## If Time Permits:

Module 06: "Prototype"





## Agenda

- ▶ Introductory Example: Deck of Playing Cards
- Challenges
- ▶ Implementing Prototype Pattern with ICloneable
- Pattern: Prototype
- Overview of Prototype Pattern



# Introductory Example: Deck of Playing Cards

```
class Card
{
    public Suit Suit { get; }
    public Rank Rank { get; }
}
```

```
class Deck : IEnumerable<Card>
{
    private List<Card> _cards;
    ...
}
```

```
Deck deck = new Deck();
deck.SwapCards(10, 20);
deck.TakeCard();
deck.SwapCards(0, 30);
deck.SwapCards(1, 29);
deck.TakeCard();
deck.Shuffle();
Deck copy = ...; // ???
```



## Challenges

- Might be expensively, difficult, or even downright impossible to recreate copy of object with the same state
- Internal state might not be exposed externally to clients
- Might not want client to create new objects with constructor



### **ICloneable**

▶ .NET has ICloneable interface built-in for implementing Prototype Pattern

```
public interface ICloneable
{
    object Clone();
}
```



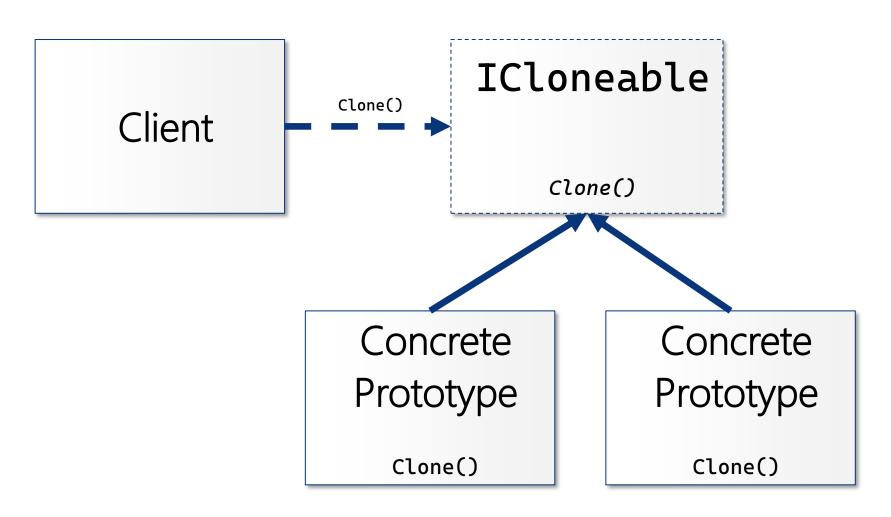
## Pattern: Prototype

Specify the kinds of objects to create using a prototypical instance, and create new objects by copying this prototype.

- Outline
  - Allow client to create copies of existing objects
  - Use **ICloneable** interface to let master object clone itself
- Origin: Gang of Four



## Overview of Prototype Pattern





## Overview of Prototype Pattern

#### ICloneable

- Interface pre-built into .NET
- Provides a Clone() method to be overridden in concrete prototypes
- Concrete Prototype
  - Implements **ICloneable** interface and supplies appropriate cloning logic
  - Might employ the **object.MemberwiseClone()** method built into .NET
    - Note: Beware of value types vs. reference types of elements
- Client
  - Invokes Clone() on Concrete Prototype to create a copy



