

Object Oriented Programming

Lecture 5

Dr. Naveed Anwar Bhatti

Webpage: naveedanwarbhatti.github.io



Separation of *interface* and *implementation*





Separation of interface and implementation

- Public member function exposed by a class is called interface
- Separation of implementation from the interface is good software engineering



Separation of interface and implementation

- Usually functions are defined in implementation files (**.cpp**) while the class definition is given in header file (**.h**)
- Some authors also consider this as separation of interface and implementation



Rectangle.h

```
class Rectangle
{
    int width, height;
public:
    Rectangle& set_width(int width);
    Rectangle& set_height(int height);
    int area();
};
```



Rectangle.cpp

```
#include "Rectangle.h"

Rectangle& Rectangle::set_width(int width)
{
    this->width = width;
    return *this;
}

Rectangle& Rectangle::set_height(int height)
{
    this->height = height;
    return *this;
}

int Rectangle::area()
{
    return width * height;
}
```



main.cpp

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

#include "Rectangle.h"

int main()
{
    Rectangle r1;
    r1.set_width(10).set_height(10);
    cout << r1.area();
    return 0;
}
```

Overall Structure of the program



Rectangle.h



Rectangle.cpp



main.cpp



`const` Member Functions





const Member Functions

- There are functions that are meant to be read only
- There must exist a mechanism to detect error if such functions accidentally change the data member



const Member Functions

- Keyword **const** is placed at the end of the parameter list



const Member Functions

Declaration:

```
class ClassName
{
    ReturnVal Function() const;
};
```

Definition:

```
ReturnVal ClassName::Function() const
{
    ...
}
```



Example

```
class Rectangle
{
    int width, height;
public:

    int get_width() const
    {
        return width;
    }

    int get_height() const
    {
        return height;
    }
};
```



- Constant member functions cannot modify the state of any object
- They are just “*read-only*”
- Errors due to typing are also caught at compile time



Example

```
bool Rectangle::isWidth(int W) {  
    if (Width == W) {  
        return true;  
    }  
    return false;  
}
```



Example

```
bool Rectangle::isWidth(int W) {  
    /*undetected typing mistake*/  
  
    if (Width = W) {  
        return true;  
    }  
    return false;  
}
```




Example

```
bool Rectangle::isWidth(int W) const {  
    /*compiler error*/  
  
    if (Width = W) {  
        return true;  
    }  
    return false;  
}
```



- Constructors and Destructors cannot be **const**
- Constructor and destructor are used to modify the object to a well defined state



Example

```
class Rectangle{  
public:  
    Rectangle() const {}    //error...  
    ~Rectangle() const {}  //error...  
};
```



- Also, **constant member function** cannot access **non-constant member functions**



Example

```
class Rectangle
{
    int width, height;
public:
    int set_width(int a)
    {
        width=a;
    }
    int get_width() const
    {
        set_width(1);
    }
};
```



Error



this Pointer and const Member Function

- ***this*** pointer is passed as constant pointer to const data in case of constant member functions

instead of `Rectangle * const this;`
`const Rectangle *const this;`



this Pointer and const Member Function

`Rectangle* const this;`

Constant Pointer

`const Rectangle* this;`

Pointer to
Constant Data

`const Rectangle* const this;`

Constant Pointer
to Constant Data

Thanks a lot



If you are taking a Nap, **wake up**.....Lecture Over