Reusing Code through Interfaces

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Overview

Understanding interfaces

Implementing and using interfaces

Interfaces and polymorphism

Understanding Interfaces

Remember abstract classes?

Can’t be instantiated

Can contain abstract methods

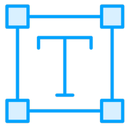
Guarantee to be implemented by inheriting classes

Introducing interfaces

Contract that must be implemented by classes use the interface

Contains definitions for set of related functionalities that classes must implement

Introducing Interfaces



Use interface keyword

Typically contain no implementation code, though possible since C# 8

Can’t be instantiated

Name typically starts with “I”

Members are public by default

```
internal interface ISaveable
{
    string ConvertToStringForSaving();
}
```

A First Interface

No implementation included for methods or properties

```
public class Order: ISaveable
{
    public string ConvertToStringForSaving()
    {
        return "Order";
    }
}
```

Implementing an Interface

By implementing the interface, we know (the contract) that the type has an implementation for the method(s)
Method must have same name and signature

```
ISaveable s1 = new ISaveable();//error
```

Instantiating an Interface

No implementation so no instantiation

Demo

Creating an interface

Implementing the interface

Implementing and Using Interfaces

Creating Interfaces

Methods

Properties

Events

Indexers

```
public interface ISaveable
{
    string Save();
    bool CanSave { get; set; }
    event EventHandler SaveableChanged;
}
```

A Real-world Interface

Implementing interfaces

- All members must be implemented
- One or more interface can be implemented
- Interfaces can inherit from other interfaces
  - All members from entire hierarchy must receive an implementation

Implementing Multiple Interfaces

```
public class Order: ISaveable, ILoggable
{

    public void Save()
    {
        ...
    }

    public void Log()
    {
        ...
    }
}
```

Implementing an Interface Explicitly

```
public class Order: ISaveable, ILoggable
{

    public void ISaveable.Save()
    {
        ...
    }

    public void ILoggable.Log()
    {
        ...
    }
}
```

Adding Implementations to an Interface

Possible but rarely used!

Demo

Implementing multiple interfaces

.NET Comes with Many Interfaces

IEnumerable

IDisposable

ICloneable

IComparable

IList/ICollection

ISerializable

The ICloneable Interface

```
namespace System
{
    //
    // Summary:
    //     Supports cloning, which creates a new instance of a class with the
    //     same value
    //     as an existing instance.
    public interface ICloneable
    {
        //
        // Summary:
        //     Creates a new object that is a copy of the current instance.
        //
        // Returns:
        //     A new object that is a copy of this instance.
        object Clone();
    }
}
```

```
public class Order: ISaveable, ICloneable
{

    public object Clone()
    {
        throw new NotImplementedException();
    }
}
```

Implementing ICloneable

Demo

Implementing ICloneable

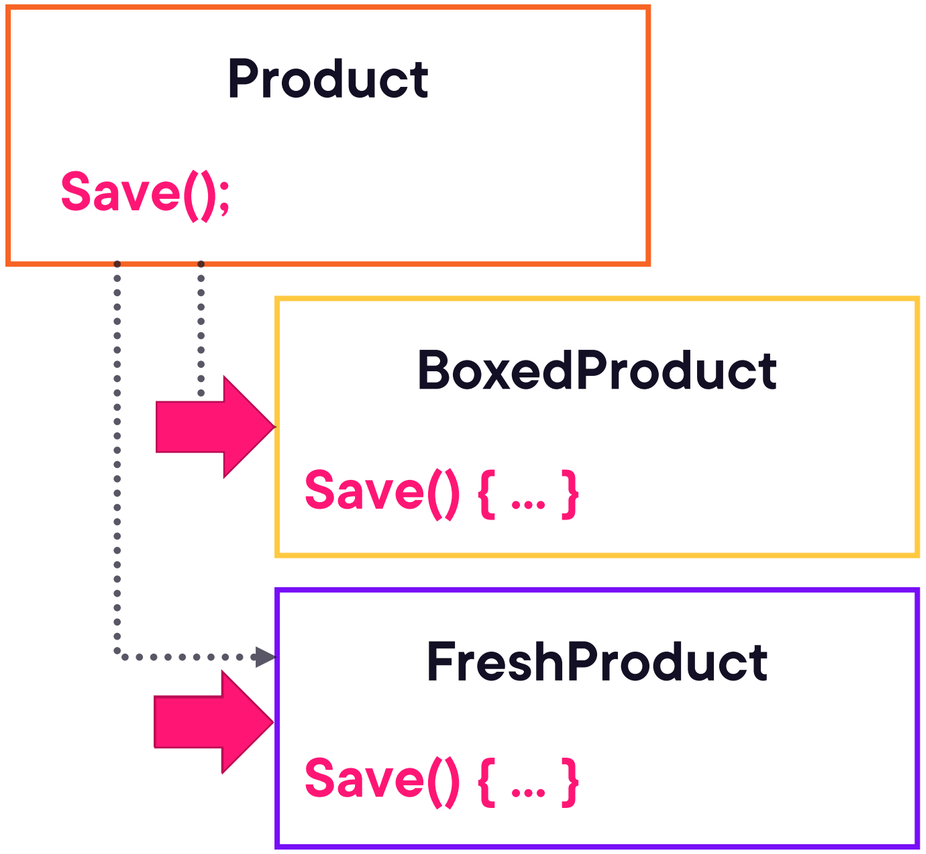
Interfaces and Polymorphism

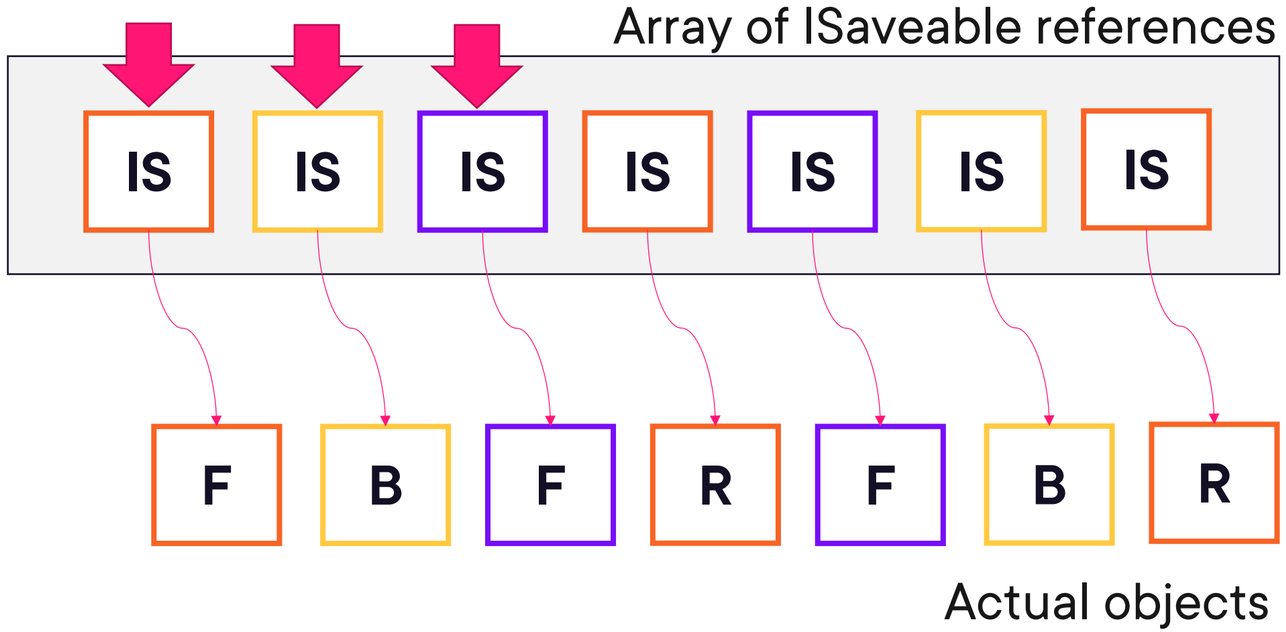
```
ISaveable s1 = new Product();
s1.Save();

s1.UseProduct();//error since not defined on ISaveable interface
```

Using an Interface Type Reference

Using Polymorphism with Interfaces

Working with an Array of Interface Variables





Demo

Using polymorphism with interfaces

Summary

Interfaces help with abstraction

Define a contract

Can be used in polymorphic way

.NET comes with many interfaces built-in

“Hey Bethany! The new application is ready.
Your staff can start using it!”

“Oh, that is great!

It works as expected, we won’t run out of stock anymore! No more days without pie!!”

Congratulations

on finishing this course!