Analyzing Performance of Arrays and Objects

1. Introduction

A. Objectives

- Understand how arrays and objects work through the lens of `Big O`
- Explain why adding elements to the beginning of an array is costly
- Compare and contrast the runtime for arrays and objects, as well as built-in methods

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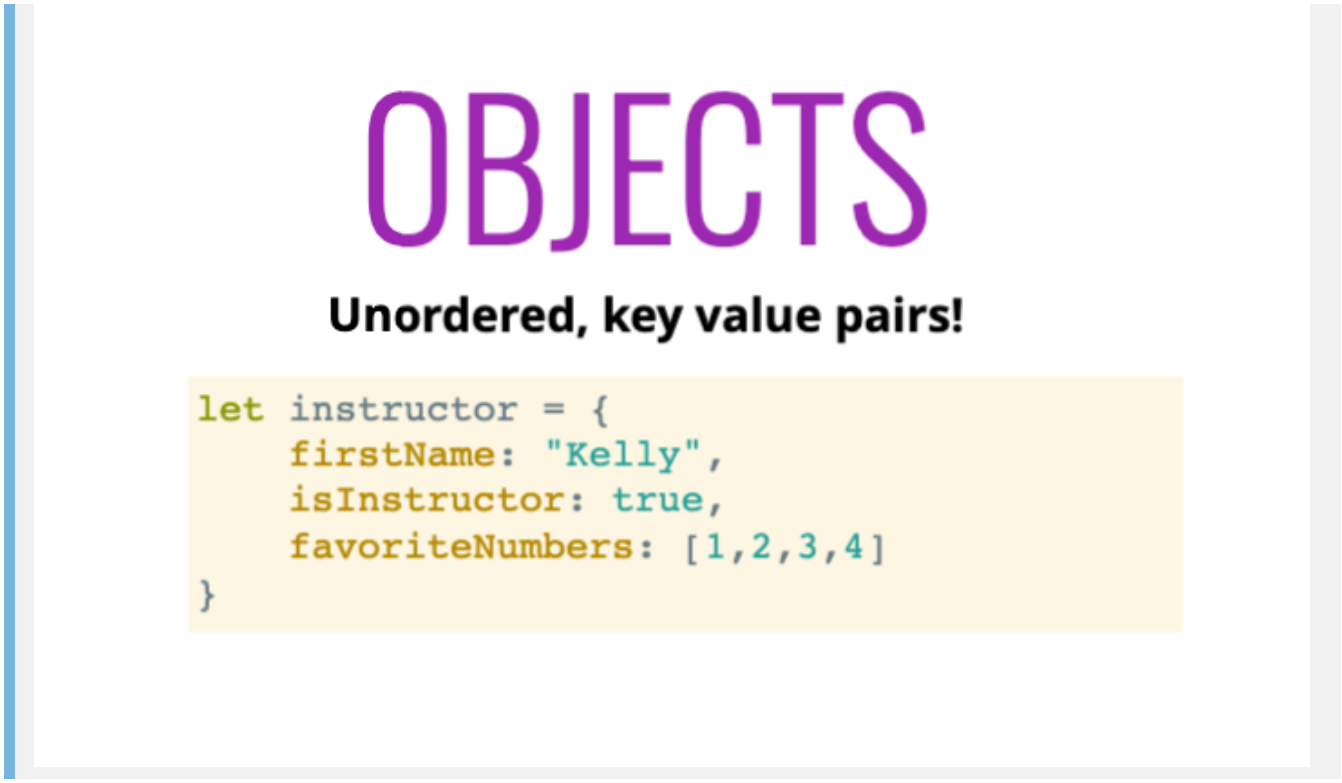
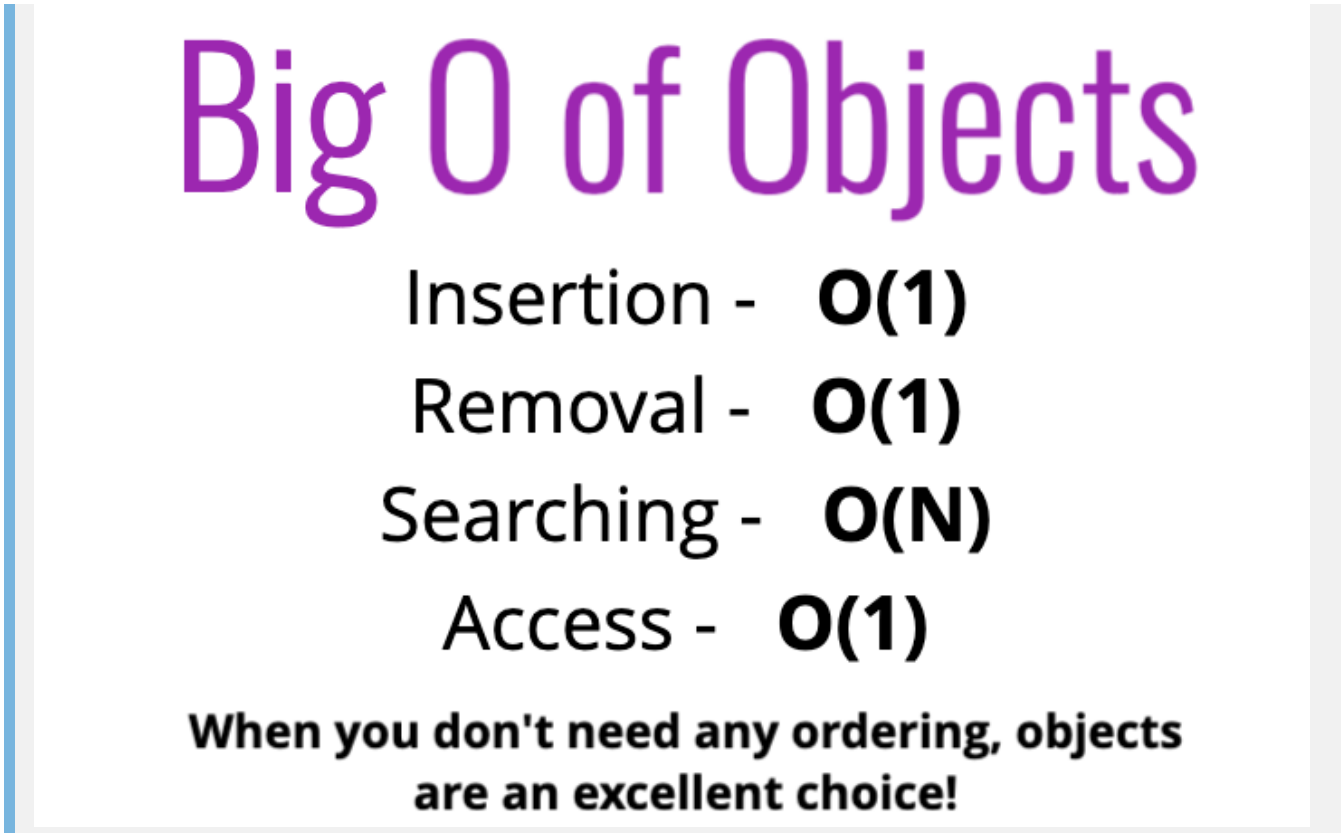
2. The Big O of Objects



When to use objects

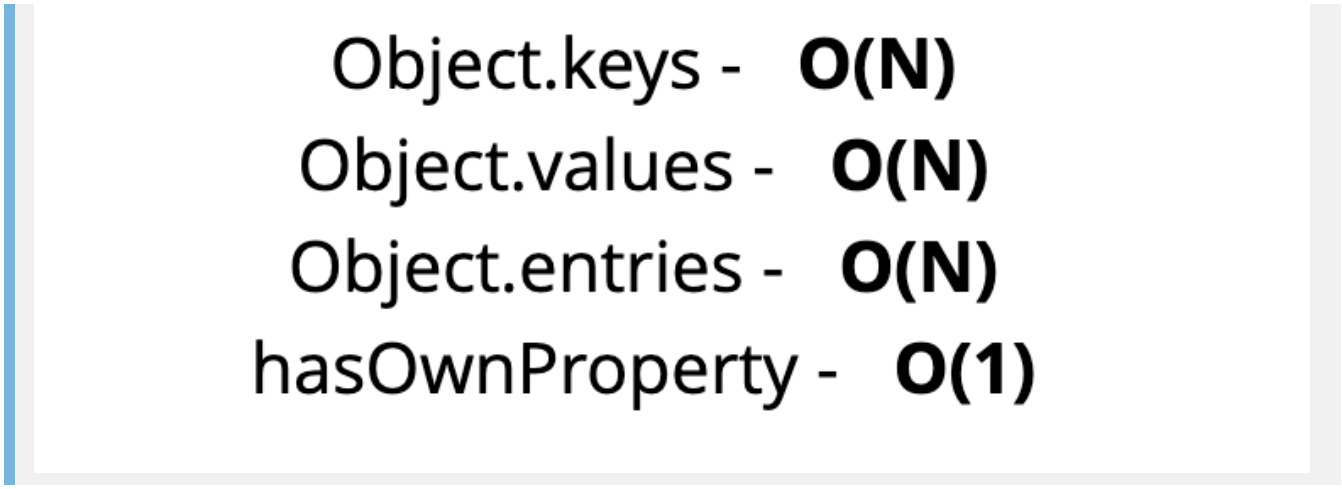
- When you don't need order
- When you need fast access/insertion and removal.

A. Big O of Objects



- Objects are very fast.
- **Hash maps** explain how objects work behind the scenes
- Searching -`O(n)`, does NOT refer to searching for a KEY; rather, it refers to searching for information within the value.

B. Big O of Object Methods



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3. When are Arrays Slow?

ARRAYS

Ordered lists!

```
let names = ["Michael", "Melissa", "Andrea"];

let values = [true, {}, [], 2, "awesome"];
```

A. When to use Arrays

- When you need order
- When you need fast access/inserting and removal(sort of...)

Arrays aren't the only ordered data structure. Sometimes, singlely/doubley linked list perform better than arrays

B. Big O of Arrays

Big O of Arrays

Insertion - **It depends....**

Removal - **It depends....**

Searching - **O(N)**

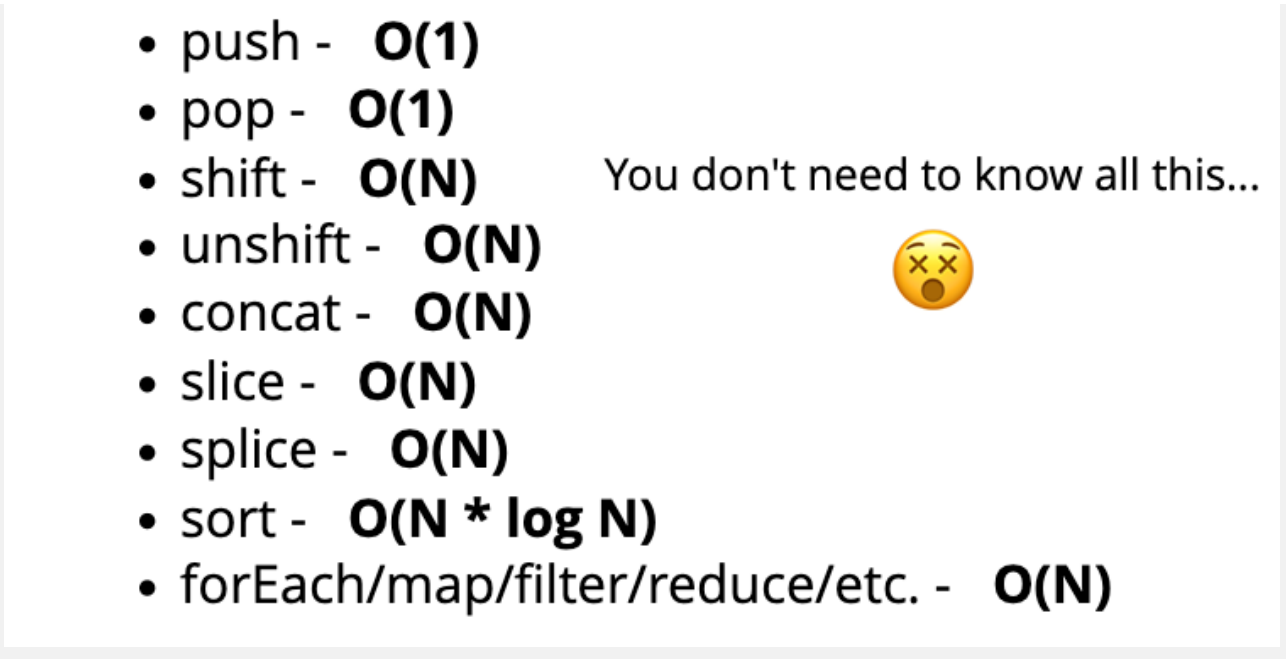
Access - **O(1)**

Let's see what we mean by that!

- When you `access` an element in an array using the index, JavaScript doesn't access the element by counting up to the n^{th} index value, and then returning the element; instead it **jumps to the index** and returns the value, which is why Big O of array access is `O(1)`.
- `Insertion` and `Removal` depends on where you insert/remove:

    - insert at end is `O(1)`
    - insert at beginning is `O(N)` (requires re-indexing)
    - remove from beginning is `O(N)` (requires re-indexing)
    - remove from end is `O(1)`
    - push/pop (end) FASTER than shift/unshift (beginning)
- Searching is `O(N)`

C. Big O of Array Operations



Recap

- Object are fast, but there's no order.
- Arrays are great when you need order and plan on inserting and removing only at the end of an array.
- Inserting/removing from the beginning and the middle of an array will cause re-indexing of the array.