



A SunCam online continuing education course

Web-Based Programming For Engineers - Part 1

by

Kwabena Ofofu, Ph.D., P.E., PTOE



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Abstract

The objective of this course series is to present web-based computer programming to engineers. Engineers generally learn a conventional computer programming language such as *FORTRAN*, *Pascal*, *C++*, etc. Since the advent of the internet and the World Wide Web, web browsers such as *Internet Explorer*, *Mozilla Firefox*, *Google Chrome*, etc. have built-in capabilities to interpret and implement programmed instructions written in a class of programming languages called scripting languages. Web-based programming involves writing codes, called scripts, in a scripting language. The scripts are embedded in the structure of web pages. Unlike conventional general purpose programming languages, web-based programming does not require any special software to be installed. The scripts are interpreted and implemented directly by the web browser. Web-based programming is an increasingly relevant and advantageous tool for engineers competing in the global marketplace in the age of the internet and the World Wide Web. Once uploaded to the World Wide Web, web-based applications are immediately exposed to a global audience.

This course is the first of a series on web-based programming. This course prepares participants for learning scripting languages and web-based programming. This course uses screenshots and an easily readable click-by-click narrative that engages participants as they proceed through the topics. An introduction to computers and computer networks, the internet and the World Wide Web, is presented. The fundamentals of the Hyper Text Markup Language (HTML), for building web pages, are presented in detail. Several examples are presented to illustrate the creation and editing of web pages using HTML alone. At the end of this course, participants will be capable of building a web page from scratch, and editing and updating existing web pages. Upon completion of this course, participants will be prepared to begin learning how to program web-based applications. On completion of this course participants will be able to identify professional situations in which applying web-based programming will be of great benefit to them in their fields of specialty, and to their organizations.



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1. INTRODUCTION

1.1 Computers

A computer can be defined as an electronic device that has the ability to accept, manipulate, process, store, retrieve, and output data according to programmed instructions.

There are many types of computers. A **personal computer** is a computer designed for an individual user. A **server** is a computer that manages resources for an interconnected network of computers. A **mainframe** computer is a very large and expensive computer capable of supporting hundreds, and thousands, of users simultaneously. Mainframes are used by large and complex organizations for large-scale data processing and critical applications, e.g. the census, national security, etc. A **supercomputer** is the fastest type of computer. Supercomputers are used for specialized applications that require complex mathematical calculations on an enormous scale. Supercomputers are used in weather forecasting, petrochemical exploration, and scientific research. Other types of computers include **tablet** computers, **game consoles**, **smartphones**, **automated teller machines** (ATM), and many others.

A computer consists of two basic parts 1) The **Hardware** refers to the physical components of the computer, such as the monitor, keyboard, mouse, etc.; 2) The **Software** is all the sets of instructions that tell the hardware what to do, e.g. web browsers, games, word processors, etc.

The **central processing unit (CPU)** is the hardware component of a computer that carries out the instructions by performing the basic operations such as data input, arithmetic, logic, and output of results. The CPU is essentially the physical “brain” of the computer. The **memory** of a computer refers to the hardware used to store the instructions and data on a temporary or permanent basis. The **storage** of a computer refers to physical components and recording media used to retain the data in electronic format on a long term basis.

The **operating system (OS)** of a computer is software that manages and coordinates the computer's memory, storage, processes, and all of its software and hardware. Modern operating systems use a **graphical user interface (GUI, pronounced "gooey")** to enable a human user to interact with the computer. It is the GUI that enables a user to click on icons, select buttons, menus, checkboxes, etc., and have results displayed back to the user on a screen using graphics, text, or some combination thereof. Currently, the most common operating systems in use for personal computers are *Microsoft Windows*, *Apple Mac OS X*, and *Linux*.



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1.2 Computer Networks

An interconnected group of computers that can communicate with each other and also share and exchange information is called a computer network. A group of less than ten interconnected computers is called a **workgroup**. Workgroups are commonly used in offices, small businesses, and in homes, etc. A **local area network** (LAN) is a computer network for a limited geographic area such as a school, a university campus, an office complex, etc. A **wide area network** (WAN) covers a broader regional or even national geographic area, and includes public as well private communication lines. For example, national governmental agencies and large corporations utilize such networks to conduct business on a national scale from any of their many physical locations. A network built by a business to connect its numerous locations and to share computer resources is referred to as an **enterprise network**. In LANs, WANs, and enterprise networks in general, there are clear roles for the constituent computers in the network. For example, in a network there may be one computer that “serves” resources and data to a number of requesting “client” computers. Such a network is referred to as a client/server network.

The **internet** is a group of interconnected computers, networks and groups of networks on a global scale. Therefore, technically, the internet is a wide area network. In order for a computer on the internet to communicate with other participating computers it must have special software that can interpret what other computers are "saying". This special software is called a **web browser** (or browser). Some of the common web browsers in use today include **Internet Explorer, Mozilla Firefox, Google Chrome, Opera, and Safari**. All web browsers are free and come with the computer’s operating system. For example, *Microsoft Windows* comes with the *Internet Explorer* browser.

1.3 The World Wide Web

The terms “internet” and “World Wide Web” have become synonymous and interchangeable in common usage. However, there is a clear difference. The internet is the physical network of all the networks of all the participating interconnected computers. The World Wide Web (or **the web**) is a network of virtual documents that reside on computers on this network (the internet). With a web browser these documents, called **web pages**, can be accessed, opened, and viewed from any participating computer. The web pages are accessed by the web browser using hyperlinks. The browser interprets the instructions (**source code** or **code**) in the document and displays the web page. Web pages are generally stored on server computers (servers) on the



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internet. Therefore the web is a constituent part of the internet. A collection of related web pages is referred to as a **website**.

1.4 Web Pages

A web browser interprets the code in the web page document and then displays the contents to the user accordingly. However, web browsers are not designed to understand ordinary everyday language. **Hyper Text Markup Language (HTML)** is the language of the web. All web pages are HTML documents. The HTML code tells the web browser how to display the web page's words, numbers, images, etc., to the user.

HTML is a markup language. A markup language is a combination of keywords and symbols that provide instructions on how a document should appear. In contrast to a programming language, e.g. *Visual Basic*, a markup language has no variables and is not used to perform calculations, etc. Computations, algorithms, etc., are performed by embedding code written in a **scripting language** into the HTML code. A scripting language is a “lightweight” programming language that can be interpreted by a web browser. Examples of currently popular scripting languages include *JavaScript* and *VBScript*. Codes written in programming languages such *C++*, *Visual Basic*, etc., are compiled, i.e. converted to machine language that the computer can understand and then implement. A markup language on the other hand is not compiled; it is interpreted by the web browser which then displays the document accordingly.

HTML is free and there is no special or required software needed to develop HTML documents. It is pertinent to note that there are many commercial software products on the market for creating or editing web pages and websites. These products generally provide a visually pleasing interactive environment with enhanced graphics and other features which the user can apply to design web pages without any knowledge of HTML. These products cover a wide variety of capabilities, features, and prices. All of these products ultimately generate an HTML file(s) that is then uploaded to the web. It is important to note however that an HTML file can be created or edited using any text editor program. As with web browsers, text editors are free and come with the operating system of the computer. For example, *Microsoft Windows* comes with the text editors *WordPad* and *Notepad*.

The standards for the HTML language are provided by the **World Wide Web Consortium (W3C)**. HTML is into its seventh version as of 2012, called *HTML5*.



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1.5 Relevance of Computing and Web Development

The question often arises as to why engineers and scientists should learn HTML, web development, web-based programming, etc. Engineers, for instance, are generally required to take an introductory level computer programming class as college freshers. They are not required to study web development. Beyond the fresher requirements, engineering students generally do not receive any further formal instructions on the subject and may not be required to apply it in any other classes for the rest of their entire undergraduate work. Effectively, by graduation, the computing class is a distant memory of questionable relevance, and yet computing is becoming an increasingly advantageous and necessary skill set for engineers and scientists competing in the global economy. By writing computer programs and scripts to automate tedious and repetitive tasks such as design calculations, or preparing, processing and analyzing large amounts of data which would otherwise be done by hand, engineers and scientists can drastically increase their productivity and efficiency. Competence in computing and web development predisposes engineers and scientists to pursue and develop more creative and innovative solutions than their peers. Knowledge and some level of experience in computing enables engineers and scientists to communicate more effectively with full-time programmers, web developers, and information technology professionals they may work with and collaborate with on various projects.

Another question that often arises is whether programming solutions should be developed as desktop applications or web-based applications. Desktop applications reside on the individuals' computers or may be available over their organizations' network(s) for use by a limited number of coworkers and authorized staff members. In contrast, the web has become a primary global medium. Web-based applications are immediately available to the global internet audience for view, review, search (by search engines), download, etc., giving professionals and their organizations exposure and recognition on a world wide scale. Desktop applications require some investment in software for implementation. Web-based applications, on the other hand, are run through the web browser and require no software whatsoever. Consider a desktop database application developed by an engineering company. For the application to be implemented across the organization the company will have to purchase the relevant software to be installed on the computers of all employees who will be participating. This software may be costly and may require periodic upgrades, updates, license renewal fees, subscriptions, maintenance fees, etc. In contrast, if a web-based solution was implemented, there would be no special software needed, as the application would be run through the web browser, and none of the above costs would be relevant. The requirement for a web-based solution is an internet connection.



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1.6 Planning Web-Based Solutions

A six-step procedure for planning and implementing a web-based application solution to a problem or research question is as follows:

1. Study the problem in detail and gain a good working understanding of the fundamental concepts and principles, and underlying theories. This may involve knowledge from a wide variety of fields such as engineering, physical sciences, mathematics, statistics, business, economics, government and many others.
2. Develop an algorithm for solving the problem. A flow chart of the algorithm will provide a detailed visual representation of the process from start to finish, including all inputs, calculations, data processing, automated reasoning, outputs, reports, and feedback procedures.
3. Write **pseudo code** for your algorithm. Pseudo code is the instructions needed to implement the algorithm in ordinary everyday language. Test your algorithm by performing manual calculations to verify your results.
4. Write code to implement the algorithm in the target markup and scripting languages following all syntax rules and requirements.
5. Test and debug the code intermittently to identify and resolve glitches and errors.
6. Test the program. Validate and verify the results. Make changes and updates as necessary where needed.



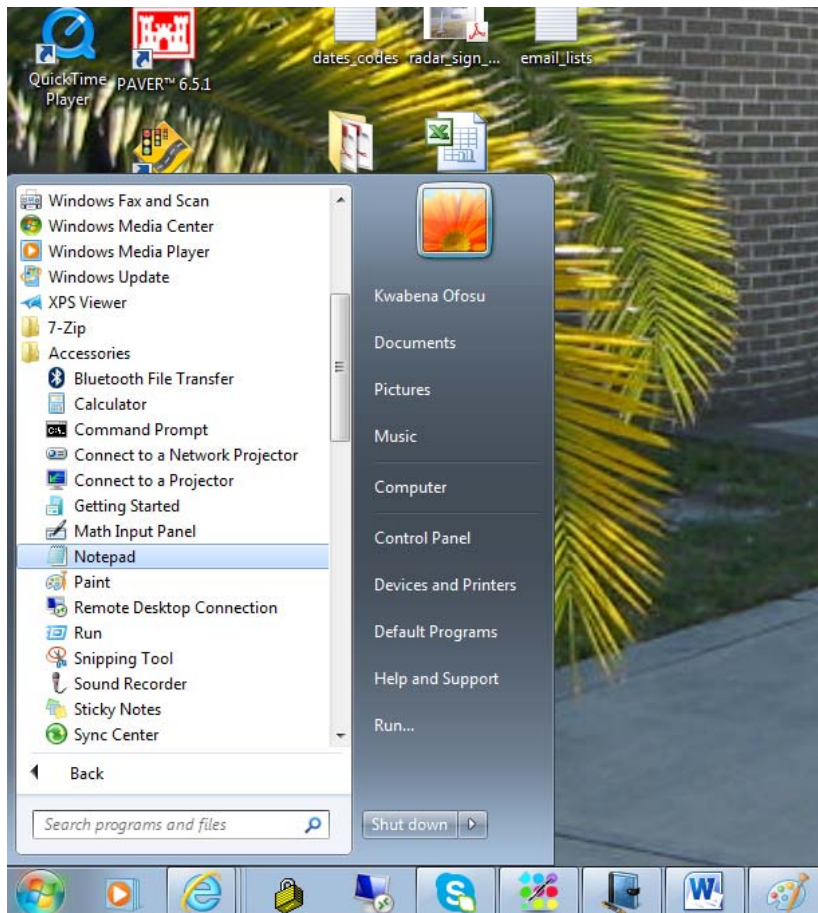
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2. INTRODCUTION TO HTML

2.1 Getting Started

In this section a simple web page (HTML document) will be created to illustrate the basic structures of HTML.

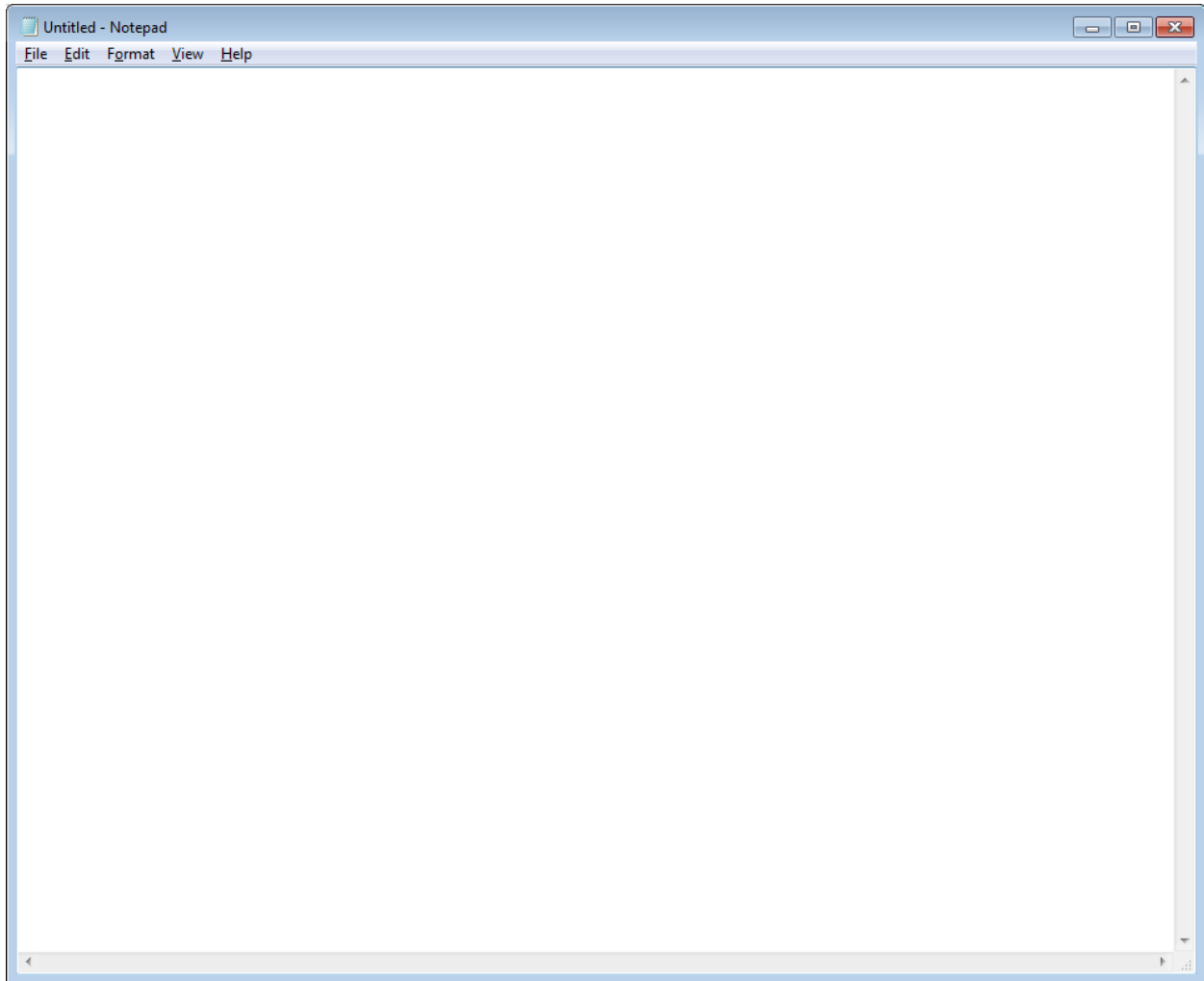
From the **Start** button select **All Programs**, select **Accessories**, select **Notepad**.





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A new blank *Notepad* session opens.





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Type in the following code.

A screenshot of a Notepad window titled "Untitled - Notepad". The window has a menu bar with "File", "Edit", "Format", "View", and "Help". The text area contains the following HTML code:

```
<!DOCTYPE html>
<html>
  <title>
    HTML Hompage
  </title>
  <body>
    <h1>My First Web Page </h1>
    <p> welcome to HTML. </p>
  </body>
</html>
```



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A pair of angle brackets and its contents is called an **HTML tag** (or tag). The text within a tag is called a tag keyword. Tags come in pairs, an **opening tag** and a **closing tag** (or **start tag** and **end tag** respectively). The closing tag includes a back slash. The tags and the plain text typed in between an opening and closing pair of tags is called an **HTML element**. The tag keyword invokes some property to the **element content**, the plain text in between the tags, or to the HTML document.

Not all HTML tags require a closing tag. However, if a closing tag is required, it must be added for the web page content to be displayed correctly by the browser. The opening and closing tags do not have to be on the same line as each other or their element content, and the amount of white space between a tag and its element content is of no consequence to the browser. It is good practice to space out the code and offset some blocks of code from others to enhance readability. This is particularly advantageous when reviewing your code for errors and bugs. Offsetting blocks of code is called **indenting**.

The structure of the first example HTML document is as follows.

1. The `<!DOCTYPE html>` tag declares the document type to the browser. This declaration tag is the current standard for *HTML5*.
2. `<html>` `</html>` : This pair indicates the beginning and end of the HTML code in the text file.
3. `<title>` `</title>` : This pair encloses the text that will appear in the title of the browser tab when the browser opens to display the document.
4. `<body>` `</body>` : This pair encloses the main body of the web page content. This is where the majority of the web page's code will be typed in.
5. `<h1>` `</h1>` : This pair imparts a heading font format to the element content. *h1* is one of many heading styles supported by HTML.
6. `<p>` `</p>` : This pair creates a new paragraph for the element content.

HTML tags are not case-sensitive. The World Wide Web Consortium (W3C) recommends lower case for all tags. In this course all tags will use lower case unless explicitly noted otherwise.

Tags may be embedded (nested) within each other, as needed, to meet the objectives.



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In this example add the following code.

A screenshot of a Notepad window titled "Untitled - Notepad". The window contains the following HTML code:

```
<!DOCTYPE html>
<html>
  <title>
    HTML Hhomepage
  </title>
  <body>
    <h1>My First Web Page </h1>
    <p> Welcome to HTML.<br> HTML is easy and should be fun.</p>
  </body>
</html>
```

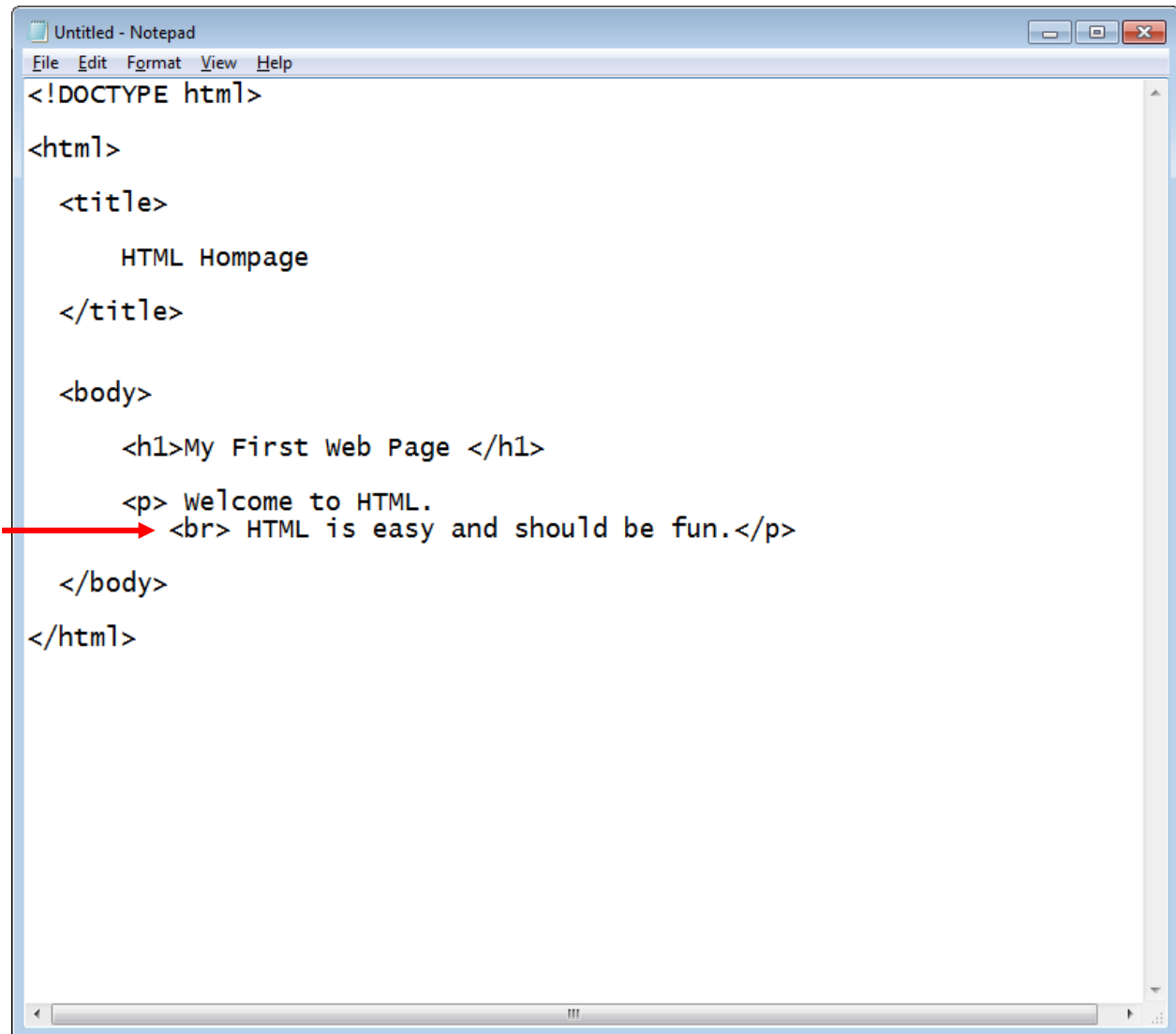
A red arrow points to the `
` tag in the second line of the `<p>` element.

The `
` tag inserts a line break such that the text after it (to the right) will start on a new line. The `
` is one example of a tag for which there is no closing tag. Also this tag has no element content associated with it. Such HTML elements are called **empty elements**.



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Note that due to the fact that the browser will ignore white space within and between HTML elements, the code can be typed as

A screenshot of a Notepad window titled "Untitled - Notepad". The window contains the following HTML code:

```
<!DOCTYPE html>
<html>
  <title>
    HTML Homepage
  </title>
  <body>
    <h1>My First Web Page </h1>
    <p> welcome to HTML.
    <br> HTML is easy and should be fun.</p>
  </body>
</html>
```

A red arrow points to the line containing the `
` tag, highlighting the white space between the two lines of text in the paragraph.



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or as

A screenshot of a Notepad window titled "Untitled - Notepad". The window contains the following HTML code:

```
<!DOCTYPE html>
<html>
  <title>
    HTML Hhomepage
  </title>
  <body>
    <h1>My First Web Page </h1>
    <p>
      Welcome to HTML.
      <br>
      HTML is easy and should be fun.
    </p>
  </body>
</html>
```

Two red arrows are present: one points to the opening <p> tag, and the other points to the
 tag.

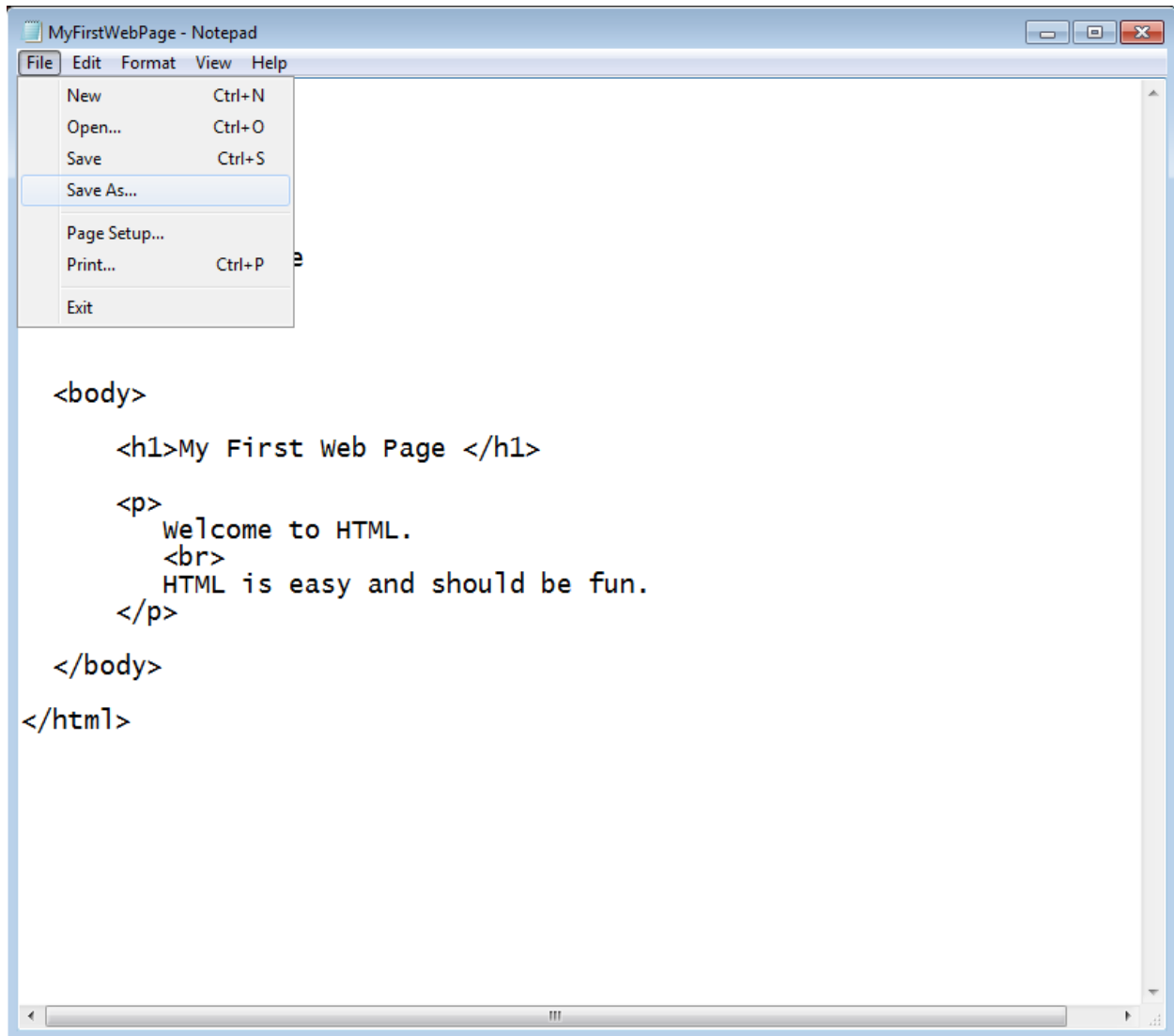
or other combinations thereof.



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The document may now be saved.

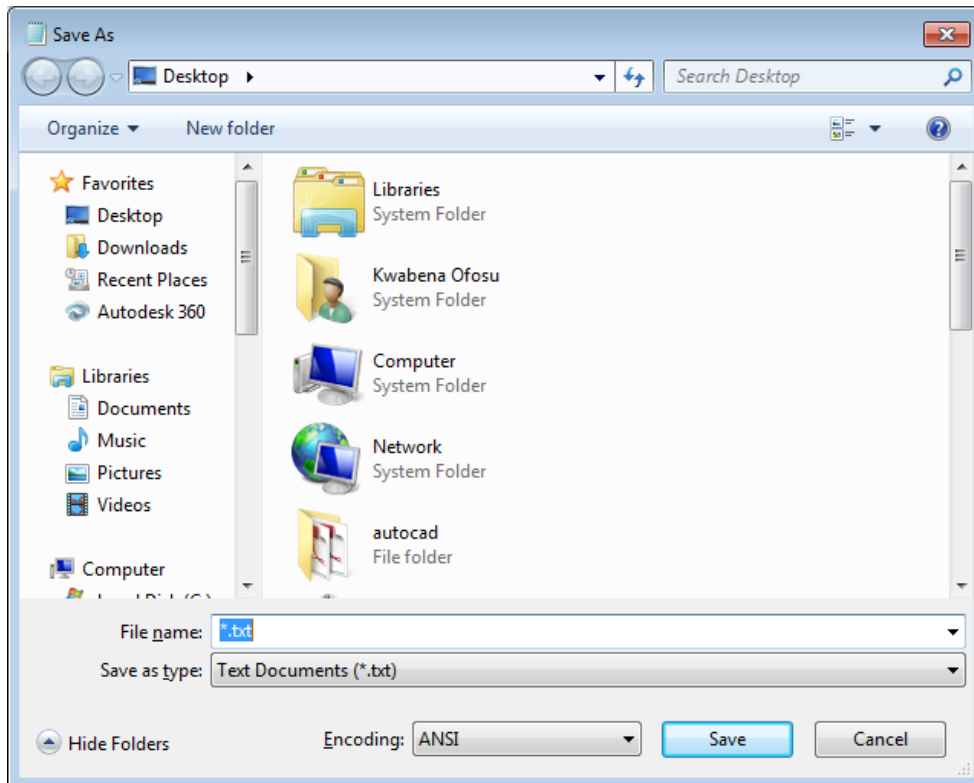
Click on **File**, select **Save As**





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Navigate to a directory of your choice to save your file to.

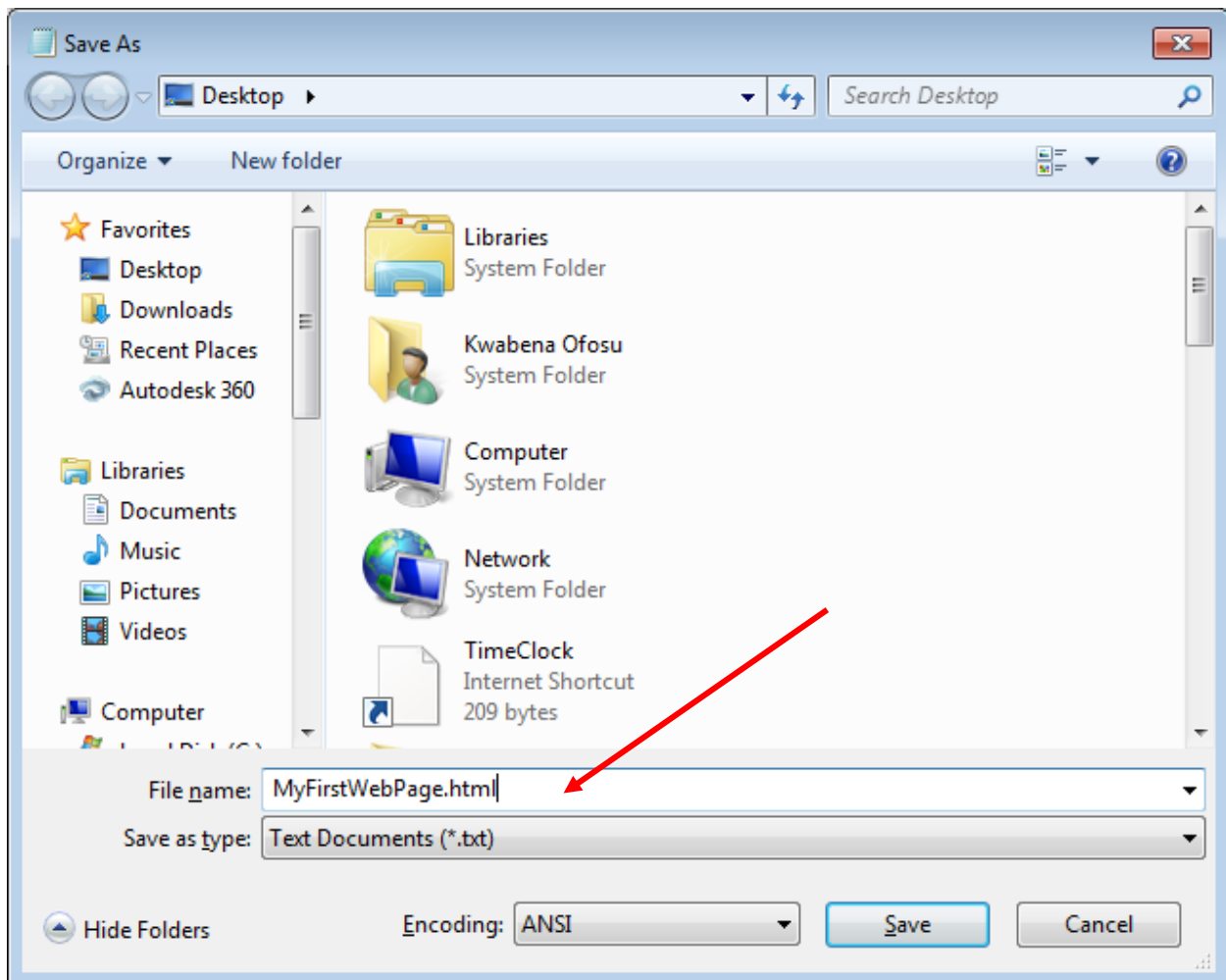




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Give your file a name of your choice.

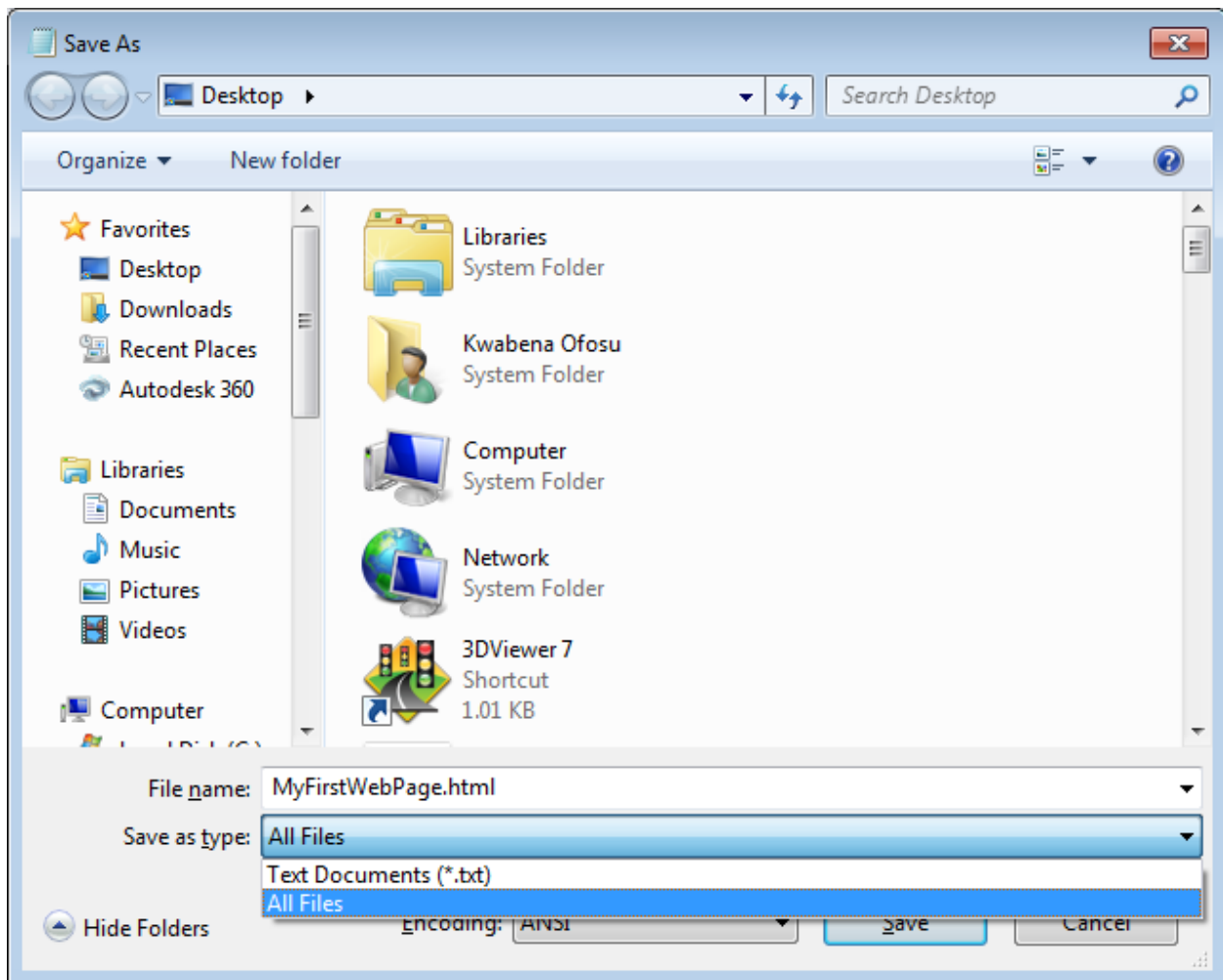
In the first of two critical steps, append the name suffix “.html” or “.htm” to the file name.





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In the second critical step, change the *Save as type* to *All Files*





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Click on **Save** to save the file.

A screenshot of a Notepad window titled "MyFirstWebPage - Notepad". A red arrow points to the "File" menu. The window contains the following HTML code:

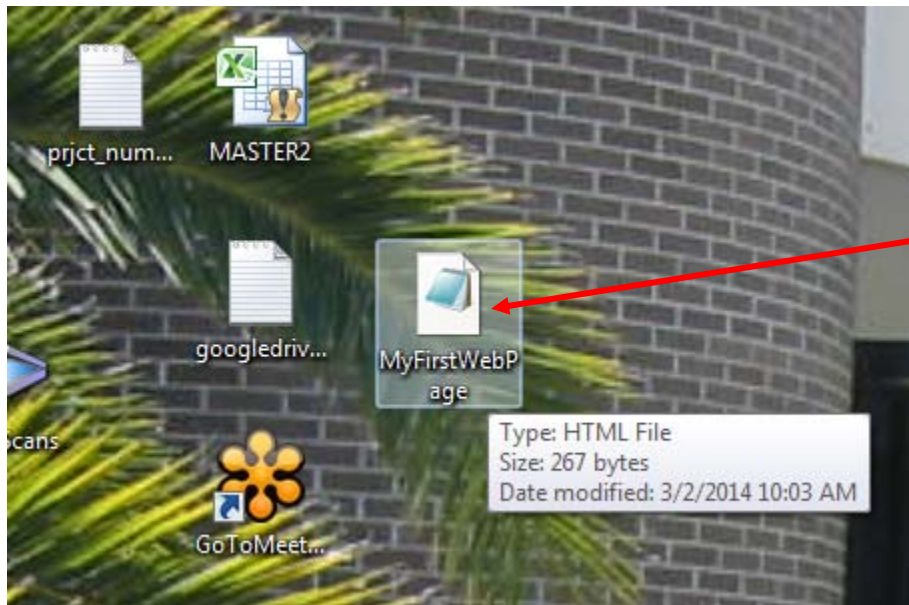
```
<!DOCTYPE html>
<html>
  <title>
    HTML Hompage
  </title>
  <body>
    <h1>My First web Page </h1>
    <p>
      welcome to HTML.
      <br>
      HTML is easy and should be fun.
    </p>
  </body>
</html>
```

Close the file.



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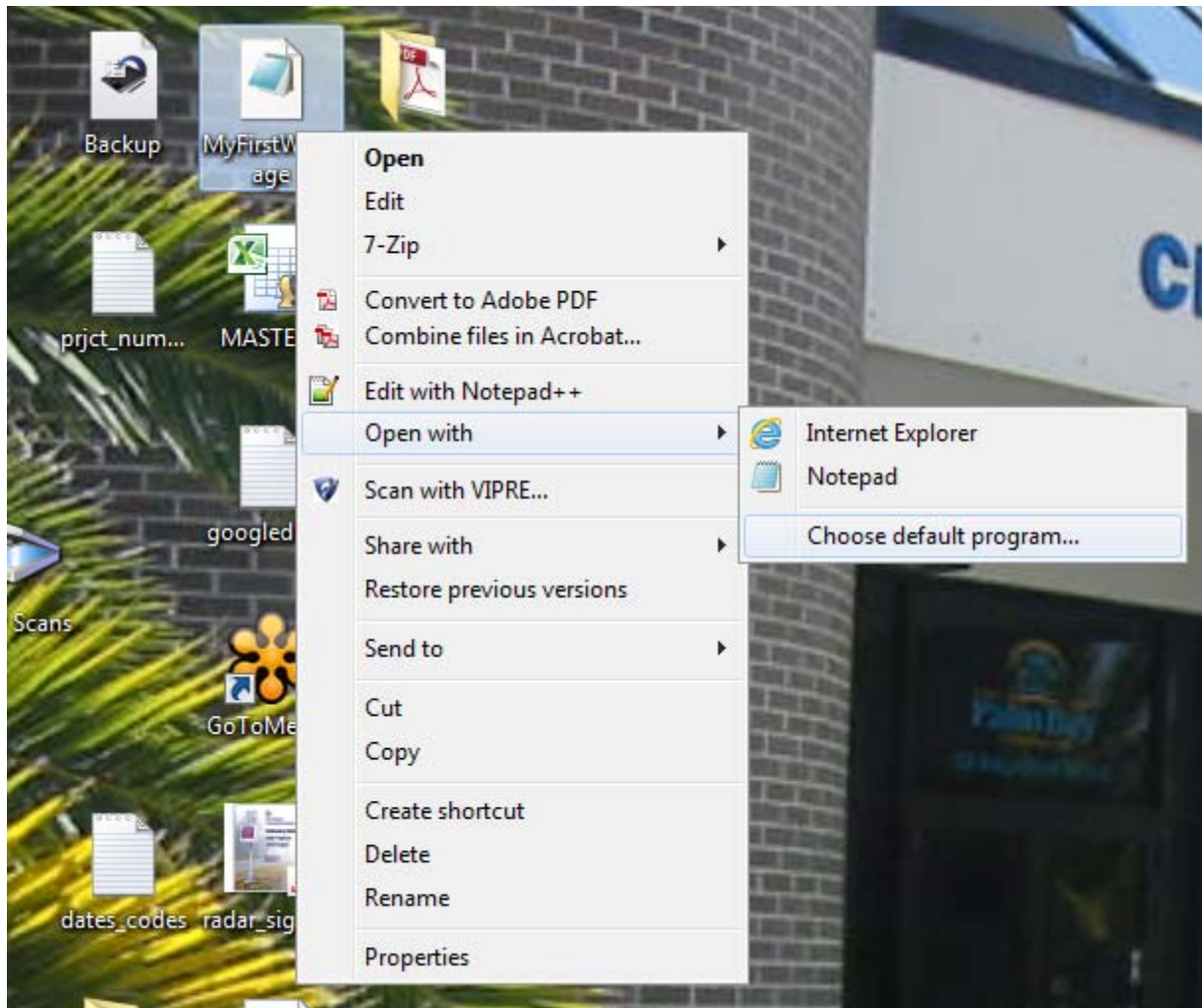
Go to the directory to look for your first HTML file.





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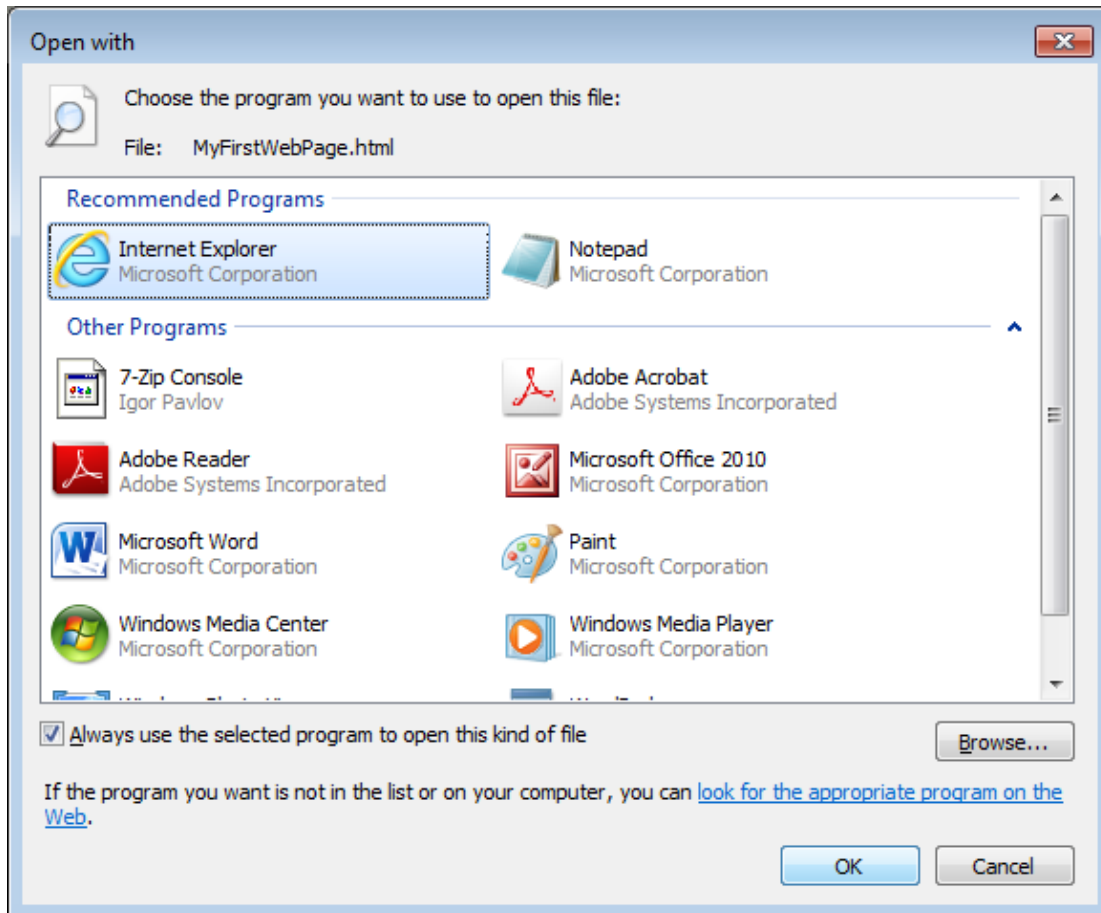
Select the file. Right click, select **Open with**, select **Choose default program**.





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Select your current default or a preferred web browser.



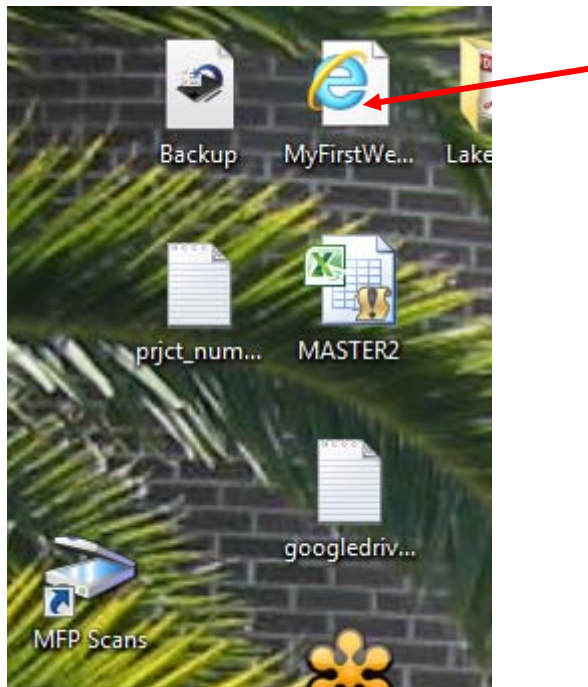
Click **OK**



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Note the change of the icon of your HTML file. It now indicates the default program (the web browser) that will open it for viewing.

Congratulations, you have just created your first web page.

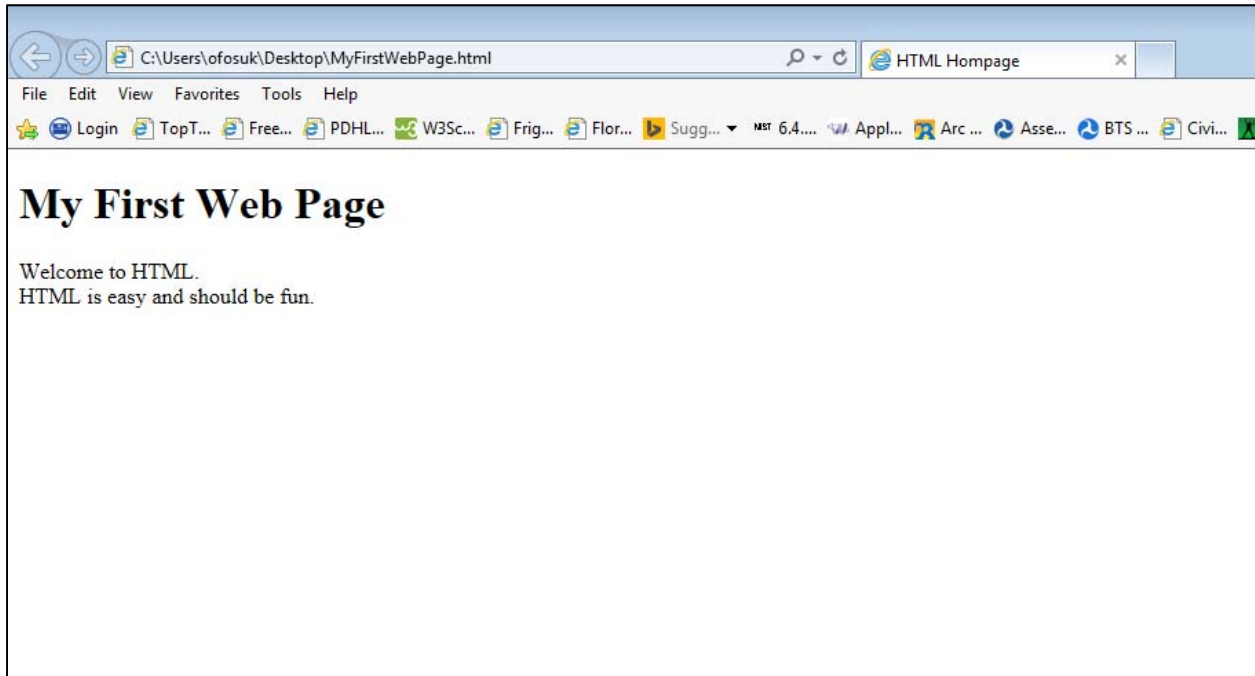


Double click on the file icon to open it.



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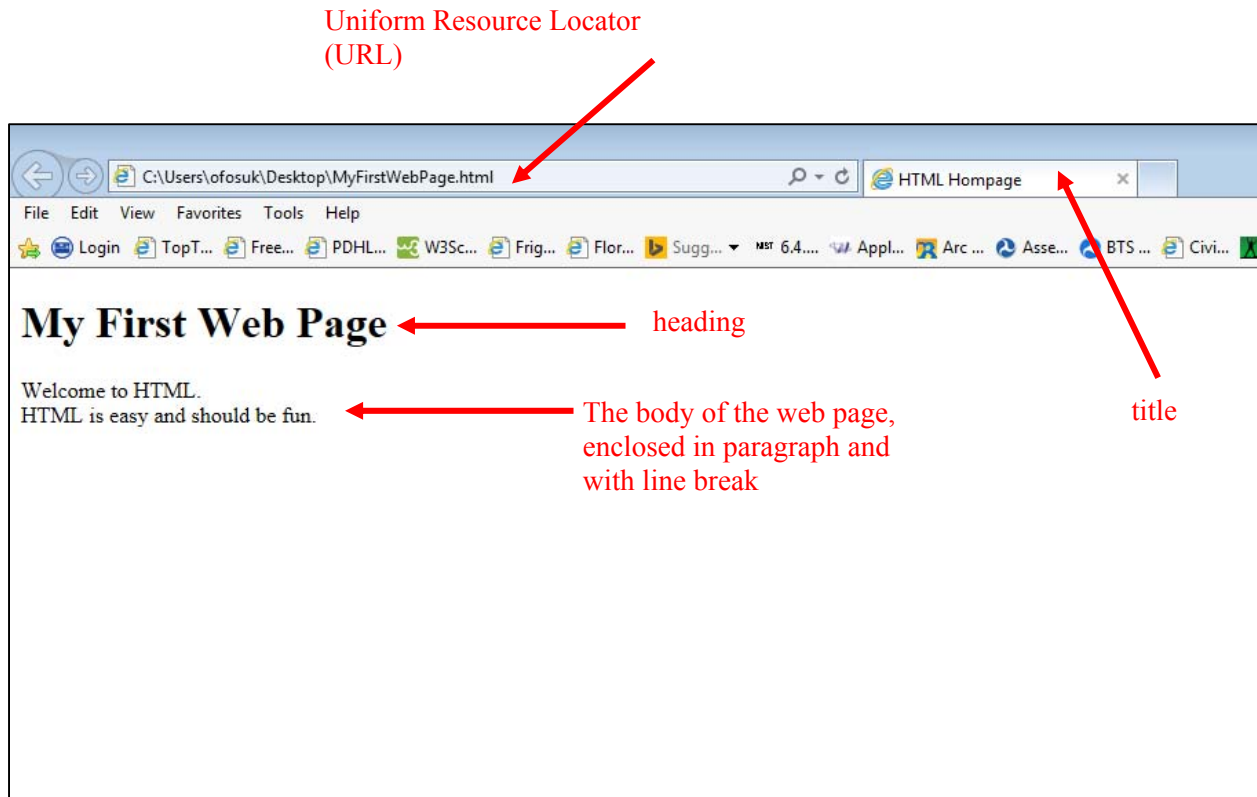
The default program, in this case the web browser that was selected, opens the file as a web page.





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Review the HTML elements.



The **Uniform Resource Locator (URL)** is the physical location where the HTML document resides. It is analogous to a physical address. Currently this address is on the private local hard drive of your computer. If it was in a directory on a web server (or any directory that is connected to the internet for that matter), this document would be “live” on the web and viewable as such by any user anywhere in the world.

Confirm that your document has loaded correctly as designed. If not, review and adjust your code. Otherwise you have successfully created your first webpage. The test is a success.



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3. HTML TAGS

3.1 HTML Text Formatting

This section presents a review of a selection of HTML tags used for formatting text. Some of the commonly used text formatting tags are shown in Table 3.1.

Table 1: HTML tags

Format	Tag	Example	Result
Bold	<code> ... </code>	<code>Engineer</code>	Engineer
Italics	<code><i> ... </i></code>	<code><i>Equipment</i></code>	<i>Equipment</i>
Mark/ highlight	<code><mark> ... </mark></code>	<code><mark>missing</mark></code>	missing
Strikeout	<code><strike> ... </strike></code>	<code><strike>Tuesday</strike></code>	Tuesday
Subscript	<code><sub> ... </sub></code>	$T_{n-1} = a_{n-1}t_{n-1}$	$T_1 = a_1t_{n-1}$
Superscript	<code><sup> ... </sup></code>	$5x^2 - x^{-4}$	$5x^2 - x - 4$
Underline	<code><u> ... </u></code>	<code><u>Construction</u></code>	<u>Construction</u>

Tags may be combined (nested) to provide the desired formatting.

Table 2: Nesting tags

Example	Result
<code><i>Engineer</i></code>	<i>Engineer</i>
<code><u>Equipment</u></code>	<u>Equipment</u>
<code><i><u>Traffic</u></i></code>	<i><u>Traffic</u></i>

Comprehensive lists of tags supported by *HTML5* can be found at numerous sources (w3schools.com, 2014e).



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3.2 HTML Fonts

Text fonts are manipulated using the `...` tags. Additional information about the element or some property of the element can be added to the start tag. This additional information is called an **attribute**. Attributes of a font include color, size, face, etc. Each attribute can be assigned a value from a range of applicable values for that attribute.

The general form of assigning an attribute value is as follows:

```
<tag attribute = "value">...</tag>
```

For example to set a font size,

```
<font size = "16">HELLO</font>
```

Will display: HELLO

Multiple attributes may be assigned simultaneously by separating each attribute assignment by a space. For example,

```
<font size = "16" color = "blue">HELLO</font>
```

‘which will display as: HELLO

The font face attribute is the “style” of the font e.g. Times New Roman, Garamond, Arial, etc. Not all browsers support all font faces, therefore it is common practice to assign a list of font faces to the face attribute, separated by commas. For example

```
<font face = "Arial, Georgia, Verdana, Calabri" color = "blue">...</font>
```



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The browser will apply the first face that it supports, starting from the left. Alternately, a font family may be assigned. Examples of some of the common font families recognized by *HTML5* include Serif, Sans Serif, and Monospace.

The default color of fonts in a document can be adjusted from the `<body>` tag using the *text* attribute. For example

```
<body text = "green"> ...</body>
```

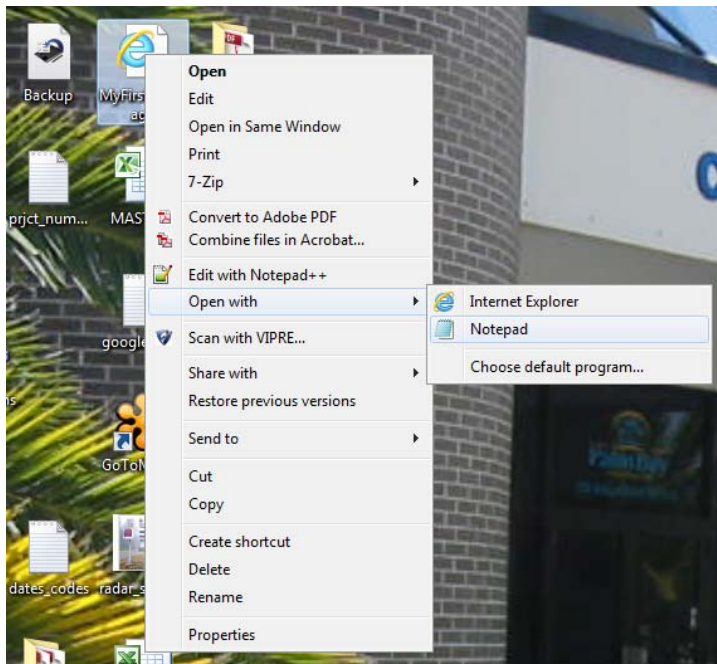
Comprehensive lists of font attributes and applicable values can be found at numerous sources. (w3schools.com, 2014d), (w3schools.com, 2014c), (w3schools.com, 2014b)

3.3 HTML Headings and Paragraphs

Right click on your HTML file *MyFirstWebpage*.

Select ***Open with***

Select a text editor. (In this demonstration ***Notepad*** shall be used throughout).





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The HTML file opens for editing.

A screenshot of a Notepad window titled "MyFirstWebPage - Notepad". The window has a menu bar with "File", "Edit", "Format", "View", and "Help". The text area contains the following HTML code:

```
<!DOCTYPE html>

<html>
  <title>
    HTML Hompage
  </title>

  <body>
    <h1>My First web Page </h1>

    <p>
      welcome to HTML.
      <br>
      <mark>HTML is easy and should be fun.</mark>
    </p>

  </body>
</html>
```




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HTML has six built-in headings `<h1>` through `<h6>`.

Change the heading style to `<h2>`.

Add an alignment attribute and value in the heading tag to center the heading on the web page.

```
<h2 align = "center"> </h2>
```

Alternately, use the tags `<center>` `</center>` to enclose the heading element.

```
<center><h2 > </h2></center>
```

Change the heading to read “TRAFFIC OPERATIONS DIVISION”.

Change the web page title to “Traffic”.

Add a horizontal line under the heading. This can be done with the underline `<u> ... </u>` tags or the horizontal line tag `<hr>`. The horizontal line tag is an open tag.

Provide a brief narrative on the Traffic Operations program. Split your narrative into paragraphs.



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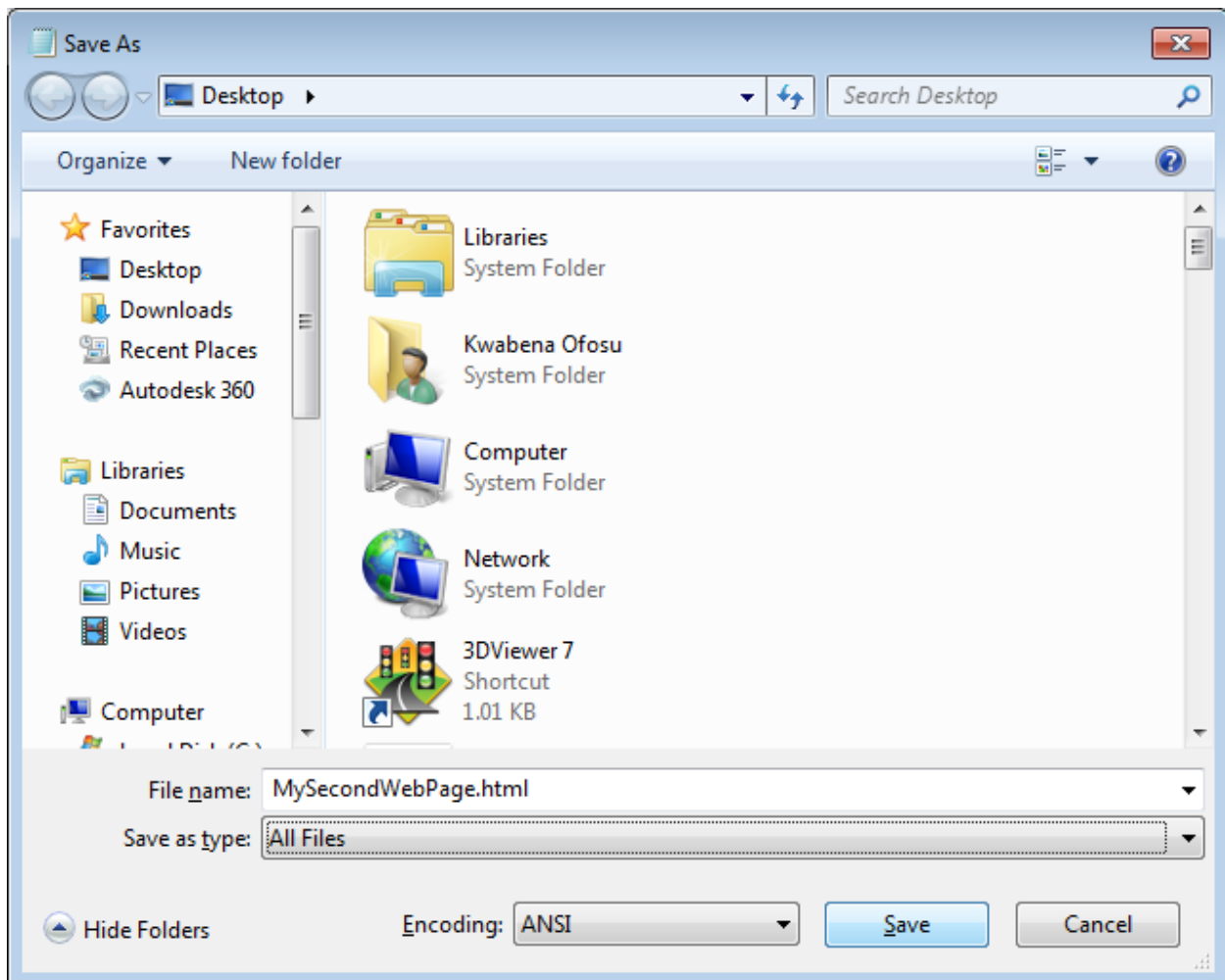
The HTML code is as follows

```
MyFirstWebPage - Notepad
File Edit Format View Help
<!DOCTYPE html>
<html>
  <title>
    Traffic
  </title>
  <body>
    <h2 align="center">TRAFFIC OPERATIONS DIVISION </h2>
    <hr>
    <p>
      The Traffic Operations Division maintains traffic
      signals within the city limits. There are currently 65
      signalized intersections within the city limits. Maintenance
      activities include repairing and replacing damaged and worn
      out hardware, conducting operational reviews of the systems
      and updating the signal timing plans where warranted.
    </p>
    <p>
      The city currently runs the Red Light Camera program as part
      of the traffic safety plan. Red light cameras also known as
      traffic infraction cameras must comply with all state laws
      and regulations. Of particular importance and public interest
      is the change interval, which is the yellow time plus the
      all-red clearance time.
    </p>
  </body>
</html> |
```



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Save the file as *MySecondWebPage.html* in a directory of your choice.

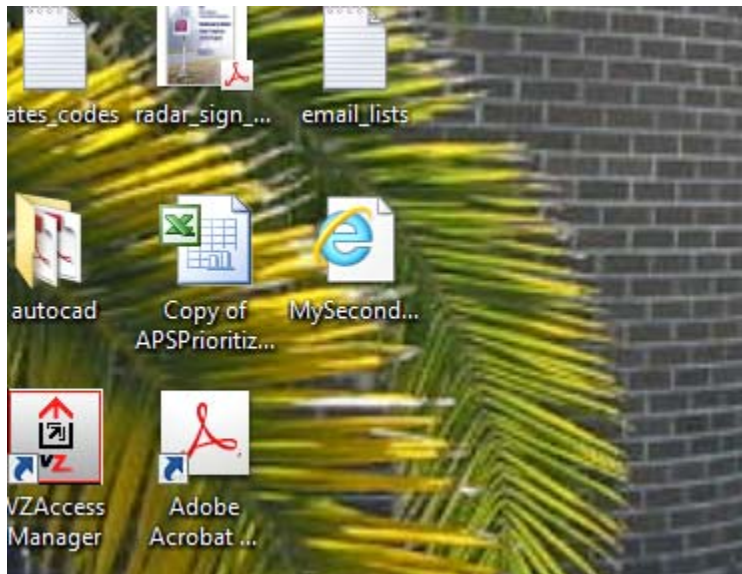


Once saved, close the file.



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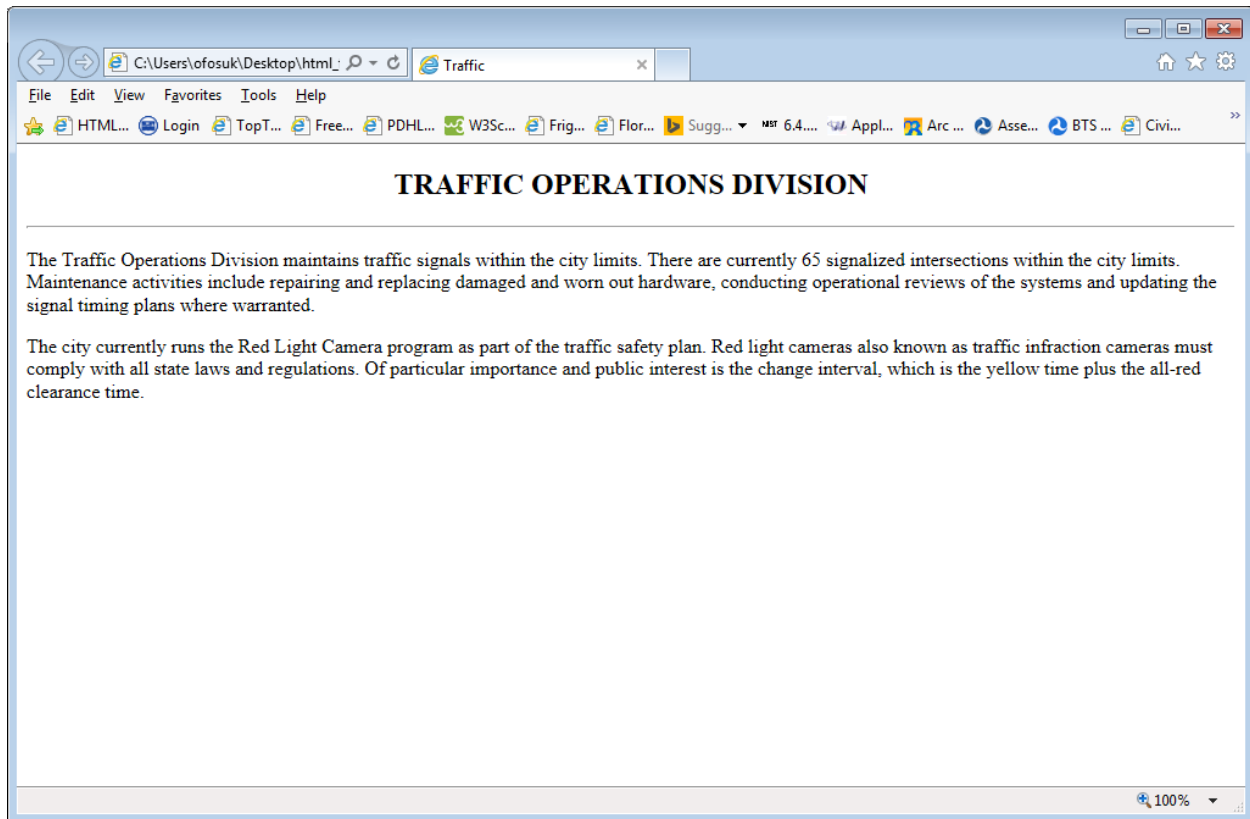
In the directory, verify that the file has been saved and named as intended.





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Double click on the file icon to open it in the browser.





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3.4 Comments

It is strongly encouraged and highly recommended that comments be added to all codes as applications are being developed. Comments should describe and explain what the codes are doing in plain ordinary language. A good rule of thumb is to add as many comments as needed for a non-expert third party to read the comments alone and have a general understanding of what the codes are attempting to achieve and how they are being implemented.

In HTML, comments are inserted into a tag as follows

```
<!--Put your comments here -->
```

When interpreting your HTML file, the web browser will ignore this element and its contents as it recognizes it as a comment put in by the user for informational purposes only.

In some instances particularly during editing or testing for errors it may be necessary to comment out some parts of codes that may span over multiple lines. In such cases the tags are as follows

```
<!--  
    block of codes, or multi-line comment  
-->
```

Open your HTML file ***MySecondWebPage*** in a text editor for editing.



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Add the following comments

```
MySecondWebPage - Notepad
File Edit Format View Help
<!DOCTYPE html>
<html>
  <title>
    Traffic
  </title>
  <body>
    <h2 align="center">TRAFFIC OPERATIONS DIVISION </h2>
    <!-- remove the horizontal line, we shall bring it back later <hr> -->

    <p>
      The Traffic Operations Division maintains maintains traffic
      signals within the city limits. There are currently 65
      signalized intersections within the city limits. Maintenance
      activities include repairing and replacing damaged and worn
      out hardware, conducting operational reviews of the systems
      and updating the signal timing plans where warranted.
    </p>

    <p>
      The city currently runs the Red Light Camera program as part
      of the traffic safety plan. Red light cameras also known as
      traffic infraction cameras must comply with all state laws
      and regulations. Of particular importance and public interest
      is the change interval, which is the yellow time plus the
      all-red clearance time.
    </p>

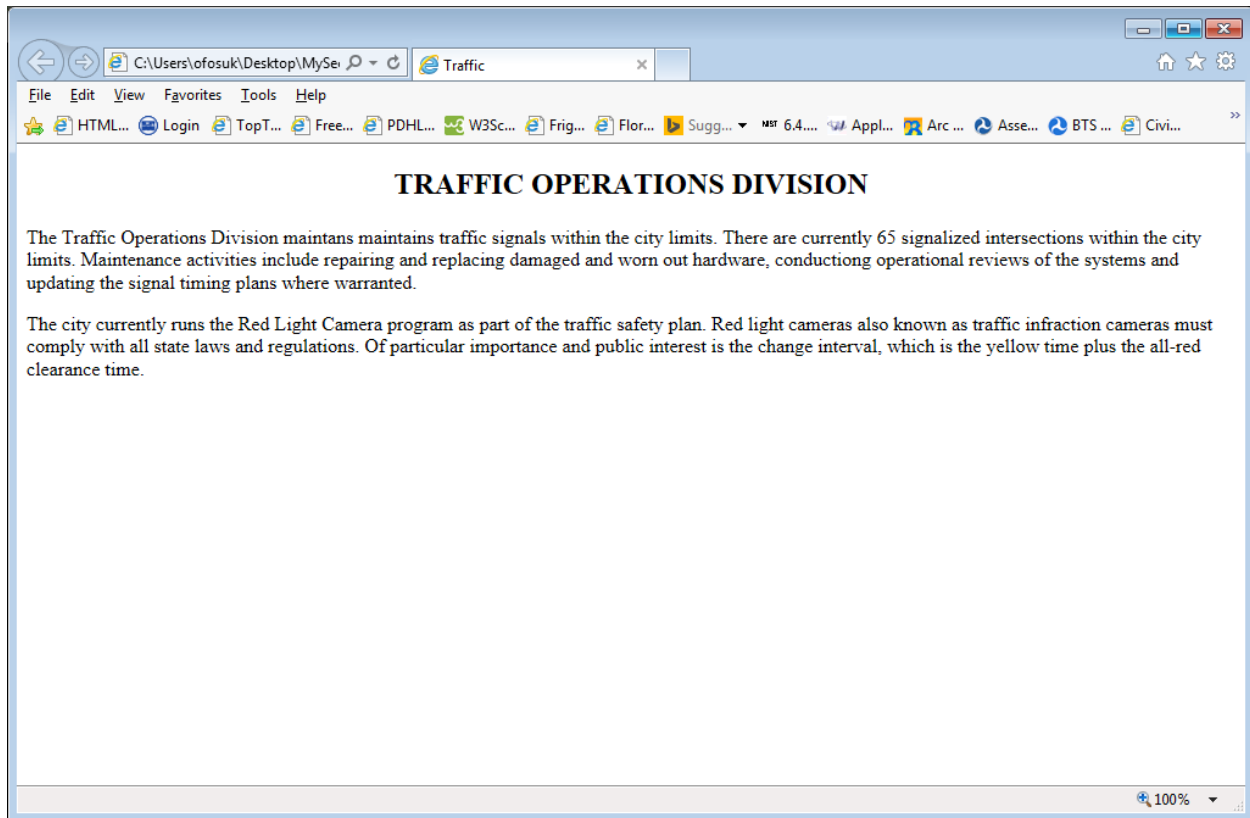
  </body>
</html>
```



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Save and close the file.

Double click on the file from its directory location to open it.



The horizontal line tag is now part of a comment and is ignored by the browser.



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Make the following updates. This time reinstate the horizontal line, and comment out the second paragraph of the narrative.

```
MySecondWebPage - Notepad
File Edit Format View Help
<!DOCTYPE html>

<html>
  <title>
    Traffic
  </title>

  <body>

    <h2 align="center">TRAFFIC OPERATIONS DIVISION </h2>
    <hr>

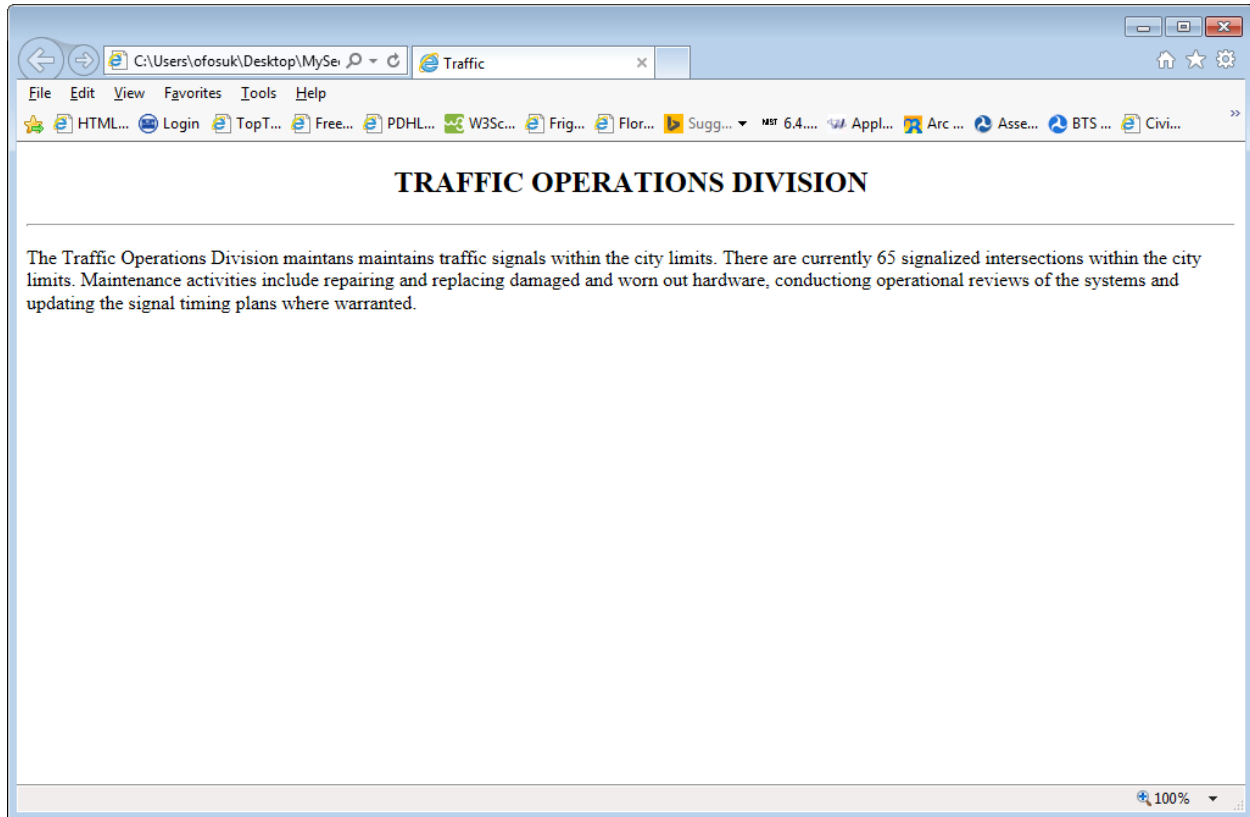
    <p>
      The Traffic Operations Division maintains maintains traffic
      signals within the city limits. There are currently 65
      signalized intersections within the city limits. Maintenance
      activities include repairing and replacing damaged and worn
      out hardware, conducting operational reviews of the systems
      and updating the signal timing plans where warranted.
    </p>
    <!-- WE DONT NEED THIS PARAGRAPH FOR NOW SO COMMENT IT OUT
    <p>
      The city currently runs the Red Light Camera program as part
      of the traffic safety plan. Red light cameras also known as
      traffic infraction cameras must comply with all state laws
      and regulations. Of particular importance and public interest
      is the change interval, which is the yellow time plus the
      all-red clearance time.
    </p>
    -->

  </body>
</html>
```



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Save, Close, and run the HTML file.



It is important to note that the closing part of the tag specifies where the comment ends. If it is not supplied, everything after the opening part of the comment tag becomes a comment and will be ignored by the browser.

Restore your file to its original code without the comments.
Save the file and close it.



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3.5 Lists

HTML tags can be used to create lists. Lists may be **unordered** (bullet points) or **ordered**, where the list items are marked with numbers.

The syntax for an unordered list is

```
<ul>
<li>first item</li>
<li>second item</li>
<li>third item</li>
  :
  :
<li>last item</li>
</ul>
```

The syntax for an ordered list is

```
<ol>
<li>first item</li>
<li>second item</li>
<li>third item</li>
  :
  :
<li>last item</li>
</ol>
```

Another type of list supported by HTML is a **description list** which has an indented description slot for each item in the list.



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The syntax for a description list is

```
<dl>
< dt>first item</dt>
< dd>- first item description</dd>
< dt>second item</dt>
< dd>- second item description</dd>
< dt>third item</dt>
< dd>- third item description</dd>
      :
      :
< dt>last item</dt>
< dd>- last item description</dd>
</dl>
```

Open your HTML file ***MySecondWebPage*** in a text editor for editing.

Add an unordered list of intersections where traffic infraction cameras are currently in use



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Add the following code.

```
MySecondWebPage - Notepad
File Edit Format View Help

<body>

  <h2 align="center">TRAFFIC OPERATIONS DIVISION </h2>
  <hr>

  <p>
  The Traffic Operations Division maintains traffic
  signals within the city limits. There are currently 65
  signalized intersections within the city limits. Maintenance
  activities include repairing and replacing damaged and worn
  out hardware, conducting operational reviews of the systems
  and updating the signal timing plans where warranted.
  </p>

  <p>
  The city currently runs the Red Light Camera program as part
  of the traffic safety plan. Red light cameras also known as
  traffic infraction cameras must comply with all state laws
  and regulations. Of particular importance and public interest
  is the change interval, which is the yellow time plus the
  all-red clearance time.

  <br><br>
  The intersections currently monitored by traffic infraction cameras are:
  <br><br>
  <ul>
  <li>Malabar Avenue and San Filippo Boulevard</li>
  <li>Malabar Avenue and Emerson Road</li>
  <li>Malabar Avenue and Minton Drive</li>
  <li>Babcock Road and Port Tilman Drive</li>
  </ul>

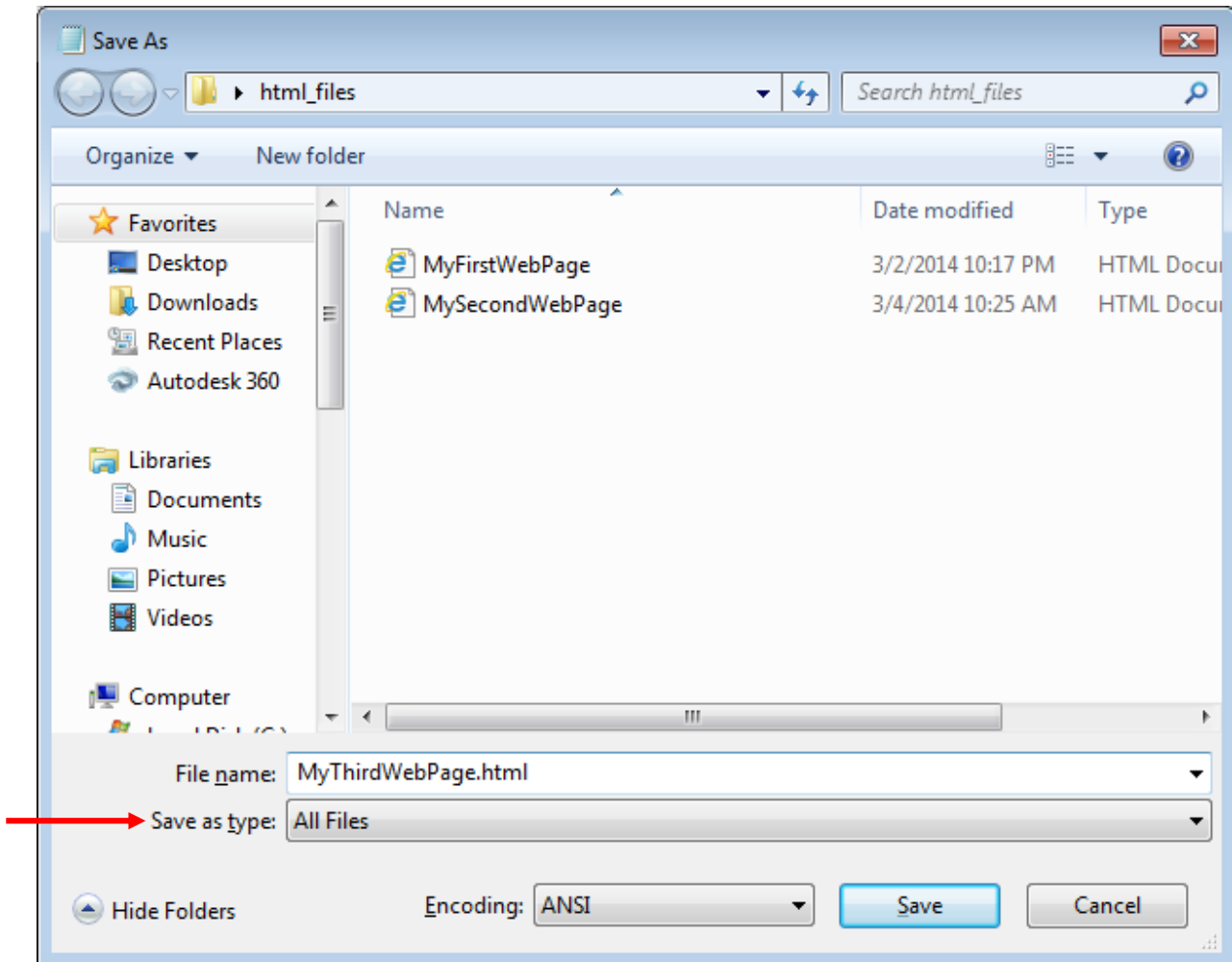
  </p>

</body>
</html> |
```



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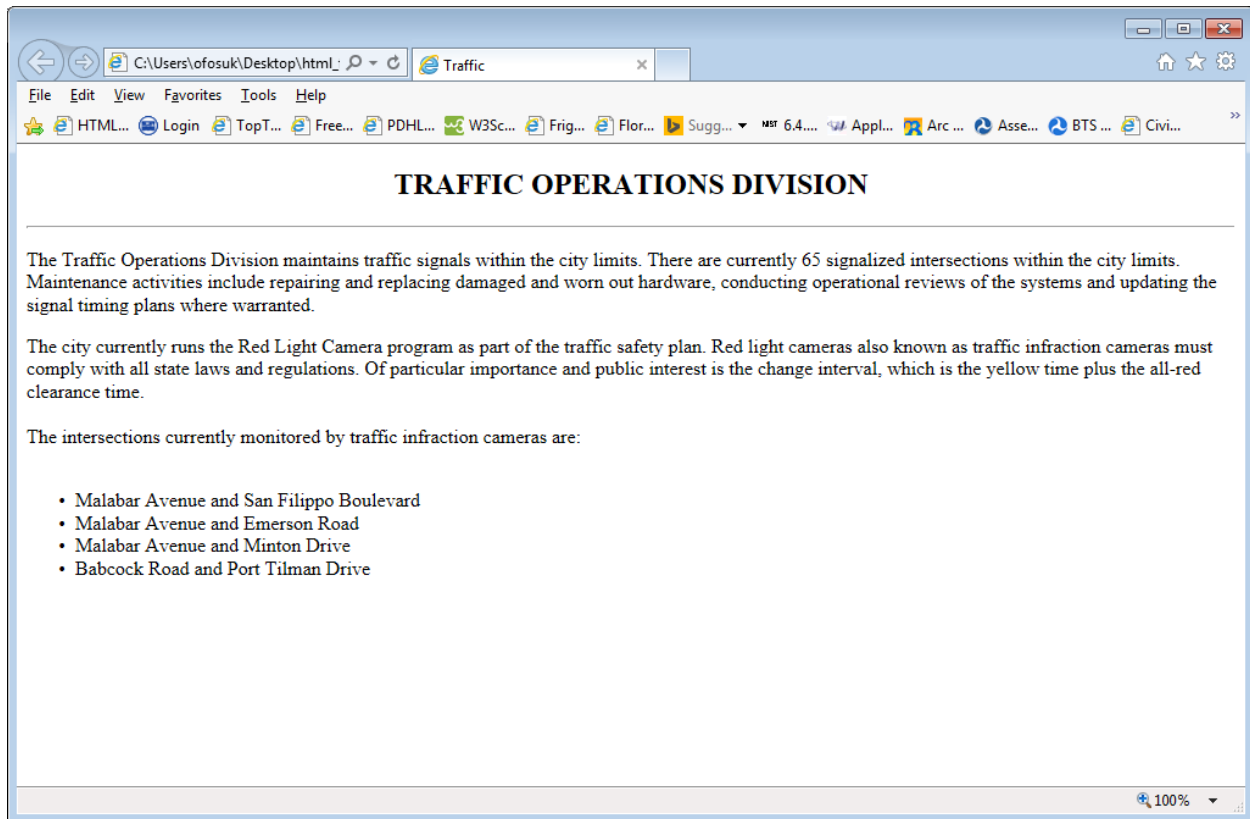
Save your file as ***MyThirdWebPage.html*** in your working directory.
Close the file.





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Test your file.



Note that the closing tags for the list items are optional and if omitted will have no impact on how the web page is displayed, however it is good practice to add them at all times for consistency.



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With your web page open, go to the directory and open the HTML file with your text editor. Change the tags to create an ordered list for the intersections currently monitored by traffic infraction cameras.

```
MyThirdWebPage - Notepad
File Edit Format View Help
<body>

    <h2 align="center">TRAFFIC OPERATIONS DIVISION </h2>
    <hr>

    <p>
    The Traffic Operations Division maintains traffic
    signals within the city limits. There are currently 65
    signalized intersections within the city limits. Maintenance
    activities include repairing and replacing damaged and worn
    out hardware, conducting operational reviews of the systems
    and updating the signal timing plans where warranted.
    </p>

    <p>
    The city currently runs the Red Light Camera program as part
    of the traffic safety plan. Red light cameras also known as
    traffic infraction cameras must comply with all state laws
    and regulations. Of particular importance and public interest
    is the change interval, which is the yellow time plus the
    all-red clearance time.

    <br><br>
    The intersections currently monitored by traffic infraction cameras are:
    <br><br>

    <ol>
    <li>Malabar Avenue and San Filippo Boulevard</li>
    <li>Malabar Avenue and Emerson Road</li>
    <li>Malabar Avenue and Minton Drive</li>
    <li>Babcock Road and Port Tilman Drive</li>
    </ol>

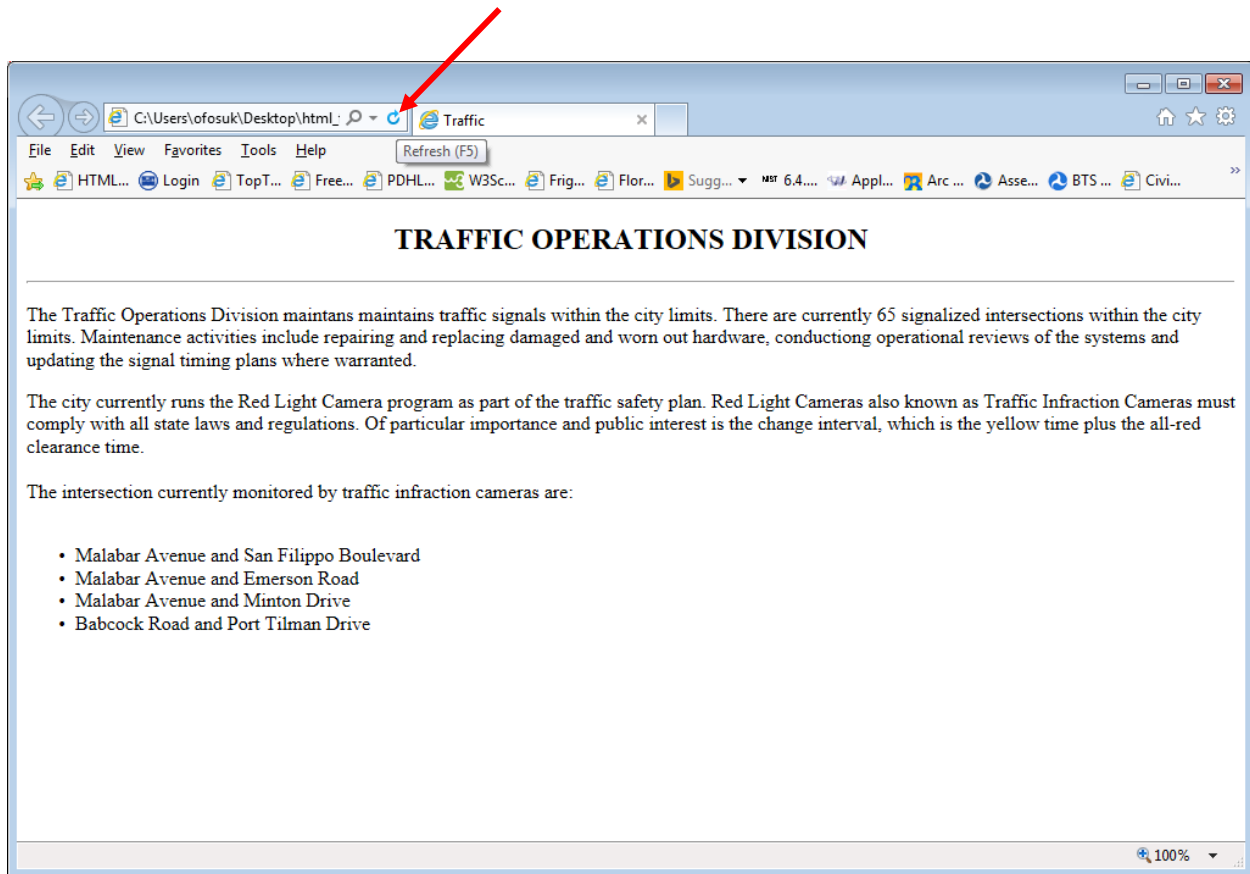
    </p>
```




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Save the file and minimize it.

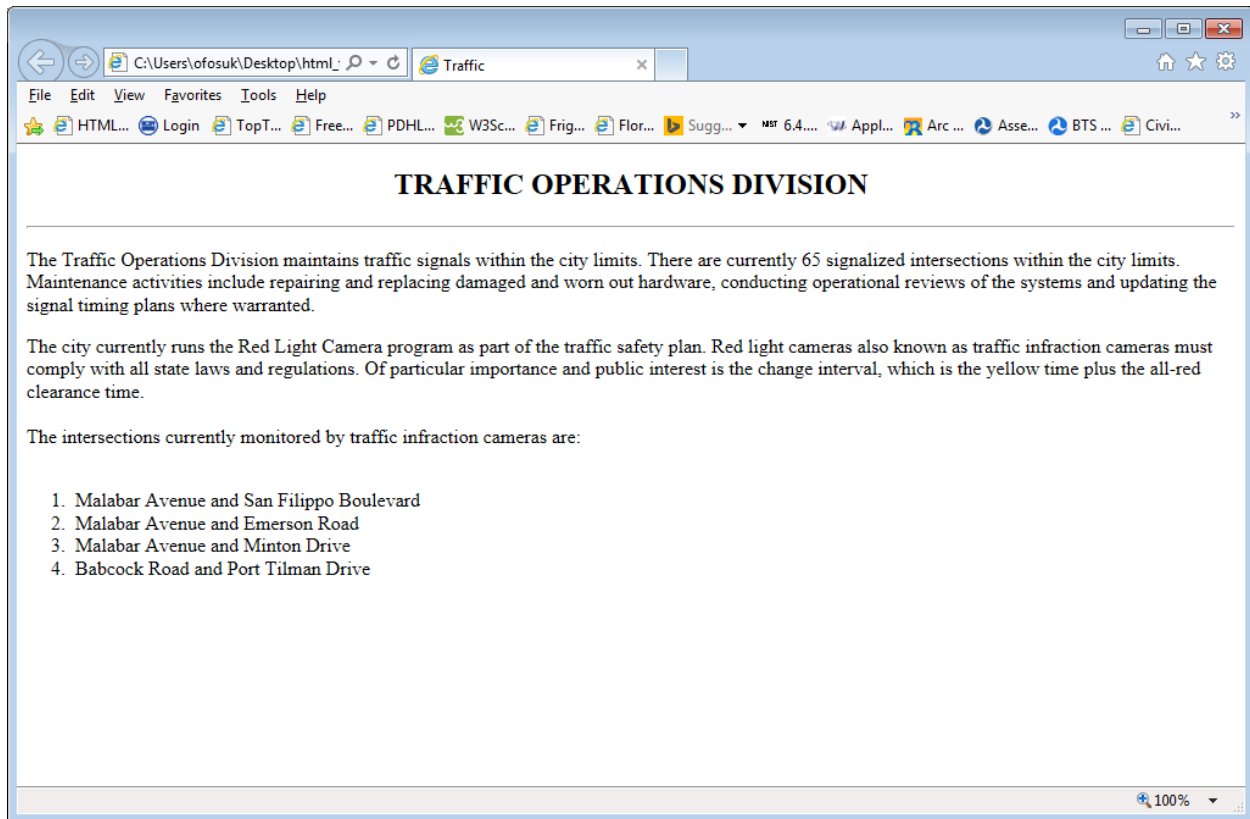
Click on the *Refresh* icon in your browser bar, to refresh the web page and display the latest updates to it.





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The web page refreshes the display per the latest HTML tags.





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Pull up the web page in the text editor and change the list to a description list with the following information.

```
MyThirdWebPage - Notepad
File Edit Format View Help
signals within the city limits. There are currently 65
signalized intersections within the city limits. Maintenance
activities include repairing and replacing damaged and worn
out hardware, conducting operational reviews of the systems
and updating the signal timing plans where warranted.
</p>
<p>
The city currently runs the Red Light Camera program as part
of the traffic safety plan. Red light cameras also known as
traffic infraction cameras must comply with all state laws
and regulations. Of particular importance and public interest
is the change interval, which is the yellow time plus the
all-red clearance time.

<br><br>
The intersections currently monitored by traffic infraction cameras are:
<br><br>
<dl>
<dt>Malabar Avenue and San Filippo Boulevard</dt>
<dd>- All approaches are monitored</dd>
<dt>Malabar Avenue and Emerson Road</dt>
<dd>- The eastbound approach only</dd>
<dt>Malabar Avenue and Minton Drive</dt>
<dd>- The northbound and the eastbound approaches only</dd>
<dt>Babcock Road and Port Tilman Drive</dt>
<dd>- The westbound approach only</dd>
</dl>

</p>

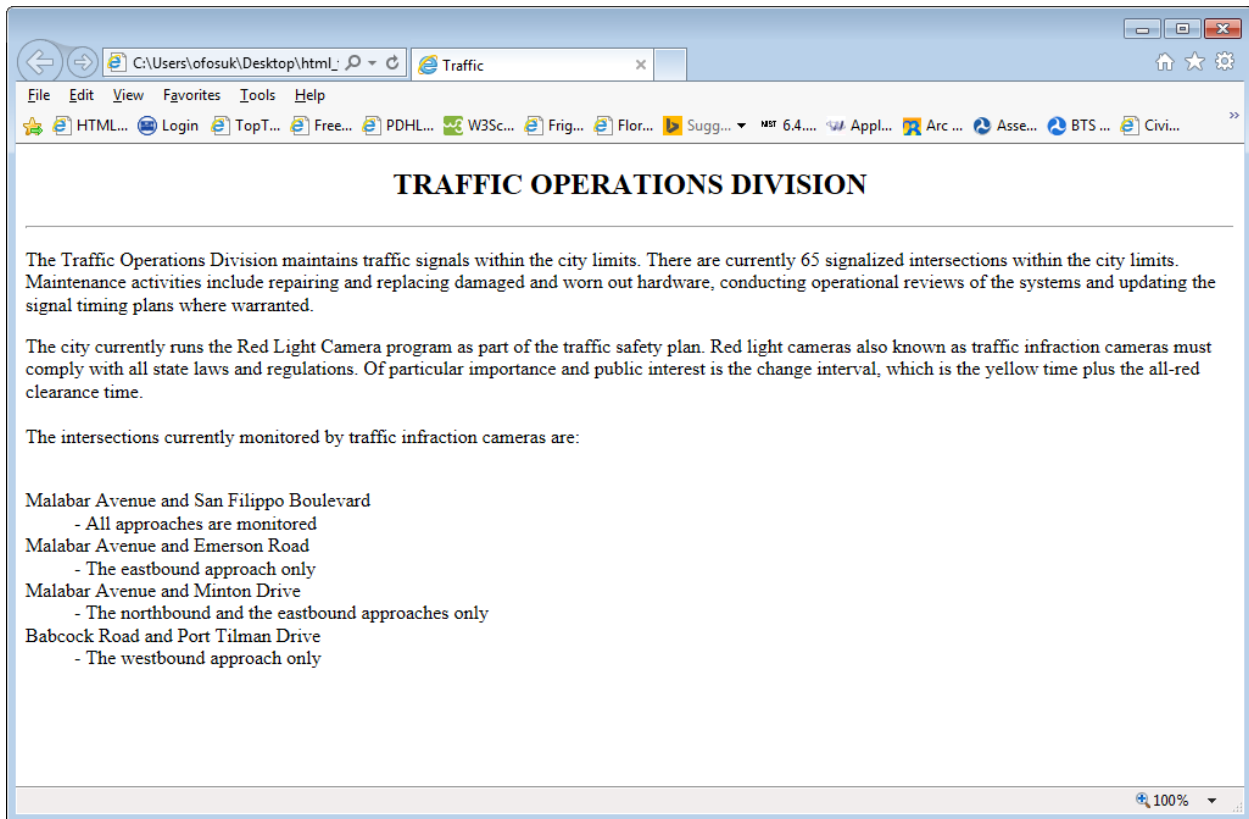
</body>
</html>
```

Save your HTML file and minimize it.



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Test your file by refreshing your browser.



Save your file.

Close the file.



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3.6 HTML Tables

Due to their flexibility and versatility, tables are the most widely used HTML feature for setting up and controlling web pages.

A table is defined using the tags

```
<table> ... </table>
```

A table is divided into any number of rows. The tags to create a row are

```
<table>  
  <tr> ... </tr>  
</table>
```

Each row can be split into any number of columns by adding a number of column tags

```
<table>  
  <tr>  
    <td> ... </td>  
    <td> ... </td>  
  </tr>  
</table>
```



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Open *MyThirdWebPage* in a text editor.

Save As *MyFourthWebPage.html*.

Add the following code to set up a table of one row with three columns that starts below the heading with the horizontal line. The main body of information on the web page shall be moved to row-1-column-2.

```
MyFourthWebPage - Notepad
File Edit Format View Help
<!DOCTYPE html>
<html>
  <title>
    Traffic
  </title>
  <body>
    <h2 align="center">TRAFFIC OPERATIONS DIVISION </h2>
    <hr>
    <table>
      <tr> <!--open of row 1 -->
      <td> <!--column 1: empty column for now will items later -->
      </td>
      <td> <!--column 2: will hold main body of information -->
        <p>
          The Traffic Operations Division maintains traffic
          signals within the city limits. There are currently 65
          signalized intersections within the city limits. Maintenance
          activities include repairing and replacing damaged and worn
          out hardware, conducting operational reviews of the systems
          and updating the signal timing plans where warranted.
        </p>
        <p>
          The city currently runs the Red Light Camera program as part
          of the traffic safety plan. Red light cameras also known as
          traffic infraction cameras must comply with all state laws
          and regulations. Of particular importance and public interest
          is the change interval, which is the yellow time plus the
          all-red clearance time.
        </p>
      </td>
    </tr>
  </table>

```



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Remember to add the corresponding closing tags for all open tags that are added.

```
MyFourthWebPage - Notepad
File Edit Format View Help

<td>  <!--column 2: will hold main body of information -->

  <p>
  The Traffic Operations Division maintains traffic
  signals within the city limits. There are currently 65
  signalized intersections within the city limits. Maintenance
  activities include repairing and replacing damaged and worn
  out hardware, conducting operational reviews of the systems
  and updating the signal timing plans where warranted.
</p>

  <p>
  The city currently runs the Red Light Camera program as part
  of the traffic safety plan. Red light cameras also known as
  traffic infraction cameras must comply with all state laws
  and regulations. Of particular importance and public interest
  is the change interval, which is the yellow time plus the
  all-red clearance time.

  <br><br>
  The intersections currently monitored by traffic infraction cameras are:
  <br><br>

  <ul>
  <li>Malabar Avenue and San Filippo Boulevard</li>
  <li>Malabar Avenue and Emerson Road</li>
  <li>Malabar Avenue and Minton Drive</li>
  <li>Babcock Road and Port Tilman Drive</li>
  </ul>

  </p>

</td>  <!--close of column 2 -->

<td>
  <!--column 3: empty column for now will items later -->
</td>

<tr>  <!--close of row 1 -->

</body>

</html>
```



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Establish the width of each column by typing in a measurement (in pixels) for the width as an attribute in the column start tag. The magnitude of the measurement may be different for your particular computer, so a trial and error process will be needed. In this example the widths of column 1 and column 2 only will be entered. The browser will subtract the total of the measurements given from the total width available to your monitor and assign that as the width of the remaining column.

```
MyFourthWebPage - Notepad
File Edit Format View Help

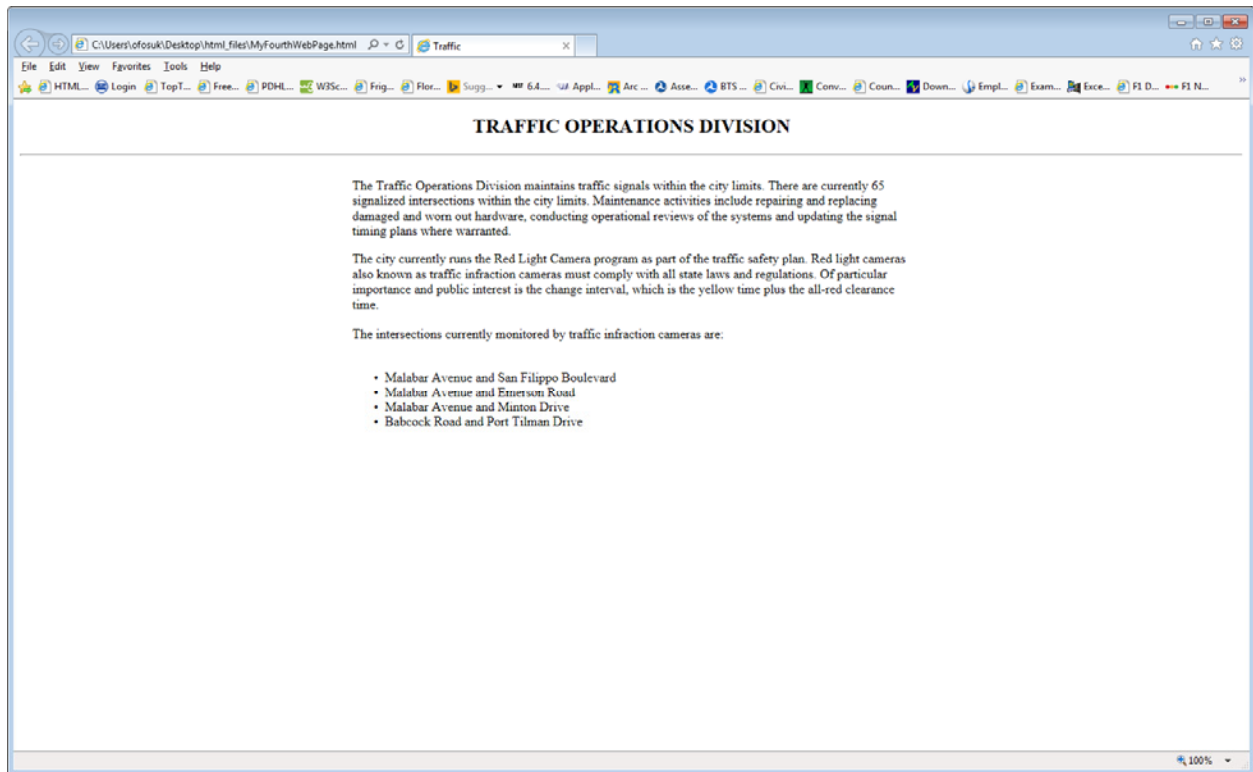
<tr>  <!--open of row 1 -->
<td width = "400"> <!--column 1: empty column for now will items later -->
</td>
<td>  <!--column 2: will hold main body of information -->
  <p>
    The Traffic Operations Division maintains traffic
    signals within the city limits. There are currently 65
    signalized intersections within the city limits. Maintenance
    activities include repairing and replacing damaged and worn
    out hardware, conducting operational reviews of the systems
    and updating the signal timing plans where warranted.
  </p>
  <p>
    The city currently runs the Red Light Camera program as part
    of the traffic safety plan. Red light cameras also known as
    traffic infraction cameras must comply with all state laws
    and regulations. Of particular importance and public interest
    is the change interval, which is the yellow time plus the
    all-red clearance time.

    <br><br>
    The intersections currently monitored by traffic infraction cameras are:
    <br><br>
    <ul>
      <li>Malabar Avenue and San Filippo Boulevard</li>
      <li>Malabar Avenue and Emerson Road</li>
      <li>Malabar Avenue and Minton Drive</li>
      <li>Babcock Road and Port Tilman Drive</li>
    </ul>
  </p>
</td>  <!--close of column 2 -->
<td width = "400"> <!--column 3: empty column for now will items later -->
```




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Test your file.





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Alternately, a column width may be specified as a percentage of the available monitor width it shall cover. As in the previous case the measurements for two columns can be specified, and the browser will assign the remainder to the unspecified column.

```
MyFourthWebPage - Notepad
File Edit Format View Help

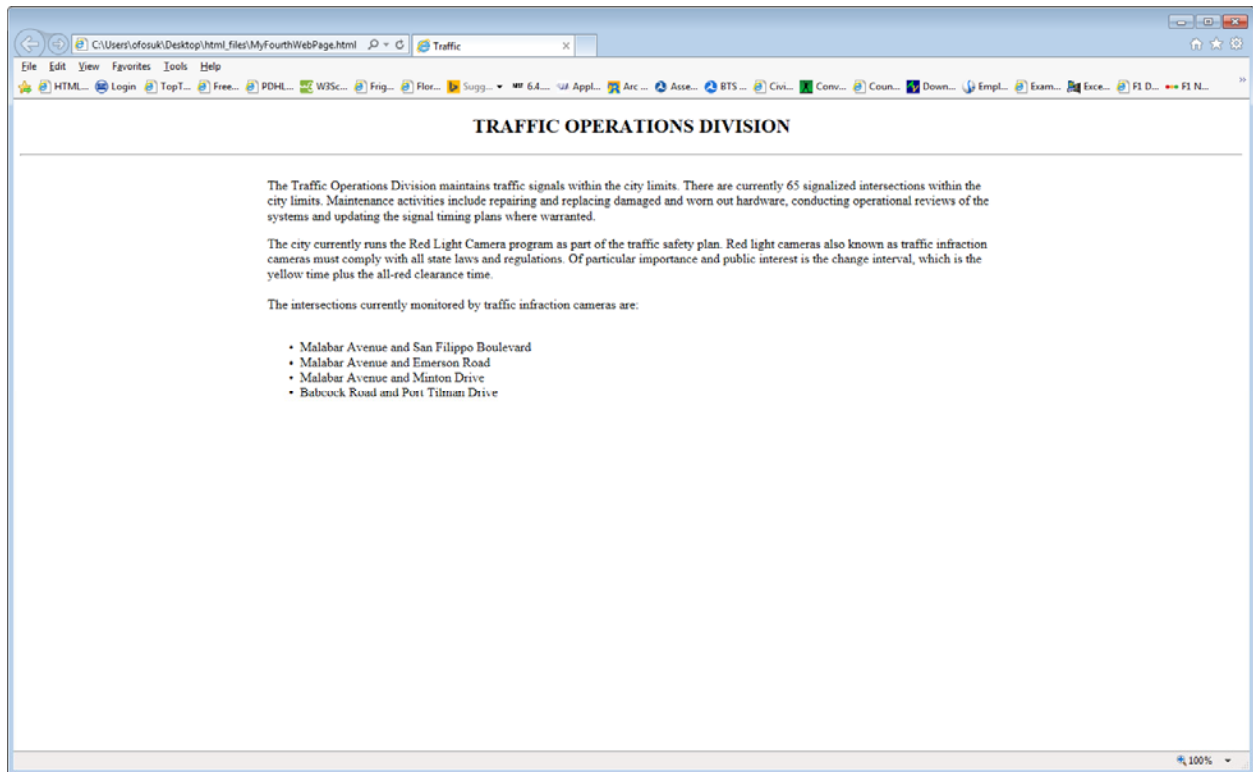
<tr>  <!--open of row 1 -->
<td width = "20%"> ←
      <!--column 1: empty column for now will items later -->
</td>
<td>  <!--column 2: will hold main body of information -->
<p>
  The Traffic Operations Division maintains traffic
  signals within the city limits. There are currently 65
  signalized intersections within the city limits. Maintenance
  activities include repairing and replacing damaged and worn
  out hardware, conducting operational reviews of the systems
  and updating the signal timing plans where warranted.
</p>
<p>
  The city currently runs the Red Light Camera program as part
  of the traffic safety plan. Red light cameras also known as
  traffic infraction cameras must comply with all state laws
  and regulations. Of particular importance and public interest
  is the change interval, which is the yellow time plus the
  all-red clearance time.

  <br><br>
  The intersections currently monitored by traffic infraction cameras are:
  <br><br>
  <ul>
  <li>Malabar Avenue and San Filippo Boulevard</li>
  <li>Malabar Avenue and Emerson Road</li>
  <li>Malabar Avenue and Minton Drive</li>
  <li>Babcock Road and Port Tilman Drive</li>
  </ul>
</p>
</td>  <!--close of column 2 -->
<td width = "20%"> ←
      <!--column 3: empty column for now will items later -->
```



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Test your code.





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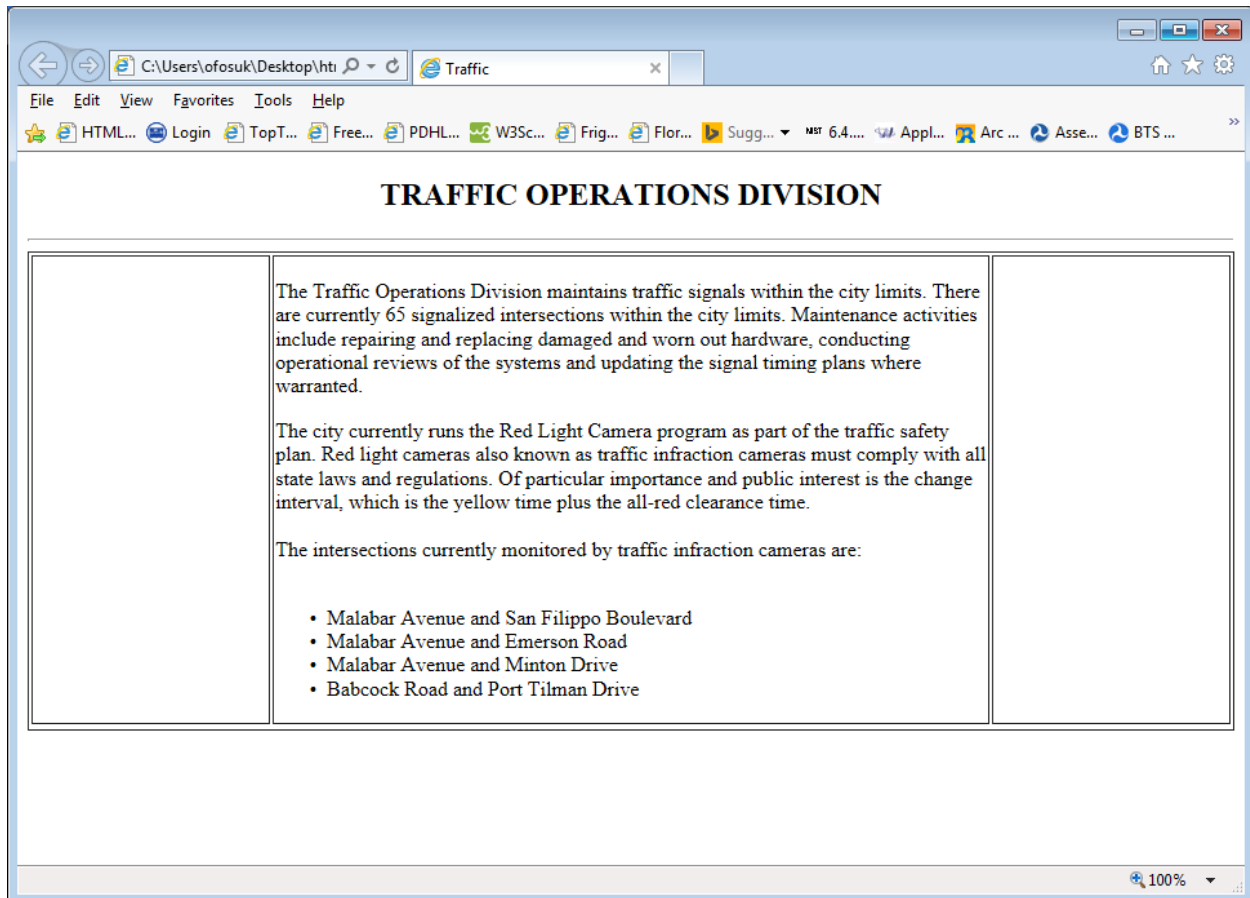
Add the following code to create borders of specified type for the table.

```
MyFourthWebPage - Notepad
File Edit Format View Help
<!DOCTYPE html>
<html>
  <title>
    Traffic
  </title>
  <body>
    <h2 align="center">TRAFFIC OPERATIONS DIVISION </h2>
    <hr>
    <table border = "1" > ←
      <tr> <!--open of row 1 -->
        <td width = "20%" >
          <!--column 1: empty column for now will items later -->
        </td>
        <td> <!--column 2: will hold main body of information -->
          <p>
            The Traffic Operations Division maintains traffic
            signals within the city limits. There are currently 65
            signalized intersections within the city limits. Maintenance
            activities include repairing and replacing damaged and worn
            out hardware, conducting operational reviews of the systems
            and updating the signal timing plans where warranted.
          </p>
          <p>
            The city currently runs the Red Light Camera program as part
            of the traffic safety plan. Red light cameras also known as
            traffic infraction cameras must comply with all state laws
            and regulations. Of particular importance and public interest
            is the change interval, which is the yellow time plus the
            all-red clearance time.
          </p>
          <br><br>
          The intersections currently monitored by traffic infraction cameras are:
```



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Test your code.





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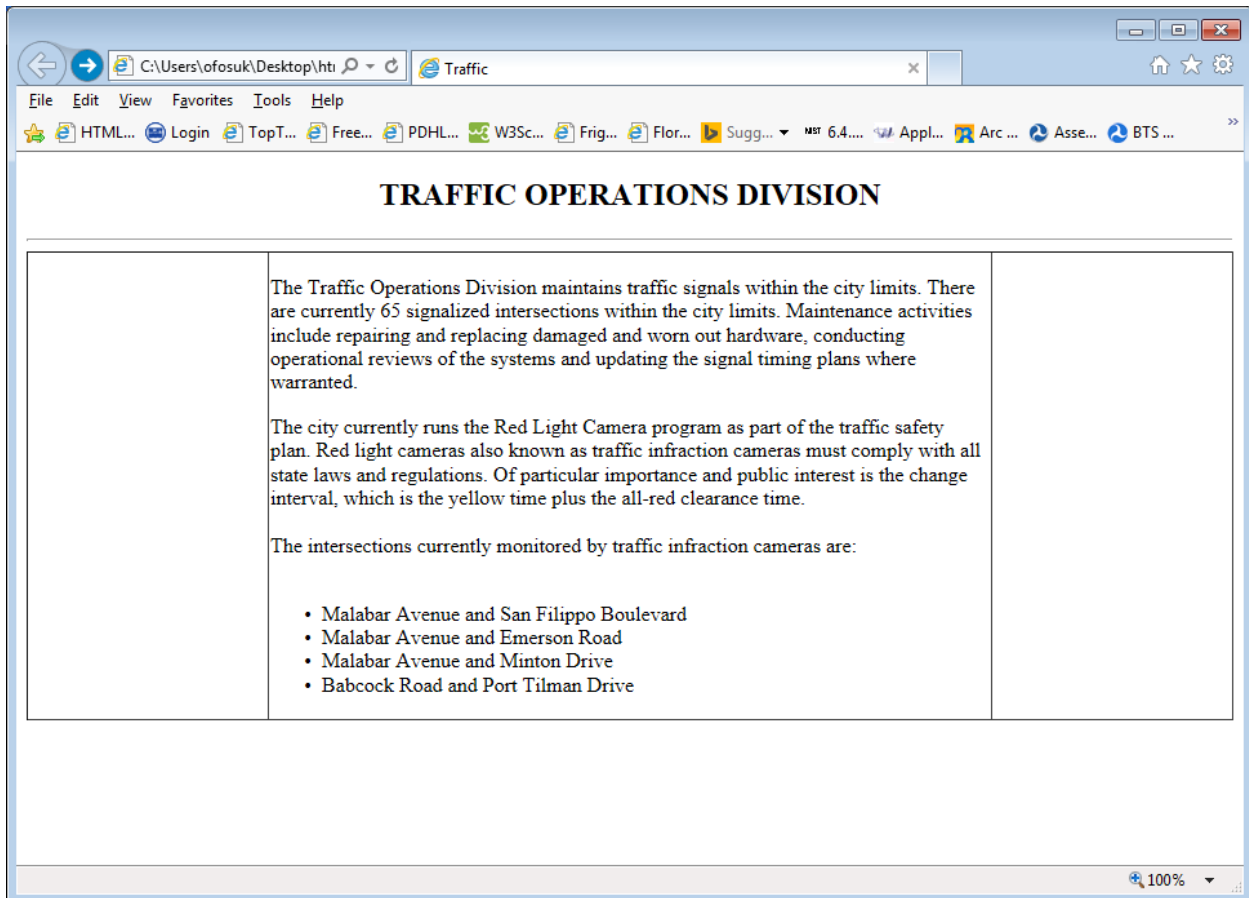
Add the following code for collapsible borders using the *style* attribute.

```
MyFourthWebPage - Notepad
File Edit Format View Help
<!DOCTYPE html>
<html>
  <title>
    Traffic
  </title>
  <body>
    <h2 align="center">TRAFFIC OPERATIONS DIVISION </h2>
    <hr>
    <table border = "1" ; style = "border-collapse:collapse"> ←
      <tr>  <!--open of row 1 -->
        <td width = "20%" >
          <!--column 1: empty column for now will items later -->
        </td>
        <td>  <!--column 2: will hold main body of information -->
          <p>
            The Traffic Operations Division maintains traffic
            signals within the city limits. There are currently 65
            signalized intersections within the city limits. Maintenance
            activities include repairing and replacing damaged and worn
            out hardware, conducting operational reviews of the systems
            and updating the signal timing plans where warranted.
          </p>
          <p>
            The city currently runs the Red Light Camera program as part
            of the traffic safety plan. Red light cameras also known as
            traffic infraction cameras must comply with all state laws
            and regulations. Of particular importance and public interest
            is the change interval, which is the yellow time plus the
            all-red clearance time.
          </p>
          <br><br>
          The intersections currently monitored by traffic infraction cameras are:
```



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Test your file.





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Borders may be specified for a particular row, column or cell in the table.
Add the following code to turn off the general table border, and apply a border of a specified thickness, line type, and color to column 1 and column 3 only.

```
MyFourthWebPage - Notepad
File Edit Format View Help
<!DOCTYPE html>
<html>
  <title>
    Traffic
  </title>
  <body>
    <h2 align="center">TRAFFIC OPERATIONS DIVISION </h2>
    <hr>
    <table > ←
      <tr>  <!--open of row 1 -->
        <td width = "20%" style = "border:2px solid black" > ←
          <!--column 1: empty column for now will items later -->
        </td>
        <td>  <!--column 2: will hold main body of information -->
          <p>
            The Traffic Operations Division maintains traffic
            signals within the city limits. There are currently 65
            signalized intersections within the city limits. Maintenance
            activities include repairing and replacing damaged and worn
            out hardware, conducting operational reviews of the systems
            and updating the signal timing plans where warranted.
          </p>
        </td>
      </tr>
    </table>
  </body>
</html>
```




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and,

```
MyFourthWebPage - Notepad
File Edit Format View Help

The city currently runs the Red Light Camera program as part
of the traffic safety plan. Red light cameras also known as
traffic infraction cameras must comply with all state laws
and regulations. Of particular importance and public interest
is the change interval, which is the yellow time plus the
all-red clearance time.

<br><br>
The intersections currently monitored by traffic infraction cameras are:
<br><br>
    <ul>
    <li>Malabar Avenue and San Filippo Boulevard</li>
    <li>Malabar Avenue and Emerson Road</li>
    <li>Malabar Avenue and Minton Drive</li>
    <li>Babcock Road and Port Tilman Drive</li>
    </ul>

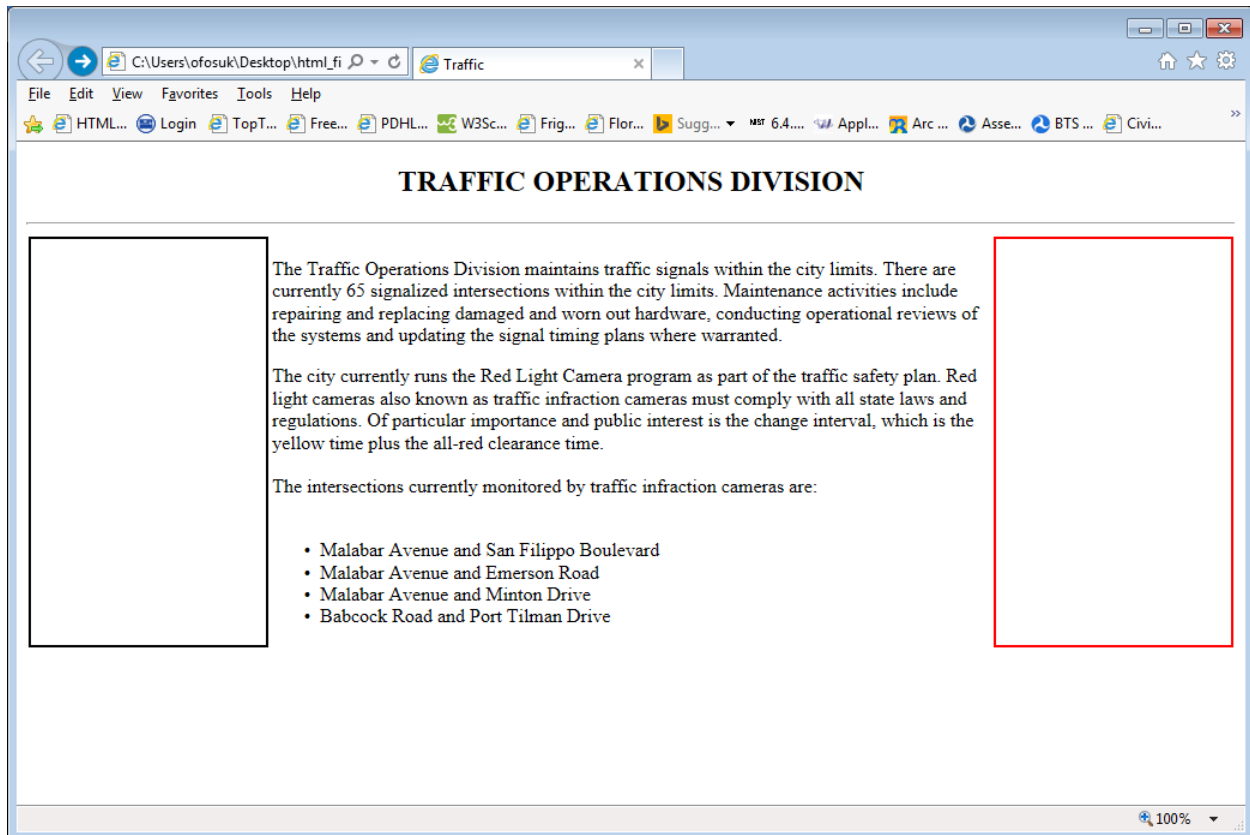
</p>

</td> <!--close of column 2 -->
<td width = "20%" style = "border:2px solid red"> ←
    <!--column 3: empty column for now will items later -->
</td>
<tr>    <!--close of row 1 -->
</body>
</html>
```



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Test your file.



Note that the height of the row has not been specified. In that case the browser will automatically provide a height in which the content can fit.



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Add the following code to add background colors in the table cells.

Colors can be looked up by name, *hexadecimal value*, or by *RGB values*. A comprehensive listing of colors and their values can be found at various sources (w3schools.com, 2014a).

```
MyFourthWebPage - Notepad
File Edit Format View Help
<!DOCTYPE html>
<html>
  <title>
    Traffic
  </title>
  <body>
    <h2 align="center">TRAFFIC OPERATIONS DIVISION </h2>
    <hr>
  <table >
    <tr>  <!--open of row 1 -->
    <td width = "20%" style = "border:2px solid black" bgcolor="#98AFC7">
      <!--column 1: empty column for now will items later -->
    </td>
    <td>  <!--column 2: will hold main body of information -->
      <p>
        The Traffic Operations Division maintains traffic
        signals within the city limits. There are currently 65
        signalized intersections within the city limits. Maintenance
        activities include repairing and replacing damaged and worn
        out hardware, conducting operational reviews of the systems
        and updating the signal timing plans where warranted.
      </p>
    </td>
  </tr>
</table>
</body>
</html>
```



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Also,

```
MyFourthWebPage - Notepad
File Edit Format View Help

The city currently runs the Red Light Camera program as part
of the traffic safety plan. Red light cameras also known as
traffic infraction cameras must comply with all state laws
and regulations. Of particular importance and public interest
is the change interval, which is the yellow time plus the
all-red clearance time.

<br><br>
The intersections currently monitored by traffic infraction cameras are:
<br><br>
  <ul>
  <li>Malabar Avenue and San Filippo Boulevard</li>
  <li>Malabar Avenue and Emerson Road</li>
  <li>Malabar Avenue and Minton Drive</li>
  <li>Babcock Road and Port Tilman Drive</li>
  </ul>

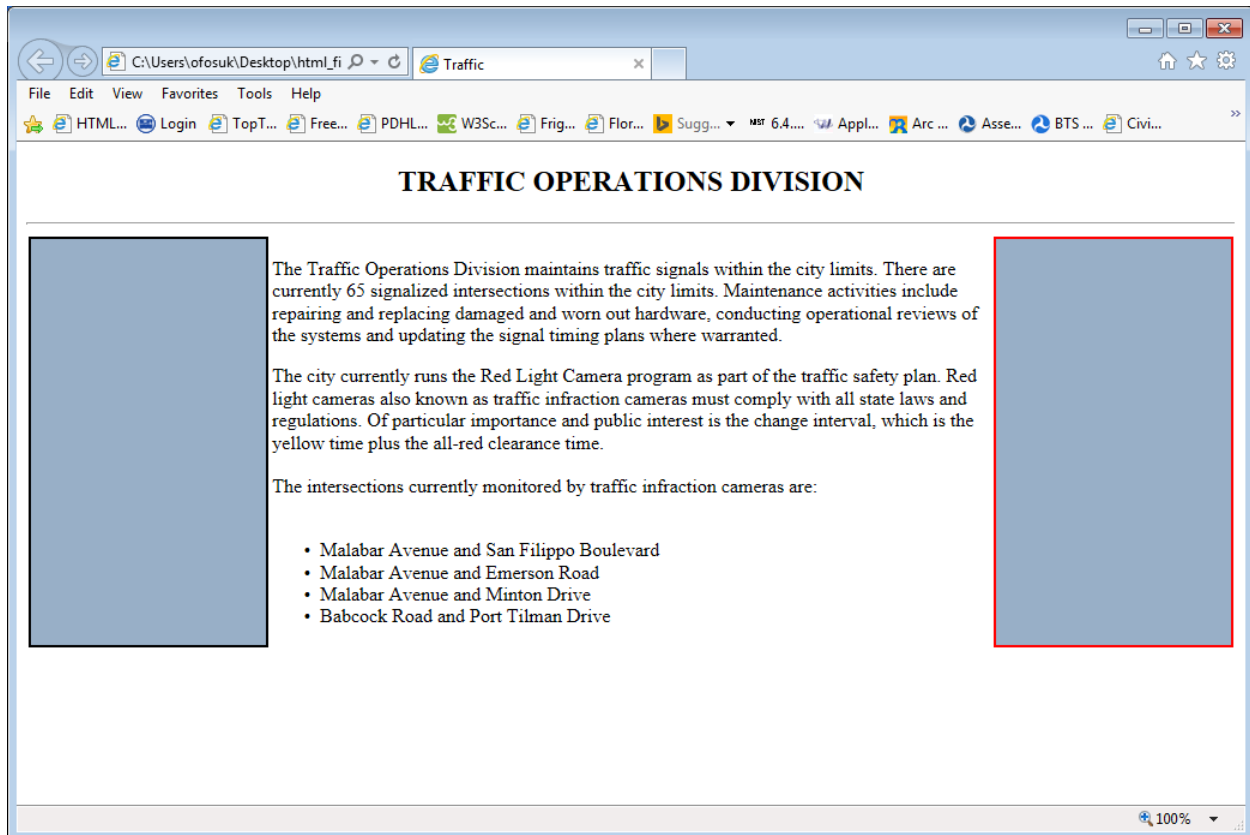
</p>

</td>  <!--close of column 2 -->
<td width = "20%" style = "border:2px solid red" bgcolor="#98AFC7">
  <!--column 3: empty column for now will items later -->
</td>
<tr>  <!--close of row 1 -->
</body>
</html>
```



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Test your file.





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Table 3.3 lists a selection of attributes that can be applied to customize tables and table elements.

Table 3: Attributes

Attribute	Description	Example
colspan	Creates a cell that spans over a number of columns in the table	<i>colspan = "3"</i>
rowspan	Creates a cell that spans over a number of rows in the table	<i>rowspan = "3"</i>
valign	Sets the vertical alignment in a table, row, column, or a cell	<i>valign = "top"</i>
cellpadding	Sets the thickness of the white space between the cell border and the cell's contents	<i>cellpadding = "3"</i>
cellspacing	Sets the thickness of the white space between the borders of adjacent cells	<i>cellspacing = "5"</i>
height	Sets the height of a row in pixels or as a percentage of monitor	<i>height = "35" or height = "15%"</i>

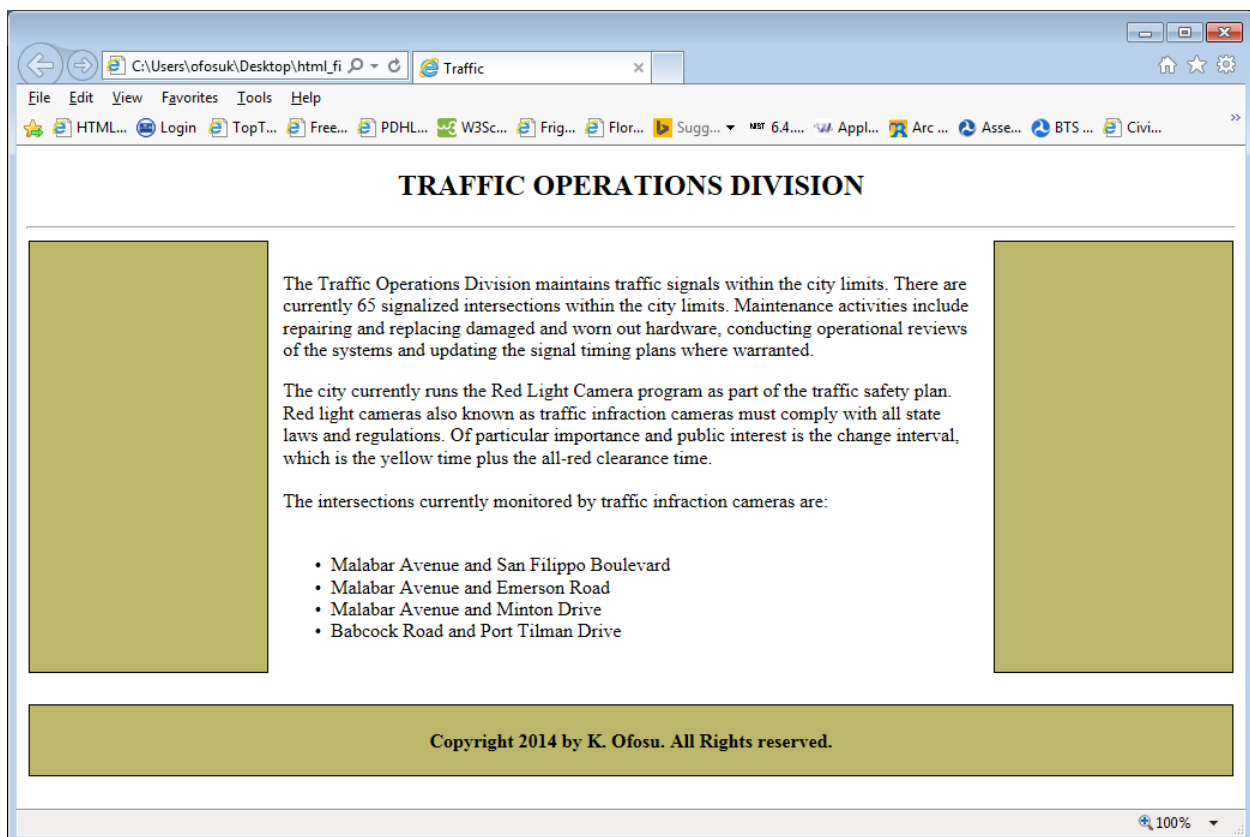


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Manipulate your table attributes values as you wish to obtain your own preferred appearance.
The following updates were made,

- *Cellpadding* of size 10 applied to the entire table
- Change the background color of the two outer columns to the color *DarkKhaki*
- Apply a solid black border of 1px to the two outer columns
- Add a blank row of height 1 pixel that spans all three columns
- At the bottom of the table, add another row of height 60 pixels, with *DarkKhaki* background color, solid line black border of 1px, center alignment and “middle” vertical alignment. This row spans three columns, and contains bold text with information identifying the year and holder of the copyright to the web page.

The updates yield the following webpage,



Save as *MyFifthWebPage.html*.



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3.7 HTML Links

A link (or **hyperlink**) is a word, group of words, or image that is clicked on to open and move to another webpage or specific section of another webpage.

The HTML link syntax is of the form

```
<a href = "webpage to open" >a word sentence or image to be clicked on</a>
```

For example

```
<a href = www.mycompany.org >Click here to go to our company website</a>
```

If the intent is to open to a specific section of the target web page, then a label to that location in the target web page must be typed into the HTML of the target web page at the correct location. For example, if a link is established to open to the section “New Projects” on the company web page, then the following syntax must be entered at the “New Projects” location in the company webpage HTML code.

```
<a id = "mybookmark" >New Projects</a>
```

or

```
<a name = "mybookmark" >New Projects</a>
```

So to jump to “New Projects” section of the company web page from our current web page location, set up the link as follows



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` Click here to go to the New Projects section`

If the linked section is on the same web page, then the page URL portion of the reference in the start tag may be omitted.

To open a linked web page in a new browser or new browser tab, a *target* attribute must be added to the start tag. For example,

` Click here to go to our company website `

By default, in all browsers, links appear as follows:

- Unvisited link (*link*) is underlined and blue
- A visited link (*vlink*) is underlined and purple
- An active link (*alink*) is underlined and red

This color scheme can be changed by assigning different colors to the attributes *link*, *vlink*, and *alink* in the `<body>` start tag of your HTML document.

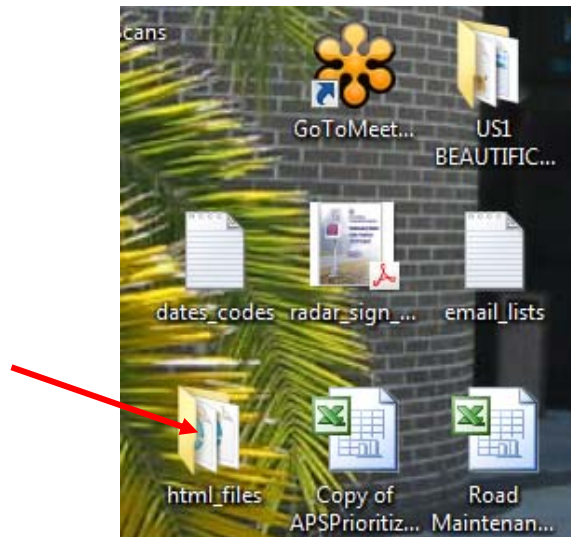
Open ***MyFifthWebPage***.

Save as ***MySixthWebPage.html*** and close it.

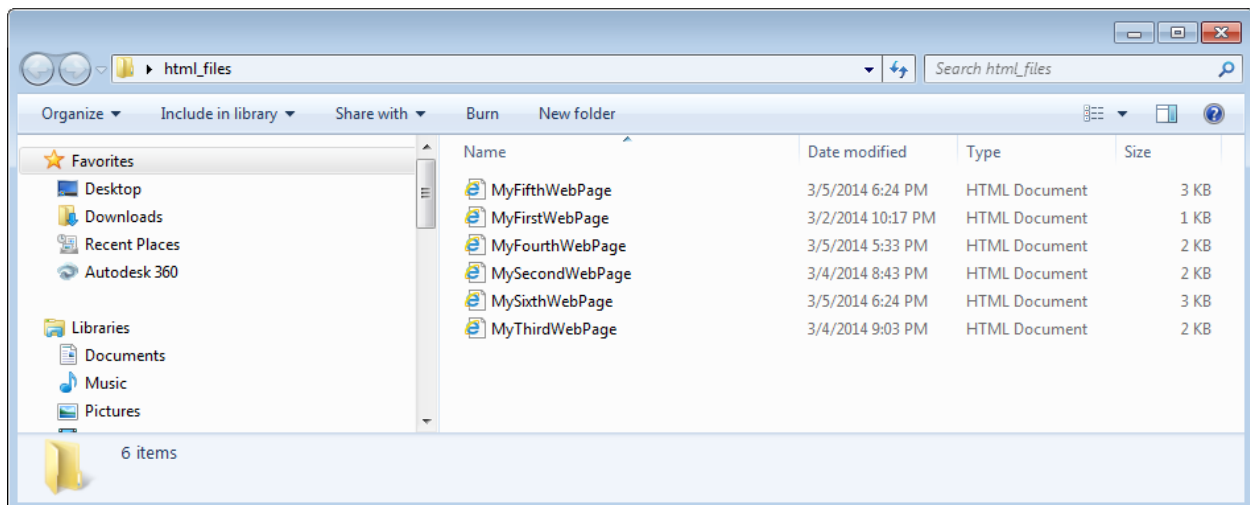


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Before proceeding further, create a folder on your desktop and give it a name of your choice e.g. “html_files”.



Move all the HTML files created so far in this course to that folder.



Upload the following documents (from SunCam) to your folder: *FloridaStatutes2013.pdf*.



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Open *MySixthWebPage* in your text editor. Add the following information and links to the cell at row-1-column-1 of the table.

```
MySixthWebPage - Notepad
File Edit Format View Help

<table cellpadding = "10">
  <tr>  <!--open of row 1 -->
    <td width = "20%"  style = "border:1px solid black" bgcolor="#BDB76B">
      <p>
        <b>Location:</b>
        <br>
        1316 Malabar Boulevard<br>
        Farm Bay<br>
        Florida, 33695<br>
        Ph. 432-589-6556<br>
        Fax. 432-589-6557<br><br>
        Business Hours: 8:00am - 4:30pm
      </p>
      <p>
        <a href="mailto:kbofosu@research.com?subject=Customer Feedback
        &body=Type your comments and questions here.
        &cc=ofosu_k@yahoo.com
        &bcc=kofosu@mail.valenciacollege.edu">Email us</a>
      </p>
      <p>
        <a href="http://www.cityoforlando.net/" target = "_blank">
          Main Page</a>
      </p>
      <p>
        <a href="FloridaStatutes2013.pdf" target = "_blank">
          Laws and Regulations</a>
      </p>
    </td>
```



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Review the links created.

```
MySixthWebPage - Notepad
File Edit Format View Help

<table cellpadding = "10">
  <tr>  <!--open of row 1 -->
  <td width = "20%"  style = "border:1px solid black" bgcolor="#BDB76B">
    <p>
    <b>Location:</b>
    <br>
    1316 Malabar Boulevard<br>
    Farm Bay<br>
    Florida, 33695<br>
    Ph. 432-589-6556<br>
    Fax. 432-589-6557<br><br>
    Business Hours: 8:00am - 4:30pm
    </p>
    <p>
    <a href="mailto:kbofosu@research.com?subject=Customer Feedback
    &body=Type your comments and questions here.
    &cc=ofosu_k@yahoo.com
    &bcc=kofosu@mail.valenciacollege.edu">Email us</a>
    </p>
    <p>
    <a href="http://www.cityoforlando.net/" target = "_blank">
    Main Page</a>
    </p>
    <p>
    <a href="FloridaStatutes2013.pdf" target = "_blank">
    Laws and Regulations</a>
    </p>
  </td>
</table>
```

Email link: will open your default email program

Link to another web page

Link to a pdf document in the working directory

For links to documents that are not in the working directory, provide the full path to the file. In the above examples, the links will open in a new browser window due to the *target* attribute provided.



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Test your file.

The screenshot shows a web browser window with the address bar containing 'C:\Users\ofosuk\Desktop\html_fi' and the page title 'Traffic'. The browser's menu bar includes 'File', 'Edit', 'View', 'Favorites', 'Tools', and 'Help'. The address bar also shows 'Traffic' and navigation icons. The browser's toolbar includes icons for 'HTML...', 'Login', 'TopT...', 'Free...', 'PDHL...', 'W3Sc...', 'Frig...', 'Flor...', 'Sugg...', 'MHT 6.4...', 'Appl...', 'Arc ...', 'Asse...', 'BTS ...', and 'Civi...'. The main content area features a header 'TRAFFIC OPERATIONS DIVISION' and a sidebar on the left with contact information. The main content area contains three paragraphs of text and a bulleted list of intersections. The footer contains a copyright notice.

TRAFFIC OPERATIONS DIVISION

Location:
1316 Malabar Boulevard
Farm Bay
Florida, 33695
Ph. [432-589-6556](tel:432-589-6556)
Fax. 432-589-6557

Business Hours: 8:00am - 4:30pm

[Email us](#)

[Main Page](#)

[Laws and Regulations](#)

The Traffic Operations Division maintains traffic signals within the city limits. There are currently 65 signalized intersections within the city limits. Maintenance activities include repairing and replacing damaged and worn out hardware, conducting operational reviews of the systems and updating the signal timing plans where warranted.

The city currently runs the Red Light Camera program as part of the traffic safety plan. Red light cameras also known as traffic infraction cameras must comply with all state laws and regulations. Of particular importance and public interest is the change interval, which is the yellow time plus the all-red clearance time.

The intersections currently monitored by traffic infraction cameras are:

- Malabar Avenue and San Filippo Boulevard
- Malabar Avenue and Emerson Road
- Malabar Avenue and Minton Drive
- Babcock Road and Port Tilman Drive

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Hover of any link. Notice that the cursor changes. Also notice the information regarding the link is displayed at the bottom of the window.

The screenshot shows a web browser window with the following content:

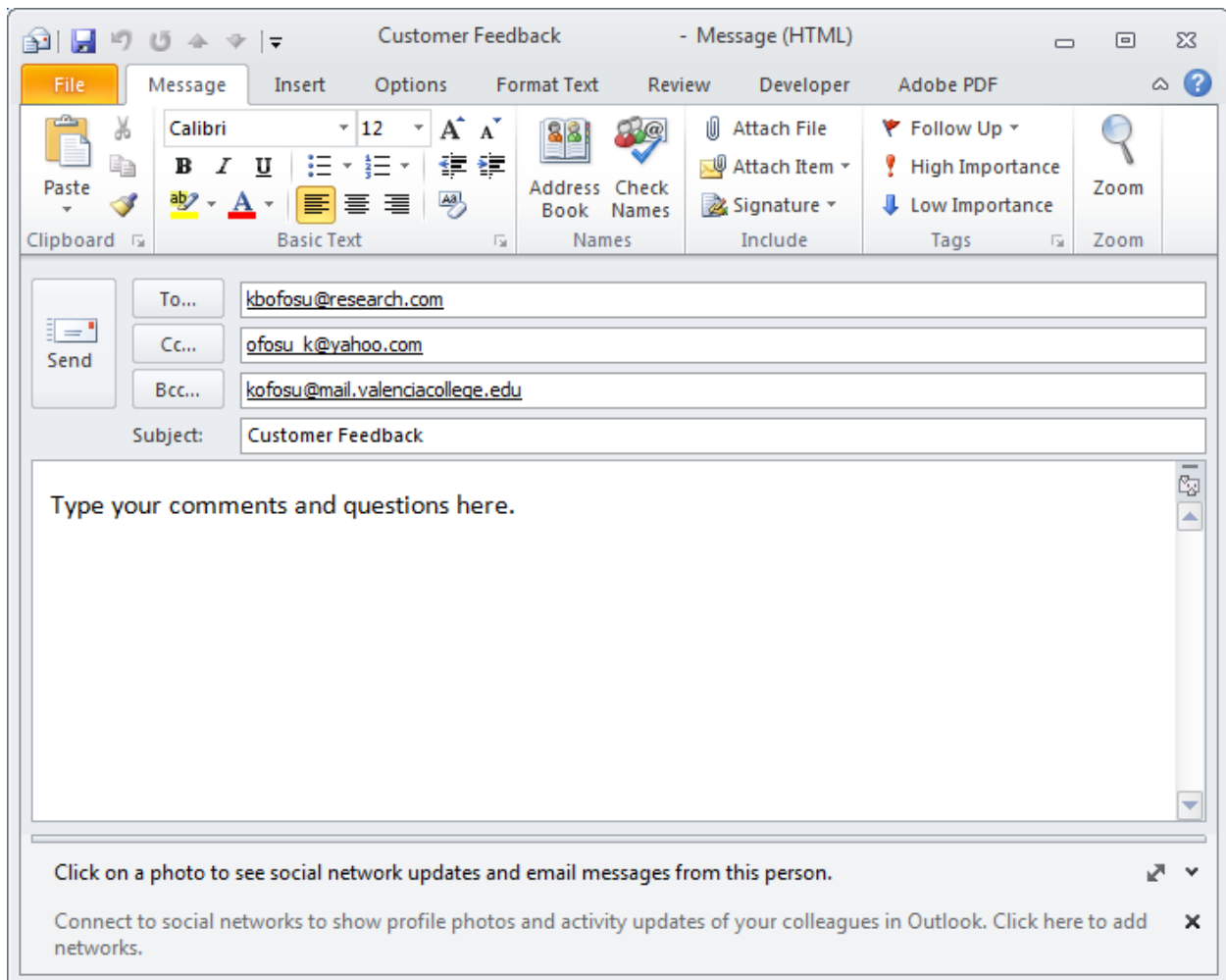
- TRAFFIC OPERATIONS DIVISION**
- Location:**
1316 Malabar Boulevard
Farm Bay
Florida, 33695
Ph. [432-589-6556](tel:432-589-6556)
Fax. 432-589-6557
- Business Hours: 8:00am - 4:30pm
- [Email us](#)
- [Main Page](#)
- [Laws and Regulations](#)
- The Traffic Operations Division maintains traffic signals within the city limits. There are currently 65 signalized intersections within the city limits. Maintenance activities include repairing and replacing damaged and worn out hardware, conducting operational reviews of the systems and updating the signal timing plans where warranted.
- The city currently runs the Red Light Camera program as part of the traffic safety plan. Red light cameras also known as traffic infraction cameras must comply with all state laws and regulations. Of particular importance and public interest is the change interval, which is the yellow time plus the all-red clearance time.
- The intersections currently monitored by traffic infraction cameras are:
 - Malabar Avenue and San Filippo Boulevard
 - Malabar Avenue and Emerson Road
 - Malabar Avenue and Minton Drive
 - Babcock Road and Port Tilman Drive
- Copyright 2014 by K. Ofosu. All Rights reserved.
- Address bar: <http://www.cityoforlando.net/>



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Click on the *Email* link.

The default email program on your computer opens in a new window. Review the email entries and identify where they were specified in the HTML code.

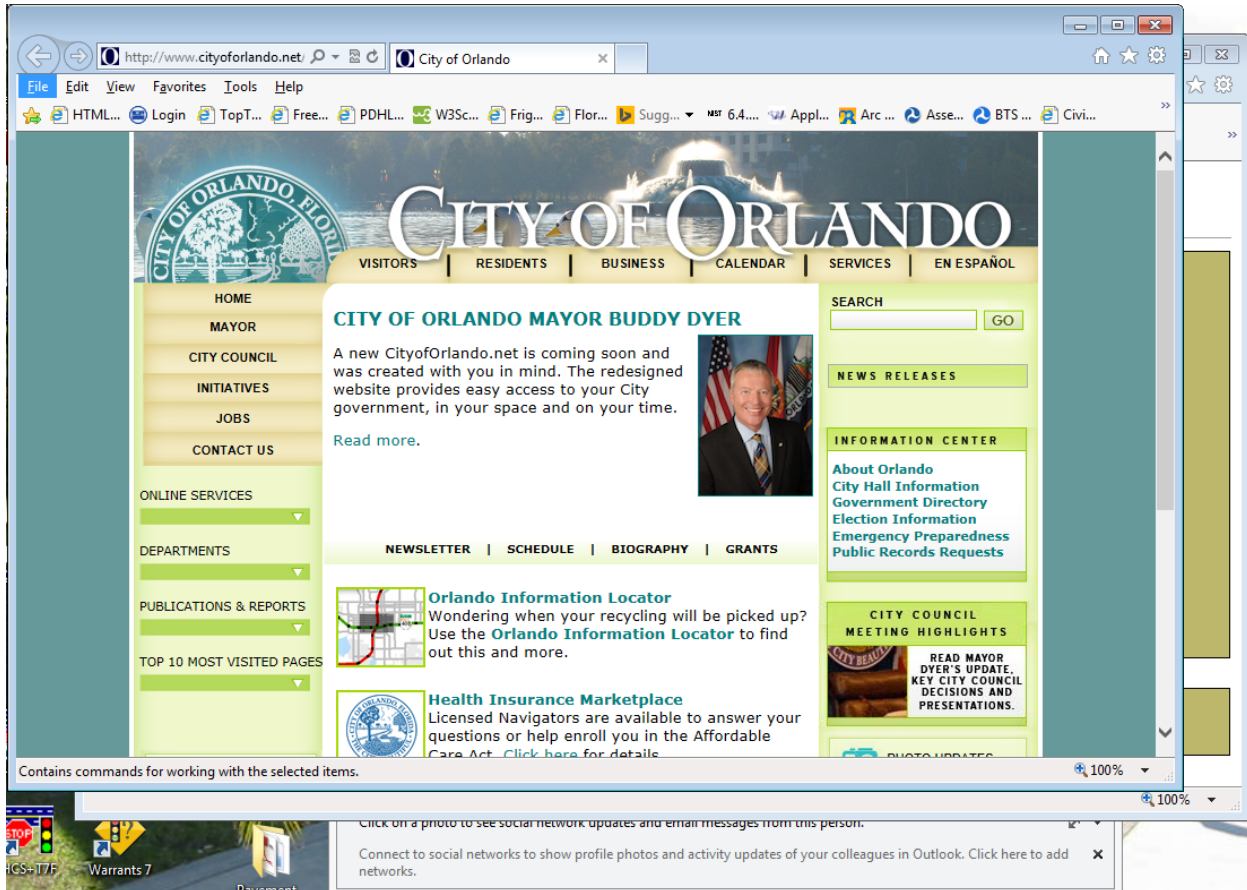




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Click on the *Main Page* link.

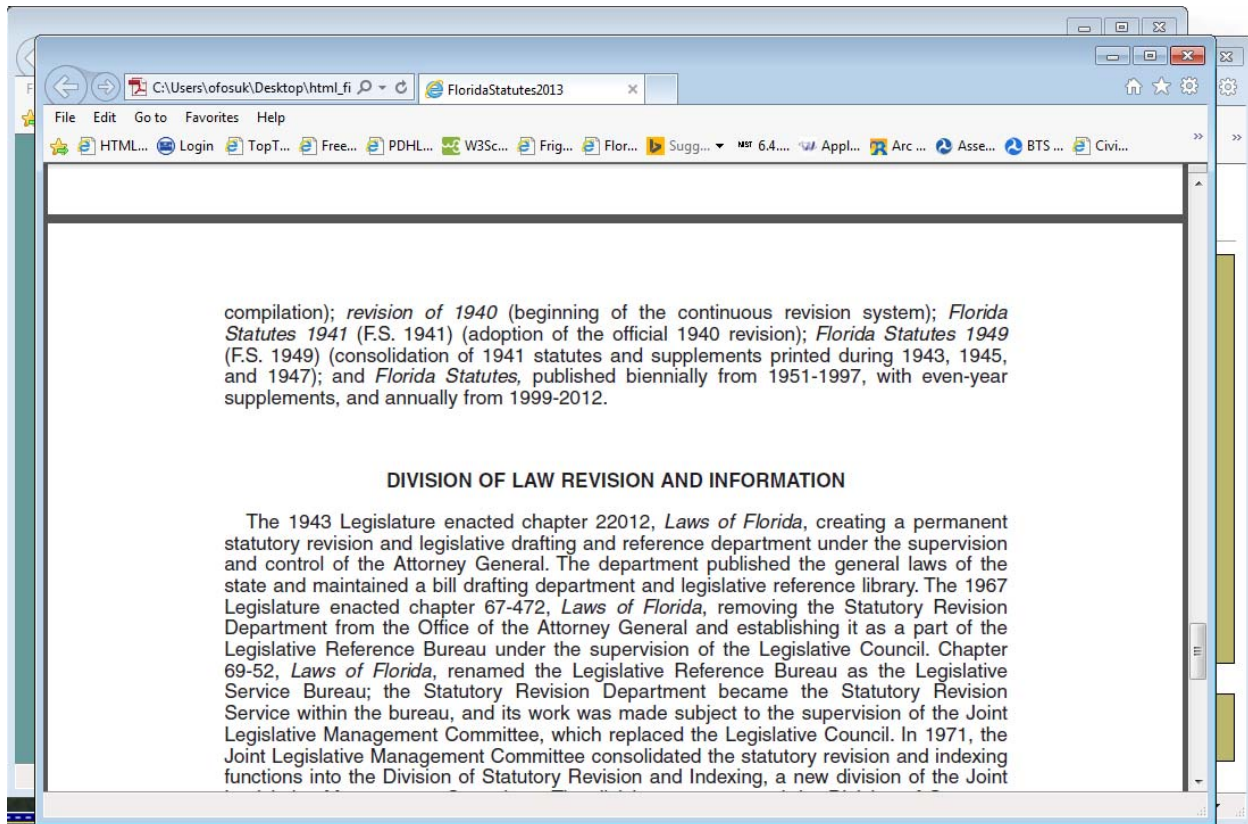
The web page opens in a new browser window





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Click on the link to the *Laws and Regulations* pdf document.
The document opens in a new window.





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Add links to popular websites of your choice in the table cell to the right.
Change the vertical alignment of the cell to “top”.
Repeat the vertical alignment update in row-1-column-1.

```
MySixthWebPage - Notepad
File Edit Format View Help

</td> <!--close of column 2 -->
<td width = "20%" style = "border:1px solid black" bgcolor="#BDB76B"
      valign = "top">
    <p>
      <a href="http://www.ite.org/" target = "_blank">
        Institute of Transportation Engineers</a>
    </p>
    <p>
      <a href="http://www.dot.gov/" target = "_blank">
        U.S. Department of Transportation</a>
    </p>
    <p>
      <a href="http://www.fbpe.org/" target = "_blank">
        Florida Board of Professional Engineers Board </a>
    </p>
</td>
<tr> <!--close of row 1 -->

<tr height = "1">
  <td colspan = "3"></td>
```



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Test your file.

The screenshot shows a web browser window with the address bar containing "C:\Users\ofosuk\Desktop\html_fi" and the page title "Traffic". The browser's menu bar includes "File", "Edit", "View", "Favorites", "Tools", and "Help". The address bar also shows "Traffic" and a search icon. The browser's toolbar includes "HTML...", "Login", "TopT...", "Free...", "PDHL...", "W3Sc...", "Frig...", "Flor...", "Sugg...", "MHT 6.4...", "Appl...", "Arc...", "Asse...", "BTS...", and "Civi...".

TRAFFIC OPERATIONS DIVISION

Location:
1316 Malabar Boulevard
Farm Bay
Florida, 33695
Ph. [432-589-6556](tel:432-589-6556)
Fax. 432-589-6557

Business Hours: 8:00am - 4:30pm

[Email us](#)

[Main Page](#)

[Laws and Regulations](#)

The Traffic Operations Division maintains traffic signals within the city limits. There are currently 65 signalized intersections within the city limits. Maintenance activities include repairing and replacing damaged and worn out hardware, conducting operational reviews of the systems and updating the signal timing plans where warranted.

The city currently runs the Red Light Camera program as part of the traffic safety plan. Red light cameras also known as traffic infraction cameras must comply with all state laws and regulations. Of particular importance and public interest is the change interval, which is the yellow time plus the all-red clearance time.

The intersections currently monitored by traffic infraction cameras are:

- Malabar Avenue and San Filippo Boulevard
- Malabar Avenue and Emerson Road
- Malabar Avenue and Minton Drive
- Babcock Road and Port Tilman Drive

[Institute of Transportation Engineers](#)

[U.S. Department of Transportation](#)

[Florida Board of Professional Engineers Board](#)

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In the “main” cell add a link to open the “next page” and close the existing page. Align the link to the right horizontally and to the bottom vertically.

```
MySixthWebPage - Notepad
File Edit Format View Help
<br><br>
<ul>
<li>Malabar Avenue and San Filippo Boulevard</li>
<li>Malabar Avenue and Emerson Road</li>
<li>Malabar Avenue and Minton Drive</li>
<li>Babcock Road and Port Tilman Drive</li>
</ul>
</p>
<p align = "right" valign = "bottom">
  <a href="MySeventhWebPage" >Next Page</a>
</p>
</td> <!--close of column 2 -->
<td width = "20%" style = "border:1px solid black" bgcolor="#BDB76B"
  valign = "top">
  <p>
    <a href="http://www.ite.org/" target = "_blank">
      Institue of Transportation Engineers</a>
  </p>
  <p>
    <a href="http://www.dot.gov/" target = "_blank">
      U.S. Department of Transportation</a>
  </p>
  <p>
    <a href="http://www.fbpe.org/" target = "_blank">
```



Web-Based Programming For Engineers – Part 1 *A SunCam online continuing education course*

Test the file.

The screenshot shows a web browser window with the following content:

TRAFFIC OPERATIONS DIVISION

Location:
1316 Malabar Boulevard
Farm Bay
Florida, 33695
Ph. [432-589-6556](tel:432-589-6556)
Fax. 432-589-6557

Business Hours: 8:00am - 4:30pm

[Email us](#)

[Main Page](#)

[Laws and Regulations](#)

The Traffic Operations Division maintains traffic signals within the city limits. There are currently 65 signalized intersections within the city limits. Maintenance activities include repairing and replacing damaged and worn out hardware, conducting operational reviews of the systems and updating the signal timing plans where warranted.

The city currently runs the Red Light Camera program as part of the traffic safety plan. Red light cameras also known as traffic infraction cameras must comply with all state laws and regulations. Of particular importance and public interest is the change interval, which is the yellow time plus the all-red clearance time.

The intersections currently monitored by traffic infraction cameras are:

- Malabar Avenue and San Filippo Boulevard
- Malabar Avenue and Emerson Road
- Malabar Avenue and Minton Drive
- Babcock Road and Port Tilman Drive

[Next Page](#)

[Institute of Transportation Engineers](#)

[U.S. Department of Transportation](#)

[Florida Board of Professional Engineers Board](#)

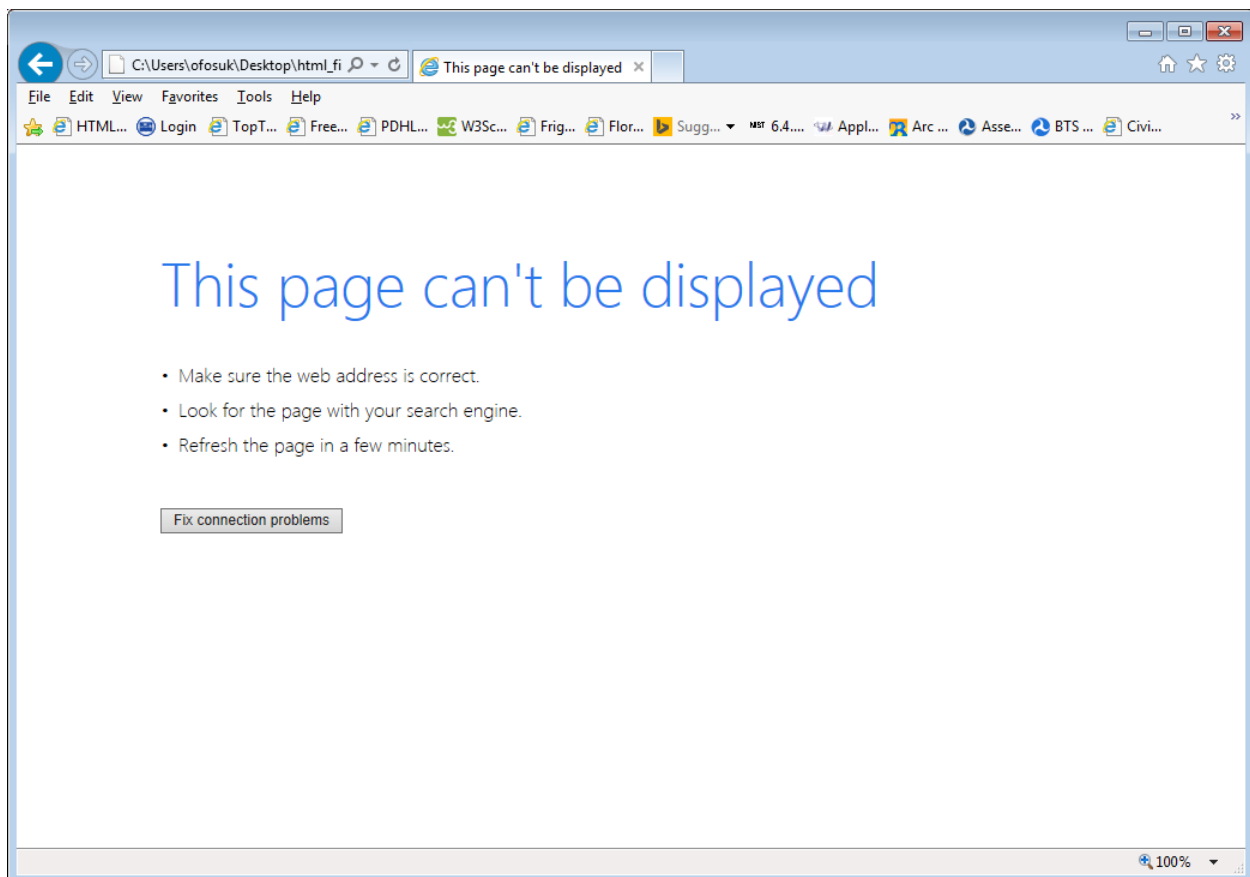
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Click on *Next Page* to open that link. Since the *target* attribute was not used, the original web page will close and the new one will open.

The *MySeventhWebPage* web page currently does not exist, so clicking on the *Next Page* link yields an error message. You may return to your original web page by clicking in the *Back* button of the web browser.





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3.8 Images

Images can be added to the web page using the image tag

```

```

The path to the image must include the relevant suffix e.g. “.jpeg”, “.GIF”, “.TIFF”, etc. There is no closing tag for images. The *alt* attribute provides an alternative text to display if the browser cannot display the image. Attributes that are commonly added to the image tag include alignment, height, width, border, background properties, etc. Images will often need to be resized by trial and error to fit appropriately on your web pages.

Upload the folder named *pictures* (from *SunCam*) into your *html_files* folder.

Open the folder *pictures*, and double click on the text file *seventh_code* to open it.

Go back to the *html_files* folder and open ***MySixthWebPage*** in your text editor.



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Update the *Next Page* link.

```
MySixthWebPage - Notepad
File Edit Format View Help
traffic infraction cameras must comply with all state laws
and regulations. Of particular importance and public interest
is the change interval, which is the yellow time plus the
all-red clearance time.

<br><br>
The intersections currently monitored by traffic infraction cameras are:
<br><br>

<ul>
<li>Malabar Avenue and San Filippo Boulevard</li>
<li>Malabar Avenue and Emerson Road</li>
<li>Malabar Avenue and Minton Drive</li>
<li>Babcock Road and Port Tilman Drive</li>
</ul>

</p>

<p align = "right" valign = "bottom">
<a href="pictures\MySeventhWebPage.html" >Next Page</a>
</p>
```

Note that the extended file name (path) of the linked page is given as the two web pages are in different folders.

Save your file.

Copy and paste the contents of the text file *seventh_code* to replace the content of *MySixthWebPage* at the table cell row-1-column-2.



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Study the code and identify some image tags.

```
seventh_code - Notepad
File Edit Format View Help

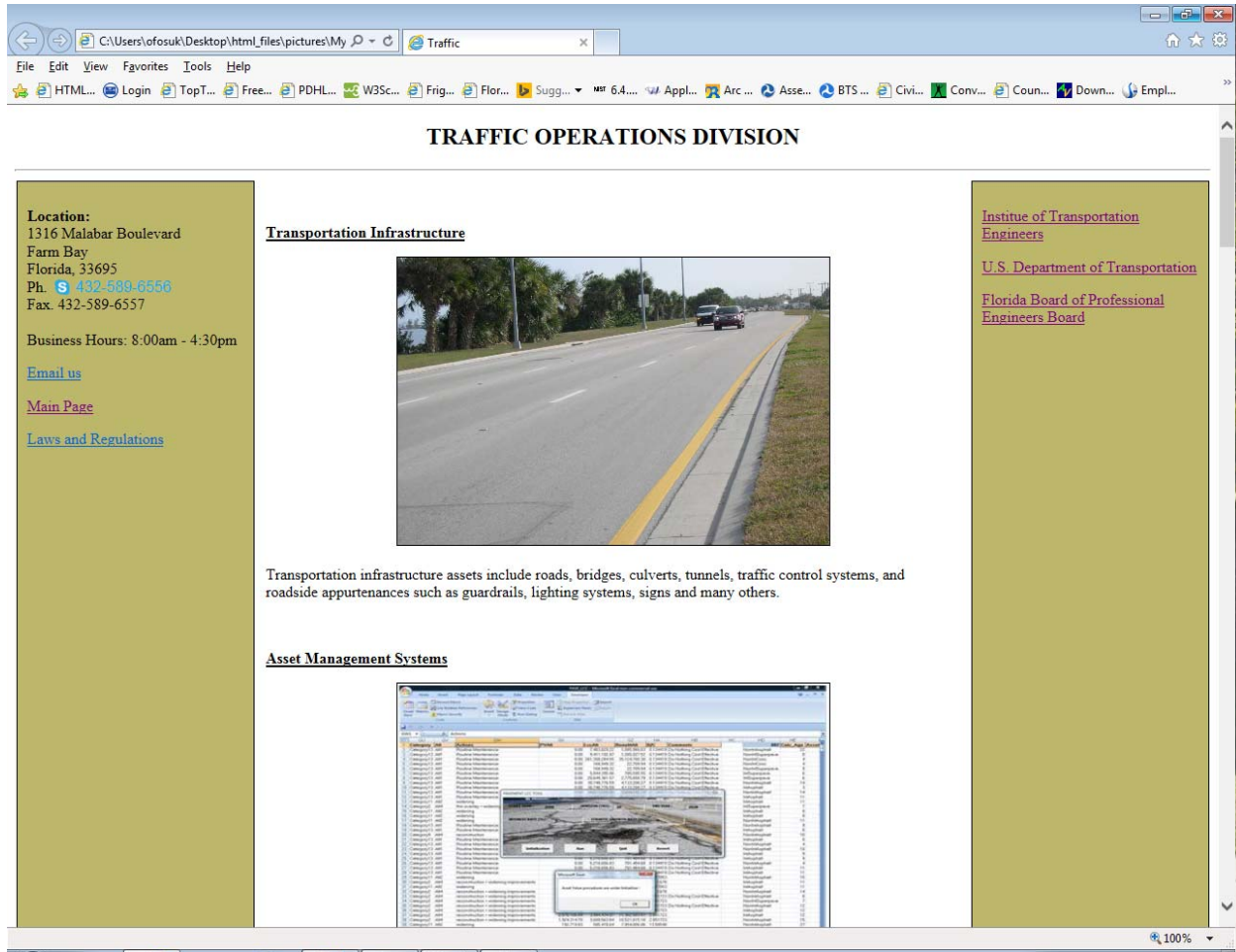
<p align="left">
Transportation agencies employ infrastructure (or asset) management systems to
monitor, manage, and maintain these facilities in a cost effective manner.
</p><br>

    <p font size="14"><b><a name="detmodel"><u>Deterioration Models</u></a></b></p>
<p align="center"></p>
<p align="left">
A deterioration model predicts the future condition or performance of an asset if
or improvements are conducted over a given time horizon. Deterioration models vary
opinion, to simple linear regression models, to stochastic methods. In recent time
have been proposed. Reliability methods have the advantage of being capable of cap
nature of infrastructure deterioration, and its propagation throughout the service
</p><br>
    <p font size="14"><b><a name="reliab"><u>Reliability and Life Testing</u></a></p>
<p align="center"></p>
<p align="left">
To develop the reliability-based deterioration model, probability plotting can be
or condition data of an asset to a known statistical distribution. The data may in
as censored observations of sojourn times an asset spends in a given condition/ per
data may be synthesized from the expected stochastic deterioration model and the c
distribution.
</p><br>
    <p font size="14"><b><a name="reliabpred"><u>Reliability and Lifetime Performance</u></p>
<p align="center"></p>
```



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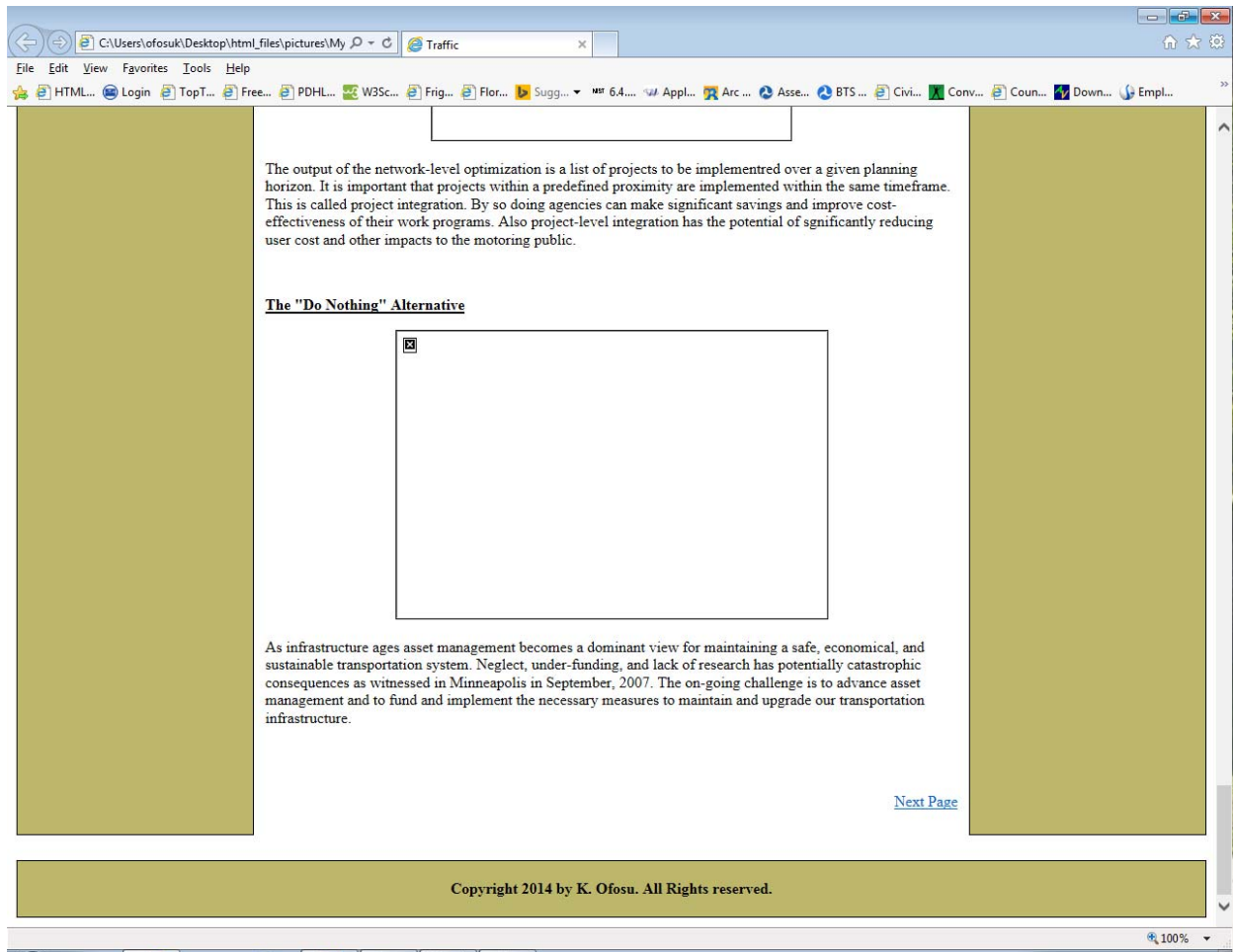
Save as *MySeventhWebPage.html* in the *pictures* folder.
Test the file.





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Scroll to the bottom of the web page.



Notice that not all of the images display correctly. On careful review of the code, you will see that those image files listed in the image tag do not exist in the *pictures* folder at this time.



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Open the *MySeventhWebPage* file in your text editor.

Change the *Next Page* link to *Previous Page*, link it back to *MySixthWebPage*, and align it to the bottom-left.

```
MySeventhWebPage - Notepad
File Edit Format View Help
align="center"></p>

align="left">
s infrastructure ages asset management becomes a dominant view for maintaining a safe, economi
nder-funding, and lack of research has potentially catastrophic consequences as witnessed in M
hallenge is to advance asset management and to fund and implement the necessary measures to ma
/p><br><br>

<p align = "left" valign = "bottom">
  <a href="C:\Users\ofosuk\Desktop\html_files\MySixthWebPage.html" >Previous Page</a>
</p>

<!--close of column 2 -->
width = "20%" style = "border:1px solid black" bgcolor="#BDB76B"
valign = "top">
```

Note that the extended file name (path) of the linked page is given as the two web pages are in different folders.



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Scroll through the code and identify a bookmark, or a labeled section that is hyperlinked from another web page (a link tag containing “a name...” or “a id ...”).

Note the name of the bookmark.

```
MySeventhWebPage - Notepad
File Edit Format View Help

<p align="left">
The objective of project-level analysis is to determine the cost-effective tre
among a set of applicable treatments, for an asset based on its current condit
The process involves modelling known and predicted future events associated wi
as a "cash flow" diagram. An engineering economic analysis is then performed t
</p><br>

    <p font size="14"><b><a name="usercost"><u>User Cost</u></a></b></p>

<p align="center"></p>

<p align="left">
Road user cost is incurred by motorists any time they have to make a diversion
structural or functional failure of a facility such as a pavement, a height re
User costs are also incurred due to construction activity. Asset management to
when assessing impacts and decisions at the project-level and also at the infr
</p><br>

    <p font size="14"><b><a name="networklevel"><u>Network-level Analysis</u>

<p align="center"></p>
```

Save and close your file.



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Open *MySixthWebPage* in your text editor.

Insert a picture at the top of the narrative. Select a picture of your choice from the *pictures* folder.

```
MySixthWebPage - Notepad
File Edit Format View Help

    <p>
        <a href="FloridaStatutes2013.pdf" target = "_blank">
            Laws and Regulations</a>
    </p>
</td>
<td> <!--column 2: will hold main body of information -->
    <p align="center">
    </p>
    <p>
        The Traffic Operations Division maintains traffic
        signals within the city limits. There are currently 65
        signalized intersections within the city limits. Maintenance
        activities include repairing and replacing damaged and worn
        out hardware, conducting operational reviews of the systems
        and updating the signal timing plans where warranted.
    </p>
```



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Now, make the image a clickable link to the bookmark you identified on *MySeventhWebPage*. To do so, wrap the image tag in link tags.

```
MySixthWebPage - Notepad
File Edit Format View Help

    <p>
        <a href="FloridaStatutes2013.pdf" target = "_blank">
            Laws and Regulations</a>
    </p>
</td>
<td>  <!--column 2: will hold main body of information -->

    <p align="center">
        <a href="pictures\MySeventhWebPage.html#usercosts">
            
        </a>
    </p>

    <p>
        The Traffic Operations Division maintains traffic
        signals within the city limits. There are currently 65
        signalized intersections within the city limits. Maintenance
        activities include repairing and replacing damaged and worn
        out hardware, conducting operational reviews of the systems
```



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Test your file.

Hover over the picture.

TRAFFIC OPERATIONS DIVISION


Location:
1316 Malabar Boulevard
Farm Bay
Florida, 33695
Ph. 432-589-6556
Fax. 432-589-6557

Business Hours: 8:00am - 4:30pm

[Email us](#)

[Main Page](#)

[Laws and Regulations](#)



The Traffic Operations Division maintains traffic signals within the city limits. There are currently 65 signalized intersections within the city limits. Maintenance activities include repairing and replacing damaged and worn out hardware, conducting operational reviews of the systems and updating the signal timing plans where warranted.

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The intersections currently monitored by traffic infraction cameras are:

- Malabar Avenue and San Filippo Boulevard
- Malabar Avenue and Emerson Road
- Malabar Avenue and Minton Drive
- Babcock Road and Port Tilman Drive

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file:///C:/Users/ofosuk/Desktop/html_files/pictures/MySeventhWebPage.html#usercosts



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Click on the picture.

The linked page opens at the bookmark location.

The screenshot shows a web browser window with the following content:

User Cost

Road user cost is incurred by motorists any time they have to make a diversion, detour, or slow down as result of structural or functional failure of a facility such as a pavement, a height restricted bridge, or deficient culvert. User costs are also incurred due to construction activity. Asset management tools must take user cost into consideration when assessing impacts and decisions at the project-level and also at the infrastructure network-level.

Network-level Analysis

$$\sum_{r=0}^T \sum_{j=1}^J \sum_{q=1}^{N_j} c_{jq} x_{jq} \leq B_T$$

The objective of network analysis is to assign resources such as the maintenance budget to a list of candidate projects that were identified at the project-level analysis phase. Traditionally agencies analyze individual classes independently, for example the bridge program may not consider events in the pavement program. The challenge now is to develop network-level analyses tools that consider all sub-systems of the total infrastructure network as well as the relationships between them, simultaneously, in the network-level analysis. This optimization problem can be formulated in a number ways. An agency may have several goals or objectives for example improving network-wide performance and minimizing the percentage of assets in less than "fair" condition, as well constraints such as overall budget limitations and statutory requirements on funding levels for a particular asset class. A scenario of this nature can be formulated as a multiobjective integer nonlinear program.

Genetic Algorithm

Asset Class	Asset ID	Improvement	M Candidate Solutions for Generation k					
Pavement	Pavement 1	Pavement Improv 1	0	1	1	1	0
	Pavement 2	Pavement Improv 2	0	1	1	0	0

Also, test the *Next Page* and *Previous Page* links.

The test is a success.



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3.9 Videos

Video files may be accessed through hyperlinks. For example,

```
<a href="intro.swf">Play a video file</a>
```

Video files may also be opened using a video tag. For example

```
<video width="320" height="240" controls>  
  <source src="movie.mp4" type="video/mp4">  
  <source src="movie.ogg" type="video/ogg">  
Sorry, this browser does not support the video tag.  
</video>
```

The browser will attempt to play the video in the first format. If unsuccessful, it will attempt to play it in the second format. If that fails the user is notified that the video cannot be played with the current web browser.

A video may also be embedded in a web page. For example

```
<embed src="intro.swf" height="200" width="200">
```

A common strategy is to combine the video element with the embed element so that if the former fails, the browser will fall back on the latter.



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For example

```
<video width="320" height="240" controls>  
  <source src="movie.mp4" type="video/mp4">  
  <source src="movie.ogg" type="video/ogg">  
  <object data="movie.mp4" width="320" height="240">  
    <embed src="movie.swf" width="320" height="240">  
  </object>  
</video>
```

Open **MySixthWebPage**.

In the rightmost cell of the HTML table, create a link to the video: (This is a video preloaded onto this author's *GoogleDrive*, copy or reproduce the path to the file)

```
MySixthWebPage - Notepad  
File Edit Format View Help  
Institute of Transportation Engineers</a>  
</p>  
<p>  
  <a href="http://www.dot.gov/" target = "_blank">  
    U.S. Department of Transportation</a>  
</p>  
<p>  
  <a href="http://www.fbpe.org/" target = "_blank">  
    Florida Board of Professional Engineers Board </a>  
</p>  
<p>  
  <a href="https://docs.google.com/file/d/0B1YIDTYhzvYcZkw1UXMwQ2JzS28/preview?pli=1"  
    target="_blank">  
    Traffic Data Video</a>  
</p>  
<!--close of row 1 -->
```



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Save your file and test it.

Click on the link to open the video.

TRAFFIC OPERATIONS DIVISION

Location:
1316 Malabar Boulevard
Farm Bay
Florida, 33695
Ph. 432-589-6556
Fax. 432-589-6557

Business Hours: 8:00am - 4:30pm

[Email us](#)
[Main Page](#)
[Laws and Regulations](#)

The Traffic Operations Division maintains traffic signals within the city limits. There are currently 65 signalized intersections within the city limits. Maintenance activities include repairing and replacing damaged and worn out hardware, conducting operational reviews of the systems and updating the signal timing plans where warranted.

The city currently runs the Red Light Camera program as part of the traffic safety plan. Red light cameras also known as traffic infraction cameras must comply with all state laws and regulations. Of particular importance and public interest is the change interval, which is the yellow time plus the all-red clearance time.

The intersections currently monitored by traffic infraction cameras are:

- Malabar Avenue and San Filippo Boulevard
- Malabar Avenue and Emerson Road
- Malabar Avenue and Minton Drive
- Babcock Road and Port Tilman Drive

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[Institute of Transportation Engineers](#)
[U.S. Department of Transportation](#)
[Florida Board of Professional Engineers Board](#)
[Traffic Data Video](#)

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The link opens. Click on the play button to play the video.

The screenshot shows a web browser window with a video player. The video player is currently paused at 0:00 / 27:14. Below the video player, the text reads: "The intersections currently monitored by traffic infraction cameras are:" followed by a bulleted list:

- Malabar Avenue and San Filippo Boulevard
- Malabar Avenue and Emerson Road
- Malabar Avenue and Minton Drive
- Babcock Road and Port Tilman Drive

At the bottom right of the page, there is a link labeled "Next Page".



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Embed the video at the bottom of the main section.

```
MySixthWebPage - Notepad
File Edit Format View Help
The intersections currently monitored by traffic infraction cameras are:
<br><br>
<ul>
<li>Malabar Avenue and San Filippo Boulevard</li>
<li>Malabar Avenue and Emerson Road</li>
<li>Malabar Avenue and Minton Drive</li>
<li>Babcock Road and Port Tilman Drive</li>
</ul>
</p> <br><br>
<p align="center">
<u>Traffic Data Analysis Video</u><br>
<embed src="https://docs.google.com/file/d/0B1YIDTYhzVycZkw1UXMwQ2JzS28/preview?pli=1" height="300" width="450">
</p>
<p align="right" valign="bottom">
<a href="pictures\MySeventhWebPage.html" >Next Page</a>
</p>
</td> <!--close of column 2 -->
<td width="20%" style="border:1px solid black" bgColor="#BDB76B"
valign="top">
```



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Test your file.

Click on the play button to play the video.

Florida, 33695
Ph. 432-589-0500
Fax. 432-589-6557
Business Hours: 8:00am - 4:30pm
[Email us](#)
[Main Page](#)
[Laws and Regulations](#)

[Florida Board of Professional Engineers Board](#)
[Traffic Data Video](#)

The Traffic Operations Division maintains traffic signals within the city limits. There are currently 65 signalized intersections within the city limits. Maintenance activities include repairing and replacing damaged and worn out hardware, conducting operational reviews of the systems and updating the signal timing plans where warranted.

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- Babcock Road and Port Tūman Drive

Traffic Data Analysis Video

Next Page

11:09 PM
1/6/2014



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3.10 Cascading Style Sheets (CSS)

In this course we have seen how to use the style attribute to format specific HTML elements and specific parts of the web page. This is referred to as an **inline style**. For example, setting the style of a cell in an HTML table,

```
MySixthWebPage - Notepad
File Edit Format View Help
<br><br>
<ul>
<li>Malabar Avenue and San Filippo Boulevard</li>
<li>Malabar Avenue and Emerson Road</li>
<li>Malabar Avenue and Minton Drive</li>
<li>Babcock Road and Port Tilman Drive</li>
</ul>
</p>
<p align = "right" valign = "bottom">
  <a href="MySeventhWebPage" >Next Page</a>
</p>
</td> <!--close of column 2 -->
<td width = "20%" style = "border:1px solid black" bgcolor="#BDB76B"
  valign = "top">
  <p>
  <a href="http://www.ite.org/" target = "_blank">
    InSTITUTE of Transportation Engineers</a>
  </p>
  <p>
  <a href="http://www.dot.gov/" target = "_blank">
    U.S. Department of Transportation</a>
  </p>
  <p>
  <a href="http://www.fbpe.org/" target = "_blank">
```




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Styles can be set for specific elements within the entire document by creating an **internal style sheet**. The internal style sheet is created in the `<head>` section towards the top of an HTML document.

Make a copy of your file *MyFourthWebPage*, and name it *MyFourthWebPageISS.html*. Open *MyFourthWebPageISS* with your text editor and add the following internal style sheet.

```
MyFourthWebPageISS - Notepad
File Edit Format View Help
<!DOCTYPE html>
<html>
<head>
<title>
  Traffic
</title>
<style>
  p {font-family: Verdana, Tahoma, Sans Serif;
    font-size: 12pt; color: blue}
  td {font-family: Georgia, Garamond, serif;
    font-size: 11pt; background-color: #ff8080;
    border: 2px solid black }
  li { color: green }
</style>
</head>
<body>
  <h2 align="center">TRAFFIC OPERATIONS DIVISION </h2>
  <hr>
<table >
```

Study the internal style sheet.

Since it is in the `<head>` tags, it sets default styles for the entire document. For example, all paragraphs will by default use the designated font family, font size and color. All columns will



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have the designated border style and background color specified in the internal style sheet by default. All list items will have the specified color. Note how the element attributes are listed in the brackets and separated by the semi-colon. The attribute values are assigned using the colon, and unlike the previous formatting tags we learned, in `<style>`, the attribute values are not placed in quotation marks.

These styles hold as the default unless they are changed inline for a specific element or specific block of the document. For example, column 3 has an inline border style, which will override the default settings established in the internal style sheet at that area in the code for which it is specified.

```
MyFourthWebPageISS - Notepad
File Edit Format View Help
all-red clearance time.

<br><br>
The intersections currently monitored by traffic infraction camera
<br><br>

<ul>
<li>Malabar Avenue and San Filippo Boulevard</li>
<li>Malabar Avenue and Emerson Road</li>
<li>Malabar Avenue and Minton Drive</li>
<li>Babcock Road and Port Tilman Drive</li>
</ul>

</p>

</td> <!--close of column 2 -->
<td width = "20%" style = "border:1px solid red" >
    <!--column 3: empty column for now will items later -->
</td>
<tr> <!--close of row 1 -->
</body>
</html>
```

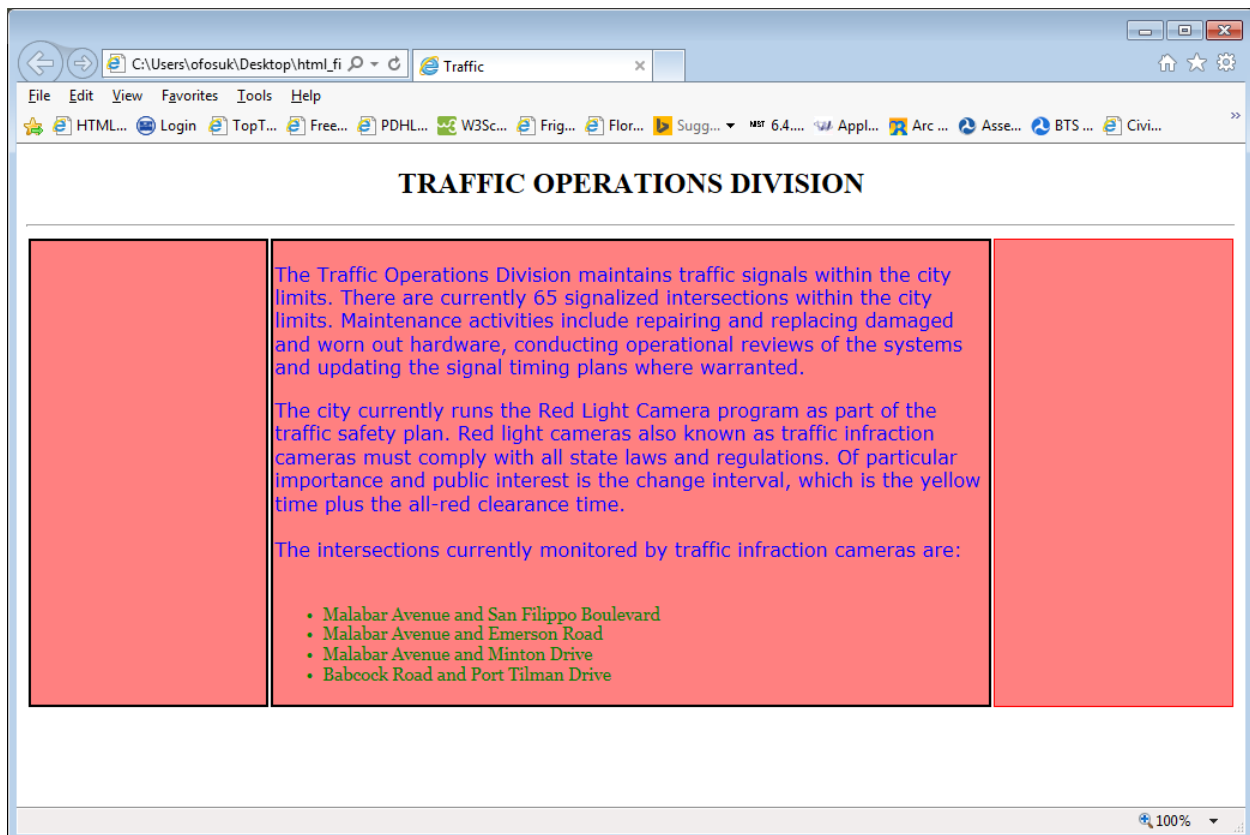


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Save your file.

Test your file.

Note that the heading tag also imparts a formatting to the heading that overrides the pre-existing styles from the internal style sheet.





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A **cascading style sheet** (CSS) is essentially an external style sheet. In other words it has the same contents as an internal style sheet would have but it is saved as a separate document. The document is then called in the `<head>` tag to implement the cascading styles.

Make a copy of your file *MyFourthWebPageISS* and name it *MyFourthWebPageCSS.html*.

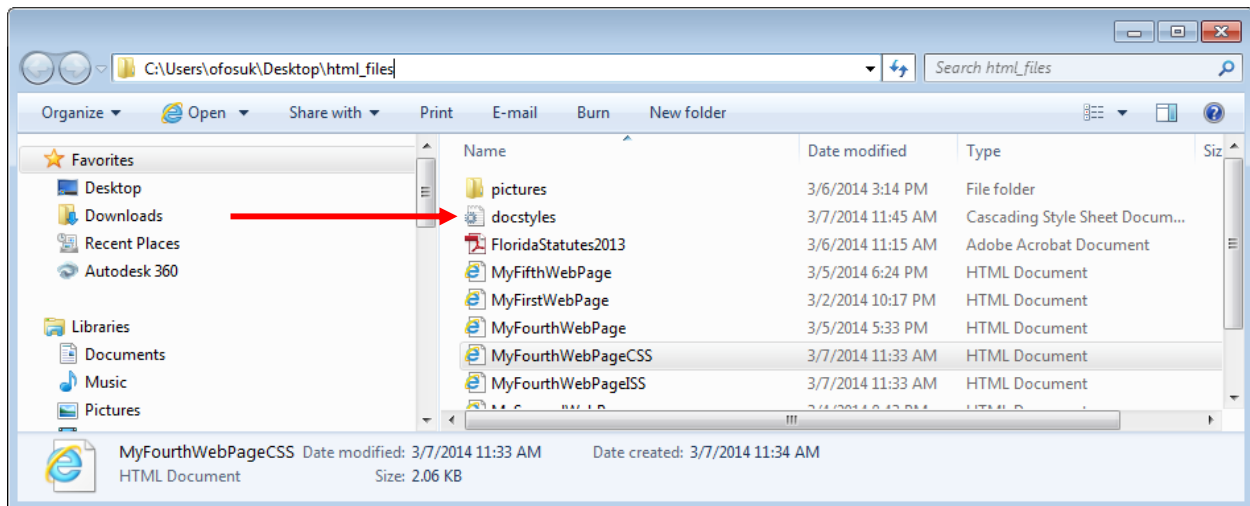
Open *MyFourthWebPageCSS.html*.

Open a new session of your text editor.

Cut and paste the internal styles sheet content (excluding the `<style>` `</style>` tags) in *MyFourthWebPageISS* to the new empty session of your text editor.

Save your “styles” file as “docstyles.css” in your working directory. (Remember to select “All Files” in the *Save as type*)

Review your working directory and look for your newly created “.css” file.





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Add a link to your CSS file in the `<head>` of *MyFourthWebPageCSS*.

Note that if the CSS file was placed in a different folder, the full path to the CSS file would have to be provided.

Save both files and close them.

```
MyFourthWebPageCSS - Notepad
File Edit Format View Help
<!DOCTYPE html>
<html>
<head>
  <title>
    Traffic
  </title>
  <link rel=stylesheet type="text/css" href="docstyles.css">
</head>
<body>
  <h2 align="c
  <hr>
  <table >
    <tr> <!--open
    <td width = "20
    <!--co
  </td>
```

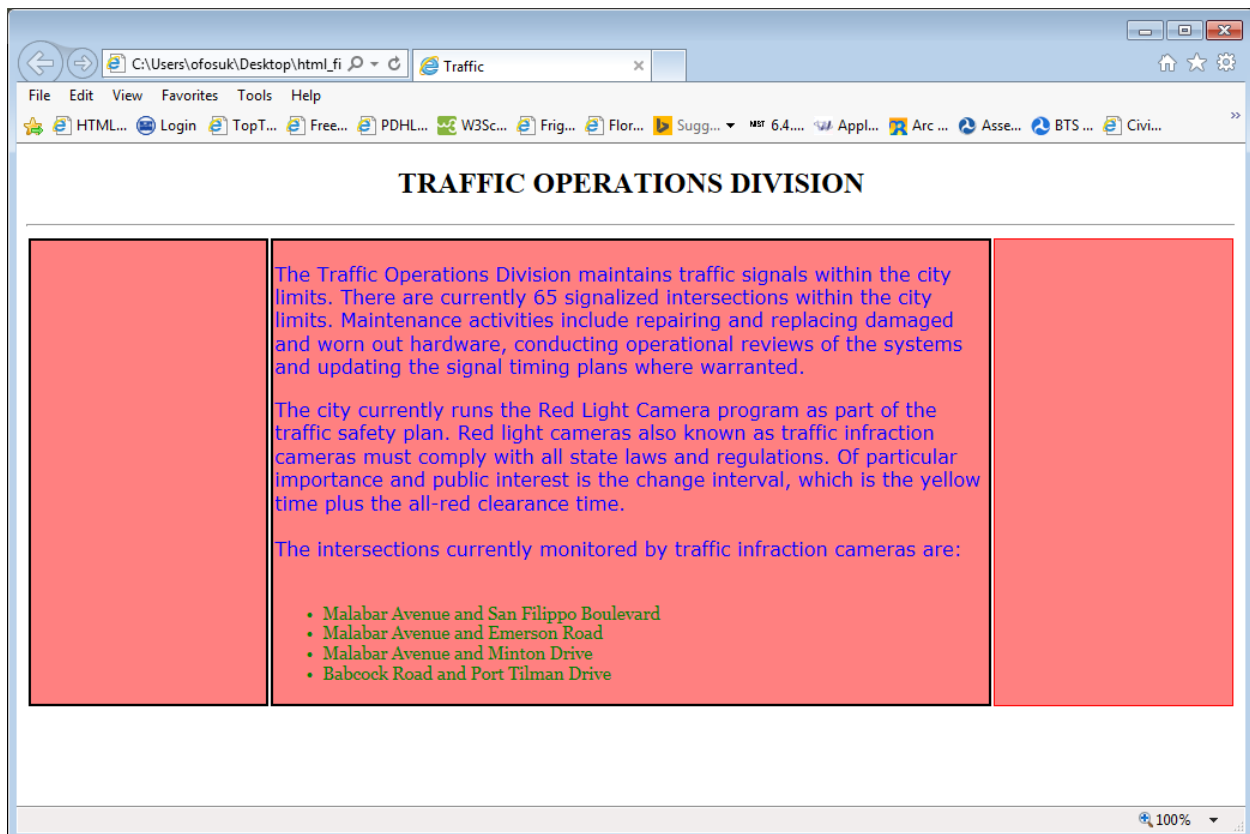
```
docstyles - Notepad
File Edit Format View Help
p {font-family: Verdana, Tahoma, Sans Serif;
  font-size: 12pt; color: blue}
td {font-family: Georgia, Garamond, Serif;
  font-size: 11pt; background-color: #ff8080;
  border: 2px solid black }
li { color: green }
```



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Test your file.

The CSS file is called from the `<head>` of *MyFourthWebPageCSS*, and applies the cascading styles accordingly.



CSS can be used to great advantage particularly for large websites. CSS facilitates the consistency of your HTML documents (web pages). CSS will make the editing and updating of web pages more efficient. CSS reduces the amount of code in your HTML files and will help reduce errors during development, editing, and updating.



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4. DEPLOYING YOUR WEB PAGES

4.1 Web Hosting Services

All the web pages (HTML files) developed in this course are currently residing on your computer (in the Desktop folder *html_files*), unless you moved or renamed the folder. The web pages must be uploaded to the web to go “live” and be viewable by the global internet audience. In order to do so, your files must be uploaded to a hosting web server. Many large companies and institutions such as universities and colleges have such facilities and allow members’ web pages to be hosted on their servers for non-commercial use. Some internet service providers and cable companies may offer web hosting services to their customers, typically for a fee or periodic paid subscription. Otherwise individuals and small businesses may use a commercial web hosting service. There is an abundance of web hosting companies on the web. The costs for such services are varied and depend on the purpose of the website, e.g. personal use versus online retail business, etc. The customer signs up for an account and a domain name(s) e.g. *ww.kwabenaofosu.com*, etc. The customer then uploads their files to designated folders in their account for them to go “live”. The web hosting products generally come with additional incentives and benefits such as multiple domain names, free web page editing software, and free email accounts, as well as features to help online businesses such as database support, and e-commerce tools. Some web hosts may provide the service for free to their customers but the customers may have to agree to carry advertising on their web pages. It is the sole prerogative of the customer to research and decide which hosting service is right for them.

After uploading your files to a web host it is important that the web pages be tested. For example images should be checked for proper display. Links should be clicked on to verify that they open, and open to the correct location(s). Links that were set up using the full file path will typically need to be reconfigured to reflect the path to the file as it now exists on the web hosting server.

Figure 4.1 shows a screenshot of a web hosting account for a personal website hosted by an online web hosting company.

4.2 Debugging HTML Files

HTML codes should be reviewed and thoroughly tested frequently as they are being developed. Unlike a typical programming language e.g. *Visual Basic*, the web browser does not throw error messages when an error or omission is encountered in the code. If your code contains errors, the web browser will show what it can and ignore the rest of the code, or it will interpret the code as-



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The screenshot displays a web hosting control panel with a top navigation bar containing links for Home, Hosting, Domains, Addons, Account, Cart, and Help. Below this is a secondary menu with icons for cPanel, Server, Email, Website, FTP, Databases, and Manage IPs. The main content area is organized into several sections:

- Notices:** A section for system announcements.
- Mail:** A collection of email management tools including Email Accounts, Webmail, Spam Assassin™, Spam Experts, Spam Hammer, Forwarders, Auto Responders, Mailing Lists, Account Filtering, User Filtering, Import Addresses, and MX Entry.
- Website Builders:** Options for WordPress, Simple Scripts, Weebly, and goMobi Mobile.
- Mojo Marketplace:** Tools for One-Click Installs, My Installs, Themes & Templates, Logos & Graphics, and Plugins & Extensions.
- File Management:** Tools for Site Backup Pro, File Manager, Legacy File Manager, File Count, Disk Space Usage, Web Disk, and FTP Accounts.
- Domain Management:** Tools for Domain Manager, Register Domain, Transfer Domain, Subdomains, Addon Domains, Parked Domains, Redirects, DNS Zone Editor, and CloudFlare.
- Upgrades:** A section for upgrading services.

On the left side, there is a search bar and a 'Frequently Accessed Areas' section with links to File Manager, Legacy File Manager, Email Accounts, phpMyAdmin, and FTP Accounts. Below that is a 'Stats' section for the domain **kbofosu.com**, showing details such as Username (kbofosuc), Home Directory (/home1/kbofosuc), Last login from (208.90.217.196), File Count (3370), Email Accounts (2 / ∞), Subdomains (0 / ∞), Parked Domains (0 / ∞), and Addon Domains (0 / ∞).

Figure 1: Web hosting account



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is and display that. It is the web developer's responsibility to frequently test the code and address problems as they arise. Verify or otherwise that the browser displays the web page as intended. Test your codes frequently, block by block, line by line, tag by tag, rather than writing the entire code and then testing that. In the latter scenario, it will be much more difficult to identify and isolate any problems.

4.3 Web Browser Compatibility

It is pertinent to note that different web browsers (and versions thereof), have some slight differences in the way they interpret and execute some commands. This must be kept in mind in the development and testing of your applications. In this course series, all codes were developed and tested with the *Internet Explorer* (version 10) web browser by *Microsoft*. It is the programmer's responsibility to test that the codes will work as intended on other web browsers.

4.4 Getting Help

There is currently an abundance of help information for web hosting, web page design and HTML, particularly on the web. These include official (peer-reviewed) and unofficial sources, websites, academic work, professional presentations, tutorial videos (YouTube, etc.), user groups, online forums, downloadable trial software, code snippets, etc., etc. Typing an HTML topic in a search engine will typically yield hundreds if not thousands of results. It is strongly recommended that all codes developed be tested thoroughly before deployment.



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5. CONCLUSION

This course has presented a broad overview of the fundamentals of the Hyper Text Markup Language (HTML). In this course participants developed a prototype website using codes based on the *HTML5* standards. All codes were typed in using the *Notepad* text editor.

This course has enabled participants to identify situations where web-based programming is relevant and will be of advantage to the practicing professional. Practitioners are strongly encouraged to look out for situations in their domains of expertise where web-based programming solutions are applicable and will be of benefit to their work and their organization.

Web development as well as web-based programming require a careful and meticulous approach, and can only be mastered and retained by practice and repetition.

Good Luck and Happy Web Programming.



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Images were all drawn/ prepared by Kwabena Ofofu

Videos were all recorded/ prepared by Kwabena Ofofu