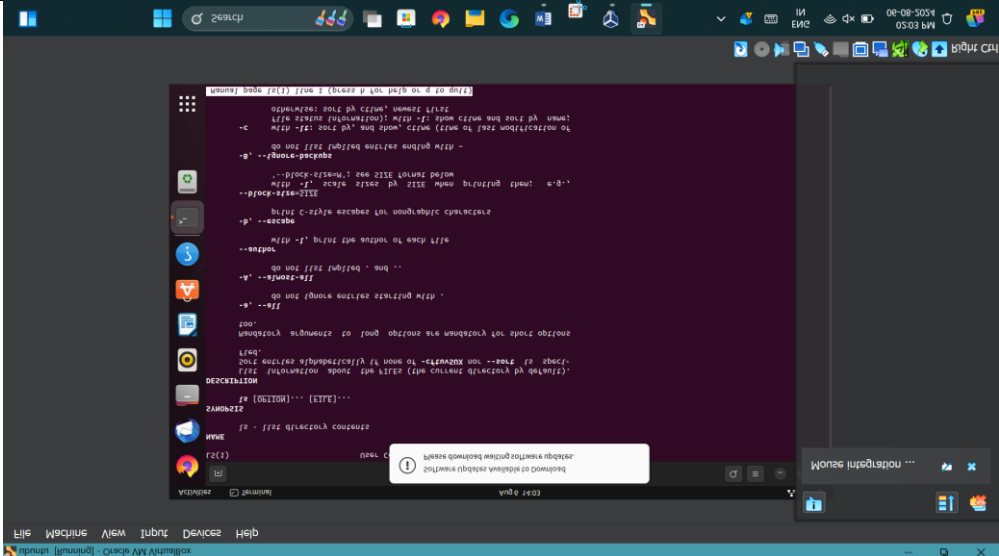**Topic Name:**

The main aim of this lab session is to provide hands-on experience on

- Getting Help
- Basic Commands
- Navigation
- File System
- simple shell script

1. Getting Help

Task	Command Name	Syntax	Example	Screenshots
To get manual page for the known command	man	man command_name	man ls	

To get manual page for the unknown command	aprops	Aprops keyword	man –k network	```nithesh@nithesh-VirtualBox:~$ ls` `a.out Desktop Documents Downloads hallo.c hello.c Music my.c Pictures Public snap Templates Videos` `nithesh@nithesh-VirtualBox:~$ man -k network` `network: nothing appropriate.` `nithesh@nithesh-VirtualBox:~$```
To know the source file binary	where is	which command_name	Whereis ls	```nithesh@nithesh-VirtualBox:~$ whereis ls` `ls: /usr/bin/ls /usr/share/man/man1/ls.1.gz` `nithesh@nithesh-VirtualBox:~$```
To know the path of the command	which	which command_name	Whereis python	```nithesh@nithesh-VirtualBox:~$ whereis python` `python:```
To know the command is external or internal	type	Type command_name	Type echo	```nithesh@nithesh-VirtualBox:~$ type echo` `echo is a shell builtin` `nithesh@nithesh-VirtualBox:~$ type grep` `grep is aliased to `grep --color=auto'```

To get help for the internal command	help	Help command_name	Help cd	
To list out bash commands	bash	Compgen -c	Man bash	

The terminal screenshot for "help cd":

```
nithesh@nithesh-VirtualBox:~$ help cd
cd: cd [-L|[-P [-e]] [-@]] [dir]
    Change the shell working directory.

    Change the current directory to DIR.  The default DIR is the value of the
    HOME shell variable.

    The variable CDPATH defines the search path for the directory containing
    DIR.  Alternative directory names in CDPATH are separated by a colon (:).
    A null directory name is the same as the current directory.  If DIR begins
    with a slash (/), then CDPATH is not used.

    If the directory is not found, and the shell option `cdable_vars' is set,
    the word is assumed to be  a variable name.  If that variable has a value,
    its value is used for DIR.

    Options:
      -L        force symbolic links to be followed: resolve symbolic
                links in DIR after processing instances of `..'
      -P        use the physical directory structure without following
                symbolic links: resolve symbolic links in DIR before
                processing instances of `..'
      -e        if the -P option is supplied, and the current working
                directory cannot be determined successfully, exit with
                a non-zero status
      -@        on systems that support it, present a file with extended
                attributes as a directory containing the file attributes

    The default is to follow symbolic links, as if `-L' were specified.
    `..' is processed by removing the immediately previous pathname component
    back to a slash or the beginning of DIR.

    Exit Status:
    Returns 0 if the directory is changed, and if $PWD is set successfully when
    -P is used; non-zero otherwise.
```

The terminal screenshot for "man bash":

```
BASH(1)                         General Commands Manual                        BASH(1)

NAME
    bash - GNU Bourne-Again SHell

SYNOPSIS
    bash [options] [command_string | file]

COPYRIGHT
    Bash is Copyright (C) 1989-2020 by the Free Software Foundation, Inc.

DESCRIPTION
    Bash is an sh-compatible command language interpreter that executes commands read from the standard input or from a file.
    Bash also incorporates useful features from the Korn and C shells (ksh and csh).

    Bash is intended to be a conformant implementation of the Shell and Utilities portion of  the  IEEE  POSIX  specification
    (IEEE Standard 1003.1).  Bash can be configured to be POSIX-conformant by default.
```

To know the usage of the command	man	Man command_name	Ls -la	

2. Basic Commands

Task	Command Name	Syntax	Example	Screenshots
To know today's date	date	date	Date +"%Y-%m-%d"	
To print calendar	cal	cal -m	Cal [month] [year]	

To print kernel version	Uname	Uname -r	Uname -r	`(kali⊛kali)-[~/nithesh]`
				`$ uname -r`
				`6.1.0-kali9-amd64`

To print default shell	Echo $SHELL	$echo $SHELL	/user/bin/bash	`(kali⊛kali)-[~/nithesh]`
				`$ echo $SHELL`
				`/usr/bin/zsh`

To print currently logged in user	whoami	whoami	Whoami user_name	`(kali⊛kali)-[~/nithesh]`
				`$ whoami`
				`kali`

To create shortcut for command	alias	Alias shortcut_name='actual_command'	Alias 11='ls –la'	GNU nano 8.1 /home/kali/.zshrc
				`# ~/.zshrc file for zsh interactive shells.`
				`# see /usr/share/doc/zsh/examples/zshrc for examples`
				
				`setopt autocd          # change directory just by typing its name`
				`#setopt correct         # auto correct mistakes`
				`setopt interactivecomments # allow comments in interactive mode`
				`setopt magicequalsubst  # enable filename expansion for arguments of the form 'anything=expression'`
				`setopt nonomatch        # hide error message if there is no match for the pattern`
				`setopt notify           # report the status of background jobs immediately`
				`setopt numericglobsort  # sort filenames numerically when it makes sense`
				`setopt promptsubst      # enable command substitution in prompt`
				
				`WORDCHARS=${WORDCHARS//\/} # Don't consider certain characters part of the word`
				
				`# hide EOL sign ('%')`
				`PROMPT_EOL_MARK=""`
				
				`# configure key keybindings`
				`bindkey -e                              # emacs key bindings`
				`bindkey ' ' magic-space                 # do history expansion on space`
				`bindkey '^U' backward-kill-line         # ctrl + U`
				`bindkey '^[[3;5~' kill-word             # ctrl + Supr`
				`bindkey '^[[3~' delete-char             # delete`
				`bindkey '^[[1;5C' forward-word          # ctrl + →`
				`bindkey '^[[1;5D' backward-word         # ctrl + ←`
				`bindkey '^[[5~' beginning-of-buffer-or-history  # page up`
				`bindkey '^[[6~' end-of-buffer-or-history        # page down`
				`bindkey '^[[H' beginning-of-line        # home`
				`bindkey '^[[F' end-of-line              # end`
				`bindkey '^[[Z' undo                     # shift + tab undo last action`
				
				`# enable completion features`
				`autoload -Uz compinit`
				`compinit -d ~/.cache/zcompdump`
				`zstyle ':completion:*:*:*:*:*' menu select`
				`zstyle ':completion:*' auto-description 'specify: %d'`
				`zstyle ':completion:*' completer _expand _complete`
				`zstyle ':completion:*' format 'Completing %d'`
				`zstyle ':completion:*' group-name ''`
				`zstyle ':completion:*' list-colors ''`
				`zstyle ':completion:*' list-prompt %SAt %p: Hit TAB for more, or the character to insert%s`

To delete shortcut	unalias	Unalias shortcut_name	Source ~/.zshrc	
To change the timestamp of the file	touch	Touch –t YYYYMMDDhhmm	touch -t 2408051234 filename	
To clear the screen	clear	clear	clear	

```
# ~/.zshrc file for zsh interactive shells.
# see /usr/share/doc/zsh/examples/zshrc for examples

setopt autocd                # change directory just by typing its name
#setopt correct              # auto correct mistakes
setopt interactivecomments   # allow comments in interactive mode
setopt magicequalsubst       # enable filename expansion for arguments of the form 'anyth
setopt nonomatch             # hide error message if there is no match for the pattern
setopt notify                # report the status of background jobs immediately
setopt numericglobsort       # sort filenames numerically when it makes sense
setopt promptsubst           # enable command substitution in prompt

WORDCHARS=${WORDCHARS//\/}  # Don't consider certain characters part of the word

# hide EOL sign ('%')
PROMPT_EOL_MARK=""

# configure key keybindings
bindkey -e                              # emacs key bindings
bindkey ' ' magic-space                 # do history expansion on space
bindkey '^U' backward-kill-line         # ctrl + U
bindkey '^[[3;5~' kill-word             # ctrl + Supr
bindkey '^[[3~' delete-char             # delete
bindkey '^[[1;5C' forward-word          # ctrl + →
bindkey '^[[1;5D' backward-word         # ctrl + ←
bindkey '^[[5~' beginning-of-buffer-or-history   # page up
bindkey '^[[6~' end-of-buffer-or-history         # page down
bindkey '^[[H' beginning-of-line        # home
bindkey '^[[F' end-of-line              # end
bindkey '^[[Z' undo                     # shift + tab undo last action
```

```
┌──(kali㉿kali)-[~/nithesh/CLI]
└─$ touch -t 2408051234 commands.txt

┌──(kali㉿kali)-[~/nithesh/CLI]
└─$ touch -t 2408051234 commands.txt

┌──(kali㉿kali)-[~/nithesh/CLI]
└─$ ls
commands.txt  LS1  LS2

┌──(kali㉿kali)-[~/nithesh/CLI]
└─$ ls -l
total 8
-rw-r--r-- 1 kali kali    0 Aug  5 12:34 commands.txt
drwxr-xr-x 2 kali kali 4096 Aug  6 13:08 LS1
drwxr-xr-x 2 kali kali 4096 Aug  6 13:08 LS2

┌──(kali㉿kali)-[~/nithesh/CLI]
└─$ touch -t 2408051234 commands.txt

┌──(kali㉿kali)-[~/nithesh/CLI]
└─$ █
```

To create empty files	Touch filename	>filename	Touch	
To know disk usage	Du	du -h	du	
To know free space in the system	df	df -h	df	
To know about the Linux release	Lsb_rele ase	hostnamectl	Cat /etc/os-release	

3. **Navigation**

Task	Command	Syntax	Screenshots
To navigate home directory	cd	Cd ~	

To navigate to the parent directory	cd	cd..	┌──(kali⊛kali)-[~] └─$ cd .. ┌──(kali⊛kali)-[/home] └─$ ▮
To navigate to the child directory	Cd directory_name	Cd projects	──(kali⊛kali)-[~] ─$ cd nithesh ──(kali⊛kali)-[~/nithesh] ─$ mkdir new_folder ──(kali⊛kali)-[~/nithesh] ─$ mkdir -p parent_foldder/child_folder
Alternate command to cd	Push pop	pushd	┌──(kali⊛kali)-[~/nithesh] └─$ popd popd: directory stack empty
To go back to the previous directory	cd	Cd -	┌──(kali⊛kali)-[~/nithesh] └─$ cd - ~ ┌──(kali⊛kali)-[~] └─$ ▮
To go to the root directory	cd	Cd /	┌──(kali⊛kali)-[~] └─$ cd / ┌──(kali⊛kali)-[/] └─$ ▮

4. File System

Task	Syntax	Command
How to identify the file system	**df -T**	┌──(kali⊛kali)-[/] └─$ df -T Filesystem Type 1K-blocks Used Available Use% Mounted on udev devtmpfs 963488 0 963488 0% /dev tmpfs tmpfs 200604 1212 199392 1% /run /dev/sda1 ext4 82083148 16346428 61521172 21% / tmpfs tmpfs 1003008 0 1003008 0% /dev/shm tmpfs tmpfs 5120 0 5120 0% /run/lock tmpfs tmpfs 200600 124 200476 1% /run/user/1000

a. Create Folder "CYS"
b. Navigate to CYS

c. Create folder LS1 and LS2 under CYS
d. Go back to CYS

e.
f. Working with Files

     i. Add commands which you learnt during lab session in the file commands.txt

     ii. Change the timestamp of the file to yesterday

```
┌──(kali⊛kali)-[/home/kali]
└─PS> touch -d "yesterday" commands.txt

┌──(kali⊛kali)-[/home/kali]
└─PS> ls -l
total 60
-rw-r--r-- 1 kali kali     0 Aug  5 15:07 commands.txt
drwxr-xr-x 5 kali kali 4096 Aug  6 14:34 CYS
drwxr-xr-x 2 kali kali 4096 Aug  6 11:00 Desktop
drwxr-xr-x 2 kali kali 4096 Aug  6 11:00 Documents
drwxr-xr-x 2 kali kali 4096 Aug  6 11:00 Downloads
-rw-r--r-- 1 kali kali  144 Aug  6 14:36 hobbies.sh
drwxr-xr-x 2 kali kali 4096 Aug  6 11:00 Music
drwxr-xr-x 2 kali kali 4096 Aug  6 14:05 new_folder
drwxr-xr-x 6 kali kali 4096 Aug  6 14:06 nithesh
drwxr-xr-x 3 kali kali 4096 Aug  6 14:05 parent_foldder
drwxr-xr-x 2 kali kali 4096 Aug  6 11:08 Pictures
drwxr-xr-x 2 kali kali 4096 Aug  6 14:02 projects
drwxr-xr-x 2 kali kali 4096 Aug  6 11:00 Public
drwxr-xr-x 2 kali kali 4096 Aug  6 11:00 Templates
drwxr-xr-x 2 kali kali 4096 Aug  6 14:03 user
drwxr-xr-x 2 kali kali 4096 Aug  6 11:00 Videos
```

iii.   Copy the contents from the file commands.txt to commands_demo.txt

```
┌──(kali⊛kali)-[/home]
└─$ cp commands.txt commands_demo.txt
cp: cannot stat 'commands.txt': No such file or directory
```

iv.   Rename the file commands_demo.txt to duplicate

```
┌──(kali⊛kali)-[/home]
└─$ mv commands_demo.txt duplicate
mv: cannot stat 'commands_demo.txt': No such file or directory
```

v.   Rename all .html to .hldd   (could not chdir to /path/to/directory)
vi.   Delete the file duplicate   (could not chdir to /path/to/directory)
vii.   Copy the contents commands.txt to unit4 and unit5 (using relative path) (could not chdir to /path/to/directory)
viii.   Delete the contents from unit5 (using absolute path) (could not chdir to /path/to/directory)
ix.   Navigate to root

x. List all the files under root


```
┌──(kali㉿kali)-[/etc]
└─$ ls -l /
total 1048648
lrwxrwxrwx   1 root root          7 May 23  2023 bin → usr/bin
drwxr-xr-x   3 root root       4096 Aug  6 13:13 boot
drwxr-xr-x  18 root root       3480 Aug  6 12:05 dev
drwxr-xr-x 185 root root      12288 Aug  6 14:58 etc
drwxr-xr-x   3 root root       4096 May 23  2023 home
lrwxrwxrwx   1 root root         28 Aug  6 12:07 initrd.img → boot/initrd.img-6.8.11-amd64
lrwxrwxrwx   1 root root         33 May 23  2023 initrd.img.old → boot/initrd.img-6.1.0-kali9-amd64
lrwxrwxrwx   1 root root          7 May 23  2023 lib → usr/lib
lrwxrwxrwx   1 root root          9 May 23  2023 lib32 → usr/lib32
lrwxrwxrwx   1 root root          9 May 23  2023 lib64 → usr/lib64
lrwxrwxrwx   1 root root         10 May 23  2023 libx32 → usr/libx32
drwx------   2 root root      16384 May 23  2023 lost+found
drwxr-xr-x   2 root root       4096 May 23  2023 media
drwxr-xr-x   2 root root       4096 May 23  2023 mnt
drwxr-xr-x   3 root root       4096 May 23  2023 opt
dr-xr-xr-x 279 root root          0 Aug  6 11:00 proc
drwx------   4 root root       4096 Aug  6 12:11 root
drwxr-xr-x  36 root root        940 Aug  6 13:12 run
lrwxrwxrwx   1 root root          8 May 23  2023 sbin → usr/sbin
drwxr-xr-x   3 root root       4096 May 23  2023 srv
-rw-------   1 root root 1073741824 May 23  2023 swapfile
dr-xr-xr-x  13 root root          0 Aug  6 11:00 sys
drwxrwxrwt  15 root root       4096 Aug  6 15:09 tmp
drwxr-xr-x  17 root root       4096 Aug  6 12:02 usr
drwxr-xr-x  12 root root       4096 May 23  2023 var
lrwxrwxrwx   1 root root         25 Aug  6 12:07 vmlinuz → boot/vmlinuz-6.8.11-amd64
lrwxrwxrwx   1 root root         30 May 23  2023 vmlinuz.old → boot/vmlinuz-6.1.0-kali9-amd64
```

xi. Explore all the folders (Do not delete any folder)

```
┌──(kali㊀kali)-[/]
└─$ ls /
cd /path/to/folder

bin   boot  dev   etc   home  initrd.img   initrd.img.old  lib  lib32  lib64  libx32  lost+found  media  mnt  opt  proc  root  run  sbin  srv  swapfile  sys  tmp  usr
```

xii.   Navigate to /etc/passwd


```
┌──(kali㊀kali)-[~]
└─$ cd /etc

┌──(kali㊀kali)-[/etc]
└─$
```

xiii.   Open the file passwd


```
  GNU nano 8.1                                                                                                     passwd *
```

xiv.   Explore the file passwd

```
┌──(kali㉿kali)-[/etc]
└─$ cat passwd
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:/run/ircd:/usr/sbin/nologin
_apt:x:42:65534::/nonexistent:/usr/sbin/nologin
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin
systemd-network:x:998:998:systemd Network Management:/:/usr/sbin/nologin
systemd-timesync:x:997:997:systemd Time Synchronization:/:/usr/sbin/nologin
messagebus:x:100:107::/nonexistent:/usr/sbin/nologin
tss:x:101:109:TPM software stack,,,:/var/lib/tpm:/bin/false
strongswan:x:102:65534::/var/lib/strongswan:/usr/sbin/nologin
tcpdump:x:103:110::/nonexistent:/usr/sbin/nologin
usbmux:x:104:46:usbmux daemon,,,:/var/lib/usbmux:/usr/sbin/nologin
sshd:x:105:65534::/run/sshd:/usr/sbin/nologin
dnsmasq:x:106:65534:dnsmasq,,,:/var/lib/misc:/usr/sbin/nologin
avahi:x:107:112:Avahi mDNS daemon,,,:/run/avahi-daemon:/usr/sbin/nologin
speech-dispatcher:x:108:29:Speech Dispatcher,,,:/run/speech-dispatcher:/bin/false
saned:x:109:115::/var/lib/saned:/usr/sbin/nologin
lightdm:x:110:116:Light Display Manager:/var/lib/lightdm:/bin/false
polkitd:x:996:996:polkit:/nonexistent:/usr/sbin/nologin
rtkit:x:111:117:RealtimeKit,,,:/proc:/usr/sbin/nologin
colord:x:112:118:colord colour management daemon,,,:/var/lib/colord:/usr/sbin/nologin
nm-openvpn:x:113:119:NetworkManager OpenVPN,,,:/var/lib/openvpn/chroot:/usr/sbin/nologin
nm-openconnect:x:114:120:NetworkManager OpenConnect plugin,,,:/var/lib/NetworkManager:/usr/sbin/nologin
mysql:x:115:122:MySQL Server,,,:/nonexistent:/bin/false
stunnel4:x:995:995:stunnel service system account:/var/run/stunnel4:/usr/sbin/nologin
_rpc:x:116:65534::/run/rpcbind:/usr/sbin/nologin
geoclue:x:117:124::/var/lib/geoclue:/usr/sbin/nologin
Debian-snmp:x:118:125::/var/lib/snmp:/bin/false
```

xv.   Navigate to /etc/group and explore

```
  ┌──(kali㉿kali)-[/etc]
  └─$ cat group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:kali
tty:x:5:
disk:x:6:
lp:x:7:
mail:x:8:
news:x:9:
uucp:x:10:
man:x:12:
proxy:x:13:
kmem:x:15:
dialout:x:20:kali
fax:x:21:
voice:x:22:
cdrom:x:24:kali
floppy:x:25:kali
tape:x:26:
sudo:x:27:kali
audio:x:29:kali
dip:x:30:kali
www-data:x:33:
backup:x:34:
operator:x:37:
list:x:38:
irc:x:39:
src:x:40:
shadow:x:42:
utmp:x:43:
video:x:44:kali
sasl:x:45:
plugdev:x:46:kali
staff:x:50:
games:x:60:
users:x:100:kali
nogroup:x:65534:
systemd-journal:x:999:
systemd-network:x:998:
crontab:x:101:
```

g. Difference between

  i.   GUI vs. CLI

GUI: Uses pictures and icons, easy to use.   CLI: Uses text commands, powerful but harder to learn

    ii.   man vs info

Man: Older system for displaying command documentation. Short, focused on specific commands.   Info: Newer system, more like a book. Offers detailed explanations and links between topics

    iii.   which vs. whereis

which: Finds the exact path of an executable in your PATH environment variable.

whereis: Searches for a command, its source code, and its manual page in standard system directories.

    iv.   Terminal vs shell

Terminal is the interface (the window) where you type commands.   Shell is the program that interprets and executes those commands.

h.   Write a simple shell script to print your name and your hobbies!

```bash
#!/bin/bash

# Define variables
NAME="Nithesh"
HOBBIES="Reading, Hiking"

# Print name and hobbies
echo "Name: $NAME"
echo "Hobbies: $HOBBIES"
~
~
~
~
~
```

i.

Interesting commands to Explore

Banner

History

Note: Include your screenshots

Evaluation :

Marks : 10   (Deadline : 4 – Originality :3 – Completeness :3)

Deadline: 06.08.2024

"All our dreams can come true if we have the courage to pursue them."

- Walt Disney