Chapter 03: Regular Expression

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1. Write down the regular expressions containing only 0 and 1 (binary).

A string starting with 0 and of odd length (e.g., 010, 001, 000, 01101), or starting with 1 and of even length (e.g., 10, 11, 1101).

`^0([01][01])*$`

`^1[01]([01][01])*$`

以上为包括0和1在内，若至少两位数，则|换为+即可*

2. For each of the following regular expressions, how many bit strings are `1000` matched by?

- `0(0|1)*1`
- `0*101*`
- `(1|01)*`
- `((0|1)0)*`

  Answer:3
- ×
- √
- √
- √

3. Summarize the usage of the metacharacaters `?`, `+`, `|`, `()` under BRE, ERE, and PCRE in a table.

BRE	ERE	PCRE
\?	?	?
\+	+	+
|	|	|

generated by ha

BRE	ERE	PCRE
\(\)	()	()

在三个之中，四种符号意义相同，区别在于BRE中使用必须使用转义字符，而ERE和PCRE中可以直接使用（相对的如果要使用这几种符号本意，则需要转义字符）。

`?` 匹配前面的子表达式零次或一次.
`+` 匹配前面的子表达式一次或多次.
`|` 指明两项之间的一个选择.
`()` 标记一个子表达式的开始和结束位置。子表达式可以获取供以后使用。

4. Grep Exercises

1. Print all lines starting with a phone number from Shanghai like 021-3420-4348 or 02134204348.
   `grep -E '^021-?[[:digit:]]{4}-?[[:digit:]]{4} filename`
2. Print all lines start with three consonant letters and followed by a blank.
   `grep -E '^[^aeiouAEIOU]{3}\s' filename`
3. Extract all the dates after 2000 for each line.
   `grep -E '^[2-9][0-9]{3,}' filename`
4. Print all lines containing a vowel (a, e, i, o, u) followed by a single character followed by the same vowel again.
   `grep -E '([aeiou]).\1' filename`
5. Print all lines containing “ear” but not “near”.
   `grep -E 'ear' filename | grep -vE 'near'`
6. Extract the “ear” but not “(n)ear”.
   `grep -oE 'ear' filename | grep -vE 'near'`
7. Print all lines that do not begin with a capital S.
   `grep -vE '^S' filename`
8. Print all lines that contain SH in either uppercase or lowercase.
   `grep -iE 'SH' filename`
9. Print all lines that contain an email address, preceded by the line number.
   `grep -nE '^[[:alpha:][:digit:]]+([-_.][[:alpha:][:digit:]]+)*@([[:alpha:][:digit:]]+[-.])+[[:alpha:][:digit:]]{2,4} @@footer filename`
10. Print all lines that contain the word “are” as a whole word.
    `grep -wE 'are' filename`

@@footer