ComponentOne

RichTextBox for WPF and Silverlight

GrapeCity US

GrapeCity
201 South Highland Avenue, Suite 301
Pittsburgh, PA 15206
Tel: 1.800.858.2739 | 412.681.4343
Fax: 412.681.4384
Website: https://www.grapecity.com/en/
E-mail: us.sales@grapecity.com

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Copying and Distribution

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RichTextBox for WPF and Silverlight Overview

RichTextBox for WPF and Silverlight is the most complete rich text editor available for WPF or Silverlight. Load, edit, and save formatted text as HTML or RTF documents. The C1RichTextBox control provides rich formatting, automatic line wrapping, HTML and RTF import/export, table support, images, annotations, and more.

Help with ComponentOne Studio for WPF

Getting Started

- For information on installing ComponentOne Studio WPF Edition, licensing, technical support, namespaces and creating a project with the control, please visit Getting Started with WPF Edition.
- For information on installing ComponentOne Studio Silverlight Edition, licensing, technical support, namespaces and creating a project with the control, please visit Getting Started with Silverlight Edition.

The C1.Silverlight.RichTextBox.dll Assembly

C1.Silverlight.RichTextBox.dll contains the C1RichTextBox control, a full-fledged editor with a document-based architecture similar to the one used in **WPF**.

Main Classes

The following main classes are included in the **C1.Silverlight.RichTextBox.dll** assembly:

- **C1RichTextBox:** Control used to view and edit **C1Document** documents. The control can import and export HTML, and supports rich formatting including fonts, foreground and background colors, borders, paragraph alignment, images, hyperlinks, lists, arbitrary **UIElement** objects, and more.
- **C1Document:** Class that represents documents as a hierarchical list of elements that represent document components such as paragraphs, lists, images, and so on. The object model exposed by the **C1Document** object is similar to the one used in the **WPF FlowDocument** class and in the HTML DOM.

The C1.Silverlight.RichTextBox.Toolbar.dll Assembly

C1.Silverlight.RichTextBox.Toolbar.dll contains the C1RichTextBoxToolbar control, a toolbar that attaches to a C1RichTextBox control and provides common formatting commands. The toolbar is packaged in a separate DLL because many applications may choose to implement their own custom toolbars (or no toolbars at all) for the **C1RichTextBox**. These applications don't have to deploy the standard toolbar.

Main Classes

The following main classes are included in the **C1.Silverlight.RichTextBox.Toolbar.dll** assembly:

- **C1RichTextBoxToolbar:** Toolbar control that attaches to a **C1RichTextBox** control and provides common formatting commands such as bold, italics, underline, font size, alignment, and so on.

The C1.Silverlight.RichTextBox.RtfFilter.dll Assembly

C1.Silverlight.RichTextBox.RtfFilter.dll contains the filter required to import/export Rich Text Format documents

from/to the C1RichTextBox (C1Document).

Main Classes

The following main classes are included in the **C1.Silverlight.RichTextBox.RtfFilter.dll** assembly:

- **RrfFilter:** This class provides the methods: **ConvertToDocument** and **ConvertFromDocument** that can be used with any **C1Document**.

RichTextBox for WPF and Silverlight Key Features

RichTextBox for WPF and Silverlight allows you to create customized, rich applications. Make the most of **RichTextBox for WPF and Silverlight** by taking advantage of the following key features:

- **Import and Export Formats**
  RichTextBox for WPF and Silverlight supports importing and exporting RTF, HTML, and plain text. Load existing rich text or HTML into the **C1RichTextBox** control, edit the document, and then export it back to RTF or HTML.
- **Apply Rich Formatting**
  Edit and format text containing multiple fonts, decorations, colors, tables, images, lists, and more.
- **Language Support**
  C1RichTextBox now supports input in Chinese, Japanese, and Korean languages.
- **C1RichTextBoxToolbar**
  Get started immediately with the full-featured C1RichTextBoxToolbar control, or build your own custom toolbar. The included actions are: Font Family, Font Size, Grow Font, Shrink Font, Bold, Italic, Underline, Change Case, Subscript, Superscript, Text Color, Text Highlight Color, Align Left, Align Center, Align Right, Justify, Bullets, Numbering, Text Wrapping, Border Thickness, Border Color, Paragraph Color, Margin, Padding, Insert Image, Insert Symbol, Insert Hyperlink, Remove Hyperlink, Cut, Copy, Paste, Undo, Redo, Find and Replace, and Spell Check. The **RichTextBoxToolbar** uses the **C1Toolbar** control enabling complete customization. See the Working with **C1RichTextBoxToolbar** topics for more information.
- **Page Zooming**
  RichTextBox supports page zooming in both print layout and draft views.
- **Spell-check Your Text**
  RichTextBox supports two types of spell-checking using the **C1SpellChecker** component:
  - **Modal spell checking**: Shows a Spell dialog box and selects each spelling mistake in the document. The end-user may choose to ignore the mistake, fix it by typing or picking from a list of suggestions, or add the word to a user dictionary. See the Modal Spell-Checking topic for more information.
  - **As-you-type checking**: Highlights spelling mistakes as the end-user types, typically with a wavy, red underline. The end-user may right-click the mistake in the document to see a menu with options that include options to ignore, add to dictionary, or pick a suggestion to correct the mistake automatically. See the Spell-Checking topic for more information.

- **Undo/Redo Support**
  Edit data in the RichTextBox with confidence. You have the ability to easily undo and redo your changes with the click of a button.
- **Clipboard Support**
  C1RichTextBox fully supports the clipboard. Implement cut/copy/paste activities within the RichTextBox.
- **Annotations**
  Add highlights and annotations to your documents with **C1RichTextBox**. Annotations are comments, notes, remarks or explanations that can be attached to specific part of a Web document.
- **Save as PDF**
  In addition to direct printing, The **C1RichTextBox** content can be exported to PDF format.
- **Rich Document Object Model**
  Patterned after the **Document** class in WPF, RichTextBox's rich document object model (DOM) supports images, lists, hyperlinks, borders, background and foreground colors for text ranges, and more. Use the rich DOM to create and modify documents programmatically. See the Working with the C1Document Object topic for more information.
- **Lightning-speed Performance**
  RichTextBox allows instantaneous editing and really fast document loading.

RichTextBox for WPF and Silverlight Quick Start

In this quick start, you begin by creating a WPF or Silverlight application in Visual Studio, add the RichTextBox and RichTextBoxToolbar controls to the application, add code to customize the application, and run the application to view possible run-time interactions.

Step1: Creating a WPF Application

In this step, you create a new WPF application and add the **RichTextBox** and **RichTextBoxToolbar** controls in XAML. After completing this step, you have a mostly functional text-rich editor.

In Design View

To add the RichTextBox control to your WPF application in Design view, perform the following steps

1. Create a new WPF application in Visual Studio.
2. Navigate to the Toolbox and locate the **C1RichTextBox** and **C1RichTextBoxToolbar** controls.
3. Double-click the C1RichTextBox and C1RichTextBoxToolbar icons to add the controls to the MainWindow.
4. In the XAML view, add the relevant namespaces to the page by editing the MainWindow tags.

XAML copyCode

```
xmlns="http://schemas.microsoft.com/winfx/2006/xaml/presentation"
xmlns:x="http://schemas.microsoft.com/winfx/2006/xaml"
xmlns:c1="http://schemas.componentone.com/winfx/2006/xaml"
x:Class="RTBQuickStart.MainWindow"
Title="MainWindow" Height="350" Width="525">
```

5. Place the cursor between the <Grid> and </Grid> tags, click once, and add the following markup within the <Grid> tags to add a **StackPanel** panel.

XAML copyCode

```
<StackPanel HorizontalAlignment="Left" Margin="0,10,0,0" x:Name="SP"
VerticalAlignment="Top" Height="418" Width="645" Grid.ColumnSpan="2"
Grid.Column="1"/>
```

6. Click between the StackPanel tags and add the following markup to edit the appearance and positioning of RichTextBox and RichTextBoxToolbar controls in the XAML view.

XAML

```
<c1:C1RichTextBox Name="c1RichTextBox1" Margin="0,127,0,10"/>
<c1:C1RichTextBoxToolbar RichTextBox="{Binding ElementName= c1RichTextBox1}"
Name="C1RTBTB" Margin="3,0,-3,197" />
```

On running the application, you see an almost fully functional RichTextBox application. You can enter text in the RichTextBox control and edit the text using the options in the RichTextBoxToolbar. In the next step, you set up spell-checking and customize the application further.

Step 2: Adding Spell-Check Functionality

In the previous step, you created a new application and added the **RichTextBox** and **RichTextBoxToolbar** controls to the application. If you currently click the **Spell Check** button in the toolbar at runtime, you receive a message that spell checking is currently not set up. In this step, you customize the application further and add spell-checking functionality to the application.

To add spell checking to the application, complete the following steps:

1. In the Solution Explorer, right-click the project and select **Add | Existing Item**.
2. In the **Add Existing Item** dialog, locate the **C1Spell_en-US.dct** file that can be found in the installed folder at the following location: **C:\...\Documents\ComponentOne Samples\WPF\C1.WPF.RichTextBox\C5\RichTextBoxSamples\Resources**
   This is a US English dictionary file – if you add another file, instead, you can adapt the steps below with the appropriate code.
3. In the Solution Explorer, right-click the **MainPage.xaml** file and select **View Code** to open the code file.
4. In the code editor, add the required import statements.
   - **Visual Basic**

```
Imports C1.WPF.RichTextBox
Imports C1.WPF.SpellChecker
```

   - **C#**

```
using C1.WPF.RichTextBox;
```

```
using C1.WPF.SpellChecker;
```

5. Add code to the **MainPage** constructor to add spell-check functionality in the RichTextBox control.
   - **Visual Basic**

```
InitializeComponent()
Dim spell = New C1SpellChecker()
spell.MainDictionary.LoadAsync("C1Spell_en-US.dct")
Me.c1RichTextBox1.SpellChecker = spell
```

   - **C#**

```
InitializeComponent();
var spell = new C1SpellChecker();
spell.MainDictionary.LoadAsync("C1Spell_en-US.dct");
this.c1RichTextBox1.SpellChecker = spell;
```

6. Set the Text property for RichTextBox control to add content for spell checking.
   - **Visual Basic**

```
Me.c1RichTextBox1.Text = "Hello World! Weelcome to the most complete rich text editor availible for WPF. Load, edit, and save formattted text as HTML or RTF documents with ComponentOne RichTextBox for WPF. The C1RichTextBox control provide rich formatting, automatic line wrapping, HTML and RTF import/export, table support, images, anotations, and more."
```

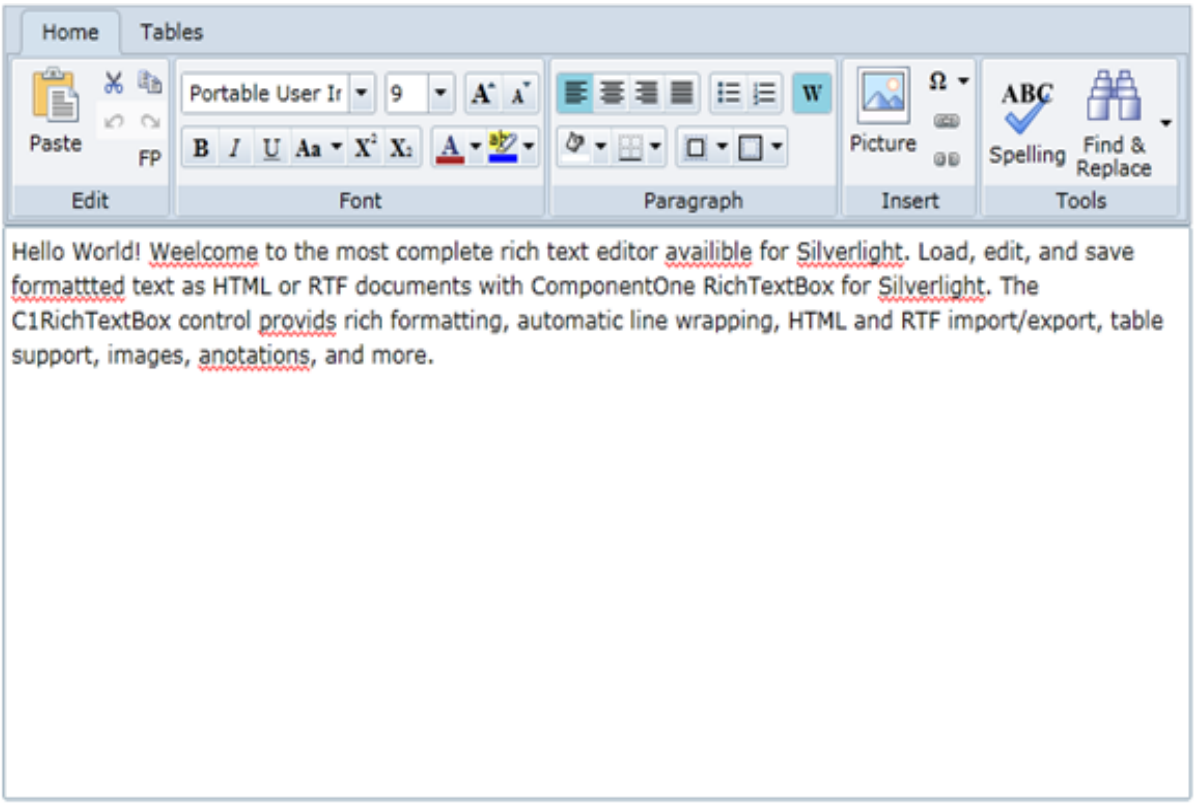
   - **C#**

```
this.c1RichTextBox1.Text = "Hello World! Weelcome to the most complete rich text editor availible for WPF. Load, edit, and save formattted text as HTML or RTF documents with ComponentOne RichTextBox for WPF. The C1RichTextBox control provide rich formatting, automatic line wrapping, HTML and RTF import/export, table support, images, anotations, and more.";
```

Step 3: Using the Control at Runtime

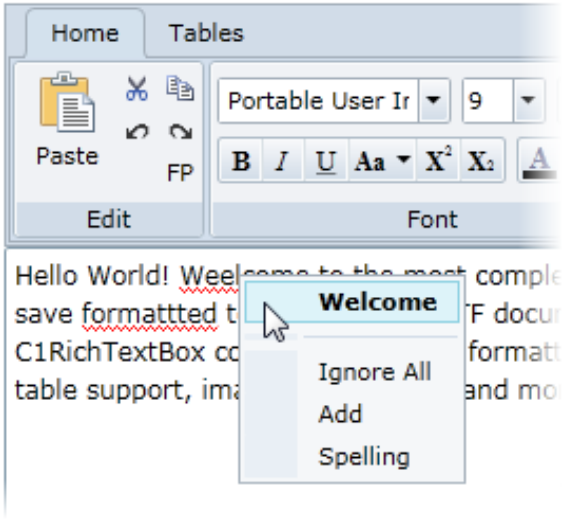
In the previous steps, you created a WPF application, added the RichTextBox and RichTextBoxToolbar controls, and added spell-check functionality to the application. Run the application and try out some possible runtime interactions.

1. Press **F5** to run the application.

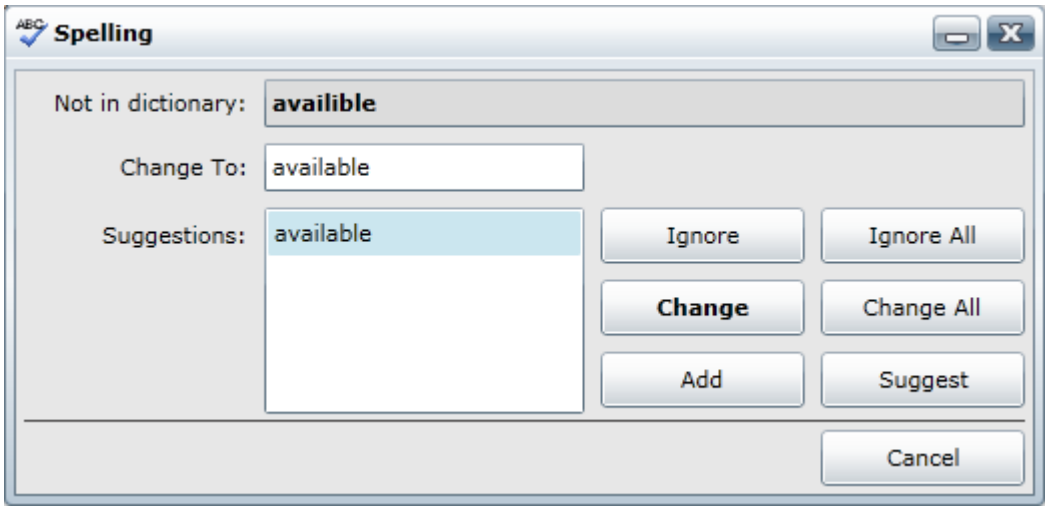


   Note that as you type, spell-checking is visibly implemented as indicated by wavy red lines under words not included in the dictionary.

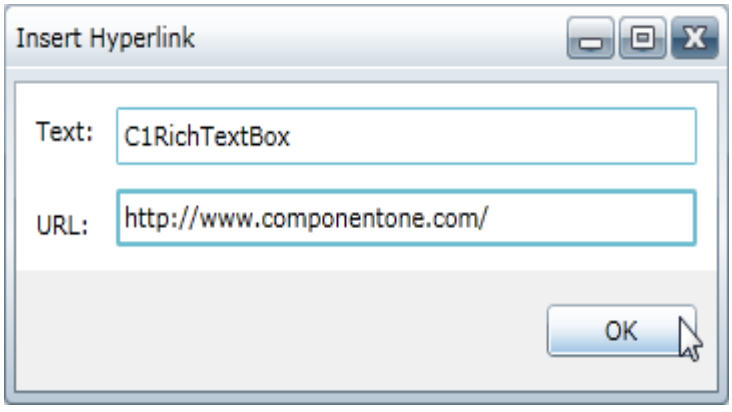
2. Right-click the first misspelled word, "Welcome", and from the options that appear, choose the correct spelling:



3. Click the **Spell Check** button in the **Tools** group. The **Spelling** dialog box appears

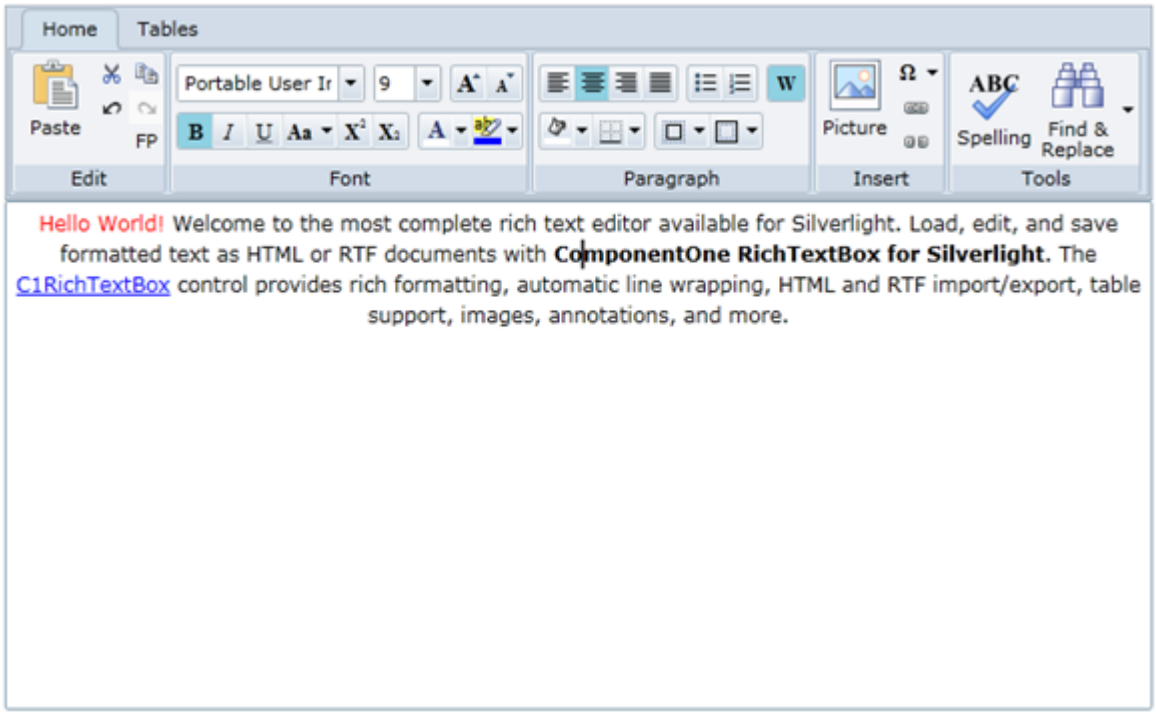


4. Click **Change** to accept the suggested spelling. The dialog box moves onto the next word.
5. Click **Add** in the **Spelling** dialog box to add "WPF" to the dictionary.
6. Click **Change** for each of the following words to accept the suggested spellings.
7. Use the mouse to highlight "ComponentOne RichTextBox for Silverlight" and click the **Bold** button in the **Font** group to bold the text.
8. Highlight "C1RichTextBox" and click the **Hyperlink** button in the **Insert** group to open the **Insert Hyperlink** dialog box.
9. In the **URL** box of the **Insert Hyperlink** dialog box, enter http://ww.componentone.com/ and click **OK** to close the dialog box. The link will be added.



The text gets linked to the ComponentOne website.

10. Highlight the "Hello World!" text and click the **Font Color** drop-down box in the **Font** group and choose **Red** to turn the text red.
11. Highlight the entire paragraph and click the **Align Text Center** button in the **Paragraph** group to align the text. The application will now appear similar to the following:



What You've Accomplished

Congratulations, you successfully completed this Quick Start tutorial! You learned about using the **RichTextBox** and **RichTextBoxToolbar** controls, and also viewed some possible run-time interactions.

XAML Quick Reference

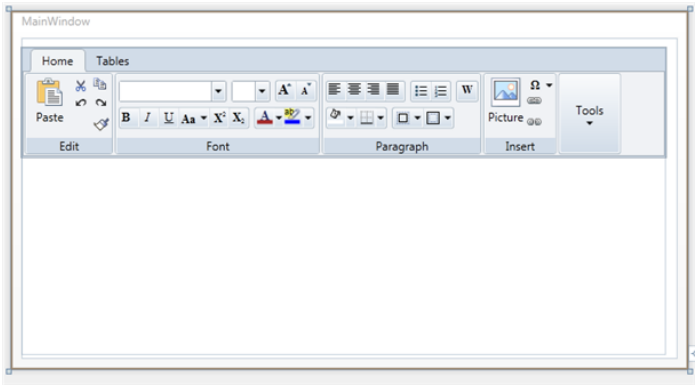
This topic is dedicated to providing a quick overview of the XAML used to create a C1RichTextBox and C1RichTextBoxToolbar control.

To get started developing, add a **c1** namespace declaration in the root element tag:

XAML

```
xmlns:c1="http://schemas.componentone.com/winfx/2006/xaml"
```

Here is a sample C1RichTextBox and C1RichTextBoxToolbar:



Below is the XAML code for the sample:

WPF

```
<Window x:Class="RichTextBoxWPFXAML.MainWindow"
xmlns="http://schemas.microsoft.com/winfx/2006/xaml/presentation"
xmlns:x="http://schemas.microsoft.com/winfx/2006/xaml"
Title="MainWindow"Height="370"Width="697"xmlns:c1="http://schemas.componentone.com/winfx/2006/xaml">
<GridHeight="310">
<StackPanelHorizontalAlignment="Left"Name="SP"VerticalAlignment="Top"Height="327"Width="663">
            <c1:C1SimplifiedRichTextBoxToolbarx:Name="richToolbar"RichTextBox="{BindingElementName=C1RTB}" />
            <c1:C1RichTextBoxx:Name="C1RTB"Grid.Row="1"BorderThickness="0"Height="165" />
        </StackPanel>
    </Grid>
</Window>
```

Silverlight

```
<UserControl xmlns:c1="http://schemas.componentone.com/winfx/2006/xaml"
    x:Class="SilverlightApplication2.MainPage"
    xmlns="http://schemas.microsoft.com/winfx/2006/xaml/presentation"
    xmlns:x="http://schemas.microsoft.com/winfx/2006/xaml"
    xmlns:d="http://schemas.microsoft.com/expression/blend/2008"
    xmlns:mc="http://schemas.openxmlformats.org/markup-compatibility/2006"
    mc:Ignorable="d"
    d:DesignHeight="489" d:DesignWidth="668">
    <Grid x:Name="LayoutRoot" Background="White">
        <c1:C1RichTextBox Name="C1RTB" Margin="0,133,12,28" />
        <c1:C1RichTextBoxToolbar Name="richToolbar" RichTextBox="{Binding ElementName=C1RTB}" Margin="2,12,12,0" Height="123" VerticalAlignment="Top" />
    </Grid>
</UserControl>
```

Working with RichTextBox for WPF and Silverlight

The most complete rich text editor available for WPF, load, edit, and save formatted text as HTML or RTF documents with **RichTextBox for WPF and Silverlight**. The C1RichTextBox control provides rich formatting, automatic line wrapping, HTML and RTF import/export, table support, images, annotations, and more.

The **C1.WPF.RichTextBox** assembly contains two main objects: the **C1RichTextBox** control and the **C1Document** object.

C1RichTextBox is a powerful text editor that allows you to display and edit formatted text. **C1RichTextBox** supports all the usual formatting options, including fonts, background and foreground colors, lists, hyperlinks, images, borders, and so on. **C1RichTextBox** also supports loading and saving documents in HTML format.

C1Document is the class that represents the contents of a **C1RichTextBox**. It is analogous to the **FlowDocument** class in WPF. As in WPF, a **C1Document** is composed of stacked elements (**C1Block** objects) which in turn are composed of inline elements (**C1Run** objects).

Many applications may deal only with the **C1RichTextBox** control, which provides a simple linear view of the document. Other applications may choose to use the rich object model provided by the **C1Document** class to create and manage documents directly, with full access to the document structure.

You can also use related elements such as the C1RichTextBoxToolbar control and **C1SpellChecker** component to expand the functionality of the **C1RichTextBox** control. **C1RichTextBoxToolBar** is a Ribbon-like toolbar included in the **C1.WPF.RichTextBox.Toolbar** assembly. You can easily add a **C1RichTextBoxToolBar** control and link it to a **C1RichTextBox** control to create a full featured Rich Text editor. **C1SpellChecker** is located in the **C1.WPF.SpellChecker** assembly and can be used to add spell-checking functionality to the editor.

C1RichTextBox Concepts and Main Properties

On the surface, the C1RichTextBox control appears just like a standard **TextBox**. It provides the same properties to control the font, colors, text, and selection. That can be an advantage – if you have an application that uses **TextBox** controls, you may be able to simply replace them with **C1RichTextBox** controls without any additional changes.

For example, the following code implements a simple search-and-replace routine that works on **TextBox** and on **C1RichTextBox** controls:

Visual Basic

```
Private Sub SearchAndReplace(tb As TextBox, find As String, replace As String)
    Dim start As Integer = 0
    While True
        Dim pos As Integer = tb.Text.IndexOf(find, start)
        If pos < 0 Then
            Exit While
        End If
        tb.[Select](pos, find.Length)
        ' Optionally show a dialog box to confirm the change.
        tb.SelectedText = replace
        start = pos + 1
    End While
End Sub
```

C#

```
void SearchAndReplace(TextBox tb, string find, string replace)
{
  for (int start = 0; ; )
  {
    int pos = tb.Text.IndexOf(find, start);
    if (pos < 0) break;
    tb.Select(pos, find.Length);
    // Optionally show a dialog box to confirm the change.
    tb.SelectedText = replace;
    start = pos + 1;
  }
}
```

The code looks for matches in the C1RichTextBox.Text property. It selects each match using the C1RichTextBox.Select method, and then replaces the text using the **SelectedText** property. To convert this method for use with the C1RichTextBox control, you would simply change the type of the first argument to use a **C1RichTextBox** instead of a regular **TextBox**.

This is what the **C1RichTextBox** has in common with the regular **TextBox**. But of course it goes way beyond that. Suppose you wanted to highlight the replacements with a yellow background. This would be impossible with a regular **TextBox**. With the **C1RichTextBox**, you could accomplish that with one additional line of code:

Visual Basic

```
Private Sub SearchAndReplace(tb As TextBox, find As String, replace As String)
    Dim start As Integer = 0
    While True
        Dim pos As Integer = tb.Text.IndexOf(find, start)
        If pos < 0 Then
            Exit While
        End If
        tb.[Select](pos, find.Length)
        ' Optionally show a dialog box to confirm the change.
        tb.Selection.InlineBackground = New SolidColorBrush(Colors.Yellow)
        tb.SelectedText = replace
        start = pos + 1
    End While
End Sub
```

C#

```
void SearchAndReplace(TextBox tb, string find, string replace)
{
  for (int start = 0; ; )
  {
    int pos = tb.Text.IndexOf(find, start);
```

```
    if (pos < 0) break;
    tb.Select(pos, find.Length);
    // Optionally show a dialog box to confirm the change.
    tb.Selection.InlineBackground = new SolidColorBrush(Colors.Yellow);
    tb.SelectedText = replace;
    start = pos + 1;
  }
}
```

The C1RichTextBox.Selection property provides properties that allow you to inspect and modify the formatting of the current selection. With this property and the ones in common with the **TextBox** control, you can easily create documents and add rich formatting.

You could use the technique described above to implement a toolbar or to add syntax coloring to documents. These topics are described in more detail in later sections.

C1RichTextBox Content

The content of the C1RichTextBox can be specified in two ways, using the C1RichTextBox.Text property or the C1RichTextBox.Html property. The **Text** property is used to assign and retrieve the control content as plain text.

Visual Basic

```
Me.C1RichTextBox1.Text = "Hello World!"
```

C#

```
this.c1RichTextBox1.Text = "Hello World!";
```

The **Html** property is used to assign and retrieve formatted text as HTML. The HTML text needs to be encoded in the XAML file, so, for example, instead of <b> for bold, tags are encoded as <b>.

Visual Basic

```
Me.C1RichTextBox1.Html = "&lt;b&gt;Hello World!&lt;/b&gt;"
```

C#

```
this.c1RichTextBox1.Html = "&lt;b&gt;Hello World!&lt;/b&gt;"
```

The C1RichTextBox exposes a C1RichTextBox.TextWrapping property that specifies whether the control should wrap long lines or whether it should keep the lines together and provide a horizontal scrollbar instead.

Visual Basic

```
Me.C1RichTextBox1.TextWrapping = TextWrapping.NoWrap
```

C#

```
this.c1RichTextBox1.TextWrapping = TextWrapping.NoWrap;
```

The code above sets the **C1RichTextBox** control so that text content will not wrap in the control and will appear in a continuous line.

Saving and Loading HTML

You can persist the contents of a simple **TextBox** control using the **Text** property. You can also use the C1RichTextBox.Text property to persist content in the C1RichTextBox control, but you will lose any rich formatting. Instead, you can use the C1RichTextBox.Html property to persist the content of a **C1RichTextBox** while preserving the formatting.

The **Html** property gets or sets the formatted content of a **C1RichTextBox** as an HTML string. The HTML filter built into the **C1RichTextBox** is fairly rich. It supports CSS styles, images, hyperlinks, lists, and so on. But the filter does not support all HTML; it is limited to features supported by the **C1RichTextBox** control itself. For example, the current version of **C1RichTextBox** does not support tables. Still, you can use the **Html** property to display simple HTML documents**.**

If you type "Hello world." into a **C1RichTextBox**, the **Html** property will return the following markup:

HTML

```
<html>
<head>
  <style type="text/css">
    .c0 { font-family:Portable User Interface;font-size:9pt; }
    .c1 { margin-bottom:7.5pt; }
  </style>
</head>
<body class="c0">
<p class="c1">Hello world.</p>
</body>
</html>
```

Note that the **Html** property is just a filter between HTML and the internal **C1Document** class. Any information in the HTML stream that is not supported by the **C1RichTextBox** (for example, comments and meta information) is discarded, and will not be preserved when you save the HTML document later.

Custom Command Bars

You can create your own custom toolbar, context menu, or pop-up controls that apply formatting and functionality to the C1RichTextBox control. The following section describes the code necessary to perform the most basic formatting commands. It does not include code for setting up a toolbar or an AppBar.

The following code snippets assume the name of the **C1RichTextBox** control on your page is **rtb**.

Clipboard Functions

The following code snippets demonstrate the code used for clipboard functions:

Copy

C#

```
rtb.ClipboardCopy();
Paste
if(!rtb.IsReadOnly)
{
    rtb.ClipboardPaste();
}
```

Cut

Example Title

```
if(rtb.IsReadOnly)
    rtb.ClipboardCopy();
else
{
    rtb.ClipboardCut();
}
```

Alignment Functions

The following code snippets demonstrate the code used for aligning text:

Align Left

C#

```
rtb.Selection.TextAlignment = C1TextAlignment.Left;
```

Align Center

C#

```
rtb.Selection.TextAlignment = C1TextAlignment.Center;
```

Align Right

C#

```
rtb.Selection.TextAlignment = C1TextAlignment.Right;
```

Justify

C#

```
rtb.Selection.TextAlignment = C1TextAlignment.Justify;
```

Font Functions

The following code snippets demonstrate the code used for font functions:

Font Family

C#

```
rtb.Selection.FontFamily = newFontFamily("Arial");
Font Size
rtb.Selection.TrimRuns();
foreach(varrun inrtb.Selection.Runs)
{
    run.FontSize = size;
}
```

Formatting Functions

The following code snippets demonstrate the code used for formatting functions.

You can also use Ctrl+a shortcut to select the entire text, Ctrl+b shortcut to bold the text, Ctrl+i shortcut to italicize the text, and Ctrl+u shortcut to underline the text.

Foreground Color

C#

```
rtb.Selection.Foreground = newSolidColorBrush(Colors.Red);
Highlight (background) color
rtb.Selection.InlineBackground = newSolidColorBrush(Colors.Yellow);
Toggle Bold
if(rtb.Selection.FontWeight != null&& rtb.Selection.FontWeight.Value.Weight ==
FontWeights.Bold.Weight)
{
    rtb.Selection.FontWeight = FontWeights.Normal;
}
else
{
    rtb.Selection.FontWeight = FontWeights.Bold;
}
```

Toggle Italic

C#

```
if(rtb.Selection.FontStyle != null&& rtb.Selection.FontStyle == FontStyle.Italic)
{
    rtb.Selection.FontStyle = FontStyle.Normal;
}
else
{
    rtb.Selection.FontStyle = FontStyle.Italic;
```

```
}
```

Toggle Underline

C#

```
var range = rtb.Selection;
var collection = new C1TextDecorationCollection();
if (range.TextDecorations == null)
{
    collection.Add(C1TextDecorations.Underline[0]);
}
else if (!range.TextDecorations.Contains(C1TextDecorations.Underline[0]))
{
    foreach (var decoration in range.TextDecorations)
        collection.Add(decoration);

    collection.Add(C1TextDecorations.Underline[0]);
}
else
{
    foreach (var decoration in range.TextDecorations)
        collection.Add(decoration);

    collection.Remove(C1TextDecorations.Underline[0]);
    if (collection.Count == 0)
        collection = null;
}
range.TextDecorations = collection;
```

Clear Formatting

C#

```
rtb.Selection.InlineBackground = null;
rtb.Selection.Foreground = rtb.Foreground;
rtb.Selection.FontWeight = FontWeights.Normal;
rtb.Selection.FontStyle = FontStyle.Normal;
rtb.Selection.TextDecorations = null;
```

Select Text Function

The following code snippet demonstrates the code used to select text:

Select All

C#

```
rtb.SelectAll();
```

Document History Functions

The following snippets demonstrates the code used to create document history functions:

Undo

C#

```
if(rtb.DocumentHistory.CanUndo)
{
    rtb.DocumentHistory.Undo();
}
```

Redo

C#

```
if(rtb.DocumentHistory.CanRedo)
{
    rtb.DocumentHistory.Redo();
}
```

Hyperlinks

The C1RichTextBox supports hyperlinks. As in regular HTML documents, this feature allows you to make certain parts of the document active. When the user clicks them, the application receives a notification and takes some action.

The code below shows how you can create a hyperlink:

Visual Basic

```
Public Sub New()
    InitializeComponent()

    ' Set text
    _rtb.Text = "This is some text with a hyperlink in it."

    ' Create hyperlink
    Dim pos As Integer = _rtb.Text.IndexOf("hyperlink")
    _rtb.[Select](pos, 9)
    Dim uri = New Uri("http://www.grapecity.com", UriKind.Absolute)
    _rtb.Selection.MakeHyperlink(uri)

    ' Handle navigation requests
    _rtb.NavigationMode = NavigationMode.OnControlKey
    AddHandler _rtb.RequestNavigate, AddressOf _rtb_RequestNavigate;
End Sub
```

C#

```
public MainPage()
{
  InitializeComponent();
```

```
  // Set text
  _rtb.Text = "This is some text with a hyperlink in it.";

  // Create hyperlink
  int pos = _rtb.Text.IndexOf("hyperlink");
  _rtb.Select(pos, 9);
  var uri = new Uri("http://www.grapecity.com", UriKind.Absolute);
  _rtb.Selection.MakeHyperlink(uri);

  // Handle navigation requests
  _rtb.NavigationMode = NavigationMode.OnControlKey;
  _rtb.RequestNavigate += _rtb_RequestNavigate;
}
```

The code starts by assigning some text to the **C1RichTextBox**. Next, it selects the word "hyperlink" and calls the EditExtensions.MakeHyperlink method to make it a hyperlink. The parameter is a URI that is assigned to the new hyperlink's C1Hyperlink.NavigateUri property.

Then, the code sets the NavigationMode property to determine how the **C1RichTextBox** should handle the mouse over hyperlinks. The default behavior is like that of Microsoft Word and Visual Studio: moving the mouse over a hyperlink while holding down the CTRL key causes the cursor to turn into a hand, and clicking while the CTRL key is pressed fires the RequestNavigate event. This allows users to edit the hyperlink text as they would edit regular text.

The **RequestNavigate** event handler is responsible for handling the hyperlink navigation. In many cases this requires opening a new browser window and navigating to a different URL. This is illustrated below:

Visual Basic

```
Private Sub _rtb_RequestNavigate(sender As Object, e As RequestNavigateEventArgs)
    ' Open link in a new window ("_self" would use the current one)
    Dim target As String = "_blank"
    System.Windows.Browser.HtmlPage.Window.Navigate(e.Hyperlink.NavigateUri, target)
End Sub
```

C#

```
void _rtb_RequestNavigate(object sender, RequestNavigateEventArgs e)
{
  // Open link in a new window ("_self" would use the current one)
  string target = "_blank";
    System.Windows.Browser.HtmlPage.Window.Navigate(e.Hyperlink.NavigateUri, target);
}
```

Note that hyperlink actions are not restricted to URI navigation. You could define a set of custom URI actions to be used as commands within your application. The custom URIs would be parsed and handled by the **RequestNavigate** handler. For example, the code below uses hyperlinks to show message boxes:

Visual Basic

```
Public Sub New()
    InitializeComponent()

    ' Set text
    _rtb.Text = "This is some text with a hyperlink in it."
```

```
    ' Create hyperlink
    Dim pos As Integer = _rtb.Text.IndexOf("hyperlink")
    _rtb.[Select](pos, 9)
    Dim uri = New Uri("msgbox:Thanks for clicking!")
    _rtb.Selection.MakeHyperlink(uri)

    ' Handle navigation requests
    _rtb.NavigationMode = NavigationMode.OnControlKey
    AddHandler _rtb.RequestNavigate, AddressOf _rtb_RequestNavigate
End Sub
Private Sub _rtb_RequestNavigate(sender As Object, e As RequestNavigateEventArgs)
    Dim uri As Uri = e.Hyperlink.NavigateUri
    If uri.Scheme = "msgbox" Then
        MessageBox.Show(uri.LocalPath)
    End If
End Sub
```

C#

```
public MainPage()
{
  InitializeComponent();

  // Set text
  _rtb.Text = "This is some text with a hyperlink in it.";

  // Create hyperlink
  int pos = _rtb.Text.IndexOf("hyperlink");
  _rtb.Select(pos, 9);
  var uri = new Uri("msgbox:Thanks for clicking!");
  _rtb.Selection.MakeHyperlink(uri);

  // Handle navigation requests
  _rtb.NavigationMode = NavigationMode.OnControlKey;
  _rtb.RequestNavigate += _rtb_RequestNavigate;
}
void _rtb_RequestNavigate(object sender, RequestNavigateEventArgs e)
{
  Uri uri = e.Hyperlink.NavigateUri;
  if (uri.Scheme == "msgbox")
  {
    MessageBox.Show(uri.LocalPath);
  }
}
```

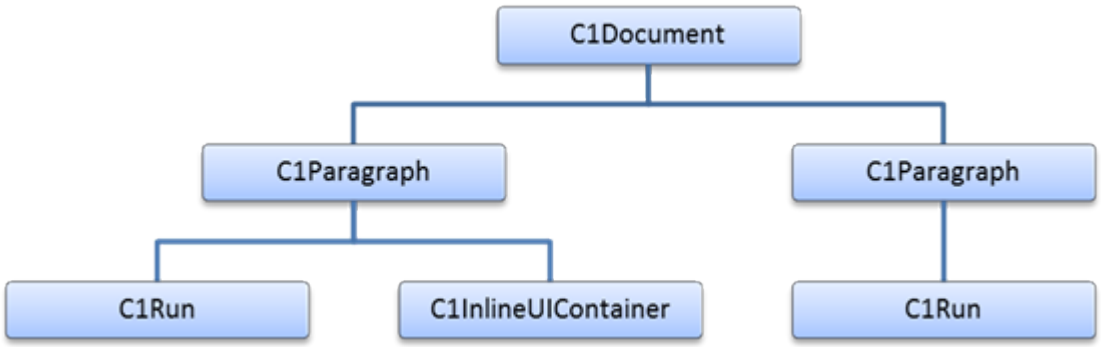
The only change in the **EditExtensions.MakeHyperlink** code is the line that creates the URI. The **C1RichTextBox.RequestNavigate** handler uses the URI members to parse the command and argument. You could use this technique to create documents with embedded menus for example.

Note that the **CreateHyperlink** method is just a quick and easy way to turn an existing part of a document into a hyperlink. You can also create hyperlinks by adding C1Hyperlink elements to **C1Document** objects. This is described in later sections.

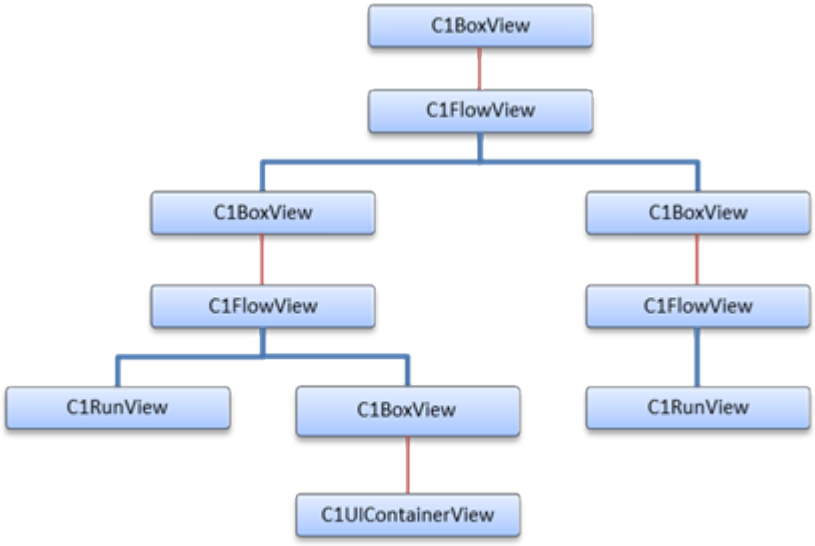
Accessing Layout Information

When C1RichTextBox creates the **C1Document** layout, it creates a parallel tree composed of C1TextElementView objects. For each C1TextElement in the **C1Document** tree, there is at least one **C1TextElementView** that is tasked with its layout and drawing.

Take this **C1Document** tree as an example:



Its corresponding view tree will look like the following:



Each **C1TextElementView** provides some basic layout information for its corresponding **C1TextElement**:

- C1TextElementView.Origin: this is the origin of the view in document coordinates.
- C1TextElementView.DesiredSize: this is the desired size of the view from the last time it was measured.

Multiple C1TextElementViews can be composed to handle layout and drawing for out **C1TextElement**. When this is done, the C1TextElementView.Content property contains the inner most **C1TextElementView** in the composition. The content view's children correspond to the C1TextElementView.Children collection of the associated C1TextElement.

View composition is used in C1BoxView to handle margin, padding and border for its **C1TextElementView.Content** view. This means that the origin of each **C1BoxView** is outside the margin, padding and border box, while the origin of its **C1TextElementView.Content** is inside.

C1FlowView takes care of flowing boxes and text into lines. Each line is represented by a C1Line object. Note that C1Lines not only contains single lines of text, but may also contain an entire paragraph. Each **C1FlowView** contains a list of **C1Line**, which are always vertically stacked. In turn, each **C1Line** is composed of C1LineFragments, which are horizontally stacked. **C1LineFragments** have a reference to the child element whose origin matches the position of the fragment.

For example, the following code counts the lines in a **C1RichTextBox**:

Visual Basic

```
Private Function CountLines(rtb As C1RichTextBox) As Integer
    Dim root = rtb.ViewManager.GetView(rtb.Document)
    Return CountLines(root)
End Function

Private Function CountLines(view As C1TextElementView) As Integer
    Dim count As Integer = 0
    Dim flow = TryCast(view, C1FlowView)
    If flow IsNot Nothing Then
        For Each line As var In flow.Lines
            If TypeOf line.Fragments.First().Element Is C1Inline Then
                count += 1
            End If
        Next
    End If
    For Each child As var In view.Children
        count += CountLines(child)
    Next
    Return count
End Function
```

C#

```
int CountLines(C1RichTextBox rtb)
{
    var root = rtb.ViewManager.GetView(rtb.Document);
    return CountLines(root);
}

int CountLines(C1TextElementView view)
{
    int count = 0;
    var flow = view as C1FlowView;
    if (flow != null)
    {
        foreach (var line in flow.Lines)
        {
            if (line.Fragments.First().Element is C1Inline)
            {
                ++count;
            }
        }
    }
```

```
    foreach (var child in view.Children)
    {
        count += CountLines(child);
    }
    return count;
}
```

At first, the root view is obtained. That's the same as the view associated to root element, so C1RichTextViewManager.GetView is used to get the view of **rtb.Document**. After that, the view tree is traversed counting the lines in each **C1FlowView** found. Note that you only count the lines with **C1Inline** elements; otherwise you would also count paragraphs and other container blocks.

Painters

Painters are a way of extending C1RichTextBox by displaying **UIElements** in the same canvas where **C1RichTextBox** displays text. This allows more general extensions than style overrides, but might be harder to use. Painters are used internally by **C1RichTextBox** to display the selection.

A painter is an implementation of the IRichTextPainter interface. This interface has two methods, IRichTextPainter.Paint and IRichTextPainter.PaintInline, which are called at different stages of **C1RichTextBox**'s painting pass. Each method receives a **C1PaintingContext** object that is used to check the viewport being painted, and has the methods that are used for painting custom **UIElements**.

IRichTextPainter.Paint is called each time the entire screen is repainted. Note that each time this method is called, all **UIElements** must be painted by calling **C1PaintingContext.Paint**, otherwise they will be removed. Passing the same **UIElement** each time is more efficient, as it is not removed from the visual tree.

IRichTextPainter.PaintInline is called for each C1Line that is painted. This method allows finer control over the layer where custom **UIElements** are painted. For instance, it is possible to paint above the text background, but below the text itself. It has the same rule as **IRichTextPainter.Paint**. All **UIElements** must be painted by calling **C1PaintingContext.PaintInline**, otherwise they will be removed.

The **Annotations** sample uses painters to display sticky notes. Here is the implementation:

Visual Basic

```
Class StickyPainter
    Implements IRichTextPainter
    Private _stickies As List(Of StickyNote)

    Public Sub New(stickies As List(Of StickyNote))
        _stickies = stickies
    End Sub

    Public Sub Paint(context As C1PaintingContext)
        For Each sticky As var In _stickies
            Dim rect = context.ViewManager.GetRectFromPosition(sticky.Range.Start)
            context.Paint(Math.Round(rect.X), Math.Round(rect.Bottom), False, sticky)
        Next
    End Sub

    Public Sub PaintInline(context As C1PaintingContext, line As C1Line)
    End Sub
```

```
    Public Event PainterChanged As EventHandler(Of RichTextPainterChangeEventArgs)
End Class
```

C#

```
class StickyPainter : IRichTextPainter
{
    List<StickyNote> _stickies;

    public StickyPainter(List<StickyNote> stickies)
    {
        _stickies = stickies;
    }

    public void Paint(C1PaintingContext context)
    {
        foreach (var sticky in _stickies)
        {
            var rect = context.ViewManager.GetRectFromPosition(sticky.Range.Start);
            context.Paint(Math.Round(rect.X), Math.Round(rect.Bottom), false,
sticky);
        }
    }

    public void PaintInline(C1PaintingContext context, C1Line line)
    {
    }

    public event EventHandler<RichTextPainterChangeEventArgs> PainterChanged;
}
```

StickyPainter only uses the **C1PaintingContext.Paint** method. For each sticky note it just gets the coordinates inside document and then calls **C1PaintingContext.Paint**. Note that these are document coordinates; they are independent of paging, scrolling and zooming.

Spell-Checking

Most rich editors implement two types of spell-checking:

- **Modal spell checking**: Shows the **Spelling** dialog box and selects each spelling mistake in the document. The user may choose to ignore the mistake, fix it by typing or picking from a list of suggestions, or add the word to a user dictionary.
- **As-you-type checking**: Highlights spelling mistakes as the user types, typically with a wavy red underline. The user may right-click the mistake in the document to see a menu with options that include ignore, add to dictionary, or pick a suggestion to correct the mistake automatically.

The C1RichTextBox supports both types of spell-checking using the **C1SpellChecker** component, which is also included in **WPF Edition**. The **C1SpellChecker** ships as a separate assembly because it can spell-check other controls as well.

Modal Spell-Checking

To implement modal spell checking, you start by adding to your project a reference to the **C1.WPF.SpellChecker** assembly. Then, add the following code to your project:

Visual Basic

```
Imports C1.WPF.SpellChecker

Public Partial Class MainPage
    Inherits UserControl
    ' Spell-checker used by all controls on this page
    Private _spell As New C1SpellChecker()

    ' Page constructor
    Public Sub New()
        ' Regular Standard initialization
        InitializeComponent()

        ' Load main spelling dictionary
        AddHandler _spell.MainDictionary.LoadCompleted, AddressOf
MainDictionary_LoadCompleted
        _spell.MainDictionary.LoadAsync("C1Spell_en-US.dct")

        ' Load user dictionary
        Dim ud As UserDictionary = _spell.UserDictionary
        ud.LoadFromIsolatedStorage("Custom.dct")

            ' Other initializations
            ' ...
        AddHandler App.Current.[Exit], AddressOf App_Exit
    End Sub
End Class
```

C#

```
using C1.WPF.SpellChecker;

public partial class MainPage : UserControl
{
  // Spell-checker used by all controls on this page
  C1SpellChecker _spell = new C1SpellChecker();

  // Page constructor
  public MainPage()
  {
    // Standard initialization
    InitializeComponent();
    // Load main spelling dictionary
    _spell.MainDictionary.LoadCompleted += MainDictionary_LoadCompleted;
    _spell.MainDictionary.LoadAsync("C1Spell_en-US.dct");
```

```
    // Load user dictionary
    UserDictionary ud = _spell.UserDictionary;
    ud.LoadFromIsolatedStorage("Custom.dct");
    App.Current.Exit += App_Exit;

    // Other initializations
    // ...
  }
}
```

The code creates a new **C1SpellChecker** object to be shared by all controls on the page that require spell-checking.

Later, the page constructor invokes the **LoadAsync** method to load the main spell dictionary. In this case, we are loading **C1Spell_en-US.dct**, the American English dictionary. This file must be present on the application folder on the server. **C1SpellChecker** includes over 20 other dictionaries which can be downloaded from our site.

The code adds a handler to the **SpellDictionaryBase.LoadCompleted** event so it can detect when the main dictionary finishes loading and whether there were any errors. Here is a typical event handler:

Visual Basic

```
Private Sub MainDictionary_LoadCompleted(sender As Object, e As
OpenReadCompletedEventArgs)
    If e.[Error] IsNot Nothing Then
        MessageBox.Show("Error loading spell dictionary, " & "spell-checking is
disabled.")
    End If
End Sub
```

C#

```
void MainDictionary_LoadCompleted(object sender, OpenReadCompletedEventArgs e)
{
  if (e.Error != null)
    MessageBox.Show("Error loading spell dictionary, " +
                    "spell-checking is disabled.");
}
```

The code also loads a user dictionary from isolated storage. This step is optional. The user dictionary stores words such as names and technical terms. The code attaches an event handler to the application's **Exit** event to save the user dictionary when the application finishes executing:

Visual Basic

```
Private Sub App_Exit(sender As Object, e As EventArgs)
    Dim ud As UserDictionary = _spell.UserDictionary
    ud.SaveToIsolatedStorage("Custom.dct")
End Sub
```

C#

```
void App_Exit(object sender, EventArgs e)
{
  UserDictionary ud = _spell.UserDictionary;
  ud.SaveToIsolatedStorage("Custom.dct");
}
```

Once the dictionary has been loaded, you can invoke the modal spell-checker by calling the **C1SpellChecker.CheckControlAsync** method. For example:

Visual Basic

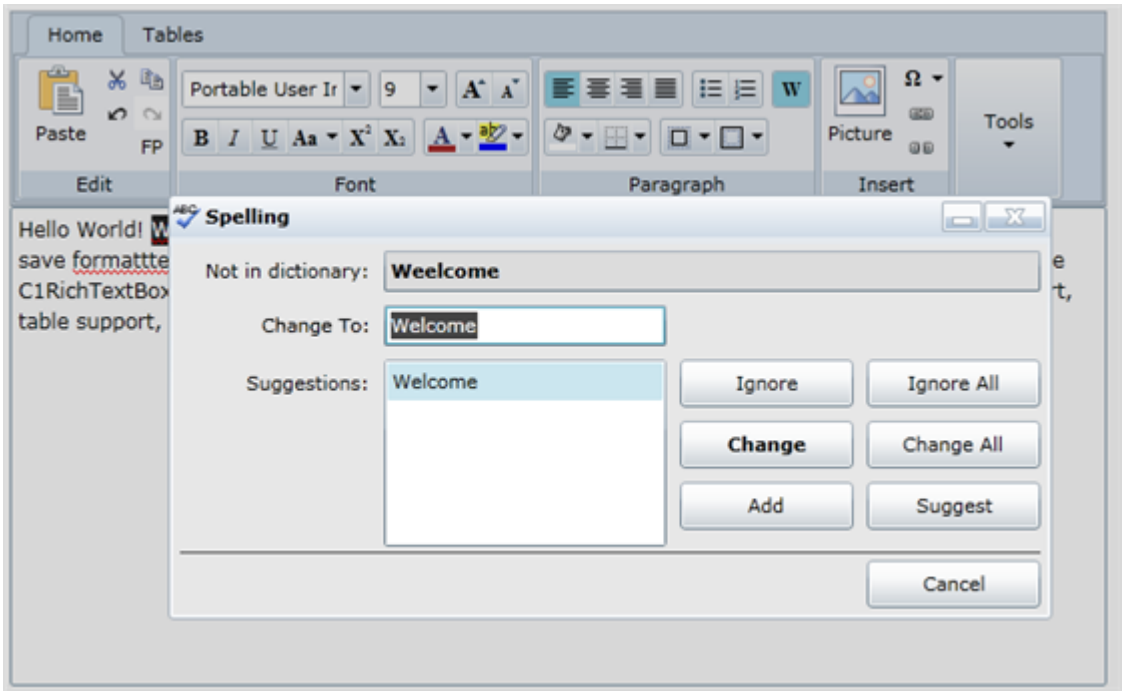
```
Private Sub SpellCheck_Click(sender As Object, e As RoutedEventArgs)
    AddHandler _spell.CheckControlCompleted, AddressOf _spell_CheckControlCompleted
    _spell.CheckControlAsync(_rtb)
End Sub
Private Sub _spell_CheckControlCompleted(sender As Object, e As
CheckControlCompletedEventArgs)
    If Not e.Cancelled Then
        Dim msg = String.Format("Spell-check complete. {0} error(s) found.",
e.ErrorCount)
        MessageBox.Show(msg, "Spell-check complete", MessageBoxButton.OK)
    End If
End Sub
```

C#

```
private void SpellCheck_Click(object sender, RoutedEventArgs e)
{
  _spell.CheckControlCompleted += _spell_CheckControlCompleted;
  _spell.CheckControlAsync(_rtb);
}
void _spell_CheckControlCompleted(object sender, CheckControlCompletedEventArgs e)
{
  if (!e.Cancelled)
  {
    var msg = string.Format(
      "Spell-check complete. {0} error(s) found.", e.ErrorCount);
    MessageBox.Show(msg, "Spell-check complete..", MessageBoxButton.OK);
  }
}
```

The code calls **C1SpellChecker.CheckControlAsync**. When the modal checking is complete, the **C1SpellChecker.CheckControlCompleted** event fires and shows a dialog box to indicate that the spell-checking operation is complete.

The image below shows the spell-checking dialog box in action:



Syntax Coloring

The Understanding C1TextPointer section describes how you can use the Selection property to obtain a C1TextRange object that corresponds to the current selection, and how to use that object to inspect and apply custom formatting to parts of the document.

In some cases, however, you may want to inspect and apply formatting to ranges without selecting them. To do that using the **Selection** property, you would have to save the current selection, apply all the formatting, and then restore the original selection. Also, changing the selection may cause the document to scroll in order to keep the selection in view.

To handle these situations, the C1RichTextBox exposes a **GetTextRange** method. The **GetTextRange** method returns a C1TextRange object that may be used without affecting the current selection.

For example, you could use the **GetTextRange** method to add HTML syntax coloring to a **C1RichTextBox**. The first step is to detect any changes to the document. The changes will trigger the method that performs the actual syntax coloring:

Visual Basic

```
' Update syntax coloring on a timer
Private _updating As Boolean
Private _syntax As Storyboard

' Start the timer whenever the document changes
Private Sub tb_TextChanged(sender As Object, e As C1TextChangedEventArgs)
    If Not _updating Then
        ' Create storyboard if it's still null
        If _syntax Is Nothing Then
            _syntax = New Storyboard()
            AddHandler _syntax.Completed, AddressOf _syntax_Completed
            _syntax.Duration = New Duration(TimeSpan.FromMilliseconds(1000))
        End If
```

```
        ' Re-start storyboard
        _syntax.[Stop]()
        _syntax.Seek(TimeSpan.Zero)
        _syntax.Begin()
    End If
End Sub
' Timer elapsed, update syntax coloring
Private Sub _syntax_Completed(sender As Object, e As EventArgs)
    _updating = True
    UpdateSyntaxColoring(_rtb)
    _updating = False
End Sub
```

C#

```
// Update syntax coloring on a timer
bool _updating;
Storyboard _syntax;

// Start the timer whenever the document changes
void tb_TextChanged(object sender, C1TextChangedEventArgs e)
{
  if (!_updating)
  {
    // Create storyboard if it's still null
    if (_syntax == null)
    {
      _syntax = new Storyboard();
      _syntax.Completed += _syntax_Completed;
      _syntax.Duration = new Duration(TimeSpan.FromMilliseconds(1000));
    }

    // Re-start storyboard
    _syntax.Stop();
    _syntax.Seek(TimeSpan.Zero);
    _syntax.Begin();
  }
}
// Timer elapsed, update syntax coloring
void _syntax_Completed(object sender, EventArgs e)
{
  _updating = true;
  UpdateSyntaxColoring(_rtb);
  _updating = false;
}
```

The code creates a timer that starts ticking whenever the user changes the document in any way. If the user changes the document while the timer is active, then the timer is reset. This prevents the code from updating the syntax coloring too often, while the user is typing quickly.

When the timer elapses, the code sets a flag to prevent the changes made while updating the syntax coloring from triggering the timer, then calls the **UpdateSyntaxColoring** method:

Visual Basic

```
' Perform syntax coloring
Private Sub UpdateSyntaxColoring(rtb As C1RichTextBox)
    ' Initialize regular expression used to parse HTML
    Dim pattern As String = "</?(?<tagName>[a-zA-Z0-9_:\-]+)" & "(\s+(?<attName>[a-
zA-Z0-9_:\-]+)(?<attValue>(=""[^""]+"")?))*\s*/?>"


    ' Initialize brushes used to color the document
    Dim brDarkBlue As Brush = New SolidColorBrush(Color.FromArgb(255, 0, 0, 180))
    Dim brDarkRed As Brush = New SolidColorBrush(Color.FromArgb(255, 180, 0, 0))
    Dim brLightRed As Brush = New SolidColorBrush(Colors.Red)

    ' Remove old coloring
    Dim input = rtb.Text
    Dim range = rtb.GetTextRange(0, input.Length)
    range.Foreground = rtb.Foreground

    ' Highlight the matches
    For Each m As Match In Regex.Matches(input, pattern)
        ' Select whole tag, make it dark blue
        range = rtb.GetTextRange(m.Index, m.Length)
        range.Foreground = brDarkBlue

        ' Select tag name, make it dark red
        Dim tagName = m.Groups("tagName")
        range = rtb.GetTextRange(tagName.Index, tagName.Length)
        range.Foreground = brDarkRed

        ' Select attribute names, make them light red
        Dim attGroup = m.Groups("attName")
        If attGroup IsNot Nothing Then
            Dim atts = attGroup.Captures
            For i As Integer = 0 To atts.Count - 1
                Dim att = atts(i)
                range = rtb.GetTextRange(att.Index, att.Length)
                range.Foreground = brLightRed
            Next
        End If
    Next
End Sub
```

C#

```
// Perform syntax coloring
void UpdateSyntaxColoring(C1RichTextBox rtb)
{
  // Initialize regular expression used to parse HTML
  string pattern =
    @"</?(?<tagName>[a-zA-Z0-9_:\-]+)" +
    @"(\s+(?<attName>[a-zA-Z0-9_:\-]+)(?<attValue>(=""[^""]+"")?))*\s*/?>";
```

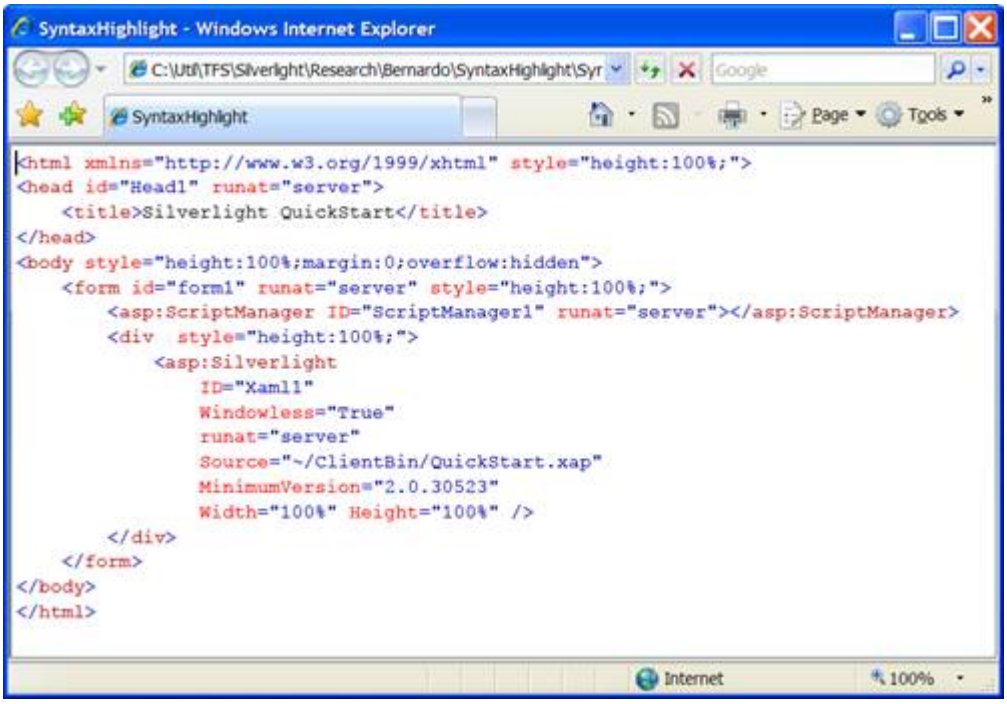
```
  // Initialize brushes used to color the document
  Brush brDarkBlue = new SolidColorBrush(Color.FromArgb(255, 0, 0, 180));
  Brush brDarkRed = new SolidColorBrush(Color.FromArgb(255, 180, 0, 0));
  Brush brLightRed = new SolidColorBrush(Colors.Red);

  // Remove old coloring
  var input = rtb.Text;
  var range = rtb.GetTextRange(0, input.Length);
  range.Foreground = rtb.Foreground;

  // Highlight the matches
  foreach (Match m in Regex.Matches(input, pattern))
  {
    // Select whole tag, make it dark blue
    range = rtb.GetTextRange(m.Index, m.Length);
    range.Foreground = brDarkBlue;

    // Select tag name, make it dark red
    var tagName = m.Groups["tagName"];
    range = rtb.GetTextRange(tagName.Index, tagName.Length);
    range.Foreground = brDarkRed;

    // Select attribute names, make them light red
    var attGroup = m.Groups["attName"];
    if (attGroup != null)
    {
      var atts = attGroup.Captures;
      for (int i = 0; i < atts.Count; i++)
      {
        var att = atts[i];
        range = rtb.GetTextRange(att.Index, att.Length);
        range.Foreground = brLightRed;
      }
    }
  }
}
```

The code starts by defining a regular expression pattern to parse the HTML. This is not the most efficient way to parse HTML, and the expression is not terribly easy to read or maintain. We don't recommend using regular expressions for parsing HTML except in sample code, where it may help keep the code compact and easy to understand.

The next step is to remove any old coloring left over. This is done by creating a range that spans the whole document and setting its **Foreground** property to match the **Foreground** of the C1RichTextBox control.

Next, the regular expression is used to parse the document. The code scans each match, creates a C1TextRange object, and sets the C1TextRange.Foreground property to the desired value. We use dark blue for the HTML tag, dark red for the tag name, and light red for the attribute names.

That's all the code that is required. The image below shows an HTML document viewed in the syntax-coloring **C1RichTextBox** we just created:



Test the application by typing or pasting some HTML text into the control. Notice that shortly after you stop typing, the new text is colored automatically.

A real application could optimize the syntax coloring process by detecting the type of text change and updating the coloring of small parts of the document. Also, it would detect additional elements such as style sheets and comments, and it probably would use a specialized parser instead of regular expressions.

The essential mechanism would be the same, however: detect ranges within the document, get **C1TextRange** objects, and apply the formatting.

Overriding Styles

The Syntax Coloring section described how you can use C1TextRange objects to modify the style of parts of a document without moving the selection. In some cases, however, you may want to modify only the view, and not the document itself.

For example, the current selection is highlighted with different foreground and background colors. This style change does not belong to the document itself; it belongs to the view. Other examples are syntax coloring and as-you-type spell-checking.

The C1RichTextBox control supports these scenarios with the StyleOverrides property. This property contains a collection of objects that specify ranges and style modifications to be applied to the view only. This approach has two advantages over applying style modifications to **C1TextRange** objects as you did in the previous section:

- The style overrides are not applied to the document, and therefore are not applied when you save a document as HTML (you would not normally want the current selection and spelling error indicators to be persisted to a file).
- Because the changes are not added to the document, and only affect the part that is currently visible, this approach is much more efficient than changing **C1TextRange** objects directly.

The limitation of this approach is that the style changes cannot involve style elements that affect the document flow. You can use style overrides to change the background, foreground, and to underline parts of the document. But you

cannot change the font size or style, for example, since that would affect the document flow.

Let us demonstrate the use of style overrides by modifying the previous syntax coloring example.

First, we need to declare a C1RangeStyleCollection object and add that to the control's **StyleOverrides** collection. Once that is done, any overrides added to our collection will be applied to the control. We will later populate the collection with the syntax-colored parts of the document.

Visual Basic

```
Private _rangeStyles As New C1RangeStyleCollection()

Public Sub New()
    InitializeComponent()

    _rtb = New C1RichTextBox()
    LayoutRoot.Children.Add(_rtb)

    AddHandler _rtb.TextChanged, AddressOf tb_TextChanged
    _rtb.FontFamily = New FontFamily("Courier New")
    _rtb.FontSize = 16
    _rtb.Text = GetStringResource("w3c.htm")

    ' Add our C1RangeStyleCollection to the control's
    ' StyleOverrides collection
    _rtb.StyleOverrides.Add(_rangeStyles)
End Sub
```

C#

```
C1RangeStyleCollection _rangeStyles = new C1RangeStyleCollection();

public MainPage()
{
  InitializeComponent();

  _rtb = new C1RichTextBox();
  LayoutRoot.Children.Add(_rtb);

  _rtb.TextChanged += tb_TextChanged;
  _rtb.FontFamily = new FontFamily("Courier New");
  _rtb.FontSize = 16;
  _rtb.Text = GetStringResource("w3c.htm");

  // Add our C1RangeStyleCollection to the control's
  // StyleOverrides collection
  _rtb.StyleOverrides.Add(_rangeStyles);
}
```

Now, all we need to do is modify the **UpdateSyntaxColoring** method shown earlier and have it populate our collection of range styles (instead of applying the coloring to the document as we did before):

Visual Basic

```
' Perform syntax coloring using StyleOverrides collection
```

```
' (takes a fraction of a second to highlight the default document)
Private  Sub UpdateSyntaxColoring(ByVal rtb As C1RichTextBox)
  ' Initialize regular expression used to parse HTML
  String pattern =
    "</?(?<tagName>[a-zA-Z0-9_:\-]+)" +
    "(\s+(?<attName>[a-zA-Z0-9_:\-]+)" +
    (?<attValue>(\s*=\s*""(^"")+"")?))*\s*/?>"

  ' Initialize styles used to color the document
  Dim key As var =  C1TextElement.ForegroundProperty
  Dim brDarkBlue As var =  New C1TextElementStyle()
  brDarkBlue(key) = New SolidColorBrush(Color.FromArgb(255, 0, 0, 180))
  Dim brDarkRed As var =  New C1TextElementStyle()
  brDarkRed(key)  = New SolidColorBrush(Color.FromArgb(255, 180, 0, 0))
  Dim brLightRed As var =  New C1TextElementStyle()
  brLightRed(key) = New SolidColorBrush(Colors.Red)

  ' Remove old coloring
  _rangeStyles.Clear()

  ' Highlight the matches
  Dim input As var =  rtb.Text
  Dim m As Match
  For Each m In Regex.Matches(input,pattern)
    ' Select whole tag, make it dark blue
    Dim range As var =  rtb.GetTextRange(m.Index,m.Length)
    _rangeStyles.Add(New C1RangeStyle(range,brDarkBlue))

    ' Select tag name, make it dark red
    Dim tagName As var =  m.Groups("tagName")
    range = rtb.GetTextRange(tagName.Index, tagName.Length)
    _rangeStyles.Add(New C1RangeStyle(range,brDarkRed))

    ' Select attribute names, make them light red
    Dim attGroup As var =  m.Groups("attName")
    If Not attGroup Is Nothing Then
      Dim att As Capture
      For Each att In attGroup.Captures
        range = rtb.GetTextRange(att.Index, att.Length)
        _rangeStyles.Add(New C1RangeStyle(range,brLightRed))
      Next
    End If
  Next
End Sub
```

C#

```
// Perform syntax coloring using StyleOverrides collection
// (takes a fraction of a second to highlight the default document)
void UpdateSyntaxColoring(C1RichTextBox rtb)
{
  // Initialize regular expression used to parse HTML
```

```
  string pattern =
    @"</?(?<tagName>[a-zA-Z0-9_:\-]+)" +
    @"(\s+(?<attName>[a-zA-Z0-9_:\-]+)" +
    (?<attValue>(\s*=\s*""[^""]+"")?))*\s*/?>";

  // Initialize styles used to color the document
  var key = C1TextElement.ForegroundProperty;
  var brDarkBlue  = new C1TextElementStyle();
  brDarkBlue[key] = new SolidColorBrush(Color.FromArgb(255, 0, 0, 180));
  var brDarkRed   = new C1TextElementStyle();
  brDarkRed[key]  = new SolidColorBrush(Color.FromArgb(255, 180, 0, 0));
  var brLightRed  = new C1TextElementStyle();
  brLightRed[key] = new SolidColorBrush(Colors.Red);

  // Remove old coloring
  _rangeStyles.Clear();

  // Highlight the matches
  var input = rtb.Text;
  foreach (Match m in Regex.Matches(input, pattern))
  {
    // Select whole tag, make it dark blue
    var range = rtb.GetTextRange(m.Index, m.Length);
    _rangeStyles.Add(new C1RangeStyle(range, brDarkBlue));

    // Select tag name, make it dark red
    var tagName = m.Groups["tagName"];
    range = rtb.GetTextRange(tagName.Index, tagName.Length);
    _rangeStyles.Add(new C1RangeStyle(range, brDarkRed));

    // Select attribute names, make them light red
    var attGroup = m.Groups["attName"];
    if (attGroup != null)
    {
      foreach (Capture att in attGroup.Captures)
      {
        range = rtb.GetTextRange(att.Index, att.Length);
        _rangeStyles.Add(new C1RangeStyle(range, brLightRed));
      }
    }
  }
}
```

The revised code is very similar to the original. Instead of creating brushes to color the document, it creates **C1TextElementStyle** objects that contain an override for the foreground property. The code starts by clearing the override collection, then uses a regular expression to locate each HTML tag in the document, and finally populates the overrides collection with C1RangeStyle objects that associate ranges with **C1TextElementStyle** objects.

If you run this new version of the code, you should notice the dramatic performance increase. The new version is thousands of times faster than the original.

Hit-Testing

The C1RichTextBox supports hyperlinks, which provide a standard mechanism for implementing user interactivity. In some cases, you may want to go beyond that and provide additional, custom mouse interactions. For example, you may want to apply some custom formatting or show a context menu when the user clicks an element.

To enable these scenarios, the **C1RichTextBox** exposes **ElementMouse*** events and a C1RichTextBox.GetPositionFromPoint method.

If all you need to know is the element that triggered the mouse event, you can get it from the **source** parameter in the event handler. If you need more detailed information (the specific word that was clicked within the element for example), then you need the **C1RichTextBox.GetPositionFromPoint** method. **C1RichTextBox.GetPositionFromPoint** takes a point in client coordinates and returns a **C1TextPosition** object that expresses the position in document coordinates.

The **C1TextPosition** object has two main properties: **Element** and **Offset**. The **Element** property represents an element within the document; **Offset** is a character index (if the element is a **C1Run**) or the index of the child element at the given point.

For example, the code below creates a **C1RichTextBox** and attaches a handler to the C1RichTextBox.ElementMouseLeftButtonDown event:

Visual Basic

```
Public Sub New()
    ' Default initialization
    InitializeComponent()

    ' Create a C1RichTextBox and add it to the page
    _rtb = New C1RichTextBox()
    LayoutRoot.Children.Add(_rtb)

    ' Attach event handler
    Add Handler _rtb.ElementMouseLeftButtonDown AddressOf
rtb_ElementMouseLeftButtonDown
End Sub
```

C#

```
public MainPage()
{
  // Default initialization
  InitializeComponent();

  // Create a C1RichTextBox and add it to the page
  _rtb = new C1RichTextBox();
  LayoutRoot.Children.Add(_rtb);

  // Attach event handler
  _rtb.ElementMouseLeftButtonDown += rtb_ElementMouseLeftButtonDown;
}
```

The event handler below toggles the C1TextElement.FontWeight property for the entire element that was clicked. This could be a word, a sentence, or a whole paragraph:

Visual Basic

```
Private Sub _rtb_ElementMouseLeftButtonDown(sender As Object, e As
MouseButtonEventArgs)
    If Keyboard.Modifiers <> 0 Then
        Dim run = TryCast(sender, C1Run)
        If run IsNot Nothing Then
            run.FontWeight = If(run.FontWeight = FontWeights.Bold,
FontWeights.Normal, FontWeights.Bold)
        End If
    End If
End Sub
```

C#

```
void _rtb_ElementMouseLeftButtonDown(object sender, MouseButtonEventArgs e)
{
  if (Keyboard.Modifiers != 0)
  {
    var run = sender as C1Run;
    if (run != null)
    {
      run.FontWeight = run.FontWeight == FontWeights.Bold
        ? FontWeights.Normal
        : FontWeights.Bold;
    }
  }
}
```

The code gets the element that was clicked by casting the **sender** parameter to a **C1Run** object.

If you wanted to toggle the **C1TextElement.FontWeight** value of a single word instead, then you would need to determine which character was clicked and expand the selection to the whole word. This is where the C1RichTextBox.GetPositionFromPoint method becomes necessary. Here is a revised version of the event handler that accomplishes that:

Visual Basic

```
Private Sub _rtb_ElementMouseLeftButtonDown(sender As Object, e As
MouseButtonEventArgs)
    If Keyboard.Modifiers <> 0 Then
        ' Get position in control coordinates
        Dim pt = e.GetPosition(_rtb)

        ' Get text pointer at position
        Dim pointer = _rtb.GetPositionFromPoint(pt)

        ' Check that the pointer is pointing to a C1Run
        Dim run = TryCast(pointer.Element, C1Run)
        If run IsNot Nothing Then
            ' Get the word within the C1Run
            Dim text = run.Text
            Dim start = pointer.Offset
            Dim [end] = pointer.Offset
```

```
            While start > 0 AndAlso Char.IsLetterOrDigit(text, start - 1)
                start -= 1
            End While
            While [end] < text.Length - 1 AndAlso Char.IsLetterOrDigit(text, [end] +
1)
                [end] += 1
            End While

            ' Toggle the bold property for the run that was clicked
            Dim word = New C1TextRange(pointer.Element, start, [end] - start + 1)
            word.FontWeight = If(word.FontWeight.HasValue AndAlso
word.FontWeight.Value = FontWeights.Bold, FontWeights.Normal, FontWeights.Bold)
        End If
    End If
End Sub
```

C#

```
void _rtb_ElementMouseLeftButtonDown(object sender, MouseButtonEventArgs e)
{
  if (Keyboard.Modifiers != 0)
  {
    // Get position in control coordinates
    var pt = e.GetPosition(_rtb);

    // Get text pointer at position
    var pointer = _rtb.GetPositionFromPoint(pt);

    // Check that the pointer is pointing to a C1Run
    var run = pointer.Element as C1Run;
    if (run != null)
    {
      // Get the word within the C1Run
      var text = run.Text;
      var start = pointer.Offset;
      var end = pointer.Offset;
      while (start > 0 && char.IsLetterOrDigit(text, start - 1))
        start--;
      while (end < text.Length - 1 && char.IsLetterOrDigit(text, end + 1))
        end++;

      // Toggle the bold property for the run that was clicked
      var word = new C1TextRange(pointer.Element, start, end - start + 1);
      word.FontWeight =
        word.FontWeight.HasValue && word.FontWeight.Value == FontWeights.Bold
          ? FontWeights.Normal
          : FontWeights.Bold;
    }
  }
}
```

Notice that the **C1TextElement.FontWeight** property returns a nullable value. If the range contains a mix of values

for this attribute, the property returns null. The code used to toggle the **FontWeight** property is the same we used earlier when implementing the formatting toolbar.

The **GetPositionFromPoint** allows you to get a **C1TextPosition** object from a point on the screen. The **GetRectFromPosition** method performs the reverse operation, returning a **Rect** that represents the screen position of a **C1TextPosition** object. This is useful in situations where you want to present a UI element near a specific portion of a document.

HtmlFilter Customization

HtmlFilter is the component in C1RichTextBox that transforms HTML strings to C1Documents and back. It's also capable of transforming to and from an intermediate representation of an HTML document called C1HtmlDocument.

When transforming between **C1HtmlDocument** and C1Document, several events are fired allowing customization of each node that is transformed. These events are:

- HtmlFilter.ConvertingHtmlNode: this event is fired just before an HTML node is transformed. If marked as handled by the event handler then HtmlFilter assumes the node was transformed and skips it.
- HtmlFilter.ConvertedHtmlNode: this event is fired after a node was transformed. It can be used to make minor changes to the transformation result.
- HtmlFilter.ConvertingTextElement: this event is fired just before a C1TextElement is transformed. If marked as handled by the event handler then HtmlFilter assumes the element was transformed and skips it.
- HtmlFilter.ConvertedTextElement: this event is fired after a **C1TextElement** is transformed. It can be used to make minor changes to the transformation result.

As an example you can see how the **HtmlFilterCustomization** sample adds support for GIF images using C1.WPF.Imaging. It uses both **HtmlFilter.ConvertingHtmlNode** and **HtmlFilter.ConvertingTextElement** events. Here is the **HtmlFilter.ConvertingHtmlNode** event handler:

Visual Basic

```
Private Sub HtmlFilter_ConvertingHtmlNode(sender As Object, e As
ConvertingHtmlNodeEventArgs)
    Dim htmlElement = TryCast(e.HtmlNode, C1HtmlElement)
    If htmlElement IsNot Nothing AndAlso htmlElement.Name = "img" Then
        Dim src As String
        If htmlElement.Attributes.TryGetValue("src", src) Then
            Dim uri = New Uri("/HtmlFilterCustomization;component/" & src,
UriKind.Relative)
            Dim resource = Application.GetResourceStream(uri)
            If resource IsNot Nothing Then
                Dim imageSource = New C1Bitmap(resource.Stream).ImageSource
                Dim image = New Image() With { _
                    Key .Source = imageSource _
                }
                SetImageSource(image, src)
                e.Parent.Children.Add(New C1InlineUIContainer() With { _
                    Key .Child = image _
                })
                e.Handled = True
            End If
        End If
    End If
End Sub
```

C#

```
void HtmlFilter_ConvertingHtmlNode(object sender, ConvertingHtmlNodeEventArgs e)
{
    var htmlElement = e.HtmlNode as C1HtmlElement;
    if (htmlElement != null && htmlElement.Name == "img")
    {
        string src;
        if (htmlElement.Attributes.TryGetValue("src", out src))
        {
            var uri = new Uri("/HtmlFilterCustomization;component/" + src,
UriKind.Relative);
            var resource = Application.GetResourceStream(uri);
            if(resource != null)
            {
                var imageSource = new C1Bitmap(resource.Stream).ImageSource;
                var image = new Image { Source = imageSource };
                SetImageSource(image, src);
                e.Parent.Children.Add(new C1InlineUIContainer { Child = image });
                e.Handled = true;
            }
        }
    }
}
```

The first thing the event handler does is cast **e.HtmlNode** to C1HtmlElement. There are two types that inherit from **C1HtmlNode: C1HtmlElement**, which represents an HTML element like <img/>, and C1HtmlText, which represents a text node.

Once the C1HtmlNode object has been cast to **C1HtmlElement**, it's possible to check the tag name, and access its attributes. This is done to see if the element is in fact an IMG tag, and to obtain the SRC attribute. The rest of the code takes core of creating the appropriate element, which is then added to **e.Parent**. Note that the SRC value is saved as an attached property, to be accessed when exporting.

Once the transformation is done, the handler can set **e.Handled** to **True** in order to prevent HtmlFilter from transforming this **C1HtmlNode**.

The HtmlFilter.ConvertingTextElement event handler looks like the following:

Visual Basic

```
Private Sub HtmlFilter_ConvertingTextElement(sender As Object, e As
ConvertingTextElementEventArgs)
    Dim inlineContainer = TryCast(e.TextElement, C1InlineUIContainer)
    If inlineContainer IsNot Nothing Then
        Dim src = GetImageSource(inlineContainer.Child)
        If src IsNot Nothing Then
            Dim element = New C1HtmlElement("img")
            element.Attributes("src") = src
            e.Parent.Add(element)
            e.Handled = True
        End If
    End If
End Sub
```

C#

```
void HtmlFilter_ConvertingTextElement(object sender, ConvertingTextElementEventArgs
e)
{
    var inlineContainer = e.TextElement as C1InlineUIContainer;
    if (inlineContainer != null)
    {
        var src = GetImageSource(inlineContainer.Child);
        if (src != null)
        {
            var element = new C1HtmlElement("img");
            element.Attributes["src"] = src;
            e.Parent.Add(element);
            e.Handled = true;
        }
    }
}
```

This is pretty similar to the other handler, only it transforms a C1TextElement to a C1HtmlElement. Note that the SRC value is recovered from the attached property, and a **C1HtmlElement** is created with that attribute. As before, the new element is added to **e.Parent**, and the event is marked as **Handled**.

Working with the C1Document Object

So far we have focused on the object model of the C1RichTextBox control. But the control is just an editable view of a **C1Document** object, which exposes a rich object model for creating and editing the underlying document. This architecture is similar to the one used by the Microsoft WPF **RichTextBox** control, which provides a view of a **FlowDocument** object.

Programming directly against the **C1Document** object is the best way to perform many tasks, including report generation and the implementation of import and export filters. For example, the Html property exposes an HTML filter with methods that convert **C1Document** objects to and from HTML strings. You could implement a similar filter class to import and export other popular formats such as RTF or PDF.

The **C1RichTextBox** deals mainly with text. It provides a flat, linear view of the control content. The **C1Document**, on the other hand, exposes the structure of the document. The document model makes it easy to enumerate the runs within each paragraph, items within each list, and so on. This will be shown in a later section.

Creating Documents and Reports

To illustrate the process of creating a **C1Document**, we will walk through the steps required to implement a simple assembly documentation utility.

To start, create a new project and add a reference to the **C1.WPF** and **C1.WPF.RichTextBox** assemblies. Then edit the page constructor as follows:

Visual Basic

```
Imports C1.WPF
Imports C1.WPF.RichTextBox
Imports C1.WPF.RichTextBox.Documents

Public Partial Class MainPage
    Inherits UserControl
    ' C1RichTextBox that will display the C1Document
    Private _rtb As C1RichTextBox

    Public Sub New()
        ' Default initialization
        InitializeComponent()

        ' Create the C1RichTextBox and add it to the page
        _rtb = New C1RichTextBox()
        LayoutRoot.Children.Add(_rtb)

        ' Create document and show it in the C1RichTextBox
        _rtb.Document = DocumentAssembly(GetType(C1RichTextBox).Assembly)
        _rtb.IsReadOnly = True
    End Sub
End Class
```

C#

```
using C1.WPF;
```

```
using C1.WPF.RichTextBox;
using C1.WPF.RichTextBox.Documents;

public partial class MainPage : UserControl
{
  // C1RichTextBox that will display the C1Document
  C1RichTextBox _rtb;

  public MainPage()
  {
    // Default initialization
    InitializeComponent();

    // Create the C1RichTextBox and add it to the page
    _rtb = new C1RichTextBox();
    LayoutRoot.Children.Add(_rtb);

    // Create document and show it in the C1RichTextBox
    _rtb.Document = DocumentAssembly(typeof(C1RichTextBox).Assembly);
    _rtb.IsReadOnly = true;
  }
}
```

The code creates the C1RichTextBox and assigns its C1RichTextBox.Document property to the result of a call to the **DocumentAssembly** method. It then makes the control read-only so users can't change the report.

The **DocumentAssembly** method takes an **Assembly** as argument and builds a **C1Document** containing the assembly documentation. Here is the implementation:

Visual Basic

```
Private Function DocumentAssembly(asm As Assembly) As C1Document
    ' Create document
    Dim doc As New C1Document()
    doc.FontFamily = New FontFamily("Tahoma")

    ' Assembly
    doc.Blocks.Add(New Heading1("Assembly" & vbCr & vbLf + asm.FullName.Split(","C)
(0)))

    ' Types
    For Each t As Type In asm.GetTypes()
        DocumentType(doc, t)
    Next

    ' Done
    Return doc
End Function
```

C#

```
C1Document DocumentAssembly(Assembly asm)
{
```

```
  // Create document
  C1Document doc = new C1Document();
  doc.FontFamily = new FontFamily("Tahoma");

  // Assembly
  doc.Blocks.Add(new Heading1("Assembly\r\n" + asm.FullName.Split(',')[0]));

  // Types
  foreach (Type t in asm.GetTypes())
    DocumentType(doc, t);

  // Done
  return doc;
}
```

The method starts by creating a new **C1Document** object and setting its C1TextElement.FontFamily property. This will be the default value for all text elements added to the document.

Next, the method adds a **Heading1** paragraph containing the assembly name to the new document's **Blocks** collection. Blocks are elements such as paragraphs and list items that flow down the document. They are similar to "div" elements in HTML. Some document elements contain an **Inlines** collection instead. These collections contain elements that flow horizontally, similar to "span" elements in HTML.

The **Heading1** class inherits from C1Paragraph and adds some formatting. We will add several such classes to the project, for normal paragraphs and headings 1 through 4.

The **Normal** paragraph is a **C1Paragraph** that takes a content string in its constructor:

Visual Basic

```
Class Normal
    Inherits C1Paragraph
    Public Sub New(text As String)
        Me.Inlines.Add(New C1Run() With { _
            Key .Text = text _
        })
        Me.Padding = New Thickness(30, 0, 0, 0)
        Me.Margin = New Thickness(0)
    End Sub
End Class
```

C#

```
class Normal : C1Paragraph
{
  public Normal(string text)
  {
    this.Inlines.Add(new C1Run() { Text = text });
    this.Padding = new Thickness(30, 0, 0, 0);
    this.Margin = new Thickness(0);
  }
}
```

The **Heading** paragraph extends **Normal** and makes the text bold:

Visual Basic

```
Class Heading
    Inherits Normal
    Public Sub New(text As String)
        MyBase.New(text)
        Me.FontWeight = FontWeights.Bold
    End Sub
End Class
```

C#

```
class Heading : Normal
{
  public Heading(string text) : base(text)
  {
    this.FontWeight = FontWeights.Bold;
  }
}
```

Heading1 through **Heading4** extend **Heading** to specify font sizes, padding, borders, and colors:

Visual Basic

```
Class Heading1
    Inherits Heading
    Public Sub New(text As String)
        MyBase.New(text)
        Me.Background = New SolidColorBrush(Colors.Yellow)
        Me.FontSize = 24
        Me.Padding = New Thickness(0, 10, 0, 10)
        Me.BorderBrush = New SolidColorBrush(Colors.Black)
        Me.BorderThickness = New Thickness(3, 1, 1, 0)
    End Sub
End Class
Class Heading2
    Inherits Heading
    Public Sub New(text As String)
        MyBase.New(text)
        Me.FontSize = 18
        Me.FontStyle = FontStyles.Italic
        Me.Background = New SolidColorBrush(Colors.Yellow)
        Me.Padding = New Thickness(10, 5, 0, 5)
        Me.BorderBrush = New SolidColorBrush(Colors.Black)
        Me.BorderThickness = New Thickness(3, 1, 1, 1)
    End Sub
End Class
Class Heading3
    Inherits Heading
    Public Sub New(text As String)
        MyBase.New(text)
        Me.FontSize = 14
        Me.Background = New SolidColorBrush(Colors.LightGray)
        Me.Padding = New Thickness(20, 3, 0, 0)
```

```
    End Sub
End Class
Class Heading4
    Inherits Heading
    Public Sub New(text As String)
        MyBase.New(text)
        Me.FontSize = 14
        Me.Padding = New Thickness(30, 0, 0, 0)
    End Sub
End Class
```

C#

```
class Heading1 : Heading
{
  public Heading1(string text) : base(text)
  {
    this.Background = new SolidColorBrush(Colors.Yellow);
    this.FontSize = 24;
    this.Padding = new Thickness(0, 10, 0, 10);
    this.BorderBrush = new SolidColorBrush(Colors.Black);
    this.BorderThickness = new Thickness(3, 1, 1, 0);
  }
}
class Heading2 : Heading
{
  public Heading2(string text): base(text)
  {
    this.FontSize = 18;
    this.FontStyle = FontStyles.Italic;
    this.Background = new SolidColorBrush(Colors.Yellow);
    this.Padding = new Thickness(10, 5, 0, 5);
    this.BorderBrush = new SolidColorBrush(Colors.Black);
    this.BorderThickness = new Thickness(3, 1, 1, 1);
  }
}
class Heading3 : Heading
{
  public Heading3(string text) : base(text)
  {
    this.FontSize = 14;
    this.Background = new SolidColorBrush(Colors.LightGray);
    this.Padding = new Thickness(20, 3, 0, 0);
  }
}
class Heading4 : Heading
{
  public Heading4(string text): base(text)
  {
    this.FontSize = 14;
    this.Padding = new Thickness(30, 0, 0, 0);
  }
```

```
}
```

Now that we have classes for all paragraph types in the document, it's time to add the content. Recall that we used a **DocumentType** method in the first code block. Here is the implementation for that method:

Visual Basic

```
Private Sub DocumentType(doc As C1Document, t As Type)
    ' Skip non-public/generic
    If Not t.IsPublic OrElse t.ContainsGenericParameters Then
        Return
    End If

    ' Type
    doc.Blocks.Add(New Heading2("Class " & Convert.ToString(t.Name)))

    ' Properties
    doc.Blocks.Add(New Heading3("Properties"))
    For Each pi As PropertyInfo In t.GetProperties()
        If pi.DeclaringType = t Then
            DocumentProperty(doc, pi)
        End If
    Next

      ' Methods
        doc.Blocks.Add(New Heading3("Methods"))
    For Each mi As MethodInfo In t.GetMethods()
        If mi.DeclaringType = t Then
            DocumentMethod(doc, mi)
        End If
    Next

        ' Events
        doc.Blocks.Add(New Heading3("Events"))
        For Each ei As EventInfo In t.GetEvents()
        If ei.DeclaringType = t Then
            DocumentEvent(doc, ei)
        End If
    Next
End Sub
```

C#

```
void DocumentType(C1Document doc, Type t)
{
  // Skip non-public/generic
  if (!t.IsPublic || t.ContainsGenericParameters)
    return;

  // Type
  doc.Blocks.Add(new Heading2("Class " + t.Name));

  // Properties
```

```
  doc.Blocks.Add(new Heading3("Properties"));
  foreach (PropertyInfo pi in t.GetProperties())
  {
    if (pi.DeclaringType == t)
      DocumentProperty(doc, pi);
  }

  // Methods
  doc.Blocks.Add(new Heading3("Methods"));
  foreach (MethodInfo mi in t.GetMethods())
  {
    if (mi.DeclaringType == t)
      DocumentMethod(doc, mi);
  }

  // Events
  doc.Blocks.Add(new Heading3("Events"));
  foreach (EventInfo ei in t.GetEvents())
  {
    if (ei.DeclaringType == t)
      DocumentEvent(doc, ei);
  }
}
```

The method adds a **Heading2** paragraph with the class name and then uses reflection to enumerate all the public properties, events, and methods in the type. The code for these methods is simple:

Visual Basic

```
Private Sub DocumentProperty(doc As C1Document, pi As PropertyInfo)
    If pi.PropertyType.ContainsGenericParameters Then
        Return
    End If

    doc.Blocks.Add(New Heading4(pi.Name))

    Dim text = String.Format("public {0} {1} {{ {2}{3} }}", pi.PropertyType.Name,
pi.Name, If(pi.CanRead, "get; ", String.Empty), If(pi.CanWrite, "set; ",
String.Empty))
    doc.Blocks.Add(New Normal(text))
End Sub
```

C#

```
void DocumentProperty(C1Document doc, PropertyInfo pi)
{
  if (pi.PropertyType.ContainsGenericParameters)
    return;

  doc.Blocks.Add(new Heading4(pi.Name));

  var text = string.Format("public {0} {1} {{ {2}{3} }}",
    pi.PropertyType.Name,
```

```
    pi.Name,
    pi.CanRead ? "get; " : string.Empty,
    pi.CanWrite ? "set; " : string.Empty);
  doc.Blocks.Add(new Normal(text));
}
```

The method adds a **Heading4** paragraph containing the property name, then some **Normal** text containing the property type, name, and accessors.

The methods used for documenting events and properties are analogous:

Visual Basic

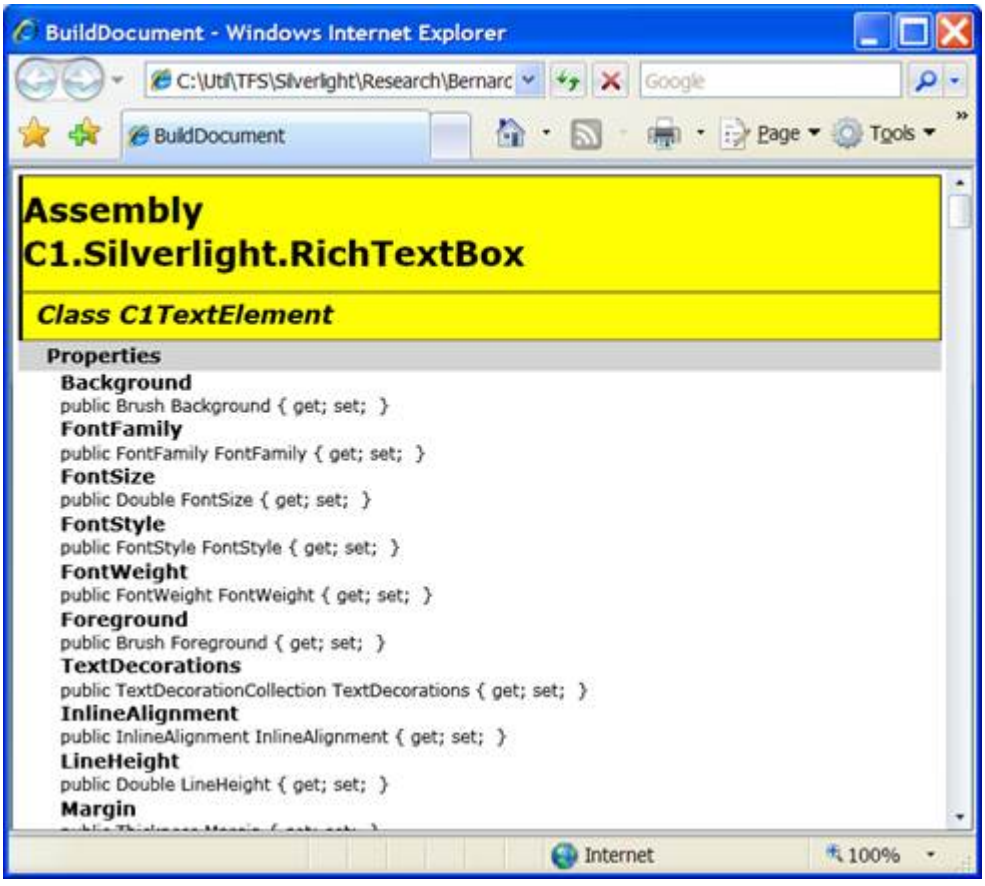
```
Private Sub DocumentMethod(doc As C1Document, mi As MethodInfo)
    If mi.IsSpecialName Then
        Return
    End If

    doc.Blocks.Add(New Heading4(mi.Name))
    Dim parms = New StringBuilder()
    For Each parm As var In mi.GetParameters()
        If parms.Length > 0 Then
            parms.Append(", ")
        End If
        parms.AppendFormat("{0} {1}", parm.ParameterType.Name, parm.Name)
    Next
    Dim text = String.Format("public {0} {1}({2})", mi.ReturnType.Name, mi.Name,
parms.ToString())

    doc.Blocks.Add(New Normal(text))
End Sub

Private Sub DocumentEvent(doc As C1Document, ei As EventInfo)
    doc.Blocks.Add(New Heading4(ei.Name))

    Dim text = String.Format("public {0} {1}", ei.EventHandlerType.Name, ei.Name)

    doc.Blocks.Add(New Normal(text))
End Sub
```

C#

```
void DocumentMethod(C1Document doc, MethodInfo mi)
{
  if (mi.IsSpecialName)
    return;

  doc.Blocks.Add(new Heading4(mi.Name));
  var parms = new StringBuilder();
  foreach (var parm in mi.GetParameters())
  {
    if (parms.Length > 0)
      parms.Append(", ");
```

```
    parms.AppendFormat("{0} {1}", parm.ParameterType.Name, parm.Name);
  }
  var text = string.Format("public {0} {1}({2})",
    mi.ReturnType.Name,
    mi.Name,
    parms.ToString());

  doc.Blocks.Add(new Normal(text));
}

void DocumentEvent(C1Document doc, EventInfo ei)
{
  doc.Blocks.Add(new Heading4(ei.Name));

  var text = string.Format("public {0} {1}",
    ei.EventHandlerType.Name,
    ei.Name);

  doc.Blocks.Add(new Normal(text));
}
```

If you run the project now, you will see a window like the one shown below:



The resulting document can be viewed and edited in the C1RichTextBox like any other. It can also be exported to HTML using the C1RichTextBox.Html property in the **C1RichTextBox**, or copied through the clipboard to applications such as Microsoft Word or Excel.

You could use the same technique to create reports based on data from a database. In addition to formatted text, the

C1Document object model supports the following features:

- **Lists**
  Lists are created by adding **C1List** objects to the document. The **C1List** object has a **C1List.ListItems** property that contains **C1ListItem** objects, which are also blocks.
- **Hyperlinks**
  Hyperlinks are created by adding C1Hyperlink objects to the document. The **C1Hyperlink** object has an C1Span.Inlines property that contains a collection of runs (typically C1Run elements that contain text), and a **NavigateUrl** property that determines the action to be taken when the hyperlink is clicked.
- **Images**
  Images and other **FrameworkElement** objects are created by adding **C1BlockUIContainer** objects to the document. The **C1BlockUIContainer** object has a **C1BlockUIContainer.Child** property that can be set to any **FrameworkElement** object.
  Note that not all objects can be exported to HTML. Images are a special case that the HTML filter knows how to handle.

Implementing Split Views

Many editors offer split-views of a document, allowing you to keep a part of the document visible while you work on another part.

You can achieve this easily by connecting two or more C1RichTextBox controls to the same underlying **C1Document**. Each control acts as an independent view, allowing you to scroll, select, and edit the document as usual. Changes made to one view are reflected on all other views.

To show how this works, let's extend the previous example by adding a few lines of code to the page constructor:

Visual Basic

```
Public Sub New()
    ' Default initialization
    InitializeComponent()

    ' Create the C1RichTextBox and add it to the page
    _rtb = New C1RichTextBox()
    LayoutRoot.Children.Add(_rtb)

    ' Create document and show it in the C1RichTextBox
    _rtb.Document = DocumentAssembly(GetType(C1RichTextBox).Assembly)
    _rtb.IsReadOnly = True

    ' Attach event handler
    AddHandler _rtb.ElementMouseLeftButtonDown, AddressOf
_rtb_ElementMouseLeftButtonDown

    ' Add a second C1RichTextBox to the page
    LayoutRoot.RowDefinitions.Add(New RowDefinition())
    LayoutRoot.RowDefinitions.Add(New RowDefinition())
    Dim rtb2 = New C1RichTextBox()
    rtb2.SetValue(Grid.RowProperty, 1)
    LayoutRoot.Children.Add(rtb2)

    ' Bind the second C1RichTextBox to the same document
    rtb2.Document = _rtb.Document
```

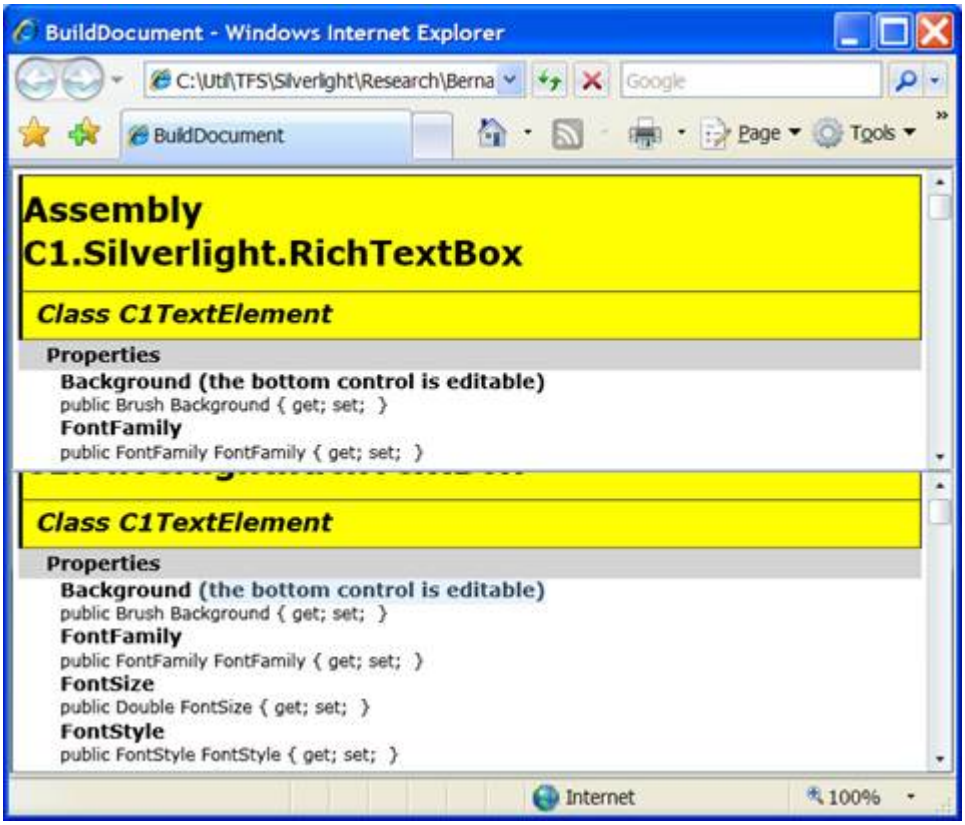
```
End Sub
```

C#

```
public MainPage()
{
  // Default initialization
  InitializeComponent();

  // Create the C1RichTextBox and add it to the page
  _rtb = new C1RichTextBox();
  LayoutRoot.Children.Add(_rtb);

  // Create document and show it in the C1RichTextBox
  _rtb.Document = DocumentAssembly(typeof(C1RichTextBox).Assembly);
  _rtb.IsReadOnly = true;

  // Attach event handler
  _rtb.ElementMouseLeftButtonDown += _rtb_ElementMouseLeftButtonDown;

  // Add a second C1RichTextBox to the page
  LayoutRoot.RowDefinitions.Add(new RowDefinition());
  LayoutRoot.RowDefinitions.Add(new RowDefinition());
  var rtb2 = new C1RichTextBox();
  rtb2.SetValue(Grid.RowProperty, 1);
  LayoutRoot.Children.Add(rtb2);

  // Bind the second C1RichTextBox to the same document
  rtb2.Document = _rtb.Document;
}
```

The new code adds a new **C1RichTextBox** to the page and then sets its C1RichTextBox.Document property to the document being shown by the original **C1RichTextBox**.

If you run the project again, you will see a window like the one shown below:



The bottom control is editable (we did not set its C1RichTextBox.IsReadOnly property to **False**). If you type into it, you will see the changes on both controls simultaneously.

The mechanism is general; we could easily attach more views of the same document. Moreover, any changes you make to the underlying document are immediately reflected on all views.

Using the C1Document Class

As we mentioned earlier, the C1RichTextBox provides a linear, flat view of the control content, while **C1Document** class exposes the document structure.

To illustrate the advantages of working directly with the document object, suppose you wanted to add some functionality to the previous sample: when the user presses the CTRL key, you want to capitalize the text in all paragraphs of type **Heading2**.

The object model exposed by the **C1RichTextBox** is not powerful enough to do this reliably. You would have to locate spans based on their formatting, which would be inefficient and unreliable (what if the user formatted some plain text with the same format used by **Heading2**?).

Using the **C1Document** object model, this task becomes trivial:

Visual Basic

```
Public Sub New()
    ' Default initialization
    InitializeComponent()

    ' No changes here...

    ' Bind the second C1RichTextBox to the same document
    rtb2.Document = _rtb.Document
    AddHandler rtb2.KeyDown, AddressOf rtb2_KeyDown
```

```
End Sub
Private Sub rtb2_KeyDown(sender As Object, e As KeyEventArgs)
    If e.Key = Key.Ctrl Then
        For Each heading2 As var In _rtb.Document.Blocks.OfType(Of Heading2)()
            Dim text = heading2.ContentRange.Text
            heading2.ContentRange.Text = text.ToUpper()
        Next
    End If
End Sub
```

C#

```
public MainPage()
{
  // Default initialization
  InitializeComponent();

  // No changes here...

  // Bind the second C1RichTextBox to the same document
  rtb2.Document = _rtb.Document;
  rtb2.KeyDown += rtb2_KeyDown;
}
void rtb2_KeyDown(object sender, KeyEventArgs e)
{
  if (e.Key == Key.Ctrl)
  {
    foreach (var heading2 in _rtb.Document.Blocks.OfType<Heading2>())
    {
      var text = heading2.ContentRange.Text;
      heading2.ContentRange.Text = text.ToUpper();
    }
  }
}
```

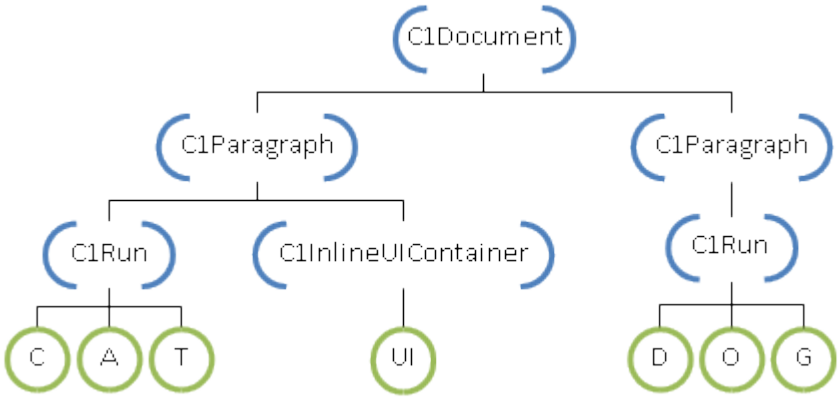
The code monitors the keyboard. When the user presses the CTRL key, it enumerates all **Heading2** elements in the document and replaces their content with capitals.

Doing the same thing using the **C1RichTextBox** object model would require a lot more code and the result would not be as reliable.

Understanding C1TextPointer

The C1TextPointer class represents a position inside a **C1Document**. It is intended to facilitate traversal and manipulation of C1Documents. The functionality is analogous to WPF's **TextPointer** class, although the object model has many differences.

A **C1TextPointer** is defined by a C1TextElement and an offset inside of it. Let's take this document as an example:



The blue bracketed nodes above are C1TextElements; the offset of a **C1TextPointer** indicates between which children the position is located. For instance, a position that points to the **C1Document** above with offset 0 is just before the first C1Paragraph, offset 1 is between the two paragraphs, and offset 2 is after the second paragraph. When a **C1TextPointer** points to a C1Run, each character in its text is considered a child of **C1Run**, so the offset indicates a position inside the text. A C1InlineUIContainer is considered to have a single child (the **UIElement** it displays) so it has two positions, one before and one after the child.

An alternative way to visualize a document is as a sequence of symbols, where a symbol can be either an element tag or some type of content. An element tag indicates the start or end of an element. In XML, the above document would be written as:

XML

```
<C1Document>
    <C1Paragraph>
        <C1Run>CAT</C1Run>
        <C1InlineUIContainer><UI/></C1InlineUIContainer>
    </C1Paragraph>
    <C1Paragraph>
        <C1Run>DOG</C1Run>
    </C1Paragraph>
</C1Document>
```

Viewing the document like this, a **C1TextPointer** points to a position between tags or content. This view also gives a clear order to **C1TextPointer**. In fact, **C1TextPointer** implements **IComparable**, and also overloads the comparison operators for convenience.

The symbol that is after a **C1TextPointer** can be obtained using the C1TextPointer.Symbol property. This property returns an object that can be of type StartTag, EndTag, char or **UIElement**.

If you want to iterate through the positions in a document, there are two methods available: **GetPositionAtOffset** and **Enumerate**. **GetPositionAtOffset** is the low-level method; it just returns the position at a specified integer offset. **Enumerate** is the recommended way to iterate through positions. It returns an **IEnumerable**<C1TextPointer> that iterates through all the positions in a specified direction. For instance, this returns all the positions in a document:

document.ContentStart.Enumerate()

Note that **ContentStart** returns the first **C1TextPointer** in a **C1TextElement**; there is also a **ContentEnd** property that returns the last position.

The interesting thing about **Enumerate** is that it returns a lazy enumeration. That is, **C1TextPointer** objects are only created when the **IEnumerable** is iterated. This allows for efficient use of LINQ extensions methods for filtering, finding, selecting, and so on. As an example, let's say you want to get the C1TextRange for the word contained under a **C1TextPointer**. You can do the following:

Visual Basic

```
Private Function ExpandToWord(pos As C1TextPointer) As C1TextRange
    ' Find word start
    Dim wordStart = If(pos.IsWordStart, pos,
pos.Enumerate(LogicalDirection.Backward).First(Function(p) p.IsWordStart))

    ' Find word end
    Dim wordEnd = If(pos.IsWordEnd, pos,
pos.Enumerate(LogicalDirection.Forward).First(Function(p) p.IsWordEnd))

    ' Return new range from word start to word end
    Return New C1TextRange(wordStart, wordEnd)
End Function
```

C#

```
C1TextRange ExpandToWord(C1TextPointer pos)
{
    // Find word start
    var wordStart = pos.IsWordStart
        ? pos
        : pos.Enumerate(LogicalDirection.Backward).First(p => p.IsWordStart);

    // Find word end
    var wordEnd = pos.IsWordEnd
        ? pos
        : pos.Enumerate(LogicalDirection.Forward).First(p => p.IsWordEnd);

    // Return new range from word start to word end
    return new C1TextRange(wordStart, wordEnd);
}
```

The **Enumerate** method returns the positions in a specified direction, but it doesn't include the current position. So the code first checks if the parameter position is a word start, and if not, searches backward for a position that is a word start. Likewise for the word end, it checks the parameter position and then searches forward. We want to find the word that contains the parameter position, so we need the first word end moving forward and the first word start moving backward. **C1TextPointer** already contains the properties **IsWordStart** and **IsWordEnd** that tells you whether a position is a word start or end depending on the surrounding symbols. We use the First LINQ extension method to find the first position that satisfies our required predicate. And finally we create a **C1TextRange** from the two positions.

LINQ extension methods can be very useful when working with positions. As another example we can count the words in a document like this:

Visual Basic

```
document.ContentStart.Enumerate().Count(Function(p) p.IsWordStart AndAlso TypeOf
p.Symbol Is Char)
```

C#

```
document.ContentStart.Enumerate().Count(p => p.IsWordStart && p.Symbol is char)
```

Note that we need to check that the symbol following a word start is a char because **IsWordStart** returns **True** for

positions that are not exactly at the start of a word. For instance the position just before a **C1Run** start tag is considered a word start if the first position of the **C1Run** is a word start.

Let's implement a **Find** method as another example:

Visual Basic

```
Private Function FindWordFromPosition(position As C1TextPointer, word As String) As
C1TextRange
    ' Get all ranges whose text length is equal to word.Length
    Dim ranges = position.Enumerate().[Select](Function(pos)
    ' Get a position that is at word.Length offset
    ' but ignoring tags that do not change the text flow
    Dim [end] = pos.GetPositionAtOffset(word.Length, C1TextRange.TextTagFilter)
    Return New C1TextRange(pos, [end])

End Function)
    ' returned value will be null if word is not found.
    Return ranges.FirstOrDefault(Function(range) range.Text = word)
End Function
```

C#

```
C1TextRange FindWordFromPosition(C1TextPointer position, string word)
{
    // Get all ranges whose text length is equal to word.Length
    var ranges = position.Enumerate().Select(pos =>
    {
        // Get a position that is at word.Length offset
        // but ignoring tags that do not change the text flow
        var end = pos.GetPositionAtOffset(word.Length, C1TextRange.TextTagFilter);
        return new C1TextRange(pos, end);
    });
    // returned value will be null if word is not found.
    return ranges.FirstOrDefault(range => range.Text == word);
}
```

We want to find the word from a specified position, so we enumerate all positions forward, and select all ranges whose text length is **word.Length**. For each position we need to find the position that is at **word.Length** distance. For this we use the **GetPositionAtOffset** method. This method returns a position at a specified offset, but it also counts all inline tags as valid positions, we need to ignore this to account for the case when a word is split between two C1Run elements. That is why we use C1TextRange.TextTagFilter; this is the same filter method used by the internal logic that translates document trees into text. As a final step we search for the range whose text matches the searched word.

As a last example let's replace the first occurrence of a word:

Visual Basic

```
Dim wordRange = FindWordFromPosition(document.ContentStart, "cat")
If wordRange IsNot Nothing Then
    wordRange.Text = "dog"
End If
```

C#

```
var wordRange = FindWordFromPosition(document.ContentStart, "cat");
if (wordRange != null)
{
    wordRange.Text = "dog";
}
```

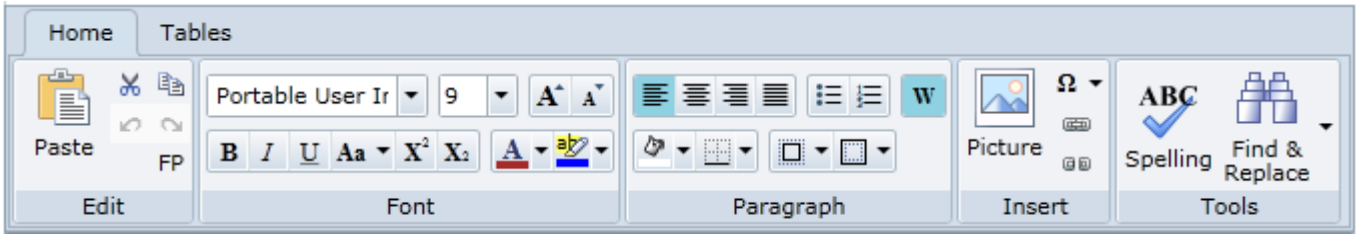
We can use the previous example to first find the word, and then replace the text by just assigning to C1TextRange.Text property.

Working with C1RichTextBoxToolbar

The C1RichTextBoxToolbar control is a full-featured, ribbon-like toolbar that easily turns the C1RichTextBox control into a complete text editor. The **C1RichTextBoxToolbar** control is based on the **C1Toolbar** control allowing complete customization.

To connect a **C1RichTextBoxToolbar** control to a **C1RichTextBox** control you would need to set the C1RichTextBoxToolbar.RichTextBox property to the name of the control you want to link with the toolbar. For an example, see Connecting a **C1RichTextBoxToolbar** to a **C1RichTextBox** topic.

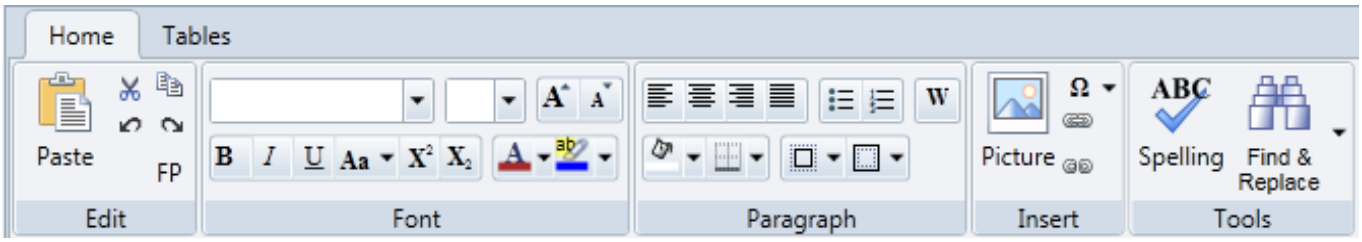
When you add the **C1RichTextBoxToolbar** to your application, it appears similar to the following:



The buttons within the toolbar appear very similar to options in Microsoft Word and other editors, so they should appear familiar to end-users. There are two tabs: **Home** and **Tables**.

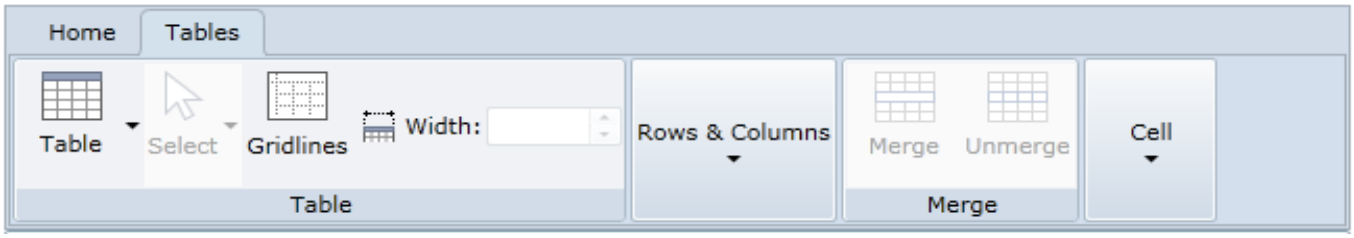
Home Tab

The **Home** tab includes five defined groups of elements: **Edit**, **Font**, **Paragraph**, **Insert**, and **Tools**.



Tables Tab

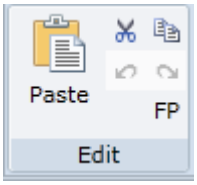
The **Tables** tab includes four defined groups of elements: **Table**, **Rows & Columns**, **Merge**, and **Cell**.



The following topics explain the elements within each group.

Edit Group

The **Edit** group provides standard editing tools, such as copy, paste, and undo. It looks similar to the following image:

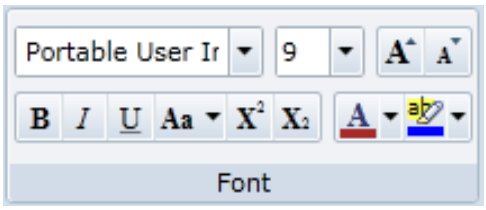


The **Edit** group includes the following options:

- **Paste**: Clicking the **Paste** button pastes the selected text into the **C1RichTextBox**. You can also paste text by pressing the CTRL + V key combination while text is selected.
- **Cut**: Clicking the **Cut** button cuts the selected text and places it on the clipboard. You can also cut text by pressing the CTRL + X key combination while text is selected.
- **Copy**: Clicking the **Copy** button copies the selected text so that it can be pasted into the **C1RichTextBox** or another application. You can also copy text by pressing the CTRL + C key combination while text is selected.
- **Undo**: Clicking the **Undo** button reverses the previous changes made to the content of the **C1RichTextBox**. The **Undo** button is not active unless changes have been made. You can also undo changes by pressing the CTRL + Z key combination.
- **Redo**: Clicking the **Redo** button after the **Undo** button has been clicked repeats the changes that had been previously reversed. The **Redo** button is not active unless the **Undo** button has been clicked. You can also redo changes by pressing the CTRL + Y key combination.
- **FP:** Clicking the **FP** button copies the formatting of the selected text and allows you to apply it to other text.

Font Group

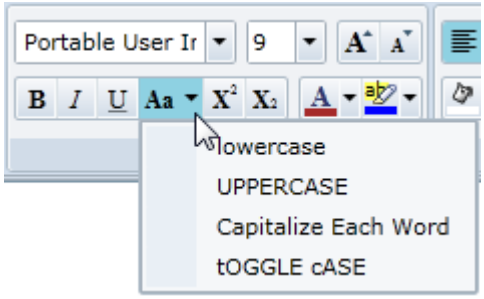
The **Font** group includes several options for customizing the font used in the C1RichTextBox control. The **Font** group appears similar to the following image:



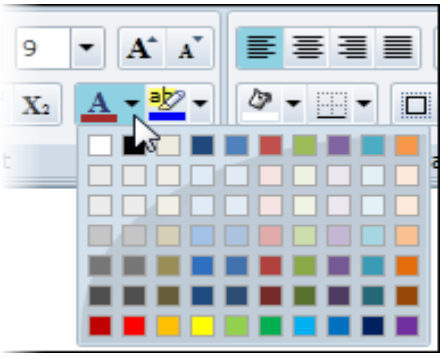
The **Font** group includes the following options:

- **Font**: The **Font** option is a drop-down list that allows you to choose the font that will be applied to text in the **C1RichTextBox** control. The default font is **Portable User Interface**.

- **Font Size**: The **Font Size** option is a drop-down list that allows you to choose the size of the font that will be applied to text in the **C1RichTextBox** control. The default font size is **9**.
- **Grow Font**: Clicking the **Grow Font** button increases the size of the selected text.
- **Shrink Font**: Clicking the **Shrink Font** button decreases the size of the selected text.
- **Bold**: Clicking the **Bold** button bolds or removes bolding from the selected text. You can also use Ctrl+b shortcut key to bold the text.
- **Italic**: Clicking the **Italic** button italicizes or removes italics from the selected text. You can also use Ctrl+i shortcut key to italicize the text.
- **Underline**: Clicking the **Underline** button underlines or removes underlining from the selected text. You can also use Ctrl+u shortcut key to underline the text.
- **Strikethrough** - Clicking the **Strikethrough** draws a line through text which indicates deletion of text in the document.
- **Change Case**: The **Change Case** option is a drop-down list that lists options that will change the case of the selected text. Options include: **lowercase**, **UPPERCASE**, **Capitalize Each Word**, and **tOGGLE cASE** (which turns lowercase text into uppercase text and uppercase text into lowercase text).



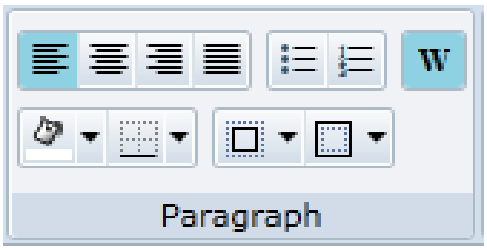
- **Superscript**: Clicking the **Superscript** button turns the selected text into superscript text (the text will appear placed higher vertically than text that is not superscript text).
- **Subscript**: Clicking the **Subscript** button turns the selected text into subscript text (the text will appear placed lower vertically than text that is not superscript text).
- **Font Color**: The **Font Color** option is a drop-down color picker that lists common colors that will change the color of the selected text.



- **Text Highlight Color**: The **Text Highlight Color** option is a drop-down color picker that lists common colors that will change the color of the background surrounding the selected text.

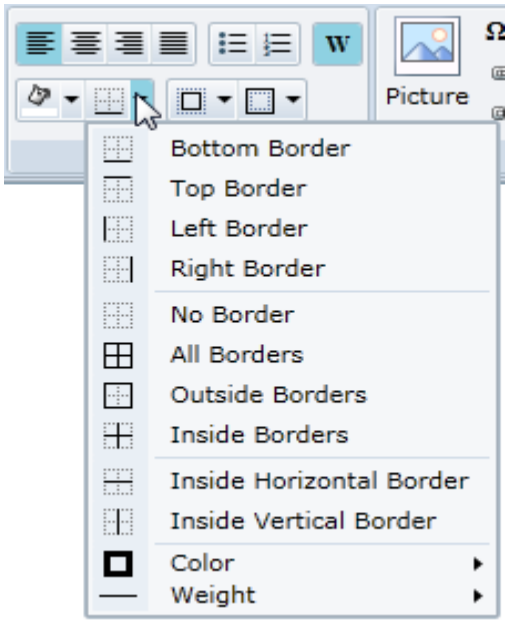
Paragraph Group

The **Paragraph** group includes several options for customizing the paragraph settings used in the C1RichTextBox control. The **Paragraph** group appears similar to the following image:



The **Paragraph** group includes the following options:

- **Align Text Left**: The **Align Text Left** option aligns the selected text so that it is left justified. This is the default alignment option.
- **Align Text Center**: The **Align Text Center** option aligns the selected text so that it is centered in the RichTextBox control.
- **Align Text Right**: The **Align Text Right** option aligns the selected text so that it is right justified.
- **Justify**: The **Justify** option spaces the selected text so that it is fully justified.
- **Bullets**: The **Bullets** option is a button that adds or removes bulleting from the selected text.
- **Numbering**: The **Numbering** option is a button that adds or removes numbering from the selected text.
- **Text Wrapping**: The **Text Wrapping** option determines if lines of text should be wrapped to fit in the RichTextBox. By default text is wrapped.
- **Borders**: The **Borders** drop-down box allows you to set the border color, thickness, and where the borders appear.

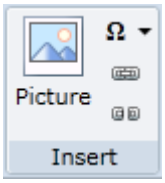


- **Paragraph Color**: The **Paragraph Color** option is a drop-down color picker that lists common colors that will change the color of the background of the entire paragraph. By default this option is set to **White**.

- **Margin**: The **Margin** drop-down box, allows you to set the margin thickness of the **Left**, **Right**, **Top**, and **Bottom** margins surrounding the text. By default the **Left**, **Right**, and **Top** values are set to **0** and the **Bottom** margin is set to **10**.
- **Padding**: The **Padding** drop-down box, allows you to set the padding space of the **Left**, **Right**, **Top**, and **Bottom** areas surrounding the selected text. By default these values are set to **0** and there is no padding.

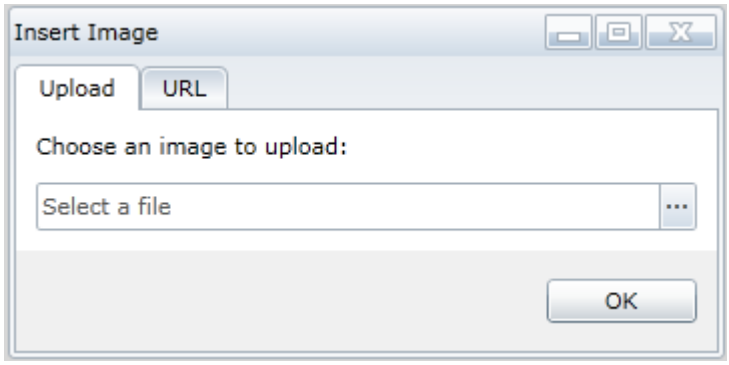
Insert Group

The **Insert** group allows inserting content in the C1RichTextBox control. The Insert group appears similar to the following image:

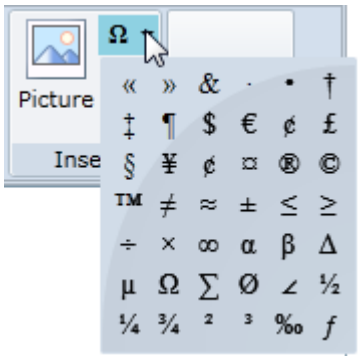


The **Insert** group includes the following options:

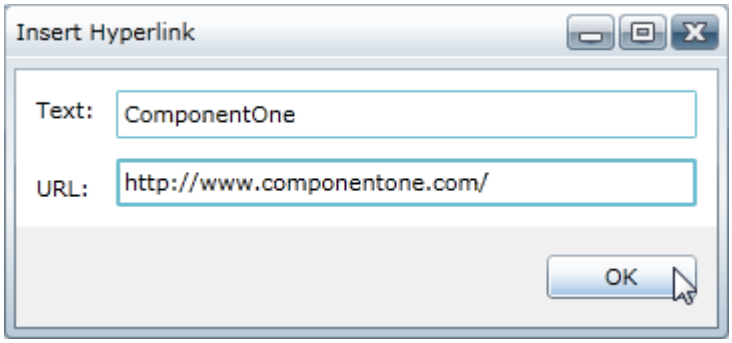
- **Insert Image**: Clicking the **Insert Image** button brings up the **Insert Image** dialog box which allows you to browse for and select an image to insert or enter a URL for the image to be inserted:



- **Insert Symbol**: Clicking the **Insert Symbol** option brings up a drop-down box that allows you to choose a symbol to insert into the RichTextBox:



- **Insert Hyperlink**: Clicking the **Insert Hyperlink** button brings up the **Insert Hyperlink** dialog box which allows you to enter the hyperlink text and URL to insert:



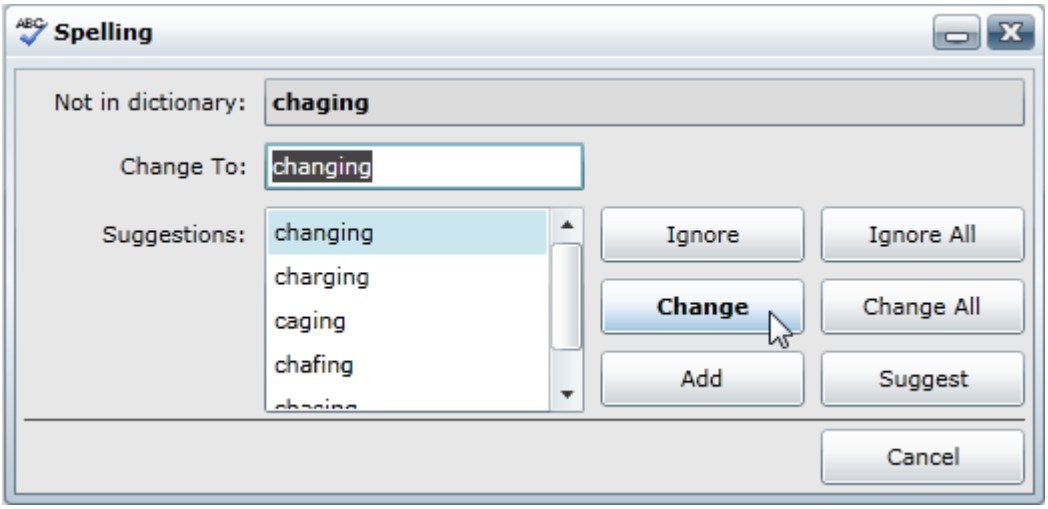
- **Remove Hyperlink**: Clicking the **Remove Hyperlink** button removes any hyperlinks within the selected text. Highlight the hyperlink in the RichTextBox and click the **Remove Hyperlink** button to remove the link.

Tools Group

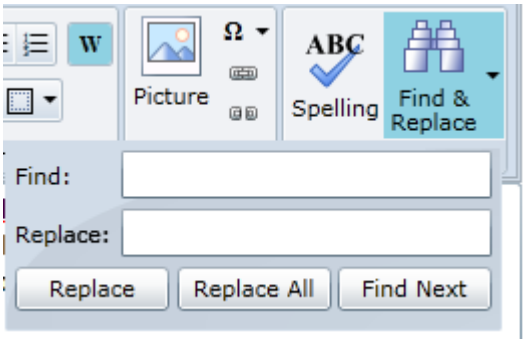
The **Tools** group allows manipulating and editing content in the C1RichTextBox control. The Tools group appears similar to the following image:

The **Tools** group includes the following options:

- **Spell Check**: Clicking the **Spell Check** button opens the **Spelling** dialog box. Note that spell-checking must be set up for this button to be active. See Spell-Checking for details. In the **Spelling** dialog box you can view suggested spellings and **Ignore** the error, **Ignore All** errors in instances of the same word, **Change** the current spelling to a suggested one, **Change All** instances of the current spelling, **Add** the current spelling to the spell-checking dictionary, **Suggest** to view additional spellings based on a suggested spelling, and **Cancel** to close the dialog box and cancel the spell-check operation.

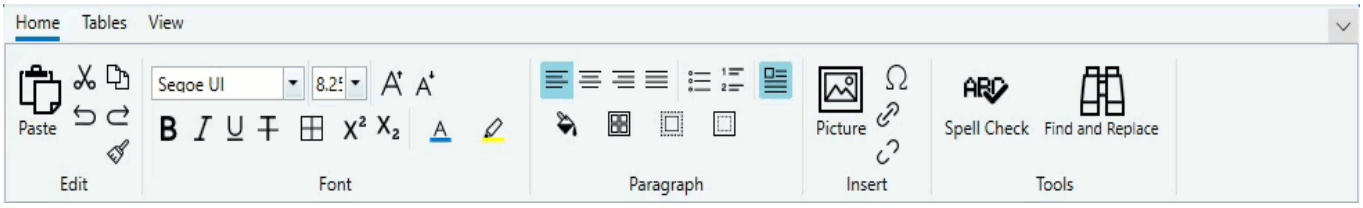


- **Find and Replace**: Clicking the **Find and Replace** option displays a drop-down box that allows you to enter text to find or find and replace in the content of the RichTextBox. You can **Replace** each instance one by one, **Replace All** instances, or **Find Next** instance.

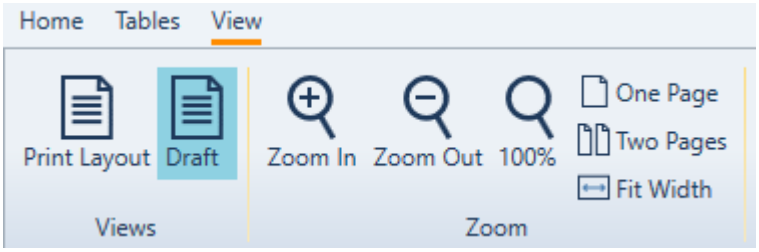


Working with C1SimplifiedRichTextBoxToolbar

The new **C1SimplifiedRichTextBoxToolbar** control is represented by the C1SimplifiedRichTextBoxToolbar class. It has new features and improvised look and feel in comparison to **C1RichTextBoxToolbar** as shown in GIF below.



C1SimplifiedRichTextBoxToolbar provides a wide set of formatting and editing features like C1RichTextBoxToolbar. Also, it contains a newly added **View Tab** which includes two defined group of elements; **Views** and **Zoom** as shown in the image below.



- The Views group allows you to view the document in Print Layout and Draft mode.
- The Zoom group allows you to Zoom In and Zoom out the document for specific purposes. It also allows you to view the document pages in multiple modes like One Page, Two Pages, and Fit Width.

In **C1SimplifiedRichTextBoxToolbar**, the **Home** Tab contains a new **Strikethrough** feature which indicates removal of text by a horizontal line drawn through it. For more information about the toolbar features, refer Working with C1RichTextBoxToolbar.

Quick Start

In this step, you create a new WPF application and add the **RichTextBox** and **SimplifiedRichTextBoxToolbar** controls in XAML. After completing this step, you have a mostly functional text-rich editor.

In Design View

To add the RichTextBox control to your WPF application in Design view, perform the following steps

1. Create a new WPF application in Visual Studio.
2. Navigate to the Toolbox and locate the **C1RichTextBox** and **C1SimplifiedRichTextBoxToolbar** controls.
3. Double-click the C1RichTextBox and C1SimplifiedRichTextBoxToolbar icons to add the controls to the MainWindow.
4. In the XAML view, add the relevant namespaces to the page by editing the MainWindow tags.

XAML copyCode

```
xmlns="http://schemas.microsoft.com/winfx/2006/xaml/presentation"
xmlns:x="http://schemas.microsoft.com/winfx/2006/xaml"
xmlns:c1="http://schemas.componentone.com/winfx/2006/xaml"
x:Class="RTBQuickStart.MainWindow"
Title="MainWindow" Height="350" Width="525">
```

5. Place the cursor between the <Grid> and </Grid> tags, click once, and add the following markup within the

<Grid> tags to add a **StackPanel** panel.

XAML copyCode

```
<StackPanel HorizontalAlignment="Left" Margin="0,10,0,0" x:Name="SP"
VerticalAlignment="Top" Height="418" Width="645" Grid.ColumnSpan="2"
Grid.Column="1"/>
```

6. Click between the StackPanel tags and add the following markup to edit the appearance and positioning of RichTextBox and SimplifiedRichTextBoxToolbar controls in the XAML view.

XAML

```
<c1:C1RichTextBox Name="c1RichTextBox1" Margin="0,127,0,10"/>
<c1:C1SimplifiedRichTextBoxToolbar RichTextBox="{Binding ElementName=
c1RichTextBox1}" Name="C1RTBTB" Margin="3,0,-3,197" />
```

You can enter text in the RichTextBox control and edit, format, and position the text using latest options in the SimplifiedRichTextBoxToolbar. To set up spell-checking and customize the application further, refer to RichTextBox for WPF Quick Start.

Elements Supported in RichTextBox

The following sections detail what HTML 4 elements, HTML attributes, CSS2 properties, and CSS selectors are supported in **RichTextBox for WPF**.

HTML Elements

RichTextBox for WPF and Silverlight supports several HTML 4 elements. The following table lists HTML elements by names and notes whether they are supported by **RichTextBox for WPF and Silverlight**.

Name	Supported
A	Yes
ABBR	Yes
ACRONYM	Yes
ADDRESS	Yes
APPLET	No
AREA	No
B	Yes
BASE	No
BASEFONT	Yes
BDO	No
BIG	Yes
BLOCKQUOTE	Yes
BODY	Yes
BR	Yes
BUTTON	No
CAPTION	No
CENTER	Yes
CITE	Yes
CODE	Yes
COL	Yes
COLGROUP	Yes
DD	Yes
DEL	Yes
DFN	Yes

DIR	Yes
DIV	Yes
DL	Yes
DT	Yes
EM	Yes
FIELDSET	No
FONT	Yes
FORM	No
FRAME	No
FRAMESET	No
H1	Yes
H2	Yes
H3	Yes
H4	Yes
H5	Yes
H6	Yes
HEAD	Yes
HR	Yes
HTML	Yes
I	Yes
IFRAME	No
IMG	Yes
INPUT	No
INS	Yes
ISINDEX	No
KBD	Yes
LABEL	Yes
LEGEND	No
LI	Yes
LINK	No
MAP	No
MENU	Yes
META	No
NOFRAMES	No

NOSCRIPT	No
OBJECT	No
OL	Yes
OPTGROUP	No
OPTION	No
P	Yes
PARAM	No
PRE	Yes
Q	No
S	Yes
SAMP	Yes
SCRIPT	No
SELECT	No
SMALL	Yes
SPAN	Yes
STRIKE	Yes
STRONG	Yes
STYLE	Yes
SUB	Yes
SUP	Yes
TABLE	Yes
TBODY	Yes
TD	Yes
TEXTAREA	No
TFOOT	Yes
TH	Yes
THEAD	Yes
TITLE	No
TR	Yes
TT	Yes
U	Yes
UL	Yes
VAR	Yes

HTML Attributes

RichTextBox for WPF and Silverlight supports several HTML 4 attribute. The following table lists HTML attributes by name and element and notes whether they are supported by **RichTextBox for** WPF and Silverlight.

Name	Elements	Supported
abbr	TD, TH	No
accept-charset	FORM	No
accept	FORM, INPUT	No
accesskey	A, AREA, BUTTON, INPUT, LABEL, LEGEND, TEXTAREA	No
action	FORM	No
align	CAPTION	No
align	APPLET, IFRAME, IMG, INPUT, OBJECT	No
align	LEGEND	No
align	TABLE	No
align	HR	No
align	DIV, H1, H2, H3, H4, H5, H6, P	Yes
align	COL, COLGROUP, TBODY, TD, TFOOT, TH, THEAD, TR	No
alink	BODY	No
alt	APPLET	No
alt	AREA, IMG	No
alt	INPUT	No
archive	APPLET	No
archive	OBJECT	No
axis	TD, TH	No
background	BODY	No
bgcolor	TABLE	Yes
bgcolor	TR	Yes
bgcolor	TD, TH	Yes
bgcolor	BODY	Yes
border	TABLE	Yes
border	IMG, OBJECT	Yes
cellpadding	TABLE	No
cellspacing	TABLE	Yes
char	COL, COLGROUP, TBODY, TD, TFOOT, TH, THEAD, TR	No

charoff	COL, COLGROUP, TBODY, TD, TFOOT, TH, THEAD, TR	No
charset	A, LINK, SCRIPT	No
checked	INPUT	No
cite	BLOCKQUOTE, Q	No
cite	DEL, INS	No
class	All elements but BASE, BASEFONT, HEAD, HTML, META, PARAM, SCRIPT, STYLE, TITLE	Yes
classid	OBJECT	No
clear	BR	No
code	APPLET	No
codebase	OBJECT	No
codebase	APPLET	No
codetype	OBJECT	No
color	BASEFONT, FONT	No
cols	FRAMESET	No
cols	TEXTAREA	No
colspan	TD, TH	Yes
compact	DIR, DL, MENU, OL, UL	No
content	META	No
coords	AREA	No
coords	A	No
data	OBJECT	No
datetime	DEL, INS	No
declare	OBJECT	No
defer	SCRIPT	No
dir	All elements but APPLET, BASE, BASEFONT, BDO, BR, FRAME, FRAMESET, IFRAME, PARAM, SCRIPT	No
dir	BDO	No
disabled	BUTTON, INPUT, OPTGROUP, OPTION, SELECT, TEXTAREA	No
enctype	FORM	No
face	BASEFONT, FONT	Yes
for	LABEL	No
frame	TABLE	Yes
frameborder	FRAME, IFRAME	No
headers	TD, TH	No

height	IFRAME	No
height	TD, TH	No
height	IMG, OBJECT	Yes
height	APPLET	No
href	A, AREA, LINK	Yes
href	BASE	No
hreflang	A, LINK	No
hspace	APPLET, IMG, OBJECT	Yes
http-equiv	META	No
id	All elements but BASE, HEAD, HTML, META, SCRIPT, STYLE, TITLE	Yes
ismap	IMG, INPUT	No
label	OPTION	No
label	OPTGROUP	No
lang	All elements but APPLET, BASE, BASEFONT, BR, FRAME, FRAMESET, IFRAME, PARAM, SCRIPT	No
language	SCRIPT	No
link	BODY	No
longdesc	IMG	No
longdesc	FRAME, IFRAME	No
marginheight	FRAME, IFRAME	No
marginwidth	FRAME, IFRAME	No
maxlength	INPUT	No
media	STYLE	No
media	LINK	No
method	FORM	No
multiple	SELECT	No
name	BUTTON, TEXTAREA	No
name	APPLET	No
name	SELECT	No
name	FORM	No
name	FRAME, IFRAME	No
name	IMG	No
name	A	No
name	INPUT, OBJECT	No
name	MAP	No

name	PARAM	No
name	META	No
nohref	AREA	No
noresize	FRAME	No
noshade	HR	No
nowrap	TD, TH	No
object	APPLET	No
onblur	A, AREA, BUTTON, INPUT, LABEL, SELECT, TEXTAREA	No
onchange	INPUT, SELECT, TEXTAREA	No
onclick	All elements but APPLET, BASE, BASEFONT, BDO, BR, FONT, FRAME, FRAMESET, HEAD, HTML, IFRAME, ISINDEX, META, PARAM, SCRIPT, STYLE, TITLE	No
ondblclick	All elements but APPLET, BASE, BASEFONT, BDO, BR, FONT, FRAME, FRAMESET, HEAD, HTML, IFRAME, ISINDEX, META, PARAM, SCRIPT, STYLE, TITLE	No
onfocus	A, AREA, BUTTON, INPUT, LABEL, SELECT, TEXTAREA	No
onkeydown	All elements but APPLET, BASE, BASEFONT, BDO, BR, FONT, FRAME, FRAMESET, HEAD, HTML, IFRAME, ISINDEX, META, PARAM, SCRIPT, STYLE, TITLE	No
onkeypress	All elements but APPLET, BASE, BASEFONT, BDO, BR, FONT, FRAME, FRAMESET, HEAD, HTML, IFRAME, ISINDEX, META, PARAM, SCRIPT, STYLE, TITLE	No
onkeyup	All elements but APPLET, BASE, BASEFONT, BDO, BR, FONT, FRAME, FRAMESET, HEAD, HTML, IFRAME, ISINDEX, META, PARAM, SCRIPT, STYLE, TITLE	No
onload	FRAMESET	No
onload	BODY	No
onmousedown	All elements but APPLET, BASE, BASEFONT, BDO, BR, FONT, FRAME, FRAMESET, HEAD, HTML, IFRAME, ISINDEX, META, PARAM, SCRIPT, STYLE, TITLE	No
onmousemove	All elements but APPLET, BASE, BASEFONT, BDO, BR, FONT, FRAME, FRAMESET, HEAD, HTML, IFRAME, ISINDEX, META, PARAM, SCRIPT, STYLE, TITLE	No
onmouseout	All elements but APPLET, BASE, BASEFONT, BDO, BR, FONT, FRAME, FRAMESET, HEAD, HTML, IFRAME, ISINDEX, META, PARAM, SCRIPT, STYLE, TITLE	No
onmouseover	All elements but APPLET, BASE, BASEFONT, BDO, BR, FONT, FRAME, FRAMESET, HEAD, HTML, IFRAME, ISINDEX, META, PARAM, SCRIPT, STYLE, TITLE	No
onmouseup	All elements but APPLET, BASE, BASEFONT, BDO, BR, FONT, FRAME, FRAMESET, HEAD, HTML, IFRAME, ISINDEX, META, PARAM, SCRIPT, STYLE,	No

	TITLE	
onreset	FORM	No
onselect	INPUT, TEXTAREA	No
onsubmit	FORM	No
onunload	FRAMESET	No
onunload	BODY	No
profile	HEAD	No
prompt	ISINDEX	No
readonly	TEXTAREA	No
readonly	INPUT	No
rel	A, LINK	No
rev	A, LINK	No
rows	FRAMESET	No
rows	TEXTAREA	No
rowspan	TD, TH	Yes
rules	TABLE	Yes
scheme	META	No
scope	TD, TH	No
scrolling	FRAME, IFRAME	No
selected	OPTION	No
shape	AREA	No
shape	A	No
size	HR	No
size	FONT	No
size	INPUT	No
size	BASEFONT	No
size	SELECT	No
span	COL	No
span	COLGROUP	No
src	SCRIPT	No
src	INPUT	No
src	FRAME, IFRAME	No
src	IMG	No
standby	OBJECT	No

start	OL	Yes
style	All elements but BASE, BASEFONT, HEAD, HTML, META, PARAM, SCRIPT, STYLE, TITLE	Yes
summary	TABLE	No
tabindex	A, AREA, BUTTON, INPUT, OBJECT, SELECT, TEXTAREA	No
target	A, AREA, BASE, FORM, LINK	No
text	BODY	No
title	All elements but BASE, BASEFONT, HEAD, HTML, META, PARAM, SCRIPT, TITLE	Yes
type	A, LINK	No
type	OBJECT	No
type	PARAM	No
type	SCRIPT	No
type	STYLE	No
type	INPUT	No
type	LI	No
type	OL	No
type	UL	No
type	BUTTON	No
usemap	IMG, INPUT, OBJECT	No
valign	COL, COLGROUP, TBODY, TD, TFOOT, TH, THEAD, TR	Yes
value	INPUT	No
value	OPTION	No
value	PARAM	No
value	BUTTON	No
value	LI	No
valuetype	PARAM	No
version	HTML	No
vlink	BODY	No
vspace	APPLET, IMG, OBJECT	Yes
width	HR	No
width	IFRAME	No
width	IMG, OBJECT	Yes
width	TABLE	No
width	TD, TH	No

width	APPLET	No
width	COL	Yes
width	COLGROUP	No
width	PRE	No

CSS2 Properties

RichTextBox for WPF and Silverlight supports several CSS2 properties. The following table lists CSS2 properties by name and media group and notes whether they are supported by **RichTextBox for** WPF and Silverlight.

Name	Media groups	Supported	Comments
azimuth	aural	No	
background-attachment	visual	No	
background-color	visual	Yes	
background-image	visual	Yes	The image is not repeated.
background-position	visual	No	
background-repeat	visual	No	
background	visual	Yes	Only supports color and image.
border-collapse	visual	Yes	
border-color	visual	Yes	
border-spacing	visual	Yes	
border-style	visual	Yes	Supports 'none', 'hidden', and solid. Other values are treated as solid.
border-top border-right border-bottom border-left	visual	Yes	
border-top-color border-right-color border-bottom-color border-left-color	visual	Yes	
border-top-style border-right-style border-bottom-style border-left-style	visual	Yes	
border-top-width border-right-width border-bottom-width border-left-width	visual	Yes	
border-width	visual	Yes	
border	visual	Yes	
bottom	visual	No	

caption-side	visual	No	
clear	visual	No	
clip	visual	No	
color	visual	Yes	
content	all	No	
counter-increment	all	No	
counter-reset	all	No	
cue-after	aural	No	
cue-before	aural	No	
cue	aural	No	
cursor	visual, interactive	Yes	All values except crosshair, move, progress, help, and <uri>.
direction	visual	No	
display	all	Yes	All values except run-in, inline-block, inline-table, and table-caption.
elevation	aural	No	
empty-cells	visual	No	
float	visual	No	
font-family	visual	Yes	
font-size	visual	Yes	
font-style	visual	Yes	
font-variant	visual	No	
font-weight	visual	Yes	
font	visual	Yes	
height	visual	Yes	Only in img elements.
left	visual	No	
letter-spacing	visual	No	
line-height	visual	Yes	
list-style-image	visual	Yes	
list-style-position	visual	No	
list-style-type	visual	Yes	All values except georgian, armenian and, lower-greek.
list-style	visual	Yes	
margin-right margin-left	visual	Yes	
margin-top margin-bottom	visual	Yes	

margin	visual	Yes	
max-height	visual	No	
max-width	visual	No	
min-height	visual	No	
min-width	visual	No	
orphans	visual, paged	No	
outline-color	visual, interactive	No	
outline-style	visual, interactive	No	
outline-width	visual, interactive	No	
outline	visual, interactive	No	
overflow	visual	No	
padding-top padding-right padding-bottom padding-left	visual	Yes	
padding	visual	Yes	
page-break-after	visual, paged	No	
page-break-before	visual, paged	No	
page-break-inside	visual, paged	No	
pause-after	aural	No	
pause-before	aural	No	
pause	aural	No	
pitch-range	aural	No	
pitch	aural	No	
play-during	aural	No	
position	visual	No	
quotes	visual	No	
richness	aural	No	
right	visual	No	
speak-header	aural	No	
speak-numeral	aural	No	
speak-punctuation	aural	No	
speak	aural	No	
speech-rate	aural	No	
stress	aural	No	
table-layout	visual	No	

text-align	visual	Yes	
text-decoration	visual	Yes	
text-indent	visual	Yes	
text-transform	visual	No	
top	visual	No	
unicode-bidi	visual	No	
vertical-align	visual	Yes	All values except <percentage> and <length>.
visibility	visual	Yes	
voice-family	aural	No	
volume	aural	No	
white-space	visual	Yes	Nowrap and pre are treated like normal and pre-wrap.
widows	visual, paged	No	
width	visual	Yes	Only in img elements.
word-spacing	visual	No	
z-index	visual	No	

CSS2 Selectors

RichTextBox for WPF and Silverlight supports several CSS2 selectors. The following table lists CSS2 selectors by pattern and CSS level and notes whether they are supported by **RichTextBox for** WPF and Silverlight.

Pattern	CSS level	Supported
*	2	Yes
E	1	Yes
E[foo]	2	Yes
E[foo="bar"]	2	Yes
E[foo~="bar"]	2	Yes
E[foo^="bar"]	3	Yes
E[foo$="bar"]	3	Yes
E[foo*="bar"]	3	Yes
E[foo|="en"]	2	Yes
E:root	3	No
E:nth-child(n)	3	No

E:nth-last-child(n)	3	No
E:nth-of-type(n)	3	No
E:nth-last-of-type(n)	3	No
E:first-child	2	No
E:last-child	3	No
E:first-of-type	3	No
E:last-of-type	3	No
E:only-child	3	No
E:only-of-type	3	No
E:empty	3	No
E:link	1	No
E:visited	1	No
E:active	2	No
E:hover	2	No
E:focus	2	No
E:target	3	No
E:lang(fr)	2	No
E:enabled	3	No
E:disabled	3	No
E:checked	3	No
E::first-line	1	No
E::first-letter	1	No
E::before	2	No
E::after	2	No
E.warning	1	No
E#myid	1	Yes
E:not(s)	3	No
E F	1	Yes
E > F	2	Yes
E + F	2	Yes
E ~ F	3	Yes

C1RichTextBox Appearance

The following topics detail how to customize the C1RichTextBox control's layout and appearance. You can use ComponentOne ClearStyle Technology to quickly style pieces of the grid. Themes allow you to customize the appearance of the grid and take advantage of WPF's XAML-based styling.

ComponentOne ClearStyle Technology

ClearStyle technology is a new, quick and easy approach to providing Silverlight and WPF control styling. **ClearStyle** allows you to create a custom style for a control without having to deal with the hassle of XAML templates and style resources.

Currently, to add a theme to all standard WPF controls, you must create a style resource template. In Microsoft Visual Studio, this process can be difficult; this is why Microsoft introduced Expression Blend to make the task a bit easier. Having to jump between two environments can be a bit challenging to developers who are not familiar with Blend or do not have the time to learn it. You could hire a designer, but that can complicate things when your designer and your developers are sharing XAML files.

That's where **ClearStyle** comes in. With **ClearStyle**, the styling capabilities are brought to you in Visual Studio in the most intuitive manner possible. In most situations you just want to make simple styling changes to the controls in your application so this process should be simple. For example, if you just want to change the row color of your data grid this should be as simple as setting one property. You shouldn't have to create a full and complicated-looking template just to simply change a few colors.

How ClearStyle Works

Each key piece of the control's style is surfaced as a simple color property. This leads to a unique set of style properties for each control. For example, a **Gauge** has **PointerFill** and **PointerStroke** properties, whereas a **DataGrid** has **SelectedBrush** and **MouseOverBrush** for rows.

Let's say you have a control on your form that does not support **ClearStyle**. You can take the XAML resource created by **ClearStyle** and use it to help mold other controls on your form to match (such as grabbing exact colors). Or let's say you'd like to override part of a style set with **ClearStyle** (such as your own custom scrollbar). This is also possible because **ClearStyle** can be extended and you can override the style where desired.

ClearStyle is intended to be a solution to quick and easy style modification but you're still free to do it the old fashioned way with ComponentOne's controls to get the exact style needed. **ClearStyle** does not interfere with those less common situations where a full custom design is required.

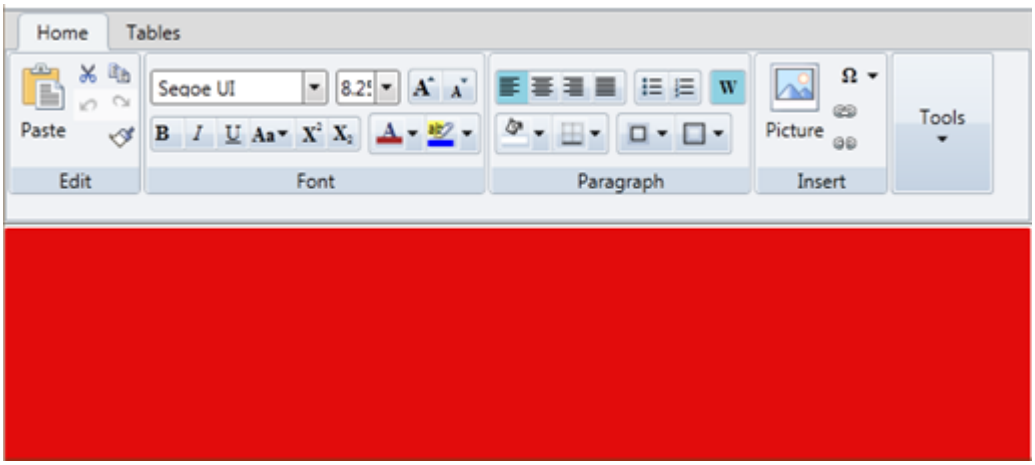
C1RichTextBox ClearStyle Properties

RichTextBox for WPF and Silverlight supports ComponentOne's new **ClearStyle** technology that allows you to easily change control colors without having to change control templates. By just setting a few color properties you can quickly style the control.

The following table outlines the brush properties of the C1RichTextBox control:

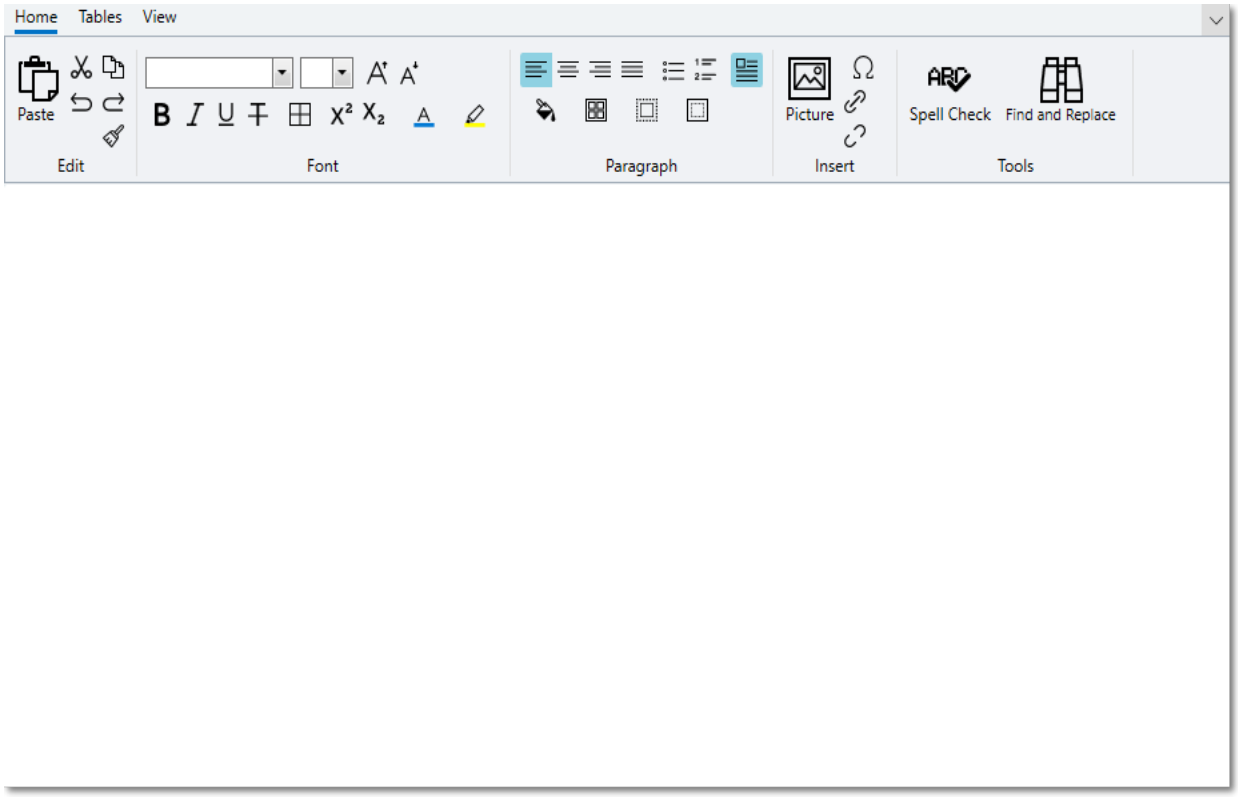
Brush	Description
Background	Gets or sets the brush of the control's background.
BorderBrush	Gets or sets the brush of the control's border.
SelectionBackground	Gets or sets the brush used to fill the background of the selected text.
SelectionForeground	Gets or sets the brush used to fill the foreground of the selected text.

You can completely change the appearance of the **C1RichTextBox** control by setting one or more properties, For example, if you set the **Background** property to "# FFE20C0C ", the **C1RichTextBox** control would appear similar to the following:

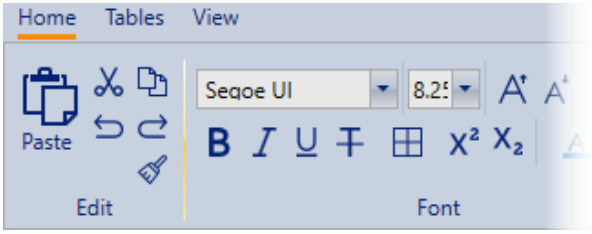
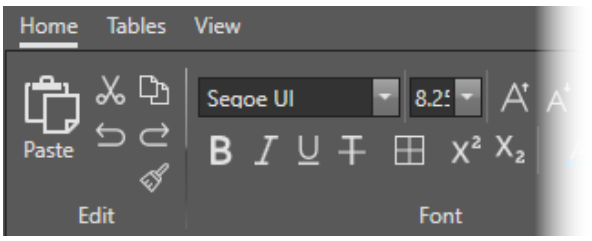
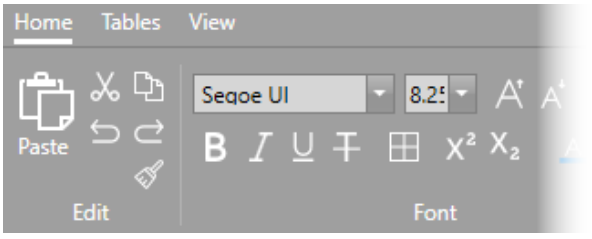


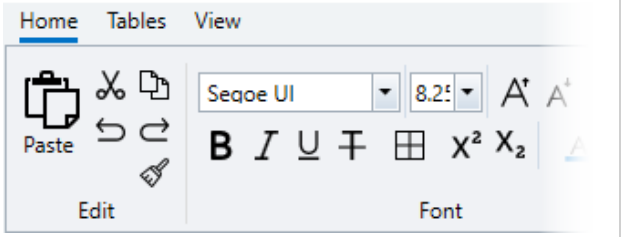
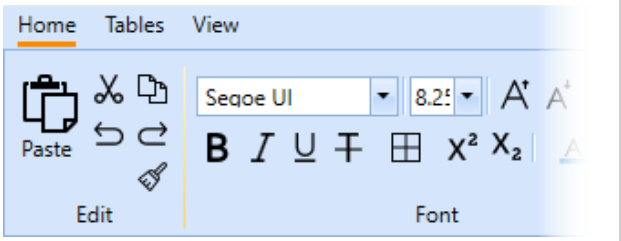
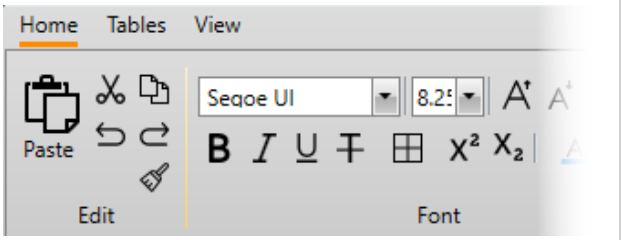
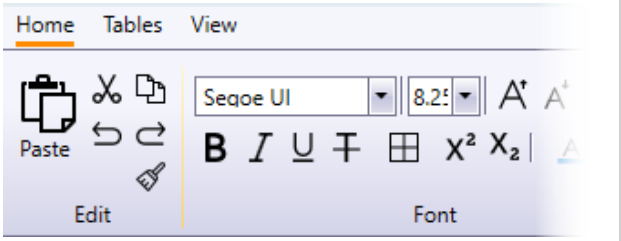
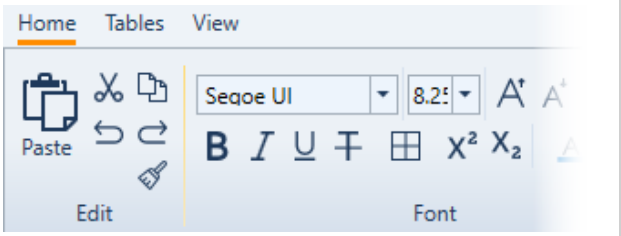
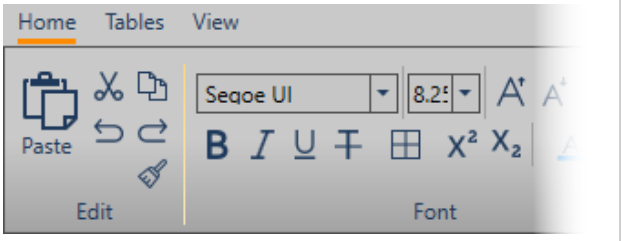
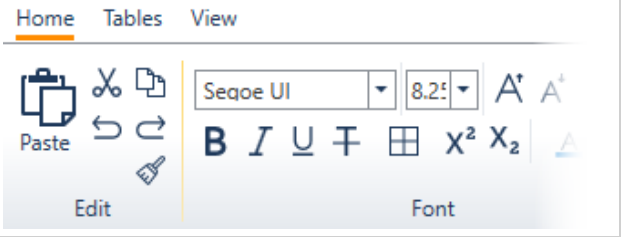
C1RichTextBox Themes

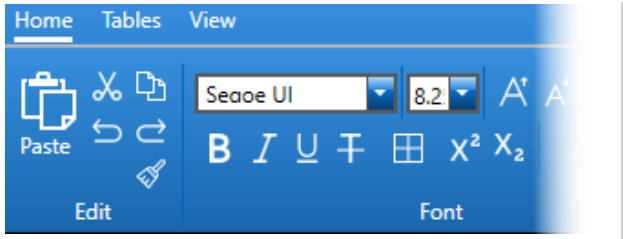
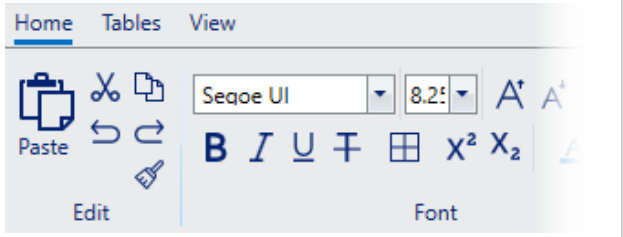
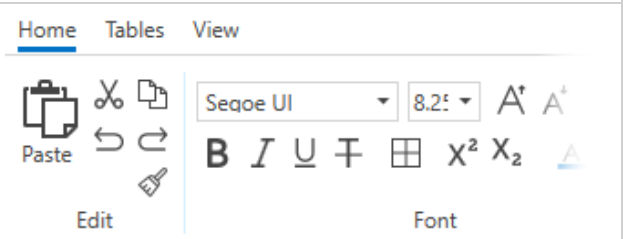
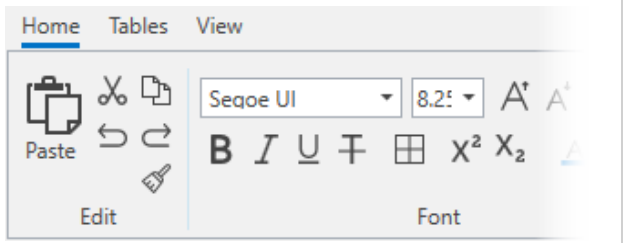
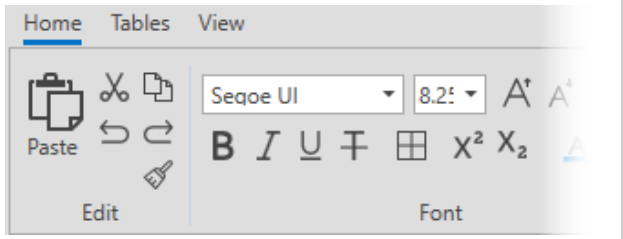
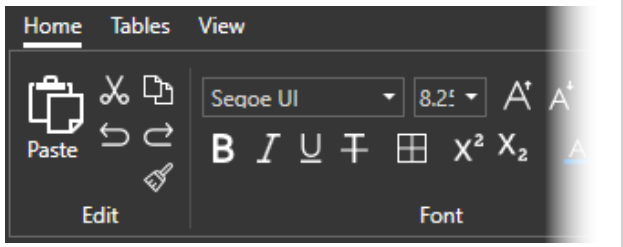
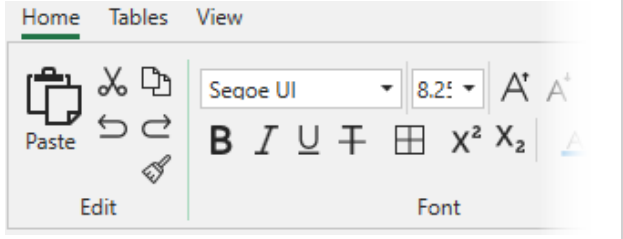
RichTextBox for WPF and Silverlight incorporates several themes that allow you to customize the appearance of your grid. When you first add a C1RichTextBox control to the page, it appears similar to the following image:

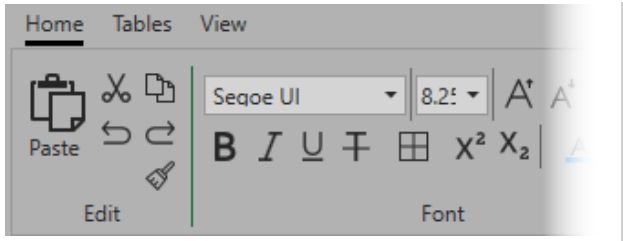
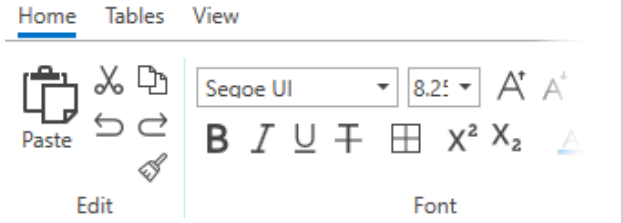
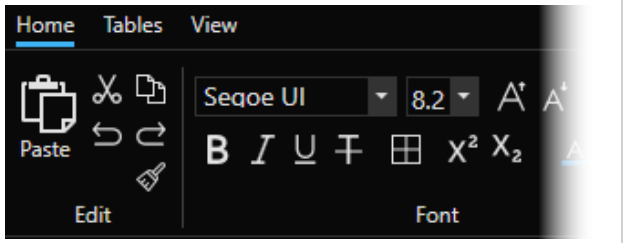
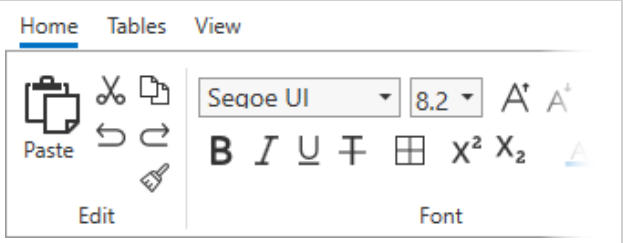


This is the control's default appearance using **C1SimplifiedRichTextBoxToolbar**. You can change this appearance by using one of the built-in themes or by creating your own custom theme. All of the built-in themes are based on WPF Toolkit themes. The built-in themes are described and pictured below; note that in the images below, **C1SimplifiedRichTextBoxToolbar** has been selected to show selected styles:

Theme Name	Theme Preview
C1ThemeBureauBlack	
C1ThemeExpressionDark	
C1ThemeExpressionLight	

C1Blue	
C1ThemeOffice2007Blue	
C1ThemeOffice2007Black	
C1ThemeOffice2007Silver	
C1ThemeOffice2010Blue	
C1ThemeOffice2010Black	
C1ThemeOffice2010Silver	

C1ThemeShinyBlue	
C1ThemeWhistlerBlue	
C1ThemeOffice2013White	
C1ThemeOffice2013LightGray	
C1ThemeOffice2013DarkGray	
C1ThemeOffice2016Black	
C1ThemeOffice2016Colorful	

C1ThemeOffice2016DarkGray	
C1ThemeOffice2016White	
C1ThemeCosmopolitanDark	
C1ThemeCosmopolitan	

To set an element's theme, use the **ApplyTheme** method. First add a reference to the theme assembly to your project, and then set the theme in code, like this:

Visual Basic

```
Private Sub Window_Loaded(sender As System.Object, e As System.Windows.RoutedEventArgs)
Handles MyBase.Loaded
   Dim theme As New C1ThemeExpressionDark
   ' Using ApplyTheme
   C1Theme.ApplyTheme(LayoutRoot, theme)
```

C#

```
private void Window_Loaded(object sender, RoutedEventArgs e)
   {
      C1ThemeExpressionDark theme = new C1ThemeExpressionDark();
      //Using ApplyTheme
      C1Theme.ApplyTheme(LayoutRoot, theme);
   }
```

To apply a theme to the entire application, use the **System.Windows.ResourceDictionary.MergedDictionaries** property. First add a reference to the theme assembly to your project, and then set the theme in code, like this:

Visual Basic

```
Private Sub Window_Loaded(sender As System.Object, e As System.Windows.RoutedEventArgs)
Handles MyBase.Loaded
   Dim theme As New C1ThemeExpressionDark
   ' Using Merged Dictionaries
```

```
Application.Current.Resources.MergedDictionaries.Add(C1Theme.GetCurrentThemeResources(theme))
End Sub
```

C#

```
private void Window_Loaded(object sender, RoutedEventArgs e)
   {
      C1ThemeExpressionDark theme = new C1ThemeExpressionDark();
      //Using Merged Dictionaries
Application.Current.Resources.MergedDictionaries.Add(C1Theme.GetCurrentThemeResources(theme));
   }
```

Note that this method works only when you apply a theme for the first time. If you want to switch to another ComponentOne theme, first remove the previous theme from **Application.Current.Resources.MergedDictionaries**.

C1RichTextBox Samples

Please be advised that this ComponentOne software tool is accompanied by various sample projects and/or demos which may make use of other development tools included with the ComponentOne Studio.

Samples can be accessed from the **ComponentOne Control Explorer**. Please refer to the pre installed samples through the following paths:

Documents\ComponentOne Samples\WPF

or

Documents\ComponentOne Samples\Silverlight

The following pages within the **ControlExplorer** sample installed with **WPF Edition** detail the **C1RichTextBox** control's functionality:

C# Sample

Sample	Description
RichTextBoxSamples	Shows a demo, how to check spelling as you type, and formatting in the C1RichTextBox control.

RichTextBox for Silverlight Samples

If you just installed **Silverlight Edition**, open Visual Studio 2008 and load the **Samples.sln** solution located in the **Documents\ComponentOne Samples\Silverlight** folder. This solution contains all the samples that ship with this release. Each sample has a readme.txt file that describes it and two projects named as follows:

<SampleName>	Silverlight project (client-side project)
<SampleName>Web	ASP.NET project that hosts the Silverlight project (server-side project)

To run a sample, right-click the **<SampleName>Web** project in the Solution Explorer, select **Set as Startup Project**, and press **F5**.

The following topics, organized by folder, describe each of the included samples.

Annotations Sample

The **Annotations** sample is installed in the **C1.Silverlight.RichTextBox\Annotations** folder in the samples directory.

This sample shows how to use the C1RichTextBox control in the C1.Silverlight.RichTextBox.dll assembly. The sample demonstrates adding notes and annotations to text in the **C1RichTextBox** control.

C1.Silverlight.RichTextBox.RtfFilter Sample

The **C1.Silverlight.RichTextBox.RtfFilter** sample is installed in the **C1.Silverlight.RichTextBox\C1.Silverlight.RichTextBox.RtfFilter** folder in the samples directory.

This sample shows how to use the C1RichTextBox control in the C1.Silverlight.RichTextBox.dll assembly. The sample demonstrates the filter required to import/export Rich Text Format documents from/to the **C1RichTextBox** control. This sample project includes elements that are incorporated in other sample projects.

C1.Silverlight.RichTextBox.Toolbar Sample

The **C1.Silverlight.RichTextBox.Toolbar** sample is installed in the **C1.Silverlight.RichTextBox\C1.Silverlight.RichTextBox.Toolbar** folder in the samples directory.

This sample shows how to use the C1RichTextBox control in the C1.Silverlight.RichTextBox.dll assembly. The sample demonstrates a toolbar that attaches to a **C1RichTextBox** control and provides common formatting commands. This sample project includes elements that are incorporated in other sample projects.

C1RichTextBox_Localization Sample

The **C1RichTextBox_Localization** sample is installed in the **C1.Silverlight.RichTextBox\C1RichTextBox_Localization** folder in the samples directory.

This sample shows how to use the C1RichTextBox control in the C1.Silverlight.RichTextBox.dll assembly and demonstrates how **C1RichTextBox**'s toolbar is localized. This sample sets the current culture of the application to

Spanish to show **C1RichTextBox**'s toolbar localized. The toolbar ships localized inseveral languages, and new languages can be added by developers.

PdfExport Sample

The **PdfExport** sample is installed in the **C1.Silverlight.RichTextBox\PdfExport** folder in the samples directory.

This sample shows how to use the C1RichTextBox control in the C1.Silverlight.RichTextBox.dll assembly and shows how to support a way to export the content of a **C1RichTextBox** control to a PDF. The export is done in the server and it requires the **C1Pdf** component.

Printing Sample

The **Printing** sample is installed in the **C1.Silverlight.RichTextBox\PrintHtml** folder in the samples directory.

This sample shows how to print the content of a rich text box or a data grid. This sample shows how to print the content of a RichTextBox. It takes the HTML and shows a browser window with the preview and the printing dialog box. In the data grid case it builds the HTML using properties of the grid.

RichTextBoxSamples Sample

The **RichTextBoxSamples** sample is installed in the **C1.Silverlight.RichTextBox\RichTextBoxSamples** folder in the samples directory.

This sample shows how to use the C1RichTextBox control in the C1.Silverlight.RichTextBox.dll assembly and samples of the rich text box control. This sample includes the following examples:

- Spell checking
- HTML import /export
- RTF import /export

SyntaxHighlight Sample

The **SyntaxHighlight** sample is installed in the **C1.Silverlight.RichTextBox\SyntaxHighlight** folder in the samples directory.

This sample shows how to use the C1RichTextBox control in the C1.Silverlight.RichTextBox.dll assembly and shows how to use **C1RichTextBox** to implement an editor with syntax highlighting. This sample demonstrates the **StyleOverride** feature of **C1RichTextBox** to implement a syntax highlighted editor with great performance. The **StyleOverride** feature allows easy and fast styling of sections of a document, without modifying it. Multiple layers of style overrides can be used to display different information, like syntax highlighting or spell checking.

C1RichTextBox Task-Based Help

The task-based help assumes that you are familiar with programming in Visual Studio and know how to use the C1RichTextBox control in general. If you are unfamiliar with the **RichTextBox for WPF** product, please see the RichTextBox for WPF Quick Start first.

Each topic in this section provides a solution for specific tasks using the **RichTextBox for WPF** product.

Each task-based help topic also assumes that you have created a new WPF project.

Setting the Text Content

The C1RichTextBox.Text property determines the text content of the C1RichTextBox control. By default the **C1RichTextBox** control starts blank and without content but you can customize this at design time, in XAML, and in code. Note that you can also set HTML markup as the control's content. See Setting the HTML Content for details.

At Design Time

To set the **C1RichTextBox.Text** property, complete the following steps:

1. Click the **C1RichTextBox** control once to select it.
2. Navigate to the Properties window, and enter text, for example "Hello World!", in the text box next to the **C1RichTextBox.Text** property.

This will set the **C1RichTextBox.Text** property to the value you chose.

In XAML

For example, to set the **C1RichTextBox.Text** property addText="Hello World!" to the <c1rtb:C1RichTextBox> tag so that it appears similar to the following:

<c1rtb:C1RichTextBox HorizontalAlignment="Left" Margin="10,10,0,0" Name="C1RichTextBox1" VerticalAlignment="Top" Height="83" Width="208" **Text="Hello World!"** />

In Code

For example, to set the **C1RichTextBox.Text** property add the following code to your project:

Visual Basic

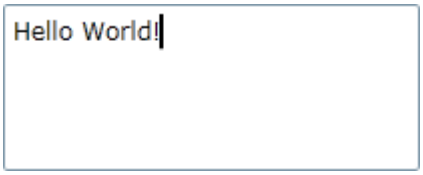
```
C1RichTextBox1.Text = "Hello World!"
```

C#

```
c1RichTextBox1.Text = "Hello World!";
```

What You've Accomplished

You've set the text content of the **C1RichTextBox** control. Run your application and observe that initially "Hello World!" (or the text you chose) will appear in the control:



Note that you can also set HTML markup as the control's content. See Setting the HTML Content for details.

Setting the HTML Content

The C1RichTextBox.Html property determines the HTML markup content of the C1RichTextBox control. By default the **C1RichTextBox** control starts blank and without content but you can customize this at design time, in XAML, and in code. Note that you can also set text as the control's content. See Setting the Text Content for details.

At Design Time

To set the **C1RichTextBox.Html** property, complete the following steps:

1. Click the **C1RichTextBox** control once to select it.
2. Navigate to the Properties window, and enter text, for example "<h1>Hello World!</h1>", in the text box next to the **C1RichTextBox.Html** property.

This will set the **C1RichTextBox.Html** property to the value you chose.

In XAML

For example, to set the **C1RichTextBox.Html** property addHtml="Hello World!" to the <c1rtb:C1RichTextBox> tag so that it appears similar to the following:

```
<c1rtb:C1RichTextBox HorizontalAlignment="Left" Margin="10,10,0,0" Name="C1RichTextBox1"
VerticalAlignment="Top" c1:C1NagScreen.Nag="True" Height="83" Width="208" Html="&lt;h1&gt;Hello
World!&lt;/h1&gt;" />
```

In Code

For example, to set the **C1RichTextBox.Html** property add the following code to your project:

Visual Basic

```
Me.C1RichTextBox1.Html = "&lt;h1&gt;Hello World!&lt;/h1&gt;"
```

C#

```
this.c1RichTextBox1.Html = "&lt;h1&gt;Hello World!&lt;/h1&gt;";
```

What You've Accomplished

You've set the text content of the **C1RichTextBox** control. Note that you had to represent angle brackets (< >) as "<" and ">". Run your application and observe that initially "Hello World!" (or the text you chose) will appear in the control in large text:

Note that you can also set text as the control's content. See Setting the Text Content for details. For an example of adding a hyperlink to the content of the **C1RichTextBox** control, see the Hyperlinks topic.

Connecting a C1RichTextBoxToolbar to a C1RichTextBox

To connect a C1RichTextBoxToolbar control to a C1RichTextBox control you would need to set the C1RichTextBoxToolbar.RichTextBox property to the name of the control you want to link with the toolbar. You can connect a **C1RichTextBoxToolbar** control to a **C1RichTextBox** control at design time, in XAML, and in code.

At Design Time

To set the **C1RichTextBoxToolbar.RichTextBox** property in Microsoft Expression Blend, complete the following

steps:

1. Click the **C1RichTextBox** control once to select it.
2. Navigate to the Properties window, and click the **Advanced Options** button next to the **C1RichTextBoxToolbar.RichTextBox** property.
3. In the **Create Data Binding** dialog box, click the **Element Property** tab.
4. In the **Element Property** tab, select the **C1RichTextBox1** item and click **OK**.

This will set the **C1RichTextBoxToolbar.RichTextBox** property to **C1RichTextBox1**.

In XAML

For example, to set the **C1RichTextBoxToolbar.RichTextBox** property addRichTextBox="{Binding ElementName=C1RichTextBox1}" to the <c1rtb:C1RichTextBox> tag so that it appears similar to the following:

<c1rtb:C1RichTextBox HorizontalAlignment="Left" Margin="10,10,0,0" Name="C1RichTextBox1" VerticalAlignment="Top" c1:C1NagScreen.Nag="True" Height="83" Width="208" RichTextBox="{Binding ElementName=C1RichTextBox1}" />

In Code

For example, to set the **C1RichTextBoxToolbar.RichTextBox** property add the following code to your project:

Visual Basic

```
Me.C1RichTextBoxToolbar1.RichTextBox = C1RichTextBox1
```

C#

```
this.c1RichTextBoxToolbar1.RichTextBox = c1RichTextBox1;
```

What You've Accomplished

You've linked a **C1RichTextBoxToolbar** to a **C1RichTextBox** control. Now when you type text in the **C1RichTextBox**, for example, change the content appearance, for example, the font. For more information about the **C1RichTextBox** control, see the Working with C1RichTextBoxToolbar topics.

Implementing a Simple Formatting Toolbar

While you can use the C1RichTextBox control to add a full toolbar to use with the **C1RichTextBox** control, you can also easily create your own simple toolbar. Most rich editors include a toolbar with buttons that format the current selection, making it bold, italic, or underlined. The buttons also change state when you move the selection, to show that the selected text is bold, italic, underlined, and so on.

Implementing a simple toolbar with the **C1RichTextBox** is easy. For example, complete the following steps:

1. In the Solution Explorer, right-click the project and, from the context menu, choose **Add Reference**.
2. In the **Add Reference** dialog box, select the **C1.WPF.RichTextBox** assembly and click **OK**.
3. Update the XAML on the page, so it appears similar to the following:

XAML

```
<Window xmlns:c1="http://schemas.componentone.com/winfx/2006/xaml"  x:Class="
C1RichTextBoxIntro.MainWindow"
        xmlns="http://schemas.microsoft.com/winfx/2006/xaml/presentation"
        xmlns:x="http://schemas.microsoft.com/winfx/2006/xaml"
        Title="MainWindow">
<Grid x:Name="LayoutRoot" Background="White">
        <Grid.RowDefinitions>
```

```
            <RowDefinition Height="Auto" />
            <RowDefinition />
        </Grid.RowDefinitions>
        <StackPanel Orientation="Horizontal" >
            <ToggleButton x:Name="_btnBold" Content="B" Click="_btnBold_Click"
Checked="_btnBold_Click" />
            <ToggleButton x:Name="_btnItalic" Content="I"
Click="_btnItalic_Click" />
            <ToggleButton x:Name="_btnUnderline" Content="U"
Click="_btnUnderline_Click" />
        </StackPanel>
        <c1:C1RichTextBox x:Name="_rtb" Grid.Row="1"
       AcceptsReturn="True"
       SelectionChanged="_rtb_SelectionChanged"/>
    </Grid>
```

This markup adds a **C1RichTextBox** control and three buttons (bold, italic, and underline) that control its formatting. When a button is clicked, the attached event handlers are responsible for updating the format of the selection. The code in the next step accomplishes that.

4. Right-click the page and choose **View Code** to switch to the Code Editor.
5. Add the following code to your application:

Visual Basic

```
Private Sub _btnBold_Click(sender As Object, e As RoutedEventArgs)
    Dim fw As System.Nullable(Of FontWeight) = _rtb.Selection.FontWeight
    _rtb.Selection.FontWeight = If(fw.HasValue AndAlso fw.Value =
FontWeights.Bold, FontWeights.Normal, FontWeights.Bold)
End Sub
```

C#

```
private void _btnBold_Click(object sender, RoutedEventArgs e)
{
  FontWeight? fw = _rtb.Selection.FontWeight;
  _rtb.Selection.FontWeight = fw.HasValue && fw.Value == FontWeights.Bold
      ? FontWeights.Normal
      : FontWeights.Bold;
}
```

The code starts by getting the value of the **FontWeight** property for the current selection. Note that the value returned is nullable (hence the '?' in the type declaration). If the selection contains a mix of different font weights, the value returned is null. The code above sets the font weight to "normal" if the whole selection has a single font weight and is bold; otherwise, the code sets the font weight to "bold".

6. Add the following code to initialize the italics button:

Visual Basic

```
Private Sub _btnItalic_Click(sender As Object, e As RoutedEventArgs)
    Dim fs As System.Nullable(Of FontStyle) = _rtb.Selection.FontStyle
    _rtb.Selection.FontStyle = If(fs.HasValue AndAlso fs.Value =
FontStyles.Italic, FontStyles.Normal, FontStyles.Italic)
End Sub
```

C#

```
private void _btnItalic_Click(object sender, RoutedEventArgs e)
{
  FontStyle? fs = _rtb.Selection.FontStyle;
  _rtb.Selection.FontStyle = fs.HasValue && fs.Value == FontStyles.Italic
      ? FontStyles.Normal
      : FontStyles.Italic;
}
```

The code that handles the italics button is very similar to the code that handles the bold button, except it uses the **FontStyle** property instead of **FontWeight**.

7. Add the following code to initialize the underline button:

Visual Basic

```
Private Sub _btnUnderline_Click(sender As Object, e As RoutedEventArgs)
    If _btnUnderline.IsChecked.HasValue Then
        rtb.Selection.TextDecorations = If(_btnUnderline.IsChecked.Value,
C1TextDecorations.Underline, Nothing)
    End If
End Sub
```

C#

```
private void _btnUnderline_Click(object sender, RoutedEventArgs e)
{
    if (_btnUnderline.IsChecked.HasValue)
    {
        _rtb.Selection.TextDecorations = _btnUnderline.IsChecked.Value
        ? C1.WPF.RichTextBox.Documents.C1TextDecorations.Underline
       : null;
    }
}
```

The code that handles the underline button is similar, this time using the **TextDecorations** property. Note that **TextDecorations** property returns an actual object, and thus is not a nullable property. The above code is all it takes to make the three buttons work.

8. Add the following code to implement the event handler for the C1RichTextBox.SelectionChanged event:

Visual Basic

```
Private Sub _rtb_SelectionChanged(sender As Object, e As EventArgs)
    Dim fw As System.Nullable(Of FontWeight) = _rtb.Selection.FontWeight
    _btnBold.IsChecked = fw.HasValue AndAlso fw.Value = FontWeights.Bold

    Dim fs As System.Nullable(Of FontStyle) = _rtb.Selection.FontStyle
    _btnItalic.IsChecked = fs.HasValue AndAlso fs.Value = FontStyles.Italic

    _btnUnderline.IsChecked = (sel.TextDecorations IsNot Nothing)
End Sub
```

C#

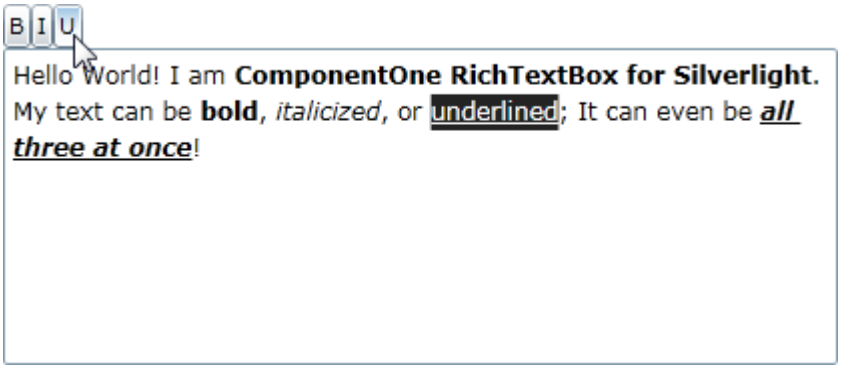
```
void _rtb_SelectionChanged(object sender, EventArgs e)
{
  var sel = _rtb.Selection;

  FontWeight? fw = _rtb.Selection.FontWeight;
  _btnBold.IsChecked = fw.HasValue && fw.Value == FontWeights.Bold;

  FontStyle? fs = _rtb.Selection.FontStyle;
  _btnItalic.IsChecked = fs.HasValue && fs.Value == FontStyles.Italic;

  _btnUnderline.IsChecked = (sel.TextDecorations != null);
}
```

This event handler is responsible for changing the state of the buttons as the user moves the selection. For example, selecting a word that is bold and underlined would make the buttons appear pressed.

The code uses the C1TextElement.FontWeight, C1TextElement.FontStyle, and C1TextElement.TextDecorations properties as before, and sets the **IsChecked** property on the corresponding buttons.

What You've Accomplished

You've created a simple toolbar. When run, the application would appear similar to the following image:



You can enter text and press the bold, italic, and underline buttons to format the text as in the above image.

A full toolbar would include more buttons and controls, and would handle them in a similar fashion. **WPF Edition** includes C1RichTextBoxToolbar, a complete toolbar as a separate assembly. The source code for the **C1RichTextBoxToolbar** control is included so you can create your own customized version. For details, see Working with C1RichTextBoxToolbar.

Adding Spell Checking

In this topic you'll add spell-checking to your application. This topic assumes you have added a C1RichTextBox control and a C1RichTextBoxToolbar control to your page and linked the two together. If you currently click the **Spell Check** button in the toolbar at run time, you'll receive a message that spell checking is currently not set up. In this step you'll add a dictionary and set up spell-checking.

Complete the following steps:

1. In the Solution Explorer, right-click the **.Web** project and select **Add | Existing Item**. The **Add Existing Item** dialog box will appear.
2. In the **Add Existing Item** dialog box locate the **C1Spell_en-US.dct** file included in the **RichTextBoxSamples** sample folder. By default, you can access the samples folder through the following path :

Documents\ComponentOne Samples\WPF.

This is a US English dictionary file – if you add another file, instead, you can adapt the steps below with the appropriate code.

1. In the Solution Explorer, right-click the **MainPage.xaml** file and select **View Code** to open the code file.
2. In the Code Editor, add the following code to import the following namespaces:

Visual Basic

```
Imports C1.WPF.RichTextBox
Imports C1.WPF.SpellChecker
```

C#

```
using C1.WPF.RichTextBox;
using C1.WPF.SpellChecker;
```

3. Add code to the **MainPage** constructor so that it appears similar to the following:

Visual Basic

```
Public Sub New()
    InitializeComponent()
    Dim spell As New C1SpellChecker()
    spell.MainDictionary.LoadAsync("C1Spell_en-US.dct")
    Me.C1RichTextBox.SpellChecker = spell
End Sub
```

C#

```
public MainPage()
{
    InitializeComponent();
    var spell = new C1SpellChecker();
    spell.MainDictionary.LoadAsync("C1Spell_en-US.dct");
    this.c1RichTextBox.SpellChecker = spell;
}
```

This code adds spell-checking – including as-you-type spell-checking – to the application.

What You've Accomplished

In this step you added spell-checking to your **C1RichTextBox** application. Type in the **C1RichTextBox** and notice that as-you-type spell-checking is initialized and misspelled words appear with a red line underneath. If you click the **Spell Check** button in the **C1RichTextBoxToolbar**, notice that the **Spelling** dialog box now appears.