

Exercise
Introduction To Linux
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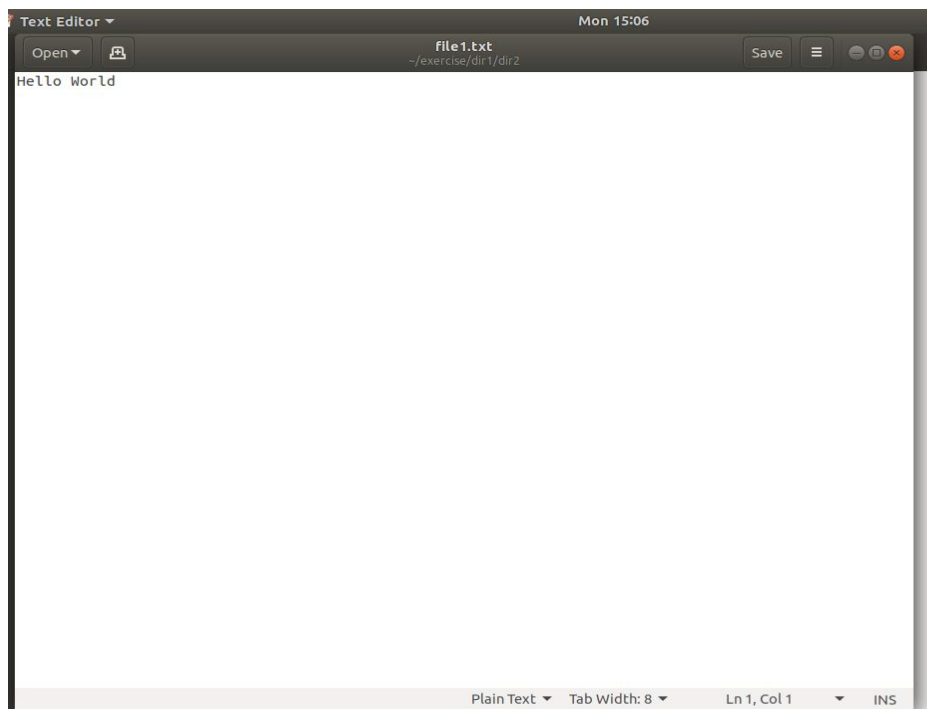
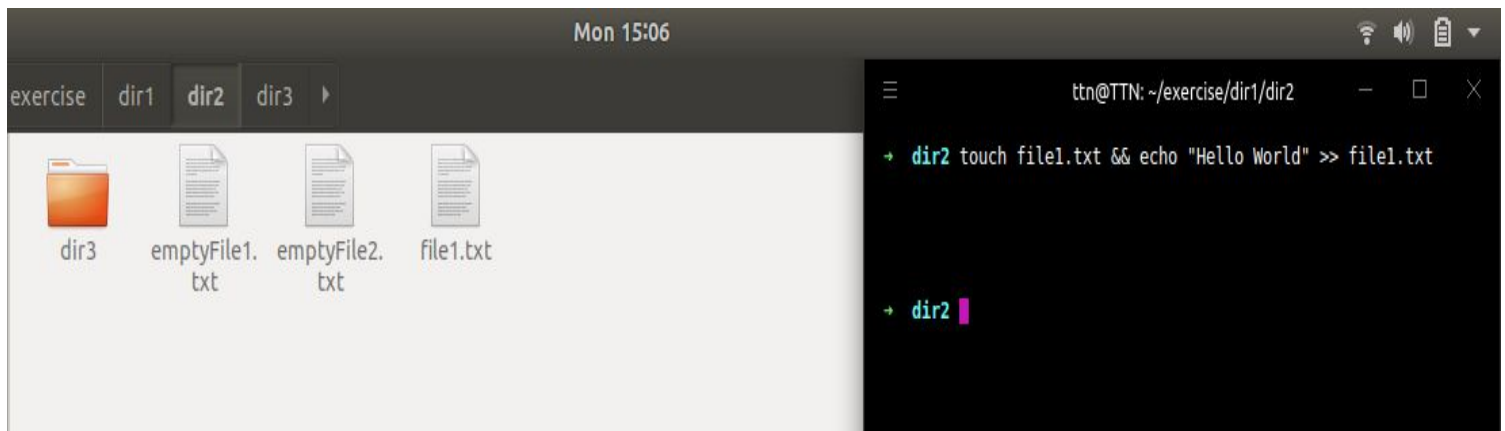
1. Create a directory "exercise" inside your home directory and create nested(dir1/dir2/dir3) directory structure inside "exercise" with single command.

```
es Hyper ▾  
→ ~ mkdir exercise && cd exercise && mkdir -p dir1/dir2/dir3  
→ exercise ls  
dir1  
→ exercise dir1  
→ dir1 ls  
dir2  
→ dir1 dir2  
→ dir2 ls  
dir3  
→ dir2 dir 3  
dir: cannot access '3': No such file or directory  
→ dir2 dir 3  
dir: cannot access '3': No such file or directory  
→ dir2
```

2. Create two empty files inside dir2 directory: emptyFile1, emptyFile2 in single command

```
s Hyper ▾ Mon 14:54  
ttn@TTN: ~/exercise/dir1/dir2  
→ exercise cd dir1  
→ dir1 dir2  
→ dir2 touch emptyFile1.txt emptyFile2.txt  
→ dir2 ls  
dir3 emptyFile1.txt emptyFile2.txt  
→ dir2
```

3. Create one file file1.txt containing text "hello world" and save it.



4. Find a "passwd" file using find command inside /etc. copy this files as passwd_copy and then rename this file as passwd_backup.

```
es Hyper ▾ Mon 15:18
ttn@TTN: /etc

→ ~ cd /etc
→ /etc find passwd
passwd
→ /etc cp passwd passwd_copy
cp: cannot create regular file 'passwd_copy': Permission denied
→ /etc sudo cp passwd passwd_copy
[sudo] password for ttn:
→ /etc find passwd_copy
passwd_copy
→ /etc mv passwd_copy passwd_backup
mv: cannot move 'passwd_copy' to 'passwd_backup': Permission denied
→ /etc sudo mv passwd_copy passwd_backup
→ /etc find passwd_backup
passwd_backup
→ /etc
```

5. Try reading passwd_backup file in multiple tools: less,more,cat,strings etc and find the difference in their usage.

more>>

```
more passwd_backup
root:x:0:0:root:/root:/usr/bin/zsh
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/bin/sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin
www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin
backup:x:34:34:backup:/var/backups:/usr/sbin/nologin
list:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin
irc:x:39:39:ircd:/var/run/ircd:/usr/sbin/nologin
gnats:x:41:41:Gnats Bug-Reporting System (admin):/var/lib/gnats:/usr/sbin/nologin
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin
systemd-network:x:100:102:systemd Network Management,,,:/run/systemd/netif:/usr/sbin/nologin
systemd-resolve:x:101:103:systemd Resolver,,,:/run/systemd/resolve:/usr/sbin/nologin
syslog:x:102:106:./home/syslog:/usr/sbin/nologin
messagebus:x:103:107:./nonexistent:/usr/sbin/nologin
_apt:x:104:65534:./nonexistent:/usr/sbin/nologin
uidd:x:105:111:./run/uidd:/usr/sbin/nologin
avahi-autoipd:x:106:112:Avahi autoip daemon,,,:/var/lib/avahi-autoipd:/usr/sbin/nologin
usbmux:x:107:46:usbmux daemon,,,:/var/lib/usbmux:/usr/sbin/nologin
dnsmasq:x:108:65534:dnsmasq,,,:/var/lib/misc:/usr/sbin/nologin
rtkit:x:109:114:RealtimeKit,,,:/proc:/usr/sbin/nologin
cups-pk-helper:x:110:116:user for cups-pk-helper service,,,:/home/cups-pk-helper:/usr/sbin/nologin
speech-dispatcher:x:111:29:Speech Dispatcher,,,:/var/run/speech-dispatcher:/bin/false
whoopsie:x:112:117:./nonexistent:/bin/false
kernoops:x:113:65534:Kernel Oops Tracking Daemon,,,:/usr/sbin/nologin
saned:x:114:119:./var/lib/saned:/usr/sbin/nologin
pulse:x:115:120:PulseAudio daemon,,,:/var/run/pulse:/usr/sbin/nologin
avahi:x:116:122:Avahi mDNS daemon,,,:/var/run/avahi-daemon:/usr/sbin/nologin
colord:x:117:123:colord colour management daemon,,,:/var/lib/colord:/usr/sbin/nologin
--More-- (87%)
```

cat>>

```
Mon 15:26
ttn@TTN: /etc

+ /etc cat passwd backup
root:x:0:0:root:/root:/usr/bin/zsh
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/bin/sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin
www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin
backup:x:34:34:backup:/var/backups:/usr/sbin/nologin
list:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin
irc:x:39:39:ircd:/var/run/ircd:/usr/sbin/nologin
gnats:x:41:41:Gnats Bug-Reporting System (admin):/var/lib/gnats:/usr/sbin/nologin
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin
systemd-network:x:100:102:systemd Network Management,,:/run/systemd/netif:/usr/sbin/nologin
systemd-resolve:x:101:103:systemd Resolver,,:/run/systemd/resolve:/usr/sbin/nologin
syslog:x:102:106:/:/home/syslog:/usr/sbin/nologin
messagebus:x:103:107:/:/nonexistent:/usr/sbin/nologin
_apt:x:104:65534:/:/nonexistent:/usr/sbin/nologin
uuid:x:105:111:/:/run/uuid:/usr/sbin/nologin
avahi-autoipd:x:106:112:Avahi autoip daemon,,:/var/lib/avahi-autoipd:/usr/sbin/nologin
usbmux:x:107:46:usbmux daemon,,:/var/lib/usbmux:/usr/sbin/nologin
dnsmasq:x:108:65534:dnsmasq,,:/var/lib/misc:/usr/sbin/nologin
rtkit:x:109:114:RealtimeKit,,:/proc:/usr/sbin/nologin
cups-pk-helper:x:110:116:user for cups-pk-helper service,,:/home/cups-pk-helper:/usr/sbin/nologin
speech-dispatcher:x:111:29:Speech Dispatcher,,:/var/run/speech-dispatcher:/bin/false
whoopsie:x:112:117:/:/nonexistent:/bin/false
kernoops:x:113:65534:Kernel Oops Tracking Daemon,,:/usr/sbin/nologin
saned:x:114:119:/:/var/lib/saned:/usr/sbin/nologin
pulse:x:115:120:PulseAudio daemon,,:/var/run/pulse:/usr/sbin/nologin
avahi:x:116:122:Avahi mDNS daemon,,:/var/run/avahi-daemon:/usr/sbin/nologin
colord:x:117:123:colord colour management daemon,,:/var/lib/colord:/usr/sbin/nologin
hplip:x:118:7:HPLIP system user,,:/var/run/hplip:/bin/false
geoclue:x:119:124:/:/var/lib/geoclue:/usr/sbin/nologin
gnome-initial-setup:x:120:65534:/:/run/gnome-initial-setup:/bin/false
gdm:x:121:125:Gnome Display Manager:/var/lib/gdm3:/bin/false
ttn:x:1000:1000:Mahesh@TTN:/home/ttn:/usr/bin/zsh

+ /etc
```

Less >>

```
00:26
ttn@TTN: /etc

+ ~ /etc
+ /etc less passwd_backup
+ /etc
```


Less(contd.)

```
less passwd_backup

root:x:0:0:root:/root:/usr/bin/zsh
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/bin/sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin
www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin
backup:x:34:34:backup:/var/backups:/usr/sbin/nologin
list:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin
irc:x:39:39:ircd:/var/run/ircd:/usr/sbin/nologin
gnats:x:41:41:Gnats Bug-Reporting System (admin):/var/lib/gnats:/usr/sbin/nologin
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin
systemd-network:x:100:102:systemd Network Management,,,:/run/systemd/netif:/usr/sbin/nologin
systemd-resolve:x:101:103:systemd Resolver,,,:/run/systemd/resolve:/usr/sbin/nologin
syslog:x:102:106:./home/syslog:/usr/sbin/nologin
messagebus:x:103:107:./nonexistent:/usr/sbin/nologin
_apt:x:104:65534:./nonexistent:/usr/sbin/nologin
uidd:x:105:111:./run/uidd:/usr/sbin/nologin
avahi-autoipd:x:106:112:Avahi autoip daemon,,,:/var/lib/avahi-autoipd:/usr/sbin/nologin
usbmux:x:107:46:usbmux daemon,,,:/var/lib/usbmux:/usr/sbin/nologin
dnsmasq:x:108:65534:dnsmasq,,,:/var/lib/misc:/usr/sbin/nologin
rtkit:x:109:114:RealtimeKit,,,:/proc:/usr/sbin/nologin
cups-pk-helper:x:110:116:user for cups-pk-helper service,,,:/home/cups-pk-helper:/usr/sbin/nologin
speech-dispatcher:x:111:29:Speech Dispatcher,,,:/var/run/speech-dispatcher:/bin/false
whoopsie:x:112:117:./nonexistent:/bin/false
kernoops:x:113:65534:Kernel Oops Tracking Daemon,,,:/usr/sbin/nologin
saned:x:114:119:./var/lib/saned:/usr/sbin/nologin
pulse:x:115:120:PulseAudio daemon,,,:/var/run/pulse:/usr/sbin/nologin
avahi:x:116:122:Avahi mDNS daemon,,,:/var/run/avahi-daemon:/usr/sbin/nologin
colord:x:117:123:colord colour management daemon,,,:/var/lib/colord:/usr/sbin/nologin
hplip:x:118:7:HPLIP system user,,,:/var/run/hplip:/bin/false
geoclue:x:119:124:./var/lib/geoclue:/usr/sbin/nologin
gnome-initial-setup:x:120:65534:./run/gnome-initial-setup:/bin/false
gdm:x:121:125:Gnome Display Manager:/var/lib/gdm3:/bin/false
ttn:x:1000:1000:Mahesh@TTN:/home/ttn:/usr/bin/zsh
~
~
~
~
(END)
```

6. Find out the number of line in password_backup containing "/bin/false".

```
e
ttn@TTN:/etc$ grep -n "/bin/false" passwd_backup
30:speech-dispatcher:x:111:29:Speech Dispatcher,,,:/var/run/speech-dispatcher:/bin/false
31:whoopsie:x:112:117::/nonexistent:/bin/false
37:hplip:x:118:7:HPLIP system user,,,:/var/run/hplip:/bin/false
39:gnome-initial-setup:x:120:65534:./run/gnome-initial-setup:/bin/false
40:gdm:x:121:125:Gnome Display Manager:/var/lib/gdm3:/bin/false
ttn@TTN:/etc$
```

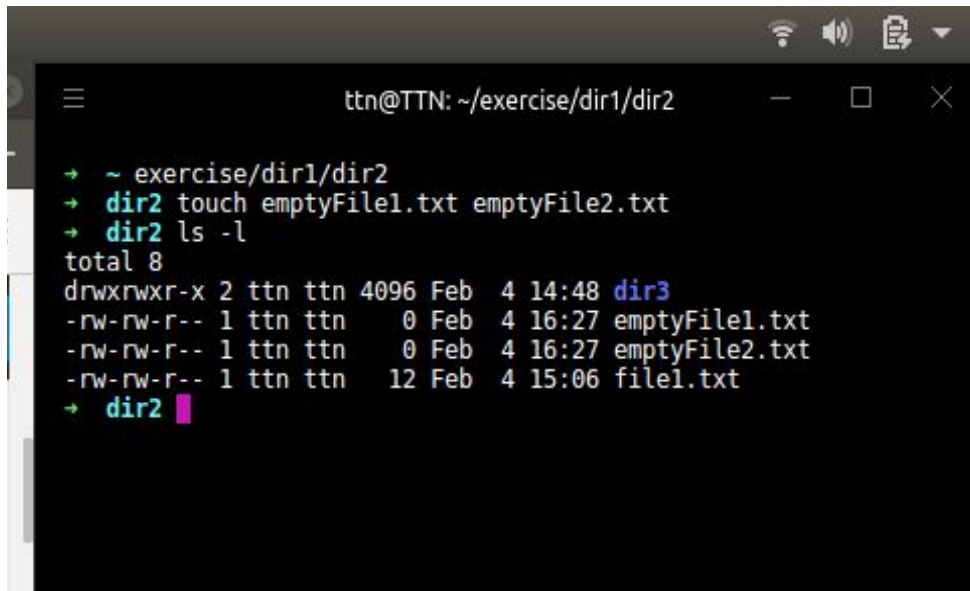
7. Get the first 5 lines of a file "password_backup" and Redirect the output of the above commands into file "output".

```
sudo: 1: Command not found
→ /etc sudo head -n 5 passwd_backup > output
→ /etc find output
output
→ /etc sudo head -n 5 output
root:x:0:0:root:/root:/usr/bin/zsh
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/bin/sync
→ /etc
```

8. Create a "test" user, create its password and find out its uid and gid.

```
ttn@TTN: ~  
→ ~ sudo useradd test  
→ ~ passwd test 1234  
Usage: passwd [options] [LOGIN]  
  
Options:  
  -a, --all                report password status on all  
                           accounts  
  -d, --delete             delete the password for the na  
                           med account  
  -e, --expire             force expire the password for  
                           the named account  
  -h, --help               display this help message and  
                           exit  
  -k, --keep-tokens        change password only if expire  
                           d  
  -i, --inactive INACTIVE set password inactive after ex  
                           piration  
                           to INACTIVE  
  -l, --lock               lock the password of the named  
                           account  
  -n, --mindays MIN_DAYS  set minimum number of days bef  
                           ore password  
                           change to MIN_DAYS  
  -q, --quiet              quiet mode  
  -r, --repository REPOSITORY change password in REPOSITORY  
                           repository  
  -R, --root CHROOT_DIR   directory to chroot into  
  -S, --status             report password status on the  
                           named account  
  -u, --unlock             unlock the password of the nam  
                           ed account  
  -w, --warndays WARN_DAYS set expiration warning days to  
                           WARN_DAYS  
  -x, --maxdays MAX_DAYS set maximum number of days bef  
                           ore password  
                           change to MAX_DAYS  
  
→ ~ id -u test  
1001  
→ ~ id -g test  
1001  
→ ~ id -G test  
1001  
→ ~ █
```


9. Change the timestamp of emptyFile1,emptyFile2 which are exist in dir2.



A terminal window titled "ttn@TTN: ~/exercise/dir1/dir2" with standard window controls. The terminal shows a sequence of commands and their output:

```
→ ~ exercise/dir1/dir2
→ dir2 touch emptyFile1.txt emptyFile2.txt
→ dir2 ls -l
total 8
drwxrwxr-x 2 ttn ttn 4096 Feb  4 14:48 dir3
-rw-rw-r-- 1 ttn ttn    0 Feb  4 16:27 emptyFile1.txt
-rw-rw-r-- 1 ttn ttn    0 Feb  4 16:27 emptyFile2.txt
-rw-rw-r-- 1 ttn ttn   12 Feb  4 15:06 file1.txt
→ dir2
```

The prompt "dir2" is highlighted in pink in the final line.

10. Login as test user and edit the "output" file created above. Since the permission won't allow you to save the changes. Configure such that test user can edit it.

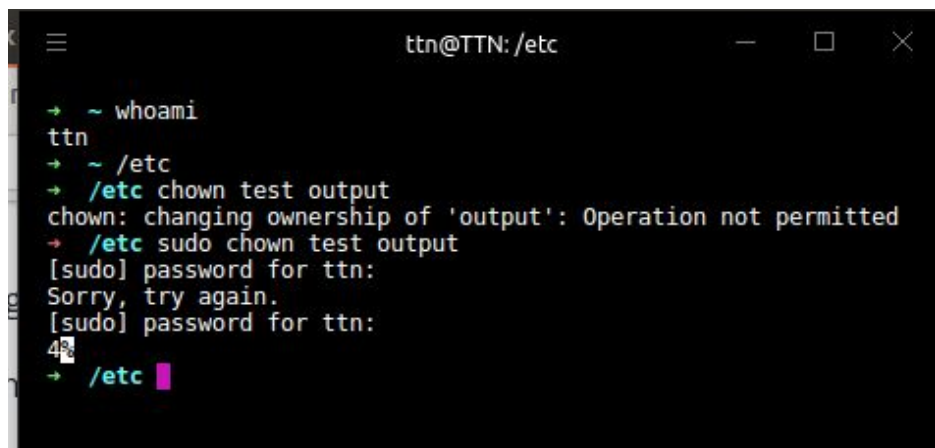


```
ttn@TTN: /etc
→ ~ whoami
ttn
→ ~ /etc
→ /etc chown test output
chown: changing ownership of 'output': Operation not permitted
→ /etc sudo chown test output
[sudo] password for ttn:
Sorry, try again.
[sudo] password for ttn:
48%
→ /etc
```

10.1. Add group owner of the "output" file as the secondary group of testuser and check/change the "output" file permission if it is editable by group. Once done revert the changes

10.2 Make the file editable to the world so that test user can access it. Revert the changes after verification.

10.3 Change the ownership to edit the file.



```
ttn@TTN: /etc
→ ~ whoami
ttn
→ ~ /etc
→ /etc chown test output
chown: changing ownership of 'output': Operation not permitted
→ /etc sudo chown test output
[sudo] password for ttn:
Sorry, try again.
[sudo] password for ttn:
48%
→ /etc
```

11. Create alias with your name so that it creates a file as `"/tmp/aliastesting"`.

```
→ ~ alias mahesh='cd /tmp && touch aliastesting'
→ ~ mahesh
→ /tmp find aliastesting
aliastesting
→ /tmp
```

12. Edit `~/.bashrc` file such that when you change to "test" user it should clear the screen and print "Welcome".

```
clear && echo "Welcome"
```

```
su - test

→ ~ su - test
Password: 
```

```
Welcome
test@TTN:/$ 
```

13. Install “zip” package.

```
Hyper Mon 17:11
ttn@TTN: ~

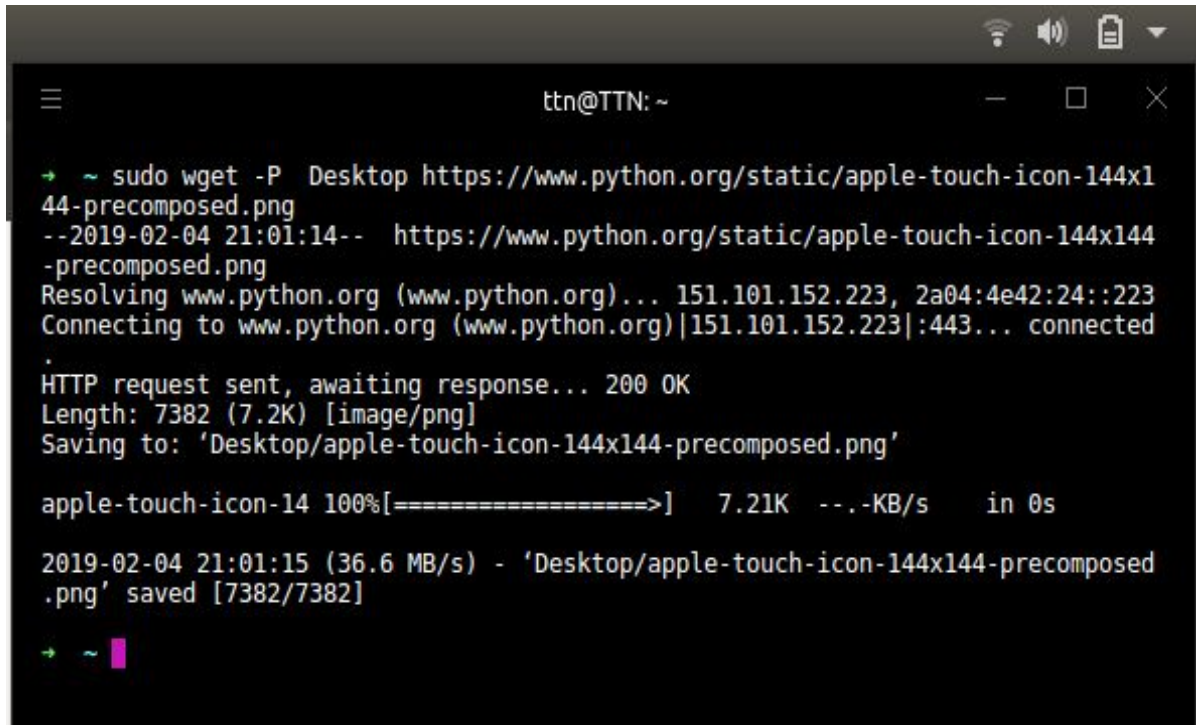
→ ~ sudo apt-get install zip
[sudo] password for ttn:
Reading package lists... Done
Building dependency tree
Reading state information... Done
zip is already the newest version (3.0-11build1).
0 upgraded, 0 newly installed, 0 to remove and 12 not upgraded.
→ ~ 
```


14. Compress "output" and "passwd_backup" files into a tar ball. List the files present inside the tar created.

```
ttn@TTN: /etc
→ /etc sudo tar -czvf ball.tar.gz passwd_backup output
passwd_backup
output
→ /etc ls
acpi                lsb-release
adduser.conf        ltrace.conf
alternatives        machine-id
anacrontab          magic
apg.conf            magic.mime
apm                 mailcap
apparmor            mailcap.order
apparmor.d          manpath.config
appport             mime.types
appstream.conf      mke2fs.conf
apt                 modprobe.d
avahi               modules
ball.tar.gz         modules-load.d
bash.bashrc         mtab
bash_completion     mtools.conf
bash_completion.d   nanorc
bindresvport.blacklist netplan
binfmt.d            networkd.conf
```

```
ttn@TTN: /etc
→ /etc tar -tvf ball.tar.gz
-rw-r--r-- root/root      2408 2019-02-04 15:15 passwd_backup
-----rwx test/root      192 2019-02-04 16:02 output
→ /etc
```

17. Download any image from web and move to desktop

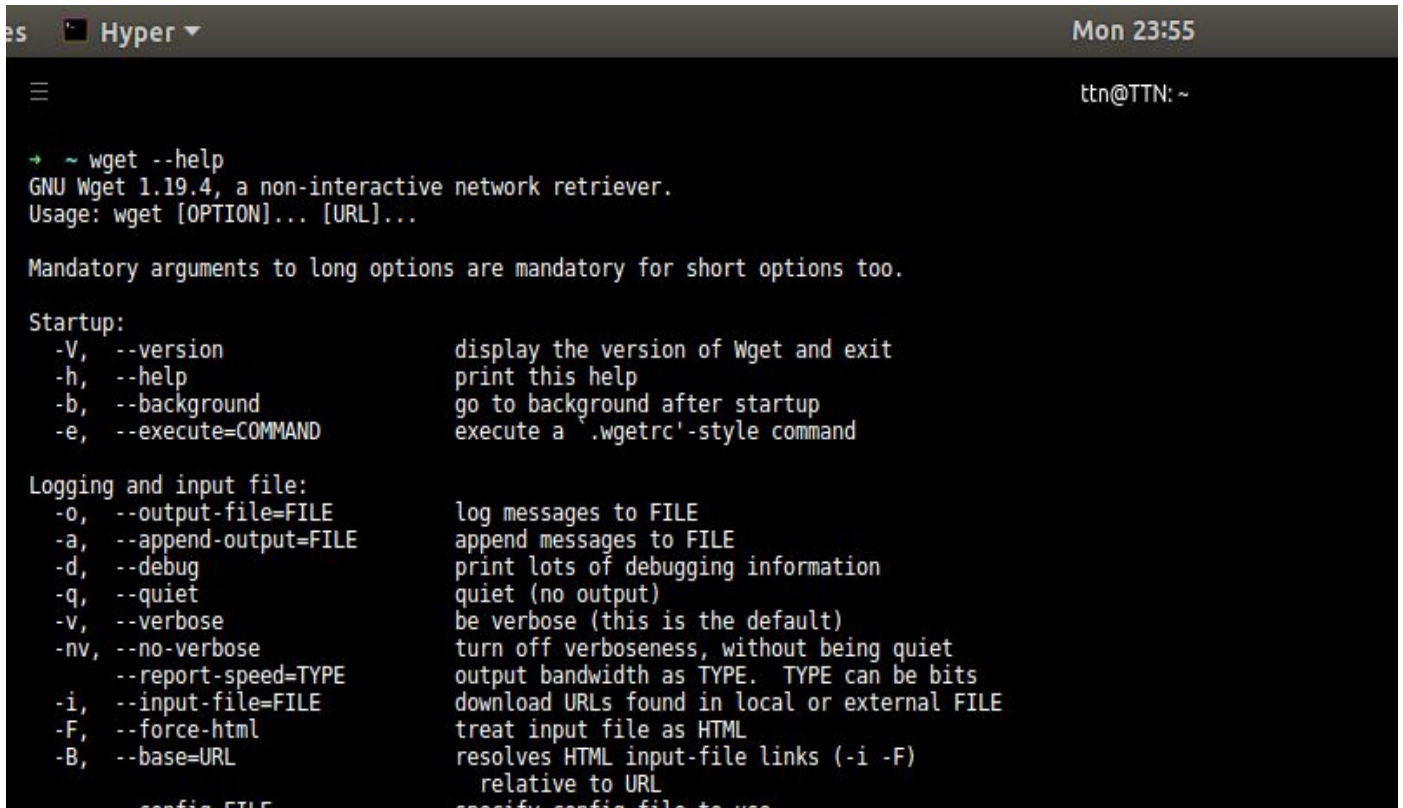


```
ttn@TTN: ~  
→ ~ sudo wget -P Desktop https://www.python.org/static/apple-touch-icon-144x144-precomposed.png  
--2019-02-04 21:01:14-- https://www.python.org/static/apple-touch-icon-144x144-precomposed.png  
Resolving www.python.org (www.python.org)... 151.101.152.223, 2a04:4e42:24::223  
Connecting to www.python.org (www.python.org)|151.101.152.223|:443... connected  
.  
HTTP request sent, awaiting response... 200 OK  
Length: 7382 (7.2K) [image/png]  
Saving to: 'Desktop/apple-touch-icon-144x144-precomposed.png'  
  
apple-touch-icon-14 100%[=====>] 7.21K --.-KB/s in 0s  
  
2019-02-04 21:01:15 (36.6 MB/s) - 'Desktop/apple-touch-icon-144x144-precomposed.png' saved [7382/7382]  
→ ~ █
```

18. How to get help of commands usages.

- By using

“command” --help

A terminal window titled 'Hyper' with a timestamp 'Mon 23:55' and a user prompt 'ttn@TTN: ~'. The terminal shows the command '~ wget --help' being executed. The output displays the GNU Wget version (1.19.4) and its usage: 'Usage: wget [OPTION]... [URL]...'. It then lists mandatory arguments for long options. The output is organized into sections: 'Startup:' with options like --version, --help, --background, and --execute; and 'Logging and input file:' with options like --output-file, --append-output, --debug, --quiet, --verbose, --no-verbose, --report-speed, --input-file, --force-html, and --base. The terminal text is as follows:

```
es  Hyper ▾ Mon 23:55
ttn@TTN: ~

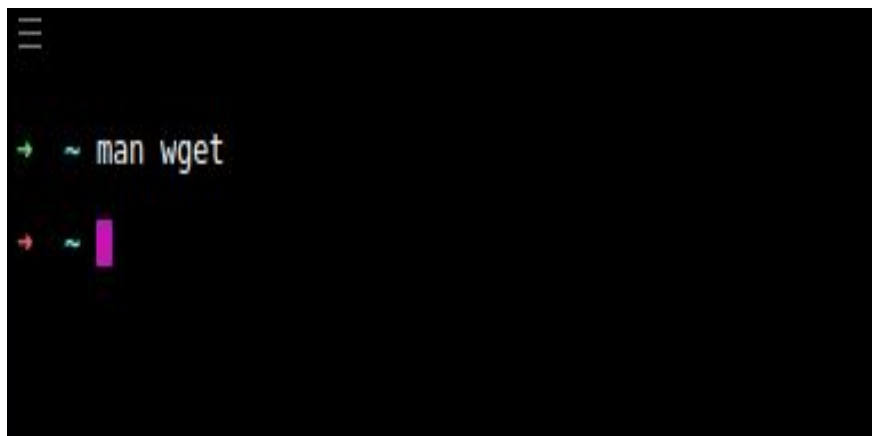
→ ~ wget --help
GNU Wget 1.19.4, a non-interactive network retriever.
Usage: wget [OPTION]... [URL]...

Mandatory arguments to long options are mandatory for short options too.

Startup:
-V, --version          display the version of Wget and exit
-h, --help             print this help
-b, --background       go to background after startup
-e, --execute=COMMAND  execute a '.wgetrc'-style command

Logging and input file:
-o, --output-file=FILE  log messages to FILE
-a, --append-output=FILE append messages to FILE
-d, --debug             print lots of debugging information
-q, --quiet            quiet (no output)
-v, --verbose          be verbose (this is the default)
-nv, --no-verbose      turn off verboseness, without being quiet
--report-speed=TYPE    output bandwidth as TYPE. TYPE can be bits
-i, --input-file=FILE  download URLs found in local or external FILE
-F, --force-html       treat input file as HTML
-B, --base=URL         resolves HTML input-file links (-i -F)
                      relative to URL
config-FILE            specify config file to use
```

- By using man “command”

A terminal window showing the command '~ man wget' being executed. The terminal is dark with a light-colored prompt and command. The output is not visible, only the command line is shown. The terminal text is as follows:

```
→ ~ man wget
```

```
man wget

WGET(1)                                GNU Wget

NAME
    Wget - The non-interactive network downloader.

SYNOPSIS
    wget [option]... [URL]...

DESCRIPTION
    GNU Wget is a free utility for non-interactive download of files from the Web. It supports HTTP, HTTPS, and FTP protocols, as well as retrieval of mirrored sites.

    Wget is non-interactive, meaning that it can work in the background, while the user is not logged on. This allows you to start a retrieval and leave the system, letting Wget finish the work. By contrast, most of the Web browsers require constant user's presence, which can be a great hindrance when downloading large files or when the connection is slow.

    Wget can follow links in HTML, XHTML, and CSS pages, to create local versions of remote web sites, fully recreating the directory structure of the original site. This is sometimes referred to as "recursive downloading." While doing that, Wget respects the Robot Exclusion Standard (/robots.txt). Wget can be configured to follow links in downloaded files to point at the local files, for offline viewing.

    Wget has been designed for robustness over slow or unstable network connections; if a download fails due to a network problem, it will keep retrying until the file has been retrieved. If the server supports regetting, it will instruct the server to continue the download from where it left off.

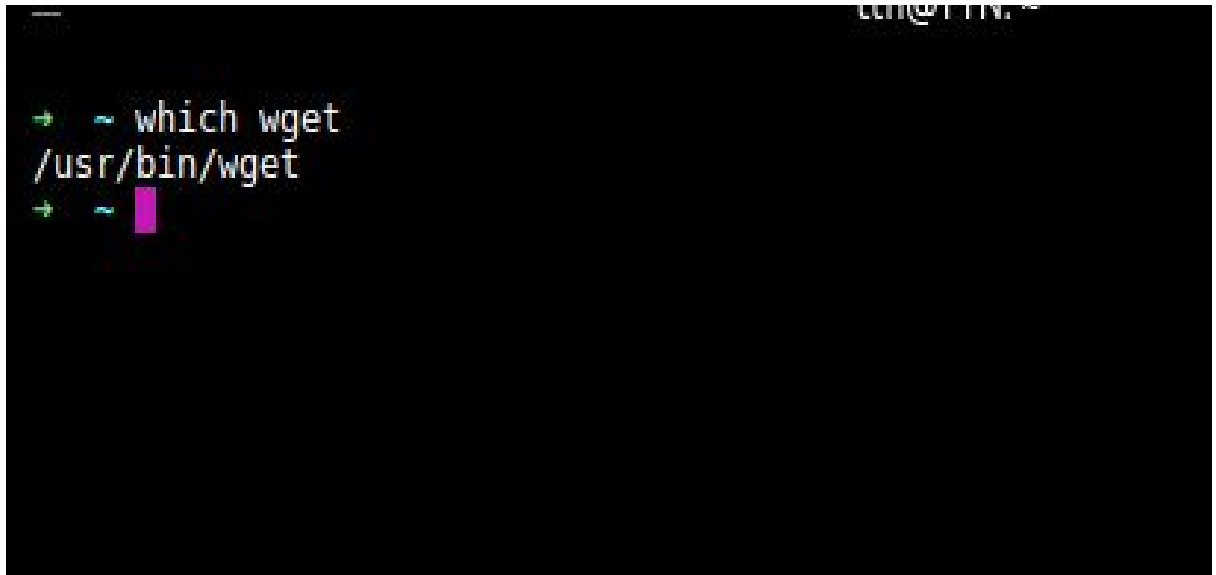
OPTIONS
    Option Syntax
    Since Wget uses GNU getopt to process command-line arguments, every option has a long form along with the short one. Long options are more convenient, but they take time to type. You may freely mix different option styles, or specify options after the command-line arguments. Thus you may write:

    wget -r --tries=10 http://fly.srk.fer.hr/ -o log
```

19. Create a symlink of /etc/services into /tmp/ports-info

```
00:06 ttn@TTN: ~
→ ~ ln -s /etc/services /tmp/ports-info
→ ~
```


20. You are appointed as a Software/DevOps Engineer in ABC media services. On your first day you need to troubleshoot a problem. There is a command “xyz” somewhere installed in that linux system. But as a new joinee you do not have any idea about where is that Installed. How can you check that?

A terminal window with a black background and light blue text. The prompt is a green arrow followed by a tilde (~). The command 'which wget' is entered. The output is '/usr/bin/wget'. A second prompt with a green arrow and tilde is shown with a red cursor block.

```
→ ~ which wget
/usr/bin/wget
→ ~
```