

Module 4.1: "Strategy"



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Agenda

- ▶ Introductory Example: Running a Bar
- ▶ Challenges
- ▶ Implementing the Strategy Pattern
- ▶ Pattern: Strategy
- ▶ Overview of Strategy Pattern
- ▶ Variation: Strategies as Delegates
- ▶ .NET Framework Example: Sorting Collections

Introductory Example: Running a Bar

```
enum Billing
{
    Normal,
    StudentDiscount,
    Regular
}
```

```
class Customer
{
    public BarTab Tab { get; }
    public Customer( Billing billing ) { ... }
    public void PlaceOrder( Order order ) { ... }
}
```

```
Customer customer = new Customer( Billing.Normal );
customer.PlaceOrder( new Order { Product = new Peanuts(), Count = 1 } );
customer.PlaceOrder( new Order { Product = new Beer(), Count = 3 } );
customer.PlaceOrder( new Order { Product = new PepsiMax(), Count = 2 } );

customer.Tab.Print();
```

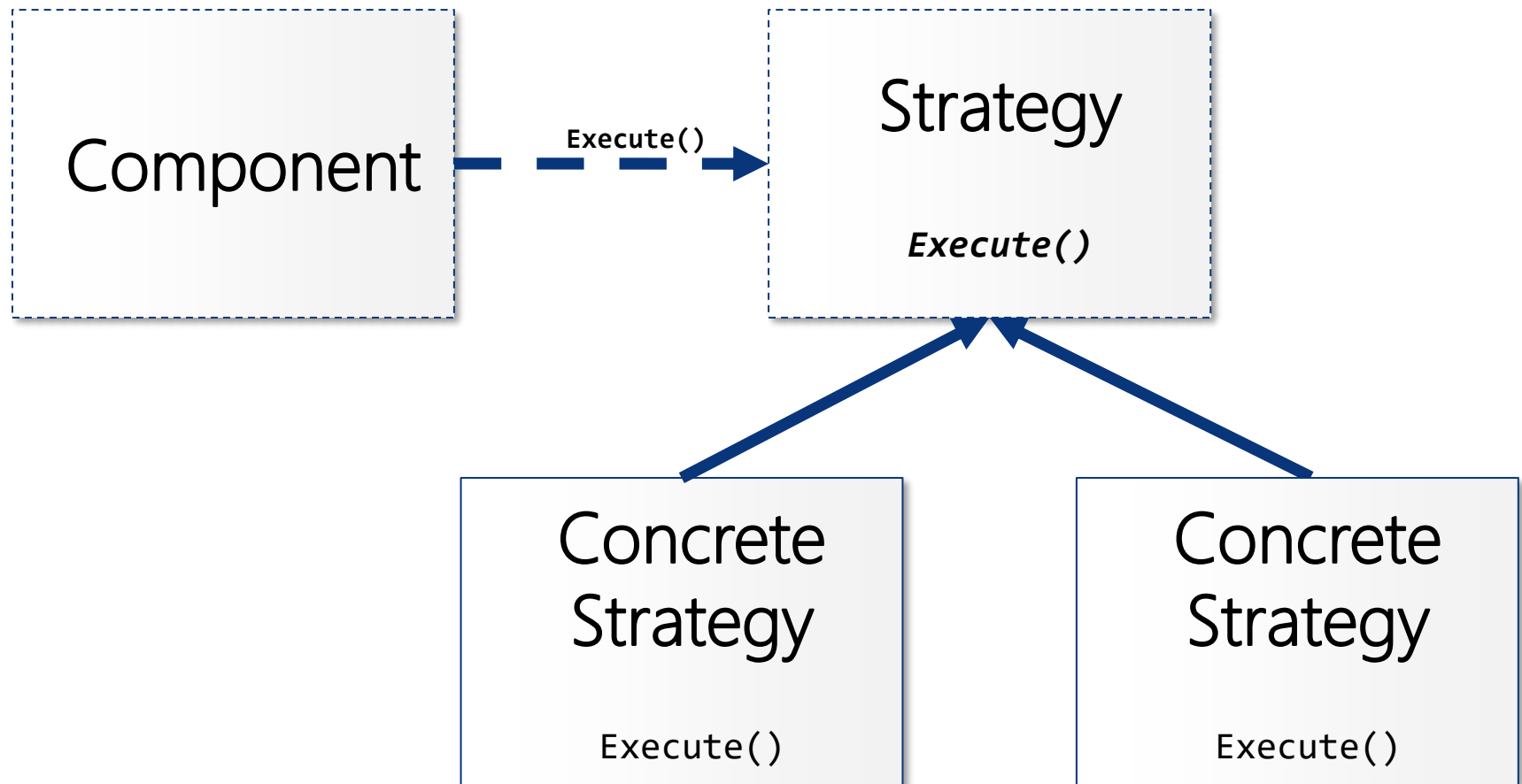
Challenges

- ▶ What if a new Billing options would be introduced?
 - Happy Hour?
 - Code will throw exception!
- ▶ Have to manually extend switch statement!
- ▶ Need to change other(!) classes
- ▶ Breaks the Open/Closed Principle
- ▶ A lot of ugly, unnecessary coupling!

Pattern: Strategy

- ▶ *Define a family of algorithms, encapsulate each one, and make them interchangeable. Strategy lets the algorithm vary independently from clients that use it.*
- ▶ Outline
 - Avoid unnecessary coupling
 - Configure a class with one of a family of algorithms at run-time
 - Strategy object implements algorithm
- ▶ Origin: Gang of Four

Overview of Strategy Pattern



Overview of Strategy Pattern

- ▶ Component
 - Concrete class parameterized by a Strategy supplied to it
 - Employs the Strategy by invoking **Execute()** whenever needed
- ▶ Strategy
 - Interface or abstract base class for algorithm declaring abstract **Execute()** method
- ▶ Concrete Strategy
 - Implements a concrete strategy in the **Execute()** method

Variation: Strategies as Delegates

- ▶ Strategies are essentially stateless “algorithm” objects
- ▶ In .NET we can implement Strategy using delegates
 - Method names
 - Anonymous Methods
 - Lambda Expressions
- ▶ Can either be
 - Injected into constructors
 - Passed as method arguments
 - Easier to change dynamically

Strategy vs. Template Method

- ▶ Strategy
 - Based on Composition
 - Can be change at run-time
 - No dictated algorithm structure

- ▶ Template Method
 - Based on Inheritance
 - Can be changed at compile-time only
 - Fixed predefined set of algorithm steps
 - Some can be refined
 - Can have a default pre-implemented functionality

.NET Framework Example: Sorting Collections

- ▶ Sorting collections implements comparisons as Strategy
 - **IComparable** or **IComparable<T>** are strategy interfaces

```
abstract class Product : IComparable<Product>
{
    public abstract string Name { get; }
    public abstract decimal SuggestedPrice { get; }

    public int CompareTo( Product other )
    {
        if (SuggestedPrice < other.SuggestedPrice) { return -1; }
        else if (SuggestedPrice > other.SuggestedPrice) { return 1; }
        else { return 0; }
    }
}
```



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