# Guide for Terminal
# Fulya Gökalp Yavuz

UNIX

Please install "cygwin" to use Linux distribution on Windows from the following link:

http://www.cygwin.com

Use the setup program and you are ready to use Linux on your Windows.

Apple users may use "iTerm" located on their IOS.

# What is shell?

Shell refers to the command line. The shell takes your keyboard commands and passes them to your operating system. Shell is supplied by GNU project names 'bash' which is an acronym for "Bourne Again Shell". You may want to use the terminal to connect with shell, since you are using a graphical user interface (GUI).

Unix has a hierarchical directory structure. The first directory is named as 'root' directory. There are one or several files and subdirectories under root directory.

Now, iTerm2 provides zsh which is Z shell, is an extended version of the Bourne Shell (sh)

# Open your terminal.. You will see something like the following:

```
The name of your computer: ~ yourname$
```

Or

```
The name of your computer: ~ %
```

# location of your current directory (print working directory)

```
pwd
```

# the files in the current directory

```
ls
```

# You may want to add some options in your command, mainly it looks like

```
command -options arguments
```

# options with a single character may be added preceded by a dash

```
ls -l

# also, bash allows us to use multiple short options

# the files in the current directory with more details (l) and sorted by the file's modification date (t)

ls -lt

# see the file's type

file filename

# see a text file

less filename

# 'q' for quit
```

I use HomeBrew for any command I want to get: https://brew.sh

Intall HomeBrew

```
/bin/bash -c "$(curl -fsSL https://raw.githubusercontent.com/Homebrew/install/HEAD/install.sh)"
```

Use help command for detailse on a specific command

```
help cd
```

## Change Directories

```
cd /TheDirectoryYouWantToGoAndPlay

# Please notice that you may also want to use a pathname which is the route to the directory you want to go.

# For example, /usr/bin is a pathname which contains bin directory under usr directory from the root directory (the leading slash represent this root)

cd /usr/bin
pwd
ls -la

# It is NOT necessary to read it but if you are really curious about what is /bin, here is more information about filesystem hierarchy standard (http://www.pathname.com/fhs/pub/fhs-2.3.pdf)
```

!.. tab can be used for autocomplete. For example, d.'tab' will bring a directory or a file starting with d

```
# list any directory
```

```
ls /usr

# go back to home directory

cd ~
pwd

# change the working directory to the home directory of name_user.

cd ~name_user

# list home directory

ls ~

# create new and empty files

touch myfile1.txt
touch myfile2.txt

# remove a file

rm myfile1.txt
```

!.. Since there is no 'undelete' in Unix-like operating systems, when you remove a file with rm command, you do not have that file anymore! Be careful!

-f	force to delete a file.
-r	delete recursive (delete everything in the file)
-d	delete empty file.

```
# move a file or a directory

mv myfile2.txt myfile3.txt

# make a new directory

mkdir mynewfolder

# make several directories

mkdir dir1 dir2 dir3

# go into this folder and get out of it

cd mynewfolder
cd ..
```

!.. '..' refers to the parent directory. The single dot '.' Refers to the working directory.

!.. Use up-arrow key to see your previous command (Linux will remember last 1000 commands of yours).

```
!.. Left and right-arrow keys allow you to make some editing
commands.
!.. Ctrl-c and Ctrl-v do not work inside a terminal window.
!.. All filenames and commands are case sensitive in Linux.

# rename a folder

mv mynewfolder myfolder

random commands

# date

date

# calendar >>> it did not work in zsh

cal
whoami
Hostname

# exit the terminal

exit

## Files and Directories

# create a new folder
mkdir mynewfolder

# go in and out

cd mynewfolder
cd ..
pwd
cd mynewfolder

# create one more folder and move around

mkdir subdir
cd subdir

# go back to the home directory

cd ~

# go back again to the subdirectory

cd mynewfolder/subdir
pwd

# change the name of a file
mv mynewfolder datadepot
```

```
# Copy Files and Directories

# copy a file or directory to file or directory

# copy file1 to file2

touch file1.txt
cp file1.txt file2.txt

!.. You should have file1.txt (not necessarily file2.txt)

# prompt the user before overwriting an existing file

cp -i file1.txt file2.txt

# copy file1 and file2 files into dir1 directory

cp file1.txt file2.txt dir1

# copy all files in dir1 to dir2
!.. You should have dir1 directory

cp dir1/* dir2

# remove a directory

rm -r rootdizin #more useful for not-empty directories

# or

rmdir rootdizin

!.. Please avoid using following characters for file names
< > ? ? * { } [ ] ( ) ^ ! \ | & $ ? ~

# Lets create a kitchen for yourself and cook in it!

mkdir kitchen
cd kitchen
touch pilav bean

# copy passwd file into the current working directory

cp /etc/passwd .

# display informative message for the user

cp -v /etc/passwd .

# play around

mv passwd yogurt
mkdir dir1
mv yogurt dir1
```

```
# move a file into another directory (first, generate dir2)

mkdir dir2
mv dir1/yogurt dir2

# move a file into current directory

mv dir2/yogurt .

# more

mv yogurt dir1
mv dir1 dir2
ls -l dir2
ls -l dir2/dir1

# return to the beginning

mv dir2/dir1 .
mv dir1/yogurt .

# We may want to move several files into a single file (first,
generate files)

touch file{1..3}.txt
cat file* > allfiles.txt

# echo command, echo displays a line of text

echo
echo this is my first statement
echo $((7 -7)) # arithmetic expansion
echo 100/20=$((100/20))
echo {01..100} # brace expansion
echo {2016..2017}-{01..12}

# make consecutive files for your photos
mkdir photo
cd photo
mkdir {1983..2019}-{01..12}
ls

echo *
```

'*' is not any character for Linux, it has special meaning (it is one of the wildcards). It means match any characters in a filename.

```
echo D*
echo c*

# commands can be substituted with echo command, try:

echo cal
echo $(cal)

## Example

mkdir myexample

# go into the directory

cd myexample

# WGET

GNU Wget is a free software package for retrieving files using HTTP,
HTTPS, FTP and FTPS, the most widely used Internet protocols.

Source: https://www.gnu.org/software/wget/

#Data Expo 2009: Airline on time data

The data consists of flight arrival and departure details for all
commercial flights within the USA, from October 1987 to April 2008.
This is a large dataset: there are nearly 120 million records in
total, and takes up 1.6 gigabytes of space compressed and 12
gigabytes when uncompressed.

# put some data into the folder: the following link is not working
any more.

wget http://stat-computing.org/dataexpo/2009/2008.csv.bz2

# Here is the new source for this data set:

https://dataverse.harvard.edu/api/access/datafile/:persistentId?
persistentId=doi:10.7910/DVN/HG7NV7/EIR0RA

# Wget this file with correct name when redirected:

wget --content-disposition https://dataverse.harvard.edu/api/access/
datafile/:persistentId?persistentId=doi:10.7910/DVN/HG7NV7/EIR0RA

# Wget this file with correct name when redirected: (if you work
with zsh add " before and after the link since it takes ? As
wildcard)

wget --content-disposition "https://dataverse.harvard.edu/api/
access/datafile/:persistentId?persistentId=doi:10.7910/DVN/HG7NV7/
EIR0RA"

# You may want to achieve the same automated behavior with curl,
using:

curl -JLO https://dataverse.harvard.edu/api/access/
datafile/:persistentId?persistentId=doi:10.7910/DVN/HG7NV7/EIR0RA
```

```
# -O uses the remote name, and -J forces the -O to get that name
from the content-disposition header rather than the URL, and -L
follows redirects if needed.*

# Note #############################################################

# If wget did not work.

For MAC: try the following commands:

/usr/bin/ruby -e "$(curl -fsSL https://raw.githubusercontent.com/
Homebrew/install/master/install)"
brew install wget

# Website to find new libraries in Mac:

https://brew.sh

For More information check out:

# For mac: http://hichenwang.blogspot.com.tr/2011/07/install-wget-
in-mac-os-x.html
# For windows: https://codeforgeek.com/2014/07/wget-for-windows/

###################################################################

ls -la

# unzip the data (it comes in a compressed format)

bzip2 -d 2008.csv.bz2

ls -la

# Please notice that 2008.csv is 234052199 byte (~234 MB)

# see the first and last 10 rows

head 2008.csv
tail 2008.csv

# see only the first/last 3 lines on that file

head -n3 2008.csv
tail -n3 2008.csv

!.. For details about a command, you may use man command

man head

# save a shorter version of the data into a new file

head -n20 2008.csv > short.csv
```

```
# add 20 lines too

tail -n20 2008.csv >> short.csv

!.. '>' overwrites the file, on the other hand '>>' append the output to a file.

# see the entire file

cat short.csv

# print line, word and bytes for each file

wc 2008.csv
```

## References

# Fulya Gokalp Yavuz and Mark Daniel Ward. 2018. Introduction to Big Data. Workshop@American Statistical Association Conference on Statistical Practice, 2018, Portland, USA.

# Garrett Grolemund. 2014. Hands-On Programming with R. O’Reilly Media, Inc., CA, USA.

# https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/HG7NV7

# *https://superuser.com/questions/301044/how-to-wget-a-file-with-correct-name-when-redirected

Enjoy the Linux!

FGY.