Unit 2: Data Structures

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Approach Lecture

Objectives

In this lecture, we'll explore the concept of...

-Arrays

-Objects

-Linked Lists

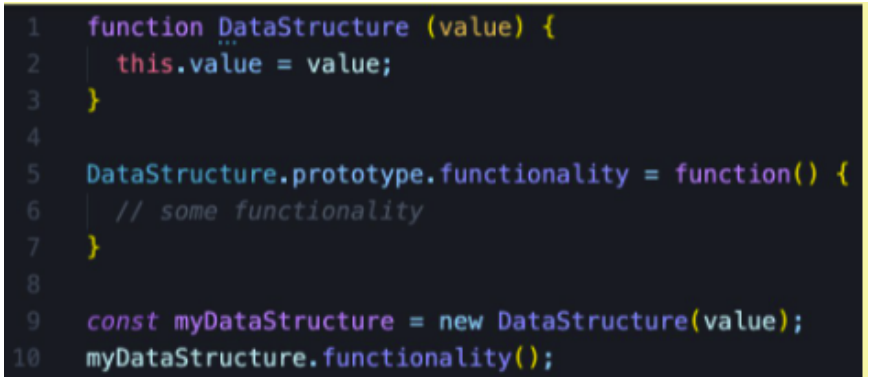
-Hash Tables

-Stacks and Queues

-Binary Search Trees

Recap: OOP

- Pseudoclassical inheritance
- Data and functionality
- What is *this*?



OOP recap cont'd

Class syntax & constructor

```
//* This is also good.
class Stack {
  constructor() {
    this.storage = {};
    this.index = 0;
  }
```

Why can't we use ES6 arrow functions?

```
//! This is not good.
//! Don't use arrow functions as constructors!!
const Stack = () => {
  this.storage = {};
  this.index = 0;
}
```

Arrays and Objects

```
const arr = [];
const arr2 = new Array();

const obj = {};
const obj2 = new Object();
```

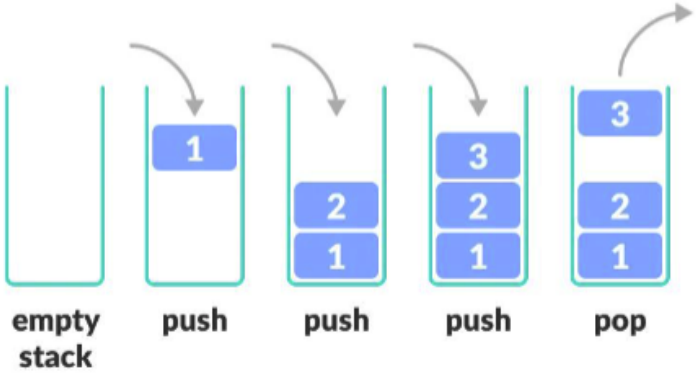
JS Native Data Structures

How do they compare?

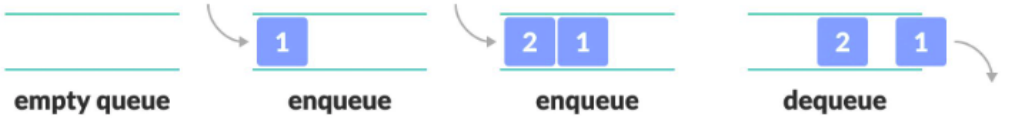
Which do you prefer? Why?

Stacks and Queues

Stacks: last in, first out



Queues: first in, first out



Demo: stacks & queues

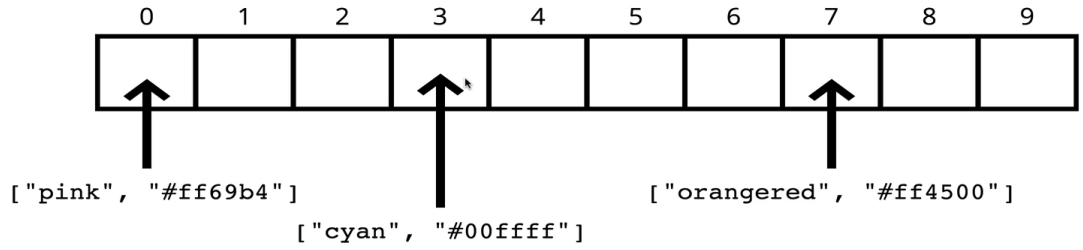
Linked Lists- What are they?

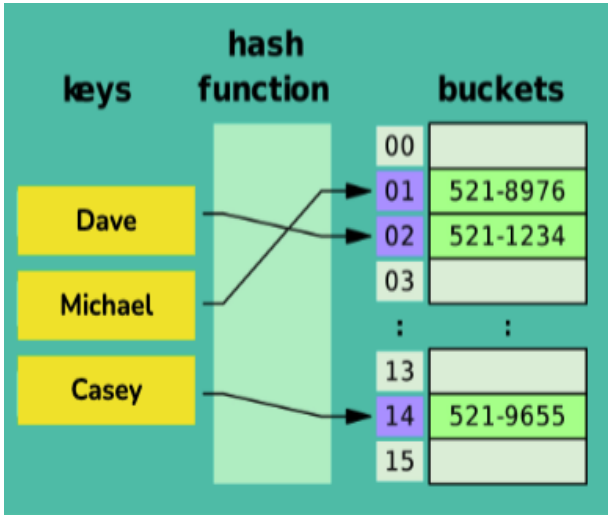
- Nodes with value and pointer
- Contains a head & tail
- No indices

Demo: Linked List

Hash Tables

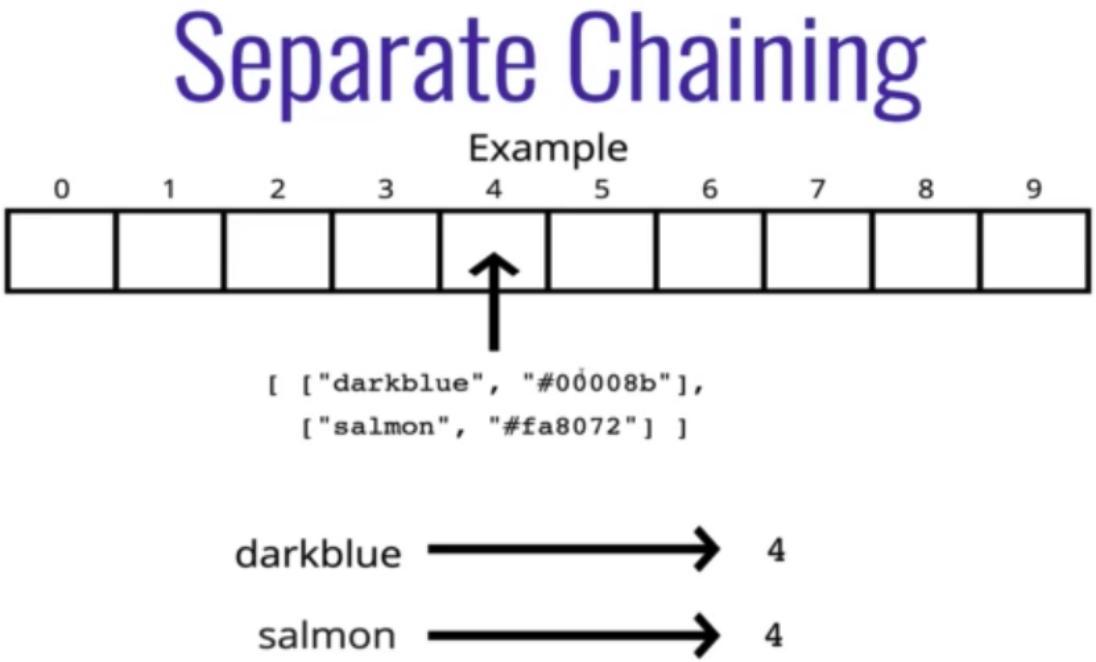
- Used to store key-value pairs
- Commonly used for quick retrieval of data
- Hashing function to convert keys to valid array indices



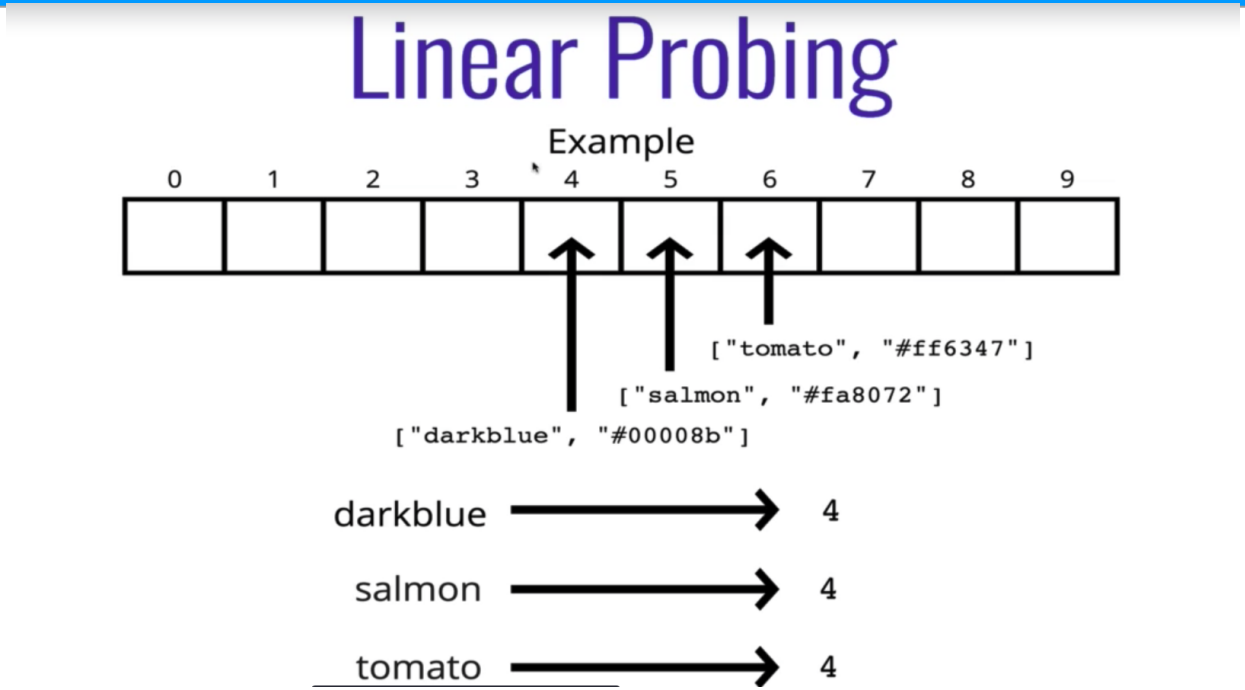


Demo: Hash Table

Hash Tables-Collisions

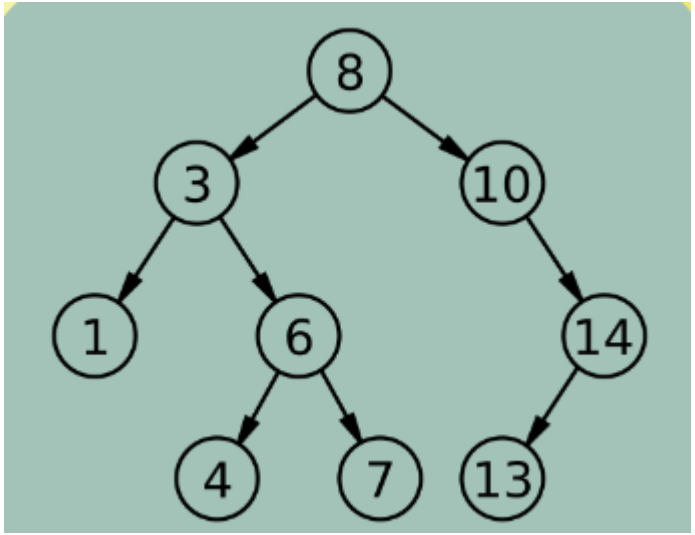


Hash Tables-Collisions



Binary Search Trees

- Trees are made of nodes connected in a specific pattern
- Nodes on left are lesser than root
- Nodes on right are greater than root
- Each node is a valid BST in itself



Demo: Binary Search Tree

Resources

- **Medium Article on Objects vs.Arrays-** https://medium.com/@zac_heisey/objects-vs-arrays-42601ff79421
- **Geeks for Geeks Article on Arrays vs.Linked Lists-** Medium Article on Objects vs.Arrays-https://medium.com/@zac_heisey/objects-vs-arrays-42601ff79421
- **Codesmith Hard Parts- Classes, Prototypes, and OOP Part 1**: https://www.youtube.com/watch?v=MSmpf47YaFY
- **Codesmith Hard Parts- Classes, Prototypes, and OOP Part 2**: https://www.youtube.com/watch?v=3qgYKLf9w-Y
- **Medium Article on Binary Search Trees:** https://medium.com/swlh/binary-search-tree-in-javascript-31cb74d8263b
- **Codeburst Article on Hash Tables and Hashing Functions:** https://codeburst.io/objects-and-hash-tables-in-javascript-a472ad1940d9
- **Visualize Data Structures using** https://visualgo.net/en