

Using DHTML to Make Your Web Pages Come Alive

Significance of the Topic

The group of technologies known as Dynamic Hypertext Markup Language (DHTML) can make your Web pages come alive. DHTML lets the Web page author add functions to the page that can change everything on the page. Instead of having to download new information from the server computer every time something on the page changes, changes can be made by the HTML document. Web pages built with Dynamic HTML are richer and more interactive, react faster, and don't use much bandwidth. The major elements of DHTML include HTML code, scripting languages such as JavaScript, the Document Object Model, Cascading Style Sheets, multimedia filters, and the browser itself. In this paper I explore these elements, focusing on how they can be used to add animation and interactivity to Web pages. In the conclusion, I discuss the issue of whether it is best to use Macromedia Director or DHTML to create animations.

Important terms that I define in this paper are displayed in underlined blue text. These terms are included in the Glossary in the Appendix section. Key words and JavaScript code are typed in red. Hyperlinks are shown in bold underlined blue text.

Discussion of DHTML

Introduction

What is DHTML?

First, let's look at what Dynamic HTML is not. It is *not* a scripting language like JavaScript. It is a browser feature that allows your browser (Netscape Navigator 4.x or higher, or Microsoft Internet Explorer 4.x or higher) to be dynamic. A "[dynamic browser](#)" can alter a Web page's look *after* the document has loaded. (Gardner, 1998). Also, DHTML is *not* one particular, technology or set of features. It includes several technologies and describes how these technologies interact.

Definitions - There are many definitions of DHTML. It has been described as animated [HTML](#) (the language Web pages are written in), because it allows a Web page

to change after it is loaded into the browser and does not require any communication with the server for an update. As Gardner (1998) puts it, “DHTML is the combination of several built-in browser features in fourth-generation browsers that enable a Web page to be more dynamic.” Dynamic HTML has also been described as a set of commands mixed with text that describe how a Web page should appear. (Hyman, 1999, p. 8). “Dynamic HTML” is a marketing term coined by both Netscape and Microsoft to describe a series of technologies introduced in the 4.0 versions of their browsers, to enhance the “dynamic” capabilities of those browsers.” (Teague, 1999, p. 3).

Advantages of DHTML

(1) DHTML makes documents dynamic. Dynamic documents :

- Allow the designer to control how the HTML displays Web pages’ content.
- React and change with the actions of the visitor.
- Can exactly position any element in the window, and change that position after the document has loaded.
- Can hide and show content as needed. (Teague, 1999, p. 3).

(2) DHTML allows any HTML [element](#) (any object on the screen that can be controlled independently using JavaScript) in Internet Explorer to be manipulated at any time, turning plain HTML into dynamic HTML. (Schurman and Pardi, 1999, p. 5).

(3) With DHTML, changes occur entirely on the [client-side](#) (on the user’s browser). (Weiss, 1998).

(4) Using DHTML gives the author more control over how the page is formatted and how content is positioned on the page. (Richmond, 1969).

Components of DHTML

Dynamic HTML includes the following components:

- Conventional HTML
- [Scripts](#) – Small programs designed to manipulate Web pages. (Hyman, 1999, p. 13).
- [Document Object Model](#) (DOM) – The road map through which you can locate any element in an HTML document and use a scripting

language, such as JavaScript, to change the element's properties. (Teague, 1998, p. 138).

- [Absolute Positioning](#) – The elements on the page are placed in a fixed location, as opposed to relative positioning, in which an element's location is relative to particular elements on the page. (Cearley, 1998, p. 484).
- [Multimedia filters](#) – Multimedia features that create visual effects for text, images, and other objects, without imposing long download times on the user. (Schurman, E. & Pardi, W., 1999, p. 262).

The Browser Issue

The only browsers that are DHTML-capable are versions 4.0 and above of the Netscape and Microsoft browsers. If the user is using a [legacy browser](#) (one released prior to version 4.0), you have to make sure your Web pages will work with and *without* DHTML features in them. (Teague, 1998, p. 5)

The Document Object Model (DOM)

What is the DOM?

The DOM is like a roadmap of your Web page. You describe a path that leads from the HTML document down to the various elements on the page. The DOM for an image called `button1` would be: `document.images.button1`. (Teague, 1998, p. 138). The Document Object Model was created with these four goals in mind:

- To delineate a hierarchical structure representing all parts of a Web document.
- To allow the modification of that structure through adding and removing content.
- To provide a way to monitor and manipulate the characteristics of content on the page.
- To provide information about how the items on a page interrelate with the user and each other. (Schurman, E. & Pardi, W., 1999, p. 74).

What Does the DOM Allow us to Do?

The Web page author can connect any element on the screen to a JavaScript. (Teague, 1998, p. 137). He or she can use scripts to control everything on the page and to

change virtually anything at any time. Some examples of effects the designer can create using the DOM with script:

- A button's image changes when the user passes the mouse over it.
- The user can drag text or images around on a page.
- Some of the items on a page mover around without user interaction and end up positioned exactly where the author wants them.
- When the user positions the mouse over an image, text appears.
- The Web page author can change the formatting of text, graphics, and tables on the fly.
- Parts of the page are dynamically created or destroyed as they appear on the screen. (Schurman, E. & Pardi, W., 1999, pp. 75).

How the DOM works

The DOM works by tracing a path from the script down to the individual elements to be acted upon with the HTML document. The steps in this hierarchy are:

window
 (parent)
 (frame)
 document
 ID
 image
 link
 anchor
 form (Teague, 1998, p. 139)

Components of the DOM

The DOM is comprised of these components:

- [Objects](#) – The object is the basic unit of the DOM. Every element on the page is part of the DOM. Text and images are examples of objects. A table would be a *parent* object; its cells would be *children* of the table. A form named “MyForm” could be referred to as: `<FORM NAME=“MyForm”>`. After the author names an object, it can be referred to easily in a JavaScript. (Schurman, E. & Pardi, W., 1999, pp. 75-76).

- [Properties](#) – Properties are adjectives that describe parts of the Web page. (Hyman, 1999, p. 13). Examples could include height, width, color, and size. If a cell border is two pixels wide, its width property would be referenced as: **WIDTH=5**. (Schurman, E. & Pardi, W., 1999, p. 76).
- [Events](#) – An event is an action or occurrence of a Web page. When an event occurs on a page, the item that received the event notifies the DOM that the event has occurred. This is called [firing](#) the event. An event is [trapped](#), or [handled](#), if a script is present that responds to the firing of that event. The script is called an event handler. Some examples of events:
 - **onMouseDown** – Fired when the user presses the mouse button.
 - **onMouseOver** – Fired when the user positions the mouse pointer over an object.
 - **onMouseOut** - Fired when the user moves the mouse pointer outside the boundaries of an object.
 - **onKeyPress** – Fired when the user presses a key.
 - **onFocus** – Fired when the object receives the focus.
 - **onClick** – Fired when the mouse button is clicked over an area. (Schurman, E. & Pardi, W., 1999, p. 77).
- [Event bubbling](#) – (supported only in Internet Explorer) – When an object fires an event, it also notifies its parent object that the event has occurred. The event continues to travel, or “bubble,” up the hierarchy until it reaches the top or the bubbling action is cancelled. (Schurman, E. & Pardi, W., 1999, p. 78).
- [Methods](#) – They describe the actions an object can take. For example, the *open* method directs the window to open a new browser window. Other examples are *focus*, *Run*, and *reload*. (Schurman, E. & Pardi, W., 1999, p. 78).
- [Collections](#) – Collections are lists of items that are associated with a particular object. For example, the collection name *images* is a list of all image objects. (Schurman, E. & Pardi, W., 1999, p. 78).

Cross-browser Issues

[Cross-browser DHTML](#) will run virtually identically, regardless of the DHTML browser (4.x and above) being used. These technologies are common to both browsers:

- [Cascading Style Sheets](#) (CSS), Level 1 – Allow you to define how HTML tags should display their content.
- [Cascading Style Sheets-Positioning](#) (CSS-P) – Let you position HTML elements anywhere in the window, as well as control the visibility of those elements.
- [JavaScript 1.2](#) – Allows you to create simple code to control the actions of Web page elements. (Teague, 1998, p. 4).

Netscape's new DHTML technologies will never become the standard because CSS does most of the same things and is endorsed by the [World Wide Web Consortium](#) (W3C), the organization that sets the standards for all information about Cascading Style Sheets and the Dynamic Object Model. The W3C's standards for CSS can be found at this URL: <http://www.w3.org/Style>. (Teague, 1998, p. 241). Netscape's JavaScript Style Sheets use a syntax that differs slightly from the CSS standard. (Teague, 1998, p. 5). Netscape also uses [layers](#) to control the position of elements on the screen and their visibility.

Navigator, unlike Explorer, only provides access to an element's positioning properties. The syntax used is: `document.elementName.styleProperty`. To move the element **A very pretty HTML element** across the screen, the author would write this code:

```
Function NAVmoveElement(elementName) {
    document.elementName.left = 120;
    document.elementName.top = 120;
}
```

(Teague, 1998, p. 142)

Microsoft-specific DHTML uses [visual filters](#) and dynamic CSS. Visual filters let you perform visual effects on graphics and text on a Web page. Dynamic CSS enables you to change the visual appearance as well as the position of elements on the screen. (Teague, 1998, p. 5). This code would move the element **A very pretty HTML element** across the screen:

```
Function IEmoveElement(elementName) {
    document.all.elementName.style.left = 120;
    document.all.elementName.style.top = 120;
```

}
(Teague, 1998, p. 143)

Sensing the browser type and version – The author could code two different versions of a Web page to accommodate the differences between browsers, but this would be a very time-consuming solution. For version 4.x browsers, you have to tell the computer how to tell the difference between Internet Explorer and Netscape Navigator. This should not be necessary for versions 5.x of both browsers, because both companies have pledged to follow the standards set down by the W3C. (Teague, 1998, p. 144)

Creating a cross-browser DOM – The developer can write code that detects which browser the user has and then use variables to create a generic DOM that will work on either browser. (Teague, 1998, p. 146).

Cascading Style Sheets

Introduction to CSS

Cascading Style Sheets is a rich specification that gives the Web page author powerful visual control over such HTML elements as location, size, color, background, images, etc. (Hyman, 1999, p. 35). CSS is a separate language, one of several you need to know to master DHTML. (Heinle, No Date, Dynamic HTML and cascading style sheets). Cascading Style Sheets is supported in HTML 4.0, released in December 1997 by the World Wide Web Consortium (<http://www.w3.org/Style/CSS>). (Teague, 1998, p. 15).

CSS rules define what the HTML should look like and how it should behave in the browser window. (Teague, 1998, p. 16). Rules have three parts:

- **Selectors** – Alpha-numeric characteristics that identify the rule
- **Properties** – What is being defined
- **Values** – Assigned to a property by defining its nature. A value can be a keyword, such as “yes” or “no,” a number, or a percentage.

Style – A style is a group of properties that define how an HTML element will

appear in a document. (Heinle, No Date, Dynamic HTML and cascading style sheets). CSS lets you make changes to an entire document. CSS operates by collecting all the different properties such as bold, italic, font size, etc., that you want to apply to similar types of text, then giving these groups of properties a common name. (Teague, 1998, p. 14).

Grouping styles – When you apply a single style to a single element, you have created an [inline style](#). When you group multiple style properties together between **STYLE** tags, you create a [style sheet](#). You can apply styles to existing HTML tags. (Heinle, No Date, Dynamic HTML and cascading style sheets).

What can We do with CSS?

Cascading Style Sheets allows us to manipulate the text of our Web pages in many ways. Some of them are:

- 1) Control font sizes, styles, colors, etc.
- 2) Control text, by adjusting it in various ways, such as:
 - [Kerning](#) – The amount of space between the letters in a word.
 - Word spacing.
 - [Leading](#) – Line height
 - [Justifying](#) the text – Setting the horizontal alignment (left, right, center) of the text
 - Aligning the text vertically.
 - Indenting paragraphs
 - Controlling text case
 - Decorating the text – You can embellish the text with one of four different looks: underline, overline, line-through, or blink. Blink is not supported by Internet Explorer (thank God!).
 - Controlling the amount of white space on a line
- 3) Creating lists
- 4) Controlling background colors and graphics
- 5) Controlling margins and borders
- 6) Controlling the position of elements on a page
- 7) Controlling visibility or invisibility
- 8) Absolute positioning
- 9) Relative positioning
- 10) Static positioning
- 11) Setting margins (Teague, 1998, pp. 41-118).

Handling CSS Compatibility Issues

You can easily add additional code to your document to determine if the browser is Netscape Navigator or Microsoft Internet Explorer. After you determine the browser, you can assign the HTML elements on the page to shortcut variables that both browsers can use. (Heinle, No Date, Dynamic HTML and cascading style sheets).

Adding Multimedia and Animated Graphics to Web Pages with DHTML

Introduction to Animation with DHTML

[DirectAnimation multimedia controls](#) - In this class we are using Macromedia's Director 7 animation and multimedia program. The Web page author can do many of the same things with DHTML. When you do animation with DHTML, you embed the code that creates the animation inside paired tags. Microsoft has developed a set of tools it calls DirectAnimation multimedia controls. These controls only work in Internet Explorer 4.x and higher. They eliminate media files by transferring instructions to the browser that tell it how to create and display an object. Four of these controls ship with Internet Explorer:

- [Structured Graphics control](#) – Use to create lightweight [vector graphics](#) that can be scaled or rotated in three dimensions. Vector graphics are built using a series of lines and curves. They can be manipulated in many ways while keeping the integrity of the entire image.
- [Sequencer control](#) – Manages the timing and sequencing of events on the stage. The sequencer control works by executing an [action set](#), a script used to control the actions of other objects on the stage.
- [Path control](#) – Positions the elements and directs them where they move on the page over a set period of time. This control lets the author define a path of almost any shape, target an object to move along that path, set the duration of movement, and set markers on the path that can be used to call other events.
- [Sprite control](#) – Allows the addition of still or animated images to a page and offers control over the frame rate and playback. The Direct Animation Sprite control lets you create animations from a series of still images and achieve a high level of control over the playback and

behavior of these animations. (Schurman, E. & Pardi, W., 1999, pp. 282-337).

Adding Sound and Video to Web Pages

If you add sound and/or video that requires a plug-in to play, you should provide a link on your Web page to a site that provides that plug-in.

Playing multimedia – The `<EMBED>` tag is the most common method of adding sound to a Web page. It can also be used to add video, and is supported by versions 3.x and higher of both browsers. (Example: `<EMBED SRC="music.wav"></EMBED>`). You can also use the `<BGSOUND>` (background sound) tag to add sound to your Web page. It is supported by Internet Explorer only and must be located in the **HEAD** section of the document. (Example: `<BGSOUND SRC="music.wav" LOOP="infinite">`). (Schurman, E. & Pardi, W., 1999, p. 302).

Imbedding Videos – You can embed a video in the page by changing the **SRC** tag so that it points to a video file. You can use the `` tag to add a video file to a Web page. (Example: ``). (Schurman, 1999, pp. 302-303). You can make the video or audio clip play in an external window by making the browser launch an external media player. (Schurman, E. & Pardi, W., 1999, pp. 282-289).

Streaming media plays in the user's browser as the file downloads. Three of the most popular media players are:

- Microsoft NetShow (also known as Windows Media Player)
- RealNetwork's RealPlayer . (Schurman, E. & Pardi, W., 1999, pp. 290-292).
- Apple's QuickTime player

Interactive Music Control – The designer can use the Interactive Music Control, which uses almost no bandwidth, to add interactive music to a Web page. He or she can get different effects by specifying such characteristics of the music as Style, Band, Transition, Length, and Activity level. (Schurman, E. & Pardi, W., 1999, p. 314).

Animated Graphics

Animated **GIFs** (Graphics Interchange Format, a proprietary technology owned by CompuServe, now part of AOL) are the most common type of multimedia found on the Web. They are supported by all modern browsers. The HTML code is the same whether or not the GIF is animated. (Example:). (Schurman, E. & Pardi, W, 1999, p. 292).

Creating Behaviors with DHTML

A **behavior** is a tag or style the Web page author creates to extend the browser. They only work in Internet Explorer. You can use DHTML to create rollover behaviors such as onMouseOver and onMouseOut. (Hyman, 1999, p. 266-272).

Some Examples of DHTML on the Web

Jimmy Clark's Web site at Austin Community College – When the visitor clicks on the link to my site, at first the index page displays only a black background. After a second or two, the red text of the headline displays: **Welcome to my Corner of the Web....** I modified a file from Michael Hyman's Dynamic HTML for Dummies to create this effect. My Web site is located at <http://www2.austin.cc.tx.us/jdclark> .

Superfly Fashions demo at the Macromedia Web site - This is a really cool effect that shows a fly changing its size as it buzzes across your screen. Macromedia has many other demonstrations of DHTML in action at its site. Some are cross-browser compatible, some work only in Internet Explorer, some work only in Netscape Navigator. The URL for Macromedia's DHTML demos is:
<http://www.dhtmlzone.com/tutorials/index.html> .

Bratta.com Web site – Bratta shows a different cross-browser DHTML every week. It is located at: <http://www.bratta.com/dhtml> .

Conclusion: Should You Use DHTML or Director to do Animations?

In this class we have learned how to use Macromedia's Director 7 to do animations. Which is better, Director or DHTML? The easy answer is to use Director to do the things it does best, and DHTML for the things it does best. Director is a more versatile tool for animation, giving the designer a powerful tool for creating instructional CDs, as well as animating Web pages. DHTML is strictly a Web page design tool. DHTML is a very powerful tool for controlling the text of Web pages. In conclusion, I would say use Director for complex animations. If you use Macromedia's Dreamweaver Web page design program, you can use Cascading Style Sheets to lay out your pages, then use Director to create your animations. You might want to use Macromedia Flash to build simple animations that will use very little bandwidth.

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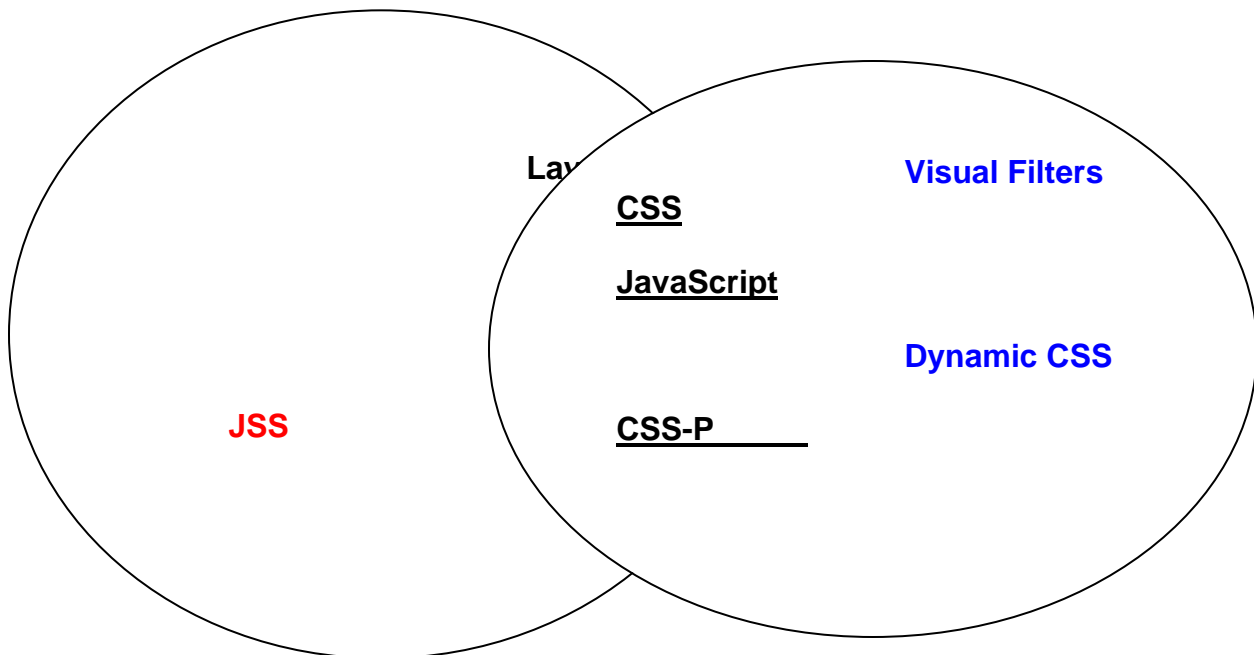
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❖ Appendix A - Cross Browser DHTML

Netscape DHTML



Microsoft DHTML

Figure 1 The green area where the two versions of Dynamic HTML intersect is cross-browser DHTML. The developer should work in this area as much as possible. (Teague, 1999, p. 4).

❖ Appendix B – Glossary

Absolute positioning – The elements on the page are placed in a fixed location, as opposed to relative positioning, in which an element's location is relative to particular elements on the page.

Action set – A script used to control the actions of other objects on the stage. (See Sequencer control).

Behavior – A tag or style the Web page author creates to extend the browser. Behaviors only work in Internet Explorer.

Cascading Style Sheets (CSS), Level 1 – Allow you to define how HTML tags should display their content.

Cascading Style Sheets-Positioning (CSS-P) – Let you position HTML elements anywhere in the window, as well as control the visibility of those elements.

Client-side – On the user (viewer's) browser.

Collections – Lists of items that are associated with a particular object.

Cross-browser DHTML – Will run virtually identically, regardless of the DHTML browser (4.x and above) being used.

CSS rules – Define what the HTML should look like and how it should behave in the browser window.

DirectAnimation multimedia controls – A set of controls developed by Microsoft that eliminate media files. They work by transferring instructions to the browser that tell it how to create and display an object. These controls only work in Internet Explorer, versions 4.0 and higher.

Document Object Model (DOM) – The road map through which you can locate any element in an HTML document and use a scripting language, such as JavaScript, to change the element's properties.

Dynamic browser – Can alter a Web page after the document has loaded.

Element – Any object on the screen that can be controlled independently using JavaScript

Event – An action or occurrence on a Web page.

Event bubbling – When an object fires an event, it also notifies its parent object that the event has occurred. The event continues to travel, or “bubble,” up the hierarchy until it reaches the top or the bubbling action is cancelled.

Firing the event – When an event occurs on a page, the item that received the event notifies the DOM that the event has occurred.

GIF – A proprietary graphics format owned by CompuServe, now part of AOL. It is the most popular graphics format on the Web.

HTML – The language Web pages are written in.

Inline style – A single style applied to a single element.

Interactive Music Control – The Web page author can use it to add interactive music to a Web page. It uses almost no bandwidth.

JavaScript 1.2 – Allows you to create simple code to control the actions of Web page elements.

Justifying the text – Setting the horizontal alignment of the text.

Kerning – The amount of space between the letters in a word.

Layer – An independent “chunk” of Web content within an HTML document, set using two LAYER tags.

Leading – Line height.

Legacy browser – One released prior to version 4.0

Methods – They describe the actions that an object can take.

Multimedia filters – Create visual effects for text, images, and other objects, without imposing long download times on the user.

Object – The basic unit of the DOM.

Path control – Positions the elements and directs them where they move on the page over a set period of time.

Properties – Adjectives that describe parts of the Web page.

Properties – What is being defined.

Scripts – Small programs designed to manipulate Web pages.

Selectors – Alpha-numeric characteristics that identify the rule being referenced.

Sequencer control – Manages the timing and sequencing of events on the stage. The sequencer control works by executing an **action set**, a script used to control the actions of other objects on the stage.

Sprite control – Allows the addition of still or animated images to a page and offers control over the frame rate and playback.

Streaming media – Plays in the user's browser as the file downloads.

Structured Graphics control – Used to create lightweight vector graphics that can be scaled or rotated in three dimensions.

Style – A group of properties that define how an HTML element will appear in a document.

Style sheet – Multiple style properties grouped together between STYLE tags.

Trapping or handling an event – An event is trapped, or handled, when a script is present that responds to the firing of that event.

Values – Assigned to a property by defining its nature. A value can be a keyword, such as “yes” or “no,” a number, or a percentage.

Vector graphics – Built using a series of lines and curves.

Visual filters – Let you perform visual effects on graphics and text on a Web page.

World Wide Web Consortium (W3C) – The organization that sets the standards for all information about Cascading Style Sheets and the Dynamic Object Model.

*This paper is written by Jimmy Clark for the course EDC 385G Multimedia Authoring at the University of Texas at Austin.