Creating the Classes

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Overview

Creating the Product class

Using composition

Working with class-level members

Splitting into multiple partial classes

Creating the Product class

The Class Template

```
public class MyClass
{
    private int counter;

    public void MyMethod()
    {
        //Do something great here
    }
}
```

```
public class Product
{
    ...
}
```

The Product Class

The Class Access Modifiers

public

protected and private

internal

Can I leave out the access modifier?

internal by default

Also now default when creating a new class using Visual Studio

The Product Class: Data

Id

Name

Description

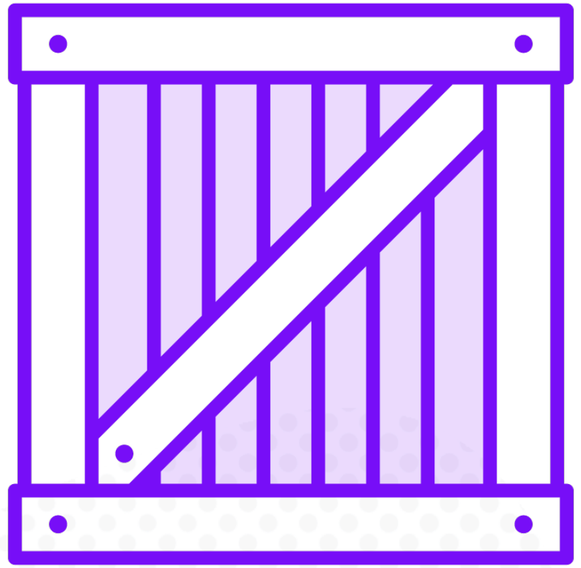
Maximum in stock

Price & currency

Unit type

Current amount in stock

Low on stock?



```
public class Product
{
    private int id;
    private string name = string.Empty;
}
```

Adding Fields (aka Instance Variables)

Typically, private (also default)
Hiding the information inside the class > Encapsulation
Must be accessed through methods or properties

Possible Access Modifiers on a Field

private

public

protected

internal

Using encapsulation

Change and access through public interface

Some data is never exposed and thus only used for inner workings

Through access modifiers, we apply encapsulation

Demo

Creating the class

Adding fields

The Product Class: Functionalities

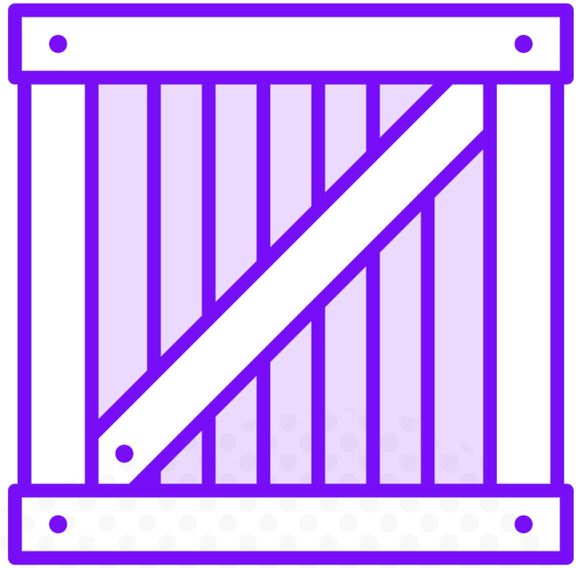
"Use" product

Add new product to inventory

Alert if low on stock

Display the details of a product (short & long)

Increase stock when order arrives



```
public class Product
{
    public void IncreaseStock()
    {
        amountInStock++;
    }
}
```

Adding a Method

Public if part of the public interface
Can work with private fields to change state of object they belong to

The Method Template

```
<access modifier> <return type> Method_Name (Parameters)
{
        //method statements
}
```

Demo

Adding methods

Using “getter and setter” Methods

```
public class Product
{
    private string name;

    public string GetName()
    {
        return name;
    }

    public void SetName(string n)
    {
        name = n;
    }
}
```

Can we only use methods?

Some data might need to be part of public interface of class

Properties wrap data and can control its value

```
public class Product
{
    public string Name
    {
        get { return name; }
        set
        {
            name = value;//custom logic can be included here
        }
    }
}
```

Using a Property

Combination of private field and public method
Contain get and set accessors
Can contain logic to check value

Analyzing a Full Property

```
public string Name
{
        get { return name; }
        set
        {
                name = value;
        }
}
```

Converting to Auto-Implemented Properties

Also known as automatic properties

Product.cs

```
public string Name
{
    get { return name; }
    set
    {
        name = value;
    }
}
```

Product.cs

```
public string Name { get; set; }
```

```
public string Name
{
     get {return name;}
}
```

◀ **Readonly property**

```
public string Name { get; private set; }
```

◀ **Private set**

Demo

Adding properties

Using properties inside the class

Creating Objects

```
Product product = new Product();
```

```
public Product()
{
    maxAmountInStock = 100;
    name = string.Empty;
}
```

Adding a Constructor

Used to instantiate an object with initial values

- Numeric to 0
- Char to '\0'
- Boolean to false
- References to null

What happens if we omit the constructor?

A default constructor is created for us

Only if we don’t include another constructor!

```
public Product()
{ }
```

The “Default” Constructor

Not visible
Not created when any other constructor is created

```
public Product(int id, string name)
{
    Id = id;
    Name = name;
}
```

Passing Parameters to the Constructor

Demo

Adding constructors

Do we always need to find unique names?

Combination of parameters (number, order, data types) must be unique

Names can be reused

Method overloading

```
public void IncreaseStock()
{
    AmountInStock++;
}

public void IncreaseStock(int amount)
{
    //implement method here
}
```

Using Method Overloading

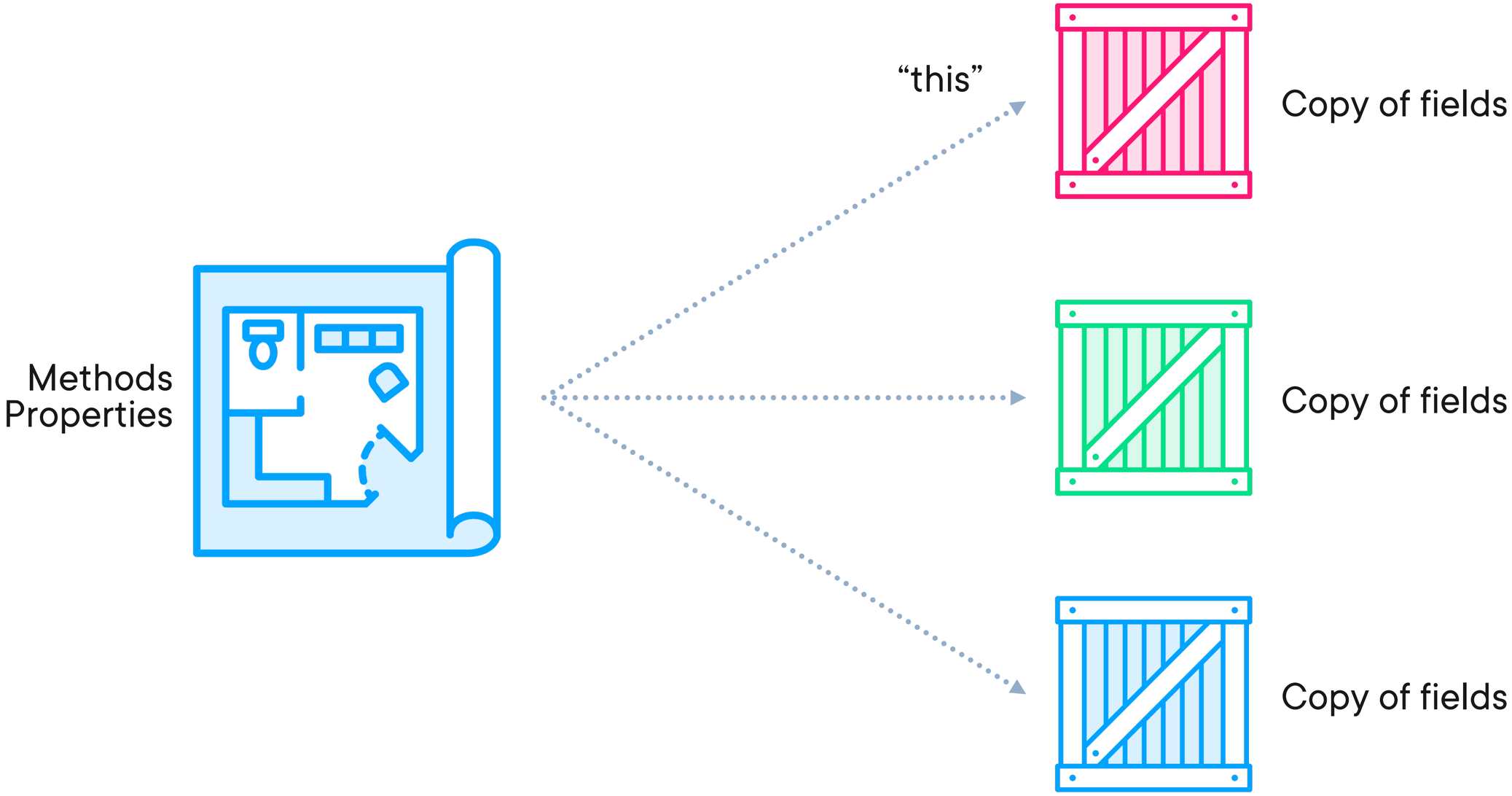
```
public Product(int id) : this(id, string.Empty)
{ }


public Product(int id, string name)
{
    Id = id;
    Name = name;
}
```

Using Constructor Overloading

Demo

Using method and constructor overloading

How Objects Are Created



```
public Product(int id, string name)
{
    this.Id = id;
    this.Name = name;
}
```

Working with this

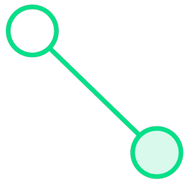
Demo

Using the this reference

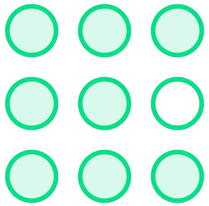
Using Composition

A Product “Has-A” Price

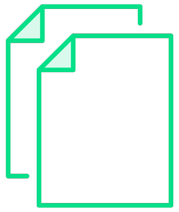
Using Composition



Association of objects of different classes



Type may not be able to exist standalone



Can be reused in multiple classes

Demo

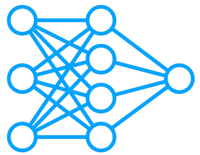
Adding the Price class

Applying composition

Splitting into Partial Classes

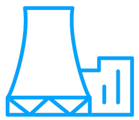
Using partial

Physically splitting up over multiple files



Classes, structs and interfaces support partial

Combined upon compilation



Useful if parts of the class are generated

Using the partial Keyword

Product.cs

```
public partial class Product
{
}
```

Product2.cs

```
public partial class Product
{
}
```

Demo

Creating a second Product class using partial

Adding the Order Class

Demo

Adding the Order class

Summary

Classes are the main building block in C#

Contain

- Fields
- Methods
- Properties
- Constructors

Encapsulation is applied using access modifiers

Composition creates the “Has-A” relation

Can be partial

Up Next:

Using and Testing the Classes