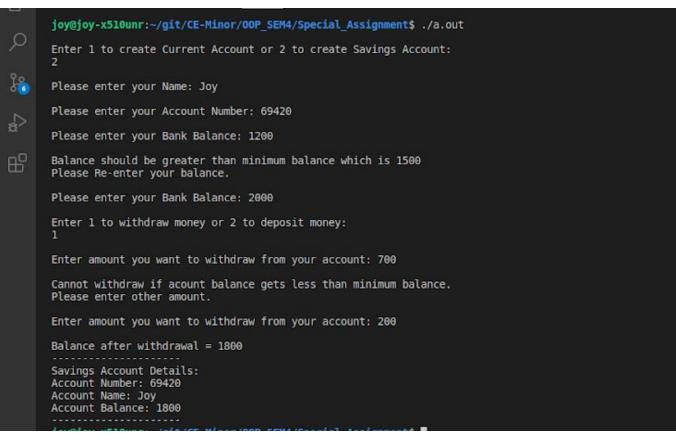


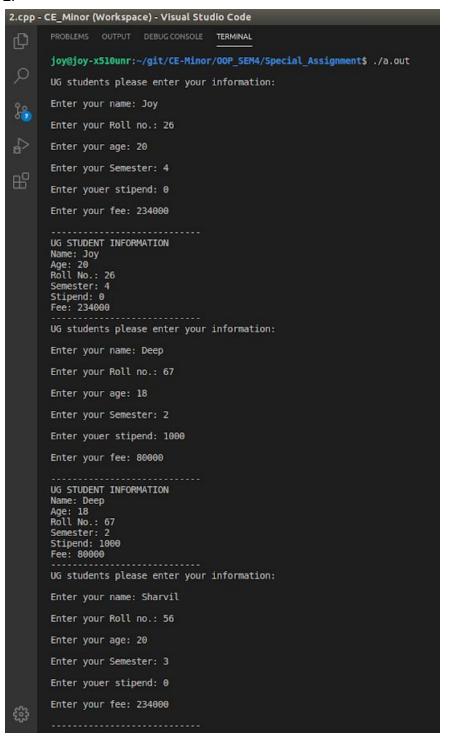
## Special Assignment

CEM 251 OOP with C++

-Joy Mehta(18BIC026)

1.





```
2.cpp - CE_Minor (Workspace) - Visual Studio Code
        PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL
(D)
        Enter your age: 20
        Enter your Semester: 3
        Enter youer stipend: 0
        Enter your fee: 234000
        UG STUDENT INFORMATION
       Name: Sharvil
Age: 20
Roll No.: 56
        Semester: 3
        Stipend: 0
        Fee: 234000
        UG students please enter your information:
        Enter your name: Parth
        Enter your Roll no.: 66
        Enter your age: 21
        Enter your Semester: 5
        Enter youer stipend: 0
        Enter your fee: 800000
        UG STUDENT INFORMATION
        Name: Parth
        Age: 21
Roll No.: 66
        Semester: 5
        Stipend: 0
        Fee: 800000
        UG students please enter your information:
        Enter your name: Dhwajal
        Enter your Roll no.: 55
        Enter your age: 22
        Enter your Semester: 6
        Enter youer stipend: 0
        Enter your fee: 800000
        UG STUDENT INFORMATION
        Name: Dhwajal
        Age: 22
Roll No.: 55
        Semester: 6
        Stipend: 0
        Fee: 800000
```

```
2.cpp - CE_Minor (Workspace) - Visual Studio Code
       PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL
Ф
       PG students please enter your information:
 Q
       Enter your name: Deep
       Enter your Roll no.: 143
       Enter your age: 27
       Enter your Semester: 3
品
       Enter youer stipend: 100000
       Enter your fee: 50000
       PG STUDENT INFORMATION
       Name: Deep
       Age: 27
Roll No.: 143
       Semester: 3
       Stipend: 100000
       Fee: 50000
       PG students please enter your information:
       Enter your name: Paras
       Enter your Roll no.: 134
       Enter your age: 24
       Enter your Semester: 2
       Enter youer stipend: 90000
       Enter your fee: 80000
       PG STUDENT INFORMATION
       Name: Paras
       Age: 24
       Roll No.: 134
       Semester: 2
       Stipend: 90000
       Fee: 80000
       PG students please enter your information:
       Enter your name: Akshay
       Enter your Roll no.: 89
       Enter your age: 23
       Enter your Semester: 1
       Enter youer stipend: 1500000
       Enter your fee: 70000
£33
       PG STUDENT INFORMATION
```

```
2.cpp - CE_Minor (Workspace) - Visual Studio Code
       PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL
Ф
       Enter youer stipend: 1500000
 Q
       Enter your fee: 70000
       PG STUDENT INFORMATION
       Name: Akshay
       Age: 23
       Roll No.: 89
       Semester: 1
Stipend: 1500000
品
       Fee: 70000
       PG students please enter your information:
       Enter your name: Parth
       Enter your Roll no.: 99
       Enter your age: 23
       Enter your Semester: 3
       Enter youer stipend: 5000
       Enter your fee: 1000
       PG STUDENT INFORMATION
       Name: Parth
       Age: 23
Roll No.: 99
       Semester: 3
       Stipend: 5000
       Fee: 1000
       PG students please enter your information:
       Enter your name: Harsh
       Enter your Roll no.: 21
       Enter your age: 25
       Enter your Semester: 3
       Enter youer stipend: 900000
       Enter your fee: 1000000
       PG STUDENT INFORMATION
       Name: Harsh
       Age: 25
Roll No.: 21
       Semester: 3
       Stipend: 900000
       Fee: 1000000
       Average age for students in UG = 20.2
       Average age for students in PG = 24.4
       joy@joy-x510unr:~/git/CE-Minor/OOP_SEM4/Special_Assignment$
```

- 3. Justify the following statement with the help of a suitable example: "In a class hierarchy of many levels if we want a function at any level to be called through a base class pointer then the function must be declared as virtual in the base class."
  - A C++ virtual function is a member function in the base class that you redefine in a derived class. It is declared using the virtual keyword. A 'virtual' is a keyword preceding the normal declaration of a function.
  - It is used to tell the compiler to perform dynamic linkage or late binding on the function. There is a necessity to use the single pointer to refer to all the objects of the different classes.
  - So, we create the pointer to the base class that refers to all the derived objects. But, when the base class pointer contains the address of the derived class object, it always executes the base class function. This issue can only be resolved by using the 'virtual' function.
  - When the function is made virtual, C++ determines which function is to be invoked at the runtime based on the type of the object pointed by the base class pointer.

## Example-

```
#include <iostream>
using namespace std;

class rectangle;

class figure
{
    public:
        virtual void pf()
        {
            cout << "\nThis is the base class.\n";
        }
};

class rectangle: public figure
{
    public:
        void pf()
        {
            cout << "\nThis is derived class\n";
        }
};

int main()
{
    figure* f;
    rectangle r;
    f=&r;
    f -> pf();
    return 0;
}
```

Here, the base class is figure and the rectangle is a derived class. When pf() function is defined as virtual function the base pointer executes base class function pf(). But when it is not declared as a virtual function then it executes the derived class function pf(). Thus virtual function is important. We can see the output in the below image.

```
joy@joy-x510unr:~/git/CE-Minor/OOP_SEM4/Special_Assignment$ g++ 3.cpp
joy@joy-x510unr:~/git/CE-Minor/OOP_SEM4/Special_Assignment$ ./a.out

This is derived class
joy@joy-x510unr:~/git/CE-Minor/OOP_SEM4/Special_Assignment$ g++ 3.cpp
joy@joy-x510unr:~/git/CE-Minor/OOP_SEM4/Special_Assignment$ ./a.out

This is the base class.
joy@joy-x510unr:~/git/CE-Minor/OOP_SEM4/Special_Assignment$ []
```

4.

