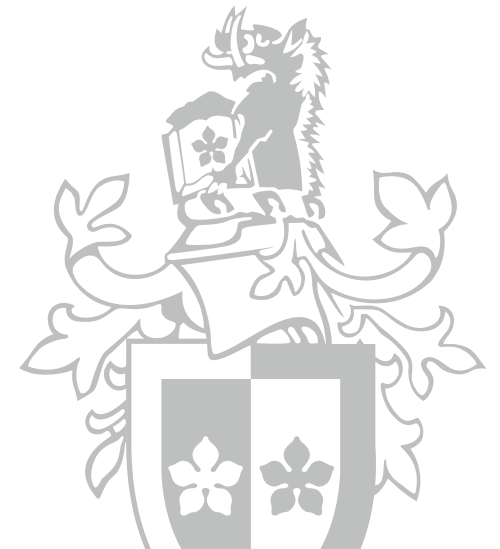


Framework Classes and Unit Testing

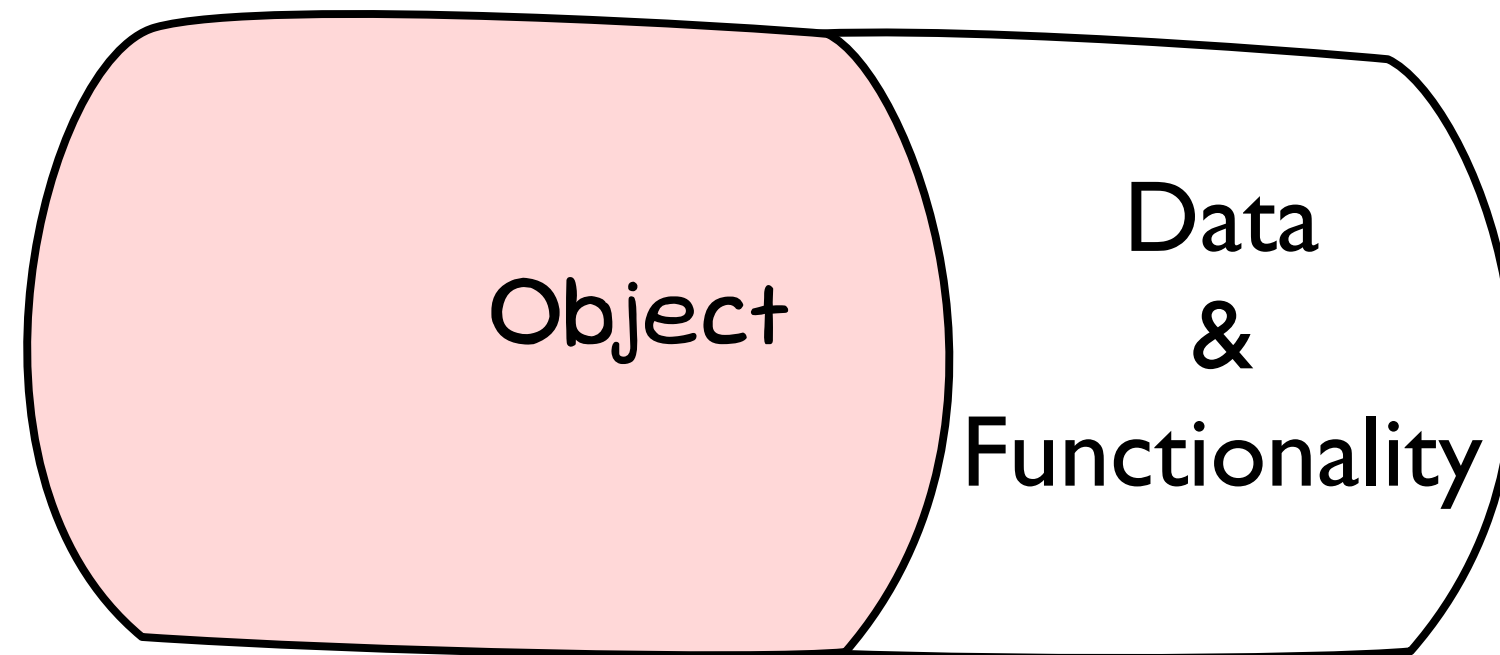
Charlotte Pierce



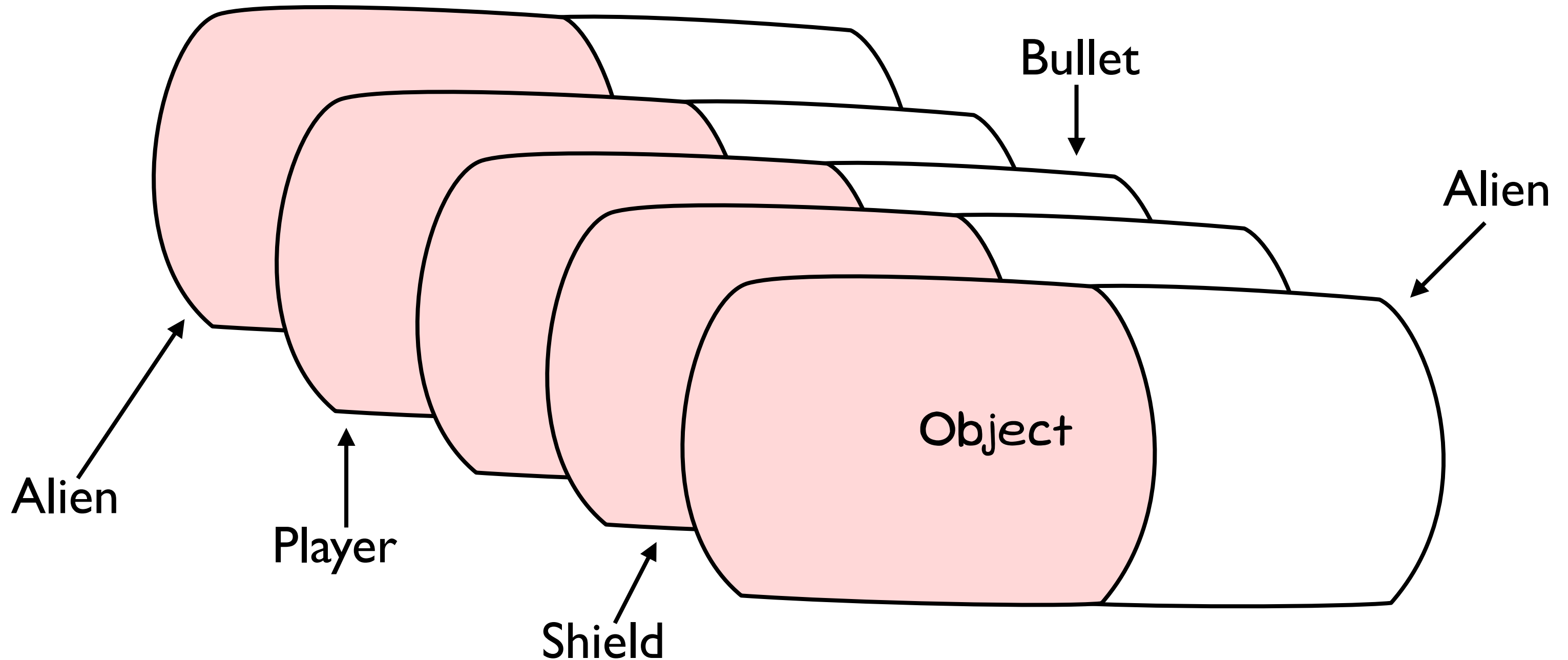
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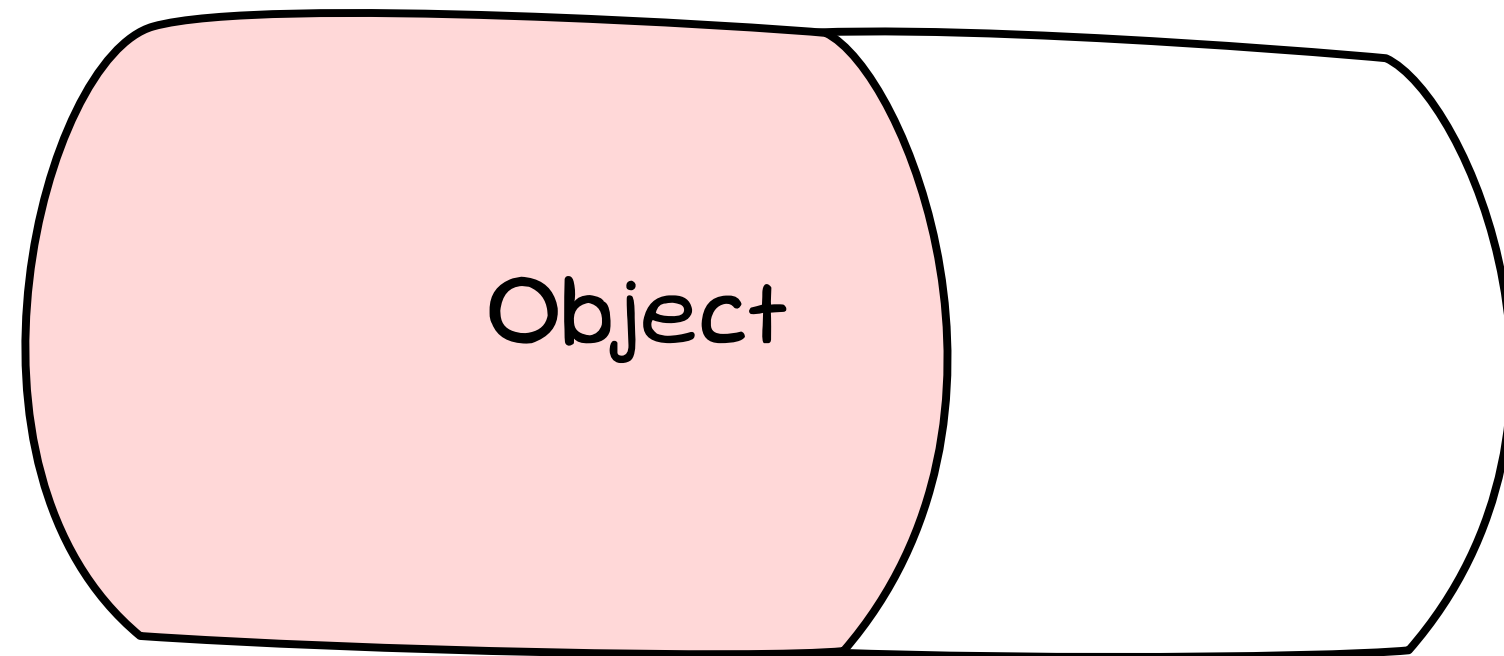
Objects know and can do things



Developers create programs using many objects that each perform a given role

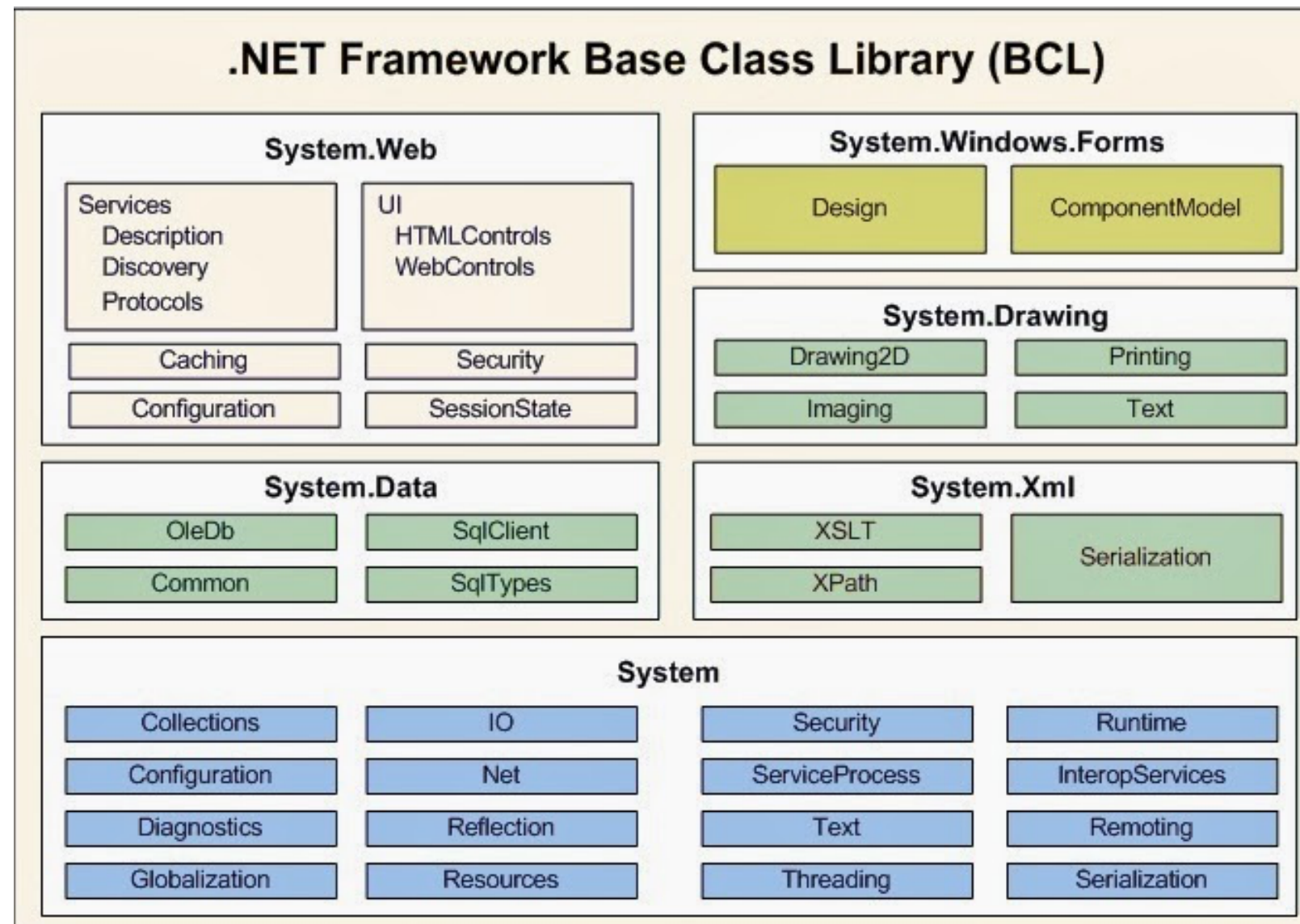


Many programs require the same kinds of objects — creating a range of common roles



List
Knows the objects it contains
Can add objects Can insert objects Can remove objects ...

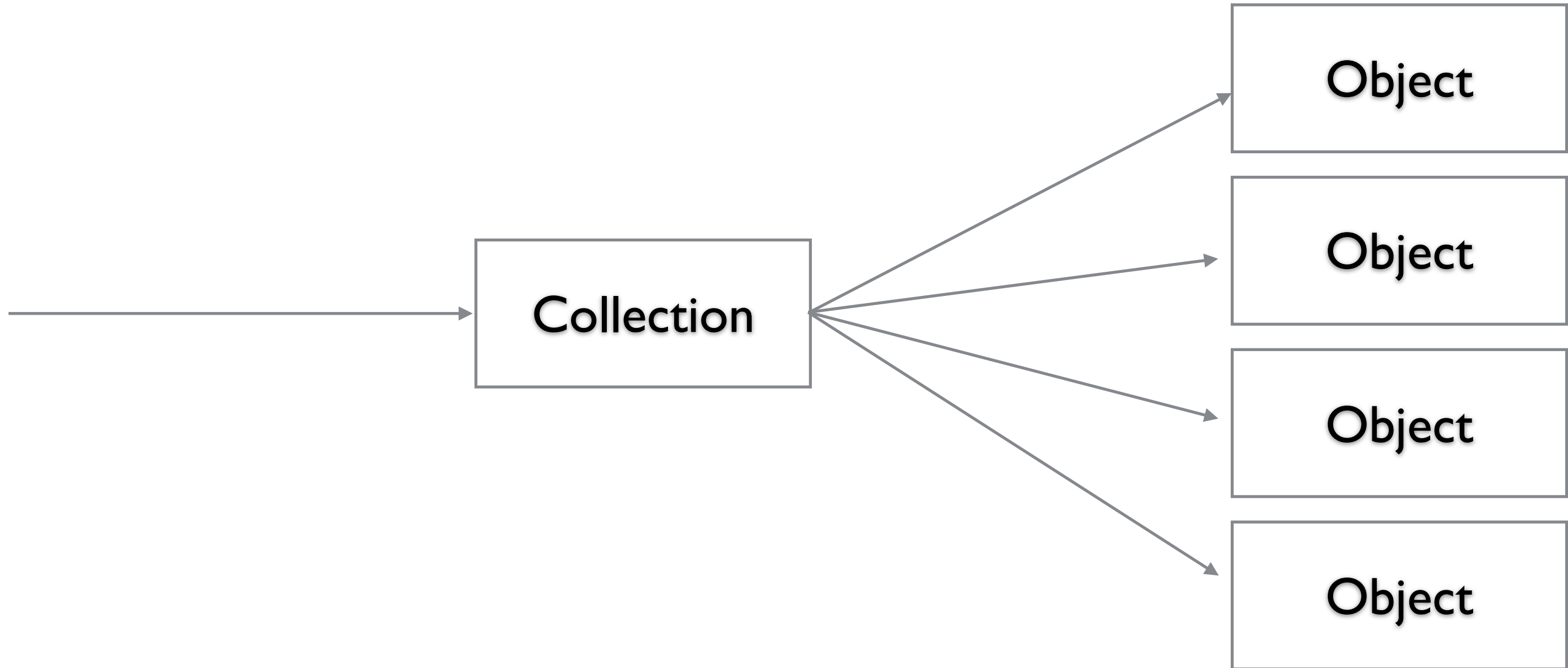
Reusable classes greatly help developers save time and avoid bugs



Use classes from the language's
class library to provide common
roles

Start using collection classes to
manage numbers of objects

Collection objects know a number of objects, and manage access to these for you



Use different collection types for different features based on how they store objects



List

Array

Index based access



Dictionary

Hash map

Key based access

Tell the collection the kind of data it will store

List <T>

Array

Index based access

T = type of data in array

Dictionary <K,V>

Hash map

Key based access

K = type of data for key

V = type of data for value

Demo - Collections

Unit Testing classes help automate
the testing process

The *xUnit* framework provides tools to perform unit testing in many languages

```
graph TD; xUnit[xUnit] --- NUnit[NUnit]; xUnit --- JUnit[JUnit]; xUnit --- OtherUnit[...Unit];
```

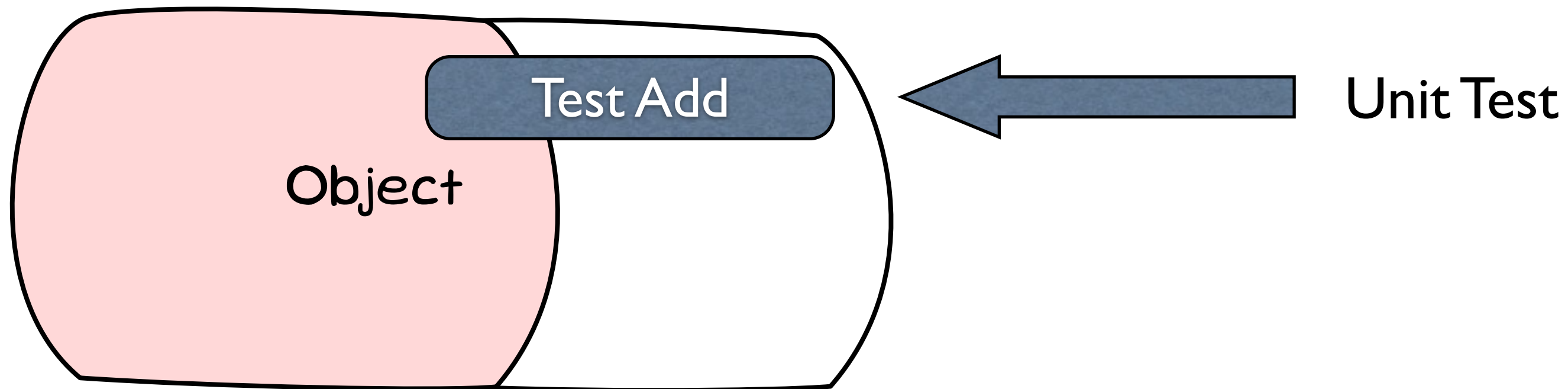
xUnit

NUnit

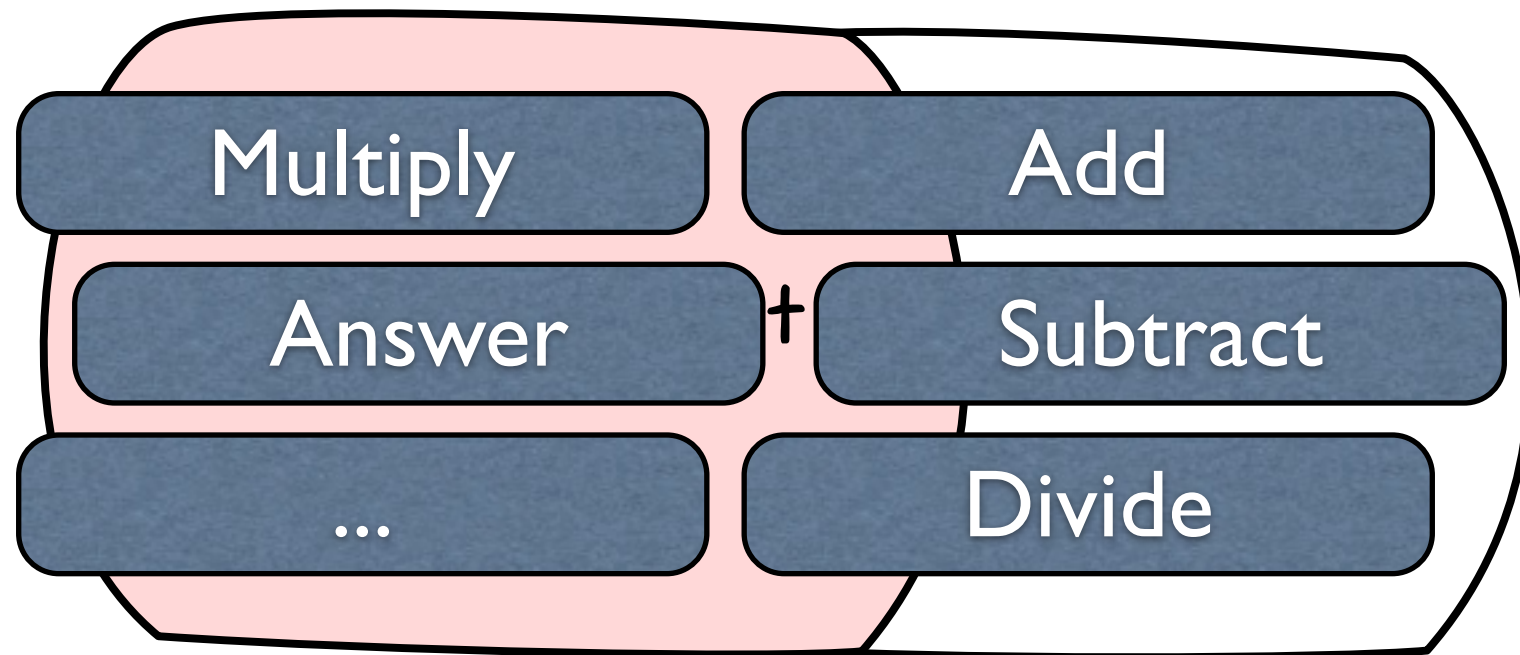
JUnit

...Unit

Each unit test represent a small testable part of your program



Use many small tests to check as much of the program functionality as possible



Create test fixtures that contain unit tests

```
[TestFixture()]
public class TestCalc
{
    [Test()]
    public void TestPush ()
    {
        RpnCalculator c = new RpnCalculator();
        int actual;

        c.Push(5);
        actual = c.Answer();

        Assert.AreEqual(5, actual);
    }
}
```



Setup

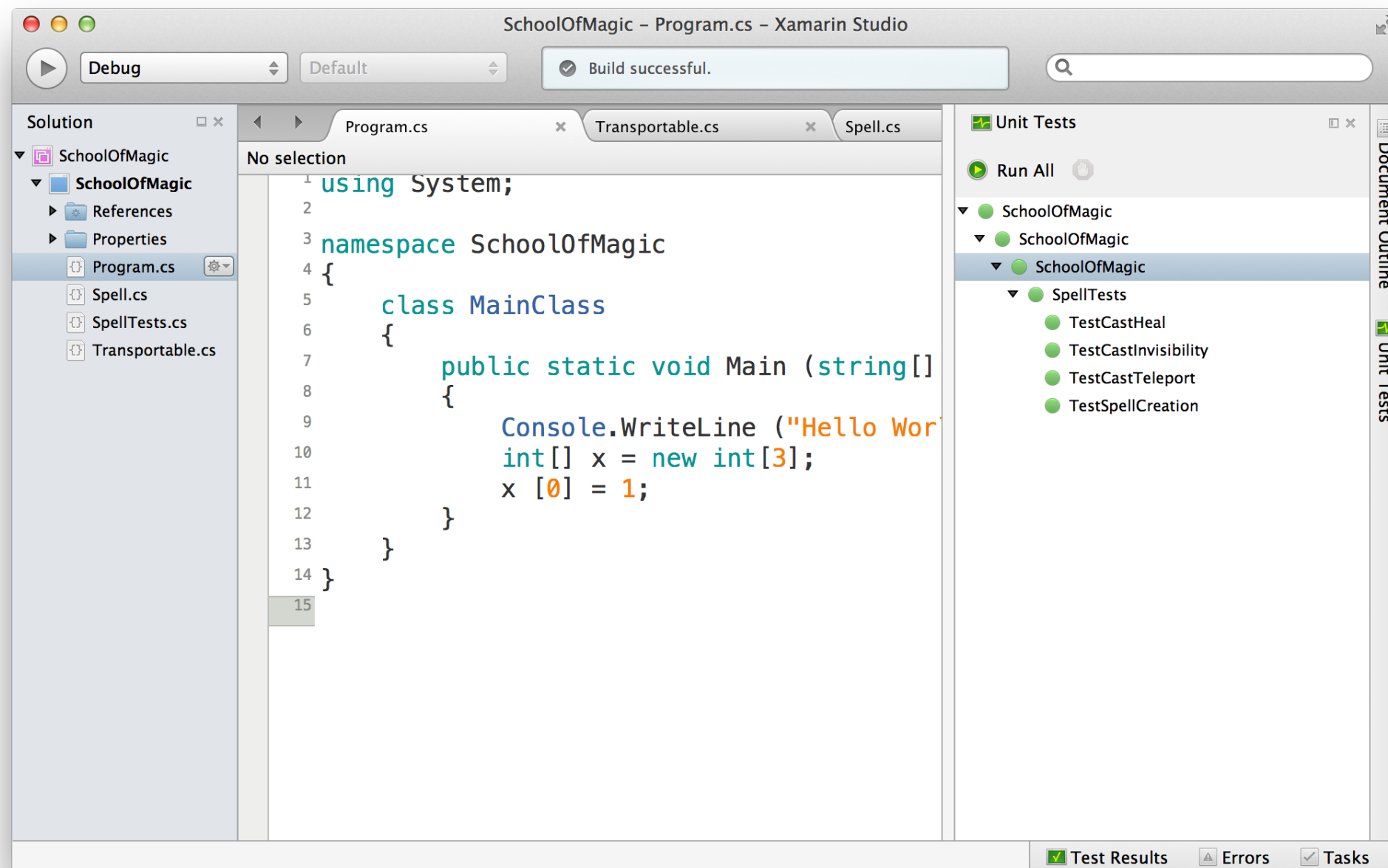


Perform

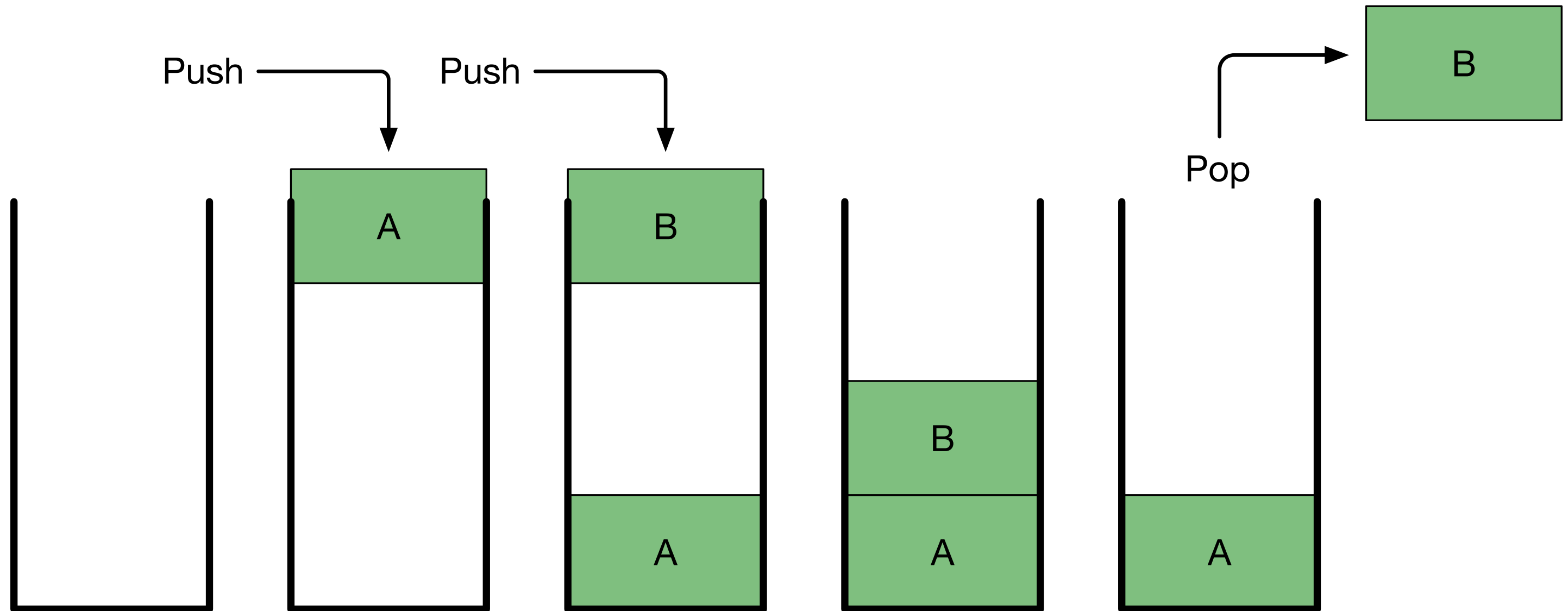


Check

Use the tools to run all of the tests each time you make changes

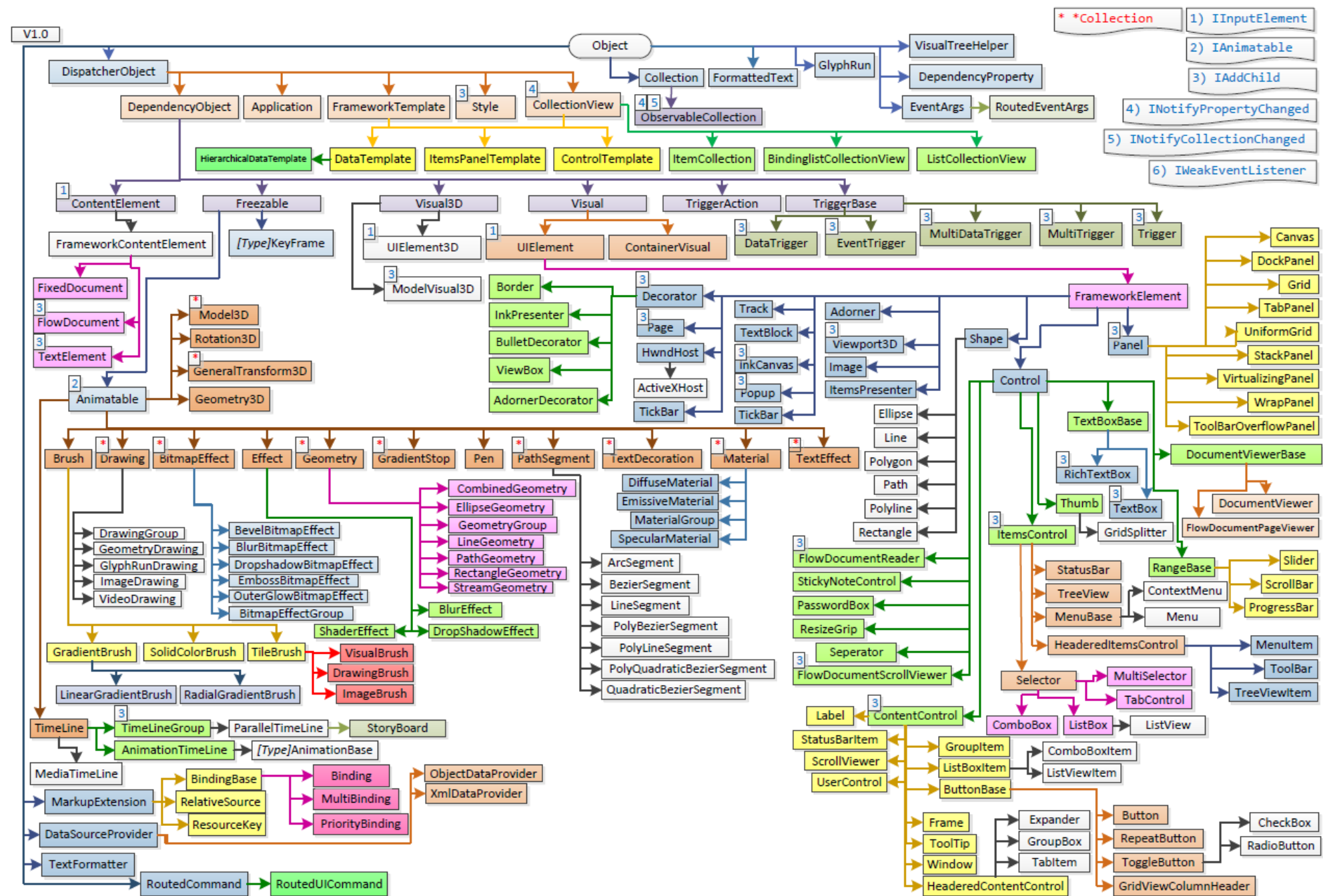


Demo - Creating and testing a Stack collection class



Explore other aspects of the class
library as you develop experience

Use visual objects from GUI frameworks to build user interfaces

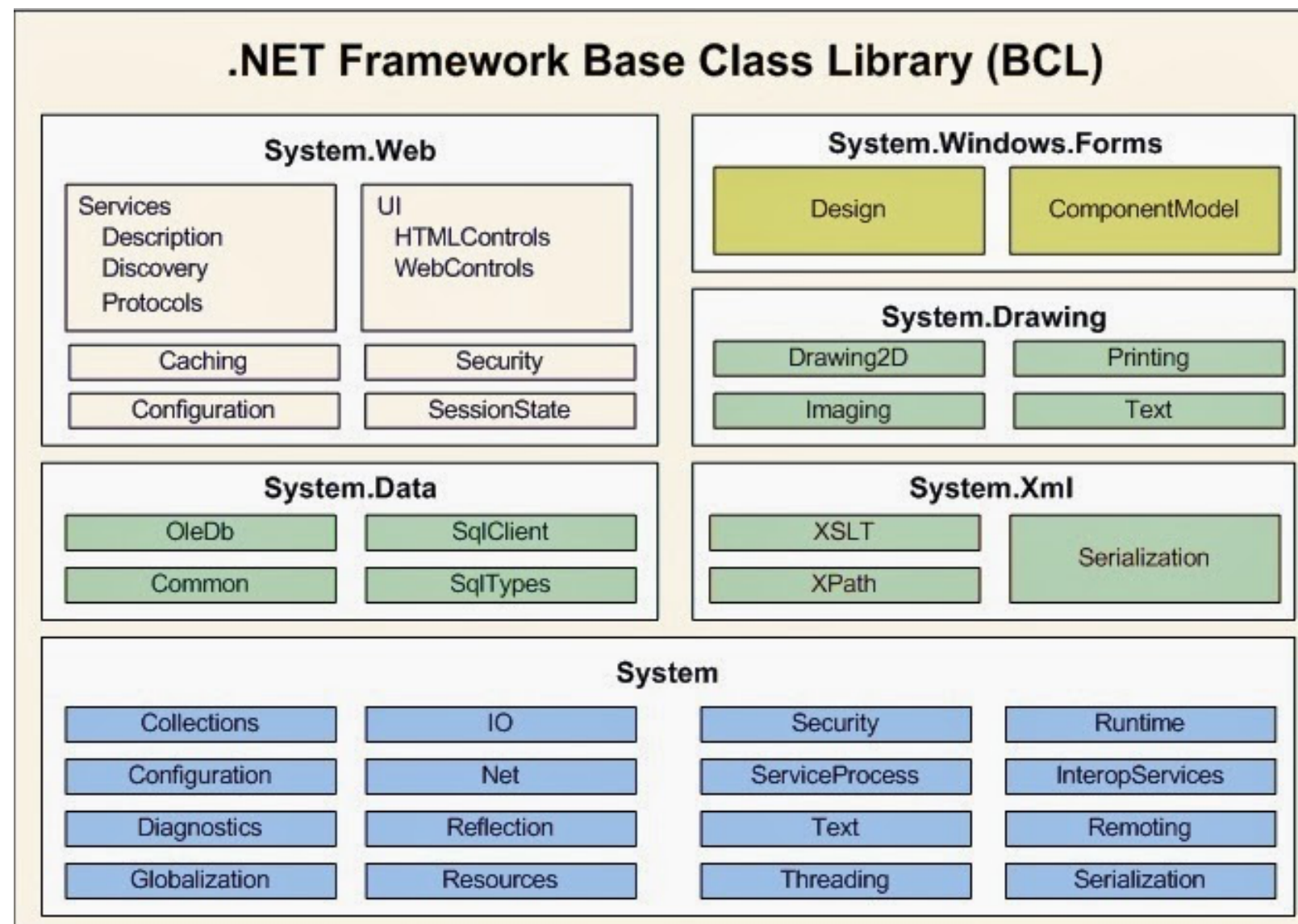


Data frameworks provide access to database and files



Order Table				
Order ID	Customer ID	OrderDate	Delivery Address	Status
12734	32762	2007/01/01	10 My Place, My Town, My Country 1234	Awaiting Payment
12735	18254	2007/01/01	11 My Place, My Town, My Country 1234	Shipped

... and the rest. Frameworks cover an extensive range of features.



Will the framework classes help you
implement your programs?

Some roles are likely to exist across
many different programs

Use classes from the language's
class library to provide common
roles

Don't reinvent things you can reuse
from the class library!