Introduction to
Unix Command Line

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Outline

Introduction

- What and Why Command line?
- Open Terminal
- First command ‘Hello World!’
- Directory Navigating Command Line
  - Directory structure, relative path, absolute path
  - pwd, ls

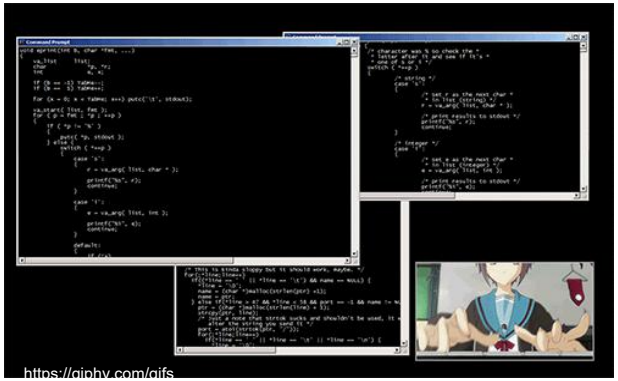
Exercise

- Explore files and directory
  - cd, ls
- Creation and inspection
  - cp, rm, rmdir, mv, ln
  - wc, cat, touch, mkdir, less, head, tail, more, grep
  - Redirecting output: >>, >

- Advanced Topic
  - Wildcards, grep, sed
  - Man pages
  - Bash programming

What do you think of command line?

Someone do hacking!!



Computer geek language !!

What is actually command line?

These words are often used interchangeably:
Command line interpreter (shell)
sh, bash, tcsh

Programs that give you interaction with shell
Terminal, konsole, xterm, gnome-terminal

“One of user interfaces provided to command and control computing system.”

Old-school IBM terminal PC

Network equipments

Raspberry Pi

itithat

Command line vs GUI

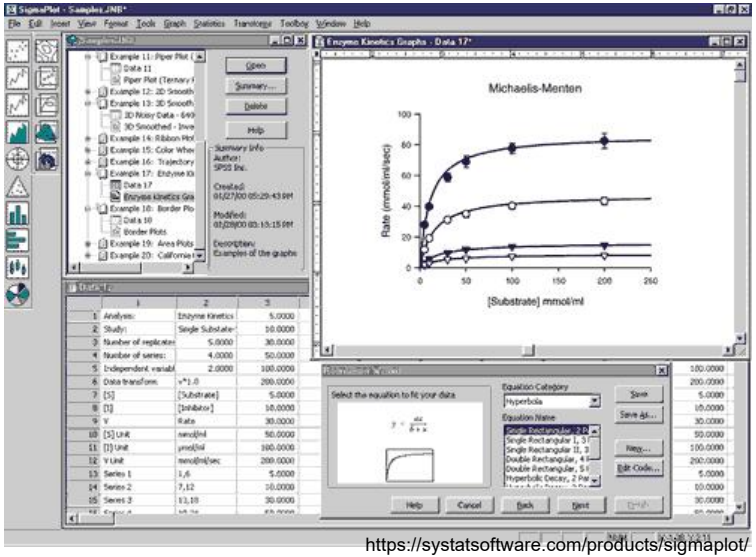
```
declare -x    miRBase18=/icgc/ngs_share/assemblies/hg19_GRCh37_1000genomes/databases/miRNA/miRBase_version-18_chr
gz
declare -x    COSMIC=/icgc/ngs_share/assemblies/hg19_GRCh37_1000genomes/databases/COSMIC/Cosmic_v77_hg19_coding_S
ed.gz:7,8,9:1
declare -x    miRNAtargets=/icgc/ngs_share/assemblies/hg19_GRCh37_1000genomes/databases/miRNA/miRNAsites_TargetSc
rtelLab_2011_01_14_chr.bed.gz
declare -x    CgiMountains=/icgc/ngs_share/assemblies/hg19_GRCh37_1000genomes/CustomDeepAnnotation/CgiMountains_c
d.gz:4
declare -x    phastConsElem20bp=/icgc/ngs_share/assemblies/hg19_GRCh37_1000genomes/databases/UCSC/phastConsElem_m
p_chr.bed.gz:4
declare -x    ENCODE_TFBS=/icgc/ngs_share/assemblies/hg19_GRCh37_1000genomes/databases/UCSC/Sept2013/UCSC_27Sept2
gEncodeRegTfbsClusteredV3.bed.gz
#=PIPE_CONFIG:INDEL_DEEPANNOTATION



declare -x WRAPPED_SCRIPT_DEBUG_OPTIONS="-v -x -o pipefail "

if [[ "${SET_PATH-}" != "" ]]; then export PATH=${SET_PATH}; fi
-bash-4.2$ cat roddyExecutionStore/exec_181210_143532630_icgcdata_WES/runtimeConfig.sh  | CONFI
-bash: CONFI: command not found
-bash-4.2$ cat roddyExecutionStore/exec_181210_143532630_icgcdata_WES/runtimeConfig.sh  | grep CONFI
declare -x    MIN_CONFIDENCE_SCORE=8
declare -x    CONFIDENCE_OPTS_INDEL=
declare -x    CONFIDENCE_OPTS="-t 500 -c 0 -p 0"
declare -x    TOOL_PLATYPUS_CONFIDENCE_ANNOTATION=/lsdf/dkfz/project/inform/liquid_biopsies/sequencing/exon_seque
/view-by-pid/LB-I023_004/indel_results/paired/tumor01_control/results_IndelCallingWorkflow-1.2.177_v1_0_2018-12-1
33/roddyExecutionStore/exec_181210_143532630_icgcdata_WES/analysisTools/indelCallingWorkflow/confidenceAnnotation
ls.py
declare -x    TOOL_PLATYPUS_CONFIDENCE_ANNOTATION_NO_CONTROL=/lsdf/dkfz/project/inform/liquid_biopsies/sequencing
_sequencing/view-by-pid/LB-I023_004/indel_results/paired/tumor01_control/results_IndelCallingWorkflow-1.2.177_v1_
8-12-10_14h33/roddyExecutionStore/exec_181210_143532630_icgcdata_WES/analysisTools/indelCallingWorkflow/platypusC
enceAnnotation_noControl.pl
#=PIPE_CONFIG:INDEL_RELIABILITY
#=PIPE_CONFIG:INDEL_RELIABILITY
#=PIPE_CONFIG:INDEL_DEEPANNOTATION
#=PIPE_CONFIG:INDEL_DEEPANNOTATION
-bash-4.2$ ll
total 77813
-r--r-----. 1 icgcdata W610-LOW-MAF      808 Dec 10 15:28 checkSampleSwap.json
-r--r-----. 1 icgcdata W610-LOW-MAF        0 Dec 10 15:28 indelCallingCheckPoint_checkSampleSwap
```

VS



https://systatsoftware.com/products/sigmaplot/

Command line

- Learn commands
- Combine commands
- Free to do anything if you know how

Graphic User Interface (GUI)

- Intuitive to use with graphical interface
- Window-style, clickable
- Good for what it's designed for

Why Command line?

- Tasks can be performed quicker and can be much easier to automate and do remotely.
- Faster to develop command line program since GUIs need amount of time to create.
  - The source code are mostly openly distributed and allow modification.
  - Drive faster software development for research
- Easier to manipulate large text files and to perform repetitive task.
- GUI software requires more computing resource (memory, CPU, disk space)
- Most computer cluster for research provide non-GUI to users.

Log in with your Linux account

My username:

rkurs01

Password:

pk4seed

Note down your login name:

rkurs01
rkurs02
…
rkurs49

Open the Terminal

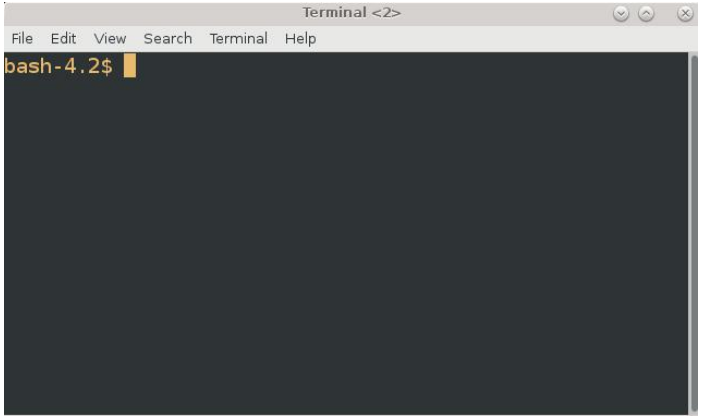
Click this icon:
(Bottom of Desktop screen)

Terminal

Or

Go to Applications Menu -> System -> Xfce Terminal
(Top of Desktop Screen)

Hello Terminal



It always start with string of characters (**prompt)**. $

You type command line commands after the prompt.

General Structure of Commands

[command] [options] [arguments]

```
clear
```

command only

```
ls          -lth
```

1 option

```
ls          -lth          /Intro/Linux
```

1 option and 1 argument

```
cut     -f 2    -d","     text.csv
```

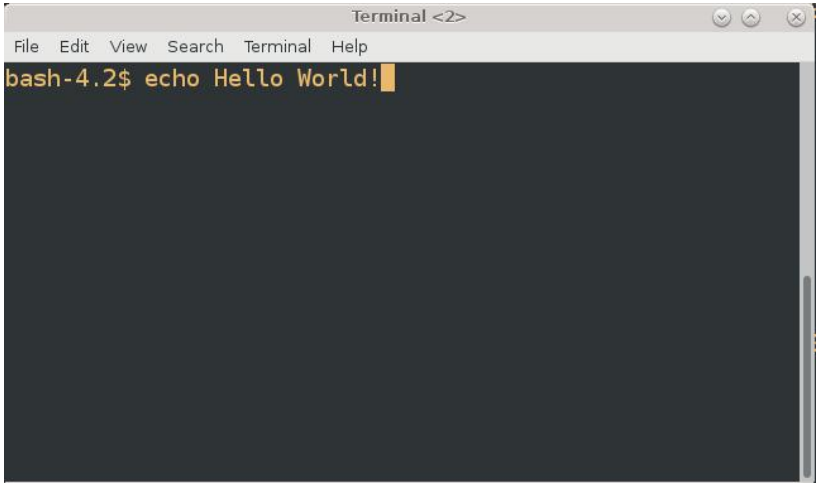
2 options and 1 argument

First command ‘Hello World!’

Now you are ready to run the first command.

Please type after command prompt

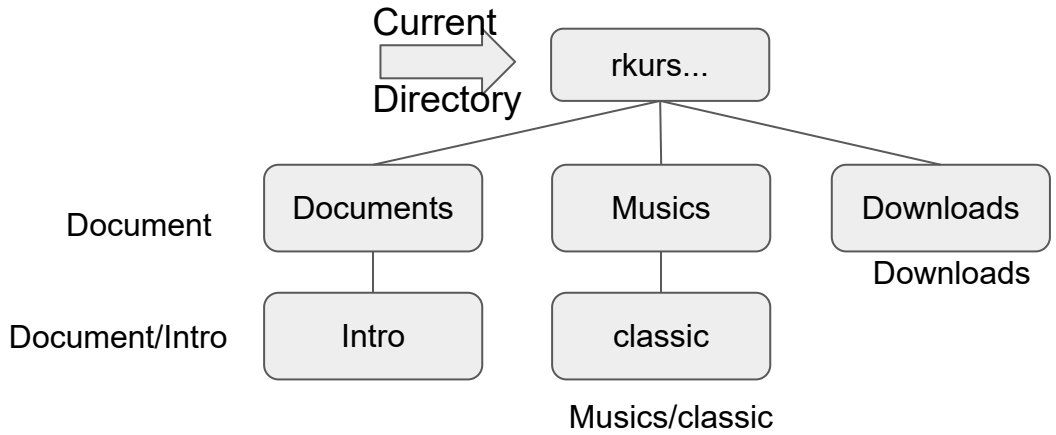
echo Hello World!



Directory structure in Linux

A path is a sequence of nested directories with a file or directory at the end, separated by the / character

Relative path: Documents/Intro
(relative to the current directory)



Type command below

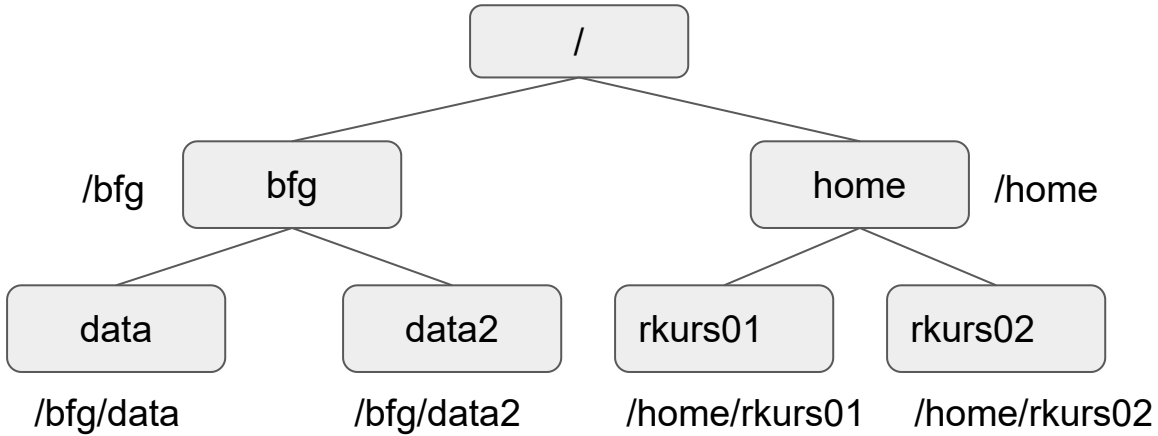
pwd (what is shown to you?) Actual path of current directory

ls -la (what is shown to you?) All files/directories inside current directory

Directory structure in Linux

Absolute path: /bfg/data/courses/seeded2017/Intro/Linux

/ : root directory.
Start of absolute paths for all files on the system
(even for files on removable devices or network shared).



Wildcards (Regular Expression)

Replace (parts of) filenames. Examples

ls *txt

- The shell first replaces *txt by all the file and directory names ending by txt (including .txt), except those starting with ., and then executes the ls command line.

cat ?.log

- Displays all the files which names start by 1 character and end by .log

Redirecting a Command’s Output ...

- … to a file:
  ls > file.txt (print output to the file, replace if file exists)
  ls >> file.txt (if file exists, append output to the end of file)
- … to another command (pipes):
  ls | head

Creating links(shortcut in Windows) to a file

Instead of copying a large file to your home directory, you can set a softlink to it:

```
ln    -s    targetfile    link-name
```

Now you’re ready for exercise!!

- Remember! Learn them with opened heart
- Learning CLI, you will grasp a very direct and powerful way to manipulate computer.
- You can produce wonderful creations or wreak havoc on yourself and on others.

“With great power comes great responsibility”

-Benjamin Parker

Thank you and hope you enjoy exercise