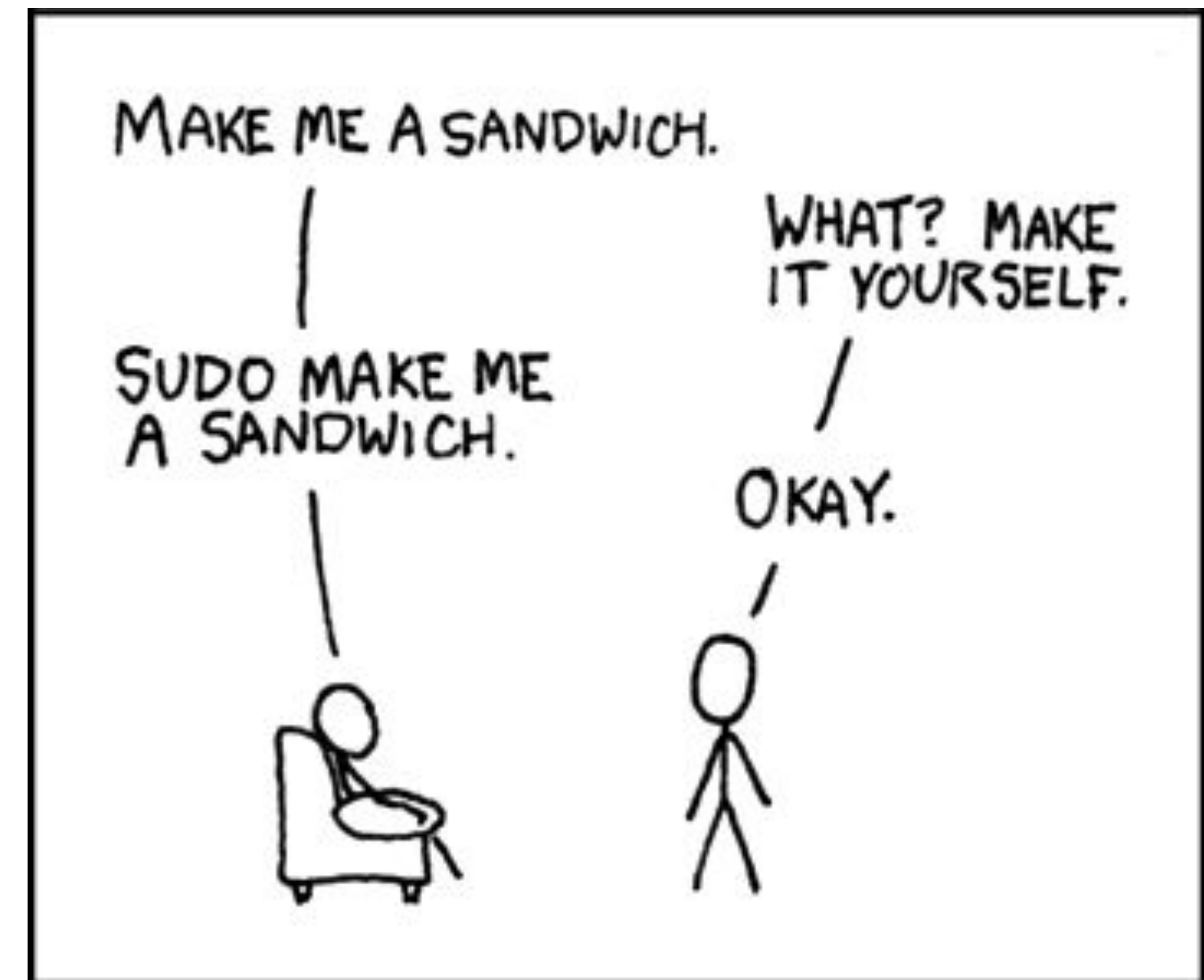
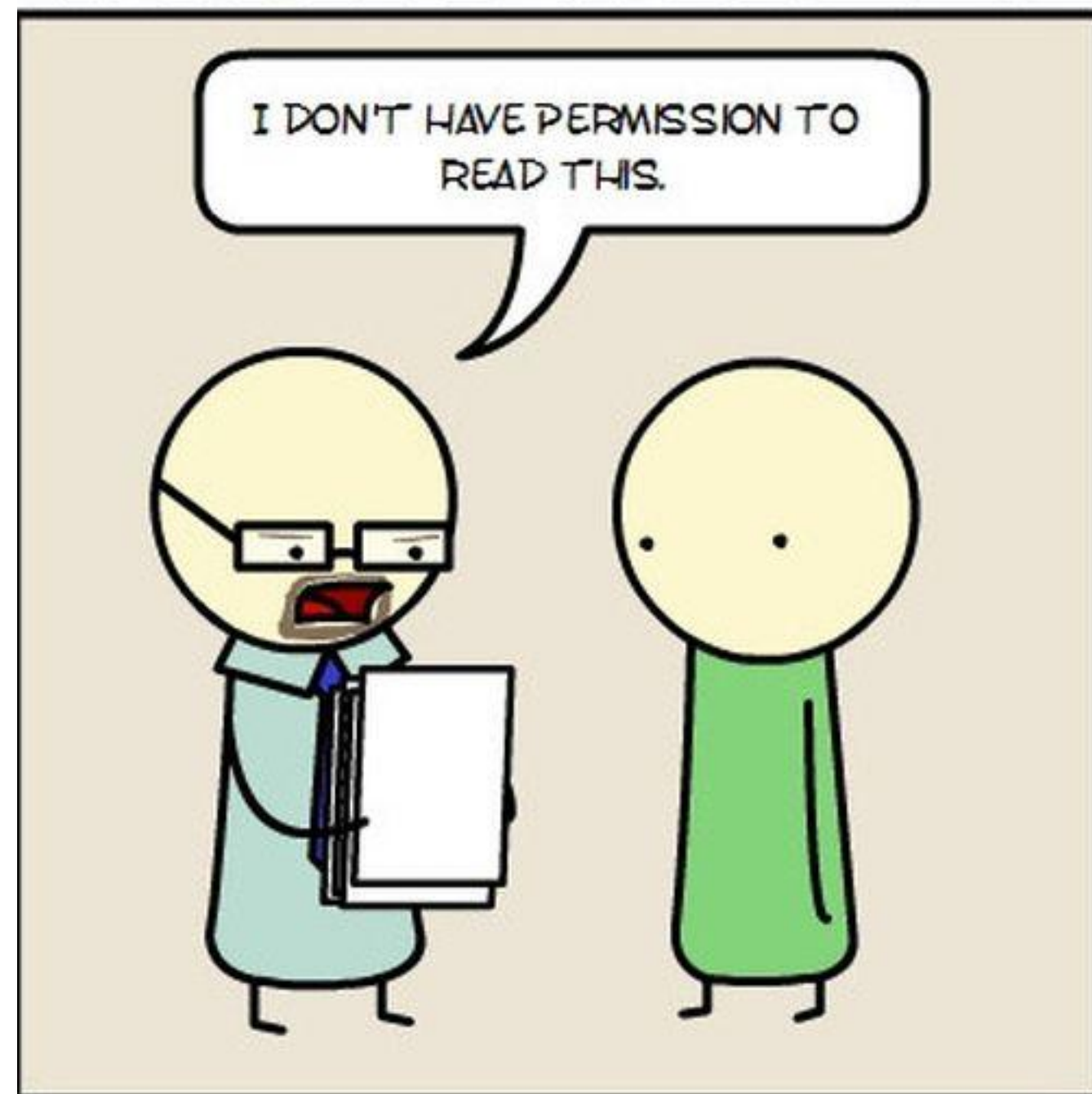


Data analysis with the shell

Spring 2023
PCfB Class 3
February 3, 2023

UNIX SHELL



Outline

- Installing/running programs
- ‘for’ loops
- Shell scripts
- Assignment

Installing/running
programs

Computers only understand
their native machine language

2 types of programming languages

Permissions ('ls -l')

permissions	user	group	size	date		file/directory
drwxr-xr-x	2 paul	users	1024	Jan	2 23:50	.
drwxr-xr-x	6 root	root	1024	Jan	2 22:51	..
drwxr-xr-x	3 paul	users	1024	Jan	8 11:42	grassdata
lrwxrwxrwx	1 paul	users	13	May	6 1998	latex -> /d2/lt
drwx-----	2 paul	users	1024	Mar	8 17:30	mail
drwx-----	2 paul	users	1024	Feb	4 01:09	projects
-rw-r--r--	1 paul	users	844344	Dec	9 1998	nations.ps
-rw-rw-r--	1 paul	users	21438	Mar	2 21:47	ps4mf.txt

↑

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other (world) permissions

group permissions

user permissions

d : directory

- : file

l : link (to other file/directory)

r : read permission

w : write permission

x : execute permission (programm)

- : permission not set

Changing Permissions

chmod (change mode)

Add execute for User:

```
chmod u+x file.txt
```

Add read and write for Group:

```
chmod g+rw file.txt
```

Remove write and execute for Other:

```
chmod o-wx file.txt
```

All three in one command:

```
chmod u+x,g+rw,o-wx file.txt
```

\$PATH

- A list of directories
 - Locations your computer looks for command-line software
- Searched in the order listed
- To view: `echo $PATH`
- To add a directory: `PATH="$PATH:path/to/new/dir"`

Recommendation

- Create three directories in your home directory:
 - *scripts* (your own custom scripts, PCfB p. 85-88)
 - *programs* (ready-to-use code downloaded from others)
 - *source* (source code that needs to be compiled)
- Add *scripts* and *programs* to \$PATH

Dependencies

Installing
program
demo

‘for’ loops

for loop

- Simple, but powerful way to repeatedly execute the same commands for different files, parameter values, etc.
- Can be included in scripts or run directly on command line

Basic syntax

```
for file in *.sh; do chmod u+x $file; done
```

'for' loop examples

```
for file in *.fasta;  
do print_fasta_seq_lengths.py $file;  
done
```

```
for file in *txt; do cp $file copy_$file;  
mkdir dir_$file; mv $file dir_$file; done
```

‘for’ loop

demo

Shell scripts

Why use shell scripts?

- Automate a series of commands
 - particularly useful when each command takes a long time to run
- Creates a record of commands that have been run
- Easy format for rerunning commands

Two ways to specify the interpreter to use

Specify interpreter inside script

```
1 #!/bin/bash~  
2 ~  
3 mkdir test~  
4 cd test~
```

File extensions

- Recommended (but not required) to save script with specific file extension
- Allows recognition from file name
- Syntax-specific coloring in text editors
- For shell script:

Shell + Regexp method

1. Use the shell to generate a list of files/directories
2. Use regular expressions within your text editor to turn those file/directory names into a list of commands

Shell script
demo