CS7026

HTML: Images, Tables, Validation

Adding images

- The most commonly used graphics file formats found on the Web are JPEG, GIF and PNG.
  - JPEG (Joint Photographic Experts Group) format is primarily used for realistic, photographic-quality images.
  - GIF (Graphics Interface Format) used for almost everything else
  - PNG (Portable Network Graphics) format. Designed to replace GIF.
- All of these are simply the names of different ways of compressing bitmaps/raster images.
- Newer formats include WebP and AVIF. These perform better but browser support may be an issue.
- There is also the option of using vector images with SVG.

An aside – Bitmap Vs. Vector

Bitmap (raster) images

- The most common image files are bitmap or raster images, which are composed of little blocks of color called pixels organized in rows and columns.
- Each pixel is assigned a color code and a location, and when mapped together, they form a picture. When you zoom in on a bitmap image, you can see the individual pixels, so there's a loss of quality.
- This is often referred to as resolution-dependent since the quality or sharpness of the image depends on the resolution.
  Common bitmap image file types include: .jpeg (or .jpg), .png, .gif, .bmp

Vector graphics

Based on geometrical formulas (mathematical equations) based on paths, instead of pixels, to represent images.

- Because of that, you can edit it, resizing and changing colors without any loss of resolution. This makes them ideal for illustrations, icons, and logos.
- Vector images are resolution-independent because image quality isn't affected by size or resolution settings.
- Made up entirely of shapes like rectangles, circles, curves and lines, vectors are drawn and then filled or stroked with color to create a vector image. Individual components of the image (or paths) can also be modified, edited, and resized without impacting the image quality.
- Commonly used for illustrations, line art, logos and icons, vector images are computer-generated and cannot be practically used for photographs or photo-realistic images, which are better suited for bitmaps.
- Common vector image file types include: .svg, .eps, .pdf.

Image file formats

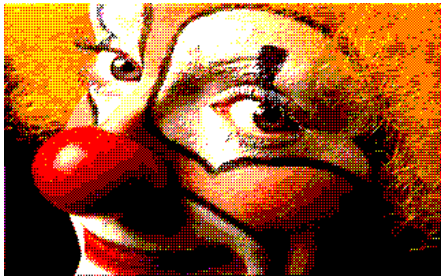
- Choosing the right file format to save your images in is important.
- Each is suited to a specific type of image, and matching your image to the correct format should result in a small, fast-loading graphic.
- When choosing the format for your image, you should always be conscious of both the image's **quality** and **filesize**.

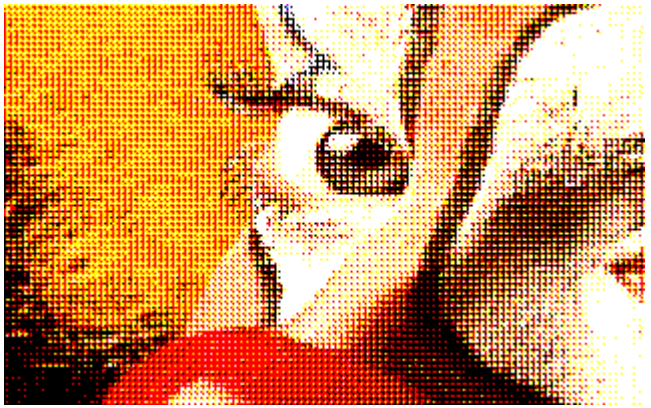
GIF - Graphics Interchange Format

- Compuserve's 8-bit GIF format has long been the most popular on the Internet, mainly because of its small size.
- It is ideal for small navigational icons and simple diagrams and illustrations where accuracy is required, or graphics with large blocks of a single colour.
- The format is lossless, meaning it does not get blurry or messy.
- GIFs use a simple technique called LZW (Lempel-Ziv-Welch) compression to reduce the file sizes of images by finding repeated patterns of pixels.

GIF - Graphics Interchange Format

- **GIF files can be saved with a maximum of 256 colours**.
  - This makes it a poor format for photographic images.
  - Because this can sometimes be tight, GIFs have the option to ***dither***, and will mix pixels of two different available colours to create a suggestion of another colour.





GIF - Graphics Interchange Format

- **GIFs can be animated.**
  - A lot of animated banner ads are GIFs. You will need an animation program to make your own animations. (See https://giphy.com/).

- **GIFs allow single-bit transparency.**
  - This means when you are creating your image, you can specify one colour to be transparent. This allows the background colours of the web page to show through the image.

GIF - Graphics Interchange Format

- **GIFs can be interlaced.**
  - This is a way of saving a graphic so that it loads progressively — first a blurry, low-detail version is loaded, and then successive layers of detail are added.
  - This usually means a larger overall file size, but it means that a version of the image gets placed onto the viewer's screen much quicker, and so is beneficial in many situations, as it gives the *impression* of a speedier download.

GIF Examples

- This first image is indicative of the optimum properties of a GIF image — small, low on colours, and containing large areas of continuous colour.

- This is the same graphic, but the number of available colours has been reduced. The file size is improved, but it doesn't look quite as smooth.

- To remedy this, we can add some dithering (which does add a bit to the file size), to produce the image below. The loss of colours becomes less obvious, and the file size overall is about half as big.

JPEG - Joint Photographic Experts Group

- The 16-bit JPEG format (file extension is without the ‘E’), was designed with **photographs** in mind.

- It is **capable of displaying millions of colours** at once, without the need for dithering, allowing for the complex blend of hues that occur in photographic images.

- JPEGs use a complex compression algorithm, which can be applied on a sliding scale.

JPEG - Joint Photographic Experts Group

- Compression is achieved by ‘forgetting’ certain details about the image, which the JPG will then try to fill in later when it is being displayed.

- You can save a JPG with 0% compression for a perfect image with a large file size; or with 80% compression for a small but noticeably degraded image.

- In practical use, **a compression setting of about 60% will result in the optimum balance of quality and file size**, without letting the lossy compression do too much damage.

JPEG - Joint Photographic Experts Group

- Though JPGs can be interlaced, they lack many of the other special abilities of GIFs, like animation and transparency.

- Simple graphics with large blocks of colour should not be saved as JPGs because the edges get all smudgy.

JPEG Examples

0% Compression

60% Compression

99% Compression

80% Compression

PNG - Portable Network Graphics

- PNG is a format invented specifically for the web in response to a licensing scheme introduced which meant the creators of any software that supported the GIF format had to pay royalties to Unisys (this has since expired).

- While they were at it however, the creators of PNG (“ping”) went ahead and created a format superior to GIF in almost every way.

PNG - Portable Network Graphics

- One version of the format, PNG-8, is similar to the GIF format. It can be saved with a maximum of 256 colours and supports 1-bit transparency.

- File sizes can be noticeably smaller than the GIF counterpart, as PNGs save their colour data more efficiently.

- PNG-24 has 24-bit colour support, allowing ranges of colour akin to a high colour JPG. (PNG-24 is in no way a replacement format for JPG, however, because it is a loss-less compression format. This means that file sizes can be big against a comparable JPG.)

PNG - Portable Network Graphics

- PNG's main draw are alpha-channels. Instead of the rudimentary transparency options in other formats (where a pixel is either transparent or opaque), an alpha channel can **specify the opacity of any pixel from 0–255**, where 0 is fully transparent and 255 is fully opaque.

- This allows you to create a graphic that can be placed on top of any background colour and will retain a translucent effect, with the background showing through the pixels that are not opaque.

- **Animated Portable Network Graphics** (**APNG)** is a file format first introduced by Mozilla which extends the PNG standard to add support for animated images.

Adding Images

- Add all images using the image tag **<img>** and the **src** attribute:

  <img src="*location/filename*">

- This is the **<img>** tag with an attribute (**src**) and an attribute value ("***location/filename***").

Adding Images

```
<html>
  <head>
      <title>My First Image</title>
  </head>

  <body>
      <p>This is an image in my first web
      page</p>
      <p> <img src= “happy.jpg"> </p>
  </body>

</html>
```

Adding Images

This is an image in my first web page

Adding Images

- Adding Alternate Text - ***Required***
  - Text that describes the image.
  - Use the **`alt`** attribute.

```
<img src= "kitten.jpg" alt="disaffected kitten">
```

Adding Images

- Adding Alternate Text
  - Important because
    - Identifies images for the visually impaired
    - Search engine optimisation
  - The **`alt`** attribute ensures that people who can't see your graphics can still understand their context. It is ***required,*** your page won't validate without it.

Adding Images

- The **width** and **height** attributes specify the width and height of an image, in pixels.

```
<img src= "kitten.jpg" alt="disaffected kitten"
width="80" height="80">
```

- It's good practice to specify both the **height** and **width** attributes for images. If height and width are set, the space required for the image is reserved when the page is loaded. However, without these attributes, the browser does not know the size of the image and cannot reserve the appropriate space to it. The effect will be that the page layout will change during loading (while the images load).

- **Tip:** Downsizing a large image with the **height** and **width** attributes forces a user to download the large image (even if it looks small on the page). To avoid this, rescale the image with a program before using it on a page.

Adding Images

- Using Images as Links
  - Exactly the same as using text
  - Use the anchor tag **<a>** to surround the item you want to act as your hyperlink.

```
<a href="ghost_story.htm">
    <img src = "ghost.gif"
    alt = "click here for more ghostly
    tales" width="80" height="80">
</a>
```

Image Etiquette

- Use small images whenever possible. The larger an image's file size, the longer it will take to load in the browser - remember a user's time is precious.
- The more images you add the more the total file size of your page will increase. Preview your page in several browsers and on several machines - if you find it too slow so will your users.
- Make sure that the text for the **`alt`** attribute is relevant to the image - anything less will frustrate your users.
- Make sure your images are relevant to the text/content.
- There are plenty of free images on the Web - don't use copyrighted material.

Creating Tables

- **Table:** An arrangement of horizontal rows and vertical columns. The intersection of a row and a column is called a cell.

Class Timetable					
Time	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**
10:00-11:00	Authoring for Digital Media	Authoring for Digital Media	Audio, Video & Sensor Technologies	Programming for Digital Media	Contextual Media
11:00-12:00		Visual Computing and Design	Contextual Media		
12:00-13:00	Visual Computing and Design		Visual Computing and Design		Audio, Video & Sensor Technologies

- Creating tables requires organisation.

Creating Tables

- All tables begin with the **<table>** tag and end with a **</table>** tag.
- In between those tags are three other tags to be aware of:
  - **<tr>** defines a horizontal row
  - **<td>** defines a data cell within that row
  - **<th>** specifies a data cell as a table heading (generally, a table heading cell is formatted as centred and bold).
- So, tables are built row by row…

Creating Tables

```
<html>
   <head>
      <title>Table</title>
   </head>

   <body>

      <table>
         <tr> <th>Row 1, Column 1</th> <th>Row 1, Column 2</th> </tr>
         <tr> <td>Row 2, Column 1</td> <td>Row 2, Column 1</td> </tr>
         <tr> <td>  Row 3, Column 1</td> <td>Row 3, Column 1</td> </tr>
      </table>

   </body>
</html>
```

Creating Tables

- Formatting Tables - Attributes
  - **`width`** (default: *to fit*)
    Width of table or cells (in pixels or as a % of the page)
  - **`border`** (default: `0`)
    Width of the border (in pixels - **`<table>`** tag)
- *Note: These will not validate as they are presentational and should really be implemented using CSS – we'll do it properly next week!*

Advanced Tables

- The **colspan** and **rowspan** attributes are used to create complex tables.
- You can use them to merge cells across rows and columns.

```
<table border="1">
     <tr>
        <th colspan="2"> Column 1 and Column 2 are combined </th>
     </tr>
     <tr>
        <td>content</td><td rowspan="2">Row 2 and Row 3 are combined</td>
     </tr>
     <tr>
        <td> Row 3 </td>
     </tr>
</table>
```

When to use Tables

- HTML tables should be used for tabular data - this is what they are designed for.

- A lot of people used to use HTML tables to lay out web pages, e.g. one row to contain the header, one row to contain the content columns, one row to contain the footer, etc.

- This was commonly used because CSS support across browsers used to be terrible; table layouts are much less common nowadays, but you might still see them in some corners of the web.

When to use Tables

- Using tables for layout is a bad idea:
  - **Layout tables reduce accessibility for visually impaired users**: Because tables are not the right tool for layout, the markup is more complex than with CSS layout techniques, the result is that the screenreaders' output will be confusing.
  - **Tables produce tag soup**: Because table layouts generally involve more complex markup structures than proper layout techniques, the code is harder to write, maintain, and debug.
  - **Tables are not automatically responsive**: Proper layout containers' width defaults to 100%. Table widths default to the size of their content.

Entities

- **Special Characters**
  - Symbols such as +, -, %, and & are used frequently.
  - Not all Web browsers display these symbols correctly.
  - HTML uses a little computer shorthand to tell the browser how to interpret these symbols.
  - www.w3.org/TR/REC-html40/sgml/entities.html#h-24.2.1 - Contains a complete list of the characters supported by HTML.

Entities

Char	Code	Description
&	&amp;	ampersand
<	&lt;	less than
>	&gt;	greater than
©	&copy;	copyright
®	&reg;	registered trademark
²	&sup2;	superscript2
³	&sup3;	superscript3
/	&acute;	acute accent/fada
\	&#96;	grave accent
#	&#35;	hash sign
%	&#37;	percent sign

Entities

- **Special Characters**
  - Probably the most important of these special characters is the non-breaking space:

```
 
```

  - Used to insert a space inside a HTML document.
  - Also used to create an empty cell in a table.

Meta Element

- Metadata is data that describes data, and html has an official way of adding metadata to a document – the **<meta>** element.
- Contained within the **<head>** tag.
- You can use as many **<meta>** tags as you want in your page
- Doesn't appear in the document.

Meta Element

- Used to
  - identify the page's author;
  - Provide a brief description to appear in search results;
  - identify keywords used for searching;
  - give commands to the browser;
  - specify the **`charset`**.
  - …

Meta Element

- Many **<meta>** elements include **name** and **content** attributes.
- **name** specifies the type of meta element it is, i.e. what type of information it contains.
- **content** specifies the actual **meta** content.
- Let's look at how **<meta>** elements can be used for SEO (we'll come across other uses for them as we go along) …

Meta Element - Improve Searching

- Search Engines add the content of your Web pages to their indexes
- When a potential visitor enters a search phrase, the search engine checks its index to find that phrase and returns any pages that include it.
- You can use the **`<meta>`** element to include product names, geographic locations, industry terms, and synonyms.

Meta Element

- The following **<meta>** tags work to help improve your chances of being found by a search engine
  - **Description**
  - **Author**
  - **Keywords**

Meta Element

- **`Description`** – usually a paragraph of information about your page. Some search engines use this description to describe your page; other search engines use the first few lines of text in your document.

- **`Author`** – this is useful in a few ways: it is useful to be able to work out who wrote the page, if you want to contact them with questions about the content. Some content management systems have facilities to automatically extract page author information and make it available for such purposes.

Meta Element

- **`Keywords`** – Make sure the keywords you select are relevant to the page in question.

- As a general rule, don't use more than about 10 meta keywords for a single page.

- Aside from the obviously important questions of number and relevance, when selecting your keywords, it's a good idea to bear in mind:
  - **Common Misspellings**
  - **International spelling variations**
  - **Real Searches:** Check your analytics or log files to find those keywords, and use keyword tools to back up your data. What words do people tend naturally to use when describing your business? And what words are your competitors using?

Meta Element

Note:

Meta keywords aren't the big players they once were in SEO.

Most search engines have realized that sites can easily "game" the meta keywords field with black-hat keyword stuffing (shoving as many seo keywords onto a page as physically possible), so meta keywords are no longer an important part of the Google ranking algorithm.

More attention ought to be paid to Title Tags and Meta Descriptions than to Meta Keywords.) But they can nonetheless still play a small but helpful part in communicating your message and attracting searchers to your site. In the competitive world of search engine marketing, every little bit helps

Meta Element

- Meta information comes in pairs: **name** and **contents**.

```
<head>
  <title>Your HTML Page</title>

  <meta name="description" contents="a brief
  paragraph describing your document">

  <meta name="author" contents="your name">

  <meta name="keywords" contents="keywords
  relevant to your page">

</head>
```

How to start a valid HTML5 page

- There must be a DOCTYPE declaration in the document prior to the root element.
- The HTML layout engines in modern web browsers use the DOCTYPE for mode selection.
- The DOCTYPE declaration for HTML5 is very simple:

```
<!DOCTYPE html>
```

Character Encoding

- We also need to specify the character encoding for the HTML document.
- Character encoding tells computers how to interpret digital data into letters, numbers and symbols.
- ASCII was the first **character encoding standard** (also called character set). ASCII defined 128 different alphanumeric characters that could be used on the internet: numbers (0-9), English letters (A-Z), and some special characters like ! $ + - ( ) @ < > .
- ANSI (Windows-1252) was the original Windows character set, with support for 256 different character codes.
- ISO-8859-1 was the default character set for HTML 4. This character set also supported 256 different character codes.

Character Encoding?

- Because ANSI and ISO-8859-1 were so limited, HTML 4 also supported UTF-8.
- UTF-8 (Unicode) covers almost all of the characters and symbols in the world.
- ***The default character encoding for HTML5 is UTF-8.***

Character Encoding

- You specify the character encoding by using the **`charset`** attribute.
- Do this using a **`<meta>`** tag nested within the **`<head>`** tag:
- The character encoding (charset) declaration for HTML5 is also very simple:

```
<meta charset="UTF-8">
```

What Language?

- It's a good idea to declare the language of your document.
- This can be done by declaring the language as an attribute of the html element.

```
<html lang="en">
```

- See https://www.w3docs.com/learn-html/html-language-codes.html for a list of languages.

So for valid HTML5…

```
<!DOCTYPE html>
<html lang="en">
    <head>
        <meta charset="UTF-8">
        <title> Document Title </title>
    </head>

    <body>
        Content of the document.....
    </body>

</html>
```

To Validate…

1. Go to https://validator.w3.org/
2. Choose the 'Validate by File Upload' tab.
3. Select 'Choose File' and browse to the file you wish to validate.
4. Click on the 'Check' button.

Lab Exercise 1 - Images

- Make a copy of your **lab01** folder that you created in the previous exercise and rename it **lab02**.
- Download ***exercise_images.zip*** from Blackboard and unzip it into your **lab02** folder.
- Open ***homepage.html***.
- Replace your list of text links in ***homepage.html*** with the images provided and link those images up to the relevant pages.
- Don't forget your `alt` attributes!
- Validate the 4 html pages.
- Upload to your **www** folder and view.

Lab Exercise 2 - tables

- Create the following html table:

Class Timetable					
Time	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**
10:00-11:00	Authoring for Digital Media	Authoring for Digital Media	Audio, Video & Sensor Technologies(Audio Technologies) Contextual Media(Cultural and Critical Theory)	Programming for Digital Media	Contextual Media
11:00-12:00		Visual Computing and Design			
12:00-13:00	Visual Comuting and Design				Audio, Video & Sensor Technologies(Moving Image)

- Validate your html document, upload it to the server and view it.

- The **`width`** and **`border`** attributes will throw up errors – you can ignore those for the time being.