# Introduction

When I started creating WPF applications, I just mixed all markup directly in the WPF code. Gradually, I discovered this is not the way to go.

* Re-use of style information is hard.
* Changing what your application looks like is a lot of work.

This article intends to help you to create a style library that separates markup from WPF functional layout and makes re-sue a bit easier. I do not claim to have a perfect solution, and like to invite you to express your ideas and improvements.

You can download a demo project from Github.

You need some knowledge on WPF (elementary) and you need a basic knowledge of Resource Dictionaries to understand this article.

# Application setup

The demo application has two projects:

* StyleDemo.DesktopUI a WPF .Net C ore 3.1 project. This is only for demo and testing purposes.
* Styles.Library a WPF User Control library, .Net Core 3.1 Make sure to use a user control library and not an ordinary class library.

This should work for .Net framework as well.

The Destop UI depends on the Styles.Library project, so do not forget to include these dependencies.

You do not need any Nuget packages. I use Visual Studio Community Edition 2019, version 16.5.

# Setting up the Styles.Library project

The basic concept is to create a number of resource dictionaries. To avoid the need to create references to each individual dictionary, first a dictionary that collects all other dictionaries is created. I use the convention to put the term “Dictionary” in the name of each resource dictionary.

In the demo I name it StylesDictionary.

To be able to test this, you need at least one dictionary to include. In the user control library. To do this, I create three empty dictionaries:

* ColorSchemaDictionary which will contain all colors used in the application.
* SizeSchemaDictionary for all sizes we like to give standard values.
* FontDictonary to define fonts.

The code for Styles.Dictionary looks like this:

<ResourceDictionary xmlns="http://schemas.microsoft.com/winfx/2006/xaml/presentation">

<!-- https://www.codeproject.com/Articles/35346/Using-a-Resource-Dictionary-in-WPF -->

<ResourceDictionary.MergedDictionaries>

<!-- Basic markup -->

<ResourceDictionary Source="ColorSchemaDictionary.xaml" />

<ResourceDictionary Source="SizeSchemaDictionary.xaml" />

<ResourceDictionary Source="FontDictionary.xaml" />

</ResourceDictionary.MergedDictionaries>

</ResourceDictionary>

As the number of dictionaries grows, you can add more dictionaries.

## Make Styles.Library available in the UI

Now, we can make this StylesDictionary available in in the desktop application.

To do this, adapt App.xaml, to refer to this resource dictionary:

<Application x:Class="StyleDemo.DesktopUI.App"

xmlns="http://schemas.microsoft.com/winfx/2006/xaml/presentation"

xmlns:x="http://schemas.microsoft.com/winfx/2006/xaml"

StartupUri="MainWindow.xaml">

<Application.Resources>

<ResourceDictionary>

<ResourceDictionary.MergedDictionaries>

<ResourceDictionary Source="pack://application:,,,/Styles.Library;component/StylesDictionary.xaml"/>

</ResourceDictionary.MergedDictionaries>

</ResourceDictionary>

</Application.Resources>

</Application>

Make sure to get all elements in the complex URI right. There is a complex explanation for this, but I can live without fully understanding the logic behind this. I got this from this article at CodeProject:

<https://www.codeproject.com/Articles/35346/Using-a-Resource-Dictionary-in-WPF>

If it is not working, make sure your desktop project has a dependency set to the Styles.Library dll.

Now the application should run as before, but consult your (empty) resource dictionary.

# Setting colours

The ColorSchemaDictionary is intended to collect all colours. To give a idea of the syntax, as very simple schema is created, just enough to show how it works. You need to set up colours as brushes. In this example I only use solid brushes, but it also works for other brush types. If you

<!-- Window colors -->

<SolidColorBrush x:Key="WindowBackground" Color="LightBlue" />

<SolidColorBrush x:Key="WindowBorderBrush" Color="CornflowerBlue" />

<SolidColorBrush x:Key="ControlBackground" Color="LightBlue" />

<SolidColorBrush x:Key="TextBoxBackground" Color="Oldlace" />

<SolidColorBrush x:Key="HeaderBackground" Color="DarkGray" />

<!-- Border colors -->

<SolidColorBrush x:Key="BorderDefault" Color="DarkBlue" />

<SolidColorBrush x:Key="BorderAlert" Color="OrangeRed" />

<!-- Text colors -->

<SolidColorBrush x:Key="LabelText" Color="Black" />

<SolidColorBrush x:Key="DataText" Color="Black" />

<SolidColorBrush x:Key="AlertText" Color="OrangeRed" />

<!-- Button colors -->

<SolidColorBrush x:Key="ButtonBackground" Color="DarkBlue" />

<SolidColorBrush x:Key="ButtonText" Color="Lavender" />

<SolidColorBrush x:Key="ButtonDisabled" Color="Gray" />

<SolidColorBrush x:Key="ButtonHover" Color="CornflowerBlue" />

<SolidColorBrush x:Key="ButtonPressed" Color="LightBlue" />

If you view this code in Visual Studio, it will show small colour samples. The big advantage is, that you have all colours at one place, which makes it easy to review if you have a nice balance.

You should consider naming carefully. Intellisense will work, but if you start typing a B, it will only show everything starting with the character B. Therefore I prefer to mention the control type first in the name and then a descriptive text of what the function of the resource is. This may seem an open door, but I still regret the projects where I did this in a wrong order, e.g. setting things like DefaultWindowBackgroundColor and so on. The you have a long list of Default to search through.

You can refer to these colours directly from the desktop:

<Button Background="{StaticResource ButtonBackground}"

Foreground="{StaticResource ButtonText}">Test button</Button>

This code will create a window filling blue button, with a more or less white text. As you see in the code above, this way of using named resources is very cumbersome, so we will do it better. The button still uses the whole window size. This is not what you normally want, so the next step is to define some default dimensions.

# Setting dimensions

For this purpose the SizeSchemaDictionary can be used.

<ResourceDictionary xmlns="http://schemas.microsoft.com/winfx/2006/xaml/presentation"

xmlns:x="http://schemas.microsoft.com/winfx/2006/xaml"

xmlns:system="clr-namespace:System;assembly=System.Runtime">

<Thickness

x:Key="MarginDefault"

Bottom="5"

Left="5"

Right="5"

Top="5" />

<Thickness

x:Key="MarginSmall"

Bottom="3"

Left="3"

Right="3"

Top="3" />

<Thickness

x:Key="PaddingDefault"

Bottom="2"

Left="2"

Right="2"

Top="2" />

<Thickness

x:Key="PaddingSmall"

Bottom="1"

Left="1"

Right="1"

Top="1" />

<!-- Button dimensions -->

<system:Double x:Key="ButtonDefaultWidth">100</system:Double>

<system:Double x:Key="ButtonWideWidth">120</system:Double>

<system:Double x:Key="ButtonDefaultHeight">30</system:Double>

</ResourceDictionary>

In the example you see that Margin and Padding are represented by a Thickness object. The height and with of , for instance a button must be set as a double. This is not obvious, and it may take some research to find out how to do this in different cases. Until now I only use these two ways to specify dimensions.

If we apply these settings to the butting, it goes like this:

<Button Background="{StaticResource ButtonBackground}"

Foreground="{StaticResource ButtonText}"

Width="{StaticResource ButtonDefaultWidth}"

Height="{StaticResource ButtonDefaultHeight}"

Margin="{StaticResource MarginDefault}"

Padding="{StaticResource PaddingDefault}">Test button</Button>

In this way your markup is better re-usable, but your xaml specs will grow large and it still is a lot of typing.

One comment. I tend to apply this MarginDefault to every single control in this way. There may be other options, e.g. to apply margin at the right and bottom sides only. I noticed that your markup soon gets ugly if the way you apply margin is not very consistent. Then you may need to apply manual fixes, to get controls properly aligned, which may result in more inconsistencies, resulting in broken markup if you change anything. Because I apply the same margin to all controls, everything looks well aligned always.

# Defining simple styles

Markup tends to be large and not very readable. To make this better, you can define styles for your controls. Because this tutorial focusses on setting up the way of working, defining complex styles will not be covered.

It is possible to change the default style for each control. Being lazy, I tried to do so, but in a number of cases you will run into trouble. The reason is that controls may be used in other controls. If you start applying fancy default styles, these styles will be applied also where you really do not want this. Therefore, 99% of the styles I use do have a key and must be applied explicitly. I learned my lesson here …

This article gives some nice examples: <https://ikriv.com/dev/wpf/TextStyle/>

So, as a rule, always specify x:Key to keep control over the usage of a style.

It helps to make a division in style files. For this demo, four additional style dictionaries will be created and wired up::

* WindowDictionary for Window styles
* ButtonDictionary for buttons
* TextBlockDictionary for TextBlocks
* TextBoxDictionary for TextBoxes

# WindowDictionary

As a first step, a resource dictionary for windows is created:

<ResourceDictionary xmlns="http://schemas.microsoft.com/winfx/2006/xaml/presentation"

xmlns:x="http://schemas.microsoft.com/winfx/2006/xaml">

<!-- Window style -->

<Style x:Key="WindowDefault" TargetType="Window">

<Setter Property="Background" Value="{DynamicResource WindowBackground}" />

</Style>

</ResourceDictionary>

An important thing to note: if you create the resource dictionary inside the project where it is used, you can use StaticResource as resource type. For dictionaries created in a separate library project, always use DynamicResource as shown in the example. You can see the property here refers to another resource.

Now you must make sure the resource is known the library interface, so adapt StylesDictionary:

<ResourceDictionary xmlns="http://schemas.microsoft.com/winfx/2006/xaml/presentation">

<!-- https://www.codeproject.com/Articles/35346/Using-a-Resource-Dictionary-in-WPF -->

<ResourceDictionary.MergedDictionaries>

<!-- Basic markup -->

<ResourceDictionary Source="ColorSchemaDictionary.xaml" />

<ResourceDictionary Source="SizeSchemaDictionary.xaml" />

<ResourceDictionary Source="WindowDictionary.xaml" />

<ResourceDictionary Source="ButtonDictionary.xaml" />

<ResourceDictionary Source="TextBlockDictionary.xaml" />

<ResourceDictionary Source="TextBoxDictionary.xaml" />

</ResourceDictionary.MergedDictionaries>

</ResourceDictionary>

And finally, apply the style to the window (here you can use a static resource):

<Window x:Class="StyleDemo.DesktopUI.MainWindow"

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"

mc:Ignorable="d"

Style="{StaticResource WindowDefault}"

Title="MainWindow" Height="450" Width="800">

<Grid>

<Button Background="{StaticResource ButtonBackground}"

Foreground="{StaticResource ButtonText}"

Width="{StaticResource ButtonDefaultWidth}"

Height="{StaticResource ButtonDefaultHeight}"

Margin="{StaticResource MarginDefault}"

Padding="{StaticResource PaddingDefault}">Test button</Button>

</Grid>

</Window>

The result should be a nice blue screen with a dark blue button in the centre.

When creating this style, I would have liked to make default for WindowStartupLocation as well. This will not work, because it is not a XAML dependency property. At stackoverflow you find a workaround. I guess it is also possible to derive your own window class and fix this there.

<https://stackoverflow.com/questions/10596515/setting-windowstartuplocation-from-resourcedictionary-throws-xamlparseexception>

This allows you to make all windows to look similar and you may change the background colour easily.

# Font resources

For a long time I could not find a lot of information on how to make re-usable font settings. It is not really straight forward, but this is how you can do it.

You can define a Font Family like this:

<FontFamily x:Key="FontFamilyDefault">Consolas, Arial</FontFamily>

In this case two font families are defined, Arial can be used as a replacement if Consolas is not available. If you want to use, non-standard font, you need to make sure these will be included in the solution or installer somehow.

You can use this with a setter in a style:

<Setter Property="FontFamily" Value="{DynamicResource FontFamilyDefault}"/>

Defining a font size is a bit more complicated. The problem is that by default you cannot pass units in the size, e.g. you cannot specify a 12pt font. If you do not specify units, WPF defaults to 1/96 inch. This works, but you need to set sizes considerably larger that you would use in e.g. Word.

I found a solution at StackOverFlow.

<https://stackoverflow.com/questions/5907020/how-to-set-fontsize-in-pt-if-we-use-staticresource-or-dynamicresource>

You need to create a new class:

using System;

using System.ComponentModel;

using System.Windows;

using System.Windows.Markup;

namespace Styles.Library

{

// Usage: <local:FontSize Size="11pt" x:Key="ElevenPoint"/>

public class FontSizeExtension : MarkupExtension

{

[TypeConverter(typeof(FontSizeConverter))]

public double Size { get; set; }

public override object ProvideValue(IServiceProvider serviceProvider)

{

return Size;

}

}

}

There is a lot of technology behind this solution, I will not try to explain it.

Now you can define the size like this:

<local:FontSize Size="20pt" x:Key="FontSizeDefault"/>

In the resource directory header you may need to define library (Visual Studio will do this for you):

xmlns:local="clr-namespace:Styles.Library"

This complexity will be hidden in your style definitions:

<Setter Property="FontFamily" Value="{DynamicResource FontFamilyDefault}" />

Font weight and font style are straight forward:

<!-- FontWeight -->

<FontWeight x:Key="FontWeightDefault">Black</FontWeight>

<FontWeight x:Key="FontWeightTextBlock">Normal</FontWeight>

<FontWeight x:Key="FontWeightTextBox">Normal</FontWeight>

<!-- FontStyle -->

<FontStyle x:Key="FontStyleDefault">Italic</FontStyle>

<FontStyle x:Key="FontStyleTextBlock">Italic</FontStyle>

<FontStyle x:Key="FontStyleTextBox">Normal</FontStyle>

Finally, there some styles that are treated in Word as part of the font settings, but WPF works differently. Here these attributes are attached to a specific control, e.g. TextBlock or TextBox. The Window control does not support it, so you cannot globally underline all texts.

This is how you can define them as style resources:

<Style x:Key="TextBlockUnderlined">

<Setter Property="TextBlock.TextDecorations" Value="Underline" />

</Style>

<Style x:Key="TextBoxUnderlined">

<Setter Property="TextBox.TextDecorations" Value="Underline" />

</Style>

See also <https://www.manongdao.com/q-204646.html> where I found this way to solve the issue.Their usage fits in the general pattern.

# Some other controls

To show some slightly more complex examples, I added three styles, for a TextBlock, a TextBox and a Button.

The TextBlock is straight forward:

<ResourceDictionary xmlns="http://schemas.microsoft.com/winfx/2006/xaml/presentation"

xmlns:x="http://schemas.microsoft.com/winfx/2006/xaml">

<Style x:Key="TextBlockDefault" TargetType="{x:Type TextBlock}">

<Setter Property="Foreground" Value="{DynamicResource LabelText}" />

<Setter Property="Background" Value="{DynamicResource ControlBackground}" />

<Setter Property="Margin" Value="{DynamicResource MarginDefault}" />

<Setter Property="HorizontalAlignment" Value="Stretch" />

<Setter Property="VerticalAlignment" Value="Center" />

<Setter Property="FontSize" Value="{DynamicResource FontSizeTextBlock}" />

<Setter Property="FontFamily" Value="{DynamicResource FontFamilyTextBlock}" />

<Setter Property="FontWeight" Value="{DynamicResource FontWeightTextBlock}" />

</Style>

</ResourceDictionary>

You can define other variants in the same or in separate resource dictionaries.

For the TextBox, I adapted the default TextBox (the x:Key attribute is not defined). In this case this works. Not shown in the demo, but I created some variants like a read-only textbox and a multiline textbox. It depends on your taste and needs how you want to do this.

<ResourceDictionary xmlns="http://schemas.microsoft.com/winfx/2006/xaml/presentation"

xmlns:x="http://schemas.microsoft.com/winfx/2006/xaml"

xmlns:local="clr-namespace:Styles.Library">

<!-- Textbox -->

<Style TargetType="{x:Type TextBox}">

<Setter Property="FontSize" Value="{DynamicResource FontSizeTextBox}" />

<Setter Property="FontFamily" Value="{DynamicResource FontFamilyTextBox}" />

<Setter Property="FontWeight" Value="{DynamicResource FontWeightTextBox}" />

<Setter Property="FontStyle" Value="{DynamicResource FontStyleTextBox}" />

<Setter Property="Foreground" Value="{DynamicResource DataText}" />

<Setter Property="Background" Value="{DynamicResource TextBoxBackground}" />

<Setter Property="Margin" Value="{DynamicResource MarginDefault}" />

<Setter Property="Padding" Value="{DynamicResource PaddingDefault}" />

<Setter Property="Height" Value="{DynamicResource TextBoxDefaultHeight}" />

<Setter Property="HorizontalAlignment" Value="Stretch" />

<Setter Property="TextAlignment" Value="Left" />

<Setter Property="VerticalContentAlignment" Value="Center" />

</Style>

</ResourceDictionary>

Buttons are far more complicated, if you want to use markup variants for a mouse over, pressed or disabled state. I show the example here, to give you a starting point.

<ResourceDictionary xmlns="http://schemas.microsoft.com/winfx/2006/xaml/presentation"

xmlns:x="http://schemas.microsoft.com/winfx/2006/xaml"

xmlns:local="clr-namespace:Styles.Library">

<!-- Standard button layout -->

<Style x:Key="ButtonDefault" TargetType="{x:Type Button}">

<Setter Property="HorizontalContentAlignment" Value="Center" />

<Setter Property="VerticalContentAlignment" Value="Center" />

<Setter Property="Margin" Value="{DynamicResource MarginDefault}" />

<Setter Property="Width" Value="{DynamicResource ButtonDefaultWidth}" />

<Setter Property="Height" Value="{DynamicResource ButtonDefaultHeight}" />

<Setter Property="Background" Value="{DynamicResource ButtonBackground}"/>

<Setter Property="Foreground" Value="{DynamicResource ButtonText}"/>

<Setter Property="Template">

<Setter.Value>

<ControlTemplate TargetType="{x:Type Button}">

<Grid x:Name="grid">

<Border

x:Name="border"

Background="{DynamicResource ButtonBackground}"

BorderBrush="{DynamicResource LabelText}"

Padding="{DynamicResource PaddingDefault}"

BorderThickness="{DynamicResource ThinBorderWidth}">

<ContentPresenter

HorizontalAlignment="Center"

VerticalAlignment="Center"

TextElement.FontWeight="Bold" />

</Border>

</Grid>

<ControlTemplate.Triggers>

<Trigger Property="IsPressed" Value="True">

<Setter TargetName="border"

Property="Background"

Value="{DynamicResource ButtonPressed}" />

</Trigger>

<Trigger Property="IsMouseOver" Value="True">

<Setter TargetName="border"

Property="Background"

Value="{DynamicResource ButtonHover}" />

</Trigger>

<Trigger Property="IsEnabled" Value="False">

<Setter TargetName="border"

Property="Background"

Value="{DynamicResource ButtonDisabled}" />

</Trigger>

</ControlTemplate.Triggers>

</ControlTemplate>

</Setter.Value>

</Setter>

</Style>

</ResourceDictionary>

This allows you to display a disabled button using a grey background:

<Button Style="{StaticResource ButtonDefault}" IsEnabled="False">

Disabled button

</Button>

The fonts are inherited from the font settings at the Window level. You may or may not want that, depending on the level of control you need.

# Final remarks

In this article I present a way of working I discovered with trial and error during a long period of time, with a lot of help from generous developers who contributed with their solutions and aswers to questions. The solution is not intended as a copy paste solution that solves all your markup problems. It depends on your specific needs how you setup the details. My choice is to do it relatively low level, but with extensive re-use of the low level components. You may choose to use only one font for a number of controls. This is less work, but if you want to change the design, this may cause more work.

I am looking forward to hear about better solutions. In many aspects I am beginner, but this works for me right now and I hope it helps you to create something that works for you.

I like to end with a big THANK YOU to the developer community for all the help they provide for free and making it possible for me to create software at all.