Lab #1: 1-Dimensional Arrays

The main aim of the lab is to solve some common problems related to one dimensional arrays.

Task 1: For a given class **MyArray.java** is as follows:

```
public class MyArray {
	private int[] array;
	public MyArray(int[] array) {
		this.array = array;
	}

	//...

}
```

Task 1.1: Implement some basic methods in class **MyArray.java** as follows:

```
	//Method mirror that outputs the contents of an array
	in a  //reverse order like a mirror
    //Example: input [1, 2, 3] ==> output: [1, 2, 3, 3, 2, 1]

	public int[] mirror() {
		// TODO
		return null;
	}

	// removes all duplicate elements from an array and
	returns a  // new array
	//Input: 1 3 5 1 3 7 9 8
	//Output: 1 3 5 7 9 8
	public int[] removeDuplicates() {
		// TODO
		return null;
	}

	// Check whether a given array is sorted.
	// Input: 10 11 12 13 14 16 17 19 20
	// Output: true
	public boolean isSorted() {
		// TODO
		return false;
	}
```

Task 1.2: Implement some advanced methods in class MyArray.java as follows:

```
	// determine missing values from a sorted array.
	// Input: 10 11 12 13 14 16 17 19 20
	// Output: 15 18
```

```
	public int[] getMissingValues() {
		// TODO
```



```
		return null;
	}
	// Fill missing data by the minimal average of its
k  //neighbors
	// Input: 10 11 12 -1 14 10 17 19 20
	// Output(k=3): 10 11 12 12 14 16 17 19 20
	public int[] fillMissingValues(int k) {
		// TODO
		return null;
	}
```

Remember to test the implemented methods.

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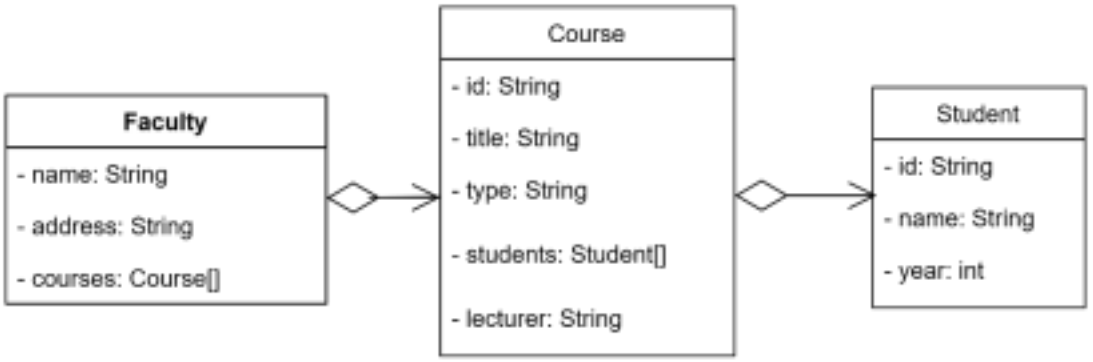
Task 2: For a given class diagram as follows:



Each faculty is identified by a name, address, and an array of courses. Each course includes id, title, type (practical or theoretical), students enrolled in, and a lecturer. A student has an id, name, and cohort year. Implement the following requirements:

1) Define classes in the given class diagram (using Java)
2) Implement a method (named contains) to check whether a given student is enrolled in a course.
3) Count the number of students enrolled in each course based on a given year. 4) Count the number of students in a faculty based on a given year. Notice that, a student can enroll in more than one course.
5) Find the course with the highest number of enrolled students.
6) Get all courses taught by a given lecturer.