Lab 04 Class and Object

Part One: ★★★★☆

Task 01 ➜ Give a UML representation of the following classes and the association between them:

1. A road connects two cities.
2. A country has a capital.

Task 02 ➜ Write a program that would print the information (name, year of joining, salary, address) of three employees by creating a class named 'Employee'. The program should output the following information:

Name	Year of joining	Address
Amine	2002	24 rue Bt 5001-Oran
Aek	2012	29 rue – sba
Mahmoud	1999	59 Bt 5000 - Chlef

Task 03 ➜ Write a constructor in the Car class given below that:

a. Initializes the *car_Type* attribute with the string "Peugeot", of year 2007.
b. Check the Car year and if year < 2019 then edit the remark attribute by "This car needs scanner verification". Otherwise, edit the remark attribute by "This car doesn't need a scanner verification".
c. Add to the car class add a method to print car information.

```java
public class Car{
    String car_Type;
    int year;
    String remark;
}
```

Task 04 ➜ A student is characterized by his name, phone number, email address, id number, and average mark. Each student has two addresses. The address is characterized by a street name, city, postal code, and country.

1. Give the UML class representation of the above description, including the relation between classes.
2. Give the java code of classes.
3. Add method to print information for each student
4. Create a Main class that contain the main method and create a student object with his information and addresses

Task 06 ➜ Write a java program that asks continuously a user to create an object from a class and then each time prints the number of created instances. (See the program output sample)

```
Do you want to create an instance y/n ?
y
Number of the created instances is :1
Do you want to create an instance y/n ?
y
Number of the created instances is :2
Do you want to create an instance y/n ?
y
Number of the created instances is :3
Do you want to create an instance y/n ?
n
Number of the created instances is :3
Do you want to create an instance y/n ?
n
Number of the created instances is :3
Do you want to create an instance y/n ?
```

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République Algérienne Démocratique et Populaire
Ministère de l'Enseignement Supérieur
et de la Recherche Scientifique
ECOLE SUPÉRIEURE EN INFORMATIQUE
8 Mai 1945 - Sidi-Bel-Abbès

ESI SBA

الجمهورية الجزائرية الديمقراطية الشعبية
وزارة التعليم العالي والبحث العلمي
المدرسة العليا للإعلام الآلي
8 ماي 1945 - سيدي بلعباس

Part Two:

In this part, you will design and solve your own exercise. The goal is to practice working with classes, objects, and their relationships while reinforcing your understanding of UML class diagrams.

Instructions:

1. Generate an Exercise Idea Using ChatGPT, Deepseek or other LLMs:
    o   Generate a random problem statement related to real-life scenarios that can be modeled using classes and objects.
    o   The exercise should involve at least three related classes with appropriate attributes and methods.
2. Design the UML Class Diagram:
    o   Represent your classes, their attributes, methods, and relationships (association, aggregation, or composition) in a UML class diagram.
    o   Use appropriate multiplicities to show how objects are related.
3. Implement the Solution:
    o   Write a Java program to implement your problem using:
        ▪   Classes and Objects
        ▪   Instance variables and methods
        ▪   Arrays (not ArrayList) for storing multiple objects
4. Test Your Program:
    o   Create a main method to demonstrate object creation, method usage, and interactions between the classes.
    o   Ensure your program correctly handles object relationships.

Evaluation Criteria:

*   Creativity in problem selection
*   Correct UML class diagram representation
*   Proper implementation of classes and objects
*   Clean code structure
*   Functional and well-Presented

Deliverables:

1. A document with the problem statement and UML class diagram.
2. A Java program implementing the solution.
3. A short report explaining your design choices and how the classes interact.

Note: Four (or more) Students will be selected during the session to present their work.

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