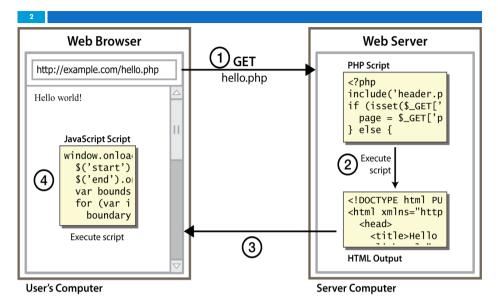


Why use client-side programming?

PHP already allows us to create dynamic web pages. Why also use client-side scripting?

- □ client-side scripting (JavaScript) benefits:
 - usability: can modify a page without having to post back to the server (faster UI)
 - efficiency: can make small, quick changes to page without waiting for server
 - event-driven: can respond to user actions like clicks and key presses

Client Side Scripting



Why use client-side programming?

□ server-side programming (PHP) benefits:

- security: has access to server's private data; client can't see source code
- compatibility: not subject to browser compatibility issues
- **power**: can write files, open connections to servers, connect to databases, ...

What is Javascript?

- a lightweight programming language ("scripting language")
 - used to make web pages interactive
 - insert dynamic text into HTML (ex: user name)
 - react to events (ex: page load user click)
 - get information about a user's computer (ex: browser type)
 - perform calculations on user's computer (ex: form validation)

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What is Javascript?

- 6
 - □ a web standard supported by all browsers
 - at times not identically especially in the case of old browsers)
 - NOT related to Java other than by name and some syntactic similarities

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Javascript vs Java

- □ interpreted, not compiled
- more relaxed syntax and rules
 - fewer and "looser" data types
 - variables don't need to be declared
 - errors often silent (few exceptions)
- key construct is the function rather than the class
 - "first-class" functions are used in many situations
- contained within a web page and integrates with its HTML/CSS content



Javascript vs Java



JavaScript vs. PHP

□ similarities:

- both are interpreted, not compiled
- both are relaxed about syntax, rules, and types
- both are case-sensitive
- both have built-in regular expressions for powerful text processing

JavaScript vs. PHP

□ differences:

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- JS is more object-oriented: noun.verb(), less procedural: verb(noun)
- JS focuses on user interfaces and interacting with a document; PHP is geared toward HTML output and file/form processing
- JS code runs on the client's browser; PHP code runs on the web server

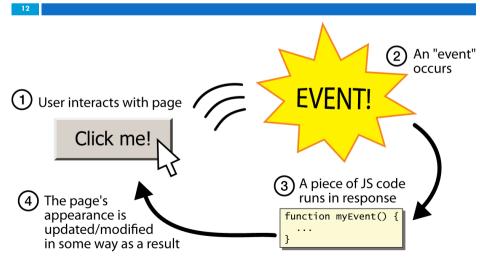
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Linking to a JavaScript file: script

<script src="filename" type="text/javascript"></script>
HTML

- □ script tag should be placed in HTML page's head
- □ script code is stored in a separate .js file
- JS code can be placed directly in the HTML file's body or head (like CSS)
 - but this is bad style (should separate content, presentation, and behavior

Event-driven programming



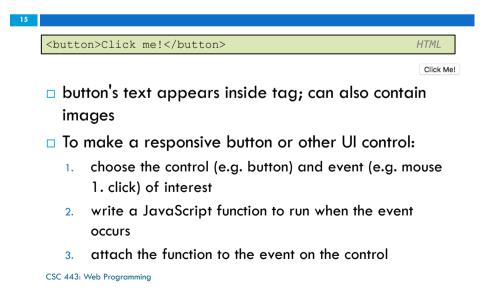
A JavaScript statement: alert

13		
	<pre>alert("IE6 detected. Suck-mode enabled."); J</pre>	5
	Alert	
	IE6 detected. Suck-mode enabled.	
	ОК	

 a JS command that pops up a dialog box with a message

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Buttons

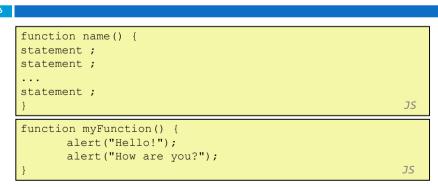


Event-driven programming

- you are used to programs that start with a main method (or implicit main like in PHP)
- JavaScript programs instead wait for user actions called events and respond to them
- event-driven programming: writing programs driven by user events
- Let's write a page with a clickable button that pops up a "Hello, World" window...

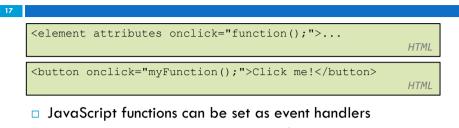
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JavaScript functions



- the above could be the contents of example.js linked to our HTML page
- statements placed into functions can be evaluated in response to user events

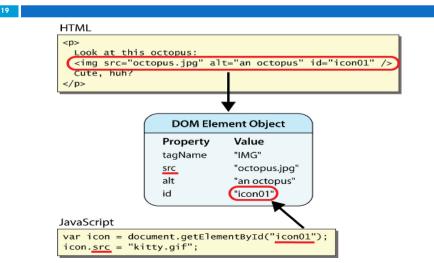
Event handlers



- when you interact with the element, the function will execute
- onclick is just one of many event HTML attributes we'll use
- but popping up an alert window is disruptive and annoying
 - A better user experience would be to have the message appear on the page...

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DOM element objects



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Document Object Model (DOM)

- most JS code manipulates elements on an HTML page
- □ we can examine elements' state
 - e.g. see whether a box is checked
- we can change state
 - e.g. insert some new text into a div
- we can change styles
 - e.g. make a paragraph red

head body title h1 div

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Accessing elements: document.getElementById

<pre>var name = document.getElementById("id");</pre>	JS
<button onclick="changeText();">Click me!</button>	
<span <b="">id="output">replace me	
<input id="textbox" type="text"/>	HTML
<pre>function changeText() {</pre>	
<pre>function changeText() { var span = document.getElementById("output");</pre>	
	");
<pre>var span = document.getElementById("output");</pre>	");
<pre>var span = document.getElementById("output"); var textBox = document.getElementById("textbox")</pre>	");
<pre>var span = document.getElementById("output"); var textBox = document.getElementById("textbox")</pre>	"); JS

Accessing elements: document.getElementById

- document.getElementById returns the DOM object for an element with a given id
- can change the text inside most elements by setting the innerHTML property
- can change the text in form controls by setting the value property

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Preetify

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function changeText() {
 //grab or initialize text here

// font styles added by JS: text.style.fontSize = "13pt"; text.style.fontFamily = "Comic Sans MS"; text.style.color = "red"; // or pink?

JS

Changing element style: element.style

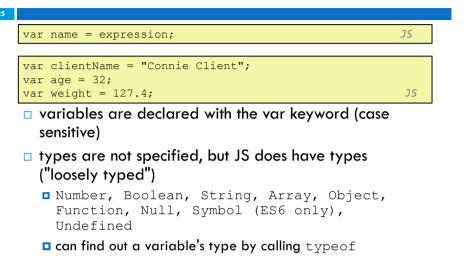
2

Attribute	Property or style object
color	color
padding	padding
background-color	backgroundColor
border-top-width	borderTopWidth
Font size	fontSize
Font famiy	fontFamily

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²⁴ More Javascript Syntax

Variables



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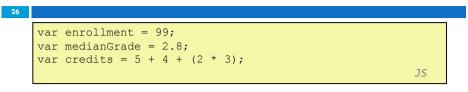
Comments (same as Java)



- identical to Java's comment syntax
- □ recall: 4 comment syntaxes
 - HTML: <!-- comment -->

- Java/JS/PHP: // comment
- PHP: # comment

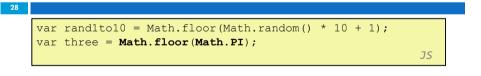
Number type



- integers and real numbers are the same type (no int vs. double)
- same operators: + * / % ++ -- = += -= *= /= %=
- □ similar precedence to Java
- □ many operators auto-convert types: "2" * 3 is 6

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Math object



- methods: abs, ceil, cos, floor, log, max, min, pow, random, round, sin, sqrt, tan
- □ properties: E, PI

Special values: null and undefined

var ned = null; var benson = 9; var caroline; // at this point in the code, // ned is null // benson's 9 // caroline is undefined

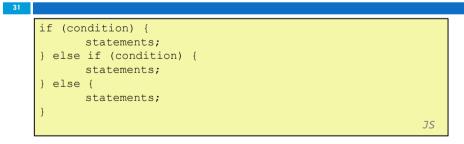
undefined : has been declared but not assigned a value

JS

- null : exists, but was specifically assigned an empty or null value
- □ Why does JavaScript have both of these?

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if/else statement (same as Java)



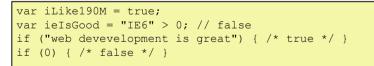
- □ identical structure to Java's if/else statement
- JavaScript allows almost anything as a condition

Logical operators

- □ > < >= <= && | | ! == != === !==
- most logical operators automatically convert types:
 - 5 < "7" is true
 - 42 == 42.0 is true
 - **5.0**" == 5 is true
- === and !== are strict equality tests; checks both type and value
 "5.0" === 5 is false

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Boolean type



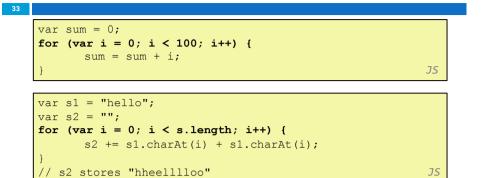
JS

- □ any value can be used as a Boolean
 - "falsey" values: 0, 0.0, NaN, "", null, and undefined
 - "truthy" values: anything else
- converting a value into a Boolean explicitly:

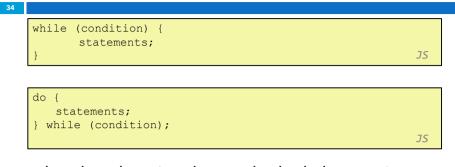
var boolValue = Boolean(otherValue);

var boolValue = !!(otherValue);

for loop (same as Java)



while loops (same as Java)



 break and continue keywords also behave as in Java

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Popup boxes

<pre>alert("message");</pre>	-		
confirm("message"			
<pre>prompt("message")</pre>	; // returns	user input string	
			JS
Confirm	×		
Confirm (?) Depositing \$100.00. Are you sure		What is your quest?	1
		What is your quest?	

Arrays

36		
	<pre>var name = []; // empty array var name = [value, value,, value]; // pre-filled name[index] = value; // store element</pre>	
		JS
	<pre>var ducks = ["Huey", "Dewey", "Louie"];</pre>	
	<pre>var stooges = []; // stooges.length is 0</pre>	
	<pre>stooges[0] = "Larry"; // stooges.length is 1</pre>	
	<pre>stooges[1] = "Moe"; // stooges.length is 2</pre>	
	<pre>stooges[4] = "Curly"; // stooges.length is 5</pre>	
	<pre>stooges[4] = "Shemp"; // stooges.length is 5</pre>	
		JS

Array methods

var a = ["Stef", "Jason"]; // Stef, Jason a.push("Brian"); // Stef, Jason, Brian a.unshift("Kelly"); // Kelly, Stef, Jason, Brian a.pop(); // Kelly, Stef, Jason a.shift(); // Stef, Jason a.sort(); // Jason, Stef

- array serves as many data structures: list, queue, stack, ...
- methods: concat, join, pop, push, reverse, shift, slice, sort, splice, toString, unshift

JS

JS

- push and pop add / remove from back
- unshift and shift add / remove from front
- shift and pop return the element that is removed
- Slice selects elements from an array
 - citrus = fruits.slice(1, 3);

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More about String

- 39
 - \square escape sequences behave as in Java: \' \" \& \n \t \\
 - converting between numbers and Strings:

var count = 10;	
var s1 = "" + count; // "10"	
<pre>var s2 = count + " bananas, ah ah ah!"; // "10 banana</pre>	as, ah
ah ah!"	
<pre>var n1 = parseInt("42 is the answer"); // 42</pre>	
<pre>var n2 = parseFloat("booyah"); // NaN</pre>	JS

var firstLetter = s[0]; // fails in IE var firstLetter = s.charAt(0); // does work in IE var lastLetter = s.charAt(s.length - 1);

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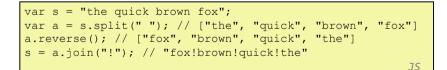
String type

```
var s = "Connie Client";
var fName = s.substring(0, s.indexOf(" ")); // "Connie"
var len = s.length; // 13
var s2 = 'Melvin Merchant';
JS
```

- methods: charAt, charCodeAt, fromCharCode, indexOf, lastIndexOf, replace, split, substring, toLowerCase, toUpperCase
 - charAt returns a one-letter String (there is no char type)
- length property (not a method as in Java)
- □ Strings can be specified with "" or "
- \Box concatenation with + :
 - □ 1 + 1 is 2, but "1" + 1 is "11"

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Splitting strings: split and join



 split breaks apart a string into an array using a delimiter

can also be used with regular expressions (seen later)

 join merges an array into a single string, placing a delimiter between them