11. HTML5, HTML Graphics, HTML Media

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HTML5 Introduction

- **What is New in HTML5?**
  - DOCTYPE declaration for HTML5 is very simple
  - The character encoding (charset) declaration is also very simple
    - The default character encoding in HTML5 is UTF-8

```html
<!DOCTYPE html>
<html>
<head>
<meta charset="UTF-8">
<title>Title of the document</title>
</head>

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

</html>
```

HTML5 Introduction (cont'd)

- **New HTML5 Elements**
  - New **semantic** elements
    - <header>, <footer>, <article>, and <section>
  - New form **control attributes**
    - Number, date, time, calendar, and range.
  - New **graphic** elements
    - <svg> and <canvas>
  - New **multimedia** elements
    - <audio> and <video>

- **New HTML5 API's (Application Programming Interfaces)**
  - HTML Geolocation, HTML Drag and Drop, HTML Local Storage, HTML Web Workers, HTML SSE

HTML5 Introduction (cont'd)

HTML History

Version	Year
Tim Berners-Lee invented www	1989
Tim Berners-Lee invented HTML	1991
Dave Raggett drafted HTML+	1993
HTML Working Group defined HTML 2.0	1995
W3C Recommended HTML 3.2	1997
W3C Recommended HTML 4.01	1999
W3C Recommended XHTML 1.0	2000
HTML5 WHATWG First Public Draft	2008
HTML5 WHATWG Living Standard	2012
HTML5 W3C Final Recommendation	2014

HTML5 Semantic Elements

- **What are Semantic Elements?**
  - A semantic elements clearly describes its meaning to both the browser and the developer
    - Semantic = Meaning
    - Semantic elements = Elements with meaning
  - Examples of non-semantic elements : <div>, <span>
  - Examples of semantic elements : <form>, <table>, and <img>

- **Browser Support**

HTML5 Semantic Elements (cont'd)

🔹 **New Semantic Elements in HTML5**

- 🟠 Many web sites contain HTML code like : <div id="nav"> <div class="header"> <div="footer"> to indicate navigation, header, and footer

- 🟠 HTML5 offers new semantic elements to define different parts of a web page :

  - ▪ <article>, <aside>, <details>, <figcaption>, <figure>, <footer>, <header>, <main>, <mark>, <nav>, <section>, <summary>, <time>

HTML5 Semantic Elements (cont'd)

- **HTML5 <section> Element** *Try it!*
  - Defines a section in a document.
  - According to W3C's HTML5 document
    - "A section is a thematic grouping of content, typically with heading."

- **HTML5 <article> Element** *Try it!*
  - Specifies independent, self-contained content
  - Examples : Forum post, Blog post, Newspaper article

- **HTML5 <header> Element** *Try it!*
  - Specifies a header for a document or section
  - Should be used as a container for introductory content
  - Can have several <header> elements in one document

HTML5 Semantic Elements (cont'd)

- **HTML5 <footer> Element**   *Try it!*
  - Specifies a footer for a document or section
  - Should contain information about its containing element
  - Typically contains the author of the document, copyright information, links to terms of use, contact information, etc
  - Can have several <footer> elements in one document

- **HTML5 <nav> Element**   *Try it!*
  - Defines a set of navigation links

- **HTML5 <aside> element**   *Try it!*
  - Defines some content aside from the content it is placed in (like a sidebar)
  - Should be related to the surrounding content

HTML5 Semantic Elements (cont'd)

- **HTML5 <figure> and <figcaption> Elements**   *Try it!*
  - With HTML5, images and captions can be grouped together in **<figure>** elements
  - **<img>** element defines the image, the **<figcaption>** element defines the caption.

- **Why Semantic HTML5 Elements?**
  - With HTML4, developers used their own favorite attribute names to style page elements
  - This made it impossible for search engines to identify the correct web page content.
  - With HTML5 elements like : <header> <footer> <nav> <section> <article>, this will become easier.
  - According to the W3C, a Semantic Web :
    - "Allows data to be shared and reused across applications, enterprises, and communities."

HTML5 Semantic Elements (cont'd)

🔷 Semantic Elements in HTML5   *HTML5 Reference*

Tag	Description
<article>	Defines an article
<aside>	Defines content aside from the page content
<details>	Defines additional details that the user can view or hide
<figcaption>	Defines a caption for a <figure> element
<figure>	Specifies self-contained content, like illustrations, diagrams, photos, code listings, etc.
<footer>	Defines a footer for a document or section
<header>	Specifies a header for a document or section
<main>	Specifies the main content of a document
<mark>	Defines marked/highlighted text
<nav>	Defines navigation links
<section>	Defines a section in a document
<summary>	Defines a visible heading for a <details> element
<time>	Defines a date/time

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HTML5 Canvas

- **What is HTML Canvas?**
  - The HTML <canvas> element is used to draw graphics, on the fly via scripting (usually JavaScript)
  - Has several methods for drawing paths, boxes, circles, text, and adding images

- **Browser Support**
  - The numbers in the table specify the first browser version that fully supports the <canvas> element.

Element					
<canvas>	4.0	9.0	2.0	3.1	9.0

HTML5 Canvas (cont'd)

Canvas Examples

- A canvas is a rectangular area on an HTML page
- By default, a canvas has no border and no content

  ```
  <canvas id="myCanvas" width="200" height="100"> </canvas>
  ```

- **Note :** Always specify an id attribute (to be referred to in a script), and a width and height attribute to define the size of the canvas
- *Basic Canvas Example , Drawing with JavaScript , Draw a Line, Draw a Circle, Draw a Text, Stroke Text, Draw Linear Gradient, Draw Circular Gradient, Draw Image*

HTML5 SVG

- **What is SVG?**
  - Scalable Vector Graphics
  - Used to define graphics for the Web
  - W3C recommendation

- **The HTML <svg> Element**
  - A container for SVG graphics
  - SVG has several methods for drawing paths, boxes, circles, text, and graphic images

- **Browser Support**

Element					
<svg>	4.0	9.0	3.0	3.2	10.1

HTML5 SVG (cont'd)

- **SVG Circle**   *Try it!*

- **SVG Rectangle**   *Try it!*

- **SVG Rounded Rectangle**   *Try it!*

- **SVG Star**   *Try it!*

- *SVG Logo*   *Try it!*

HTML5 SVG (cont'd)

🔹 **Comparison of Canvas and SVG**

Canvas	SVG
• Resolution dependent • No support for event handlers • Poor text rendering capabilities • You can save the resulting images as .png or .jpg • Well suited for graphics-intensive game	• Resolution independent • Support for event handlers • Best suited for applications with large rendering area (Google Maps) • Slow rendering if complex (anything that uses the DOM a lot will be slow) • Not suited for game applications

HTML Multimedia

🔹 **What is Multimedia?**

- Can be almost anything you can hear or see.
- Examples : Pictures, music, sound, videos, records, films, animations, and more
- Web pages often contains multimedia elements of different types and formats

🔹 **Multimedia Formats**

- Multimedia elements (like sounds or videos) are stored in media files.
- Multimedia files have their own formats and different extensions like : .swf, .waf, .mp3, .mp4, .mpg, .wmv, and .avi

HTML Multimedia (cont'd)

Common Video Formats

Format	File	Description
MPEG	.mpg .mpeg	MPEG. Developed by the Moving Pictures Expert Group. The first popular video format on the web. Used to be supported by all browsers, but it is not supported in HTML5 (See MP4).
AVI	.avi	AVI (Audio Video Interleave). Developed by Microsoft. Commonly used in video cameras and TV hardware. Plays well on Windows computers, but not in web browsers.
WMV	.wmv	WMV (Windows Media Video). Developed by Microsoft. Commonly used in video cameras and TV hardware. Plays well on Windows computers, but not in web browsers.
QuickTime	.mov	QuickTime. Developed by Apple. Commonly used in video cameras and TV hardware. Plays well on Apple computers, but not in web browsers. (See MP4)
RealVideo	.rm .ram	RealVideo. Developed by Real Media to allow video streaming with low bandwidths. It is still used for online video and Internet TV, but does not play in web browsers.
Flash	.swf .flv	Flash. Developed by Macromedia. Often requires an extra component (plug-in) to play in web browsers.
Ogg	.ogg	Theora Ogg. Developed by the Xiph.Org Foundation. Supported by HTML5.
WebM	.webm	WebM. Developed by the web giants, Mozilla, Opera, Adobe, and Google. Supported by HTML5.
MPEG-4 or MP4	.mp4	MP4. Developed by the Moving Pictures Expert Group. Based on QuickTime. Commonly used in newer video cameras and TV hardware. Supported by all HTML5 browsers. Recommended by YouTube.

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HTML Multimedia (cont'd)

Sound Formats

Format	File	Description
MIDI	.mid .midi	MIDI (Musical Instrument Digital Interface). Main format for all electronic music devices like synthesizers and PC sound cards. MIDI files do not contain sound, but digital notes that can be played by electronics. Plays well on all computers and music hardware, but not in web browsers.
RealAudio	.rm .ram	RealAudio. Developed by Real Media to allow streaming of audio with low bandwidths. Does not play in web browsers.
WMA	.wma	WMA (Windows Media Audio). Developed by Microsoft. Commonly used in music players. Plays well on Windows computers, but not in web browsers.
AAC	.aac	AAC (Advanced Audio Coding). Developed by Apple as the default format for iTunes. Plays well on Apple computers, but not in web browsers.
WAV	.wav	WAV. Developed by IBM and Microsoft. Plays well on Windows, Macintosh, and Linux operating systems. Supported by HTML5.
Ogg	.ogg	Ogg. Developed by the Xiph.Org Foundation. Supported by HTML5.
MP3	.mp3	MP3 files are actually the sound part of MPEG files. MP3 is the most popular format for music players. Combines good compression (small files) with high quality. Supported by all browsers.
MP4	.mp4	MP4 is a video format, but can also be used for audio. MP4 video is the upcoming video format on the internet. This leads to automatic support for MP4 audio by all browsers.

HTML5 Video

- **Playing Videos in HTML**
  - Before HTML5, there was no standard for showing videos on a web page.
  - Before HTML5, videos could only be played with a plug-in (like flash).
  - The HTML5 <video> element specifies a standard way to embed a video in a web page.

- **Browser Support**

Element					
<video>	4.0	9.0	3.5	4.0	10.5

HTML5 Video (cont'd)

🔹 **The HTML <video> Element**   *Try it!*

🔹 **How it Works**

- The **controls** attribute adds video controls, like play, pause, and volume
- Text between the <video> and </video> tags will only display in browsers that do not support the <video> element.
- Multiple **<source>** elements can link to different video files. The browser will use the first recognized format.

🔹 **HTML <video> Autoplay**   *Try it!*

HTML5 Video (cont'd)

HTML Video – Browser Support

- Currently, there are 3 supported video formats for the <video> element : MP4, WebM, and Ogg

Browser	MP4	WebM	Ogg
Internet Explorer	YES	NO	NO
Chrome	YES	YES	YES
Firefox	YES	YES	YES
Safari	YES	NO	NO
Opera	YES (from Opera 25)	YES	YES

HTML5 Video (cont'd)

🔷 **HTML Video – Media Types**

File Format	Media Type
MP4	video/mp4
WebM	video/webm
Ogg	video/ogg

🔷 **HTML Video – Methods, Properties, and Events**   *Try it!*

- 🔶 HTML5 defines DOM methods, properties, and events for the <video> element.
- 🔶 *HTML5 Audio/Video DOM Reference*

HTML5 Video (cont'd)

🔷 **HTML5 Video Tags**

Tag	Description
<video>	Defines a video or movie
<source>	Defines multiple media resources for media elements, such as <video> and <audio>
<track>	Defines text tracks in media players

HTML5 Audio

Audio on the Web

- Before HTML5, there was no standard for playing audio files on a web page.
- Before HTML5, audio files could only be played with a plug-in (like flash).
- The HTML5 <video> element specifies a standard way to embed a audio in a web page.

Browser Support

Element	⬤	℮	🦊	⬤	O
<audio>	4.0	9.0	3.5	4.0	10.5

HTML5 Audio (cont'd)

📦 **The HTML <audio> Element** *Try it!*

📦 **How it works**

- The **controls** attribute adds audio controls, like play, pause, and volume
- Text between the <audio> and </audio> tags will only display in browsers that do not support the <audio> element.
- Multiple **<source>** elements can link to different audio files. The browser will use the first recognized format.

HTML5 Audio (cont'd)

- ## HTML Audio – Browser Support
  - Currently, there are 3 supported file formats for the <audio> element : MP3, Wav, and Ogg

Browser	MP3	Wav	Ogg
Internet Explorer	YES	NO	NO
Chrome	YES	YES	YES
Firefox	YES	YES	YES
Safari	YES	YES	NO
Opera	YES	YES	YES

HTML5 Audio (cont'd)

- **HTML Audio – Media Types**

File Format	Media Type
MP3	audio/mpeg
Ogg	audio/ogg
Wav	audio/wav

- **HTML Audio – Methods, Properties, and Events**
  - *HTML5 Audio/Video DOM Reference*

HTML5 Audio (cont'd)

HTML5 Audio Tags

Tag	Description
<audio>	Defines sound content
<source>	Defines multiple media resources for media elements, such as <video> and <audio>