Introduction to .Net, C#, and Visual Studio

January 16, 2008

Coordinates

- Time: Wednesdays, 10-11am
- Place: 140 Fisher–Bennett Hall

- Instructor: Jeff Vaughan
- Office Hours: Tuesdays 2:00-3:00, 514 Levine Hall

- Website:
  `http://www.seas.upenn.edu/~vaughan2/cis399-005/`

Goals

- Learn C#
  - Core Language
  - Generics
  - .Net library ...
- Practice good software engineering
  - Good design
  - Clean code
  - Source control
  - Documentation ...

Problem Sets and Grading

- Course grade will be based entirely on problem set grades
- 5 Problem Sets
  - Emphasis on writing code
  - First four will ask you to do specific tasks
  - Last will be an open ended project
- Policies
  - Code *must* compile with Visual Studio Express 2008
  - Late Policy: -25% per day.
  - Cheating: Unpleasant for all involved.

Java and C# share many features

- Similar syntax, object model, runtime model, etc.
- Today: Learn basic C# features by analogy to Java.
- Throughout the semester: Learn advanced features of C#.

Java: Hello World

```
package greeting;

class Hello
{
    public static void main(String[] args)
    {
        System.out.println(GetText());
    }

    private static String GetText()
    {
        return "Hello World";
    }
}
```

Translating Hello World (I)

```
// Java package declaration
package greeting;

// C# namespace
namespace Greeting
{ ...
}
```

Namespaces contain classes and other other namespaces. Two different classes (or namespaces) with the same name may coexist in different namespaces.

Translating Hello World (II)

```
// Java and C#
class Hello{
  ...
}
```

Basic class declaration look the same in Java and C#.

Translating Hello World (III)

```
// Java
private static String GetText()
{
    return "Hello World";
}

// C#
private static string GetText()
{
    return "Hello World";
}
```

Identical, except that C# treats `string` as a keyword.

Translating Hello World (IV)

```
// Java
public static void main(String[] args)
{
    System.out.println(GetText());
}

// C#
static void Main(string[] args)
{
    System.Console.Out.WriteLine(GetText());
}
```

Unlike Java, a C# program's main method does not need to be public. (By default methods are private.)
In both cases, args is the list of strings provided as input on the command line.

C#: Hello World

```
namespace Greeting
{
    class Hello
    {
        static void Main(string[] args)
        {
            System.Console.Out.WriteLine(GetText());
        }

        private static string GetText()
        {
            return "Hello␣World";
        }
    }
}
```

More Syntax: Inheritance and Interface Syntax

```
class Animal { ... }

// .Net convention: name interfaces
// using IName format
interface IWarmBlood { ... }

interface IBackBone { ... }

// Uniform syntax for extending a base
// class and implementing an interface
class Mammal : Animal, IWarmBlood, IBackBone {
    ...
}
```

More details of class and object system later this semester...

More Syntax: Arrays

```
// Declare a new array
int[] myArray = new int[6];

// Declare and initialize an array
int[] myOtherArray = {2, 4, 6, 8, 10, 12};

// Iterate through an array
for( int i = 0; i < myOtherArray.Length; i++) {
    myArray[i] = myOtherArray[i];
}
```

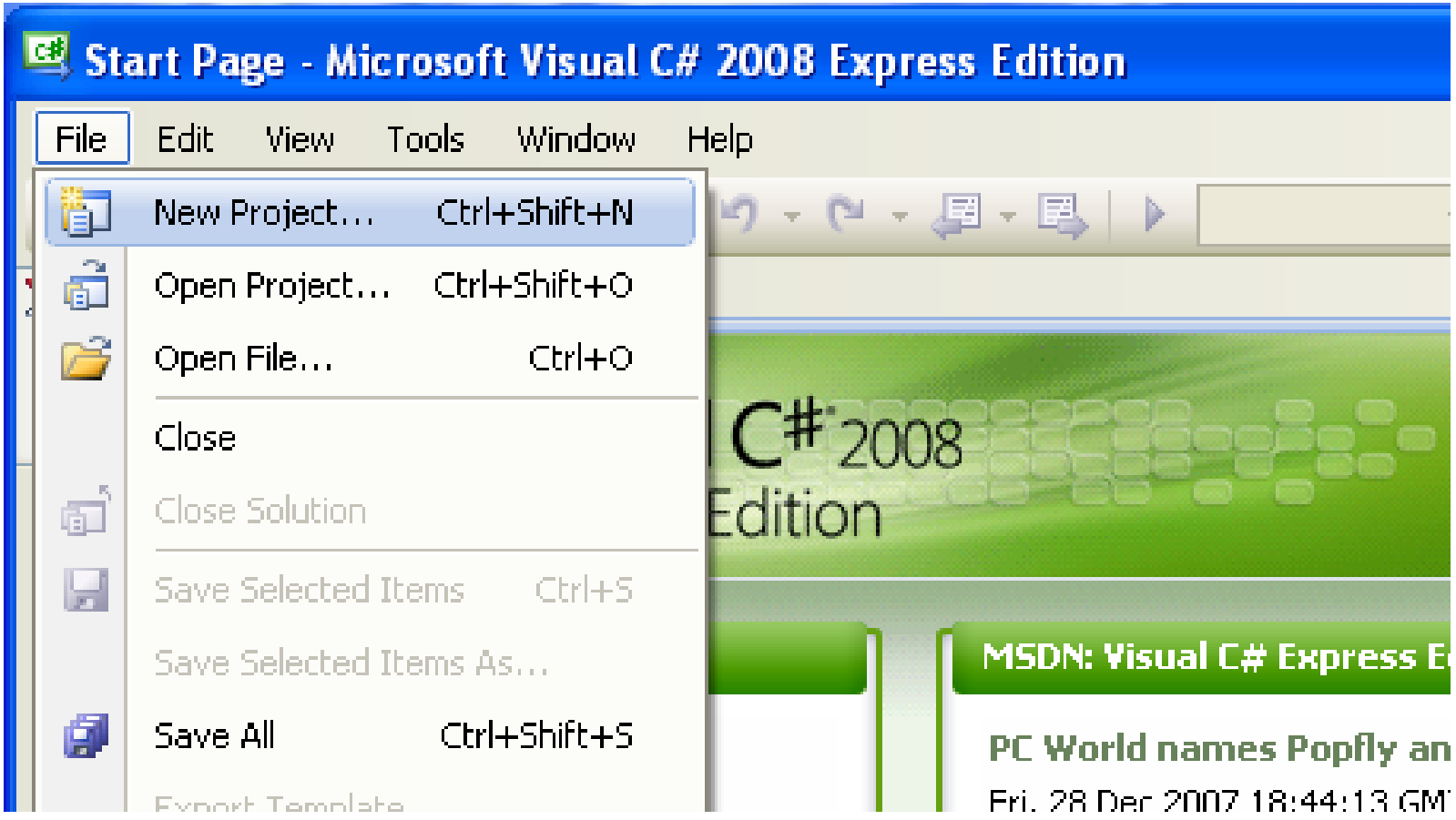
But we will learn about better ways to store data soon...

Course Software

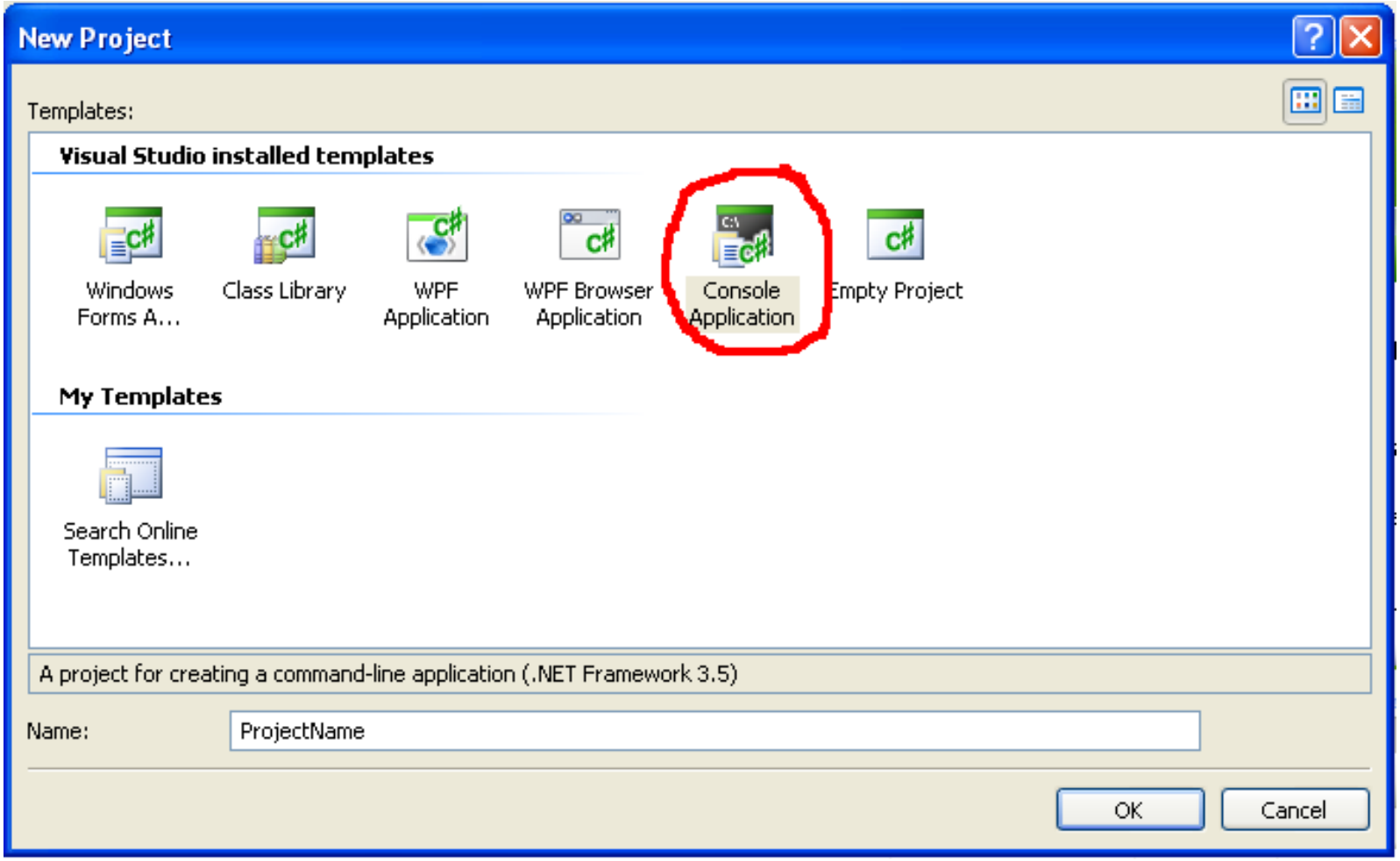
- Visual Studio Express 2008, C# edition, Microsoft's free compiler.
- NUnit 2.4.6, A framework for unit testing.

Links to both on the course website.

Creating a console app in Visual Studio



Creating a console app in Visual Studio



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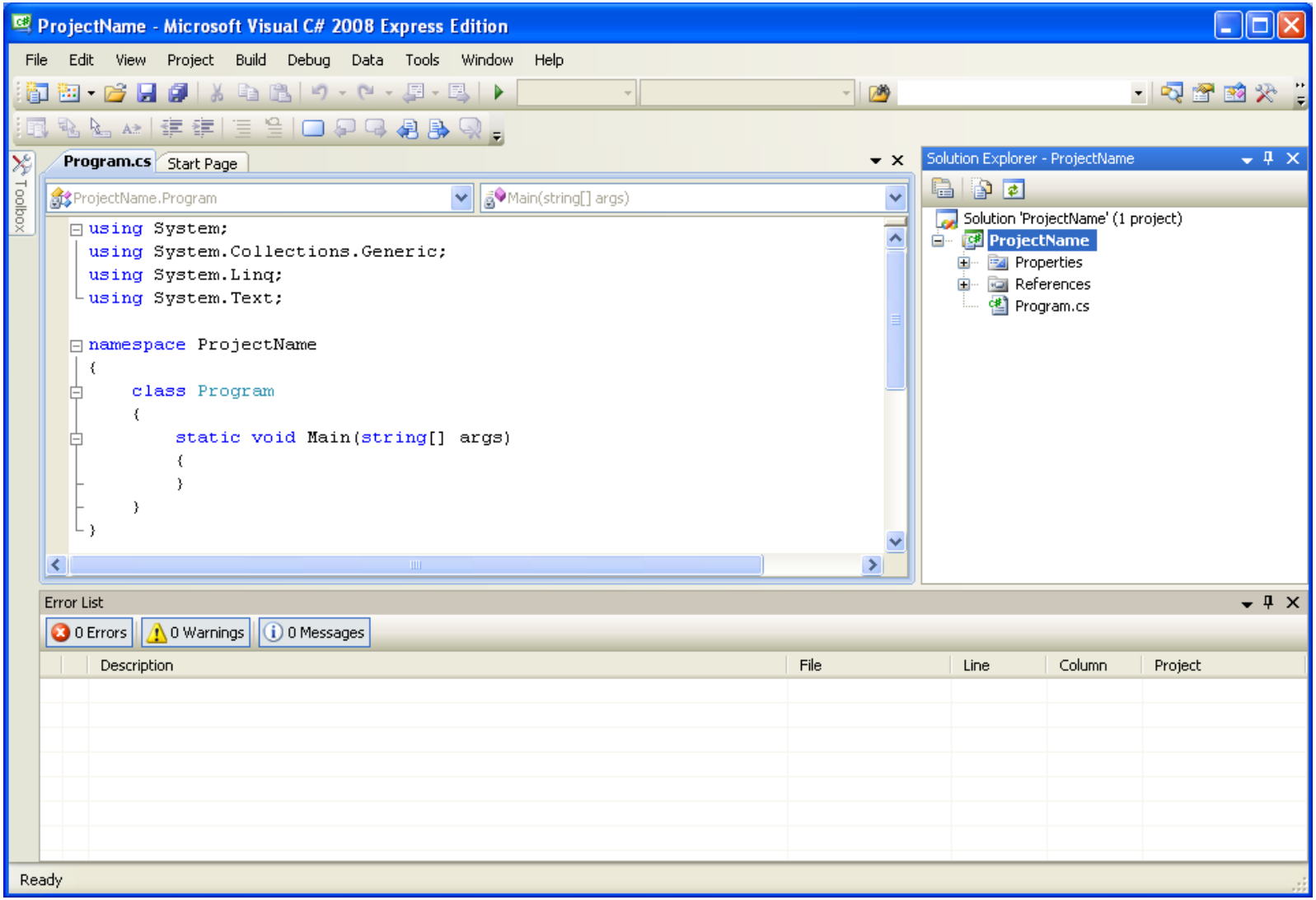


Visual Studio organizes files into Projects and Solutions

- Solutions (usually) correspond to file system directories
- Each solution contains one or more projects
- Projects contains items:
  - .cs files (which can represent normal objects, winforms, etc...)
  - references (e.g. nunit.framework),
  - *linq*s to databases
  - xml files...

NUnit is a tool for automated testing

- Programmer specify test methods using *attributes*.
- NUnit runs these methods and reports if *assertions* hold.
- Agile Programming Philosophy: Test every corner case, and run test cases after every time you compile!

NUnit example (I)

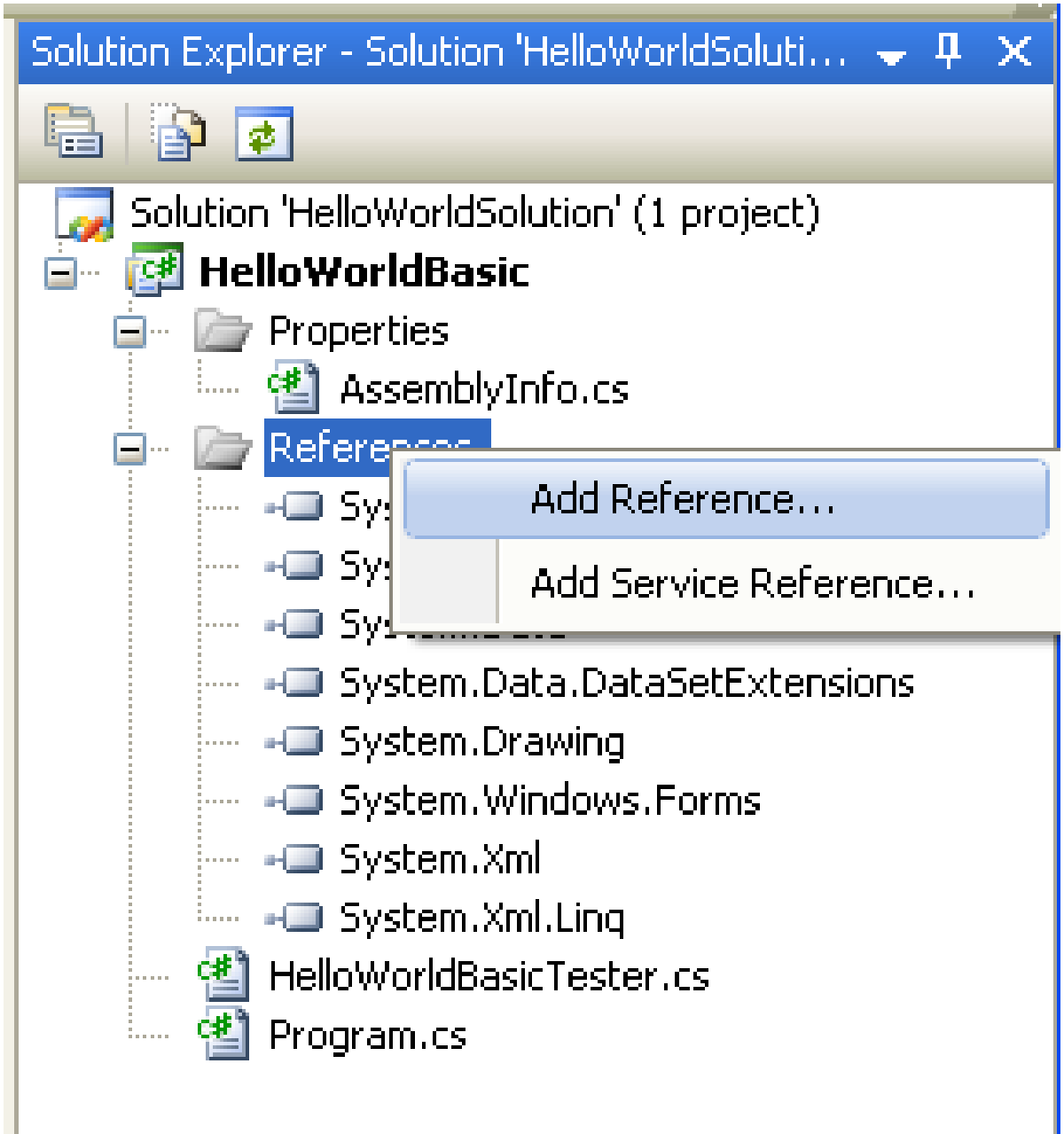
NUnit hooks into test code in your project.

```
using NUnit.Framework;

namespace Greeting
{
    [TestFixture]
    public class HelloTester
    {
        [Test]
        public void CorrectString()
        {
            Assert.AreEqual(Hello.GetText(),
                            "Hello␣World");
        }
    }
}
```

NUnit example (II)

Add Nunit.Framework as a reference for your project.



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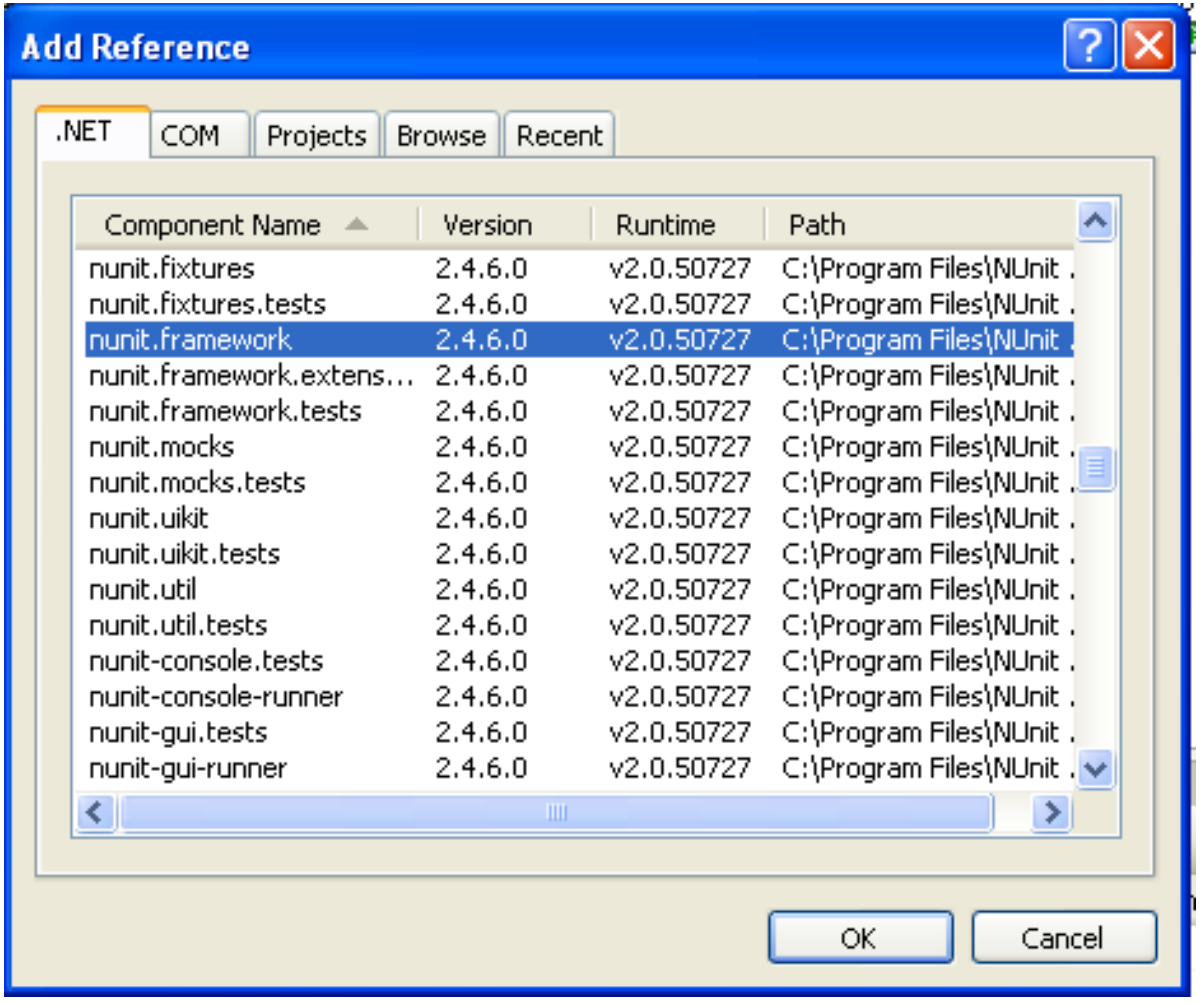

NUnit example (III)

Run tests from within the Nunit program.

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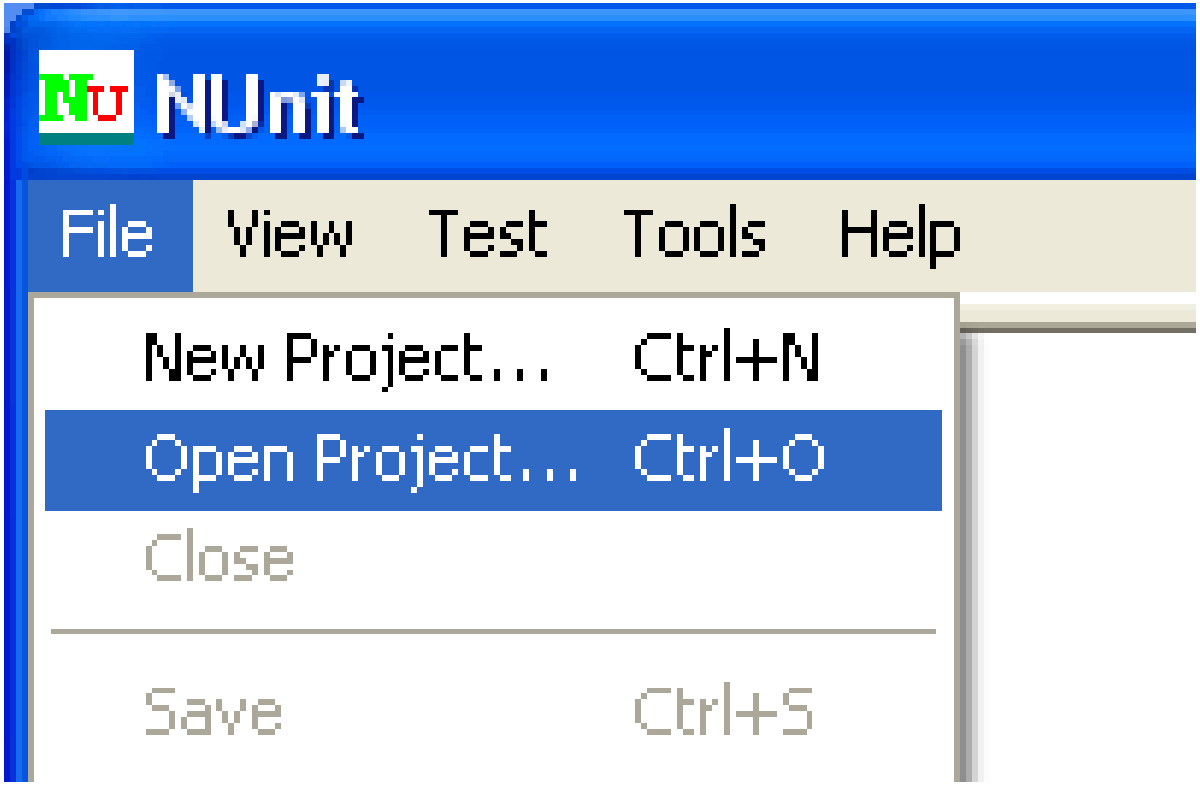

NUnit example (III)

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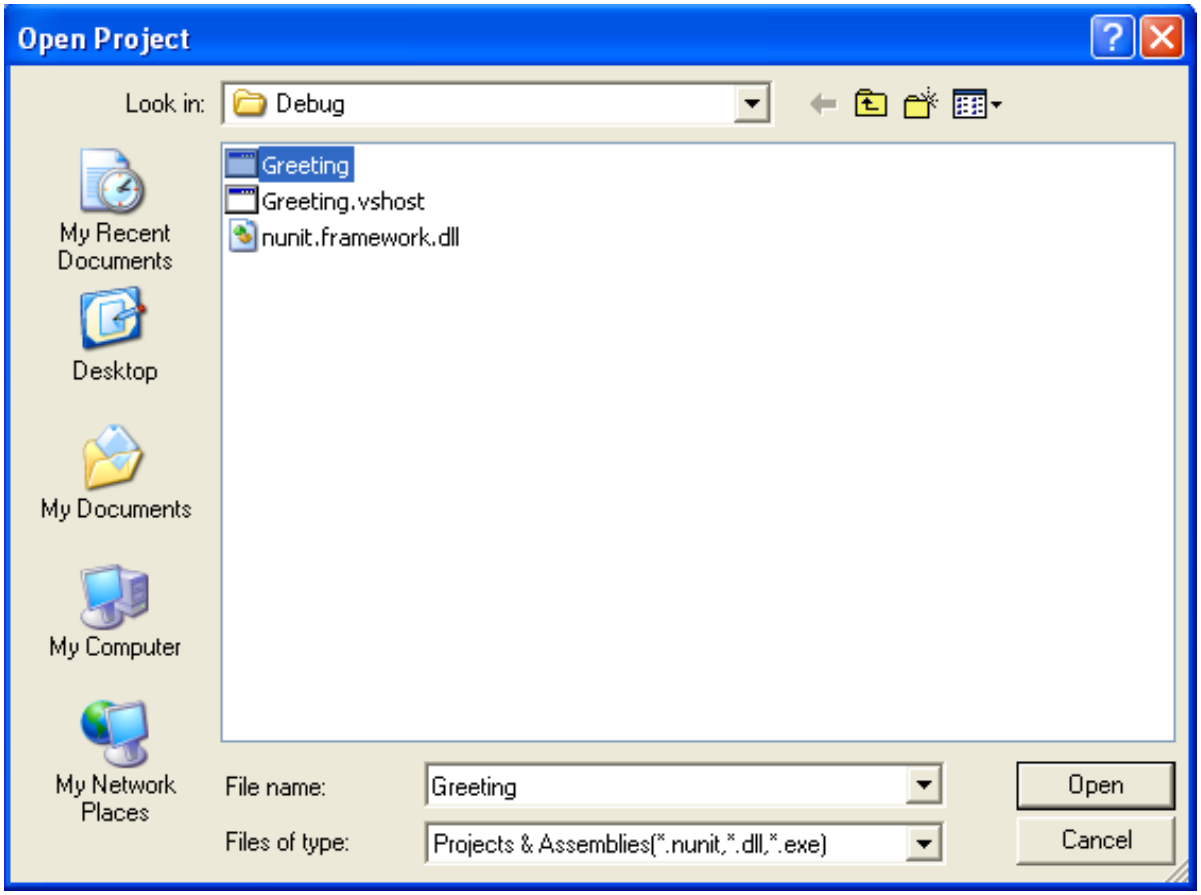

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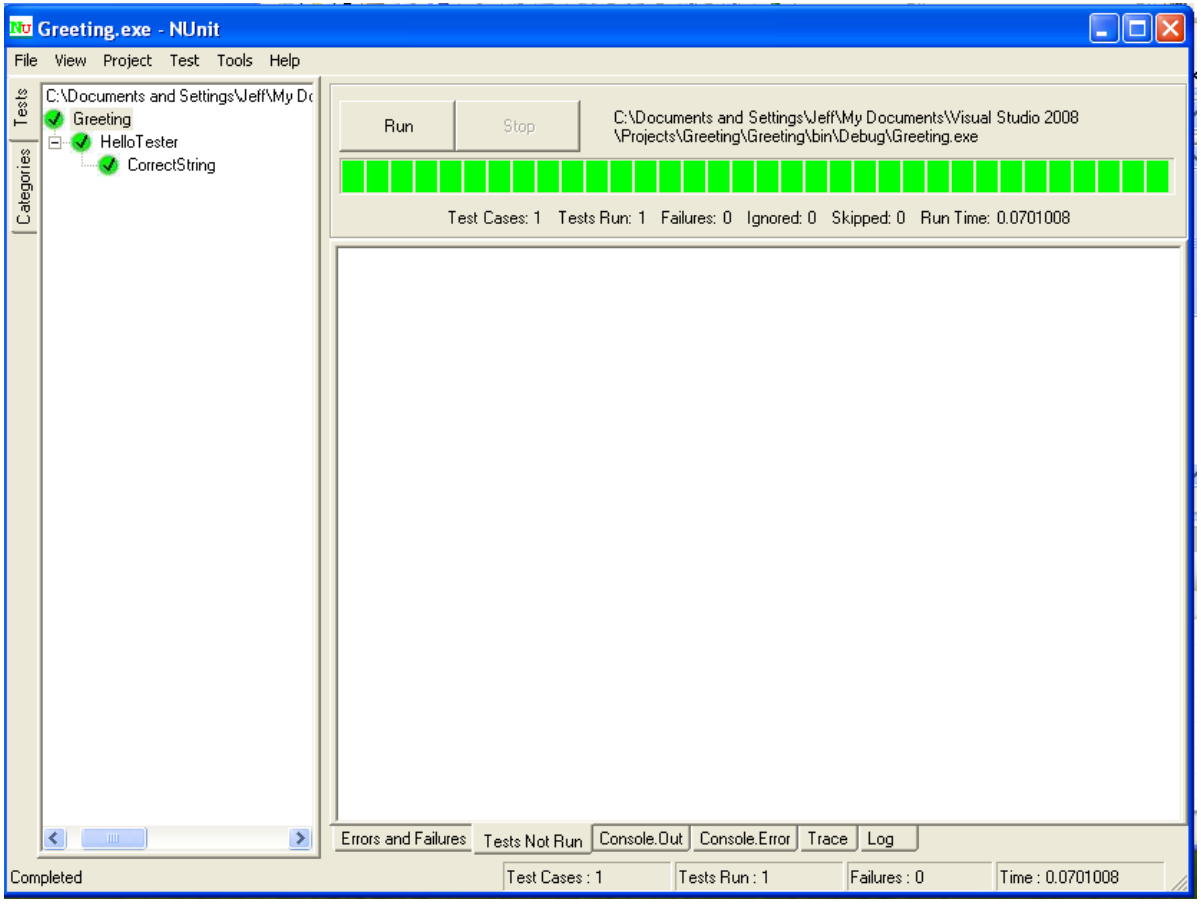

Problem Set 1

- First problem set available online today.
- Problem set is designed to get you setup for development.
- Due next Wednesday (1/23). Email your solution to me before class.