Tutorial 7
Working with Multimedia

HTML, CSS, and Dynamic HTML

5TH EDITION

Objectives

- Learn about sound file formats and properties
- Embed a sound clip using the `audio` element
- Embed a sound clip using the `embed` element
- Learn about video file formats and properties
- Embed a video clip using the `video` element

Objectives

- Embed a video clip using the `object` element
- Explore how to use Shockwave Flash players
- Explore how to embed YouTube videos
- Explore the history of Java
- Embed a Java applet and other Objects

Playing Web Audio

The HTML5 **audio** element displays an audio clip within the body of the Web page.

The HTML5 **source** elements define the location of the audio file. More than one source may be necessary to support all browsers.

```
<audio controls="controls">
  <source src="overture.mp3" />
  <source src="overture.ogg" />
</audio>
```

Multimedia player within the Internet Explorer browser.

The **type** attribute defines the data type of the media clip.

```
<embed src="overture.mp3" type="audio/mpeg"
width="250" height="20"
autoplay="no" controller="yes" />
```

The **embed** element is used to embed small stand-alone programs called **plug-ins** or **add-ons** that can be used to play multimedia clips.

The **attributes** are passed to the player to control its appearance and operation.

Introducing Multimedia

- **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 a Web site
  - Multimedia is much more accessible to Internet users because of high-speed internet connections and the reduction of the file size of multimedia clips

Introducing Multimedia

- Multimedia is displayed within a Web page in a fashion similar to an inline images
  - Controls are displayed as part of the Web page
  - To play a multimedia file, a browser often will have access to a plug-in or add on
  - Starting with the widespread adoption of HTML5, many browsers now include built-in support for audio and video files, removing the need for plug-ins

Exploring Digital Audio

- Every sound wave is composed of two components:
  - **Amplitude**- the height of the sound wave
    - Relates to sound's volume
  - **Frequency**- the speed at which the sound wave moves
    - Relates to sound's pitch

Exploring Digital Audio

Figure 7-2   A simple sound wave
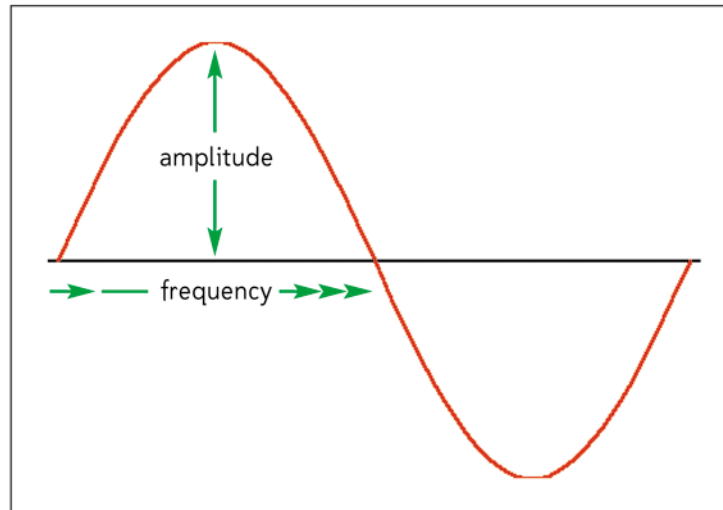
Exploring Digital Audio

- You hear sounds as a continuously varying signal

- Must be converted to digital format to store as a computer file

- Digital recording measures the sound's amplitude at discrete moments in time
  - Each measurement is called a **sample**
    - Samples per second taken is called the **sampling rate**

Exploring Digital Audio

Figure 7-3   Different sampling rates

low sampling rate

medium sampling rate

high sampling rate
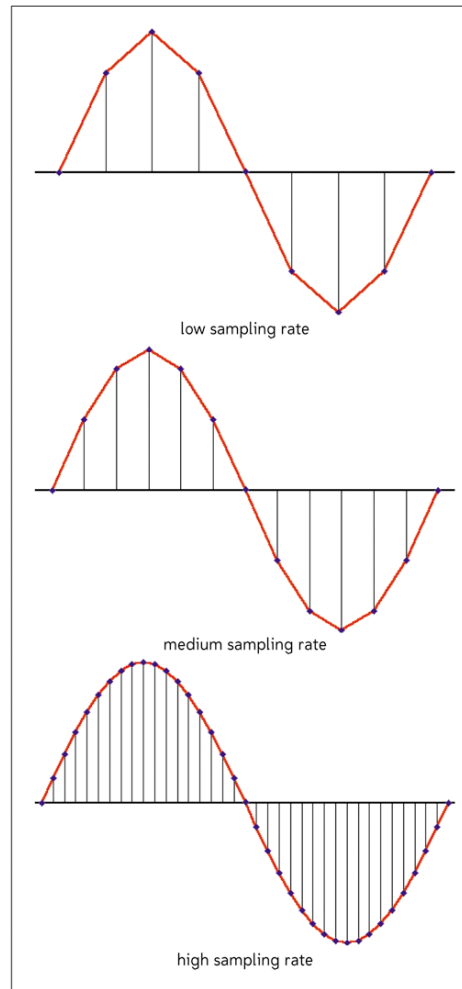
Exploring Digital Audio

- **Sampling resolution** (also called **bit depth**) indicates the precision in measuring the sound within each sample.
  - 8-bit
  - 16-bit
  - 32-bit

Exploring Digital Audio

Figure 7-4   Different sampling resolutions

low sample resolution

high sample resolution
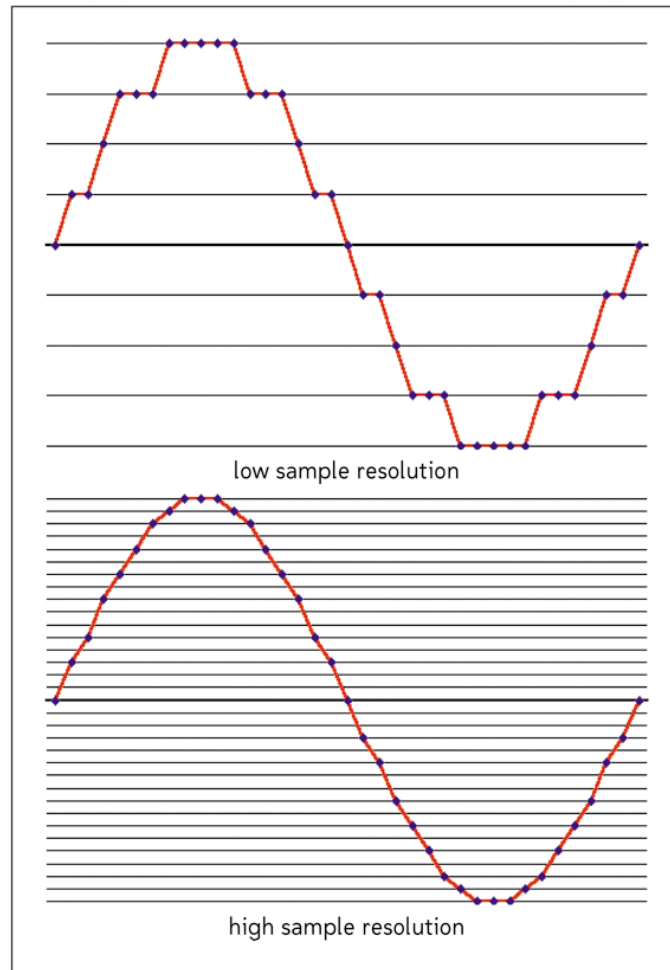
Exploring Digital Audio

- There are different sound file formats used for different operating systems.

- Different file formats provide varying levels of sound quality and **file compression**.

Exploring Digital Audio

Figure 7-5	Audio formats in HTML5

Format	Description
MP3	The most popular format for downloading and storing music, MP3 compresses sound files to roughly one-tenth the size of uncompressed files while maintaining good audio quality. However, the MP3 format is proprietary and not royalty-free, which can be a hindrance to audio distributors.
Ogg Vorbis	A file compression format designed for Web audio, Ogg Vorbis is an open source and royalty-free format. In general, Ogg Vorbis provides better sound quality than MP3, especially at lower bitrates. However, few portable players support Ogg Vorbis, while the MP3 format has almost universal support.
WAV	The original audio format for Windows PCs, WAV is commonly used for storing uncompressed CD-quality sound. In this format, a WAV file requires about 10 megabytes per minute of sound, making it impractical as a format for Web audio for all but the shortest audio clips.

Adding HTML5 Audio

- To add an audio clip under HTML5, use the `audio` element

```
<audio>

        <source src="url1" />

        <source src="url2" />

        …

</audio>
```

  where url1, url2, etc. are the possible sources of the audio clip.

Adding HTML5 Audio

Figure 7-8　Attributes of the audio element

Attribute	Description
autoplay="autoplay"	Starts playing the audio clip as soon as it is downloaded
controls="controls"	Displays the audio controls in the Web page
loop="loop"	Automatically restarts the audio clip when it is finished playing
preload="*type*"	Specifies whether the audio clip should be preloaded by the browser, where *type* is auto (to load the entire clip), metadata (to preload only descriptive data about the clip), or none (not to preload the audio clip)
src="*url*"	Specifies the source of the audio clip, where *url* is the location and name of the audio file

Figure 7-11　The audio player as rendered by different browsers

Listen Up — Internet Explorer

Listen Up — Firefox

Listen Up — Opera

Listen Up — Safari for Windows

Listen Up — Google Chrome

Listen Up — Safari for the Macintosh

Working with Embedded Objects

- Older browsers that don't support the HTML5 `audio` element instead rely on plug-ins to play embedded media clips

- To insert an embedded object such as a media player, you can nest the embed element within the `audio` element

  – Browsers recognizing the `audio` element will attempt to load the audio clip that way

Working with Embedded Objects

```
<audio src="overture.mp3">
    <embed src="overture.mp3"
    type="audio/mpeg"
    width="250" height="10"
    />
</audio>
```

Working with Embedded Objects

- The **MIME types** identify the type of data contained in the file

Figure 7-12   Audio MIME types

Format	File Extension	MIME Type
AU	.au	audio/basic
MIDI	.mid	audio/mid
MP3	.mp3	audio/mpeg
Ogg Vorbis	.ogg	audio/ogg
RealAudio	.ra	audio/x-pn-realaudio
SND	.snd	audio/basic
Shockwave Flash	.swf	application/x-shockwave-flash
WAV	.wav	audio/wav

Working with Embedded Objects

- The `src`, `type`, `height`, and `width` attributes constitute the basic HTML attributes for the embed element, but they do not specify how users interact with the embedded object

| Figure 7-15 | Attributes of the QuickTime plug-in |

Attribute	Description
`autoplay="value"`	Specifies whether the clip should start playing automatically when the page loads, where `value` equals `true` or `false`
`bgcolor="color"`	Sets the background color for the space allotted to the object
`controller="value"`	Specifies whether or not to show the object controls, where `value` equals `true` or `false`
`endtime="hh:mm:ss"`	Specifies the time in the clip at which playback ends
`href="url"`	Specifies the page to load when a user clicks on the object
`loop="value"`	Specifies whether to play the clip in a continuous loop, where `value` equals `true`, `false`, or `palindrome` (to play backward and then forward)
`src="url"`	Specifies the source of the clip
`starttime="hh:mm:ss"`	Specifies the time in the clip at which playback begins
`volume="value"`	Sets the initial audio volume, where `value` ranges from 0 to 255

Playing Web Video

HTML5 video player in Internet Explorer

Shockwave player

In Focus

Royal Wedding (1951)

HTML5 video player

Adobe Flash Player

Adobe Flash

```
<video controls="controls"
        width="280" height="240">
    <source src="rwdance.mp4" />
    <source src="rwdance.webm" />
</video>
```

The HTML5 **video** element displays a movie clip within the body of the Web page.

The HTML5 **source** elements define the location of the video file. More than one source may be necessary to support all browsers.

```
<object data="rwdance.swf"
        type="application/x-shockwave-flash"
        width="280" height="240">
    <param name="movie" value="rwdance.swf" />
    <param name="quality" value="high" />

    You need the Flash player to view this video.
</object>
```

The **object** element is used to embed objects within the Web page. A **SWF file** contains the Flash player used to play Flash video and animation.

Alternate text can be nested within the object element to be displayed by browsers that cannot display the object.

The **param** element is used to define the action and appearance of the embedded object.

Exploring Digital Video

- Digital video adds a visual element to a Web page as well as provides information

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

- Many frames are sized to have width-to-height ratios or **aspect ratios** of 4:3, though theatrical releases typically have aspect ratios of 1.85:1 or 2.39:1

- The **video bit rate**, which is the amount of data that has to be processed by the video player each second

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

Exploring Digital Video

Figure 7-19	**Video formats**			

File Format	File Extension	MIME Type	Video Codec(s)	Description
Flash Video	.flv	video/x-flv	VP6 Sorenson Spark H.264	A proprietary file format developed by Adobe to deliver video over the Internet using the popular Adobe Flash Player
MP4	.mp4	video/mpeg	MPEG-4 H.264	A widely-used proprietary format developed by Apple with versions of the H.264 codec used in all of Apple's mobile devices
Ogg Theora	.ogv	video/ogg	Theora	An open source format developed by the Xiph.org Foundation that uses the Theora codec as an alternative to the MPEG-4 codec
WebM	.webm	video/webm	VP8	An open source format introduced by Google to provide royalty-free video and audio to be used with the HTML5 video element

Adding Video in HTML5

- To add a video clip with HTML5 use

```
<video>
    <source src="url1" />
    <source src="url2" />
    …
</video>
```

where *url1, url2,* etc. are the possible sources of the video clip.

Adding Video in HTML5

Figure 7-22 Attributes of the video element

Attribute	Description
audio="muted"	Mutes the audio track of the video clip
autoplay="autoplay"	Starts playing the video clip as soon as it is downloaded
controls="controls"	Displays the video controls
height="value"	Sets the height of the video clip in pixels
loop="loop"	Automatically restarts the video clip when it is finished playing
poster="url"	Specifies the url of an image that represents the video
preload="type"	Specifies whether the video clip should be preloaded by the browser, where type is auto (to load the entire clip), metadata (to preload only descriptive data about the clip), or none (not to preload the video clip)
src="url"	Specifies the source of the video clip, where url is the location and name of the video file
width="value"	Specifies the width of the video clip in pixels

Introducing the `object` Element

- The object element was introduced in the specifications for HTML 4 for the purpose of marking any kind of nontextual content

- The object element replaced the embed element, which was widely supported though never part of the previous HTML specifications released by the W3C

```
<object attributes>
     parameters
</object>
```

Introducing the `object` Element

Figure 7-26 Attributes of the object element

Attribute	Description
`data="url"`	Specifies the source of the file used in the object
`form="name"`	Specifies the name of the form that the object belongs to (HTML5)
`height="value"`	Sets the height of the object in pixels
`name="name"`	Provides a unique name for the object
`type="mime"`	Identifies the MIME type of the data within the object
`usemap="url"`	Associates the object with a client-side image map
`width="value"`	Sets the width of the object in pixels

Adding a Flash Player File

- To add a Flash player (.swf) file, use the object element

```
<object data="url"
      type="application/x-shockwave-
      flash" width="value"
      height="value">
      <param name="movie" value="url" />
      parameters
</object>
```

- where *url* is the location and filename of the SWF file, and *parameters* is other parameter elements that manage the appearance and actions of the player

Adding a Flash Player File

Figure 7-28 Parameters of the Flash player

Name	Value(s)	Description
bgcolor	#rrggbb | color name	Sets the background color of the Flash player
flash-var	text	Contains text values that are passed to the Flash player as variables to control the behavior and content of the movie
id	text	Identifies the embedded Flash movie so that it can be referenced
loop	true | false	Plays the movie in a continuous loop
menu	true | false	Displays the full Flash popup when a user right-clicks the movie
name	text	Names the embedded Flash movie so that it can be referenced
play	true | false	Starts playing the movie automatically when the page loads
quality	low | autolow | autohigh | medium | high | best	Sets the playback quality of the movie; low values favor playback speed over display quality; high values favor display quality over playback speed
scale	showall | noborder | exactfit	Defines how the movie clip is scaled within the defined space; a value of showall makes the entire clip visible in the specified area without distortion; a value of noborder scales the movie to fill the specified area, without distortion but possibly with some cropping; a value of exactfit makes the entire movie visible in the specified area without trying to preserve the original aspect ratio
wmode	window | opaque | transparent	Sets the appearance of the Flash player against the page background; a value of window causes the movie to play within its own window in the page; a value of opaque hides everything in the page behind the clip; a value of transparent allows the page background to show through transparent colors in the movie

Embedding Videos from YouTube

- YouTube videos are embedded using either the YouTube Shockwave Flash player file (.swf) or, depending on each user's device and playing preferences, an HTML5 video player.

```
<object width="value" height="value">
        <param name="movie" value="url" />
        parameters
        <embed src="url"
        type="application/x-shockwave-
        flash" width="value"
        height="value" parameters />
</object>
```

Embedding Videos from YouTube

Figure 7-33	Parameters of the YouTube player

Parameter	Default Value	Description
autoplay=0|1	0	Indicates whether to play the video automatically (1) or to wait for the user to press the play button (0)
controls=0|1	1	Removes the player controls (0) or displays them (1)
fs=0|1	0	Enables the user to play the video full screen (1) or not (0)
hd=0|1	0	Causes the high-definition version of the video to play (1) or not (0)
loop=0|1	0	Sets the video to repeat (1) or to play only once (0)
playlist=$list$		Plays a list of videos, where list is a comma-separated list of videos
rel=0|1	1	Indicates whether to display a $list$ of related YouTube videos (1) or to disable that feature (0)
start=$value$		Starts the video playback $value$ seconds into the video

The `object` Element and ActiveX

- Internet Explorer supports a technology called ActiveX to play embedded media

- **ActiveX** employs reusable software components that can be run from within a variety of Windows programs

- Each ActiveX component is identified by a unique string of characters called the class id.

The `object` Element and ActiveX

Figure 7-34 ActiveX class ids

| ActiveX Control	Class id
Flash Shockwave Player	D27CDB6E-AE6D-11cf-96B8-444553540000
QuickTime Player	02BF25D5-8C17-4B23-BC80-D3488ABDDC6B
RealAudio Player	CFCDAA03-8BE4-11cf-B84B-0020AFBBCCFA
Windows Media Player	6BF52A52-394A-11d3-B153-00C04F79FAA6
Java applet	8AD9C840-044E-11D1-B3E9-00805F499D93

The codebase Attribute

- When a browser encounters a plug-in or an ActiveX control that it doesn't recognize, it usually leaves a blank space where the embedded object normally would appear

- One way of dealing with this problem is to provide browsers with information about where a working version of the plug-in or control can be downloaded

The codebase Attribute

```
<object classid="clsid:02BF25D5-
    8C17-4B23-BC80-D3488ABDDC6B"
    codebase="http://www.apple.co
    m/qtactivex/qtplugin.cab">
    parameters
</object>
```

Embedding an Applet
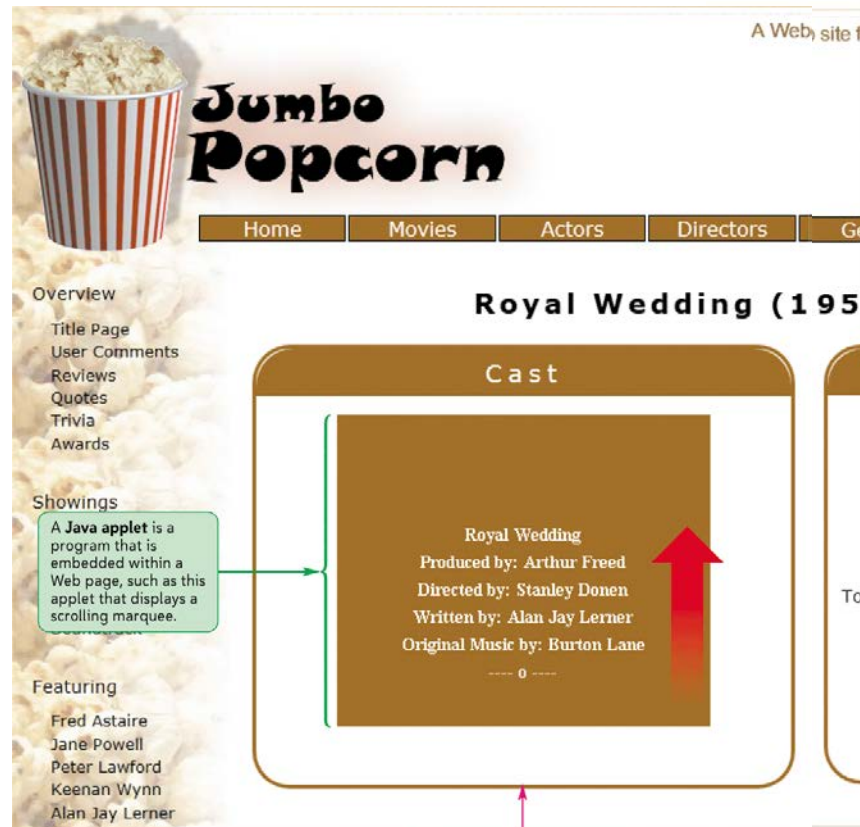

```
<object type="application/x-java-applet"
                    width="250" height="250">
  <param name="code" value="CreditRoll.class" />

  <param name="fontsize" value="14" />
  <param name="bgcolor" value="A27029" />
  <param name="textcolor" value="FFFFFF" />
  <param name="text1" value="Royal Wedding" />
  <param name="text2" value="Produced by: Arthur Freed" />
  ...

  Tom Bowen ... Fred Astaire<br />
  Ellen Bowen ... Jane Powell<br />
  Lord John Brindale ... Peter Lawford<br />
  Anne Ashmond ... Sarah Churchill<br />
  Irving Klinger ... Keenan Wynn<br />
  Edgar Klinger ... Keenan Wynn<br />
  James Ashmond ... Albert Sharpe

  <br /><br />
  To view a scrolling marquee, get the latest
  <a href="http://java.sun.com/products/plugin/downloads">
      Java Plug-in.
  </a>
</object>
```

The **object element** contains the CreditRoll.class applet embedded within the Web page.

Parameters for the applet are defined using the param element.

Nested within the object element is **alternate content** that is displayed by browsers that do not support Java.

A **Java applet** is a program that is embedded within a Web page, such as this applet that displays a scrolling marquee.

Java applet displayed by browsers that support Java.

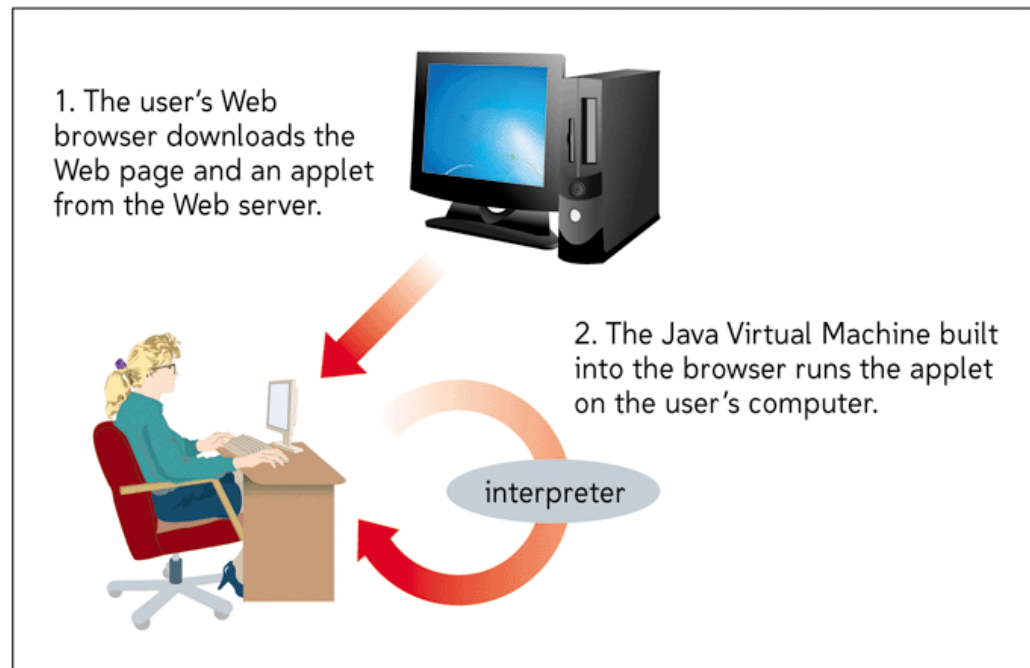Content displayed by browsers that don't support Java.

graphit/Shutterstock.com
Gl0ck/Shutterstock.com

Introducing Java

- Oak was developed by Sun Microsystems as an operating system intended to be used by common appliances and devices

- Oak was renamed **Java** in 1995

- Each Java program works with a **Java Virtual Machine (JVM)**

Applets and Java Virtual Machines

Figure 7-35   Applets and Java Virtual Machines

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

2. The Java Virtual Machine built into the browser runs the applet on the user's computer.

interpreter

Applets

- **Applets** are displayed as embedded objects on a Web page

- Several libraries of Java applets are available

- The popularity of Java has declined in recent years as more and more of its features can be duplicated with Flash or JavaScript

- The programming enhancements provided with HTML5 also will result in an even more reduced need for Java

Working with Java Applets

- To embed a Java applet, use the object element

```
<object type="application/x-java-
        applet"
                width="value" height="value">
        <param name="code" value="url" />
        parameters
</object>
```

where the *width* and *height* attributes define the dimensions of the applet window, *url* specifies the location and filename of the Java file (usually the class file), and *parameters* represents the parameters associated with running the applet.

Inserting Java Parameters

Figure 7-37 Parameters of the CreditRoll.class

Parameter	Description
bgcolor	The background color of the applet window, expressed as a hexadecimal color value
fadezone	The text in the applet window fades in and out as it scrolls; this parameter sets the size of the area in which the text fades (in pixels)
textcolor	The color value of the text in the applet window
font	The font used for the scrolling text in the applet window
textx	Each line of text in the applet window requires a separate textx parameter, where x is the line number; for example, the parameter text1 sets the text for the first line in the applet window, text2 sets the text for the second line in the applet window, and so forth
url	Specifies the Web page that is opened if the applet window is clicked
repeat	Specifies whether the text in the applet window is repeated; setting this parameter's value to yes causes the text to scroll continuously
speed	The speed at which the text scrolls, expressed in milliseconds between each movement
vspace	The space between each line of text, in pixels
fontsize	The point size of the text in the applet window

Embedding Other Objects

- Inline images
- HTML files

Figure 7-43 | Embedded object containing external page