

Akademija tehničko-vaspitačkih strukovnih studija

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.NET tehnologije

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.NET tehnologije



IDE .NET-a: VISUAL STUDIO

podržani tipovi aplikacija

(3)

Sadržaj

▶ Visual Studio

- ▶ Visual Studio od '97 do danas
- ▶ Tri realizacije VS-a
- ▶ Podrška razvoju aplikacija
 - ▶ UWP i Desktop aplikacije
 - ▶ Web i Cloud aplikacije
 - ▶ Cross-platformske aplikacije

▶ .NET Framework/Core - verzije

- ▶ Solution i Project fajlovi

▶ IDE okruženje VS

- ▶ Dizajn
- ▶ Kodiranje
- ▶ Solution i Resource Explorer prozori
- ▶ Class View prozor
- ▶ Properties prozor

- ▶ Object browser prozor
- ▶ Debug/Output prozor
- ▶ Team Explorer prozor
- ▶ Notifications prozor
- ▶ C# Interactive prozor
- ▶ Ostali prozori

▶ .NET Framework aplikacije

- ▶ Konzolna
- ▶ WindowsForm
- ▶ WebForm
- ▶ Web MVC

▶ Cross-platformske aplikacije

- ▶ Konzolna
- ▶ ASP .NET Core

▶ Android app

Da se podsetimo

- Razvojno okruženje MS .NET Framework obuhvata **PET TEHNOLOGIJA**:
 - **Visual Studio .NET** - razvojno i izvršno okruženje .NET-a;
 - **CLR** (engl. *Common Language Runtime*), zajednički izvršni podsistem za jezike koji opslužuje aplikacije u trenutku izvršavanja;
 - **Programski jezici** koji koriste zajednički izvršni podsistem **CLR**-a i biblioteke klasa;
 - **F(B)CL** - biblioteke klasa (engl. Framework (Base) Class Library);
 - **MS ASP.NET** za razvoj Web aplikacija i Web servisa.



Visual Studio

- ▶ VISUAL STUDIO (VS) je integrisano **RAZVOJNO** i **IZVRŠNO** okruženje pridruženo .NET tehnologijama od strane Microsofta.
- ▶ Visual Studio **AUTOMATIZUJE** korake prilikom:
 - ▶ kreiranja,
 - ▶ kompajliranja i
 - ▶ izvršenja koda .NET jezika.
- ▶ VS obezbeđuje alate za brzi dizajn **RAZLIČITIH TIPOVA** aplikacija.
- ▶ VS nudi moćne **ALATE** za kreiranje NAVIGACIJE, OBRAZACA i DIJALOGA u svim tipovima podržanih aplikacija.
- ▶ Pored razvoja **DESKTOP** i **MOBILNIH** aplikacija, VS je dizajniran i za razvoj **WEB** (ASP.NET) i **CLOUD** aplikacija.
- ▶ VS obezbeđuje napredne tehnike **OTKRIVANJA** i **OTKLANJANJA** grešaka.
- ▶ **DEBAGOVANJE** programa postavljanjem prekidnih tačaka (engl. *Break points*) na specifičnim mestima u **IZVORNOM KODU**.

Razvojno okruženje Visual Studio

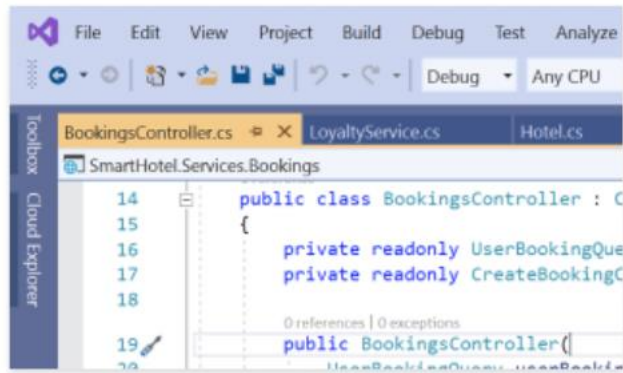
- ▶ Visual Studio .NET je **VIŠEJEZIČNO** razvojno okruženje koje je potpuno oslonjeno na XML.
 - ▶ Visual Studio .NET potpomaže razvoj u sledećim **OO** programskim jezicima:
 - ▶ Microsoft Visual Basic, **VB.NET**
 - ▶ Microsoft Visual, **C++**
 - ▶ C sa povisilicom, **C#**,
 - ▶ **F#**, od 2011.
 - ▶ Dakle, Visual Studio .NET **UBRZAVA IZRADU APLIKACIJA** i omogućava programeru **SLOBODAN IZBOR** programskog jezika.
 - ▶ VS dozvoljava aplikacijama da **dele** i **razmenjuju** podatke preko Interneta.
 - ▶ VS omogućuje izgradnju aplikacije od:
 - ▶ **Novo-napisanog** i/ili
 - ▶ već **postojećeg** koda.
- BEZ OBZIRA** na platformu, programski jezik ili objektni model !

Visual Studio od '97 do danas

Product name	Code name	Release date	Version number	Latest Update Version	Latest Update Date	Support Ends	Supported .NET Framework (no add-on)	Supported .NET Core (no add-on)
Visual Studio 2022	<i>Dev17</i>	2021-11-08 ^[58]	17.0	17.3.4 ^[59]	September 13, 2022	January 13, 2032 ^[60]	3.5, 4.6 - 4.8.1	2.1, 3.1, 5.0, 6.0
Visual Studio 2019	<i>Dev16</i>	2019-04-02 ^[61]	16.0	16.11.19 ^{[62][63]}	August 10, 2022	April 10, 2029 ^[64]	3.5 - 4.8	2.1, 2.2, 3.0, 3.1, 5.0 ^[65]
Visual Studio 2017	<i>Dev15</i>	2017-03-07 ^[66]	15.0	15.9.47 ^{[67][68]}	April 19, 2022	April 13, 2027 ^[69]	3.5 - 4.7.2	1.0, 1.1, 2.0, 2.1
Visual Studio 2015	<i>Dev14</i>	2015-07-20 ^{[70][71]}	14.0	Update 3 ^[72]	June 27, 2016	October 14, 2025 ^[69]	2.0 - 4.6.1	1.0
Visual Studio 2013	<i>Dev12</i>	2013-10-17 ^{[73][74]}	12.0	Update 5 ^[70]	July 20, 2015	April 9, 2024 ^[69]	2.0 - 4.5.1	—
Visual Studio 2012	<i>Dev11</i>	2012-09-12 ^{[75][76][77]}	11.0	Update 5 ^[78]	August 24, 2015	January 10, 2023 ^[69]	2.0 - 4.5	—
Visual Studio 2010	<i>Dev10</i> ^[79]	2010-04-12 ^{[80][81][82]}	10.0	Service Pack 1 ^{[83][84]}	March 10, 2011	July 14, 2020 ^[85]	2.0 - 4.0	—
Visual Studio 2008	<i>Orcas</i> ^[86]	2007-11-19 ^{[87][88]}	9.0	Service Pack 1 ^[89]	August 11, 2008	April 10, 2018 ^[90]	2.0, 3.0, 3.5	—
Visual Studio 2005	<i>Whidbey</i> ^[91]	2005-11-07 ^{[92][93]}	8.0	Service Pack 1 ^[94]	December 15, 2006	April 12, 2016 ^[95]	2.0	—
Visual Studio .NET 2003	<i>Everett</i> ^[96]	2003-04-24 ^[97]	7.1	Service Pack 1 ^[98]	August 15, 2006	October 8, 2013 ^[99]	1.1	—
Visual Studio .NET (2002)	<i>Rainier</i> ^[100]	2002-02-13 ^[101]	7.0	Service Pack 1 ^[102]	March 8, 2005	July 14, 2009 ^[103]	1.0	—
Visual Studio 6.0	<i>Aspen</i> ^[104]	1998-09-02 ^{[105][106]}	6.0	Service Pack 6 ^[107]	March 29, 2004	September 30, 2005 ^{[108][109]}	—	—
Visual Studio 97	<i>Boston</i> ^[110]	1997-03-19 ^{[111][112][113]}	5.0	Service Pack 3	December 4, 1997	June 30, 2003 ^{[114][115]}	—	—

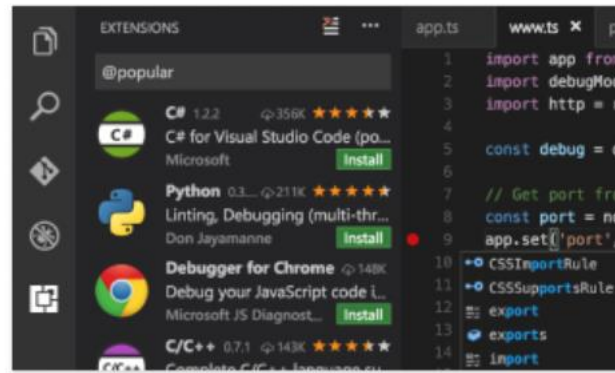
VS - tri realizacije

Visual Studio



Full-featured IDE to code, debug, test, and deploy to any platform

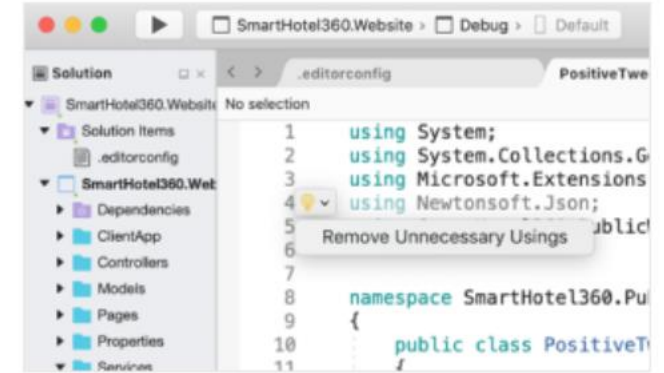
Visual Studio Code



Editing and debugging on any OS

(By using Visual Studio Code you agree to its [license](#) and [privacy statement](#))

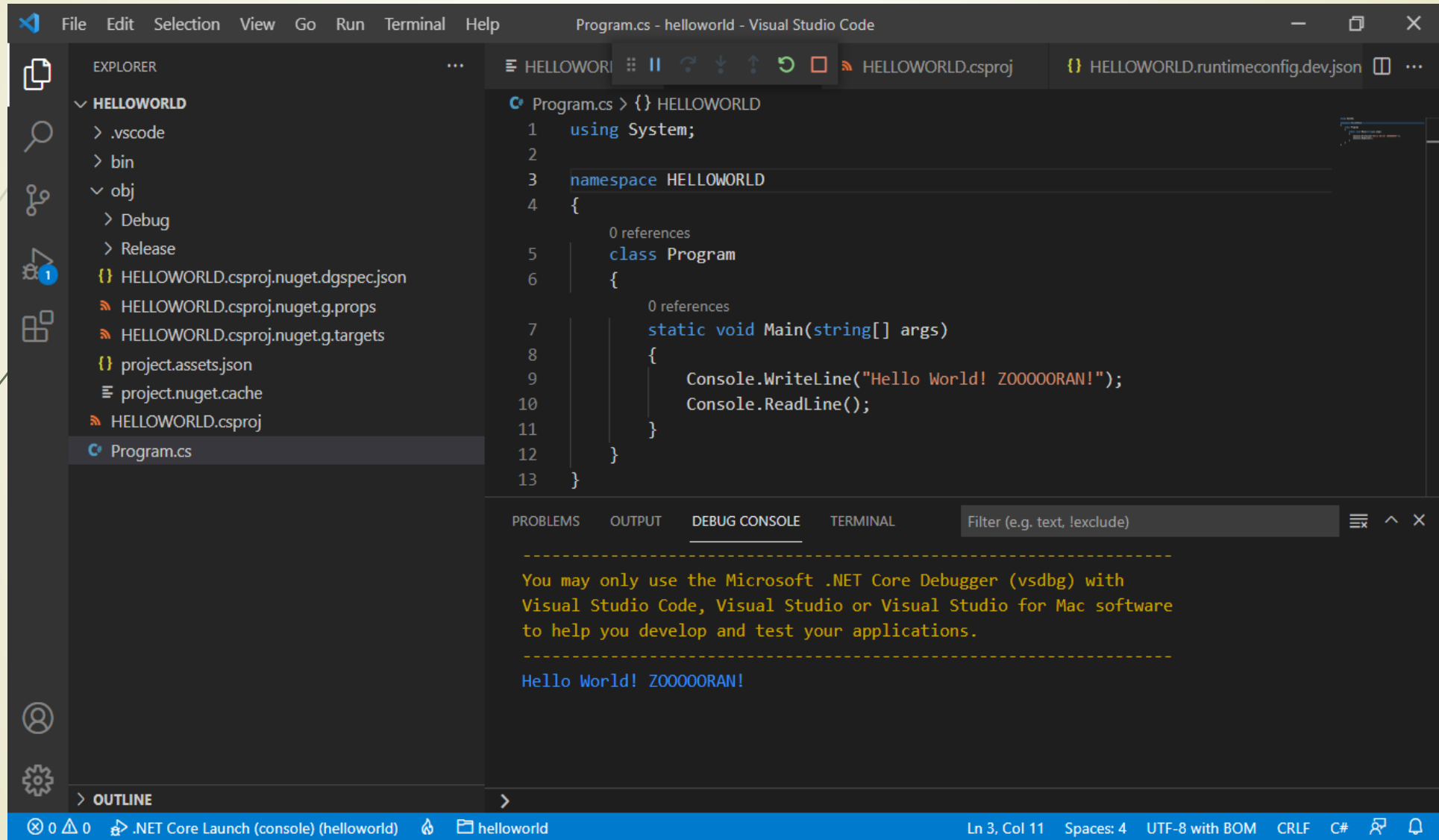
Visual Studio for Mac



Develop apps and games for iOS, Android, and web using .NET

[Read more about activating your license](#)

VS Code, WSL - realizacija na Linux-u



The screenshot displays the Visual Studio Code interface with a C# project named 'HELLOWORLD'. The Explorer sidebar on the left shows the project structure, including folders like '.vscode', 'bin', and 'obj', and files like 'HELLOWORLD.csproj.nuget.dgspec.json' and 'Program.cs'. The main editor window shows the source code for 'Program.cs' with the following content:

```
1 using System;
2
3 namespace HELLOWORLD
4 {
5     0 references
6     class Program
7     {
8         0 references
9         static void Main(string[] args)
10        {
11            Console.WriteLine("Hello World! ZO0000RAN!");
12            Console.ReadLine();
13        }
14    }
```

Below the code editor, the DEBUG CONSOLE panel is active, displaying the output of the program:

```
-----
You may only use the Microsoft .NET Core Debugger (vsdbg) with
Visual Studio Code, Visual Studio or Visual Studio for Mac software
to help you develop and test your applications.
-----
Hello World! ZO0000RAN!
```

The status bar at the bottom indicates the current file is 'Program.cs' at line 3, column 11, with a UTF-8 encoding and CRLF line endings. The bottom-most status bar shows the active terminal window is '.NET Core Launch (console) (helloworld)' with a 'helloworld' window open.

Podržani tipovi aplikacija u VS



Web & cloud



ASP.NET & web development



Azure



Python



Node.js

Windows



.NET desktop development



Desktop development with C++



UWP development

Mobile & gaming



Mobile development with .NET



Mobile development with C++



Game development with Unity



Game development with C++

Other toolsets



Data storage & processing



Data science & analytical applications



Visual Studio extension development



Office/SharePoint



Linux development with C++



.NET Core cross-platform development

UWP i Desktop aplikacije



Universal Windows Platform

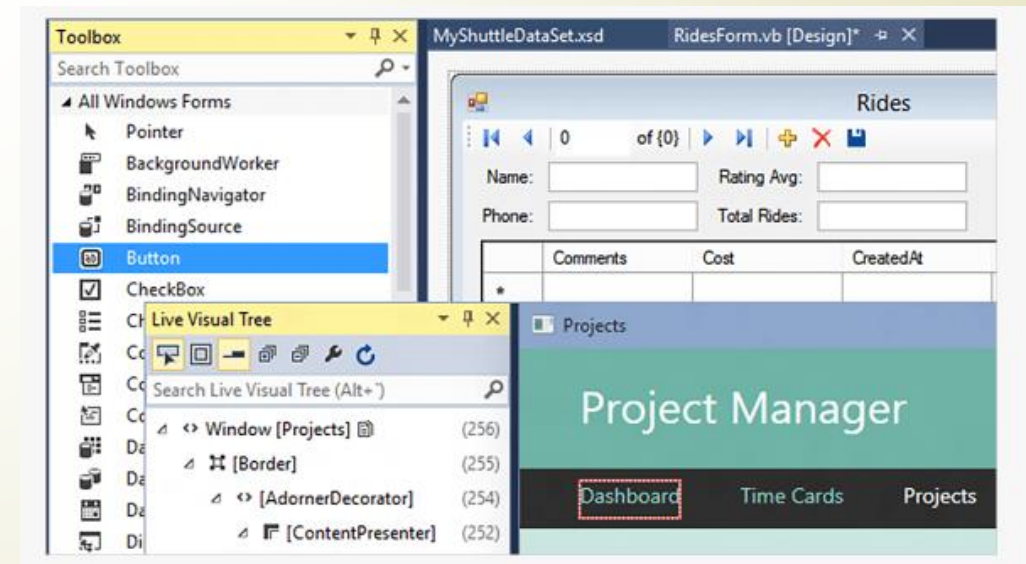
Jedna Windows platforma – više uređaja.

Koristi osobine C#-a i Visual Basic-a za kreiranje nove generacije Windows aplikacija. Windows 10 radi na jedinstvenom jezgru na svim uređajima. Windows 10 aplikacije sa C# i Visual Basic-om se pokreću jednako brzo kao i C++ uz .NET Native-a.

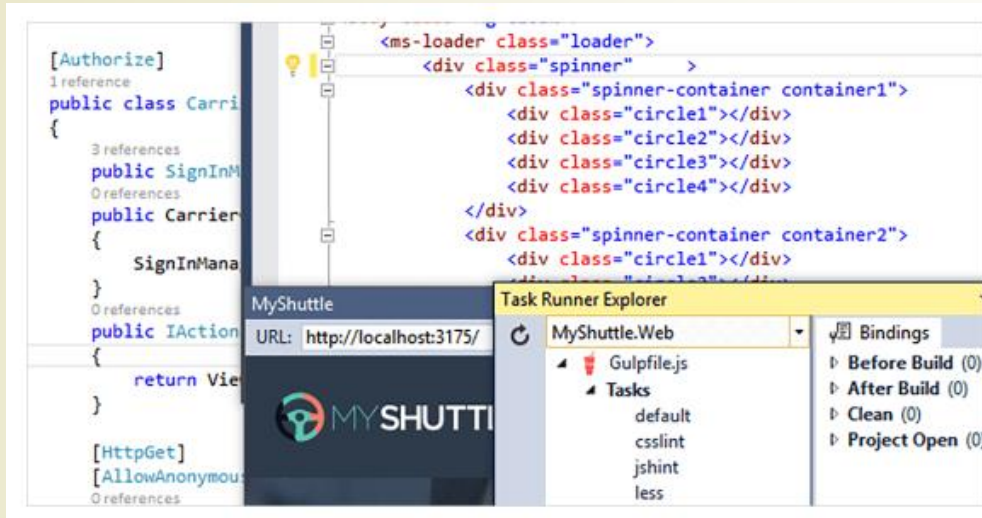
Desktop aplikacije

WinForms i WPF.

.NET Framework i Visual Studio omogućavaju razvoj data-centric modernih poslovnih aplikacija (LoB) u Windowsu. Kreira vizuelno korisnička iskustva korišćenjem WPF-a ili WinForms-a. Brz razvoj poslovnih aplikacija sa sveobuhvatnim setom funkcija kao što su kontrole, povezivanje podataka, animacija, stilovi,



Web i Cloud aplikacije



ASP.NET Web aplikacije

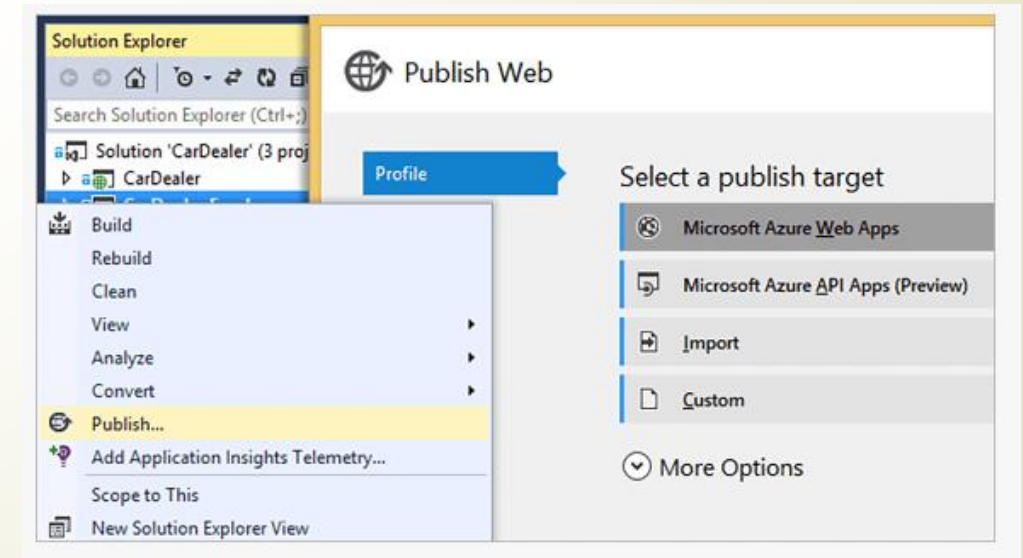
Otvoreni, fleksibilni alati kojim se kreiraju i implementiraju savremene Web aplikacije.

ASP.NET je Web okvir otvorenog koda za izgradnju Web stranica i Web aplikacija pomoću HTML, CSS i JavaScript. Takođe, mogu se kreirati Web API i mobilne Web aplikacije korišćenjem savremenih programerskih tehnologija.

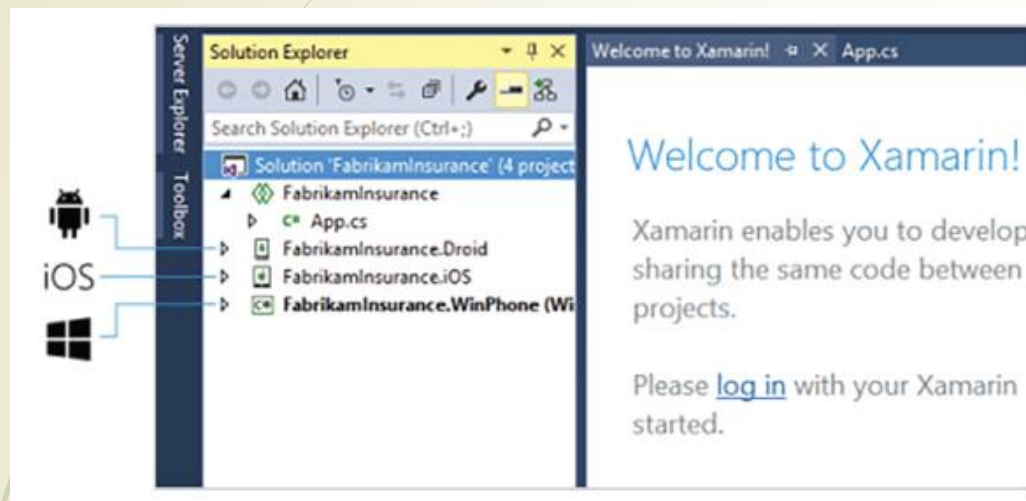
Cloud aplikacije u Azure

Brzo implementiranje kritičnih aplikacije. Aplikacija raste sa zahtevima

Pokreće ASP.NET Web aplikacije i .NET programe u oblaku koristeći Azure Websites, Cloud Services i VM-ove. Koristi se .NET i Visual Studio za postavljanje nove ili postojeće aplikacije.



Cross-platformske aplikacije



Cross - platform mobile

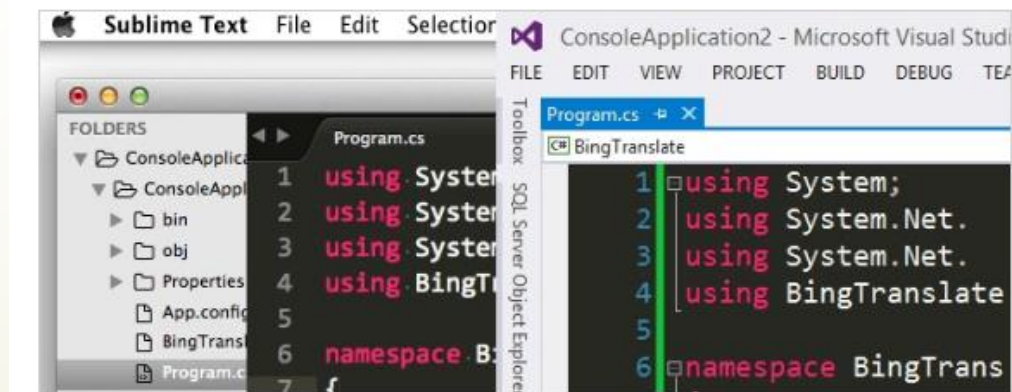
Visual Studio i Xamarin.

Kreira bogate „native“ aplikacije pomoću C# za **iOS**, **Android** i **Windows**, uz maksimalno ponovno korišćenje koda. Programski kod se deli između platformi ili se prenose biblioteke klasa.

.NET Core

Modularan, cross-platformski, otvorenog koda.

.NET Core je skup runtime-a, komponenti, biblioteka i kompajlera optimizovanih za moderno okruženja na Windows, macOS i Linux-u. Može se instalirati lokalno uz aplikaciju sa neophodnim paketima. Runtime, .NET Core, biblioteke i prevodilac su otvorenog koda i nalaze se na GitHub-u.



.NET Framework – stare verzije

- Microsoft .NET Framework je **NEOPHODNA** programska **KOMPONENTA** za korišćenje Visual Studio .NET paketa.
- Na jednom računaru **MOŽE** biti **VIŠE VERZIJA** .NET Framework-a!

Arhitektura **.NET**-a Framework-a



2008



2007



2013



J2SE Development Kit 5.0 Update 16
J2SE Runtime Environment 5.0 Update 16
Java(TM) SE Runtime Environment 6
JSmartCardExplorer
Launch Simulator
Lizardtech DjVu Control
McAfee Security Scan Plus
Microsoft .NET Compact Framework 2.0 SP2
Microsoft .NET Compact Framework 3.5
Microsoft .NET Framework 1.1
Microsoft .NET Framework 3.5 SP1
Microsoft .NET Framework 4 Multi-Targeting Pack
Microsoft .NET Framework 4.5.1
Microsoft ASP.NET MVC 2

Sun Microsystems, Inc.	31.10.2006
Sun Microsystems, Inc.	31.10.2006
Sun Microsystems, Inc.	17.4.2007
Primiano Tucci	14.5.2013
IIT Kharagpur	6.5.2013
	4.7.2012
McAfee, Inc.	21.5.2014
Microsoft Corporation	2.9.2008
Microsoft Corporation	2.9.2008
	5.8.2007
Microsoft Corporation	28.8.2009
Microsoft Corporation	4.12.2013
Microsoft Corporation	7.12.2013
Microsoft Corporation	4.12.2013

.NET Framework/Core, nove verzije

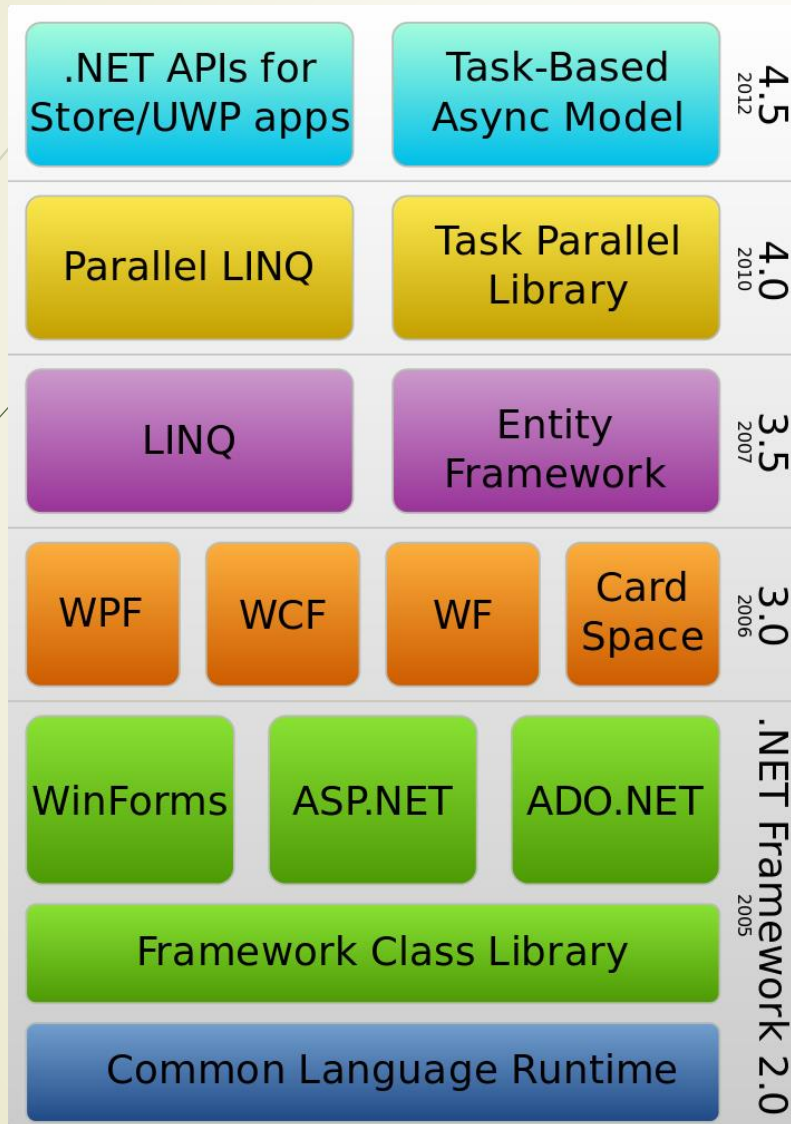
- Različite verzije **.NET Frameworka**, odnosno, .NET Core-a su **NEOPHODNE KOMPONENTE** za korišćenje Visual Studio .NET paketa.

Verzije .NET Core-a

Name	Publisher	Installed On	Size	Version
Microsoft .NET Core Runtime - 2.1.30 (x64)	Microsoft Corporation	24-Aug-21	89.5 MB	2.1.30.30411
Microsoft .NET Core SDK 2.1.700 (x64)	Microsoft Corporation	26-Jun-19	483 MB	2.1.700
Microsoft .NET Core SDK 3.1.414 (x64)	Microsoft Corporation	15-Oct-21	566 MB	3.1.414.15823
Microsoft .NET Framework 4.5 Multi-Targeting Pack	Microsoft Corporation	16-Oct-14	41.8 MB	4.5.50710
Microsoft .NET Framework 4.5 SDK	Microsoft Corporation	16-Oct-14	18.5 MB	4.5.50710
Microsoft .NET Framework 4.5.1 Multi-Targeting Pack	Microsoft Corporation	16-Oct-14	49.3 MB	4.5.50932
Microsoft .NET Framework 4.5.1 Multi-Targeting Pack (ENU)	Microsoft Corporation	16-Oct-14	74.5 MB	4.5.50932
Microsoft .NET Framework 4.5.1 SDK	Microsoft Corporation	16-Oct-14	19.4 MB	4.5.51641
Microsoft .NET Framework 4.5.2 Multi-Targeting Pack (ENU)	Microsoft Corporation	28-Oct-15	74.4 MB	4.5.51209
Microsoft .NET Framework 4.6 SDK	Microsoft Corporation	28-Oct-15	20.0 MB	4.6.00081
Microsoft .NET Framework 4.6 Targeting Pack	Microsoft Corporation	28-Oct-15	40.3 MB	4.6.00081
Microsoft .NET Framework 4.6 Targeting Pack (ENU)	Microsoft Corporation	28-Oct-15	65.9 MB	4.6.00081
Microsoft .NET SDK 5.0.402 (x64) from Visual Studio	Microsoft Corporation	18-Oct-21	180 KB	5.4.221.47606
Microsoft .NET Version Manager (x64) 1.0.0-beta5	Microsoft Corporation	28-Oct-15	68.0 KB	1.0.10609.0
Microsoft ASP.NET Core 2.1.30 - Shared Framework	Microsoft Corporation	24-Aug-21	94.9 MB	2.1.30.60071
Microsoft ASP.NET Core 3.1.20 - Shared Framework (x86)	Microsoft Corporation	15-Oct-21	23.4 MB	3.1.20.21472
Microsoft ASP.NET MVC 4 Runtime	Microsoft Corporation	16-Oct-14	2.93 MB	4.0.40804.0

Verzije .NET Framework-a

Verzije i vreme pojavljivanja .NET FW-a



- **WPF** (engl. *Windows Presentation Foundation*) razvijen za rad desktop aplikacija pod Windows-om
- **WCF** (engl. *Windows Communication Foundation*) razvijen za gradnju servisa kojima se pristupa putem mreže.
- **WF** – (engl. *Windows Workflow Foundation*)
- **LINQ** (engl. *Language-INtegrated Query*) - SQL-like query features, integracija pristupa bazi podataka u programski jezik.

.NET FW 4.5 – pregled tehnologija

Windows Presentation Foundation

- Built-in Ribbon controls ★
- Databinding improvements
- Ability to add breakpoints to databindings
- Data source change aware views (Live Shaping) ★
- Validation improvements ⚙️
- Improved legacy UI integration
- Dispatcher improvements ⚙️
- Speed-up of large data sets 📈

Windows 8 support ★

- Support for Windows Runtime (WinRT)
- .NET Profile for Metro-style apps
- Improved support for sharing DLLs between .NET profiles

ASP.NET

- Built-in providers now natively support SQL Azure
- Support for implementing WebSocket receivers ★
- Built-in JavaScript + CSS combining and minification ★
- ASP.NET MVC 4
 - Async controllers ⚙️
 - Built-in mobile templates + jQuery Mobile support
 - Alternate views (e.g. print version, mobile site)
 - Support for Recipes: intelligent codegen ★
- ASP.NET Web Pages 2
 - New site templates
 - Versatile validation support
 - Support for OAuth and OpenID ★
 - Built-in map embedding tools; supports Google, Bing and others
 - Did you know? ASP.NET Web Pages is yet another way to work the web besides Web Forms and MVC. WP sites can Razor and are typically developed with WebMatrix.
- Web Forms
 - Strongly typed data binding
 - MVC-like support for Models ★
 - HTML encoded binding expressions
 - HTML5 support ★
 - Control support for new semantic elements
 - Validator and UpdatePanel now support new HTML5 elements
 - Multiple support for FileUpload control
- Tooling
 - IntelliSense improvements
 - More JavaScript support
 - IIS Express used by default
 - New templates and snippets
- Asynchronous pipeline support ⚙️ (Response, Request, HttpHandlers)
- Performance improvements: Multicore JIT, 35% faster startup, memory optimizations, assembly sharing between sites, pre-fetch support 📈
- Request validation improvements: AntiXSS built-in, validation usable per field

Windows Communication Foundation

- Support for UDP multicast channels
- TCP channels now work with partial trust
- Asynchronous operations ⚙️
- Streaming improvements
- Simplified configuration (again!)
- Can now generate service stubs from WSDL
- WebSocket support ★

Windows Workflow Foundation

- C# Expressions
- State machine workflows are back! ★
- Workflow versioning ★
- Code-first activity design
- Faster execution 📈
- Designer usability improvements

Managed Extensibility Framework 2.0

- Debugging improvements
- Support for explicit bindings between objects
- Support for binding POCOs: no more attribute requirements

ADO.NET

- Sparse columns support improved (SQL Server)
- Passwords are now stored encrypted
- Asynchronous operations ⚙️
- SQL Express LocalDB
 - New light version of SQL Express for developer use. Supported in .NET 4.5, separate patch for 4.0 is coming.
- SQL Server 2012 ("Denali") Support
 - High Availability support on connection string level
 - Fast failover across multiple subnets
 - Support for new spatial data types (polygons, arcs etc.) ★
- Entity Framework 4.5
 - Enumeration support
 - Migrations for schema changes ★
 - Designer improvements
- Spatial data type support ★
- Table-valued function support ★
- Multi-result spoc support
- Multiple diagrams per model
- Code-first support ★
- Auto-compiled LINQ queries 📈

Base Class Library

- Usability improved for WeakReferences and Streams
- Key interfaces now have async versions ⚙️
- New ArraySegment and ReadOnlyDictionary classes
- Support for CLR objects over 2 GB in size
- Resource file management performance improved 📈
- Unicode support for console applications

Task Parallel Library ⚙️

- Task thread controls improved: Task.WaitAll/WaitAny, various timeout primitives available
- TPL Dataflow: Tools for parallel data flow processing ★

C# 5.0

- Support for async programming: async and await keywords ⚙️
- Methods can access call site info as parameters (CallerInfo)

Visual Basic 11

- Iterator implementations (Yield)
- Async and Await equal to C# ⚙️
- "Global" keyword for namespace referencing
- Call Hierarchy view available
- CallerInfo attributes (as in C#)

F# 3.0

- Type providers ★
- Query expressions (LINQ) ★
- Auto-implemented properties

Visual C++ 11

- C++11 standard support improved
- Auto-vectorization and parallelization of loops ⚙️ 📈
- Support for controlling GPU-driven processing (C++ AMP)

Legend:

- ⚙️ = Asynchrony support
- 📈 = Performance improvement
- ★ = Significant new feature

Information based on public sources available in October 2011. Changes before RTM are likely.
Composed by Jouni Heikkinen
Thanks to Sami Ponsala and Jani Järvinen for the data.
www.heikkinen.net/hardcoded

.NET Framework, VS 2017/19

Configure your new project

ASP.NET Web Application (.NET Framework) C# Windows Web

Project name

Location

Solution name ⓘ

Place solution and project in the same directory

Framework


- .NET Framework 2.0
- .NET Framework 3.0
- .NET Framework 3.5
- .NET Framework 4
- .NET Framework 4.5
- .NET Framework 4.5.1
- .NET Framework 4.5.2
- .NET Framework 4.6
- .NET Framework 4.6.1
- .NET Framework 4.7.1
- .NET Framework 4.7.2

Name	Year	Publisher
Microsoft .NET Core SDK 2.1.700 (x64)	2019	Microsoft Corporation
Microsoft .NET Framework 4.5 Multi-Targeting Pack		Microsoft Corporation
Microsoft .NET Framework 4.5 SDK	2014	Microsoft Corporation
Microsoft .NET Framework 4.5.1 Multi-Targeting Pack		Microsoft Corporation
Microsoft .NET Framework 4.5.1 Multi-Targeting Pack (ENU)		Microsoft Corporation
Microsoft .NET Framework 4.5.1 SDK		Microsoft Corporation
Microsoft .NET Framework 4.5.2 Multi-Targeting Pack (ENU)		Microsoft Corporation
Microsoft .NET Framework 4.6 SDK		Microsoft Corporation
Microsoft .NET Framework 4.6 Targeting Pack		Microsoft Corporation
Microsoft .NET Framework 4.6 Targeting Pack (ENU)	2015	Microsoft Corporation
Microsoft .NET Version Manager (x64) 1.0.0-beta5		Microsoft Corporation
Microsoft ASP.NET MVC 4 Runtime		Microsoft Corporation
Microsoft Azure Authoring Tools - v2.9.6		Microsoft Corporation
Microsoft Azure Compute Emulator - v2.9.6		Microsoft Corporation
Microsoft Azure Libraries for .NET - v2.9		Microsoft Corporation
Microsoft Azure PowerShell - December 2017		Microsoft Corporation
Microsoft Azure Storage Emulator - v5.9		Microsoft Corporation
Microsoft Help Viewer 2.1		Microsoft Corporation
Microsoft Help Viewer 2.2		Microsoft Corporation
Microsoft Help Viewer 2.3		Microsoft Corporation
Microsoft ODBC Driver 17 for SQL Server		Microsoft Corporation
Microsoft Office 2013 click-to-run proxy...		Microsoft Corporation

DOSTUPNE verzije FW-a

INSTALIRANE verzije FW-a

Poslednje verzije .NET Framework-a



Version	Release date	CLR Version	Included in Windows	Included in Windows Server
4.8.1	2022-08-09	4	-	-
4.8	2019-04-18	4	10 May 2019 Update	2022
4.7.2	2018-04-30	4	10 April 2018 Update (Version 1803)	version 1803
4.7.1	2017-10-17	4	10 Fall Creators Update (Version 1709)	version 1709
4.7	2017-04-11	4	10 Creators Update (Version 1703)	-
4.6.2	2016-08-02	4	10 Anniversary Update (Version 1607)	2016
4.6.1	2015-11-30	4	10 November Update (Version 1511)	-
4.6	2015-07-29	4	10	-
4.5.2	2014-05-05	4	-	-
4.5.1	2014-01-15	4	8.1	2012 R2
4.5	2012-10-09	4	8	2012
4	2010-04-12	4	-	-

**Nastavlja se razvoj
samo .NET Core-a !**

.NET Core - verzije

Arhitektura .NET
Core-a

Jezici +
kompajleri

Biblioteke
BCL+NuGet

Core CLR

Channel	Support	Latest release	Latest release date	End of Life date
7.0	○ Release Candidate	7.0.0-rc.1	2022-09-14	-
6.0	● Current (LTS)	6.0.9	2022-09-13	2024-11-12
5.0	● End of Life	5.0.17	2022-05-10	2022-05-10
3.1	● Maintenance	3.1.29	2022-09-13	2022-12-13
3.0	● End of Life	3.0.3	2020-02-18	2020-03-03
2.2	● End of Life	2.2.8	2019-11-19	2019-12-23
2.1	● End of Life	2.1.30	2021-08-19	2021-08-21
2.0	● End of Life	2.0.9	2018-07-10	2018-10-01
1.1	● End of Life	1.1.13	2019-05-14	2019-06-27
1.0	● End of Life	1.0.16	2019-05-14	2019-06-27



Solution i Project fajlovi u VS

- ▶ Za smeštanje specifičnih postavki Visual Studio koristi **TRI TIPA** FAJLOVA tzv. **SOLUTION FAJLOVIMA** :
 - ▶ **.sln** (organizacija projekta - ne treba editovati)
 - ▶ **.suo** (engl. *solution user options* - smešta korisničke postavke, pr. breakpoints)
 - ▶ **.csproj** (sadrži listu fajlova u projektu i reference na sistemske sklopove)
- ▶ Informacije specifične za VS projekte imaju sledeće ekstenzije:
 - ▶ Izvorni kod: **.cs**
 - ▶ Class Diagram: **.cd**
 - ▶ Resources File: **.resx**
 - ▶ XSLT fajlovi: **.xslt**
 - ▶ Crystal Report: **.rpt**
 - ▶ Appl. Configuration File: **.config**
 - ▶ Report: **.rdlc**
 - ▶ JScript File: **.js**
 - ▶ Windows Script Host: **.wsf**
 - ▶ Web Form files: **.aspx**
 - ▶ Web User Control: **.ascx**
 - ▶ Web Service files: **.asmx**
 - ▶ HTML stranice: **.htm**
 - ▶ XML File: **.xml**

IDE okruženje VS-a: Dizajn prozor

The image shows the Visual Studio IDE interface with several key components highlighted by red dashed arrows and text boxes:

- Paleta dugmića**: Points to the Toolbox on the left, which contains various Windows Forms controls like Button, CheckBox, and ListBox.
- Solution Explorer prozor**: Points to the Solution Explorer on the right, showing the project structure for 'WindowsFormsApp1'.
- Prostor za selektovani (design mod) prozor**: Points to the central design surface where a form is being edited, containing a label, a button, and a list box.
- Kutija sa alatom za dizajn**: Points to the design tool palette on the left side of the design surface.
- Properties prozor**: Points to the Properties window on the right, which displays the properties for the selected 'listBox1' control.

The Properties window for 'listBox1' shows the following properties:

Property	Value
HorizontalExtent	0
HorizontalScrollbar	False
ImeMode	NoControl
IntegralHeight	True
ItemHeight	16
Items	(Collection)
Location	567, 247
Locked	False
Margin	3, 3, 3, 3
MaximumSize	0, 0
MinimumSize	0, 0
Modifiers	Private
MultiColumn	False
RightToLeft	No
ScrollAlwaysVisible	False
SelectionMode	One
Size	120, 84

IDE okruženje VS-a: Kodiranje

The screenshot displays the Visual Studio IDE interface. The main editor window shows the code for `Form1.cs` in the `WindowsFormsApp1` project. The code is as follows:

```
1 namespace WindowsFormsApp1
2 {
3     3 references
4     partial class Form1
5     {
6         /// <summary>
7         /// Required designer variable.
8         /// </summary>
9         private System.ComponentModel.IContainer components = null;
10
11         /// <summary>
12         /// Clean up any resources being used.
13         /// </summary>
14         /// <param name="disposing">true if managed resources should be disposed; otherwise, false.</param>
15         0 references
16         protected override void Dispose(bool disposing)
17         {
18             if (disposing && (components != null))
19             {
20                 components.Dispose();
21             }
22             base.Dispose(disposing);
23
24         Windows Form Designer generated code
25
26         private System.Windows.Forms.Label label1;
27         private System.Windows.Forms.Button button1;
28         private System.Windows.Forms.ComboBox comboBox1;
29         private System.Windows.Forms.ListBox listBox1;
30     }
31 }
```

A red box with white text is overlaid on the code, containing the text: "Prostor za kod selektovanog fajla".

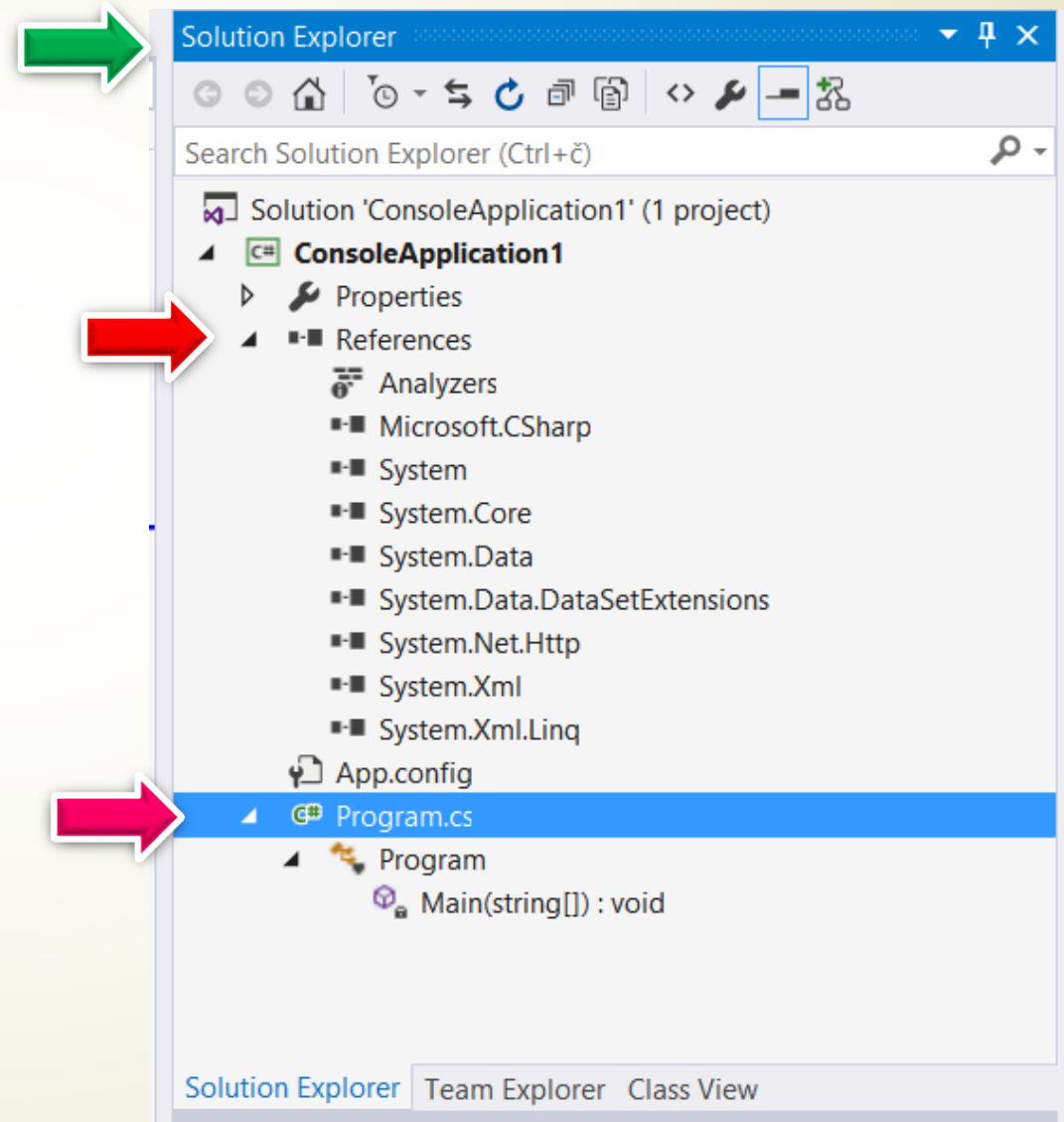
The Solution Explorer on the right shows the project structure for `WindowsFormsApp1`, including `Form1.cs` and `Form1.Designer.cs`. The Properties window is also visible at the bottom right.

Red arrows point to the `Form1.cs` tab in the top toolbar, the `Form1` folder in the Solution Explorer, and the `Form1` folder in the Properties window.

Solution i Resource Explorer/Framework

SOLUTION EXPLORER

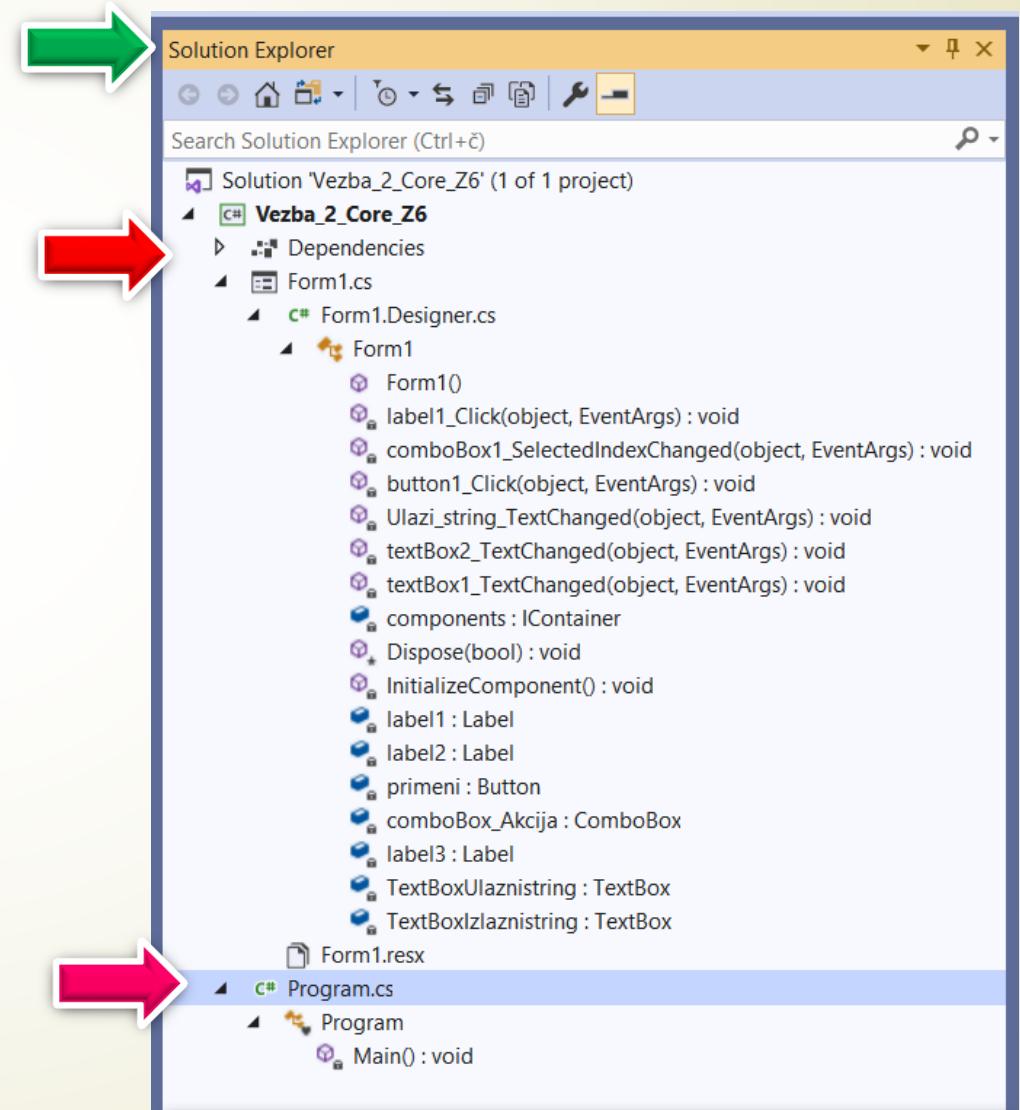
- ▶ Daje pregled fajlova u aktivnom projektu.
- ▶ Istovremeno se daje prikaz resursa aktivnog projekta - References.
- ▶ Pregled korišćenih klasa u projektu.
- ▶ Osnovne postavke projekta (engl. properties).
- ▶ Konfiguraciju aplikacije.



Solution i Resource Explorer/Core

SOLUTION EXPLORER

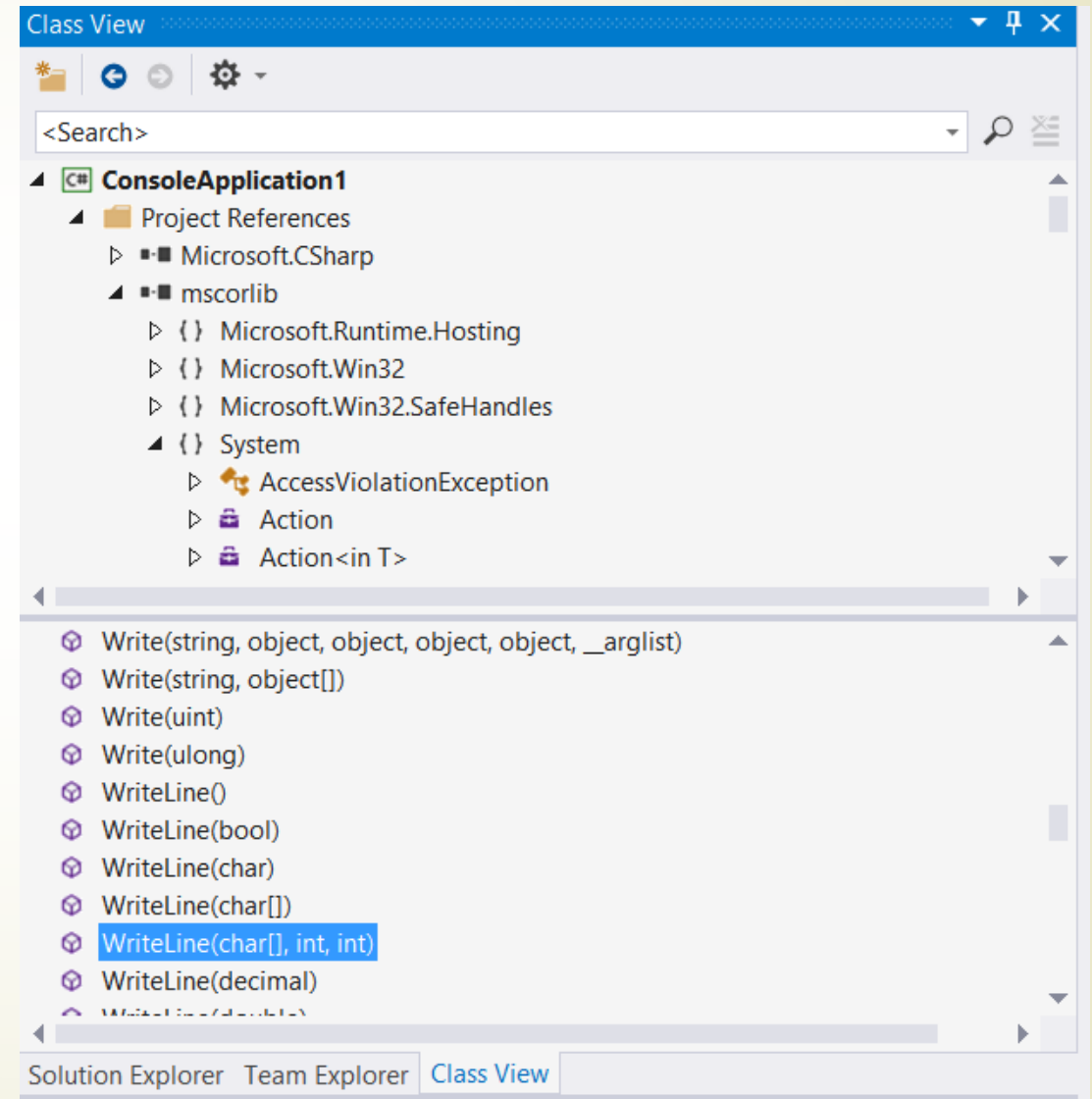
- ▶ Daje pregled fajlova u aktivnom projektu.
- ▶ Istovremeno se daje prikaz resursa aktivnog projekta - Dependencies.
- ▶ Pregled korišćenih klasa u projektu.
- ▶ Osnovne postavke projekta (engl. properties).
- ▶ Konfiguraciju aplikacije.



Class View prozor

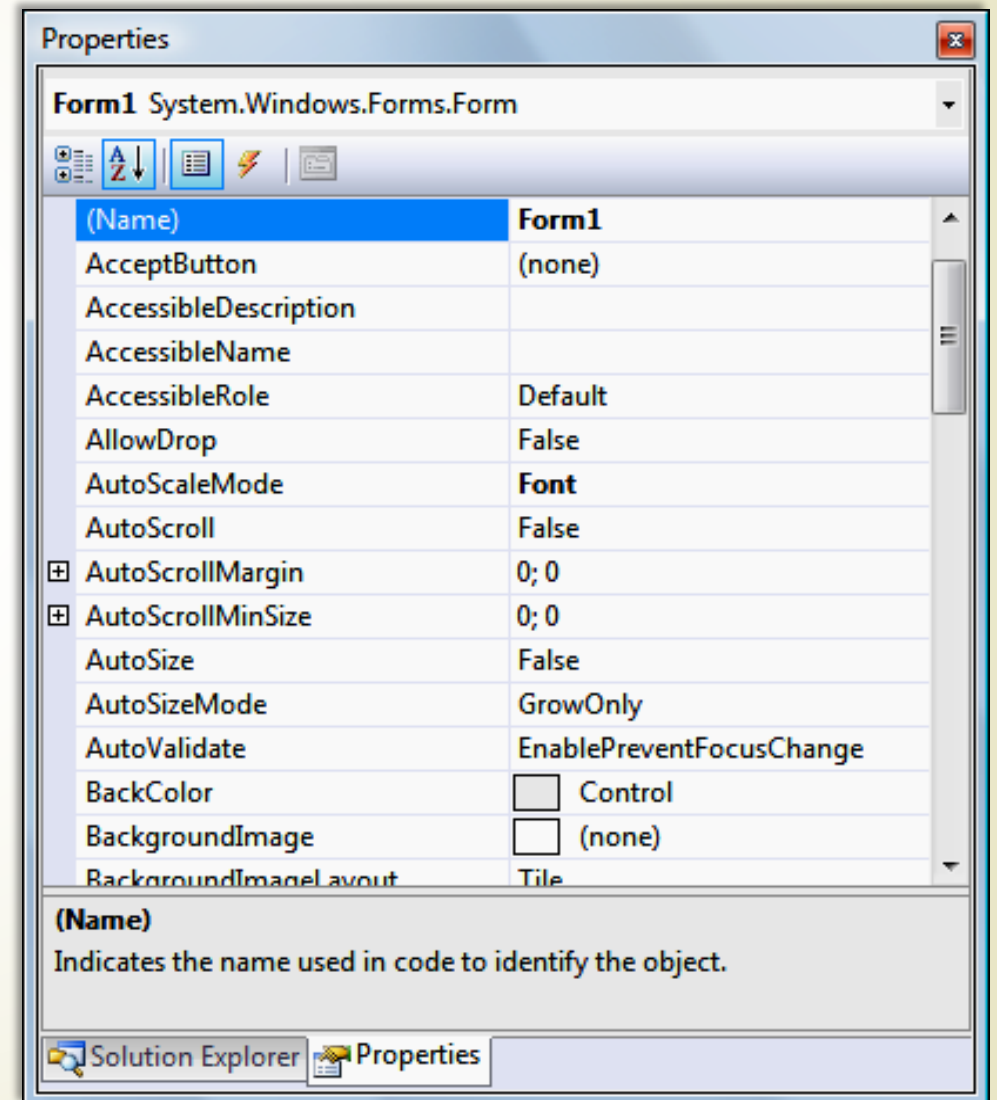
CLASS VIEW

- ▶ daje prikaz klasa u projektu koje se koriste ili se kreiraju.
- ▶ Omogućava dodavanje i menjanje postojeće klase.



Prozor Properties

- Prozor „SVOJSTAVA“ (engl. *Properties window*) prikazuje svojstva trenutno odabranog obrasca ili objekta.
- Pored prikaza – interaktivno omogućava MENJANJE i dodatno KONFIGURISANJE pojedinih elemenata kao što je:
 - Promena imena
 - Izgled forme,
 - Izgled dugmeta,
 - Natpisa na dugmetu,
 - Fonta,
 - Boje,
 - Stanja objekta ...



Object browser prozor (1)

The screenshot shows the Object Browser window in Visual Studio. The left pane displays a tree view of the System namespace, including classes like Action, ActivationContext, and AppDomain. The right pane shows the signature of the WriteLine method: `public static void WriteLine(char[] buffer, int index, int count)`. The window title is "Object browser VIEW".

Object browser VIEW

Hijerarhija imenskih prostora

Dostupne metode i svojstva

Kratk opis metode

public static void WriteLine(char[] buffer, int index, int count)
Member of [System.Console](#)

Summary:
Writes the specified subarray of Unicode characters, followed by the current line terminator, to the standard output stream.

Parameters:
buffer: An array of Unicode characters.
index: The starting position in buffer.
count: The number of characters to write.

Object browser prozor (2)

The screenshot shows the Visual Studio IDE with the Object Browser window open. The left pane shows a tree view of the **System.Console** class, with the **WriteLine(string)** method selected. The right pane displays the signature and details of this method. A red box highlights the method signature and its summary, parameters, and exceptions.

System.Console.WriteLine(string)

System.Console

```
public static void WriteLine(string value)
Member of System.Console

Summary:
Writes the specified string value, followed by the current line terminator, to the
standard output stream.

Parameters:
value: The value to write. Opis metode WriteLine

Exceptions:
System.IO.IOException: An I/O error occurred.
```

Prozor Debug/Output

- Prozor **Debug** služi za praćenje izvršavanja programa.
- Klikom na *Start* u *Debug* meniju ili pritiskom na taster **F5** se startuje ova opcija.

```
Output
Show output from: Debug
'iisexpress.exe' (CLR v4.0.30319: /LM/W3SVC/2/ROOT-1-131211330784312138): Loaded 'C:\Windows\Microsoft.Net\assembly
'iisexpress.exe' (CLR v4.0.30319: /LM/W3SVC/2/ROOT-1-131211330784312138): Loaded 'C:\Windows\Microsoft.Net\assembly
'iisexpress.exe' (CLR v4.0.30319: /LM/W3SVC/2/ROOT-1-131211330784312138): Loaded 'C:\Windows\Microsoft.Net\assembly
'iisexpress.exe' (CLR v4.0.30319: DefaultDomain): Loaded 'C:\Windows\Microsoft.Net\assembly\GAC_MSIL\System.Web.Req
'iisexpress.exe' (CLR v4.0.30319: /LM/W3SVC/2/ROOT-1-131211330784312138): Loaded 'C:\Users\Zoran\AppData\Local\Temp
'iisexpress.exe' (CLR v4.0.30319: /LM/W3SVC/2/ROOT-1-131211330784312138): Loaded 'C:\Users\Zoran\AppData\Local\Temp
'iisexpress.exe' (CLR v4.0.30319: /LM/W3SVC/2/ROOT-1-131211330784312138): Loaded 'C:\Windows\Microsoft.Net\assembly
'iisexpress.exe' (CLR v4.0.30319: /LM/W3SVC/2/ROOT-1-131211330784312138): Loaded 'C:\Users\Zoran\AppData\Local\Temp
'iisexpress.exe' (CLR v4.0.30319: /LM/W3SVC/2/ROOT-1-131211330784312138): Loaded 'C:\Windows\Microsoft.Net\assembly
'iisexpress.exe' (CLR v4.0.30319: /LM/W3SVC/2/ROOT-1-131211330784312138): Loaded 'C:\Windows\Microsoft.Net\assembly
'iexplore.exe' (Script): Loaded 'Script Code (Windows Internet Explorer)'.
The program '[8172] iexplore.exe' has exited with code 0 (0x0).
The program '[7572] iiexpress.exe: Program Trace' has exited with code 0 (0x0).
```



Microsoft Visual Studio

Debug Team Tools Architecture Test Analyze Window

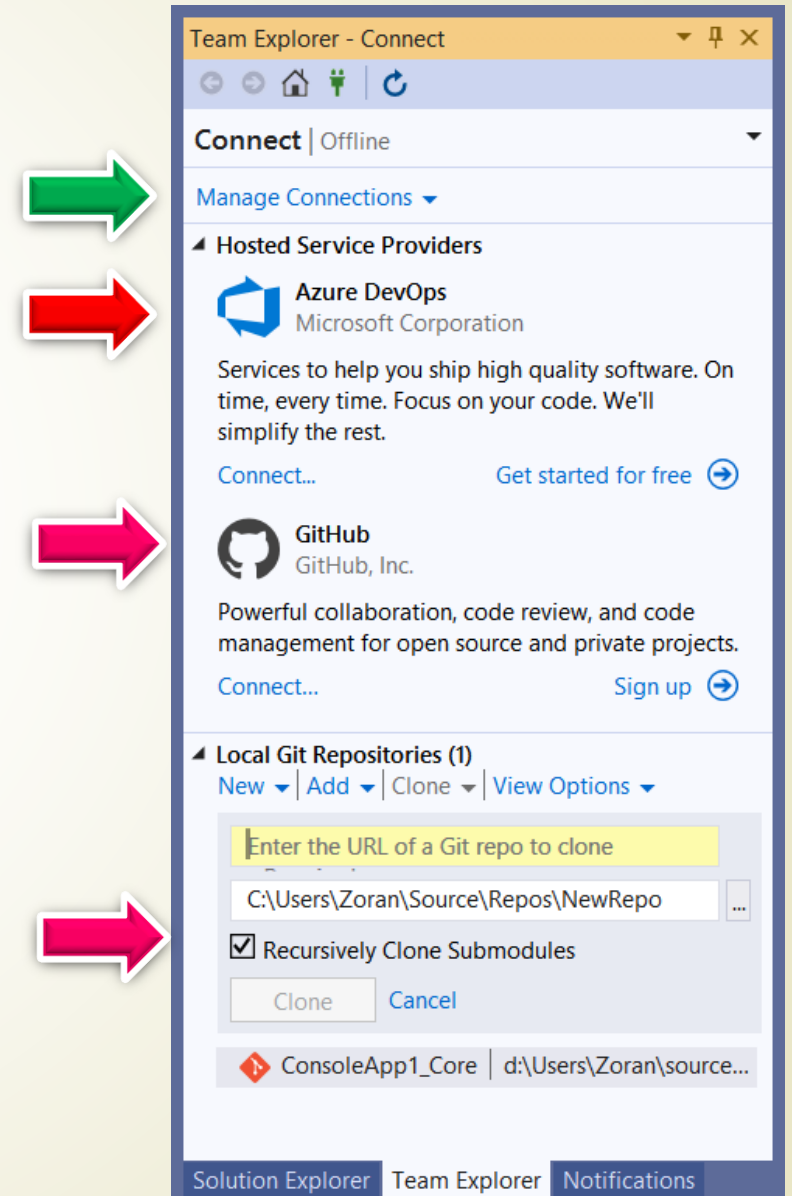
- Windows
- Graphics
- Show Diagnostic Tools (Ctrl+Alt+F2)
- Start Debugging (F5)
- Start Without Debugging (Ctrl+F5)
- Start Diagnostic Tools Without Debugging... (Alt+F2)
- Attach to Process... (Ctrl+Alt+P)
- Other Debug Targets
- Profiler
- Step Into (F11)
- Step Over (F10)
- Toggle Breakpoint (F9)
- New Breakpoint
- Delete All Breakpoints (Ctrl+Shift+F9)
- Options...
- WebApplication5 Properties...

Team Explorer

TEAM EXPLORER

- ▶ Pomoću *Team Explorer*-a se koordiniraju poslovi kodiranja sa drugim članovima tima kako bi se razvili softverski projekat.
- ▶ Pored toga, upravlja se poslovima dodeljeni vama, vašem timu ili vašim projektima.
- ▶ Programeri efikasno saraduju na projektima hostovanim na Azure DevOps Servisu.

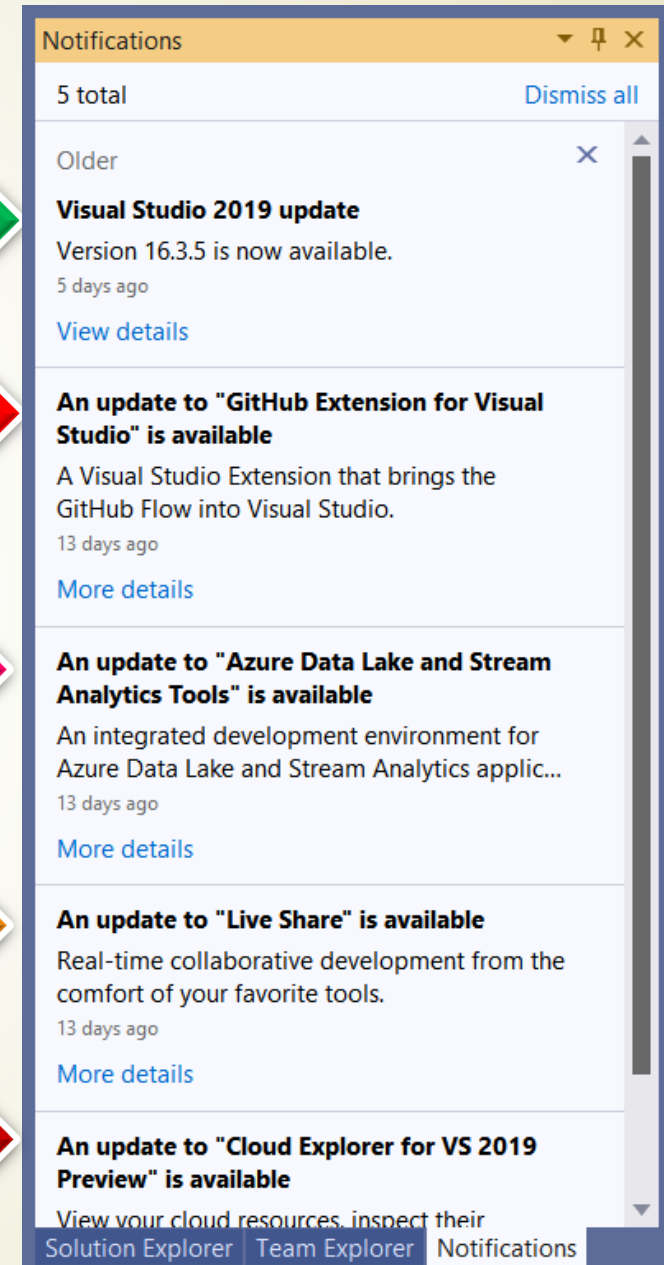
Kloniranje
GitHub skladišta



Notifications

NOTIFICATIONS






- ▶ Važna obaveštenja.
- ▶ O svim temama vezanim za
 - ▶ Visual Studio,
 - ▶ Programske jezike,
 - ▶ GitHub-u,
 - ▶ Ostalim novostima



Notifications

5 total [Dismiss all](#)

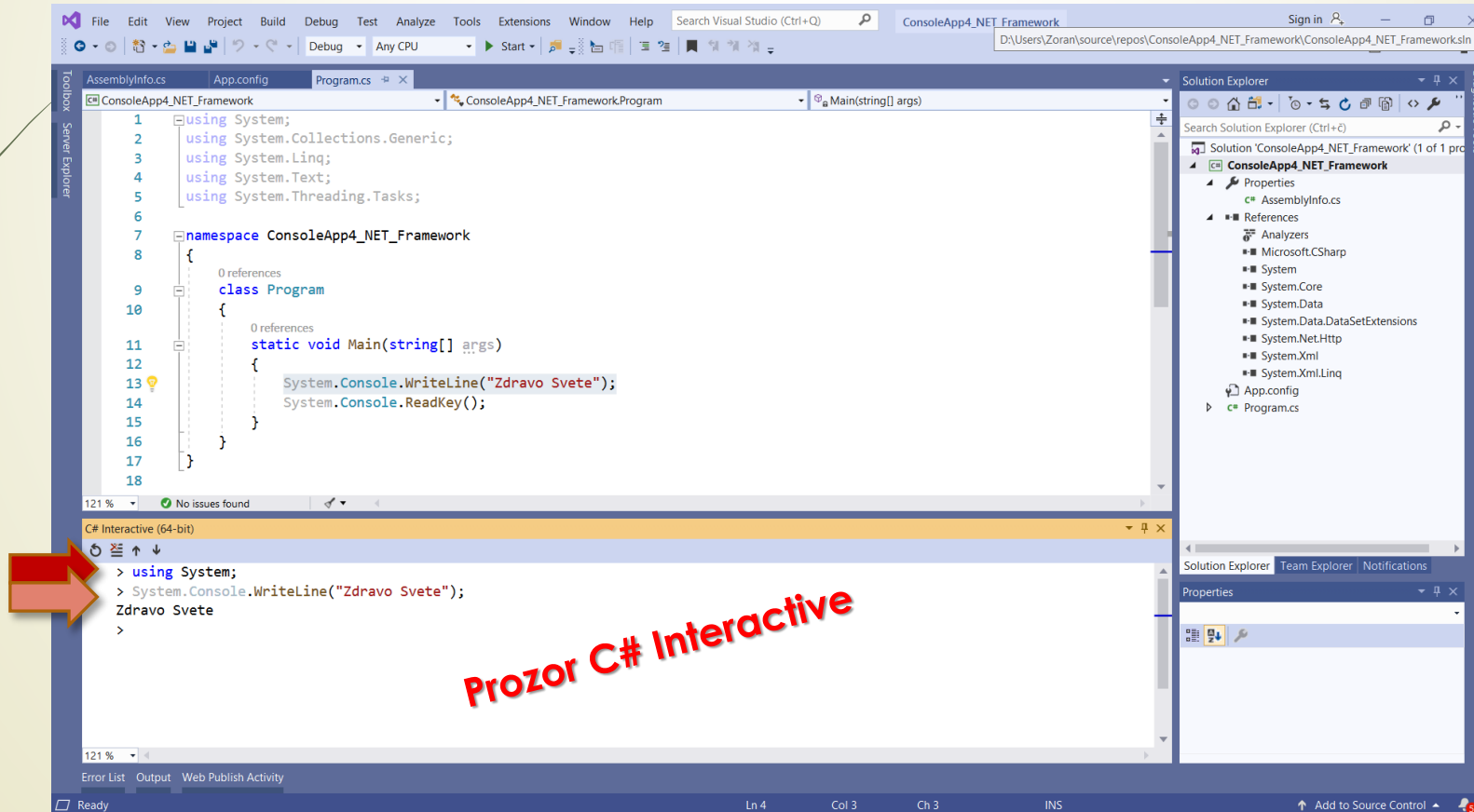
Older [×](#)

-  **Visual Studio 2019 update**
Version 16.3.5 is now available.
5 days ago
[View details](#)
-  **An update to "GitHub Extension for Visual Studio" is available**
A Visual Studio Extension that brings the GitHub Flow into Visual Studio.
13 days ago
[More details](#)
-  **An update to "Azure Data Lake and Stream Analytics Tools" is available**
An integrated development environment for Azure Data Lake and Stream Analytics applic...
13 days ago
[More details](#)
-  **An update to "Live Share" is available**
Real-time collaborative development from the comfort of your favorite tools.
13 days ago
[More details](#)
-  **An update to "Cloud Explorer for VS 2019 Preview" is available**
View your cloud resources, inspect their

















[Solution Explorer](#) [Team Explorer](#) [Notifications](#)

















Prozor C# Interactive

- U ovom prozoru se može interaktivno izvršavati delovi programskog koda **BEZ KOMPILIRANJA** čitavog projekta.
- Ovaj prozor se dobija klikom na *View | Other Windows | C# Interactive*



IDE okruženje VS-a: ostali prozori

	Command Window	Ctrl+Alt+A
	Data Sources	Shift+Alt+D
	Web Browser	Ctrl+Alt+R
	Test Results	
	Source Control Explorer	
	Data Tools Operations	
	Microsoft Azure Activity Log	
	Bookmark Window	Ctrl+K, Ctrl+W
	Diagnostic Events	
	Application Insights Search	
	GitHub	
	HDInsight Task List Window	
	HiveServer2 Output Window	
	Live Share	
	Web Publish Activity	
	Task Runner Explorer	Ctrl+Alt+Bkspce

	JSON Outline	
	Device Log	
	Package Manager Console	
	Browser Link Dashboard	
	Document Outline	Ctrl+Alt+T
	History	
	Pending Changes	
	Property Manager	
	Resource View	Ctrl+Shift+E
	Python Environments	Ctrl+K, Ctrl+,
	Python Interactive Window	Alt+I
	Node.js Interactive Window	Ctrl+K, N
	F# Interactive	Ctrl+Alt+F
	C# Interactive	
	Code Metrics Results	
	Python Performance Explorer	

.NET Framework / .NET Core

Selekcija tipa aplikacije

2015

Recent

Installed

Templates

- Visual C#
 - Windows
 - Universal
 - Windows 8
 - Classic Desktop
 - Web
 - Android
 - Cloud
 - Cross-Platform
 - Extensibility
- iOS
- LightSwitch
- Office/SharePoint
- Silverlight
- Test
- tvOS
- WCF
- Workflow

ASP.NET Framework 4.5.2 Sort by: Default

- Windows Forms Application
- WPF Application
- Console Application
- Shared Project
- Class Library
- Class Library (Portable)
- WPF Browser Application
- Empty Project
- Windows Service
- WPF Custom Control Library
- WPF User Control Library

Name: WindowsFormsApplication2

Location: c:\users\zoran\documents\visual studio 2015\Projects

Solution name: WindowsFormsApplication2

2019

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

- ASP.NET Web Application (.NET Framework)

Search for project templates

Language Platform Project type

Filtering by: C#, Windows, Web

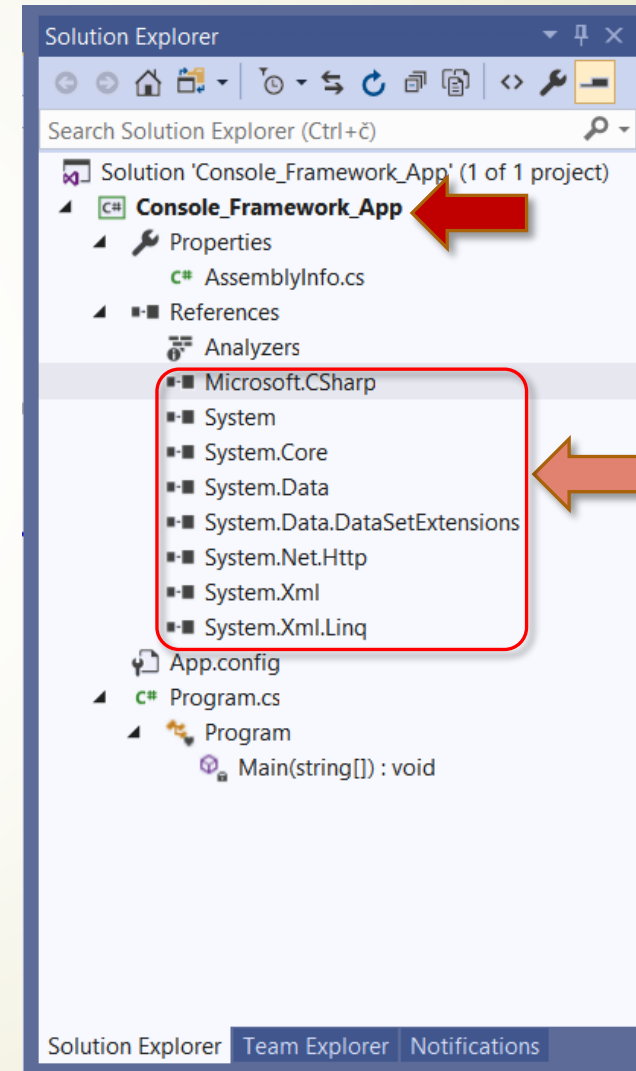
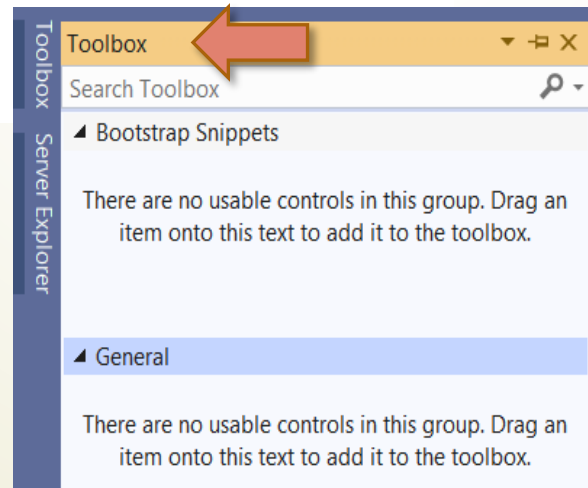
Core

- 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
- ASP.NET Web Application (.NET Framework)
Project templates for creating ASP.NET applications. You can create ASP.NET Web Forms, MVC, or Web API applications and add many other features in ASP.NET.
C# Windows Web
- JUnit Test Project (.NET Core)
A project that contains NUnit tests that can run on .NET Core on Windows, Linux and MacOS.
C# Linux macOS Windows Desktop Test Web
- Web Driver Test for Edge (.NET Core)
A project that contains unit tests that can automate UI testing of web sites within Edge browser (using Microsoft WebDriver).
C# Windows Web Test
- Web Driver Test for Edge (.NET Framework)
A project that contains unit tests that can automate UI testing of web sites within Edge browser (using Microsoft WebDriver).

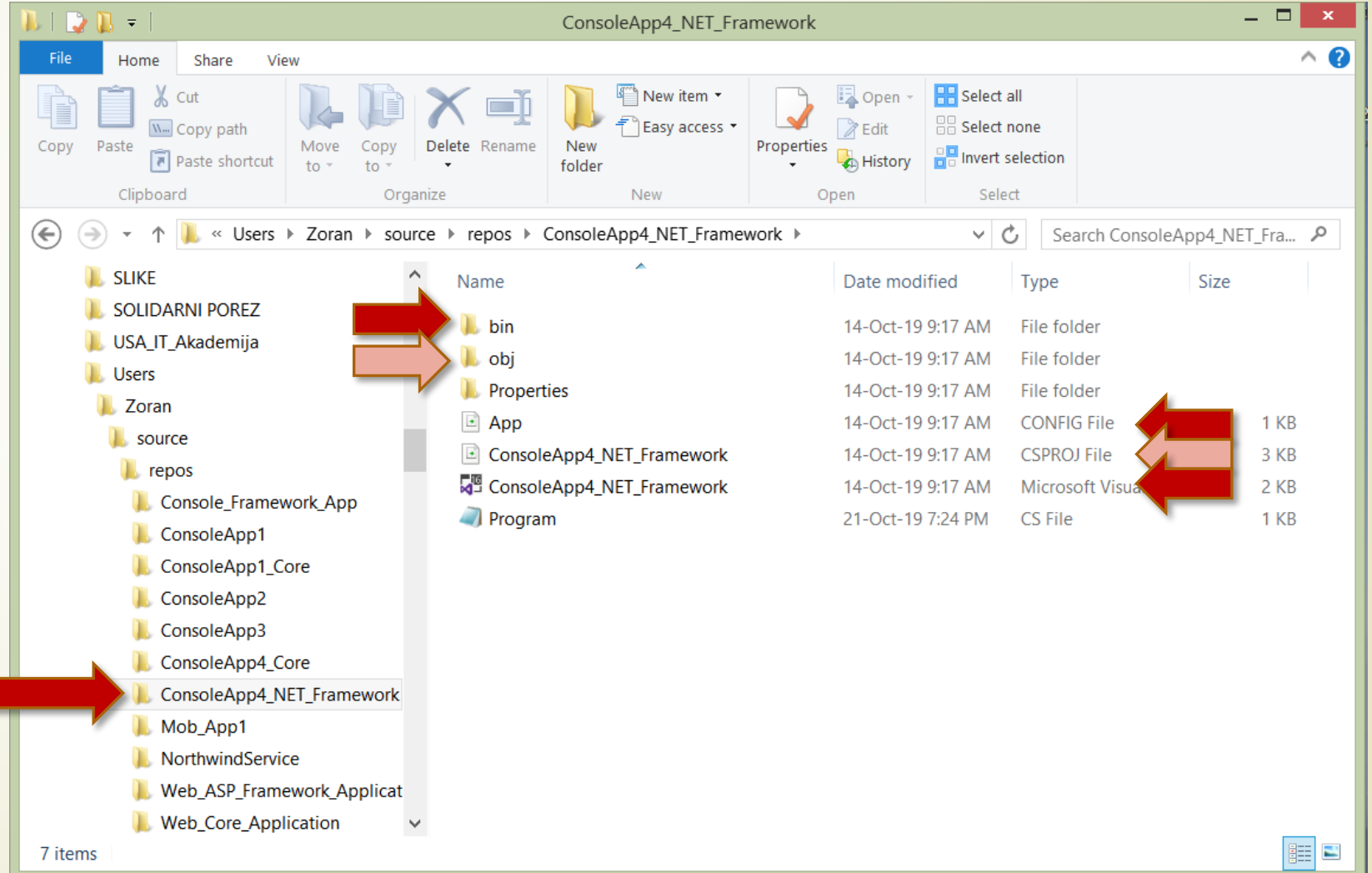
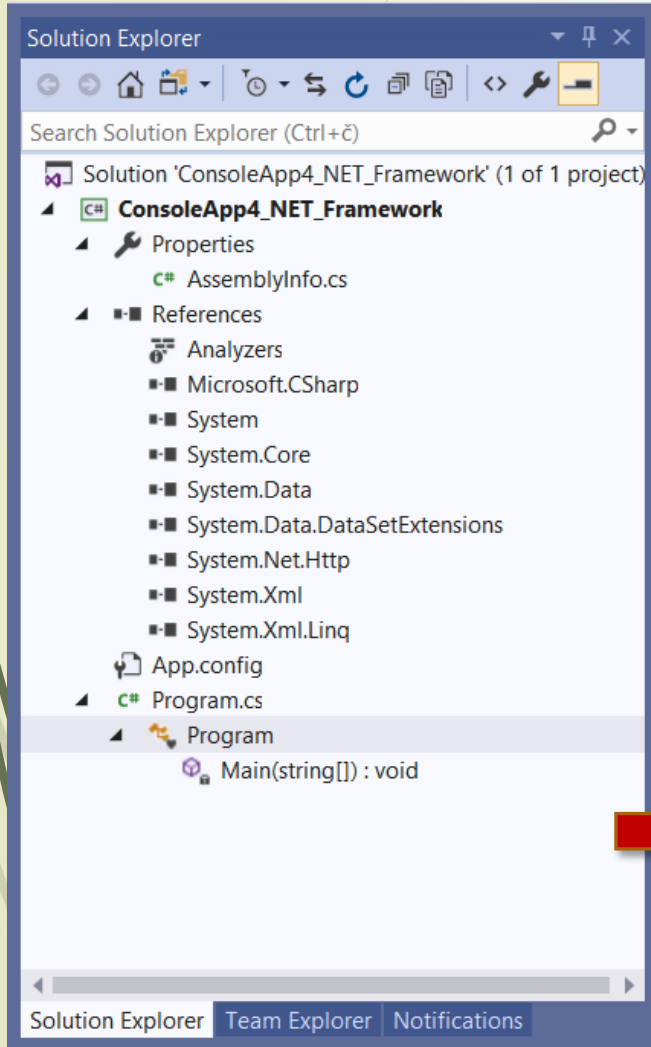
Next

Konzolna .NET Framework aplikacija

```
1  Console_Framework_App
2  using System.Collections.Generic;
3  using System.Linq;
4  using System.Text;
5  using System.Threading.Tasks;
6
7  namespace Console_Framework_App
8  {
9      class Program
10     {
11         static void Main(string[] args)
12         {
13             System.Console.WriteLine("Zdravo Framework svete");
14             System.Console.ReadLine();
15         }
16     }
17 }
18
```



Solution explorer i skladište aplikacija FW



.sln fajl FW

header



```
Microsoft Visual Studio Solution File, Format Version 12.00
# Visual Studio Version 16
VisualStudioVersion = 16.0.29020.237
MinimumVisualStudioVersion = 10.0.40219.1
Project("{FAE04EC0-301F-11D3-BF4B-00C04F79EFBC}") = "ConsoleApp4_NET_Framework", "ConsoleApp4_NET_Framework.csproj", "{73774A25-346D-466E-BFF5-2C0EB8C1674B}"
EndProject
Global
  →GlobalSection(SolutionConfigurationPlatforms) = preSolution
  →→Debug|Any CPU = Debug|Any CPU
  →→Release|Any CPU = Release|Any CPU
  →EndGlobalSection
  →GlobalSection(ProjectConfigurationPlatforms) = postSolution
  →→{73774A25-346D-466E-BFF5-2C0EB8C1674B}.Debug|Any CPU.ActiveCfg = Debug|Any CPU
  →→{73774A25-346D-466E-BFF5-2C0EB8C1674B}.Debug|Any CPU.Build.0 = Debug|Any CPU
  →→{73774A25-346D-466E-BFF5-2C0EB8C1674B}.Release|Any CPU.ActiveCfg = Release|Any CPU
  →→{73774A25-346D-466E-BFF5-2C0EB8C1674B}.Release|Any CPU.Build.0 = Release|Any CPU
  →EndGlobalSection
  →GlobalSection(SolutionProperties) = preSolution
  →→HideSolutionNode = FALSE
  →EndGlobalSection
  →GlobalSection(ExtensibilityGlobals) = postSolution
  →→SolutionGuid = {6A97E7C2-1876-4C52-A160-C01B078909D4}
  →EndGlobalSection
EndGlobal
```



body

AssemblyInfo.cs i pridruženi XML fajlovi FW

```
AssemblyInfo - Notepad
File Edit Format View Help
using System.Reflection;
using System.Runtime.CompilerServices;
using System.Runtime.InteropServices;

// General Information about an assembly is controlled through the following
// set of attributes. Change these attribute values to modify the information
// associated with an assembly.
[assembly: AssemblyTitle("ConsoleApp4_NET_Framework")]
[assembly: AssemblyDescription("")]
[assembly: AssemblyConfiguration("")]
[assembly: AssemblyCompany("")]
[assembly: AssemblyProduct("ConsoleApp4_NET_Framework")]
[assembly: AssemblyCopyright("Copyright © 2019")]
[assembly: AssemblyTrademark("")]
[assembly: AssemblyCulture("")]

// Setting ComVisible to false makes the types in this assembly not visible
// to COM components. If you need to access a type in this assembly from
// COM, set the ComVisible attribute to true on that type.
[assembly: ComVisible(false)]

// The following GUID is for the ID of the typelib if this project is exposed to COM
[assembly: Guid("73774a25-346d-466e-bff5-2c0eb8c1674b")]

// Version information for an assembly consists of the following four values:
//
//      Major Version
//      Minor Version
//      Build Number
//      Revision
//
// You can specify all the values or you can default the Build and Revision Numbers
// by using the '*' as shown below:
// [assembly: AssemblyVersion("1.0.*")]
[assembly: AssemblyVersion("1.0.0.0")]
[assembly: AssemblyFileVersion("1.0.0.0")]
```

AssemblyInfo.cs

```
App - Notepad
File Edit Format View Help
<?xml version="1.0" encoding="utf-8" ?>
<configuration>
  <startup>
    <supportedRuntime version="v4.0" sku=".NETFramework,Version=v4.7.2" />
  </startup>
</configuration>
```

App.config

```
ConsoleApp4_NET_Framework - Notepad
File Edit Format View Help
<?xml version="1.0" encoding="utf-8"?>
<Project ToolsVersion="15.0" xmlns="http://schemas.microsoft.com/developer/msbuild/2003">
  <Import Project="$(MSBuildExtensionsPath)\$(MSBuildToolsVersion)\Microsoft.Common.props"
  <PropertyGroup>
    <Configuration Condition="'$(Configuration)' == ''">Debug</Configuration>
    <Platform Condition="'$(Platform)' == ''">AnyCPU</Platform>
    <ProjectGuid>{73774A25-346D-466E-BFF5-2C0EB8C1674B}</ProjectGuid>
    <OutputType>Exe</OutputType>
    <RootNamespace>ConsoleApp4_NET_Framework</RootNamespace>
    <AssemblyName>ConsoleApp4_NET_Framework</AssemblyName>
    <TargetFrameworkVersion>v4.7.2</TargetFrameworkVersion>
    <FileAlignment>512</FileAlignment>
    <AutoGenerateBindingRedirects>true</AutoGenerateBindingRedirects>
    <Deterministic>true</Deterministic>
  </PropertyGroup>
  <PropertyGroup Condition="'$(Configuration)|$(Platform)' == 'Debug|AnyCPU' ">
    <PlatformTarget>AnyCPU</PlatformTarget>
    <DebugSymbols>true</DebugSymbols>
    <DebugType>full</DebugType>
    <Optimize>>false</Optimize>
    <OutputPath>bin\Debug</OutputPath>
    <DefineConstants>DEBUG;TRACE</DefineConstants>
    <ErrorReport>prompt</ErrorReport>
    <WarningLevel>4</WarningLevel>
```

.csproj

VS i pridruženi fajlovi FW

The screenshot displays the Visual Studio IDE with the following details:







- Code Editor:** Shows `Program.cs` with the following code:

```
2 using System.Collections.Generic;
3 using System.Linq;
4 using System.Text;
5 using System.Threading.Tasks;
6
7 namespace ConsoleApp4_NET_Framework
8 {
9     class Program
10    {
11        static void Main(string[] args)
12        {
13            System.Console.WriteLine("Zdravo Svete");
14            System.Console.ReadKey();
15        }
16    }
17 }
18
```
- Solution Explorer:** Shows the project structure for `ConsoleApp4_NET_Framework`. The `bin` folder contains `Debug` and `Release` subfolders. The `obj` folder contains `Debug` and `TempPE` subfolders. The `Properties` folder contains `AssemblyInfo.cs`. The `Source Files` folder contains `App.config`, `ConsoleApp4_NET_Framework.csproj`, `ConsoleApp4_NET_Framework.sln`, and `Program.cs`.
- Watermark:** A red watermark reading "Solution explorer" is positioned diagonally in the bottom right corner of the image.

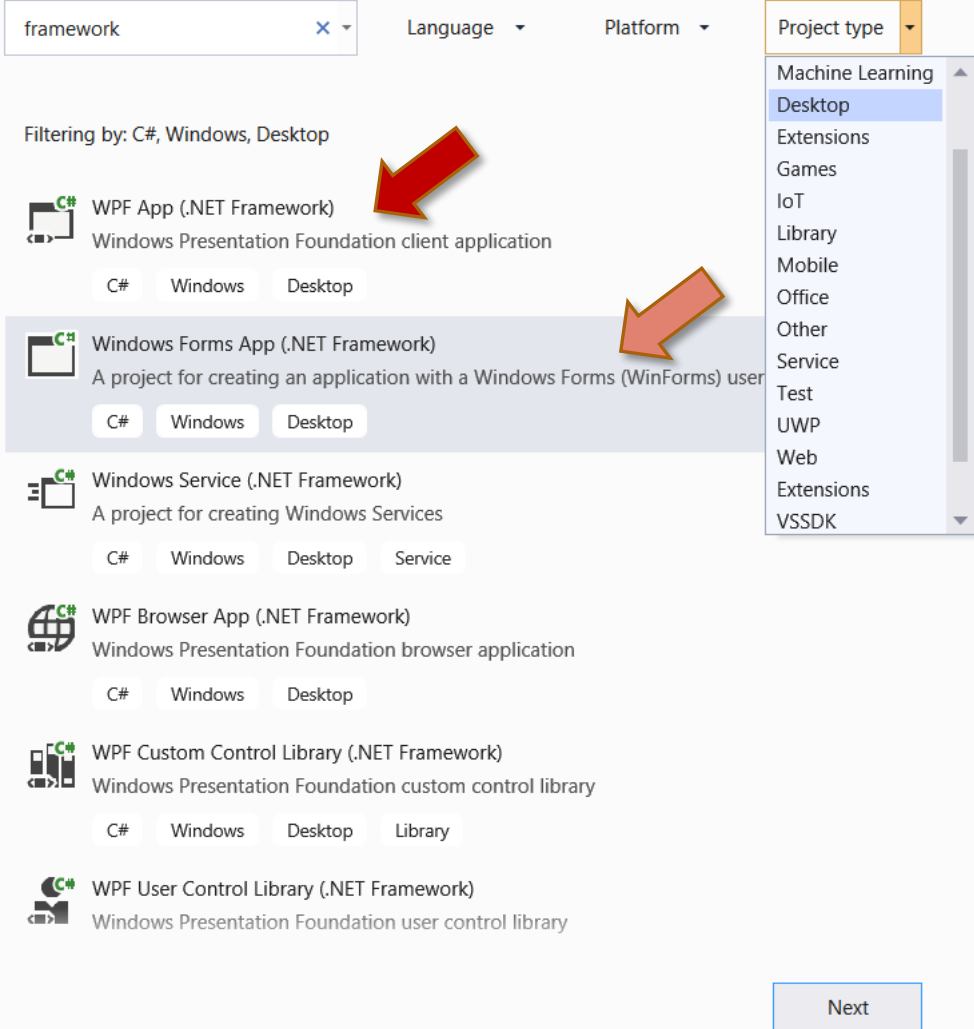
WindowsForm .NET Framework App (1)

Create a new project

Recent project templates

-  Console App (.NET Core) C#
-  ASP.NET Web Application (.NET Framework) C#
-  ASP.NET Web Application (.NET Framework) Visual Basic
-  ASP.NET Core Web Application C#
-  Console App (.NET Framework) C#
-  Mobile App (Xamarin.Forms) C#







**Većina laboratorijskih
vežbi u grafičkom
okruženju se realizuju
ovim tipom aplikacija!**



framework x Language Platform Project type

Machine Learning
Desktop
Extensions
Games
IoT
Library
Mobile
Office
Other
Service
Test
UWP
Web
Extensions
VSSDK

Filtering by: C#, Windows, Desktop

-  WPF App (.NET Framework)
Windows Presentation Foundation client application
C# Windows Desktop
-  Windows Forms App (.NET Framework)
A project for creating an application with a Windows Forms (WinForms) user interface
C# Windows Desktop
-  Windows Service (.NET Framework)
A project for creating Windows Services
C# Windows Desktop Service
-  WPF Browser App (.NET Framework)
Windows Presentation Foundation browser application
C# Windows Desktop
-  WPF Custom Control Library (.NET Framework)
Windows Presentation Foundation custom control library
C# Windows Desktop Library
-  WPF User Control Library (.NET Framework)
Windows Presentation Foundation user control library

Next

WindowsForm .NET Framework App (2)

The screenshot displays the Visual Studio IDE with the following components:

- Toolbox:** A red box highlights the 'Common Controls' section, which includes items like Pointer, Button, CheckBox, ComboBox, DateTimePicker, Label, LinkLabel, ListBox, ListView, MaskedTextBox, MonthCalendar, NotifyIcon, NumericUpDown, PictureBox, ProgressBar, RadioButton, RichText..., TextBox, ToolTip, TreeView, and WebBrow... A tooltip for 'RadioButton' is shown, stating: 'Version 4.7.2.0 from Microsoft Corporation .NET Component Enables the user to select a single option from a group of choices when paired with other RadioButtons.'
- Solution Explorer:** Shows the project 'WindowsFormsApp1' with a tree view of references (Microsoft.CSharp, System, System.Core, System.Data, System.Data.DataSetExtensions, System.Deployment, System.Drawing, System.Net.Http, System.Windows.Forms, System.Xml, System.Xml.Linq) and files (App.config, Form1.cs, Form1.Designer.cs, Form1, Program.cs).
- Properties Window:** Shows 'Form1.cs' File Properties with fields for Build Action (Compile), Copy to Output Directory (Do not copy), Custom Tool, Custom Tool Namespace, File Name (Form1.cs), and Full Path (C:\Users\Zoran\source\repos\W...).
- Design Surface:** A central area labeled 'Form1' where the form is being designed.

DRUGI CIKLUS Laboratorijskih vežbi je zasnovan na WindowsForm Framework/Core aplikacijama!

WebForm .NET Framework aplikacija (1)

The screenshot shows the Visual Studio interface with the 'Create a new ASP.NET Web Application' wizard. The 'Web Forms' template is selected. Annotations include a red arrow pointing to the 'Web Forms' template, and three orange arrows pointing to the 'Authentication', 'Add folders & core references', and 'Advanced' sections. The 'Authentication' section shows 'No Authentication' selected. The 'Add folders & core references' section shows 'Web Forms' checked. The 'Advanced' section shows 'Configure for HTTPS' checked and 'Also create a project for unit tests' checked with the text 'Web_NET_Framework_ASP_Application1.Tests' in the input field. The 'Back' and 'Create' buttons are visible at the bottom.

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 JavaScript, HTML5, CSS3, and more.

Authentication
No Authentication
[Change](#)

Add folders & core references

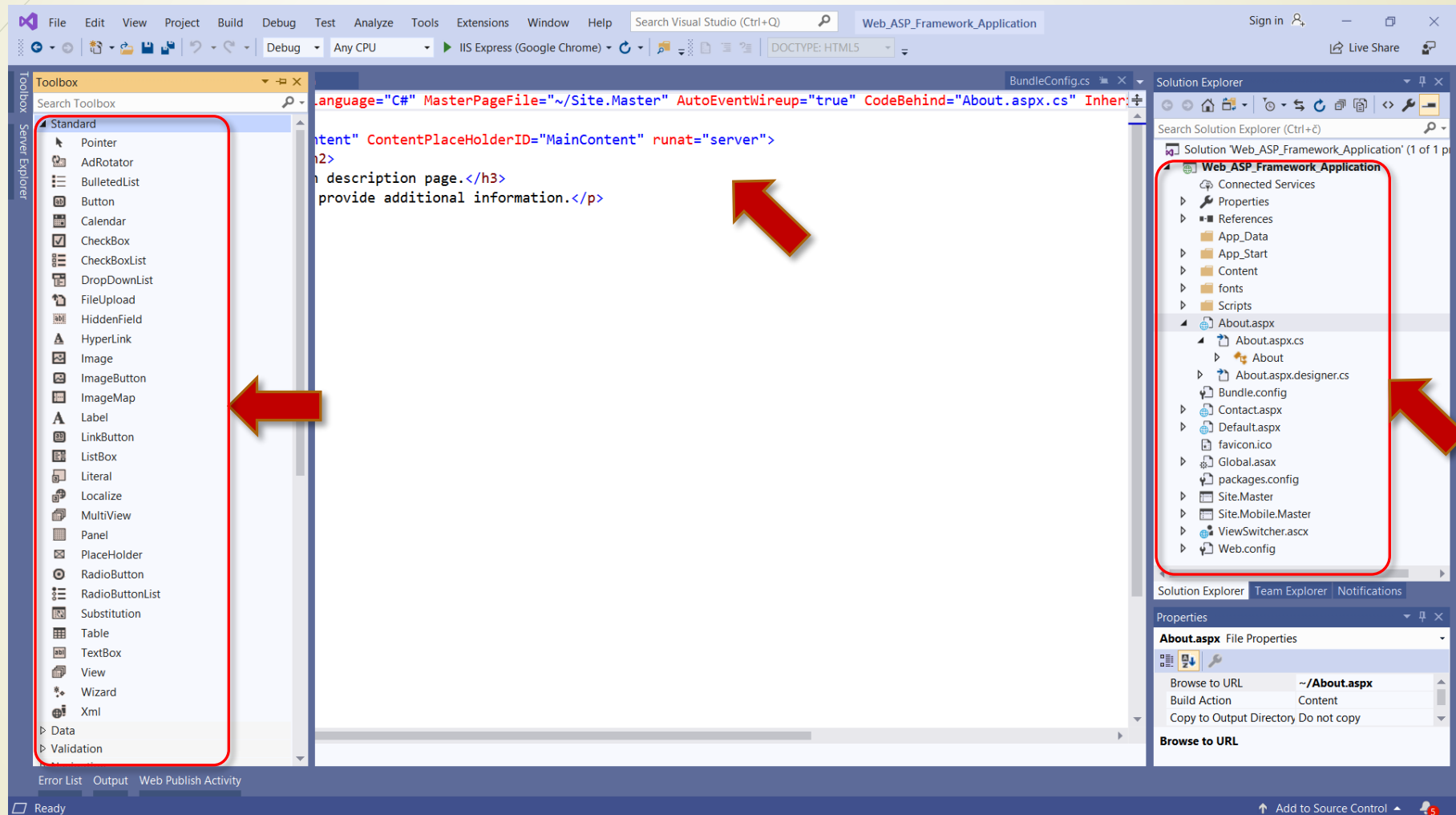
- Web Forms
- MVC
- Web API

Advanced

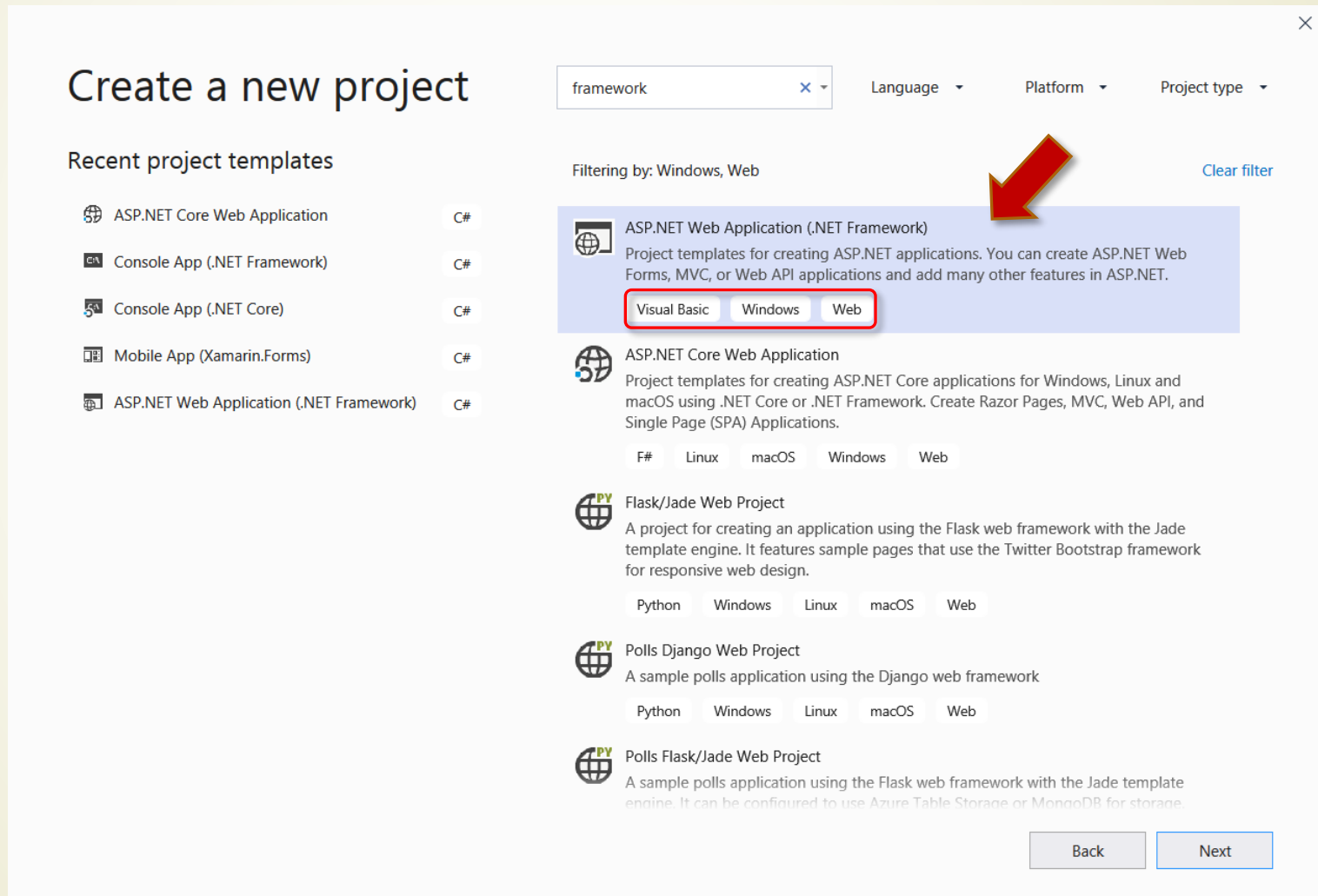
- Configure for HTTPS
- Docker support
(Requires [Docker Desktop](#))
- Also create a project for unit tests
Web_NET_Framework_ASP_Application1.Tests

Back Create

WebForm .NET Framework aplikacija (2)



Web .NET Framework aplikacija (1)



Create a new project

Recent project templates

- ASP.NET Core Web Application C#
- Console App (.NET Framework) C#
- Console App (.NET Core) C#
- Mobile App (Xamarin.Forms) C#
- ASP.NET Web Application (.NET Framework) C#

framework x Language Platform Project type

Filtering by: Windows, Web Clear filter

ASP.NET Web Application (.NET Framework)
Project templates for creating ASP.NET applications. You can create ASP.NET Web Forms, MVC, or Web API applications and add many other features in ASP.NET.

Visual Basic Windows Web

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.

F# Linux macOS Windows Web

Flask/Jade Web Project
A project for creating an application using the Flask web framework with the Jade template engine. It features sample pages that use the Twitter Bootstrap framework for responsive web design.

Python Windows Linux macOS Web

Polls Django Web Project
A sample polls application using the Django web framework

Python Windows Linux macOS Web

Polls Flask/Jade Web Project
A sample polls application using the Flask web framework with the Jade template engine. It can be configured to use Azure Table Storage or MongoDB for storage.

Back Next

Web MVC .NET Framework aplikacija (2)

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

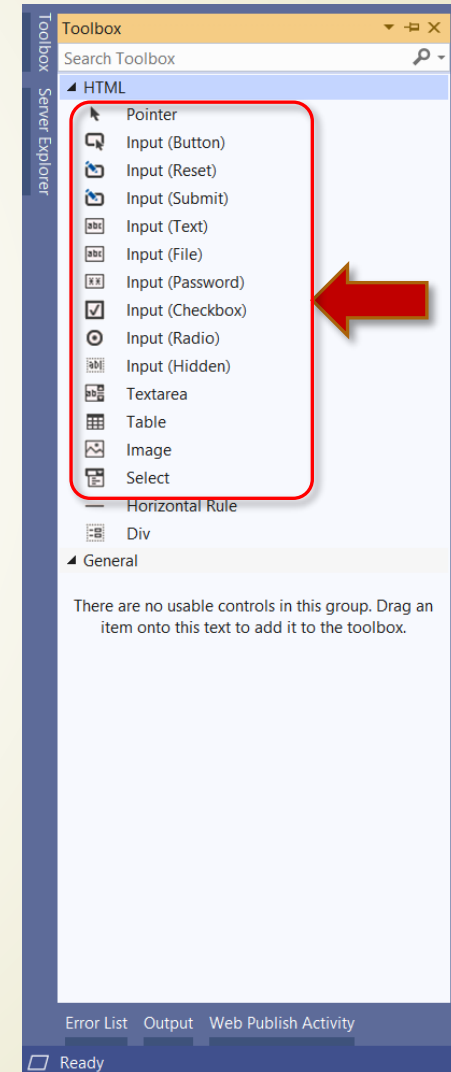
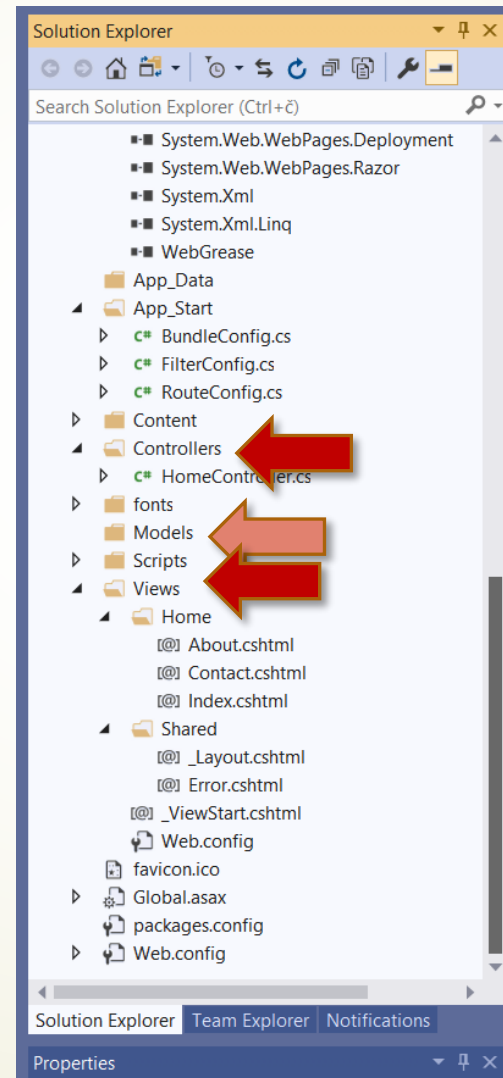
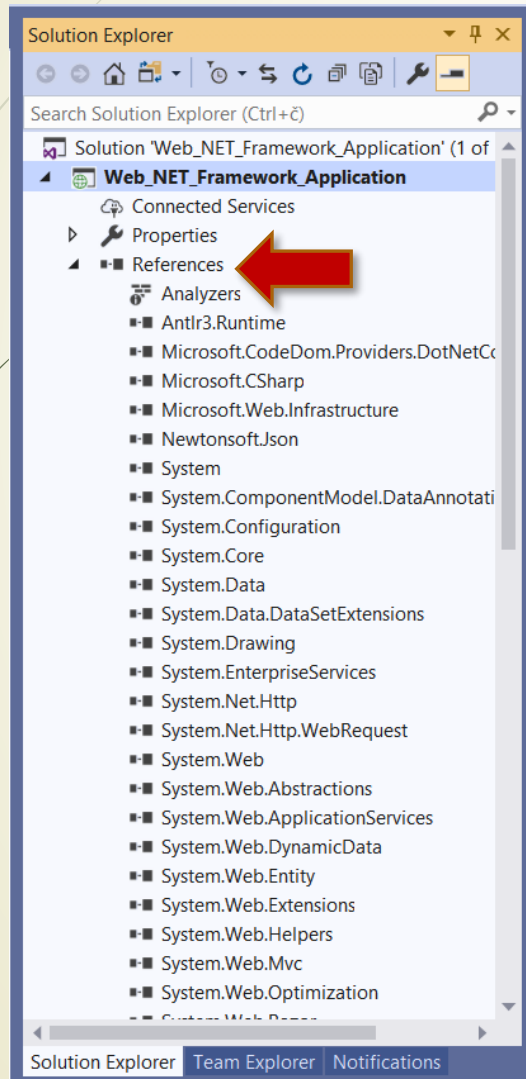
- Configure for HTTPS
- Docker support
(Requires [Docker Desktop](#))
- Also create a project for unit tests

Web_Framework_Application.Tests

Back

Create

Web MVC .NET Framework aplikacija (3)



Web MVC .NET Framework aplikacija (4)

Home Page - My ASP.NET A x +

localhost:44371

Application name Home About Contact

ASP.NET

ASP.NET is a free web framework for building great Web sites and Web applications using HTML, CSS and JavaScript.

[Learn more »](#)

Getting started

ASP.NET MVC gives you a powerful, patterns-based way to build dynamic websites that enables a clean separation of concerns and gives you full control over markup for enjoyable, agile development.

[Learn more »](#)

Get more libraries

NuGet is a free Visual Studio extension that makes it easy to add, remove, and update libraries and tools in Visual Studio projects.

[Learn more »](#)

Web Hosting

You can easily find a web hosting company that offers the right mix of features and price for your applications.

[Learn more »](#)

© 2019 - My ASP.NET Application

Cross-platformske aplikacije

Create a new project

Recent project templates

-  Console App (.NET Framework) C#
-  Console App (.NET Core) C#
-  Mobile App (Xamarin.Forms) C#
-  ASP.NET Core Web Application C#
-  ASP.NET Web Application (.NET Framework) C#

Search for project templates

Language


Platform

Project type


Filtering by: C#, Windows, Console

Core


[Clear filter](#)

 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

 Console App (.NET Framework)
A project for creating a command-line application

C# Windows Console

 Workflow Console Application
A blank Workflow Console Application

C# Windows Console

Podržane platforme

Not finding what you're looking for?
[Install more tools and features](#)

Next

Konzolna cross-platformska aplikacija

```
2
3 namespace ConsoleApp1_Core
4 {
5     0 references
6     class Program
7     {
8         0 references
9         static void Main(string[] args)
10        {
11            Console.WriteLine("Hello World!");
12        }
13    }
```

Toolbox

Search Toolbox

▲ Bootstrap Snippets

There are no usable controls in this group. Drag an item onto this text to add it to the toolbox.

▲ General

There are no usable controls in this group. Drag an item onto this text to add it to the toolbox.

Solution Explorer

Search Solution Explorer (Ctrl+ċ)

Solution 'ConsoleApp1_Core' (1 of 1 project)

- ConsoleApp1_Core
 - Dependencies
 - SDK
 - Microsoft.NETCore.App (2.1)
 - Microsoft.NETCore.DotNetHostPr
 - Microsoft.NETCore.Platforms (2.1
 - Microsoft.NETCore.Targets (2.1.0)
 - Microsoft.CSharp.dll
 - Microsoft.VisualBasic.dll
 - Microsoft.Win32.Primitives.dll
 - mscorlib.dll
 - netstandard.dll
 - System.AppContext.dll
 - System.Buffers.dll
 - System.Collections.Concurrent.dll
 - System.Collections.dll
 - System.Collections.Immutable.dll
 - System.Collections.NonGeneric.dl
 - System.Collections.Specialized.dl
 - System.ComponentModel.Annot
 - System.ComponentModel.DataA
 - System.ComponentModel.dll
 - System.ComponentModel.EventB
 - System.ComponentModel.Primiti
 - System.ComponentModel.TypeC
 - System.Configuration.dll
 - System.Console.dll
 - System.Core.dll
 - System.Data.Common.dll

Cross-platformska Web aplikacija (1)

The screenshot shows the 'Create a new project' dialog in Visual Studio. On the left, under 'Recent project templates', there are five options, all in C#: Console App (.NET Framework), Console App (.NET Core), Mobile App (Xamarin.Forms), ASP.NET Core Web Application, and ASP.NET Web Application (.NET Framework). The main area on the right shows a search for project templates with filters for Language (C#), Platform (Windows), and Project type (Web). The 'ASP.NET Core Web Application' template is highlighted with a blue background and an orange arrow. Below its name, a row of tags includes C#, Windows, Linux, macOS, and Web, with 'C#' and 'Web' circled in red. A red arrow points to the 'ASP.NET Web Application (.NET Framework)' template below it, which also has 'C#' and 'Web' circled in red. At the bottom right, there are 'Back' and 'Next' buttons.

Create a new project

Search for project templates 🔍 Language Platform Project type

Filtering by: C#, Windows, Web [Clear filter](#)

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

ASP.NET Web Application (.NET Framework)
Project templates for creating ASP.NET applications. You can create ASP.NET Web Forms, MVC, or Web API applications and add many other features in ASP.NET.

C# Windows Web

NUnit Test Project (.NET Core)
A project that contains NUnit tests that can run on .NET Core on Windows, Linux and MacOS.

C# Linux macOS Windows Desktop Test Web

Web Driver Test for Edge (.NET Core)
A project that contains unit tests that can automate UI testing of web sites within Edge browser (using Microsoft WebDriver).

C# Windows Web Test

Web Driver Test for Edge (.NET Framework)
A project that contains unit tests that can automate UI testing of web sites within Edge browser (using Microsoft WebDriver).

Back Next

Cross-platformska Web aplikacija (2)

Create a new ASP.NET Core Web Application

.NET Core ASP.NET Core 2.1

- 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**
A project template for creating an ASP.NET Core application with Angular.
- React.js**
A project template for creating an ASP.NET Core application with React.js.
- React.js and Redux**
A project template for creating an ASP.NET Core application with React.js and Redux.

[Get additional project templates](#)

Authentication
No Authentication
[Change](#)

Advanced
 Configure for HTTPS
 Enable Docker Support
(Requires [Docker Desktop](#))

Linux

Author: Microsoft
Source: SDK 2.1.700

Back Create

Cross-platformska Web aplikacija (3)

The image displays a Visual Studio IDE window for a project named 'Web_Core_Application'. The main editor shows the following C# code:

```
2 using System.Collections.Generic;
3 using System.IO;
4 using System.Linq;
5 using System.Threading.Tasks;
6 using Microsoft.AspNetCore;
7 using Microsoft.AspNetCore.Hosting;
8 using Microsoft.Extensions.Configuration;
9 using Microsoft.Extensions.Logging;
10
11 namespace Web_Core_Application
12 {
13     0 references
14     public class Program
15     {
16         0 references | 0 exceptions
17         public static void Main(string[] args)
18         {
19             CreateWebHostBuilder(args).Build().Run();
20         }
21         1 reference | 0 exceptions
22         public static IWebHostBuilder CreateWebHostBuilder(string[] args) =>
23             WebHost.CreateDefaultBuilder(args)
24                 .UseStartup<Startup>();
25     }
26 }
```

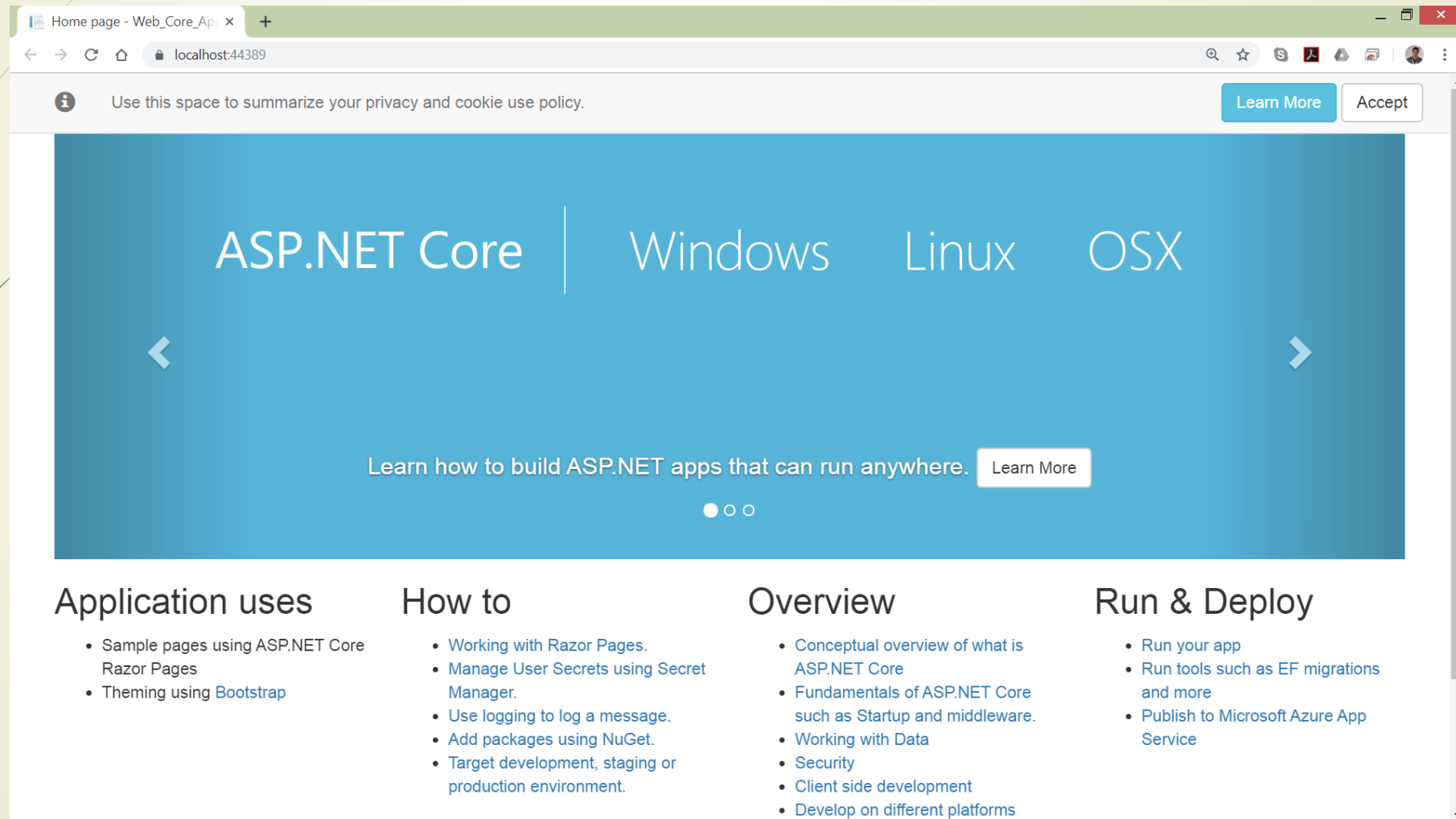
Three orange arrows point to specific elements:

- One arrow points to the `namespace Web_Core_Application` declaration on line 11.
- Another arrow points to the `Startup` class in the `Startup.cs` file, which is partially visible at the bottom of the code editor.
- The third arrow points to the `NuGet` folder in the Solution Explorer on the right.

The Solution Explorer on the right shows the project structure:

- Solution 'Web_Core_Application' (1 of 1 project)
- Web_Core_Application
- Connected Services
- Dependencies
- Analyzers
- NuGet
 - Microsoft.AspNetCore.App (2.1.1)
 - Microsoft.AspNetCore.Razor.Design (2.1.1)
 - SDK
 - Microsoft.AspNetCore.App (2.1.1)
 - Microsoft.NETCore.App (2.1)
- Properties
- wwwroot
 - css
 - images
 - js
 - lib
- favicon.ico
- Pages
- appsettings.json
- Program.cs
- Startup.cs
 - Startup(IConfiguration)
 - Configuration : IConfiguration
 - ConfigureServices(IServiceCollection) : void
 - Configure(IApplicationBuilder, IHostingEnvironment)

Cross-platformska Web aplikacija (4)



Home page - Web_Core_Ap... x +

localhost:44389

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ASP.NET Core | Windows Linux OSX

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Application uses

- Sample pages using ASP.NET Core Razor Pages
- Theming using [Bootstrap](#)

How to

- [Working with Razor Pages.](#)
- [Manage User Secrets using Secret Manager.](#)
- [Use logging to log a message.](#)
- [Add packages using NuGet.](#)
- [Target development, staging or production environment.](#)

Overview

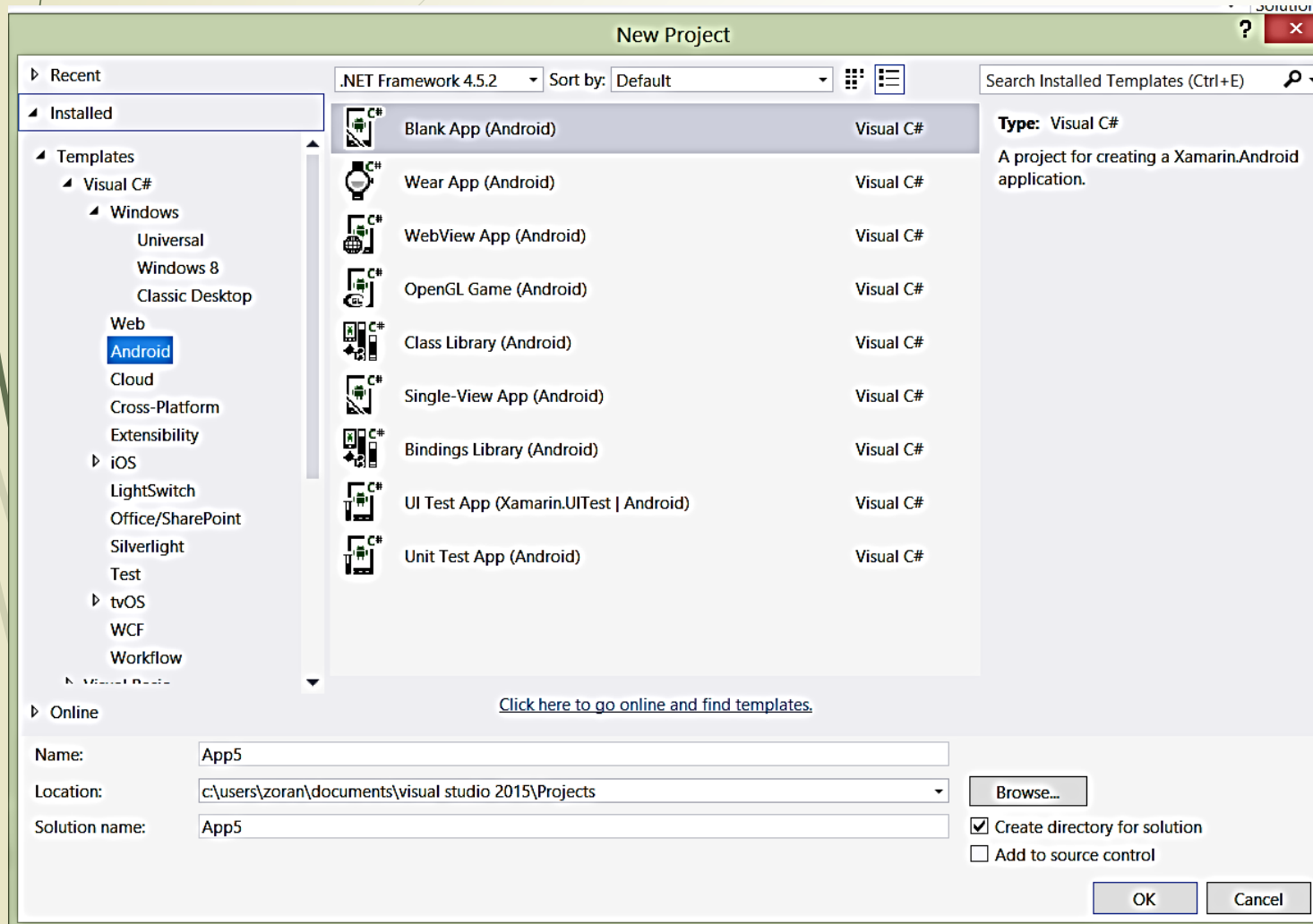
- [Conceptual overview of what is ASP.NET Core](#)
- [Fundamentals of ASP.NET Core such as Startup and middleware.](#)
- [Working with Data](#)
- [Security](#)
- [Client side development](#)
- [Develop on different platforms](#)

Run & Deploy

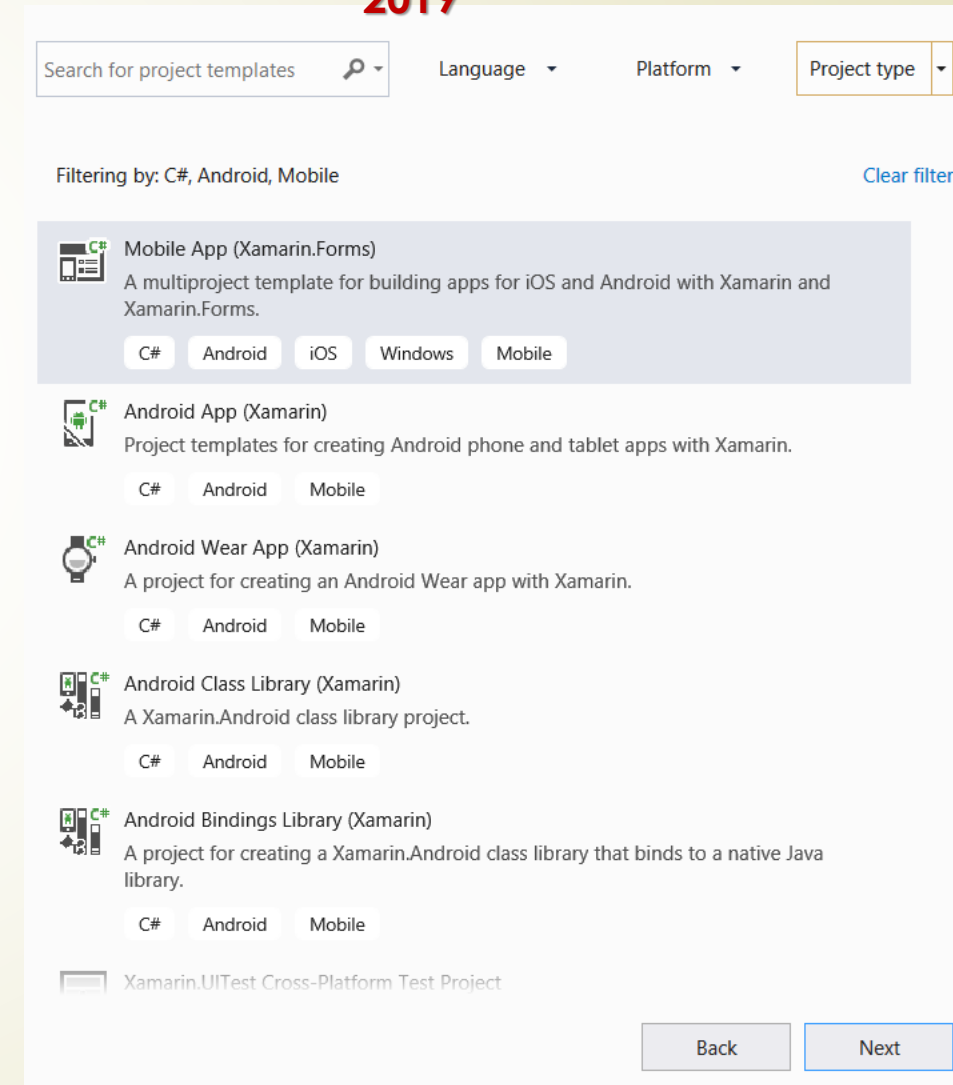
- [Run your app](#)
- [Run tools such as EF migrations and more](#)
- [Publish to Microsoft Azure App Service](#)

Android app. u VS-u (1)

2015



2019



Android app. u VS-u (2)

The screenshot displays the Microsoft Visual Studio IDE for an Android application project named 'App5'. The interface includes a menu bar (File, Edit, View, Project, Build, Debug, Team, Tools, Architecture, Test, Analyze, Window, Help), a toolbar, and a status bar at the bottom showing 'Ready'.

The central area is divided into several panes:

- Code Editor:** Shows the `MainActivity.cs` file with the following code:

```
using Android.App;
using Android.Widget;
using Android.OS;

namespace App5
{
    [Activity(Label = "App5", MainLauncher = true, Icon = "@drawable...
    0 references
    public class MainActivity : Activity
    {
        1 reference
        protected override void OnCreate(Bundle bundle)
        {
            base.OnCreate(bundle);

            // Set our view from the "main" layout resource
            // SetContentView (Resource.Layout.Main);
        }
    }
}
```
- Emulator:** A virtual Android phone is running, displaying a home screen with a Google search bar, a clock, and a 'Gallery' app icon. The time is 8:18.
- Solution Explorer:** Shows the project structure for 'App5', including folders for Properties, References, Components, Assets, Resources, and files like `AboutAssets.txt`, `GettingStarted.Xamarin`, and `MainActivity.cs`.
- Output Window:** Displays the build process logs:

```
Show output from: Build
>>Determining if emulator is already running...
2>Preparing virtual machine...
2>Launching emulator...
2>Emulator launched successfully.
```
- Properties Window:** Shows the 'MainActivity.cs File Properties' with settings for 'Build Action' (Compile), 'Copy to Output Directory' (Do not copy), and 'Custom Tool'.

The status bar at the bottom indicates the system is 'Ready'.

Android app. u VS-u (3)

The screenshot displays the Microsoft Visual Studio interface for an Android application named "App5".

Code Editor (App5.MainActivity.cs):

```
using Android.App;
using Android.Widget;
using Android.OS;

namespace App5
{
    [Activity(Label = "App5", MainLauncher = true, Icon = "@drawable/icon")]
    public class MainActivity : Activity
    {
        protected override void OnCreate(Bundle bundle)
        {
            base.OnCreate(bundle);

            // Set our view from the "main" layout resource
            // setContentView (Resource.Layout.Main);
        }
    }
}
```

Output Window:

```
Show output from: Build
>>Determining if emulator is already running...
>>Preparing virtual machine...
>>Launching emulator...
>>Emulator launched successfully.
```

Virtual Devices:

- The left virtual device shows the app's main screen. The header includes the URL "vtsnis.edu.rs" and the logo of "ВИСОКА ТЕХНИЧКА ШКОЛА СТРУКОВНИХ СТУДИЈА НИШ". Below the header is a blue "Menu" button and a banner for "УПИС 2018/19". The main content area features a photo of students and a text overlay: "КОНКУРСИ ЗА СТУДЕНТСКИ СМЕШТАЈ, КРЕДИТЕ И СТИПЕНДИЈЕ У ШКОЛСКОЈ 2018/2019.".
- The right virtual device shows a numeric keypad with numbers 1-9, 0, *, and #, along with a blue bar at the bottom containing a clock, a phone icon, and a menu icon.

Solution Explorer: Shows the project structure for "App5", including folders for Properties, References, Components, Assets, and Resources, and files for AboutAssets, GettingStarted, and MainActivity.cs.

Properties Window: Shows the properties for the selected file, "MainActivity.cs".

Build Action: Shows the build action for the selected file, "Build Action".