Internet Programming I

Chapter 2
Web Development Using HTML

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Objectives

After success completion of the chapter you will be able to:

➢ Identify the core web development technologies

➢ Understand the HTML document structure and contents models.

➢ Identify and use HTML elements and attributes
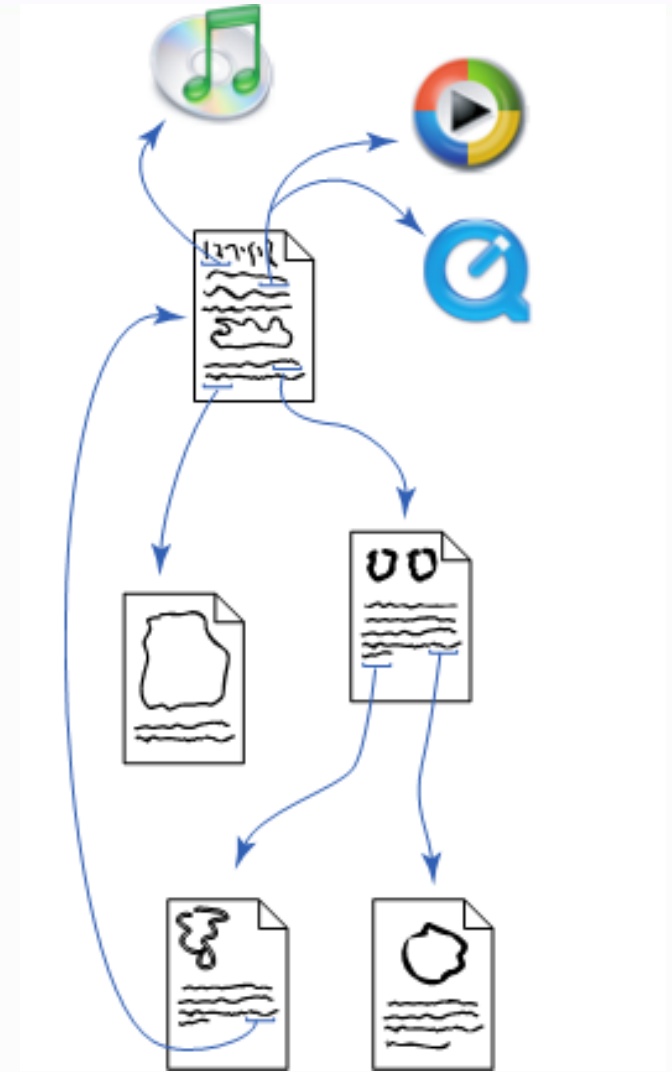
➢ Build website using HTML

Lesson 3
HTML Elements
(HTML Links and Images)

Outline

- Link elements

  - Hyperlinks

  - The Document Base

  - External resource links

- Working with images
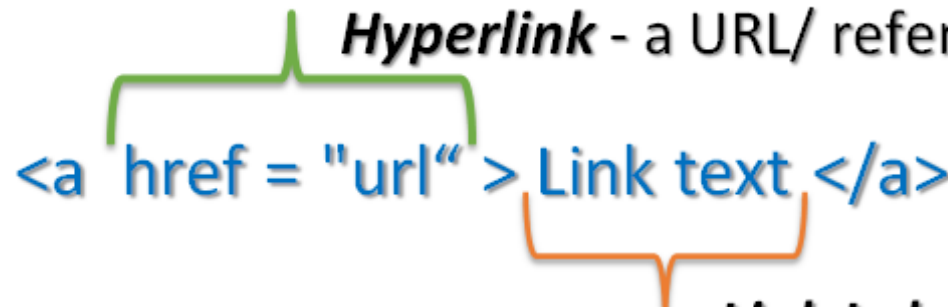
- Figure and figurecaption elements

HTML Links

- Links are the *lifeblood* of the web.

- Without links, every web page would just exist on its own, *completely disconnected* from all the others and web *has no life* at all.

- HTML document is different from other markup languages by its *hypertext features*.

- Links are a conceptual construct that represent a connection between two web resources, one of which is the current Document.

- There are two kinds of links in HTML:
    - ➢ *Hyperlinks*
    - ➢ *External resource links*

1. Hyperlinks

- A hyperlink (also called link) is **clickable** a *word, term, phrase, or image* that enable web user to navigate within the web document.

- A hyperlink has two ends called anchors and a direction.

- The link starts at the *"source" anchor* and points to the *"destination" anchor*,

- The *destination" anchor* can be any Web resource (e.g., an image, a video clip, a sound bite, a program, an HTML document, an element within an HTML document, etc.)

- In HTML, primarily the **hyperlinks** are specified using the anchor (<a>) element

- The anchor (<a>) element has two main parts:

  - *Destination (hyperlink) ----> specified with "href" attribute*

  - *Label (hypertext) -----> visible element that the user points to and clicks*

Cont'd

- **Anchor element syntax :**

Hyperlink - a URL/ reference the hypertext directs the user to

`<a href = "url" > Link text </a>`

Link Label - a *hypertext (text with references) or hypermedia (more diverse reference) to some other text/multimedia.*

- The **anchor element** can be used in two ways to create wide range of links:
  - ➢ To create a *link to another web resources* (web pages, files, email address, etc.) by using the **href** attribute
  - ➢ To create a *bookmark inside a document*, by using the **name** attribute

Cont'd

Where to link?

- Links to external sites or web pages

- Link to individual resource on other sites (file, multimedia etc.)

- Links to particular locations on another web pages.

- Links to other web pages or resources within the same site.

- Links to other places within the current page (book mark).

- Links to start the user's email program or telephone number

- Links to execute a server side or client side script function.

Attribute	Value	Description
href	*URL*	➢ Specifies the URL of the page the link goes to. ➢ This can be specified using either absolute or relative reference. ➢ Not restricted to HTTP-based URLs, can be used any URL scheme supported by browsers like email address and telephone number
target	*_blank* *_parent* *_self* *_top*	Specifies where to open the linked document ➢ _self (default) - the current browsing context. ➢ _blank - Opens in new tab (usually) or new window (if configured) ➢ _parent: Opens in the parent window. ➢ _top: Opens in the full browser window
download	*filename*	➢ Specifies that the target will be downloaded when a user clicks on the hyperlink instead of navigating to it. ➢ Without a value, the browser will suggest a filename/extension, generated from various sources:

Cont'd

Example

```html
<!DOCTYPE html>
<html lang="en">
<head>
    <title>Setting the HTML Link's Target</title>
</head>
<body>
    <p><a href="https://html.spec.whatwg.org/"
        target="_top">HTML Living Standard</a></p>

  <p>You can reach me at:</p>
  <ul>
    <li><a href="https://www.google.com/"
        target="_blank"> Website</a></li>
    <li><a href="mailto:m.bluth@example.com">Email</a></li>
    <li><a href="tel:+123456789">Phone</a></li>
  </ul>

</body>
</html>
```

Opening link in the full browser window

Links to external sites

Opening link in a new browser tab

Cont'd

Attribute	Value	Description
hreflang	*language_code*	Specifies the language of the linked document

rel	*alternate, author, help, license, next, pingback, prefetch, preload, preconnect, prerender prev, search, stylesheet*	➢ Specify the relationship between the current and the linked document.
		➢ It is used only when href attribute present
		➢ E.g. **alternate:** It defines an alternate version of the document
		  - **author**: It defines the author of the document
		  - **license**: It defines copyright information for the document

ping	*Space-separated list of URLs*	➢ When the link is followed, the browser will send POST requests with the body PING to the URLs. ➢ Typically for tracking.
referrer policy	*no-referrer, unsafe-url, origin, strict-origin, etc.*	Specifies which referrer to use when fetching the resource

Web resource referencing

(a) Absolute path reference

- References a complete address (full path) of a resource on the web or in your computer system.

- Always start at the same place, which is the root directory and follows the directory tree branches up-to the desired directory/file.

- Mostly used to used to refer to resources (websites) that are on a domain other than your home domain.

- Absolute reference can be formed using either of the following :

  - ➢ URL → *protocol + domain name + directory + file*

    e.g. https://developer.mozilla.org/en-US/docs/Web/HTML

  - ➢ Local path: Drive + {folder(s)} + {file}

    e.g. D:\mycourses\programming\outline.html

(b) Relative path reference

- It reference the desired resource (file) relative the current working directory.

- Like absolute path, it doesn't provide a full absolute path.

- Used for internal links i.e. to create links to file that are part of same website.

- Use a *pathname* to specify where the resource (file) located

  - "/" - used to separate directory names from each other and from file names.

  - ".." - used to reference a directory "above" the current one in the directory tree.

- **Example:**

  - ```
    <a href="images/logo.gif">
    ```

  - ```
    <a href="../images/about.html">
    ```
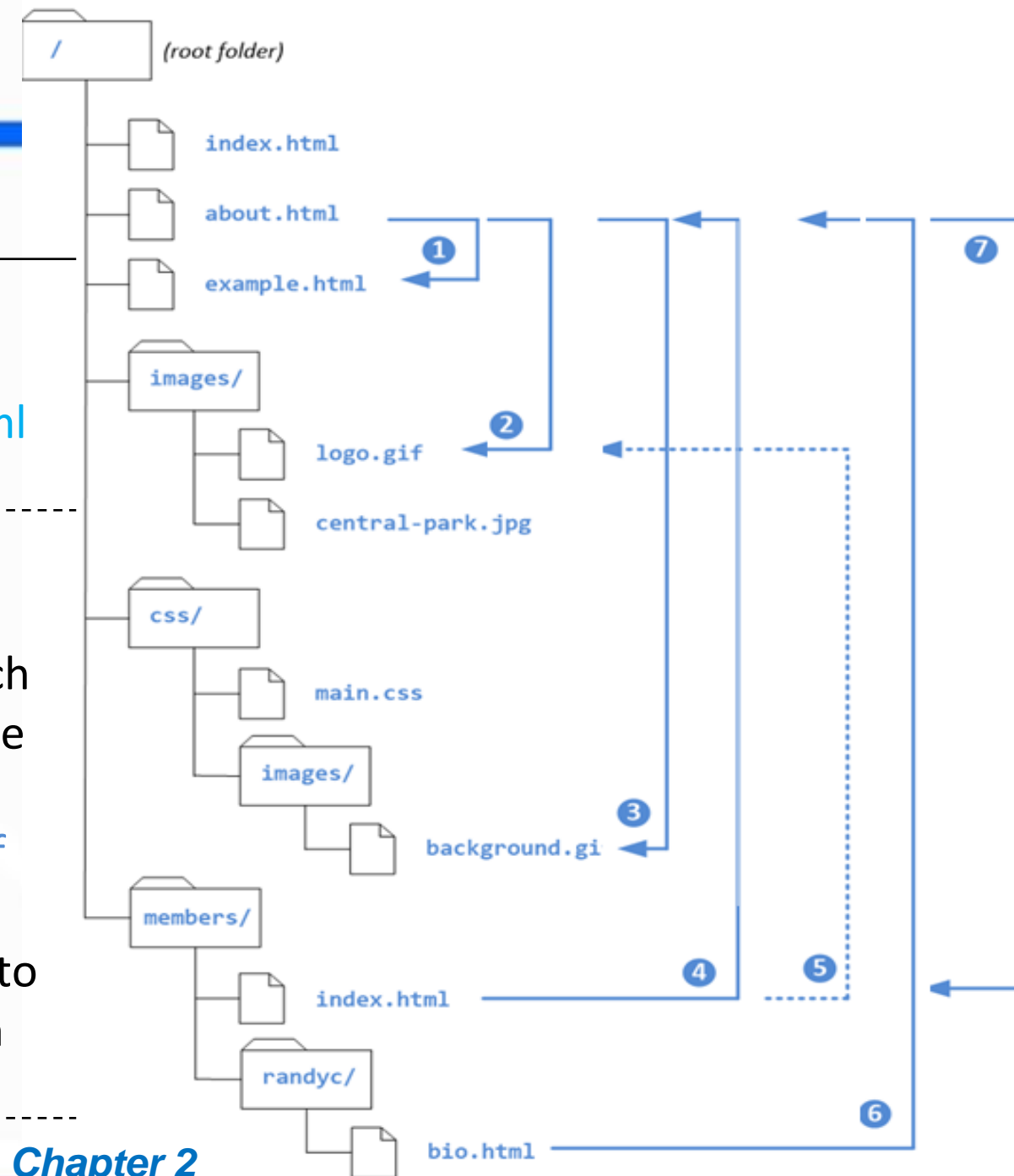
Cont'd

Relative path types

Same Directory ①

➢ To link file within the same folder use the file name
➢ E.g. *<a href="example.html">,* a link to example.html
   from about.html

Child or Grandchild Directory ② ③

➢ To link to a file within a subdirectories *below* the
   current one, construct the full path by including each
   subdirectory name (separated by slashes) before the
   file name.
➢ E.g. (1) *<a href="images/logo.gif">,* a link to logo.gif
   (in the child directory) from about.html, use:
➢ E.g. (2) *<a href="css/images/background.gif">,* link to
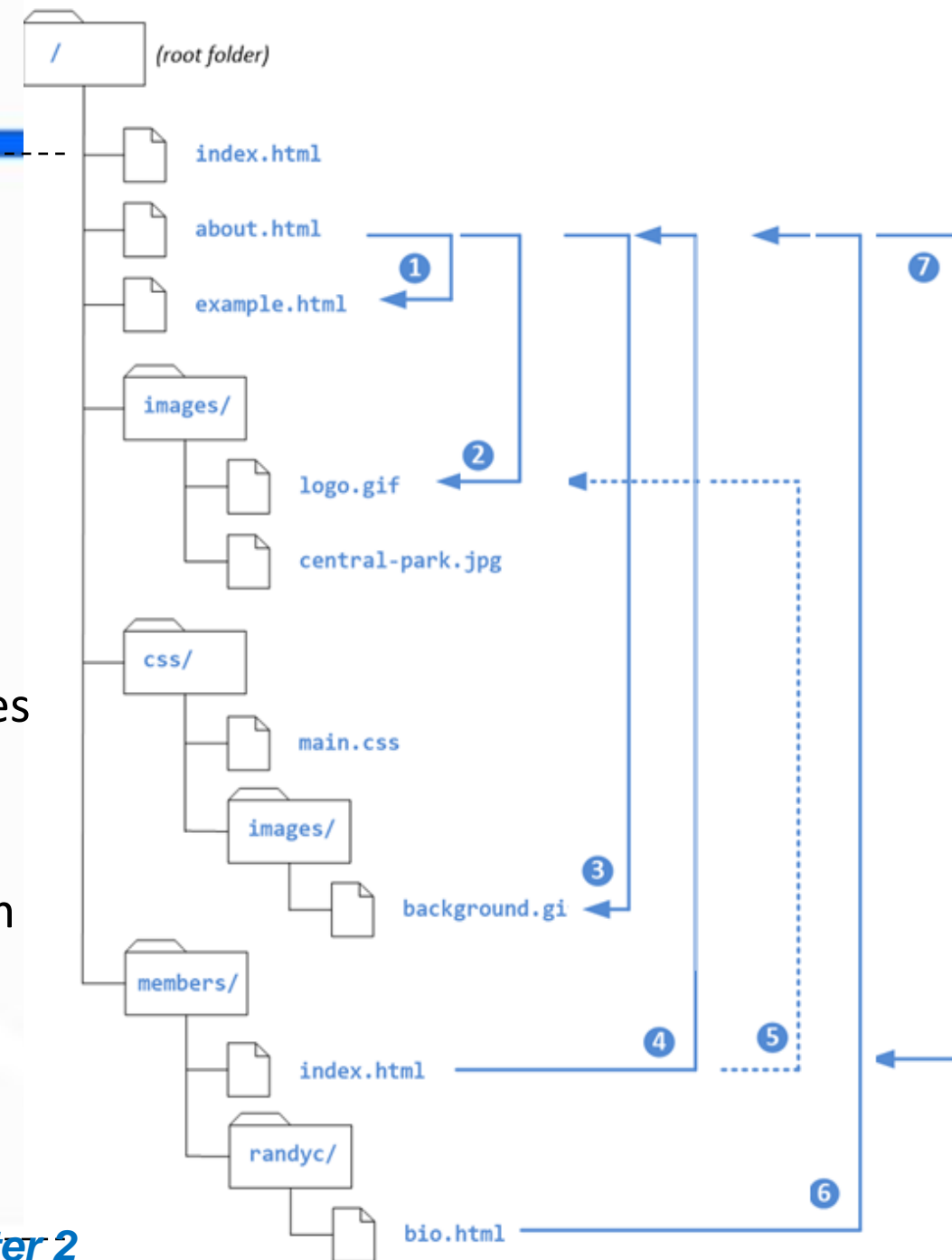   background.gif (locate in grandchild directory) from
   about.html,

Cont'd

➢ Use "**../**" to reference a folder *above* the current one.

➢ If trying to reference a file *several levels above*, simply concatenate together multiple "**../**".

➢ To reference a file in sibling directory just **combine** the *parent/ancestor directory* reference with child/grandchild directory reference.

➢ An alternative approach for ancestor and sibling references is to use the so-called **root reference** approach (start with "/" and specify child/grandchild directory)

➢ e.g. (1) *<a href="../about.html">,* a link to about.html from index.html in members

➢ e.g. (2) a link to about.html from bio.html

   <a href="../../about.html"> -----> *ancestor directory*

   <a href="/about.html"> -----> *root refernce*

Tips: reference web resources

- Only the link destinations are handled differently for absolute URLs, relative URLs, and named anchors.

- Any web page can be referenced by an absolute URL as long as it is a correct address. But its good practice and recommendable;

    - *To link to someone else's website, use an absolute URL.*

    - To link to webpages on your site, use a relative URL.

    - To link page to its self, put the "#" for the href attribute.

- To link to the default file for a directory, specify the path, but omit the file name.

- To link to a site's default (home) page, omit the path.

- Use all lowercase letters for URLs, unless page or directory name has uppercase letters.

- Always keep the links operational by testing them periodically and update any that have died. Because a dead links frustrate visitors and detract from your Web pages.

Creating named anchor

- The named anchor point to a *specific location (create a bookmark)* on the web page (within HTML document).

- Creating bookmarks is a two-step process:

  - ➤ Step 1: adding id attribute to the element where you want to link.

    Syntax: * Section label *

  - ➤ Step 2: create a link using the id attribute value preceded by the hash sign (#) as the value of the href attribute of the <a> tag.

    Syntax: * Link label *

Cont'd

- **Example:** *book mark within the same document*

```html
<body>
    <p><a href="#vision">Jump to Vision</a></p>
    <p><a href="#mission">Jump to Mission</a></p>
    <p><a href="#values">Jump to Values </a></p>

    <h2 id="vision">Vision</h2>
    <p> AASTU aspires to become an internationally recogn
       respected Hub of Science and Technology with strong
       commitment and significant continental impact by 20

    <h2 id="mission">Mission</h2>
    <ul>
        <li>Delivering world-class education and training <
        <li>Conducting problem-solving applied research  </
        <li>Serving as center for knowledge & technological
        <li>Building technical & managerial capabilities of
        <li>Building  a national hub of science & technolo
    </ul>
    <h2 id="values">Values</h2>
     <ul>
         <li> Professionalism </li>      <li> Excellence </
         <li> Commitment</li>         <li> Diversity </li>
         <li> Openness </li>        <li> Collaboration </l
    </ul>
</body>
```

Jump to Vision

Jump to Mission

Jump to Values

Vision

AASTU aspires to become an internationally recognized and respected Hub of Science and Technology with strong national commitment and significant continental impact by 2030

Cont'd

Creating anchor to a section on different web page

> A bookmark can be created to a section on different web page by appending the named anchor id attribute value to an absolute or relative link as long as the destination being referenced contains that named anchor

> **Syntax:**

* Link label *

> **Example:**

* Reviews for product X*

* top *

Hyperlinks appearance

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

  - An unvisited link is underlined and blue

  - A visited link is underlined and purple

  - An active link is underlined and red

- However, you can overwrite this using CSS

Contact Us

Google

2. The Document Base

- When you link HTML documents related to the same website, it is not required to give a complete URL for every link.

- The <base> HTML element specifies the base URL to use for all relative URLs in a document.

- The <base> tag must have either an *href or a target attribute*, or both

- There can be only one <base> element in a document.

- If multiple <base> elements are used, only the first href and first target are obeyed.

- It must appear before any element that refers to an external resource.

```html
<!DOCTYPE html>
<html>
<head>
  <base href="https://www.w3schools.com/" target="_blank">
</head>
<body>
<h1>The base element</h1>
<p><img src="images/stickman.gif">
 - Notice that we have only specified
   a relative address for the image.</p>
<p><a href="tags/tag_base.asp">HTML base tag</a>
  - Notice that the link opens in a new window,
    even if it has no target="_blank" attribute.</p>
</body>
</html>
```

3. External resource links

- These are links to resources that are to be used to augment the current document.

- It automatically processed by the user agent.

- The *link element* allows authors to link their document to external resources, most commonly link to *stylesheets, scripts, or to add a favicon* to your website

- It share most of the <a> element attributes.

- Additional attributes include media, sizes, title, disabled, prefetch, integrity etc.

- Example:

```
<link rel="apple-touch-icon-precomposed" sizes="114x114"
      href="apple-icon-114.png" type="image/png">
```

```
<link href="print.css" rel="stylesheet" media="print">
<link href="mobile.css" rel="stylesheet" media="screen and (max-width: 600px)">
```

Working with Images

4. HTML Images

- A picture speaks a thousand words.

- Without images, web content would be quite boring.

- Images enhance visual appearance of the web pages by making them more interesting and colorful.

- The <img> tag is used to embeds images in the HTML documents.

- It is an empty element and contains attributes only.

- it is an *inline element* and the content categories are *embedded content ---> phrasing content ---> Flow content.*

- The <img> tag has two required attributes:

  ➢ *src - Specifies the path to the image*

  ➢ *alt - Specifies an alternate text for the image*

Cont'd

- **Syntax:**

`<img src="dog.jpg" alt="My Dog">`

Image **filename**   Image **description**

➢   (1) – **img** is an image tags which embed a given /picture/image

➢   (2) - **src** attribute is short for **source**

it tells the tag which image to load by specifying the image path and name.

➢   (3) – **alt** attribute is short hand for *alternative text*

Cont'd

- **Example:**

```html
<!DOCTYPE html>
<html>

    <head>
        <title>HTML  Tag</title>
    </head>

    <body>
        <img src = "https://www.tutorialspoint.com/images/html.gif"
             alt = "HTML Tutorial" height = "250" width = "340" />
    </body>

</html>
```

Absolute vs. Relative URLs
➢ **Absolute links** are URLs that contain the protocol, the domain name and the full path to the resource.
➢ **Relative links** are URLs that are 'relative' to the file that you are using them in, or linking from.
➢ Relative path can be specified down the in the directory tree starting from the root directory.

Cont'd

- **The alt attributes:**

  - Defines an alternative text description of the image

  - A browser might not display images for several reason, such as:

    - ✓ *The image is invalid or an unsupported type or not available*
    - ✓ *The image cannot to be loaded because of slow connection*
    - ✓ *Non-visual browsers (such as those used by people with visual impairments)*
    - ✓ *The user chooses not to display images (saving bandwidth, privacy reasons)*

  - In these cases, the browser may replace the image with the text in the element's alt attribute.

  - Omitting **alt** indicates that the image is a key part of the content and *no textual equivalent is available*.

  - The alt attribute is considered good for SEO prospective.

  - Therefore, provide a **useful value** for alt attributes whenever possible

Cont'd

- The **empty alt** attributes:

  ➢ Indicates that this image is not a key part of the content

  ➢ Non-visual browsers may omit it from rendering the image.

  ➢ Visual browsers will also hide the broken image icon and the image failed to display.

- Authoring meaningful alternate descriptions

  ➢ An alt attribute's value should clearly and concisely describe the image's content.

  ➢ It should not describe the presence of the image itself or the file name of the image.

HTML image example with alt attribute
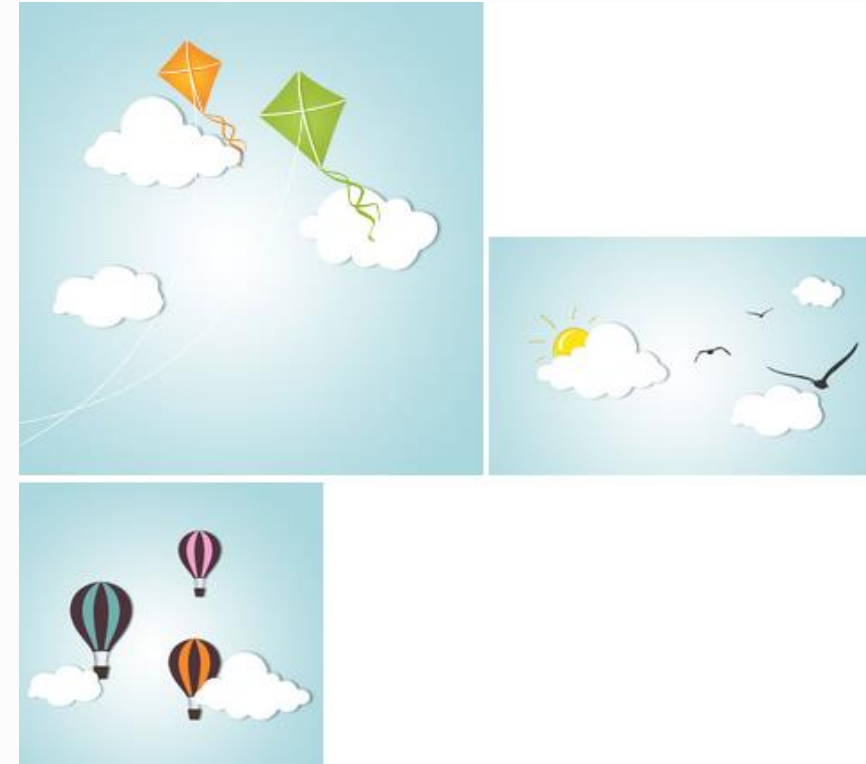

HTML image example with alt attribute

animal image

Cont'd

Attribute	Value	Description
crossorigin	• anonymous • use-credentials	It allows images from third-party sites that allow cross-origin access to be reused with canvas.
height	pixels or %	Specifies the height of the image.
width	pixels or %	Sets the width of an image
ismap	URL	Defines the image as a server-side image map.
usemap	#mapname	Defines the image as a client-side image map and used along with <map> and <area> tags.
decoding	sync / async / auto	Provides an image decoding hint to the browser
loading	eager / lazy	Indicates how the browser should load the image
srcset	URL	One or more strings separated by commas, indicating possible image sources for the user agent to use
sizes	Media condition, Source size value	One or more strings separated by commas, indicating a set of source sizes

Cont'd

Example:

```html
<!DOCTYPE html>
<html lang="en">
<head>
    <title>Setting Image Width and Height Using style Attribute in
HTML</title>
</head>
<body>
    <img src="https://www.tutorialrepublic.com/examples/images/kites.jpg"
        alt="Flying Kites" width ="300" height ="300">
    <img src="https://www.tutorialrepublic.com/examples/images/sky.jpg"
        alt="Cloudy Sky" width="250" height = "150">
    <img src="https://www.tutorialrepublic.com/examples/images/balloons.jpg"
        alt="Hot Air Balloons" width="200" height = "200">
</body>
</html>
```

Output:

- **Note**:
  - ➢ It's a good practice to specify both the width and height attributes for an image, so that browser can allocate enough space for the image before loading it.
  - ➢ Otherwise, image loading may cause distortion or flicker in your website layout.

Cont'd

Responsive Images the Simple Way (using sizes, src, srcset attributes)

1. At this screen size,

2. I will be displayed at roughly this size.

```
<img alt="Ferrari"
     src="ferrari.png"
     sizes="(min-width: 1023px) 780px,
            (min-width: 675px)  620px,
            100vw"
     srcset="ferrari-320.png   320w,
             ferrari-640.png   640w,
             ferrari-960.png   960w,
             ferrari-1280.png 1280w,
             ferrari-1920.png 1920w,
             ferrari-2560.png 2560w">
```

3. You can choose from any of these images...

4. ...which are this wide

5. So please pick the best image for right now.

- The image file formats that are most commonly used on the web are:
  - ➢ APNG (Animated Portable Network Graphics)
    - — Good choice for lossless animation sequences (GIF is less performant)
  - ➢ AVIF (AV1 Image File Format)
    - — Good choice for both images and animated images due to high performance
  - ➢ GIF (Graphics Interchange Format)
    - — Good choice for *simple* images and animations.
  - ➢ JPEG (Joint Photographic Expert Group image)
    - — Good choice for lossy compression of still images (currently the most popular)
  - ➢ PNG (Portable Network Graphics)
    - — Good choice for lossy compression of still images (slightly better quality than JPEG)
  - ➢ SVG (Scalable Vector Graphics) - vector image format
    - —Use for images that must be drawn accurately at different sizes.
  - ➢ WebP (Web Picture format)
    - — Excellent choice for both images and animated images

5. The <figure> and <figurecaption> Elements

The <figure> element

> Specifies *self-contained content*, like *illustrations, diagrams, photos, code listings, poem script etc.*

> Its content is related to the main flow, but its position is independent of the main flow, and if removed it should not affect the flow of the document.

The <figurecaption> element

> Represents a *caption or legend* describing the contents of <figure> element which is its parent.

> Can be placed as the *first or last child* of the <figure> element.

▪ *Both <figre> tag and <figurecaption> tag don't have any specific attribute*

Cont'd

Example 1:

```html
<!DOCTYPE html>
<html lang="en">
<head>
<title>Example of HTML figure Tag</title>
</head>
<body>
  <figure>
      <img src="https://interactive-examples.mdn.mozilla.net
             /media/cc0-images/elephant-660-480.jpg"
      alt="Elephant at sunset">
      <figcaption>An elephant at sunset</figcaption>
  </figure>
</body>
</html>
```


An elephant at sunset

Note

> The *figure, its caption, and its contents* are referenced as **a single unit**.

Cont'd

Example 2:

```html
<!DOCTYPE html>
<html lang="en">
<head>
<title>Example of HTML figure Tag</title>
</head>
<body>
  <figure>
    <p style="white-space:pre">
  Bid me discourse, I will enchant thine ear,
    Or like a fairy trip upon the green,
  Or, like a nymph, with long dishevell'd hair,
    Dance on the sands, and yet no footing seen:
  Love is a spirit all compact of fire,
    Not gross to sink, but light, and will aspire.</p>
    <figcaption><cite>Venus and Adonis</cite>,
      by William Shakespeare</figcaption>
  </figure>

</body>
</html>
```

Output

Bid me discourse, I will enchant thine ear,
  Or like a fairy trip upon the green,
Or, like a nymph, with long dishevell'd hair,
  Dance on the sands, and yet no footing seen:
Love is a spirit all compact of fire,
  Not gross to sink, but light, and will aspire.

Venus and Adonis, by William Shakespeare

Note:
➢ *Only one <figcaption> element can be nested within a <figure> tag although the <figure> element itself may contain multiple other elements like <img> or <code>*

Summary

- The <img> element is used to add images to a web page.

- The <img> tag has two primary attributes (need to be specified always) supported in standard HTML:

  - ➢ src - The location and filename of the image to include.

  - ➢ alt - A text string to substitute for the image in text-only browsers.

- The images should saved at the size it will be used on the web page and in the appropriate format.

Exercise

1. Discuss the image load errors.

2. Even though the <img> tag is an empty element (has no content) it includes an image into your web page. Does it not contradict with the definition of empty element?

3. What the rules for creating images for a website?

4. Discuss the common image format supported by most browsers.

5. Explain the difference between image dimension and image resolution.

6. Compare and contrast the anchor (<a>) element and the <link> element.

7. Demonstrate how to create a bookmark link to another web document which found either on the same domain or different domain.

Practical Exercise

[old coding style] Write HTML code to place image within paragraph and produce the below output

Reading Resources/Materials

Chapter 4,5:

- ✔ Jon Duckett; HTML and CSS Design and Build Websites, 2011 John Wiley & Sons, Inc., Indianapolis, Indiana

Chapter 2 (2.6 & 2.7):

- ✔ Paul Deitel, Harvey Deitel, Abbey Deitel (2014). Internet & World Wide Web How To Program (5th Edition), Pearson Education.

Chapter 5, 6:

- ✔ Musciano, C., Kennedy, B. (2006). HTML and XHTML: The Definitive Guide, 6th edition. O'Reilly Media, Inc.

Thank You
For Your Attention!!

Any Questions

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