



National Textile University  
Department of Computer Science  
Subject:  
Operating System

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02

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## Part 1: Linux Environment Orientation

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### 1.1 UNDERSTANDING THE LINUX ENVIRONMENT

```
khizar@KHIZARS-LAPTOP: ~  
khizar@KHIZARS-LAPTOP:~$ whoami  
khizar  
khizar@KHIZARS-LAPTOP:~$ pwd  
/home/khizar  
khizar@KHIZARS-LAPTOP:~$ uname -a  
Linux KHIZARS-LAPTOP 6.6.87.2-microsoft-standard-WSL2 #1 SMP PREEMPT_DYNAMIC Thu Jun  5 18:30:46 UTC 2025 x86_64 x86_64 x86_64 GNU/Linux  
khizar@KHIZARS-LAPTOP:~$ date  
Fri Sep 26 15:02:38 PKT 2025  
khizar@KHIZARS-LAPTOP:~$
```

### 1.2 GETTING HELP IN LINUX

```
khizar@KHIZARS-LAPTOP: ~  
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 .  
  
-A, --almost-all  
do not list implied . and ..  
  
--author  
with -l, print the author of each file  
  
-b, --escape  
print C-style escapes for nongraphic characters  
  
--block-size=SIZE  
with -l, scale sizes by SIZE when printing them; e.g.,  
'--block-size=M'; see SIZE format below  
  
-B, --ignore-backups  
do not list implied entries ending with ~  
  
-c with -lt: sort by, and show, ctime (time of last change of file  
status information); with -l: show ctime and sort by name; other-  
wise: sort by ctime, newest first  
  
-C list entries by columns  
  
--color[=WHEN]  
Manual page ls(1) line 1 (press h for help or q to quit)
```

```
khizar@KHIZARs-LAPTOP: ~  
khizar@KHIZARs-LAPTOP:~$ man ls  
khizar@KHIZARs-LAPTOP:~$ ls --help  
Usage: ls [OPTION]... [FILE]...  
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 .  
-A, --almost-all do not list implied . and ..  
-l, --author with -l, print the author of each file  
-b, --escape print C-style escapes for nongraphic characters  
-b, --block-size=SIZE with -l, scale sizes by SIZE when printing them;  
e.g., '--block-size=M'; see SIZE format below  
  
-B, --ignore-backups do not list implied entries ending with ~  
-c with -lt: sort by, and show, ctime (time of last  
change of file status information);  
with -l: show ctime and sort by name;  
otherwise: sort by ctime, newest first  
  
-C list entries by columns  
-C, --color[=WHEN] color the output WHEN; more info below  
-d, --directory list directories themselves, not their contents  
-D, --dired generate output designed for Emacs' dired mode  
-f list all entries in directory order  
-F, --classify[=WHEN] append indicator (one of */=>@|) to entries WHEN  
--file-type likewise, except do not append '*'  
--format=WORD across -x, commas -m, horizontal -x, long -l,  
single-column -l, verbose -l, vertical -C  
  
--full-time like -l --time-style=full-iso  
--group-directories-first like -l, but do not list owner  
group directories before files;  
can be augmented with a --sort option, but any  
use of --sort=none (-U) disables grouping  
  
-G, --no-group in a long listing, don't print group names  
-h, --human-readable with -l and -s, print sizes like 1K 234M 2G etc.  
--si likewise, but use powers of 1000 not 1024  
-H, --dereference-command-line
```

```
khizar@KHIZARs-LAPTOP: ~  
khizar@KHIZARs-LAPTOP:~$ which ls  
/usr/bin/ls  
khizar@KHIZARs-LAPTOP:~$ type ls  
ls is aliased to `ls --color=auto'  
khizar@KHIZARs-LAPTOP:~$
```

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## Part 2: File System Navigation

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### 2.1 UNDERSTANDING LINUX DIRECTORY STRUCTURE

```
khizar@KHIZARs-LAPTOP: /home
khizar@KHIZARs-LAPTOP:~$ ls /
bin          etc          lib.usr-is-merged  mnt          run          srv          var
bin.usr-is-merged  home        lib64            opt          sbin         sys
boot         init         lost+found       proc         sbin.usr-is-merged  tmp
dev          lib          media            root         snap         usr

khizar@KHIZARs-LAPTOP:~$ ls -la
total 56
drwxr-x--- 8 khizar khizar 4096 Sep 26 15:07 .
drwxr-xr-x 3 root   root   4096 Sep 19 16:28 ..
-rw----- 1 khizar khizar 2034 Sep 25 14:17 .bash_history
-rw-r--r-- 1 khizar khizar  220 Sep 19 16:28 .bash_logout
-rw-r--r-- 1 khizar khizar 3771 Sep 19 16:28 .bashrc
drwx----- 3 khizar khizar 4096 Sep 20 20:50 .cache
drwxr-xr-x 3 khizar khizar 4096 Sep 20 20:50 .dotnet
-rw-r--r-- 1 khizar khizar   62 Sep 20 20:33 .gitconfig
drwxr-xr-x 2 khizar khizar 4096 Sep 25 13:54 .landscape
-rw----- 1 khizar khizar   20 Sep 26 15:07 .lessht
-rw-rw-r-- 1 khizar khizar    0 Sep 26 14:28 .motd_shown
-rw-r--r-- 1 khizar khizar  807 Sep 19 16:28 .profile
drwx----- 2 khizar khizar 4096 Sep 20 20:43 .ssh
-rw-r--r-- 1 khizar khizar    0 Sep 20 20:12 .sudo_as_admin_successful
drwxr-xr-x 5 khizar khizar 4096 Sep 20 20:50 .vscode-server
drwxr-xr-x 3 khizar khizar 4096 Sep 20 20:39 ubuntu
khizar@KHIZARs-LAPTOP:~$ cd /home
khizar@KHIZARs-LAPTOP:/home$ cd ~
khizar@KHIZARs-LAPTOP:~$ cd -
/home
khizar@KHIZARs-LAPTOP:/home$
```

## 2.2 BASIC NAVIGATION COMMANDS (15 MINUTES)

```
khizar@KHIZARs-LAPTOP: /
khizar@KHIZARs-LAPTOP:~$ pwd
/home/khizar
khizar@KHIZARs-LAPTOP:~$ ls
ubuntuu
khizar@KHIZARs-LAPTOP:~$ ls -l
total 4
drwxr-xr-x 3 khizar khizar 4096 Sep 20 20:39 ubuntuu
khizar@KHIZARs-LAPTOP:~$ ls -la
total 56
drwxr-x--- 8 khizar khizar 4096 Sep 26 15:07 .
drwxr-xr-x 3 root root 4096 Sep 19 16:28 ..
-rw----- 1 khizar khizar 2034 Sep 25 14:17 .bash_history
-rw-r--r-- 1 khizar khizar 220 Sep 19 16:28 .bash_logout
-rw-r--r-- 1 khizar khizar 3771 Sep 19 16:28 .bashrc
drwx----- 3 khizar khizar 4096 Sep 20 20:50 .cache
drwxr-xr-x 3 khizar khizar 4096 Sep 20 20:50 .dotnet
-rw-r--r-- 1 khizar khizar 62 Sep 20 20:33 .gitconfig
drwxr-xr-x 2 khizar khizar 4096 Sep 25 13:54 .landscape
-rw----- 1 khizar khizar 20 Sep 26 15:07 .lessshst
-rw-rw-r-- 1 khizar khizar 0 Sep 26 14:28 .motd_shown
-rw-r--r-- 1 khizar khizar 807 Sep 19 16:28 .profile
drwx----- 2 khizar khizar 4096 Sep 20 20:43 .ssh
-rw-r--r-- 1 khizar khizar 0 Sep 20 20:12 .sudo_as_admin_successful
drwxr-xr-x 5 khizar khizar 4096 Sep 20 20:50 .vscode-server
drwxr-xr-x 3 khizar khizar 4096 Sep 20 20:39 ubuntuu
khizar@KHIZARs-LAPTOP:~$ ls -lh
total 4.0K
drwxr-xr-x 3 khizar khizar 4.0K Sep 20 20:39 ubuntuu
khizar@KHIZARs-LAPTOP:~$ cd ubuntuu/
khizar@KHIZARs-LAPTOP:~/ubuntuu$ cd
khizar@KHIZARs-LAPTOP:~$ cd ubuntuu/
khizar@KHIZARs-LAPTOP:~/ubuntuu$ cd ..
khizar@KHIZARs-LAPTOP:~$ cd ubuntuu/
khizar@KHIZARs-LAPTOP:~/ubuntuu$ cd ~
khizar@KHIZARs-LAPTOP:~$ cd /
khizar@KHIZARs-LAPTOP:/$
```

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## Part 3: File and Directory Operations

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### 3.1 CREATING AND MANAGING FILES/DIRECTORIES

#### COMMANDS TO DEMONSTRATE:

```
khizar@KHIZARs-LAPTOP: /mnt/s/OS-L/mylab2/test/sub/dir
khizar@KHIZARs-LAPTOP:/mnt/s/OS-L$ mkdir mylab2
khizar@KHIZARs-LAPTOP:/mnt/s/OS-L$ cd mylab2/
khizar@KHIZARs-LAPTOP:/mnt/s/OS-L/mylab2$ mkdir -p test/sub/dir
khizar@KHIZARs-LAPTOP:/mnt/s/OS-L/mylab2$ cd test/sub/dir
khizar@KHIZARs-LAPTOP:/mnt/s/OS-L/mylab2/test/sub/dir$ touch file1.txt
khizar@KHIZARs-LAPTOP:/mnt/s/OS-L/mylab2/test/sub/dir$ touch file2.txt file3.txt
khizar@KHIZARs-LAPTOP:/mnt/s/OS-L/mylab2/test/sub/dir$ nano hello.txt
khizar@KHIZARs-LAPTOP:/mnt/s/OS-L/mylab2/test/sub/dir$ echo "Hello"> hello.txt
khizar@KHIZARs-LAPTOP:/mnt/s/OS-L/mylab2/test/sub/dir$
```

#### FILE VIEWING COMMANDS:

```
khizar@KHIZARs-LAPTOP: /mnt/s/OS-L/mylab2/test/sub/dir
khizar@KHIZARs-LAPTOP:/mnt/s/OS-L/mylab2/test/sub/dir$ cat hello.txt
Hello
khizar@KHIZARs-LAPTOP:/mnt/s/OS-L/mylab2/test/sub/dir$
```

```
khizar@KHIZARs-LAPTOP: /mnt/s/OS-L/mylab2/test/sub/dir
Hello
hello.txt (END)
```

```
khizar@KHIZARs-LAPTOP: /mnt/s/OS-L/mylab2/test/sub/dir
khizar@KHIZARs-LAPTOP:/mnt/s/OS-L/mylab2/test/sub/dir$ head hello.txt
Hello
khizar@KHIZARs-LAPTOP:/mnt/s/OS-L/mylab2/test/sub/dir$
```

```
khizar@KHIZARs-LAPTOP: /mnt/s/OS-L/mylab2/test/sub/dir
khizar@KHIZARs-LAPTOP:/mnt/s/OS-L/mylab2/test/sub/dir$ tail hello.txt
Hello
khizar@KHIZARs-LAPTOP:/mnt/s/OS-L/mylab2/test/sub/dir$ wc hello.txt
1 1 6 hello.txt
khizar@KHIZARs-LAPTOP:/mnt/s/OS-L/mylab2/test/sub/dir$
```

### 3.2 COPYING, MOVING, AND DELETING

```
khizar@KHIZARs-LAPTOP: /mnt/s/OS-L/Operating-system-1169
khizar@KHIZARs-LAPTOP:/mnt/s/OS-L/mylab2/test/sub/dir$ cp -r mylab2 mylab2_backup
cp: cannot stat 'mylab2': No such file or directory
khizar@KHIZARs-LAPTOP:/mnt/s/OS-L/mylab2/test/sub/dir$ cd ..
khizar@KHIZARs-LAPTOP:/mnt/s/OS-L/mylab2/test/sub$ cd ..
khizar@KHIZARs-LAPTOP:/mnt/s/OS-L/mylab2/test$ cd ..
khizar@KHIZARs-LAPTOP:/mnt/s/OS-L/mylab2$ cd ..
khizar@KHIZARs-LAPTOP:/mnt/s/OS-L$ cp -r mylab2 mylab2_backup
khizar@KHIZARs-LAPTOP:/mnt/s/OS-L$ touch text.txt
khizar@KHIZARs-LAPTOP:/mnt/s/OS-L$ ls
Operating-system-1169  testnap  mylab2  mylab2_backup  note.txt  text.txt  ubuntu
khizar@KHIZARs-LAPTOP:/mnt/s/OS-L$ rm text.txt
khizar@KHIZARs-LAPTOP:/mnt/s/OS-L$ ls
Operating-system-1169  testnap  mylab2  mylab2_backup  note.txt  ubuntu
khizar@KHIZARs-LAPTOP:/mnt/s/OS-L$ rm -r mylab2
khizar@KHIZARs-LAPTOP:/mnt/s/OS-L$ rm -r mylab2_backup
khizar@KHIZARs-LAPTOP:/mnt/s/OS-L$ ls
Operating-system-1169  testnap  note.txt  ubuntu
khizar@KHIZARs-LAPTOP:/mnt/s/OS-L$ cd Operating-system-1169/
khizar@KHIZARs-LAPTOP:/mnt/s/OS-L/Operating-system-1169$ LS
LS: command not found
khizar@KHIZARs-LAPTOP:/mnt/s/OS-L/Operating-system-1169$ ls
L1H-1169.pdf  task1.c  task1.out
khizar@KHIZARs-LAPTOP:/mnt/s/OS-L/Operating-system-1169$ cd
khizar@KHIZARs-LAPTOP:~$ cd /mnt
khizar@KHIZARs-LAPTOP:/mnt$ cd s
khizar@KHIZARs-LAPTOP:/mnt/s$ cd OS-L
khizar@KHIZARs-LAPTOP:/mnt/s/OS-L$ CD Operating-system-1169/
CD: command not found
khizar@KHIZARs-LAPTOP:/mnt/s/OS-L$ cd Operating-system-1169/
khizar@KHIZARs-LAPTOP:/mnt/s/OS-L/Operating-system-1169$ ls
L1H-1169.pdf  task1.c  task1.out
khizar@KHIZARs-LAPTOP:/mnt/s/OS-L/Operating-system-1169$ mkdir test
khizar@KHIZARs-LAPTOP:/mnt/s/OS-L/Operating-system-1169$ ls
L1H-1169.pdf  task1.c  task1.out  test
khizar@KHIZARs-LAPTOP:/mnt/s/OS-L/Operating-system-1169$ rmdir test/
khizar@KHIZARs-LAPTOP:/mnt/s/OS-L/Operating-system-1169$ ls
L1H-1169.pdf  task1.c  task1.out
khizar@KHIZARs-LAPTOP:/mnt/s/OS-L/Operating-system-1169$
```

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## Part 4: File Permissions and Ownership

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### 4.1 UNDERSTANDING FILE PERMISSIONS

```
khizar@KHIZARs-LAPTOP: ~  
khizar@KHIZARs-LAPTOP:~$ ls -l  
total 4  
-rw-r--r-- 1 khizar admin    0 Sep 26 16:31 note.txt  
drwxr-xr-x 3 khizar khizar 4096 Sep 20 20:39 ubuntu  
khizar@KHIZARs-LAPTOP:~$ sudo chmod 755 note.txt  
khizar@KHIZARs-LAPTOP:~$ ls -l  
total 4  
-rwxr-xr-x 1 khizar admin    0 Sep 26 16:31 note.txt  
drwxr-xr-x 3 khizar khizar 4096 Sep 20 20:39 ubuntu  
khizar@KHIZARs-LAPTOP:~$ sudo chmod u+x note.txt  
khizar@KHIZARs-LAPTOP:~$ ls -l  
total 4  
-rwxr-xr-x 1 khizar admin    0 Sep 26 16:31 note.txt  
drwxr-xr-x 3 khizar khizar 4096 Sep 20 20:39 ubuntu  
khizar@KHIZARs-LAPTOP:~$ sudo chmod g-w note.txt  
khizar@KHIZARs-LAPTOP:~$ ls -l  
total 4  
-rwxr-xr-x 1 khizar admin    0 Sep 26 16:31 note.txt  
drwxr-xr-x 3 khizar khizar 4096 Sep 20 20:39 ubuntu  
khizar@KHIZARs-LAPTOP:~$ sudo chown admin:khizar note.txt  
chown: invalid user: 'admin:khizar'  
khizar@KHIZARs-LAPTOP:~$ sudo chown khizar:khizar note.txt  
khizar@KHIZARs-LAPTOP:~$ ls -l  
total 4  
-rwxr-xr-x 1 khizar khizar    0 Sep 26 16:31 note.txt  
drwxr-xr-x 3 khizar khizar 4096 Sep 20 20:39 ubuntu  
khizar@KHIZARs-LAPTOP:~$
```