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mvvm

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#mvvm

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About

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Chapter 1: Getting started with mvvm

Remarks

This section provides an overview of what mvvm is, and why a developer might want to use it.

It should also mention any large subjects within mvvm, and link out to the related topics. Since the Documentation for mvvm is new, you may need to create initial versions of those related topics.

Examples

C# MVVM Summary and Complete Example

Summary:

MVVM is an architectural pattern that is represented by three distinct components, the **Model**, **View** and **ViewModel**. In order to understand these three layers, it is necessary to briefly define each, followed by an explanation of how they work together.

Model is the layer that drives the business logic. It retrieves and stores information from any data source for consumption by the **ViewModel**.

ViewModel is the layer that acts as a bridge between the **View** and the **Model**. It may or may not transform the raw data from the **Model** into a presentable form for the **View**. An example transformation would be: a boolean flag from the model to string of 'True' or 'False' for the view.

View is the layer that represents the interface of the software (i.e. the GUI). Its role is to display the information *from* the **ViewModel** to the user, and to communicate the changes of the information back *to* the **ViewModel**.

These three components work together by referencing one another in the following fashion:

- The **View** references the **ViewModel**.
- The **ViewModel** references the **Model**.

It is important to note that the **View** and the **ViewModel** are capable of two-way communications known as **Data Bindings**.

A major ingredient for two-way communication (data-binding) is the INotifyPropertyChanged interface.

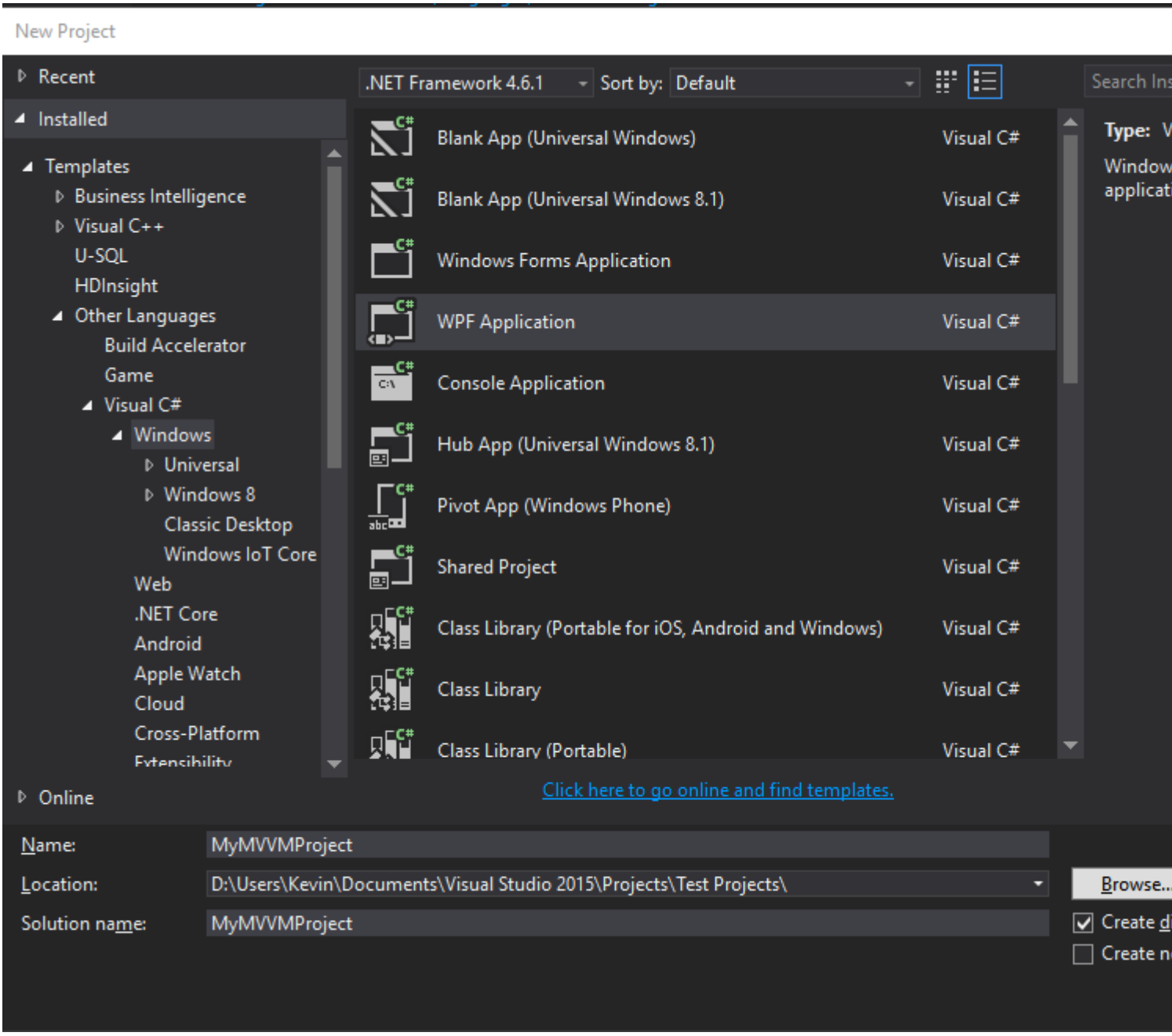
By utilizing this mechanism, the **View** can modify the data in the **ViewModel** through user input, and the **ViewModel** can update the **View** with data that may have been updated via processes in the **Model** or with updated data from the repository.

MVVM architecture puts a heavy emphasis on the **Separation of Concerns** for each of these layers. Separating the layers benefits us as:

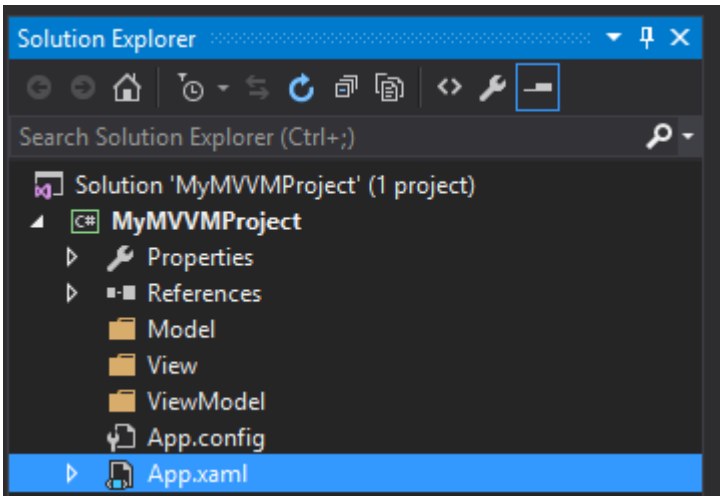
- **Modularity:** Each layer's internal implementation can be changed or swapped without affecting the others.
- **Increased testability:** Each layer can be **Unit Tested** with fake data, which is not possible if the **ViewModel**'s code is written in the Code-Behind of the **View**.

The Build:

Create a new WPF Application project

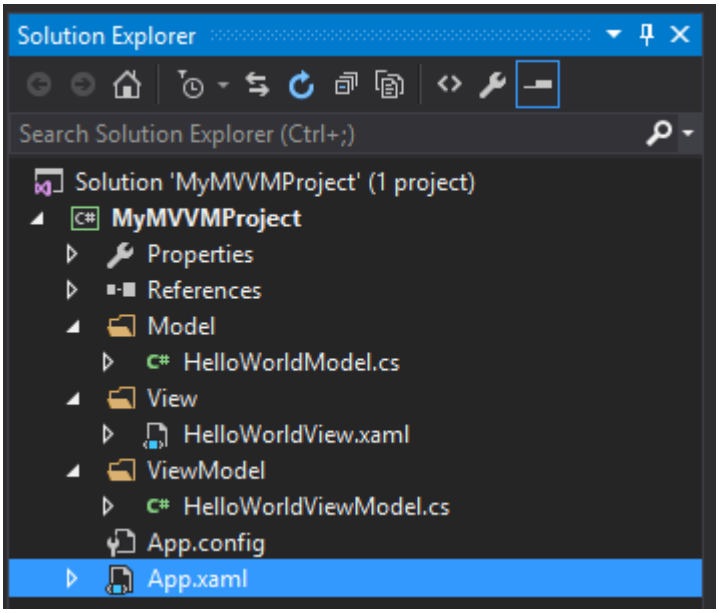


Create three new folders in your solution: **Model**, **ViewModel** and **View**, and delete the original `MainWindow.xaml`, just to get a fresh start.



Create three new items, each corresponding to a separate layer:

- Right click the **Model** folder, and add a **Class** item called `HelloWorldModel.cs`.
- Right click the **ViewModel** folder, and add a **Class** item called `HelloWorldViewModel.cs`.
- Right click the **View** folder, and add a **Window (WPF)** item called `HelloWorldView.xaml`.



Alter `App.xaml` to point to the new **View**

```
<Application x:Class="MyMVVMProject.App"
             xmlns="http://schemas.microsoft.com/winfx/2006/xaml/presentation"
             xmlns:x="http://schemas.microsoft.com/winfx/2006/xaml"
             xmlns:local="clr-namespace:MyMVVMProject"
             StartupUri="/View/HelloWorldView.xaml">
    <Application.Resources>

    </Application.Resources>
</Application>
```

ViewModel:

Begin with building the **ViewModel** first. The class must implement the `INotifyPropertyChanged` interface, declare a `PropertyChangedEventHandler` event, and create a method to raise the event

(source: MSDN: How to Implement Property Change Notification). Next, declare a field and a corresponding property, making sure to call the `OnPropertyChanged()` method in the property's `set` accessor. The constructor in the below example is being used to demonstrate that the **Model** provides the data to the **ViewModel**.

```
using System;
using System.Collections.Generic;
using System.ComponentModel;
using System.Linq;
using System.Runtime.CompilerServices;
using System.Text;
using System.Threading.Tasks;
using MyMVVMProject.Model;

namespace MyMVVMProject.ViewModel
{
    // Implements INotifyPropertyChanged interface to support bindings
    public class HelloWorldViewModel : INotifyPropertyChanged
    {
        private string helloString;

        public event PropertyChangedEventHandler PropertyChanged;

        public string HelloString
        {
            get
            {
                return helloString;
            }
            set
            {
                helloString = value;
                OnPropertyChanged();
            }
        }

        /// <summary>
        /// Raises OnPropertychangedEvent when property changes
        /// </summary>
        /// <param name="name">String representing the property name</param>
        protected void OnPropertyChanged([CallerMemberName] string name = null)
        {
            PropertyChanged?.Invoke(this, new PropertyChangedEventArgs(name));
        }

        public HelloWorldViewModel()
        {
            HelloWorldModel helloWorldModel = new HelloWorldModel();
            helloString = helloWorldModel.ImportantInfo;
        }
    }
}
```

Model:

Next, build the **Model**. As stated previously, The **Model** provides data for the **ViewModel** by pulling it from a repository (as well as pushing it back to the repository for saving). This is demonstrated below with the `GetData()` method, which will return a simple `List<string>`. Business

logic is also applied in this layer, and can be seen in the `ConcatenateData()` method. This method builds the sentence “Hello, world!” from the `List<string>` that was previously returned from our “repository”.

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
using System.Threading.Tasks;

namespace MyMVVMProject.Model
{
    public class HelloWorldModel
    {
        private List<string> repositoryData;
        public string ImportantInfo
        {
            get
            {
                return ConcatenateData(repositoryData);
            }
        }

        public HelloWorldModel()
        {
            repositoryData = GetData();
        }

        /// <summary>
        /// Simulates data retrieval from a repository
        /// </summary>
        /// <returns>List of strings</returns>
        private List<string> GetData()
        {
            repositoryData = new List<string>()
            {
                "Hello",
                "world"
            };
            return repositoryData;
        }

        /// <summary>
        /// Concatenate the information from the list into a fully formed sentence.
        /// </summary>
        /// <returns>A string</returns>
        private string ConcatenateData(List<string> dataList)
        {
            string importantInfo = dataList.ElementAt(0) + ", " + dataList.ElementAt(1) + "!";
            return importantInfo;
        }
    }
}
```

View:

Finally, the **View** can be built. There is nothing that needs to be added to the code behind for this example, although this can vary depending on the needs of the application. However, there are a

few lines added to the XAML. The `Window` needs a reference to the `ViewModel` namespace. This is mapped to the XAML namespace `xmlns:vm="clr-namespace:MyMVVMProject.ViewModel"`. Next, the Window needs a `DataContext`. This is set to `<vm:HelloWorldViewModel/>`. Now the label (or control of your choosing) can be added to the window. The key point at this stage is to ensure that you set the **Binding** to the property of the **ViewModel** that you wish to display as the label content. In this case, it is `{Binding HelloString}`.

It is important to bind to the property, and not the field, as in the latter case the **View** will not receive the notification that the value changed, since the `OnPropertyChanged()` method will only raise the `PropertyChangedEvent` on the property, and not on the field.

```
<Window x:Class="MyMVVMProject.View.HelloWorldView"
        xmlns="http://schemas.microsoft.com/winfx/2006/xaml/presentation"
        xmlns:x="http://schemas.microsoft.com/winfx/2006/xaml"
        xmlns:d="http://schemas.microsoft.com/expression/blend/2008"
        xmlns:mc="http://schemas.openxmlformats.org/markup-compatibility/2006"
        xmlns:local="clr-namespace:MyMVVMProject.View"
        xmlns:vm="clr-namespace:MyMVVMProject.ViewModel"
        mc:Ignorable="d"
        Title="HelloWorldView" Height="300" Width="300">
    <Window.DataContext>
        <vm:HelloWorldViewModel/>
    </Window.DataContext>
    <Grid>
        <Label x:Name="label" FontSize="30" Content="{Binding HelloString}"
HorizontalAlignment="Center" VerticalAlignment="Center"/>
    </Grid>
</Window>
```

Read Getting started with mvvm online: https://riptutorial.com/mvvm/topic/4293/getting-started-with-mvvm

Credits

S. No	Chapters	Contributors
1	Getting started with mvvm	Community, Gabor Barat, Kcvin, Kevin Mills, Maverik, MotKohn, Umair Farooq