CSC2111 Computer Science I Lab

Lab 06

Objectives

1. Classes and Data Abstraction
2. User-defined classes
3. Implementation of a class in separate files

Example

- Write a program to define the class circle and implement the basic properties of a circle into files for implementing, the class (header file), defining the functions of the class (cpp file that maps to the header file), and testing the class by a driver program (cpp file with a main function).

Solution

Put your class definition and member variables and member functions porotypes in a header file with the same name of your class.

```
// This is circle.h file
class circle
{
public:
    void setRadius(double r);//Function to set the radius.
    double getRadius();//Function to return the radius.
    double area();//Function to return the area of a circle.

    circle();//Constructor with a default parameter .The default value of the radius is 0.0;
    circle(double r);//parameterized Constructor. Create a circle with user defined radius.
    bool equal(circle& otherCircle) const;// compare this circle with another circle.
    void printCircle();//Print a circle information.

private:
    double radius;//private variable
};
```

```cpp
//Implementation for circle class in circleImp.cpp
#include <iostream>
#include <iomanip>
#include "circle.h"
using namespace std;

void circle::setRadius(double r)
{
    if (r >= 0)
        radius = r;
    else
        radius = 0;
}

double circle::getRadius()
{
    return radius;
}

double circle::area()
{
    return 3.1416 * radius * radius;
}
circle::circle()
{
    radius = 0;
}
circle::circle(double r)
{
    radius = r;
}
bool circle::equal(circle& otherCircle) const
{
    return(radius == otherCircle.radius);
}
void circle::printCircle()
{
    cout << "The radius of circle is " << radius << endl;
}
```

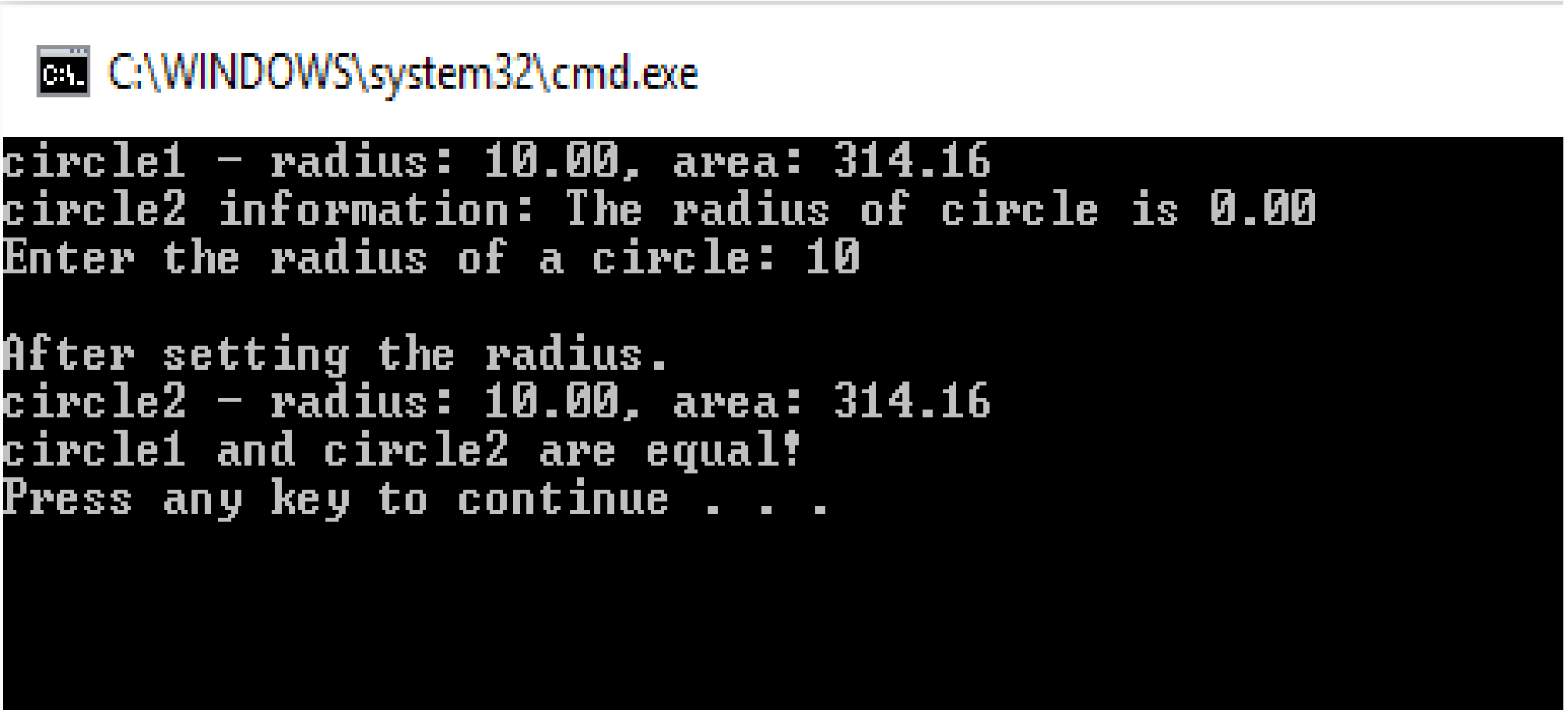
Create another file lets say circleImp.cpp and include your class header file into it then implement all member functions of your class in this file

```cpp
//Implementation for driver program in mainProgram.cpp
#include <iostream>
#include <iomanip>
#include "circle.h"
using namespace std;
int main()
{
    circle circle1(10);
    circle circle2;

    double radius;

    cout << fixed << showpoint << setprecision(2);

    cout << "circle1 - "
        << "radius: " << circle1.getRadius()
        << ", area: " << circle1.area()
        << endl;

    cout << "circle2 information: ";
    circle2.printCircle();


    cout << "Enter the radius of a circle: ";
    cin >> radius;
    cout << endl;

    circle2.setRadius(radius);

    cout << "After setting the radius." << endl;
    cout << "circle2 - "
        << "radius: " << circle2.getRadius()
        << ", area: " << circle2.area()
        << endl;
    if (circle1.equal(circle2))
        cout << "circle1 and circle2 are equal! \n";
    else
        cout << "circle1 and circle2 are unequal! \n";
    return 0;
}//end main
```

Create a driver program with the main() function in another cpp file lets say mainProgram.cpp and include your class header file into it. Now you can create objects based on your new class and use corresponding actions by calling its member functions.

Keep all three files in the same subdirectory unless compiler

Output


C:\WINDOWS\system32\cmd.exe
circle1 - radius: 10.00, area: 314.16
circle2 information: The radius of circle is 0.00
Enter the radius of a circle: 10
After setting the radius.
circle2 - radius: 10.00, area: 314.16
circle1 and circle2 are equal!
Press any key to continue . . .