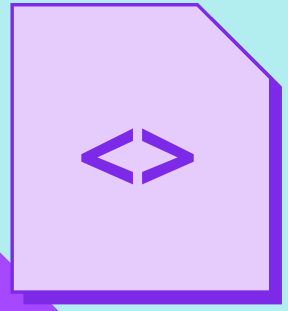
Javascript Syntax



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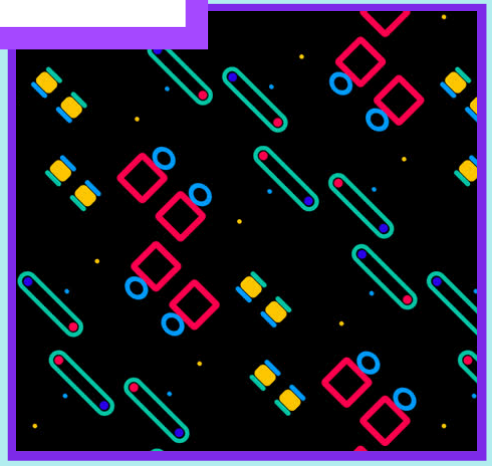

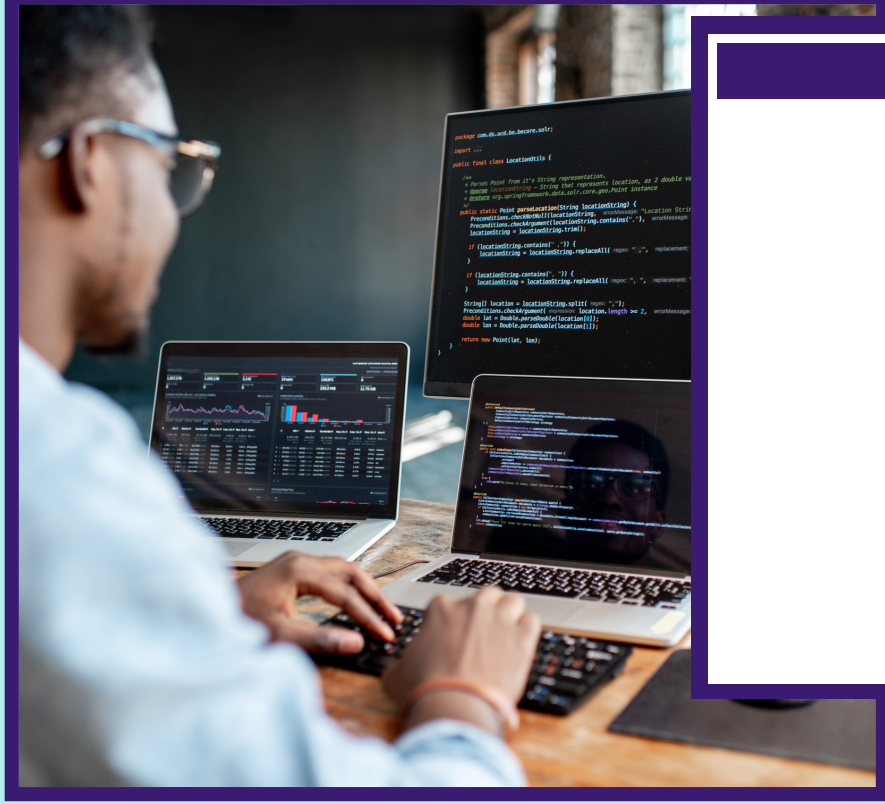

Basic JS syntax

The syntax, expressions, and operators

Interpreted/Compiled:

- Web Browser
- Command line (Node.js) eg: node test.js

VARIABLES & CONSTANTS

You can define them using one of the keywords →

```
01 | // An immutable value available from the line
02 | // where the constant is defined
03 | const constValue = 'hey';
04 |
05 | // A mutable value available from the line
06 | // where the variable is defined
07 | let variableValue = 0;
08 |
09 | // A mutable value, old syntax. Hoists to the beginning
10 | // of the function scope or to the global scope,
11 | // whatever is closer. Not recommended for use.
12 | var anotherVariableValue = false;
13 |
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23 |
24 |
25 |
```

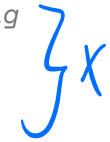

PRINTING ARBITRARY VALUES TO CONSOLE

Just use **console.log** →

```
01 | // Let's say we have a constant storing a string
02 | const name = 'Bindi';
03 |
04 | // And a variable storing a number
05 | let age = 22;
06 |
07 | // And an object
08 | let wildlifeWarrior = {
09 |   name: name,
10 |   age: age,
11 |   gender: 'f',
12 | };
13 |
14 | // This will print 'Hello, world!' to console
15 | console.log('Hello, world!');
16 |
17 | // Additionally, you can print any value
18 | console.log(name); // Prints 'Bindi'
19 | console.log('name:', name); // Prints 'name: Bindi'
20 | console.log('age: ' + age); // Prints 'age: 22'
21 |
22 | // This will print an object as a string
23 | console.log('Person:', wildlifeWarrior);
24 | // Person: { name: 'Bindi', age: 22, gender: 'f' }
25 |
```

name + age = 'Bindi22'

✓

DATA TYPES

JavaScript is a dynamically typed language, meaning that the same variable can contain values of different types →

```
01 | let value;
02 |
03 | // A float or integer number
04 | value = 0.1;
05 |
06 | // A string, double quotes "" can also be used
07 | value = 'some-string';
08 |
09 | // In JavaScript, null is a separate type
10 | value = null;
11 |
12 | // This type represents no value and no variable
13 | value = undefined;
14 |
15 | // A boolean value, either true or false
16 | value = true;
17 |
18 | // A unique value
19 | value = Symbol();
20 |
21 | // An object, which is basically a dictionary
22 | // of dynamically typed values identified by their keys
23 | value = { key: 'hey', anotherKey: 10 };
24 |
25 |
```

null == undefined.
true.

DATA TYPES

Functions are first-class citizens, meaning that they can be assigned to variables and can be referenced →

```
let value;

// An anonymous function
value = (param1, param2) => {
  console.log(param1, param2);
};

// A normal function
value = function(param) {
  console.log('param =', param);
};

// Function can be defined without assigning it
// to a variable, in that case, it hoists
function foo(bar) {
  // If number, adds 1 to it, otherwise concatenates it
  return bar + 1;
}

// Calling a function
const result = foo(10);
value(result); // Prints 'param = 11'

// A big integer number
value = BigInt(9007199254740991);
```

DATA TYPES

You can always find out the type of the value that the varable currently holds, at runtime →

However, in some cases, you'd need a more complex check

```
01 | let value;
02 |
03 | value = 0.1;
04 | console.log(typeof value); // Prints 'number'
05 |
06 | value = 'some-string';
07 | console.log(typeof value); // Prints 'string'
08 |
09 | value = null;
10 | console.log(typeof value); // Prints 'object'
11 |
12 | value = undefined;
13 | console.log(typeof value); // Prints 'undefined'
14 |
15 | value = true;
16 | console.log(typeof value); // Prints 'boolean'
17 |
18 | value = Symbol();
19 | console.log(typeof value); // Prints 'symbol'
20 |
21 |
22 |
23 |
24 |
25 |
```

DATA TYPES

You can always find out the type of the value that the varable currently holds, at runtime →

However, in some cases, you'd need a more complex check

```
01 | let value;
02 |
03 | value = { key: 'hey', anotherKey: 10 };
04 | console.log(typeof value); // Prints 'object'
05 |
06 | value = function() { /* ... */ };
07 | console.log(typeof value); // Prints 'function'
08 |
09 | value = BigInt(9007199254740991);
10 | console.log(typeof value); // Prints 'bigint'
11 |
12 |
13 |
14 |
15 |
16 |
17 |
18 |
19 |
20 |
21 |
22 |
23 |
24 |
25 |
```

DATA TYPES

undefined is also the type of a variable that hasn't been assigned a value yet →

#justjavascriptythings

```
01 | let value;
02 |
03 | console.log(typeof value); // Prints 'undefined'
04 |
05 | // For more information on data types,
06 | // visit the MDN page:
07 | // http://mdn.io/Data_structures
08 |
09 | // I also recommend watching this old but gold talk
10 | // by Gary Bernhardt:
11 | // https://www.destroyallsoftware.com/talks/wat
12 | // This talk makes fun of some JS things like
13 | undefined == null
14 | // being true, and
15 | undefined === null
16 | // being false
17 |
18 |
19 |
20 |
21 |
22 |
23 |
24 |
25 |
```

are the values are the same

are the values and types the same

TYPE CONVERSIONS

It's possible to convert values of one type into another, for some of the supported types →

```
01 | let value = 10;
02 |
03 | let strValue = value.toString();
04 | // or: let strValue = value + '';
05 |
06 | let numValue = parseInt(strValue, 10);
07 | // or: let numValue = parseFloat(strValue);
08 | // or: let numValue = +strValue;
09 |
10 | let bigIntValue = BigInt(numValue);
11 | // or: let bigIntValue = BigInt(strValue);
12 |
13 | let numValue = Number(bigIntValue);
14 | // or: let numValue = parseInt(bigIntValue, 10);
15 |
16 |
17 |
18 |
19 |
20 |
21 |
22 |
23 |
24 |
25 |
```

Always use ===

COMPARING VALUES

There is a strict equality check and a loose equality check, and the strict check is generally preferred whenever possible →

```
01 | let value = 10;
02 | let anotherValue = '10';
03 |
04 | // With a loose equality check (aka '=='), two variables
05 | // are considered as holding identical values
06 | console.log(value == anotherValue); // Prints 'true'
07 |
08 | // With a strict equality check (aka '==='), the result
09 | // will indicate that the stored values are different
10 | console.log(value === anotherValue); // Prints 'false'
11 |
12 | // Comparing with an implicit type case can result
13 | // in a pretty weird outcome and should be avoided
14 | // when possible
15 | const str = '[object Object]';
16 | const obj = { catsSay: 'meow', dogsSay: 'woof' };
17 | console.log(str == obj); // Prints 'true' ¯\_(ツ)_/¯
18 | console.log(str === obj); // Prints 'false'
19 |
20 | // For more information, please check out these pages:
21 | // https://mdn.io/Equality_comparisons_and_sameness
22 | // http://ecma-international.org/ecma-262/5.1/#sec-11.9.3
23 |
24 |
25 |
```

PRIMITIES

Object, Array, Map, Set

```
01 | // An object is a dictionary of dynamically typed values
02 | const obj = { key: 'some-value', anotherKey: 10.2 };
03 | console.log(obj.key); // Prints 'some-value'
04 | console.log(obj['key']); // Prints 'some-value'
05 |
06 | // An array is an indexed list of dynamically typed
07 | // values. Every Array is also an object.
08 | const arr = ['first value', 2, obj];
09 | console.log(arr[0]); // Prints 'first value'
10 | console.log(arr.length); // Prints '3'
11 | console.log(typeof arr); // Prints 'object'
12 |
13 | // A Map is an object that can use any value as a key
14 | // (not only strings) and preserves the original
15 | // element order.
16 | const map = new Map();
17 | map.set('one', 1);
18 | console.log(map.get('one')); // Prints '1'
19 |
20 | // A Set is an object that contains unique values
21 | const set = new Set();
22 | set.add('one');
23 | set.add('one'); // 'one' isn't added the second time
24 | console.log(set.has('one')); // Prints 'true'
25 |
```

CONDITIONALS

Conditionals look like their alternatives in other C-like languages

The value in parentheses automatically gets casted to a boolean value

```
01 | // One-liner if condition
02 | if (condition) doSomething(); // If condition is truthy
03 |
04 | // Multiline if
05 | if (condition) {
06 |   // If condition is truthy
07 | }
08 |
09 | // If with else
10 | if (confition) {
11 |   // If condition is truthy
12 | } else {
13 |   // If condition is falsy
14 | }
15 |
16 | // If with multiple branches
17 | if (condition1) {
18 |   // If condition1 is truthy
19 | } else if (condition2) {
20 |   // If condition2 is truthy
21 | } else {
22 |   // If both condition1 and condition2 are falsy
23 | }
24 |
25 |
```

CONDITIONALS

Using the **switch** statement often is more convenient and improves the code readability →

Don't forger about the **break** at the end of each case!

```
01 | const value = 5;
02 |
03 | // For mulitple branches, it's often more
04 | // convenient to use a switch-case block
05 | switch (value) {
06 |   case 0:
07 |     // If value equals to 0, the below code runs
08 |     console.log('No items in the bag!')
09 |     break;
10 |   case 1:
11 |     // If value equals to 1, the below code runs
12 |     console.log('One item is in the bag!');
13 |     break;
14 |   case 2:
15 |     // If value equals to 2, the below code runs
16 |     console.log('A couple of items is in the bag!');
17 |     break;
18 |   default:
19 |     // If value isn't 0, 1, or 2, the below code runs
20 |     console.log('Lots of items are in the bag');
21 | }
22 |
23 |
24 |
25 |
```

CONDITIONALS

Inline if, aka the Ternary operator, is a convenient way to write less code and make it easier to understand →

```
01 | // Inline if (aka the ternary operator)
02 | condition ? ifTrue() : ifFalse();
03 |
04 | // It is an operator, meaning that it returns a value
05 | const result = condition ? valIfTrue() : valIfFalse();
06 |
07 | // Additionally, you can use lazy || and && operators
08 | condition && ifTrue() || ifFalse();
09 |
10 | // The above also returns a value
11 | // (this is also known as rvalue in some languages)
12 | const result = condition && valIfTrue() || valIfFalse();
13 |
14 | // Thanks to the && operator, it's possible to write
15 | // a short version of a one-liner if:
16 | condition && runSomething();
17 | // which is a single line equivalent to
18 | if (condition) {
19 |   runSomething();
20 | }
21 |
22 |
23 |
24 |
25 |
```

CONDITIONALS

As said above, the condition inside parentheses gets auto-casted to a boolean value

However, to avoid accidental unexpected bugs, still, you must understand how the type casting works →

```
01 | if (true) {
02 |   console.log('Always prints');
03 | }
04 |
05 | if (false) {
06 |   console.log('Never prints');
07 | }
08 |
09 | if ('hey') {
10 |   console.log('Always prints');
11 | }
12 |
13 | if ('') {
14 |   console.log('Never prints');
15 | }
16 |
17 | if ('0') {
18 |   console.log('Always prints');
19 | }
20 |
21 | if (0) {
22 |   console.log('Never prints');
23 | }
24 |
25 |
```

true

false

true

false

CONDITIONALS

As said above, the condition inside parentheses gets auto-casted to a boolean value

However, to avoid accidental unexpected bugs, still, you must understand how the type casting works →

```
01 | if (1) {
02 |   console.log('Always prints');
03 | }
04 |
05 | if (null) {
06 |   console.log('Never prints');
07 | }
08 |
09 | if (undefined) {
10 |   console.log('Never prints');
11 | }
12 |
13 | if ({ x: 'test' }) {
14 |   console.log('Always prints');
15 | }
16 |
17 | if (Symbol()) {
18 |   console.log('Always prints');
19 | }
20 |
21 | if (function x() {}) {
22 |   console.log('Always prints');
23 | }
24 |
25 |
```

CONDITIONALS

And sometimes, it gets really tricky →

```
01 | if (BigInt(1020202)) {
02 |   console.log('Always prints');
03 | }
04 |
05 | if (BigInt(0)) {
06 |   console.log('Never prints');
07 | }
08 |
09 | if ('1' - 1) {
10 |   console.log('Never prints');
11 | }
12 |
13 | if (+'0') {
14 |   console.log('Never prints');
15 | }
16 |
17 | if (new String('')) {
18 |   console.log('Always prints');
19 | }
20 |
21 | if (new Number(0)) {
22 |   console.log('Always prints');
23 | }
24 |
25 |
```

LOOPS

JavaScript supports the same syntax for the loops that many curly bracket syntax languages like C do

```
01 | // Good old for loop
02 | for (let i = 0; i < 100; i++) {
03 |   console.log(i);
04 | }
05 |
06 | // An equivalent while loop
07 | let i = 0;
08 | while (i < 100) {
09 |   console.log(i);
10 |   i++;
11 | }
12 |
13 | // Or equivalent do...while loop
14 | let i = 0;
15 | do {
16 |   ++i;
17 |   if (i >= 100) {
18 |     break;
19 |   }
20 |
21 |   console.log(i);
22 | } while (true);
23 |
24 |
25 |
```

Amy
Tom

0
1

```
const names = ['Amy', 'Tom'];
for (const name of names) {
  console.log(name);
}
```

```
for (const name in names) {
  console.log(name);
}
```

CLASSES

Modern JavaScript also supports classes, allowing for a convenient way to implement abstractions and ship the data along with the functions that can process it →

```
01 | // Defining a new class
02 | class Snack {
03 |   // A consuctor that will be auto-called
04 |   constructor(calories, name) {
05 |     this.caloriesRemaining = calories;
06 |     this.name = name;
07 |   }
08 |
09 |   // One of attached functions, usually called 'methods'
10 |   chew() {
11 |     this.caloriesRemaining -= 100;
12 |   }
13 | }
14 |
15 |
16 |
17 |
18 |
19 |
20 |
21 |
22 |
23 |
24 |
25 |
```

CLASSES

A JavaScript class can be extended and can have static members

```
01 | class Snack {
02 |   constructor(calories, name) {
03 |     this.caloriesRemaining = calories;
04 |     this.name = name;
05 |   }
06 |   chew() {
07 |     this.caloriesRemaining -= 100;
08 |   }
09 | }
10 |
11 | class Pizza extends Snack {
12 |   static caloriesPerGram = 2.66;
13 |
14 |   constructor(weightInGrams) {
15 |     super(Pizza.caloriesPerGram * weightInGrams, 'XL');
16 |   }
17 | }
18 |
19 | class Crisps extends Snack {
20 |   static caloriesPerGram = 5.36;
21 |
22 |   constructor(weightInGrams) {
23 |     super(Crisps.caloriesPerGram * weightInGrams, 'Thins');
24 |   }
25 | }
```

CLASSES

With classes, you can use all features and patterns established in object-oriented programming

However, internally, each class is just a constructor function, because JavaScript OOP is based on 'prototyping'

```
01 | class Meal {
02 |   constructor(snacks) {
03 |     this.snacks = snacks;
04 |   }
05 |
06 |   eatSome() {
07 |     for (let i = 0; i < this.snacks.length; i++) {
08 |       const snack = this.snacks[i];
09 |       console.log('Chewing', snack.name);
10 |       snack.chew();
11 |     }
12 |   }
13 |
14 |   logCalories() {
15 |     for (let i = 0; i < this.snacks.length; i++) {
16 |       const snack = this.snacks[i];
17 |       console.log(snack.name, ': ', snack.caloriesRemaining);
18 |     }
19 |   }
20 | }
21 |
22 | console.log(typeof Meal); // Prints 'function'
23 |
24 |
25 |
```

CLASSES

A class is just a constructor function, and a class instance is an object

```
const snacks = [
  new Pizza(800),
  new Crisps(150),
];

const meal = new Meal(snacks);
meal.logCalories();
meal.eatSome();
meal.logCalories();

console.log(typeof Meal); // Prints 'function'
console.log(typeof meal); // Prints 'object'
```

SIMPLE FIBONACCI SEQUENCE GENERATOR IN JAVASCRIPT

So hopefully, this example's got a bit easier to understand →

```
01 | const fib = (n) => {
02 |   if (n === 0) {
03 |     return 0;
04 |   }
05 |
06 |   if (n === 1) {
07 |     return 1;
08 |   }
09 |
10 |   let current = 0;
11 |   let previous = 1;
12 |   let prePrevious = 0;
13 |   // Iterative calculation
14 |   for (let i = 0; i < n; i++) {
15 |     prePrevious = previous;
16 |     previous = current;
17 |     current = prePrevious + previous;
18 |   }
19 |
20 |   return current;
21 | };
22 |
23 | console.log(fib(5));
24 |
25 |
```

```
const nums = [1,2,3,4,5,6,7];
const newNums = [];
for (const num of nums) {
    if (num < 5) {
        newNums.push(num);
    }
}
console.log(newNums);

/*const lessThan5 = (num) => {
    return num < 5;
}*/

const lessThan5 = (num) => num < 5;

const newNums2 = nums.filter(lessThan5);
console.log(newNums2);
```

```
const numbers = [406, 646, 199, 996, 989, 47, 55, 614, 293, 407, 287, 605,
    -56, 960, 832, 25, 596, 541, -577, 56, 878, 483, 681, 17, 73, 428, -
    757, 923, 748, 619, 117, 588, -661, -267, 571, 95, 923, 386, 507, 243,
    -868, -797, 344, 660, 34, 945, -424, -169, 344, 601, 277, 478, 562,
    863, 887, 172, 23, 995, 999, 2, 12, 476, 755, 617, 155, 698, 91, 1,
    481, 971, 371, 164, 220, 854, 590, 364, 446, 254, 980, 469, 738, 866,
    297, 410, 407, 576, 893, 319, 866, 501, 939, 536, 380, 331, 438, 76,
    423, 951, 459, 425 ];

const evenNumbers = numbers.filter((number) => number % 2 == 0);
const positiveNumbers = numbers.filter((number) => number > 0);
const numOver400 = numbers.filter((number) => number > 400);
const numbersIndex20To40 = numbers.filter((number, idx) => (idx >= 20 &&
    idx <= 40));

const sum = numbers.reduce((t, v) => t + v, 0);
let positiveSum = positiveNumbers.reduce((t, v) => t + v, 0);
let evenSum = evenNumbers.reduce((t, v) => t + v, 0);
let sumAbove400 = numOver400.reduce((t, v) => t + v, 0);
let sumIndex20to40 = numbersIndex20To40.reduce((t, v) => t + v, 0);

console.log('Sum = ' + sum);
console.log('Positive Sum = ' + positiveSum);
console.log('Even Sum = ' + evenSum);
console.log('Sum of numbers above 400 = ' + sumAbove400);
console.log('Sum of numbers between indexes 20 and 40 inclusively = ' +
    sumIndex20to40);

/*
Sum = 40244
Positive Sum = 44820
Even Sum = 19326
Sum of numbers above 400 = 38696
Sum of numbers between indexes 20 and 40 inclusively = 40244
*/
```

```
/*const greeting = () => {
    return 'Hello';
}*/

const greeting = () => {
    return 'Hello';
};

const printName = (fn, name) => {
    console.log(fn(), name);
};

printName(greeting, 'Hayden');
```

```
/*const greeting = () => {
    return 'Hello';
}*/

const printThere = () => {
    return 'there';
};

const greeting = (secondPart) => {
    return 'Hello ' + secondPart();
};

const printName = (fn, name) => {
    console.log(fn(), name);
};

printName(greeting('there'), 'Hayden');
printName(() => greeting('there'), 'Hayden');
```

Calling of a function

Error

Hello there Hayden.

function itself → definition of this function.