Microsoft® Silverlight™

Hands-On Lab

Building Applications in Silverlight 4

Module 3: User Registration with Authentication, Validation, MVVM, Implicit Styles and RichTextBox

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Introduction

In this lab, you will modify the example application to customize data and behavior based on the logged in user, using the Model-View-ViewModel pattern. You will also implement server-side access control, and explore how WCF RIA Services data annotations work with data forms to provide end to end validation in Silverlight applications.

You can start from where you left off with the previous lab, if you completed it. But if you did not get to the end, or if it you would just prefer to work from a fresh starting point, make a copy of the solution in the **StartingPoint** folder for this lab—it contains the completed solution from the previous lab.

In the lab for the previous module, your Silverlight application used a simple approach that works for very basic applications, but which can run into problems as your program grows. You were binding controls directly to data sources that came back from WCF RIA Services, and putting all the code into the code behind for your XAML pages. This is problematic for a number of reasons. Embedding application behavior into the code behind makes that behavior hard to test in isolation. You cannot write unit tests for that code without somehow loading the XAML. Binding directly to objects returned by a service raises problems when your application needs to show state that doesn't correspond directly to properties those objects already have. You certainly wouldn't want to go adding new items to the object model returned by a domain service simply to support user interface status such as knowing whether the user has dismissed a notification in the UI yet, but it's entirely reasonable (a good idea in fact) to use data binding to work with that sort of state.

Non-trivial Silverlight applications typically add an extra layer between the XAML and the underlying data model to provide flexibility and testability. You will use this approach in this part of the lab. You will customize the user interface based on whether the user is logged in, and if so, which role their account belongs to.

Obviously, concepts such as account and role are as much server-side concerns as client-side ones, so these ideas belong in the world of the domain model. In fact the Silverlight Business Application template adds some services to support these features to any new application. The logic for deciding which specific UI elements should be available to which users is clearly specific to the client-side code, and that's the logic that will go into the extra layer. We call this layer the ViewModel, because it sits between the View (the XAML with its codebehind) and the Model (the client-side wrappers generated by WCF RIA Services for our domain service, in this case).

Exercise 1: Introducing MVVM and Customizing the UI by UI Role

This exercise will add a ViewModel to the application's home screen (view) while introducing MVVM practices. Authentication features will be modified to check against the sample database's user and roles tables.

Setup Authentication

1. Open the **SlEventManager** solution in Visual Studio 2010 (copy the Starting Point solution).

> This lab uses the aspnet_ tables and ASP.NET authentication. You can see the tables in the application's database by following the steps below.
>
> Expand the **App_Data** folder and double click **SlEventManager.mdf**. This will show the **Server Explorer** panel, and will expand the **Data Connections** entry for your project's database. Expand the **Tables** item for this database, and you'll see various tables whose names begin with **aspnet_**.
>
> Right click on **aspnet_Users** and select **Show Table Data**, and it will show the contents of the table. You should see two rows, representing two user accounts (**ian** and **administrator**) that are present in the database provided for this example project.
>
> These **aspnet_** tables are standard ones recognized by various ASP.NET features for working with users, role-based security, and profiles. It's common for these tables to end up in an auto-generated SQL Express database called **ASPNETDB.MDF**—Visual Studio can arrange for this database to be generated for you. (And in fact it will hide it by default, so it's not always obvious that it's done it.) But we're not going to use a generated database. We're going to use the tables already present in the **SlEventManager.mdf** database, for two reasons. First, the database is preloaded with some user accounts and roles that you'll be using in this lab. Second, keeping everything in one database is simpler for deployment reasons.
>
> The one downside is that we need to configure the ASP.NET web application to use our database. By default it will go ahead and generate one for you. In fact, if you've already been playing with the login controls that the Silverlight Business Application template adds to new applications, it's possible that this has already happened. Select the **App_Data** folder and then click the Show All Files button at the top of Solution Explorer, and if you see an **ASPNETDB.MDF**, that means the automatic generation has already happened. Not that this is a problem. We'll switch to the example database now.

2. Open the **SlEventManager.Web** project's **web.config** file.

3. Find the **<system.web>** element.

4. Delete the **<roleManager enabled="true" />** element.
5. Delete the **<profile>** element and all its children.
6. Inside the **<system.web>** element, add the following:

XML

```
<membership defaultProvider="SlEventManagerMembershipProvider"
userIsOnlineTimeWindow="15">
  <providers>
    <clear />
    <add name="SlEventManagerMembershipProvider"
         type="System.Web.Security.SqlMembershipProvider, System.Web,
Version=4.0.0.0, Culture=neutral, PublicKeyToken=b03f5f7f11d50a3a"
         connectionStringName="SlEventManagerDb"
applicationName="/SlEventManager" enablePasswordRetrieval="false"
         enablePasswordReset="true" requiresQuestionAndAnswer="true"
requiresUniqueEmail="true"
         passwordFormat="Hashed" />
  </providers>
</membership>

<roleManager enabled="true" defaultProvider="SlEventManagerRoleProvider">
  <providers>
    <clear />
    <add name="SlEventManagerRoleProvider"
         type="System.Web.Security.SqlRoleProvider, System.Web,
Version=4.0.0.0, Culture=neutral, PublicKeyToken=b03f5f7f11d50a3a"
         connectionStringName="SlEventManagerDb"
applicationName="/SlEventManager" />
  </providers>
</roleManager>

<profile enabled="true" defaultProvider="SlEventManagerProfileProvider">
  <providers>
    <clear />
    <add name="SlEventManagerProfileProvider"
connectionStringName="SlEventManagerDb"
         applicationName="/SlEventManager"
         type="System.Web.Profile.SqlProfileProvider, System.Web,
Version=4.0.0.0, Culture=neutral, PublicKeyToken=b03f5f7f11d50a3a" />
  </providers>
  <properties>
    <add name="FriendlyName" />
  </properties>
</profile>
```

The editorial process has split some of the lines to fit them on the page. If you copy and paste this in you should be fine, but don't try to reproduce the line breaks in the middle of the **type** attributes.

This explicitly configures Membership, Role, and Profile providers. Silverlight Business Applications use all three of these. (The Membership feature is the one that deals with user logins, by the way.)

This explicit configuration lets us do two things. First, it lets us specify an **applicationName**; this scopes the user accounts, roles, and profiles to our application, and it's considered good practice always to set this. Second, it lets us specify the database connection string to be used for each of these features, which is how ASP.NET will know to use our database. All three are using the **SlEventManagerDb** connection string.

7. Find the **<connectionStrings>** section of the **web.config**. Add another entry for the authentication database:

XML

```
<add name="SlEventManagerDb"
     connectionString="Data
Source=.\SQLEXPRESS;AttachDbFilename=|DataDirectory|\SlEventManager.mdf;Int
egrated Security=True;User Instance=True;MultipleActiveResultSets=True"
     providerName="System.Data.SqlClient" />
```

The **connectionString** should not have any line breaks in your **web.config**.

8. Run the application.
9. Click on the **login** link at the top right of the page. A login UI will appear.
10. Log in with a username of **administrator**, and a password of **P@ssw0rd** (that's a number zero after the **w**).

The login should succeed, verifying that your application is successfully using the **aspnet_Users** table (and associated tables such as aspnet_**Membership**) to for managing logins. (Feel free to verify that it's not simply allowing *any* credentials, by trying to log in with a non-existent account, or the wrong password. The login should fail when you try that.)

11. Close the application.
12. Back in Visual Studio, inspect the data in the **aspnet_Roles** table.

This contains two rows, defining two roles: **Event Administrators** and **Registered Users**. (In the database supplied, the **administrator** account belongs to both roles, while the **ian** account belongs only to the second. Role membership is defined in the **aspnet_UsersInRoles** table.) The **Registered Users** role is one you'll typically get by default in this sort of application, because the Silverlight Business Application template includes code to generate it.

The **AddUser** method in the **SlEventManager.Web** project's **UserRegistrationService.cs(C#) or UserRegistrationService.vb(VB)** file uses the ASP.NET **Roles** class to create the **Registered Users** role if it doesn't already exist, and automatically adds newly-created users to that role.

13. Run the application
14. If the application still shows you as being logged in, log out.
15. Use the login UI to create a new user account (all the code for registering as a new user is built into the template).

> Once you've done this you should see new entries in the **aspnet_Users**, **aspnet_Membership**, and **aspnet_UsersInRoles** tables, representing your new account, and its membership of the **Registered Users** role.

Create Registration Buttons

1. Go to **Home.xaml** in the **SlEventManager** project's **Views** folder.
2. Add the following StackPanel after the existing one:

XAML

```
<StackPanel Orientation="Horizontal" HorizontalAlignment="Right">
  <Button x:Name="registerForEventButton" Content="Register" />
  <Button x:Name="unregisterForEventButton" Content="Unregister" />
</StackPanel>
```

> Right now both panels will be visible at once, but we'll fix that with a ViewModel that will provide bindable properties to control the visibility of these two panels.

3. Add a new class to your **SlEventManager** project (with **Shift+Alt+C** or the **Add→Class…** context menu in the Solution Explorer) called **ViewModelBase**.

> A ViewModel needs to notify Silverlight whenever its properties change so that and data binding expressions that connect to the ViewModel know to update the target UI element. The usual way to do this is to implement **INotifyPropertyChanged**. So it's common to define a base class to provide a common implementation of this interface for all ViewModels.

4. Add this using declaration:

C#

```
using System.ComponentModel;
```

Visual Basic

```
Imports System.ComponentModel
```

5. Implement the class as shown here:

C#

```
public class ViewModelBase : INotifyPropertyChanged
{
    public event PropertyChangedEventHandler PropertyChanged;
    protected void OnPropertyChanged(string propertyName)
    {
```

```
        if (PropertyChanged != null)
        {
            PropertyChanged(this,
                new PropertyChangedEventArgs(propertyName));
        }
    }
}
```

Visual Basic

```
Public Class ViewModelBase
    Implements INotifyPropertyChanged

    Public Event PropertyChanged As PropertyChangedEventHandler Implements
System.ComponentModel.INotifyPropertyChanged.PropertyChanged
    Protected Sub OnPropertyChanged(ByVal propertyName As String)
        RaiseEvent PropertyChanged(Me, New
PropertyChangedEventArgs(propertyName))
    End Sub
End Class
```

Create the ViewModel

1. Add a new folder to the **SlEventManager** project called **ViewModels**.

> ViewModels are typically designed either for a particular view (i.e. a particular XAML file and its code behind) or some part of the view (e.g., an individual item in a list inside a view). You will be defining a ViewModel for the **Home.xaml** view.

2. Add a class called **HomeViewModel** in the **ViewModels** folder.
3. Make this new class derive from the **ViewModelBase** class you created.
4. The ViewModel needs to determine the visibility of the administrator buttons, so add the following property definition:

C#

```
private Visibility _adminButtonsVisibility;
public Visibility AdminButtonsVisibility
{
    get { return _adminButtonsVisibility; }
    set
    {
        if (_adminButtonsVisibility != value)
        {
            _adminButtonsVisibility = value;
            OnPropertyChanged("AdminButtonsVisibility");
        }
    }
}
```

Visual Basic

```
Private _adminButtonsVisibility As Visibility
```

```
Public Property AdminButtonsVisibility() As Visibility
	Get
		Return _adminButtonsVisibility
	End Get
	Set(ByVal value As Visibility)
		If _adminButtonsVisibility <> value Then
			_adminButtonsVisibility = value
			OnPropertyChanged("AdminButtonsVisibility")
		End If
	End Set
End Property
```

This is the typical boilerplate implementation for a property that raises change notifications. This particular property's type is **Visibility**—that's because we're going bind this to one of the **StackPanel**s' **Visibility** properties.

5. Add another similar property called **AttendeeButtonsVisibility**.

C#

```
private Visibility _attendeeButtonsVisibility;
public Visibility AttendeeButtonsVisibility
{
    get { return _attendeeButtonsVisibility; }
    set
    {
        if (_attendeeButtonsVisibility != value)
        {
            _attendeeButtonsVisibility = value;
            OnPropertyChanged("AttendeeButtonsVisibility");
        }
    }
}
```

Visual Basic

```
Private _attendeeButtonsVisibility As Visibility
Public Property AttendeeButtonsVisibility() As Visibility
	Get
		Return _attendeeButtonsVisibility
	End Get
	Set(ByVal value As Visibility)
		If _attendeeButtonsVisibility <> value Then
			_attendeeButtonsVisibility = value
			OnPropertyChanged("AttendeeButtonsVisibility")
		End If
	End Set
End Property
```

6. Add the following code to have the ViewModel set these properties :

C#

```
private void UpdateForUserRole()
{
```

```
    bool isLoggedIn = WebContext.Current.User.IsAuthenticated;
    bool isAdmin = isLoggedIn &&
                   WebContext.Current.User.IsInRole("Event 
Administrators");

    AdminButtonsVisibility = isAdmin ?
        Visibility.Visible : Visibility.Collapsed;
    AttendeeButtonsVisibility = (isLoggedIn && !isAdmin) ?
        Visibility.Visible : Visibility.Collapsed;
}
```

Visual Basic

```
Private Sub UpdateForUserRole()
      Dim isLoggedIn As Boolean = WebContext.Current.User.IsAuthenticated
      Dim isAdmin As Boolean = isLoggedIn AndAlso 
WebContext.Current.User.IsInRole("Event Administrators")

      AdminButtonsVisibility = If(isAdmin, Visibility.Visible, 
Visibility.Collapsed)
      AttendeeButtonsVisibility = If((isLoggedIn AndAlso (Not isAdmin)), 
Visibility.Visible, Visibility.Collapsed)
End Sub
```

This uses the **WebContext** class, which is provided by WCF RIA Services. This has built-in support for the concept of user authentication and roles. This relies on the **AuthenticationService** in the **SlWebManager.Web** project's **Services** folder.

7. We need to call the UpdateForUserRole method when the UI first loads, but also whenever the user logs in or out. So add the following constructor to your ViewModel:

C#

```
public HomeViewModel()
{
    WebContext.Current.Authentication.LoggedIn += (s, e) => 
UpdateForUserRole();
    WebContext.Current.Authentication.LoggedOut += (s, e) => 
UpdateForUserRole();
    UpdateForUserRole();
}
```

Visual Basic

```
Public Sub New()
      AddHandler WebContext.Current.Authentication.LoggedIn, Sub(s, e) 
UpdateForUserRole()
      AddHandler WebContext.Current.Authentication.LoggedOut, Sub(s, e) 
UpdateForUserRole()
      UpdateForUserRole()
End Sub
```

> The **WebContext.Current.Authentication** object offers these events to notify you when the user logs in or out, enabling us to know when we should update the ViewModel's state.

8. Create an instance of this ViewModel and bind the view to it by adding the field declaration and initializer in the Home.xaml.cs(C#) or Home.xaml.vb(VB) codebehind:

C#

```
HomeViewModel _viewModel = new HomeViewModel();
```

Visual Basic

```
Dim _viewModel As New HomeViewModel()
```

9. Add this using statement:

C#

```
using SlEventManager.ViewModels;
```

Visual Basic

```
Imports SlEventManager.ViewModels
```

10. In the view's constructor, assign this into the DataContext for the view:

C#

```
this.DataContext = _viewModel;
```

Visual Basic

```
Me.DataContext = _viewModel
```

11. In **Home.xaml**, go to the original **StackPanel**, the one containing the buttons for editing and creating events.

12. Add the following attribute to the 2 StackPanels to cause the panel's visibility to be controlled by the ViewModel.

XAML

```
Visibility="{Binding Path=AdminButtonsVisibility}"
```

13. Add a similar attribute to the other **StackPanel**, binding its Visibility to the **AttendeeButtonsVisibility** property.

14. Run the application.

> Initially you will most likely not be logged in (unless you checked the checkbox to remain logged in earlier.) When not logged on, you will see no buttons at all. But if you log in as a normal user (e.g. **ian**, password **P@ssw0rd**), you should see the Register and Unregister buttons appear. If you log back out these will disappear again. If you log in as **administrator** (**P@ssw0rd**) you will see the buttons for editing and creating events.

Exercise 2: Commands and the ViewModel

One of the goals of a ViewModel is to minimize the amount of code in the view, in order to facilitate unit testing. The first part of this lab illustrated how data binding makes it possible for a ViewModel to update properties of elements in the view. But what about when we need things to flow in the other direction? How does the ViewModel discover user activity such as button clicks?

One solution is to have ordinary event handlers in the view's code behind, and have those call into methods on the ViewModel. For example, the ViewModel could define an **OnRegisterButtonClicked** method to be called by the view. While this doesn't quite meet the ideal of avoiding all code in the view, that's not a huge problem, because the only code required in the view is a single method call through to the ViewModel. However, Silverlight 4 introduces a feature that was previously only available on the desktop with WPF, which can help us do better: commands.

Commands are an abstraction representing an operation that can be invoked through some user action such as a button click. You can data bind a Button's **Command** property to a command object exposed by a ViewModel, which avoids the need for a **Click** handler in the code behind. The button is able to invoke the command directly. But it adds an additional benefit: the command abstraction (represented by the **ICommand** interface) also supports the idea that a command may be enabled or disabled from time to time. This means the ViewModel also has a way of controlling whether the button associated with a command is enabled or disabled. (Of course, we could have done that by offering a bool property on the ViewModel and binding a button's **IsEnabled** property to that. But commands let us kill two birds with one stone: by binding just the one property: **Button.Command,** we can have the ViewModel both handle button clicks and set the enabled state of the button.

In this exercise, we'll use this technique for the Register and Unregister buttons you added in the previous part.

Commanding

1. Add a new class to the **SlEventManager** project called RelayCommand, with the following implementation:

    While Silverlight defines the **ICommand** interface, it doesn't provide any implementations. So the first thing we need to do is provide our own. The most flexible approach is to write one class that simply relays the command invocation onto a delegate. That way we can use one command implementation to implement any number of commands.

    C#

    ```
    public class RelayCommand : ICommand
    {
        private Action _handler;
        public RelayCommand(Action handler)
    ```

```
    {
        _handler = handler;
    }

    private bool _isEnabled;
    public bool IsEnabled
    {
        get { return _isEnabled; }
        set
        {
            if (value != _isEnabled)
            {
                _isEnabled = value;
                if (CanExecuteChanged != null)
                {
                    CanExecuteChanged(this, EventArgs.Empty);
                }
            }
        }
    }

    public bool CanExecute(object parameter)
    {
        return IsEnabled;
    }

    public event EventHandler CanExecuteChanged;

    public void Execute(object parameter)
    {
        _handler();
    }
}
```

Visual Basic

```
Public Class RelayCommand
    Implements ICommand

    Private _handler As Action
    Public Sub New(ByVal handler As Action)
        _handler = handler
    End Sub

    Private _isEnabled As Boolean
    Public Property IsEnabled() As Boolean
        Get
            Return _isEnabled
        End Get
        Set(ByVal value As Boolean)
            If value <> _isEnabled Then
                _isEnabled = value
```

```
                RaiseEvent CanExecuteChanged(Me, EventArgs.Empty)
            End If
        End Set
    End Property

    Public Function CanExecute(ByVal parameter As Object) As Boolean
Implements System.Windows.Input.ICommand.CanExecute
        Return IsEnabled
    End Function

    Public Event CanExecuteChanged As EventHandler Implements
System.Windows.Input.ICommand.CanExecuteChanged

    Public Sub Execute(ByVal parameter As Object) Implements
System.Windows.Input.ICommand.Execute
        _handler()
    End Sub

End Class
```

There are other common implementations of this general idea you can find on the Internet that are also called **RelayCommand**. The variations are in details such as whether they use the command parameter. This example doesn't need it a command parameter, so we just ignore it. Another variation is whether the **CanExecute** status is handled with a property or a callback. But the basic principle is the same.

2. Add two methods OnRegister and OnUnregister to the **HomeViewModel.cs(C#) or HomeViewModel.vb(VB)** ViewModel class. These will be used as handlers for the commands:

C#

```
private void OnRegister()
{
}

private void OnUnregister()
{
}
```

Visual Basic

```
Private Sub OnRegister()
End Sub

Private Sub OnUnregister()
End Sub
```

3. Add the following property and field definitions to the **HomeViewModel.cs(C#) or HomeViewModel.vb(VB)** ViewModel class:

C#

```
private readonly RelayCommand _registerCommand;
```

```
public ICommand RegisterCommand { get { return _registerCommand; } }
private readonly RelayCommand _unregisterCommand;
public ICommand UnregisterCommand { get { return _unregisterCommand; } }
```

Visual Basic

```
Private ReadOnly _registerCommand As RelayCommand
Public ReadOnly Property RegisterCommand() As ICommand
	Get
		Return _registerCommand
	End Get
End Property
Private ReadOnly _unregisterCommand As RelayCommand
Public ReadOnly Property UnregisterCommand() As ICommand
	Get
		Return _unregisterCommand
	End Get
End Property
```

While these properties will be used for data binding, they never change, so there's no need to for set accessors nor any need to raise change notifications.

4. In the constructor, add the following code to initialize these command fields with **RelayCommand** objects referring to the two handlers. Put these at the *start* of the constructor before the call to **UpdateUserForRole**.

C#

```
_registerCommand = new RelayCommand(OnRegister);
_unregisterCommand = new RelayCommand(OnUnregister);
```

Visual Basic

```
_registerCommand = New RelayCommand(AddressOf OnRegister)
_unregisterCommand = New RelayCommand(AddressOf OnUnregister)
```

5. Add a property to track the current selection.

We need to write the logic that will determine whether these commands should be enabled. This requires two things: we need to know events for which the user is already registered, and we need to know which event has currently been selected in the grid.

C#

```
private Event _selectedEvent;
public Event SelectedEvent
{
    get { return _selectedEvent; }
    set
    {
        _selectedEvent = value;
        UpdateRegistrationButtons();
    }
}
```

```
private void UpdateRegistrationButtons()
{
}
```

Visual Basic

```
Private _selectedEvent As [Event]
Public Property SelectedEvent() As [Event]
	Get
		Return _selectedEvent
	End Get
	Set(ByVal value As [Event])
		_selectedEvent = value
		UpdateRegistrationButtons()
	End Set
End Property

Private Sub UpdateRegistrationButtons()
End Sub
```

6. Add the following using directive:

C#

```
using SlEventManager.Web;
```

Visual Basic

```
Imports SlEventManager.Web
```

Add Authentication Based Custom Domain Service Methods

1. Add the following using directive in the EventManagerDomainService class in the SlEventManager.Web project:

C#

```
using System.Web.Security;
```

Visual Basic

```
Imports System.Web.Security
```

2. Add this method, which will retrieve the IDs of the events for which the current user is registered.

> This uses the ASP.NET Membership class to discover the current user, so there's no need for any parameters.

C#

```
[Invoke]
public IEnumerable<int> FetchEventsForWhichCurrentUserIsRegistered()
{
    MembershipUser mu = Membership.GetUser();
    if (mu == null)
    {
        return new int[0];
```

```
    }
    var q = from attendeeEvent in this.ObjectContext.AttendeeEvents
            where attendeeEvent.Attendee.AspNetUserId == (Guid)
mu.ProviderUserKey
            select attendeeEvent.EventID;
    return q;
}
```

Visual Basic

```
<Invoke()>
Public Function FetchEventsForWhichCurrentUserIsRegistered() As
IEnumerable(Of Integer)
        Dim mu As MembershipUser = Membership.GetUser()
        If mu Is Nothing Then
                Return New Integer(){}
        End If
        Dim q = From attendeeEvent In Me.ObjectContext.AttendeeEvents
                Where attendeeEvent.Attendee.AspNetUserId =
CType(mu.ProviderUserKey, Guid)
                Select attendeeEvent.EventID
        Return q
End Function
```

The ***[Invoke] (C#) or <Invoke()>(VB)***attribute tells WCF RIA Services that this method does not attempt to return any entities. By default, when a domain service method returns an ***IEnumerable<T>***, RIA Services presumes that the method intends to act as a query over some domain entities. That would cause it to report an error here, because this method enumerates ints, which are not valid entities. Declaring that this is simply an invocation-style operation avoids the error.

3. A the following methods to handle registering and unregistering the current user for events:

C#

```
[Invoke]
public void RegisterCurrentUserForEvent(int eventId)
{
    Attendee attendee = GetOrCreateAttendeeForCurrentUser();
    if (!attendee.AttendeeEvents.Any(ev => ev.EventID == eventId))
    {
        attendee.AttendeeEvents.Add(new AttendeeEvent { EventID = eventId
});
    }

    this.ObjectContext.SaveChanges();
}
[Invoke]
public void UnregisterCurrentUserForEvent(int eventId)
{
    Attendee attendee = GetOrCreateAttendeeForCurrentUser();
    AttendeeEvent av = attendee.AttendeeEvents.SingleOrDefault(
                            x => x.EventID == eventId);
```

```
    if (av != null)
    {
        attendee.AttendeeEvents.Remove(av);
        this.ObjectContext.AttendeeEvents.DeleteObject(av);
    }

    this.ObjectContext.SaveChanges();
}
private Attendee GetOrCreateAttendeeForCurrentUser()
{
    MembershipUser mu = Membership.GetUser();
    if (mu == null)
    {
        throw new InvalidOperationException("User not logged in");
    }
    Attendee at = this.ObjectContext.Attendees.FirstOrDefault(
                  x => x.AspNetUserId == (Guid) mu.ProviderUserKey);
    if (at == null)
    {
        at = new Attendee
        {
            AspNetUserId = (Guid) mu.ProviderUserKey
        };
        this.ObjectContext.AddToAttendees(at);
    }
    return at;
}
```

Visual Basic

```
<Invoke()>
Public Sub RegisterCurrentUserForEvent(ByVal eventId As Integer)
      Dim attendee As Attendee = GetOrCreateAttendeeForCurrentUser()
      If Not attendee.AttendeeEvents.Any(Function(ev) ev.EventID =
eventId) Then
             attendee.AttendeeEvents.Add(New AttendeeEvent With {.EventID =
eventId})
      End If

      Me.ObjectContext.SaveChanges()
End Sub
<Invoke()>
Public Sub UnregisterCurrentUserForEvent(ByVal eventId As Integer)
      Dim attendee As Attendee = GetOrCreateAttendeeForCurrentUser()
      Dim av As AttendeeEvent =
attendee.AttendeeEvents.SingleOrDefault(Function(x) x.EventID = eventId)
      If av IsNot Nothing Then
             attendee.AttendeeEvents.Remove(av)
             Me.ObjectContext.AttendeeEvents.DeleteObject(av)
      End If

      Me.ObjectContext.SaveChanges()
```

```
End Sub
Private Function GetOrCreateAttendeeForCurrentUser() As Attendee
        Dim mu As MembershipUser = Membership.GetUser()
        If mu Is Nothing Then
                Throw New InvalidOperationException("User not logged in")
        End If
        Dim at As Attendee =
Me.ObjectContext.Attendees.FirstOrDefault(Function(x) x.AspNetUserId =
CType(mu.ProviderUserKey, Guid))
        If at Is Nothing Then
                at = New Attendee With {.AspNetUserId =
CType(mu.ProviderUserKey, Guid)}
                Me.ObjectContext.AddToAttendees(at)
        End If
        Return at
End Function
```

Implement the Bindings

1. Add the following using declarations to **HomeViewModel.cs(C#) or HomeViewModel.vb(VB)** so the ViewModel can use these methods and remember which events the current user belongs to.

C#

```
using System.Collections.Generic;
using SlEventManager.Web.Services;
```

Visual Basic

```
Imports System.Collections.Generic
Imports SlEventManager.Web.Services
```

2. Add the following field to the ViewModel:

C#

```
private HashSet<int> _currentUserRegisteredEventIds;
```

Visual Basic

```
Private _currentUserRegisteredEventIds As HashSet(Of Integer)
```

3. Implement the **UpdateRegistrationButton** method that we added earlier.

> This updates the button command status based on the current set of event ids:

C#

```
private void UpdateRegistrationButtons()
{
    _registerCommand.IsEnabled = _currentUserRegisteredEventIds != null &&
         SelectedEvent != null &&
        !_currentUserRegisteredEventIds.Contains(SelectedEvent.EventID);

    _unregisterCommand.IsEnabled = _currentUserRegisteredEventIds != null
&&
```

```
        SelectedEvent != null &&
        _currentUserRegisteredEventIds.Contains(SelectedEvent.EventID);
}
```

Visual Basic

```
Private Sub UpdateRegistrationButtons()
      _registerCommand.IsEnabled = _currentUserRegisteredEventIds IsNot
Nothing AndAlso SelectedEvent IsNot Nothing AndAlso Not
_currentUserRegisteredEventIds.Contains(SelectedEvent.EventID)

      _unregisterCommand.IsEnabled = _currentUserRegisteredEventIds IsNot
Nothing AndAlso SelectedEvent IsNot Nothing AndAlso
_currentUserRegisteredEventIds.Contains(SelectedEvent.EventID)
End Sub
```

4. Add the following code at the end of the **UpdateForUserRole** method to populate the set of registered events:

C#

```
if (isLoggedIn)
{
    var ctx = new EventManagerDomainContext();
    ctx.FetchEventsForWhichCurrentUserIsRegistered((op) =>
    {
        if (!op.HasError)
        {
            var items = op.Value;
            _currentUserRegisteredEventIds = new HashSet<int>(items);
            UpdateRegistrationButtons();
        }
    }, null);
}
else
{
    _currentUserRegisteredEventIds = null;
    UpdateRegistrationButtons();
}
```

Visual Basic

```
If isLoggedIn Then
      Dim ctx = New EventManagerDomainContext()
      ctx.FetchEventsForWhichCurrentUserIsRegistered(Sub(op)
            If Not op.HasError Then
                  Dim items = op.Value
                  _currentUserRegisteredEventIds = New HashSet(Of
Integer)(items)
                  UpdateRegistrationButtons()
            End If
      End Sub, Nothing)
Else
      _currentUserRegisteredEventIds = Nothing
```

```
        UpdateRegistrationButtons()
End If
```

5. Implement the button command handlers we previously added empty methods for:

C#

```
private void OnRegister()
{
    if (SelectedEvent != null)
    {
        var ctx = new EventManagerDomainContext();
        ctx.RegisterCurrentUserForEvent(SelectedEvent.EventID, (op) =>
            {
                UpdateForUserRole();
            }, null);
    }
}
private void OnUnregister()
{
    if (SelectedEvent != null)
    {
        var ctx = new EventManagerDomainContext();
        ctx.UnregisterCurrentUserForEvent(SelectedEvent.EventID, (op) =>
        {
            UpdateForUserRole();
        }, null);
    }
}
```

Visual Basic

```
Private Sub OnRegister()
        If SelectedEvent IsNot Nothing Then
                Dim ctx = New EventManagerDomainContext()
                ctx.RegisterCurrentUserForEvent(SelectedEvent.EventID, Sub(op)
UpdateForUserRole(), Nothing)
        End If
End Sub
Private Sub OnUnregister()
        If SelectedEvent IsNot Nothing Then
                Dim ctx = New EventManagerDomainContext()
                ctx.UnregisterCurrentUserForEvent(SelectedEvent.EventID,
Sub(op) UpdateForUserRole(), Nothing)
        End If
End Sub
```

6. Wire the view up to the commands. By binding the Command properties of the two buttons to the command objects exposed by the ViewModel:

XAML

```
<Button x:Name="registerForEventButton" Content="Register"
        Command="{Binding Path=RegisterCommand}" />
<Button x:Name="unregisterForEventButton" Content="Unregister"
```

```
            Command="{Binding Path=UnregisterCommand}" />
```

7. Bind the SelectedItem property of the data grid by adding the following attribute to the data grid:

XAML

```
SelectedItem="{Binding Path=SelectedEvent, Mode=TwoWay}"
```

8. Run the application.

9. Log in as a non-admin user (e.g., **ian**, **P@ssw0rd**).

> In the example database, the **ian** user is registered for the third event, so when you select that event the Register button should become disabled and the Unregister button should be enabled. For all other events, it should be the other way around. You should be able to us the buttons to register and unregister the user for events in the list.

Exercise 3: Server-Side Access Control

Changing the available UI elements on the client side based on the user's identity is a useful technique, but of course it's not a secure one. We mustn't rely on the client-side to enforce role-based secure access. So in this part, you'll add security measures on the server side to restrict certain domain service facilities based on the role membership of the user. That way, even if a malicious user subverts the client-side code to gain access to features that they're not authorized to use, their attempts will be foiled on the server side.

1. Run the application and log in as **administrator** (**P@ssw0rd**).
2. Select an event and click the button to edit it.
3. Copy the URL to the clipboard.
4. Edit the event, save the changes and return to the home page, verifying that the data changed.
5. Log out of the application.
6. Paste the URL back in and this will take you to the editing page again.
7. Edit the event and save the changes again.
8. Go back to the home page to verify that you were able to modify the event despite not being logged in.
9. Close the application.
10. In the **SlEventManager.Web** project, open the **EventManagerDomainService.cs(C#) or EventManagerDomainService.vb(VB)** file in the **Services** folder.
11. Find the **UpdateEvent** method.
12. Add a **[RequiresRole("Event Administrators")](C#) or <RequiresRole("Event Administrators")>(VB)** attribute.
13. Run the application again.

> As before, paste in the URL for the editing page while not logged in. Make a change to the event and click Save Changes. This time you should get an error. (Verify that you are still able to save changes when logged in as the administrator though.)

Exercise 4: Validation

The login UI allows new user accounts to be created. It performs some validation of data. In this final step you will add an additional validation requirement.

1. Run the application.
2. Ensure you're not already logged in and then click the login button.
3. Instead of logging in, click the **Register Now** link at the bottom of the dialog.
4. Try clicking OK without filling in any fields.

> Most of the fields will light up red. If you click in them, you will see further details. This behavior is controlled in the **RegistrationData.cs(C#) or RegistrationData.vb(VB)** file in the **Models** folder of the **SlEventManager.Web** project.

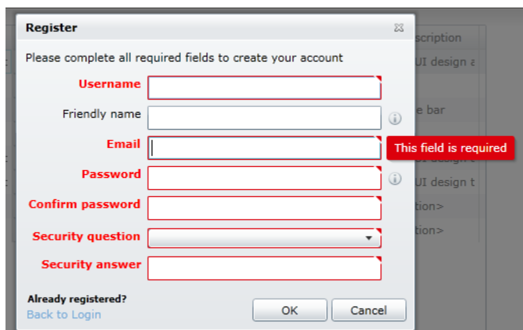


Figure 1

Registration Validation

5. Close the browser.
6. Find the **FriendlyName** property in the **RegistrationData** class. (Currently this field is not required.)
7. Add a **[Required](C#) or <Required()>(VB)** attribute to this property and run the application again.
8. Try to register without filling any details in again. This time, the **Friendly name** field should turn red like the rest.

Exercise 5: RichTextBox

One way we could enhance user registration would be to enable users to supply some sort of text about themselves—if we wanted to add some sort of forum system to the site, the ability to provide a more detailed online identity would be important. We could add a simple text box to hold such information, but that's a little limited. It might be better to use the **RichTextBox** added in Silverlight 4, which provides a way to display and edit formatted text—unlike the plain **TextBox**, the edited text can contain a mixture of plain, bold, or italic text, with different font sizes, colors, and typefaces if you choose. And the **RichTextBox** offers a read-only mode enabling such formatted text to be displayed easily. (It was possible to render formatted text in earlier versions of Silverlight, but the **RichTextBox** makes it much easier.)

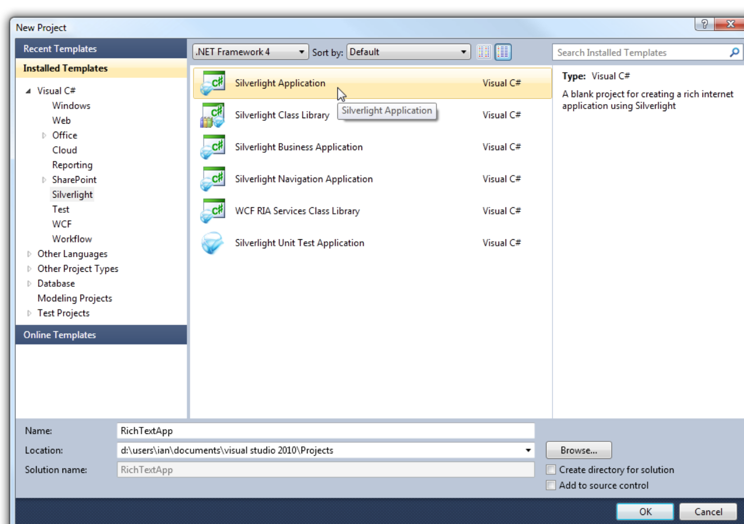
In fact we could use this feature in other places. For example, the event description itself is currently just plain text, but could be enhanced with the use of more flexibly styled text. Since the **RichTextBox** is very broadly applicable, this part of the lab will look at it in isolation, rather than wiring it into a specific part of the example application, so that we can focus on the details of using the **RichTextBox** itself.

1. Open Visual Studio 2010.

In Visual Studio 2010, press **Ctrl+Shift+N**, or use the **File→New→Project...** menu item.

2. Select **Visual C#→Silverlight(C#) or Visual Basic→Silverlight(VB)** in the treeview on the left.
3. In the center, select the Silverlight Application template.
4. Name the project **RichTextApp**.

   C#:



   Visual Basic:

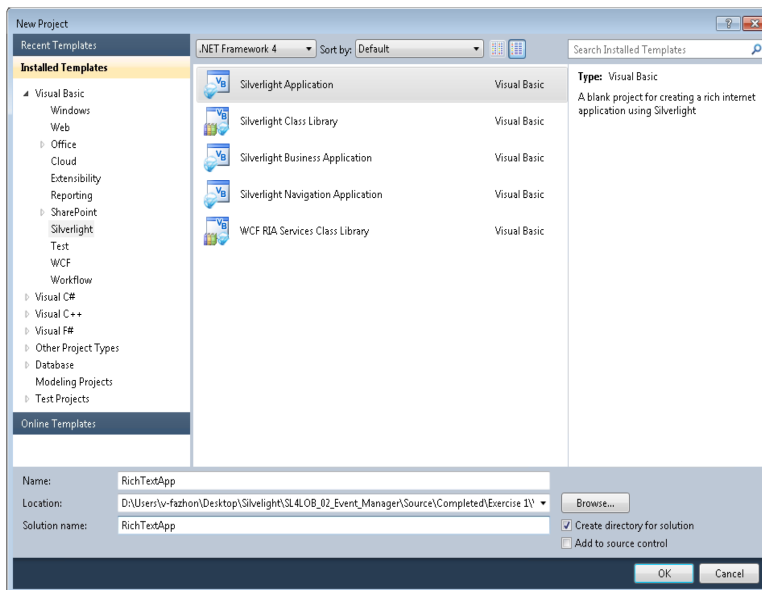


Figure 2

Add New Silverlight Application Project

5. This project does not need a web site, so uncheck the “Create directory for solution” checkbox.

6. Click OK.

7. In the New Silverlight Application dialog that appears, uncheck the checkbox labeled **Host the Silverlight application in a new Web site**. Click OK.

8. In the MainPage.xaml file that appears in Visual Studio, add the following inside the Grid:

XAML

```
<RichTextBox x:Name="rtb">
</RichTextBox>
```

9. Run the application. The empty rich text box will be filling the whole browser frame. Click in it and try typing something—at this stage it will behave in the same way as an ordinary **TextBox**. (It does not automatically handle common shortcuts such as Ctrl+B, so at this stage, you can’t exploit the ‘rich’ in rich text box.)

10. A **RichTextBox** can be pre-loaded with formatted content. Inside the **<RichTextBox>** element, add the following XAML:

XAML

```
<Paragraph>
    This is some text.
    <Bold>This is some bold text.</Bold>
</Paragraph>
```

11. Run the application. You will see a mixture of normal and bold text. You can edit the text, and whatever text you type will be in the same style as the surrounding text.

The design surface in the Release Candidate of Visual Studio 2010 is not completely consistent with what you'll see at runtime. It handles whitespace differently. If you look closely, you'll see that in Visual Studio, there is no space between the period at the end of the first sentence, and the start of the next sentence. But when you run the application, there is a space.

The rules for whitespace handling in XAML are somewhat complex, but they are designed to provide the results you are most likely to want most of the time while letting you indent your XAML to reflect its structure. (They are similar in spirit to HTML's whitespace handling.) For example, although both lines containing text in the XAML are indented, those indentation spaces do not appear at runtime. A run of whitespace in the middle of mixed content typically collapses down to a single space—so although the XAML has a new line, and space for indentation before the **<Bold>** tag, at runtime this is reduced to one space, which is what we want here. Whitespace at the beginning and end is handled differently—the whitespace between the opening **<Paragraph>** tag and the first bit of text is collapsed down to nothing, as is the whitespace between the closing **</Bold>** and the closing **</Paragraph>** tag.

Although the whitespace handling usually does what you what, it's occasionally necessary to take more control, so the next few steps will show the two ways to do this in XAML.

Whitespace Handling

1. In the XAML, add a couple of extra spaces between the words "**is**" and "**some**" on the first line of text. Notice that this has no effect, either in the designer or when you run the application.

2. Add an **xml:space="preserve"** attribute to the opening **<Paragraph>** tag. The extra spaces you added will now be faithfully reproduced. So will any new lines—the two pieces of text new appear on two separate lines. More subtly, there's a blank line at the start, because the opening **<Paragraph>** tag is followed immediately by a new line, and that has also been preserved. Moreover, the indentation has carefully been maintained too, which is not especially useful here.

   The **xml:space** attribute is a standard feature of XML, and you can add it to any XML document. The XML specification deliberately leaves some latitude for how applications use this attribute, and XAML's whitespace rules explicitly take this attribute into account. So while this is a standard attribute, there is some XAML-specific behavior here.

3. Remove the **xml:space** attribute you just added.

4. Inside the **<Paragraph>** element, replace the first line of text with this:

XAML

```
<Run Text="This is   some text." />
```

5. Note that these extra spaces are honored for this particular run of text, but the other whitespace is collapsed as before. This is the usual technique for taking fine-grained control of whitespace when you only need precise control in a specific area.

> This works because the whitespace processing rules are applied to plain text when it appears as element content, but not to text inside attribute values.
>
> Be aware that if you don't specify a **Run** explicitly as we just have, the XAML compiler converts plain textual content into **Run** elements for you—**Run** is the only type in the **RichTextBox** text object model that is capable of containing text. If you look at the properties offered by types such as **Paragraph** or **Bold**, you'll see that that the only things these elements are capable of containing are other text elements. Only **Run** has a **Text** property. So you will end up with **Run** elements whether or not you put them explicitly in the XAML.

Nested Formatting

1. Formatting tags can be nested within one another, and their settings combine. And you can also apply text formatting attributes to the **Paragraph** container. Copy this XAML inside your **RichTextBox** to see this in action:

XAML

```
<Paragraph FontStyle="Italic">
    This is italic.
    <Bold>This is bold italic.</Bold>
</Paragraph>
<Paragraph>
    <Bold FontSize="20">
        Bold
        <Italic>Italic</Italic>.
        Bold,
        <Span FontFamily="Georgia">and in a different font.</Span>
    </Bold>
</Paragraph>
```

> The **<Span>** element here is similar to **<Bold>** and **<Italic>** in that it can be used to apply formatting to a range of text. In fact the **Bold** and **Italic** classes both derive from **Span**. The difference is that **Span** has no intrinsic formatting of its own—it has no visible effect unless you set one or more font properties. The **Bold** element is essentially just a **Span** that sets the **FontWeight** to **Bold** for you.
>
> Because **Span** supports the **FontWeight** and **FontStyle** properties, you can use a **Span** to do anything you could do with **Bold** or **Italic**. Those elements are only provided for convenience.

Read-only RichTextBox

1. Add an **IsReadOnly="True"** attribute to the **RichTextBox** element. Run the application again. Observe that the text is displayed but can no longer be edited. Instead, it can be selected and copied.

   This mode is useful for displaying formatted text. If you are familiar with WPF, you would normally use one of the flow document reader controls for this purpose, but Silverlight combines editing and viewing functionality into the one control, **RichTextBox**.

2. When using a **RichTextBox** in this way, it is common to want to support scrolling to show more text than will fit. This is built in. Add a **VerticalScrollBarVisibility="Visible"** attribute to the **RichTextBox**, and add some more paragraphs to the content so that you have enough text to make a scrollbar necessary. Run the application to verify that the scrollbar works as you'd expect.

3. When displaying large volumes of text, you will typically want text wrapping enabled. Add a **TextWrapping="Wrap"** property to the **RichTextBox**.

Programming the RichTextBox

1. To enable the end user to apply formatting, we need to provide some additional UI and code. Add the following XAML at the **top** of the **Grid** (before the **RichTextBox**).

XAML

```
<Grid.RowDefinitions>
    <RowDefinition Height="*" />
    <RowDefinition Height="Auto" />
</Grid.RowDefinitions>

<StackPanel Orientation="Horizontal" Grid.Row="1">
    <Button x:Name="boldButton" Content="Bold" />
    <Button x:Name="italicButton" Content="Italic" />
</StackPanel>
```

2. Add **Click** event handlers to both buttons.

3. In the code behind, add this helper:

C#

```
private void ToggleSetting(DependencyProperty property,
                           object onValue, object offValue)
{
    object currentValue = rtb.Selection.GetPropertyValue(property);
    bool alreadyApplied =  currentValue.ToString() == onValue.ToString();

    rtb.Selection.ApplyPropertyValue(property,
                                     alreadyApplied ? offValue : onValue);
}
```

Visual Basic

```
Private Sub ToggleSetting(ByVal [property] As DependencyProperty,
ByVal onValue As Object, ByVal offValue As Object)
```

```
        Dim currentValue As Object =
rtb.Selection.GetPropertyValue([property])
        Dim alreadyApplied As Boolean = currentValue.ToString() =
onValue.ToString()

        rtb.Selection.ApplyPropertyValue([property],If(alreadyApplied,
offValue, onValue))
End Sub
```

This detects whether a particular property is already applied across the current selection in the **RichTextBox**. If it is not already present, then that property is applied. If it is already present, then the 'off' value is applied instead. (We cannot just remove the property. For one thing, the selection object does not offer a method for doing that, but in any case, the property may be inherited from a containing element. For example, the entire **Paragraph** might be bold, but we might want to unbold some selected text. So the absence of a property on the selection is not enough—we need to explicitly apply a property forcing the property back to normal to be able to override formatting applied at a containing scope.

4. Implement the bold button's click handler like this:

C#

```
private void boldButton_Click(object sender, RoutedEventArgs e)
{
    ToggleSetting(TextElement.FontWeightProperty,
                  FontWeights.Bold, FontWeights.Normal);
}
```

Visual Basic

```
Private Sub boldButton_Click(ByVal sender As Object, ByVal e As
RoutedEventArgs)
        ToggleSetting(TextElement.FontWeightProperty, FontWeights.Bold,
FontWeights.Normal)
End Sub
```

5. Similarly, implement the italic button like this:

C#

```
private void italicButton_Click(object sender, RoutedEventArgs e)
{
    ToggleSetting(TextElement.FontStyleProperty,
                  FontStyles.Italic, FontStyles.Normal);
}
```

Visual Basic

```
Private Sub italicButton_Click(ByVal sender As Object, ByVal e As
RoutedEventArgs)
        ToggleSetting(TextElement.FontStyleProperty, FontStyles.Italic,
FontStyles.Normal)
End Sub
```

6. In the XAML, remove the **IsReadOnly** attribute from the **RichTextBox**.

7. Run the application, select some text in the **RichTextBox**, and verify that the Bold and Italic buttons toggle the bold and italic appearance of the text.
8. Finally, the ability to edit formatted text wouldn't be much use if we couldn't get hold of the current contents, so we'll see how to retrieve the formatted text. The **RichTextBox** makes this available as XAML. Add the following to the XAML, after the Grid.RowDefinitions element, but before the StackPanel:

XAML

```
<Grid.ColumnDefinitions>
    <ColumnDefinition Width="*" />
    <ColumnDefinition Width="*" />
</Grid.ColumnDefinitions>

<ScrollViewer Grid.Column="1" Grid.RowSpan="2">
    <TextBlock x:Name="textAsXaml" TextWrapping="Wrap" />
</ScrollViewer>
```

9. Add a handler for the **RichTextBox** element's **ContentChanged** event. Implement it as follows:

C#

```
private void rtb_ContentChanged(object sender, ContentChangedEventArgs e)
{
    textAsXaml.Text = rtb.Xaml;
}
```

Visual Basic

```
Private Sub rtb_ContentChanged(ByVal sender As Object, ByVal e As
ContentChangedEventArgs)
       textAsXaml.Text = rtb.Xaml
End Sub
```

10. Run the application, and make a modification to the contents of the **RichTextBox**. The right-hand side of the UI should show the Xaml for the **RichTextBox**'s current contents.

Exercise 6: Implicit Styling

Since the user registration features are, by definition, visible to the end user, visual design starts to become more of a concern than it might be for a purely internal application. (Not that there's anything wrong with wanting internal LOB applications to look good. But appearance tends to become a higher priority with UI that customers can see.) The buttons we added earlier in this lab aren't very consistent with the look of the rest of the application. The main navigation chrome's link buttons look like neither normal hyperlinks nor normal buttons. And even where moderately normal-looking buttons appear (e.g. in the login UI) they don't use the standard Silverlight appearance for a button.

To make our buttons look more harmonious with the rest of the application, we'll define a style for them. We'll use the implicit styling feature added in Silverlight 4 to apply this style automatically to all buttons in the application that don't specify their own custom style. That way, all the unstyled buttons we have added already will pick up the new look, as will any more we add in the future.

1. Open the **SlEventManager** project in Visual Studio 2010.
2. Open the **App.xaml** file.
3. You'll find the file already contains an **<Application.Resources>** element, with a **<ResourceDictionary>** inside it. The **ResourceDictionary** contains a couple of merged dictionaries. You're going to add the style *after* the closing **</ResourceDictionary.MergedResources>** tag and *before* the closing **</ResourceDictionary>** tag. Paste in the following Xaml between those two closing tags:

XAML

```xml
<Style TargetType="Button">
  <Setter Property="Background" Value="#FF484848"/>
  <Setter Property="Foreground" Value="White"/>
  <Setter Property="Padding" Value="6"/>
  <Setter Property="Margin" Value="3"/>
  <Setter Property="BorderThickness" Value="1"/>
  <Setter Property="BorderBrush" Value="#FF1C1D33"/>
  <Setter Property="Template">
    <Setter.Value>
      <ControlTemplate TargetType="Button">
        <Grid>
          <VisualStateManager.VisualStateGroups>
            <VisualStateGroup x:Name="CommonStates">
              <VisualState x:Name="Normal"/>
              <VisualState x:Name="MouseOver">
                <Storyboard>
                  <DoubleAnimation Duration="0" To="1"
                    Storyboard.TargetProperty="Opacity"
                    Storyboard.TargetName="BackgroundAnimation"/>
                </Storyboard>
              </VisualState>
```

```
            <VisualState x:Name="Pressed">
              <Storyboard>
                <DoubleAnimation Duration="0" To="1"
                  Storyboard.TargetProperty="Opacity"
                  Storyboard.TargetName="BackgroundAnimation"/>
                <ColorAnimation Duration="0" To="#FF563AFF"
    Storyboard.TargetProperty="(Border.Background).(SolidColorBrush.Color)"
    Storyboard.TargetName="BackgroundAnimation" />
              </Storyboard>
            </VisualState>
            <VisualState x:Name="Disabled">
              <Storyboard>
                <DoubleAnimation Duration="0" To=".55"
                  Storyboard.TargetProperty="Opacity"
                  Storyboard.TargetName="DisabledVisualElement"/>
              </Storyboard>
            </VisualState>
          </VisualStateGroup>
          <VisualStateGroup x:Name="FocusStates">
            <VisualState x:Name="Focused">
              <Storyboard>
                <DoubleAnimation Duration="0" To="1"
                  Storyboard.TargetProperty="Opacity"
                  Storyboard.TargetName="FocusVisualElement"/>
              </Storyboard>
            </VisualState>
            <VisualState x:Name="Unfocused"/>
          </VisualStateGroup>
        </VisualStateManager.VisualStateGroups>
        <Border x:Name="Background"
              BorderBrush="{TemplateBinding BorderBrush}"
              BorderThickness="{TemplateBinding BorderThickness}"
              Background="{TemplateBinding Background}"
              CornerRadius="1"
              Padding="1">
          <Border x:Name="BackgroundAnimation" Background="#FF448DCA"
                Opacity="0"/>
        </Border>
        <ContentPresenter
          x:Name="contentPresenter"
          ContentTemplate="{TemplateBinding ContentTemplate}"
          Content="{TemplateBinding Content}"
          HorizontalAlignment="{TemplateBinding HorizontalContentAlignment}"
          Margin="{TemplateBinding Padding}"
          VerticalAlignment="{TemplateBinding VerticalContentAlignment}"/>
        <Rectangle x:Name="DisabledVisualElement" Fill="#FFFFFFFF"
          IsHitTestVisible="false" Opacity="0" RadiusY="1" RadiusX="1"/>
        <Rectangle x:Name="FocusVisualElement" IsHitTestVisible="false"
          Margin="1" Opacity="0" RadiusY="0.5" RadiusX="0.5"
          Stroke="#FF6DBDD1" StrokeThickness="1"/>
      </Grid>
```

```
      </ControlTemplate>
    </Setter.Value>
  </Setter>
</Style>
```

4. Run the application.
5. Log in. (You can log in either as **ian** or **administrator** (**P@ssw0rd**, in either case), as either kind of user will cause some buttons to appear.)
6. The buttons that appear when you log in should now look slightly more in keeping with the overall look provided by the Silverlight Business Application template. (Feel free to express your creativity by modifying the style to suit your own tastes.)