



Programming Basics

INFO/CSE 100, Spring 2005

Fluency in Information Technology

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



Readings and References

- Reading
 - » *Fluency with Information Technology*
 - Chapter 18, Fundamental Concepts Expressed in JavaScript
 - Appendix B, Javascript Rules
- Other References
 - » Games and Puzzles
 - Thomas Jefferson National Accelerator Facility, Office of Science Education
 - <http://education.jlab.org/indexpages/elementgames.html>

The Plan

- We will learn JavaScript over the next few lectures
 - JavaScript is used with HTML in Web pages
 - JavaScript is a contemporary programming language -- we will learn only its basics
 - You will program in a text editor and run your program with your browser

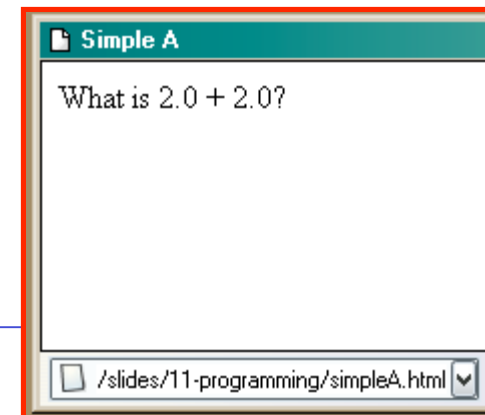
JavaScript is a way to make HTML “dynamic”

Begin with HTML

Basic HTML is static

the contents of the file are displayed as given

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN"
  "http://www.w3.org/TR/html4/loose.dtd">
<html>
<head>
<title>Simple A</title>
</head>
<body>
What is 2.0 + 2.0?
</body>
</html>
```



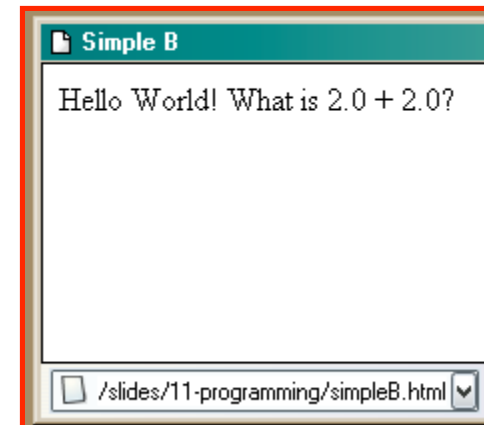
Add some “dynamic” content

Scripting languages let us create active pages

- » implement actions to be taken at run-time when the page is loaded or in response to user event

```
<head>
<title>Simple B</title>
<script type="text/javascript">
var greeting = "Hello World!";
</script>
</head>

<body>
<script type="text/javascript">
document.write(greeting);
</script>
What is 2.0 + 2.0?
</body>
```





JavaScript in an HTML page

<script> block
in <head>

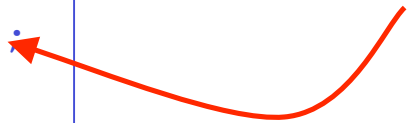


<script> block
in <body>

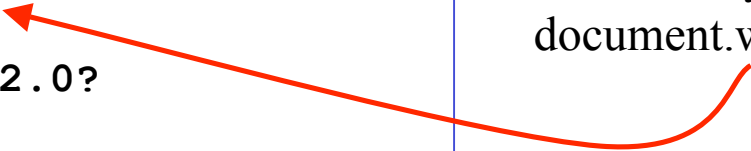


```
<head>  
<title>Simple B</title>  
<script type="text/javascript">  
var greeting = "Hello World!";  
</script>  
</head>  
  
<body>  
<script type="text/javascript">  
document.write(greeting);  
</script>  
What is 2.0 + 2.0?  
</body>
```

Language we are
using is javascript

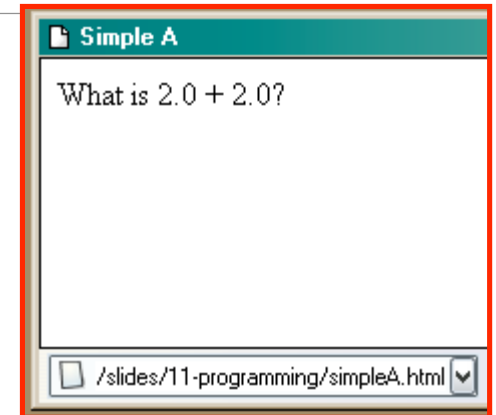


Generate HTML
"on the fly" with
document.write(...)



Browser interprets your page

- You are telling the browser what to do
 - » using HTML for the static parts of the page



This page is written in the *HTML language*.

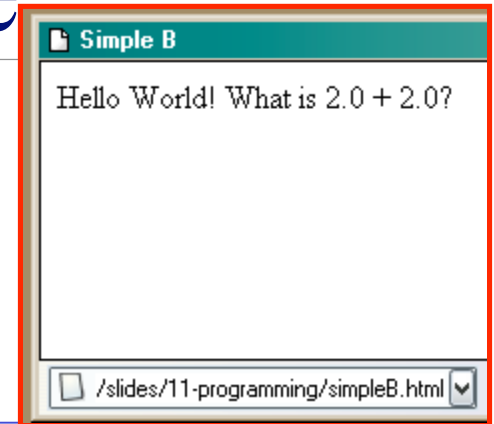
Here is some *header information* about the page.

Here is the *main body* of the page.

```
<html>
<head>
<title>Simple A</title>
</head>
<body>
What is 2.0 + 2.0?
</body>
</html>
```

Browser interprets your page

- You are telling the browser what to do
 - » using HTML for the static parts of the page
 - » using JavaScript for the more dynamic parts

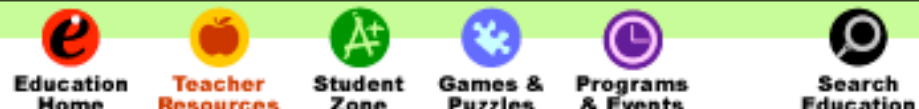


Here is some *script initialization* information.

```
<head>
<title>Simple B</title>
<script type="text/javascript">
var greeting = "Hello World!";
</script>
</head>
```

Here is some *script* for the body of the page.

```
<body>
<script type="text/javascript">
document.write(greeting);
</script>
What is 2.0 + 2.0?
</body>
```

Games & Puzzles



All of these internet based games require a JavaScript enabled browser.

Science Games

[Who Wants to Win \\$1,000,000?](#) - Answer 15 science and math based questions correctly and become a (pretend!) millionaire!

[Virginia State Standards of Learning Practice Tests](#) - Practice taking the SOL tests! Subjects currently include algebra, math, science and technology.

[Science Vocabulary Hangman](#) - Use the clues to discover the computer's secret word!

[Science Crossword Puzzles](#) - Use the clues provided to

Element Games

[Element Flash Cards](#) - Learn the names and symbols of the elements!

[Element Math Game](#) - Calculate the number of protons, neutrons or electrons in an atom based on information from the [Periodic Table of Elements!](#)

[Element Hangman](#) - Discover which element the computer has picked by guessing the letters in its name!

[Element Crossword Puzzles](#) - Use the clues provided to solve each crossword puzzle!

Variables In Real Life

- A variable is a "container" for information you want to store
 - » The name of the variable stays the same, but the value associated with that name can change

That's why it's called a "variable"!

Variable Name	Current Value	Previous Value
#1 Single	My Boo, Usher And Alicia Keys	Goodies, Ciara
AL Champion	Boston Red Sox	New York Yankees
#1 Box Office	Shark Tale	Shark Tale
Day Of The Week	Monday	Sunday
Husky Card Balance	\$52	\$60

Variables In Programming

- Program variables have names and values
 - » Names (also called identifiers)
 - generally start with a letter and can contain letters, numbers, and underscore characters “_”
 - Names are *case sensitive*
 - » Values
 - can be numbers, strings, boolean, etc
 - change as the program executes

Variable Name	Current Value	Previous Value
No_1_Single	My Boo, Usher And Alicia Keys	Goodies, Ciara
ALChampion	Boston Red Sox	New York Yankees
No_1_Box_Office	Shark Tale	Shark Tale
dayOfTheWeek	Monday	Sunday
huskyCardBalance	\$52	\$60

Assign a *value* to a *variable*

The universal form of the assignment statement

» variable *gets* value

greeting *gets the value* “Hello World!”

balance *gets the value* 52

Each language expresses “gets” in a particular way

» JavaScript uses the single equals sign =

```
greeting = "Hello World!";
```

```
balance = 52;
```

NOTE: The equals sign = is used *differently* in math and programming.

Variable Declarations

```
<script type="text/javascript">
```

```
var eyeColor; <<< undefined!
```

```
var eyeColor = "green"; <<< initialized
```

```
var eyeColor = ""; <<< initilized, empty
```

```
var eyeColor = "green", hairColor="blonde";
```

```
hairColor = "carmel";
```

```
</script>
```



Basic Data Types in Javascript

Numbers:

```
var gasPrice = 2.55;
```

Strings

```
var eyeColor = "hazel green";
```

Boolean

```
var isFriday = true;  
var isWeekend = 0;
```



Special String Characters

- All English letters and numbers are valid.
- Most English punctuation is valid.
- There are some special string characters which we use with an escape sequence

`\t` tab

`\n` newline

`\"` double quote

`\'` single quote

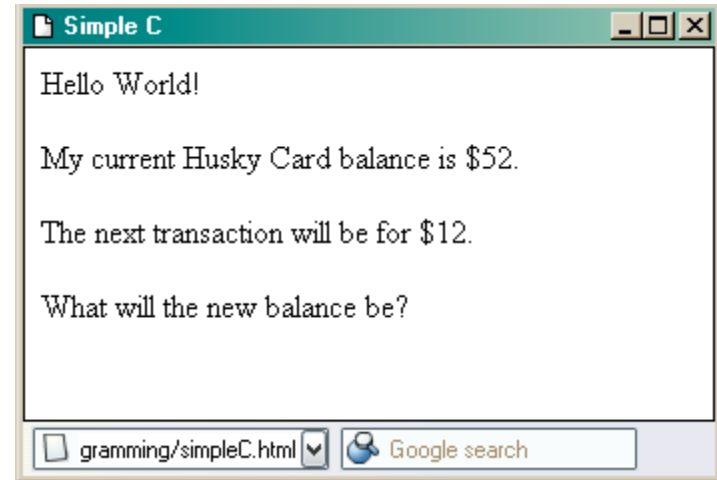
`\\` backslash

```
var nikeQuote = "\"Just Do It!\"";
```

JavaScript Variables

```
<html>
<head>
<title>Simple C</title>
<script type="text/javascript">
var greeting = "Hello World!";
var balance = 52;
var transaction = 12;
</script>
</head>
```

```
<body>
<script type="text/javascript">
document.writeln("<p>" + greeting + "</p>");
document.writeln("<p>My current Husky Card balance is $" + balance + ".</p>");
document.writeln("<p>The next transaction will be for
$" + transaction + ".</p>");
document.writeln("<p>What will the new balance be?</p>");
</script>
</body>
```





Expressions

- The right-hand side of an assignment statement can be any valid *expression*
- Expressions are “formulas” saying how to manipulate existing values to compute new values

```
balance = balance - transaction;  
seconds = 60*minutes;  
message = "Status code is " + codeValue;
```



Operators

Use operators to build expressions

» Numeric operators

+ - * / *mean* add, subtract, multiply, divide

$$3 + 3 = 6$$

» String operator

+ *means* concatenate strings

$$"3" + "3" = "33"$$

» Relational operators

< <= == != >= > *mean* less than, less than or equal to, equal to, not equal to, greater than or equal to, greater than

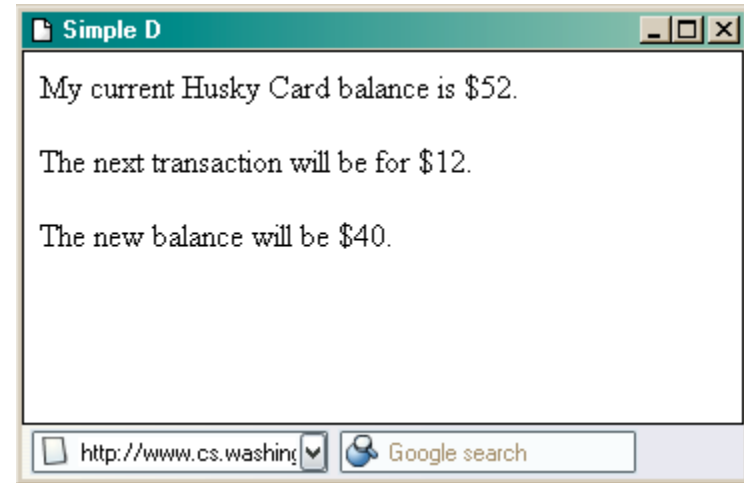
» Boolean operators

&& || ! *mean* and, or, not

JavaScript Expressions

```
<html>
<head>
<title>Simple D</title>
<script type="text/javascript">
var balance = 52;
var transaction = 12;
</script>
</head>
```

```
<body>
<script type="text/javascript">
document.writeln("<p>My current Husky Card balance is
$"+balance+".</p>");
document.writeln("<p>The next transaction will be for
$"+transaction+".</p>");
balance = balance - transaction;
document.writeln("<p>The new balance will be $"+balance+".</p>");
</script>
</body>
</html>
```



Practice, practice, practice

- Write a simple web page with a simple script like the ones here
- Save it to disk
- Open the web page with your browser
- Does it look like what you expected?
 - » Edit, save, reload
 - » Edit, save, reload
 - » ...



http://www.w3schools.com/js/js_examples.asp

Edit the text and click me

```
<html>
<head>
<title>Simple B</title>
<script type="text/javascript">
var greeting = "Hello World!";
</script>
</head>

<body>
<script type="text/javascript">
document.writeln(greeting);
document.writeln("<br>What is 2.0 + 2.0?");
document.writeln("<br>" + (2.0+2.0));
</script>
</body>
</html>
```

Hello World!
What is 2.0 + 2.0?
4

Edit the text above, and click on the button to see the result.

http://www.w3schools.com/js/tryit.asp?filename=tryjs_text