# What's new in WPF and Smart Clients in .NET 4.0

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#### What's new...

- Cached compositions
- Text clarity
- Layout Rounding
- ClickOnce improvements
- Multitouch
- Windows 7 Taskbar
- Ribbon
- Focus mgt improvements
- Support for UIAccessible2
- VSM integration
- Full Trust XBaps

- PS 3
- Client Profile
- Data controls
- Accessibility Improvements
- Chart Controls
- Control Themes
- Hundreds of good bug fixes...
- Plus all the goodness of .NET4!
  - MEF
  - Dynamic Language Support
- More...



#### Agenda

- Light up Windows 7
- Fundamentals
- New Controls

### Light up Windows 7

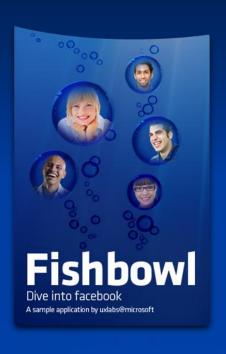
- Taskbar
  - Jumplist
  - Progress bars
  - Icon overlays
- Multi-touch





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#### Multi-touch

- UIElement changes
  - Manipulation events (tracking and interpreter)
  - Touch system gesture events (double-tap and rollover)
  - Raw touch input events (for going to the metal)
- Multi-touch support in controls:
  - ScrollViewer update to accept pan gestures
  - Base controls updated to be multi-touch aware
  - Multi-capture support (for more than one contact point at time)
  - New multi-touch specific controls (e.g. ScatterView)
- Compatible with Surface SDK 2.0



**Microsoft** 



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### Multi-touch

In 20 lines of code







#### **Fundamentals**

- Framework Deployment
- Application Deployment
- Improved interop
- Text Clarity
- Layout Rounding / Snapping
- Graphics Performance



#### Framework Deployment

- NET 4 is a Side by Side release!
- Visual Studio and .NET support multitargeting
- Client Profile SKU
- Setup improvements

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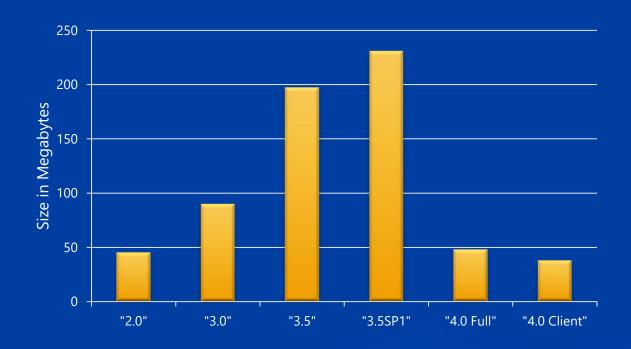


#### Client Profile SKU

- Smaller, Faster NET Framework SKU
  - .NET Framework Client 26mb
  - Setup optimizations for ngen, download, etc.
  - Works across ALL CONFIGURATIONS
- Brandable deployment experience
  - Developers can customize app deployment experience to match brand
  - Can integrate framework and app installers
  - Tools and documentation for creating these packages
- Easier deployment of applications
  - Developers may use deployment bootstrapper to manage the installation of their app and pre-reqs
  - Will install application after the framework and launch it (.msi, .application or .xbap)



#### Setup and Size



#### Application Deployment

- Continuing to make improvements to ClickOnce to enable a more seamless install and upgrade experience
  - Command-line arguments for CO deployed apps
  - File associations for CO deployed apps
  - Background updates and custom install ux



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### ClickOnce Background Update



#### Graphics

- Entirely New Text Rendering Stack
- Layout Rounding
- ClearTypeHint Clear Type on IRTs
- Animation Easing Functions
- Pixel Shader 3.0 Support
- Cached Composition
- VisualScrollableAreaClip



#### Graphics

- Other Stuff
  - Faster Default Image Resampling
  - Removal of Legacy BitmapEffect Support
  - Removal of Fixed-Function Rendering Pipeline



- Motivation:
  - Vector rasterization is a very expensive operation
  - Video cards are optimized to render textures
  - Difficult to cache vector data
    - Per-primitive AA forces retessellation on scale / translation

- Previously two basic ways:
  - RenderTargetBitmap
  - TileBrush caching via the RenderOptions.CachingHint attached property

- New Property on UIElement
  - UIElement.CacheMode
  - Currently accepts an instance of BitmapCache
- New Brush
  - BitmapCacheBrush basically a cached
     VisualBrush
- Interactive
- XAML-able
- Hardware Accelerated



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### Cached Compositions



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- When expensive content would require rerendering
- When IRTs would be repeatedly regenerated
  - e.g. All inputs to Effects (including ImageBrushes)
  - Bypasses IRT allocation / deallocaiton cost



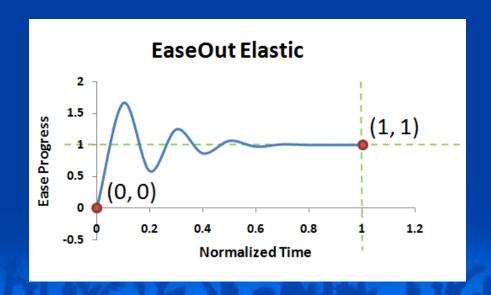
#### **Animation Easing Functions**

- Added an EasingFunction property to all From/To and By animation types
- Easing Function modifies animation progress
- Allows for custom modification of any animation's progress
- Easy to create custom easing functions (Implement lEasingFunction)



#### **Animation Easing Functions**

- Normal progress ranges from 0...1
- Easing Functions allow progress ranges below 0 and above 1 (e.g. bouncing)





# Animation Easing Functions Built-In Easing Functions

	Class Name	Properties
<b>Circle Easing Function</b>	CircleEase	N/A
<b>Back Easing Function</b>	BackEase	<ul> <li>Amplitude</li> </ul>
<b>Exponential Easing Function</b>	ExponentialEase	<ul> <li>Exponent</li> </ul>
<b>Power Easing Function</b>	PowerEase	<ul><li>Power</li></ul>
<b>Quad Easing Function</b>	QuadraticEase	N/A
<b>Cubic Easing Function</b>	CubicEase	N/A
<b>Quart Easing Function</b>	QuarticEase	N/A
<b>Quint Easing Function</b>	QuinticEase	N/A
<b>Elastic Easing Function</b>	ElasticEase	<ul> <li>Oscillations</li> </ul>
		<ul> <li>Springiness</li> </ul>
<b>Bounce Easing Function</b>	BounceEase	<ul> <li>Bounces</li> </ul>
		<ul> <li>Bounciness</li> </ul>
Sine Easing Function	SineEase	N/A



# <demo/>

### **Animation Easing**



#### Why a New Text Stack?

- General blurriness of rendered text
- Small characters especially blurry
- Small East-Asian characters sometimes hard to distinguish
- Lack of rendering options



### Font Rendering History



#### Aliased Rendering

- Glyphs on pixel boundaries
- Sharp horizontal and vertical features
- Curved and diagonal portions of text exhibited substantial aliasing



#### ClearType Rendering

 Tripled horizontal resolution on LCDs



#### TrueType fonts

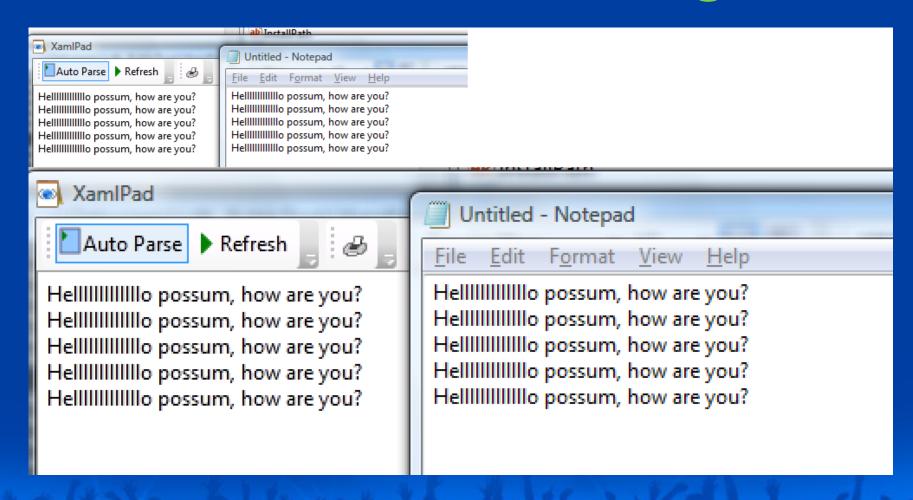
- Encoded text as quadratic Beziers
- Arbitrary scaling of glyphs
- Hinting Language
- Embedded Bitmaps

#### Improved Text Rendering

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                           IList<double>
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    East-theorie
    Smilarquage
                language.
              Britis Did Combine
```



#### WPF 4.0 < left > vs. GDI < right >



### Text Rendering API





#### Text Rendering API

- TextFormattingMode
  - Ideal (default behavior which uses IdealWidth text metrics)
  - Display (optional new behavior which uses ComptabileWidth text metrics)
- TextRenderingMode
  - Aliased (aliased rendering)
  - Grayscale (grayscale antialiasing)
  - ClearType (ClearType always on)
  - Auto (ClearType unless otherwise specified in the system font smoothing options)



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### Text Rendering



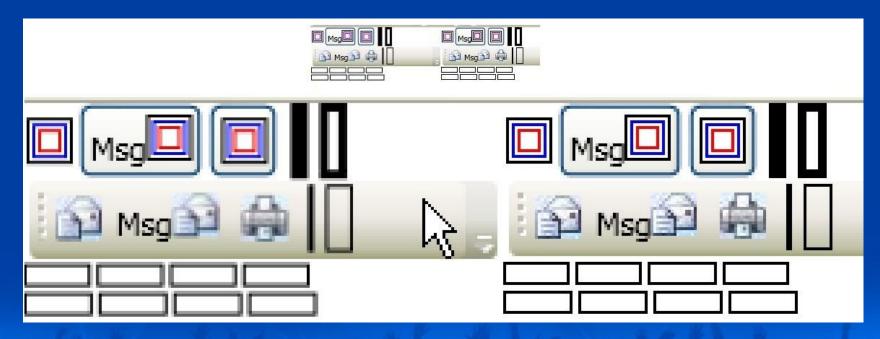
#### Text in WPF 4.0

- Sharper East-Asian Fonts
  - WPF Can now render using the embedded font bitmaps in many East Asian Languages
- Better foreign language support
  - New glyph shaping engines provide better international support (e.g. diacritics)



#### Layout Rounding

Rounds an object's coordinates on whole pixels.





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### Layout Rounding



#### Layout Rounding

- Not a graphics feature a Layout Feature
- How is it different from Pixel Snapping?
  - Guidelines
  - Pixel Snapping is difficult to use and often doesn't work
  - Layout Rounding changes both the position and the size of elements



#### Pixel Shader 3.0 Support

- PS 3.0 is now supported
  - Max executed instruction: 96 -> 65535
  - Constant registers: 32 -> 224
  - Texture indirections: 4 -> unlimited
  - True flow control (branching, loops, etc...)
- NO Software Fallback
  - Means no PS 3.0 for RTB, printing, RDP / TS, base tile of a tiled TileBrush, or when app is running in SW



## Support for Dynamic Objects

 WPF4 now has support for data binding with dynamic objects that implement IDynamicMetaObjectProvider (DynamicObject)





## Dynamic objects



#### **New Controls**

- DataGrid
- DatePicker
- Calendar

VSM is also now in WPF 4

FirstName	LastName	Email	IsGold	Status
Orlando	Gee	mailto:orlando0@adventure-works.com	<b>J</b>	New
Keith	Harris	mailto:keith0@adventure-works.com	<b>J</b>	Received
Donna	Carreras	mailto:donna0@adventure-works.com		None
Janet	Gates	mailto:janet0@adventure-works.com	<b>V</b>	Shipped
Lucy	Harrington	mailto:lucy0@adventure-works.com		New
Rosmarie	Carroll	mailto:rosmarie0@adventure-works.com	<b>V</b>	Processing
	Gash	mailto:dominic0@adventure-works.com	V	Received ▼
Kathleen	Garza	mailto:kathleen0@adventure-works.com		None
Katherine	Harding	mailto:katherine0@adventure-works.com	<b>V</b>	New
Johnny	Caprio	mailto:johnny0@adventure-works.com		Processing Shipped
				Received





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### New Controls



#### Resources

- Resources for Developers <u>msdn.com</u>
- Microsoft Certification & Training Resources <u>microsoft.com/learning</u>



**Slides** are available on my **blog** @ http://www.rudigrobler.net/speaking



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#### **Architecting WPF Applications**

10-14 May 2010, Astrotech Conference Centre, Parktown, Johannesburg

Internationally acclaimed WPF expert, Brian Noyes in conjunction with Dariel Solutions will be hosting an intensive 5 day

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