(Optional) Coding Challenge: Object Oriented Programming Basics

Develop an Employee Management System

Estimated time needed: 20 minutes

This optional self-guided lab provides exercises that align with skills you learned in this module. Follow the instructions to write code using your knowledge to create the described apps. After you complete the lab exercises, you can validate that your code is correct with the solution provided.

Prerequisites (optional)

You must have completed all the labs in Module 1.

Clone the challenges repo

1. Run the following command to clone the repository with the challenges and solution.

   ```
   git clone https://github.com/ibm-developer-skills-network/flgsb-oop-additional-practice.git
   ```

2. Change to `OOPs/Module 1` directory.

   ```
   cd flgsb-oop-additional-practice/OOPs/Module\ 1
   ```

3. Run the `ls` command to view the directories. Each directory has one challenge.

   ```
   ls
   ```

Employee Management System Challenge

What is this challenge?

This is a Java coding challenge where you'll build a simple Employee Management System from scratch. You'll create a program that can store employee information, validate data, perform calculations like determining annual salary, and even make copies of employee records.

What will you build

In this challenge, you'll complete the following coding tasks:

1. Create a basic Employee class to store information like name, age, and salary
2. Add different ways to create new employees (using different constructors)
3. Make your code secure by hiding data and adding validation rules
4. Implement useful features like calculating annual salary and giving raises
5. Learn how to duplicate or clone employee records when needed
6. Test the code to make sure it works properly

Skills you will build

Through this hands-on exercise, you'll learn:

- Encapsulation: How to protect data by making the data private and only accessible through controlled methods
- Constructor overloading: How to create multiple ways to initialize objects
- Data validation: How to ensure information like age and salary follows business rules
- Object cloning: How to make copies of objects when needed
- Java fundamentals: Working with classes, methods, interfaces, and exception handling

Solve the challenge

1. In the terminal, change to `Build your own constructor`.

   ```
   cd Build\ your\ own\ constructor
   ```

2. Select the following button to open the Java coding challenge.

[Open **Employee.java** in IDE]

3. Make changes in the file based on the specifications.

4. Compile the Java file.

5. Set the CLASSPATH.

6. Select the button below to open the Java coding challenge.

Open **TestEncapsulation.java** in IDE

7. Make changes in the file based on the specifications.

8. Compile the Java file.

9. Run the class `TestEncapsulation` to ensure the class is created as per instructions.

Click here for the solution

Java Student Class Challenge

Introduction

Welcome to the Java Student Class Challenge! In this hands-on exercise, you'll create your first Java class from scratch and learn fundamental object-oriented programming concepts.

What you will build

You'll develop a complete student record management system with two classes:

- A Student class to store and manage individual student information
- A StudentRegistry class to demonstrate how to use your Student class in a real application

What you will learn

Through this challenge, you'll master essential Java programming skills:

- Class Design: Creating classes with appropriate attributes and methods
- Encapsulation: Using private variables with getter/setter methods
- Data Validation: Implementing simple validation in setter methods
- Method Creation: Building utility methods for displaying data and calculations
- Object Instantiation: Creating and working with multiple objects
- Object Comparison: Comparing properties between different instances

How the Challenge Works

The provided skeleton file contains the structure with detailed comments guiding you through each step. You'll implement:

- Private instance variables for student data (ID, name, grade, active status)
- Accessor methods (getters and setters) with validation
- Utility methods like grade calculation and student comparison
- A main program that demonstrates your class in action

Solve the challenge

1. In the terminal, change to `Create your own class`.

   ```
   cd Create\ your\ own\ class
   ```

2. Select the button below to open the Java coding challenge.

Open **Student.java** in IDE

3. Make changes in the file based on the specifications.

4. Compile the Java file.

5. Set the CLASSPATH.

6. Select the button below to open the Java coding challenge.

Open **StudentRegistry.java** in IDE

7. Make changes in the file based on the specifications.

8. Compile the Java file.

9. Run the class `StudentRegistry` to ensure the class is created based on the instructions.

Click here for the solution.

Conclusion

After you have successfully completed these coding challenge labs, you should be comfortable with constructor and encapsulation object-oriented programming.

Author(s)

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