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# Session 19

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May 27, 2024

## 1 Built-in Array Methods

### 1.1 push

Suppose you have this array:

```
1 | var colors = ["red", "orange", "yellow"];
```

And you want to add another color to the end of the array. You can use this way:

```
1 | colors[3] = "green";  
2 | console.log(colors); // ["red", "orange", "yellow", "green"]
```

However, there is a better way to do this. You can use the push method:

```
1 | var colors = ["red", "orange", "yellow"];  
2 | colors.push("green");  
3 | console.log(colors); // ["red", "orange", "yellow", "green"]
```

The push method is an array method that adds an element to the end of an array, and returns the new length of the array.

You can also use push to add multiple elements to an array:

```
1 | var colors = ["red", "orange"];  
2 | var newLen = colors.push("blue", "indigo", "violet");  
3 | console.log(colors); // ["red", "orange", "blue", "indigo", "violet"]  
4 | console.log(newLen); // 5
```

### 1.2 unshift

unshift is similar to push, but it adds an element to the beginning of an array instead of the end, and returns the new length of the array.

```
1 | var colors = ["red", "orange", "yellow"];  
2 | var newLen = colors.unshift("green");
```

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```
3 console.log(colors); // ["green", "red", "orange", "yellow"]
4 console.log(newLen); // 4
```

You can also use `unshift` to add multiple elements to an array:

```
1 var colors = ["red", "orange"];
2 colors.unshift("blue", "indigo", "violet");
3 console.log(colors); // ["blue", "indigo", "violet", "red", "orange"]
```

## 1.3 pop

`pop` removes the last element from an array and returns that element.

```
1 var colors = ["red", "orange", "yellow"];
2 var removed = colors.pop();
3 console.log(removed); // "yellow"
4 console.log(colors); // ["red", "orange"]
```

## 1.4 shift

`shift` removes the first element from an array and returns that element.

```
1 var colors = ["red", "orange", "yellow"];
2 var removed = colors.shift();
3 console.log(removed); // "red"
4 console.log(colors); // ["orange", "yellow"]
```

### Hovering on functions

When you hover with the mouse cursor over a function in VS Code, you can see a brief description of what the function does. This can be helpful if you're not sure what a function does or how to use it.

To know the length of an array, you can use the `length` *property*:

It's a property, because arrays are objects, and `length` is a property of the array object.

```
1 var colors = ["red", "orange", "yellow"];
2 console.log(colors.length); // 3
```

`length` is always higher than the highest index in the array by 1 since it starts from 1 and index starts from 0, so if you have an array with 3 elements, the highest index is 2, and the length is 3.

## 1.5 splice

`splice` can add or remove elements from an array, and returns the removed elements.

It takes three arguments:

1. The index at which to start changing the array.
2. The number of elements to remove.
3. The elements to add.

So this is its syntax:

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```
1 | array.splice(start, deleteCount, item1, item2, ...)
```

Example on deleting elements with splice:

```
1 | var colors = ["red", "orange", "yellow", "green", "blue"];
2 | // To delete yellow and green
3 | var removed = colors.splice(2, 2); // From index 2, delete 2 elements
4 | console.log(colors); // ["red", "orange", "blue"]
5 | console.log(removed); // ["yellow", "green"]
6 |
7 | colors = ["red", "orange", "yellow", "green", "blue"];
8 | // To delete all elements starting from index 2
9 | removed = colors.splice(2); // From index 2, delete all elements
10 | console.log(colors); // ["red", "orange"]
11 | console.log(removed); // ["yellow", "green", "blue"]
12 |
13 | colors = ["red", "orange", "yellow", "green", "blue"];
14 | // This have no effect on the array
15 | removed = colors.splice(2, 0); // From index 2, delete 0 elements
16 | console.log(colors); // ["red", "orange", "yellow", "green", "blue"]
```

Example on adding elements with splice:

```
1 | var colors = ["red", "orange"];
2 | // To add yellow and black
3 | colors.splice(1, 0, "yellow", "black"); // From index 1, delete 0 elements,
   | ↪ add "yellow" and "black"
4 | console.log(colors); // ["red", "yellow", "black", "orange"]
5 |
6 |
7 | colors = ["red", "orange", "yellow"];
8 | // To add green and blue and remove orange
9 | colors.splice(2, 1, "green", "blue"); // From index 2, delete 1 element,
   | ↪ add "green" and "blue"
10 | console.log(colors); // ["red", "orange", "green", "blue"]
```

## 1.6 slice

slice takes two arguments: the start index and the end index (*not included*), and returns a new array with the elements between the start and end indexes.

*Not included* means that the last index is not included in the new array.

With slice, the original array is not affected.

```
1 | var colors = ["red", "orange", "yellow", "green", "blue"];
2 | var subColors = colors.slice(1, 3); // From index 1 to 3 (not included)
3 | console.log(subColors); // ["orange", "yellow"]
```

## 1.7 includes

includes checks if an array includes a certain element, and returns true or false.

## 2 EXERCISE

```
1 | var colors = ["red", "orange", "yellow"];
2 | console.log(colors.includes("yellow")); // true
3 | console.log(colors.includes("purple")); // false
```

You can also specify a starting index from which to start searching:

```
1 | var colors = ["red", "orange", "yellow", "green", "blue"];
2 | console.log(colors.includes("orange", 2)); // false
```

Here the color "orange" already exists in the array, but since we specified the starting index as 2, it starts searching from index 2, and "orange" is at index 1, so it returns false.

### 1.8 indexOf & lastIndexOf

indexOf returns the first index at which a given element can be found in the array, or -1 if it is not present.

```
1 | var colors = ["red", "orange", "yellow", "green", "blue"];
2 | console.log(colors.indexOf("green")); // 3
3 | console.log(colors.indexOf("purple")); // -1
```

If the array contains two similar elements, indexOf returns the index of the first one:

```
1 | var colors = ["orange", "red", "yellow", "red"];
2 | console.log(colors.indexOf("red")); // 1
```

What if you want to get the index of the last occurrence of an element? You can use lastIndexOf:

```
1 | var colors = ["orange", "red", "yellow", "red"];
2 | console.log(colors.indexOf("red")); // 1
3 | console.log(colors.lastIndexOf("red")); // 3
```

#### Other Methods

There are many other methods that you can use with arrays. You can find the full list of array methods in the [MDN Web Docs](#).

Some methods like map, filter, reduce, and forEach were introduced in ES6, and they are very useful when working with arrays. We will cover them in the next sessions.

## 2 Exercise

Try to find how many times a certain element appears in an array.

```
1 | function getOccurrences(array, searchElement) {
2 |     var indices = [];
3 |     if (array.includes(searchElement)) {
4 |         for (var i = 0; i < array.length; i++) {
5 |             if (array[i] === searchElement) {
6 |                 indices.push(i);
7 |             }
8 |         }
9 |         return indices;
10 |     } else {
```

### 3 CRUD OPERATIONS

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```
11     return 0;
12 }
13 }
14
15 var numbers = [1, 2, 3, 4, 1, 1, 1, 1];
16 console.log(getOccurrences(numbers, 1)); // [0, 4, 5, 6, 7]
```

### 3 CRUD Operations

**CRUD** stands for *C*reate, *R*ead, *U*ppdate, and *D*eleate. These are the four basic operations that can be performed on data. You can also add *S* for *S*earch.

Any software application that works with data usually performs these operations.

When working making your website always finish the design first (the HTML and CSS), then add the functionality (JavaScript).

Also when solving a problem using JS divide it into smaller tasks, and solve each task separately.

See the CRUD system example videos from video 4 to 9.