ME1 Computing- Session 8: Object Oriented Programming (Part II)

Learning outcomes:
- Being able to set inheriting classes
- Being able to implement the basic use of objects and methods with inheritance

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Before you start
In your H drive create a folder *H:\ME1MCP\Session8* 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.

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

Establish a **child** class of *Students*, *Registry*, representing the entirety of the student population and their academic results, with attributes: department and enrolments.

Task 2: Methods definition
- Within the class *Student*, write a method, *Average*, to determine the average mark of the student.

- Within the class *Student,* write a method, *Classify*, to determine mark result classification of a student.

- Within the class Registry, write a method, *Statistics*, to determine the number of all students with a given classification.

- Within the class *Cohort*, write a method to determine the name of the best student of the cohort.

- Within the class *Cohort*, write a method to determine the Dean's List (top 10% students).

Task 3: Objects 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.

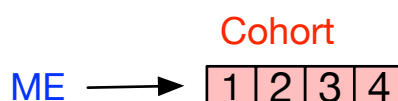Organise the data according to the object diagrams below:

Figure 1: List *ME*: list 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 entry and a list of objects of class *Student*, enrolled in that year.
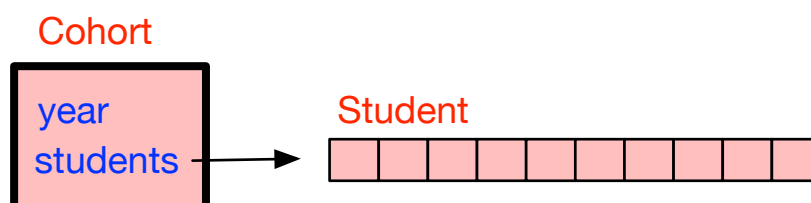

Figure 2: Every element of list *ME* is an object of class *Cohort*.

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.
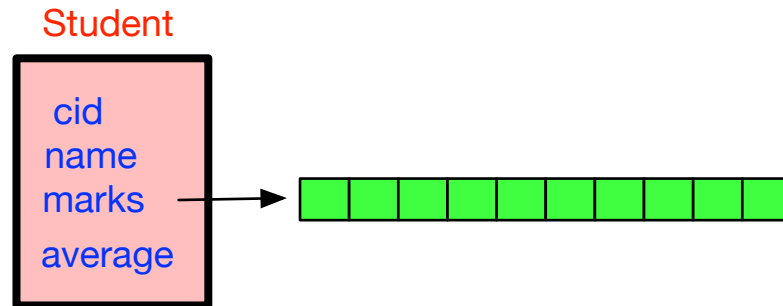
Figure 3: Every element of the list of student is an object of class *Student*.

The attributes of class *Registry* represent the name of a department and a list of all students within that department. Each element of this list will be of class *Student*, and refers to one student enrolled in the department.
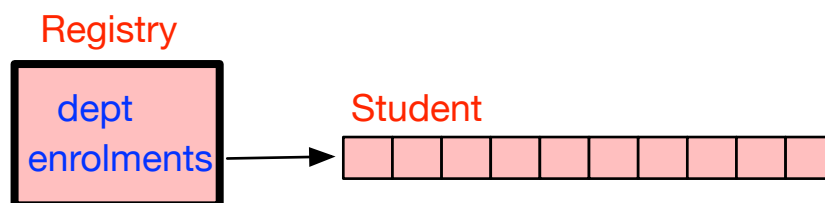

Figure 4: Attributes of class *Registry.*

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.

- Foer every student in Mech. Eng., print out the name and the average mark classification.

- Determine how many students overall in Mech. Eng. have achieved a First, a 2.1 and a 2.2, based on their marks average.

Answer Questions 1 and 2