Session: 5

Data Validation and Annotation

Objectives

- Define and describe how to validate data
- Explain how to use data annotation
- Explain and describe how to use ModelState

Data Validation

- In an ASP.NET MVC application, users interact with the application in the following ways:
  - Typing a URL on the browser.
  - Clicking a link on the application.
  - Submitting a form provided by the application as a view.
- In all the preceding interactions:
  - You as a developer need to ensure that any data sent by a user to the application is valid.
  - You can validate user data by including validation logic in your application.
  - The validation logic should first analyze whether or not the user specified data is valid and as expected by the application.
  - The validation logic should accordingly provide feedback to the user so that the user can identify and rectify any invalid input before they resubmit the data.

Data Validation Workflow

- The MVC Framework implements a validation workflow to validate user data.
- The validation workflow starts when a user specified data arrives in the server.
- The validation process:
  - First checks whether the request is some form of attack, such as Cross Site Scripting (CSS).
  - If the process identifies a request as an attack, it throws an exception.
  - Else, the process checks the request data against the validation requirements of a application.
  - If all data meets the validation requirements, the process forwards the request to the application for further processing.
  - If one or more data does not meet the validation requirements, the process sends back a validation error message as a response.

Manual Validation 1-5

- In an ASP.NET MVC application, you can manually validate data in the controller action that accepts user data for some kind of processing.
- To manually validate data, you can implement simple validation routines, such as a routine to check that the length of a password submitted through a registration form exceeds more than seven characters.

Manual Validation 2-5

- Following code snippet shows a manual validation implemented in an action method:

Code Snippet:

```
public class HomeController : Controller    {
     Public ActionResult Index() {
      return View();
    }
     [HttpPost]
      Public ActionResult Index(User model) {
      String modelPassword = model.password;
        if (modelPassword.Length< 7)            {
              return View();
            }
               else           {
               /*Implement registration process*/
               return Content("You have successfully registered");
            }
        }
    }
```

Manual Validation 3-5

- The preceding code:
  - Creates a `HomeController` controller class with two `Index()` action methods.
  - The first `Index()` method returns the corresponding view.
  - When a user submits a form displayed by the view the `HttpPost` version of the action method receives a `User` model object that represents the user submitted data.
  - This action method validates whether or not the length of the password property is greater than seven.
  - If the password length is less than seven, the action method returns back the view, else the action method returns a success message.
  - You can also use regular expression while performing manual validations.
  - For example, you can use a regular expression to check whether the user submitted e-mail id is in the correct format, such as `abc@abc.com`.

Manual Validation 4-5

- Following code snippet shows a manual validation implemented in an action method using regular expression:

Code Snippet:

```
public class HomeController : Controller {
     public ActionResult Index() {
          return View();
     }
     [HttpPost]
public ActionResult Index(User model) {
 string modelEmailId = model.email;
 string regexPattern=@"[A-Za-z0-9._%+-]+@[A-Za-z0-9.-]+\.[A-Za-z]{2,4}";
           if (System.Text.RegularExpressions.Regex.IsMatch(modelEmailId,
            regexPattern)) {
              /*Implement registration process*/
              return Content("You have successfully registered"); }
              else {
               return View(); }
         }
     }
```

Manual Validation 5-5

- The preceding code:
  - Uses the `regexPattern` variable to store a regular expression that specifies a valid email id format.
  - Then, uses the `IsMatch()` method of the `System.Text.RegularExpressions.Regex` class to validate whether or not the `email` property is in valid format. If the value of the `email` property is valid, the action method returns back the view else the action method returns a success message.

Data Annotation

- The MVC Framework provides several data annotations that you can apply as attributes to a model.
- These data annotations implement tasks that are commonly required across applications.
- Some of the important annotations that you can use in the models of an ASP.NET MVC application are as follows:
  - `Required`
  - `StringLength`
  - `RegularExpression`
  - `Range`
  - `Compare`
  - `DisplayName`
  - `ReadOnly`
  - `DataType`
  - `ScaffoldColumn`

Required Annotation 1-9

- The `Required` data annotation specifies that the property, with which this annotation is associated, is a required property.
- This attribute raises a validation error if the property value is null or empty.
- Following is the syntax of the `Required` data annotation:

Syntax:

```
[Required]
public string <property_name>;
```

where,

- `property_name`: Is the name of a model property.

Required Annotation 2-9

- Following code snippet shows using the `Required` annotation in the properties of a `User` model:

Code Snippet:

```
public class User {
  public long Id { get; set; }
  [Required]
  public string Name { get; set; }
  [Required]
  public string Password { get; set; }
  [Required]
  public string ReenterPassword { get; set; }
  [Required]
  public int Age { get; set; }
  [Required]
   public string Email { get; set; }  }
```

- In this code, the `Required` attribute is specified for the `Name`, `Password`, `ReenterPassword`, `Age`, and `Email` properties of the `User` model.

Required Annotation 3-9

- Once you use the `Required` attributes in the model properties, you should:
  - Use the `Html.ValidationSummary()` helper method passing true as the parameter.
  - This method is used to display validation messages on the page.
  - Use the `Html.ValidationMessageFor()` helper method passing the lambda expression to associate the method with a model property for each field.
  - This method returns the validation error message for the associated property as HTML.

Required Annotation 4-9

- Following code shows the view that uses helper methods to display validation messages:

Code Snippet:

```
@model MVCModelDemo.Models.User @{
ViewBag.Title = "User Form Validation";
}
<h2>User Form</h2>
@using (Html.BeginForm()) {
@Html.ValidationSummary(true)
<div>
@Html.LabelFor(model =>model.Name)
</div>
<div>
@Html.EditorFor(model =>model.Name)
@Html.ValidationMessageFor(model =>model.Name)
</div>
<div>
@Html.LabelFor(model =>model.Password)
</div>
<div>
@Html.EditorFor(model =>model.Password)
@Html.ValidationMessageFor(model =>model.Password)
</div>
```

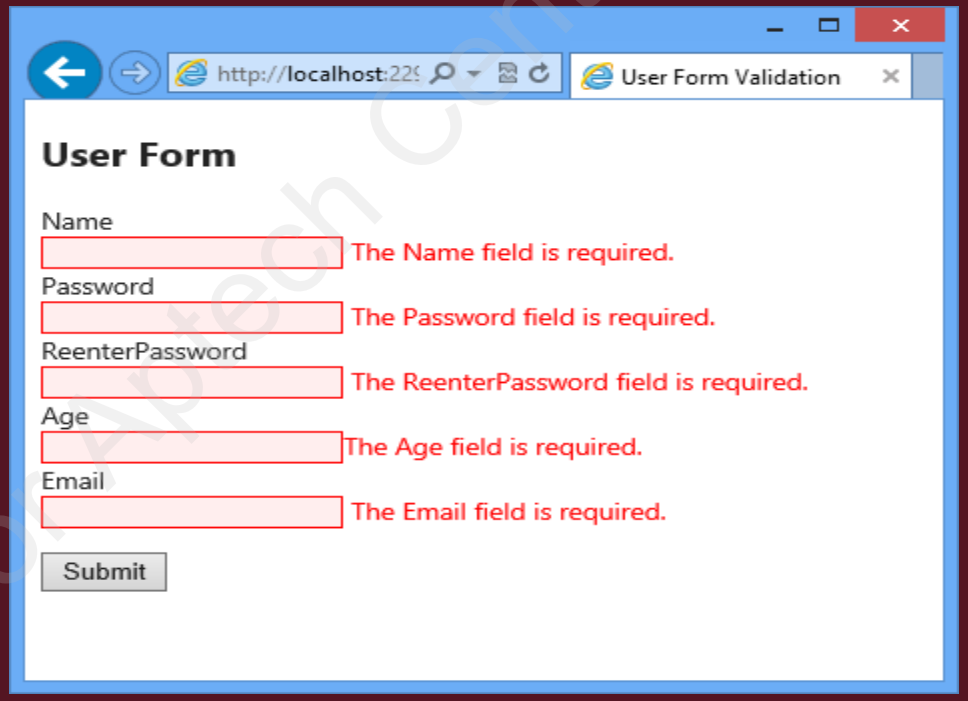
Required Annotation 5-9

Code Snippet:

```
<div>
@Html.LabelFor(model =>model.ReenterPassword)
</div>
<div>
@Html.EditorFor(model =>model.ReenterPassword)
@Html.ValidationMessageFor(model =>model.ReenterPassword)
</div>
<div>
@Html.LabelFor(model =>model.Age)
</div>
@Html.EditorFor(model =>model.Age)
@Html.ValidationMessageFor(model =>model.Age)
<div>
@Html.LabelFor(model =>model.Email)
</div>
<div>
@Html.EditorFor(model =>model.Email)
@Html.ValidationMessageFor(model =>model.Email)
</div>
<p>
<input type="submit" value="Submit" />
</p>
}
```

Required Annotation 6-9

- In the preceding code:
  - The `Html.ValidationSummary(true)` helper method displays validation messages as a list.
  - Then, for each UI field, the `Html.ValidationMessageFor()` helper method is used to validate the corresponding property of the model.
- Following figure shows the default validation error messages when a user clicks the **Submit** button without specifying any values in the fields:



Required Annotation 7-9

- You can also specify a custom validation message for the `Required` annotation.
- The syntax to specify a custom validation message for the `Required` annotation is as follows:

Syntax:

```
[Required(ErrorMessage = <error-message>)]
```

where,

- `error-message=`: Is the custom error message that you want to display.

Required Annotation 8-9

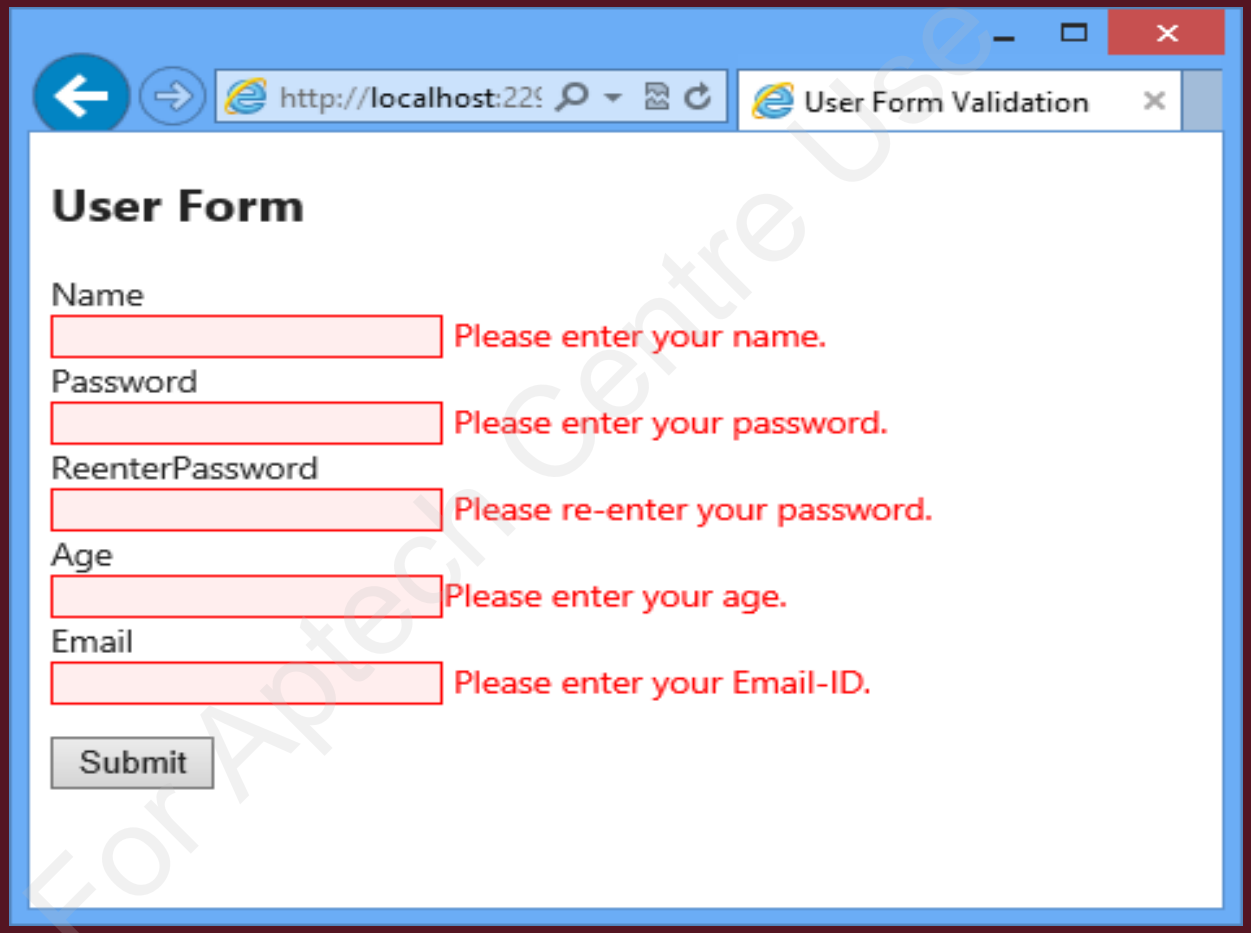
- Following code snippet shows a `User` model with the `Required` annotations with custom validation messages applied to its properties:

Code Snippet:

```
public class User     {
   public long Id { get; set; }
   [Required(ErrorMessage = "Please enter your name.")]
   public string Name { get; set; }
   [Required(ErrorMessage = "Please enter your password.")]
   public string Password { get; set; }
   [Required(ErrorMessage = "Please re-enter your password.")]
   public string ReenterPassword { get; set; }
   [Required (ErrorMessage = "Please enter your age.")]
   public int Age { get; set; }
   [Required(ErrorMessage = "Please enter your Email-ID.")]
   public string Email { get; set; }
 }
```

Required Annotation 9-9

- Following figure shows the custom validation messages when a user tries to submit the form without specifying any values:



StringLength Annotation 1-3

- You can use the `StringLength` annotation to specify the minimum and maximum lengths of a string field.
- Following is the syntax for `StringLength` annotation:

Syntax:

```
[StringLength(<max_length>, MinimumLength= <min_length>)]
```

where,

- `max_length`: Is an integer value that specifies the maximum allowed length.
- `min_length`: Is an integer value that specifies the minimum allowed length.

StringLength Annotation 2-3

- Following code shows a `User` model with the `StringLength` annotations applied to its `Password` and `ReenterPassword` properties:

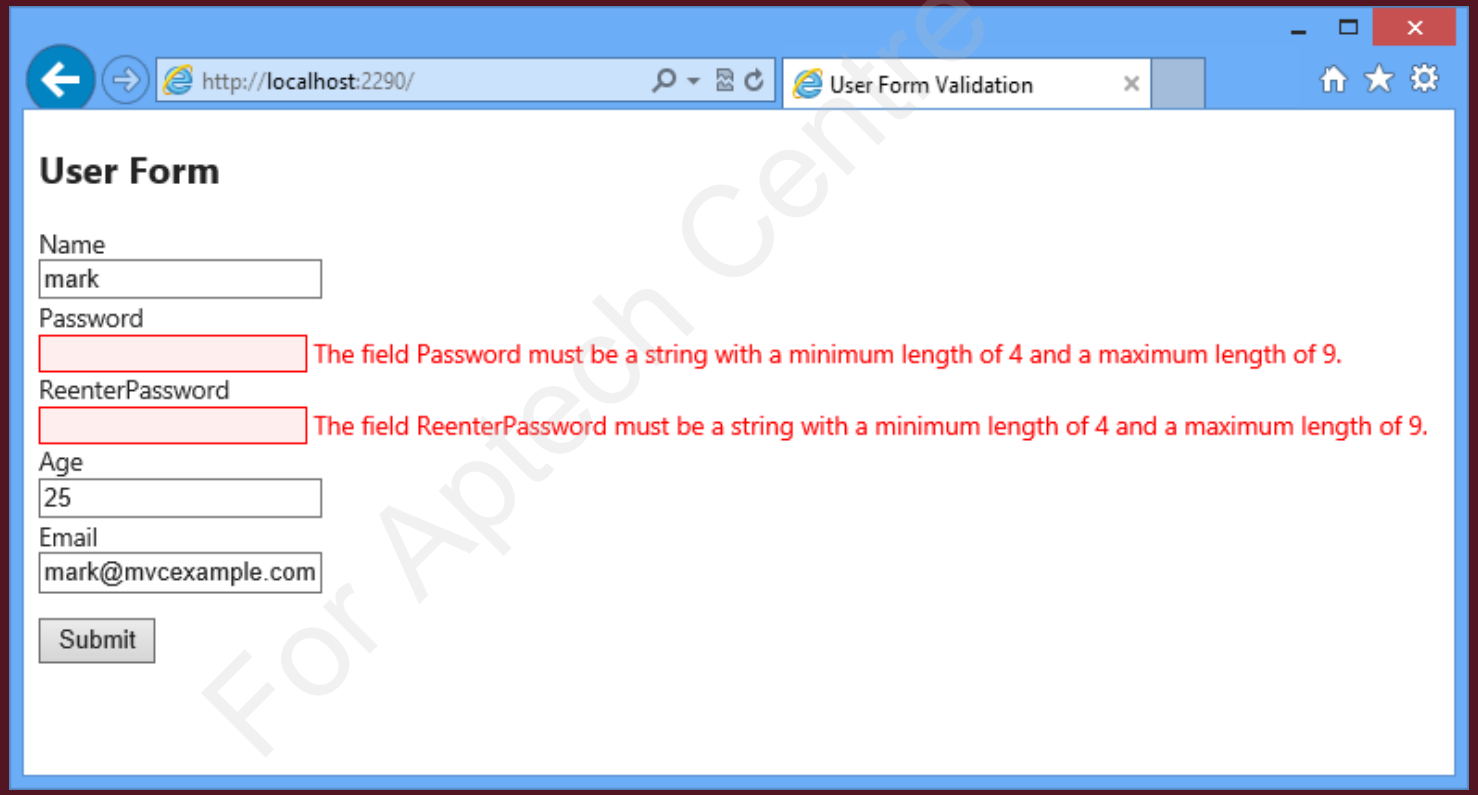
Code Snippet:

```
public class User { public long Id { get; set; }
     [Required(ErrorMessage = "Please enter your name.")]
    public string Name { get; set; }
     [StringLength(9, MinimumLength = 4)]
     [DataType(DataType.Password)]
    public string Password { get; set; }
     [StringLength(9, MinimumLength = 4)]
     [DataType(DataType.Password)]
    public string ReenterPassword { get; set; }
     [Required (ErrorMessage = "Please enter your age.")]
    public int Age { get; set; }
     [Required(ErrorMessage = "Please enter your Email-ID.")]
    public string Email { get; set; }   }
```

- In this code, the `[StringLength]` annotation specifies that the maximum length of the `Password` and `ReenterPassword` properties is set to `9` and the minimum length is set to `4`.

StringLength Annotation 3-3

- Whenever a user specified values for these fields are out of this specified range a validation error message is displayed
- Following figure shows the validation messages when a user specified value in the `Password` and `ReenterPassword` fields is out of the specified range:



RegularExpression Annotation 1-4

- You can use the `RegularExpression` annotation to accept user input in a specific format.
- This annotation allows you to match a text string with a search pattern that contains one or more character literals, operators, or constructs.
- Following is the syntax for `RegularExpression` annotation:

Syntax:

```
[RegularExpression(<pattern>)]
```

where,

- `<pattern>`: is the specified format according to which you want user input.

RegularExpression Annotation 2-4

- Following code shows a `User` model with the `RegularExpression` annotations applied to its `Email` property:

Code Snippet:

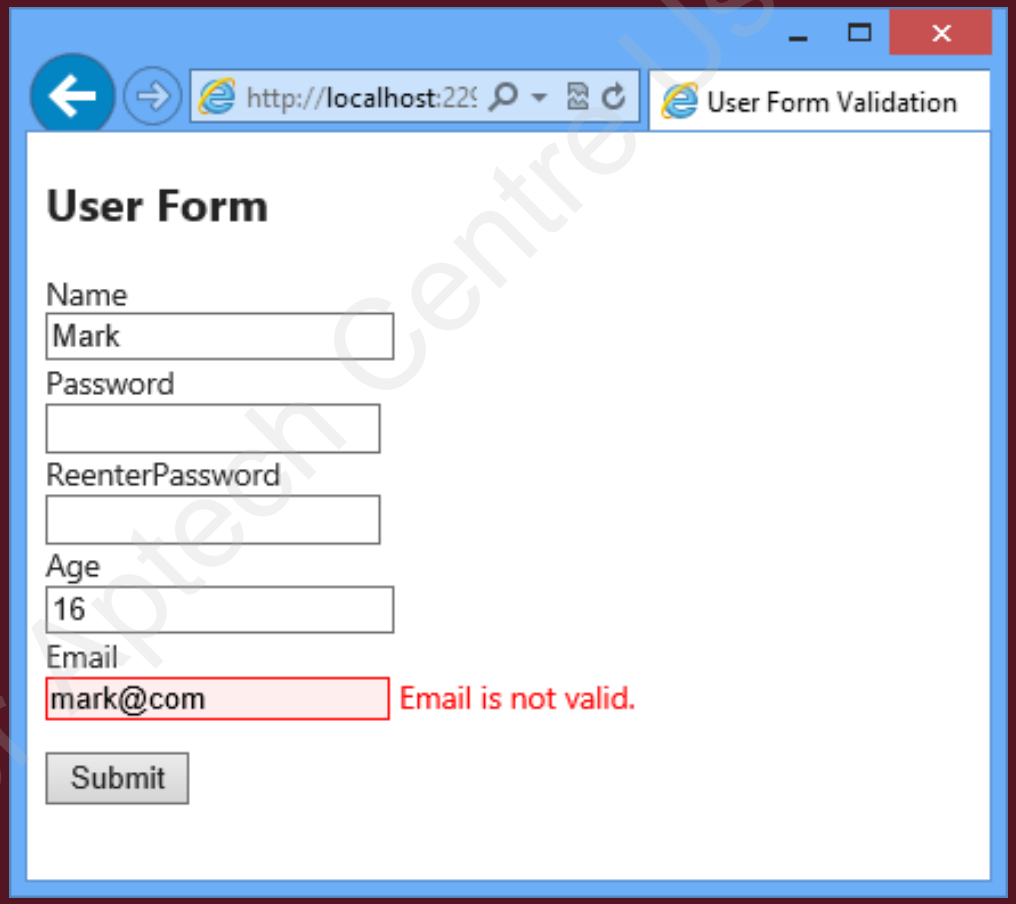
```
public class User     {
  public long Id { get; set; }
    [Required(ErrorMessage = "Please enter your name.")]
  public string Name { get; set; }
    [StringLength(9, MinimumLength = 4)]
  public string Password { get; set; }
    [StringLength(9, MinimumLength = 4)]
  public string ReenterPassword { get; set; }
    [Required (ErrorMessage = "Please enter your age.")]
  publicint Age { get; set; }
    [RegularExpression(@"[A-Za-z0-9._%+-]+@[A-Za-z0-9.-]+\.[A-Za-z]{2,4}",
      ErrorMessage = "Email  is not  valid.")]
  public string Email { get; set; }
}
```

RegularExpression Annotation 3-4

- In the preceding code:
  - The regular expression `A-Za-z0-9._%+-]+@[A-Za-z0-9.-]+\.[A-Za-z]{2,4}` defines the format of an e-mail address. It is divided in three parts where:
  - **Part 1**: `[A-Za-z0-9._%+-]+`
  - **Part 2**: `[A-Za-z0-9.-]+`
  - **Part 3**: `[A-Za-z]{2,4}`
- The first part of the regular expression specifies the characters and it ranges within square brackets that can appear.
- Then, the + sign between the first and second part indicates that these parts can consist of one or more characters of the types specified within the square brackets preceding the + sign.
- The third part contains `{2,4}` at the end indicating that this part can include 2-4 characters.

RegularExpression Annotation 4-4

- Following figure shows the validation message that is displayed when a user specified value in the `Email` field is not in a valid format as specified using regular expression:



Range Annotation 1-3

- You can use the `Range` annotation to specify the minimum and maximum constraints for a numeric value.
- Following is the syntax of the `Range` annotation:

Syntax:

```
[Range (<minimum_range>, <maximum_range>)]
```

where,

- `minimum_range`: Is a numeric value that specifies the minimum value for the range.
- `maximum_range`: Is a numeric value that specifies the minimum value for the range.

Range Annotation 2-3

- Following code shows a `User` model with the `Range` annotations applied to its `Age` property:

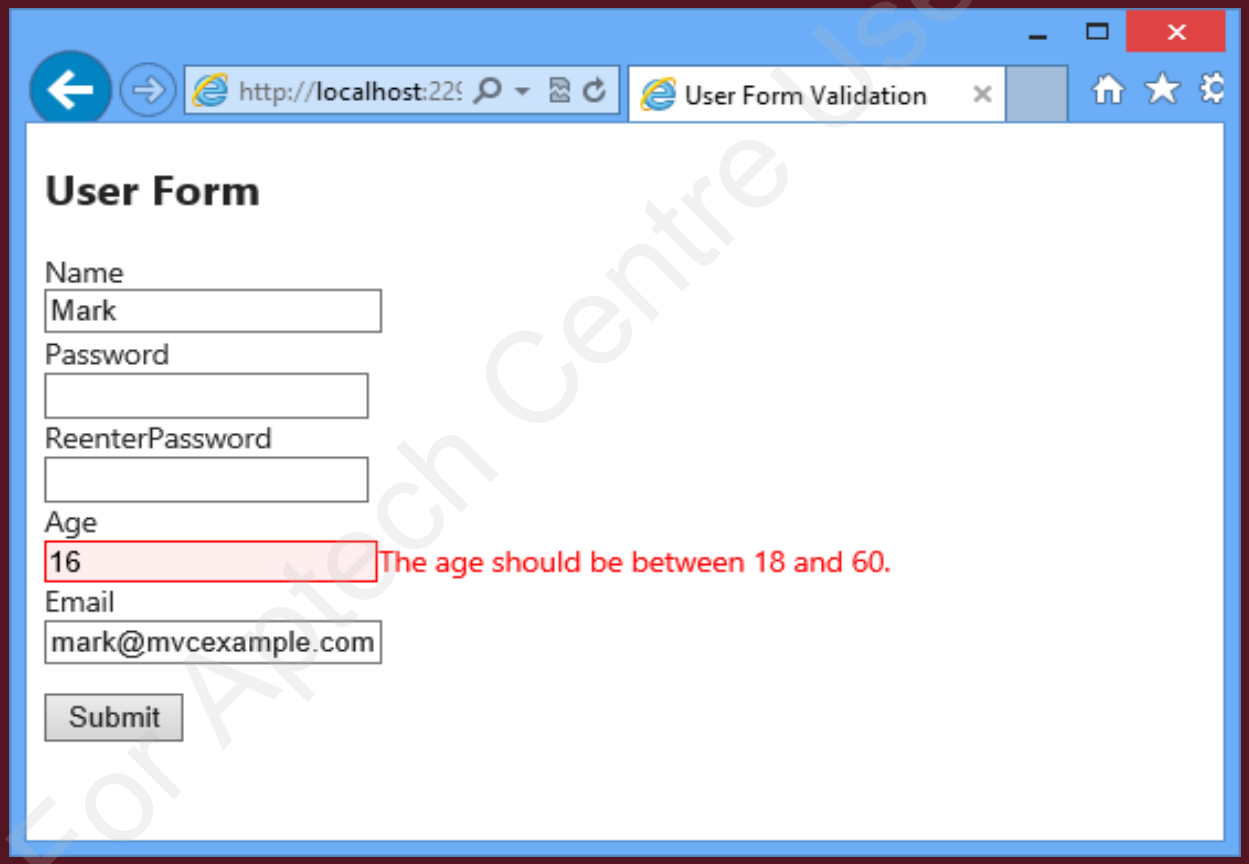
Code Snippet:

```
public class User     {
  public long Id { get; set; }
    [Required(ErrorMessage = "Please enter your name.")]
  public string Name { get; set; }
    [StringLength(9, MinimumLength = 4)]
  public string Password { get; set; }
    [StringLength(9, MinimumLength = 4)]
  public string ReenterPassword { get; set; }
    [Range(18, 60, ErrorMessage = "The age should be between 18 and 60.")]
  public int Age { get; set; }
    [RegularExpression(@"[A-Za-z0-9._%+-]+@[A-Za-z0-9.-]+\.[A-Za-z]{2,4}",
      ErrorMessage = "Email  is not  valid.")]
  public string Email { get; set; }
}
```

- This code shows using the `Range` annotations to the `Age` property.

Range Annotation 3-3

- Following figure shows the validation error message that is displayed when a user specified age is not in the specified range:



Compare Annotation 1-3

- You can use the `Compare` annotation to compare values in two fields.
- The `Compare` annotation ensures that the two properties on a model object have the same value.
- Following code snippet shows a `User` model with the `Compare` annotation applied to its `ReenterPassword` property:

Code Snippet:

```
public class User     {
  public long Id { get; set; }
    [Required(ErrorMessage = "Please enter your name.")]
  public string Name { get; set; }
    [StringLength(9, MinimumLength = 4)]
public string Password { get; set; }
    [StringLength(9, MinimumLength = 4)]
    [Compare("Password", ErrorMessage = "The specified passwords do not
      match with the Password field.")]
```

Compare Annotation 2-3

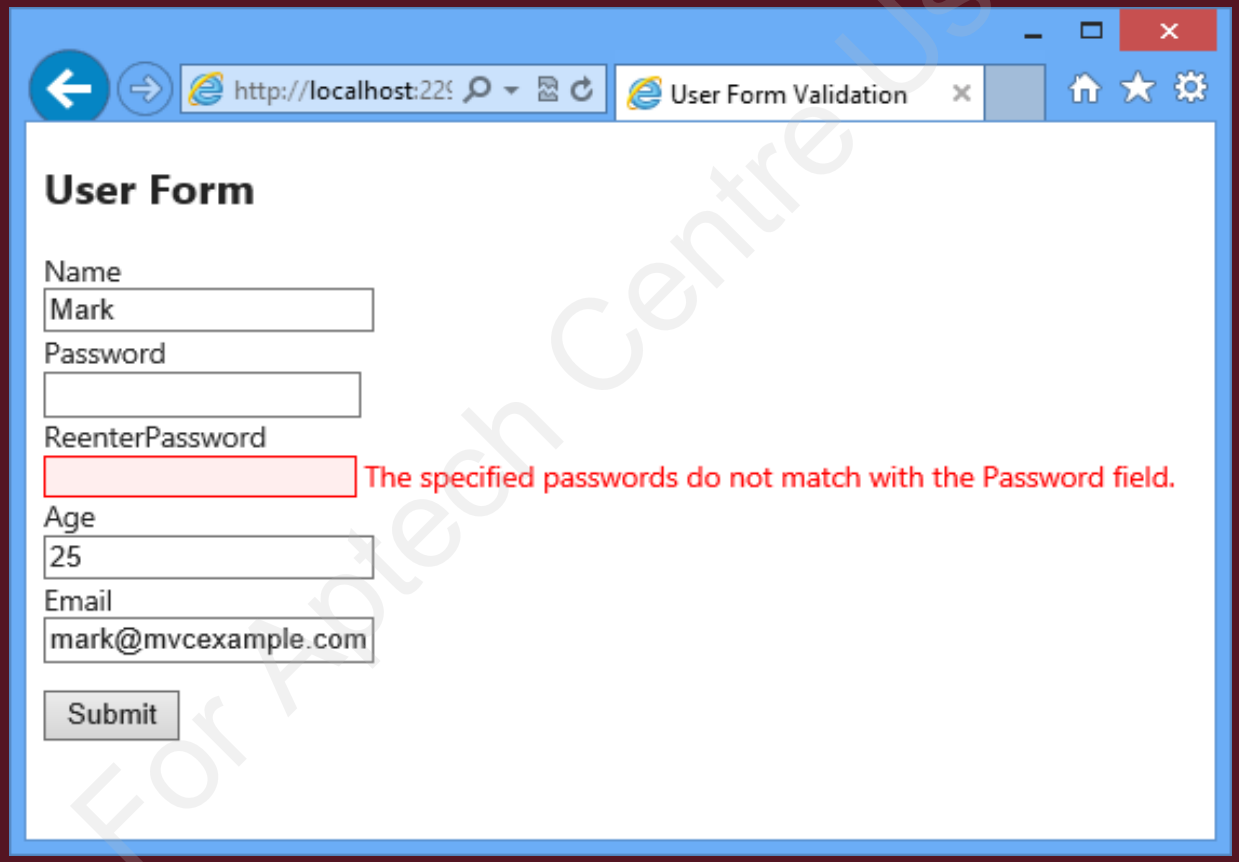
Code Snippet:

```
public string ReenterPassword { get; set; }
   [Range(18, 60, ErrorMessage = "The age should be between 18 and 60.")]
  public int Age { get; set; }
   [RegularExpression(@"[A-Za-z0-9._%+-]+@[A-Za-z0-9.-]+\.[A-Za-z]{2,4}",
     ErrorMessage = "Email  is not  valid.")]
  public string Email { get; set; }
 }
```

- This code uses the `Compare` annotation to check that the `ReenterPassword` field contains the same values as that of the `Password` field.

Compare Annotation 3-3

- Following figure shows the validation error message that is displayed when a user does not enter the same value in both the `Password` and `ReenterPassword` fields:



DisplayName Annotation 1-3

- When you use the `@Html.LabelFor()` helper method in a strongly typed view, the method displays a label with a text whose value is the corresponding property name.
- You can also explicitly state the text that the `@Html.LabelFor()` method should display using the `DisplayName` annotation on the model property.
- Following is the syntax for `Range` annotation:

Syntax:

```
[DisplayName(<text>)]
```

where,

- `text`: Is the text to be displayed for the property.

DisplayName Annotation 2-3

- Following code shows a User model with the `DisplayName` annotation applied to its `Name`, `ReenterPassword`, and `Email` properties:

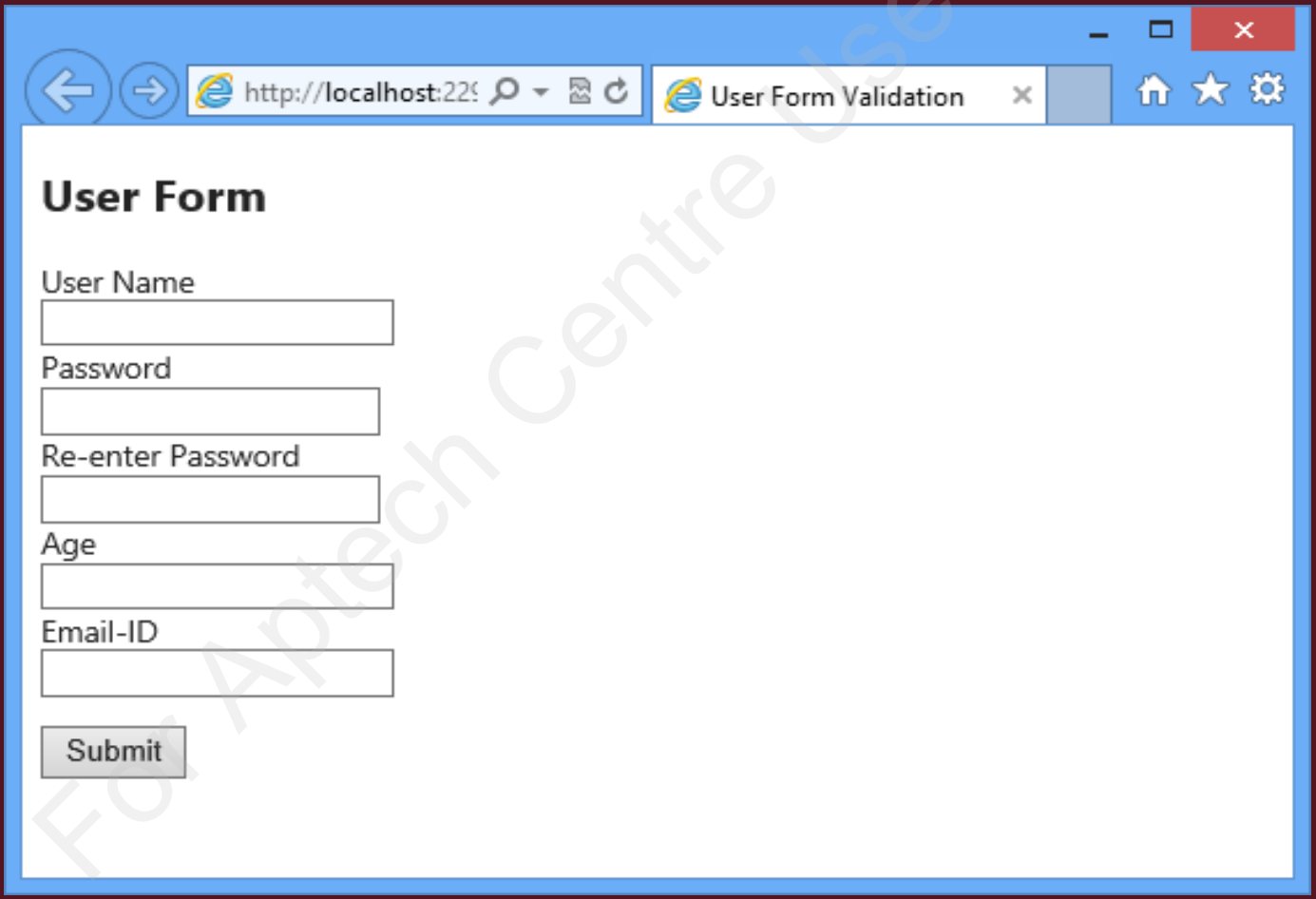
Code Snippet:

```
public class User {
  public long Id { get; set; }
    [DisplayName("User  Name")]
  public string Name { get; set; }
  public string Password { get; set; }
    [DisplayName("Re-enter Password")]
  public string ReenterPassword { get; set; }
  public int Age { get; set; }
    [DisplayName("Email- ID")]
  public string Email { get; set; }
}
```

- This code applies the `DisplayName` annotation to the `Name`, `ReenterPassword`, and `Email` properties.

DisplayName Annotation 3-3

- Following figure shows the user friendly display name for the `Name`, `ReenterPassword`, and `Email` model properties:



ReadOnly Annotation 1-2

- You can use the `ReadOnly` annotation to display read-only fields on a form.
- You can use this annotation to instruct the default model binder not to set the `DiscountedAmount` property with a new value from the request.
- Following is the syntax for `ReadOnly` annotation:

Syntax:

```
[ReadOnly(<boolean_value>)]
```

where,

- `boolean_value`: Is a boolean value which can be either `true` or `false`. A `true` value indicates that the default model binder should not set a new value for the property. A `false` value indicates that the default model binder should set a new value for the property based on the request.

ReadOnly Annotation 2-2

- Following code snippet shows how to use the `ReadOnly` annotation:

Code Snippet:

```
[ReadOnly(true)]
public intDiscountedAmount { get; set; }
}
```

- This code uses the `ReadOnly` annotation passing `true` as the value for the `DiscountedAmount` property.

DataType Annotation 1-3

- You can use the `DataType` annotation to provide information about the specific purpose of a property at run time.
- Following is the syntax for `DataType` annotation:

Syntax:

```
[DataType(DataType.<value>)]
```

where,

- `value`: Is a member of `DataType` enumeration.

DataType Annotation 2-3

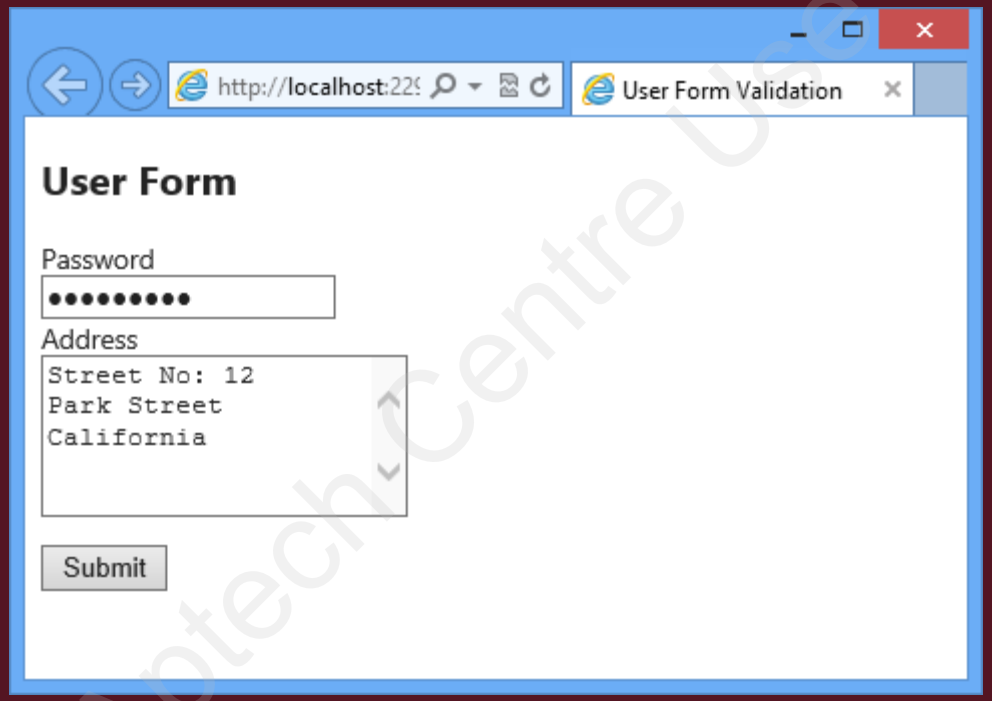
- Following code shows applying the `DataType` annotation to the `Password` and `Address` properties of a model:

Code Snippet:

```
[DataType(DataType.Password)]
public string Password { get; set; }
[DataType(DataType.MultilineText)]
public string Address { get; set; }
```

- In this code:
  - The `DataType` annotation is first applied to the `Password` property. This instructs the view to display password field masks the user entered password.
  - Next, the `DataType` annotation is applied to the `Address` property. This instructs the view to display a multi-line text area for the `Address` property.

- Following figure shows the view that displays the fields for the `Password` and `Address` properties:



ScaffoldColumn Annotation

- When you use scaffolding using the Create template, the view by default will create UI fields for all the properties of the model.
- However, you might need to ensure that the template does not create UI fields for certain properties.
- In such scenarios, you can use the `ScaffoldColumn` annotation passing a false value.
- Following code shows using the `ScaffoldColumn` annotation:

Code Snippet:

```
[ScaffoldColumn (false)]

public long Id { get; set; }
```

- In this code, the `ScaffoldColumn` annotation with a `false` value instructs the Create scaffolding template not to create a UI field in the view for the `Id` property.

ModelState Validation 1-2

- ModelState:
  - Is a class in the `System.Web.Mvc` namespace that encapsulate the state of model binding in an application.
  - Object stores the values that a user submits to update a model and any validation errors.
- You can check whether the state of a model is valid by using the `ModelState.IsValid` property.
- If the model binding succeeds, the `ModelState.IsValid` property returns true and you can accordingly perform the required function with the model data.

ModelState Validation 2-2

- Following code shows how to use the `ModelState.IsValid` property:

Code Snippet:

```
publicActionResult Index(User model)
  {
    if (ModelState.IsValid)
      {
         /*Perform required function with the model data*/
         return Content("You have successfully registered");
      }
else
return View();
  }
```

- In this code, the `ModelState.IsValid` is used to check the state of the `User` model.
  - If the property returns true, a success message is displayed.
  - Else the view is returned so that the user can enter valid values.

Summary

- The MVC Framework implements a validation workflow to validate user data.
- In an ASP.NET MVC application, you can manually validate data in the controller action.
- The MVC Framework provides several data annotations that you can apply as attributes to the properties of a model.
- The Required annotation when applied to a property validates that a value is specified for that property.
- The RegularExpression annotation when applied to a property validates that a value specified for that property matches the specified regular expression.
- The @Html.LabelFor() helper method when used in a strongly typed view displays a label with a text whose value is the corresponding property name.
- ModelState is a class in the System.Web.Mvc namespace that encapsulate the state of model binding in an application.