.NET Framework: Developing Modern Web Apps with ASP.NET MVC – Workshop*PLUS*

Module 04: Views

Student Lab Manual

Instructor Edition (Book Title Hidden Style)

Version 1.0

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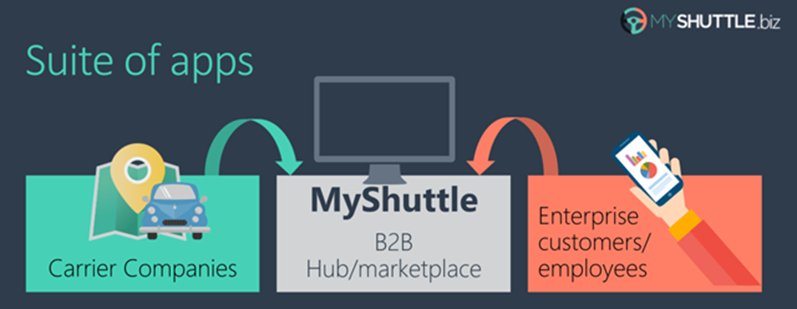
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# Lab 4: Creating Views

#### Introduction

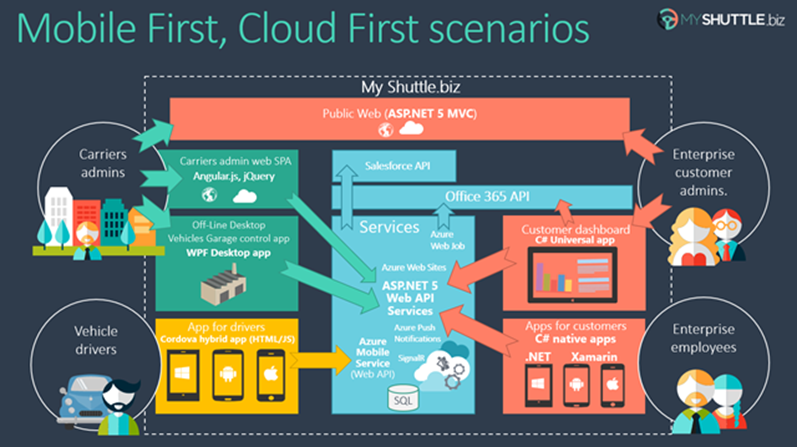
The aim of this exercise is to explore the role of views, how to create views and learn Razor syntax.

MyShuttle is a B2B highly scalable multi-tenant software as a service (SaaS) solution that targets corporate scenarios in which carrier companies offer transport services to enterprise customers.



This multi-tenant SaaS system would allow any number of carrier companies who must be syndicated with the system, to provide their services (cabs/shuttles) directly to any number of customer-enterprises/companies who would also be registered in the MyShuttle.biz system. The final outcome is that any employee in those customer companies would be able to request a cab/shuttle at any time in any place/city without worrying about how to pay. Everything would take place underneath between their company and the carrier company for that ride.

The global scenario is described in the following image:

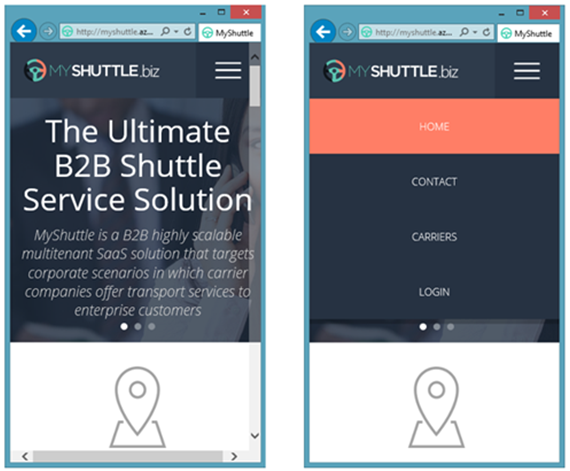


There are two web applications in the above scenario:

**Public Website:**

It is a typical public website. Its main purpose is to show information about the business but in a modern and clean way. It provides a responsive design and even if you resize the browser, you can see how it would also be perfectly valid for mobile devices, like a smartphone.

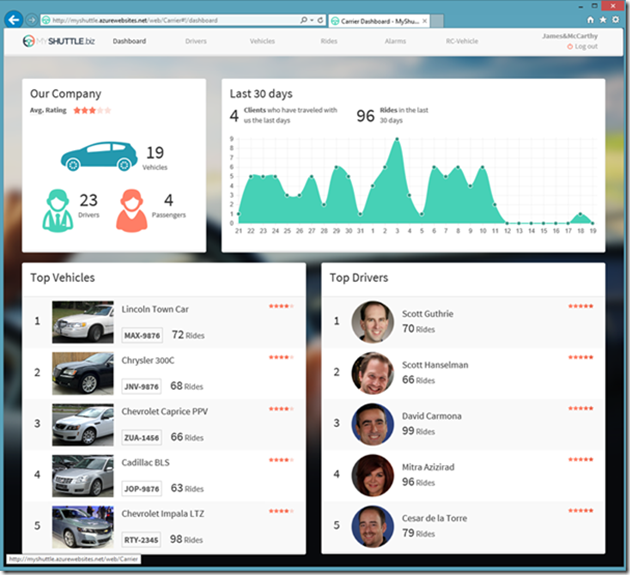




**Private Web Application:**

The second application is a Web Single Page Application (SPA), which you can access by logging in from the public website. However, in reality it is like a different web application, simulating a private web application especially made for the Carriers’ administrators.

This application is a data-driven and CRUD app so you can create and update information about your drivers, vehicles, etc. This application consumes the ASP.NET Web API Services using client-side frameworks.



In this series of labs, you will build the public website and some parts of the private web application above.

#### Overview

The Model View Controller (MVC) architectural pattern separates an application into three main components:

* **Models:** Model objects are the parts of the application that implement the domain logic. Often, model objects also retrieve and store model state in a database
* **Views:** Views are the components that display the application's User Interface (UI). Typically, this UI is created from the model data. An example would be an edit view of a Products table that displays text boxes, drop-down lists, and checkboxes based on the current state of a Product object.
* **Controllers:** Controllers are the components that handle user interaction, manipulate the model, and ultimately select a view to render the UI. In an MVC application, the view only displays information; the controller handles and responds to user input and interaction.

The MVC pattern helps you to create applications that separate the different aspects of the application (input logic, business logic, and UI logic), while providing a loose coupling between these elements. This separation helps you manage complexity when you build an application, because it enables you to focus on one aspect of the implementation at a time. In addition to managing complexity, the MVC pattern makes it easier to test applications than it is to test a traditional ASP.NET Web application, encouraging the use of Test-Driven Development (TDD) for creating an application.

Then, the ASP.NET MVC framework provides an alternative to the ASP.NET Web-forms pattern for creating MVC-based Web applications. The ASP.NET MVC framework is a lightweight, highly testable presentation framework that (as with Web-forms-based applications) is integrated with existing ASP.NET features, such as master pages and membership-based authentication.

In addition, the loose coupling between the three main components of an MVC application also promotes parallel development. For instance, one developer can work on the view, a second developer can work on the controller logic, and a third developer can focus on the business logic in the model.

#### Objectives

After completing this lab, you will be able to:

* Understand the basic principles of MVC.
* Learn how to implement a view in Razor view engines.
* Learn how to pass data from controllers to views.
* Learn how to implement GET, POST scenarios.

#### Prerequisites

None

#### Scenario

In this scenario, you will explore MVC Views.

#### System Requirements

To complete this lab, you need:

* Microsoft Visual Studio 2017
* Microsoft SQL Server (any edition)

#### Hosted Lab Credentials

If the lab is exercised in Microsoft cloud environment, use the following user credentials to sign in:

* Username: aspnetuser
* Password: @Cir9hvc6!w

#### Estimated Time to Complete This Lab

60 minutes

#### For more information, (if applicable)

Refer the following blog post to see how MyShuttle application interoperates with a number of other client-side applications:

<http://blogs.msdn.com/b/cesardelatorre/archive/2014/11/30/myshuttle-biz-demo-apps-from-connect-visual-studio-and-azure-event.aspx>

Exercise 1: Explore ASP .NET MVC View Files Structure

#### Objectives

In this exercise, you will:

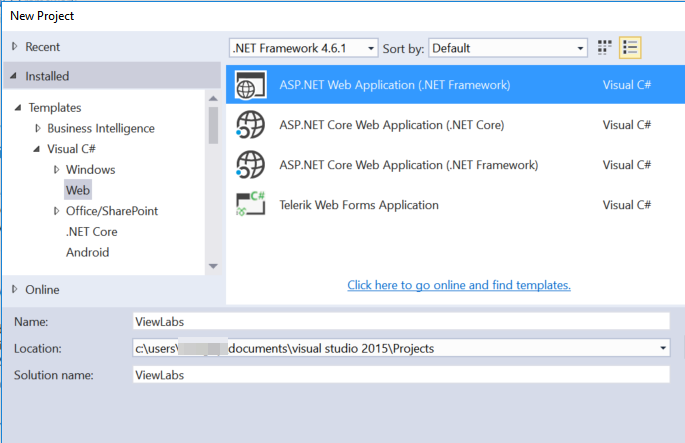
* Create a new ASP.NET MVC application in Visual Studio 2017.
* Explore the view organization within the Views folder of Visual Studio project.

#### Scenario

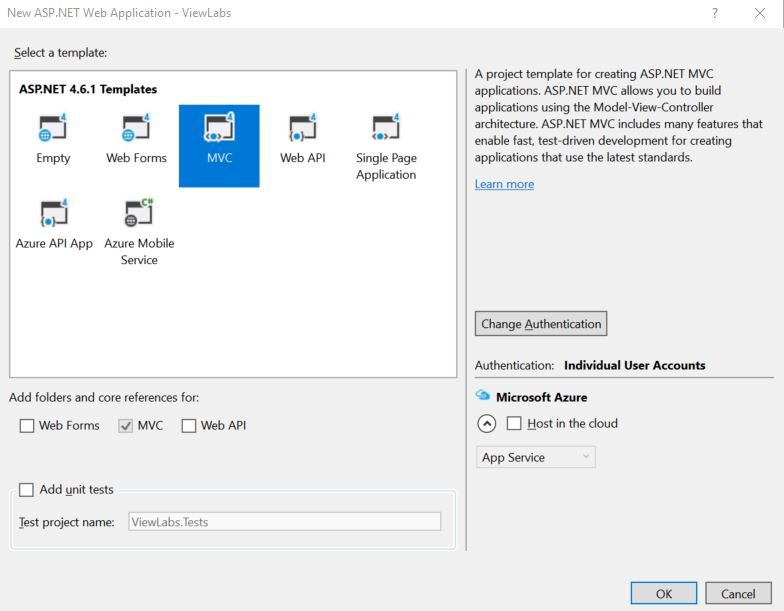
Creating a new MVC application and exploring view organization.

Task 1: Creating a new project

1. Open **Visual Studio 2017**.
2. Click **File** > **New** > **Project** to open a **New Project** screen.
3. From **Visual C#** **> Web**, select **ASP.NET Web Application (.NET Framework)**



1. Name the project *ViewsLab* and click **OK**.
2. In the **ASP.NET Templates**, select **MVC** template. For now, you will clear the **Host in the cloud** check box.
3. Click **OK**.



1. Double-click any controller class or a view to see its codebase.

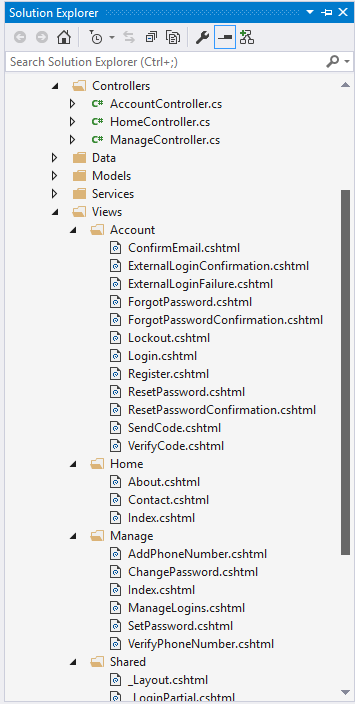
Note that you have multiple controllers included in the project by default:

* **AccountController** handles user account-related events.
* **HomeController** handles the default first view of the web application.

Another important thing to notice here is that all views are used by:

* AccountController are included in **Views** > **Account folder**.
* Similarly, views used by HomeController are in **Views** > **Home** folder.

This default convention can be overridden.



**Note:** **Internet application** template by default includes a number of views, especially under **Account folder**. It is because most of the user management functionalities are included by default, and should be good enough for most user authentication scenarios.

Exercise 2: View Creation and Data Passage

In the typical workflow of an MVC Web application, controller action methods handle an incoming Web request. These action methods use the incoming parameter values to execute application code, and retrieve or update data model objects from a database. They then select a view that renders a response to a browser.

In an MVC application, the views are the components responsible for displaying the application's user interface. Views are intended exclusively for encapsulating presentation logic. They should not contain any application logic or database retrieval code. Views render the appropriate UI by using this **View Data class**, which is a MVC view-related data object that the controller provides when it calls the method to render the view.

If ASPX view engine is used, the views use .aspx, .ascx, and .master files, as well as any other files that are related to rendering views. Views use .cshtml or .vbhtml if Razor engine is used. The Views folder contains a folder for each controller that is named with the controller prefix.

#### Objectives

In this exercise, you will:

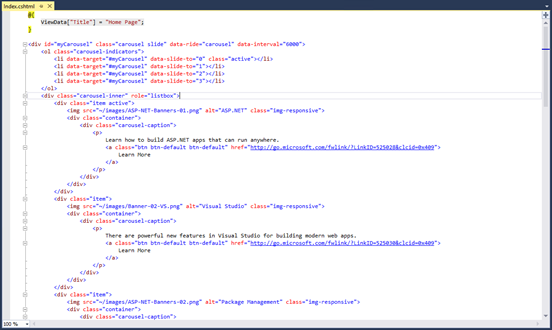
* Explore Views
* Explore Razor view engine

#### Scenario

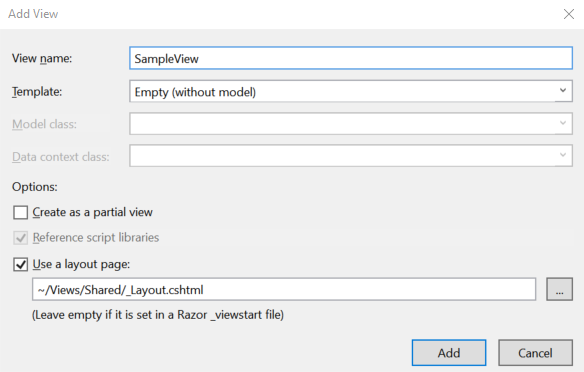
Razor is the default view engine but MVC supports multiple view engines.

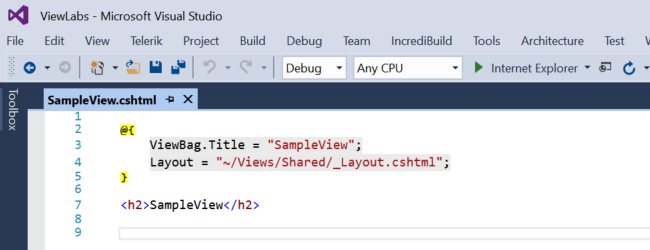
Task 1: Exploring Razor

1. Click **Views** > **Home** > **Index.cshtml**.  
   This is the first view displayed when the application runs.



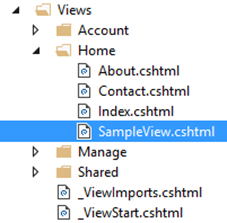
**Note:** The Index view is created by default.

1. To create a view, you either need to do it through **Solution Explorer** or action method code.  
   When a view is created in the context of action method (by right-clicking action method signature), the view is created specifically for that particular action method. Let us create a view through **Solution Explorer**.
2. From the **Views** folder, right-click **Home** folder > **Add** > **View**. This will open the view scaffolding window to generate a view
3. Fill in the fields like the screenshot below  
   
4. The view created looks like below. It is very different from the Index view:

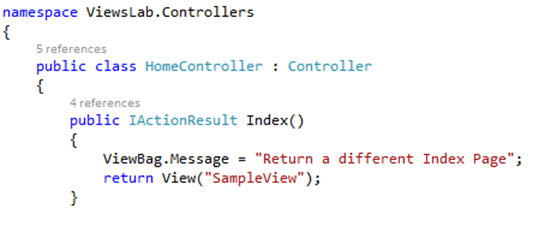


**Note:** By default, the created view uses a layout for implementing a universal look throughout the website or web application. You can always point to a different layout file globally or per view. The layout specification is located in the \_ViewStart.cshtml file.

1. After the view is created, a controller action method can use it. If you want to return the view, **SampleView.cshtml**, from Index action method of HomeController, you need to ensure that the view file is placed under **Views > Home folder**.



1. Modify the Index action method to specifically return the **SampleView** view instead of the **Index** view.

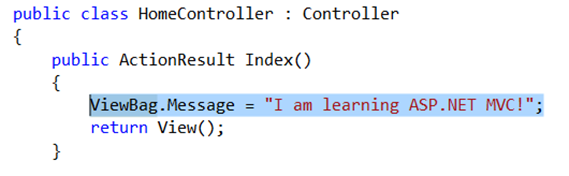


1. Run the application. The default view should now return the **SampleView** view as shown below:



Controller manipulates a model and selects a view to display the model. Hence, it needs to pass the model data to the view to display it. There are several ways to do so. One way is to use **ViewData**. ViewData is a container to pass data from a Controller to View.

1. Modify the **Index** method of **HomeController** as shown below.



A simpler way to pass data is to use **ViewBag**. ViewBag is a dynamic wrapper around ViewData. Since it is dynamic, it only supports keys that form a valid identifier in the language. For example, My Message is not a valid key, but *MyMessage* will work.

1. Print passed data in **Index.cshtml** by access **ViewBag** data in the view.



1. As you may already have noticed, you can add **C#** syntax code to a page by using the **@** character. This is called Razor syntax. The @ character starts inline expressions, single statement blocks, and multi-statement blocks:

<!-- Single statement blocks -->

@{ var total = 7; }

@{ var myMessage = "Hello World"; }

<!-- Inline expressions -->

<p>The value of your account is: @total </p>

<p>The value of myMessage is: @myMessage</p>

<!-- Multi-statement block -->

@{

var greeting = "Welcome to our site!";

var weekDay = DateTime.Now.DayOfWeek;

var greetingMessage = greeting + " Today is: " + weekDay;

}

<p>The greeting is: @greetingMessage</p>

1. Open the **About.cshtml** file under the **Views\Home** folder. And type the following code:

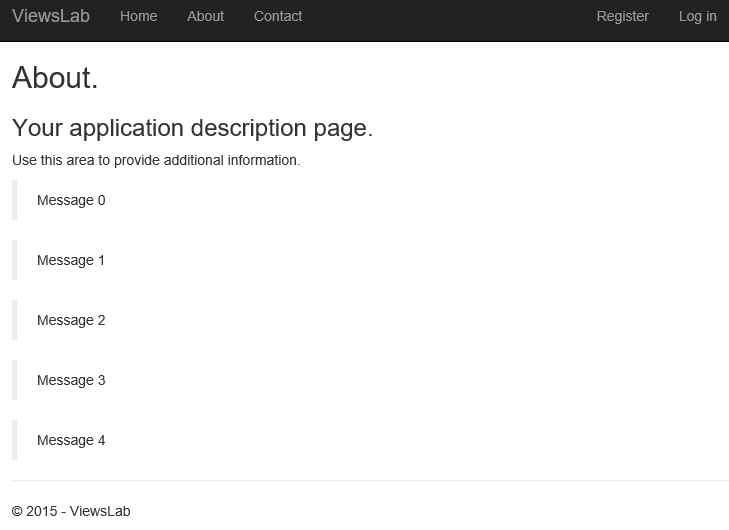
@for (int i = 0; i < 5; i++)

{

<blockquote>Message @i</blockquote>

}

1. Start debugging by clicking the **IIS Express** button. Notice the simplicity of Razor for rendering the list on the page:



Exercise 3: Strongly Typed Views

#### Objectives

In this exercise, you will:

* Learn how to create strongly typed view against a model.

#### Scenario

Strongly typed views allow for easier binding to models through the controllers.

Task 1: Create a model and bind it to a view

1. With the **ViewsLab** project created earlier, right-click the **Models** folder and **Add** > **New Item**.
2. Choose **Class** from available templates and name it **MovieModelM.cs**
3. Remove all code snippets and paste the following code:

using System;

using System.Collections.Generic;

using System.Linq;

using System.Threading.Tasks;

namespace ViewsLab.Models

{

public class Movie

{

public int ID { get; set; }

public string Title { get; set; }

public DateTime ReleaseDate { get; set; }

}

}

1. Open **HomeController.cs**, and change the About action method as follows.   
   First you create a movie object and then you pass it to the View method which corresponds to the About view.

public IActionResult About()

{

ViewData["Message"] = "Your application description page.";

var movie = new Models.Movie

{

ID = 1,

Title = "Follow the Wind",

ReleaseDate = new DateTime(2017, 01, 21)

};

return View(movie);

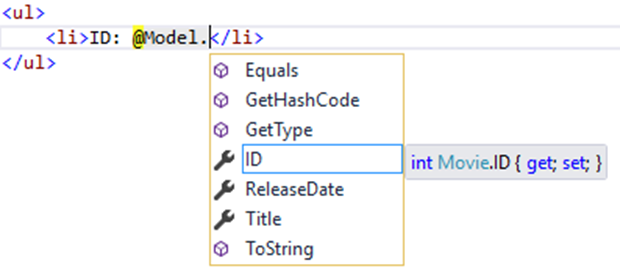
}

1. Make the About view strongly typed. To do that, open the **About.cshtml** file and add at the top of the page a reference to the Movie model namespace:

@using ViewsLab.Models

@model Movie

1. Now you should be able to access the Movie object within this view. For instance, add the follow code snippet and debug the application. Notice that you have access to IntelliSense in the Views. The page should show the same values that you have instantiated in the About action method:



<ul>

<li>ID: @Model.ID</li>

<li>Title: @Model.Title</li>

<li> Release: @Model.ReleaseDate.ToString("ddd d MMM yyyy", new System.Globalization.CultureInfo("en-US"))</li>

</ul>

1. Run the application and click the **About** menu. You should see the movie information that you have instantiated in the **HomeController**.
2. With strongly typed views, you are able to display dynamic data to the page. Let us see now how you can pass the data from the view to the controller. First, let us create an html markup for a form with inputs representing the Movie object properties and labels for name labeling. You also will add a button to submit the data entered:

<form >

<label for="ID">ID: </label>

<input type="text" id="id" />

<label for="Title">Title: </label>

<input type="text" id="title" />

<label for="ReleaseDate">Release Date: </label>

<input type="text" id="releasedate" />

<button type="submit">Submit</button>

</form>

1. Now, you have our form but you cannot post the data back to the server just yet. Now let’s create a form in the view to allow us to post data back to the server, add the following code to render a similar markup :

@using (Html.BeginForm("About", "Home", FormMethod.Post))

{

@Html.AntiForgeryToken()

<div>@Html.ValidationSummary(true, "")</div>

@Html.LabelFor(model => model.Title)

<div>

@Html.EditorFor(model => model.Title)

@Html.ValidationMessageFor(model => model.Title, "")

</div>

@Html.LabelFor(model => model.ReleaseDate)

<div>

@Html.EditorFor(model => model.ReleaseDate)

@Html.ValidationMessageFor(model => model.ReleaseDate, "")

</div>

<input type="submit" value="Create" />

}

1. As you want to post the data back to the server, you need to create an action method to handle http Post method. In the Home controller, create a new About method:

[HttpPost]

public IActionResult About(Models.Movie movieIncoming)

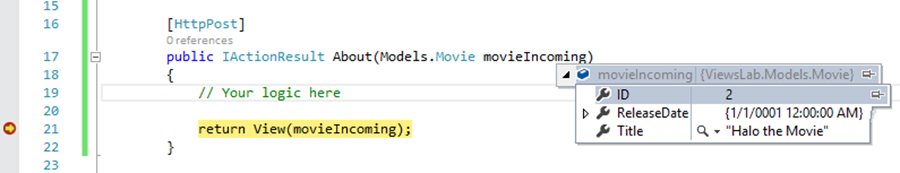
{

// Your logic here

return View(movieIncoming);

}

1. Put a breakpoint at the line return View(movieIncoming); and then Run the application. Navigate to the **About** page and enter some data in the fields and click the **Submit** button. You should then hit the break point. Inspect the object movieIncoming being returned:



Exercise 4: Create Index View for MyShuttle app

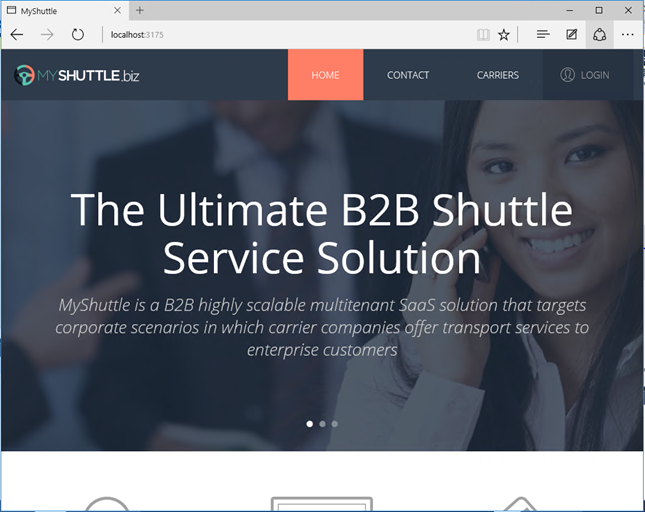
#### Objective

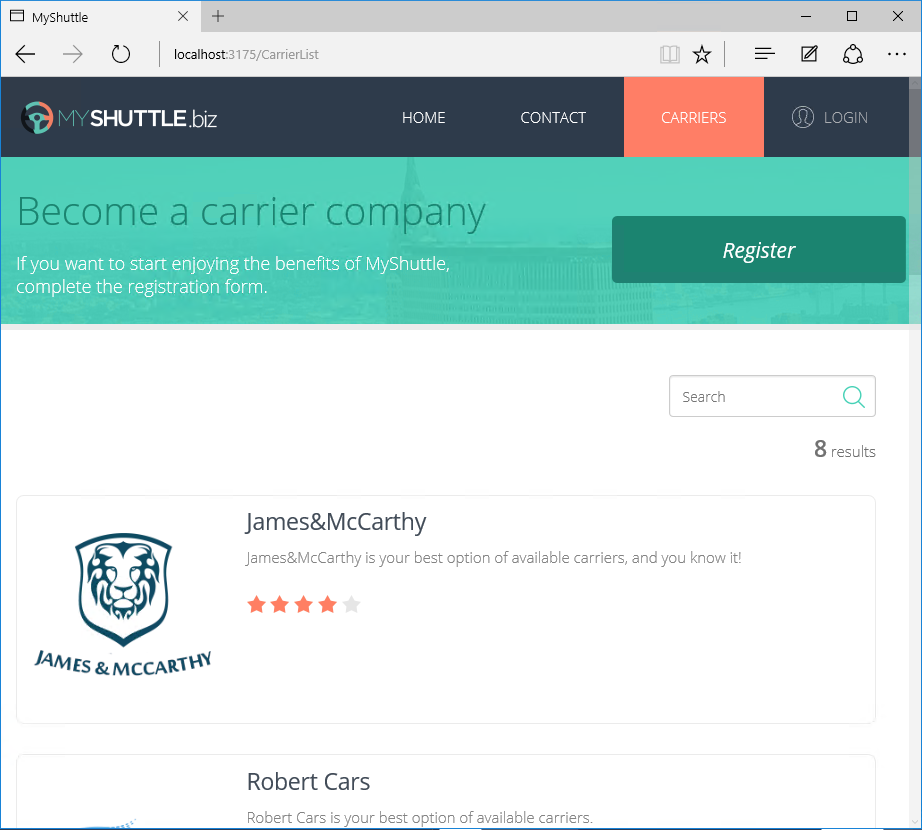
In this exercise, you will:

* Create Index.cshtml View for Home Controller in MyShuttle application.

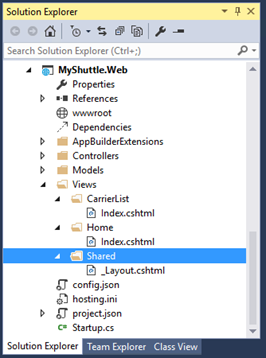
Task 1: Create layout.cshtml page

You are tasked to create the Home and Carriers pages. The company marketing and design teams have come up with the following mock-ups:





1. As you may notice, both mock-ups do have lot similarities on the page and their UI is very consistent. You can put the similar UI rendering and features in a Layout page. First re-open the **MyShuttle** application from the **Begin** folder for this lab module.
2. Right-click the **Views** folder and right-click and **Add >** **New Folder.** Name the folder as **Shared**. This folder will contain views that are commonly used. Partial views are good candidates to be organized in this folder.
3. Right-click the Shared folder and **Add** 🡺 **Existing Item**. Navigate to this lab assets location and add the **\_Layout.cshtml** file.



Figure

1. A **Razor Layout page** is the equivalent of an ASP.NET Master Page. It defines the structure of a Web page by using **HTML markup**, and defines sections that will be filled with custom content. Web pages linked to a layout will only have to complete the sections with their own HTML. By using layout pages, your site will have a consistent layout and structure.
2. Reopen the **Index.cshtml** from **Views/Home** folder. Specify the Layout template that you want to use for this page:

@{

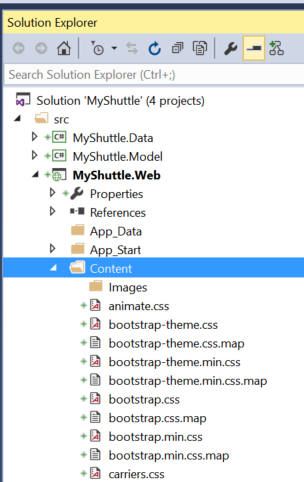
ViewBag.Title = "Home Page";

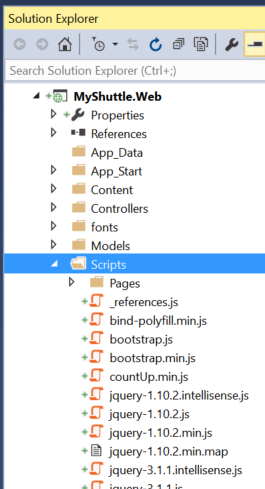
Layout = "/Views/Shared/\_Layout.cshtml";

}

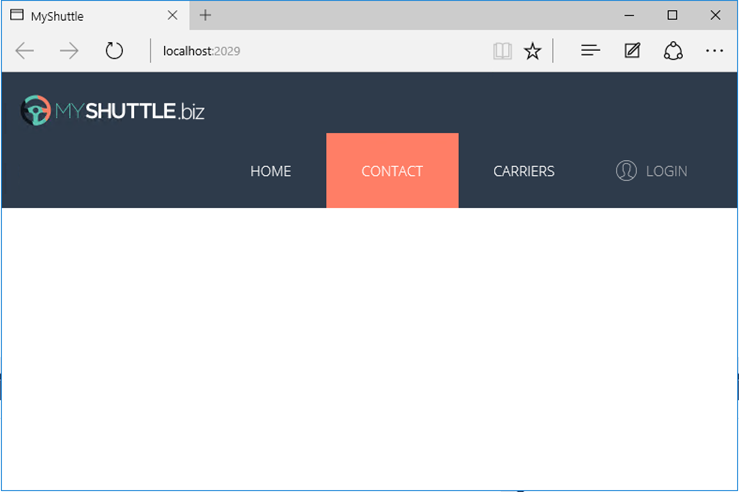
1. Review and understand the Razor and HTML markup for the layout page.
2. Run the application and you should see that the Index page has more markups now.



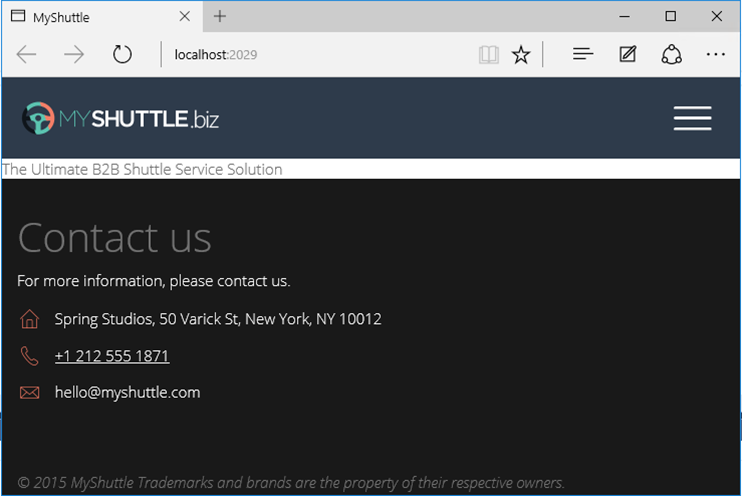
1. However, no style or image has been applied. Those references are specified in the Layout page but they are actually missing from the project. Let us fix this.
2. Right-click the **Content** folder and **Add** > **Existing Item**. Browse to **Labs Assets Content** folder and add all the files in the **Content** folder and in the **Images** subfolder.  
    
3. Right-click **Scripts** folder and click **Add** > **Existing Item** add all the scripts from **Assets Scripts** folder. Make sure to add Pages and Home Folder and add all the contents their corresponding contents as well:



1. Run the application, but you would see a blank page.

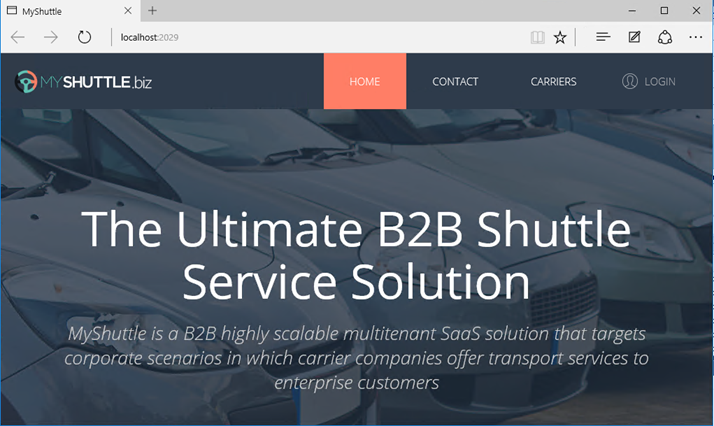


1. By resizing the browser, you will only see our message. This is definitively not the behavior you would want for our application. You will need to fix this in the next exercise.



Task 2: Modify the index.cshtml page

1. Rename the **index.cshtml** to **index\_old.cshtml**. Right-click the **Home** folder and **Add** **>** **Existing Item**. Navigate to this lab assets location and add the **index.cshtml** file.
2. Spend some time to check what is implemented in the **Index.cshtml** page. As you may have noticed, the markup is mainly decorated with styles and scripts references compared to the old index.cshtml. Run the application and you will notice that the default view for the Home controller looks completely different and more modern. You will discuss this in details in the Client-Side Development module.



Exercise 5: Create CarrierList View

#### Objective

In this exercise, you will:

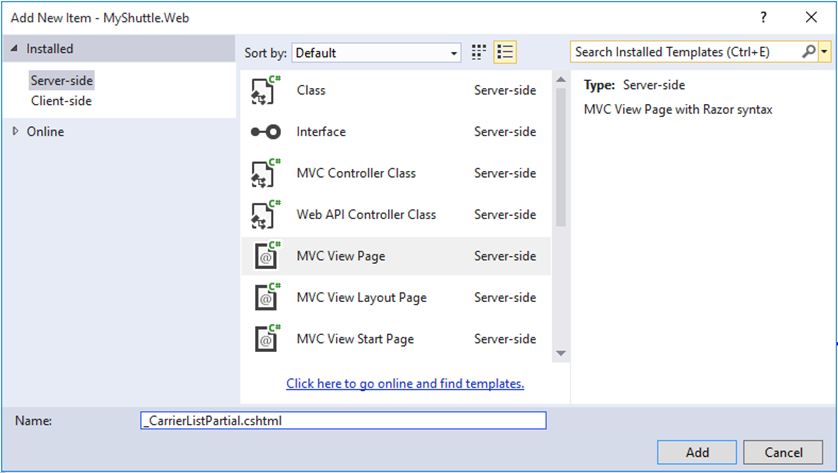
* Create Index.cshtml View for CarrierList Controller in MyShuttle application, which will have Register a carrier, search carrier, and List of all carrier functionality.

Task 1: Create \_CarrierListPartial.cshtml page

A partial view enables you to define a view that will be rendered inside a parent view. Partial views are implemented as ASP.NET user controls (.ascx).

When a partial view is instantiated, it gets its own copy of the [ViewDataDictionary](https://msdn.microsoft.com/en-in/library/system.web.mvc.viewdatadictionary(v=vs.100).aspx) object that is available to the parent view. The partial view therefore has access to the data of the parent view. However, if the partial view updates the data, those updates affect only the partial view's ViewData object. The parent view's data is not changed.

1. Right-click the **Shared folder** in **MyShuttle.Web** project **Add** > **New Item**. Select **MVC View** page and name it as **\_CarrierListPartial** page. A partial view enables you to define a view that will be rendered inside a parent view.



1. You will use the MyShuttle.Model for the display of List of Carriers. So delete the content in the file and add below two lines of code. List<Carrier> will be passed from the controller.

@using MyShuttle.Model

@model List<Carrier>

1. You need to display how many Carriers are there in the application. So, let us create a div and put these count on the right-side.

<div class="carrier-results text-right">

<span class="n-results">@Html.Raw(@Model.Count)</span>

<span class="text-results">results</span>

</div>

1. Now, you need to iterate over the records in the list and display them.

<div class="row margin-zero carrier-info-wrapper">

@{ var odd = true; }

@foreach (var Tile in Model)

{

<article class="col-md-6 carrier-tile row margin-zero">

<div class="carrier-info row @(odd ? "" : "even")">

<div class="col-xs-3 text-center img-wrapper ">

@{

var imgSrc = string.Format("data:image/png;base64,{0}",

Convert.ToBase64String(Tile.Picture));

<img src="@imgSrc" class="carrier-pic" />

}

</div>

<div class="col-xs-9">

<p class="carrier-name">@Tile.Name</p>

<p class="carrier-description">@Tile.Description</p>

<div class="customer-rating" data-score="@Tile.RatingAvg"></div>

</div>

</div>

</article>

odd = !odd;

}

</div>

1. This is just a partial page; you can run the application after you use this partial page in Indexpage. As of now, let us continue with **Task 2** add the functionality to register the CarrierPage

Task 2: Create \_RegisterCarrierForm.cshtml page

1. Right-click the **Shared folder** in **MyShuttle.Web** project and **Add** > **New** **Item**. Select the **MVC View** page and name it as **\_RegisterCarrierForm.cshtml**. This is also a partial page that will go in Index.cshtml page of CarrierList that you will write.
2. You will pass CarrierViewModel from controllers to register a New Carrier. Clear all the contents of the file and the following line.

@model MyShuttle.Web.Models.CarrierViewModel

1. Add the HTML mark-up code to get inputs from the user.

@Html.Beginform Writes an opening <form> tag to the response. The form uses the POST method, and the request is processed by the action method for the view.

@{bool isValid = ViewData.ModelState.IsValid ? true : false;}

<div class="carrier-form-wrapper col-sm-12 padding-zero full-spaced @((!isValid)?"cover-background" :"") ">

<div class="carrier-form ms-container-fluid full-spaced clearfix">

<div class="row">

<div class="col-sm-7">

<h2 class="become-carrier">Become a carrier company</h2>

<h3 class="become-carrier-description">If you want to start enjoying the benefits of MyShuttle, complete the registration form.</h3>

</div>

<div class="col-sm-5 text-right">

<input type="button" class="@((isValid)?"" :"hide") ms-submit-btn green-style md-style" id="registerExpand" value="Register" />

</div>

</div>

@using (Html.BeginForm("Index", "CarrierList", FormMethod.Post, new { @class = ((isValid) ? "collapse" : "") + " register-carrier-form" }))

{

@Html.AntiForgeryToken()

<div class="col-sm-6 padding-zero padding-right-row-md">

<p>

@Html.TextBoxFor(m => m.CompanyName, new { @class = "ms-form-control green-style", @placeholder = "Company name..." })

</p>

<p>

@Html.TextBoxFor(m => m.Address, new { @class = "ms-form-control green-style", @placeholder = "Address..." })

</p>

<div class="row">

<div class="col-xs-6">

@Html.TextBoxFor(m => m.ZipCode, new { @class = "ms-form-control green-style", @placeholder = "Zip Code..." })

</div>

<div class="col-xs-6">

@Html.TextBoxFor(m => m.City, new { @class = "ms-form-control green-style control-right", @placeholder = "City..." })

</div>

</div>

<div class="row">

<div class="col-xs-6">

@Html.TextBoxFor(m => m.State, new { @class = "ms-form-control green-style", @placeholder = "State..." })

</div>

<div class="col-xs-6">

@Html.TextBoxFor(m => m.Country, new { @class = "ms-form-control green-style control-right", @placeholder = "Country..." })

</div>

</div>

</div>

<div class="col-sm-6 padding-zero padding-left-row-md">

<p>

@Html.TextBoxFor(m => m.CompanyID, new { @class = "ms-form-control green-style", @placeholder = "ID..." })

</p>

<p>

@Html.TextBoxFor(m => m.Email, new { @class = "ms-form-control green-style", @placeholder = "Email..." })

</p>

<p>

@Html.TextBoxFor(m => m.Description, new { @class = "ms-form-control green-style description-style", @placeholder = "Description..." })

</p>

<p>

<input id="sendNewCarrierBtn" type="submit" class="ms-submit-btn green-style" value="Register" />

</p>

</div>

<span class="validation"></span>

<div class="clearfix"></div>

@Html.ValidationSummary()

}

</div>

<div class="separator">

</div>

</div>

Task 3: Create \_SearchPartial.cshtml page

1. Right-click the **Shared folder in MyShuttle.Web** project and **Add** > **New Item**. Select the **MVC View** page and name it as **\_SearchPartial.cshtml**. This is also a partial page that will go in Index.cshtml page of CarrierList that you will write for searching a carrier vendor.
2. Add the below markup code for the search functionality after you clean all of the initial file contents.

@model MyShuttle.Web.Models.SearchViewModel

<div>

@using (Html.BeginForm("CarrierListFiltered", "Index", FormMethod.Get, new {@id="searchForm", @class = ""}))

{

<div class="search-input-wrapper" id="searchBtn"></div>

@Html.TextBoxFor(m=>m.SearchString ,new { @id = "searchInput", @type = "search" ,@placeholder = "Search" , @class="form-control search-input" })

}

</div>

Task 4: Create Index.cshtml page

1. Open **Index.cshtml** in **Views** **>** **CarrierList** folder that you created in the previous lab and remove all its contents.
2. You are passing the **CarrierListViewModel** from the controller to the View. Also set the Layout property to Layout.cshtml page. Add the below lines of code to index.cshtml

@model MyShuttle.Web.Models.CarrierListViewModel

@{

ViewBag.Title = "Home Page";

Layout = "/Views/Shared/\_Layout.cshtml";

}

<!-- Add the CSS references for the index.cshtml page -->

@section styles{

<link rel="stylesheet" type="text/css" href="Content/jquery.raty.css" xmlns="http://www.w3.org/1999/html" />

<link rel="stylesheet" type="text/css" href="Content/form.css" xmlns="http://www.w3.org/1999/html" />

<link rel="stylesheet" type="text/css" href="Content/carriers.css" xmlns="http://www.w3.org/1999/html" />

<link rel="stylesheet" type="text/css" href="Content/footer.css" xmlns="http://www.w3.org/1999/html" />

}

1. Display the Carrier Registration view partial page that you created in **Task 2**.

<!-- Carrier List -->

<div>

@Html.Partial("\_RegisterCarrierForm", Model.Carrier)

</div>

1. Display the search pane and list of all carriers that are available. These are the partial pages that you created in **Task 1** and **Task 3**.

<section class="carrier-list">

<div class="ms-container-fluid full-spaced clearfix text-center ">

<div class="row carrier-controls margin-zero">

<div class="col-sm-offset-9 col-sm-3 search-carrier padding-zero">

@Html.Partial("\_SearchPartial", Model.Search)

</div>

</div>

<div id="listContainer">

@Html.Partial("\_CarrierListPartial", Model.CarrierList)

</div>

</div>

</section>

1. Add the scripts section at the end.

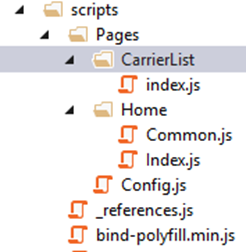
@section scripts{

<script charset="UTF-8" type="text/javascript" src="https://ecn.dev.virtualearth.net/mapcontrol/mapcontrol.ashx?v=7.0&s=1"></script>

<script src="Scripts/Pages/CarrierList/index.js"></script>

}

1. You are almost done with our CarrierList View. You need to add the script file to the project to handle interactive features for the page. Right-click the **Scripts/Pages** folder and **Add > New Folder** and name it **CarrierList.** Right- click the **CarrierList** folder and **Add > Existing Item.** Navigate to the **Asset** location for this lab module and add the **index.js file.**



Add other js files in Asset folder as shown above.

1. Run the application and click the **CarrierList** button in the top navigation bar or Navigate to URL: [http://localhost:[YOUR LOCALHOST PORT]/CarrierList/Index](http://localhost:[YOUR%20LOCALHOST%20PORT]/CarrierList/Index) to trigger the Index action method of the CarrierList controller.

