ME1 Computing- Session 7: Object Oriented Programming

Learning outcomes:

- Understanding the definition of classes and objects
- Understanding the definition of methods
- Being able to implement the basic use of objects and methods

Before you start

In your H drive create a folder *H:\ME1MCP\Session7* and work within it.

We would like to create a database of all students in Mech. Eng., store their marks and determine the Dean's List for each cohort.

Task 1: Class definition and inheritance

Establish a class, *Student*, representing a student, with attributes: CID, name, list of marks and average mark.

Establish a **parent** class, *Cohort*, representing a cohort, with attributes: year and list of students.

Task 2: Method definition

Within the class *Student*, write a method to determine the average mark of the student.

Within the class *Cohort*, write a method to determine the name of the best student of the cohort and a method to determine the Dean's List (top 10% students).

Task 3: Object definition

Read the files *CIDs.txt* and *Names.txt*. These contains CID number and name of all the students.
Students with:
$0 < 2000$ belong to year entry 2019,
$2000 \leq CID < 4000$ belong to year entry 2020,
$4000 \leq CID < 6000$ belong to year entry 2021,
$CID \geq 6000$ belong to year entry 2022.

Read the files *Mark.txt*. It contains 10 marks for each student, ordered sequentially, i.e., 1st student: first 10 marks; 2nd student: next 10 marks; 3rd student: next 10 marks; etc.

Organise the data according to the object diagrams below:

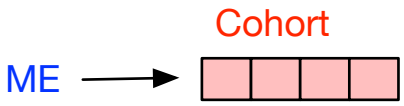

Figure 1: list *ME*, of objects of class *Cohort*.

ME is a list of objects of class *Cohort*. There are four elements, one for each year entry: 2019, 2020, 2021 and 2022, respectively.
Each element of *ME* is an object containing the year of the entry and a list of objects of class *Student*.

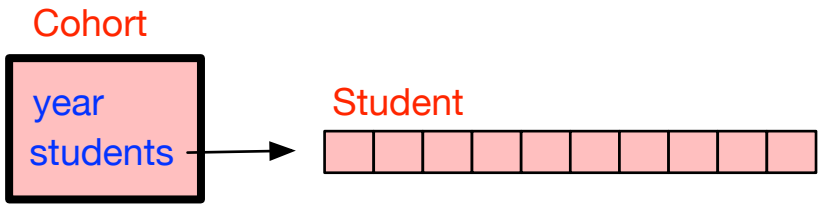

Figure 2: an element of *ME*: an object of class *Cohort*.

The attribute *students*, refers to a list of objects of class *Student*. These are the student group in the specific cohort.

Each element of *students* refers to an individual student, represented through one object of class *Student*. The object will contain, as attributes, the CID number and name of a student, and a list of 10 marks awarded to the student.

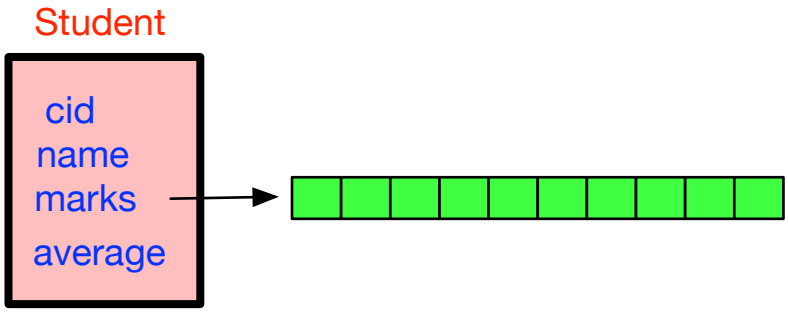

Figure 3: an element of the list of students: an object of class *Student*.

Task 4: Using methods

Determine and print out the name of the top student for each cohort.

Determine and print the list of names of students entering the Dean's List. The Dean's list is made by the top 10% students of each cohort.

Answer Questions 1 and 2