Programming Fundamentals

using JavaScript

Declaration / Assignement

Comments

```
// single line comment
100; // single line comment

/**
 * Multiline
 * comment
 */
100;
```

Declarations

```
// declaration
var a;
var b;
```

Assignment

```
// declaration
var a;
var b;

// assignment
a = 10;
b = 20;
```

Initialization

```
// declaration with initialization
var a = 10;
var b = 20;

// same as doing this
var a;
var b;

a = 10;
b = 20;
```

Re-assignment

```
// declaration with initialization
var a = 10;
var b = 20;

// re-assignment
a = 30;
b = 100;
```

Re-assignment

```
// declaration with initialization
var a = 10;
var b = 20;

// re-assignment
a = b;
b = a;
```

Re-assignment

```
// declaration with initialization
var a = 10;
var b = 20;

// re-assignment
var temp = a;
a = b;
b = temp;
```

Local vs. global

```
// local variables
var a = 10;
var b = 20;

// global variables
// (if not declared)
c = 50;
d = 100;
```

More on this later

Keywords

Reserved Keywords

- break
- case
- catch
- class
- const
- continue
- debugger
- default
- delete
- do
- instanceof
- else
- export
- extends
- finally
- for
- function
- if
- import
- in
- new
- return
- super
- switch
- this
- throw
- try
- typeof
- var
- void
- while
- with
- yield

Has specific syntactical meaning in a program

Reserved Keywords

```
// allowed
var a = 5;
var a10 = 100;

// not allowed
var 10 = 100;
var var = 10;
var super = 20;
```

Exercises

Instructions:

- Install node.js from https://nodejs.org/en/
- Download exercise bundle from Canvas: exercises-fundamentals.zip
- Unzip
- Follow instructions in "readme.md" for how to run the exercises

Assignments to solve:

- Declaration and Assignment
- Re-assignment

Evaluation

and Expressions

Evaluation

```
10;
// => 10

5 + 5;
// => 10

"hello"
// => "hello"

true;
// => true
```

Evaluation

```
((1 + 2) + 3) + 4;
(3 + 3) + 4;
6 + 4;
// => 10
```

Evaluation

```
var a = 1;
var b = 2;
var c = 3;
var d = 4;

((a + b) + c) + d;
((1 + 2) + 3) + 4;
// => 10
```

Evaluation

```
var a = 1;
var b = 2;
var c = 3;
var d = 4;

a, b, c, d;
// => 4;
```

Evaluation

```
var a = 1;
var b = 2;
var c = 3;
var d = 4;

var e = (a, b, c, d);
// => 4
```

Evaluation

```
var a = 1;
// => undefined

a = 5;
// => 5

var b = a = 10;
// => undefined
```

More on this later

Exercises

Instructions:

- Use the same exercises bundle as before, but continue with following exercises

Assignments to solve:

- Evaluation

Primitive Types

Numbers

```
// integer
20;

// floating point
1.234;
```

Spoiler: They're all floating point -
JavaScript only has a single number type

Numbers

```
2.3 * 100
// => 229.99999999999997

0.1 + 0.2
// => 0.30000000000000004
```

More on this later

Numbers

```
// "integer"
var a = 20;

// floating point
var b = 1.234;
var c = 100 + 0.1;
```

Number methods

```
// decide precision
100.1234.toFixed(1);
// => '100.1'

// convert to string
100.1234.toString();
// => '100.1234'
```

Strings

```
// double quotes
var a = "wubbulubbadubdub!";

// single quotes
var b = 'thanks for all the fish';
```

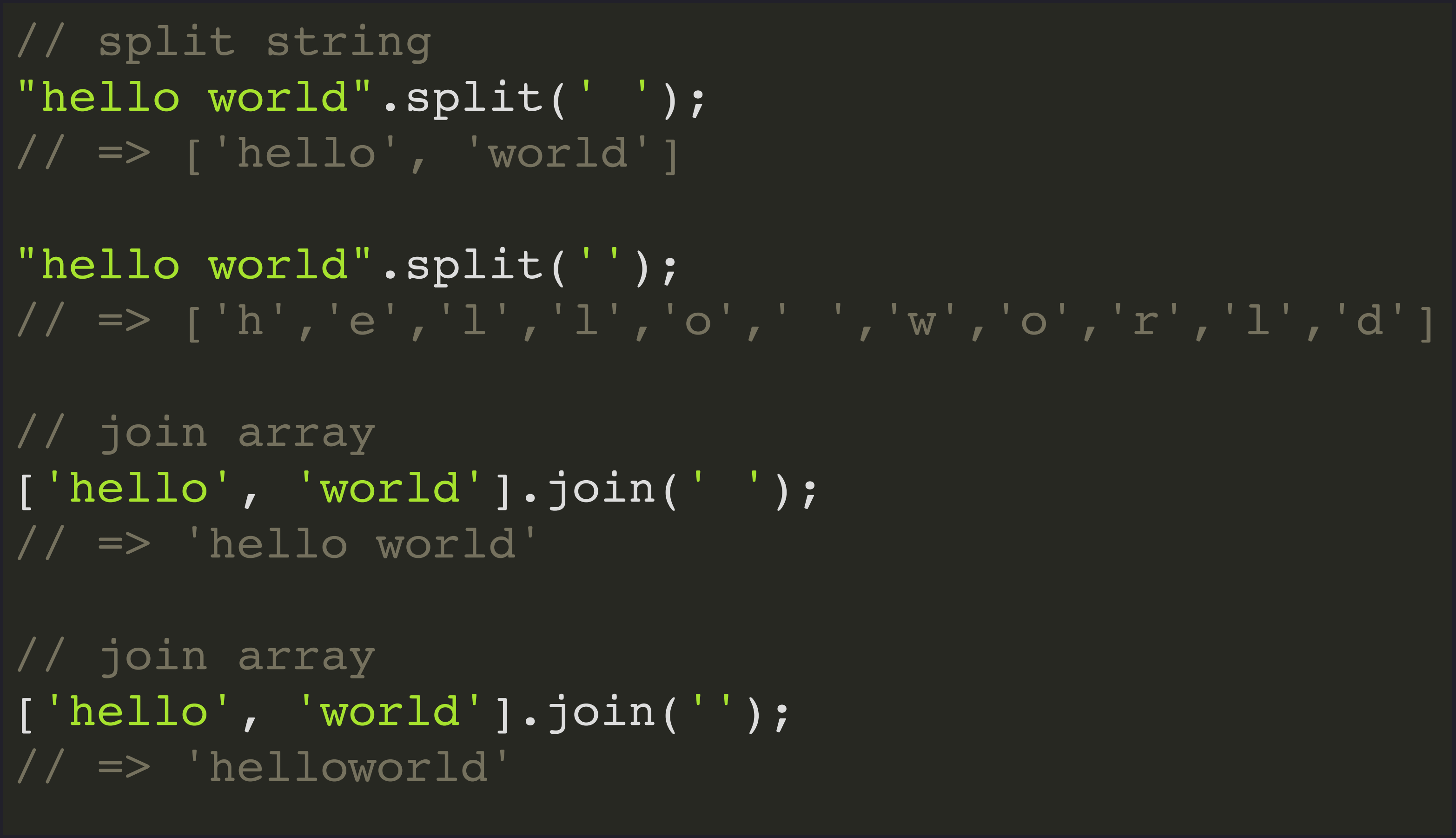
String methods

```
// get specific character
"wubbulubbadubdub!".charAt(3);
// => 'b'

// uppercase
"wubbulubbadubdub!".toUpperCase();
// => 'WUBBULUBBADUBDUB!'

// get substring
"wubbulubbadubdub!".slice(0, 10);
// => 'wubbulubba'
```

String split/join



```
// split string
"hello world".split(' ');
// => ['hello', 'world']

"hello world".split('');
// => ['h','e','l','l','o',' ','w','o','r','l','d']

// join array
['hello', 'world'].join(' ');
// => 'hello world'

// join array
['hello', 'world'].join('');
// => 'helloworld'
```

Booleans

```
true;
// => true

false;
// => false

var a = true;
var b = false;
```

Exercises

Instructions:

- Use the same exercises bundle as before, but continue with following exercises

Assignments to solve:

- Primitive Types

Operators

Numerical Operators

```
// addition
5 + 10; // => 15

// subtraction
5 - 10; // => -5

// multiplication
5 * 10; // => 50

// division
5 / 10; // => 0.5

// remainder
5 % 10; // => 5
```

Precedence

```
// implicit precedence
6 + 10 * 10 / 2 - 1;
// => 55

// explicit precedence
6 + (10 * (10 / 2)) - 1;
// => 55
```

Use parens for explicit precedence

Increment

```
var i = 0;
i = i + 1;
i++;
++i;
```

Decrement

```
var i = 10;
i = i - 1;
i--;
--i;
```

Comparative

```
// less than
5 < 10;
// => true

// less than or equals
5 <= 10;
// => true

// larger than
10 > 5;
// => true

// larger than or equals
10 >= 5;
// => true

// equals
10 == 10;
// => true
```

Logical

```
// and operator
true && false;
// => false

// or operator
true || false;
// => true
```

String Concatenation

```
"hello" + "world"; // => "helloworld"
```

```
var a = "wubba";
var b = "lubba";
var c = "dub";


a + b + c + c + "!";
// => wubbalubbadubdub!
```

Uses the + operator

Exercises

Instructions:

- Use the same exercises bundle as before, but continue with following exercises

Assignments to solve:

- Operators

Conditionals

Conditionals

```
// runs
if (true) {
  console.log('Yeehaa!');
}

// skips
if (false) {
  console.log('Oh no..');
}
```

If

```
var a = 10;

if (a > 5) {
  var message = "a is larger than five!";
  console.log(message);
}
```

If / Else

```
var a = 10;

if (a > 5) {
 console.log("a is larger than five!");
} else {
 console.log("a is less than five..");
}
```

If / Else If / Else

```
var a = 10;

if (a > 5) {
  console.log("a is larger than five!");
} else if (a == 5) {
  console.log("a is exactly five!");
} else {
  console.log("a is less than five..");
}
```

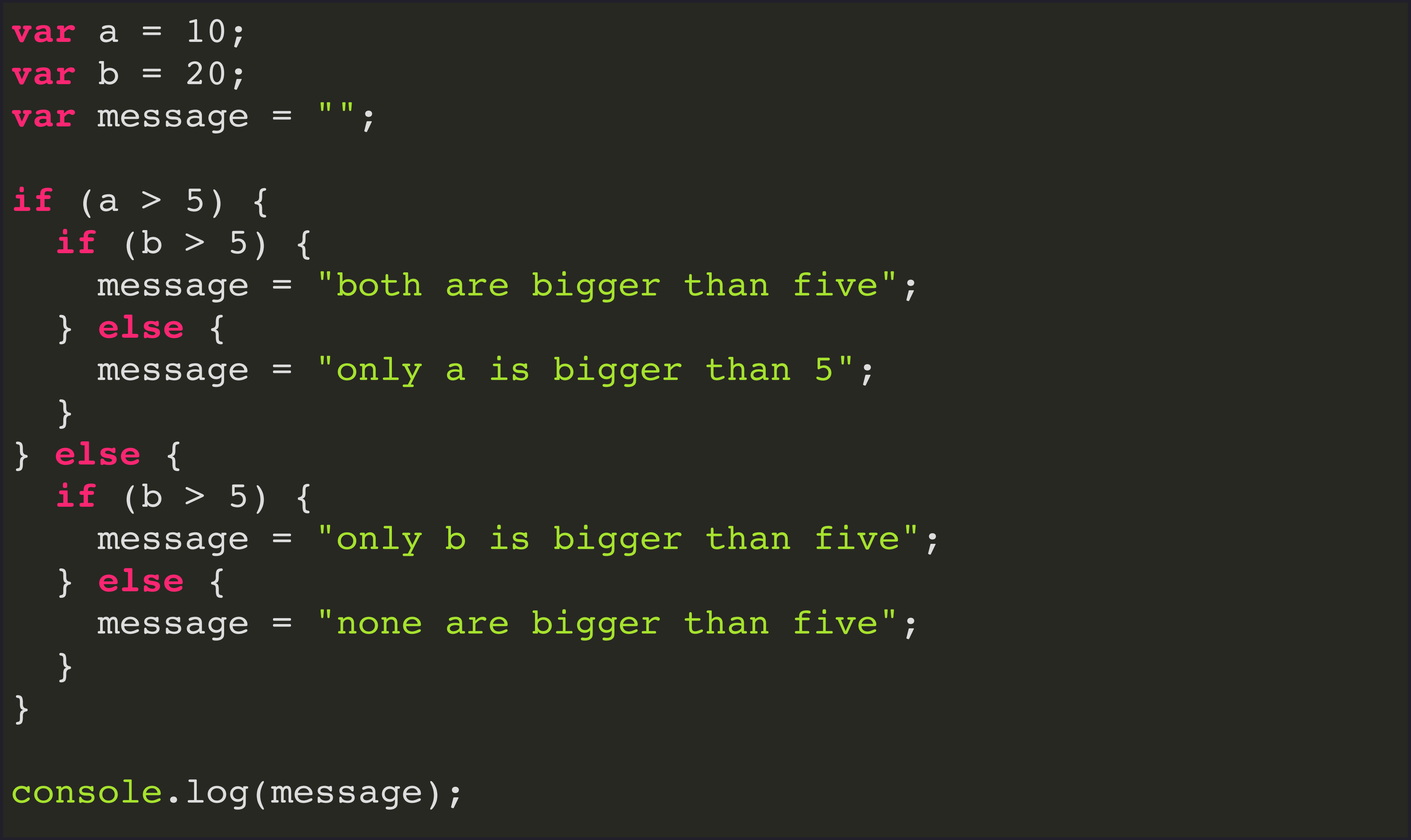
If / Else If / Else

```
var a = 10;
var message = "";

if (a > 5) {
  message = "a is larger than five!";
} else if (a == 5) {
  message = "a is exactly five!";
} else {
  message = "a is less than five..";
}

console.log(message);
```

Nested Conditionals



```
var a = 10;
var b = 20;
var message = "";

if (a > 5) {
  if (b > 5) {
    message = "both are bigger than five";
  } else {
    message = "only a is bigger than 5";
  }
} else {
  if (b > 5) {
    message = "only b is bigger than five";
  } else {
    message = "none are bigger than five";
  }
}

console.log(message);
```

Alternative

```
var a = 10;
var b = 20;
var message = "";

if (a > 5 && b > 5) {
  message = "both are bigger than five";
} else if (a > 5 && b < 5) {
  message = "only a is bigger than 5";
} else if (a < 5 && b > 5) {
  message = "only b is bigger than five";
} else {
  message = "none are bigger than five";
}

console.log(message);
```

Conditionals

Conditionals can be used to make decision trees in your code

Many ways to solve these types of problems, where some a better than others in the long run

Exercises

Instructions:

- Use the same exercises bundle as before, but continue with following exercises

Assignments to solve:

- Conditionals