Java Regex

The **Java Regex** or Regular Expression is an API to *define a pattern for searching or manipulating strings*.

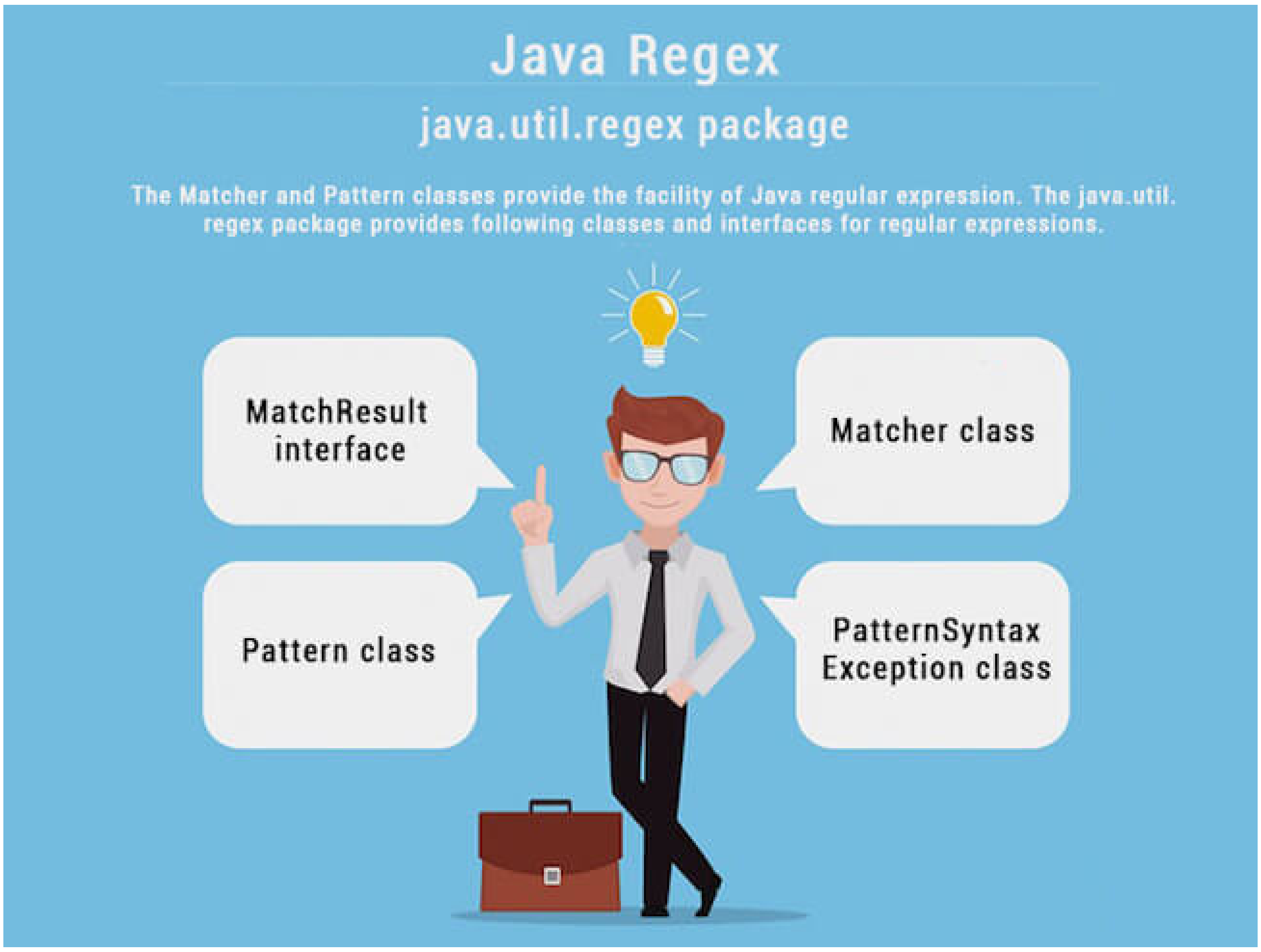
It is widely used to define the constraint on strings such as password and email validation. After learning Java regex tutorial, you will be able to test your regular expressions by the Java Regex Tester Tool.

Java Regex API provides 1 interface and 3 classes in **java.util.regex** package.

java.util.regex package

The Matcher and Pattern classes provide the facility of Java regular expression. The java.util.regex package provides following classes and interfaces for regular expressions.

1. MatchResult interface
2. Matcher class
3. Pattern class
4. PatternSyntaxException class


Java Regex
java.util.regex package
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MatchResult interface
Matcher class
Pattern class
PatternSyntax Exception class

Matcher class

It implements the **MatchResult** interface. It is a *regex engine* which is used to perform match operations on a character sequence.

No.	Method	Description
1	boolean matches()	test whether the regular expression matches the pattern.
2	boolean find()	finds the next expression that matches the pattern.
3	boolean find(int start)	finds the next expression that matches the pattern from the given start number.
4	String group()	returns the matched subsequence.
5	int start()	returns the starting index of the matched subsequence.
6	int end()	returns the ending index of the matched subsequence.
7	int groupCount()	returns the total number of the matched subsequence.

Pattern class

It is the *compiled version of a regular expression*. It is used to define a pattern for the regex engine.

No.	Method	Description
1	static Pattern compile(String regex)	compiles the given regex and returns the instance of the Pattern.
2	Matcher matcher(CharSequence input)	creates a matcher that matches the given input with the pattern.
3	static boolean matches(String regex, CharSequence input)	It works as the combination of compile and matcher methods. It compiles the regular expression and matches the given input with the pattern.
4	String[] split(CharSequence input)	splits the given input string around matches of given pattern.
5	String pattern()	returns the regex pattern.

Example of Java Regular Expressions

There are three ways to write the regex example in Java.

```
import java.util.regex.*;
public class RegexExample1{
public static void main(String args[]){
//1st way
Pattern p = Pattern.compile(".s");//. represents single character
Matcher m = p.matcher("as");
boolean b = m.matches();

//2nd way
boolean b2=Pattern.compile(".s").matcher("as").matches();

//3rd way
boolean b3 = Pattern.matches(".s", "as");

System.out.println(b+" "+b2+" "+b3);
}}
```

Test it Now

Output

```
true true true
```

Regular Expression . Example

The . (dot) represents a single character.

```
import java.util.regex.*;
class RegexExample2{
public static void main(String args[]){
System.out.println(Pattern.matches(".s", "as"));//true (2nd char is s)
System.out.println(Pattern.matches(".s", "mk"));//false (2nd char is not s)
System.out.println(Pattern.matches(".s", "mst"));//false (has more than 2 char)
System.out.println(Pattern.matches(".s", "amms"));//false (has more than 2 char)
System.out.println(Pattern.matches("..s", "mas"));//true (3rd char is s)
}}
```

Test it Now

Regex Character classes

No.	Character Class	Description
1	[abc]	a, b, or c (simple class)
2	[^abc]	Any character except a, b, or c (negation)
3	[a-zA-Z]	a through z or A through Z, inclusive (range)

4	[a-d[m-p]]	a through d, or m through p: [a-dm-p] (union)
5	[a-z&&[def]]	d, e, or f (intersection)
6	[a-z&&[^bc]]	a through z, except for b and c: [ad-z] (subtraction)
7	[a-z&&[^m-p]]	a through z, and not m through p: [a-lq-z](subtraction)

Regular Expression Character classes Example

```
import java.util.regex.*;
class RegexExample3{
public static void main(String args[]){
System.out.println(Pattern.matches("[amn]", "abcd"));//false (not a or m or n)
System.out.println(Pattern.matches("[amn]", "a"));//true (among a or m or n)
System.out.println(Pattern.matches("
[amn]", "ammmna"));//false (m and a comes more than once)
}}
```

Test it Now

Regex Quantifiers

The quantifiers specify the number of occurrences of a character.

Regex	Description
X?	X occurs once or not at all
X+	X occurs once or more times
X*	X occurs zero or more times
X{n}	X occurs n times only
X{n,}	X occurs n or more times
X{y,z}	X occurs at least y times but less than z times

Regular Expression Character classes and Quantifiers Example

```
import java.util.regex.*;
```

```
class RegexExample4{
public static void main(String args[]){
System.out.println("? quantifier ....");
System.out.println(Pattern.matches("[amn]?", "a"));//true (a or m or n comes one time)
System.out.println(Pattern.matches("[amn]?", "aaa"));//false (a comes more than one time)
System.out.println(Pattern.matches("
[amn]?", "aammmnn"));//false (a m and n comes more than one time)
System.out.println(Pattern.matches("
[amn]?", "aazzta"));//false (a comes more than one time)
System.out.println(Pattern.matches("
[amn]?", "am"));//false (a or m or n must come one time)

System.out.println("+ quantifier ....");
System.out.println(Pattern.matches("[amn]+", "a"));//true (a or m or n once or more times)
System.out.println(Pattern.matches("[amn]+", "aaa"));//true (a comes more than one time)
System.out.println(Pattern.matches("
[amn]+", "aammmnn"));//true (a or m or n comes more than once)
System.out.println(Pattern.matches("
[amn]+", "aazzta"));//false (z and t are not matching pattern)

System.out.println("* quantifier ....");
System.out.println(Pattern.matches("
[amn]*", "ammmna"));//true (a or m or n may come zero or more times)

}}
```

Test it Now

Regex Metacharacters

The regular expression metacharacters work as shortcodes.

Regex	Description
.	Any character (may or may not match terminator)
\d	Any digits, short of [0-9]
\D	Any non-digit, short for [^0-9]
\s	Any whitespace character, short for [\t\n\x0B\f\r]
\S	Any non-whitespace character, short for [^\s]
\w	Any word character, short for [a-zA-Z_0-9]

\W	Any non-word character, short for [^\w]
\b	A word boundary
\B	A non word boundary

Regular Expression Metacharacters Example

```
import java.util.regex.*;
class RegexExample5{
public static void main(String args[]){
System.out.println("metacharacters d....");\\d means digit

System.out.println(Pattern.matches("\\d", "abc"));//false (non-digit)
System.out.println(Pattern.matches("\\d", "1"));//true (digit and comes once)
System.out.println(Pattern.matches("\\d", "4443"));//false (digit but comes more than once)
System.out.println(Pattern.matches("\\d", "323abc"));//false (digit and char)

System.out.println("metacharacters D....");\\D means non-digit

System.out.println(Pattern.matches("\\D", "abc"));//false (non-
digit but comes more than once)
System.out.println(Pattern.matches("\\D", "1"));//false (digit)
System.out.println(Pattern.matches("\\D", "4443"));//false (digit)
System.out.println(Pattern.matches("\\D", "323abc"));//false (digit and char)
System.out.println(Pattern.matches("\\D", "m"));//true (non-digit and comes once)

System.out.println("metacharacters D with quantifier....");
System.out.println(Pattern.matches("\\D*", "mak"));//true (non-
digit and may come 0 or more times)

}}
```

Test it Now

Regular Expression Question 1

```
/*Create a regular expression that accepts alphanumeric characters only.
Its length must be six characters long only.*/

import java.util.regex.*;
```

```
class RegexExample6{
public static void main(String args[]){
System.out.println(Pattern.matches("[a-zA-Z0-9]{6}", "arun32"));//true
System.out.println(Pattern.matches("[a-zA-Z0-9]
{6}", "kkvarun32"));//false (more than 6 char)
System.out.println(Pattern.matches("[a-zA-Z0-9]{6}", "JA2Uk2"));//true
System.out.println(Pattern.matches("[a-zA-Z0-9]{6}", "arun$2"));//false ($ is not matched)
}}
```

Test it Now

Regular Expression Question 2

```
/*Create a regular expression that accepts 10 digit numeric characters
 starting with 7, 8 or 9 only.*/

import java.util.regex.*;
class RegexExample7{
public static void main(String args[]){
System.out.println("by character classes and quantifiers ...");
System.out.println(Pattern.matches("[789]{1}[0-9]{9}", "9953038949"));//true
System.out.println(Pattern.matches("[789][0-9]{9}", "9953038949"));//true

System.out.println(Pattern.matches("[789][0-9]
{9}", "99530389490"));//false (11 characters)
System.out.println(Pattern.matches("[789][0-9]{9}", "6953038949"));//false (starts from 6)
System.out.println(Pattern.matches("[789][0-9]{9}", "8853038949"));//true

System.out.println("by metacharacters ...");
System.out.println(Pattern.matches("[789]{1}\\d{9}", "8853038949"));//true
System.out.println(Pattern.matches("[789]
{1}\\d{9}", "3853038949"));//false (starts from 3)

}}
```

Test it Now

Java Regex Finder Example

```
import java.util.regex.Pattern;
import java.util.Scanner;
import java.util.regex.Matcher;
```

```java
public class RegexExample8{
    public static void main(String[] args){
        Scanner sc=new Scanner(System.in);
        while (true) {
            System.out.println("Enter regex pattern:");
            Pattern pattern = Pattern.compile(sc.nextLine());
            System.out.println("Enter text:");
            Matcher matcher = pattern.matcher(sc.nextLine());
            boolean found = false;
            while (matcher.find()) {
                System.out.println("I found the text "+matcher.group()+" starting at index "+
                 matcher.start()+" and ending at index "+matcher.end());
                found = true;
            }
            if(!found){
                System.out.println("No match found.");
            }
        }
    }
}
```

Output:

```
Enter regex pattern: java
Enter text: this is java, do you know java
I found the text java starting at index 8 and ending at index 12
I found the text java starting at index 26 and ending at index 30
```