CITS1231 Web Technologies
Working with Image Maps and Multimedia
Image Maps

Different parts of an image can contain hyperlinks.

A hotspot is a defined area of the image that acts as a hypertext link.

When a user clicks within a hotspot, the hyperlink is activated.
Good Image Map

A point
A polygonal region
A circular region
A rectangular region

Reference: From Laura Lemay *Teach Yourself Web Publishing with HTML4*
A Not So Good Image Map
Image Maps

- An **image map** is made up of an image and a list of hotspots.
- A hotspot is defined by its shape, its location and the hyperlink address.
- There are two types of image maps: **server-side image maps** and **client-side image maps**.
Server-Side Image Maps

- In a server-side image map, the image map is stored on the Web server.
- Server-side image maps are supported by most graphical browsers.
- Server-side image maps can be slow to operate.
- The browser’s status bar does not display the target of each hotspot.
Server-Side Image Maps

User clicks a hotspot on the image map

The server consults the image map and accesses the link indicated on the map

The server sends the destination document back to the user
Client-Side Image Maps

- A **client-side image map** is inserted in an image map into the HTML file.
- The browser locally processes the image map.
- Because all of the processing is done locally, you can easily test Web pages.
- More responsive than server-side maps.
- The browser’s status bar displays the target of each hotspot.
- Older browsers do not support client-side images.
Defining Image Map Hotspots

- Define a hotspot using two properties:
  - Its location in the image
  - Its shape

- Syntax of the hotspot element:
  ```html
  <area shape="shape" coords="coordinates" href="url" alt="text" />
  ```

<table>
<thead>
<tr>
<th>Shape Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>rect</td>
<td>Rectangular shape</td>
</tr>
<tr>
<td>circle</td>
<td>Circle shape</td>
</tr>
<tr>
<td>polygon</td>
<td>Polygon shape</td>
</tr>
</tbody>
</table>
Creating a Rectangular Hotspot

- Two points define a **rectangular hotspot**:
  - the upper-left corner
  - the lower-right corner

- A sample code for a **rectangular hotspot** is:

  ```html
  <area shape="rect" coords="384,61,499,271" href="water.htm">
  ```
  
  - the **hotspot** is a hypertext link to water.htm
  - **coordinates** are entered as a series of four numbers
    - first two numbers indicate coordinates for the upper-left corner
    - second two numbers indicate the location of the lower-right corner
Creating a Circular Hotspot

- A **circular hotspot** is defined by the location of its center and its radius

- A sample code for a **circular hotspot** is:

  ```html
  <area shape="circle" coords="307,137,66" href="karts.htm">
  ```
  
  - **coordinates** are (307, 137), and it has a radius of 66 pixels
  - the **hotspot** is a hypertext link to karts.htm
Creating a Polygonal Hotspot

• To create a polygonal hotspot, you enter the coordinates for each vertex in the shape.

• A sample code for a **polygonal hotspot** is:

```html
<area shape="polygon"
     coords="13,60,13,270,370,270,370,225,230,225,230,60"
     href="rides.htm">
```

– **coordinates** are for each vertex in the shape.
– the **hotspot** is a hypertext link to rides.htm
Client-side Image Map

- Most browsers support the `USEMAP` attribute for client-side image maps.

- `USEMAP` references a `map` element which contain list of hotspots.

```html
<img src="supersite.gif" usemap="#map1">
<map name="map1">
  <area coords="0,0,50,50" href="topleft.html">
  <area coords="50,50,80,80" href="bottomright.html">
</map>
```
Server-side Image Map

- ISMAP is used to implement server-side image maps. It requires a server-side program (e.g. “map”) to interpret map coordinates.

- The coordinates start from the top left corner of the image. When the user clicks on the image, the coordinates are sent as part of the URL using the HTTP GET method.

```html
<html><head><title>Server-side Image Map</title></head><body><p><a href="http://samplesite.com/cgi-bin/map"><img src="navigation.jpg" alt="Site Navigation Image Map" ismap></a></p></body></html>
```
How do we make image maps?

- Working out the coordinates can be difficult.
- Many tools are available for making image maps (e.g., Macromedia Dreamweaver) - work out coordinates according to the area a user specified through graphical interface.
- You can use server-side and client-side image map together to ensure both browser compatibility and responsiveness.

```html
<a href="http://samplesite.com/cgi-bin/map">
<img src="navigation.jpg" alt="Site Navigation Image Map" ismap usemap="#navigation">
</a>
```
Working with Multimedia

• Multimedia includes a combination of audio, images, animation and video.

• Multimedia files can be large and take time to download.

• **Bandwidth** is a measure of the amount of data that can be sent through a communication pipeline each second.

• Consider bandwidth when working with multimedia on Web site.

• Multimedia added to Web page two different ways:
  
  – **External media** is accessed through a link
    • Useful for a low bandwidth
  
  – **Inline media** is placed within Web page as embedded object
Working with Multimedia
Working with Audio

• Every sound wave is composed of two components:
  – **Amplitude** - the height of the wave. The higher the amplitude, the louder the sound.
  – **Frequency** - number of waves per second. The higher the frequency, the higher the pitch.
Sampling Rate

- Sound waves are **analog** functions (represent a continuously varying signal).

- To store the information, however, it must be converted to **digital** data (bits) – **digitized**.

- **Digital** recording measures the sound’s amplitude at discrete points in time.

- Each discrete measurement is called a **sample**.

- Samples per second taken is called the **sampling rate**.
Sampling Rate

- Low sampling rate
- Medium sampling rate
- High sampling rate
Sample Resolution

• Each sample has an amplitude which must be approximated to a digital value.

• **Sampling resolution** indicates the precision in measuring the amplitude for each sample:
  - 8-bit
  - 16-bit
  - 32-bit
Sample Resolution

Low sample resolution

High sample resolution
Basic Sampling Theory

• Digitize an analog function/signal by:
  – Sampling the function at discrete points in time.
  – Approximate the amplitude using a sample resolution.

• The higher the sampling rate and resolution, the higher the quality of reproduced audio:

<table>
<thead>
<tr>
<th>Sample Rate and Resolution</th>
<th>Sound Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 KHz, 8-bit, mono</td>
<td>Telephone</td>
</tr>
<tr>
<td>22 KHz, 16-bit, stereo</td>
<td>Radio</td>
</tr>
<tr>
<td>44 KHz, 16-bit, stereo</td>
<td>CD</td>
</tr>
<tr>
<td>48 KHz, 16-bit, stereo</td>
<td>Digital Audio Tape (DAT)</td>
</tr>
</tbody>
</table>
Sound File Formats

- **WAV (Waveform Audio File Format)** usually contains uncompressed audio.
  - High quality, but large file size.
- **MP3** is version of MPEG format, which compresses audio files with minor impact on sound quality.
  - Controversy around MP3 involves copyrighted material that has been copied without the permission of the artist or producers.
- **WMA (Windows Media Audio)** uses Microsoft proprietary compression algorithm.
- **MIDI (Musical Instrument Digital Interface)** is widely adopted in music industry
  - limited to instrumental music and not speech/general sounds
Sound File Formats

- **Nonstreaming media** must be completely downloaded before being played
  - May produce lengthy delays
- **Streaming media** processed in continuous stream as they are downloaded
  - Both sound and video
- Different formats provide varying levels sound quality and compression.
- You can link to sound files:
  
  <a href="forrest.mp3">Relaxation Music</a>
Embedding an Audio Clip

- An **embedded object** is any media clip, file, program, or other object that can be run/viewed from within a Web page
  - Browsers need appropriate plug-ins to run embedded objects
- To embed a sound or video clip:
  ```html
  <embed src="url" width="value" height="value" autostart="type"/>
  ```

  where
  - `url` is the location of the object,
  - `width` and `height` specify the width and the height of the object in pixels
  - `type=1` to start automatically when the page loads
  - `type=0` to require user to start the clip manually
- Deprecated in HTML 4 in favour of new `<object>`.
- Widespread browser support for `<embed>`; not so for `<object>`.
- `<embed>` reintroduced in HTML 5.
Embedding an Audio Clip

<html>
<head></head>
<body>
  <embed src="b9.wma" width="275" height="40" autostart="0"/>
</body>
</html>
Playing Background Sound

• Internet Explorer (with Version 3.0) introduced an element to play background sounds:

   `<bgsound src="url" balance="value" loop="value" volume="value" />`

where

   – **url** is the URL of the sound file,
   – the **balance** attribute defines how the sound should be balanced between left and right speakers,
   – **loop** defines how many times the sound clip is played, and
   – the **volume** attribute indicates the background sound volume.
Working with Video

- Video files add a visual element to a Web page as well as provide information.

- Video files are composed of a series of single images called frames.

- The number of frames shown in a period of time is the frame rate.

- Control file size of video files:
  - Reducing the frame rate reduces the size of your file.
  - Using a Codec (compression/decompression) is another way to control the file size.
## Video File Formats

<table>
<thead>
<tr>
<th>Format</th>
<th>Filename Extensions</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>AVI</td>
<td>.avi</td>
<td>Nonstreaming</td>
</tr>
<tr>
<td>MPEG</td>
<td>.mpg, .mpeg, .mp3</td>
<td>Nonstreaming</td>
</tr>
<tr>
<td>QuickTime</td>
<td>.mov</td>
<td>Streaming</td>
</tr>
<tr>
<td>RealVideo</td>
<td>.rm, .ram</td>
<td>Streaming</td>
</tr>
<tr>
<td>Windows Media</td>
<td>.wmv</td>
<td>Streaming</td>
</tr>
</tbody>
</table>
Linking/Embedding a Video Clip

• Follow the same procedure to link a video clip as you would to link a sound clip
  – Include information about the size of each video file so that users can determine whether they want to retrieve the clip

• Use the same embed element to embed a video file as you did to embed a sound clip
  – You must specify a source for an embedded video clip with the src attribute and a size for the clip using the height and width attributes
Using a Dynamic Source

To turn inline images into dynamic video clips, use the following syntax:

\[<\text{img src="url" dynsrc="durl" start="stype" loop="lvalue" controls />}\]

where

- \text{durl}=URL of a dynamic (video) version of inline image.
- \text{stype}=fileopen (start on page load) or mouseover
- \text{lvalue}=infinity (loop forever) or 1, 2, 3, ...
- If controls is specified, then display player controls

Only supported by IE!
Applets

• A small application that performs a specific task.

• Sometimes running within the context of a larger program, perhaps as a plugin.

• Typically refers to programs written in the Java programming language which are included in a web page.

• This unit doesn’t cover creating applets, just how to put them on a web page.
Applets and Java Interpreters

1. The user’s Web browser downloads the Web page and an applet from the Web server.

2. The interpreter built in to the browser runs the applet on the user’s computer.
Java Applets

- **Applets** are displayed as embedded objects on a Web page in an **applet window**

- Use a Java Developer’s Kit (JDK) to write your own Java applet.

- **Compiling** changes the file into an executable file that can run by itself without the JDK.
  - The executable file is called a **class file**.
Inserting a Java applet

• To insert a Java applet, use the code

```html
<applet code="file" codebase="url" height="value" width="value" name="text" alt="text">
    <param name="pname" value="pval" />
    <param name="pname" value="pval" />
    ...
</applet>
```

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>alt=&quot;text&quot;</td>
<td>An alternate text description of the applet for browsers that do not support applets</td>
</tr>
<tr>
<td>codebase=&quot;url&quot;</td>
<td>A URL providing the location of the .class file, if different from the location of the Web page</td>
</tr>
<tr>
<td>code=&quot;file&quot;</td>
<td>The filename of the .class file</td>
</tr>
<tr>
<td>height=&quot;value&quot;</td>
<td>The height of the embedded applet in pixels</td>
</tr>
<tr>
<td>name=&quot;text&quot;</td>
<td>The name of the applet</td>
</tr>
<tr>
<td>width=&quot;value&quot;</td>
<td>The width of the embedded applet in pixels</td>
</tr>
</tbody>
</table>
Inserting a Java applet

```html
<applet code="file" codebase="url" height="value" width="value" name="text" alt="text">
  <param name="pname" value="pval" />
  <param name="pname" value="pval" ?>
  ...
</applet>
```

- `ptext` is the name of an applet parameter
- `pval` is the parameter’s value
- `<applet>` is deprecated in HTML 5 in preference for `<object>`
- `<applet>` has wide browser support; not so for `<object>`
Tips for using Multimedia

• When linking to multimedia, provide a variety of media formats to ensure that all users have access to formats they can use.

• Include the file size in links to large multimedia files to notify users with low bandwidth connections.

• Do not embed multimedia clips in your Web pages unless you are sure that users will be accessing the pages through a high-speed connection.

• Do not insert media clips unless you provide a method for users to turn off the clips; if a clip plays automatically, allow it to play only once.

• Use the `<embed>` and `<applet>` elements in preference to the `<object>` element because of the broader browser support.