



shell

Scrum club

2018-05-23

Sources:

<http://bioinformatics-core-shared-training.github.io/shell-novice/>

<http://swcarpentry.github.io/shell-novice>



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Nanoscopy division

PhD student

Topic: Detector for cryogenic
electron microscopy



<https://datahub.mumc.maastrichtuniversity.nl/>

We provide an institutional repository for
research data, that is more than just a data
archive.

Data Engineer and Data Steward

An introduction to Unix* and the† shell

(*) unix-like operating systems

(†) actually, *a* shell

the Bourne Again SHell (BASH)

Why learn the shell?

Bad reasons to be here

~~The shell is intuitive and easy to use.~~

We'll let you judge...

~~Shell tools let us process all kinds of data.~~

Only if the data is suitably 'retro'.

~~The shell is a good programming language.~~

The shell pre-dates 40 years of important advances in software engineering.

Good reasons to be here

Unix-like operating systems are everywhere, and you can control them through the shell.

The shell allows you to automate workflows and eliminate repetitive tasks.

The shell is the natural route to other power tools like C, perl, R, & Java.

The shell is your gateway to the world's supercomputers.

<https://software-carpentry.org/>

Lesson	Site	Repository	Reference	Instructor Guide	Maintainer(s)
The Unix Shell					Gabriel Devenyi , Ashwin Srinath , Colin Morris, Will Pitchers
Version Control with Git					Ivan Gonzalez , Daisie Huang , Nima Hejazi , Katherine Koziar, Madicken Munk
Version Control with Mercurial					Doug Latornell
Using Databases and SQL					Abigail Cabunoc Mayes , Sam Hames, Henry Senyondo
Programming with Python					Trevor Bekolay , Valentina Staneva , Anne Fouilloux, Maxim Belkin, Mike Trizna
Plotting and Programming in Python					Nathan Moore , Allen Lee, Sourav Singh, Olav Vahtras
Programming with R					Daniel Chen , Katrin Leinweber, Diya Das
R for Reproducible Scientific Analysis					Thomas Wright , Naupaka Zimmerman , Jeffrey Oliver , David Mawdsley
Programming with MATLAB					Ashwin Srinath
Automation and Make					Gerard Capes
Instructor Training					Erin Becker , Christina Koch , Karen Word

shell-novice

	Setup	Download files required for the lesson
00:00	1. Introducing the Shell	What is a command shell and why would I use one?
00:05	2. Navigating Files and Directories	How can I move around on my computer? How can I see what files and directories I have? How can I specify the location of a file or directory on my computer?
00:45	3. Working With Files and Directories	How can I create, copy, and delete files and directories? How can I edit files?
01:20	4. Pipes and Filters	How can I combine existing commands to do new things?
02:10	5. Loops	How can I perform the same actions on many different files?
03:00	6. Shell Scripts	How can I save and re-use commands?
03:45	7. Finding Things	How can I find files? How can I find things in files?
04:30	Finish	

shell-novice

- <http://swcarpentry.github.io/shell-novice/>
- Read and do setup first
 - Windows requires most work. Use ``git bash``
- Download data-shell.zip and unzip it on your desktop

Lesson 1

- Getting started
- Input/output

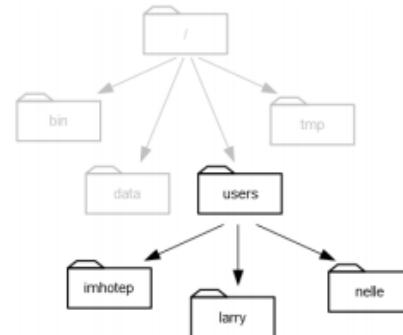
The problem:



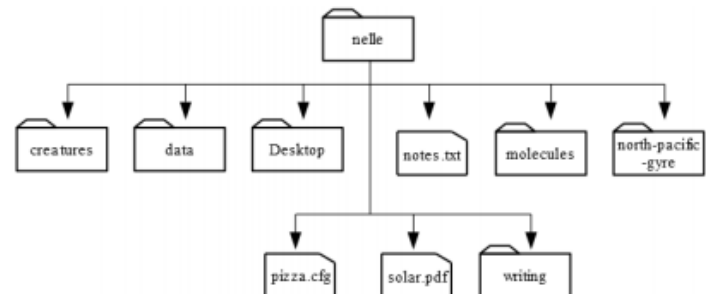
You are 'Nelle Nemo', a marine biologist. Your supervisor has given you a great project: but you have to use *his* analysis tools, and they are command line tools that only work on Unix machines...

Nelle's data

Nelle's group share a file system:



And Nelle's data is in her home directory:



Lesson 2

Navigating Files and Directories

pwd

'print working directory'

This tells you where you are in the file system, and how deep.

cd

'change directory'

The command that moves you from place to place.

whoami

'who am I (logged in as)?'

Not as stupid as it sounds – it tells you which username you are logged in with. *No spaces!*

ls, ls -F

'list'

Shows the content of the current directory.

- Getting help:
 - RTFM: <https://tldr.oostera.io>
 - man
 - --help
 - <https://explainshell.com/>
 - Google

A note on editors

- *emacs* versus *vi* wars
- Any plain text editor will do!
 - Even a graphical one
- For simplicity sake I will use `nano`

Lesson 3

Working With Files and Directories

mkdir

'make directory'

Creates a new directory, in the current directory.

vi

'visual editor'

Some day you will need to learn vi. Not today.

touch

Literally, 'touch'

Updates the timestamp on a file, or creates it if it doesn't exist.

rmdir

'remove directory'

It removes a directory – but is relatively forgiving.

nano

'an editor called nano'

A simple text editor for use in a terminal window.

rm, rm -r

'remove'

Removes a file, or (with flags) a whole branch. **rm** does not forgive. There is no wastebasket.

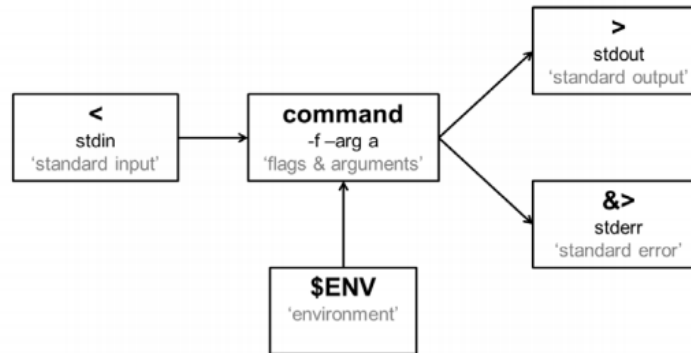
Lesson 4

Pipes and Filters

The anatomy of a unix command.

Unix processes have some standard ways of handling input and output.

The “environment” is the list of properties the process picks up from its parent. Your processes will all have the shell as their parent.

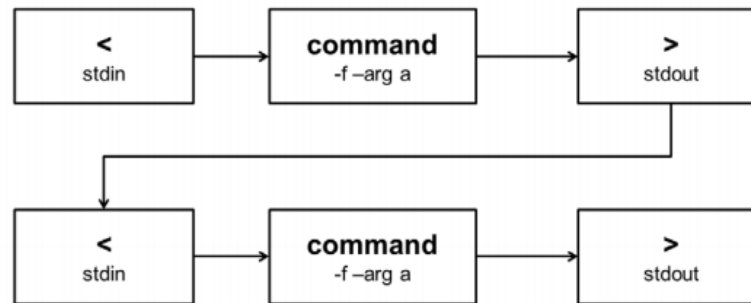


Lesson 4

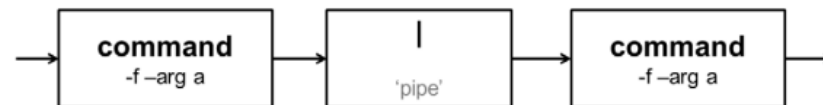
Pipes and Filters

Pipes

Laziness is seen as a virtue among computer programmers.
Rather than carry out this pattern over and over:



...you can short-circuit the stdout/stdin using a 'pipe'.



Lesson 4

Pipes and Filters

We've lost <, >, and | from our keyboard – time to lose some more.

Globbering

In the shell, *, ?, and [...] are treated as wildcards:

- *.txt** – any text file
- bob*.txt** – matches **bob.txt** and **bobcat.txt**
- bo?.txt** – matches **bob.txt** not **bobcat.txt**
- bo[bg].txt** – matches **bob.txt** and **bog.txt**

Regular expressions

There are more complex patterns called regular expressions which add even more complex rules (with slightly different syntax):

```
^[a-zA-Z0-9._%+-]+@[a-zA-Z0-9.-]+\.[a-zA-Z]{2,4}$
```

If you like regular expressions, you'll love Perl...

Lesson 4

Pipes and Filters

WC

'word count'

Counts the number of characters, words and lines in a text file.

head, head -N

'head'

Prints the first few lines of a file, you can choose how many.

cat

'concatenate'

Prints a single file or list of files to the screen.

tail, tail -N

'tail'

Prints the last few lines of a file.

sort, sort -n

Yes, 'sort'

Sorts the lines of a text file alphabetically or by number.

grep

'global regular expression print'

Search for lines in a file containing a pattern.

Lesson 5

Loops