THE UNIVERSITY OF WESTERN AUSTRALIA

SEEK WISDOM

Using Regular Expressions is a SuperPower

Lecture 10

Michael J Wise

grep

`grep` *[<options>] <regular-expression> <file>* ...

- As we saw before, you can search with an ordinary string but, in reality, it's a regular expression

正则表达式

- Useful options:

`-i` Make comparisons case insensitive ("i" matches "I")

`-n` Prepend the numbers of the matching lines

`-v` Invert the match so only non-matching lines are reported

Regular Expressions

- A regular expression is any string that you want to match with another string. However, regular expressions can also contain “wild-cards”, allowing multiple target strings to match.
- Unfortunately, UNIX has two different formats for regular expressions
  - *Shell pattern matching, .a.k.a. globbing, i.e. the regular expressions you have already seen in connection with filenames and the case statement.*
  - *A number of UNIX utilities, e.g.* `grep`*, use a different, expanded format for regular expressions derived from* `ed` *(predecessor to* `vi`*).*

Wild-card Patterns

ed	shell	Description
.	?	Single character
[ ]	[ ]	Single character from set or range(s)
[^]	[^]	Single character NOT from this set/range(s)
*		Zero or more occurrences of preceding letter
.*	*	Zero or more occurrences of any letter
^		Start of a matching string
$		End of a matching string
\	\	Take special meaning away from next letter
\(\)		Capture match for later reuse

The last of these is a more advanced facility, but one that I use a lot (more in a bit)

Examples of Ed-Style Patterns

- `malloc  *(`   # No space before `(`
  - *Note one or more spaces*
- `.*`
  - *Any string (include empty string)*
- `\.`
  - *Dot (as such)*
- `[a-zA-Z][a-zA-Z]*`
  - *Alphabetic string*
- `[0-9][0-9]*\.[0-9][0-9]*`
  - *Floating point number*
- `^$`
  - *Empty string*

Capturing Matches(🌵)

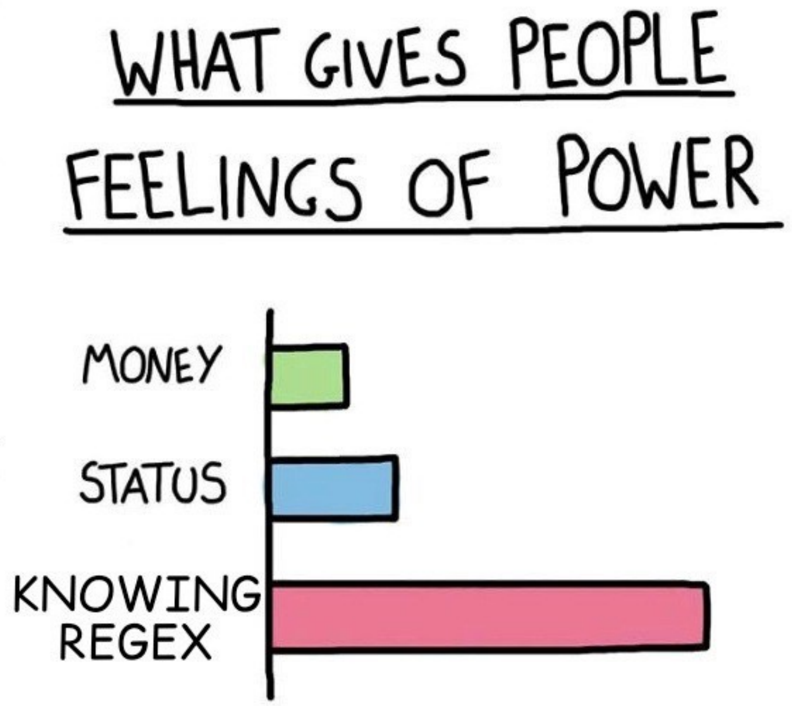
- `sed` and `grep` (but not `awk`) provide a way of recording the match you have made and then recalling it for use in later comparisons (or substitutions)
- `\(    \)` around a regular expression records the string that matched that regular expression. You can record up to 9 regular expression matches in a single operation.
- `\`<*N*> is used to refer to one of the recorded matches, that is `\1` refers to the first match recorded, `\2` for the second, and so on.

🌵 This is more advanced content – but really useful

Capturing Matches

- Example: `\([a-z]\)\([a-z]\)\1\2` matches a string where the first letter is repeated as the third letter and the second repeated as the fourth, e.g. `abab`, but not `abba`
  - *Does* `xxxx` *match?*

Regex Power



Neetish Raj, https://neetishop.medium.com/best-learning-path-to-master-regex-for-javascript-developers-d928960a9d14

Examples

What lines do these patterns match:

- `grep '^\.[VABL][LIE]$' file` example: □.VL
- `grep -v 'warning:' errs | grep -v 'In function'`
- `find . -name Makefile -exec grep awk '{}' \; -print`

Demo

- Let’s use `grep` to extract lines from `Alice_in_Wonderland.txt`
- Extract the lines that mention both Alice and cat
- Extract the lines that mention oyster or mystery
- In the spirit of Wordle, I want to get a list of 5 letter words from the Alice text.
  - *How about 5 letter palindromes (i.e. words such as radar that read the same right to left, as left to right.*

REs Summarize Many Strings

- Regular Expressions are very useful in data-cleaning
  - *Eg Check for range of years 1950..1999:* 19[5-9][0-9]
- Maximize the number of strings you want to include, but remember that there might be unwanted matches, which need to be minimized
  - *Likely to deal with these later explicitly*

Demo

- Create a regular expression to match all of the following strings, but minimize other strings that may also be include by the RE

abcd
aacd
acd
ace

```
.*
[a-z][a-z][a-z][a-z]
[a-e][a-e][a-e][a-e]
a[abc][cde]d*
```