Module 5

"Control Templates and User-Defined Controls"

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Agenda

- Control Templates
- Creating User and Custom Controls in WPF

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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

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Introducing Control Templates

- A control template replaces the visual tree of the control
  - `Control.Template` property
- `ControlTemplate`
  - `VisualTree` — Content property
  - `TargetType` — Restricts use
  - `Triggers`
- 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

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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!

Agenda

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

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" ☺

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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 ☺

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Creating Custom Controls

- Use "**`WPF Custom Control Library`**" project template in Visual Studi
  - Add markup to your control
  - Add functionality
  - Add dependency properties
  - …
  - Create **`Generic.xaml`** control template
- Add Reference til 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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