University of Central Punjab

**Faculty of Information Technology**

# Object Oriented Programming

# Spring 2023

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| **Lab 02** | |  |
| **Topic** | classes in C++, access specifiers and methods |
| **Objective** | Making students familiarize with classes and their implementations in C++,methods and access Specifiers |
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**Instructions:**

* Indent your code.
* Comment your code.
* Use meaningful variable names.
* Plan your code carefully on a piece of paper before you implement it.
* Name of the program should be same as the task name. i.e. the first program should be Task\_1.cpp
* **void main() is not allowed. Use int main()**
* Implement it in multiple files. Every task will contain three respective files Class.h Class.cpp and task.cpp (main().cpp)
* **You are not allowed to use any built-in functions**
* **You are required to follow the naming conventions as follow:**
  + **Variables:** firstName; (no underscores allowed)
  + **Function:** getName(); (no underscores allowed)
  + **ClassName:** BankAccount (no underscores allowed)

**Students are required to complete the following tasks in lab timings.**

**Task 1:**

Using the concept of implementation in three files coding using Visual Studio, Write a class with a student name that contains student data his/her rollno, name, city and cgpa as private data members and create a two function having name of input\_information(); to take data in the data members of the class and also display data using a member function display\_student\_data(); after doing it for one student data then you have to manage the same data for the whole class, assuming that there is a class of 5 students minimum. And you also have to enter the 5 subjects details along with every student and to enter the marks of those subjects. After entering the data of the students, you have to enter a roll\_no of a student, the data of that corresponding student should be displayed. You have to do this program in three different files.

**Task 2:**

Write a class that contains a string, you have to enter a string using a member function input\_alphabets(); and then use a convert function Convert\_To\_Uppercase that converts all of its letters to uppercase (Hint: Use a character array to store the sentence. You can also add checks for invalid characters). **You have to perform this task in three different files.**

Sample Input

Object oriented programming is so cool!

Expected Output

OBJECT ORIENTED PROGRAMMING IS SO COOL!

**Task 3:**

Create a class named as **Date** having following private attributes:

* 1. **day(int)**
  2. **month(int)**
  3. **year(int)**

Now write the following for the above mentioned class:

* + Write a function **init** which should receive three integers as parameters (\_day, \_month and \_year) and initialize all the attributes with the respective values received in the parameters.

**Remember:** Validate the values in the above function. For eg: month can never be negative etc.

* + Write a non-returning **display** function to print the attributes of the class.

Now write a program to create two objects of Date in main(). In one you have to ask user to enter his birthDate and in other the currentDate. Display the birthdate and currentDate of the user by display function. And then calculate age of the user from the objects and print it.

**Task 4:**

Create a class named as **Triangle** having following private attributes:

* 1. **base (double)**
  2. **height(double)**

Now write the following for the above mentioned class:

* + Write a function **init** which should receive two doubles as parameters (\_base and \_height) and initialize all the attributes with the respective values received in the parameters.

**Remember:** Validate the values in the above function. For eg: height can never be negative etc.

* + Write a non-returning **display** function to print the attributes of the class.
  + Write a function **calculateArea** which calculates the area of the triangle and returns it.

Write a program to create **a five objects** of **Triangle** with different data. Display the attributes of the triangle through display function having greatest area (use function written in the class to calculate area).

**Task 5:**

Create a class named as **ComplexNumber** having following private attributes:

* 1. **realPart(double)**
  2. **imaginaryPart(double)**

Now write the following for the above mentioned class:

* + Write a function **init** which should receive two doubles as parameters (\_realPart and \_imaginaryPart) and initialize all the attributes with the respective values received in the parameters.

**Remember:** Validate the values in the above function.

* + Write a non-returning **display** function to print the attributes of the class in the format given below.

Write a program to create **a five objects** of **ComplexNumber** with different data. And then display all the complex number objects in the following format.

**Output Format:** 3+2i