Chapter 9: Flash, Video & Audio

Introduction

Flash is a very popular technology used to add animations, video, and audio to websites. This chapter begins by looking at how to use it in your web pages. We then focus on how to add video and audio to your site, using either the new HTML5 `<video>` and `<audio>` elements or a hosted service (such as YouTube or SoundCloud). In this chapter, you will learn:

- How to use Flash in your web pages
- How to use HTML5 `<video>` and `<audio>` elements
- When to host your own video and audio and when to use a service such as YouTube

How Flash Works

Since the late 1990s, Flash has been a very popular tool for creating animations, and later for playing audio and video in websites. Whether you are creating an animation or a media player in Flash, the files you put on your website are referred to as Flash movies.

- If you want to create your own Flash movie, you need to purchase the Flash authoring environment from Adobe.
- There are, however, several companies that offer Flash animations and slideshows, as well as video and audio players that you can use without purchasing this tool.
- The Flash authoring environment is used to create Flash Movies. When you create a Flash file in the Flash authoring environment, it is saved with the `.fla` file extension. In order to use this file on a web page, it has to be saved in a different format known as SWF (with the `.swf` file extension).
- When you export the movie into SWF format, Flash creates code that you can use to embed the Flash movie in your page. Traditionally, this code used the HTML `<object>` and `<embed>` tags. However, now it is more common to use JavaScript.
- To view Flash, browsers need to use a plugin called the Flash Player. Statistics commonly indicate that 98% of browsers on desktop computers have the Flash plugin installed. (The percentage of mobiles and tablets with it is much less.)
- The `.swf` file is included in your web page using JavaScript.

Use of Flash

Since 2005, a number of factors have meant that fewer websites are written in Flash or even use elements of Flash in their pages.

- When Flash was first released, it was developed to create animations. The technology quickly evolved, however, and people started to use it to build media players and even entire websites.
- Although Flash is still very popular, in recent years people have been more selective about when they use it (and now rarely consider building an entire website in Flash).
- Despite this, Flash does have a future on the web because there are some things it does very well, such as creating animations.
- Reasons for reduced use of Flash:

- In 2005–2006, a set of JavaScript libraries were launched (including Prototype, script.aculo.us, and jQuery) which made it easier for people to create animated effects using JavaScript.
- When Apple launched the iPhone in 2007 and later the iPad in 2010, they took the decision not to support Flash.
- There have been laws introduced to ensure that websites are usable by those with visual or physical impairments – and Flash has been criticized because Flash content does not always meet accessibility requirements.
- In 2008, browsers started to support HTML5 `<video>` and `<audio>` tags. At the time of writing, Flash is still a popular way of playing video and audio on the web, but more and more people are switching to HTML5.

Timeline: Flash, Video & Audio

Web technologies change quickly. Here is a timeline of some changes in how animation, video, and audio are created on the web:

- **1995**: FutureSplash, forerunner to Flash (Animation)
- **1996**: RealAudio streaming audio (Audio)
- **1997**: Flash 4 streaming audio (Audio)
- **1998**: RealVideo streaming video (Video)
- **2000**: RealVideo 8 streaming video (Video)
- **2002**: Flash MX Flash video (Video)
- **2004**: Video sharing sites offer alternatives to self-hosting
- **2005**: YouTube launched
- **2006**: Vimeo launched
- **2007**: YouTube releases iPhone app; JavaScript libraries (jQuery, script.aculo.us, Prototype) are written to create animated effects
- **2008**: Internet Explorer 9, Firefox 3.5, Chrome 3, Safari 3.1 introduce HTML5 `<video>` and `<audio>` tags
- **2009**: Vimeo releases HTML5 player
- **2010**: YouTube releases HTML5 player; Apple releases iPhone and iPad, which don't support Flash
- **2011**: Vimeo releases iPhone app

Adding a Flash Movie to Your Web Page

The most popular way of adding Flash into a web page is using JavaScript. The script we will be looking at here is called SWFObject. You can obtain a copy of it for free from Google.

- One advantage to using this technique is that it allows browsers to show alternative content for users whose browsers are not capable of showing Flash.

- This technique uses a `<div>` element to create a space where the Flash movie should sit. The `<div>` element has an `id` attribute whose value is used by the SWFObject script. In this example, the value of the `id` attribute is `bird`.
- Inside the `<div>` element, you can place the alternative content for users who are not able to play Flash.
- The SWFObject script checks if the user's browser can play the Flash movie. If it can, the script replaces the content of the `<div>` with the `.swf` file.
- For users who cannot see the Flash movie, you could show a still from the movie instead or use a text description for accessibility and search engine indexing.

```
<!DOCTYPE html>
<html>
  <head>
    <title>Adding a Flash Movie</title>
    <script type="text/javascript" src="http://ajax.googleapis.com/ajax
       /libs/swfobject/2.2/swfobject.js"></script>
    <script type="text/javascript">
      swfobject.embedSWF("flash/bird.swf", "bird", "400", "300", "8.0.0
         ");
    </script>
  </head>
  <body>
    <div id="bird"><p>An animation of a bird taking a shower</p></div>
  </body>
</html>
```

- **Explanation**:
  - The SWFObject script is hosted on Google's servers and included using a `<script>` element.
  - The `type` attribute indicates the script is JavaScript, and the `src` attribute specifies its location.
  - The second `<script>` element provides the SWFObject script with:
    1. The location of the `.swf` file: `flash/bird.swf`
    2. The element to replace, specified by the `id` attribute: `bird`
    3. The width of the Flash movie: 400 px
    4. The height of the Flash movie: 300 px
    5. The minimum Flash Player version needed: 8.0.0

Understanding Video Formats and Players

To add video to your site, there are two key issues to understand: file formats and video players/plugins.

- **Formats**:
  - Movies are available in many formats online (e.g., AVI, Flash Video, H264, MPEG, Ogg Theora, QuickTime, WebM, Windows Media).
  - Browsers differ in supported video formats, so you may need to encode videos into another format.

    - The process of converting a video into another format is called "encoding." Tools like `www.mirovideoconverter.com` can help encode videos.
- **Players/Plugins**:
    - Older browsers (pre-2010) required players or plugins to play video, supporting specific formats.
    - Modern browsers support the HTML5 `<video>` tag, reducing the need for plugins, but require videos in different formats for compatibility.
- **Approach**:
    - The easiest way to add video is using hosted services like YouTube or Vimeo.
    - For self-hosting, use HTML5 `<video>` for modern browsers and Flash video as a fallback, providing videos in WebM and MP4 formats.

Using Hosted Video Services

- **Advantages**:
    - Hosted services provide players compatible with most browsers and handle video encoding into multiple formats.
    - Saves bandwidth costs as videos are hosted on their servers.
- **Disadvantages**:
    - Videos are available on the host's site, which may not be ideal for exclusive content.
    - Some services restrict advertising in videos or add their own ads.
    - Video quality may be limited.
- **Alternative**:
    - Self-hosting requires more setup but offers control over content and presentation.

Preparing a Flash Video for Your Site

Three steps to add a Flash Video:

1. **Convert Video to FLV Format**:
    - Use the Flash Video Encoder (included with Flash 6+ authoring environment) or alternative software to convert to FLV or H264.
2. **Find an FLV Player**:
    - Use players from sites like `www.osflv.com` or `www.longtailvideo.com`, which support FLV format and provide controls like play/pause.
3. **Include Player and Video in Your Page**:
    - Use SWFObject to embed the player and specify the video file path.

```
<!DOCTYPE html>
<html>
  <head>
    <title>Adding a Flash Video</title>
    <script type="text/javascript" src="http://ajax.googleapis.com/ajax
       /libs/swfobject/2.2/swfobject.js"></script>
```

```
    <script type="text/javascript">
      var flashvars = {};
      var params = {movie: "./videos/puppy.flv"};
      swfobject.embedSWF("flash/splayer.swf", "snow", "400", "320", "
         8.0.0", flashvars, params);
    </script>
  </head>
  <body>
    <div id="snow"><p>A video of a puppy playing in the snow</p></div>
  </body>
</html>
```

HTML5: Preparing Video for Your Pages

- **Support**: The HTML5 `<video>` element is supported by recent browsers but requires a Flash fallback for older browsers.
- **Digital Rights**: The `<video>` element does not support DRM.
- **Formats**:
  - H264: Supported by IE and Safari.
  - WebM: Supported by Android, Chrome, Firefox, Opera.
- **Controls**: Browsers provide their own controls, which can vary; JavaScript can customize them.
- **In the Browser**: HTML5 video resolves issues like inconsistent behavior with menus or window scaling.

```
<!DOCTYPE html>
<html>
  <head>
    <title>Adding HTML5 Video</title>
  </head>
  <body>
    <video src="video/puppy.mp4" poster="images/puppy.jpg" width="400"
       height="300" preload controls loop>
      <p>A video of a puppy playing in the snow</p>
    </video>
  </body>
</html>
```

- **Attributes**:
  - `src`: Path to the video (e.g., H264 format for IE/Safari).
  - `poster`: Image shown while the video loads.
  - `width`, `height`: Player size in pixels.
  - `controls`: Displays browser-provided controls.
  - `autoplay`: Plays video automatically.
  - `loop`: Replays video upon completion.
  - `preload`: Options (`none`, `auto`, `metadata`) control video loading behavior.

HTML5: Multiple Video Sources

- Use the `<source>` element inside `<video>` to specify multiple video formats, replacing the `src` attribute.
- Example: Provide MP4 (H264) first for iPad compatibility, then WebM.
- Use the `type` attribute to specify video format and codecs.

```
<!DOCTYPE html>
<html>
  <head>
    <title>Multiple Video Sources</title>
  </head>
  <body>
    <video poster="images/puppy.jpg" width="400" height="320" preload
        controls loop>
      <source src="video/puppy.mp4" type='video/mp4;codecs="avc1.42E01E
          , mp4a.40.2"' />
      <source src="video/puppy.webm" type='video/webm;codecs="vp8,
          vorbis"' />
      <p>A video of a puppy playing in the snow</p>
    </video>
  </body>
</html>
```

HTML5: Combining Flash & HTML5 Video

- Offer videos in HTML5 and Flash formats to maximize compatibility.
- Some Flash players support H264, reducing the need for FLV format.
- Advanced features include custom playback controls, resolution switching for different devices, and syncing video with page elements.

Adding Audio to Web Pages

- **MP3**: Most popular audio format.
- **Options**:
  - **Hosted Services**: Sites like SoundCloud provide embeddable players.
  - **Flash**: Flash-based MP3 players offer simple or complex functionality (e.g., playlists).
  - **HTML5**: The `<audio>` element provides browser-native controls.
- Continuous playback across pages is challenging, often requiring AJAX or a new window.

```
<!DOCTYPE html>
<html>
  <head>
    <title>Adding a Flash MP3 Player</title>
    <script type="text/javascript" src="http://ajax.googleapis.com/ajax
        /libs/swfobject/2.2/swfobject.js"></script>
    <script type="text/javascript">
      var flashvars = {};
      var params = {mp3: "audio/test-audio.mp3"};
      swfobject.embedSWF("flash/player_mp3_1.0.0.swf", "music-player",
          "200", "20", "8.0.0", flashvars, params);
    </script>
```

```
  </head>
  <body>
    <div id="music-player">
      <p>You cannot hear this track because this browser does not
         support our Flash music player.</p>
    </div>
  </body>
</html>
```

HTML5: Adding HTML5 Audio to Your Pages

- The `<audio>` element includes attributes to control playback:
  - `src`: Path to the audio file.
  - `controls`: Displays browser-provided controls.
  - `autoplay`: Plays audio automatically (not recommended).
  - `preload`: Options (`none`, `auto`, `metadata`) control audio loading.
  - `loop`: Replays audio upon completion.
- Example works in browsers supporting Ogg Vorbis (Firefox, Chrome, Opera); MP3 required for Safari/IE.

```
<!DOCTYPE html>
<html>
  <head>
    <title>Adding HTML5 Audio</title>
  </head>
  <body>
    <audio src="audio/test-audio.ogg" controls autoplay>
      <p>This browser does not support our audio format.</p>
    </audio>
  </body>
</html>
```

HTML5: Multiple Audio Sources

- Use `<source>` elements to specify multiple audio formats (e.g., MP3 for Safari/Chrome/IE9, Ogg Vorbis for Firefox/Chrome/Opera).
- The `<audio>` tag has less widespread adoption than `<video>` due to audio quality issues in early implementations.

```
<!DOCTYPE html>
<html>
  <head>
    <title>Multiple Audio Sources</title>
  </head>
  <body>
    <audio controls autoplay>
      <source src="audio/test-audio.ogg" />
      <source src="audio/test-audio.mp3" />
      <p>This browser does not support our audio format.</p>
    </audio>
  </body>
</html>
```

Example: Flash, Video & Audio

This example uses HTML5 to show a video in H264 and WebM formats, with a Flash player fallback embedded using SWFObject. If neither is supported, a text message is displayed.

```
<!DOCTYPE html>
<html>
  <head>
    <title>Flash, Video and Audio</title>
    <script type="text/javascript" src="http://ajax.googleapis.com/ajax
       /libs/swfobject/2.2/swfobject.js"></script>
    <script type="text/javascript">
      var flashvars = {};
      var params = {movie: "./videos/puppy.mp4"};
      swfobject.embedSWF("flash/splayer.swf", "snow", "400", "320", "
         9.0.0", flashvars, params);
    </script>
  </head>
  <body>
    <video poster="images/puppy.jpg" width="400" height="320" preload
       controls loop>
      <source src="video/puppy.mp4" type='video/mp4;codecs="avc1.42E01E
         , mp4a.40.2"' />
      <source src="video/puppy.webm" type='video/webm;codecs="vp8,
         vorbis"' />
      <div id="snow"><p>A video of a puppy playing in the snow</p></div
         >
    </video>
  </body>
</html>
```

Summary

- Flash allows you to add animations, video, and audio to the web.
- Flash is not supported on iPhone or iPad.
- HTML5 introduces `<video>` and `<audio>` elements for adding video and audio to web pages, but these are only supported in the latest browsers.
- Browsers that support HTML5 elements do not all support the same video and audio formats, so you need to supply files in different formats to ensure compatibility.