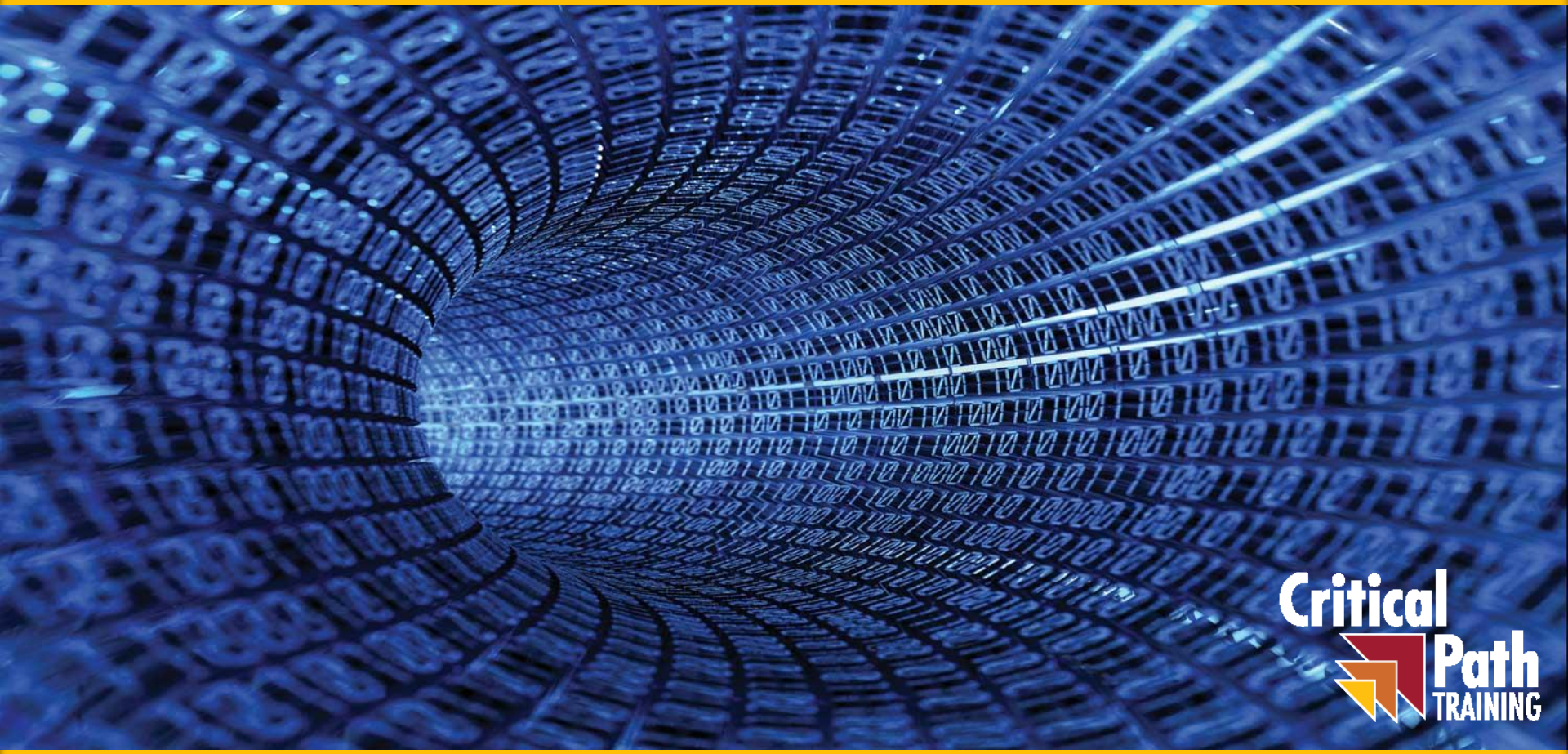
Developing SharePoint Solutions



Agenda

- Understanding SharePoint Solutions
- Features and Feature Receivers
- Creating Web Parts
- Creating Site Pages and Application Pages

SharePoint Solutions

- SharePoint development based on solutions
  - Solution is a CAB file with a `*.wsp` extension
  - Solution is a container of files distributed as a unit
  - Solution contain manifest with instructions for installer
- Solutions can be deployed at two different scopes
  - At farm scope as a farm solution *(aka Full Trust Solution)*
  - At site collection scope as a sandboxed solution

Sandbox Solutions

- A short-lived strategy for safer developer extensibility
  - Introduced in SharePoint 2010
  - Solutions with “User Code” are deprecated in SharePoint 2013
  - SharePoint App Model designed to replace Sandbox Solutions
  - Avoid using Sandboxed solutions on any new projects

- No-code sandboxed solutions (NCSS) are not deprecated
  - NCSS created using features and declarative XML elements
  - NCSS can be deployed at either farm level or site collection level
  - NCSS can be used to create lists, site columns and content types
  - NCSS can be used to add content

SharePointRoot Directory

- SharePoint Foundation relies on set of template files
  - Stored in special directory known as SharePointRoot
  - SharePointRoot located on file system of each WFE at this path
    - `C:\Program Files\Common Files\Microsoft Shared\Web Server Extensions\16`
  - Farm solutions deploy their files into child directories

Path relative to SharePoint Root	Template file types
/ISAPI	Web Services (*.svc, *.ashx and *.asmx)
/Resources	Resource files (*.resx)
/TEMPLATE/ADMIN	Application pages used exclusively in Central Administration
/TEMPLATE/CONTROLTEMPLATES	ASP.NET User Controls (*.ascx)
/TEMPLATE/FEATURES	Feature definition files (*.xml)
/TEMPLATE/IMAGES	Images (*.gif, *.jpg and *.png)
/TEMPLATE/LAYOUTS	Application pages (*.aspx)
/TEMPLATE/LAYOUTS/1033/STYLES	CSS Files (*.css)
/TEMPLATE/LAYOUTS/ClientBin	Silverlight components (*.xap)
/TEMPLATE/SiteTemplates	Site Definition files (onet.xml)
/TEMPLATE/XML	Custom field type definition files (fdltype*.xml)

Deployment Using Solution Packages

- What is a solution package?
  - Deployment mechanism
  - Atomic unit of reuse, deployment and versioning
  - A set of files and manifest with installation instructions
  - A CAB file with `*.wsp` extension
- What can be deployed via a solution package
  - Feature definitions
  - Images
  - Assemblies
  - And much more…

The manifest.xml file

- Each Solution Package requires `manifest.xml` file
  - Mainly serves as instructions to installer on WFE

```
<?xml version="1.0" encoding="utf-8"?>
<Solution xmlns="http://schemas.microsoft.com/sharepoint/"
          SolutionId="07752644-45b2-41c3-9eaa-2d58a1ac31b9"
          SharePointProductVersion="16.0"
          DeploymentServerType="WebFrontEnd"
          ResetWebServer="TRUE">
  <FeatureManifests>
    <FeatureManifest Location="LeadTracker\Feature.xml" />
  </FeatureManifests>
  <TemplateFiles>
    <TemplateFile Location="IMAGES\WingtipDevProject\FeatureIcon.gif" />
    <TemplateFile Location="IMAGES\WingtipDevProject\SiteIcon.gif" />
  </TemplateFiles>
  <Assemblies>
    <Assembly Location="WingtipDevProject.dll"
              DeploymentTarget="GlobalAssemblyCache" />
  </Assemblies>
</Solution>
```

Farm Solution Deployment

- Done using Windows PowerShell scripts
  - `Add-SPSolution` – uploads solution package
  - `Install-SPSolution` – deploy solution package

```
Add-PSSnapin Microsoft.SharePoint.Powershell -ErrorAction SilentlyContinue

$SolutionPackageName  = "WingtipDevProject1.wsp"
$SolutionPackagePath = "WingtipDevProject1_v1000\WingtipDevProject1.wsp"

$solution = Get-SPSolution | where-object {$_.Name -eq $SolutionPackageName}
if ($solution -ne $null) {
  if($solution.Deployed -eq $true){
    Uninstall-SPSolution -Identity $SolutionPackageName -Local -Confirm:$false
  }
  Remove-SPSolution -Identity $SolutionPackageName -Confirm:$false
}

Write-Host "Installing Solution..."
Add-SPSolution -LiteralPath $SolutionPackagePath

Install-SPSolution -Identity $SolutionPackageName -Local -GACDeployment
Write-Host "Deployment Complete"
```

Updating a Farm Solution

- Used to push out new files to WFE
  - Used to replace images or DLLs with new version
  - Used in feature upgrade

```
$SolutionPackageName = "WingtipDevProject1.wsp"
$SolutionPackagePath =
"WingtipDevProject1_v2000\WingtipDevProject1.wsp"

Update-SPSolution -Identity $SolutionPackageName -LiteralPath
$SolutionPackagePath -Local -GACDeployment
```

- Watch out…
  - Solution update doesn't automatically upgrade features


DEMO
Creating Farm Solutions

Agenda

- ✓ Understanding SharePoint Solutions
- ➢ Features and Feature Receivers
- Creating Web Parts
- Creating Site Pages and Application Pages

Designing and Implementing Features

- What is a SharePoint Feature?
  - Formally known as a “feature definition”
  - A unit of design and implementation
  - A building block for creating SharePoint solutions
- Features can contain elements
  - e.g. menu items, links, list types and list instances
  - Many other element types possible
- Features can contain event handlers
  - Implemented using a feature receiver class
  - Event handler code can program using SharePoint OM

The feature.xml file

- `feature.xml` serves as feature manifest file
  - Defines attributes for feature definition
  - Can reference one or more element manifests
  - Can reference a feature receiver

```
<Feature xmlns="http://schemas.microsoft.com/sharepoint/"
         Id="86689158-7048-4421-AD21-E0DEF0D67C81"
         Title="Wingtip Lead Tracker"
         Description="A sample feature deployed using WingtipDevProject1.wsp"
         Version="1.0.0.0"
         Scope="Web"
         Hidden="FALSE"
         ReceiverAssembly="WingtipDevProject1, Version=1.0.0.0, Culture=neutral, PublicKeyToken=56170dd0494afccc"
         ReceiverClass="WingtipDevProject1.FeatureReceiver"
         ImageUrl="WingtipDevProject1/FeatureIcon.gif">

  <ElementManifests>
    <ElementManifest Location="elements.xml" />
  </ElementManifests>

</Feature>
```

Element Manifest Files

- Element manifest contain declarative elements
  - `ListInstance` elements creates list during activation
  - Many other element types available
  - Element manifest can contain many elements
  - `feature.xml` file can reference many element manifests

```
<Elements xmlns="http://schemas.microsoft.com/sharepoint/">
  <ListInstance Id="SalesLeads"
    FeatureId="00BFEA71-7E6D-4186-9BA8-C047AC750105"
    TemplateType="105"
    Title="Sales Leads"
    Url="SalesLeads"
    OnQuickLaunch="TRUE" />
</Elements>
```

Feature Element Types

Element Type	Description
BdcModel	Used to include ECTs with SharePoint Apps
ClientWebPart	Used to create a client web part in the host web
ContentType	Used to create a content type
ContentTypeBinding	Used to add a content type to a list
Control	Used to create a delegate control
CustomAction	Used to create a new link or menu command
CustomActionGroup	Used to create a new section for links
HideCustomAction	Used to hide a built-in or custom link or menu command
FeatureSiteTemplateAssociation	Used to staple a feature to a site definition
Field	Used to create a site column
ListInstance	Used to create a list instance
ListTemplate	Used to create a custom list type
Module	Used to provision a file from a template file
PropertyBag	Used to add name-value properties to feature
Workflow	Used to create a workflow template
WorkflowActions	Used to broadcast actions in pre v4.0 workflows
WorkflowActions4	Used to broadcast actions in v4.0 workflows
WorkflowAssociation	Used to associate a workflow template with a list

Feature Receivers

- Feature receiver used to add event handlers
- Must derive from `SPFeatureReceiver`
- Not available with Features included in Apps

```
public class FeatureReceiver : SPFeatureReceiver {
  public override void FeatureActivated(SPFeatureReceiverProperties props) {
    SPWeb site = props.Feature.Parent as SPWeb;
    if (site != null) {
      site.Title = "Feature Activated";
      site.SiteLogoUrl = @"_layouts/images/WingtipDevProject1/SiteIcon.gif";
      site.Update();
  } }

  public override void FeatureDeactivating(SPFeatureReceiverProperties props) {
    SPWeb site = props.Feature.Parent as SPWeb;
    if (site != null) {
      site.Title = "Feature Deactivated";
      site.SiteLogoUrl = "";
      site.Update();
      SPList list = site.Lists.TryGetList("Sales Leads");
      if (list != null) { list.Delete(); }
} } }
```

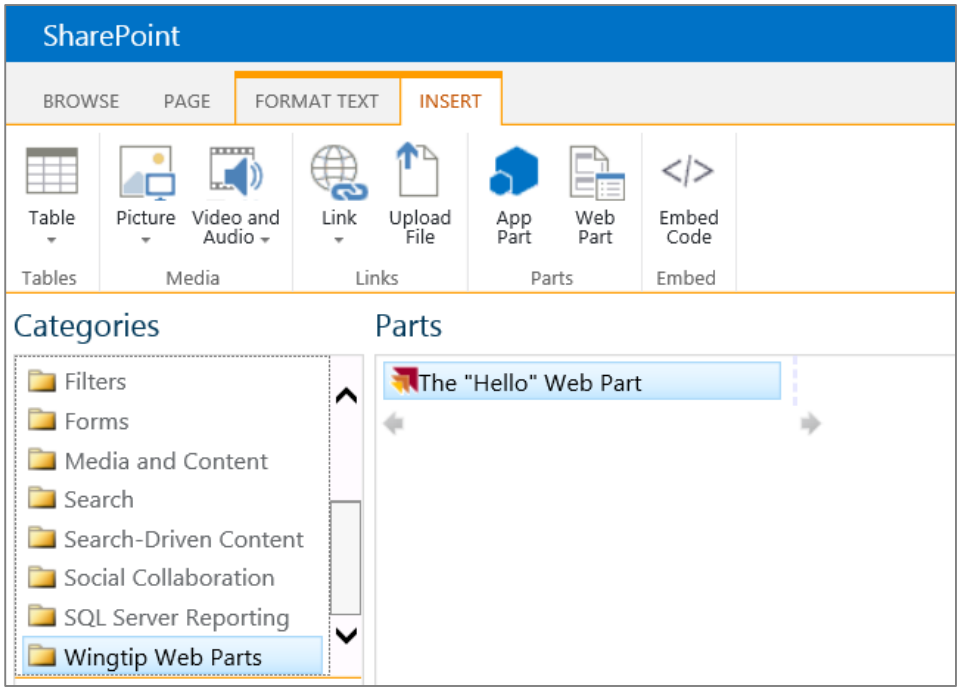

DEMO
Working with SharePoint Features

Agenda

- ✓ Understanding SharePoint Solutions
- ✓ Features and Feature Receivers
- ➢ Creating Web Parts
- • Creating Site Pages and Application Pages

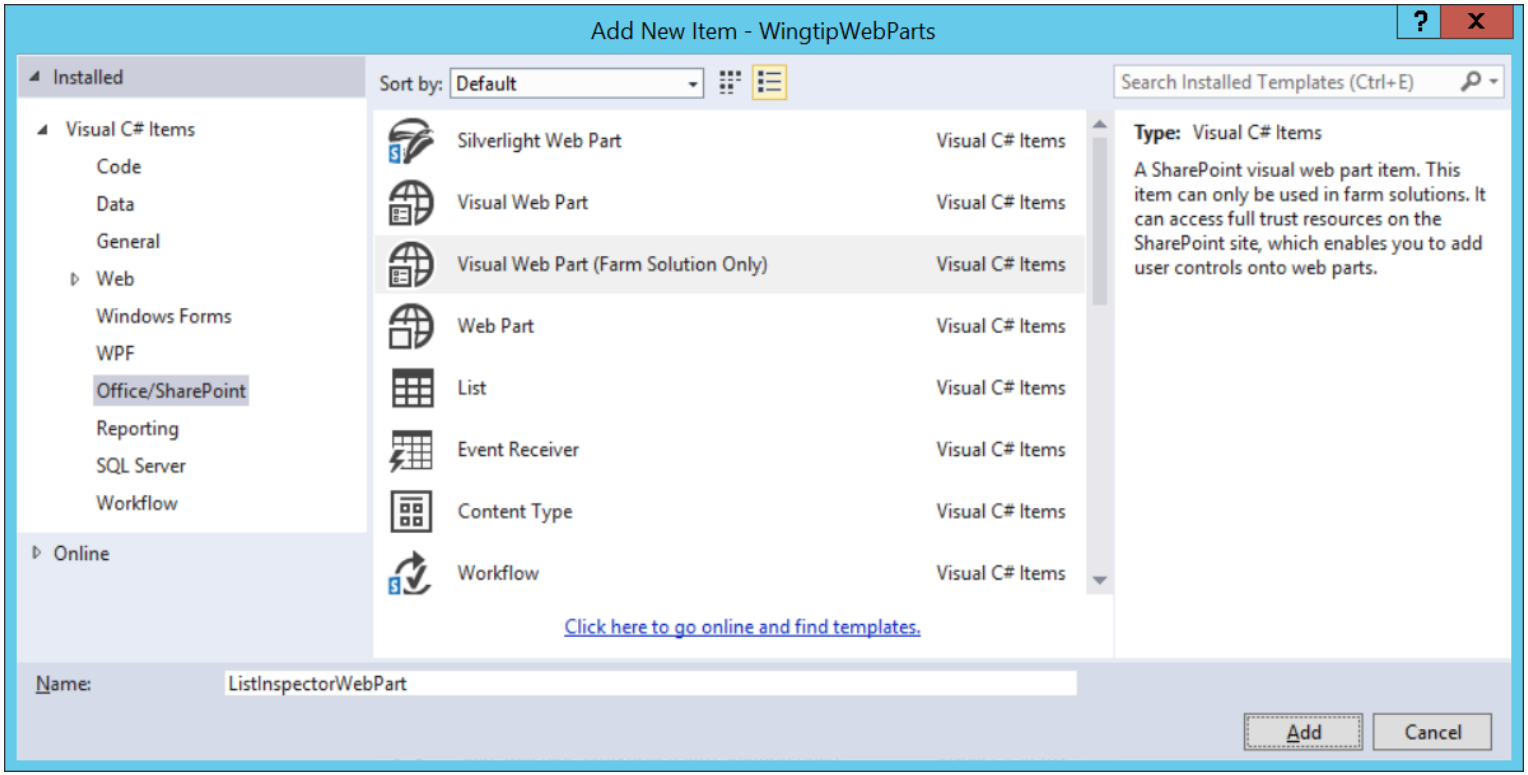
Web Parts

- Web Parts add content and functionality
  - Content is modular, consistent and easy to navigate
  - Configurable chrome: border and title bar
  - Added and configured by users inside browser



Overview of Developing Web Parts

- SharePoint Developer Tools supports two types
  - **Web Part:** ASP.NET server control style
  - **Visual Web Part:** ASP.NET user control style (*.ASCX)



Creating the Custom Web Part Object

- Build a typical ASP.NET 2.0 server control:
  - Create a new class that inherits from: `System.Web.UI.WebControls.WebParts.WebPart`
  - Override `CreateChildControls()`
    - Used to add any child controls to the page such as buttons, textboxes, labels, etc.
  - Override `RenderContents()`
    - Renders the contents of the Web Part, inside the outer tags and Web Part chrome
  - Never override `Render()` !!!!
    - SharePoint overrides `Render()` to include the Web Part chrome and outer tags


DEMO
Creating a Custom Web Part

Agenda

- ✓ Understanding SharePoint Solutions
- ✓ Features and Feature Receivers
- ✓ Creating Web Parts
- ➢ Creating Site Pages and Application Pages

SharePoint Sites are Collections of Pages

- All pages share the same look and feel
  - HTML page layout defined by common Master Page
  - Page formatting defined by common CSS files
  - Client-side behaviors defined by JavaScript files
- Pages within site can be split into two categories
  - **Site Pages** exist within the content DB for a site
  - **Application Pages** only exist on file system of WFE

Site Pages vs. Application Pages

- Site Pages exist within virtual file system of site
  - They support customization via Web Parts and/or SPD
  - Site pages can be rendered using underlying template
  - Page using template is said to be a ghosted page
  - Page can be customized (unghosted) by user
- Application Pages are deployed once per farm
  - They are accessible through _**layouts** virtual directory
  - They are parsed / compiled in classic ASP.NET mode
  - They do not support any form of user customization
  - The can only be added using farm solutions

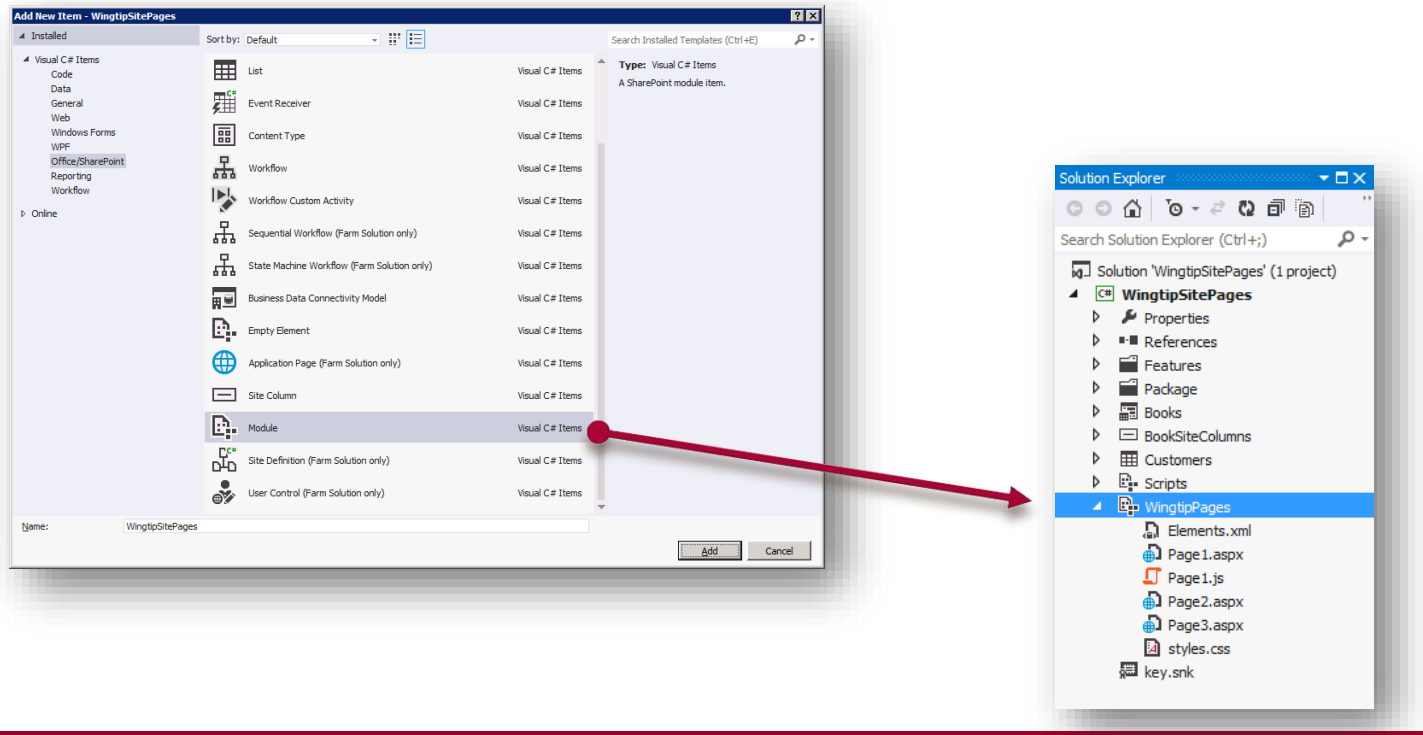
Site Pages Overview

- Site pages can be added by a developer
  - Works in SharePoint solutions and in SharePoint apps
  - Sites pages and related resources added with **Modules**
  - Site pages cannot contain any server-side code

- Developers create site pages using templates
  - You create a Module and add one of more templates
  - Feature activation create instances from the templates
  - Sites pages initially in uncustomized state (ghosted)
  - Sites pages can be customized (unghosted) by users

Creating Site Pages from Page Templates

- Site pages created using a **Module**
  - Module must be associated with a feature
  - Visual Studio adds project folder with `elements.xml` file
  - Inside is a `<Module>` element with `<File>` elements



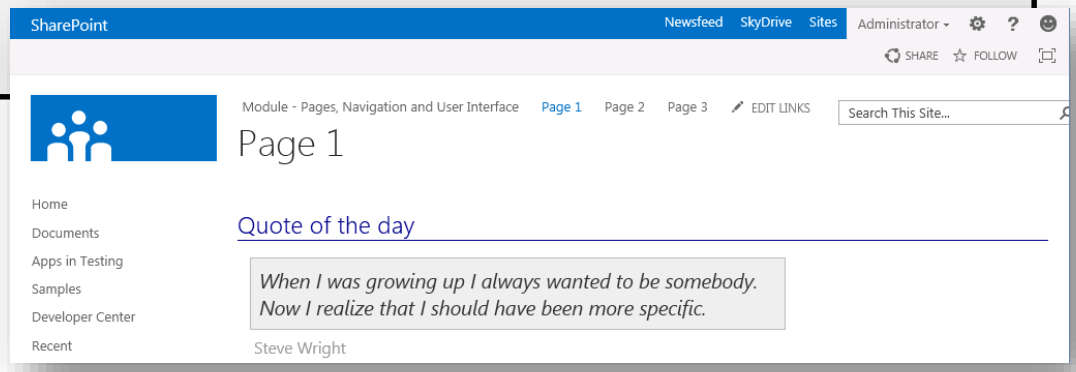
Modules & Elements.xml File

- Visual Studio updates Module `element.xml` for you
  - You just create / add files to Module folder
  - Some scenarios requires manual edits to `elements.xml`

```
<?xml version="1.0" encoding="utf-8"?>
<Elements xmlns="http://schemas.microsoft.com/sharepoint/">
  <Module Name="WingtipPages">
    <File Path="WingtipPages\Page1.aspx" Url="WingtipPages/Page1.aspx" />
    <File Path="WingtipPages\Page2.aspx" Url="WingtipPages/Page2.aspx" />
    <File Path="WingtipPages\Page3.aspx" Url="WingtipPages/Page3.aspx" />
    <File Path="WingtipPages\styles.css" Url="WingtipPages/styles.css" />
  </Module>
</Elements>
```

'Hello World' Page Template for Site Page

```
<%@ Page MasterPageFile="~masterurl/default.master" %>

<asp:Content ContentPlaceHolderId="PlaceHolderAdditionalPageHead" runat="server">
  <link href="styles.css" rel="stylesheet" type="text/css" />
  <script src="Page1.js" type="text/javascript"></script>
</asp:Content>

<asp:Content ContentPlaceHolderId="PlaceHolderPageTitle" runat="server">
  Page 1 – This shows up at the top of the browser window
</asp:Content>

<asp:Content ContentPlaceHolderId="PlaceHolderPageTitleInTitleArea" runat="server">
  Page 1
</asp:Content>

<asp:Content ContentPlaceHolderId="PlaceHolderMain" runat="server">
  <h3>Quote of the day</h3>
  <p id="quote">When I was growing up I always wanted to be somebody.
                Now I realize that I should have been more specific.</p>
  <p id="quote_author">Steve Wright</p>
</asp:Content>
```



Designing Web Part Pages

- Changes from previous page templates
  - Inherit from `WebPartPage` class
  - Add controls for web part zones and web parts

```
<%@ Assembly Name="Microsoft.SharePoint, Version=15.0.0.0, Culture=neutral, PublicKeyToken=71e9bce111e9429c" %>

<%@ Page MasterPageFile="~masterurl/default.master" Inherits="Microsoft.SharePoint.WebPartPages.WebPartPage" %>

<%@ Register TagPrefix="WebPartPages"
  Namespace="Microsoft.SharePoint.WebPartPages"
  Assembly="Microsoft.SharePoint, Version=15.0.0.0, Culture=neutral, PublicKeyToken=71e9bce111e9429c" %>

<asp:Content ContentPlaceHolderID="PlaceHolderMain" runat="server">
  <WebPartPages:WebPartZone ID="Main" Title="Main Web Part Zone" FrameType="TitleBarOnly" runat="server">
    <ZoneTemplate>
      <WebPartPages:XsltListViewWebPart
              runat="server" ID="CsutomersWebPart"
              Title="Customers" ListUrl="Lists/Customers"
              ChromeType="None">
      </WebPartPages:XsltListViewWebPart>
    </ZoneTemplate>
  </WebPartPages:WebPartZone>
</asp:Content>
```

Adding Navigation Nodes to Top Nav Bar

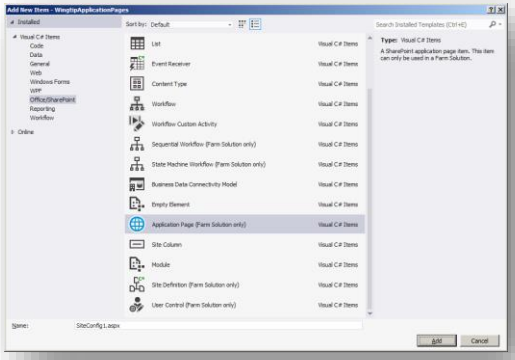
- Simple navigation technique for teams sites
  - Done using server-side code or client-side code
  - Not a technique to use in publishing sites

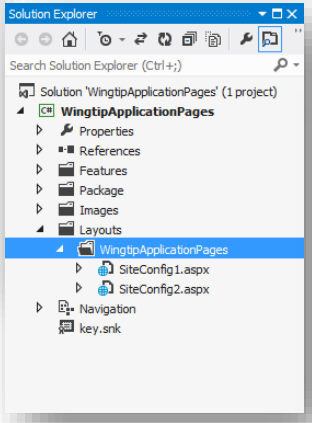
```
public class MainSiteEventReceiver : SPFeatureReceiver
{
  public override void FeatureActivated(SPFeatureReceiverProperties properties)
  {
    SPSite siteCollection = properties.Feature.Parent as SPSite;
    if (siteCollection != null)
    {
      SPWeb site = siteCollection.RootWeb;
      // create menu items on top link bar for custom site pages
      SPNavigationNodeCollection topNav = site.Navigation.TopNavigationBar;
      topNav.AddAsLast(new SPNavigationNode("Page 1", "WingtipPages/Page1.aspx"));
      topNav.AddAsLast(new SPNavigationNode("Page 2", "WingtipPages/Page2.aspx"));
      topNav.AddAsLast(new SPNavigationNode("Page 3", "WingtipPages/Page3.aspx"));
    }
  }
}
```

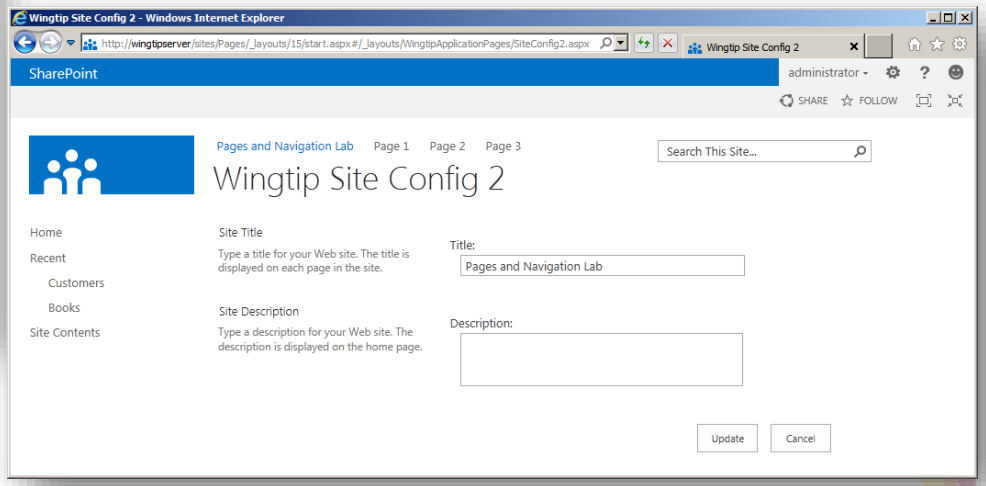

DEMO
Provisioning Site Pages using
Page Templates

Creating Application Pages

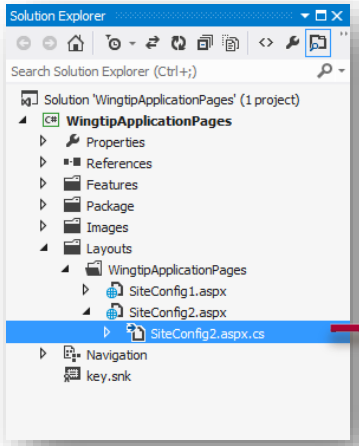
- Creating custom application pages
  - Visual Studio provides project item template
  - Only supported in farm solutions
  - Only type of page that supports server-side code







Adding Code to An Application Page



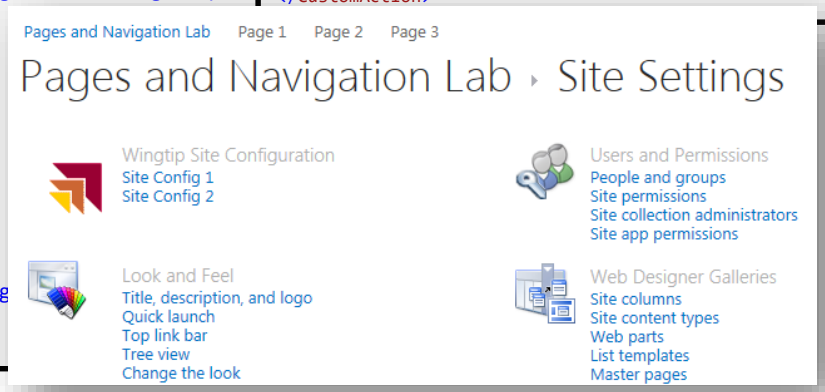

```
public partial class SiteConfig2 : LayoutsPageBase {

  protected override void OnInit(EventArgs e) {
    base.OnInit(e);
    cmdUpdate.Click += new EventHandler(cmdUpdate_Click);
  }

  void cmdUpdate_Click(object sender, EventArgs e) {
    SPWeb site = this.Web;
    site.Title = txtSiteTitle.Text;
    site.Description = txtSiteDescription.Text;
    site.Update();
    SPUtility.Redirect("settings.aspx",
                       SPRedirectFlags.RelativeToLayoutsPage,
                       this.Context);
  }

  protected override void OnPreRender(EventArgs e) {
    base.OnPreRender(e);
    SPWeb site = this.Web;
    txtSiteTitle.Text = site.Title;
    txtSiteDescription.Text = site.Description;
  }
}
```

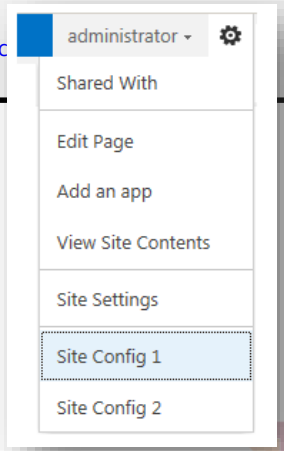
Navigating with CustomActions

- `CustomAction` elements provide navigation
  - Add Site Settings links and Site Actions menu items

```
<CustomActionGroup
  Id="WingtipSiteConfiguration"
  Location="Microsoft.SharePoint.SiteSettings"
  Title="Wingtip Site Configuration"
  Sequence="1"
  Description="Wingtip application pages"
  ImageUrl="/_layouts/15/images/WingtipApplicationPages/WingtipIcon.gif" />

<CustomAction
    Id="WingtipSiteSettingsConfig1"
    GroupId="WingtipSiteConfiguration"
    Location="Microsoft.SharePoint.SiteSettings"
    Rights="ManageWeb"
    Sequence="1"
    Title="Site Config 1"
    Description="Use this page to configure the current site" >
  <UrlAction Url="~site/_layouts/WingtipApplicationPages/SiteConfig1.aspx"
</CustomAction>

<CustomAction
  Id="WingtipSiteSettingsConfig2"
  GroupId="WingtipSiteConfiguration"
  Location="Microsoft.SharePoint.SiteSettings"
  Rights="ManageWeb"
  Sequence="2"
  Title="Site Config 2"
  Description="Use this page to configure the current
  <UrlAction Url="~site/_layouts/WingtipApplicationPag
</CustomAction>
```

```
<CustomAction
  Id="WingtipSiteActionsConfig1"
  GroupId="SiteActions"
  Location="Microsoft.SharePoint.StandardMenu"
  Rights="ManageWeb"
  Sequence="1"
  Title="Site Config 1"
  Description="Use this page to configure the current site" >
  <UrlAction Url="~site/_layouts/WingtipApplicationPages/SiteConfig1.aspx" />
</CustomAction>

<CustomAction
  Id="WingtipSiteActionsConfig2"
  GroupId="SiteActions"
  Location="Microsoft.SharePoint.StandardMenu"
  Rights="ManageWeb"
  Sequence="2"
  Title="Site Config 2"
  Description="Use this fancier page to configure the current
  <UrlAction Url="~site/_layouts/WingtipApplicationPages/SiteC
</CustomAction>
```





Summary

- ✓ Understanding SharePoint Solutions
- ✓ Features and Feature Receivers
- ✓ Creating Web Parts
- ✓ Creating Site Pages and Application Pages