Windows Forms – Validation, Exceptions, ListView, TreeView

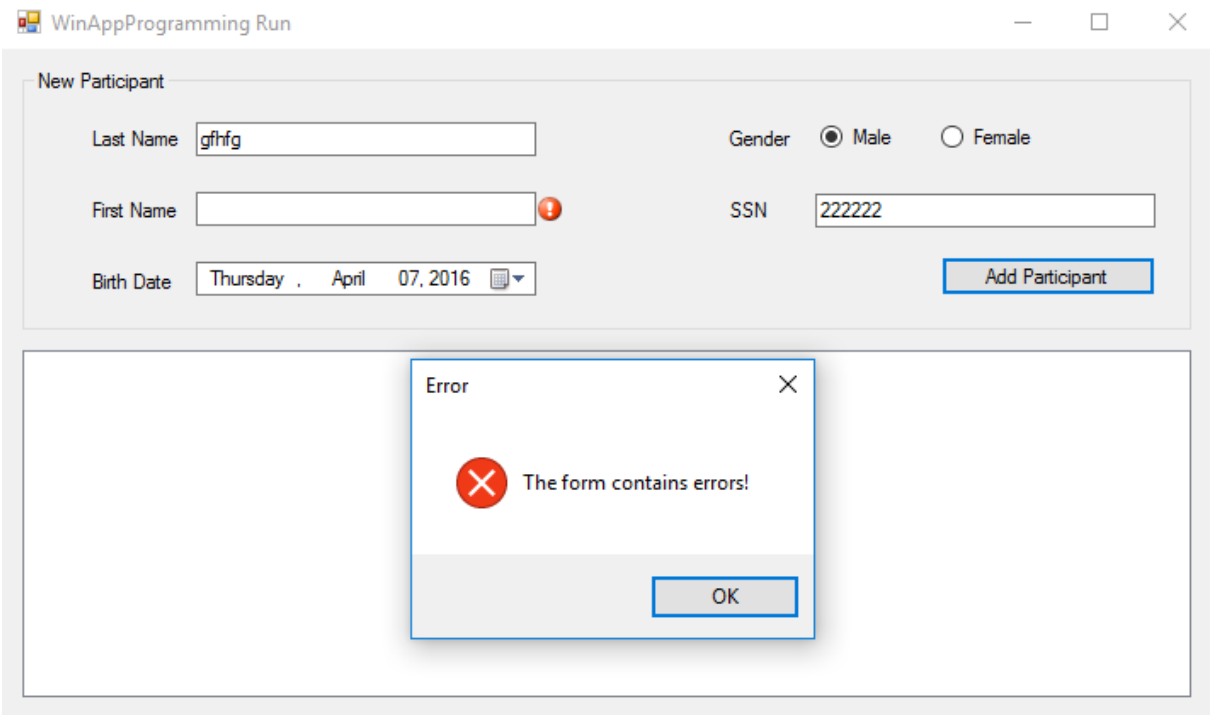
Contents

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: **epLastName**, **epFirstName**
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. Complex Visualization Controls

2.1. 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

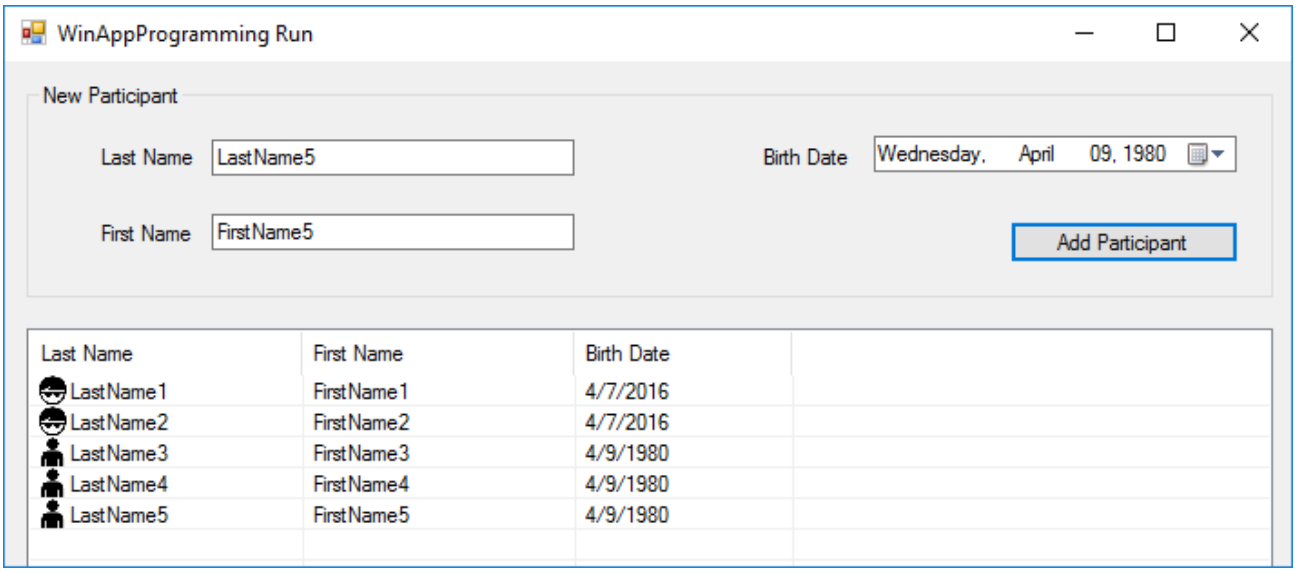


Figure 1 ListView

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 .

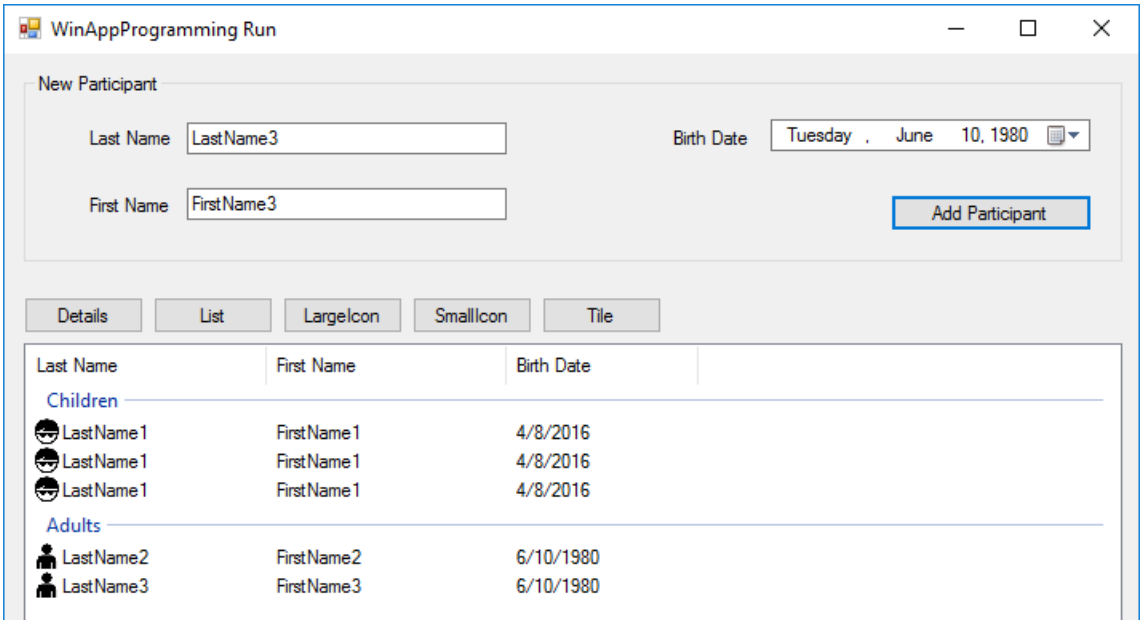


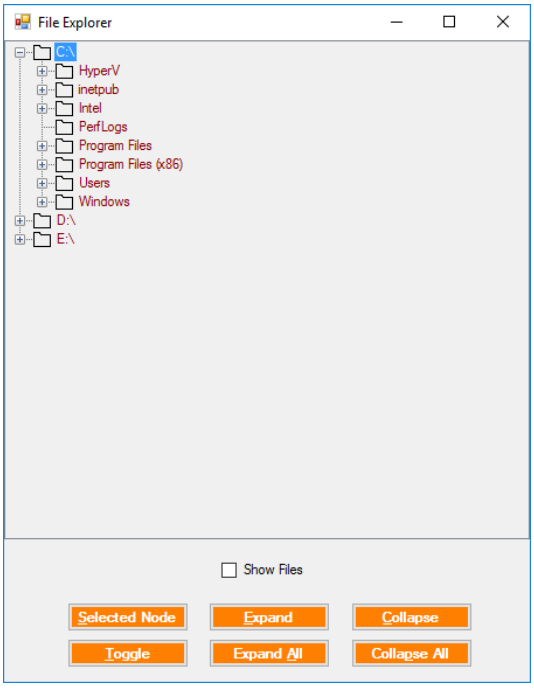
Figure 2. ListView with Groups

2.2. 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
```

3. Exception Handling

3.1. 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");
}
```

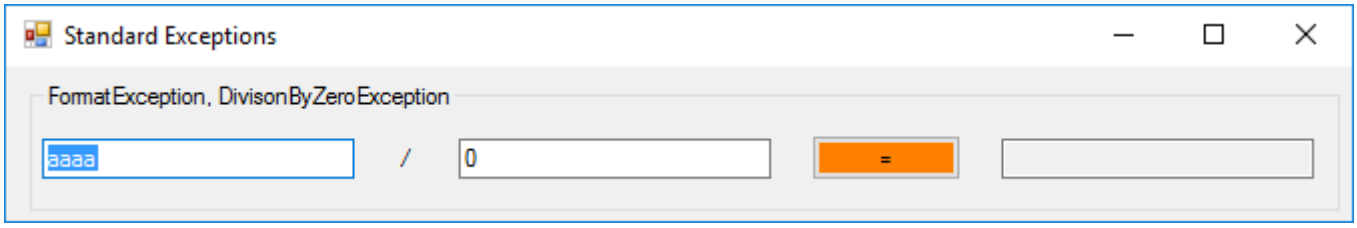
3.2. Standard Exceptions

- 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);
        }
}
```