Associative Arrays and Maps

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Table of Content

1. Associative Arrays
   - Definition
   - Declaration
   - Attributes
   - Looping
2. Maps
   - Definition
   - Declaration
   - Functions
   - Sorting

Have a Question?

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Associative Arrays

Storing keys and values

What is an Associative Array ?

- Associative arrays are arrays indexed by **keys**
- Hold a set of pairs `[key => value]`
  - The key can either be an integer or a string
  - The value can be of any type

Key	Value
`John Smith`	`+1-555-8976`
`Lisa Smith`	`+1-555-1234`
`Sam Doe`	`+1-555-5030`

Declaration

- We can declare associative array **dynamically**

```
let arr = [];
arr["one"] = 1;
arr["two"] = 2;
```

- Keep in mind that if you use **named** indexes, JavaScript will **redefine** the array to a **standard object**.

```
arr[0]; // will return undefined
arr.length; // will return 0
```

Attributes

- The syntax for accessing the value of a key is:

```
arrayName["key"] // person["age"]
```

or

```
arrayName[key] // key = "age"; person[key]
```

- Assigning the value to a variable

```
let value = arrayName[key];
```

Looping

- Using for-in loop

```
let arr = [];
arr["one"] = 1;
arr["two"] = 2;
arr["three"] = 3;
for(let key in arr) {
   console.log(key + " = " + arr[key]);
}
```

```
one = 1
two = 2
three = 3
```

Problem Phone book

- Write a function that reads **names** and **numbers**, store them in an array and print them. If same name occurs, safe the **latest** number

Input	Output
Tim 0834212554	Tim -> 0876566344
Peter 0877547887	Peter -> 0877547887
Bill 0896543112	Bill -> 0896543112
Tim 0876566344	

Solution Phone book

```
function solve(input){
    let arr = [];
    for(let string of input){
        let tokens = string.split(" ");
        let name = tokens[0];
        let number = tokens[1];
        arr[name] = number;
    }
    for(let key in arr){
        console.log(`${key} -> ${arr[key]}`);
    }
}
```

Check your solution here: https://judge.softuni.bg/Contests/1231/

Map()

Maps

Storing key-value pairs

What is a Map ?

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- A Map object iterates its elements in **insertion order**
- A for-of loop returns an array of **[key, value]** for each iteration
- Pure **JavaScript objects** are similar to **Maps** in that both let you set keys to values, delete keys and detect whether something is stored in a key
- A Map may **perform better** in scenarios involving **frequent addition and removal** of key pairs

Adding/Accessing Elements

- **.set**(key, value) – adds a new key-value pair

```
let map = new Map()
map.set(1, "one") // key – 1, value – one
map.set(2, "two") // key – 2, value – two
```

- **.get**(key) – returns the value of the given key

```
map.get(2) // two
map.get(1) // one
```

Contain/Delete

- **.has(key)** – checks if the map has the given key

```
map.has(2) // true
map.has(4) // false
```

- **.delete(key)** – returns true if it exists and has been removed.

```
map.delete(1) // removes 1 from the map
```

- **.clear**() – removes all key-value pairs

Iterators

- **.entries**() – returns Iterator – array of [key, value]
- **.keys**() – returns Iterator with all the keys
- **.values**() – returns Iterator with all the values

```
let entries = Array.from(map.entries())
// [[2, two], [3, three]]
let keys = Array.from(map.keys()) // [2, 3]
let vals = Array.from(map.values()) // [two, three]
```

Entries, keys and values returns an Iterator, so we transform it into an Array

Problem Storage

- Write a function that **stores products** and their **quantity**. If the same product appears **more than once**, add the **new quantity** to the old one.

Input	Output
tomatoes 10 coffee 5 olives 100 coffee 40	tomatoes -> 10 coffee -> 45 olives -> 100

Solution Storage

```
function solve(arr){
   let map = new Map();
   for(let string of arr){
       let tokens = string.split(" ");
       let product = tokens[0];
       let quantity = Number(tokens[1]);
       if(!map.has(product)){
           map.set(product, quantity);
       } else {
           let currQuantity = map.get(product);
           let newQuantity = currQuantity += quantity;
           map.set(product, newQuantity);
        }
    }
    // TODO: Print Map
}
```

Check your solution here: https://judge.softuni.bg/Contests/1231/

Map sorting

- To sort a map, we just make it into an array and use the sort array function

```
let map = new Map();
map.set("one", 1);
map.set("eight", 8);
map.set("two", 2);
let sorted = […map.entries()]
.sort((a, b) => a[1] - b[1]);
for (let [key, value] of sorted){
    console.log(`${key} -> ${value}`);
}
```

[["one", 1], ["eight", 8], ["two", 2]]

returns array of arrays of 2 elements

sort by the values (idx 1 of each array)

sorted -> [["one", 1], ["two", 2]], ["eight", 8]]

Problem School grades

- Write a function to **store students** with all of their **grades**. If a student appears **more than once**, add the **new grades**. At the end print the students sorted by **average grade**.

Input	Output

`Lilly 4 6 6 5`
`Tim 5 6`
`Tammy 2 4 3`
`Tim 6 6`
	`Tammy: 2, 4, 3`
	`Lilly: 4, 6, 6, 5`
	`Tim: 5, 6, 6, 6`

Solution School grades

```
function solve(arr){
    let map = new Map();
    for(let string of arr){
       let tokens = string.split(" ");
       let name = tokens[0];
       let grades = tokens.splice(1, tokens.length).map(Number);
       //TODO: fill the map
    }
    let sorted = [...map].sort((a, b) => average(a, b));
     //TODO: print each key and joined values
} //TODO: implement the average function
```

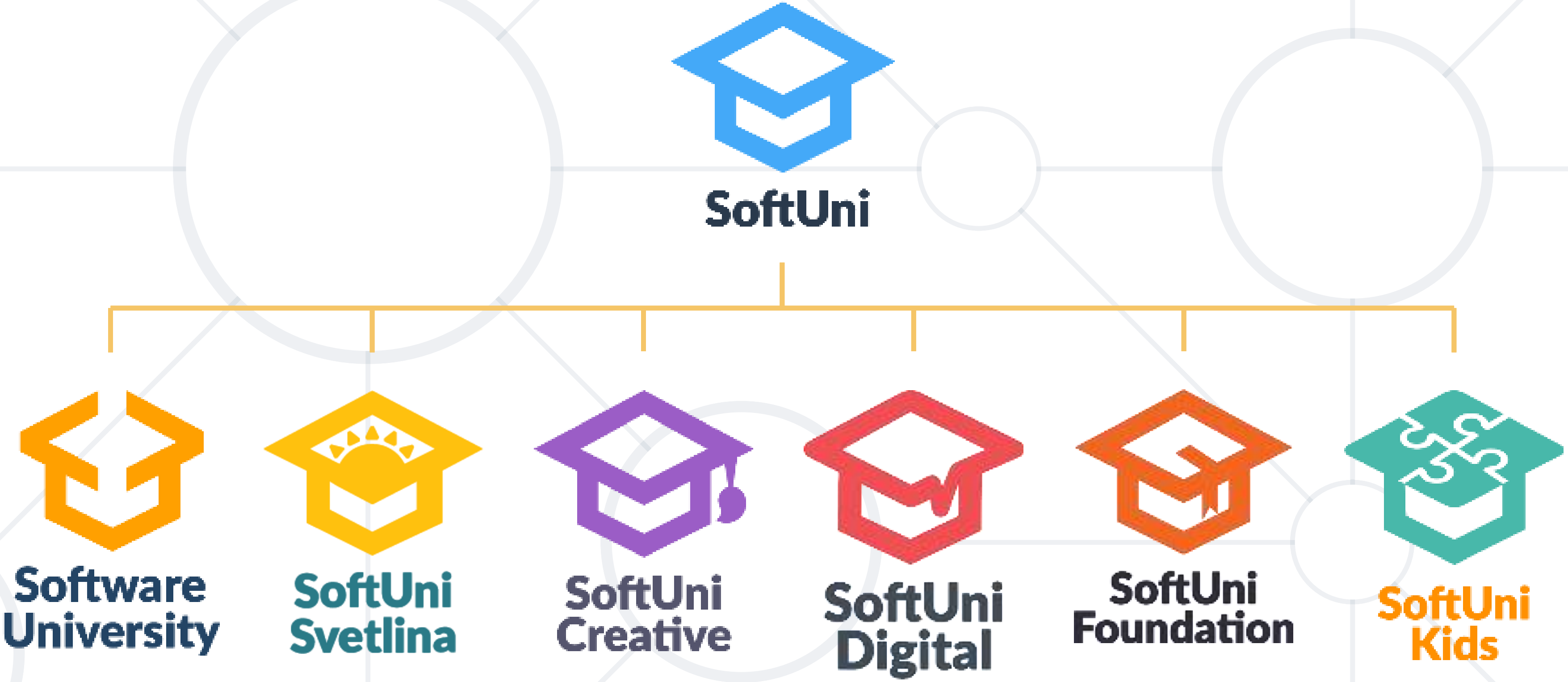
Check your solution here: https://judge.softuni.bg/Contests/1231/

Live Exercises

Summary

- We can use both **Arrays** and **Maps** to store key-value pairs
- Maps are a better way to do it because:
  - They are **iterable**
  - They have **size property**
  - They are better for **adding** and **deleting** many key-value pairs

Questions?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