Building Cross Platform Mobile and Web Apps for Engineers and Scientists An Active Learning Approach 1st edition Lingras Solutions Manual

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Chapter 2

Self-test exercises

ST1. Who invented the World Wide Web?
Answer: Tim Berners-Lee

ST2. What does the acronym http stand for?
Answer: HyperText Transfer Protocol

ST3. What does the acronym ftp stand for?
Answer: File Transfer Protocol

ST4. What does the acronym scp stand for?
Answer: Secure Copy Protocol

ST5. What are HTML5 tags?
Answer: HTML5 tags are enclosed in a pair of angled brackets <...> and are instructions to the web browsers on the display and behavior of a web page.

ST6. List four HTML5 tags.
Answer:
<head> ...</head>
<body>...</body>
<!DOCTYPE>
<title>...</title>
<html>...</html>

ST7. What is the purpose of comments in an HTML5 document? What is the syntax for a comment?
Answer: Comments are used as documentation, so other developers can understand the HTML5 code in the web page. Comments are ignored by the web browser when displaying the web page and are not rendered on the page. A comment is enclosed in <!-- and -->.

ST8. Which tag is used to create a table in an HTML5 document?
Answer: <table>...</table>

ST9. Which tag is used to create an unordered list in an HTML5 document?
Answer: <ul>...

ST10. Which tag is used to create an ordered list in an HTML5 document?
Answer: <ol>...

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ST11. Which tag is used to create a list item in an HTML5 document?
Answer: <li>...

ST12. What is the difference between an ordered and unordered list in an HTML5 document?
Answer: Labels in an ordered list follow a numeric or alphabetical order, such as 1, 2, 3, ... or a, b, c. The unordered list is labeled with symbols such as bullets.

ST13. What does the acronym CSS stand for?
Answer: Cascading Style Sheet

ST14. What is a stylesheet?
Answer: HTML5 defines the structure of a web page. A stylesheet specifies how the elements of a web page should be displayed.

ST15. Which tag is used to include an image in an HTML5 document?
Answer: <img>

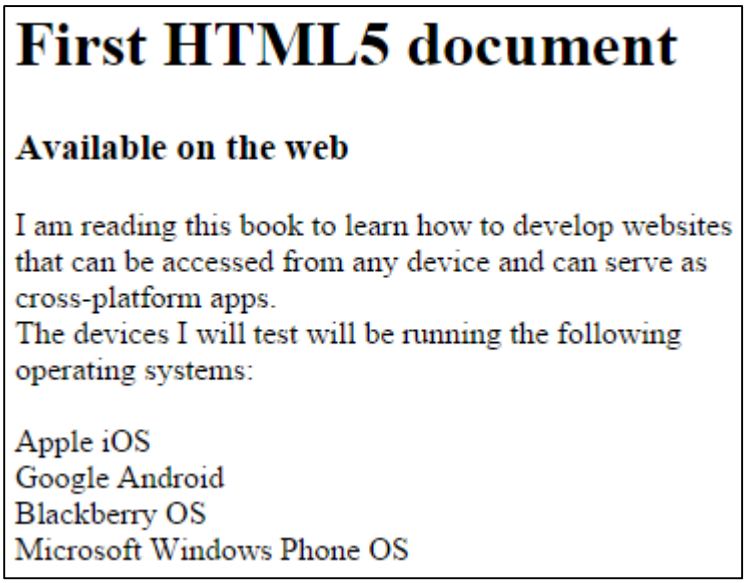
ST16. Which tag is used to include a video in an HTML5 document?
Answer: <video>…</video> and <source>

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Programming exercises

PE1. Create a web page that looks like:



Get an account from your system administrator and upload your web page to your account.

Answer:

```
<!DOCTYPE html>
<html>
  <head>
    <title>First HTML5 document</title>
  </head>
  <body>
     <h1>First HTML5 document</h1>
     <h3>Available on the web</h3>

    <p>
    I am reading this book to learn how to develop
    websites that can be accessed from any device
    and can serve as cross-platform apps.
     <br>
     The devices I will test will be running the following operating
systems:
     <br><br>
     Apple iOS
     <br>
     Google Android
     <br>
     Blackberry OS
     <br>
     Microsoft Windows Phone OS
    </p>
```


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

You will need a username and password from the system administrator.

You will need to find the name of the folder where you are supposed to copy the web pages so that they can be viewed on the World Wide Web.

You need a program such as WinSCP to upload the web page.

Finally, you need to set the permissions of the web pages, so the web server can access them.

PE2. View your web page from as many devices and web browsers as possible.

Answer: You can either test them on physical devices, or download and install the emulators as described in Chapter 2

PE3. Write HTML5 code that will create the following display:

1. Apple iOS
2. Google Android
3. Blackberry OS
4. Microsoft Windows Phone OS

Answer:

```
<ol>
      <li>
       Apple iOS
      </li>
      <li>
       Google Android
      </li>
      <li>
       Blackberry OS
      </li>
      <li>
       Microsoft Windows Phone OS
      </li>
</ol>
```


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PE4. Write HTML5 code that will create the following display:

1. Apple iOS
   - iPad
   - iPhone
   - iPod touch
2. Google Android
   - Nexus 7
   - Samsung Galaxy Notes 8
   - Samsung Galaxy Notes 4
   - HP Slate 7
3. Blackberry OS
   - Blackberry Z10
   - Blackberry Q10
4. Microsoft Windows Phone OS/RT
   - Nokia
   - Samsung ATIV
   - Surface

(Hint: You can nest an <ul>... pair of tags inside a pair of <li>...)

Answer:

```
<ol>
  <li>
     Apple iOS
    <ul>
      <li>iPad</li>
      <li>iPhone</li>
      <li>iPod touch</li>
    </ul>
  </li>
  <li>
    Google Android
    <ul>
      <li>Nexus 7</li>
      <li>Samsung Galaxy Notes 8</li>
      <li>Samsung Galaxy Notes 4</li>
      <li>HP Slate 7</li>
    </ul>
  </li>
  <li>
    Blackberry OS
    <ul>
      <li>Blackberry Z10</li>
      <li>Blackberry Q10</li>
    </ul>
  </li>
  <li>
    Microsoft Windows Phone OS/RT
    <ul>
      <li>Nokia</li>
      <li>Samsung ATIV</li>
```


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```
        <li>Surface</li>
      </ul>
    </li>
  </ol>
```

PE5. Write HTML5 code that will create the following display:

Apple iOS	iPad	iPhone	iPod touch	
Google Android	Nexus 7	Samsung Galaxy Notes 8	Samsung Galaxy Notes 4	HP Slate 7
Blackberry OS	Blackberry Z10	Blackberry Q10		
Microsoft Windows Phone OS/RT	Nokia	Samsung ATIV	Surface	

Answer:

```
<table border="1">
  <tr>
       <td>Apple iOS</td>
      <td>iPad</td>
      <td>iPhone</td>
      <td>iPod touch</td>
      <td> </td>
  </tr>
  <tr>
      <td>Google Android</td>
      <td>Nexus 7</td>
      <td>Samsung Galaxy Notes 8</td>
      <td>Samsung Galaxy Notes 4</td>
      <td>HP Slate 7</td>
  </tr>
  <tr>
      <td>Blackberry OS</td>
      <td>Blackberry Z10</td>
      <td>Blackberry Q10</td>
      <td> </td>
      <td> </td>
  </tr>
  <tr>
      <td>Microsoft Windows Phone OS/RT</td>
      <td>Nokia</td>
      <td>Samsung ATIV</td>
      <td>Surface</td>
      <td> </td>
  </tr>
 </table>
```


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PE6. Write the CSS3 and HTML5 that will create the following display:



Answer:

HTML5:

```
<!DOCTYPE html>
<html>
<head>
  <link rel="stylesheet" type="text/css"
    href="devices0.css">
</head>
<body>
  <h1>Programming exercises</h1>
  <p>Devices</p>
</body>
</html>
```

CSS3:

```
h1, p {
  text-align: center;
}
```

PE7. Write the CSS3 for the web page from the previous exercise web page that will create the following display:



Answer:

HTML5:

```
Same as PE7
```

CSS3:

```
h1, p {
  text-align: center;
  color: white;
}

body {
  background-color: black;
}
```


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PE8. Write the CSS3 for your answer to PE5 that will create the following display:

Apple iOS	iPad	iPhone	iPod touch	
Google Android	Nexus 7	Samsung Galaxy Notes 8	Samsung Galaxy Notes 4	HP Slate 7
Blackberry OS	Blackberry Z10	Blackberry Q10		
Microsoft Windows Phone OS/RT	Nokia	Samsung ATIV	Surface	

Answer:

```
body {
  background-color: black;
}

table {
  background-color: gold;
  border-radius: 5px;
  border-collapse: collapse;
}

table td {
    border: 1px solid black;
    padding: 5px;
}
```


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Programming projects

PRJ1. **Compute the load distribution on a beam**. Assume that you have a one-dimensional beam resting on two rigid supports. The beam has a length described by the variable *length*. We have put a weight *w* at a distance *d*, where *d* < *length*, from the left end of the beam. You should find out the reaction forces on the left and right ends of the beam. You can make this project as complicated as you are capable of solving. You can have multiple weights, uniformly distributed load, and uniformly varying loads.

Use tables, ordered and unordered lists, other relevant tags such as <mark>, , <sup>, and CSS3 to improve the appearance of the web page.

Hint: You can search for the term "load distribution on beams" on the web. You will find many relevant websites.

PRJ2. **Binary operator.** Create a web page that describes various binary operators such as "and", "or", "not", "xor".

Use tables, ordered and unordered lists, other relevant tags such as <mark>, , <sup>, and CSS3 to improve the appearance of the web page.

Hint: You can search for the term "binary operators" on the web. You will find many relevant websites that will help you create content for your web page.

PRJ3. **Electricity calculations:** Create a web page that describes the physical relationship between current, voltage, resistance, and amount of electricity consumed.

Use tables, ordered and unordered lists, other relevant tags such as <mark>, , <sup>, and CSS3 to improve the appearance of the web page.

Hint: You can search for the term "current voltage resistance electricity consumption" on the web. You will find many relevant websites.

PRJ4. **Amortization calculations:** Create a web page that describes how to compute the annual cost of a project that costs *p* and is funded by a loan at an interest *i* over *y* number of years.

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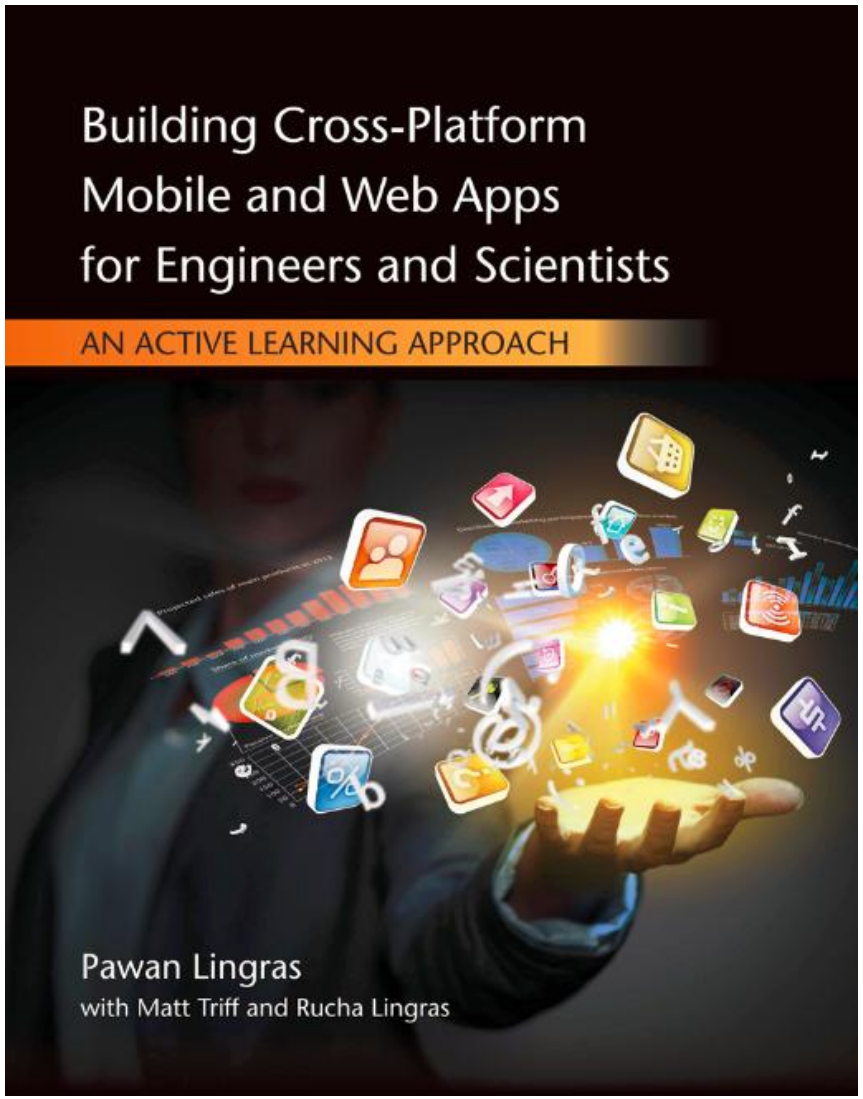
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Use tables, ordered and unordered lists, other relevant tags such as <mark>, , <sup>, and CSS3 to improve the appearance of the web page.

Hint: You can search for the term "amortization calculations" on the web. You will find many relevant websites.

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Chapter 2

Developing, installing, and testing first app

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Learning objectives

1. How to create a simple HTML5-based app
2. How to put the app on the web for general access through the web
3. How to enhance the presentation with CSS3
4. How to add multimedia to the web page including images and videos

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Choice of programming platform

- The three major operating systems for mobile devices
    1. iOS by Apple
    2. Windows 8 by Microsoft
    3. Android by Google
- Apple devices: apps written in an integrated development environment (IDE) called Xcode.
- Windows mobile devices: apps written in .Net framework.
- Cross-platform development
    - well-established HTML—HyperText Markup Language.
    - a response to the changing nature of the Internet.

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How to create a simple HTML5 web page

- Tags: instructions to the web browser regarding the display and behavior of a web page.
- An HTML5 tag is enclosed in two angled braces <...>.

```
<!DOCTYPE html>
<html>
  <head>
    <title>Physics Application</title>
  </head>
  <body>

    <!--
     ...
     ...
    The body of the document goes here shown on the following pages
     ...
     ...
     -->

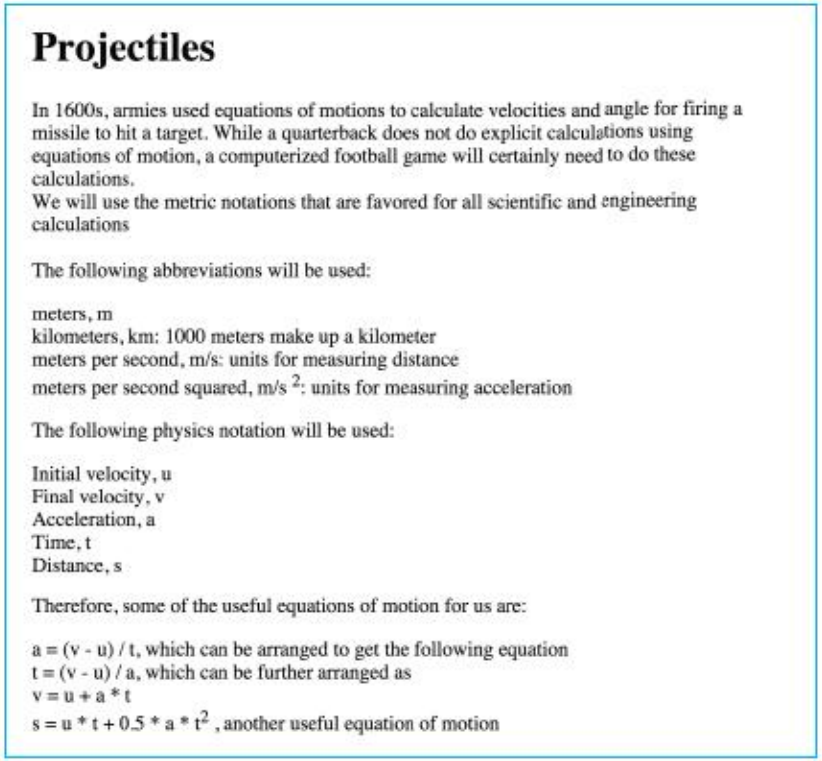
  </body>
</html>
```

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How to create a simple HTML5 web page (cont'd)

- A screenshot of the complete page



Projectiles

In 1600s, armies used equations of motions to calculate velocities and angle for firing a missile to hit a target. While a quarterback does not do explicit calculations using equations of motion, a computerized football game will certainly need to do these calculations.
We will use the metric notations that are favored for all scientific and engineering calculations

The following abbreviations will be used:

meters, m
kilometers, km: 1000 meters make up a kilometer
meters per second, m/s: units for measuring distance
meters per second squared, m/s^2: units for measuring acceleration

The following physics notation will be used:

Initial velocity, u
Final velocity, v
Acceleration, a
Time, t
Distance, s

Therefore, some of the useful equations of motion for us are:

a = (v - u) / t, which can be arranged to get the following equation
t = (v - u) / a, which can be further arranged as
v = u + a * t
$s = u * t + 0.5 * a * t^2$, another useful equation of motion

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How to create a simple HTML5 web page (cont'd)

- The rest of the HTML5 code that goes into the <body> section

```
<body>
    <h1>Projectiles</h1>

    <p>In 1600s, armies used equations of motions
     to calculate velocities and angle for firing
     a missile to hit a target.
     While a quarterback does not do explicit
     calculations using equations of motion, a
     computerized football game will certainly
     need to do these calculations.
     <br>
     We will use the metric notations that are
     favored for all scientific and engineering
     calculations
     <br><br>
     The following abbreviations will be used:
    </p>

      meters, m<br>
      kilometers, km: 1000 meters
        make up a kilometer<br>
      meters per second, m/s: units for
        measuring distance<br>
      meters per second squared, m/s
        <sup>2</sup>: units for measuring
        acceleration<br>

    <p>
     The following physics notation will be used:
    </p>

     Initial velocity, u<br>
     Final velocity, v<br>
     Acceleration, a<br>
     Time, t<br>
     Distance, s<br>

    <p>Therefore, some of the useful equations of
     motion for us are:
    </p>
     a = (v - u) / t, which can be
       arranged to get the following
       equation<br>
     t = (v - u) / a, which can be
       further arranged as<br>
     v = u + a * t<br>
     s = u * t + 0.5 * a * t<sup>2</sup>
       , another useful equation of
       motion<br>
</body>
```

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How to create a simple HTML5 web page (cont'd)

- The browsers uses physical line breaks based on the HTML5 tags.
- Other line breaks: come from two tags, ... and <br>.
- One of the best resources which provides a comprehensive introduction to HTML5:
  - http://www.w3schools.com

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How to put an HTML5 web page on the Internet

- Directory called “web”.
- Example: ch02/physicsProjectileApp0/version1
  - look for a file called physicsProjectileApp.html
- Assume Windows as the default operating system for the rest of the discussion.
- Putting the app code on the web is the easiest way to download and distribute it to multiple mobile devices through wireless communication.
  - Contact an Internet Service Provider (ISP)

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How to put an HTML5 web page on the Internet (cont'd)

- An account on a server with the domain name called cs.smu.ca.
- The domain name is translated into an IP address.
  - An IP address is used to refer to any computer on the Internet.

- **Web server**: typically an Internet-accessible computer that is specially configured to serve and receive documents at very high rates of transmission.
  - Apache
  - Microsoft Exchange Server

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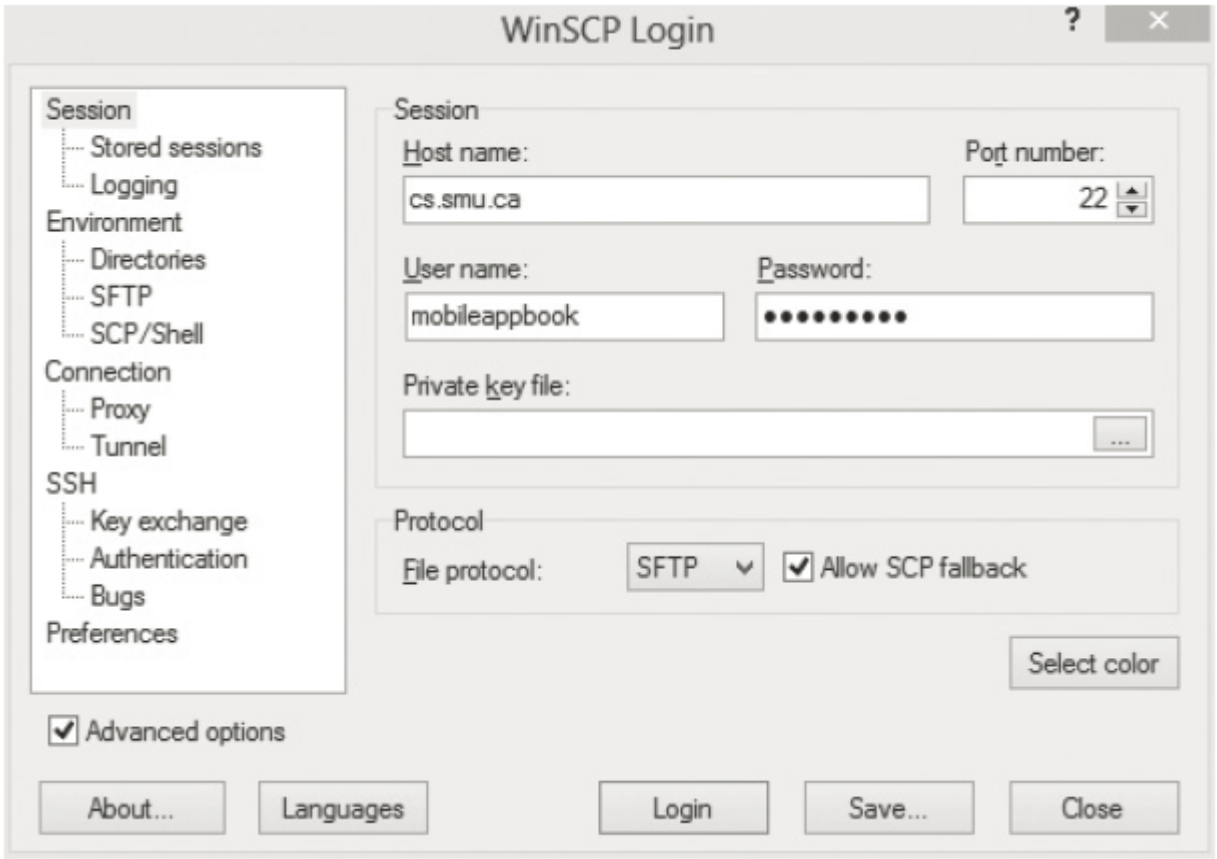
Example

- Put our first HTML5 web page on the web for accessing it from any web-enabled device.
  - Linux server
  - Put our web pages in a folder called public_html. They will be accessible to the rest of the Internet using the URL: http://cs.smu.ca/~mobilebook.
- Transfer files from personal computer to the web server cs.smu.ca.
  - WinSCP

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Screenshot of the login screen for WinSCP to upload the web pages



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Example (cont'd)

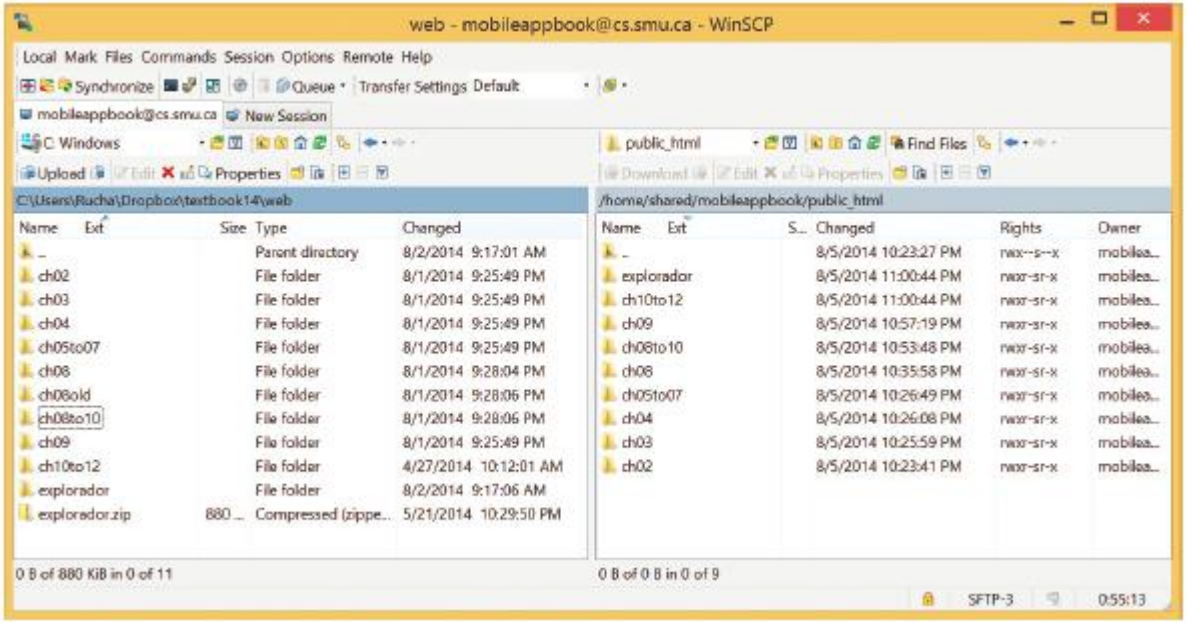
- Permissions in the UNIX environment
  - Linux and Mac OS X
  - Users: "owner", "group", "world"
- The web server program: considered to be a user on the computer system and usually a part of the set of users called world or others.
- Three types of permissions: read (R), write (W), and execute/run (X).
  - Reading, writing, and executing

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Screenshot of the WinSCP after logging in

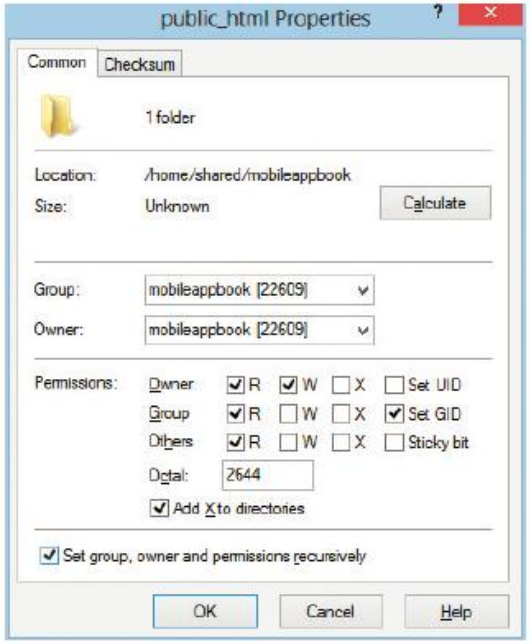


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Example (cont'd)

- Permission settings
  - All the files under the folder public_html and recursively all its subfolders need to be readable by everyone.



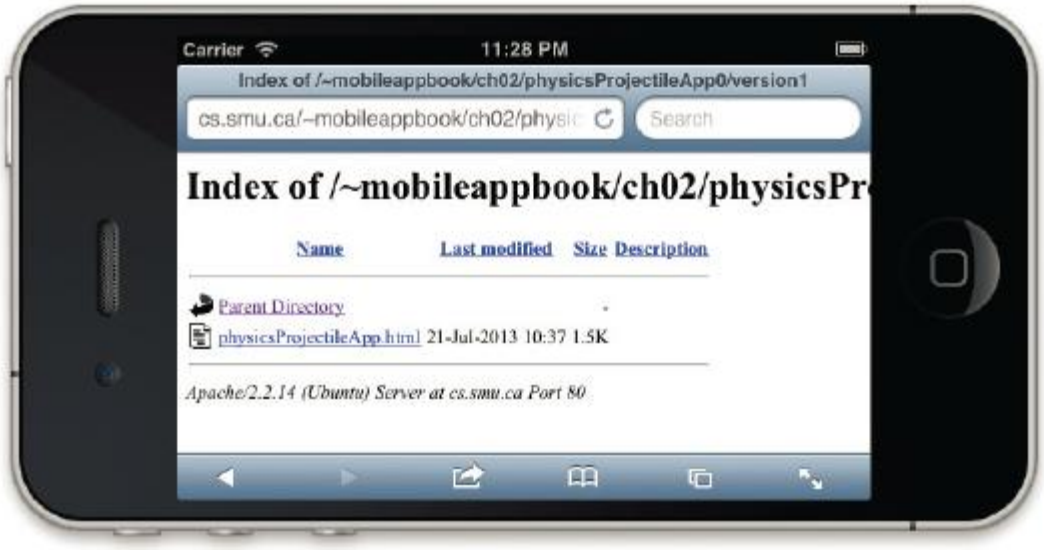
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Example (cont'd)

- Type in our URL, http://cs.smu.ca/~mobileappbook, in the browser's address window.
- HTML5 web page: physicsProjectileApp.html



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More HTML5 formatting

- High-level view of the newly formatted part of the web page.
- Tags <h2>...</h2>

```
<h2>Abbreviations</h2>
    <ul>
    ......
    ......
    <!-- Code for unordered list with bullets -->
    ......
    ......


    </ul>

    <h2>Notations</h2>

    <table border="1">
    ......
    ......
    <!-- Code for table -->
    ......
    ......

    </table>

    <h2>Equations</h2>
    <ol>
    ......
    ......
    <!-- Code for ordered list with numbers -->
    ......
    ......

    </ol>
```

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Unordered and ordered lists

- An unordered list: a list that does not specify an order with numbers or alphabets.
- The complete list is enclosed in a pair of tags <ul>....
  - Added four items to the list using the pair of tags called <li>....
- An ordered list uses numbers or alphabets for listing items.

```
<h2>Abbreviations</h2>
<ul>
 <li>meters, <em>m</em></li>
 <li>kilometers, <em>km</em>: 1000 meters
   make up a kilometer</li>
 <li>meters per second, <em>m/s</em>: units
   for measuring distance</li>
 <li>meters per second squared, <em>m/s
   <sup>2</sup></em>: units for measuring
   acceleration</li>
</ul>
```

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HTML5 tables

- Look at http://www.w3schools.com
- A table consists of rows enclosed in <tr>...</tr> tags and columns enclosed in either <th>...</th> or <td>...</td>.

```
<h2>Notations</h2>

    <table border="1">
     <tr>
       <th>Abbreviation</th>
       <th>Meaning</th>
     </tr>
     <tr>
       <td><em>u</em></td>
       <td>Initial velocity</td>
     </tr>
     <tr>
       <td><em>v</em></td>
       <td>Final velocity</td>
     </tr>
     <tr>
       <td><em>a</em></td>
       <td>Acceleration</td>
     </tr>
     <tr>
       <td><em>t</em></td>
       <td>Time</td>
     </tr>
     <tr>
       <td><em>s</em></td>
       <td>Distance</td>
     </tr>
    </table>
```

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Screenshot of a table

Notations

Abbreviation	Meaning
u	Initial velocity
v	Final velocity
a	Acceleration
t	Time
s	Distance

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Cascading Style Sheets (CSS)

- Adding fonts and color information to every single page
  - Long and expensive process.
  - Cascading style sheets (CSS) to mitigate this problem.
  - From HTML 4.0, all formatting can be stored in a separate CSS file.

```
<!DOCTYPE html>
<html>
  <head>
    <title>Physics Application</title>
    <link rel="stylesheet"
      href="css/physicsProjectileApp.css">
  </head>
  <body>
    <div>
     ......
     ......
     <!-- Rest of the code is essentially the same as previous version -->
     ......
     ......

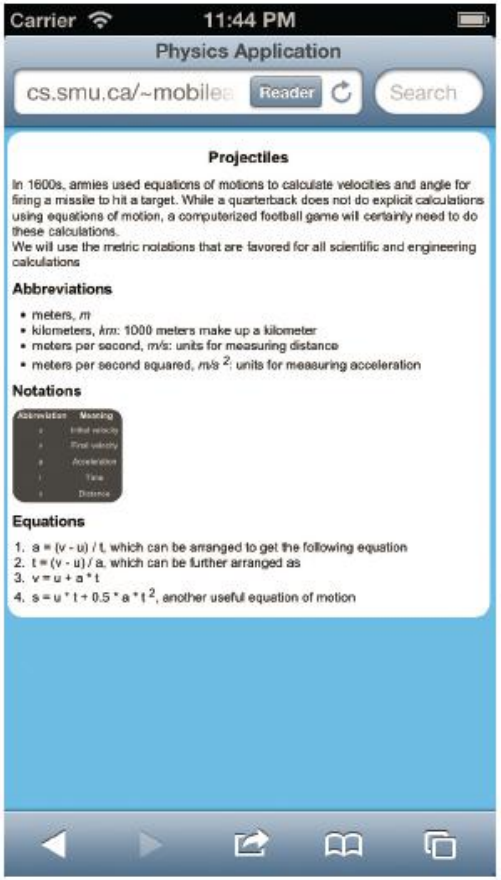
    </div>
  </body>
</html>
```

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Screenshot of a web page that uses a cascading style sheet



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A cascading style sheet (CSS)

- The <link> tag
- Creating a “css” directory under the directory where our web page is located: ch02/physicsProjectileApp0/version3/css.

```
body
{
  background-color: #78BDFA;
  font-family: Arial;
}

div
{
  background-color: white;
  border-radius: 30px;
  padding:10px;
}

h1
{
  text-align: center;
}

table
{
  background-color:#444444;
  color: white;
  border-radius: 25px;
  text-align: center;
}

table tr td
{
  padding: 5px;
}

table tr th
{
  padding-left:8px;
}
```

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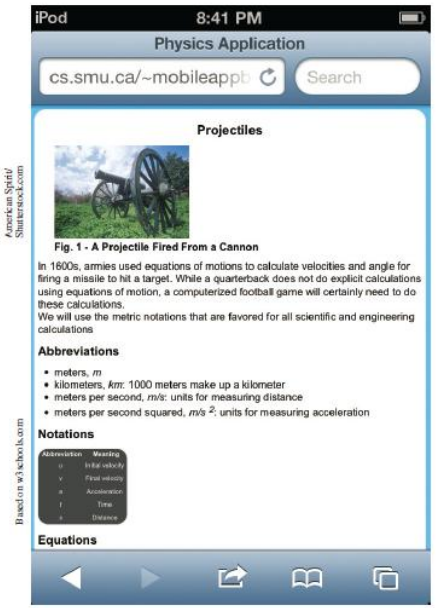
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Adding some multimedia

- HTML5 called <figure>...</figure> allows us to format a figure in our web page.
- Often used in conjunction with a nested pair of tags <figcaption>...</figcaption>.
- <figcaption> allows us to provide a caption underneath the figure.

```
<figure>
  <img src="media/projectilePic.png"
   alt="A Cannon Firing a Projectile"
   width="333" height="228">
   <figcaption><strong>Fig. 1 - A Projectile
    Fired From a Cannon</strong></figcaption>
</figure>
```



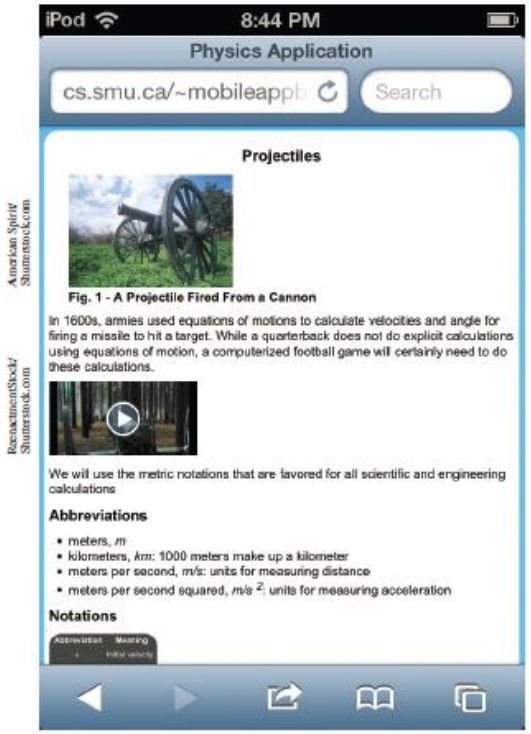
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Augmented the page with a video

- The <video> tag must have a nested tag called <source>.



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Quick facts/buzzwords

- <body> </body>: A pair of HTML5 tags that enclose the body section of an HTML document.
- : A pair of HTML5 tags that enclose a paragraph in an HTML document.
-
: An HTML5 tag used to add a line break in an HTML document.
- : A pair of HTML5 tags that are used to display a superscript in an HTML document.
- http: HyperText Transfer Protocol for transmitting web pages on the Internet.
- ftp: File Transfer Protocol for transmitting files on the Internet.
- scp: Secure Copy Protocol, a secure alternative to ftp.
- secure ftp: A secure alternative to ftp.

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