

# INT422 Assignment 4

Work with associated data, display-only.

Read/skim all of this document before you begin work.

## Due date

Section A: Thursday, Oct 6, 2016, at 11:59pm ET

Section B: Wednesday, Oct 5, 2016, at 11:59pm ET

Grade value: 4% of your final course grade

*If you wish to submit the lab before the due date and time, you can do that.*

## Objective(s)

Work with associated data, display only. Your app will enable users to view a list of invoices, and detail for an invoice. The detail will be extensive, and will include data from many associated entities.

## Introduction to the problem to be solved

We need an “invoice viewer” web app. The data shown by the invoice viewer must be rich and extensive.

## Specifications overview and work plan

Here’s a brief list of specifications that you must implement:

- Follows best practices
- Implements the recommended system design guidance
- Customized appearance, with an added menu item
- Displays invoice and associated data

Here is a brief work plan sequence:

1. Create the project, based on the project template
2. Customize the app’s appearance
3. Create view models and mappers that cover the initial use cases
4. Add methods to the Manager class that handle the use cases
5. Add controller(s), with code to work with the manager object
6. For the invoice entity, implement the “get all” use case; including controller code, and view
7. Implement the “get one” use case; including controller code, and view

## 8. Incrementally add associated data

During the class/session, your professor will help you *get started* and *make progress* on this assignment.

Every week, in the computer-lab class/session, your teacher will record a grade when you complete a specific small portion of the assignment. We call this “*in-class grading*”.

The *in-class grading* will be announced in-class by your professor.

## Getting started

Create a new web app, named Assignment4.

It **MUST** use the new “Web app project v2” project template. Download this new project template from the course website, and install it into your Visual Studio configuration.

Warning: Your teachers believe that the best way to work through this Assignment 4 is to do it *incrementally*. Get one thing working, before moving on to the next. Test each part.

## Customize the app’s appearance

You will customize the appearance all of your web apps and assignments. Never submit an assignment that has the generic auto-generated text content. Make the time to customize the web app’s appearance.

*For this assignment, you can defer this customization work until later. Come back to it at any time, and complete it before you submit your work.*

Follow the guidance from Assignment 1 to customize the app’s appearance.

## Create view models and mappers that cover the initial use cases

We will be working with the invoice entity, AND some of its associated entities.

Tip:

*Study the DesignModelClasses.cd class diagram that’s in the Models folder.*

*It will help you visualize where the Invoice entity is located in the design model.*

As noted above, these use cases need view models:

- Invoice – “get all”
- Invoice – “get one”

Go ahead and write those view model classes. Do not worry about associated entities yet. Focus only on the “get all” and “get one” for the invoice entity.

Remember to add the [Key] data annotation to all/most of your view model classes.

## Mappers

Define the maps that these use cases will need. At this point in time, you should have enough experience to know which maps are required. Ask if you need help.

## Add methods to the Manager class that handle the use cases

Again, focus only on “get all” and “get one”, for the invoice entity. Do not worry about associated entities yet.

In the Manager class, add the methods that support these use cases.

For “get all”, you should probably use a LINQ query expression to sort the results in a logical way.

## Add controllers, with code to work with the manager object

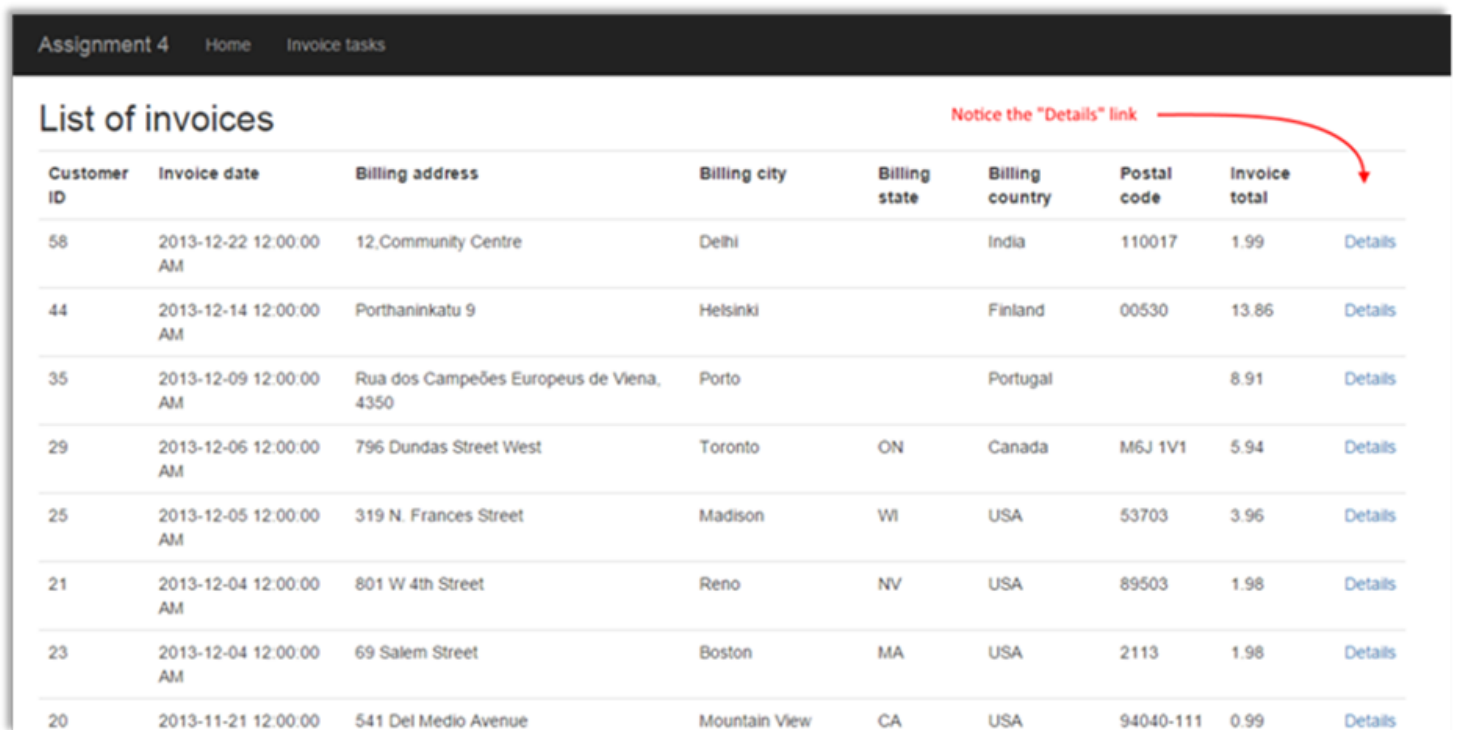
Again, focus only on “get all” and “get one”, for the invoice entity. Do not worry about associated entities yet.

Create a controller for the invoice entity.

## For the invoice entity, implement the “get all” use case; including controller code, and view

The “get all” use case will show the default view when working with invoice objects. Each invoice will have a “Details” link at the right side.

Here’s an example screen capture.

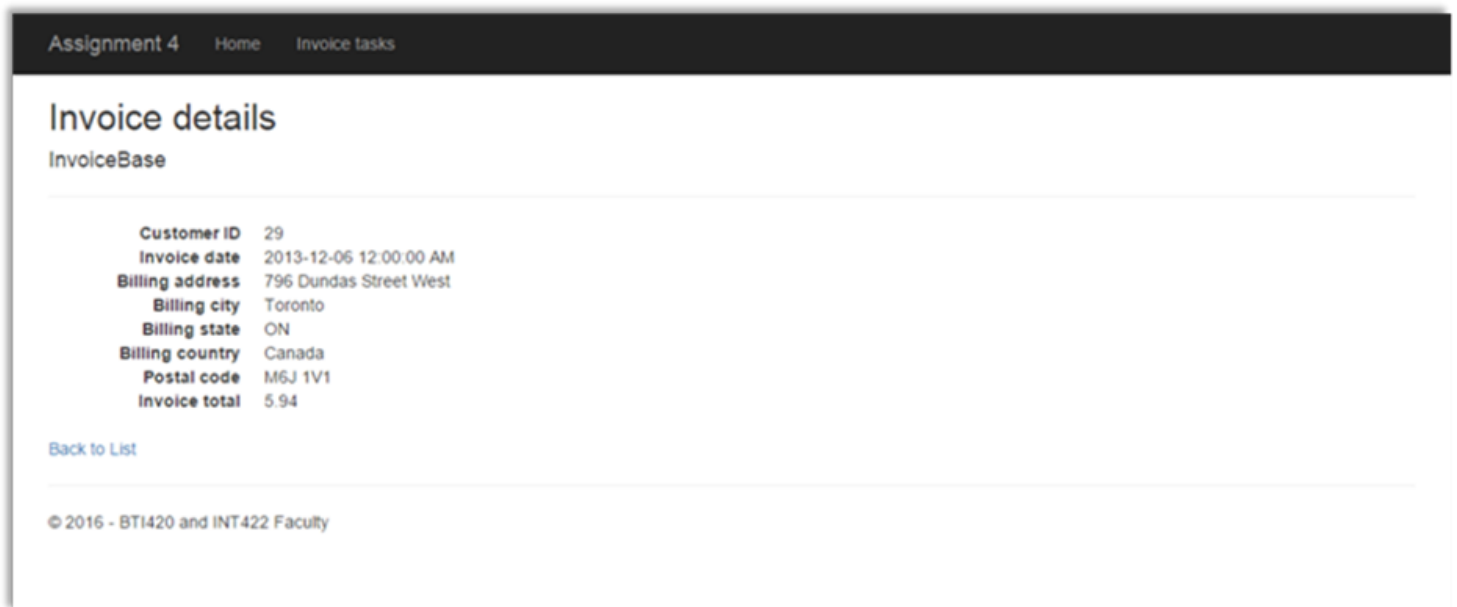


Customer ID	Invoice date	Billing address	Billing city	Billing state	Billing country	Postal code	Invoice total	
58	2013-12-22 12:00:00 AM	12,Community Centre	Delhi		India	110017	1.99	<a href="#">Details</a>
44	2013-12-14 12:00:00 AM	Porthaninkatu 9	Helsinki		Finland	00530	13.86	<a href="#">Details</a>
35	2013-12-09 12:00:00 AM	Rua dos Campeões Europeus de Viena, 4350	Porto		Portugal		8.91	<a href="#">Details</a>
29	2013-12-06 12:00:00 AM	796 Dundas Street West	Toronto	ON	Canada	M6J 1V1	5.94	<a href="#">Details</a>
25	2013-12-05 12:00:00 AM	319 N. Frances Street	Madison	WI	USA	53703	3.96	<a href="#">Details</a>
21	2013-12-04 12:00:00 AM	801 W 4th Street	Reno	NV	USA	89503	1.98	<a href="#">Details</a>
23	2013-12-04 12:00:00 AM	69 Salem Street	Boston	MA	USA	2113	1.98	<a href="#">Details</a>
20	2013-11-21 12:00:00	541 Del Medio Avenue	Mountain View	CA	USA	94040-111	0.99	<a href="#">Details</a>

## Implement the “get one” use case; including controller code, and view

The “get one” use case will show the default ugly view for an invoice object.

Here’s an example screen capture.



## Incrementally add associated data

At this point, your app will reliably display a list of invoices, and individual invoices.

Now, it's time to incrementally add associated data. We will add some data from these entities:

- Customer
- Employee (via Customer)
- InvoiceLine
- Track (via InvoiceLine)
- Album (via Track and InvoiceLine)
- MediaType (via Track and InvoiceLine)
- Artist (via Album and Track and InvoiceLine)

We will use the same sequence from the “Specifications overview and work plan” section above.

## Add data from Customer (and Employee)

Do we need “customer” view model classes? Interestingly, we do not, if we used composed property names and AutoMapper’s “flattening” feature.

So, let's proceed with that plan. It will less our workload.

Create an InvoiceWithDetail view model class. It will inherit from InvoiceBase.

Add some composed property names from the Customer and Employee design model classes.

In a class, a composed property name is a string concatenation of the *property* names, from the navigation property in the current class, to the property in the destination class. On the way to the destination, you can pass through other navigation properties.

For example, the Invoice class has a “Customer” navigation property. If we want the Customer class “FirstName” property, the composed property name will be “CustomerFirstName”.

In addition, the Customer class has an “Employee” navigation property. If we want the Employee class “FirstName” property, the composed property name will be “CustomerEmployeeFirstName”.

For now, we need:

- customer first and last names, and city, and state
- employee (i.e. the customer’s sales rep) first and last name

Add a mapper, from Invoice, to InvoiceWithDetail.

In the Manager class, add another “get one” invoice method. Its purpose will be to fetch an invoice, with some associated data. Its suggested name is “InvoiceGetByIdWithDetail()”. It must use the Include() method, for the Customer and Employee properties.

How can you get employee information?

*The problem is that Invoice does NOT have a direct association with Employee. Instead, the path is Invoice > Customer > Employee.*

*Can we easily get employee information? Yes. You may recall reading the MSDN documentation for the [Include\(\)](#) method. The “path” parameter is a “dot-separated list of related objects to return in the query results.”*

*Ah. Something like “Customer.Employee”.*

At this point in time, you have had something that looks like this.

Assignment 4 Home Invoice tasks

## Invoice details

InvoiceWithDetail

Customer ID	13
Invoice date	2012-03-03 12:00:00 AM
Billing address	Qe 7 Bloco G
Billing city	Brasilia
Billing state	DF
Billing country	Brazil
Postal code	71020-677
Invoice total	13.86
CustomerFirstName	Fernanda
CustomerLastName	Ramos
CustomerCity	Brasilia
CustomerState	DF
CustomerEmployeeF...	Margaret
CustomerEmployeeL...	Park

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Yes, it fetched properties from the associated Customer object

But this is ugly!  
And too atomic - do we need separate first and last names?

Can we make it look better?

It's ugly. Can we make it look better? Yes. Hand-edit the view:

- Format the numbers and dates so they look nicer
- Gather the invoice-specific info together (and display the invoice identifier)
- Gather the customer info together

### Format the numbers and dates

At the top of every view, there is a Razor code expression block (which starts with @{...}).

We suggest that you add code to this block, to declare and prepare strings that can be used in the view. For example, we can format dates and numbers. And we can concatenate strings in a more convenient manner.

Note:

*There is a [DisplayFormat](#) data annotation.  
That can be quite useful for date and number formatting too.*

To get you started, let's change the ugly default date format (for the invoice date), to something that's nicer to read and understand. Here's the edited code block:

```
@{
    ViewBag.Title = "Invoice details";

    // Prepare some strings, to be used below
    var invoiceDate = Model.InvoiceDate.ToLongDateString();

    // Add more here
}
```

Then later, when you need to use the new pretty "invoiceDate":

```
<dd>
    @invoiceDate
    @*@Html.DisplayFor(model => model.InvoiceDate)*@
</dd>
```

### Gather the invoice-specific info together (and display the invoice identifier)

We suggest that you create a new <dl> element, to hold the invoice-specific info.

Remember – a view *source code file* can hold HTML and code expressions.

### Gather the customer info together

Maybe the first step is to get rid of those atomic customer-related elements. Create new concatenated strings (in the code block at the top of the view).

At this point in time, you have had something that looks like this. Looks pretty good – almost perfect (for now).

Assignment 4HomeInvoice tasks

Invoice details

InvoiceWithDetail

Invoice number

264

Invoice date

Saturday, March 3, 2012

Invoice total

\$ 13.86

Customer ID

13

Customer name

Fernanda Ramos  
Brasilia, DF

Sales representative

Margaret Park

Billing address

Qe 7 Bloco G

Billing city

Brasilia

Billing state

DF

Billing country

Brazil

Postal code

71020-677

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← This looks MUCH better!

Notice that we replaced multiple ugly lines of text with a format that's easier to read and understand

Finish off the work by following the same process to collapse and format the billing address info. You may end up with something like this.

Assignment 4HomeInvoice tasks

Invoice details

InvoiceWithDetail

Invoice number

264

Invoice date

Saturday, March 3, 2012

Invoice total

\$ 13.86

Customer ID

13

Customer name

Fernanda Ramos  
Brasilia, DF

Sales representative

Margaret Park

Billing address

Qe 7 Bloco G  
Brasilia, DF, Brazil  
71020-677

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## Add data from InvoiceLine

Now, we will add invoice line-item detail.

First, we need a “base” view model class for InvoiceLine. And a mapper.

Next, modify the invoice-with-details view model class, by adding a collection navigation property for the InvoiceLineBase items. Make sure the name of this navigation property matches the design model class.

Now, modify the manager invoice-get-by-id-with-detail method. Include the InvoiceLines property in the statement. The controller method is good as is, with no changes.

Finally, in the view source code, add HTML and code expressions to build a table, located below the existing information. It will probably look like the following.

The screenshot shows a web application interface for 'Assignment 4' with a dark header bar containing 'Home' and 'Invoice tasks' links. The main content area is titled 'Invoice details' and 'Invoice and customer information'. It displays invoice details (number 264, date Saturday, March 3, 2012, total \$ 13.86) and customer information (ID 13, name Fernanda Ramos, address Qe 7 Bloco G, Brasilia, DF, Brazil 71020-677). Below this is a 'Line item detail' section containing a table of invoice line items. The table has columns: Invoice line ID, Track ID, Unit price, and Quantity. The table is highlighted with a red box and labeled 'Ugly.' with a suggestion to add Bootstrap classes (table and table-striped) to the <table> element. A 'Back to List' link is at the bottom left of the table. The footer shows '© 2016 - BT1420 and INT422 Faculty'.

Invoice line ID	Track ID	Unit price	Quantity
1428	1677	0.99	1
1429	1686	0.99	1
1430	1695	0.99	1
1431	1704	0.99	1
1432	1713	0.99	1
1433	1722	0.99	1
1434	1731	0.99	1
1435	1740	0.99	1
1436	1749	0.99	1
1437	1758	0.99	1
1438	1767	0.99	1
1439	1776	0.99	1
1440	1785	0.99	1
1441	1794	0.99	1

Not bad, but the table is ugly. Follow the guidance in the image above to fix it. The two classes (table and table-striped) are defined by the [Bootstrap framework](#) (which will be introduced soon in this course). Then, it will probably look something like the following.



## Invoice details

### Invoice and customer information

**Invoice number** 264  
**Invoice date** Saturday, March 3, 2012  
**Invoice total** \$ 13.86

**Customer ID** 13  
**Customer name** Fernanda Ramos  
 Brasília, DF  
**Sales representative** Margaret Park  
  
**Billing address** Qe 7 Bloco G  
 Brasília, DF, Brazil  
 71020-677

### Line item detail

Invoice line ID	Track ID	Unit price	Quantity
1428	1677	0.99	1
1429	1686	0.99	1
1430	1695	0.99	1
1431	1704	0.99	1
1432	1713	0.99	1
1433	1722	0.99	1
1434	1731	0.99	1

## Line item calculation

Add another column, to hold the line item total.

## Add data from Track (via InvoiceLine)

While the invoice line items are technically correct, they're not very useful to a browser user. We must add information about the track that's readable and understandable for the browser user. For example, the track name, and other detail.

A strategy similar to what we did for Customer and Employee (above) is recommended. We'll take advantage of the AutoMapper "flattening" feature.

Create an InvoiceLineWithDetail view model class. It will inherit from InvoiceLineBase.

Add some composed property names from the Track design model class. We want the track name, for sure. Others? We could optionally add the composer.

Add a mapper, from InvoiceLine to InvoiceLineWithDetail.

Modify the existing manager method so that it includes the path InvoiceLines > Track.

Next, go back to the *invoice* view model classes. The invoice-with-details view model class has a navigation property that holds the collection of invoice lines. What's its data type? InvoiceLineBase. We must change the data type, to the new view model class that you just created (InvoiceLineWithDetail).

Finally, edit the view source code.

At this point, you will probably have something that looks like the following.

Assignment 4

Home

Invoice tasks

Invoice details

Invoice and customer information

Invoice number66

Invoice dateFriday, October 9, 2009

Invoice total\$ 5.94

Customer ID55

Customer nameMark Taylor

Sidney, NSW

Sales representativeMargaret Park

Billing address421 Bourke Street

Sidney, NSW, Australia

2010

Line item detail

Invoice line ID	Track ID	Track Name	Unit price	Quantity	Item Total
349	2104	Relevation (Mother Earth) Composer(s): O. Osbourne, R. Daisley, R. Rhoads	0.99	1	0.99
350	2108	Children Of The Grave Composer(s): A. F. Iommi, W. Ward, T. Butler, J. Osbourne	0.99	1	0.99
351	2112	Dee Composer(s): R. Rhoads	0.99	1	0.99
352	2116	Blue Train Composer(s): Jimmy Page, Robert Plant, Charlie Jones, Michael Lee	0.99	1	0.99
353	2120	Walking Into Clarksdale Composer(s): Jimmy Page, Robert Plant, Charlie Jones, Michael Lee	0.99	1	0.99

## Add data from Album (via Track and InvoiceLine) and data from Artist (via Album and Track and InvoiceLine)

We hope that you now see a pattern for working with associated data. And that adding data from the Album and Artist objects is surprisingly easy.

Track has a to-one association with Album. To work with the Album “Title” property:

1. Add a composed property name to the InvoiceLineWithDetail view model class
2. Modify the existing manager method, to include the *path* to the Album object
3. Edit the view source code

Album has a to-one association with Artist. To work with the Artist “Name” property:

1. Add a composed property name to the InvoiceLineWithDetail view model class
2. Modify the existing manager method, to include the *path* to the Artist object
3. Edit the view source code

## Add data from MediaType (via Track and InvoiceLine)

Above, when working with Album and Artist data, we had a straight-line path from the InvoiceLine object:

InvoiceLine > Track > Album > Artist

Now, we need a piece of data from the MediaType object. It has a slightly different path:

InvoiceLine > Track > MediaType

As a result, to add data from MediaType (the “Name” property), we still follow the same strategy as we did with Album and Artist, but we will need a third Include() method to get to the MediaType object.

If you did this correctly, you will probably have something that looks like the following.

Assignment 4   Home   Invoice tasks

Invoice details

Invoice and customer information

Invoice number66

Invoice dateFriday, October 9, 2009

Invoice total\$ 5.94

Customer ID55

Customer nameMark Taylor

Sales representativeMargaret Park

Billing address421 Bourke Street

Sidney, NSW, Australia

2010

Track information has many details now

Track name

Artist

Album

Composer

and MediaType

Line item detail

Invoice line ID	Track ID	Track Info	Unit price	Quantity	Item Total
349	2104	Relevation (Mother Earth) by Ozzy Osbourne Album: Tribute Composer(s): O. Osbourne, R. Daisley, R. Rhoads Format: MPEG audio file	0.99	1	0.99
350	2108	Children Of The Grave by Ozzy Osbourne Album: Tribute Composer(s): A. F. Iommi, W. Ward, T. Butler, J. Osbourne Format: MPEG audio file	0.99	1	0.99
351	2112	Dee by Ozzy Osbourne	0.99	1	0.99

## Iternative column organization

Just for fun, you can play around with the view source code, and organize the columns in different ways. For example, the following shows two columns to hold track information.

Assignment 4
Home
Invoice tasks

## Invoice details

Invoice and customer information

[Back to List](#)

**Invoice number** 395  
**Invoice date** Saturday, October 5, 2013  
**Invoice total** \$ 5.94

**Customer ID** 12  
**Customer name** Roberto Almeida  
 Rio de Janeiro, RJ  
**Sales representative** Jane Peacock  
**Billing address** Praça Pio X, 119  
 Rio de Janeiro, RJ, Brazil  
 20040-020

*Alternative column organization*

### Line item detail

Invoice line ID	Track ID	Track name, artist	Album, composer(s)	Unit price	Quantity	Item total
2135	2499	Eye by Smashing Pumpkins	Album: Rotten Apples: Greatest Hits Composer(s): Billy Corgan Format: MPEG audio file	0.99	1	0.99
2136	2503	Stand Inside Your Love by Smashing Pumpkins	Album: Rotten Apples: Greatest Hits Composer(s): Billy Corgan Format: MPEG audio file	0.99	1	0.99
2137	2507	Flower by Soundgarden	Album: A-Sides Composer(s): Chris Cornell/Kim Thayll Format: MPEG audio file	0.99	1	0.99

## Testing your work

In a browser, test your work, by doing tasks that fulfill the use cases in the specifications.

## Reminder about academic honesty

You must comply with the College’s academic honesty policy. Although you may interact and collaborate with others, *you must submit your own work*.

## Submitting your work

Here’s how to submit your work, before the due date and time:

1. Locate the folder that holds your solution files. In Solution Explorer, right-click the “Solution” item, and choose “Open Folder in File Explorer”. It has three (or more) items: a Visual Studio Solution file, a folder that has your project’s source code, and a “packages” folder. Go UP one level.
2. Make a copy of the folder. This is the version that you will be uploading.
3. Remove the “packages” folder from the copied folder; also, remove the “bin” and “obj” folders.
4. Compress/zip the copied folder. The zip file SHOULD be about 2MB or less in size. If it isn’t, you haven’t followed the instructions properly.

5. Login to My.Seneca/Blackboard. Open the Web Programming on Windows course area. Click the "Assignments" link on the left-side navigator. Follow the link for this lab. Submit/upload your zip file. The page will accept three submissions, so if you upload, then decide to fix something and upload again, you can do so.