Walkthrough: Creating a Measurement Studio Application with Web Forms Controls and Analysis

Note To complete this walkthrough, you must have either the Measurement Studio Professional or Measurement Studio Enterprise package installed for Visual Studio 2005 or later. This walkthrough will not work with the Measurement Studio Standard package.

Measurement Studio includes user interface controls, such as a waveform graph control and a gauge control, and Analysis functionality, such as signal generation and mathematical functions. This walkthrough is designed to help you learn how to add analysis and presentation functionality to a Web Forms application by taking you through the following steps:

- **Setting up the project**—Using the Measurement Studio Application Wizard, you will create a new project that references the Measurement Studio Analysis class library and Web Forms controls.
- **Adding user interface controls to the project**—Using the Toolbox and the Properties window, you will add and configure a button, waveform graph, legend, gauge, and numeric edit user interface control.
- **Generating, plotting, and analyzing the data**—Using `NationalInstruments.Analysis.SignalGeneration.WhiteNoiseSignal` and `NationalInstruments.Analysis.Math.Statistics.Mean`, you will generate data, plot the generated data on a waveform graph, and calculate the mean of the data.
- **Customizing the user interface**—Using the Collection Editor and Auto Format dialog boxes, you will display the mean value on the gauge and the numeric edit, as well as customize your user interface.

NATIONAL INSTRUMENTS

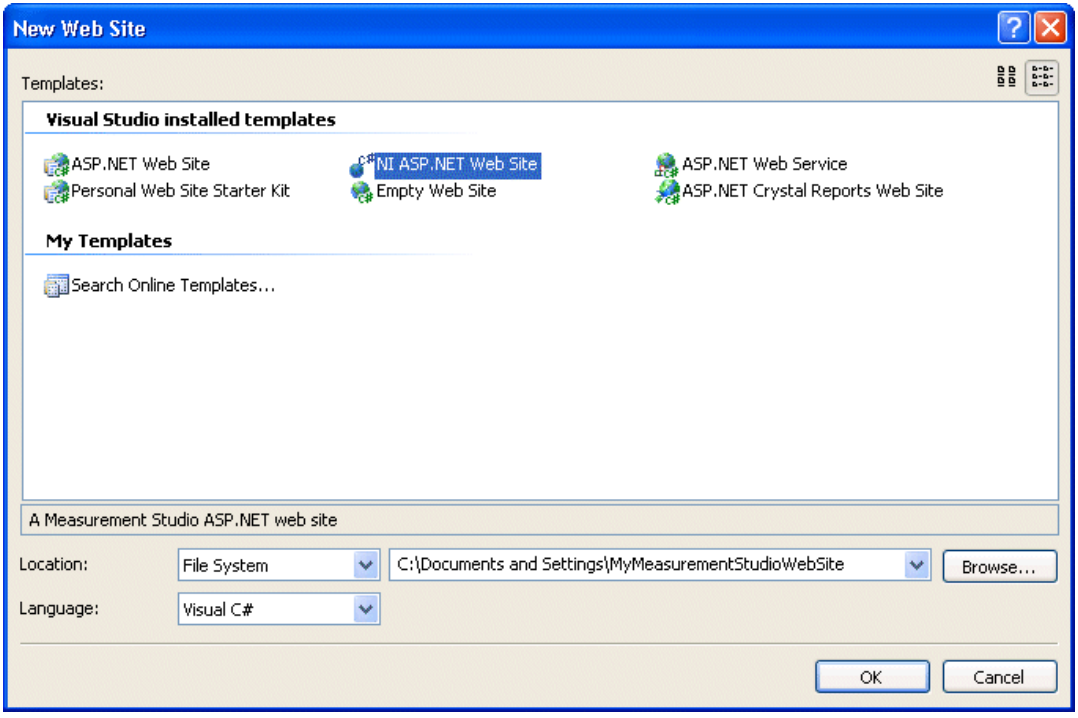
Before You Begin

The following components are required to complete this walkthrough:

- Microsoft Visual Studio 2005 or Visual Studio 2008
- Measurement Studio 8.0.1 or later (Professional or Enterprise package) for Visual Studio 2005 or Measurement Studio 8.5 or later (Professional or Enterprise package) for Visual Studio 2008

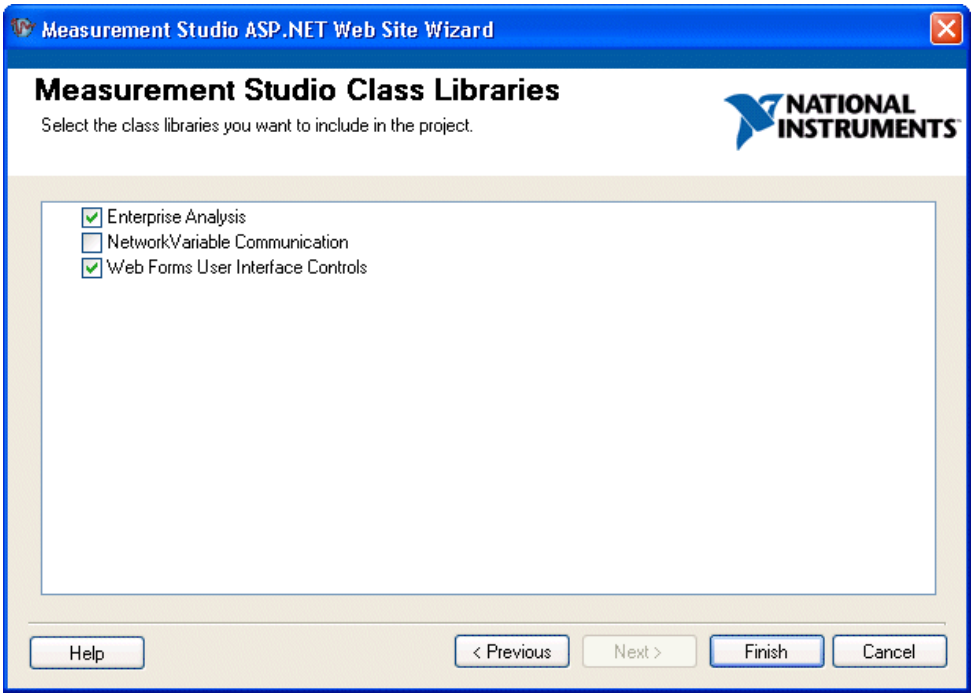
Setting Up the Project

1. Select **Start»All Programs»Microsoft Visual Studio 2005»Microsoft Visual Studio 2005** or **Start»All Programs»Microsoft Visual Studio 2008»Microsoft Visual Studio 2008**.
2. Select **File»New»Web Site**. The New Web Site dialog box launches.



3. In the Templates pane, select **NI ASP.NET Web Site**. Select `File System` and specify a file path of your choice.
4. Use the drop-down box to select **Visual C#** or **Visual Basic**, depending on which language you want to create the project in.

5. Click **OK**. The Measurement Studio ASP.NET Web Site Wizard launches.
6. Select **Analysis Library** and **Web Forms User Interface Control Library**.

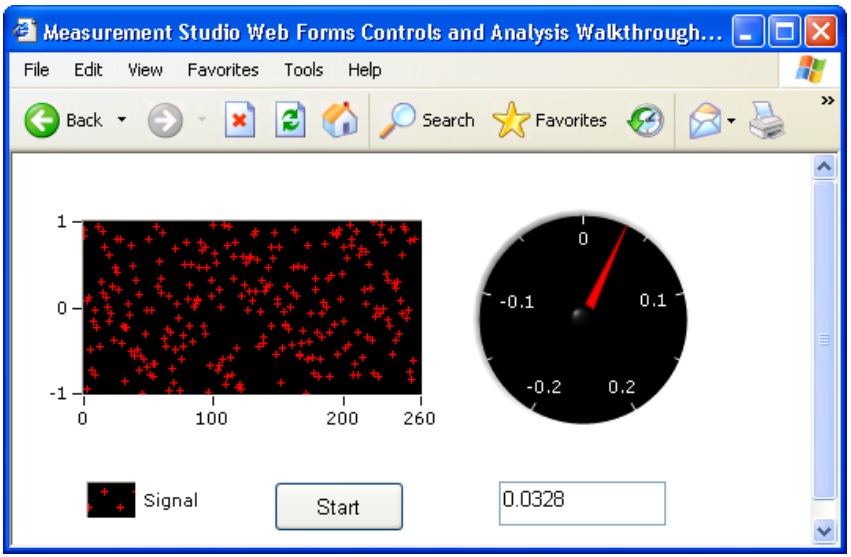


Tip If you are working with an existing project, you can access the Add/Remove Class Libraries dialog box by selecting **Measurement Studio»Add/Remove .NET Class Libraries Wizard**.

7. Click **Finish** to display `Default.aspx` in the Web Forms Designer.
8. You can change the title of your Web page. Click inside the `<title>` tag and rename the title to **Measurement Studio Web Forms Controls and Analysis Walkthrough**.

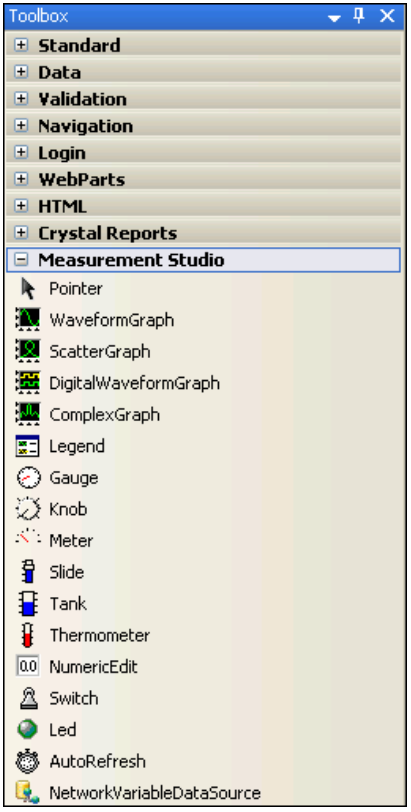
Adding User Interface Controls to the Project

In this section, you will build a Web page that looks like the following screenshot.



1. Click **Design** in the lower left corner to switch from Source View to Design View.
2. Select **View»Toolbox** to display the Toolbox. The Toolbox contains components and controls that you can add to your project.
3. Expand the **HTML** group on the Toolbox. Select the Table control in the Toolbox and drag and drop it on the form. You use the table cells to arrange the user interface controls on your Web page, as shown in the previous screenshot.
4. The default table that appears is 3×3. This table provides a customizable form for arranging the user interface controls for your Web page. Expand the table to approximately 300 px (pixels) tall by 550 px wide by clicking and dragging the table borders.
5. If you are using Visual Studio 2005, merge the top two cells of all three columns by selecting the cells, right-clicking, and selecting **Merge Cells**. If you are using Visual Studio 2008, merge the top two cells of all three columns by selecting the cells, right-clicking, and selecting **Modify»Merge Cells**.
6. Expand the **Standard** group on the Toolbox. The Standard group contains ASP.NET server controls included in the `System.Web.UI` namespace.

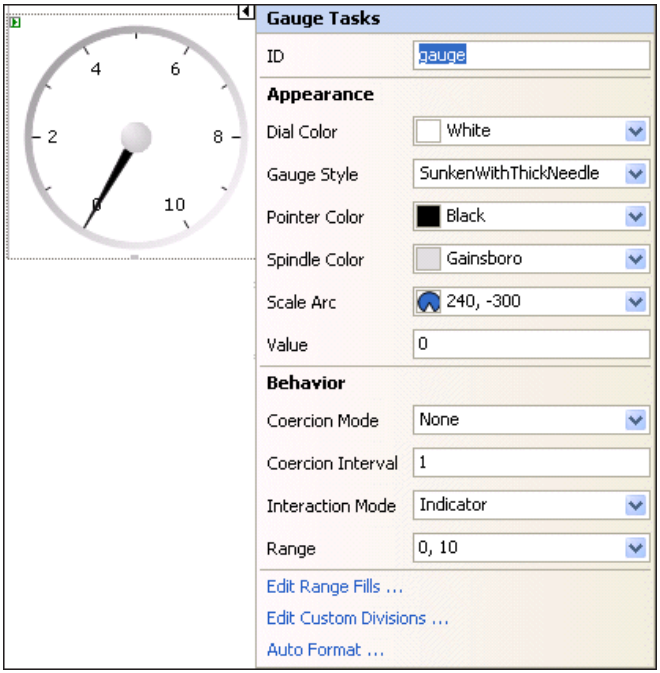
7. Select the **Button** control and drag and drop it into the lower right table cell.
8. Right-click the button and select **Properties** to display the Properties window. You configure the properties of the control in the Properties window.
9. Scroll to the Text property in the Properties window. Type `Start` for the button text.
10. Expand the **Measurement Studio** group on the Toolbox.



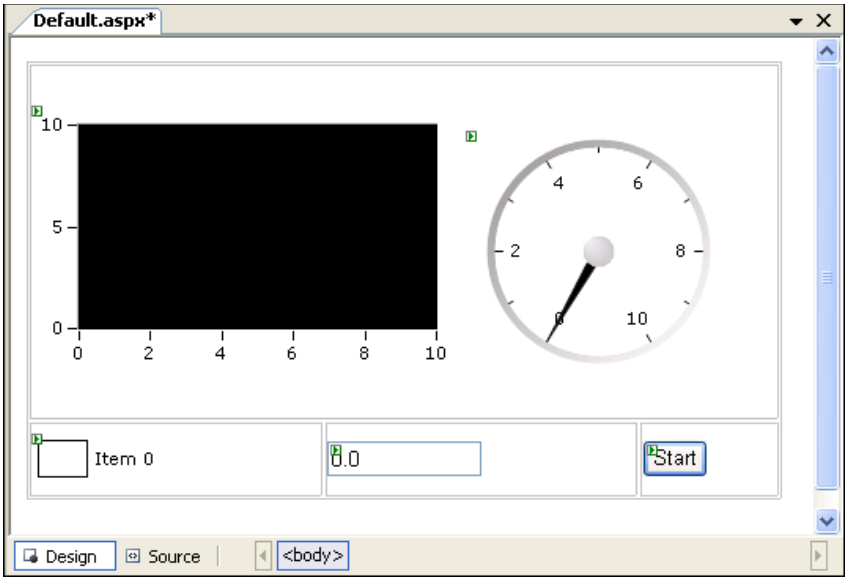
11. Select the **WaveformGraph** control and drag and drop it into the top table cell.
12. On the waveform graph smart tag, type `graph` for the name of the waveform graph ID.

Tip To access the smart tag, left click on a control to select it and then left click on the arrow button in the upper right corner of the control.

13. Select the **Legend** control and drag and drop it into the bottom left table cell.
14. Select the **NumericEdit** control and drag and drop it into the bottom center table cell.
15. On the numeric edit smart tag, type `numericedit` for the name of the numeric edit ID.
16. Select the **Gauge** control and drag and drop it into the top table cell, to the right of the waveform graph. Resize controls and table cells as necessary.
17. On the gauge smart tag, type `gauge` for the name of the gauge ID.



The following screenshot shows `Default.aspx` with the user controls.



Generating, Plotting, and Analyzing the Data

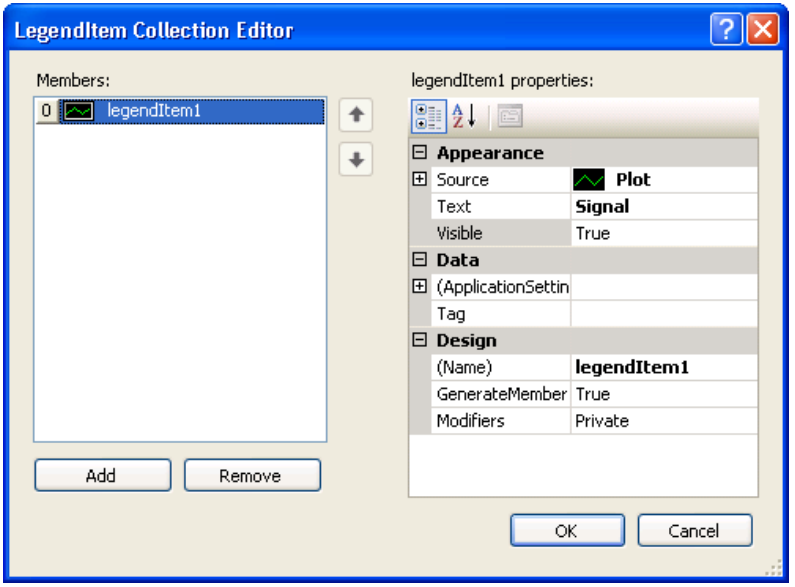
1. Double-click the button control to display the `Default.aspx.cs` code, with the cursor inside the click event handler of the button control.
2. Add the following code to generate random data, plot the data, calculate the mean of the data, and display the mean on the gauge.

```
[VB.NET]
' Declare and initialize an instance of WhiteNoiseSignal.
Dim whiteNoise As New WhiteNoiseSignal()
' Store the generated data in a double array named data.
Dim data As Double() = whiteNoise.Generate(1000.0, 256)
' Use the PlotY method to plot the data.
graph.PlotY(data)
' Use the Mean method to calculate the mean of the data.
Dim mean As Double = Statistics.Mean(data)
' Display the mean on the numeric edit.
numericedit.Value = mean
' Display the mean on the gauge.
gauge.Value = mean
```

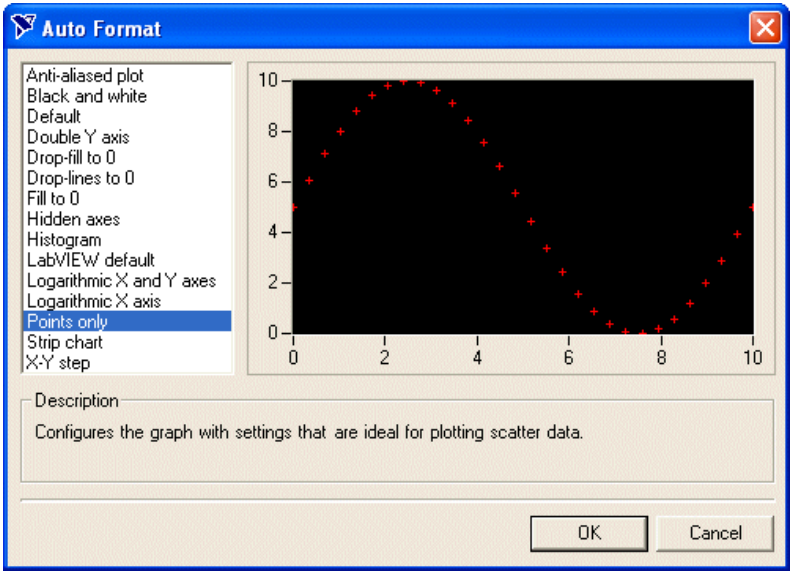
```
[C#]
// Declare and initialize an instance of WhiteNoiseSignal.
WhiteNoiseSignal whiteNoise = new WhiteNoiseSignal();

// Store the generated data in a double array named data.
double[] data = whiteNoise.Generate(1000.0, 256);

// Use the PlotY method to plot the data.
graph.PlotY(data);

// Use the Mean method to calculate the mean of the data.
double mean = Statistics.Mean(data);

// Display the mean on the numeric edit.
numericedit.Value = mean;

// Display the mean on the gauge.
gauge.Value = mean;
```

Customizing Your User Interface

1. Select the **Default.aspx** tab to return to the Web Forms Designer.
2. Right-click the legend and select **Edit Items** to display the LegendItem Collection Editor dialog box. You use the LegendItem Collection Editor dialog box to add or remove legend items and to configure legend item properties.



3. Select **Plots[0]** in the **Source** drop-down list and enter `Signal` in the **Text** box. Click **OK**. Now that you have specified a legend item for the plot, changes you make to the plot will be reflected on the legend.
4. Right-click the graph and select **Auto Format** to display the Auto Format dialog box. The Auto Format dialog box provides a set of pre-configured control styles. When you select a style and click **OK**, the Auto Format feature configures the appropriate control properties to reflect the style you chose.
5. Select **Points Only**. Click **OK**. Notice that the legend changed automatically to match the formatting of the graph.



6. Right-click the gauge and select **Auto Format** to display the Auto Format dialog box.
7. Select **Dark** and click **OK**.
8. On the gauge smart tag, set the Range property for the gauge with the drop-down Range type editor. Type `-0.2` for the minimum value and type `0.2` for the maximum value.
9. On the numeric edit smart tag, select **Indicator** for the **InteractionMode** property of the numeric edit control.
10. On the numeric edit smart tag, select Format Mode and in the Numeric Format Mode Editor dialog box, change the Precision to `4` to show four decimal places of precision. Click **OK**.
11. Select **File»Save Default.aspx** to save your application.
12. Select **Debug»Start Without Debugging** to run the application.

13. After your program builds, click **Start**. Notice the graph shows the data plot, and the gauge and the numeric edit display the mean of the data. The following screenshot shows `Default.aspx` in its final form.