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## Fundamentals of Windows Presentation Foundation (WPF)

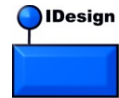
Brian Noyes  
Chief Architect  
IDesign Inc. ([www.idesign.net](http://www.idesign.net))

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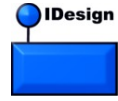
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### About Brian

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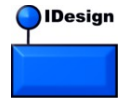
- Chief Architect, IDesign Inc. ([www.idesign.net](http://www.idesign.net))
- Microsoft MVP (Visual Developer – Solution Architect)
- Writing
  - Data Binding with Windows Forms 2.0, Addison Wesley, January 2006
  - Smart Client Deployment with ClickOnce, Addison Wesley, Summer 2006
  - MSDN Magazine, MSDN Online, CoDe Magazine, The Server Side .NET, asp.netPRO, Visual Studio Magazine
- Speaking
  - Microsoft TechEd US, Europe, Malaysia, Visual Studio Connections, DevTeach, INETA Speakers Bureau, MSDN Webcasts
- Participates in Microsoft Design Reviews
- E-mail: [brian.noyes@idesign.net](mailto:brian.noyes@idesign.net)
- Blog: <http://www.softinsight.com/bnoyes>



## It's A User Group Thing

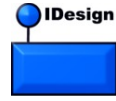


- As an INETA member, your User Group gets:
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  - INETA even pays for the pizza
  - Discounts on software, conferences, subscriptions and more
  - Newsletter, content repository and forums of use to User Group members
- INETA needs volunteers
  - Benefit your User Group and yourself by getting involved
- INETA Web Site: [www.ineta.org](http://www.ineta.org)



## Agenda

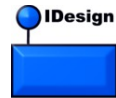
- Overview of WPF
- Basic Application Structure
- Designing Your UI
- Data Binding
- Other capabilities



## WPF Overview

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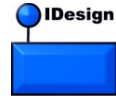
- New Windows UI Framework
  - Alternative to Windows Forms / ASP.NET?
- How do I get it?
  - Windows Vista / WinFx
    - ▲ Dec 2005 CTP current
    - ▲ Beta 2 Spring 2006
  - WinFx compatible with Windows XP/Server 2003
  - .NET 2.0
  - Visual Studio "Orcas" (2007?) / .NET 3.0



## WPF Features

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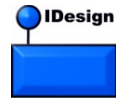
- State of the art graphics
  - DirectX under the covers
  - Controls, 2D, 3D graphics
- Not tied to the hardware
  - Logical pixels
  - Blurred line between Windows and graphics
- Raised abstraction level
  - Elemental composition
  - Data contexts
  - Resources



## WPF Features

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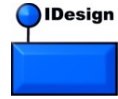
- Declarative programming model – XAML
- Documents and content first class citizens
  - Word/PDF/etc.
  - Video/Audio
- Interop with Windows Forms
  - Host Windows Forms controls in WPF apps
  - Host WPF controls in Windows Forms apps



## Building WPF Applications

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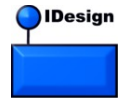
- Visual Studio 2005
  - Code
    - ▲ Everything is still an object
    - ▲ Framework classes in System.Windows namespace
  - XAML
    - ▲ Extensible Application Markup Language
    - ▲ Declarative XML syntax for UI and objects
    - ▲ Easier for machine parsing (designer generated code)
    - ▲ Used for other parts of WinFx (xoml – WinWF)
- Visual Studio "Orcas"
  - Cider – WPF designer



## Agenda

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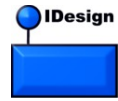
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## Structural Overview

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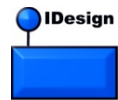
- Compositional Model
  - Application
  - Framework Elements
    - ▲ Windows, controls
  - Geometries
- Event Driven
  - Routed Events
    - ▲ Bubbling, Tunneling, Direct
  - Routed Commands
    - ▲ Not associated with a single object
    - ▲ Raise their own events
- Content
  - Documents
  - Styles
  - Navigation



## The Application

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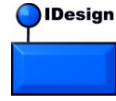
- Entry point for a WPF application
- Application base class
- Programmatic or XAML based
- Can have its own resources



## Windows

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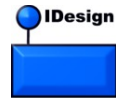
- Top level windows in your app
  - Windows, dialogs, page (browser based apps)
- Derive from Window base class
- Fill with content
  - Controls
  - Documents
  - Graphics
- NavigationWindow – provides page experience even for Windows apps



## Controls

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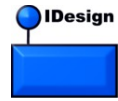
- Built-in controls
  - Button, TextBox, ComboBox, etc.
- Containers
  - Grid, StackPanel, DockPanel, Canvas
- Custom
  - Container controls
  - Self-rendering
- Managed through properties
  - Dependency properties
  - Attached properties
- Controls only lock down the behavior of the control, not the presentation



## XAML

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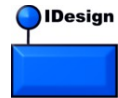
- eXtensible Application Markup Language
- Declarative syntax for UI layout and interaction
- Primarily the static aspects of your UI
  - Can be initialized to dynamic data sources
- Uses partial classes – compiled to BAML
- Put dynamic aspects (programmatic code) in code behind file
- IntelliSense in Visual Studio 2005
- Cider designer in Visual Studio "Orcas"



## Agenda

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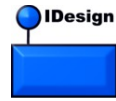
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## Content model

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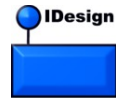
- Elements can be containers
- Window/control content composed of other elements
- Set through:
  - Content property
  - Specific properties (i.e. Text, Image)
  - Child control collections



## Layout

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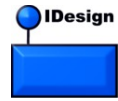
- Grid
  - Tabular layout – think HTML tables
  - Handles resizing
  - Container for other elements
  - Define through ColumnDefinition and RowDefinition objects
  - Add controls to grid through attached properties
    - ▲ Grid.Row, Grid.Column



## Layout

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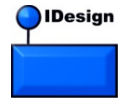
- StackPanel
  - Vertical or Horizontal Alignment
  - Can combine with Grid or DockPanel for complex layouts
  - Works well for toolbar like layouts
- DockPanel
  - Works like Dock property on individual controls in Windows Forms
  - Use attached properties on contained controls
    - ▲ DockPanel.Fill, DockPanel.Left, etc.



## Layout

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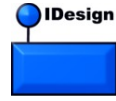
- Canvas
  - Drawing palette
  - Absolute positioning of elements



## Agenda

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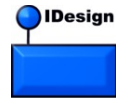
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## Data Binding Overview

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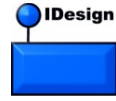
- Data Sources
  - Objects or collections
  - Based on interfaces
    - ▲ INotifyPropertyChanged, INotifyCollectionChanged, ICollectionView
  - Use ObservableCollection<T> for collections
- Bindings
  - Tie control properties to data source properties
  - Declarative through XAML or programmatic
- Data Context
  - Data objects or collections flow from parent containers to child controls
- Master Details
  - Nest data contexts



## Agenda

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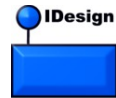
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## Templates

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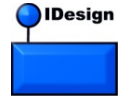
- Styles
  - Set combinations of properties
  - Tie to control type or named
  - Apply to individual elements
- Data
  - Set up structure of elements for each data item in a bound container
- Control
  - Change the presentation of a control to something completely different



## Graphics

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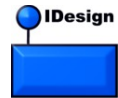
- Shapes are elements too
  - Can be styled, data bound, use layout containers, etc.
- Geometries to compose complex drawings
- Use Canvas for raw drawings
- Pixels 1/96<sup>th</sup> of an inch – not tied to hardware
- Coordinate systems supported
- Transformations (rotate, scale, translate, matrix)



## Animation

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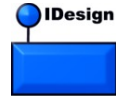
- Fancy way of setting properties on elements
  - Controls, graphic objects
  - Must be dependency properties
- Based on timelines
  - SetterTimeline
    - ▲ BeginTime, Duration, AutoReverse, Path
  - ParallelTimeline
    - ▲ Container for other timelines
- Supports setting speed, acceleration
- Frame-based animations



## Deployment

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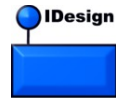
- ClickOnce works for WPF as well
- Publish to a web/file server
- Provide a link to the deployment manifest to users
- User clicks on the link
  - App files are copied to cache under local machine user profile
  - App is launched in secure sandbox by runtime
- Publish update to the deployment server
  - App updates the next time the user launches the app



## Summary

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- Vast new framework for UI applications
- Rich content model
- Blurs the lines between different kinds of presentation applications
- New programming model to learn
  - Routed events, dependency properties, attached properties
  - XAML/code separation



## Resources

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- Windows Vista Developer Center, <http://msdn.microsoft.com/windowsvista/>
- Programming Windows Presentation Foundation, Chris Sells and Ian Griffiths, O'Reilly & Associates, [http://www.amazon.com/gp/product/0596101139/sr=1-1/qid=1137414971/ref=pd\\_bbs\\_1/102-6092476-9927357?%5Fencoding=UTF8](http://www.amazon.com/gp/product/0596101139/sr=1-1/qid=1137414971/ref=pd_bbs_1/102-6092476-9927357?%5Fencoding=UTF8)
- Data Binding with Windows Forms 2.0, Brian Noyes, Addison Wesley, [http://www.amazon.com/gp/product/032126892X/qid=1124482085/sr=11-1/ref=sr\\_11\\_1/102-6092476-9927357?n=283155](http://www.amazon.com/gp/product/032126892X/qid=1124482085/sr=11-1/ref=sr_11_1/102-6092476-9927357?n=283155)
- Smart Client Deployment with ClickOnce, Brian Noyes, Addison Wesley, expected release late summer 2006.
- WPF Master Class, coming in mid-2006, IDesign, <http://www.idesign.net/>

E-mail: [brian.noyes@idesign.net](mailto:brian.noyes@idesign.net)

Blog: <http://www.softinsight.com/bnoyes>