

WINDOWS PROGRAMMING OVERVIEW

IEEE Computer Society

INTRODUCTION

- Frank Hubbell
 - Hubbell Consulting
 - 585-392-5293
 - fhubbell@rochester.rr.com
 - frhiee@rit.edu
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WINDOWS PRESENTATION FOUNDATION

- Latest Windows Development Environment
 - Replaces Windows Forms?
 - Better Graphics
 - Better Multimedia Support
 - Different Kinds of Applications
 - Desktop
 - Web page
 - Web Application
 - Silverlight
 - Foundation For Other Environments
-

WPF FEATURES

	Windows Forms	PDF	Windows Forms/ GDI+	Windows Media Player	Direct3D	WPF
Graphical interface, e.g., forms and controls	X					X
On-screen documents	X					X
Fixed-format documents		X				X
Images			X			X
Video and audio				X		X
Two-dimensional graphics			X			X
Three-dimensional graphics					X	X

MICROSOFT WINDOWS OPERATING SYSTEMS

- 1985 Windows 1.0
 - 1987 Windows 2.0
 - 1990 Windows 3
 - 1993 Windows NT
 - 1995 Windows 95
 - 1998 Windows 98
 - 1999 Windows 98SE
 - 2000 Windows ME
 - 2001 Windows XP
 - 2005 Windows Vista
 - 2009 Windows 7
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MICROSOFT WINDOWS DEVELOPMENT PLATFORMS

- **WIN16 API**
 - **WIN32 API**
 - **Window Foundation Class (WFC)**
 - **.NET Window Forms (WinForms)**
 - **.NET Window Presentation Foundation (WPF)**
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WINDOWS PROGRAMMING LANGUAGES

- **1985 C or VB** **Windows Application Program Interface (API)**
 - **1992 C++ or VB** **Microsoft Foundation Class (MFC) library**
 - **2001 C# or C++
or VB** **Windows Forms (.NET Framework)**
 - **2006 C# or VB** **Windows Presentation Foundation (WPF)**
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VISUAL BASIC

- Are you now, or have you ever been a basic programmer?

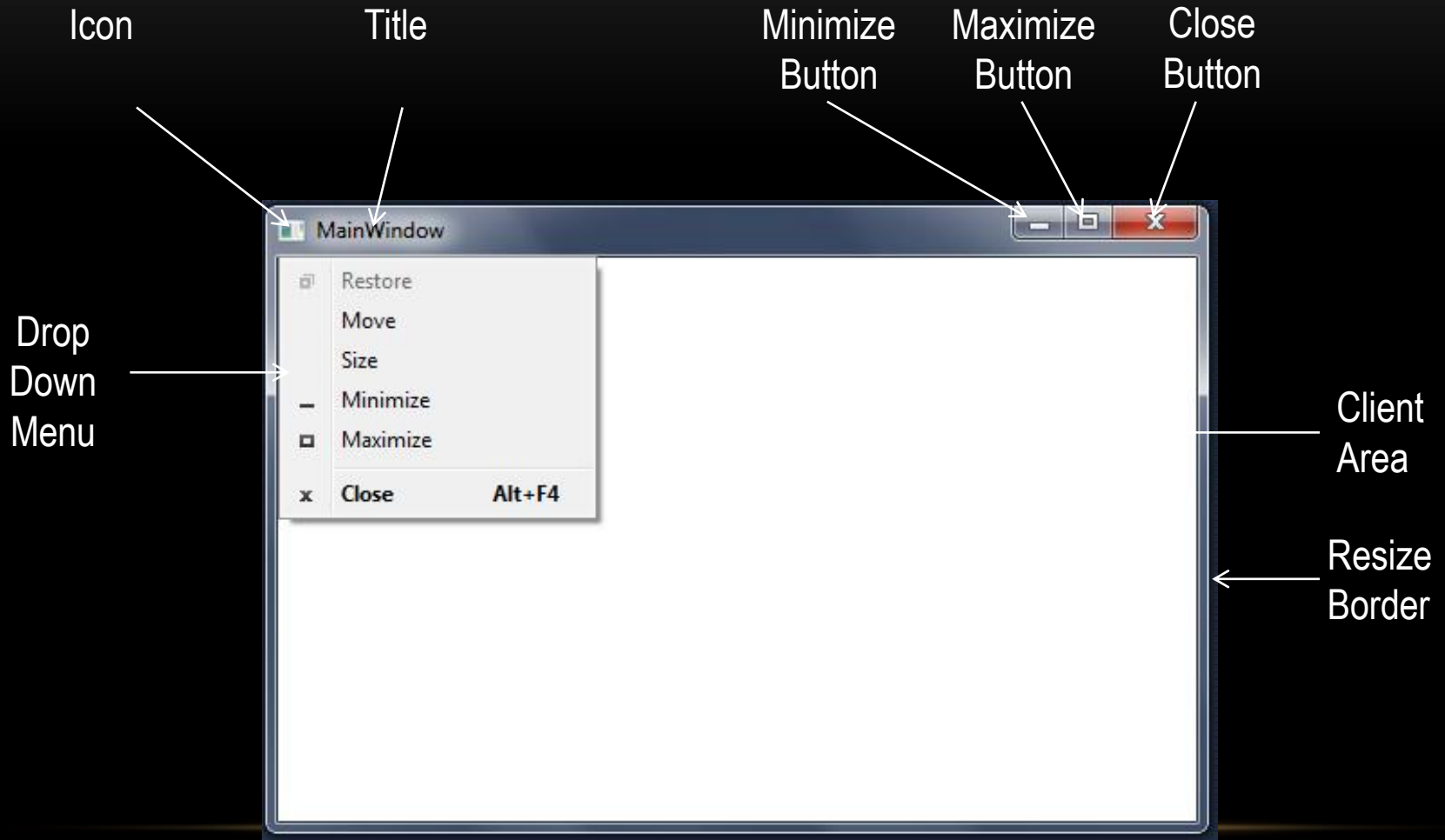
MICROSOFT ARCHITECTURE



FIRST DEMONSTRATION

- **Creating a default application in Visual Studio 2010**
- **Half Code, Half XAML**

WINDOW STRUCTURE



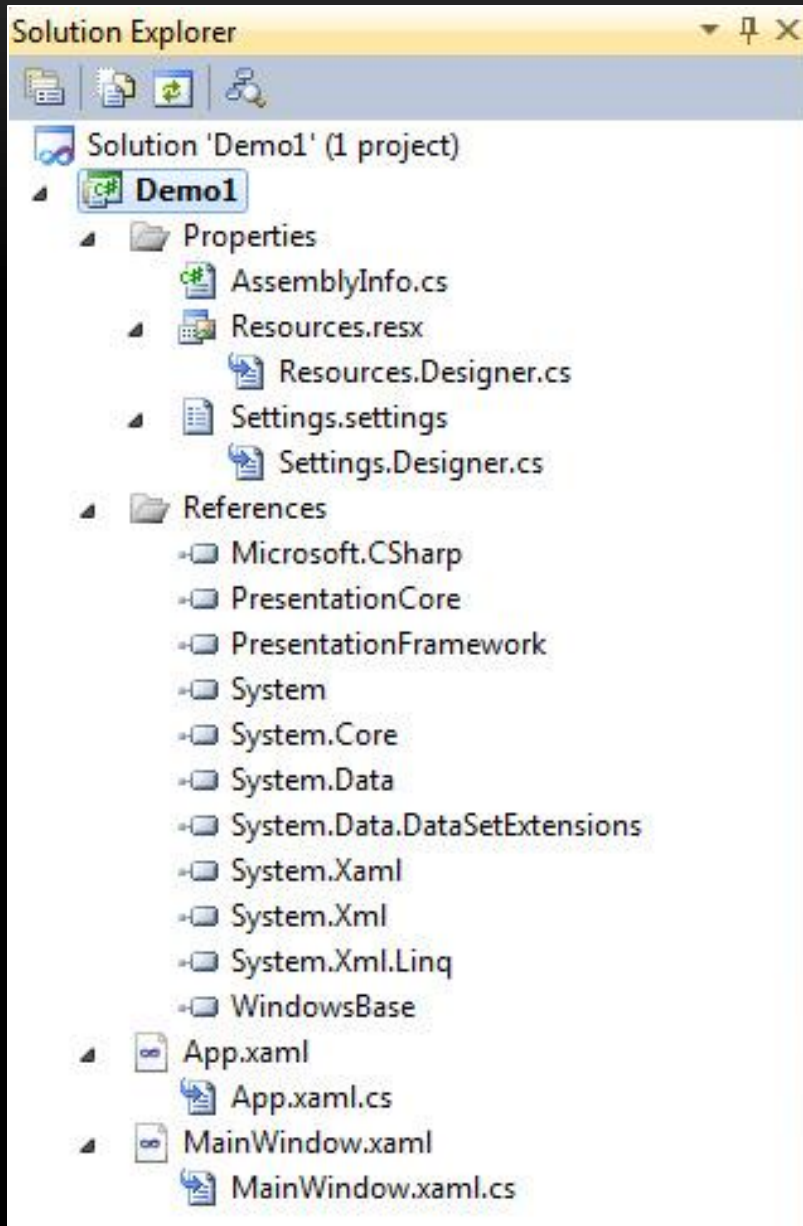
WPF ARCHITECTURE

- Separation of User Interface from rest of the application
 - Object Oriented Architecture
 - Extensible Application Markup Language (XAML)
 - Code-behind (C# or Visual Basic)
 - Partial Classes
 - Event Driven Logic
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EXTENSIBLE APPLICATION MARKUP LANGUAGE (XAML)

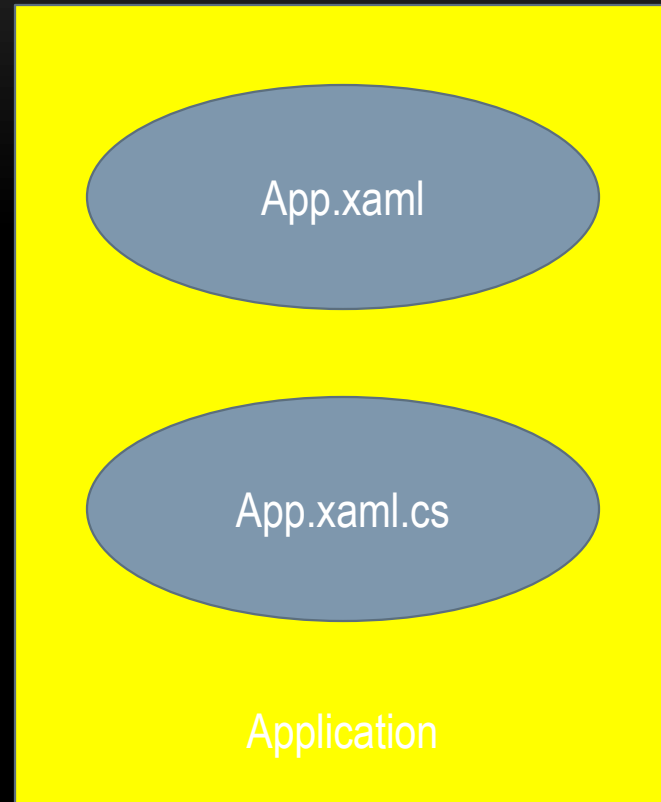
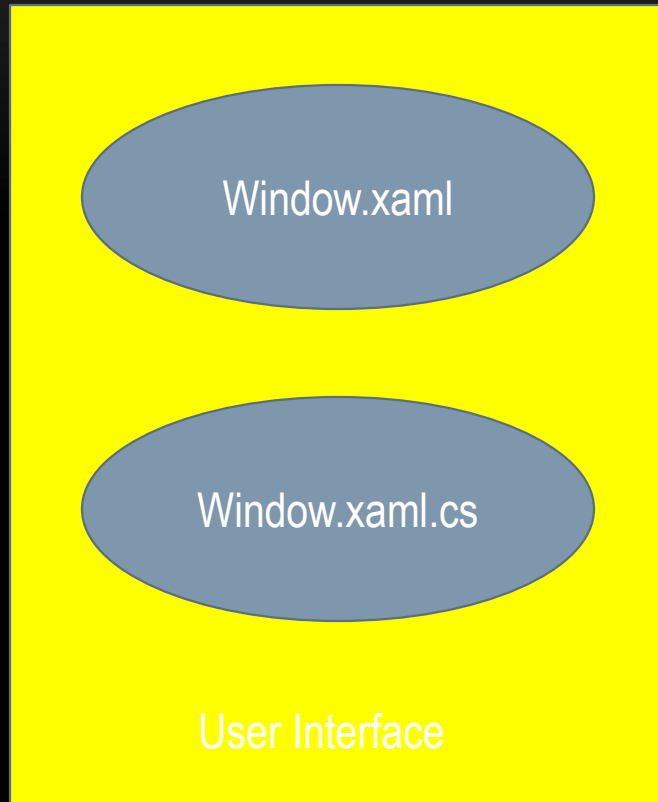
- Pronounced /'zæməɪ/ rhymes with camel
 - A declarative XML-based language
 - Created by Microsoft
 - Used mostly for Windows Presentation Foundation (WPF)
 - Subset of code functionality
 - Can not execute functions
-

PROJECT STRUCTURE



- Summary
 - 33 Files
 - 8 Folders
 - Size 133 KB

OBJECT STRUCTURE



OBJECT STRUCTURE

Window.xaml

App.xaml

Markup

Window.xaml.cs

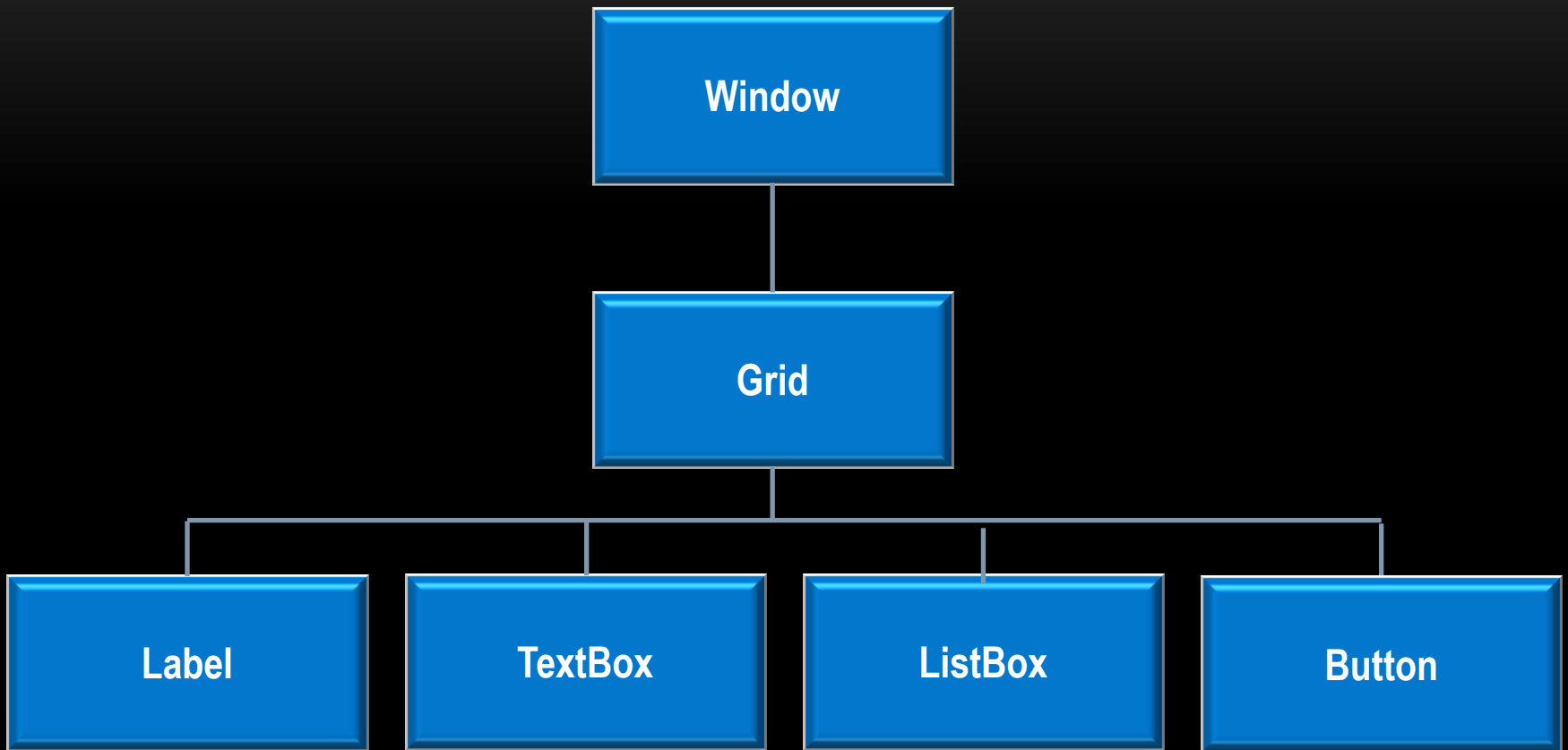
App.xaml.cs

Code

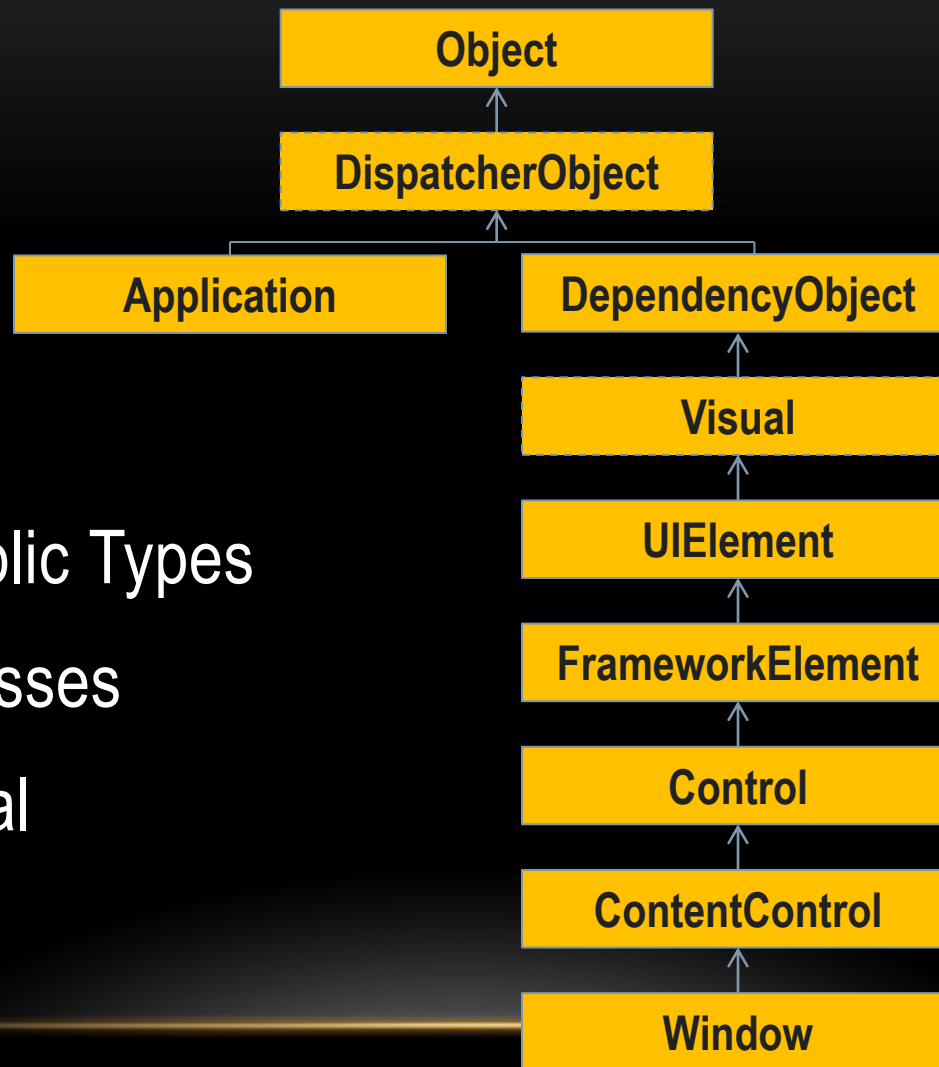
SECOND DEMONSTRATION

- Minimal application that still does something
 - Enter text and build a list of words
 - Control Components
 - Label Control
 - TextBox Control
 - ListBox Control
 - Button Control
 - Need to process button click event
 - Half Code, Half XAML
-

DEMO2 LOGICAL TREE



WPF CLASS HIERARCHY



- 1600 Public Types
- 3500 Classes
- 5100 Total

DEMO2 DESIGN ANALYSIS

- Entered value remains in textbox
- No control is selected when application starts
- User must click in textbox to enter a value
- User must move to button to submit value
 - Button can be eliminated
- Words in listbox are not sorted in order
- Form is static, should be dynamic
- Needs color

DEMO2 CLASS DIAGRAM

MainWindow

Class

→ Window

Methods

MainWindow()

textBox1_PreviewKeyDown(object sender, KeyEventArgs e) : void

Window_Loaded(object sender, RoutedEventArgs e) : void

App

Class

→ Application

Resources

Class

Fields

resourceCulture : CultureInfo

resourceMan : ResourceManager

Properties

Culture { get; set; } : CultureInfo

ResourceManager { get; } : ResourceManager

Methods

Resources()

Settings

Sealed Class

→ ApplicationSettingsBase

Fields

defaultInstance : Settings

Properties

Default { get; } : Settings

THIRD DEMONSTRATION

- Demonstration of two dimensional graphics
- Koch curve
- Right and left mouse buttons to interact with graphic display
- No XAML, All C# Code
- Fixed size window

2D GRAPHIC CONTROLS

- Ellipse Draws an ellipse
 - Line Draws a line
 - Path Draws a series of lines and curves
 - Polygon Draws a series of line segments that connect a series of points. It finishes by connecting the last point to the first
 - Polyline Draws a series of line segments that connect a series of points
 - Rectangle Draws a rectangle
-

MainWindow

Class

→ Window

Fields

- m_angle : double
- m_aspect : double
- m_canvas : Canvas
- m_level : double
- m_line : Polygon
- m_size : double
- m_x : double
- m_y : double

Methods

- forward(double amount) : void
- left(double delta) : void
- Main(string[] args) : void
- MainWindow()
- OnMouseLeftButtonDown(MouseButtonEventArgs e) : void
- OnMouseRightButtonDown(MouseButtonEventArgs e) : void
- right(double delta) : void
- side(double size, double level) : void
- snowflake(double size, double level) : void

Resources

Class

Fields

- resourceCulture : CultureInfo
- resourceMan : ResourceManager

Properties

- Culture { get; set; } : CultureInfo
- ResourceManager { get; } : ResourceManager

Methods

- Resources()

Settings

Sealed Class

→ ApplicationSettingsBase

Fields

- defaultInstance : Settings

Properties

- Default { get; } : Settings

FOURTH DEMONSTRATION

- Layout Control Examples
 - StackPanel
 - WrapPanel
 - DockPanel
 - Grid
 - Canvas
 - All XAML, No Code
-

USER INPUT CONTROLS

- Button
 - Calendar
 - CheckBox
 - ComboBox
 - DatePicker
 - PasswordBox
 - RadioButton
 - RichTextBox
 - Slider
 - TextBlock
 - TextBox
-

DATA DISPLAY CONTROLS

- Border
 - ContentControl
 - DataGrid
 - DocumentViewer
 - Expander
 - Image
 - Label
 - ListBox
 - ListView
 - MediaElement
 - ScrollViewer
 - TabControl
 - TreeView
 - Viewbox
 - WebBrowser
 - WindowsFormsHost
-

WINDOW COMPONENT CONTROLS

- Frame
 - GridSplitter
 - GroupBox
 - Menu
 - ProgressBar
 - ScrollBar
 - Separator
 - StatusBar
 - ToolBar
 - ToolBarPanel
 - ToolBarTray
-

CONTROL SUMMARY

- 45 different controls in toolbox

FIFTH DEMONSTRATION

- Controls
 - Slider
 - Textbox
- Data Binding
- All XAML, No Code

SIXTH DEMONSTRATION

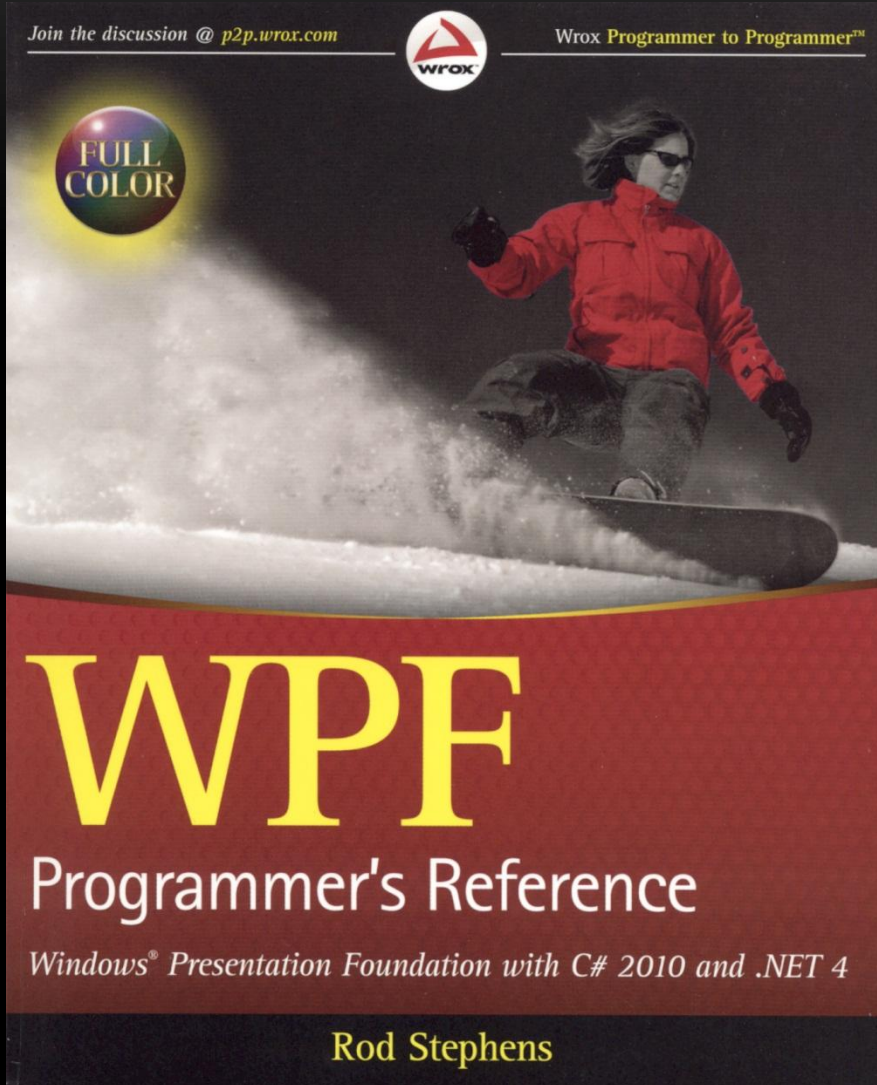
- 3D Graphics and Animation
- Reference:
 - MagicBox
 - 3D Programming for Windows
 - Charles Petzold
- All XAML, No Code

SEVENTH DEMONSTRATION

- 3D Graphics and Animation
 - Reference:
 - Gasket3D
 - WPF Programmer's Reference
 - Rod Stephens
-

REFERENCE MATERIAL

WPF PROGRAMMER'S REFERENCE



Rod Stephens

ISBN: 978-0-470-47722-9

Published: 2010

241 Small Examples

587 Pages

Color

PRO WPF IN C# 2010

Matthew MacDonald

ISBN: 978-1-4302-7205-2

Published: 2010

55 Large Examples

1181 Pages

THE EXPERT'S VOICE® IN .NET

Pro WPF in C# 2010

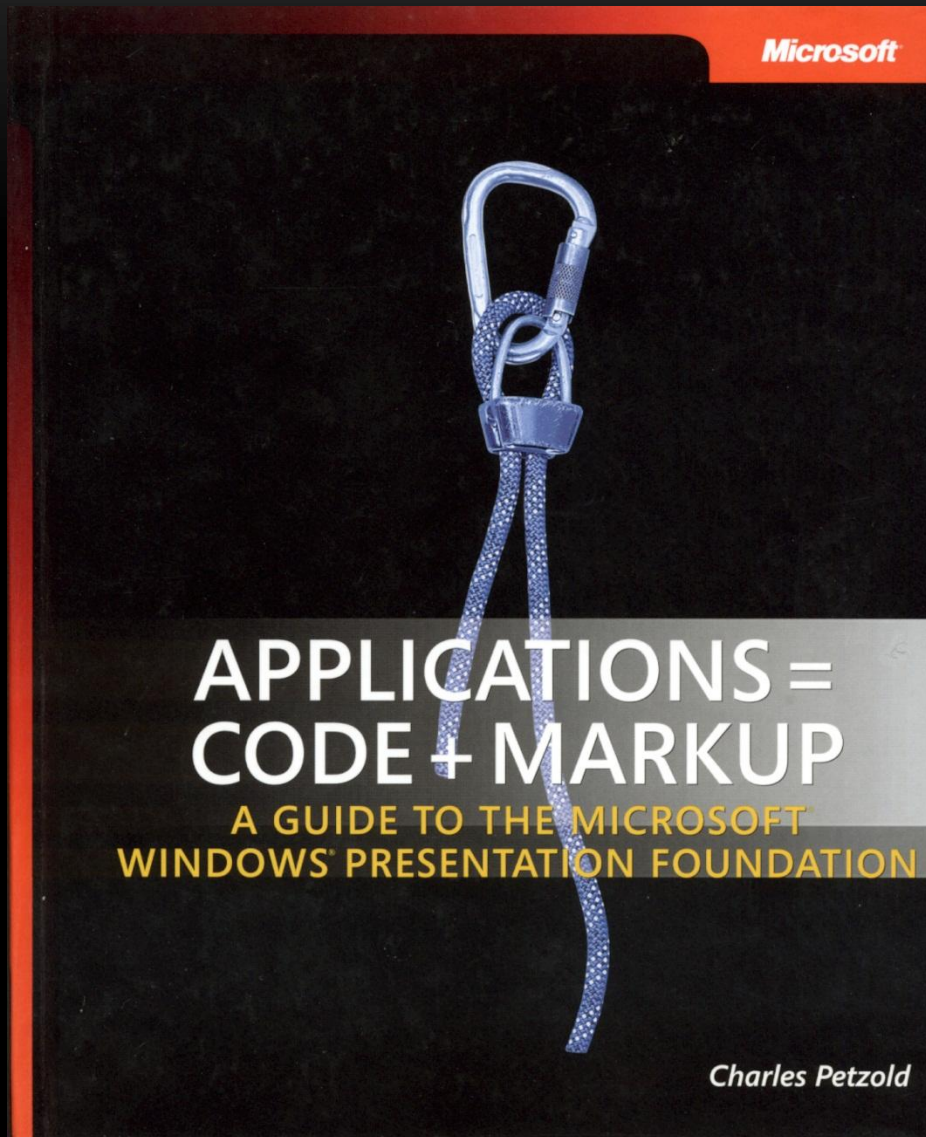
Windows Presentation Foundation in .NET 4

*Create the next generation
of Windows applications*

Matthew MacDonald

Apress®

APPLICATIONS = CODE + MARKUP



Charles Petzold

ISBN: 978-7356-1957-9

Published: 2006

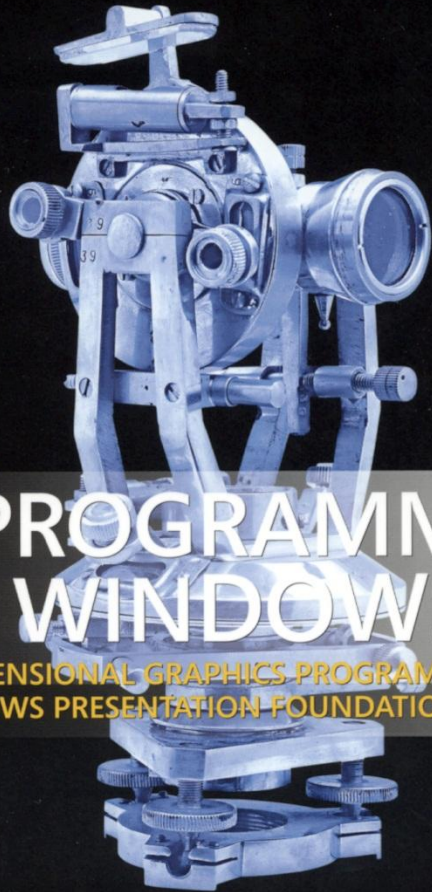
504 Examples

50% Code, 50% XAML

1002 Pages

3D PROGRAMMING FOR WINDOWS

Microsoft



3D PROGRAMMING FOR WINDOWS

THREE-DIMENSIONAL GRAPHICS PROGRAMMING FOR
THE WINDOWS PRESENTATION FOUNDATION

Charles Petzold

Charles Petzold

ISBN: 978-07356239

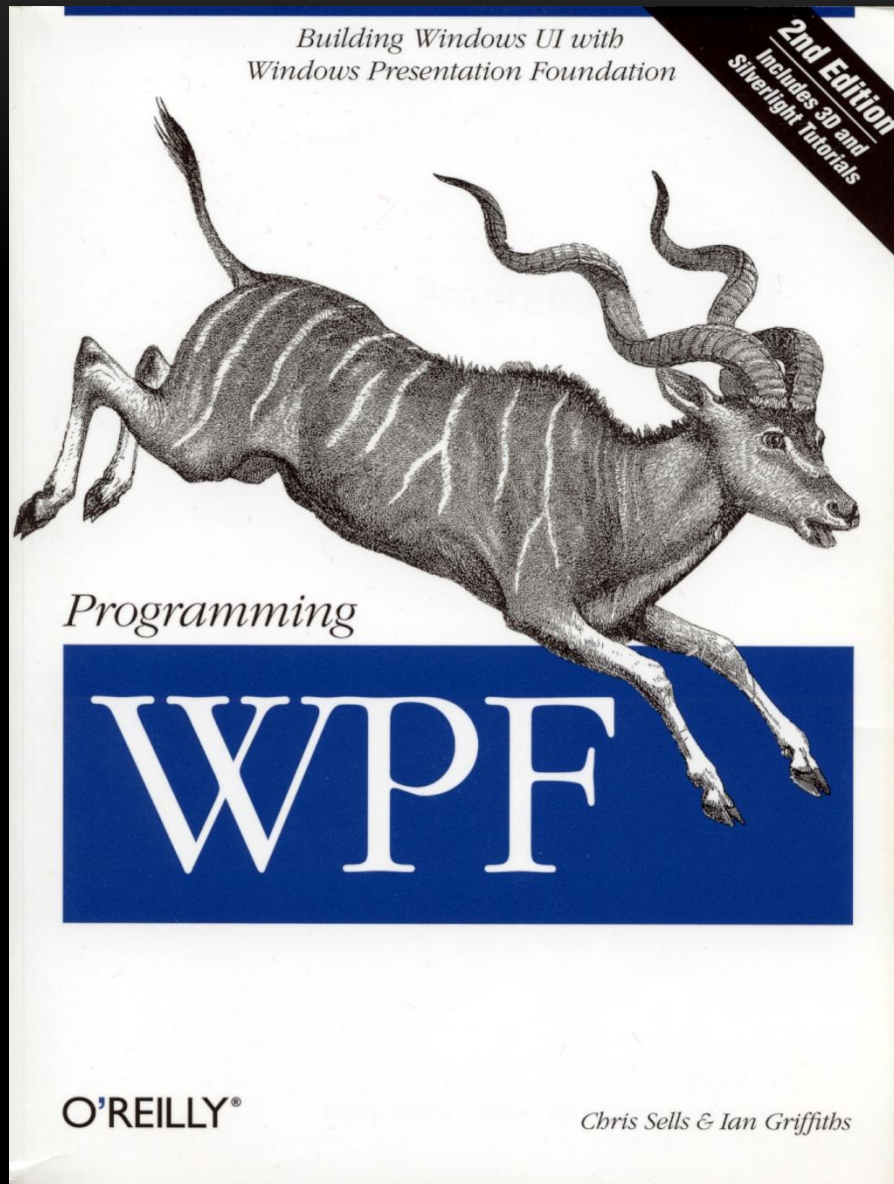
Published: 2007

77 Examples

Mostly XAML

430 Pages

PROGRAMMING WPF



Chris Sells & Ian Griffiths

ISBN: 978-0-596-51037-4

Published: 2005

358 Examples

835 Pages

Book is getting dated

WEB LINKS

- <http://windowsclient.net/default.aspx>
- <http://msdn.microsoft.com/en-us/library/ms754130.aspx>
- <http://www.codeproject.com/>
- <http://visualstudiomagazine.com/Home.aspx>

SPECIAL THANKS

- To Tom Kurtenbach for his help in preparing this talk