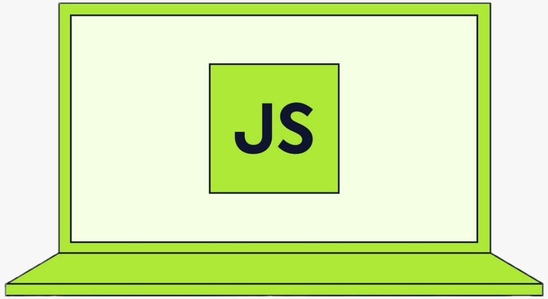
Newton School of Technology

The Complete Javascript Course



@newtonschool

Lecture 6: Array and Array Methods

-Vishal Sharma

JS

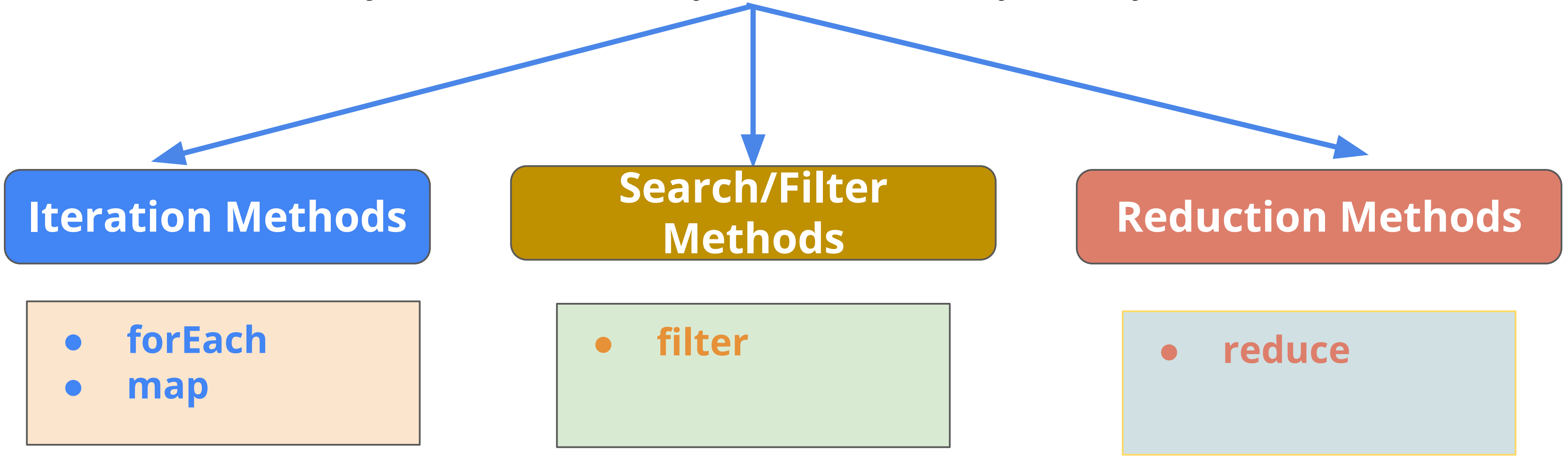
Table of Contents

Newton School of Technology

Array Traversal and Manipulation Methods

What are these methods??

We need these advanced array methods because they provide a **concise, readable, and efficient way** to work with arrays. We can broadly classify them as:-



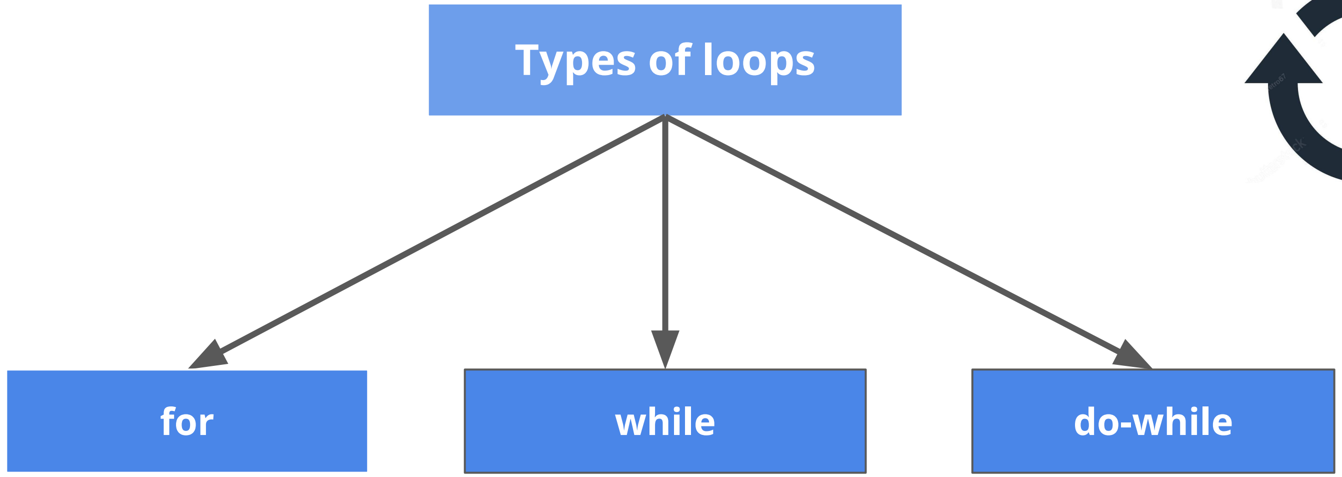
Pre-discussed: Loops in real life

Every day we follow certain routine which we repeat all over the week, like brushing your teeth, taking shower etc.

Newton School of Technology

Pre-discussed: Loops in Programming

Just like we repeat several tasks in daily like, we need some tasks to be repeated in programming and we repeat those tasks with the help of loops.



Why do we need newer methods?

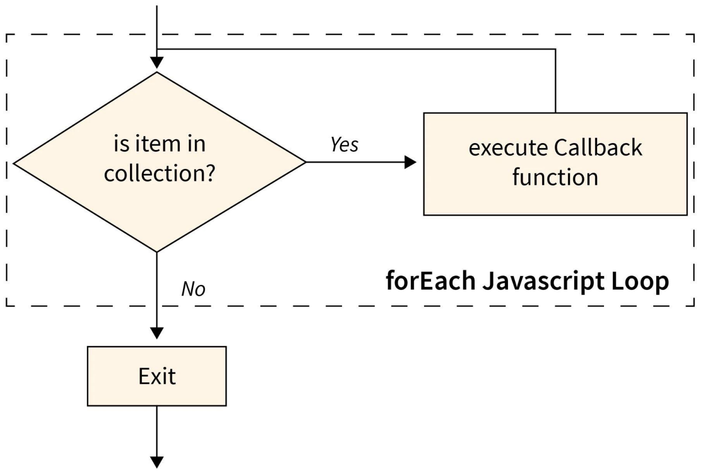
Need for newer methods

We need newer iteration methods to simplify code, enhance readability, and enable efficient operations like forEach, mapping, filtering and reducing arrays.

Let’s talk about forEach and map methods

Iteration Methods: forEach

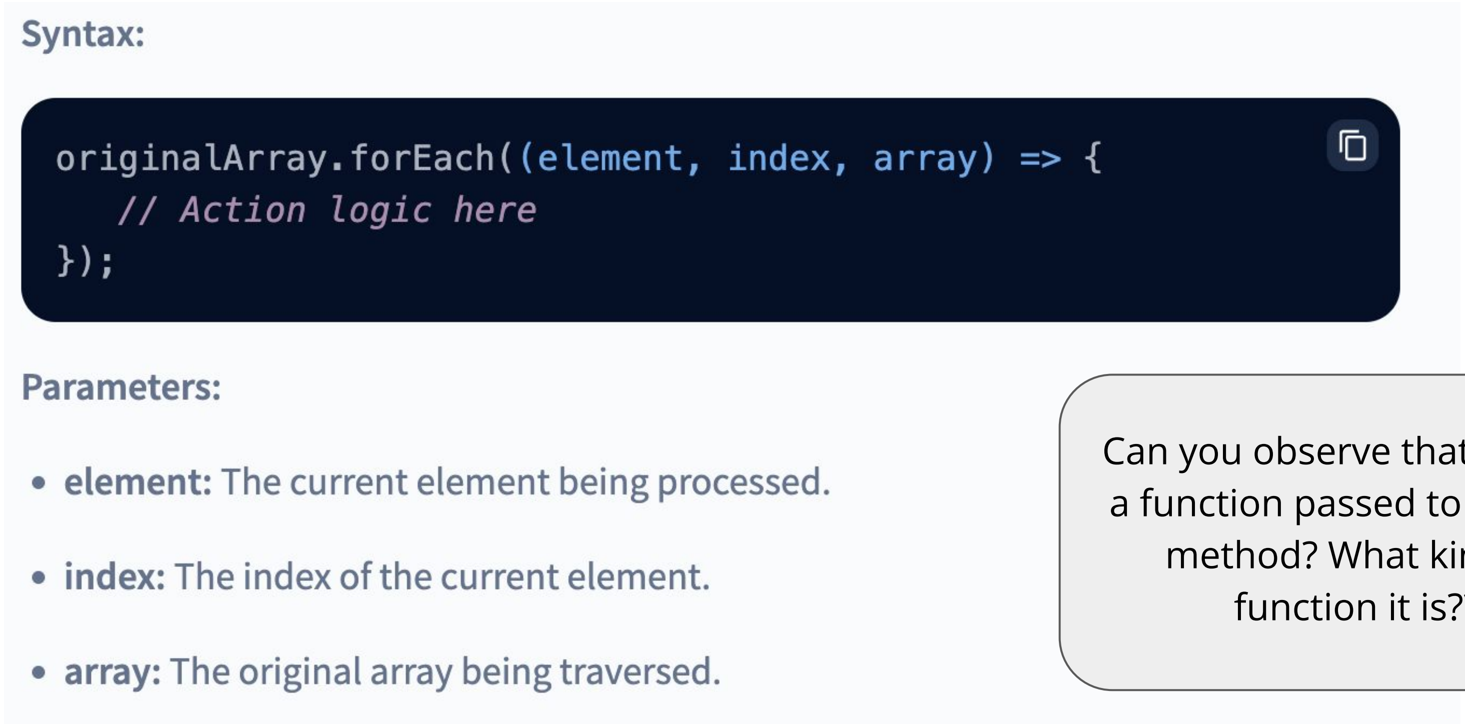
The forEach() method executes a provided function once for each array element but does not create a new array.



You need not to write test condition, neither to initialize nor to increment/decrement anything

forEach syntax

Let’s have a look at its syntax:-



Syntax:

```
originalArray.forEach((element, index, array) => {
    // Action logic here
});
```

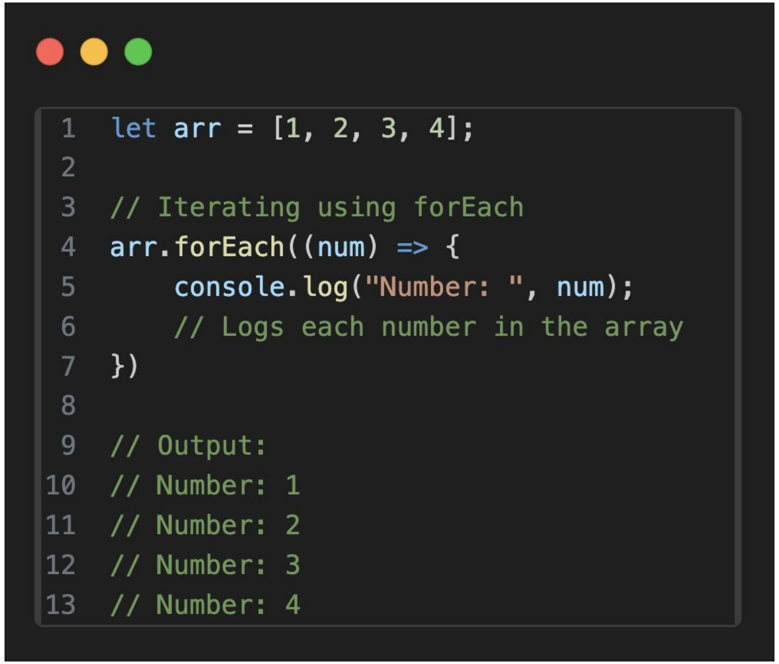
Parameters:

- **element:** The current element being processed.
- **index:** The index of the current element.
- **array:** The original array being traversed.

Can you observe that there is a function passed to forEach method? What kind of function it is??

forEach example

Let’s learn to write forEach method, here we will declare and assign an array and iterate over it using forEach method. Let’s begin:-

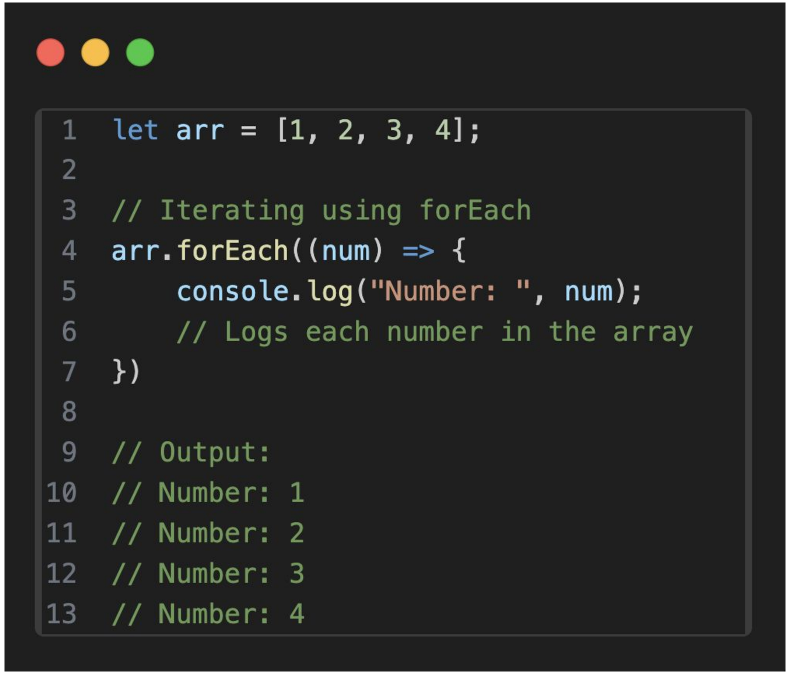


```javascript
let arr = [1, 2, 3, 4];

// Iterating using forEach
arr.forEach((num) => {
    console.log("Number: ", num);
    // Logs each number in the array
})

// Output:
// Number: 1
// Number: 2
// Number: 3
// Number: 4
```

Can you appreciate how easy it is compared to traditional javascript loops?

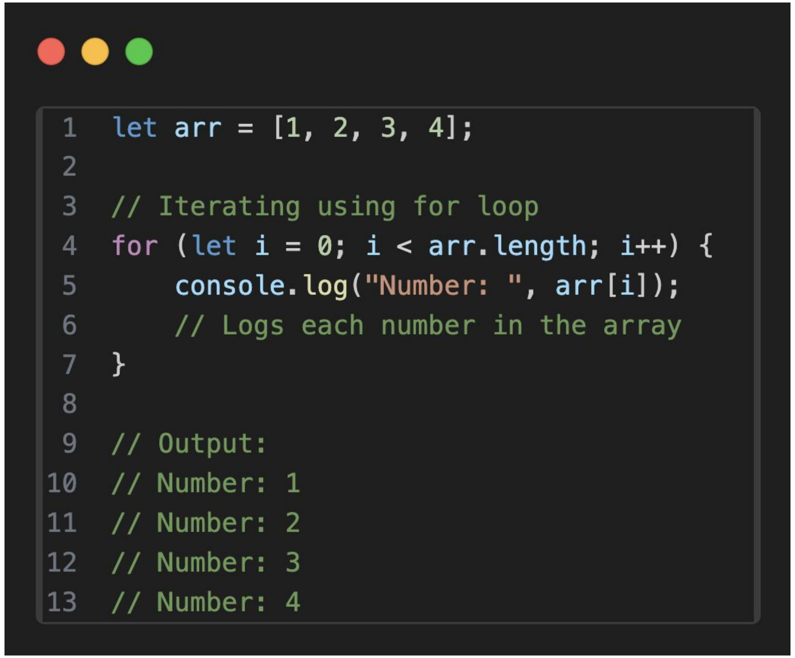
forEach comparison with for loop

Let's compare it with for loop of javascript, which one is easier to write?



```javascript
let arr = [1, 2, 3, 4];

// Iterating using forEach
arr.forEach((num) => {
    console.log("Number: ", num);
    // Logs each number in the array
})

// Output:
// Number: 1
// Number: 2
// Number: 3
// Number: 4
```

forEach



```javascript
let arr = [1, 2, 3, 4];

// Iterating using for loop
for (let i = 0; i < arr.length; i++) {
    console.log("Number: ", arr[i]);
    // Logs each number in the array
}

// Output:
// Number: 1
// Number: 2
// Number: 3
// Number: 4
```

for loop

When to use what: for and forEach

Let’s compare it with for loop of javascript, which one is easier to write??

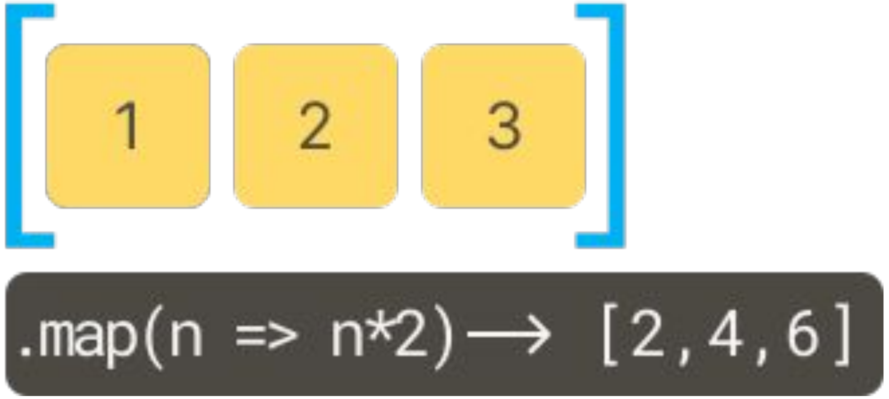
for loop	forEach
When you want greater flexibility, as you can decide start index, test condition etc.	forEach is utilized for its simplicity and readability, providing a straightforward way to iterate over array
You can conditionally break or skip code based on condition using break and continue. Hence optimize the performance	You cannot use break and continue statement and hence can’t optimize the performance.

Practice Question

Store 10 student names in an array and use a forEach loop to print their names one by one.

Iteration Methods: What is map()

map is used to iterate over an array and creates a new array with the results, while forEach simply iterates without returning anything.

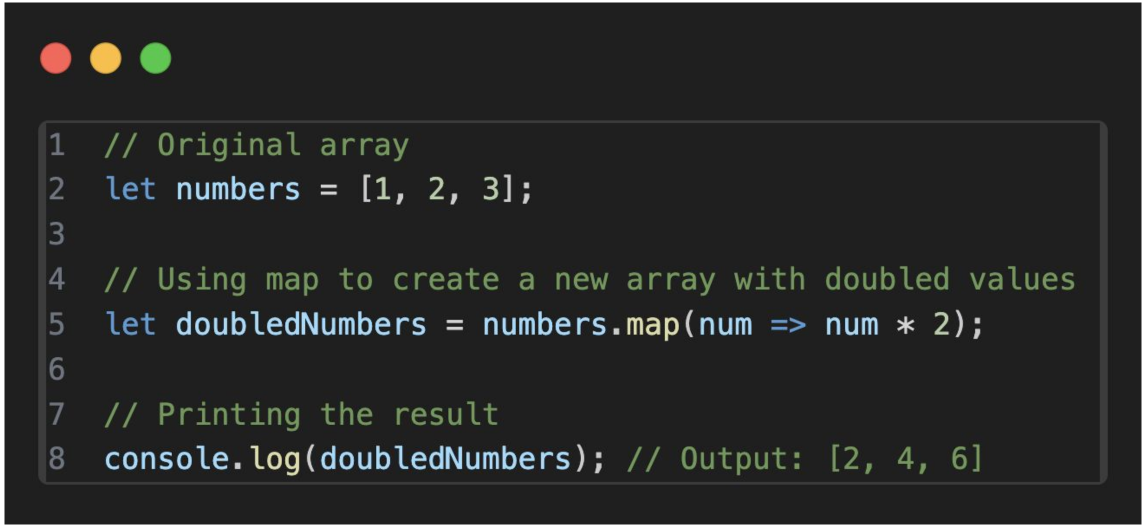


```
.map(n => n*2)⟶ [2,4,6]
```

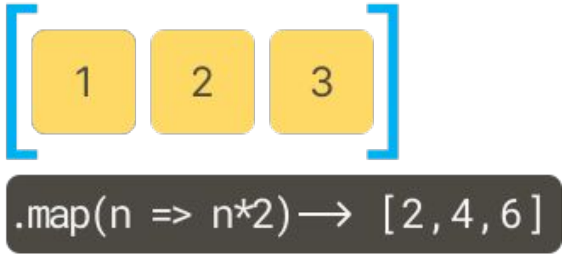
Here we are iterating over an array and returning a new array with values doubled.

map() Example 1

Let's write code for implementing it:-

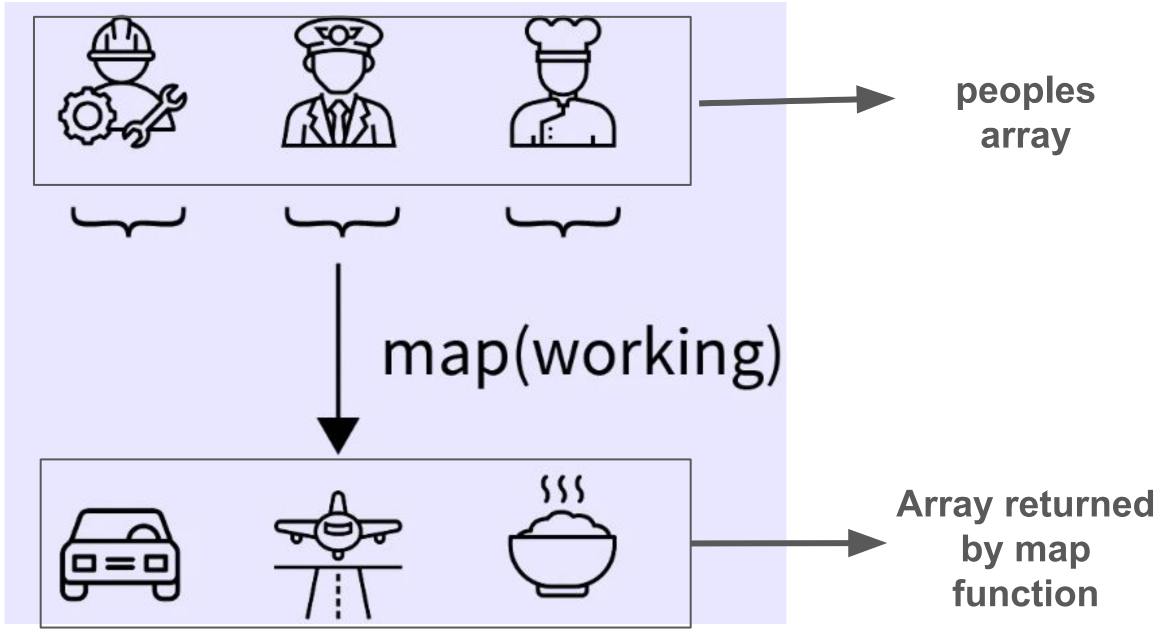


```javascript
// Original array
let numbers = [1, 2, 3];

// Using map to create a new array with doubled values
let doubledNumbers = numbers.map(num => num * 2);

// Printing the result
console.log(doubledNumbers); // Output: [2, 4, 6]
```



map() example 2

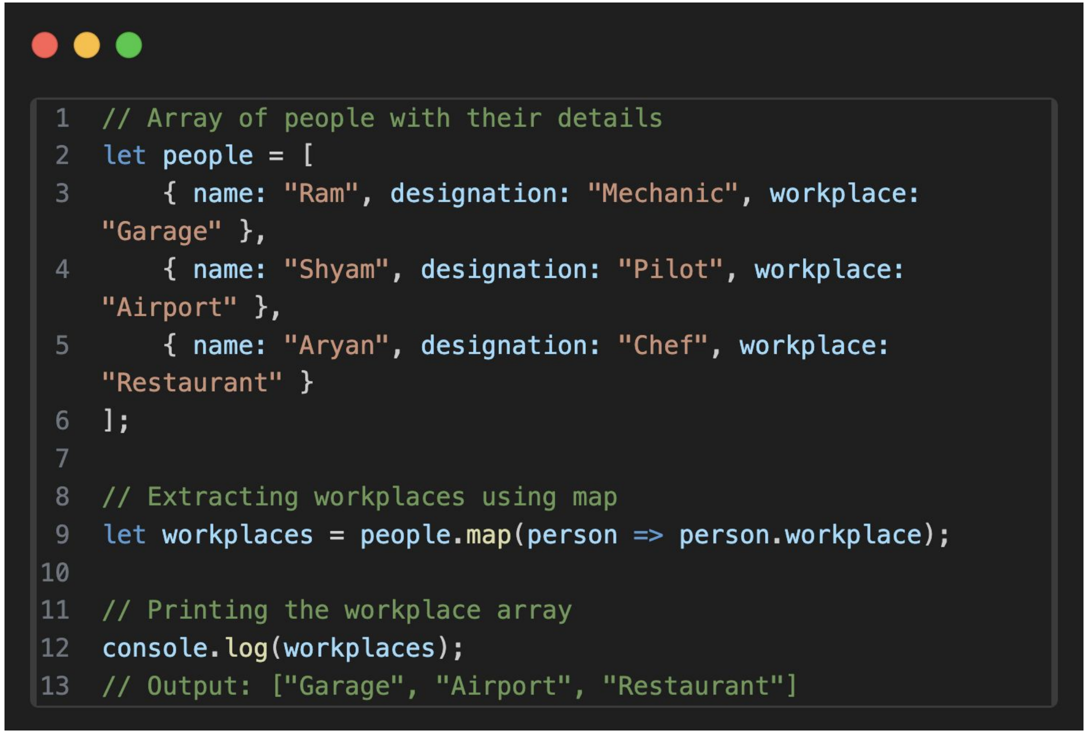
You are provided with a workers array and you need to iterate over that array and return an array listing their workplaces.



The map function iterates over the peoples array and returns an array of their workplaces.

map() example 2

Let’s write code example of illustration in previous slide:-



```javascript
// Array of people with their details
let people = [
    { name: "Ram", designation: "Mechanic", workplace:
"Garage" },
    { name: "Shyam", designation: "Pilot", workplace:
"Airport" },
    { name: "Aryan", designation: "Chef", workplace:
"Restaurant" }
];

// Extracting workplaces using map
let workplaces = people.map(person => person.workplace);

// Printing the workplace array
console.log(workplaces);
// Output: ["Garage", "Airport", "Restaurant"]
```

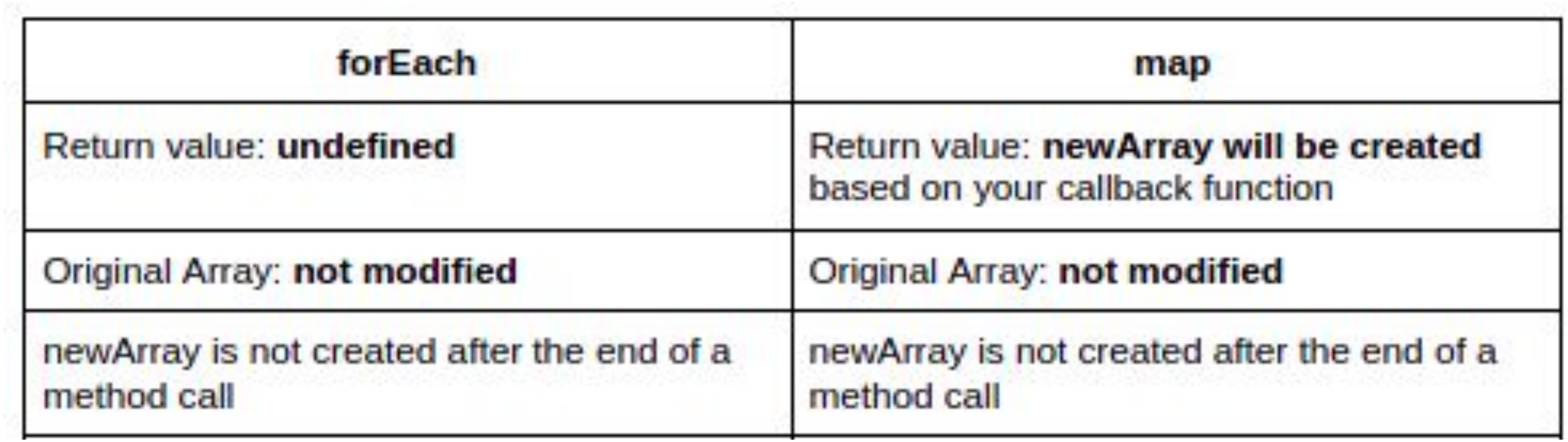
Here we have iterated over people array and returned an array which lists their workplaces and stored in a variable workplaces.

Practice Question

Use map to convert an array of strings to their uppercase versions.

Difference: forEach and map method

Let’s observe the difference between the two:-



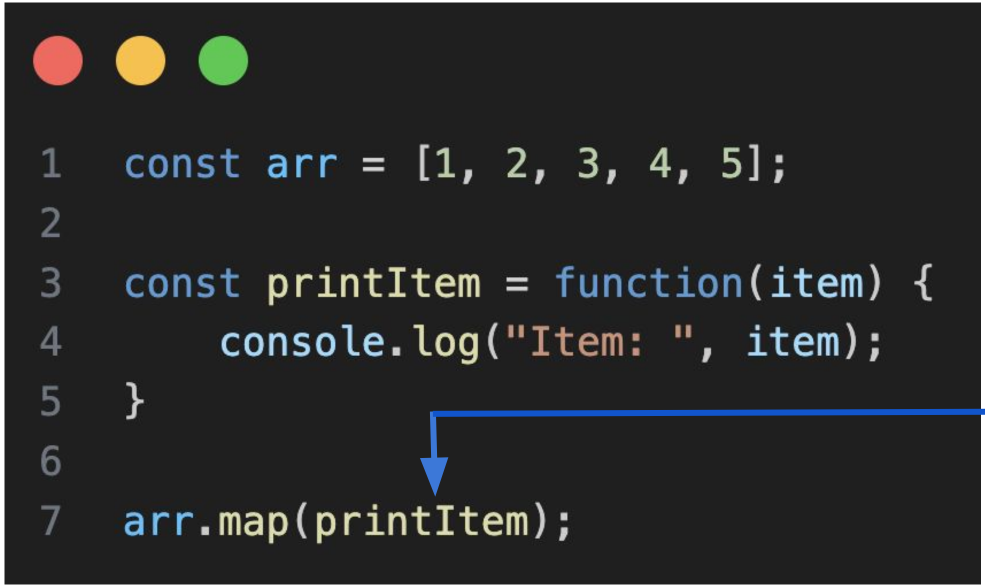
forEach	map
Return value: **undefined**	Return value: **newArray will be created** based on your callback function
Original Array: **not modified**	Original Array: **not modified**
newArray is not created after the end of a method call	newArray is not created after the end of a method call

Newton School of Technology

Higher Order functions

Higher order functions: map()

In previous illustrations we have used .forEach() and .map() method, these functions are taking a callback function as input. These type of functions are called higher order functions.

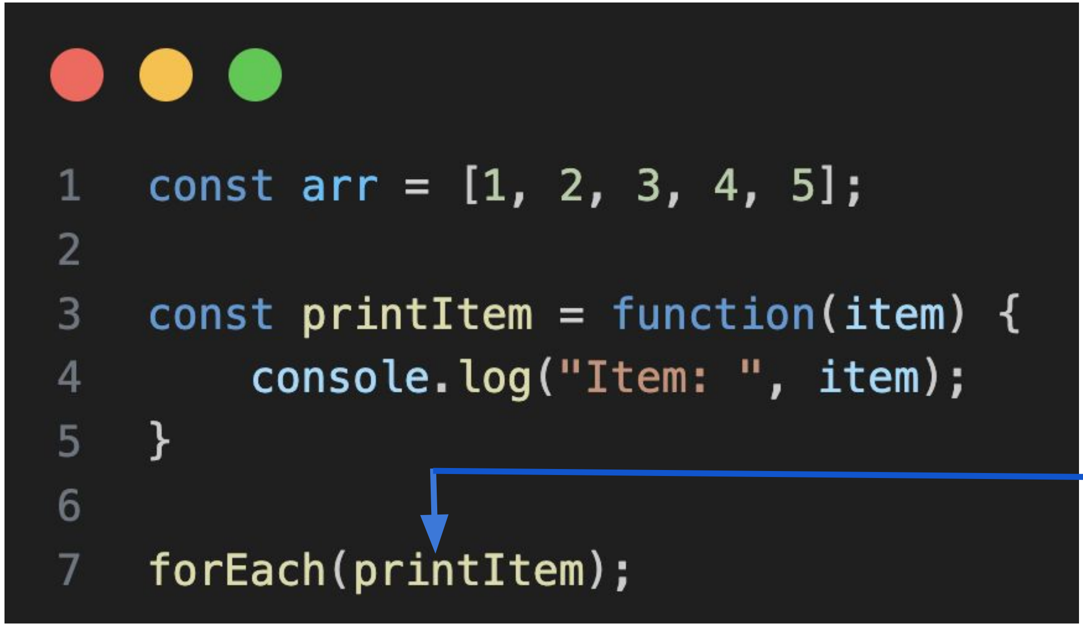


```
const arr = [1, 2, 3, 4, 5];

const printItem = function(item) {
    console.log("Item: ", item);
}

arr.map(printItem);
```

Here we passed a callback function to map which is higher order function

Higher order functions: forEach()

Similarly forEach() is also a higher order function as it receives a callback function as an argument.



```
const arr = [1, 2, 3, 4, 5];

const printItem = function(item) {
    console.log("Item: ", item);
}

forEach(printItem);
```

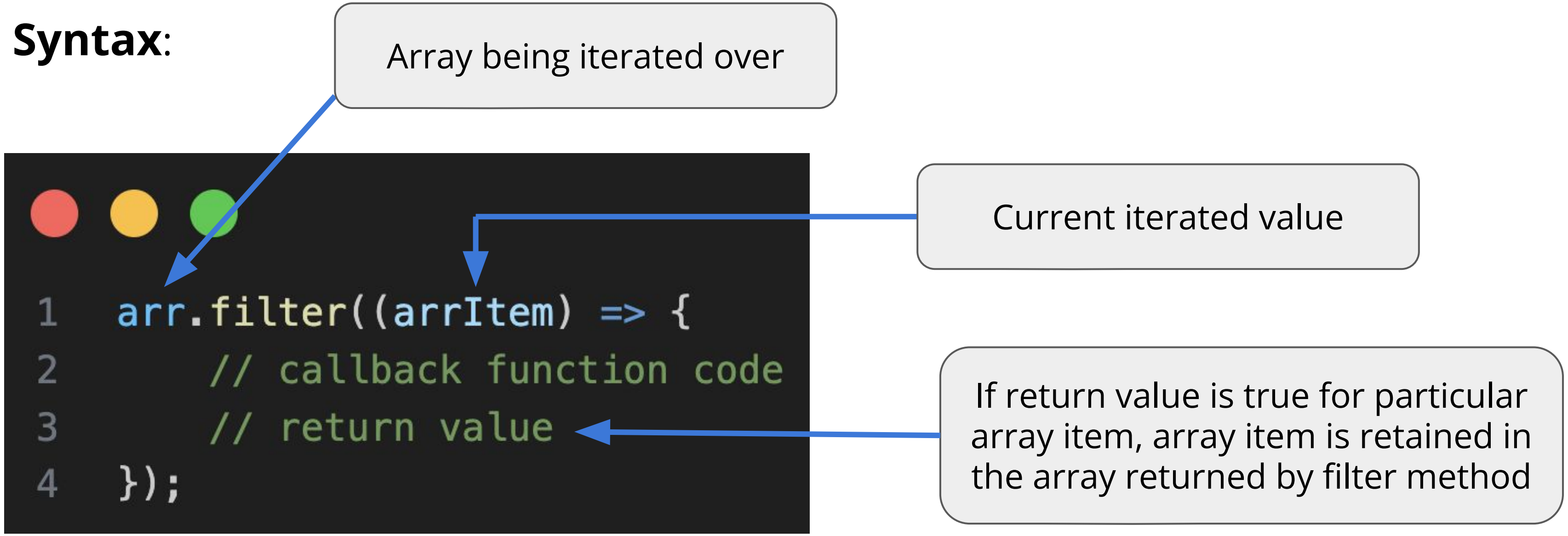
Similarly we would have a look into more higher order functions in upcoming slides.

Callback function passed to higher order function forEach()

Search/Filter Methods: filter()

The filter method returns a new array with values from the original array that satisfy the condition in the callback function.

Syntax:

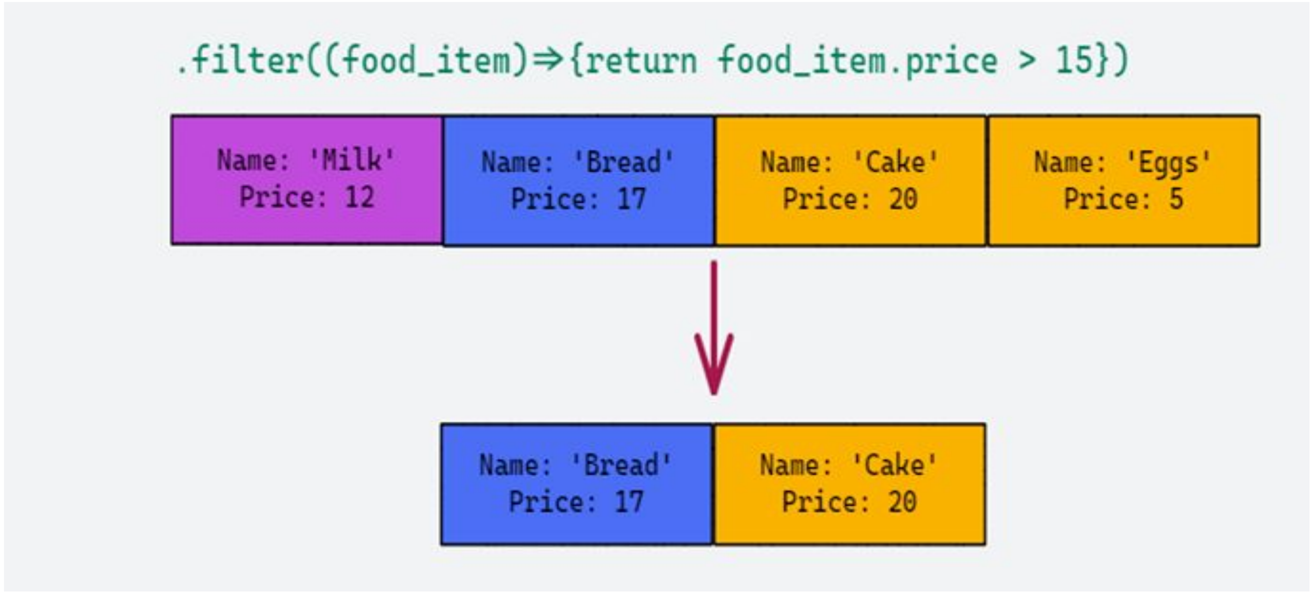


```
arr.filter((arrItem) => {
    // callback function code
    // return value
});
```

Array being iterated over
Current iterated value
If return value is true for particular array item, array item is retained in the array returned by filter method

Search/Filter Methods: filter()

Let’s say you have an array containing food items and it need to be iterated and return just items having price over 15. Here is diagrammatic representation of the solution:-

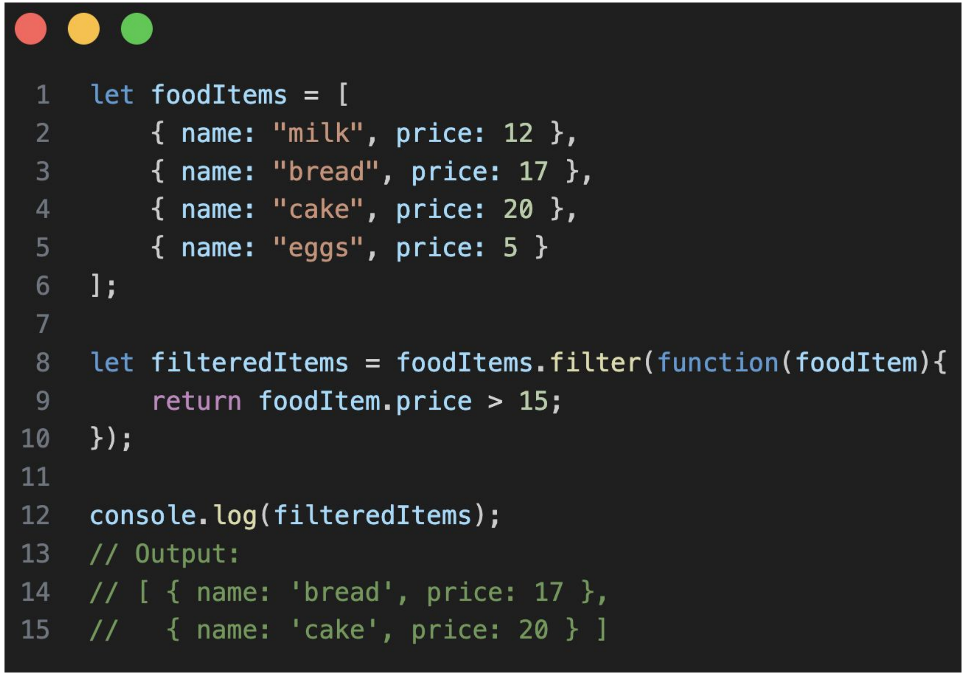


```
.filter((food_item)⇒{return food_item.price > 15})
```

Here only those items got filtered out whose price was more than 15.

filter() example

Let’s write code for example in the previous slide:-



```javascript
let foodItems = [
    { name: "milk", price: 12 },
    { name: "bread", price: 17 },
    { name: "cake", price: 20 },
    { name: "eggs", price: 5 }
];

let filteredItems = foodItems.filter(function(foodItem){
    return foodItem.price > 15;
});

console.log(filteredItems);
// Output:
// [ { name: 'bread', price: 17 },
//   { name: 'cake', price: 20 } ]
```

Here bread and cake is filtered out.

Practice Question

Write a function using a filter to return all elements in an array greater than a given value.

Reduction Methods: What is reduce()

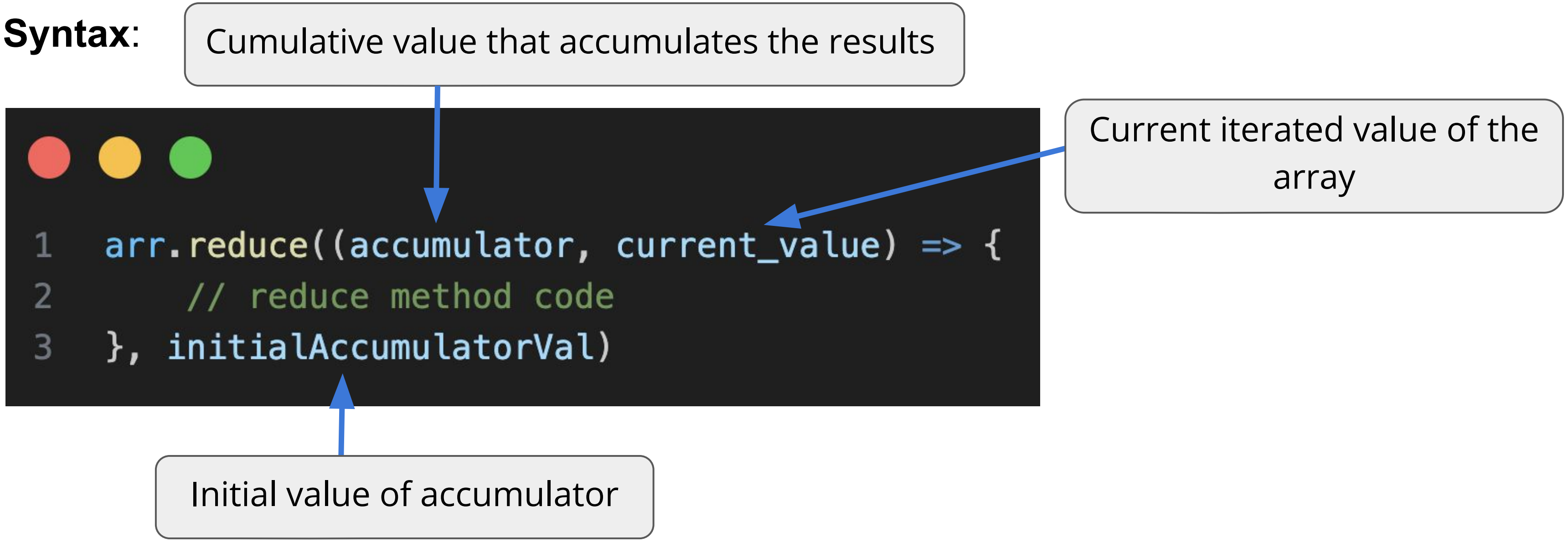
The reduce method transforms an array into a single value by applying a function to each element, using an accumulator to store the result. After processing all elements, it returns the final value.

Just like mixing ingredients to make a dish, the reduce method combines values to produce a single result.

reduce(): syntax

The `reduce` method iterates through an array and applies a callback function to accumulate all elements into a single value, such as a sum, product, array, or object.

Syntax:

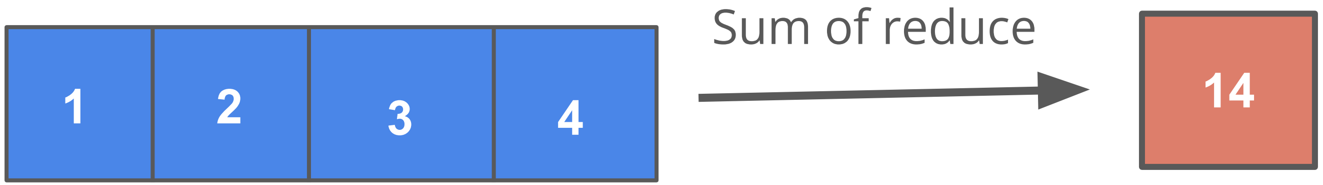


```
arr.reduce((accumulator, current_value) => {
     // reduce method code
}, initialAccumulatorVal)
```

Cumulative value that accumulates the results
Current iterated value of the array
Initial value of accumulator

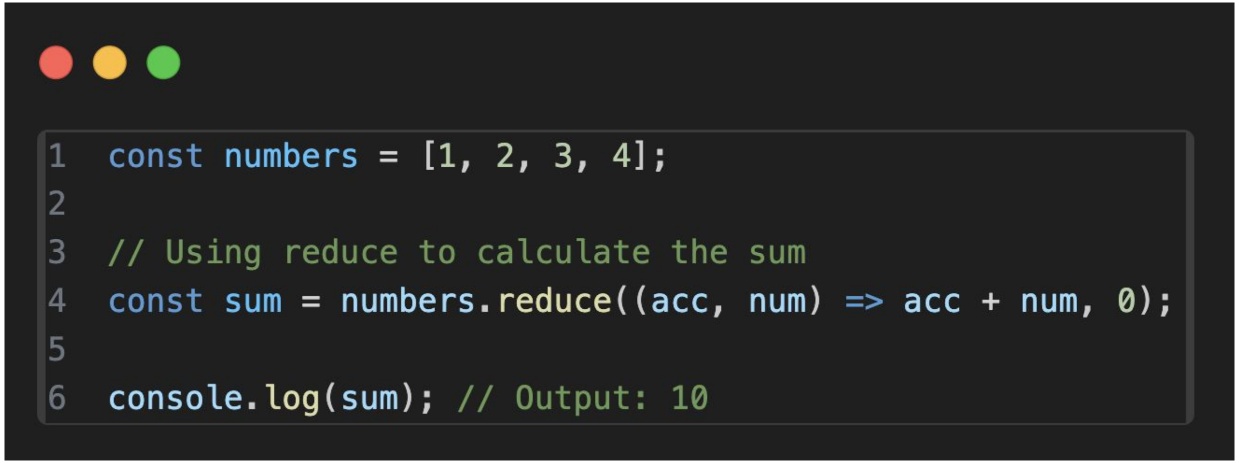
reduce() example 1

Here we were provided with an array, we can use reduce() method to calculate the sum and return the value 14.



reduce() example 1

Let's implement that example:-



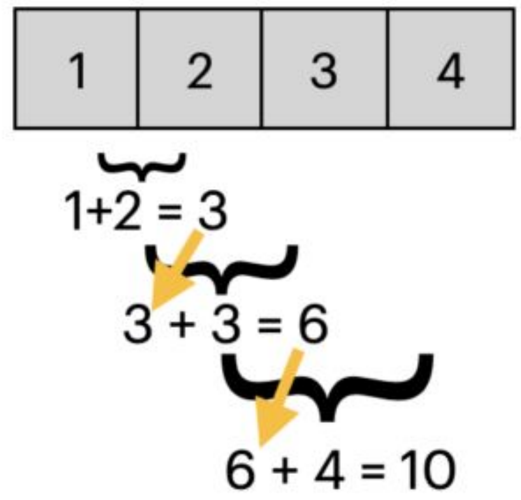
```
const numbers = [1, 2, 3, 4];

// Using reduce to calculate the sum
const sum = numbers.reduce((acc, num) => acc + num, 0);

console.log(sum); // Output: 10
```

reducer function accepts these arguments:-

1. Accumulator(acc): cumulative value that accumulates the results
2. Current Value(num): current value being processed

reduce() example 1

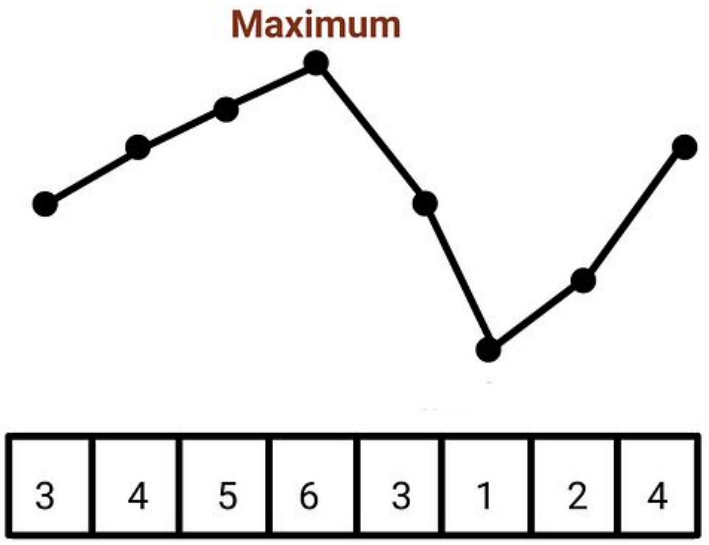
The reduce method iterates over the array, adding each value to an accumulator, starting from 0, and returns the final sum after processing all elements. In this case, the sum of [1, 2, 3, 4] is 10.



The accumulator starts at zero, adding values at each step, and the final sum is calculated at the end.

reduce() example 2

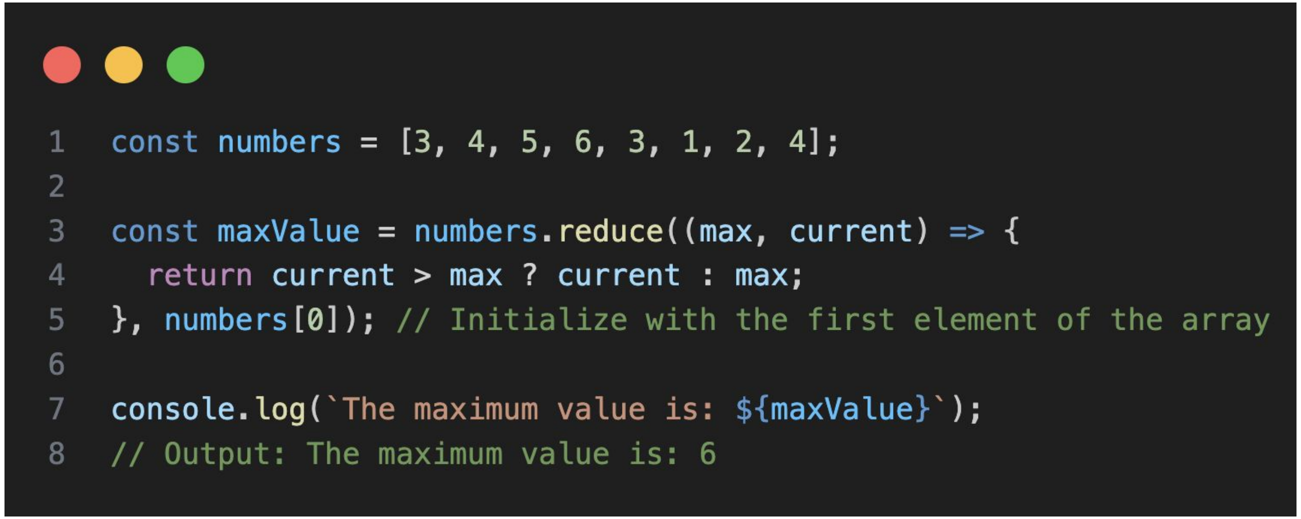
Here given an array find out maximum value by scanning the array using reduce method.



You might be tempted to use forEach or map method. Wait...wait... there is even better way i.e. reduce()

reduce() example 2

Let's write the javascript code using reduce().

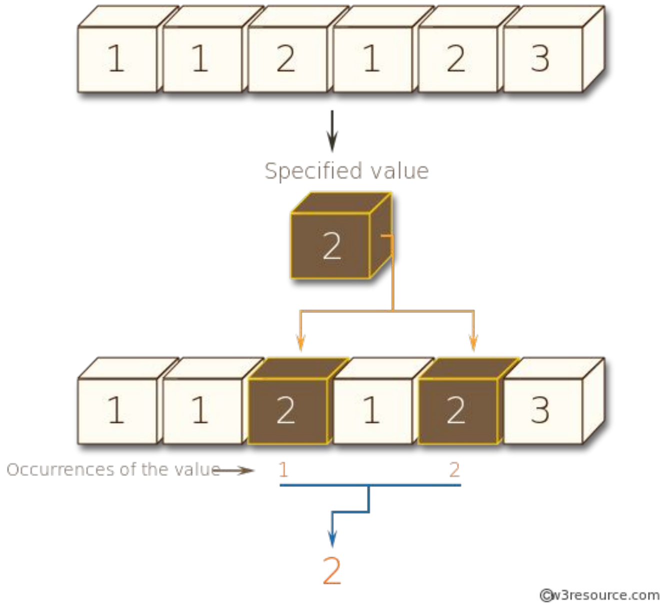


```javascript
const numbers = [3, 4, 5, 6, 3, 1, 2, 4];

const maxValue = numbers.reduce((max, current) => {
  return current > max ? current : max;
}, numbers[0]); // Initialize with the first element of the array

console.log(`The maximum value is: ${maxValue}`);
// Output: The maximum value is: 6
```

Observe how crisp and clear the code is with reduce().

reduce() example 3

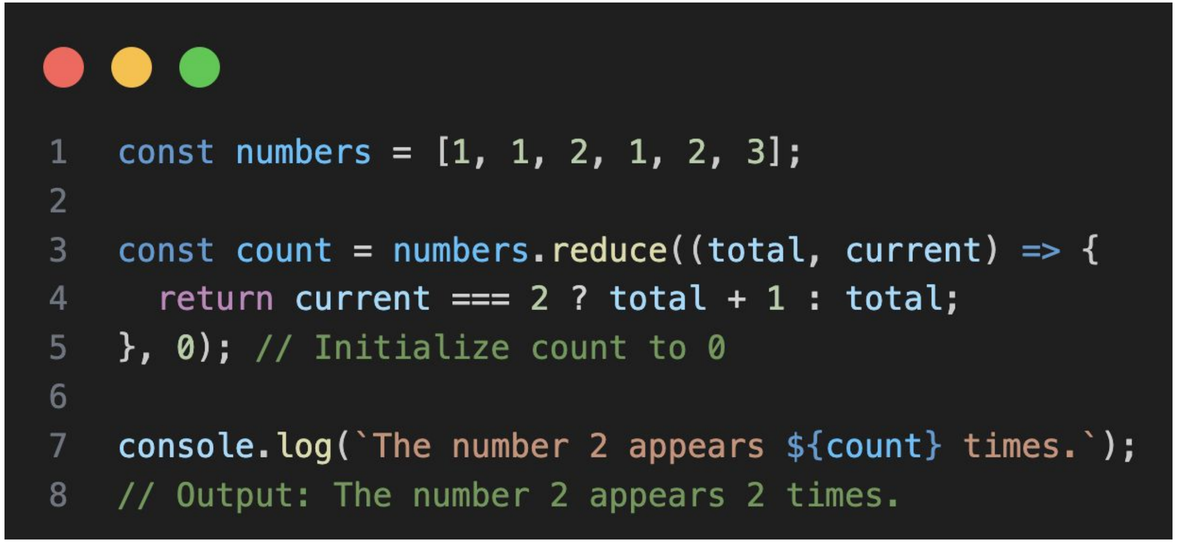
Provided an array of integers find out how many times integer value 2 got repeated using reduce method.



Do this one by yourself..

reduce() example 3

Let’s have a look at the solution:-



```javascript
const numbers = [1, 1, 2, 1, 2, 3];

const count = numbers.reduce((total, current) => {
  return current === 2 ? total + 1 : total;
}, 0); // Initialize count to 0

console.log(`The number 2 appears ${count} times.`);
// Output: The number 2 appears 2 times.
```

Were you able to do it by yourself??

Practice Question

Find the first string in the array having more than 5 characters.

In Class Questions

Newton School of Technology

Thanks for watching!