State Management

Today You Will Learn

- The Problem of State
- View State
- Transferring Information Between Pages
- Cookies

The Problem of State

- How you store information over the lifetime of your application.
- In a traditional Windows program, users interact with a continuously running application.
- A portion of memory on the desktop computer is allocated to store the current set of working information.
- In a typical web request, the client connects to the web server and requests a page. When the page is delivered, the connection is severed, and the web server discards all the page objects from memory. By the time the user receives a page, the web page code has already stopped running, and there's no information left in the web server's memory.

Advantage of Stateless Design:

- Clients need to be connected for only a few seconds at most, a web server can handle a huge number of nearly simultaneous requests without a performance hit.

View State

- One of the most common ways to store information is in view state.
- View state uses a hidden field that ASP.NET automatically inserts in the final, rendered HTML of a web page.
- Example: If you change the text of a label, the Label control automatically stores its new text in view state. That way, the text remains In place the next time the page is posted back.

The ViewState Collection

- The ViewState property of the page provides the current view state information.
- This property provides an instance of the StateBag collection class.
- The StateBag is a dictionary collection, which means every item is stored in a separate "slot" using a unique string name.

View State

```
//The this keyword refers to the current Page object. It's optional.
        this.ViewState["Counter"] = 1;
```

- When retrieving a value, you use the key name. You also need to cast the retrieved value to the appropriate data type using the casting syntax.
- This extra step is required because the ViewState collection stores all items as basic objects, which allows it to handle many different data types.

```
        int counter;
        counter = (int)this.ViewState["Counter"];
```

A View State Example

- A simple counter program that records how many times a button is clicked.

View State

```
public partial class SimpleCounter : Syatem.Web.UI.Page
{
    protected void cmdIncrement_Click(object sender, EventArgs e)
    {
        int counter;
        if(ViewState["Counter"] == null)
        {
            counter = 1;
        }
        else
        {
            counter = (int)ViewState["Counter"] + 1;
        }
        ViewState["Counter"] = counter;
        lblCount.Text = "Counter :" + counter.ToString();
    }
}
```

The code checks to make sure the item exists in view state before it attempts to retrieve it. Otherwise, you could easily run into problems such as the infamous ***null reference exception***.

View State

Making View State Secure

- View state information is stored in a single jumbled string that looks like this:

```
<input type="hidden" name="__VIEWSTATE" id="__VIEWSTATE"
 value="dDw3NDg2NTI5MDg7Oz4=" />
```

- As you add more information to view state, this value can become much longer. Because this value isn't formatted as clear text.
- The view state information is simply patched together in memory and converted to a **Base64 string**.

Tamper-Proof View State

There are two choices to make View State more secure:

- The view state information is tamperproof by instructing ASP.NET to use a ***hash code***.

View State

- A **hash code** is sometimes described as a cryptographically strong checksum.
- **Private States**: View state contains some information you want to keep secret, you can enable view state encryption.
  - You can turn on encryption for an individual page using the ViewStateEncryptionMode property of the Page directive:

```
<%@Page ViewStateEncryptionMode="Always" %>
```

  - you can set the same attribute in a configuration file to configure view state encryption for all the pages in your website:

```
<configuration>
        <system.web>
                <pages viewStateEncryptionMode="Always" />
        </system.web>
</configuration>
```

To convert "auto" to Always" call Page.RegisterRequiresViewStateEncryption()

View State

- There are three choices for view state encryption setting—always encrypt (Always), never encrypt (Never), or encrypt only if a control specifically requests it (Auto).

Retaining Member Variables

- The basic principle is to save all member variables to view state when the Page.PreRender event occurs and retrieve them when the Page.Load event occurs.

Steps:

  - A member variable that will be cleared with every postback.
  - If IsPostBack Then Restore variables.
  - In Page_PreRender event Persist variables.

View State

Disadvantages:

- It stores unnecessary information in view state, it will enlarge the size of the final page output and can thus slow down page transmission times.
- It hides the low-level reality that every piece of data must be explicitly saved and restored.

- To use this approach to save member variables in view state, use it ***exclusively***. That means refrain from saving some view state variables at the PreRender stage and others in control event handlers.

Storing Custom Objects

- To store an item in view state, ASP.NET must be able to convert it into a stream of bytes so that it can be added to the hidden input field in the page. This process is called **serialization**.

View State

- To make your objects serializable, you need to add a Serializable attribute before your class declaration.

```
[Serializable]
```

- Then it can be stored in View State.

```
Customer cust  = new Customer("Marsala", "Simons")
ViewState("CurrentCustomer") = cust
```

- It is needed to casting the view state object.

```
//Retrieve a customer from view state.
Customer cust;
cust = (Customer)ViewState[“CurrentCustomer”]
```

You can find more serializable classes in Visual Studio Help.

Transferring Information Between Pages

- One of the most significant limitations with view state is that it's tightly bound to a specific page.
- Two basic techniques to transfer information between pages:
  - cross-page posting
  - The query string

Cross-Page Posting

- A cross-page postback is a technique that extends the postback mechanism, so that one page can send the user to another page, complete with all the information for that page.
- The infrastructure that supports cross-page postbacks is a property named PostBackUrl, which is defined by the IButtonControl interface and turns up in button controls such as ImageButton, LinkButton, and Button.

Transferring Information Between Pages

- To use cross-posting, you simply set PostBackUrl to the name of another web form.
- When the user clicks the button, the page will be posted to that new URL with the values from al l the input controls on the current page.
- Example—A page named CrossPage1.aspx that defines a form with two text boxes and a button. When the button is clicked, it posts to a page named CrossPage2.aspx.

CrossPage1.aspx

```
<asp:Button runat="server" ID="cmdPost"
        PostBackUrl="CrossPage2.aspx" Text="Cross-Page Postback" />
```

Getting More Information from the Source Page

Transferring Information Between Pages

- To get more specific details, such as control values, you need to cast the PreviousPage reference to the appropriate page class.

```
public partial class CrossPage2 : System.Web.UI. Page
{
    protected void Page_Load(Object sender, EventArgs e)
    {
        if( PreviousPage != null)
        {
            lblInfo.Text = "You came from a page titled " + PreviousPage.Title;
        }
    }
}
```

The page checks for null reference before attempting to access the PreviousPage object. If it's a null reference, no cross-page postback took place.

Transferring Information Between Pages

- You can manually specify the reference by adding the PreviousPageType directive to the .aspx page, that receives the cross-page postback right after the Page directive.

```
<%@ PreviousPageType VirtualPath="~/CrossPage1.aspx" %>
```

Disadvantage:

- This approach is more fragile because it limits you to a single page class.
- Once you've cast the previous page to the appropriate page type, you still won't be able to directly access the control objects it contains.
- That's because the controls on the web page are not publicly accessible to other classes. You can work around this by using properties.

Transferring Information Between Pages

The Query String

- Another common approach is to pass information using a query string in the URL.
- This approach is commonly found in search engines.

  http://www.google.co.in/search?q=organic+gardening

- The query string is the portion of the URL after the question mark. In this case, it defines a single variable named q, which contains the string organic+gardening.

Advantages of Query String

- It is lightweight.
- It doesn't exert any kind of burden on the server.

Transferring Information Between Pages

Limitations of Query String

- Information is limited to simple strings, which must contain URL-legal characters.
- Information is clearly visible to the user and to anyone else who cares to eavesdrop on the Internet.
- The enterprising user might decide to modify the query string and supply new values, which your program won't expect and can't protect against.
- Many browsers impose a limit on the length of a URL (usually from 1KB to 2KB). For that reason, you can't place a large amount of information in the query string and still be assured of compatibility with most browsers.

Transferring Information Between Pages

```
//Go to newpage.aspx. Submit a single query string argument named recordID, and set to 10.
        Response.Redirect("newpage.aspx?recordID=10")
```

- You can send multiple parameters as long as they're separated with an ampersand (&):

```
//Go to newpage.aspx. Submit two query string arguments: recordID (10) and mode (full).
        Response.Redirect("newpage.aspx?recordID=10&mode=full")
```

- It can receive the values from the QueryString dictionary collection exposed by the built-in Request object:

```
string ID = Request.QueryString["recordID"];
```

A Query String Example

- The program presents a list of entries. When the user chooses an item by clicking the appropriate item in the list, the user is forwarded to a new page. This page displays the received ID number. This provides a quick and simple query string test with two pages.

Transferring Information Between Pages

URL Encoding

- One potential problem with the query string is that some characters aren't allowed in a URL.
- It supports for all characters must be alphanumeric or one of a small set of special characters (including $-_.+!*'(),).
- Some characters have special meaning.
  - The ampersand (&) is used to separate multiple query string parameters
  - The plus sign (+) is an alternate way to represent a space
  - The number sign (#) is used to point to a specific bookmark in a web page.
- If you try to send query string values that include any of these characters, you'll lose some of your data.
- To solve this problem **URL encoding** on text values before you place them in the query string.

Transferring Information Between Pages

- With URL encoding, special characters are replaced by escaped character sequences starting with the percent sign (%), followed by a two-digit hexadecimal representation.

  Example: The & character becomes %26

- To perform URL encoding, you use the UrlEncode() and UrlDecode() methods of the HttpServerUtility class.

```
string url= "QueryStringRecipient.aspx?"
Url += "Item="  + Server.UrlEncode(lstItems.SelectedItem.Text) + "&";
Url += "Mode=" + chkDetails.Checked.ToString() ;
Response.Redirect(Url)
```

- Use the UrlDecode() method to return a URL-encoded string to its initial value.
- ASP.NET automatically decodes your values when you access them through the Request.QueryString collection in query strings.

Cookies

- Cookies provide another way that you can store information for later use.
- **Cookies** are small files that are created in the web browser's memory (if they're temporary) or on the client's hard drive.

Advantage:

- Cookies work transparently without the user being aware that information needs to be stored.
- Cookies can be easily used by any page in your application and even be retained between visits, which allows for truly long-term storage.

Disadvantages:

- Cookies are limited to simple string information.
- Cookies are easily accessible and readable if the user finds and opens the corresponding file.

Cookies

- Some users disable cookies on their browsers, which will cause problems for web applications that require them.
- Users might manually delete the cookie files stored on their hard drives.
- Both the Request and Response objects (which are provided through Page properties) provide a Cookies collection.
- Retrieve cookies from the Request object, and set cookies using the Response object.

  - To set a cookie, just create a new HttpCookie object.

```
HttpCookie cookie = Request.Cookies["Preference"];
```

Set the value for Cookie

```
cookie["LanguagePref"] = "English" ‘
```

  - Adding values to the Cookie

```
cookie["Country"] = "US" ;
```

Cookies

- Attach Cookie to the current web response

```
Response.Cookies.Add(cookie);
```

- A cookie added in this way will persist until the user closes the browser and will be sent with every request.
- Creating a longer-lived cookie, by setting an expiration date.

```
cookie.Expires = DateTime.Now.AddYears(1);
```

- Retrieve cookies by cookie name using the Request.Cookies collection.

```
HttpCookie cookie = Request.Cookies["Preferences"];
```

- Check to see whether a cookie was found with this name.

```
string language;
if(cookie ! = null)
{
   language = cookie["LanguagePref"];
}
```

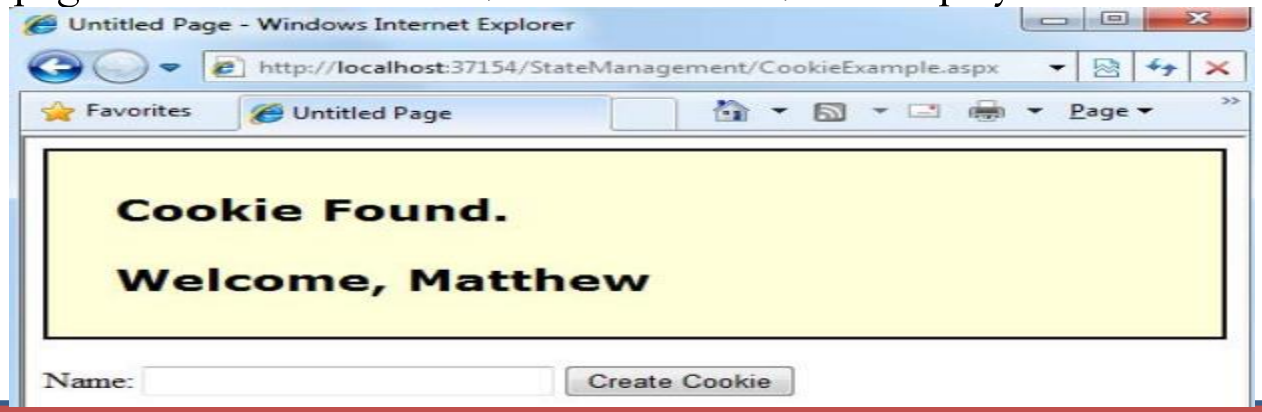
Cookies

- The only way to remove a cookie is by replacing it with a cookie that has an expiration date that has already passed.

```
HttpCookie cookie = new HttpCookie("Preferences");
cookie.Expires = DateTime.Now.AddDays(-1) ;
Response.Cookies.Add(cookie) ;
```

A Cookie Example

– To try this example, begin by running the page, entering a name, and clicking the Create Cookie button. Then, close the browser, and request the page again. The second time, the page will find the cookie, read the name, and display a welcome message.



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