







♠ / Design Patterns / Structural patterns / Decorator

Decorator in C++



Back to **Decorator** description

Decorator design pattern

- 1. Create a "lowest common denominator" that makes classes interchangeable
- 2. Create a second level base class for optional functionality
- 3. "Core" class and "Decorator" class declare an "isa" relationship
- 4. Decorator class "has a" instance of the "lowest common denominator"
- 5. Decorator class delegates to the "has a" object
- 6. Create a Decorator derived class for each optional embellishment
- 7. Decorator derived classes delegate to base class AND add extra stuff
- 8. Client has the responsibility to compose desired configurations

```
#include <iostream>
using namespace std;
// 1. "lowest common denominator"
class Widget
  public:
    virtual void draw() = 0;
};
class TextField: public Widget
    // 3. "Core" class & "is a"
    int width, height;
  public:
    TextField(int w, int h)
        width = w;
        height = h;
    /*virtual*/
    void draw()
        cout << "TextField: " << width << ", " << height << '\n';</pre>
};
// 2. 2nd level base class
class Decorator: public Widget // 4. "is a" relationship
    Widget *wid; // 4. "has a" relationship
  public:
    Decorator(Widget *w)
    {
        wid = w;
    }
    /*virtual*/
    void draw()
        wid->draw(); // 5. Delegation
    }
};
class BorderDecorator: public Decorator
{
  public:
```

```
// 6. Optional embellishment
    BorderDecorator(Widget *w): Decorator(w){}
    /*virtual*/
    void draw()
        // 7. Delegate to base class and add extra stuff
        Decorator::draw();
        cout << "
                    BorderDecorator" << '\n';</pre>
    }
};
class ScrollDecorator: public Decorator
{
  public:
    // 6. Optional embellishment
    ScrollDecorator(Widget *w): Decorator(w){}
    /*virtual*/
    void draw()
        // 7. Delegate to base class and add extra stuff
        Decorator::draw();
        cout << " ScrollDecorator" << '\n';</pre>
    }
};
int main()
  // 8. Client has the responsibility to compose desired configurations
  Widget *aWidget = new BorderDecorator(new BorderDecorator(new ScrollDecorator
    (new TextField(80, 24))));
  aWidget->draw();
}
```

Output

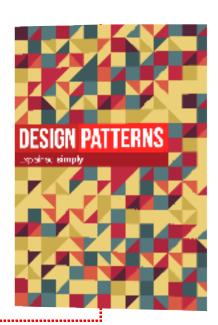
```
TextField: 80, 24
ScrollDecorator
BorderDecorator
BorderDecorator
```

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