Programming Basics

INFO/CSE 100, Spring 2006

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
  - » WebDeveloper.com
    - http://www.webdeveloper.com/forum/index.php
  - » Thomas Jefferson National Accelerator Facility, Office of Science Education
    - http://education.jlab.org/indexpages/elementgames.html
  - » W3Schools Javascript Home
    - http://www.w3schools.com/js/default.asp

An algorithm to alphabetize CDs

define variable named *Artist*
    use *Artist* to refer to the name of the group that made a CD
for all slots in the rack starting at one end
    call the current slot *alpha*
    for all the remaining slots in the rack
        call the next slot *beta*
        Exchange?
            If *Artist* of the CD in the *beta* slot is earlier in the alphabet than the *Artist* of the CD in the *alpha* slot, interchange the CDs
    next *beta*
  next *alpha*
done

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

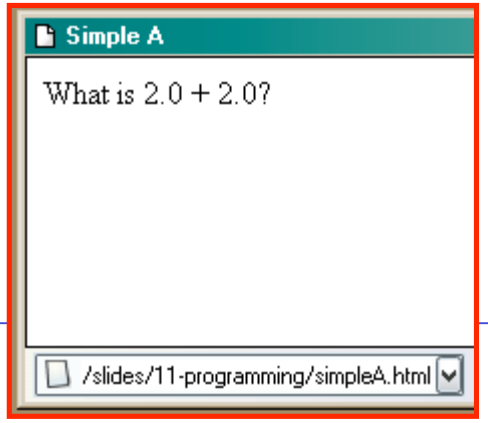
JavaScript is a way to make HTML "dynamic"

Begin with HTML

Basic HTML is static

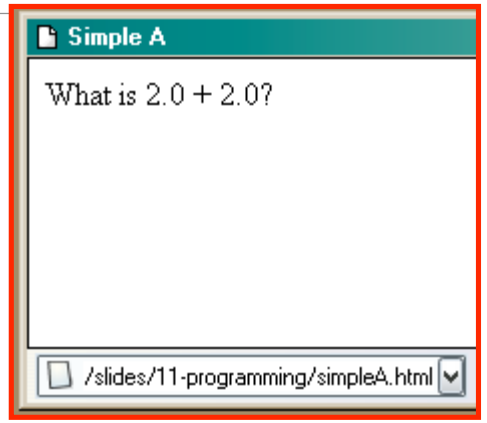
the contents of the file are displayed as given

```
<!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>
```



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>
```

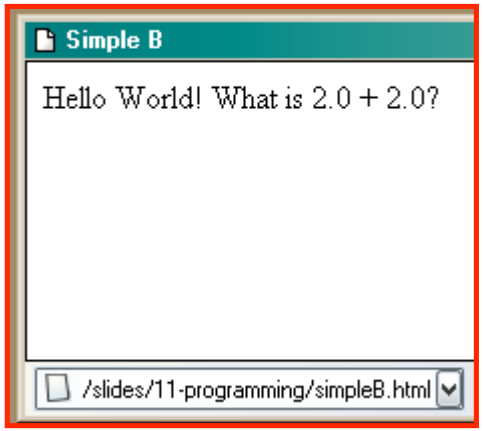
Add some "dynamic" content

Scripting languages let us create active pages

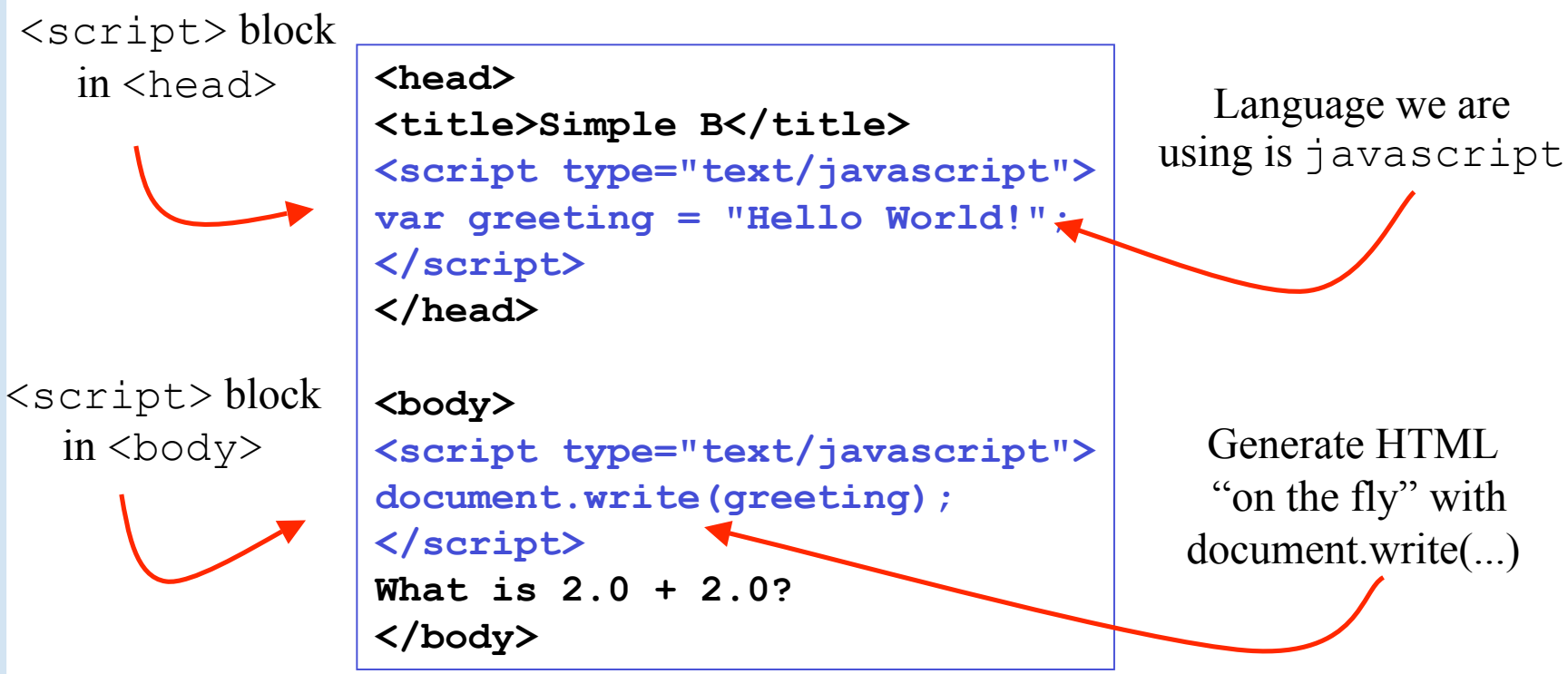
» implement actions to be taken at run-time when the page is loaded or in response to user event

```
<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>
```

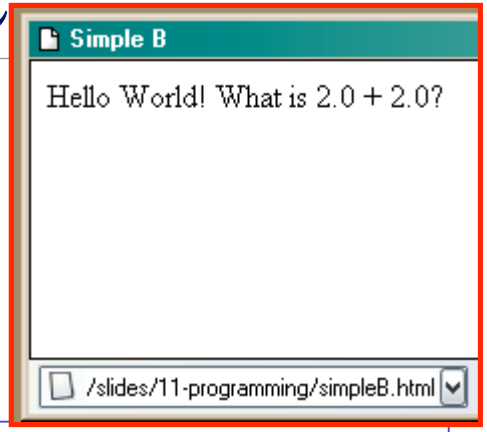


JavaScript in an HTML page



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

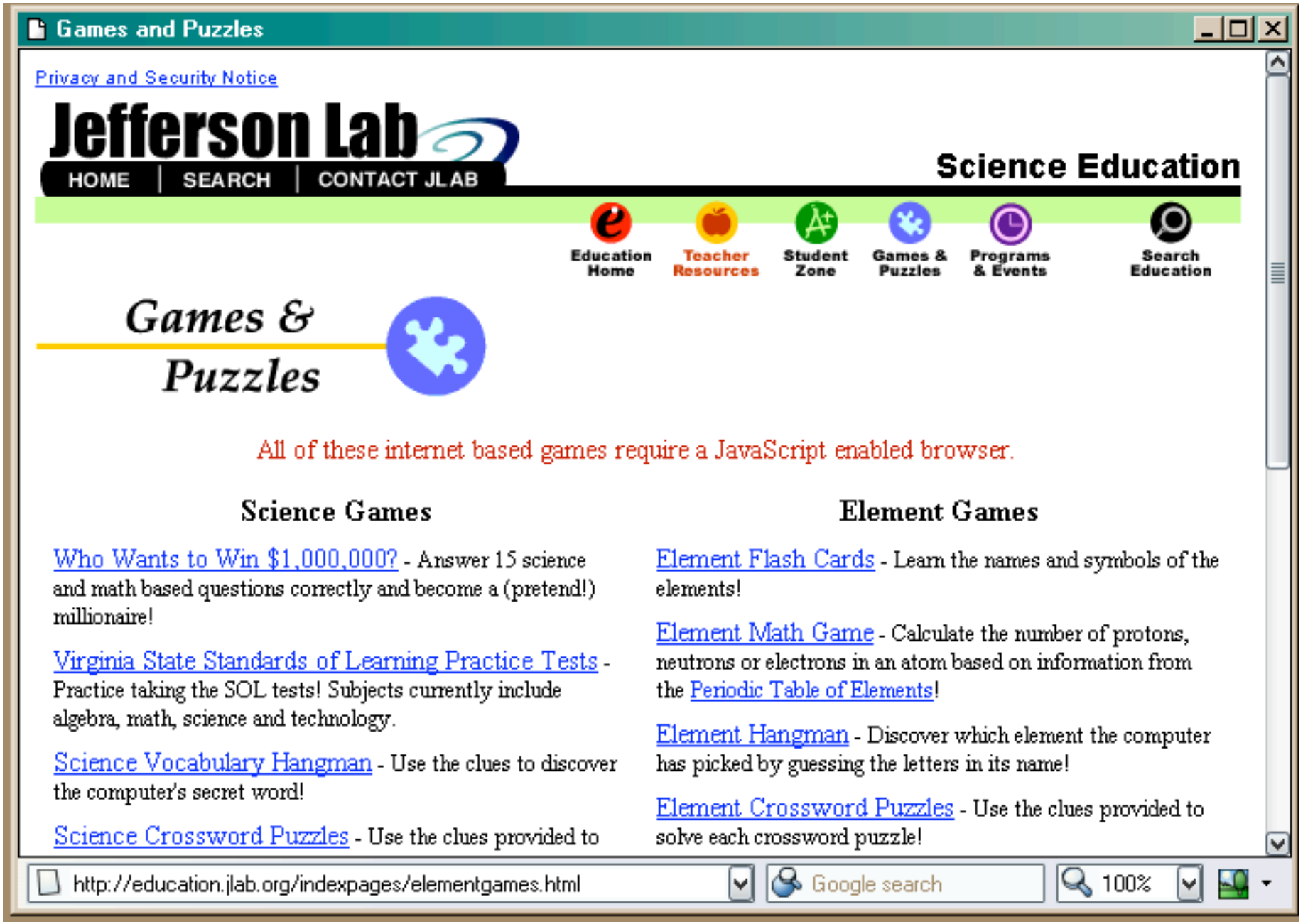


Here is some script initialization information.

Here is some script for the body of the page.

```
<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>
```


Games and Puzzles
Privacy and Security Notice
Jefferson Lab
HOME | SEARCH | CONTACT JLAB
Science Education
Education Home
Teacher Resources
Student Zone
Games & Puzzles
Programs & Events
Search Education
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!
http://education.jlab.org/indexpages/elementgames.html
Google search
100%

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*
    - *No spaces!*
  - » 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

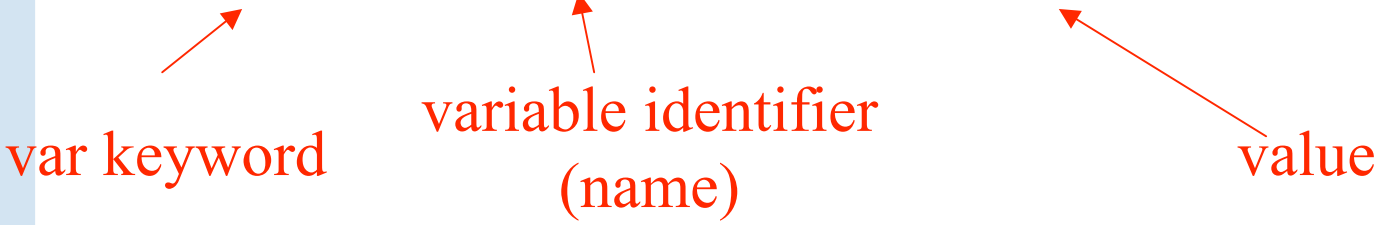
balance *gets the value* 52

greeting *gets the value* "Hello World!"

Each language expresses "gets" in a particular way

» JavaScript uses the single equals sign =

```
var balance = 52;
var greeting = "Hello World!";
```



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";<<< variable assignment

</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

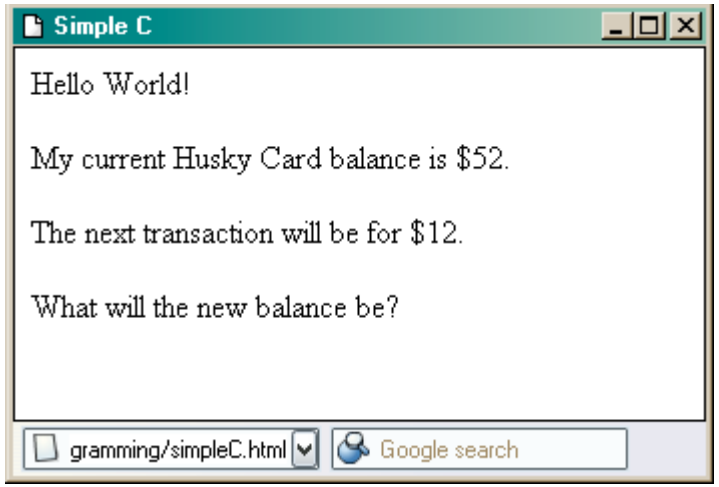
```
\t tab
\n newline
\" double quote
\' single quote
\\ backslash
```

```
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 HuskyCard 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;
isFreezing = (temp < 32);
```

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

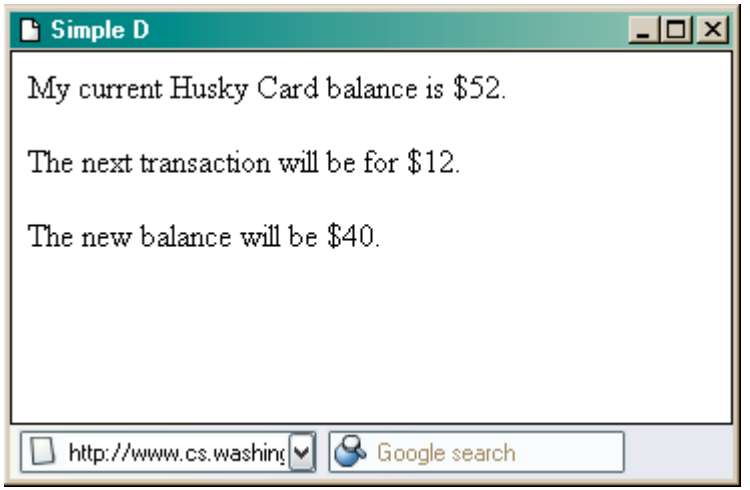
- Boolean operators

  && || ! *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 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