Strings and RegExp

String Operations and Regular Expressions

SoftUni Team

Technical Trainers

Software University

http://softuni.bg

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Have a Question?

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#JS-CORE

Strings in JavaScript

String Operations and Methods

What is a String?

- JavaScript strings are used for **storing** and **manipulating** text

```
let str = "Hello, World!";
```

- You can use the **+** operator to append multiple strings together:

```
let longString = "This is a very long string" +
                 "to wrap across multiple lines" +
                 "otherwise my code is unreadable."
```

Quotes in Strings

- Unlike some other languages, JavaScript makes **no distinction** between **single-quoted** strings and **double-quoted** strings.

```
let carName = "Volvo XC60"; // Double quotes
let carName = 'Volvo XC60'; // Single quotes
```

- Quotes can be used inside a string, as long as they don't match the quotes surrounding the strings:

```
let str1 = "It's alright";
let str2 = "He is called 'Johnny'";
let str3 = 'He is called "Johnny"';
```

Length and Special Characters

- The length of a string is found in the built in property **length**:

```
let myStr = "Find my length.";
let length = myStr.length; // 15
```

- **Special chars** can be encoded using **escape notation**:

Code	Result	Description
\'	'	Single quote
\"	"	Double quote
\\	\	Backslash

Escape Sequences

Code	Result
\b	Backspace
\f	Form Feed
\n	New Line
\r	Carriage Return
\t	Horizontal Tabulator
\v	Vertical Tabulator

```
let example = "This is an example \nfor a new line.";
// This is an example
// for a new line.
```

Comparing Strings

- Equality - "**==**" - True if **operands** are the same, otherwise false.

```
let sVal = "example";
if (sVal == "example") // true
```

- Strict Equality - "**===**" - True if **operands** and **data type** are the same, otherwise false.

```
let sVal = "example";
let sVal2 = new String("example");
if (sVal === sVal2) // not true
```

Comparing Strings

- Inequality - "!=" - True if operands are not the same, otherwise false

```
let firstStr = "9900";
let firstNum = 9900
if (firstStr != secondStr) // false
```

- Strict Inequality - "!==“ - True if operands and data type are not the same, otherwise false

```
let firstStr = "9900";
let firstNum = 9900
if (firstStr !== secondStr) // true
```

Comparing Strings (2)

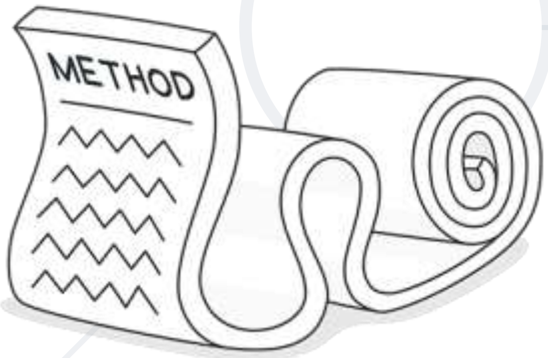
- Greater than - ">" (Greater than or equal - ">=")
  - True if first operand is greater than (or equal) to the second one.
- Less than - "<" (Less than or equal - "<=")
  - True if second operand is greater than (or equal) to the first one.

```
if ("b" > "a") // true
```

```
if ('Example of a long string' <= 'A short one') // false
```

String Methods

- **indexOf()** - returns the position of the first found occurrence of a specified value in a string
- **lastIndexOf()** - returns the position of the last found occurrence of a specified value in a string
- **search()** - searches a string for a specified value



String Methods (2)

- **slice()** - extracts a part of a string and returns a new one.
- **substring()** - extracts the characters from a string between two specified indices.
- **substr()** - extracts the characters from a string, beginning at a specified start position and through the specified length.

String Methods: Examples

```
let str = "JavaScript is fun!";
console.log(str.indexOf("JavaScript")); // 0
console.log(str.indexOf("java")); // -1
```

```
let str = "I am JavaScript developer";
let sub = str.substr(5);   // substr(start, length)
console.log(sub);          // JavaScript developer
```

```
let str = "I am JavaScript developer";
let sub = str.substring(5, 9); // startIndex, endIndex
console.log(sub);             // Java
```

String Methods: Examples

- Accessing elements like an Array

```
let str = "JavaScript is fun!";
let letter = str[0];
console.log(letter); // J
```

```
let str = "JavaScript is fun!";
let letter = str.charAt(0);
console.log(letter); // J
```

- Converting string to an array with the split method

```
let str = "I like JS";
let tokens = str.split(' ');
console.log(tokens); // ["I", "like", "", "", "", "JS"]
tokens = tokens.filter(s => s!='');
console.log(tokens.join(' ')); // I like JS
```

Problem: Pascal or Camel Case

- Convert the first string to either "Pascal Case" or "Camel Case".

```
function solve() {
  let input = document.getElementById("str1").value;
  let currentCase = document.getElementById("str2").value;
  function pascalOrCamelCase(input, currentCase) {
    let split = input.toLowerCase().split(' ').filter(a => a !== '');
    let output = "";
    if (currentCase === "Pascal Case") {
      for (let word of split) {
        if (word[0] !== word[0].toUpperCase()) {
          word = word.replace(word[0], word[0].toUpperCase())
        }
        output += word;
      }
    }
// Continues on the next slide
```

Problem: Pascal or Camel Case

```
else if (currentCase === "Camel Case") {
      for (let word of split) {
        if (word[0] !== word[0].toUpperCase()) {
          word = word.replace(word[0], word[0].toUpperCase())
        }
        output += word;
      }
      output = output.replace(output[0], output[0].toLowerCase());
    } else {
      output = "Error!";
    }

    document.getElementById("result").innerHTML = output;
  }
  pascalOrCamelCase(input, currentCase);
}
```

Check your solution here: https://judge.softuni.bg/Contests/Practice/Index/1476#0

Problem: Find ASCII Equivalent

If the current element of the string is of type number, print its **ASCII** char equivalent. Else, print the corresponding **ASCII** number.

```
function solve() {
  let input = document.getElementById("str").value;
  let result = document.getElementById('result');

  function findAsciiEquivalent(input) {
    let split = input.split(' ').filter(a => a !== '');
    let output = "";
    for (let element of split) {
      if (Number(element)) {
        output += (String.fromCharCode(element));
      }
// Continues on the next slide
```

Check your solution here: https://judge.softuni.bg/Contests/Practice/Index/1476#1

Problem: Find ASCII Equivalent

```
      else {
        let charToNum = [];
        for (let i = 0; i < element.length; i++) {
           charToNum.push(element[i].charCodeAt(0))
        }
        let p = document.createElement('p');
        p.innerHTML = charToNum.join(' ')
        result.appendChild(p);
      }
    }
    let p = document.createElement('p');
    p.innerHTML = output;
    result.appendChild(p);
  }
  findAsciiEquivalent(input);
}
```

Problem: Split String Equally

You will receive a **string** and a positive integer (**bigger than 0!**). Split the string into **equal sequences** by the number you received.

```
function solve() {
   let string = document.getElementById("str").value;
   let n = parseInt(document.getElementById("num").value);
   function splitStringEqually(string, n) {
     let arr = [];
     let indexCounter = 0;
     if (string.length % n !== 0) {
       let len = string.length;
       let symbolsCount = 0;

// Continues on the next slide
```

Check your solution here: https://judge.softuni.bg/Contests/Practice/Index/1476#2

Problem: Split String Equally

```
      while (len % n !== 0) {
        len %= n;
        len++;
        symbolsCount++;
      }
      for (let i = 0; i < symbolsCount; i++) {
        string += string[indexCounter];
        indexCounter++;
      }
    }
    for (let i = 0; i < string.length; i += n) {
      arr.push(string.substr(i, n));
    }
    document.getElementById("result").innerHTML = arr.join(' ');
  }
  splitStringEqually(string, n);
}
```

Regular Expressions

The Beauty of Modern String Processing

What are Regular Expressions?

Match text by pattern

- RegExp in **string methods**

```
let str = "RegExp Example";
let search = str.search(/RegExp/i) // 0
```

/i -> makes the regex match case **insensitive**

```
let str = "Java Regex Example Java";
let search = str.replace(/Java/g, "JavaScript");
// JavaScript RegExp Example JavaScript
```

/g -> replaces all matches

Problem: Replace a Certain Word

- For each string in the array, **replace** the necessary word with the given one.

```
function solve() {
  let arr = JSON.parse(document.getElementById("arr").value);
  let word = document.getElementById("str").value;
  let result = document.getElementById('result');
  function replaceCertainWord(arr, word) {
    let wordToReplace = arr[0].split(' ').filter(a => a !== '')[2];
    let regex = new RegExp(wordToReplace, 'gi');
    for (let sentence of arr) {
      sentence = sentence.replace(regex, word);
      let p = document.createElement('p');
      p.innerHTML = sentence
      result.appendChild(p);
    }
  }
  replaceCertainWord(arr, word);
}
```

Check your solution here: https://judge.softuni.bg/Contests/Practice/Index/1476#3

Patterns

Patterns are defined by special syntax, e.g.

- `[0-9]+` matches non-empty sequence of digits
- `[A-Z][a-z]*` matches a capital + small letters
- `\s+` matches whitespace (non-empty)
- `\S+` matches non-whitespace
- `[0-9]{3,6}` – matches 3-6 digits
- `\d+ matches digits`
- `\D+` matches non-digits
- `\w+ matches letters`
- `\W+` matches non-letters

RegEx Brackets

[abc]	Find any character between the brackets
[^abc]	Find any character NOT between the brackets
[0-9]	Find any character between the brackets (any digit)
[^0-9]	Find any character NOT between the brackets (any non-digit)
(x|y)	Find any of the alternatives specified

Quantifiers

- **n+** - matches any string that contains **at least one** n
- **n*** - matches any string that contains **zero or more** occurrences of n
- **n?** - matches any string that contains **zero or one** occurrences of n
- **n{X}** - matches any string that contains **a sequence of X** n's
- **n{X,Y}** - matches any string that contains **a sequence of X to Y** n's
- **n{X,}** - matches any string that contains a **sequence of at least X** n's
- **n$** - matches any string with n **at the end** of it
- **^n** – matches any string with n **at the beginning** of it

RegEx Methods

- **exec()**

```
let namePattern = (/[A-Z][a-z]+/g);
let names = "Test Testov, example, Example";
let match;
while(match = namePattern.exec(names)) {   // Test
     console.log(match[0]);                  // Testov
}                                            // Example
```

- **test()** – returns **true** or **false**

```
let pattern = (/[0-9]+/g);
let str = "Test Testov";
console.log(pattern.test(str)); // false
```

Problem: Extract User Data

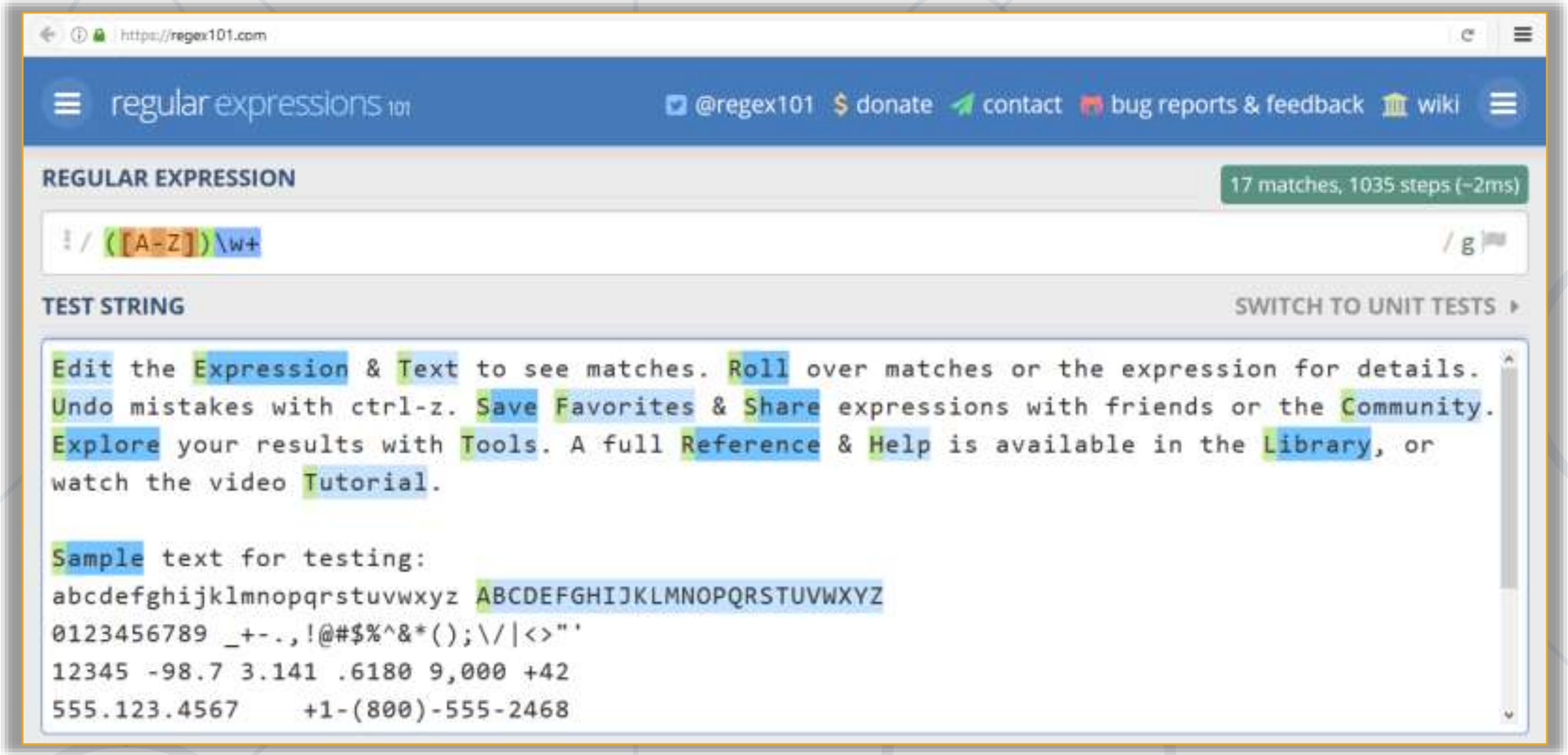
- You have to extract all valid user data from each string

```
function extractUserData() {
    let arr = JSON.parse(document.getElementById("arr").value);
    let result = document.getElementById('result');
    function userData(arr) {
        let pattern =
            /^([A-Z][a-z]* [A-Z][a-z]*) (\+359 [0-9] [0-9]{3} [0-9]{3}|\+359-[0-9]-[0-9]{3}-
[0-9]{3}) ([a-z0-9]+@[a-z]+\.[a-z]{2,3})$/;
        let match;
        for (let data of arr) {
            match = pattern.exec(data);
            if (match) {
                let firstParagraph = document.createElement('p');
                firstParagraph.textContent = `Name: ${match[1]}`;
                result.appendChild(firstParagraph);           // Continues on the next slide
```

Check your solution here: https://judge.softuni.bg/Contests/Practice/Index/1476#4

Problem: Extract User Data

```
                let secondParagraph = document.createElement('p');
                secondParagraph.textContent = `Phone Number: ${match[2]}`;
                result.appendChild(secondParagraph);
                let thirdParagraph = document.createElement('p');
                thirdParagraph.textContent = `Email: ${match[3]}`;
                result.appendChild(thirdParagraph);
            } else {
                let errorParagraph = document.createElement('p');
                errorParagraph.textContent = 'Invalid data';
                result.appendChild(errorParagraph);
            }
            let dashes = document.createElement('p');
            dashes.textContent = '- - -';
            result.appendChild(dashes);
        }
    }
    userData(arr);
}
```



REGULAR EXPRESSION

17 matches, 1035 steps (~2ms)

```
/ ([A-Z])\w+ / g
```

TEST STRING

SWITCH TO UNIT TESTS

```
Edit the Expression & Text to see matches. Roll over matches or the expression for details.
Undo mistakes with ctrl-z. Save Favorites & Share expressions with friends or the Community.
Explore your results with Tools. A full Reference & Help is available in the Library, or
watch the video Tutorial.

Sample text for testing:
abcdefghijklmnopqrstuvwxyz ABCDEFGHIJKLMNOPQRSTUVWXYZ
0123456789 _+-.,!@#$%^&*();\/|<>"'
12345 -98.7 3.141 .6180 9,000 +42
555.123.4567    +1-(800)-555-2468
```

Live Demo

www.regex101.com

Live Exercises

Summary

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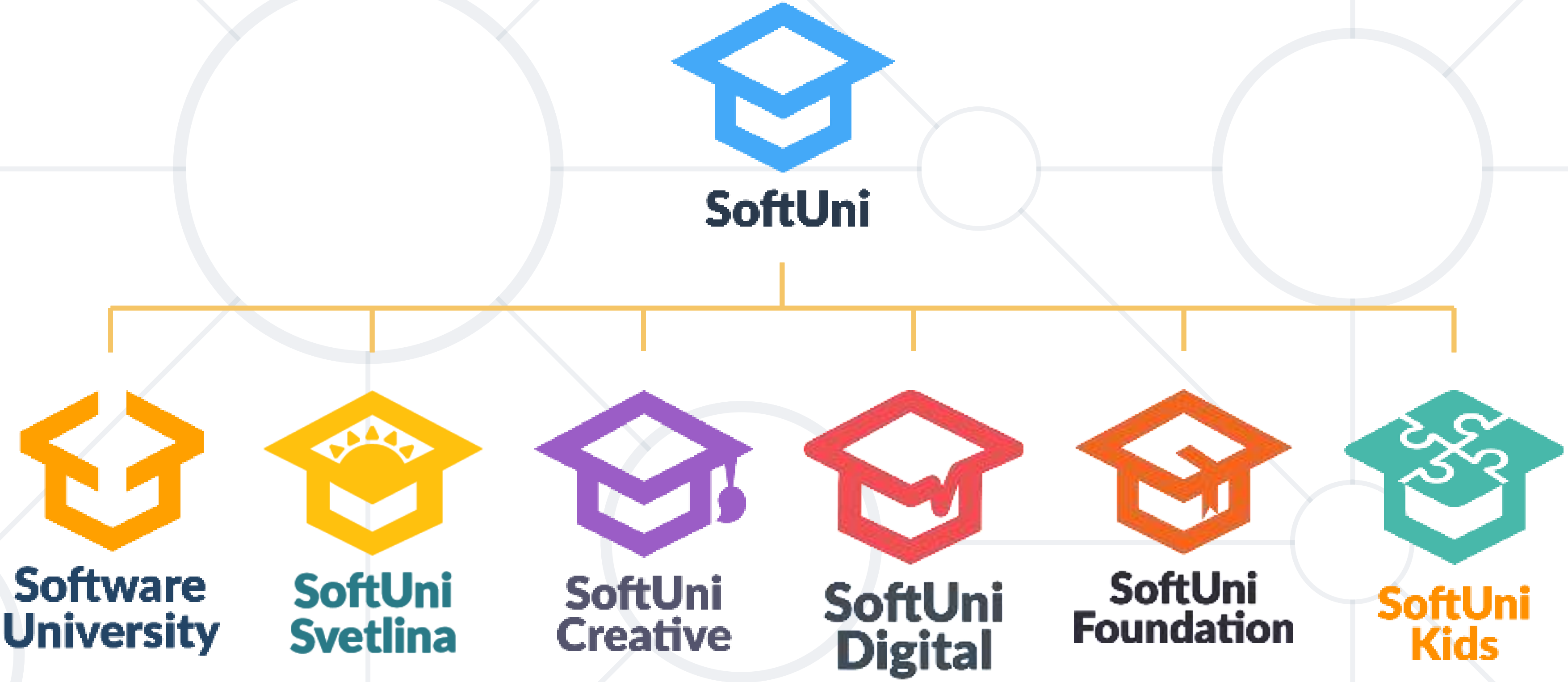
- **Strings** in JavaScript
- String **Methods**: **split()**, **substring()**, **indexOf()**, **trim()**, **replace()** . . .
- Regular expressions match text by **pattern**
- Regex methods and quantifiers

Questions?



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