# National University

Of Computer & Emerging Sciences Faisalabad-Chiniot Campus

# CL-1004
# Object Oriented Programming
# Lab No 10

## Objectives:

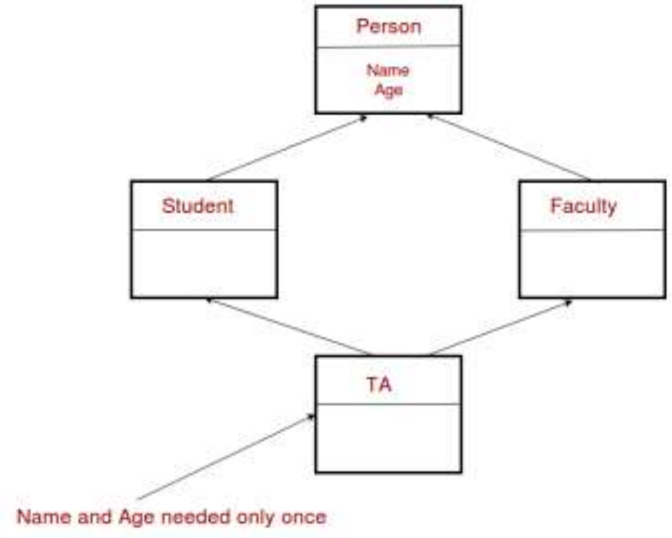
- Function overriding
- Composition
- Aggregation

**Note: Carefully read the following instructions (*Each instruction contains a weightage*)**

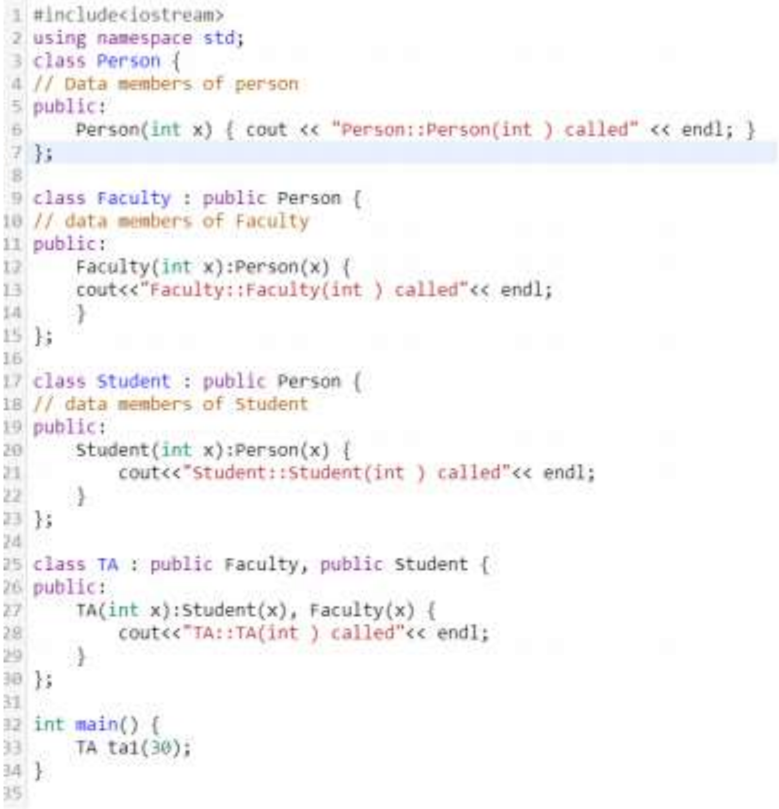
1. There must be a block of comments at start of every question's code by students; the block should contain brief description about functionality of code.
2. Comment on every function about its functionality.
3. Use understandable name of variables.
4. Proper indentation of code is essential
5. Write a C++ statement(s) for each of the following task one after the other, in the same order.
6. Make a Microsoft Word file and paste all of your C++ code with all possible screenshots of every **task output in MS word and submit .cpp file with word file**.
7. Make separate .cpp files for all tasks and use this format **22F-1234_Task1.cpp.**
8. First think about statement problems and then write/draw your logic on copy.
9. After copy pencil work, code the problem statement on MS Studio C++ compiler.
10. At the end when you done your tasks, attached C++ created files in MS word file and make your submission on Google classroom. (Make sure your submission is completed).
11. Please submit your file in this format **22F-1234_L1**.
12. Do not submit your assignment **after deadline**.
13. **Do not copy code from any source otherwise you will be penalized with negative marks.**

**Problem 1: | (Multiple and Multi Level Inheritance, Diamond Problem)**

The diamond problem occurs when two super classes of a class have a common base class. For example, in the following diagram, the TA class gets two copies of all attributes of Person class, this causes ambiguities.



a) What is the output for below code?



```
#include<iostream>
using namespace std;
class Person {
// Data members of person
public:
    Person(int x) { cout << "Person::Person(int ) called" << endl; }
};

class Faculty : public Person {
// data members of Faculty
public:
    Faculty(int x):Person(x) {
    cout<<"Faculty::Faculty(int ) called"<< endl;
    }
};

class Student : public Person {
// data members of Student
public:
    Student(int x):Person(x) {
        cout<<"Student::Student(int ) called"<< endl;
    }
};

class TA : public Faculty, public Student {
public:
    TA(int x):Student(x), Faculty(x) {
        cout<<"TA::TA(int ) called"<< endl;
    }
};

int main() {
    TA ta1(30);
}
```

b) Mention problem if any in **part a** and implement it correctly.
c) Write the code in 3-file structure.

**Problem 2: | (Multi Level Inheritance, Function Overriding)**

Write a program which can detect the sounds of Animals.

Write a class Animals having the following attributes:

1. String Name
2. Sound()

Inherit the following classes from Animals having the same attributes and behavior of base class

Override the sound function for each class

1. Cat
2. Dog
3. Tiger_Family
4. Deer

From Tiger_family class inherit the following sub classes publically: (override the sound function for each class).

1. Tiger
2. Lion

**Note:**

- Make instance of each class and call sound function.
- Each class animal should have its own sound.
- Program should be in 3-file structure.

### Problem 3: | (Multi Level Inheritance, Function Overriding)

You are developing a social media platform that allows users to post and share different types of content, such as text, photos, and videos. How would you use function overriding to implement different methods for displaying and organizing each type of content, such as filtering and sorting options?

Add appropriate constructors and member functions to initialize, access, and manipulate the data members.

Write a program to test your classes.

### Problem 4: Composition

Create a class Time with following data members and member functions

```
public:
	Time();
	Time(int, int);
	void setTime(int, int);
	void getTime(int&, int&);
	void printTime();
private:
	int hr;
	int min;
```

Create a class Date with following data members and member functions

```
public:
	Date();
	Date(int, int, int);
	void setDate(int, int, int);
	void getDate(int&, int&, int&);
	void printDate();

private:
	int month;
	int day;
	int year;
```

Create a class Event with following data members and member functions

```
public:
      Event(int hours = 0, int minutes = 0, int m = 1,
            int d = 1, int y = 1900, string name = "Christmas");
      void setEventData(int hours, int minutes, int m, int d, int y, string 
name);
      void printEventData();

private:
      string eventName;
      Time eventTime;
      Date eventDay;
```

**Write a Main and create events using the above classes to demonstrate composition.**

## Problem 5: Death Relation

Implement the death relation using car as a whole class and engine, wheel, window, door and tires as a part classes.

## Problem 6: Aggregation

Implement the person address problem with respect to aggregation. You need to make your code in such a way that 3 persons living on a same address

## Problem 7: Aggregation

Implement the person teacher problem with respect to aggregation. You need to make your code in such a way that if teacher object is destroyed still person exists.

## Problem 8:

Mention at-least five examples of composition and five examples of aggregation with proper explanation.

Proper code indentation will hold extra marks !

Best of luck ☺

**You are done with your exercise, submit on classroom at given time.**