.NET Framework 4 - ASP.NET

**ASP.NET State Management Overview**

A new instance of the Web page class is created each time the page is posted to the server. In traditional Web programming, this would typically mean that all information associated with the page and the controls on the page would be lost with each round trip. For example, if a user enters information into a text box, that information would be lost in the round trip from the browser or client device to the server.

To overcome this inherent limitation of traditional Web programming, ASP.NET includes several options that help you preserve data on both a per-page basis and an application-wide basis. These features are as follows:

* View state
* Control state
* Hidden fields
* Cookies
* Query strings
* Application state
* Session state
* Profile Properties

View state, control state, hidden fields, cookies, and query strings all involve storing data on the client in various ways. However, application state, session state, and profile properties all store data in memory on the server. Each option has distinct advantages and disadvantages, depending on the scenario.

Description: http://i.msdn.microsoft.com/Global/Images/clear.gifClient-Based State Management Options

The following sections describe options for state management that involve storing information either in the page or on the client computer. For these options, no information is maintained on the server between round trips.

**View State**

The [ViewState](http://msdn.microsoft.com/en-us/library/system.web.ui.control.viewstate.aspx) property provides a dictionary object for retaining values between multiple requests for the same page. This is the default method that the page uses to preserve page and control property values between round trips.

When the page is processed, the current state of the page and controls is hashed into a string and saved in the page as a hidden field, or multiple hidden fields if the amount of data stored in the [ViewState](http://msdn.microsoft.com/en-us/library/system.web.ui.control.viewstate.aspx) property exceeds the specified value in the [MaxPageStateFieldLength](http://msdn.microsoft.com/en-us/library/system.web.ui.page.maxpagestatefieldlength.aspx) property. When the page is posted back to the server, the page parses the view-state string at page initialization and restores property information in the page.

You can store values in view state as well. For more information on using View State, see [ASP.NET View State Overview](http://msdn.microsoft.com/en-us/library/bb386448.aspx). For recommendations about when you should use view state, see [ASP.NET State Management Recommendations](http://msdn.microsoft.com/en-us/library/z1hkazw7.aspx).

**Control State**

Sometimes you need to store control-state data in order for a control to work properly. For example, if you have written a custom control that has different tabs that show different information, in order for that control to work as expected, the control needs to know which tab is selected between round trips. The [ViewState](http://msdn.microsoft.com/en-us/library/system.web.ui.control.viewstate.aspx) property can be used for this purpose, but view state can be turned off at a page level by developers, effectively breaking your control. To solve this, the ASP.NET page framework exposes a feature in ASP.NET called control state.

The [ControlState](http://msdn.microsoft.com/en-us/library/system.web.ui.pagestatepersister.controlstate.aspx) property allows you to persist property information that is specific to a control and cannot be turned off like the [ViewState](http://msdn.microsoft.com/en-us/library/system.web.ui.control.viewstate.aspx) property.

**Hidden Fields**

ASP.NET allows you to store information in a [HiddenField](http://msdn.microsoft.com/en-us/library/system.web.ui.webcontrols.hiddenfield.aspx) control, which renders as a standard HTML hidden field. A hidden field does not render visibly in the browser, but you can set its properties just as you can with a standard control. When a page is submitted to the server, the content of a hidden field is sent in the HTTP form collection along with the values of other controls. A hidden field acts as a repository for any page-specific information that you want to store directly in the page.

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| **Description: Security noteSecurity Note** |
| It is easy for a malicious user to see and modify the contents of a hidden field. Do not store any information in a hidden field that is sensitive or that your application relies on to work properly. For more information, see [ASP.NET State Management Recommendations](http://msdn.microsoft.com/en-us/library/z1hkazw7.aspx). |

A [HiddenField](http://msdn.microsoft.com/en-us/library/system.web.ui.webcontrols.hiddenfield.aspx) control stores a single variable in its [Value](http://msdn.microsoft.com/en-us/library/system.web.ui.webcontrols.hiddenfield.value.aspx) property and must be explicitly added to the page. For more information, see [HiddenField Web Server Control Overview](http://msdn.microsoft.com/en-us/library/ms227988.aspx).

In order for hidden-field values to be available during page processing, you must submit the page using an HTTP POST command. If you use hidden fields and a page is processed in response to a link or an HTTP GET command, the hidden fields will not be available. For usage recommendations, see [ASP.NET State Management Recommendations](http://msdn.microsoft.com/en-us/library/z1hkazw7.aspx).

**Cookies**

A cookie is a small amount of data that is stored either in a text file on the client file system or in-memory in the client browser session. It contains site-specific information that the server sends to the client along with page output. Cookies can be temporary (with specific expiration times and dates) or persistent.

You can use cookies to store information about a particular client, session, or application. The cookies are saved on the client device, and when the browser requests a page, the client sends the information in the cookie along with the request information. The server can read the cookie and extract its value. A typical use is to store a token (perhaps encrypted) indicating that the user has already been authenticated in your application.

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| **Description: Security noteSecurity Note** |
| The browser can only send the data back to the server that originally created the cookie. However, malicious users have ways to access cookies and read their contents. It is recommended that you do not store sensitive information, such as a user name or password, in a cookie. Instead, store a token in the cookie that identifies the user, and then use the token to look up the sensitive information on the server. |

For more information about using cookies, see [Cookies](http://msdn.microsoft.com/en-us/library/system.web.httpresponse.cookies.aspx) and [ASP.NET State Management Recommendations](http://msdn.microsoft.com/en-us/library/z1hkazw7.aspx).

**Query Strings**

A query string is information that is appended to the end of a page URL. A typical query string might look like the following example:

[Copy Code](javascript:CopyCode('ctl00_MTCS_main_ctl42_ctl00_ctl18_code');" \o "Copy Code)

http://www.contoso.com/listwidgets.aspx?category=basic&price=100

In the URL path above, the query string starts with a question mark (?) and includes two attribute/value pairs, one called "category" and the other called "price."

Query strings provide a simple but limited way to maintain state information. For example, they are an easy way to pass information from one page to another, such as passing a product number from one page to another page where it will be processed. However, some browsers and client devices impose a 2083-character limit on the length of the URL.

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| **Description: Security noteSecurity Note** |
| Information that is passed in a query string can be tampered with by a malicious user. Do not rely on query strings to convey important or sensitive data. Additionally, a user can bookmark the URL or send the URL to other users, thereby passing that information along with it. For more information, see [ASP.NET State Management Recommendations](http://msdn.microsoft.com/en-us/library/z1hkazw7.aspx) and [How to: Protect Against Script Exploits in a Web Application by Applying HTML Encoding to Strings](http://msdn.microsoft.com/en-us/library/a2a4yykt.aspx). |

In order for query string values to be available during page processing, you must submit the page using an HTTP GET command. That is, you cannot take advantage of a query string if a page is processed in response to an HTTP POST command. For usage recommendations, see [ASP.NET State Management Recommendations](http://msdn.microsoft.com/en-us/library/z1hkazw7.aspx).

Description: http://i.msdn.microsoft.com/Global/Images/clear.gifServer-Based State Management Options

ASP.NET offers you a variety of ways to maintain state information on the server, rather than persisting information on the client. With server-based state management, you can decrease the amount of information sent to the client in order to preserve state, however it can use costly resources on the server. The following sections describe three server-based state management features: application state, session state, and profile properties.

**Application State**

ASP.NET allows you to save values using application state — which is an instance of the [HttpApplicationState](http://msdn.microsoft.com/en-us/library/system.web.httpapplicationstate.aspx) class — for each active Web application. Application state is a global storage mechanism that is accessible from all pages in the Web application. Thus, application state is useful for storing information that needs to be maintained between server round trips and between requests for pages. For more information, see [ASP.NET Application State Overview](http://msdn.microsoft.com/en-us/library/ms178594.aspx).

Application state is stored in a key/value dictionary that is created during each request to a specific URL. You can add your application-specific information to this structure to store it between page requests.

Once you add your application-specific information to application state, the server manages it. For usage recommendations, see [ASP.NET State Management Recommendations](http://msdn.microsoft.com/en-us/library/z1hkazw7.aspx).

**Session State**

ASP.NET allows you to save values by using session state — which is an instance of the [HttpSessionState](http://msdn.microsoft.com/en-us/library/system.web.sessionstate.httpsessionstate.aspx) class — for each active Web-application session. For an overview, see [ASP.NET Session State Overview](http://msdn.microsoft.com/en-us/library/ms178581.aspx).

Session state is similar to application state, except that it is scoped to the current browser session. If different users are using your application, each user session will have a different session state. In addition, if a user leaves your application and then returns later, the second user session will have a different session state from the first.

Session state is structured as a key/value dictionary for storing session-specific information that needs to be maintained between server round trips and between requests for pages. For more information, see [ASP.NET Session State Overview](http://msdn.microsoft.com/en-us/library/ms178581.aspx).

You can use session state to accomplish the following tasks:

* Uniquely identify browser or client-device requests and map them to an individual session instance on the server.
* Store session-specific data on the server for use across multiple browser or client-device requests within the same session.
* Raise appropriate session management events. In addition, you can write application code leveraging these events.

Once you add your application-specific information to session state, the server manages this object. Depending on which options you specify, session information can be stored in cookies, on an out-of-process server, or on a computer running Microsoft SQL Server. For usage recommendations, see [ASP.NET State Management Recommendations](http://msdn.microsoft.com/en-us/library/z1hkazw7.aspx).

**Profile Properties**

ASP.NET provides a feature called profile properties, which allows you to store user-specific data. This feature is similar to session state, except that the profile data is not lost when a user's session expires. The profile-properties feature uses an ASP.NET profile, which is stored in a persistent format and associated with an individual user. The ASP.NET profile allows you to easily manage user information without requiring you to create and maintain your own database. In addition, the profile makes the user information available using a strongly typed API that you can access from anywhere in your application. You can store objects of any type in the profile. The ASP.NET profile feature provides a generic storage system that allows you to define and maintain almost any kind of data while still making the data available in a type-safe manner.

To use profile properties, you must configure a profile provider. ASP.NET includes a [SqlProfileProvider](http://msdn.microsoft.com/en-us/library/system.web.profile.sqlprofileprovider.aspx) class that allows you to store profile data in a SQL database, but you can also create your own profile provider class that stores profile data in a custom format and to a custom storage mechanism such as an XML file, or even to a web service.

Because data that is placed in profile properties is not stored in application memory, it is preserved through Internet Information Services (IIS) restarts and worker-process restarts without losing data. Additionally, profile properties can be persisted across multiple processes such as in a Web farm or a Web garden. For more information, see [ASP.NET Profile Properties Overview](http://msdn.microsoft.com/en-us/library/2y3fs9xs.aspx).

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**ASP.NET Profile Properties Overview**

In many applications, you want to store and use information that is unique to a user. When a user visits your site, you can use the information you have stored to present the user with a personalized version of your Web application. Personalizing an application requires a number of elements: you must store the information using a unique user identifier, be able to recognize users when they visit again, and then fetch the user information as needed. To simplify your applications, you can use the ASP.NET profile feature, which can perform all of these tasks for you.

The ASP.NET profile feature associates information with an individual user and stores the information in a persistent format. Profiles allow you to manage user information without requiring you to create and maintain your own database. In addition, the ASP.NET profile feature makes the user information available using a strongly typed API that you can access from anywhere in your application.

You can store objects of any type using profiles. The profile feature provides a generic storage feature that allows you to define and maintain almost any kind of data while still making the data available in a type-safe manner.

Description: http://i.msdn.microsoft.com/Global/Images/clear.gifHow ASP.NET Profiles Work

To use profiles, you first enable profiles by modifying the configuration file for your ASP.NET Web application. As part of the configuration, you specify a profile provider, which is the underlying class that performs the low-level tasks of storing and retrieving profile data. You can use the profile provider included with the .NET Framework, which stores profile data in SQL Server, or you can create and use your own profile provider as described in the topic [Implementing a Profile Provider](http://msdn.microsoft.com/en-us/library/0580x1f5.aspx). You can specify an instance of the [SqlProfileProvider](http://msdn.microsoft.com/en-us/library/system.web.profile.sqlprofileprovider.aspx) that connects to a database of your choosing, or you can use the default instance of the [SqlProfileProvider](http://msdn.microsoft.com/en-us/library/system.web.profile.sqlprofileprovider.aspx) that stores profile data on the local Web server.

You configure the profile feature by defining a list of properties whose values you want to maintain. For example, you might want to store the user's postal code so that your application can offer region-specific information, such as weather reports. In the configuration file, you would define a profile property named PostalCode. The **profile** section of the configuration file might look like the following:

[Copy Code](javascript:CopyCode('ctl00_MTCS_main_ctl19_ctl00_ctl03_code');" \o "Copy Code)

<profile>

<properties>

<add name="PostalCode" />

</properties>

</profile>

When your application runs, ASP.NET creates a **ProfileCommon** class, which is a dynamically generated class that inherits the [ProfileBase](http://msdn.microsoft.com/en-us/library/system.web.profile.profilebase.aspx) class. The dynamic **ProfileCommon** class includes properties created from the profile property definitions you specify in your application configuration. An instance of this dynamic **ProfileCommon** class is then set as the value of the [Profile](http://msdn.microsoft.com/en-us/library/system.web.httpcontext.profile.aspx) property of the current [HttpContext](http://msdn.microsoft.com/en-us/library/system.web.httpcontext.aspx) and is available to pages in your application.

In your application, you collect the value or values you want to store and assign them to the profile properties you have defined. For example, your application's home page might contain a text box that prompts the user to enter a postal code. When the user enters a postal code, you set a [Profile](http://msdn.microsoft.com/en-us/library/system.web.httpcontext.profile.aspx) property to store the value for the current user, as in the following example:

Visual Basic

[Copy Code](javascript:CopyCode('ctl00_MTCS_main_ctl19_ctl00_ctl08_code');" \o "Copy Code)

Profile.PostalCode = txtPostalCode.Text

C#

[Copy Code](javascript:CopyCode('ctl00_MTCS_main_ctl19_ctl00_ctl09_code');" \o "Copy Code)

Profile.PostalCode = txtPostalCode.Text;

When you set a value for Profile.PostalCode, the value is automatically stored for the current user. You do not need to write any code to determine who the current user is or explicitly store the value in a database—the profile feature performs these tasks for you.

When you want to use the value, you can get it in much the same way that you set it. For example, the following code example shows how to call an imaginary function named GetWeatherInfo, passing it the current user's postal code as stored in a profile:

Visual Basic

[Copy Code](javascript:CopyCode('ctl00_MTCS_main_ctl19_ctl00_ctl10_code');" \o "Copy Code)

weatherInfo = GetWeatherInfo( Profile.PostalCode )

C#

[Copy Code](javascript:CopyCode('ctl00_MTCS_main_ctl19_ctl00_ctl11_code');" \o "Copy Code)

weatherInfo = GetWeatherInfo( Profile.PostalCode );

You do not need to explicitly determine who the user is or perform any database lookups. Simply getting the property value out of a profile causes ASP.NET to perform the necessary actions to identify the current user and look up the value in the persistent profile store.

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**User Identification for ASP.NET Profile Properties**

The ASP.NET user profile feature is designed to provide information that is unique to the current user. Profiles can work with either authenticated users or with anonymous (non-authenticated) users.

Description: http://i.msdn.microsoft.com/Global/Images/clear.gifAuthenticated Users

By default, a user profile is associated with the user identity stored in the [User](http://msdn.microsoft.com/en-us/library/system.web.httpcontext.user.aspx) property of the current HTTP context, accessible through the [HttpContext..::.Current](http://msdn.microsoft.com/en-us/library/system.web.httpcontext.current.aspx) property. The user identity is determined by:

* The ASP.NET Forms authentication system, which sets the user identity after successful authentication.
* Windows or Passport authentication, which sets the user identity after successful authentication.
* Custom authentication, where you manage getting user credentials and setting the user identity manually.

ASP.NET Forms authentication involves creating a login form and prompting the user for credentials. You can use the ASP.NET login controls to create the login form and perform Forms authentication without writing any code. For information on using ASP.NET features to authenticate users, see [ASP.NET Login Controls Overview](http://msdn.microsoft.com/en-us/library/ms178329.aspx) and [Managing Users by Using Membership](http://msdn.microsoft.com/en-us/library/tw292whz.aspx). For information about Forms authentication, see [How to: Implement Simple Forms Authentication](http://msdn.microsoft.com/en-us/library/xdt4thhy.aspx).

Description: http://i.msdn.microsoft.com/Global/Images/clear.gifAnonymous Users

Profiles can also work with anonymous users. Support for anonymous profiles is not enabled by default, so you must explicitly enable it. In addition, when you define profile properties in the Web.config file, you must explicitly make them available individually for anonymous users. Profile properties do not support anonymous access by default because profiles may be designed to work with authenticated users, and many properties are likely to pertain to personal information that is not available for anonymous users.

If anonymous identification is enabled, ASP.NET creates a unique identification for users the first time they visit your site. The unique user identification is stored in a cookie on the user's computer so that the user can be identified with each page request. The cookie's default expiration is set to approximately 70 days and is periodically renewed when a user visits the site. If the user's computer does not accept cookies, the user's identification can be maintained as part of the URL of the page request, although the identification will be lost when the user shuts down the browser.

For information on enabling anonymous identification, see the [anonymousIdentification Element (ASP.NET Settings Schema)](http://msdn.microsoft.com/en-us/library/91ka2e6a.aspx).

Description: http://i.msdn.microsoft.com/Global/Images/clear.gifMigrating Anonymous Profile Information

In some cases, your application might initially be maintaining personalization information for an anonymous user, but eventually the user logs in to your application. In that case, the user's identity changes from the assigned anonymous user identity to the identity provided by the authentication process.

When users log in (that is, when they stop being anonymous users), the [MigrateAnonymous](http://msdn.microsoft.com/en-us/library/system.web.profile.profilemodule.migrateanonymous.aspx) event is raised. You can handle this event to migrate information from the user's anonymous identity to the new authenticated identity, if necessary. The following code example shows how to migrate information when a user is authenticated.

Visual Basic

[Copy Code](javascript:CopyCode('ctl00_MTCS_main_ctl21_ctl00_ctl01_code');" \o "Copy Code)

Public Sub Profile\_OnMigrateAnonymous(sender As Object, args As ProfileMigrateEventArgs)

Dim anonymousProfile As ProfileCommon = Profile.GetProfile(args.AnonymousID)

Profile.ZipCode = anonymousProfile.ZipCode

Profile.CityAndState = anonymousProfile.CityAndState

Profile.StockSymbols = anonymousProfile.StockSymbols

''''''''

' Delete the anonymous profile. If the anonymous ID is not

' needed in the rest of the site, remove the anonymous cookie.

ProfileManager.DeleteProfile(args.AnonymousID)

AnonymousIdentificationModule.ClearAnonymousIdentifier()

' Delete the user row that was created for the anonymous user.

Membership.DeleteUser(args.AnonymousID, True)

End Sub

C#

[Copy Code](javascript:CopyCode('ctl00_MTCS_main_ctl21_ctl00_ctl02_code');" \o "Copy Code)

public void Profile\_OnMigrateAnonymous(object sender, ProfileMigrateEventArgs args)

{

ProfileCommon anonymousProfile = Profile.GetProfile(args.AnonymousID);

Profile.ZipCode = anonymousProfile.ZipCode;

Profile.CityAndState = anonymousProfile.CityAndState;

Profile.StockSymbols = anonymousProfile.StockSymbols;

////////

// Delete the anonymous profile. If the anonymous ID is not

// needed in the rest of the site, remove the anonymous cookie.

ProfileManager.DeleteProfile(args.AnonymousID);

AnonymousIdentificationModule.ClearAnonymousIdentifier();

// Delete the user row that was created for the anonymous user.

Membership.DeleteUser(args.AnonymousID, true);

}

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**ASP.NET Profile Providers**

The ASP.NET profile feature uses the same provider-based structure used by ASP.NET membership, ASP.NET role management, and other ASP.NET features. The ASP.NET profile feature works as a tiered system in which the functionality of the profile feature—providing typed property values and managing user identities—is separated from the underlying data storage. The profile feature relies on profile providers (data providers) to perform the back-end tasks required to store and retrieve profile property values.

Description: http://i.msdn.microsoft.com/Global/Images/clear.gifDefault Profile Provider

ASP.NET includes a profile provider that stores data using Microsoft SQL Server. The default ASP.NET machine configuration contains a default [SqlProfileProvider](http://msdn.microsoft.com/en-us/library/system.web.profile.sqlprofileprovider.aspx) instance named AspNetSqlProfileProvider that connects to SQL Server on the local machine. By default, the ASP.NET profile feature uses this instance of the provider. Alternatively, you can specify a different default provider in your application's Web.config file.

To use a [SqlProfileProvider](http://msdn.microsoft.com/en-us/library/system.web.profile.sqlprofileprovider.aspx), you must first create the SQL Server database used by the [SqlProfileProvider](http://msdn.microsoft.com/en-us/library/system.web.profile.sqlprofileprovider.aspx). You can create the database by running the Aspnet\_regsql.exe command, which is found in the following path:

*systemroot*\Microsoft .NET\SDK\*version*

When you run the tool, you specify the **-Ap** option. The following command shows the syntax that you use to create the database required to store ASP.NET profiles using the [SqlProfileProvider](http://msdn.microsoft.com/en-us/library/system.web.profile.sqlprofileprovider.aspx):

[Copy Code](javascript:CopyCode('ctl00_MTCS_main_ctl15_ctl00_ctl04_code');" \o "Copy Code)

aspnet\_regsql.exe -Ap

The example above does not specify a name for the database that is created, so the default name will be used. The default database name is Aspnetdb.

If the profile provider is configured with a connection string that uses integrated security, the process account of the ASP.NET application must have rights to connect to the SQL Server database.

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| **Description: NoteNote** |
| If you are using a SQL Server 2005 Express Edition database that is installed using the default configuration and the database is on the same computer as the Web server, the profile database will be created automatically by ASP.NET. |

Description: http://i.msdn.microsoft.com/Global/Images/clear.gifCustom Profile Providers

In some cases, you might want to create and use a custom profile provider. This is often true if you already have a database that stores user information, such as an employee database, if you need to use a database other than Microsoft SQL Server, or if you need to use a different data store, such as XML files. For more information, see [Implementing a Profile Provider](http://msdn.microsoft.com/en-us/library/0580x1f5.aspx).

The properties stored in a user profile can all be served by different profile providers. You can therefore manage data from multiple data sources to store information for a single user profile