

Module 8

"MVVM Problems and Solutions"



TEKNOLOGISK
INSTITUT

Agenda

- ▶ **MVVM Frameworks**
- ▶ Solutions to Common Problems
- ▶ Concluding Remarks

The Jungle of MVVM Frameworks

- ▶ Caliburn
- ▶ Catel
- ▶ Cinch
- ▶ ClientUI
- ▶ Excalibur
- ▶ **MVVM Light**
- ▶ Prism
- ▶ Simple MVVM
- ▶ Vidyano
- ▶ ... + many more

MVVM Light Toolkit

- ▶ Developed by Laurent Bugnion of GalaSoft
 - <http://www.galasoft.ch/mvvm/>
- ▶ Patterns
 - ViewModel Locator / IoC
 - Stateful and Stateless ViewModel
 - Message Bus
 - View Service
 - ...
- ▶ Provides
 - Project Templates
 - Infrastructure and Helper Classes
 - Snippets
 - NuGet packages



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Stateful ViewModel Pattern

- ▶ Controls do not have state – ViewModel does!
- ▶ Easier to test
- ▶ Decouples business logic from UI
- ▶ MVVM Light Toolkit provides NuGet package
 - **ViewModelBase** + snippets

```
public class MainViewModel : GalaSoft.MvvmLight.ViewModelBase
{
    public string FirstName { ... set { ...
        RaisePropertyChanged( () => FirstName );
    }
}
}
```

- ▶ *Alternative: Stateless ViewModel pattern (e.g. Update Controls.NET)*



Message Bus Pattern

- ▶ Need to synchronize viewmodels
 - Without tightly coupling them!
 - **Messenger** provides loosely coupled communication
- ▶ Note that WPF 4.5 provides "live shaping"
 - **CollectionViewSource.**
 - **IsLiveSortingRequested**
 - **IsLiveFilteringRequested**
 - **IsLiveGroupingRequested**
- ▶ *Alternative: Selection Model pattern*



Inversion of Control Pattern

- ▶ It is really helpful to make use of an IoC container
 - Unity
 - Simpleloc
 - ...
- ▶ This will allow simple setup of many nice features, e.g.
 - Design-mode vs. runtime models, view models and services
 - View Service Pattern
 - ...
- ▶ MVVM Light Toolkit provides the **SimpleIoc** helper



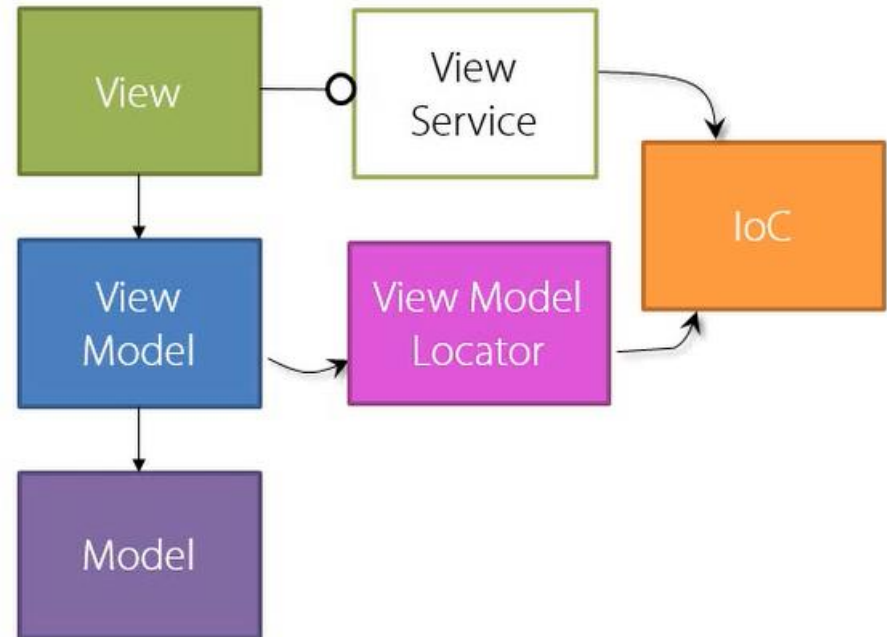
View Services Pattern

- ▶ Cardinal rule of MVVM

- Never look "up"...

- ▶ ViewModel should never call View methods, e.g.

- Prompts
- Message boxes etc.



- ▶ Solution is to create View Services to break potential circular dependency between View and ViewModel

- ▶ *Alternative: ViewModel Events pattern*



Attached Behaviors Pattern

- ▶ Nikhil Kothari
 - In 2008 discovered the sheer power of attached properties
 - Attaches “unavailable” behavior to UI elements, e.g. **Command**
- ▶ Blend Team went to improve it to **Behavior<T>** class
 - In **System.Windows.Interactivity** namespace
 - **EventTrigger**
 - **InvokeCommandAction**
- ▶ Examples may include
 - Providing **Command** property
 - Converting events to commands
 - Drag ‘n Drop
 - Setting focus to elements
 - ... + many more
- ▶ MVVM Light provides **EventToCommand** behavior similar to **InvokeCommandAction**



MVVM Validation in WPF 4.5

- ▶ WPF 4.5 adds a new interface for validation

```
public interface INotifyDataErrorInfo
{
    bool HasErrors { get; }
    IEnumerable GetErrors( string propertyName );
    event EventHandler<DataErrorsChangedEventArgs> ErrorsChanged;
}
```

- ▶ Use
 - `Binding.ValidatesOnNotifyDataErrors = true` or
 - `NotifyDataErrorValidationRule`
- ▶ Fixes the problems with the "ordinary" `IDataErrorInfo`
 - Capability to raise event when state changes
 - Allows asynchronous validation
 - Facilitates correlation between properties
 - Can control time of validation



Data Annotations

- ▶ **INotifyDataErrorInfo** mixes well with Data Annotations
 - In **System.ComponentModel.DataAnnotations**
 - Originally from ASP.NET MVC
- ▶ **Validator** class
- ▶ **ValidationAttribute**
 - CustomValidationAttribute
 - RangeAttribute
 - RegularExpressionAttribute
 - RequiredAttribute
 - StringLengthAttribute
 - EmailAddressAttribute
 - ...



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Summarizing...

- ▶ Many variations and alternative sub-patterns exist
- ▶ MVVM keeps a clear and clean separation
- ▶ MVVM is in many ways like "re-learning" WPF
- ▶ MVVM is often difficult upon new first encounters
- ▶ MVVM frameworks support sets of sub-patterns

- ▶ Choose the approach which suits YOU
- ▶ But stay as consistent as possible...
 - Uncle Google might be your enemy here

MVVM is "going global..." 😊

► Works for any XAML-based formalism

- WPF
- UWP
- Xamarin.Forms

► Adapted by

- KnockoutJS
- Angular

Choose a ticket class:

```
<select data-bind="options: tickets,
optionsCaption: 'Choose...',
optionsText: 'name',
value: chosenTicket"></select>
```

Binding attributes
declaratively link
DOM elements
with model
properties

```
<button data-bind="enable: chosenTicket,
click: resetTicket">Clear</button>
```

```
<p data-bind="with: chosenTicket">
  You have chosen <b data-bind="text: name"></b>
  ($<span data-bind="text: price"></span>)
</p>
```

```
<script>
  function TicketsViewModel() {
    this.tickets = [
      { name: "Economy", price: 199.95 },
      { name: "Business", price: 449.22 },
      { name: "First Class", price: 1199.99 }
    ];
    this.chosenTicket = ko.observable();
    this.resetTicket = function() { this.chosenTicket(null) }
  }
  ko.applyBindings(new TicketsViewModel());
</script>
```

Your view model
holds the UI's
underlying data
and behaviors

Activates Knockout

Summary

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