Get Started with ASP.NET Web API 2 (C#)

11/28/2017 8 minutes to read Contributors all

In this article

by Mike Wasson

Download Completed Project

HTTP is not just for serving up web pages. HTTP is also a powerful platform for building APIs that expose services and data. HTTP is simple, flexible, and ubiquitous. Almost any platform that you can think of has an HTTP library, so HTTP services can reach a broad range of clients, including browsers, mobile devices, and traditional desktop applications.

ASP.NET Web API is a framework for building web APIs on top of the .NET Framework. In this tutorial, you will use ASP.NET Web API to create a web API that returns a list of products.

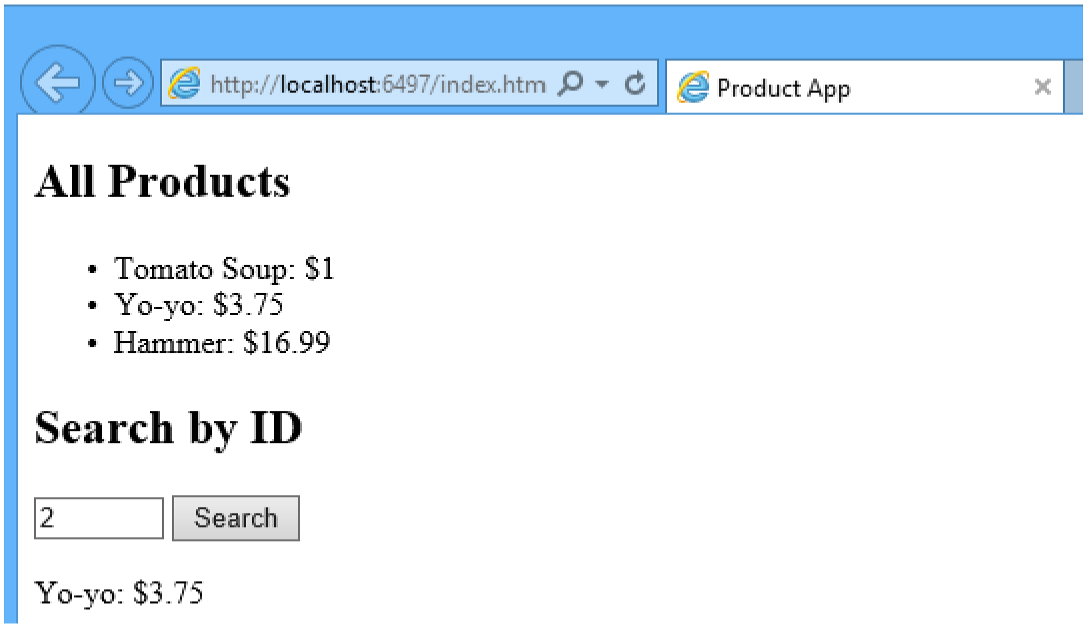
Software versions used in the tutorial

- Visual Studio 2017
- Web API 2

See Create a web API with ASP.NET Core and Visual Studio for Windows for a newer version of this tutorial.

Create a Web API Project

In this tutorial, you will use ASP.NET Web API to create a web API that returns a list of products. The front-end web page uses jQuery to display the results.



All Products

- Tomato Soup: $1
- Yo-yo: $3.75
- Hammer: $16.99

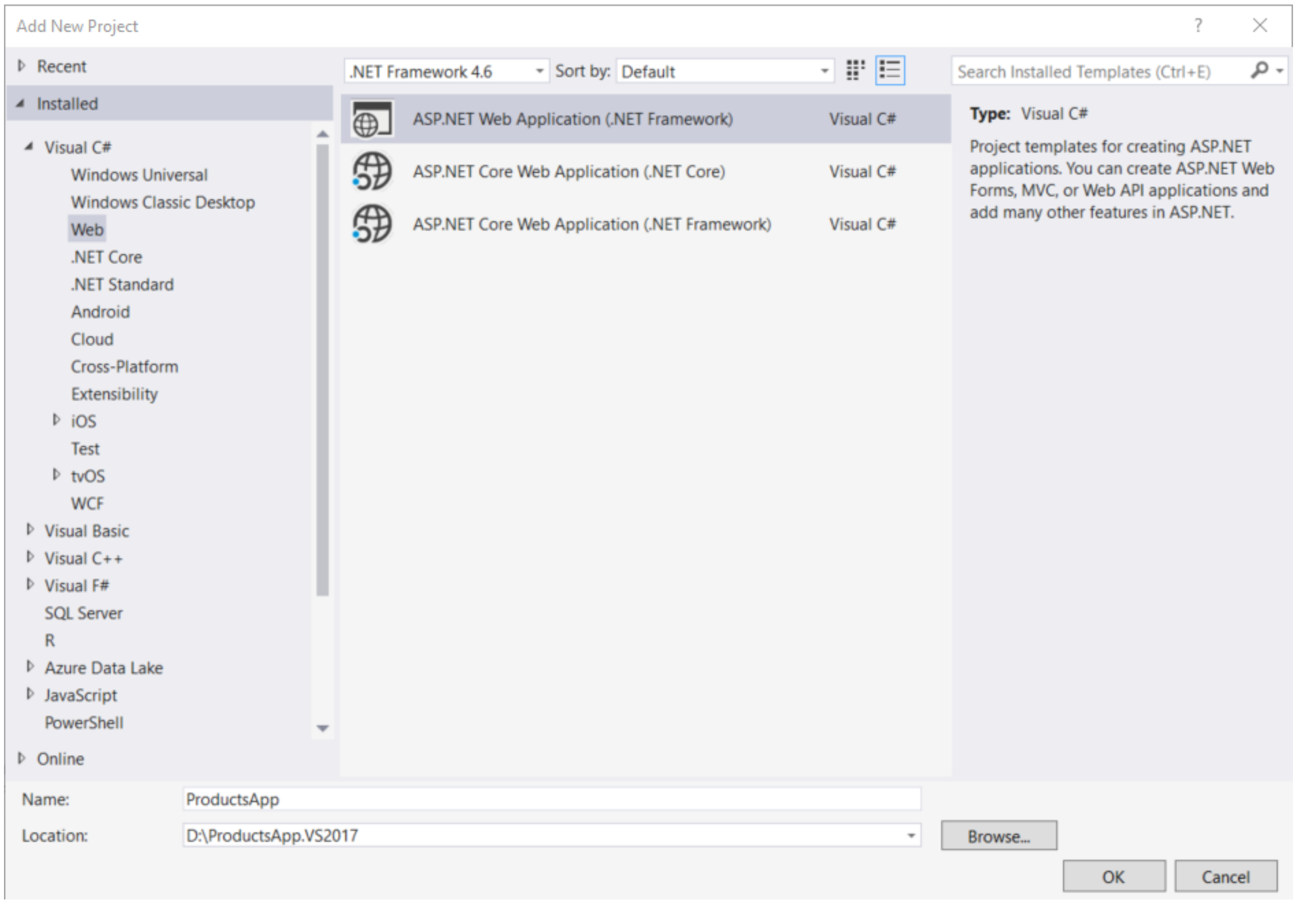
Search by ID

2

Yo-yo: $3.75

Start Visual Studio and select **New Project** from the **Start** page. Or, from the **File** menu, select **New** and then **Project**.

In the **Templates** pane, select **Installed Templates** and expand the **Visual C#** node. Under **Visual C#**, select **Web**. In the list of project templates, select **ASP.NET Web Application**. Name the project "ProductsApp" and click **OK**.



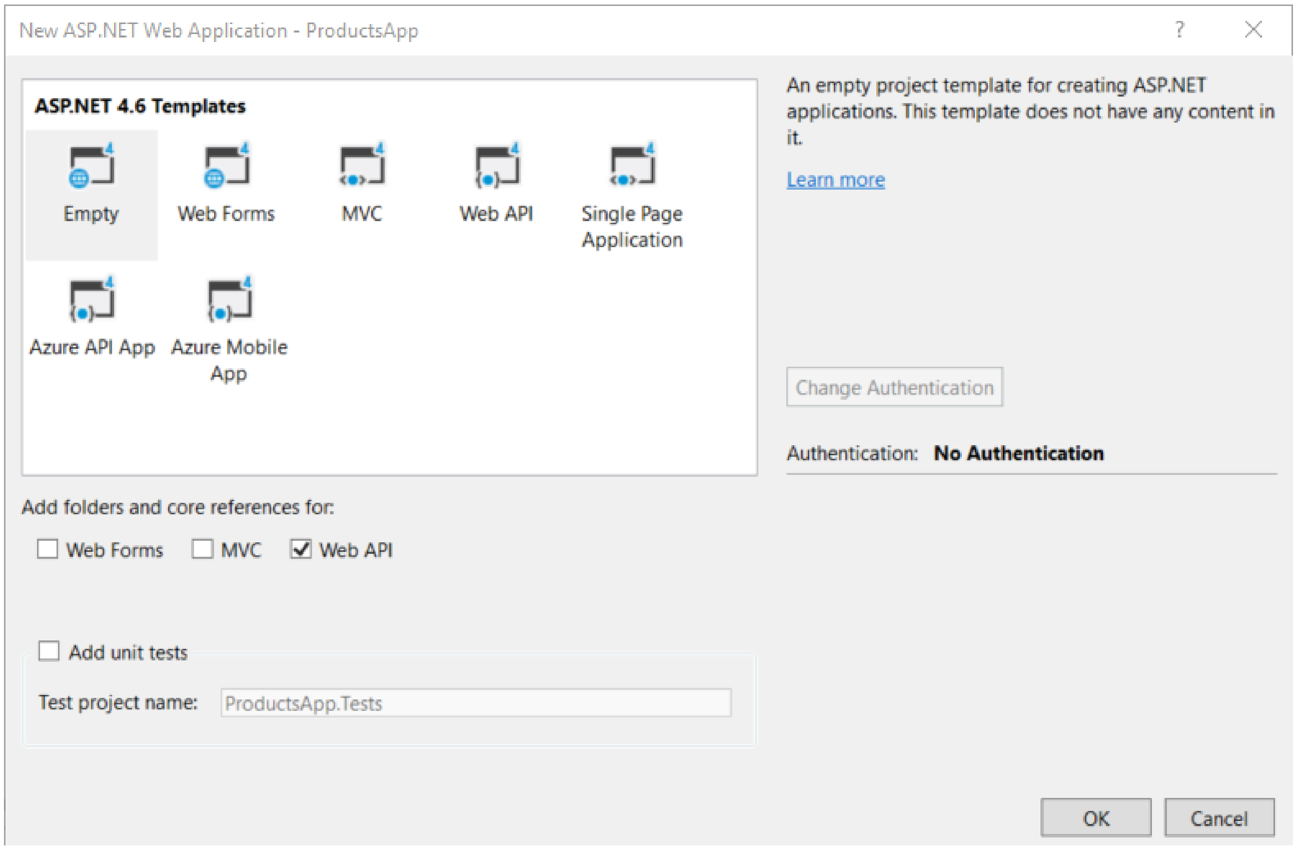
ASP.NET Web Application (.NET Framework) Visual C#
ASP.NET Core Web Application (.NET Core) Visual C#
ASP.NET Core Web Application (.NET Framework) Visual C#

Type: Visual C#

Project templates for creating ASP.NET applications. You can create ASP.NET Web Forms, MVC, or Web API applications and add many other features in ASP.NET.

Name: ProductsApp
Location: D:\ProductsApp.VS2017

In the **New ASP.NET Project** dialog, select the **Empty** template. Under "Add folders and core references for", check **Web API**. Click **OK**.



An empty project template for creating ASP.NET applications. This template does not have any content in it.

Authentication: **No Authentication**

Add folders and core references for:
☐ Web Forms ☐ MVC ☑ Web API

☐ Add unit tests
Test project name: ProductsApp.Tests

ⓘ Note

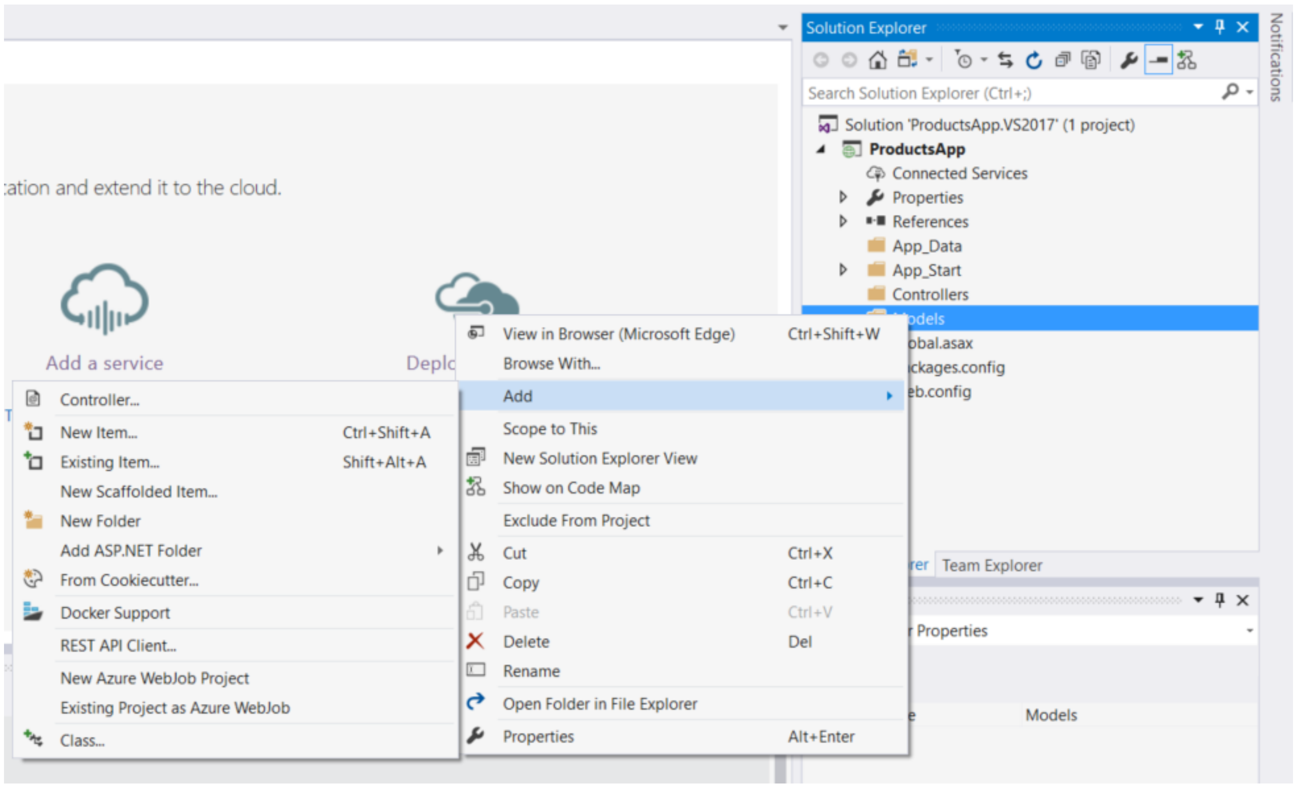
You can also create a Web API project using the "Web API" template. The Web API template uses ASP.NET MVC to provide API help pages. I'm using the Empty template for this tutorial because I want to show Web API without MVC. In general, you don't need to know ASP.NET MVC to use Web API.

Adding a Model

A *model* is an object that represents the data in your application. ASP.NET Web API can automatically serialize your model to JSON, XML, or some other format, and then write the serialized data into the body of the HTTP response message. As long as a client can read the serialization format, it can deserialize the object. Most clients can parse either XML or JSON. Moreover, the client can indicate which format it wants by setting the Accept header in the HTTP request message.

Let's start by creating a simple model that represents a product.

If Solution Explorer is not already visible, click the **View** menu and select **Solution Explorer**. In Solution Explorer, right-click the Models folder. From the context menu, select **Add** then select **Class**.



Name the class "Product". Add the following properties to the `Product` class.

C# Copy

```
namespace ProductsApp.Models
{
    public class Product
    {
        public int Id { get; set; }
        public string Name { get; set; }
        public string Category { get; set; }
        public decimal Price { get; set; }
    }
}
```

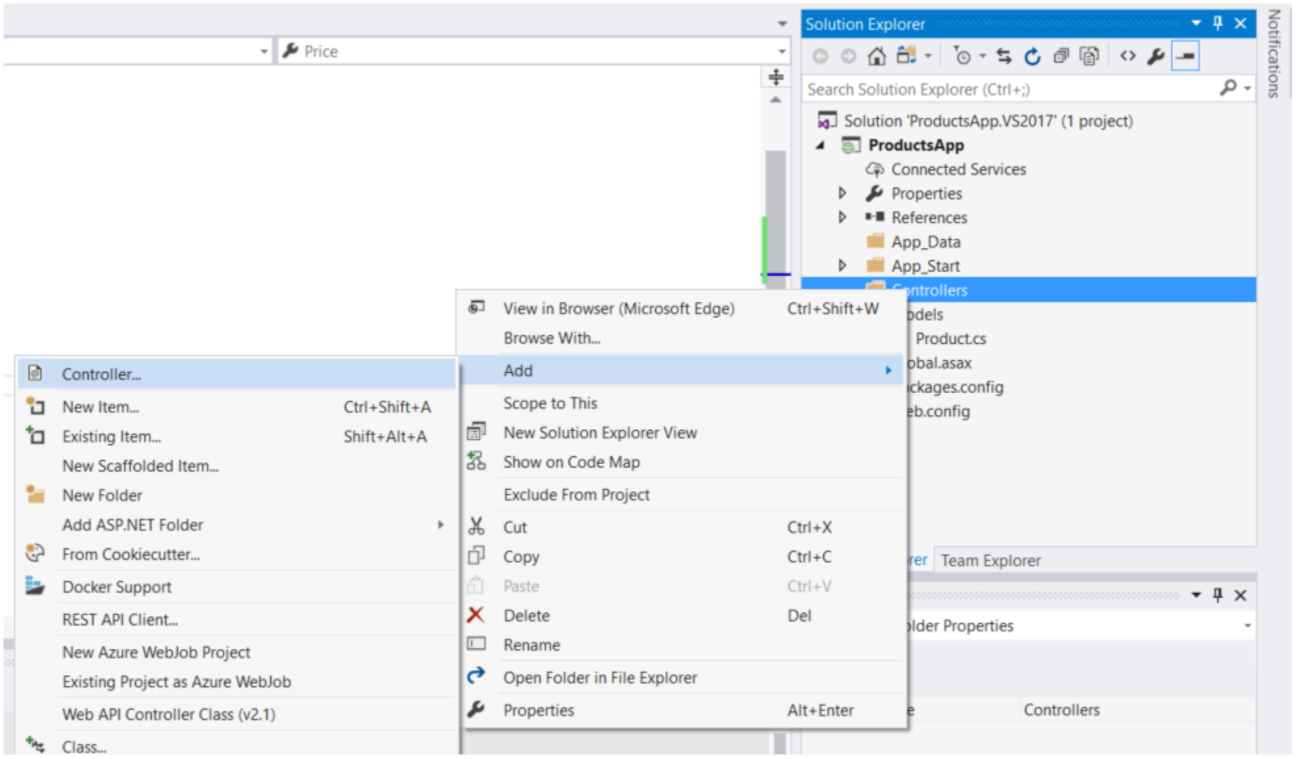
Adding a Controller

In Web API, a *controller* is an object that handles HTTP requests. We'll add a controller that can return either a list of products or a single product specified by ID.

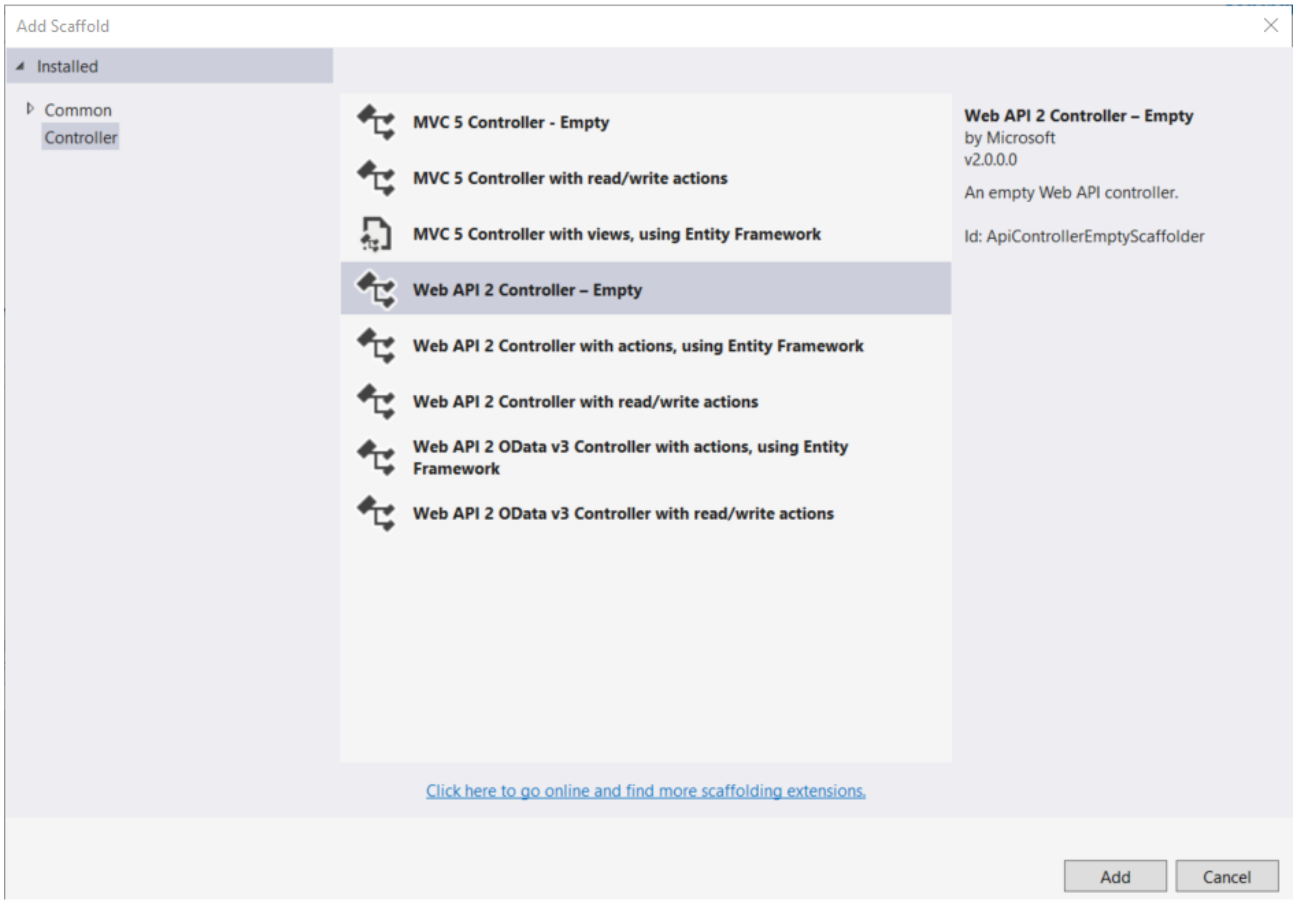
Note

If you have used ASP.NET MVC, you are already familiar with controllers. Web API controllers are similar to MVC controllers, but inherit the **ApiController** class instead of the **Controller** class.

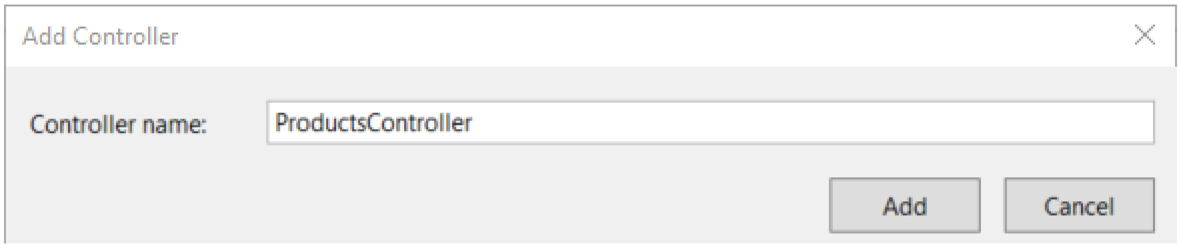
In **Solution Explorer**, right-click the Controllers folder. Select **Add** and then select **Controller**.



In the **Add Scaffold** dialog, select **Web API Controller - Empty**. Click **Add**.

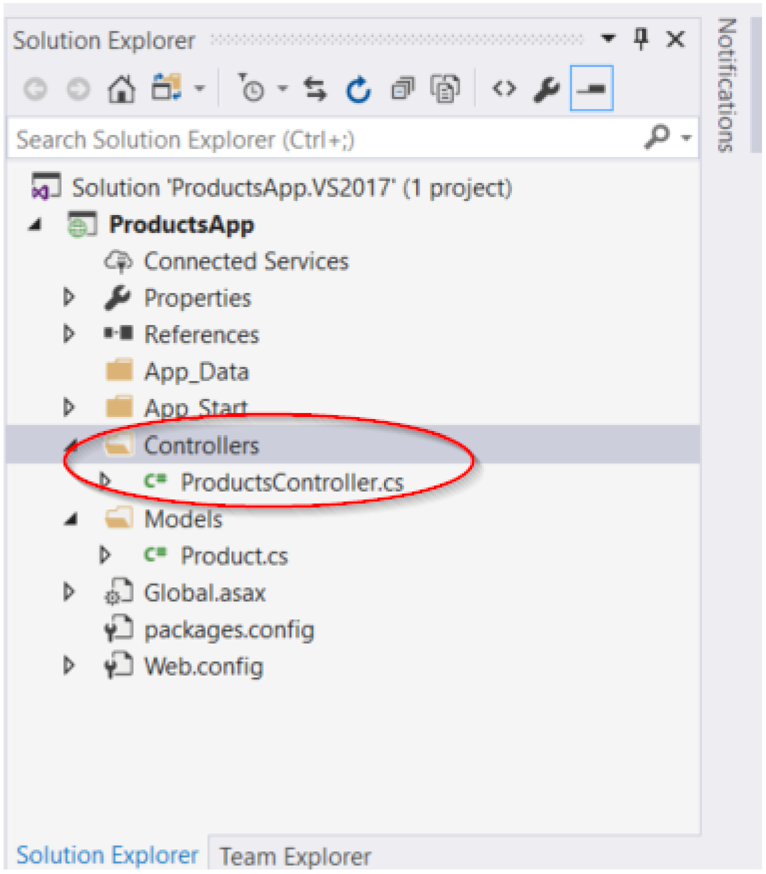

Add Scaffold
Installed
Common
Controller
MVC 5 Controller - Empty
MVC 5 Controller with read/write actions
MVC 5 Controller with views, using Entity Framework
Web API 2 Controller – Empty
Web API 2 Controller with actions, using Entity Framework
Web API 2 Controller with read/write actions
Web API 2 OData v3 Controller with actions, using Entity Framework
Web API 2 OData v3 Controller with read/write actions
Web API 2 Controller – Empty
by Microsoft
v2.0.0.0
An empty Web API controller.
Id: ApiControllerEmptyScaffolder
Click here to go online and find more scaffolding extensions.
Add
Cancel

In the **Add Controller** dialog, name the controller "ProductsController". Click **Add**.



Controller name: ProductsController

The scaffolding creates a file named ProductsController.cs in the Controllers folder.



```
Solution 'ProductsApp.VS2017' (1 project)
  ProductsApp
    Connected Services
    Properties
    References
    App_Data
    App_Start
    Controllers
      ProductsController.cs
    Models
      Product.cs
    Global.asax
    packages.config
    Web.config
```

Note

You don't need to put your controllers into a folder named Controllers. The folder name is just a convenient way to organize your source files.

If this file is not open already, double-click the file to open it. Replace the code in this file with the following:

C# Copy

```
using ProductsApp.Models;
using System;
using System.Collections.Generic;
using System.Linq;
using System.Net;
using System.Web.Http;

namespace ProductsApp.Controllers
{
    public class ProductsController : ApiController
    {
        Product[] products = new Product[]
        {
            new Product { Id = 1, Name = "Tomato Soup", Category = "Groceries",
Price = 1 },
            new Product { Id = 2, Name = "Yo-yo", Category = "Toys", Price =
3.75M },
            new Product { Id = 3, Name = "Hammer", Category = "Hardware", Price
= 16.99M }
        };

        public IEnumerable<Product> GetAllProducts()
        {
            return products;
        }

        public IHttpActionResult GetProduct(int id)
        {
            var product = products.FirstOrDefault((p) => p.Id == id);
            if (product == null)
            {
                return NotFound();
            }
            return Ok(product);
        }
    }
}
```

To keep the example simple, products are stored in a fixed array inside the controller class. Of course, in a real application, you would query a database or use some other external data source.

The controller defines two methods that return products:

- The `GetAllProducts` method returns the entire list of products as an **IEnumerable<Product>** type.
- The `GetProduct` method looks up a single product by its ID.

That's it! You have a working web API. Each method on the controller corresponds to one or more URIs:

Controller Method	URI
GetAllProducts	/api/products
GetProduct	/api/products/*id*

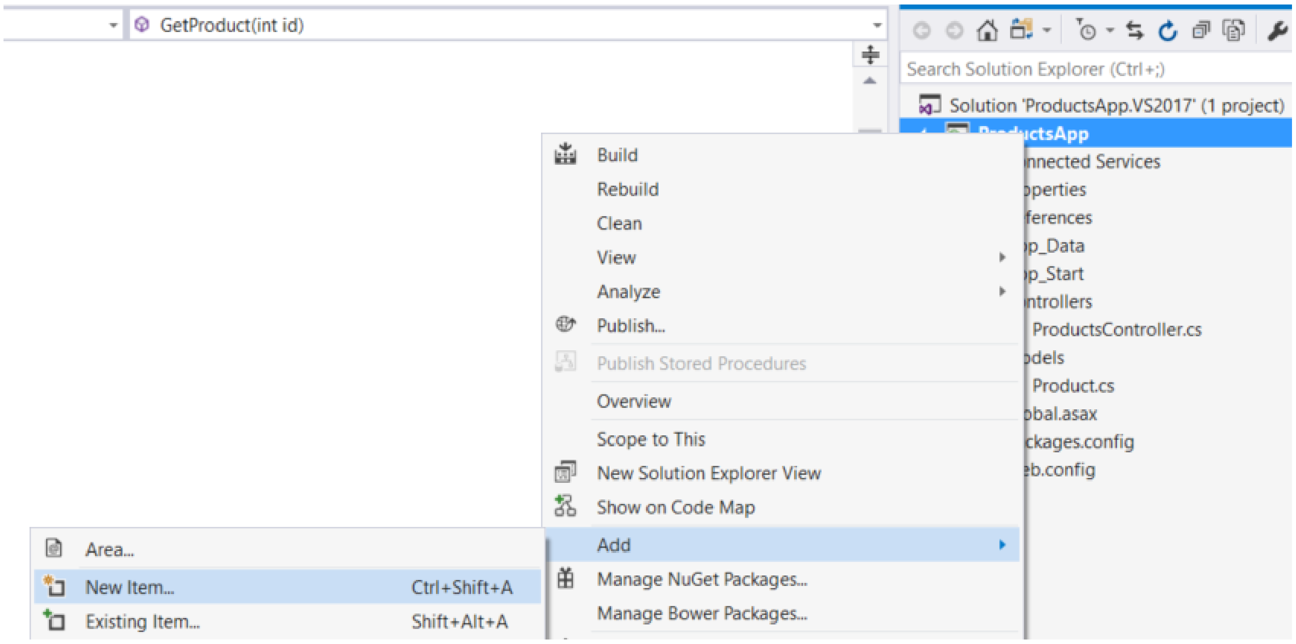
For the `GetProduct` method, the *id* in the URI is a placeholder. For example, to get the product with ID of 5, the URI is `api/products/5`.

For more information about how Web API routes HTTP requests to controller methods, see Routing in ASP.NET Web API.

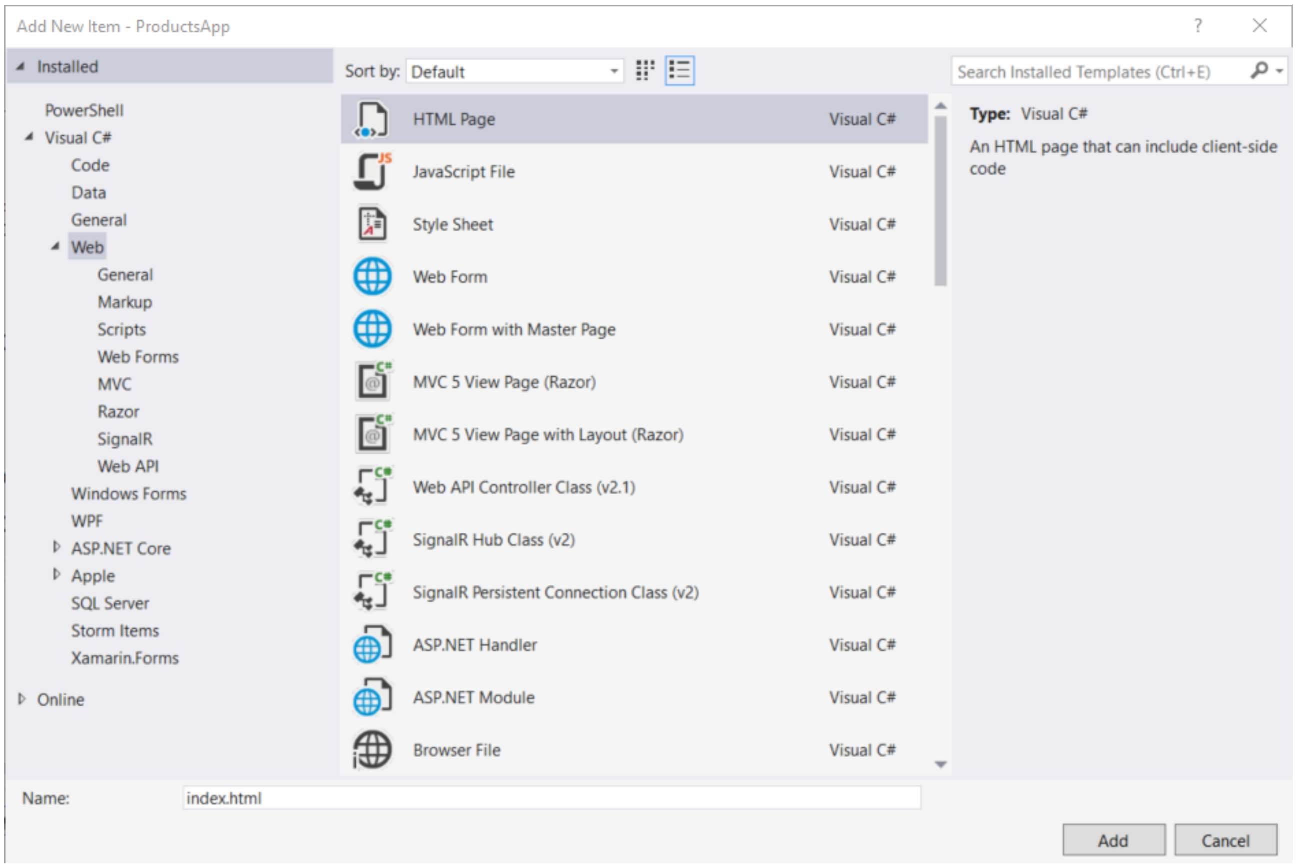
Calling the Web API with Javascript and jQuery

In this section, we'll add an HTML page that uses AJAX to call the web API. We'll use jQuery to make the AJAX calls and also to update the page with the results.

In Solution Explorer, right-click the project and select **Add**, then select **New Item**.



In the **Add New Item** dialog, select the **Web** node under **Visual C#**, and then select the **HTML Page** item. Name the page "index.html".


Add New Item - ProductsApp
Installed
Sort by: Default
Search Installed Templates (Ctrl+E)
PowerShell
Visual C#
Code
Data
General
Web
General
Markup
Scripts
Web Forms
MVC
Razor
SignalR
Web API
Windows Forms
WPF
ASP.NET Core
Apple
SQL Server
Storm Items
Xamarin.Forms
Online
HTML Page Visual C#
JavaScript File Visual C#
Style Sheet Visual C#
Web Form Visual C#
Web Form with Master Page Visual C#
MVC 5 View Page (Razor) Visual C#
MVC 5 View Page with Layout (Razor) Visual C#
Web API Controller Class (v2.1) Visual C#
SignalR Hub Class (v2) Visual C#
SignalR Persistent Connection Class (v2) Visual C#
ASP.NET Handler Visual C#
ASP.NET Module Visual C#
Browser File Visual C#
Type: Visual C#
An HTML page that can include client-side code
Name: index.html
Add
Cancel

Replace everything in this file with the following:

HTML

Copy

```
<!DOCTYPE html>
<html xmlns="http://www.w3.org/1999/xhtml">
<head>
  <title>Product App</title>
</head>
<body>

  <div>
    <h2>All Products</h2>
    <ul id="products" />
  </div>
  <div>
    <h2>Search by ID</h2>
    <input type="text" id="prodId" size="5" />
    <input type="button" value="Search" onclick="find();" />
    <p id="product" />
  </div>

  <script src="https://ajax.aspnetcdn.com/ajax/jQuery/jquery-2.0.3.min.js">
</script>
  <script>
    var uri = 'api/products';
    $(document).ready(function () {
      // Send an AJAX request
      $.getJSON(uri)
          .done(function (data) {
            // On success, 'data' contains a list of products.
            $.each(data, function (key, item) {
              // Add a list item for the product.
              $('<li>', { text: formatItem(item) }).appendTo($('#products'));
            });
          });
    });

    function formatItem(item) {
      return item.Name + ': $' + item.Price;
    }

    function find() {
      var id = $('#prodId').val();
      $.getJSON(uri + '/' + id)
          .done(function (data) {
            $('#product').text(formatItem(data));
          })
          .fail(function (jqXHR, textStatus, err) {
            $('#product').text('Error: ' + err);
          });
    }
  </script>
</body>
</html>
```

There are several ways to get jQuery. In this example, I used the Microsoft Ajax CDN. You can also download it from http://jquery.com/, and the ASP.NET "Web API" project template includes jQuery as well.

Getting a List of Products

To get a list of products, send an HTTP GET request to "/api/products".

The jQuery getJSON function sends an AJAX request. For response contains array of JSON objects. The `done` function specifies a callback that is called if the request succeeds. In the callback, we update the DOM with the product information.

HTML Copy

```
$(document).ready(function () {
    // Send an AJAX request
    $.getJSON(apiUrl)
```

```
        .done(function (data) {
            // On success, 'data' contains a list of products.
            $.each(data, function (key, item) {
                // Add a list item for the product.
                $('<li>', { text: formatItem(item) }).appendTo($('#products'));
            });
        });
});
```

Getting a Product By ID

To get a product by ID, send an HTTP GET request to "/api/products/*id*", where *id* is the product ID.

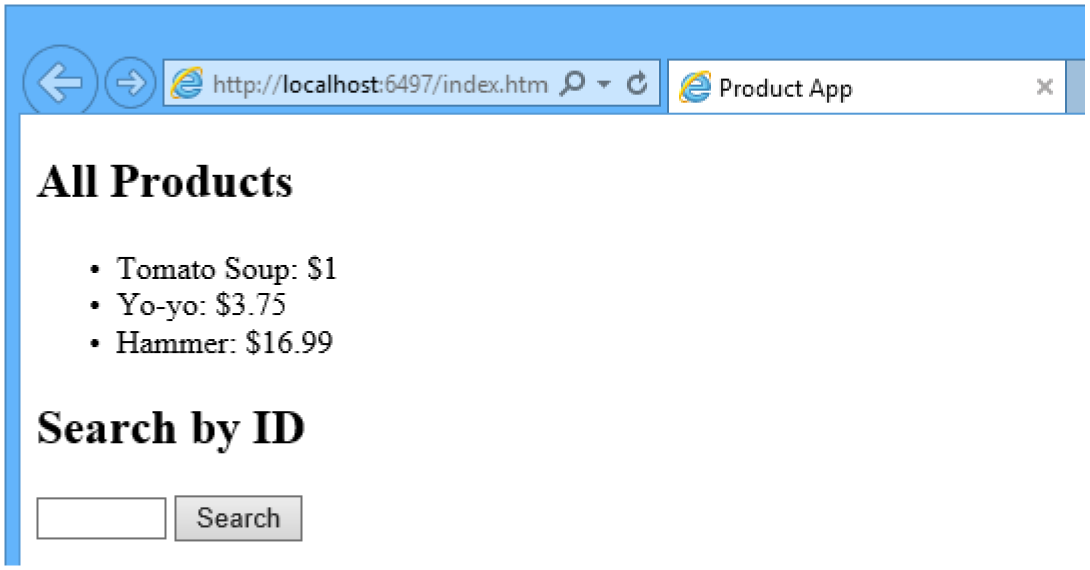
JavaScript Copy

```javascript
function find() {
    var id = $('#prodId').val();
    $.getJSON(apiUrl + '/' + id)
        .done(function (data) {
            $('#product').text(formatItem(data));
        })
        .fail(function (jqXHR, textStatus, err) {
            $('#product').text('Error: ' + err);
        });
}
```

We still call `getJSON` to send the AJAX request, but this time we put the ID in the request URI. The response from this request is a JSON representation of a single product.

Running the Application

Press F5 to start debugging the application. The web page should look like the following:

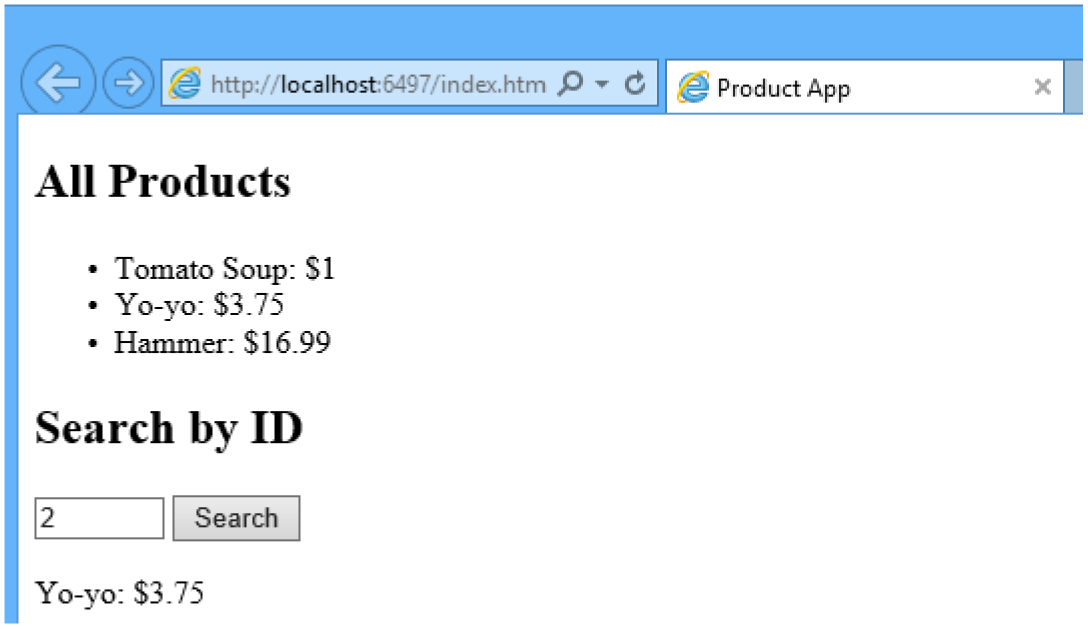


All Products

- Tomato Soup: $1
- Yo-yo: $3.75
- Hammer: $16.99

Search by ID

To get a product by ID, enter the ID and click Search:



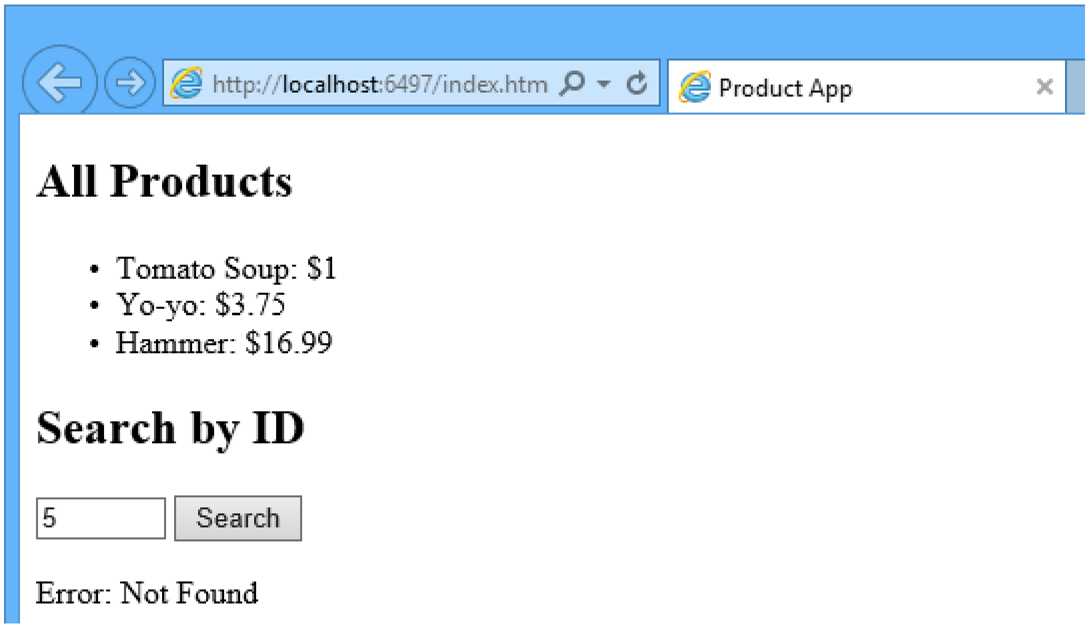
All Products

- Tomato Soup: $1
- Yo-yo: $3.75
- Hammer: $16.99

Search by ID

Yo-yo: $3.75

If you enter an invalid ID, the server returns an HTTP error:



All Products

- Tomato Soup: $1
- Yo-yo: $3.75
- Hammer: $16.99

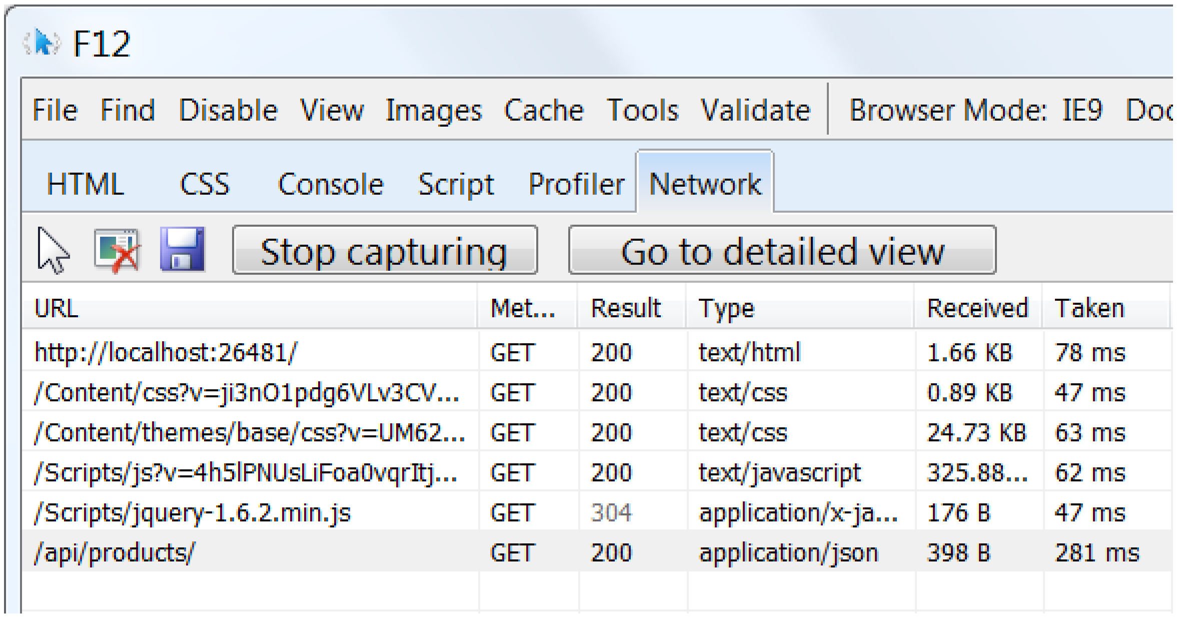
Search by ID

5 Search

Error: Not Found

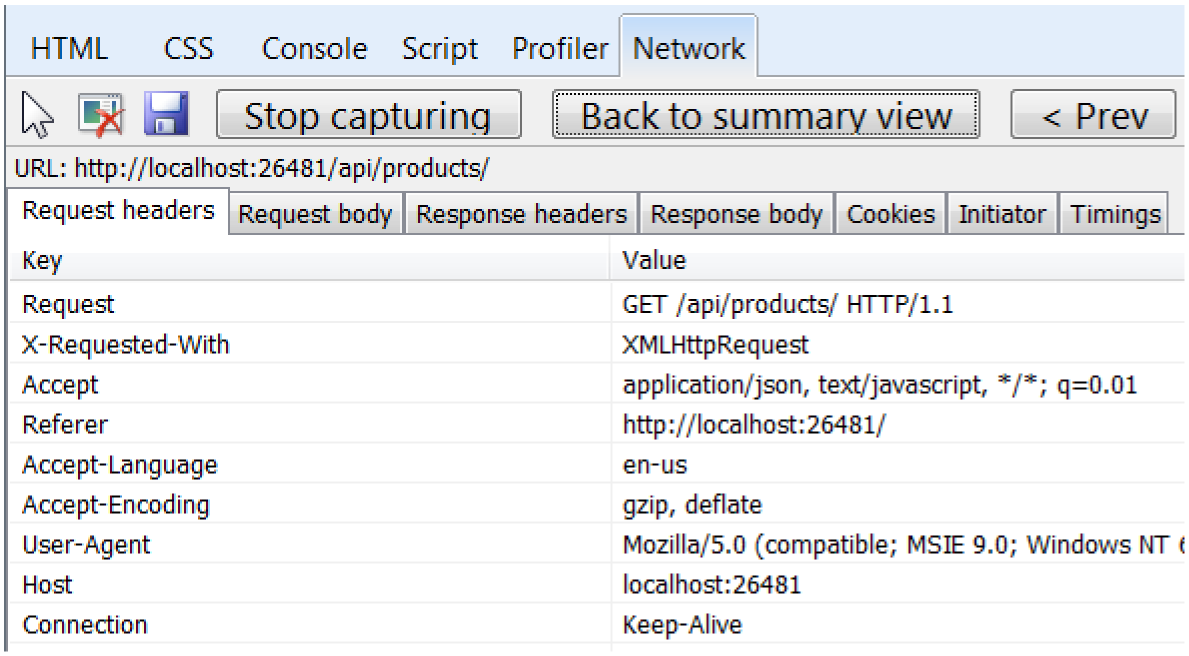
Using F12 to View the HTTP Request and Response

When you are working with an HTTP service, it can be very useful to see the HTTP request and request messages. You can do this by using the F12 developer tools in Internet Explorer 9. From Internet Explorer 9, press **F12** to open the tools. Click the **Network** tab and press **Start Capturing**. Now go back to the web page and press **F5** to reload the web page. Internet Explorer will capture the HTTP traffic between the browser and the web server. The summary view shows all the network traffic for a page:


F12
File Find Disable View Images Cache Tools Validate Browser Mode: IE9 Doc
HTML CSS Console Script Profiler Network
Stop capturing
Go to detailed view

URL	Met...	Result	Type	Received	Taken
http://localhost:26481/	GET	200	text/html	1.66 KB	78 ms
/Content/css?v=ji3nO1pdg6VLv3CV...	GET	200	text/css	0.89 KB	47 ms
/Content/themes/base/css?v=UM62...	GET	200	text/css	24.73 KB	63 ms
/Scripts/js?v=4h5lPNUsLiFoa0vqrItj...	GET	200	text/javascript	325.88...	62 ms
/Scripts/jquery-1.6.2.min.js	GET	304	application/x-ja...	176 B	47 ms
/api/products/	GET	200	application/json	398 B	281 ms

Locate the entry for the relative URI "api/products/". Select this entry and click **Go to detailed view**. In the detail view, there are tabs to view the request and response headers and bodies. For example, if you click the **Request headers** tab, you can see that the client requested "application/json" in the Accept header.



URL: http://localhost:26481/api/products/

Key	Value
Request	GET /api/products/ HTTP/1.1
X-Requested-With	XMLHttpRequest
Accept	application/json, text/javascript, */*; q=0.01
Referer	http://localhost:26481/
Accept-Language	en-us
Accept-Encoding	gzip, deflate
User-Agent	Mozilla/5.0 (compatible; MSIE 9.0; Windows NT
Host	localhost:26481
Connection	Keep-Alive

If you click the Response body tab, you can see how the product list was serialized to JSON. Other browsers have similar functionality. Another useful tool is Fiddler, a web debugging proxy. You can use Fiddler to view your HTTP traffic, and also to compose HTTP requests, which gives you full control over the HTTP headers in the request.

See this App Running on Azure

Would you like to see the finished site running as a live web app? You can deploy a complete version of the app to your Azure account by simply clicking the following button.

Deploy to Azure

You need an Azure account to deploy this solution to Azure. If you do not already have an account, you have the following options:

- Open an Azure account for free - You get credits you can use to try out paid Azure services, and even after they're used up you can keep the account and use free Azure services.
- Activate MSDN subscriber benefits - Your MSDN subscription gives you credits every month that you can use for paid Azure services.

Next Steps

- For a more complete example of an HTTP service that supports POST, PUT, and DELETE actions and writes to a database, see Using Web API 2 with Entity Framework 6.
- For more about creating fluid and responsive web applications on top of an HTTP service, see ASP.NET Single Page Application.
- For information about how to deploy a Visual Studio web project to Azure App Service, see Create an ASP.NET web app in Azure App Service.