Document Object Model (DOM)

INFO/CSE 100, Autumn 2004

Fluency in Information Technology

http://www.cs.washington.edu/100

References

- References
  - » *JavaScript, The Definitive Guide*
    - by David Flanagan. Publisher O'Reilly

  - » W3C Document Object Model
    - http://www.w3.org/DOM/
    - http://www.w3.org/2003/02/06-dom-support.html
  - » Document Object Model in Mozilla
    - http://www.mozilla.org/docs/dom/

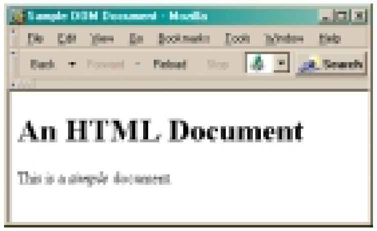
What the heck is the DOM?

- Document Object Model
  - » Your web browser builds a *model* of the web page (the *document*) that includes all the *objects* in the page (tags, text, etc)
  - » All of the properties, methods, and events available to the web developer for manipulating and creating web pages are organized into objects
  - » Those objects are accessible via scripting languages in modern web browsers

This is what the browser reads (sampleDOM.html).

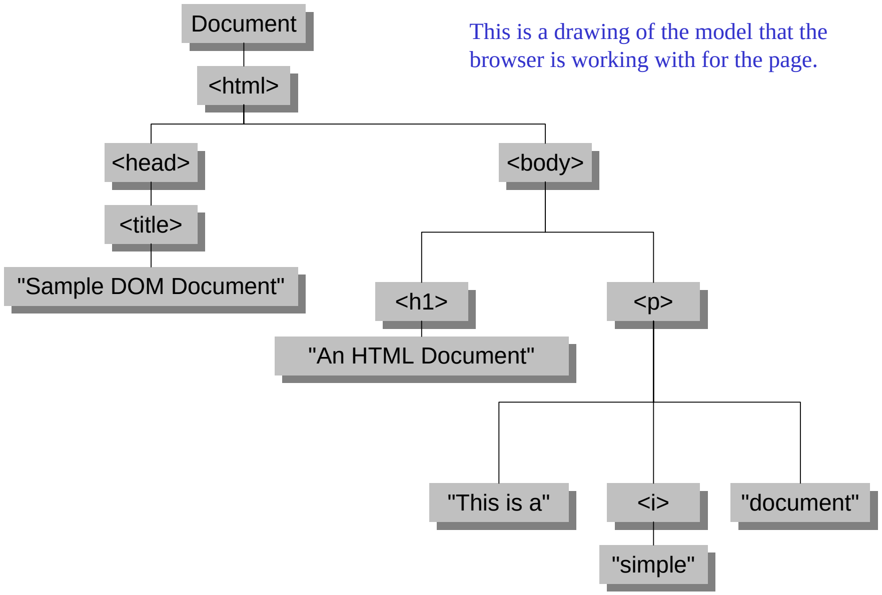
```
<html>
  <head>
    <title>Sample DOM Document</title>
  </head>
  <body>
    <h1>An HTML Document</h1>
    <p>This is a <i>simple</i> document.
  </body>
</html>
```

This is what the browser displays on screen.


Sample DOM Document - Mozilla
File Edit View Go Bookmarks Tools Window Help
Back Forward Reload Stop Search

An HTML Document

This is a simple document.



This is a drawing of the model that the browser is working with for the page.

Figure 17-1. The tree representation of an HTML document
Copied from JavaScript by Flanagan.

Why is this useful?

- Because we can access the model too!
  - » the model is made available to scripts running in the browser, not just the browser itself
    - A script can find things out about the state of the page
    - A script can change things in response to events, including user requests
  - » We have already used this capability in the GUI programming that we've done

Recall our simple GUI example

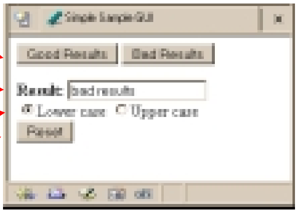
This GUI has several simple controls.

Two buttons to control the results

One text field to display the results

One pair of radio buttons to control the display

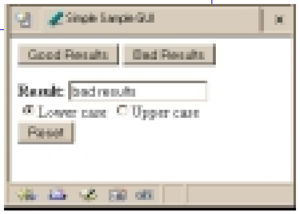
One button to reinitialize



http://www.cs.washington.edu/education/courses/100/04au/slides/16-dom/gui.html

setResults(resultString)

```
<script type="text/javascript">
function setResults(resultString) {
  var tempString = resultString;
  if (document.getElementById("radioLC").checked) {
    tempString = tempString.toLowerCase();
  } else if (document.getElementById("radioUC").checked) {
    tempString = tempString.toUpperCase();
  }
  document.getElementById("resultField").value = tempString;
}
</script>
```



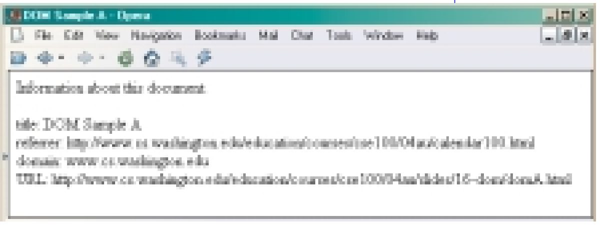
the highlighted script above makes reference to several objects in the document object model

document.getElementById("radioLC").checked

- Reference to several nodes in the model of the page that the browser constructed
- `document`
  - » The root of the tree is an object of type `HTMLDocument`
  - » Using the global variable `document`, we can access all the nodes in the tree, as well as useful functions and other global information
    - title, referrer, domain, URL, body, images, links, forms, ...
    - open, write, close, getElementById, ...

Some information from a document

```
<html>
  <head>
    <title>DOM Sample A</title>
  </head>
  <body>
    Information about this document.<br>
    <script type="text/javascript">
    document.write("<br>Title: ",document.title);
    document.write("<br>Referrer: ",document.referrer);
    document.write("<br>Domain: ",document.domain);
    document.write("<br>URL: ",document.URL);
    </script>
  </body>
</html>
```


DOM Sample A - Opera
File Edit View Navigation Bookmarks Mail Chat Tools Window Help

Information about this document.

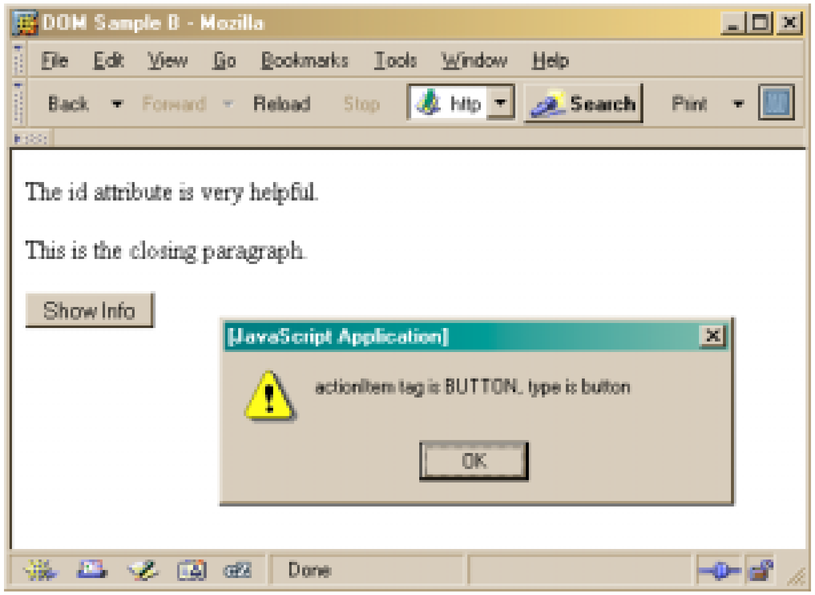
title: DOM Sample A
referrer: http://www.cs.washington.edu/education/courses/cse100/04au/calendar100.html
domain: www.cs.washington.edu
URL: http://www.cs.washington.edu/education/courses/cse100/04au/slides/16-dom/domA.html

document.getElementById("radioLC").checked

- `getElementById("radioLC")`
  - » This is a predefined function that makes use of the `id` that can be defined for any element in the page
  - » An `id` must be unique in the page, so only one element is ever returned by this function
  - » The argument to `getElementById` specifies which element is being requested

Some information about elements

```
<html>
  <head>
    <title>DOM Sample B</title>
    <script type="text/javascript">
    function showInfo() {
      var element = document.getElementById("opener");
      var buffer = element.id + " tag is " + element.tagName;
      alert(buffer);
      element = document.getElementById("actionItem");
      buffer = element.id + " tag is " + element.tagName;
      buffer += ", type is "+element.type;
      alert(buffer);
    }
    </script>
  </head>
  <body>
    <p id="opener">The id attribute is very helpful.</p>
    <p id="closer">This is the closing paragraph.</p>
    <form>
    <button id="actionItem" type="button" onclick="showInfo()">Show Info</button>
    </form>
  </body>
</html>
```


DOM Sample B - Mozilla
File Edit View Go Bookmarks Tools Window Help
Back Forward Reload Stop http Search Print
Show Info
[JavaScript Application]
OK
Done

The id attribute is very helpful.

This is the closing paragraph.

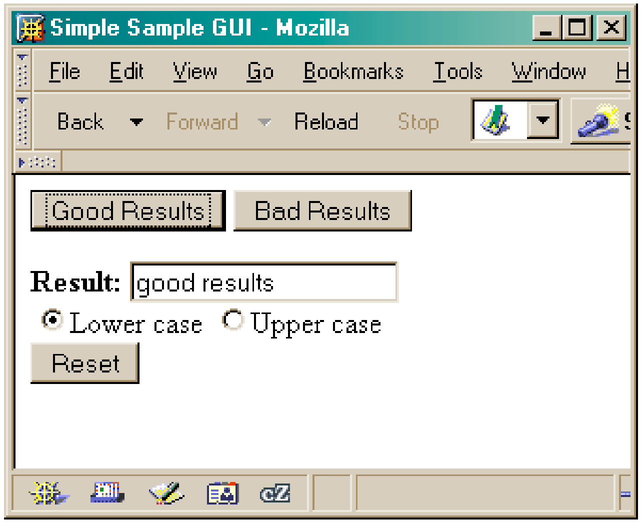
actionItem tag is BUTTON, type is button

`document.getElementById("radioLC").checked`

- **`checked`**
  - » This is a particular property of the node we are looking at, in this case, a radio button
  - » Each type of node has its own set of properties
    - for radio button: `checked, name, ...`
    - refer to the HTML DOM for specifics for each element type
  - » Some properties can be both read and set

Some specific properties

```
<head>
<title>Simple Sample GUI</title>
<script type="text/javascript">
function setResults(resultString) {
  var tempString = resultString;
  if (document.getElementById("radioLC").checked) {
    tempString = tempString.toLowerCase();
  } else if (document.getElementById("radioUC").checked) {
    tempString = tempString.toUpperCase();
  }
  document.getElementById("resultField").value = tempString;
}
</script>
</head>
```

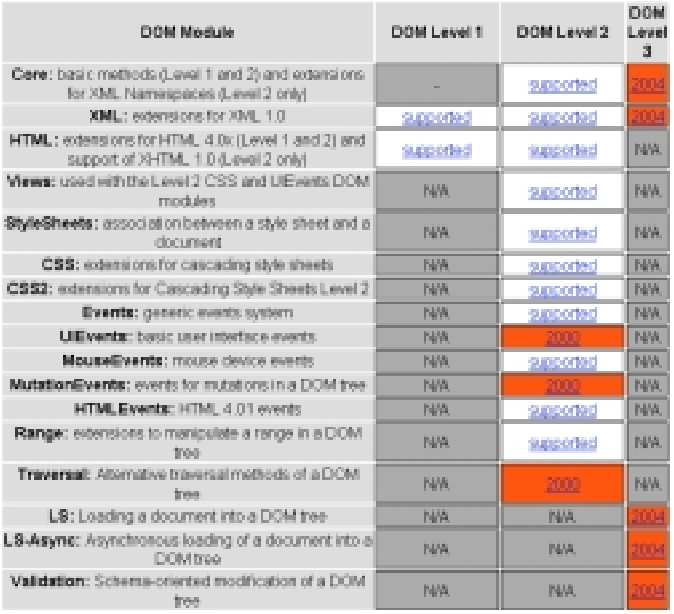

Simple Sample GUI - Mozilla
File Edit View Go Bookmarks Tools Window H
Back Forward Reload Stop
Good Results
Bad Results
Reset

Result: good results

● Lower case ○ Upper case

Just the tip of the DOM

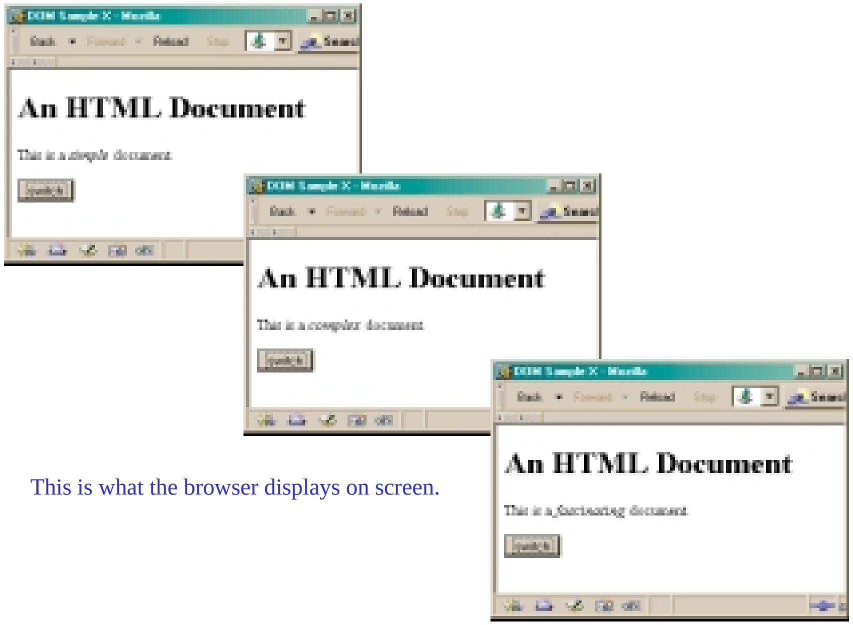
- The HTML Document Object Model is a standard for structuring data on a web page
  - » The field is advancing rapidly as people recognize the benefits of standardized structure and access
  - » The DOM is steadily improving to cover general purpose data structuring requirements
- XML (Extendible Markup Language) also uses the Core DOM to specify its structured data
  - » similar to HTML but more carefully defined



DOM Module	DOM Level 1	DOM Level 2	DOM Level 3
Core: basic methods (Level 1 and 2) and extensions for XML Namespaces (Level 2 only)	-	supported	2004
XML: extensions for XML 1.0	supported	supported	2004
HTML: extensions for HTML 4.0x (Level 1 and 2) and support of XHTML 1.0 (Level 2 only)	supported	supported	N/A
Views: used with the Level 2 CSS and UIEvents DOM modules	N/A	supported	N/A
StyleSheets: association between a style sheet and a document	N/A	supported	N/A
CSS: extensions for cascading style sheets	N/A	supported	N/A
CSS2: extensions for Cascading Style Sheets Level 2	N/A	supported	N/A
Events: generic events system	N/A	supported	N/A
UIEvents: basic user interface events	N/A	2000	N/A
MouseEvents: mouse device events	N/A	supported	N/A
MutationEvents: events for mutations in a DOM tree	N/A	2000	N/A
HTMLEvents: HTML 4.01 events	N/A	supported	N/A
Range: extensions to manipulate a range in a DOM tree	N/A	supported	N/A
Traversal: Alternative traversal methods of a DOM tree	N/A	2000	N/A
LS: Loading a document into a DOM tree	N/A	N/A	2004
LS-Async: Asynchronous loading of a document into a DOM tree	N/A	N/A	2004
Validation: Schema-oriented modification of a DOM tree	N/A	N/A	2004

This is what the browser reads (domC.html).

```
<html>
  <head>
    <title>DOM Sample C</title>
    <script type="text/javascript">
    var switchCount = 0;
    var adjectives = ["simple","complex","fascinating","unique"];
    function switcher() {
        switchCount = (switchCount + 1) % adjectives.length;
        var italicNode = document.getElementById("adjPhrase");
        italicNode.firstChild.nodeValue = adjectives[switchCount];
        }
    </script>
  </head>
  <body>
    <h1>An HTML Document</h1>
    <p>This is a <i id="adjPhrase">simple</i> document.
    <form>
    <button type="button" onclick="switcher()">switch</button>
    </form>
  </body>
</html>
```



An HTML Document

This is a *simple* document.

switch

An HTML Document

This is a *complex* document.

switch

An HTML Document

This is a *fascinating* document.

switch

This is what the browser displays on screen.