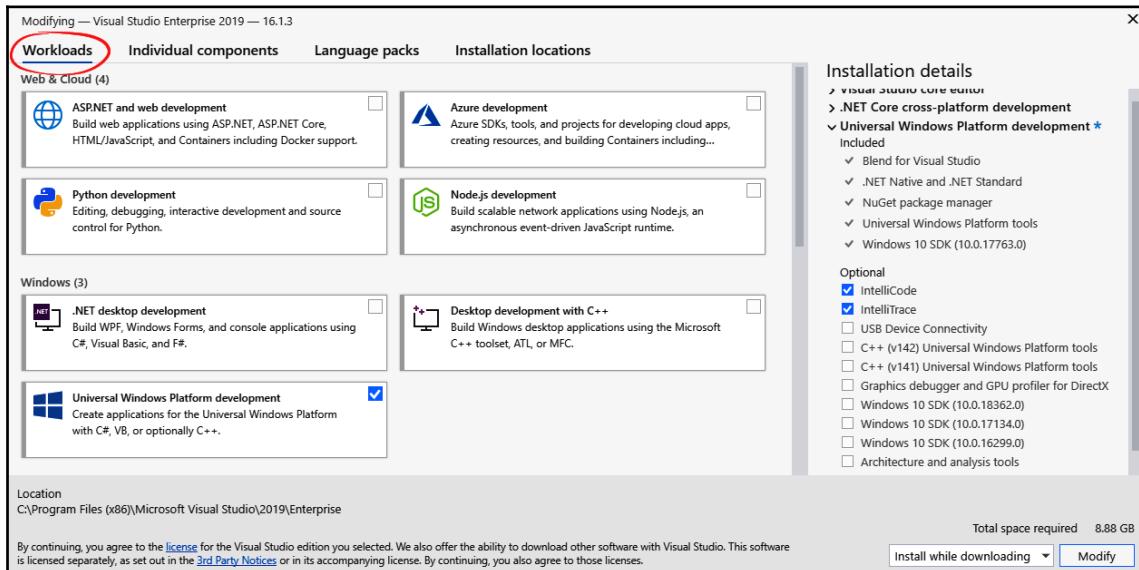


# Chapter 1: What's New in the Visual Studio 2019 IDE?



## Visual Studio Installer

Before you get started, we need to set up a few things so that you can configure your installation.

To learn more about privacy, see the [Microsoft Privacy Statement](#).

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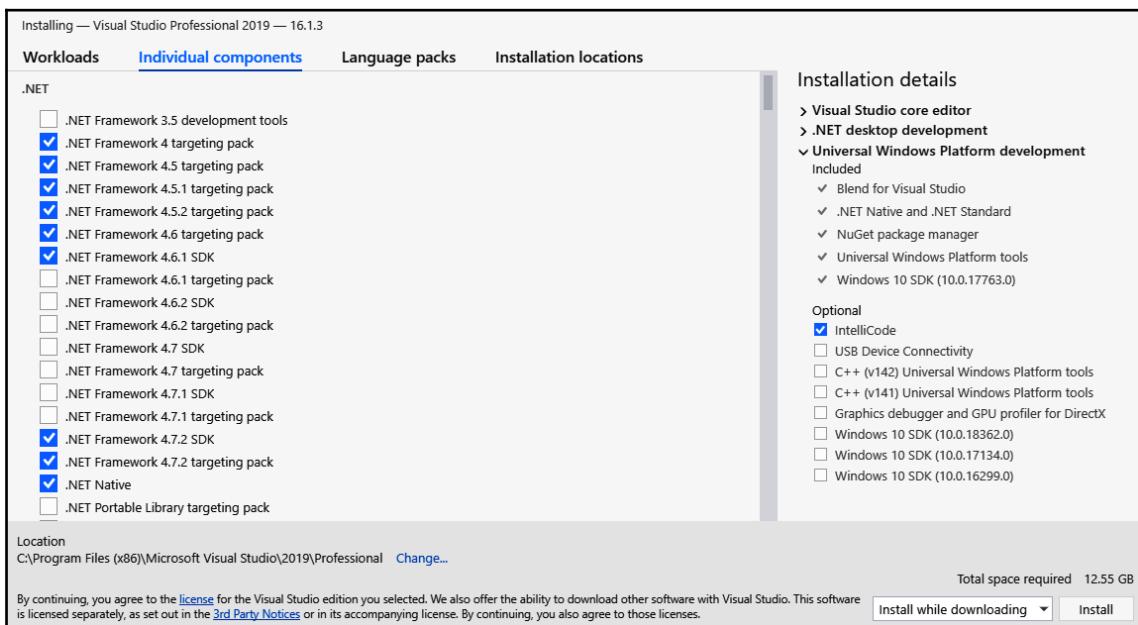
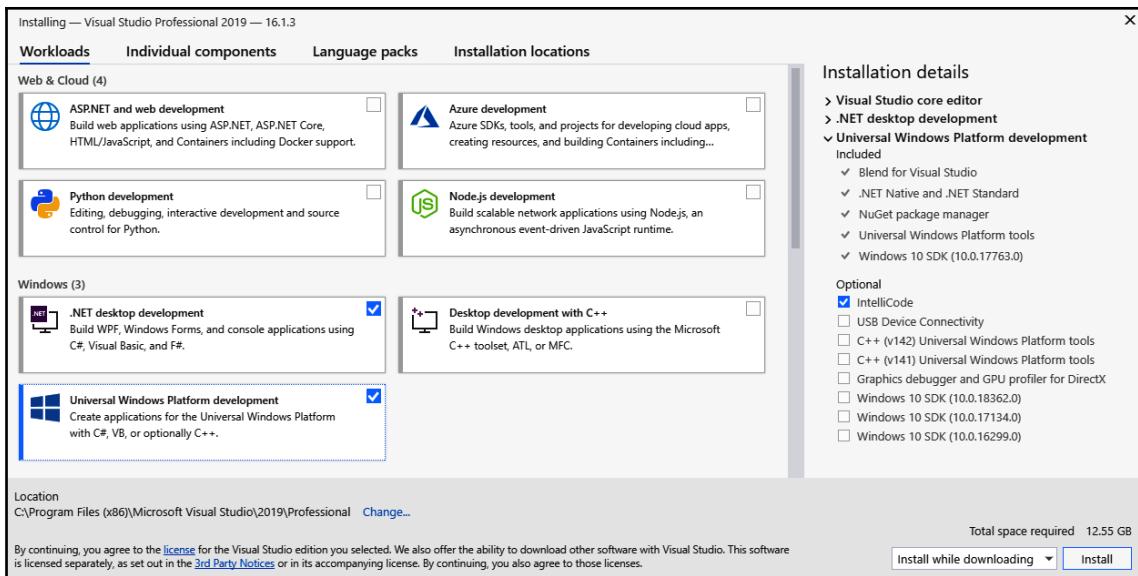
## Visual Studio Installer

 Almost done ... Getting everything ready.

 Downloaded

 Installed





Installing — Visual Studio Professional 2019 — 16.1.3

**Workloads**   **Individual components**   **Language packs**   **Installation locations**

You can add additional language packs to your Visual Studio installation.

Chinese (Simplified)  
 Chinese (Traditional)  
 Czech  
 English  
 French  
 German  
 Italian  
 Japanese  
 Korean  
 Polish  
 Portuguese (Brazil)  
 Russian  
 Spanish  
 Turkish

**Installation details**

> Visual Studio core editor  
> .NET desktop development  
✓ Universal Windows Platform development included  
✓ Blend for Visual Studio  
✓ .NET Native and .NET Standard  
✓ NuGet package manager  
✓ Universal Windows Platform tools  
✓ Windows 10 SDK (10.0.17763.0)

**Optional**

IntelliCode  
 USB Device Connectivity  
 C++ (v142) Universal Windows Platform tools  
 C++ (v141) Universal Windows Platform tools  
 Graphics debugger and GPU profiler for DirectX  
 Windows 10 SDK (10.0.18362.0)  
 Windows 10 SDK (10.0.17134.0)  
 Windows 10 SDK (10.0.16299.0)

**Location**  
C:\Program Files (x86)\Microsoft Visual Studio\2019\Professional   [Change...](#)

Total space required 12.55 GB   [Install while downloading](#)   [Install](#)

By continuing, you agree to the [license](#) for the Visual Studio edition you selected. We also offer the ability to download other software with Visual Studio. This software is licensed separately, as set out in the [3rd Party Notices](#) or in its accompanying license. By continuing, you also agree to those licenses.

Installing — Visual Studio Professional 2019 — 16.1.3

**Workloads**   **Individual components**   **Language packs**   **Installation locations**

**Visual Studio IDE** ⓘ  
C:\Program Files (x86)\Microsoft Visual Studio\2019\Professional   [...](#)   2 GB

Installation nickname

**Download cache** ⓘ  
C:\ProgramData\Microsoft\VisualStudio\Packages   2.87 GB  
 Keep download cache after the installation

**Shared components, tools, and SDKs** ⓘ  
C:\Program Files (x86)\Microsoft Visual Studio\Shared   2.1 GB

System cache, tools, and SDKs with fixed locations   5.6 GB

**Installation details**

> Visual Studio core editor  
> .NET desktop development  
✓ Universal Windows Platform development included  
✓ Blend for Visual Studio  
✓ .NET Native and .NET Standard  
✓ NuGet package manager  
✓ Universal Windows Platform tools  
✓ Windows 10 SDK (10.0.17763.0)

**Optional**

IntelliCode  
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 Windows 10 SDK (10.0.16299.0)

**Location**  
C:\Program Files (x86)\Microsoft Visual Studio\2019\Professional

Total space required 12.55 GB   [Install while downloading](#)   [Install](#)

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# Visual Studio Installer

Installed Available

## Visual Studio Enterprise 2019 Preview

16.2.0 Preview 1.0

**Update available**

16.2.0 Preview 2.0

[View details](#)

[Update](#)  
[Launch](#)  
[More ▾](#)

## Visual Studio Enterprise 2017

15.9.11

**Update available**

15.9.13

[View details](#)

[Update](#)  
[Launch](#)  
[More ▾](#)

## Visual Studio Enterprise 2019

Downloading and verifying: 42 MB of 72 MB

( 420 KB/sec )

57%

Installing: package 4 of 6

70%

Microsoft.Net.4.7.1.SDK

[Release notes](#)

[Pause](#)

## Developer News

[Streamlining Azure DevOps extension development](#)

Azure DevOps has an incredibly deep set of  
Friday, June 21, 2019

[Windows 10 SDK Preview Build 18917 available now!](#)

Today, we released a new Windows 10 Preview  
Friday, June 21, 2019

[Windows 10 SDK Preview Build 18917 available now!](#)

Today, we released a new Windows 10 Preview  
Friday, June 21, 2019

[View more online...](#)

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Installer Version 2.2.1042.525

# Visual Studio Installer

Installed Available

## Visual Studio Enterprise 2019 Preview

16.2.0 Preview 2.0

Setup paused

[Release notes](#)

Resume

Modify

More ▾

## Visual Studio Enterprise 2017

15.9.11

Update available

15.9.13

[View details](#)

Update

Launch

More ▾

## Visual Studio Enterprise 2019

16.1.4

Microsoft DevOps solution for productivity and coordination across teams of any size

[Release notes](#)

Modify

Launch

More ▾

## Developer News

Announcing ML.NET 1.1 and Model Builder updates (Machine Learning for .NET)

ML.NET is an open-source and cross-platform

Tuesday, June 25, 2019

Microsoft's MT-DNN Achieves Human Performance Estimate on General Language Understanding Evaluation (GLUE) Benchmark

Understanding natural language is one of the

Tuesday, June 25, 2019

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Learn how to build cross-platform mobile

Tuesday, June 25, 2019

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Installer Version 2.2.2059.610

# Visual Studio Installer

Installed Available

## Visual Studio Enterprise 2019 Preview

16.2.0 Preview 2.0

Setup paused

[Release notes](#)

Resume

Modify

More ▾

## Visual Studio Enterprise 2017

15.9.11

Update available

15.9.13

[View details](#)

Update

Launch

More ▾

## Visual Studio Enterprise 2019

16.1.4

Microsoft DevOps solution for productivity and coordination across teams of any size

[Release notes](#)

Modify

Launch

More ▾

Repair

Uninstall

Import configuration

Export configuration

## Developer News

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Need help? Check out the [Microsoft Developer Community](#) or reach us via [Visual Studio Support](#).

Installer Version 2.2.2059.610

# Visual Studio 2019

## Open recent

-  **MyFirstDemo.sln** 09-Jan-19 10:20 PM  
D:\OneDrive\Documents\Visual Studio 2017\Projects\MyFirstDemo
-  **ConsoleApp1.sln** 09-May-19 11:01 AM  
D:\OneDrive\Documents\Visual Studio 2017\Projects\ConsoleApp1
-  **UseUnitTesting.Demo.sln** 09-May-19 09:28 PM  
D:\OneDrive\Documents\Visual Studio 2017\Projects\UseUnitTesting.Demo
-  **ConsoleApp1.csproj** 09-May-19 07:13 PM  
D:\OneDrive\Documents\Visual Studio 2017\Projects\ConsoleApp1\ConsoleApp1
-  **ConsoleApp1.csproj** 09-May-19 07:13 PM  
D:\OneDrive\Documents\Visual Studio 2017\Projects\ConsoleApp1\ConsoleApp1
-  **UseUnitTesting.Demo.sln** 09-Apr-19 09:17 PM  
D:\OneDrive\Documents\Visual Studio 2017\Projects\UseUnitTesting.Demo
-  **useUnitProject.sln** 09-Apr-19 09:18 PM  
D:\OneDrive\Documents\Visual Studio 2017\Projects\useUnitProject
-  **useUnitProject.csproj** 09-Apr-19 09:18 PM  
D:\OneDrive\Documents\Visual Studio 2017\Projects\useUnitProject

## Get started



### Clone or check out code

Get code from an online repository like GitHub or Azure DevOps



### Open a project or solution

Open a local Visual Studio project or .sln file



### Open a local folder

Navigate and edit code within any folder



### Create a new project

Choose a project template with code scaffolding to get started

[Continue without code →](#)

# Visual Studio 2019

## Open recent

 MyFirstDemo.sln	26 May 19 11:01 PM
 ConsoleApp1.sln	26 May 19 11:01 AM
 UserCode Testing Demo.sln	26 May 19 09:39 PM
 ConsoleApp1.csproj	26 May 19 09:11 PM
 ConsoleApp1.csproj	26 May 19 09:11 PM
 UserCode Testing Demo.sln	25 Apr 19 05:17 PM
 testWithProject.sln	25 Apr 19 05:14 PM
 testWithProject.csproj	25 Apr 19 05:08 PM

## Get started



### Clone or check out code

Get code from an online repository like GitHub or Azure DevOps



### Open a project or solution

Open a local Visual Studio project or .sln file



### Open a local folder

Navigate and edit code within any folder



### Create a new project

Choose a project template with code scaffolding to get started

[Continue without code ➔](#)

## Clone or check out code

Enter a Git repository URL

Repository location

`https://www.kunal-chowdhury.com/code-repo/demo.git`

Enter the repository URL that  
you are willing to clone

Local path

`C:\Users\kunal\Source\Repos\demo`

...

Browse a repository

Azure DevOps

GitHub

Enter the local path of the  
repository where you are  
cloning

Click 'Clone' to start the code cloning process

Back

Clone

# Clone or check out code

Enter a Git repository URL

Repository location

https://example.com/example.git <Required>

Local path

C:\Users\kunal\Source\Repos

Browse a repository

Azure DevOps

GitHub



Open from GitHub X

[GitHub.com](#)

Search or enter a URL

Your repositories

- [kunal-chowdhury/kunal-chowdhury.com](#)
- [kunal-chowdhury/Git-Demo](#)
- [kunal-chowdhury/MVS2019](#)
- [kunal-chowdhury/Public-Samples](#)
- [kunal-chowdhury/Public-Samples](#)
- [kunal-chowdhury/Public-Samples](#)
- [kunal-chowdhury/Public-Samples](#)

Collaborator repositories

- [PacktPublishing/Mastering-Visual-Studio-2019](#)

Local path  [Browse](#)

Clone Open

[Back](#)

[Clone](#)

# Visual Studio 2019

## Open recent

 <a href="#">MyFirstConsoleApp.csproj</a>	20-Jan-19 11:00 PM
 <a href="#">MySecondConsoleApp.csproj</a>	20-Jan-19 11:01 PM
 <a href="#">ConsoleApp1.csproj</a>	20-May-19 11:01 AM
 <a href="#">Console.UnitTesting.csproj</a>	20-May-19 09:28 PM
 <a href="#">ConsoleApp2.csproj</a>	20-May-19 09:11 PM
 <a href="#">ConsoleApp3.csproj</a>	20-May-19 09:11 PM
 <a href="#">Console.UnitTesting.csproj</a>	20-Apr-19 09:17 PM
 <a href="#">mythirdproject.csproj</a>	20-Apr-19 09:24 PM

## Get started



### Clone or check out code

Get code from an online repository like GitHub or Azure DevOps



### Open a project or solution

Open a local Visual Studio project or .sln file



### Open a local folder

Navigate and edit code within any folder



### Create a new project

Choose a project template with code scaffolding to get started

[Continue without code →](#)

# Visual Studio 2019

## Open recent

 Hadoop Demo.sln	26 May 19 11:33 PM
 SH.sln	26 May 19 11:31 PM
 ConsoleApp1.csproj	26 May 19 11:31 PM
 Core Unit Testing Demo.sln	26 May 19 09:38 PM
 ConsoleApp1.csproj	26 May 19 09:31 PM
 ConsoleApp1.csproj	26 May 19 09:31 PM
 Core Unit Testing Demo.sln	26 May 19 09:27 PM
 Core Unit Testing Demo.sln	26 May 19 09:24 PM

## Get started

-  **Clone or check out code**  
Get code from an online repository like GitHub or Azure DevOps
-  **Open a project or solution**  
Open a local Visual Studio project or .sln file
-  **Open a local folder**  
Navigate and edit code within any folder
-  **Create a new project**  
Choose a project template with code scaffolding to get started

[Continue without code ➔](#)

# Visual Studio 2019

## Open recent

 MyFirstConsoleApp.sln	06-Jan-19 11:00 PM
 MyFirstConsoleApp	06-Jan-19 11:01 PM
 ConsoleApp1.sln	28-May-19 11:01 AM
 LiveUnitTesting.Demo.sln	28-May-19 09:00 AM
 ConsoleApp1.csproj	28-May-19 07:10 PM
 ConsoleApp1.csproj	28-May-19 07:10 PM
 LiveUnitTesting.Demo.sln	23-Apr-19 09:00 AM
 myfirstapp.sln	23-Apr-19 09:00 AM

## Get started



### Clone or check out code

Get code from an online repository like GitHub or Azure DevOps



### Open a project or solution

Open a local Visual Studio project or .sln file



### Open a local folder

Navigate and edit code within any folder



### Create a new project

Choose a project template with code scaffolding to get started

[Continue without code →](#)



# Create a new project

## Recent project templates

- Console App (.NET Core) C#
- Unit Test Project (.NET Framework) C#
- Class Library (.NET Framework) C#
- Console App (.NET Framework) C#
- Blank Solution
- ASP.NET Core Web Application C#
- ASP.NET Web Application (.NET Framework) C#

|  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

**Service Fabric Application**

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

# Configure your new project

Console App (.NET Core)

C#

Linux

macOS

Windows

Console

Project name

DemoProject

Location

C:\Users\kunal\Source\Repos

...

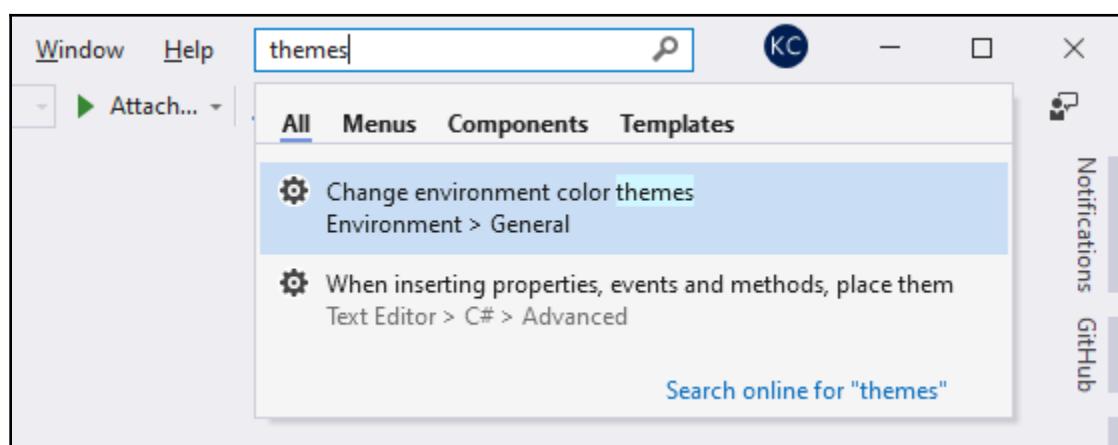
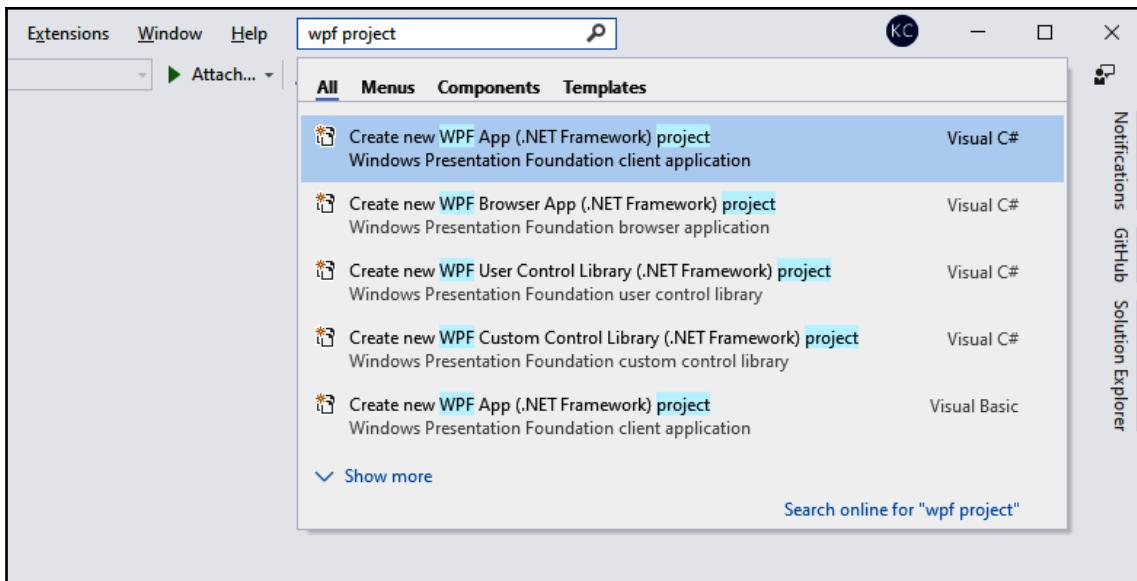
Solution name 

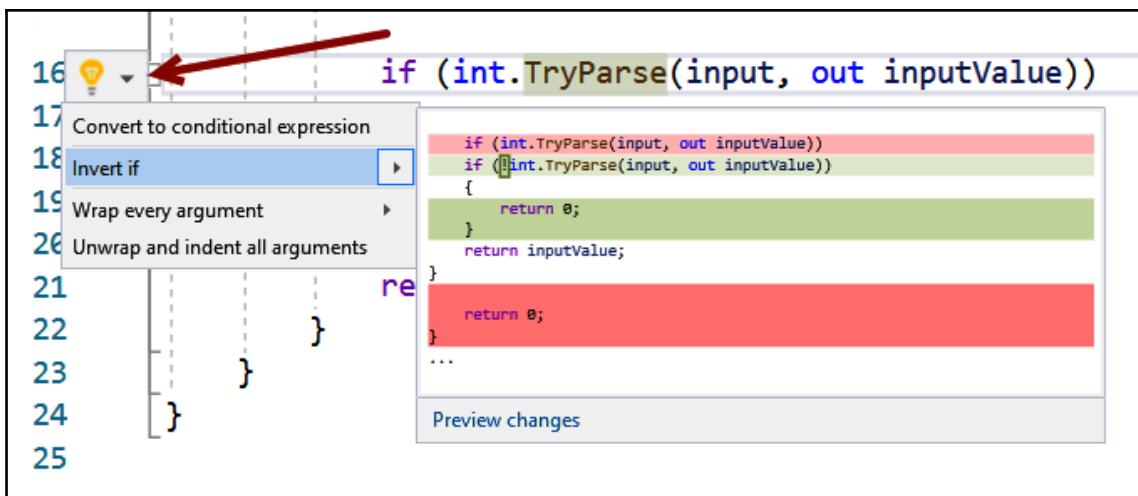
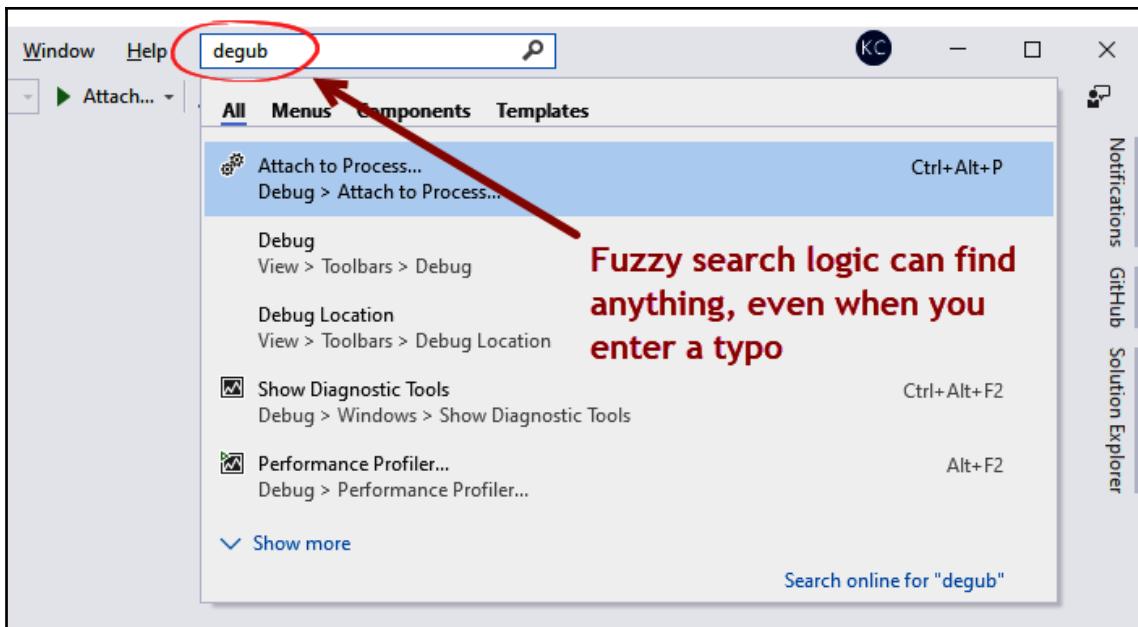
DemoProject

Place solution and project in the same directory

[Back](#)

[Create](#)



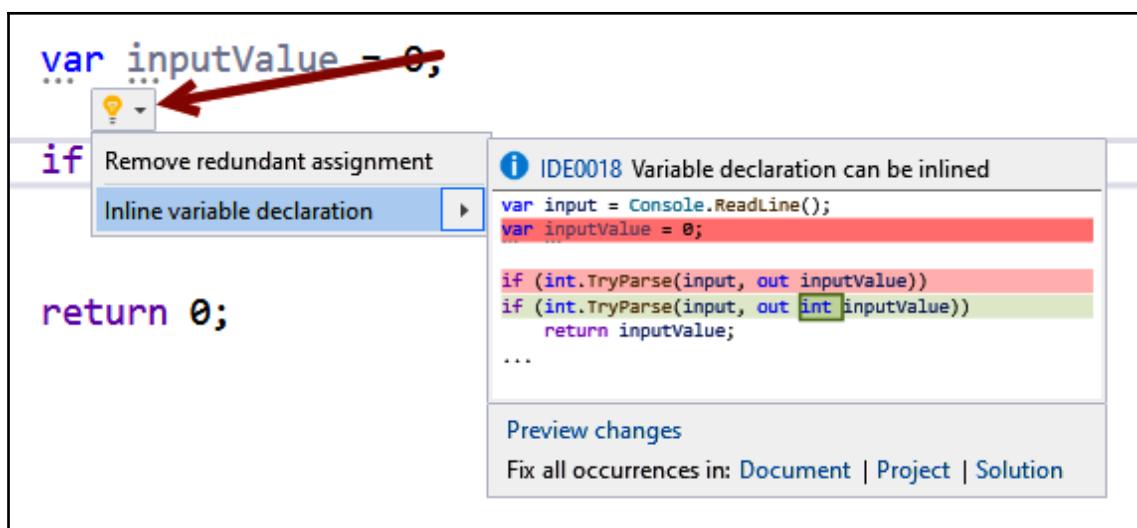


A screenshot of the Visual Studio IDE showing a context menu for code refactoring. The menu is triggered by a yellow lightbulb icon on line 16. The 'Wrap every argument' option is selected. A submenu shows three options: 'Align wrapped arguments', 'Indent all arguments', and 'Indent wrapped arguments'. A preview window on the right shows the code after applying the 'Align wrapped arguments' option, where the 'out inputValue' parameter is aligned under the first 'TryParse' call.

```
16 if (int.TryParse(input, out inputValue))  
17     Convert to conditional expression  
18     Invert if  
19     Wrap every argument > Align wrapped arguments  
20     Unwrap and indent all arguments  
21         }  
22     }  
23     }  
24 }  
25  
if (int.TryParse(input, out inputValue))  
if (int.TryParse(input,  
    out inputValue))  
{  
...  
Preview changes
```

A screenshot of the Visual Studio IDE showing a context menu for code refactoring. The menu is triggered by a yellow lightbulb icon on line 16. The 'Unwrap argument list' option is selected. A submenu shows two options: 'Unwrap all arguments' and 'Unwrap and indent all arguments'. A preview window on the right shows the code after applying the 'Unwrap all arguments' option, where the 'out inputValue' parameter is unwrapped from the second 'TryParse' call.

```
16 if (int.TryParse(input,  
    out inputValue))  
17     Convert to conditional expression  
18     Invert if  
19     Wrap every argument  
20     Unwrap argument list > Unwrap all arguments  
21         }  
22     }  
23     }  
24     }  
25 }  
26  
if (int.TryParse(input,  
    out inputValue))  
if (int.TryParse(input, [out inputValue]))  
{  
...  
Preview changes
```



```
4 {  
5     1 reference  
6     class Person  
7     {  
8     }  
9     0 references  
10    class Employee : Person  
11    {  
12        0 references  
13        public string GetName()  
14        Replace 'GetName' with property  
15        Use expression body for methods  
16        Pull 'GetName' up to 'Person'  
17    }  
18 }  
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```

The screenshot shows a code editor in Visual Studio with the following code:

```
foreach (var item in items)
```

The code editor displays several refactoring suggestions in the top left:

- 14 Use explicit type instead of 'var'
- 16 Convert to LINQ
- 17 Convert to LINQ (call form)
- 18 Convert to 'for'

The 'Convert to LINQ' option is highlighted. The right pane shows the converted LINQ code:

```
using System.Text;
using System.Linq;

...
var items = new List<string>();

foreach (var item in items)
{
    if (item.Equals("ERROR"))
        foreach (var _ in from item in items
                           where item.Equals("ERROR")
                           select new { } // code logic
        )
    {
        // code logic
    }
}
```

A 'Preview changes' button is at the bottom right.

The screenshot shows a code editor in Visual Studio with the following code:

```
foreach (var item in items)
```

The code editor displays several refactoring suggestions in the top left:

- 14 Use explicit type instead of 'var'
- 16 Convert to LINQ
- 17 Convert to LINQ (call form)
- 18 Convert to 'for'

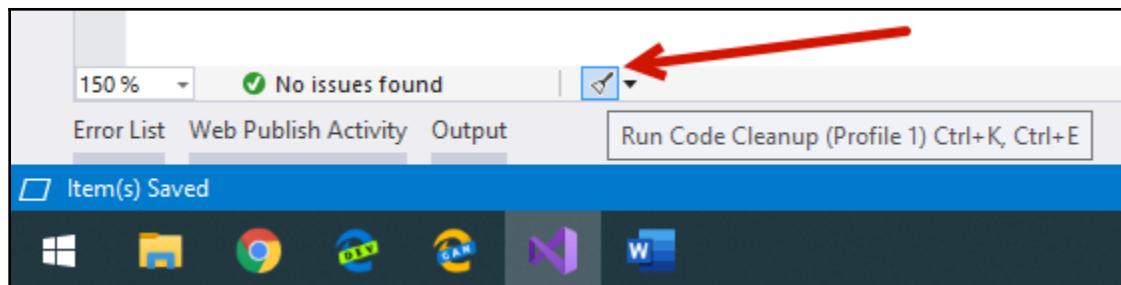
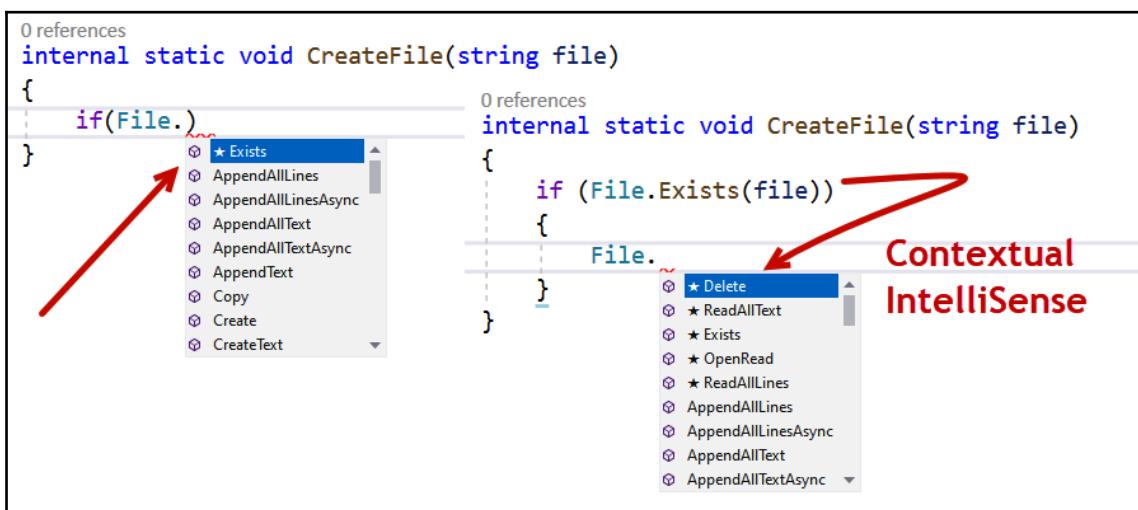
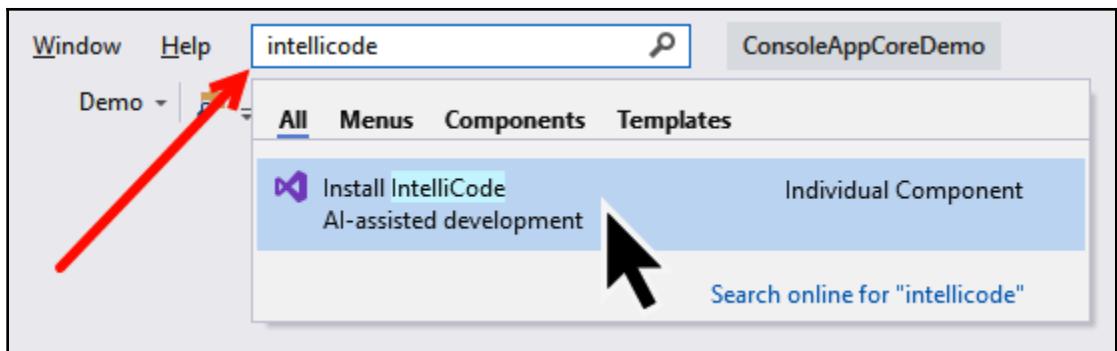
The 'Convert to LINQ (call form)' option is highlighted. The right pane shows the converted LINQ code:

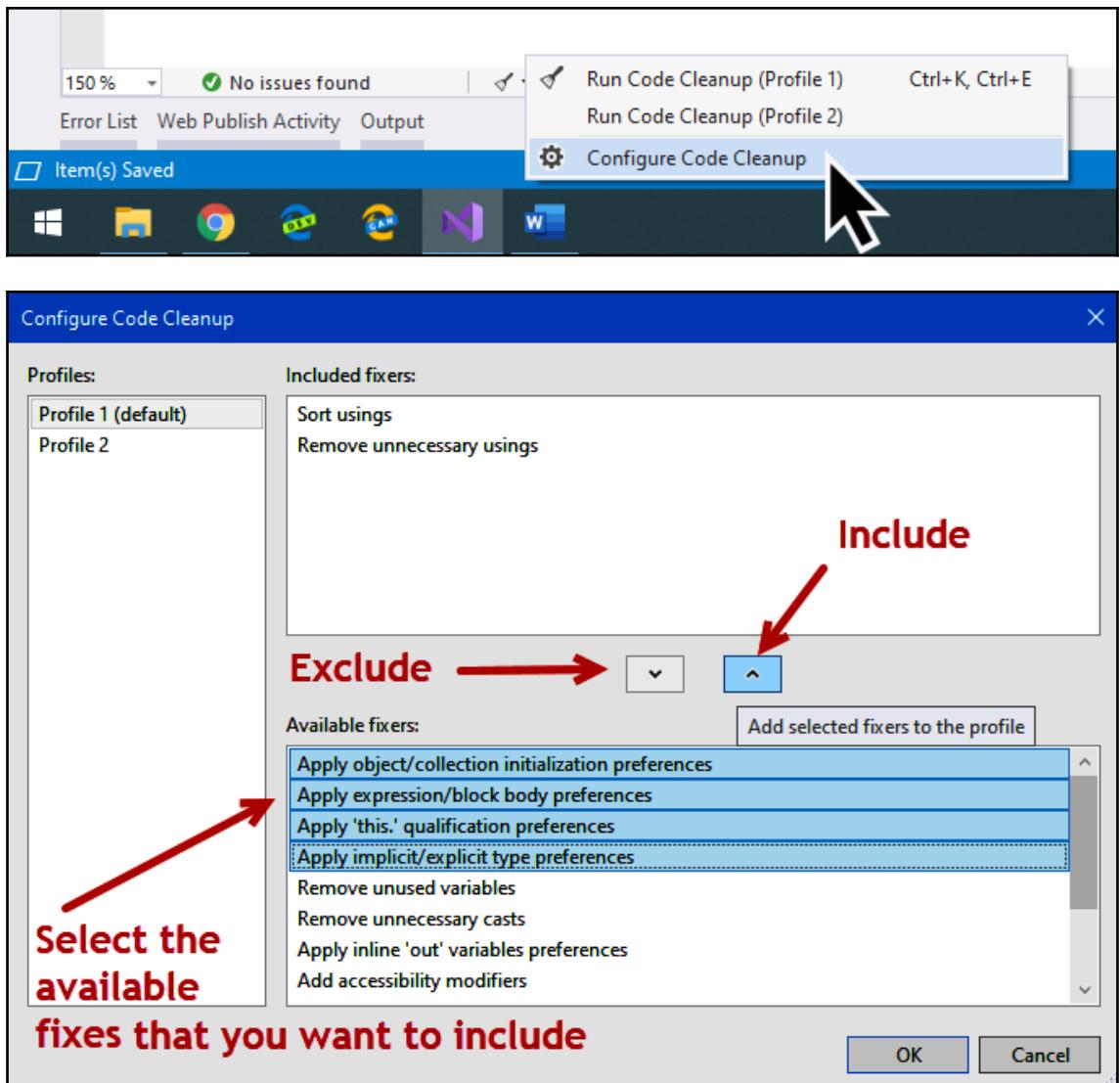
```
using System.Text;
using System.Linq;

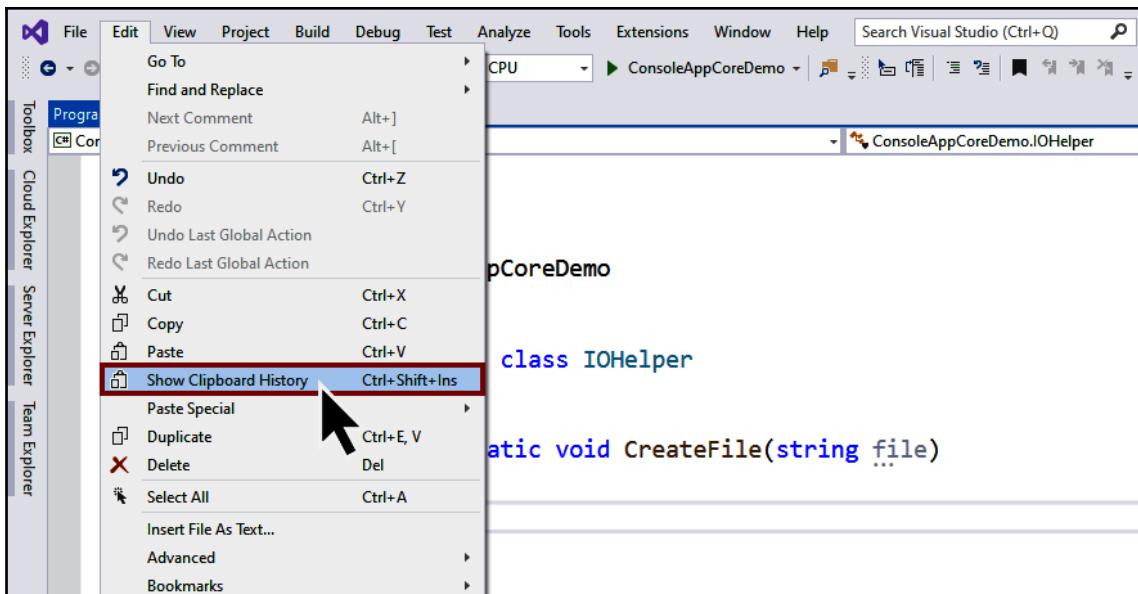
...
var items = new List<string>();

foreach (var item in items)
{
    if (item.Equals("ERROR"))
        foreach (var _ in items.Where(item => item.Equals("ERROR")).Select(item => new { }) // code logic
        )
    {
        // code logic
    }
}
```

A 'Preview changes' button is at the bottom right.







A screenshot of the Visual Studio interface showing the clipboard history. The clipboard contains the following items:

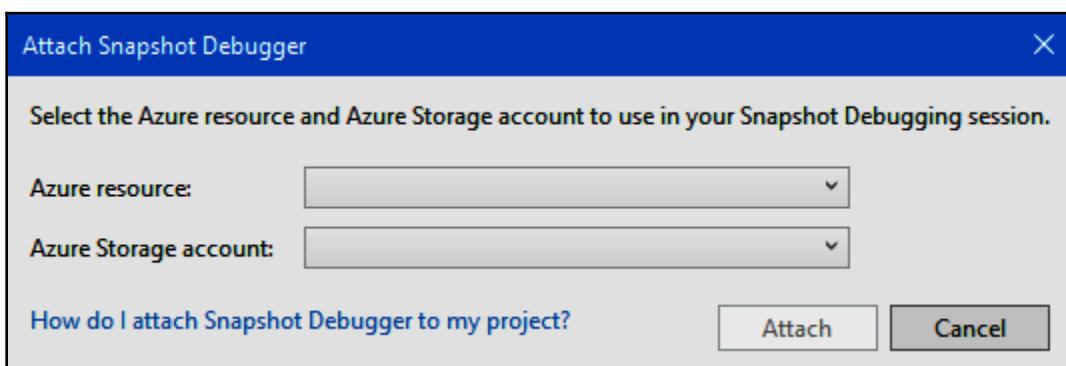
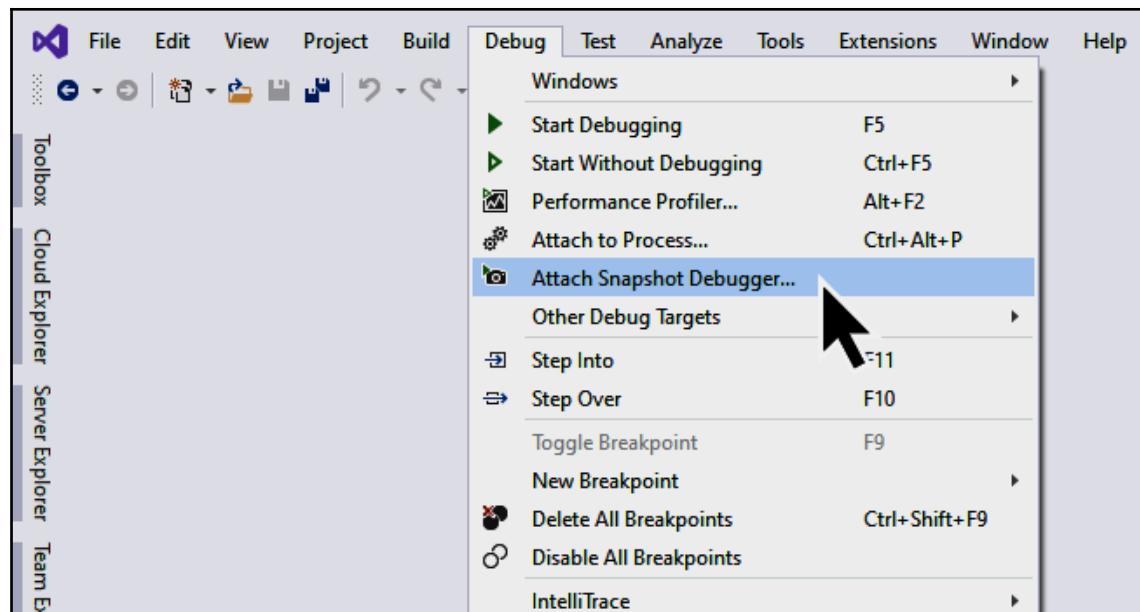
- 1: internal-static-void>CreateFile(string-file) ...
- 2: if-(File.Exists(file)) .....{ ..... ..
- 3: Click-on-the-

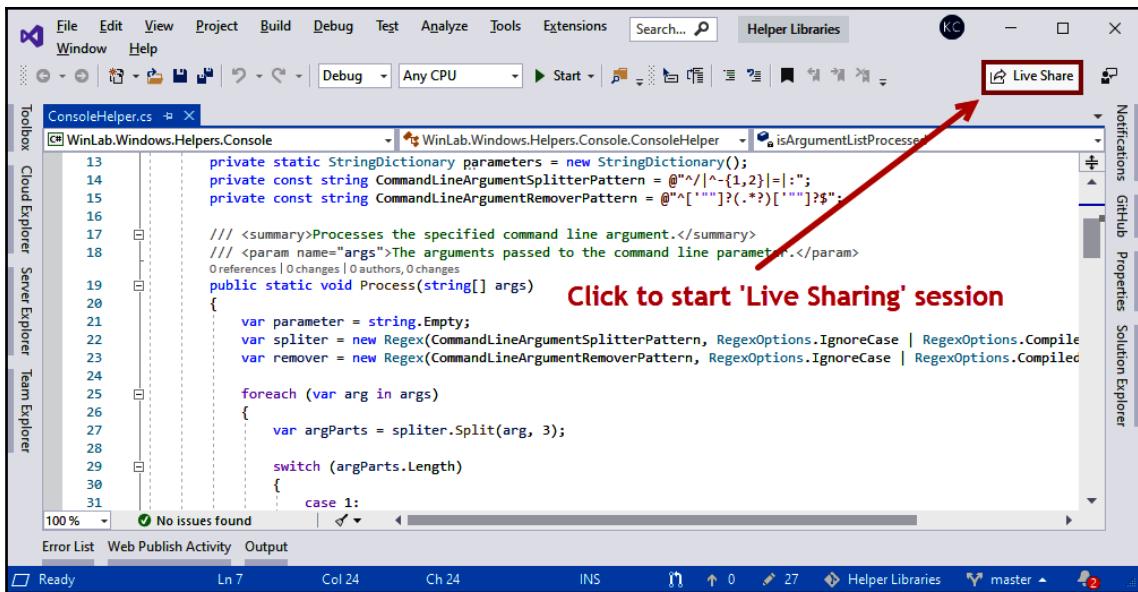
A red arrow points to the second item in the list, with the following text overlaid:

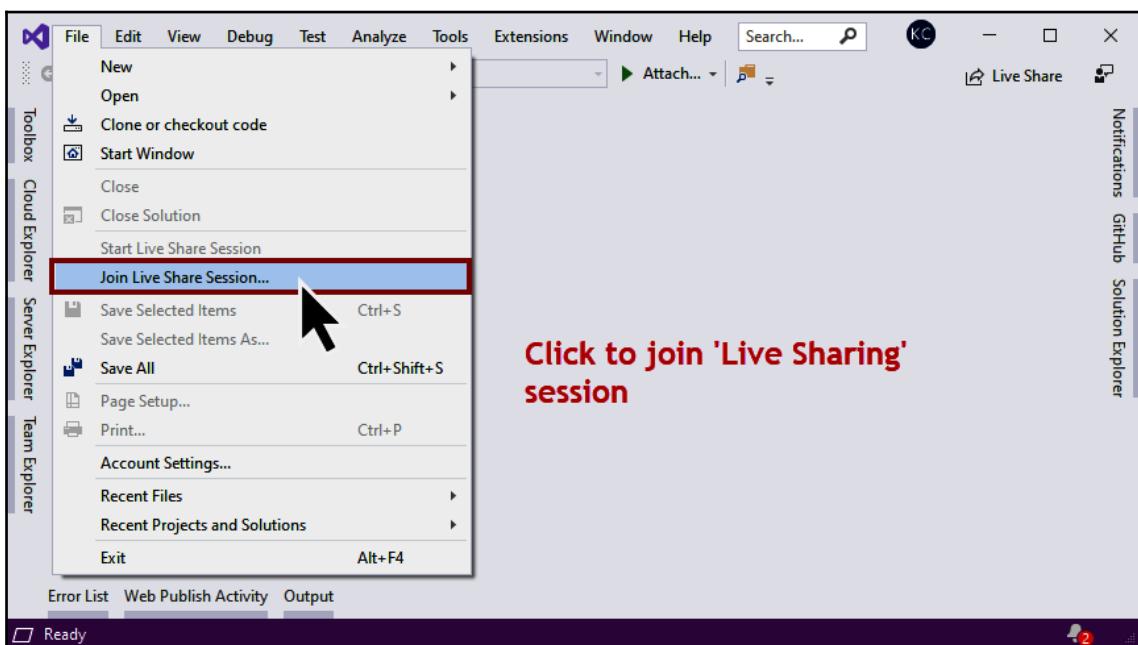
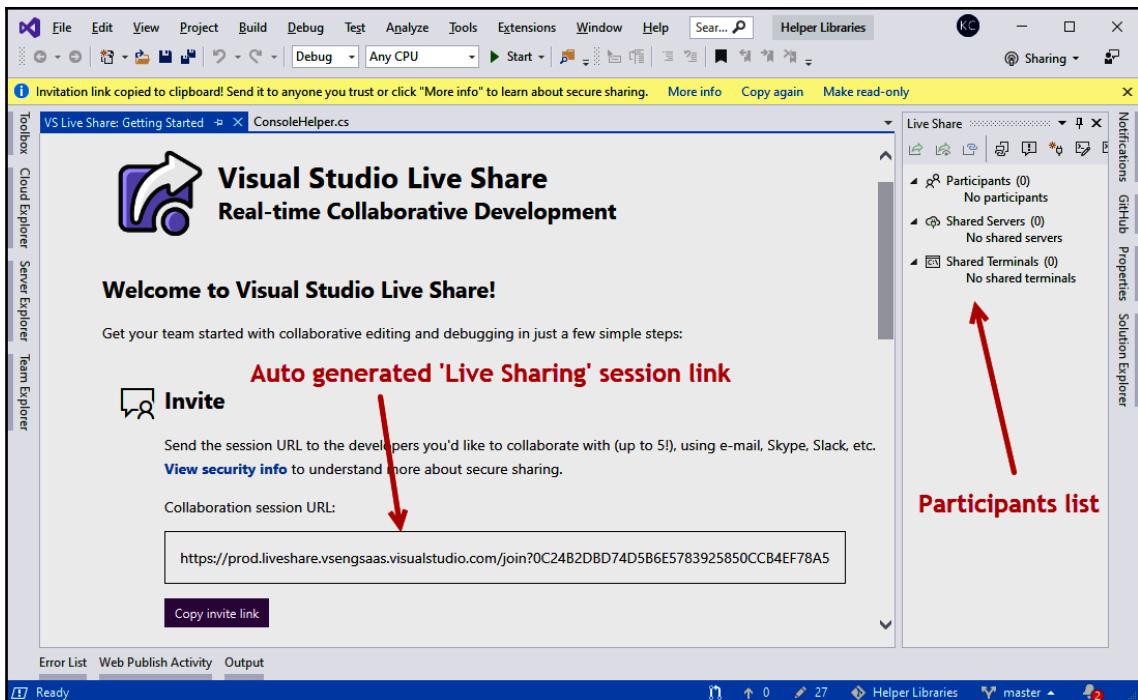
Select the copied content that you want to paste from the Clipboard History

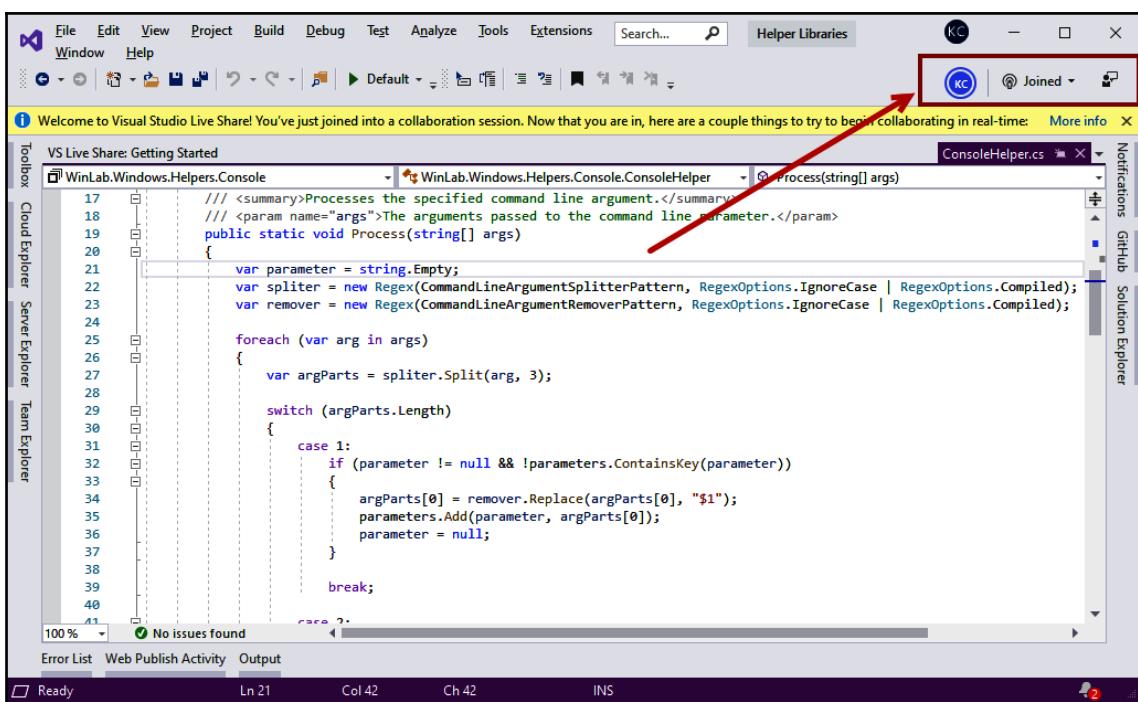
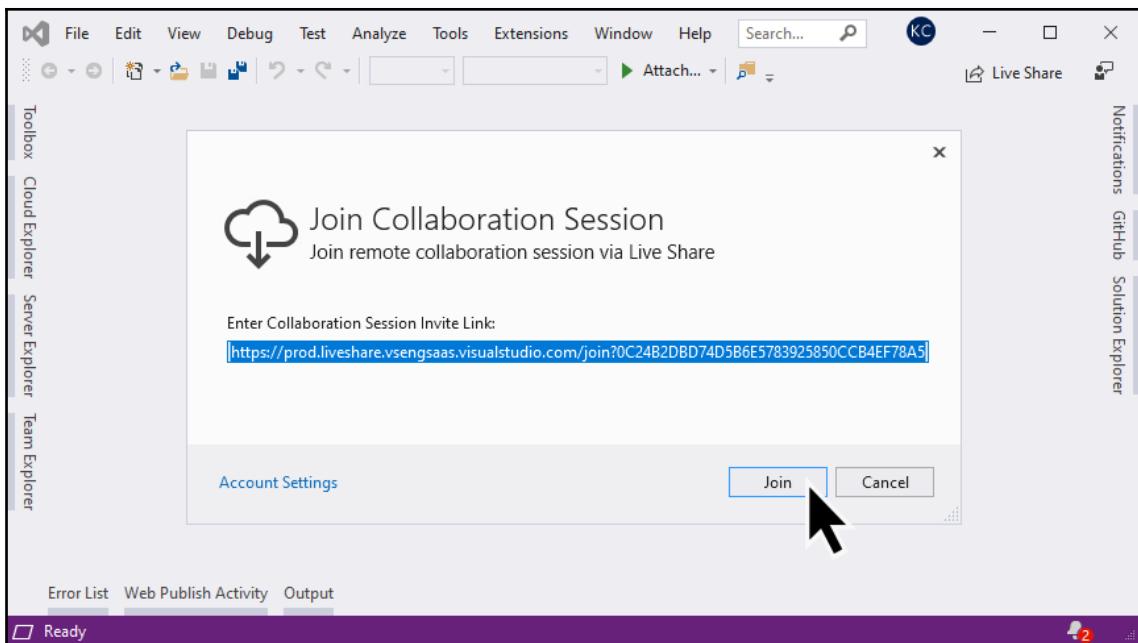
Autos			
name		Value	Search Depth: 3
Name	author	{WinLab.Test.Person}	
BlogURL		"https://www.kunal-chowdhury.com"	🔍
BookName		"Mastering Visual Studio 2019"	🔍
FirstName		"Kunal"	🔍
ID		306844559	🔍
LastName		"Chowdhury"	🔍

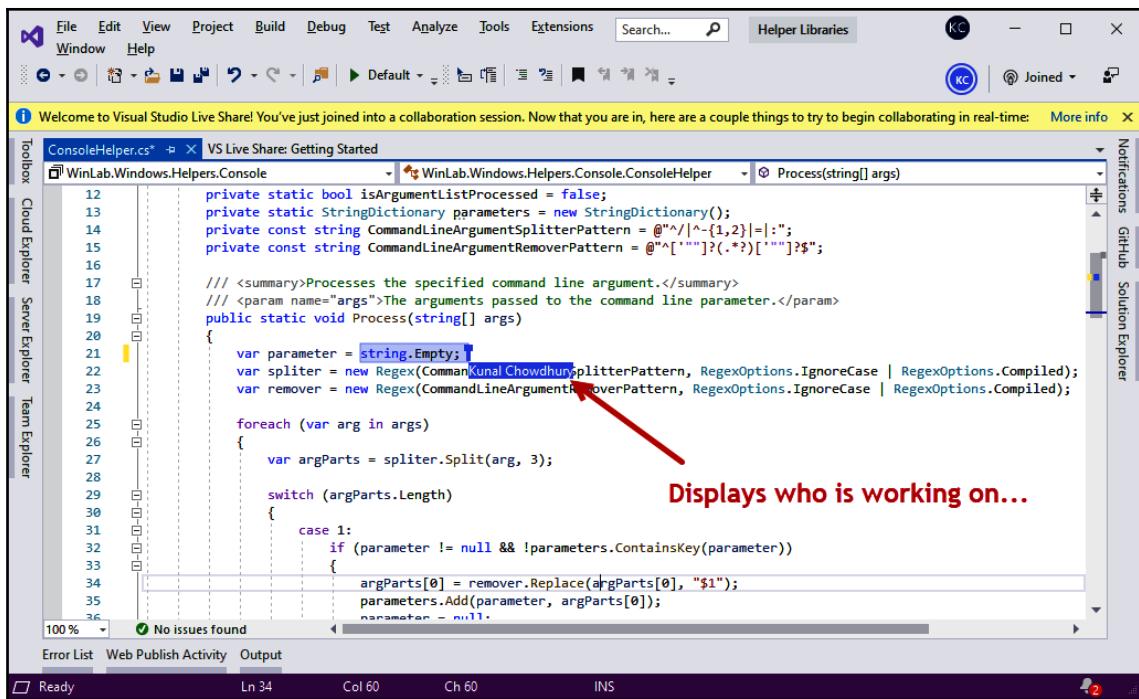
Locals			
kunal		Value	Search Depth: 3
Name	author	{WinLab.Test.Person}	Type
args		{string[0]}	string[]
BlogURL		"https://www.kunal-chowdhury.com"	string
BookName		"Mastering Visual Studio 2019"	string
FirstName		"Kunal"	string
ID		306844559	int
LastName		"Chowdhury"	string

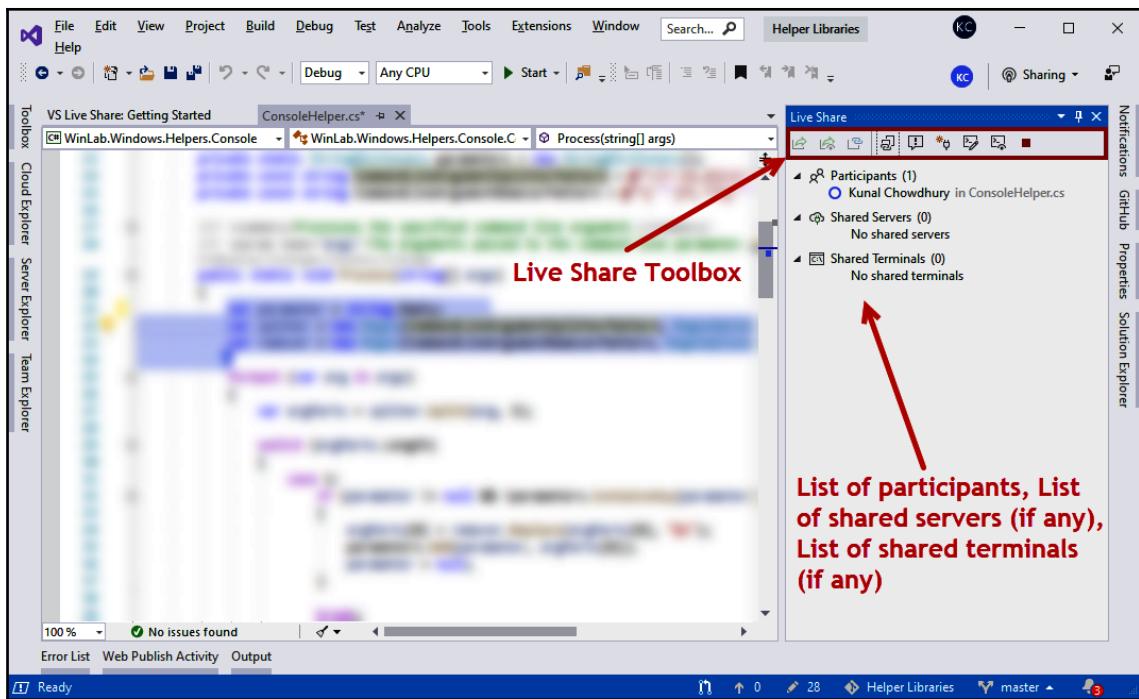


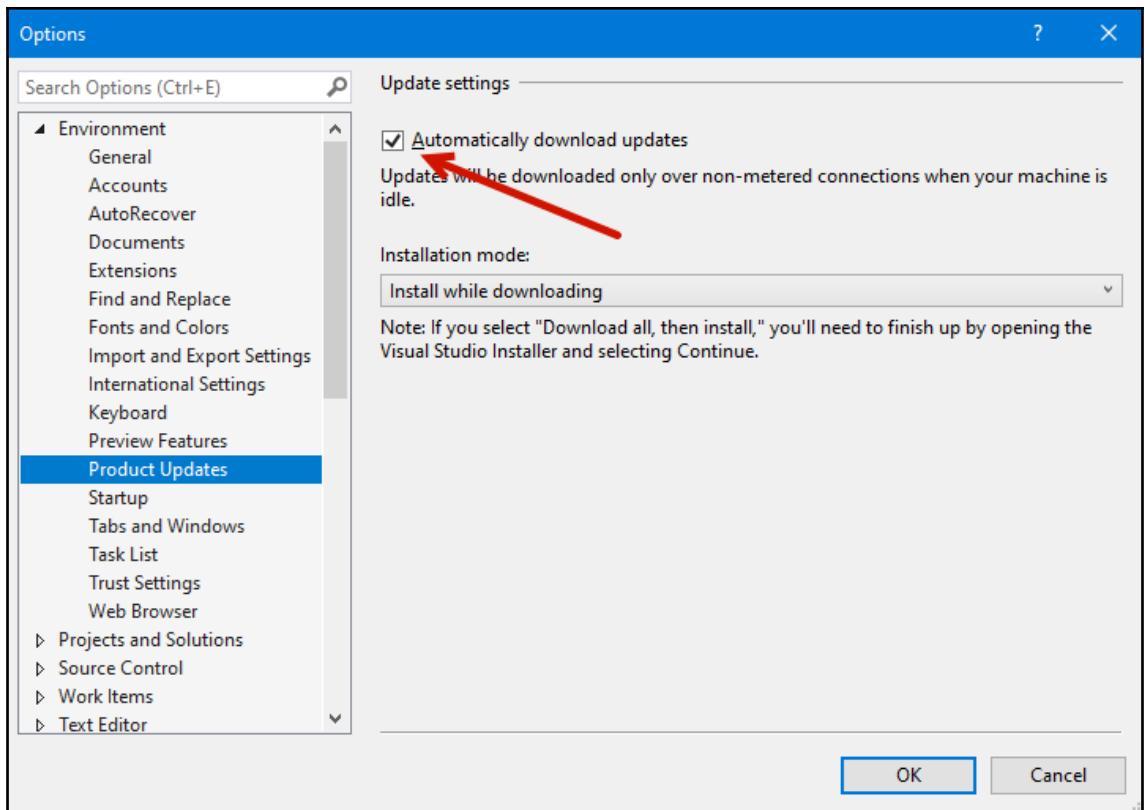




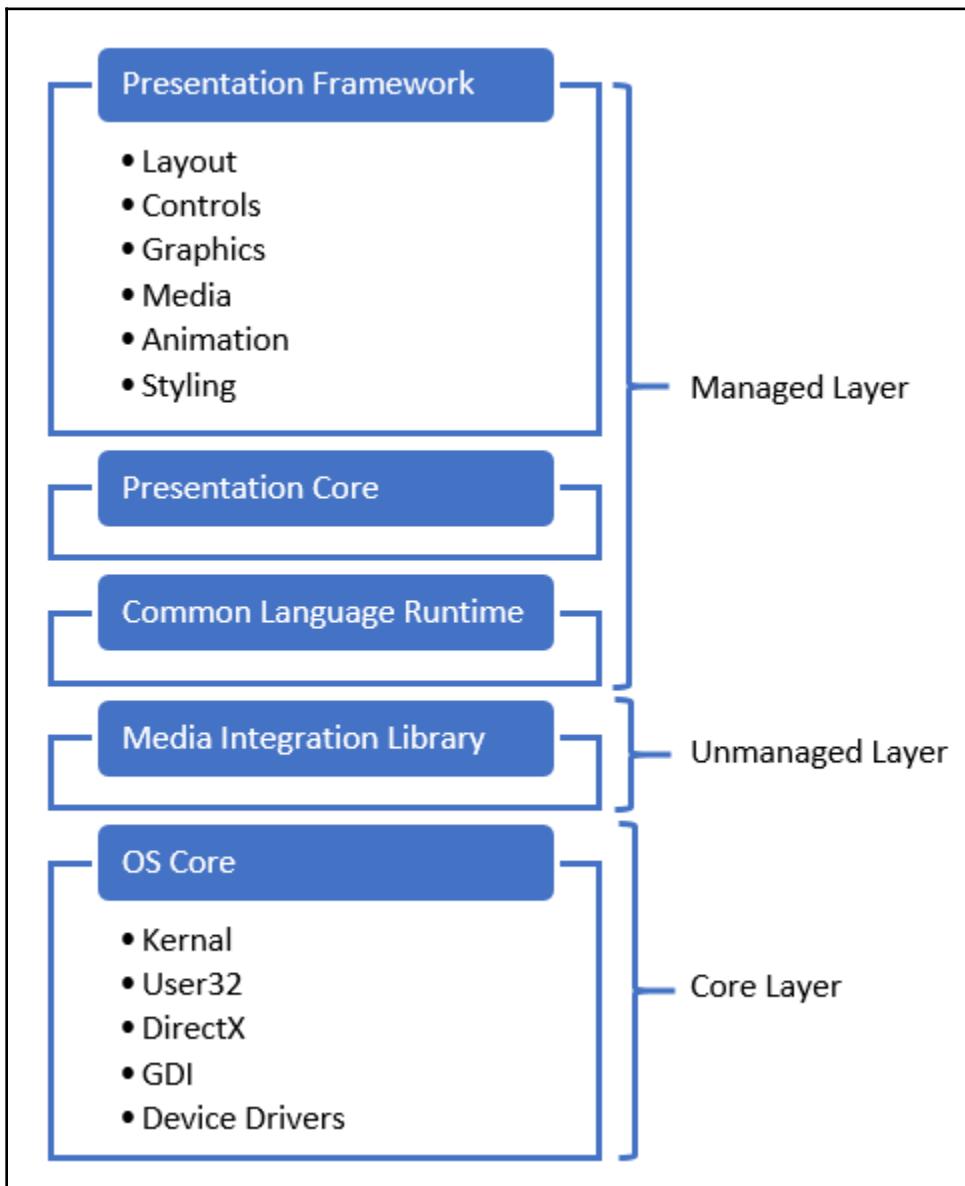


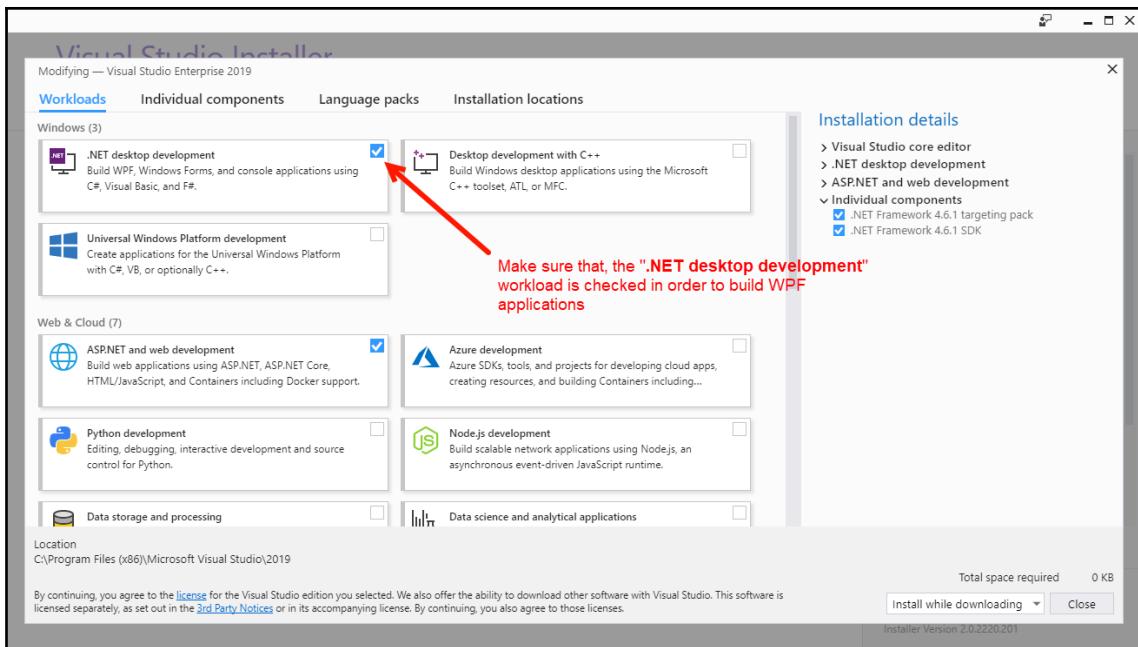






# Chapter 2: Building Desktop Applications for Windows Using WPF





# Visual Studio 2019

Open recent



## Clone or check out code

Get code from an online repository like GitHub or Azure DevOps



## Open a project or solution

Open a local Visual Studio project or .sln file



## Open a local folder

Navigate and edit code within any folder

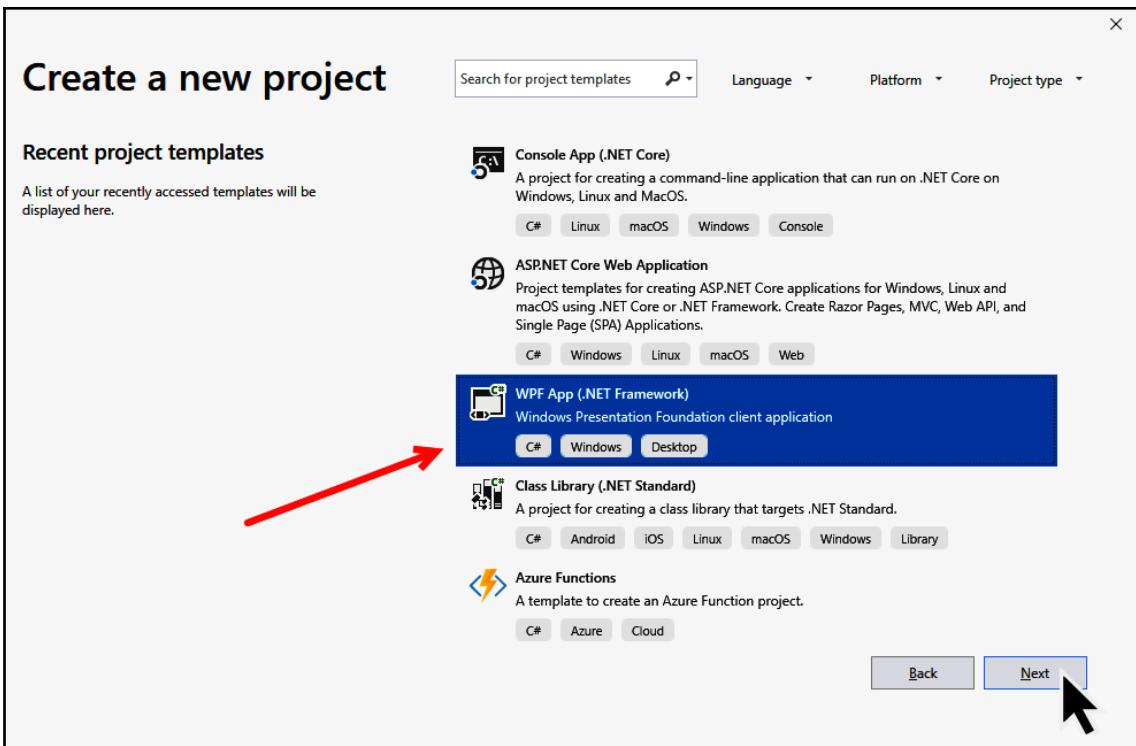


## Create a new project

Choose a project template with code scaffolding to get started



Continue without code



# Configure your new project

WPF App (.NET Framework)

C#

Windows

Desktop

Project name

Demo.WPF.FirstApp

Location

D:\kunal-chowdhury.com\Books\Demos\



Solution name ⓘ

Windows Presentation Foundation

Place solution and project in the same directory

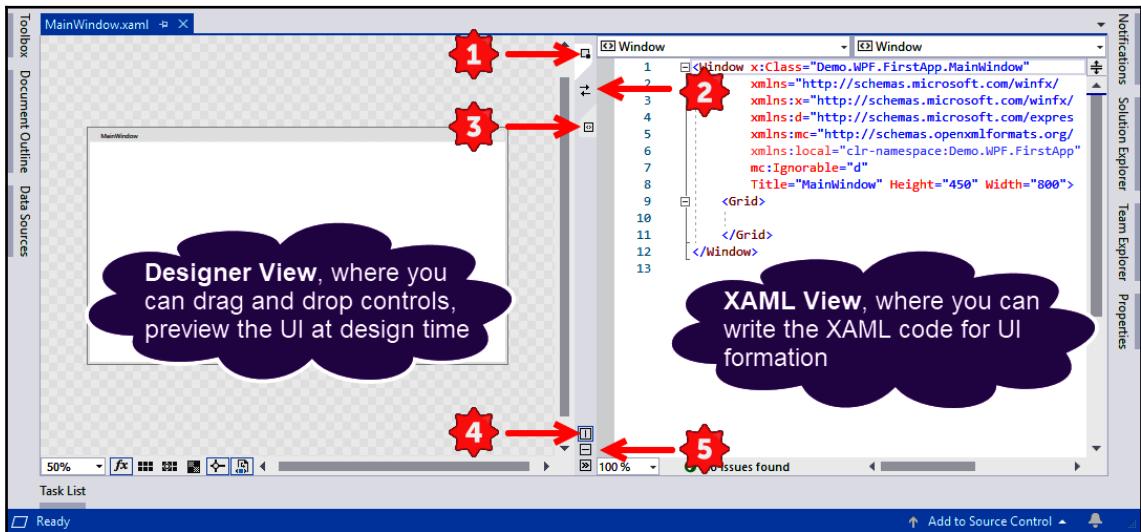
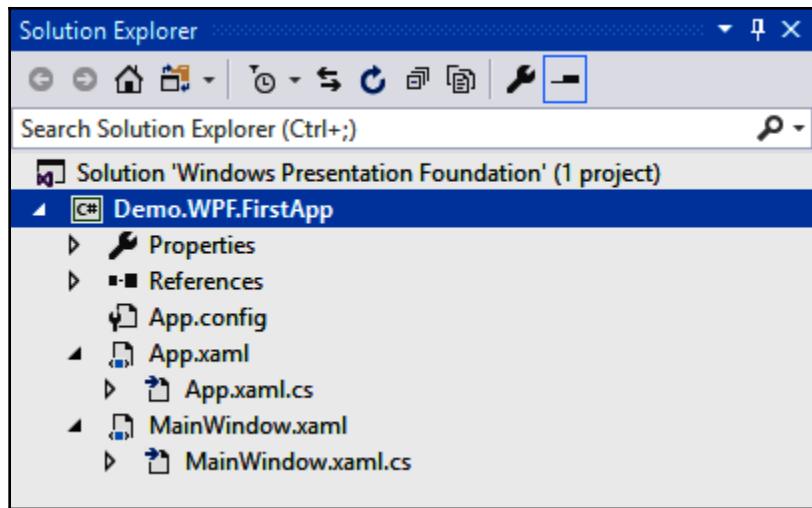
Framework

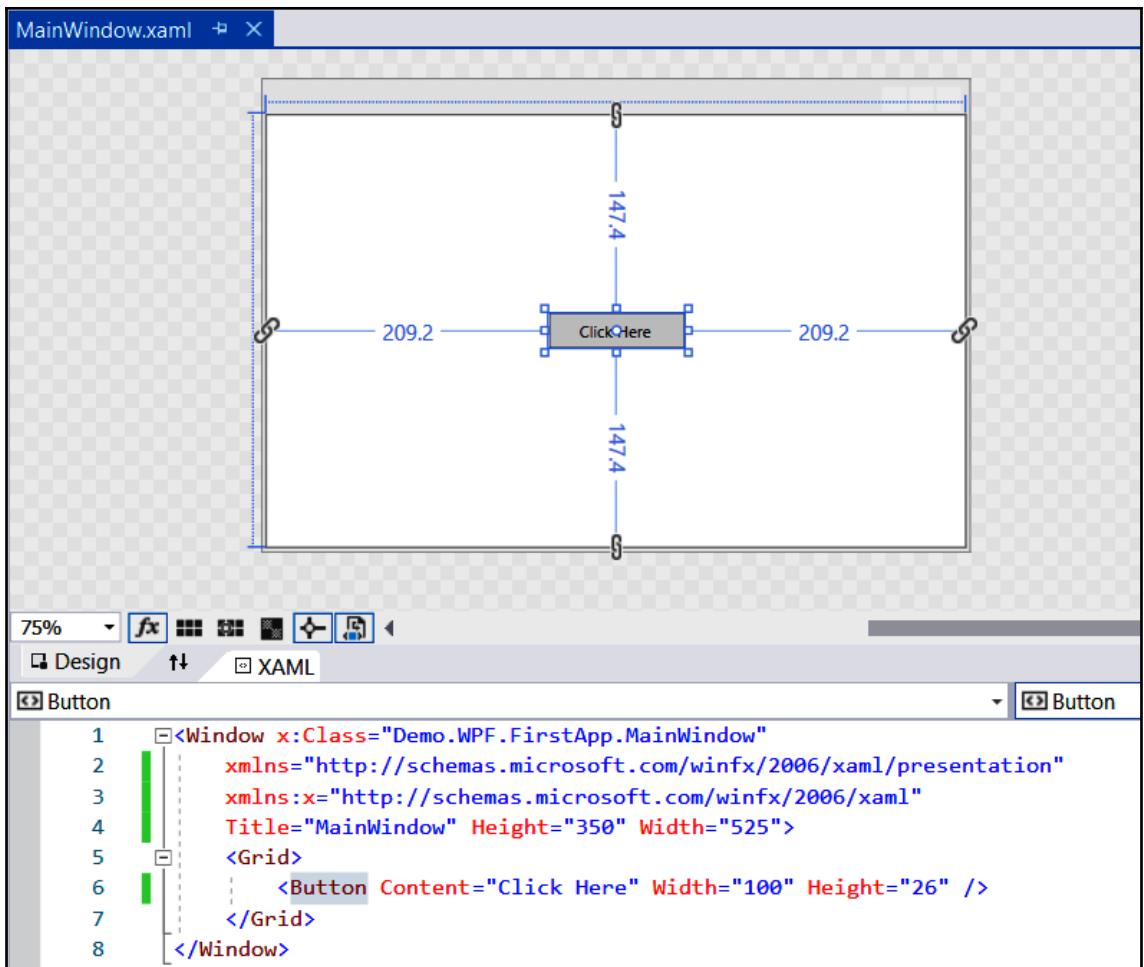
.NET Framework 4.7.2

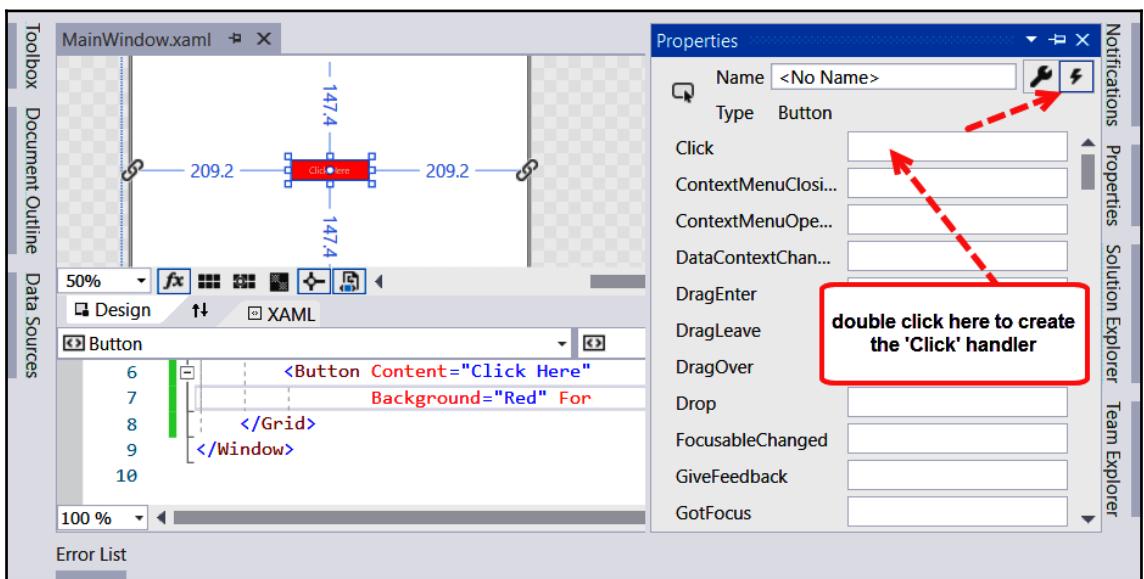
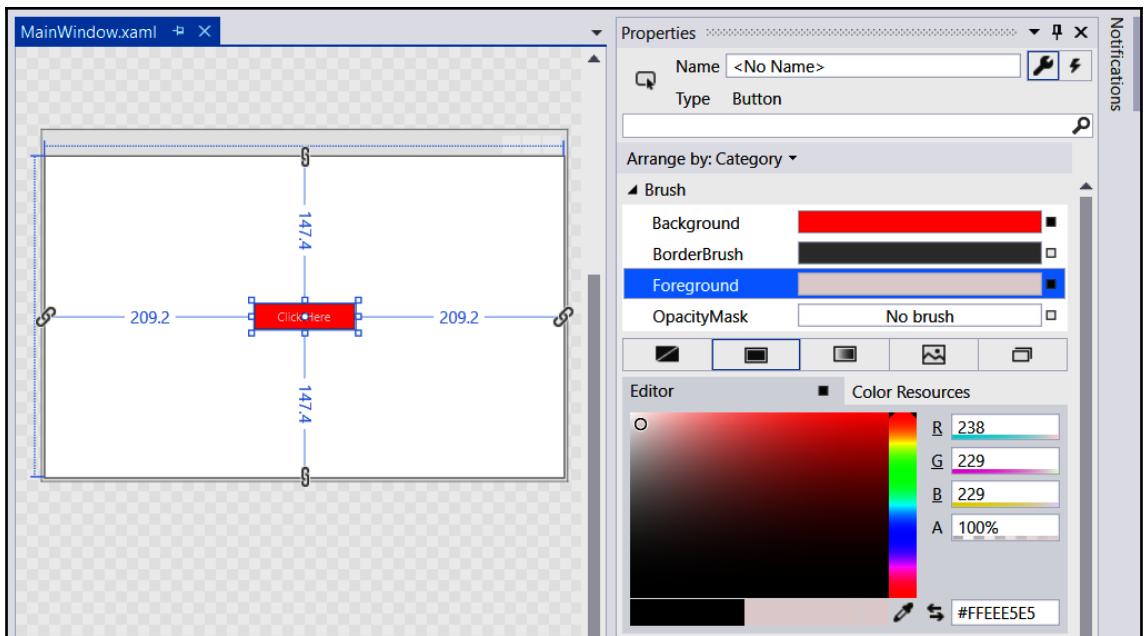
Back

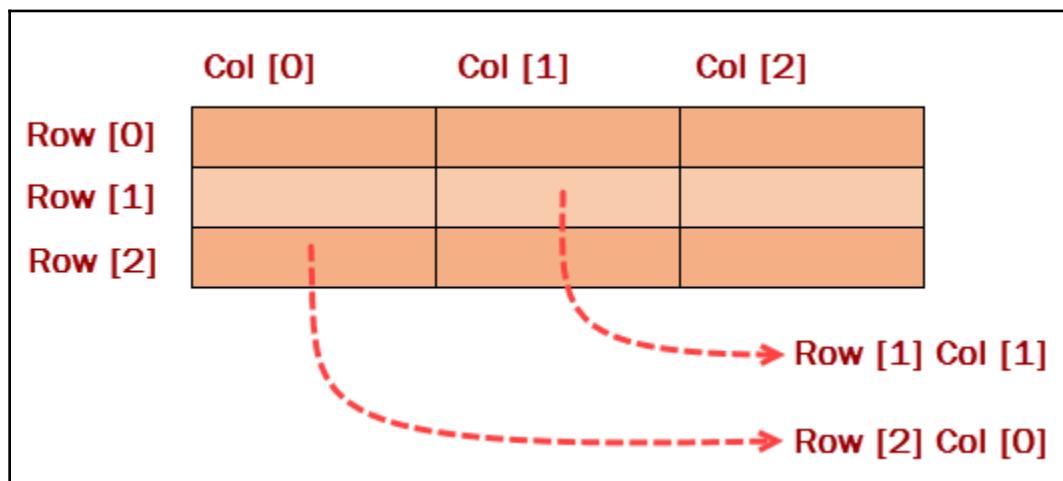
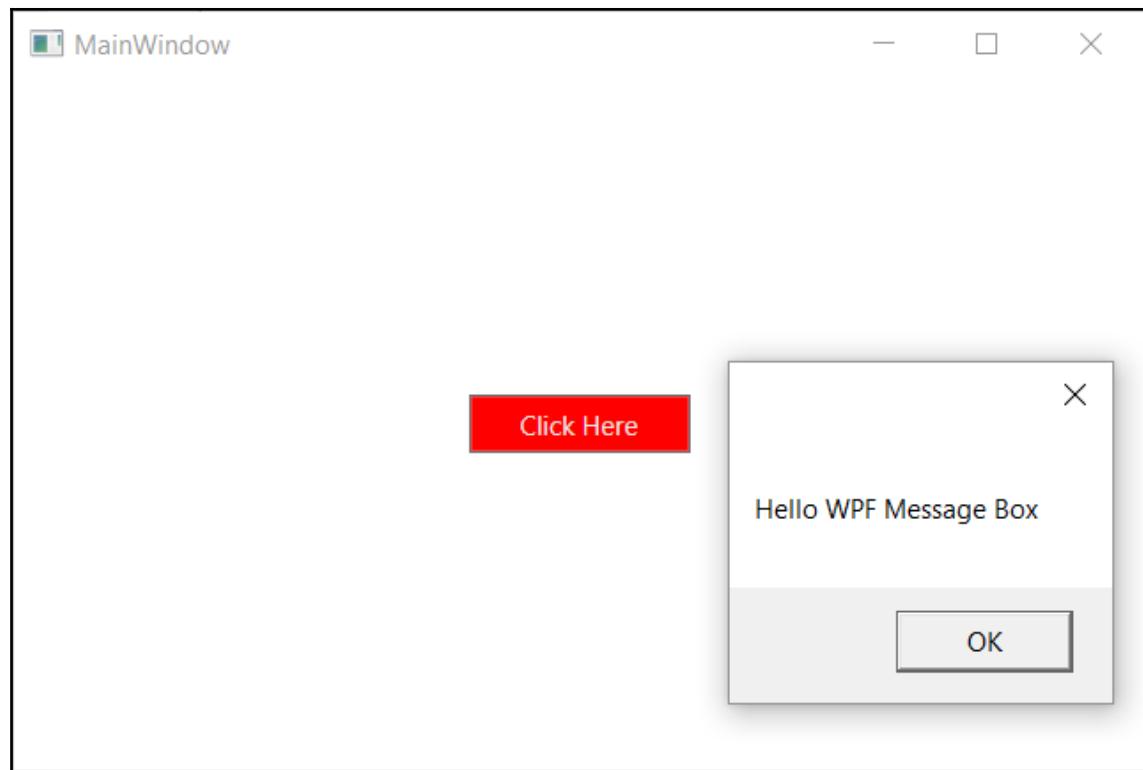
Create









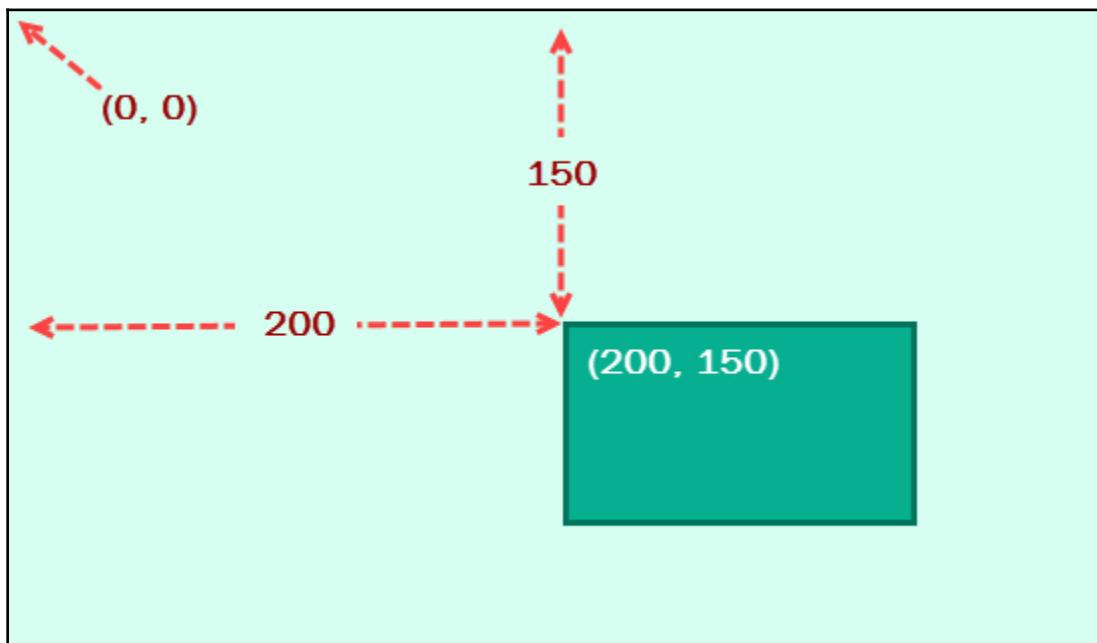
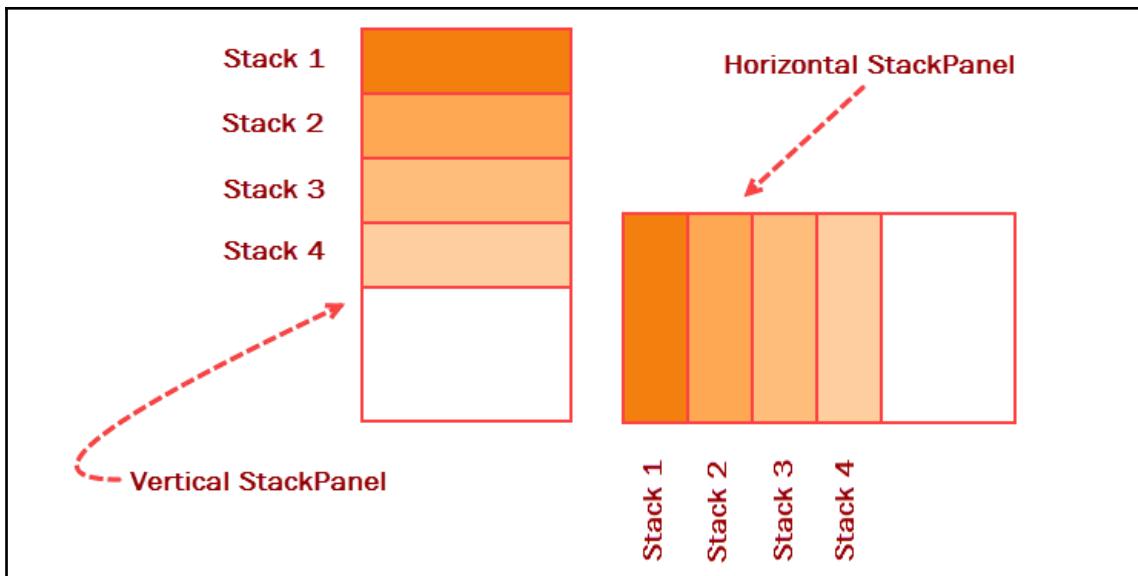


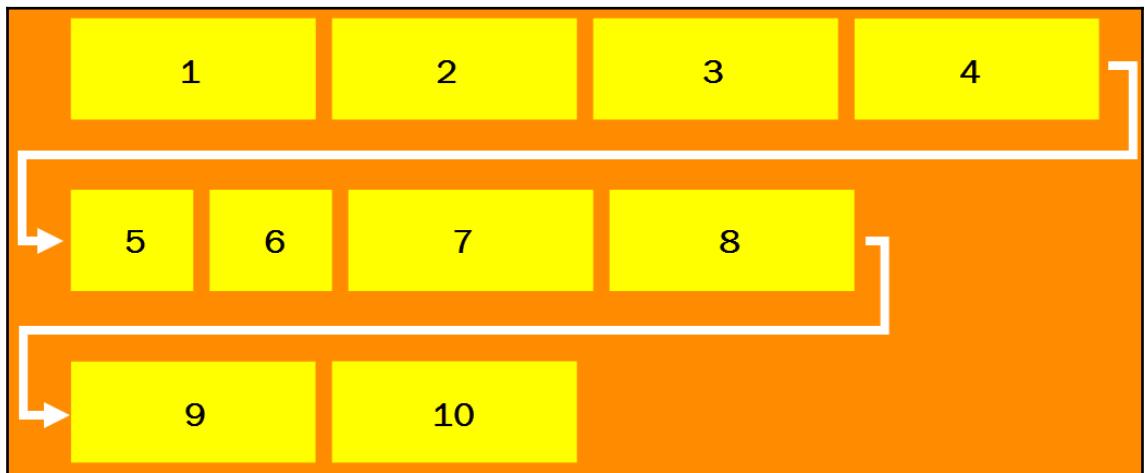
```
<Grid>
    <Grid.RowDefinitions>
        <RowDefinition Height="Auto"/> <!-- auto layout based on content -->
        <RowDefinition Height="Auto"/> <!-- auto layout based on content -->
        <RowDefinition Height="*"/> <!-- take entire available space -->
        <RowDefinition Height="30"/> <!-- take only 30px height -->
    </Grid.RowDefinitions>
    <Grid.ColumnDefinitions>
        <ColumnDefinition Width="Auto"/> <!-- auto layout based on content -->
        <ColumnDefinition Width="20"/> <!-- take only 20px width -->
        <ColumnDefinition Width="*"/> <!-- take entire available space -->
    </Grid.ColumnDefinitions>

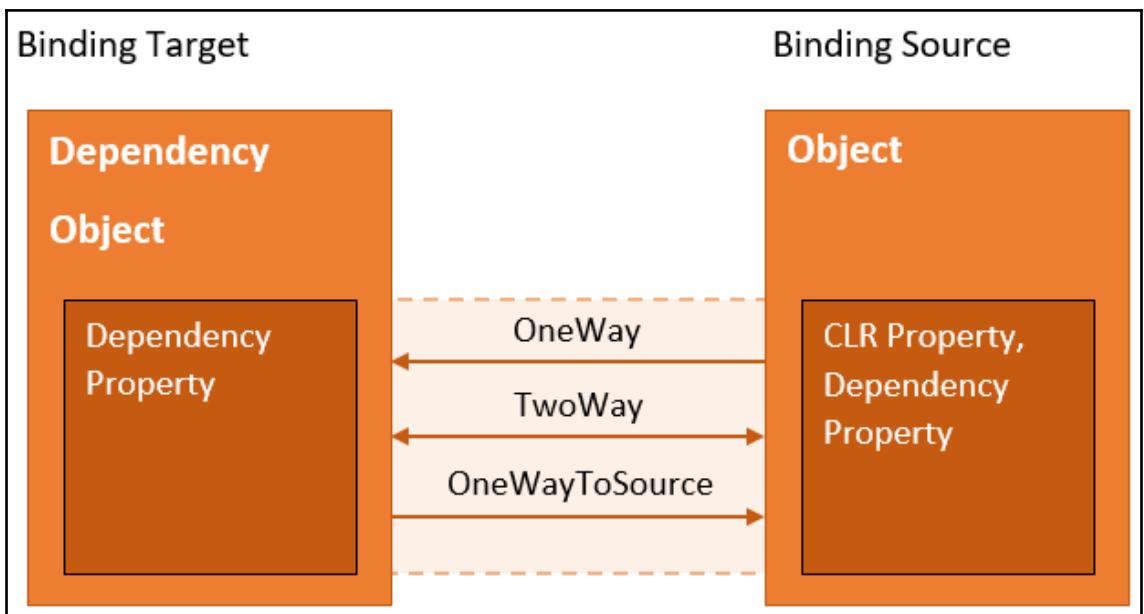
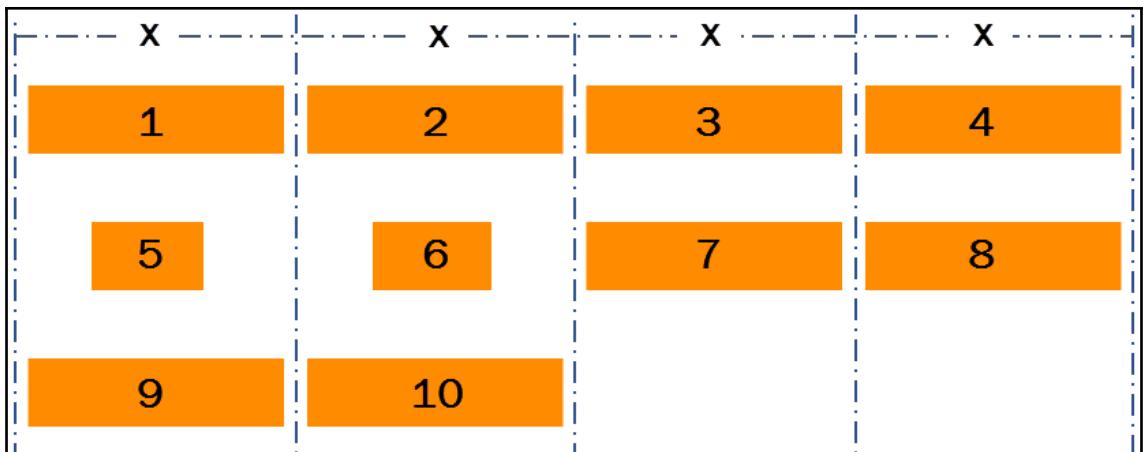
    <!-- First Row -->
    <TextBlock Text="First Name" Grid.Row="0" Grid.Column="0"/>
    <TextBlock Text=":" Grid.Row="0" Grid.Column="1"/>
    <TextBox Grid.Row="0" Grid.Column="2"/>

    <!-- Second Row -->
    <TextBlock Text="Last Name" Grid.Row="1" Grid.Column="0"/>
    <TextBlock Text=":" Grid.Row="1" Grid.Column="1"/>
    <TextBox Grid.Row="1" Grid.Column="2"/>

</Grid>
```







**Data Binding Demo**

Author Name :	Kunal Chowdhury	(Mode=OneWay)
Book Name :	Mastering Visual Studio	(Mode=TwoWay)
Published :	2019	(Mode=TwoWay, UpdateSourceTrigger=PropertyChanged)

**You entered Author Name:**  
Kunal Chowdhury

**You entered Book Name:**  
Mastering Visual Studio

**You entered Published Date:**  
2019

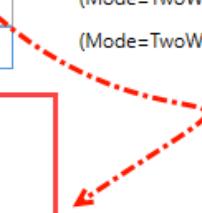
**Data Binding Demo**

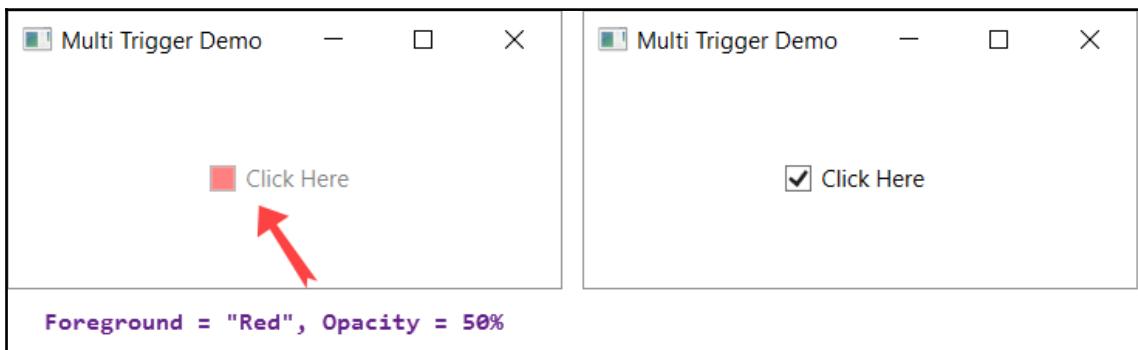
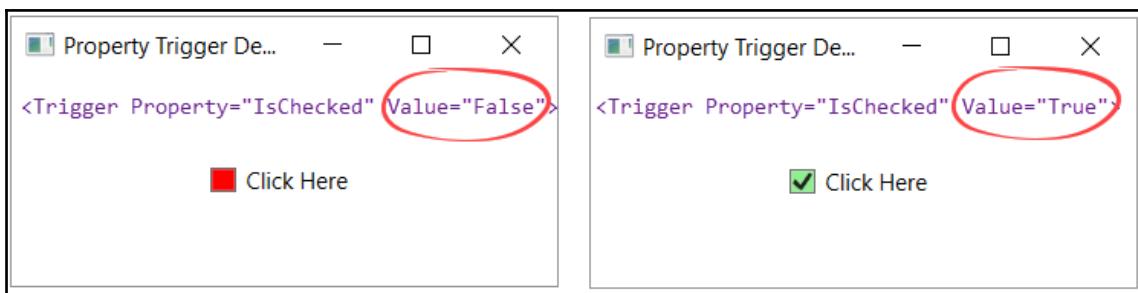
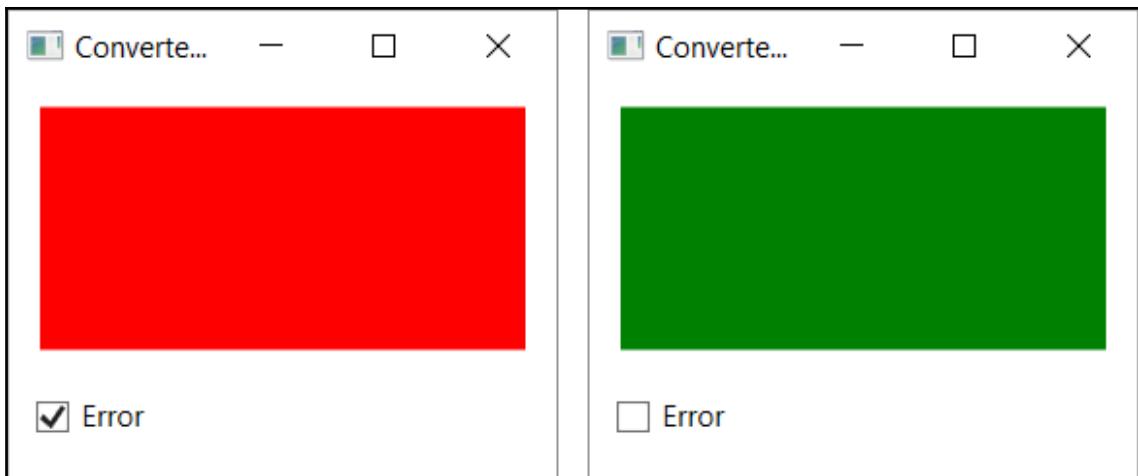
Author Name :	Kunal Chowdhury	(Mode=OneWay)
Book Name :	Mastering Visual Studio 2019	(Mode=TwoWay)
Published :	2019	(Mode=TwoWay, UpdateSourceTrigger=PropertyChanged)

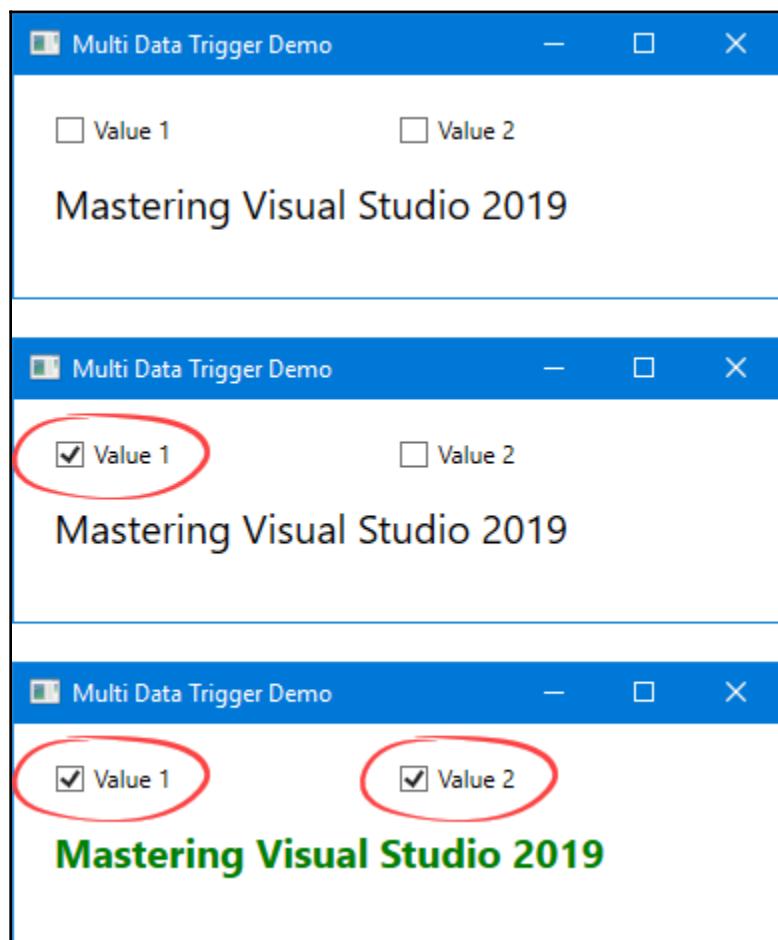
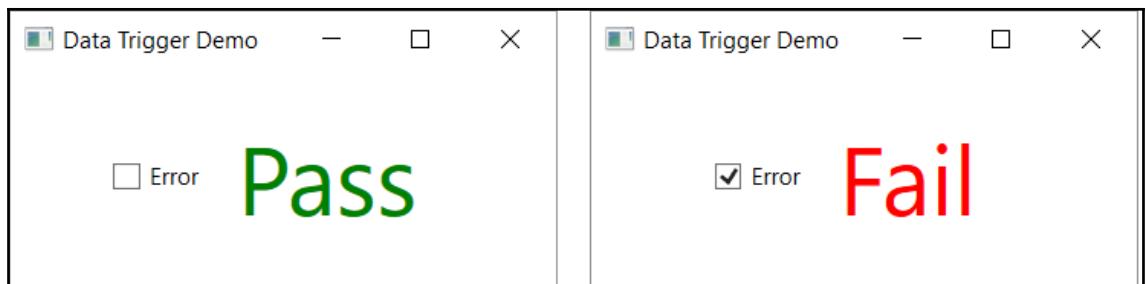
**You entered Author Name:**  
Kunal Chowdhury

**You entered Book Name:**  
Mastering Visual Studio 2019

**You entered Published Date:**  
2019







Event Trigger Demo



Hover here

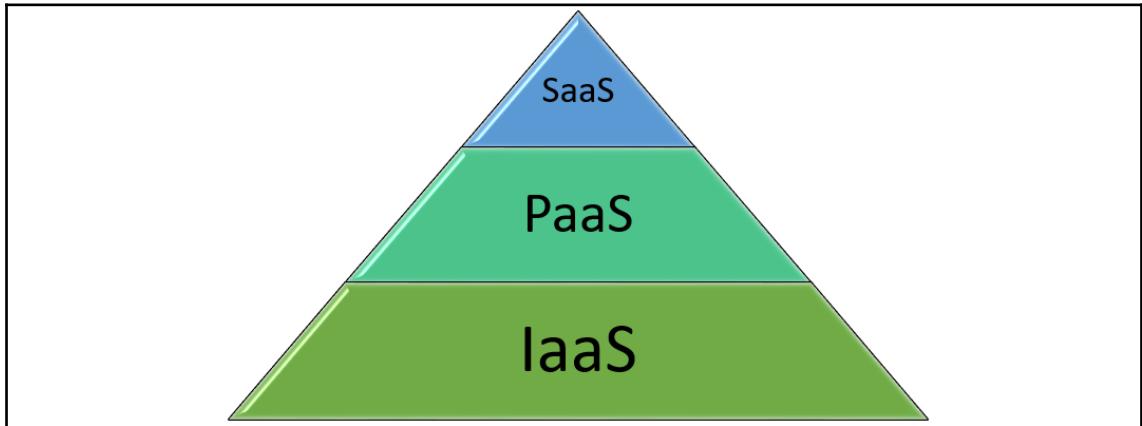
Event Trigger Demo

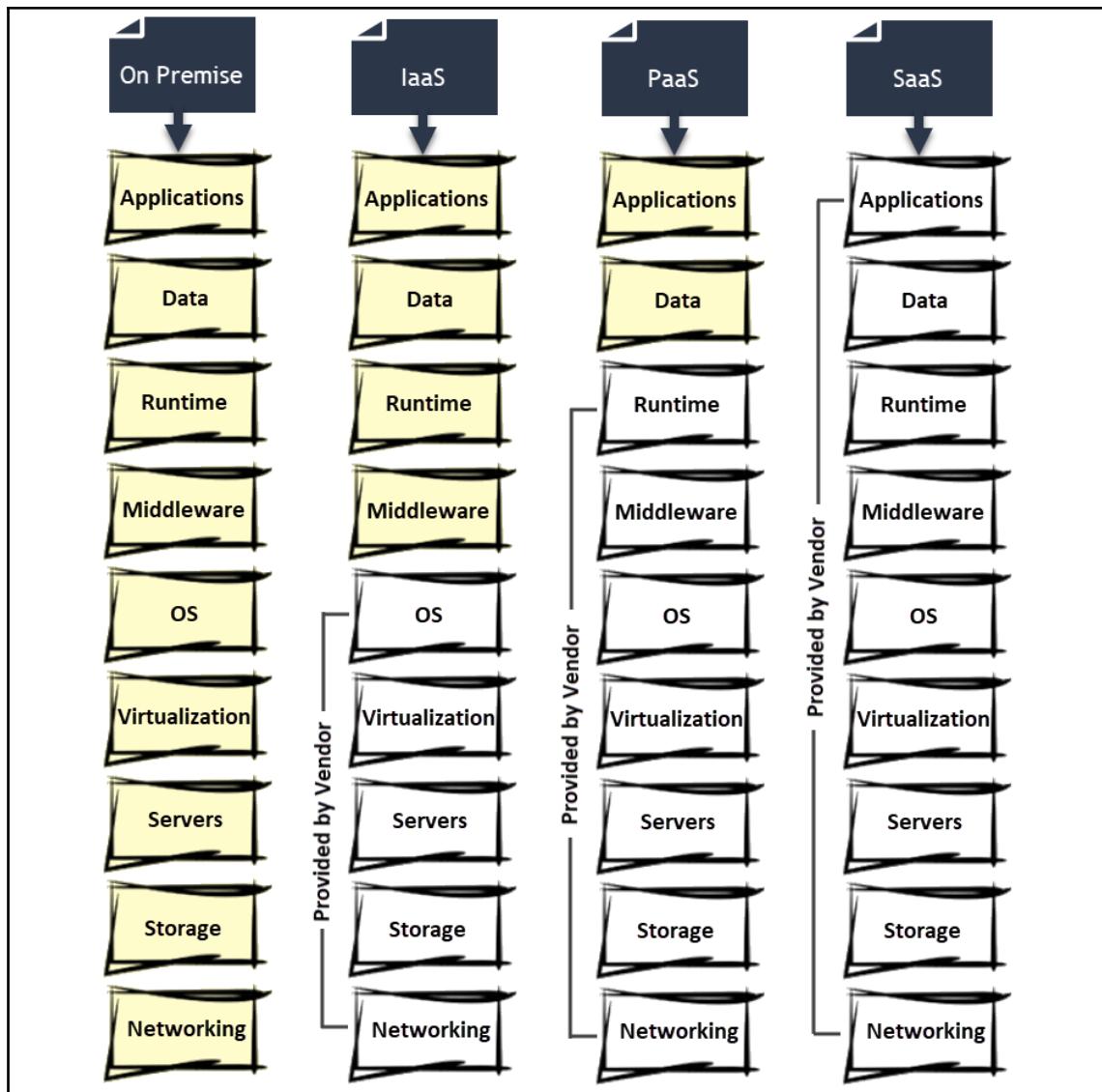


Hover here



# Chapter 3: Accelerate Cloud Development with Microsoft Azure





**Microsoft Azure**

SALES 000-800-100-3928 ▾ MY ACCOUNT PORTAL Search

Why Azure Solutions Products Documentation Pricing Training Partners Blog Resources Support

# Create your free Azure account today

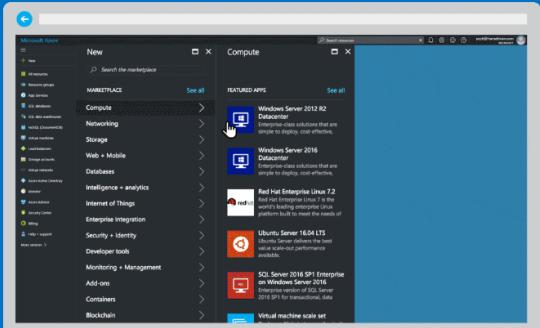
 **Get \$200 free credit**  
Start free with \$200 in credit, and keep going with free options.

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**Visual Studio Installer**

Installed Available

 Visual Studio Enterprise 2019 Preview 16.0.0 Preview 4.0 Microsoft DevOps solution for productivity and coordination across teams of any size <a href="#">Release notes</a>	<a href="#">Modify</a> <a href="#">Launch</a> <a href="#">More ▾</a>
 Visual Studio Enterprise 2017 15.9.7 Microsoft DevOps solution for productivity and coordination across teams of any size <a href="#">Release notes</a>	<a href="#">Modify</a> <a href="#">Launch</a> <a href="#">More ▾</a>
 Visual Studio Enterprise 2019 16.0.0 Microsoft DevOps solution for productivity and coordination across teams of any size <a href="#">Release notes</a>	<a href="#">Modify</a> <span style="border: 2px solid red; padding: 2px;">Launch</span> <a href="#">More ▾</a>

**Developer News**

Visual Studio 2019 Release Candidate (RC) now available  
Today we're sharing a Visual Studio 2019...  
Friday, March 1, 2019

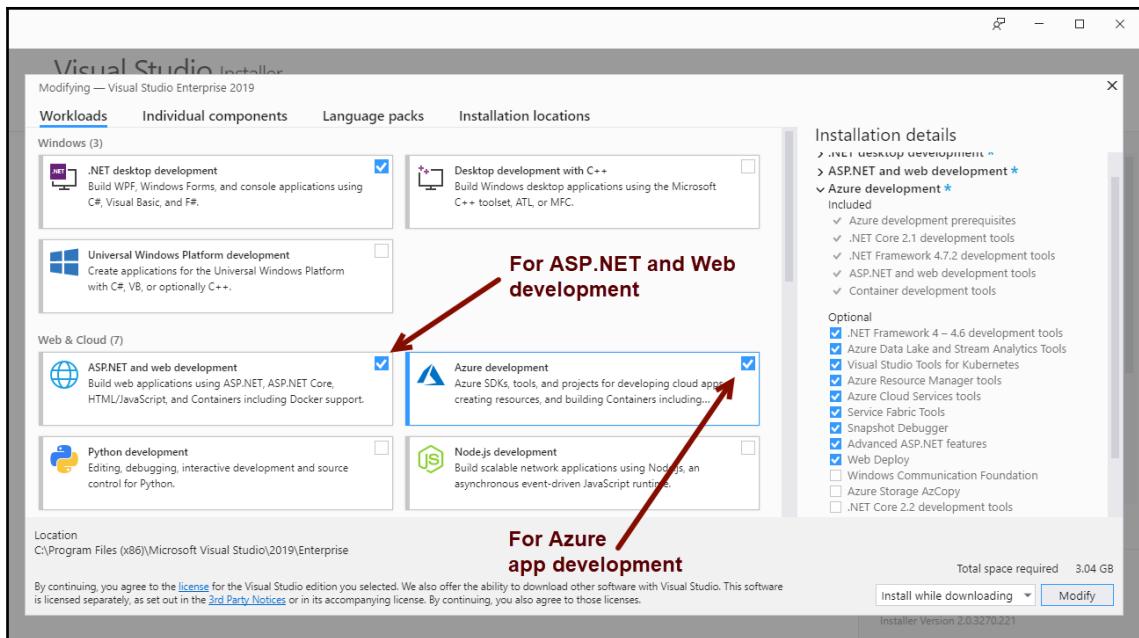
Growing the Visual Studio App Center Service Portfolio  
As you know, Visual Studio App Center deliver...  
Friday, March 1, 2019

An update to C# versions and C# tooling  
Starting with Visual Studio 2019 Preview 4, we...  
Friday, March 1, 2019

Going Public (With Our Visual Studio App Center Plans)  
Throughout Visual Studio App Center's life, w...  
[More news...](#)

Need help? Check out the [Microsoft Developer Community](#) or reach us via [Visual Studio Support](#).

Installer Version 2.0.3270.221



The screenshot shows the Microsoft Azure portal dashboard. The left sidebar contains navigation links such as 'New', 'Dashboard', 'Resource groups', 'All resources', 'Recent', 'App Services', 'Virtual machines (cl...)', 'Virtual machines', 'SQL databases', 'Cloud services (clas...', 'Subscriptions', and 'More services >'. The main dashboard area has a title 'Dashboard' with a dropdown arrow. It features three main cards: 'All resources' (VISUAL STUDIO ULTIMATE W...) which says 'No resources to display' and has a 'Create resources' button; 'Azure Health MY RESOURCES' which displays a world map with green checkmarks indicating healthy resources; and 'Marketplace' and 'Help + support' cards. The top of the page includes a search bar, a user profile icon, and several quick access icons.

Microsoft Azure

Dashboard

All resources  
VISUAL STUDIO ULTIMATE W...

No resources to display

Create resources

Azure Health  
MY RESOURCES

Cloud map showing resource locations worldwide

Marketplace

Help + support

The screenshot shows the Microsoft Azure portal interface. On the left, there's a sidebar with various navigation options: New (highlighted with a cursor), Dashboard, Resource groups, All resources, Recent, App Services, Virtual machines (classic), Virtual machines, SQL databases, and Cloud services (classic). The main dashboard area has a title 'Dashboard'. Below it, there's a section for 'All resources' which says 'VISUAL STUDIO ULTIMATE W...' and 'No resources to display'. There's a blue button labeled 'Create resources'. To the right of this is the 'Azure Health MY RESOURCES' section, which includes a world map with green dots indicating resource locations. Below the map are two cards: 'Marketplace' (with a cloud icon) and 'Help + support' (with a person icon).

Microsoft Azure

» Dashboard > New

## New

Search the Marketplace

Azure Marketplace See all

Featured See all

Get started

Recently created

Compute

Networking

Storage

Web

Mobile

Containers

Databases

Analytics

AI + Machine Learning

Web App Quickstart tutorial

Logic App Quickstart tutorial

Web App for Container Quickstart tutorial

CDN Quickstart tutorial

Media Services Quickstart tutorial

Get started

Recently created

Compute

Networking

Storage

Web

Mobile

Containers

Databases

Analytics

AI + Machine Learning

Web App Quickstart tutorial

Logic App Quickstart tutorial

Web App for Container Quickstart tutorial

CDN Quickstart tutorial

Media Services Quickstart tutorial

Microsoft Azure   New > Web + Mobile > Web App

Web App

Create

\* App name  
kunal-chowdhury.azurewebsites.net

\* Subscription  
Visual Studio Ultimate with MSDN (Main)

\* Resource Group  
Create new   Use existing  
kunal-chowdhury

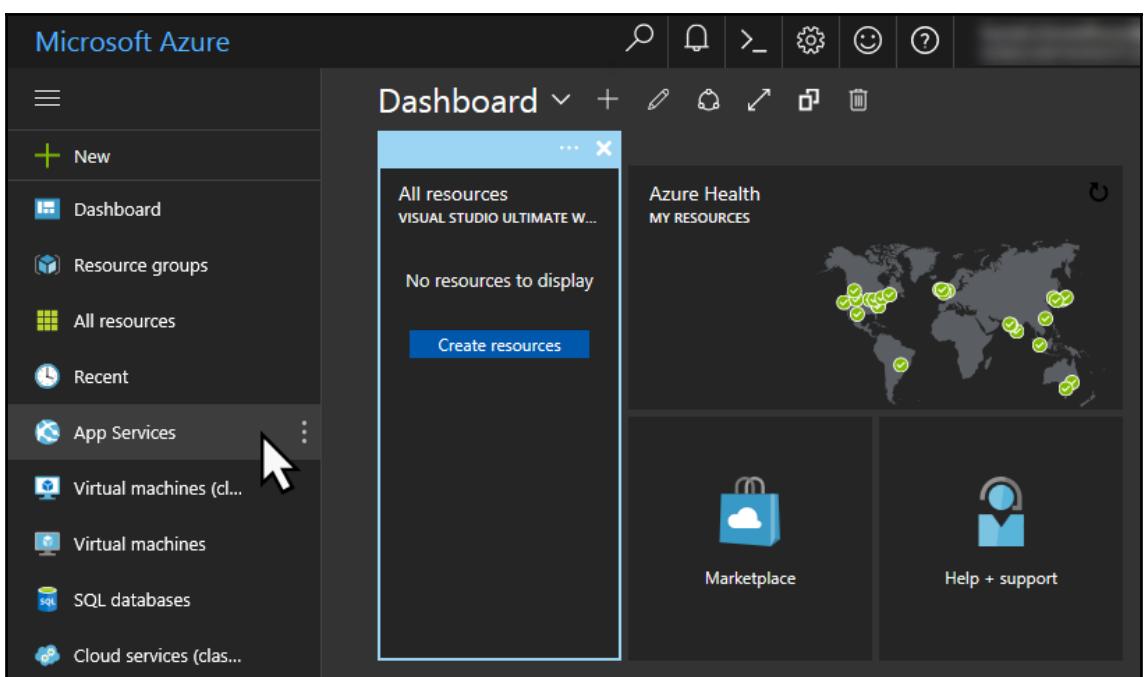
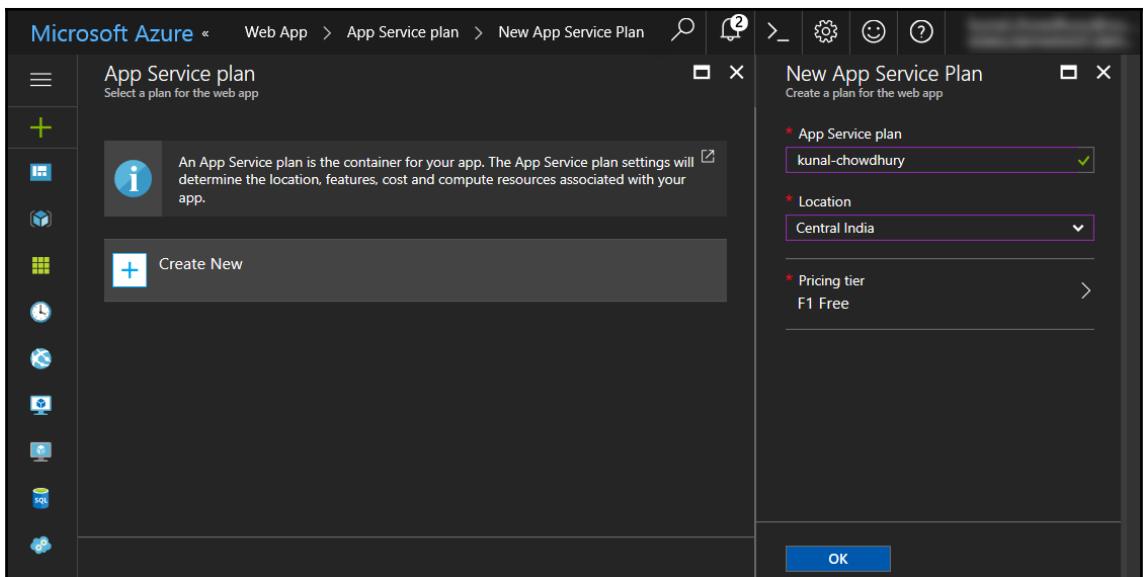
\* App Service plan/Location  
ServicePlan1eefdf669-b57f(South...)

Application Insights  
On   Off

Pin to dashboard

**Create**   Automation options

The screenshot shows the Microsoft Azure portal interface for creating a new Web App. The left sidebar has icons for various services like Storage, Functions, and Logic Apps. The main form is titled 'Web App' and 'Create'. It requires an 'App name' (kunal-chowdhury), a 'Subscription' (Visual Studio Ultimate with MSDN (Main)), and a 'Resource Group' (Create new, named 'kunal-chowdhury'). It also specifies an 'App Service plan/Location' (ServicePlan1eefdf669-b57f(South...)). Application Insights is turned 'On'. A 'Pin to dashboard' checkbox is available, and there are 'Create' and 'Automation options' buttons at the bottom.



Microsoft Azure App Services

App Services  
kunal2383@yahoo.co (Default Directory)

+ Add Columns Refresh

Subscriptions: 1 of 2 selected

Filter by name... Visual Studio Ultimate with MSDN (Main) All locations No grouping

1 items

NAME	STATUS	APP TYPE	APP SERVICE PLAN	LOCATION	SUBSCRIPTION
kunal-chowdhury	Running	Web app	kunal-chowdhury	Central India	Visual Studio Ultim... •••

The screenshot shows the Microsoft Azure App Services dashboard. On the left, there's a sidebar with various icons for different services like Storage, Functions, and Logic Apps. The main area displays a table of app services. One row is selected, showing details: Name (kunal-chowdhury), Status (Running), App Type (Web app), App Service Plan (kunal-chowdhury), Location (Central India), and Subscription (Visual Studio Ultim...). The 'NAME' column is currently sorted. There are also filter and search options at the top.

Microsoft Azure App Services > **kunal-chowdhury**

Search (Ctrl+/  
)

**kunal-chowdhury**  
App Service

Overview (selected)  
Activity log  
Access control (IAM)  
Tags  
Diagnose and solve problems

DEPLOYMENT

Quickstart  
Deployment credentials  
Deployment slots  
Deployment options  
Continuous Delivery (Preview)

SETTINGS

Application settings  
Authentication / Authorization  
Backups  
Custom domains

Browse Stop Swap Restart Delete More

Essentials

Resource group (change)  
**kunal-chowdhury**  
Status  
**Running**  
Location  
**Central India**  
Subscription name (change)  
**Visual Studio Ultimate with MSDN (Main)**  
Subscription ID  
**1fa4f721-0c6d-48ac-aea8-18d94ba910c0**

URL  
**http://kunal-chowdhury.azurewebsites.net**  
App Service plan/pricing tier  
**kunal-chowdhury (Free)**  
FTP/deployment username  
**kunal-chowdhury\cwc-kc**  
FTP hostname  
**ftp://waws-prod-pn1-001.ftp.azurewebsites...**  
FTPS hostname  
**https://waws-prod-pn1-001.ftp.azurewebsite...**

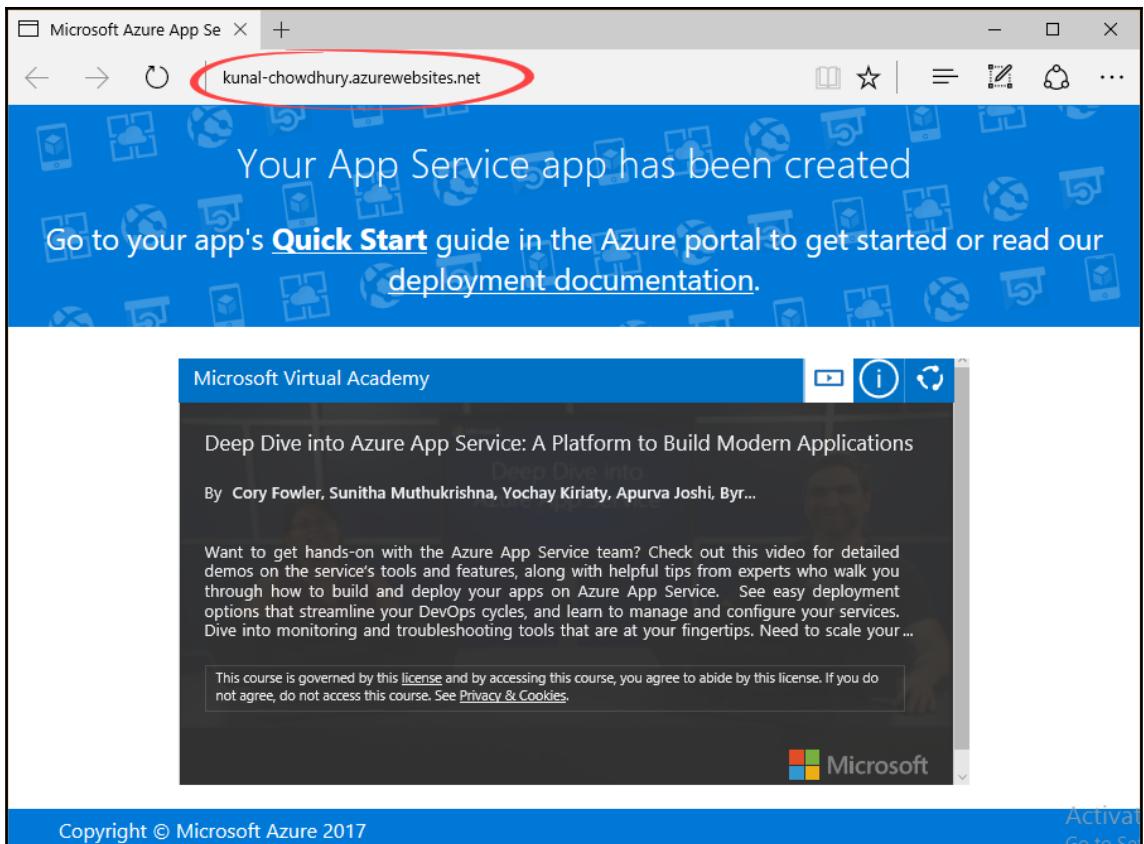
Monitoring

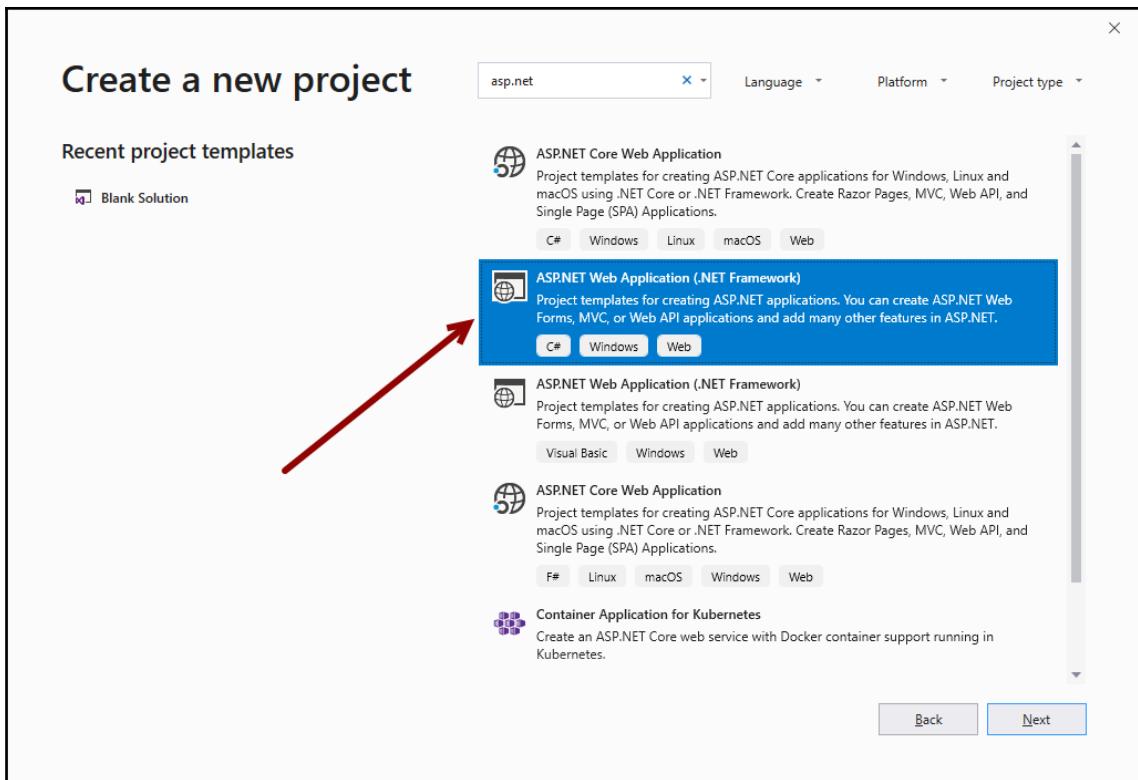
Requests and errors

1  
0.8  
0.6  
0.4  
0.2  
0

22:00 22:15 22:30 22:45

REQUESTS HTTP SERVER ERRORS





# Create a new ASP.NET Web Application



## Empty

An empty project template for creating ASP.NET applications. This template does not have any content in it.



## Web Forms

A project template for creating ASP.NET Web Forms applications. ASP.NET Web Forms lets you build dynamic websites using a familiar drag-and-drop, event-driven model. A design surface and hundreds of controls and components let you rapidly build sophisticated, powerful UI-driven sites with data access.



## MVC

A project template for creating ASP.NET MVC applications. ASP.NET MVC allows you to build applications using the Model-View-Controller architecture. ASP.NET MVC includes many features that enable fast, test-driven development for creating applications that use the latest standards.



## Web API

A project template for creating RESTful HTTP services that can reach a broad range of clients including browsers and mobile devices.



## Single Page Application

A project template for creating rich client side JavaScript driven HTML5 applications using ASP.NET Web API. Single Page Applications provide a rich user experience which includes client-side interactions using HTML5, CSS3, and JavaScript.

### Authentication

No Authentication

[Change](#)

### Add folders & core references

Web Forms

MVC

Web API

### Advanced

Docker support

(Requires [Docker Desktop](#))

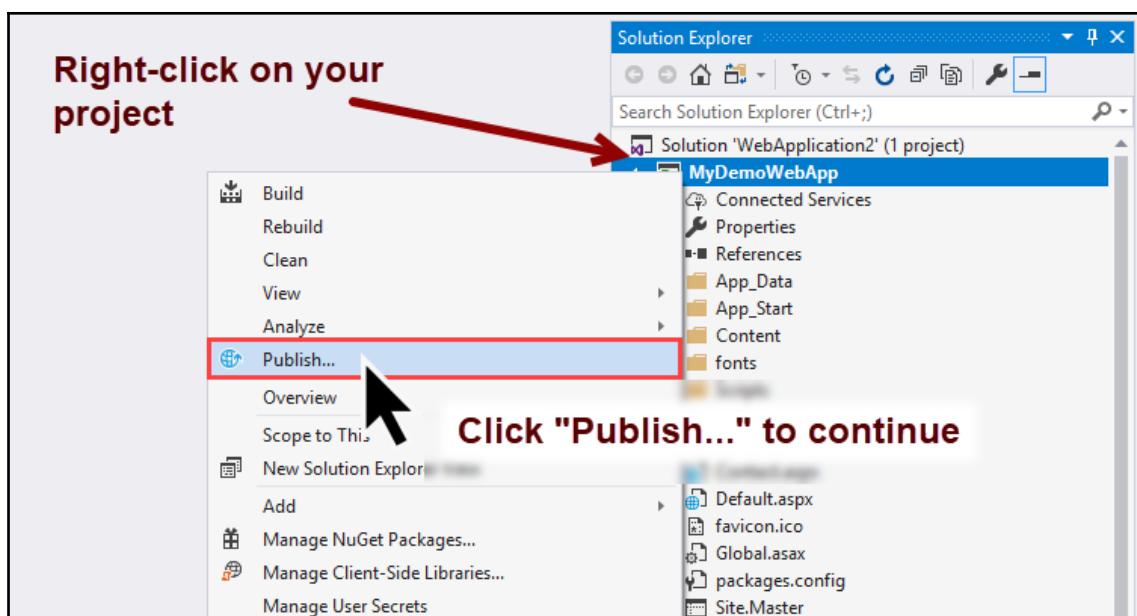
Also create a project for unit tests

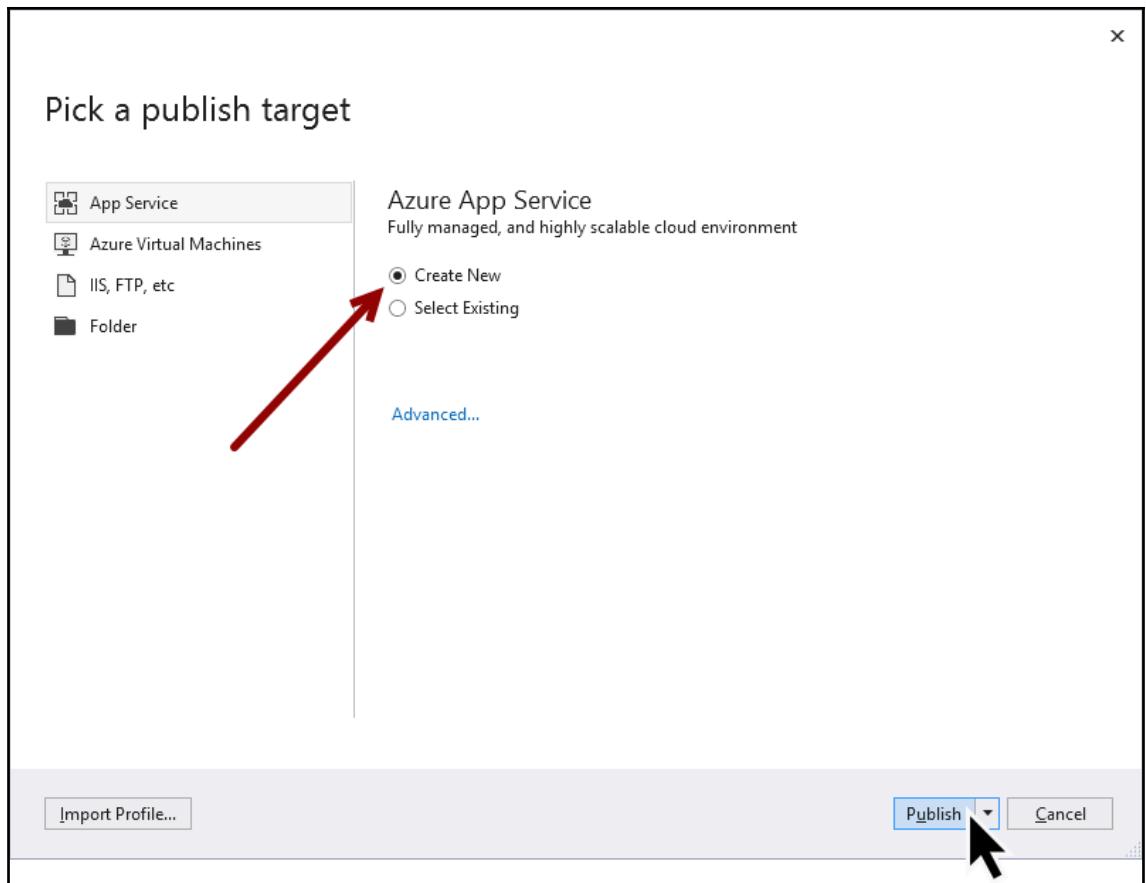
[WebApplication2.Tests](#)

Back

Create







## Azure App Service

Create new

Name

Subscription

Resource Group  [New...](#)

Hosting Plan  [New...](#)

Application Insights

ⓘ Using Application Insights is recommended for performance management and website analytics

[Export...](#)

Microsoft account

**Explore additional Azure services**

 [Create a storage account](#)

 [Create a SQL Database](#)

**Clicking the Create button will create the following Azure resources**

Hosting Plan - [kunal-chowdhury](#)  

App Service - [kunalchowdhury](#)

Create Cancel



## Configure Hosting Plan

Create new

X

### Hosting Plan

kunal-chowdhury

### Location

Central US

### Size

Free

Free

Shared

B1 (1 core, 1.75 GB RAM)

B2 (2 cores, 3.5 GB RAM)

B3 (4 cores, 7 GB RAM)

S1 (1 core, 1.75 GB RAM)

S2 (2 cores, 3.5 GB RAM)

S3 (4 cores, 7 GB RAM)

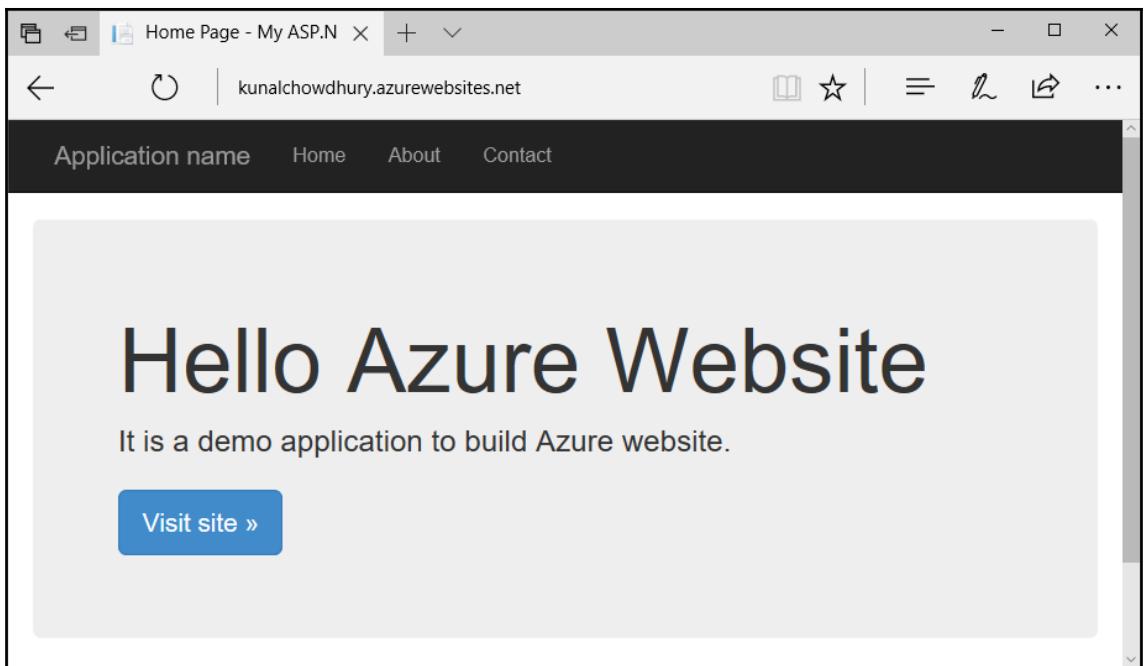
P1 (1 core, 1.75 GB RAM)

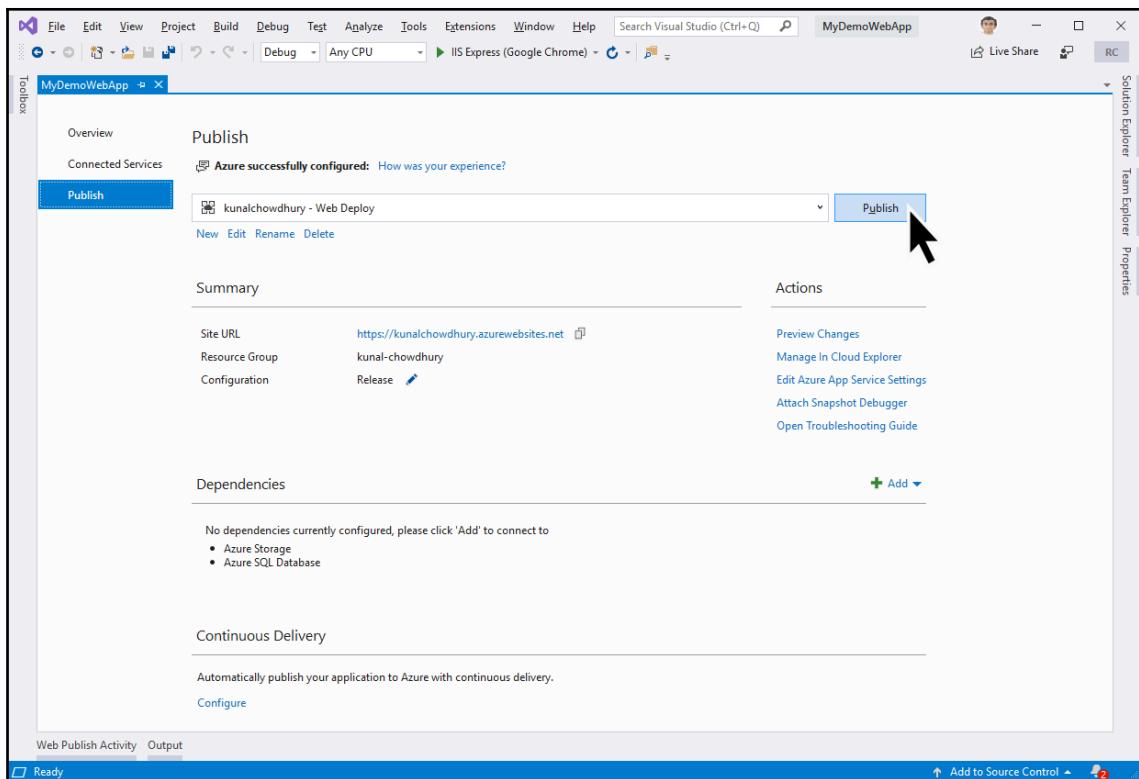
P2 (2 cores, 3.5 GB RAM)

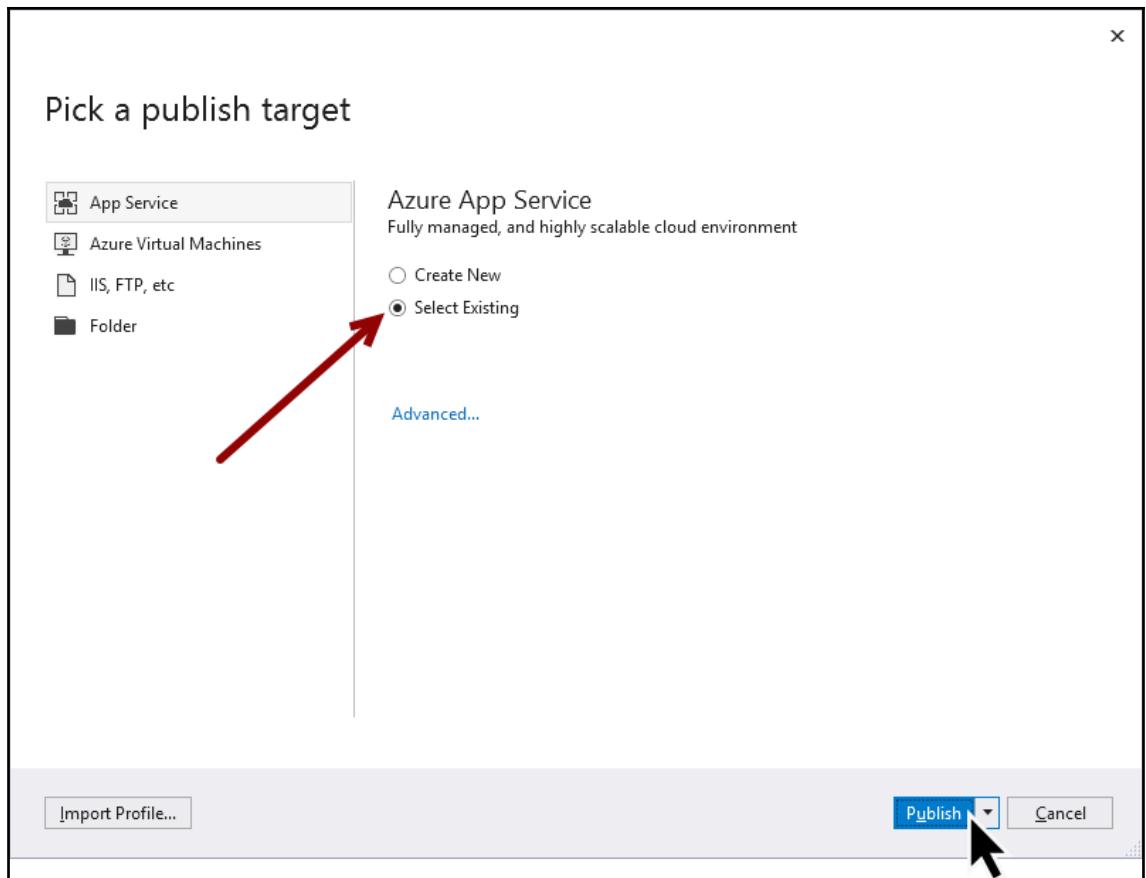
P3 (4 cores, 7 GB RAM)

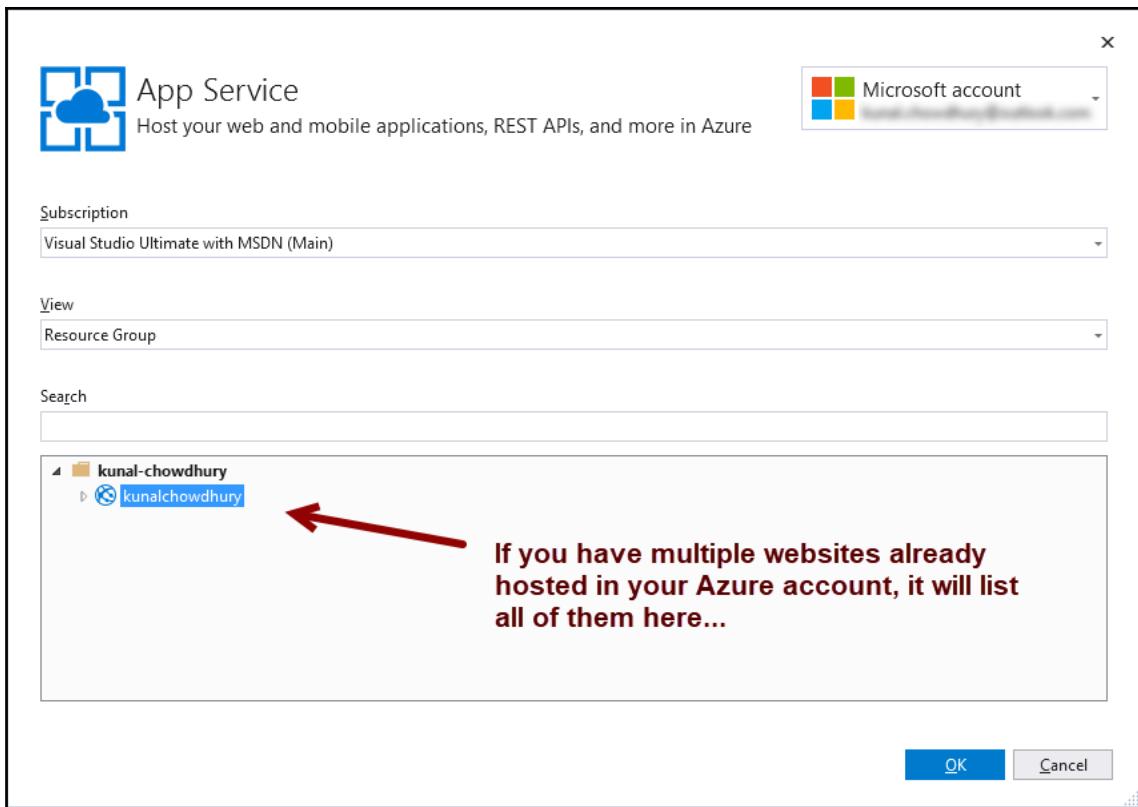
OK

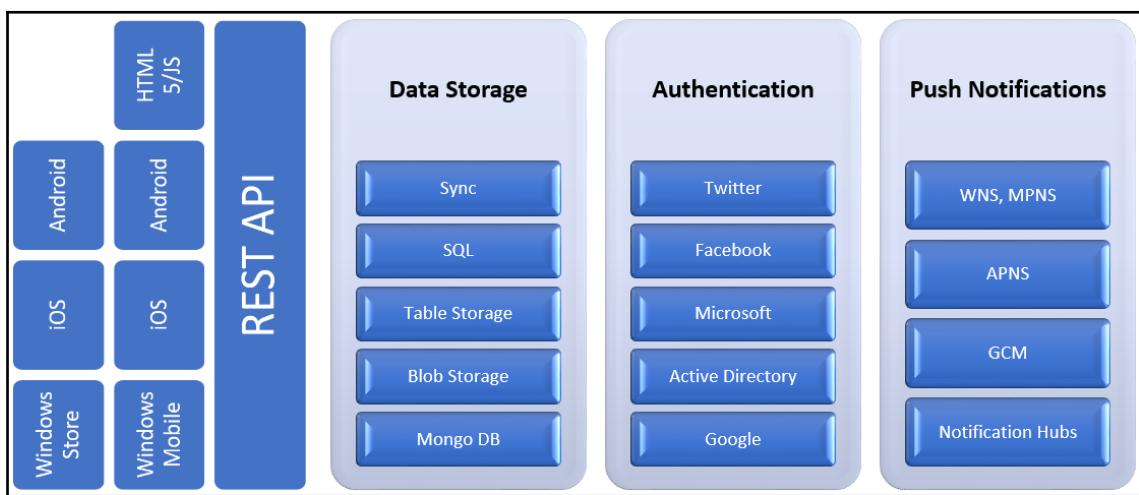
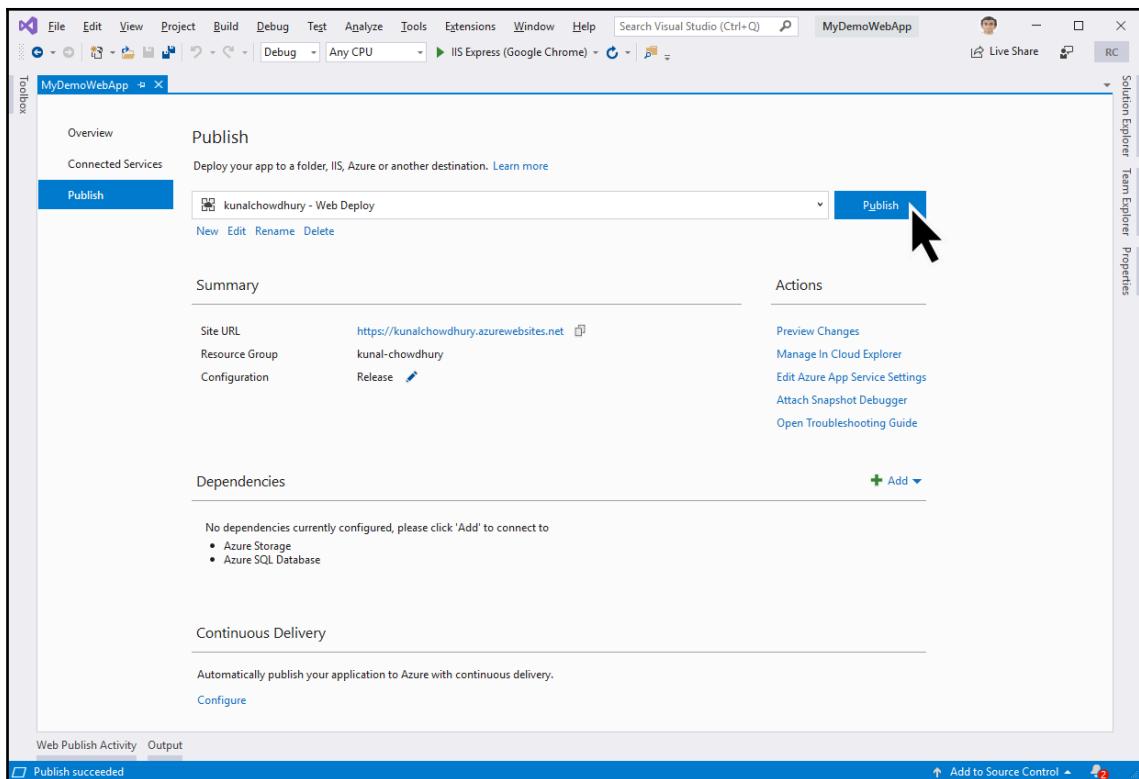
Cancel











Microsoft Azure < Mobile App

Web + Mobile  Mobile App

FEATURED APPS See all

- Web App**  
Enjoy secure and flexible development, deployment, and scaling options for your web app.
- Mobile App**  
A scalable and secure backend that can be used to power apps on any platform – iOS, Android, Windows or
- Logic App**  
Automate the access and use of data across clouds without writing code
- Web App On Linux (preview)**  
Enjoy your web app natively hosted on Linux.

App name **kunal-chowdhury-service** .azurewebsites.net

Subscription Visual Studio Ultimate with MSDN (Main)

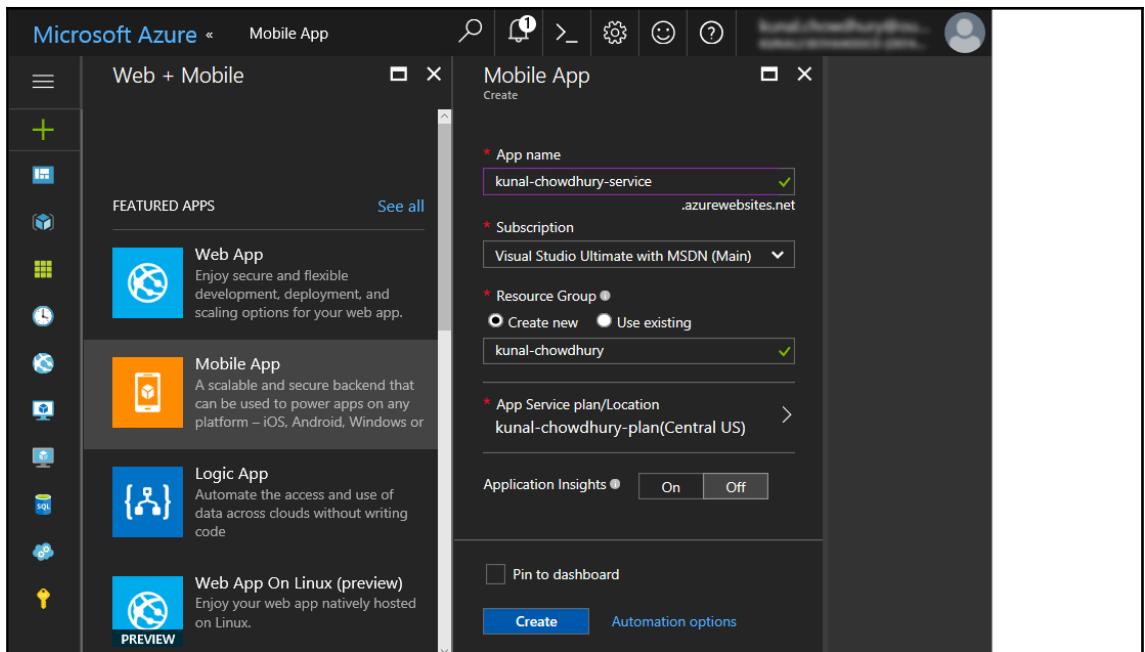
Resource Group  Create new  Use existing  
**kunal-chowdhury**

App Service plan/Location **kunal-chowdhury-plan(Central US)**

Application Insights  On  Off

Pin to dashboard

**Create** Automation options



Microsoft Azure App Services

App Services **kunal2383@yahoo.com (Default Directory)**

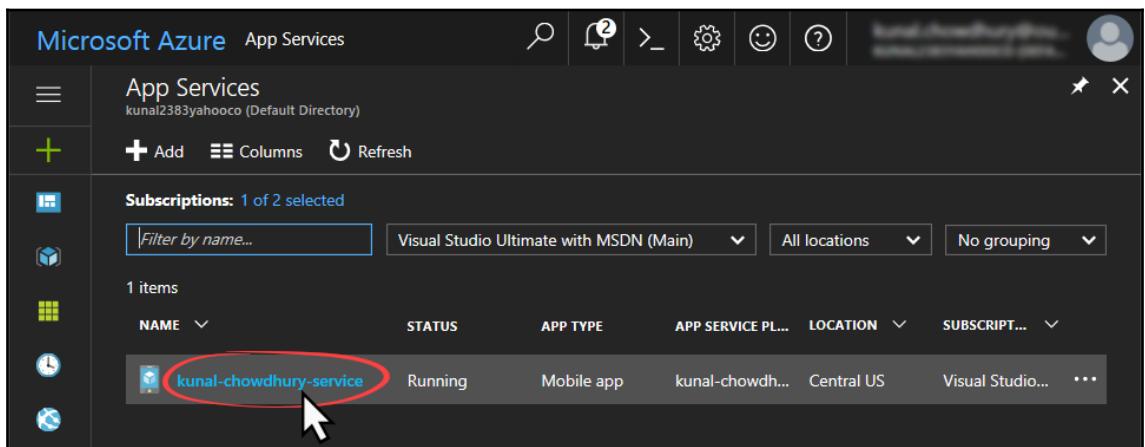
+ Add Columns Refresh

Subscriptions: 1 of 2 selected

Filter by name... Visual Studio Ultimate with MSDN (Main) All locations No grouping

1 items

NAME	STATUS	APP TYPE	APP SERVICE PL...	LOCATION	SUBSCRIPT...	...
 <b>kunal-chowdhury-service</b>	Running	Mobile app	kunal-chowdhury...	Central US	Visual Studio...	...



Microsoft Azure < kunal-chowdhury-service - Quickstart

kunal-chowdhury-service - Quickstart

App Service

Search (Ctrl+ /)

Filter settings

GENERAL

- iOS (Objective-C) >
- iOS (Swift) >
- Android >
- Windows (C#)** > 
- Windows 8.1 (C#) >
- Xamarin.Android >
- Xamarin.iOS >
- Xamarin.Forms >
- Cordova >

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

DEPLOYMENT

Quickstart

Deployment credentials

Deployment slots

Deployment options



Microsoft Azure < Windows (C#)

Windows (C#)

Quick start

1 Connect a database

 You will need a database in order to complete this quickstart. Click here to create one.



Microsoft Azure < Data Connections > Add data connection

Data Connections

+ Add

NAME	TYPE
No Data Connections	

Add data connection

Type: SQL Database

\* SQL Database: Configure required settings

\* Connection string: Configure required settings

This screenshot shows the Microsoft Azure Data Connections interface. On the left, there's a sidebar with various icons. The main area is titled 'Data Connections' and shows a list with one item: 'No Data Connections'. A large button '+ Add' is at the top left. To the right, a detailed configuration panel is open for 'Add data connection'. It has a dropdown 'Type' set to 'SQL Database'. Below it are two sections: 'SQL Database' and 'Connection string', each with a 'Configure required settings' link.

Microsoft Azure < Database

Create a new database

No databases found

SQL Database

\* Name: dbDemo ✓

\* Target server: Configure required settings >

\* Pricing tier: Configure required settings 🔒

\* Collation: SQL\_Latin1\_General\_CI\_AS

Select

This screenshot shows the Microsoft Azure Database interface. The left sidebar has icons for Data Connections, Databases, Tables, etc. The main area is titled 'Database' and shows a button 'Create a new database' and a message 'No databases found'. To the right, a detailed configuration panel for 'SQL Database' is open. It includes fields for 'Name' (set to 'dbDemo'), 'Target server' (with a 'Configure required settings' link), 'Pricing tier' (with a 'Configure required settings' link and a lock icon), and 'Collation' (set to 'SQL\_Latin1\_General\_CI\_AS'). At the bottom is a blue 'Select' button.

Microsoft Azure

Server

New server

Create a new server

No servers found

\* Server name  
dbdemo-kc .database.windows.net

\* Server admin login  
kunalchowdhury

\* Password

\* Confirm password

\* Location  
Central US

Allow azure services to access server ⓘ

Select

The screenshot shows the Microsoft Azure portal interface. On the left, there's a sidebar with various icons: a plus sign for creating a new server, a bar chart, a clock, a globe, a monitor, a cloud, and a SQL database icon. The main area has two tabs: 'Server' and 'New server'. The 'Server' tab shows a message 'No servers found'. The 'New server' tab is active, showing a form to create a new server. The form includes fields for 'Server name' (set to 'dbdemo-kc'), 'Server admin login' (set to 'kunalchowdhury'), 'Password' (redacted), 'Confirm password' (redacted), 'Location' (set to 'Central US'), and a checkbox for 'Allow azure services to access server' which is checked. A 'Select' button is at the bottom of the form.

Microsoft Azure < Windows (C#)

Quick start

Windows (C#)

Create a table API

2

**To store data in your backend, you need a table. Pick a backend language below and create a Todolitem table API.**

Backend language:

Node.js

I acknowledge that this will overwrite all site contents.

Create Todolitem table

To create additional tables later, navigate to the 'Easy Tables' settings.

A large orange arrow points from the bottom left towards the 'Create Todolitem table' button.

Microsoft Azure < Windows (C#) 🔍 ⚡ ⌂ ⚙ 😊 ⓘ

### Windows (C#)

Quick start

1 Connect a database

You already have a data connection

---

2 Create a table API

You already have a TodoItem table

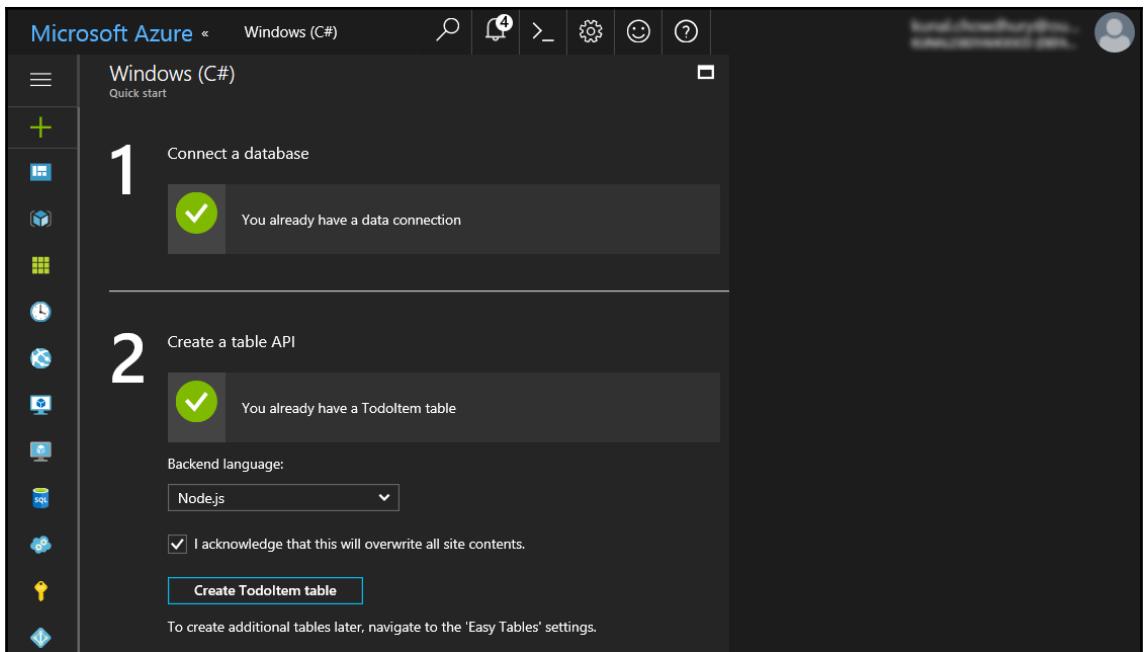
Backend language:

Node.js

I acknowledge that this will overwrite all site contents.

Create TodoItem table

To create additional tables later, navigate to the 'Easy Tables' settings.



Microsoft Azure < Windows (C#) 🔍 ⚡ ⌂ ⚙ 😊 ⓘ

### Windows (C#)

Quick start

3 Configure your client application

CREATE A NEW APP CONNECT AN EXISTING APP ←

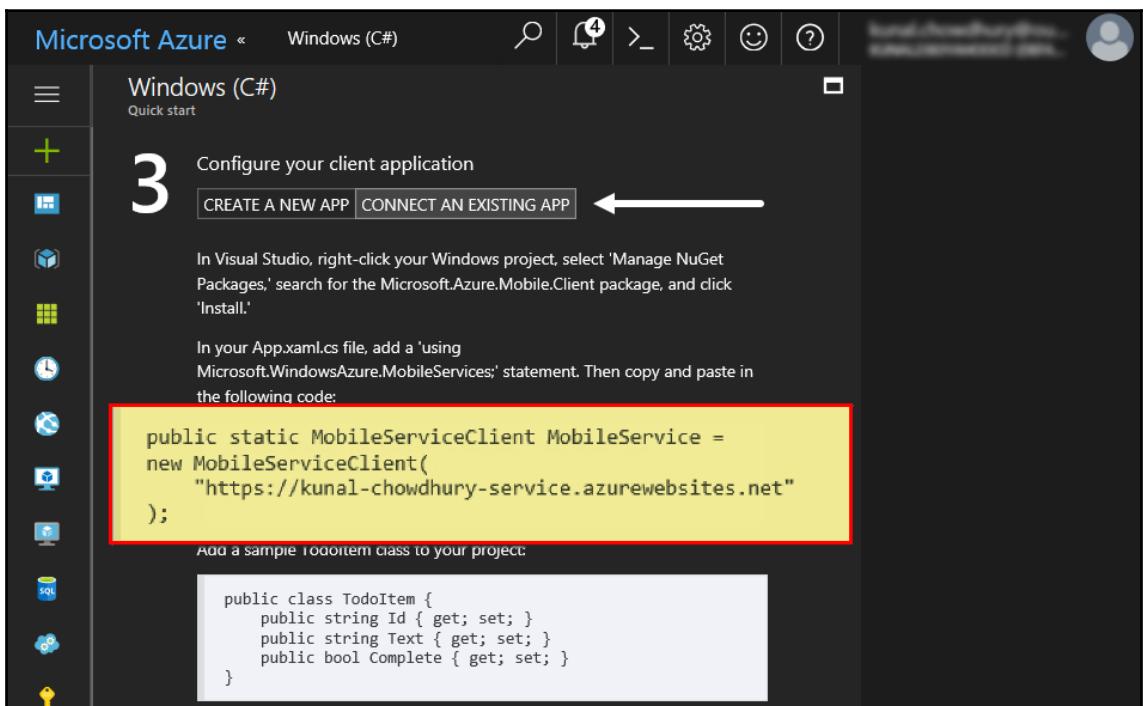
In Visual Studio, right-click your Windows project, select 'Manage NuGet Packages,' search for the Microsoft.Azure.Mobile.Client package, and click 'Install.'

In your App.xaml.cs file, add a 'using Microsoft.WindowsAzure.MobileServices;' statement. Then copy and paste in the following code:

```
public static MobileServiceClient MobileService =  
new MobileServiceClient(  
    "https://kunal-chowdhury-service.azurewebsites.net"  
)
```

Add a sample TodoItem class to your project:

```
public class TodoItem {  
    public string Id { get; set; }  
    public string Text { get; set; }  
    public bool Complete { get; set; }  
}
```



A screenshot of the Visual Studio code editor. The code is as follows:

```
14     public partial class App : Application
15     {
16         public static MobileServiceClient MobileService =
17             new MobileServiceClient("https://kunal-chowdhury-service.azurewebsites.net");
18         Generate type 'MobileServiceClient'
19         Install package 'Microsoft.Azure.Mobile.Client'
20             Encapsulate field: 'MobileService' (and use property)
21             Encapsulate field: 'MobileService' (but still use field)
```

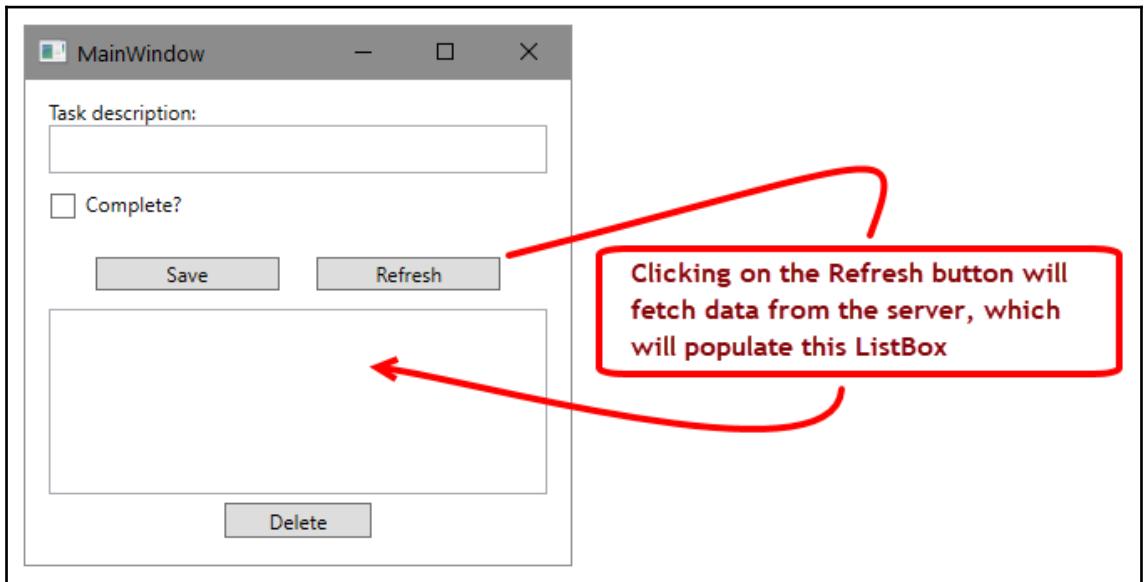
The cursor is hovering over the 'Install package' suggestion. A context menu is open with the following options:

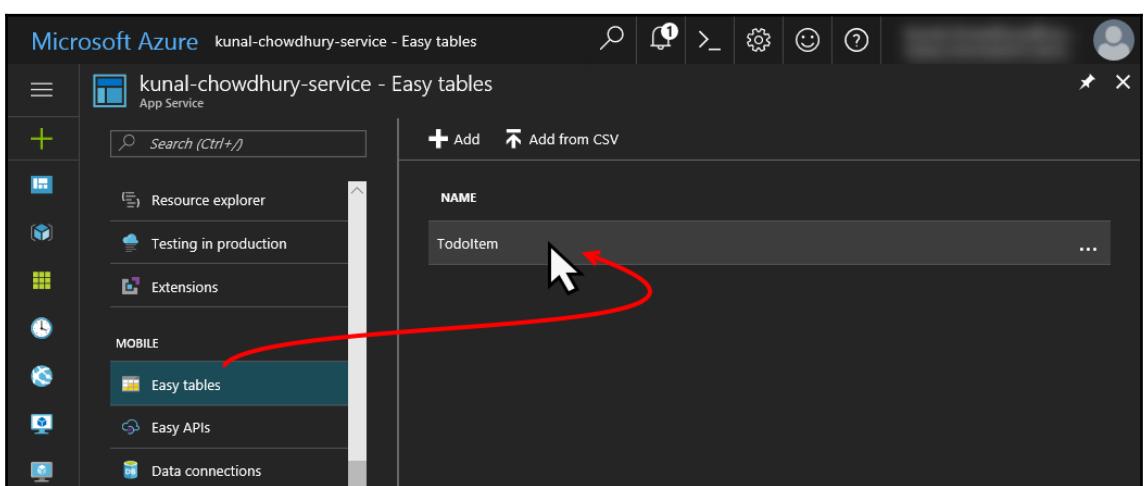
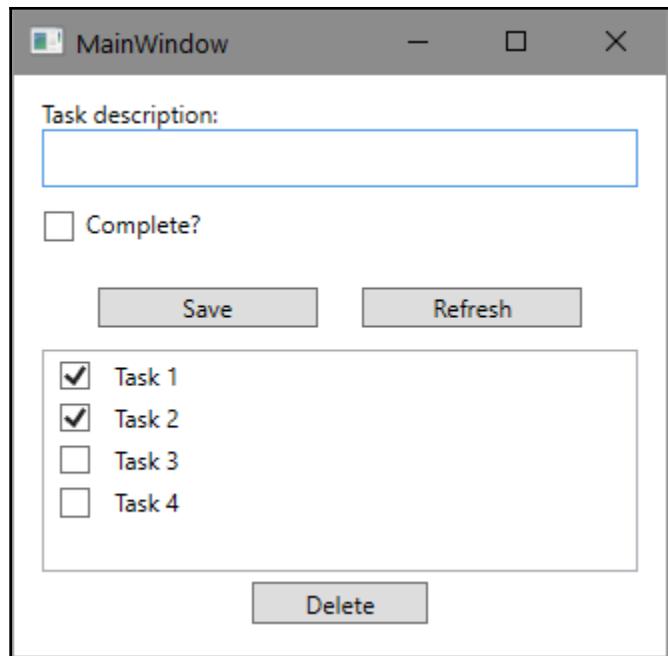
- Find and install latest version
- Install with package manager...

A tooltip message is displayed: CS0246 The type or namespace name 'MobileServiceClient' could not be found (are you missing a using directive or an assembly reference?)

Below the code editor, the status bar shows:

- Find and install latest version of 'Microsoft.Azure.Mobile.Client'
- Preview changes





Microsoft Azure TodoItem (4 records)

TodoItem (4 records)							
	ID	CREAT...	UPDA...	VERS...	DELET...	TEXT	COMP...
	d1920a43...	2017-05-...	2017-05-...	AAAAAAA...	false	Task 1	true
	e337d000...	2017-05-...	2017-05-...	AAAAAAA...	false	Task 2	false
	0709194a...	2017-05-...	2017-05-...	AAAAAAA...	false	Task 3	false
	b1e2016f...	2017-05-...	2017-05-...	AAAAAAA...	false	Task 4	false

Microsoft Azure Choose your pricing tier

Choose your pricing tier  
Browse the available plans and their features

P1 Premium	P2 Premium	P3 Premium
1 Core	2 Core	4 Core
1.75 GB RAM	3.5 GB RAM	7 GB RAM
BizTalk Services	BizTalk Services	BizTalk Services
250 GB Storage	250 GB Storage	250 GB Storage
Up to 20 instance(s) * Subject to availability	Up to 20 instance(s) * Subject to availability	Up to 20 instance(s) * Subject to availability
20 slots Web app staging	20 slots Web app staging	20 slots Web app staging
50 times daily	50 times daily	50 times daily
Traffic Manager Geo availability	Traffic Manager Geo availability	Traffic Manager Geo availability
<b>14,752.68</b> INR/MONTH (ESTIMATED)	<b>29,505.37</b> INR/MONTH (ESTIMATED)	<b>59,010.73</b> INR/MONTH (ESTIMATED)

S1 Standard	S2 Standard	S3 Standard
1 Core	2 Core	4 Core
1.75 GB RAM	3.5 GB RAM	7 GB RAM
50 GB Storage	50 GB Storage	50 GB Storage

APP SERVICE PLAN

Scale up (App Service plan)

Scale out (App Service plan)

MySQL In App

Properties

Locks

Automation script

Select

Microsoft Azure

kunal-chowdhury-service - Scale out (App Service plan)

Search (Ctrl+ /)

Save Discard Disable autoscale Refresh

Configure Run history JSON Notify

Override condition

Instance count 1

Your autoscale configuration is disabled. To reinstate your configuration, enable autoscale.

Enable autoscale

The screenshot shows the Azure portal interface for managing an App Service plan named 'kunal-chowdhury-service'. On the left, a sidebar lists various configuration options like Custom domains, SSL certificates, Networking, and Scale up/out. The 'Scale out (App Service plan)' option is selected and highlighted with a red oval. The main pane displays an 'Override condition' section with an 'Instance count' slider set to 1. A message indicates that autoscale is disabled and provides a link to enable it. A cursor is positioned over the 'Enable autoscale' button.

Microsoft Azure

kunal-chowdhury-service - Scale out (App Service plan)

Search (Ctrl+ /)

Save Discard Disable autoscale Refresh

Configure Run history JSON Notify

\* Autoscale setting name AS1

Resource group kunal-chowdhury

Default Auto created scale condition

Scale mode Scale based on a metric

Rules Scale out and scale in your instances based on metric. For example, add a rule that increases instance count by 1 when CPU percentage is above 70%\*

Add a rule

Instance limits Minimum 1 Maximum 5 Default 2

Schedule This scale condition is executed when none of the other scale condition(s) match

Add a scale condition

The screenshot shows the same Azure portal interface as the first one, but now with the 'Enable autoscale' button clicked, indicating that autoscale has been successfully enabled. The configuration pane now displays an 'Autoscale setting name' field set to 'AS1', a 'Resource group' dropdown set to 'kunal-chowdhury', and a 'Default' scale condition. The 'Scale mode' is set to 'Scale based on a metric'. A tooltip explains that rules can be added to scale out and scale in based on metrics like CPU percentage. The 'Instance limits' section shows values 1, 5, and 2 for minimum, maximum, and default respectively. The 'Schedule' section states that this condition is executed when no other conditions match. A link to add another scale condition is also present.

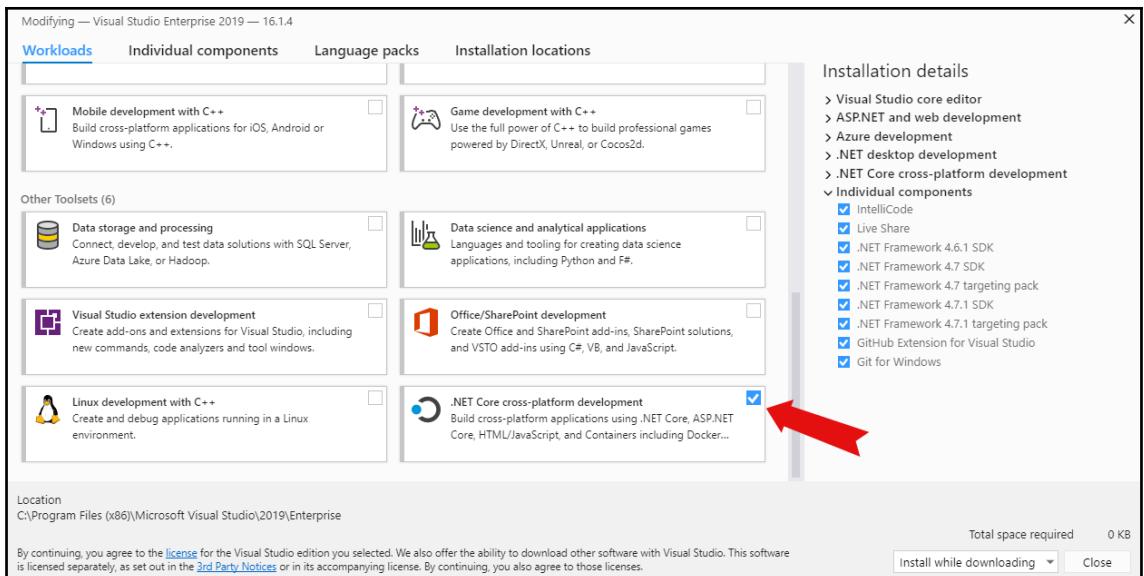
## Chapter 4: Building Applications with .NET Core

Visual Studio

Visual Studio  
Code

.NET Core CLI

Shared SDK component



```
D:\Demo>dotnet new
Welcome to .NET Core!
-----
Learn more about .NET Core @ https://aka.ms/dotnet-docs. Use dotnet --help to see available commands or go to https://aka.ms/dotnet-cli-docs.
Telemetry
-----
The .NET Core tools collect usage data in order to improve your experience. The data is anonymous and does not include command-line arguments. The data is collected by Microsoft and shared with the community. You can opt out of telemetry by setting a DOTNET_CLI_TELEMETRY_OPTOUT environment variable to 1 using your favorite shell. You can read more about .NET Core tools telemetry @ https://aka.ms/dotnet-cli-telemetry.
Configuring...
-----
A command is running to initially populate your local package cache, to improve restore speed and enable offline access. This command will take up to a minute to complete and will only happen once.
Decompressing 100% 5873 ms
Expanding 100% 95342 ms
```

Templates	Short Name	Language
Console Application	console	[C#], F#, VB
Class library	classlib	[C#], F#, VB
Unit Test Project	mstest	[C#], F#, VB
NUnit 3 Test Project	nunit	[C#], F#, VB
NUnit 3 Test Item	nunit-test	[C#], F#, VB
xUnit Test Project	xunit	[C#], F#, VB
Razor Page	page	[C#]
MVC ViewImports	viewimports	[C#]
MVC ViewStart	viewstart	[C#]
ASP.NET Core Empty	web	[C#], F#
ASP.NET Core Web App (Model-View-Controller)	mvc	[C#], F#
ASP.NET Core Web App	razor	[C#]
ASP.NET Core with Angular	angular	[C#]
ASP.NET Core with React.js	react	[C#]
ASP.NET Core with React.js and Redux	reactredux	[C#]
Razor Class Library	razorclasslib	[C#]
ASP.NET Core Web API	webapi	[C#], F#
global.json file	globaljson	
NuGet Config	nugetconfig	
Web Config	webconfig	
Solution File	sln	

C:\Windows\System32\cmd.exe

```
D:\DotNetCore\Demo> dotnet new console
Content generation time: 48.0845 ms
The template "Console Application" created successfully.
```

Documents (D:) > DotNetCore > Demo			
Name	Date modified	Type	Size
Demo.csproj	01-Mar-17 10:37 P...	Visual C# Project F...	1 KB
Program.cs	01-Mar-17 10:37 P...	Visual C# Source F...	1 KB

```
C:\Windows\System32\cmd.exe
```

```
D:\DotNetCore> dotnet new console -lang C# -n "HelloDotNetCore"
Content generation time: 104.5538 ms
The template "Console Application" created successfully.
```

Name	Date modified	Type	Size
HelloDotNetCore.csproj	01-Mar-17 10:46 P...	Visual C# Project F...	1 KB
Program.cs	01-Mar-17 10:46 P...	Visual C# Source F...	1 KB

```
C:\Windows\System32\cmd.exe
```

```
D:\DotNetCore> dotnet new classlib -n "CustomLibrary" -lang C#
Content generation time: 119.0008 ms
The template "Class library" created successfully.
```

Name	Date modified	Type	Size
Class1.cs	02-Mar-17 12:00 A...	Visual C# Source F...	1 KB
CustomLibrary.csproj	02-Mar-17 12:00 A...	Visual C# Project F...	1 KB

```
C:\Windows\System32\cmd.exe
```

```
D:\DotNetCore> dotnet new sln
Content generation time: 84.0916 ms
The template "Solution File" created successfully.
```

Name	Date modified	Type	Size
DotNetCore.sln	02-Mar-17 08:53 P...	Visual Studio Solut...	1 KB

```
C:\Windows\System32\cmd.exe

D:\DotNetCore> dotnet new sln -n "Demo Solution" ←
Content generation time: 20.1394 ms
The template "Solution File" created successfully.

Documents (D:) > DotNetCore
Name Date modified Type Size
Demo Solution.sln 02-Mar-17 08:56 P... Visual Studio Solut... 1 KB
```



```
1 C:\Windows\System32\cmd.exe
D:\DotNetCore> dotnet new console -n "Demo App"
Content generation time: 59.9189 ms
The template "Console Application" created successfully.

2 D:\DotNetCore> dotnet new classlib -n "Custom Library"
Content generation time: 45.6169 ms
The template "Class library" created successfully.

3 D:\DotNetCore> dotnet new sln -n "Demo Solution"
Content generation time: 32.3128 ms
The template "Solution File" created successfully.

4 D:\DotNetCore> dotnet sln "Demo Solution.sln" add "Demo App\Demo App.csproj"
"Custom Library\Custom Library.csproj"
Project `Demo App\Demo App.csproj` added to the solution.
Project `Custom Library\Custom Library.csproj` added to the solution.
```

```
C:\Windows\System32\cmd.exe

D:\DotNetCore> dotnet restore
Restoring packages for D:\DotNetCore\Custom Library\Custom Library.csproj...
Restoring packages for D:\DotNetCore\Demo App\Demo App.csproj...
Generating MSBuild file D:\DotNetCore\Custom Library\obj\Custom Library.csproj.nuget.g.props.
Generating MSBuild file D:\DotNetCore\Custom Library\obj\Custom Library.csproj.nuget.g.targets.
Writing lock file to disk. Path: D:\DotNetCore\Custom Library\obj\project.assets.json
Restore completed in 607.02 ms for D:\DotNetCore\Custom Library\Custom Library.csproj.
Generating MSBuild file D:\DotNetCore\Demo App\obj\Demo App.csproj.nuget.g.props.
Generating MSBuild file D:\DotNetCore\Demo App\obj\Demo App.csproj.nuget.g.targets.
Writing lock file to disk. Path: D:\DotNetCore\Demo App\obj\project.assets.json
Restore completed in 902.59 ms for D:\DotNetCore\Demo App\Demo App.csproj.

NuGet Config files used:
  C:\Users\kunal\AppData\Roaming\NuGet\NuGet.Config
  C:\Program Files (x86)\NuGet\Config\Microsoft.VisualStudio.Offline.config

Feeds used:
  https://api.nuget.org/v3/index.json
  C:\Program Files (x86)\Microsoft SDKs\NuGetPackages\
```

```
C:\Windows\System32\cmd.exe

D:\DotNetCore> dotnet build
Microsoft (R) Build Engine version 15.1.545.13942
Copyright (C) Microsoft Corporation. All rights reserved.

  Custom Library -> D:\DotNetCore\Custom Library\bin\Debug\netstandard1.4\Custom Library.dll
  Demo App -> D:\DotNetCore\Demo App\bin\Debug\netcoreapp1.0\Demo App.dll

Build succeeded.
  0 Warning(s)
  0 Error(s)

Time Elapsed 00:00:02.35
```

```
C:\Windows\System32\cmd.exe

D:\DotNetCore> dotnet build "Demo App"
Microsoft (R) Build Engine version 15.1.545.13942
Copyright (C) Microsoft Corporation. All rights reserved.

  Demo App -> D:\DotNetCore\Demo App\bin\Debug\netcoreapp1.0\Demo App.dll

Build succeeded.
  0 Warning(s)
  0 Error(s)

Time Elapsed 00:00:02.12
```

```
C:\Windows\System32\cmd.exe

D:\DotNetCore> dotnet run --project "Demo App\Demo App.csproj"
Hello World!

D:\DotNetCore> dotnet "Demo App\bin\Debug\netcoreapp1.0\Demo App.dll"
Hello World!
```

```
C:\Windows\System32\cmd.exe

D:\DotNetCore> dotnet new mvc -n "MVC Demo" -uld true -au none
Content generation time: 1072.6964 ms
The template "MVC ASP.NET Core Web Application" created successfully.

> DotNetCore > MVC Demo >   


| Name                    | Date modified        | Type                   | Size |
|-------------------------|----------------------|------------------------|------|
| Controllers             | 04-Mar-17 11:19 A... | File folder            |      |
| Views                   | 04-Mar-17 11:19 A... | File folder            |      |
| wwwroot                 | 04-Mar-17 11:19 A... | File folder            |      |
| .bowerrc                | 04-Mar-17 11:19 A... | BOWERRC File           | 1 KB |
| appsettings.Development | 04-Mar-17 11:19 A... | JSON File              | 1 KB |
| appsettings             | 04-Mar-17 11:19 A... | JSON File              | 1 KB |
| bower                   | 04-Mar-17 11:19 A... | JSON File              | 1 KB |
| bundleconfig            | 04-Mar-17 11:19 A... | JSON File              | 1 KB |
| MVC Demo.csproj         | 04-Mar-17 11:19 A... | Visual C# Project F... | 1 KB |
| Program.cs              | 04-Mar-17 11:19 A... | Visual C# Source F...  | 1 KB |
| Startup.cs              | 04-Mar-17 11:19 A... | Visual C# Source F...  | 2 KB |


```

X

# Visual Studio 2019

Open recent



## Clone or check out code

Get code from an online repository like GitHub or Azure DevOps



## Open a project or solution

Open a local Visual Studio project or .sln file



## Open a local folder

Navigate and edit code within any folder



## Create a new project

Choose a project template with code scaffolding to get started



[Continue without code](#)

# Configure your new project

Console App (.NET Core)

C#

Linux

macOS

Windows

Console

Project name

ConsoleApp

Location

D:\DotNetCore\



Solution name ⓘ

DotnetCore Demo

Place solution and project in the same directory

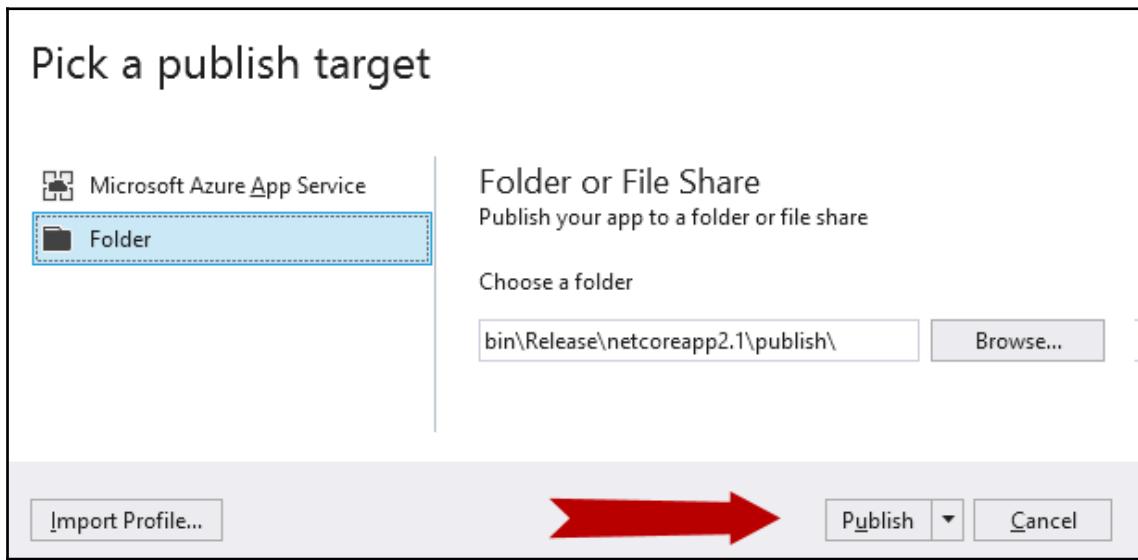
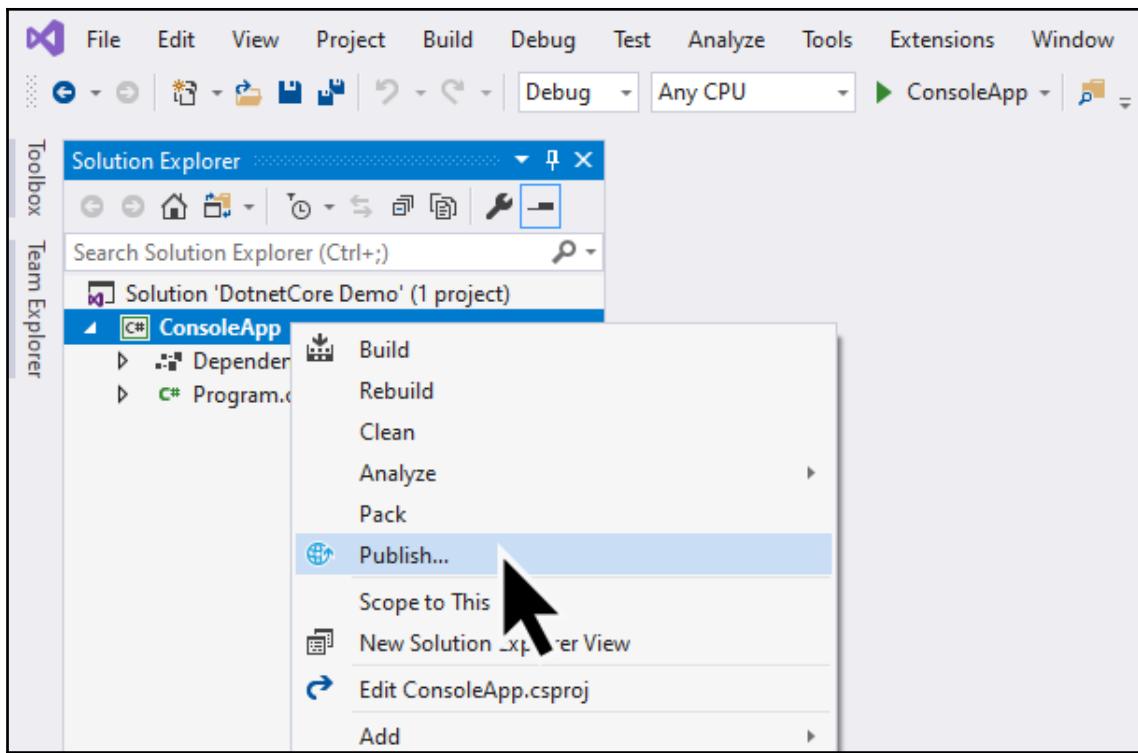
Back

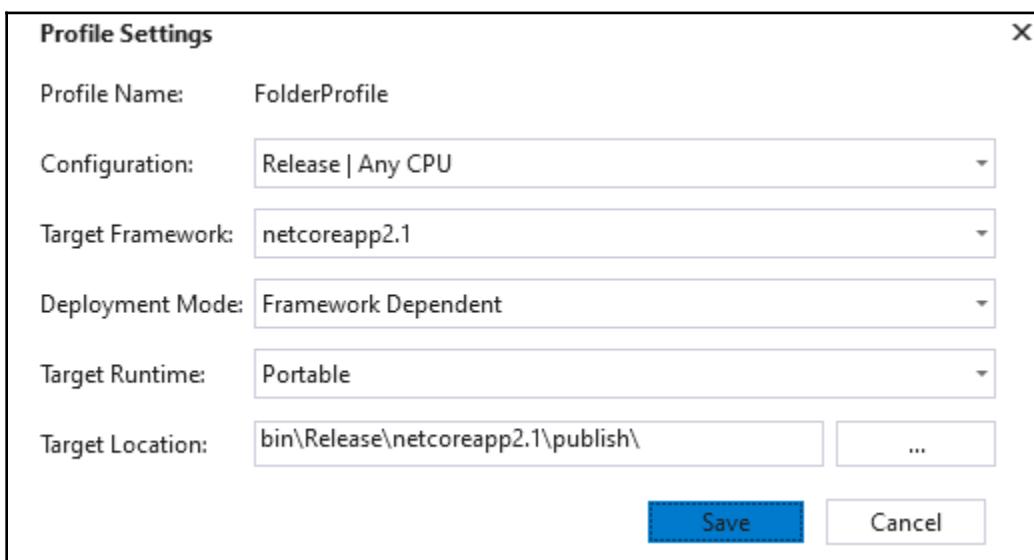
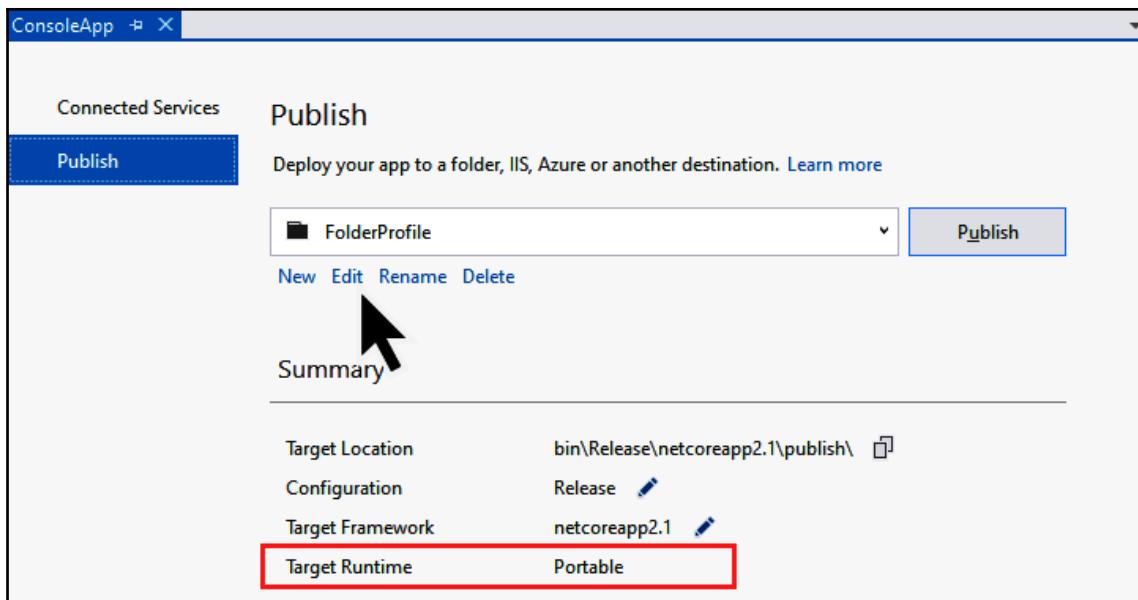
Create

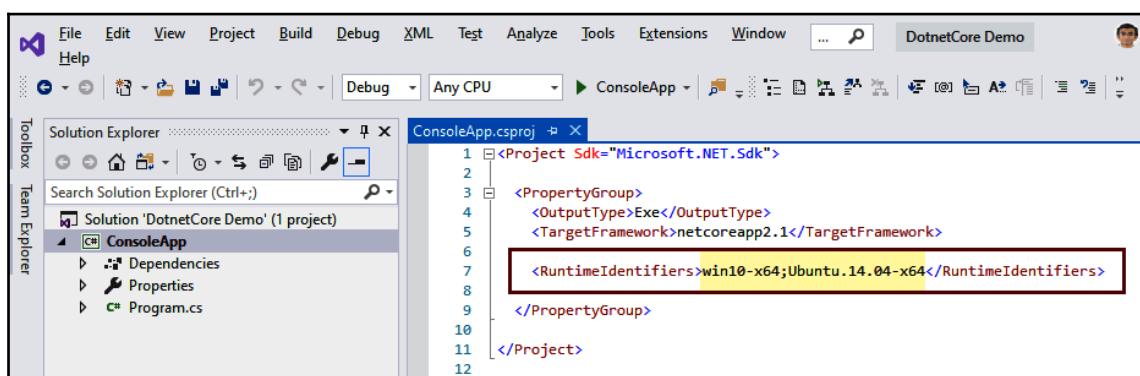
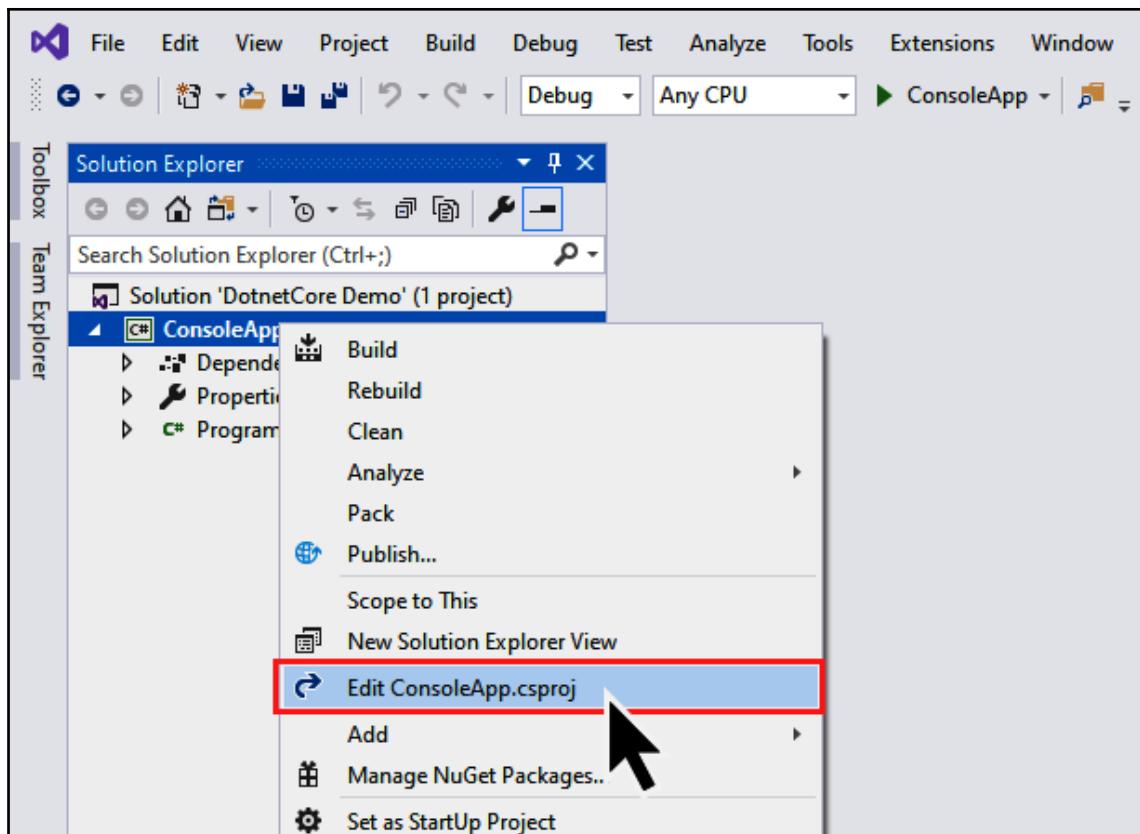
The screenshot shows the Visual Studio IDE interface. The title bar reads "DotnetCore Demo". The menu bar includes File, Edit, View, Project, Build, Debug, Test, Analyze, Tools, Extensions, Window, Help. The toolbar has various icons for file operations. The Solution Explorer on the left shows a solution named 'DotnetCore Demo' containing a project named 'ConsoleApp' with files 'Dependencies' and 'Program.cs'. The 'Program.cs' file is open in the main editor, displaying the following C# code:

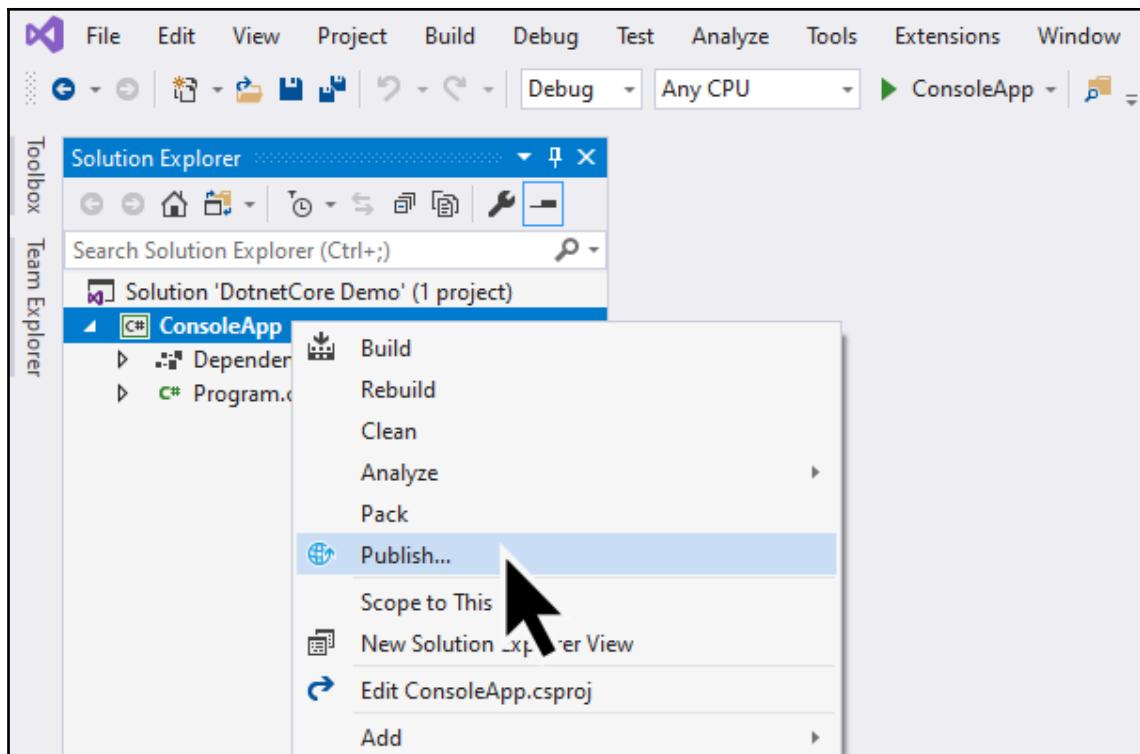
```
1  using System;
2
3  namespace ConsoleApp
4  {
5      class Program
6      {
7          static void Main(string[] args)
8          {
9              Console.WriteLine("Hello World!");
10         }
11     }
12 }
13
```

The status bar at the bottom shows "Ready".

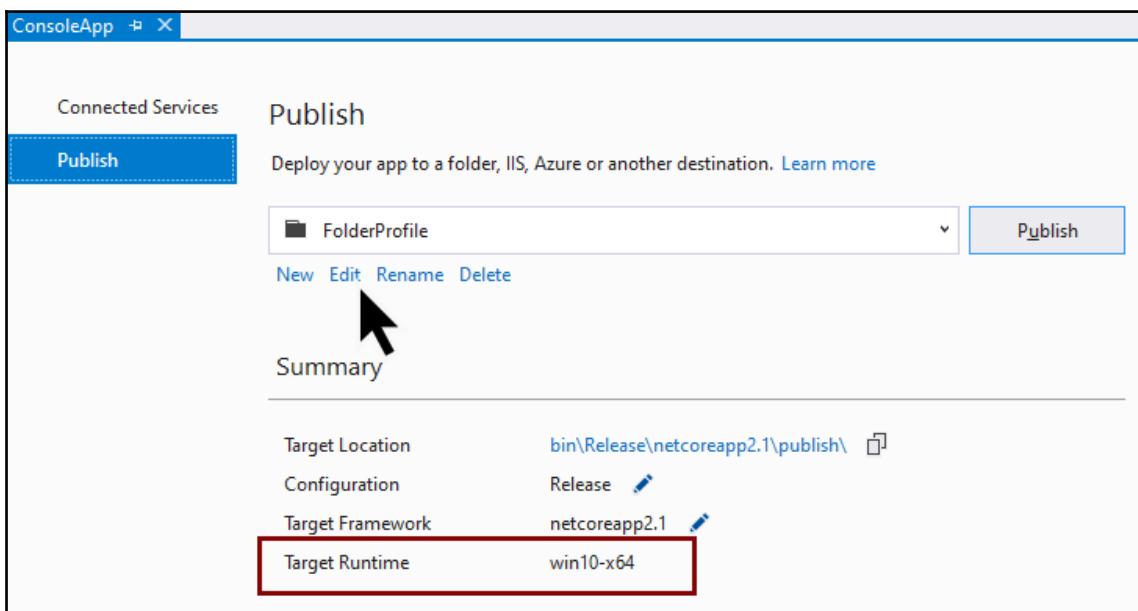
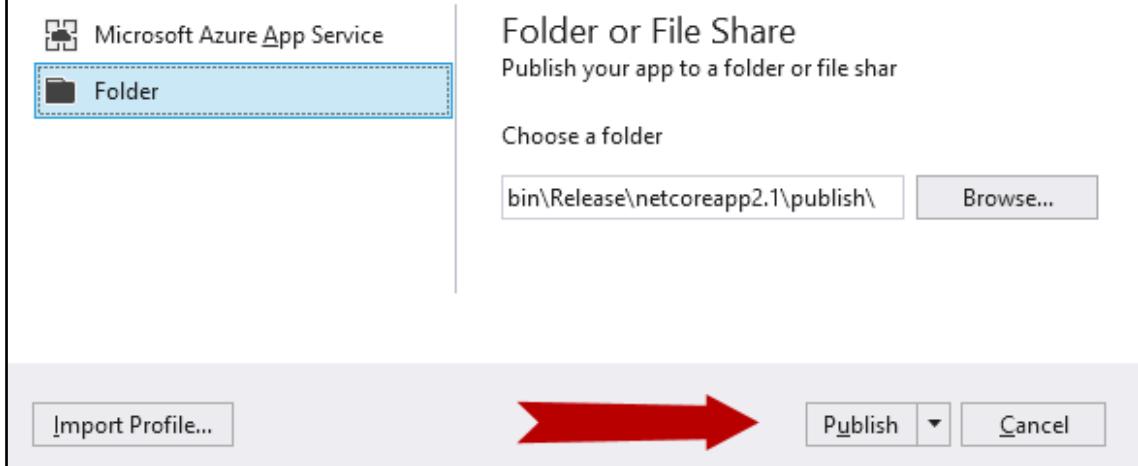








## Pick a publish target



**Profile Settings**

Profile Name: FolderProfile

Configuration: Release | Any CPU

Target Framework: netcoreapp2.1

Deployment Mode: Framework Dependent

Target Runtime: win10-x64

Target Location: bin\Release\netcoreapp2.1\publish\

**Profile Settings**

Profile Name: FolderProfile

Configuration: Release | Any CPU

Target Framework: netcoreapp2.1

Deployment Mode: Framework Dependent

Target Runtime: Ubuntu.14.04-x64

Target Location: bin\Release\netcoreapp2.1\publish\

Connected Services

## Publish

**Publish**

Deploy your app to a folder, IIS, Azure or another destination. [Learn more](#)

FolderProfile

**Publish**

New Edit Rename Delete



### Summary

Target Location bin\Release\netcoreapp2.1\publish\

Configuration Release

Target Framework netcoreapp2.1

Target Runtime Ubuntu.14.04-x64



# Configure your new project

ASP.NET Core Web Application

C#

Windows

Linux

macOS

Web

Project name

WebApplication

Location

D:\DotNetCore



Solution

Create new solution

Solution name

Web Application Demo

Place solution and project in the same directory

Back

Create

# Create a new ASP.NET Core Web Application

.NET Core

ASP.NET Core 2.1

If you like to change the authentication type of the web site, click this link



## Empty

An empty project template for creating an ASP.NET Core application. This template does not have any content in it.



## API

A project template for creating an ASP.NET Core application with an example Controller for a RESTful HTTP service. This template can also be used for ASP.NET Core MVC Views and Controllers.



## Web Application

A project template for creating an ASP.NET Core application with example ASP.NET Core Razor Pages content.



## Web Application (Model-View-Controller)

A project template for creating an ASP.NET Core application with example ASP.NET Core MVC Views and Controllers. This template can also be used for RESTful HTTP services.



## Razor Class Library

A project template for creating a Razor class library.



## Angular

[Get additional project templates](#)

## Authentication

No Authentication

[Change](#)

## Advanced

Configure for HTTPS

Enable Docker Support  
(Requires Docker Desktop)

Linux

Author: Microsoft

Source: SDK 2.1.602

[Back](#)

[Create](#)



## Change Authentication

X

For applications that don't require any user authentication.

No Authentication

[Learn more](#)

Individual User Accounts

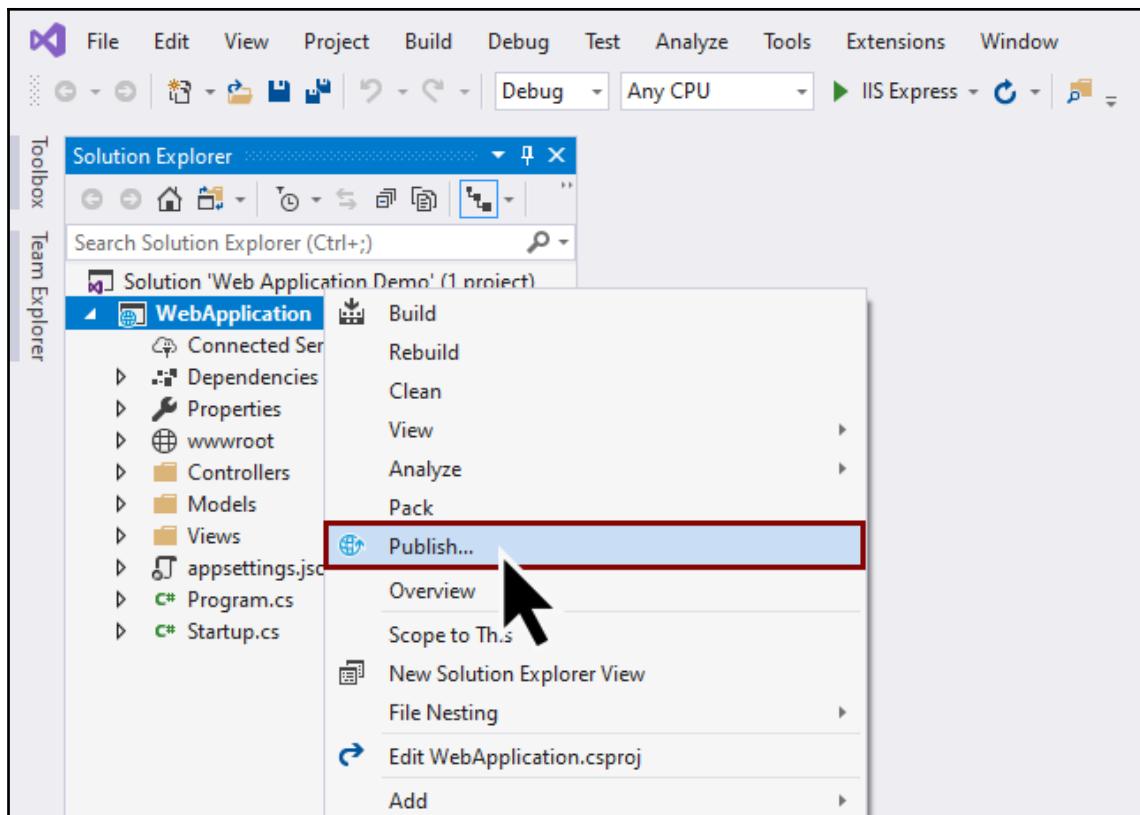
Work or School Accounts

Windows Authentication

[Learn more about third-party open source authentication options](#)

[OK](#)

[Cancel](#)



## Pick a publish target

 App Service

 App Service Linux

 Azure Virtual Machines

 IIS, FTP, etc

 Folder

### Azure App Service

Fully managed, and highly scalable cloud environment

Create New

Select Existing

[Advanced...](#)

[Import Profile...](#)

[Publish](#) 

[Cancel](#)



# Azure App Service

Create new

**1** Name

**2** Subscription

**3** Resource Group  [New...](#)

**4** Hosting Plan  [New...](#)

Application Insights   
Using Application Insights is recommended for performance management and website analytics

[Export...](#) [Create](#) [Cancel](#)

**Explore additional Azure services**

[Create a storage account](#)

[Create a SQL Database](#)

**Clicking the Create button will create the following Azure resources**

App Service - DotnetCoreWebAppDemo

Overview

Connected Services

**Publish**

Publish

Deploy your app to a folder, IIS, Azure or another destination. [Learn more](#)

DotnetCoreWebAppDemo - Web Deploy

New Edit Rename Delete

**Summary**

Site URL: <https://dotnetcorewebap...>

Resource Group: DotnetCoreDemo

Configuration: Release

Target Framework: netcoreapp2.1

Deployment Mode: Framework-Dependent

**Actions**

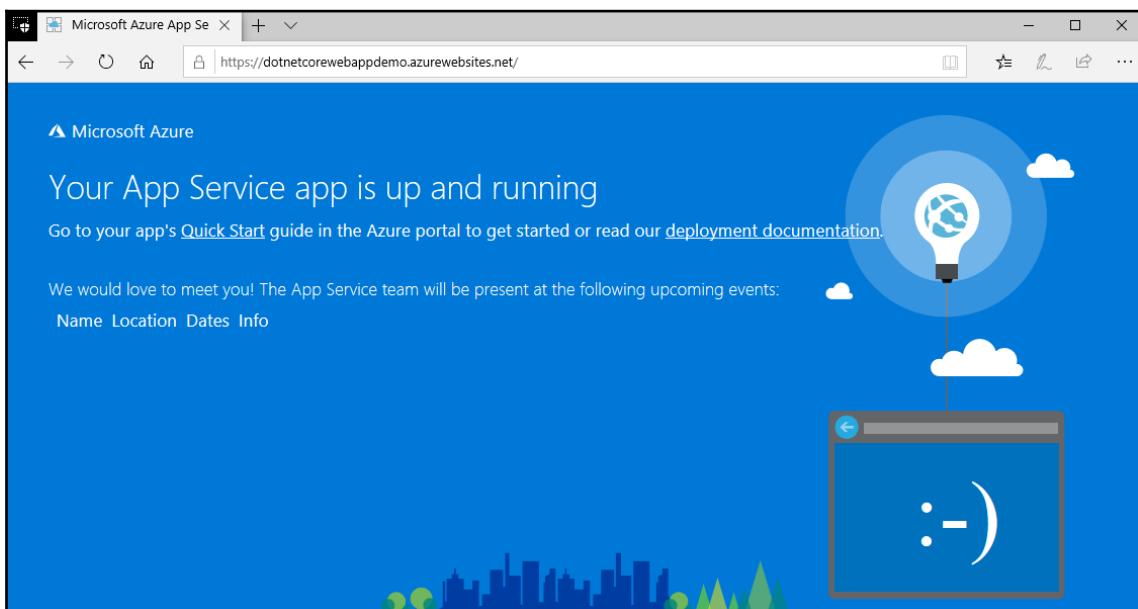
Preview Changes

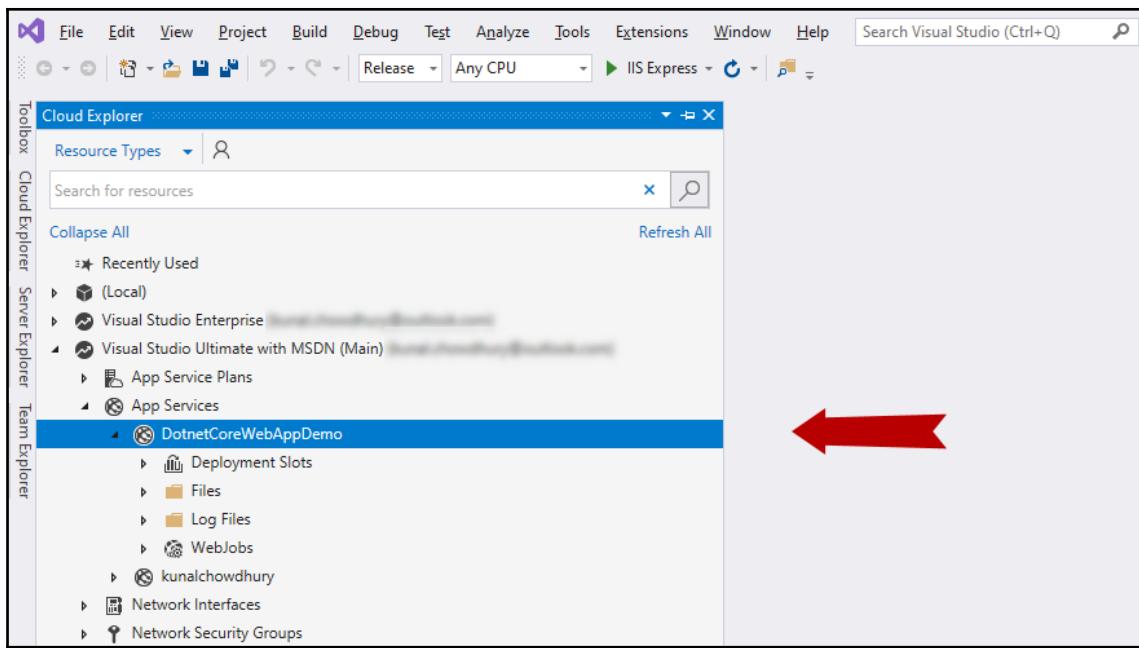
Manage In Cloud Explorer

Edit Azure App Service Settings

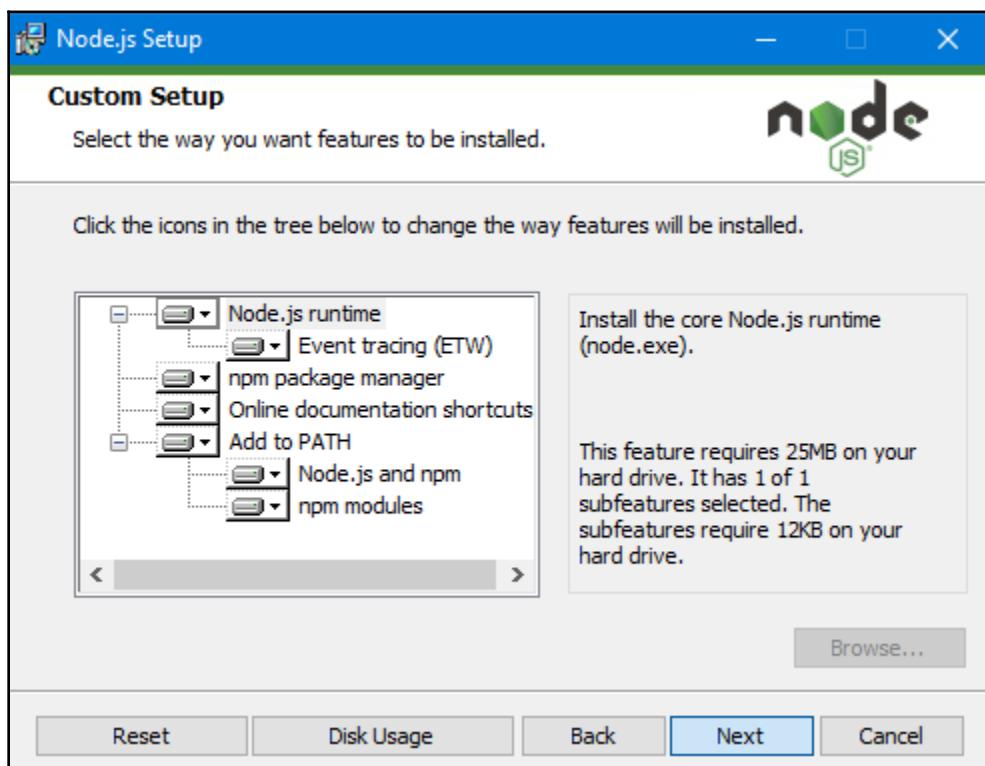
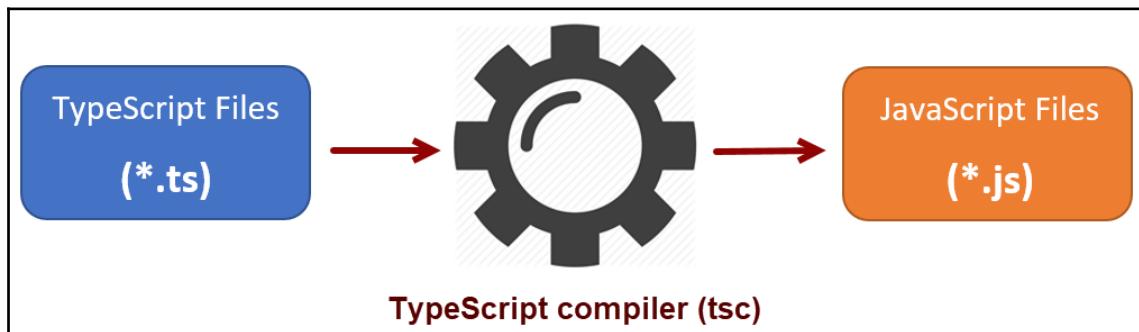
Attach Snapshot Debugger

Open Troubleshooting Guide





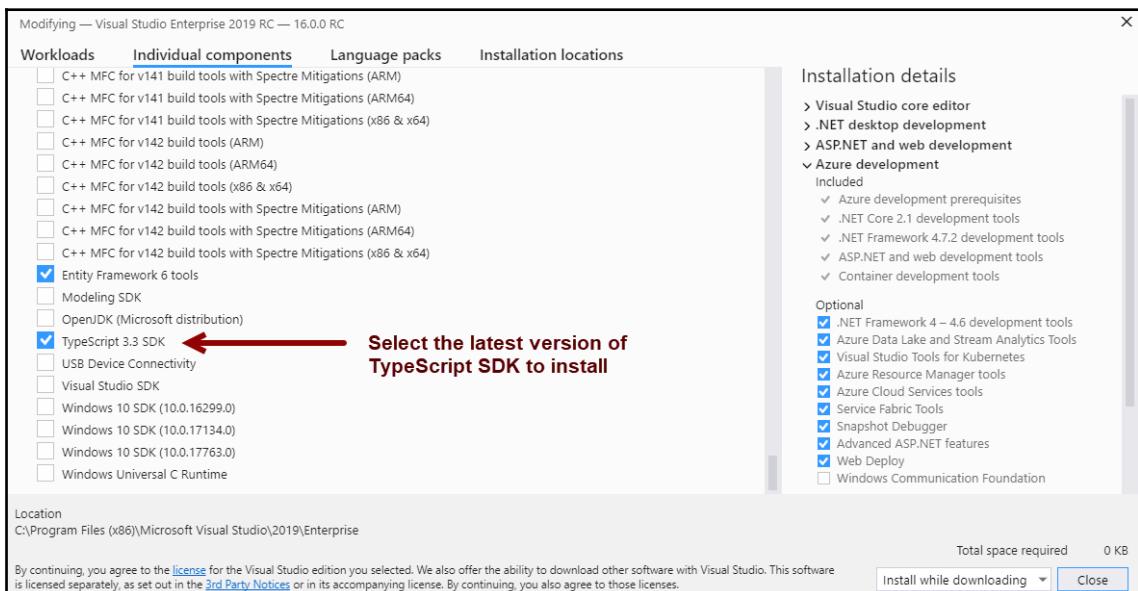
# Chapter 5: Web Application Development Using TypeScript

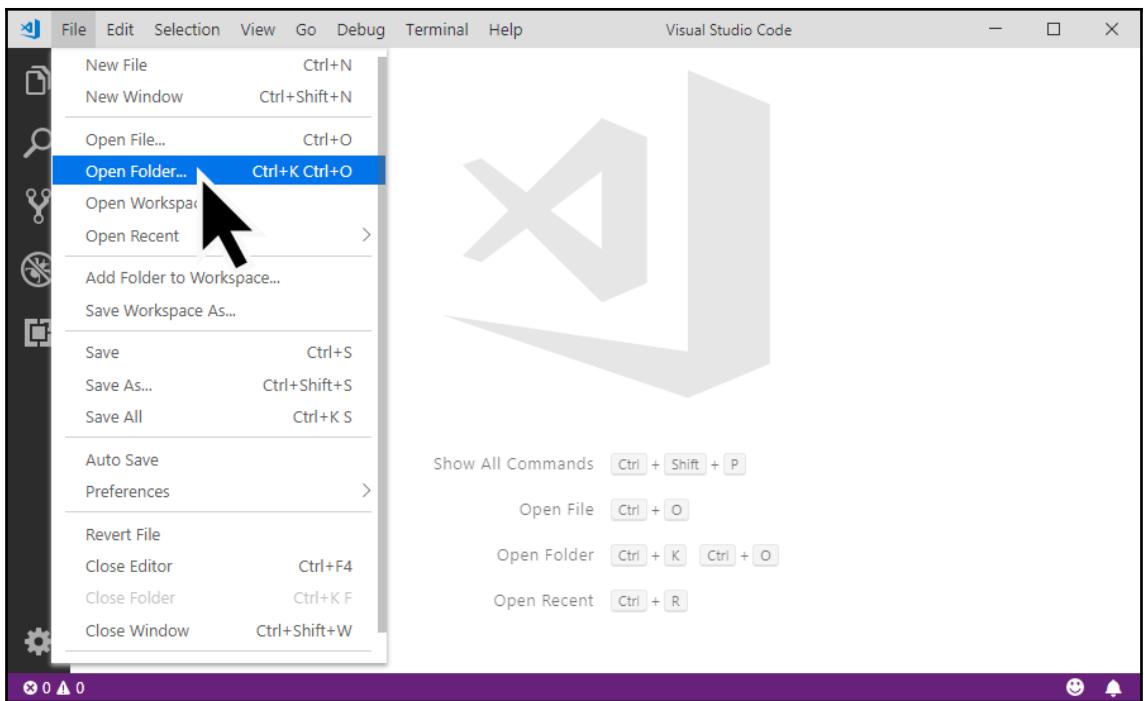


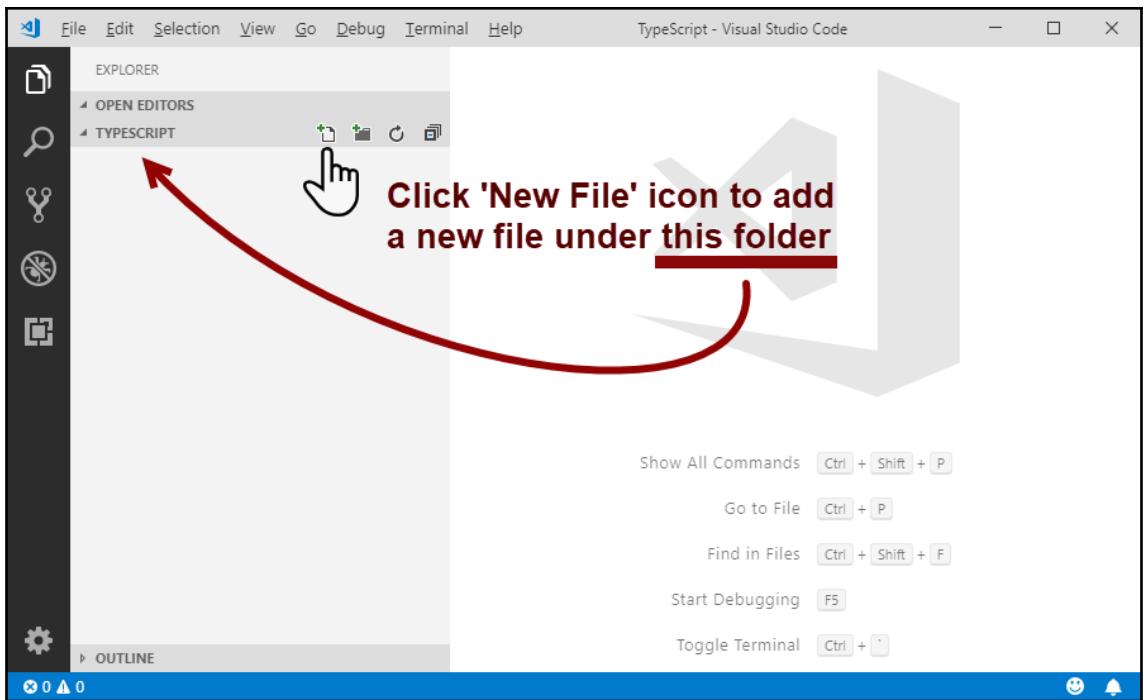
```
C:\WINDOWS\system32\cmd.exe
Microsoft Windows [Version 10.0.18312.1007]
(c) 2018 Microsoft Corporation. All rights reserved.

C:\Users\kunal>npm install -g typescript
C:\Users\kunal\AppData\Roaming\npm\tsserver -> C:\Users\kunal\AppData\Roaming\npm\node_modules\typescript\bin\tsserver
C:\Users\kunal\AppData\Roaming\npm\tsc -> C:\Users\kunal\AppData\Roaming\npm\node_modules\typescript\bin\tsc
+ typescript@3.3.333
added 1 package from 1 contributor in 3.202s

C:\Users\kunal>
```







A screenshot of the Visual Studio Code interface. The title bar reads "HelloTypeScript.ts - TypeScript - Visual Studio Code". The left sidebar is the "EXPLORER" view, showing "OPEN EDITORS" with "HelloTypeScript.ts" listed and "TYPESCRIPT" with "HelloTypeScript.ts" also listed. The main editor area displays the following TypeScript code:

```
// create a function that accepts a person name of type string
function greet(person : string) {
    // greet the user with customized message
    console.log(`Hello ${person}, Welcome to TypeScript`);
}

// call the function passing the name of the person
greet("reader");
```

The status bar at the bottom shows "Ln 8, Col 17" and other settings like "Spaces:4", "UTF-8", "CRLF", "TypeScript", and "3.3.3".

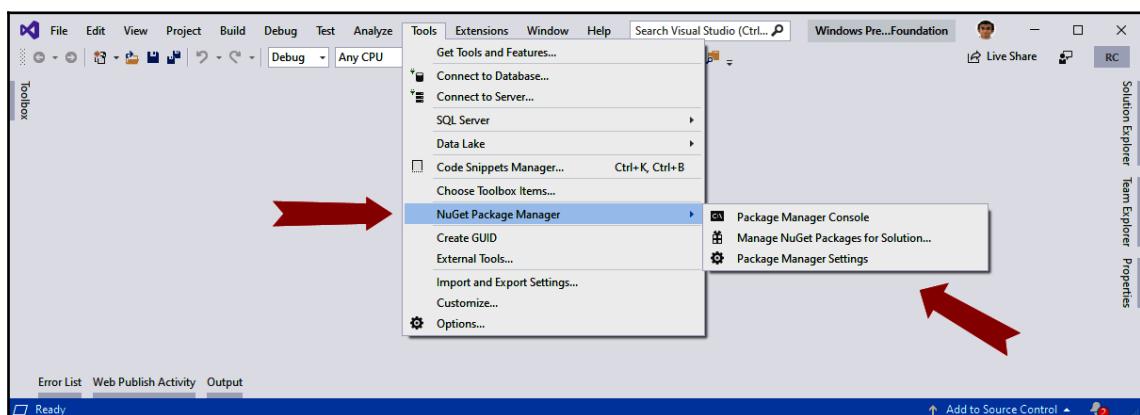
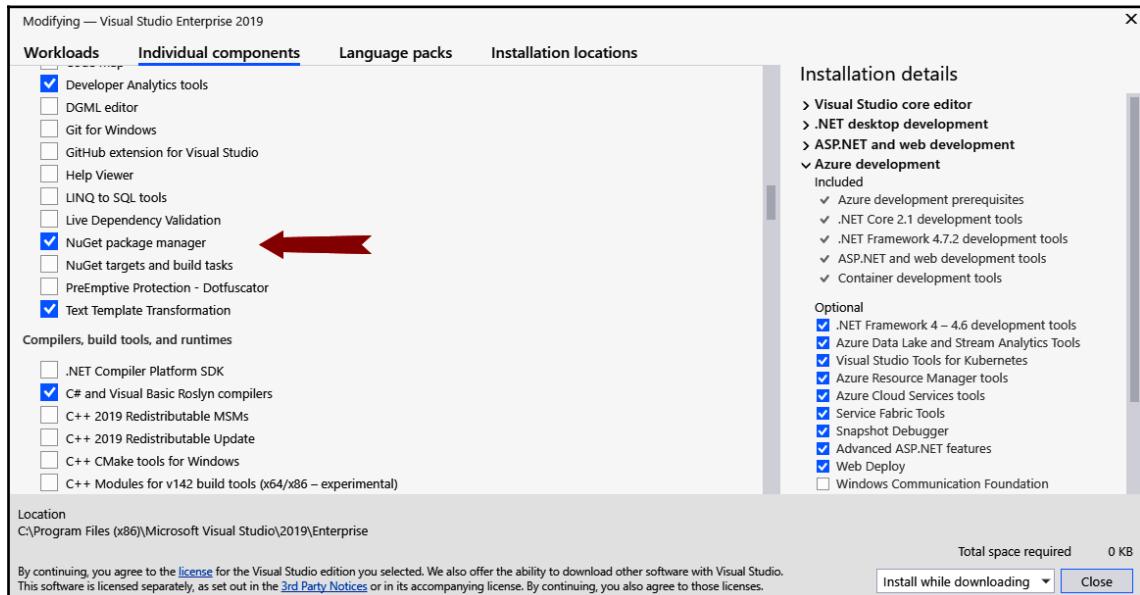
kunal-chowdhury.com > Books > Demos > TypeScript

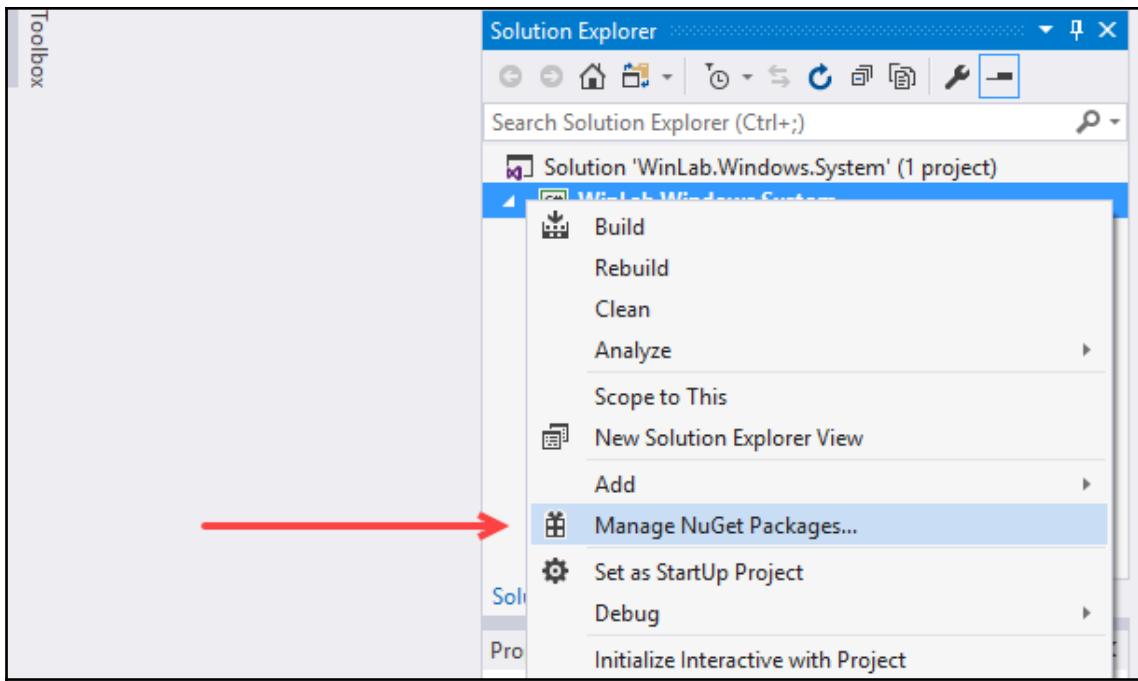
Name	Date modified	Type	Size
HelloTypeScript			
HelloTypeScript			

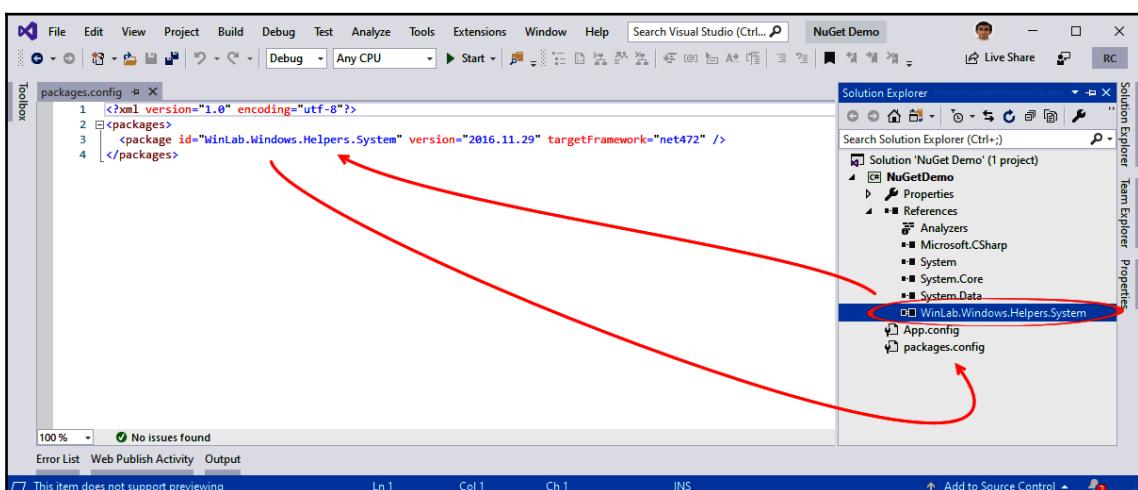
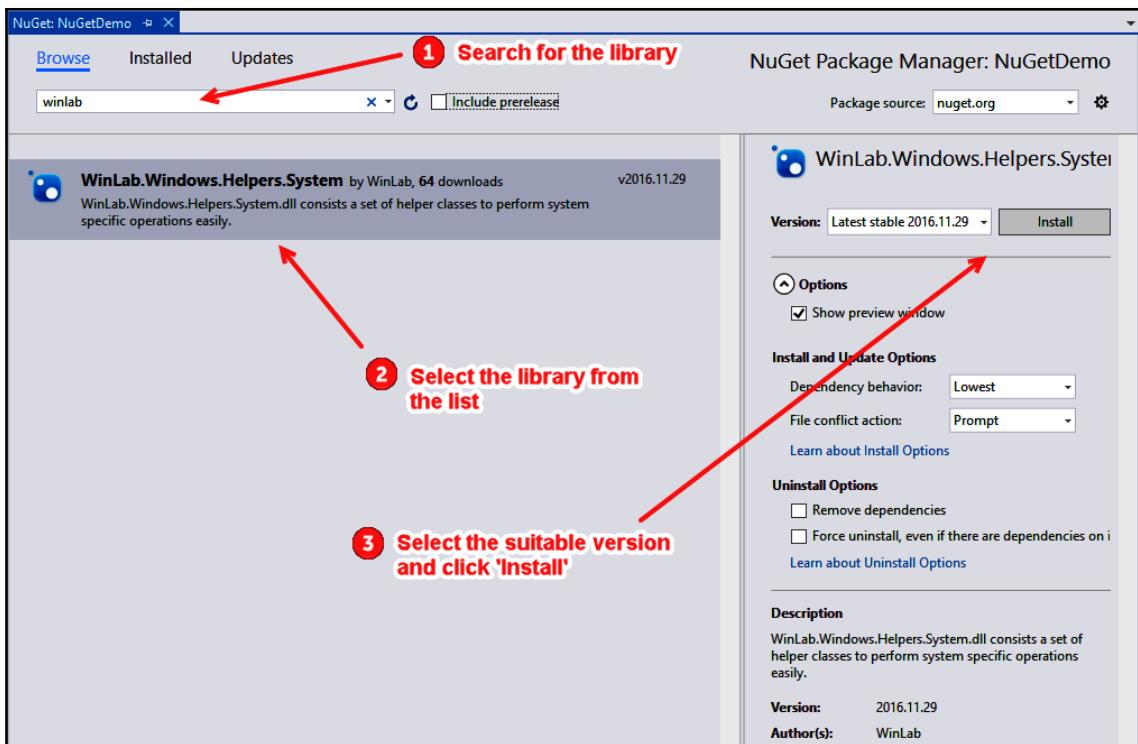
C:\Windows\System32\cmd.exe

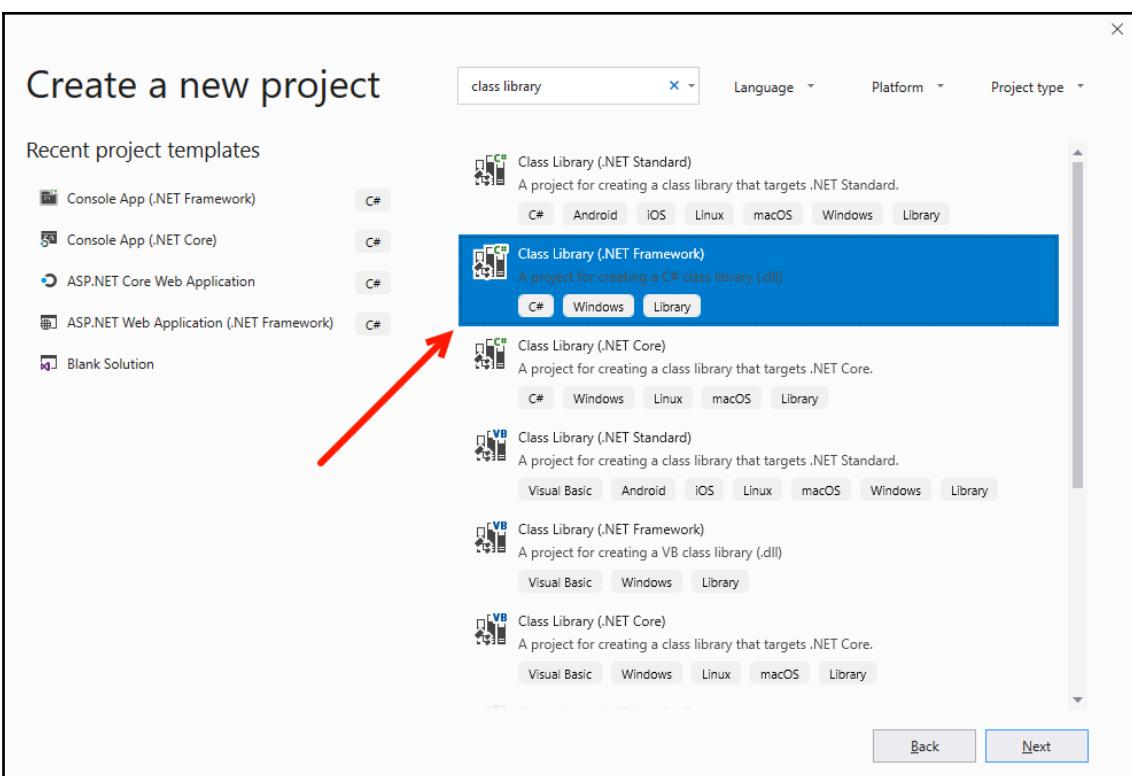
```
D:\kunal-chowdhury.com\Books\Demo>tsc HelloTypeScript.ts
D:\kunal-chowdhury.com\Books\Demo>node HelloTypeScript
Hello reader, Welcome to TypeScript
D:\kunal-chowdhury.com\Books\Demo>
```

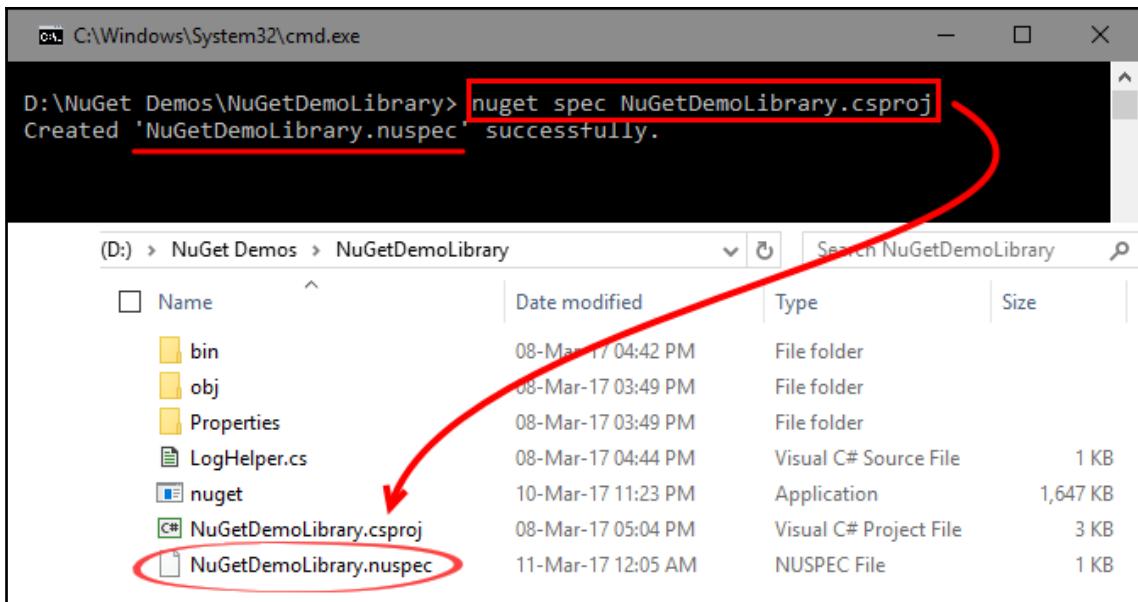
# Chapter 6: Managing NuGet Packages











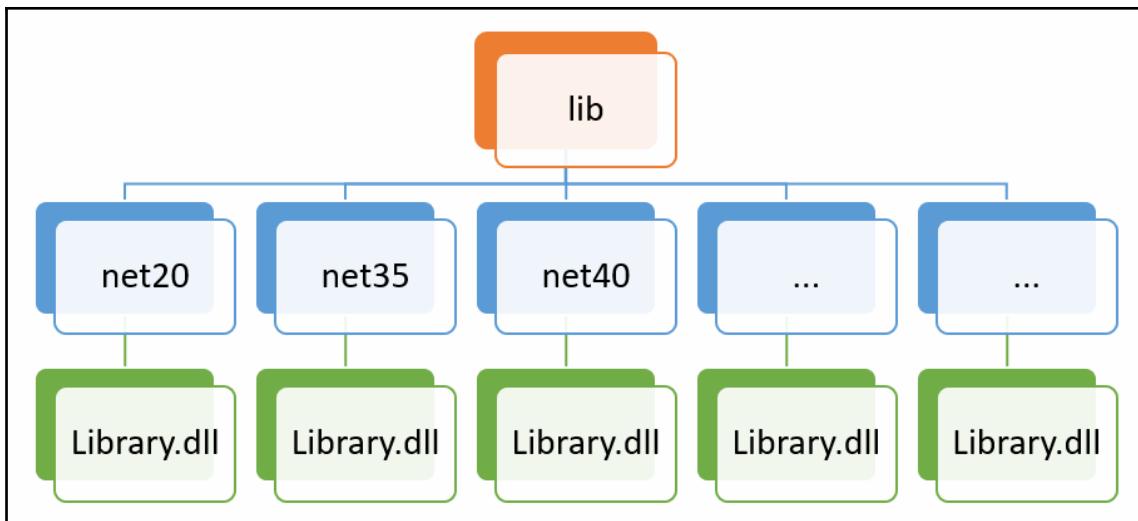
```
<?xml version="1.0"?>
<package>
  <metadata>
    <id>$id$</id>           → Must be unique, globally in NuGet Store
    <version>$version$</version>
    <title>$title$</title>
    <authors>$author$</authors>
    <owners>$author$</owners>
    <licenseUrl>http://LICENSE_URL_HERE_OR_DELETE_THIS_LINE</licenseUrl>
    <projectUrl>http://PROJECT_URL_HERE_OR_DELETE_THIS_LINE</projectUrl>   → optional
    <iconUrl>http://ICON_URL_HERE_OR_DELETE_THIS_LINE</iconUrl>
    <requireLicenseAcceptance>false</requireLicenseAcceptance>
    <description>$description$</description>
    <releaseNotes>Summary of changes made in this release of the package.</releaseNotes>
    <copyright>Copyright 2017</copyright>
    <tags>Tag1 Tag2</tags>
  </metadata>
</package>
```

```
C:\Windows\System32\cmd.exe

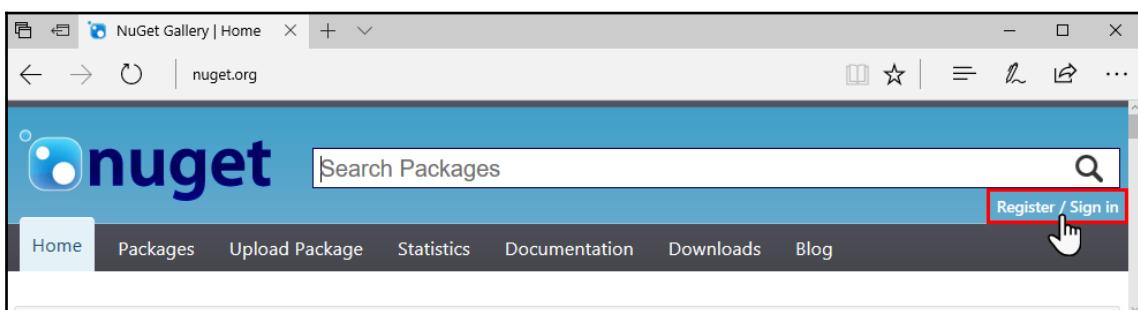
D:\NuGet Demos\NuGetDemoLibrary> nuget pack NuGetDemoLibrary.nuspec
Attempting to build package from 'NuGetDemoLibrary.nuspec'.
Successfully created package 'D:\NuGet Demos\NuGetDemoLibrary\Demo.Packt.Kuna
l.NuGetDemoLibrary.1.0.0-alpha.nupkg'.

WARNING: 1 issue(s) found with package 'Demo.Packt.Kunal.NuGetDemoLibrary'.
Issue: Assembly not inside a framework folder.
Description: The assembly 'lib\NuGetDemoLibrary.dll' is placed directly under
'lib' folder. It is recommended that assemblies be placed inside a framework
-specific folder.
Solution: Move it into a framework-specific folder. If this assembly is targe
ted for multiple frameworks, ignore this warning.

(D:) > NuGet Demos > NuGetDemoLibrary
Search NuGetDemoLibrary
Name Date modified
bin 08-Mar-17 04:42 PM
obj 11-Mar-17 11:15 AM
Properties 08-Mar-17 03:49 PM
Demo.Packt.Kunal.NuGetDemoLibrary.1.0.0-alpha.nupkg 11-Mar-17 12:40 PM
LogHelper.cs 08-Mar-17 04:44 PM
nuget 10-Mar-17 11:23 PM
NuGetDemoLibrary.csproj 08-Mar-17 05:04 PM
NuGetDemoLibrary.nuspec 11-Mar-17 12:24 PM
```



```
C:\Windows\System32\cmd.exe
D:\NuGet Demos\NuGetDemoLibrary> nuget pack NuGetDemoLibrary.nuspec
Attempting to build package from 'NuGetDemoLibrary.nuspec'.
Successfully created package 'D:\NuGet Demos\NuGetDemoLibrary\Demo.Packt
.Kunal.NuGetDemoLibrary.1.0.0-alpha.nupkg'.
```



The screenshot shows the NuGet Gallery Upload interface. At the top, there's a navigation bar with icons for back, forward, refresh, and search, followed by the URL "nuget.org/packages/manage/upload". Below the header is the NuGet logo and a search bar labeled "Search Packages". A user profile is shown with the name "kunal.chowdhury / Sign out". The main menu includes Home, Packages, Upload Package (which is highlighted), Statistics, Documentation, Downloads, and Blog.

## Upload Your Package

1. Upload      2. Verify Details

Your package file will be uploaded and hosted on the NuGet Gallery server (<http://www.nuget.org>).

Choose a package...

A red arrow points from the text input field to the "Browse..." button, indicating where to click to select the package file. A mouse cursor icon is positioned over the "Upload" button.

This is a prerelease version of Demo.Packt.Kunal.NuGetDemoStandardLibrary.

**This package has not been indexed yet.** It will appear in search results and will be available for install/restore after indexing is completed.

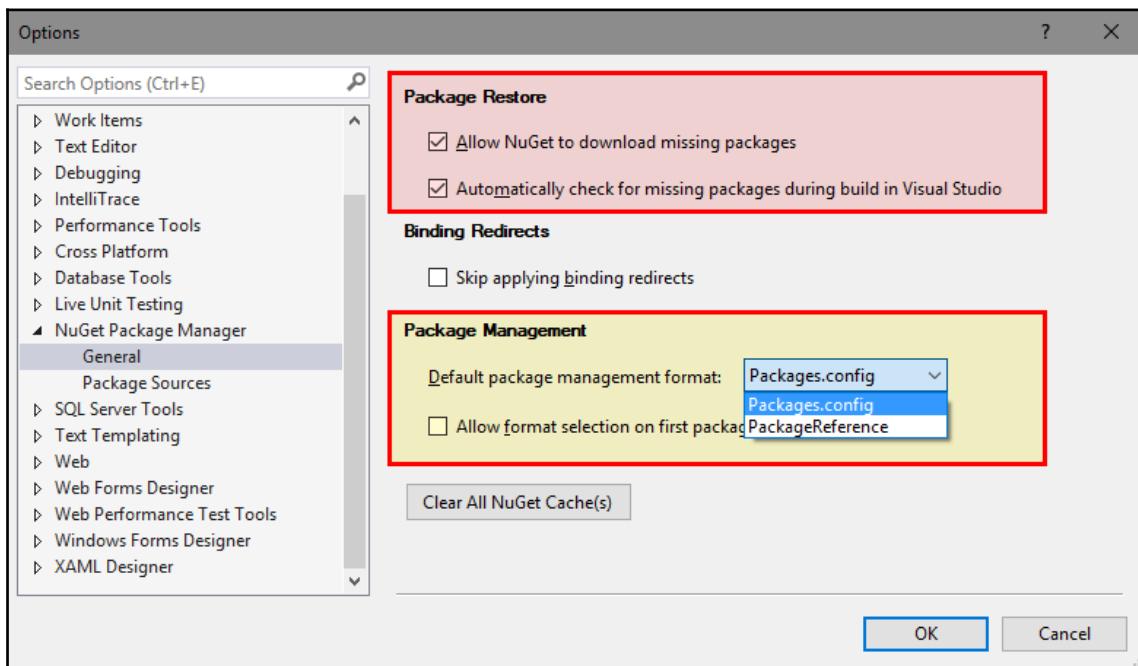
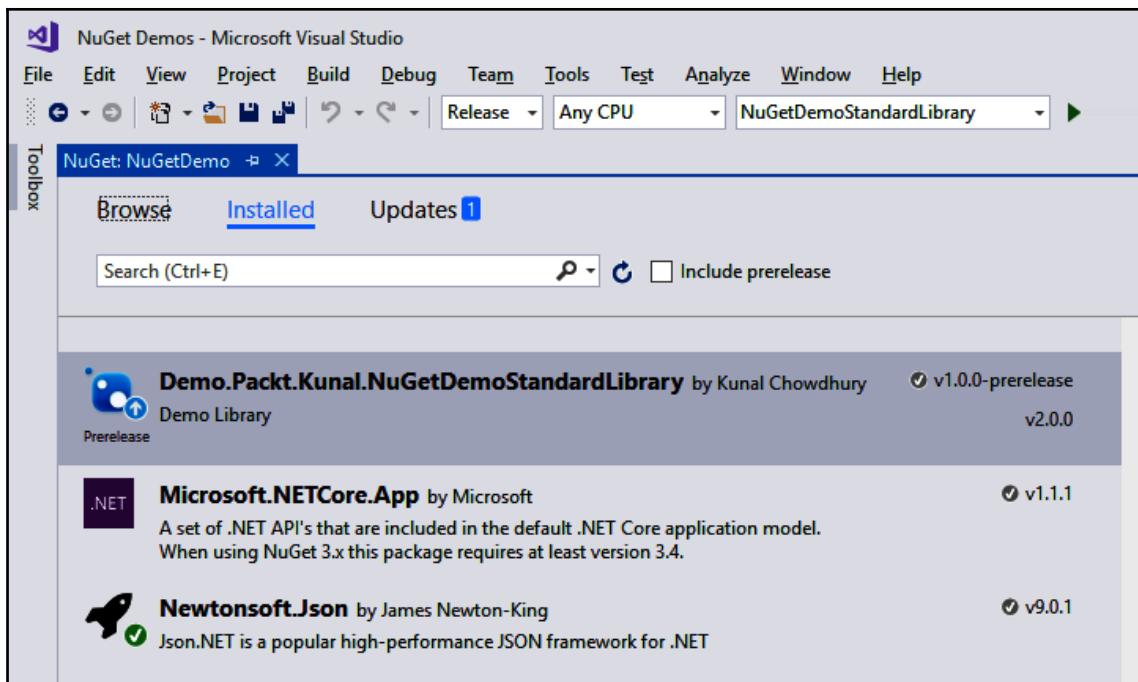
## Demo.Packt.Kunal.NuGetDemoStandardLib...

### 1.0.0-prerelease

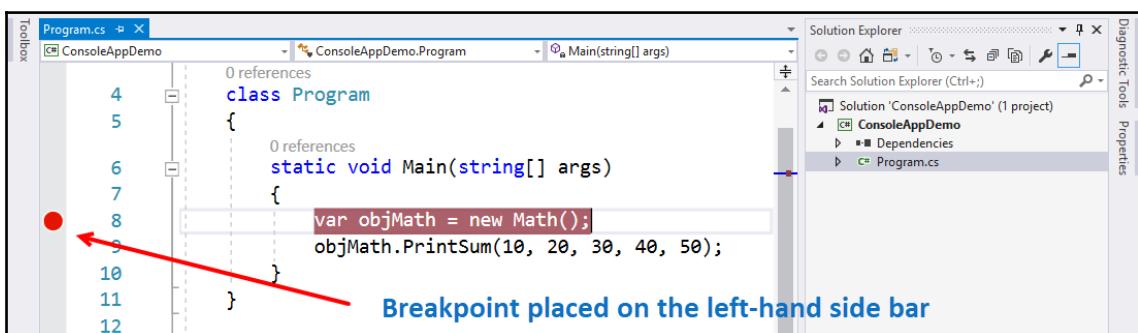
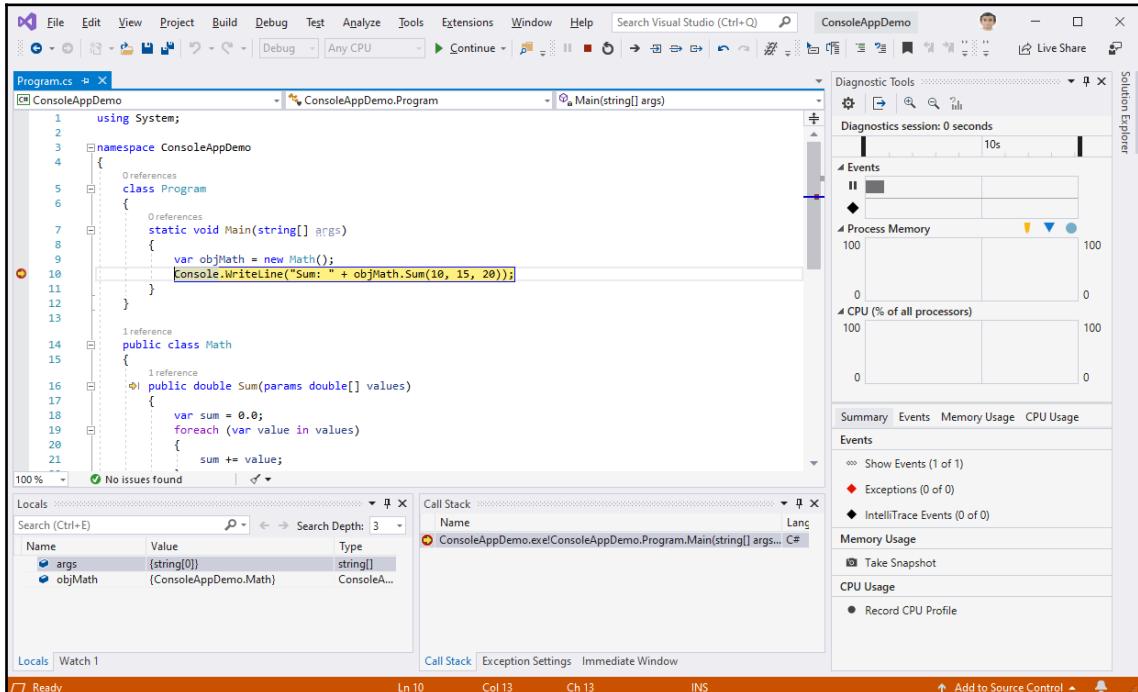
Demo Library

To install Demo.Packt.Kunal.NuGetDemoStandardLibrary, run the following command in the [Package Manager Console](#)

```
PM> Install-Package  
Demo.Packt.Kunal.NuGetDemoStandardLibrary -Pre
```



# Chapter 7: Debugging Applications with Visual Studio 2019

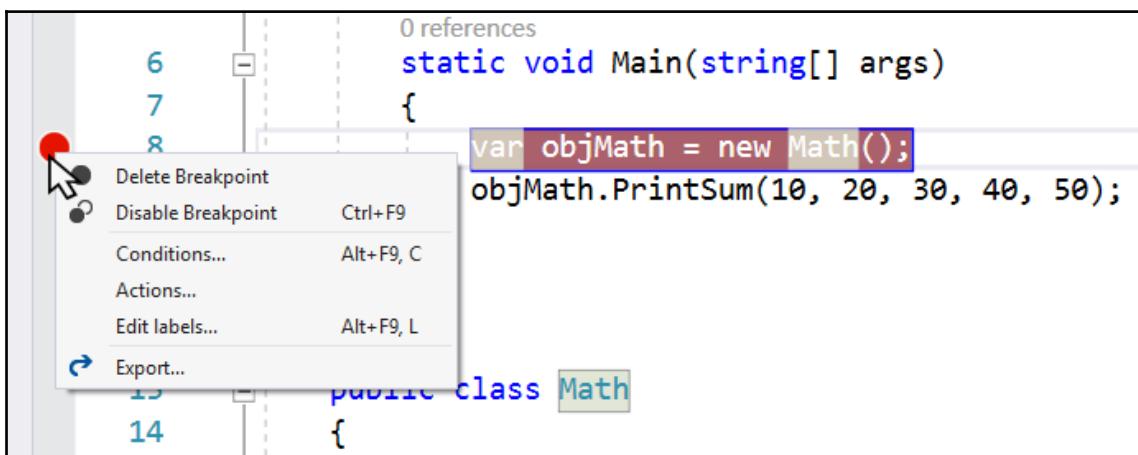


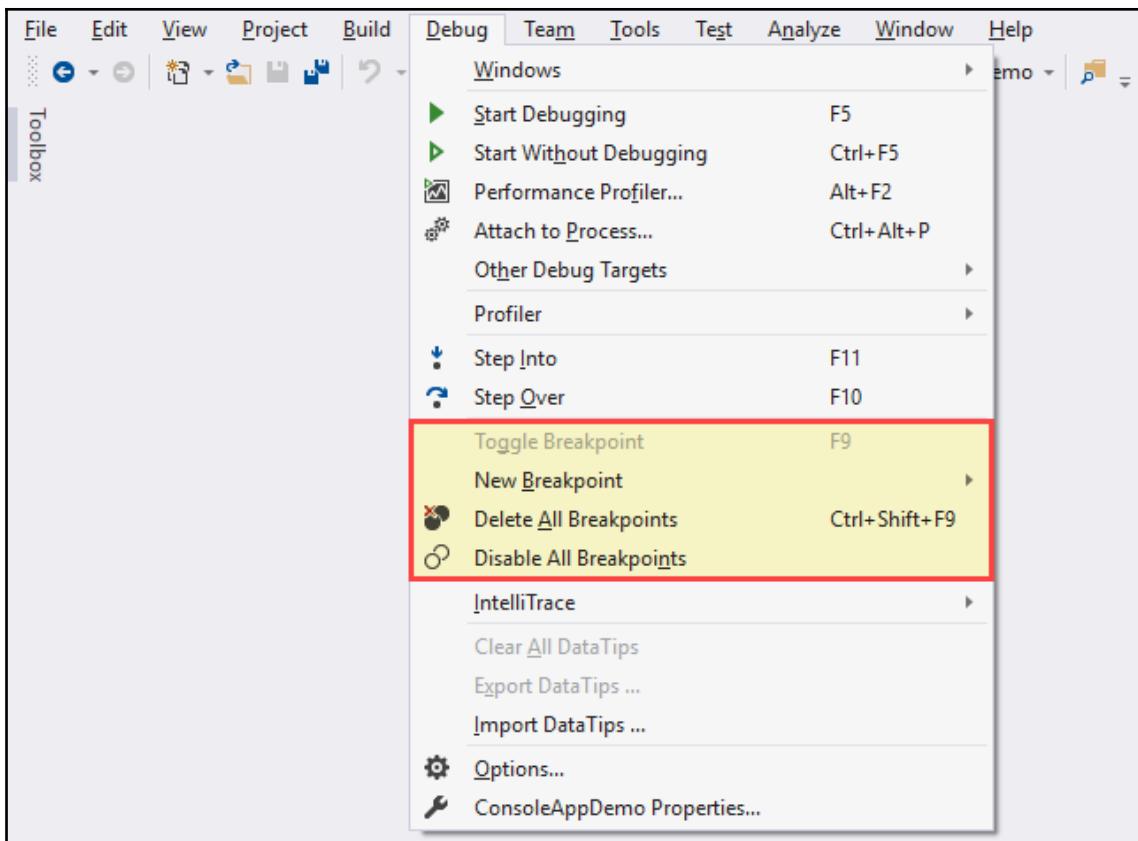
A screenshot of the Visual Studio IDE. The main window shows the code for Program.cs:

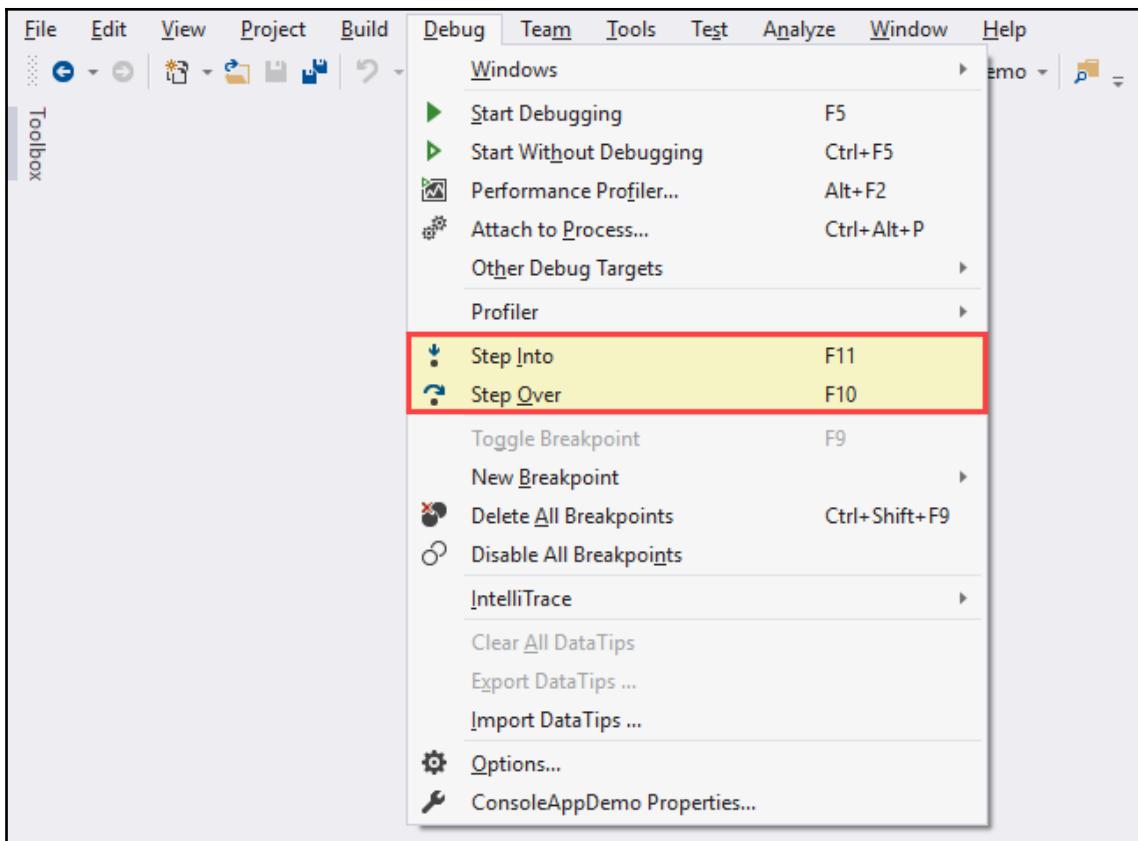
```
Program.cs
ConsoleAppDemo
ConsoleAppDemo.Program
Main(string[] args)

4 class Program
5 {
6     static void Main(string[] args)
7     {
8         var objMath = new Math();
9         objMath.PrintSum(10, 20, 30, 40, 50);
10    }
11 }

Diagnostic Tools
Diagnostics session: 0 seconds (234 ms selected)
Events
Process Memory Snapshot Private Bytes
CPU (% of all processors)
```







A screenshot of the Visual Studio IDE showing a code editor window. The code is a C# method named `PrintSum`:

```
1 reference
public void PrintSum(params double[] values)
{
    var count = values.Length;    ≤ 3ms elapsed
    var commaSeparatedValues = string.Empty;

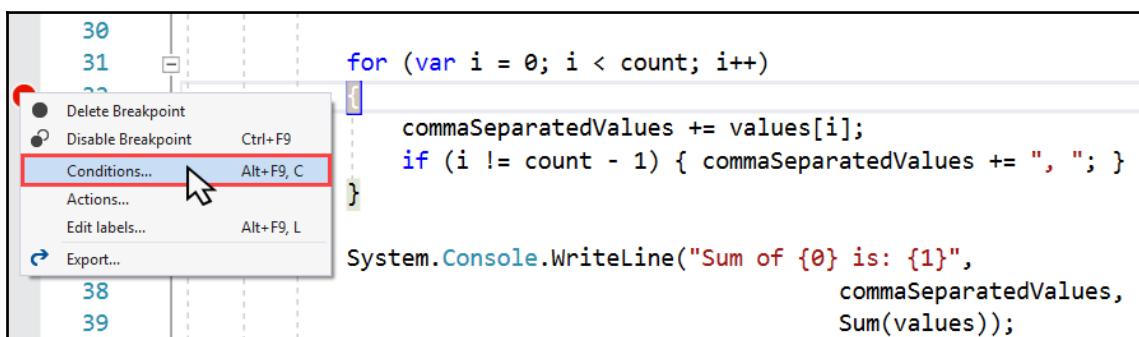
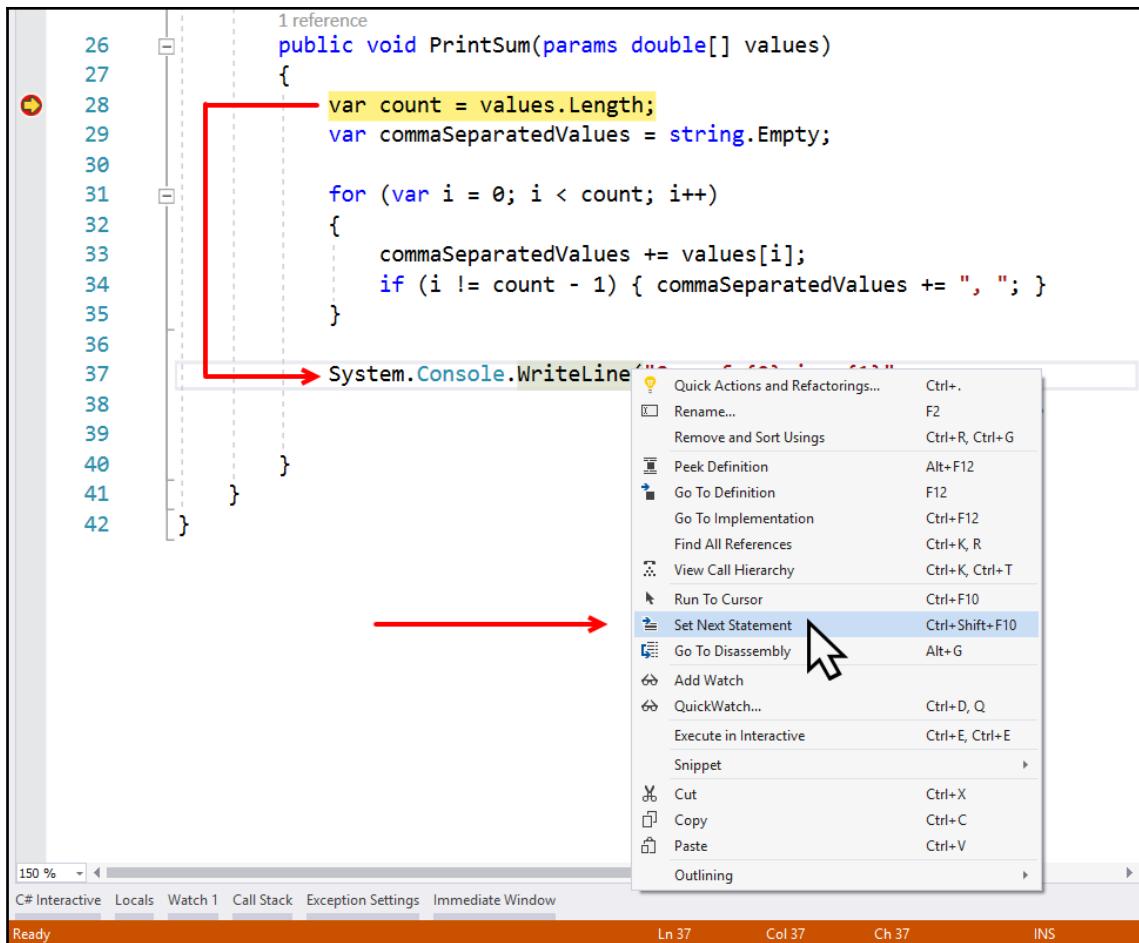
    for (var i = 0; i < count; i++)
    {
        commaSeparatedValues += values[i];
        if (i != count - 1) { commaSeparatedValues += ", " }
    }

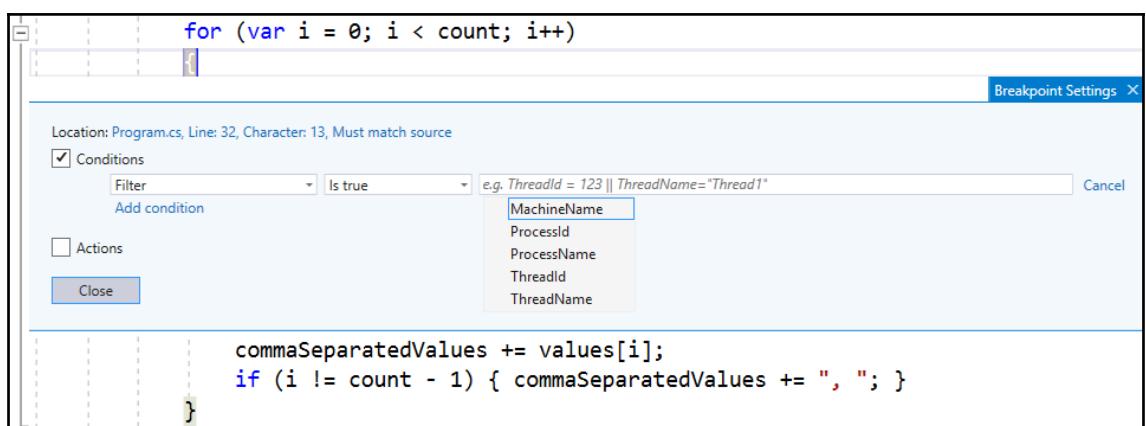
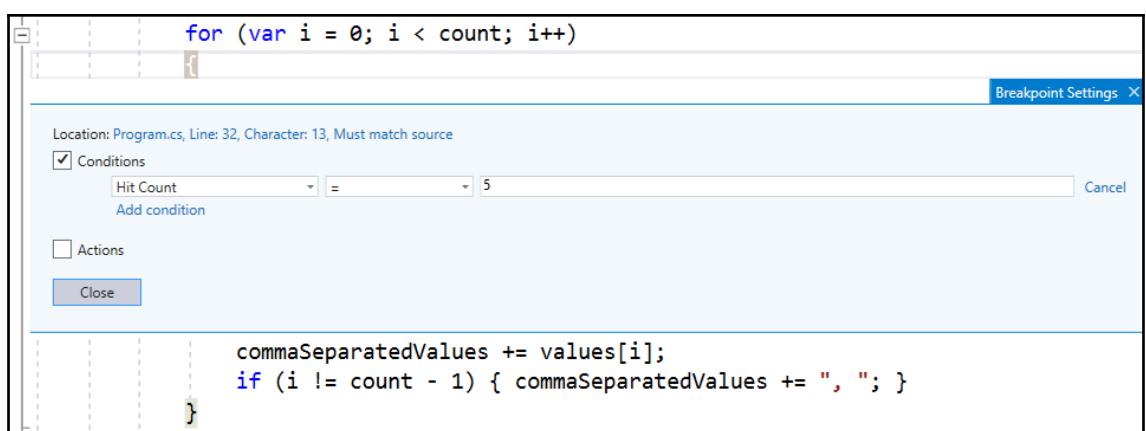
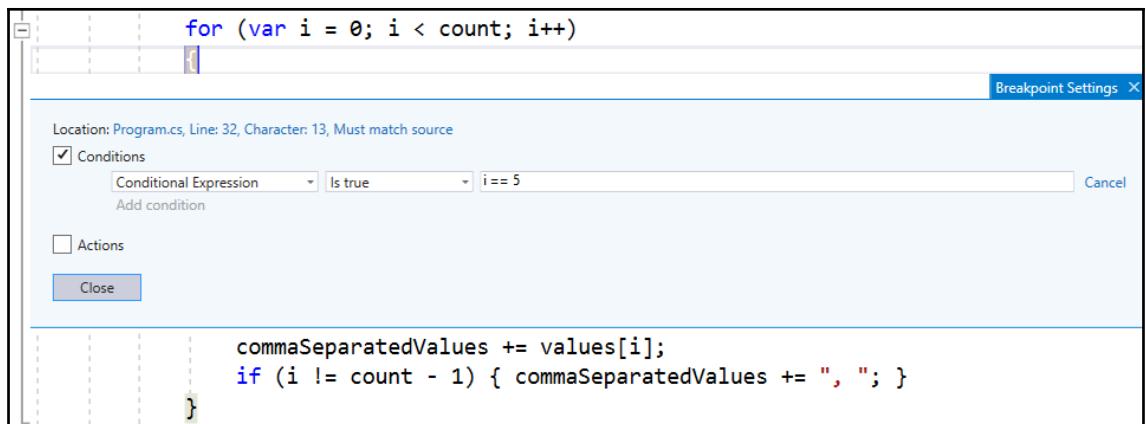
    System.Console.WriteLine("Sum of the values is: " + commaSeparatedValues);
}
```

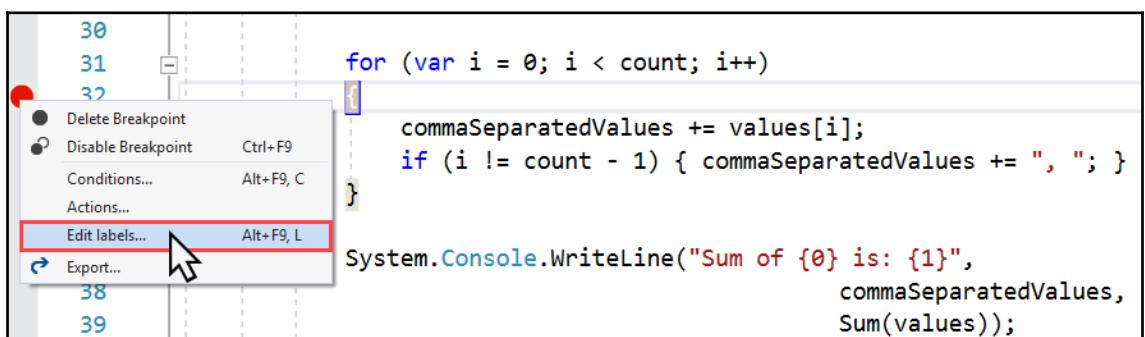
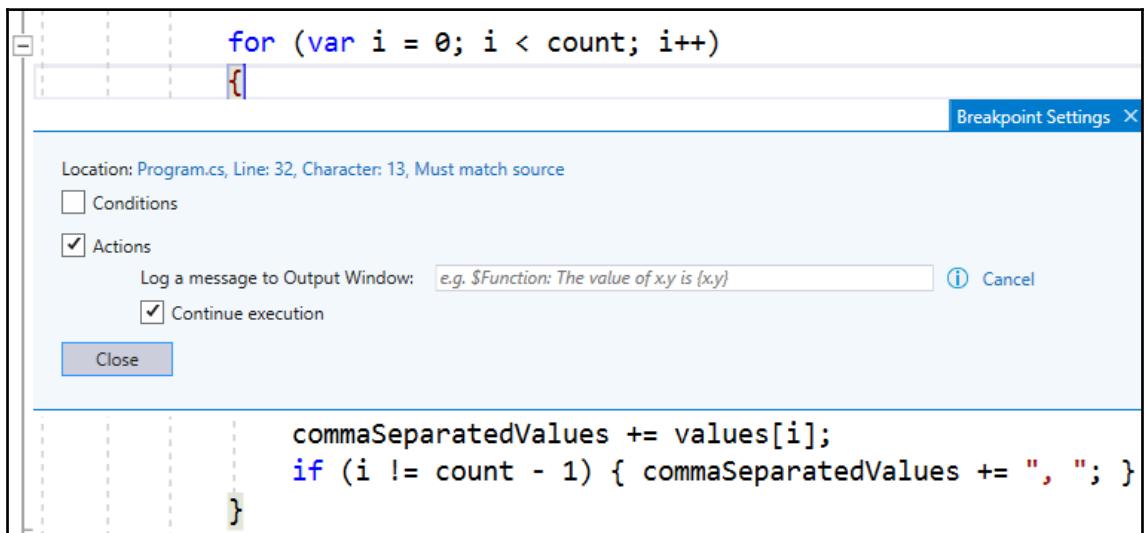
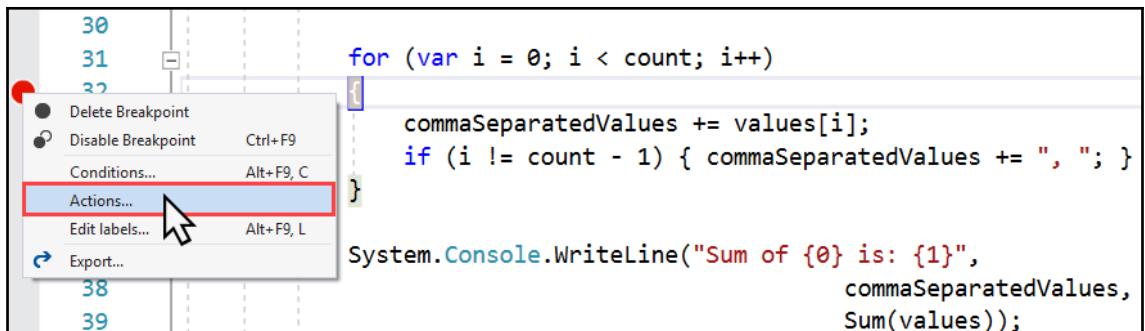
The cursor is positioned at the end of the `System.Console.WriteLine` line. A context menu is open, with the "Run To Cursor" option highlighted. A red arrow points from the bottom left towards the "Run To Cursor" option.

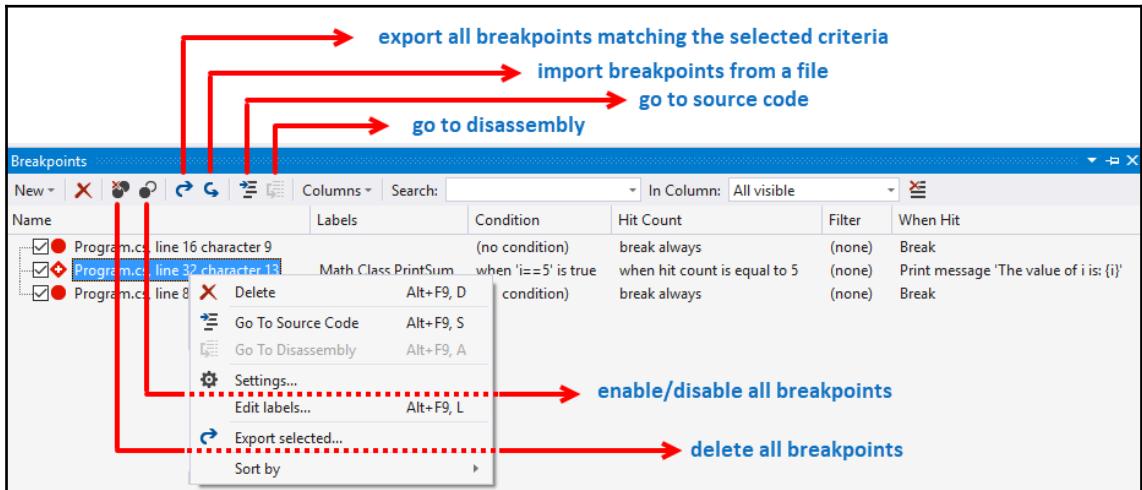
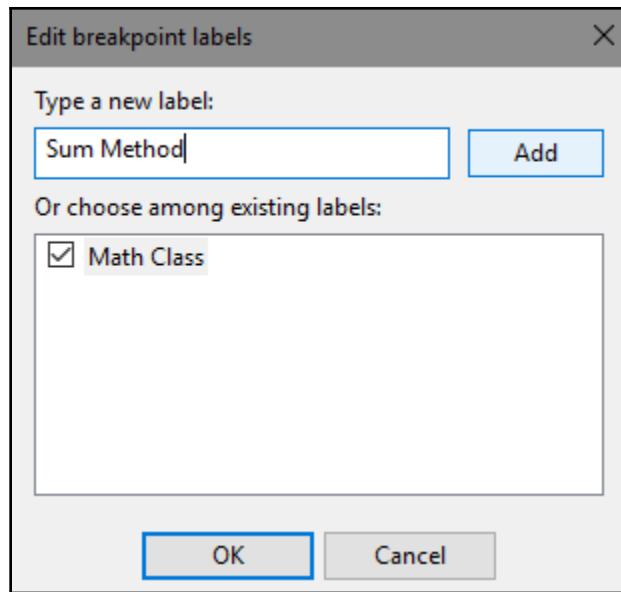
Context menu options:

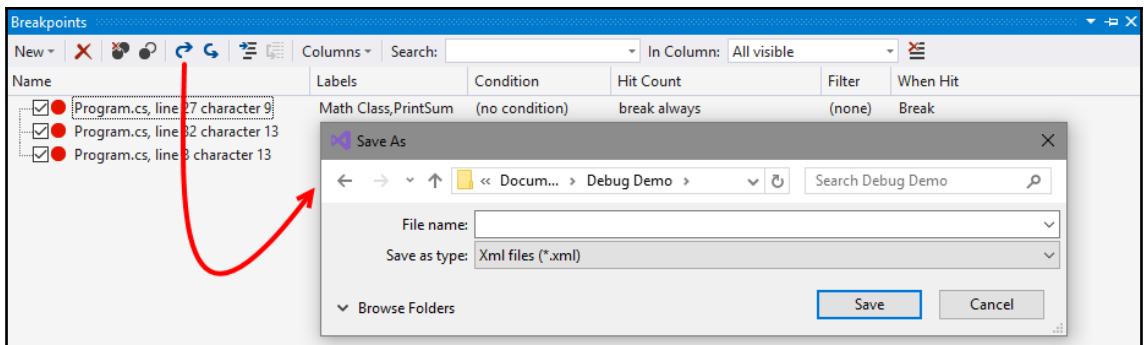
- Quick Actions and Refactorings... Ctrl+.
- Rename... F2
- Remove and Sort Usings Ctrl+R, Ctrl+G
- Peek Definition Alt+F12
- Go To Definition F12
- Go To Implementation Ctrl+F12
- Find All References Ctrl+K, R
- View Call Hierarchy Ctrl+K, Ctrl+T
- Run To Cursor** Ctrl+F10
- Set Next Statement Ctrl+Shift+F10
- Go To Disassembly Alt+G
- Add Watch
- QuickWatch... Ctrl+D, Q
- Execute in Interactive Ctrl+E, Ctrl+E
- Snippet
- Cut Ctrl+X
- Copy Ctrl+C
- Paste Ctrl+V
- Outlining











The screenshot shows the Visual Studio code editor with the following code:

```
1 reference
public void PrintSum(params double[] values)
{
    var count = values.Length;
    var commaSeparatedValues = string.Empty;

    for (var i = 0; i < count; i++)
    {
        commaSeparatedValues += values[i];
        if (i != count - 1) { commaSeparatedValues += ", ";}
    }
}
```

A breakpoint is set at line 56. A Data Tip is shown for the 'values' variable, displaying its contents as a double[5] array with values [0] to [4]. A red arrow points from the Data Tip to the text 'Data Tips'.

The screenshot shows the Visual Studio code editor with the same code as the previous screenshot. A Data Tip is pinned to the side of the code editor, showing the value 'values[1] 20'. A red arrow points from the pinned Data Tip to the text 'Pinned Data Tips'.

```
1 reference
54
55
56 var count = values.Length;
57 var commaSeparatedValues = string.Empty;
58
59 for (var i = 0; i < count; i++)
60 {
```

```
1 reference
54
55
56 var count = values.Length;
57 var commaSeparatedValues = string.Empty;
58
59 for (var i = 0; i < count; i++)
60 {
```

150 %

Name	Value	Type
commaSeparatedValues	null	string
count	5	int
this	(ConsoleAppDemo.Math)	ConsoleAppDemo.Math
values	[double[5]]	double[]
[0]	10	double
[1]	20	double
[2]	30	double
[3]	40	double
[4]	50	double
values.Length	5	int

Call Stack Exception Settings Immediate Window Locals Watch 1

Ready      Add to Source Control

The screenshot shows the Locals window in the Visual Studio debugger. A red dot at the top left indicates a break point. The code being debugged is:

```
56     var count = values.Length;
57     var commaSeparatedValues = string.Empty;
58
59     for (var i = 0; i < count; i++)
60     {
61         commaSeparatedValues += values[i];  ≤ 1ms elapsed
62         if (i != count - 1) { commaSeparatedValues += ", ";}
63     }

```

The Locals table displays the following variable information:

Name	Value	Type
this	{ConsoleAppDemo.Math}	[ConsoleAppDemo.Math]
values	{double[5]}	double[]
[0]	10	double
[1]	20	double
[2]	30	double
[3]	40	double
[4]	50	double
count	5	int
commaSeparatedValues	"10,"	string
i	1	int

Below the Locals window, the status bar shows: Call Stack, Exception Settings, Immediate Window, Locals, Watch 1, Autos. The toolbar includes: Ready, Add to Source Control.

The screenshot shows a context menu open over the variable 'commaSeparatedValues' in the code editor. The menu items and their keyboard shortcuts are:

- Quick Actions and Refactorings... Ctrl+,
- Rename... F2
- Remove and Sort Usings Ctrl+R, Ctrl+G
- Peek Definition Alt+F12
- Go To Definition F12
- Go To Implementation Ctrl+F12
- Find All References Ctrl+K, R
- View Call Hierarchy Ctrl+K, Ctrl+T
- Step Into Specific
- Run To Cursor Ctrl+F10
- Set Next Statement Ctrl+Shift+F10
- Go To Disassembly Alt+G
- Add Watch (highlighted)
- QuickWatch... Ctrl+D, Q
- Execute in Interactive Ctrl+E, Ctrl+E
- Snippet
- Cut Ctrl+X
- Copy Ctrl+C
- Paste Ctrl+V
- Outlining

The code in the editor is:

```
1 reference
54     public void PrintSum(params double[] values)
55     {
56         var count = values.Length;
57         var commaSeparatedValues = string.Empty;
58
59         for (var i = 0; i < count; i++)
60         {
61             commaSeparatedValues += values[i];
62             if (i != count - 1) { commaSeparatedValues += ", ";}
63         }
64
65         System.Console.WriteLine(commaSeparatedValues);
66     }
67 }
68 }
69 }
70 }
```

1 reference

```
54     public void PrintSum(params double[] values)
55     {
56         var count = values.Length;
57         var commaSeparatedValues = string.Empty;
58
59         for (var i = 0; i < count; i++)
60         {
61             commaSeparatedValues += values[i];    ≤ 1ms elapsed
62             if (i != count - 1) { commaSeparatedValues += ", ";}
63         }
64     }
65     System.Console.WriteLine(commaSeparatedValues);
66 }
67 }
68 }
69 }
70 }
```

Watch 1

Name	Type
values	double[]
[0]	double
[1]	double
[2]	double
[3]	double
[4]	double
commaSeparatedValues += values[i];	string

Call Stack Exception Settings Immediate Window Locals Autos Parallel Watch 1

Ready Add to Source Control

56 57 58 59 60 61 62 63 64 65 66 67 68 69 70

```
56     var count = values.Length;
57     var commaSeparatedValues = string.Empty;
58
59     for (var i = 0; i < count; i++)
60     {
61         commaSeparatedValues += values[i];
62         if (i != count - 1) { commaSeparatedValues += ", ";}
63     }
64
65     System.Console.WriteLine(commaSeparatedValues);
66 }
67 }
68 }
69 }
70 }
```

Quick Actions and Refactorings... Ctrl+.

Rename... F2

Remove and Sort Usings Ctrl+R, Ctrl+G

Peek Definition Alt+F12

Go To Definition F12

Go To Implementation Ctrl+F12

Find All References Ctrl+K, R

View Call Hierarchy Ctrl+K, Ctrl+T

Step Into Specific

Run To Cursor Ctrl+F10

Set Next Statement Ctrl+Shift+F10

Go To Disassembly Alt+G

Add Watch

QuickWatch... Ctrl+D, Q

Execute in Interactive Ctrl+E, Ctrl+E

Snippet

Cut Ctrl+X

Copy Ctrl+C

Paste Ctrl+V

Outlining

**QuickWatch**

Expression: `values` Reevaluate

Add Watch

**Value:**

Name	Value	Type
values	{double[5]}	double[]
[0]	10	double
[1]	20	double
[2]	30	double
[3]	40	double
[4]	50	double

Close Help

**QuickWatch**

Expression: `$exception` Reevaluate

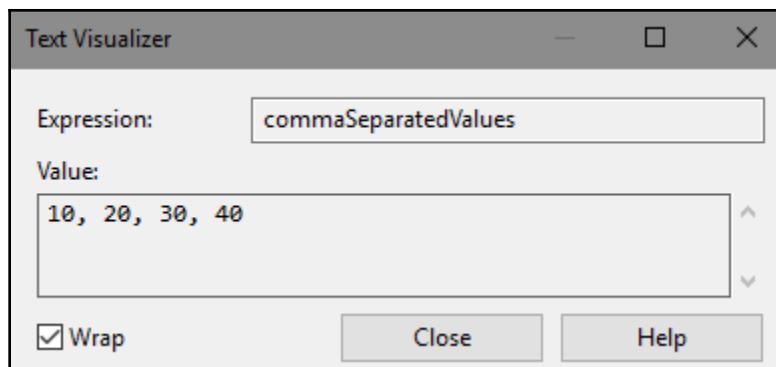
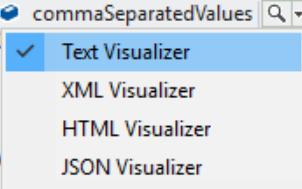
Add Watch

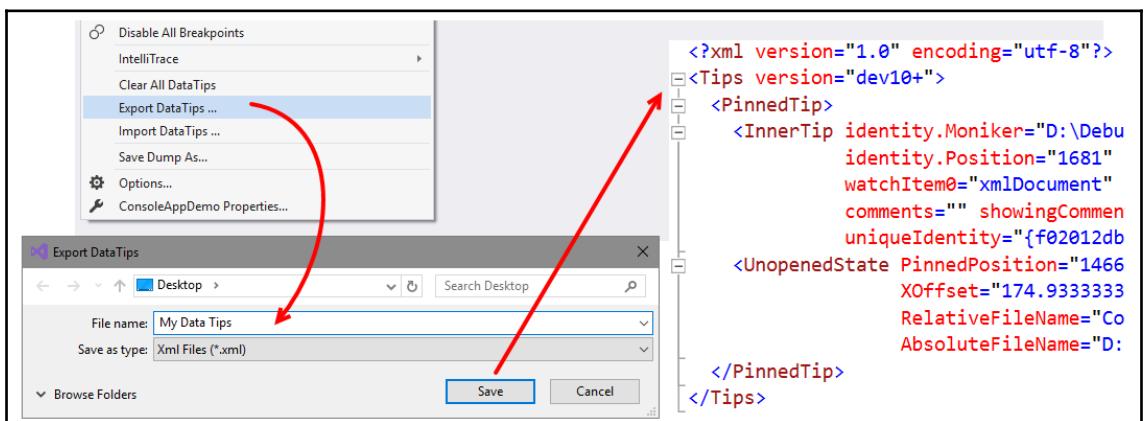
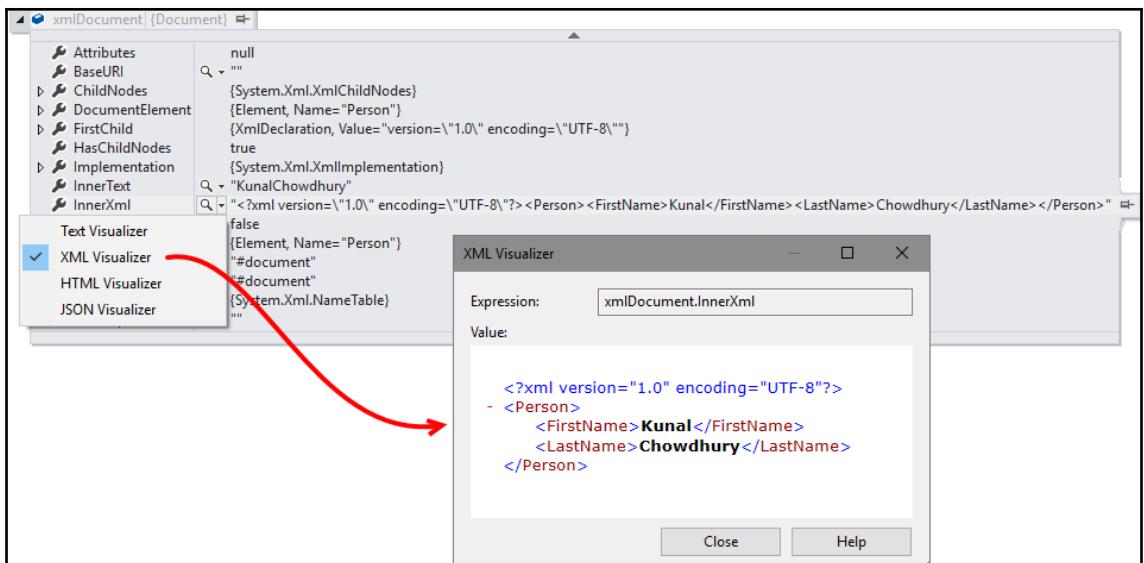
**Value:**

Name	Value	Type
\$exception	{System.OutOfMemoryException}	System.OutOfMemoryException
Data	{System.Collections.ListDictionaryInternal}	System.Collections.IDictionary {System.Collections.IList}
Count	0	int
IsFixedSize	false	bool
IsReadOnly	false	bool
IsSynchronized	false	bool
Keys	{System.Collections.ListDictionaryInternal.NodeKeyValueCollection}	System.Collections.ICollection {System.Collections.IList}
SyncRoot	{object}	object
Values	{System.Collections.ListDictionaryInternal.NodeKeyValueCollection}	System.Collections.ICollection {System.Collections.IList}
Non-Public members		
Results View	Expanding the Results View will enumerate the IEnumerable	
HResult	-2147024882	int
HelpLink	null	string
InnerException	null	System.Exception
Message	The function evaluation was disabled because of an out of memory exception.	string
Source	The function evaluation was disabled because of an out of memory exception.	string
StackTrace	" at System.String.Concat(Object[] args)\r\n at ConsoleAppDemo.Program.Main()"	string
TargetSite	{System.String.Concat(System.Object[])}	System.Reflection.MethodBase {System.Reflection.MethodInfo}
Static members		
Non-Public members		

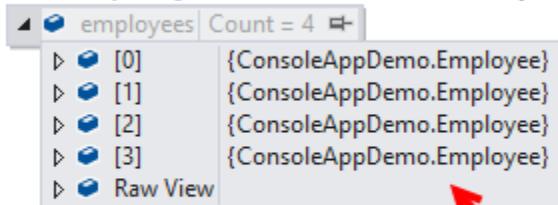
Close Help

```
for (var i = 0; i < count; i++)  
{  
    commaSeparatedValues += values[i];  
    if (i != count - 1)  
        commaSeparatedValues += ", ";  
}  
  
System.Console.WriteLine("{0} is: {1}",  
    commaSeparatedValues,  
    Sum(values));
```





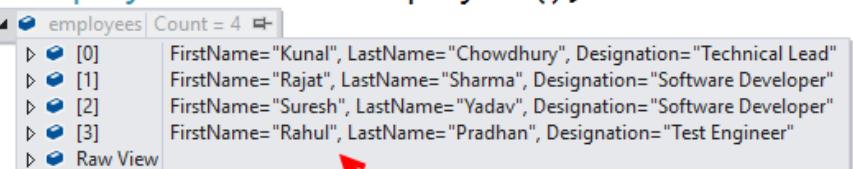
```
var employees = EmployeeContext.GetEmployees();
```



```
[DebuggerDisplay("FirstName={FirstName}, LastName={LastName}, Designation={Designation}")]
```

```
public class Employee
{
    public string FirstName { get; set; }
    public string LastName { get; set; }
    public string Designation { get; set; }
}
```

```
var employees = EmployeeContext.GetEmployees();
```

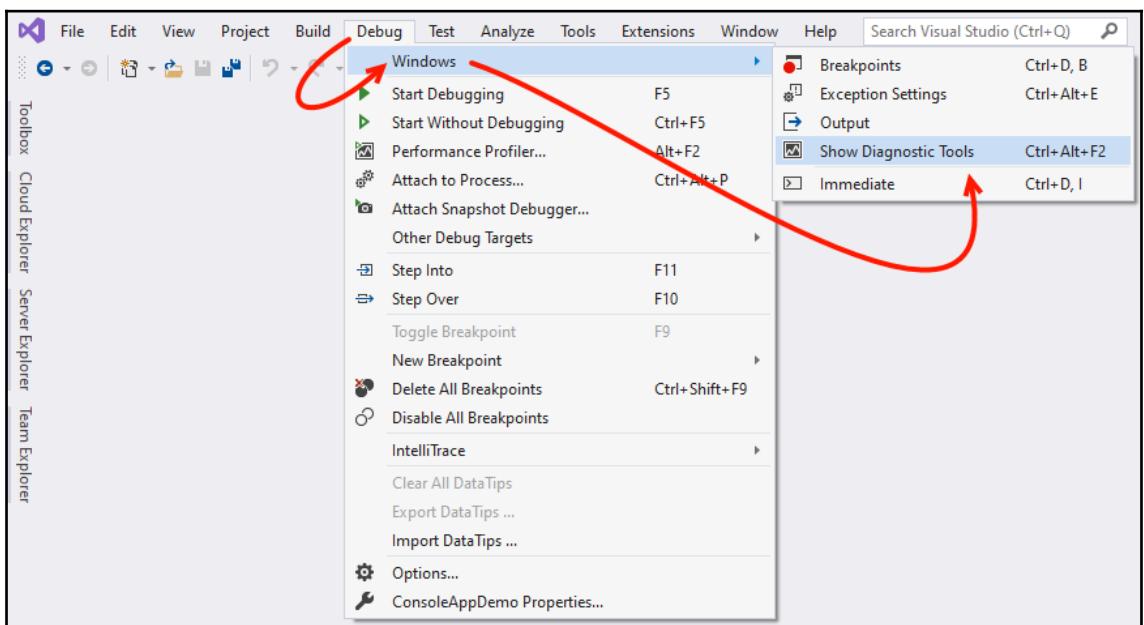


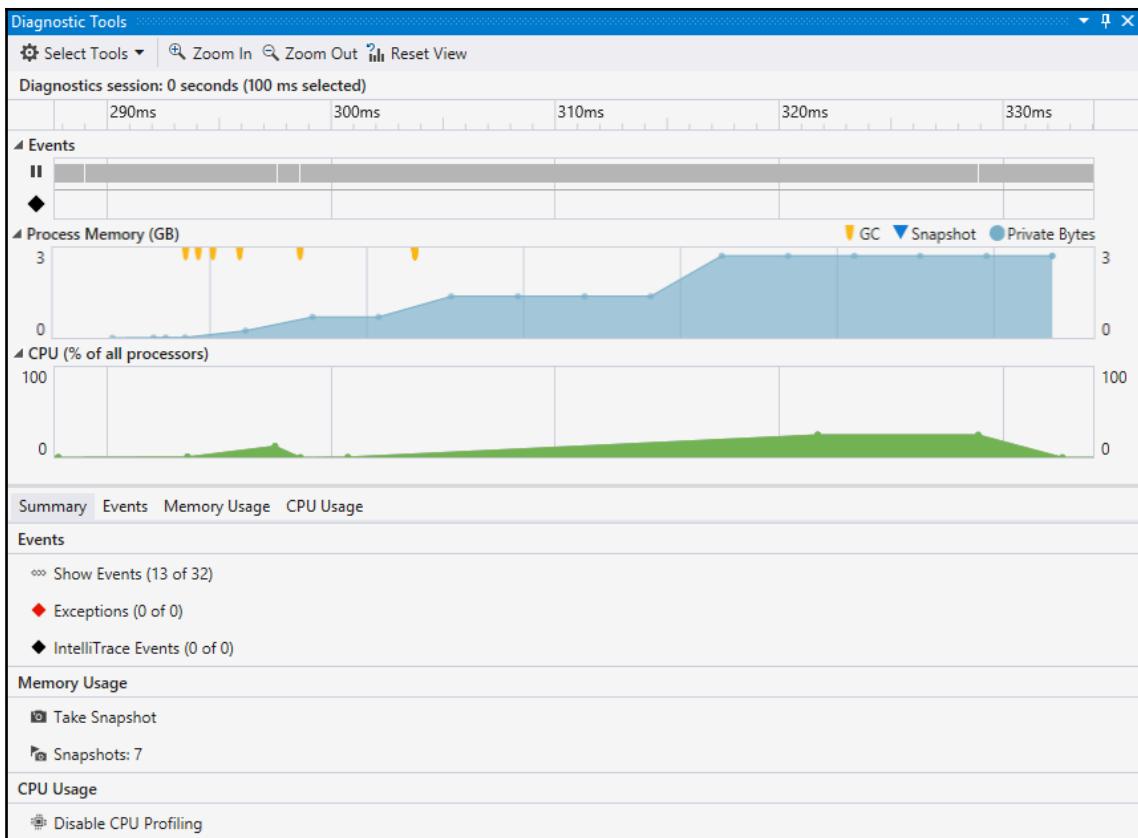
Immediate Window

```
employees;
Count = 4
[0]: {ConsoleAppDemo.Employee}
[1]: {ConsoleAppDemo.Employee}
[2]: {ConsoleAppDemo.Employee}
[3]: {ConsoleAppDemo.Employee}

employees; ← when debugger display is set
Count = 4
[0]: FirstName="Kunal", LastName="Chowdhury", Designation="Technical Lead"
[1]: FirstName="Rajat", LastName="Sharma", Designation="Software Developer"
[2]: FirstName="Suresh", LastName="Yadav", Designation="Software Developer"
[3]: FirstName="Rahul", LastName="Pradhan", Designation="Test Engineer"

employees[0].FirstName + " " + employees[0].LastName;
"Kunal Chowdhury"
```





Summary Events Memory Usage CPU Usage

Filter

Event	Time	Duration	Thread
Breakpoint: PrintSum, Program.cs line 110	0.25s	1ms	[388] Main Thread
Step: PrintSum, Program.cs line 113	0.27s	14ms	[388] Main Thread
Step: Main, Program.cs line 13	0.27s	1ms	[388] Main Thread
Step: Main, Program.cs line 16	0.27s	1ms	[388] Main Thread
Step: Main, Program.cs line 17	0.27s	7ms	[388] Main Thread
Step: Main, Program.cs line 32	0.28s	4ms	[388] Main Thread
Step: Main, Program.cs line 34	0.28s	3ms	[388] Main Thread
Step: Main, Program.cs line 37	0.28s	5ms	[388] Main Thread
Step: Main, Program.cs line 38	0.29s	9ms	[388] Main Thread
Step: Main, Program.cs line 39	0.29s	1ms	[388] Main Thread
Step: Main, Program.cs line 42	0.32s	31ms	[388] Main Thread
Step: Main, Program.cs line 43	0.35s	25ms	[388] Main Thread
Step: Main, Program.cs line 45	0.35s	3ms	[388] Main Thread

Summary Events Memory Usage CPU Usage

Take Snapshot View Heap Delete

	Time	Objects (Diff)	Heap Size (Diff)	
1	0.24s	250 (n/a)	49.19 KB (n/a)	
3	0.25s	278 (+28 ↑ )	50.38 KB (+1.20 KB ↑ )	
4	0.25s	280 (+2 ↑ )	50.45 KB (+0.06 KB ↑ )	
5	0.25s	281 (+1 ↑ )	50.49 KB (+0.05 KB ↑ )	
6	0.27s	342 (+61 ↑ )	54.30 KB (+3.81 KB ↑ )	
7	0.32s	390 (+48 ↑ )	57.36 KB (+3.05 KB ↑ )	
» 8	0.35s	403 (+13 ↑ )	124.59 KB (+67.23 KB ↑ )	
» 9	0.35s	403 (+0)	124.59 KB (+0.00 KB)	

Snapshot #1 Heap dotnet.exe (1.72s) X

Managed Memory (dotnet.exe) Compare to: Select baseline ▾ Search type names

Object Type	Count	Size (Bytes)	Inclusive Size (Bytes)
AppDomain	1	19,896	21,088
OutOfMemoryException	2	6,064	6,064
CultureData	2	2,728	2,728
StreamWriter	1	1,464	1,720
NumberFormatInfo	1	1,056	1,056
CalendarData	1	960	960
Dictionary<String, Object>	2	536	536
AppDomainSetup	1	512	728
RuntimeType	10	480	480
ThreadAbortException	2	304	304
CultureInfo	2	304	1,976
Dictionary<String, CultureData>	1	280	304
Exception	1	152	152
StackOverflowException	1	152	152
ExecutionEngineException	1	152	152
StringBuilder	1	144	144
EncoderReplacementFallback	4	128	128
DecoderReplacementFallback	4	128	128
CompareInfo	2	112	112
UnicodeEncoding	2	112	240
UTF8Encoding	2	96	224
TextInfo	1	88	88

Paths to Root | Referenced Types

Object Type	Reference Count
OutOfMemoryException [Strong Handle]	2

Summary	Events	Memory Usage	CPU Usage
CPU Profiling		Filter	
Function Name	Total CPU [ms, %]		
dotnet.exe (PID: 4940)		86 (100.00 %)	
ConsoleAppDemo.Program::Main		85 (98.84 %)	
ConsoleAppDemo.Math::PrintSum		12 (13.95 %)	

Current View: Call Tree

Function Name	Total CPU [ms, %]	Self CPU [ms, %]	Module
dotnet.exe (PID: 9864)	238 (100.00 %)	0 (0.00 %)	dotnet.exe
[External Code]	238 (100.00 %)	67 (28.15 %)	Multiple modules
ConsoleAppDemo.Program::Main	171 (71.85 %)	0 (0.00 %)	ConsoleAppDemo.dll
[External Code]	166 (69.75 %)	166 (69.75 %)	Multiple modules
ConsoleAppDemo.Math::PrintSum	5 (2.10 %)	0 (0.00 %)	ConsoleAppDemo.dll
[External Code]	5 (2.10 %)	5 (2.10 %)	Multiple modules

# Chapter 8: Live Unit Testing with Visual Studio 2019

The screenshot shows a code editor window with the following code:

```
2 references
public class Math
{
    3 references | ✘ 1/2 passing
    public int Divide(int val1, int val2)
    {
        ✘ if (val2 == 0) { throw new ArgumentException(); }

        ✓ return val1 / val2;
    }
}
```

On the left, there are two reference nodes. The first node has a red 'X' icon and the text '3 references | ✘ 1/2 passing'. The second node has a green checkmark icon and the text 'return val1 / val2;'. This indicates that the test for the Divide method failed because it did not throw an exception when val2 was 0, while the return statement was correct.

The screenshot shows the Visual Studio interface with the following details:

- Test Explorer:** Shows a tree view of failed tests. Under 'TestClassLibrary (5)', there are five test cases:
  - TestAssigningOneObjectToAnotherReferencesSameObject (150 ms)
  - TestCloningOneObjectReturnsDifferentInstance (150 ms)
  - TestCloningPopulatesThePropertiesProperly (150 ms)
  - TestMethod1 (150 ms)
  - TestTwoInstanceOfPersonInstancesAreNotEqual (13 ms)
- Source Code:** A code editor window titled 'UnitTest1.cs' shows the implementation of the failing test methods.

```
12 var person1 = new Person();
13 var person2 = new Person();

14 var status = person1 == person2;

15 Assert.IsFalse(status);

16 [TestMethod]
17 [TestCategory("Live Unit Testing")]
18 public void TestAssigningOneObjectToAnotherReferencesSameObject()
19 {
20     var person1 = new Person();
21     var person2 = person1;

22     var status = person1 == person2;

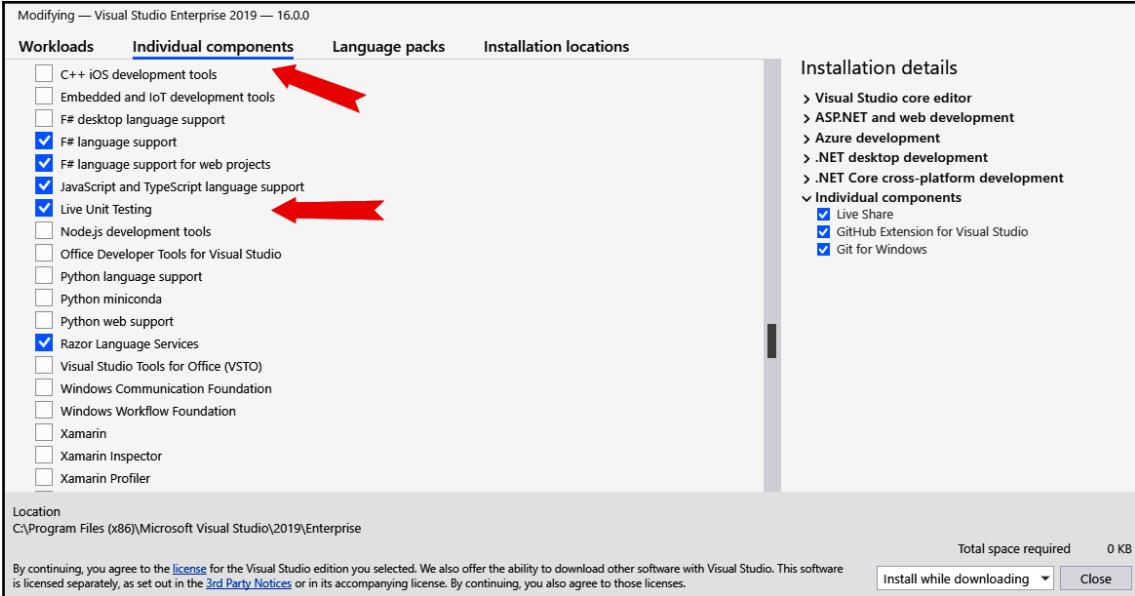
23     Assert.IsTrue(status);
24 }

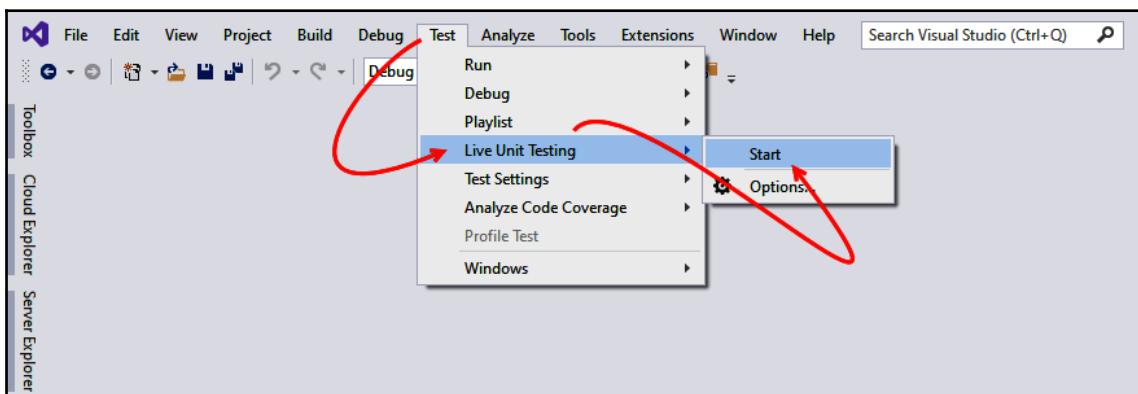
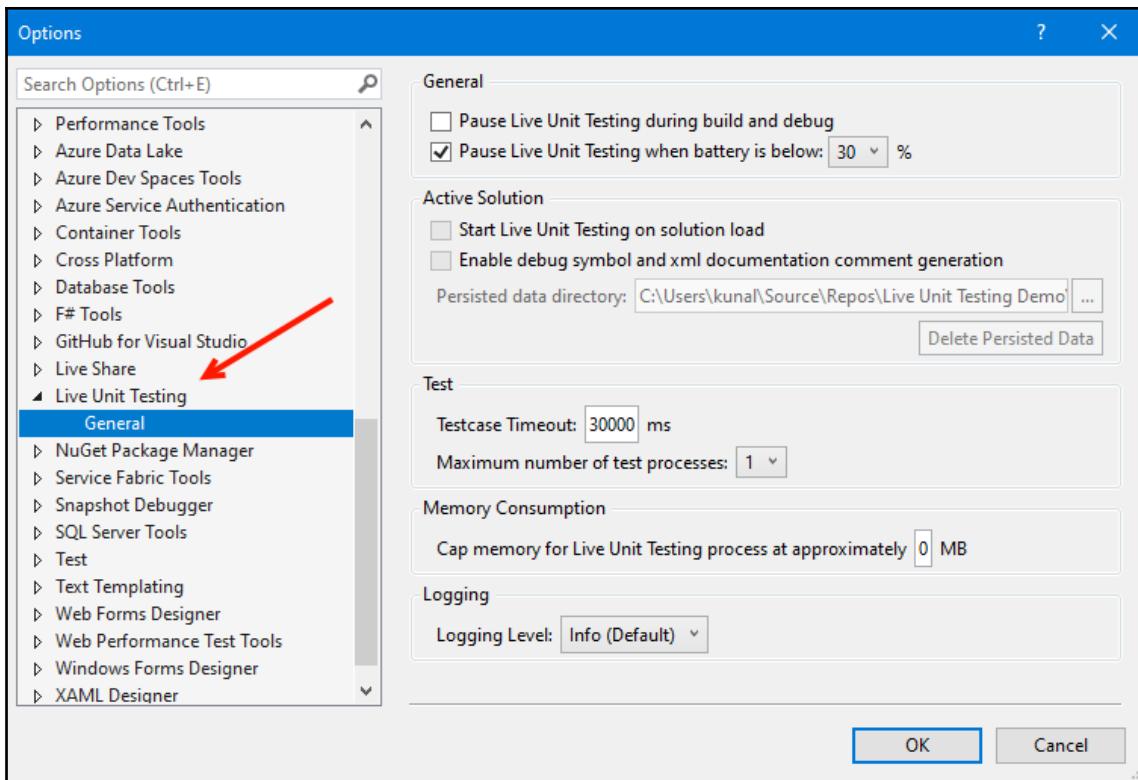
25 [TestMethod]
26 [TestCategory("Live Unit Testing")]
27 public void TestCloningOneObjectReturnsDifferentInstance()
28 {
29     var person1 = new Person();
30     var person2 = (Person)person1.Clone();

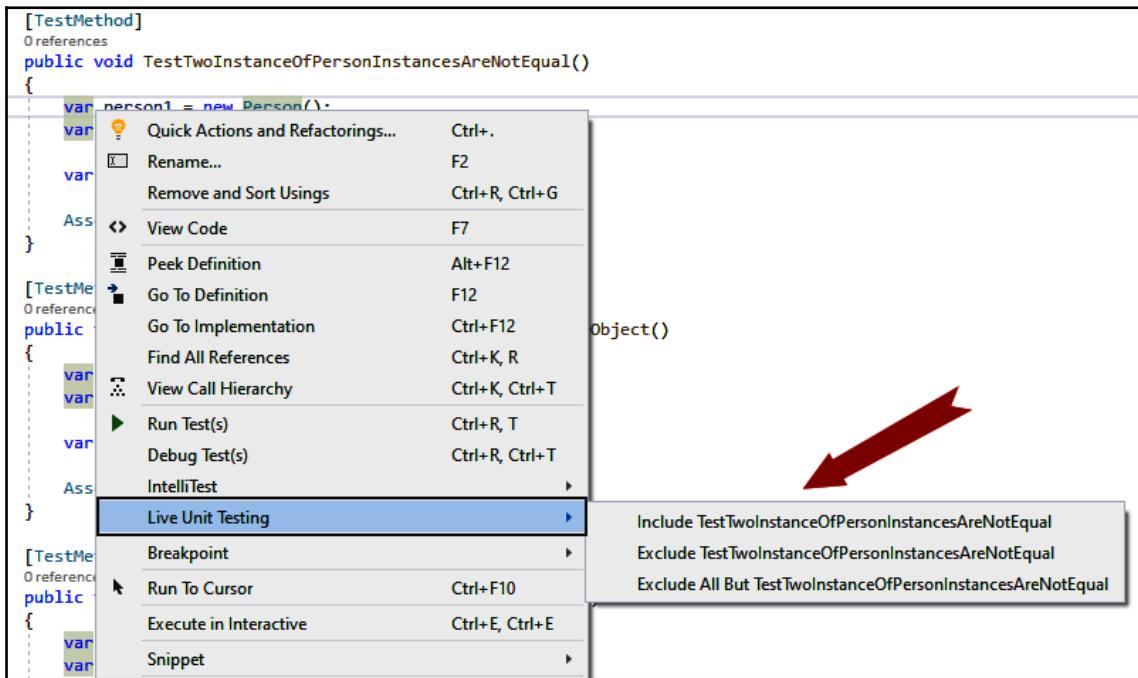
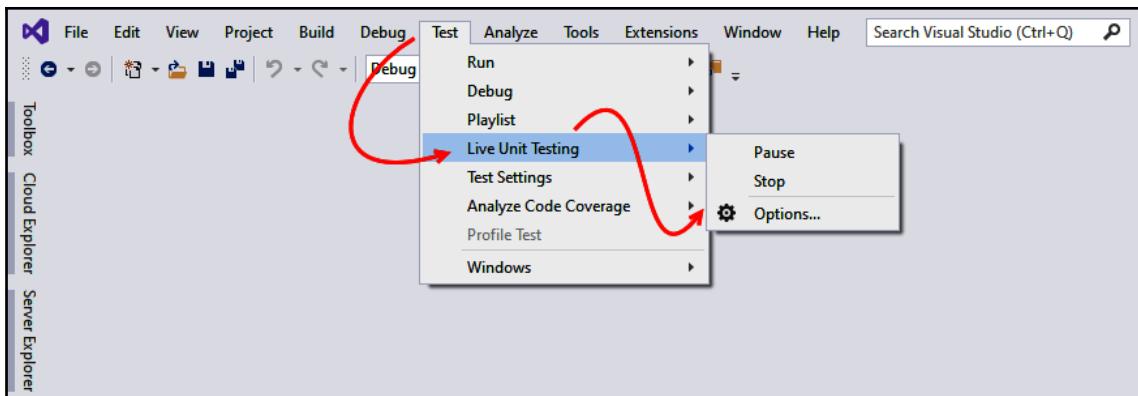
31     var status = person1 == person2;

32     Assert.IsFalse(status);
33 }

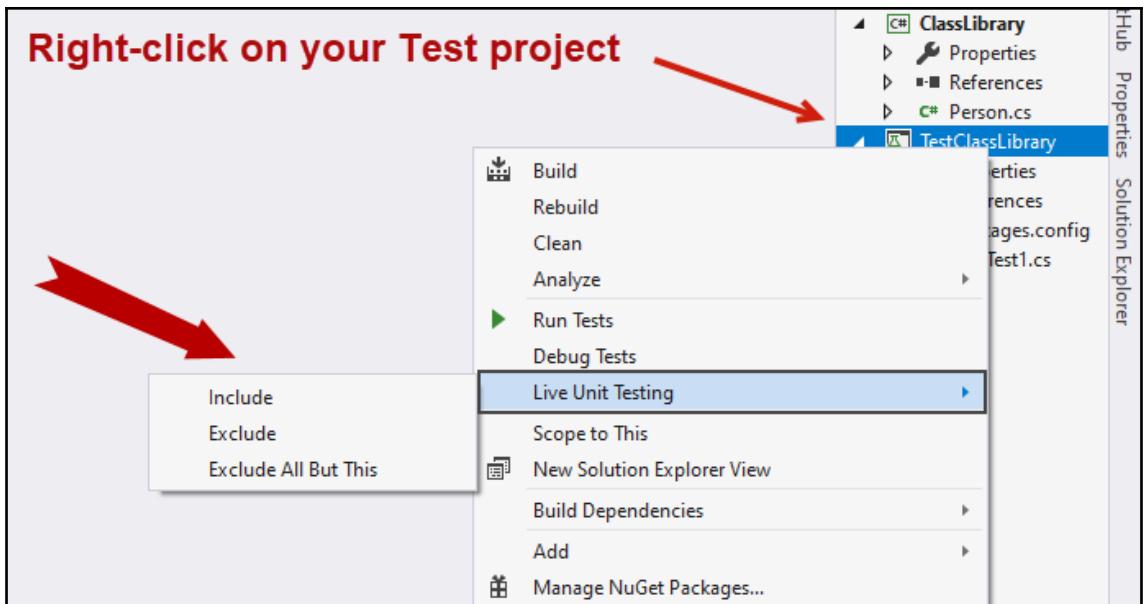
34 [TestMethod]
35 [TestCategory("Live Unit Testing")]
36 public void TestCloningPopulatesThePropertiesProperly()
37 {
38     var person1 = new Person();
39 }
```
- Status Bar:** Shows 'Ln 5 Col 22 Ch 22 INS' and 'Ready'.
- Bottom Navigation:** Includes 'Error List', 'Web Publish Activity', 'Output', 'Add to Source Control', and other standard Visual Studio icons.

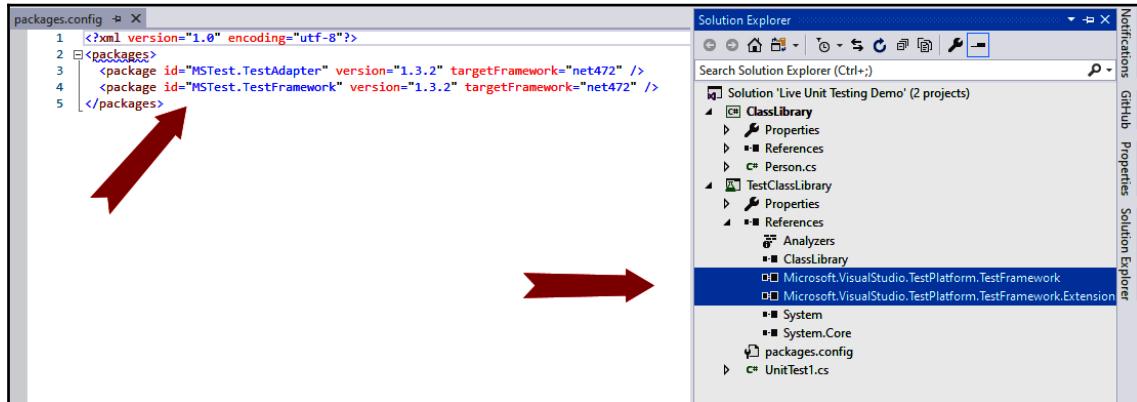
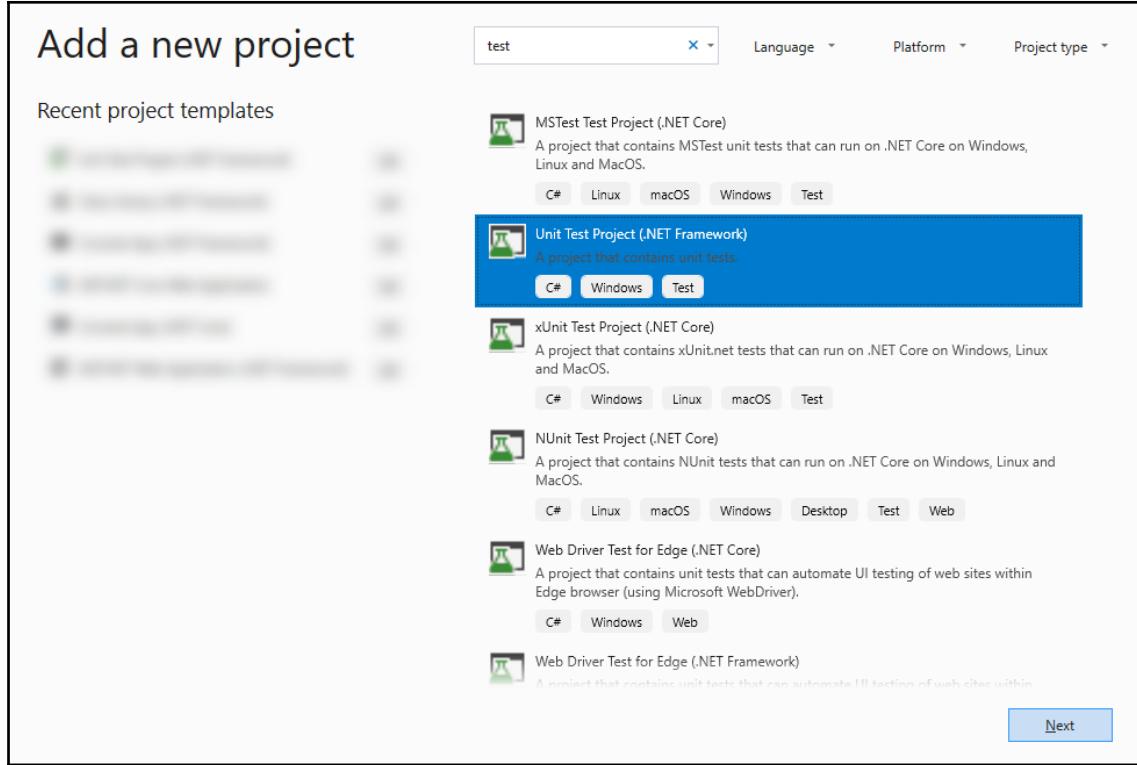






**Right-click on your Test project**





```
6      [TestClass]  
7      0 references  
8      public class UnitTest1  
9      {  
10     [TestMethod]  
11     0 references  
12     public void TestTwoInstancesOfPersonInstancesAreNotEqual()  
13     {  
14         var person1 = new Person();  
15         var person2 = new Person();  
16  
17         var status = person1 == person2;  
18  
19         Assert.IsFalse(status);  
20     }  
21     [TestMethod]  
22     0 references  
23     public void TestAssigningOneObjectToAnotherReferencesSameObject()  
24     {  
25         var person1 = new Person();  
26         var person2 = person1;  
27  
28         var status = person1 == person2;  
29  
29         Assert.IsTrue(status);  
30     }
```

```
30
31 [TestMethod]
32     | 0 references
33     public void TestCloningOneObjectReturnsDifferentInstance()
34     {
35         var person1 = new Person();
36         var person2 = (Person)person1.Clone();
37
38         var status = person1 == person2;
39
40         Assert.IsFalse(status);
41     }
42
43 [TestMethod]
44     | 0 references
45     public void TestCloningPopulatesThePropertiesProperly()
46     {
47         var person1 = new Person();
48         var person2 = (Person)person1.Clone();
49
50         var status = person1 == person2;
51
52         Assert.IsFalse(status);
53         Assert.AreEqual(person1.ID, person2.ID);
54         Assert.AreEqual(person1.Name, person2.Name);
55         Assert.AreEqual(person1.Address, person2.Address);
56     }
```

Exception at this line

7 references

```
public class Person : ICloneable
{
    2 references | ✘ 0/1 passing
    public string ID { get; set; }

    2 references | ✘ 0/1 passing
    public string Name { get; set; }

    2 references | ✘ 0/1 passing
    public string Address { get; set; }

    2 references | ✘ 0/2 passing
    public object Clone()
    {
        throw new NotImplementedException();
    }
}
```

7 references

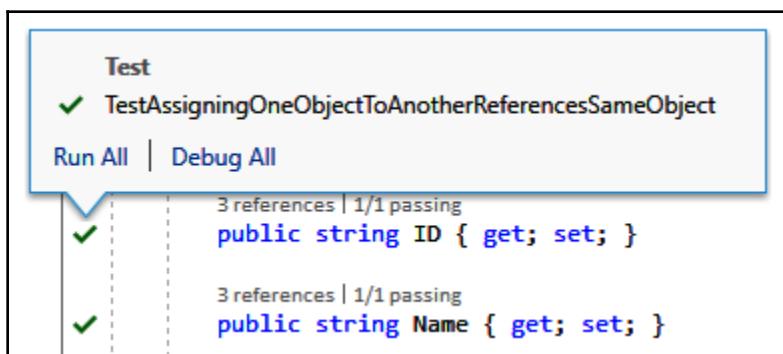
```
public class Person : ICloneable
{
    ✓ 2 references | 1/1 passing
        public string ID { get; set; }

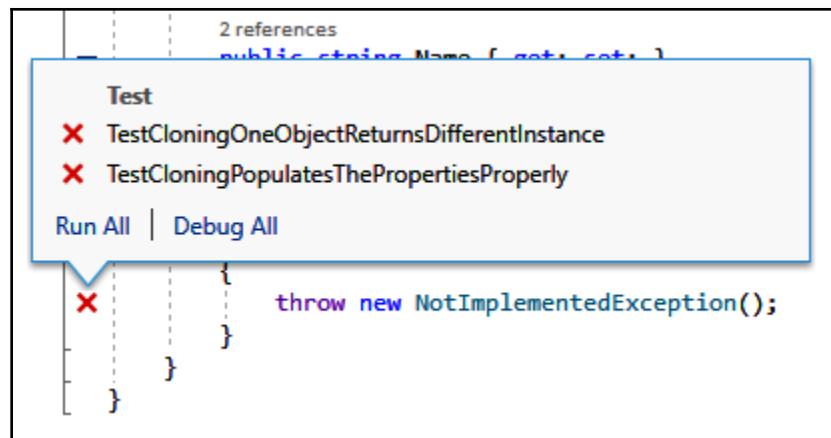
    ✓ 2 references | 1/1 passing
        public string Name { get; set; }

    ✓ 2 references | 1/1 passing
        public string Address { get; set; }

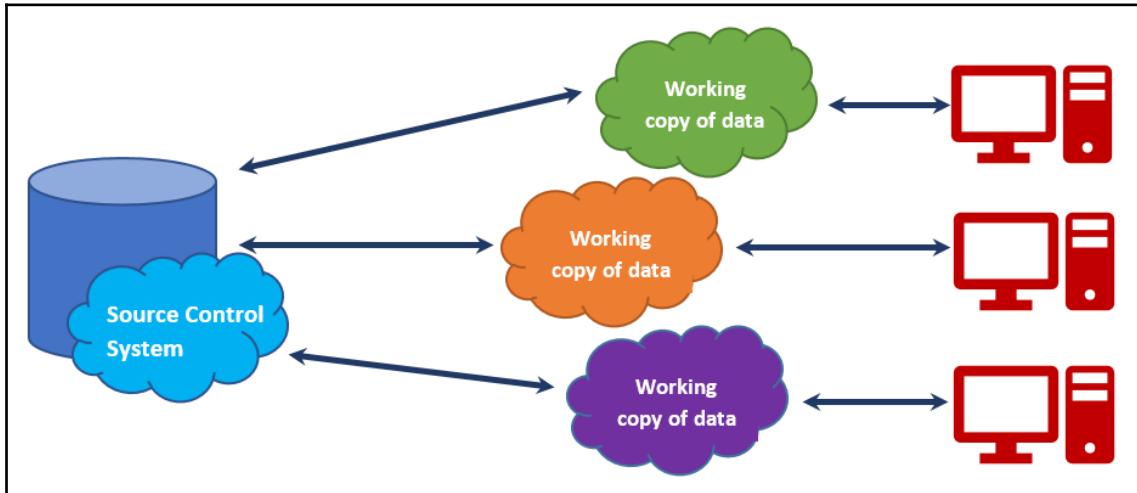
    ✓ 2 references | 2/2 passing
        public object Clone()
    {
        ✓ return MemberwiseClone();
    }
}
```

```
31 [TestMethod]
32     public void TestCloningOneObjectReturnsDifferentInstance()
33     {
34         var person1 = new Person();
35         var person2 = (Person)person1.Clone();
36
37         var status = person1 == person2;
38
39         Assert.IsFalse(status);
40     }
41
42 [TestMethod]
43     public void TestCloningPopulatesThePropertiesProperly()
44     {
45         var person1 = new Person();
46         var person2 = (Person)person1.Clone();
47
48         var status = person1 == person2;
49
50         Assert.IsFalse(status);
51         Assert.AreEqual(person1.ID, person2.ID);
52         Assert.AreEqual(person1.Name, person2.Name);
53         Assert.AreEqual(person1.Address, person2.Address);
54     }
}
```





# Chapter 9: Exploring Source Controls in Visual Studio 2019



Modifying — Visual Studio Enterprise 2019 — 16.0.0

**Workloads**   **Individual components**   Language packs   Installation locations

**Code tools**

- Azure DevOps Office Integration
- Class Designer
- ClickOnce Publishing
- Code Clone
- Code Map
- Developer Analytics tools
- DGML editor
- Git for Windows
- GitHub extension for Visual Studio
- Help Viewer
- LINQ to SQL tools
- Live Dependency Validation
- NuGet package manager
- NuGet targets and build tasks
- PreEmptive Protection - Dotfuscator
- Text Template Transformation

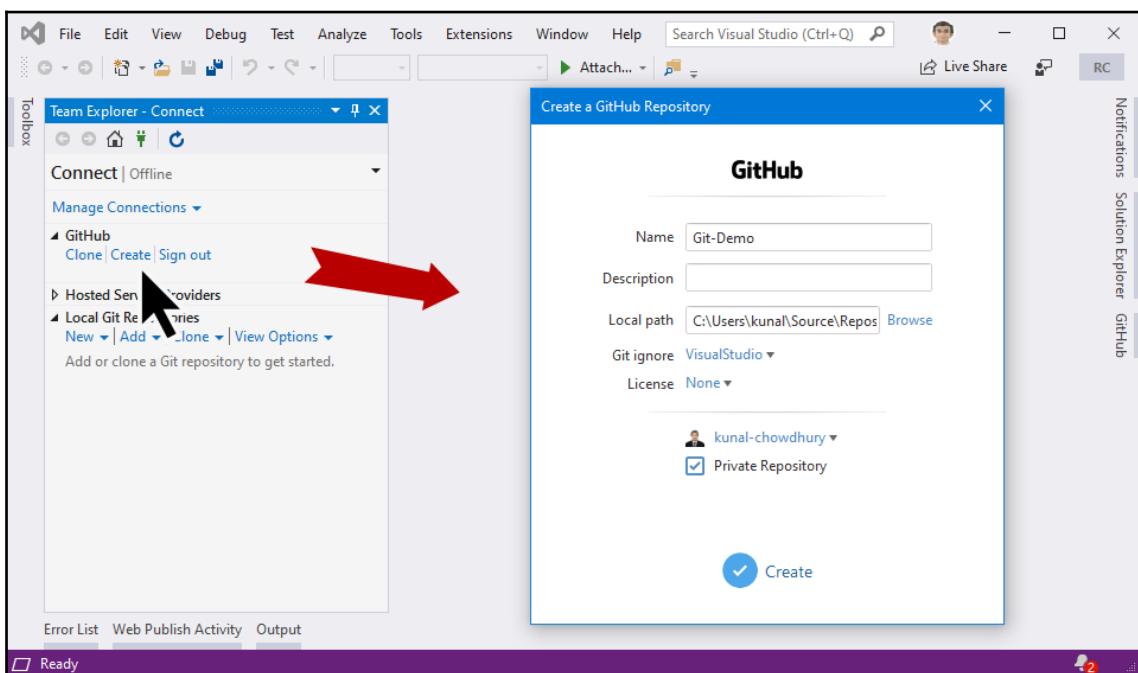
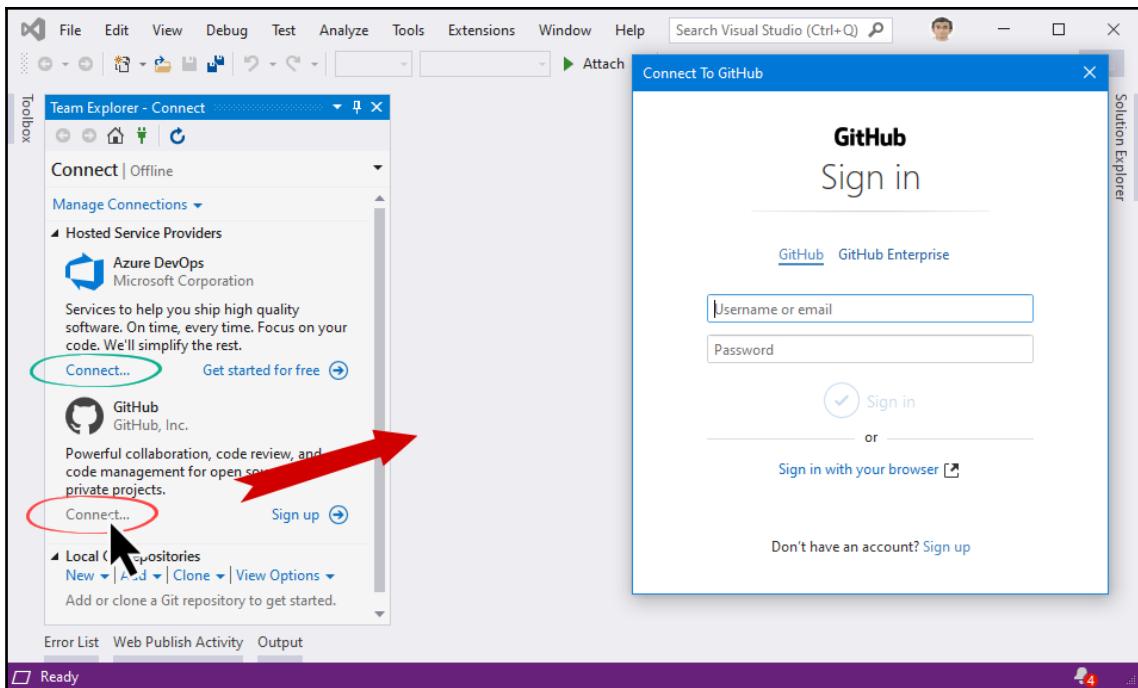
**Compilers, build tools, and runtimes**

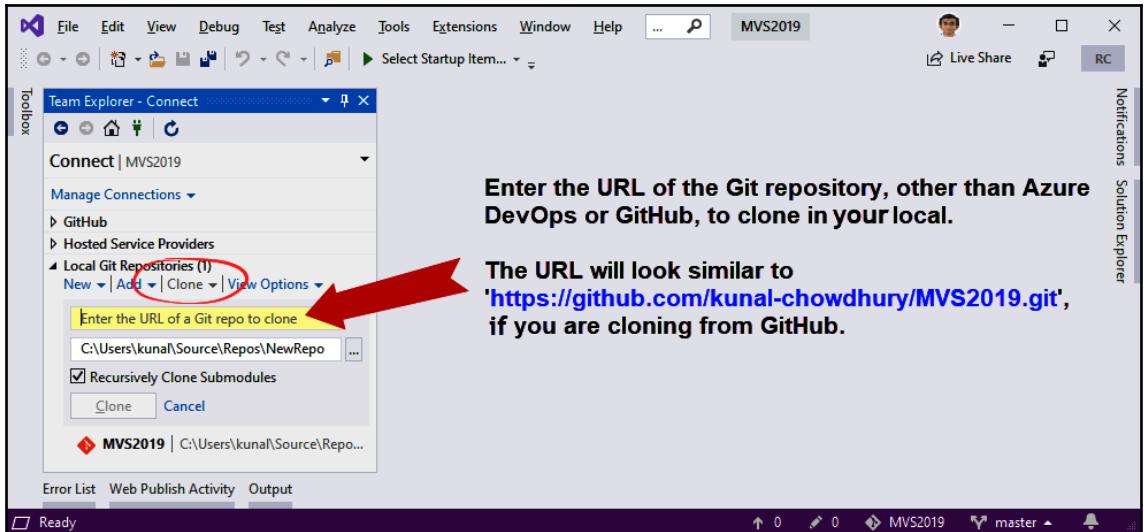
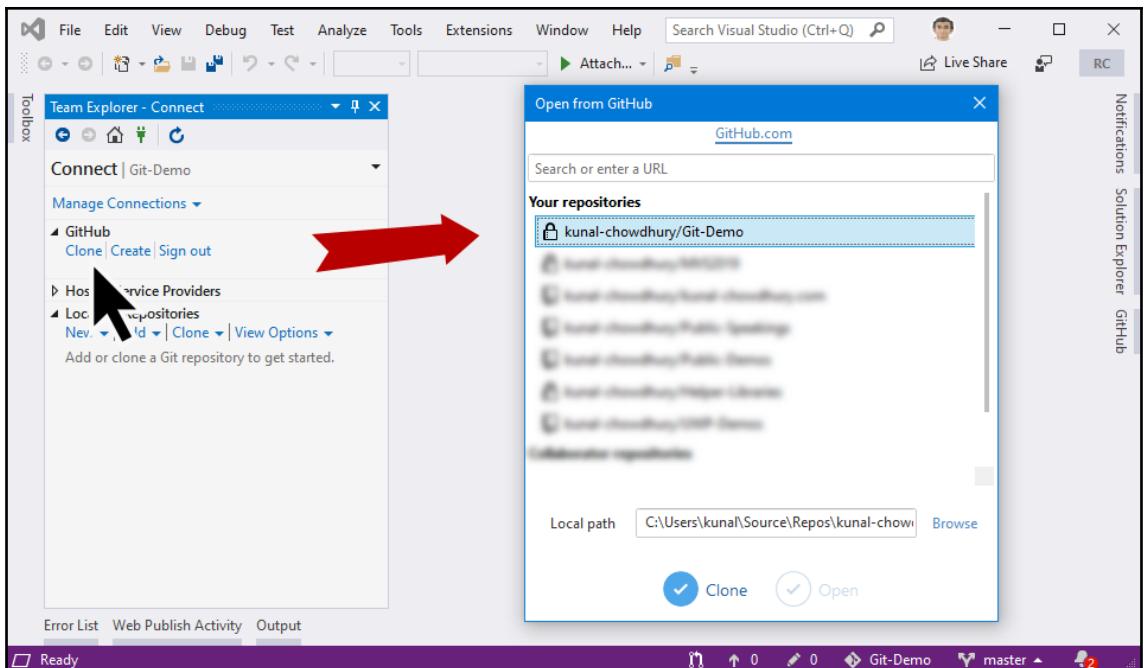
**Location**  
C:\Program Files (x86)\Microsoft Visual Studio\2019\Enterprise

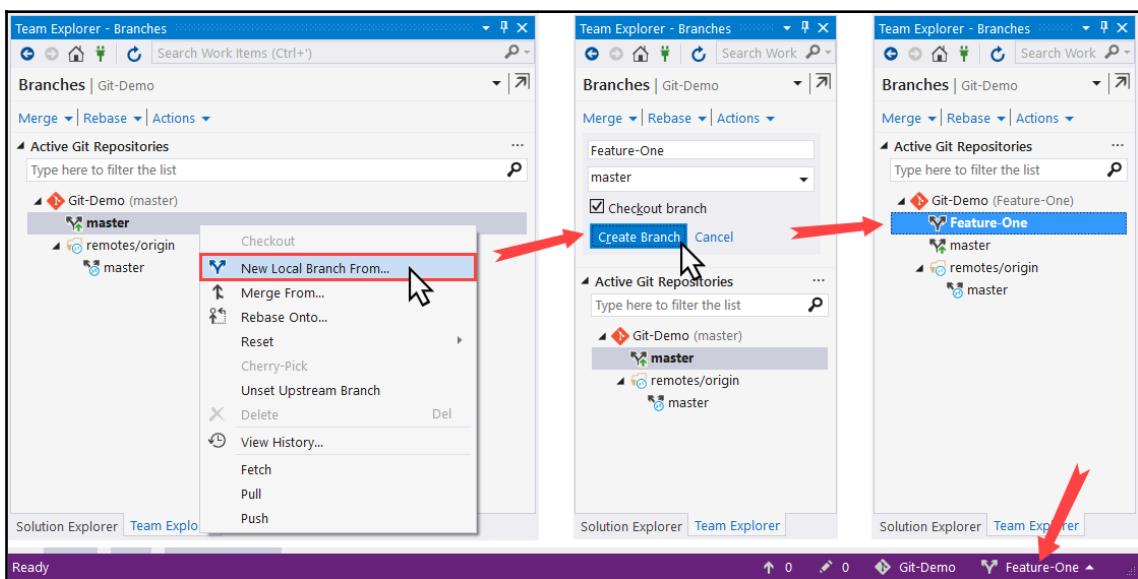
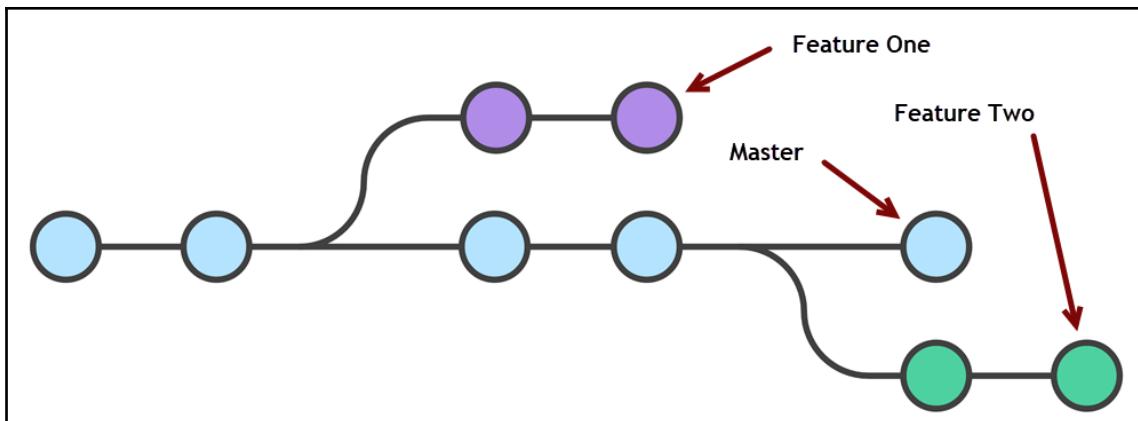
Total space required 322 MB

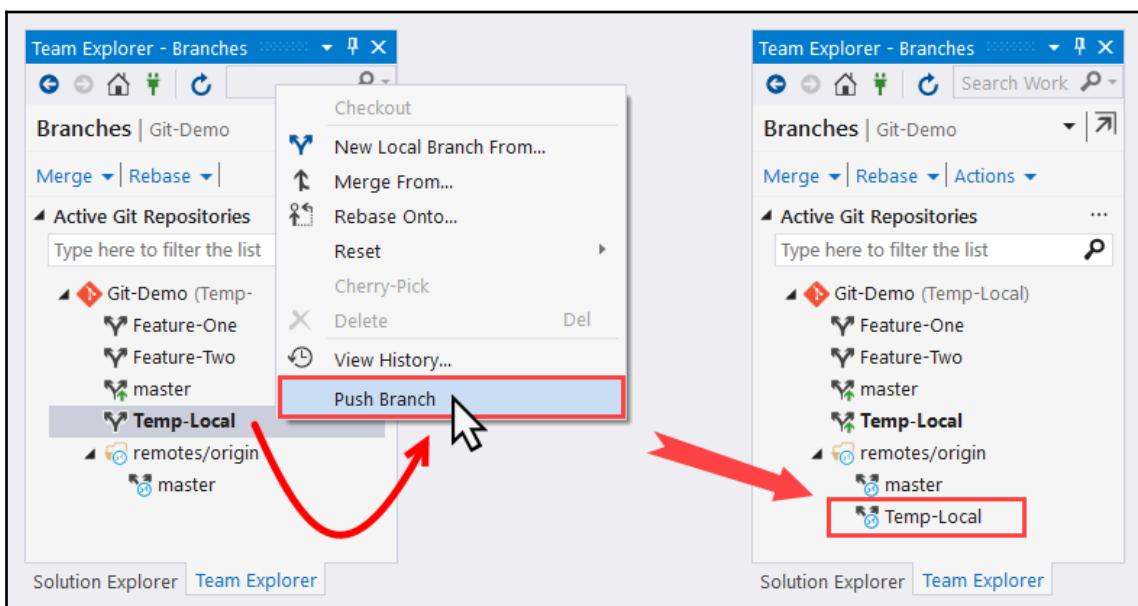
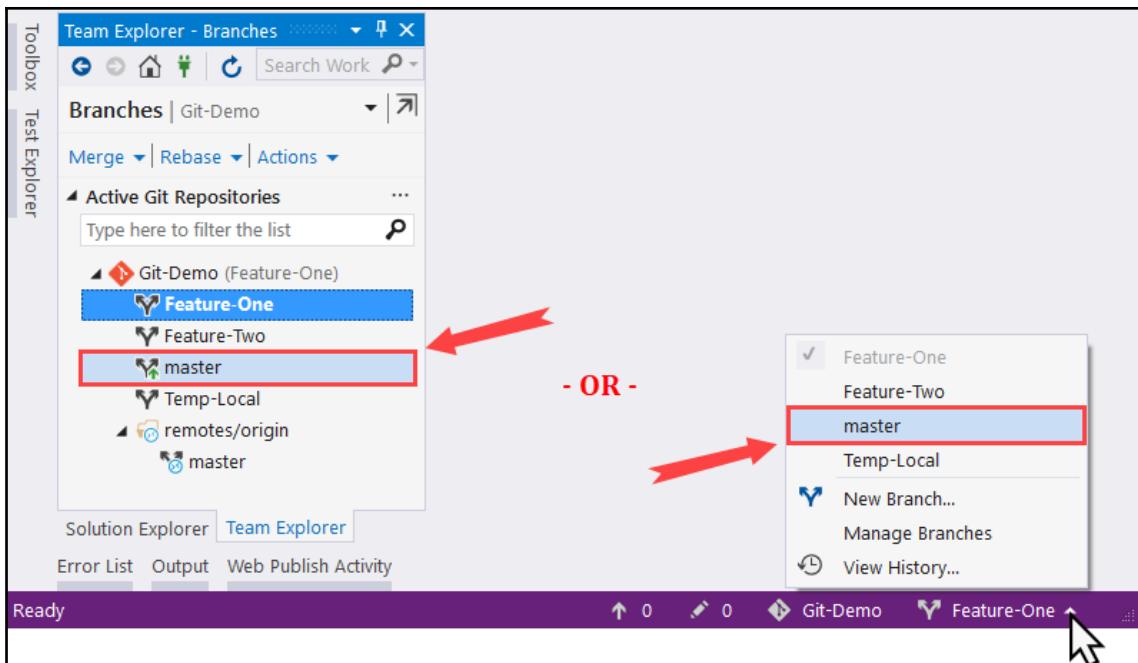
By continuing, you agree to the [license](#) for the Visual Studio edition you selected. We also offer the ability to download other software with Visual Studio. This software is licensed separately, as set out in the [3rd Party Notices](#) or in its accompanying license. By continuing, you also agree to those licenses.

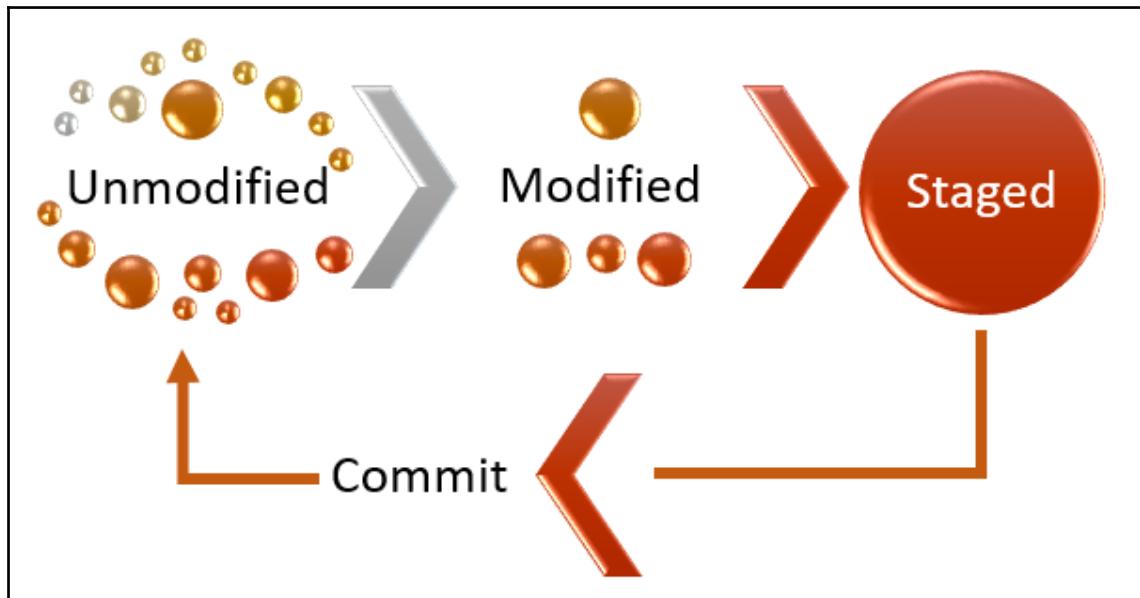
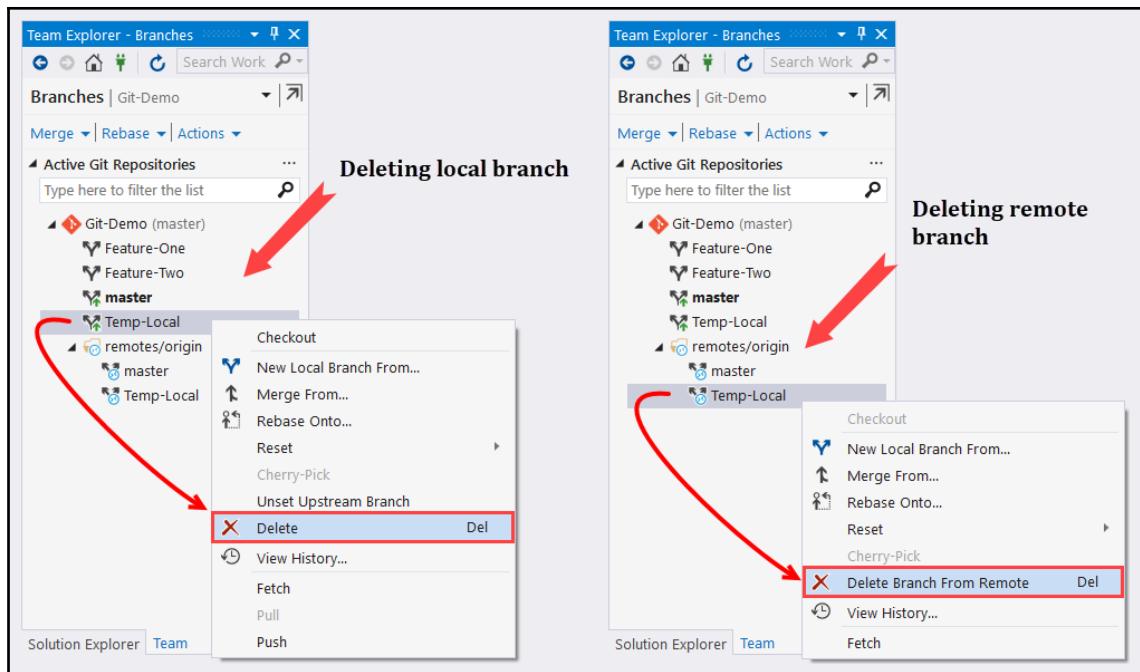
Install while downloading ▾   [Modify](#)

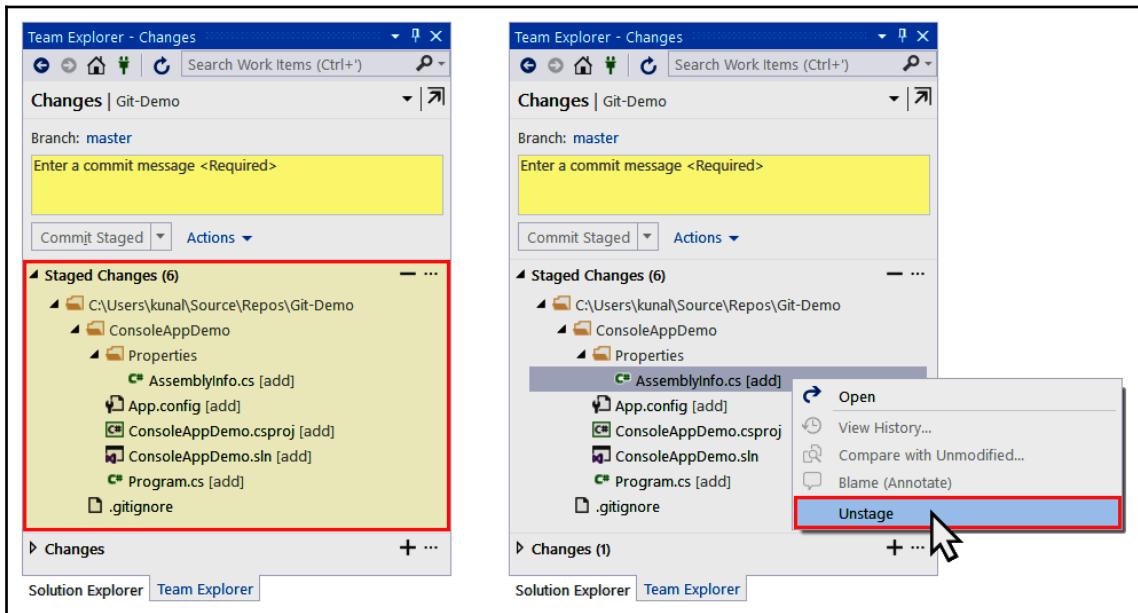
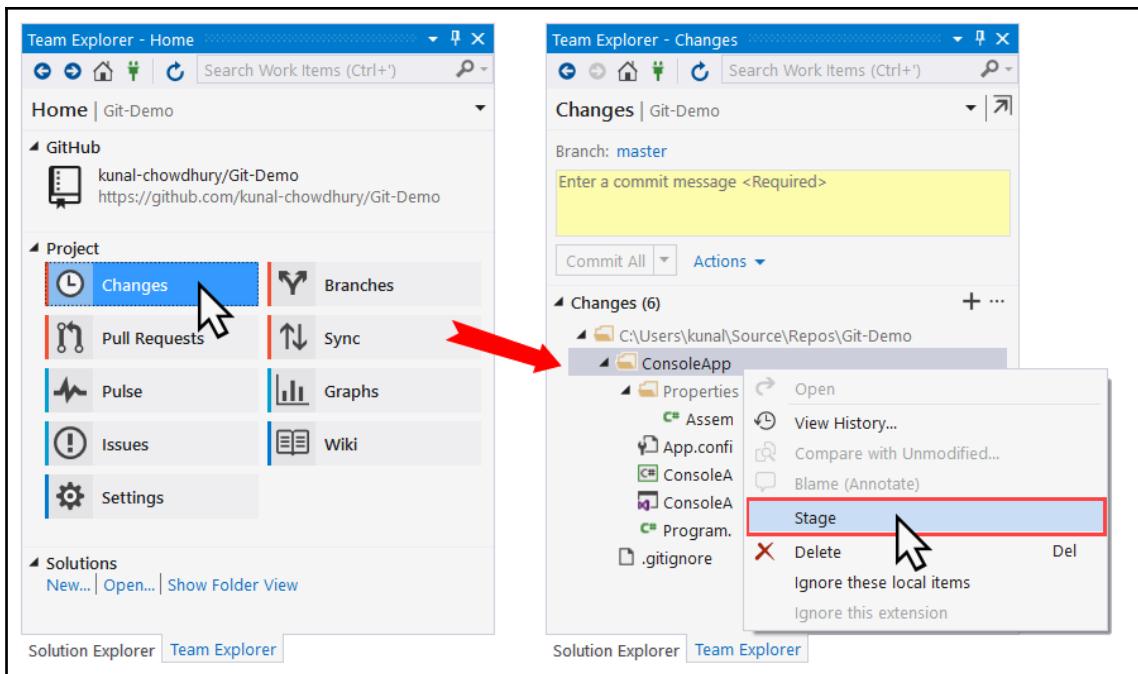


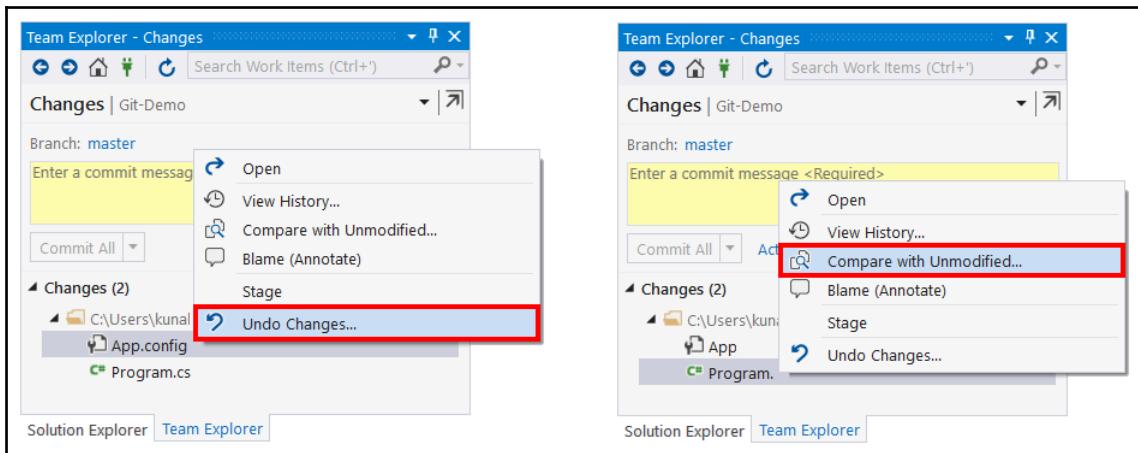
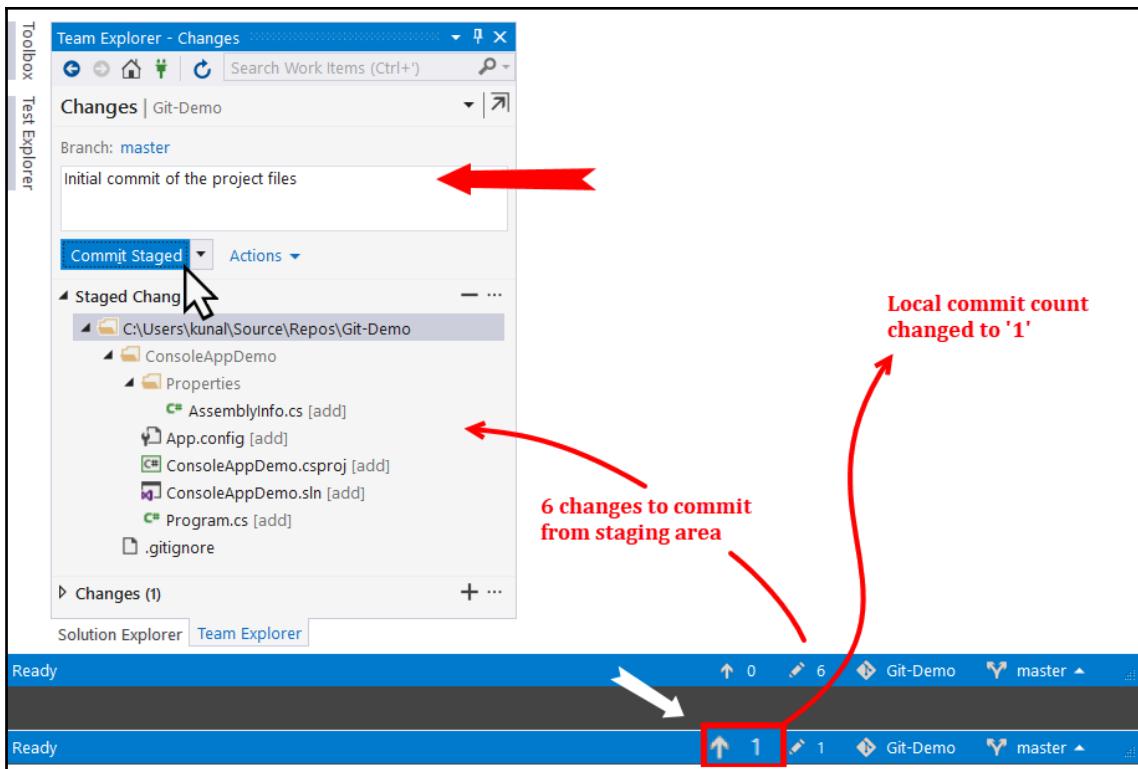












Diff - Program.cs:HEAD vs. Program.cs

Program.cs:HEAD

Miscellaneous Files ▾ ConsoleAppDemo. ▾ Main(string[] args) ▾

```
1 using System;
2 using System.Collections.Generic;
3 using System.Linq;
4 using System.Text;
5 using System.Threading.Tasks;
6
7 namespace ConsoleAppDemo
8 {
9     class Program
10    {
```

Program.cs

ConsoleAppDemo ▾ ConsoleAppDemo.Prc ▾ Main(string[] args) ▾

```
1
2 namespace ConsoleAppDemo
3 {
4     public class Program
5     {
```

125% ◀ ▶

Removed Added Help

Team Explorer - Commit Details

Commit Details | Git-Demo

Commit 51162719

Kunal Chowdhury  
29-May-17 10:36:07 PM

Parent: aeFCB859

Quick commit

Revert | Amend Message | Reset | Create Tag | Actions

Changes (1)

ConsoleAppDemo  
Program.cs

Team Explorer - Commit Details

Commit Details | Git-Demo

Commit 51162719

Kunal Chowdhury  
29-May-17 10:36:07 PM

Parent: aeFCB859

Implemented Feature D

Revert | Amend Message | Reset | Create Tag | Actions

Changes (1)

ConsoleAppDemo  
Program.cs

Team Explorer - Commit Details

Commit Details | Git-Demo

Commit 3cd9127

Kunal Chowdhury  
29-May-17 10:36:07 PM

Committed by:  
Kunal Chowdhury  
29-May-17 10:37:07 PM

Parent: aeFCB859

Implemented Feature D

Revert | Amend Message | Reset | Create Tag | Actions

Changes (1)

ConsoleAppDemo  
Program.cs

Team Explorer - Home

Home | Git-Demo

GitHub

kunal-chowdhury/Git-Demo  
https://github.com/kunal-chowdhury/Git-Demo

Project

Changes Branches

Pull Requests Sync

Pulse Graphs

Team Explorer - Synchronization

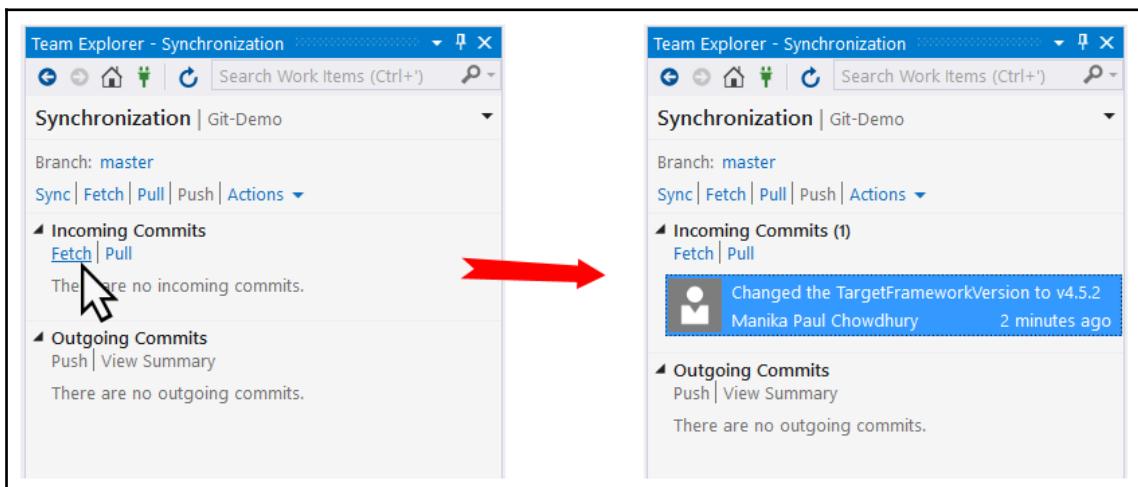
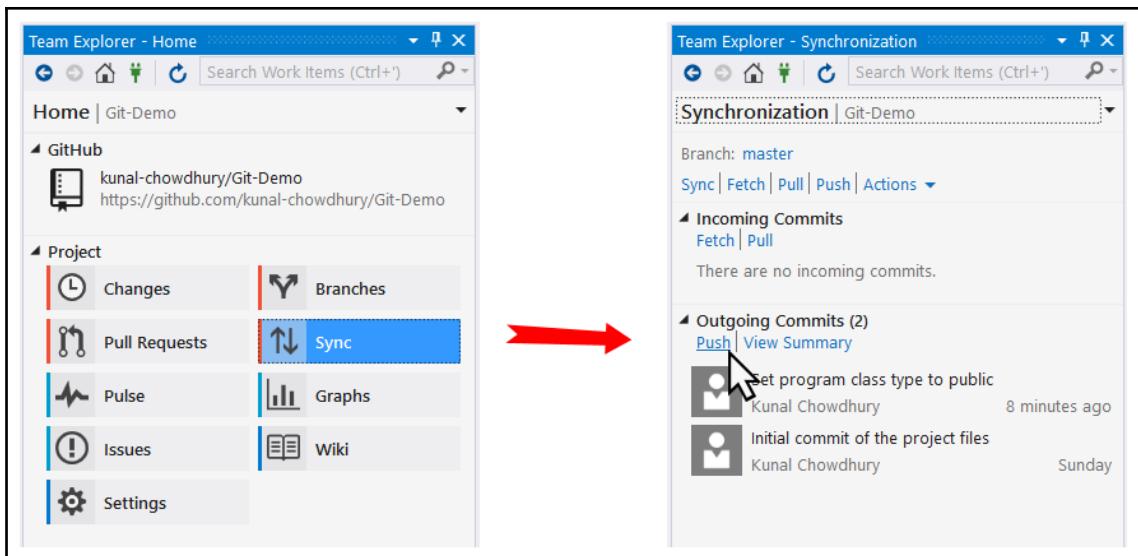
Synchronization | Git-Demo

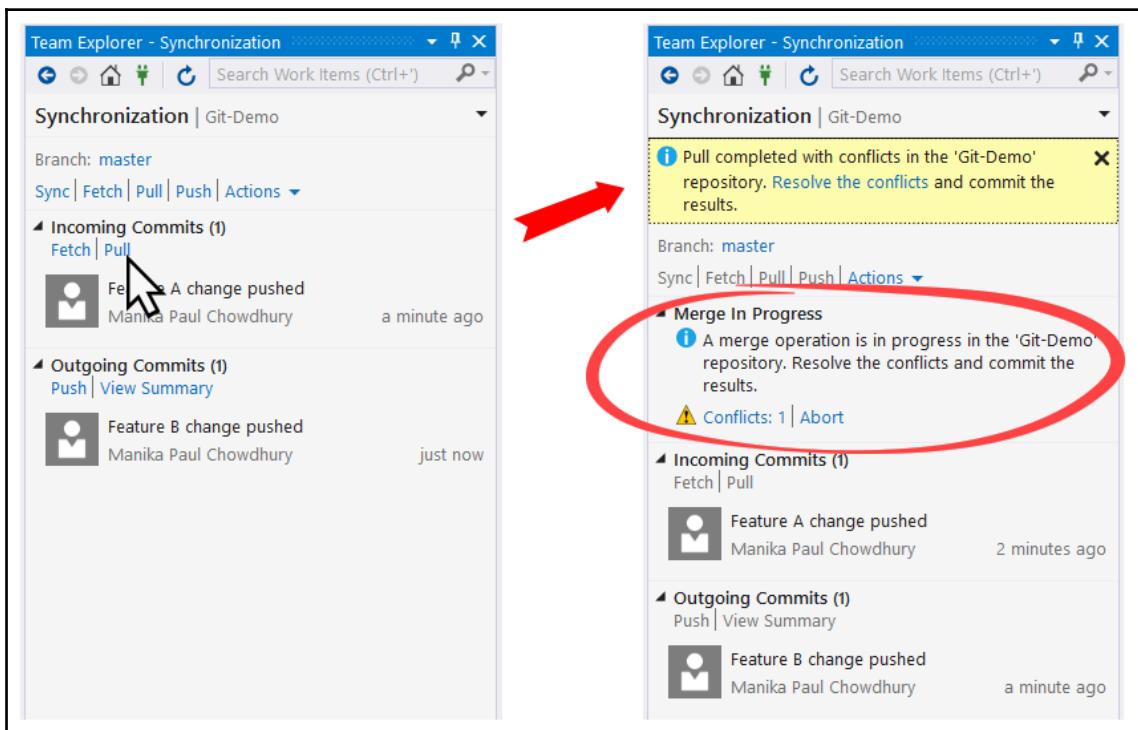
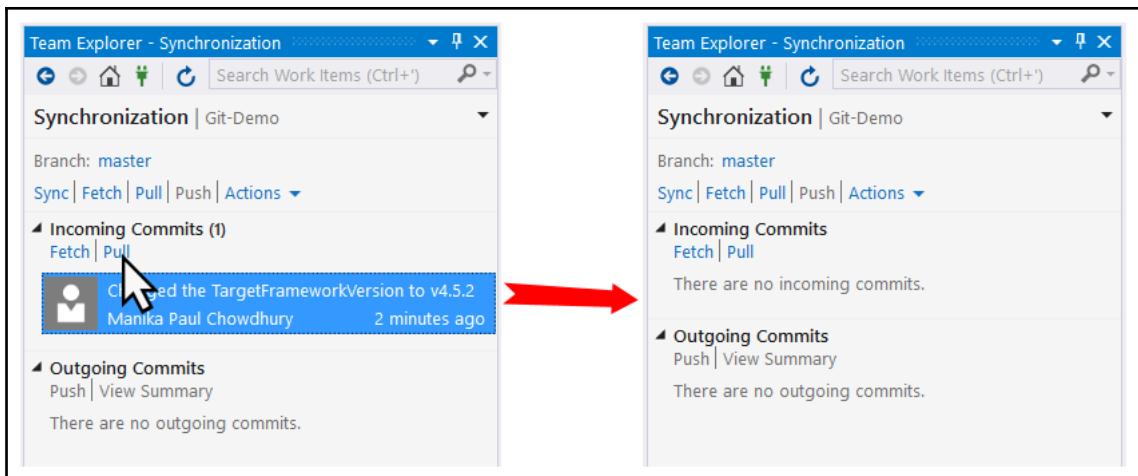
Branch: master

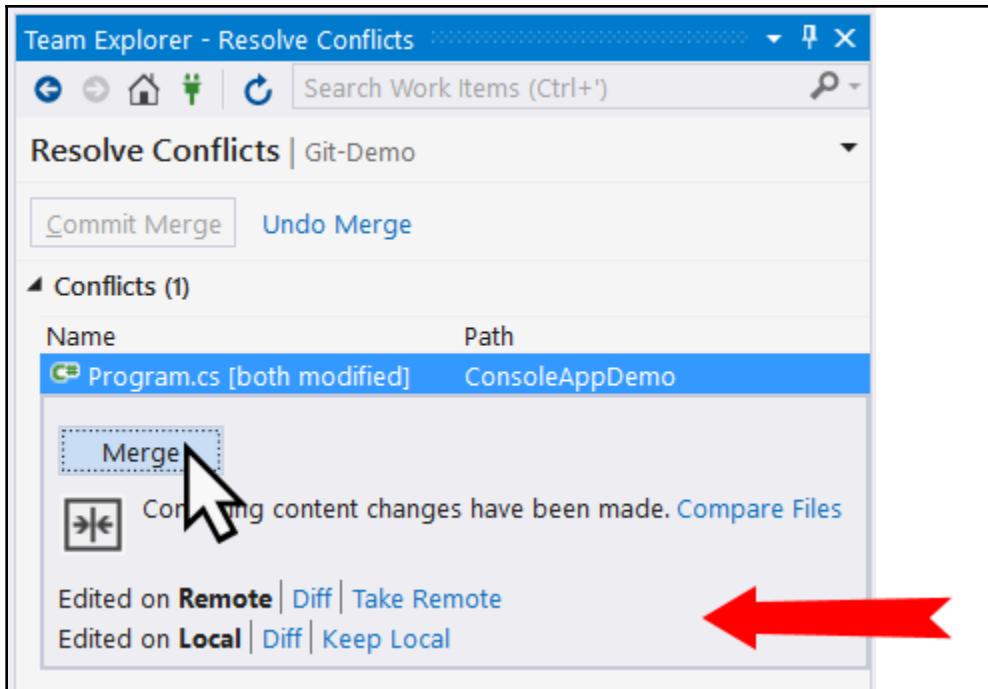
Sync | Fetch | Pull | Push | Actions

Incoming Commits

There are no incoming commits.







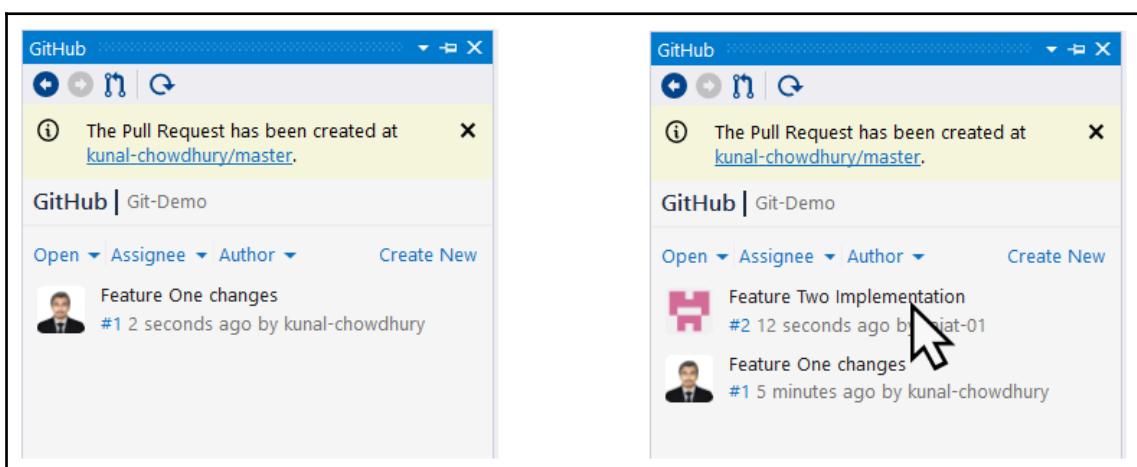
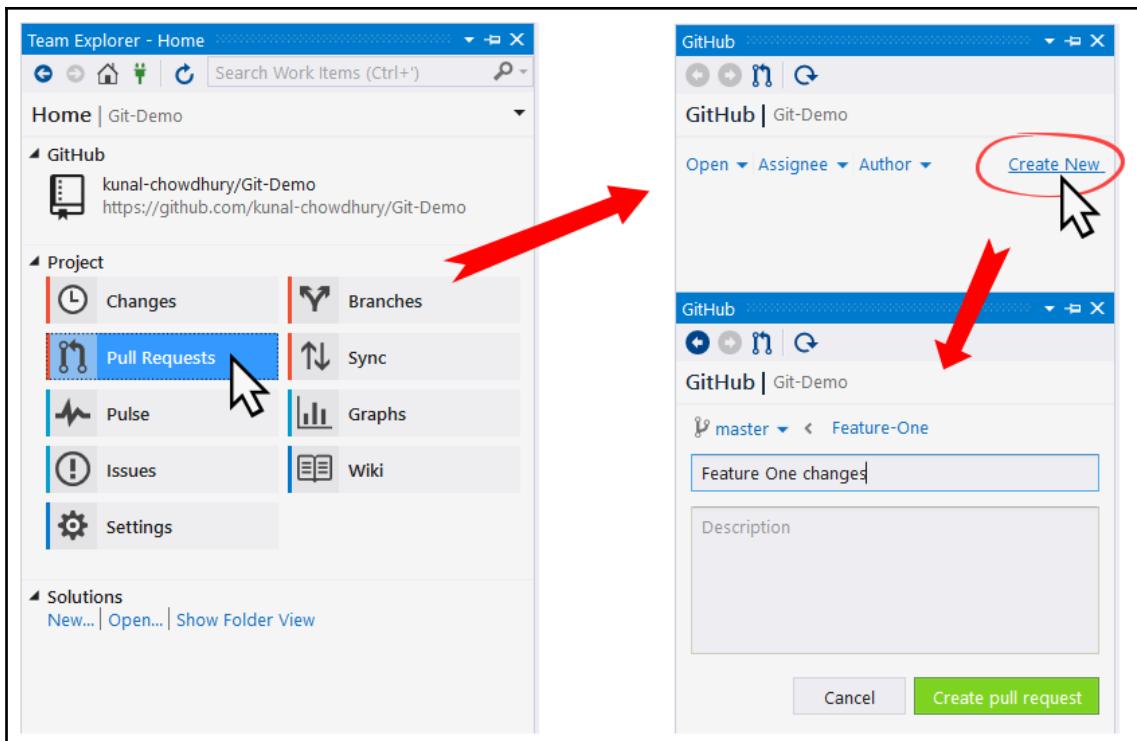
The screenshot shows a merge tool interface with three panes. The top pane displays the 'Source' file (Program.cs) with a conflict at line 8. The middle pane shows the 'Target' file (Program.cs) with a conflict at line 8. The bottom pane shows the 'Result' file (Program.cs), which contains both 'Feature A' and 'Feature B'. Red arrows point from the 'Accept Merge' button in the top-left to the 'Source' and 'Target' panes, indicating that accepting the merge will incorporate both changes.

```
Source: ConsoleAppDemo/Program.cs:Remote
1 Conflicts (0 Resolving)
Target: ConsoleAppDemo/Program.cs:Local
Result: ConsoleAppDemo/Program.cs
```

```
public class Program
{
    static void Main(string[] args)
    {
        System.Console.WriteLine("Feature A");
    }
}
```

```
public class Program
{
    static void Main(string[] args)
    {
        System.Console.WriteLine("Feature B");
    }
}
```

```
public class Program
{
    static void Main(string[] args)
    {
        System.Console.WriteLine("Feature A");
        System.Console.WriteLine("Feature B");
    }
}
```



This screenshot shows a side-by-side comparison of two versions of a C# file, Program.cs, in Visual Studio. The left pane is 'Program.cs (master)' and the right pane is 'Program.cs (PR 1)'. The code is identical, displaying a Main method that prints four lines to the console: "A", "B", "C", and "D". A red arrow points from the GitHub icon in the status bar at the bottom to the '+' icon on line 17 of the PR 1 code, which is highlighted in green. The status bar also displays 'Press Enter to navigate to E...', 'Ln 16', 'Col 1', 'Ch 1', 'INS', and 'I #1 ↑ 0 ↗ 0 Git-Demo Feature-Three'.

This screenshot shows the same code diff as the previous one, but with a GitHub comment dialog open over the PR 1 code. The dialog has a text input field with 'Leave your comment here...' and three buttons: 'Add a single comment', 'Start a review', and 'Cancel'. The GitHub icon in the status bar is highlighted with a blue box. The status bar also displays 'Ready', 'Ln 16', 'Col 1', 'Ch 1', 'INS', and 'I #1 ↑ 0 ↗ 0 Git-Demo Feature-Three'.

## Feature Two Implementation #2

Edit

 Open rajat-01 wants to merge 1 commit into master from Feature-Two

 Conversation 0     Commits 1     Files changed 1

Changes from all commits ▾ 1 file ▾ +1 -0

Unified Split

[Review changes](#) ▾

1 ConsoleAppDemo/Program.cs

Show comments

[View](#)

```
 8     8         System.Console.WriteLine("Feature A");  
 9     9         System.Console.WriteLine("Feature B");  
10    10        System.Console.WriteLine("Feature C");  
11    +         System.Console.WriteLine("Feature F");
```

[Write](#) | [Preview](#)

[Leave a comment](#)

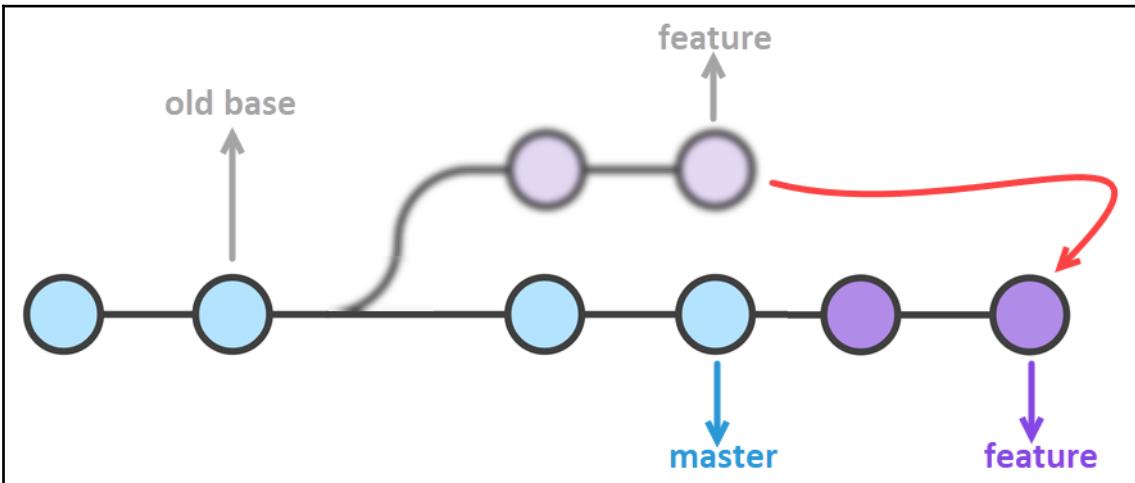
Attach files by dragging & dropping, [selecting them](#), or pasting from the clipboard.

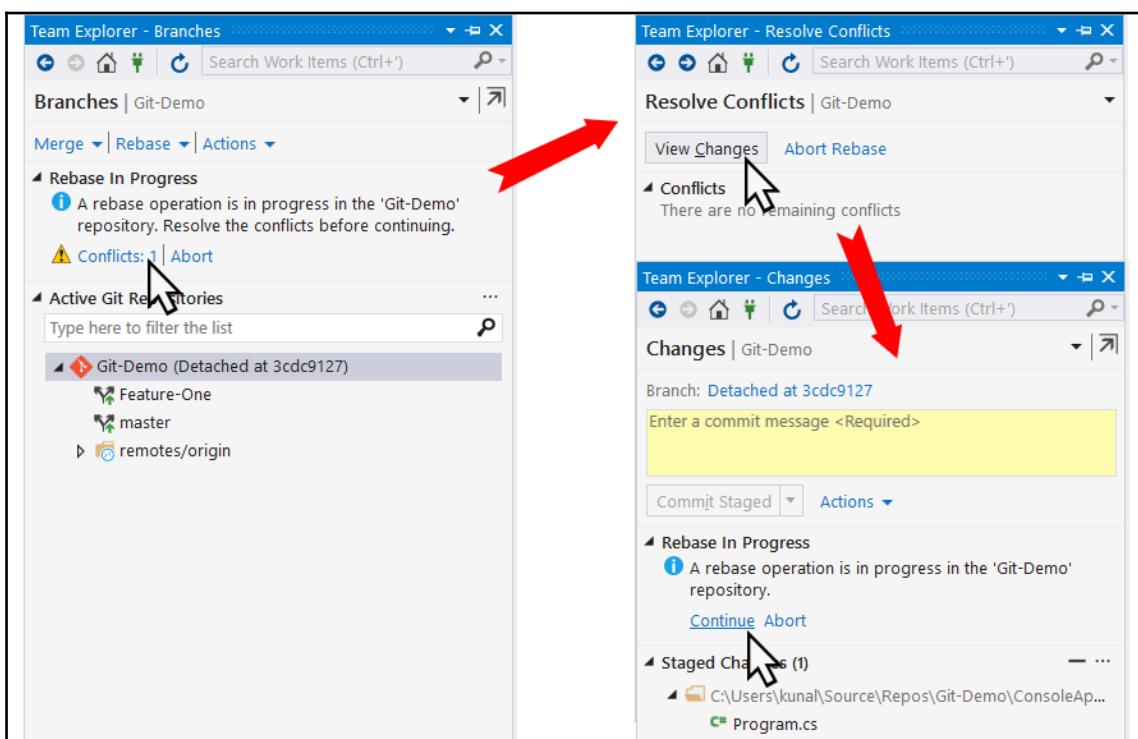
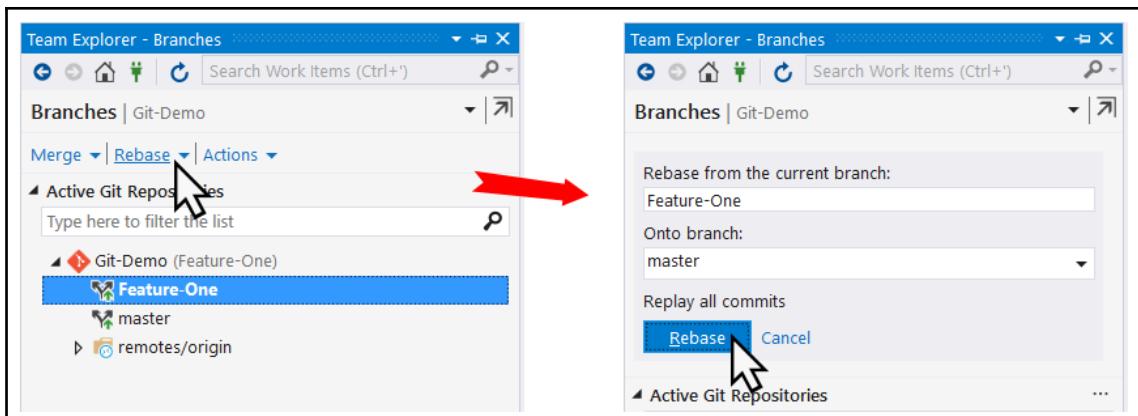
**M+** Styling with Markdown is supported

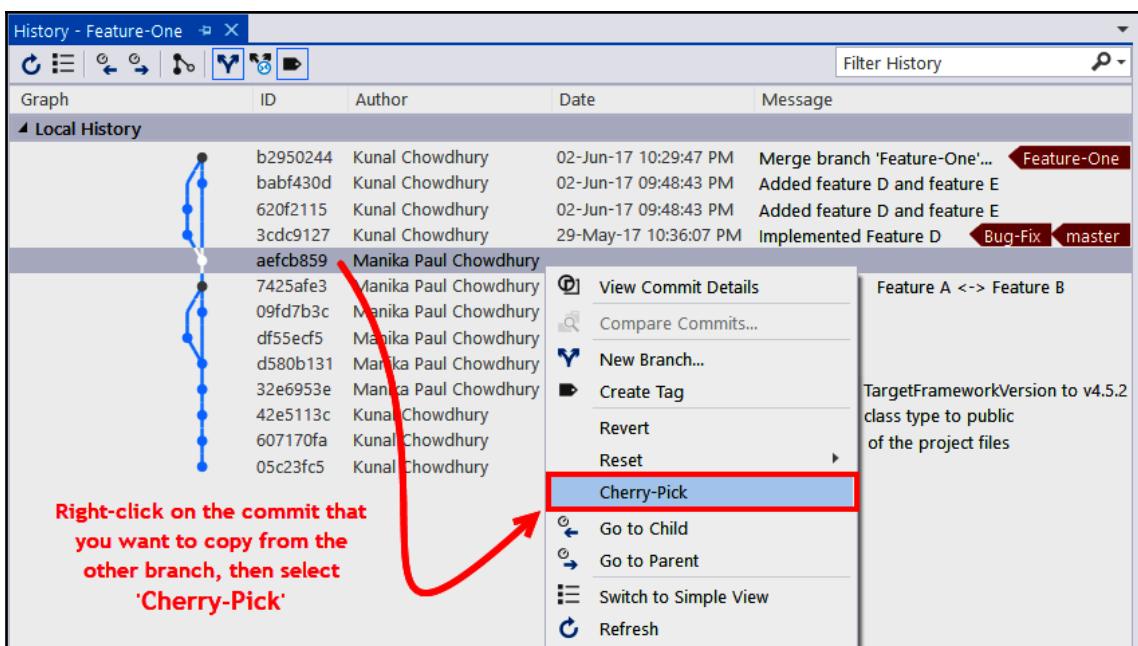
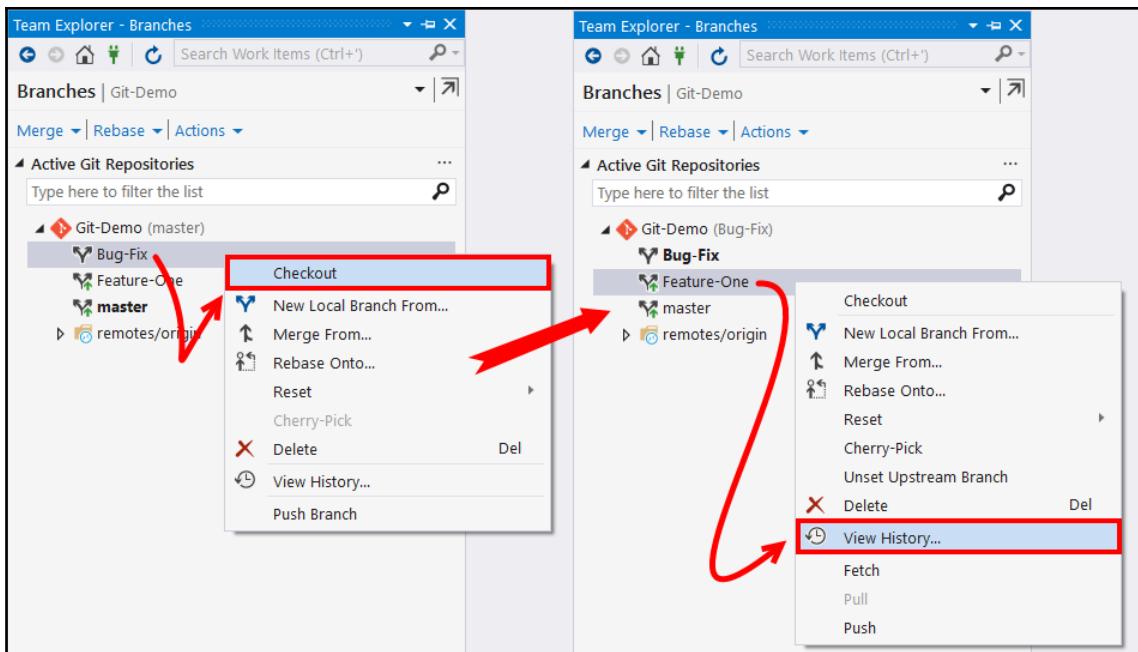
**Cancel**

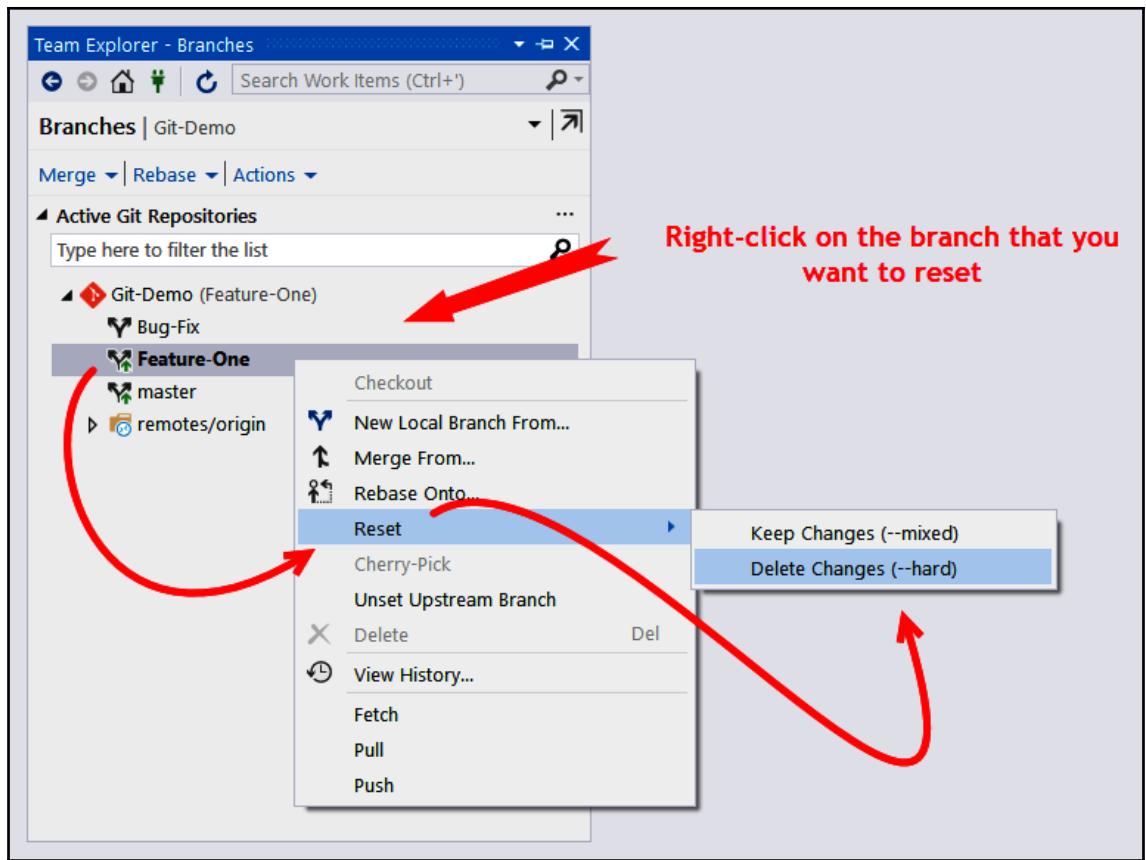
### Add single comment

[Start a review](#)









History - Feature-One

Graph ID Author Date Message

**Local History**

ID	Author	Date	Message
b2950244	Kunal Chowdhury	02-Jun-17 10:29:47 PM	Merge branch 'Feature-...' ← Feature-One ← origin/Feature-One
babf430d	Kunal Chowdhury	02-Jun-17 09:48:43 PM	Added feature D and feature E
620f2115	Kunal Chowdhury	02-Jun-17 09:48:43 PM	Added feature D and feature E
3cdc9127	Kunal Chowdhury	29-May-17 10:36:07 PM	Implemented Feature D
aefcb859	Manika Paul Chowdhury	29-May-17 10:32:50 PM	Implemented Feature C
<b>7425afe3</b>	<b>Manika Paul</b>	<b>29-May-17 10:30:30 PM</b>	<b>merged: Feature A &lt;-&gt; Feature B</b> ← Bug-Fix ← Feature-One
09fd7b3c	Manika Paul	29-May-17 10:08:28 PM	Feature A change pushed
df55ecf5	Manika Paul	29-May-17 10:09:12 PM	Feature B change pushed
d580b131	Manika Paul	29-May-17 10:07:02 PM	Feature Change one
32e6953e	Manika Paul Chowdhury	29-May-17 09:54:43 PM	Changed the TargetFrameworkVersion to v4.5.2
42e5113c	Kunal Chowdhury	29-May-17 09:09:15 PM	Set program class type to public
607170fa	Kunal Chowdhury	28-May-17 01:31:52 PM	Initial commit of the project files
05c23fc5	Kunal Chowdhury	27-May-17 07:30:11 PM	Initial commit

View Commit Details Compare Commits... New Branch... Create Tag Revert Reset Cherry-Pick Go to Child Go to Parent Switch to Simple View Refresh

merged: Feature A <-> Feature B  
A change pushed  
B change pushed  
Change one  
the TargetFrameworkVersion to v4.5.2  
ram class type to public  
commit of the project files

Keep Changes (--mixed)  
Delete Changes (--hard)

History - Feature-One

Graph ID Author Date Message

**Incoming**

ID	Author	Date	Message
b2950244	Kunal Chowdhury	02-Jun-17 10:29:47 PM	Merge branch 'Feature-One' of https://g... ← origin/Feature-One
babf430d	Kunal Chowdhury	02-Jun-17 09:48:43 PM	Added feature D and feature E
620f2115	Kunal Chowdhury	02-Jun-17 09:48:43 PM	Added feature D and feature E
3cdc9127	Kunal Chowdhury	29-May-17 10:36:07 PM	Implemented Feature D
aefcb859	Manika Paul Chowdhury	29-May-17 10:32:50 PM	Implemented Feature C

**Local History**

ID	Author	Date	Message
<b>7425afe3</b>	<b>Manika Paul Chowdhury</b>	<b>29-May-17 10:30:30 PM</b>	<b>Code merged: Feature A &lt;-&gt; Feat...</b> ← Bug-Fix ← Feature-One
09fd7b3c	Manika Paul Chowdhury	29-May-17 10:08:28 PM	Feature A change pushed
df55ecf5	Manika Paul Chowdhury	29-May-17 10:09:12 PM	Feature B change pushed
d580b131	Manika Paul Chowdhury	29-May-17 10:07:02 PM	Feature Change one
32e6953e	Manika Paul Chowdhury	29-May-17 09:54:43 PM	Changed the TargetFrameworkVersion to v4.5.2
42e5113c	Kunal Chowdhury	29-May-17 09:09:15 PM	Set program class type to public
607170fa	Kunal Chowdhury	28-May-17 01:31:52 PM	Initial commit of the project files
05c23fc5	Kunal Chowdhury	27-May-17 07:30:11 PM	Initial commit

History - Feature-One

Graph ID Author Date Message

Local History

ID	Author	Date	Message
b2950244	Kunal Chowdhury	02-Jun-17 10:29:47 PM	Merge branch 'Feature...' <--> Feature-One origin/Feature-One
babf430d	Kunal Chowdhury	02-Jun-17 09:48:43 PM	Added feature D and feature E
620f2115	Kunal Chowdhury	02-Jun-17 09:48:43 PM	Added feature D and feature E
3cdc9127	Kunal Chowdhury	29-May-17 10:36:07 PM	Implemented Feature D
aefcb859	Manika Paul Chowdhury	29-May-17 10:32:50 PM	
7425afe3	Manika Paul Chowdhury		feature A <-> Feature B
09fd7b3c	Manika Paul Chowdhury		pushed
df55ecf5	Manika Paul Chowdhury		pushed
d580b131	Manika Paul Chowdhury		
32e6953e	Manika Paul Chowdhury		FrameworkVersion to v4.5.2
42e5113c	Kunal Chowdhury		type to public
607170fa	Kunal Chowdhury		the project files
05c23fc5	Kunal Chowdhury		

View Commit Details Compare Commits... New Branch... Create Tag Revert Reset Cherry-Pick Go to Child Go to Parent Switch to Simple View Refresh

Revert is highlighted with a red box.

origin/master Bug-Fix

History - Feature-One

Graph ID Author Date Message

Local History

ID	Author	Date	Message
b2950244	Kunal Chowdhury	02-Jun-17 10:29:47 PM	Merge branch 'Feature...' <--> Feature-One origin/Feature-One
babf430d	Kunal Chowdhury	02-Jun-17 09:48:43 PM	Added feature D and feature E
620f2115	Kunal Chowdhury	02-Jun-17 09:48:43 PM	Added feature D and feature E
3cdc9127	Kunal Chowdhury		Feature D
aefcb859	Manika Paul Chowdhury		Feature C
7425afe3	Manika Paul Chowdhury		Feature A <-> Feature B
09fd7b3c	Manika Paul Chowdhury		pushed
df55ecf5	Manika Paul Chowdhury		change pushed
d580b131	Manika Paul Chowdhury		change pushed
32e6953e	Manika Paul Chowdhury		
42e5113c	Kunal Chowdhury		TargetFrameworkVersion to v4.5.2
607170fa	Kunal Chowdhury		class type to public
05c23fc5	Kunal Chowdhury		of the project files

View Commit Details Compare Commits... New Branch... Create Tag Revert Reset Cherry-Pick Go to Child Go to Parent Switch to Simple View Refresh

Create Tag is highlighted with a red box.

master Bug-Fix

