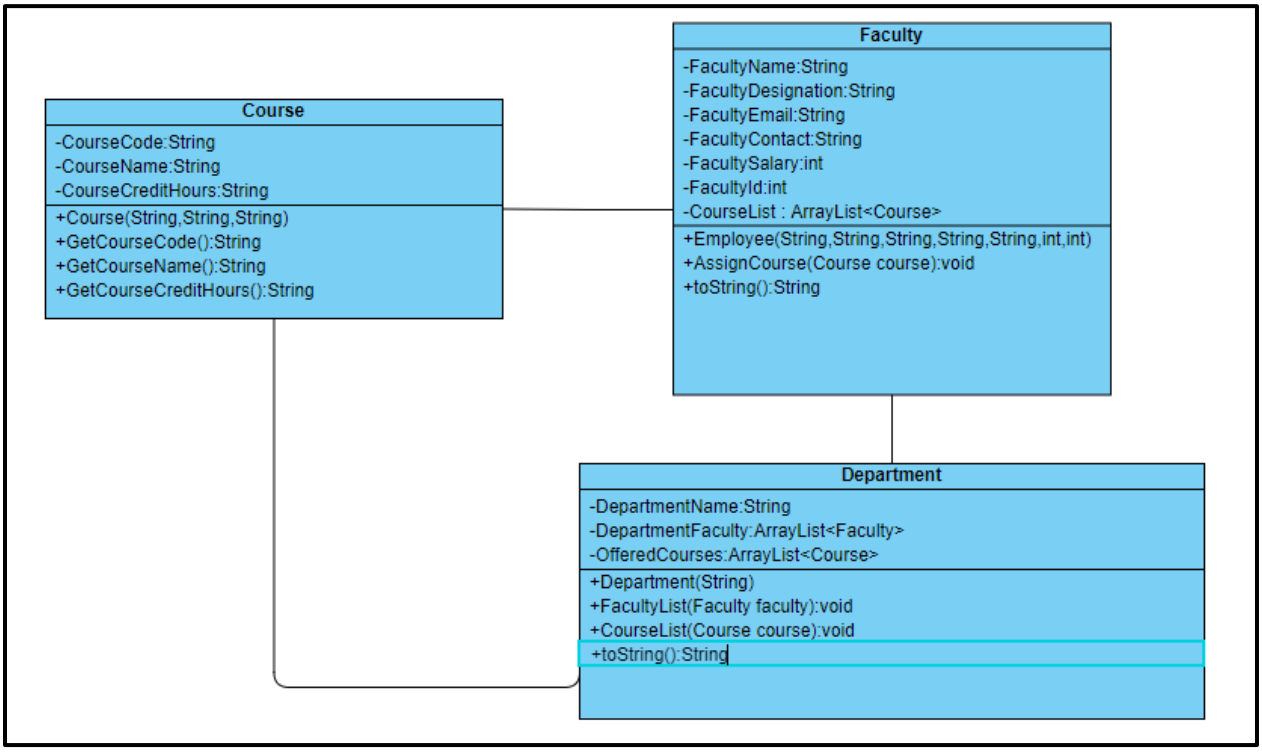
Lab 06 – Association and Aggregation

Task 01:

Create a java program based on the given UML diagram and implement the relation between the classes as shown in the diagram.



Code:

```
package Task;

public class Course {
    private String code;
    private String name;
    private String cr;

    // constructor
    public Course(String code, String name, String cr){
        this.code = code;
        this.name = name;
        this.cr = cr;
    }

    // getters
    public String getCode(){
        return code;
    }
    public String getName(){
        return name;
    }
```

```
    public String getCr(){
        return cr;
    }

    public void displayInfo(){
        System.out.println("\t" + code + " " + name + " " + cr);
    }
}
```

```
package Task;

import java.util.List;
import java.util.ArrayList;

public class Faculty {
    private int id;
    private String name;
    private String designation;
    private String email;
    private String contact;
    private int salary;
    private List<Course> c;

    // constructor
    public Faculty(int id, String name, String designation, String email,
String contact, int salary){
        this.id = id;
        this.name = name;
        this.designation = designation;
        this.email = email;
        this.contact = contact;
        this.salary = salary;
        this.c = new ArrayList<>(); // when a faculty will be created a list
of courses for this faculty will created
    }

    // method to assign course
    public void assignCourse(Course c){
        this.c.add(c); // adding course to the list
    }

    public void displayInfo(){
        System.out.println( + id + " " + name + " " + designation + " " +
email + " " + contact + " " + salary);
        System.out.println("\tCourses taught by: " + name);
        for(Course co : c){
            System.out.print("\t\t");
            co.displayInfo();
        }
    }
}
```

```java
package Task;

import java.util.List;
import java.util.ArrayList;

public class Department {
    private String name;
    private List<Faculty> f;

    // constructor
    public Department(String name){
        this.name = name;
        this.f = new ArrayList<>(); // a new list of faculty
    }

    // add faculty
    public void  addFaculty(Faculty f){
        this.f.add(f);
    }

    public void displayInfo(){
        System.out.println("Department name: " + name);

        System.out.println("List of faculty: ");
        for(Faculty fa : f){
            fa.displayInfo();
        }
    }
}
```

Task 02:

Create Driver class named as **Association_aggregation_1**. Create proper Objects of all classes as follows

- 2 Objects of Course class
- 3 Objects of Faculty class
- 3 Objects of Department Class

And properly display all the information

Code:

```
package Task;

public class Main {

    public static void main(String[] args) {

        //1. two objects of Course class
        Course c1 = new Course("CSC101", "CP", "4");
        Course c2 = new Course("CSC102", "OOP", "3");

        //2. three objects of faculty class
        Faculty f1 = new Faculty(10, "Hasan", "HOD", "h@gmail.com", "404",
10000);
        Faculty f2 = new Faculty(11, "Ghafoor", "Dean", "g@gmail.com", "405",
20000);
        Faculty f3 = new Faculty(12, "Ishtiaq", "Cluster Head",
"i@gmail.com", "406", 30000);

        /*
        assigning course to faculty
            - hasan will be teaching c1 & c2
            - ghafoor will be teaching c1
            - ishtiaq will not be teaching ant course
         */
        f1.assignCourse(c1);
        f1.assignCourse(c2);

        f2.assignCourse(c1);

        //3. three objects of department
        Department d1 = new Department("Computer Science");
        Department d2 = new Department("Social Sciences");
        Department d3 = new Department("Management Studies");

        /*
        assigning faculty to department
            - d1 will have f1, f2 & f3
            - d2 will have f1 & f2
            - d3 will have f1
         */
        d1.addFaculty(f1);
        d1.addFaculty(f2);
        d1.addFaculty(f3);

        d2.addFaculty(f1);
        d2.addFaculty(f2);
```

```
        d3.addFaculty(f1);


        // printing all of the things
        System.out.println("-----------------------------------------");
        System.out.println("            University Data              ");
        System.out.println("-----------------------------------------\n");


        System.out.println("*****************************************");
        System.out.println("1. List of All Courses");
        System.out.println("-----------------------------------------");
        c1.displayInfo();
        c2.displayInfo();
        System.out.println("*****************************************\n");

        System.out.println("*****************************************");
        System.out.println("2. List of All Faculty Members");
        System.out.println("-----------------------------------------");
        f1.displayInfo();
        System.out.println("-----------------------------------------");
        f2.displayInfo();
        System.out.println("-----------------------------------------");
        f3.displayInfo();
        System.out.println("*****************************************\n");

        System.out.println("*****************************************");
        System.out.println("3. List of All Departments");
        System.out.println("-----------------------------------------");
        d1.displayInfo();
        System.out.println("-----------------------------------------");
        d2.displayInfo();
        System.out.println("-----------------------------------------");
        d3.displayInfo();
        System.out.println("*****************************************\n");
    }
}
```

Output:

```
"C:\Program Files\Java\jdk-24\bin\java.exe" "-javaagent:C:\Program Files\Jet
----------------------------------------
            University Data
----------------------------------------

****************************************
1. List of All Courses
----------------------------------------
    CSC101 CP 4
    CSC102 OOP 3
****************************************

****************************************
2. List of All Faculty Members
----------------------------------------
10 Hasan HOD h@gmail.com 404 10000
    Courses taught by: Hasan
            CSC101 CP 4
            CSC102 OOP 3
----------------------------------------
11 Ghafoor Dean g@gmail.com 405 20000
    Courses taught by: Ghafoor
            CSC101 CP 4
----------------------------------------
```

```
----------------------------------------
11 Ghafoor Dean g@gmail.com 405 20000
    Courses taught by: Ghafoor
            CSC101 CP 4
----------------------------------------
12 Ishtiaq Cluster Head i@gmail.com 406 30000
    Courses taught by: Ishtiaq
****************************************

****************************************
3. List of All Departments
----------------------------------------
Department name: Computer Science
List of faculty:
10 Hasan HOD h@gmail.com 404 10000
    Courses taught by: Hasan
            CSC101 CP 4
            CSC102 OOP 3
11 Ghafoor Dean g@gmail.com 405 20000
    Courses taught by: Ghafoor
            CSC101 CP 4
12 Ishtiaq Cluster Head i@gmail.com 406 30000
    Courses taught by: Ishtiaq
```

```
12 Ishtiaq Cluster Head i@gmail.com 406 30000
    Courses taught by: Ishtiaq
---------------------------------------
Department name: Social Sciences
List of faculty:
10 Hasan HOD h@gmail.com 404 10000
    Courses taught by: Hasan
            CSC101 CP 4
            CSC102 OOP 3
11 Ghafoor Dean g@gmail.com 405 20000
    Courses taught by: Ghafoor
            CSC101 CP 4
---------------------------------------
Department name: Management Studies
List of faculty:
10 Hasan HOD h@gmail.com 404 10000
    Courses taught by: Hasan
            CSC101 CP 4
            CSC102 OOP 3
***************************************


Process finished with exit code 0
```