Building a Multi-Page Image Viewer with ImageGear for Silverlight

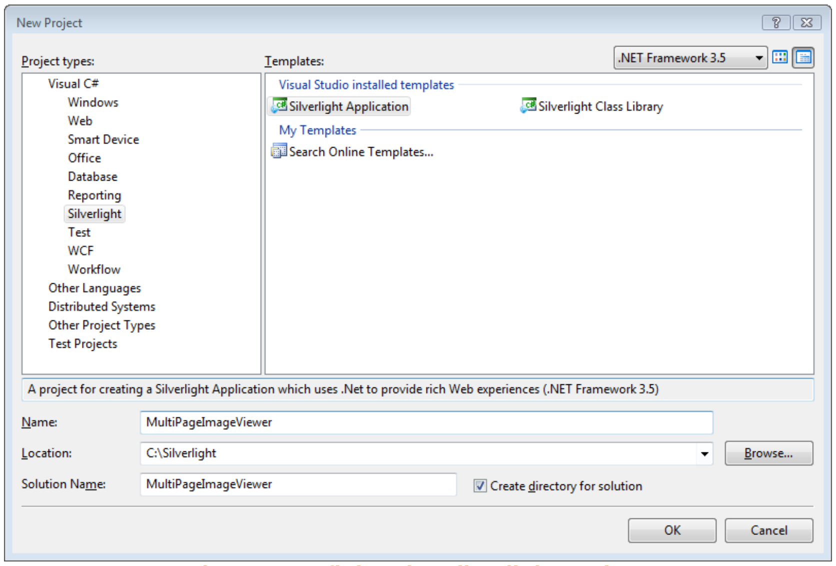
As the desire to deliver rich web content and functionality has increased over the last decade, Rich Internet Application (RIA) technologies have become increasingly powerful. Unfortunately, many of these technologies have been out of reach for many client application developers because of the non-trivial learning curve involved. In addition, with the number of RIA technologies available, where do you even begin? In many cases, there was not a "one size fits all" solution, so RIA development would involve a mix of HTML, JavaScript, Adobe Flash, and perhaps a little AJAX thrown in (just to name a few possibilities). Luckily, Microsoft has entered the world of RIA frameworks, and with the introduction of Microsoft Silverlight 2, offers a platform, which leverages existing .NET developers' talents. With version 3.0 in the works, providing enhanced graphics support, data binding, and perhaps best of all, out-of-browser support, the Silverlight platform is certainly worth a look for new, and even existing, RIA development.

Silverlight includes many of the same base services and types included in the .NET Framework. However, because it is a runtime built specifically for the web, where developers expect a robust platform in a small package, much of the functionality included in its desktop cousin is absent. For example, the image type in Silverlight, **System.Windows.Media.Imaging.BitmapImage**, only supports JPEG and PNG image file types, and does not include support for grayscale. This is where third-party tools vendors become part of the Silverlight ecosystem, providing extensions to the base platform as the market demands. For the imaging domain, Accusoft Pegasus has continued its reputation as the imaging tools leader, by providing one of the first imaging toolkits for Silverlight developers – ImageGear for Silverlight.

This article will provide a quick tour of the ImageGear for Silverlight toolkit while developing a multi-page image viewer, running completely on the client, via managed code.

Building the Viewer

To get started, download the ImageGear for Silverlight SDK and sample code here. Open Visual Studio 2008, and bring up the **New Project** dialog. Under the **Visual C#** heading, select **Silverlight** as the project type, and then select **Silverlight Application** as the project template. If you do not have **Silverlight** as an available project type, you need to install the Silverlight 2 SDK, available from Microsoft. Finally, enter a name for your project, and click OK (Figure 1).



New Project

Project types:
- Visual C#
  - Windows
  - Web
  - Smart Device
  - Office
  - Database
  - Reporting
  - Silverlight
  - Test
  - WCF
  - Workflow
- Other Languages
- Distributed Systems
- Other Project Types
- Test Projects

Templates: .NET Framework 3.5

Visual Studio installed templates
- Silverlight Application
- Silverlight Class Library

My Templates
- Search Online Templates...

A project for creating a Silverlight Application which uses .Net to provide rich Web experiences (.NET Framework 3.5)

Name: MultiPageImageViewer

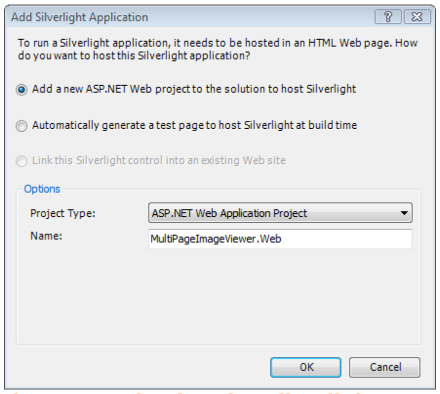
Location: C:\Silverlight

Solution Name: MultiPageImageViewer

[✓] Create directory for solution

Figure 1: Defining the Silverlight Project

The next screen presented as you create the project deserves a bit of explanation, particularly to those new to Silverlight development. The unit of deployment of a Silverlight application is a XAP package, and deploys within an HTML web page, or as part of an ASP.NET project. For many Silverlight applications, using an HTML web page as your host would be perfectly fine. However, ImageGear for Silverlight utilizes a web service to validate its SDK license, and the Silverlight application calling that web service must run from the domain name that hosts the service. So, it is best to avoid the HTML web page option, and instead create the ASP.NET project. The project wizards set everything up for you anyway (Figure 2), so even the most inexperienced web developer will be ok.



Add Silverlight Application

To run a Silverlight application, it needs to be hosted in an HTML Web page. How do you want to host this Silverlight application?

[✓ Add a new ASP.NET Web project to the solution to host Silverlight]

Automatically generate a test page to host Silverlight at build time

Link this Silverlight control into an existing Web site

Options

Project Type: ASP.NET Web Application Project

Name: MultiPageImageViewer.Web

Figure 2: Selecting the Silverlight Host

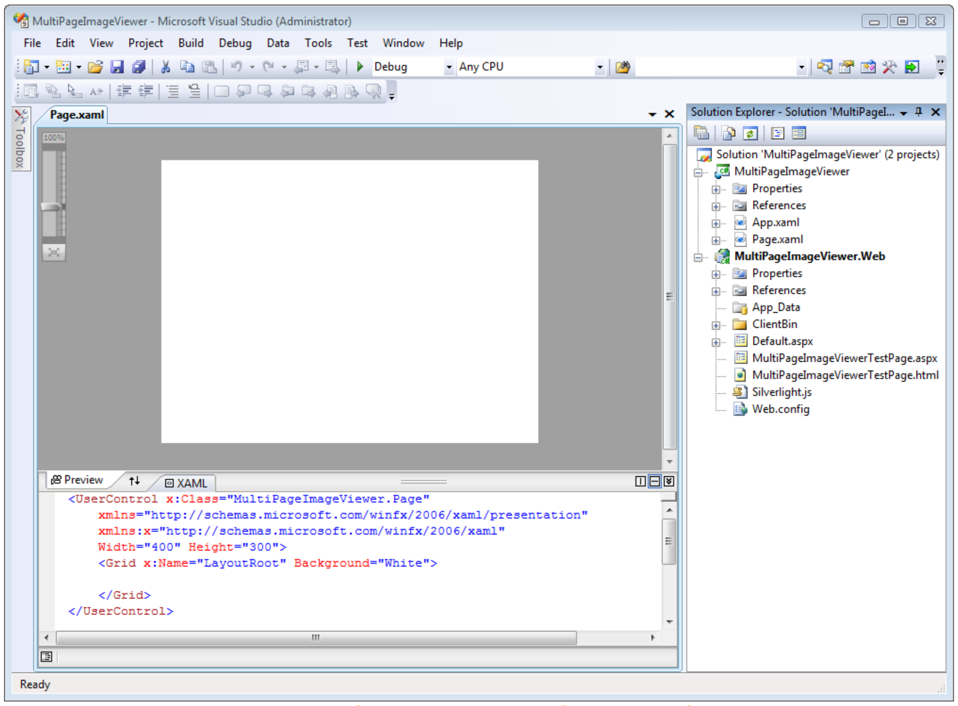
And, with a click of the OK button, a solution is created, containing two projects – the Silverlight application, where we will spend most of our time, and an ASP.NET host, set as the startup project. If you compile and run at this point, the application will execute;

however, it will be pretty boring – just a blank page in IE. However, this page is not blank. There is a full-fledged Silverlight application running within it. We just need to build its layout to support our image viewer.

Defining the Layout

If you have utilized **Windows Presentation Foundation (WPF)** or **Windows Workflow Foundation (WF)**, you have likely become familiar with XAML. While XAML is nothing more than a way to initialize a set of .NET types, it has become very popular in the next generation GUI stacks provided by Microsoft, and that carries through to Silverlight. To define the layout for our multi-page image viewer, we will modify the generated XAML to specify a user interface more suitable than the blank surface we get by default. A complete overview of XAML and the Silverlight GUI stack is beyond the scope of this article, but we will briefly explain what we are doing along the way.

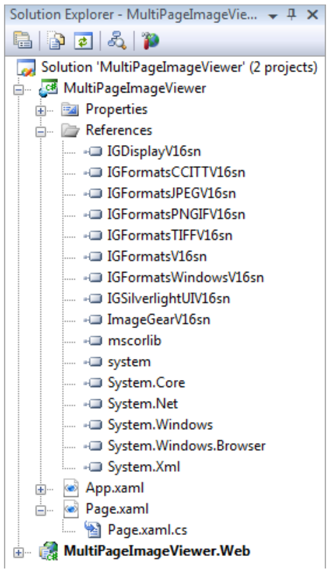
To help us get our bearings, Figure 3 below shows the default view and XAML generated by Visual Studio. It defines a Silverlight **UserControl**, which contains an empty **Grid**.


MultiPageImageViewer - Microsoft Visual Studio (Administrator)
File Edit View Project Build Debug Data Tools Test Window Help
Debug
Any CPU
Toolbox
Page.xaml
Solution Explorer - Solution 'MultiPagel...
Solution 'MultiPageImageViewer' (2 projects)
MultiPageImageViewer
Properties
References
App.xaml
Page.xaml
MultiPageImageViewer.Web
Properties
References
App_Data
ClientBin
Default.aspx
MultiPageImageViewerTestPage.aspx
MultiPageImageViewerTestPage.html
Silverlight.js
Web.config
Preview
XAML
Ready

```
<UserControl x:Class="MultiPageImageViewer.Page"
    xmlns="http://schemas.microsoft.com/winfx/2006/xaml/presentation"
    xmlns:x="http://schemas.microsoft.com/winfx/2006/xaml"
    Width="400" Height="300">
    <Grid x:Name="LayoutRoot" Background="White">

    </Grid>
</UserControl>
```

Figure 3: Generated Page.xaml

For our image viewer, we want to add a couple of controls to the **UserControl** – an instance of the **ImGearSilverlightPageView** type for display of the image and several buttons to support opening a file and navigating between its pages. But, before we modify the XAML, we have some references to add to the project to ensure calls to ImageGear for Silverlight resolve at compile time. ImageGear for Silverlight allows the developer to deploy only those assemblies required for their specific application. This allows the developer to keep the size of their deployment packages small, while enabling background loading of non-essential assemblies. A complete listing and description of the assemblies in ImageGear for Silverlight are in the toolkit's documentation. For now, it is enough to make sure your references list looks like that in Figure 4. You will find the ImageGear for Silverlight assemblies in your \\Program Files\Accusoft\ImageGear for Silverlight\Bin directory.



```
Solution Explorer - MultiPageImageVie...
Solution 'MultiPageImageViewer' (2 projects)
  MultiPageImageViewer
    Properties
    References
      IGDisplayV16sn
      IGFormatsCCITTV16sn
      IGFormatsJPEGV16sn
      IGFormatsPNGIFV16sn
      IGFormatsTIFFV16sn
      IGFormatsV16sn
      IGFormatsWindowsV16sn
      IGSilverlightUIV16sn
      ImageGearV16sn
      mscorlib
      system
      System.Core
      System.Net
      System.Windows
      System.Windows.Browser
      System.Xml
    App.xaml
    Page.xaml
      Page.xaml.cs
  MultiPageImageViewer.Web
```

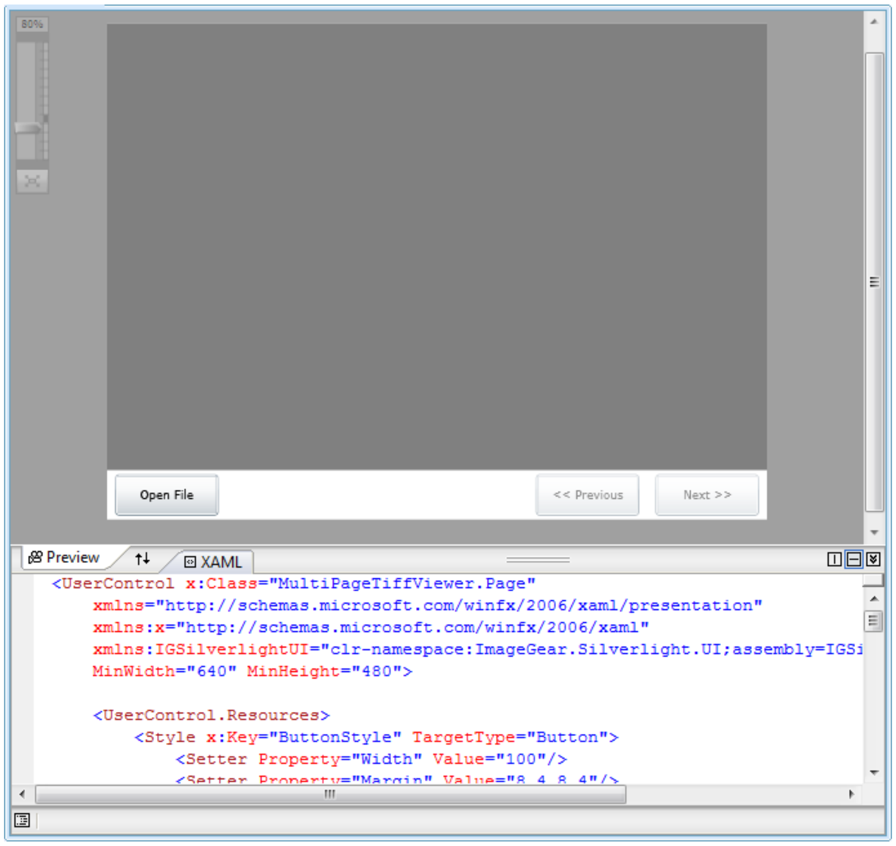
Figure 4: Required References

Finally, Listing 1 (below) shows the XAML for our image viewer's layout. The XAML in Listing 1 adds two rows in the original grid, one to hold the image viewer and a second to hold the buttons. For the **ImGearSilverlightPageView**, it is placed directly in the cell because it will simply fill its available space. The buttons, however, require some additional layout containers to ensure the desired layout is created. This is done with a second **Grid** containing two columns. The first will contain a **Button** we will use to invoke an Open File operation. The second column will contain two buttons – Previous Page and Next Page – so we will use a **StackPanel** container, and place two buttons within it. The other primary point of interest in our XAML is the use of a **Style** resource for each of our buttons. To make our XAML a bit cleaner and more efficient, the look for our buttons is defined once, as a **Style** contained in the **UserControl** resources, and applied to each button. There are many excellent resources on the Silverlight GUI elements and XAML, and if you are not familiar with these technologies, I encourage you to look. You will never want to drag and drop user controls again!

Listing 1: Multi-Page Image Viewer XAML

```
<UserControl x:Class="MultiPageImageViewer.Page"
    xmlns="http://schemas.microsoft.com/winfx/2006/xaml/presentation"
    xmlns:x="http://schemas.microsoft.com/winfx/2006/xaml"
    xmlns:IGSilverlightUI="clr-namespace:ImageGear.Silverlight.UI;assembly=IGSilverlightUIV16sn"
    MinWidth="640" MinHeight="480">

    <UserControl.Resources>
        <Style x:Key="ButtonStyle" TargetType="Button">
            <Setter Property="Width" Value="100"/>
            <Setter Property="Margin" Value="8,4,8,4"/>
        </Style>
    </UserControl.Resources>

    <Grid x:Name="LayoutRoot" Background="White">
        <Grid.RowDefinitions>
            <RowDefinition Height="9*"/>
            <RowDefinition Height="*"/>
        </Grid.RowDefinitions>

        <!-- Primary Image Viewer -->
        <Grid Grid.Row="0" Background="Gray">
            <IGSilverlightUI:ImGearSilverlightPageView Margin="8"
                x:Name="mPageView" Background="Gray"/>
        </Grid>

        <!-- Button Row -->
        <Grid Grid.Row="1">
            <Grid.ColumnDefinitions>
                <ColumnDefinition Width="1*"/>
                <ColumnDefinition Width="2*"/>
            </Grid.ColumnDefinitions>

            <Button x:Name="mOpenButton" Grid.Column="0" Style="{StaticResource ButtonStyle}"
                    Click="mOpenButton_Click" HorizontalAlignment="Left" IsEnabled="False">
                <TextBlock Text="Open File"/>
            </Button>

            <StackPanel Grid.Column="1" Orientation="Horizontal" HorizontalAlignment="Right">
                <Button x:Name="mPreviousButton" Style="{StaticResource ButtonStyle}"
                        Click="mPreviousButton_Click" IsEnabled="False">
                    <TextBlock Text="&lt;&lt; Previous"/>
                </Button>
                <Button x:Name="mNextButton" Style="{StaticResource ButtonStyle}"
                        Click="mNextButton_Click" IsEnabled="False">
                    <TextBlock Text="Next &gt;&gt;"/>
                </Button>
            </StackPanel>
        </Grid>
    </Grid>
</UserControl>
```

Now, it is difficult to visualize our image viewer using the XAML definition only. Luckily, Visual Studio supports a split view so you can see the result of your XAML as you go. Figure 5 below shows the layout generated by the XAML in Listing 1.



```
<UserControl x:Class="MultiPageTiffViewer.Page"
    xmlns="http://schemas.microsoft.com/winfx/2006/xaml/presentation"
    xmlns:x="http://schemas.microsoft.com/winfx/2006/xaml"
    xmlns:IGSilverlightUI="clr-namespace:ImageGear.Silverlight.UI;assembly=IGSi
    MinWidth="640" MinHeight="480">

    <UserControl.Resources>
        <Style x:Key="ButtonStyle" TargetType="Button">
            <Setter Property="Width" Value="100"/>
            <Setter Property="Margin" Value="8 4 8 4"/>
```

Figure 5: Multi-Page Image Viewer Layout

We have come a long way from the blank page, but now we need to write the code for our application to run. If you compile and run right now, you will face all sorts of errors (missing click handlers for one), so let's take care of those, and get our image viewer running!

The Code

We will start with the initialization code, contained in the **Page** constructor shown in Listing 2 below. ImageGear for Silverlight requires a license to run, and while you develop your application with the SDK, it uses a web service for validation.[1] The **ImGearLicense.SetService** call allows you to specify the location of this web service, and

[1] For more information on deployment licensing, please see the ImageGear for Silverlight documentation.

it needs to be running from a URL on the same machine as the toolkit. Next, an anonymous delegate is setup to run once the **LicenseRequest** event fires, more on this soon. Finally, **ImGearLicense.SetSolutionName** is called, passing the evaluation solution name as an argument.

The anonymous delegate that executes when the **LicenseRequest** event occurs is where the remainder of the initialization occurs. The event is required because of the web service involved; when the request for a license is made to the web service, the response is not synchronous. As a result, we have to wait until the request is granted before proceeding further. Within the delegate body, initialization of the PNG and Windows (bitmap) codecs are performed, along with CCITT TIFF, TIFF, and JPEG. While the toolkit requires the PNG and Windows formats to display images in the **ImGearSilverlightPageView**, all others are optional. The developer gets to make the choice.

Listing 2: Page Constructor and ImageGear for Silverlight Initialization

```
public Page()
{
    InitializeComponent();

    // ImageGear for Silverlight Development licensing. This licensing
    // requires the sample to be run from a URL hosted on the same machine
    // ImageGear for Silverlight was installed on.
    string webServiceUrl = string.Format("http://{0}/{1}",
        App.Current.Host.Source.DnsSafeHost,
        "SilverlightWebService/SilverlightWebService.svc");

    ImGearLicense.SetService(webServiceUrl);
    ImGearLicense.LicenseRequest =
        new ImGearLicense.DelegateLicenseRequest(delegate(Exception error)
        {
            // Initialize format components
            // Required for ImGearSilverlightPageView
            ImGearFormatsPNGIFComponent.Initialize();
            ImGearFormatsWindowsComponent.Initialize();

            // Common formats
            ImGearFormatsCCITTComponent.Initialize();
            ImGearFormatsTIFFComponent.Initialize();
            ImGearFormatsJPEGComponent.Initialize();

            // ImageGear Initialized and Licensed; Enable the Open Button
            this.mOpenButton.IsEnabled = true;
        });

     ImGearLicense.SetSolutionName("AccuSoft 5-44-16");
}
```

Once the toolkit is initialized, we can write handlers for each of our buttons, and get some images to display in the application. The **mOpenButton** handler (Listing 3) performs the bulk of the work. Most of the code is stock, and will be familiar to anyone who has utilized the **OpenFileDialog** type before. The **Stream** created is passed as an argument to **ImGearFileFormats.LoadDocument** to be loaded. If a codec corresponding to the file type is known to the toolkit (via initialization above), it will load; otherwise, an **ImGearException** is thrown.

With the document loaded and an instance of the **ImGearDocument** in hand, an **ImGearPageDisplay** instance is created to specify the viewable page to the **ImGearSilverlightPageView**. The easiest way to link the concepts is to think of the **ImGearDocument** as the in-memory representation of the file, and an **ImGearPageDisplay** as the logical representation of the page for display. In other words, the **ImGearPageDisplay** type contains the instructions for **ImGearSilverlightPageView** to display the page properly. Examples might include resolution, clipping rectangles, or transforms desired. Finally, to get the page to display, an **ImGearPageDisplay** is assigned to the **ImGearSilverlightPageView.Display** property, and a call to **ImGearSilverlightPageView.Update** made to force a redraw to occur.

Listing 3: Open Button Handler

```
private ImGearDocument mLoadedDocument = null;
private Int32 mCurrentPage = -1;
private ImGearPageDisplay mCurrentPageDisplay = null;

            .
            .
            .

private void mOpenButton_Click(object sender, System.Windows.RoutedEventArgs e)
{
    // Prompt the user to select an image file
    OpenFileDialog ofd = new OpenFileDialog();
    ofd.Filter =
        "Image files (*.tif;*.jpg;*.png;*.bmp)|*.tif;*.jpg;*.png;*.bmp|All files (*.*)|*.*";
    ofd.FilterIndex = 1;
    bool? result = ofd.ShowDialog();

    if (!result.GetValueOrDefault(false))
        return;

    try
    {
        using (Stream f = ofd.File.OpenRead())
        {
            // Open it with ImageGear, showing the first page by default
            this.mLoadedDocument = ImGearFileFormats.LoadDocument(f, 0, -1);
            this.mCurrentPage = 0;

            if (null == this.mCurrentPageDisplay)
            {
                this.mCurrentPageDisplay =
                   new ImGearPageDisplay(this.mLoadedDocument.Pages[this.mCurrentPage]);
            }
            else
            {
                this.mCurrentPageDisplay.Page =
                   this.mLoadedDocument.Pages[this.mCurrentPage];
            }

            mPageView.Display = this.mCurrentPageDisplay;
            mPageView.Update();

            // Update the previous\next buttons depending on page count
            this.UpdateButtonStates();
        }
    }
    catch (ImGearException)
    {
        MessageBox.Show("The file selected is not supported by this sample.",
                "MultiPageTiffViewer Control", System.Windows.MessageBoxButton.OK);
    }
}
```

The remainder of the code manipulates the page displayed via the previous and next buttons, modifying the page displayed by the **ImGearSilverlightPageView** type. The **Pages** collection within the **ImGearDocument** allows you to select the page loaded in the **ImGearPageDisplay**. Remember, when changing the page display, always call **ImGearSilverlightPageView.Update**, or a redraw will not occur.

Listing 4: Previous and Next Button Handlers, UpdateButtonStates Method

```
private void mPreviousButton_Click(object sender, System.Windows.RoutedEventArgs e)
{
    if (this.mCurrentPage > 0)
    {
        this.mCurrentPageDisplay.Page = this.mLoadedDocument.Pages[--this.mCurrentPage];
        this.mPageView.Update();
    }

    // Update the previous\next buttons depending on page count
    this.UpdateButtonStates();
}

private void mNextButton_Click(object sender, System.Windows.RoutedEventArgs e)
{
    if (this.mCurrentPage < this.mLoadedDocument.Pages.Count - 1)
    {
        this.mCurrentPageDisplay.Page = this.mLoadedDocument.Pages[++this.mCurrentPage];
        this.mPageView.Update();
    }

    // Update the previous\next buttons depending on page count
    this.UpdateButtonStates();
}

private void UpdateButtonStates()
{
    this.mPreviousButton.IsEnabled =
        (this.mCurrentPage > 0 && mLoadedDocument.Pages.Count > 1) ? true : false;

    this.mNextButton.IsEnabled =
        ((this.mCurrentPage < (this.mLoadedDocument.Pages.Count - 1) &&
        mLoadedDocument.Pages.Count > 1)) ? true : false;
}
```

And, with that, we have our multi-page image viewer for Silverlight! Figure 6 below shows the final product, with some "splash" applied by the web designer. With ImageGear for Silverlight, we've been able to extend the base platform to support loading of TIFF files, and we have a basic RIA suitable for document imaging display. Best of all, it was all done with current .NET technologies like XAML and C#, using tools in the ecosystem. Of course, a full featured viewer would do much more, and ImageGear for Silverlight will help you get there.

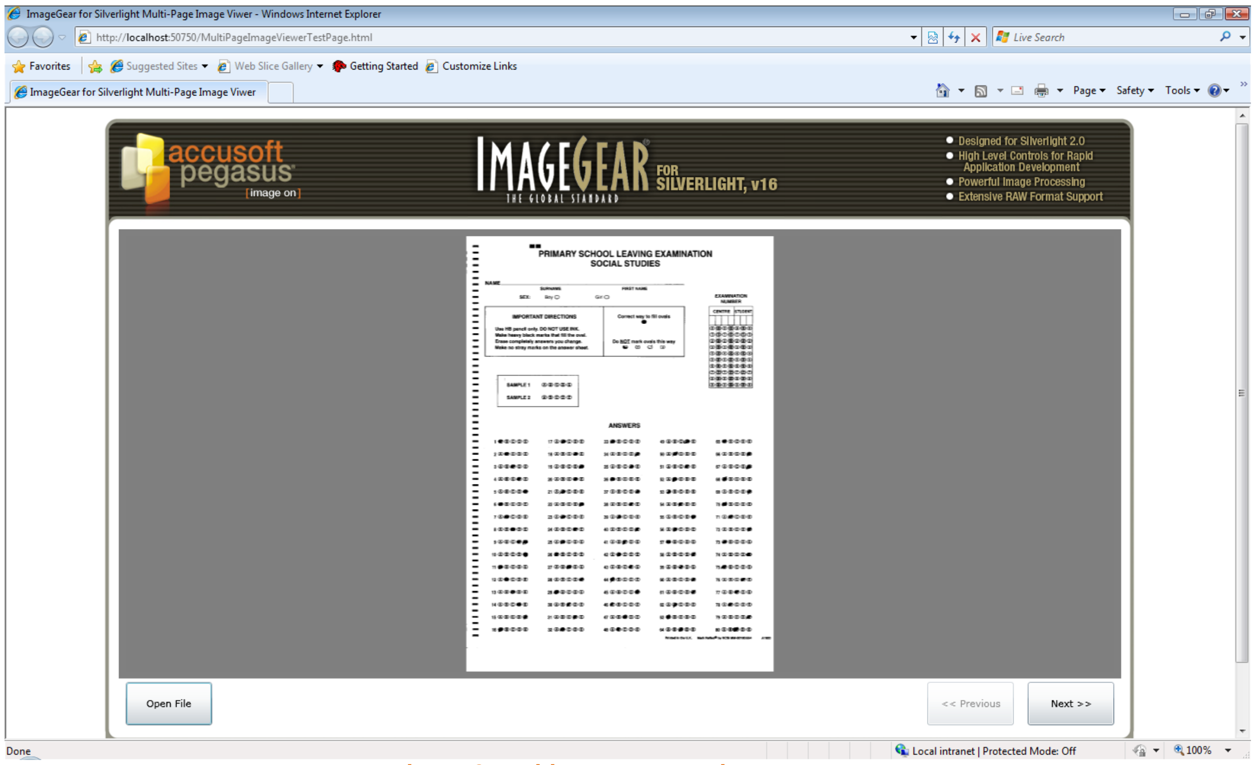

ImageGear for Silverlight Multi-Page Image Viwer - Windows Internet Explorer
http://localhost:50750/MultiPageImageViewerTestPage.html
Live Search
Favorites
Suggested Sites
Web Slice Gallery
Getting Started
Customize Links
ImageGear for Silverlight Multi-Page Image Viwer
Page
Safety
Tools
accusoft pegasus [image on]
IMAGEGEAR FOR SILVERLIGHT, v16
THE GLOBAL STANDARD
Designed for Silverlight 2.0
High Level Controls for Rapid Application Development
Powerful Image Processing
Extensive RAW Format Support
PRIMARY SCHOOL LEAVING EXAMINATION
SOCIAL STUDIES
ANSWERS
Open File
<< Previous
Next >>
Done
Local intranet | Protected Mode: Off
100%

Figure 6: Multi-Page Image Viewer

You can find Pegasus Imaging product downloads and features at www.accusoft.com. Please contact us at sales@accusoft.com or support@accusoft.com for more information.

About The Author

Casey Muse, Program Manager
Since early 2007, Casey has been responsible for building Accusoft Pegasus' Atlanta engineering team. He also contributes to and supervises product design, implementation, quality, and release for several products. In previous positions at Accusoft Pegasus, Casey has contributed to software development, technology integration strategies, development organizational structure, and product architecture. In addition, he has served as a technical lead for Autodesk, working on DWF applications including Autodesk Design Review. Casey earned a Masters in Business Administration with Honors from the University of Tampa, and a Bachelor of Science in Information Systems (Magna Cum Laude) from the University of South Florida.

accusoft pegasus
[image on]

About Accusoft Pegasus

Founded in 1991 under the corporate name Pegasus Imaging, and headquartered in Tampa, Florida, Accusoft Pegasus is the largest source for imaging software development kits (SDKs) and image viewers. Imaging technology solutions include barcode, compression, DICOM, editing, forms processing, OCR, PDF, scanning, video, and viewing. Technology is delivered for Microsoft .NET, ActiveX, Silverlight, AJAX, ASP.NET, Windows Workflow, and Java environments. Multiple 32-bit and 64-bit platforms are supported, including Windows, Windows Mobile, Linux, Sun Solaris, Mac OSX, and IBM AIX. Visit www.accusoft.com for more information.