

Akademija tehničko-vaspitačkih strukovnih studija

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.NET tehnologije

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.NET tehnologije

The image shows a screenshot of the Visual Studio IDE. On the left, the Solution Explorer displays the 'Form' class hierarchy, including 'Base Types', 'ContainerControl', and various 'Form' related classes like 'Form.ControlCollection', 'FormBorderStyle', etc. On the right, the Properties window shows the 'Form' class methods, such as 'Dispose(bool)', 'DoDragDrop(object, System.Windows.Forms.DragDropEffects)', 'DrawToBitmap(System.Drawing.Bitmap, System.Drawing.Rectang)', 'EndInvoke(System.IAsyncResult)', 'Equals(object)', 'Equals(object, object)', 'FindForm()', 'Focus()', 'Form()', 'FromChildHandle(System.IntPtr)', 'FromHandle(System.IntPtr)', 'GetAccessibilityObjectById(int)', 'GetAutoScaleSize(System.Drawing.Font)', 'GetAutoSizeMode()', and 'GetChildAtPoint(System.Drawing.Point)'. Overlaid on the bottom right of the screenshot is a diagram showing a central blue circle labeled 'Class Library'. Six blue boxes with arrows point towards this central circle: 'Silver light', 'Windows Phone', 'Xbox 360', 'Windows store apps', 'WPF', and 'Windows'.

Biblioteke baznih klasa .NET-a

FCL, BCL i NuGet

(6)

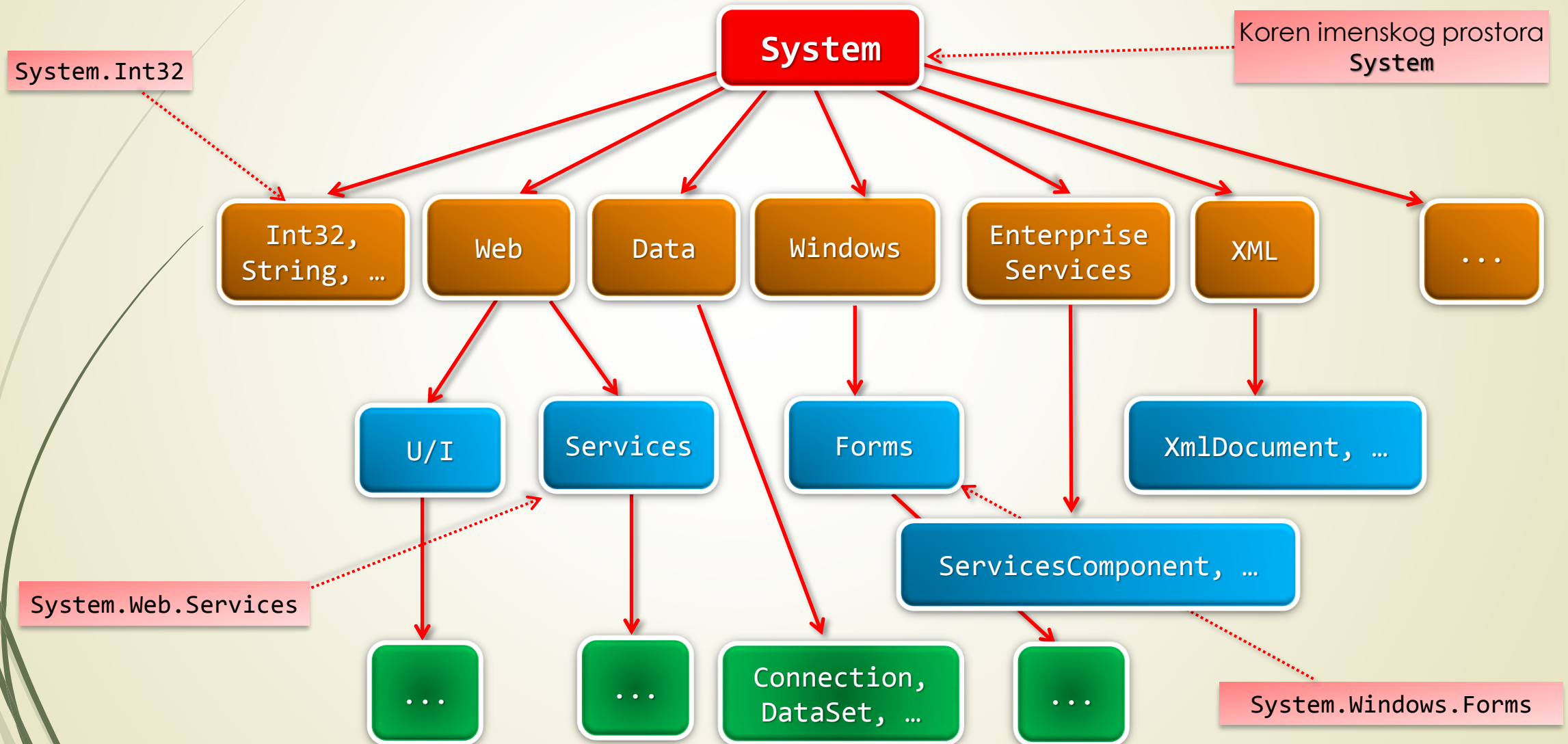
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 - ▶ Događaj **Click**
- ▶ Imenski prostor aplikacije
- ▶ WindowsForms aplikacija

Biblioteka baznih klasa .NET-a

- **BIBLIOTEKA BAZNIH KLASA** .NET-a je **KOLEKCIJA** objektno-orijentisanih **TIPOVA** i **INTERFEJSA** koji obezbeđuju **OBJEKTE MODELA** i **SERVISE** za najrazličitije programske zadatke.
- VEĆINA TIPOVA iz baznih klasa su **PROŠIRIVI**, tako da se mogu graditi **NOVI TIPOVI** koji objedinjuju funkcionalnost upravljivog koda.
- Da li se sećate šta je to **UPRAVLJIV** kod (predavanje 2)?
- Biblioteka **BAZNIH KLASA** je hijerarhijski organizovana u **PROSTORE IMENA**.
- **PROSTOR IMENA** predstavlja **LOGIČKO GRUPISANJE TIPOVA** koji izvršavaju srodne funkcije.
- Slično kao i u Javi, prostori imena u .NET-u su **HIJERARHIJSKI** organizovani, a **KOREN** baznih klasa .NET Frameworka je **PROSTOR IMENA** (imenski prostor) pod nazivom **System**.

Hijerarhija prostora imena .NET-a



Prostor imena u .NET-u / FCL

- ▶ Tako na primer, PROSTOR IMENA pod nazivom **System.Windows.Forms** sadrži **SVE TIPOVE** koji sačinjavaju:
 - ▶ WINDOWS **OBRASCE** (forme) i
 - ▶ WINDOWS **KONTROLE** tih obrazaca.
- ▶ Svim prostorima/podprostorima imena u .NET-u se može PRISTUPITI koristeći **HIJERARHIJU** baznih klasa i **OPERATOR TAČKU** (".").
- ▶ Evo nekoliko primera PROSTORA IMENA uz primenu **TAČKE** kao operatora:
 - ▶ **System**
 - ▶ **System.Data**
 - ▶ **System.Data.SqlClient**
- ▶ U okviru .NET Framework platforme postoji **SKUP SKLOPOVA .NET-a** pod skraćenim nazivom **FCL** (engl. **Framework Class Library**) koji sadrži na hiljade **DEFINICIJE TIPOVA** gde SVAKI TIP poseduje svoju definiciju.

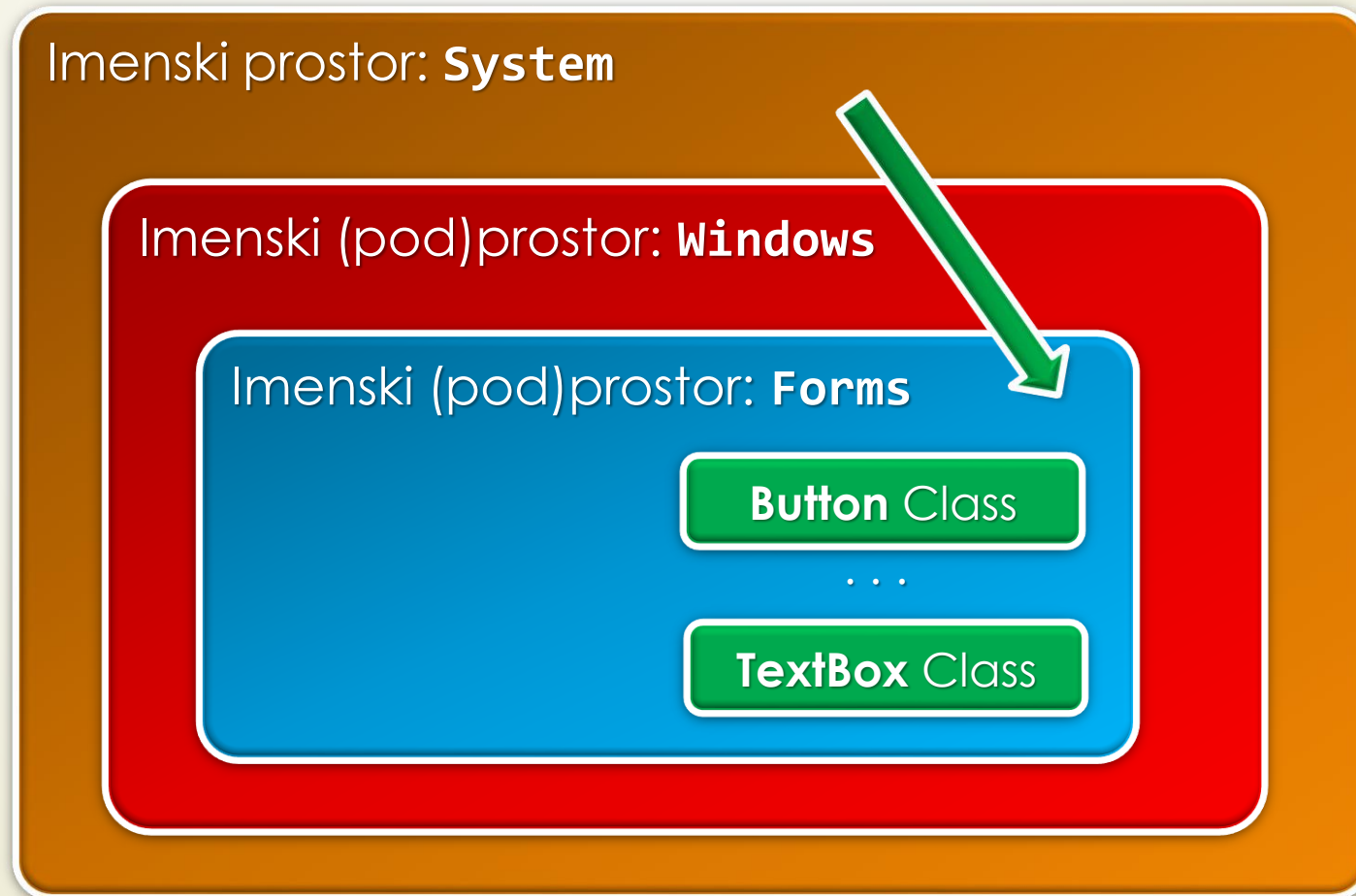


Vrh hijerarhije prostora imena

Dno hijerarhije prostora imena

Imenski prostor klase Button

Imenski prostor tipova vezanih za obrasce (klasa **Button**): **System.Windows.Forms**



Bazne klasa NET-a - izvod

System	Uključuje osnovne klase koje su neophodne gotovo svakom programu. Klase koje pripadaju ovom imenskom prostoru su Object , Char , String , Array i Exception . Ovaj imenski prostor takođe uključuje naprednije klase kao što su GC i AppDomain .
System.IO	Obezbeđuje skup klasa koje podržavaju sinhronu i asinhronu manipulaciju tokovima podataka. Takođe, obezbeđuje klase za manipulaciju fajlovima, kao što je kreiranje, upravljanje i brisanje fajlova i direktorijuma. Neke od tih klasa su FileStream , MemoryStream , Path i Directory .
System.Collections	Uključuje skup klasa koje omogućavaju upravljanje kolekcijama objekta. Neke od tih klasa su ArrayList , DictionaryBase , Hashtable , Queue i Stack .
System.Threading	Uključuje skup klasa koje omogućavaju upravljanje nitima. Neke od tih klasa su Thread , ThreadPool , Mutex i AutoResetEvent .
System.Reflection	Uključuje skup klasa koje omogućavaju upravljanje dinamičkom dodelom memorije i ispitivanje tipova. Neke od tih klasa su Assembly , Module i MethodInfo .
System.Security	Uključuje skup klasa i imenske podprostore koje podržavaju bezbednost . Neke tih imenskih podprostora su Cryptography , Permissions , Policy i Principal .
System.Net	Uključuje skup klasa i imenske podprostore koje podržavaju mrežno programiranje . Neki od tih imenskih podprostora su IPAddress , Dns i HttpWebRequest .
System.Data	Sadrži klase za ADO.NET .

FCL / BCL biblioteke klasa

- **BIBLIOTEKA BAZNIH KLASA BCL** (engl. **Base Class Library**) je **PODSKUP FCL**-a (engl. **Framework Class Library**) i predstavlja **OSNOVNI SKUP KLASA** koje se koriste kao **BAZNI API** (engl. **Application Programming Interface**) CLR-a.
- Klase u **mscorlib.dll**, **System.dll** i **System.core.dll** su dizajnirane da budu deo **BCL**-a i uključuju klase iz imenskih prostora ko što su:
 - **System**, **System.Diagnostics**,
 - **System.Globalization**, **System.Resources**, **System.Text**,
 - **System.Runtime.Serialization**, **System.Data**, ...
- Dakle, biblioteka klasa **FCL** je **NADSKUP BCL klasa** i obuhvata **SVE BIBLIOTEKE KLASA** koje se isporučuju sa .NET Framework-om.
- **FCL** uključuje **PROŠIRENI SKUP BIBLIOTEKA** uključujući **Windows Forms**, **ADO.net**, **ASP.net**, **Language Integrated Query**, **Windows Presentation Foundation (WPF)**, **Windows Communication Foundation (WCF)** i mnoge druge.

.NET FCL biblioteka (1)

- ▶ **CLR** i **FCL** omogućavaju programerima da izrade sledeće vrste aplikacija:
 - ▶ “**XML WEB SERVISI**“, omogućavaju jednostavan pristup do metoda putem Interneta.
 - ▶ XML Web servisi su suština MS .NET tehnologije.
 - ▶ Aplikacije tipa “**WEB FORMS**“ se baziraju na HTML-u.
 - ▶ Ove aplikacije šalju upite BAZAMA PODATAKA i pozivaju Web servise.
 - ▶ Aplikacije “**WINDOWS FORMS**“ su bogate Windows GUI aplikacije.
 - ▶ Koriste razvijene klase za menije, obradu događaja i komuniciraju sa operativnim sistemom.
 - ▶ Deo vežbi biće rađene u ovoj formi aplikacije.
 - ▶ Aplikacije tipa “**WINDOWS CONSOLE**“ imaju male U/I zahteve.
 - ▶ Prve vežbe će biti rađene u ovoj formi Windows aplikacije.

.NET FCL biblioteka (2)

- **WINDOWS SERVISI** služe za izradu servisnih aplikacija koje se koriste posredstvom Windows Service Control Manager-a.
- **BIBLIOTEKA KOMPONENTI**, .NET platforma omogućava izgradnju samostalne komponente (tipova) koje se mogu lako ugraditi u već pomenute aplikacije.
- PROSTOR IMENA, **System** sadrži tipove za **celobrojne vrednosti**, **znakove**, **nizove znakova**, **upravljanje izuzecima**, **konzolu I/O** kao i veliki broj pomoćnih tipova.
- SVE APLIKACIJE koriste tipove definisane u prostoru imena **System**.
- Da bi se pristupilo bilo kom alatu .NET platforme, mora se **ZNATI** koji prostor imena sadrži potrebne tipove.
- **SOPSTVENI TIPOVI PODATAKA** se mogu kreirati jednostavnim **IZVOĐENJEM** iz OSNOVNIH.
- Pored ostalog, mogu se formirati i **SOPSTVENI PROSTORI IMENA!**

Kreiranje sopstvenog imenskog prostora

- Korisnički imenski prostor (engl. *Name Space*) se deklarise ključnom rečju „**namespace**“ iza koje sledi ime imenskog prostora:

```
namespace namespace_name {  
  
    // kod deklaracije  
  
}
```

- **Imena klasa** deklarisanu u **jednom** imenskom prostoru **NISU U SUKOBU** sa istim imenima klasa deklarisanim u **drugom**.
- Da bi se pozvala verzija bilo koje **FUNKCIJE** ili **PROMENLJIVE** iz deklarisanog prostora imena, treba dodati ime prostora imena:

```
namespace_name.item_name;
```

- U C#, prostori imena mogu biti **UGNEŽĐENI** jedan u drugi.

Izvod iz .NET FCL biblioteke

- Pored **OPŠTIH** PROSTORA imena, .NET nudi i **SPECIJALIZOVANE** PROSTORE IMENA koji zavise od **TIPA APLIKACIJE**.
- .NET programski jezici za razliku od jezičko-specifičnih biblioteka koriste **ISTI IMENSKI PROSTOR** i **ISTE TIPOVE**.

SPEC. PROSTORI IMENA	TIP APLIKACIJE
<code>System.Web.Services</code>	Tipovi podataka koji se koriste za izgradnju XML Web servisa .
<code>System.Web.UI</code>	Tipovi podataka korišćeni za gradnju Web Formi .
<code>System.ServiceProcess</code>	Tipovi podataka korišćeni za građenje Windows servisa kontrolisanih SCM -om (engl. <i>Service Control Manager</i>)
<code>System.Windows.Forms</code>	Tipovi podataka korišćeni za građenje Windows GUI aplikacija

.NET klasa Console u imenskom prostoru System

```
// Hello world in C#.
using System;
public class MyApp
{
    static void Main()
    {
        Console.WriteLine("Hi from C#");
    }
}
```

```
' Hello world in VB.
Imports System
Public Module MyApp
    Sub Main()
        Console.WriteLine("Hi from VB")
    End Sub
End Module
```

```
// Hello world in C++/CLI.
#include "stdafx.h"
using namespace System;
int main(array<System::String ^> ^args)
{
    Console::WriteLine(L"Hi from C++/CLI");
    return 0;
}
```


Paket menadžer za .NET - NuGet

- Pored hijerarhijskog prostora imena, savremeni koncept razvoja softvera zahteva i alat koji upravlja korišćenim softverskihko paketa – tzv. **PAKET-MENADŽER**.
- U ovom kontekstu, pod **PAKETIMA** se smatra **KOMPAJLIRANA BIBLIOTEKA** sa nekim deskriptivnim **METAPODACIMA**.
- **NuGet** je zvanični **PAKET-MENADŽER** koji se koristi u .NET-u.
- **NuGet** je **alat** moderne razvojne platforme koji omogućava programerima da: **kreiraju**, **dele** i **koriste** upotrebljiv kod.
- Često se takav kod povezuje u „**PAKETE**“ koji sadrže kompajlirani kod zajedno sa drugim sadržajem potrebnim u projektima koji koriste ove pakete.
- NuGet paket sadrži jednu ZIP datoteku sa ekstenzijom **.nupkg** koja se sastoji od **PREVEDENOG KODA** (DLL) i **INFORMACIJA** kao što je broj verzije paketa.

NuGet - deljiva jedinica koda

- **NuGet** sam obrađuje sve posredne detalje, na primer, ako programer sa kodom koji želi da deli kreira paket i objavi ga na **JAVNOM** ili **PRIVATNOM** hostu.
- **POTROŠAČI PAKETA** zatim dobijaju te pakete od odgovarajućih hostova i **DODAJU IH SVOJIM PROJEKTIMA** i na kraju **POZIVAJU FUNKCIONALNOST** paketa u svom kodu.
- **KOD** NuGet paketa koji je razvila organizacija, **MOŽE SE KORISTITI**, jer podržava privatne hostove zajedno sa javnim **nugget.org** hostom.
- **NuGet** paketi se takođe mogu koristiti na zgodan način za **FAKTORISANJE VAŠEG KODA** koristeći ga u svojim projektima.
- NuGet se smatra **DELJIVOM JEDINICOM KODA**, ali ne zahteva nikakva posebna sredstva za deljenje.
- NuGet paket se instalira u svaku aplikaciju posebno!

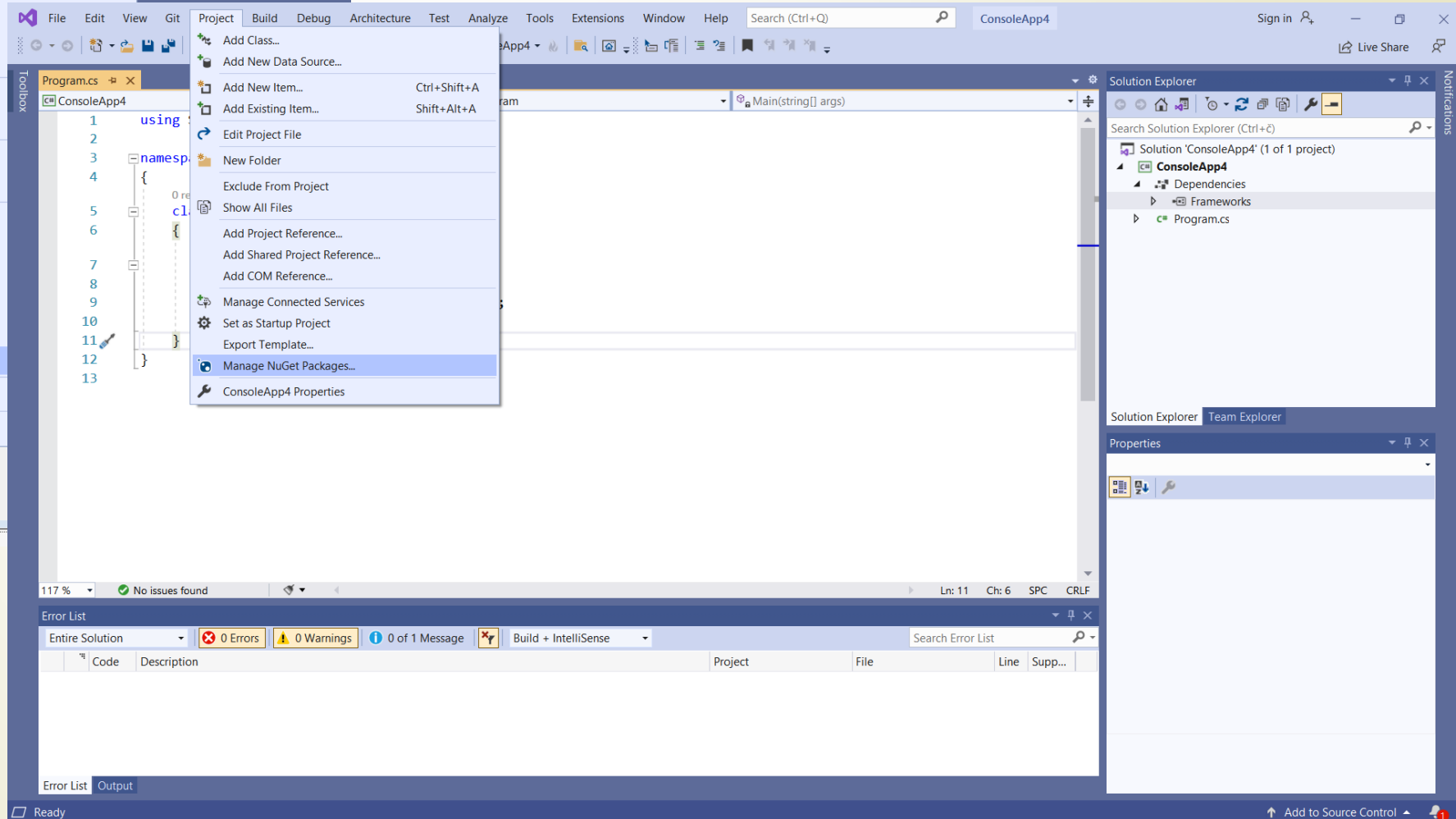
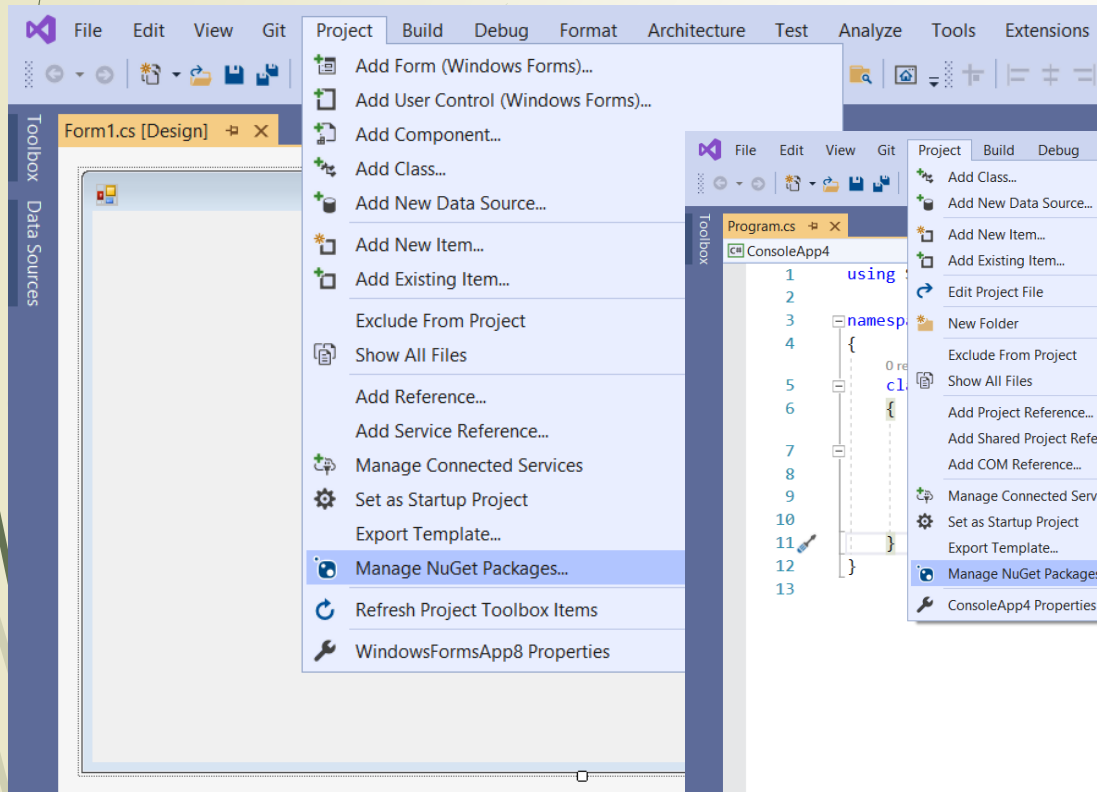


<https://www.nuget.org/>

The image shows the NuGet website homepage. At the top, there is a navigation bar with the following links: Packages, Upload, Statistics, Documentation, Downloads, and Blog. On the right side of the navigation bar, there is a "Sign in" link. The main heading reads "Create .NET apps faster with NuGet". Below the heading is a search bar with the placeholder text "Search for packages...". The central graphic is a stylized illustration of a circuit board with three callout boxes providing statistics:

- 4,987,462 package versions
- 244,411,614,923 package downloads
- 329,817 unique packages

<https://www.nuget.org/>



https://www.nuget.org/

The screenshot shows the Visual Studio interface with the NuGet Package Manager console open. The console is displaying a list of installed packages on the left and the details for the selected package, 'Newtonsoft.Json', on the right. The package details include the version (13.0.1), author (James Newton-King), license (MIT), and project URL. The Solution Explorer on the right shows the project structure with 'Program.cs' selected.

Package Name	Version
Microsoft.EntityFrameworkCore.SqlServer	7.0.0
Microsoft.EntityFrameworkCore	7.0.0
Newtonsoft.Json	13.0.1
Microsoft.EntityFrameworkCore.Tools	7.0.0
Microsoft.EntityFrameworkCore.Design	7.0.0

Newtonsoft.Json Details:

- Version: 13.0.1
- Author(s): James Newton-King
- License: MIT
- Date published: Monday, March 22, 2021 (3/22/2021)
- Project URL: <https://www.newtonsoft.com/json>
- Report Abuse: <https://www.nuget.org/packages/Newtonsoft.Json/13.0.1/ReportAbuse>
- Tags: json

The screenshot shows the Visual Studio Solution Explorer with the project structure expanded. A red arrow points to the 'Packages' folder, which contains the 'Newtonsoft.Json (13.0.1)' package. The Solution Explorer also shows the 'Dependencies', 'Frameworks', and 'Program.cs' files.

Solution Explorer Structure:

- Solution 'ConsoleApp4' (1 of 1 project)
 - ConsoleApp4
 - Dependencies
 - Frameworks
 - Packages
 - Newtonsoft.Json (13.0.1)
 - Program.cs

Direktiva using

- Pokazano je da se za korišćenje definisanog tipa treba koristiti **PUNO IME TIP** zajedno sa PROSTOROM IMENA kome pripada, kao na primer:

```
System.Windows.Forms.Form;
```

- Međutim, korišćenjem **DIREKTIVE** (naredbe) „**using**“ može se **IZOSTAVITI** oznaka prostora imena, odnosno, u prethodnom primeru koristiti (uobičajeno) samo **Form**.
- U C# naredba „**using**“ mora da se pojavi **PRE SVAKOG ELEMENTA** PROSTORA IMENA kao što je **KLASA** (engl. *class*) ili **STRUKTURA** (engl. *struct*).
- Primer korišćenja naredbe **using**:

```
using System.Windows.Forms;
```

Alias prostora imena

- ▶ Ako postoje **DVA TIP**A sa ISTIM IMENOM u više od jednog uvedenog prostora imena, mora se koristiti **POTPUNO OZNAČAVANJE**.
- ▶ U C# se mogu koristiti i **ALIASI** za rešavanja sukoba prostora imena:

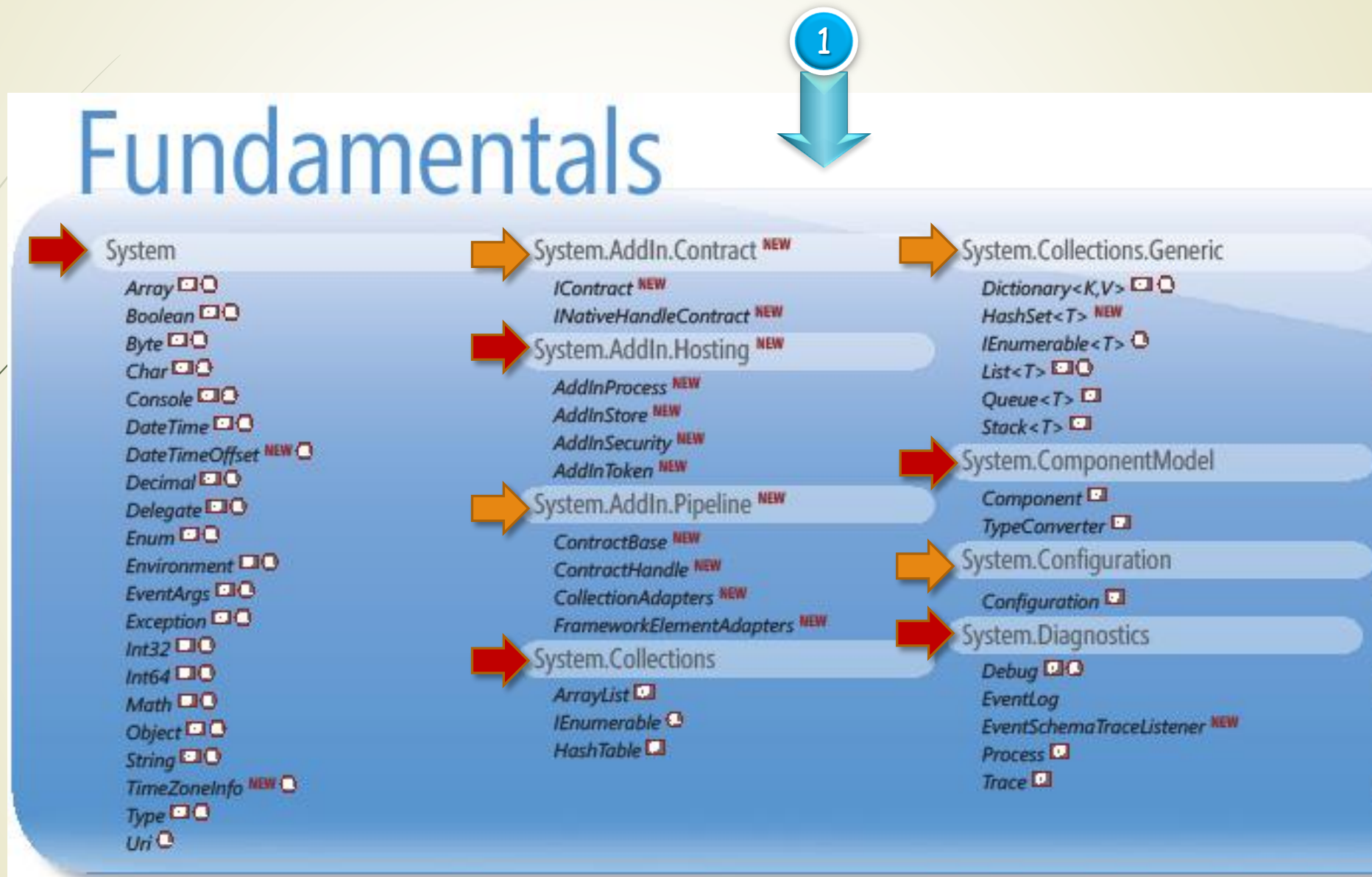
```
using MyAlias = MyNameSpaceTwo.Widget
```

- ▶ Posle implementacije aliasa može se koristiti za poziv na klasu:

```
MyAlias anotherWidget = new MyAlias();
```

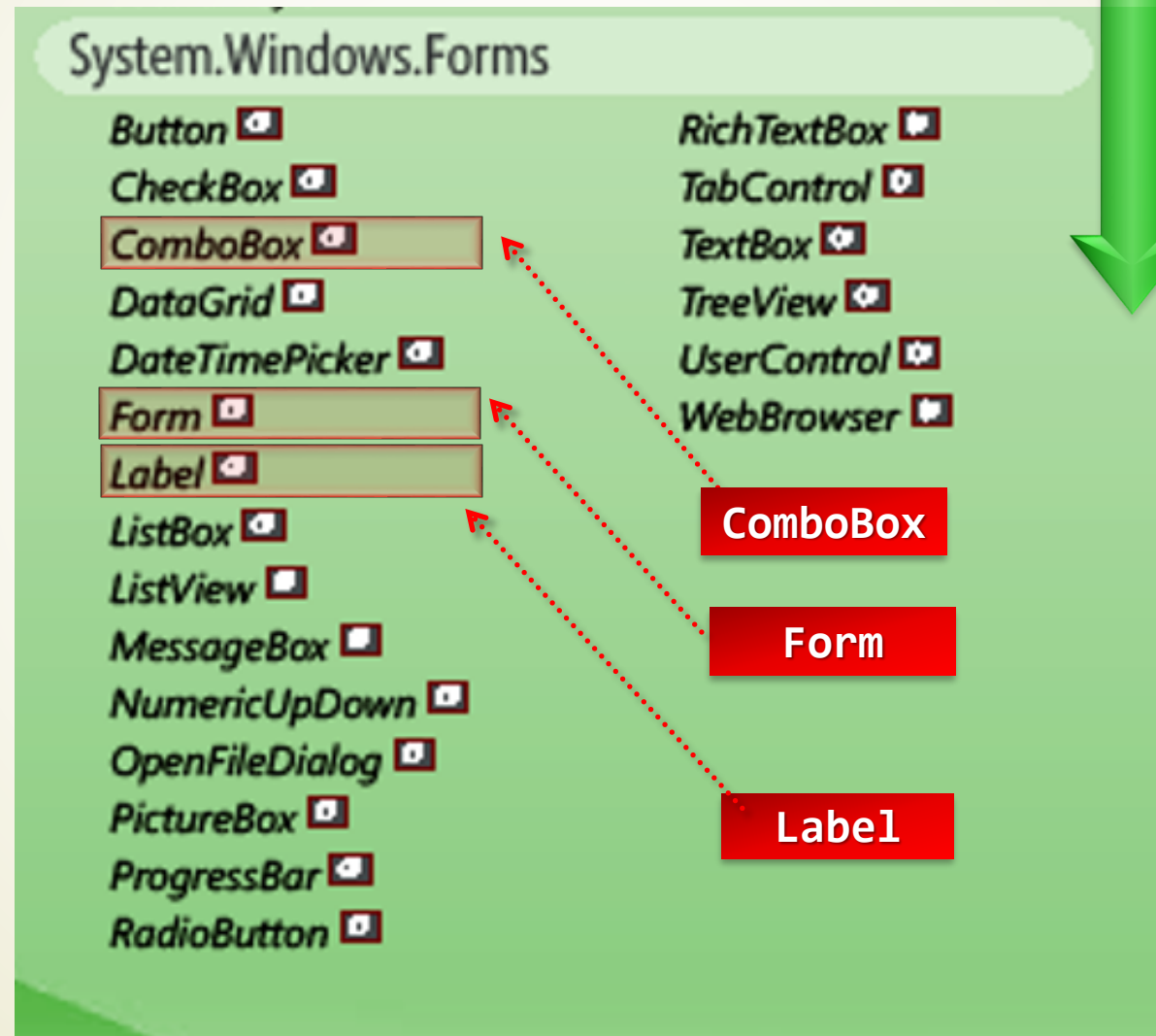
- ▶ Na sledećem slajdu su prikazani **ZAJEDNIČKI TIPOVI** i PROSTOR IMENA (IP) u .NET-u verzije Frameworka 3.5.

Koreni imenski prostor: System



IP: System.Windows.Forms

2



U primerima će biti korišćene klase:

ComboBox

Form

Label

WindowsForm i WindowsGUI APP

- Već je pokazano, klase koje se koriste u dizajnu WindowsFormi su locirane u imenskom prostoru **System.Windows.Forms**.
- Sa druge strane, funkcionalnost **CRTANJA** je locirana u imenskom prostoru **System.Drawing**.
- Tipična **WindowsForm** aplikacija se sastoji od sledećih elemenata:
 - **KONTROLA** (engl. *Controls*) i korisnički definisanih (engl. *user-defined*) kontrola (engl. *UserControls*).
 - **FORMI** (engl. *Forms*) izvedenih iz Container Controla u formi dijaloga MDI (engl. *Multiple Document Interface*).
- Programiranje u grafičkom okruženju Windows-a je zasnovano na **DOGAĐAJIMA**, (obrađivano u JavaScript-u u Internet tehnologijama) što zapravo znači da je klasično skaniranje ulaznih uređaja **ZAMENJENO** ovim konceptom.

Win APP zasnovane na događajima

- ▶ Aplikacija **ČEKA DOGAĐAJ** koji može biti aktiviran (trigerovan) na sledeće načine:
 - ▶ **Korisničkom interakcijom** (engl. *Users*) putem tastature, miša, ...
 - ▶ **Programskim kontrolama** (engl. *Controls*)
 - ▶ **Sistemskim događajima** - Operativnim sistemom (*Idle*, ...)
- ▶ Klasa **Application** je odgovorna za **STRATOVANJE** standardne **APLIKACIONE PETLJE PORUKA** u WindowsForm aplikacijama (VS2008).

```
public sealed class Application
{
    static void Run(Form MainForm);
    static void Exit();
    static event EventHandler ApplicationExit;
    static event EventHandler Idle;
}
```

App petlja WindowsForm 2019

```
using System;
using System.Windows.Forms;

namespace WindowsFormsApp1
{
    static class Program
    {
        /// <summary>
        /// The main entry point for the application.
        /// </summary>
        [STAThread]
        static void Main()
        {
            Application.EnableVisualStyles();
            Application.SetCompatibleTextRenderingDefault(false);
            Application.Run(new Form1());
        }
    }
}
```

Definisanje COM
modela niti

Metode klase
Application

Standardna APLIKACIONA PETLJA PORUKA
u WindowsForm aplikacijama (VS2019)

Obj. Browser: System.Windows.Forms

The screenshot displays the Visual Studio IDE with the Object Browser open. The left pane shows the tree structure of the `System.Windows.Forms` namespace, with `Application` selected. The right pane lists the methods of the `Application` class, with `Run()` highlighted. A red callout box with the text "Metode klase Application" points to the `Run()` method. The Solution Explorer on the right shows the project structure, with `System.Windows.Forms` highlighted. The Properties window is also visible at the bottom right.

Metode klase Application

```
public static void Run()
    Member of System.Windows.Forms.Application
```

Summary:
Begins running a standard application message loop on the current thread, without a form.

Exceptions:
[System.InvalidOperationException](#): A main message loop is already running on this thread.

VS: Pronalaženje IP, klasa, metoda, svostava

The screenshot shows the Visual Studio interface with several key components highlighted by red callouts:

- Object Browser:** Located in the bottom-left pane, it shows the namespace hierarchy. The path `System.Windows.Forms` is expanded, and the `Form` class is selected. A red arrow points from the `Form` class to the `Form()` constructor method.
- Solution Explorer:** Located in the bottom-right pane, it shows the project structure. The `System.Windows.Forms` assembly is highlighted, with a red arrow pointing to its IP: `System.Windows.Forms`.
- Properties Window:** Located at the bottom, it shows the reference properties for `System.Windows.Forms`. The `Misc` section is expanded, showing the `File Type` as `Assembly`.
- Code Editor:** The central pane shows the source code for `Form.cs`. The `Form()` constructor is visible, with a red arrow pointing to its signature: `public Form()`.

Red callout boxes provide additional context:

- Imenski prostor System.Windows.Forms Klasa Form:** Points to the `Form` class in the Object Browser.
- Metode klase Form():** Points to the `Form()` constructor in the Code Editor.
- Object Browser:** Points to the Object Browser pane.
- Solution Explorer Reference:** Points to the `System.Windows.Forms` assembly in the Solution Explorer.
- IP: System.Windows.Forms:** Points to the IP of the `System.Windows.Forms` assembly in the Properties window.

Jednostavna Forma, VS 2008

Kutija sa **alatom** za dizajn

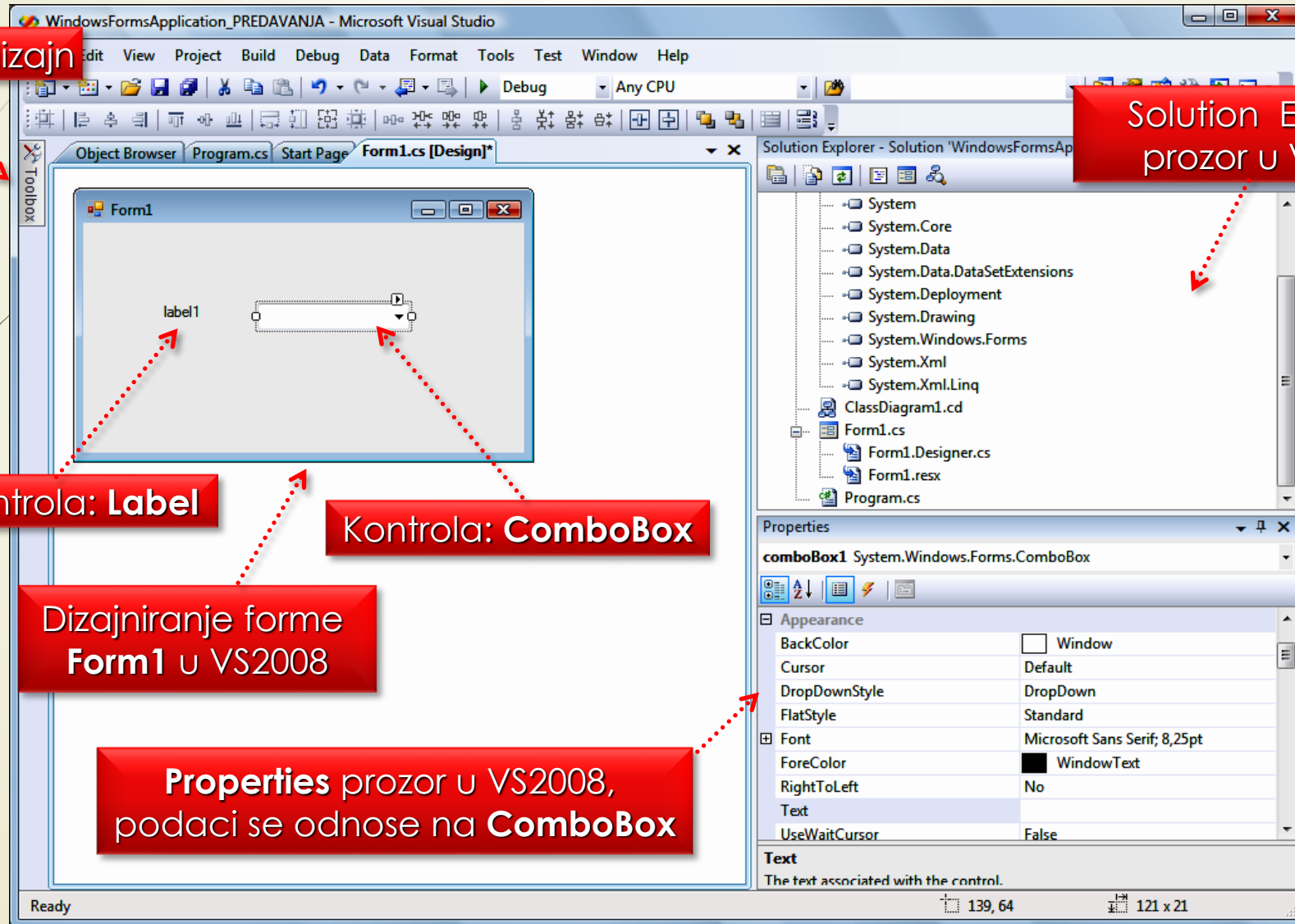
Solution Explorer prozor u VS2008

Kontrola: **Label**

Kontrola: **ComboBox**

Dizajniranje forme **Form1** u VS2008

Properties prozor u VS2008, podaci se odnose na **ComboBox**



Jednostavna Forma, VS 2008

using direktive

Imenski prostor Vaše aplikacije

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Windows.Forms;

namespace WindowsFormsApplication_PREDAVANJA
{
    static class Program
    {
        /// <summary>
        /// The main entry point for the application.
        /// </summary>
        [STAThread]
        static void Main()
        {
            Application.EnableVisualStyles();
            Application.SetCompatibleTextRenderingDefault(false);
            Application.Run(new Form1());
        }
    }
}
```

Ovaj kod formira VS za Vas

Klasa Program sadrži statičku metodu Main()

Klasa Application služi za upravljanje izvršavanjem aplikacije, Run(), zapravo poziva Vaše metode na izvršavanje

Metoda Run iz klase Application

Prozor **Object Browser**
iz VS 2008

Assembly:
System.Windows.Forms

IP

WindowsFormsApplication_PREDAVANJA - Microsoft Visual Studio

File Edit View Project Build Debug Data Tools Test Window Help

Debug Any CPU

Object Browser Program.cs Start Page Form1.cs [Design]*

Browse: All Components

<Search>

System.Web.DynamicData.Design

System.Web.Entity

System.Web.Entity.Design

System.Web.Extensions

System.Web.Extensions.Design

System.Web.Mobile

System.Web.RegularExpressions

System.Web.Routing

System.Web.Services

System.Windows.Forms

System.Resources

System.Windows.Forms

AccessibleEvents

AccessibleNavigation

AccessibleObject

AccessibleRole

AccessibleSelection

AccessibleStates

AmbientProperties

AnchorStyles

Appearance

Application

Base Types

Object

Application.MessageLoopCallback

ApplicationContext

ArrangeDirection

ArrangeStartingPosition

OnThreadException(System.Exce

RaiseIdle(System.EventArgs)

RegisterMessageLoop(System.W

RemoveMessageFilter(System.W

Restart()

Run(System.Windows.Forms.Ap

Run(System.Windows.Forms.Fo

Run()

SetCompatibleTextRenderingDel

SetSuspendState(System.Window

SetUnhandledExceptionMode(Sy

SetUnhandledExceptionMode(Sy

UnregisterMessageLoop()

AllowQuit

CommonAppDataPath

public static void Run()
Member of
[System.Windows.Forms.Application](#)

Summary:
Begins running a standard application message loop on the current thread, without a form.

Exceptions:
[System.InvalidOperationException](#):
A main message loop is already running on this thread.

Solution Explorer - Solution 'WindowsFormsApplication_PREDAVANJ...

System

System.Core

System.Data

System.Data.Data

System.Deployme

System.Drawing

System.Windows

System.Xml

System.Xml.Linq

ClassDiagram1.cd

Form1.cs

Form1.Designer.cs

Form1.resx

Program.cs

Properties

Sve metode, svojstva i događaji klase **Application**. Metoda **Run()** takođe pripada ovoj klasi

Dekleracija izabrane članice, u ovom slučaju metode **Run()**

KLASA **Application** iz imenskog prosrora: **System.Windows.Form**

Članice klase Application

WindowsFormsApplication_PREDAVANJA - Microsoft Visual Studio

File Edit View Project Build Debug Data Tools Test Window Help

Debug Any CPU

Object Browser Program.cs Start Page Form1.cs [Design]*

Browse: All Components

<Search>

- System.Web.DynamicData.Design
- System.Web.Entity
- System.Web.Entity.Design
- System.Web.Extensions
- System.Web.Extensions.Design
- System.Web.Mobile
- System.Web.RegularExpressions
- System.Web.Routing
- System.Web.Services
- System.Windows.Forms
 - System.Resources
 - System.Windows.Forms
 - AccessibleEvents
 - AccessibleNavigation
 - AccessibleObject
 - AccessibleRole
 - AccessibleSelection
 - AccessibleStates
 - AmbientProperties
 - AnchorStyles
 - Appearance
 - Application
 - Base Types
 - Object
 - ApplicationContext
 - ArrangeDirection
 - ArrangeStartingPosition

LocalUserAppDataPath
MessageLoop
OpenForms
ProductName
ProductVersion
RenderWithVisualStyles
SafeTopLevelCaptionFormat
StartupPath
UserAppDataPath
UserAppDataRegistry
UseWaitCursor
VisualStyleState
ApplicationExit
EnterThreadModal
Idle
LeaveThreadModal
ThreadException
ThreadExit

public static event [System.EventHandler](#) ApplicationExit
Member of [System.Windows.Forms.Application](#)

Summary:
Occurs when the application is about to shut down.

Solution Explorer - Solution 'WindowsFormsApplication'

- System
- System.Core
- System.Data
- System.Data.DataSetExtensions
- System.Deployment
- System.Drawing
- System.Windows.Forms
- System.Xml
- System.Xml.Linq
- ClassDiagram1.cd
- Form1.cs
- Form1.Designer.cs
- Form1.resx
- Program.cs

Properties

Prozor Object Browser iz VS 2008

Pridruženi imenski prostori uz Vašu aplikaciju

Događaj ApplicationExit pridružen klasi Application

Opis selektovanog događaja

Koren svih objekta: Object (1)

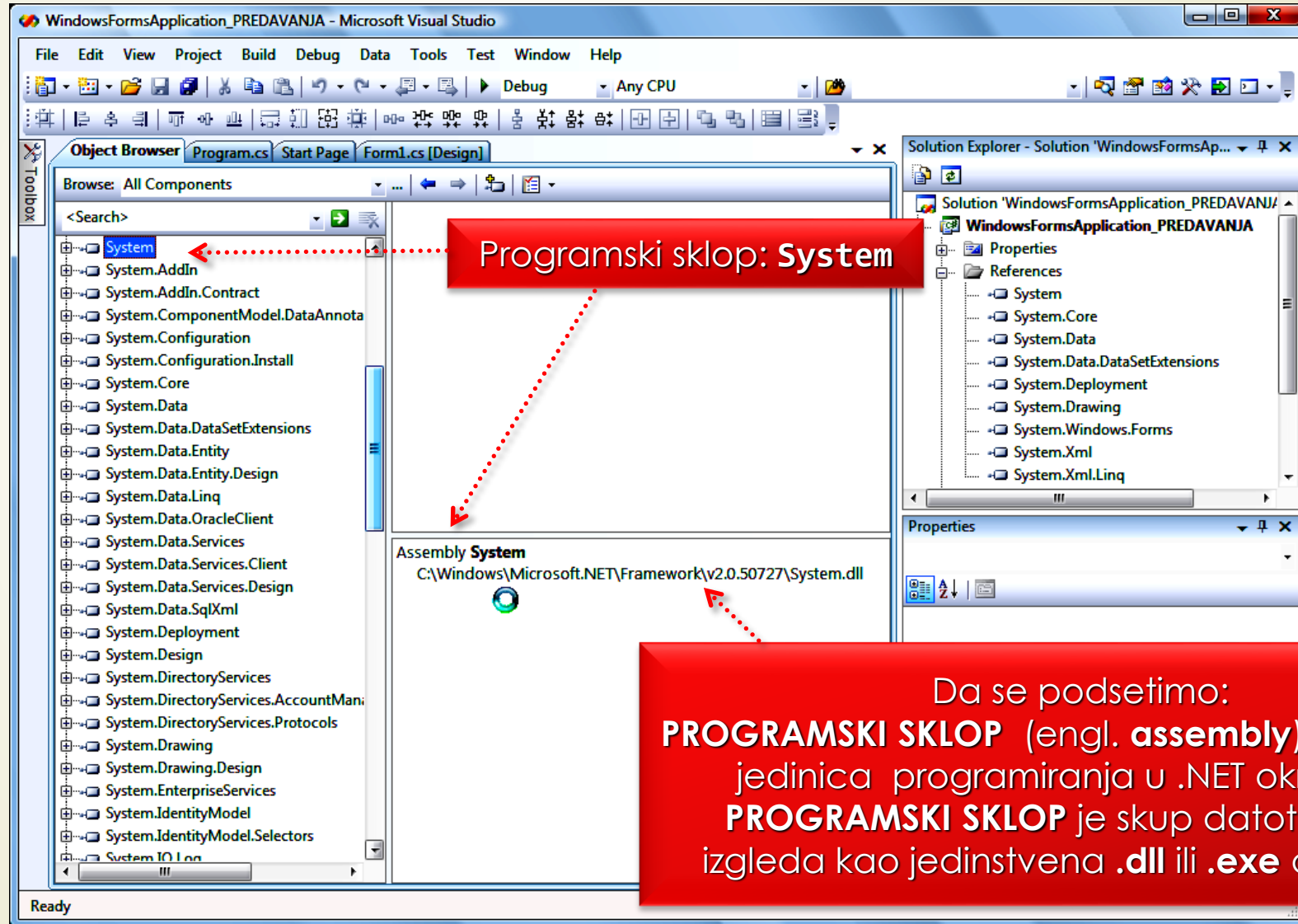
Prozor Object Browser
iz VS 2008

Metode koje se nasleđuju od klase **Object**

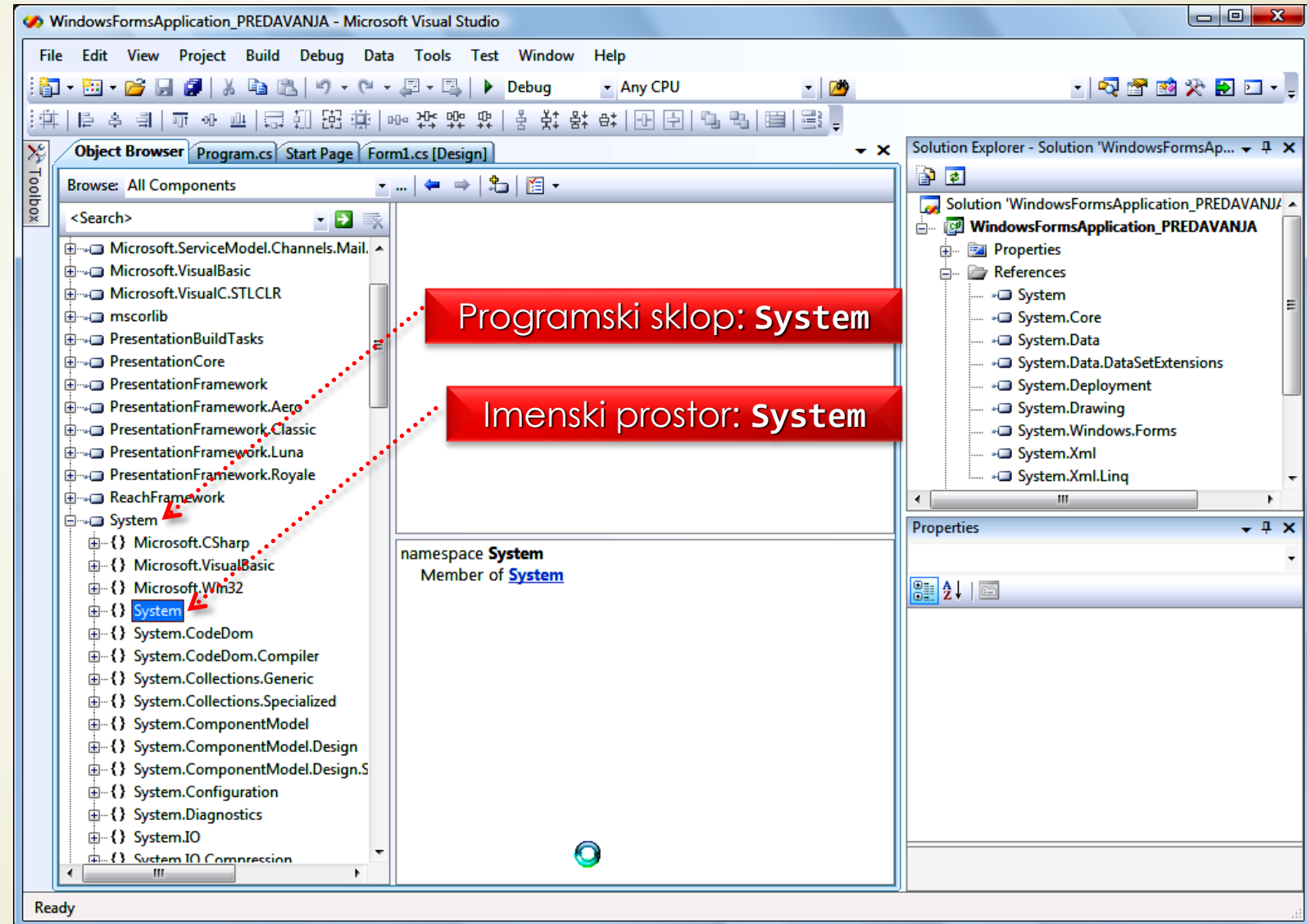
Sećate se, svi objekti poseduju metodu **ToString()**

Svi objekti su izvedeni iz jedne klase pod nazivom **Object** koja se nalazi u Imenskom prostoru **System**

Assembly: System, VS 2008



Imenski prostor: System, VS2008



Assembly: System.Windows.Forms

WindowsFormsApplication_PREDAVANJA - Microsoft Visual Studio

File Edit View Project Build Debug Data Tools Test Window Help

Debug Any CPU

Object Browser Program.cs Start Page Form1.cs [Design]

Browse: All Components

<Search>

- System.Web.Entity
- System.Web.Entity.Design
- System.Web.Extensions
- System.Web.Extensions.Design
- System.Web.Mobile
- System.Web.RegularExpressions
- System.Web.Routing
- System.Web.Services
- System.Windows.Forms**
- System.Resources
- System.Windows.Forms
- System.Windows.Forms.ComponentModel.Com2Interop
- System.Windows.Forms.Design
- System.Windows.Forms.Layout
- System.Windows.Forms.PropertyGridInternal
- System.Windows.Forms.VisualStyles
- System.Windows.Presentation
- System.Workflow.Activities
- System.Workflow.ComponentModel
- System.Workflow.Runtime
- System.WorkflowServices
- System.Xml
- System.Xml.Linq
- UIAutomationClient
- UIAutomationClientsideProviders
- UIAutomationProvider
- UIAutomationTypes
- WindowsBase

Solution Explorer - Solution 'WindowsFormsAp...'

- WindowsFormsApplication_PREDAVANJA
- Properties
- System.Deployment
- System.Drawing
- System.Windows.Forms
- System.Xml
- System.Xml.Linq

Properties

Assembly **System.Windows.Forms**
C:\Windows\Microsoft.NET\Framework\v2.0.50727\System.Windows.Forms.dll

Ready

Programski sklop: **System.Windows.Forms** - biće korišćen u primeru

Lokacija programskog sklopa. Programski sklop je skup datoteka koji izgleda kao jedinstvena .dll ili .exe datoteka.

Imenski pr.: System.Windows.Form

The screenshot shows the Microsoft Visual Studio interface. The main window is titled "WindowsFormsApplication_PREDAVANJA - Microsoft Visual Studio". The menu bar includes File, Edit, View, Project, Build, Debug, Data, Tools, Test, Window, and Help. The toolbar shows various icons for file operations and development. The Object Browser on the left shows the "All Components" view, with the "System.Windows.Forms" namespace selected. The Solution Explorer on the right shows the project structure, including "System.Core", "System.Data", "System.Data.DataSetExtensions", "System.Deployment", "System.Drawing", "System.Windows.Forms", "System.Xml", and "System.Xml.Linq". The Properties window at the bottom right is empty. Two red callout boxes are overlaid on the image: one pointing to "System.Windows.Forms" in the Object Browser, and another pointing to the "namespace System.Windows.Forms" in the Solution Explorer.

Programski sklop: **System.Windows.Form**

Imenski prostor: **System.Windows.Form** - biće korišćen u primeru

ComboBox

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

- Object Browser:** Shows the class hierarchy for `ComboBox`. It is highlighted as a member of `System.Windows.Forms.ListControl`, which inherits from `Control` and `Component`.
- Solution Explorer:** Shows the project structure for `WindowsFormsApplication_PREDAVANJA`, including references to `System`, `System.Core`, `System.Data`, `System.Data.DataSetExtensions`, `System.Deployment`, `System.Drawing`, `System.Windows.Forms`, and `System.Xml.Linq`.
- Properties Window:** Shows the properties of the selected `ComboBox` control.
- Code View:** Displays the definition of the `ComboBox` class, showing it inherits from `System.Windows.Forms.ListControl` and is a member of `System.Windows.Forms`.

Annotations in red callouts provide additional information:

- Klasa ComboBox je članica System.Windows.Forms**: Points to the `ComboBox` class in the Object Browser.
- Članice (metode) klase ComboBox**: Points to the list of methods in the Code View, such as `AddItemsCore`, `BeginUpdate`, `Dispose`, `EndUpdate`, `FindString`, `FindStringExact`, `GetItemHeight`, `IsInputKey`, `OnBackColorChanged`, `OnDataSourceChanged`, `OnDisplayMemberChanged`, `OnDrawItem`, `OnDropDown`, `OnDropDownClosed`, `OnDropDownStyleChanged`, and `OnFontChanged`.
- Objašnjenje**: Points to the `Summary` property of the class, which states: "Represents a Windows combo box control."

Svojstvo BackColor iz ComboBox-a

The screenshot shows the Microsoft Visual Studio interface. The Object Browser window displays the class hierarchy for `ComboBox`, with `BackColor` highlighted. The Solution Explorer window shows the project structure. The Properties window shows the `BackColor` property. A red callout box with the text "Članice - svojstva klase ComboBox: BackColor" points to the `BackColor` property in the Properties window. Another red callout box with the text "Objašnjenje" points to the summary and returns information for the `BackColor` property in the Object Browser.

public virtual [System.Drawing.Color](#)
BackColor { set; get; }
Member of
[System.Windows.Forms.Control](#)

Summary:
Gets or sets the background color for the control.

Returns:
A [System.Drawing.Color](#) that represents the background color of the control. The default is the value of the [System.Windows.Forms.Control.DefaultBackColor](#) or property.

Članice - svojstva klase ComboBox:
BackColor

Objašnjenje

Koren svih objekta: Object (2)

The screenshot shows the Visual Studio interface with the Object Browser open. The left pane shows a tree view of classes, with 'Object' highlighted under 'System'. The right pane shows the code for the 'Object' class, including its constructor and destructor. Red callout boxes with arrows point to specific parts of the code and the tree view.

Destruktor klase Object

Konstruktor klase Object

Metode koje se nasleđuju od klase Object

Svi objekti su izvedeni iz klase Object

```
public class Object
    Member of System

Summary:
Supports all classes in the .NET Framework class hierarchy and provides low-level services to derived classes. This is the ultimate base class of all classes in the .NET Framework; it is the root of the type hierarchy.

~Object()
Equals(object, object)
Equals(object)
GetHashCode()
GetType()
MemberwiseClone()
Object()
ReferenceEquals(object, object)
ToString()
```

Imenski prostor aplikacije (1)

Imenski prostor Vaše aplikacije

```
using System;
using System.Collections.Generic;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Linq;
using System.Text;
using System.Windows.Forms;

namespace WindowsFormsApplication_PREDAVANJA
{
    public partial class Form1 : Form
    {
        public Form1()
        {
            InitializeComponent();
        }

        private void Form1_Load(object sender, EventArgs e)
        {
        }

        private void label1_Click(object sender, EventArgs e)
        {
        }
    }
}
```

Klase i metode (za obradu događaja) koje pripadaju Imenskom prostoru Vaše aplikacije

Ready Ln 12 Col 5 Ch 5 INS

Imenski prostor aplikacije (2)

```
namespace WindowsFormsApplication_PREDAVANJA
{
    partial class Form1
    {
        /// <summary>
        /// Required designer variable.
        /// </summary>
        private System.ComponentModel.IContainer components = null;

        /// <summary>
        /// Clean up any resources being used.
        /// </summary>
        /// <param name="disposing">true if managed resources should be
        protected override void Dispose(bool disposing) {...}

        #region Windows Form Designer generated code

        /// <summary>
        /// Required method for Designer support - do not modify
        /// the contents of this method with the code editor.
        /// </summary>
        private void InitializeComponent() {...}

        #endregion

        private System.Windows.Forms.Label label1;
        private System.Windows.Forms.ComboBox comboBox1;
    }
}
```

VS2008 i automatsko generisanje koda sa direktivama #region koje taj deo obeležavaju

Imenski prostor aplikacije (3)

WindowsFormsApplication_PREDAVANJA - Microsoft Visual Studio

File Edit View Refactor Project Build Debug Data Tools Test Window Help

Debug Any CPU

ClassDiagram1.cd* Start Page Object Browser Form1.cs Form1.Designer.cs Program.cs

WindowsFormsApplication_PREDAVANJA.Form1 InitializeComponent()

```
/// </summary>
private void InitializeComponent()
{
    this.label1 = new System.Windows.Forms.Label();
    this.comboBox1 = new System.Windows.Forms.ComboBox();
    this.SuspendLayout();
    //
    // label1
    //
    this.label1.AutoSize = true;
    this.label1.Location = new System.Drawing.Point(62, 64);
    this.label1.Name = "label1";
    this.label1.Size = new System.Drawing.Size(35, 13);
    this.label1.TabIndex = 0;
    this.label1.Text = "label1";
    this.label1.Click += new System.EventHandler(this.label1_Click);
    //
    // comboBox1
    //
    this.comboBox1.DisplayMember = "LIXA";
    this.comboBox1.FormattingEnabled = true;
    this.comboBox1.Items.AddRange(new object[] {
        "Zoran",
        "Veličković",
        "Profesor"});
    this.comboBox1.Location = new System.Drawing.Point(139, 64);
    this.comboBox1.Name = "comboBox1";
    this.comboBox1.Size = new System.Drawing.Size(121, 21);
    this.comboBox1.TabIndex = 1;
    this.comboBox1.SelectedIndexChanged += new System.EventHandler(this.comboBox1_SelectedIndexChanged);
    //
}
```

Solution Explorer - Solution 'WindowsFormsApplicatio...'

System.Data

Form1.cs

Form1.Designer.cs

Form1.resx

Program.cs

Properties

Ready Ln 29 Col 44 Ch 44 INS

Otvoreni deo programskog koda koji je automatski generisao VS2008, deo koji se odnosi na **ComboBox**

Rutine za obradu događaja

WindowsForms aplikacija (1)

Start Page - Microsoft Visual Studio

File Edit View Debug Team Tools Architecture Test Analyze Window Help

Start Page Object Browser

Visual Studio

Start

New Project...

Open Project...

Open from Source Control...

Recent

ConsoleApplication1

WebApplication1

WebApplication5

App3

App1

App2

Xamarin1

Xamarin3

Xamarin2

OperatorOverloading

New Project

.NET Framework 4.5.2 Sort by: Default Search Installed Templates (Ctrl+E)

Template	Type	Description
Windows Forms Application	Visual C#	Type: Visual C# A project for creating an application with a Windows Forms user interface
WPF Application	Visual C#	
Console Application	Visual C#	
Shared Project	Visual C#	
Class Library	Visual C#	
Class Library (Portable)	Visual C#	

Recent

Installed

Templates

- Visual C#
 - Windows
 - Web
 - Android
 - Cloud
 - Cross-Platform
 - Extensibility
- iOS
 - LightSwitch
 - Office/SharePoint
 - Silverlight
 - Test
- tvOS
 - WCF
 - Workflow
- Visual Basic
- Visual F#
- Visual C++

Online

Name: WindowsFormsApplication1

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

Solution name: WindowsFormsApplication1

Create directory for solution

Add to source control

OK Cancel

Output

Show output from:

WindowsForms aplikacija (2)

WindowsFormsApplication1 - Microsoft Visual Studio

File Edit View Project Build Debug Team Format Tools Architecture Test Analyze Window Help

Debug Any CPU Start

Form1.resx* Form1.Designer.cs* Form1.cs* Form1.cs [Design]*

Server Explorer Toolbox Data Sources

Form1

label1

button1

Solution Explorer

Search Solution Explorer (Ctrl+ĉ)

- App.config
- Form1.cs
 - Form1.Designer.cs
 - Form1
 - WindowsFormsApplication1.Form1
 - button1_Click(object, EventArgs): void
 - components: IContainer
 - Dispose(bool): void
 - InitializeComponent(): void
 - button1: Button
 - textBox1: TextBox
 - label1: Label
- Form1.resx
 - Form1
 - Form10
 - button1_Click(object, EventArgs): void
 - components: IContainer
 - Dispose(bool): void
 - InitializeComponent(): void
 - button1: Button
 - textBox1: TextBox
 - label1: Label
- c# Program.cs

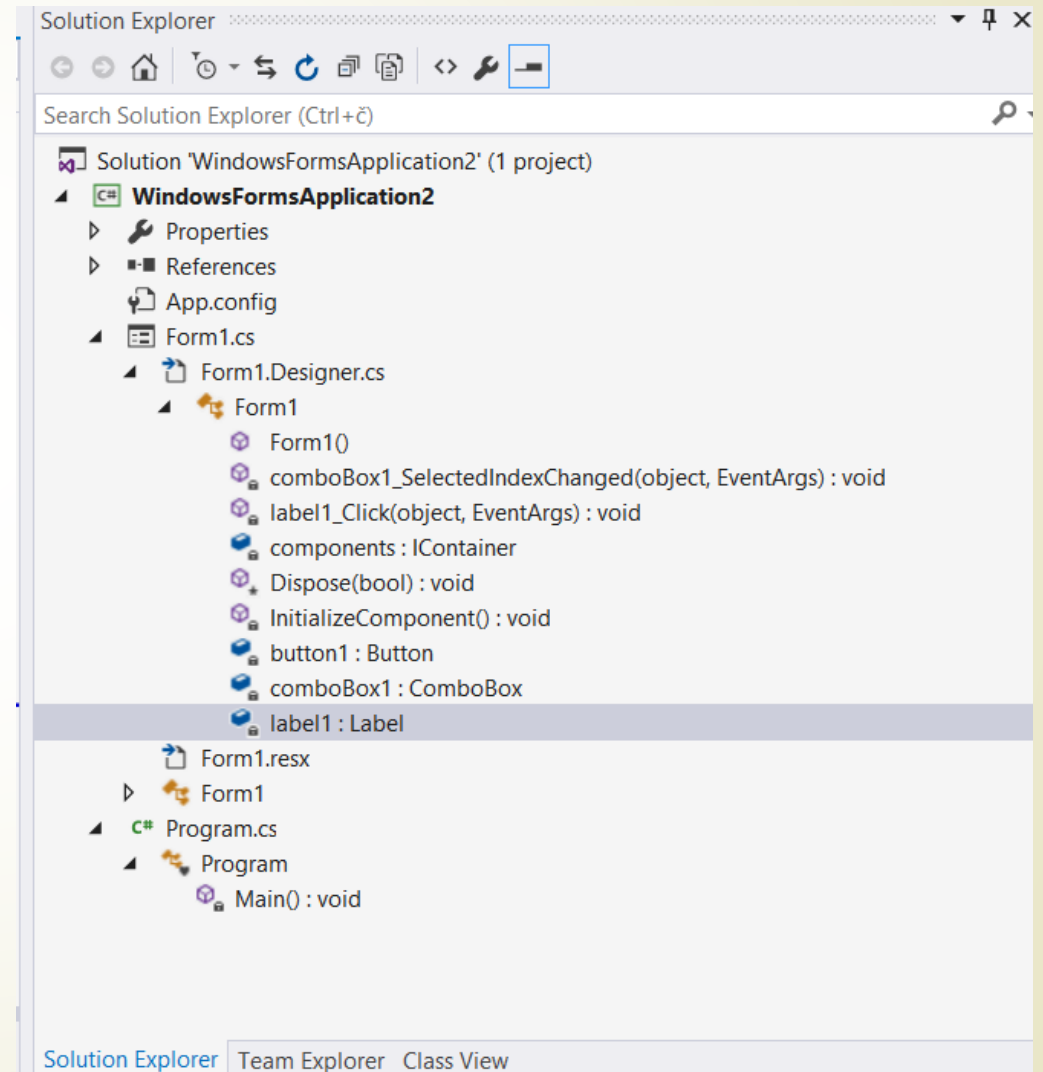
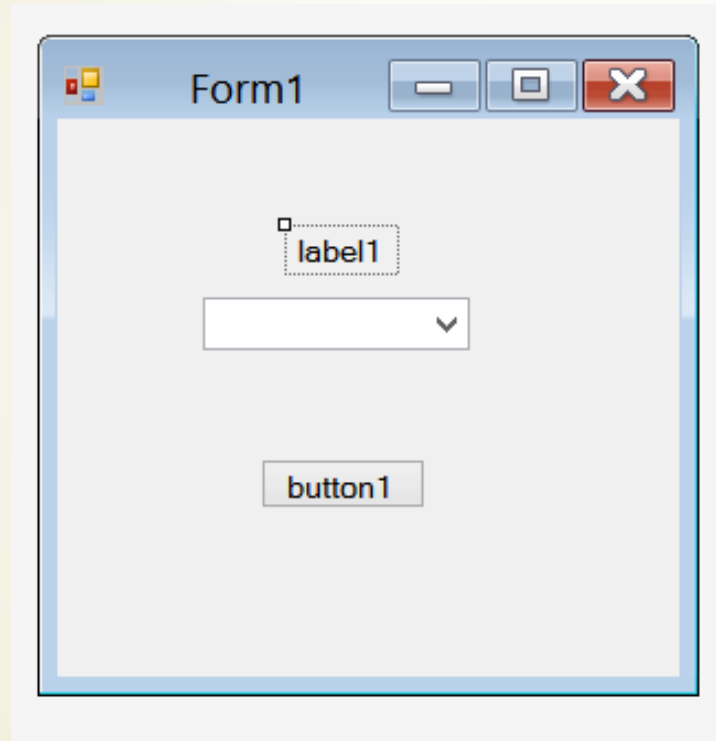
Properties

button1 System.Windows.Forms.Button

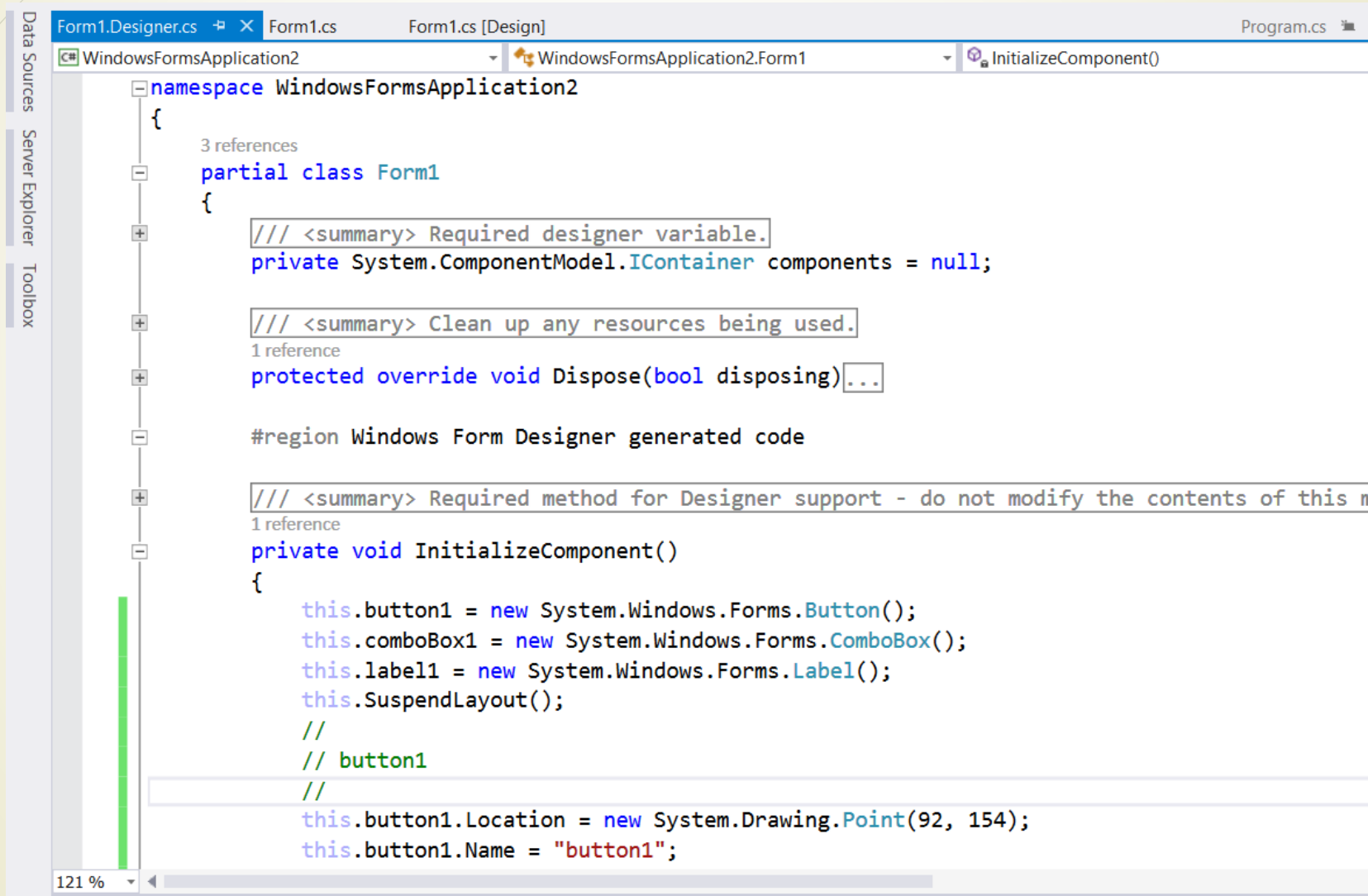
ImageAlign MiddleCenter
ImageIndex (none)
ImageKey (none)
ImageList (none)
RightToLeft No
Text **button1**

Text
The text associated with the control.

Design: izgled WinForm APP



WindowsForms aplikacija (1)



```
Form1.Designer.cs  Form1.cs  Form1.cs [Design]  Program.cs
WindowsFormsApplication2  WindowsFormsApplication2.Form1  InitializeComponent()

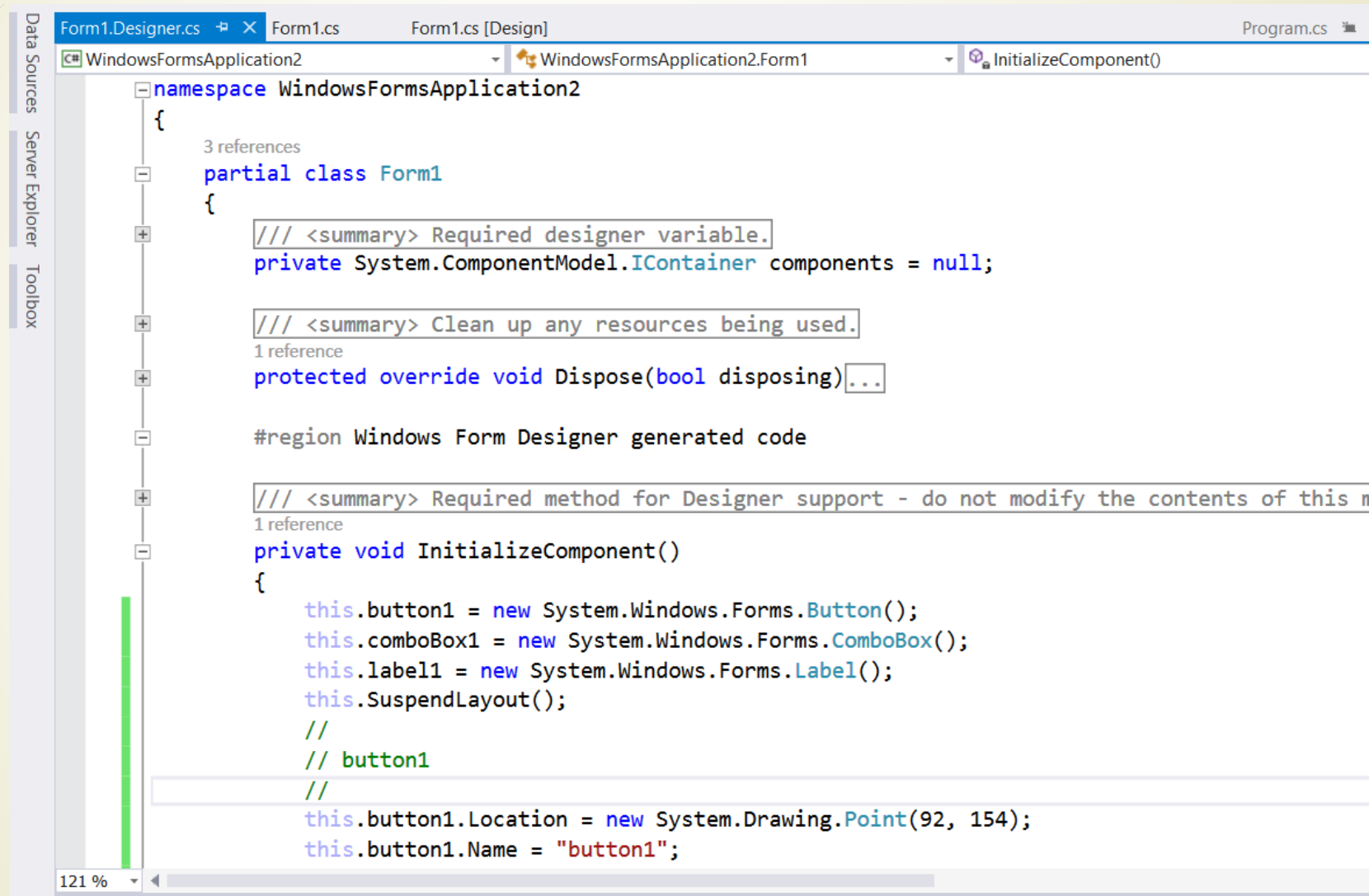
namespace WindowsFormsApplication2
{
    3 references
    partial class Form1
    {
        /// <summary> Required designer variable.
        private System.ComponentModel.IContainer components = null;

        /// <summary> Clean up any resources being used.
        1 reference
        protected override void Dispose(bool disposing) ...

        #region Windows Form Designer generated code

        /// <summary> Required method for Designer support - do not modify the contents of this m
        1 reference
        private void InitializeComponent()
        {
            this.button1 = new System.Windows.Forms.Button();
            this.comboBox1 = new System.Windows.Forms.ComboBox();
            this.label1 = new System.Windows.Forms.Label();
            this.SuspendLayout();
            //
            // button1
            //
            this.button1.Location = new System.Drawing.Point(92, 154);
            this.button1.Name = "button1";
        }
    }
}
```


WindowsForms aplikacija (2)



```
Form1.Designer.cs  Form1.cs  Form1.cs [Design]  Program.cs
WindowsFormsApplication2  WindowsFormsApplication2.Form1  InitializeComponent()

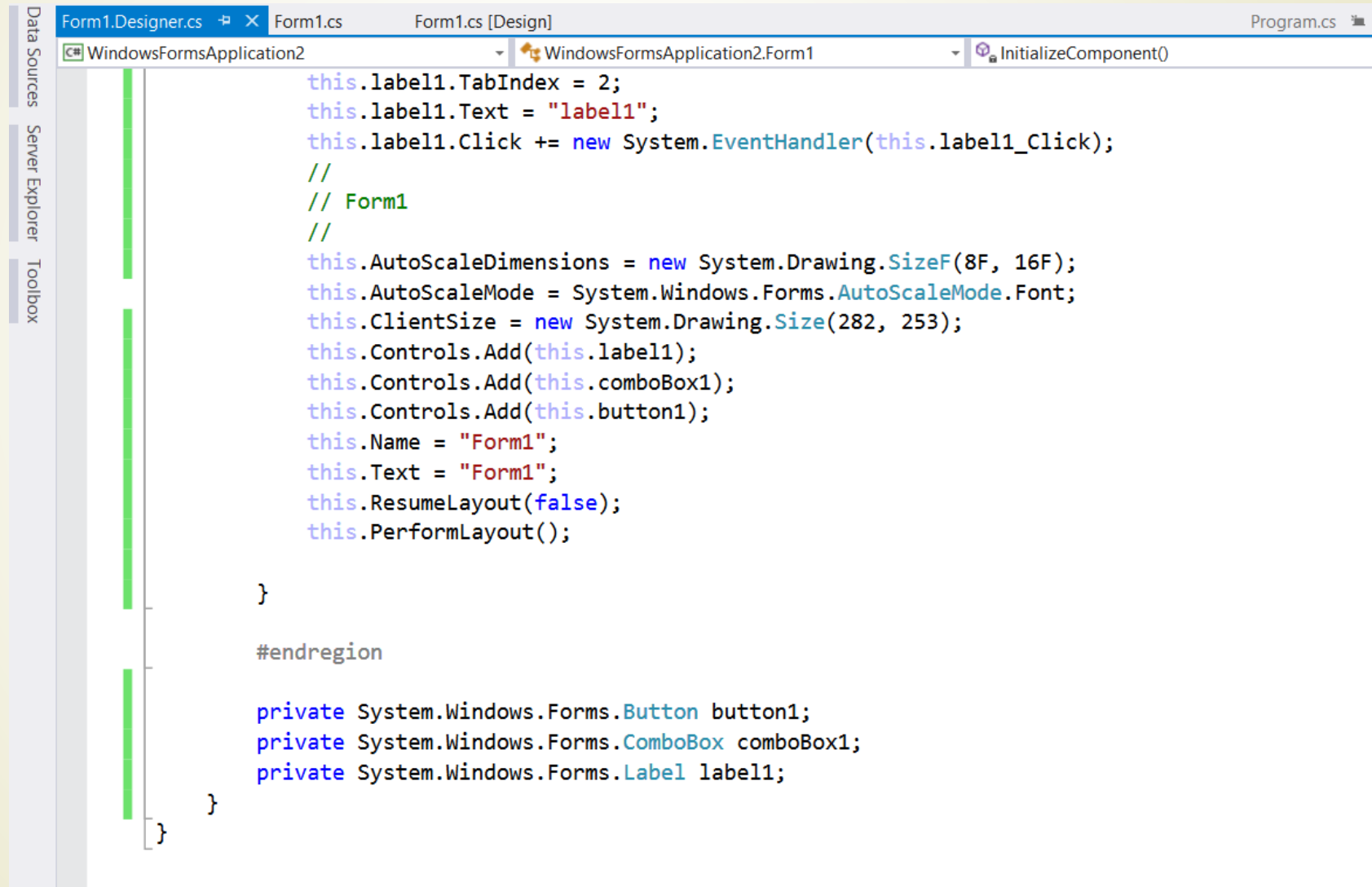
namespace WindowsFormsApplication2
{
    3 references
    partial class Form1
    {
        /// <summary> Required designer variable.
        private System.ComponentModel.IContainer components = null;

        /// <summary> Clean up any resources being used.
        1 reference
        protected override void Dispose(bool disposing) ...

        #region Windows Form Designer generated code

        /// <summary> Required method for Designer support - do not modify the contents of this m
        1 reference
        private void InitializeComponent()
        {
            this.button1 = new System.Windows.Forms.Button();
            this.comboBox1 = new System.Windows.Forms.ComboBox();
            this.label1 = new System.Windows.Forms.Label();
            this.SuspendLayout();
            //
            // button1
            //
            this.button1.Location = new System.Drawing.Point(92, 154);
            this.button1.Name = "button1";
        }
    }
}
```

WindowsForms aplikacija (3)



```
Form1.Designer.cs  Form1.cs  Form1.cs [Design]  Program.cs
WindowsFormsApplication2  WindowsFormsApplication2.Form1  InitializeComponent()

this.label1.TabIndex = 2;
this.label1.Text = "label1";
this.label1.Click += new System.EventHandler(this.label1_Click);
//
// Form1
//
this.AutoScaleDimensions = new System.Drawing.SizeF(8F, 16F);
this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font;
this.ClientSize = new System.Drawing.Size(282, 253);
this.Controls.Add(this.label1);
this.Controls.Add(this.comboBox1);
this.Controls.Add(this.button1);
this.Name = "Form1";
this.Text = "Form1";
this.ResumeLayout(false);
this.PerformLayout();

}

#endregion

private System.Windows.Forms.Button button1;
private System.Windows.Forms.ComboBox comboBox1;
private System.Windows.Forms.Label label1;

}
```

WindowsForms Core aplikacija (1)

The screenshot displays the Visual Studio IDE with a Windows Forms application in design mode. The interface is divided into several panes:

- Toolbox:** Located on the left, it contains a search bar and a list of Windows Forms controls such as Pointer, Button, CheckBox, and TextBox. A red arrow points to this pane.
- Design Area:** The central workspace shows a form titled "Form1" with three text boxes labeled "String", "Akcija", and "Rezultat", and a button labeled "Primeni". A red arrow points to the bottom center of the form.
- Solution Explorer:** Located on the right, it shows the project structure for "Vezba_2_Core_Z6". The "Microsoft.WindowsDesktop.App.WindowsForms" framework reference is highlighted. A red arrow points to this entry.
- Properties Window:** At the bottom right, it shows the properties for the selected framework reference, including Path, Profile, and Version.

At the bottom of the window, there is a status bar with the text "This item does not support previewing" and system information like "496, -12" and "72 x 15".

WindowsForms Core aplikacija (2)

The screenshot displays the Visual Studio IDE with a Windows Forms application in design mode. The main window shows a form titled "Form1" with the following controls:

- A text box labeled "String".
- A dropdown menu labeled "Akcija".
- A text box labeled "Rezultat".
- A button labeled "Primeni".

The Solution Explorer on the right shows the project structure, with the **System.Windows.Forms** assembly highlighted by a red arrow. The Properties window at the bottom right shows the properties for the **System.Windows.Forms** Framework Assembly:

System.Windows.Forms Framework Assembly	
Assembly Name	System.Windows.Forms
Assembly Version	4.0.0.0
File Version	4.800.119.56404
Path	C:\Program Files\dotnet\packs\Microsoft