

Section 1: Coding in Bash Shell

- Concepts and Terms
- Most Frequently Used Commands
 - Basic operations
 - File system navigation
 - File creation and editing
 - Interacting with Python/ Git/ AWS/ HDFS
 - More tips
- Exercises & Learning Resources

Section 1: Coding in Bash Shell

- **Concepts and Terms**

Unix

- A operating system & a set of tools that support multitasking and multi-user functionality
- Unix is most widely used in all forms of computing systems such as desktop, laptop, and servers.

Shell

- One of the Unix tools
- A command line interface program

Bash

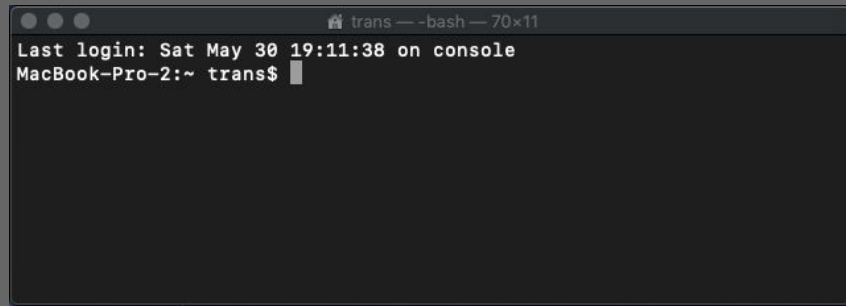
- One of the Shell programs (default shell program on Mac/ Ubuntu)

Section 1: Coding in Bash Shell

- Concepts and Terms

CLI (Command-Line Interface)

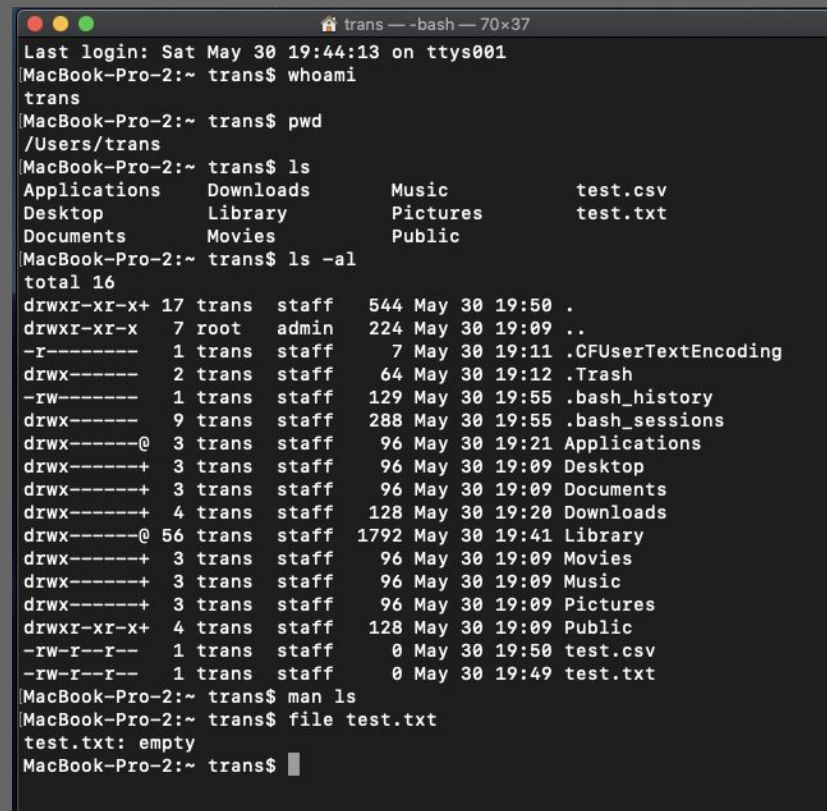
- Processes lines of commands to a computer program
- Terminal, iterm/ iterm2, tmux
 - Zoom in/ out: Cmd + “+” / Cmd + “-”
 - Open a new tab: Cmd + “t”
 - Close current tab/ window: Cmd + “w”



Section 1: Coding in Bash Shell

- Most Frequently Used Commands - Basics

- Who am I: whoami
- Where am I: pwd (print working directory)
- What's inside: ls (list) / ls - al (list all long)
- How to use a command:
 - man ls (manual list)
 - type "q" to quit
- What's this file: file file_name.file_format
- What was the previous commands:
 - history
 - !1
 - history | grep l

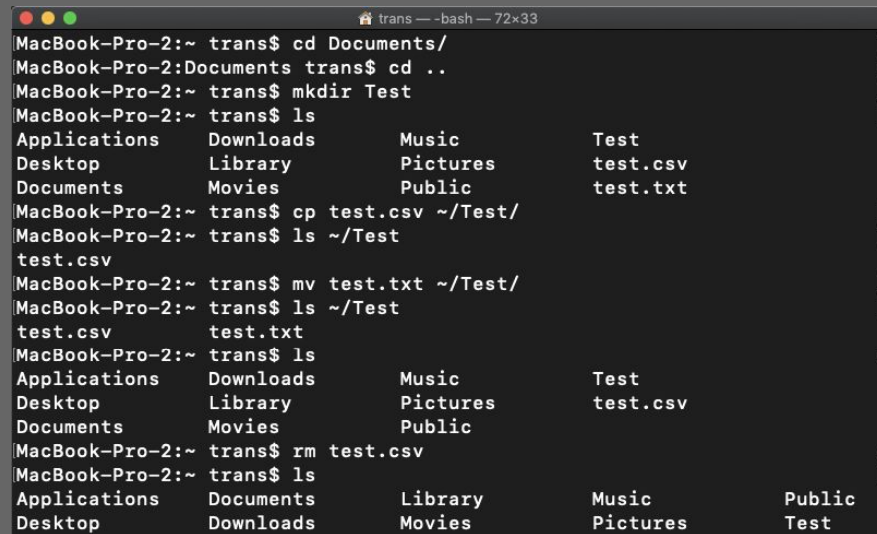


```
trans -- -bash -- 70x37
Last login: Sat May 30 19:44:13 on ttys001
[MacBook-Pro-2:~ trans$ whoami
trans
[MacBook-Pro-2:~ trans$ pwd
/Users/trans
[MacBook-Pro-2:~ trans$ ls
Applications      Downloads          Music              test.csv
Desktop           Library            Pictures            test.txt
Documents         Movies             Public
[MacBook-Pro-2:~ trans$ ls -al
total 16
drwxr-xr-x+ 17 trans  staff   544 May 30 19:50 .
drwxr-xr-x  7 root   admin   224 May 30 19:09 ..
-r-----  1 trans  staff    7 May 30 19:11 .CFUserTextEncoding
drwx----- 2 trans  staff   64 May 30 19:12 .Trash
-rw----- 1 trans  staff  129 May 30 19:55 .bash_history
drwx----- 9 trans  staff  288 May 30 19:55 .bash_sessions
drwx-----@ 3 trans  staff   96 May 30 19:21 Applications
drwx-----+ 3 trans  staff   96 May 30 19:09 Desktop
drwx-----+ 3 trans  staff   96 May 30 19:09 Documents
drwx-----+ 4 trans  staff  128 May 30 19:20 Downloads
drwx-----@ 56 trans  staff 1792 May 30 19:41 Library
drwx-----+ 3 trans  staff   96 May 30 19:09 Movies
drwx-----+ 3 trans  staff   96 May 30 19:09 Music
drwx-----+ 3 trans  staff   96 May 30 19:09 Pictures
drwxr-xr-x+ 4 trans  staff  128 May 30 19:09 Public
-rw-r--r--  1 trans  staff    0 May 30 19:50 test.csv
-rw-r--r--  1 trans  staff    0 May 30 19:49 test.txt
[MacBook-Pro-2:~ trans$ man ls
[MacBook-Pro-2:~ trans$ file test.txt
test.txt: empty
[MacBook-Pro-2:~ trans$
```

Section 1: Coding in Bash Shell

- Most Frequently Used Commands - Navigation

- Go to another place:
 - `cd` (change directory)
 - `cd ..` (go back to one-level-up directory)
- Make a new folder: `mkdir` (make directory)
- Copy a file: `cp` (copy)
- Move a file: `mv` (move)
- Don't want it anymore:
 - `rm` (remove)
 - Please pay 200% attention
 - There's no "control z"

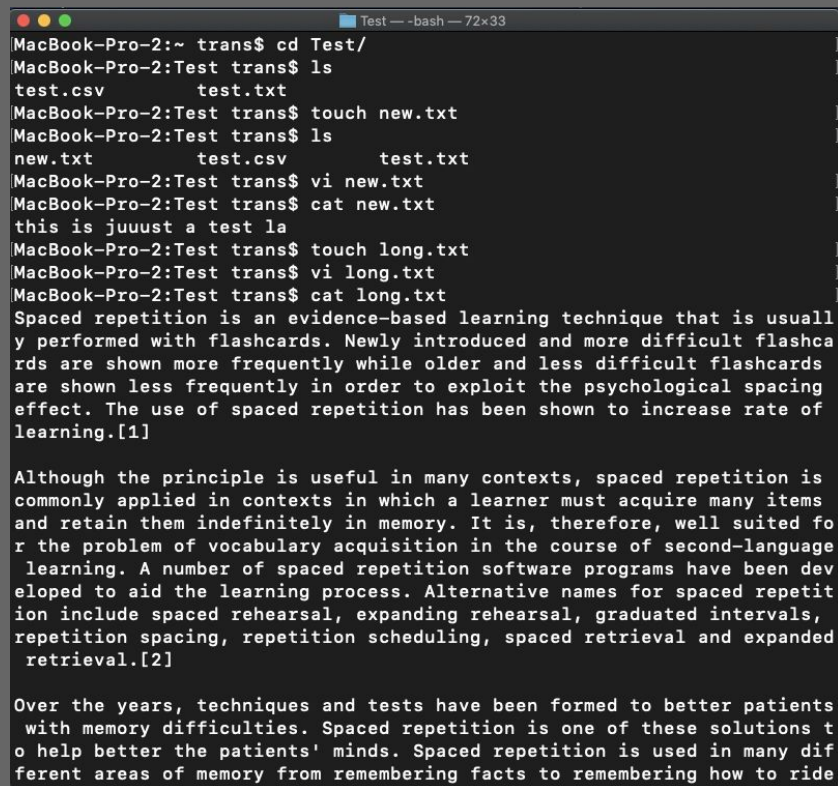


```
trans — -bash — 72x33
MacBook-Pro-2:~ trans$ cd Documents/
MacBook-Pro-2:Documents trans$ cd ..
MacBook-Pro-2:~ trans$ mkdir Test
MacBook-Pro-2:~ trans$ ls
Applications  Downloads      Music          Test
Desktop       Library        Pictures       test.csv
Documents     Movies         Public         test.txt
MacBook-Pro-2:~ trans$ cp test.csv ~/Test/
MacBook-Pro-2:~ trans$ ls ~/Test
test.csv
MacBook-Pro-2:~ trans$ mv test.txt ~/Test/
MacBook-Pro-2:~ trans$ ls ~/Test
test.csv  test.txt
MacBook-Pro-2:~ trans$ ls
Applications  Downloads      Music          Test
Desktop       Library        Pictures       test.csv
Documents     Movies         Public
MacBook-Pro-2:~ trans$ rm test.csv
MacBook-Pro-2:~ trans$ ls
Applications  Documents      Library        Music          Public
Desktop       Downloads     Movies         Pictures       Test
```

Section 1: Coding in Bash Shell

- Most Frequently Used Commands - Create/ Edit files

- Create a file: touch file_name.file_format
- Edit the file:
 - vi file_name.file_format (visual editor)
 - “I” (insert)
 - “esc” (exit) => “:wq” (write and quit)
- View the file(s):
 - cat file_name.file_format (concatenate)
 - less file_name.file_format
 - tail -n file_name.file_format



```
MacBook-Pro-2:~ trans$ cd Test/
MacBook-Pro-2:Test trans$ ls
test.csv      test.txt
MacBook-Pro-2:Test trans$ touch new.txt
MacBook-Pro-2:Test trans$ ls
new.txt       test.csv      test.txt
MacBook-Pro-2:Test trans$ vi new.txt
MacBook-Pro-2:Test trans$ cat new.txt
this is juuust a test la
MacBook-Pro-2:Test trans$ touch long.txt
MacBook-Pro-2:Test trans$ vi long.txt
MacBook-Pro-2:Test trans$ cat long.txt
Spaced repetition is an evidence-based learning technique that is usually performed with flashcards. Newly introduced and more difficult flashcards are shown more frequently while older and less difficult flashcards are shown less frequently in order to exploit the psychological spacing effect. The use of spaced repetition has been shown to increase rate of learning.[1]

Although the principle is useful in many contexts, spaced repetition is commonly applied in contexts in which a learner must acquire many items and retain them indefinitely in memory. It is, therefore, well suited for the problem of vocabulary acquisition in the course of second-language learning. A number of spaced repetition software programs have been developed to aid the learning process. Alternative names for spaced repetition include spaced rehearsal, expanding rehearsal, graduated intervals, repetition spacing, repetition scheduling, spaced retrieval and expanded retrieval.[2]

Over the years, techniques and tests have been formed to better patients with memory difficulties. Spaced repetition is one of these solutions to help better the patients' minds. Spaced repetition is used in many different areas of memory from remembering facts to remembering how to ride
```

Section 1: Coding in Bash Shell

- Most Frequently Used Commands - Interactions

- Python
 - your/environment/bin/python
 - your/environment/bin/jupyter notebook
- Git
 - git clone/ add/ commit/ push/ pull/ status
- AWS
 - aws s3 cp from/path to/path
 - aws s3 cp from/path to/path -- recursive
- HDFS
 - Hadoop fs -get from/path to/path

```
MacBook-Pro-2:Test trans$ /Users/Jiaying/anaconda3/bin/python
Python 3.6.3 |Anaconda, Inc.| (default, Oct 6 2017, 12:04:38)
[GCC 4.2.1 Compatible Clang 4.0.1 (tags/RELEASE_401/final)] on darwin
Type "help", "copyright", "credits" or "license" for more information.
>>> import pandas as pd
>>> df = pd.DataFrame({"a": [11, 22, 33], "b": [44, 55, 66]})
>>> df
   a  b
0 11 44
1 22 55
2 33 66
>>> exit()
MacBook-Pro-2:Test trans$ git clone https://github.com/nychealth/coronavirus-data.git
Cloning into 'coronavirus-data'...
remote: Enumerating objects: 56, done.
remote: Counting objects: 100% (56/56), done.
remote: Compressing objects: 100% (56/56), done.
remote: Total 983 (delta 6), reused 0 (delta 0), pack-reused 927
Receiving objects: 100% (983/983), 987.29 KiB | 8.66 MiB/s, done.
Resolving deltas: 100% (134/134), done.
MacBook-Pro-2:Test trans$ ls
coronavirus-data  new.txt          test.txt
long.txt         test.csv
MacBook-Pro-2:Test trans$ aws s3 cp s3://example_bucket_name/example_folder_name . --recursive
-bash: aws: command not found
MacBook-Pro-2:Test trans$ hadoop fs -get from/this/path to/this/path/
-bash: hadoop: command not found
MacBook-Pro-2:Test trans$
```

Section 1: Coding in Bash Shell

- **Most Frequently Used Commands** - More tips
 - too lazy to type it all:
 - Tab (case sensitive)
 - Arrow up & down
 - too many lines: clear
 - Too lazy to press the arrows:
 - Control + “a” (go to head)
 - Control + “e” (go to end)
 - Stop running something: control + “c” (cancel/ crease)

Wrap-up: Coding in Bash Shell

- Concepts and Terms
- Most Frequently Used Commands
 - Basic operations
 - File system navigation
 - File creation and editing
 - Interacting with Python/ Git/ AWS/ HDFS
 - More tips
- Exercises & Learning Resources (credits to [Thomas Gauthier](#))
 - Linux Coding: <https://linuxjourney.com/lesson/the-shell>
 - Linux Productivity Tools: https://www.usenix.org/sites/default/files/conference/protected-files/lisa19_maheshwari.pdf
 - The Unix Workbench: <https://www.coursera.org/learn/unix>