Module 1

Introduction to Internet and WWW

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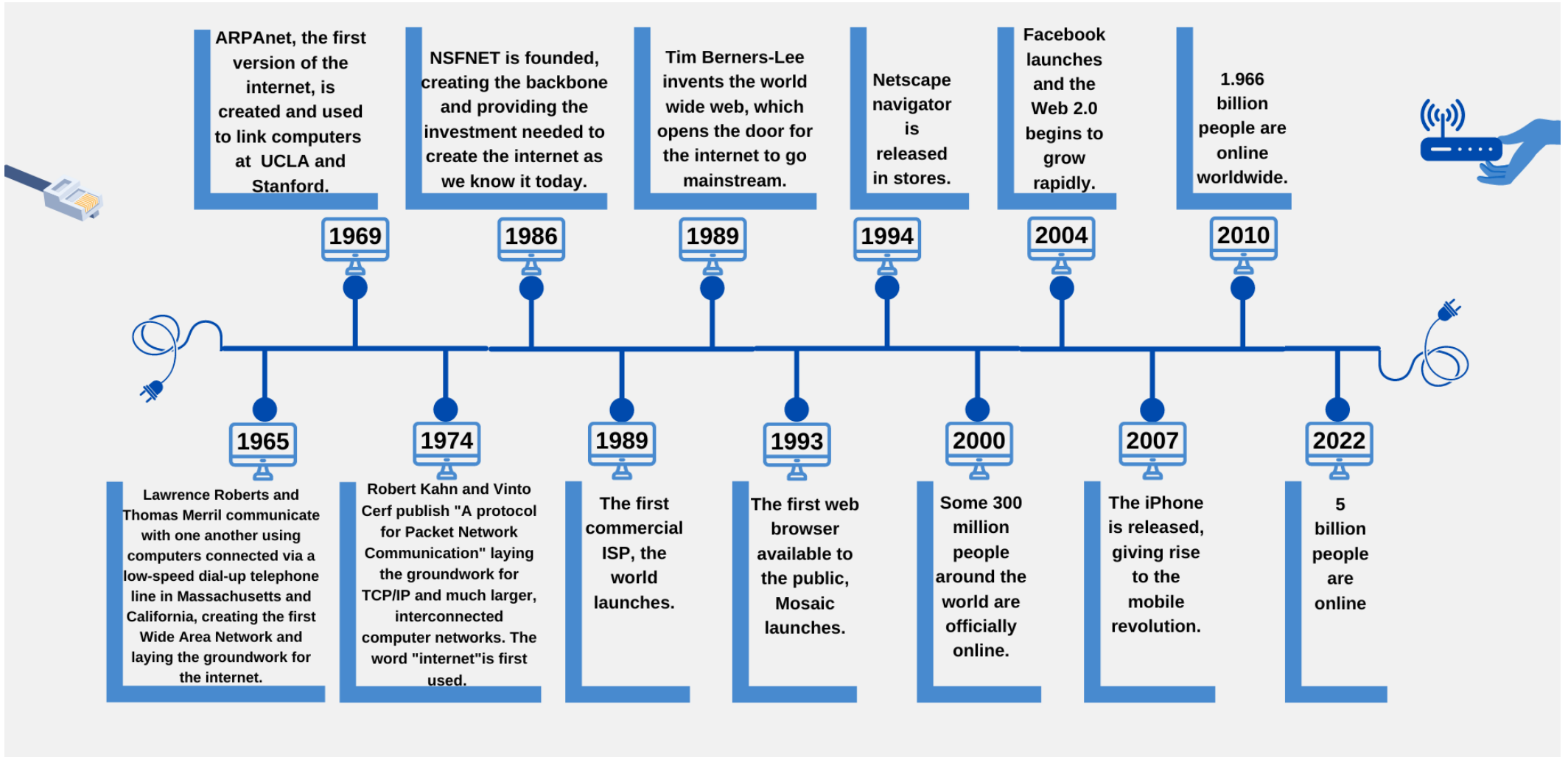
What is Internet?

- The Internet is a global network of billions of computers and other electronic devices.

- With the Internet, it's possible to access almost any information, communicate with anyone else in the world, and do much more.

Evolution of Internet



World Wide Web

- The World Wide Web, commonly known as the Web or W3, is an information system enabling information to be shared over the Internet through some methods.

- This information can be in different formats, including text, images, audio and video.

Applications of Internet

- Computers and the Internet in health care
  - **Electronic health records**
    - include a patient's medical history, prescriptions, lab results, allergies, insurance information and more.
  - **Human Genome Project**
    - founded to identify and analyze the 20,000+ genes in human DNA and store the information in databases which have been made available over the Internet to researchers in many fields.

Applications of Internet

- Computers and the Internet for social good
  - **AMBER™ Alert**
    - The AMBER (America's Missing: Broadcast Emergency Response) Alert System is used to find missing children.
  - **World Community Grid**
    - People worldwide can donate their unused computer processing power by installing a free secure software.

Applications of Internet

- Computers and the Internet in entertainment
  - **iTunes and the App Store**
    - iTunes is Apple's media store where you can buy and download music, movies, TV shows, e-books, ringtones and apps.
  - **Internet TV**
    - allow you to access content on demand, such as games, news, movies, TV shows and more.

Web Basics

- **Web page**
  - An HTML document that describes to a web browser the document's content and structure.

- **Hyper links**
  - HTML documents contain hyperlinks, which, when clicked, load a specified web document.
  - Widely used to reference sources, or sites that have more information on a particular topic.

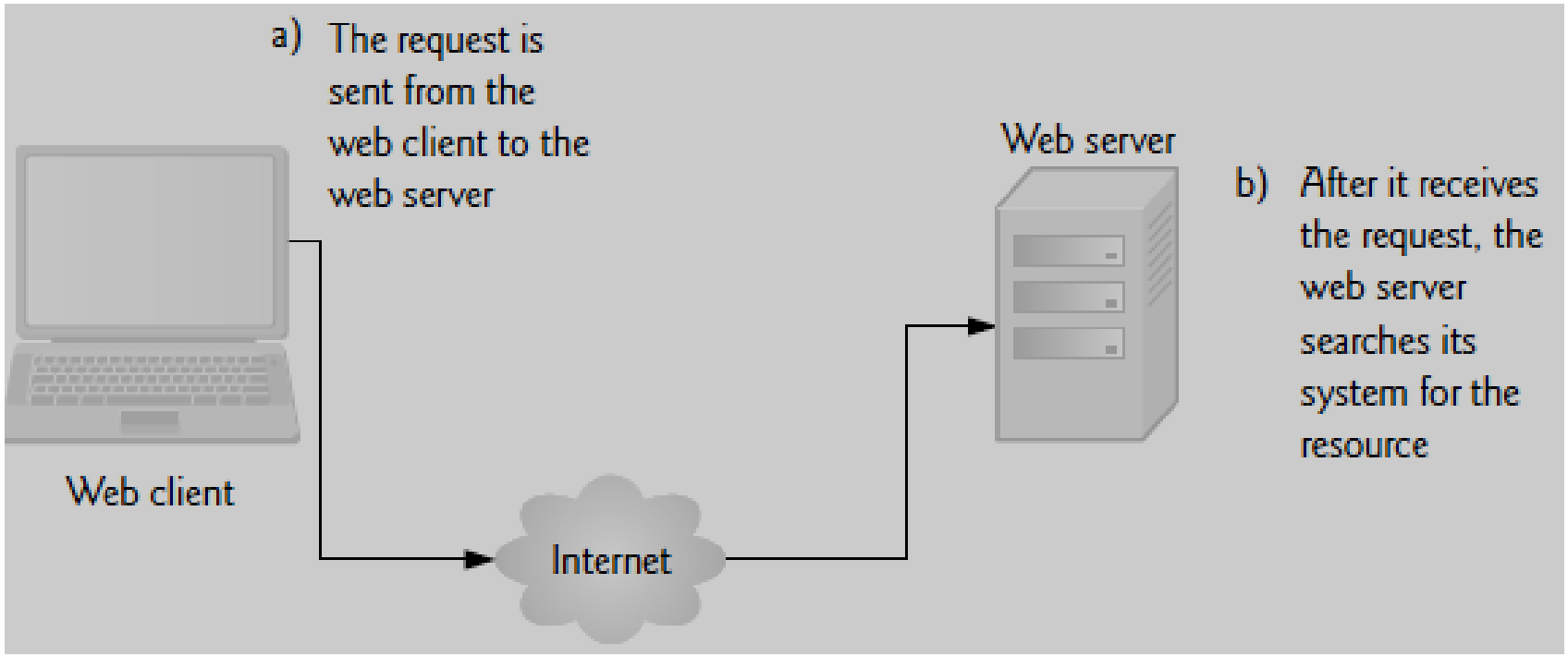
Web Basics

- **URIs and URLs**
  - URIs (Uniform Resource Identifiers) identify resources on the Internet.
  - URIs that start with *http://* are called URLs (Uniform Resource Locators).

- **Parts of a URL**

Web Basics

- **Making a Request and Receiving a Response**



Web Basics

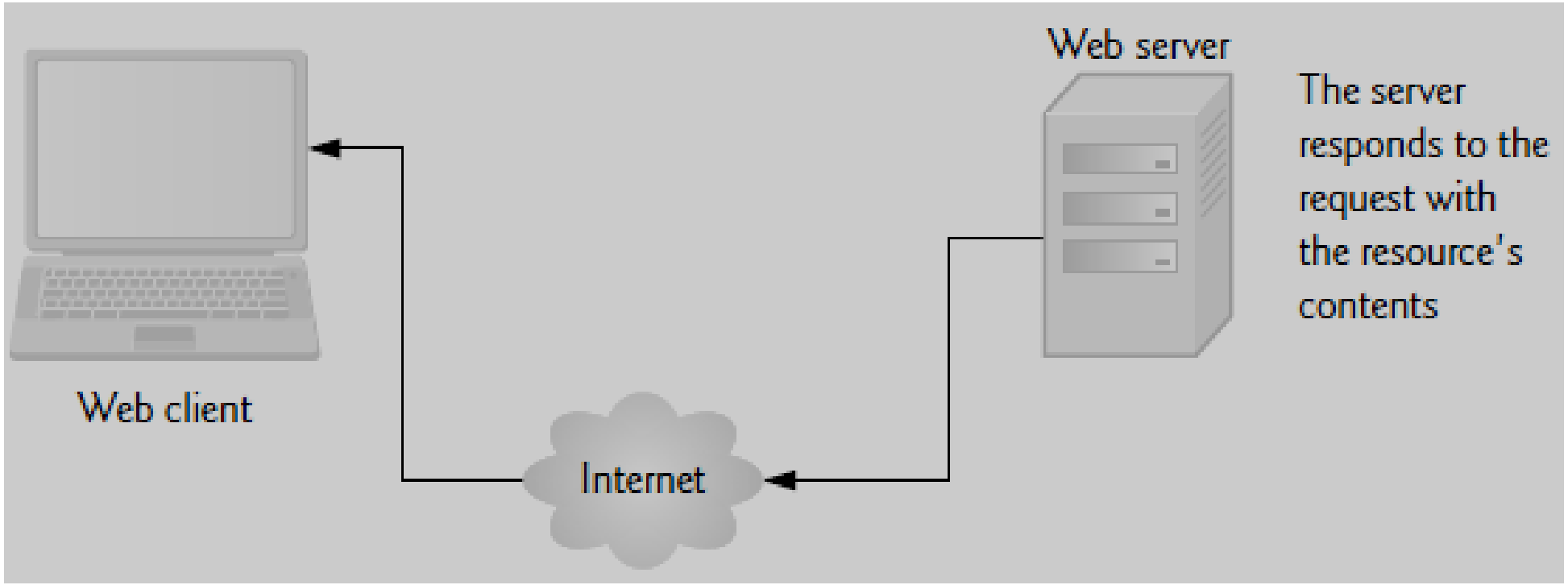
- The request (in its simplest form) is:

  GET /books/downloads.html HTTP/1.1

- The word *GET* is an HTTP method indicating that the client wishes to obtain a resource from the server.
- The client's request also contains some required and optional headers.

- Any server that understands HTTP (version 1.1) can translate this request and respond appropriately.

Web Basics



Client receiving a response from the web server

Web Basics

- The server first sends a line of text that indicates the HTTP version, followed by a numeric code and a phrase describing the status of the transaction. For example,

HTTP/1.1 200 OK

indicates success, whereas

HTTP/1.1 404 Not found

indicates that web server could not locate the requested resource

Web Basics

- **HTTP Headers**
  - Next, the server sends one or more HTTP headers, which provide additional information about the data.

    Content-type: text/html

  - The header or set of headers is followed by a blank line, which indicates to the client browser that the server is finished sending HTTP headers.
  - Finally, the server sends the contents of the requested document (*downloads.html*).

Web Basics

- **HTTP *get* and *post* Requests**
  - A ***get*** request gets information from a server, such as an HTML document, an image or search results based on a user-submitted search term.
  - A ***post*** request typically posts (or sends) data to a server.
    - Common uses of post requests are to send form data or documents to a server.

Web Basics

- ***get*** and ***post*** requests can both be used to send data to a web server, but each type sends the information differently.
- A get request appends data to the URL

  e.g., ***www.google.com/search?q=deitel***
- In this case ***search*** is the name of Google's server-side form handler, ***q*** is the name of a variable and ***deitel*** is the search term.
- The ***?*** in the preceding URL separates the query string from the rest of the URL in a request.
- If more than one name/value pair is submitted, each pair is separated by an ampersand (&)

Web Basics

- A ***post*** request sends form data as part of the HTTP message, not as part of the URL.
- A ***get*** request typically limits the query string to a specific number of characters,
  - So it's necessary to send large amounts of information using the post method.

- The post method is preferred because it hides the submitted data from the user by embedding it in an HTTP message.

Web Basics

- **Client-Side Caching**
- Browsers often cache (save on disk) recently viewed web pages for quick reloading.
- An HTTP response can indicate the length of time for which the content remains “fresh.”
- Browsers typically do not cache the server’s response to a post request, because the next post might not return the same result.

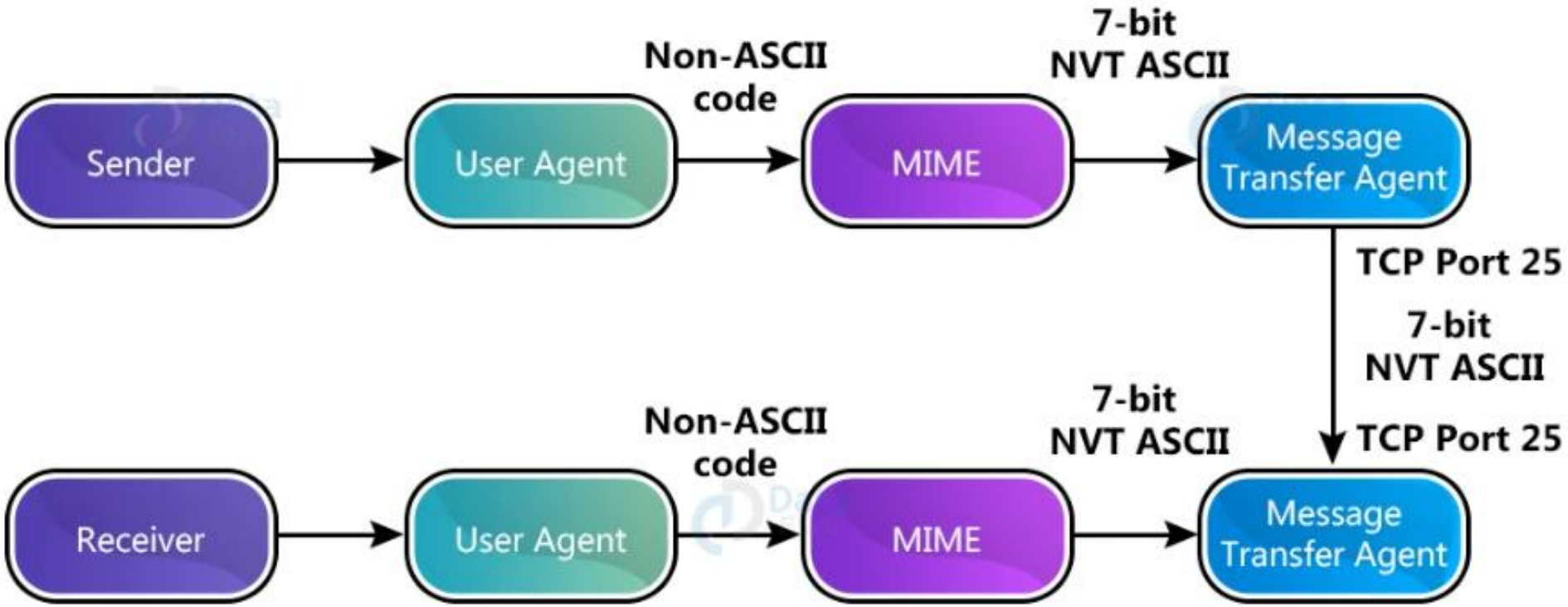
Web Basics

- **MIME Media Types**
  - Stand for **M**ultipurpose **I**nternet **M**ail **E**xtension media types.
  - To send and receive emails containing attachments like images, audio, video, and other file types, as well as non-ASCII characters, which were not originally supported by the basic email protocol, SMTP.

  - Some common examples of media types are as follows:
    - application/json
    - audio/mpeg
    - text/pdf

Web Basics

- **Working of MIME Protocol**



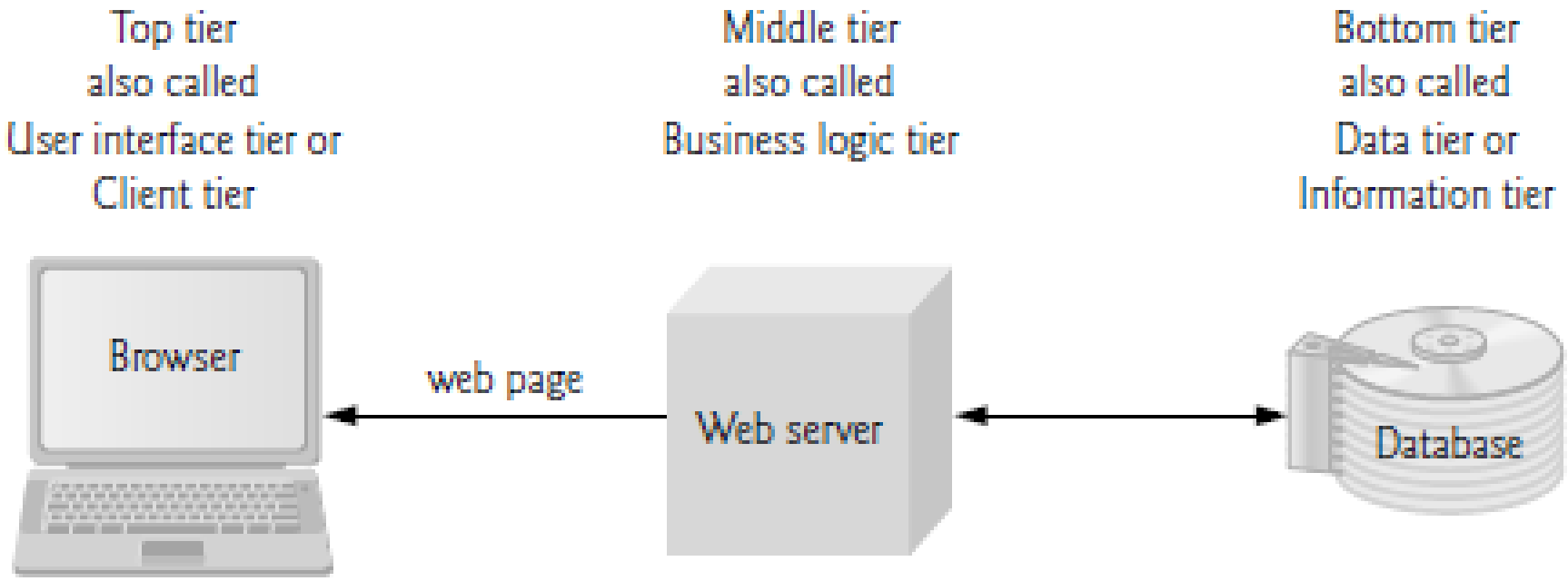
7-bit NVT ASCII (7-bit Network Virtual Terminal ASCII)

Multitier Application Architecture

- Web-based applications are multitier applications.
  - divide functionality into separate tiers

- Although tiers can be located on the same computer, the tiers of web-based applications reside on separate computers.

Multitier Application Architecture



World Wide Web Consortium (W3C)

- In October 1994, Tim Berners-Lee founded this organization
  - devoted to developing nonproprietary, interoperable technologies for the World Wide Web.

- One of the W3C's primary goals is to make the web universally accessible.

World Wide Web Consortium

- The W3C is also a standards organization.
- Web technologies standardized by the W3C are called **Recommendations**.
- Current W3C Recommendations include the HTML5, Cascading Style Sheets 3 (CSS3) and the Extensible Markup Language (XML).

- A recommendation is a document that specifies a technology's role, syntax rules, etc.

Introduction to HTML5

- HTML5 is a markup language that specifies the structure and content of documents that are displayed in web browsers.

- Computers called web servers store HTML5 documents.
- Clients (such as web browsers running on your local computer or smart phone) request HTML5 documents from web servers.

HTML5 Example

```
<!DOCTYPE html>
<!-- First HTML5 example. -->
<html>
   <head>
      <meta charset = "utf-8">
      <title>Welcome</title>
   </head>

   <body>
      <p>Welcome to HTML5!</p>
   </body>
</html>
```

Tab shows contents of title element

HTML5 Example

- ***Document Type Declaration***
  - The document type declaration (DOCTYPE) is required in HTML5 documents so that browsers render the page in standards mode, according to the HTML and CSS specifications.

HTML5 Example

- ***Comments***
  - To improve readability and describe the content of a document.
  - The browser ignores comments when your document is rendered.
  - HTML5 comments start with **<!--** and end with **-->**

HTML5 Example

- ***html, head and body Elements***
  - The ***html*** element encloses the head section and the body section.
  - The ***head*** section contains information such as the character-encoding scheme that the page uses.
  - It also can contain special document-formatting instructions called CSS3 style sheets and client-side programs called scripts for creating dynamic web pages.
  - The ***body*** section contains the page's content, which the browser displays when the user visits the web page.

HTML5 Example

- ***Start Tags and End Tags***
  - A start tag consists of the element name in angle brackets
    - Eg: ***<html>***
  - An end tag consists of the element name preceded by a forward slash (/) in angle brackets
    - Eg: ***</html>***
  - There are “void elements” that do not have end tags.
  - Many start tags have attributes that provide additional information about an element.
  - Each attribute has a name and a value separated by an equals sign.

HTML5 Example

- ***title Element***
  - Titles usually appear in the title bar at the top of the browser
  - Search engines use the title for indexing purposes and when displaying results.

- ***Paragraph Element (...)***
  - All the text placed between the *** *** and *** *** tags forms one paragraph.
  - When a browser renders a paragraph, it places extra space above and below the paragraph text.

W3C HTML5 Validation Service

- W3C provides a validation service (*validator.w3.org*) for checking a document's syntax.

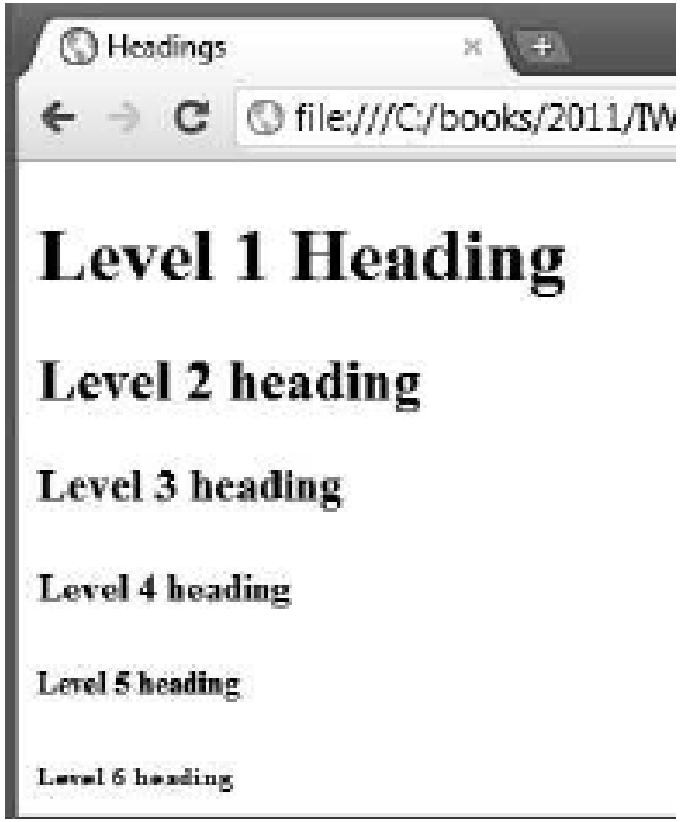
- Documents can be validated by
  - providing the URL of an online web page
  - uploading a file to the validator
  - pasting code directly into a text area provided on the validator site

Headings

- HTML5 provides six heading elements (h1 through h6).

```
<!DOCTYPE html>
<html>
    <head>
        <meta charset = "utf-8">
        <title>Headings</title>
    </head>

    <body>
        <h1>Level 1 Heading</h1>
        <h2>Level 2 heading</h2>
        <h3>Level 3 heading</h3>
        <h4>Level 4 heading</h4>
        <h5>Level 5 heading</h5>
        <h6>Level 6 heading</h6>
    </body>
</html>
```



Linking

- Hyperlinks references other resources, such as HTML5 documents and images.

```
<body>
   <h1>Here are my favorite sites:</h1>
   <p><strong>Click a name to visit that site.</strong></p>

   <!-- create four text hyperlinks -->
   <p><a href = "http://www.facebook.com">Facebook</a></p>
   <p><a href = "http://www.twitter.com">Twitter</a></p>
   <p><a href = "http://www.foursquare.com">Foursquare</a></p>
   <p><a href = "http://www.google.com">Google</a></p>
</body>
```

❑ Links are created using the ***a*** (anchor) element with an attribute ***href*** which specifies a resource's location, such as a web page or location within a web page or a file or an e-mail address.

Linking

- **Hyperlinking to an E-Mail Address**
  - using a ***mailto:*** URL.
  - When the user clicks this type of anchored link, most browsers launch the user's default e-mail program

```
<body>
   <p>
      To write to <a href = "mailto:deitel@deitel.com">
      Deitel & Associates, Inc.</a>, click the link and your default
      email client will open an email message and address it to us.
   </p>
</body>
```

Images

- use an ***img*** element to include an image in the document. The image location is specified with the ***src*** attribute.
- Optional attributes ***width*** and ***height*** specify the image's dimensions.
- Images are measured in pixels (picture elements).

```
<img src = "cpphtp.png" width = "92" height = "120"
   alt = "C++ How to Program book cover">
```

If a browser cannot render an image, the browser displays the ***alt*** attribute's value.

Void Elements

- Some HTML5 elements contain only attributes and do not mark up text (i.e., text is not placed between a start and an end tag).
- We can terminate void elements by using the forward slash character

```
<img src = "jhtp.png" width = "92" height = "120"
   alt = "Java How to Program book cover" />
```

Using Images as Hyperlinks

- By using images as hyperlinks, we can create graphical web pages that link to other resources.

```
<a href = "links.html">
   <img src = "buttons/links.jpg" width = "65"
      height = "50" alt = "Links">
</a>
```

Special Characters

- Certain characters may be difficult to embed directly into an HTML5 document.
  - Some keyboards do not provide these symbols (such as ©).

- For example:

  *** if x < 10 then increment x by 1 ***

- HTML5 provides character entity references (in the form &code;) for representing special characters.
  - Eg: *** if x < 10 then increment x by 1 ***

Special Characters

Symbol	Description	Character entity reference
&	ampersand	&amp;
’	apostrophe	&apos;
>	greater-than	&gt;
<	less-than	&lt;
“	quote	&quot;
	non-breaking space	
©	copyright	&copy;
1/4	fraction 1/4	&frac14;
1/2	fraction 1/2	&frac12;
™	trademark	&trade;
®	registered trademark	&reg;

Horizontal Rules

- Horizontal rule, indicated by the ***<hr>*** tag inputs a horizontal line with extra space above and below it.

Example

```
<p>
    <a href = “abc.com”>Click Here     </a>
</p>
<hr>        <!-- inserts a horizontal rule -->
<p>
    <del> The equation x<sup>2</sup> is not correct .</del> It is
    x<sub>1</sub> + x<sub>2</sub>
</p>
<p>
    Note: &lt; &frac14; of the people went for party.
</p>
```

Lists

- To organize content that similar in nature.
- Two types:
  - Unordered list (uses ***<ul>*** element)
  - Ordered list (uses ***<ol>*** element)
- The ***ul*** tag creates a list in which each item begins with a bullet symbol (typically a disc).
- Each entry in an unordered list is an ***<li>*** element
- Lists can be nested to represent hierarchical relationships.

Lists

Unordered list

```
<!-- create an unordered list -->
<ul>
   <!-- the list contains four list items -->
   <li><a href = "http://www.youtube.com">YouTube</a></li>
   <li><a href = "http://www.wikipedia.org">Wikipedia</a></li>
   <li><a href = "http://www.amazon.com">Amazon</a></li>
   <li><a href = "http://www.linkedin.com">LinkedIn</a></li>
 </ul>
```

- YouTube
- Wikipedia
- Amazon
- LinkedIn

Lists

Ordered list

```
<ul>
   <li>New games</li>
   <li>New applications

      <!-- nested ordered list -->
      <ol>
         <li>For business</li>
         <li>For pleasure</li>
      </ol>
   </li> <!-- ends line 27 new applications li-->
 </ul>
```

- New games
- New applications
    1. For business
    2. For pleasure

Tables

- To organize data into rows and columns.

```
<table border = “1”>
    <caption><strong>Table of Fruits </strong></caption>
    <thead>
        <tr>
            <th>Fruit</th>
            <th>Price</th>
        </tr>
    </thead>
    <tfoot>
        <tr>
            <th>Total</th>
            <th>$0.75</th>
        </tr>
    </tfoot>
    <tbody>
        <tr>
            <td>Apple</td>
            <td>$0.25</td>
        </tr>
        <tr>
            <td>Orange</td>
            <td>$0.50</td>
        </tr>
    </tbody>
</table>
```

Tables

- Output:

Table of Fruits

Fruit	Price
Apple	$0.25
Orange	$0.50
Total	**$0.75**

Tables

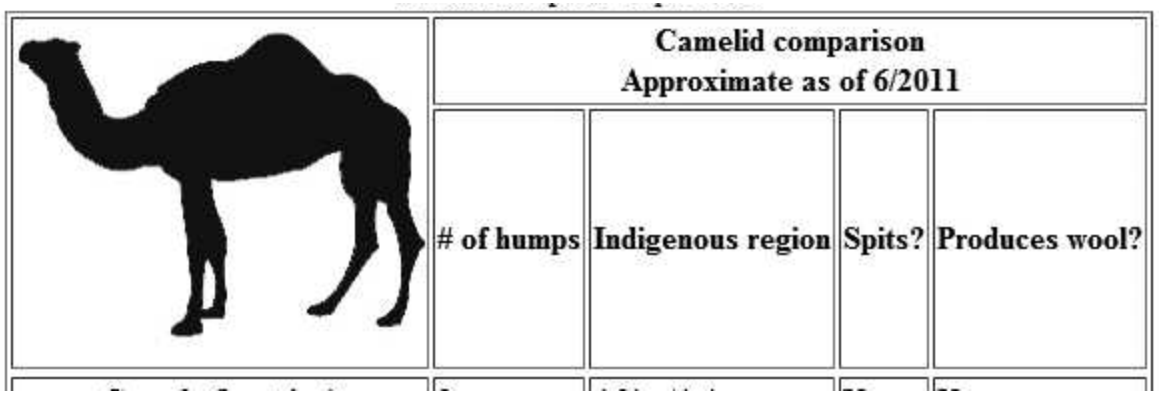
Using *rowspan* and *colspan* with Tables

- Table cells are sized to fit the data they contain, but we can create cells that apply to more than one row or column using ***rowspan*** and ***colspan***.

- The values assigned to these attributes specify the number of rows or columns occupied by a cell.

Tables

```
<th rowspan = "2">
    <img src = "camel.png" width = "205“ height = "167" alt = "a camel">
</th>
<th colspan = "4">
    <strong>Camelid comparison</strong><br>
    Approximate as of 6/2011
</th>
```



	Camelid comparison Approximate as of 6/2011			
	# of humps	Indigenous region	Spits?	Produces wool?

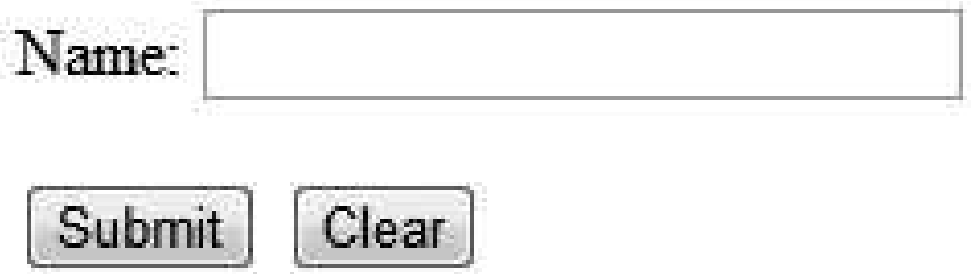
Forms

- To provide information such as search queries, e-mail addresses and zip codes.

- Used for collecting data from a user.

Forms

```
<form method = "post" action = “test.php">
    <p><label>Name:
      <input name = "name" type = "text" size = "25”>
      </label>
    </p>
    <p>
      <input type = "submit" value = "Submit">
      <input type = "reset" value = "Clear">
    </p>
</form>
```



Forms

Some additional form elements

- `<input type = “hidden”  ......>`
- `<textarea name = “” rows = "4" cols = "36">`
- `<input type = "password“ ........>`
- `<input type = "checkbox“ ......... >`
- `<input type = "radio“ ........checked>`
- `<select .........>`

```
<option >1</option>
<option>2</option>
```

Internal Linking

- A mechanism that enables the user to jump between locations in the same document without scrolling.

```
<h1 id = "features">The Best Features of the Internet</h1>
<p><a href = "#bugs"> Go to Favorite Bugs</a></p>
.....
.....
<h1 id = "bugs">My 3 Favorite Bugs</h1>
<p><a href = "#features">Go to Favorite Features</a></p>
```

Internal Linking

- A hyperlink can also reference an internal link in another document as:

href = "filename.html#id"

Meta Elements

- Specifies information about a document.
- Search engines uses each page's meta elements for crawling the site.
- One of many methods of Search Engine Optimization (SEO)
  - the process of tuning your website to maximize your findability and improve your rankings search engine results.

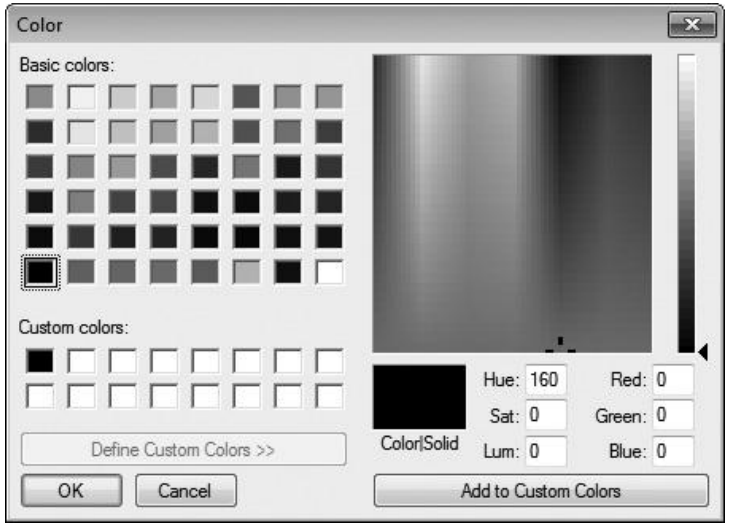
- Two important attributes are
  - ***name***: identifies the type of meta element,
  - ***content***: provides the information for search engines

Meta Elements

```
<meta name = "keywords" content = "web page, design,
   HTML5, tutorial, personal, help, index, form,
   contact, feedback, list, links, deitel">
<meta name = "description" content = "This website will
   help you learn the basics of HTML5 and web page design
   through the use of interactive examples and
   instruction.">
```

New HTML5 Form input Types

- **input Type color**
  - Enables the user to select a color from a color picker
    - *<input type = "color" autofocus />*
  - The autofocus attribute is an optional attribute



New HTML5 Form input Types

- **Note: Validation**
  - The new HTML5 input types are self validating on the client side, eliminating the need to add complicated JavaScript code to your web pages to validate user input, reducing the amount of invalid data submitted and consequently reducing Internet traffic between the server and the client to correct invalid input.

New HTML5 Form input Types

- **input Type date**
  - Enables the user to select a date in the form mm/dd/yyyy.
  - Chrome and Safari display a spinner control—a text field with an up-down arrow allowing the user to select a date
  - The start date is the current date.

New HTML5 Form input Types

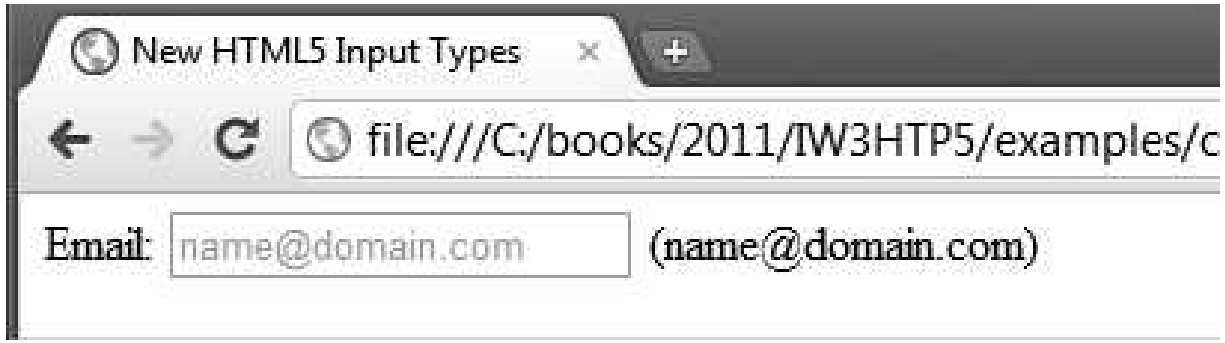
- **input Type datetime-local**
  - Enables the user to select a date, time(hour, minute, second, fraction of a second) and the time zone set to UTC (Universal Time, Coordinated).

New HTML5 Form input Types

- **input Type email**
  - enables the user to enter an e-mail address or a list of email addresses separated by commas.
  - Currently, all of the browsers display a text field. If the user enters an invalid(not in proper format) e-mail address and clicks the Submit button, a callout asking the user to enter an e-mail address is rendered pointing to the input element

New HTML5 Form input Types

- **placeholder Attribute**
  - Allows you to place temporary text in a text field.
  - When the focus is placed in the text field, the placeholder text disappears.



New HTML5 Form input Types

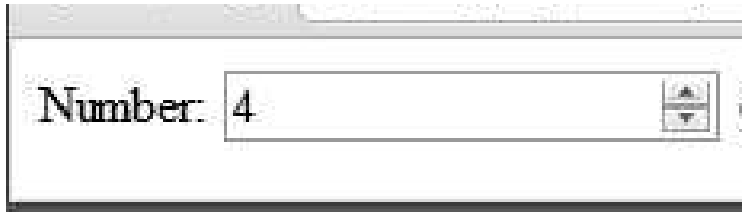
- **required Attribute**
  - forces the user to enter a value before submitting the form.

New HTML5 Form input Types

- **input Type month**
  - enables the user to enter a year and month in the format "***February-2019"***

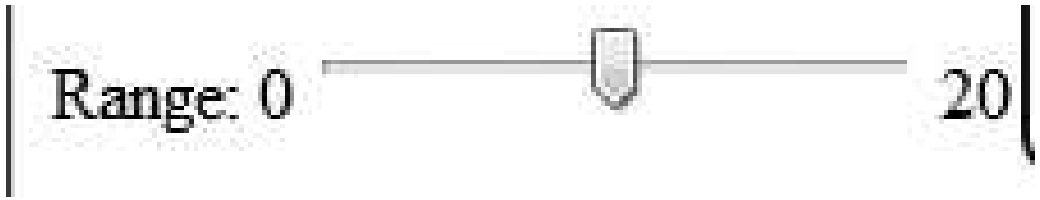
New HTML5 Form input Types

- **input Type number**
  - Enables the user to enter a numerical value
  - Mobile browsers typically display a numeric keypad for this input type.
  - Browser places a spinner control for adjusting the number. The ***min*** attribute sets the minimum valid number, the ***max*** attribute sets the maximum valid number, and the ***step*** attribute determines the increment in which the numbers increase.



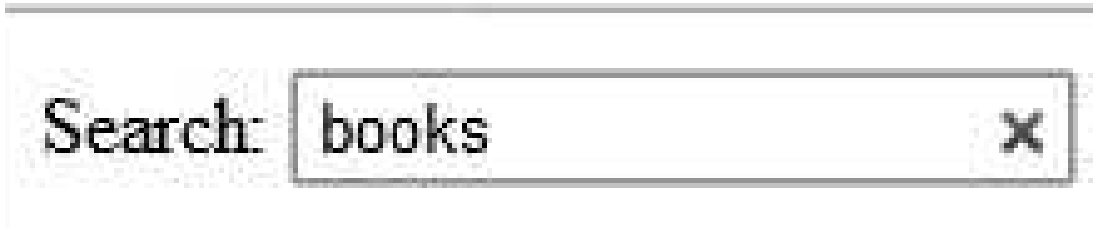
New HTML5 Form input Types

- **input Type range**
  - It appears as a slider control
  - You can set the ***min***, ***max*** and ***value*** attributes



New HTML5 Form input Types

- **input Type search**
  - It provides a search field for entering a query.
  - It is functionally equivalent to an input of type text.
  - When the user begins to type in the search field, browser displays an **X** that can be clicked to clear the field.



New HTML5 Form input Types

- **input Type tel**
  - Enables the user to enter a telephone number
  - Mobile browsers display a keypad specific to enter phone numbers.

New HTML5 Form input Types

- **input Type time**
  - Enables the user to enter an hour, minute, seconds and fraction of second.
  - The HTML5 specification indicates that a time must have two digits representing the hour, followed by a colon (:) and two digits representing the minute.

New HTML5 Form input Types

- **input Type url**
  - It enables the user to enter a URL.
  - The element is rendered as a text field, and the proper format is ***http://www.deitel.com***

New HTML5 Form input Types

- **input Type week**
  - It enables the user to select a year and week number in the format ***Wnn, yyyy***, where ***Wnn*** is Week number
    - for example, 52-2019 represents the last week in December 2019.

input Element autocomplete Attribute

- The ***autocomplete*** attribute can be used on input types to automatically fill in the user's information based on previous input.

- You can enable this for an entire form or just for specific elements.

  <form method = "post" autocomplete="on">

datalist Element

- It provides input options for a text input element.
- When the user clicks in the text field, a drop-down list of the items appears.
- If the user types a letter, all items containing that letter appear in the drop-down list.

```
<input type = "text" id = "txtList"
   placeholder = "Select a month" list = "months" />
<datalist id = "months">
   <option value = "January">
   <option value = "February">
   <option value = "March">
   <option value = "April">
   <option value = "May">
```

Page-Structure Elements

- HTML5 introduces several new page-structure elements that identify areas of the page as headers, footers, articles, navigation areas, figures, etc.
- ***<header>*** : Creates header for the page, can include HTML headings (<h1> through <h6>)
- ***<section id = "1">*** : Section begin
- ***<nav>*** : groups navigation links
- ***<figure>*** : figure element describes the image
  - ***<figcaption>*** : Caption for the image
- ***<mark>*** : mark element highlights text

Page-Structure Elements

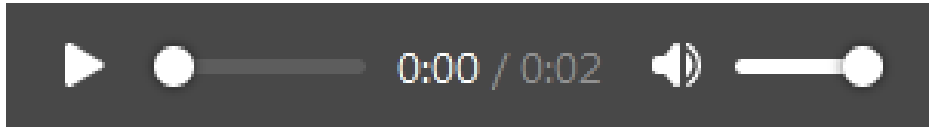
- ***<summary>*** and ***<details>***: The summary element displays a right-pointing arrow next to a summary, when clicked, the arrow points downward and reveals the content in the details element.
- ***<footer>*** : footer to a section or page
- ***<address>*** : for representing addresses

HTML5 Audio Elements

- The HTML **<audio>** element is used to play an audio file on a web page.

- Example:

```
<audio controls>
    <source src="horse.ogg" type="audio/ogg">
    <source src="horse.mp3" type="audio/mpeg">
    Your browser does not support the audio element.
</audio>
```



HTML5 Audio Elements

- The controls attribute adds audio controls, like play, pause, and volume.
- The <source> element allows you to specify alternative audio files which the browser may choose from.
  - The browser will use the first recognized format.

- The text between the <audio> and </audio> tags will only be displayed in browsers that do not support the <audio> element.

HTML <audio> Autoplay

- To start an audio file automatically, use the **autoplay** attribute.

```
<audio controls autoplay>
    <source src="horse.ogg" type="audio/ogg">
    <source src="horse.mp3" type="audio/mpeg">
    Your browser does not support the audio element.
</audio>
```

HTML Audio - Media Types

File Format	Media Type
MP3	audio/mpeg
OGG	audio/ogg
WAV	audio/wav

HTML Video

- The HTML <video> element is used to show a video on a web page.

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