

42. What is the difference between the “x” permission for a file and for a directory

- **For a File:** The "x" (execute) permission allows a file to be executed as a program or script. If a file has the "x" permission, users can run it as a command.
- **For a Directory:** The "x" (execute) permission allows users to enter the directory and access its contents. It enables the traversal of the directory to access files or subdirectories within it.

43. Copy the rm program to your home directory, naming it myrm, grant set-uid permission, what happens if one of the users starts your ~username/myrm to edit one of your own files?

```
ibrahim@ibrahim-Lenovo-ideapad-100-15IBD:~$ cp /bin/rm ~/myrm
ibrahim@ibrahim-Lenovo-ideapad-100-15IBD:~$ ls
2nd_file  Documents  my_cv      new_dir    Public     test
Desktop   Downloads  myrm       oldpasswd  snap       Videos
docs      Music      myteam     Pictures   Templates
ibrahim@ibrahim-Lenovo-ideapad-100-15IBD:~$ ls -l
total 120
-rw-rw-r-- 1 ibrahim ibrahim    91 2 10:05 9  يون nd_file
drwxr-xr-x 2 ibrahim ibrahim  4096 09:27 9  يون Desktop
drwxrwxr-x 2 ibrahim ibrahim  4096 14:11 6  يون docs
drwxr-xr-x 2 ibrahim ibrahim  4096 19:07 9  يون Documents
drwxr-xr-x 2 ibrahim ibrahim  4096 11:12 10 يون Downloads
drwxr-xr-x 2 ibrahim ibrahim  4096 16:09 3  يون Music
-rw--wx--x 1 ibrahim ibrahim   297 13:20 9  يون my_cv
-rwxr-xr-x 1 ibrahim ibrahim 59912 12:43 10 يون myrm
drwx----- 2 ibrahim ibrahim  4096 13:30 9  يون myteam
d----- 2 ibrahim ibrahim  4096 14:19 9  يون new_dir
```

```
ibrahim@ibrahim-Lenovo-ideapad-100-15IBD:~$ chmod u+s ~/myrm
ibrahim@ibrahim-Lenovo-ideapad-100-15IBD:~$ ls -l
total 120
-rw-rw-r-- 1 ibrahim ibrahim    91 2 10:05 9  يون nd_file
drwxr-xr-x 2 ibrahim ibrahim  4096 09:27 9  يون Desktop
drwxrwxr-x 2 ibrahim ibrahim  4096 14:11 6  يون docs
drwxr-xr-x 2 ibrahim ibrahim  4096 19:07 9  يون Documents
drwxr-xr-x 2 ibrahim ibrahim  4096 11:12 10 يون Downloads
drwxr-xr-x 2 ibrahim ibrahim  4096 16:09 3  يون Music
-rw--wx--x 1 ibrahim ibrahim   297 13:20 9  يون my_cv
-rwsr-xr-x 1 ibrahim ibrahim 59912 12:43 10 يون myrm
drwx----- 2 ibrahim ibrahim  4096 13:30 9  يون myteam
d----- 2 ibrahim ibrahim  4096 14:19 9  يون new_dir
```

44. What is the difference between the set-uid and set-gid?

setuid: a bit that makes an executable run with the privileges of the owner of the file.

setgid: a bit that makes an executable run with the privileges of the group of the file

45. Create a directory with sticky-bit and write permissions on, grant all the users to access the directory, will any user be able to create and delete files from the directory?

```
ibrahim@ibrahim-Lenovo-ideapad-100-15IBD:~$ mkdir sticky_bit_dir
```

```
Ls -l
```

```
drwxrwxr-x 2 ibrahim ibrahim 4096 13:23 10 يون sticky_bit_dir
```

```
ibrahim@ibrahim-Lenovo-ideapad-100-15IBD:~$ chmod 1777 sticky_bit_dir
ibrahim@ibrahim-Lenovo-ideapad-100-15IBD:~$ ls -l
```

```
total 124
-rw-rw-r-- 1 ibrahim ibrahim 91 2 10:05 9 يون nd_file
drwxr-xr-x 2 ibrahim ibrahim 4096 09:27 9 يون Desktop
drwxrwxr-x 2 ibrahim ibrahim 4096 14:11 6 يون docs
drwxr-xr-x 2 ibrahim ibrahim 4096 19:07 9 يون Documents
drwxr-xr-x 2 ibrahim ibrahim 4096 11:12 10 يون Downloads
drwxr-xr-x 2 ibrahim ibrahim 4096 16:09 3 يون Music
-rw--wx--x 1 ibrahim ibrahim 297 13:20 9 يون my_cv
-rwsr-xr-x 1 ibrahim ibrahim 59912 12:43 10 يون myrm
drwx----- 2 ibrahim ibrahim 4096 13:30 9 يون myteam
d----- 2 ibrahim ibrahim 4096 14:19 9 يون new_dir
-rw-r--r-- 1 ibrahim ibrahim 2893 14:25 8 يون oldpasswd
drwxr-xr-x 4 ibrahim ibrahim 4096 16:50 6 يون Pictures
drwxr-xr-x 2 ibrahim ibrahim 4096 16:09 3 يون Public
drwx----- 5 ibrahim ibrahim 4096 13:11 6 يون snap
drwxrwxrwt 2 ibrahim ibrahim 4096 13:23 10 يون sticky_bit_dir
drwxr-xr-x 2 ibrahim ibrahim 4096 16:09 3 يون Templates
```

46. Create a directory with set-gid permission, what do you notice when you create a new file or a directory?

```
ibrahim@ibrahim-Lenovo-ideapad-100-15IBD:~$ mkdir n_dir
```

```
ibrahim@ibrahim-Lenovo-ideapad-100-15IBD:~$ ls -l
```

```
drwxrwxr-x 2 ibrahim ibrahim 4096 13:36 10 يون n_dir
```

```
chgrp: changing group of 'n_dir': operation not permitted
ibrahim@ibrahim-Lenovo-ideapad-100-15IBD:~$ sudo chgrp python n_dir
```

```
ibrahim@ibrahim-Lenovo-ideapad-100-15IBD:~$ ls -l
```

```
drwxrwxr-x 2 ibrahim python 4096 13:36 10 يون n_dir
```

```
ibrahim@ibrahim-Lenovo-ideapad-100-15IBD:~$ chmod g+s n_dir
ibrahim@ibrahim-Lenovo-ideapad-100-15IBD:~$ ls -l
```

```
drwxrwsr-x 2 ibrahim python 4096 13:36 10 يون n_dir
```

```
ibrahim@ibrahim-Lenovo-ideapad-100-15IBD:~$ cd n_dir
ibrahim@ibrahim-Lenovo-ideapad-100-15IBD:~/n_dir$ touch n_file
ibrahim@ibrahim-Lenovo-ideapad-100-15IBD:~/n_dir$ ls -l
total 0
-rw-rw-r-- 1 ibrahim python 0 13:40 10 يون n_file
```

1. List the available shells in your system.

```
ibrahim@ibrahim-Lenovo-ideapad-100-15IBD:~$ cat /etc/shells
# /etc/shells: valid login shells
/bin/sh
/bin/bash
/usr/bin/bash
/bin/rbash
/usr/bin/rbash
/usr/bin/sh
/bin/dash
/usr/bin/dash
```

2. List the environment variables in your current shell.

```
ibrahim@ibrahim-Lenovo-ideapad-100-15IBD:~$ env
SHELL=/bin/bash
SESSION_MANAGER=local/ibrahim-Lenovo-ideapad-100-15IBD:@/tmp/.ICE-unix/1369,unix
/ibrahim-Lenovo-ideapad-100-15IBD:/tmp/.ICE-unix/1369
QT_ACCESSIBILITY=1
COLORTERM=truecolor
XDG_CONFIG_DIRS=/etc/xdg/xdg-ubuntu:/etc/xdg
SSH_AGENT_LAUNCHER=gnome-keyring
XDG_MENU_PREFIX=gnome-
GNOME_DESKTOP_SESSION_ID=this-is-deprecated
LC_ADDRESS=ar_EG.UTF-8
GNOME_SHELL_SESSION_MODE=ubuntu
LC_NAME=ar_EG.UTF-8
SSH_AUTH_SOCK=/run/user/1000/keyring/ssh
XMODIFIERS=@im=ibus
DESKTOP_SESSION=ubuntu
LC_MONETARY=ar_EG.UTF-8
GTK_MODULES=gail:atk-bridge
PWD=/home/ibrahim
LOGNAME=ibrahim
XDG_SESSION_DESKTOP=ubuntu
XDG_SESSION_TYPE=wayland
SYSTEMD_EXEC_PID=1570
XAUTHORITY=/run/user/1000/.mutter-Xwaylandauth.Z8YGP2
HOME=/home/ibrahim
USERNAME=ibrahim
IM_CONFIG_PHASE=1
LC_PAPER=ar_EG.UTF-8
```

3. List all of the environment variables for the bash shell.

```
ibrahim@ibrahim-Lenovo-ideapad-100-15IBD:~$ man bash
```

Shell Variables

The following variables are set by the shell:

_ At shell startup, set to the pathname used to invoke the shell or shell script being executed as passed in the environment or argument list. Subsequently, expands to the last argument to the previous simple command executed in the foreground, after expansion. Also set to the full pathname used to invoke each command executed and placed in the environment exported to that command. When checking mail, this parameter holds the name of the mail file currently being checked.

BASH Expands to the full filename used to invoke this instance of bash.

BASHOPTS

A colon-separated list of enabled shell options. Each word in the list is a valid argument for the **-s** option to the **shopt** builtin command (see **SHELL BUILTIN COMMANDS** below). The options appearing in **BASHOPTS** are those reported as on by **shopt**. If this variable is in the environment when **bash** starts up, each shell option in the list will be enabled before reading any startup files. This variable is read-only.

BASHPID

Expands to the process ID of the current **bash** process. This differs from **\$\$** under certain circumstances, such as subshells that do not require **bash** to be re-initialized. Assignments to **BASHPID** have no effect. If **BASHPID** is unset, it loses its special properties, even if it is subsequently reset.

BASH_ALIASES

4. What are the commands that list the values of all the variables?

```
ibrahim@ibrahim-Lenovo-ideapad-100-15IBD:~$ set
BASH=/usr/bin/bash
BASHOPTS=checkwinsize:cmdhist:complete_fullquote:expand_aliases:extglob:extquote
:force_ignore:globasciiranges:histappend:interactive_comments:progcomp:promptva
rs:sourcepath
BASH_ALIASES=()
BASH_ARGC=([0]="0")
BASH_ARGV=()
BASH_CMDS=()
BASH_COMPLETION_VERSION=([0]="2" [1]="11")
BASH_LINENO=()
BASH_REMATCH=()
BASH_SOURCE=()
BASH_VERSION=([0]="5" [1]="1" [2]="16" [3]="1" [4]="release" [5]="x86_64-pc-lin
ux-gnu")
BASH_VERSION='5.1.16(1)-release'
COLORTERM=truecolor
COLUMNS=80
COMP_WORDBREAKS=$' \t\n\"'>=&|&(:'
DBUS_SESSION_BUS_ADDRESS=unix:path=/run/user/1000/bus
DESKTOP_SESSION=ubuntu
DIRSTACK=()
DISPLAY=:0
EUID=1000
GDMSESSION=ubuntu
GNOME_DESKTOP_SESSION_ID=this-is-deprecated
GNOME_SETUP_DISPLAY=:1
GNOME_SHELL_SESSION_MODE=ubuntu
GNOME_TERMINAL_SCREEN=/org/gnome/Terminal/screen/315623bd_2c0f_4d3d_9fd3_9ff911f
71412
GNOME_TERMINAL_SERVICE=:1.234
```


5. What are the commands that list the value of a specific variable?

```
ibrahim@ibrahim-Lenovo-ideapad-100-15IBD:~$ echo passwd  
passwd  
ibrahim@ibrahim-Lenovo-ideapad-100-15IBD:~$
```

6. Display your current shell.

```
ibrahim@ibrahim-Lenovo-ideapad-100-15IBD:~$ echo $SHELL  
/bin/bash  
ibrahim@ibrahim-Lenovo-ideapad-100-15IBD:~$
```

7. State the initialization files of: sh, ksh, csh, bash.

Bourne Shell (sh):

Login Shell: /etc/profile (system-wide), ~/.profile (user-specific)

Korn Shell (ksh):

Login Shell: /etc/profile (system-wide), ~/.profile (user-specific)

C Shell (csh):

Login Shell: /etc/csh.login (system-wide), ~/.login (user-specific)

Bash (bash):

Login Shell: /etc/profile (system-wide), ~/.bash_profile, ~/.bash_login, ~/.profile (user-specific, first found is executed)

8. Edit in your profile to display date at login and change your prompt permanently.

```
ibrahim@ibrahim-Lenovo-ideapad-100-15IBD:~$ vi ~/.bashrc  
ibrahim@ibrahim-Lenovo-ideapad-100-15IBD:~$ vi ~/.bashrc
```

```
ibrahim@ibrahim-Lenovo-ideapad-100-15IBD:~$  
# ~/.bashrc: executed by bash(1) for non-login shells.  
# see /usr/share/doc/bash/examples/startup-files (in the package bash-doc)  
# for examples  
# If not running interactively, don't do anything  
echo "welcom"  
cur_date = $(date + "%Y-%m-%d")  
echo "current date : $cur_date"  
case $- in  
    *i*) ;;  
    *) return;;  
esac
```

```
welcom  
current date: 2024-06-10  
ibrahim@ibrahim-Lenovo-ideapad-100-15IBD:~$
```

9. Execute the following command :

echo \ then press enter

Notice the prompt what is that and how can you change it.

```
ibrahim@ibrahim-Lenovo-ideapad-100-15IBD:~$ echo\  
> ^C  
ibrahim@ibrahim-Lenovo-ideapad-100-15IBD:~$
```

10. Create a Bash shell alias named ls for the “ls -l” command

```
ibrahim@ibrahim-Lenovo-ideapad-100-15IBD:~$ alias ls='ls -l'  
ibrahim@ibrahim-Lenovo-ideapad-100-15IBD:~$ ls  
total 128  
-rw-rw-r-- 1 ibrahim ibrahim 91 2 10:05 9 يون nd_file  
drwxr-xr-x 2 ibrahim ibrahim 4096 09:27 9 يون Desktop  
drwxrwxr-x 2 ibrahim ibrahim 4096 14:11 6 يون docs  
drwxr-xr-x 2 ibrahim ibrahim 4096 19:07 9 يون Documents  
drwxr-xr-x 2 ibrahim ibrahim 4096 11:12 10 يون Downloads  
drwxr-xr-x 2 ibrahim ibrahim 4096 16:09 3 يون Music  
-rw--wx--x 1 ibrahim ibrahim 297 13:20 9 يون my_cv  
-rwsr-xr-x 1 ibrahim ibrahim 59912 12:43 10 يون myrm  
drwx----- 2 ibrahim ibrahim 4096 13:30 9 يون myteam  
drwxrwsr-x 2 ibrahim python 4096 13:40 10 يون n_dir  
d----- 2 ibrahim ibrahim 4096 14:19 9 يون new_dir  
-rw-r--r-- 1 ibrahim ibrahim 2893 14:25 8 يون oldpasswd  
drwxr-xr-x 4 ibrahim ibrahim 4096 16:50 6 يون Pictures  
drwxr-xr-x 2 ibrahim ibrahim 4096 16:09 3 يون Public  
drwx----- 5 ibrahim ibrahim 4096 13:11 6 يون snap  
drwxrwxrwt 2 ibrahim ibrahim 4096 13:23 10 يون sticky_bit_dir  
drwxr-xr-x 2 ibrahim ibrahim 4096 16:09 3 يون Templates  
-rw--w---- 1 ibrahim ibrahim 0 14:08 9 يون test  
drwxr-xr-x 2 ibrahim ibrahim 4096 16:09 3 يون Videos
```