Regular Expression

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    - Write a program to display all .txt file names present in specific(E:\scjp) folder

Introduction

A Regular Expression is a expression which represents a group of Strings according to a particular pattern.

Example:

We can write a Regular Expression to represent all valid mail ids.
We can write a Regular Expression to represent all valid mobile numbers.

The main important application areas of Regular Expression are:

To implement validation logic.
To develop Pattern matching applications.
To develop translators like compilers, interpreters etc. To develop digital circuits.
To develop communication protocols like TCP/IP, UDP etc.

Example:

```
import java.util.regex.*;
class RegularExpressionDemo
{
       public static void main(String[] args)
       {
              int count=0;
              Pattern p=Pattern.compile("ab");
              Matcher m=p.matcher("abbbabbaba");
              while(m.find())
              {
              count++; System.out.println(m.start()+"------
              "+m.end()+"--
----"+m.group());
              }
              System.out.println("The no of occurences
:"+count);
       }
}
Output: 0------
2------ab 4----
--6------ab 7--
----9------ab
The no of occurrences: 3
```

Pattern class:

A Pattern object represents "compiled version of Regular Expression".
We can create a Pattern object by using compile() method of Pattern class.

public static Pattern compile(String
regex); Example:

```
Pattern p=Pattern.compile("ab");
```

Note: if we refer API we will get more information about pattern class.

Matcher:

A Matcher object can be used to match character sequences against a Regular Expression.
We can create a Matcher object by using matcher() method of Pattern class.

```
public Matcher matcher(String target);
```

```
Matcher m=p.matcher("abbbabbaba");
```

Important methods of Matcher class:

1. boolean find();
   It attempts to find next match and returns true if it is available otherwise returns false.

2. int start();
   Returns the start index of the match.
3. int end();
   Returns the offset(equalize) after the last character matched.(or) Returns the "end+1" index of the matched.
4. String group();
   Returns the matched Pattern.

Note: Pattern and Matcher classes are available in java.util.regex package, and introduced in 1.4 version

Character classes:

1. [abc]---------- Either 'a' or 'b' or 'c'
2. [^abc] ---------- Except 'a' and 'b' and 'c'
3. [a-z] ---------- Any lower case alphabet symbol
4. [A-Z] ---------- Any upper case alphabet symbol
5. [a-zA-Z] ---------- Any alphabet symbol
6. [0-9] ---------- Any digit from 0 to 9
7. [a-zA-Z0-9] ---------- Any alphanumeric character
8. [^a-zA-Z0-9] ---------- Any special character

Example:

```
import java.util.regex.*;
class RegularExpressionDemo
{
       public static void main(String[] args)
       {
              Pattern  p=Pattern.compile("x");
              Matcher  m=p.matcher("a1b7@z#");
              while(m.find())
              {
                     System.out.println(m.start()+"-------
"+m.group());
              }
       }
}
```

Output:

x=[abc]	x=[^abc]	x=[0-9]	x=[a-z]
0-------a	1-------1	1-------1	0-------a
2-------b	3-------7	3-------7	2-------b
	4-------@		5-------z
	5-------z		
	6-------#		

Predefined character classes:

\s----------space character
\d----------Any digit from o to 9[o-9]
\w----------Any word character[a-zA-Z0-9]
. ----------Any character including special characters.

\S----------any character except space character
\D----------any character except digit
\W----------any character except word character(special character)

Example:

```
import java.util.regex.*;
class RegularExpressionDemo
{
       public static void main(String[] args)
       {
              Pattern p=Pattern.compile("x");
              Matcher       m=p.matcher("a1b7
              @z#"); while(m.find())
              {
                     System.out.println(m.start()+"-------
"+m.group());
              }
       }
}
```

Output:

x=\\s	x=\\d	x=\\w	x=.
4-------	1-------1	0-------a	0-------a
	3-------7	1-------1	1-------1
		2-------b	2-------b
		3-------7	3-------7
		6-------z	4-------
			5-------@
			6-------z
			7-------#

Quantifiers:

Quantifiers can be used to specify no of characters to match.

a----------Exactly one 'a'

a+----------At least one 'a'

a*----------Any no of a's including zero number

a? ----------At most one 'a'

Example:

```
import java.util.regex.*;
class RegularExpressionDemo
{
	public static void main(String[] args)
	{
		Pattern p=Pattern.compile("x");
		Matcher m=p.matcher("abaabaaab");
		while(m.find())
		{
			System.out.println(m.start()+"-------
"+m.group());
		}
	}
}
```

Output:

x=a	x=a+	x=a*	x=a?
0-------a	0-------a	0-------a	0-------a
2-------a	2-------aa	1-------	1-------
3-------a	5-------aaa	2-------aa	2-------a
5-------a		4-------	3-------a
6-------a		5-------aaa	4-------
7-------a		8-------	5-------a
		9-------	6-------a
			7-------a
			8-------
			9-------

Pattern class split() method:

Pattern class contains split() method to split the given string against a regular expression.

Example 1:

```
import java.util.regex.*;
class RegularExpressionDemo
{
	public static void main(String[] args)
	{
		Pattern p=Pattern.compile("\\s");
		String[] s=p.split("ashok software
		solutions"); for(String s1:s)
		{
			System.out.println(s1);//ashok
					//software
					 //solutions
		}
	}
}
```

Example 2:

```
import java.util.regex.*;
class RegularExpressionDemo
{
```

```
	public static void main(String[] args)
	{
		Pattern p=Pattern.compile("\\."); //(or)[.]
		String[] s=p.split("www.dugrajobs.com");
		for(String s1:s)
		{
			System.out.println(s1);//www
					//dugrajobs
					 //com
		}
	}
}
```

String class split() method:

String class also contains split() method to split the given string against a regular expression.

Example:

```
import java.util.regex.*;
class RegularExpressionDemo
{
	public static void main(String[] args)
	{
		String  s="www.saijobs.com";
		String[]  s1=s.split("\\.");
		for(String s2:s1)
		{
			System.out.println(s2);//www
					 //saijobs
					 //com
		}
	}
}
```

Note : String class split() method can take regular expression as argument where as pattern class split() method can take target string as the argument.

StringTokenizer:

This class present in java.util package.
It is a specially designed class to perform string tokenization.

Example 1:

```
import java.util.*;
class RegularExpressionDemo
{
	public static void main(String[] args)
	{
		StringTokenizer st=new
StringTokenizer("sai software solutions");
```

```
            while(st.hasMoreTokens())
            {
                  System.out.println(st.nextToken());//sai
                                                     //software
                                                     //solutions
            }
      }
}
```

The default regular expression for the StringTokenizer is space.

Example 2:

```
import java.util.*;
class RegularExpressionDemo
{
      public static void main(String[] args)
      {



         StringTokenizer st=new
StringTokenizer("1,99,988",",");
            while(st.hasMoreTokens())
            {
                  System.out.println(st.nextToken());//1
                                                     //99
                                                     //988
            }
      }
}
```

Requirement:

Write a regular expression to represent all valid identifiers in java language.

Rules:

The allowed characters are:

1. **a to z, A to Z, 0 to 9, -,#**
2. **The 1st character should be alphabet symbol only.**
3. **The length of the identifier should be at least 2.**

Program:

```
import java.util.regex.*;
class RegularExpressionDemo
{
      public static void main(String[] args)
      {
            Pattern p=Pattern.compile("[a-zA-Z][a-zA-Z0-9-
#]+"); (or)
```

```
            Pattern p=Pattern.compile("[a-zA-Z][a-zA-Z0-
9-#][a-zA-Z0-9-#]*");
            Matcher m=p.matcher(args[0]);
            if(m.find()&&m.group().equals(args[0]))
            {
                  System.out.println("valid identifier");
            }
            else
            {
                  System.out.println("invalid identifier");
            }

      }
}
Output:
E:\scjp>javac  RegularExpressionDemo.java
E:\scjp>java  RegularExpressionDemo  ashok
Valid identifier
E:\scjp>java RegularExpressionDemo ?ashok
Invalid identifier
```

Requirement:

Write a regular expression to represent all mobile numbers.

1. **Should contain exactly 10 digits.**
2. **The 1st digit should be 7 to 9.**

```
Program:
import java.util.regex.*;
class RegularExpressionDemo
{
      public static void main(String[] args)
      {
            Pattern p=Pattern.compile(" [7-9][0-9][0-
                        9][0-9][0-9][0-
9][0-9][0-9][0-9][0-9]");
            //Pattern p=Pattern.compile("[7-9][0-
            9]{9}"); Matcher m=p.matcher(args[0]);
            if(m.find()&&m.group().equals(args[0]))
            {
                  System.out.println("valid number");
            }
            else
            {
                  System.out.println("invalid number");
            }
}
}
```

```
Analysis:

10 digits mobile: [7-9][0-9][0-9][0-9][0-9][0-9][0-
9][0-9][0-9][0-9] (or) [7-9][0-9]{9}


Output:

E:\scjp>javac RegularExpressionDemo.java
E:\scjp>java RegularExpressionDemo 9989123456
Valid number

E:\scjp>java RegularExpressionDemo
6989654321 Invalid number
10 digits (or) 11 digits:
(0?[7-9][0-9]{9})

Output:

E:\scjp>javac RegularExpressionDemo.java

E:\scjp>java RegularExpressionDemo 9989123456

Valid number

E:\scjp>java RegularExpressionDemo 09989123456

Valid number

E:\scjp>java RegularExpressionDemo
919989123456 Invalid number
10 digits (0r) 11 digit (or) 12
digits: (0|91)?[7-9][0-9]{9} (or)
(91)?(0?[7-9][0-9]{9})

E:\scjp>javac RegularExpressionDemo.java

E:\scjp>java RegularExpressionDemo 9989123456
Valid number
E:\scjp>java RegularExpressionDemo 09989123456
Valid number
E:\scjp>java RegularExpressionDemo 919989123456
Valid number
E:\scjp>java RegularExpressionDemo 69989123456
Invalid number
```

Requirement:

Write a regular expression to represent all Mail Ids.

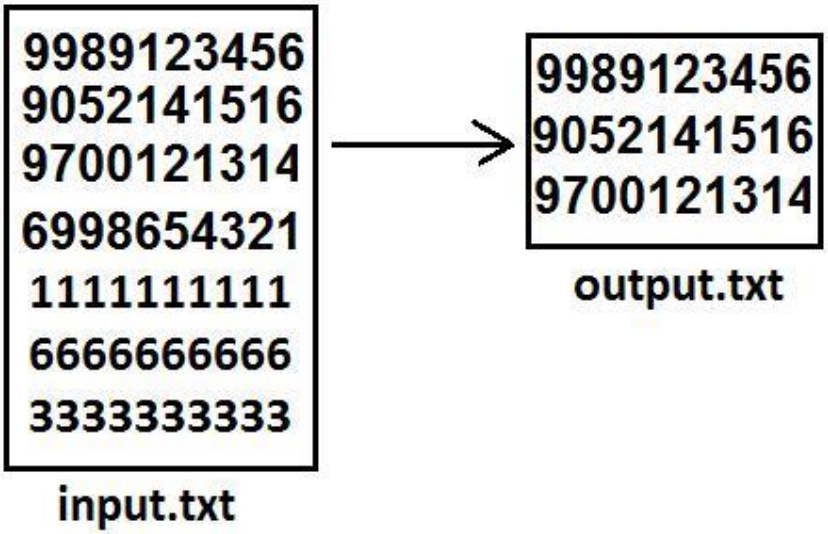
```
Program:

import java.util.regex.*;
class RegularExpressionDemo
{
       public static void main(String[] args)
       {
              Pattern p=Pattern.compile("
```

```
                                    [a-zA-Z][a-zA-Z0-9-.]*@[a-zA-Z0-
9]+([.][a-zA-Z]+)+");
                Matcher m=p.matcher(args[0]);
                if(m.find()&&m.group().equals(args[0]))
                {
                        System.out.println("valid mail id");
                }
                else
                {
                        System.out.println("invalid mail id");
                }
        }
}
Output:
E:\scjp>javac RegularExpressionDemo.java
E:\scjp>java RegularExpressionDemo
sunmicrosystem@gmail.com Valid mail id
E:\scjp>java RegularExpressionDemo
999sunmicrosystem@gmail.com Invalid mail id
E:\scjp>java RegularExpressionDemo
999sunmicrosystem@gmail.co9 Invalid mail id
```

Requirement:

Write a program to extract all valid mobile numbers from a file.

Diagram:




```
Program:
import java.util.regex.*;
import java.io.*;
class RegularExpressionDemo
{
        public static void main(String[] args)throws IOException
```

```
	{
		PrintWriter out=new PrintWriter("output.txt");
		BufferedReader br=new BufferedReader(new
FileReader("input.txt"));
		Pattern p=Pattern.compile("(0|91)?[7-9][0-
9]{9}");
		String line=br.readLine();
		while(line!=null)
		{
			Matcher m=p.matcher(line);
			while(m.find())
			{
				out.println(m.group());
			}
			line=br.readLine();
		}
		out.flush();
	}
}
```

Requirement:

Write a program to extract all Mail IDS from the File.

Note: In the above program replace mobile number regular expression with MAIL ID regular expression.

Requirement:

Write a program to display all .txt file names present in E:\scjp folder.

Program:

```
import java.util.regex.*;
import java.io.*;
class RegularExpressionDemo
{
	public static void main(String[] args)throws IOException
	{
		int count=0;
		Pattern p=Pattern.compile("[a-zA-Z0-
9-$.]+[.]txt");
		File f=new File("E:\\scjp");
		String[] s=f.list();
		for(String s1:s)
		{
			Matcher m=p.matcher(s1);
			if(m.find()&&m.group().equals(s1))
			{
				count++;
				System.out.println(s1);
			}

		}
```

```
                System.out.println(count);
        }
}
Output:
input.txt
output.txt
outut.txt
3
```

Write a program to check whether the given mailid is valid or not.

In the above program we have to replace mobile number regular expression with mailid regular expression

Write a regular expressions to represent valid Gmail mail id's
: [a-zA-Z0-9][a-zA-Z0-9-.]*@gmail[.]com

Write a regular expressions to represent all Java language identifiers
: Rules :

The length of the identifier should be atleast two.

```
The   allowed   characters
 are a-z
 A-Z
 0-9
 #
 $
```

The first character should be lower case alphabet symbol k-z , and second character should be a digit divisible by 3

[k-z][0369][a-zA-Z0-9#$]*

Write a regular expressions to represent all names starts with 'a' [aA][a-zA-Z]*

To represent all names starts with 'A' ends with 'K' [aA][a-zA-Z]*[kK]