How to modernise WPF and Windows Forms applications with Windows Apps SDK

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About me...

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Consultant focused on industrial and embedded solutions using .NET and other native SDKs with over 30 years of experience, XeDotNet community co-founder, speaker and Microsoft MVP since 2012

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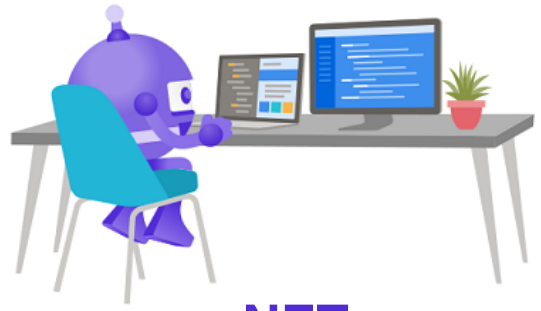
Microsoft® MVP Windows Development



.NET
your platform for building anything

Agenda

- Desktop Technologies
- Platform
- Windows 10 Integration
- .NET Upgrade Assistant
- Windows App SDK
- WinUI3
- More…

Desktop Technologies

- Windows Form | aka **WinForms**
- Windows Presentation Fondation | aka **WPF**
- Universal Windows Platform | aka **UWP ***
- Windows UI | aka **WinUI**
- .NET **M**ulti-Platform **A**pplication **UI** | aka **MAUI**
- Blazor Desktop
- Windows App SDK | aka **WinAppSDK**

Writing apps for Windows - Windows apps | Microsoft Learn

* Microsoft stirred up some debate with its recent announcement that "**.NET 5/6 Will Not Be Coming to UWP Project Types**," which many decried as a further deprecation of UWP on the part of the company.

Platforms

Platform:	WinForms	WPF	WinRT	UWP	WinUI
Full Name	Windows Forms	Windows Presentation Foundation	Windows Runtime	Universal Windows Platform	Windows UI Library
Year Released	2002	2006	2012	2015	2021
Supports Win32 (desktop) Apps	Yes	Yes	No	No	Yes
Supports UWP Apps	No	No	Yes	Yes	Yes
Targets .NET Framework	Yes, 1.0+	Yes, 3.0+	No	No	Yes
Targets .NET 6	Yes	Yes	No	No	Yes
Programming Languages	C#, VB.NET	C#, VB.NET	C#, C++, VB.NET, Python, JavaScript	C#, C++, VB.NET	C#, C++
XAML-based UI	No	Yes	Yes	Yes	Yes
Fluent/Modern Style	*No	*No	Yes	Yes	Yes

Desktop Application .NET 7/8

- Support to latest tooling and C# features
- Core runtime and API improvements
- Performance
- Deploy
  - Side by side
  - Machine global or app local framework
  - Self conteined EXEs

Windows Development

- WPF and Windows Forms supported as first-class citizens in .NET
- Improved Designer Support (both WinForms and XAML)
- Improved ClickOnce Support
- Improved performance and reliability
- Accessibility improvements
- Quick Actions
- XAML Hot Reload Improvements (WPF /WinUI)
- Hot Reload
- IntelliSense Improvements

Single File Applications

- .NET aims to re-introduce the experience of publishing small, self-contained version of applications
  - Across all .NET application formats (Windows, Web,…)
  - Across all the platforms (Windows, Mac, Linux)
- Required Framework components are included in the deployment
- True xcopy-enabled, single-file executables
- Assembly Trimming
- .NET has come a long way for this

WebView2

- New Edge-Chromium-based HTML control
- Available in Windows Forms, WPF
- .NET Framework, .NET Core 3.x, and .NET 5/6/7/8
- Windows 7 and later
- Evergreen (updated every 6 weeks)
- WebView2 Evergreen is now a Windows component

ARM64

- .NET has many performance and size optimizations specifically driven by support for ARM chips
- ARM chips are very popular in phones, but they are also becoming more popular in laptops
- Surface Pro X is ARM-based
- Apple has announced that their Apple Silicon-based Macs will be ARM based
- IoT devices are often based on ARM chips
- Raspberry Pi 3 & 4 are ARM-based

Get started with Arm64EC

Understanding Arm64EC ABI and assembly code

New features in XAML Tooling

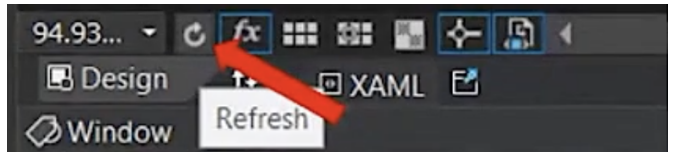
- Improvement to in-app toolbar
- Inline color previews
- Design Time Data

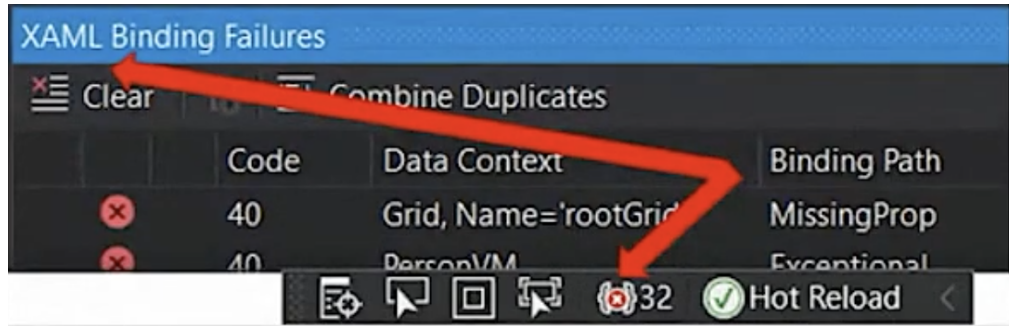
```
<GradientStop Color="#FFD470F5"/>
<GradientStop Color="Cyan" Offset="1"/>
```

```
132    <Label Content="{Binding Name}" d:Content="Name!" />
133    <Button Content="{Binding Path=ButtonContent}" d:Content="Design Time Content" d:IsEnabled="false" Width="125" Heigh
```

https://docs.microsoft.com/visualstudio/xaml-tools/xaml-designtime-data

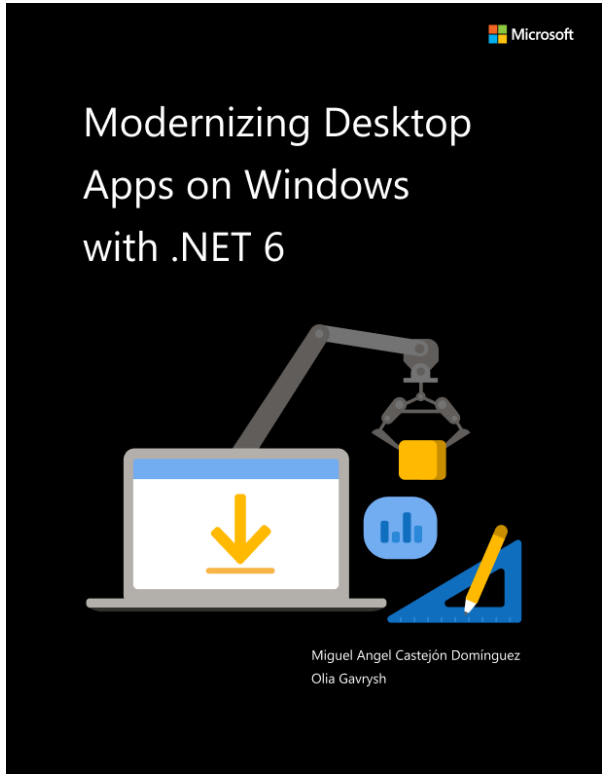
- Refresh designer button
- Suggested Actions
- XAML Hot Reload
- XAML Binding Failures
- New Designer for .NET FW apps
- XAML Live Preview !





.NET Upgrade Assistant

- Reduce time and difficulty modernizing older .NET codebases
- Helps to analyze and upgrade older codebases
- Understands dependencies
- Provides guidance and assistance
- Multiple project types supported
- **Bring your apps to the latest .NET !!!**



EDITION v1.0.3 - Updated to .NET 7

Learn more | https://aka.ms/dotnet-upgrade-assistant

Call Windows Runtime APIs in desktop apps

- Easily integrate notification, geolocation, Windows Hello, Bluetooth, Low Energy, …

- .NET 6 and later: **Use the Target Framework Moniker option**

  - Starting in .NET 6, you can specify the Target Framework Moniker (TFM) in your project file to access WinRT APIs. This option is supported in projects that target Windows 10, version 1809 or later.

  - For earlier versions of .NET, you can install the Microsoft.Windows.SDK.Contracts NuGet package to add all necessary references to your project. This option is supported in projects that target Windows 10, version 1803 or later.

Call Windows Runtime APIs in desktop apps - Windows apps | Microsoft Learn

Call Windows Runtime APIs in desktop apps

```
<Project Sdk="Microsoft.NET.Sdk">


  <PropertyGroup>
    <OutputType>WinExe</OutputType>
    <TargetFramework>net7.0-windows10.0.22000.0</TargetFramework>
    <Nullable>enable</Nullable>
    <UseWPF>true</UseWPF>
  </PropertyGroup>


</Project>
```

Call Windows Runtime APIs in desktop apps

```
<Project Sdk="Microsoft.NET.Sdk">


  <PropertyGroup>
    <OutputType>WinExe</OutputType>
    <TargetFramework>net7.0-windows10.0.22000.0</TargetFramework>
    <Nullable>enable</Nullable>
    <UseWPF>true</UseWPF>
  </PropertyGroup>


</Project>
```

Net7.0-windows10.0.17763.0: If your app targets Windows 10, version 1809.
Net7.0-windows10.0.18362.0: If your app targets Windows 10, version 1903.
Net7.0-windows10.0.19041.0: If your app targets Windows 10, version 2004.
Net7.0-windows10.0.22000.0: If your app targets Windows 11.

Making app great for people who use them

- Support new hardware
- Modern use experience
- App deploy and management
- Reliability, security, privacy
- System performance and battery life

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… but starting where you are

- Compatibility with all you code (WinForm, WPF, UWP, MFC)
- Support for existing packaging and deployment
- Features that work across users' version of Windows 10/11

Windows App SDK

- This is the former “Project Reunion”
- Re-unification of various Windows/Desktop UI technologies
- WinForms, WPF, UWP, WinUI, Xamarin

Delight users with modern UI	Access new platform features	Backwards compatible
 Powerful WinUI 3 UI	 Localization + power status + more	 Down to Windows 10 1809

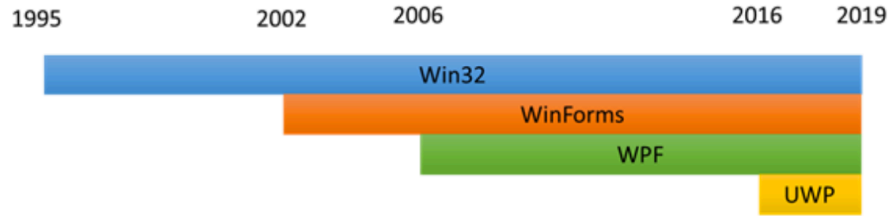
The Windows App SDK does not replace the Windows SDK or existing desktop Windows app types such as .NET (including Windows Forms and WPF) and desktop Win32 with C++. Instead, the Windows App SDK complements these existing tools and app types with a common set of APIs that developers can rely on across these platforms.

The Windows App SDK is a set of new developer components and tools that represent the next evolution in the Windows app development platform. The Windows App SDK provides a unified set of APIs and tools that can be used in a consistent way by any desktop app on Windows 11 and down-level to Windows 10, version 1809.

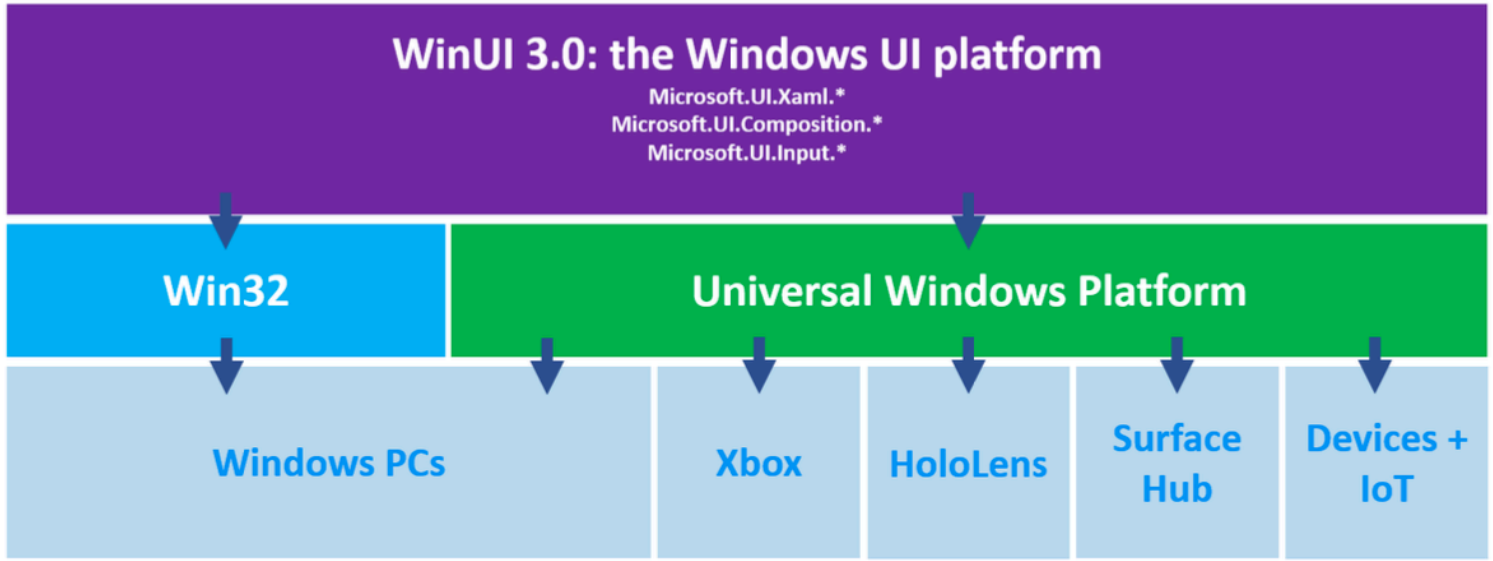
2018		2019		2020		2021
1709	1803	1809	1903	1909	2004	Win11

WinUI 3

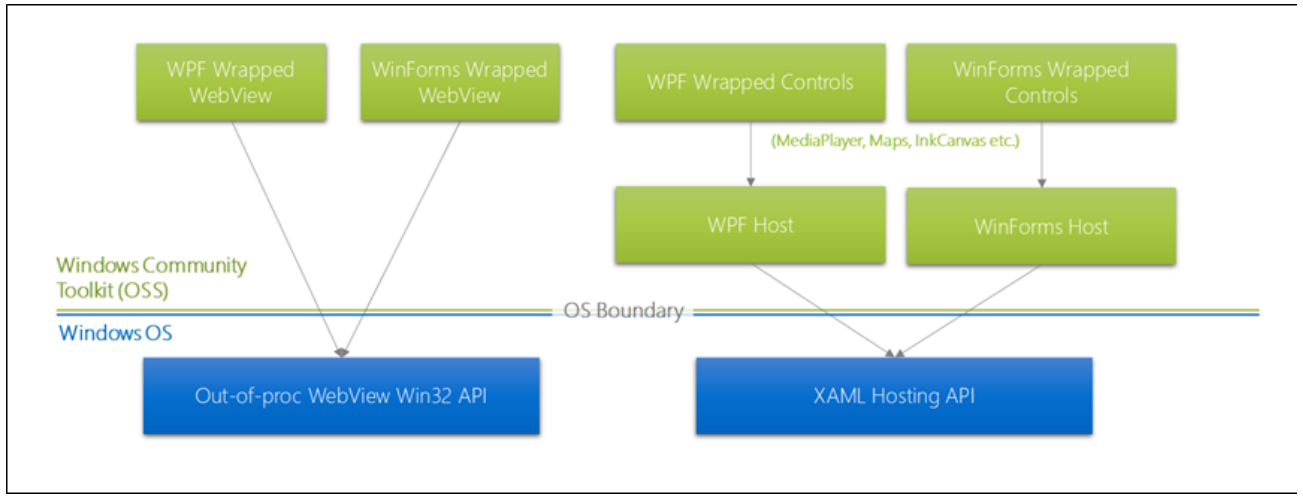
- Continuation of WinRT, XAML Islands,…
- Windows 10/11 only

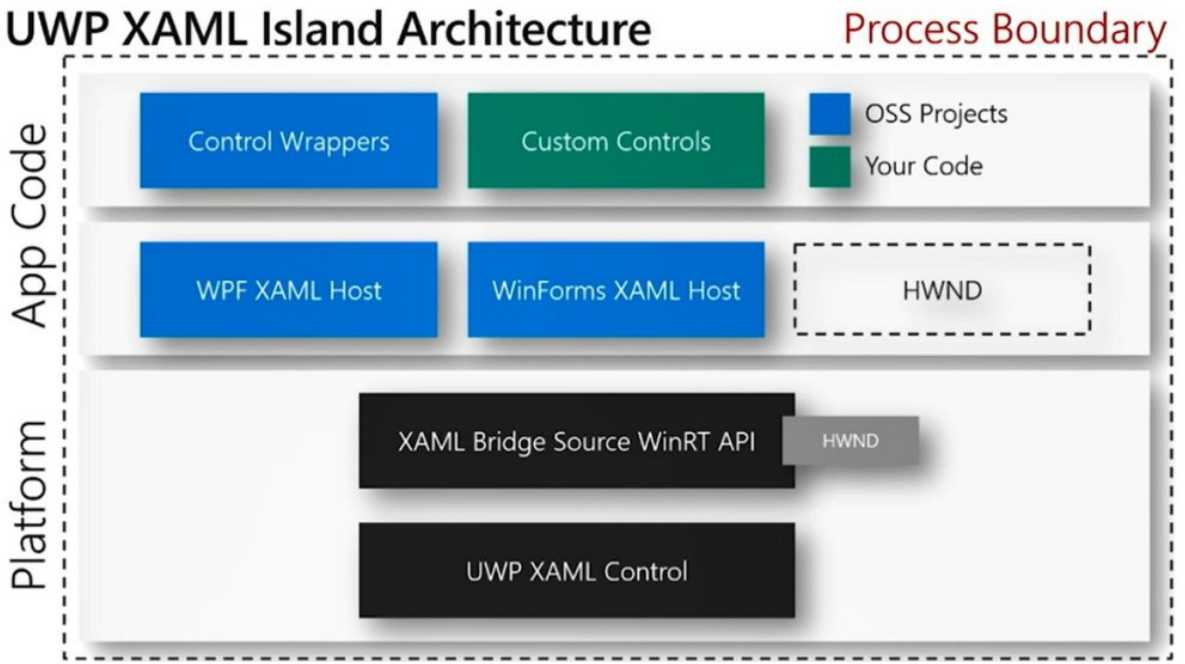


WinUI 3 is the next generation of the WinUI framework. It dramatically expands WinUI into a full UX framework, making WinUI available for all types of Windows apps – from Win32 to UWP – for use as the UI layer.



XAML Islands





Using XAML Islands to host WinRT XAML controls in WPF and Windows Forms apps is currently **supported only in apps that target .NET Core 3.x.** XAML Islands are not yet supported in apps that target .NET, or in apps that any version of the .NET Framework.

[Host WinRT XAML controls in desktop apps - Windows apps | Microsoft Learn]

Windows App SDK - release channels

Channel	Description	Release cadence	Supported?	Latest release
✅ Stable (release notes)	This channel is supported for use by apps in production environments. It includes only stable APIs.	No more frequent than every six months (+ servicing)	Yes	1.3.1 (1.3.230502000) (05/09/2023)
✨ Preview (release notes)	This channel provides a preview of the next stable release. There may be breaking API changes between a given preview channel release and the next stable release.	At least one preview per stable version	No	1.3.0-preview1 (03/07/2023)
🔄 Experimental (release notes)	This channel includes experimental features that are in early stages of development. Experimental features may be removed from the next release, or may never be released.	As needed when requiring feedback for features in early design or prototype stages	No	1.3.0-experimental1 (02/06/2023)

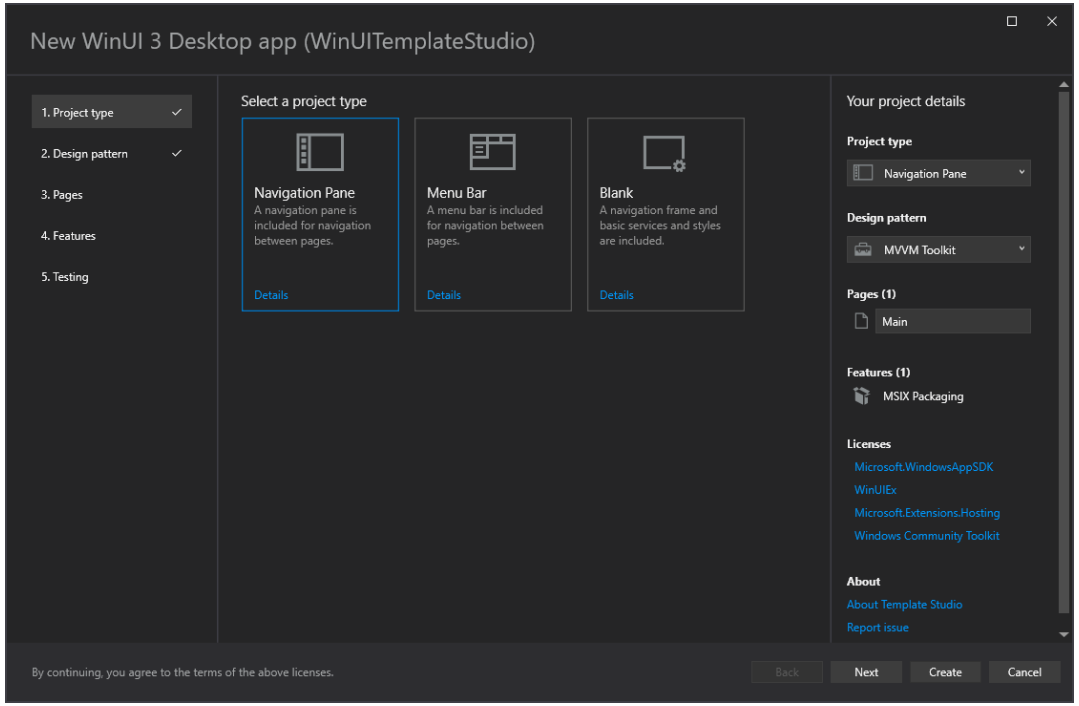
Windows App SDK - Features available by release channel

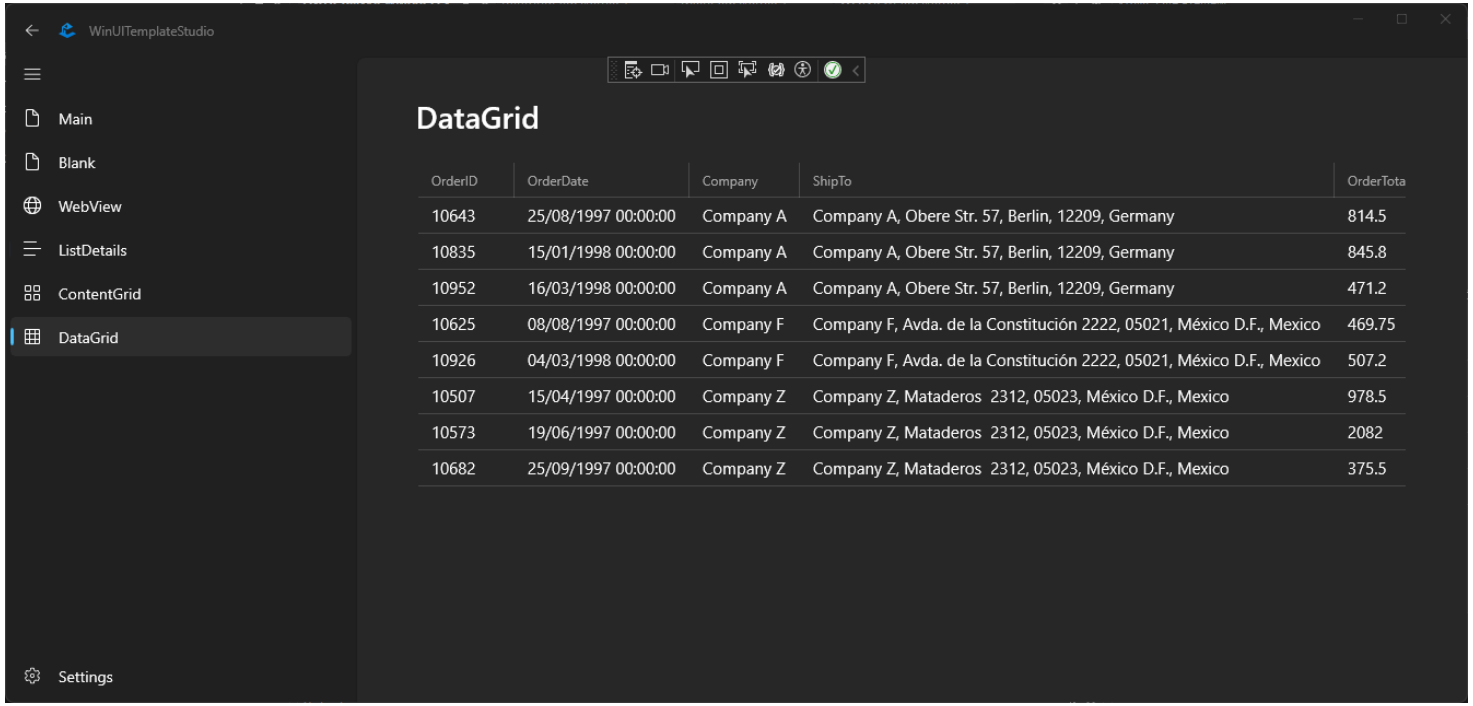
Feature	✅ Stable	✨ Preview	🔄 Experimental
Deployment guide for framework-dependent packaged apps	✓ Available	✓ Available	✓ Available
Deployment guide for framework-dependent apps packaged with external location or unpackaged	✓ Available	✓ Available	✓ Available
WinUI 3	✓ Available	✓ Available	✓ Available
Text rendering	✓ Available	✓ Available	✓ Available
Manage resources	✓ Available	✓ Available	✓ Available
App lifecycle: App instancing	✓ Available	✓ Available	✓ Available
App lifecycle: Rich activation	✓ Available	✓ Available	✓ Available
App lifecycle: Power management	✓ Available	✓ Available	✓ Available
Manage app windows	✓ Available	✓ Available	✓ Available
Push notifications	✓ Available	✓ Available	✓ Available
App notifications	✓ Available	✓ Available	✓ Available
Windows Widgets	✓ Available	✓ Available	✓ Available

Windows App SDK - Release lifecycle

Windows App SDK version	Original release date	Latest patch version	Patch release date	Support level	End of servicing
1.3	04/12/2023	1.3.230502000	05/09/2023	Current	04/12/2024
1.2	11/10/2022	1.2.230313.1	03/15/2023	Maintenance	11/10/2023
1.1	05/24/2022	1.1.5	09/14/2022	Maintenance	05/24/2023
1.0	11/16/2021	1.0.4	06/14/2022	Out of Support	11/16/2022
0.8	6/24/2021	0.8.12	08/03/2022	Out of Support	6/24/2022
0.5	3/29/2021	0.5.9	8/10/2021	Out of Support	11/1/2021

Demo





[Create your first WinUI 3 (Windows App SDK) project]

[Template Studio for WPF - Visual Studio Marketplace]

Windows Apps SDK, ther is more...

- Windows Apps SDK SDK doesn’t include only WinUI, but other features that can be integrated in existing Win32 apps:
  - Resource manager
  - Activation APIs
  - Windowing APIs
  - Text rendering
  - Push notification
  - …

Windows Apps SDK – Activation APIs

- Support also in Win32 apps the rich activation system introduced in the universal Windows Platofrm like file, protocol, statup task, pickers, etc.

- Enables the usages the AppInstance class to manage single-instance apps and multi-instanced apps

- It enables advanced redirection scenarios, like working in single instance mode, but switching to multi-instance if the application is activated from file

Windows Apps SDK – Windows management APIs

- New AppWindow API which acts as a high-level implementation of HWND

- Lot of customization options for your windows:
  - Customize the title bar
  - Use a custom title bar based on XAML
  - Support full screen and compact overlay

Community Toolkit - .NET Community Toolkit

- .NET Community Toolkit is a collection of helpers and APIs that work for all .NET developers and are agnostic of any specific UI platform. The toolkit is maintained and published by Microsoft, and part of the .NET Foundation.

- The .NET Community Toolkit is available as a set of NuGet Packages for new or existing .NET projects.

  - CommunityToolkit.Common
  - CommunityToolkit.Diagnostics
  - CommunityToolkit.HighPerformance
  - CommunityToolkit.Mvvm (aka MVVM Toolkit)

Community Toolkits Documentation

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```
[ObservableRecipient]
public partial class MyViewModel : ObservableValidator
{
    [ObservableProperty]
    [AlsoNotifyChangeFor(nameof(Id))]
    [AlsoNotifyCanExecuteFor(nameof(GreetuserCommand))]
    [AlsoBroadcastChange]
    [Required]
    [MinLength(2)]
    [MaxLength(100)]
    [RegularExpression(@"^\w+$")]
    private string? username;

    [ObservableProperty]
    [AlsoNotifyChangeFor(nameof(Id))]
    [AlsoNotifyCanExecuteFor(nameof(GreetuserCommand))]
    [AlsoBroadcastChange]
    [Required]
    [EmailAddress]
    private string? email;

    public string Id => $"{Username} ({Email})";

    [ICommand]
    private void Greetuser()
    {
    }
}
```

Community Toolkits Documentation

Thanks !

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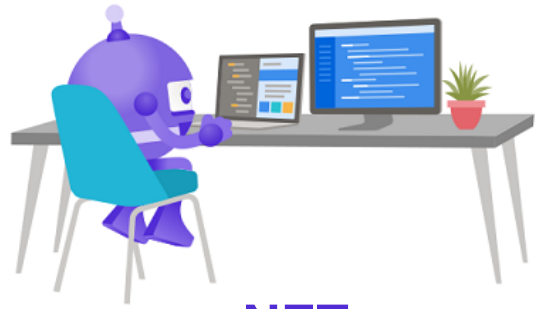

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