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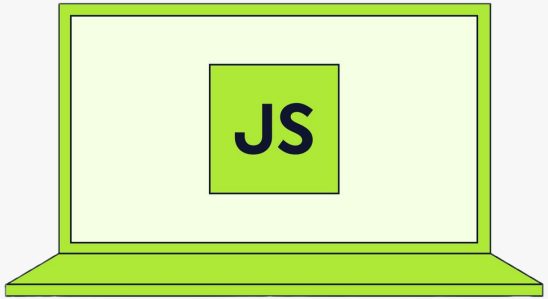
The Complete Javascript Course



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Lecture 5: Introduction to Arrays

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JS

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Arrays

Planning a party

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Imagine you are organizing a party, for that you need to purchase lot of items.

You will need, cake, music player, food and decorative items. So you might want to make a list out of it!!

Planning a party: making lists

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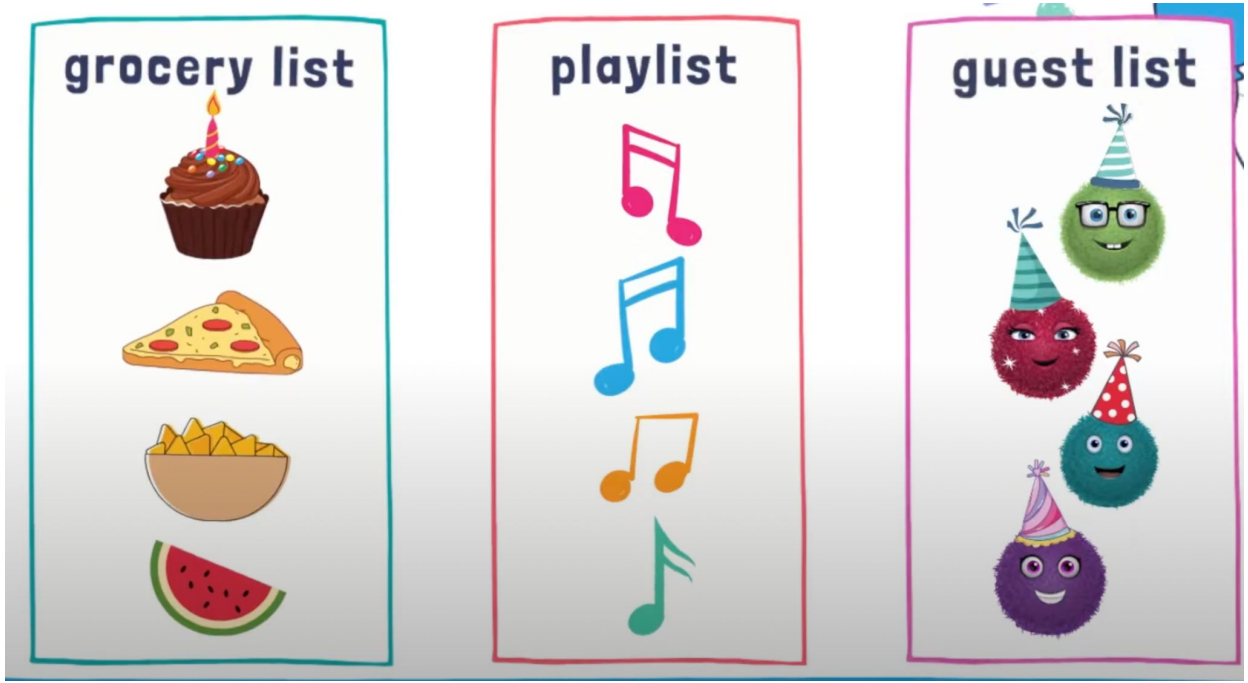
Let’s make lists, separate list for separate group of items:-



Lists help us to keep our tasks organized!!!

Planning a party: making lists

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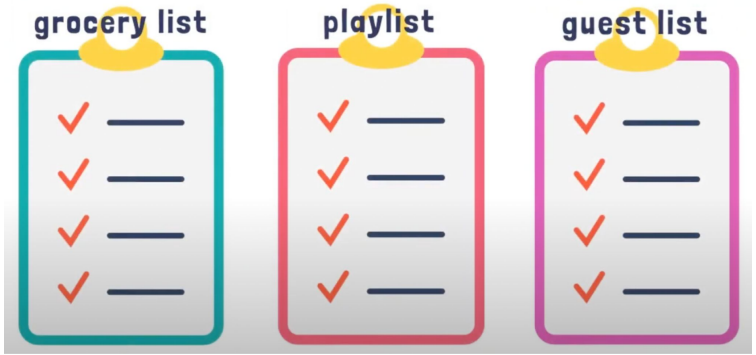
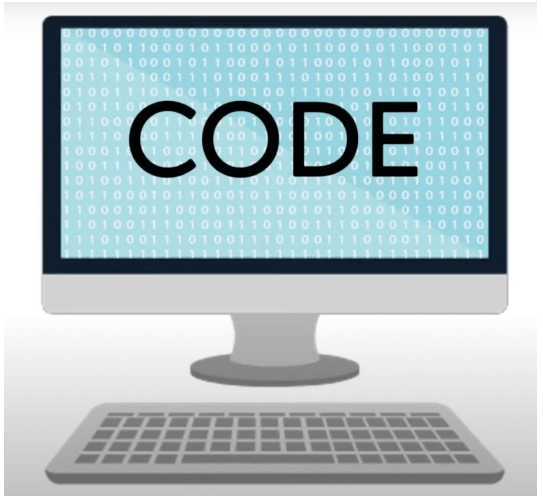
Just like lists help you keep your tasks organized. Lists are very helpful in programming too:-





Array: Lists in javascript

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Lists in javascript are called “Array”.

Definition: An array in JavaScript is a special object used to store multiple values in a single variable.

Why do we need array?

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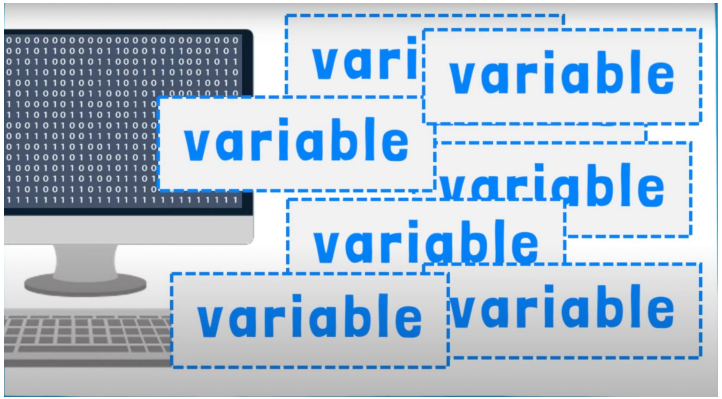
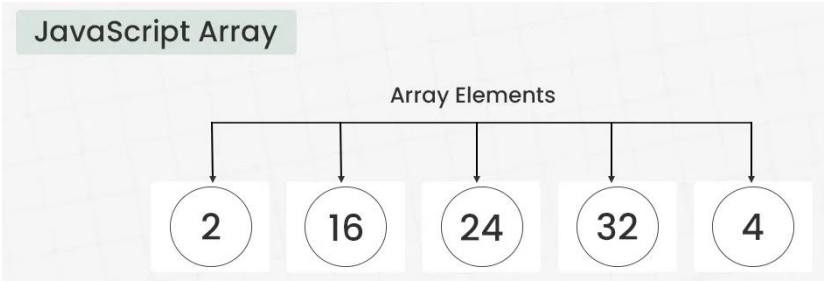
Variables store data, but managing many of them is hard. Arrays simplify this by organizing multiple values in one place.





Array: Definition and Syntax

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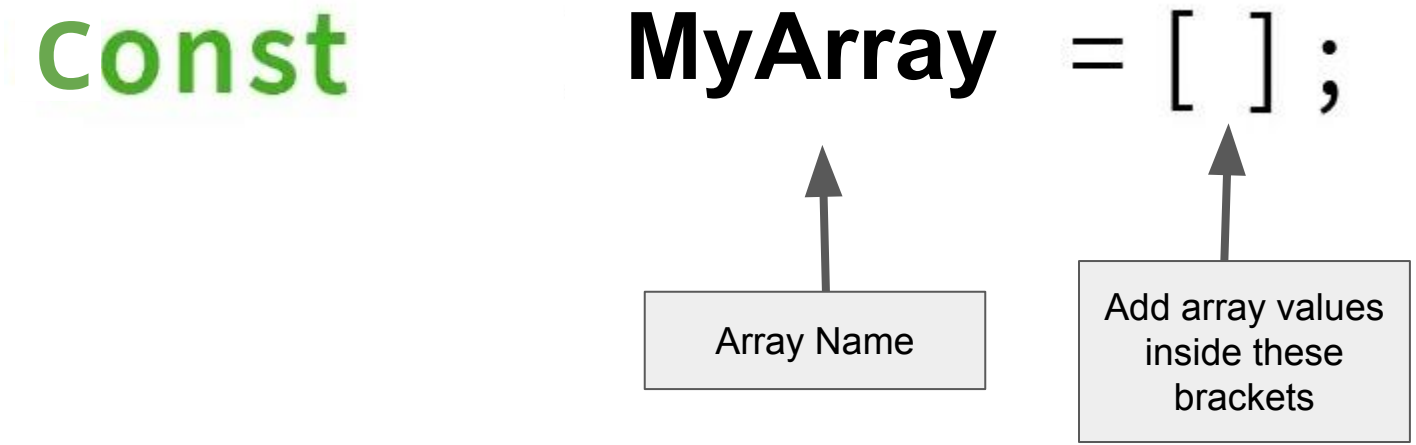
An array in JavaScript is a special object used to store multiple values in a single variable.



Array: Storing values in arrays

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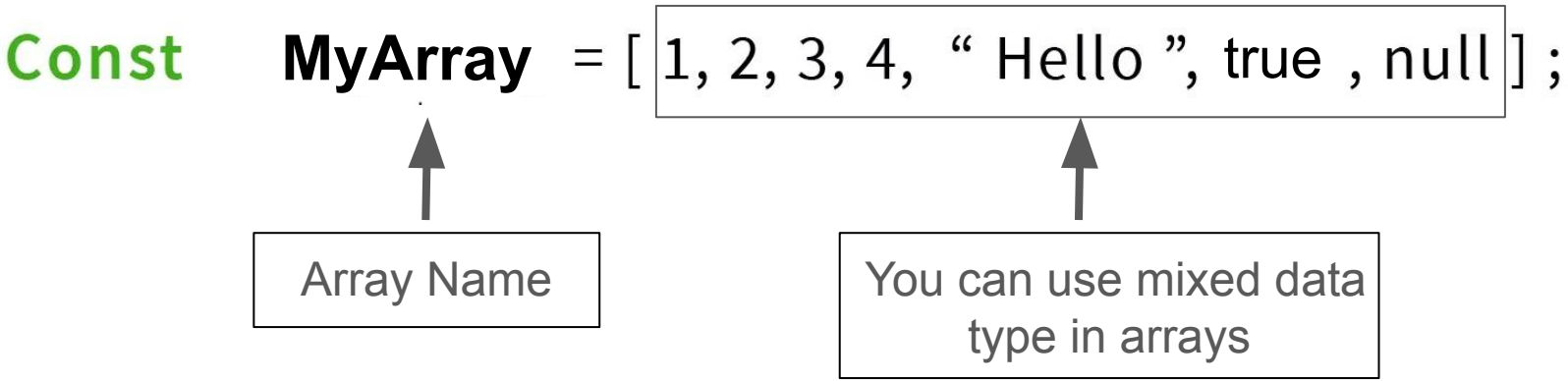
We can declare array as well as store values at the same time.



Array: Accessing the array values

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We can access values stored in array by using indexes.

```
1  // Declaring and assigning array
2  const MyArray = [1, 2, 3, 4, "Hello", true , null];
3
4  // Printing array values
5  console.log(MyArray);
6  // Output: [1, 2, 3, 4, "Hello", true , null];
7  console.log(MyArray[0]); // Output: 1
8  console.log(MyArray[1]); // Output: 2
9  console.log(MyArray[4]); // Output: Hello
10 console.log(MyArray[5]); // Output: True
```

If we just type *MyArray* in console, entire array would get printed

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Array Manipulation

Array manipulation

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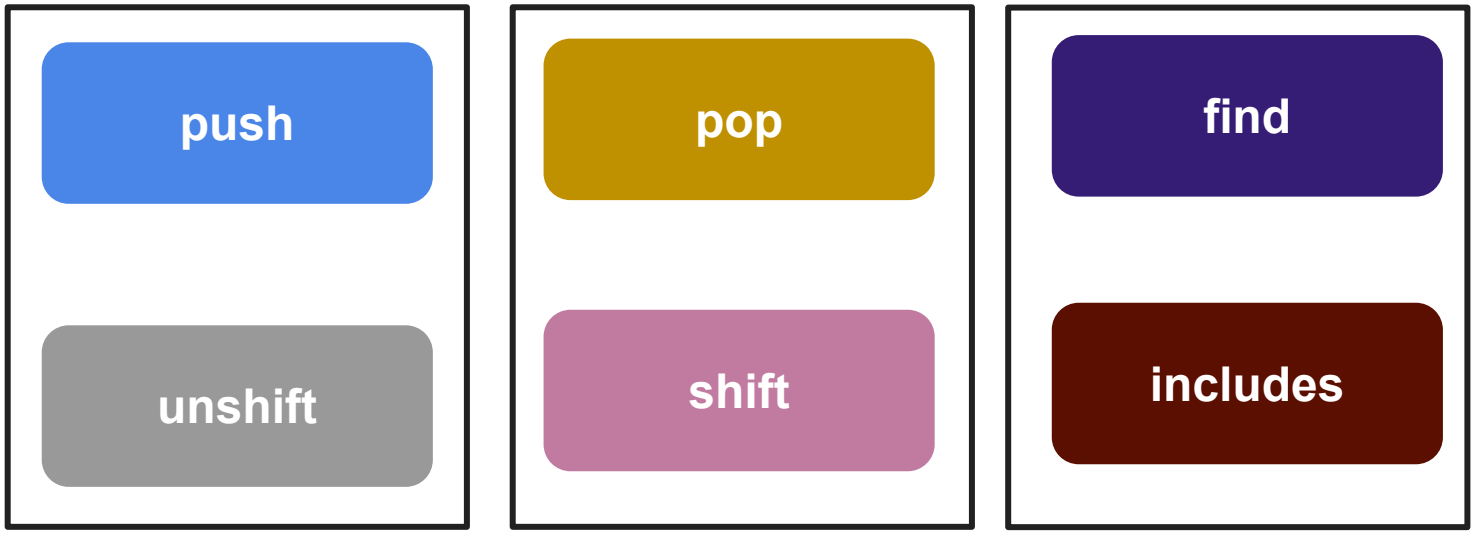
Often, we need to manipulate arrays by adding, removing, updating, or extracting elements. Array methods make this process easy and efficient.

We achieve it using array methods.

Common Javascript Methods

Here are some commonly used array methods:



Add Items: push

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Adds one or more items to the **end** of the array. Initially there was 10, however we could have started with empty array

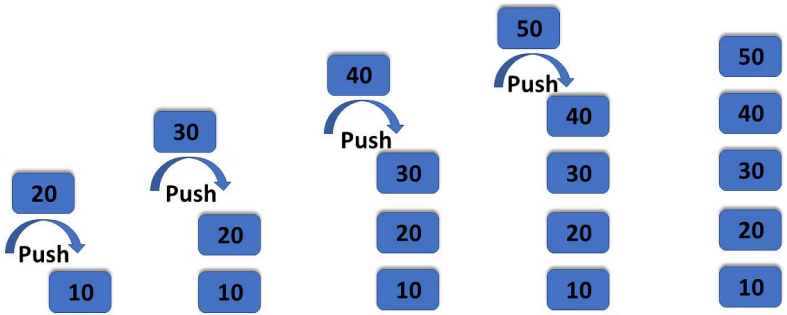
```
// Declaring an empty array
let numbers = [10];

// Adding items one by one
numbers.push(20);  // [20]
numbers.push(30);  // [20, 30]
numbers.push(40);  // [20, 30, 40]
numbers.push(50);  // [20, 30, 40, 50]

console.log(numbers); // [20, 30, 40, 50]

// Adding two items at once
numbers.push(60, 70);

console.log(numbers); // [20, 30, 40, 50, 60, 70]
```



Add Items: unshift

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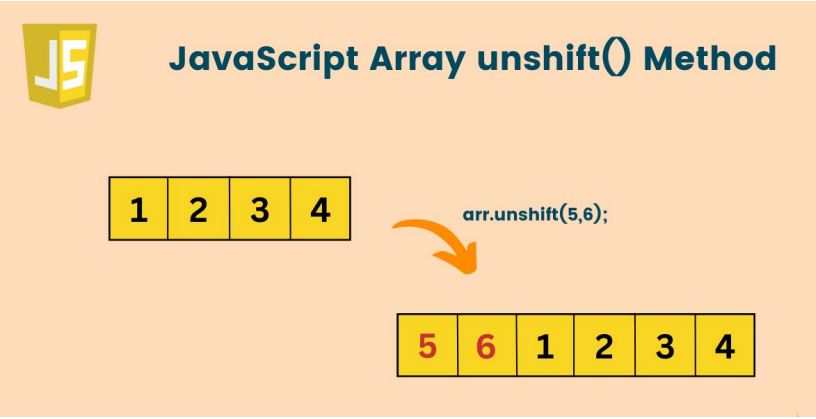
Instead of adding items at the end of the array we can add items to the **beginning** of the array.




```
// Declaring an empty array
let numbers = [];

// Adding items to the start of the array
numbers.unshift(1);  // [1]
numbers.unshift(2);  // [2, 1]
numbers.unshift(3);  // [3, 2, 1]
numbers.unshift(4);  // [4, 3, 2, 1]
numbers.unshift(5);  // [5, 4, 3, 2, 1]

console.log(numbers); // [5, 4, 3, 2, 1]
```

Difference: push and unshift

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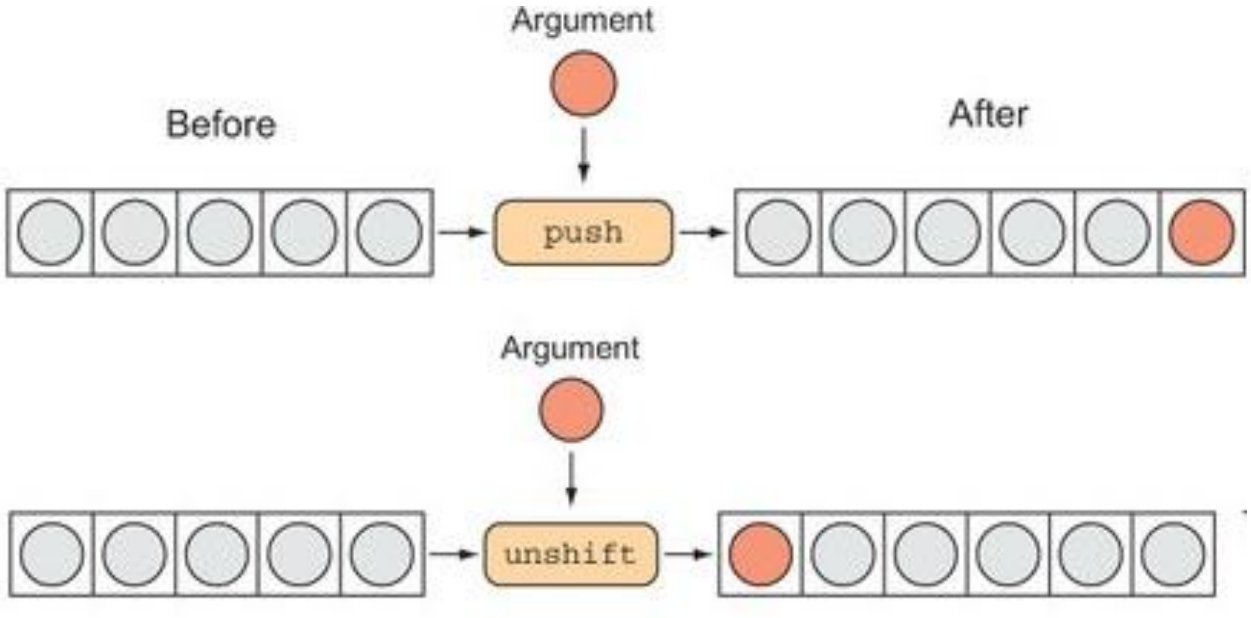
Let’s understand the difference between them two:-



Remove Items: pop

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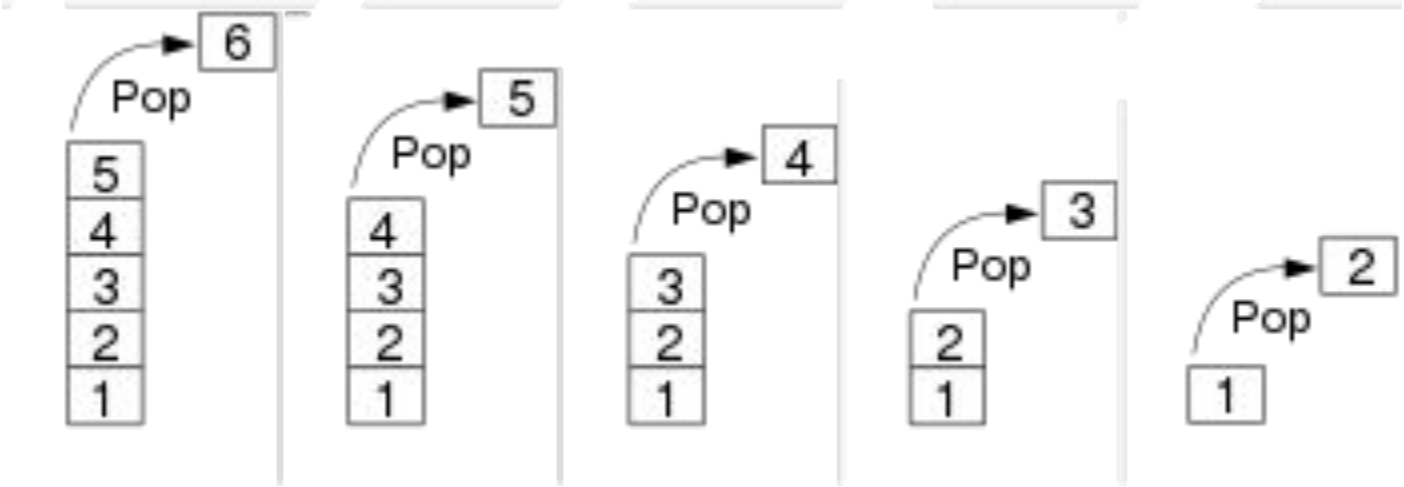
Removes the **last** item from an array.



Remove Items: pop

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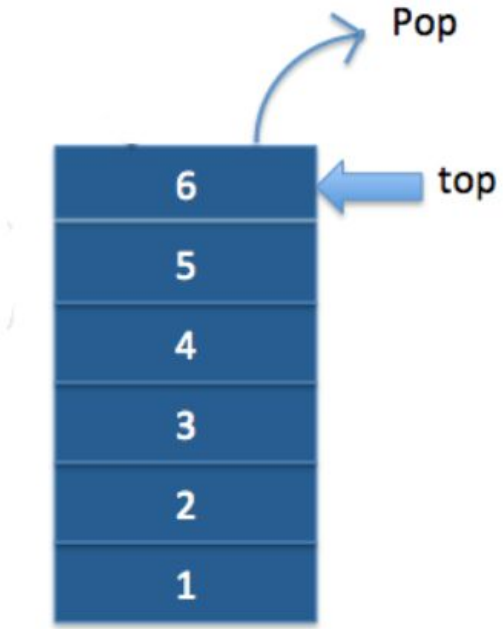
Let’s write javascript code for it:-

```
// Initial array with 5 items
let numbers = [1, 2, 3, 4, 5];

// Using pop to remove all items
numbers.pop();  // [1, 2, 3, 4]
numbers.pop();  // [1, 2, 3]
numbers.pop();  // [1, 2]
numbers.pop();  // [1]
numbers.pop();  // []

console.log(numbers); // []
```



Remove Items: shift

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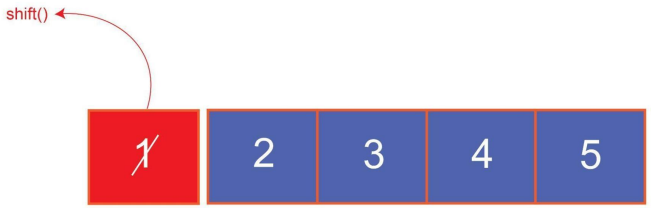
Removes the **first** item from an array.




```
// Initial array with 5 items
let numbers = [1, 2, 3, 4, 5];

// Using shift to remove items
numbers.shift();  // [2, 3, 4, 5]
numbers.shift();  // [3, 4, 5]
numbers.shift();  // [4, 5]
numbers.shift();  // [5]
numbers.shift();  // []

console.log(numbers); // []
```

Difference: pop and shift

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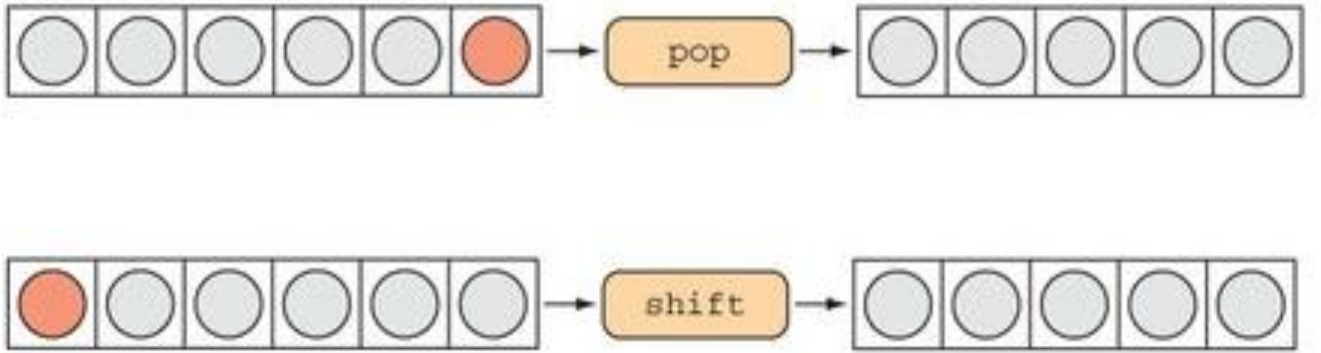
Let’s understand the difference between these two:-



Let’s quickly recap what we learned

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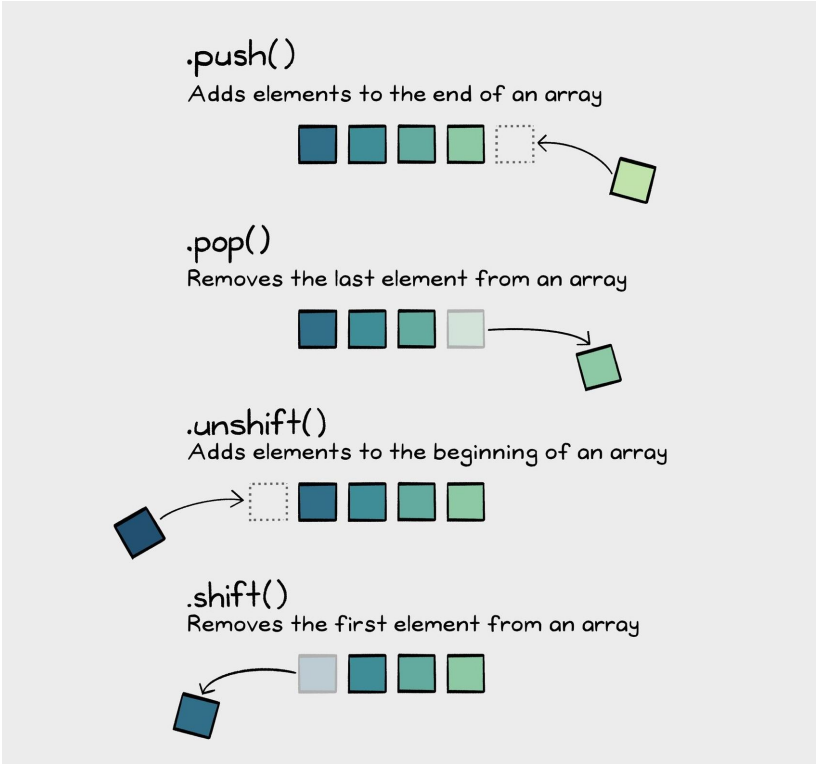
Here’s a quick recap of the array methods we've covered:



Search Methods: find()

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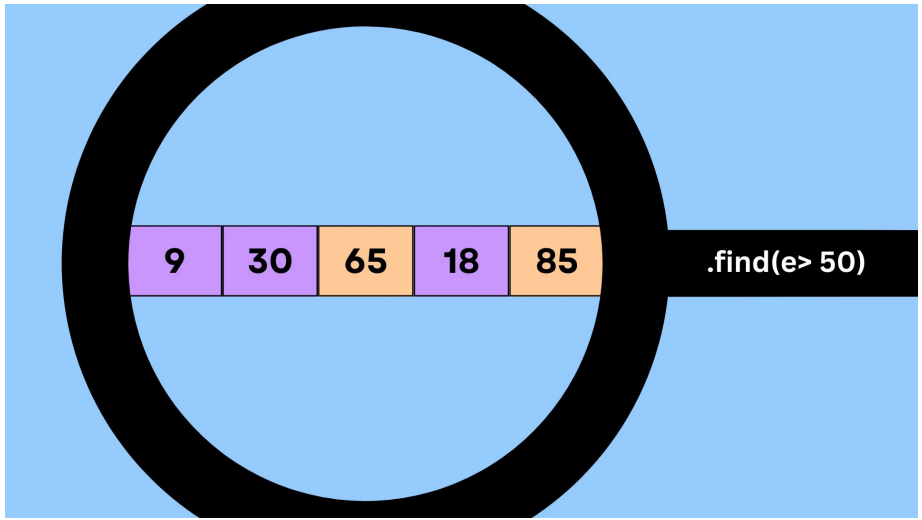
The find method helps you search through an array and find the **first** item that matches a specific condition. Once it finds the item, it stops searching and returns that item.



Since only two values i.e. 65 and 85 is greater than 50, but since 65 is the first occurrence, 65 gets returned.

find(): Syntax

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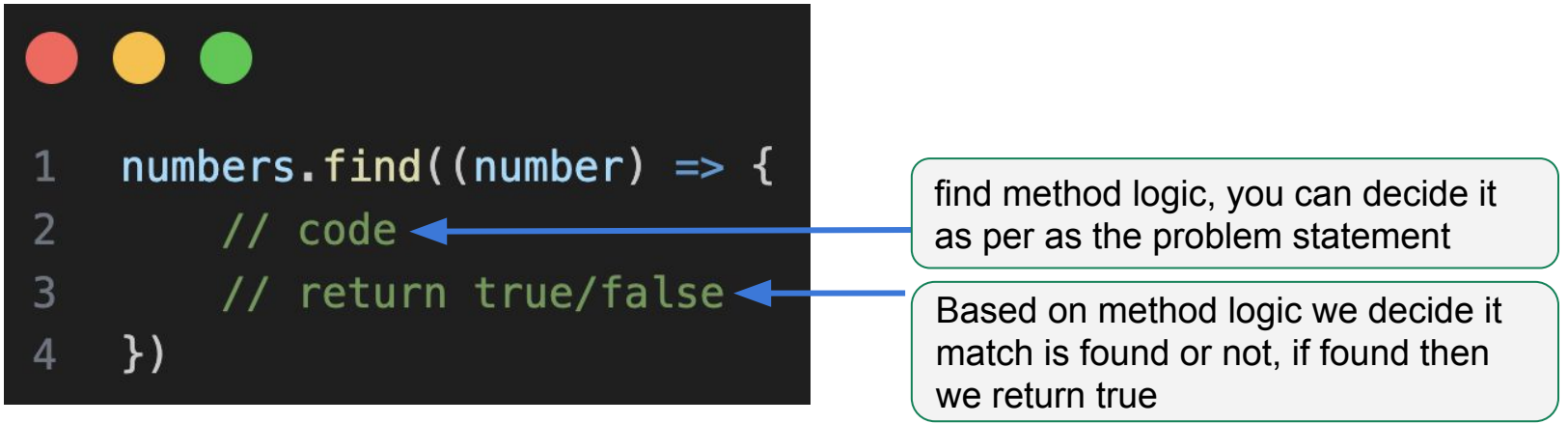
Let’s have a look at the syntax of find method.

Syntax:



find() example 1

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You are given an array of integers and your task is to find the first occurrence of a number which is more than 10. Let's use find() method for this purpose:-

```
// Define the array of numbers
const numbers = [5, 8, 12, 3, 7];

// `find` method to get the first number greater than 10
const greaterThanTen = numbers.find(num => {
  // Check if the current number is greater than 10
  const greater = num > 10;
  return greater;
});

// Log the result to the console
console.log(greaterThanTen); // Output: 12
```

Since 12 is the first number which is more than 10, output is 12.

find() example 2

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Given an array having data of different people find out the person with exact age of 30 yrs. Let's use an arrow function to shorten the code this time:-

```
// Array of objects with name and age
let people = [
    { name: "John", age: 25 },
    { name: "Alice", age: 30 },
    { name: "Bob", age: 22 }
];

// find the first person who is 30 years old
let person = people.find(p => p.age === 30);

// Printing the result
console.log(person);
// Output: { name: "Alice", age: 30 }
```

We searched the array and printed the information of the person whose age is exactly 30.

Search Methods: includes()

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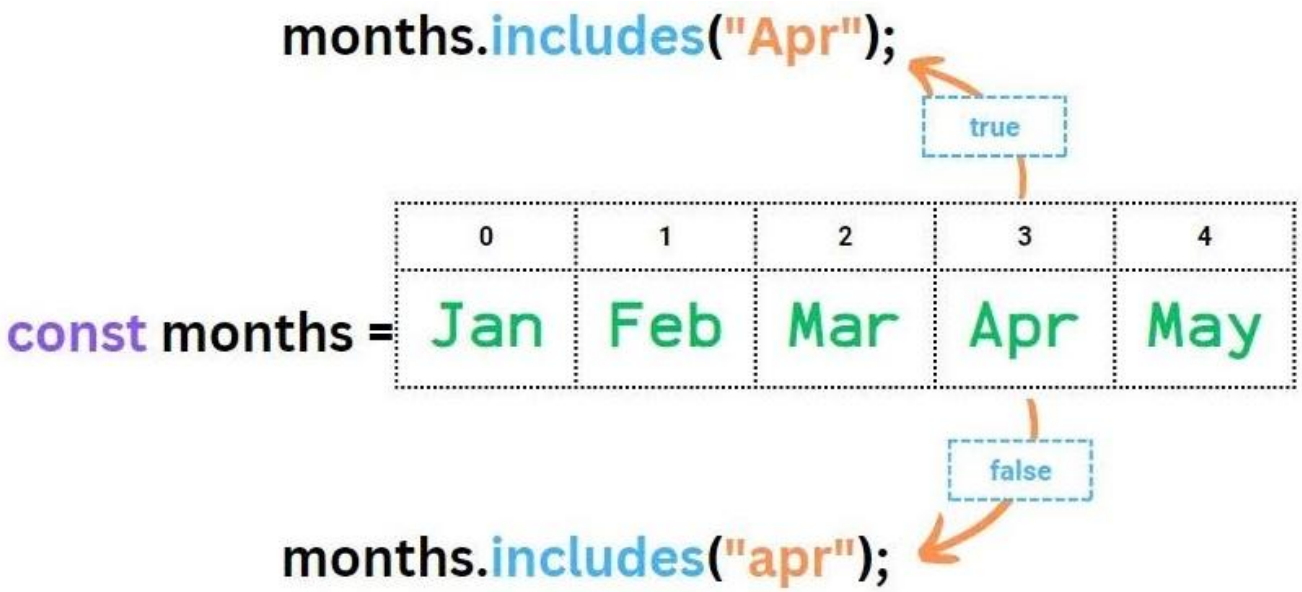
The includes method checks if a certain value exists in an array. It returns true if the value is found, and false if it's not.



includes() example

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Given an array of months, check if particular month is present in the array or not.

```
1  const months = ["Jan", "Feb", "Mar", "Apr", "May"];
2
3  // Check if the array includes "Apr" and "apr"
4  let includesApr = months.includes("Apr");
5  let includesAprLower = months.includes("apr");
6
7  console.log(includesApr); // Output: true
8  console.log(includesAprLower); // Output: false
```

We haven't stored April in lowercase, i.e., "apr", so we got false in the second instance.

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Copying the array and modifying it directly

Copying the Array: slice() method

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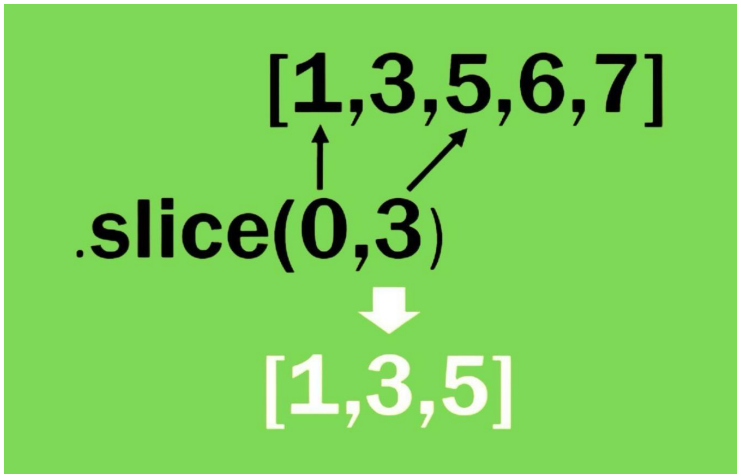
As the name suggests, the slice method cuts out a section of an array and returns a new array containing that section, without modifying the original array.



slice(): Example

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Let's take an initial array [1, 3, 5, 6, 7], and use the slice(0, 3) method to get a portion of it.

```
1  // Initial array
2  let numbers = [1, 3, 5, 6, 7];
3
4  // Using slice from index 0 to 3 (excluding index 3)
5  let slicedArray = numbers.slice(0, 3);
6
7  console.log(slicedArray); // [1, 3, 5]
8  console.log(numbers);
9  // [1, 3, 5, 6, 7] (Original array)
```

Not the end index is not included in the slice!!

Modifying the Array: splice() method

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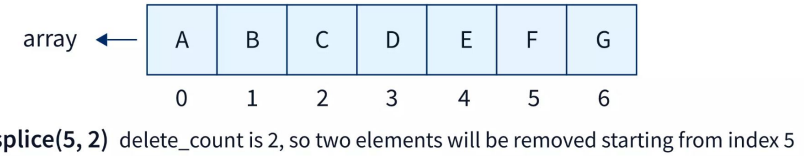
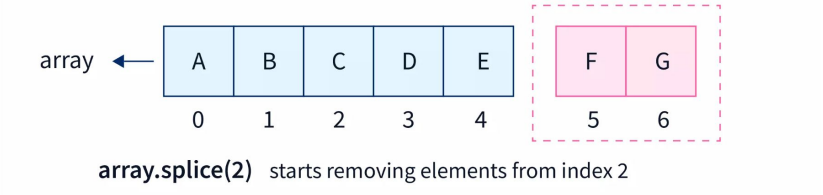
The splice method changes the contents of an array by removing, replacing, or adding elements at a specified index, modifying the original array.

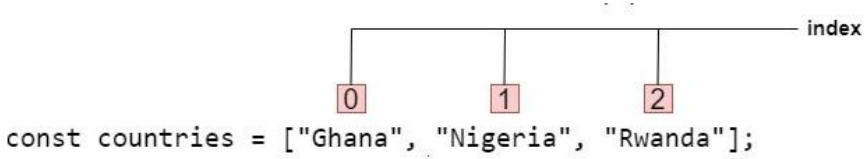


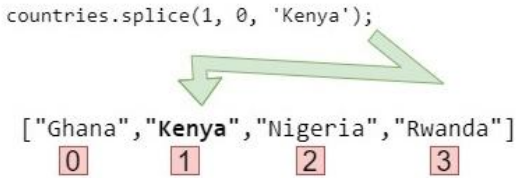
array.splice(5, 2) delete_count is 2, so two elements will be removed starting from index 5



array.splice(2) starts removing elements from index 2

Removing Items





Adding Items

splice(): Example

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splice(0, 3) removes 3 elements starting from index 0, modifying the original array to [4, 5].

```
// Initial array
let numbers = [1, 2, 3, 4, 5];

// Using splice to remove the first three items
numbers.splice(0, 3);

console.log(numbers); // [4, 5]
```

Here instead of modifying the original array splice method modified the original array.

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Sort method

Organizing array: sort()

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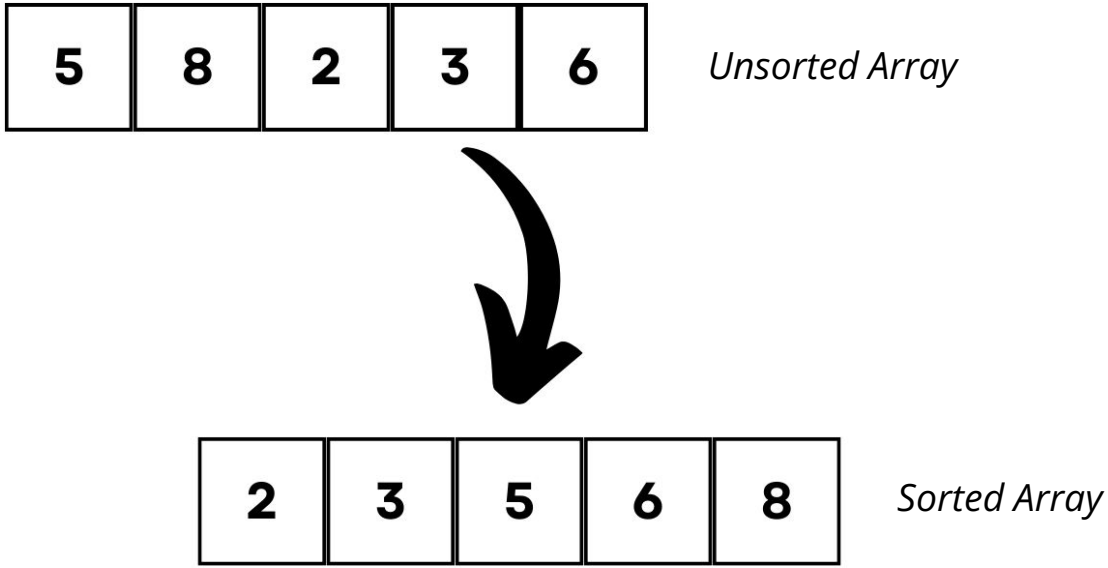
The sort() method allows us to arrange array elements in a specific order, making data easier to understand and work with.



Sorting an array organizes data, improves readability and speeds up searches.

sort(): How it works?

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By default sort() method sorts in alphabetical and ascending order:-

```
1  // Array declaration and assignment
2  const array = [5, 4, 3, 2, 6];
3
4  // Sorting the array
5  array.sort();
6
7  console.log(array);
8  // Output: [2, 3, 4, 5, 6]
```

We can pass compare function as a callback function to sort() to change it's default behaviour.

sort(): How it works?

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To sort an array we need to use sort() method and pass a compare function to it:-

```
// Array declaration and assignment
const array = [5, 4, 3, 2, 6];

// Sorting the array
array.sort(compareFunction);
```

```
// compare function ascending
function compareFunction(a, b){
    return a - b;
}
```

```
// compare function descending
function compareFunction(a, b){
    return b - a;
}
```

sort(): Example Ascending

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Let’s sort the array in ascending order:-

```
// Sorting the array
array.sort(compareFunction);

// compare function ascending
function compareFunction(a, b){
    return a - b;
}

console.log(array);
// Output: [2, 3, 4, 5, 6]
```

If a - b is **positive** (a > b):

- **Action**: b is placed before a because b is smaller.
- **Reason**: The sort() function swaps the two elements to ensure the smaller value comes first.

Vice-versa if is a - b **is negative** (a < b)

sort(): Example Descending

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Let's sort the array in descending order:-

```
1  // Sorting the array
2  array.sort(compareFunction);
3
4  // compare function descending
5  function compareFunction(a, b){
6      return b - a;
7  }
8
9  console.log(array);
10 // Output: [6, 5, 4, 3, 2, 1]
```

If b - a **is positive** (b > a):

- **Action:** b is placed before a because b is larger.
- **Reason**: The sort function keeps b first, ensuring the larger value comes first.

Vice-versa if b - a **is negative** (b < a):

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Bonus:

split and join methods

Array to String: join() method

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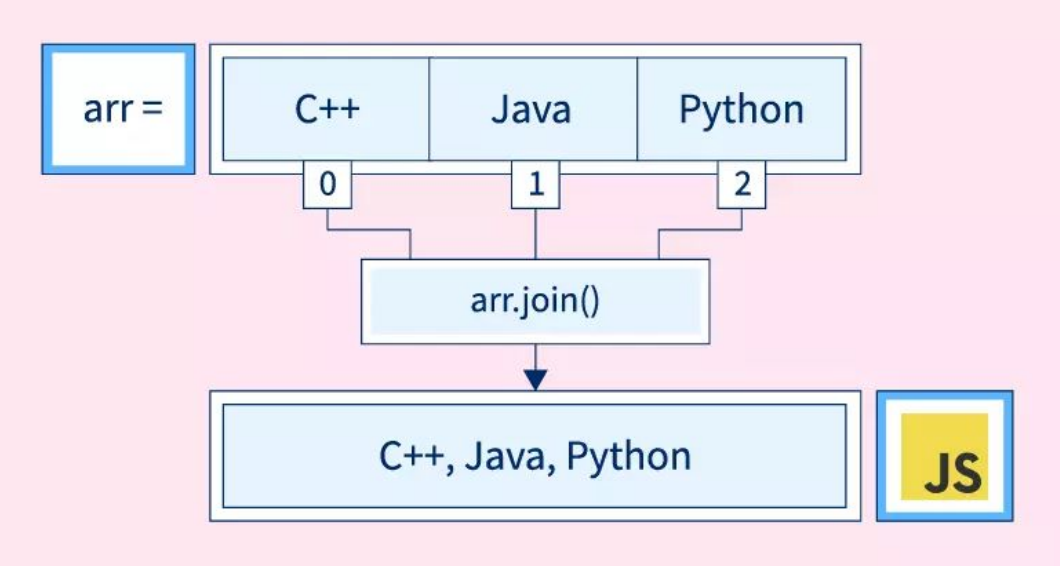
The join() method is used to concatenate the array elements into a string.



We can pass separator arguments in join method.

Let's say we did
arr.join('|')

⇩

C++|Java|Python

join(): Example

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Let’s understand join method with few examples:-

```
1  const languages = ['C++', 'Java', 'Python'];
2
3  // Using the default separator (comma)
4  console.log(languages.join());
5  // Output: "C++,Java,Python"
6
7  // Using a custom separator
8  console.log(languages.join(' | '));
9  // Output: "C++ | Java | Python"
10
11 // Joining without any separator
12 console.log(languages.join(''));
13 // Output: "C++JavaPython"
```

When we don’t pass any argument in the join() method we get comma(,) as an separator.

String to Array: split() method

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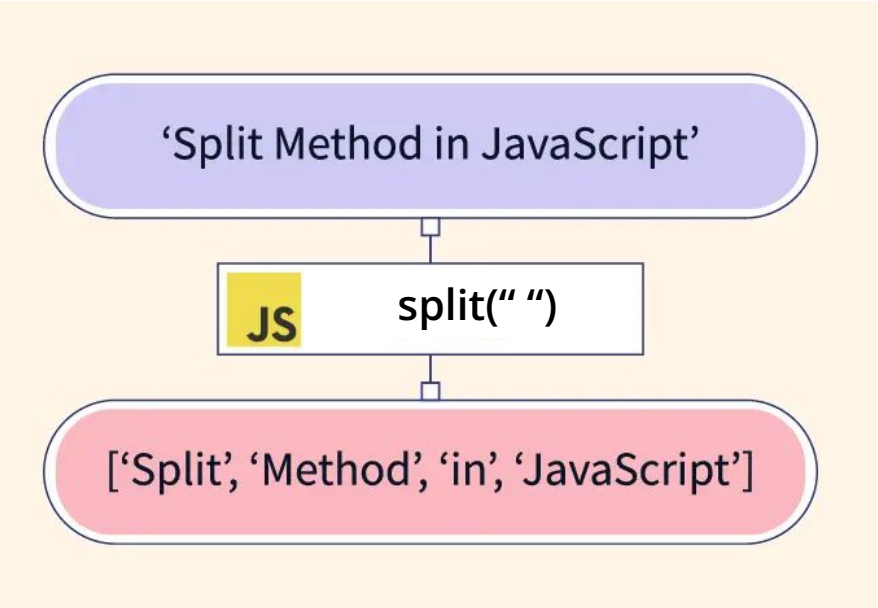
We can reverse the join method i.e. we can create array from string by using split() method:-



We need delimiters inside the split() method. Here in this case we use whitespace:-

⇩

split(" ");

split(): Example

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Let’s understand split method with few examples:

If we don’t pass delimiter, it by default returns the whole text

```
const text = "C++,Java,Python";
const result = text.split();
// No separator provided

console.log(result);
// Output: ["C++,Java,Python"]
```

Here we splitted the array using whitespace a delimiter

```
const sentence = "Split method in javascript";
const wordsArray = sentence.split(" ");
// Splits the string at each space

console.log(wordsArray);
// Output: ["Split", "method", "in", "javascript"]
```

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Call by value vs call by reference

Call by Value vs Call by Reference

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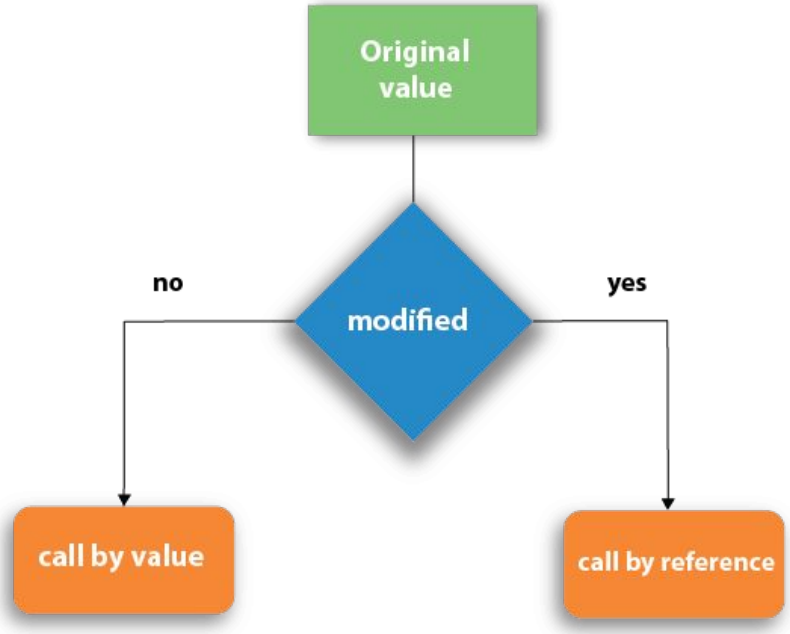
Understanding how JavaScript handles primitives and reference types in functions



Understood?? Don’t worry, let’s jump into next slides and then come back, to understand.

Primitive vs Non-primitive

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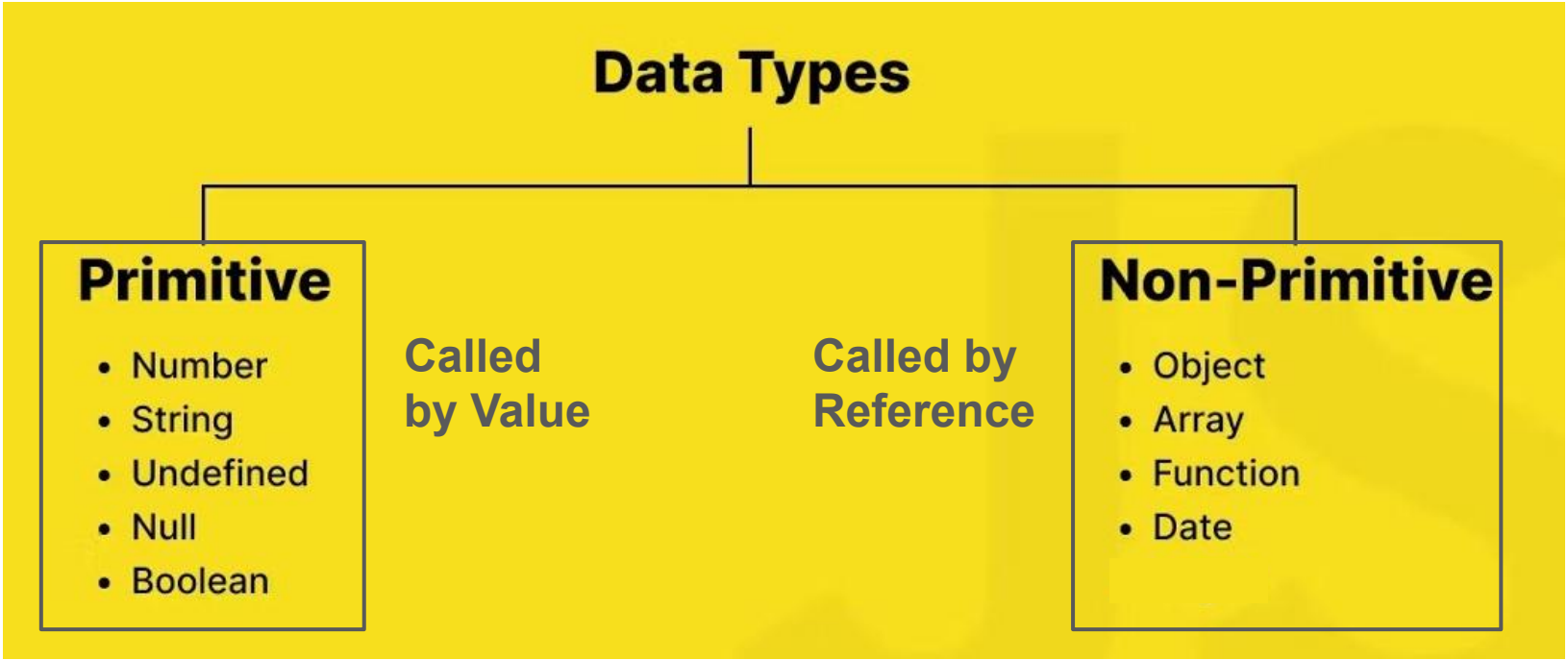
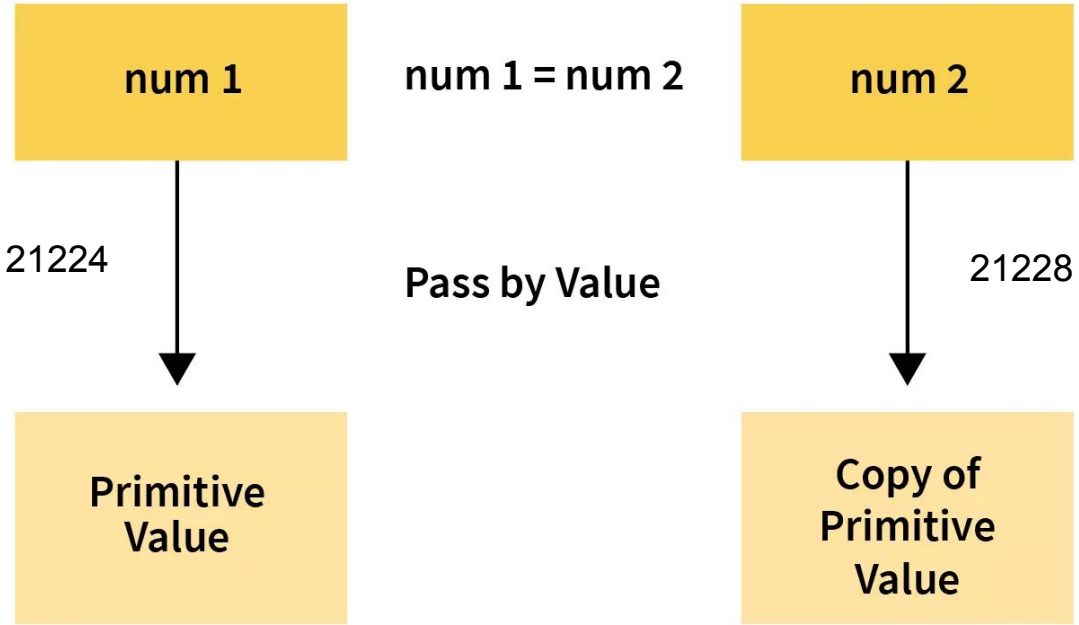
Primitive data types (like numbers and strings) are passed by value (a copy), while non-primitive data types (like objects) are passed by reference (a link to the original).



Call by Value

Whenever primitive value is assigned to another variable or passed to a function a new copy of it is generate.



Here 21224 and 21228 are memory locations where num1 and num2 are stored respectively.

Call by Value: example

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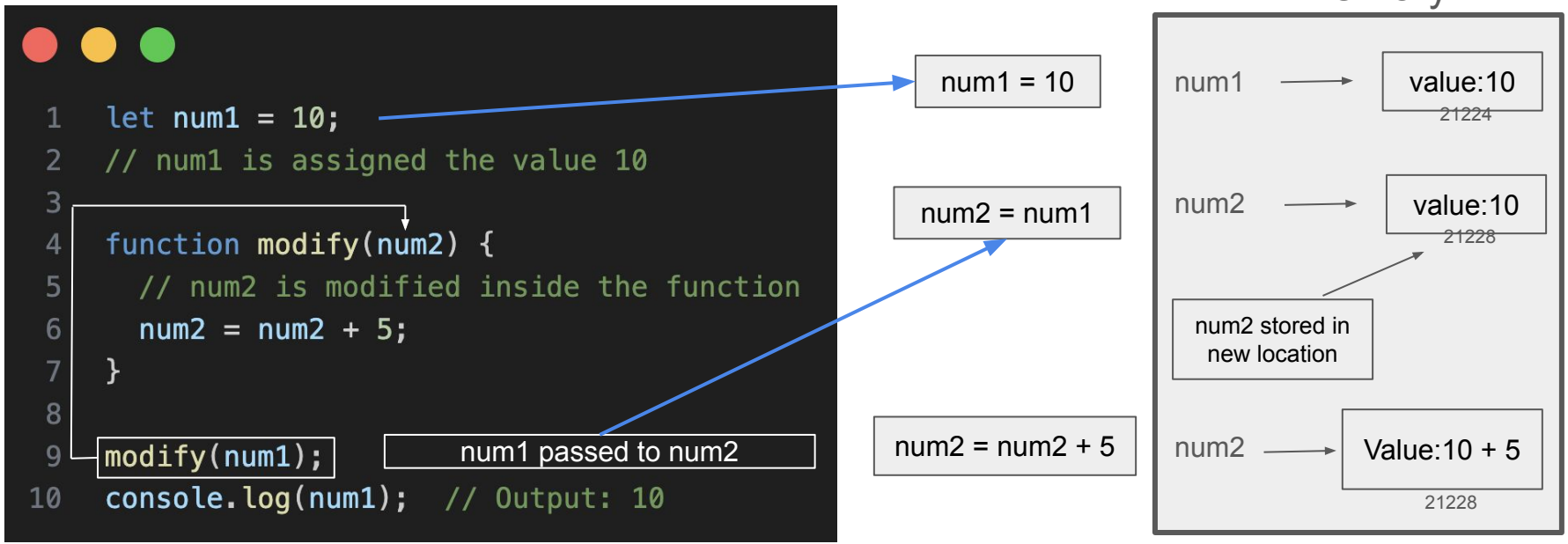
Let’s understand how it happens with an example.



Call by Reference

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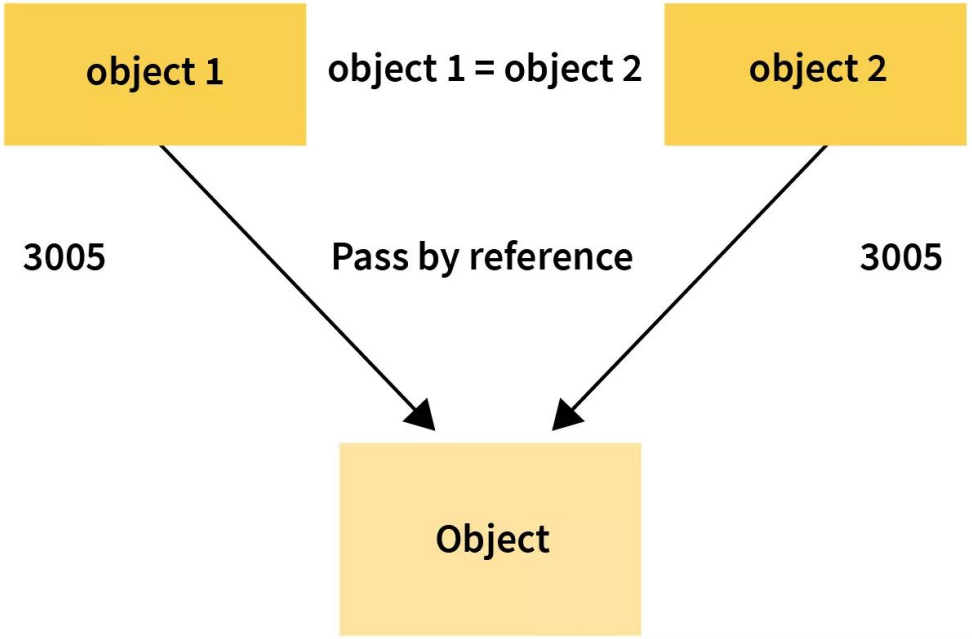
Whereas in call by reference, the original variable and the function parameter point to the **same memory location**.



3005 is their common memory location.

Call by Reference: example

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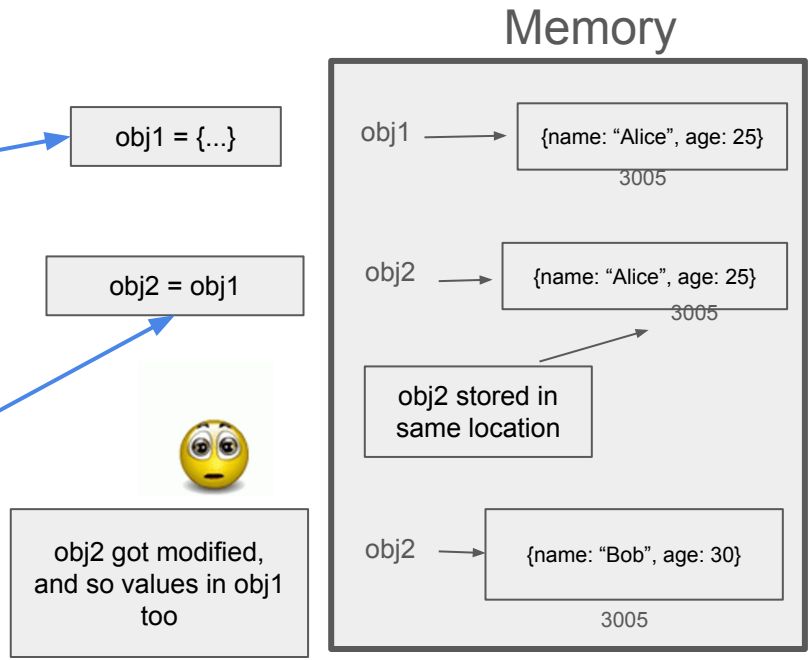
Let’s understand how it happens with an example. Here obj1 and obj2 are pointing to same address.

```
1  // Initial object
2  let object1 = { name: "Alice", age: 25 };
3
4  function modifyObject(object2) {
5    object2.age = 30;
6    // Modifies the original object via object2
7    object2.name = "Bob";
8    // Modifies the name property as well
9  }
10
11 // Passing object1 to the function
12 modifyObject(object1);
```



Quick Recap

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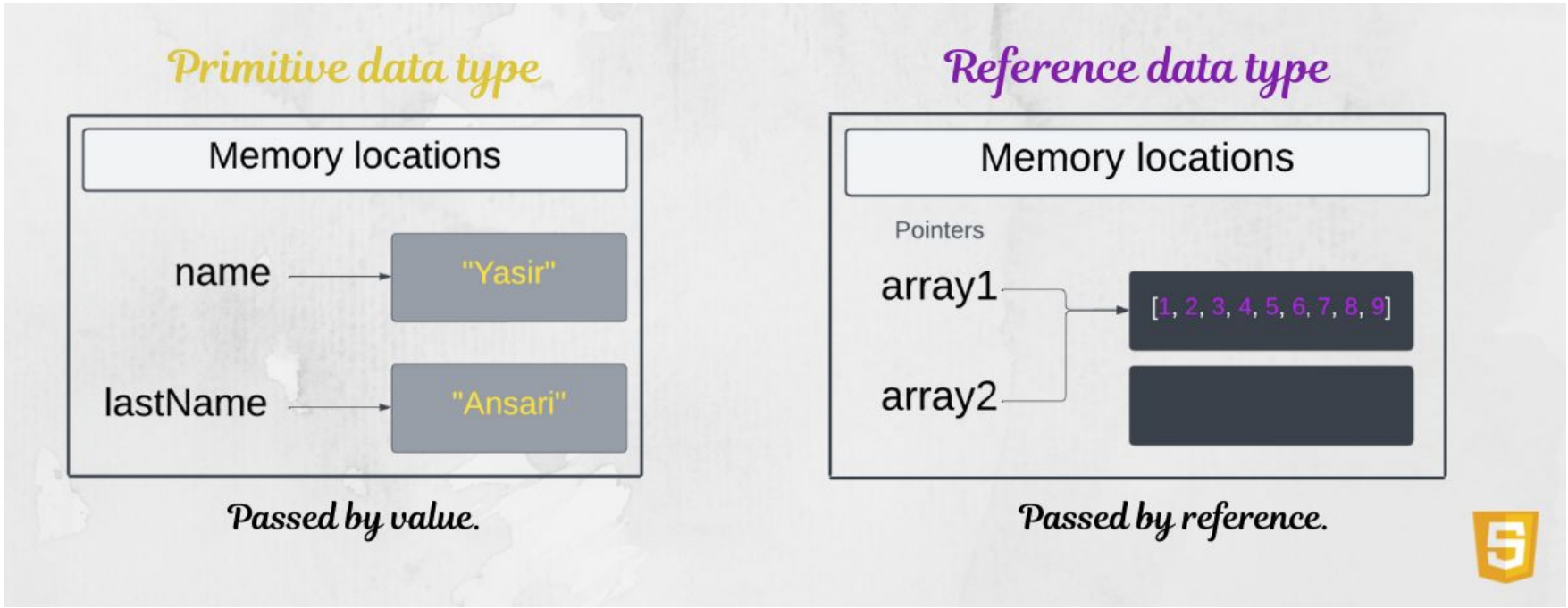
Let’s have a quick recap how values are passed based on its type.



In Class Questions

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Thanks for watching!