Introduction to Linux

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Outcomes

1. Be familiar with Linux terminal and Bash language
2. Be able to manipulate files and directories using command lines
3. Be able to combine commands

Linux – What is it?

Open source Unix-like operating system

- Created by Linus Torvalds in 1991

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Software that directly manages a system's hardwares and resources (CPU, memory, storage)
Makes the connections between all of yours softwares and the physical resources

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UNIX: Operating system developed in the 70’s
Published in 1973
by Ken Thompson and Dennis Ritchie

Linux – What is it?

Open source Unix-like operating system

- Created by Linus Torvalds in 1991

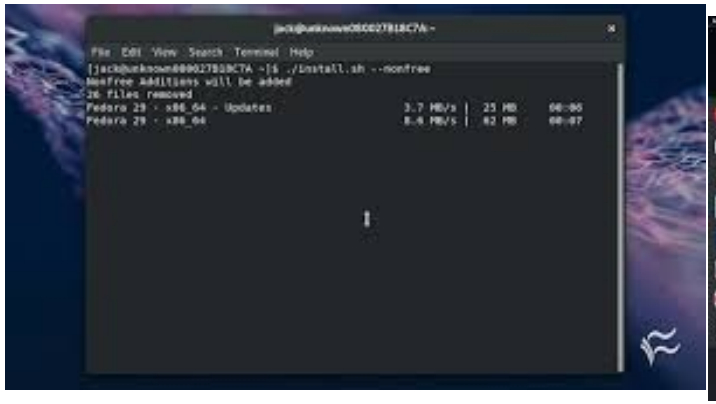
Under GNU General Public license:
Anyone can download, use,
share and modify the OS

As of 2006, ~2% of the Linux was written
by Torvalds himself, because thousands
have contributed

Linux – What is it?

Different versions or distributions

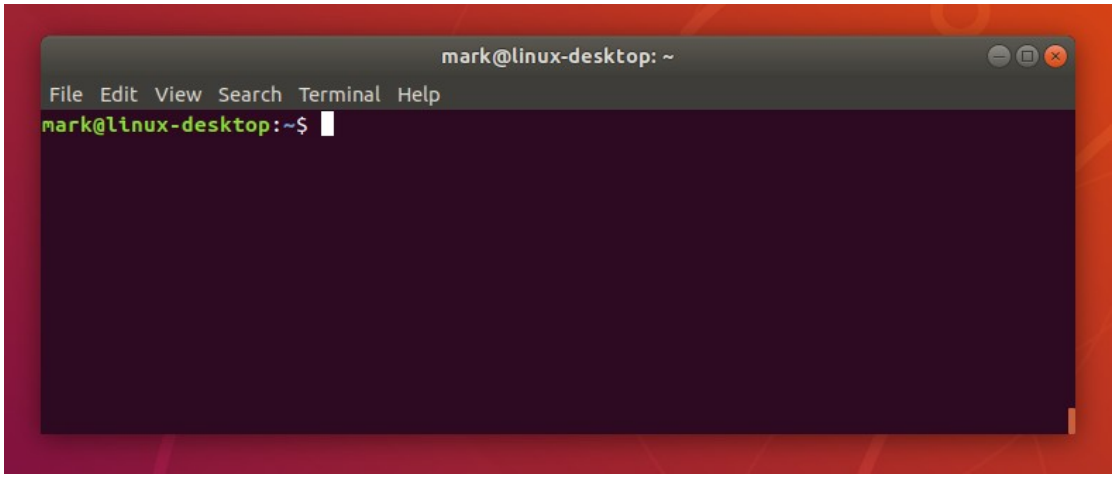
- Linux mint, Manjaro, Debian, Ubuntu, Antergos, Solus, Fedora



Bash – What is it?

Command language for Unix systems

- Bash commands in a terminal
  - “terminal”, “command”, “prompt”, “shell”
  - Ctrl-Alt-T
- Bash reads and executes commands from a shell script



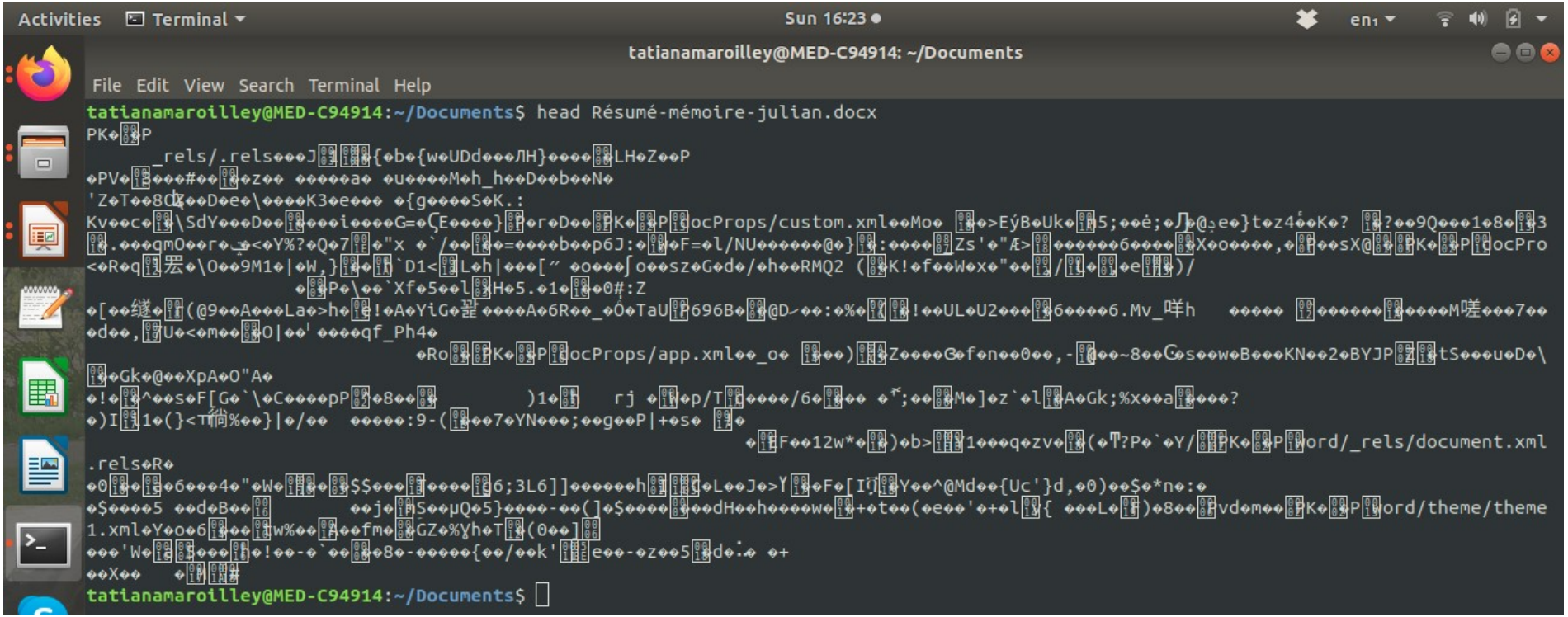

```
#!/bin/bash

if [ "$1" = "back" ]; then
        sshcommand="user-backend@11.11.11.11"
elif [ "$1" = "front" ]; then
        sshcommand="user-frontend@22.22.22.22"
else
        echo "server side required"
        exit 1
fi

echo "will execute"
echo "ssh $sshcommand"
```

Tips before we start

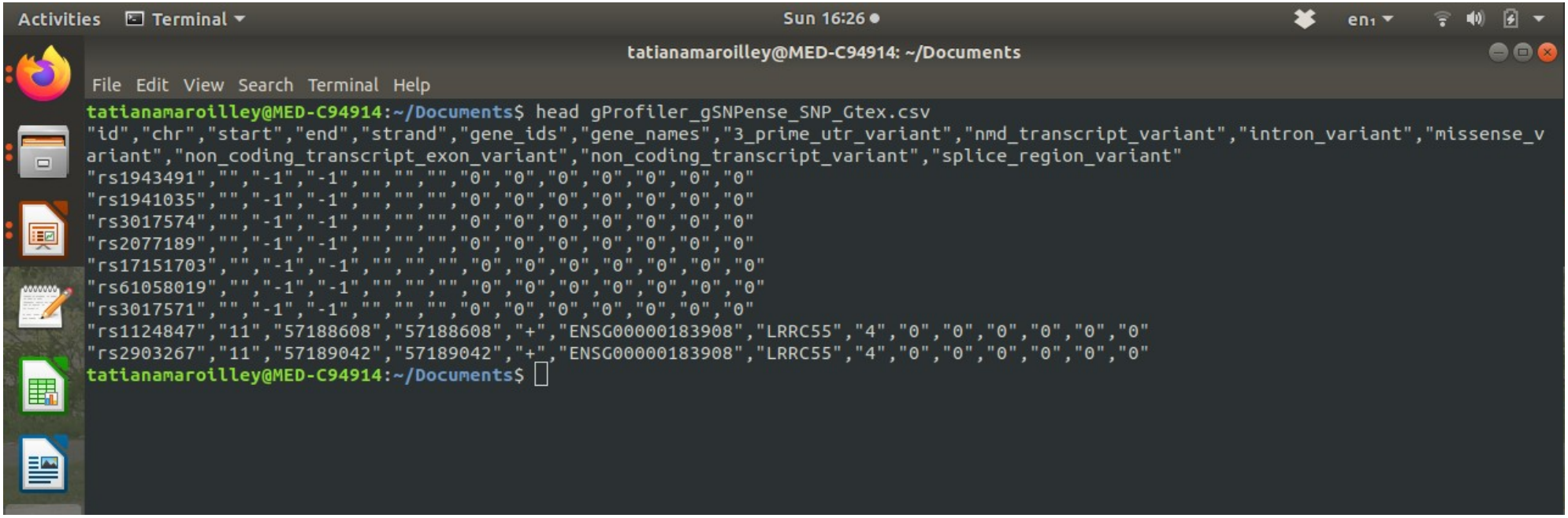
Word/Excel files aren’t readable by Linux terminal



Tips before we start

Word/Excel files aren't readable by Linux terminal

- Excel sheet: export it as .csv



Tips before we start

Tab completion will save you time

- Works for commands, file and directory names
  1) Type only the first letters of command/filename
  2) Push TAB
     - Linux will complete it if only one fits
     - If multiple hits, will draw a list of the possibilities

Tips before we start

Keep track of commands that worked well

- You do not want to spend another hour to find again how to do it
- Text file, Word file… what is comfortable for you

Workshop

- **Videos to present commands + Tips**
- **Directory containing**
  - Assignment with steps and questions to be answered
  - Index of commands
  - Data necessary for the workshop
  - Slides
  - Link to a video that summarizes commands and how to use them
- **Time in breakout rooms to work on assignment step by step**

Assignment

- **10 questions**
- **To get full mark:**
  - Answer
  - Command / code used to find the answer
- **To be completed before tomorrow – 9am**
  - D2L
- **If you find different commands to answer one question, report them all – Bonus!**

Tip #1

Any problem you are facing, someone probably already faced it

1) Ask Google – How to ……. on Linux
2) Ask your peers and supervisors
3) Bioinformatics forums – StackOverFlow, BioStar
4) Contact the developers

Get Data for our workshop

GitHub – github.com (Linus Torvalds)

1) Open terminal
2) Is Git installed?
    1) NO – install git
    2) YES – **git clone https://github.com/tmaroilley/Linux_Course**
3) No working?
    1) Go to https://github.com/tmaroilley/Linux_Course
    2) > Code
    3) > Download ZIP
    4) Extract files

Basic commands

Assignment #1

Open Linux_Course/assignment/assignment.txt with your favourite editor

Do Steps #1 to #4

Management of files and directory

Tip #2

Name your files and directory wisely

- No space
- Delimiters: _.-
- The user choose the extension of the file – not necessary for Linux to access the file
  - .txt, .tsv, .csv, .bed, .fa, .vcf …
- Case sensitive
  - Avoid: MyFiLNaMe.txt – Prefer myfilemane.txt or my_filename.txt

Assignment #2

Do Steps #5 to #8

Breakout rooms - 10’

Manipulating files

Tip #3

Modifying files with command lines

Tip #3

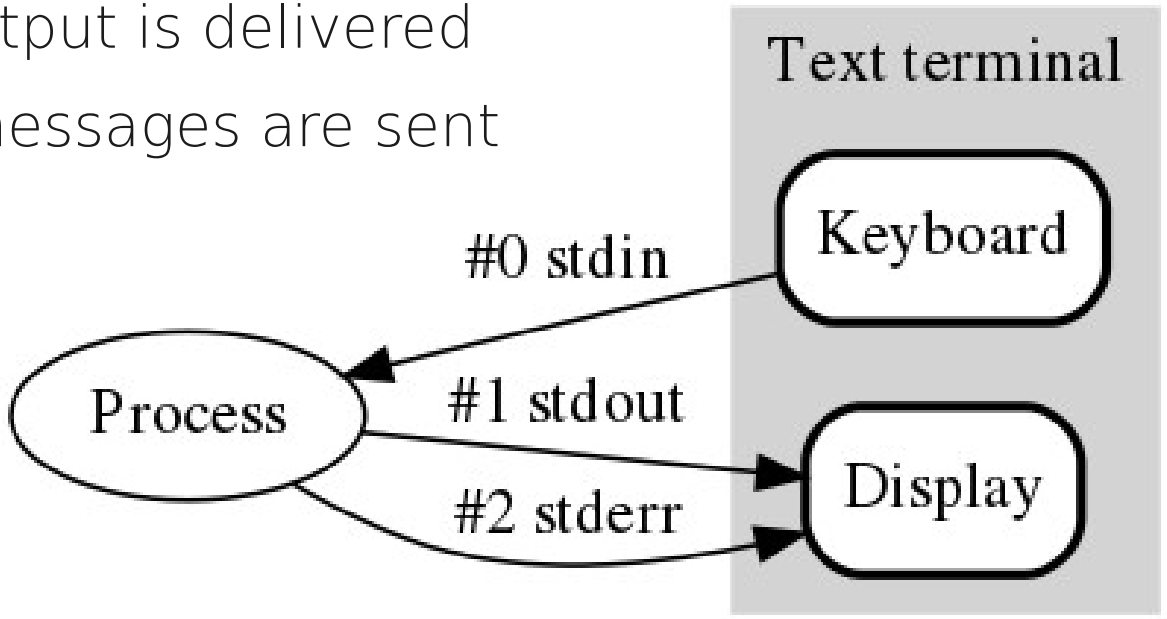
Modifying files with command lines

- Any change is definitive - No UNDO button
- Make a copy of the original file

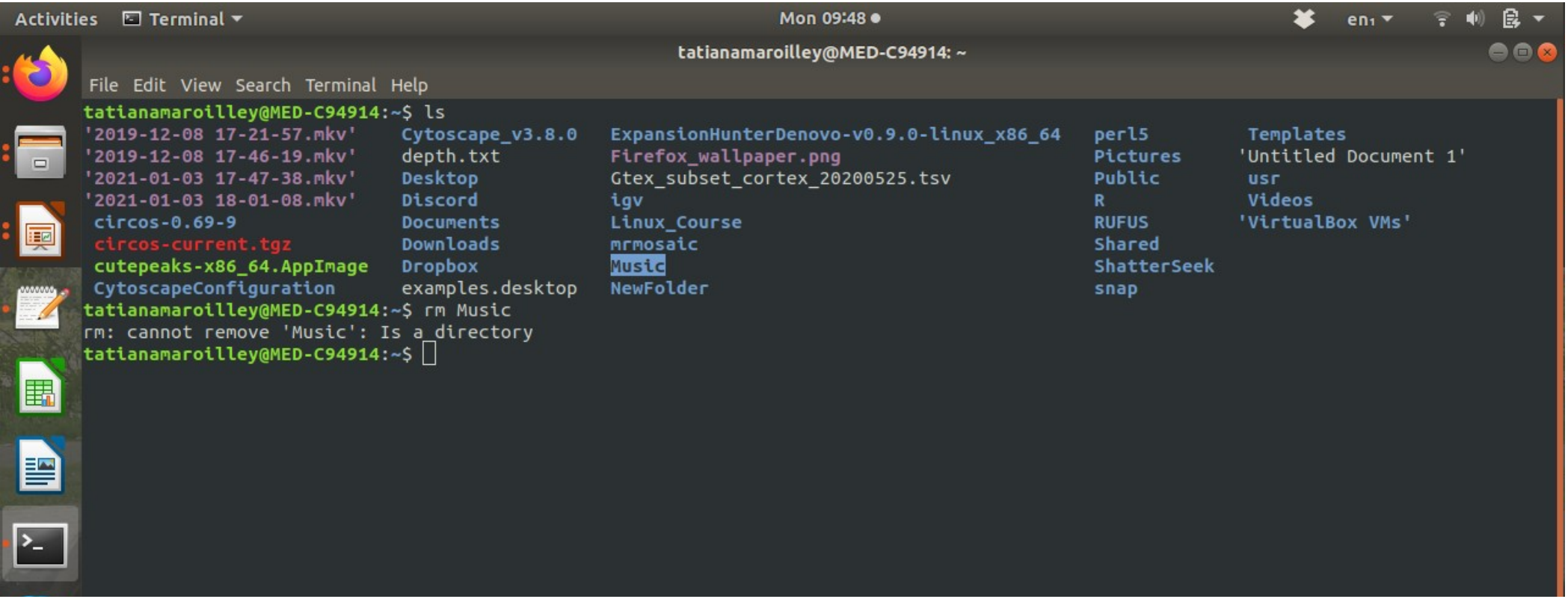
Streams – Flux of data

3 standard streams established when a command is executed:

- STDIN: standard input stream
- STDOUT: where text output is delivered
- STDERR: where error messages are sent



Streams – Flux of data



Streams – Flux of data

Redirection of STDOUT into files

- head FILE > output.txt
  - Send the 10 first lines into output file - created or overwritten
- head FILE >> output.txt
  - If output.txt exists, add STDOUT at the end of it

Assignment #3

Do Steps #9 to #12

Breakout rooms - 15’

More complex commands

Combining commands

Redirection of STDOUT as input to another command

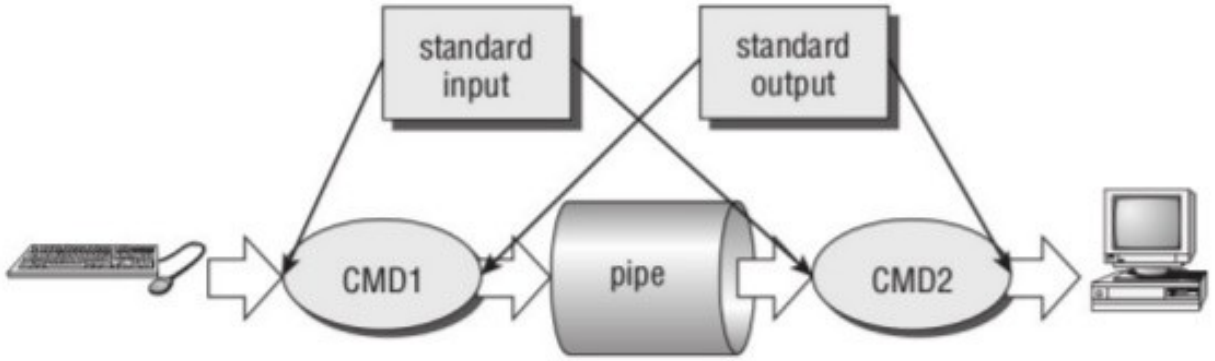
- comm -1 -2 <(sort file1.txt) <(sort file2.txt)

Combining commands

Pipe

The second command will be apply on the output of the first one

- cut -f2 mart_export.txt | sort | uniq | wc -l
- grep ATX3 mart_export.txt | awk '{print $1"\t"$4}' | sort | head



Assignment #4

Do Steps #13 to #15

Breakout rooms - 20’

The end

Please send your assignment by tomorrow 9am

- D2L

- **Questions?**