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Web Systems Fundamentals and Databases (Grundläggande webbsystem och databaser) DI4020 - 11hp

Lectures 10 and 11

Wagner Ourique de Morais

Previously in DI4020

- Lecture 9
  - Web Development
  - Web Applications vs Desktop Applications
  - Static web pages vs dynamic web pages
  - Web page vs web site
  - Client-server model
  - DNS
  - URL
  - HTTP
  - HTML
  - Web server
  - Web browser
  - Search engine

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Objectives

- Purpose
  - Introduce HTML
    - What Is HTML and Where Did It Come from?
  - Familiarize students with the syntax of HTML
  - Discuss semantic markup and its importance
  - Understand the structural components of a web page
  - Introduce key HTML elements used in web development
    - <html>, <head>, <meta>, <title>, <link>, <script>, <style>, <body>, <h1> to <h6>, <p>, <ul>, <ol>, , <header>, <footer>, <nav>, <article>, <section>, <aside>, <a>, <img>, <table>, <tr>, <th>, <td>, <form>, <input>
  - Explore HTML tables and forms for organizing and collecting data
    - <table>
      - <tr>, <th>, <td>
    - <form>
      - <input>
  - Cover aspects of web media
    - <canvas>, <audio> and <video>
  - Guide on creating and deploying a web page effectively
- Preparation
  - Chapter 3 gives an introduction to HTML and focuses on HTML's key parts.
  - Chapter 5 covers HTML tables and forms.
  - Chapter 6 gives an introduction to web media, such as images, audio and video.
  - Although we use and follow the structure of the coursebook, in the Lectures, we cover parts of:
    - HTML basics
    - HTML: HyperText Markup Language
    - Structuring the Web with HTML
    - Web forms - Working with user data

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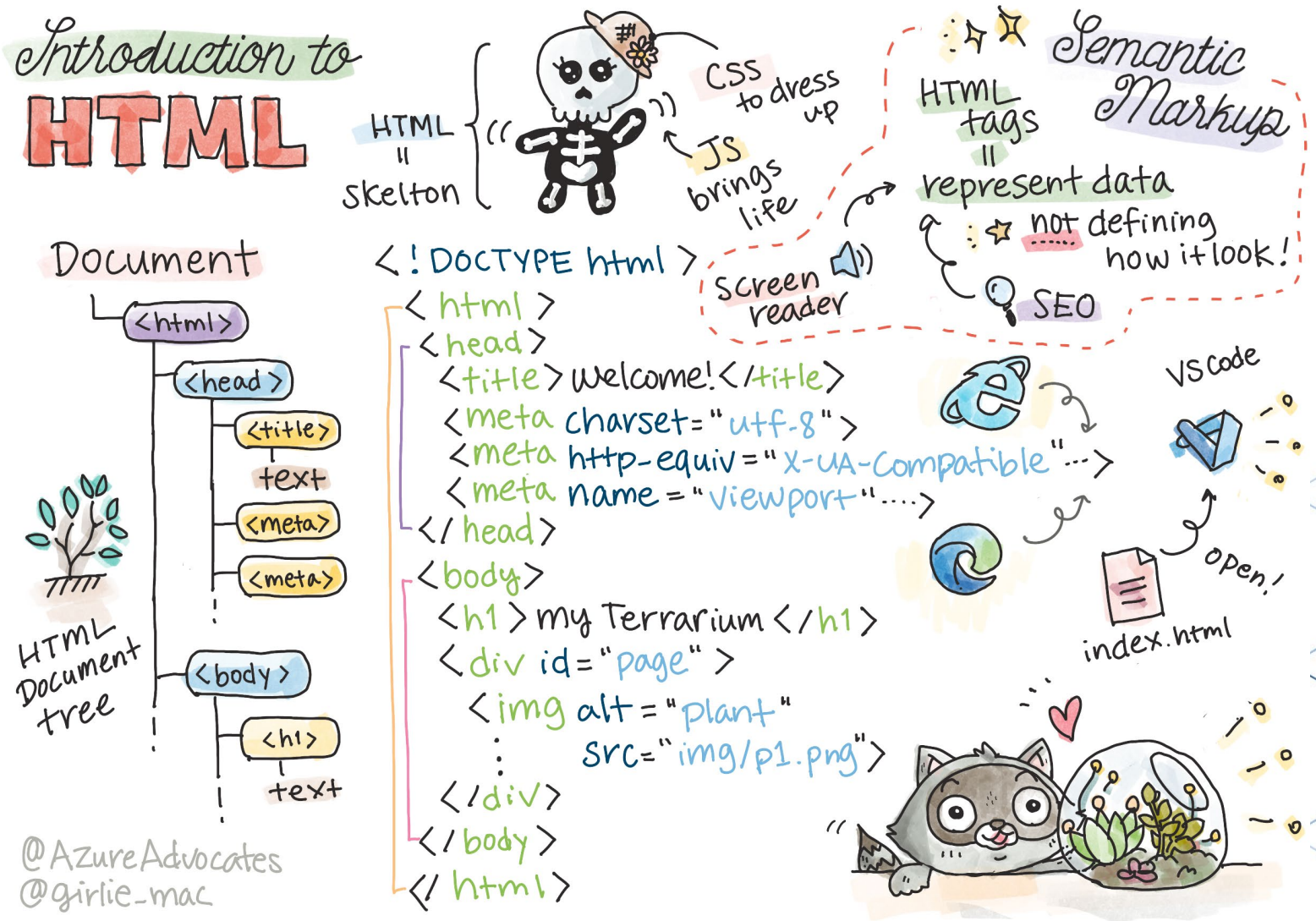
Objectives illustraded



Sketchnote by Tomomi Imura

https://github.com/microsoft/Web-Dev-For-Beginners/tree/main/3-terrarium/1-intro-to-html

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Chapter 3 - Introduction to HTML

a. The page encoded using HTML.

Tag indicating beginning of document

Preliminaries

The part of the document that will be displayed by a browser

Tag indicating end of document

```
<html>
<head>
<title>demonstration page</title>
</head>
<body>
<h1>My Web Page</h1>
<p>Click here for another page.</p>
</body>
</html>
```

b. The page as it would appear on a computer screen.

My Web Page

Click here for another page.

```
<!DOCTYPE html>
<html lang="sv">
<head>
    <title>Enkel HTML-sida</title>
</head>
<body>
    <header>
        <h1>Välkommen till min enkla HTM
    </header>
    <main>
        <p>Detta är en enkel HTML-sida m
        <button onclick="displayMessage(
    </main>
</body>
</html>
```

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What is Web page?

- Is a plain text file that contains instructions about what kind of content is contained within the document.
  - These instructions are written in HTML.
  - The document is called a Web page.

- A Web page is made up of one or more files that are downloaded to the computer.

- A web page is interpreted by a web browser and rendered out to screen.

a. The page encoded using HTML.

Tag indicating beginning of document

Preliminaries

The part of the document that will be displayed by a browser

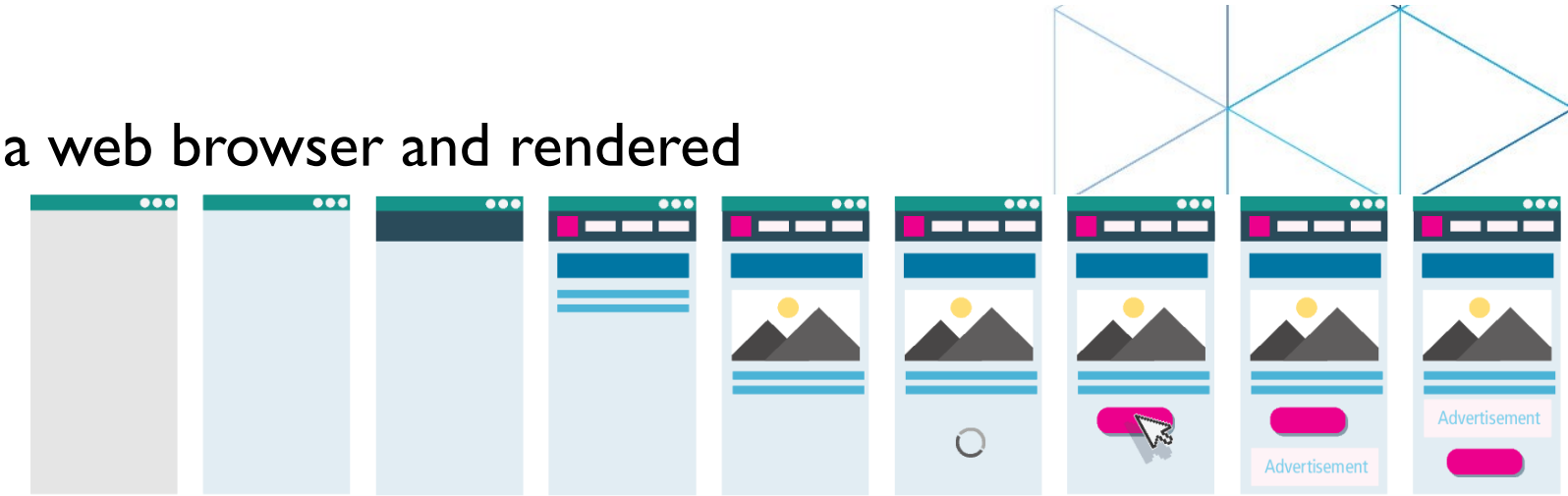
Tag indicating end of document

```
<html>
<head>
<title>demonstration page</title>
</head>
<body>
<h1>My Web Page</h1>
<p>Click here for another page.</p>
</body>
</html>
```

b. The page as it would appear on a computer screen.

My Web Page

Click here for another page.



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DOCTYPE - Document Type Declaration

- The DOCTYPE informs the web browser about the version of HTML or XHTML used in the document, allowing the browser to interpret and render the content correctly.
  - HTML5:
    - <!DOCTYPE html>
  - HTML 4.01 Strict:
    - <!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01//EN" "http://www.w3.org/TR/html4/strict.dtd">
  - HTML 4.01 Transitional:
    - <!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN" "http://www.w3.org/TR/html4/loose.dtd">
  - XHTML 1.0 Strict:
    - <!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
  - XHTML 1.0 Transitional:
    - <!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">

```
<!DOCTYPE html>
<html>
  <head>
  <meta charset="UTF-8">
    <title> Title of the document</title>
  </head>
  <body>
    Content of the document.....
  </body>
</html>
```

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What is HTML?

```
\documentclass[12pt]{article}
\usepackage{lingmacros}
\begin{document}
\section*{Notes for my lecture}
They look like this:
\subsection*{Lecture 1}
Course information and outline.
\end{document}
```

- WHAT?
  - Defined as a **markup language**.
    - A markup is a way to indicate information about the content that is distinct from the content.
  - Created by Tim Berners-Lee to create a system for sharing information among scientists at CERN.
- WHY?
  - It provides the structure, content and connections between pages.
    - Tell the browser how to render a web page.
- HOW?
  - Set of markup symbols or codes to indicate information about the content.
  - Individual markup codes are called **tags** or **elements**.
    - Syntax: **<start tag> content </end tag>**
  - HTML start tags can contain attributes that provide extra information about an element.
    - Syntax: **name="value"**

```
<?xml version="1.0" encoding="UTF-8"?>
<note>
  <to>Students</to>
  <from>Wagner</from>
  <heading>Reminder</heading>
  <body>Course material at BB</body>
</note>
```

Opening tag — Closing tag

```
<a href="http://www.centralpark.com">Central Park</a>
```

Element name — Attribute — Content (*may be text or other HTML elements*)

```
<!DOCTYPE html>
<html>
  <head>
  <meta charset="UTF-8">
    <title>Title of the document</title>
  </head>
  <body>
    Content of the document......
  </body>
</html>
```

- HTML validation: validator.w3.org

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Introduction to HTML

HTML = skelton

CSS to dress up

JS brings life

Semantic Markup

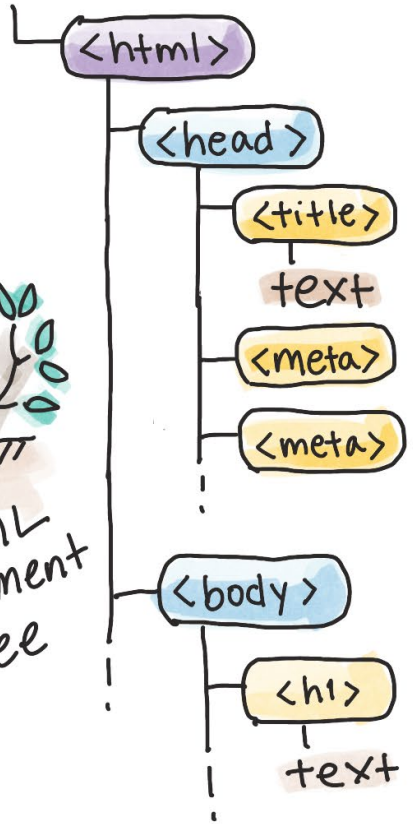
HTML tags = represent data

not defining how it look!

Screen reader

SEO

Document



HTML Document tree

```
<!DOCTYPE html>
<html>
  <head>
    <title>welcome!</title>
    <meta charset="utf-8">
    <meta http-equiv="X-UA-Compatible"...>
    <meta name="viewport"....>
  </head>
  <body>
    <h1>my Terrarium</h1>
    <div id="page">
      <img alt="plant"
           src="img/p1.png">
      ⋮
    </div>
  </body>
</html>
```

VS code

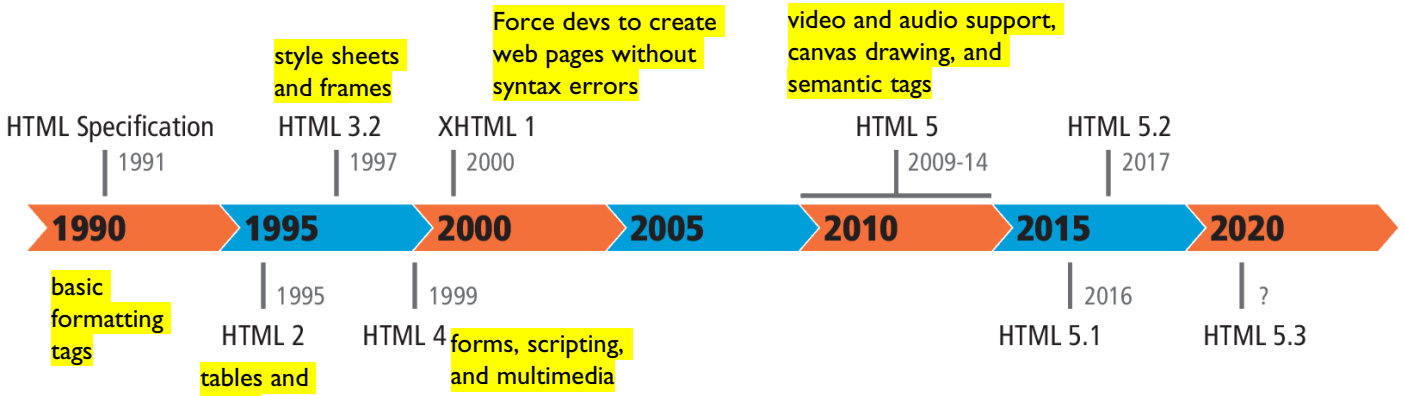
open!

index.html

@AzureAdvocates
@girlie_mac

HTML origins

- HTML evolution has been driven by technical innovation, user needs, and industry standards.
  - Growing Complexity of Web Pages
  - New Technologies (XML, JavaScript and CSS)
  - Standards Compliance
  - Accessibility and Usability




```
<!DOCTYPE HTML PUBLIC
  "-//W3C//DTD HTML 4.01//EN"
  "http://www.w3.org/TR/html4/strict.dtd">
<HTML>
  <HEAD>
    <TITLE>My first HTML document</TITLE>
  </HEAD>
  <BODY>
    <P>Hello world!
  </BODY>
</HTML>
```

Many pages on the internet contain "bad" HTML.

```
<?xml version="1.0" encoding="UTF-8"?>
<note>
  <to>Tove</to>
  <from>Jani</from>
  <heading>Reminder</heading>
  <body>Don't forget me this weekend!</body>
</note>
```

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0
Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-
transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
  <head>
    <title>Title of document</title>
  </head>
  <body>
    some content
  </body>
</html>
```

How browsers should deal with invalid markup. Backward compatibility.

```
<!DOCTYPE html>
<html>
  <head>
  <meta charset="UTF-8">
    <title> Title of the document</title>
  </head>
  <body>
    Content of the document.....
  </body>
</html>
```

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.htm, .html, .cfm, .php, .aspx, …

- FQDN <u>might</u> end up with .htm, .html, .cfm, .php, or .aspx.
  - As far as the web browser is concerned, they're just normal HTML documents like every other on the web.
- These different extensions indicate that some sort of processing has happened on the server before the page was sent to your browser.
  - The web page is generated dynamically and customized.
- Working this way, every web browser only has to support one kind of page structural language.
- Thus, to access any website all you need is a web browser and an internet connection.

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HTML basics

- HTML documents should only focus on the structure of the document.
- Information about how the content should look is best left for CSS (Cascading Style Sheets)
- What can you do?
  - Create links with the <a> tag.
  - Insert images using the <img> tag.
  - Create lists with the <ul>, <ol> and <li> tags.
  - Create headings with <h1>, <h2>, …, <h6>.
  - Define metatdata with <meta> tag.
  - And much more…

- HTML5
  - Semantic elements: <header>, <footer>, <article>, and <section>.
    - **Semantic markup** - Focus on the structure of the document, not the visual
      - Maintainability, performance, accessibility, search engine optimization (SEO)
  - Attributes of form elements: number, date, time, calendar, and range.
  - Graphic elements: <svg> and <canvas>.
  - Multimedia elements: <audio> and <video>.

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HTML Syntax

Opening tag — Closing tag

```
<a href="http://www.centralpark.com">Central Park</a>
```

Element name — Attribute — Content *(may be text or other HTML elements)*

- HTML documents are composed of **textual content** and **HTML elements**.
- HTML element vs HTML tag vs HTML attribute
  - An HTML element is a fundamental building block of a web page.
    - It consists of a start tag, content, and an end tag (in most cases).
    - Elements can be structural (e.g., , <p>, <header>,) or semantic (e.g., <nav>, <article>, <section>, <aside>).
  - An HTML tag is a part of an HTML element that denotes its beginning or end.
    - Tags are enclosed in angle brackets (< and >).
    - There are two types of tags: start tags and end tags, which mark the beginning the end of an element, respectively.
    - Some HTML elements do not require an end tag or content. These are are called empty elements or void elements.
  - An HTML attribute provides additional information about an element.
    - Attributes modify the behavior or appearance of elements.
    - Attributes are specified within the start tag of an element and are written as name-value pairs.
    - Common attributes include class, id, src, href, alt, title, style, and target.
- Nesting HTML Elements
  - Elements can contain other elements

Example empty element

```
<img src="file.gif" alt="something" />
```

Element name — Trailing slash *(optional)*

Correct nesting

```
<h1>Share Your <strong>Travels</strong></h1>
```

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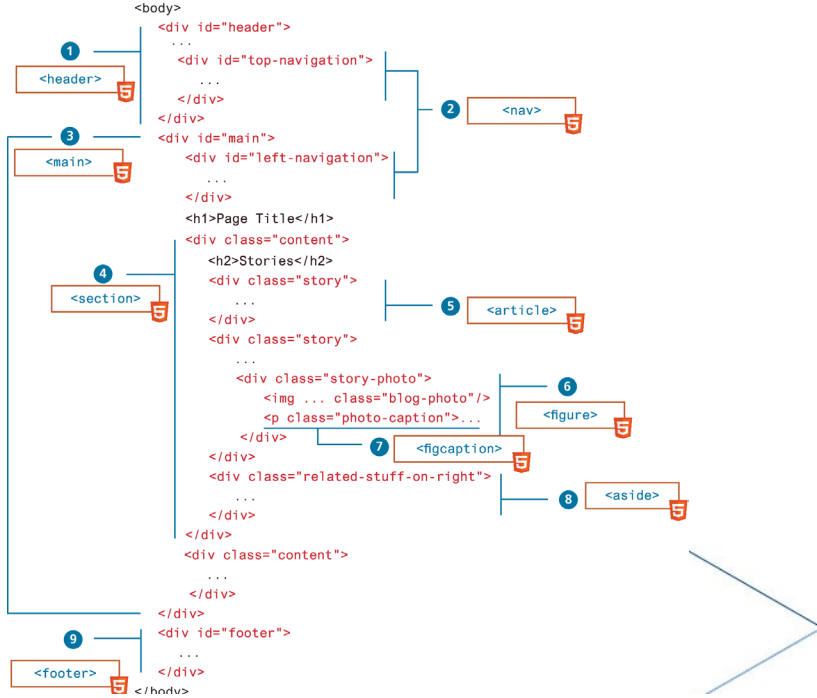
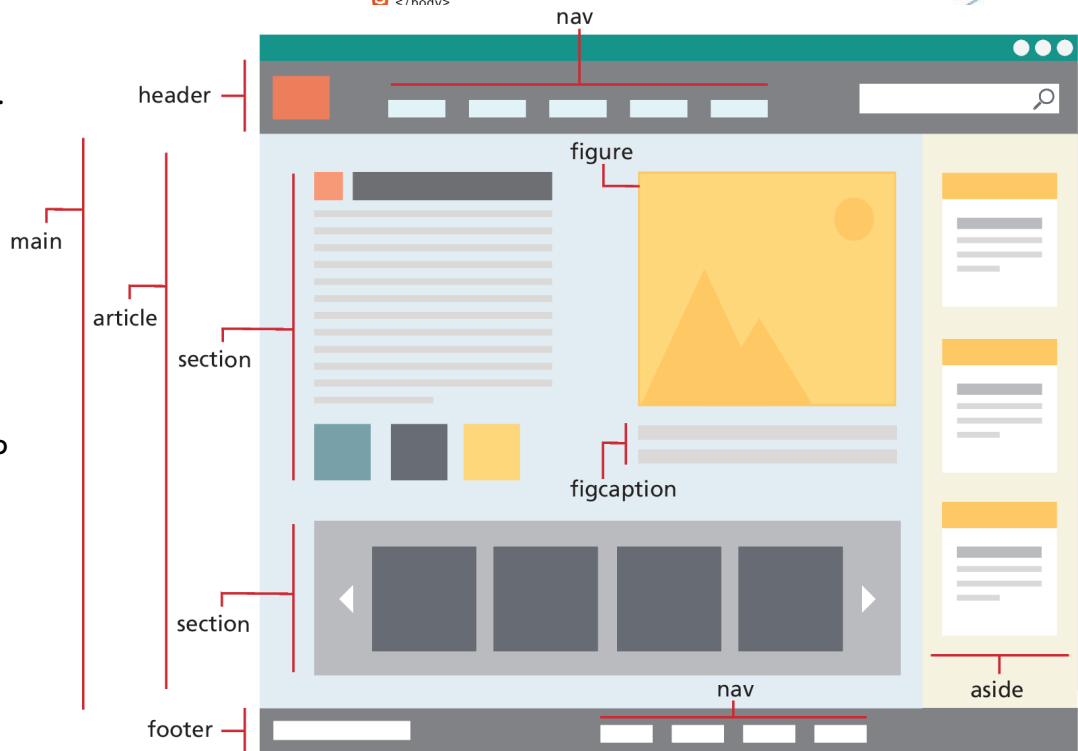
HTML5 Semantic Structure Elements



- Semantic elements are elements with a meaning.
  - Non-semantic elements like , and tell nothing about its content.
  - HTML code like to indicate navigation, header, and footer.
    `<div id="nav"> <div class="header"> <div id="footer">`
  - Semantic elements like `<form>, <table>, and <article>` clearly define their content and type of interaction.
- Semantic Elements in HTML
  - <article> - Defines independent, self-contained content
  - <aside> - Defines content aside from the page content
  - <details> - Defines additional details that the user can view or hide
  - <figcaption> - Defines a caption for a <figure> element
  - <figure> - Specifies self-contained content, like illustrations, diagrams, photos, code listings, etc.
  - <footer> - Defines a footer for a document or section
  - <header> - Specifies a header for a document or section
  - <main> - Specifies the main content of a document
  - <mark> - Defines marked/highlighted text
  - <nav> - Defines navigation links
  - <section> - Defines a section in a document
  - <summary> - Defines a visible heading for a <details> element
  - <time> - Defines a date/time

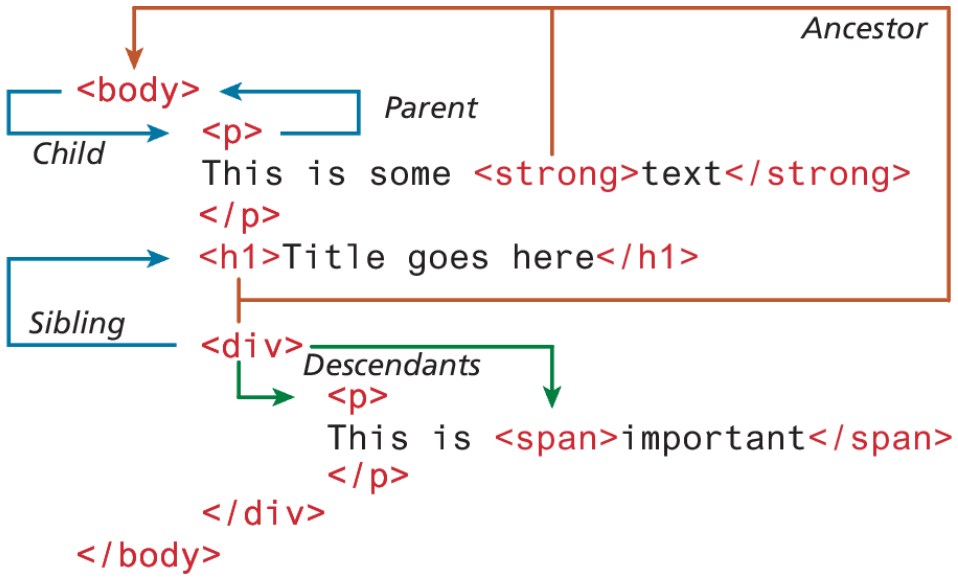
https://www.w3schools.com/html/html5_semantic_elements.asp

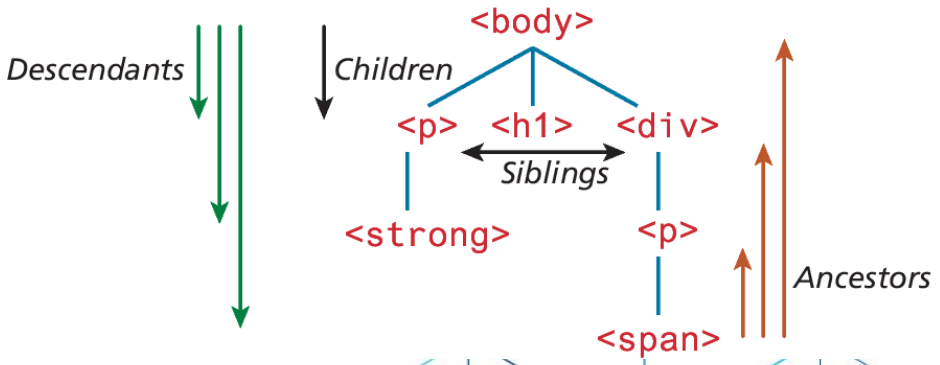


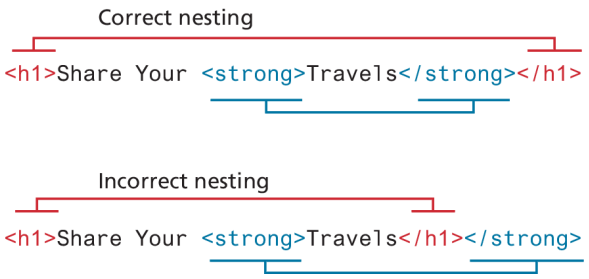
Aspect	Structural Elements	Semantic Elements
Purpose	Organizes layout only	Conveys meaning and context
Examples	`<div>`, `<span>`	`<header>`, `<nav>`, `<article>`, `<footer>`, `<main>`
Use Case	Visual grouping	Structuring with context
Accessibility	Neutral impact	Improved accessibility
SEO	Neutral impact	Positive impact on SEO

Nesting HTML Elements

- Often an HTML element will contain other HTML elements.
- The container element is said to be a **parent** of the contained, or **child**, element.
- Any elements contained within the child are said to be **descendants** of the parent element
- Likewise, any given child element may have a variety of **ancestors**.
- This concept is called the **Document Object Model** (DOM)







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Structure of HTML Documents

1. <!DOCTYPE> – tells the browser what type of document it is about to process
2. HTML element (root) – contains the web page document
3. Head element – contains the head section describing the web page document
   5. Meta element – to describe the character encoding.
   – Title element – text displays in title bar of window.
   6. Link element – to link to external resources, like a CSS.
   7. Script element – to define client-side JavaScripts.
4. Body element – contains the body section.
   – The body section contains the text and elements that display in the browser viewport.

index.html - Notepad

File Edit Format View Help

```
<!doctype html>
<html lang="en">
<head>
  <title>My First Web Page</title>
  <meta charset="utf-8">
</head>
<body>
Hello World
</body>
</html>
```

```
1  <!DOCTYPE html>
2  <html lang="en">
3  <head>
5     <meta charset="utf-8" />
      <title>Share Your Travels -- New York - Central Park</title>
6     <link rel="stylesheet" href="css/main.css" />
7     <script src="js/html5shiv.js"></script>
   </head>
4  <body>
      <h1>Main heading goes here</h1>
      ...
   </body>
   </html>
```

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Comments or Questions?

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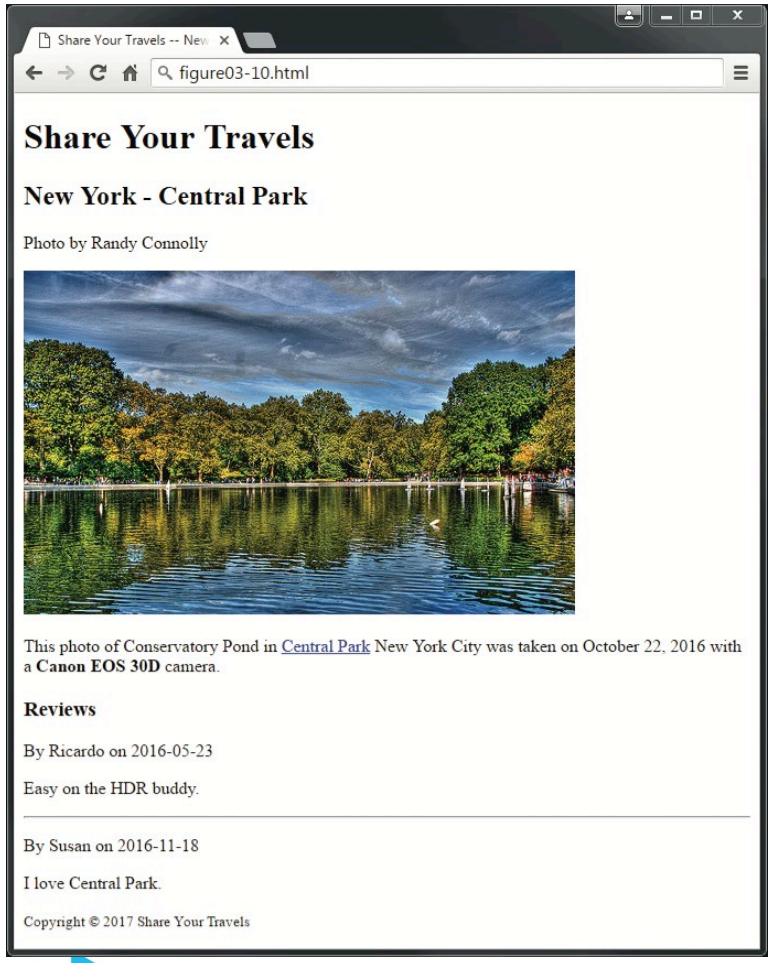
Quick Tour of HTML Elements




```
<body>
  <h1>Share Your Travels</h1>
  <h2>New York - Central Park</h2>
  <p>Photo by Randy Connolly</p>
  <p>This photo of Conservatory Pond in
     <a href="http://www.centralpark.com/">Central Park</a>
     New York City was taken on October 22, 2016 with a
     <strong>Canon EOS 30D</strong> camera.
  </p>
  <img src="images/central-park.jpg" alt="Central Park" />

  <h3>Reviews</h3>
  <div>
     <p>By Ricardo on <time>2016-05-23</time></p>
     <p>Easy on the HDR buddy.</p>
  </div>
  <hr>
  <div>
     <p>By Susan on <time>2016-11-18</time></p>
     <p>I love Central Park.</p>
  </div>

  <p><small>Copyright &copy; 2017 Share Your Travels</small></p>
</body>
```

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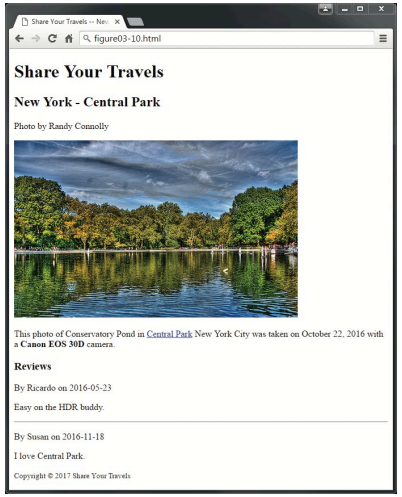
Headings

1. HTML provides six levels of heading (`<h1> to <h6>`)
   - <h1> defines the most important heading.
   - <h6> defines the least important heading.
- Headings are also used by the browser to create a document outline for the page.




```
<body>
  <h1>Share Your Travels</h1>
  <h2>New York - Central Park</h2>
  <p>Photo by Randy Connolly</p>
  <p>This photo of Conservatory Pond in
     <a href="http://www.centralpark.com/">Central Park</a>
     New York City was taken on October 22, 2016 with a
     <strong>Canon EOS 30D</strong> camera.
  </p>
  <img src="images/central-park.jpg" alt="Central Park" />

  <h3>Reviews</h3>
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     <p>I love Central Park.</p>
  </div>

  <p><small>Copyright &copy; 2017 Share Your Travels</small></p>
</body>
```

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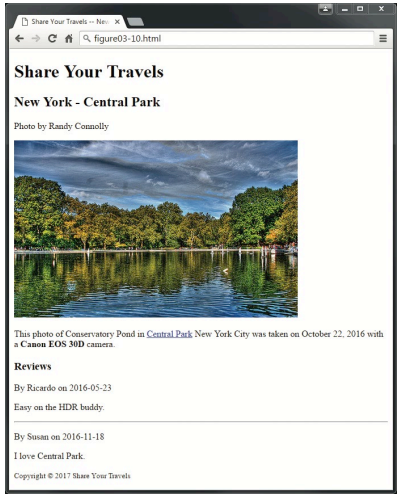
Paragraphs and Divisions

2 The paragraph (**<p>** tag) is a container for text and other inline HTML elements (ex. <a>,)

- **inline HTML** elements do not cause a paragraph break but are part of the regular "flow" of the text.

6 The division (** ** tag) also a container element and is used to create a logical grouping of content.

- The element has no intrinsic presentation.
- It is frequently used in contemporary CSS-based layouts to mark out sections.
- Groups block-elements to format them with CSS.




```
<body>
  <h1>Share Your Travels</h1>
  <h2>New York - Central Park</h2>
  <p>Photo by Randy Connolly</p>
  <p>This photo of Conservatory Pond in
     <a href="http://www.centralpark.com/">Central Park</a>
     New York City was taken on October 22, 2016 with a
     <strong>Canon EOS 30D</strong> camera.
  </p>
  <img src="images/central-park.jpg" alt="Central Park" />

  <h3>Reviews</h3>
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     <p>By Ricardo on <time>2016-05-23</time></p>
     <p>Easy on the HDR buddy.</p>
  </div>
  <hr>
  <div>
     <p>By Susan on <time>2016-11-18</time></p>
     <p>I love Central Park.</p>
  </div>

  <p><small>Copyright &copy; 2017 Share Your Travels</small></p>
</body>
```

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Links

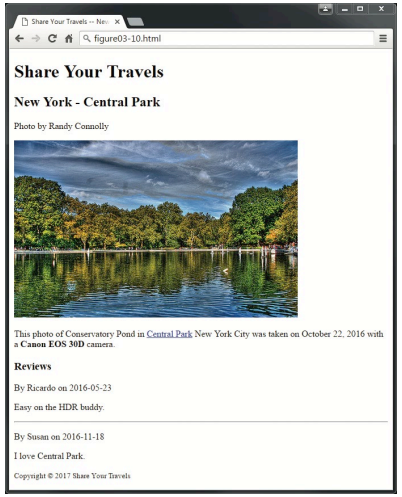
- Links are an essential feature of all web pages
- 3 Links use the **<a>** element (the "a" stands for anchor).
  - Used to create hyperlinks
  - A link has two main parts: the destination and the label.
    - The label, i.e., the text between the <a> and </a>, is displayed on the web page.

```
<a href="http://www.centralpark.com">Central Park</a>
```

Destination — Label (text)

```
<a href="index.html"><img src="logo.gif" alt="logo" /></a>
```

Label (image)




```
<body>
  <h1>Share Your Travels</h1>
  <h2>New York - Central Park</h2>
  <p>Photo by Randy Connolly</p>
  <p>This photo of Conservatory Pond in
     <a href="http://www.centralpark.com/">Central Park</a>
     New York City was taken on October 22, 2016 with a
     <strong>Canon EOS 30D</strong> camera.
  </p>
  <img src="images/central-park.jpg" alt="Central Park" />

  <h3>Reviews</h3>
  <div>
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  </div>
  <hr>
  <div>
     <p>By Susan on <time>2016-11-18</time></p>
     <p>I love Central Park.</p>
  </div>

  <p><small>Copyright &copy; 2017 Share Your Travels</small></p>
</body>
```

1 2 3 4 5 6 7 8 9 10

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Links - Examples

Link to external site

```
<a href="http://www.centralpark.com">Central Park</a>
```

Link to resource on external site

```
<a href="http://www.centralpark.com/logo.gif">Central Park</a>
```

Link to another page on same site as this page

```
<a href="index.html">Home</a>
```

Link to another place on the same page

```
<a href="#top">Go to Top of Document</a>
...
<a name="top">
```

Defines anchor for a link to another place on same page

Link to specific place on another page

```
<a href="productX.html#reviews">Reviews for product X</a>
```

Link to email

```
<a href="mailto:person@somewhere.com">Someone</a>
```

Link to JavaScript function

```
<a href="javascript:OpenAnnoyingPopup();">See This</a>
```

Link to telephone (automatically dials the number when user clicks on it using a smartphone browser)

```
<a href="tel:+18009220579">Call toll free (800) 922-0579</a>
```

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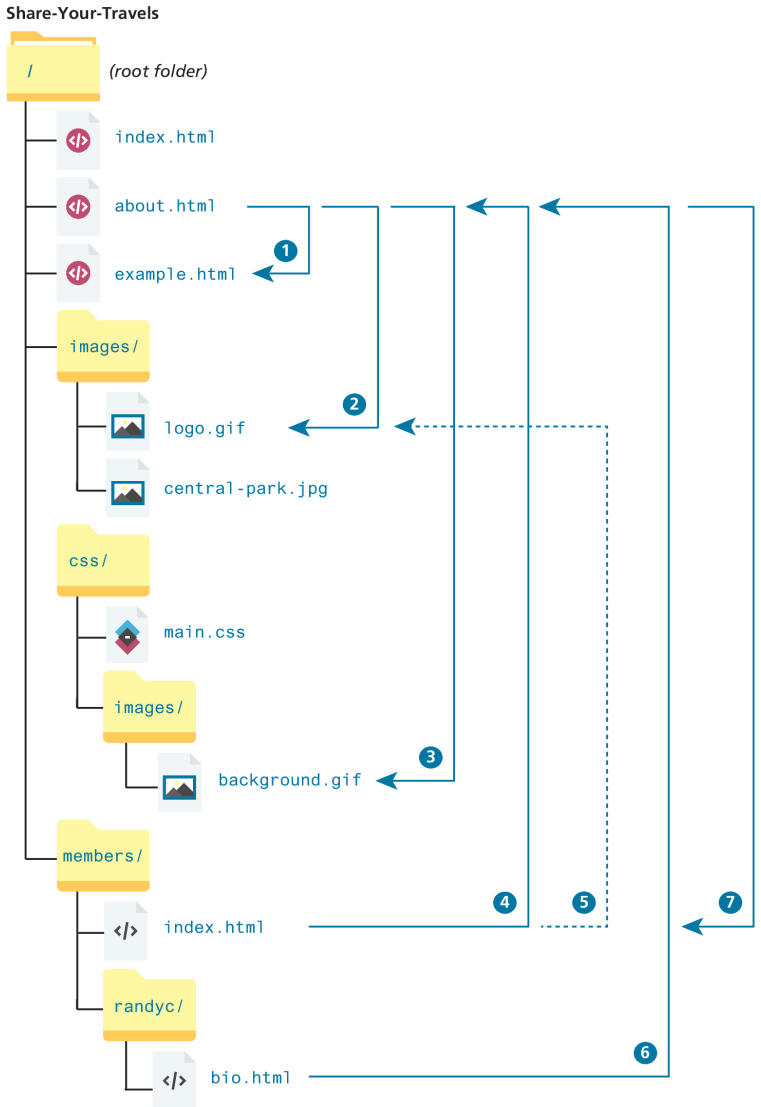
Absolute and Relative URLs

- When referencing a page or resource on an external site, a full absolute URL reference is required
  - Full URL with a protocol (typically, http:// or https://), the domain name, any paths, and the file name of the desired resource.
- When referencing a resource that is on the same server, you can use relative referencing.
  - If the URL does not include the "http://" then the browser will request the current server for the file.

Links - URL Relative Referencing

Relative Link Type	Example
1. Same directory	<a href="example.html">
2. Child Directory	<a href="images/logo.gif">
3. Grandchild/Descendant Director	<a href="css/images/background.gif">
4. Parent/Ancestor Directory	<a href="../about.html">
	<a href="../../about.html”>
5. Sibling Directory	<a href="../images/about.html">
6. Root Reference	<a href="/images/background.gif">



1. **Same Directory**
   - To link to a file within the same folder, simply use the file name.
2. **Child Directory**
   - To link to a file within a subdirectory, use the name of the subdirectory and a slash before the file name.
3. **Grandchild/Descendant Directory**
   - To link to a file that is multiple subdirectories below the current one, construct the full path by including each subdirectory name (separated by slashes) before the file name.
4. **Parent/Ancestor Directory**
   - Use “../” to reference a folder above the current one. If trying to reference a file several levels above the current one, simply string together multiple “../”.
5. **Sibling Directory**
   - Use “../” to move up to the appropriate level, and then use the same technique as for child or grandchild directories.
6. **Root Reference**
   - In this approach, begin the reference with the root reference (the “/”), and then use the same technique as for child or grandchild directories.

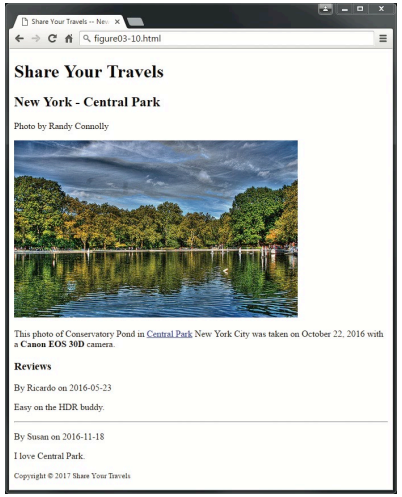
Inline Text Elements

- Do not disrupt the flow of text (i.e., cause a line break).
- HTML5 defines over 30 of these elements.

3 <a>
- <abbr>
-
- <cite>
- <code>
-
- <mark>

9 <small>
-
-

7 <time>




```
<body>
  <h1>Share Your Travels</h1>
  <h2>New York - Central Park</h2>
  <p>Photo by Randy Connolly</p>
  <p>This photo of Conservatory Pond in
     <a href="http://www.centralpark.com/">Central Park</a>
     New York City was taken on October 22, 2016 with a
     <strong>Canon EOS 30D</strong> camera.
  </p>
  <img src="images/central-park.jpg" alt="Central Park" />

  <h3>Reviews</h3>
  <div>
     <p>By Ricardo on <time>2016-05-23</time></p>
     <p>Easy on the HDR buddy.</p>
  </div>
  <hr>
  <div>
     <p>By Susan on <time>2016-11-18</time></p>
     <p>I love Central Park.</p>
  </div>

  <p><small>Copyright &copy; 2017 Share Your Travels</small></p>
</body>
```

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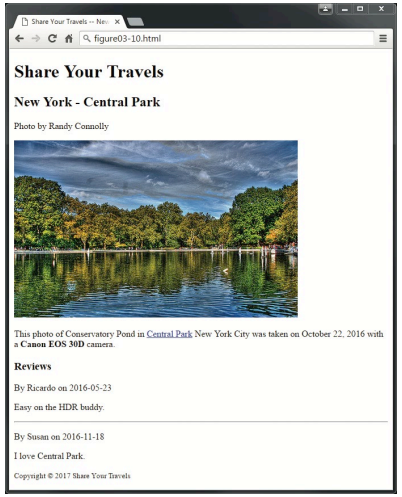
Images <img>

5 When the **images are content**, such as in the images in a gallery or the image of a product in a product details page, then the <img> tag is the semantically appropriate approach.

- However, for purely **decorative images**, such as background gradients and patterns, logos, border art, and so on, it makes semantic sense to keep such images out of the markup and in CSS where they more rightly belong.




```
<body>
  <h1>Share Your Travels</h1>
  <h2>New York - Central Park</h2>
  <p>Photo by Randy Connolly</p>
  <p>This photo of Conservatory Pond in
     <a href="http://www.centralpark.com/">Central Park</a>
     New York City was taken on October 22, 2016 with a
     <strong>Canon EOS 30D</strong> camera.
  </p>
  <img src="images/central-park.jpg" alt="Central Park" />

  <h3>Reviews</h3>
  <div>
     <p>By Ricardo on <time>2016-05-23</time></p>
     <p>Easy on the HDR buddy.</p>
  </div>
  <hr>
  <div>
     <p>By Susan on <time>2016-11-18</time></p>
     <p>I love Central Park.</p>
  </div>

  <p><small>Copyright &copy; 2017 Share Your Travels</small></p>
</body>
```

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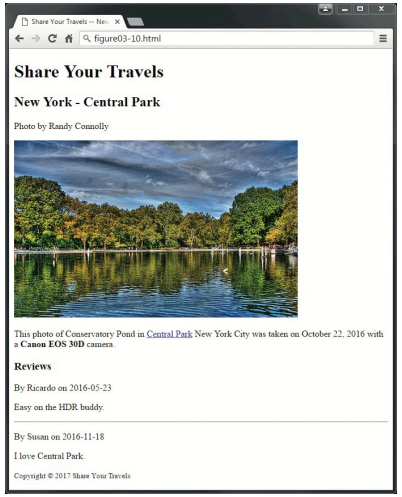
Special Characters

- Used to display special characters such as quotes, copyright symbol
  - When there is either no easy way to type a symbol via a keyboard, or
  - When the symbol has a reserved meaning in HTML (like“<“)

Entity	Description
	Nonbreakable space
<	<
>	>
©	©
™	™




```
<body>
  <h1>Share Your Travels</h1>
  <h2>New York - Central Park</h2>
  <p>Photo by Randy Connolly</p>
  <p>This photo of Conservatory Pond in
     <a href="http://www.centralpark.com/">Central Park</a>
     New York City was taken on October 22, 2016 with a
     <strong>Canon EOS 30D</strong> camera.
  </p>
  <img src="images/central-park.jpg" alt="Central Park" />

  <h3>Reviews</h3>
  <div>
     <p>By Ricardo on <time>2016-05-23</time></p>
     <p>Easy on the HDR buddy.</p>
  </div>
  <hr>
  <div>
     <p>By Susan on <time>2016-11-18</time></p>
     <p>I love Central Park.</p>
  </div>

  <p><small>Copyright &copy; 2017 Share Your Travels</small></p>
</body>
```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Lists

- Ordered lists

  `<ol><li>item</li></ol>`

  – type attribute: 1, A, a, I, i

  – start attribute

  – reversed attribute

- Unordered lists

  `<ul><li>item</li></ul>`

  – `style="list-style-type:square"`

- Description lists:

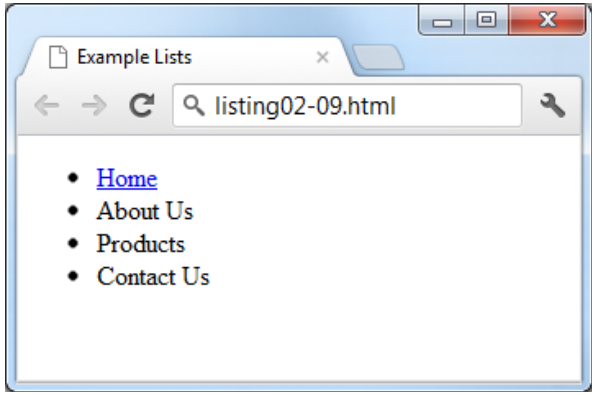
  `<dl><dt>Term</dt><dd>Description</dd></dl>`

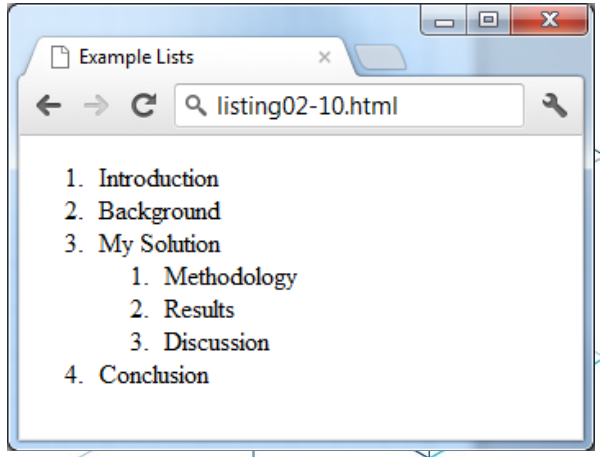
- Can be nested.

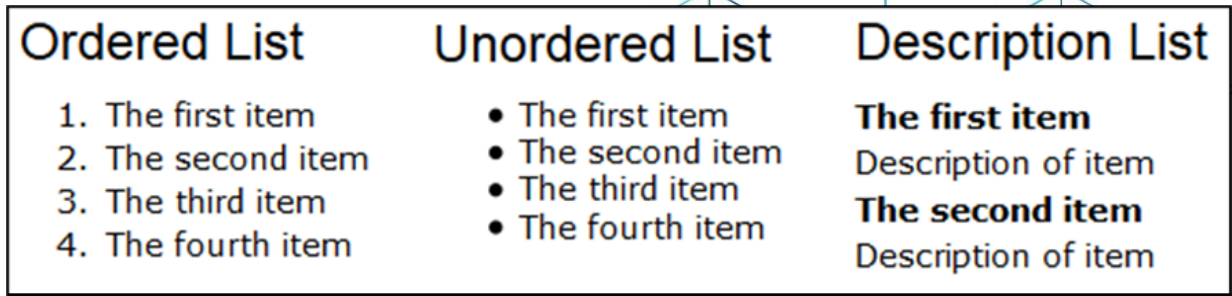
Notice that the list item element can contain other HTML elements

```
<ul>
   <li><a href="index.html">Home</a></li>
   <li>About Us</li>
   <li>Products</li>
   <li>Contact Us</li>
</ul>
```

```
<ol>
   <li>Introduction</li>
   <li>Background</li>
   <li>My Solution</li>
   <li>
      <ol>
         <li>Methodology</li>
         <li>Results</li>
         <li>Discussion</li>
      </ol>
   </li>
   <li>Conclusion</li>
</ol>
```







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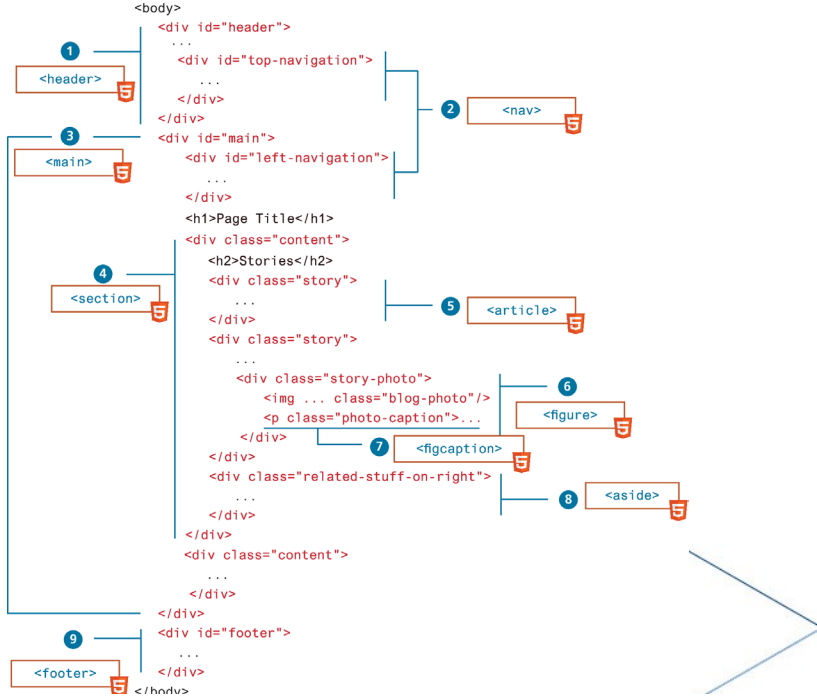
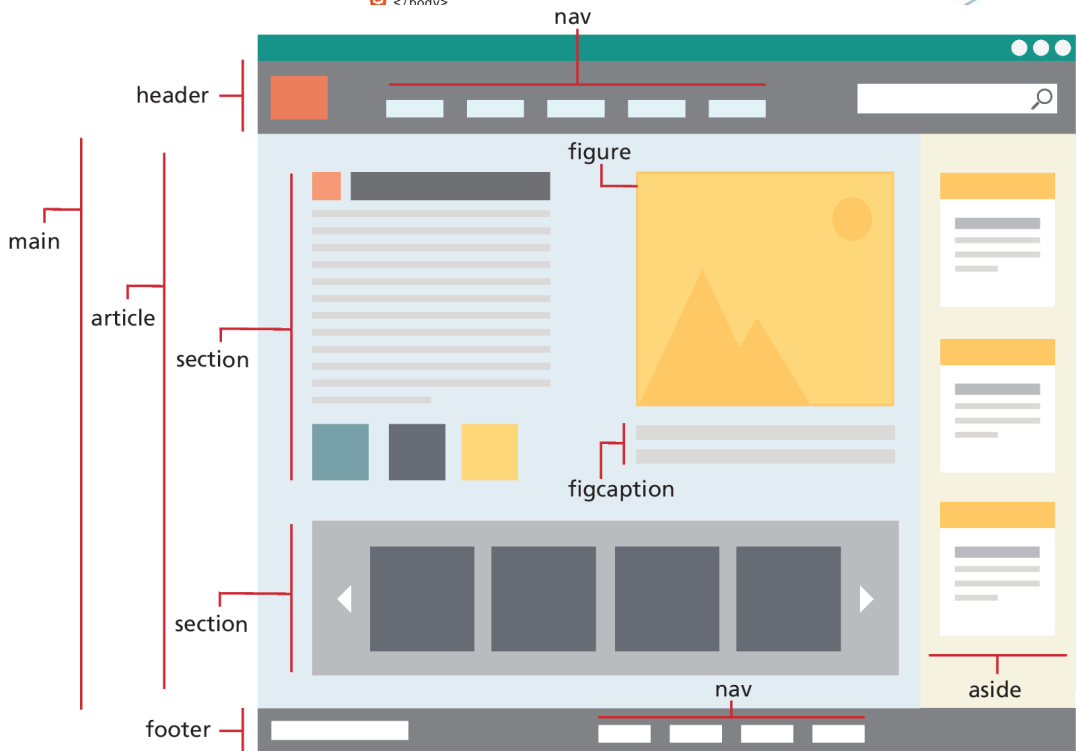
HTML5 Semantic Structure Elements

- Semantic elements are elements with a meaning.
  - Non-semantic elements like , and tell nothing about its content.
  - HTML code like to indicate navigation, header, and footer.

    `<div id="nav"> <div class="header"> <div id="footer">`
  - Semantic elements like `<form>`, `<table>`, and `<article>` clearly define their content and type of interaction.

- Semantic Elements in HTML
  - <article> - Defines independent, self-contained content
  - <aside> - Defines content aside from the page content
  - <details> - Defines additional details that the user can view or hide
  - <figcaption> - Defines a caption for a <figure> element
  - <figure> - Specifies self-contained content, like illustrations, diagrams, photos, code listings, etc.
  - <footer> - Defines a footer for a document or section
  - <header> - Specifies a header for a document or section
  - <main> - Specifies the main content of a document
  - <mark> - Defines marked/highlighted text
  - <nav> - Defines navigation links
  - <section> - Defines a section in a document
  - <summary> - Defines a visible heading for a <details> element
  - <time> - Defines a date/time





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https://www.w3schools.com/html/html5_semantic_elements.asp

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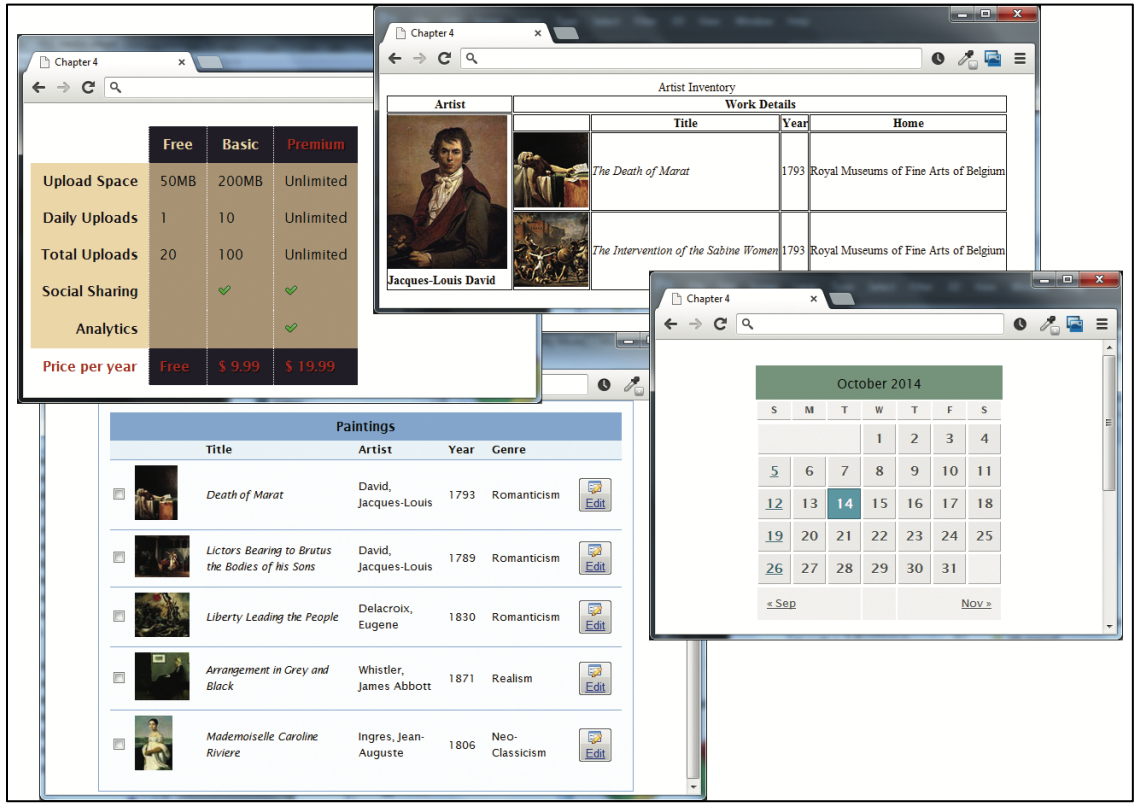
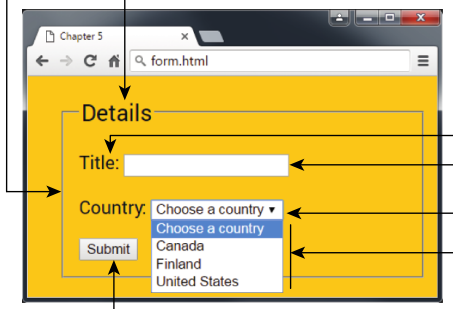
Chapter 5 - HTML Tables and Forms






```
<form method="post" action="process.php">
 <fieldset>
  <legend>Details</legend>
  <p>
   <label>Title: </label>
   <input type="text" name="title" />
  </p>
  <p>
   <label>Country: </label>
   <select name="where">
    <option>Choose a country</option>
    <option>Canada</option>
    <option>Finland</option>
    <option>United States</option>
   </select>
  </p>
  <input type="submit" />
 </fieldset>
</form>
```

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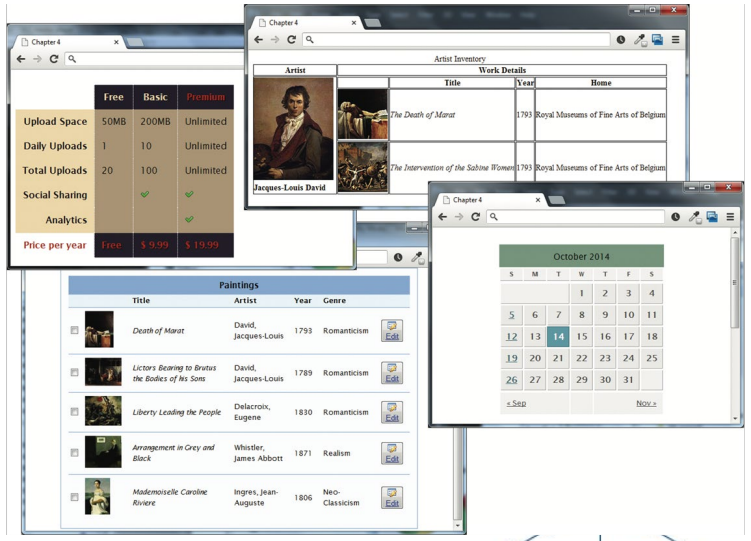
Tables



- Used on web pages to organize or structure tabular data.
- Composed of rows and columns
- HTML tables were used to lay out web pages
  - One row for the header, one row for the content, one row for the footer, etc.
- Defined with the `<table>` tag.
  - Divided into table rows with the `<tr>` tag.
  - Table rows are divided into table data with the `<td>` tag.
    - Table data `<td>` are the data containers of the table.
    - They can contain all sorts of HTML elements like text, images, lists, other tables, etc.

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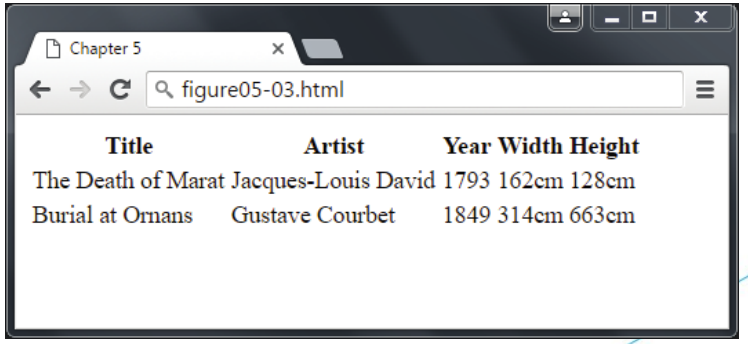
Basic table structure

<table>

<tr>	Title <th>	Artist <th>	Year <th>	Width <th>	Height <th>
<tr>	The Death of Marat <td>	Jacques-Louis David <td>	1793 <td>	162cm <td>	128cm <td>
<tr>	Burial at Ornans <td>	Gustave Courbet <td>	1849 <td>	314cm <td>	663cm <td>

```
<table>
   <tr>
      <th>Title</th>
      <th>Artist</th>
      <th>Year</th>
      <th>Width</th>
      <th>Height</th>
   </tr>
   <tr>
      <td>The Death of Marat</td>
      <td>Jacques-Louis David</td>
      <td>1793</td>
      <td>162cm</td>
      <td>128cm</td>
   </tr>
   <tr>
      <td>Burial at Ornans</td>
      <td>Gustave Courbet</td>
      <td>1849</td>
      <td>314cm</td>
      <td>663cm</td>
   </tr>
</table>
```



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Tables - Spanning columns and rows

- A table row can also be divided into table headings with the <th> tag.

Name	Birthday
James	11/08
Karen	4/17
Sparky	11/28

- colspan Attribute

```
<td colspan="2">Birthday List</td>
```

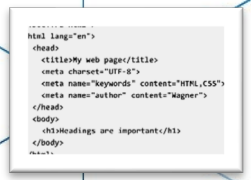
Birthday List	
James	11/08
Karen	4/17

- rowspan Attribute

```
<td rowspan="2">This spans two rows</td>
```

This spans two rows	Row 1 Column 2
	Row 2 Column 2

- Table Row Groups
  - <thead> table head rows
  - <tbody > table body rows
  - <tfoot> table footer rows



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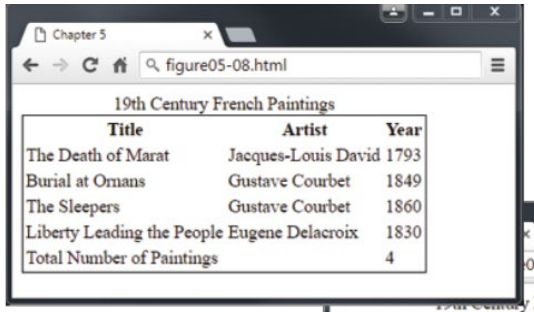
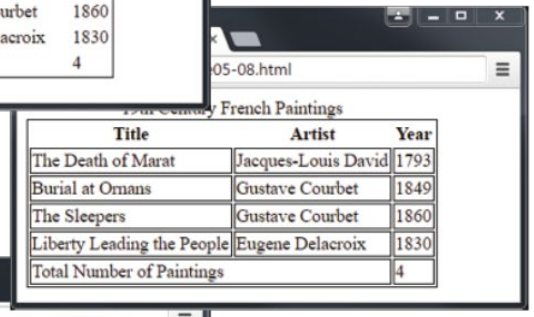
Tables - Style

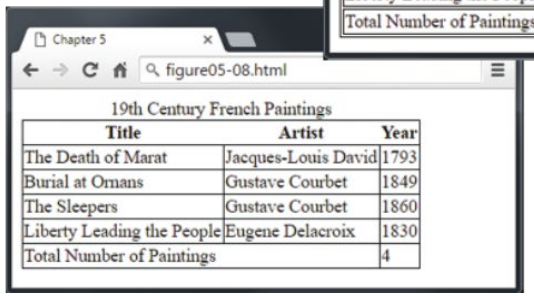
- As Chapter 5 is after Chapter 3 - CSS



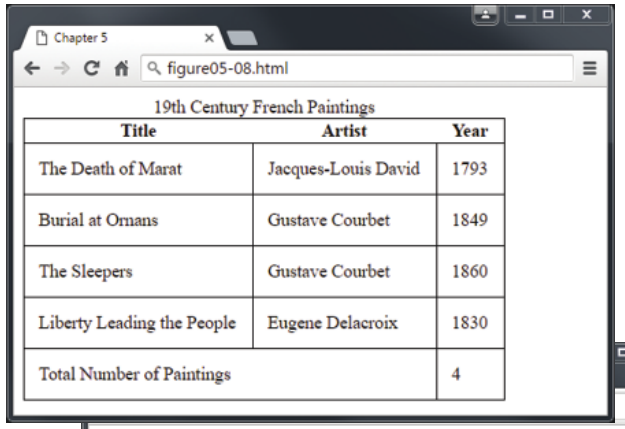

```
table {
   border: solid 1pt black;
}
```



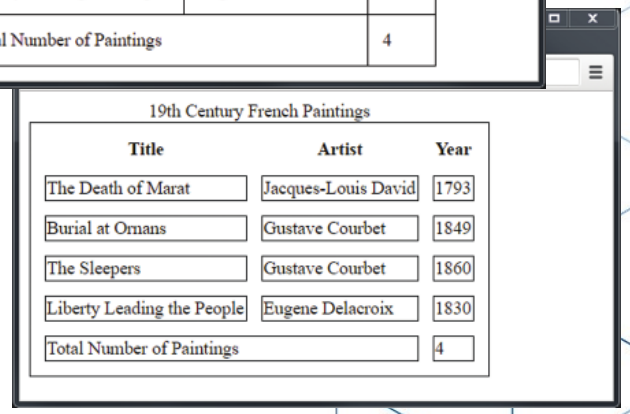

```
table {
   border: solid 1pt black;
}
td {
   border: solid 1pt black;
}
```




```
table {
   border: solid 1pt black;
   border-collapse: collapse;
}
td {
   border: solid 1pt black;
}
```




```
table {
   border: solid 1pt black;
   border-collapse: collapse;
}
td {
   border: solid 1pt black;
   padding: 10pt;
}
```




```
table {
   border: solid 1pt black;
   border-spacing: 10pt;
}
td {
   border: solid 1pt black;
}
```

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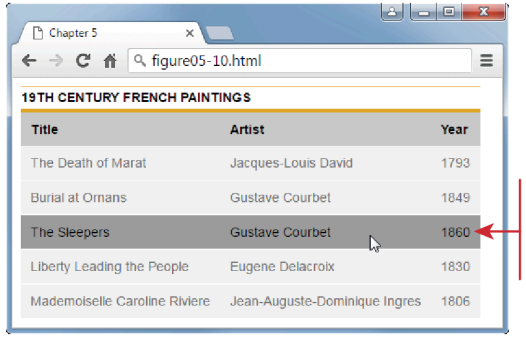
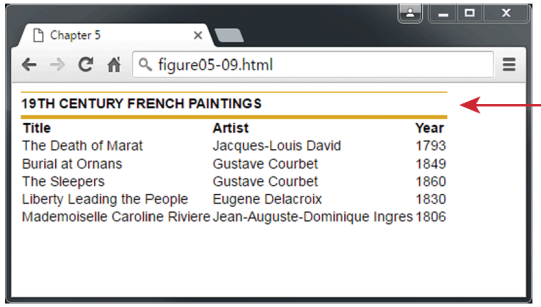
Tables - Boxes and Zebras

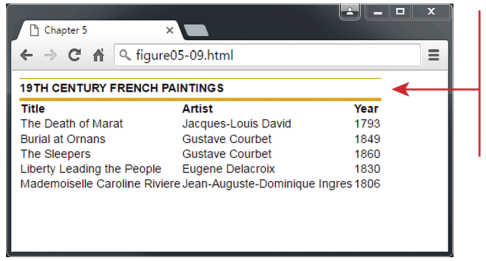



```
tbody tr:hover {
   background-color: #9e9e9e;
   color: black;
}
```

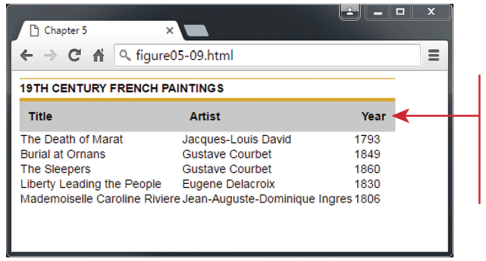
```
tbody tr:nth-child(even) {
   background-color: lightgray;
}
```




```
caption {
   font-weight: bold;
   padding: 0.25em 0 0.25em 0;
   text-align: left;
   text-transform: uppercase;
   border-top: 1px solid #DCA806;
}
table {
   font-size: 0.8em;
   font-family: Arial, sans-serif;
   border-collapse: collapse;
   border-top: 4px solid #DCA806;
   border-bottom: 1px solid white;
   text-align: left;
}
```




```
caption {
   font-weight: bold;
   padding: 0.25em 0 0.25em 0;
   text-align: left;
   text-transform: uppercase;
   border-top: 1px solid #DCA806;
}
table {
   font-size: 0.8em;
   font-family: Arial, sans-serif;
   border-collapse: collapse;
   border-top: 4px solid #DCA806;
   border-bottom: 1px solid white;
   text-align: left;
}
```




```
thead tr {
   background-color: #CACACA;
}
th {
   padding: 0.75em;
}
```

```
tbody tr {
   background-color: #F1F1F1;
   border-bottom: 1px solid white;
   color: #6E6E6E;
}
tbody td {
   padding: 0.75em;
}
```

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Comments or Questions?

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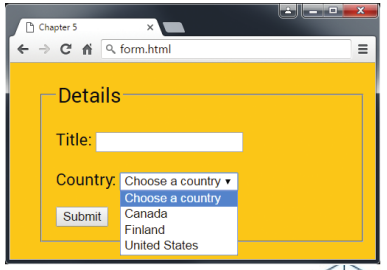
Forms



- Forms provide the user with an alternative way to interact with a web server.
- Used to collect user input.
- Two Components
  1. The web page form
     - An HTML element that contains and organizes form controls such as text boxes, check boxes, and buttons that can accept information from website visitors.
  2. The server-side processing
     - Server-side processing works with the form data and sends e-mail, writes to a text file, updates a database, or performs some other type of processing on the server.

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Form structure

- Attributes

1 method

- HTTP method to send form-data
  - GET – default value, form data passed in URL
  - POST – more secure, form data transferred in HTTP header

2 action

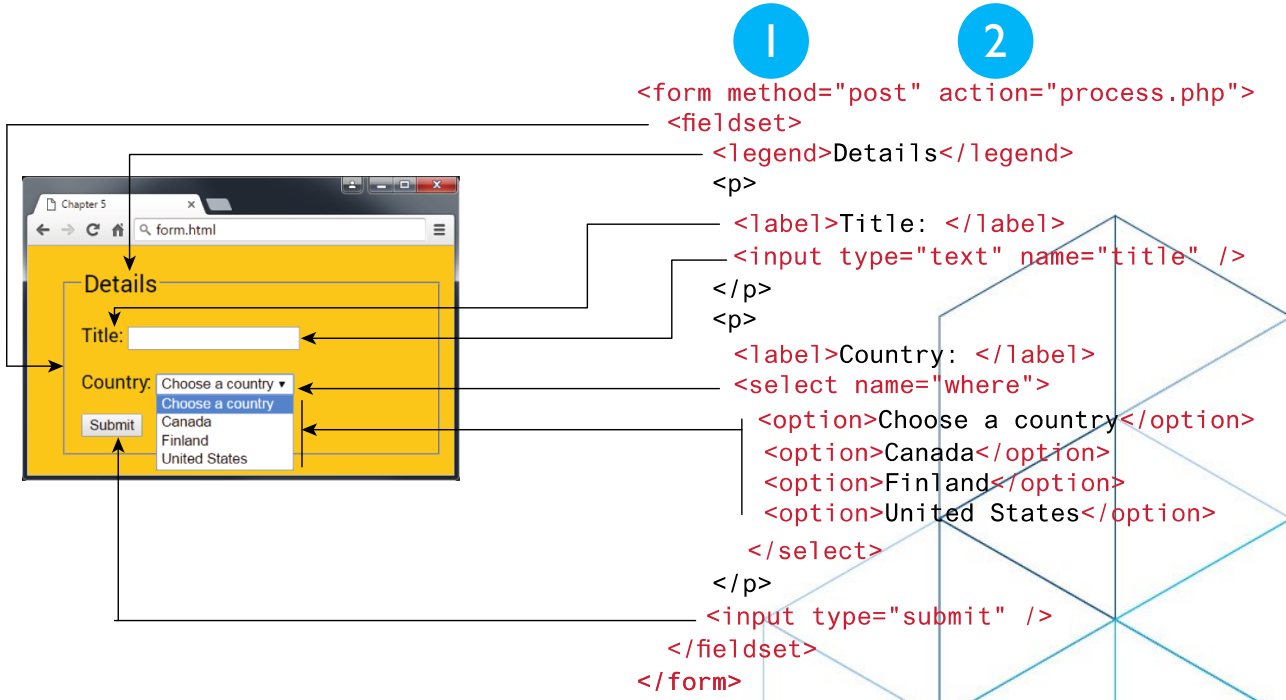
- Specifies the server-side program or script that will process your form data

– id

- Identifies the form

– name

- Specifies the name of a form



- A web page can contain multiple forms, but **forms cannot be nested**, i.e. no form within a form.

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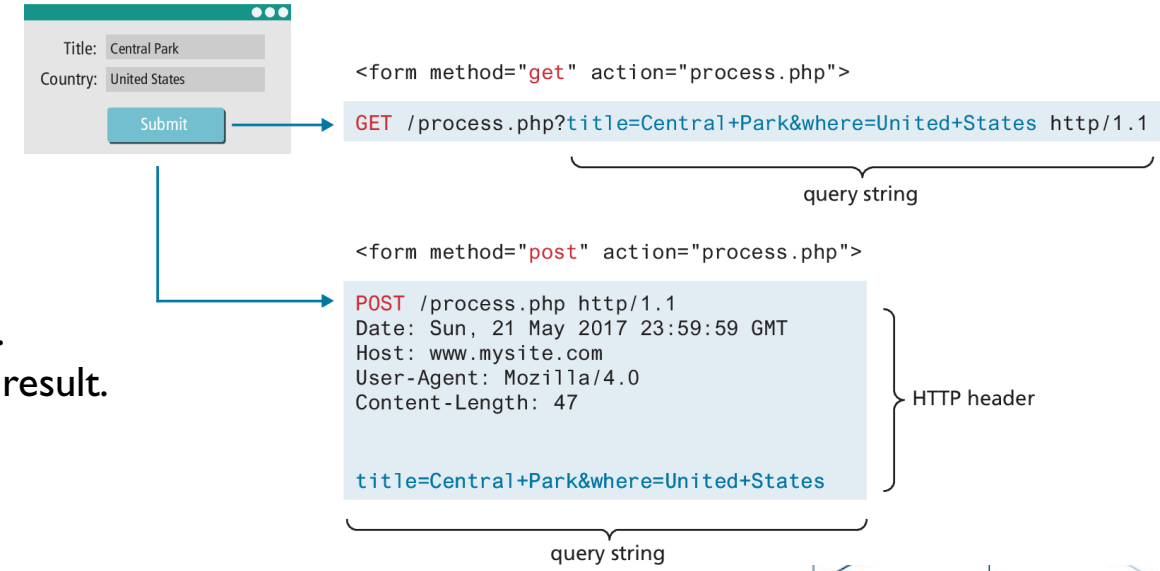
Forms – GET vs POST
Which of these should one use?

- GET
  - Default method when submitting form data is GET.
  - Appends form-data into the URL in name/value pairs.
  - The length of a URL is limited (about 3000 characters).
  - Never use GET to send sensitive data! (will be visible in the URL).
  - Useful for form submissions where a user want to bookmark the result.
  - GET is better for non-secure data, like query strings in Google.
- POST
  - Always use POST if the form data contains sensitive or personal information.
  - The POST method does not display the submitted form data in the page address field.
  - POST has no size limitations and can be used to send large amounts of data.
  - Form submissions with POST cannot be bookmarked.
  - You must encrypt data before transmitting for security.



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Form Control Elements
Text Input Controls

```
<input type="text" ... />
```

Text:

```
<textarea>
  enter some text
</textarea>
```

```
<textarea placeholder="enter some text">
</textarea>
```

TextArea: enter some text

TextArea: Enter some text

```
<input type="password" ... />
```

Password:

Password: ••••

```
<input type="search" placeholder="enter search text" ... />
```

Search: enter search text

Search: HTML

```
<input type="email" ... />
```

Email: fcsdfs

Please enter a valid email address

In Opera

Email: sdasdas

Please enter an email address.

In Chrome

```
<input type="url" ... />
```

url: sdsdfdf

Please enter a URL.

```
<input type="tel" ... />
```

Tel:

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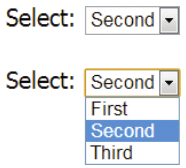
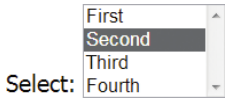
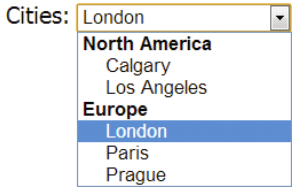
Form Control Elements
Choice Controls




```
<select name="choices">
  <option>First</option>
  <option selected>Second</option>
  <option>Third</option>
</select>
```




```
<select size="3" ... >
```




```
<select ... >
 <optgroup label="North America">
   <option>Calgary</option>
   <option>Los Angeles</option>
 </optgroup>
 <optgroup label="Europe">
   <option>London</option>
   <option>Paris</option>
   <option>Prague</option>
 </optgroup>
</select>
```

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Form Control Elements
Button Controls (radio & checkbox)

Continent:

- North America
- South America
- Asia

```
<input type="radio" name="where" value="1">North America<br/>
<input type="radio" name="where" value="2" checked>South America<br/>
<input type="radio" name="where" value="3">Asia
```

I accept the software license ☑

```
<label>I accept the software license</label>
<input type="checkbox" name="accept" >
```

Where would you like to visit?

- ☑ Canada
- ☐ France
- ☑ Germany

```
<label>Where would you like to visit? </label><br/>
<input type="checkbox" name="visit" value="canada">Canada<br/>
<input type="checkbox" name="visit" value="france">France<br/>
<input type="checkbox" name="visit" value="germany">Germany
```

```
?accept=on&visit=canada&visit=germany
```

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Form Control Elements
Button Controls

```
<input type="submit"  />
```

```
<input type="reset"  />
```

```
<input type="button" value="Click Me" />
```

```
<input type="image" src="appointment.png" />
```

```
<button>
   <a href="email.html">
      <img src="images/email.png" alt=""/>
      Email
   </a>
</button>
```

```
<button type="submit"  >
   <img src="images/edit.png" alt=""/>
   Edit
</button>
```

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Form Control Elements
Pattern and datalist

```
<input type="text" ... placeholder="L#L #L#" pattern="[a-z][0-9][a-z] [0-9][a-z][0-9]"  />
```

Postal: L#L #L#

Postal: abcd

Please match the requested format.

Search City: P

Paris

Prague

```
<input type="text" name="city" list="cities"  />

<datalist id="cities">
   <option>Calcutta</option>
   <option>Calgary</option>
   <option>London</option>
   <option>Los Angeles</option>
   <option>Paris</option>
   <option>Prague</option>
</datalist>
```

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Form Control Elements
Specialized Controls

Upload a travel photo

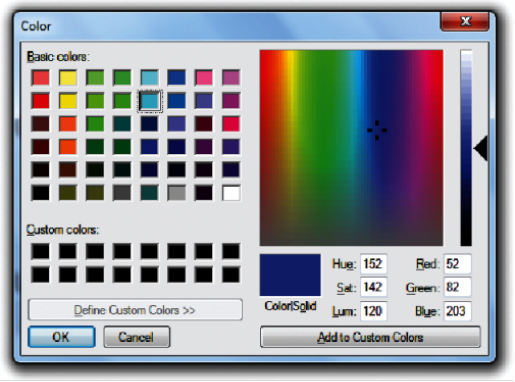
Choose File No file chosen

Upload a travel photo

Choose File IMG_0020.JPG

```
<form method="post" enctype="multipart/form-data" ... >
   ...
   <label>Upload a travel photo</label>
   <input type="file" name="photo" />
   ...
</form>
```

Background Color:

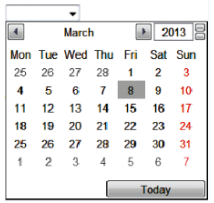



```
<label>Background Color: <br/>
<input type="color" name="back" />
```

Background Color:

Control as it appears in browser that doesn't support this input type

Date:




```
<label>Date: <br/>
<input type="date" ... />
```

Time:

02:02 AM

```
<input type="time" ... />
```

DateTime:

2013-03-08 05:46 UTC

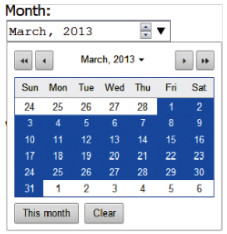
```
<input type="datetime" ... />
```

DateTime Local:

2013-03-13 12:02

```
<input type="datetime-local" ... />
```

Month:




```
<input type="month" ... />
```

Week:

```
<input type="week" ... />
```

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Validating User Input

- User input must never be trusted.
- It could be missing.
- It might be in the wrong format.
- It might even contain JavaScript or SQL as a means to causing some type of havoc.
- Thus, almost always user input must be tested for validity.

- Types of Input Validation
  - Required information
  - Correct data type
  - Correct format
  - Comparison
  - Range check.
  - Custom.

Validation can be performed at three different levels.

- With HTML5 - basic validation.
- JavaScript validation - improves the user experience.
- Server-side validation – required.

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Notifying the User (Figures)

Sample Form

Form Validation Examples

The following data input errors must be corrected:

The year must be a valid number between 500 and 2014

The painting height must be valid number larger than 0

Title	Starry Night	
Year	4534	The year must be a valid number between 500 and 2014
Medium	Oil on canvas	
Width	45	
Height	56d3	The painting height must be valid number larger than 0
Link	http://en.wikipedia.org/wiki/The_Starry_Nic	

Add

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Comments or Questions?

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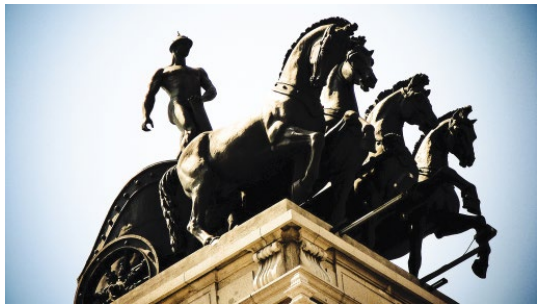
Chapter 6 - Web Media



Original photographic image

Output as pixels
(size exaggerated)

Output as halftones
(size exaggerated)

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Web Media

- Modern web sites and applications often need to present graphics of varying sophistication.
- Web media refers to any type of multimedia content that can be embedded into a web page, including images, audio, video, and animations.
- HTML (Hypertext Markup Language) provides a number of tags and attributes that can be used to embed and manipulate web media within a web page.
  - Static images can easily be displayed using the <img> element
  - You can also use the background-image property to set the background of HTML elements.
  - You can also construct graphics on-the-fly or manipulate images after the fact.
  - You might want also to add video and audio players to your HTML documents and controlling the playback.

- Before using any media in your web sites, be aware that most images are copyrighted. Thus, do not display an image on your webpage unless:
  - You own the image.
  - You have permission from owner, I mean a written permission
  - You are sure that the image in the public domain.

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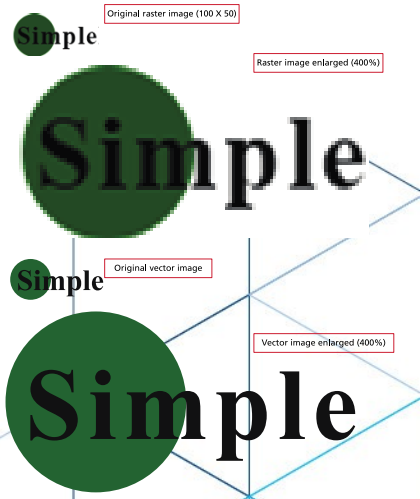
Digital Representation of Images

- Raster images
  - Image composed of a grid of pixels. Referred also to as bitmaps.
  - Fixed resolution (determines the level of detail and clarity of the image)
  - JPEG, PNG, GIF, and ICO, which are commonly used on web pages.
    - Photos, illustrations, and other images that require a high level of detail and color variation
- Vector images
  - Image composed of objects such as lines, circles, Bezier curves, and polygons.
  - Resolution independent (i.e. no loss of quality when resized.).
  - SVG
    - Logos, icons, and other simple images that need to be resized or used at different resolutions.



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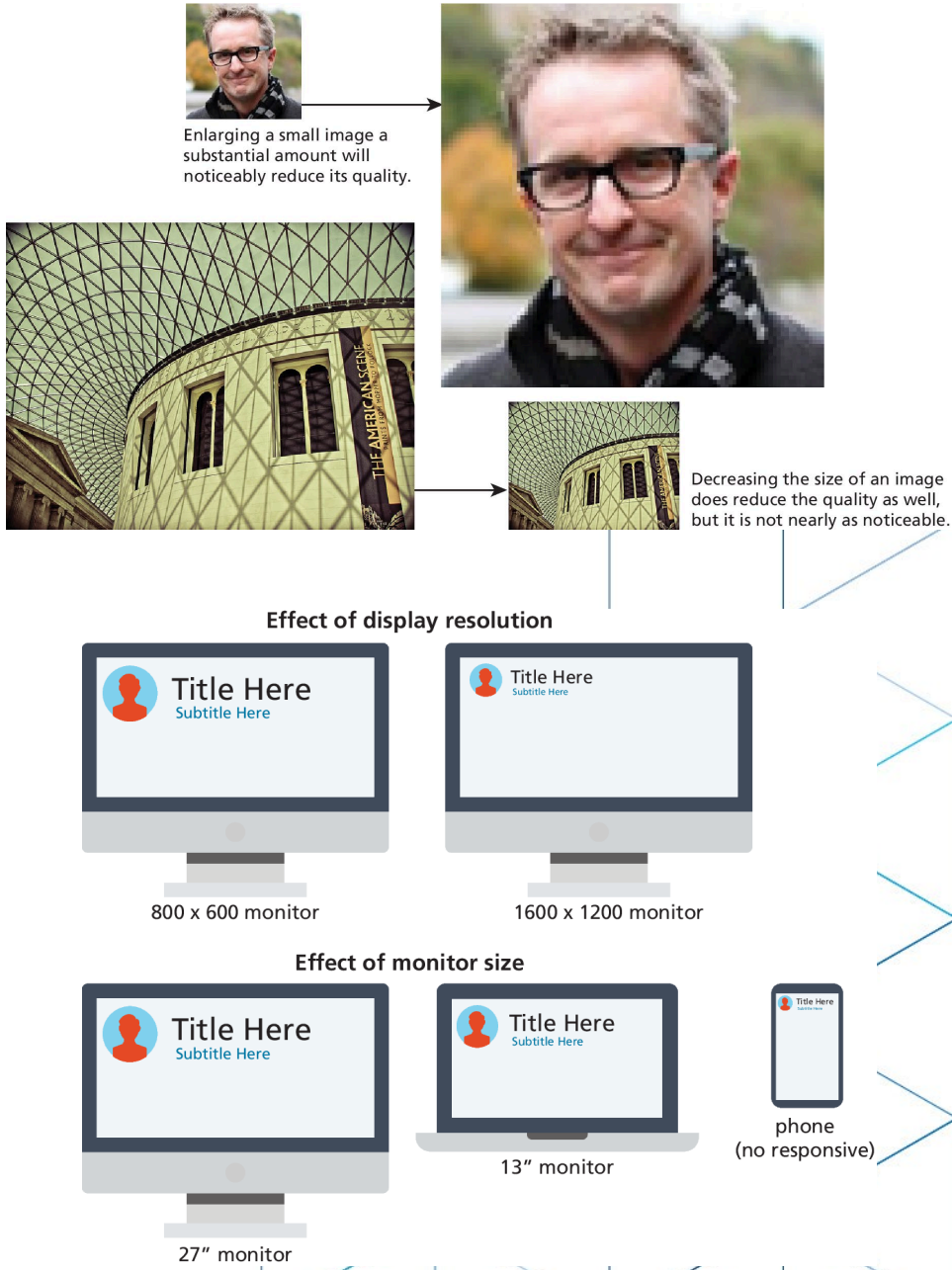
File Formats

- JPEG (Joint Photographic Experts Group)
  - 24-bit, true-color file format that is ideal for photographic images.
  - It uses a compression scheme to reduce the file size (and hence download time) of the image
  - JPEG is quite poor for vector art or diagrams or any image with a large area of a single color
  - At the highest levels of compression, you will begin to see blotches and noise (also referred to as artifacts)
- GIF (Graphic Interchange Format) – the first
  - 8-bit or less format, meaning that it can contain no more than 256 colors.
  - GIF uses a lossless compression system, which means that no pixel information is lost.
- PNG (Portable Network Graphics)
  - 8-bit indexed color as well as full 24-bit true color.
  - Lossless compression
  - From 1 to 8 bits of transparency.
- SVG (Scalable Vector Graphics) is a vector format
  - Like all vector formats, SVG graphics do not lose quality when enlarged or reduced.
  - The files are actually XML files
- Other image formats;: TIF, WebP and ICO

Image Size

- Image size refers to how many pixels a raster image contains
- The size of an image onscreen is determined by
  - Pixel dimensions of the image,
  - Monitor size, and the
  - Computer's display resolution
    - The display resolution refers to how many pixels a device can display.
    - A web page will appear smaller on a high-resolution system (and larger on a low-resolution system)
- Whenever you resize, the program (the browser, Photoshop, etc) doing the resizing must interpolate.



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Web Graphics – Image Element

- `<img>`
  - Configures graphics on a web page

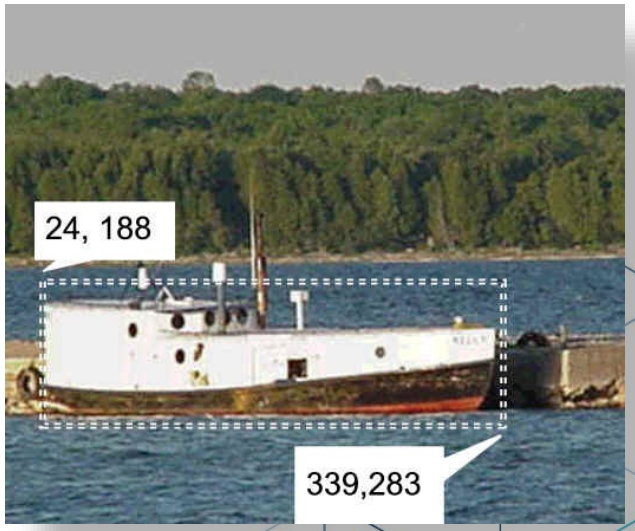
```
<img src="url" alt="some_text">
```

  - The src attribute defines the url (web address) of the image
  - The alt attribute specifies a text description of an image, if it cannot be displayed.
    - The alt attribute is required. Spiders and robot use it.
    - Screen readers can read the alt attribute.
  - Width and height or style (prefered) attributes to specify the width and height of an image.

```
<img src="html5.gif" alt="HTML5 Icon" style="width:128px;height:128px">
<img src="html5.gif" alt="HTML5 Icon" width="128" height="128">
```

Web Graphics – Image maps

- `<map>`
  - For an image, you can create an image map, with clickable areas.
  - `<map></map>` element defines an image-map
  - `<area>` element defines a clickable area inside an image-map
    - href Attibute – Specifies the hyperlink target for the area
    - shape Attribute – Specifies the shape of the area (rect, circle, poly)
    - coords Attribute – Specifies the coordinates of the area




```
<img src="fishingboat.jpg" usemap="#boat" alt="Door County” width="416" height="350">
<map name="boat" id="boat">
     <area href="http://www.doorcountyvacations.com" shape="rect" coords="24, 188, 339, 283"     alt="Door County Fishing">
</map>
```

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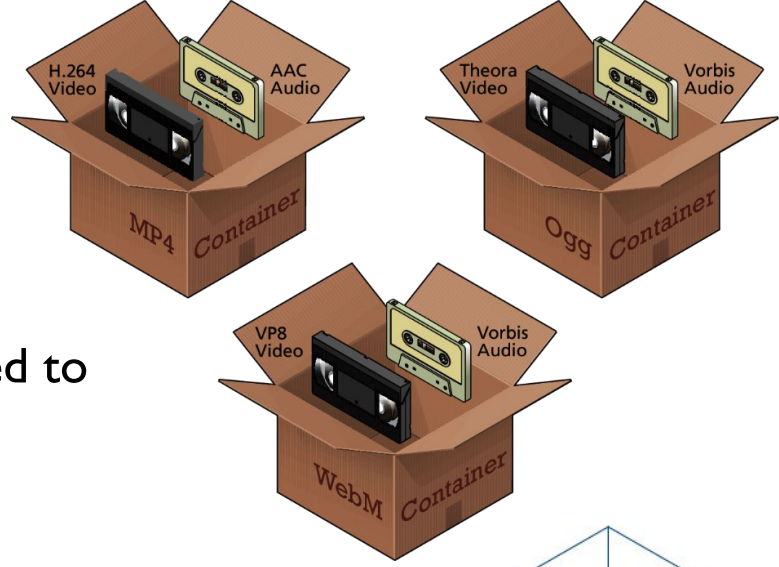
Web media - Audio and Video



- Media is encoded using compression/decompression software, usually referred to as a codec (for compression/decompression).
- When a video is played, the video player:
  - Examines and extracts information from the container format used by the file.
  - Decodes the video stream within the container using a video codec.
  - Decodes the audio stream within the container using an audio codec
  - Synchronizes audio stream with the video stream.

- MP4 container with H.264 Video and AAC Audio.
  - This combination is generally referred to as MPEG-4 and has the .mp4 or .m4v file extension.
  - H.264 is a proprietary codec and the browser manufacturer must pay a licensing fee to decode it
- WebM container with VP8 video and Vorbis audio.
  - Files using this combination usually have the .webm file extension.
  - This combination was created by Google to be open-source and royalty free.
- Ogg container with Theora video and Vorbis audio.
  - Like the previous combination, this one is open-source and royalty free.
  - Files using this combination usually have the .ogv file extension.

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Web media - Audio and Video

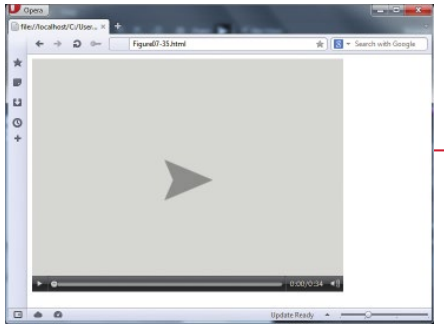
- About 20 years ago, we could not use HTML to embed video and audio on web pages
  - Proprietary (or plugin-based) technologies like Flash were used for handling such video and sound.
    - But plugins did not work well with HTML/CSS and had security and and accessibility issues.

- Later on, the HTML5 specification included the <video> and <audio> elements, and JavaScript APIs for controlling them.

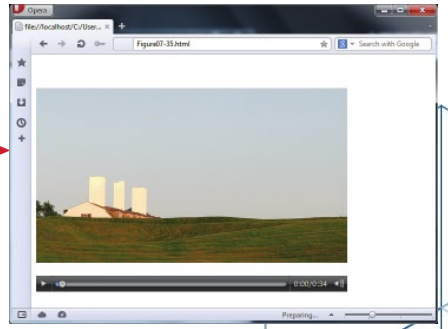
- It is also common to embed audio and video using third-party services like YouTube or SoundCloud. These services provide an easy way to embed audio and video files without having to host them on your own website.

Using the <video> element

- The <video> tag is used to embed video files into a web page.
  - The src attribute specifies the URL of the video file.
  - The <video> tag also includes attributes for controlling playback, such as controls, autoplay, and loop.
  - Additionally, the width and height attributes can be used to control the size of the video display on the web page.

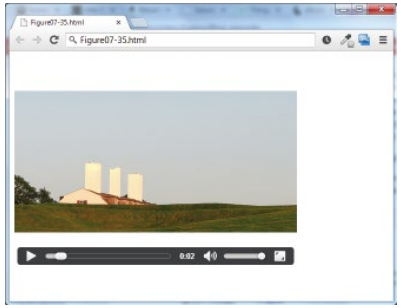


Showing poster image before playback

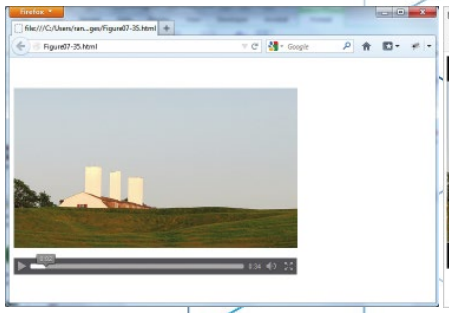


After playback begins (Opera)

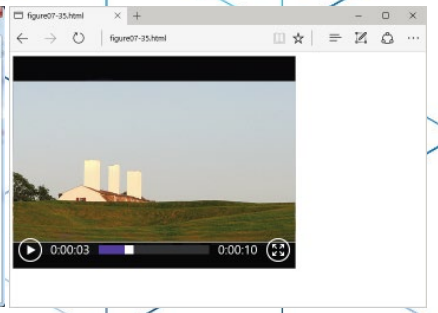
```
<video id="video" poster="preview.png" controls width="480" height="360">
   <source src="sample.mp4" type='video/mp4; codecs="avc1.42E01E, mp4a.40.2"'>
   <source src="sample.webm" type='video/webm; codecs="vp8, vorbis"'>
   <source src="sample.ogv" type='video/ogg; codecs="theora, vorbis"'>

   <!-- Use Flash if above video formats not supported -->
   <object width="480" height="360" type="application/x-shockwaveflash" data="sample.swf">
       <param name="movie" value="sample.swf">
       <param name="flashvars" value="controlbar=over&amp;image=preview.png&amp;file=sample.mp4">
       <img src="preview.jpg" width="480" height="360" title="video not supported">
   </object>
</video>
```



Chrome



Firefox



Edge

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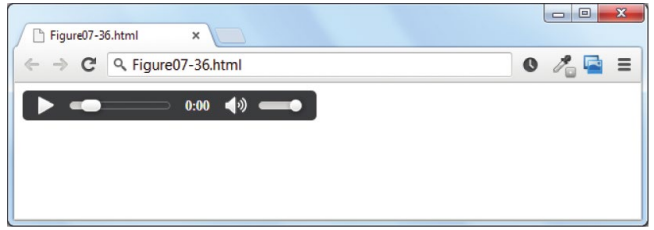
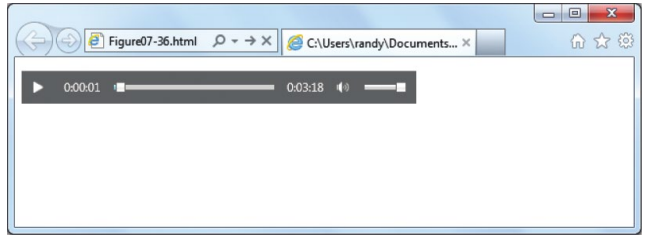
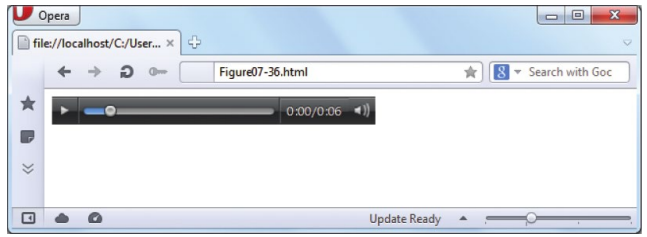
Using the <audio> element

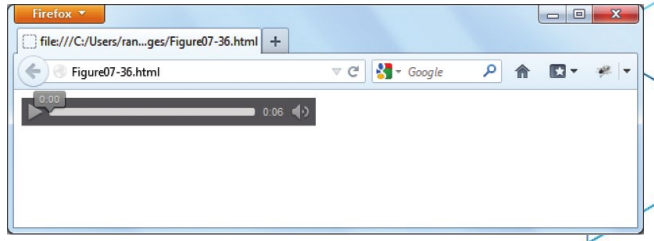
- The <audio> tag is used to embed audio files into a web page.
  - The src attribute specifies the URL of the audio file, and the controls attribute can be used to provide standard audio controls such as play, pause, and volume.
  - Other attributes, such as autoplay and loop, can be used to control the behavior of the audio file.




```
<audio id="example" controls preload="auto">
  <source src="example.ogg" type="audio/ogg">
  <source src="example.wav" type="audio/webm">
  <source src="example.webm" type="audio/webm">
  <p>Browser doesn't support the audio control</p>
</audio>
```







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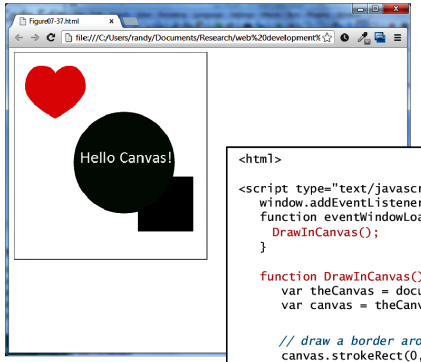
The <canvas> elememt

- Is a two-dimension drawing surface that uses JavaScript coding to perform the actual drawing.
- By default, a canvas is a rectangular area on an HTML page with no border and no content.
- Used to create animations, games, and other forms of interactivity.
- Contains methods for drawing paths, boxes, circles, text, and adding images.
- There are several books devoted just to the <canvas> element.




```
<html>

<script type="text/javascript">
   window.addEventListener('load', eventWindowLoaded, false);
   function eventWindowLoaded() {
     DrawInCanvas();
   }

   function DrawInCanvas() {
      var theCanvas = document.getElementById('myCanvas');
      var canvas = theCanvas.getContext('2d');

      // draw a border around the canvas
      canvas.strokeRect(0,0,350,375);
      // draw another rectangles
      canvas.fillRect(225,225,100,100);

      //draw circle
      canvas.beginPath();              // shapes begin as a path

      canvas.arc(200, 200, 90, (Math.PI/180)*0, (Math.PI/180)*360, false);
      canvas.strokeStyle = "black";    // draw a black outline
      canvas.lineWidth = 3;            // outline is three pixels wide
      canvas.fillStyle = "#003300";    // fill circle with green
      canvas.stroke();                 // draw circle outline
      canvas.fill();                   // fill in circle

      canvas.closePath();              // shapes end by closing the path

      // draw heart
      canvas.beginPath();
      canvas.fillStyle = "red";
      canvas.bezierCurveTo(75,37,70,25,50,25);
      canvas.bezierCurveTo(20,25,20,62.5,20,62.5);
      canvas.bezierCurveTo(20,80,40,102,75,120);
      canvas.bezierCurveTo(110,102,130,80,130,62.5);
      canvas.bezierCurveTo(130,62.5,130,25,100,25);
      canvas.bezierCurveTo(85,25,75,37,75,40);
      canvas.fill();
      canvas.closePath();

      // add some text
      canvas.fillStyle = "white";                    // white text color
      canvas.font = "30px Calibri";
      canvas.fillText ("Hello Canvas!", 120, 200);  // write text
   }
</script>

<body>
   <canvas width="700" height="500" id="myCanvas">
     Your browser does not support HTML5 canvas.
   </canvas>
</body>
</html>
```

Notice that paths must be explicitly begun and then ended.

https://arcade.ly/games/asteroids/

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Color models

- We need a way to describe or represent colors.
- A color may also include an alpha-channel transparency value, indicating how the color should composite with its background.

```
.rectangleA {
   background-color: rgb(0, 255, 0);
}
```

red blue green

```
.rectangleB {
   background-color: green;
   opacity: 0.75;
}
```

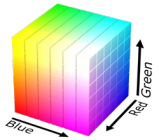
```
.rectangleC {
   background-color: rgba(0, 255, 0, 0.50);
}
```

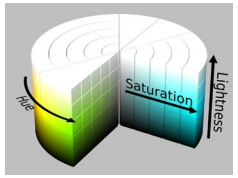
opacity

- A `<color>` can be defined in any of the following ways
  - Using a keyword (such as blue or transparent) for predefined color names
  - Using the RGB cubic-coordinate system (via the #hexadecimal or the rgb() and rgba() functional notations)
  - Using the HSL cylindrical-coordinate system (via the hsl() and hsla() functional notations)

```
.rectangleD {
   background-color: hsla(120, 100%, 50%, 0.25);
}
```

hue luminosity saturation opacity





https://developer.mozilla.org/en-US/docs/Web/CSS/color_value
https://en.wikipedia.org/wiki/RGB_color_model
https://en.wikipedia.org/wiki/HSL_and_HSV

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Comments or Questions?

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