Basic tools : Introduction to Linux & GitHub

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Linux is not equal to Unix

Operating system (OS) is system software that manages computer hardware, software resources, and provides common services for

Unix is the family of OS that derive from the original AT&T Unix (Bell labs, 1970)
Unix OS are :

- Multiuser
- Multitasking
- Respect POSIX standards

<u>Examples :</u>

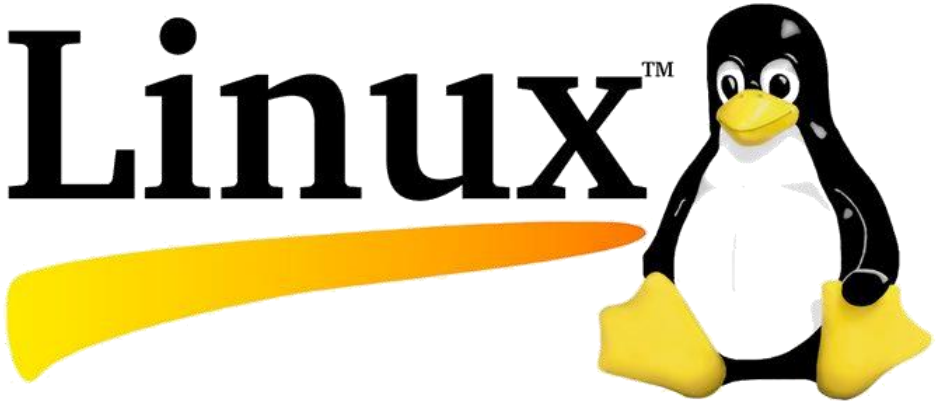
- Mac OS X
- Android
- GNU/Linux

* Microsoft Windows family is another type of OS

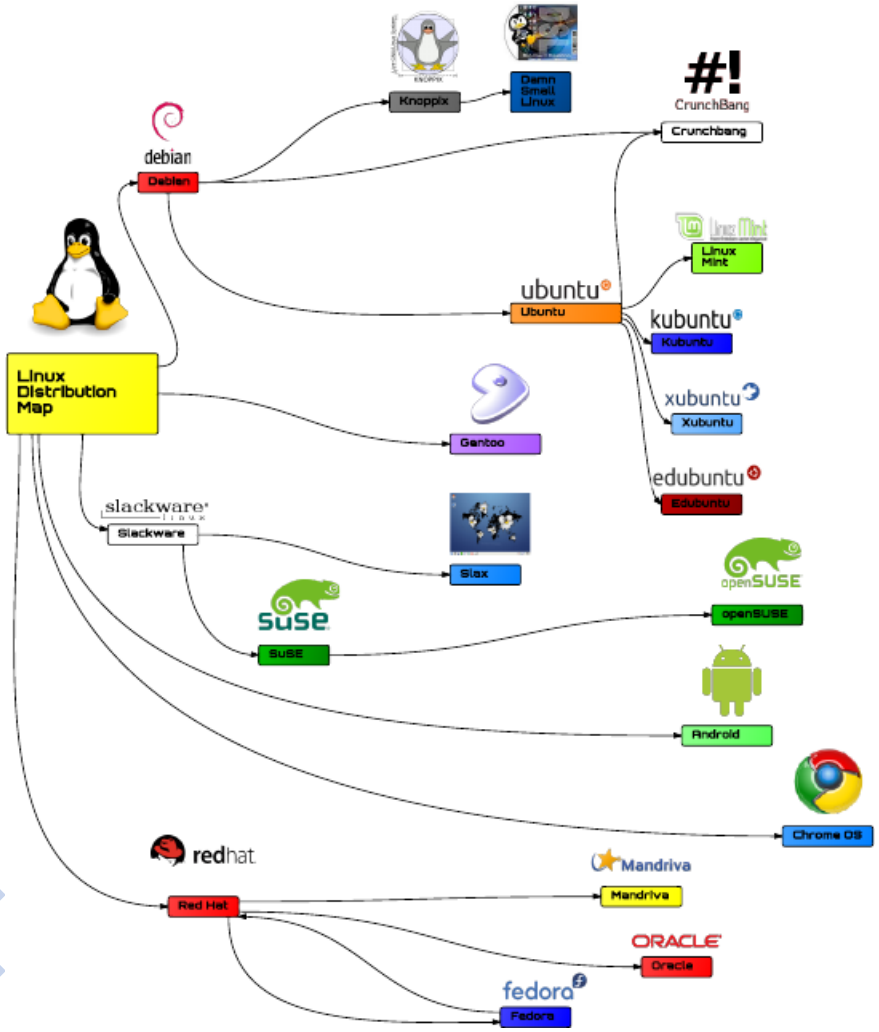
Linux is not equal to Unix

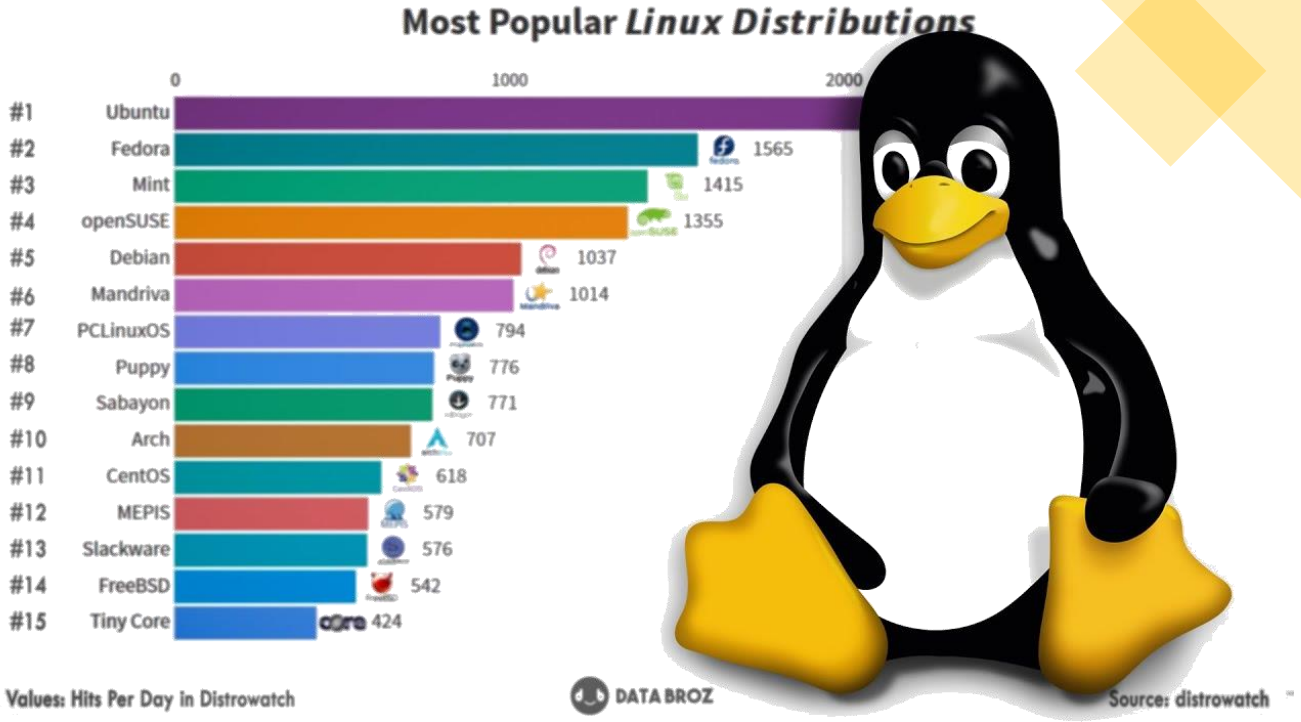
Linux = Kernel = Deepest layer of OS

Linux is free software which gives freedom to use, to study, to modify source code
→ wealth (or dispersion ?) of the free software ecosystem



Popular Linux distributions



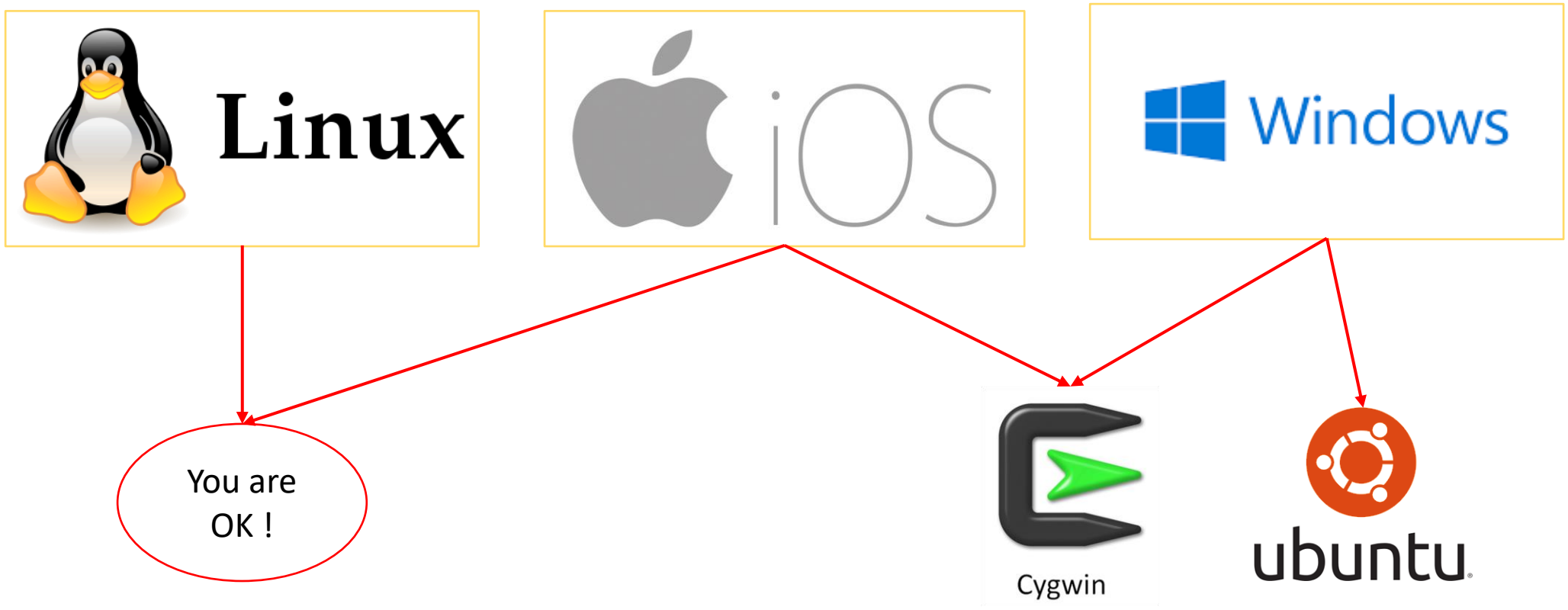


Why do we need to use Linux ?

Google Cloud Platform

amazon web services

What is your Operating System ?



Bash

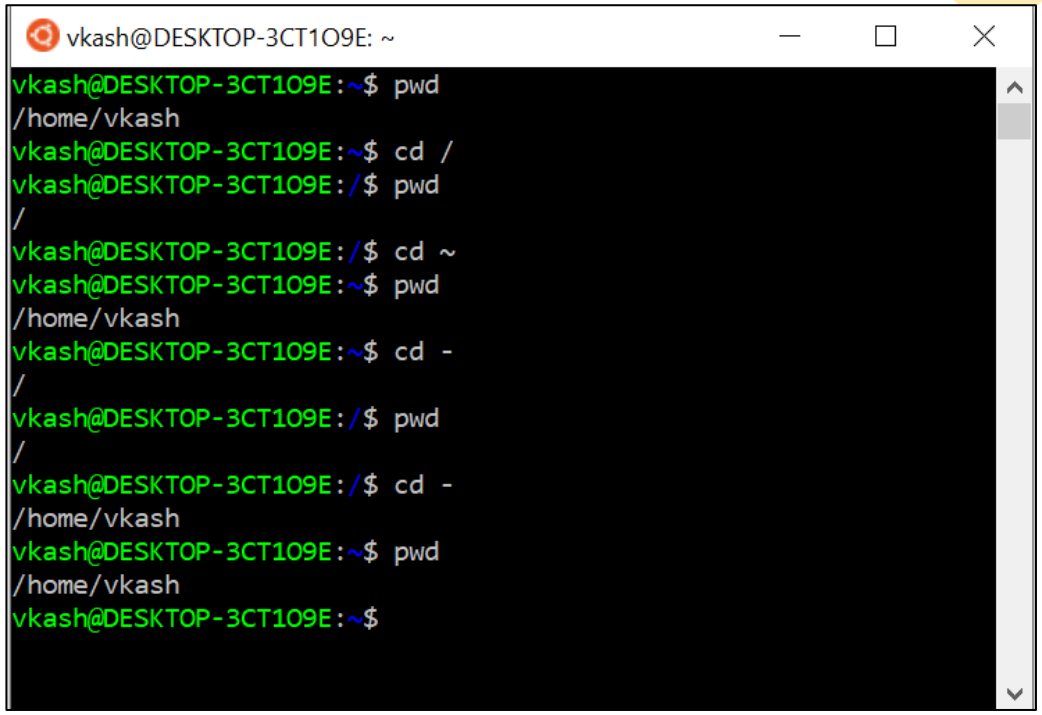
- **Bash is a Unix shell and command language**.
- **Bash** is a command processor that typically runs in a text window where the user types commands that cause actions. Bash can also read and execute commands from a file, called a shell script.

To check that you use Bash, enter : **echo $SHELL**

File system commands

cd – command to go to a specific folder
pwd - command to get a path of the current working directory
ls - command to get a list of contents of the current working directory
(or of any directory if we use ls + "directory path")

mkdir – command to crate a new directory/directories
cp - command to copy a file
mv – command to rename or to move a file/files
ln - command to create a link to a file
rm – command to remove a file/files
rmdir - – command to remove a directory



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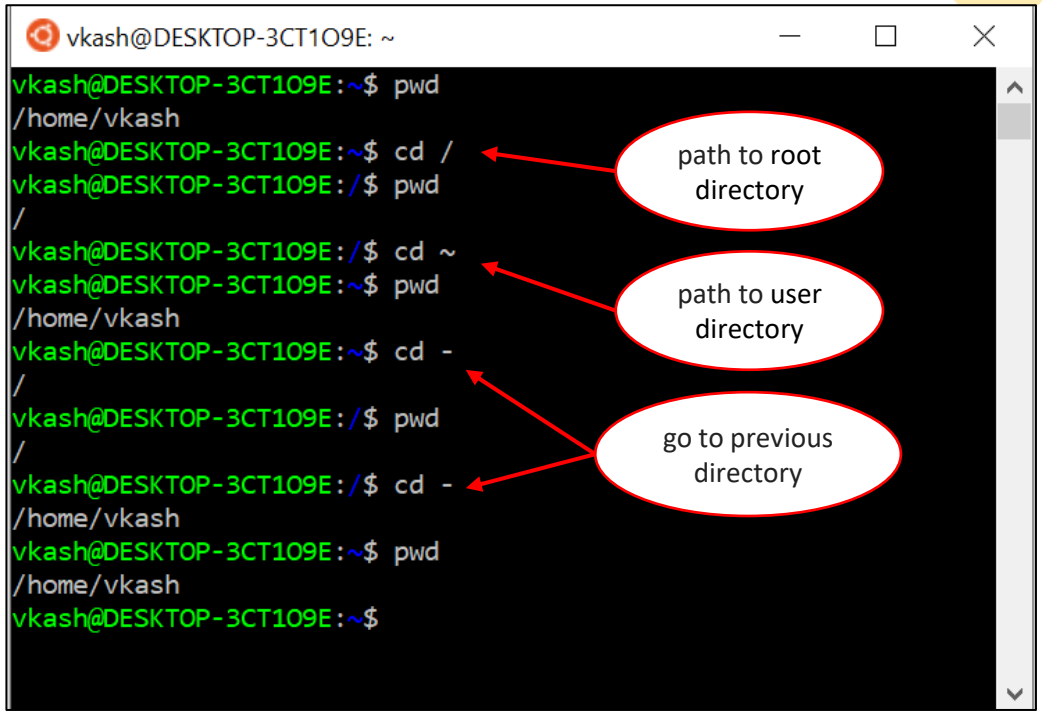


File system specificity

Absolute path : **/**repertoire/sous_repertoire/sous_sous_ repertoire/fichier_ou_dossier

Relative path : sous_repertoire/fichier_ou_dossier (depends on current directory)

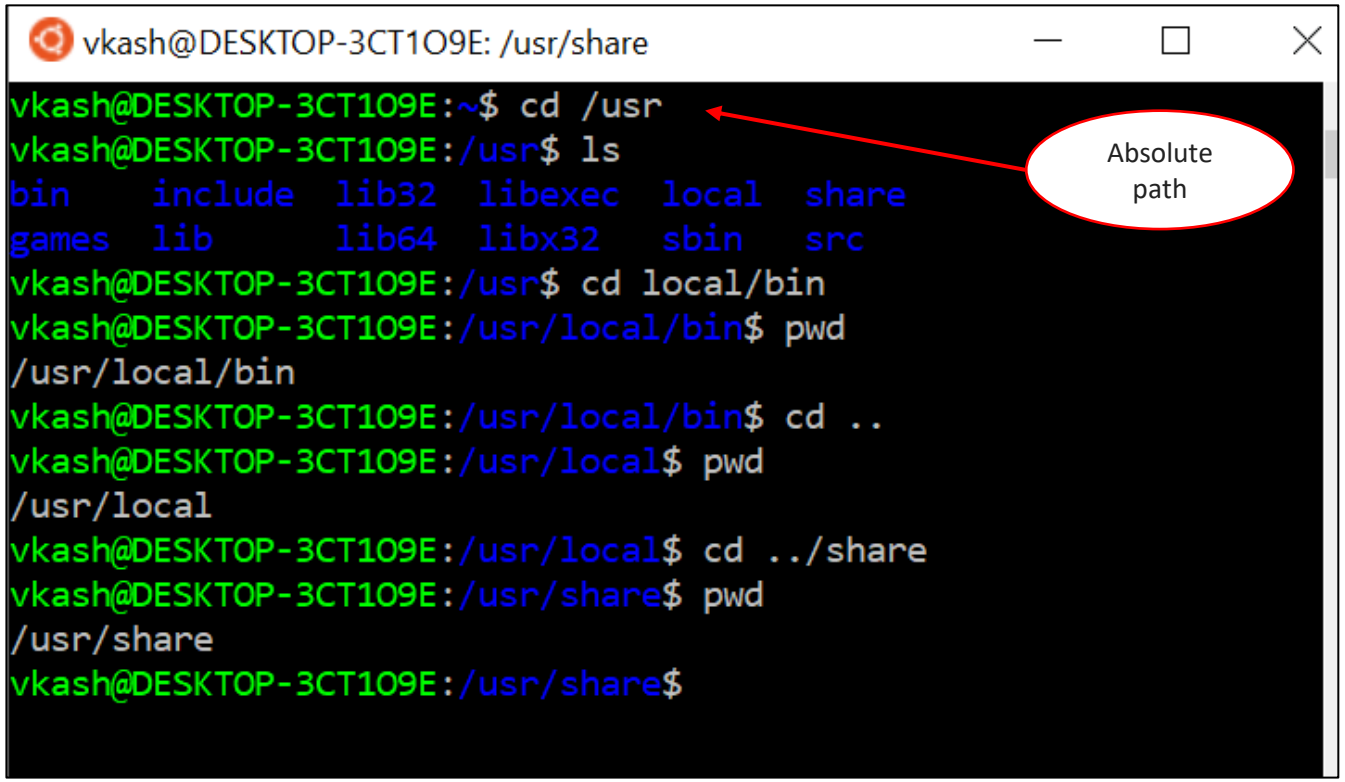
vkash@DESKTOP-3CT1O9E: /usr/share

```
vkash@DESKTOP-3CT1O9E:~$ cd /usr
vkash@DESKTOP-3CT1O9E:/usr$ ls
bin    include  lib32  libexec  local  share
games  lib      lib64  libx32   sbin   src
vkash@DESKTOP-3CT1O9E:/usr$ cd local/bin
vkash@DESKTOP-3CT1O9E:/usr/local/bin$ pwd
/usr/local/bin
vkash@DESKTOP-3CT1O9E:/usr/local/bin$ cd ..
vkash@DESKTOP-3CT1O9E:/usr/local$ pwd
/usr/local
vkash@DESKTOP-3CT1O9E:/usr/local$ cd ../share
vkash@DESKTOP-3CT1O9E:/usr/share$ pwd
/usr/share
vkash@DESKTOP-3CT1O9E:/usr/share$
```

File system specificity

Absolute path : **/**repertoire/sous_repertoire/sous_sous_ repertoire/fichier_ou_dossier

Relative path : sous_repertoire/fichier_ou_dossier (depends on current directory)



File system specificity

Absolute path : **/**repertoire/sous_repertoire/sous_sous_ repertoire/fichier_ou_dossier

Relative path : sous_repertoire/fichier_ou_dossier (depends on current directory)

vkash@DESKTOP-3CT1O9E: /usr/share

```
vkash@DESKTOP-3CT1O9E:~$ cd /usr
vkash@DESKTOP-3CT1O9E:/usr$ ls
bin    include  lib32  libexec  local  share
games  lib      lib64  libx32   sbin   src
vkash@DESKTOP-3CT1O9E:/usr$ cd local/bin
vkash@DESKTOP-3CT1O9E:/usr/local/bin$ pwd
/usr/local/bin
vkash@DESKTOP-3CT1O9E:/usr/local/bin$ cd ..
vkash@DESKTOP-3CT1O9E:/usr/local$ pwd
/usr/local
vkash@DESKTOP-3CT1O9E:/usr/local$ cd ../share
vkash@DESKTOP-3CT1O9E:/usr/share$ pwd
/usr/share
vkash@DESKTOP-3CT1O9E:/usr/share$
```

Relative path

File system specificity

Absolute path : **/**repertoire/sous_repertoire/sous_sous_ repertoire/fichier_ou_dossier

Relative path : sous_repertoire/fichier_ou_dossier (depends on current directory)

vkash@DESKTOP-3CT1O9E: /usr/share

```
vkash@DESKTOP-3CT1O9E:~$ cd /usr
vkash@DESKTOP-3CT1O9E:/usr$ ls
bin    include  lib32  libexec  local  share
games  lib      lib64  libx32   sbin   src
vkash@DESKTOP-3CT1O9E:/usr$ cd local/bin
vkash@DESKTOP-3CT1O9E:/usr/local/bin$ pwd
/usr/local/bin
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vkash@DESKTOP-3CT1O9E:/usr/local$ pwd
/usr/local
vkash@DESKTOP-3CT1O9E:/usr/local$ cd ../share
vkash@DESKTOP-3CT1O9E:/usr/share$ pwd
/usr/share
vkash@DESKTOP-3CT1O9E:/usr/share$
```

Relative path

Relative path with path to **parent directory**

Exercise : **cd** & **pwd**

What folders will we get after running these commands ?

```
$ cd /bin
$ cd ../usr/share/zoneinfo          =>  ?

$ cd /usr/X11R6/bin
$ cd ../lib/X11                     => ?

$ cd /usr/bin
$ cd ../bin/../bin                  => ?
```

Exercise : **cd** & **pwd**

What folders will we get after running these commands ?

$ **cd /bin**
$ **cd ../usr/share/zoneinfo** => /usr/share/zoneinfo

$ **cd /usr/X11R6/bin**
$ **cd ../lib/X11** => /usr/X11R6/lib/X11

$ **cd /usr/bin**
$ **cd ../bin/../bin** => /usr/bin

Exercise : ls

vkash@DESKTOP-3CT1O9E: /usr

```
vkash@DESKTOP-3CT1O9E:~$ cd /usr
vkash@DESKTOP-3CT1O9E:/usr$ ls
bin    include  lib32  libexec  local  share
games  lib      lib64  libx32   sbin   src
vkash@DESKTOP-3CT1O9E:/usr$ ls -a
.   bin    include  lib32  libexec  local  share
..  games  lib      lib64  libx32   sbin   src
vkash@DESKTOP-3CT1O9E:/usr$ man ls
```

list of contents

full list of contents, hidden content included

manual for command

vkash@DESKTOP-3CT1O9E: /usr

```
LS(1)                    User Commands                    LS(1)

NAME
       ls - list directory contents

SYNOPSIS
       ls [OPTION]... [FILE]...

DESCRIPTION
       List information about the FILEs (the current directory
       by default).  Sort entries alphabetically  if  none  of
       -cftuvSUX nor --sort is specified.

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

       -a, --all
              do not ignore entries starting with .
 Manual page ls(1) line 1 (press h for help or q to quit)
```

How to get a full information about all objects in the directory ?

Exercise : ls

```
vkash@DESKTOP-3CT1O9E: ~
vkash@DESKTOP-3CT1O9E:~$ ls -l /usr
total 0
drwxr-xr-x 1 root root 4096 Sep 13 21:02 bin
drwxr-xr-x 1 root root 4096 Apr 15 13:09 games
drwxr-xr-x 1 root root 4096 Aug  5 00:07 include
drwxr-xr-x 1 root root 4096 Aug  5 00:07 lib
drwxr-xr-x 1 root root 4096 Aug  4 23:39 lib32
drwxr-xr-x 1 root root 4096 Aug  4 23:39 lib64
drwxr-xr-x 1 root root 4096 Aug  4 23:41 libexec
drwxr-xr-x 1 root root 4096 Aug  4 23:39 libx32
drwxr-xr-x 1 root root 4096 Aug  4 23:39 local
drwxr-xr-x 1 root root 4096 Sep 13 21:02 sbin
drwxr-xr-x 1 root root 4096 Aug  5 00:07 share
drwxr-xr-x 1 root root 4096 Aug  4 23:47 src
```

also works (ls + “path”) but doesn’t change current directory

“long listing”, detailed list of contents

access rights

number of references to this element of file system

list of owners ang groups

object size

time of object last modification

object name

Exercise : **mkdir** & **cp** & **mv**

1. Go to your user directory and create 3 new directories : “tic”, “tac” and “toe”
2. Create a new directory “tic/ket”
3. Create a new directory “tac/o/s” (and solve the error)

1. Go to the “toe” directory
2. Create a zero-size file “copyme” using command “touch”
3. *Add in this file some information using command “echo”
4. Display the file content to the terminal using command “cat”
5. Create a new file “copiedme” like a copy of file “copyme”
6. Check that these files are different

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vkash@DESKTOP-3CT1O9E: ~/toe

```
vkash@DESKTOP-3CT1O9E:~/toe$ touch copyme
vkash@DESKTOP-3CT1O9E:~/toe$ echo "some info" > copyme
vkash@DESKTOP-3CT1O9E:~/toe$ cat copyme
some info
vkash@DESKTOP-3CT1O9E:~/toe$ cp copyme copiedme
vkash@DESKTOP-3CT1O9E:~/toe$ ls -i copyme copiedme
21110623253570532 copiedme  35465847065873576 copyme
vkash@DESKTOP-3CT1O9E:~/toe$
```

Exercise : **mkdir** & **cp** & **mv**

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5. Create a new file “copiedme” like a copy of file “copyme”
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1. Rename “copiedme” to “moveme”
2. Check that it still the same file
3. Move “moveme” to “tac/o/s” directory
4. Check that file is there and not in the current directory

Exercise : **mkdir** & **cp** & **mv**

1. Go to your user directory and create 3 new directories : “tic”, “tac” and “toe”
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```
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vkash@DESKTOP-3CT1O9E:~/toe$ cat copyme
some info
vkash@DESKTOP-3CT1O9E:~/toe$ cp copyme copiedme
vkash@DESKTOP-3CT1O9E:~/toe$ ls -i copyme copiedme
21110623253570532 copiedme  35465847065873576 copyme
vkash@DESKTOP-3CT1O9E:~/toe$ mv copiedme moveme
vkash@DESKTOP-3CT1O9E:~/toe$ ls -i moveme
21110623253570532 moveme
vkash@DESKTOP-3CT1O9E:~/toe$ mv moveme ~/tac/o/s
vkash@DESKTOP-3CT1O9E:~/toe$ ls ../tac/o/s
moveme
vkash@DESKTOP-3CT1O9E:~/toe$ ls
copyme
vkash@DESKTOP-3CT1O9E:~/toe$
```

Exercise : **rm** & **rmdir**

1. Go to “tic/ket” directory
2. Create 2 zero-size files “file1” and “file2” using “touch” command
3. Delete this files
4. Check that these files are removed

Exercise : **rm** & **rmdir**

1. Go to “tic/ket” directory
2. Create 2 zero-size files “file1” and “file2” using “touch” command
3. Delete this files
4. Check that these files are removed

be careful with "**rm**" command which **removes file forever**, it's better to use "**rm -i**" to control the process

vkash@DESKTOP-3CT1O9E: ~/tic/ket

```
vkash@DESKTOP-3CT1O9E:~/tic/ket$ touch file1 file2
vkash@DESKTOP-3CT1O9E:~/tic/ket$ ls -l
total 0
-rw-r--r-- 1 vkash vkash 0 Sep 16 11:48 file1
-rw-r--r-- 1 vkash vkash 0 Sep 16 11:48 file2
vkash@DESKTOP-3CT1O9E:~/tic/ket$ rm -i file1 file2
rm: remove regular empty file 'file1'? y
rm: remove regular empty file 'file2'? y
vkash@DESKTOP-3CT1O9E:~/tic/ket$ ls -l
total 0
vkash@DESKTOP-3CT1O9E:~/tic/ket$ ls -l file1 file2
ls: cannot access 'file1': No such file or directory
ls: cannot access 'file2': No such file or directory
vkash@DESKTOP-3CT1O9E:~/tic/ket$
```

Exercise : **rm** & **rmdir**

1. Go to “tic/ket” directory
2. Create 2 zero-size files “file1” and “file2” using “touch” command
3. Delete this files
4. Check that these files are removed

1. Go to your user directory and try to delete “tic” directory
2. Find a method to delete “tic” directory

Exercise : **rm** & **rmdir**

1. Go to “tic/ket” directory
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3. Delete this files
4. Check that these files are removed

1. Go to your user directory and try t
2. Find a method to delete “tic” direc

There are 2 options :
- Delete each element in the directory (too slow)
- Use recursive force of “rm” (too dangerous)

vkash@DESKTOP-3CT1O9E: ~

```
vkash@DESKTOP-3CT1O9E:~$ ls
tac  tic  toe
vkash@DESKTOP-3CT1O9E:~$ rmdir tic
rmdir: failed to remove 'tic': Directory not empty
vkash@DESKTOP-3CT1O9E:~$ rmdir tic/ket
vkash@DESKTOP-3CT1O9E:~$ rmdir tic
vkash@DESKTOP-3CT1O9E:~$ ls -l tic
ls: cannot access 'tic': No such file or directory
vkash@DESKTOP-3CT1O9E:~$
vkash@DESKTOP-3CT1O9E:~$ mkdir -p tic/ket
vkash@DESKTOP-3CT1O9E:~$ rm -rf -i tic
rm: descend into directory 'tic'? y
rm: remove directory 'tic/ket'? y
rm: remove directory 'tic'? y
vkash@DESKTOP-3CT1O9E:~$ ls -l tic
ls: cannot access 'tic': No such file or directory
vkash@DESKTOP-3CT1O9E:~$
```

Linux File Globbing

- **Globbing** is also known as path name expansion. To learn about file globbing first we need to know about wildcards.

- **Wildcards pattern** are the **strings containing characters like '*’, '?', '['**. It performs action on more than one file having same pattern or to find part of a phrase in a text file. Shell uses wildcards for file globbing.

- **Globbing** is an operation that recognizes the wildcard pattern and expands it into its path name.

Linux File Globbing

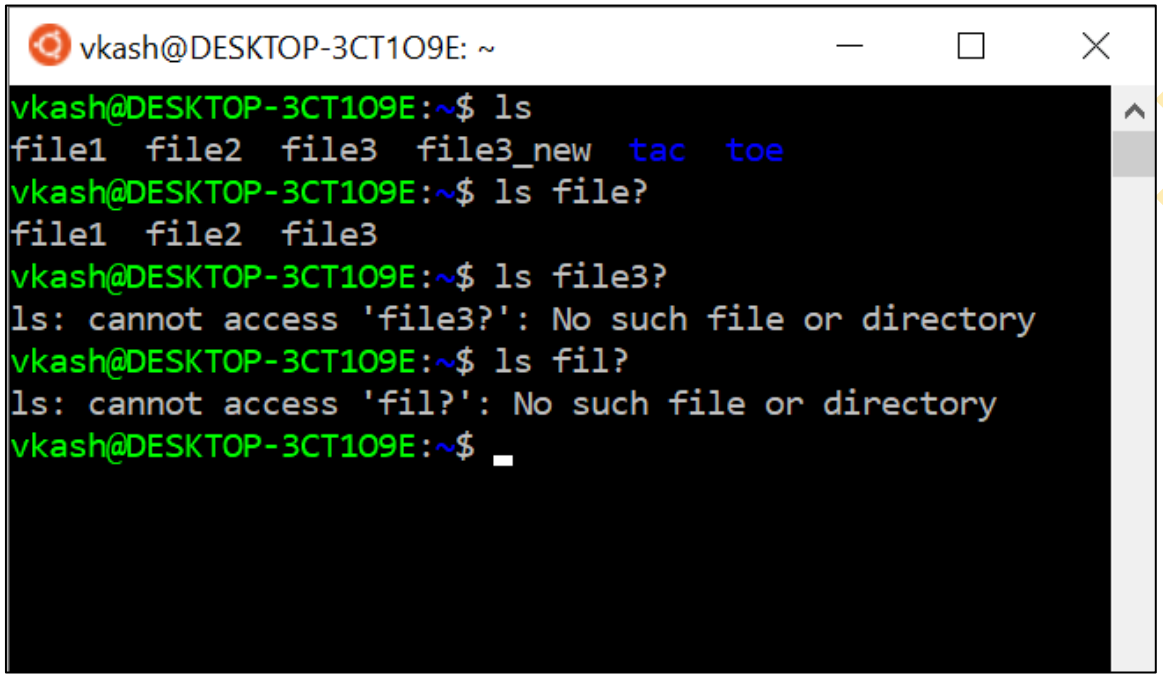
- * (Asterisk)
  The asterisk is interpreted as the sign to generate matching file names. It is placed at the end of a line.
  It matches the combination by any number of characters.

vkash@DESKTOP-3CT1O9E: ~

```
vkash@DESKTOP-3CT1O9E:~$ touch file1 file2 file3 file3_n
ew
vkash@DESKTOP-3CT1O9E:~$ ls -l
total 0
-rw-r--r-- 1 vkash vkash    0 Sep 16 12:30 file1
-rw-r--r-- 1 vkash vkash    0 Sep 16 12:30 file2
-rw-r--r-- 1 vkash vkash    0 Sep 16 12:30 file3
-rw-r--r-- 1 vkash vkash    0 Sep 16 12:30 file3_new
drwxr-xr-x 1 vkash vkash 4096 Sep 15 22:05 tac
drwxr-xr-x 1 vkash vkash 4096 Sep 15 22:35 toe
vkash@DESKTOP-3CT1O9E:~$ ls file*
file1  file2  file3  file3_new
vkash@DESKTOP-3CT1O9E:~$ ls file3*
file3  file3_new
vkash@DESKTOP-3CT1O9E:~$
```

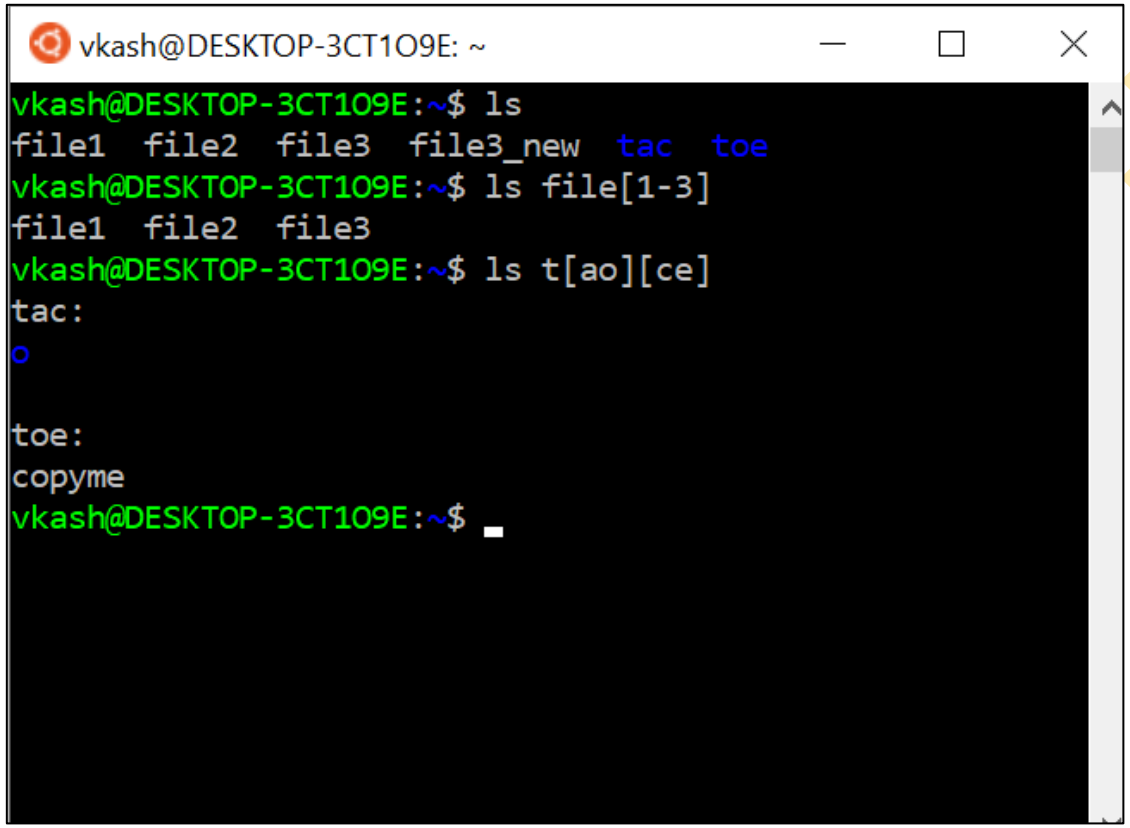
Linux File Globbing

- **?** (Question mark)
  You can also use question mark sign in place of asterisk to generate matching file names. It is placed at the end of a line.
  It matches the combination by exactly one character.



Linux File Globbing

- **[]** (Square Brackets)
  Square brackets are also used to generate matching file names inside the brackets and the first subsequent. Order inside the square bracket doesn't matter.
  It matches the combination by exactly one character.



Linux File Globbing

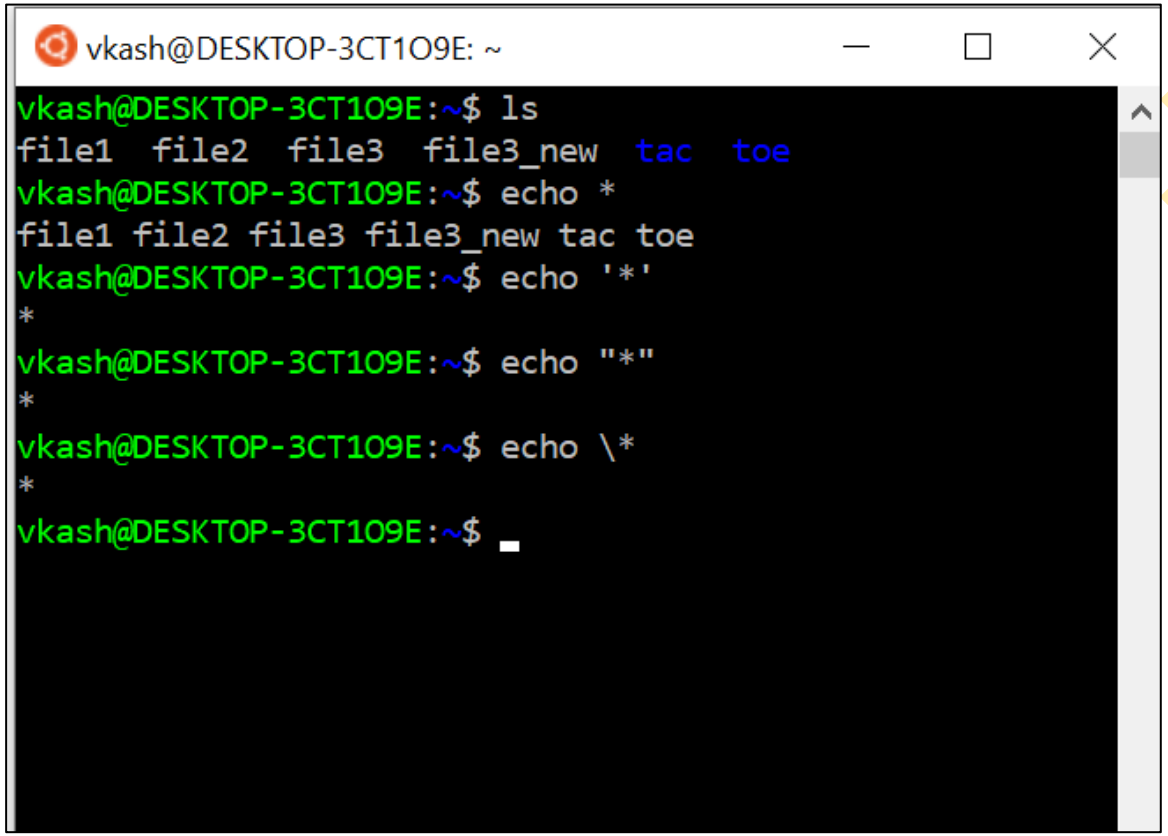
- **!** (exclamation mark)
  Exclamation mark excludes characters from the list within the square bracket. And you can use the combination of asterisk (*), question mark (?) and square bracket [].

```
vkash@DESKTOP-3CT1O9E: ~
vkash@DESKTOP-3CT1O9E:~$ ls
file1  file2  file3  file3_new  tac  toe
vkash@DESKTOP-3CT1O9E:~$ ls file[!2]
file1  file3
vkash@DESKTOP-3CT1O9E:~$ ls file[!2]*
file1  file3  file3_new
vkash@DESKTOP-3CT1O9E:~$ ls file[!3]
file1  file2
vkash@DESKTOP-3CT1O9E:~$ ls file[!3]*
file1  file2
vkash@DESKTOP-3CT1O9E:~$ ls t[ao][!e]*
o
vkash@DESKTOP-3CT1O9E:~$ ls tac
o
vkash@DESKTOP-3CT1O9E:~$
```

Try Globbing with different learned commands such as **echo, touch, mkdir, rm** etc.

Globbing Prevention

- The command **echo *** will print * when a directory is empty. But if not empty, them it will print all the files.
- To prevent it, special characters can be used like backward slash (\), single quote (') and double quote (").
- It works not only for *, but for all globbing symbols.



Globbing Prevention

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- It works not only for *, but for all globbing symbols.

Read manuels for all commands used today and try new configurations to better understad it

vkash@DESKTOP-3CT1O9E: ~

```
vkash@DESKTOP-3CT1O9E:~$ ls
file1  file2  file3  file3_new  tac  toe
vkash@DESKTOP-3CT1O9E:~$ echo *
file1 file2 file3 file3_new tac toe
vkash@DESKTOP-3CT1O9E:~$ echo '*'
*
vkash@DESKTOP-3CT1O9E:~$ echo "*"
*
vkash@DESKTOP-3CT1O9E:~$ echo \*
*
vkash@DESKTOP-3CT1O9E:~$
```