# Module 10: "Decorator"





## Agenda

- ▶ Introductory Example: Rental Vehicles
- Challenges
- Implementing the Decorator Pattern
- Pattern: Decorator
- Overview of Decorator Pattern
- ▶ To Decorate or Not To Decorate?





# Introductory Example: Rental Vehicles

```
interface IVehicle
{
    string Make { get; }
    VehicleColor Color { get; }
}
```

```
abstract class Vehicle : IVehicle
{
   public string Make { get; }
   public VehicleColor Color { get; }
}
```

```
class Car : Vehicle
{
    public CarBodyStyle BodyStyle { get; }
    public int Doors { get; }
    ...
}
```

```
class Motorcycle : Vehicle
{
    public int Wheels { get; }
    public int Cc { get; }
    ...
}
```





### Challenges

- ▶ How do we add Rental state and behavior?
- How would we then subsequently add
  - Shop state and behavior?
  - ...?

Can we uphold the Single Responsibility Principle?





#### Pattern: Decorator

 Attach additional responsibilities to an object dynamically. Decorators provide a flexible alternative to subclassing for extending functionality.

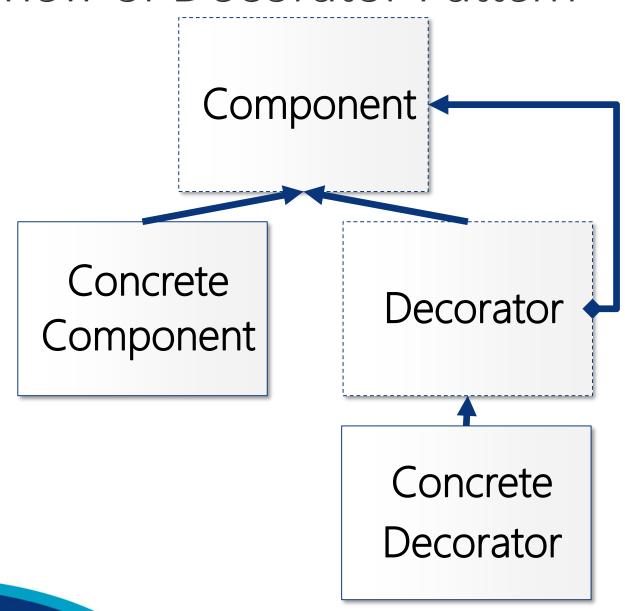
- Outline
  - Extend functionality without modifying existing classes
  - Avoid "explosion" in number of subclasses
  - Create add-on classes adding "aspect"

Origin: Gang of Four





#### Overview of Decorator Pattern





#### Overview of Decorator Pattern

- Component
  - Interface or abstract base class for class hierarchy
- Concrete Component
  - Concrete subclass in class hierarchy
- Decorator
  - Wraps an instance of Component
- Concrete Decorator
  - Adds concrete state or behavior





#### To Decorate or Not To Decorate?

#### Pros

- Decorator is central for upholding Single Reponsibility Principle of SOLID
- Can activate several decorators simultaneously
- Avoids exponential explosion of subclasses
- Can "wrap" legacy systems
- Can create decorators for "aspects"

#### Cons

- System design can get increasingly complicated
- End up with many quite similar classes





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