

# Lab: Defining Classes

This document defines the lab for the ["Java Advanced" course @ Software University](#). Please submit your solutions (source code) to all below-described problems in [Judge](#).

## Part I: Defining Classes

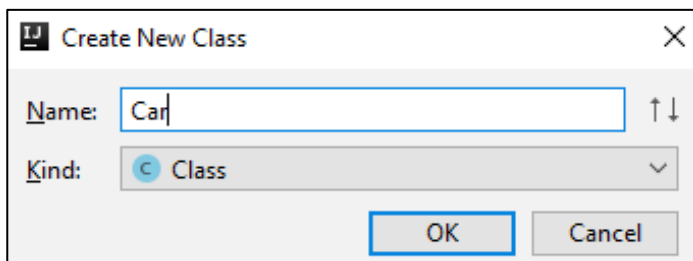
### 1. Car Info

Create a class named **Car**.

The class should have **public** fields for:

- Brand: **String**
- Model: **String**
- Horsepower: **int**

Create a **new class** and ensure **proper naming**:



Create New Class

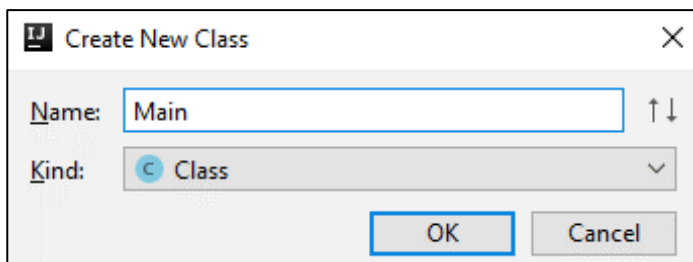
Name:

Kind:

Define the fields:

```
public class Car {  
    public String brand;  
    public String model;  
    public int horsepower;  
}
```

Create a Test client in the **same package**:



Create New Class

Name:

Kind:

You should now be able to use your class:

```

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

        Car car = new Car();

        car.brand = "Chevrolet";
        car.model = "Impala";
        car.horsePower = 390;

        System.out.println(String.format(
            "The car is: %s %s - %d HP",
            car.brand, car.model, car.horsePower
        ));
    }
}

```

## Private Fields

Change the access modifiers of all class fields to **private**.

When done, go back to the main method you should have **compilation** errors like this:

```

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

        Car car = new Car();

        car.brand = "Chevrolet";
        car.model = "Impala";
        car.horsePower = 390;

        System.out.println(String.format(
            "The car is: %s %s - %d HP",
            car.brand, car.model, car.horsePower
        ));
    }
}

```

## Getters and Setters

Create **getters** and **setters** for each class field.

**Getter** for the car brand:

```
public String getBrand() {  
    return this.brand;  
}
```

Setter for the car brand:

```
public void setBrand(String brand) {  
    this.brand = brand;  
}
```

Do the same for **all** the fields.

## Fix Main Method

You should **set** and **get** the **values** by using the correct methods

```
public class Main {  
    public static void main(String[] args) {  
        Scanner scanner = new Scanner(System.in);  
  
        Car car = new Car();  
  
        car.setBrand("Chevrolet");  
        car.setModel("Impala");  
        car.setHorsePower(390);  
  
        System.out.println(String.format(  
            "The car is: %s %s - %d HP",  
            car.getBrand(), car.getModel(), car.getHorsePower()  
        ));  
    }  
}
```

## Create Car Info Method

This method should return the info about any car object in the following format:

"The car is: {brand} {model} - {horsePower} HP."

You have to figure out how to create a method and use it in the outside code, as shown below:

```
System.out.println(car.carInfo());
```

## Test the Program

Read cars objects, add them to the collection of your choice, and print each one on the console using the **carInfo()** method. The input consists of a single integer **N**, the number of lines representing car objects. On each line you will read car info in the following format "{brand} {model} {horsePower}" separated by single space.

## Examples

Input	Output
3 Chevrolet Impala 390 Mercedes Benz 500 Volga 24 49	The car is: Chevrolet Impala - 390 HP. The car is: Mercedes Benz - 500 HP. The car is: Volga 24 - 49 HP.
5 This Car 1 Was Made 2 Only For 3 Test Purposes 4 No Way 5	The car is: This Car - 1 HP. The car is: Was Made - 2 HP. The car is: Only For - 3 HP. The car is: Test Purposes - 4 HP. The car is: No Way - 5 HP.

## Part II: Constructors

### 2. Car Constructors

Make proper constructors for the Car class so you can create car objects with a different type of input information.

If you miss information about the field of **type String** set the value to **"unknown"**, and for an **integer**, fieldset **-1**.

First, **declare** a **constructor** which takes only the car brand as a parameter:

```
public Car(String brand) {  
    this.brand = brand;  
    this.model = "unknown";  
    this.horsePower = -1;  
}
```

Also, create a **constructor** which **sets** all the **fields**:

```
public Car(String brand, String model, int horsePower) {  
    this(brand);  
    this.model = model;  
    this.horsePower = horsePower;  
}
```

Read information about cars the same way as the previous task, however, this time uses **constructors** to create the objects, not creating an object with the **default** constructor. You should be able to handle **different types** of input, the format will be the same as the previous task, but this time some of the data may be missing. For example, you can get only the car **brand** – which means you have to set the car model to **"unknown"** and the Horsepower value to **-1**. There will be lines with **complete** car data, declare constructor which sets all the fields.

You have to add the car objects to a **collection** of your choice and print the data as in the previous task. The input will **always** have one or three elements on each line.

## Examples

Input	Output
2 Chevrolet Golf Polo 49	The car is: Chevrolet unknown - -1 HP. The car is: Golf Polo - 49 HP.
4 Was Only For 3 Test Purposes 4 No Way 5	The car is: Was unknown - -1 HP. The car is: Only For - 3 HP. The car is: Test Purposes - 4 HP. The car is: No Way - 5 HP.

## 3. Bank Account

Create class **BankAccount**.

The class should have **private fields** for:

- Id: **int** (Starts from **1** and **increments** for every **new account**)
- Balance: **double**
- Interest rate: **double** (Shared for all accounts. **Default value: 0.02**)

The class should also have **public methods** for:

- **setInterestRate(double interest): void (static)**
- **getInterest(int Years): double**
- **deposit(double amount): void**

Create a test client supporting the following commands:

- **Create**
- **Deposit {Id} {Amount}**
- **SetInterest {Interest}**
- **GetInterest {ID} {Years}**
- **End**

## Examples

Input	Output	Comments
Create Deposit 1 20 GetInterest 1 10 End	Account ID1 created Deposited 20 to ID1 4.00	
Create Create Deposit 1 20 Deposit 3 20 Deposit 2 10 SetInterest 1.5 GetInterest 1 1 GetInterest 2 1 GetInterest 3 1 End	Account ID1 created Account ID2 created Deposited 20 to ID1 Account does not exist Deposited 10 to ID2 30.00 15.00 Account does not exist	Sets the global interest rate to 1. Prints interest for a bank account with id 1 for 1 year period.

## Solution

Create the class as usual and create a **constant** for the default interest rate:

```
class BankAccount {  
    private final static double DEFALUT_INTEREST_RATE = 0.02;  
}
```

Create the static and non-static fields, **all private**:

```
class BankAccount {  
    private final static double DEFALUT_INTEREST_RATE = 0.02;  
    private static double interesetRate = DEFALUT_INTEREST_RATE;  
    private static int bankAccountCount = 1;  
    private int id;  
    private double balance;  
}
```

Set the id of an account upon creation while **incrementing** the global account count:

```
BankAccount() {  
    this.id = bankAccountCount++;  
}
```

Create a setter for the global interest rate. Making the method **static** will let you access it through the class name:

```
static void setInterestRate(double interestRate) {  
    BankAccount.interesetRate = interestRate;  
}
```

Implement **deposit()** and **getInterest()**:

```
void deposit(double amount) {  
    this.balance += amount;  
}  
  
double getInterest(int years) {  
    return BankAccount.interesetRate * years * this.balance;  
}
```