V. Windows Forms – Validation, Exceptions, ListView, TreeView

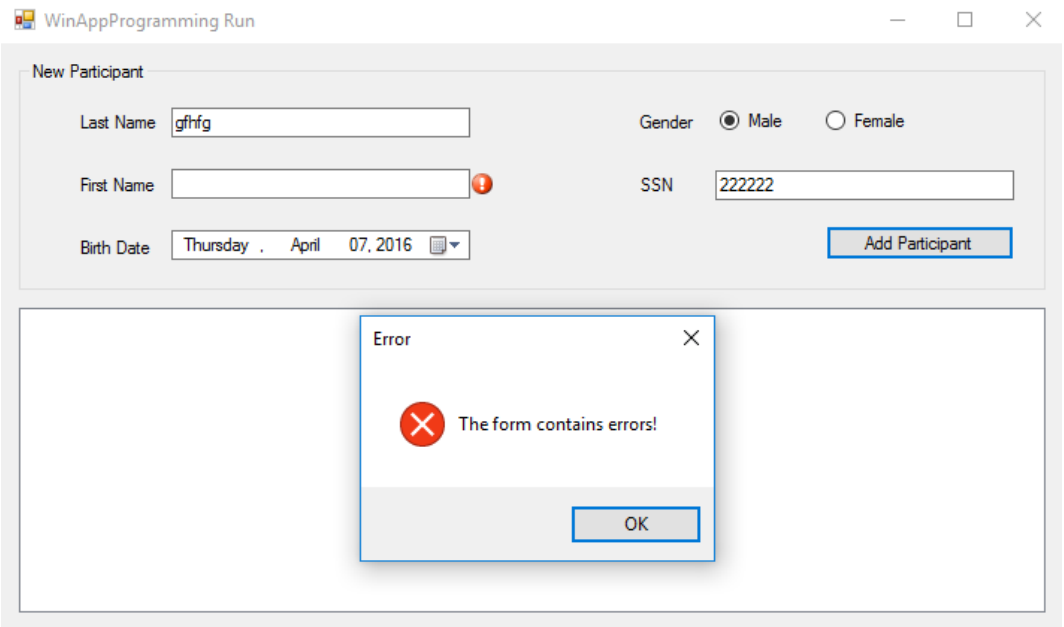
Contents

1. Data Validation

Assignment

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

1. Create a new project with the name "ValidationCustomExceptions"
2. Create the following UI



3. Add ErrorProviders for the LastName and FirstName fields
4. Handle the Validating event on tbLastName as follows.

```
string lastName = ((TextBox) sender).Text.Trim();

if (string.IsNullOrWhiteSpace(lastName))
{
```

```
        e.Cancel = true; //prevents the user from changing the focus to another control

        epLastName.SetError((Control)sender, "The Last Name should not be empty!");
}
```

5. Handle the Validated event on tbLastName as follows.

```
epLastName.Clear();
```

6. Handle the Validating and Validated events for the tbFirstName in a similar manner.
7. Handle the Click event on the "Add Participant" button as follows.

```
private void btnAdd_Click(object sender, EventArgs e)
{
        string firstName = tbFirstName.Text.Trim();
        string lastName = tbLastName.Text.Trim();
        DateTime birthDate = dtpBirthDate.Value;

        bool isValid = true;

        if (string.IsNullOrWhiteSpace(lastName))
        {
                epLastName.SetError(tbFirstName, "The Last Name should not be empty!");
                isValid = false;
        }

        if (string.IsNullOrWhiteSpace(firstName))
        {
                epFirstName.SetError(tbFirstName, "The First Name should not be empty!");
                isValid = false;
        }

        if (!isValid)
        {
                //An ErrorProvider control should
                MessageBox.Show("The form contains errors!",
                        "Error", MessageBoxButtons.OK, MessageBoxIcon.Error);

                return;
        }
}
```

8. Why is it recommended to have the validations both on the individual controls and in the handler for the "Add Participant" button?

2. Exception Handling

2.1. Custom Exceptions

Assignment

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

1. Add the following "InvalidBirthDateException" class

```
public class InvalidBirthDateException : Exception
{
	public DateTime BirthDate { get; set; }

	public InvalidBirthDateException(DateTime birthDay)
	{
		BirthDate = birthDay;
	}

	public override string Message
	{
		get
		{
			return "The birthDate " + BirthDate + " is invalid";
		}
	}
}
```

2. Update the “BirthDate” property in the “Participant” class in order to validate the received value

```
#region BirthDate
private DateTime _birthDate;
public DateTime BirthDate {
	get { return _birthDate; }
	set
	{
		if(value >= DateTime.Today)
			throw new InvalidBirthDateException(value);
		_birthDate = value;
	}
}
#endregion
```

3. Update the event handler for the “Add Participant” button in order to handle the potential exceptions.

```
try
{
	var participant = new Participant(lastName, firstName, birthDate, gender, ssn);
	//TODO Logic for adding the participant to the list bellow
}
catch (InvalidBirthDateException ex)
{
	//Expected exception
	MessageBox.Show(string.Format("The birth date {0} is invalid!", ex.BirthDate));
}
catch (Exception)
{
	//UnExpected exception
	MessageBox.Show("An exception has been encountered! Please contact the technical
support.");

	//Log the exception using:
	// - Log4Net
	// - Application Insights
}
finally
{
	Debug.WriteLine("Always executed");
}
```

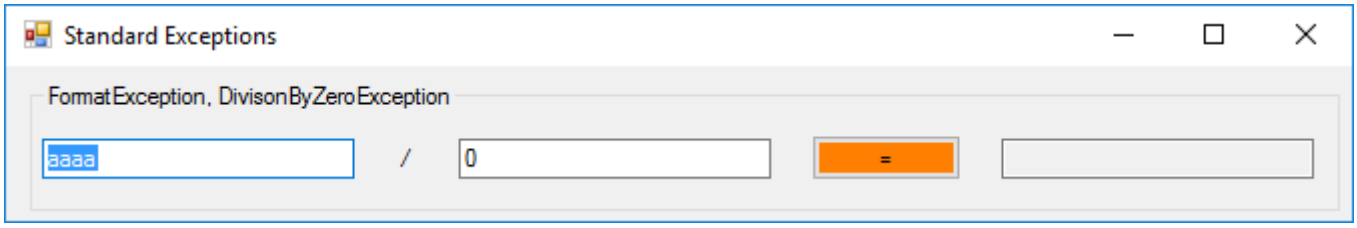
2.2. Standard Exceptions

- common exception types: System.NotImplementedException, System.DivideByZeroException, System.FormatException

Further reading: link

Assignment

1. Create a new project with the name “StandardExceptions”
2. Create the following UI



3. Handle the possible exceptions

```
try
{
      int value1 = int.Parse(tbValue1.Text);
      int value2 = int.Parse(tbValue2.Text);

      tbResult.Text = (value1/value2).ToString(CultureInfo.InvariantCulture);

      //Throwing an exception:
      //throw new NotImplementedException();
}
catch (FormatException ex)
{
      MessageBox.Show(ex.Message);

      //Rethrowing the exception
      //throw; //Handled by Program.Application_ThreadException
}
catch (DivideByZeroException ex)
{
      MessageBox.Show(ex.Message);
}
catch (Exception ex)
{
      MessageBox.Show(ex.Message);
}
```

4. Catching all uncaught exceptions in an application can be done by subscribing to the “ThreadException” event in the “Program” class.

```
static class Program
{
      /// <summary>
      /// The main entry point for the application.
      /// </summary>
      [STAThread]
```

```
        static void Main()
        {
                Application.ThreadException += Application_ThreadException;

                Application.EnableVisualStyles();
                Application.SetCompatibleTextRenderingDefault(false);
                Application.Run(new MainForm());
        }

        private static void Application_ThreadException(object sender,
System.Threading.ThreadExceptionEventArgs e)
        {
                MessageBox.Show(e.Exception.Message);
        }
}
```

3. Complex Visualization Controls

3.1. ListView

Assignment

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

1. Create a new project with the name "ListViewSample"
2. Rename "Form1" to "MainForm"
3. Create the following UI

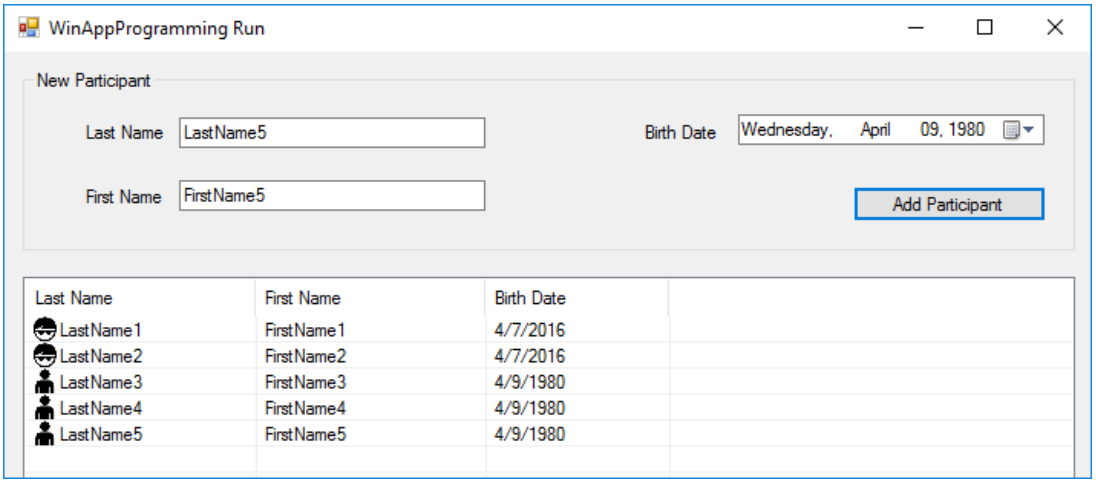


Figure 1 ListView

4. Add a new folder to your project and name it "Entities"
5. Inside the "Entities" folder add the following "Participant" class

```
internal class Participant
{
      public string LastName { get; set; }
      public string FirstName { get; set; }
      public DateTime BirthDate { get; set; }
```

```
        public Participant(string lastName, string firstName, DateTime birthDate)
        {
                LastName = lastName;
                FirstName = firstName;
                BirthDate = birthDate;
        }
}
```

4. Final form of the “MainForm” class

```
public partial class MainForm : Form
{
        #region Properties
        private List<Participant> Participants { get; set; }
        #endregion

        public MainForm()
        {
                InitializeComponent();

                Participants = new List<Participant>();
        }

        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());

                        //approximate calculation of the age
                        if ((DateTime.Now - participant.BirthDate).TotalDays / 365 >= 18)
                                listViewItem.ImageKey = "adult.png";
                        else
                                listViewItem.ImageKey = "child.png";

                        lvParticipants.Items.Add(listViewItem);
                }
        }

        #region Events
        private void btnAdd_Click(object sender, EventArgs e)
        {
                string firstName = tbFirstName.Text;
                string lastName = tbLastName.Text;
                DateTime birthDate = dtpBirthDate.Value;

                var participant = new Participant(lastName, firstName, birthDate);
                Participants.Add(participant);

                DisplayParticipants();
        }
        #endregion
```

5. Add buttons for changing the current “View” of the list, as shown in Figure 2 .
6. Display the participants in groups (“Children” and “Adults”) as shown in Figure 2 .

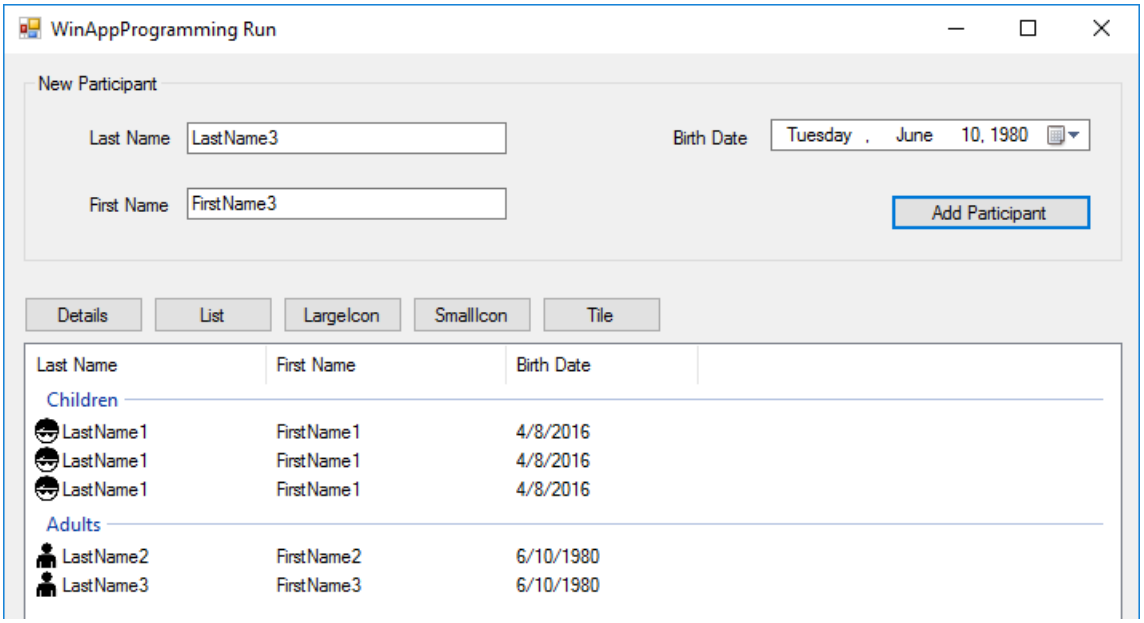


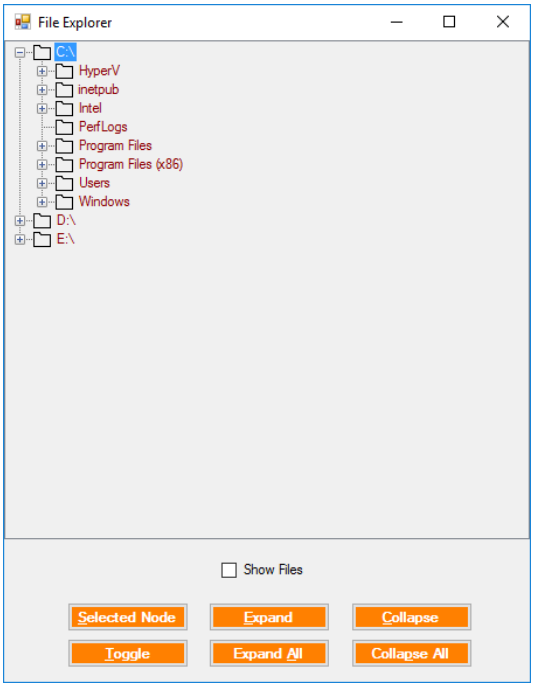
Figure 2. ListView with Groups

3.2. TreeView

Assignment

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

1. Create a new project with the name "TreeViewSample"
2. Create the following UI



3. Add the following methods

```
#region Methods
```

```
private void FillDirectoryTree()
{
	//  Suppress redraw until tree view is complete
	tvw.BeginUpdate();

	//  First clear all the nodes.
	tvw.Nodes.Clear();

	//  Get the logical drives and put them into the root nodes.
	//  Fill an array with all the logical drives on the machine.
	string[] strDrives = Environment.GetLogicalDrives();

	//  Iterate through the drives, adding them to the tree.
	//  Use a try/catch block, so if a drive is not ready,
	//  e.g. an empty floppy or CD, it will not be added to the tree.
	foreach (string rootDirectoryName in strDrives)
	{
		try
		{
			//  Find all the first level subdirectories.
			//  If the drive is not ready, this will throw an
			//  exception, which will have the effect of
			//  skipping that drive.
			Directory.GetDirectories(rootDirectoryName);

			//  Create a node for each root directory
			TreeNode ndRoot = new TreeNode(rootDirectoryName);

			//  Add the node to the tree
			tvw.Nodes.Add(ndRoot);

			//  Add subdirectory nodes.
			//  If Show Files checkbox checked, then also get the filenames.
			GetSubDirectoryNodes(ndRoot, cb.Checked);
		}
		catch (IOException)
		{
			//  let it through
		}
		catch (Exception e)
		{
			//  Catch any other errors.
			MessageBox.Show(e.Message);
		}
	}

	tvw.EndUpdate();

}

private void GetSubDirectoryNodes(TreeNode parentNode, bool getFileNames)
{
	//  Exit this method if the node is not a directory.
	DirectoryInfo di = new DirectoryInfo(parentNode.FullPath);
	if ((di.Attributes & FileAttributes.Directory) == 0)
	{
		return;
	}

	//  Clear all the nodes in this node.
	parentNode.Nodes.Clear();
```

```
        try
        {
                //  Get an array of strings containing all the subdirectories in the
parent node.
                string[] arSubs = Directory.GetDirectories(parentNode.FullPath);

                //  Add a child node for each subdirectory.
                foreach (var subDir in arSubs)
                {
                        DirectoryInfo dirInfo = new DirectoryInfo(subDir);
                        // do not show hidden folders
                        if ((dirInfo.Attributes & FileAttributes.Hidden) != 0)
                        {
                                continue;
                        }

                        TreeNode subNode = new TreeNode(dirInfo.Name);
                        subNode.ImageIndex = 0;
                        subNode.SelectedImageKey = "openFolder.png";
                        parentNode.Nodes.Add(subNode);
                }

                if (getFileNames)
                {
                        //  Get any files for this node.
                        string[] files = Directory.GetFiles(parentNode.FullPath);

                        // After placing the nodes,
                        // now place the files in that subdirectory.
                        foreach (string str in files)
                        {
                                FileInfo fi = new FileInfo(str);
                                TreeNode fileNode = new TreeNode(fi.Name);
                                parentNode.Nodes.Add(fileNode);

                                //  Set the icon
                                switch (fi.Extension.ToUpper())
                                {
                                        case ".JPG":
                                        case ".JPEG":
                                                fileNode.ImageKey = "jpgFile.png";
                                                fileNode.SelectedImageKey = "jpgFile.png";
                                                break;
                                        case ".TXT":
                                                fileNode.ImageKey = "textFile.png";
                                                fileNode.SelectedImageKey = "textFile.png";
                                                break;
                                        default:
                                                fileNode.ImageKey = "file.png";
                                                fileNode.SelectedImageKey = "file.png";
                                                break;
                                }
                        }
                }
        }
        catch (UnauthorizedAccessException)
        {

        }
}
#endregion
```