

# Operating Systems

## Lab Report

### Lab 3



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|---|---|
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| <b>Class</b>                              | Operating Systems BCE-5B                      |
| <b>Instructor's Name</b>                  | Sir Wasif                                     |

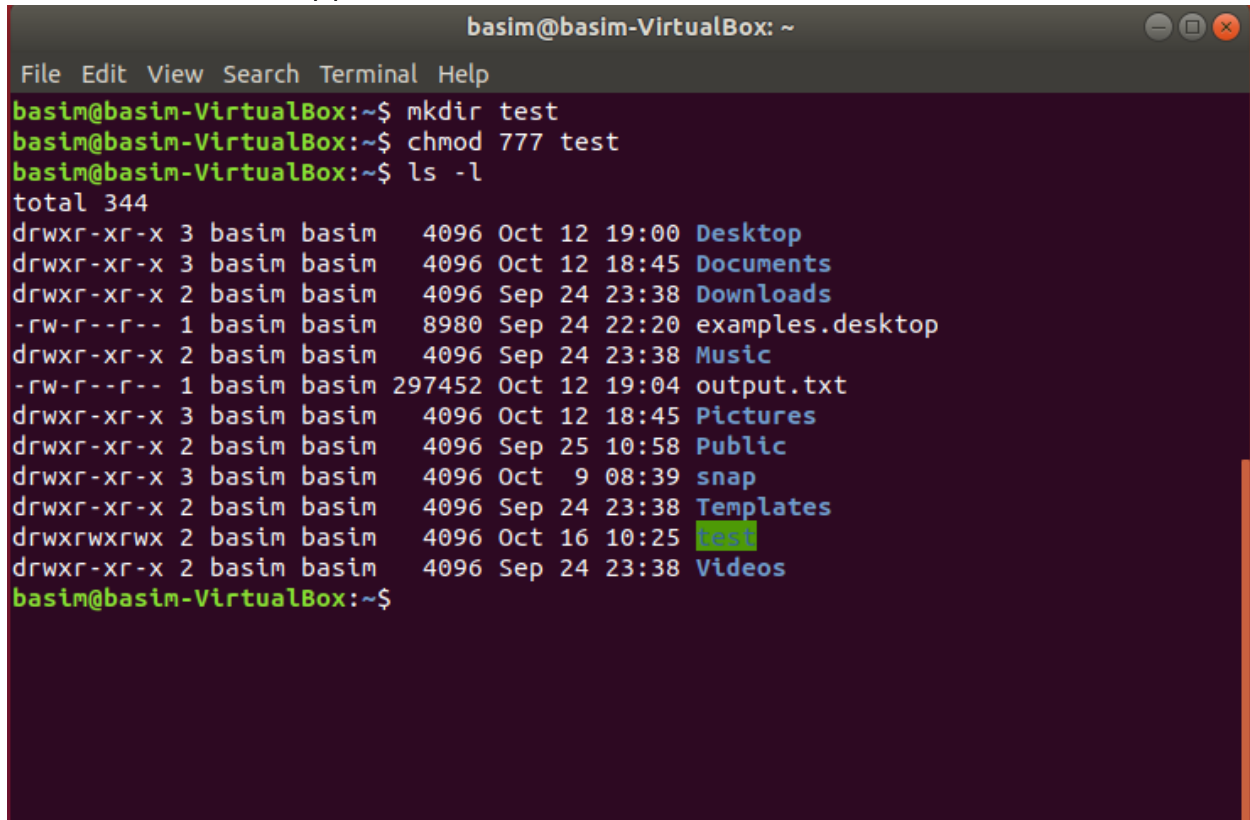
# In Lab tasks

## Activity 1:

- This activity is related to file permission. Perform the following tasks
- Create a new directory named test in root directory as superuser
- Make this directory public for all
- Create a file "testfile.txt" in /test directory
- Change its permissions that no boy can write the file, but the owner can read it.
- Create another user "Usama"
- Run the shell with user Usama
- Try to read the "testfile.txt"
- Logout as Usama
- Change the permission of testfile.txt so that everyone can read, write and execute it
- Run shell as Usama again
- Now, read the file

## Solution:

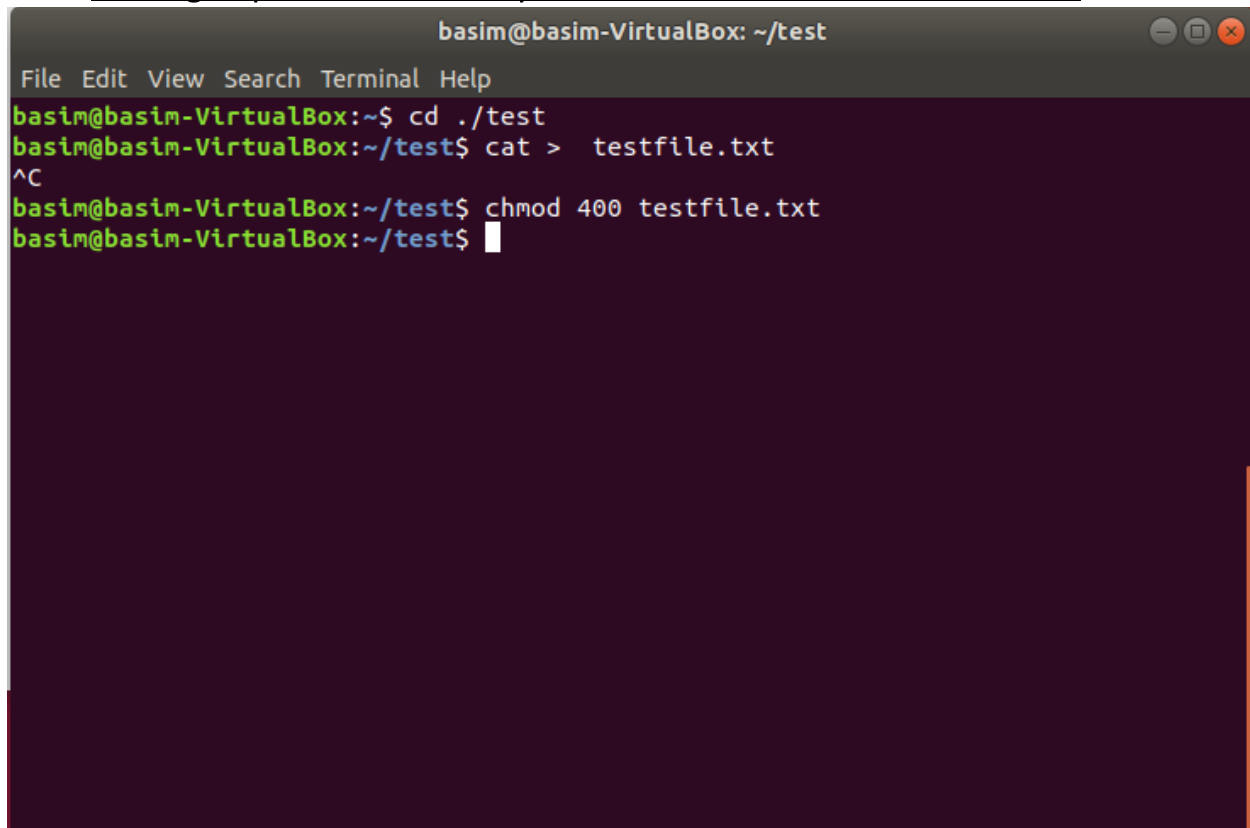
1. Creating a new directory named test
2. Make directory public for all.



```
basim@basim-VirtualBox: ~  
File Edit View Search Terminal Help  
basim@basim-VirtualBox:~$ mkdir test  
basim@basim-VirtualBox:~$ chmod 777 test  
basim@basim-VirtualBox:~$ ls -l  
total 344  
drwxr-xr-x 3 basim basim 4096 Oct 12 19:00 Desktop  
drwxr-xr-x 3 basim basim 4096 Oct 12 18:45 Documents  
drwxr-xr-x 2 basim basim 4096 Sep 24 23:38 Downloads  
-rw-r--r-- 1 basim basim 8980 Sep 24 22:20 examples.desktop  
drwxr-xr-x 2 basim basim 4096 Sep 24 23:38 Music  
-rw-r--r-- 1 basim basim 297452 Oct 12 19:04 output.txt  
drwxr-xr-x 3 basim basim 4096 Oct 12 18:45 Pictures  
drwxr-xr-x 2 basim basim 4096 Sep 25 10:58 Public  
drwxr-xr-x 3 basim basim 4096 Oct 9 08:39 snap  
drwxr-xr-x 2 basim basim 4096 Sep 24 23:38 Templates  
drwxrwxrwx 2 basim basim 4096 Oct 16 10:25 test  
drwxr-xr-x 2 basim basim 4096 Sep 24 23:38 Videos  
basim@basim-VirtualBox:~$
```

3. Creating a file testfile.txt in test directory

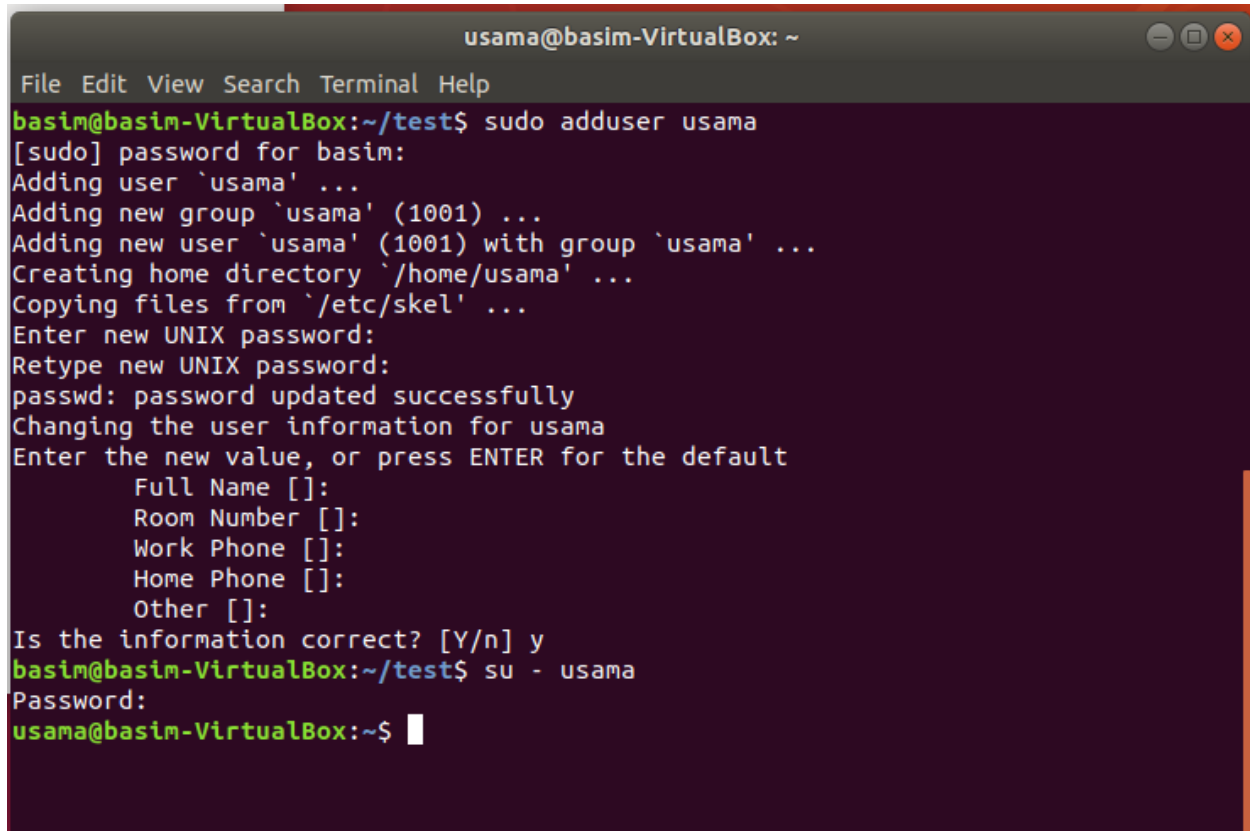
4. Setting its permission to only user can read and no one can write.



```
basim@basim-VirtualBox: ~/test
File Edit View Search Terminal Help
basim@basim-VirtualBox:~$ cd ./test
basim@basim-VirtualBox:~/test$ cat > testfile.txt
^C
basim@basim-VirtualBox:~/test$ chmod 400 testfile.txt
basim@basim-VirtualBox:~/test$
```

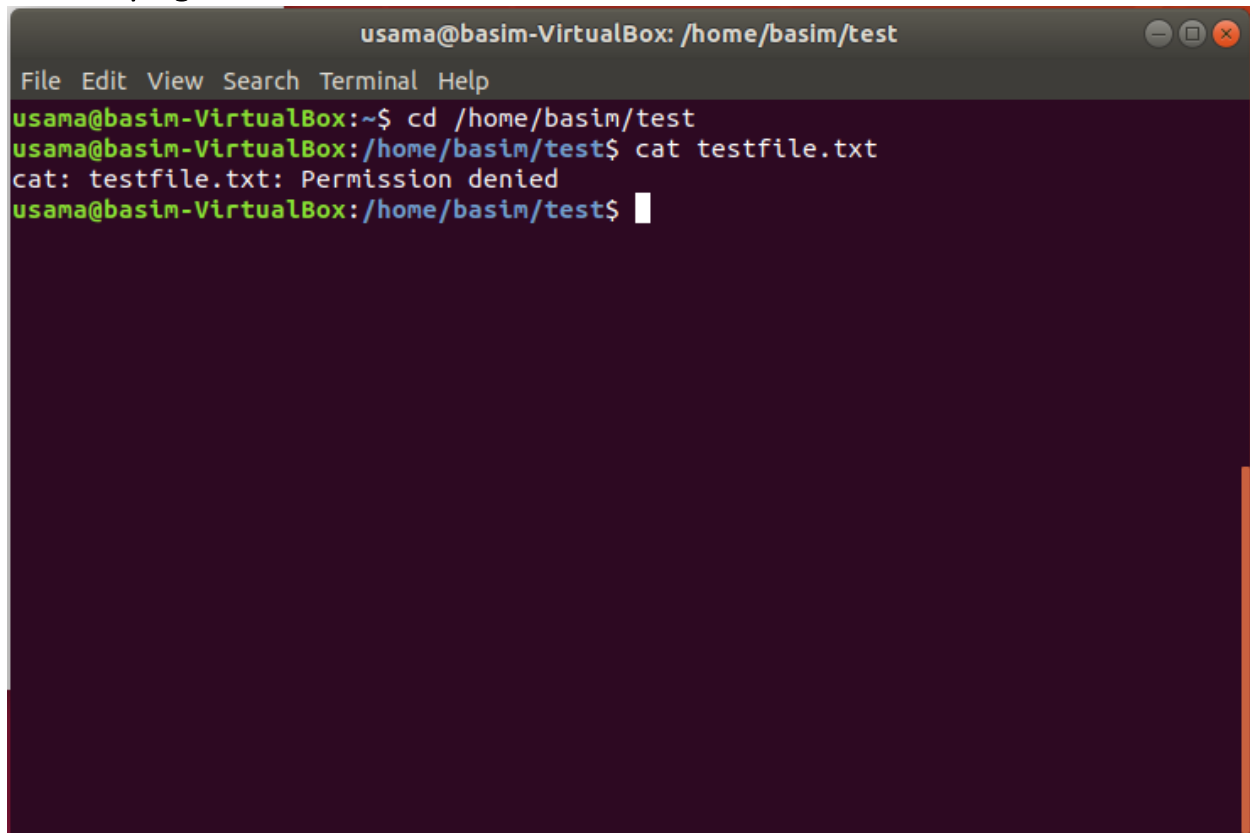
5. Creating another user usama.

6. Running shell as user usama.



```
usama@basim-VirtualBox: ~  
File Edit View Search Terminal Help  
basim@basim-VirtualBox:~/test$ sudo adduser usama  
[sudo] password for basim:  
Adding user `usama' ...  
Adding new group `usama' (1001) ...  
Adding new user `usama' (1001) with group `usama' ...  
Creating home directory `/home/usama' ...  
Copying files from `/etc/skel' ...  
Enter new UNIX password:  
Retype new UNIX password:  
passwd: password updated successfully  
Changing the user information for usama  
Enter the new value, or press ENTER for the default  
    Full Name []:  
    Room Number []:  
    Work Phone []:  
    Home Phone []:  
    Other []:  
Is the information correct? [Y/n] y  
basim@basim-VirtualBox:~/test$ su - usama  
Password:  
usama@basim-VirtualBox:~$
```

7. Trying to read testfile.txt as user usama.



```
usama@basim-VirtualBox: /home/basim/test
File Edit View Search Terminal Help
usama@basim-VirtualBox:~$ cd /home/basim/test
usama@basim-VirtualBox:/home/basim/test$ cat testfile.txt
cat: testfile.txt: Permission denied
usama@basim-VirtualBox:/home/basim/test$
```

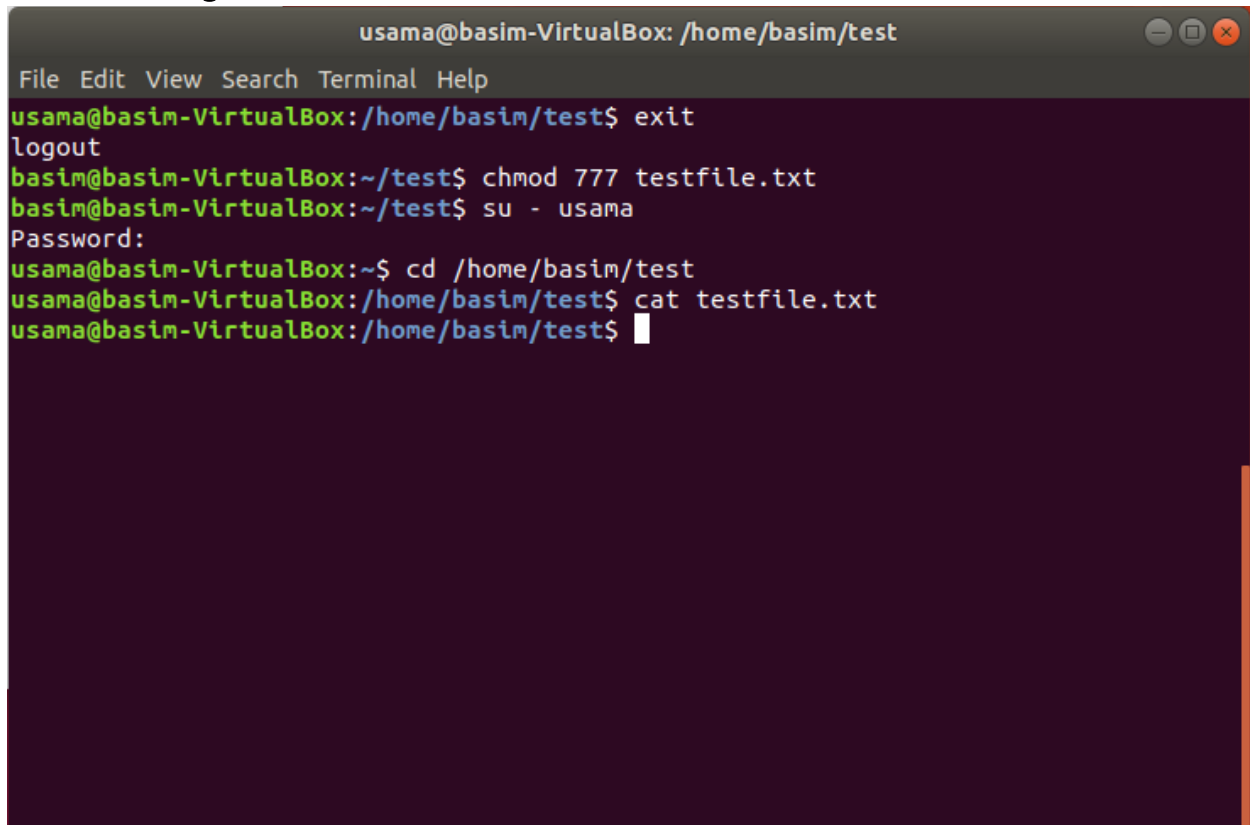
The image shows a terminal window titled "usama@basim-VirtualBox: /home/basim/test". The window has a menu bar with "File", "Edit", "View", "Search", "Terminal", and "Help". The terminal content shows the user "usama" navigating to the directory "/home/basim/test" and attempting to read the file "testfile.txt" using the "cat" command. The command results in a "Permission denied" error message. The prompt "usama@basim-VirtualBox:/home/basim/test\$" is shown at the end of the line.

8. Logging out of user usama

9. Changing permission of testfile to be read, write and executed by everyone

10. Logging into user usama

11. Reading file testfile.txt



```
usama@basim-VirtualBox: /home/basim/test
File Edit View Search Terminal Help
usama@basim-VirtualBox:/home/basim/test$ exit
logout
basim@basim-VirtualBox:~/test$ chmod 777 testfile.txt
basim@basim-VirtualBox:~/test$ su - usama
Password:
usama@basim-VirtualBox:~$ cd /home/basim/test
usama@basim-VirtualBox:/home/basim/test$ cat testfile.txt
usama@basim-VirtualBox:/home/basim/test$
```

## Activity 2:

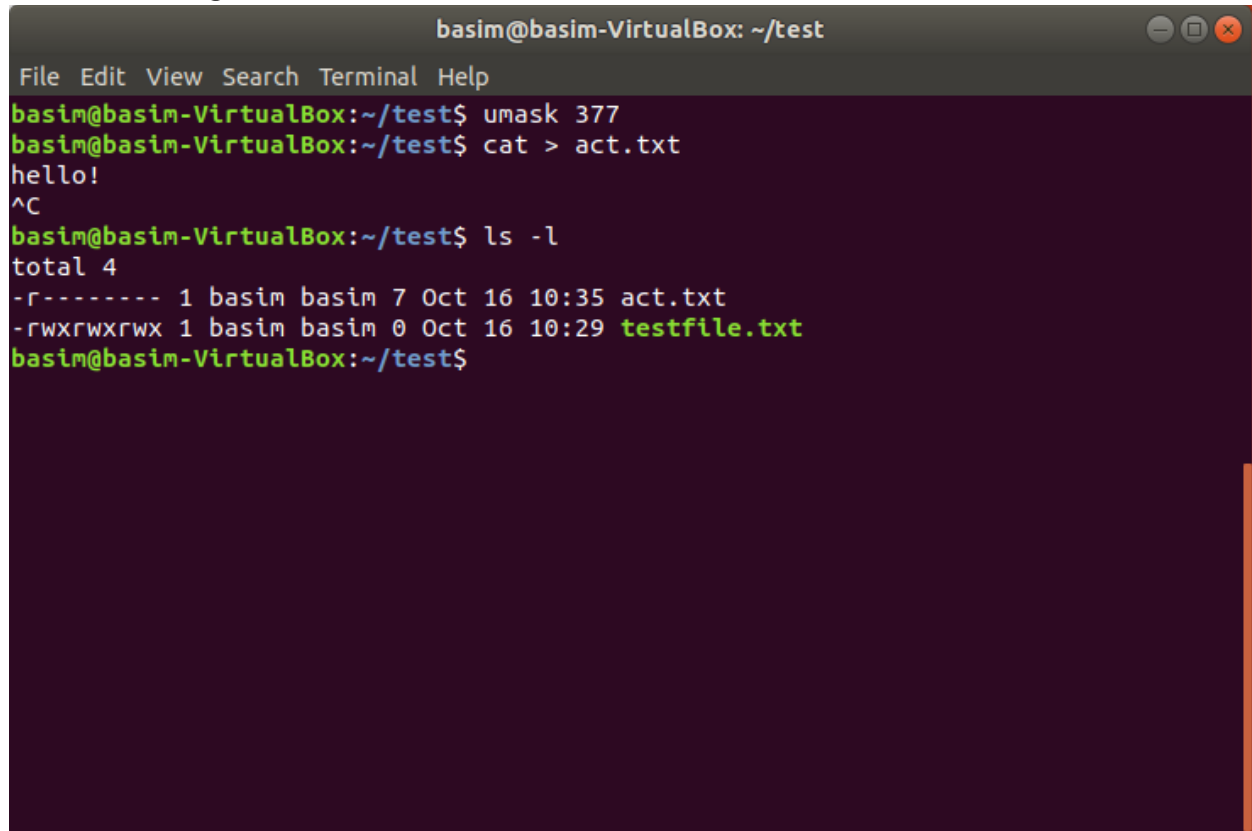
Perform the following tasks

- Set the permission such that a newly created file is readable only to the owner
- Create a text file “act.txt” in /test directory created in previous activity
- Run the shell as user “usama” (created previously)4. Access the file “act.txt”
- Logout as usama
- Now change the ownership of the file from ubuntu to usama
- Run the shell again as usama8. Read the file “act.txt” using cat command
- Logout as usama
- Now access the act.txt with user ubuntu



## Solution:

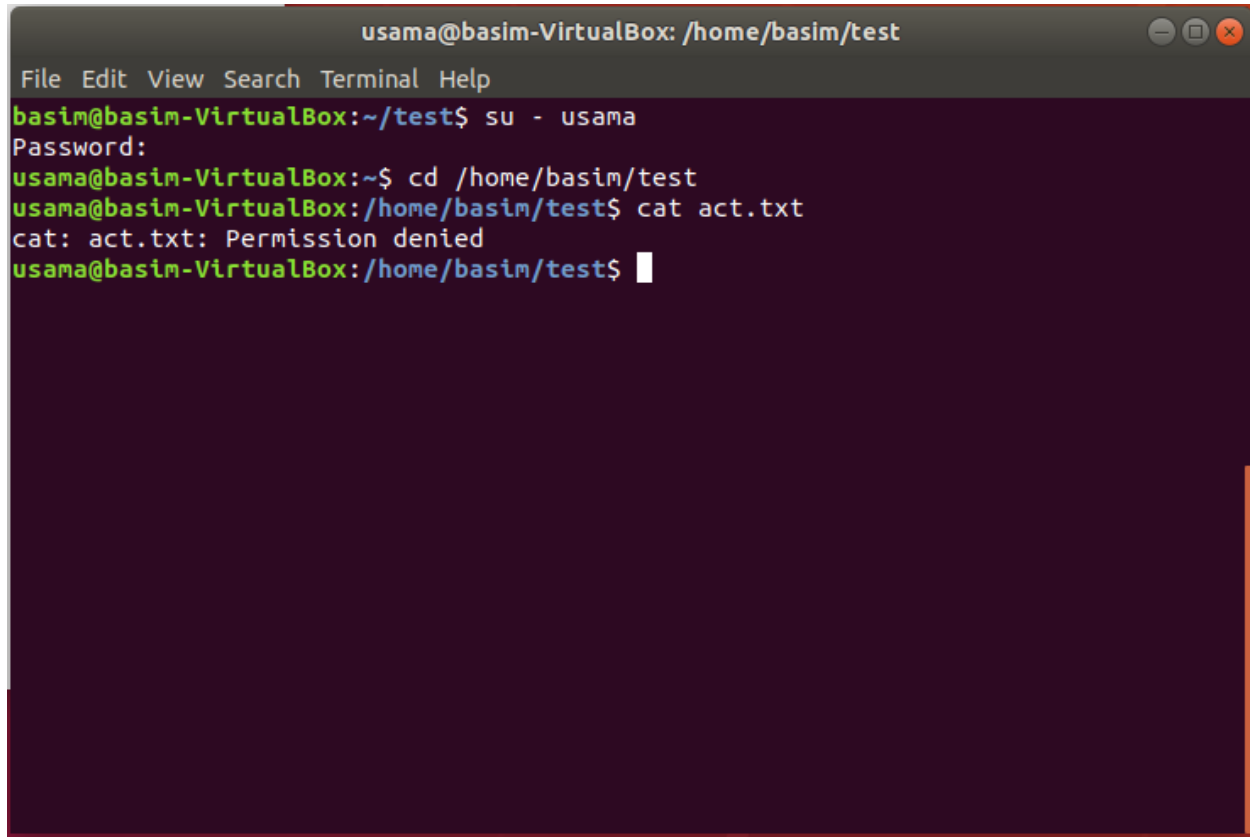
1. Setting permission such that newly created file is readable only to owner
2. Creating a file act.txt



```
basim@basim-VirtualBox: ~/test
File Edit View Search Terminal Help
basim@basim-VirtualBox:~/test$ umask 377
basim@basim-VirtualBox:~/test$ cat > act.txt
hello!
^C
basim@basim-VirtualBox:~/test$ ls -l
total 4
-r----- 1 basim basim 7 Oct 16 10:35 act.txt
-rwxrwxrwx 1 basim basim 0 Oct 16 10:29 testfile.txt
basim@basim-VirtualBox:~/test$
```

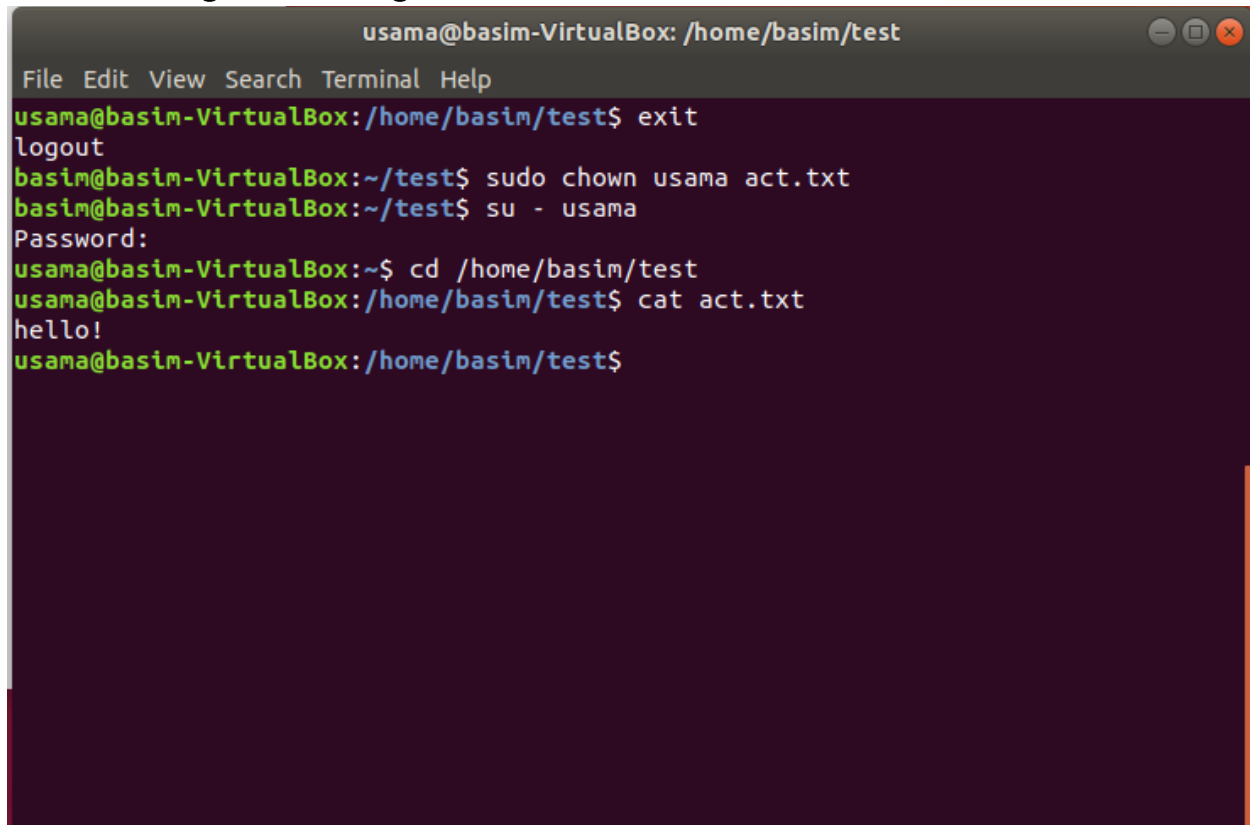
3. Logging in as user usama

4. Accessing file ac.txt

A terminal window titled 'usama@basim-VirtualBox: /home/basim/test' with standard window controls. The terminal shows a sequence of commands: 'su - usama' is entered, followed by a password prompt. Then 'cd /home/basim/test' is entered. Finally, 'cat act.txt' is entered, resulting in the error message 'cat: act.txt: Permission denied'. The prompt returns to 'usama@basim-VirtualBox:/home/basim/test\$' with a cursor.

```
usama@basim-VirtualBox: /home/basim/test
File Edit View Search Terminal Help
basim@basim-VirtualBox:~/test$ su - usama
Password:
usama@basim-VirtualBox:~$ cd /home/basim/test
usama@basim-VirtualBox:/home/basim/test$ cat act.txt
cat: act.txt: Permission denied
usama@basim-VirtualBox:/home/basim/test$
```

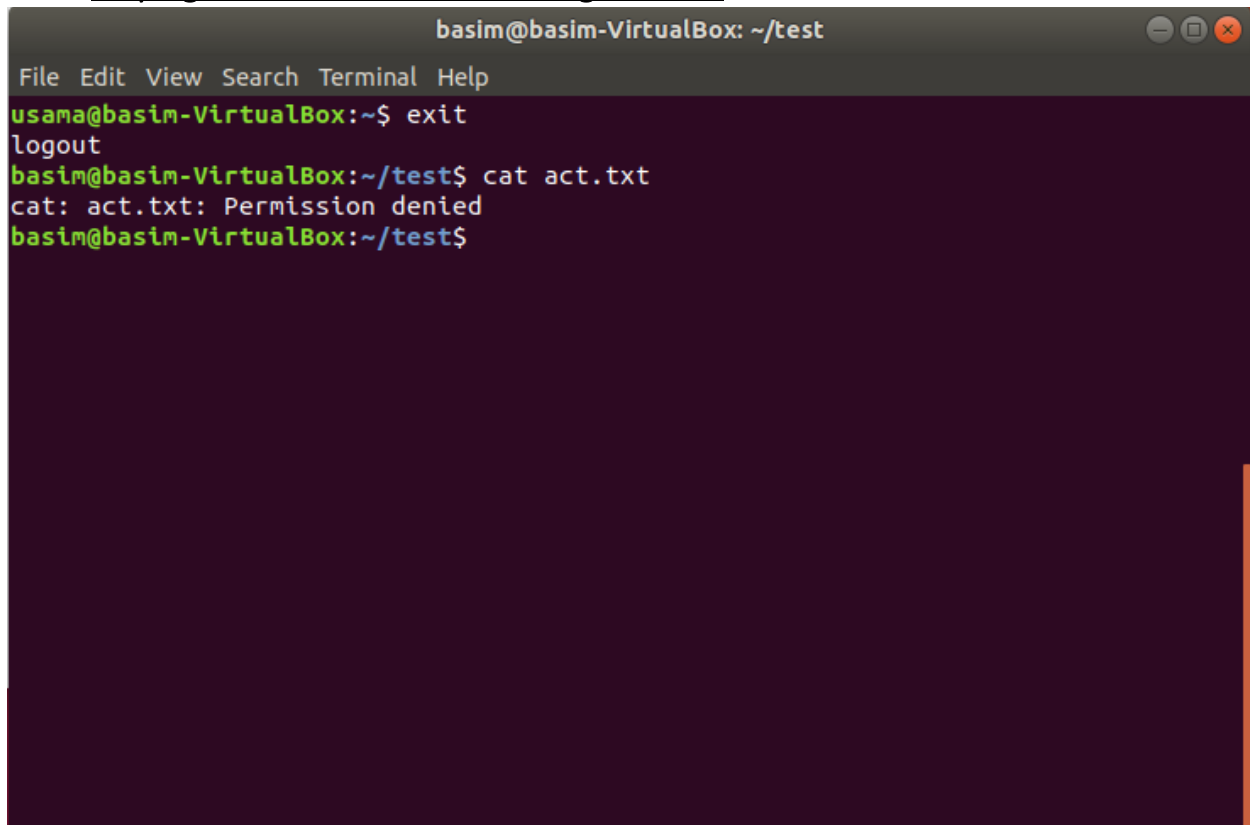
5. Logging out of user usama
6. Changing ownership of act.txt to user usama
7. Logging in of user usama
8. Reading act.txt using cat command



```
usama@basim-VirtualBox: /home/basim/test
File Edit View Search Terminal Help
usama@basim-VirtualBox:/home/basim/test$ exit
logout
basim@basim-VirtualBox:~/test$ sudo chown usama act.txt
basim@basim-VirtualBox:~/test$ su - usama
Password:
usama@basim-VirtualBox:~$ cd /home/basim/test
usama@basim-VirtualBox:/home/basim/test$ cat act.txt
hello!
usama@basim-VirtualBox:/home/basim/test$
```

9. Logging out of user usama

10. Trying to access act.txt from original user



```
basim@basim-VirtualBox: ~/test
File Edit View Search Terminal Help
usama@basim-VirtualBox:~$ exit
logout
basim@basim-VirtualBox:~/test$ cat act.txt
cat: act.txt: Permission denied
basim@basim-VirtualBox:~/test$
```

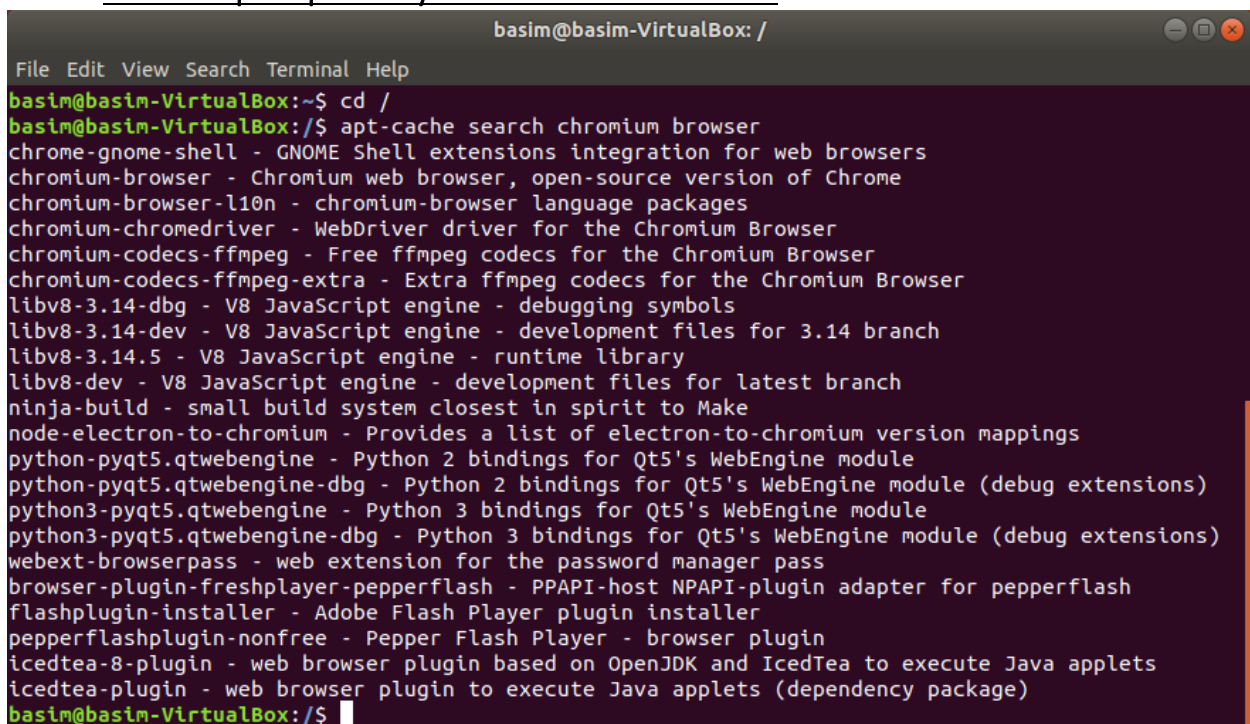
## Activity 3:

Perform the following tasks

- search apt repository for the chromium browser
- install the chromium browser using command line
- write the command to update and upgrade the repository
- list the software installed on your machine and write output on a file list.txt
- read the list.txt file using cat command

## Solution:

### 1. Search apt repository for chromium browser



```
basim@basim-VirtualBox: /
File Edit View Search Terminal Help
basim@basim-VirtualBox:~$ cd /
basim@basim-VirtualBox:/$ apt-cache search chromium browser
chrome-gnome-shell - GNOME Shell extensions integration for web browsers
chromium-browser - Chromium web browser, open-source version of Chrome
chromium-browser-l10n - chromium-browser language packages
chromium-chromedriver - WebDriver driver for the Chromium Browser
chromium-codecs-ffmpeg - Free ffmpeg codecs for the Chromium Browser
chromium-codecs-ffmpeg-extra - Extra ffmpeg codecs for the Chromium Browser
libv8-3.14-dbg - V8 JavaScript engine - debugging symbols
libv8-3.14-dev - V8 JavaScript engine - development files for 3.14 branch
libv8-3.14.5 - V8 JavaScript engine - runtime library
libv8-dev - V8 JavaScript engine - development files for latest branch
ninja-build - small build system closest in spirit to Make
node-electron-to-chromium - Provides a list of electron-to-chromium version mappings
python-pyqt5.qtwebengine - Python 2 bindings for Qt5's WebEngine module
python-pyqt5.qtwebengine-dbg - Python 2 bindings for Qt5's WebEngine module (debug extensions)
python3-pyqt5.qtwebengine - Python 3 bindings for Qt5's WebEngine module
python3-pyqt5.qtwebengine-dbg - Python 3 bindings for Qt5's WebEngine module (debug extensions)
webext-browserpass - web extension for the password manager pass
browser-plugin-freshplayer-pepperflash - PPAPI-host NPAPI-plugin adapter for pepperflash
flashplugin-installer - Adobe Flash Player plugin installer
pepperflashplugin-nonfree - Pepper Flash Player - browser plugin
icedtea-8-plugin - web browser plugin based on OpenJDK and IcedTea to execute Java applets
icedtea-plugin - web browser plugin to execute Java applets (dependency package)
basim@basim-VirtualBox:/$
```

## 2. Installing chromium browser using commandline

```
basim@basim-VirtualBox: /
File Edit View Search Terminal Help
basim@basim-VirtualBox:/$ sudo apt-get install chromium-bsu
[sudo] password for basim:
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
  linux-headers-4.15.0-29 linux-headers-4.15.0-29-generic linux-image-4.15.0-29-generic
  linux-modules-4.15.0-29-generic linux-modules-extra-4.15.0-29-generic
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  chromium-bsu-data fonts-uralic libalut0 libglc0 libglewmx1.13 libopenal-data libopenal1
  libSDL2-2.0-0 libSDL2-image-2.0-0 libsndio6.1
Suggested packages:
  libportaudio2 sndiod
The following NEW packages will be installed:
  chromium-bsu chromium-bsu-data fonts-uralic libalut0 libglc0 libglewmx1.13 libopenal-data
  libopenal1 libSDL2-2.0-0 libSDL2-image-2.0-0 libsndio6.1
0 upgraded, 11 newly installed, 0 to remove and 8 not upgraded.
Need to get 2,793 kB of archives.
After this operation, 6,671 kB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://pk.archive.ubuntu.com/ubuntu bionic/universe amd64 libopenal-data all 1:1.18.2-2 [1
02 kB]
Get:2 http://pk.archive.ubuntu.com/ubuntu bionic/universe amd64 libsndio6.1 amd64 1.1.0-3 [23.4
kB]

basim@basim-VirtualBox: /
File Edit View Search Terminal Help
Selecting previously unselected package libSDL2-image-2.0-0:amd64.
Preparing to unpack .../09-libSDL2-image-2.0-0_2.0.3+dfsg1-1_amd64.deb ...
Unpacking libSDL2-image-2.0-0:amd64 (2.0.3+dfsg1-1) ...
Selecting previously unselected package chromium-bsu.
Preparing to unpack .../10-chromium-bsu_0.9.16.1-1_amd64.deb ...
Unpacking chromium-bsu (0.9.16.1-1) ...
Setting up chromium-bsu-data (0.9.16.1-1) ...
Setting up libglewmx1.13:amd64 (1.13.0-4ubuntu0.18.04.1) ...
Setting up libopenal-data (1:1.18.2-2) ...
Setting up fonts-uralic (0.0.20040829-6) ...
Setting up libsndio6.1:amd64 (1.1.0-3) ...
Setting up libglc0 (0.7.2-5ubuntu4) ...
Setting up libSDL2-2.0-0:amd64 (2.0.8+dfsg1-1ubuntu1.18.04.4) ...
Setting up libSDL2-image-2.0-0:amd64 (2.0.3+dfsg1-1) ...
Setting up libopenal1:amd64 (1:1.18.2-2) ...
Setting up libalut0:amd64 (1.1.0-5) ...
Setting up chromium-bsu (0.9.16.1-1) ...
Processing triggers for gnome-menus (3.13.3-11ubuntu1.1) ...
Processing triggers for hicolor-icon-theme (0.17-2) ...
Processing triggers for fontconfig (2.12.6-0ubuntu2) ...
Processing triggers for mime-support (3.60ubuntu1) ...
Processing triggers for desktop-file-utils (0.23-1ubuntu3.18.04.2) ...
Processing triggers for libc-bin (2.27-3ubuntu1.2) ...
Processing triggers for man-db (2.8.3-2ubuntu0.1) ...
basim@basim-VirtualBox:/$
```

### 3. Writing command to update and upgrade the repository

```
basim@basim-VirtualBox: /
File Edit View Search Terminal Help
basim@basim-VirtualBox:/$ sudo apt-get update
Hit:1 http://pk.archive.ubuntu.com/ubuntu bionic InRelease
Get:2 http://security.ubuntu.com/ubuntu bionic-security InRelease [88.7 kB]
Get:3 http://pk.archive.ubuntu.com/ubuntu bionic-updates InRelease [88.7 kB]
Err:1 http://pk.archive.ubuntu.com/ubuntu bionic InRelease
  Unknown error executing apt-key
Err:2 http://security.ubuntu.com/ubuntu bionic-security InRelease
  Unknown error executing apt-key
Err:3 http://pk.archive.ubuntu.com/ubuntu bionic-updates InRelease
  Unknown error executing apt-key
Get:4 http://pk.archive.ubuntu.com/ubuntu bionic-backports InRelease [74.6 kB]
Err:4 http://pk.archive.ubuntu.com/ubuntu bionic-backports InRelease
  Unknown error executing apt-key
Fetched 252 kB in 3s (81.7 kB/s)
Reading package lists... Done
W: An error occurred during the signature verification. The repository is not updated and the previous index files will be used. GPG error: http://pk.archive.ubuntu.com/ubuntu bionic InRelease: Unknown error executing apt-key
W: An error occurred during the signature verification. The repository is not updated and the previous index files will be used. GPG error: http://security.ubuntu.com/ubuntu bionic-security InRelease: Unknown error executing apt-key
W: An error occurred during the signature verification. The repository is not updated and the previous index files will be used. GPG error: http://pk.archive.ubuntu.com/ubuntu bionic-updates InRelease: Unknown error executing apt-key
W: An error occurred during the signature verification. The repository is not updated and the previous index files will be used. GPG error: http://pk.archive.ubuntu.com/ubuntu bionic-backports InRelease: Unknown error executing apt-key
W: Failed to fetch http://pk.archive.ubuntu.com/ubuntu/dists/bionic/InRelease Unknown error executing apt-key
W: Failed to fetch http://pk.archive.ubuntu.com/ubuntu/dists/bionic-updates/InRelease Unknown error executing apt-key
W: Failed to fetch http://pk.archive.ubuntu.com/ubuntu/dists/bionic-backports/InRelease Unknown error executing apt-key
W: Failed to fetch http://security.ubuntu.com/ubuntu/dists/bionic-security/InRelease Unknown error executing apt-key
W: Some index files failed to download. They have been ignored, or old ones used instead.
basim@basim-VirtualBox:/$
```

### 4. Listing all the software installed on the machine in an outputfile

```
basim@basim-VirtualBox: /
File Edit View Search Terminal Help
basim@basim-VirtualBox:/$ dpkg --get-architecture > /home/basim/test/output.txt
basim@basim-VirtualBox:/$
```



## 5. Reading outputfile using cat command

```
basim@basim-VirtualBox: /
File Edit View Search Terminal Help

basim@basim-VirtualBox:/$ cat /home/basim/test/output.txt
desired=unknown/Install/Remove/Purge/hold
| status=not/inst/conf-files/unpacked/half-conf/half-inst/trig-aWatt/Irig-pend
|/ Err?=(none)/ReInst-required (status,Err: uppercase=bad)
// Name Version Architecture Description
-----
accountsservice 0.6.45-1ubuntu1 amd64 query and manipulate user account information
acl 2.2.52-3build1 amd64 Access control list utilities
acpi-support 0.142 amd64 scripts for handling many ACPI events
acpid 1:2.0.28-1ubuntu1 amd64 Advanced Configuration and Power Interface event daemon
adduser 3.116ubuntu1 all add and remove users and groups
adun-theme-ubuntu 0.3.4-0ubuntu4 all Adun message style for Ubuntu
adwaita-icon-theme 3.28.0-1ubuntu1 all default icon theme of GNOME (small subset)
atsleriot 1:3.22.5-1 amd64 GNOME solitaire card game collection
alsa-base 1.0.25+dfsg-0ubuntu5 all ALSA driver configuration files
alsa-utils 1.1.3-1ubuntu1 amd64 Utilities for configuring and using ALSA
amd64-microcode 3.20191021.1+really3.20181128.1-ubuntu0.18.04.1 amd64 Processor microcode firmware for AMD CPUs
anacron 2.3-24 amd64 cron-like program that doesn't go by time
app 2.2.3-1dfsg-1.5 amd64 Automated Password Generator - Standalone version
app-install-data-partner 16.04 all Application Installer (data files for partner applications/repositories)
apparmor 2.12-4ubuntu5.1 amd64 user-space parser utility for AppArmor
apport 2.20.9-0ubuntu7.18 all automatically generate crash reports for debugging
apport-gtk 2.20.9-0ubuntu7.18 all GTK+ frontend for the apport crash report system
apport-symptoms 0.20 all symptom scripts for apport
appstream 0.12.0-3ubuntu1 amd64 Software component metadata management
apt 1.6.12ubuntu0.1 amd64 commandline package manager
apt-config-icons 0.12.0-3ubuntu1 all API configuration snippet to enable icon downloads
apt-utills 1.6-12ubuntu0.1 amd64 package management related utility programs
aptdaemon 1.1.1+bzr982-0ubuntu19.4 all transaction based package management service
aptdaemon-data 1.1.1+bzr982-0ubuntu19.4 all data files for clients
apturl 0.5.2ubuntu14.2 amd64 Install packages using the apt protocol - GTK+ frontend
apturl-common 0.5.2ubuntu14.2 amd64 Install packages using the apt protocol - common data
aspell 0.60.7-20110707-4ubuntu0.1 amd64 GNU Aspell spell-checker
aspell-en 2017.08.24-0-0.1 all English dictionary for GNU Aspell
at-spi2-core 2.28.0-1 amd64 Assistive Technology Service Provider Interface (dbus core)
avahi-autoipd 0.7.3-1ubuntu2 amd64 Avahi local network address configuration daemon
avahi-daemon 0.7.3-1ubuntu2 amd64 Avahi mDNS/DNS-SD daemon
avahi-utils 0.7.3-1ubuntu2 amd64 Avahi browsing, publishing and discovery utilities
baobab 3.28.0-1 amd64 GNOME disk usage analyzer
base-files 10.0ubuntu2.10 amd64 Debian base system miscellaneous files
base-passwd 3.5.44 amd64 Debian base system master password and group files
bash 4.4.18-2ubuntu1.2 amd64 GNU Bourne Again Shell
bash-completion 1:2.8-1ubuntu1 all programmable completion for the bash shell
bc 1.07.1-2 amd64 GNU bc arbitrary precision calculator language
bind9-host 1:9.11.3-4dfsg-1ubuntu1.13 amd64 DNS lookup utility (deprecated)
binutils 2.30-21ubuntu1-18.04.4 amd64 GNU assembler, linker and binary utilities
binutils-common:amd64 2.30-21ubuntu1-18.04.4 amd64 Common files for the GNU assembler, linker and binary utilities
binutils-x86-64-linux-gnu 2.30-21ubuntu1-18.04.4 amd64 GNU binary utilities for x86-64-linux-gnu target
bluez 5.48-0ubuntu3.4 amd64 Bluetooth tools and daemons
bluez-cups 5.48-0ubuntu3.4 amd64 Bluetooth printer driver for CUPS
bluez-obexd 5.48-0ubuntu3.4 amd64 bluez obex daemon
bolt 0.5-0ubuntu0.18.04.1 amd64 system daemon to manage thunderbolt 3 devices
branding-ubuntu 0.10 amd64 Replacement artwork with Ubuntu branding
brltty 5.5-4ubuntu2.0.1 amd64 Access software for a blind person using a braille display
bsdmainutils 11.1-2ubuntu1 amd64 collection of more utilities from FreeBSD

basim@basim-VirtualBox: /
File Edit View Search Terminal Help

wireless-tools 30-pre9-12ubuntu1 amd64 Tools for manipulating Linux Wireless Extensions
wpasupplicant 2:2.6-15ubuntu2.5 amd64 client support for WPA and WPA2 (IEEE 802.11i)
x11-apps 7.7+0ubuntu1 amd64 X applications
x11-common 2:7.7+0ubuntu7.1 all X Window System (X.Org) infrastructure
x11-session-utils 7.7+2build1 amd64 X session utilities
x11-utils 7.7+3build1 amd64 X11 utilities
x11-xkb-utils 7.7+3ubuntu0.18.04.1 amd64 X11 XKB utilities
x11-xserver-utils 7.7+0build1 amd64 X server utilities
xauth 1:1.0-10-1 amd64 X authentication utility
xbitmaps 1.1.1-2 all Base X bitmaps
xbrlapi 5.5-4ubuntu2.0.1 amd64 Access software for a blind person using a braille display - xbrlapi
xcursor-themes 1.0.4-1 all Base X cursor themes
xdg-desktop-portal 1.0.3-0ubuntu0.2 amd64 desktop integration portal for Flatpak and Snap
xdg-desktop-portal-gtk 1.0.2-0ubuntu1.1 amd64 GTK+/GNOME portal backend for xdg-desktop-portal
xdg-user-dirs 0.17-1ubuntu1 amd64 tool to manage well known user directories
xdg-user-dirs-gtk 0.10-2 amd64 tool to manage well known user directories (gtk extension)
xdg-utils 1.1.2-1ubuntu2.3 all desktop integration utilities from freedesktop.org
xfonts-base 1:1.0.4-nmu1 all standard fonts for X
xfonts-encodings 1:1.0.4-2 all Encodings for X.Org fonts
xfonts-scalable 1:1.0.3-1.1 all scalable fonts for X
xfonts-utils 1:7.7+6 amd64 X Window System font utility programs
xinput 1.3.4-3ubuntu3 amd64 X server initialisation tool
xinput 1.6.2-1build1 amd64 Runtime configuration and test of Xinput devices
xkb-data 2.23.1-1ubuntu1.18.04.1 all X Keyboard Extension (XKB) configuration data
xorg 1:7.7+19ubuntu7.1 amd64 X.Org X Window System
xorg-docs-core 1:1.7.1-1.1 all Core documentation for the X.Org X Window System
xserver-common 2:1.19.6-1ubuntu4.6 all common files used by various X servers
xserver-xephyr 2:1.19.6-1ubuntu4.6 amd64 nested X server
xserver-xorg 1:7.7+19ubuntu7.1 amd64 X.Org X server
xserver-xorg-core 2:1.19.6-1ubuntu4.6 amd64 X.Org X server - core server
xserver-xorg-input-all 1:7.7+19ubuntu7.1 amd64 X.Org X server -- input driver metapackage
xserver-xorg-input-libinput 0.27.1-1 amd64 X.Org X server -- libinput input driver
xserver-xorg-input-wacom 1:0.36.1-0ubuntu1.1 amd64 X.Org X server -- Wacom input driver
xserver-xorg-legacy 2:1.19.6-1ubuntu4.6 amd64 setuid root Xorg server wrapper
xserver-xorg-video-all 1:7.7+19ubuntu7.1 amd64 X.Org X server -- output driver metapackage
xserver-xorg-video-amdgpu 18.0-1-1 amd64 X.Org X server -- AMDGPU display driver
xserver-xorg-video-ati 1:18.0-1-1 amd64 X.Org X server -- AMD/ATI display driver wrapper
xserver-xorg-video-fbdev 1:0.4.4-1build6 amd64 X.Org X server -- fbdev display driver
xserver-xorg-video-intel 2:2.99.917+git20171229-1 amd64 X.Org X server -- Intel i8xx, i9xx display driver
xserver-xorg-video-nouveau 1:1.0.15-2 amd64 X.Org X server -- Nouveau display driver
xserver-xorg-video-qxl 0.1.5-2build1 amd64 X.Org X server -- QXL display driver
xserver-xorg-video-radeon 1:18.0-1-1 amd64 X.Org X server -- AMD/ATI Radeon display driver
xserver-xorg-video-vesa 1:2.3.4-1build3 amd64 X.Org X server -- VESA display driver
xserver-xorg-video-vmware 1:13.2.1-1build1 amd64 X.Org X server -- VMware display driver
xul-ext-ubufox 3.4-0ubuntu1.17.10.1 all Ubuntu modifications for Firefox
xwayland 2:1.19.6-1ubuntu4.6 amd64 Xwayland X server
xxd 2:8.0-1453-1ubuntu1.4 amd64 tool to make (or reverse) a hex dump
xz-utils 5.2.2-1.3 amd64 XZ-format compression utilities
yelp 3.26.0-1ubuntu2 amd64 Help browser for GNOME
yelp-xsl 3.26.0-1.4 all XSL stylesheets for the yelp help browser
zeitgeist-core 1.0.0-1ubuntu1 amd64 event logging framework - engine
zenty 3.28.1-1 amd64 Display graphical dialog boxes from shell scripts
zenty-common 3.28.1-1 all Display graphical dialog boxes from shell scripts (common files)
zip 3.0-11build1 amd64 Archiver for .zip files
zlib1g:amd64 1:1.2.11.dfsg-0ubuntu2 amd64 compression library - runtime
```