



Index

A

- AccelerationRatio property, 404–405
- AcceptsReturn, 179
- Activated event, 120
- ActiveX control, 976
- ActiveX interoperability, 976
- ActualHeight property, 63
- ActualWidth property, 63, 398, 399
- AddBackEntry() method, 758, 759
- AddBackReference() method, 761, 763
- AddDirtyRect() method, 390
- AddedItems property, 186
- AddFixedDocument() method, 920
- AddHandler() method, 106, 108, 114
- Adding Resources, 213–214
- Add-ins, 997
 - AddInToken.Activate<T> method, 1009, 1010
 - advantages and disadvantages, 998
 - class definition, view and host, 1013
 - discovery, 1009
 - FindAddIn() method, 1009
 - host interaction
 - automation, 1012
 - ReportProgress() method, 1012
 - information details, 1009
 - Initialize() method, 1013–1016
 - interfaces, 997
 - lifetime, 1011
 - MAF and MEF, 997–998
 - pipeline, 998
 - adapters, 999, 1006–1007
 - AddInStore.Rebuild() method, 1009
 - AddInStore.Update() method, 1009
 - class relationships, 999
 - communication, 999
 - contract, 999, 1004–1005
 - directory structure, 1001
 - host adapter, 1008
 - host view, 1007, 1008
 - MustInherit abstract class, 1005–1006
 - solution preparation, 1002–1003
 - views, 999
 - to process images, 1011
 - reflection, 997
 - view, 1005
 - visual add-ins
 - FrameworkElementAdapters, 1018
 - GetVisual() method, 1019
 - ImageProcessorContract, 1017
 - user interface element, 1017
- AddLogicalChild() method, 372
- AddVisualChild() method, 372
- AddVisual() method, 373
- ADO.NET DataView, 656
- ADO.NET objects, 572–574
- AdornedElementPlaceholder, 590–591
- AdornerDecorator, 469
- Adorner layer, 589
- Airspace rule, 971–973
- Aligning Content, 156
- AllowDrop property, 131
- AllowsTransparency property, 168, 776
- all-purpose Undo() method, 265
- AlternationCount property, 614
- AlternationIndex property, 620–621
- AmbientLight, 846
- AnchorChanged event, 931

- Anchor property, 930
- Anchors collection, 930
- Anchors property, 928
- Animation, 431
 - bitmap caching, 428–430
 - brushes
 - ColorAnimation, 438
 - ellipse, 438
 - Gradient Obsession, 439
 - hypnotic effects, 439
 - PointAnimation, 438
 - RadialGradientBrush, 437
 - VisualBrush, 439–440
 - challenges, 431
 - classes
 - cluttered namespace, 395
 - ColorAnimation, 393
 - complete list, 394–395
 - data type, 393
 - DoubleAnimation, 393, 395
 - interpolation animation class, 394
 - key-frame animation, 394
 - linear interpolation, 394
 - path-based animation, 394
 - System.Windows.Media.Animation namespace, 394
 - TypeNameAnimation, 393
 - TypeNameAnimationUsingPath, 394
 - code-based
 - animated button, 397
 - BeginAnimation() method, 396
 - Duration property, 401
 - By property, 400
 - From property, 398–399
 - To property, 399–400
 - standard frame rate, 396
 - storyboard, 396
 - discrete key-frames, 443–444
 - dynamic user interfaces, 391
 - easing function
 - classes, 420–422
 - custom, 423–425
 - EasingFunctionBase class, 418
 - EasingFunction property, 418, 419
 - Easing In, 419–420
 - Easing Out, 419–420
 - ElasticEase class, 418
 - growStoryboard animation, 418
 - linear interpolation, 418
 - Oscillations property, 418
 - Springiness, 418
 - easing key frames, 444
 - frame-based
 - Canvas.SetTop() method, 450
 - CompositionTarget.Rendering event, 449
 - EllipseInfo object, 449
 - falling circles, 449
 - rendering event handler, 448
 - techniques, 448
 - TimeTracker class, 451
 - frame rate, 425–427
 - guidelines, 431
 - key-frame animation, 442–443
 - lifetime, 401–402
 - multiple transforms, 435–437
 - path-based, 446–448
 - pixel shaders, 440–442
 - property-based, 392–393
 - reference types, 393
 - simultaneous, 401
 - spline key frame, 444–445
 - storyboards (*see* Storyboards)
 - storyboards in code (*see* Bomb-dropping game)
 - Timeline class
 - AccelerationRatio property, 404–405
 - AnimationTimeline, 403
 - DecelerationRatio property, 404–405
 - MediaTimeline, 403
 - properties, 404
 - RepeatBehavior property, 405–406
 - TimelineGroup, 403
 - timer-based, 391–392
 - transforms, 432
 - definition, 432
 - LayoutTransform, 432, 434
 - RenderTransform, 432
 - RotateTransform, 432
 - ScaleTransform, 432
 - vs.* traditional media files, 391
- AnimationTimeline class, 403
- AnnotationHelper class, 923, 924, 930
- AnnotationHelper.GetAnchorInfo() method, 930
- AnnotationResource objects, 930
- Annotations
 - classes, 922–923
 - creation, 924–928
 - customizing sticky notes, 932–933
 - DocumentViewer, 922
 - enabling annotation service, 923–924
 - examination
 - AnchorChanged event, 931

- AnnotationHelper.GetAnchorInfo() method, 930
- AnnotationStore.GetAnnotations() method, 930
- AuthorChanged event, 931
- CargoChanged event, 931
- Cargos property, 928–929
- ContentLocator object, 928
- GetAnchorInfo() method, 930
- GetAnnotations() method, 928
- IAnchorInfo, 930
- properties, 928
- Section object, 929–930
- StoreContentChanged event, 931
- TextAnchor objects, 930
- FlowDocumentPageViewer, 922
- FlowDocumentReader, 922
- FlowDocumentScrollViewer, 922
- highlighting, 921
- sticky notes, 921
- storing, fixed document, 931–932
- AnnotationService class, 922, 924
- AnnotationService.Enable() method, 923, 924
- AnnotationService object, 923
- AnnotationStore class, 922
- AnnotationStore.GetAnnotations() method, 930
- AnnotationStream object, 923, 931
- AnnotationType property, 928
- AnnotionService.GetService() method, 924
- Anti-aliasing, 324
- AppendAudio() method, 832
- AppendBreak() method, 832
- AppendText() method, 832
- AppendTextWithHint() method, 832
- AppendTextWithPronunciation() method, 832
- Application class, 747
- ApplicationCommands.Print command, 920, 927
- ApplicationCommands.Undo command, 516–517
- Application.DispatcherUnhandledException event, 747
- Application.EnableVisualStyles() method, 970
- ApplicationExtension, 768
- Application.MainWindow property, 196
- ApplicationName.exe, 769
- ApplicationName.exe.manifest, 769
- ApplicationName.xbap, 769
- Application.NavigationFailed event, 747
- Application resources, 275–276
- Application.Run() method, 196, 199
- ApplicationsCommands.Open command, 791
- Application.Shutdown() method, 198
- Application.ShutdownMode, 198
- Application.Startup event fires, 207
- Application.StartupUri property, 203, 752
- Application style, 527
- Application.Windows collection, 204
- ApplyPropertyValue() method, 917
- Arcs, 356–358
- Arrange() method, 543
- ArrangeOverride() method, 543–544, 547
- Assembly resources, 269
 - AssemblyName.g.resources, 214
 - binary resources, 212
 - content files, 217–218
 - embedded resource, 213
 - ImageLibrary, 217
 - .NET applications, 212
 - .NET Reflector, 214
 - pack URI syntax, 216
 - resource-aware classes, 215–216
 - retrieving, 214–215
 - strong-named assembly, 217
- Asset Library, 303
- asynchronous data bindings, 597–598
- Asynchronous navigation, 756
- AsyncOperation class, 992
- AsyncOperationManager class, 992
- Attached events, 114
- Audio, speech
 - MediaPlayer class, 816–818
 - playing WAV audio
 - SoundPlayerAction class, 815
 - SoundPlayer class, 813–815
 - system sounds, 816
 - speech
 - recognition. (*see* Speech recognition)
 - synthesis (*see* Speech synthesis)
 - and video (*see* MediaElement class)
- AuthorChanged event, 931
- Authors property, 928
- Automatic columns, 910
- AutoReverse property, 402, 404, 405
- AutoWordSelection, 180
- AuxiliaryPaneContentTemplate, 802
- Axis lines, 849

■ B

- BackColor property, 980
- BackContent property, 529
- BackEase class, 420
- Background property, 529, 744, 776, 887, 899

- BackgroundWorker
 - asynchronous operation, 987–988
 - cancellation
 - BackgroundWorker.CancelAsync() method, 993
 - BackgroundWorker.
 - WorkerSupportsCancellation property, 993
 - CancelAsync() method, 994
 - DoWorkEventArgs.Cancel property, 994
 - FindPrimes() method, 994
 - RunWorkerCompleted event, 994–995
 - cancel messages, 987
 - creation, 989
 - progress events, 997
 - running
 - BackgroundWorker.RunWorkerAsync() method, 990
 - Dispatcher.BeginInvoke() method, 992
 - DispatcherSynchronizationContext object, 992
 - DoWork event, 991
 - FindPrimesInput object, 990–991
 - multithreading classes, 992
 - prime-number search, 990
 - RunWorkerCompleted event, 991
 - RunWorkerCompletedEventArgs.Result property, 991
 - WindowsFormsSynchronizationContext object, 992
 - Worker.FindPrimes() method, 991
 - System.ComponentModel.BackgroundWorker component, 987
 - System.Threading.Thread object, 987
 - Thread.Start() method, 987
 - tracking progress, 992–993
- BackgroundWorker.CancelAsync() method, 993
- BackgroundWorker.ReportProgress() method, 992
- BackgroundWorker.WorkerReportsProgress property, 992
- BackgroundWorker.WorkerSupportsCancellation property, 993
- BackStack property, 759
- BandIndex property, 796
- Bare-bones flow document, 890
- BasedOn attribute, 291
- BasedOn property, 287, 291
- BeginAnimation() method, 396, 401, 402
- BeginChange() method, 181
- BeginInit() method, 119
- BeginStoryboard action, 297, 407, 820, 825
- BeginStoryboard.HandoffBehavior property, 409
- BeginStyle() method, 832
- BeginTime property, 404, 411
- Behaviors, 283
 - assemblies, 298
 - code-free application design, 299
 - creation
 - Behavior class, 300
 - Canvas coordinates, 300
 - DragInCanvasBehavior code, 300–301
 - element reposition, 302
 - event handlers, 301
 - FrameworkElement, 300
 - mouse button release, 302
 - OnAttached() method, 300
 - OnDetaching() method, 300
 - UIElement, 300
 - watermark text, 300
 - CustomBehaviorsLibrary, 302
 - custom controls, 298
 - design-time behavior, 303
 - design-time feature, 298
 - draggable elements, 303
 - DragInCanvasBehavior class, 302
 - Ellipse elements, 302
 - Expression Blend, 298
 - feature version, 299
 - guidelines, 299
 - Interaction.Behaviors attached property, 302
 - Microsoft.Expression.Interactions.dll assembly, 299
 - Rectangle element, 302
 - System.Windows.Interactivity.dll assembly, 299, 302
 - triggers, 299
 - user-interface functionality, 298
 - Visual Studio application, 298
- BetweenShowDelay window, 167
- Bevel line join, 321
- Bézier curves, 358–359
- Binary Application Markup Language (BAML), 752
- BindingDirection, 974
- Binding.ElementName property, 238
- Binding elements
 - Binding.ElementName property, 238
 - code creation, 232–233
 - code retrieving, 233
 - delay property, 238
 - element-to-element binding, 227
 - errors, 229
 - expression, 228–229
 - linked controls, 228

- modes
 - default, 231–232
 - OneWayToSource, 231
 - slider thumb, 229
 - System.Windows.Data.BindingMode
 - enumeration, 230
 - multiple binding, 234–236
 - object
 - DataContext, 241
 - RelativeSource, 239–240
 - source, 239
 - updates, 237–238
 - Binding errors, 229
 - Binding expression, 228–229
 - BindingExpression.UpdateSource() method, 238
 - BindingGroup property, 592
 - Binding.IsAsync property, 598
 - BindingListCollectionView, 647, 648, 657, 658, 663
 - Binding.NotifyOnValidationError property, 587
 - BindingOperations.GetBinding() method, 233
 - Binding.RelativeSource property, 515, 619
 - Binding.StringFormat property, 603, 614
 - Binding.XPath property, 600
 - BitmapCacheBrush.BitmapCache property, 336
 - BitmapCacheBrush class, 325, 336–337
 - BitmapEffect class, 380–381
 - BitmapImage.BeginInit() method, 608
 - BitmapImage object, 216, 605
 - Blender, 856
 - Block elements, 886
 - BlockUIContainer, 895–896
 - List, 891–892
 - Paragraph and Run, 890
 - Section, 894–895
 - Table, 892–894
 - Block.NextBlock property, 903
 - BlockUIContainer class, 916
 - BlockUIContainer element, 895, 899
 - BlurEffect, 381, 540
 - Bold element, 896
 - Bomb-dropping game
 - animations
 - drops the bomb, 452
 - falling *vs.* rescued bomb, 460
 - DispatcherTimer, 455–458
 - IsFalling property, 458–460
 - main window
 - Border element, 453
 - game statistics, 453
 - refinements, 461
 - rotates the bomb, 452
 - save and update, 453, 460
 - user control, 454–455
 - Boolean property, 529
 - Boolean SuppressExceptions property, 610
 - BorderBrush property, 64, 146, 887, 894, 899
 - BorderThickness property, 64, 146, 887, 894, 899
 - Bottom property, 82
 - BounceEase class, 420
 - Bound object, 562–564
 - Box value, 891
 - Brushes
 - BitmapCacheBrush, 336–337
 - change notification, 325
 - classes, 325
 - Freezable, 325
 - ImageBrush, 331–332, 342
 - LinearGradientBrush, 326–328
 - partial transparency, 325
 - RadialGradientBrush, 329–330
 - SolidColorBrush, 325–326, 342
 - TileBrush, 342
 - tiled ImageBrush, 332–335
 - VisualBrush, 335–336
 - Building Localizable User Interfaces, 218–219
 - Built-in element, 133
 - ButtonBase, 797
 - ButtonChrome class, 469, 550
 - ButtonChrome decorator, 65, 146
 - ButtonChrome.RenderMouseOver property, 550
 - Button.FontFamily, 289
 - ButtonState event, 129
 - Button.Style property, 409, 793
 - By property, 400
- **C**
- Cache length, 578–579
 - CacheLengthUnit property, 578
 - CacheMode property, 429
 - Calendar class, 192
 - CalendarClosed event, 193
 - CalendarOpened event, 193
 - call RenderOpen() method, 371
 - CanAddToQuickAccessToolBarDirectly property, 810
 - CanContentScroll, 172
 - CanExecute event, 516, 517
 - CanExecute() method, 245, 246
 - CanExecuteSave() method, 261
 - CanGoBack property, 756, 758, 781
 - CanGoForward property, 756, 781

- CanUndo property, 181
- Canvas, 313
 - animatable content, 398
 - Bottom property, 82
 - ClipToBounds property, 83
 - code example with four buttons, 83
 - Height property, 83
 - InkCanvas, 84
 - annotating content with user-drawn strokes, 84
 - EditMode property, enumeration values, 85
 - Stroke objects, 84
 - Strokes collection, 84
 - Left property, 82
 - lightweight features of, 83
 - nesting inside a user interface, 83
 - placing elements using exact coordinates, 82
 - Right property, 82
 - Top property, 82
 - Width property, 83
 - ZIndex property, 84
- Canvas.ClipToBounds property, 316, 426
- CargoChanged event, 931
- Cargos property, 928
- CategoryName property, 632, 633
- Category.Products property, 571
- CellSpacing property, 894
- Center property, 329
- CenterX property, 339
- CenterY property, 339
- ChangeVisualState() method, 530, 537–538
- CheckAccess() method, 985
- CheckBox elements, 160–161, 617, 618, 620, 753
- CheckBox.IsChecked property, 113
- CheckedListBox class, 185
- children tag, 782
- Chrome classes, 549
- CircleEase class, 421
- Circle value, 891
- Class bindings, 258
- ClearHighlightsForSelection() method, 924
- ClickCount event, 129
- Click event, 114
- ClickOnce cache, 770, 771
- ClickOnce deployment model, 1021
 - additional options
 - file associations, 1037
 - publish options, 1039
 - Publish Version, 1035
 - update option, 1036
 - advantages, 1022
 - installation, 1023, 1033
 - limitations, 1022, 1024
 - partial-trust programming, 1022
 - publication
 - CD or DVD, 1030
 - directory structure, 1032
 - installation type, 1028
 - network file share, 1028
 - online/offline application, 1031
 - project settings, 1024
 - publisher and production settings, 1025
 - Publish Wizard, 1027
 - web server, 1029
 - shortcuts, 1027
 - strategies, 1021
 - updates, 1034
- Clip art, 367–368
- Clipboard group, 803
- ClipGeometry class, 364
- Clipping property, 828
- ClipToBounds property, 83
- Clock.CurrentProgress property, 417
- Close() method, 817
- Closing event, 120
- CodeAccessPermission.Demand() method, 773
- CodeAccessPermission objects, 773
- Code access security, 771
- Code-based approach, 653
- Coercion Callback, 102–104
- Collection items
 - displaying and editing
 - data template supply, 570
 - DisplayMemberPath property, 570
 - Grid.DataContent property, 570
 - IsLocked property, 571
 - ListBox.SelectedItem property, 571
 - list of products, 568
 - master-details display, 571
 - SelectionChanged event, 570
 - StoreDB.GetProducts() method, 568–569
 - ToString() method, 569, 570
 - unhelpful bound list, 570
 - UpdateProducts() method, 571
 - inserting and removing, 572
- CollectionViewSource class, 651–653
- CollectionViewSource.View property, 652
- ColorAnimation class, 393, 395
- Color.FromArgb() method, 145
- ColorPicker class, 520
- ColorPicker.Color property, 525

- ColorPicker control class, 526
- Color property, 509–512
- ColumnDefinition element, 70
- ColumnDefinition.MaxWidth property, 884
- ColumnGap property, 910
- Column property, 71
- ColumnRuleBrush property, 910
- ColumnRuleWidth property, 910
- ColumnSpan property, 894
- ColumnWidth property, 910
- ComboBox, 566, 642–645, 651
- ComboBox class, 576
- ComboBox control, 643, 645
- ComboBox.IsTextSearchEnabled property, 643
- ComboBoxItem object, 187, 614, 643
- Command-Line Arguments, 202–204
- CommandManager.InvalidateRequerySuggested() method, 260
- CommandParameter property, 790, 926
- Command property, 790
- Commands, 243
 - ApplicationCommands class, 248–249
 - application task, 245
 - binding
 - ExecutedRoutedEventArgs object, 251
 - links, 244
 - markup, 251
 - New command, code, 250
 - NewCommand_Executed event handler, 251
 - UIElement class, 250
 - built-in commands, 257–258
 - CanExecuteSave() method, 261
 - CommandBindings collection, 261
 - ComponentCommands, 248
 - custom commands, 259–260
 - custom controls, 254
 - Cut, Copy, and Paste commands, 261
 - disabling, 255–256
 - EditingCommands, 248
 - Execute() method, 254
 - features, 243
 - fine-tuning command text, 253–254
 - ICommand interface, 245–246
 - isDirty flag, 261
 - limits, 256–257
 - mapping events, 244
 - MediaCommands, 248
 - menu item, 252–253
 - NavigationCommands, 247
 - nested element, 254
 - parameter, 262–263
 - prebuilt commands, 246
 - RoutedCommand class, 246–247
 - RoutedUICommand class, 247
 - scope, 260
 - sources, 245, 249
 - StaticResource extension, 262
 - targets, 245
 - TextBox.Tag, 261
 - tool, 244
 - tracking and reversing
 - all-purpose Undo() method, 265
 - ApplicationCommands.Undo command, 263
 - ApplicationUndo command, 267
 - application-wide Undo action, 265–266
 - CanExecute handler, 267
 - CommandHistoryItem class code, 265
 - CommandHistoryItem object, 264
 - CommandHistoryItem, Undo() method, 267
 - CommandManager class, 263, 266
 - EditingCommands.Backspace command, 264
 - MonitorCommands, 266
 - PreviewExecuted event handler, 263–264
 - two-files-at-once text editor, 261
 - undoable commands, 244
 - without binding, 250
- CommandTarget property, 790, 925
- Common language runtime (CLR), 12
- Compare() method, 658
- ComponentResourceKey, 279–282
- Composite Application Library (CAL), 998
- ComVisible attribute, 784
- ConfigureAppWizard.xaml page, 759
- ContainerFromElement() method, 187
- ContainerStyle property, 659
- ContainerStyleSelector property, 659
- ContainerUIElement3D class, 875
- ContainerVisual, 370
- ContentControl class, 152, 507, 520, 531
- Content controls, 505, 626
 - aligning content, 156
 - buttons
 - ButtonBase, 159
 - CheckBox, 159, 160–161
 - IsCancel, 159
 - IsDefault, 159–160
 - RadioButton, 159, 161–162
 - ToggleButton and RepeatButton, 160
 - buttons types, 153
 - HeaderedContentControl class, 153

- Content controls (*cont.*)
 - hierarchy, 153
 - Label and ToolTip, 153
 - labels, 158
 - property, 154–155
 - ScrollViewer (*see* ScrollViewer)
 - single nested element, 152
 - tooltips
 - fancy, 163
 - nested element combination, 162
 - Popup, 167–169
 - StackPanel, 163
 - ToolTip properties, 163–166
 - ToolTipService Properties, 166–167
 - user-interactive controls, 163
 - WPF content philosophy, 157–158
- ContentElement class, 396, 885
- Content elements
 - block elements (*see* Block elements)
 - events handling, 885
 - Focusable property, 885
 - formatting, 887–888
 - Hyperlink, 885, 895
 - inline elements (*see* Inline elements)
 - Paragraph elements, 886
 - System.Windows.Documents namespace, 886
 - vs.* noncontent elements, 885
- ContentPresenter element, 619
- ContentRendered event, 120
- ContentTemplate property, 155, 626
- ContextMenu class, 791
- ContextMenu property, 791
- ContextMenuService.ShowOnDisabled attached
 - property, 791
- Control class, 506
 - MouseDownClick event, 129
 - PreviewMouseDownClick event, 129
- Control.FontFamily point, 99
- ControllableStoryboardAction class, 411
- Controls
 - background and foreground brushes
 - setting colors, code, 144–145
 - setting colors, XAML, 145–146
 - content (*see* Content controls:)
 - date, 190–193
 - fonts
 - embedding, 149–150
 - FontFamily, 146
 - FontStretch, 147
 - FontStyle, 147
 - FontWeight, 147
 - inheritance, 148
 - substitution, 149
 - text decorations and typography, 148
 - text formatting mode, 150–151
 - list (*see* List controls)
 - mouse cursors, 151–152
 - range-based controls (*see* Range-based controls)
 - System.Windows.Control class, 144
 - text (*see* Text controls)
 - user-interactive element, 144
- Control templates, 505
 - automatic application, 490–491
 - bare-bones styles, 502
 - browsing, 475
 - built-in recipe, 471
 - BulletChrome class, 473
 - ButtonChrome class, 471–473
 - Button class, 471
 - Button.xaml, 486–488
 - creation
 - basic button, 478
 - bindings, 479–481
 - border, 478
 - Button class, 478
 - button control, 477
 - ContentPresenter, 478
 - EventTrigger-driven animation, 484–485
 - inline template, 478
 - properties changing, triggers, 481–483
 - standardization and theme integration, 477
 - StaticResource reference, 478
 - Template property, 478
 - data templates, 473
 - DrawingBrush, 474
 - gradient button, 488
 - LinearGradientBrush, 474
 - ListBoxChrome class, 473
 - live ControlTemplate object conversion, 476–477
 - logical tree
 - LogicalTreeHelper methods, 468
 - SimpleWindow, 466
 - System.Windows.LogicalTreeHelper, 468
 - MergedDictionaries collection, 486
 - nested templates, 494–496
 - panel template, 473
 - Path, 474
 - PresentationFramework.Aero.dll assembly, 473
 - PresentationFramework.dll assembly, 475
 - PresentationFramework.Luna.dll assembly, 473

- PresentationFramework.Royale.dll assembly, 473
- reflection, 475, 476
- RenderDefaulted property, 472
- ResizeGrip element, 474
- resource dictionary, 485, 486
- scrollbar
 - background, 497
 - ContentPresenter, 500–501
 - dissecting, 497
 - element-typed style, 496, 499–500
 - horizontal scrollbar, 500
 - ListBox, 497, 501
 - multipart structure, 498
 - PART_Track, 499
 - RepeatButton class, 497
 - RepeatButton elements, 499
 - ScrollViewer, 496
 - three-row grid, 499
 - thumb, 497, 500
 - Track.ViewportSize property, 499
 - transparent background, 501
 - vertical scrollbar, 497–498
- ScrollChrome class, 473
- SimpleStyles, 502
- SnapsToDevicePixels setting, 474
- StackPanel control, 465
- styles, 483, 488–490
- style trigger, 472
- SystemDropShadowChrome class, 473
- TargetName property, 472
- TextElement.Foreground property, 472
- two-button window, 465, 466
- user-selected skins, 491–493
- visual states model, 503–504
- visual tree, 467
 - GetChild() method, 468
 - GetChildrenCount() method, 468
 - GetParent() method, 468
 - SimpleWindow, 467
 - Style.TargetType property, 468
 - System.Windows.Media.VisualTreeHelper, 468
 - VisualTreeDisplay window, 468–470
- vs.* custom controls, 490
- XAML markup, 471
- XamlWriter class, 475
- XamlWriter.Save() method, 476
- XmlWriter and XmlWriterSettings objects, 476–477
- ConvertBack() method, 606, 612
- Convert() method, 606, 612
- ConvertToString() method, 124
- CornerRadius, 64
- CornerRadius pr, 530
- CreateHighlightCommand, 926
- CreateHighlightsForSelection() method, 924
- CreateInkStickyNoteCommand, 925, 926
- CreateInkStickyNoteForSelection() method, 924
- CreateInstanceCore() method, 423
- CreateTextStickyNoteForSelection() method, 924
- CreationTime property, 928
- CubicEase class, 421
- CubicEase function, 423
- CurrentGlobalSpeedInvalidated event, 416
- CurrentStateInvalidated event, 416
- CurrentTimeInvalidated event, 416
- CurrentUICulture property, 218
- CustomContentState class, 760
- CustomContentState object, 763
- Custom Control Library, 753
- Custom decorator, 553–554
- CustomDrawnDecorator, 553–554
- CustomDrawnElement class, 553
- Custom-drawn elements
 - composite elements, 548
 - composition, 548
 - creation
 - BackgroundColor dependency property, 552
 - CustomDrawnElement, 551–552
 - DrawingContext.DrawRectangle() method, 552
 - FrameworkElement, 551
 - FrameworkPropertyMetadata.AffectRender flag, 552
 - GetForegroundBrush() method, 552–553
 - InvalidateVisual() method, 552
 - RadialGradientBrush, 551, 552
 - custom decorator creation, 553–554
 - evaluation, 550
 - OnRender() Method, 548–549
- Custom elements
 - base classes, 506–508
 - Custom Control Library project, 506
 - custom-drawn elements (*see* Custom-drawn elements)
 - custom panels (*see* Custom panels)
 - DLL assembly, 506
 - lookless control (*see* Lookless control)
 - user control
 - ColorChanged event, 516
 - ColorConverter, 516

Custom elements, user control (*cont.*)

- Color data type, 516
 - color picker, 509
 - ColorPicker object, 518, 519
 - CommandBindings collection, 518
 - command-handling code, 518
 - CommandManager.
 - RegisterClassCommandBinding() method, 518
 - command support, 516–517
 - ContentPresenter, 519
 - dependency properties, 509–512
 - EventManager.RegisterClassHandler() method, 518
 - Focusable, 518
 - HorizontalAlignment, 518
 - InitializeComponent() method, 519
 - IsTabStop, 518
 - markup addition, 513–515
 - RegisterClassCommandBinding() method, 518
 - routed events, 512–513
 - template-based control, 508, 509
 - TypeConverter attribute, 516
 - UndoCommand.CanExecute() method, 518
 - UndoCommand.Executed() method, 518
 - UserControl class, 519
 - VerticalAlignment, 518
 - XAML markup, 515
 - XML namespace, 515
 - visual states (*see* FlipPanel)
 - Visual Studio solution, 506
- CustomFilter property, 657
- Custom panels
- Canvas clone, 544–545
 - docking toolbars, 541
 - tear-off toolbars, 541
 - two-step layout process
 - ArrangeOverride() method, 543–544
 - MeasureOverride() method, 541–543
- WrapPanel
- ArrangeOverride() method, 547
 - FrameworkProperty.Metadata object, 545
 - LineBreakBefore property, 545–547
 - WrapBreakPanel, 545, 547
- CustomPopupPlacementCallback, 164
- CustomResources class, 281
- Custom scrolling, 172–173
- custom SetContent() method, 206
- CustomSort property, 658

■ D

- Dashed lines, 322–323
- Data access component
- design, 558
 - DLL component, 558
 - Store database, 558–560
- Data binding. *See also* Binding elements
- collection of objects
 - ADO.NET objects, 572–574
 - collection items (*see* Collection items)
 - IEnumerable interface, 567
 - ItemsControl class, 566, 567
 - LINQ Expression, 574–576
 - database binding with custom objects
 - bound object display, 562–564
 - change notification, 565–566
 - data access component (*see* Data access component)
 - database updation, 564–565
 - data object, 561–562
 - null values, 564
 - data providers (*see* Data providers)
 - data templates, 629
 - long lists, performance improvement
 - cache length, 578–579
 - deferred scrolling, 579
 - item container recycling, 578
 - Virtualization, 576–578
 - Redux, 601–603
 - two-way, 557
 - validation (*see* Validation, data binding)
- DataContext property, 563, 602
- Data conversion
- conditional formatting, 610–611
 - human-readable strings, 603
 - multiple properties evaluation, 612–613
 - string formatting (*see* String formatting)
 - value converters (*see* Value converters)
 - WPF tools, 603
- DataFormats class, 914
- DataFormats.Rtf format, 914
- DataFormats.Text format, 914
- DataFormats.XamlPackage format, 914
- DataFormat.Xaml format, 914
- Data forms, 575–576
- DataGrid, 566, 578, 665, 686
- automatic column generation, 686
 - column-based model, 686
 - columns
 - Binding property, 690

- DataGridCheckBoxColumn, 691
- DataGridComboBoxColumn, 691
- DataGridHyperlinkColumn, 691
- DataGridTemplateColumn, 693
- definition, 689
- format and style, 694
- frozen columns, 699
- Header property, 690
- Width property, 690
- wrapped text, 695
- display properties, 687, 688
- editing, 700
- resizing and rearranging columns, 688–689
- rows
 - highlighting rows, 697
 - LoadingRow event, 696
 - row details, 698
 - value converter, 697
- selection, 700
- sorting, 700
- DataGridView, 797
- Data object, 561–562
- Data providers
 - DataContext, 595
 - definition, 595
 - ObjectDataProvider (*see* ObjectDataProvider)
 - ProductListSource class, 595
 - resource section, 595
 - System.Windows.Data.DataSourceProvider class, 595
 - XmlDataProvider, 595, 598–600
- DataRow object, 573–574
- DataRowView object, 631
- Data Sources window, 576
- DataTable class, 575, 648, 656–657
- DataTable data binding, 572–574
- DataTable.DefaultView property, 573, 657
- DataTable.Rows collection, 573, 574
- DataTemplate.DataType property, 628
- Data templates, 505
 - advanced templates, 629–631
 - Border object, 627
 - content controls, 626
 - ContentTemplate, 626
 - DisplayMemberPath property, 625
 - Grid objects, 627
 - ItemsSource property, 626
 - ItemTemplate property, 626
 - list box example, 626
 - list controls, 626
 - ListView, 627
- selection
 - Binding.RelativeSource property, 637
 - changing item layout, 641
 - expanding selected item, 638, 639
 - Foreground and Background properties, 636
 - highlighting selected item, 637, 638
 - ItemContainerStyle, 639
 - ItemContainerStyle property, 636
 - ListBoxItem.Background property, 637
 - RelativeSource property, 639
 - SnapsToDevicePixels property, 638
 - StackPanel, tigger, 640
 - unreadable text, highlighted item, 636
 - Visibility property, 639
- selectors, 633–636
- separating and reusing, 628–629
- varying templates, 632–633
- XAML markup, 626
- DataTemplateSelector, 633–636
- DataTrigger class, 294
- Data triggers, 611, 636, 640
- CollectionView class, 573
- CollectionView.RowFilter, 657
- Data views
 - filtering
 - check boxes, 656
 - DataTable, 656–657
 - dedicated filtering class, 655
 - FilterItem() method, 656
 - FilterProduct() method, 653
 - Filter property, 653
 - inline filtering method, 654
 - minimum price, 655–656
 - MinMaxFilter, 655
 - Refresh() method, 656
 - removing Filter property, 656
 - StringFilter, 655
 - TextChanged event, 656
 - grouping
 - CategoryID property, 659
 - CategoryName property, 659
 - CollectionView.GroupDescriptions collection, 659
 - GroupItem objects, 659
 - GroupStyle.HeaderTemplate, 660
 - GroupStyle objects, 660
 - GroupStyle properties, 659
 - ItemsControl.GroupStyle property, 659
 - ListBox.GroupStyle property, 660
 - product list, 660
 - PropertyGroupDescription object, 660

- Data views, grouping (*cont.*)
 - in ranges, 661–663
 - SortDescription, 661
 - and virtualization, 663
- live shaping, 663–664
- sorting, 657–658
- view object (*see* View object)
- DataGridView.Sort property, 658
- Data virtualization, 577–578
- Date controls, 190–193
- DatePicker class, 192
- DateValidationError event, 193
- Deactivated event, 120
- DecelerationRatio property, 427
- Decimal value, 891
- Declarative user interfaces, 18
- Decorator class, 507
- DecreaseZoom() method, 908
- DefaultProductStyle, 622
- DefaultStyleKeyProperty, 520
- DefaultStyleKeyProperty.OverrideMetadata() method, 527
- Default transition, 535
- Deferred scrolling, 579
- DefiningGeometry property, 309
- DeflateStream, 776
- DeleteInkStickyNotesForSelection() method, 924
- Delete() method, 574
- DeleteStickyNotesCommand, 926
- DeleteTextStickyNotesForSelection() method, 924
- DeleteVisual() method, 373
- DependencyObject class, 511, 513, 565, 755
- Dependency properties, 754, 755
 - attached property, 99–100
 - definition, 94
 - .NET property system, 93
 - property validation
 - CoerceValueCallback method, 101
 - Coercion Callback, 102–104
 - ropertyChangedCallback, 101
 - SetValue() method, 100
 - ValidateValueCallback, 101
 - validation callback, 101–102
 - property wrapper, 96–97
 - registering
 - FrameworkPropertyMetadata object, 95
 - Register() method, 95
 - reusing, 99
 - TextBlock.FontFamily, 99
 - uses, 97–98
 - WPF-specific creation, 94
- DependencyProperty.Register() method, 95
- DependencyProperty.UnsetValue, 917
- DependencyProperty.ValidateValueCallback, 97
- DesiredSize property, 62, 542, 543
- Device-independent units, 324
- Device property, 121
- DialogResult enumeration, 969
- DiffuseMaterial, 859
- Direct events, 127
- DirectionalLight, 844, 845, 846
- Discrete key-frame animation, 443–444
- Disc value, 891
- Dispatcher.BeginInvoke() method, 985, 986
- Dispatcher.CurrentDispatcher property, 984
- DispatcherObject class, 984
 - BeginInvoke() method, 986, 987
 - Dispatcher.BeginInvoke() method, 985, 986
 - DispatcherPriority.ApplicationIdle, 986
 - DispatcherPriority.Normal, 986
 - DispatcherPriority.SystemIdle, 986
 - InvalidOperationException, 985
 - Invoke() method, 987
 - members, 984
 - System.Threading.Thread object, 985
 - time-consuming code, 986
 - UpdateTextWrong() method, 985
 - VerifyAccess() method, 985
- DispatcherOperation object, 986
- DispatcherPriority.ApplicationIdle, 986
- DispatcherPriority.SystemIdle, 986
- DisplayDateChanged event, 193
- DisplayDateStart, 192
- DisplayMemberPath property, 567, 573, 602, 614, 644
- Dispose() method, 833
- Dock property, 67, 976
- Document Object Model (DOM), 747
- Document property, 782
- Documents
 - fixed documents, 883
 - flow documents (*see* Flow documents)
- DocumentViewer, 884
- docViewer, 902
- DoDragDrop() method, 131
- DoubleAnimation class, 297, 393, 395
- Double.NaN, 398
- Double.PositiveInfinity, 542
- DoWorkEventArgs.Argument property, 991
- DoWorkEventArgs.Cancel property, 994
- DoWorkEventArgs.Result property, 991
- Drag-and-drop operations, 130

- DragDrop class, 131
- DragEnter event, 131
- DragIncrement property, 77
- DrawEllipse() method, 370
- DrawImage() method, 370
- DrawingBrush class, 325, 830
- DrawingCanvas class, 373
- DrawingContext class, 548
- DrawingContext.Close() method, 370
- DrawingContext.DrawGeometry() method, 549
- DrawingContext.DrawImage() method, 549
- DrawingContext methods, 370–371
- DrawingImage class, 331
- DrawingImage property, 803
- Drawings
 - classes, 364
 - clip art, 367–368
 - displaying
 - Canvas, 364
 - classes, 364
 - Drawing brush and image approach, 366, 367
 - Path element, 365, 366
 - GeometryDrawing, 363
 - triangle, 363
- DrawingVisual object, 550
- DrawingVisual.RenderOpen() method, 370, 550
- Drawing visuals, 370–372
- DrawLine() method, 370
- DrawRectangle() method, 370
- DrawRoundedRectangle() method, 370
- DrawSelectionSquare() method, 379
- DrawSquare() method, 374, 376, 379
- DrawText() method, 370
- DropShadowEffect, 382–383
- Duration.Automatic value, 401
- Duration.Forever value, 401
- Duration property, 401, 404
- Dynamic property-resolution system, 393
- DynamicResource references, 279
- Dynamic resources, 271
 - ComponentResourceKey, 280
 - system resources, 276, 277
 - vs.* static resource, 272–274

■ E

- EaseInCore() method, 423–425
- EaseIn mode, 419
- EaseInOut property, 419–420
- EaseIn property, 420
- EaseOut property, 419–420
- EasingFunctionBase class, 418, 419
- EasingFunction property, 418, 419
- Easing key frames animation, 444
- EasingMode property, 420
- EditingMode property, 85
- ElasticEase class, 418, 420
- ElasticEase function, 419
- ElasticEase.Oscillations property, 419
- Electric Rain ZAM 3D, 856
- ElementHost class, 970, 981
- ElementHost control, 976–978
- ElementHost.EnableModelessKeyboardInterop()
 - method, 970
- ElementName property, 522
- Ellipse class, 308, 310
- Ellipse element, 533
- Ellipse geometry, 349
- EmbeddedFont.xaml, 150
- Embedded frame, 750
- Embedded Resource, 213
- Embedding font, 149–150
- EmissiveMaterial, 859, 860
- Enabled property, 981
- EnableModelessKeyboardInterop() method, 970
- EnableVisualStyles() method, 970, 971, 975
- EnableWindowsFormsInterop() method, 970
- EndChange() method, 181
- EndInit() method, 119
- EndLineCap property, 320
- EndPoint property, 327
- EndStyle() method, 832
- EndVoice() method, 832
- Entity data model, 575
- ErrorContent property, 586, 588
- EventArgs classes, 121
- EventArgs object, 402
- Event handlers mapping, 243
- EventSetter objects, 289
- EventTrigger class, 294
- Event triggers, 290, 296–298, 406
 - attachment with style, 408–409
 - BeginStoryboard, 407
 - Click event, 407
 - data-binding expression, 408
 - definition, 407
 - DoubleAnimation object, 408
 - IValueConverter, 408
 - System.Windows.TriggerAction, 408
 - Window.Loaded event, 407
- EventTrigger.SourceName property, 413, 821

- ExceptionRoutedEventArgs.ErrorException property, 819
- ExceptionValidationRule, 581–582, 587, 588
- Executed event, 516
- Execute() method, 245, 246, 254
- ExpandDirection property, 176
- Explorer-style file browser, 780
- ExponentialEase class, 421
- Export plug-ins, 856
- Expression Blend, 298, 299
- Expression Blend SDK, 299
- Expression Blend 3 SDK, 298

■ F

- FastSpeedProperty, 598
- FieldOfView property, 850
- Figure elements, 896, 901, 909
- FileMode.Read, 932
- FileMode.ReadWrite mode, 932
- FileRegistrationHelper class, 211
- FileRegistrationHelper registers, 211
- FillBehavior property, 402, 411
- Fill brush, 318
- Fill property, 309, 310
- FillRule property, 319
- FilterProduct() method, 653
- FindPrimes() method, 988, 992, 994
- FindResource() method, 527
- FirstDayOfWeek, 192
- Fixed documents, 883
 - annotations (*see* Annotations)
 - DocumentViewer, 884
 - XPS files, 920, 921
- Fixed frame rate, 392
- Fixed-sized tiles, 332
- Fixed-size floater, 900
- FlipButton, 531
- FlipButtonAlternate, 531
- FlipPanel
 - BackContent property, 529
 - Control class, 528
 - CornerRadius property, 530
 - default control template
 - basic skeleton, 532
 - ChangeVisualState() method, 537–538
 - ContentPresenter elements, 532
 - flip button, 533
 - GetTemplateChild() method, 537
 - OnApplyTemplate() method, 536–537
 - state animations, 533–535
 - state transitions, 535–536
 - ToggleButton, 537
 - VisualStateManager.GoToState() method, 537
 - DefaultStyleKeyProperty.OverrideMetadata() method, 530
 - different control template, 539–540
 - flipping, 527, 528
 - FrameworkElement class, 528
 - FrontContent property, 529
 - GetValue() and SetValue() methods, 529
 - IsFlipped property, 529
 - parts and states selection, 530–531
 - structure, 528
 - usage, 538–539
- Flipping tiles, 335
- Floater element, 896–900, 909
- FlowDocument.Blocks.FirstBlock property, 902
- FlowDocument.Blocks.LastBlock property, 902
- FlowDocument.Blocks property, 902
- FlowDocument.ContentEnd property, 914
- FlowDocument.ContentStart property, 914
- FlowDocument element, 888
- FlowDocument.IsHyphenationEnabled property, 906
- FlowDocument.IsOptimalParagraphEnabled property, 906
- FlowDocumentMaxPageWidth property, 910
- FlowDocument objects, 179
- FlowDocumentPageViewer, 884, 907–911
- FlowDocument properties, 910
- FlowDocumentReader, 884, 901, 907–908, 911, 922
- Flow documents
 - annotations (*see* Annotations)
 - ColumnDefinition.MaxWidth property, 884
 - construction, 888–890
 - content elements (*see* Content elements)
 - editing (*see* RichTextBox control)
 - flow elements, 885–887
 - Grid container, 884
 - long lines, flow content, 884
 - programmatic interaction
 - dynamic modification, 904
 - free-flowing structure, 902
 - Generate button code, 905
 - navigation properties, 902–903
 - single paragraph and bolded text coding, 902
 - Span elements, 904–905
 - Span.Tag property, 903
 - Tag property, 903

- read-only containers
 - FlowDocumentPageViewer, 907
 - FlowDocumentReader, 907
 - FlowDocumentScrollViewer, 907
 - loading from file, 911–912
 - pages and columns creation, 908–911
 - printing, 912
 - TextBlock, 907
- RichTextBox, 884
- support rich layout, 884
- text justification, 905–906
- wasted space, flow content, 884, 885
- zooming, 907–908
- FlowDocumentScrollViewer, 884, 888, 890, 901, 902, 907, 908, 920, 922
- FlowDocumentScrollViewer.IsSelectionEnabled property, 890
- FlowLayoutPanel, 976
- Focus
 - control and noncontrol classes, 125
 - definition of, 125
 - focusable property, 125
 - moving from one element to another, 125
- Focusable property, 125, 885
- FontFamily attribute, 284
- FontFamily.BaseUri property, 150
- FontFamilyConverter, 284
- FontFamily property, 744, 887
- FontSize property, 744, 887
- FontStretch property, 887
- FontStyle property, 887
- FontWeight property, 147, 887
- FontWeights.Bold property, 917
- FontWeights.Normal property, 917
- FooterPaneContent template, 802
- ForceCursor property, 152
- Foreground property, 291, 744, 887
- FormattedText.MaxTextWidth property, 370
- Formatting bound data
 - ComboBox, 642–645
 - data binding, 601–603
 - data conversion (*see* Data conversion)
 - data templates (*see* Data templates)
 - list controls, 613–615
 - list styles (*see* List styles)
- FormHasErrors() method, 589
- Form.ShowDialog() method, 969
- ForSelection, 924
- ForwardStack property, 759
- Fragment navigation, 748
- FragmentNavigation event, 757

- Frame, 780
- Frame-based animation, 448–451
- Frame class, 748
- Frame.NavigationUIVisibility property, 749
- Frame objects, 750
- Frame.Source property, 752, 755
- FrameworkContentElement class, 885
- FrameworkElement class, 151, 162, 181, 341, 506, 531, 885
- FrameworkElement.Cursor property, 152
- FrameworkElement.FindResource() method, 275
- FrameworkElement.Triggers collection, 408
- FrameworkPropertyMetadata.Inherits flag, 148
- FrameworkPropertyMetadata object, 95, 510, 545
- Freezable class, 273
- From property, 398–399
- FrontContent property, 529

■ G

- Geometries
 - classes, 347
 - combined geometry, 351–354
 - curves and lines
 - arcs, 356–358
 - Bézier curves, 358–359
 - clipping, 361–362
 - mini-language, 359–361
 - pathfigure class, 354
 - pathsegment class, 355
 - straight lines, 355
 - ellipse, 349
 - line, 348
 - object, 348
 - rectangle, 348
 - shapes, 349–351
- Geometry3D class, 839
- GeometryModel3D class, 839
- Geometry object, 309, 338
- GeometryTransform property, 309
- GetAnnotations() method, 928
- GetContentState() method, 762, 763
- GetDefaultView() method, 648
- getElementsByTagName() method, 784
- GetFileName() method, 759
- GetFixedDocument-Sequence() method, 920
- GetForegroundBrush() method, 552–553
- GetNavigationService() method, 755
- GetPosition() method, 127
- GetProduct() method, 561, 573, 596
- GetProperty() method, 544

- GetTemplateChild() method, 525, 537
- GetTouchPoint() method, 134
- GetValue() method, 511
- GetVisualChild() method, 372
- GetVisual() method, 375
- GetVisuals() method, 378
- Global Assembly Cache (GAC), 220
- Glue code, 968
- GoBack() method, 756, 781
- GoForward() method, 756, 781
- GotFocus event, 980
- Gradient Obsession, 439
- GradientStop, 327, 328
- GrammarBuilder, 834
- GrammarBuilder.Append() method, 834
- Grid
 - ColumnDefinition and RowDefinition elements, 70
 - Column property, 71
 - ColumnSpan property, 75
 - creating a Grid-based layout, 70
 - IsSharedSizeScope property, 81
 - Layout Rounding, 74
 - placing individual elements into cells, 71
 - row and column
 - absolute sizes, 72
 - automatic sizes, 72
 - ColumnDefinition object, 73
 - proportional sizes, 72
 - RowDefinition object, Height property, 73
 - using nested Grid containers, 74
 - Row property, 71
 - RowSpan property, 75
 - SharedSizeGroup property, 81
 - shared size groups, 79
 - Shared size property, 81
 - ShowGridLines property, 70
 - splitter bars, 76
 - Background property, 78
 - DragIncrement property, 77
 - guidelines, 76
 - ResizeBehavior property, 77
 - ResizeDirection property, 77
 - resizing rows or columns, 76
 - ShowsPreview property, 77
 - UniformGrid
 - code example with four buttons, 82
 - description of, 82
 - in Visual Studio, 72
- Grid.DataContent property, 570
- Grid wrapping, 563

- GroupDescriptions property, 652
- GroupName property, 161
- GroupSizeReductionOrder property, 807
- GroupStyle.HeaderTemplate, 660
- GroupStyle property, 615
- GroupStyleSelector property, 615
- growStoryboard animation, 418
- GZipStream, 776

■ H

- Handles statement, 113
- HandoffBehavior.Compose, 410
- HandoffBehavior enumeration, 409
- HasContent property, 155
- HasDropShadow property, 164
- HeaderedContentControl, 169
- HeaderTemplate property, 659
- HeaderTemplateSelector property, 659
- HeightExplicitly property, 59
- Height property, 62, 901
- “Hidden” annotation, 925
- Hide() method, 745
- hierarchy, 271–272
- Higher-level tasks, 243
- HighlightTemplate, 633
- Hit testing
 - ContainerUIElement3D, 875
 - in 3-D scene, 871
 - ModelUIElement3D, 873–874
 - in the Viewport, 872–873
- HitTest() method, 377
- HitTestResultBehavior, 378
- HitTestResultCallback() method, 377
- HitTestResult object, 378
- HorizontalAlignment property, 58, 59, 156, 311, 393, 544, 899
- HorizontalAnchor property, 901
- HorizontalOffset property, 901
- HorizontalScrollBarVisibility property, 179
- Horizontal scrolling, 171
- HostInBrowser, 768
- HtmlBridge cla, 785
- HtmlBridge.WebClick() method, 785
- HTMLDocument object, 781, 782
- HtmlDocument object, 782
- hwnd, 972, 976
- HwndHost, 982
- HwndSource class, 982
- HwndSource property, 120
- Hyperlink element, 896

Hyperlink.NavigateUri property, 752, 755

Hyperlinks

- Click event, 746
- content element, 885, 895
- fragment navigation, 748
- inline flow elements, 745
- NavigateUri property, 746
- navigating to websites, 747
- Page.ShowsNavigationUI property, 746
- RequestNavigate event, 746
- TextBlock element, 745
- visited pages history, 746
- WindowTitle property, 747

■ I

- IAnchorInfo, 930
- IAnimatable interface, 396
- IBindingList, 647
- IBindingList interface, 573
- ICollectionView interface, 658
- ICollectionViewLiveShaping property, 663
- ICollectionView reference, 648
- ICollectionViewSource.Refresh() method, 663
- IComparer object, 658
- IDataErrorInfo interface, 579
- Id property, 928
- id tag, 782
- IEnumerable, 647
- IEnumerable(Of T), 575
- IHTMLElement.GetAttribute() method, 782
- IHTMLElement object, 781–783
- ImageBrush class, 325, 331–332, 343
 - Stretch property, 334
 - Viewport property, 333
 - ViewportUnits property, 333
- Image class, 549
- ImageDirectory property, 609
- ImagePathConverter class, 608–609, 610, 629
- ImageSource property, 281, 331, 609, 800
- Image.Stretch property, 900
- IMultiValueConverter interface, 612, 633
- IncreaseZoom() method, 908
- IndowsFormsApplicationBase, 207
- Inertia, 139, 140
- InitializeComponent() method, 120, 520, 597, 756
- Initialized event, 119
- Initialized/Loaded event handler, 756
- InitialShowDelay property, 166, 167
- Inline elements, 886
 - Bold, 896
 - Figure, 896, 901
 - Floater, 896–900
 - Hyperlink, 896
 - InlineUIContainer, 896
 - Italic, 896
 - LineBreak, 896
 - Run, 896
 - Span, 896
 - Underline, 896
 - whitespace, 896–897
- InlineUIContainer class, 919
- InlineUIContainer element, 896, 899
- InnerException property, 120, 588
- innerHTML tag, 782
- innerText tag, 782
- INotifyCollectionChanged interface, 572
- INotifyDataErrorInfo interface, 579, 582
- INotifyDataError interface
 - BindingValidationFailed event, 585
 - GetErrors() and HasErrors() methods, 584
 - IDataErrorInfo interface, 582
 - INotifyDataErrorInfo interface, 582
 - Product.ModelNumber property, 583–584
 - SetErrors() and ClearErrors() methods, 583
 - ValidatesOnDataErrors property, 585
 - ValidatesOnNotifyDataErrors property, 585
- INotifyPropertyChanged interface, 566, 632
- InputDevice class, 121
- InputEventArgs class
 - device property, 121
 - Timestamp property, 121
- Input events, 118, 121
- Interaction.Behaviors attached property, 302
- InteractiveVisual3D, 877
- Internet Explorer browser engine, 742
- IntersectionDetail property, 378
- InvalidateVisual() method, 550, 552
- InvalidOperationException property, 756, 985
- IProvideCustomContentState interface, 762, 763
- IsAdditive property, 400
- IsAsync property, 597
- IsBrowserHosted property, 773
- IsChecked property, 161, 791
- IsColumnWidthFlexible property, 910
- IScrollInfo, 172
- IsCumulative property, 405
- IsDefault, 160
- IsDocumentEnabled property, 919
- IsDropDownOpen property, 192, 643
- IsEditable property, 643, 644
- IsEnabled property, 125, 164, 291

- IsExpanded property, 176
- IsFlipped property, 529
- IsHighlighted property, 791
- IsInitialized property, 119
- IsInitialLoadEnabled property, 597
- IsLiveFiltering property, 663, 664
- IsLiveGrouping property, 663
- IsLiveSorting property, 663
- IsLoaded property, 119
- IsLocked property, 571, 795
- IsMainMenu property, 788
- IsMouseDown property, 128
- IsMouseOver property, 128
- IsolatedStorageFile.AvailableFreeSpace, 776
- IsolatedStorageFile.GetDirectoryNames() method, 775
- IsolatedStorageFile.GetFilesNames() method, 775
- IsolatedStorageFile.GetUserStoreForApplication() method, 775
- IsOpen property, 164, 166
- IsPressed property, 791
- IsReadOnly property, 180, 643, 644
- IsRepeat property, 123
- IsSelected property, 639, 753
- IsSharedSizeScope property, 81
- IsSingleInstance property, 208
- IsSnapToTickEnabled property, 189, 235
- IsSubmenuOpen property, 791
- IsTabStop property, 125
- IsThreeState, 161
- IsTodayHighlighted, 192
- ISupportInitialize interface, 119
- IsValid property, 586
- IsVisible property, 291, 777
- Italic element, 896
- Item-based scrolling, 579
- ItemContainerStyle property, 614–617
- ItemContainerStyleSelector property, 614
- ItemsControl class, 507, 576, 602, 613–615, 622, 626, 642, 643
- ItemsControl.IsSynchronizedWithCurrentItem, 651
- ItemsPanel property, 614, 788
- ItemsPanelTemplate property, 577, 641, 642
- ItemsPresenter, 577
- ItemsSource.DisplayMemberPath property, 788
- ItemsSource property, 567, 602, 614, 626, 629, 651
- ItemStringFormat property, 614
- ItemTemplate property, 567, 614, 626, 788
- ItemTemplateSelector property, 614, 788
- IValueConverter class, 606, 612, 633
- IValueConverter interface, 612

■ J

- JournalEntryName property, 760–761
- JournalEntry.Source property, 759
- journal flag, 753
- JournalOwnership property, 751

■ K

- KeepAlive property, 745, 754
- KeepTogether property, 911
- KeepWithNext property, 911
- Key attribute, 270
- Keyboard class, 126
- KeyboardDevice class, 126
- KeyboardDevice methods, 126
- KeyboardDevice property, 126
- Keyboard events, 118, 121
- Keyboard-handling models, 980
- KeyConverter, using, 124
- KeyDown event, 116, 122, 123
- KeyEventArgs object, 123, 126
- Key-frame animation, 442–443
- Key property, 123
- KeyStates property, 126
- KeyTip property, 806
- KeyUp event, 122

■ L

- Language integrated query (LINQ) Expression, 574–576
- Large fonts, 331
- LargeImageSource property, 803
- LastChildFill, 67
- LastModificationTime property, 928
- Layout
 - abstract, 55, 56
 - Canvas, 82
 - ColumnDefinition element, 88
 - ColumnSpan property, 88
 - DockPanel, 66
 - Dock, 67
 - LastChildFill, 67
 - setting the order of docking controls, 67
 - dynamic content, 88, 90
 - Grid, 70
 - modular user interfaces, 90
 - nesting layout containers, 68, 70
 - principles, 53, 54
 - scrolling, 54
 - ScrollViewer, 54

- StackPanel (*see* StackPanel)
- stages of, 54
- Visibility property, 91
- WrapPanel (*see* WrapPanel)
- Layout arranging window components in a tabular structure, 87
- LayoutTransform property, 341, 828
- Left property, 82
- Lifetime events, 118
- LinearGradientBrush class, 146, 325–328, 345, 415
- Linear interpolation, 418
- Linear navigation, journal management, 758
- LineBreakBefore property, 545–547
- LineBreak element, 896
- Line class
 - Canvas, 316
 - dashes, 322–323
 - flow content model, 316
 - line caps, 320
 - line joins, 320
 - nonzero Margin, 316
 - Stroke property, 316
- LineCount property, 179
- LineDown() method, 171
- LineHeight property, 888
- Line-justification algorithms, 905, 906
- LineLeft() method, 171
- LineRight() method, 171
- LineStackingStrategy property, 888
- LineUp() method, 171
- ListBoxChrome decorator, 65
- ListBox class, 184–187, 566, 615, 625–627, 753
- ListBox control, 615, 641, 652
- ListBox.DisplayMemberPath property, 619
- ListBox.GroupStyle property, 660
- ListBoxItem class, 410, 614, 621, 622, 625
- ListBox.ItemContainerStyle property, 615, 620
- ListBoxItem.ContentTemplate, 620, 626
- ListBoxItem.IsSelected property, 616, 619, 639, 641
- ListBoxItem objects, 576–578, 577, 615
- ListBox.Items.Add() method, 629
- ListBox.ItemsSource property, 576
- ListBoxItem.Template property, 619
- ListBox.SelectedItem property, 571
- ListBox.SelectionMode property, 620
- ListBox.SnapsToDevicePixels property, 638
- ListBox.Template property, 619
- ListCollectionView, 647, 648, 657, 658, 663
- List controls, 613–615, 626
 - ComboBox, 187–188
 - ItemsControl class, 183
 - ListBox, 184
- List element, 891–892
- ListItem collection, 903
- ListSelectionJournalEntry callback, 761
- ListSelectionJournalEntry object, 761, 762
- List styles
 - ItemContainerStyle property, 615–617
 - item style alternation, 620–622
 - ListBox
 - CheckBox elements, 617, 618
 - ListBoxItem, 618
 - RadioButton elements, 617–619
 - style selectors
 - background color, 624
 - Binding.SourceUpdated, 625
 - bold formatting, 624
 - Category property, 624
 - DataTable.RowChanged, 625
 - ItemContainerStyleSelector property, 625
 - Resources collection, 622
 - rudimentary selector, 622
 - SelectStyle() method, 622–624
 - SingleCriteriaHighlightStyleSelector, 624
- ListView, 566, 665
 - advantages, 666
 - Custom View
 - DataTemplate, 671
 - DefaultStyleKey property, 670
 - GridView class, 675
 - ImageDetailView, 676
 - ItemContainer.DefaultKeyStyle property, 670
 - passing information, 677–678
 - ResourceKey, 670
 - TileView objects, 676
 - View class, 672–673
 - view objects, 675
 - View styles, 673–675
 - GridView, 666
 - cell templates, 668–670
 - column creation, 667
 - column headers, 670
 - resizing columns, 668
 - ListBox class, 665
 - ViewBase class, 665
- LiveFilteringProperties, 664
- LiveGroupingProperties, 664
- Live shaping, 663–664
- LiveSortingProperties, 664
- LoadAsync() method, 814
- LoadCompleted event, 757, 781

- LoadedBehavior property, 818, 819, 820, 824
- Loaded event, 119
- LoadFile() method, 203
- Load() method, 814
- Localization
 - BAML resources, 218
 - building user interfaces, 218–219
 - CurrentUICulture property, 218
 - default culture, 219
 - fine-grained, 219
 - GAC, 220
 - language, 219
 - probing, 218
 - satellite assembly, 220
 - translation process
 - extracting localizable content, 221–224
 - markup elements preparation, 220–221
 - satellite assembly building, 224–226
 - user-interface, 218
 - .vbproj.csproj file, 219
- Lock() method, 390
- Logical scrolling, 172
- LookDirection property, 868
- Lookless control, 505, 506
 - color picker code, 520
 - color picker markup
 - ColorPicker.xaml file, 522
 - generic.xaml file, 520–521
 - OverrideMetadata, 520
 - TemplateBinding markup extensio, 522–523
 - theme-specific styles, 521–522
 - control template
 - adding part names, 524–525
 - documenting template parts, 526–527
 - event handlers, 524
 - manipulating template parts, 525–526
- Losing a mouse capture, 130
- LostFocus event, 120, 980
- LostMouseCapture event, 130
- LowerLatin value, 891
- LowerRoman value, 891

■ M

- Main() method, 196
- MainWindow, 799
- Managed Add-in Framework (MAF), 997–998
- Managed Extensibility Framework (MEF), 997–998
- Manipulation, 133, 136, 139
- Margin property, 58, 887
- MarkerOffset property, 891

- MarkerStyle property, 891
- Markup-based approach, 653
- MaskedTextBox, 973–974
- MaskInputRejected event, 974
- MatrixCamera class, 846
- MatrixTransform class, 338
- MaxHeight property, 58
- MaxLines property, 179
- MaxWidth property, 58
- Measure() met, 542, 543
- MeasureOverride() method, 541–542, 544
- MediaClock class, 820
- MediaCommands class, 819
- MediaElement class, 549, 815
 - animation synchronization, 825–827
 - error handling, 819
 - playing audio with triggers, 820–822
 - playing multiple sounds, 822–823
 - playing video, 827
 - Position control, 825
 - programmatic audio play, 818–819
 - SpeedRatio control, 824
 - video effects (*see* Video effects)
 - Clipping property, 828
 - content control, 827
 - copying content, 828
 - intermediary rendering surface, 830
 - LayoutTransform property, 828
 - Opacity property, 828
 - reflection effect, 828–829
 - RenderTransformOrigin property, 828
 - RenderTransform property, 828
 - resolutions and frame rates, 830
 - VideoDrawing class, 830
 - Volume and Balance control, 823–824
- MediaElement.Clock information, 825
- MediaElement.Source property, 820
- MediaElement.SpeedRatio property, 824
- MediaEnded event, 825
- MediaFailed event, 817, 819
- MediaOpened event, 817
- MediaPlayer class, 816–818, 823, 830
- MediaPlayer.Close() method, 816
- MediaState enumeration, 818
- MediaTimeline class, 403, 820, 823
- MediaTimeline.Source property, 820
- MediumSpeedProperty, 598
- MemoryStream, 923
- Menu class, 614
- MenuItem class, 789–791
- MenuItem.Click event, 790

- MenuItem.Icon property, 791
- MenuItem.InputGestureText property, 791
- MenuItem.IsChecked property, 791
- MenuItem objects, 789, 791
- Menus
 - ContextMenu class, 791
 - items, 789–791
 - Menu class, 788
 - Separators, 792–793
- MergedDictionaries property, 278–279
- MessageBeep Win32 API, 816
- Message property, 588
- Microsoft.Expression.Interactions.dll assembly, 299, 303
- Microsoft HTML Object Library, 781
- Microsoft Money, 742
- MinHeight property, 58
- MinLines property, 179
- MinOrphanLines property, 911
- MinWidth property, 58
- MinWindowLines property, 911
- Miter line join, 321
- Mixed menus, 787
- Model3DGroup class, 857
- ModelUIElement3D class, 871, 873–874
- MonitorCommands, 266
- MouseButton event, 129
- MouseButtonEventArgs object, 113, 129
- Mouse.Capture() method, 129
- Mouse class, 129
- Mouse cursors, 151–152
- MouseDoubleClick event, 129
- MouseDown event, 872, 919
- MouseEnter event, 127, 289, 290, 296
- MouseEventArgs object, 107, 127
- Mouse events, 118
 - AllowDrop property, 131
 - ButtonState event, 129
 - capturing the mouse by calling Mouse.Capture() method, 129
 - ClickCount event, 129
 - creating drag-and-drop source, 131
 - direct events, definition of, 127
 - drag-and-drop operations, 130
 - DragDrop class, 131
 - DragEnter event, 131
 - dragging-and-dropping into other applications, 132
 - IsMouseDirectlyOver property, 128
 - IsMouseOver property, 128
 - LostMouseCapture event, 130
 - MouseButton event, 129
 - MouseButtonEventArgs object, 129
 - mouse class, 129
 - mouse click events, 128
 - MouseDoubleClick event, 129
 - MouseEnter event, 127
 - MouseLeave event, 127
 - MouseMove event, 127
 - PreviewMouseDoubleClick event, 129
 - PreviewMouseMove event, 127
 - MouseLeave event, 127, 289, 290, 297
 - MouseLeftButton, 374
 - MouseLeftButtonDown event, 128
 - MouseLeftButtonUp event, 129
 - MouseMove event, 127
 - Mouse.OverrideCursor property, 152
 - MouseRightButtonDown event, 128
 - MouseRightButtonUp event, 129
 - MouseUp() method, 108
- MultiBinding, 612
- MultiBinding.StringFormat property, 612
- MultiDataTrigger class, 294
- Multiple views, 653
- Multithreading
 - BackgroundWorker (*see* BackgroundWorker)
 - context, 983
 - definition, 983
 - dispatcher, 984
 - DispatcherObject class, 984
 - BeginInvoke() method, 986, 987
 - Dispatcher.BeginInvoke() method, 985, 986
 - DispatcherPriority.ApplicationIdle, 986
 - DispatcherPriority.Normal, 986
 - DispatcherPriority.SystemIdle, 986
 - InvalidOperationException, 985
 - Invoke() method, 987
 - members, 984
 - System.Threading.Thread object, 985
 - time-consuming code, 986
 - UpdateTextWrong() method, 985
 - VerifyAccess() method, 985
 - dual-core CPUs, 983
 - element, 984
 - single-threaded apartment model, 984
 - thread affinity, 984
 - thread rental, 983
- Multitouch input, 132, 140
- MultiTrigger class, 294, 296
- MyPageData property, 755
- myTextBox element, 748

N

- Navigated event, 757, 781
- Navigate() method, 756, 781, 782
- NavigateToStream() method, 781
- NavigateToString() method, 781
- NavigateUri property, 746, 896
- Navigating event, 757, 781
- NavigationFailed event, 747, 757
- NavigationFailedEventArgs.Handled, 757
- NavigationProgress event, 757
- NavigationService class
 - events, 756–757
 - journal
 - AddBackEntry() method, 759
 - AddBackReference() method, 763
 - CustomContentState class, 760
 - CustomContentState object, 763
 - custom entries, 764, 766
 - dynamic list, 760
 - GetContentState() method, 762, 763
 - IProvideCustomContentState interface, 762, 763
 - JournalEntryName property, 760–761
 - JournalEntry object, 759
 - ListSelectionJournalEntry callback, 761
 - ListSelectionJournalEntry object, 762
 - management, 758–759
 - NavigationService.Content property, 761
 - PageWithMultipleJournalEntries, 763
 - ReplayListChange delegate, 761
 - Replay() method, 761–763
 - System.Windows.Navigation.
 - CustomContentState class, 759
 - “virtual” entries, 759
 - Page Functions (*see* PageFunction class)
 - programmatic navigation, 755–756
- NavigationService.Content property, 761
- NavigationService.GetNavigationService() method, 755
- NavigationService.Navigate() method, 764, 765
- NavigationService property, 745
- NavigationService.StopLoading() method, 756
- NavigationStopped event, 757
- NavigationUIVisibility property, 749, 751
- NavigationWindow, 742–744, 752, 769
- Nested page, 750
- .NET Framework, 771
- non-MenuItem objects, 790
- Nonshared resources, 274
- Nonzero fill rule, 319

NotifyPropertyChanged property, 663

O

- ObjectAnimationUsingKeyFrames, 394
- Object-based drawing, 18
- ObjectDataProvider, 595
 - asynchronous support, 597
 - binding, 596
 - error handling, 596–597
 - features, 596
 - GetProducts() method, 596
- Object resource, 269
 - access, code, 275
 - adaptability, 269
 - application, 275–276
 - collection, 270–271
 - dynamic resource, 272–274
 - efficiency, 269
 - maintainability, 269
 - nonshared, 274
 - static resource, 272–274
 - system, 276–277
- ObservableCollection class, 572, 575, 602
- Office ribbon, 787
- OnApplyTemplate() method, 525, 536–537
- onBlur event, 785
- onChange event, 785
- onClick event, 785
- OnColorChanged() method, 512, 513
- OnColorRGBChanged() method, 512
- OneWayToSource binding, 580
- onFocus event, 785
- OnMainWindowClose approach, 198
- onMouseOver event, 785
- OnPropertyChanged() method, 566
- OnRender() method, 154, 371, 548–550
- OnReturn() method, 765, 766
- OnStartup() method, 208
- OpacityMask gradient, 828
- OpacityMask property, 344
- Opacity masks, 414
- Opacity property, 325, 342, 344, 826, 828
- Open() method, 816, 817
- Optimal paragraph layout, 905
- Ordinary property, 754
- Orientation property, 794
- orizontalContentAlignment property, 156
- OrthographicCamera class, 846
- Oscillations property, 418
- outerHTML tag, 782

outerText tag, 782
 Overflow menu, 794–795
 OverflowMode.Always, 795
 OverflowMode.AsNeeded, 795
 OverflowMode.Never, 795
 OverflowMode property, 795
 OverrideMetadata() method, 520

■ P

PackageStore.GetPackage() method, 931
 Padding property, 69, 514, 887, 899
 Page-based interfaces. *See* Page-based navigation
 Page-based navigation
 application with NavigationWindow, 743–744
 custom property maintenance, 754–755
 events, 756–757
 hosting pages
 in another page, 750–751
 in Frame, 748–750
 in Web Browser, 751–752
 hyperlinks
 Click event, 746
 fragment navigation, 748
 inline flow elements, 745
 NavigateUri property, 746
 navigating to websites, 747
 Page.ShowsNavigationUI property, 746
 RequestNavigate event, 746
 TextBlock element, 745
 visited pages history, 746
 WindowTitle property, 747
 Internet Explorer browser engine, 742
 journal
 AddBackEntry() method, 759
 AddBackReference() method, 763
 CustomContentState class, 760
 CustomContentState object, 763
 custom entries, 764, 766
 dynamic list, 760
 GetContentState() method, 762, 763
 IProvideCustomContentState interface, 762, 763
 JournalEntryName property, 760–761
 JournalEntry object, 759
 ListSelectionJournalEntry callback, 761
 ListSelectionJournalEntry object, 762
 management, 758–759
 NavigationService.Content property, 761
 PageWithMultipleJournalEntries, 763
 ReplayListChange delegate, 761

Replay() method, 761–763
 System.Windows.Navigation.
 CustomContentState class, 759
 “virtual” entries, 759
 navigation events, 756
 navigation history, 753–754
 Navigation Service (*see* NavigationService class)
 Page class, 744–745
 Page Functions (*see* PageFunction class)
 programmatic navigation, 755–756
 System.Windows.Controls.Page class, 742
 URIs, WPF, 752–753
 WebBrowser control (*see* WebBrowser control)
 weblike applications, 742
 weblike interface, 742
 websites *vs.* Windows applications, 741
 XAML file, 742
 XBAPs (*see* XAML browser applications (XBAPs))
 Page class, 744–745
 PageDown() method, 171
 PageFunction class
 creation, 764
 OnReturn() method, 765, 766
 Product class, 764
 programmatic navigation, 765
 RemoveFromJournal property, 766
 Returned event, 765
 TypeArguments attribute, 764, 765
 <PageFunction> element, 764
 Page.Initialized event, 755
 Page.KeepAlive property, 754
 PageLeft() method, 171
 PageLibrary component, 752
 Page.Loaded event, 744, 755
 PageRight() method, 171
 Page.ShowsNavigationUI property, 746
 PageUp() method, 171
 Panel class, 507, 549
 Paragraph element, 890
 Paragraph properties, 911
 Parse() method, 606
 PasswordBox, 179
 PasswordBox.PasswordChar property, 100
 Path-based animation, 446–448
 PathGeometry object, 394
 Path shape, 338
 Pause() method, 819
 PauseStoryboard action, 411
 PerspectiveCamera class, 846
 Pixel-based scrolling, 579
 Pixel snapping, 324

- PlacementMode, 164
- Placement property, 776
- PlacementRectangle property, 164
- PlacementTarget property, 164
- PlayLooping() method, 814
- Play() method, 814, 816, 817, 819, 822, 823
- PlaySync() class, 815
- PlaySync() method, 814
- Plug-ins. *See* Add-ins
- PointLight and SpotLight, 846
- Polygon class, 308, 318–320
- Polyline class, 308
 - dynamic graphics, 318
 - Expression Design, 318
 - line caps, 320
 - line joins, 320
 - PointCollection object, 317
 - Points property, 317
 - with several segments, 317
- Pop() method, 370
- PopupAnimation property, 167, 776
- Popup.Child property, 167
- Popup.StaysOpen property, 167
- Position property, 825
- PositivePriceRule, 587
- PowerEase class, 421
- Prebuilt commands, 246
- PreviewKeyDown event, 116, 122, 124
- PreviewKeyUp event, 122
- PreviewMouseDoubleClick event, 129
- PreviewMouseLeftButtonDown event, 128
- PreviewMouseLeftButtonUp event, 129
- PreviewMouseMove event, 127
- PreviewMouseRightButtonDown event, 128
- PreviewMouseRightButtonUp event, 129
- PreviewTextInput event, 122, 123, 124
- PreviewTouchDown event, 133
- PreviewTouchMove event, 133
- PreviewTouchUp event, 133
- PriceConverter class, 607
- Primary interop assembly, 976
- PrintDocument() method, 244
- Printing, 935
 - an element, 936
 - in-memory TextBlock object, 941
 - limitations, 937
 - PrintDialog object, 936
 - PrintVisual() method, 937
 - annotations, 944
 - document
 - ColumnWidth and ColumnGap, 943
 - DocumentPaginator property, 943
 - FlowDocumentPageViewer, 943
 - FlowDocumentReader, 943
 - limitations, 944
 - PrintDocument() method, 942
 - Document paginator, 945
 - GetPage() method, 946
 - HeaderedFlowDocumentPaginator class, 945–946, 947
 - PageCount, 946
 - PageSize, 946
 - with multiple pages
 - data split, 951
 - DocumentPaginator, 951
 - DrawText() and DrawLine() methods, 955
 - GetFormattedText() method, 953
 - GetPage() method, 951, 954
 - PaginateData() method, 952
 - StoreDataSetPaginator, 952, 956
- page ranges, 957
- PrintDialog class, 938
 - PrintDocument() method, 936
 - PrintVisual() method, 936
- print queues, 957–960
- print settings, 956
- Transform object, 938
 - Canvas, 939
 - Measure() and Arrange() methods, 939
 - PrintableAreaWidth and PrintableAreaHeight properties, 939–940
- visual-layer classes
 - ContainerVisual, 948
 - custom printout, 948, 950
 - DrawingContext methods, 948–949
 - DrawingVisual, 948
- XPS documents
 - asynchronous printing, 961, 963–964
 - DocumentPaginator, 960
 - MemoryStream, writing to, 962
 - PrintDialog class, 962
 - print preview, 961
 - Write() and WriteAsync() methods, 961
- Print() method, 912
- ProductByPriceFilter object, 655, 656
- Product.CategoryName property, 660
- Product class, 764
- Product.Description property, 564
- productMatchesTracked collection, 575
- Product.ModelName property, 626
- Product.ModelNumber property, 598, 602
- Product objects, 628

Product.UnitCost property, 606, 664
 Programmatic navigation, 755–756
 ProgressBar content, 416
 ProgressBar control, 190
 ProgressBar.Value, 417
 ProgressChanged event, 992
 PromptBuilder.AppendSml() method, 833
 PromptBuilder.BeginStyle() method, 832
 PromptBuilder class, 831–833
 PromptBuilder.ToXml() method, 833
 PromptEmphasis, 832
 PromptRate value, 832
 PromptStyle object, 832
 PromptVolume value, 832
 Property-based animation, 392–393
 PropertyChanged event, 566, 625
 PropertyChanged property, 565
 PropertyGroupDescription.Name property, 660
 PropertyMap collection, 981
 PropertyNameChanged property, 565
 Property-resolution system, 399
 Property translators, 980
 Proportional coordinate system, 329
 Proportionally sized tiles, 332
 proportional scaling, 315
 PushClip() method, 371
 PushEffect() method, 371
 PushOpacityMask() method, 371
 PushOpacity() method, 371
 PushTransform() method, 371
 PushXxx() methods, 371

■ Q

QuadraticEase class, 421
 QuarticEase class, 421
 Quick Access Toolbar (QAT), 809–810
 QuickAccessToolBarImageSource property, 810
 QuinticEase class, 421

■ R

RadialGradientBrush class, 325, 329–330, 552
 RadioButton elements, 617–620
 RadioButton.Focusable property, 619
 RadioButton.IsChecked property, 619
 RadioButton objects, 373
 RadiusX property, 310, 329
 RadiusY property, 310, 329
 RaiseEvent() method, 107, 513
 RangeBase class, 525
 Range-based controls

ProgressBar, 190
 properties, 188
 slider, 188–190
 RangeBase-derived control, 525
 Raw touch support, 133, 136
 record browser, 649, 650
 Rectangle class, 308, 310
 Rectangle.Fill property, 513
 Rectangle geometry, 348
 Refresh() method, 781
 RegisterEvent() method, 110
 RegisterPixelShaderSamplerProperty() method, 384
 RegisterRoutedEvent() method, 106
 RelativeSource property, 522
 RelativeTransform property, 828
 RemoveBackEntry() method, 758
 RemoveFromJournal property, 766
 RemoveHandler() method, 106
 RemoveRequested event, 416
 RemoveSignature() method, 920
 RemoveStoryboard action, 411
 RenderedGeometry property, 309
 RenderTransformOrigin property, 340, 341, 828
 RenderTransform property, 339, 341, 828
 RepeatBehavior property, 405–406
 RepeatButton, 160
 Repeat interval, 405
 Replay() method, 761–763
 RequestNavigate event, 746
 ResizeBehavior property, 77
 ResizeDirection property, 77
 ResourceDictionary class, 270
 ResourceKey objects, 277
 ResourceKey property, 272
 Resources
 assembly resource, 269
 dictionary
 ComponentResourceKey, 279–282
 creation, 277
 CustomResources, 280
 generic.xaml, 279
 ImageSource property, 281
 library assembly, 281
 MergedDictionaries property, 278–279
 merging resource collection, 278–279
 ResourceDictionary object, 278, 279
 ResourceLibrary, 280
 ReusableDictionary.xaml, 279
 object resource (*see* Object resource)
 Resources property, 270, 287
 ResumeStoryboard action, 411, 822

- Retrieving resources, 214–215
- ReturnEventArgs.Result property, 765
- Reversible animation, 402
- RGB and scRGB, 145
- RibbonApplicationMenu class, 800
- RibbonApplicationMenuItem class, 800
- RibbonApplicationMenuItem objects, 800, 804
- Ribbon.AuxiliaryPaneContent, 802
- RibbonButton objects, 802–804, 804, 807
- RibbonCheckBox class, 804
- RibbonComboBox class, 804
- RibbonControlsLibrary.dll assembly, 798
- Ribbon.FooterPaneContent, 802
- RibbonGroup objects, 802–804
- RibbonGroupSizeDefinitionCollection, 808
- RibbonGroupSizeDefinition objects, 807
- RibbonMenuItem class, 804
- Ribbon.QuickAccessToolBar property, 809
- RibbonRadioButton class, 804
- Ribbon.Resources, 808
- Ribbons
 - adding, 798–780
 - application menu, 800–802
 - keyboard access with KeyTips, 806
 - Microsoft, 798
 - QAT, 809–810
 - rich tooltips, 804–805
 - sizing, 807–809
 - Tabs, Groups, and Buttons, 802–804
 - Windows applications, 798
- RibbonSeparator class, 804
- RibbonSplitButton class, 804
- RibbonTab objects, 802–804
- RibbonTest, 799
- RibbonTextBox class, 804
- RibbonToggleButton class, 804
- RibbonWindow class, 798–800
- RibbonWrapPanel, 807
- RichTextBox control, 179
 - file loading
 - data format, 914–915
 - Load() method, 914
 - System.Windows.Documents.TextRange class, 886
 - TextRange, 913–914
 - XamlReader.Load() method, 913
 - FlowDocument object, 913
 - individual words, 919
 - MouseUp event, 919
 - PreviewMouseDown event, 919
 - saving file, 915–916
 - text formatting, 916–918
 - UIElement objects, 919
- RichTextBox.IsDocumentEnabled property, 919
- RichTextBox.Selection property, 917
- Right property, 82
- RotateTransform class, 337, 339
- RotateTransform3D, 866–867, 878
- Round line join, 321
- RoutedCommand class, 246–247
- RoutedEventArgs class, 107, 110
- RoutedEventArgs.Handled property, 113, 757
- RoutedEventHandler property, 513
- Routed events
 - AddHandler() method, 106, 108, 114
 - attached events, 114
 - bubbled image click, 111
 - click event, 114
 - definition of, 105
 - delegate type, 108
 - MouseEventArgs object, 107
 - name property, 115
 - naming event handler methods, 107
 - RaiseEvent() method, 107
 - RegisterEvent() method, 110
 - RegisterRoutedEvent() method, 106
 - registration, 105
 - RemoveHandler() helper method, 109
 - RemoveHandler() methods, 106
 - RemoveHandler statement, 108
 - sharing, 106
 - signatures, 107
 - suppressed events, 114
 - tunneling events (*see* Tunneling events)
 - types of, 109
 - wiring up, attached event, 115
 - wrapping of, .NET events, 106
- RoutedPropertyChangedEventHandler
 - property, 513
- RoutedUICommand object, 516
- RowDefinition element, 70
- Row property, 71
- RowSpan property, 894
- Run element, 890, 895
- Runtime callable wrappers (RCWs), 976
- RunWorkerCompleted event, 994
- RunWorkerCompletedEventArgs.Result property, 991

■ S

SayAs enumeration, 832

- ScaleTransform, 540
- ScaleTransform class, 337
- ScrollToEnd() method, 171
- ScrollToHome() method, 171
- ScrollToHorizontalOffset() method, 171
- ScrollToLeftEnd() method, 171
- ScrollToRightEnd() method, 171
- ScrollToVerticalOffset() method, 171
- ScrollToXxx() methods, 171
- ScrollView, 577, 778
 - custom scrolling, 172–173
 - definition, 170
 - expander, 175–178
 - GroupBox, 173
 - HorizontalScrollBarVisibility property, 170
 - horizontal scrolling, 170
 - programmatic scrolling, 171–172
 - scrollable window, 170
 - scrollbar, 170
 - TabItem, 173–175
- ScrollView.HorizontalScrollBarVisibility property, 641
- Section.Background property, 894
- Section element, 894–895
- Section.Style property, 895
- SecureString.Dispose() method, 183
- SecurityException, 772
- SeekStoryboard action, 411
- SelectedIndex property, 615, 753
- SelectedItem.Products property, 571
- SelectedItem property, 571, 615
- SelectedText property, 180
- SelectedValue property, 615
- SelectionBoxItemTemplate property, 645
- SelectionChanged event, 180
- SelectionChangedEventArgs object, 186
- SelectionMode property, 615
- Selector class, 507, 615, 642
- SelectStyle() method, 622
- Separator objects, 789
- SetBinding() method, 525
- SetProperty() method, 544
- SetSpeedRatio() method, 414
- SetStoryboardSpeedRatio action, 411, 824
- SetStoryboardSpeedRatio.SpeedRatio action, 414
- Setters property, 286
- Setter.TargetName property, 287
- SetValue() method, 100, 511
- SetZIndex() method, 84
- ShaderEffect class, 383–384
- Shape classes, 549

- Shapes
 - angling, 338
 - animation, 338
 - classes
 - ellipse class, 308, 310
 - LayoutTransform property, 341
 - line class (*see* Line class)
 - polygon class, 308, 318–320
 - polyline class (*see* Polyline class)
 - rectangle class, 308, 310
 - elements, 307–308
 - FrameworkElement, 307
 - pixel snapping, 324
 - primitives, 307
 - properties, 309
 - repeating, 338
 - scaling with Viewbox
 - autosized container, 316
 - Canvas.ClipToBounds property, 315
 - Canvas with resizability, 314
 - DPI setting, 315
 - non-Viewbox size, 315
 - StretchDirection property, 315
 - vector graphics, 314
 - Viewbox.Stretch property, 315
 - Width and Height properties, 315
 - window resizing, 315
 - sizing and placing, 311–313
 - transforming, 339–340
- Shared attribute, 274
- SharedLibrary assembly, 753
- SharedSizeGroup property, 627
- ShowDuration property, 166
- ShowGridLines property, 70
- Show() method, 745
- ShowOnDisabled property, 167
- ShowsNavigationUI property, 745
- ShowsPreview property, 77
- ShutdownMode property, 198
- Sieve of Eratosthenes, 988
- SignDigitally() method, 920
- Silverlight, 299
- SineEase class, 421
- SingleCriteriaHighlightStyleSelector, 624–625
- SingleCriteriaHighlightTemplateSelector, 634
- Single-instance application
 - Application.Startup event fires, 207
 - building document-based applications, 207
 - file-type registration, 211–212
 - IsSingleInstance property, 208
 - Microsoft Word, 207

- Single-instance application (*cont.*)
 - OnStartup() method, 208
 - OnStartupNextInstance() method, 208
 - ShowDocument() window, 207
- SingleInstanceApplicationWrapper class, 209
- WCF, 207
- WindowsFormsApplicationBase, 207, 208
- WpfApp class, 208, 210
- SingleInstanceApplicationWrapper class, 209
- SingleInstanceApplicationWrapper.
 - OnStartupNextInstance() method, 211
- Single-thread affinity (STA), 13
- Single-threaded apartment model, 984
- SizeToContent property, 64, 178
- SkewTransform class, 339
- SkipStoryboardToFill action, 411
- Slider controls, 513
- Slider.Value property, 414
- SlowSpeedProperty, 598
- SmallImageSource property, 802, 803
- Snapshot-and-replace behavior, 409
- SnapshotAndReplace value, 409
- SnapsToDevicePixels property, 309, 324
- SolidColorBrush class, 325–326, 342, 513, 525
- SolidColorBrush objects, 145
- SolidColorBrush property, 927
- Solution Explorer, 968, 977
- SomethingClicked() method, 112, 113
- SortByModelNameLength class, 658
- SortByTextLength class, 658
- SortDescription objects, 657, 658
- SortDescriptions collection, 658
- SortDescriptions property, 652
- SoundLocation property, 814
- SoundPlayerAction class, 815
- SoundPlayer class, 813–815
- SoundPlayer.Stream property, 814
- SourceInitialized event, 120
- SourceItems property, 761
- Source property, 782, 823
- Span element, 890, 896
- Span.Tag property, 903
- SpashScreen.Show() method, 202
- SpecularMaterial, 859, 860
- SpeechDetected event, 833
- SpeechHypothesized event, 833
- Speech recognition
 - COM object, 833
 - Dispose() method, 833
 - GrammarBuilder, 834
 - SpeechDetected event, 833
 - SpeechHypothesized event, 833
 - SpeechRecognitionRejected event, 833
 - SpeechRecognizer class, 833
 - SRGS grammar, 834
 - SubsetMatchingMode enumeration, 834
 - Windows accessibility feature, 833
- Speech Recognition Grammar Specification (SRGS), 834
- SpeechRecognitionRejected event, 833
- SpeechRecognized event, 833
- SpeechRecognizedEventArgs.Result property, 833
- SpeechRecognizer class, 833
- Speech synthesis
 - dynamic text, 831
 - Narrator, 831
 - PromptBuilder class, 831–833
 - SpeechSynthesizer class, 831
 - SSML standard, 832
 - System.Speech.Synthesis namespace, 831
- Speech Synthesis Markup Language (SSML)
 - standard, 832
- SpeechSynthesizer class, 831
- SpeedRatio property, 284, 404, 411, 414
- SpellCheck.CustomDictionaries collection, 183
- SpellCheck.CustomDictionaries property, 182
- SpellCheck.IsEnabled property, 182
- SpellingReform property, 181
- Splash Screen, 202
- SplashScreen.Close() method, 202
- Spline key frames animation, 444–448
- SpreadMethod property, 328
- Square value, 891
- SrgsDocument, 834
- Stack collection, 517
- StackPanel, 311, 341, 659
 - arranging elements, 58
 - Border class, 64
 - button sizing, 62, 63
 - button stack example, 56
 - changing alignment defaults, 59
 - FrameworkElement class, 59
 - Height property, 62
 - HorizontalAlignment property, 59
 - in horizontal orientation, 58
 - layout properties, 58
 - setting control margins, 60
 - SizeToContent property, 64
 - Thickness structure, 60
 - VerticalAlignment property, 59
 - in Visual Studio, 57
 - Width property, 62

- window, 64
- StackPanel.Visibility property, 641
- StartLineCap property, 320
- StartPoint property, 327
- StartupEventArgs.Args property, 203
- StartupUri property, 197
- StartVoice() method, 832
- StaticResource reference, 628
- Static resources, 271
- StatusBar class, 793, 796–797
- StatusBarItem object, 797
- StaysOpen property, 164, 776
- StickyNoteControl class, 932–933
- StickyNoteControl.IsActive property, 932
- Stitching. *See* Z-fighting
- Stop() method, 819
- StopStoryboard action, 411
- StoreContentChanged event, 931
- StoreDB.GetProduct() method, 559, 568–569
- Storyboard.CurrentTimeInvalidated event, 825, 826
- Storyboards, 396, 406
 - declarative animation, 406
 - definition, 406
 - DoubleAnimation, 406
 - event trigger (*see* Event triggers)
 - monitoring progress, 415–417
 - overlapping animations, 409–410
 - playback control
 - BeginStoryboard action, 411, 412, 414
 - BeginStoryboardName property, 414
 - controllable animation, 412
 - ControllableStoryboardAction class, 411
 - EventTrigger.SourceName property, 413
 - media player actions, 413
 - Name property, 414
 - PauseStoryboard action, 411
 - SetSpeedRatio() method, 414
 - stopping *vs.* completing animation, 412
 - Storyboard object, 414
 - Triggers collection, 413
 - wipe effect, 414
 - synchronized animations, 410–411
 - TargetName property, 406
 - TargetProperty, 406
 - Timeline, 411
- Storyboard.SlipBehavior property, 825
- Storyboard.TargetName property, 407
- Storyboard.TargetProperty property, 407
- Straight lines, 355
- StreamResourceInfo object, 215
- StreamSource property, 608
- StretchDirection property, 315, 827
- Stretch property, 309, 312, 331, 334, 827
- StringAnimationUsingKeyFrames, 394
- StringFormat property, 612
- String formatting, 603
 - StringFormat property
 - Binding.StringFormat property, 603
 - ItemStringFormat property, 605
 - .NET format strings, 603
 - numeric data, 604
 - OrderDate property, 604
 - StringFormat value, 604
 - times and dates, 604
 - UnitCost property, 603
 - Visual Studio, 604
 - XAML parser, 604
 - with value converters
 - Binding.StringFormat property, 605
 - creation, 606
 - DataBinding namespace, 607
 - Decimal.ToString() method, 606
 - Parse() method, 606
 - PriceConverter class, 607
 - Product.UnitCost property, 606
 - Resources collection, 607
 - StaticResource reference, 607
 - System.Globalization.NumberStyles value, 606
 - ToString() method, 606
 - TryParse() method, 606
 - XML namespace prefix, 607
- StrokeDashArray property, 309, 322
- StrokeDashCap property, 309, 323, 324
- StrokeDashOffset property, 309, 323
- StrokeEndLineCap property, 309
- StrokeLineJoin property, 309
- StrokeMiterLimit property, 309, 321
- Stroke objects, 84
- Stroke property, 309, 310
- Strokes collection, 84
- StrokeStartLineCap property, 309
- StrokeThickness property, 309
- Style inheritance, 292
- Style property, 527, 887
- Styles, 283, 505
 - advantages, 286
 - attaching event handlers, 289–291
 - automatic application, types, 292–293
 - BigFontButtonStyle, 285, 286
 - data types, 284
 - definition, 283

- Styles (*cont.*)
 - dependency property, 283
 - FindResource() method, 285
 - font properties, 283
 - FontSettings object, 285
 - FontWeight.Bold, 284
 - layers, 291
 - list (*see* List styles)
 - Padding and Margin properties, 286
 - programmational, 285
 - property value inheritance feature, 284
 - Setter object, 285
 - setting properties
 - attribute with nested element, 288
 - Button class, 289
 - Control class, 289
 - dependency property, 288, 289
 - Label class, 289
 - Setter objects, 288
 - TargetType property, 289
 - TextBlock class, 289
 - static resources, 284
 - Style class properties, 286
 - Style object creation, 287
 - Style property, 285
 - System.Windows.Style object, 285
 - triggers (*see* Triggers)
 - triggers and templates, 283
 - vs.* CSS, 283
 - window resources, 284
 - Windows Forms, 970–971
- Style selectors, 611
- Style.TargetType property, 616, 932
- Style triggers, 617
- Stylus events, 118
- SubsetMatchingMode enumeration, 834
- SynchronizationContext class, 992
- SystemBrushes class, 325
- System.Collections.Generic namespaces, 517
- SystemColors class, 276
- System.ComponentModel.BackgroundWorker
 - component, 987
- System.ComponentModel.INotifyPropertyChanged
 - interface, 565
- System.ComponentModel namespace, 989
- System.ComponentModel.
 - PropertyGroupDescription objects, 659
- System.ComponentModel.SortDescription objects, 657
- System DPI
 - font size, 7
 - higher pixel density, 8
 - scaling, 10
 - Windows 7 and 8, 9
 - Windows Vista, 8
- System.Drawing.dll assembly, 968
- System.Drawing namespace, 276
- SystemFontFamilies collection, 149
- SystemFonts class, 276
- System.Globalization.CultureInfo class, 224
- System.IO.Compression namespace, 776
- System.IO.IsolatedStorage namespace, 775
- System.IO.Packaging namespace, 931
- System.Linq.Enumerable helper class, 575
- System.Linq namespace, 575
- System.Media.SystemSounds class, 816
- SystemParameters class, 276
- System resources, 276–277
- System.Runtime.InteropServices namespace, 784
- System.Security.Principal.WindowsIdentity class, 926
- System.Security.SecureString object, 183
- SystemSounds class, 816
- System.Speech.Recognition namespace, 833
- System.Speech.Recognition.SrgsGrammar
 - namespace, 834
- System.Speech.Synthesis namespace, 831
- System.Threading.DispatcherObject, 13
- System.Threading.Thread, 984
- System.TimeSpan, 401
- System.Windows.Annotations namespace, 922, 925
- System.Windows.Annotations.Storage namespace, 922
- System.Windows.Application class, 971
- System.Windows.Clipboard class, 132
- System.Windows.Control class, 144
- System.Windows.Controls.ContentControl, 15
- System.Windows.Controls.Control, 14
- System.Windows.Controls.Decorator class, 65
- System.Windows.Controls.ItemsControl, 15
- System.Windows.Controls namespace, 797, 932
- System.Windows.Controls.Page class, 742
- System.Windows.Controls.Panel, 15, 641
- System.Windows.Controls.Primitives namespace, 797
- System.Windows.Controls.Primitives.RangeBase
 - class, 525
- System.Windows.Data.Binding class, 229
- System.Windows.Data.CollectionViewSource class, 648
- System.Windows.DependencyObject, 14
- System.Windows.Documents.TextRange class, 913

- System.Windows.Forms.Application class, 971
- System.Windows.Forms.dll assembly, 968
- System.Windows.Forms.Form class, 778
- System.Windows.Forms.Integration.ElementHost class, 976–978
- System.Windows.Forms.Integration namespace, 970, 973
- System.Windows.Forms namespace, 973
- System.Windows.FrameworkElement, 14
- System.Windows.Freezable class, 146
- System.Windows.Input.Cursor object, 151
- System.Windows.Input.MediaCommands class, 819
- System.Windows.Interactivity.dll assembly, 299, 303
- System.Windows.Interop.HwndHost class, 982
- System.Windows.Markup namespace, 911
- System.Windows.Media.Animation namespace, 393–395, 417
- System.Windows.Media.Brush, 325
- System.Windows.Media.Color object, 510
- System.Windows.Media namespace, 816
- System.Windows.Media.Transform class, 337
- System.Windows.Media.Visual, 14
- System.Windows.Navigation.CustomContentState class, 759
- System.Windows.Shapes.Shape class, 14, 308
- System.Windows.SystemColors, 144
- System.Windows.Threading.Dispatcher class, 984
- System.Windows.UIElement, 14

■ T

- TabControl, 173
- TableCell element, 892–893
- TableColumn objects, 894
- Table element, 892–894
- TableLayoutPanel, 976
- TableRow element, 892
- TableRowGroup element, 892
- Table.Rows property, 894
- TabStripPlacement property, 174
- tagName tag, 782
- Tag property, 823
- TargetInvocationException, 588
- TargetInvocationException.Message property, 588
- TargetItems property, 761
- TargetName property, 406
- TargetNullValue property, 564
- TargetProperty, 406
- TargetType property, 287, 293
- TargetZone, 768
- Taskbar programming
 - jump lists, 729
 - in code, 732–733
 - custom jump list, 730–732
 - JumpListApplicationTask, 733
 - JumpTask, 733
 - launch applications, 733
 - properties, 731
 - recent document support, 729–730
 - overlay icons, 738
 - progress notification, 737
 - thumbnail buttons, 736–737
 - thumbnail preview, 734
- TemplatePart attributes, 526, 531
- Template selectors, 611, 632–636
- TestApplication.App., 197
- TextAlignment property, 887, 905
- TextAnchor object, 930
- TextBlock class, 549, 907
- TextBlock element, 293, 416, 753
- TextBlock.FontFamily property, 289
- TextBlock.FontSize property, 235
- TextBlock.Foreground property, 328
- TextBlock.Inlines collection, 907
- TextBoxBase, 179
- TextBox control, 122, 507, 753
- TextBox objects, 588
- TextBox.Tag property, 904
- TextChanged event, 122, 656
- TextCompositionEventArgs object, 123
- Text controls
 - multiple lines, 179–180
 - PasswordBox, 179, 183
 - RichTextBox control, 179
 - spell check, 181–183
 - TextBox control, 179
 - text selection, 180–181
- TextDecorations property, 148, 888
- TextInput event, 122, 123
- Text justification, 905–906
- TextMarkerStyle enumeration, 891
- TextOptions.TextFormattingMode, 151
- TextPointer objects, 914
- Text property, 753
- TextRange class, 913–914, 917
- TextRange.Load() method, 914, 916
- TextRange.Save() method, 915
- TextRange.Text property, 918
- TextSearch.TextPath property, 644
- TextSelection.GetPropertyValues() method, 917
- TextSelection object, 917
- TextTrimming property, 907

- Texture mapping
 - ImageBrush mapping
 - bitmap paint, 861
 - Positions collection, 863
 - TextureCoordinates collection, 862, 863
 - textured cube, 862
 - video and the VisualBrush, 864–865
- TextWrapping property, 158, 907
- ThicknessAnimation class, 393
- Thread affinity, 984
- Thread rental, 983
- 3-D drawing
 - advantages, 838
 - camera
 - axis lines, 849
 - complete 3-D scene, 849
 - FieldOfView property, 850
 - final scene, 849
 - LookDirection property, 868
 - MatrixCamera class, 846
 - NearPlaneDistance and FarPlaneDistance properties, 850
 - OrthographicCamera class, 846
 - PerspectiveCamera class, 846
 - positioning and angling, 848
 - Position property, 847
 - z-fighting, 850
 - complex shapes, 856
 - DiffuseMaterial, 859, 860
 - EmissiveMaterial, 859
 - four ingredients:, 837
 - interactivity and animations
 - fly over, 868
 - hit testing (*see* Hit testing)
 - rotations, 866–867
 - trackball, 870–871
 - transforms, 865–866
 - MaterialGroup, 859
 - Model3DGroup collections, 857, 858
 - shading and normals
 - blending illumination, 854
 - cube with lighting artifacts, 852
 - front face of cube, 853
 - normal calculation, 854, 855
 - Positions collection, 854
 - smoothing blending, 855
 - visible faces of cube, 853
 - SpecularMaterial, 859
 - texture mapping (*see* Texture mapping)
 - 3-D cube creation, 851
 - 3-D objects (*see* 3-D objects)
 - 3-D performance, 869–870
 - 2-D elements on 3-D surfaces, 875–878
 - Viewport3D class, 838
- 3-D objects
 - definition, 840
 - GeometryModel3D class
 - material classes, 843
 - properties, 843
 - light sources
 - adding to viewport, 845, 846
 - AmbientLight, 846
 - light classes, 844
 - lighting calculation, 844
 - white DirectionalLight, 844
 - MeshGeometry3D
 - coordinate system, 841
 - Normals, 841
 - positions, 841
 - TextureCoordinates, 841
 - triangle definition, 840
 - TriangleIndices, 841
 - vs.* 2-D drawing classes, 839
- Three-dimensional surface, 828
- TickBar element, 550
- TickPlacement, 189
- TileBrush, 336, 342
- Tiled ImageBrush class, 332–335
- TileMode enumeration, 334
- TimeLine class, 404
- Timeline class
 - AccelerationRatio property, 404–405
 - AnimationTimeline, 403
 - DecelerationRatio property, 404–405
 - MediaTimeline, 403
 - properties, 404
 - RepeatBehavior property, 405–406
 - TimelineGroup, 403
- Timeline.DesiredFrameRate attached property, 426
- TimelineGroup class, 403
- Timer-based animation, 391–392
- TimeSpan object, 401
- Timestamp property, 121
- ToArray() method, 575
- ToggleBold command, 916
- ToggleButton, 160, 531, 533, 537
- ToggleItalic command, 916
- ToggleUnderline command, 916
- ToList() method, 575
- Toolbars
 - Button, 793
 - CheckBox, 793, 794

- ComboBox, 793
- definition, 793
- different controls, 794
- HeaderedItemsControl, 794
- LayoutTransform, 794
- Orientation property, 794
- overflow menu, 794–795
- RadioButton, 793
- Separator, 793
- ToggleButton, 793
- ToolBarTray, 795–796
- ToolBarTray, 795–796
- ToolTipClosing, 166
- ToolTipDescription property, 805
- ToolTipFooterDescription property, 805
- ToolTipFooterImageSource property, 805
- ToolTipFooterTitle property, 805
- ToolTipImageSource property, 805
- ToolTipOpening, 166
- ToolTip property, 804–805, 887
- ToolTipService class, 166–167
- ToolTipTitle property, 805
- Top property, 82
- To property, 399–400
- ToString() method, 124, 154, 174
- TouchDown event, 133
- TouchEnter event, 134
- TouchLeave event, 134
- TouchMove event, 133
- TouchUp event, 133
- Transform3D class, 839
- TransformGroup class, 338
- Transform object, 309
- Transforms, 865–866
 - classes, 337
 - definition, 337
 - elements, 341
 - Freezable, 338
 - shapes, 338
- TranslateTransform class, 337
- Transparency
 - opacity masks, 344–346
 - semitransparent element, 342
 - semitransparent layers, 342–343
 - XAML contents, 343
- TravelProductStyle, 622
- TreeView, 571, 577, 665
 - controls, 686
 - data-binding
 - categories and products, 679
 - DataSet, 682–683
 - hierarchical data, 679
 - HierarchicalDataTemplate, 681
 - ItemTemplate, 682
 - templates, 681
 - flexibility, 678
 - HeaderedItemsControl class, 678
 - just-in-time node creation
 - directory-browsing application, 683
 - Expanded event, 685
 - FileSystemWatcher, 686
 - placeholder, 685
 - System.IO.DriveInfo class, 684
 - WPF's implementation, 678
- TreeView class, 614
- TriggerAction, 815
- Trigger class, 294
- Trigger.EnterActions property, 297, 409
- Trigger.ExitActions property, 297
- Triggers
 - Button.IsPressed property, 295
 - Conditions collection, 296
 - control template, 295
 - event trigger, 296–298
 - formatting, 296
 - FrameworkElement.Triggers collection, 294
 - keyboard focus button, 294
 - multiple triggers, 295
 - pre-trigger value, 295
 - Style.Triggers collection, 294
 - System.Windows.TriggerBase, 294
 - TriggerBase classes, 294
 - Trigger.Setters collection, 294
- Triggers property, 286
- TryFindResource() method, 275
- TryParse() method, 606
- Tunneling events
 - firing sequence, 116
 - naming, 116
- Tweak, 465
- Two-step layout process
 - ArrangeOverride() method, 543–544
 - MeasureOverride() method, 541–543
- TwoWay binding, 580
- txtMinPrice text box, 657
- TypeArguments attribute, 764
- TypeNameAnimation, 393
- TypeNameAnimationBase class, 394
- TypeNameAnimation classes, 394
- TypeNameAnimationUsingKeyFrames class, 394
- TypeNameAnimationUsingPath class, 394
- Typography property, 148, 888

U

- UIElement.CacheMode property, 337
- UIElement class, 341, 885
- UIElement3D class, 871
- UIElement.OnRender() method, 154
- Underline element, 517
- Undo command, 517
- Uniform property, 827
- UniformToFill property, 827
- UnitCost property, 612
- UnitsInStock property, 612
- UnloadedBehavior property, 819, 820
- Unlock() method, 390
- UnmanagedMemoryStream object, 215
- UpdateSourceTrigger.Explicit mode, 237
- UpdateSourceTrigger property, 235
- UpDirection property, 868
- UpperLatin value, 891
- UpperRoman value, 891
- use PushOpacity() method, 371
- User Account Control (UAC), 211–212
- UserControl class, 507
- UserControl.Name property, 515

V

- Validate() method, 593
- ValidateValueCallback, 99
- Validation, data binding
 - catching invalid values, 579–580
 - custom rules
 - Binding.ValidationRules collection, 586
 - Decimal.Parse() method, 586
 - ErrorContent property, 586
 - ExceptionValidationRule, 587
 - IsValid property, 586
 - minimum and maximum decimal values, 585–586
 - NumberStyles enumeration, 586
 - pattern-based text data, 587
 - PositivePriceRule, 586, 587
 - System.Text.RegularExpressions.Regex class, 587
 - UpdateSourceTrigger property, 586
 - Validate() method, 585
 - ValidationResult object, 586
 - data object
 - disadvantage, 581
 - ExceptionValidationRule, 580, 581

- INotifyDataError Interface (*see* INotifyDataError interface)
- Product.UnitPrice property, 580
- StoreDB and Product classes, 581
- UnitsInStock, 581
- different error indicator
 - AdornedElementPlaceholder, 590
 - adorned layer*, 589
 - error templates, 589–591
 - TextBox control, 591
 - validation error message, 592
 - Validation.Errors property, 591
 - Validation.HasError, 591
- error reaction, 587–588
- list of errors, 588–589
- multiple values
 - BindingGroup.CommitEdit() method, 594, 595
 - BindingGroup.GetValue() method, 593
 - BindingGroup.Items collection, 593
 - BindingGroup.Name property, 593
 - binding groups, 592
 - DataContext set, 592
 - DataGrid control, 595
 - event handling code, 594
 - GetValue() method, 594
 - Grid.DataContext property, 592
 - item-level validation, 592, 594
 - NoBlankProductRule, 592, 593
 - Validate() method, 593
 - Validation.ErrorTemplate, 594
- OneWayToSource binding, 580
- TwoWay binding, 580
- ValidationError.ErrorContent property, 588
- ValidationErrorEventArgs.Error property, 587
- ValidationError object, 587
- Validation.ErrorTemplate property, 581
- Validation.HasError property, 581
- ValueChanged event, 826
- ValueConversion attribute, 606
- Value converter class, 605
- Value converters, 603
 - background color change, 605
 - Binding.StringFormat property, 605
 - data formatting, 605
 - data templates, 632
 - Format and Parse binding events, 605
 - object creation
 - Binding.DoNothing value, 610
 - BitmapImage class, 609
 - BitmapImage object, 608, 610

- byte array, 608
- ConvertBack() method, 610
- Convert() method, 610
- displaying bound images, 609
- ImageDirectory, 608
- ImageDirectory property, 609
- ImagePathConverter, 608–609
- ImagePathConverter class, 609
- ImageSource object, 610
- Image.Source property, 609
- OpenFileDialog class, 610
- ProductImage field, 608
- StreamSource property, 608
- System.Windows.Forms.Binding class, 608
- System.Windows.Media.Imaging.
 - BitmapImage object, 608
- string formatting
 - Binding.StringFormat property, 605
 - creation, 606
 - DataBinding namespace, 607
 - Decimal.ToString() method, 606
 - Parse() method, 606
 - PriceConverter class, 607
 - Product.UnitCost property, 606
 - Resources collection, 607
 - StaticResource reference, 607
 - System.Globalization.NumberStyles value, 606
 - ToString() method, 606
 - TryParse() method, 606
 - XML namespace prefix, 607
- WPF object creation, 605
- ValueInStockConverter, 612
- vbproj .csproj file, 768
- VerifyAccess() method, 985
- VerticalAlignment property, 58, 156, 544
- VerticalAnchor property, 901
- VerticalContentAlignment property, 156
- VerticalOffset property, 901
- VerticalScrollBarVisibility property, 179, 778
- Video
 - effects
 - Clipping property, 828
 - content control, 827
 - copying content, 828
 - intermediary rendering surface, 830
 - LayoutTransform property, 828
 - Opacity property, 828
 - reflection effect, 828–829
 - RenderTransform property, 828
 - resolutions and frame rates, 830
 - VideoDrawing class, 830
 - playing, 827
 - VideoDrawing class, 830
 - Viewbox property, 332
 - Viewbox.Stretch property, 315
 - View object
 - CollectionView, 647
 - creation, 651–653
 - navigation
 - brute-force approach, 651
 - ComboBox, 651
 - CurrentChanged event, 650
 - CurrentItem, 648
 - CurrentPosition, 648
 - data binding and triggers, 650
 - DataContext, 649
 - ICollectionView interface, 649
 - ItemsControl.
 - IsSynchronizedWithCurrentItem, 651
 - ItemsSource property, 651
 - lookup list, 651
 - ModelName property, 651
 - previous and next buttons code, 650
 - record browser with drop-down list, 650
 - reference storage, 649
 - ObservableCollection class, 648
 - retrieval, 648
 - Viewport3D class, 838
 - Viewport property, 333, 872–873
 - ViewportUnits property, 333
 - Virtualization, 663
 - VirtualizingStackPanel, 577–579, 642
 - VirtualizingStackPanel.
 - IsVirtualizingWhenGrouping property, 663
 - VirtualizingStackPanel.ScrollUnit property, 579
 - Virtual trackball, 870–871
 - Visibility property, 91, 125
 - VisualBrush class, 325, 335–336, 345, 346, 828, 830, 864–865, 876
 - VisualChildrenCount property, 372
 - Visual3D class, 396, 839
 - Visual layer, 308
 - Visuals
 - complex compound shapes, 369
 - complex hit testing, 377–380
 - draw, 370–371
 - hit testing, 375–377
 - layer model, 370
 - wrapping, 372–375
 - VisualStateGroups element, 534
 - VisualStateGroup.Transitions collection, 535

VisualStateManager element, 534, 536
 VisualStateManager.VisualStateGroups element, 533
 Visual states model, 503–504
 Visual Studio data source, 575
 VisualTransition element, 536
 VisualTransition.GeneratedDuration property, 536
 VisualTreeHelper class, 377
 VisualTreeHelper.HitTest() method, 375, 377, 871
 VRoutedEventArgs class, 107

■ W

WAV audio

SoundPlayerAction class, 815
 SoundPlayer class, 813–815
 system sounds, 816

WebBrowser control, 747

DOM tree, 781–785
 HTML web page, 779
 page navigation, 780–781
 scripting with .NET code, 784–786
vs. Frame, 780
 web-style navigation, 779

WebBrowser.Document property, 782

WebBrowser element, 341

WebBrowser.LoadCompleted event, 782

WebBrowser.NavigateToString() method, 786

WebBrowser.ObjectForScripting property, 784

WebClick() method, 785, 786

Width property, 59, 62, 901

Window class, 707

Close() and Hide() method, 710
 properties, 707–708
 ShowDialog() method, 709
 Show() method, 709

WindowHeight property, 745

Window.Owner property, 205

Window.Resources collection, 821, 989

Windows, 707

built-in dialog boxes, 716–717
 custom control template, 725
 AdornerDecorator element, 725
 basic structure, 725
 Border object, Grids, 726
 code-behind approach, 728
 problems, 727
 window border and background, 727
 dialog model, 715–716
 interaction
 DoUpdate() method, 713

MainWindow and Windows properties, 713
 one-to-many, 714

ownership, 715

positioning, 710–711

saving and restoring location, 711–713

shaped window

background image, 718
 basic techniques, 717
 border, 719
 Grid, 720
 nontransparent content, 718
 transparent background, 721–722
 with transparent regions, 718
 Window.DragMove() method, 723
 Window.ResizeMode property, 723–725

taskbar programming (*see* Taskbar programming)

Windows Communication Foundation (WCF), 207

Windows Forms, 392, 793

adding Forms to WPF application, 968

adding WPF Windows to Windows Forms application, 968–969

enabling visual styles, 970–971

glue code, 968

interaction reasons, 967

interoperability access, 967–968

with mixed content

access keys, mnemonics, and focus, 978–980
 ActiveX content, 971
 airspace, 971–973
 component-specific wrapper, 971
 interoperability layer, 971
 property mapping, 980–982
 System.Windows.Forms.Integration.
 ElementHost class, 976–978
 WindowsFormsHost control, 976–978
 and WPF user controls, 975–976

modal, 969

modeless, 969–970

WindowsFormsApplicationBase, 207, 208

WindowsFormsHost class, 980, 981, 982

WindowsFormsHost control, 976–978

WindowsFormsHost element, 341, 975

WindowsFormsHost.

EnableWindowsFormsInterop() method, 970

Windows Forms layout controls, 976

Windows Forms toolkit, 968

Window.ShowDialog() method, 969

Windows Media Player, 816

Windows Presentation Foundation (WPF)

- animations, 5
- architecture
 - class hierarchy, 12–15
 - Direct3D, 12
 - layers, 11
 - milcore dll, 11
 - PresentationCore.dll, 11
 - User32, 12
 - WindowsBase.dll, 11
 - WindowsCodecs.dll, 12
- architecture PresentationFramework.dll, 11
- audio and video media, 5
- commands, 5
- declarative user interface, 5
- page-based applications, 6
- resolution independence
 - bitmap and vector graphics, 10
 - consumer monitors, 6
 - device-independent units, 6, 7
 - DPI setting, 6
 - higher pixel densities, 6
 - monitor resolution, 6
 - system DPI (*see* System DPI)
- rich drawing model, 5
- rich text model, 5
- styles and templates, 5
- web-like layout model, 5
- windows graphics
 - DirectX, 4
 - GDI/GDI+, 3
 - hardware acceleration and WPF, 4
 - User32, 3
- WPF 4.5, 15
 - toolkit, 16
 - visual studio 2012, 16, 17
- WindowTitle property, 745, 747
- Window.Unloaded event handler, 817
- WindowWidth property, 745
- Win32 interoperability, 982
- WPF
 - BeginInit() method, 119
 - controls (*see* Controls)
 - ConvertToString() method, 124
 - custom elements (*see* Custom elements)
 - dependency properties (*see* Dependency properties)
 - direct events, definition of, 127
 - drag-and-drop operations, 130
 - EndInit() method, 119
 - focus, 125
 - focusable property, 125
 - FrameworkElement class and the
 - ISupportInitialize interface, 119
 - handling a key press, 122
 - hiding or disabling a control, 125
 - HwndSource property, 120
 - InitializeComponent() method, 120
 - initialized event, 119
 - InnerException property, 120
 - InputDevice class, 121
 - input events, 118, 120
 - IsEnabled property, 125
 - IsInitialized property, 119
 - IsLoaded property, 119
 - IsRepeat property, 123
 - IsTabStop property, 125
 - Keyboard class, 126
 - KeyboardDevice class, 126
 - KeyboardDevice methods, table of, 126
 - KeyboardDevice property, 126
 - keyboard events, 118, 121
 - KeyDown event, 123
 - KeyEventArgs object, 123, 126
 - Key property, 123
 - KeyStates property, 126
 - lifetime events, 118
 - loaded event, 119
 - LostFocus event, 120
 - modifier keys, checking the status of, 126
 - mouse click events, 128
 - mouse coordinates, 127
 - MouseEventArgs object, 127
 - mouse events, 118
 - MouseMove event, 127
 - multithreading (*see* Multithreading)
 - PasswordBox class, 506
 - PreviewKeyDown event, 124
 - PreviewMouseMove event, 127
 - PreviewTextInput event, 123, 124
 - rendering process for events, 119
 - stylus events, 118
 - TabIndex property, setting, 125
 - TextBox class, 505
 - TextBox control and the TextInput event, 122
 - TextCompositionEventArgs object, 123
 - TextInput event, 123
 - ToString() method, 124
 - using the KeyConverter, 124
 - virtual key state, 126
 - visibility property, 125
 - writing validation logic in a PreviewKeyDown
 - event handler, 124

WPF (*cont.*)

XamlParseException object, 120

WPF 4.5, 787

WPF application

accessing current application, 204

assembly resources (*see* Assembly resources)

handling command-line arguments, 202–204

life cycle

App.g.cs file, 197

App.xaml.cs file, 198

object creation, 195–196

shutdown, 198–199

StartupUri property, 197

TestApplication.App., 197

Visual Studio derives, 197

XAML document, 198

XBAPs, 195

localization (*see* Localization)

single-instance (*see* Single-instance application)

Splash Screen, 202

System.Windows.Application class, 195

windows interaction, 205–207

WPF's 2-D drawing model, 368

WPF visuals. *See* Visuals

WrapBreakPanel, 545, 547

WrapDirection property, 901

WrapPanel, 641, 659

ArrangeOverride() method, 547

code example for a series of buttons, 66

controlling small-scale details controlling, 66

default settings, 65

FrameworkPropertyMetadata object, 545

LineBreakBefore property, 545–547

WrapBreakPanel, 545, 547

Wrapping visuals, 372–375

WrapWithOverflow, 179

WriteableBitmap class

Bgra32 format, 385

Bgr32 format, 385

black-and-white and grayscale formats, 386

colorData array, 386

DPI resolution, 385

graphical content, 385

Image element, 385

indexed formats, 386

modifiable array pixels, 385

Pbgra32, 386

PixelFormats, 385

pixel writing, 387–390

WritePixels() method, 386

WYSIWYG interface, 889

■ X, Y

XAML browser applications (XBAPs), 195, 751

ClickOnce deployment, 767

creation, 768–769

deployment, 769–770

embedding, web page, 779

Firefox, 767

full-trust, 772

Internet Explorer, 767

limited permissions, 767

not installed on computer, 767

prompt-free experience, 767

run inside browser window, 767

security

CodeAccessPermission.Demand() method, 773

code access security, 771

dialog boxes with pop-up control, 776–779

FileIOPermission, 774

isolated storage, 774–776

.NET Framework, 771

SecurityException, 772

unhandled exception, 772

WPF Features and Internet Zone, 771

and stand-alone applications combination, 773

update, 770–771

XAML document, 989

XAML format, 915

XamlParseException object, 120, 278

XamlReader class, 911

XamlReader.Load() method, 913, 916

XamlWriter class, 912

.xbap extension, 768

XmlDataProvider, 595, 598–600

XML Paper Specification (XPS), 216

XmlStreamStore class, 922

XPath expressions, 599

XPS document, 920, 921

XpsDocument class, 920

■ Z

ZAM 3D modeling, 866

Z-fighting, 850

z-index, 973

ZIndex property, 84

Zoom property, 907