COMS 359: Interactive Media
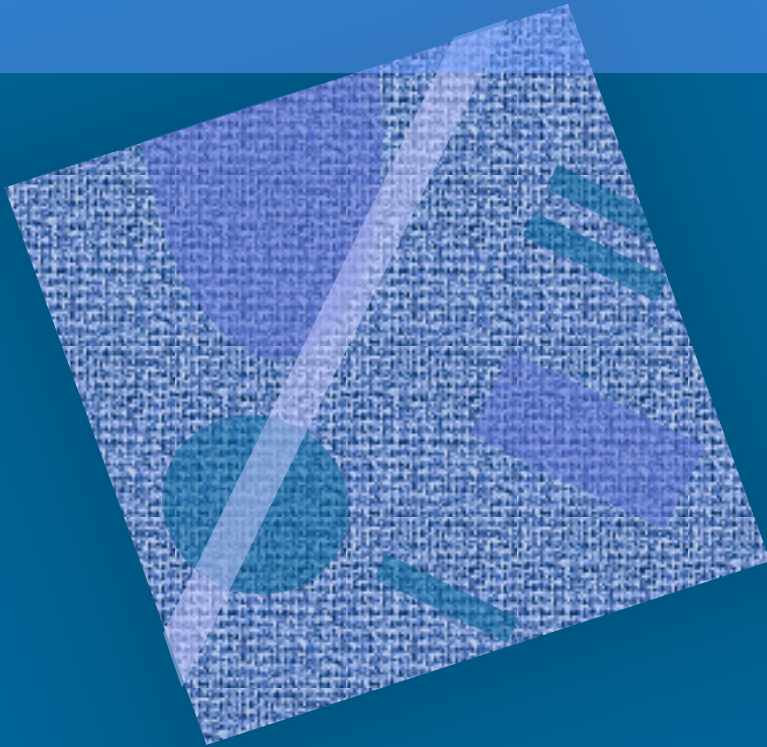
Agenda

- Audio/Video
  - Introduction
  - Audio and Video file formats
  - Methods for including multimedia
    - <a href>
    - <embed>
    - <object>
    - <audio> and <video>

Audio

Audio

- Introduction
  - Two formats
    - Analog audio = sound is encoded as a function of a continuous wave
    - Digital audio = sound is encoded as discrete pieces of information
  - Computer technology = digital audio
    - Convert analog audio to digital = capture and digitize
    - Sound card and Sound Recorder software (Accessories)

Audio

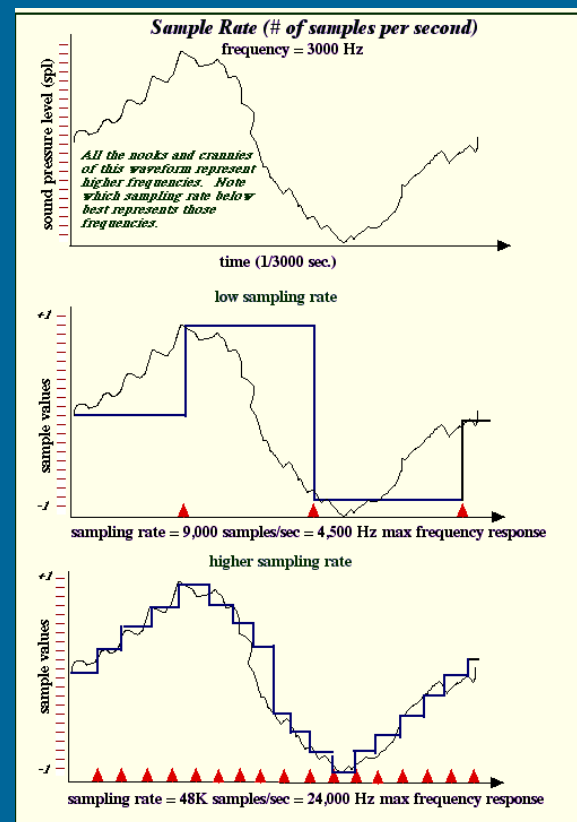- ## Introduction - Terminology

  - ### Sampling
    - When a sound is digitized, it is sampled
    - Higher sampling rate = higher quality & large file size

  - ### Sampling Rates
    - 8, 11, 22, 44 kHz
    - 1 kHz = approx. 1000 samples/sec.

  - ### Sound files
    - Saved and stored as 8-bit or 16-bit numbers
    - 16-bit = higher quality/larger file

Sample Rate (# of samples per second)
frequency = 3000 Hz

All the nooks and crannies of this waveform represent higher frequencies. Note which sampling rate below best represents those frequencies.

time (1/3000 sec.)

low sampling rate

sampling rate = 9,000 samples/sec = 4,500 Hz max frequency response

higher sampling rate

sampling rate = 48K samples/sec = 24,000 Hz max frequency response

Audio

- Introduction - Quality
  - Sample rate and bit-rate describe audio quality
    - 8-bit, 8 kHz sample = telephone quality
    - 16-bit, 44kHz sample = CD quality
  - Higher quality = larger files
    - 1 minute of 8-bit, 8kHz audio = 1.5MB
    - 1 minute of 16-bit, 44kHz audio = 10MB
    - Stereo = double these

Audio

- File Formats - Introduction
  - Number of different file types for audio
  - Each file type requires a dedicated player
    - Not all players are supported by all browsers
    - Some file types require browser plug-ins
    - Design implications
      - Use a widely accepted and supported file formats
      - Use redundancy in design to accommodate different browsers

Audio

- File Formats
  - RIFF WAVE
    - Resource Interchange File Format Waveform Audio
    - Developed by IBM & Microsoft; most common audio file format in Windows
    - Uncompressed format - 1 min of audio = 10MB file
    - File extension = *.wav*
    - Browser support – Directly supported by Firefox, Chrome and Safari; IE9 support via Windows Media Player

Audio

- File Formats
  - AIFF and AIFC
    - AIFF - Audio Interchange File Format
      - Developed by Apple
      - High quality audio
      - 1 minute = 10MB
    - AIFC - AIFF Compressed Format
      - Compressed form of AIFF
      - Compression ratio - up to 6:1; but is a lossy compression
      - Used mainly on Apple systems

Audio

- File Formats
  - MPEG Audio
    - Moving Pictures Experts Group
    - Best compression algorithm - 4:1 w/ almost no loss
    - File extension = *.mp3*
      - CD quality audio
      - Standard for web audio
    - Browser support – Directly supported by Chrome, IE9 and Safari; Firefox support with a plugin or external player

Audio

- File Formats
  - OGG
    - Open source, patent-free, open container format for audio (and video)
    - Maintained by the Xiph.org Foundation
    - File extension = *.ogg* or *.oga*
    - Common Audio Codecs
      - Vorbis – lossy audio compression
      - FLAC – lossless audio compression
    - Direct support in Firefox and Chrome; supported in Safari via add-on; no support in IE
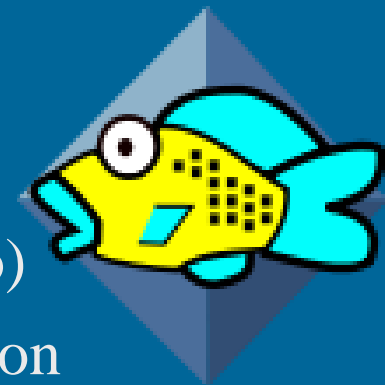
Video

Video

- Introduction
  - Video files are comprised of images and audio
  - Thus, they are the largest multimedia files.
  - Slowest download

Video

- Introduction - Quality
  - Video quality is a function of several technical elements
    - Network Bandwidth
    - Sampling rate (11, 22, 44)
    - Image size Frame rate (15, 30)
    - Bit depth (8, 16, 24)
  - Higher Quality = More Data = Larger File
  - Quality and transfer speed are inversely proportional

Video

- File Formats
  - Video for Windows - VfW
    - Developed by Microsoft for the PC
    - Played by a special Microsoft software only available on PCs running MS operating systems
    - Not directly supported by the Browser; Browser launches the application and the video plays in a separate window
    - file extension = *.avi* (audio/video interleave)

AVI
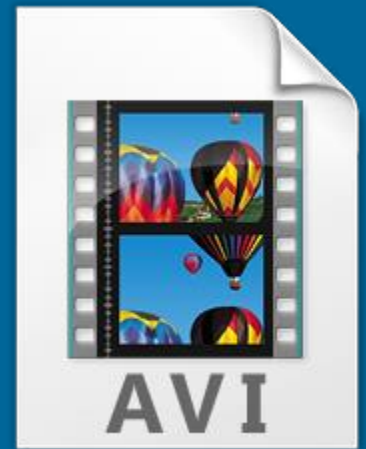
Video

- File Formats
  - MPEG - Motion Picture Experts Group
    - Browser friendly - either directly supported by the browser or plug-ins are available
    - Compressed format - files are smaller than comparable *.avi* files
    - File extension = *.mp4*

Video

- File Formats
  - QuickTime
    - Developed by Apple
    - More flexible than AVI - supported by more platforms (IBM, UNIX, MAC, etc.)
    - Decent compression algorithm
    - File extension = *.mov*

Video

- File Formats
  - OGG
    - Open source, patent-free, open container format for audio and video
    - Maintained by the Xiph.org Foundation
    - File extension - .ogg or .ogv
    - Common Audio Codecs
      - Theora – lossy video (compete with mp4)
    - Direct support in Firefox and Chrome; supported in Safari via add-on; no support in IE
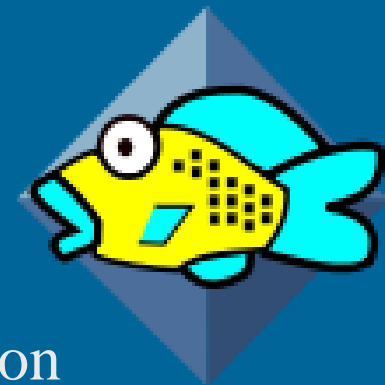
Video
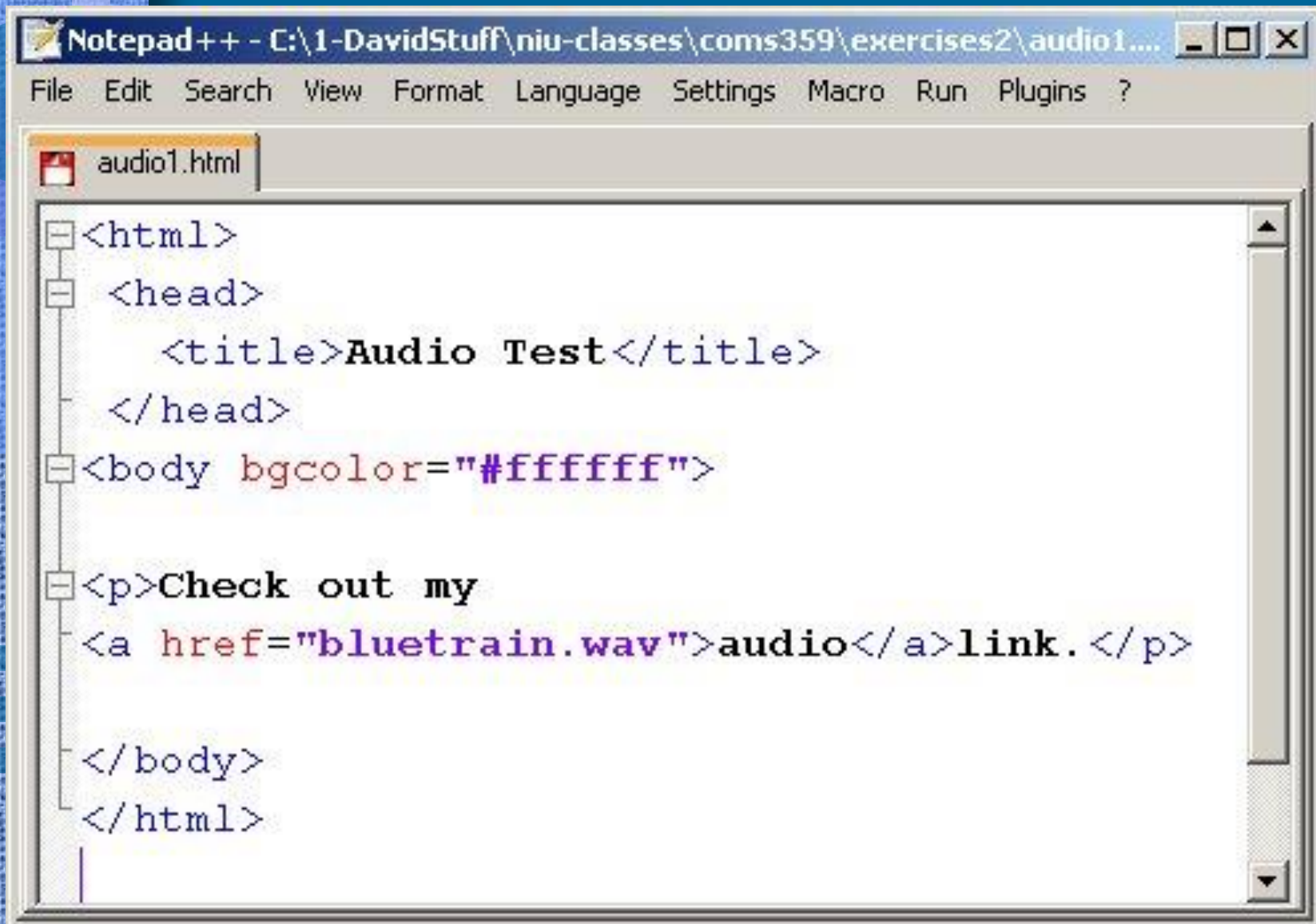
- File Formats
  - WebM
    - Royalty-free, open video compression for use with HTML5 video
    - Developed by Google
    - File extension = *.webm*
    - Codecs - VP8 video + Vorbis audio
    - Direct support in Firefox and Chrome; supported in Safari via Quicktime plugin; no direct support in IE

Audio/Video

- 4 Methods for including audio/video
  - <a href>
    - Hypertext link to audio or video file
  - <embed>
    - Deprecated tag for embedded audio/video objects
  - <object>
    - HTML 4.1 method for embedded objects
  - <audio> <video>
    - New HTML5 tags
    - Limited browser support

Audio <a href>
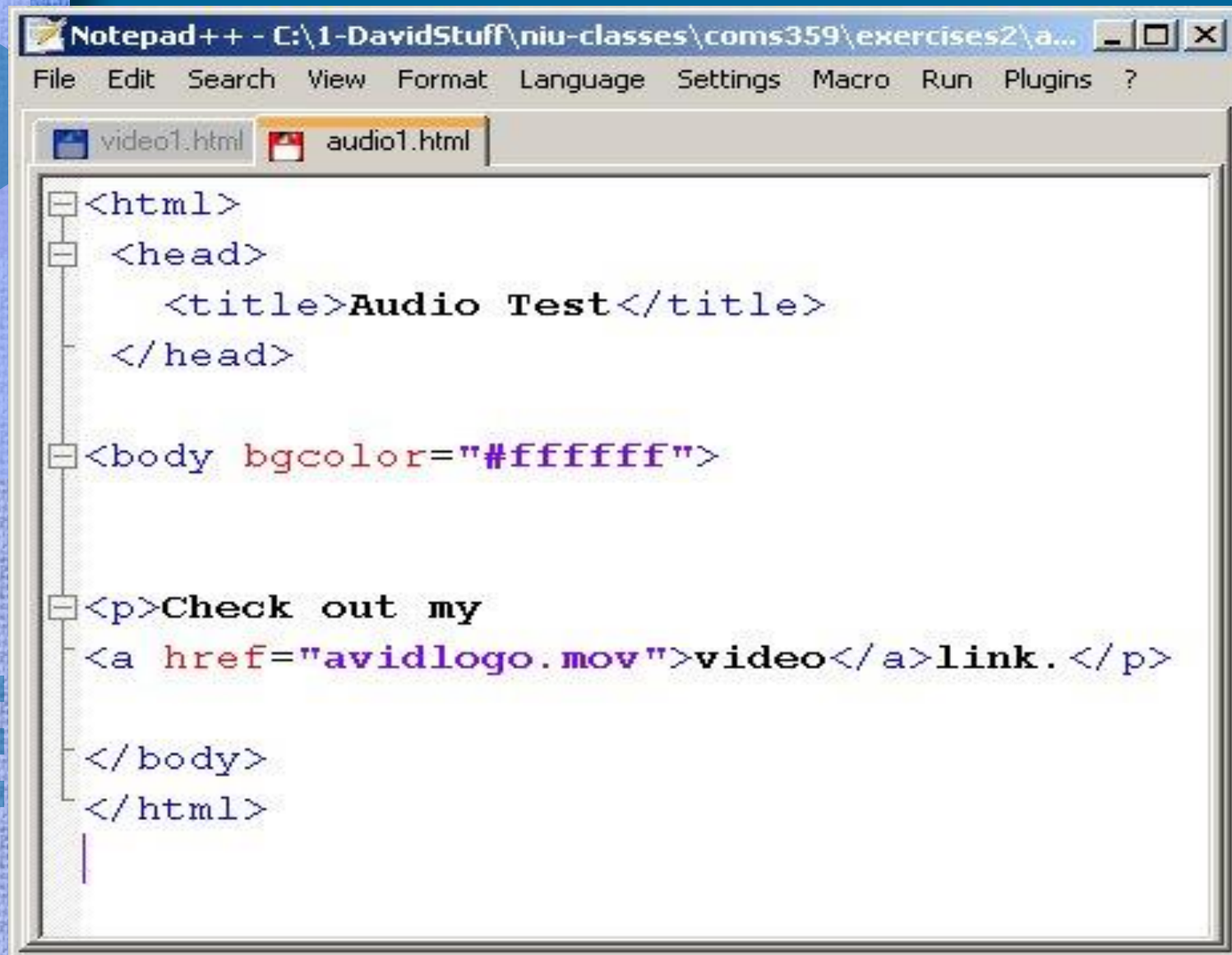
File   Edit   Search   View   Format   Language   Settings   Macro   Run   Plugins   ?

audio1.html

```
<html>
  <head>
    <title>Audio Test</title>
  </head>
<body bgcolor="#ffffff">

<p>Check out my
<a href="bluetrain.wav">audio</a>link.</p>

</body>
</html>
```
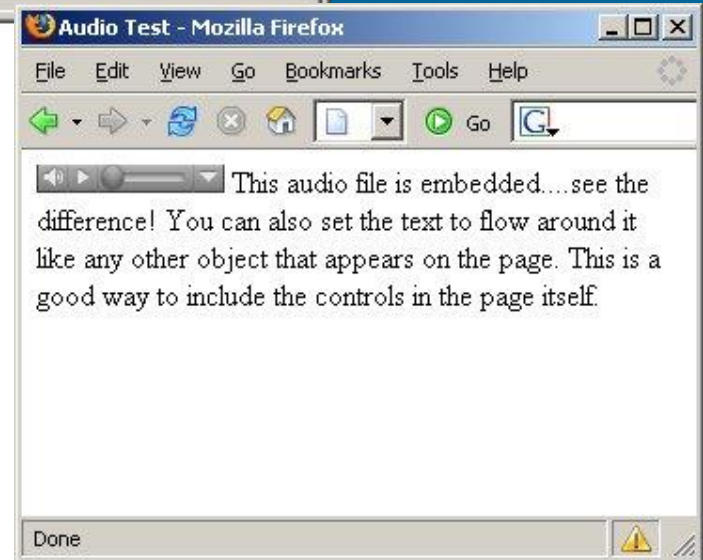
Notepad++ - C:\1-DavidStuff\niu-classes\coms359\exercises2\a... _ □ ×

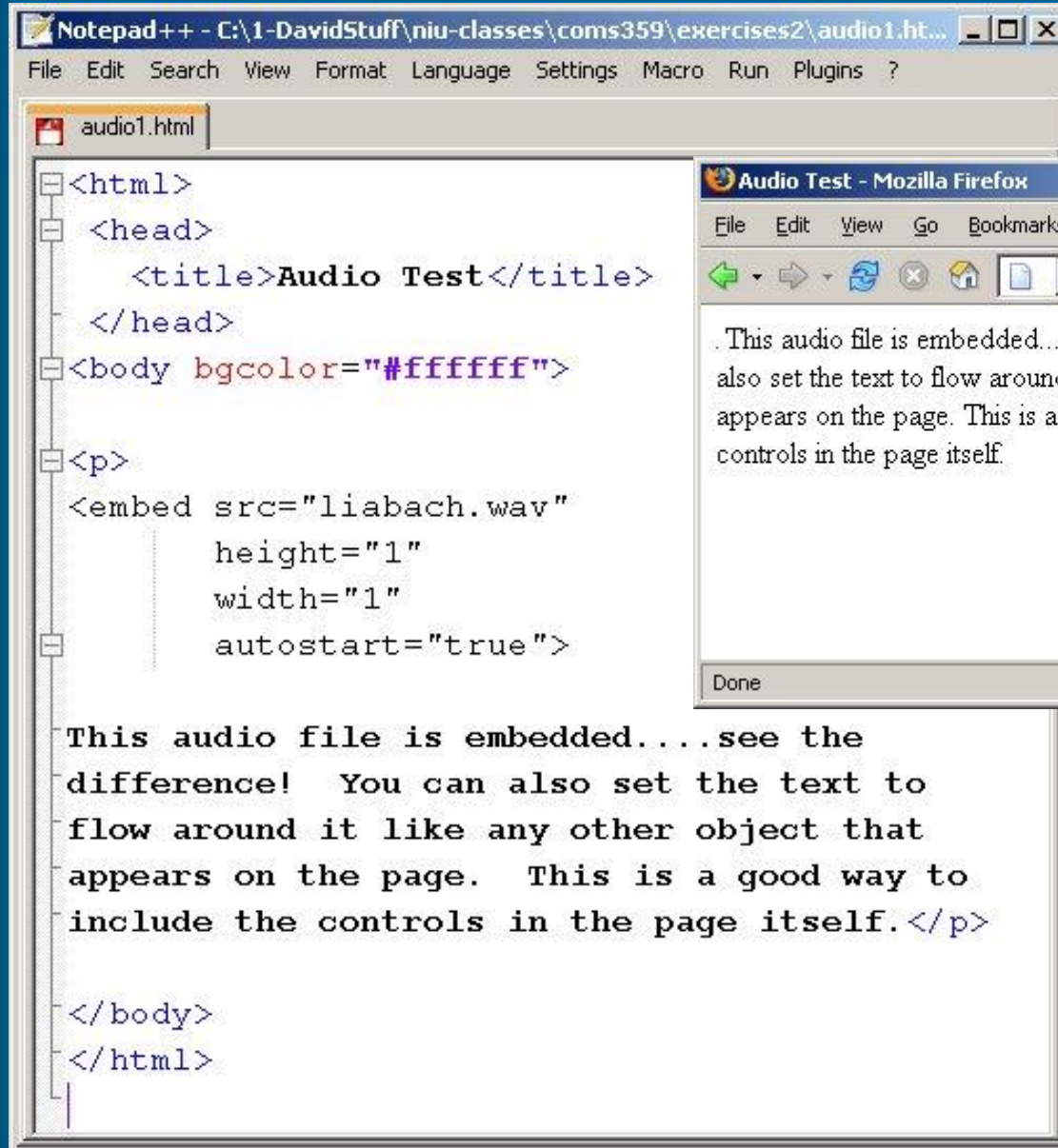File   Edit   Search   View   Format   Language   Settings   Macro   Run   Plugins   ?
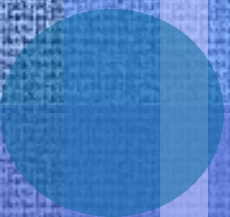
video1.html   audio1.html

```
<html>
 <head>
    <title>Audio Test</title>
 </head>


<body bgcolor="#ffffff">



<p>Check out my
 <a href="avidlogo.mov">video</a>link.</p>

</body>
</html>
```

Audio/Video

- **<embed>**
  - Tag = <embed src="bluetrain.wav">
  - Attributes
    - **height** & **width**: Specifies the size of the embedded object (i.e. Audio Console)
    - **align**: Specifies how object aligns with text
    - **loop**: Specifies whether to loop the audio or not; Its values can be set to the Boolean values true or false or a specific number to specify the number of times it loops
    - **volume**: Sets values 1 to 100
    - **autostart**: Set to the Boolean value true or false

Notepad++ - C:\1-DavidStuff\niu-classes\coms359\exercises2\audio1.ht...

File   Edit   Search   View   Format   Language   Settings   Macro   Run   Plugins   ?

audio1.html

```html
<html>
 <head>
    <title>Audio Test</title>
 </head>
<body bgcolor="#ffffff">

<p>
<embed src="bluetrain.wav"
        height="25"
        width="90"
        autostart="false">


This audio file is embedded....see the
difference!   You can also set the text to
flow around it like any other object that
appears on the page.   This is a good way to
include the controls in the page itself.</p>


</body>
</html>
```
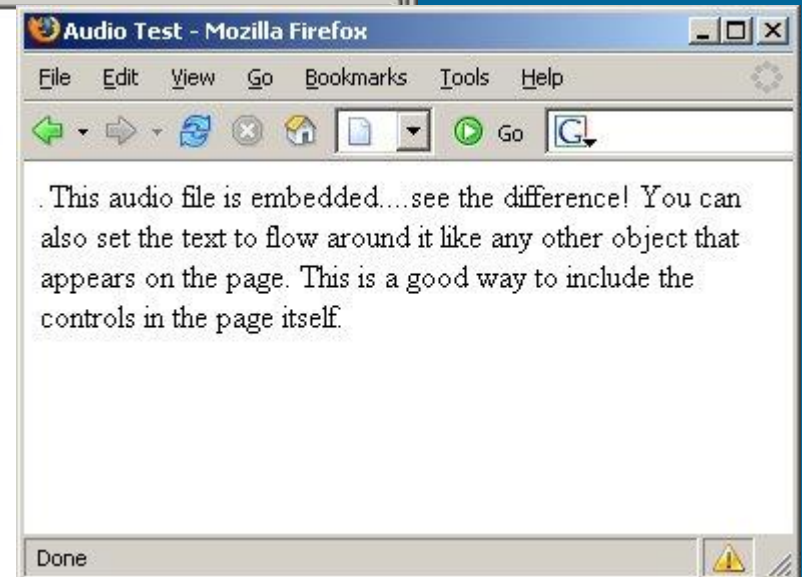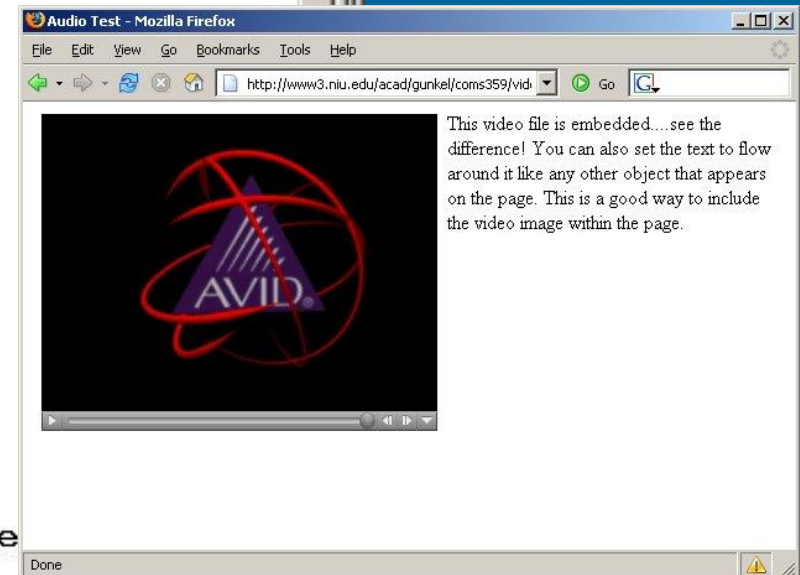
Audio Test - Mozilla Firefox

File   Edit   View   Go   Bookmarks   Tools   Help

Go

This audio file is embedded....see the difference! You can also set the text to flow around it like any other object that appears on the page. This is a good way to include the controls in the page itself.

Done

Audio   <embed>


```html
<html>
  <head>
     <title>Audio Test</title>
  </head>
<body bgcolor="#ffffff">

<p>
<embed src="liabach.wav"
       height="1"
       width="1"
       autostart="true">

This audio file is embedded....see the
difference!  You can also set the text to
flow around it like any other object that
appears on the page.  This is a good way to
include the controls in the page itself.</p>


</body>
</html>
```

Background Audio
Set the height and width
attributes to 1 or 0

Video
<embed>

Audio/Video Exercise

http://gunkelweb.com/coms359/multimedia/avstuff.html

COMS 359 - Audio/Video - Mozilla Firefox

File   Edit   View   History   Bookmarks   Tools   Help

object tag: embed content in valid st... | Novell WebAccess (David GUNKEL) | COMS 359 - Audio/Video | videos - Google Search

gunkelweb.com/coms359/multimedia/avstuff.html   Google

COMS 359 - Audio/Video Source Files

Audio Files

1. John Coltrane's Blue Train in WAV format
2. John Coltrane's Blue Train in mp3 format
3. John Coltrane's Blue Train in ogg-vorbis format

Video Files

1. Lego Gizmo in mp4 format
2. Lego Gizmo in WebM format
3. Lego Gizmo in ogg-theora format

Flash Video Player (FLV)

The FLV Player is an easy and flexible way to add video and audio to your website
playback of any format the Adobe Flash Player can handle (FLV, MP4, MP3, AAC
GIF). It also supports RTMP, HTTP and live streaming, various playlists and captio
wide range of settings and an extensive javascript API. Here's an example:

▶ ◼   00:00   00:00

This method of including multimedia content requires a number of files. Download these files and
save them to your jump-drive by doing a right click on the file name and selecting "save link as."

- Javascript file - swfobject.js
- Flash file - player.swf

Download
1. Blue Train WAV
2. Lego Gizmo mp4
   Lego Gizmo WebM

Process
Do a right click on top of the file name and save the file to your local drive (USB jump drive or computer desktop)

```html
<html>
  <head>
    <title>Audio Test</title>
  </head>
<body bgcolor="#ffffff">

<p>Check out my
    <a href="bluetrain.wav">audio</a> link.

<p> <embed src="gizmo.mp4"
              height="335"
              width="560"
              align="left"
              hspace="5">
This video file is embedded...see the
difference! You can also set the text to flow
around it like any other object that appears
on the page. This is a good way to include
the controls in the page itself.</p>

</body>
</html>
```
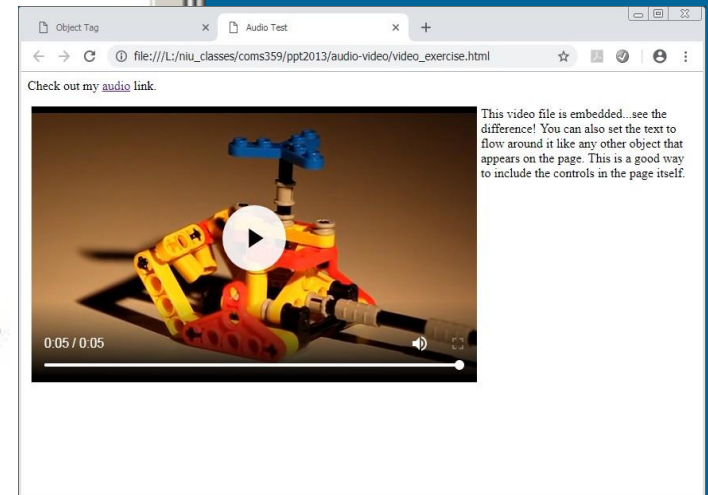
Exercise 1:
Include audio and video by using <a href> and <embed>

<object> tag

- HTML 4.1 tag for inserting any object (image, video, audio, applet, etc.) into an HTML document

- It was intended as a replacement for a number of tags: <img> <embed> <applet>…
  – Rationale: Provide one tag for all objects; standardize the tags for object inclusion
  – Problem – Inconsistent browser implementation; requires complex coding to get it to work in all browsers

<object> tag

- Attributes
  - data = "filename"
  - type = "video/mp4"
    "audio/wav"
    "text/html"
  - height = "300"
  - width = "320"
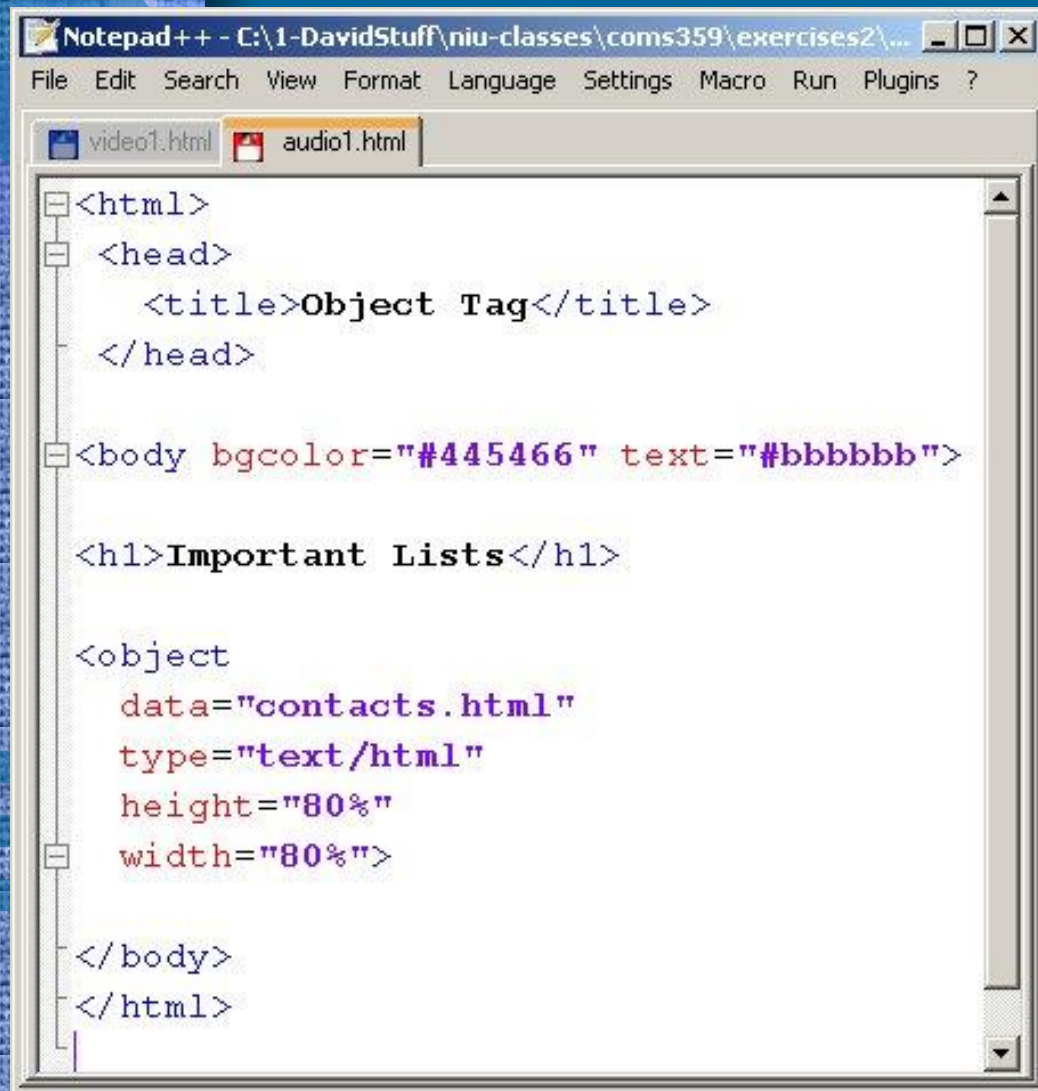
```html
1  <html>
2  <head>
3    <title>Object Tag</title>
4  </head>
5
6  <body bgcolor="#555555">
7  <h1>Video &amp; Audio Objects</h1>
8
9  <p><object
10        data="gizmo.mp4"
11        type="video/mp4"
12        height="335"
13        width="560">
14    </object></p>
15
16  <p><object
17        data="bluetrain.wav"
18        type="audio/wav"
19        height="65"
20        width="300">
21     <param name="autoplay" value="false">
22    </object></p>
23
24  </body>
25  </html>
26
```

Object Tag   ×   +

file:///L:/niu_classes/coms359/ppt2013/audio-vide...

Video & Audio Objects

0:05 / 0:05

0:21 / 0:31
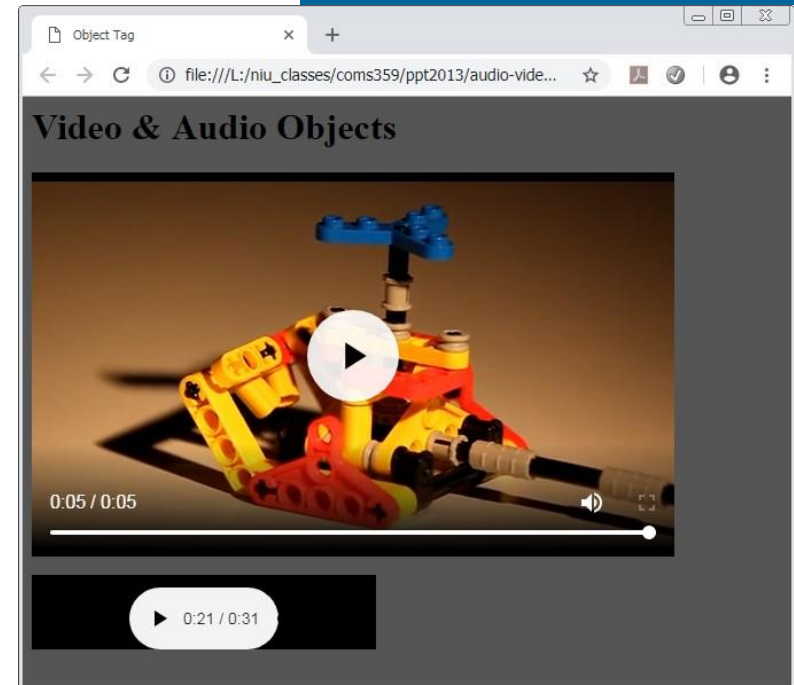
Exercise 2:
Use <object> to include
both video and audio

\<object\> Other Uses

Notepad++ - C:\1-DavidStuff\niu-classes\coms359\exercises2\...

File   Edit   Search   View   Format   Language   Settings   Macro   Run   Plugins   ?

video1.html   audio1.html

```
<html>
  <head>
    <title>Object Tag</title>
  </head>

<body bgcolor="#445466" text="#bbbbbb">


<h1>Important Lists</h1>


<object
   data="contacts.html"
   type="text/html"
   height="80%"
   width="80%">

</body>
</html>
```

Notepad++ - new 4

File   Edit   Search   View   Format   Language   Settings   Macro   Run
Plugins   ?

video1.html   audio1.html   new 4

```
<html>
<head>
    <title>Email Contacts</title>
</head>

<body bgcolor="#ffffff">
<h3>Email Contacts</h3>
<hr>
kstaszewski@pol.com
<br>smueller@ort.org
<br>tyellow@nnet.net
<br>pkeller@ameritech.net
<br>ddabrowski@yahoo.com
<br>mmoni@uic.edu
<br>plato@athens.com
<br>ikant@pnet.net
<br>hhegel@aspirit.com
<br>mheidegger@fascist.edu
<br>jkristeva@lang.net
<br>

</body>
</html>
```

`<object>` Other Uses

Notepad++ - C:\1-DavidStuff\niu-classes\coms359\exercises2\...

File   Edit   Search   View   Format   Language   Settings   Macro   Run   Plugins   ?

video1.html   audio1.html

```
<html>
  <head>
    <title>Object Tag</title>
  </head>

<body bgcolor="#445466" text

<h1>Important Lists</h1>

<object
  data="contacts.html"
  type="text/html"
  height="80%"
  width="80%">

</body>
</html>
```

Notepad++ - new 4

File   Edit   Search   View   Format   Language   Settings   Macro   Run
Plugins   ?

video1.html   audio1.html   new 4

il Contacts</title>

r="#ffffff">
ntacts</h3>

pol.com
@ort.org
nnet.net
ameritech.net
ki@yahoo.com
c.edu
hens.com
et.net
spirit.com
er@fascist.edu
a@lang.net

Using the Object Tag - Mozilla Firefox

File   Edit   View   History   Bookmarks   Tools   Help

Using the Object Tag   +

gunkelweb.com/cor   Google

Important Lists

Email Contacts

kstaszewski@pol.com
smueller@ort.org
tyellow@nnet.net
pkeller@ameritech.net
ddabrowski@yahoo.com
mmoni@uic.edu
plato@athens.com
ikant@pnet.net
hhegel@aspirit.com
mheidegger@fascist.edu
jkristeva@lang.net

Notepad++ - C:\1-DavidStuff\niu-classes\coms359\exercises2\objec... _ □ X

File   Edit   Search   View   Format   Language   Settings   Macro   Run   Plugins   ?

video1.html   object-tag2b.html   object-tag.html   audio1.html   object ◄ ►

```html
<html>
<head>
   <title>Object Tag</title>
</head>

<body bgcolor="#445466" text="#bbbbbb">


<h1>PDF Object</h1>


<object
   data="evalform1.pdf"
   type="application/pdf"
   height="700"
   width="500">
</object>


</body>
</html>
```

PDF Object

54%

Pages

COMS 359
Project #1   Name _____

Content (20 points) ____
   [ ] The project is turned in on time and in the proper format. (10)
   [ ] The information presented is consistent with and suitable for a personal homepage. All the necessary data
   are provided, and everything is adequately explained and/or detailed. (5)
   [ ] The text is free from errors in spelling, grammar, and punctuation. (5)

Structure (20 points) ____
   [ ] The site employs a distinct method of organization (e.g. linear, web, hierarchy, and/or grid). This structure
   is employed effectively and is communicated to the user through page layout, design options, and navigational
   features. (5)
   [ ] The structure employed by the site is appropriate for the content that is presented. The structure does not
   compete with or impede communication of the information. (5)
   [ ] The site is designed for user interaction and customization. The structure allows for multiple paths through
   the information and does not inappropriately limit user options. (5)
   [ ] The site does not have hypertext links that result in dead-ends, pages that link to themselves, or pages that
   do not appear when activated. (5)

Design (20 points) ____
   [ ] The site creates a consistent look and feel across all pages through use of color, graphics, and page layout
   options. (5)
   [ ] Placement of items on the page (headlines, captions, images, menus, etc.) is consistent across all pages. (5)
   [ ] Text color and layout are appropriate for the information presented and facilitate reading. The choice of
   color and layout is creative and interesting. (5)
   [ ] Images and graphics are effectively incorporated in the site, sized appropriately for the page, and aligned
   with the text and other page elements. (5)

HTML (20 points) ____
   [ ] Each page in the site demonstrates proper use of the basic HTML container tags: <HTML>, <HEAD>,
   <TITLE>, and <BODY>. (5)
   [ ] The site correctly employs hexadecimal numbers to specify font and background color. (5)
   [ ] Container and empty tags for lists, page formatting, text styles, and hypertext links are properly written and
   do not exhibit errors in syntax. (5)
   [ ] Images are in either JPEG or GIF formats and image tags are properly written to size, align, and display the
   images on the page. (5)

Presentation (20 points) ____
   [ ] The presentation of the project is organized and informative. (5)
   [ ] The presenter provides adequate description of the project's objectives, audience, and approach. (5)
   [ ] The presenter maintains effective eye contact with the audience throughout the presentation. (5)
   [ ] The presenter minimizes the um's, uh's, like's, and you-know's. (5)

Total ____

1 of 1

HTML 5 – Audio/Video

- Purpose
  - Open standard for the deliver of multimedia content over the web
  - Native support in the browser; no need for external players or plugins
- Current Status
  - HTML 5 specification released in 2009 but is still under development
  - Browser support is evolving and inconsistent; this will require some design redundancy

HTML 5 – Audio/Video

- Tags/Elements
  <audio>
  <video>
  <source>

- Valid Attributes
  src
  autoplay
  controls
  height & width
  loop
  preload
  type

HTML 5 – Audio/Video

- <audio>
  - Supported file formats – mp3, wav, ogg
  - Browser Implementation

Browser	mp3	wav	ogg
IE 9	+	-	-
Firefox	-	+	+
Chrome	+	+	+
Safari	+	+	-

HTML 5 – Audio/Video

- <video>
  - Supported file formats – mp4, ogv, WebM
  - Browser Implementation

Browser	mp4	ogv	WebM
IE 9	+	-	-
Firefox	-	+	+
Chrome	+	+	+
Safari	+	-	-
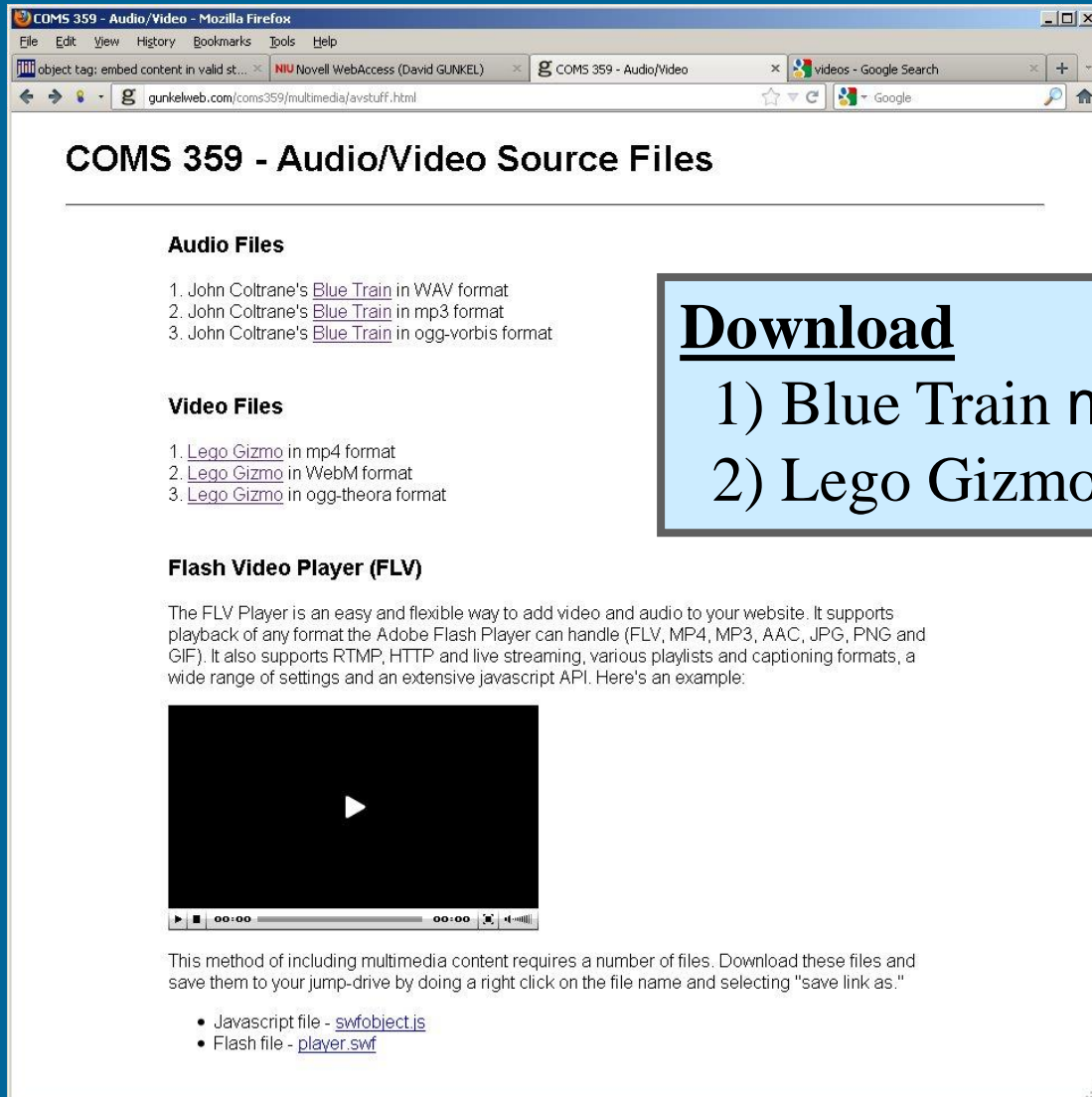
HTML 5 – Audio/Video

- Consequences

  + `<audio>` and `<video>` allow for native multimedia support in the browser using common file formats

  - Supported file formats differs across the different browsers. Implementation of the new tags remains inconsistent.

  Solution = Code and File Duplication

HTML 5 Exercise

http://gunkelweb.com/coms359/multimedia/avstuff.html

Download
1) Blue Train mp3 & ogg
2) Lego Gizmo webM & ogg

```
1   <html>
2   <head>
3     <title>HTML 5</title>
4   </head>
5
6   <body bgcolor="#555555">
7   <h1>Video with HTML 5</h1>
8
9   <p>
10  <video controls="controls"
11         autoplay="true"
12         height="335"
13         width="550">
14    <source src="gizmo.mp4"  type="video/mp4" />
15    <source src="gizmo.webm" type="video/webm" />
16    <source src="gizmo.ogv"  type="video/ogg" />
17  </video>
18  </p>
19
20  <p>
21  <audio controls="controls">
22    <source src="bluetrain.ogg" type="audio/ogg" />
23    <source src="bluetrain.mp3" type="audio/mp3" />
24  </audio>
25  </p>
26
27  </body>
28  </html>
29
```
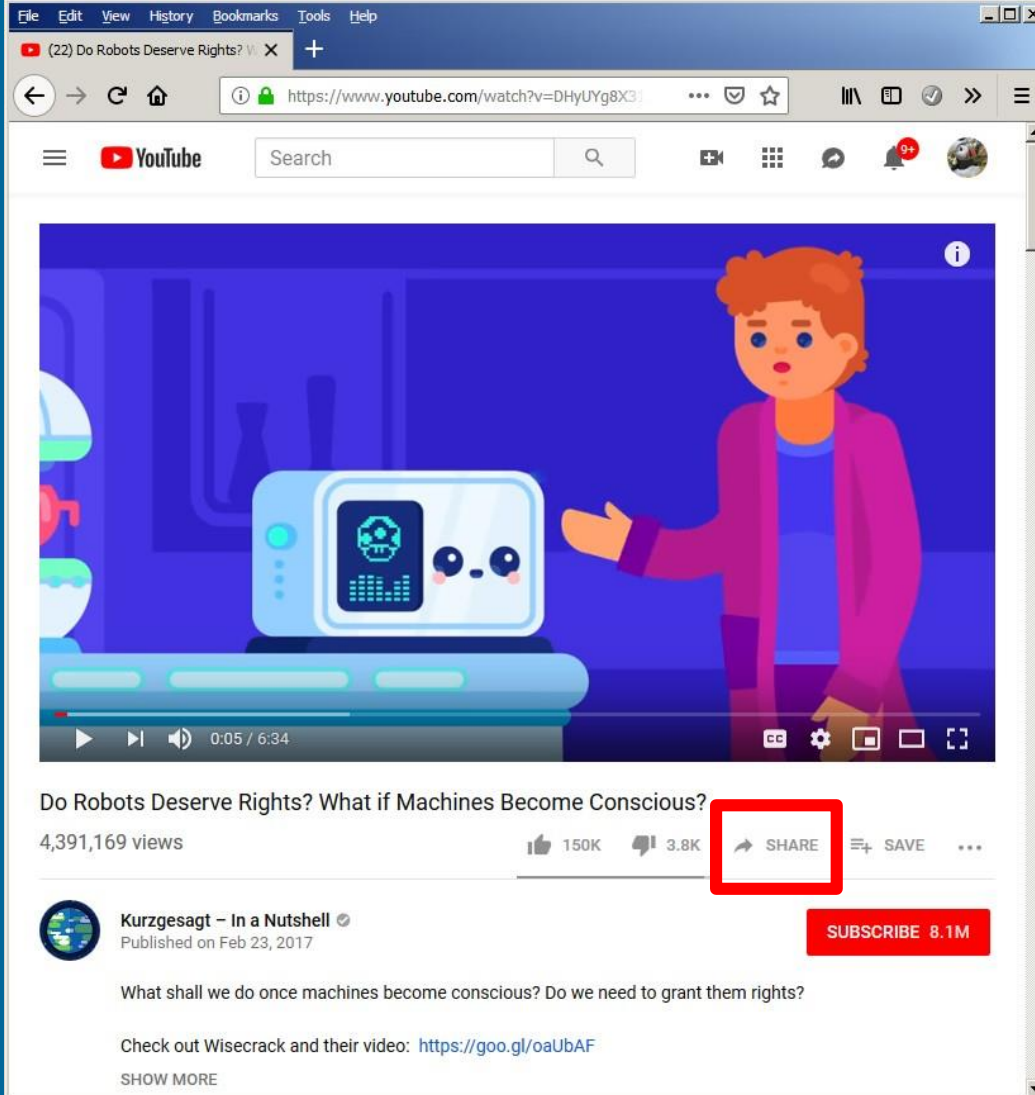
Exercise 5:
Use HTML 5 <audio>
and <video> elements

Video Tag
Exercise

```
1   <html>
2   <head>
3     <title>HTML 5</title>
4   </head>
5
6   <body bgcolor="#555555">
7   <h1>Video with HTML 5</h1>
```

Potential Problem
<audio> and <video>
will not be recognized
by older browsers

```
                        "controls"
                        "true"
                        35"
                        0">
14    <source src="gizmo.mp4"   type
15    <source src="gizmo.webm" type
16    <source src="gizmo.ogv"   type
17  </video>
18  </p>
19
20  <p>
21  <audio controls="controls">
22    <source src="bluetrain.ogg" type="audio/ogg" />
23    <source src="bluetrain.mp3" type="audio/mp3" />
24  </audio>
25  </p>
26
27  </body>
28  </html>
29
```

length : 534   lines : 29   Ln : 29   Col : 1   Sel : 0 | 0   Dos\Windows   ANSI as UTF-8   INS

HTML 5 - Windows Internet Explorer

C:\1-DavidStuff\niu-cl.   Live Search

File   Edit   View   Favorites   Tools   Help

Favorites   HTML 5

Video with HTML 5

Done   My Computer   100%

```html
1  <html>
2  <head>
3      <title>HTML 5</title>
4  </head>
5
6  <body bgcolor="#555555">
7  <h1>Video with HTML 5</h1>
8
9  <p>
10 <video controls="controls"
11        autoplay="true"
12        height="335"
13        width="550">
14   <source src="gizmo.mp4"  type="vide
15   <source src="gizmo.webm" type="vide
16   <source src="gizmo.ogv"  type="vide
17
18 It appears your browser does not support HTML5.
19 <a href="gizmo.mp4">Download</a> the video file instead.
20 </video>
21 </p>
22
23 <p>
24 <audio controls="controls">
25   <source src="bluetrain.ogg" type="audio/ogg
26   <source src="bluetrain.mp3" type="audio/mp3
27 </audio>
28 </p>
29
30 </body>
31 </html>
32
```

HTML 5 - Windows Internet Explorer

C:\1-DavidStuff\niu-cl   Live Sear

File   Edit   View   Favorites   Tools   Help

Favorites   HTML 5

Video with HTML 5

It appears your browser does not support HTML5.
Download the video file instead.

My Computer   100%

Solution
Design backwards
compatible code by
supplying an alternative,
like <a href>

```html
1  <html>
2  <head>
3    <title>HTML 5</title>
4  </head>
5
6  <body bgcolor="#555555">
7  <h1>Video with HTML 5</h1>
8
9  <p>
10 <video controls="controls"
11        autoplay="true"
12        height="335"
13        width="550">
14   <source src="gizmo.mp4"  type="video/mp4" />
15   <source src="gizmo.webm" type="video/webm" />
16   <source src="gizmo.ogv"  type="video/ogg" />
17
18 It appears your browser does not support HTML5.
19 <a href="gizmo.mp4">Download</a> the video file instead.
20 </video>
21 </p>
22
23 <p>
24 <audio controls="controls">
25   <source src="bluetrain.ogg" type="audio/ogg" />
26   <source src="bluetrain.mp3" type="audio/mp3" />
27 </audio>
28 </p>
29
30 </body>
31 </html>
32
```

Streaming Media

Streaming Media

Streaming Media

Streaming Media

```
1  <html>
2    <head>
3      <title>streaming media</title>
4    </head>
5
6  <body>
7  <h1>Streaming Media</h1>
8
9  <iframe width="560" height="315"
10           src="https://www.youtube.com/emb
11           frameborder="0" allow="acceleron
12           encrypted-media; gyroscope; pict
13           allowfullscreen></iframe>
14
15 </body>
16 </html>
17
```
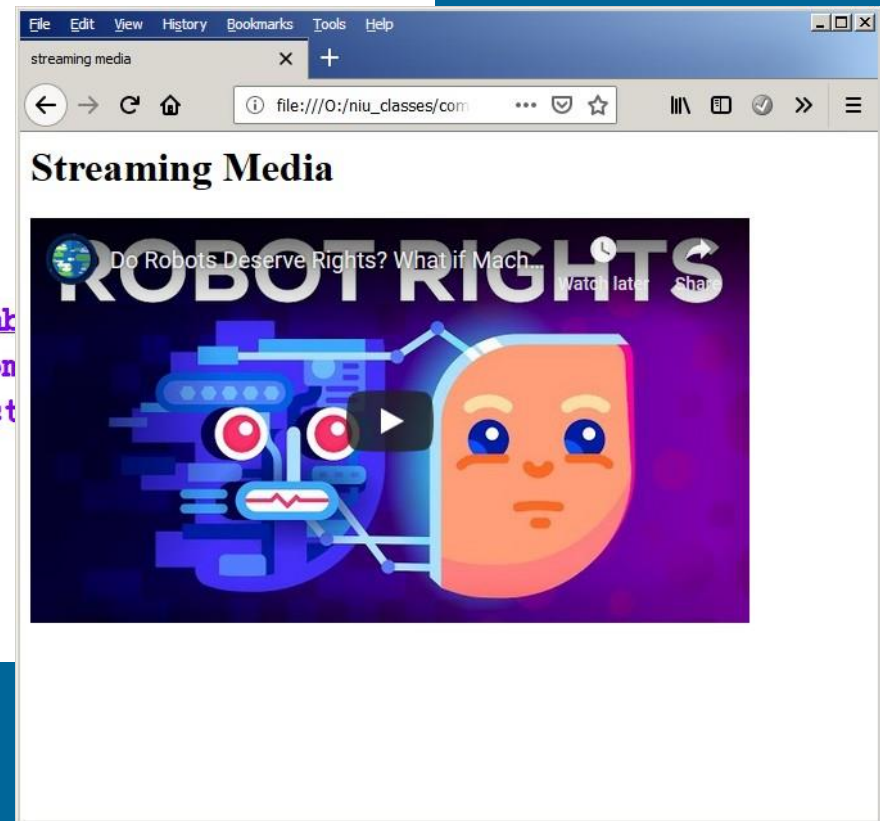
Summary

- Audio and Video file formats
- Methods for including multimedia
  - <a href>
  - <embed>
  - <object>
  - <audio> and <video>
  - streaming media

Summary

- Audio/Video
  - Project 1 must include some form of multimedia (audio or video)
  - Examples
    - Examples of your work in audio/video
    - Background music
    - Favorites – song, movie, video

Preview

- Project One – Workshop
  - Work on Project One in class