CADT IDT

W2-S2 *PRACTICE*

OOP MANIPULATION

Learning objectives

- Implement a class in Dart with specific **attributes and methods**
- Define and use default constructors.
- Implement **named constructors** and **parameterized constructors**.

- Implement **Value Objects, immutable objects**
- Manipulate **enumerations**
- Handle **Exceptions**

- Identify **const** and **final** attributes
- Be able to **encapsulate** data (private members, getters)
- Implement Operator **Overloading**
- Implement **aggregation** and **composition** of classes

No AI tools allowed to solve this practice

How to submit?

✓ **Push** your final code on **your GitHub repository**

✓ Then **attach the GitHub path** to the MS Team assignment and **turn it in**

Are you lost?

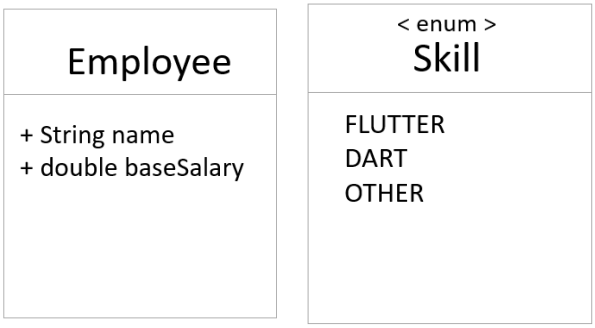
Read the following documentation to be ready for this practice:

✓ Classes ✓ Constructors ✓ Methods

EX 1 – Employee Class

In this exercise, you will be working on an existing Employee class. ***Read the start code!***

We provide the start code of the Employee class and the main that creates a few instances of Employee. We also provide the Skill enum with various values.



Q1- Add the following **new attributes to the Employee class:**

- skills: A list of skills
- address: An Address class that contains street, city, and zipCode attributes
- yearsOfExperience: An integer representing the employee's experience in years

Q2 - **Update the constructor** to initialize the new attributes.

Add **named constructors** for specific types of employees

Example: mobileDeveloper constructor that assigns FLUTTER and DART skills

Q3 - Make all attributes **private** and **provide getter** methods for accessing them.

Q4 – Add a method to **compute the salary** of the employee *(you can create your own rules!):*

Salary Specification:

Base salary: $40,000.
Each year of experience adds $2,000.
Each skill adds a different bonus:

- FLUTTER: $5,000.
- DART: $3,000.
- OTHER: $1,000.

Note: don't forget to define attributes const or final whenever possible!

EX 2 – Bank System

In this exercise, you will be working on a Bank account and a Bank class. ***Read the start code!***

Bank Account

Q1 - Decide which attributes make sense for a bank account
Q2 – Implement the following methods

`balance():`

- Returns the current balance

`withdraw(double amount)`

- Deducts the given amount from the account balance.
- If the balance goes below 0, it should throw an exception.

`credit(double amount)`

- Adds the given amount to the account balance.

Bank

Q3 - Decide which attributes make sense for a bank

- The Bank class manages a list of accounts and ensures the uniqueness of each account ID.

Q4 – Implement the following method

`Account createAccount(int accountId, String accountOwner)`

- Create a new bank account
- Ensure that the account ID is unique. Otherwise, throw an exception
- Add the account to the bank list and return it

Q5 – Draw a UML class diagram that reflects your implementation.

- Attributes and methods of the BankAccount class.
- The relationship between Bank and BankAccount (composition or aggregation)

EX 3– Duration

In this exercise, you need to create a CustomDuration class, similar to Dart's built-in Duration.
https://api.dart.dev/stable/3.5.3/dart-core/Duration-class.html

You need to understand:

- ✓ the concepts of **immutability**
- ✓ operator **overloading**
- ✓ custom **methods**

Q1 –Attribute and constructors

- Internally store the duration as a number of milliseconds (private field).
  - **Duration shall always be greater or equal to 0**

- Constructor:
  - fromHours(int hours): Constructs a duration from a number of hours
  - fromMinutes(int minutes): Constructs a duration from a number of minutes
  - fromSeconds(int seconds): Constructs a duration from a number of seconds

Q2- Overloaded Operators:

- >: Compare two durations, returning true if one duration is greater than the other.
- +: Add two durations, returning a new CustomDuration object.
- -: Minus two durations, returning a new CustomDuration object *(if possible)*

EX 4 – Shop Management

A shop sells **products** that customers can **order online**.
An **order** can be **delivered** to an address or **picked up** at the shop.
We must compute each order's **total amount**.

Learning Objectives

Design a simple **Online Shop system** using Dart concepts:

- Constructors (named, required, nullable)
- Enums
- UML class diagrams
- Object relations and methods

Questions

Q1 - UML

- Draw a **UML diagram** showing classes, attributes, and relationships.
  Be ready to explain your choices to other students or the classroom

Q1 - Implementation

- Implement the Dart classes and methods to solve this problem.
  How can we get the order total amount?

- In main(), create sample data and test your API

✅ **Deliverables**

- UML diagram
- Dart code file