Delphi XE2 WorkShop

LiveBinding
Data Binding for FireMokey and VCL

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Delphi XE2 Live Bindings

Data Binding for FireMonkey and VCL

Binding Expression Engine

- Binds
  - Concrete Delphi Objects
  - Scripted text

- Complex:
  - Probably the most complex feature added in recent Delphi versions
  - Might even 'beat' generics in complexity

- This session focuses on
  - Some fundamentals
  - Practical use in your Delphi applications:
    Lots of examples

First some theory

Followed by lots of examples

The big picture

- **Binding facilitates the communication between TComponents**

  - **Because of the Observer Pattern implementation there**
    - **See diff of the Classes unit**

- **The expressions are text based**

  - **Which makes it very flexible**
  - **But no compile time verification**

Design time versus code-time

- **DesignTime**
  - **TBindingList**
    - **Lots of bindings**
    - **Methods**
      - **Extendible**
    - **OuputConverters**
      - **Extendible**
      - **Automatically applied**
  - **TBindingScope**
    - **Binds to DB**

- **Code time**
  - **Expressions**
    - **Scope**
  - **Bindings**
  - **Notification**

Central hub 1: TBindingExpression

- Has
  - Scope
  - Expression text
- Compiles
  - TComponent references (having 'instance' and 'name')
  - TAssociations (each coupling 'TObject' instance' and 'name')
  - IScopes

- Evaluates
  - The expression text

Central hub 2: TBindingManager

- The BindingManager manages notifications of affected objects
  - Requires the use of Managed bindings
    - i.e. Expressions, and not Unmanaged bindings like BindLink
  - Makes life much easier when using them programmatically
 - Unmanaged bindings are usually better at design time

- http://docwiki.embarcadero.com/VCL/en/System.Bindings.Manager.TBindingManager

Binding Basics

- **TBindingList**
  - **Has Bindings of types:**
    - **Expressions**
      - TBindExpression **
      - TBindExprItems *
    - **Links**
      - TBindLink *
      - TBindListLink *
      - TBindGridLink
      - TBindPosition
    - **Lists**
      - TBindList *
      - TBindGridList

- **DB Links**
  - TBindDB<u>Edit</u>Link
  - TBindDB<u>Text</u>Link
  - TBindDB<u>Image</u>Link
  - TBindDB<u>Memo</u>Link
  - TBindDB<u>Check</u>Link

* **have these properties:**
- **ClearExpressions *
- **FormatExpressions *
- **ParseExpressions *

** **have these properties:**
- **ControlExpression
- **SourceExpression

TBindingExpression

- **Properties**
  - **SourceComponent** ->
    Source Scope
  - **SourceExpression**
  - **ControlComponent** ->
    Control Scope
  - **ControlExpression**

  - **Direction**
    **(diSourceToControl,
    diControlToSource,
    diBiDirectional)**

- **Example:
  ManagedBindingEdits**

- **Edit1/Edit2 are bound:
  Source/Control**
- **Expressions both are Text**

- **Notifiaction trigger is the
  OnChange event (it is
  programmed!!!)**

- **Steps:**
  - **Set Direction**
  - **Check Active**
  - **Type Text in Edit1 and Edit2**

Components overview

- **TBindingList**
  - has Binding Components (TBind....)
    - Each can refer to Scope Components
- **TBindingNavigator (FMX)**

- **TBindScopeDB**
- **TBindNavigator**

- **All of them have great design time support: property editors and wizards**

- **Binding components**
  - TBindPosition
  - TBindList
  - TBindLink
  - TBindGridLink
  - ...

- **FireMonkey specific binding (as this is the only way to bind in FMX):**
  - TBindTextLink

Infrastructure:

- **Two roles are supported**
  - **Editors of data**
  - **Observers of data**
- **You can mix the roles if you want**

LiveBindings design time

- TBindingList

- Properties
  - Methods
  - Converters
- Methods
  - Notify
- Events
- Design time
  - Methods Editor (can locally disable global methods)
  - OutputConverters Editor (can locally disable global output converters)
  - inding Components List Editor
    - similar to actionslist editor
    - only shows TBind... components that are relevant to your kind of (FMX/VCL) form

- Edit1Change
  - BindingList1.Notify(Sender, ''); // notify all managed bindings for Sender
  - BindingList1.Notify(Edit1, 'Text'); // notify Text bindings for Edit1

TBind... components

- all have
  - 1+ expression bindings
  - Active property
  - AutoActivate property
  - SourceComponent/ControlComponent
  - some: SourceExpression/ControlExpression
  - Expression editor (except TBindDB*)

TBind* component purposes

- TBindExpression/TBindExprItems
  - Both create *managed* or unmanaged bindings for assigning values
- TBindPosition
  - Link a property in a control to the position of a data source
- TBindList, TBindGridList (TBind*List)
  - Unmanaged bindings to populate a list/grid
- TBindLink
  - Unmanaged bindings to link a control to a data source
  - for instance to behave like a TDBEdit/TDBImage in VCL
- TBindListLink, TBindGridLink
  - Unmanaged bindings to link a list or grid to a data source
  - For TStringGrid to behave like TDBGrid

TBindDB*Link

- Edit, Text, List, Image, Memo, Check, Grid

- Unmanaged bindings to link FMX controls to a data source

- Demo: OneEachForm.dproj

TBindExpression additional properties

- Direction
- Managed
- NotifyOutputs
- SourceExpression/ControlExpression
- has Expression editor

- Expression editor has test buttons (Eval*)

TBindExprItems

- Similar to TBindExpressions
  - supports multiple expression strings
  - handy when updating more controls for one source
  - or more controls from multiple sources in one place
- Different properties:
  - ClearExpressions
  - FormatExpressions (not: ControlExpression)
  - NotifyOutputs
  - SourceMemberName (not: SourceExpression)

TBindPosition

- **Different properties:**
  - **PosClearExpressions**
    - **Executes when the TBindPosition is deactivated**
  - **PosControlExpressions (not: ControlExpression)**
    - **From Source to Control**
      - for ScrollBar: Self.Max (RecordCount-1), Position (Max(0, RecNo-1)), Hint ("Record " + ToStr(RecNo) + "of " + ToStr(RecordCount)
  - **PosSourceExpressions**
    - **from Control to Source**
      - for ScrollBar: RecNo <- Position+1
  - **SourceMemberName (not: SourceExpression)**

TBindList

- **Different Properties:**
  - **AutoFill**
  - **BufferCount**
  - **ClearControlExpressions -> for the ListBox**
  - **FormatControlExpressions -> for the ListBox**
  - **FormatExpressions -> for the Items in the ListBox**
  - **SourceMemberName (not: SourceExpression)**
    - **FormatExpression example: Text <- ToStr(RecNo) + ". " + Name.AsString + " (" + Weight.AsString + " pounds.)"**

- **Buttons in property editor.**
- **Commands in object inspector: Fill List; Clear List.**

TBindGridList

- Properties:
  - AutoFill
  - BufferCount
  - ClearControlExpressions
  - ColumnExpressions
  - FormatControlExpressions
  - FormatExpressions
  - SourceMemberName (not: SourceExpression)

- Commands in object inspector: Fill Grid, Clear Grid
- ColumnExpressions are a lot of work to fill in.
- It consists of a Column, and for each column the formatting expressions.

TBindGridList (continued)

- Each Column has these properties:
  - ColumnIndex
  - ColumnName
  - ControlMemberName
  - FormatCellExressions
    - (each having a ControlExpression and SourceExpression Cells[2] <- AsString + 'lbs')
  - FormatColumnExpressions (idem Cell[2, 0] <- FieldName)
  - Name
  - SourceMemberName

- FireMonkey has a live bindings component that does not require you to write expressions.
- In VCL you can also use code to fill the properties.

TBindLink (bi-directional!)

- ClearExpressions
- FormatExpressions (not: ControlExpression)
- ParseExpressions
- SourceMemberName (not: SourceExpression)

Example: Bind a TLabel so it

TBindListLink combines: TBindLink, TBindList, TBindPosition

- Properties:
  - AutoFill
  - BufferCount
  - ClearControlExpressions
  - FormatControlExpressions
  - FormatExpressions
  - ParseExpressions
  - PosControlExpressions (not: ControlExpression)
  - PosSourceExpressions
  - SourceMemberName (not: SourceExpression)

- populates ListBox
- current row in ListBox because of Navigation
- updates from Edit to Field in DataSet

- Demo:
- FormatExpressions[0]: Text <- Name.AsString + " - Weight: ' + Weight.AsString + " pounds."

TBindGridLink

- like TBindGridList but adds Positioning support and Parse expressions for bidirectional support
  - AutoFill
  - BufferCount
  - ClearControlExpressions
  - ColumnExpressions
  - FormatControlExpressions
  - FormatExpressions
  - ParseExpressions
  - PosControlExpressions (not: ControlExpression)
  - PosSourceExpressions
  - SourceMemberName (not: SourceExpression)

TBindGridLink

- Each Column has these properties:
  - ColumnIndex
  - ColumnName
  - ControlMemberName
  - FormatCellExressions
    - (each having a ControlExpression and SourceExpression
      Cells[2] <- AsString + 'lbs')

FormatColumnExpress

Drawback of Data Binding

- no support for data validation like TDB* components have.

FireMonkey FMX – more components: better support

- **TBindDB*Link**
  - Edit
  - Text
  - List
  - Image
  - Memo
  - Check
  - Grid

  - TBindDBEditLink
  - TBindDBTextLink
  - TBindDBListLink
  - TBindDBImageLink
  - TBindDBMemoLink
  - TBindDBCheckLink
  - TBindDBGridLink

- They all have "embedded" expressions: not in the object inspector, and not editable in the TBindLink editor
- They all use a TBindLink internally
  - except for TBindDBGridLink which uses a TBindGridLink internally.

SimpleDBBindLinkProject: FMX

- TBindNavigator: FMX
- - BindScope property: TBindScopeDB1

Scope Components

- - Wrap a TObject in s a scope for the expression engine
- - May be referenced by the SourceComponent property of abinding component
- - May implement one or more IScope* interfaces to specialize
  - IScopeActive

Interesting Examples

- EvalErrorSample
  - Shows that binding is about Source and Control expressions
- BindExpressionSampleProject
  - Shows binding of "Text" property from a single component
- fmx\BindListFMXProject.dpr, vcl\BindListVCLProject.dpr
  - http://blogs.embarcadero.com/jimtierney/2011/09/30/31559
  - Show BindingList feature: DB to ListBox
- ListCollectionsSampleProject
  - Shows binding to a couple of kinds of collections
  - http://blogs.embarcadero.com/jimtierney/2011/10/14/31608
  - http://blogs.embarcadero.com/jimtierney/2011/09/30/31559
    - SimpleListCollectionSampleProject, ListCollectionsSampleProject
    - BindListFMXProject, BindListVCLProject
- BindListEditVCLProject
  - Using BindingList with expressions, Binds
    - an Edit to/from a ListBox and
    - an Edit to/from a ListView

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Write an application

- Two input fields that have bidirectional copying

- Write a small aplication that has a TBindingExpression
  - Use it for doing some basic calculations
  - Enter the expression in Edit1
  - Show the results in Memo1

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References

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- Blog entries
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Demos