Exercise 1
Dart Programming Language

Overview

- This exercise is to be conducted using a **Pair Programming** strategy.
  What is pair programming? (https://youtu.be/oBraLLybGDA)
- You and your partner will be coding collaboratively online using VS Code and Live Share.
  Using Live Share for online collaborative coding (https://youtu.be/s9hfONtUcR8)
- You will communicate to each other using Google Meet, Webex or any online meeting tool.
- Record your pair programming session.

Pair Programming and Collaborative Coding

- Decide who will be the host.
- The host needs to open a Live Share session with Read and Write permissions and an online meeting session using Google Meet, Webex, or any other meeting software.
- Share the links of Live Share and the meeting for the other member to join in.
- Record the meeting about your pair programming session.

How To Record the Session

- You can choose Google meet as your online meeting tools, and use the feature **"record meeting"** to record your pair programming session.
- Note that, a free personal google account does not support the recording feature.
- Try using your student / graduate account from UTM to be able accessing the "record meeting" feature.
- Alternatively, you can also record your par programming session locally using softwares like OBS, PowerPoint, etc. Additional Resources: Video recording and editing

About the Video

- The video must show that you are coding, communicating and collaborating with your partner.
- In the video you should show: your VS Code and the output (console).
- You can record the session in a single or multiple videos. If you use multiple videos, put them in a folder, and share only the folder's link. Submit the link to elearning.
- Set the video file (or folder) permissions with "Restricted" and add me (jumail@utm.my) to access it.
- Make sure the video is available until the end of the semester.
- Submit the raw videos, i.e., you don't have to do post-editing.

Notes:

Please enlarge the font-size of your VS Code so that it is easy for me to see your code in the video. You can do this by pressing the key **Ctrl and +** in VS Code

Plagiarism Warning

You may discuss with others and refer to any resources. However, any kind of plagiarism will lead to your submission being dismissed. No appeal will be entertained at all..

Submission

- Deadline: as per mentioned in eLearning
- The submission must be done via elearning.
- Programs that CANNOT COMPILE will get a 50% penalty.
- Programs that are submitted late will get a 10% penalty for every day. It will be rounded by ceiling basis. That means, should you submit 1 hour late, it will be considered as 1 day late.

Question

The exercise comes with a codebase containing files `main.dart`, `data.dart`, `course.dart` and `utils.dart` (under the `bin` folder). In the file `data.dart` a collection of **`courses`** has been defined as map data. Do nothing on this file. You only need to modify the other files.

Accomplish the following tasks using the Dart Programming language in the corresponding dart files:

1. In the `course.dart` file, define a class named `Course` which consists of members below:
    a. Attributes: `code` and `name`, representing the course code and course name, respectively. Declare the attributes as private.
    b. A getter and setter for each of the above attributes.
    c. A getter that returns the credit hour for the course. The credit hour is determined from the course code, i.e., from the last character. For example, the credit hour for a course with code 'SECV3032' is 2 and 'SECJ3623' is 3.
    d. A getter that returns the year the course is offered. This value is determined from the fifth character of the course code. For example, if the course code is 'SECJ1023', then this getter will return 'Year 1' and for 'SECV3032', it will return 'Year 3'.

2. In the `utils.dart` file, define a function that prints a list of `Course` objects. Use **named parameters** for the function.

3. In the `main.dart` file, create a list of `Course` objects using three approaches below.
    a. with a `for` loop.
    b. with the `forEach()` high-order method.
    c. with the `map()` high-order method.

    Use a different variable for each list, for example `list1`, `list2` and `list3`. You should make use of the `courses` map (from the file `data.dart`) in order to create each list. You also need to print each list using the function defined in (2).

Expected output (from Task 3):

Course Code	Credit Hour	Year Offered	Course Name
SECD3761	1	Year 3	Technopreneurship Seminar
SECI1013	3	Year 1	Discrete Structure
SECJ1013	3	Year 1	Programming Technique I
SECJ1023	3	Year 1	Programming Technique II
SECJ2154	4	Year 2	Object Oriented Programming
SECJ2203	3	Year 2	Software Engineering
SECJ2253	3	Year 2	Requirement Engineering & Software Modeling
SECJ3032	2	Year 3	Sofware Engineering Project I
SECJ3253	3	Year 3	Programming Technique III
SECJ3323	3	Year 3	Software Design & Architecture
SECJ3563	3	Year 3	Computer Intelligence
SECJ3623	3	Year 3	Mobile Application Programming
SECJ4134	4	Year 4	Sofware Engineering Project II
SECR2043	3	Year 2	Operating Systems
SECR2242	2	Year 2	Computer Networks
SECR2941	1	Year 2	Computer Networks Lab
SECV1223	3	Year 1	Web Programming
SECV2213	3	Year 2	Fundamental of Computer Graphics
SECV3032	2	Year 3	Graphics and Multimedia Software Project I
SECV3213	3	Year 3	Fundamental of Image Processing
SECV3223	3	Year 3	Multimedia Data Processing
SECV4114	4	Year 4	Industrial Training Report
SECV4118	8	Year 4	Industrial Training
SECV4134	4	Year 4	Graphics and Multimedia Software Project II
SECV4233	3	Year 4	Data Visualization
UCSD2762	2	Year 2	Fundamental of Technopreneurship
UICI2022	2	Year 2	Science, Technology and Human
ULAB2122	2	Year 2	Advanced Academic English Skills

4. Calculate the total credit hours of all courses using the `fold()` high-order method. Print the number along with the number of courses.

Expected output (from Task 4):

```
Number of courses=28    Total credit hours=83
```


5. Calculate the number of courses by year offered. You can use any approach to achieve this. However, utilizing a map collection and high-order method will get a better mark than simply using regular if-else and loop.

Expected output (from Task 5):

```
Year Offered    Number of Courses
------------    -----------------
Year 1                  4
Year 2                  10
Year 3                  9
Year 4                  5
```

Resources

1. How do I parse a string into a number with Dart?
   https://stackoverflow.com/questions/13167496/how-do-i-parse-a-string-into-a-number-with-dart

2. Top 10 Array utility methods you should know (Dart)
   https://codeburst.io/top-10-array-utility-methods-you-should-know-dart-feb2648ee3a2

Assessment

This exercise carries **2%** weightage for the final grade of this course. The breakdown weightage is as follows (out of 100 points):

Criteria	Points
1. The code	
a. Task 1 – Define class	25
b. Task 2 – Define function	10
c. Task 3 – Create list of objects	20
d. Task 4 – Calculate total credits	10
e. Task 5 – Calculate number of courses by year offered	15
2. Pair Programming Session	
a. Video and overall	10
b. Active collaboration	5
a. Both members play both roles Driver and Navigator.	5

Submission

- Deadline: as per mentioned in eLearning
- Only one member from each pair needs to do the submission.
- Submission must be done on elearning. Any other means such as email, telegram, google drive will not be accepted at all.
- You will need to submit TWO (2) items:
  a. The modified source code: consisting of the **main.dart, course.dart, utils.dart** file.
  b. The video link (write the video link as a comment in **main.dart**)

FAQs

1. **Who will be my partner?**

   Choose your own partner. You should have done this earlier.

2. **Can I pair up with someone from a different section?**

   You should team up from the same section.

3. **Can I do the exercise alone?**

   This is only allowed if the number of students in the class is imbalanced. You also need to ask for permission from the lecturer.

4. **What do we need to show in the video?**

   You should show that you are **doing pair programming** rather than explaining about your code. The video is not meant for presentation.

5. **Do we need to switch roles between Driver and Navigator?**

   Yes. Your video should show that you and your partner keep switching between these two roles. No one should be dominant or play only one particular role.

6. **What if I do this exercise alone? Do I still need to submit the video?**

   In case you got permission to do the exercise alone, you still need to submit the video. You show in the video your progress in doing the exercise. You need to talk about what you are currently coding.

7. **What if we do pair programming physically.**

   You and your partner should use only one computer and sit side-by-side. You do not have to open LiveShare and online meetings. You can record the video locally using software like OBS. Again, you still need to talk and discuss with your partner in the video. It is also recommended to turn on the web camera. Keep in mind that you keep following the SOP about COVID-19 when working in a face-to-face environment.