ASP.NET AJAX

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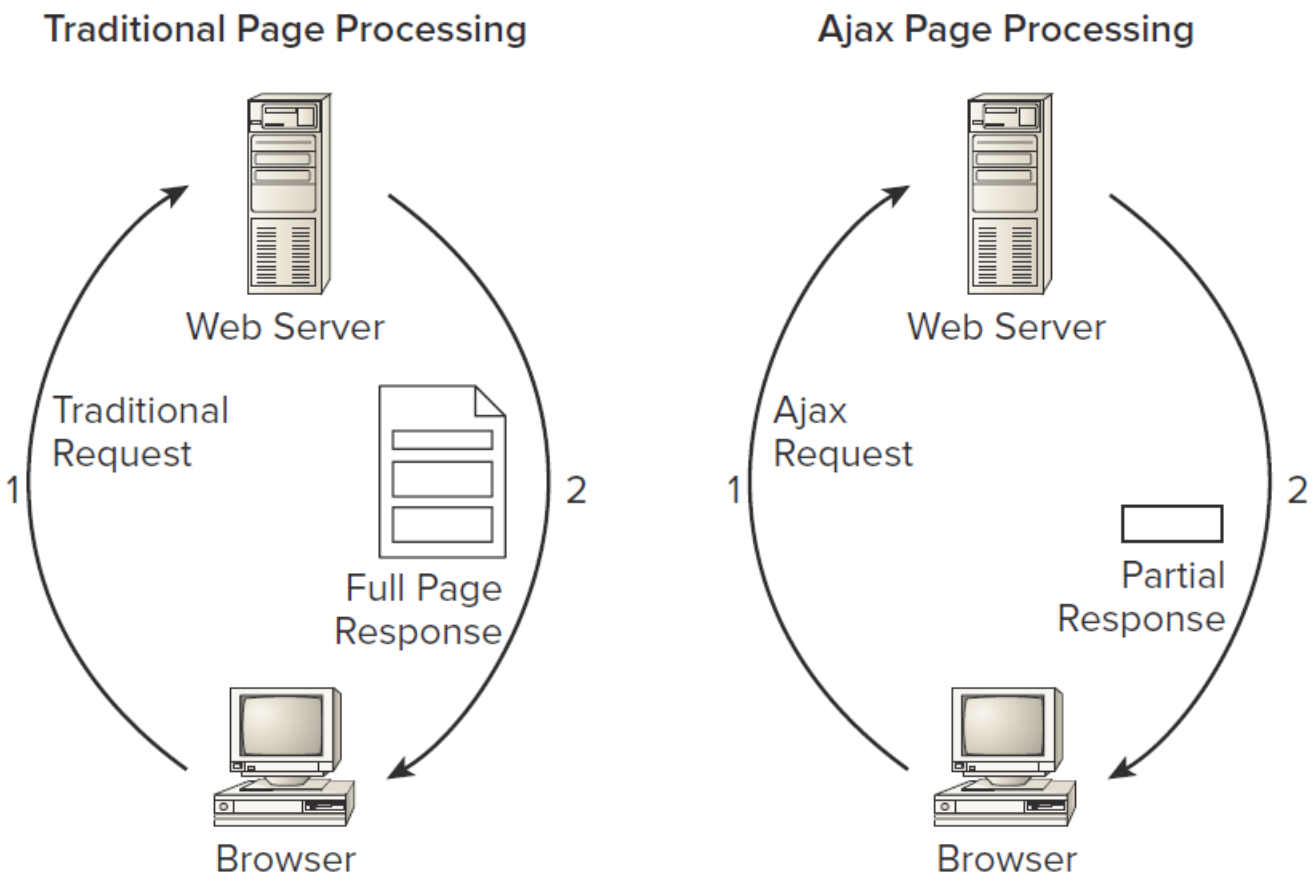
ASP.NET AJAX

- **A**synchronous **J**avaScript **A**nd **X**ML
- Enables *client-side* web pages **to exchange data** with the *server* **through asynchronous calls.**
- **Flicker-free page**
  - Enables to **perform a postback** to the server **without refreshing the entire page**.
- Gives more server controls to create ***rich***, ***interactive***, and ***responsive*** **user interfaces**.

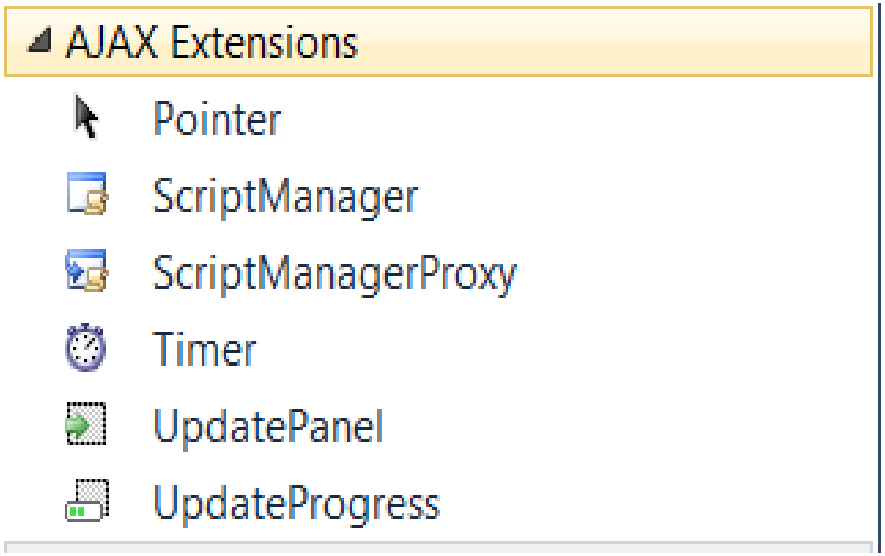
AJAX


Traditional Page Processing
Web Server
Traditional
Request
1
2
Full Page
Response
Browser
Ajax Page Processing
Web Server
Ajax
Request
1
2
Partial
Response
Browser

ASP.NET AJAX

- Enables you to:
  - **Create flicker-free pages** that enable you to refresh portions of the page **without a full reload and without affecting other parts of the page**.
  - **Provide feedback** to your users ***during*** **these page refreshes**.
  - **Update** sections of a page and **call** server-side code on a scheduled basis *using* a **timer**.
  - **Access** server-side **web services** and **page methods** and **work with** the **data** they return.
  - **Use** the **rich**, **client-side programming** framework to access and modify elements in your page, and get access to a code model and type system that looks similar to that of the .NET Framework.

AJAX Extensions



Creating Flicker-Free Pages

- **`UpdatePanel`** → To **avoid full postbacks** in ASPX pages and **update only** part of the page.
- ***Whenever*** one of the controls ***within*** the **`UpdatePanel`** causes a **postback** to the **server**, **only** the **content** ***within*** that **`UpdatePanel`** is **refreshed**.
- For this control to operate correctly;
  - **`ScriptManager`** → Bridge between the client page and the server

ScriptManager

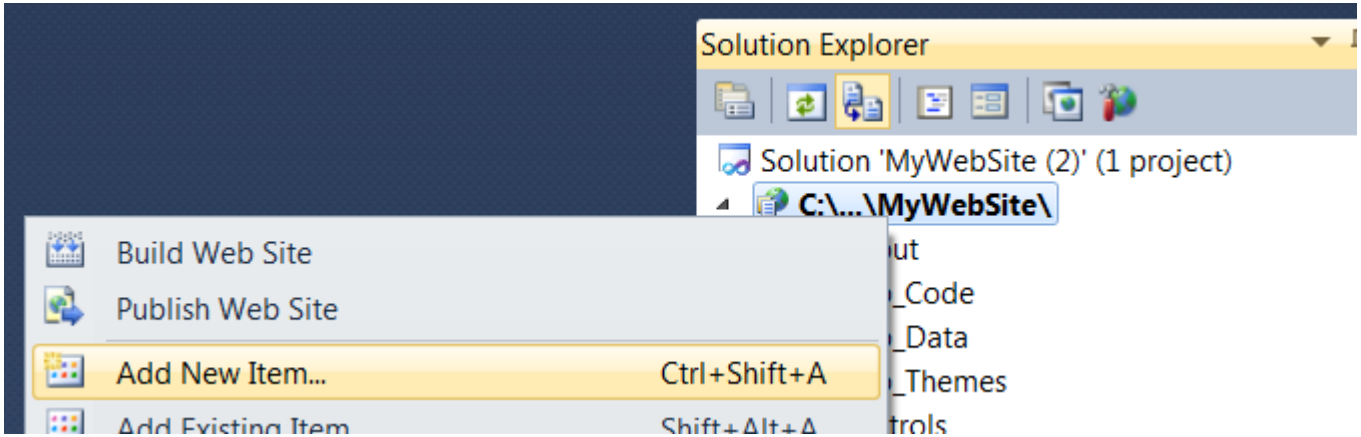
- ***Place*** the **`ScriptManager`** in the **master** page
  - If you're going to use Ajax functionality in many of your ASPX pages → It's available in all pages that are based on this master.

- You can only have **one** **`ScriptManager`** per page
  - ***If*** you add **one** to a **master** page, you **can't** add another one to a **content** page.

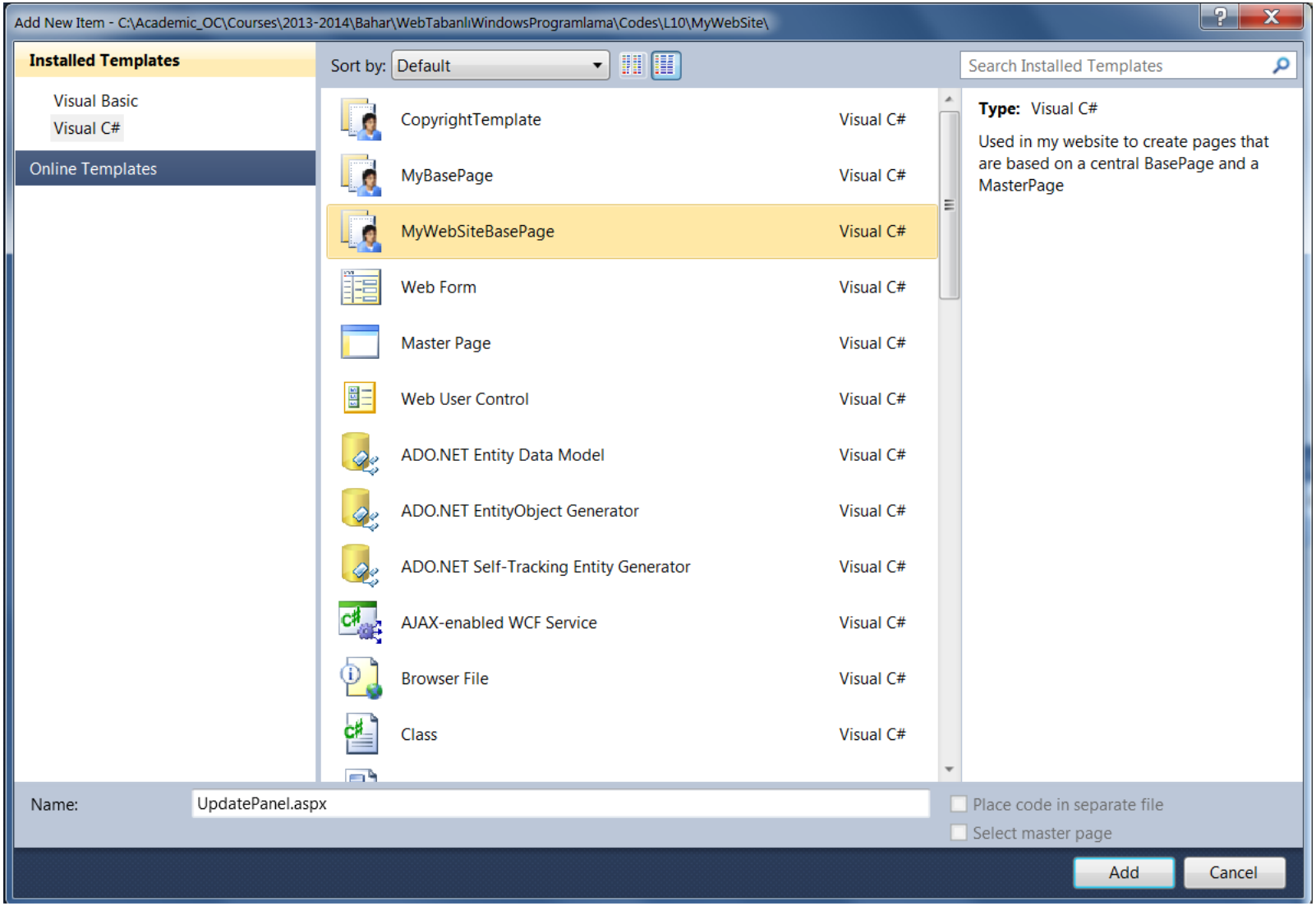
- **`ScriptManagerProxy`** → In order to access a **`ScriptManager`** control that is defined in a **master** page ***from*** a **content** page.

Example
Adding UpdatePanel

- Add New Item

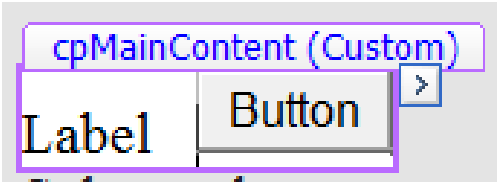


Example
Adding UpdatePanel



Example
Adding UpdatePanel

- **`Title`** → **`Update Panel Demo`**
- In Design View:
  - Drag a **`Label`** and a **`Button`**



  - Clear the **`Text`** property of the **`Label`**

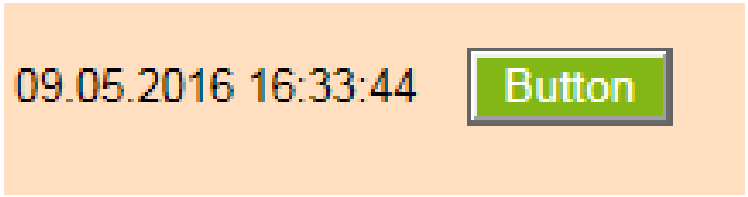
Example
Adding UpdatePanel

- Double-click the grey area:

```
protected void Page_Load(object sender, EventArgs e)
{
    Label1.Text = System.DateTime.Now.ToString();
}
```

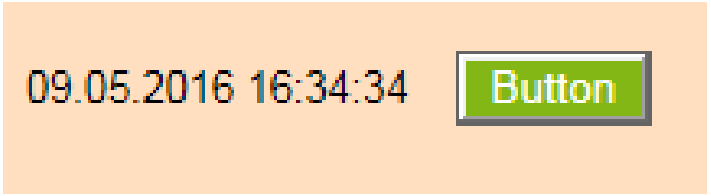
Example
Adding UpdatePanel

- View in browser



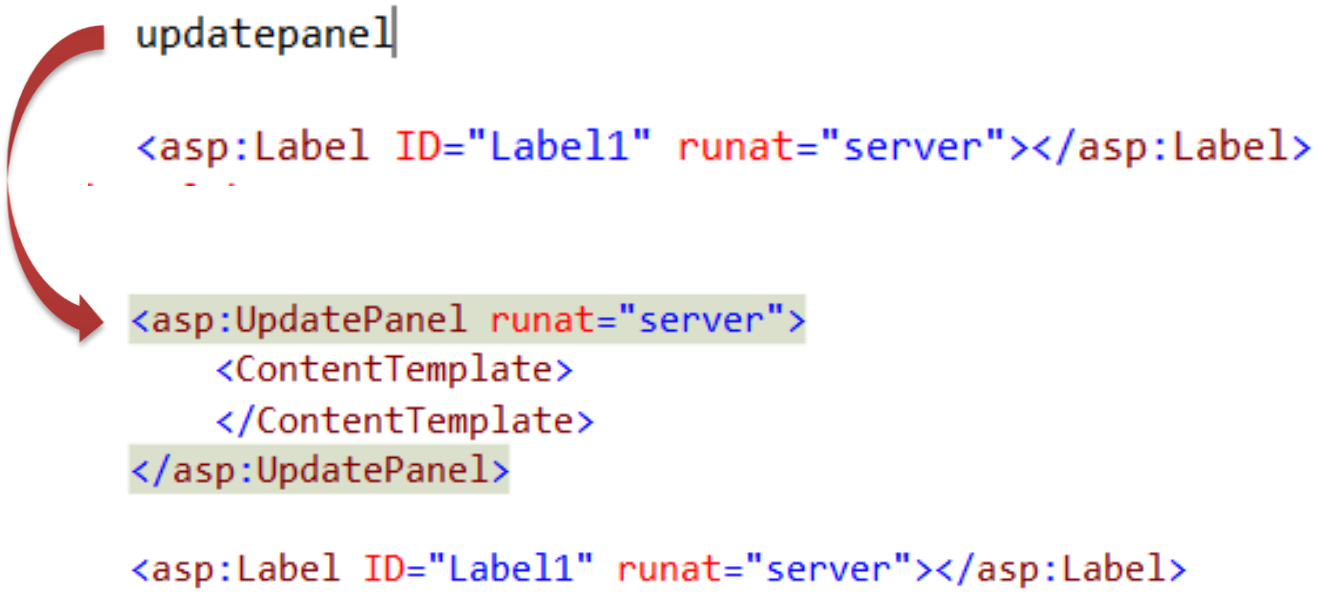
- Click the **`Button`** control a few times.

  Note that each time you click the button, the page flickers and is then redrawn, displaying the updated date and time.



Example
Adding UpdatePanel

- In Source View:
  - Make some room right before the **`Label`** control, and then type **`updatepanel`** and press Tab.



Example
Adding UpdatePanel

- Cut & paste **`Label`** and **`Button`** definitions between **`<ContentTemplate>`** and **`</ContentTemplate>`**

```
<asp:Content ID="Content2" ContentPlaceHolderID="cpMainContent" Runat="Server">
    <asp:UpdatePanel runat="server">
        <ContentTemplate>
            <asp:Label ID="Label1" runat="server"></asp:Label>
              
            <asp:Button ID="Button1" runat="server" Text="Button" />
        </ContentTemplate>
    </asp:UpdatePanel>
</asp:Content>
```

Example
Adding UpdatePanel

Drag a **`ScriptManager`** before **`UpdatePanel`**

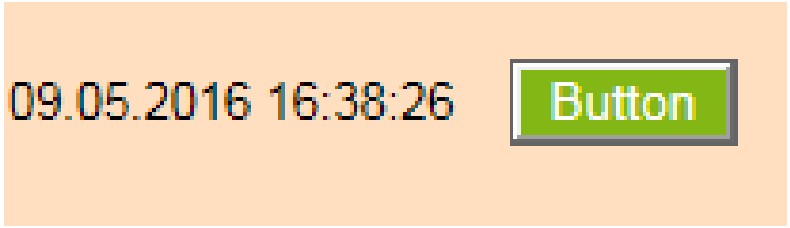
or

Type **`sm`** and press Tab

```
<asp:Content ID="Content2" ContentPlaceHolderID="cpMainContent" Runat="Server">
    <asp:ScriptManager runat="server" />
    <asp:UpdatePanel runat="server">
        <ContentTemplate>
            <asp:Label ID="Label1" runat="server"></asp:Label>
              
            <asp:Button ID="Button1" runat="server" Text="Button" />
        </ContentTemplate>
    </asp:UpdatePanel>
</asp:Content>
```

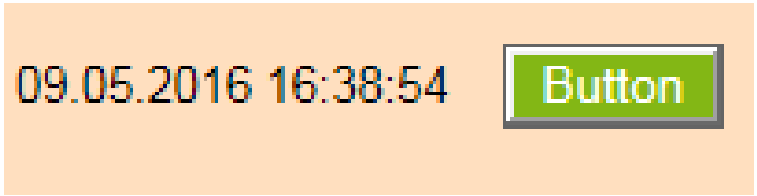
Example
Adding UpdatePanel

- View in browser



- Click the button a few times to update the label with the current date and time.

Note that there is **no page flicker** now.



UpdateProgress

- **Postback's advantage** → The user can see ***something is happening***
- **`UpdatePanel`** → Users have ***no visual cue*** that something is happening until it has happened.
- **`UpdateProgress`**
  - Tells users to hold on for a few seconds while their request is being processed.

UpdateProgress

- Connect the **`UpdateProgress`** control to an **`UpdatePanel`**:
  - **`AssociatedUpdatePanelID`** property
    - Text such as **"Please wait"** or an animated image to let the user know something is happening

Example

- Open **ContactForm.ascx** in **Controls** folder.
- In Source View → Wrap the entire **<table>** element & the **Label** at the bottom of the control in an **UpdatePanel** with a **<ContentTemplate>**.

Add ID

```
<asp:UpdatePanel ID="UpdatePanel1" runat="server">
  <ContentTemplate>

   <table class="style1" runat="server" id="FormTable">

  ..........................................................

   </table>
   <asp:Label ID="Message" runat="server" Text="Message Sent!" Visible="False"></asp:Label>

  </ContentTemplate>
  </asp:UpdatePanel>
```

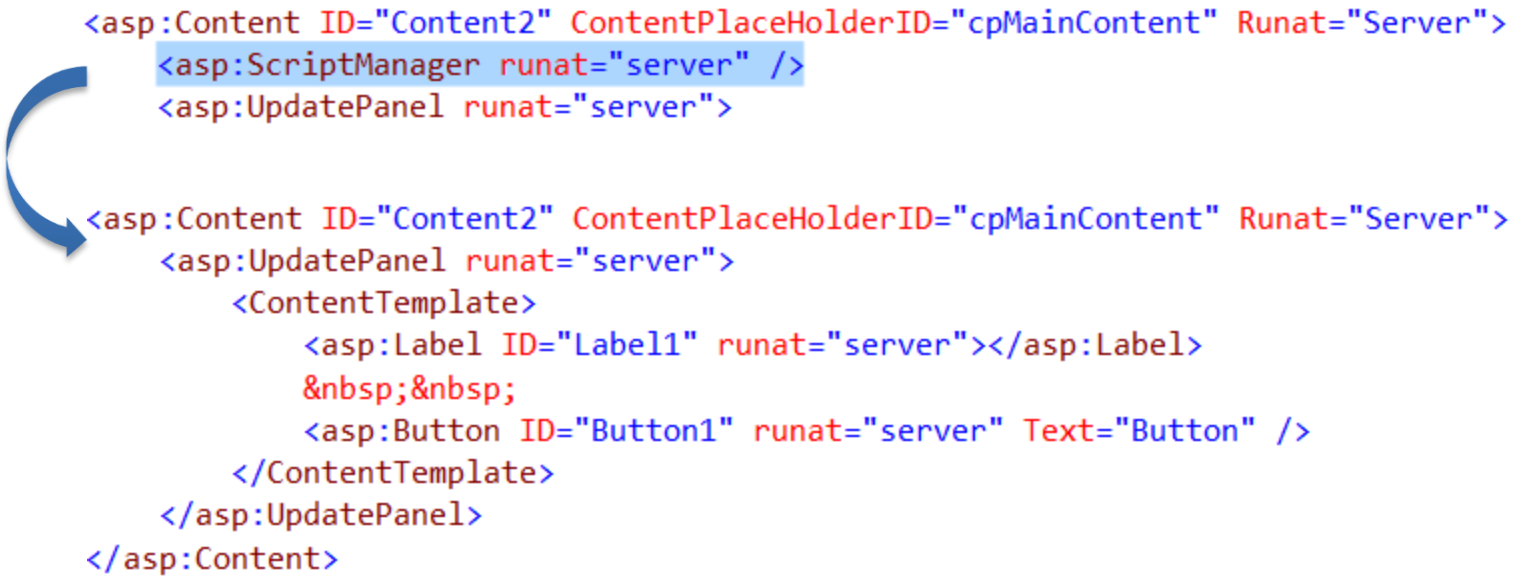
Example

- Open → **`Frontend.master`**
- Between the opening **`<form>`** tag and the **`<div>`** for the **`PageWrapper`**, add a **`ScriptManager`** control.

Example

- Open → **`UpdatePanel.aspx`**

- Remove **`ScriptManager`** Control

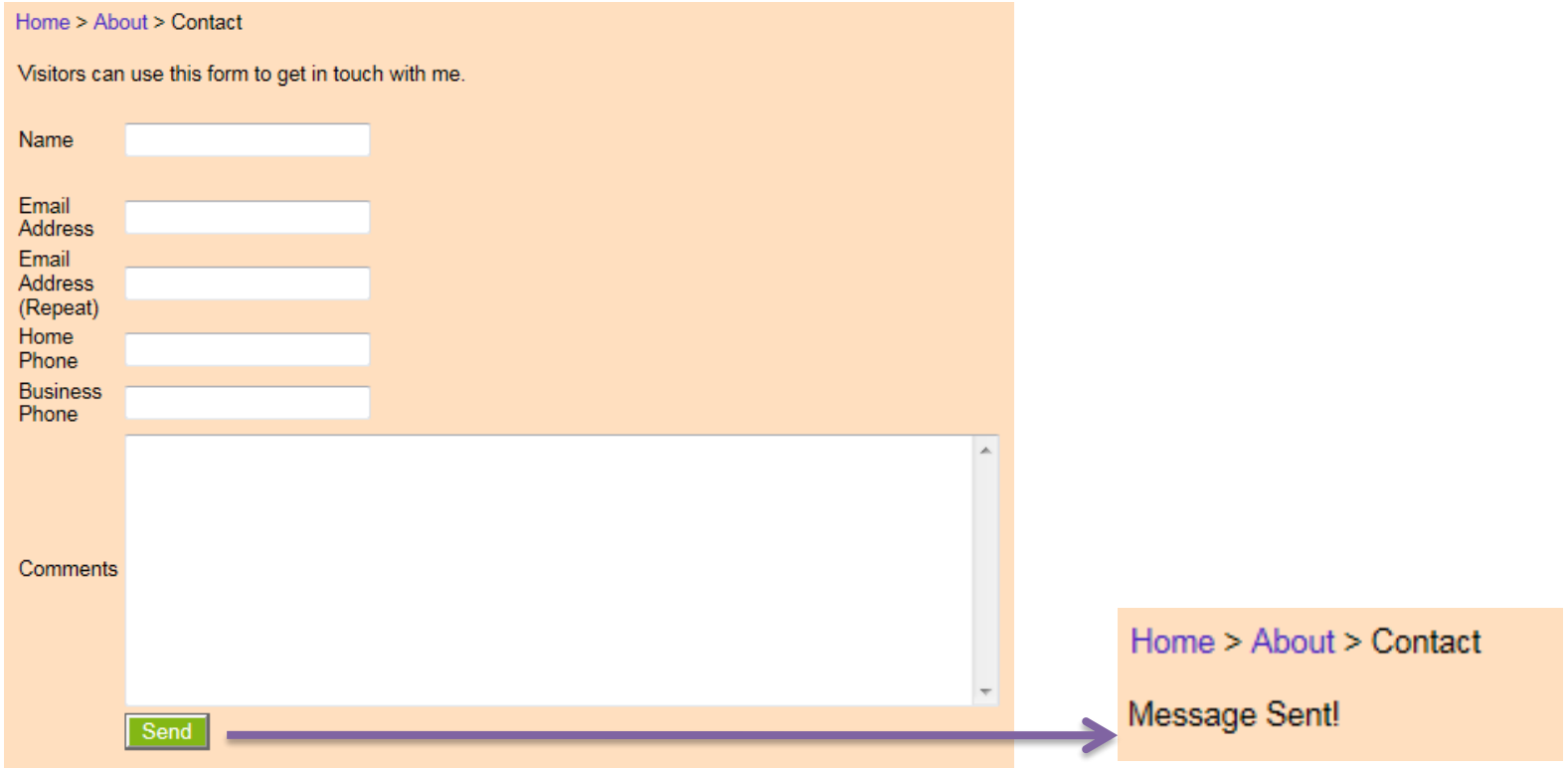


```
<asp:Content ID="Content2" ContentPlaceHolderID="cpMainContent" Runat="Server">
    <asp:ScriptManager runat="server" />
    <asp:UpdatePanel runat="server">


<asp:Content ID="Content2" ContentPlaceHolderID="cpMainContent" Runat="Server">
    <asp:UpdatePanel runat="server">
        <ContentTemplate>
            <asp:Label ID="Label1" runat="server"></asp:Label>
              
            <asp:Button ID="Button1" runat="server" Text="Button" />
        </ContentTemplate>
    </asp:UpdatePanel>
</asp:Content>
```

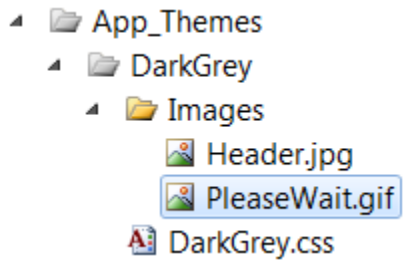
Example

- View **`Contact.aspx`** in browser

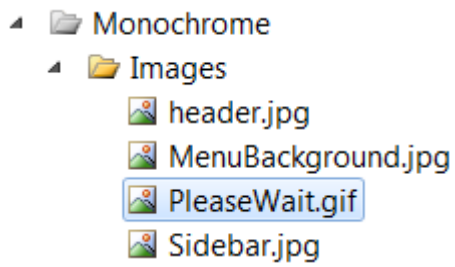


Example

- In **App_Themes** folder:
  - Add **PleaseWait.gif** → **Monochrome** > **Images**



  - Add **PleaseWait.gif** → **DarkGrey** > **Images**



PleaseWait.gif
http://ajaxload.info/

Example

- In **`Monochrome.css`** and **`DarkGrey.css`**:

```
.PleaseWait
{
    height: 32px;
    width: 500px;
    background-image: url(Images/PleaseWait.gif);
    background-repeat: no-repeat;
    padding-left: 40px;
    line-height: 32px;
}
```

Example

- Open → **`ContactForm.ascx`** in **`Controls`** folder

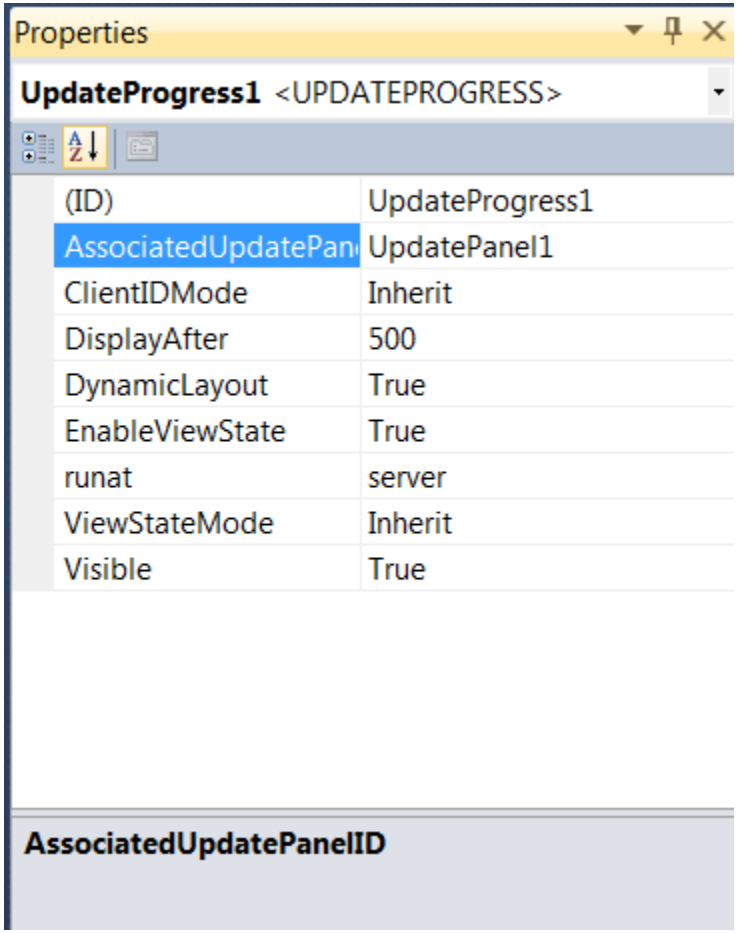
- Below the closing tag of the **`UpdatePanel`** at the end of the file, drag an **`UpdateProgress`** control.

```
  </ContentTemplate>
</asp:UpdatePanel>

<asp:UpdateProgress ID="UpdateProgress1" runat="server">
</asp:UpdateProgress>
```

Example

AssociatedUpdatePanelID = UpdatePanel1



Example

In Source View:

```
<asp:UpdateProgress ID="UpdateProgress1" runat="server" AssociatedUpdatePanelID="UpdatePanel1">
    <ProgressTemplate>
        <div class="PleaseWait">
            Please Wait...
        </div>
    </ProgressTemplate>
</asp:UpdateProgress>
```

Example

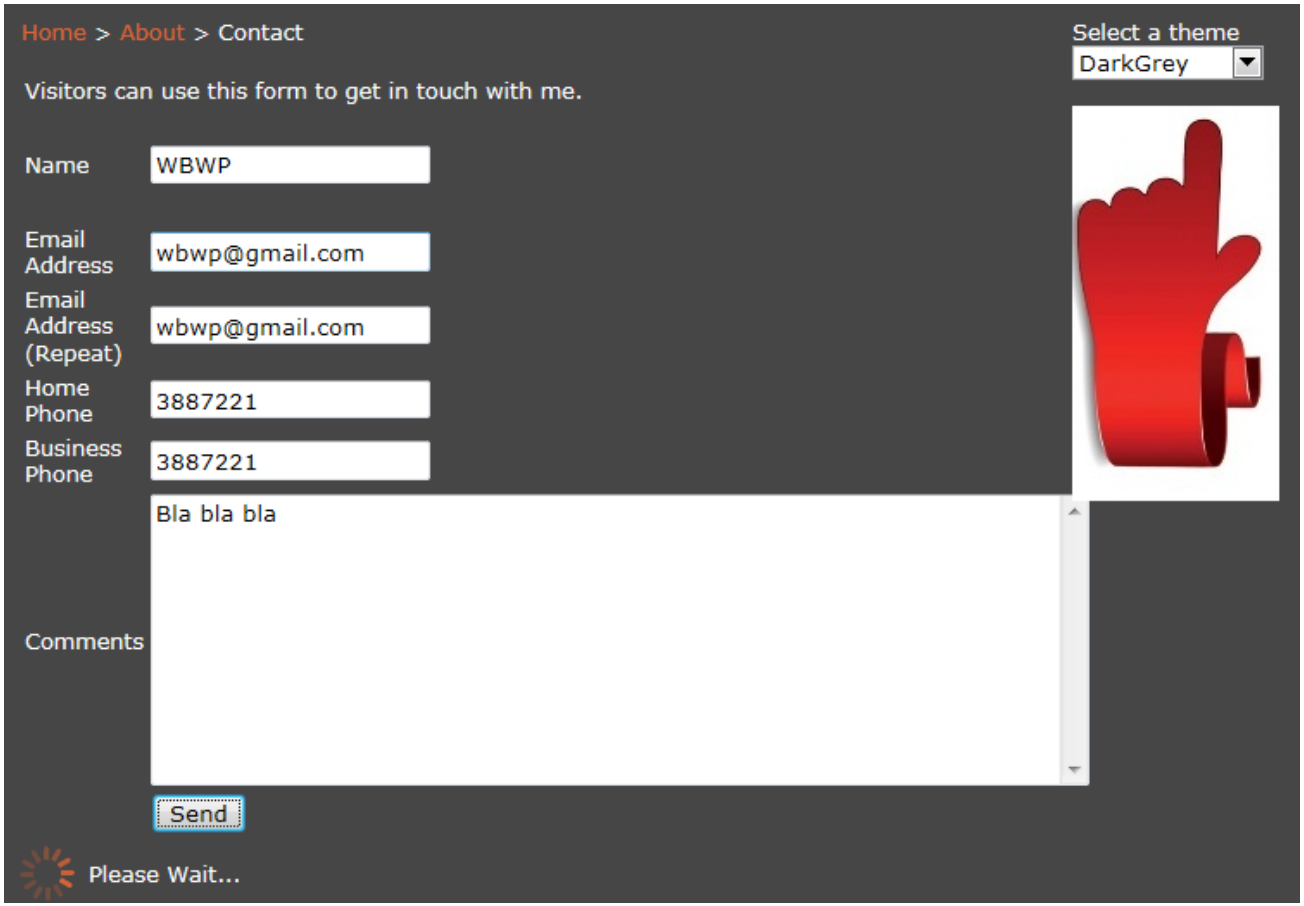
- Open → **`ControlForm.ascx.cs`**

To emulate a long delay 

```
Message.Visible = true;
FormTable.Visible = false;
System.Threading.Thread.Sleep(5000);
```

Example

- View **`Contact.aspx`** in browser



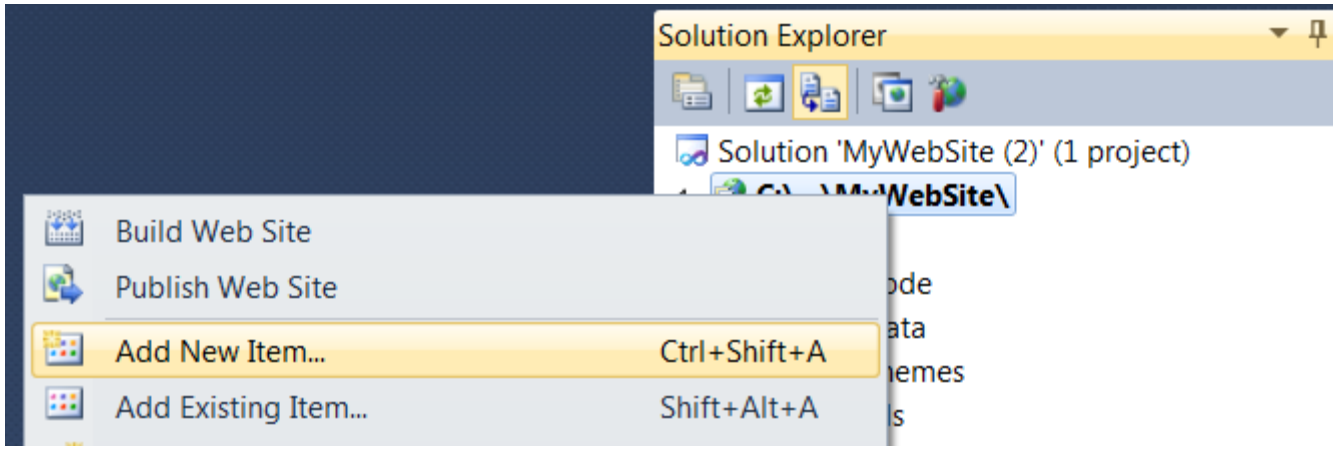
Timer

- Great for executing server-side code **on a repetitive basis**.
  - *For example*, you can use it to update the contents of an **`UpdatePanel`** every 5 seconds.

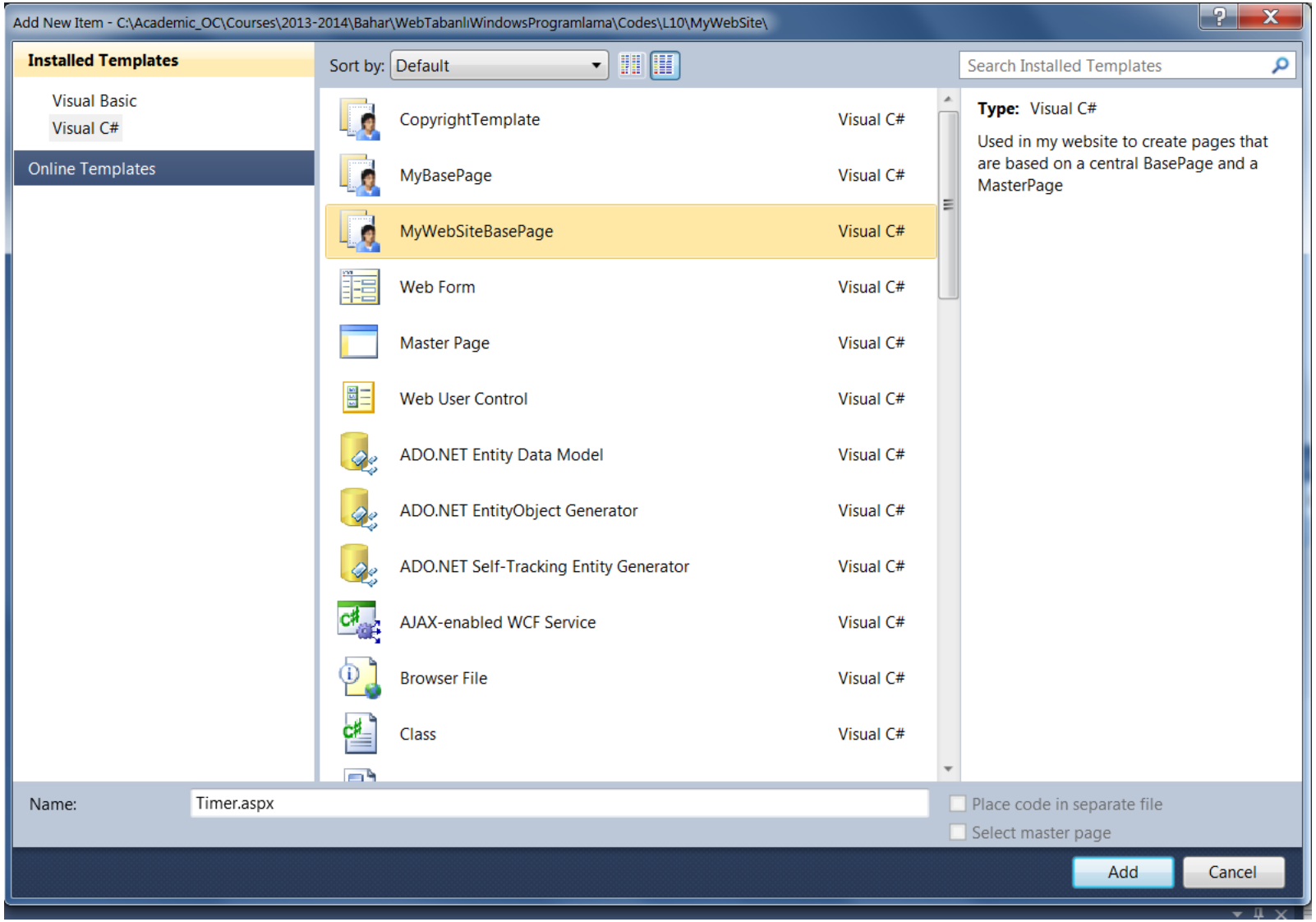
- For more information check out MSDN's web page → http://tinyurl.com/TimerClass

Example
Timer

- Add New Item



Example
Timer



Example
Timer

- **`Title = Timer Demo`**
- In Design View:
  - Drag an **`UpdatePanel`**
  - Drag a **`Label`** inside **`UpdatePanel`**

```
<asp:Content ID="Content2" ContentPlaceHolderID="cpMainContent" Runat="Server">
    <asp:UpdatePanel ID="UpdatePanel1" runat="server">
        <ContentTemplate>
            <asp:Label ID="Label1" runat="server" Text="Label"></asp:Label>
        </ContentTemplate>
    </asp:UpdatePanel>
</asp:Content>
```

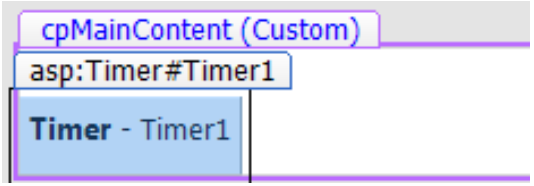
Example
Timer

- Drag a **`Timer`** control below the **`Label`**

```
<asp:Content ID="Content2" ContentPlaceHolderID="cpMainContent" Runat="Server">
    <asp:UpdatePanel ID="UpdatePanel1" runat="server">
        <ContentTemplate>
            <asp:Label ID="Label1" runat="server" Text="Label"></asp:Label>
            <asp:Timer ID="Timer1" runat="server" Interval="1000" OnTick="Timer1_Tick">
            </asp:Timer>
        </ContentTemplate>
    </asp:UpdatePanel>
</asp:Content>
```

Example
Timer

- In Design View → Double-click the **`Timer`** control




```
protected void Timer1_Tick(object sender, EventArgs e)
{
    Label1.Text = System.DateTime.Now.ToString();
}
```

Example
Timer

- View in browser

Web Services

- **Methods** that you can **call over the Internet** and that **can optionally return data to the calling code.**
- Ideal for **exchanging data** *between* **different** types of ***platforms*** and ***systems***.
  - For example;
    - exchange data between an **ASP.NET web site** *running on* **Microsoft Windows** and a **PHP-based site** *running on* **Linux**.
    - exchange data between an **ASP.NET web site** and a **client browser** *using* **JavaScript**.

Web Services

- To expose a method as a service:
  - **`WebMethod`** attribute
- An ***attribute*** is like a little ***tag*** or ***label*** that you can stick on code elements, like methods, properties, and so on, to **mark *that piece of code as <u>something special</u>***.

```
[WebMethod]
public string HelloWorld() {
    return "Hello World";
}
```

Signal to the ASP.NET runtime that you really want to expose this method *as a web method* that can be **called *from* client-side** code.

Web Services

- This also enables you to create other methods in the same class that are **not** exposed as **web services** automatically, giving you ***flexibility*** *in determining* ***what to open up for the outside world*****.**
- Place this method **in a file** with an **`.asmx`** extension and **inside a class that inherits from `System.Web.Services.WebService`**.

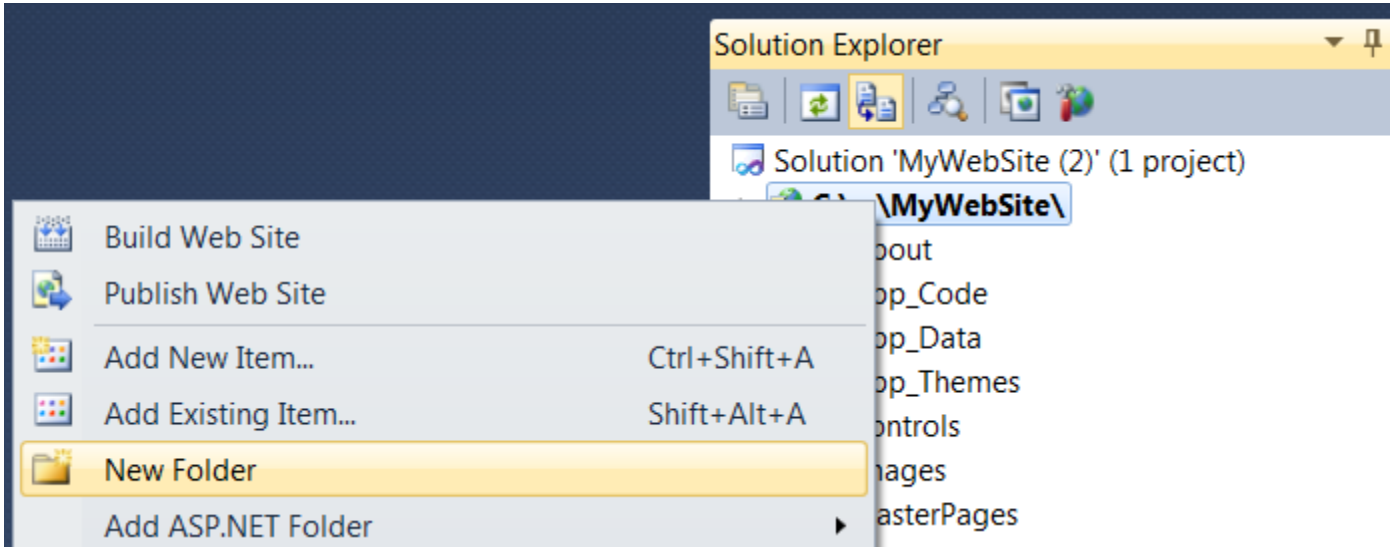
Web Services

- You may want your **client-side** pages to **talk** to a **web service on a different domain**.
  - You need to ***set up security*** in the browser to allow this.
- You can also use **web services** to **have two servers** *or* **other applications communicate with each other**. In that case, one application interacts with an ASP.NET web service over the network to exchange data.

Outside the scope of this course!

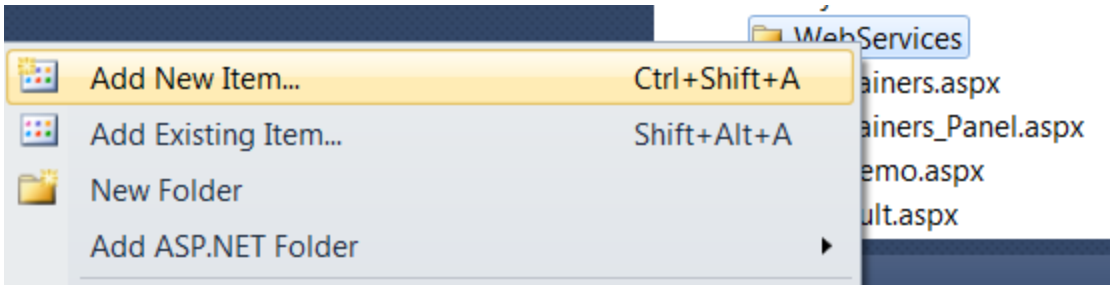
Example
Creating a Web Service

- Create a new folder → **`WebServices`**

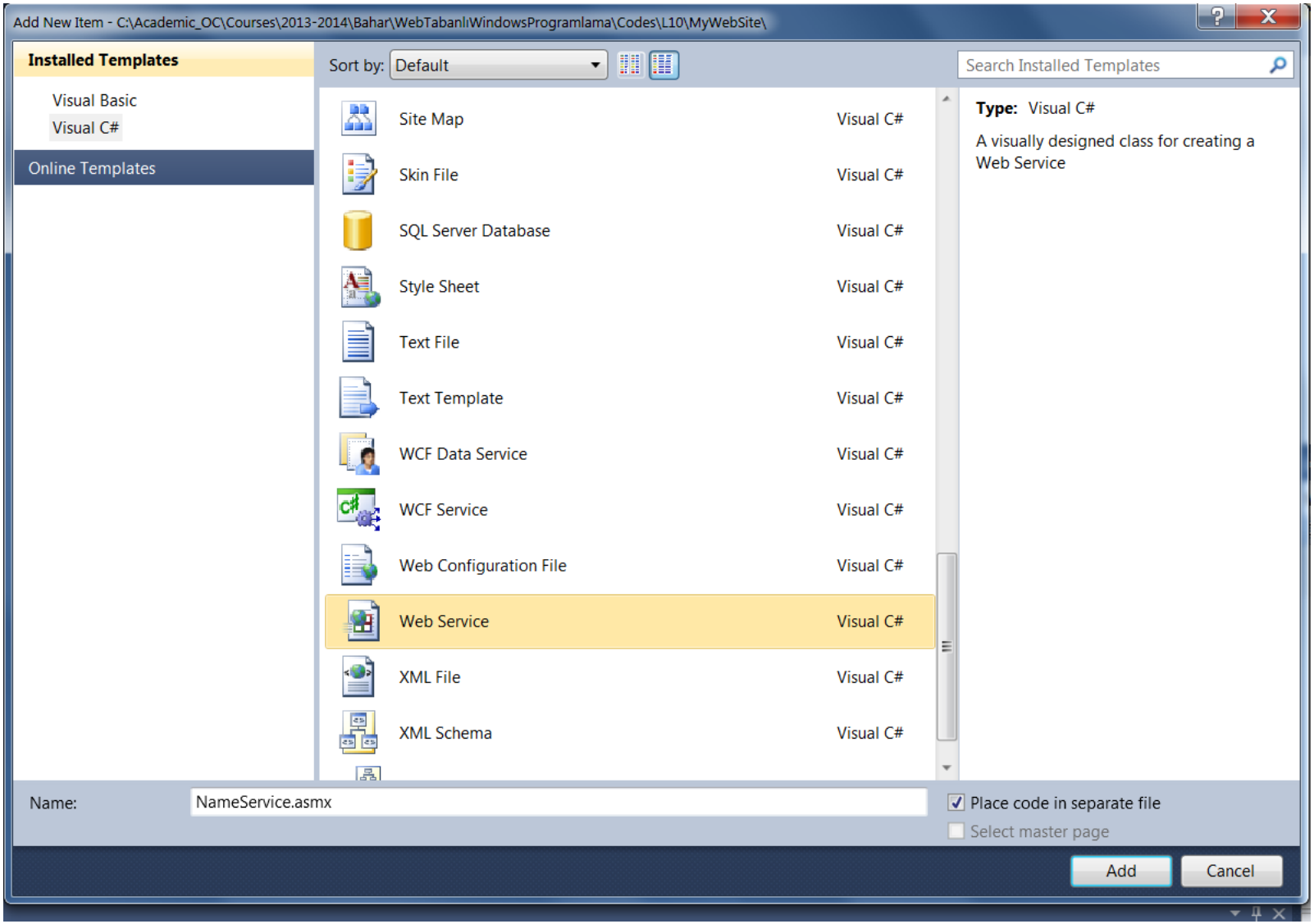


Example
Creating a Web Service

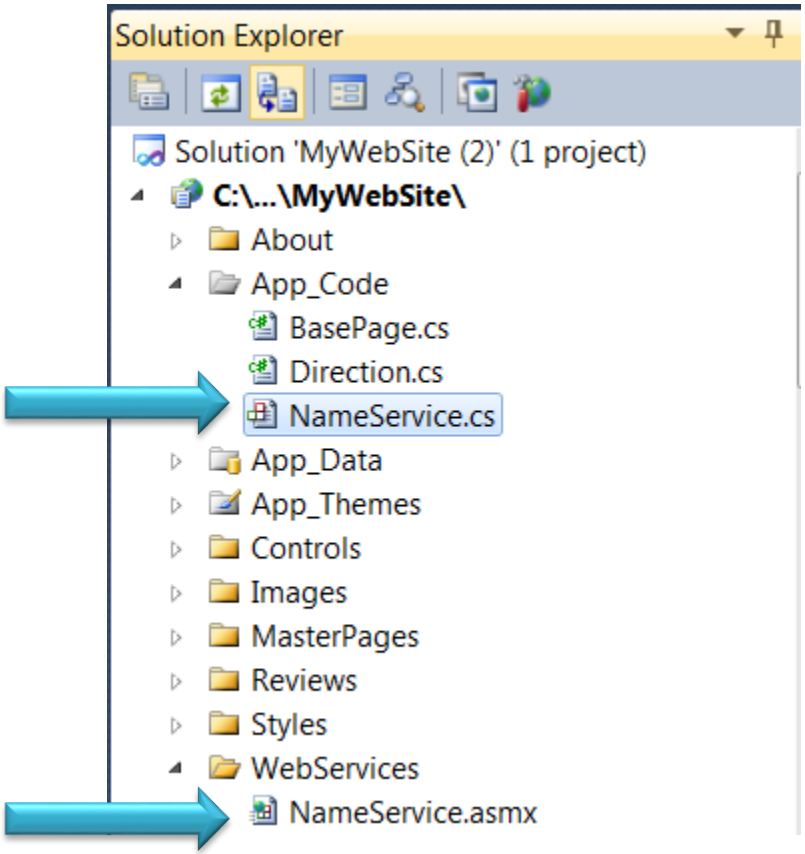
- Add New Item



Example
Creating a Web Service



Example
Creating a Web Service



Example
Creating a Web Service

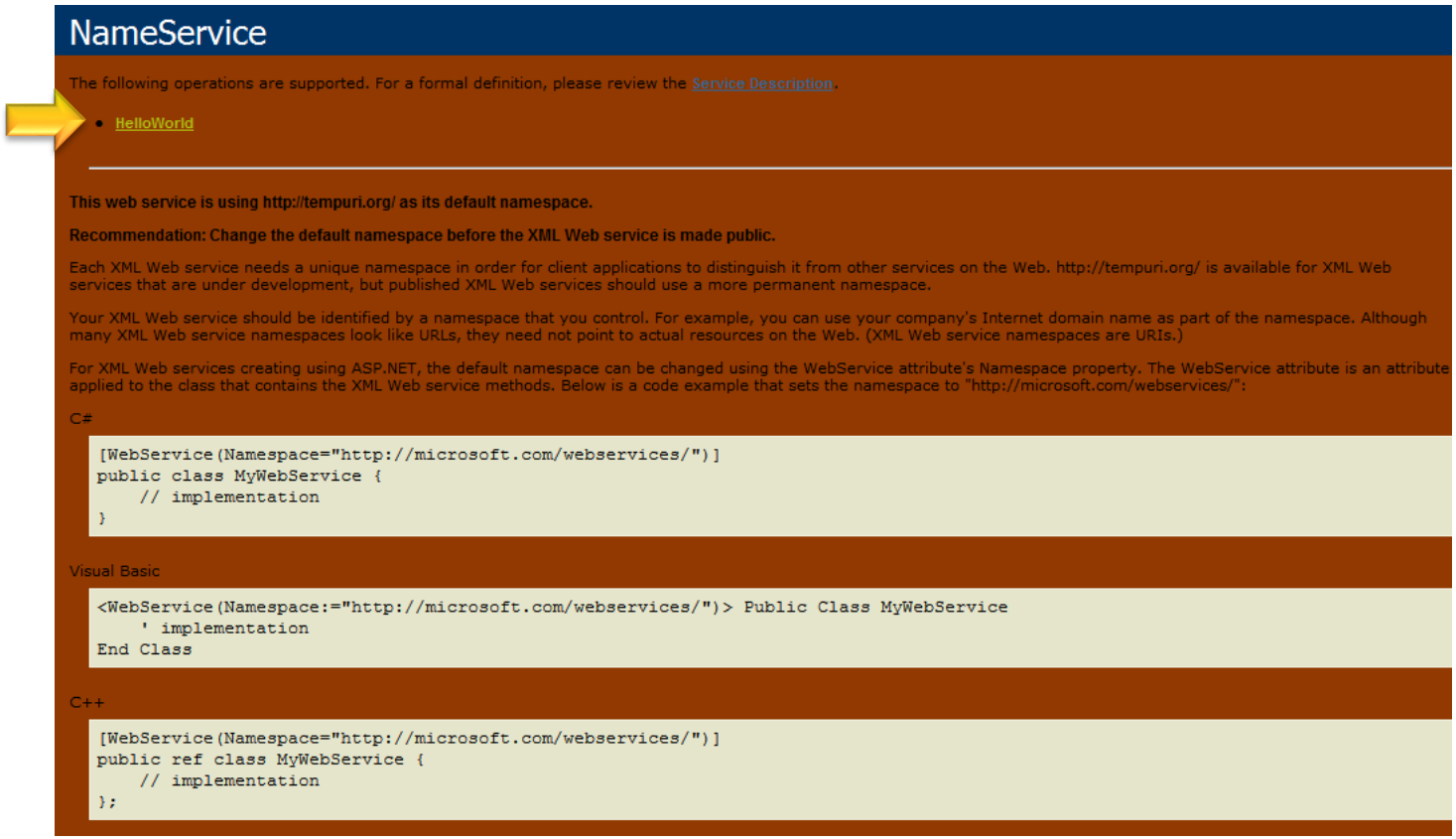
- Open → **`NameService.cs`**

```
[WebMethod]
public string HelloWorld() {
    return "Hello World";
}
```

```
[WebMethod]
public string HelloWorld(string yourName) {
    return string.Format("Hello {0}",yourName);
}
```

Example
Creating a Web Service

- View **`NameService.asmx`** in browser.



NameService

The following operations are supported. For a formal definition, please review the Service Description.

- HelloWorld

This web service is using http://tempuri.org/ as its default namespace.

Recommendation: Change the default namespace before the XML Web service is made public.

Each XML Web service needs a unique namespace in order for client applications to distinguish it from other services on the Web. http://tempuri.org/ is available for XML Web services that are under development, but published XML Web services should use a more permanent namespace.

Your XML Web service should be identified by a namespace that you control. For example, you can use your company's Internet domain name as part of the namespace. Although many XML Web service namespaces look like URLs, they need not point to actual resources on the Web. (XML Web service namespaces are URIs.)

For XML Web services creating using ASP.NET, the default namespace can be changed using the WebService attribute's Namespace property. The WebService attribute is an attribute applied to the class that contains the XML Web service methods. Below is a code example that sets the namespace to "http://microsoft.com/webservices/":

C#

```
[WebService(Namespace="http://microsoft.com/webservices/")]
public class MyWebService {
    // implementation
}
```

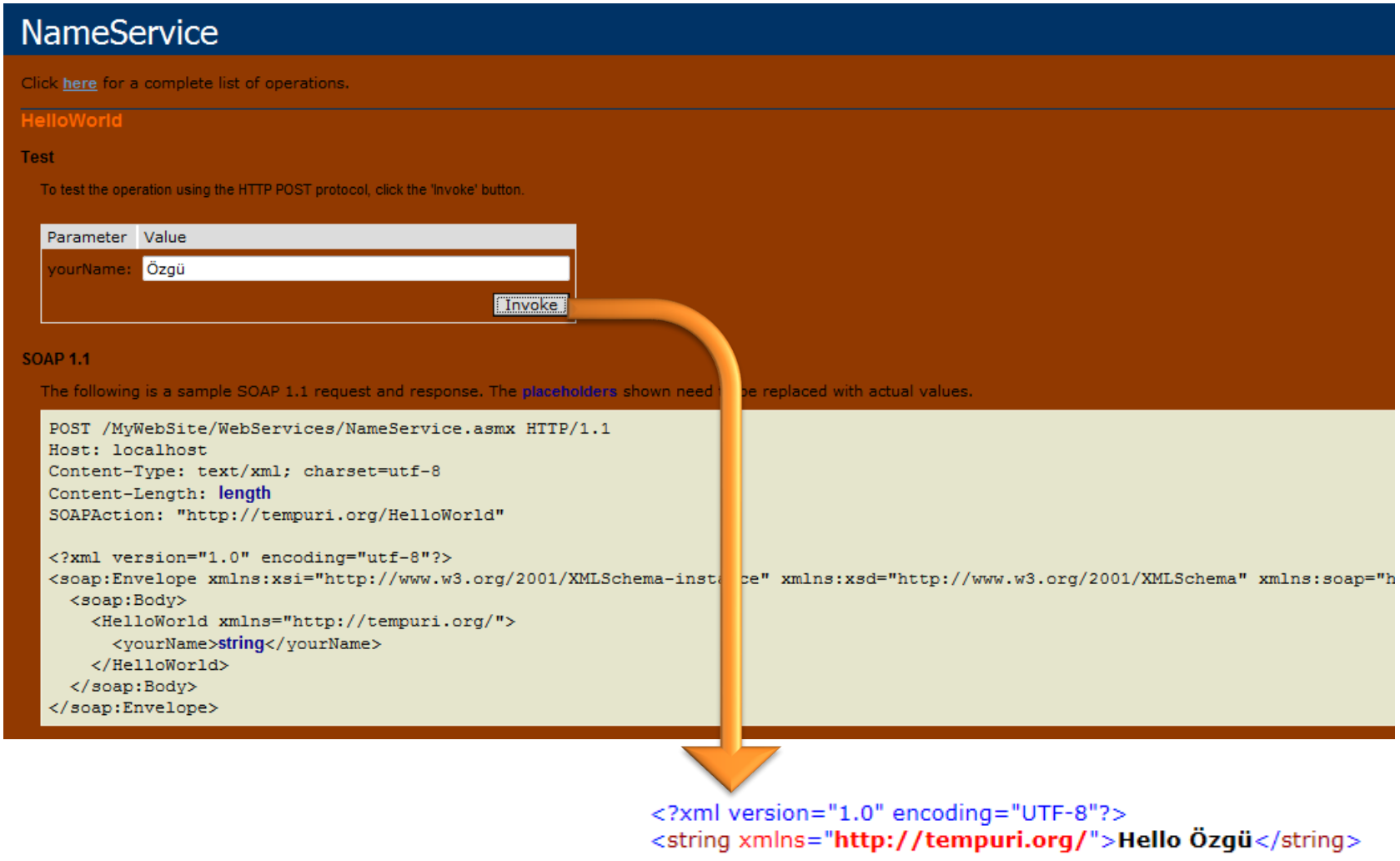
Visual Basic

```
<WebService(Namespace:="http://microsoft.com/webservices/")> Public Class MyWebService
    ' implementation
End Class
```

C++

```
[WebService(Namespace="http://microsoft.com/webservices/")]
public ref class MyWebService {
    // implementation
};
```

Example
Creating a Web Service



Configuring the Web Service

- To make a *web service* **visible** *by* **client-side script**:
  - at the **`NameService`** class in the **`App_Code`** folder, you see that the template already added the attribute for you, but commented it out:

```
// To allow this Web Service to be called from script, using ASP.NET AJAX, uncomment the following line.
// [System.Web.Script.Services.ScriptService]
```

- **Uncomment the line** to expose the entire service as a client-script service.

Configuring the ScriptManager

- A required component in almost all Ajax-related operations.
- **To expose your web service to client script:**
  - In the **`ScriptManager`** in the **master page**

  or

  - In a **content page** that uses the web service, using the **`ScriptManagerProxy`** class

Configuring the ScriptManager

*In the **`ScriptManager`** in the **master page***

- Give the **`ScriptManager`** control a **`<Services>`** element that in turn contains one or more **`ServiceReference`** elements that point to your public services.

```
<asp:ScriptManager ID="ScriptManager1" runat="server">
  <Services>
    <asp:ServiceReference Path="~/WebServices/NameService.asmx" />
  </Services>
</asp:ScriptManager>
```

Configuring the ScriptManager

- On a normal page that **doesn't** use a master page with a **`ScriptManager`** you can simply **add** a **`ScriptManager`** to the Web Form **directly**.
- *However*, if you are **using** a **master page** that already has its **own `ScriptManager`** you **need** to use a **`ScriptManagerProxy`** control.

```
<asp:ScriptManagerProxy ID="ScriptManagerProxy1" runat="server">
  <Services>
    <asp:ServiceReference Path="~/WebServices/NameService.asmx" />
  </Services>
</asp:ScriptManagerProxy>
```

Example
Calling Web Services from Client-Side

- Open → **`NameService.cs`**
- To mark it as callable by client-side script:

  Uncomment `// [System.Web.Script.Services.ScriptService]`

```
[System.Web.Script.Services.ScriptService]
```

NOTE

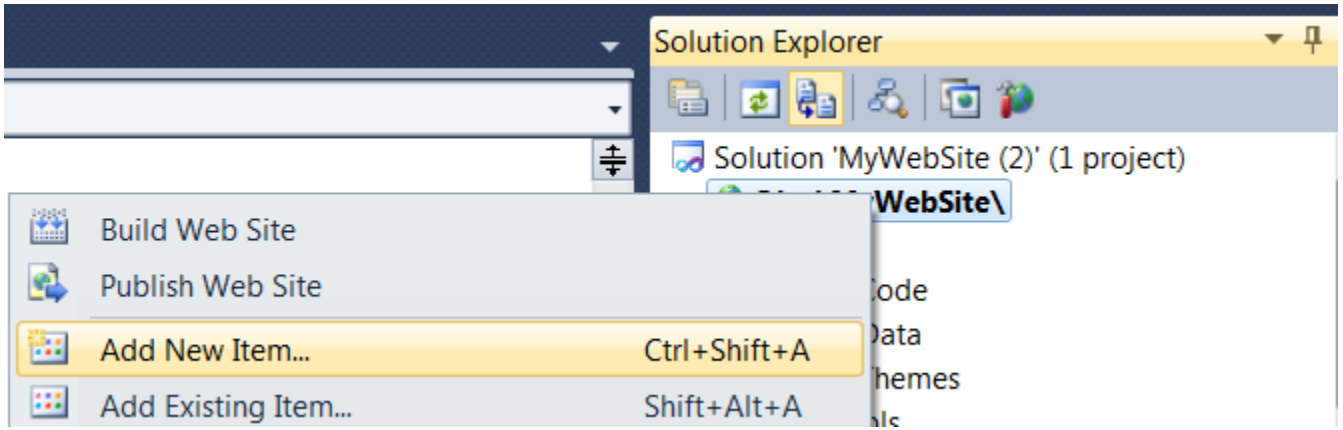
- If you have your own domain name:

```
[WebService(Namespace = "http://tempuri.org/")]
```

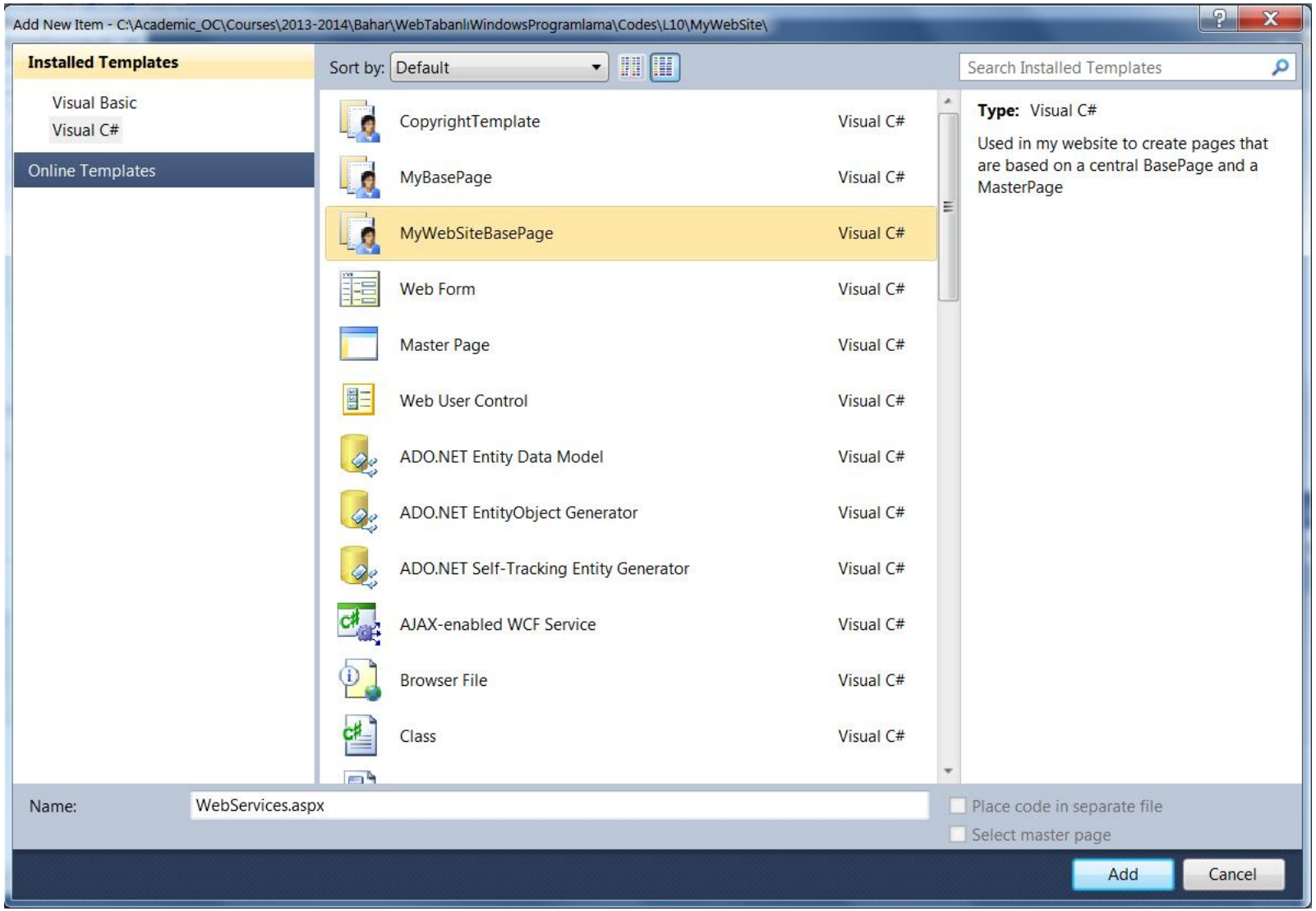
Change the namespace

Example
Calling Web Services from Client-Side

- Add New Item to the project

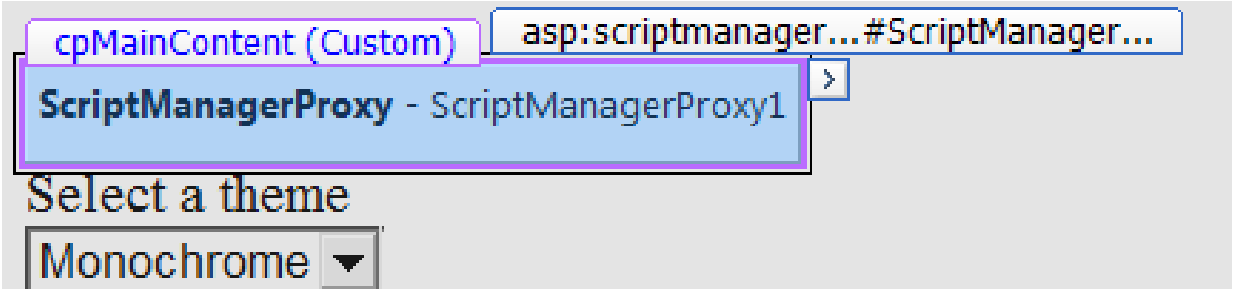


Example
Calling Web Services from Client-Side



Example
Calling Web Services from Client-Side

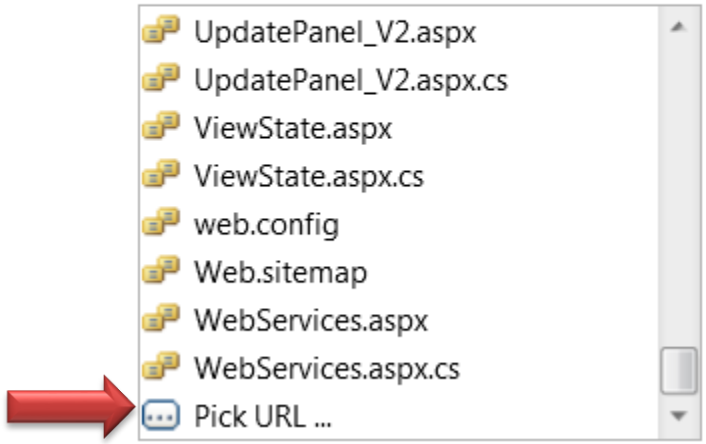
- **`Title = Web Services`**
- In Design View → Drag a **`ScriptManagerProxy`**



Example
Calling Web Services from Client-Side

- In Source View:
  - Add **`<Services>`** element that contains **`ServiceReference`** with **`Path`**

```
<asp:Content ID="Content2" ContentPlaceHolderID="cpMainContent" Runat="Server">
    <asp:ScriptManagerProxy ID="ScriptManagerProxy1" runat="server">
        <Services>
            <asp:ServiceReference Path="
        </Services>
    </asp:ScriptManagerProxy>
</asp:Content>
```



Example
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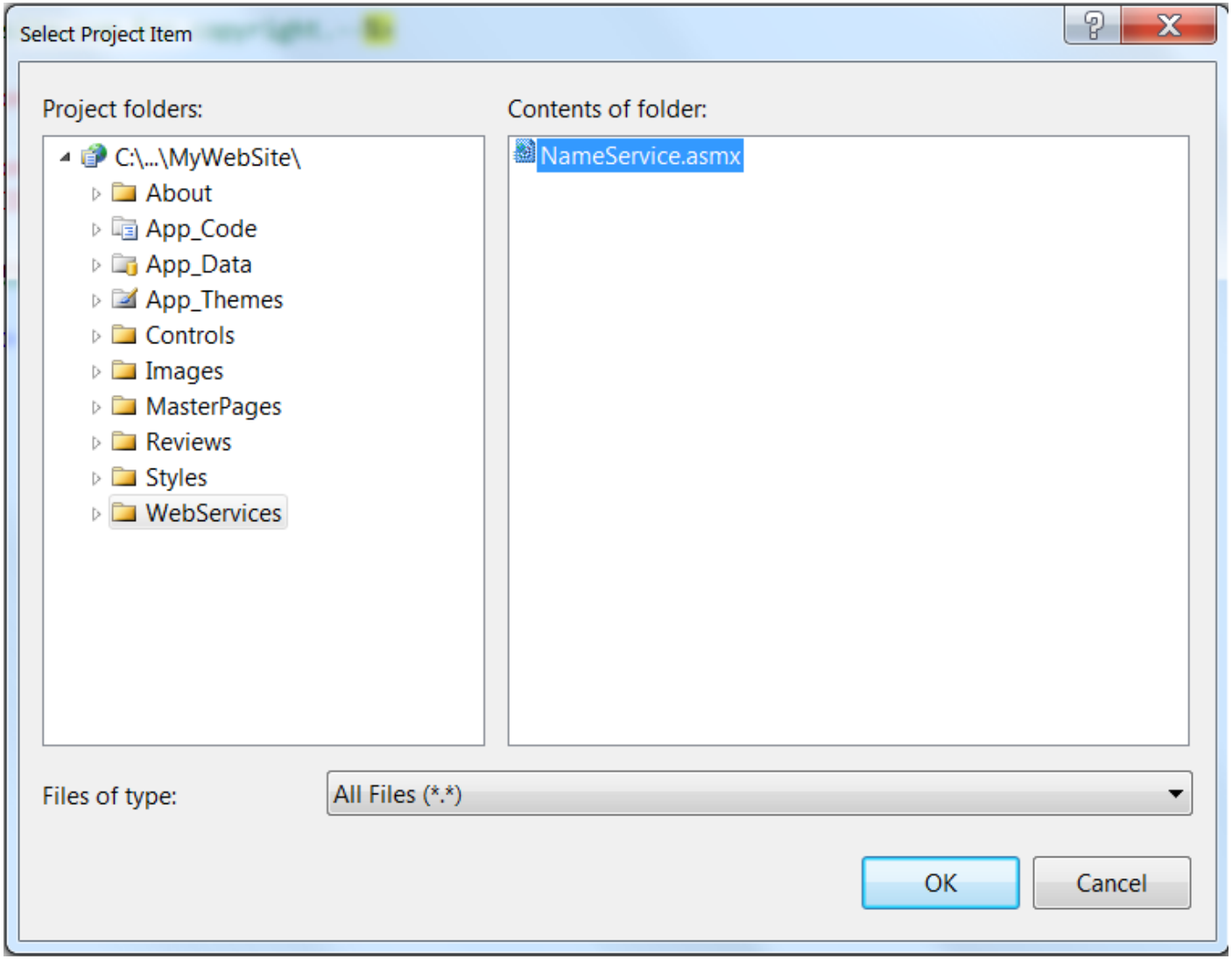


Example
Calling Web Services from Client-Side

- You should end up with this code:

```
<asp:Content ID="Content2" ContentPlaceHolderID="cpMainContent" Runat="Server">
    <asp:ScriptManagerProxy ID="ScriptManagerProxy1" runat="server">
        <Services>
            <asp:ServiceReference Path="~/WebServices/NameService.asmx" />
        </Services>
    </asp:ScriptManagerProxy>
</asp:Content>
```

Example
Calling Web Services from Client-Side

- After **`</ScriptManagerProxy>`**, drag:
  - **`Input(Text)`**
  - **`Input(Button)`**

  from HTML category of Toolbox.

```
</asp:ScriptManagerProxy>
<input id="yourNameText" type="text" />
<input id="sayHelloButton" type="button" value="Say Hello" />
```

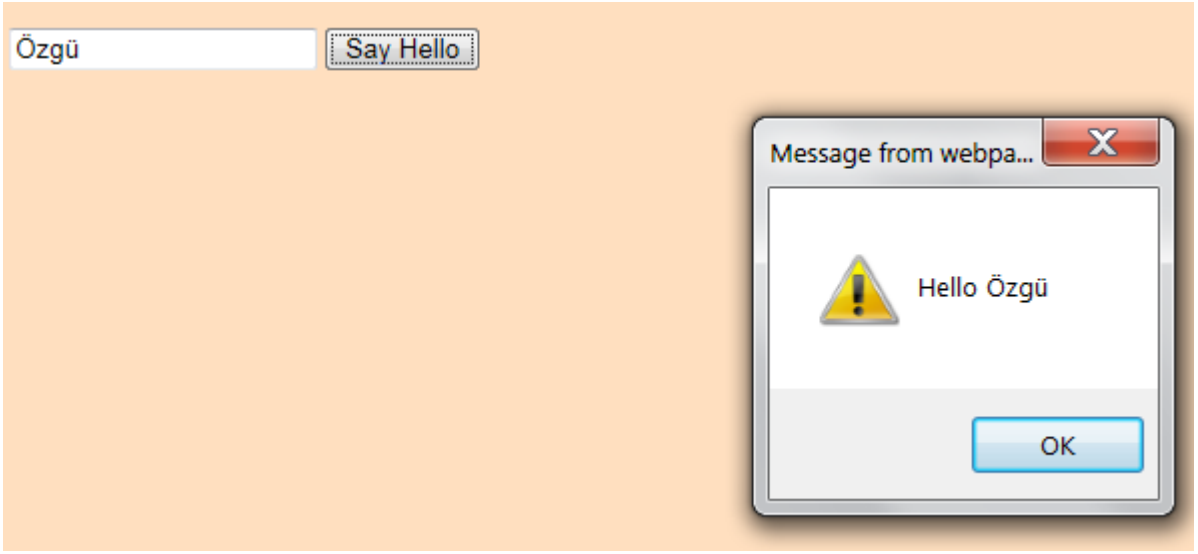
Example
Calling Web Services from Client-Side

```
<input id="yourNameText" type="text" />
<input id="sayHelloButton" type="button" value="Say Hello" />
<script type="text/javascript">
    function HelloWorld() {
        var yourName = $get('yourNameText').value;
        NameService.HelloWorld(yourName, HelloWorldCallback);
    }
    function HelloWorldCallback(result) {
        alert(result);
    }
    $addHandler($get('sayHelloButton'), 'click', HelloWorld);
</script>
```

NOTE → JavaScript is case-sensitive.

Example
Calling Web Services from Client-Side

- View **`WebServices.aspx`** in browser.



Page Methods

- Similar to web services.
- What's **different** is that page methods are defined **directly** in an ***existing*** ASPX page **instead of** a ***separate*** ASMX service file.
- You can **only** call them **from script running within that page**.
- Ideal for **small, simple functionality that is limited in scope to the current page**.

Page Methods

- To enable page methods you need to set the property **`EnablePageMethods`** of the **`ScriptManager`** control to **`True`**.

Page Methods

- Setting them up and using them is a twostep process:

1. **Create** a `public` and `static` **method** in the Code Behind of the page you're working with. You need to apply the `[WebMethod]` attribute to this method. The method can optionally receive data through its parameters and optionally return some data.

2. **Write** the **necessary JavaScript** to call the page method and work with its result.

Example
Calling Page Methods

- Open → **`Frontend.master`**
- **`ScriptManager`** Properties:
  - **`EnablePageMethods = True`**

```
<asp:ScriptManager ID="ScriptManager1" runat="server" EnablePageMethods="True" />
```

Example
Calling Page Methods

- Open → **`WebServices.aspx.cs`**
- Add the following code:

```
public partial class _WebServices : BasePage
{
    protected void Page_Load(object sender, EventArgs e)
    {

    }

    [WebMethod]
    public static string HelloWorld(string yourName)
    {
        return string.Format("Hello {0}", yourName);
    }
}
```

Example
Calling Page Methods

- Add → **`using System.Web.Services`**

```
[WebMethod]
public static string HelloWorld(string yourName)
{
    return string.Format("Hello {0}", yourName);
}
```

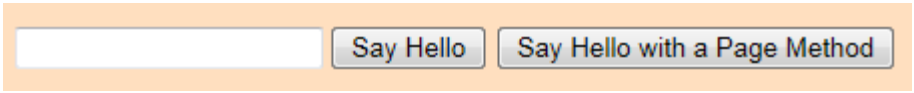
Example
Calling Page Methods

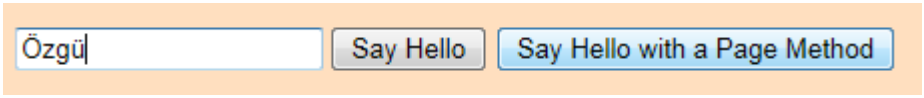
- In Source View:
  - Add **`Input(Button)`** from HTML category of Toolbox

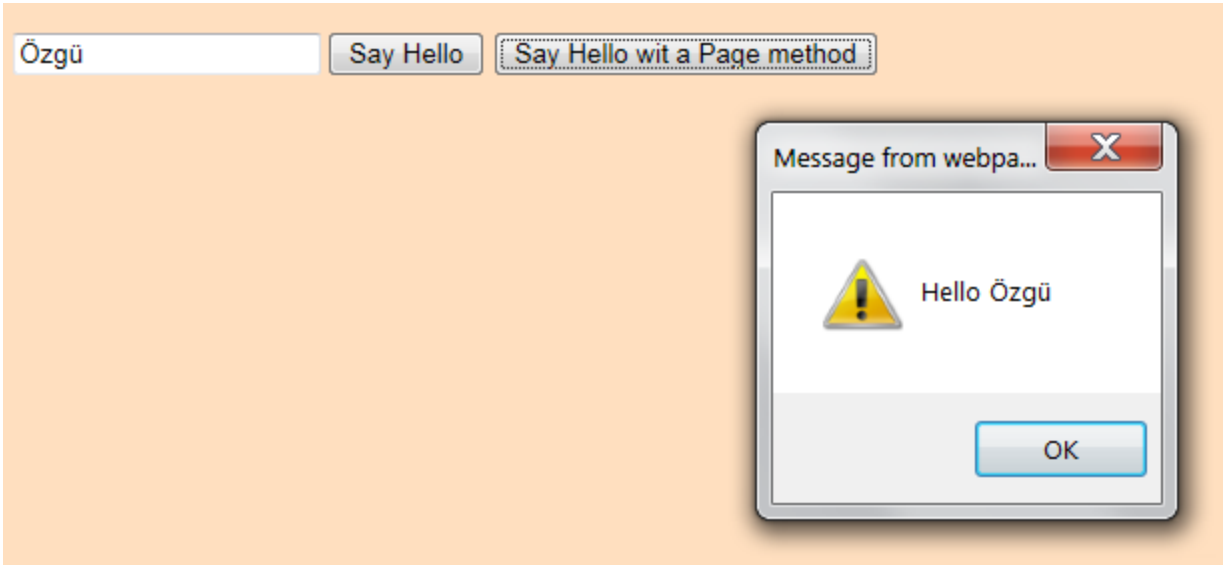
```
<input id="yourNameText" type="text" />
<input id="sayHelloButton" type="button" value="Say Hello" />
<input id="sayHelloPageMethod" type="button" value="Say Hello with a Page Method" />
<script type="text/javascript">
    function HelloWorld() {
        var yourName = $get('yourNameText').value;
        NameService.HelloWorld(yourName, HelloWorldCallback);
    }
    function HelloWorldPageMethod() {
        var yourName = $get('yourNameText').value;
        PageMethods.HelloWorld(yourName, HelloWorldCallback);
    }
    function HelloWorldCallback(result) {
        alert(result);
    }
    $addHandler($get('sayHelloButton'), 'click', HelloWorld);
    $addHandler($get('sayHelloPageMethod'), 'click', HelloWorldPageMethod);
</script>
```

Example
Calling Page Methods

- View in browser







ASP.NET AJAX

- For more information please check out MSDN's web site:

http://tinyurl.com/AboutAjax