VI. Windows Forms – Serialization, Dialogs, DataBinding

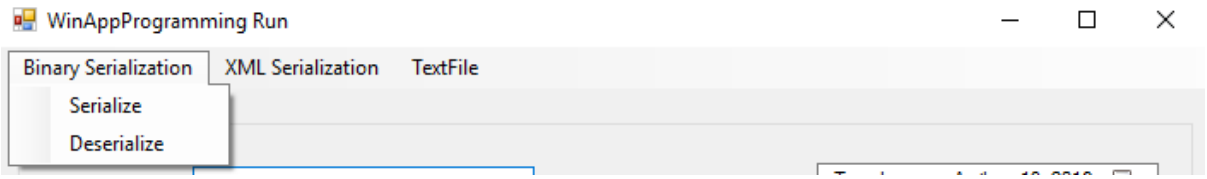
Contents

1. Serialization/Deserialization

Activity

C# Sample code available at http://online.ase.ro – "SerializationBinaryXMLTextFile" Sample

1. Create a copy of the "ListViewBasicSample" project and name it "SerializationBinaryXMLTextFile"
2. Create the following UI



1.1. Binary Serialization

3. Add a menu for "Binary Serialization" ("Serialize" - btnSerializeBinary, "Deserialize" - btnDeserializeBinary), "XML Serialization" ("Serialize" - btnSerializeXML, "Deserialize" - btnDeserializeXML) and "TextFile" ("Export" – btnExport).
4. Decorate the "Participant" class with the [Serializable] attribute, as follows. Un exception will be thrown otherwise.

```
[Serializable]
internal class Participant
{
   ……
```

5. Handle the "Click" event for the "btnSerializeBinary" button as follows

```
private void btnSerialize_Click(object sender, EventArgs e){
      BinaryFormatter formatter = new BinaryFormatter();
      using (FileStream s = File.Create("serialized.bin"))
            formatter.Serialize(s, _participants);
}
```

6. Remove the **readonly** modifier from the declaration of the "_participants" attribute in the "MainForm" class. The project will not compile otherwise.
7. Handle the "Click" event for the "btnDeserializeBinary" button as follows

```
private void btnDeserialize_Click(object sender, EventArgs e){
      BinaryFormatter formatter = new BinaryFormatter();
      using (FileStream s = File.OpenRead("serialized.bin"))      {
            _participants = (List<Participant>)formatter.Deserialize(s);
            DisplayParticipants();
      }
}
```

1.2. XML Serialization

8. Add a parameterless constructor to the "Participant" class. Change the access modifier for the class from "internal" to "public". Un exception will be thrown otherwise.
9. Handle the "Click" event for the "btnSerializeXML" button as follows.

```
XmlSerializer serializer = new XmlSerializer(typeof(List<Participant>));
using (StreamWriter writer = new StreamWriter("SerializedXML.xml"))
{
      serializer.Serialize(writer, _participants);
}
```

10. Handle the "Click" event for the "btnDeserializeXML" button as follows.

```
XmlSerializer serializer = new XmlSerializer(typeof(List<Participant>));

using (StreamReader streamReader = new StreamReader("SerializedXML.xml"))
{
      _participants = (List<Participant>)serializer.Deserialize(streamReader);
      DisplayParticipants();
}
```

1.3. TextFiles

11. Handle the "Click" event for the "btnExport" button as follows

```
// Create an instance of the open file dialog box.
SaveFileDialog saveFileDialog = new SaveFileDialog();
saveFileDialog.Filter = "Text File | *.txt";
saveFileDialog.Title = "Save as text file";

if (saveFileDialog.ShowDialog() == DialogResult.OK)
{
      //Approach 1
      //StreamWriter sw = new StreamWriter(saveFileDialog.FileName);
      //try
      //{
      //    sw.WriteLine("LastName,FirstName,BirthDate");

      //    foreach (var participant in _participants)
      //    {
      //          sw.WriteLine("{0}, {1}, {2}"
      //                , participant.LastName
      //                , participant.FirstName
      //                , participant.BirthDate.ToShortDateString());
      //    }
```

```
        //}
        //finally
        //{
        //    sw.Dispose();
        //}

        //2. Approach 2 - recommended
        // generates the try{} finally{} in Version 1
        using (StreamWriter sw = new StreamWriter(saveFileDialog.FileName))
        {
            sw.WriteLine("LastName,FirstName,BirthDate");

            foreach (var participant in _participants)
            {
                sw.WriteLine("{0}, {1}, {2}"
                    , participant.LastName
                    , participant.FirstName
                    , participant.BirthDate.ToShortDateString());
            }
        }
}
```

Activity

C# Sample code available at http://online.ase.ro – "TextFileSample" Sample

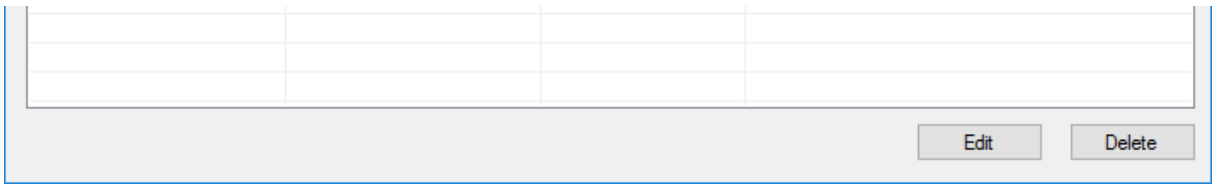
```
static void Main(string[] args)
{
    // Get the directories currently on the C drive.
    DirectoryInfo[] cDirs = new DirectoryInfo(@"c:\").GetDirectories();

    // Write each directory name to a file.
    using (StreamWriter sw = new StreamWriter("CDriveDirs.txt"))
    {
        foreach (DirectoryInfo dir in cDirs)
        {
            sw.WriteLine(dir.Name);

        }
    }

    // Read and show each line from the file.
    string line = "";
    using (StreamReader sr = new StreamReader("CDriveDirs.txt"))
    {
        while ((line = sr.ReadLine()) != null)
        {
            Console.WriteLine(line);
        }
    }
}
```

2. Dialogs

Activity

C# Sample code available at http://online.ase.ro – "DialogSample" Sample

1. Create a copy of the “BasicListView” project and name it “DialogSample”
2. Create the following UI



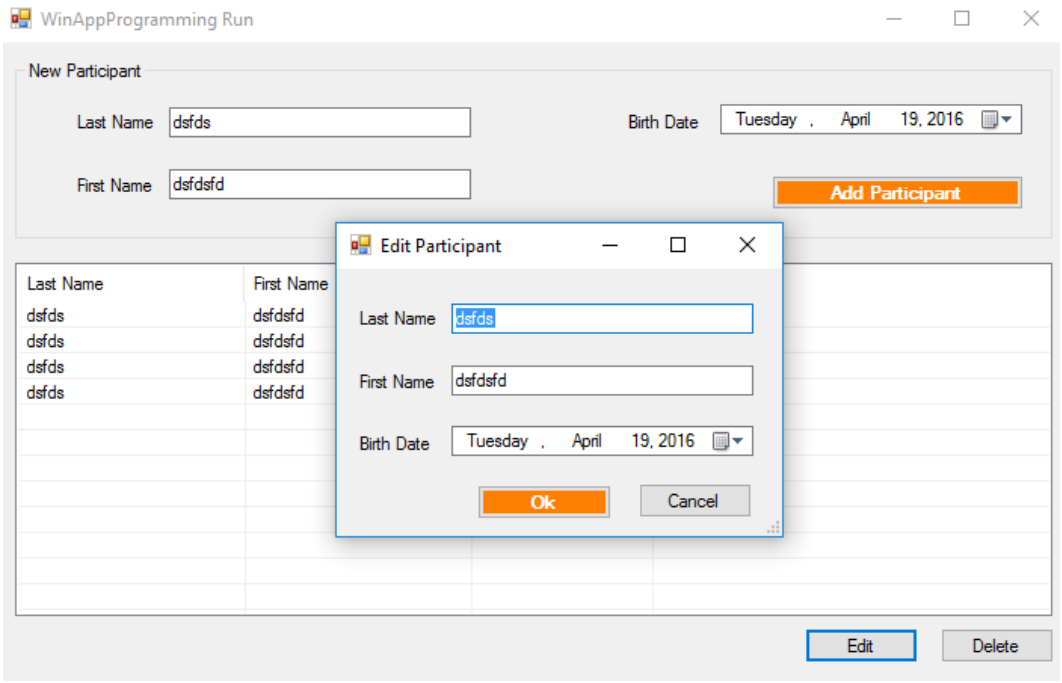
3. Name the “Edit” button “btnEdit” and the “Delete” button “btnDelete”
4. Modify the “DisplayParticipants” method in the “MainForm” class in order to set the “Tag” property for the ListViewItem instances, as shown bellow.

```
public void DisplayParticipants()
{
	lvParticipants.Items.Clear();

	foreach (Participant participant in _participants)
	{
		var listViewItem = new ListViewItem(participant.LastName);
		listViewItem.SubItems.Add(participant.FirstName);
		listViewItem.SubItems.Add(participant.BirthDate.ToShortDateString());

		//add this line
		listViewItem.Tag = participant;

		lvParticipants.Items.Add(listViewItem);
	}

}
```

5. Handle the “Click” event for the “btnDeletet” button as follows

```
if (lvParticipants.SelectedItems.Count == 0)
{
	MessageBox.Show("Choose a participant");
	return;
}

if (MessageBox.Show("Are you sure?", "Delete participant", MessageBoxButtons.YesNo,
MessageBoxIcon.Warning) ==
	DialogResult.Yes)
{
	_participants.Remove((Participant) lvParticipants.SelectedItems[0].Tag);
	DisplayParticipants();
}
```

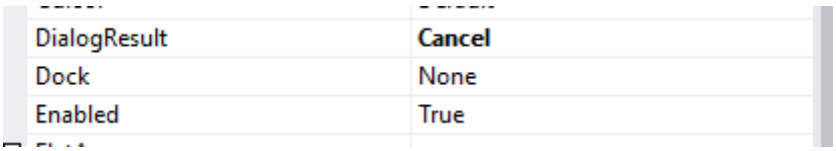
6. Add a new Form to the project and name it “EditForm”
7. Create the following UI



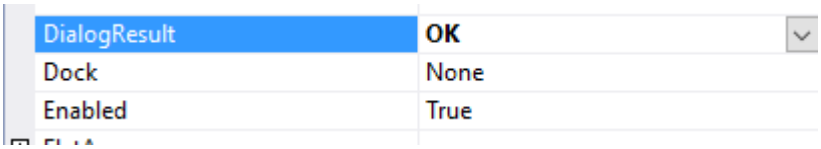
8. Rename the controls as “tbLastName”, “tbFirstName” and “dtpBirthDate”
9. Change the EditForm class, so that it is defined as follow

```
#region Attributes
private readonly Participant _participant;
#endregion


public EditForm(Participant participant)
{
	_participant = participant;

	InitializeComponent();
}

private void EditForm_Load(object sender, System.EventArgs e)
{
	tbLastName.Text = _participant.LastName;
	tbFirstName.Text = _participant.FirstName;
	dtpBirthDate.Value = _participant.BirthDate;
}
```

10. Set the DialogResult for the “Cancel” button as “Cancel”



11. Rename the “Ok” button as “btnOk”
12. Set the DialogResult for the “Ok” button as “OK”



13. Handle the "Click" event for the "btnOk" button as follows

```
_participant.LastName = tbLastName.Text;
_participant.FirstName = tbFirstName.Text;
_participant.BirthDate = dtpBirthDate.Value;
```

14. Handle the "Click" event for the "Edit" button in the "MainForm" as follows:

```
if (lvParticipants.SelectedItems.Count == 0)
{
      MessageBox.Show("Choose a participant");
      return;
}

EditForm editForm = new EditForm((Participant)lvParticipants.SelectedItems[0].Tag);
if (editForm.ShowDialog() == DialogResult.OK)
      DisplayParticipants();
```

3. DataBinding

Data binding type:

Type	Description
Simple data binding	The ability of a control to bind to a single data element, such as a value in a column in a dataset table. This is the type of binding typical for controls such as a TextBox control or Label control, which are controls that typically only displays a single value. In fact, any property on a control can be bound to a field in a database.
Complex data binding	The ability of a control to bind to more than one data element, typically more than one record in a database. Complex binding is also called list-based binding. Examples of controls that support complex binding are the DataGridView, ListBox, and ComboBox controls.

Change notification

- Ensures that your data source and bound controls always have the most recent data, we must add change notification for data binding. Specifically, we want to ensure that bound controls are notified of changes that were made to their data source, and the data source is notified of changes that were made to the bound properties of a control.

Cases:

- Simple Binding – INotifyPropertyChanged
- Complex data binding - IBindingList

Activity

C# Sample code available at http://online.ase.ro – "DataBindingDialogs" Sample

1. Create a copy of the "BasicListView" project and name it "DataBindingSample"
2. Replace the "ListView" control with a "DataGrid" control (Name: dgvParticipants)
3. Add a "ViewModel" folder to your project

4. Add the following “MainFormViewModel” class in the “ViewModel” folder

```
internal class MainFormViewModel : INotifyPropertyChanged
{
	#region Properties

	#region LastName
	private string _lastName;
	public string LastName {
		get { return _lastName; }
		set
		{
			if (_lastName == value)
				return;
			_lastName = value;

			//If we use [CallerMemberName] in the OnPropertyChanged method
			//OnPropertyChanged();
			//If we don't use the [CallerMemberName] in the OnPropertyChanged method
			OnPropertyChanged("LastName");
		}
	}
	#endregion

	#region FirstName
	private string _firstName;
	public string FirstName
	{
		get { return _firstName; }
		set
		{
			if (_firstName == value)
				return;
			_firstName = value;
			OnPropertyChanged();
		}
	}
	#endregion

	#region FirstName
	private DateTime _birthDate;

	public DateTime BirthDate
	{
		get { return _birthDate; }
		set
		{
			if (_birthDate == value)
				return;
			_birthDate = value;
			OnPropertyChanged();
		}
	}
	#endregion

	public BindingList<Participant> Participants { get; set; }
	#endregion

	public MainFormViewModel()
	{
		Participants = new BindingList<Participant>();
```

```
            BirthDate = DateTime.Now;
      }

      #region Methods
      public void AddParticipant()
      {
            Participants.Add(new Participant(LastName, FirstName, BirthDate));
            LastName = FirstName = string.Empty;
            BirthDate = DateTime.Today;
      }
      #endregion

      #region INotifyPropertyChanged
      public event PropertyChangedEventHandler PropertyChanged;

      [NotifyPropertyChangedInvocator]
      // [CallerMemberName] - Allows you to obtain the method or property name of the
caller to the method. https://msdn.microsoft.com/en-
us/library/system.runtime.compilerservices.callermembernameattribute%28v=vs.110%29.aspx
      protected virtual void OnPropertyChanged([CallerMemberName] string propertyName =
null)
      {
            if(PropertyChanged != null)
                  PropertyChanged.Invoke(this, new PropertyChangedEventArgs(propertyName));
      }
      #endregion
}
```

5. Update the "MainForm" so that it is defined as follow.

```
public partial class MainForm : Form
{
      private readonly MainFormViewModel _viewModel;

      public MainForm()
      {
            InitializeComponent();
            Load += MainForm_Load;

            _viewModel = new MainFormViewModel();
      }

      private void MainForm_Load(object sender, EventArgs e)
      {
            dgvParticipants.DataSource = _viewModel.Participants;

      tbLastName.DataBindings.Add("Text",_viewModel,"LastName",false,DataSourceUpdateMode.
OnPropertyChanged);
            tbFirstName.DataBindings.Add("Text", _viewModel, "FirstName", false,
DataSourceUpdateMode.OnPropertyChanged);
            dtpBirthDate.DataBindings.Add("Value", _viewModel, "BirthDate", false,
DataSourceUpdateMode.OnPropertyChanged);
      }

      private void btnAdd_Click(object sender, EventArgs e)
      {
            _viewModel.AddParticipant();
      }
}
```

Further reading about the MVVM pattern: link