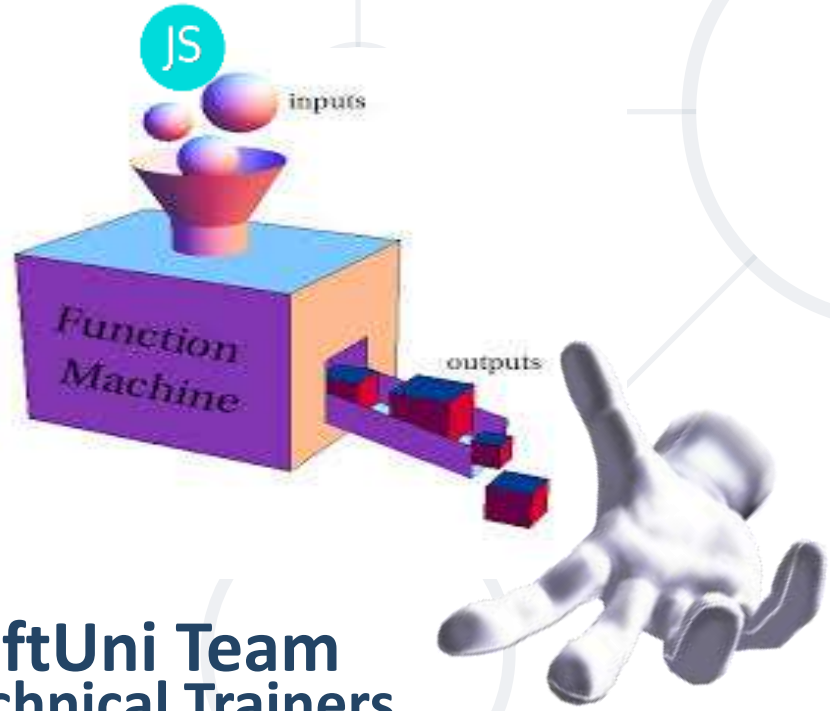
Functions and Logic Flow

Functions, Loops and Scope



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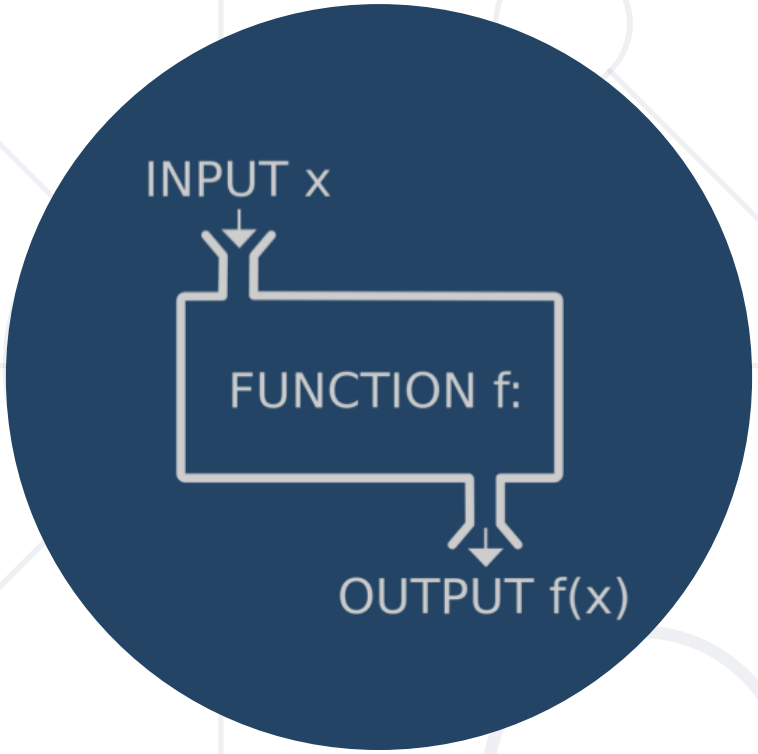
#JS-CORE



JavaScript Functions

Syntax, Invocation, Return, Functions as values

Functions in JS

- Why Functions?
  - You can **reuse** code, define **once**, use **many times**.
- **Function** = block of code
  - Can take **parameters** and return **result**

Function name: use **camelCase**

Function **parameters**: use **camelCase**

```
function printStars(count) {
  console.log("*".repeat(count));
}
```

The { stays at the same line

```
printStars(10);
```

Invoke the function

Functions in JS (2)

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```
function sum (a, b) {
  console.log(a + b);
}
sum (5, 6);              // 11
```

Invoke the function with different parameters value

```
function sum (a, b = 3) {
  console.log(a + b);
}
sum (11);                // 14
```

Default function parameters

```
function sum (a, b) {
  return a + b;
}
let c = sum (5.8, 3);
console.log (c);         // 8.8
```

Return ends function execution

Function Declaration, Expression, Arrow

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```
function walk() {
    console.log('walking');
}
walk();          // walking
```

Function **Declaration**

```
let solve = function walk() {
    console.log('walking');
}
solve();         // walking
```

Function **Expression**

```
let solve = () => {
    console.log('walking');
}
solve();         // walking
```

Arrow function

Problem: Multiplication Table

- Write a JS function to create multiplication table based on 2 numbers, that you will receive. If the first number is **greater**, print "*Try with other numbers.*"

Problem: Multiplication Table (2)

```
function multiplicationTable () {
     let numberToBeMultiplied =
parseInt(document.getElementById("num1").value);
     let multiplier = parseInt(document.getElementById("num2").value);
     let divResult = document.getElementById('result');

     function findWrongInput(numberToBeMultiplied, multiplier) {
          if (numberToBeMultiplied > multiplier) {
               document.getElementById("result").innerHTML = "Try with
other numbers.";
     }
}

 // Continues on the next slide
```

Problem: Multiplication Table (2)

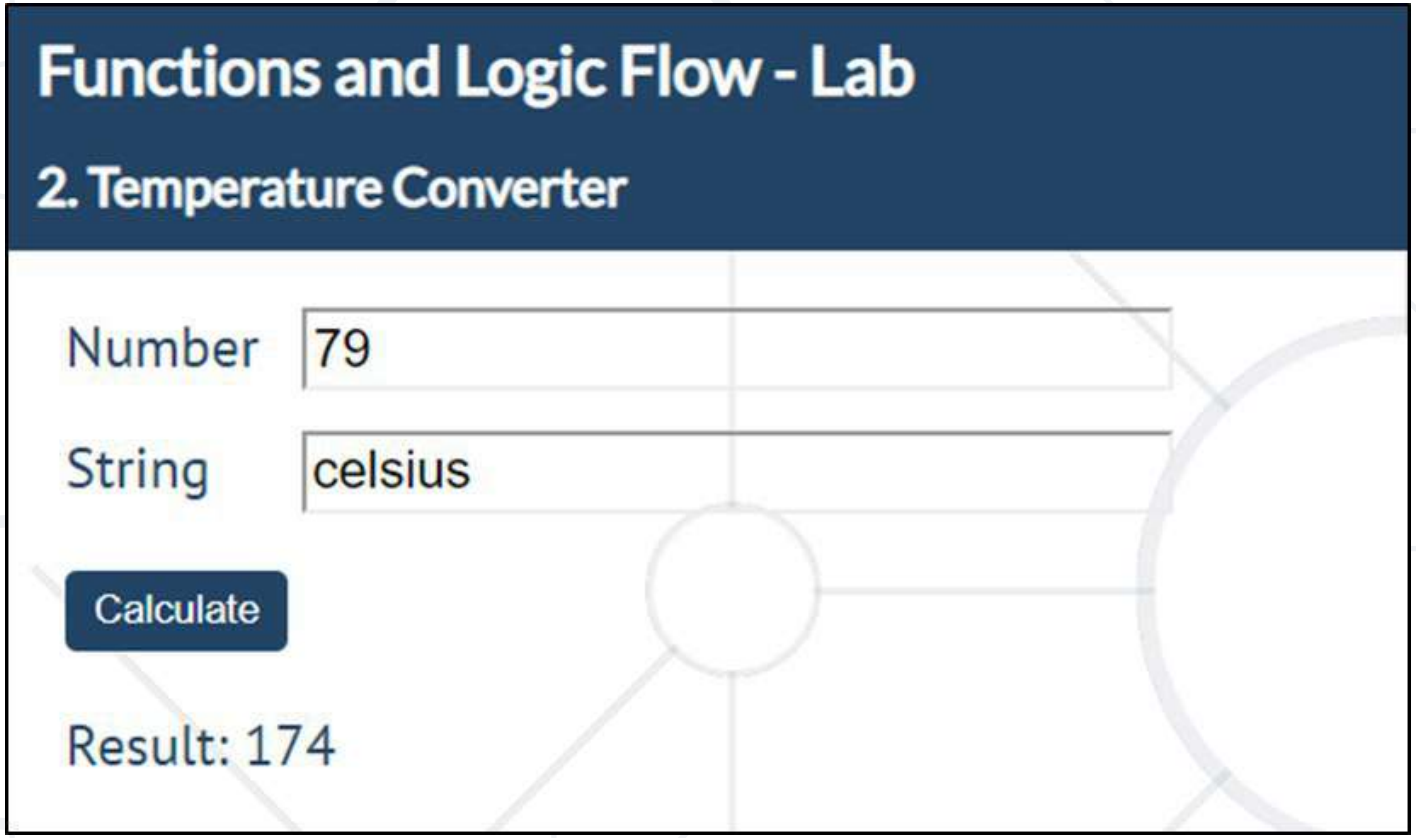
```
function printTable(numberToBeMultiplied, multiplier) {
     for (let i = numberToBeMultiplied; i <= multiplier; i++) {
         let result = multiplier * i;
         let p = document.createElement('p');
         p.textContent = `${i} * ${multiplier} = ${result}`;
         divResult.appendChild(p);
     }
}
divResult.textContent = '';

findWrongInput(numberToBeMultiplied, multiplier);
printTable(numberToBeMultiplied, multiplier);
}
```

`multiplicationTable(8, 3)` → Try with other numbers.

Problem: Temperature Converter

- Write a JS function to convert Fahrenheit to Celsius.



Check your solution here: https://judge.softuni.bg/Contests/Practice/Index/1449#1

Problem: Temperature Converter (2)

```
function temperatureConverter() {
     let degrees = parseInt(document.getElementById("num1").value);
     let type = document.getElementById("type").value;
     let result = '';
     let convertedTemperature = 0;
     let correctType = false;

    function convert(degrees, type) {
        if (type.toLowerCase() === "fahrenheit") {
            convertedTemperature = (((degrees - 32) * 5) / 9);
            correctType = true;
        }  else if (type.toLowerCase() === "celsius") {
           convertedTemperature = ((degrees * 9) / 5) + 32;
           correctType = true;
         }
      }                                          // Continues on the next slide
```

Problem: Temperature Converter (3)

```
function print(degrees, type) {
    if (correctType) {
        result = Math.round(convertedTemperature);
    } else {
        result = "Error!";
    }
}
    convert(degrees, type);
    print(degrees, type);
    document.getElementById("result").innerHTML = result;
}
```

```
temperatureConverter(85, "fahrenheit");
```

→

```
29
```

Function Invocation

- The code inside a function is executed when the function is **invoked** with **()** operator

```
function write(name) {
      console.log(`I am ${name}`);
}
write('George');        // I am George
```

Invoke the function **after** declaration

```
write('George');        // I am George
function write(name) {
      console.log(`I am ${name}`);
}
```

Invoke the function **before** declaration

Function Invocation (2)

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```
(function (count) {
  for (let i = 1; i <= count; i++)
    console.log('+'.repeat(i));
})(4);
```

Anonymous **self-invoking** function

```
+
++
+++
++++
```

```
let f = (function () {
  let x = 0;
  return function() { console.log(++x); }
})(); f(); f(); f(); f();
```

This is called "**closure**" (a state is closed inside)

```
1
2
3
4
```

Function Return

- Return statement **ends** function execution

```
function getRectArea(width, height) {
  if (width > 0 && height > 0) {
    return width * height;
  }
  return 0;
}
console.log(getRectArea(3, 4));        // 12
console.log(getRectArea(-3, 4));       // 0
```

```
let result = function (a, b) {
     return a % b;
};
console.log(result(10, 3));            // 1
```

Variables Holding Functions

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- In JS variables can hold functions as their values

```
let f = function(x) { return x * x; }
console.log(f(3)); // 9
console.log(f(5)); // 25

f = function(x) { return 2 * x; }
console.log(f(3)); // 6
console.log(f(5)); // 10

f = undefined;
console.log(f(3)); // TypeError: f is not a function(…)
```

Functions as Parameters

```
function repeatIt(count, func) {
  for (let i = 1; i <= count; i++)
    func(i);
}

let starsFunc = function(i) {
  console.log("**".repeat(i))
};

repeatIt(3, starsFunc);

repeatIt(3, function(x) {
    console.log(2 * x);
});
```

```
**
****
******
```

```
2
4
6
```

Problem: Count Occurrences of a Given Character

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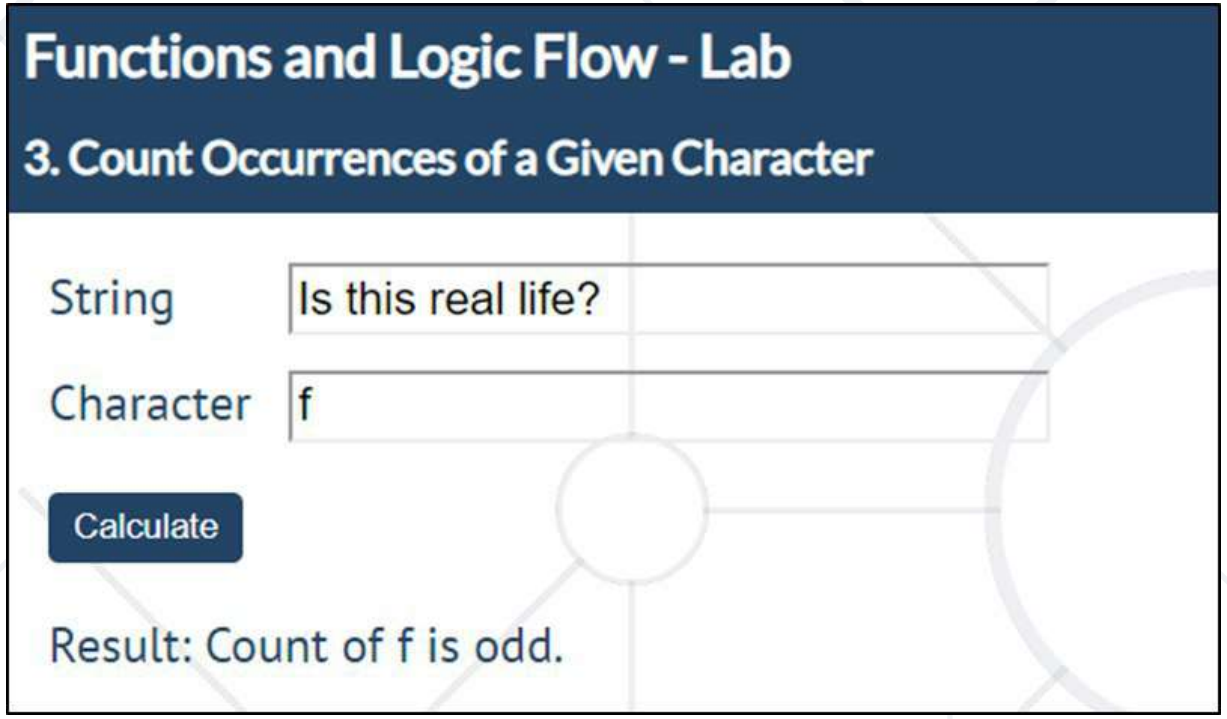
- Write a JS function that finds occurrences of a character in a string
  - Takes 2 parameters – string and character
  - Finds the count of occurrences of the given char in the given string
  - Checks if the count is even / odd

```
countChars('Is this real life?', 'f');
```

```
Count of f is odd.
```



Problem: Count Occurrences of a Given Character

```
function countChars() {
            let string = document.getElementById("string").value;
            let char = document.getElementById("character").value;
            let count = 0;
            let result = '';

    function findCharacterCount(string, char) {
        for (let i = 0; i < string.length; i++) {
            if(string[i] === char) {
                count++;
            }
        }
    }
```

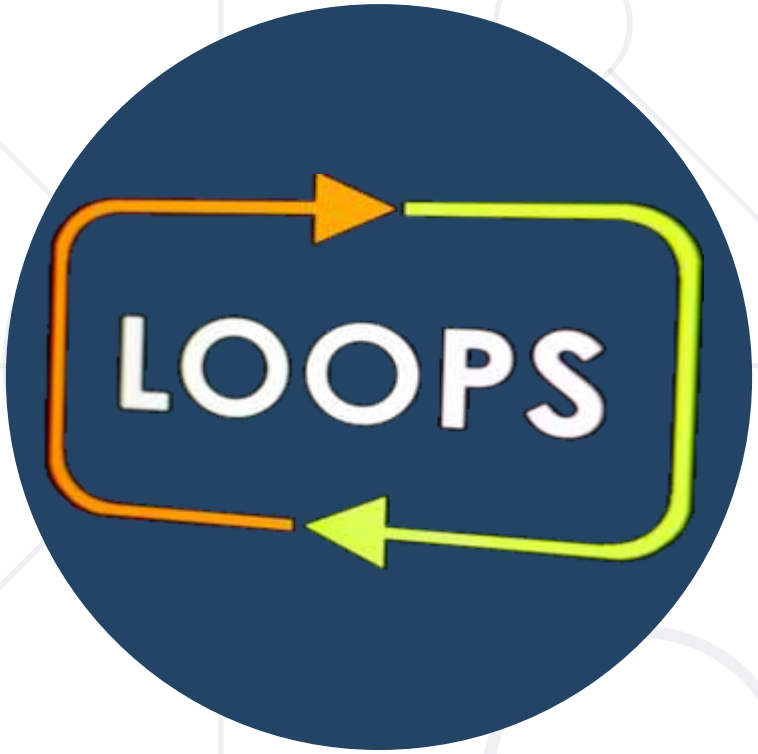
Check your solution here: https://judge.softuni.bg/Contests/Practice/Index/1449#2

Problem: Count Occurrences of a Given Character

```
    function evenOrOddCount(string, char) {
        if (count % 2 === 0) {
            result = `Count of ${char} is even.`;
        } else {
            result = `Count of ${char} is odd.`;
        }
    }

    findCharacterCount(string, char);
    evenOrOddCount(string, char);
    document.getElementById("result").innerHTML = result;
}
```

Check your solution here: https://judge.softuni.bg/Contests/Practice/Index/1449#2



Loops in JS

For…in, For…of, While

Loops: for…in

- The **for** / **while** loops work as in C++, C# and Java
- For…in loop is used to iterate over the **enumerable** properties of objects

```
function solve(arr) {
    for (const arrElement in arr) {
        console.log(arrElement);
    }
}
solve(['George', 5, null, 54]);
```

for…in loop iterates over the **indexes**

```
0
1
2
3
```

Loops: for...in

```
function solve(str) {
    for (const character in str) {
        console.log(str[character]);
    }
}
solve('Hello');
```

```
H
e
l
l
o
```

```
function solve(obj) {
    for (const objElement in obj) {
        console.log(objElement);
    }
}
solve({name: 'Peter', age: 32, town:
   'Sofia'});
```

```
name
age
town
```

Loops: for…of

- For…of loop is used to iterate over the **iterable** objects

```
function solve(arr) {
    for (const arrElement of arr) {
        console.log(arrElement);
    }
}
solve(['George', 5, null, 54]);
```

```
George
5
null
54
```

Loops: for…in

```
function solve(str) {
    for (const character of str) {
        console.log(character);
    }
}
solve('Hello');
```

```
H
e
l
l
o
```

```
function solve(obj) {
    for (const objElement of obj) {
        console.log(objElement);
    }
}
solve({name: 'Peter', age: 32, town:
   'Sofia'});
```

TypeError: obj is not iterable

Loop: while

- The while loops through a block of code as long as a specified condition is **true**.

```
function count(num) {
    while (num < 200) {
        console.log(num *= 2);
    }
}
count(5);  // 10 20 40 80 160 320
```

```
function count(arr) {
    while (arr.length>0) {
        console.log(arr.length);
        arr.length-=1;
    }
}
count(['Peter', 45, 0, 58]); // 4 3 2 1
```

Problem: Unique Characters

- Write a JS function that takes one string parameter and extract only the unique characters from the string except for whitespaces.

```
function extractUniqueChars() {
            let uniqueChars = "";
            let string = document.getElementById("string").value;

            function findUniqueChars(string) {
                for (let i = 0; i < string.length; i++) {
                    isCharWhiteSpace(i);
                    isCurrentCharUnique(i);
                }
            }
```

Check your solution here: https://judge.softuni.bg/Contests/Practice/Index/1449#3

Problem: Unique Characters (2)

```
    function isCharWhiteSpace(i) {
        if (string[i] === " ") {
            uniqueChars += string[i];
        }
    }

    function isCurrentCharUnique(i) {
        if (uniqueChars.indexOf(string[i]) === -1) {
            uniqueChars += string[i];
        }
    }

findUniqueChars(string);
document.getElementById("result").innerHTML = uniqueChars;
}
```

Scope

Local and global scope

Scope

- Scope is the **visibility** of functions and variables in the different **parts** of your code during runtime.
  - Global Scope – **Global** variables can be accessed from anywhere in a JavaScript function

```
var name = 'Maria’;          // code here can use name
function myFunction() {
    console.log(name);       // code here can also use name
}

myFunction();                // Maria
console.log(name);           // Maria
```

Scope (2)

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- Function Scope – **Local** variables can only be accessed from inside the function where they are declared

```
function myFunction() {
    var name = 'Maria';
    // only here code CAN use name
}
console.log(name);
```

ReferenceError: name is not defined

- Block Scope - Variables declared inside a block {} can not be accessed from outside the block.

```
{
    let x = 2;
} // x can NOT be used here
```

Automatically global

- We can assign a value to a variable that has **not** been **declared** and it automatically become a **Global** variable

Invoke the function **before** declaration

```
myFunction();
console.log(name);          // Maria

function myFunction() {
    name = 'Maria';
}
```

Automatically global (2)

- Global variables are **not created** automatically in 'Strict Mode'

```
'use strict'
myFunction();
console.log(name);              // ReferenceError: name is
                                   not defined

function myFunction() {
    name = 'Maria';
}
```

Problem: Special Words

Write a JS function that takes 5 parameters and Iterates from the first number to the second one.

- For numbers which are multiples of both 3 and 5, print all 3 strings
- For multiples only of 3, print the second string
- For multiples only of 5, print the third string

Problem: Special Words (2)

```
function specialWords() {
     let startNum =
parseInt(document.getElementById("firstNumber").value);
     let endNum =
parseInt(document.getElementById("secondNumber").value);
     let firstWord = document.getElementById("firstString").value;
     let secondWord = document.getElementById("secondString").value;
     let thirdWord = document.getElementById("thirdString").value;
     let divResult = document.getElementById("result");

     for (let i = startNum; i <= endNum; i++) {
          checkCurrentNumber(i);
     }

 // Continues on the next slide
```

Check your solution here: https://judge.softuni.bg/Contests/Practice/Index/1449#4

Problem: Special Words (3)

```
    function checkCurrentNumber(i) {
        let p = document.createElement('p');
        if (i % 3 === 0 && i % 5 === 0) {
            p.textContent = `${i} ${firstWord}-${secondWord}-
${thirdWord}`;
        } else if (i % 3 === 0) {
            p.textContent = `${i} ${secondWord}`;
        } else if (i % 5 === 0) {
            p.textContent = `${i} ${thirdWord}`;
        } else {
            p.textContent = i;
        }

        divResult.appendChild(p);
    }
}
```

Live Exercises

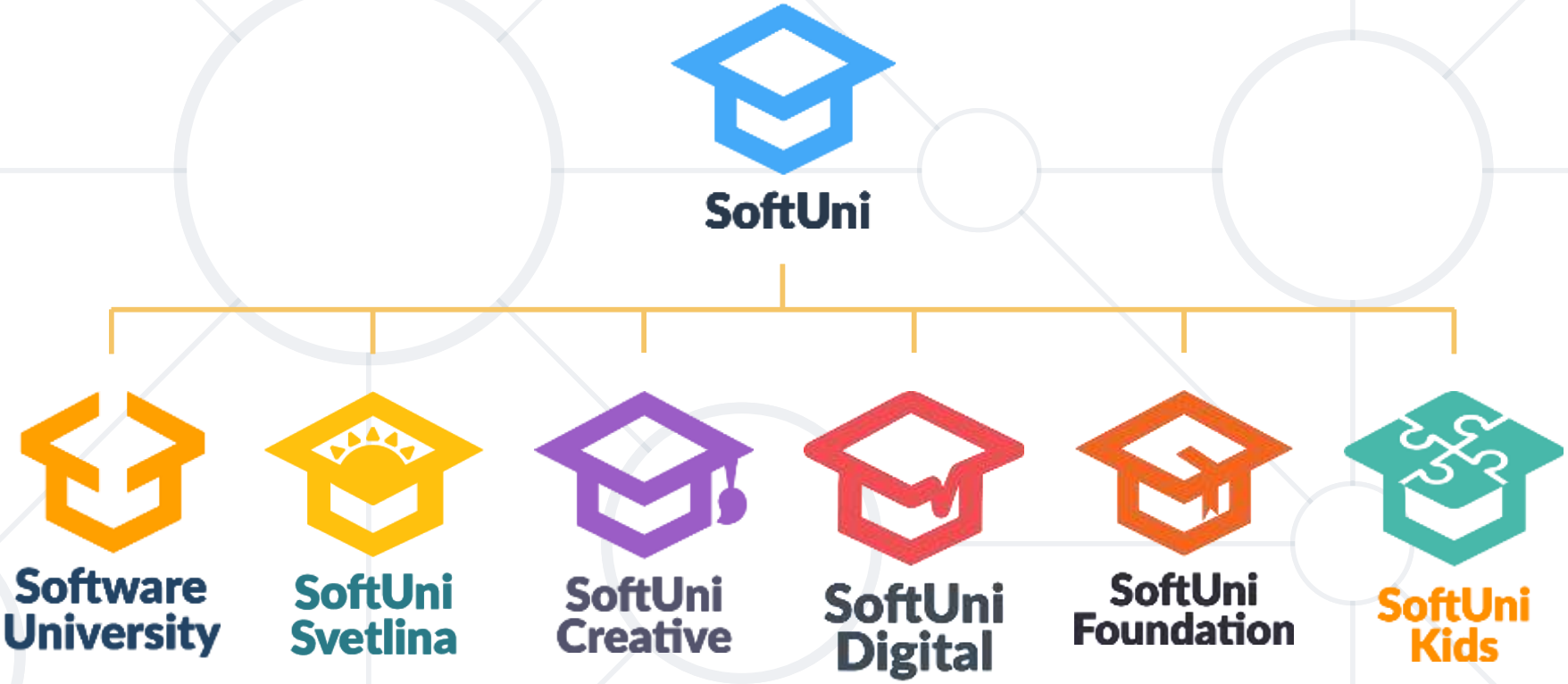
Summary

- Function = named piece of code
  - Syntax, invocation, return

```
function calcSum(a, b) {
  let sum = a + b;
  return sum;
}
```

- Loops – for…in, for…of, while
- Local and global scope

Questions?



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