

A conceptual illustration of a computer monitor displaying a collage of various images, including a soccer ball, a polar bear, a businessman, a firefighter, a hand holding a globe, and a hand holding a smartphone, symbolizing the integration of technology and diverse fields.

Title: Web Gallery Using Flash
By: Ali Akbary

Chapter 1 Introduction to Web

Learning Outcome

Objectives of this chapter are: -

- What is the web?
- What is the web site?

Introduction to Web

The technology-triggered paradigm shift in the delivering of goods in the libraries is a phenomenon of the past. These developments are principally digitization and related issues like online journals and their management, communication skills including technical writing, e-publishing, Web page hosting, institutional repositories, metadata standards, sharing, networking, storage solutions, knowledge management, automation and so on.



Figure 1 web evolution

Web 1.0 and Web 2.0 refer to eras in the history of the World Wide Web as it evolved through various technologies and formats. Web 1.0 refers roughly to the period from 1991 to 2004, where most sites consisted of static pages, and the vast majority of users

were consumers, not producers, of content. Web 2.0 is based around the idea of "the web as platform" and centers on user-created content uploaded to forums, social media and networking services, blogs, and wikis, among other services. Web 2.0 is generally considered to have begun around 2004 and continues to the current day.

The Web has been playing a very crucial role in communication and delivery of information. The latest in this field has been application of Web 2.0 and Web3.0. Web 2.0, also known as Library 2.0, is user-centered Web, where blogs, wikis, social networks, multimedia applications, dynamic programming scripts are being used for collection, contribution and collaboration on the Web. The underlying principle is sharing the resources collectively. Emergence of Web 2.0 has placed in the hands of Librarians new tools in modernizing library services.

Web 3.0 is knocking at the door! Web 3.0 is the latest Internet technology that leverages machine learning, artificial intelligence, and blockchain to achieve real-world human communication. The icing on the cake is that web 3.0 not only allows individuals to own their data but they will be compensated for their time spent on the web.

Web 3.0 also known as semantic Web, is smarter and can understand what you want. The searcher no longer needs to wade through a plethora of information or filter out search results but gets the target information straight by working on a combination of information based on his requirement as he understands and preferences, he wants i.e., one needs to be less specific and more natural with his queries. This technology should aid the users obtain answers faster and accurately.

WHAT IS THE WEB

The Web is another very powerful communication mode of recent origin. It has turned out to be an increasingly important resource of encompassing all conceivable aspects of human life like business, education, entertainment, governance, personal life, health and etc.

Web sites are hosted by anyone including individuals, organizations, business enterprises, and voluntary organizations etc., who have an interest in telling the world about themselves or about their products/services.

While most Web sites are free, some are fee-based (subscription-based) for navigation. In case of the latter, the accesses to some or all of the contents are restricted by password. Such include business, academic journal, and entertainment Web sites.

Web sites can be generally categorized as: -

- Personal Web sites
- Commercial Web sites
- Organizational including government and non-profit organization Web sites
- Entertainment Web sites

Personal Web sites

An individual can keep in touch with his close ones, seeks jobs or expresses himself through a Web site. Web pages are also meaning of not only sharing but also finding out about other individuals, their culture, interests and life.



Figure 2 Personal website example

Business Web sites

Business/commercial enterprises make good use of the Web to promote their business. They publish their products /services to millions of potential customers globally and at no extra cost for the additional target audience that emerge from time to time. It is done 24 hours a day, seven days a week in various languages as they choose.

Unlike print materials the Web pages put into use multimedia and that too in color at no extra cost. They can update prices, and the latest news, faster, easier and at much cheaper rate compared to brochures/ leaflets traditionally used. Web pages of other/ similar products or advertisers or advertising campaigns can be linked to their pages. The Web is also used as an extra outlet for sales. Web sites place all, big or small, on equal footing as the reach of one's Web is as good as that of any competitor.

The business/commercial Web sites are freely accessible to all. However, they need not be so, if they wished. They can be restricted by use password. Those that are on private networks are invariably inaccessible to outsiders.

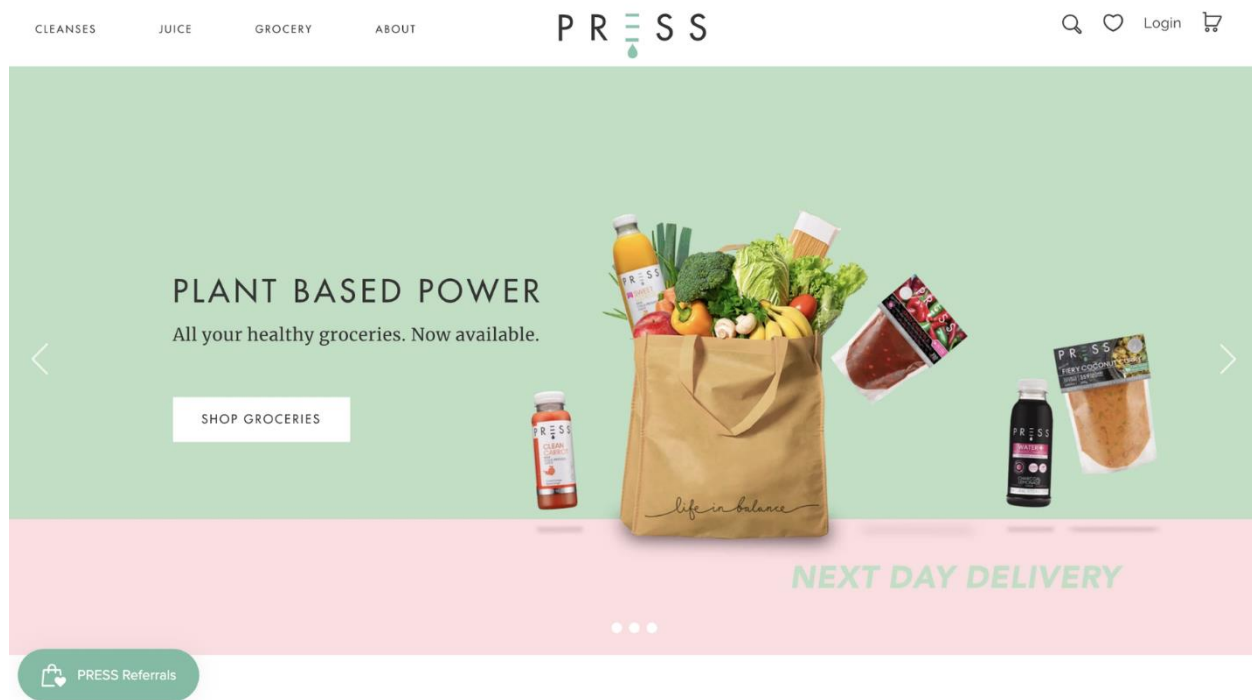


Figure 3 Business Website example

Organizational including Government and Non-profit Organization Web Sites

Organizations, including governmental or volunteer groups, use the Web to promote their causes like education, social issues, health or for that matter any filed conceivable.

For instance, let us take the case of the University whose objective is promotion of education. It uses its Web site to reach out to the students, their parents, and teaching and staff community. The Web page functions as a much superior and cheaper alternative to the brochure informing about the university, location, organizational structure, departments, and programs. The latest news pertaining to exam results, time-table, admissions, convocations, and circulars to staff are made available on its Web site. Advertisements and tender notices find the Web as the most favorite location which, at times, provides for applying online.

The public relations activities are also carried out through the Web. The Voice/Video message, photo galleries, contact details, Frequently Asked Questions (FAQs), information on collaboration with other organizations are some instances of public relations activities that appear on the site. Links provided useful or allied sites lead a user to similar or related services provided by other organizations.

It has also provided access to University's digital library, classroom teaching, video lectures, audio lectures and study materials. Besides, the information on the site can be

browsed in more than one language. Thus, the advantages of Web site vis-a-vis the traditional print system is tremendous.

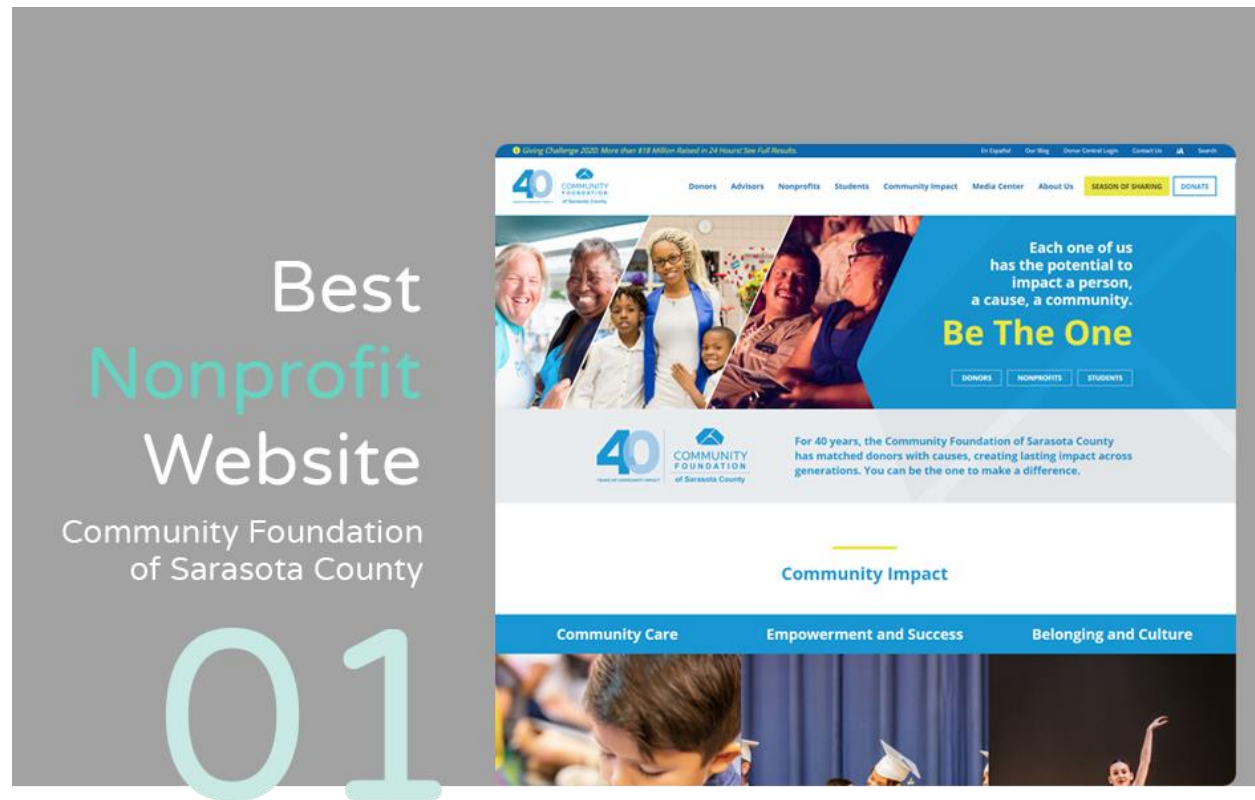


Figure 4 Organizational website example

Entertainment Web sites

Entertainment sites are heralding an important development in the Web field as it is very often seen as the only reason for people, especially the youth, to use the Web. These may be cinemas, games, music, humor pages and etc. For this reason, entertainment sites are deemed as the most demanding ones.

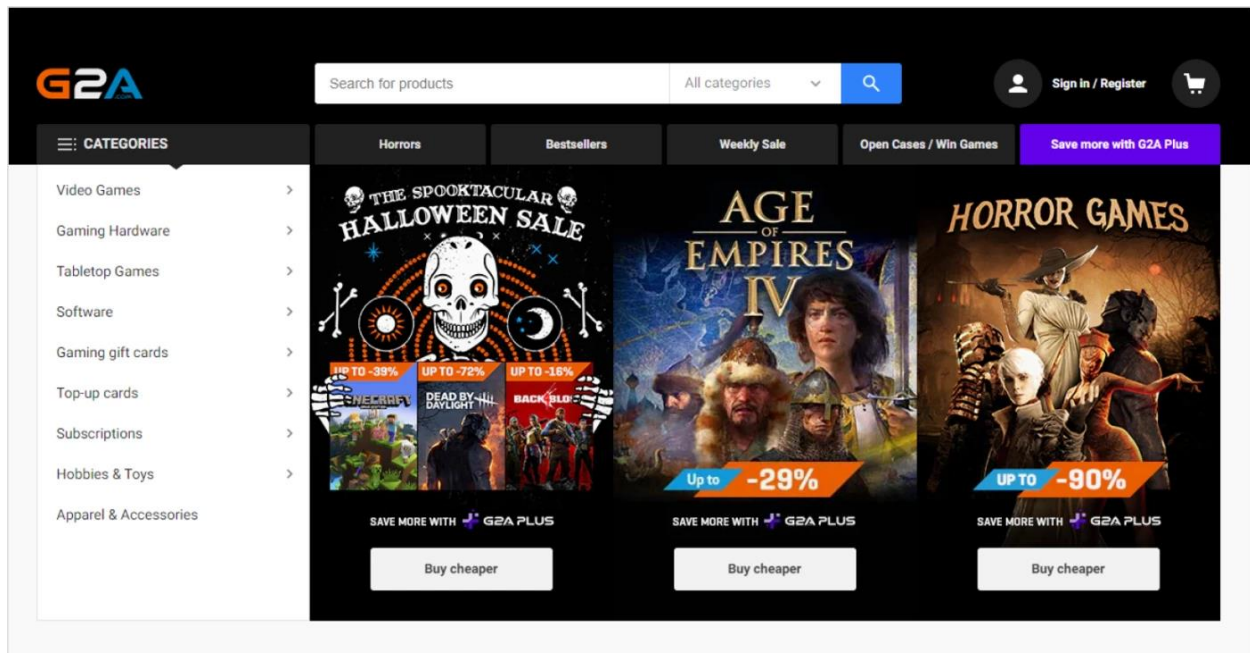


Figure 5 Entertainment website example

WHAT IS A WEB SITE?

According to Wikipedia a Web site is a collection of related Web pages, images, videos or other digital assets that are addressed relative to a common Uniform Resource Locator (URL), often consisting of only the domain name, or the IP address, and the root path in an Internet Protocol-based network.



Figure 6 Web example

A Web site is hosted on at least one Web server, accessible via a network such as the Internet or a private local area network.

Web site is a site or set of files stored on the World Wide Web. It is viewed with a browser like Microsoft Internet Explorer, google, Firefox, Safari, Netscape and etc.

Each Web site contains a home page, the main page which users see when they enter the site. The web sites are owned and managed by individuals or organizations or companies to promote their interests.

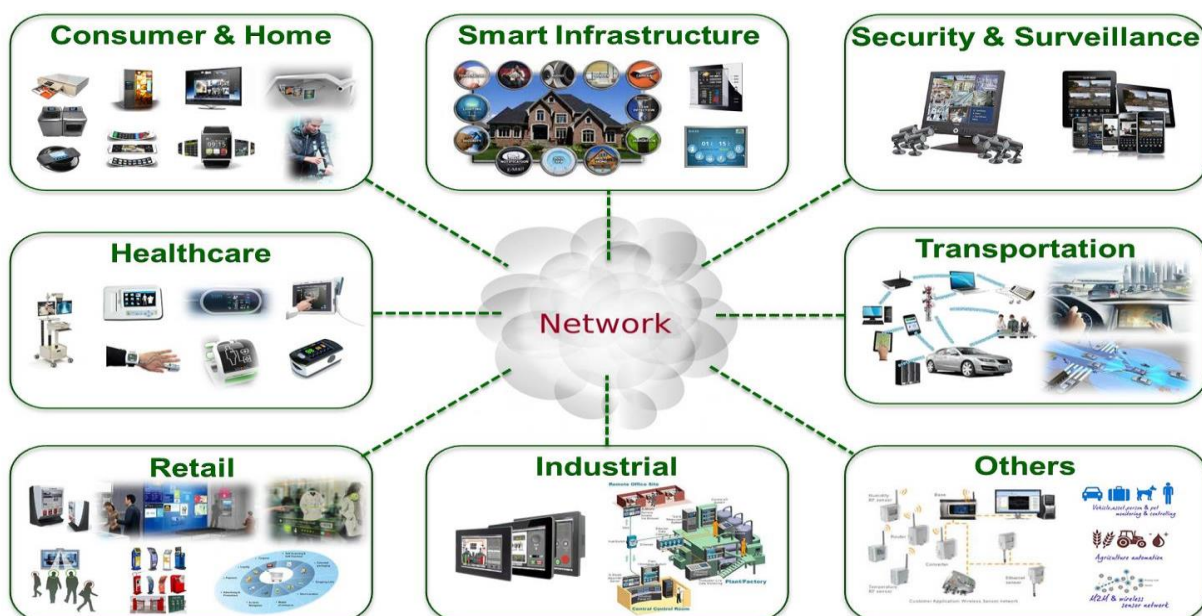
The pages of a Web site can usually be accessed from the homepage or otherwise called Uniform Resource Locator (URL) using browser which is the user application to access homepage.

Hypertext Transfer Protocol (HTTP) is the foundation of the World Wide Web, and is used to load web pages using hypertext links. With help of HTTP, the communication mode or program to access files that are stored in the Web page, transfers and displays the page content according to its HTML markup instructions.

All publicly accessible Web sites collectively constitute the World Wide Web (WWW), commonly known as the Web.

Internet and Web

Many tend to use the terms Internet and Web interchangeably. The Web (like e-mail and ftp) is but one way of making use of Internet. Internet is the connecting means to Web, and Web site is store of information which is connected to and shared through the means of Internet.



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Figure 7 Internet and networking example

In other words, the world wide web is one way information can be shared. The main difference between Web, e-mail, and ftp is that they all have their own protocols (The Internet Protocol (IP) is a set of standards for addressing and routing data on the Internet). What makes Web stand out vis -a -vis other protocol is that it can easily link one document to another and their links form a huge web of connected information.

The Web is capable of linking texts and materials stored elsewhere in the Internet. For example, let us take the Web page of some university. While clicking on other university in the main page you are taken to another page in the same Web site listing different university. Thus, the links connect you to innumerable texts, audio and visuals, and multimedia. It would appear like a huge spider's Web. From this simile the Web has derived its name.

Fundamentals of Web

The fundamentals of working of a Web are knowledge of HTML, role of server and importance of the browser HTML (Hypertext Markup Language) is a computer language that describes how a page/text should be formatted/presented in the Web site. It provides a means to create structured documents by denoting structural semantics for text such as headings, paragraphs, lists, links, video, audio, animation, images, quotes and other items.

Many languages with varying complicities have evolved later to HTML for creation of Web sites. However, HTML will suffice to creation of good Web sites. The knowledge of others will be required when you intend to create more complex web designs.

We access the Web pages from the Web server(s) using a program called Web browser (like Microsoft Internet Explorer, google, Firefox, Safari, Netscape and etc.), when you are making a request (search), the Web browser use HTTP, the communication mode or program to access any files that are stored in the Web server, it will collect and assembles files from one or more Web servers (could be hundreds at times) into one page in your machine. And this is how you see many pages of sites on any search you make on any subject.

Static and Dynamic Web Sites

In **static** Web site the information is displayed in the same format as they are stored in the server. Such information is primarily coded in HTML (the address ends in .htm or .html). Most of the Web sites are static as they present pre-defined, static information, in the sense the pages retrieved by different users at different times remain the same. To make a change to the content, the files need to be manually opened, data changed and the new version should be uploading to the Web.

A **dynamic** website is a website that displays different types of content every time a user view. This display changes depending on a number of factors like viewer demographics, time of day, location, language settings, and so on. The Dynamic Web

site pages are ones that retrieves fresh information each time you view (like the latest news you see or various games you play on the Web).

The Web: History and Development

Where the Web was born. Tim Berners-Lee, a British scientist, invented the World Wide Web (WWW) in 1989, while working at CERN. The Web was originally conceived and developed to meet the demand for automated information-sharing between scientists in universities and institutes around the world.

Tim Berners-Lee, a computer specialist, working at CERN (The European Union for Nuclear Research) in Geneva, Switzerland proposed a system of information management in 1989 that used a hypertext process to link related documents over a network. This invention heralded the birth of the Web. For several years since Web pages remained text only, confining itself to scientific labs. The breakthrough came in 1992 (till then there were only 50 Web servers!) when the first graphical browser (NCSA Mosaic) was introduced. With this the Web entered the realm of mass media. The later developments have been application of Web 2.0 and Web 3.0.

The development of the Web is overseen by the World Wide Web consortium (W3C) [www.w3.org], a consortium of many companies and organizations that exists to develop common standards for the evolution of the World Wide Web. The group was founded by Tim Berners-Lee in 1994 at the Massachusetts Institute of Technology (MIT). The W3C has contributed much to the development of Web technologies.

WHERE DO I START?

Web has been around for more than 20 years now, experiencing euphoric early expansion, an economic-driven bust, an innovation-driven rebirth, and constant evolution along the way.

One thing is certain: -

The Web as a communication and commercial medium is here to stay. Not only that, it has found its way onto devices such as smartphones, tablets, TVs, and more. There have never been more opportunities to put web design knowhow to use.

Whatever the motivation, the first question is always the same: -

“Where do I start?”

It may seem like there is a mountain of stuff to learn, and it’s not easy to know where to jump in. But you have to start somewhere. However, a good first step for everyone is to get a basic understanding of how the Web and web pages work.

There are many levels of involvement in web design, from building a small site for yourself to making it a full-blown career. You may enjoy being a full-service website developer or just specializing in one skill. There are a lot of ways you can go.

If you are interested in pursuing web design or production as a career, you'll need to bring your skills up to a professional level. Employers may not require a web design degree, but they will expect to see working sample sites that demonstrate your skills and experience. These sites can be the result of class assignments, personal projects, or a simple site for a small business or organization. What's important is that they look professional and have well written, clean HTML, style sheets, and possibly scripts behind the scenes.

WHAT DOES A WEB DESIGNER DO?

Over the years, the term "**web design**" has become a catchall for a process that encompasses a number of different disciplines, from user experience design, to document markup, to serious programming. This section describes some of the most common roles.

If you are designing a small website on your own, you will need to wear many hats. In the same way, as a solo web designer, you may be a part-time graphic designer, writer, HTML author, and information architect, but to you, it will just feel like "making web pages" Nothing to worry about.

Large-scale websites are almost always created by a team of people, numbering from a handful to hundreds. In this scenario, each member of the team focuses on one facet of the site-building process. If that is the case, you may be able to simply adapt your current set of skills (writing, Photoshop, programming, etc.) and interests to the new medium.

HTML MULTIMEDIA

Multimedia on the web is sound, music, videos, movies, and animations.

What is Multimedia?

Multimedia comes in many different formats. It can be almost anything you can hear or see, like images, music, sound, videos, records, films, animations, and more. Web pages often contain multimedia elements of different types and formats.

Browser Support

The first web browsers had support for text only, limited to a single font in a single color. Later came browsers with support for color, fonts, images, and multimedia!

Multimedia Formats

Multimedia elements (like audio or video) are stored in media files. The most common way to discover the type of a file, is to look at the file extension.

Multimedia files have formats and different extensions like: .wav, .mp3, .mp4, .mpg, .wmv, and .avi.

Common Video Formats: -

- There are many video formats out there.
- The MP4, WebM, and Ogg formats are supported by HTML.
- The MP4 format is recommended by YouTube.

Format	File	Description
MPEG	.mpg .mpeg	MPEG. Developed by the Moving Pictures Expert Group. The first popular video format on the web. Not supported anymore in HTML.
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.
RealVideo	.rm .ram	RealVideo. Developed by Real Media to allow video streaming with low bandwidths. 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 HTML.
WebM	.webm	WebM. Developed by Mozilla, Opera, Adobe, and Google. Supported by HTML.
MPEG-4 or MP4	.mp4	MP4. Developed by the Moving Pictures Expert Group. Commonly used in video cameras and TV hardware. Supported by all browsers and recommended by YouTube.

Note: Only MP4, WebM, and Ogg video are supported by the HTML standard.

Common Audio Formats

MP3 is the best format for compressed recorded music. The term MP3 has become synonymous with digital music. If your website is about recorded music, MP3 is the choice.

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. 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 HTML.
Ogg	.ogg	Ogg. Developed by the Xiph.Org Foundation. Supported by HTML.
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. Supported by all browsers.

Note: Only MP3, WAV, and Ogg audio are supported by the HTML standard.

HTML Video

The HTML <video> element is used to show a video on a web page.

The HTML <video> with controls

To show a video in HTML, use the <video> element: -

Example: -

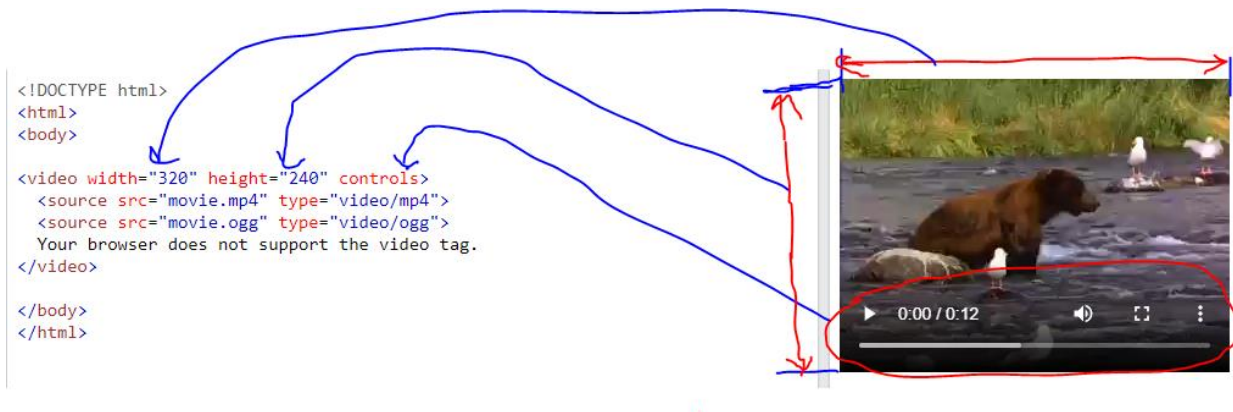


Figure 8 HTML code for display video on the web

How it Works

- The controls attribute adds video controls, like play, pause, and volume.
- It is a good idea to always include width and height attributes. If height and width are not set, the page might flicker while the video loads.
- The <source> element allows you to specify alternative video files which the browser may choose from. The browser will use the first recognized format.
- The text between the <video> and </video> tags will only be displayed in browsers that do not support the <video> element.

HTML <video> Autoplay

To start a video automatically, use the autoplay attribute: -

```
<!DOCTYPE html>
<html>
<body>

<video width="320" height="240" autoplay>
  <source src="movie.mp4" type="video/mp4">
  <source src="movie.ogg" type="video/ogg">
  Your browser does not support the video tag.
</video>

</body>
</html>
```



Figure 9 HTML code for display video on web and start play automatic

Note: Chromium browsers do not allow autoplay in most cases. However, muted autoplay is always allowed.

Add muted after autoplay to let your video start playing automatically (but muted): -

```
<!DOCTYPE html>
<html>
<body>

<video width="320" height="240" autoplay muted>
  <source src="movie.mp4" type="video/mp4">
  <source src="movie.ogg" type="video/ogg">
  Your browser does not support the video tag.
</video>






</body>
</html>
```



Figure 10 HTML code for display video on web and start play automatic but muted

Browser Support

The numbers in the table specify the first browser version that fully supports the <video> element.

Element					
<video>	4.0	9.0	3.5	4.0	10.5

HTML Video Formats

There are three supported video formats: MP4, WebM, and Ogg. The browser support for the different formats is: -

Browser	MP4	WebM	Ogg
Edge	YES	YES	YES
Chrome	YES	YES	YES
Firefox	YES	YES	YES
Safari	YES	YES	NO
Opera	YES	YES	YES

HTML Video - Methods, Properties, and Events

- The HTML DOM defines methods, properties, and events for the <video> element.
- This allows you to load, play, and pause videos, as well as setting duration and volume.

- There are also DOM events that can notify you when a video begins to play, is paused, etc.

```
<!DOCTYPE html>
<html>
<body>
<div style="text-align:center">
  <button onclick="playPause()">Play/Pause</button>
  <button onclick="makeBig()">Big</button>
  <button onclick="makeSmall()">Small</button>
  <button onclick="makeNormal()">Normal</button>
  <br><br>
  <video id="video1" width="420">
    <source src="mov_bbb.mp4" type="video/mp4">
    <source src="mov_bbb.ogv" type="video/ogg">
    Your browser does not support HTML video.
  </video>
</div>
<script>
var myVideo = document.getElementById("video1");
function playPause() { if (myVideo.paused)
                        myVideo.play();
                      else
                        myVideo.pause();
                      }
function makeBig() { myVideo.width = 560; }
                    function makeSmall() {
                      myVideo.width = 320;
                    }
function makeNormal() { myVideo.width = 420; }
</script>
</body>
</html>
```

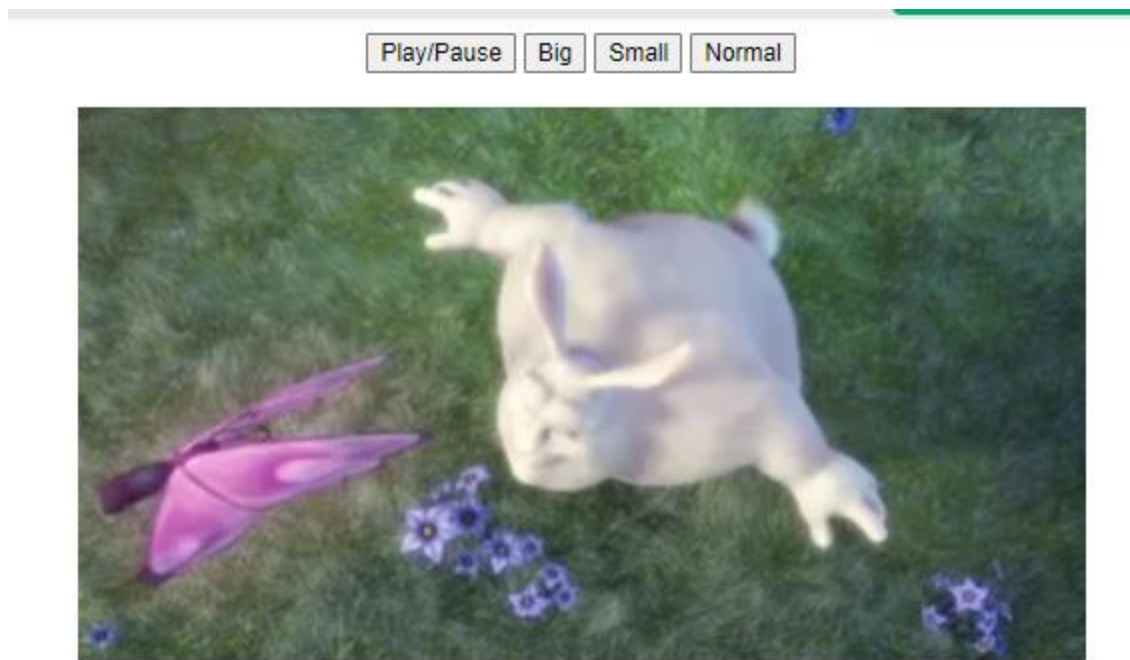


Figure 11 video with control buttons

HTML 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

HTML Audio

The HTML <audio> Element

To play an audio file in HTML, use the <audio> element: -

HTML Audio with controls - How It Works

- The controls attribute adds audio controls, like play, pause, and volume.
- The <source> element allows you to specify alternative audio files which the browser may choose from. The browser will use the first recognized format.
- The text between the <audio> and </audio> tags will only be displayed in browsers that do not support the <audio> element.

```

<!DOCTYPE html>
<html>
<body>

<audio controls>
  <source src="horse.ogg" type="audio/ogg">
  <source src="horse.mp3" type="audio/mpeg">
  Your browser does not support the audio element.
</audio>

</body>
</html>

```



Figure 12 HTML code for playing Audio with control on the web

HTML <audio> Autoplay

To start an audio file automatically, use the autoplay attribute: -

```

<!DOCTYPE html>
<html>
<body>

<audio controls autoplay>
  <source src="horse.ogg" type="audio/ogg">
  <source src="horse.mp3" type="audio/mpeg">
  Your browser does not support the audio element.
</audio>

</body>
</html>

```

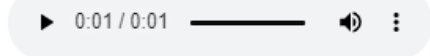


Figure 13 HTML code for playing Audio automatically on the web

Note: Chromium browsers do not allow autoplay in most cases. However, muted autoplay is always allowed.

Add muted after autoplay to let your audio file start playing automatically but muted: -

```

<!DOCTYPE html>
<html>
<body>

<audio controls autoplay muted>
  <source src="horse.ogg" type="audio/ogg">
  <source src="horse.mp3" type="audio/mpeg">
  Your browser does not support the audio element.
</audio>

</body>
</html>

```

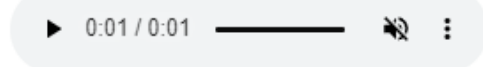







Figure 14 HTML code for playing Audio automatically but muted on the web

Browser Support

The numbers in the table specify the first browser version that fully supports the `<audio>` element.

Element					
<code><video></code>	4.0	9.0	3.5	4.0	10.5

HTML Audio Formats

There are three supported audio formats: MP3, WAV, and OGG. The browser support for the different formats is: -

Browser	MP3	WAV	OGG
Edge/IE	YES	YES*	YES*
Chrome	YES	YES	YES
Firefox	YES	YES	YES
Safari	YES	YES	NO
Opera	YES	YES	YES

HTML Audio - Methods, Properties, and Events

- The HTML DOM defines methods, properties, and events for the `<audio>` element.
- This allows you to load, play, and pause audios, as well as set duration and volume.
- There are also DOM events that can notify you when an audio begins to play, is paused, etc.
- For a full DOM reference, go to our [HTML Audio/Video DOM Reference](#).

HTML Audio Tags

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

HTML Plug-ins

Plug-ins are computer programs that extend the standard functionality of the browser.

Plug-ins

- Plug-ins were designed to be used for many different purposes:
- To run Java applets
- To run Microsoft ActiveX controls
- To display Flash movies
- To display maps
- To scan for viruses
- To verify a bank id

Warning!

Most browsers no longer support Java Applets and Plug-ins.

ActiveX controls are no longer supported in any browsers.

The support for Shockwave Flash has also been turned off in modern browsers.

The <object> Element

- The <object> element is supported by all browsers.
- The <object> element defines an embedded object within an HTML document.

It was designed to embed plug-ins (like Java applets, PDF readers, and Flash Players) in web pages, but can also be used to include HTML in HTML Or images if you like: -

```
<!DOCTYPE html>
<html>
<body>

<object data="audi.jpeg" width ="300" height = "200"></object>

</body>
</html>
```



Figure 15 HTML code for adding object on the web

The <embed> Element

- The <embed> element is supported in all major browsers.
 - The <embed> element also defines an embedded object within an HTML document.
- Web browsers have supported the **<embed>** element for a long time. However, it has not been a part of the HTML specification before HTML5.

Note that the <embed> element does not have a closing tag. It cannot contain alternative text.

```
<!DOCTYPE html>
<html>
<body>

<embed src="audi.jpeg" width="300" Height="200">

</body>
</html>
```



Figure 16 HTML code for embed element on the web

HTML YouTube Videos

The easiest way to play videos in HTML, is to use YouTube.

Struggling with Video Formats?

- Converting videos to different formats can be difficult and time-consuming.
- An easier solution is to let YouTube play the videos in your web page.

YouTube Video Id

- YouTube will display an id (like tgbNymZ7vqY), when you save (or play) a video.
- You can use this id, and refer to your video in the HTML code.

Playing a YouTube Video in HTML

To play your video on a web page, do the following: -

- Upload the video to YouTube
- Take a note of the video id
- Define an `<iframe>` and `</iframe>` element in your web page
- Let the src attribute point to the video URL
- Use the width and height attributes to specify the dimension of the player
- Add any other parameters to the URL
- The real URL is "<https://www.youtube.com/watch?v=tgbNymZ7vqY&t=2s>"

```
<!DOCTYPE html>
<html>
<body>

<iframe width="300" height="200" src="https://www.youtube.com/embed/tgbNymZ7vqY">
</iframe>

</body>
</html>
```



Figure 17 Adding YouTube video on a web page

YouTube Playlist

A comma separated list of videos to play (in addition to the original URL).

YouTube Loop

- Add loop=1 to let your video loop forever.
- Value 0 (default): The video will play only once.
- Value 1: The video will loop (forever).

```
<!DOCTYPE html>
<html>
<body>

<iframe width="420" height="345" src="https://www.youtube.com/embed/tgbNymZ7vqY?
playlist=tgbNymZ7vqY&loop=1">
</iframe>

</body>
</html>
```



Figure 18 HTML code for Looping video on a web page

YouTube Controls

- Add controls=0 to not display controls in the video player.
- Value 0: Player controls does not display.
- Value 1 (default): Player controls display.

```
<!DOCTYPE html>
<html>
<body>

<iframe width="420" height="345" src="https://www.youtube.com/embed/tgbNymZ7vqY?
controls=0">
</iframe>

</body>
</html>
```



Figure 19 HTML code for adding controls video on a web page