JavaScript New Features

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ECMAScript

- New standard for ECMAScript released yearly
  - Relatively easy to get a new feature into the language
- Transpiling: Translate new language to old style JavaScript
  - Allows front-end software to be coded with new features but run everywhere.
  - For example: Babel. Check out: https://babeljs.io/en/repl new JS in -> old JS out
- Frontend frameworks are aggressively using new language features
  - React.js - Encourages use of newer ECMAScript features
  - Angular - Encourages Typescript - Extended JavaScript with static types and type checking

Lots of new features in ECMAScript

- Already seen a few
  - `let, const, class, =>`
- Here are a few more you might encounter:
  - Modules
  - Default parameters
  - Rest parameters ...
  - Spread operator ...
  - Destructuring assignment
  - Template string literals
  - Set, Map, WeakSet, WeakMap objects, async programming

Modules - Variables global to a file not system

Old Way

```
var exportedName =
     (function () {
          var x, y, x;
          ...
          return {x: x, y: y};
     })();
```

Use Immediately Invoked Function Expressions using closures to make module variables function scope and only return a single object to access them.

New Way

```
var x, y, x;
...
var exportedName = {x: x, y: y};

export exportedName;
```

Can explicitly define file's exports and then import the module in another file. Two common ways:

- Common.js (Node.js): `module.exports/require()`
- ECMAScript 6: `export/import`

Default parameters - Parameters not specified

Old Way

```
function myFunc(a,b) {
     a = a || 1;
     b = b || "Hello";
}
```

Unspecified parameters are set to undefined. You need to explicitly set them if you want a different default.

New Way

```
function myFunc (a = 1, b = "Hello") {

}
```

Can explicitly define default values if parameter is not defined.

Rest parameters . . .

Old Way

```
function myFunc() {
  var a = arguments[0];
  var b = arguments[1];
  var c = arguments[2];
  // arguments[N]
}
```

Parameters not listed but passed can be accessed using the `arguments` array.

New Way

```
function myFunc(a, b, ...theArgsArray) {
  var c = theArgsArray[0];
}
```

Additional parameters can be placed into a named array.

Spread operator . . .

Old Way

```
var anArray = [1,2,3];
myFunc.apply(null, anArray);

var o = [5].concat(anArray).concat([6]);
```

New Way

```
var anArray = [1,2,3];
myFunc(...anArray);

var o = [5, ...anArray, 6];
```

Expand an array to pass its values to a function or insert it into an array.

Works on iterable types: strings & arrays

Destructuring assignment

Old Way

```
var a = arr[0];
var b = arr[1];
var c = arr[2];

var name = obj.name;
var age = obj.age;
var salary = obj.salary;

function render(props) {
  var name = props.name;
  var age = props.name;
}
```

New Way

```
let [a,b,c] = arr;


let {name, age, salary} = obj;


function render({name, age}) {

}
```

Template string literals

Old Way

```
function formatGreetings(name, age) {

  var str =
    "Hi " + name +
    " your age is " + age;
}

 ...
```

Use string concatenation to build up string from variables.

New Way

```
function formatGreetings(name, age) {

  var str =
    `Hi ${name} your age is ${age}`;
```

Also allows multi-line strings:

```
`This string has
two lines`
```

Very useful in frontend code. Strings can be delimited by " ", ' ', or ` `

For of

Old Way

```
var a = [5,6,7];
var sum = 0;

for (var i = 0; i < a.length; i++) {
  sum += a[i];
}
```

Iterator over an array

New Way

```
let sum = 0;

for (ent of a) {
  sum += ent;
}
```

Iterate over arrays, strings, Map, Set, without using indexes.

ECMAScript 2020

- Nullish coalescing operator (??)
  - `val1 ?? val2;` - Returns `val2` if it is not null or undefined, otherwise `val1`, like `val1 || val2`
    - `param ?? 32;` - Works for all number values of param including 0

- Optional Chaining (?.)
  - `obj?.prop` - Returns undefined if obj is undefined or null otherwise returns `obj.prop`
    - `obj?.subobj?.prop;` - Handles obj or subobj being null or undefined.
    - `func?.();` - Calls func only if not null or undefined.
    - `arr?.[1]` - Access array only if arr is not undefined or null.

- BigInt - Bigger than 53bit integers - Example: 9007199254740992n
  - Makes working with 64bit integers from other languages easier

Some additional extensions

- Set, Map, WeakSet, WeakMap objects
  - Defined interfaces for common abstractions
- async/await and Promises
  - Asynchronous programming help