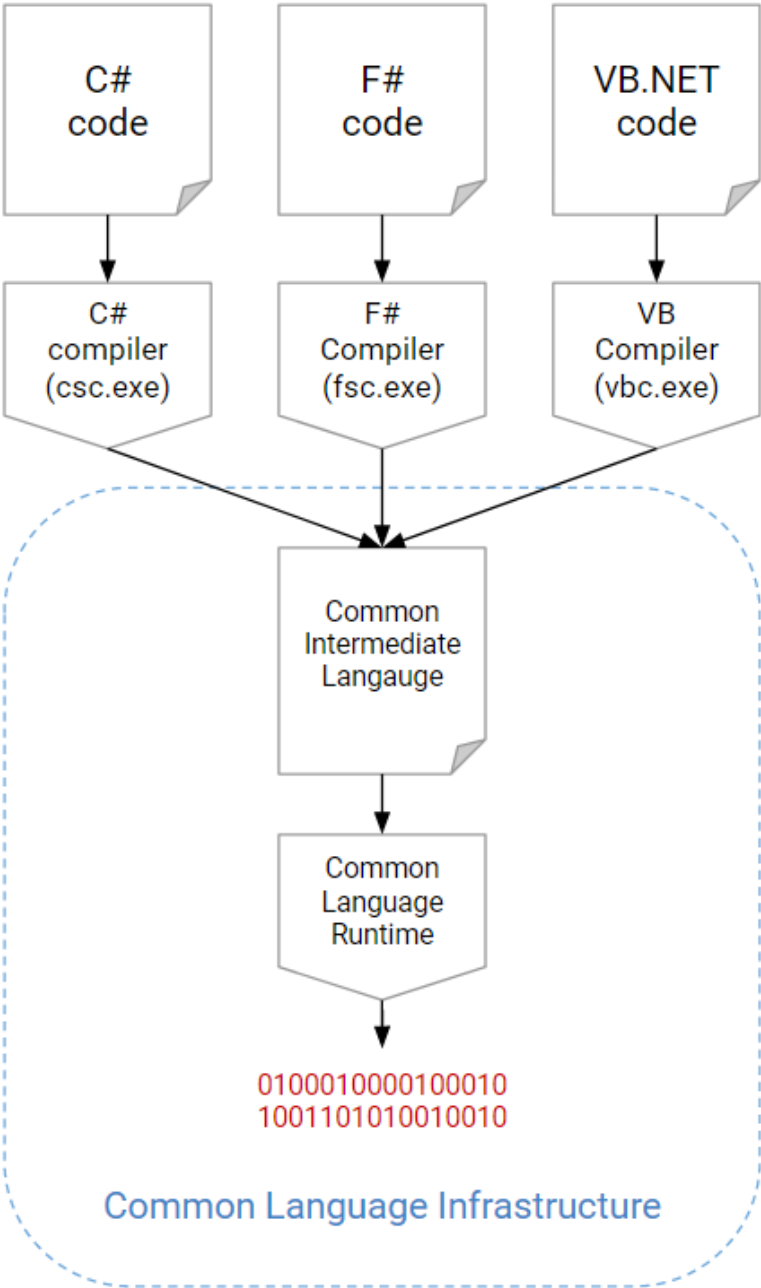
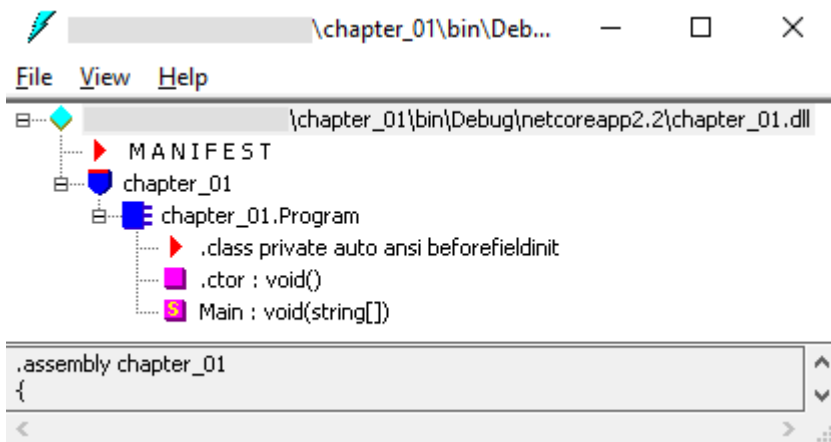
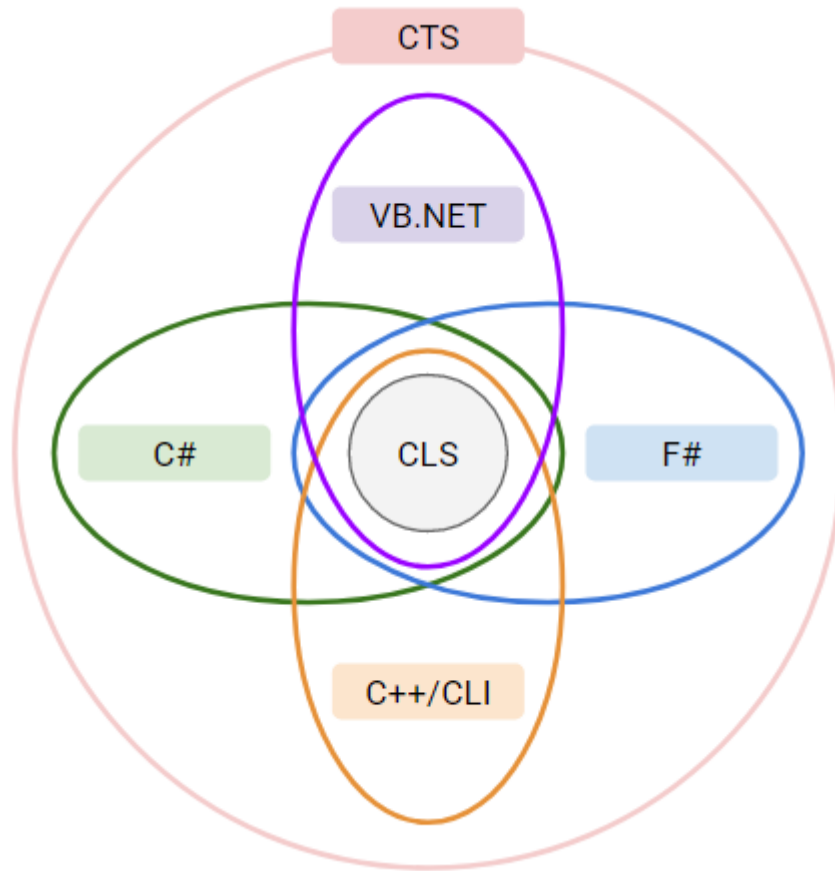


Chapter 1: Starting with the Building Blocks of C#



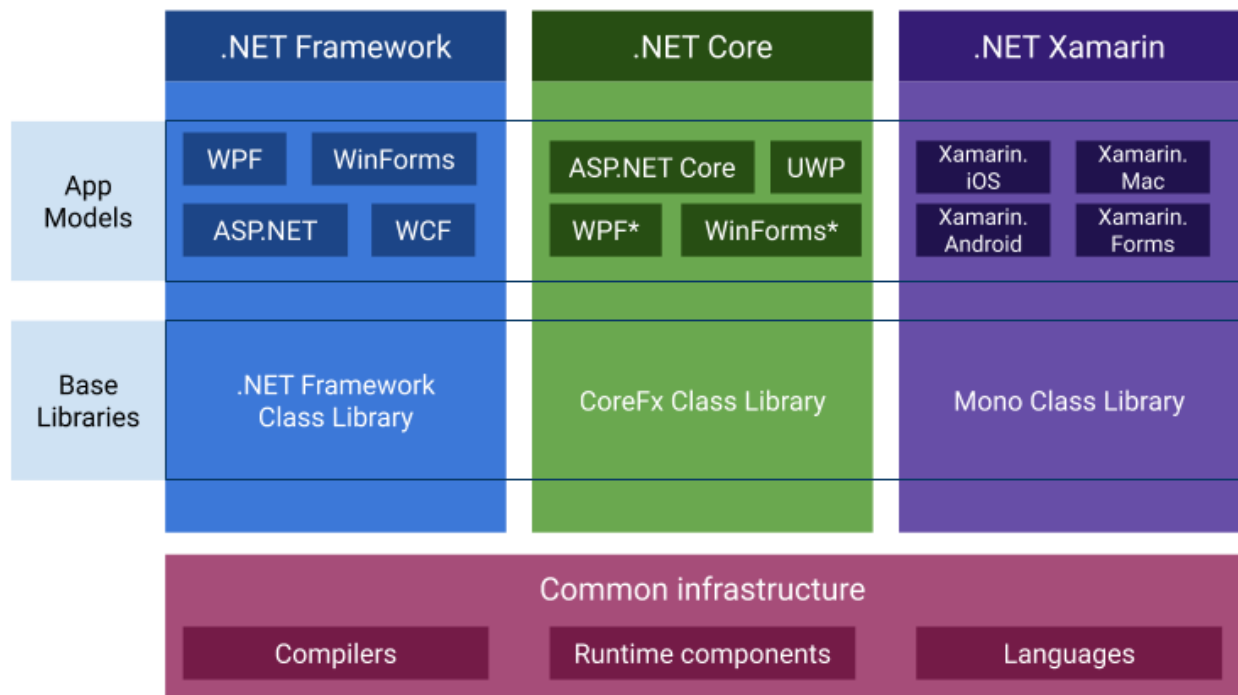
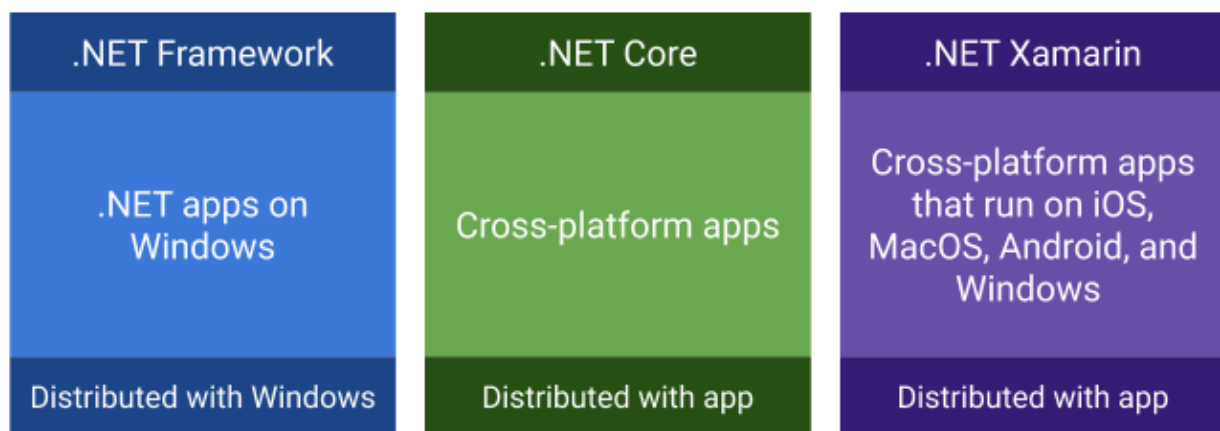


Find Find Next

```

.method private hidebysig static void Main(string[] args) cil managed
{
    .entrypoint
    // Code size      13 (0xd)
    .maxstack 8
    IL_0000: nop
    IL_0001: ldstr      "Hello World!"
    IL_0006: call       void [System.Console]System.Console::WriteLine(string)
    IL_000b: nop
    IL_000c: ret
} // end of method Program::Main

```





Language ▾

Platform ▾

Project type ▾



Console App (.NET Core)

A project for creating a command-line application that can run on .NET Core on Windows, Linux and MacOS.

C#

Linux

macOS

Windows

Console



ASP.NET Core Web Application

Project templates for creating ASP.NET Core applications for Windows, Linux and macOS using .NET Core or .NET Framework. Create Razor Pages, MVC, Web API, and Single Page (SPA) Applications.

C#

Windows

Linux

macOS

Web



WPF App (.NET Framework)

Windows Presentation Foundation client application

C#

Windows

Desktop



Class Library (.NET Standard)

A project for creating a class library that targets .NET Standard.

C#

Android

iOS

Linux

macOS

Windows

Library



Azure Functions

A template to create an Azure Function project.

C#

Azure

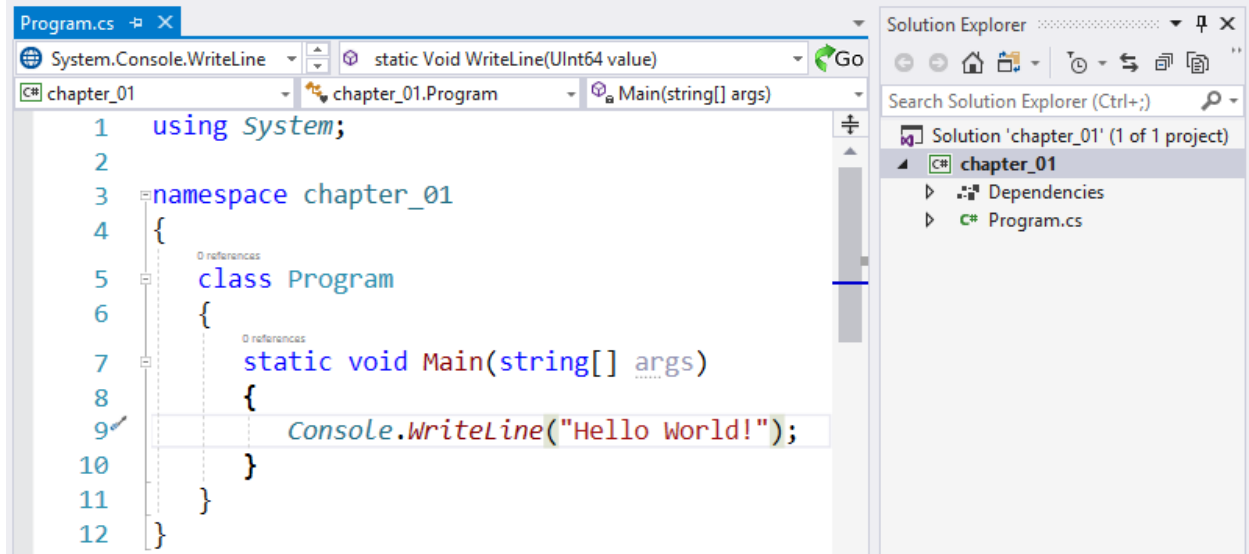
Cloud



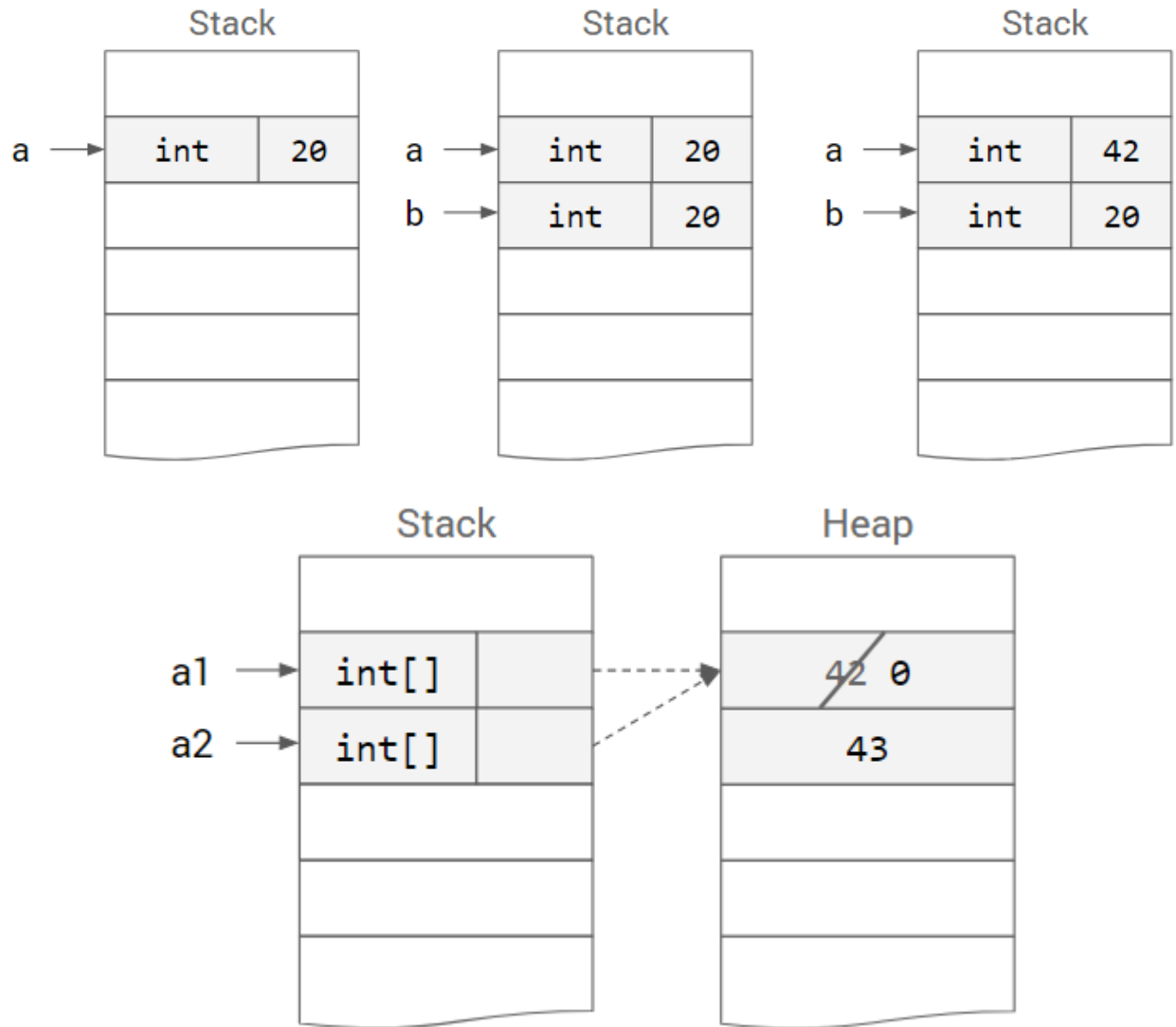
Empty Project

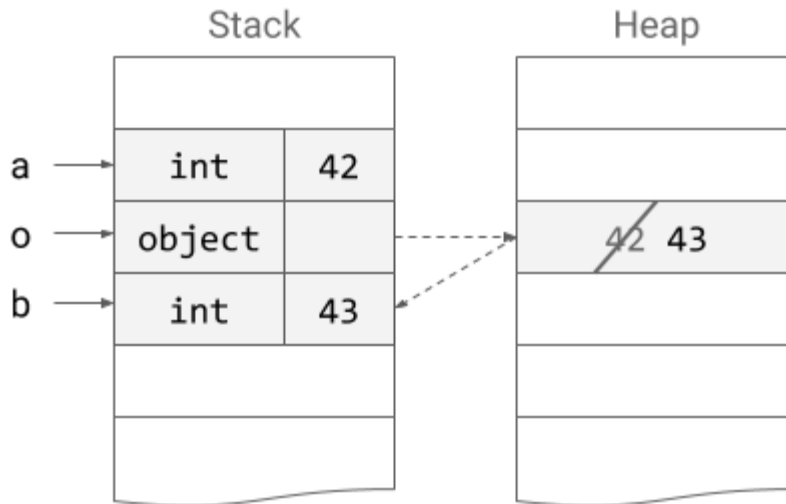
Start from scratch with C++ for Windows. Provides no starting files.

[Back](#)[Next](#)



Chapter 2: Data Types and Operator





Chapter 3: Control Statements and Exceptions

C:\Program Files\dotnet\dotnet.exe

```

0 is an even number
1 is an odd number
2 is an even number
3 is an odd number
4 is an even number
5 is an odd number
6 is an even number
7 is an odd number
8 is an even number
9 is an odd number
10 is an even number

```

C:\Program Files\dotnet\dotnet.exe

```

i = 1, j = 2
i = 2, j = 1
i = 2, j = 2
i = 3, j = 1
i = 3, j = 2
i = 4, j = 1
i = 4, j = 2

```

C:\Program Files\dotnet\dotnet.exe

```

Java
C#
Python
C++
JavaScript

```

```
C:\Program Files\dotnet\...  
0  
1  
2  
3  
4  
5
```

```
C:\Program Files\d...  
1  
3  
5  
7  
9
```

```
C:\Program Files\dotnet\dotnet.exe  
0  
1  
2  
3  
4  
5  
The goto statement is executed
```

Microsoft Visual Studio Debug Console

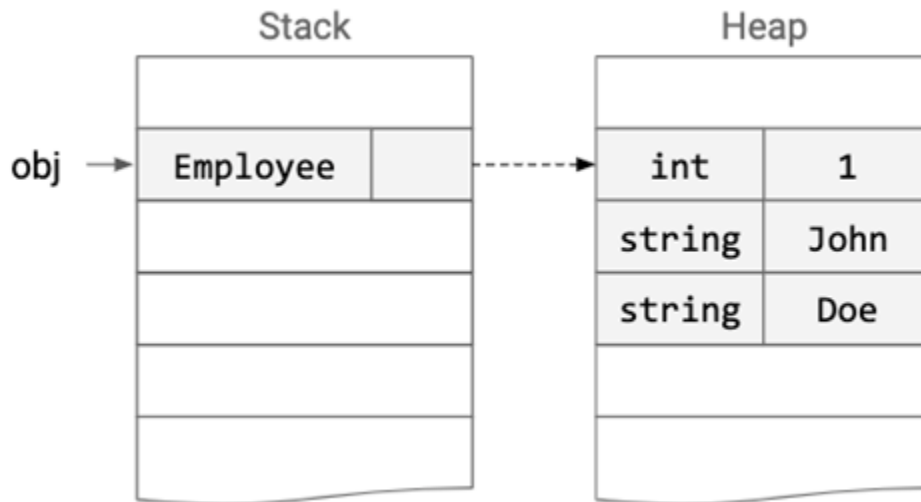
```
Produced: 1  
Consumed: 1  
Produced: 2  
Consumed: 2  
Produced: 3  
Consumed: 3  
Produced: 4  
Consumed: 4  
Produced: 5  
Consumed: 5
```

```
C:\Program Files\dotnet\dotnet.exe
System.DivideByZeroException: Attempted to divide by zero.
  at ExceptionDemo.Program.Main(String[] args) in C:\Users\asharma2\source\repos\CsharpBook\CsharpBook\Program.cs:line 13
```

C:\ Microsoft Visual Studio Debug Console

```
executing
Wrong argument: A string is expected
done
```

Chapter 4: Understanding the Various User-Defined Types



```
C:\Users\asharma2\source\repos\Chapter4\Cha... - □ ×  
Employee ID is: 1  
The full name of employee is: John Doe
```

```
C:\Program Files\dotnet\dotnet.exe
```

```
Project 1: role is Dev  
Project ID not found!  
Project 3: role is SA
```

```
C:\Program Files\dotnet\dotnet.exe
```

```
Before swapping: num1=10, num2=20  
After swapping: num1=20, num2=10
```

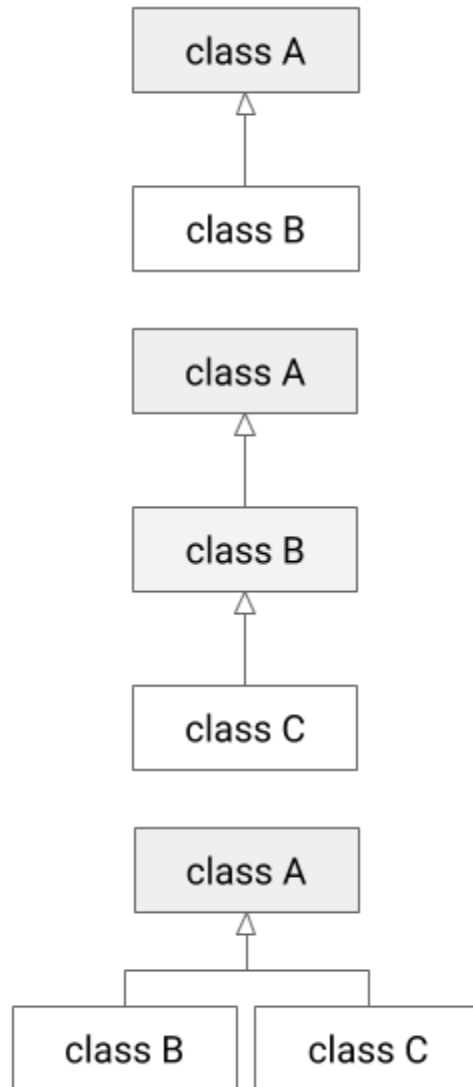
```
C:\Program Files\dotnet\dotnet.exe
```

```
Demo (Owner=John Doe)  
Demo (Owner=Jane Doe)
```

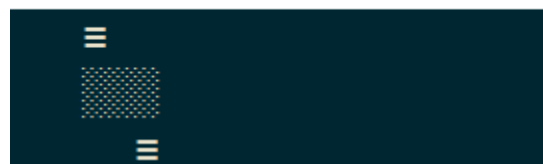
Chapter 5: Object-Oriented Programming in C#

C# Select C:\Program Files\dotnet\dotnet.exe

```
John Doe earns 2500  
John Doe earns 2637.5
```



C# Select Microsoft Visual Studio Debug Console



Microsoft Visual Studio Debug Console



Chapter 6: Generics

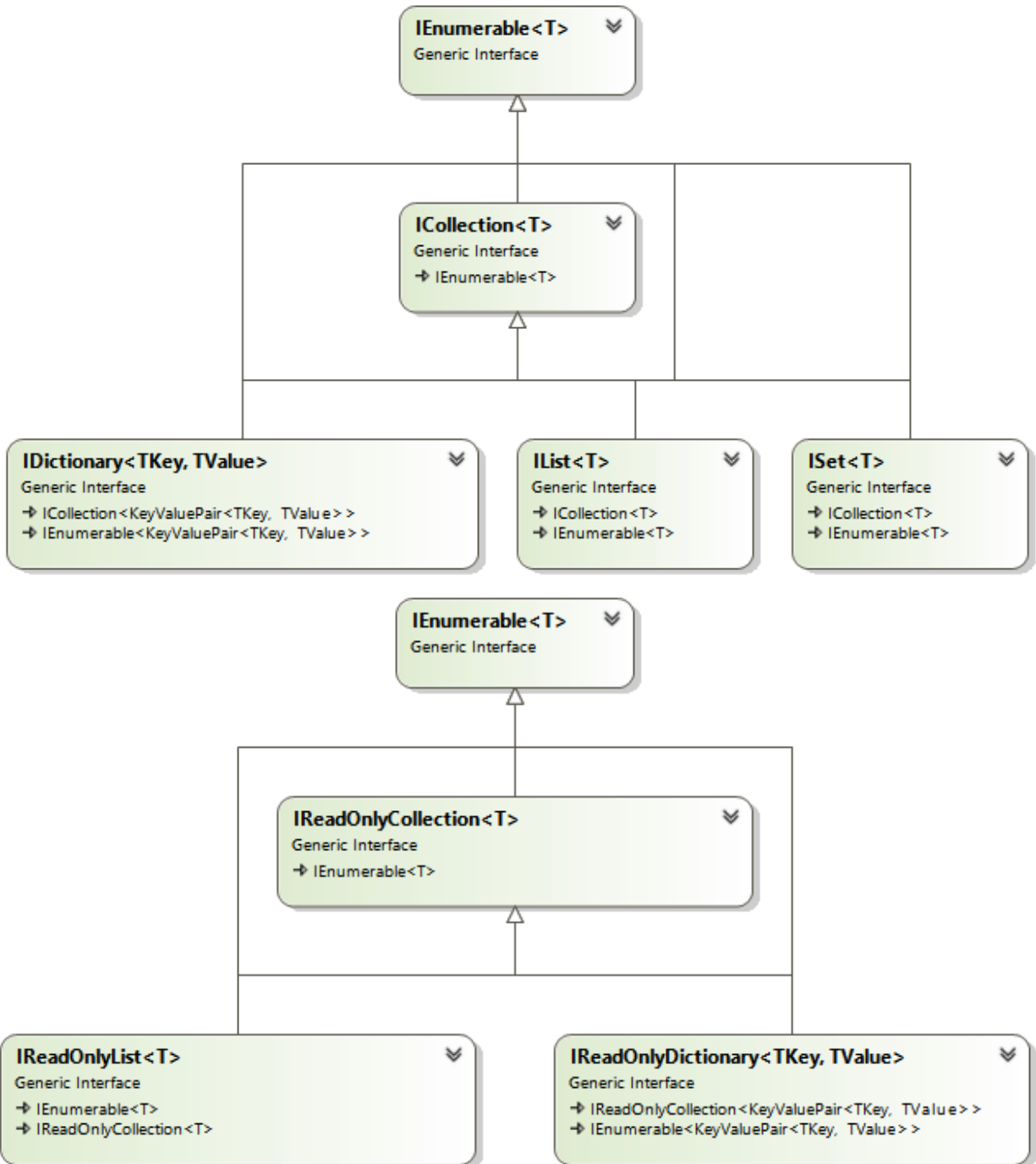
Microsoft Visual Studio Debug Console

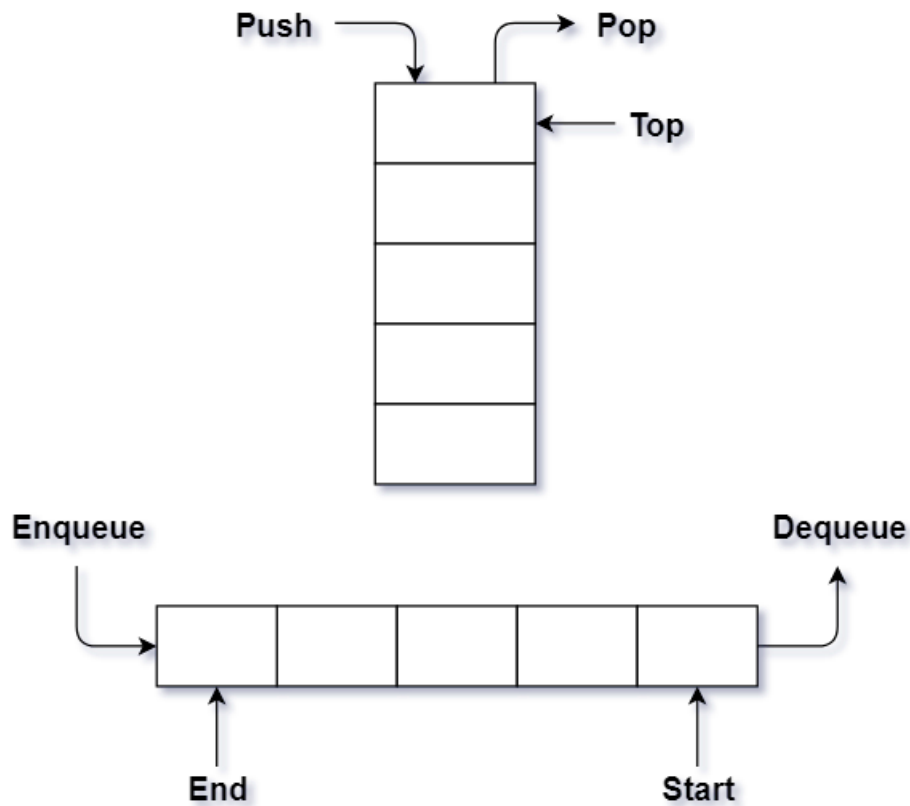
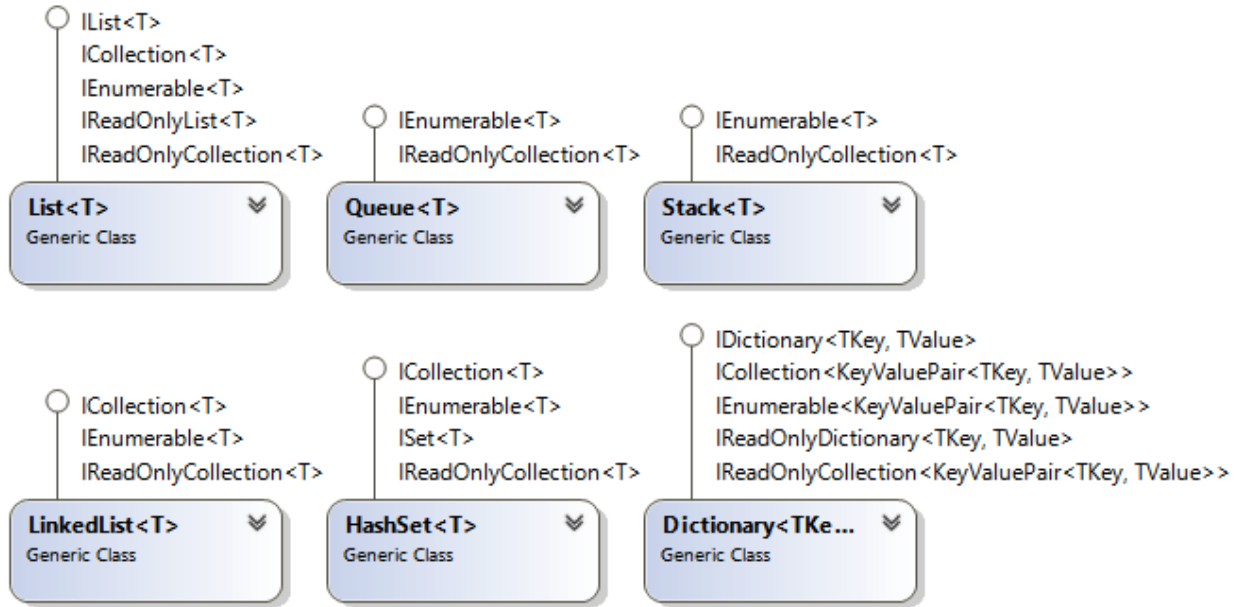
```
GenericDemo`1  
Int32  
GenericDemo`1  
String  
System.Int32 : 10  
System.String : Hello World
```

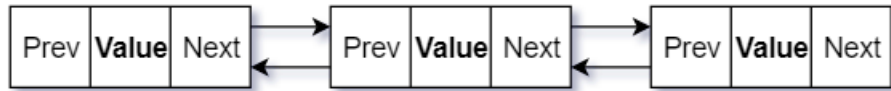
Microsoft Visual Studio Debug Console

```
The area of square is 100  
The area of circle is 176.71458676442586
```

Chapter 7: Collections



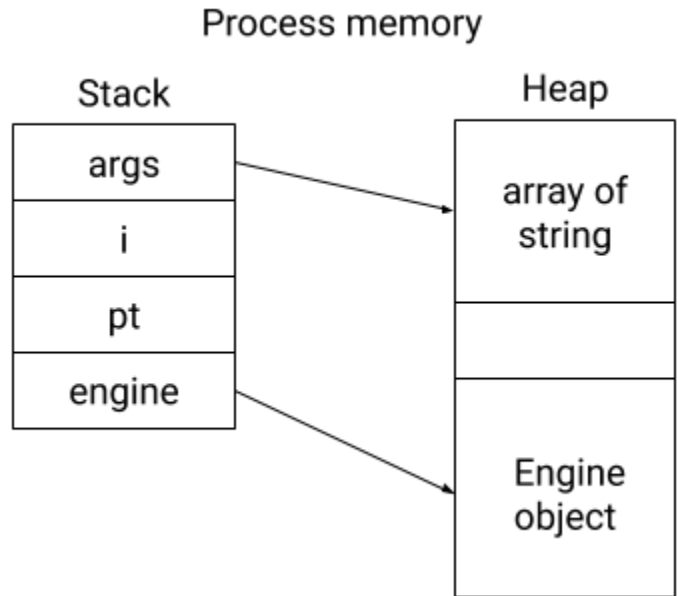




Microsoft Visual Studio Debug Console

```
[1] 1
[2] 1
[1] 2
[1] 5
[1] 8
[1] 13
[1] 21
[2] 3
[2] 55
[2] 89
[1] 34
[2] 144
[2] work done
[1] collection completed
[1] work done
```


Chapter 9: Resource Management



Microsoft Visual Studio Debug Console

```
Generation of engine: 0  
Estimated heap size: 160872
```

General

Conditional compilation symbols:

Define DEBUG constant

Define TRACE constant

Platform target:

Prefer 32-bit

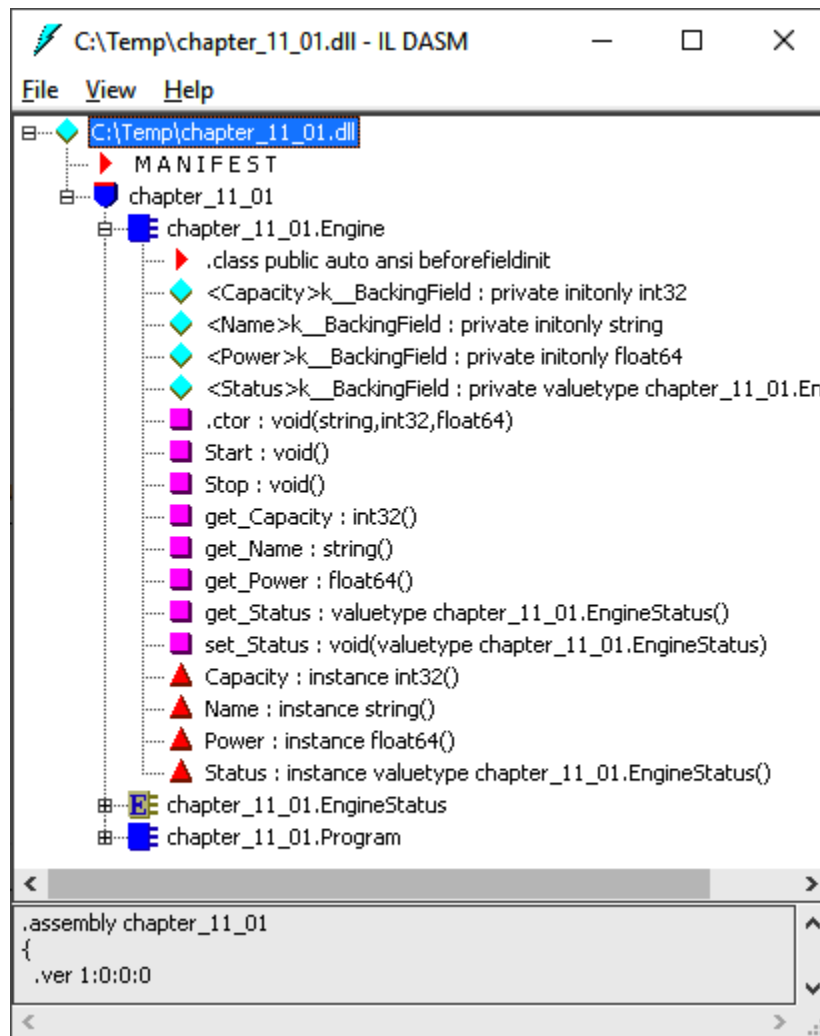
Allow unsafe code

Optimize code

Chapter 10: Lambdas, LINQ, and Functional Programming

No images...

Chapter 11: Reflection and Dynamic Programming



Chapter 12: Multithreading and Asynchronous Programming

Task Manager

File Options View

Processes Performance App history Startup Users Details Services

Name	PID	Status	CPU	Memory (a...)	Threads
NativeConsole.exe	38588	Running	00	504 K	4

Multithreading Programming

```
Current Thread Id: 1
Current Native Thread Id: 40236
```

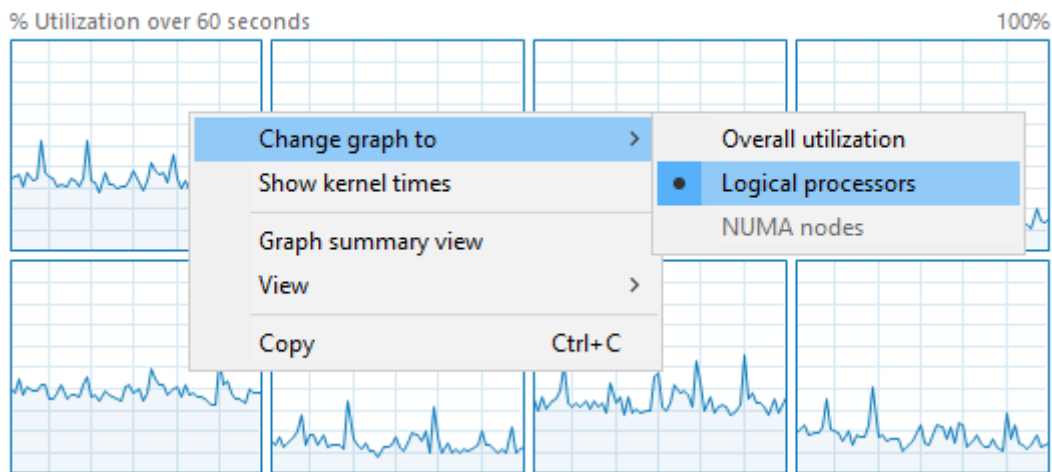
MultithreadingProgramming.exe (41864) Properties

General Statistics Performance Threads Token Modules Memory Environment Handles GPU Comment

TID	CPU	Cycles delta	Start address	Priority
44268			coreclr.dll!DiagnosticsServerThread	Normal
41988			coreclr.dll!Thread::intermediateThreadProc	Highest
40236			MultithreadingProgramming.exe!wmainCRTStartup	Normal
39456			ntdll.dll!TppWorkerThread	Normal
39012			ntdll.dll!TppWorkerThread	Normal
39004			ntdll.dll!TppWorkerThread	Normal
32524			coreclr.dll!ThreadPoolMgr::TimerThreadStart	Normal
30588			coreclr.dll!HelperCanary::ThreadProc	Normal
13844			ntdll.dll!TppWorkerThread	Normal
9288			coreclr.dll!DebuggerRCThread::ThreadProcStatic	Normal

CPU

Intel(R) Core(TM) i7-6700 CPU @ 3.40GHz

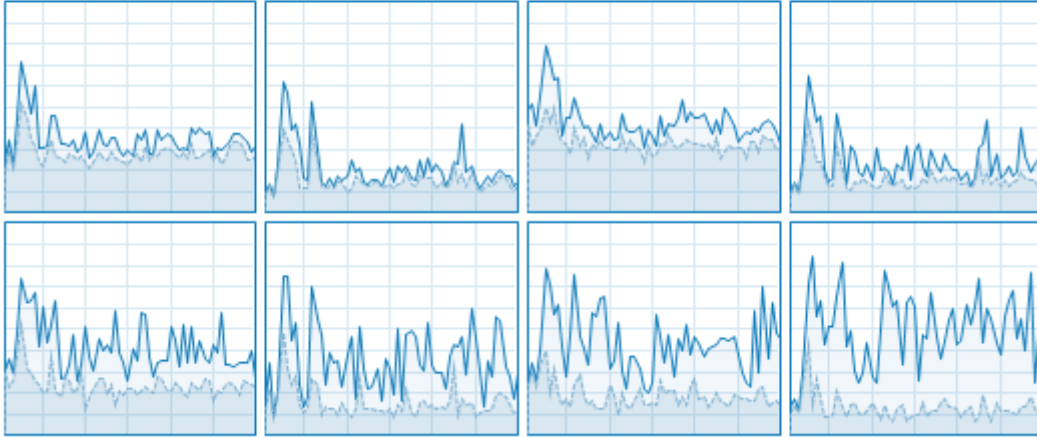


CPU

Intel(R) Core(TM) i7-6700 CPU @ 3.40GHz

% Utilization over 60 seconds

100%

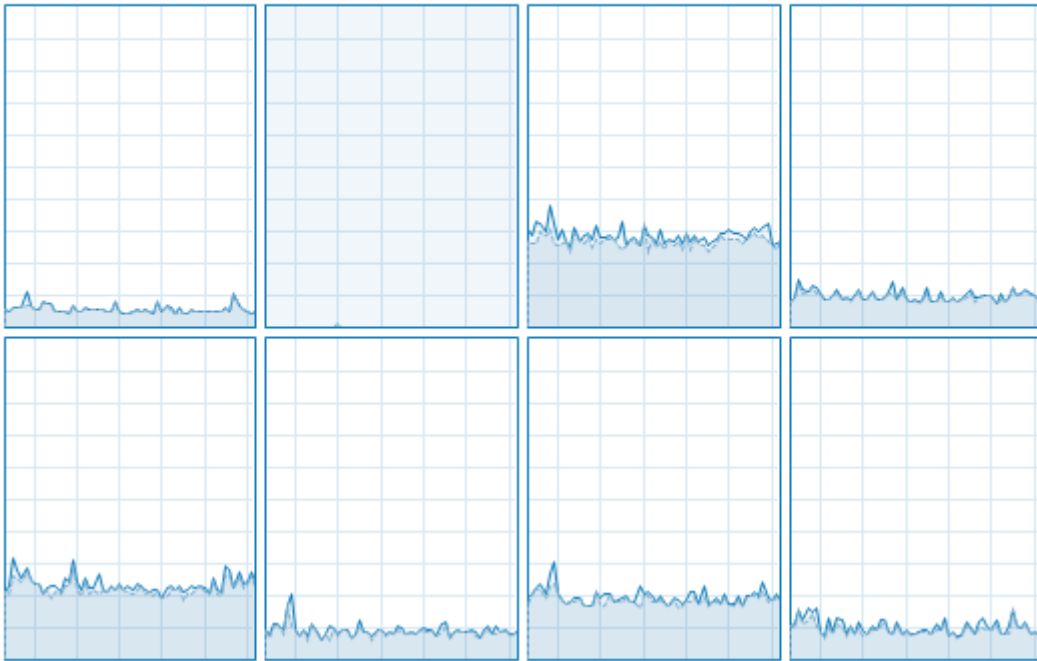


CPU

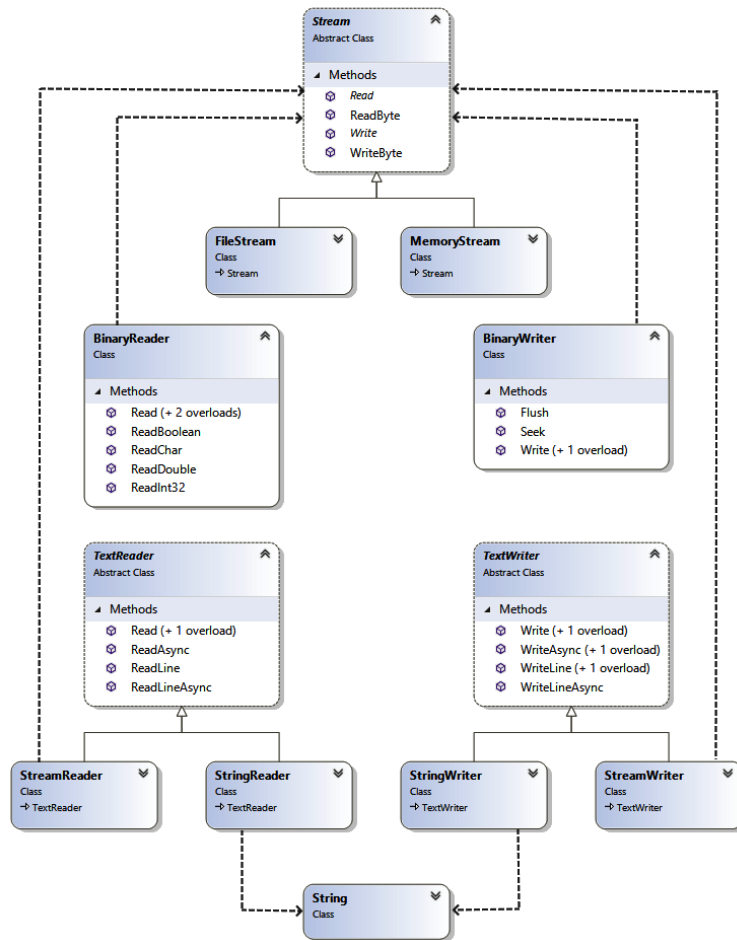
Intel(R) Core(TM) i7-6700 CPU @ 3.40GHz

% Utilization over 60 seconds

100%



Chapter 13: Files, Streams, and Serialization



C:\ Microsoft Visual Studio Debug Console

```
True
True
True
c:\
c:\Windows\System32
mmc.exe
mmc
.exe
c:\Windows\System32\mmc.dll
```

Microsoft Visual Studio Debug Console

```
C:\Users\Marius\AppData\Local\Temp\w22fbbqw.y34  
C:\Users\Marius\AppData\Local\Temp\tmp8D5A.tmp
```

Microsoft Visual Studio Debug Console

```
Full name : C:\Program Files (x86)\Microsoft SDKs\Windows\  
Name      : Windows  
Parent    : C:\Program Files (x86)\Microsoft SDKs  
Root      : C:\  
Created   : 2015-07-31 23:45:40  
Attributes: Directory, Archive  
v10.0A  
v7.0A  
v7.1A  
v8.0A  
v8.1  
v8.1A
```

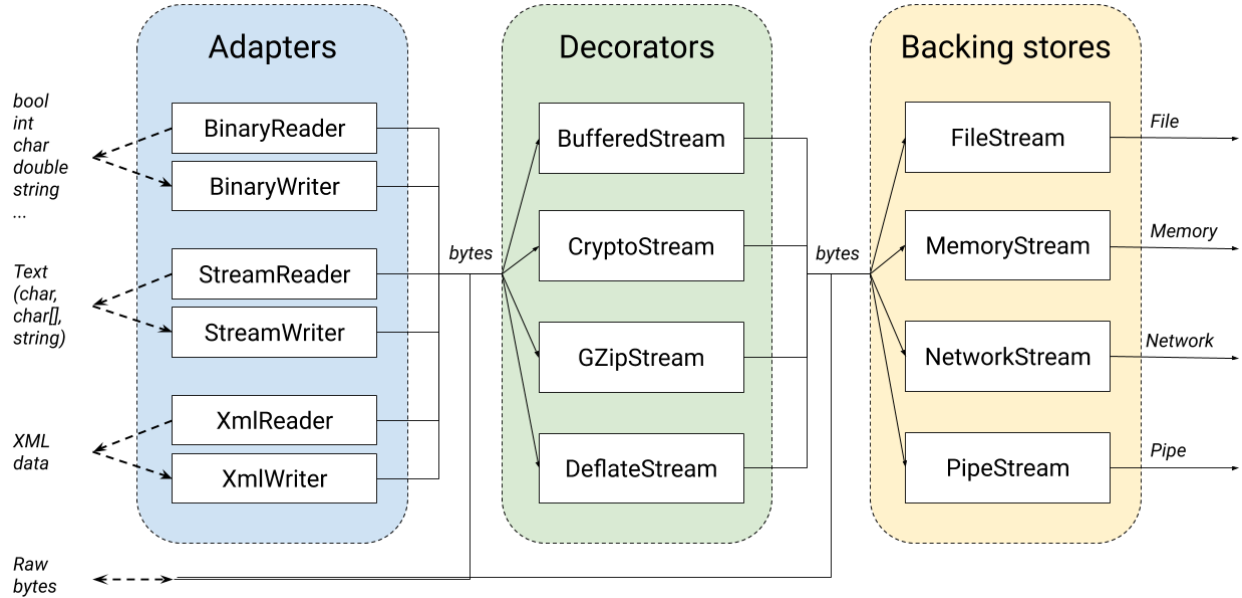
Select Microsoft Visual Studio Debug Console

```
TlbExp.exe [65680] [Archive]  
TlbImp.exe [190096] [Archive]  
Tracker.exe [169744] [Archive]
```

Microsoft Visual Studio Debug Console

```
Name:      explorer.exe  
Extension: .exe  
Full name: C:\Windows\explorer.exe  
Length:    4612520  
Attributes: Archive  
Creation:  2019-10-03 22:10:06  
Last access: 2019-10-03 22:10:06  
Last write: 2019-10-03 22:10:06
```

```
chapter_13_01.csproj
Program.cs
[bin]
  [Debug]
    [netcoreapp3.0]
      chapter_13_01.deps.json
      chapter_13_01.dll
      chapter_13_01.exe
      chapter_13_01.pdb
      chapter_13_01.runtimeconfig.dev.json
      chapter_13_01.runtimeconfig.json
[obj]
  chapter_13_01.csproj.nuget.cache
  chapter_13_01.csproj.nuget.dgspec.json
```



Microsoft Visual Studio Debug Console

— □ ×

```
<?xml version="1.0"?>
<Employee xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <EmployeeId>42</EmployeeId>
  <FirstName>John</FirstName>
  <LastName>Doe</LastName>
</Employee>
[42] Doe, John
```

Microsoft Visual Studio Debug Console

— □ ×

```
Text size: 123
Compressed: 110
Decompressed: 123
Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do
  eiusmod tempor incididunt ut labore et dolore magna aliqua.
Decompression successful!
```

Microsoft Visual Studio Debug Console

```
[xml version="1.0" encoding="utf-8"]
{
  Data :
  {
    Version : 1
  }
  { employee :
    { id : 42 }
    { firstName : John }
    { lastName : Doe }
  }
  { Department :
    { Id : 102 }
    { Name : IT }
  }
}
```

Chapter 14: Error Handling

```
try
{
    var content = File.ReadAllText(filename);
    return content.Length;
}
catch (ArgumentNullException)
catch (IOException) { /* ... */
catch (UnauthorizedAccessException)
catch (Exception) { /* ... */

return 0;

try
{
    if (validateExistence && !File.Exists(filename)) return 0;
    var content = File.ReadAllText(filename);
    return content.Length;
}
catch (Exception) { /* ... */ }
catch (ArgumentNullException) { /* ... */ }
catch (IOException) { /* ... */ }
catch (UnauthorizedAccessException) { /* ... */ }

return 0;
```

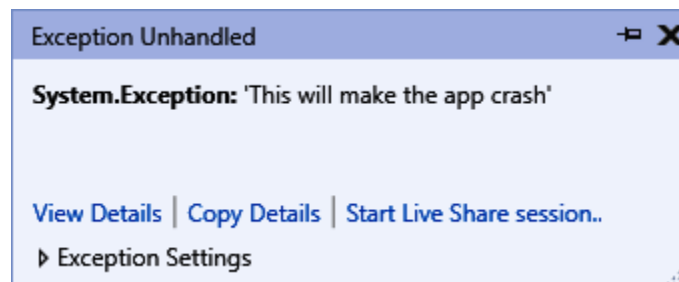
🔗 `string File.ReadAllText(string path)` (+ 1 overload)
Opens a text file, reads all the text in the file, and then closes the file.

Exceptions:

- ArgumentException
- ArgumentNullException
- PathTooLongException
- DirectoryNotFoundException
- IOException
- UnauthorizedAccessException
- FileNotFoundException
- NotSupportedException
- System.Security.SecurityException

```
File.Copy(source, target);
```

▲ 1 of 2 ▼ `void File.Copy(string sourceFileName, string destFileName)`
Copies an existing file to a new file. Overwriting a file of the same name is not allowed.
sourceFileName: The file to copy.



Exception Thrown ➔ X

System.NullReferenceException: 'Object reference not set to an instance of an object.'

str was null.

[View Details](#) | [Copy Details](#) | [Start Live Share session...](#)

▲ Exception Settings

- Break when this exception type is thrown
- Except when thrown from:
 - ExceptionDiagnostics.dll

[Open Exception Settings](#) | [Edit Conditions](#)

Exception Settings

▼ | + - ✎ ≡

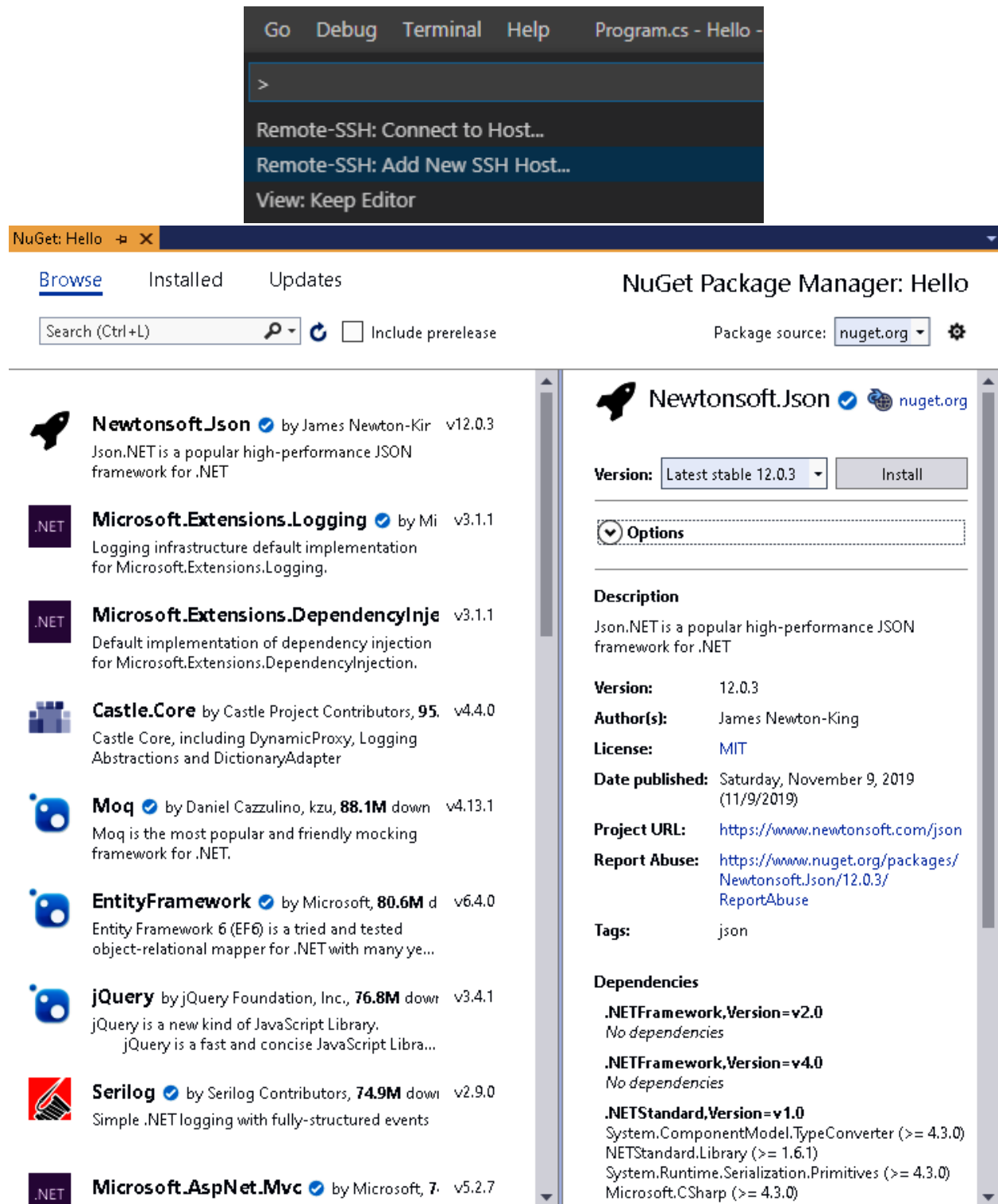
Break When Thrown

- ▶ C++ Exceptions
- ▶ Common Language Runtime Exceptions
- ▶ GPU Memory Access Exceptions
- ▶ Java Exceptions
- ▶ JavaScript (Chrome) Exceptions
- ▶ JavaScript (Edge) Exceptions
- ▶ JavaScript (Node.js 8+) Exceptions
- ▶ JavaScript Runtime Exceptions
- ▶ Managed Debugging Assistants
- ▶ Node.js Exceptions
- ▶ WebKit JavaScript Exceptions
- ▶ Win32 Exceptions
- ▲ Common Language Runtime Exceptions
 - <All Common Language Runtime Exceptions not in this list>
 - Microsoft.JScript.JScriptException
 - System.AccessViolationException
 - System.AggregateException
 - System.AppDomainUnloadedException
 - System.ApplicationException
 - System.ArgumentException
 - System.ArgumentNullException

Chapter 15: New Features of C# 8

No images...

Chapter 16: C# in Action with .NET Core 3



The screenshot displays the Visual Studio environment. At the top, a code editor window titled 'Program.cs - Hello' is visible, showing a terminal prompt '>'. Below the code editor, the NuGet Package Manager window is open, showing the 'Hello' project. The interface includes a search bar, a list of installed and available packages, and a detailed view of the selected package, 'Newtonsoft.Json'.

NuGet Package Manager: Hello

Package source: nuget.org

Newtonsoft.Json by James Newton-Kir v12.0.3
Json.NET is a popular high-performance JSON framework for .NET

Microsoft.Extensions.Logging by Mi v3.1.1
Logging infrastructure default implementation for Microsoft.Extensions.Logging.

Microsoft.Extensions.DependencyInje v3.1.1
Default implementation of dependency injection for Microsoft.Extensions.DependencyInjection.

Castle.Core by Castle Project Contributors, 95. v4.4.0
Castle Core, including DynamicProxy, Logging Abstractions and DictionaryAdapter

Moq by Daniel Cazzulino, kzu, 88.1M down v4.13.1
Moq is the most popular and friendly mocking framework for .NET.

EntityFramework by Microsoft, 80.6M d v6.4.0
Entity Framework 6 (EF6) is a tried and tested object-relational mapper for .NET with many ye...

jQuery by jQuery Foundation, Inc., 76.8M down v3.4.1
jQuery is a new kind of JavaScript Library.
jQuery is a fast and concise JavaScript Libra...

Serilog by Serilog Contributors, 74.9M down v2.9.0
Simple .NET logging with fully-structured events

Microsoft.AspNet.Mvc by Microsoft, 7. v5.2.7

Newtonsoft.Json v12.0.3

Version: Latest stable 12.0.3 Install

Options

Description
Json.NET is a popular high-performance JSON framework for .NET

Version: 12.0.3
Author(s): James Newton-King
License: MIT
Date published: Saturday, November 9, 2019 (11/9/2019)
Project URL: <https://www.newtonsoft.com/json>
Report Abuse: <https://www.nuget.org/packages/Newtonsoft.Json/12.0.3/ReportAbuse>

Tags: json

Dependencies

- .NETFramework,Version=v2.0**
No dependencies
- .NETFramework,Version=v4.0**
No dependencies
- .NETStandard,Version=v1.0**
System.ComponentModel.TypeConverter (>= 4.3.0)
NETStandard.Library (>= 1.6.1)
System.Runtime.Serialization.Primitives (>= 4.3.0)
Microsoft.CSharp (>= 4.3.0)

Search (Ctrl+L) 🔍



Include prerelease

Package source: nuget.org



Newtonsoft.Json by James Newton-King
Json.NET is a popular high-performance JSON framework for .NET

v11.0.2
v12.0.3



Newtonsoft.Json

nuget.org

Versions - 2

<input type="checkbox"/>	Project	Version
<input checked="" type="checkbox"/>	Hello	12.0.3
<input type="checkbox"/>	MyLibrary	
<input checked="" type="checkbox"/>	OldLibrary	11.0.2

Installed: multiple versions installed

Uninstall

Version: Latest stable 12.0.3

Install

Search for packages...

Newtonsoft.Json 12.0.3

Json.NET is a popular high-performance JSON framework for .NET

Requires NuGet 2.12 or higher.

```
Package Manager .NET CLI PackageReference Paket CLI
PM> Install-Package Newtonsoft.Json -Version 12.0.3
```

> Dependencies

> GitHub Usage

∨ Version History

Version	Downloads	Last updated
12.0.3	3,866,079	3 months ago
12.0.2	25,849,160	9 months ago
12.0.1	27,900,585	11/27/2018
11.0.2	31,286,948	3/24/2018

Info

- last updated 3 months ago
- Project Site
- Source repository
- Dependent repositories (1.7K+)
- License: MIT
- Contact owners
- Report
- Download package (2.48 MB)
- Download symbols (887.73 KB)

Statistics

↓ 367,106,045 total downloads
📦 3,866,079 downloads of current version

Feedback

Add a new project

shared Clear all

Recent project templates

- Worker Service C#
- ASP.NET Core Web Application C#

C# All platforms All project types

Shared Project
Shared Project
C# Windows Desktop

Chapter 17: Unit Testing

The screenshot shows the Visual Studio search interface. At the top, there is a search bar with a magnifying glass icon and a 'Clear' link to its right. Below the search bar, the filters are set to 'C#' for language, 'All Platforms' for platform, and 'Test' for category. The search results list five project templates, each with a C# icon, a title, a description, and a set of tags.

- MSTest Test Project (.NET Core)**
A project that contains MSTest unit tests that can run on .NET Core on Windows, Linux and MacOS.
Tags: C#, Linux, macOS, Windows, Test
- NUnit Test Project (.NET Core)**
A project that contains NUnit tests that can run on .NET Core on Windows, Linux and MacOS.
Tags: C#, Linux, macOS, Windows, Desktop, Test, Web
- Unit Test Project (.NET Framework)**
A project that contains MSTest unit tests.
Tags: C#, Windows, Test
- xUnit Test Project (.NET Core)**
A project that contains xUnit.net tests that can run on .NET Core on Windows, Linux and MacOS.
Tags: C#, Windows, Linux, macOS, Test
- Web Driver Test for Edge (.NET Core)**
A project that contains unit tests that can automate UI testing of web sites within Edge browser (using Microsoft WebDriver).
Tags: C#, Windows, Web, Test

A 'Next' button is located at the bottom right of the search results area.

Test Explorer

1 1 0

Search Test Explorer

Test	Duration	Traits	E.
✔ UnitTestDemo (1)	7 ms		
✔ UnitTestDemo (1)	7 ms		
✔ UnitTest1 (1)	7 ms		
✔ TestMethod1	7 ms		

Group Summary

UnitTestDemo

Tests in group: 1

🕒 Total Duration: 7 ms

Outcomes

✔ 1 Passed

Add New Item - UnitTestsDemo

Sort by: Default

Search (Ctrl+E)

Item	Type
Basic Unit Test	Visual C# Items
Generic Test	Visual C# Items
Unit Test	Visual C# Items
U-SQL C# UDO Unit Test	Visual C# Items

Type: Visual C# Items
An empty unit test class declaration

Name: UnitTest3.cs

Add Cancel

Test Explorer

4 4 0

Search Test Explorer

Test	Duration	Traits
✓ chapter_17_tests (4)	< 1 ms	
└─ ✓ chapter_17_tests (4)	< 1 ms	
└─ ✓ RectangleTests (4)	< 1 ms	
└─ ✓ TestConstructor	< 1 ms	
└─ ✓ TestEmpty	< 1 ms	
└─ ✓ TestProperties	< 1 ms	
└─ ✓ TestPropertiesMore	< 1 ms	

Group Summary

chapter_17_tests

Tests in group: 4

Outcomes

✓ 4 Passed

Test Explorer

4 3 1

Search Test Explorer

Test	Duration	Traits
chapter_17_tests (4)	62 ms	
chapter_17_tests (4)	62 ms	
RectangleTests (4)	62 ms	
TestConstructor	36 ms	
TestEmpty	< 1 ms	
TestProperties	26 ms	
TestPropertiesMore	< 1 ms	

Group Summary

chapter_17_tests

Tests in group: 4

⌚ Total Duration: 62 ms

Outcomes

- ✓ 3 Passed
- ✗ 1 Failed

chapter_17_tests (12)	56 ms	
chapter_17_tests (12)	56 ms	
RectangleDataDrivenTests (2)	26 ms	
RectangleExtensionsTests (4)	1 ms	
RectangleTests (4)	29 ms	
TestConstructor	< 1 ms	
TestEmpty	< 1 ms	
TestProperties	29 ms	Assert.AreEqual failed. Expecte...

Test Detail Summary

TestProperties

Source: [RectangleTests.cs](#) line 30

Duration: 29 ms

Message:

Assert.AreEqual failed. Expected:<6>.

Stack Trace:

[RectangleTests.TestProperties\(\)](#) line

Test Explorer

8 8 0

Search Test Explorer

Test	Duration	Traits
chapter_17_tests (8)	40 ms	
chapter_17_tests (8)	40 ms	
RectangleExtensionsTests (4)	40 ms	
TestDeflate	40 ms	
TestInflate	< 1 ms	
TestIntersect	< 1 ms	
TestIntersectsWith	< 1 ms	
RectangleTests (4)	< 1 ms	
TestConstructor	< 1 ms	
TestEmpty	< 1 ms	
TestProperties	< 1 ms	
TestPropertiesMore	< 1 ms	

Code Coverage Results

Hierarchy	Not Covered (Blocks)	Not Covered (% Blocks)	Covered (Blocks)	Covered (% Blocks)
chapter_17_lib.dll	1	3.03%	32	96.97%
{ } chapter_17_lib	1	3.03%	32	96.97%
Rectangle	0	0.00%	8	100.00%
Rectangle(int, i...	0	0.00%	1	100.00%
get_Area()	0	0.00%	3	100.00%
get_Empty()	0	0.00%	2	100.00%
get_Height()	0	0.00%	1	100.00%
get_Width()	0	0.00%	1	100.00%
RectangleExtensions	1	4.00%	24	96.00%
Deflate(chapter...	0	0.00%	2	100.00%
Inflate(chapter_...	0	0.00%	2	100.00%
Intersect(chapt...	0	0.00%	13	100.00%
IntersectsWith(...	1	12.50%	7	87.50%