JavaScript

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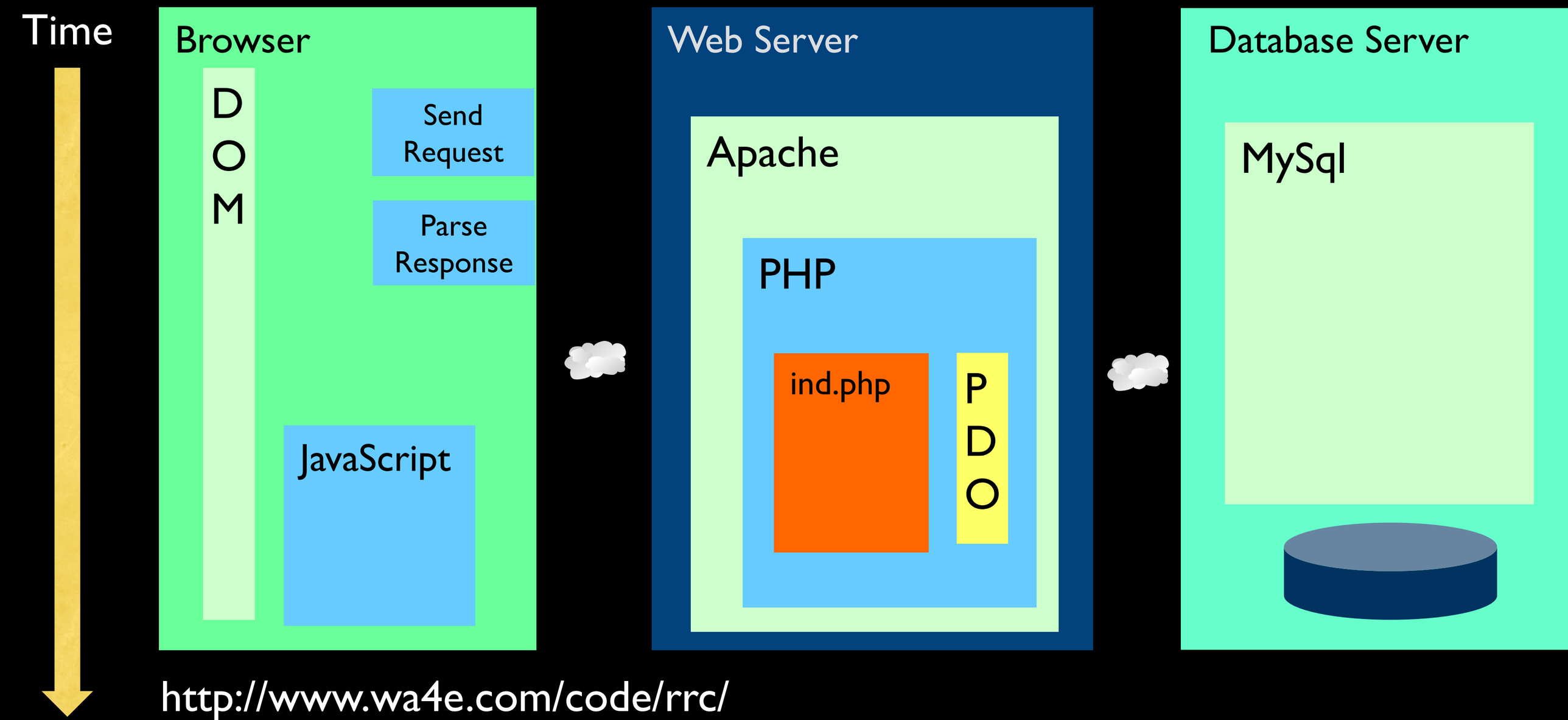
www.wa4e.com

http://www.wa4e.com/code/javascript
http://www.wa4e.com/code/javascript.zip



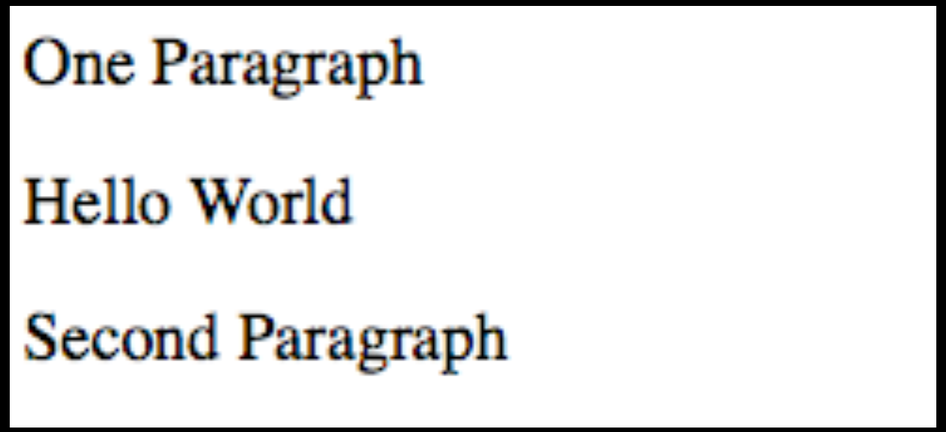
http://www.wa4e.com/code/rrc/

About JavaScript

- Introduced in Netscape in 1995
- Developed by Brandon Eich
- Named to make use of Java market buzz
- Standardized today as ECMAScript

http://en.wikipedia.org/wiki/Brendan_Eich

```
<html>
<head>
<title>Hello World</title>
</head>
<body>
<p>One Paragraph</p>
<script type="text/javascript">
  document.write("<p>Hello World</p>")
</script>
<noscript>
Your browser doesn't support or has disabled
JavaScript.
</noscript>
<p>Second Paragraph</p>
</body>
</html>
```

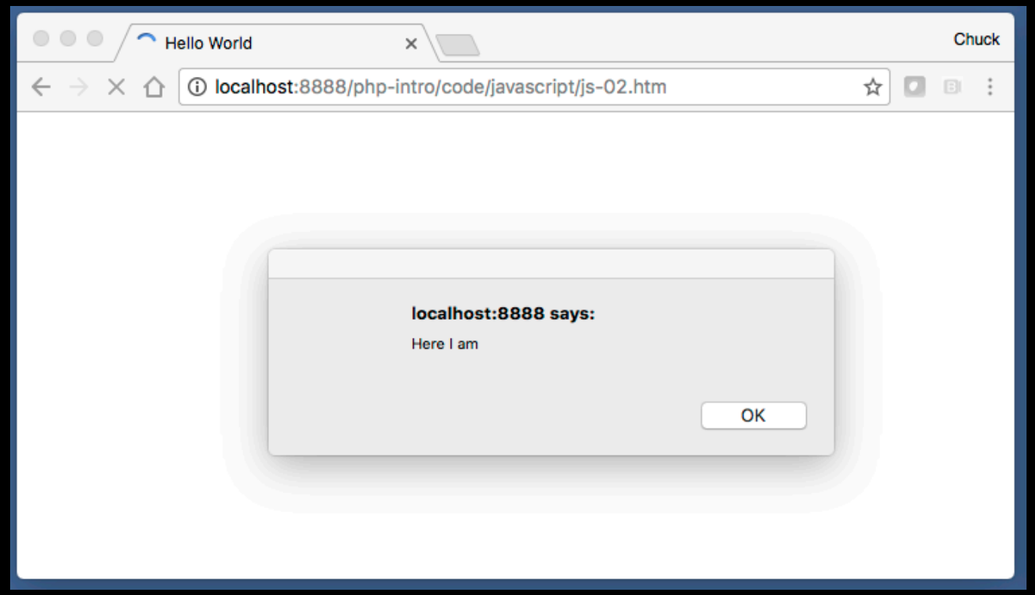


js-01.htm

Low-Level Debugging

- When in doubt, you can always add an alert() to your JavaScript.
- The alert() function takes a string as a parameter and pauses the JavaScript execution until you press “OK”.

```
<html>
<head>
<title>Hello World</title>
</head>
<body>
<p>One Paragraph</p>
<script type="text/javascript">
  alert("Here I am");
  document.write("<p>Hello World</p>")
</script>
<noscript>
Your browser doesn't support or has disabled JavaScript.
</noscript>
<p>Second Paragraph</p>
</body>
</html>
```



js-02.htm

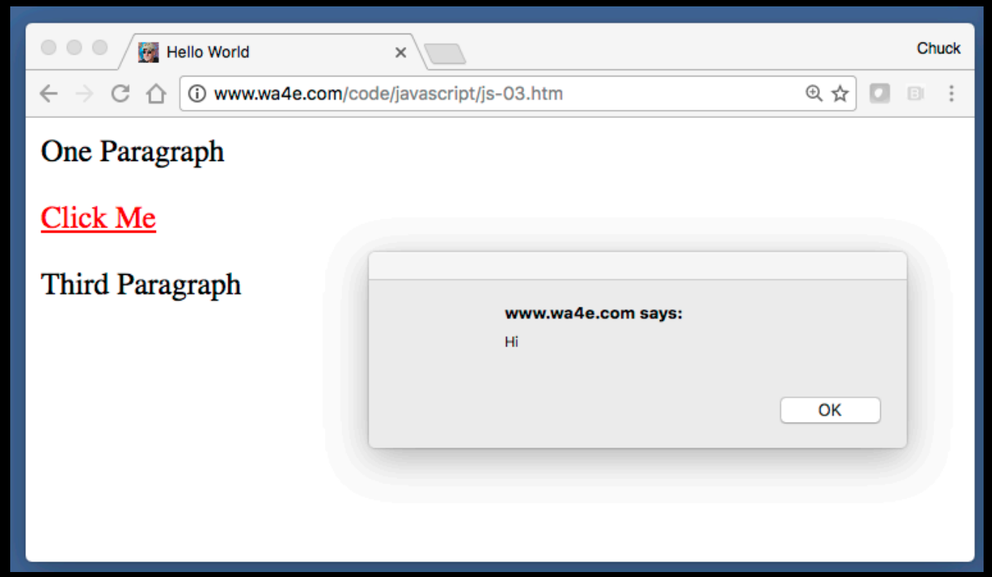
Including JavaScript

Three Patterns:

- Inline within the document
- As part of an event in an HTML tag
- From a file

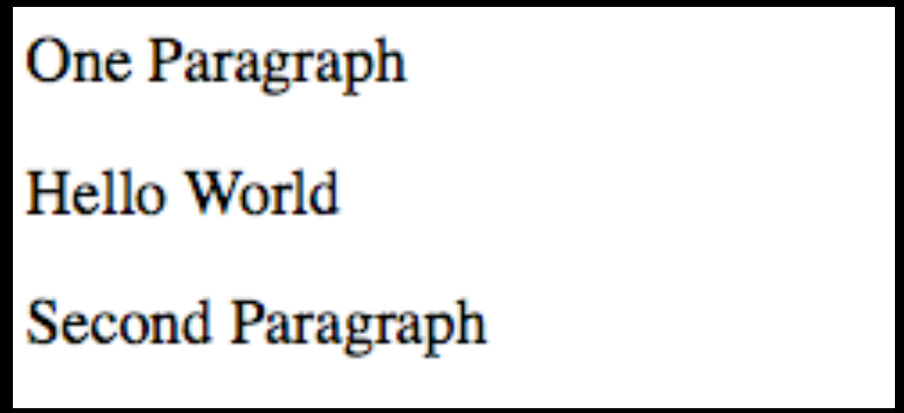
js-03.htm

```
<html>
<head>
<title>Hello World</title>
</head>
<body>
<p>One Paragraph</p>
<p><a href="js-01.htm"
 onclick="alert('Hi'); return false;">Click Me</a></p>
<p>Third Paragraph</p>
</body>
</html>
```



JavaScript on a tag

```
<html>
<head>
<title>Hello World</title>
</head>
<body>
<p>One Paragraph</p>
<script type="text/javascript" src="script.js">
</script>
<p>Third Paragraph</p>
</body>
</html>
```



JavaScript in a separate file

script.js:

```
document.write("<p>Hello World</p>");
```

js-04.htm

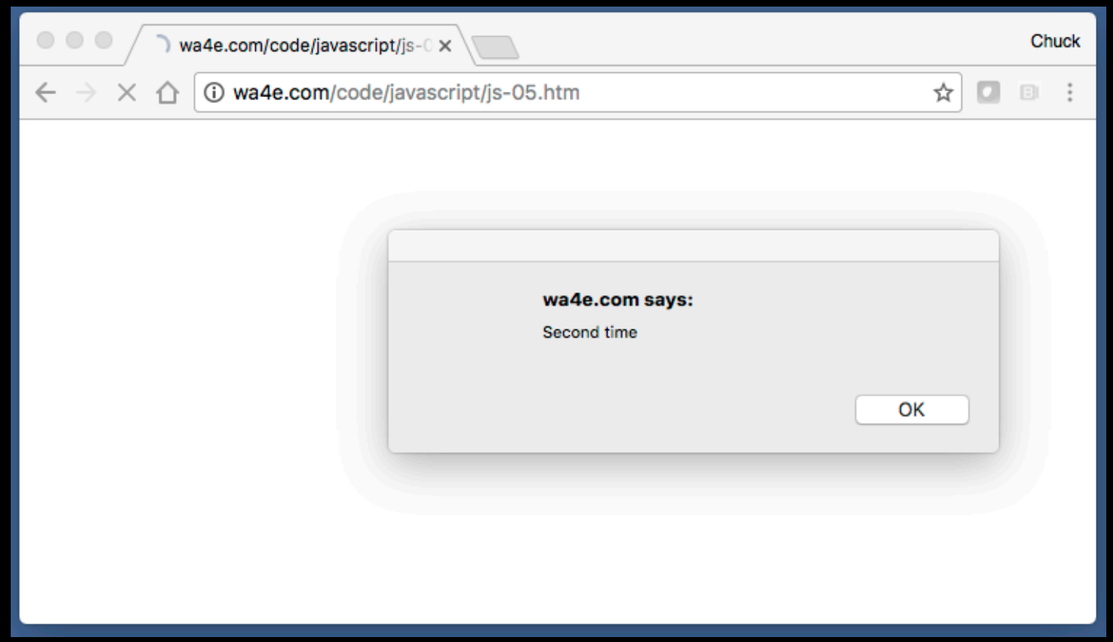
Basic JavaScript

Syntax Errors

- As in any language, we can make syntax errors
- By default, browsers silently eat any kind of JavaScript error
- But the code stops running in that file or script section

```
<p>One Paragraph</p>
<script type="text/javascript">
  alert("I am broken');
  alert("I am good");
</script>
<p>Two Paragraph</p>
<script type="text/javascript">
  alert("Second time");
</script>
<p>Three Paragraph</p>
```

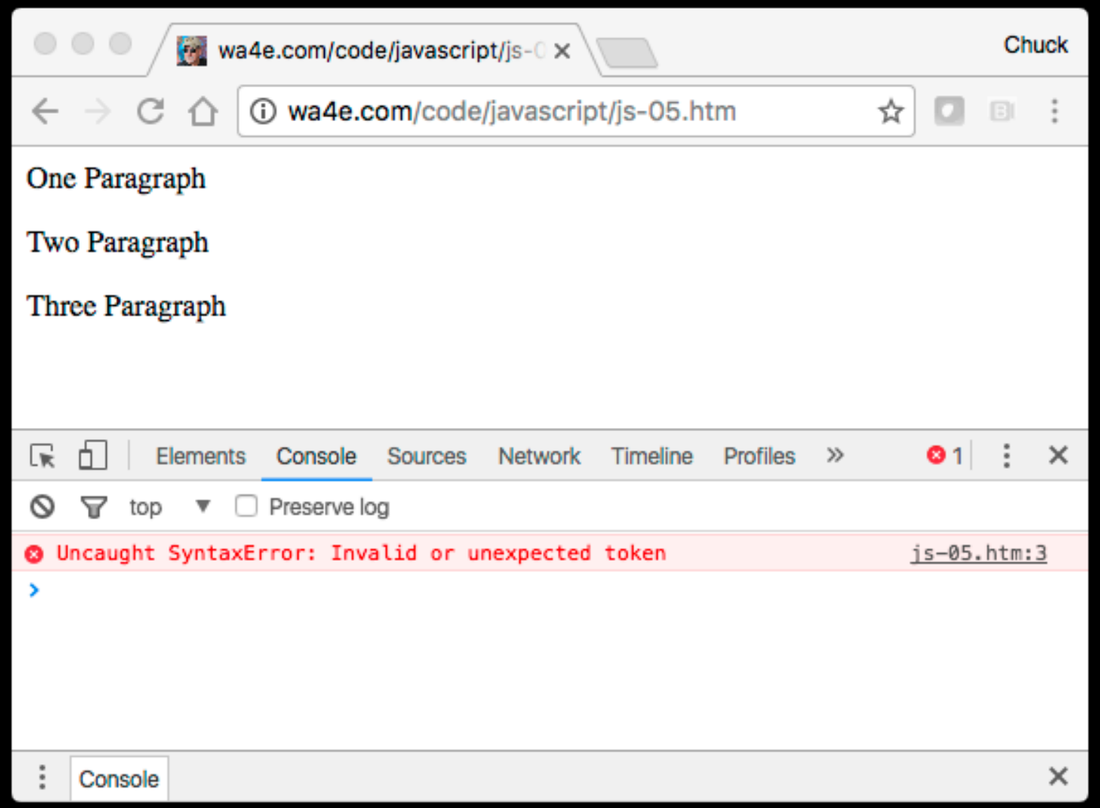
js-05.htm

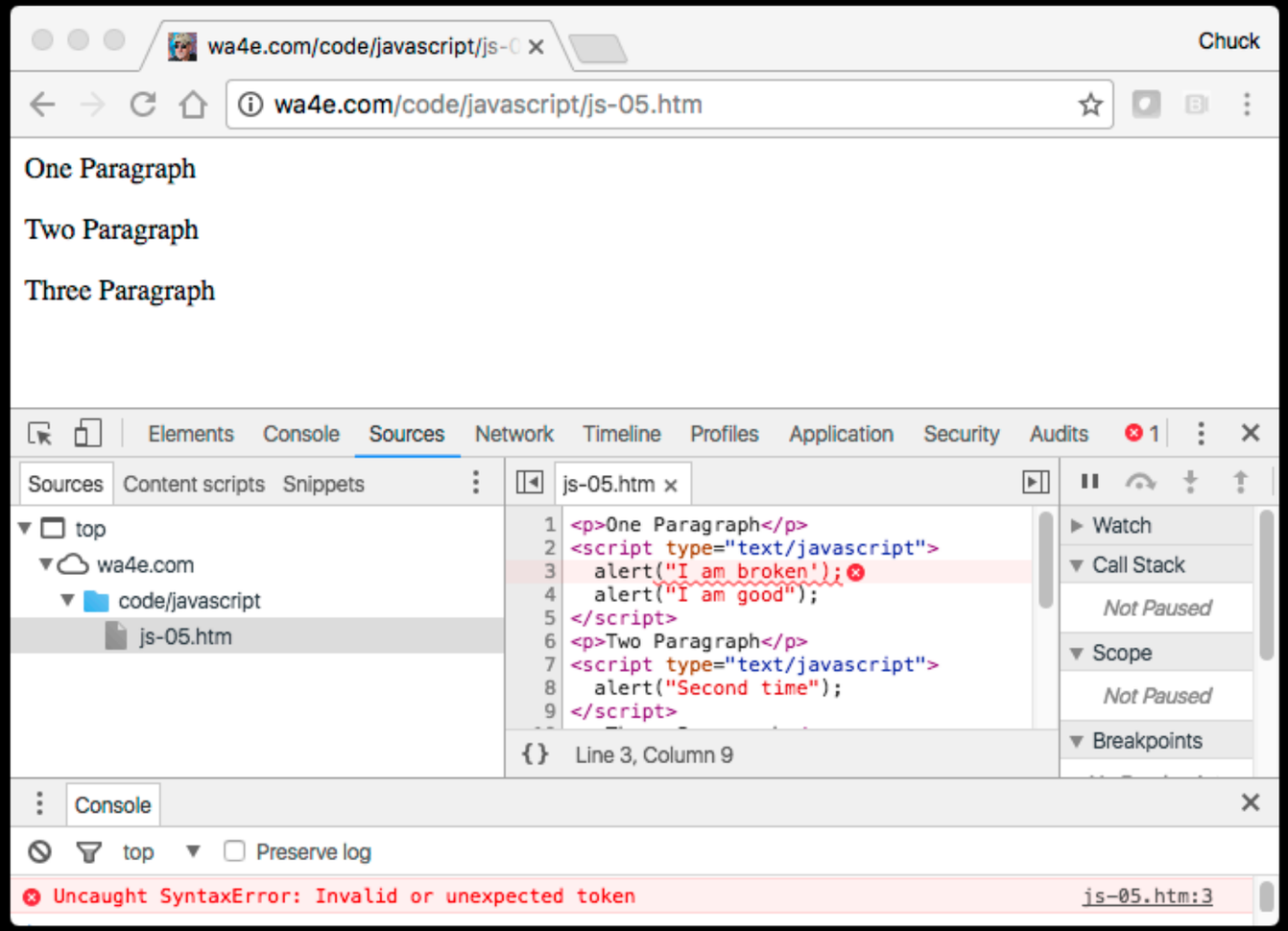


Seeing the Error

- Since the end user really cannot take any action to fix the JavaScript coming as part of a web page, the browser eats the errors.
- As developers, we need to look for the errors - sometimes it takes a minute to even remember to check for a JS error.

js-05.htm


wa4e.com/code/javascript/js-0
Chuck
wa4e.com/code/javascript/js-05.htm
One Paragraph
Two Paragraph
Three Paragraph
Elements
Console
Sources
Network
Timeline
Profiles
1
top
Preserve log
Uncaught SyntaxError: Invalid or unexpected token
js-05.htm:3
Console


wa4e.com/code/javascript/js-0
Chuck
wa4e.com/code/javascript/js-05.htm
One Paragraph
Two Paragraph
Three Paragraph
Elements
Console
Sources
Network
Timeline
Profiles
Application
Security
Audits
1
Sources
Content scripts
Snippets
top
wa4e.com
code/javascript
js-05.htm
js-05.htm
1 One Paragraph
2 <script type="text/javascript">
3 alert("I am broken");
4 alert("I am good");
5 </script>
6 Two Paragraph
7 <script type="text/javascript">
8 alert("Second time");
9 </script>
{} Line 3, Column 9
Watch
Call Stack
Not Paused
Scope
Not Paused
Breakpoints
Console
top
Preserve log
Uncaught SyntaxError: Invalid or unexpected token
js-05.htm:3

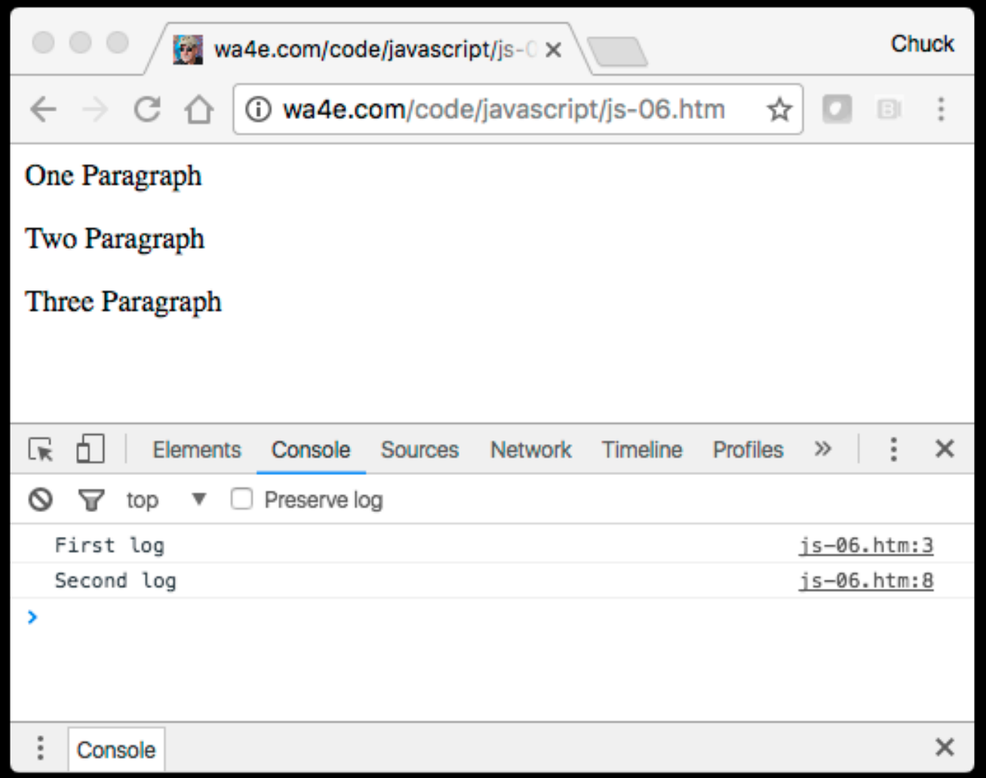
Console Logging

- Debugging using alert() can get tiring - sometimes you want to record what happens in case something goes wrong
- console.log("String") - and many more functions

Note: Requires recent browsers

```
<p>One Paragraph</p>
<script type="text/javascript">
  console.log("First log");
  alert("YO");
</script>
<p>Two Paragraph</p>
<script type="text/javascript">
  console.log("Second log");
</script>
<p>Three Paragraph</p>
```

js-06.htm



Console is Not Always There

Some browsers only define the console if a debugger is running.

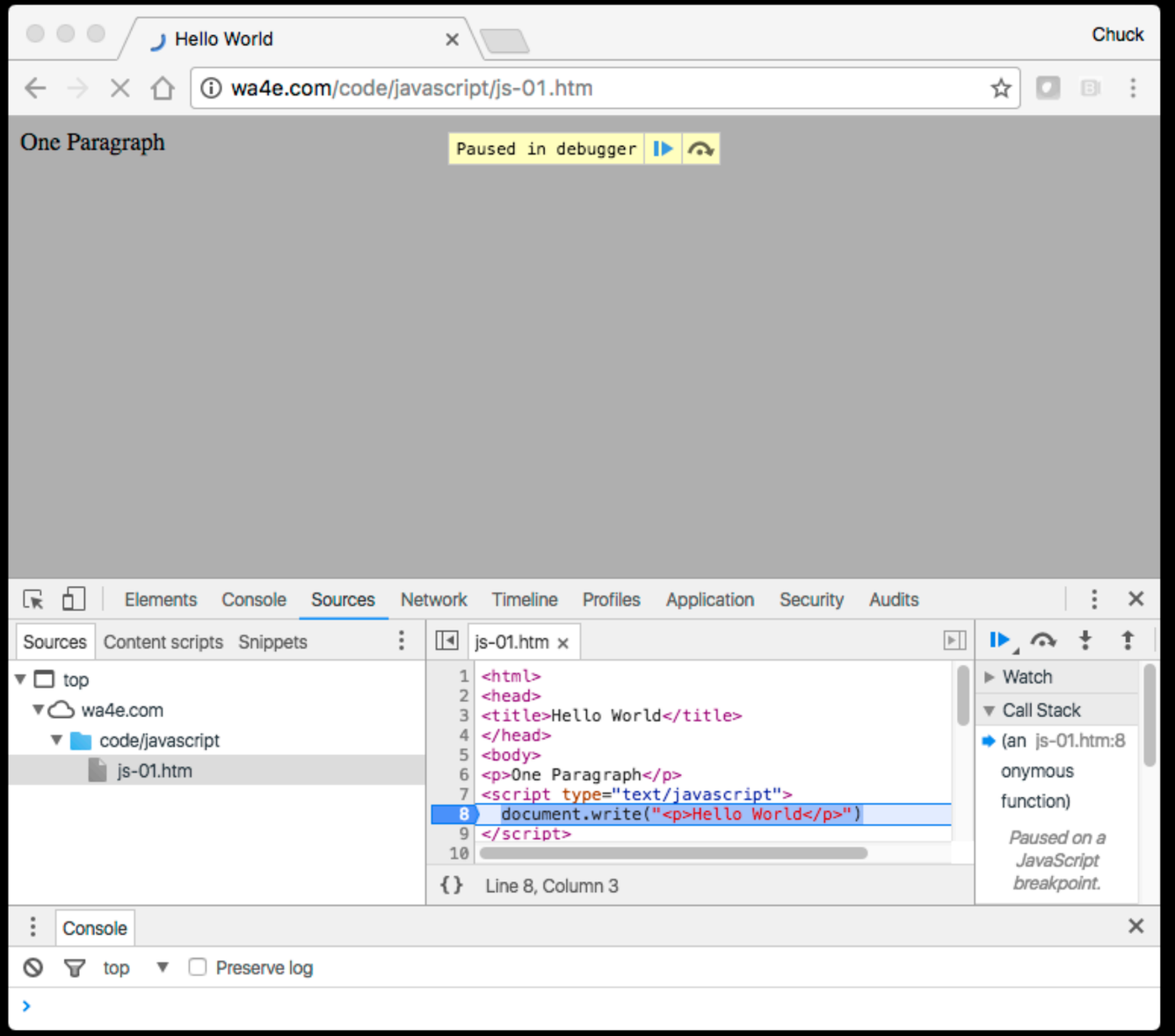
```
window.console && console.log(...)
```

```
if (typeof console == "undefined") {
    this.console = {log: function() {} }
}
```

http://stackoverflow.com/questions/3326650/console-is-undefined-error-for-internet-explorer

Using the Debugger (Chrome)

- Get into a source view.
- Click on a line of JavaScript to set a breakpoint.
- Reload the page.


Hello World
Chuck
wa4e.com/code/javascript/js-01.htm
One Paragraph
Paused in debugger
Elements
Console
Sources
Network
Timeline
Profiles
Application
Security
Audits
Sources
Content scripts
Snippets
top
wa4e.com
code/javascript
js-01.htm
js-01.htm
1 <html>
2 <head>
3 <title>Hello World</title>
4 </head>
5 <body>
6 One Paragraph
7 <script type="text/javascript">
8 document.write(" Hello World ")
9 </script>
10
Line 8, Column 3
Watch
Call Stack
(an js-01.htm:8
onymous
function)
Paused on a JavaScript breakpoint.
Console
top
Preserve log

JavaScript – Core Language Features

Comments in JavaScript = Awesome

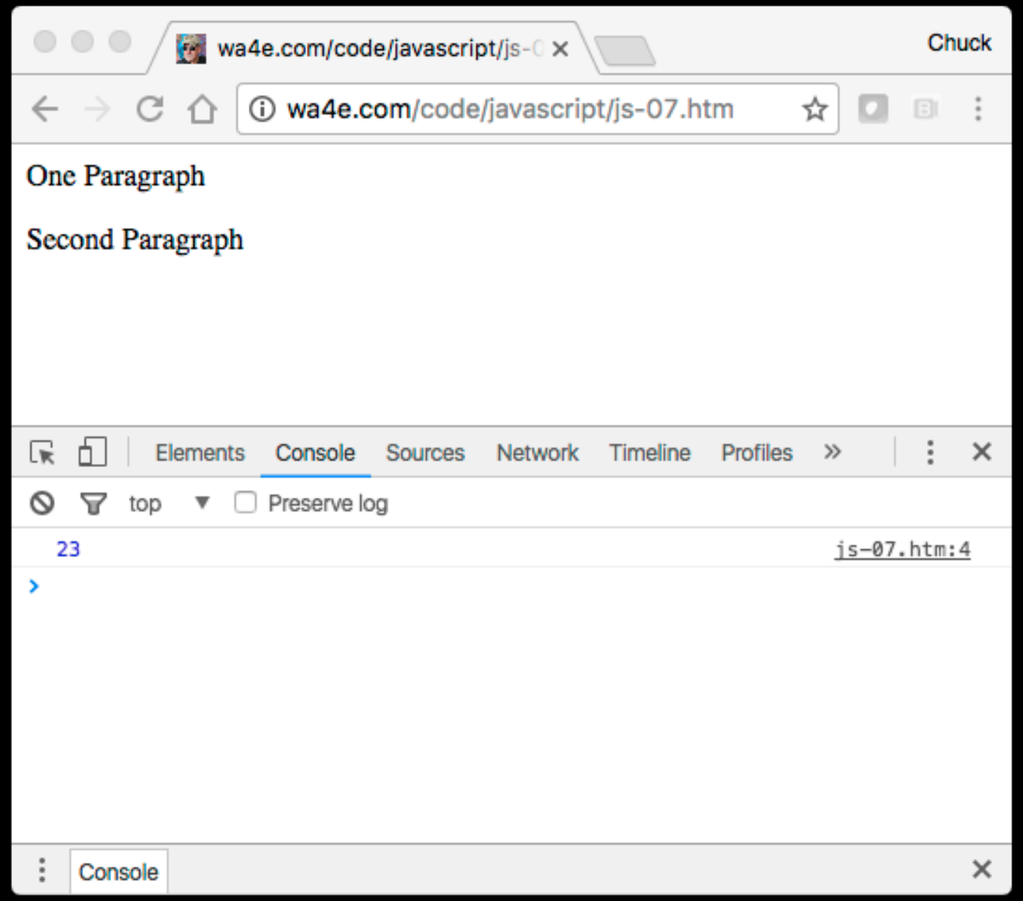
```
// This is a comment

/* This is a section of
   multiline comments that will
   not be interpreted */
```

Statements

- White space and newlines do not matter.
- Statements end with a semicolon ;
- There are cases where you can leave the semicolon off, but don't bother exploiting this feature - just add semicolons like in C, Java, PHP, C++, etc.

```
<p>One Paragraph</p>
<script type="text/javascript">
    x = 3 +
        5 * 4; console.log(
x);
</script>
<p>Second Paragraph</p>
```

js-07.htm



Variable Names

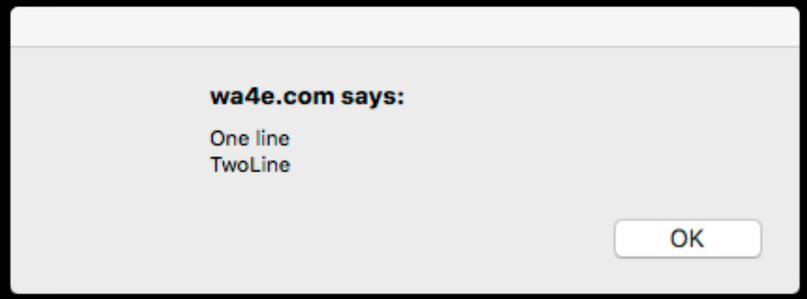
- Valid Characters: a-z, A-Z, 0-9, _ and $
- Must not start with a number
- Names are case sensitive
- Starting with a dollar sign is considered “tacky”

String Constants

js-08.htm

- Double or Single Quotes - Single quotes are used typically in JavaScript and we let HTML use double quotes to keep our minds a little sane.
- Escaping - done using the backslash character

```
<script type="text/javascript">
alert('One line\nTwoLine');
</script>
```

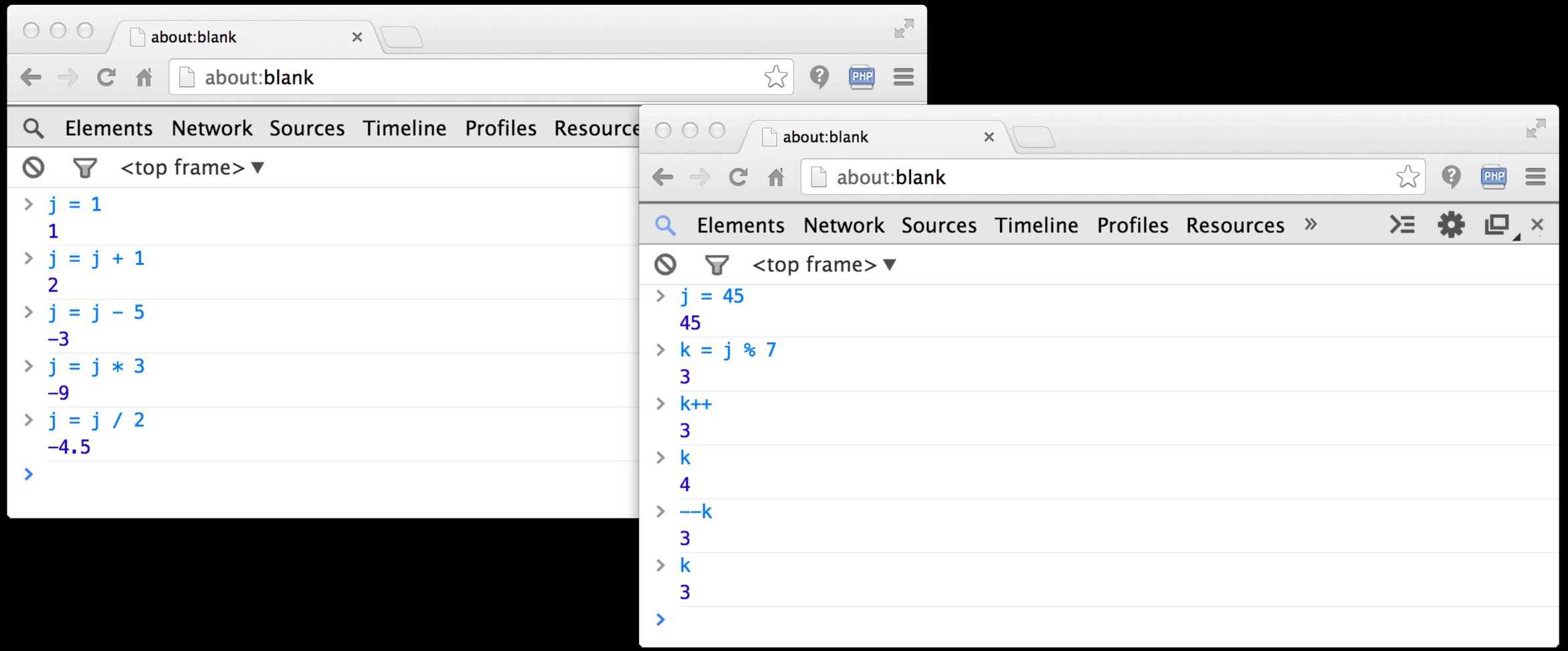


Numeric Constants

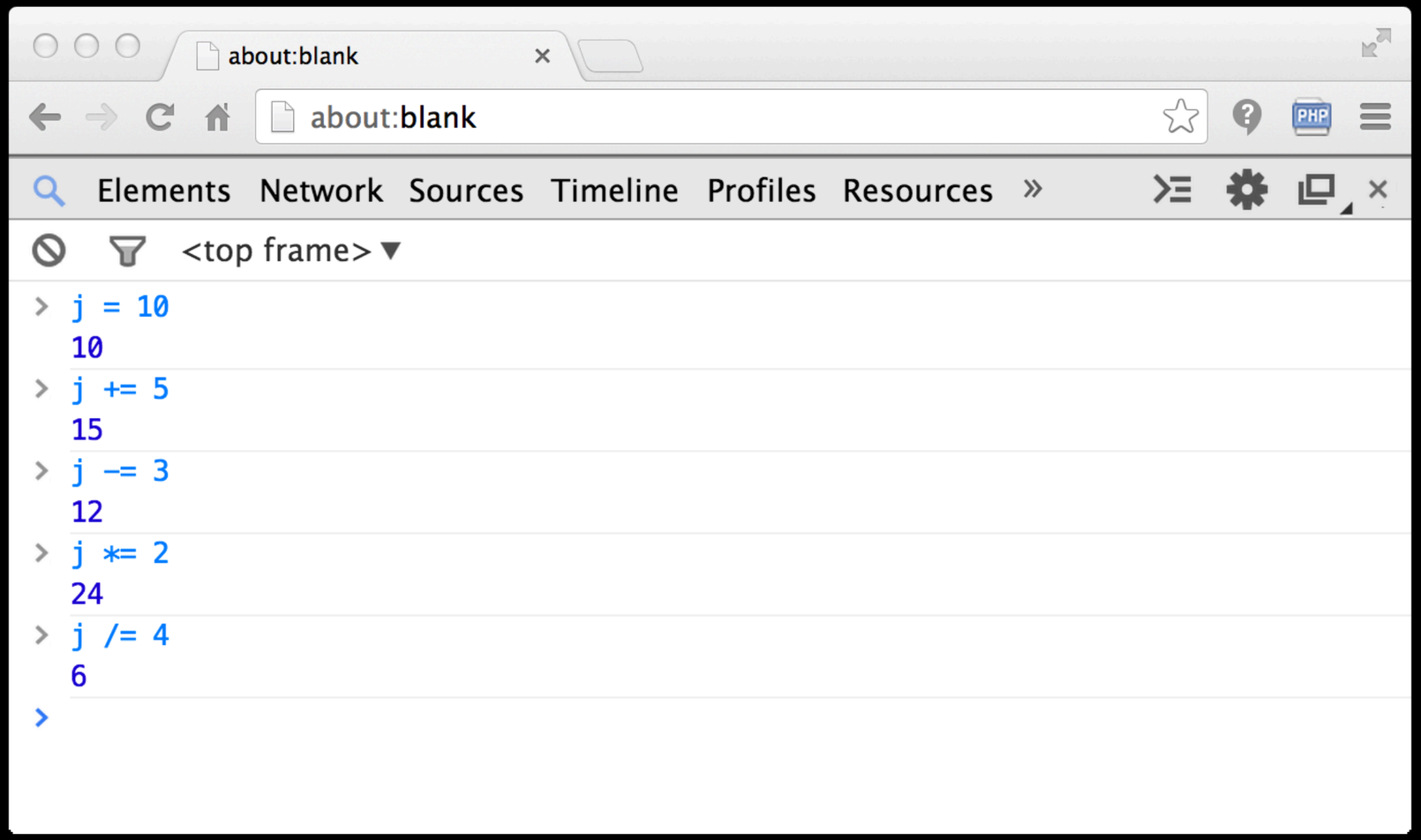
As you would expect…

JavaScript – Variables and Expressions

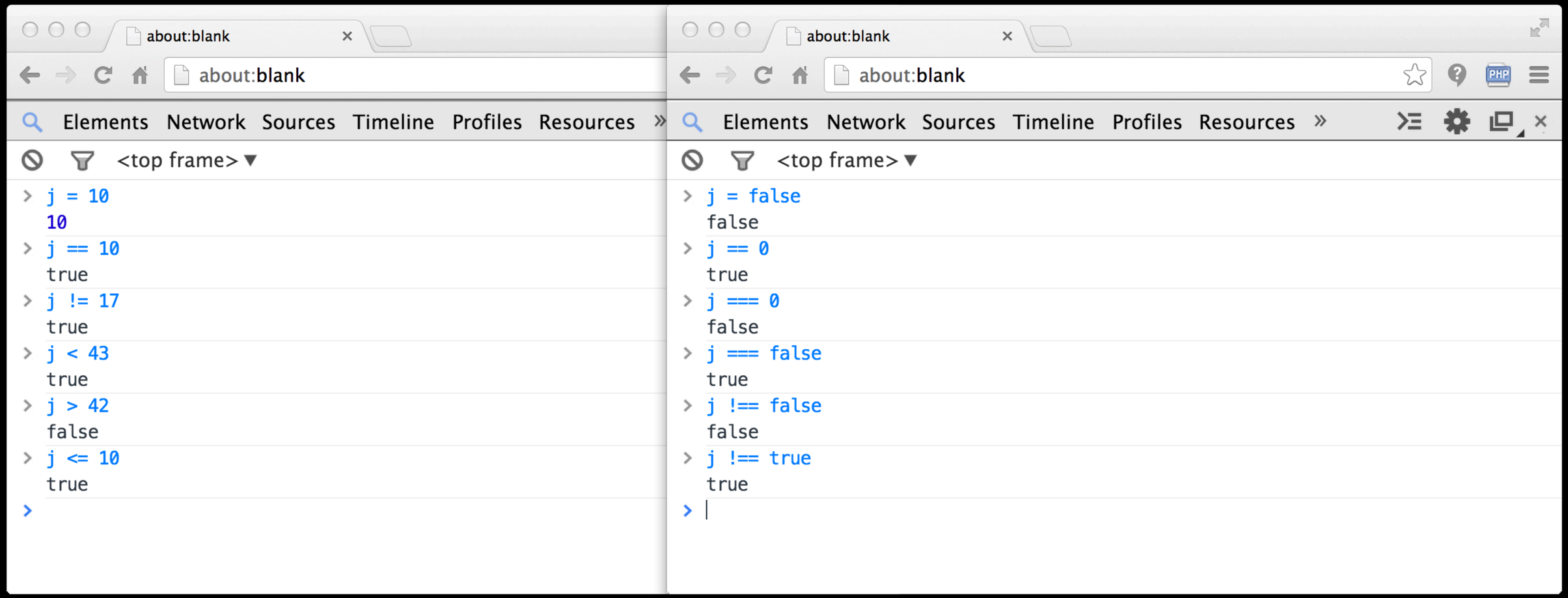
Operators


about:blank
about:blank
Elements Network Sources Timeline Profiles Resource
<top frame>
> j = 1
1
> j = j + 1
2
> j = j - 5
-3
> j = j * 3
-9
> j = j / 2
-4.5
about:blank
about:blank
Elements Network Sources Timeline Profiles Resources
<top frame>
> j = 45
45
> k = j % 7
3
> k++
3
> k
4
> --k
3
> k
3

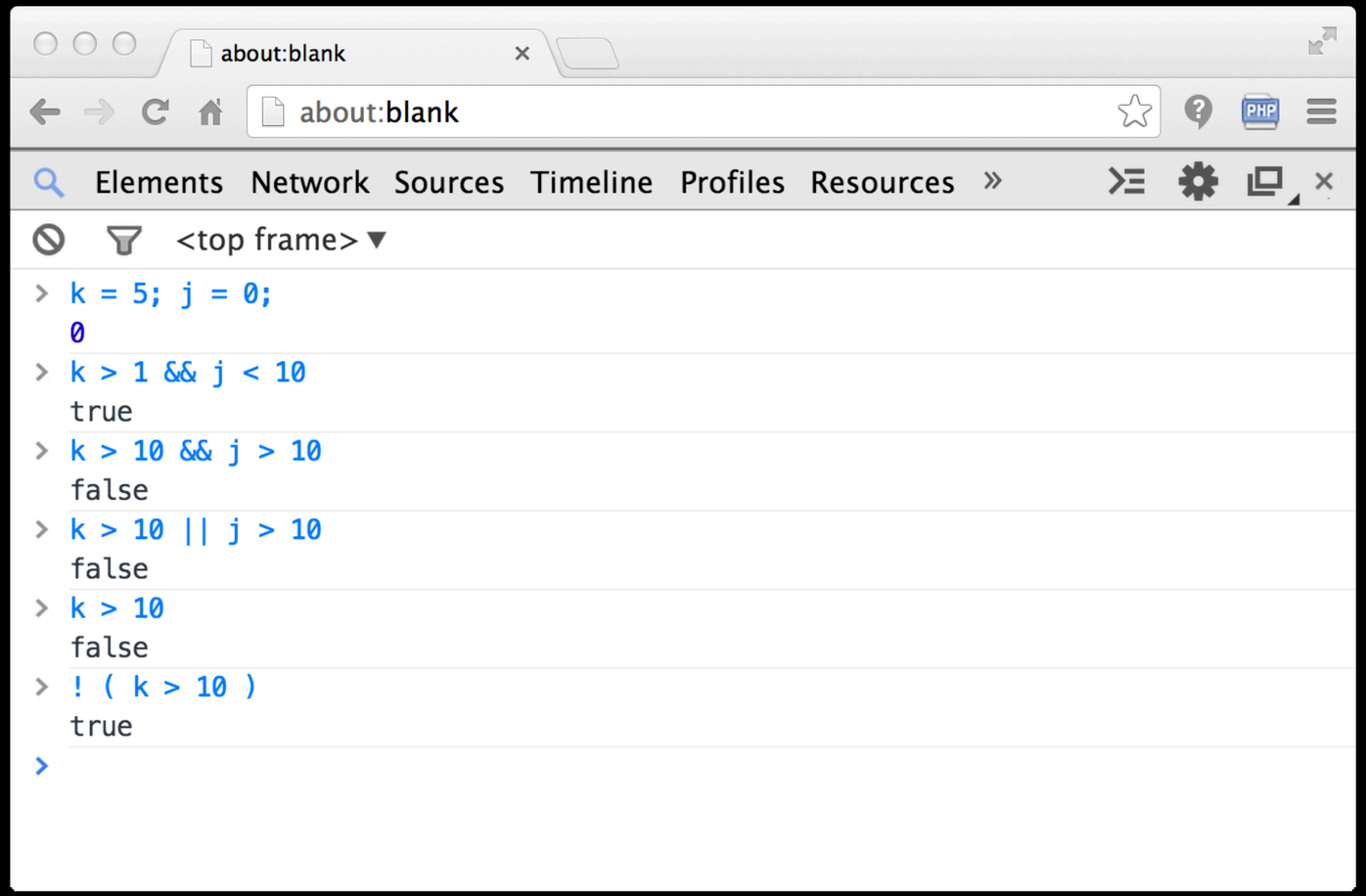
Assignment (side effect) Operators



Comparison Operators

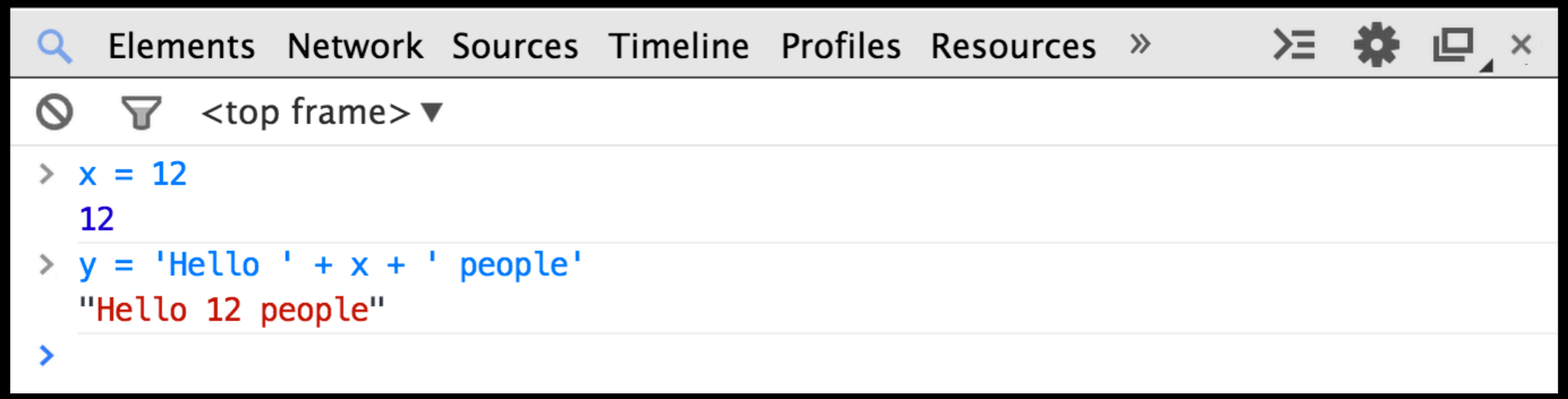


Logical Operators



String Concatenation

- JavaScript string concatenation is like Python and Java and uses "+", versus PHP which uses "."
- Like the PHP "." operator, it automatically converts non-string values to strings as needed.

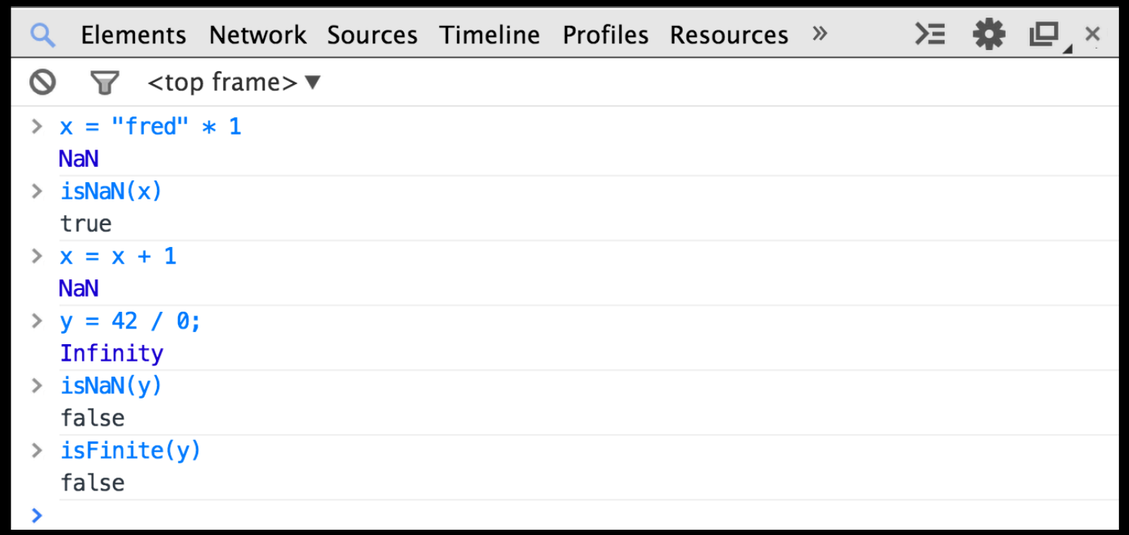


Variable Typing

JavaScript is a loosely typed language and does automatic type conversion when evaluating expressions.

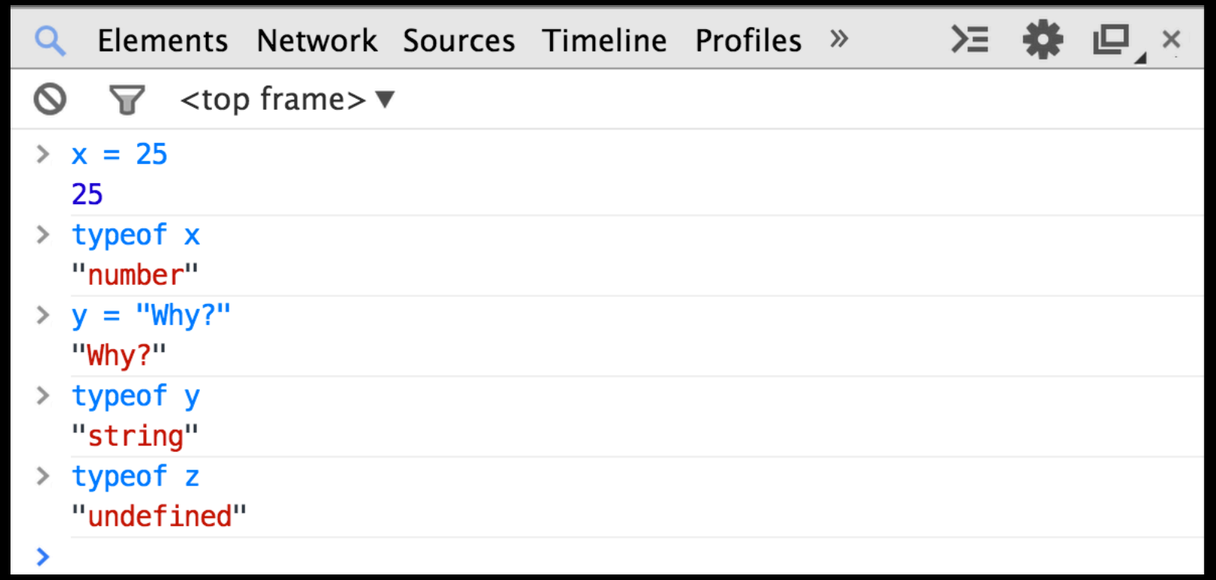
Variable Conversion

If a string cannot be converted to a number, you end up with “Not a Number” or “NaN”. It is a value, but it is sticky - all operations with NaN as a operand end up with NaN.



Determining Type

JavaScript provides a unary typeof operator that returns the type of a variable or constant as a string.

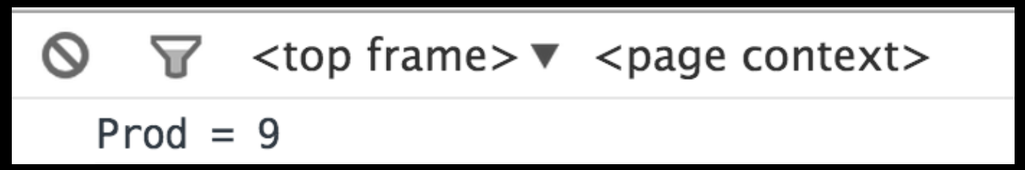


Functions

js-09.htm

- Functions use a typical syntax and are indicated using the function keyword.
- The return keyword functions as expected.

```
<script type="text/javascript">
function product(a,b) {
    value = a + b;
    return value;
}
console.log("Prod = "+product(4,5));
</script>
```



Scope - Global (default)

js-10.htm

- Variables defined outside a function that are referenced inside of a function have global scope.
- This is a little different than what we expect.

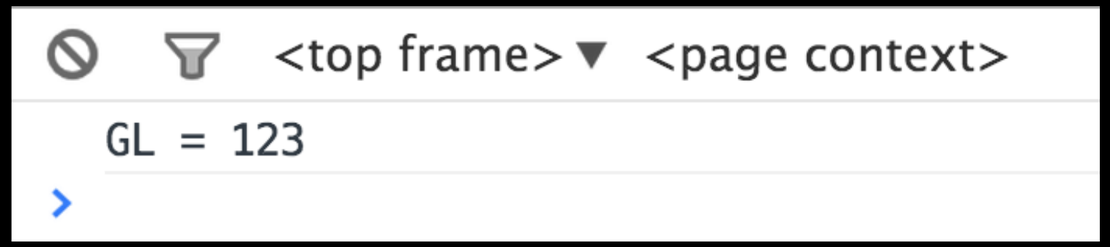
```
<script type="text/javascript">
gl = 123;
function check() {
    gl = 456;
}
check();
window.console && console.log("GL = "+gl);
</script>
```

Making a Variable Local

js-11.htm

In a function, the parameters (formal arguments) are local and any variables we mark with the var keyword are local too.

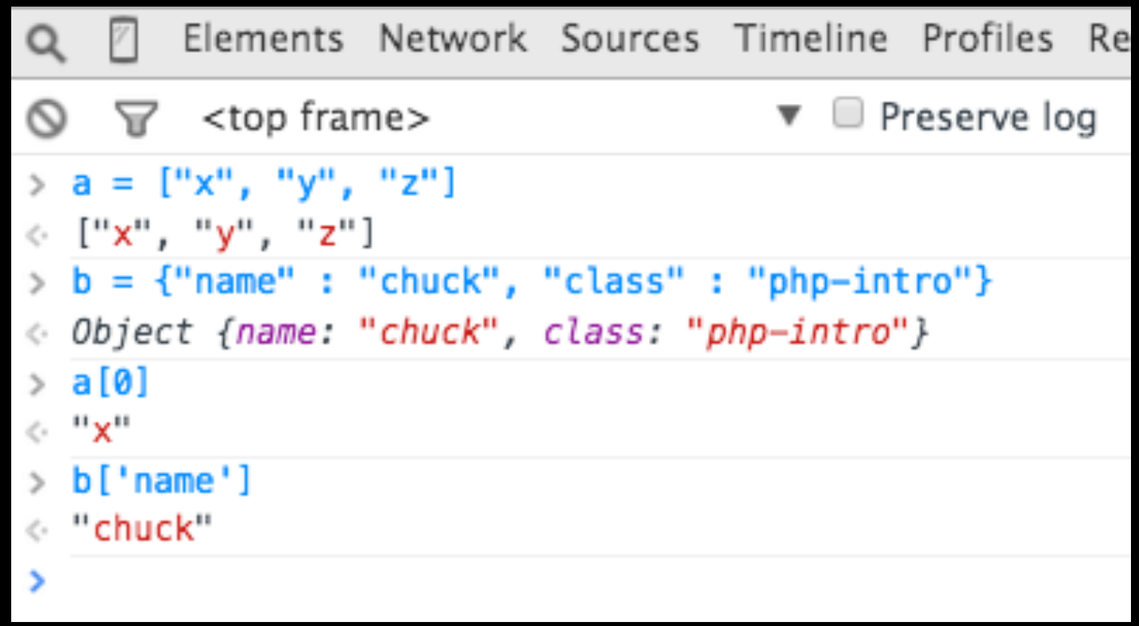
```
<script type="text/javascript">
gl = 123;
function check() {
    var gl = 456;
}
check();
window.console && console.log("GL = "+gl);
</script>
```



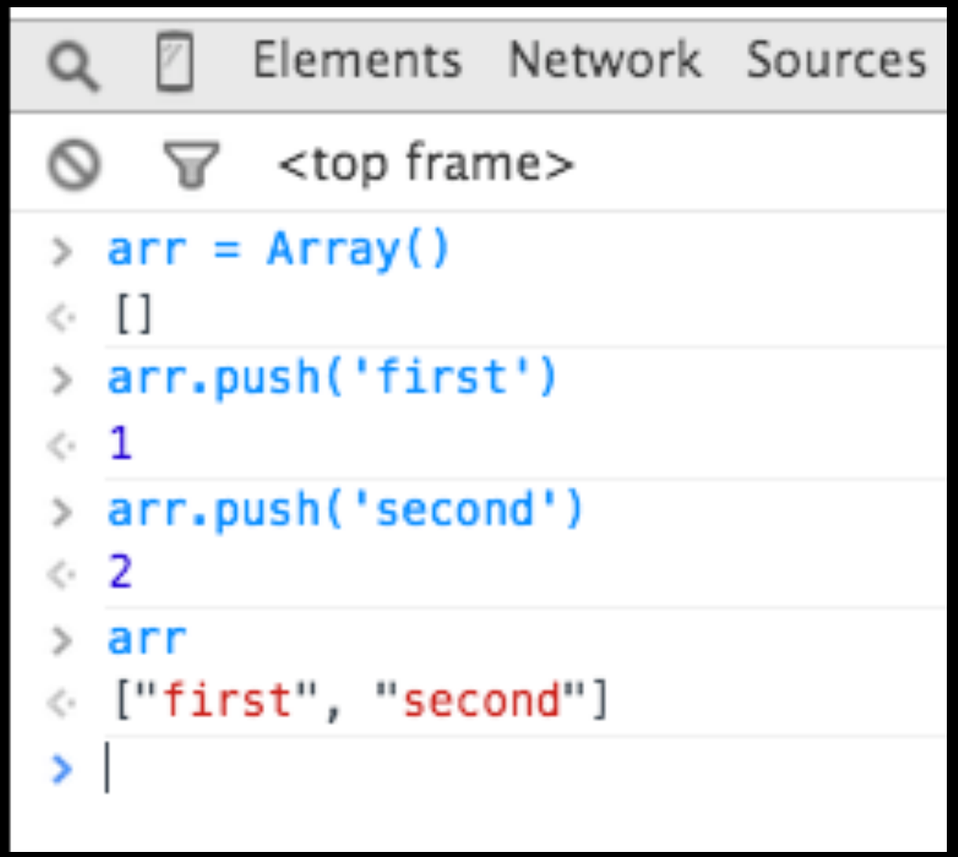
JavaScript – Arrays and Control Structures

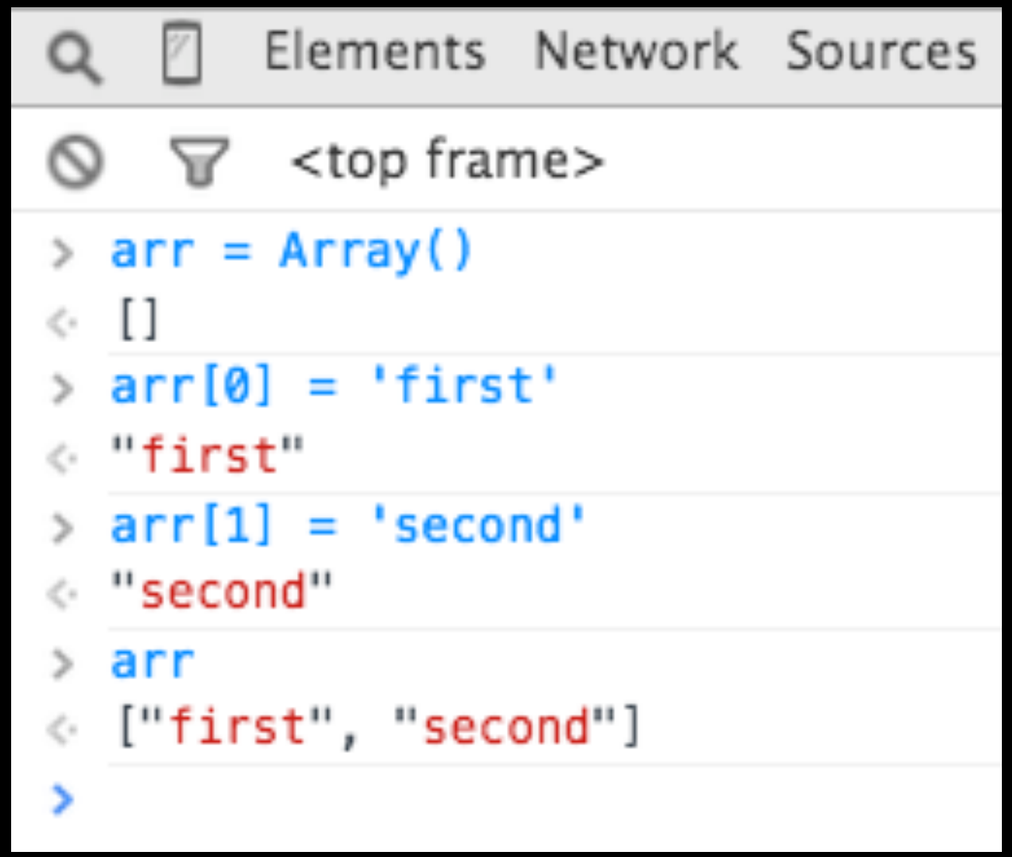
Arrays in JavaScript

JavaScript supports both linear arrays and associative structures, but the associative structures are actually objects.

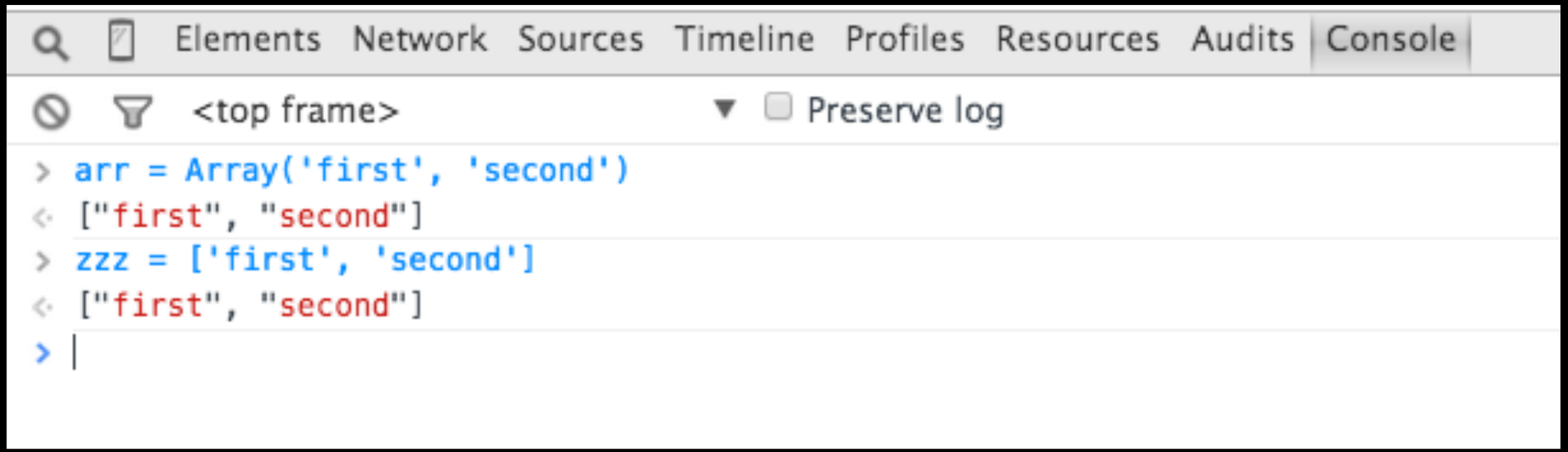


Linear Arrays





Array Constructor / Constants



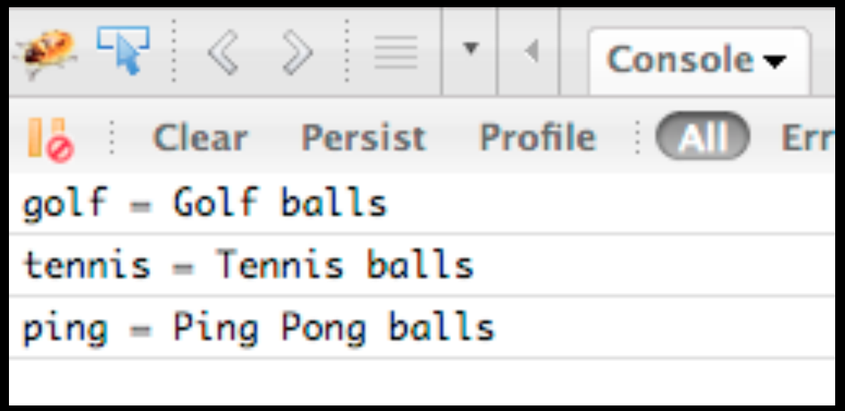
Control Structures

- We use curly braces for control structure.
- Whitespace / line ends do not matter.
- if statements are like PHP.
- while loops are like PHP.
- Counted for loops are like PHP – for(; ;) ...
- In loops, break and continue are like PHP.

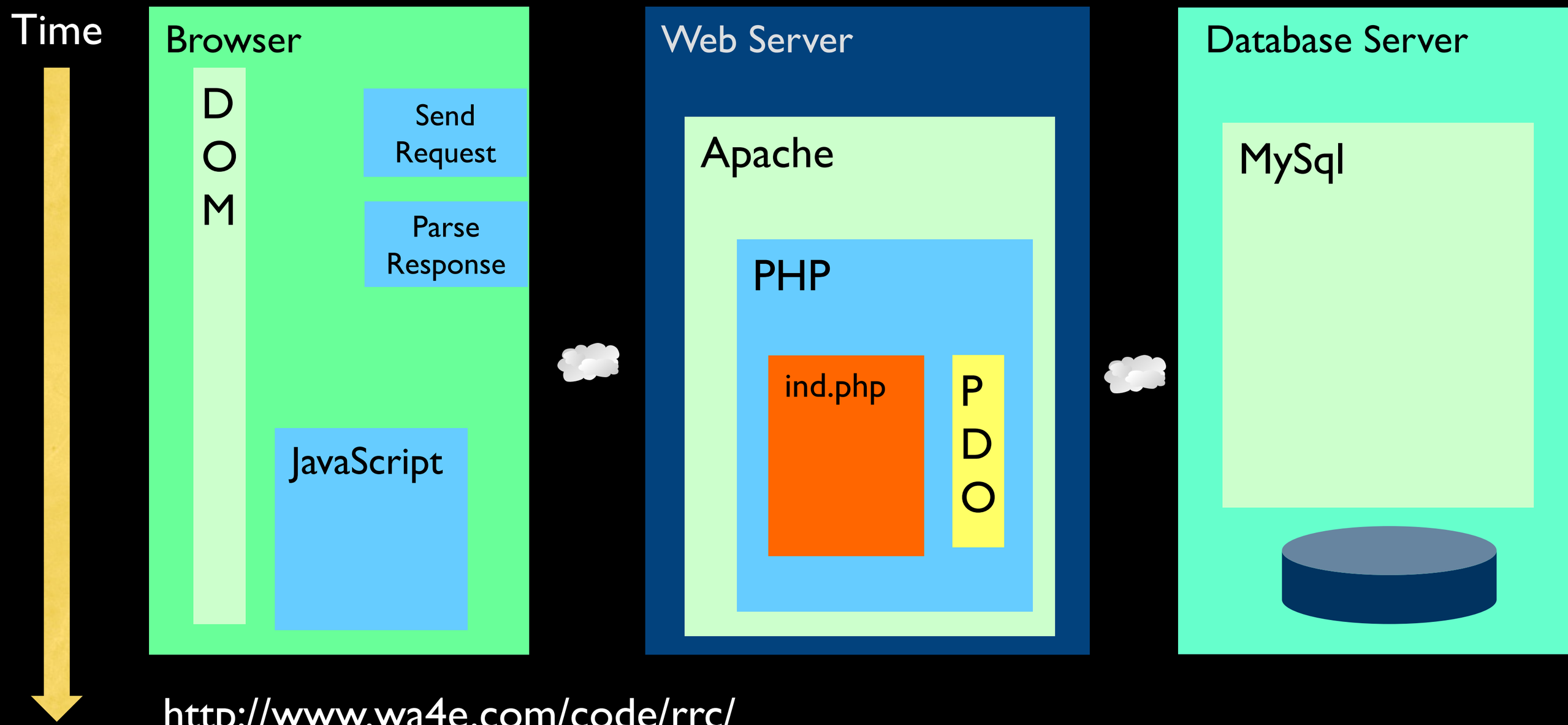
Definite Loops (for)

js-12.htm

```
balls = {"golf": "Golf balls",
     "tennis": "Tennis balls",
     "ping": "Ping Pong balls"};

for (ball in balls) {
   console.log(ball+' = '+balls[ball]);
}
```



JavaScript - Document Object Model



http://www.wa4e.com/code/rrc/

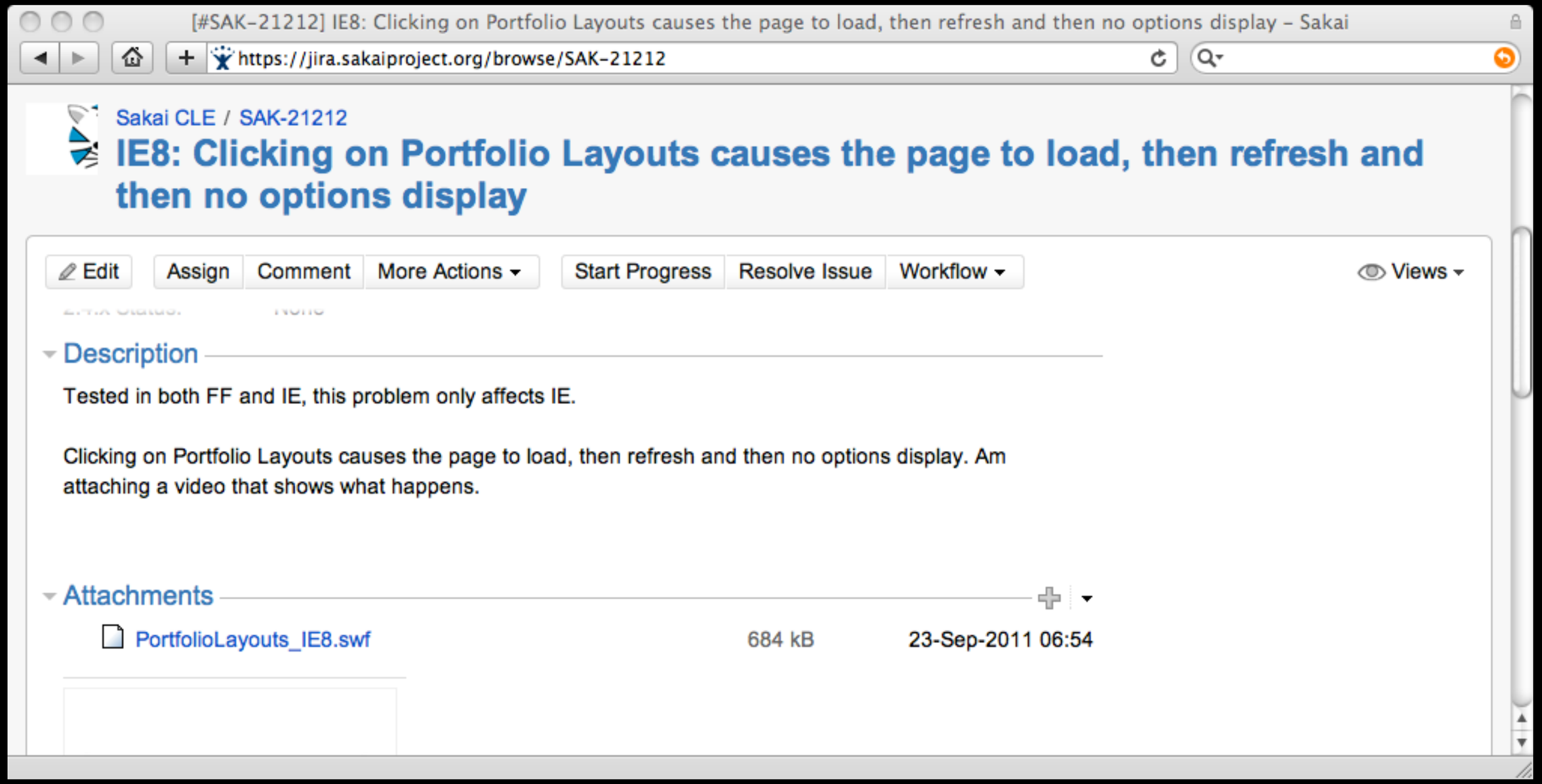
Document Object Model

- JavaScript can manipulate the current HTML document.
- The "Document Object Model" tells us the syntax to use to access various "bits" of the current screen to read and/or manipulate.
- You can even find pieces of the model by id attribute and change them.
- We can read and write the DOM from JavaScript.

http://en.wikipedia.org/wiki/Document_Object_Model

DOMs are Not Identical

- Not all browsers represent their page exactly the same way.
- This makes it a challenge to keep all of your JavaScript working on all browsers.
- It also means you need to test your code over and over on each browser.
- Aargh..

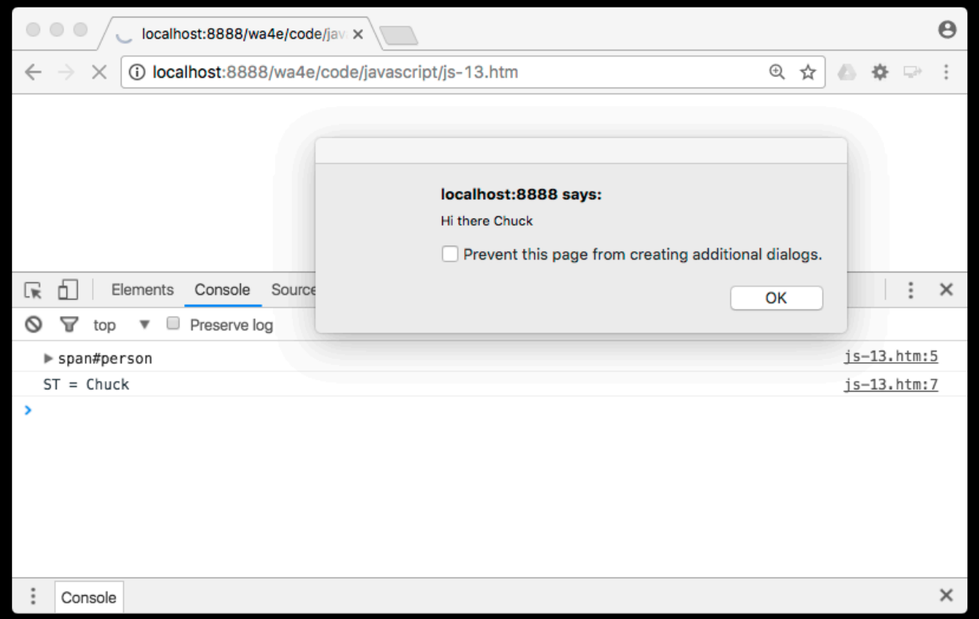

[#SAK-21212] IE8: Clicking on Portfolio Layouts causes the page to load, then refresh and then no options display - Sakai
https://jira.sakaiproject.org/browse/SAK-21212
Sakai CLE / SAK-21212
IE8: Clicking on Portfolio Layouts causes the page to load, then refresh and then no options display
Edit
Assign
Comment
More Actions
Start Progress
Resolve Issue
Workflow
Views
Description
Tested in both FF and IE, this problem only affects IE.
Clicking on Portfolio Layouts causes the page to load, then refresh and then no options display. Am attaching a video that shows what happens.
Attachments
PortfolioLayouts_IE8.swf
684 kB
23-Sep-2011 06:54

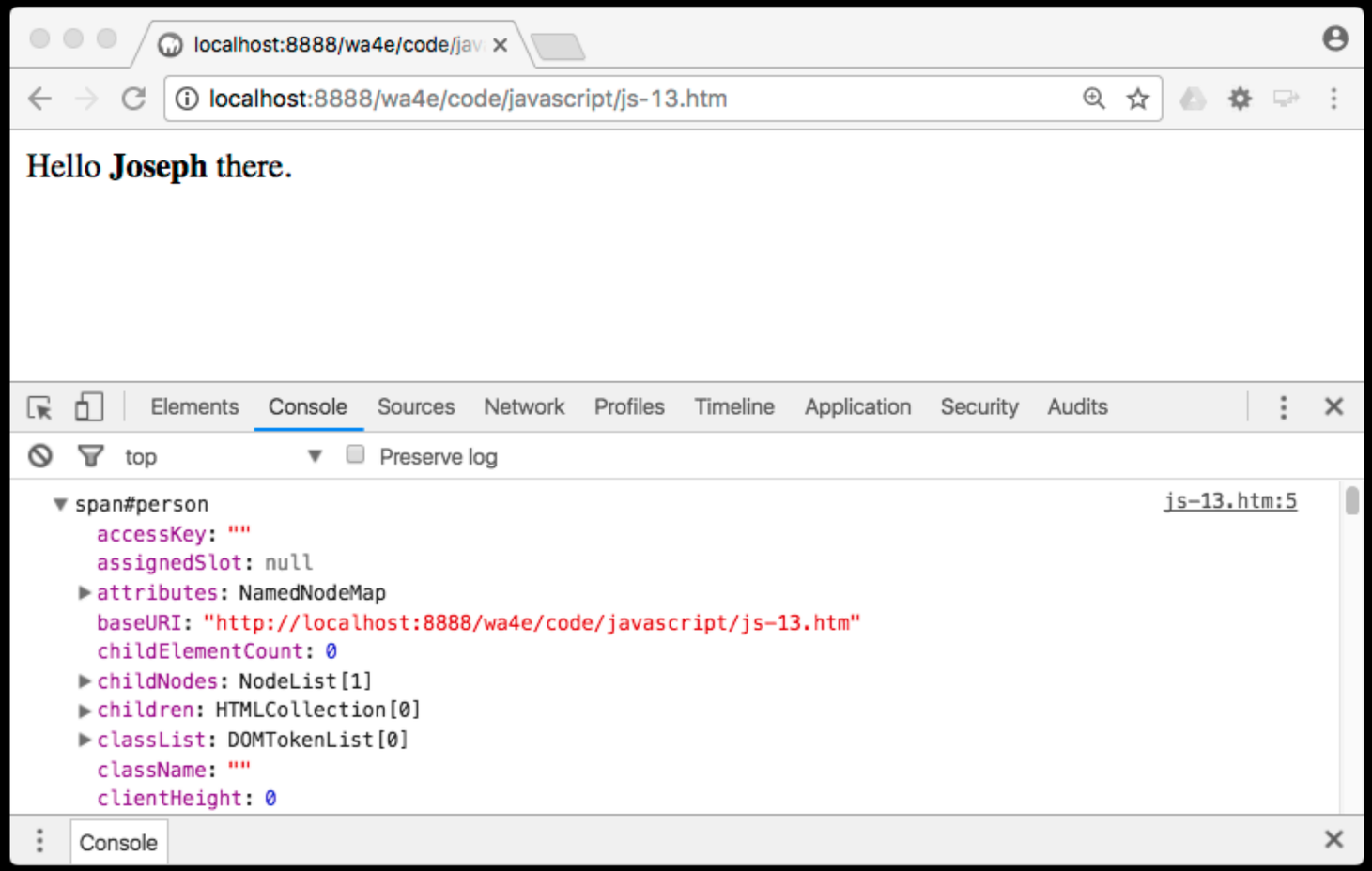
Using getElementById()

In order not to have to traverse each unique DOM, we use a function call that all browsers support. This allows us to bypass the DOM structure and jump to a particular tag within the DOM and manipulate that tag.

```
<p>
Hello <b><span id="person">Chuck</span></b> there.
</p>
<script type="text/javascript">
st = document.getElementById('person').innerHTML;
console.log("ST = "+st);
console.dir(document.getElementById('person'));
alert('Hi there ' + st);
document.getElementById('person').innerHTML = 'Joseph';
</script>
```

js-13.htm





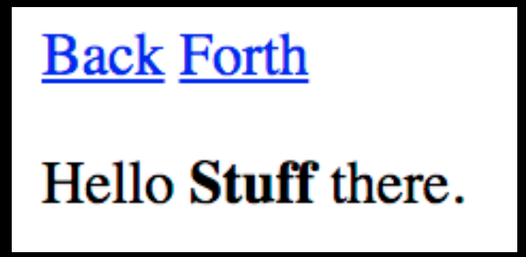
js-13.htm

```
console.dir(document.getElementById('person'));
```

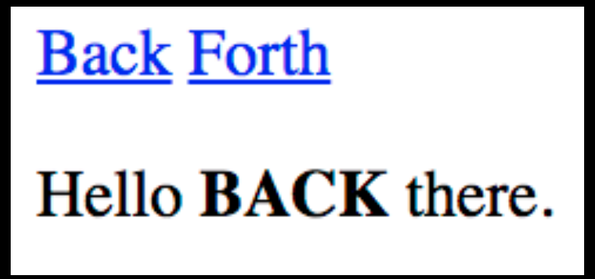
```
<a href="#"
  onclick="document.getElementById('stuff').innerHTML='BACK';return false;">
      Back</a>
<a href="#"
  onclick="document.getElementById('stuff').innerHTML='FORTH';return false;">
   Forth</a>
</p>
<p>
Hello <b><span id="stuff">Stuff</span></b> there.
```

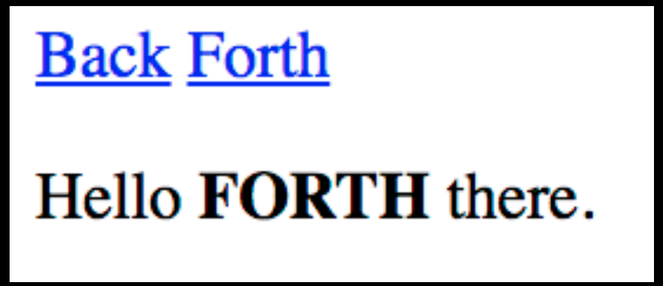
Updating the Browser Document

This is one reason why you can only have one id per document.



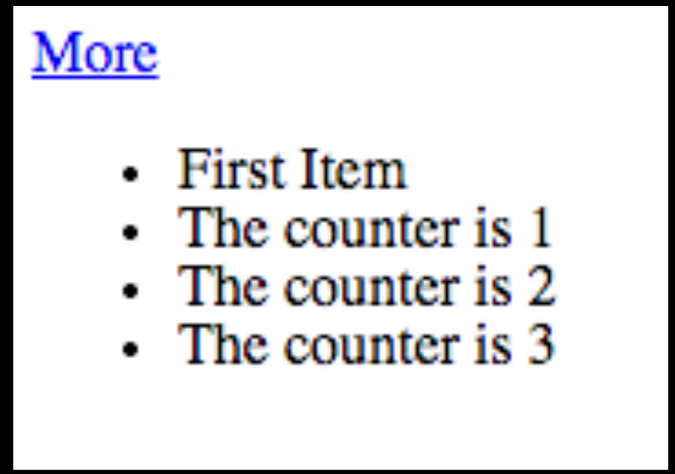
js-14.htm





Js-15.htm

```
<p>
<a href="#" onclick="add();return false;">More</a>
</p>
<ul id="the-list">
<li>First Item</li>
</ul>
<script>
counter = 1;
console.log(document.getElementById('the-list'))
function add() {
    var x = document.createElement('li');
    x.className = "list-item";
    x.innerHTML = "The counter is "+counter;
    document.getElementById('the-list').appendChild(x);
    counter++;
}
</script>
```



JQuery to the Rescue

- While the DOMs are not particularly portable, and direct DOM manipulation is a little clunky, there are a number of JavaScript frameworks that handle the myriad of subtle differeces between browsers.
- With JQuery, instead of manipulating the DOM, we use JQuery functions and everything works much better...

http://jquery.org

Summary

- Using JavaScript
- Syntax errors
- Debugging
- Language features
- Global and local scope
- Arrays
- Control structures
- Document Object Model
- JQuery

Acknowledgements / Contributions

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Insert new Contributors and Translators here including names and dates

Continue new Contributors and Translators here