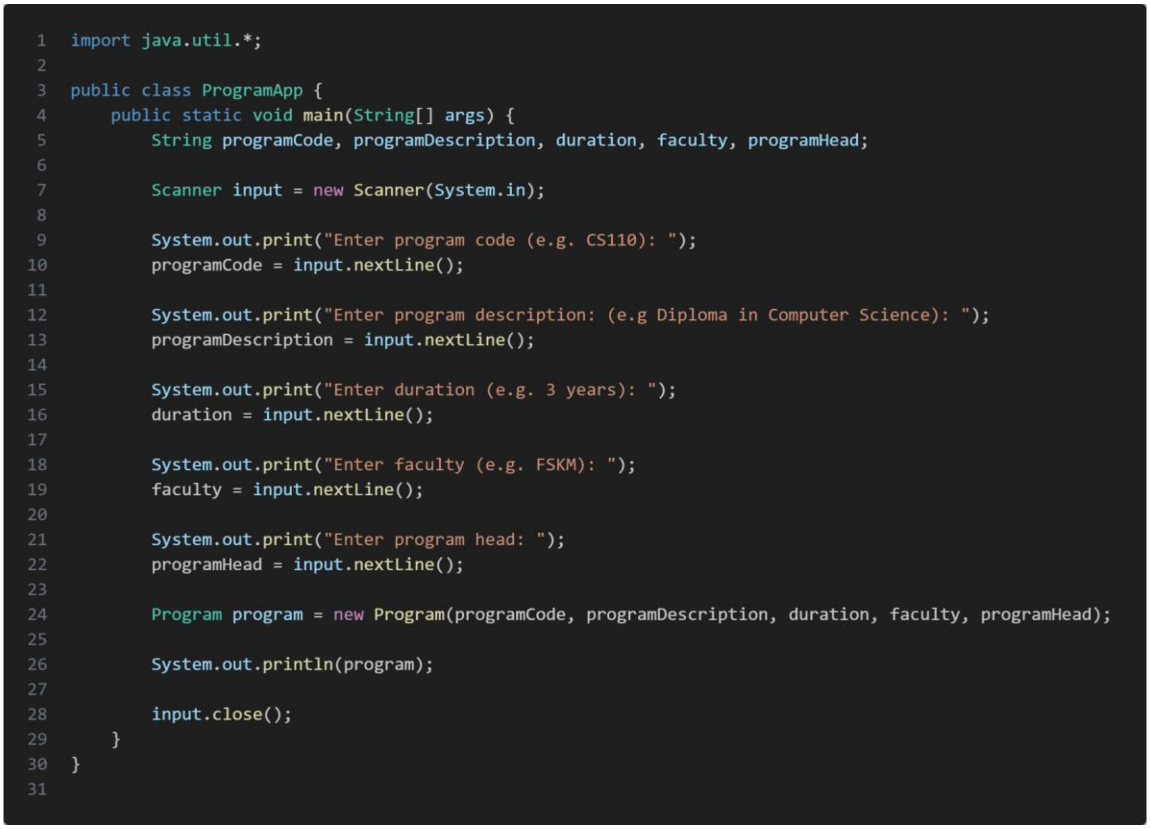


```java
public class Program {
    private String programCode;
    private String programDescription;
    private String duration;
    private String faculty;
    private String programHead;

    // default constructor
    public Program() {
        programCode = "";
        programDescription = "";
        duration = "";
        faculty = "";
        programHead = "";
    }

    // Normal constructor that set all data with values given through the parameter.
    public Program(String programCode, String programDescription, String duration, String faculty, String programHead) {
        this.programCode = programCode;
        this.programDescription = programDescription;
        this.duration = duration;
        this.faculty = faculty;
        this.programHead = programHead;
    }

    // Copy constructor that set all data with values given through the parameter.
    public Program(Program copyProgram) {
        this.programCode = copyProgram.programCode;
        this.programDescription = copyProgram.programDescription;
        this.duration = copyProgram.duration;
        this.faculty = copyProgram.faculty;
        this.programHead = copyProgram.programHead;
    }

    // getter and setter
    public String getProgramCode() {
        return this.programCode;
    }

    public void setProgramCode(String programCode) {
        this.programCode = programCode;
    }

    public String getProgramDescription() {
        return this.programDescription;
    }

    public void setProgramDescription(String programDescription) {
        this.programDescription = programDescription;
    }

    public String getDuration() {
        return this.duration;
    }
```



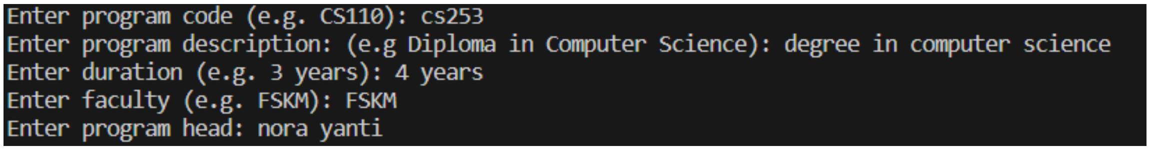
```java
public void setDuration(String duration) {
        this.duration = duration;
    }

    public String getFaculty() {
        return this.faculty;
    }

    public void setFaculty(String faculty) {
        this.faculty = faculty;
    }

    public String getProgramHead() {
        return this.programHead;
    }

    public void setProgramHead(String programHead) {
        this.programHead = programHead;
    }

    // toString method that return all data in a string format.
    @Override
    public String toString() {
        return "\nProgram Code: " + getProgramCode() + "\nProgram Description: " + getProgramDescription()
                + "\nProgram Level: " + programLevel()
                + "\nDuration: " + getDuration() + "\nFaculty: " + getFaculty() + "\nProgram Head: " + getProgramHead();
    }

    public String programLevel() {
        char thirdCharacter = getProgramCode().charAt(2);
        switch (thirdCharacter) {
            case '1':
                return "Certificate";
            case '2':
                return "Diploma";
            case '3':
                return "Bachelor";
            case '4':
                return "Master";
            case '5':
                return "Doctorate";
            default:
                return "Invalid";
        }
    }
}
```

SOURCE CODE (PROGRAM APP / MAIN METHOD) - https://pastecode.io/s/h9bhgwbq



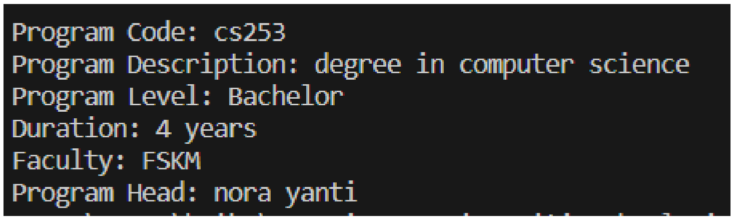
```java
import java.util.*;

public class ProgramApp {
    public static void main(String[] args) {
        String programCode, programDescription, duration, faculty, programHead;

        Scanner input = new Scanner(System.in);

        System.out.print("Enter program code (e.g. CS110): ");
        programCode = input.nextLine();

        System.out.print("Enter program description: (e.g Diploma in Computer Science): ");
        programDescription = input.nextLine();

        System.out.print("Enter duration (e.g. 3 years): ");
        duration = input.nextLine();

        System.out.print("Enter faculty (e.g. FSKM): ");
        faculty = input.nextLine();

        System.out.print("Enter program head: ");
        programHead = input.nextLine();

        Program program = new Program(programCode, programDescription, duration, faculty, programHead);

        System.out.println(program);

        input.close();
    }
}
```

SAMPLE INPUT



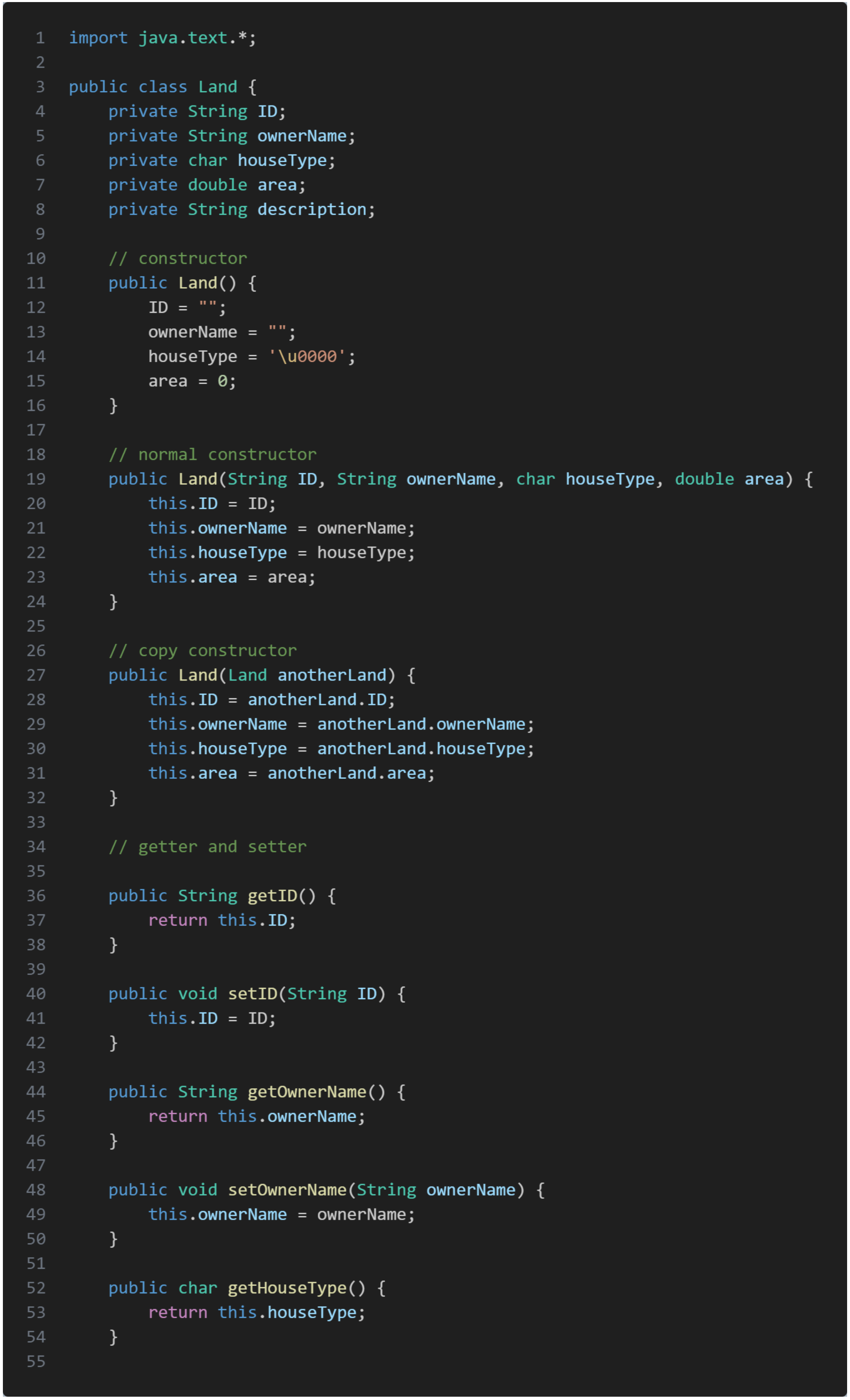
```
Enter program code (e.g. CS110): cs253
Enter program description: (e.g Diploma in Computer Science): degree in computer science
Enter duration (e.g. 3 years): 4 years
Enter faculty (e.g. FSKM): FSKM
Enter program head: nora yanti
```

SAMPLE OUTPUT

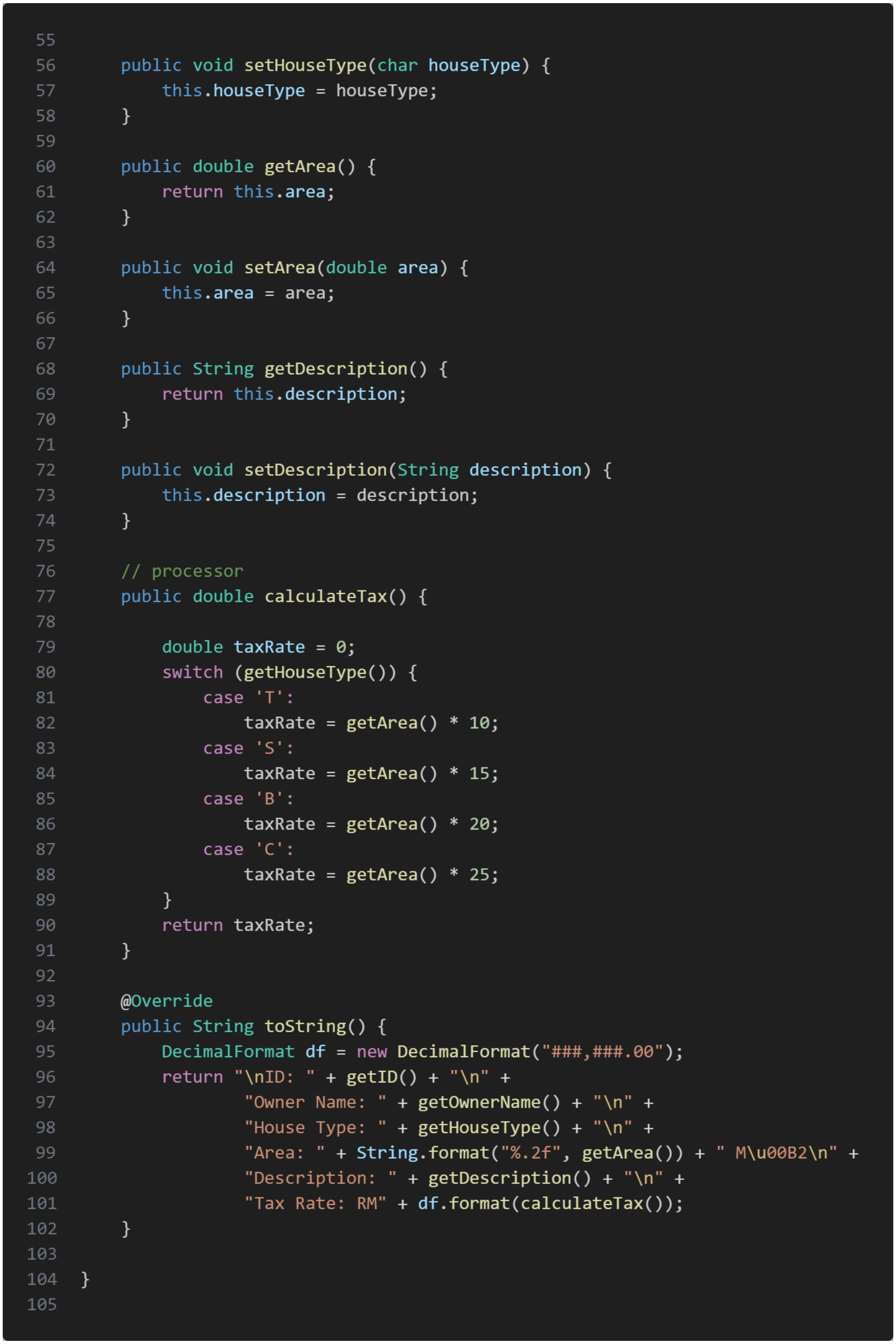


```
Program Code: cs253
Program Description: degree in computer science
Program Level: Bachelor
Duration: 4 years
Faculty: FSKM
Program Head: nora yanti
```

SOURCE CODE 1.2 (LAND CLASSES) - https://pastecode.io/s/exyhaqa8

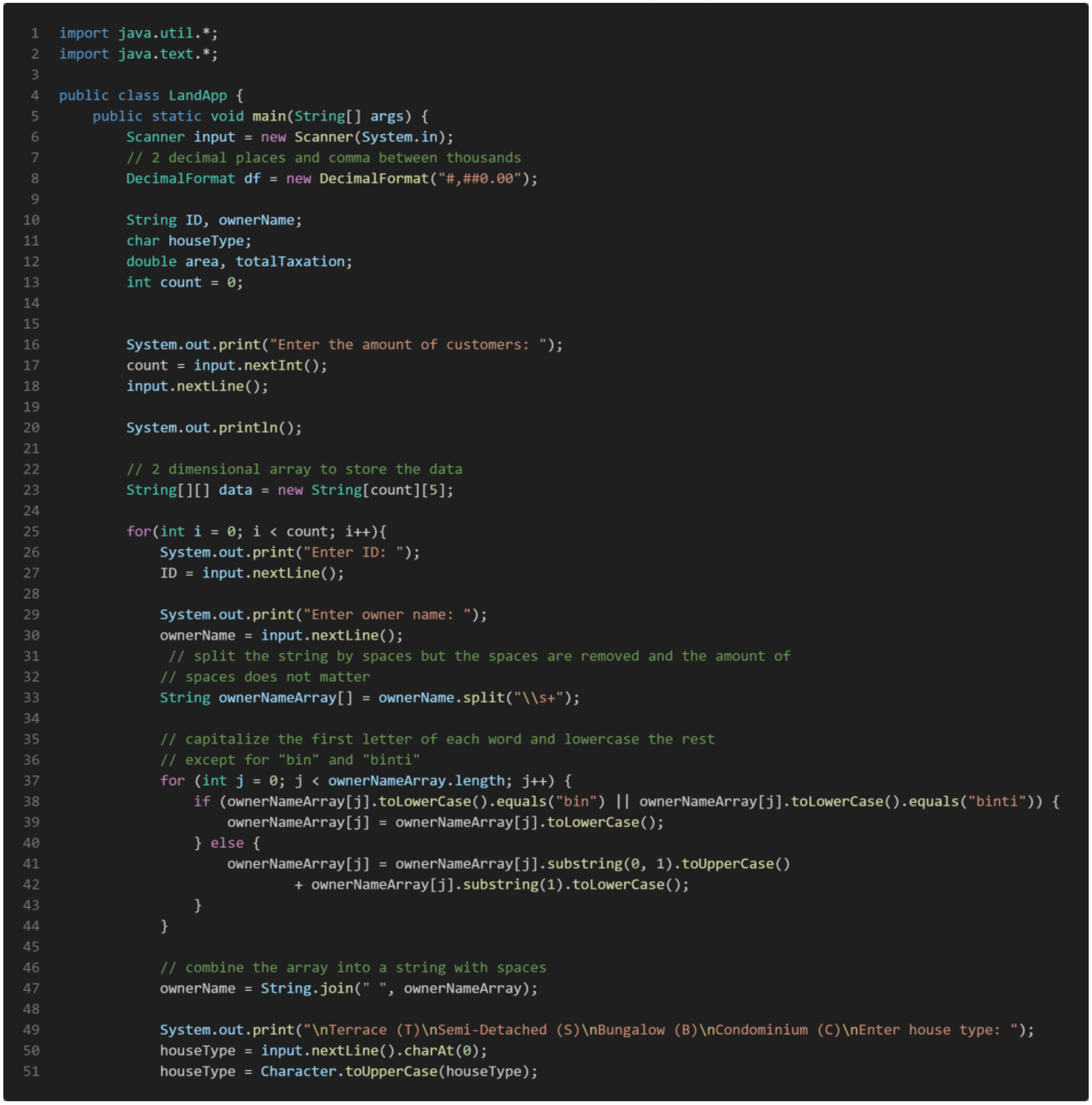


```java
import java.text.*;

public class Land {
    private String ID;
    private String ownerName;
    private char houseType;
    private double area;
    private String description;

    // constructor
    public Land() {
        ID = "";
        ownerName = "";
        houseType = '\u0000';
        area = 0;
    }

    // normal constructor
    public Land(String ID, String ownerName, char houseType, double area) {
        this.ID = ID;
        this.ownerName = ownerName;
        this.houseType = houseType;
        this.area = area;
    }

    // copy constructor
    public Land(Land anotherLand) {
        this.ID = anotherLand.ID;
        this.ownerName = anotherLand.ownerName;
        this.houseType = anotherLand.houseType;
        this.area = anotherLand.area;
    }

    // getter and setter

    public String getID() {
        return this.ID;
    }

    public void setID(String ID) {
        this.ID = ID;
    }

    public String getOwnerName() {
        return this.ownerName;
    }

    public void setOwnerName(String ownerName) {
        this.ownerName = ownerName;
    }

    public char getHouseType() {
        return this.houseType;
    }

```

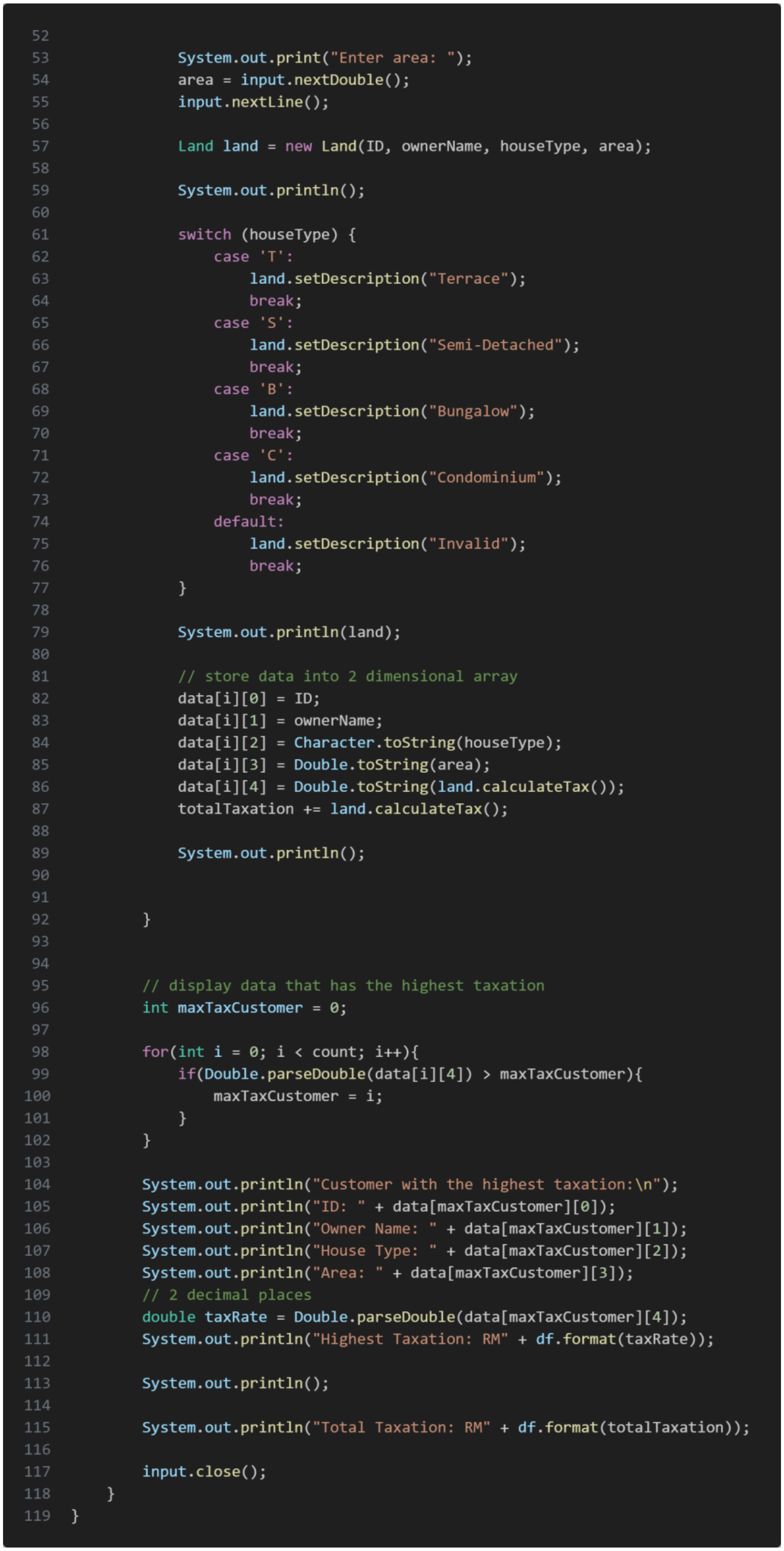


```java

    public void setHouseType(char houseType) {
        this.houseType = houseType;
    }

    public double getArea() {
        return this.area;
    }

    public void setArea(double area) {
        this.area = area;
    }

    public String getDescription() {
        return this.description;
    }

    public void setDescription(String description) {
        this.description = description;
    }

    // processor
    public double calculateTax() {

        double taxRate = 0;
        switch (getHouseType()) {
            case 'T':
                taxRate = getArea() * 10;
            case 'S':
                taxRate = getArea() * 15;
            case 'B':
                taxRate = getArea() * 20;
            case 'C':
                taxRate = getArea() * 25;
        }
        return taxRate;
    }

    @Override
    public String toString() {
        DecimalFormat df = new DecimalFormat("###,###.00");
        return "\nID: " + getID() + "\n" +
                "Owner Name: " + getOwnerName() + "\n" +
                "House Type: " + getHouseType() + "\n" +
                "Area: " + String.format("%.2f", getArea()) + " M\u00B2\n" +
                "Description: " + getDescription() + "\n" +
                "Tax Rate: RM" + df.format(calculateTax());
    }

}

```

SOURCE CODE (LAND APP @ MAIN METHOD) - https://pastecode.io/s/f805euvr

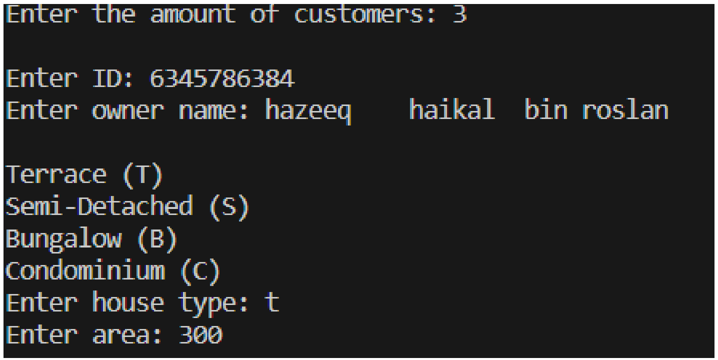


```java
import java.util.*;
import java.text.*;

public class LandApp {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);
        // 2 decimal places and comma between thousands
        DecimalFormat df = new DecimalFormat("#,##0.00");

        String ID, ownerName;
        char houseType;
        double area, totalTaxation;
        int count = 0;


        System.out.print("Enter the amount of customers: ");
        count = input.nextInt();
        input.nextLine();

        System.out.println();

        // 2 dimensional array to store the data
        String[][] data = new String[count][5];

        for(int i = 0; i < count; i++){
            System.out.print("Enter ID: ");
            ID = input.nextLine();

            System.out.print("Enter owner name: ");
            ownerName = input.nextLine();
             // split the string by spaces but the spaces are removed and the amount of
            // spaces does not matter
            String ownerNameArray[] = ownerName.split("\\s+");

            // capitalize the first letter of each word and lowercase the rest
            // except for "bin" and "binti"
            for (int j = 0; j < ownerNameArray.length; j++) {
                if (ownerNameArray[j].toLowerCase().equals("bin") || ownerNameArray[j].toLowerCase().equals("binti")) {
                    ownerNameArray[j] = ownerNameArray[j].toLowerCase();
                } else {
                    ownerNameArray[j] = ownerNameArray[j].substring(0, 1).toUpperCase()
                            + ownerNameArray[j].substring(1).toLowerCase();
                }
            }

            // combine the array into a string with spaces
            ownerName = String.join(" ", ownerNameArray);

            System.out.print("\nTerrace (T)\nSemi-Detached (S)\nBungalow (B)\nCondominium (C)\nEnter house type: ");
            houseType = input.nextLine().charAt(0);
            houseType = Character.toUpperCase(houseType);
```

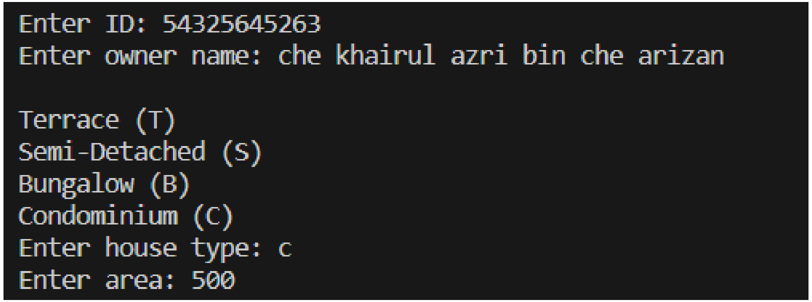


```java

            System.out.print("Enter area: ");
            area = input.nextDouble();
            input.nextLine();

            Land land = new Land(ID, ownerName, houseType, area);

            System.out.println();

            switch (houseType) {
                case 'T':
                    land.setDescription("Terrace");
                    break;
                case 'S':
                    land.setDescription("Semi-Detached");
                    break;
                case 'B':
                    land.setDescription("Bungalow");
                    break;
                case 'C':
                    land.setDescription("Condominium");
                    break;
                default:
                    land.setDescription("Invalid");
                    break;
            }

            System.out.println(land);

            // store data into 2 dimensional array
            data[i][0] = ID;
            data[i][1] = ownerName;
            data[i][2] = Character.toString(houseType);
            data[i][3] = Double.toString(area);
            data[i][4] = Double.toString(land.calculateTax());
            totalTaxation += land.calculateTax();

            System.out.println();


        }


        // display data that has the highest taxation
        int maxTaxCustomer = 0;

        for(int i = 0; i < count; i++){
            if(Double.parseDouble(data[i][4]) > maxTaxCustomer){
                maxTaxCustomer = i;
            }
        }

        System.out.println("Customer with the highest taxation:\n");
        System.out.println("ID: " + data[maxTaxCustomer][0]);
        System.out.println("Owner Name: " + data[maxTaxCustomer][1]);
        System.out.println("House Type: " + data[maxTaxCustomer][2]);
        System.out.println("Area: " + data[maxTaxCustomer][3]);
        // 2 decimal places
        double taxRate = Double.parseDouble(data[maxTaxCustomer][4]);
        System.out.println("Highest Taxation: RM" + df.format(taxRate));

        System.out.println();

        System.out.println("Total Taxation: RM" + df.format(totalTaxation));

        input.close();
    }
}
```

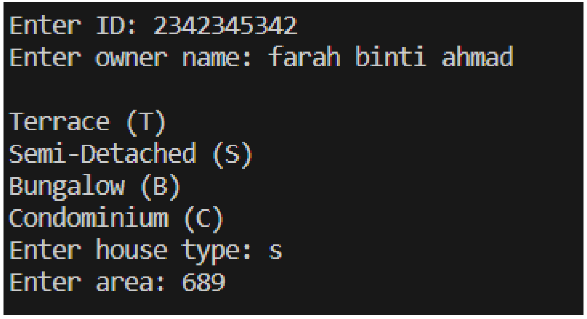
SAMPLE INPUT



```
Enter the amount of customers: 3

Enter ID: 6345786384
Enter owner name: hazeeq    haikal  bin roslan

Terrace (T)
Semi-Detached (S)
Bungalow (B)
Condominium (C)
Enter house type: t
Enter area: 300
```

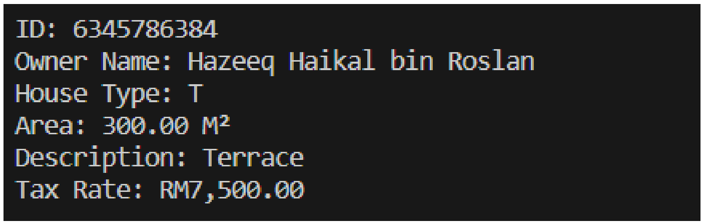


```
Enter ID: 54325645263
Enter owner name: che khairul azri bin che arizan

Terrace (T)
Semi-Detached (S)
Bungalow (B)
Condominium (C)
Enter house type: c
Enter area: 500
```

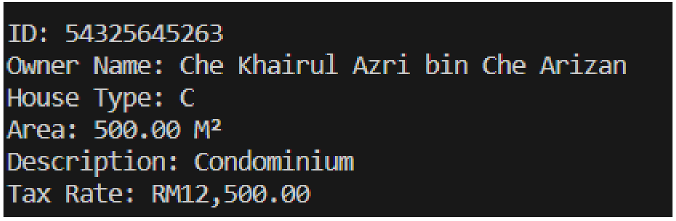


```
Enter ID: 2342345342
Enter owner name: farah binti ahmad

Terrace (T)
Semi-Detached (S)
Bungalow (B)
Condominium (C)
Enter house type: s
Enter area: 689
```

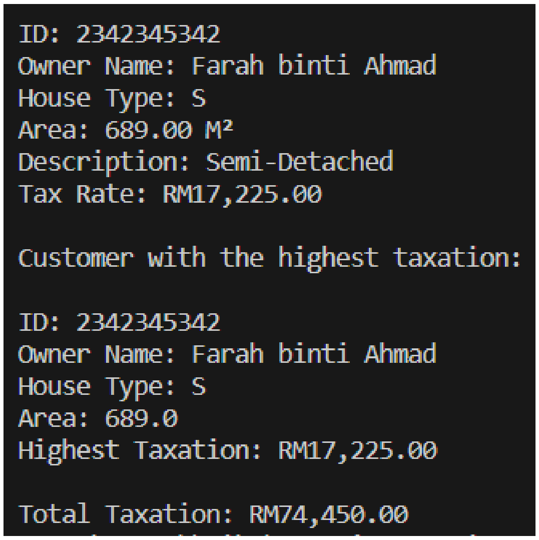
SAMPLE OUTPUT



```
ID: 6345786384
Owner Name: Hazeeq Haikal bin Roslan
House Type: T
Area: 300.00 M²
Description: Terrace
Tax Rate: RM7,500.00
```



```
ID: 54325645263
Owner Name: Che Khairul Azri bin Che Arizan
House Type: C
Area: 500.00 M²
Description: Condominium
Tax Rate: RM12,500.00
```



```
ID: 2342345342
Owner Name: Farah binti Ahmad
House Type: S
Area: 689.00 M²
Description: Semi-Detached
Tax Rate: RM17,225.00

Customer with the highest taxation:

ID: 2342345342
Owner Name: Farah binti Ahmad
House Type: S
Area: 689.0
Highest Taxation: RM17,225.00

Total Taxation: RM74,450.00
```