The objective of this lab is to:

Understand and practice polymorphism.

Instructions!

1. This is a **graded** lab, you are strictly **NOT** allowed to discuss your solutions with your fellow colleagues, even not allowed asking how is he/she is doing, it may result in negative marking. You can **ONLY** discuss with your TAs or with me.
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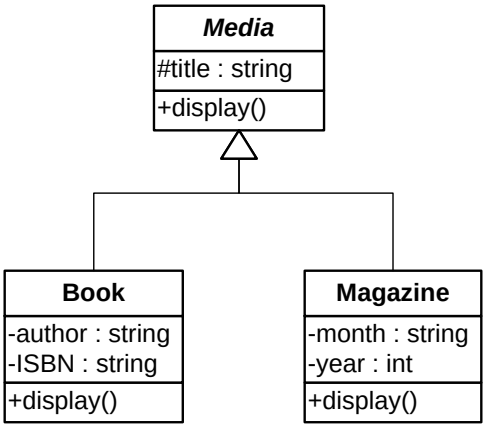
3. Follow good coding conventions.

Task 01: [30 Marks]

In this task, you are required to implement the following inheritance hierarchy:



Declare and implement the class **`Media`**. This class will have a protected member variable **title** (of string type) to store the title of the media item. Apart from the overloaded constructor, Media class will have a *virtual function* **`display()`**.

Inherit two classes from the Media class, namely: **`Book`** and **`Magazine`**.

The **`Book`** class will have two strings to store the **author name** and **ISBN** of the book. Apart from the overloaded constructor, this class will implement the **`display()`** function which will display all attributes of a Book on screen in a neat and readable way.

The **`Magazine`** class will have a string to store the **month name** and an integer to store the **year of publication** of the magazine. Apart from the overloaded constructor, this class will also implement the **`display()`** function which will display all attributes of a Magazine on screen in a neat and readable way.

Now, implement a main function which should ask the user how many Media items the user wants to create, and store the value entered by the user in an integer variable **n**. Then, your program will dynamically allocate an array of **`Media*`** of size **n**.

After that, your program will ask the user to create **n** Media items. The user should be asked to enter 1 if he/she wants to create a Book and 2 if he/she wants to create a Magazine. Once the choice has been entered, your program should ask the user for all the attributes necessary for creating that item (Book or Magazine). Then, that item should be dynamically allocated and its address should be stored in the array of **Media***.

Once all Media items have been created, your program should traverse the array of **Media*** to display the details of each item on screen.

At the end, your program should properly deallocate all the dynamically allocated memory.

Task 02: [25 Marks]

Design a Ship class that has the following members:

- A member variable for the name of the ship (a string)
- A member variable for the year that the ship was built (a string)
- A constructor and appropriate accessors and mutators
- A virtual print function that displays the ship s name and the year it was built.

Design a **CruiseShip** class that is derived from the Ship class. The CruiseShip class should have the following members:

- A member variable for the maximum number of passengers (an int)
- A constructor and appropriate accessors and mutators
- A print function that overrides the print function in the base class. The

CruiseShip class s print function should display only the ship s name and the maximum number of passengers.

Design a **CargoShip** class that is derived from the Ship class. The CargoShip class should have the following members:

- A member variable for the cargo capacity in tonnage (an int).
- A constructor and appropriate accessors and mutators.
- A print function that overrides the print function in the base class.

The CargoShip class's print function should display only the ship s name and the ship's cargo capacity.
Demonstrate the classes in a program that has an array of Ship pointers. The array elements should be initialized with the addresses of dynamically allocated Ship CruiseShip, and CargoShip objects. The program should then step through the array, calling each object's print function.