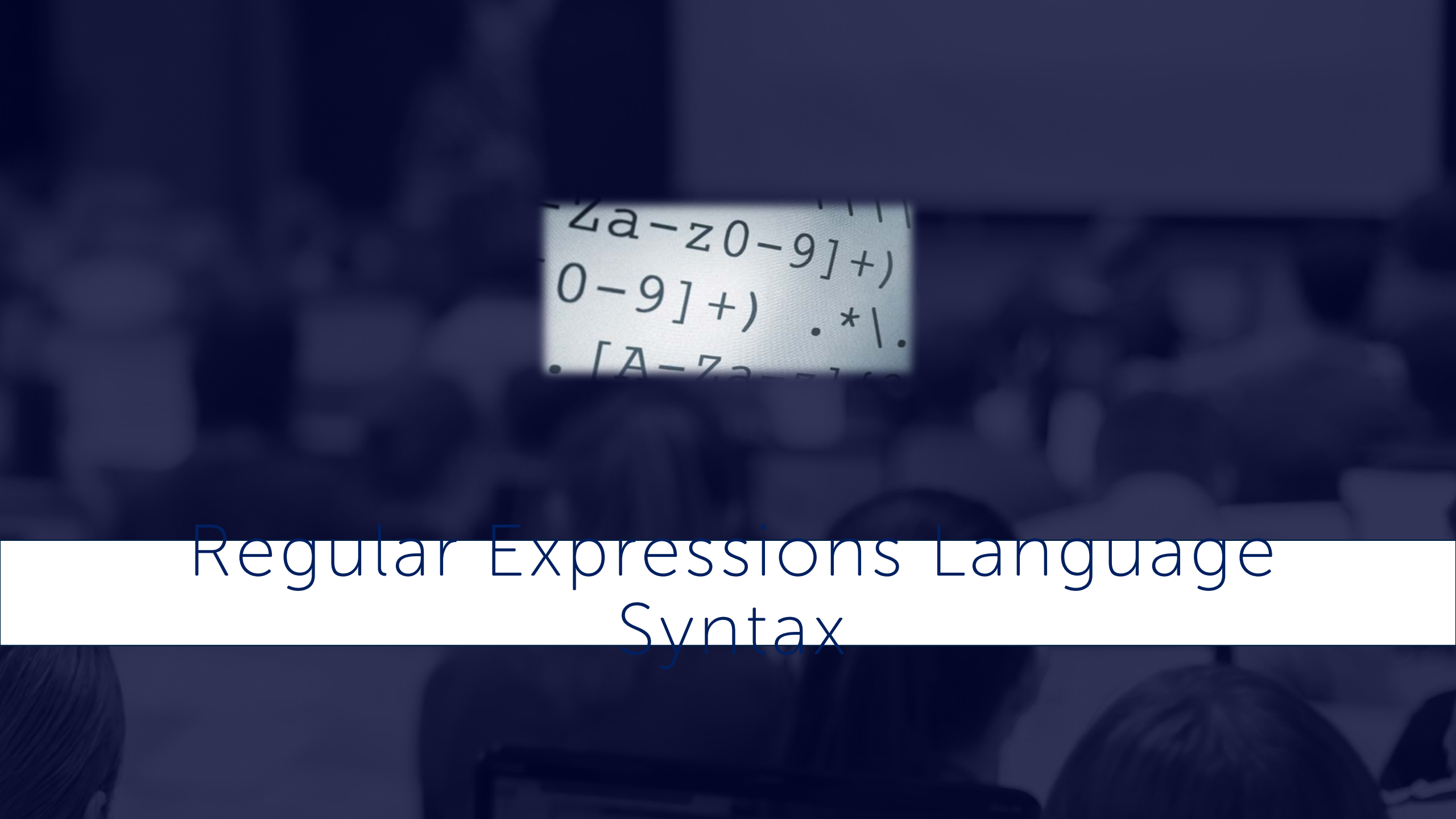
Regular Expressions (RegEx)



Regular Expressions Language Syntax

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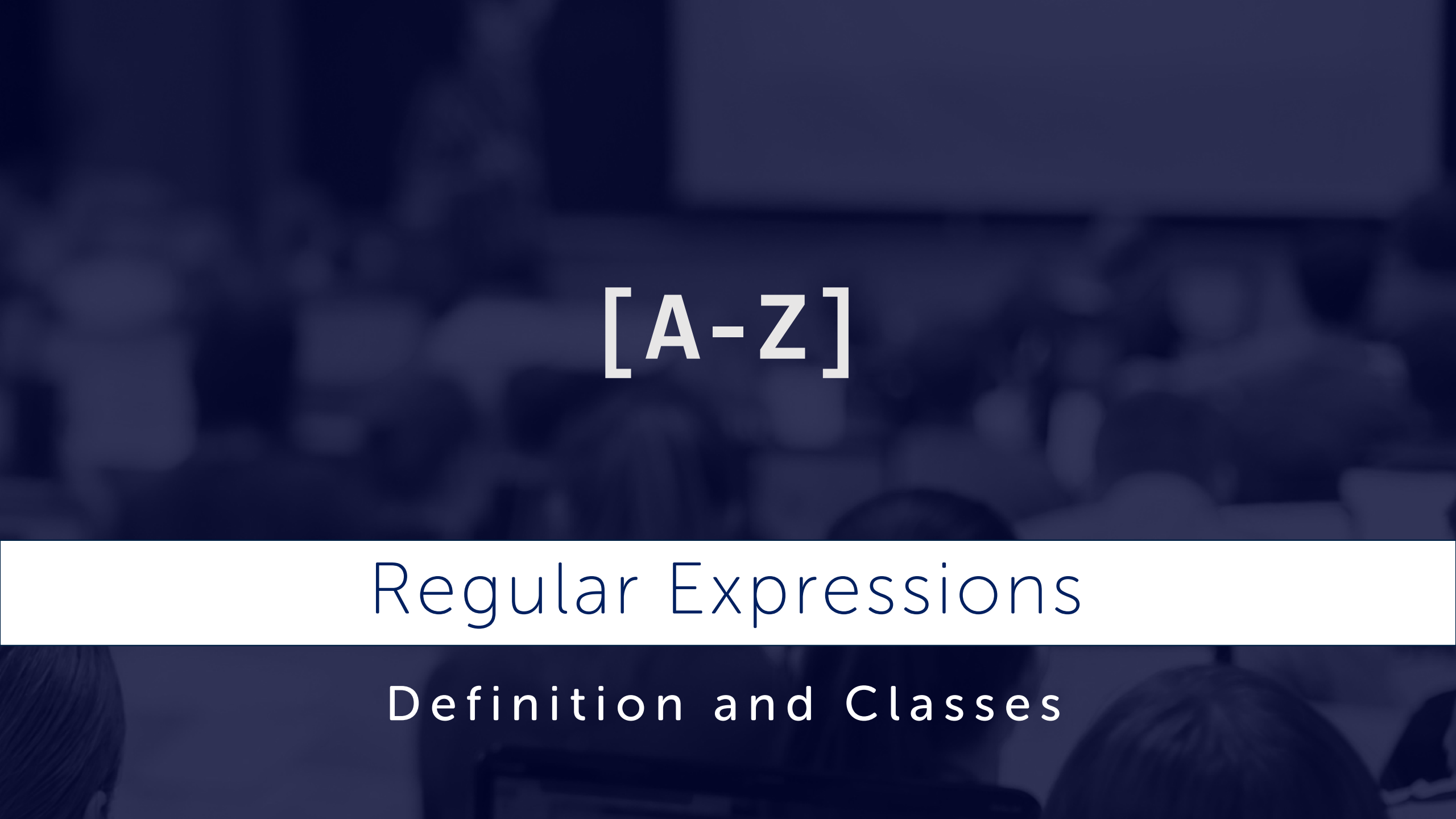
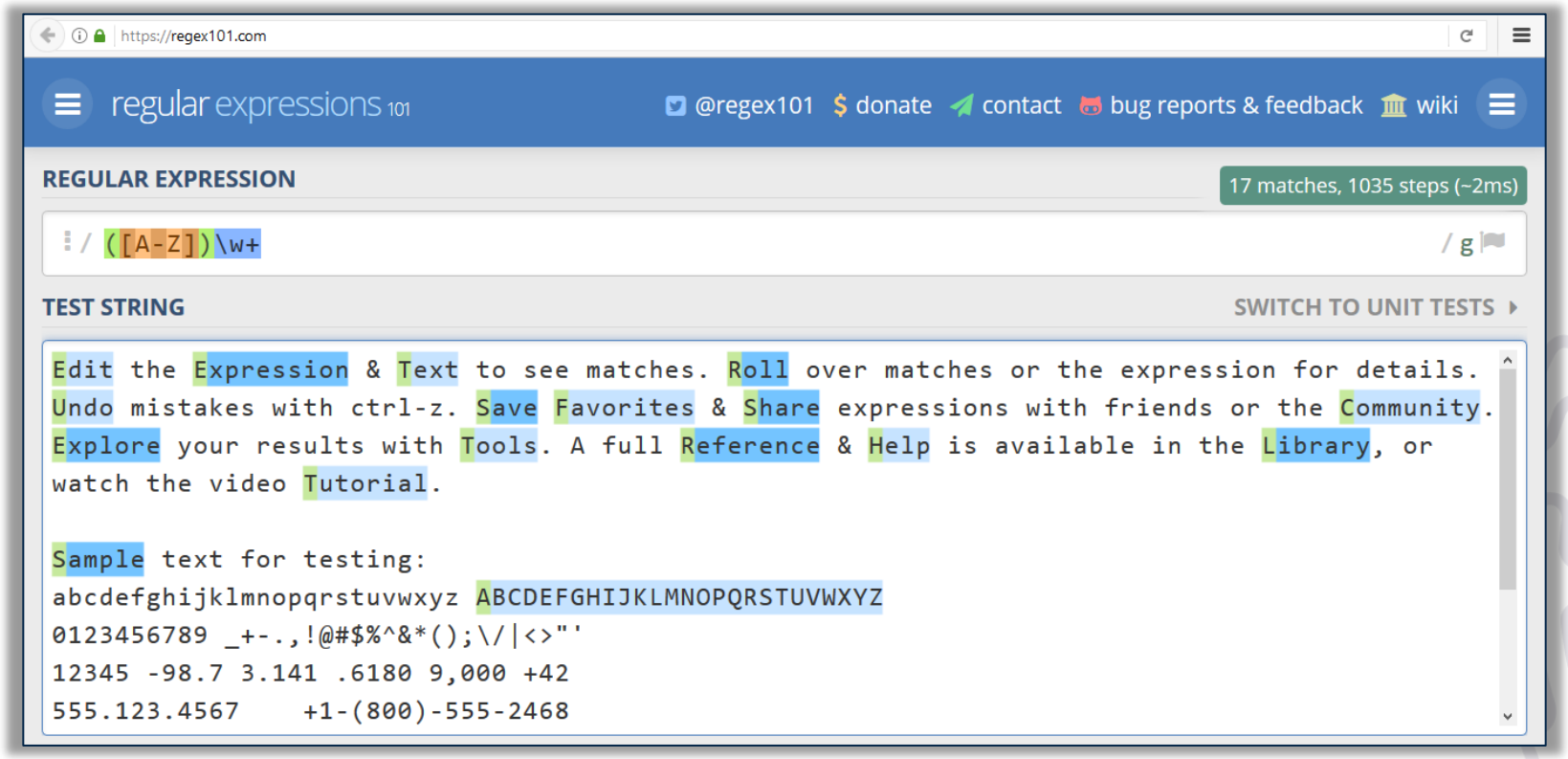


Regular Expressions

Definition and Classes

What Are Regular Expressions?

- Regular expressions (regex)
  - Match text by pattern
- 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
- Play with regex live at: regexr.com, regex101.com



www.regex101.com

Live Demo

Regular Expression Pattern – Example

- Regular expressions (regex) describe a search pattern
- Used to find / extract / replace / split data from text by pattern

```
[A-Z][a-z]+ [A-Z][a-z]+
```

```
John Smith
```

```
Linda Davis
```

```
Contact: Alex Scott
```

Character Classes: Ranges

- **[nvj]** matches any character that is either **n**, **v** or **j**

```
node.js v0.12.2
```

- **[^abc]** – matches any character that is **not a**, **b** or **c**

```
Abraham
```

- **[0-9]** – character range: matches any digit from **0** to **9**

```
John is 8 years old.
```

Predefined Classes

- \w – matches any **word character** (a-z, A-Z, 0-9, _)
- \W – matches any **non-word character** (the opposite of \w)
- \s – matches any **white-space** character
- \S – matches any **non-white-space** character (opposite of \s)
- \d – matches any **decimal digit** (0-9)
- \D – matches any **non-decimal character** (the opposite of \d)

Quantifiers

Grouping

Quantifiers

- `*` – matches the previous element zero or more times

```
\+\d*   ➡   +359885976002 a+b
```

- `+` – matches the previous element one or more times

```
\+\d+   ➡   +359885976002 a+b
```

- `?` – matches the previous element zero or one time

```
\+\d?   ➡   +3598859760002 a+b
```

- `{3}` – matches the previous element exactly 3 times

```
\+\d{3}   ➡   +359885976002 a+b
```

Grouping Constructs

- **(subexpression)** – captures the matched subexpression as numbered group

```
\d{2}-(\w{3})-\d{4}
```
➡
```
22-Jan-2015
```

- **(?:subexpression)** – defines a non-capturing group

```
^(?:Hi|hello),\s*(\w+)$
```
➡
```
Hi, Peter
```

- **(?<name>subexpression)** – defines a named capturing group

```
(?<day>\d{2})-(?<month>\w{3})-
(?<year>\d{4})
```
➡
```
22-Jan-2015
```

Problem: Match All Words

- Write a regular expression in www.regex101.com that extracts all word char sequences from given text

```
_ (Underscores) are also word characters!
```

```
_|Underscores|are|also|word|characters
```

Problem: Match Dates

- Write a regular expression that extracts **dates** from text
  - Valid date format: **dd-MMM-yyyy**
  - Examples: **12-Jun-1999**, **3-Nov-1999**

```
I am born on 30-Dec-1994.
My father is born on the 9-Jul-1955.
01-July-2000 is not a valid date.
```

Problem: Email Validation

- Write a regular expression that performs simple **email validation**
  - An email consists of: **username @ domain name**
  - **Usernames** are **alphanumeric**
  - **Domain names** consist of **two strings**, separated by a **period**
  - **Domain names** may contain only **English letters**

Valid:

```
valid123@email.com
```

Invalid:

```
invalid*name@emai1.com
```

Backreferences

Numbered Capturing Group

Backreferences Match Previous Groups

- **\number** – matches the value of a numbered capture group

```
<(\w+)[^>]*>.*?<\/\1>
```

```
<b>Regular Expressions</b> are cool!
<p>I am a paragraph</p> … some text after
Hello, <div>I am a<code>DIV</code></div>!
<span>Hello, I am Span</span>
<a href="https://kingslanduniversity.com/"
>Kingsland</a>
```

Regular Expressions in JS

Regex in JS

- In JS you construct a regular expression in one of two ways:
  - Regular Expression Literal
  - The constructor function **RegExp**

```
// Provides compilation when the script is loaded
let regLiteral = /[A-Za-z]+/g

// Provides runtime compilation
// Used when the pattern is from another source
let regExp = new RegExp('[A-Za-z]+', 'g');
```

Validating String by Pattern

- The method **`test(string text)`**
  - Determines whether there is a match

```
let text = 'Today is 2015-05-11';
let regex = /\d{4}-\d{2}-\d{2}/g;


let containsValidDate = regex.test(text);
console.log(containsValidDate); // true
```

Checking for Matches

- The method **`match(regex)`**
  - Returns an **array** of all matches (strings)

```
let text = 'Peter: 123 Mark: 456';
let regex = /([A-Z][a-z]+): (\d+)/g;
let matches = text.match(regex);


console.log(matches.length); // 2
console.log(matches[0]); // Peter: 123
console.log(matches[1]); // Mark: 456
```

Using the Exec() Method

- The method **`exec(string text)`**
  - Works with a pointer & returns the **groups**

```
let text = 'Peter: 123 Mark: 456';
let regex = /([A-Z][a-z]+): (\d+)/g;
let firstMatch = regex.exec(text);
let secondMatch = regex.exec(text);
console.log(firstMatch[0]) // Peter: 123
console.log(firstMatch[1]); // Peter
console.log(firstMatch[2]); // 123
```

Replacing with Regex

- The method **`replace(regex, string replacement)`**
  - Replaces all strings that match the pattern with the provided replacement

```
let text = 'Peter: 123 Mark: 456';
let replacement = '999';
let regex = /\d{3}/g;
let result = text.replace(regex, replacement);
// Peter: 999 Mark: 999
```

Splitting with Regex

- The method **`split(regex)`**
  - Splits the text by the pattern
  - Returns an array of strings

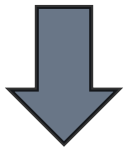
```
let text = '1  2 3    4';
let regex = /\s+/g;
let result = text.split(regex);
console.log(result) // ['1', '2', '3', '4'];
```

Live Exercises

Problem: Match Full Name

- You are given a list of names
  - Match all full names

```
Ivan Ivanov, Ivan ivanov, ivan Ivanov, IVan Ivanov, Test
Testov, Ivan   Ivanov
```



```
Ivan Ivanov Test Testov
```

Solution: Match Full Name

```
function solve(input) {
  let pattern = /\b[A-Z][a-z]+[ ][A-Z][a-z]+\b/g;
  let validNames = [];
  let validName = null;
  while((validName = pattern.exec(input)) !== null){
    validNames.push(validName[0]);
  }
  console.log(validNames.join(' '));
}
```

Problem: Match Phone Number

- Match a **valid phone number** from **Atlanta**. After you find all **valid phones**, **print** them on the console, separated by **", "**
- A valid number has the following characteristics:
  - Starts with "**+404**"
  - Followed by the **number** itself, which consists of **7 digits** (separated in **two groups** of **3** and **4 digits** respectively)
  - The different **parts** are **separated** by either a **space** or a **hyphen** ('**-**')

Solution: Match Phone Number

```
function regExPhones(input) {
  let validNames = [];
  let pattern = /(?<!\d)[+]404([ -])\d{3}\1\d{4}\b/g;
  while ((validName = pattern.exec(input)) !== null) {
    validNames.push(validName[0]);
  }
  console.log(validNames.join(', '));
}
```

Summary

- **Regular expressions** describe **patterns**
  for searching through text
- Define **special characters**, **operators** and **constructs** for building complex pattern
- Can utilize **character classes**, **groups**,
  quantifiers and more

Questions?

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