

Module 5

"Control Templates and User-Defined Controls"



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Agenda

- ▶ **Control Templates**
- ▶ Creating User and Custom Controls in WPF



WPF Trees

► Logical Tree

- View in Visual Studio with
 - **View → Other Windows → Document Outline**
 - Bottom-left corner icon ☺
- Essential for eventing

► Visual Tree

- Elements deriving from **Visual** and **Visual3D**
- View in Visual Studio with “WPF Tree Visualizer”
 - Access from Locals, Autos, or Watch window
- Essential for styling and templating



Introducing Control Templates

- ▶ A control template replaces the visual tree of the control
 - **Control.Template** property
- ▶ **ControlTemplate**
 - **VisualTree**
 - **TargetType**
 - **Triggers**

Content property
Restricts use
- ▶ Can be applied
 - Directly
 - As a resource
 - Through a style
- ▶ Even though they're similar Control Templates are not the same as Data Templates!



Triggers, Presenters, and Template Bindings

▶ **ControlTemplate**

- Triggers

▶ Presenters

- **ContentPresenter** Light-weight, specialized **ContentControl**
- **ItemsPresenter** Light-weight, specialized **ItemsControl**

▶ **TemplateBinding** Light-weight, specialized **Binding**

- Binds properties to properties of the *Templated Parent*
 - **Content** property is implicitly bound
 - Note: **ControlTemplate.TargetType** must be set
 - Used for “respecting” Templated Parent’s properties



Tips and Tricks

- ▶ **TemplateBinding** vs. **Binding**
 - **TemplateBinding**
 - Only works within template's visual tree: not in triggers!
 - Can use data binding with **RelativeSource = TemplatedParent**
 - Conventional data binding can always be used
- ▶ Viewing built-in templates
 - Use **XamlWriter** to save template property value
- ▶ Predefined **PART_Xxx** names in templates
 - E.g. TextBox: **PART_ContentHost**
 - E.g. ComboBox: **PART_Popup**
 - ...



Visual State Manager

- ▶ You should consider all the visual states of a control when templating it!
 - You could craft all this by hand. But... ☹
- ▶ Visual State Manager (VSM)
 - Easy control over parts and states e.g. Expression Blend
 - Better than to use triggers!
- ▶ WPF controls exhibit a number of States in State Groups
 - e.g. for **Button**:
 - **CommonStates** **Normal, MouseOver, Pressed, Disabled**
 - **FocusStates** **Unfocused, Focused**
 - Always in one State from each State Group



Animations and the Visual State Manager

- ▶ **VisualStateManager.VisualStateGroups** attached property on visual tree
 - **VisualStateGroup** collection
 - **VisualState** collection
 - Storyboard
 - Transitions
- ▶ **Storyboard** contains animations (See Module 1)
- ▶ **VisualStateGroup.Transitions**
 - **VisualTransition** collection
 - To optional state (matches all)
 - From optional state (matches all)
- ▶ **ViewBox** is often very helpful!



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Templating or Control Authoring?

- ▶ Three possibilities for custom elements
 - Templates
 - When appearance needs to be changed
 - User Controls
 - When combining existing into composite functionality
 - Custom Controls
 - When functionality is otherwise not possible
 - Derive from existing control, or
 - Derive from Control or ContentControl directly

- ▶ "Choose wisely" 😊



Creating User Controls

- ▶ Use "**WPF User Control Library**" project template in Visual Studio
 - Design control surface
 - Add functionality
 - Add dependency properties
 - ...

- ▶ Add Reference til control library
 - **clr-namespace**
 - Use as any other control 😊



Creating Custom Controls

- ▶ Use "**WPF Custom Control Library**" project template in Visual Studio
 - Add markup to your control
 - Add functionality
 - Add dependency properties
 - ...
 - Create **Generic.xaml** control template

- ▶ Add Reference to control library
 - **clr-namespace**
 - Use as any other control ☺



Themes

► Themes

- Rely on OS's visual characteristics
- **Generic.xaml** must be defined!
- Optionally; *ThemeName.ThemeColor.xaml* files, e.g.
 - **Aero2.NormalColor.xaml** Windows 8
 - **Aero.NormalColor.xaml** Windows 7 + Windows Vista
 - **Luna.Metallic.xaml** Windows XP
 - **Classic.xaml** Windows Classic
- **ThemeInfoAttribute**
 - **ResourceDictionaryLocation**
 - None
 - **SourceAssembly**
 - **ExternalAssembly**
 - *ControlAssemblyName.ThemeName.dll*



Summary

- ▶ Control Templates
- ▶ Creating User and Custom Controls in WPF





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