3.1 How to inherit one class

Discipline.h

```cpp
#ifndef DISCIPLINE_H
#define DISCIPLINE_H
#include<string>
using namespace std;

class Discipline
{
public:
    Discipline();
    Discipline(string name, int num_of_courses, int credit_hours);

    string getName();
    void setName(string name);
    int getNumOfCourses();
    void setNumOfCoures(int num_of_courses);
    int getCreditHours();
    void setCreditHours(int credit_hours);

    int DegreeRequirement();
    void Input();
    void Display();
private:
    string name;
    int num_of_courses;
    int credit_hours;
};

#endif
```

Discipline.cpp

```cpp
#include"Discipline.h"
#include<iostream>

Discipline::Discipline()
{
}
Discipline::Discipline(string name, int num_of_courses, int credit_hours)
{
    this->name = name;
    this->num_of_courses = num_of_courses;
    this->credit_hours = credit_hours;
}

string Discipline::getName()
{
    return name;
}
void Discipline::setName(string name)
```

```cpp
{
    this->name = name;
}
int Discipline::getNumOfCourses()
{
    return num_of_courses;
}
void Discipline::setNumOfCoures(int num_of_courses)
{
    this->num_of_courses = num_of_courses;
}
int Discipline::getCreditHours()
{
    return credit_hours;
}
void Discipline::setCreditHours(int credit_hours)
{
    this->credit_hours = credit_hours;
}

int Discipline::DegreeRequirement()
{
    return num_of_courses * credit_hours;
}

void Discipline::Input()
{
    cout << "Enter Discipline's name: ";
    cin >> name;
    cout << "Enter number of courses: ";
    cin >> num_of_courses;
    cout << "Enter credit hours per course: ";
    cin >> credit_hours;
}

void Discipline::Display()
{
    cout << endl;
    cout << "Degree: " << name << endl;
    cout << "Number of required courses: " << num_of_courses << endl;
    cout << "Number of credit hours: " << credit_hours << endl;
}
```

Graduation.h

```cpp
#ifndef GRADUATION_H
#define GRADUATION_H
#include"Discipline.h"

class Graduation: public Discipline
{
public:
    Graduation();
    Graduation(string name, int num_of_courses, int credit_hours);

    int getThesisCredit();

    int DegreeRequirement();
```

```cpp
    void Input();
    void Display();
private:
    int thesis_credit = 4;
};

#endif
```

Graduation.cpp

```cpp
#include"Graduation.h"
#include<iostream>

Graduation::Graduation()
{
}

Graduation::Graduation(string name, int num_of_courses, int credit_hours)
{
    setName(name);
    setNumOfCoures(num_of_courses);
    setCreditHours(credit_hours);
}

int getThesisCredit()
{
    return '4';
}

int Graduation::DegreeRequirement()
{
    return getNumOfCourses() * getCreditHours() + thesis_credit;
}

void Graduation::Input()
{
    string name;
    int num_of_courses;
    int credit_hours;

    cout << "Enter Discipline's name: ";
    cin >> name;
    setName(name);

    cout << "Enter number of courses: ";
    cin >> num_of_courses;
    setNumOfCoures(num_of_courses);

    cout << "Enter credit hours per course: ";
    cin >> credit_hours;
    setCreditHours(credit_hours);
}

void Graduation::Display()
{
    cout << endl;
    cout << "Degree: " << getName() << endl;
    cout << "Number of required courses: " << getNumOfCourses() << endl;
```

```cpp
    cout << "Number of credit hours: " << getCreditHours() << endl;
    cout << "Thesis credit: " << '4' << endl;
    cout << "Total number of required credit hours for graduation degree: " << DegreeRequirement()
<< endl;
    cout << endl;
}
```

PostGraduation.h

```cpp
#ifndef POSTGRADUATION_H
#define POSTGRADUATION_H
#include"Discipline.h"

class PostGraduation: public Discipline
{
public:
    PostGraduation();
    PostGraduation(string name, int num_of_courses, int credit_hours, string thesis_project);

    string getThesisProject();
    void setThesisProject(string thesis_project);

    int DegreeRequirement();
    void Input();
    void Display();
private:
    string thesis_project;
    int thesis_project_credit;
};

#endif
```

PostGraduation.cpp

```cpp
#include"PostGraduation.h"
#include<iostream>

PostGraduation::PostGraduation()
{
}
PostGraduation::PostGraduation(string name, int num_of_courses, int credit_hours, string
thesis_project)
{
    setName(name);
    setNumOfCoures(num_of_courses);
    setCreditHours(credit_hours);

    this->thesis_project = thesis_project;

    if(thesis_project == "Thesis")
        this->thesis_project_credit = 4;
    else if(thesis_project == "Project")
        this->thesis_project_credit = 6;
}

string PostGraduation::getThesisProject()
```

```cpp
{
    return thesis_project;
}
void PostGraduation::setThesisProject(string thesis_project)
{
    this->thesis_project = thesis_project;
}


int PostGraduation::DegreeRequirement()
{
    return getNumOfCourses() * getCreditHours() + thesis_project_credit;
}

void PostGraduation::Input()
{
    string name;
    int num_of_courses;
    int credit_hours;
    char thesis_project;

    cout << "Enter Discipline's name: ";
    cin >> name;
    setName(name);

    cout << "Enter number of courses: ";
    cin >> num_of_courses;
    setNumOfCoures(num_of_courses);

    cout << "Enter credit hours per course: ";
    cin >> credit_hours;
    setCreditHours(credit_hours);

    cout << "Enter your choice for Thesis or Project;  T/t for thesis; P/p for project: ";
    cin >>  thesis_project;
    if(thesis_project == ('T' or 't'))
        this->thesis_project = "Thesis";
    else if(thesis_project == ('P' or 'p'))
        this->thesis_project = "Project";

    if(this->thesis_project == "Thesis")
        this->thesis_project_credit = 4;
    else if(this->thesis_project == "Project")
        this->thesis_project_credit = 6;
}

void PostGraduation::Display()
{
    cout << endl;
    cout << "Degree: " << getName() << endl;
    cout << "Number of required courses: " << getNumOfCourses() << endl;
    cout << "Number of credit hours: " << getCreditHours() << endl;

    if(thesis_project == "Thesis")
        cout << "Thesis credit: " << '4' << endl;
    else if(thesis_project == "Project")
        cout << "Project credit: " << '6' << endl;

    cout << "Total number of required credit hours for graduation degree: " << DegreeRequirement()
<< endl;
    cout << endl;
}
```

main.cpp

```cpp
#include"Graduation.h"
#include"PostGraduation.h"
#include<iostream>

int main()
{
    Graduation op1;
    PostGraduation op2;

    op1.Input();
    op1.Display();

    op2.Input();
    op2.Display();

    return 0;
}
```

3.2 inherit

Person.h

```cpp
#ifndef PERSON_H
#define PERSON_H
#include<string>
using namespace std;

class Person
{
public:
    Person();
    Person(string id, string name, int age, string address, string phone_no);
    ~Person();

    string getId();
    void setId(string id);
    string getName();
    void setName(string name);
    int getAge();
    void setAge(int age);
    string getAddress();
    void setAddress(string address);
    string getPhoneNo();
    void setPhoneNo(string phone_no);

    void Input();
    void showOutPut();
private:
    string id;
    string name;
    int age;
```

```
    string address;
    string phone_no;
};

#endif
```

Person.cpp

```cpp
#include"Person.h"
#include<iostream>

Person::Person()
{
}
Person::Person(string id, string name, int age, string address, string phone_no)
{
    this->id = id;
    this->name = name;
    this->age = age;
    this->address = address;
    this->phone_no = phone_no;
}
Person::~Person()
{
}

string Person::getId()
{
    return id;
}
void Person::setId(string id)
{
    this->id = id;
}
string Person::getName()
{
    return name;
}
void Person::setName(string name)
{
    this->name = name;
}
int Person::getAge()
{
    return age;
}
void Person::setAge(int age)
{
    this->age = age;
}
string Person::getAddress()
{
    return address;
}
void Person::setAddress(string address)
{
    this->address = address;
}
```

```cpp
string Person::getPhoneNo()
{
    return phone_no;
}
void Person::setPhoneNo(string phone_no)
{
    this->phone_no = phone_no;
}

void Person::Input()
{
    cout << endl;
    cout << "*-*-*-**-*-*-*-*-*-*-*-*-*" << endl;
    cout << "  Enter Person's Information  " << endl;
    cout << "*-*-*-**-*-*-*-*-*-*-*-*-*" << endl;
    cout << "Enter the Roll No:                          ";
    cin >> id;
    cout << "Enter the Name of the Person:               ";
    cin >> name;
    cout << "Enter the Age of the Person:                ";
    cin >> age;
    cout << "Enter the Address of the Person:            ";
    cin >> address;
    cout << "Enter the Phone No of the Person:           ";
    cin >> phone_no;
    cout << endl;
}
void Person::showOutPut()
{
    cout << endl;
    cout << "*-*-*-*-*-*-*-*-*" << endl;
    cout << "   Person's Data   " << endl;
    cout << "*-*-*-*-*-*-*-*-*" << endl;
    cout << "Person Id:            " << id << endl;
    cout << "Person Name:          " << name << endl;
    cout << "Person Age:           " << age << endl;
    cout << "Person Address:       " << address << endl;
    cout << "Person Phone Number:   " << phone_no << endl;
    cout << endl;
}
```

Student.h

```cpp
#ifndef STUDENT_H
#define STUDENT_H
#include"Person.h"

class Student: public Person
{
public:
    Student();
    Student(string id, string name, int age, string address, string phone_no,
        string course_name, int room_no, double GPA);

    string getCourseName();
    void setCourseName(string course_name);
    int getRoomNo();
    void setRoomNo(int room_no);
```

```cpp
        double getGPA();
        void setGPA(double GPA);

        void Input();
        void showOutPut();
private:
        string course_name;
        int room_no;
        double GPA;
};

    #endif
```

Student.cpp

```cpp
#include"Student.h"
#include<iostream>

Student::Student()
{
}
Student::Student(string id, string name, int age, string address, string phone_no,
        string course_name, int room_no, double GPA)
{
    setId(id);
    setName(name);
    setAge(age);
    setAddress(address);
    setPhoneNo(phone_no);
    this->course_name = course_name;
    this->room_no = room_no;
    this->GPA = GPA;
}

string Student::getCourseName()
{
    return course_name;
}
void Student::setCourseName(string course_name)
{
    this->course_name = course_name;
}
int Student::getRoomNo()
{
    return room_no;
}
void Student::setRoomNo(int room_no)
{
    this->room_no = room_no;
}
double Student::getGPA()
{
    return GPA;
}
void Student::setGPA(double GPA)
{
    this->GPA = GPA;
}
```

```cpp
void Student::Input()
{
    string id, name; int age; string address, phone_no;

    cout << endl;
    cout << "*-*-*-**-*-*-*-*-*-*-*-*-*" << endl;
    cout << "  Enter Student's Information " << endl;
    cout << "*-*-*-**-*-*-*-*-*-*-*-*-*" << endl;
    cout << "Enter the Roll No:                              ";
    cin >> id;
    setId(id);
    cout << "Enter the Name of the Person:                   ";
    cin >> name;
    setName(name);
    cout << "Enter the Age of the Person:                    ";
    cin >> age;
    setAge(age);
    cout << "Enter the Address of the Person:                ";
    cin >> address;
    setAddress(address);
    cout << "Enter the Phone No of the Person:               ";
    cin >> phone_no;
    setPhoneNo(phone_no);
    cout << "Enter the Course Discipline of the Person [CS/IT]:  ";
    cin >> course_name;
    cout << "Enter the Room No of the Person:                ";
    cin >> room_no;
    cout << "Enter the GPA of the Person:                    ";
    cin >> GPA;
    cout << endl;
}
void Student::showOutPut()
{
    cout << endl;
    cout << "*-*-*-*-*-*-*-*-*" << endl;
    cout << "   Student's Data  " << endl;
    cout << "*-*-*-*-*-*-*-*-*" << endl;
    cout << "Student Id:                      " << getId() << endl;
    cout << "Student Name:                    " << getName() << endl;
    cout << "Student Age:                     " << getAge() << endl;
    cout << "Student Address:                 " << getAddress() << endl;
    cout << "Student Phone Number:            " << getPhoneNo() << endl;
    cout << "Student Course Discipline [CS/IT]:  " << course_name << endl;
    cout << "Student Room No:                 " << room_no << endl;
    cout << "Student GPA:                     " << GPA << endl;
    cout << endl;
}
```

Employee.h

```cpp
#ifndef EMPLOYEE_H
#define EMPLOYEE_H
#include"Person.h"

class Employee: public Person
{
public:
```

```cpp
        Employee();
        Employee(string id, string name, int age, string address, string phone_no,
            string department_name, double gross_salary, double tax_percentage);

        string getDepartementName();
        void setDepartmentName(string department_name);
        double getGrossSalary();
        void setGrossSalary(double gross_salary);
        double getTaxPercentage();
        void setTaxPercentage(double tax_percentage);
        double getNetSalary();
        void setNetSalary();

        void Input();
        void showOutPut();
private:
        string department_name;
        double gross_salary;
        double tax_percentage;
        double net_salary;
};

    #endif
```

Employee.cpp

```cpp
#include"Employee.h"
#include<iostream>

Employee::Employee()
{
}
Employee::Employee(string id, string name, int age, string address, string phone_no,
    string department_name, double gross_salary, double tax_percentage)
{
    setId(id);
    setName(name);
    setAge(age);
    setAddress(address);
    setPhoneNo(phone_no);
    this->department_name = department_name;
    this->gross_salary = gross_salary;
    this->tax_percentage = tax_percentage*1.0 / 100;
    this->net_salary = gross_salary * (1 - tax_percentage);
}

string Employee::getDepartementName()
{
    return department_name;
}
void Employee::setDepartmentName(string department_name)
{
    this->department_name = department_name;
}
double Employee::getGrossSalary()
{
    return gross_salary;
}
```

```cpp
void Employee::setGrossSalary(double gross_salary)
{
    this->gross_salary = gross_salary;
}
double Employee::getTaxPercentage()
{
    return tax_percentage * 100;
}
void Employee::setTaxPercentage(double tax_percentage)
{
    this->tax_percentage = tax_percentage*1.0 / 100;
}
double Employee::getNetSalary()
{
    return net_salary;
}
void Employee::setNetSalary()
{
    net_salary = gross_salary * (1 - tax_percentage);
}

void Employee::Input()
{
    string id, name; int age; string address, phone_no;
    double tax_percentage;

    cout << endl;
    cout << "*-*-*-**-*-*-*-*-*-*-*-*-*" << endl;
    cout << " Enter Employee's Information " << endl;
    cout << "*-*-*-**-*-*-*-*-*-*-*-*-*" << endl;
    cout << "Enter the Employee Id:                  ";
    cin >> id;
    setId(id);
    cout << "Enter the Name of the Person:           ";
    cin >> name;
    setName(name);
    cout << "Enter the Age of the Person:            ";
    cin >> age;
    setAge(age);
    cout << "Enter the Address of the Person:        ";
    cin >> address;
    setAddress(address);
    cout << "Enter the Phone No of the Person:       ";
    cin >> phone_no;
    setPhoneNo(phone_no);
    cout << "Enter the Department of the Person:      ";
    cin >> department_name;
    cout << "Enter the Gross Salary of the Person:    ";
    cin >> gross_salary;
    cout << "Enter the Tax Percentage of the Person:  ";
    cin >> tax_percentage;
    this->tax_percentage = tax_percentage*1.0 / 100;
    this->net_salary = this->gross_salary * (1 - this->tax_percentage);
    cout << endl;
}

void Employee::showOutPut()
{
    cout << endl;
    cout << "*-*-*-*-*-*-*-*-*" << endl;
    cout << "  Employee's Data  " << endl;
```

```cpp
        cout << "*-*-*-*-*-*-*-*-*" << endl;
        cout << "Employee Id:              " << getId() << endl;
        cout << "Employee Name:            " << getName() << endl;
        cout << "Employee Age:             " << getAge() << endl;
        cout << "Employee Address:         " << getAddress() << endl;
        cout << "Employee Phone Number:    " << getPhoneNo() << endl;
        cout << "Employee Department:      " << department_name << endl;
        cout << "Employee's Gross Salary:  " << gross_salary << " with " << tax_percentage*100 << "%
of Tax" << endl;
        cout << "Employee's Net Salary:    " << net_salary << endl;
        cout << endl;
    }
```

main.cpp

```cpp
#include"Student.h"
#include"Employee.h"
#include <iostream>

int main(int argc, char** argv) {
    Student student;
    student.Input();
    student.showOutPut();

    Employee employee;
    employee.Input();
    employee.showOutPut();

    return 0;
}
```