



About the W3C Document Object Model

The World Wide Web Consortium (W3C) Document Object Model (DOM) is a platform- and language-neutral interface that permits script to access and update the content, structure, and style of a document. The W3C DOM includes a model for how a standard set of objects representing HTML and XML documents are combined, and an interface for accessing and manipulating them. Web authors can use the W3C DOM interface in Microsoft Internet Explorer 5 and later to take advantage of this dynamic model.

The key advantages of the W3C DOM are the abilities to access everything in the document, to make numerous content updates, and to work with content in separate document fragments. Working together with the Dynamic HTML (DHTML) Object Model available as of Internet Explorer 4.0, the W3C DOM enhances a Web author's ability to build and manage complex documents and data. Many tasks, such as moving an object from one part of the document to another, are highly efficient and easy to perform using W3C DOM members. Internet Explorer 6 and later support all of the properties, methods, and collections defined in the [Document Object Model \(DOM\) Level 1](http://www.w3.org/tr/2000/wd-dom-level-1-20000929/) [<http://www.w3.org/tr/2000/wd-dom-level-1-20000929/>] specification. This document discusses the implementation of the W3C DOM interface available in Internet Explorer 5 and later.

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W3C DOM vs. the DHTML Object Model

An object model is a mechanism for accessing and programming a document or program. The [DHTML Object Model](http://msdn.microsoft.com/en-us/library/ms533022(VS.85).aspx) [[http://msdn.microsoft.com/en-us/library/ms533022\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/ms533022(VS.85).aspx)], available in Internet Explorer 4.0, provides access to almost all elements, and to all attributes on an element. Every element is exposed to the DHTML Object Model in Internet Explorer 5 and later. The W3C DOM is consistent with the DHTML Object Model in that every element and every attribute is accessible in script.

The W3C DOM is a robust evolution from the DHTML Object Model because it provides a structured model and logical interface for authors to access and update elements and attributes. Authors who are familiar with the DHTML Object Model or scripting object models should find the W3C DOM implementation fairly straightforward to use. Those unfamiliar with the DHTML Object Model or object models in general, are encouraged to read the DHTML Object Model article.

Benefits of the W3C DOM

Using the W3C DOM has many advantages for manipulating the document tree. With the W3C DOM, content authors can:

- Move one part of the document tree to another without destroying and re-creating the content.
- Create elements and attach them to any point in the document tree.
- Organize and manipulate new or existing tree branches in a document fragment before inserting the objects back into the tree.

The ability to move a part of the document tree without destroying and re-creating the content reduces the size of script and is more efficient. Consider the following HTML that creates an unordered list using the [ul](http://msdn.microsoft.com/en-us/library/ms535914(VS.85).aspx) [[http://msdn.microsoft.com/en-us/library/ms535914\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/ms535914(VS.85).aspx)] and [li](http://msdn.microsoft.com/en-us/library/ms535847(VS.85).aspx) [[http://msdn.microsoft.com/en-us/library/ms535847\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/ms535847(VS.85).aspx)] elements.

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```
<UL ID="oList" onclick="fnShuffleItem()">
<LI>Item 1
<LI>Item 2
<LI>Item 3
<LI>Item 4
<LI>Item 5
<LI ID="oItem">Shuffle Item
```

Using the DHTML Object Model, shuffling the last list requires destroying and re-creating each item. Before the `li` element is destroyed, the [outerHTML](http://msdn.microsoft.com/en-us/library/ms534310(VS.85).aspx) [[http://msdn.microsoft.com/en-us/library/ms534310\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/ms534310(VS.85).aspx)] values are recorded so they can be re-created. By keeping track of the index of the element in the [children](http://msdn.microsoft.com/en-us/library/ms537446(VS.85).aspx) [[http://msdn.microsoft.com/en-us/library/ms537446\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/ms537446(VS.85).aspx)] collection, the location of two list items are exchanged. The following sample code shuffles the list.

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```
window.onload=fnInit;
var iShuffle;
function fnInit(){
    iShuffle=oList.children.length-1;
}
function fnShuffleItem(){
    var oChildren=oList.children;
    if(iShuffle<=0){
        iShuffle=oChildren.length-1;
        var sData=oChildren[0].outerHTML;
        oChildren[0].outerHTML="";
        oList.innerHTML+=sData;
    }
    else{
        var sSwap1=oChildren[iShuffle-1].outerHTML;
```

```

    var sSwap2=oChildren[iShuffle].outerHTML;
    oChildren[iShuffle-1].outerHTML=sSwap2;
    oChildren[iShuffle].outerHTML=sSwap1;
    iShuffle--;
  }
}

```

Using the W3C DOM, the same effect is achieved by exchanging the position of the two list items in the document tree hierarchy using the [swapNode](http://msdn.microsoft.com/en-us/library/ms536774(VS.85).aspx) [http://msdn.microsoft.com/en-us/library/ms536774(VS.85).aspx] method. In this example, the item that is shuffled is swapped with the previous item. Rather than query the **children** collection of the list, the previous item is determined with the [previousSibling](http://msdn.microsoft.com/en-us/library/ms534350(VS.85).aspx) [http://msdn.microsoft.com/en-us/library/ms534350(VS.85).aspx] property. The following sample code shuffles the list item using the W3C DOM **swapNode** method.

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```

window.onload=fnInit;
var oShuffle;
function fnInit(){
    oShuffle=oList.lastChild;
}
function fnShuffleItem(){
    var oSwap=oShuffle.previousSibling;
    if(!oSwap){
        oSwap=oList.lastChild
    }
    oShuffle.swapNode(oSwap);
}

```

Code example: <http://samples.msdn.microsoft.com/workshop/samples/author/dom/RowShuffle.htm>
[http://samples.msdn.microsoft.com/workshop/samples/author/dom/RowShuffle.htm]

W3C DOM Implementation

The W3C DOM interface in Windows Internet Explorer allows authors to access different nodes of the document tree. A node is a reference to an element, an attribute, or a string of text. To implement the W3C DOM members, authors should understand the conceptual layout of the document tree and the relationship that nodes have with one another. While the W3C DOM provides a streamlined approach to completing tasks that are viable under the DHTML Object Model, it does not implement all of the DHTML Object Model members, particularly events. This section describes implementing the W3C DOM by navigating, creating, and manipulating nodes. It also provides a comparison between the W3C DOM and the DHTML Object Model.

Among the [DHTML Methods](http://msdn.microsoft.com/en-us/library/ms533053(VS.85).aspx) [http://msdn.microsoft.com/en-us/library/ms533053(VS.85).aspx] , [properties](http://msdn.microsoft.com/en-us/library/ms533048(VS.85).aspx) [http://msdn.microsoft.com/en-us/library/ms533048(VS.85).aspx] , and [collections](http://msdn.microsoft.com/en-us/library/ms533048(VS.85).aspx) [http://msdn.microsoft.com/en-us/library/ms533048(VS.85).aspx] exposed as of Internet Explorer 5.5 are several DOM-specific members that represent the W3C DOM interface. The following tables outline these members.

Methods

add [http://msdn.microsoft.com/en-us/library/ms535921(VS.85).aspx]	appendChild [http://msdn.microsoft.com/en-us/library/ms535934(VS.85).aspx]	blur [http://msdn.microsoft.com/en-us/library/ms536347(VS.85).aspx]	clear [http://msdn.microsoft.com/en-us/library/ms536359(VS.85).aspx]
clear [http://msdn.microsoft.com/en-us/library/ms536361(VS.85).aspx]	click [http://msdn.microsoft.com/en-us/library/ms536363(VS.85).aspx]	cloneNode [http://msdn.microsoft.com/en-us/library/ms536365(VS.85).aspx]	close [http://msdn.microsoft.com/en-us/library/ms536369(VS.85).aspx]
createCaption [http://msdn.microsoft.com/en-us/library/ms536381(VS.85).aspx]	createDocumentFragment [http://msdn.microsoft.com/en-us/library/ms536387(VS.85).aspx]	createElement [http://msdn.microsoft.com/en-us/library/ms536389(VS.85).aspx]	createTextNode [http://msdn.microsoft.com/en-us/library/ms536400(VS.85).aspx]
createTFOot [http://msdn.microsoft.com/en-us/library/ms536402(VS.85).aspx]	createTHead [http://msdn.microsoft.com/en-us/library/ms536403(VS.85).aspx]	deleteCaption [http://msdn.microsoft.com/en-us/library/ms536405(VS.85).aspx]	deleteCell [http://msdn.microsoft.com/en-us/library/ms536406(VS.85).aspx]
deleteRow [http://msdn.microsoft.com/en-us/library/ms536408(VS.85).aspx]	deleteTFOot [http://msdn.microsoft.com/en-us/library/ms536409(VS.85).aspx]	deleteTHead [http://msdn.microsoft.com/en-us/library/ms536410(VS.85).aspx]	focus [http://msdn.microsoft.com/en-us/library/ms536425(VS.85).aspx]
getAttribute [http://msdn.microsoft.com/en-us/library/ms531348(VS.85).aspx]	getAttribute [http://msdn.microsoft.com/en-us/library/ms536429(VS.85).aspx]	getAttribute [http://msdn.microsoft.com/en-us/library/ms536431(VS.85).aspx]	getElementById [http://msdn.microsoft.com/en-us/library/ms536437(VS.85).aspx]
getElementsByName [http://msdn.microsoft.com/en-us/library/ms536438(VS.85).aspx]	getElementsByTagName [http://msdn.microsoft.com/en-us/library/ms536439(VS.85).aspx]	hasChildNodes [http://msdn.microsoft.com/en-us/library/ms536445(VS.85).aspx]	insertBefore [http://msdn.microsoft.com/en-us/library/ms536454(VS.85).aspx]
insertCell [http://msdn.microsoft.com/en-us/library/ms536455(VS.85).aspx]	insertRow [http://msdn.microsoft.com/en-us/library/ms536457(VS.85).aspx]	item [http://msdn.microsoft.com/en-us/library/ms536462(VS.85).aspx]	item [http://msdn.microsoft.com/en-us/library/ms536460(VS.85).aspx]
item [http://msdn.microsoft.com/en-us/library/dd347034(VS.85).aspx]	item [http://msdn.microsoft.com/en-us/library/dd347035(VS.85).aspx]	open [http://msdn.microsoft.com/en-us/library/ms536652(VS.85).aspx]	remove [http://msdn.microsoft.com/en-us/library/ms536694(VS.85).aspx]

removeAttribute [http://msdn.microsoft.com/en-us/library/ms531401 (VS.85).aspx]	removeAttribute [http://msdn.microsoft.com/en-us/library/ms536696 (VS.85).aspx]	removeChild [http://msdn.microsoft.com/en-us/library/ms536702 (VS.85).aspx]	replaceChild [http://msdn.microsoft.com/en-us/library/ms536716 (VS.85).aspx]
reset [http://msdn.microsoft.com/en-us/library/ms536721 (VS.85).aspx]	select [http://msdn.microsoft.com/en-us/library/ms536733 (VS.85).aspx]	select [http://msdn.microsoft.com/en-us/library/ms536735 (VS.85).aspx]	setAttribute [http://msdn.microsoft.com/en-us/library/ms531404 (VS.85).aspx]
setAttribute [http://msdn.microsoft.com/en-us/library/ms536739 (VS.85).aspx]	splitText [http://msdn.microsoft.com/en-us/library/ms536764 (VS.85).aspx]	submit [http://msdn.microsoft.com/en-us/library/ms536771 (VS.85).aspx]	write [http://msdn.microsoft.com/en-us/library/ms536782 (VS.85).aspx]
writeln [http://msdn.microsoft.com/en-us/library/ms536783 (VS.85).aspx]			

Properties

acceptCharset [http://msdn.microsoft.com/en-us/library/ms533061 (VS.85).aspx]	accessKey [http://msdn.microsoft.com/en-us/library/ms533062 (VS.85).aspx]	action [http://msdn.microsoft.com/en-us/library/ms533063 (VS.85).aspx]	align [http://msdn.microsoft.com/en-us/library/ms533066 (VS.85).aspx]
align [http://msdn.microsoft.com/en-us/library/ms533067 (VS.85).aspx]	align [http://msdn.microsoft.com/en-us/library/ms533068 (VS.85).aspx]	align [http://msdn.microsoft.com/en-us/library/ms533069 (VS.85).aspx]	aLink [http://msdn.microsoft.com/en-us/library/ms533070 (VS.85).aspx]
alt [http://msdn.microsoft.com/en-us/library/ms533073 (VS.85).aspx]	background [http://msdn.microsoft.com/en-us/library/ms530722 (VS.85).aspx]	background [http://msdn.microsoft.com/en-us/library/ms533498 (VS.85).aspx]	background [http://msdn.microsoft.com/en-us/library/ms533499 (VS.85).aspx]
bgColor [http://msdn.microsoft.com/en-us/library/ms533505 (VS.85).aspx]	border [http://msdn.microsoft.com/en-us/library/ms536476 (VS.85).aspx]	border [http://msdn.microsoft.com/en-us/library/ms530744 (VS.85).aspx]	border [http://msdn.microsoft.com/en-us/library/ms533533 (VS.85).aspx]
border [http://msdn.microsoft.com/en-us/library/ms533534 (VS.85).aspx]	caption [http://msdn.microsoft.com/en-us/library/ms536478 (VS.85).aspx]	caption [http://msdn.microsoft.com/en-us/library/ms533548 (VS.85).aspx]	cellIndex [http://msdn.microsoft.com/en-us/library/ms533549 (VS.85).aspx]
cellPadding [http://msdn.microsoft.com/en-us/library/ms533550 (VS.85).aspx]	cellSpacing [http://msdn.microsoft.com/en-us/library/ms533551 (VS.85).aspx]	charset [http://msdn.microsoft.com/en-us/library/ms533553 (VS.85).aspx]	checked [http://msdn.microsoft.com/en-us/library/ms533556 (VS.85).aspx]
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cols [http://msdn.microsoft.com/en-us/library/ms533583 (VS.85).aspx]	cols [http://msdn.microsoft.com/en-us/library/ms533582 (VS.85).aspx]	cols [http://msdn.microsoft.com/en-us/library/ms533584 (VS.85).aspx]	colSpan [http://msdn.microsoft.com/en-us/library/ms533581 (VS.85).aspx]
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us/library/ms533779 (VS.85).aspx]	us/library/ms530765 (VS.85).aspx]	us/library/ms533781 (VS.85).aspx]	us/library/ms533867 (VS.85).aspx]
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length [http://msdn.microsoft.com/en-us/library/ms534101 (VS.85).aspx]	link [http://msdn.microsoft.com/en-us/library/ms534119 (VS.85).aspx]	lowsrc [http://msdn.microsoft.com/en-us/library/ms534138 (VS.85).aspx]	marginHeight [http://msdn.microsoft.com/en-us/library/ms534145 (VS.85).aspx]
marginWidth [http://msdn.microsoft.com/en-us/library/ms534153 (VS.85).aspx]	maxLength [http://msdn.microsoft.com/en-us/library/ms534157 (VS.85).aspx]	media [http://msdn.microsoft.com/en-us/library/ms534161 (VS.85).aspx]	method [http://msdn.microsoft.com/en-us/library/ms534167 (VS.85).aspx]
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name [http://msdn.microsoft.com/en-us/library/ms534184 (VS.85).aspx]	nextSibling [http://msdn.microsoft.com/en-us/library/ms534189 (VS.85).aspx]	nodeName [http://msdn.microsoft.com/en-us/library/ms534190 (VS.85).aspx]	nodeType [http://msdn.microsoft.com/en-us/library/ms534191 (VS.85).aspx]
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rev [http://msdn.microsoft.com/en-us/library/ms534373 (VS.85).aspx]	rowIndex [http://msdn.microsoft.com/en-us/library/ms534377 (VS.85).aspx]	rows [http://msdn.microsoft.com/en-us/library/ms534379 (VS.85).aspx]	rows [http://msdn.microsoft.com/en-us/library/ms534380 (VS.85).aspx]
rowSpan [http://msdn.microsoft.com/en-us/library/ms534378 (VS.85).aspx]	rules [http://msdn.microsoft.com/en-us/library/ms534384 (VS.85).aspx]	scrolling [http://msdn.microsoft.com/en-us/library/ms534616 (VS.85).aspx]	sectionRowIndex [http://msdn.microsoft.com/en-us/library/ms534621 (VS.85).aspx]
selectableContent [http://msdn.microsoft.com/en-us/library/aa342520 (VS.85).aspx]	selected [http://msdn.microsoft.com/en-us/library/ms534623 (VS.85).aspx]	selectedIndex [http://msdn.microsoft.com/en-us/library/ms534624 (VS.85).aspx]	shape [http://msdn.microsoft.com/en-us/library/ms534628 (VS.85).aspx]
size [http://msdn.microsoft.com/en-us/library/ms534632 (VS.85).aspx]	size [http://msdn.microsoft.com/en-us/library/ms534634 (VS.85).aspx]	size [http://msdn.microsoft.com/en-us/library/ms534631 (VS.85).aspx]	size [http://msdn.microsoft.com/en-us/library/ms534633 (VS.85).aspx]
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src [http://msdn.microsoft.com/en-us/library/ms534643 (VS.85).aspx]	src [http://msdn.microsoft.com/en-us/library/dd347029 (VS.85).aspx]	start [http://msdn.microsoft.com/en-us/library/ms534645 (VS.85).aspx]	tabIndex [http://msdn.microsoft.com/en-us/library/ms534654 (VS.85).aspx]
tagName [http://msdn.microsoft.com/en-us/library/ms534657 (VS.85).aspx]	target [http://msdn.microsoft.com/en-us/library/ms531121 (VS.85).aspx]	target [http://msdn.microsoft.com/en-us/library/ms534659 (VS.85).aspx]	text [http://msdn.microsoft.com/en-us/library/ms534677 (VS.85).aspx]
text [http://msdn.microsoft.com/en-us/library/ms534679 (VS.85).aspx]	text [http://msdn.microsoft.com/en-us/library/ms534676 (VS.85).aspx]	text [http://msdn.microsoft.com/en-us/library/ms534678 (VS.85).aspx]	tfoot [http://msdn.microsoft.com/en-us/library/ms534680 (VS.85).aspx]
thead [http://msdn.microsoft.com/en-us/library/ms534681	title [http://msdn.microsoft.com/en-us/library/ms534682	type [http://msdn.microsoft.com/en-us/library/ms534696	type [http://msdn.microsoft.com/en-us/library/ms534701

(VS.85).aspx]	(VS.85).aspx]	(VS.85).aspx]	(VS.85).aspx]
type [http://msdn.microsoft.com/en-us/library/ms534692 (VS.85).aspx]	type [http://msdn.microsoft.com/en-us/library/ms534695 (VS.85).aspx]	type [http://msdn.microsoft.com/en-us/library/ms534699 (VS.85).aspx]	type [http://msdn.microsoft.com/en-us/library/ms534693 (VS.85).aspx]
type [http://msdn.microsoft.com/en-us/library/ms534691 (VS.85).aspx]	type [http://msdn.microsoft.com/en-us/library/ms534697 (VS.85).aspx]	type [http://msdn.microsoft.com/en-us/library/ms534698 (VS.85).aspx]	type [http://msdn.microsoft.com/en-us/library/ms534700 (VS.85).aspx]
type [http://msdn.microsoft.com/en-us/library/ms534702 (VS.85).aspx]	URL [http://msdn.microsoft.com/en-us/library/ms534708 (VS.85).aspx]	useMap [http://msdn.microsoft.com/en-us/library/ms534711 (VS.85).aspx]	vAlign [http://msdn.microsoft.com/en-us/library/ms534714 (VS.85).aspx]
value [http://msdn.microsoft.com/en-us/library/ms535124 (VS.85).aspx]	value [http://msdn.microsoft.com/en-us/library/ms535127 (VS.85).aspx]	value [http://msdn.microsoft.com/en-us/library/ms535122 (VS.85).aspx]	value [http://msdn.microsoft.com/en-us/library/ms535123 (VS.85).aspx]
value [http://msdn.microsoft.com/en-us/library/ms535125 (VS.85).aspx]	vLink [http://msdn.microsoft.com/en-us/library/ms535138 (VS.85).aspx]	vspace [http://msdn.microsoft.com/en-us/library/ms535141 (VS.85).aspx]	width [http://msdn.microsoft.com/en-us/library/ms531325 (VS.85).aspx]
width [http://msdn.microsoft.com/en-us/library/ms535144 (VS.85).aspx]	width [http://msdn.microsoft.com/en-us/library/ms535145 (VS.85).aspx]	width [http://msdn.microsoft.com/en-us/library/ms531183 (VS.85).aspx]	width [http://msdn.microsoft.com/en-us/library/ms535147 (VS.85).aspx]

Collections

anchors [http://msdn.microsoft.com/en-us/library/ms537435 (VS.85).aspx]	applets [http://msdn.microsoft.com/en-us/library/ms537436 (VS.85).aspx]	areas [http://msdn.microsoft.com/en-us/library/ms537437 (VS.85).aspx]	attributes [http://msdn.microsoft.com/en-us/library/ms537438 (VS.85).aspx]
cells [http://msdn.microsoft.com/en-us/library/ms537443 (VS.85).aspx]	childNodes [http://msdn.microsoft.com/en-us/library/ms537445 (VS.85).aspx]	elements [http://msdn.microsoft.com/en-us/library/ms537449 (VS.85).aspx]	forms [http://msdn.microsoft.com/en-us/library/ms537457 (VS.85).aspx]
images [http://msdn.microsoft.com/en-us/library/ms537461 (VS.85).aspx]	links [http://msdn.microsoft.com/en-us/library/ms537465 (VS.85).aspx]	options [http://msdn.microsoft.com/en-us/library/ms537472 (VS.85).aspx]	rows [http://msdn.microsoft.com/en-us/library/ms537484 (VS.85).aspx]
rules [http://msdn.microsoft.com/en-us/library/ms531199 (VS.85).aspx]	tbodyes [http://msdn.microsoft.com/en-us/library/ms537490 (VS.85).aspx]		

The following tables list the **Document Object Model (DOM) Level 1 methods** and **properties** that are supported by Internet Explorer 6 and later. As of Internet Explorer 6, all of the methods, properties, and collections defined in the **Document Object Model (DOM) Level 1** specification are supported.

Methods

appendData [http://msdn.microsoft.com/en-us/library/ms535935 (VS.85).aspx]	createAttribute [http://msdn.microsoft.com/en-us/library/ms536379 (VS.85).aspx]	createComment [http://msdn.microsoft.com/en-us/library/ms536383 (VS.85).aspx]	deleteData [http://msdn.microsoft.com/en-us/library/ms536407 (VS.85).aspx]
getAttributeNode [http://msdn.microsoft.com/en-us/library/ms536430 (VS.85).aspx]	getNamedItem [http://msdn.microsoft.com/en-us/library/ms536441 (VS.85).aspx]	hasFeature [http://msdn.microsoft.com/en-us/library/ms536446 (VS.85).aspx]	insertData [http://msdn.microsoft.com/en-us/library/ms536456 (VS.85).aspx]
namedItem [http://msdn.microsoft.com/en-us/library/dd347040 (VS.85).aspx]	namedItem [http://msdn.microsoft.com/en-us/library/ms536634 (VS.85).aspx]	namedItem [http://msdn.microsoft.com/en-us/library/dd347041 (VS.85).aspx]	namedItem [http://msdn.microsoft.com/en-us/library/dd347042 (VS.85).aspx]
normalize [http://msdn.microsoft.com/en-us/library/ms536646 (VS.85).aspx]	removeAttributeNode [http://msdn.microsoft.com/en-us/library/ms536698 (VS.85).aspx]	removeNamedItem [http://msdn.microsoft.com/en-us/library/ms536706 (VS.85).aspx]	replaceData [http://msdn.microsoft.com/en-us/library/ms536718 (VS.85).aspx]
setAttributeNode [http://msdn.microsoft.com/en-us/library/ms536741 (VS.85).aspx]	setNamedItem [http://msdn.microsoft.com/en-us/library/ms536751 (VS.85).aspx]	substringData [http://msdn.microsoft.com/en-us/library/ms536772 (VS.85).aspx]	

Properties

abbr [http://msdn.microsoft.com/en-us/library/ms533058 (VS.85).aspx]	accept [http://msdn.microsoft.com/en-us/library/ms533060 (VS.85).aspx]	archive [http://msdn.microsoft.com/en-us/library/ms533081 (VS.85).aspx]	axis [http://msdn.microsoft.com/en-us/library/ms533489 (VS.85).aspx]
---	---	--	---

(VS.85).aspx]	(VS.85).aspx]	(VS.85).aspx]	(VS.85).aspx]
ch [http://msdn.microsoft.com/en-us/library/ms533552 (VS.85).aspx]	chOff [http://msdn.microsoft.com/en-us/library/ms533557 (VS.85).aspx]	cite [http://msdn.microsoft.com/en-us/library/ms533558 (VS.85).aspx]	compact [http://msdn.microsoft.com/en-us/library/ms533585 (VS.85).aspx]
dateTime [http://msdn.microsoft.com/en-us/library/ms533712 (VS.85).aspx]	declare [http://msdn.microsoft.com/en-us/library/ms533713 (VS.85).aspx]	doctype [http://msdn.microsoft.com/en-us/library/ms533737 (VS.85).aspx]	headers [http://msdn.microsoft.com/en-us/library/ms533778 (VS.85).aspx]
hreflang [http://msdn.microsoft.com/en-us/library/ms533787 (VS.85).aspx]	implementation [http://msdn.microsoft.com/en-us/library/ms533884 (VS.85).aspx]	label [http://msdn.microsoft.com/en-us/library/ms533929 (VS.85).aspx]	label [http://msdn.microsoft.com/en-us/library/ms533932 (VS.85).aspx]
longDesc [http://msdn.microsoft.com/en-us/library/ms534132 (VS.85).aspx]	ownerDocument [http://msdn.microsoft.com/en-us/library/ms534315 (VS.85).aspx]	profile [http://msdn.microsoft.com/en-us/library/ms534351 (VS.85).aspx]	scheme [http://msdn.microsoft.com/en-us/library/ms534386 (VS.85).aspx]
scope [http://msdn.microsoft.com/en-us/library/ms534387 (VS.85).aspx]	standby [http://msdn.microsoft.com/en-us/library/ms534644 (VS.85).aspx]	summary [http://msdn.microsoft.com/en-us/library/ms534652 (VS.85).aspx]	type [http://msdn.microsoft.com/en-us/library/ms534694 (VS.85).aspx]
value [http://msdn.microsoft.com/en-us/library/ms535129 (VS.85).aspx]	valueType [http://msdn.microsoft.com/en-us/library/ms535121 (VS.85).aspx]	version [http://msdn.microsoft.com/en-us/library/cc304098 (VS.85).aspx]	width [http://msdn.microsoft.com/en-us/library/ms535148 (VS.85).aspx]

Navigating Nodes

Identifying a particular node is easy if a Web author knows the [ID](http://msdn.microsoft.com/en-us/library/ms533880(VS.85).aspx) [[http://msdn.microsoft.com/en-us/library/ms533880\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/ms533880(VS.85).aspx)] of the element. Finding an adjacent element, or locating an element in relation to another, can be more difficult. The W3C DOM exposes several properties and collections that identify a node, and the relationship a node has with other nodes.

The following HTML demonstrates a tree structure built from a **ul** element.

[Copy Code](#)

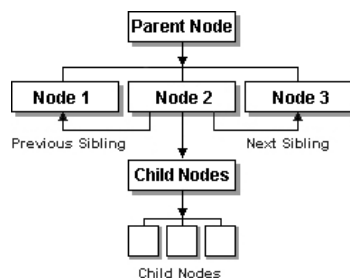
```
<UL ID="oParent">
  <LI>Node 1
  <LI ID="oNode">Node 2
    <UL>
      <LI>Child 1
      <LI ID="oChild2">Child 2
      <LI>Child 3
    </UL>
  <LI>Node 3
</UL>
```

Given a reference to a node in the list where the **ID** is **oNode**, the W3C DOM members can be used to identify the adjacent, parent, and child nodes. Since elements and text exist as nodes, they are accessible through the W3C DOM. The following code identifies the basic structure of the specified node, **oNode**.

[Copy Code](#)

```
<!-- oParent is the parent node of oNode. -->
<UL ID="oParent">
  <!-- oNode is the childNode of oParent.-->
  <LI ID="oNode">
    <!-- Node 2 is a text node and is a child of oNode.-->
    Node 2
  </LI>
```

The **ul** and **li** elements are exposed in the DHTML Object Model. However, the text is only directly accessible as a node in the W3C DOM. Use the following diagram to identify the hierarchy of the list.



The first three **li** elements, labeled Node 1, Node 2, and Node 3, are the child nodes of the first **ul** element, **oParent** (Parent Node). The child nodes collection is exposed to **oParent** as [childNodes](http://msdn.microsoft.com/en-us/library/ms537445(VS.85).aspx) [[http://msdn.microsoft.com/en-us/library/ms537445\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/ms537445(VS.85).aspx)], and contains Node 1, Node 2, and Node 3. As child nodes, these three **li** elements return **oParent** as the parent node through the [parentNode](http://msdn.microsoft.com/en-us/library/ms534328(VS.85).aspx) [[http://msdn.microsoft.com/en-us/library/ms534328\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/ms534328(VS.85).aspx)] property. Node 1, Node 2, and Node 3 are siblings and are exposed to each other through the **previousSibling** and

[nextSibling](http://msdn.microsoft.com/en-us/library/ms534189(VS.85).aspx) [[http://msdn.microsoft.com/en-us/library/ms534189\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/ms534189(VS.85).aspx)] properties. Node 2 exposes a **childNodes** collection that contains three unlabeled **li** elements.

The following sample is an interactive tree that provides the same information as the previous diagram. It allows some experimentation with identifying the relationships of selected nodes and introduces tree manipulation.

Code example: <http://samples.msdn.microsoft.com/workshop/samples/author/dom/InteractiveTree.htm>
[<http://samples.msdn.microsoft.com/workshop/samples/author/dom/InteractiveTree.htm>]

The W3C DOM and DHTML Object Model provide a means to query a specified node to determine its location in the document hierarchy and its relationship to other nodes. Using the previous unordered list, querying the **oNode** object is compared between the W3C DOM and the DHTML Object Model as follows:

- Parent. The parent of **oNode** has an ID of **oParent** in the HTML code.

- - DOM

```
var oParent = oNode.parentNode
```

[Copy Code](#)

- DHTML Object Model

```
var oParent = oNode.parentElement
```

[Copy Code](#)

- Previous Sibling. The nodes adjacent to **oNode** are labeled Node 1 and Node 3. The previous sibling is Node 1.

-

- - DOM

```
var oPrevious = oNode.previousSibling
```

[Copy Code](#)

- DHTML Object Model

```
var oPrevious = fnGetSibling();
function fnGetSibling(){
    var oParent=oNode.parentElement;
    var iLength=oParent.children.length;
    for(var i=0;i < iLength;i++){
        if(oParent.children[i]==oNode){
            return oParent.children[i - 1];
            break;
        }
    }
}
```

[Copy Code](#)

- Node Value. The node value of **oNode** is accessed through the W3C DOM using the [nodeValue](http://msdn.microsoft.com/en-us/library/ms534192(VS.85).aspx) [[http://msdn.microsoft.com/en-us/library/ms534192\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/ms534192(VS.85).aspx)] property, or the [innerHTML](http://msdn.microsoft.com/en-us/library/ms533897(VS.85).aspx) [[http://msdn.microsoft.com/en-us/library/ms533897\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/ms533897(VS.85).aspx)] or [innerText](http://msdn.microsoft.com/en-us/library/ms533899(VS.85).aspx) [[http://msdn.microsoft.com/en-us/library/ms533899\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/ms533899(VS.85).aspx)] property using the DHTML Object Model.

-

- - DOM

```
oNode.childNodes[0].nodeValue="The new label";
```

[Copy Code](#)

- DHTML Object Model

```
oNode.innerHTML="The new label";
```

[Copy Code](#)

Notice the similarities and differences between querying the W3C DOM and the DHTML Object Model. First, the [parentElement](http://msdn.microsoft.com/en-us/library/ms534327(VS.85).aspx) [[http://msdn.microsoft.com/en-us/library/ms534327\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/ms534327(VS.85).aspx)] and **parentNode** properties return the same element for this sample. Second, finding the previous sibling using the DHTML Object Model is more tedious than simply using the **previousSibling** property exposed in the W3C DOM. And third, notice that the text is treated as a node in the W3C DOM and is accessible through the **childNodes** collection. An important distinction about a [TextNode](http://msdn.microsoft.com/en-us/library/ms535905(VS.85).aspx) [[http://msdn.microsoft.com/en-us/library/ms535905\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/ms535905(VS.85).aspx)] is that it cannot contain any child nodes.

Creating Nodes

Nodes are created using the [createElement](http://msdn.microsoft.com/en-us/library/ms536389(VS.85).aspx) [[http://msdn.microsoft.com/en-us/library/ms536389\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/ms536389(VS.85).aspx)] and [createTextNode](http://msdn.microsoft.com/en-us/library/ms536400(VS.85).aspx) [[http://msdn.microsoft.com/en-us/library/ms536400\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/ms536400(VS.85).aspx)] methods. Both methods are exposed only to the [document](http://msdn.microsoft.com/en-us/library/ms531073(VS.85).aspx) [[http://msdn.microsoft.com/en-us/library/ms531073\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/ms531073(VS.85).aspx)] object, and can be used in HTML documents, [DHTML behaviors](http://msdn.microsoft.com/en-us/library/ms531079(VS.85).aspx) [[http://msdn.microsoft.com/en-us/library/ms531079\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/ms531079(VS.85).aspx)], and [HTML Applications \(HTAs\)](http://msdn.microsoft.com/en-us/library/ms536496(VS.85).aspx) [[http://msdn.microsoft.com/en-us/library/ms536496\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/ms536496(VS.85).aspx)]. In the DHTML Object Model, elements are added to the document hierarchy by modifying the **innerHTML** and **outerHTML** property values, or by using methods explicit to particular elements, such as the [insertRow](http://msdn.microsoft.com/en-us/library/ms536457(VS.85).aspx) [[http://msdn.microsoft.com/en-us/library/ms536457\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/ms536457(VS.85).aspx)] and [insertCell](http://msdn.microsoft.com/en-us/library/ms536455(VS.85).aspx) [[http://msdn.microsoft.com/en-us/library/ms536455\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/ms536455(VS.85).aspx)] methods for the [table](http://msdn.microsoft.com/en-us/library/ms535901(VS.85).aspx) [[http://msdn.microsoft.com/en-us/library/ms535901\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/ms535901(VS.85).aspx)] element. With the **createElement** method, only the name of the element is needed.

Use the following syntax to create a new element.

[Copy Code](#)

```
// Create an element
var oElement = document.createElement(sElementName);
```

The **createElement** method is available in Internet Explorer 4.0, but only the [area](http://msdn.microsoft.com/en-us/library/ms535185(VS.85).aspx) [[http://msdn.microsoft.com/en-us/library/ms535185\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/ms535185(VS.85).aspx)] , [img](http://msdn.microsoft.com/en-us/library/ms535259(VS.85).aspx) [[http://msdn.microsoft.com/en-us/library/ms535259\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/ms535259(VS.85).aspx)] , and [option](http://msdn.microsoft.com/en-us/library/ms535877(VS.85).aspx) [[http://msdn.microsoft.com/en-us/library/ms535877\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/ms535877(VS.85).aspx)] elements can be created. As of Internet Explorer 5, all elements can be created stand-alone. In addition, read-only properties, such as [id](http://msdn.microsoft.com/en-us/library/ms533880(VS.85).aspx) [[http://msdn.microsoft.com/en-us/library/ms533880\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/ms533880(VS.85).aspx)] , are read-write for stand-alone elements before they are inserted into the document hierarchy. Some elements might require additional steps or rely on the existence of other elements. For example, the [TYPE](http://msdn.microsoft.com/en-us/library/ms534700(VS.85).aspx) [[http://msdn.microsoft.com/en-us/library/ms534700\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/ms534700(VS.85).aspx)] attribute of the [input](http://msdn.microsoft.com/en-us/library/ms535260(VS.85).aspx) [[http://msdn.microsoft.com/en-us/library/ms535260\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/ms535260(VS.85).aspx)] element defaults to

```
text
```

. So, to create a button control, the

```
type
```

property needs to be set to

```
button
```

, and the [value](http://msdn.microsoft.com/en-us/library/ms535123(VS.85).aspx) [[http://msdn.microsoft.com/en-us/library/ms535123\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/ms535123(VS.85).aspx)] property should be set to provide a label.

The following sample code highlights how a [fieldset](http://msdn.microsoft.com/en-us/library/ms535247(VS.85).aspx) [[http://msdn.microsoft.com/en-us/library/ms535247\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/ms535247(VS.85).aspx)] , [legend](http://msdn.microsoft.com/en-us/library/ms535846(VS.85).aspx) [[http://msdn.microsoft.com/en-us/library/ms535846\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/ms535846(VS.85).aspx)] , and [INPUT type=button](http://msdn.microsoft.com/en-us/library/ms535261(VS.85).aspx) [[http://msdn.microsoft.com/en-us/library/ms535261\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/ms535261(VS.85).aspx)] control are created in script to build a short form. Notice that one function is designed to create and append the elements, and a reference to the new element is returned so additional elements can be appended as children.

[Copy Code](#)

```
function fnCreate(sElement,sData,sType,oNode){
    var oNewElement=document.createElement(sElement);
    if(sType){
        oNewElement.type=sType;
        oNewElement.value=sData;
    }
    if(sData){
        if(sElement.toLowerCase()!="input"){
            var oNewText=document.createTextNode(sData);
            oNewElement.appendChild(oNewText);
        }
    }
    if(oNode){
        oNode.appendChild(oNewElement);
    }
    else{
        oNewForm.appendChild(oNewElement);
    }
    return oNewElement;
}

var oNode=fnCreate("FIELDSET");
fnCreate("LEGEND","My Form","",oNode);
fnCreate("INPUT","Some Text","text",oNode);
fnCreate("INPUT","A button","button",oNode);
```

Code example: <http://samples.msdn.microsoft.com/workshop/samples/author/dom/CreateForm.htm>
[<http://samples.msdn.microsoft.com/workshop/samples/author/dom/CreateForm.htm>]

When creating and threading together nodes, it is important to use well-formed HTML to avoid creating an invalid tree. By creating and adding an invalid tree into the document hierarchy, unpredictable behavior can ensue. For the most part, Web authors need not be concerned. However, there are some elements, such as **table**, that warrant special discussion.

A well-formed HTML table consists of at least two nodes: **table** and **tbody** [[http://msdn.microsoft.com/en-us/library/ms535902\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/ms535902(VS.85).aspx)] . In the DHTML Object Model, a **table**, with accompanying rows and cells, can be created using the **innerHTML** property, the **insertRow** and **insertCell** methods, and the **rows** [[http://msdn.microsoft.com/en-us/library/ms537484\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/ms537484(VS.85).aspx)] and **cells** [[http://msdn.microsoft.com/en-us/library/ms537443\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/ms537443(VS.85).aspx)] collections. While the **tbody** element is not explicitly added, it is created as a part of the table object model. For example, the following code generates a two-cell table using the DHTML Object Model.

[Copy Code](#)

```
var sTable="<TABLE ID='oTable1'></TABLE>"
document.body.innerHTML+=sTable;
oTable1.insertRow(oTable1.rows.length);
oTable1.insertRow(oTable1.rows.length);
oTable1.rows(0).insertCell(oTable1.rows(0).cells.length);
oTable1.rows(0).insertCell(oTable1.rows(0).cells.length);
oTable1.rows(0).cells(0).innerHTML="Cell 1";
oTable1.rows(0).cells(1).innerHTML="Cell 2";
```

The following HTML is the result of the previous code. Notice that the **tbody** element exists even though it was not added in script.

[Copy Code](#)

```
<TABLE ID="oTable">
<TBODY>
<TR><TD>Cell 1</TD><TD>Cell 2</TD></TR>
```

```
</TBODY>
</TABLE>
```

To create a well-formed table in the W3C DOM, the **tBody** element must be explicitly created and added to the tree. By not including the **tBody** element, the nodes comprising the entire table form an invalid tree and result in unpredictable behavior. The following script outlines the creation of a table using the W3C DOM, including the **tBody** element.

[Copy Code](#)

```
var oTable=document.createElement("TABLE");
var oTBody=document.createElement("TBODY");
var oRow=document.createElement("TR");
var oCell=document.createElement("TD");
var oCell2=oCell.cloneNode();
oRow.appendChild(oCell);
oRow.appendChild(oCell2);
oTable.appendChild(oTBody);
oTBody.appendChild(oRow);
document.body.appendChild(oTable);
oCell.innerHTML="Cell 1";
oCell2.innerHTML="Cell 2";
```

Manipulating Nodes

Once a node is created, and its relationship with other nodes is identified, it can be manipulated. A node can be updated without any knowledge of what nodes are adjacent to it, but it is a good idea to know what could be affected if a node is altered. For example, if a Web author wants to remove portions of a list, removing the topmost node and all its children might delete information that should have been preserved. In addition, removing only the topmost node of a list might cause additional problems later because the existing list items would still exist, without the [ol](http://msdn.microsoft.com/en-us/library/ms535875(VS.85).aspx) [[http://msdn.microsoft.com/en-us/library/ms535875\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/ms535875(VS.85).aspx)] or **ul** parent.

Some of the W3C DOM methods that allow authors to easily manipulate nodes are the [cloneNode](http://msdn.microsoft.com/en-us/library/ms536365(VS.85).aspx) [[http://msdn.microsoft.com/en-us/library/ms536365\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/ms536365(VS.85).aspx)] , [removeNode](http://msdn.microsoft.com/en-us/library/ms536708(VS.85).aspx) [[http://msdn.microsoft.com/en-us/library/ms536708\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/ms536708(VS.85).aspx)] , [replaceNode](http://msdn.microsoft.com/en-us/library/ms536719(VS.85).aspx) [[http://msdn.microsoft.com/en-us/library/ms536719\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/ms536719(VS.85).aspx)] , and **swapNode** methods. These methods provide copy, move, and delete functionality to the entire document tree. Understanding how a node interacts with other nodes helps keep a document clean and the client-side script stable. For example, consider the following list code.

[Copy Code](#)

```
<UL ID=oParent>
<LI>Item 1
<LI ID=oNode2>Item 2
<OL ID=oSubList>
<LI>Sub Item 1
<LI>Sub Item 2
<LI>Sub Item 3
</OL>
<LI>Item 3
</UL>
```

Manipulating nodes can be tricky because it is very easy to build invalid tree structures. For example, to copy one of the list items represented in the previous HTML and paste it at the bottom of the list, the new node should be appended to the parent, **oParent**, not the last list item. By appending the node to the last list item, the new node becomes a child of **oParent**, not a sibling to the other nodes. The converse is also true for appending children to each list item. If a new sublist is created and appended to **oParent**, it becomes a sibling to the other list items, not a child of a particular list item.

To create a new sublist of three items, one new **ol** element and three new **li** elements can be created and appended to the last list item. However, since this structure already exists, it can be copied with the **cloneNode** method. By passing

```
true
```

as a parameter to the method, the children are cloned as well. The following code demonstrates how the entire sublist is copied and appended to the last list item.

[Copy Code](#)

```
var oClone=oSubList.cloneNode(true);
oParent.childNodes[oParent.childNodes.length-1].appendChild(oClone);
```

The **replaceNode** and **swapNode** methods are used to exchange a node with one in the document hierarchy. The difference between these methods is that **replaceNode** removes the node that invokes the method from the document hierarchy, and **swapNode** moves the node that invokes the method to the position of the incoming node. The following sample code highlights the use of both methods.

[Copy Code](#)

```
<SCRIPT>
window.onload=fnInit;
function fnInit(){
    var oNewPara=document.createElement("P");
    var oText=document.createTextNode("This is the new paragraph");
    oNewPara.appendChild(oText);
    document.body.appendChild(oNewPara);
    // Paragraph 2 is replaced with the new paragraph
    oP2.replaceNode(oNewPara);
    // The position of paragraph 1 is exchanged with the new paragraph
    oNewPara.swapNode(oP1);
```

```
}  
</SCRIPT>  
  
<P ID=oP1>This is the first paragraph</P>  
<P ID=oP2>This is the second paragraph</P>
```

The ability to manipulate nodes allows authors to perform complex operations on the document without rewriting the content. Speed and efficiency are gained by working directly with the document tree. Being able to navigate and identify nodes, create new nodes, and manipulate existing nodes prepares authors to make the most of their creativity and ingenuity when developing dynamic documents.

Security

The W3C DOM adheres to the same security restrictions as the DHTML Object Model and is subject to the [cross-frame security](#) [[http://msdn.microsoft.com/en-us/library/ms533028\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/ms533028(VS.85).aspx)] rules of Internet Explorer. In addition, the same scripting security still applies.

Related Topics

- [About the DHTML Object Model](#) [[http://msdn.microsoft.com/en-us/library/ms533022\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/ms533022(VS.85).aspx)]
- [Document Object Model \(DOM\)](#) [<http://www.w3.org/dom/>] 

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