



Linux Essentials





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- ▶ Major Open Source Applications
- ▶ Open-Source Software and Licensing
- ▶ What is Shell
- ▶ Basic Shell Commands

Draw or type 2 things you already know about Linux:



Students, draw anywhere on this slide!



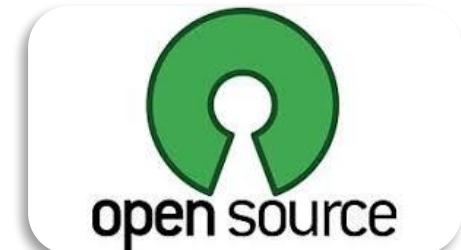
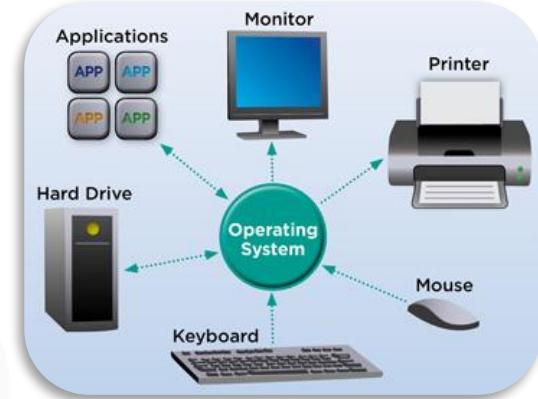
Linux Evolution





What is Linux?

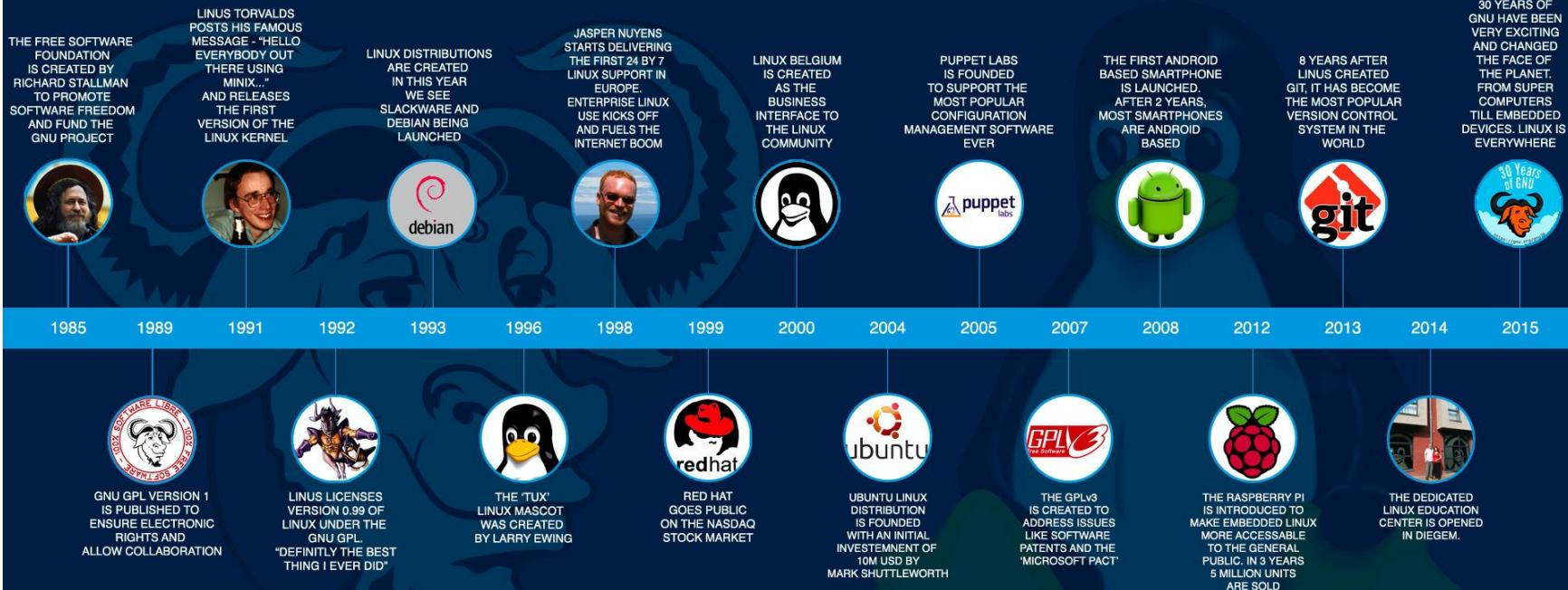
- Linux is a Free and Open-Source operating system





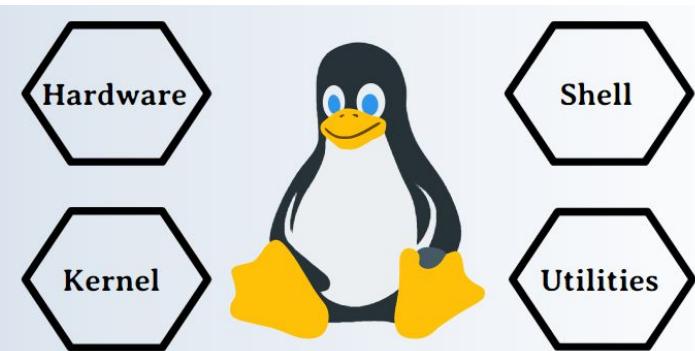
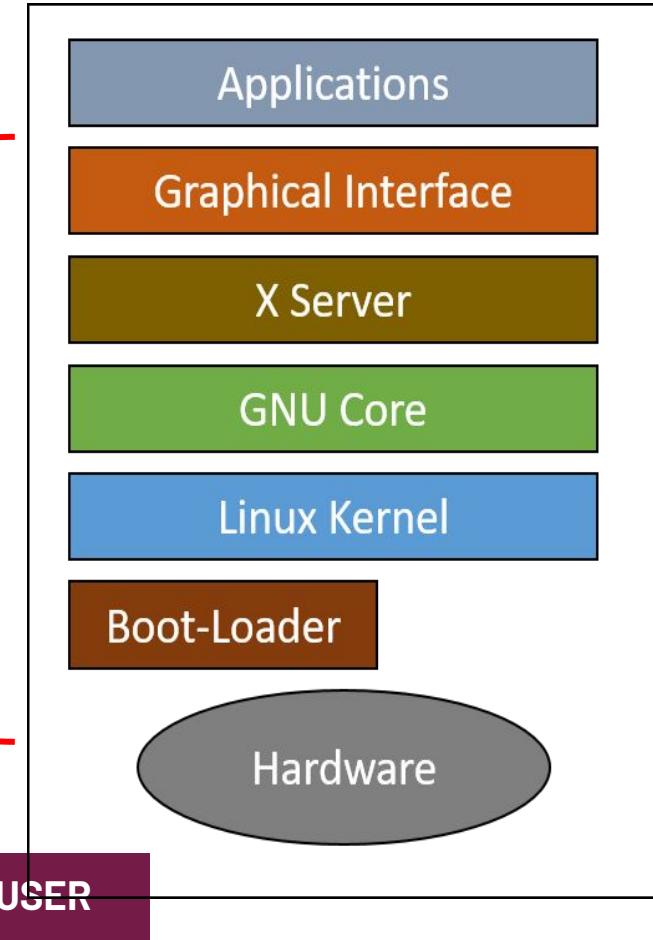
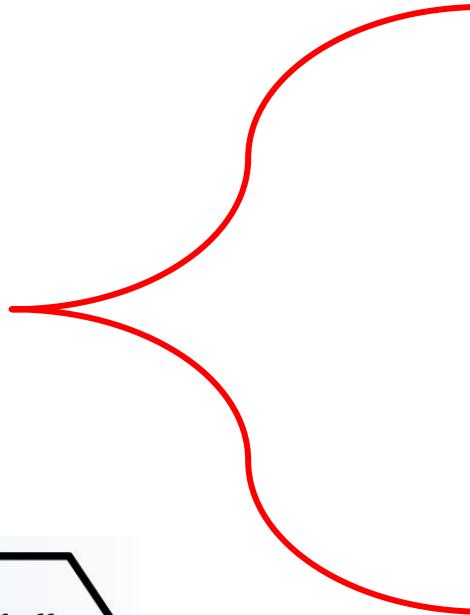
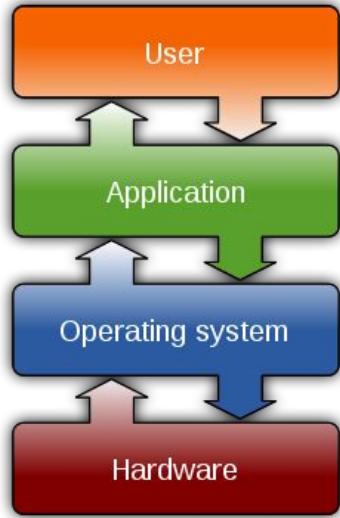
MEMORABLE LINUX EVENTS

CELEBRATING 30 YEARS OF GNU LINUX



Linux is a registered trademark of Linus Torvalds. Linux Belgium is a registered trademark of Linux Belgium b.v.b.a. Red Hat is a registered trademark of Red Hat Inc. Android is a trademark of Google Inc.

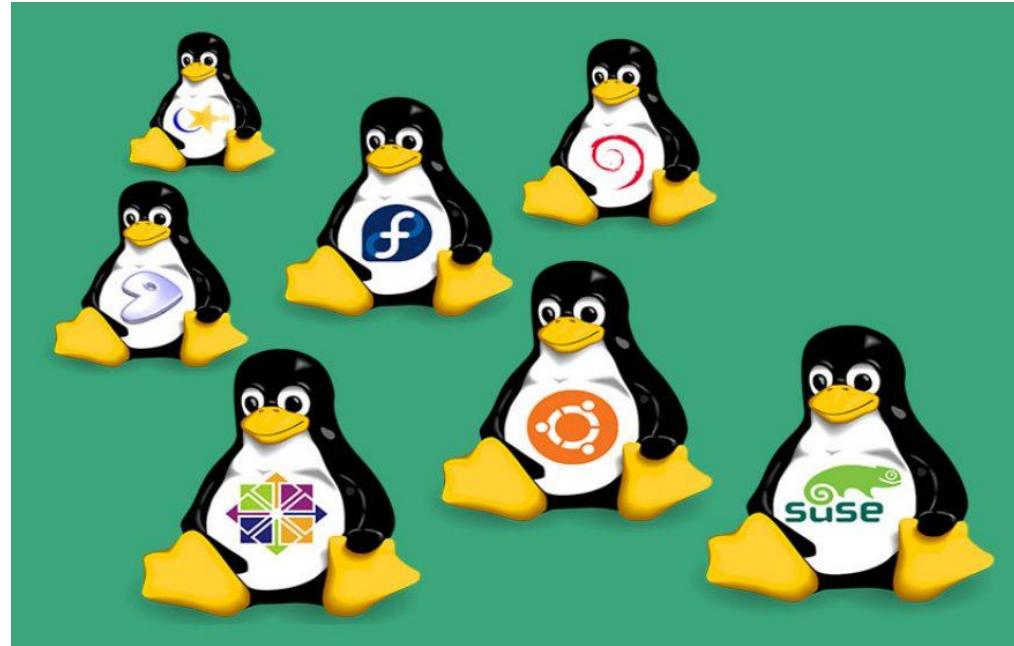
Components of Linux

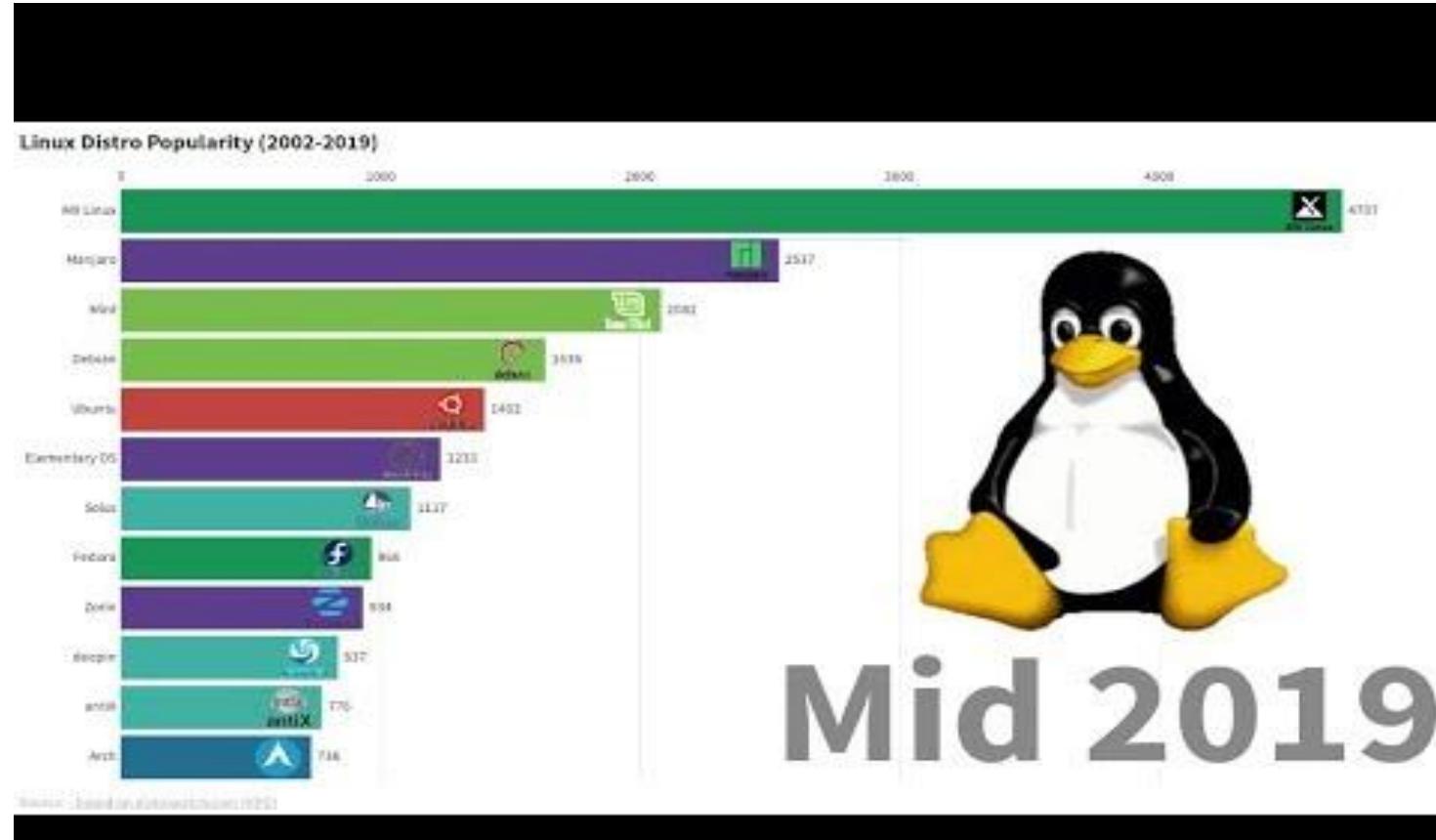


Popular Linux Distributions



- [Debian](#)
- [Ubuntu](#)
- [Mint](#)
- [Manjaro](#)
- [openSUSE](#)
- [RedHat](#)
- [Fedora](#)



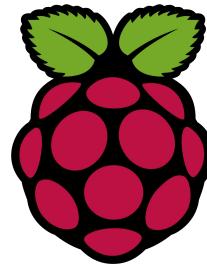


Linux Embedded Systems



Embedded System

An embedded system is a computer system that is dedicated to one or two specific functions.

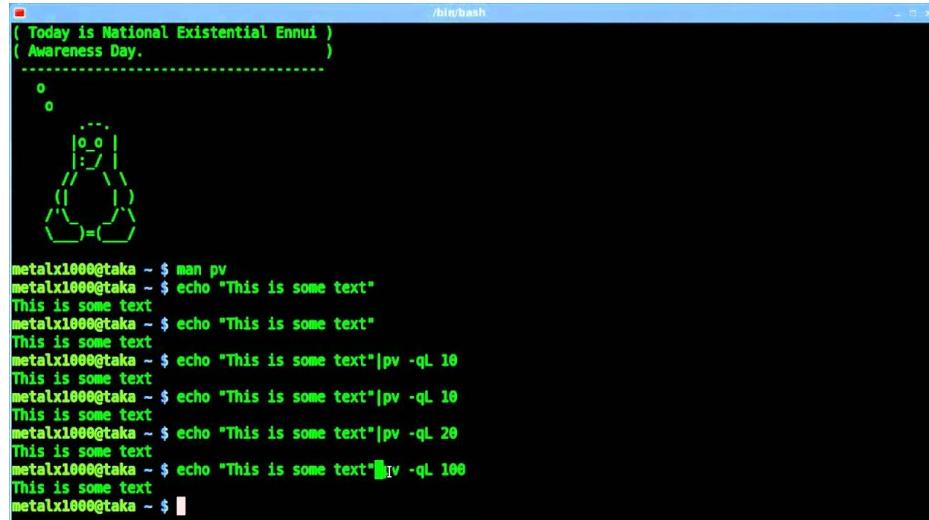


Development Languages



Shell

Shell is a command language interpreter that executes commands read from the standard input device such as a keyboard or from a file.n as a "Bash shell script" (or "script").



The terminal window shows a session on a machine named 'taka'. It starts with a greeting message: '(Today is National Existential Ennui)' followed by '(Awareness Day.)'. Below this, there is a decorative ASCII art of a face with a neutral expression. The session continues with several commands being run:

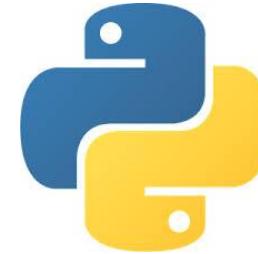
```
( Today is National Existential Ennui )
( Awareness Day.

-----
o
o
  .:.
  |:|
  // \_
(( )) 
('')=()

metalx1000@taka ~ $ man pv
metalx1000@taka ~ $ echo "This is some text"
This is some text
metalx1000@taka ~ $ echo "This is some text"
This is some text
metalx1000@taka ~ $ echo "This is some text" |pv -qL 10
This is some text
metalx1000@taka ~ $ echo "This is some text" |pv -qL 10
This is some text
metalx1000@taka ~ $ echo "This is some text" |pv -qL 20
This is some text
metalx1000@taka ~ $ echo "This is some text" |pv -qL 100
This is some text
metalx1000@taka ~ $
```

Development Languages

- C
- Java
- JavaScript
- Perl
- Python
- PHP



What is open-source



Open-source software is software with source code that anyone can inspect, modify, and enhance.



Major Open Source Applications



Desktop Applications

1. LibreOffice
2. VLC Media Player
3. GIMP
4. Shotcut
5. Brave
6. Audacity
7. KeePass
8. Thunderbird
9. FileZilla
10. Linux



 LibreOffice





Server Applications

- Apache Web Server
- NGINX
- MySQL
- Samba
- ownCloud



Package Management Tools



- Contemporary distributions of Linux-based operating systems install software in pre-compiled packages, which are archives that contain binaries of software, configuration files, and information about dependencies.

- Dpkg
- apt-get
- rpm: Red Hat Package Manager
- yum: yellowdog updater modified





Open-Source Software and Licensing



FSF and OSI



Free Software Foundation (FSF)

- The Free Software Foundation (FSF) is a nonprofit with a worldwide mission to promote computer user freedom.
- The FSF is working to secure freedom for computer users by promoting the development and use of free software and documentation.



► FSF and OSI



Open Source Initiative (OSI)

- The Open Source Initiative (OSI) is a non-profit organization dedicated to the promotion of open-source software.
- OSI was founded in 1998 by Bruce Perens and Eric Raymond..



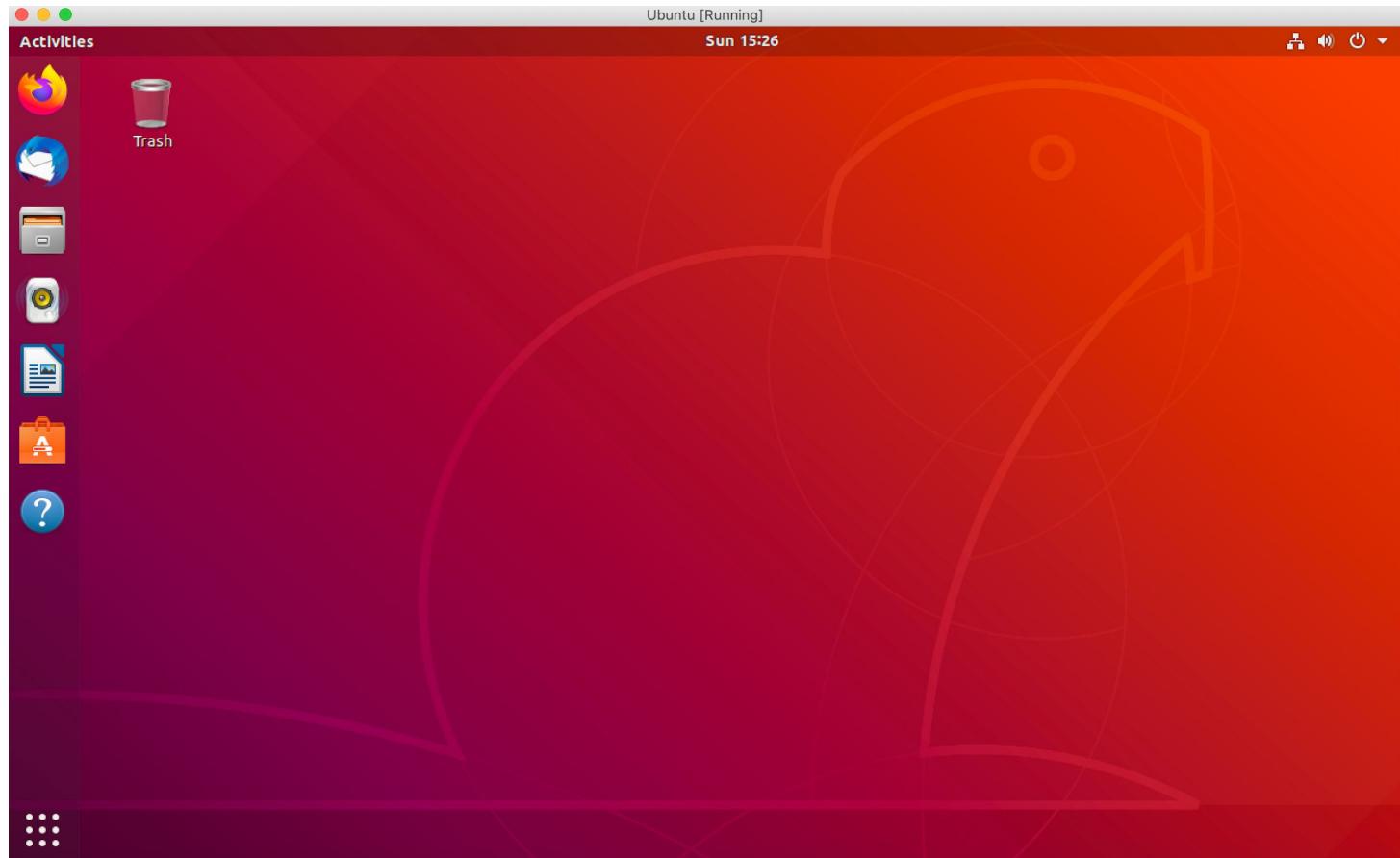
<https://www.debian.org/intro/free>



Linux GUI

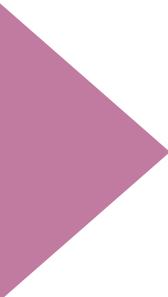


GUI





Linux SHELL

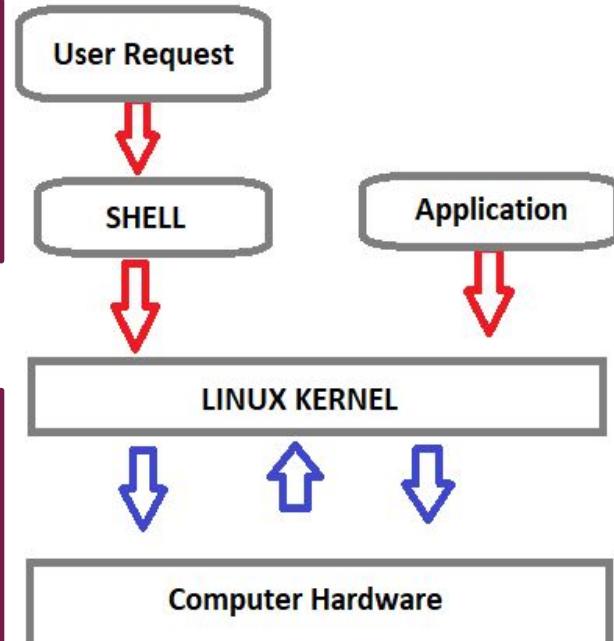




What is SHELL?

Shell is a program that receives the user's commands and gives them to the operating system to process and displays the output.

Bash (**Bourne Again SHell**) is an enhanced version of Steve Bourne's first Unix shell application, and serves as the shell program on most Linux systems.





What is SHELL?

The standard Linux shell is both a command-line interpreter and a programming language.

>_

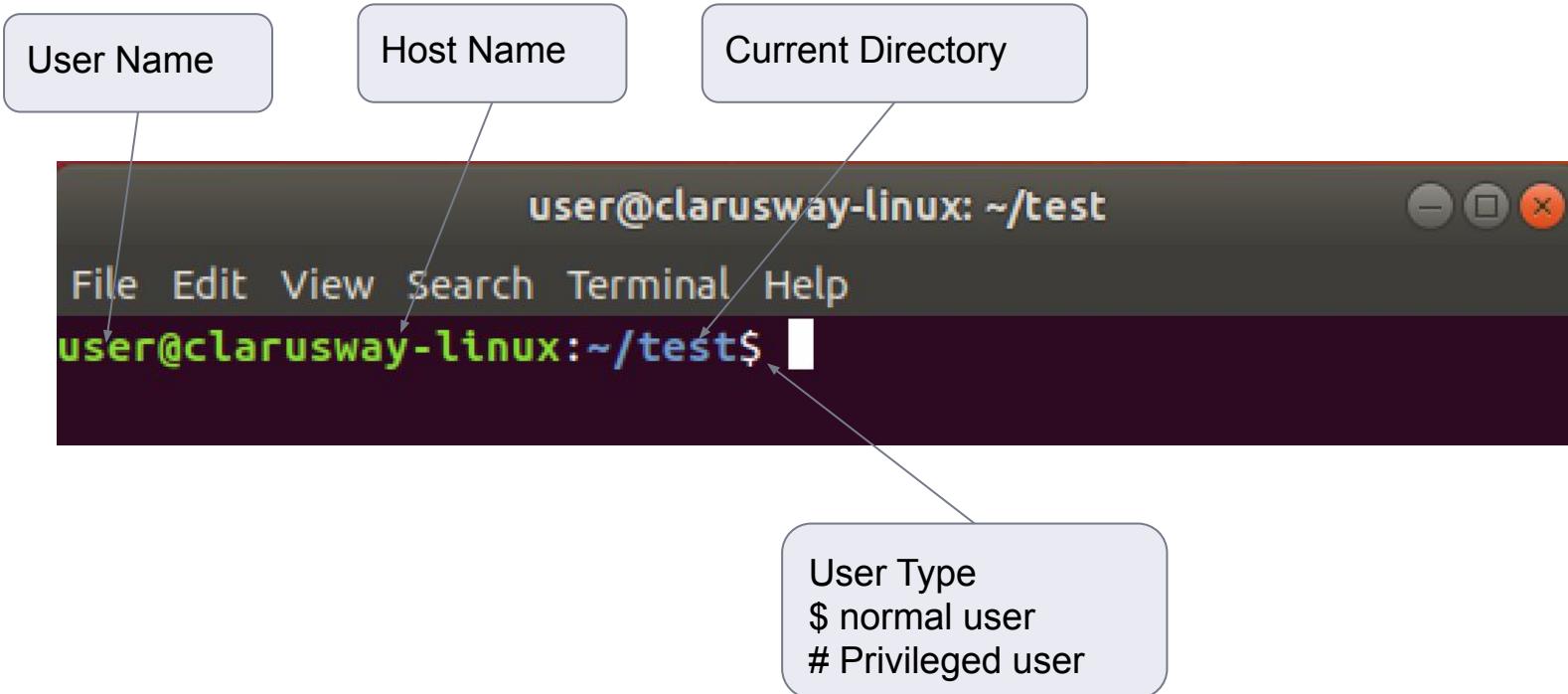
The command prompt for Linux generally shows the current **user**, the current **host**, and the appropriate **directory**.

```
File Edit View Search Terminal Help  
clarusway@linux-desktop:~$ |
```

At the end of the prompt list, the \$(dollar sign) signifies the current user being unprivileged, and the device is ready to receive feedback.

The input is sent for parsing and execution to the interpreter.

Command Prompt





Which one is not a user interface of Linux



USWAY[©]
MENT YOURSELF

Students choose an option

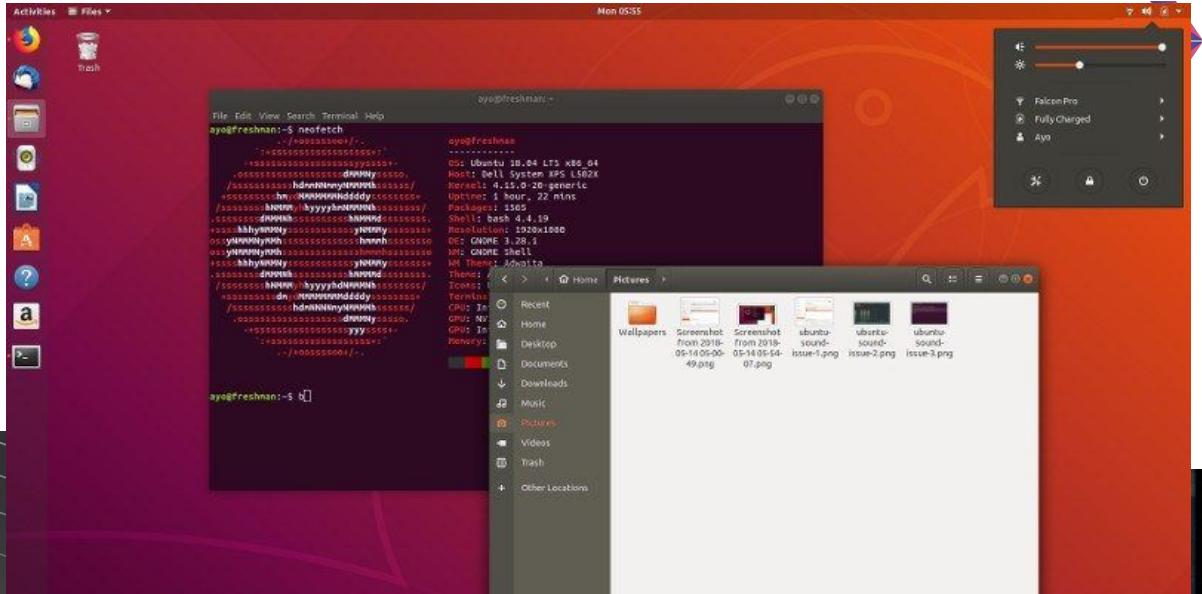
Pear Deck Interactive Slide
Do not remove this bar



Using Linux on Different Platforms



Linux Alternatives



Linux Alternatives



LMS: Try it

The screenshot shows a web browser window displaying a learning management system (LMS) interface. The URL in the address bar is lms.clarusway.com/mod/lti/view.php?id=1315. The page title is "CLARUSWAY Way to Reinvent Yourself". The left sidebar contains a navigation menu with the following items:

- Linux
- Participants
- Badges
- Competencies
- Grades
- General
- Course Overview
- Introduction of Linux
- Major Open-Source Applications
- Open-Source Software and Licensing
- How to install and run Linux? (Optional)
- Command Line Basics** (highlighted in blue)
- Using the Command Line to Get Help

The main content area has a breadcrumb navigation path: Dashboard / Courses / Miscellaneous / Linux / Command Line Basics / Try it. The main title is "Try it". Below the title, there is a "Loading..." message followed by a terminal-like interface. The terminal output includes:

```
Welcome to JS/Linux (x86)
Use 'vflogin username' to connect to your account.
You can create a new account at https://vfsync.org/signup .
Use 'export file filename' to export a file to your computer.
Imported files are written to the home directory.

[root@localhost ~]#
```

At the bottom of the page, there are links for "Complementary Interactive Lesson about" and "Check Yourself ►".

Linux Alternatives



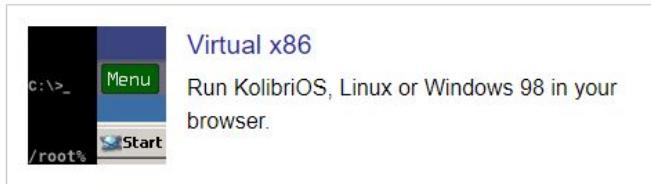
Copy.sh

<https://copy.sh/>



You can email me at copy@copy.sh. Use my GnuPG key.

Projects

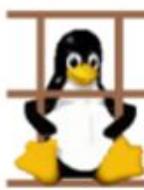


<https://cocalc.com/doc/terminal.html>





linuxzoo.net



Welcome to linuxzoo

Learn Linux from the safety of your chair using a remote private linux machine with root access.

- Welcome to linuxzoo
- [Our environment](#)
- [Essential Linux](#)
- [System Administration](#)

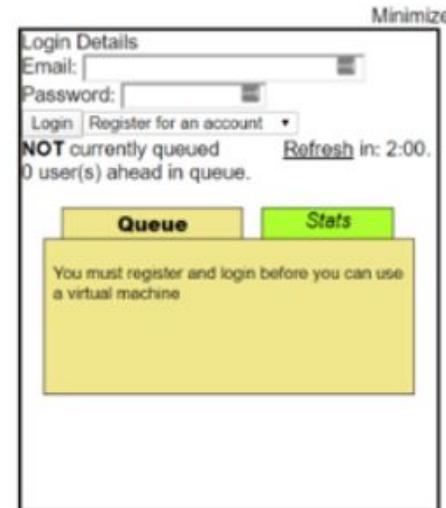
Status: Normal. Everything should be stable.

Look at the [Our Environment](#) link, and then [Running Your Machine](#) for getting started.

Quick start hints: register/login, Join Queue, Switch On (in Control tab), Wait for successful boot, click the Connect tab, and then click "telnet: linuxzoo.net" (or type `telnet linuxzoo.net` at your command prompt). Username `root`, password `secure`.

Image	Username	Password
Linux Centos 7	root	secure
	alice	secure
Caine Forensics 10.0	caine	caine

FAQ for VNC: There are a few options to getting a remote graphical desktop. In "connect" you can click on Java VNC, which requires java 7 installed on your machine. JavaScript VNC is more flexible, but it may be slower (it is experimental). Some systems do not like you logging in graphically as root.



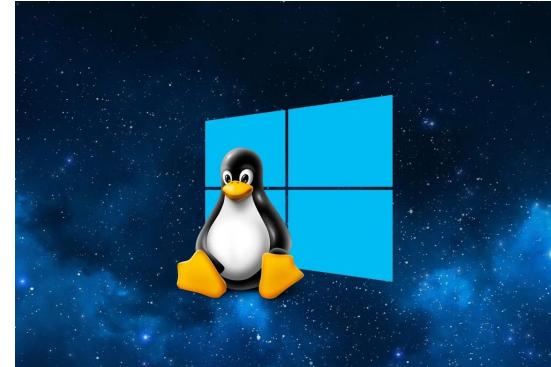
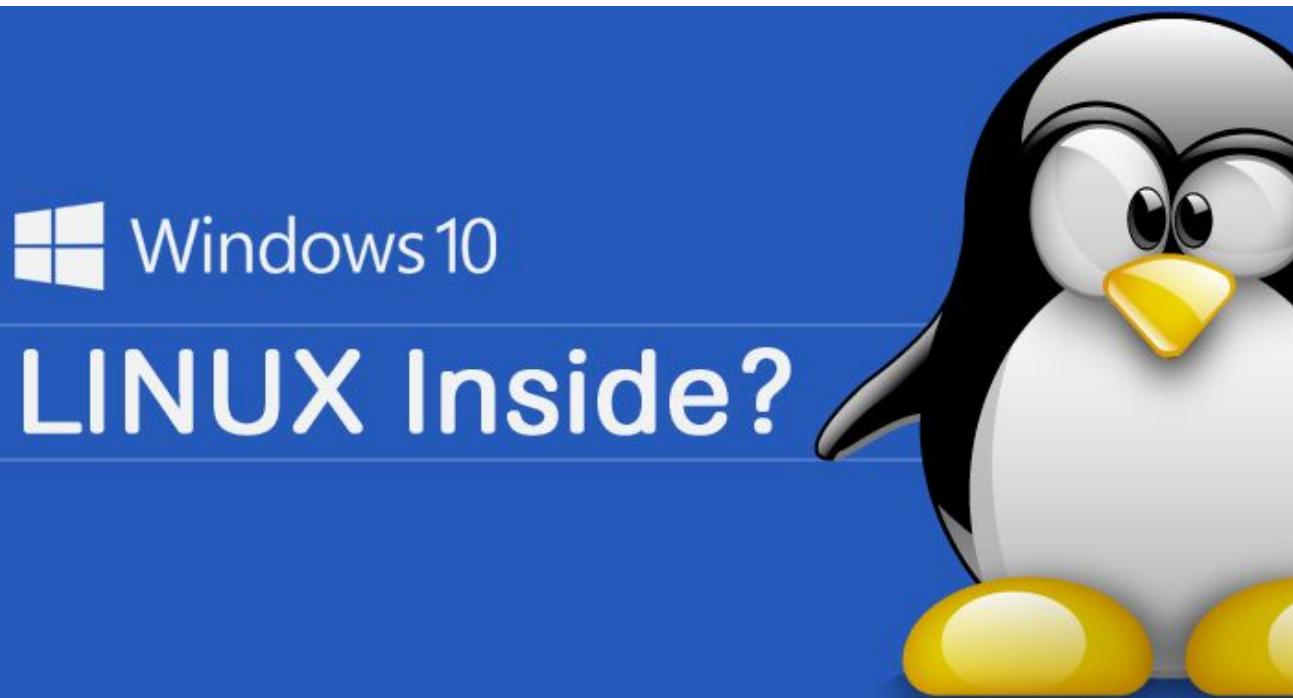
Login Details
Email:
Password:
Login Register for an account NOT currently queued Refresh in: 2:00.
0 user(s) ahead in queue.

Queue **Stats**

You must register and login before you can use a virtual machine



WSL





Linux Distros on Virtual Machines

MacOS/Windows

<https://www.virtualbox.org/wiki/Downloads>



Windows



<https://www.vmware.com/products/workstation-player/workstation-player-evaluation.html>

Linux Alternatives

GIT

<https://git-scm.com/downloads>

The screenshot shows the official Git website at <https://git-scm.com/downloads>. The page features a large "Downloads" section with three main links: "Mac OS X", "Windows", and "Linux/Unix". Below these, a note states: "Older releases are available and the Git source repository is on GitHub." To the right, a computer monitor displays a teal-colored window titled "Latest source Release 2.27.0" with a "Download 2.27.0 for Windows" button. The left sidebar includes links for "About", "Documentation", "Downloads" (which is highlighted in red), and "Community". A callout box at the bottom left promotes the "Pro Git book" by Scott Chacon and Ben Straub.

About

Documentation

Downloads

GUI Clients
Logos

Community

The entire **Pro Git book** written by Scott Chacon and Ben Straub is available to [read online for free](#). Dead tree versions are available on [Amazon.com](#).

Downloads

Mac OS X Windows
 Linux/Unix

Older releases are available and the [Git source repository](#) is on GitHub.

GUI Clients

Git comes with built-in GUI tools (**git-gui**, **gitk**), but there are several third-party tools for

Logos

Various Git logos in PNG (bitmap) and EPS (vector) formats are available for use in

Latest source Release
2.27.0
Release Notes (2020-06-01)
Download 2.27.0 for Windows



Linux Distros on Virtual Machines



<https://ubuntu.com/download/desktop>



<https://www.debian.org/distrib/netinst>



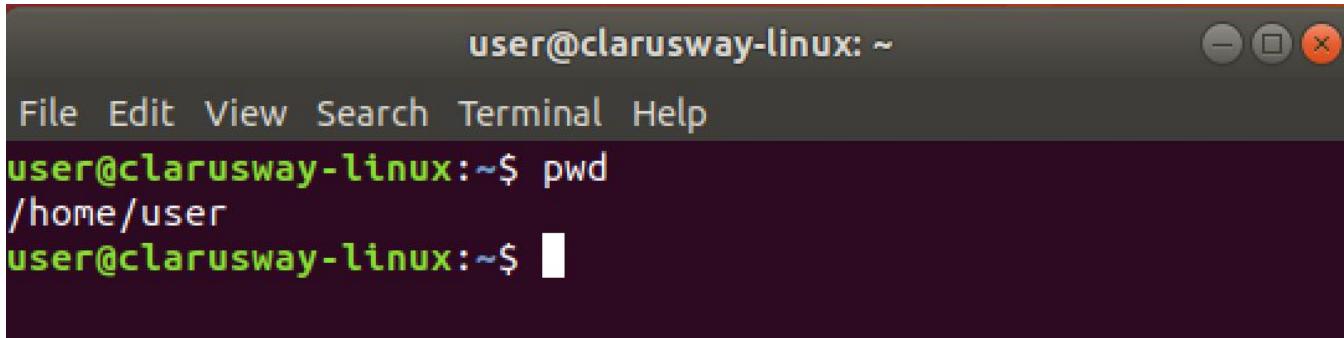


Basic SHELL Commands



Basic Shell Commands

pwd show current path



A screenshot of a Linux terminal window titled "user@clarusway-linux: ~". The window has standard window controls (minimize, maximize, close) in the top right corner. The terminal menu bar includes "File", "Edit", "View", "Search", "Terminal", and "Help". The command line shows the user's prompt "user@clarusway-linux:~\$" followed by the output of the "pwd" command, which is "/home/user". The terminal window has a dark background with light-colored text.

```
user@clarusway-linux: ~
File Edit View Search Terminal Help
user@clarusway-linux:~$ pwd
/home/user
user@clarusway-linux:~$
```

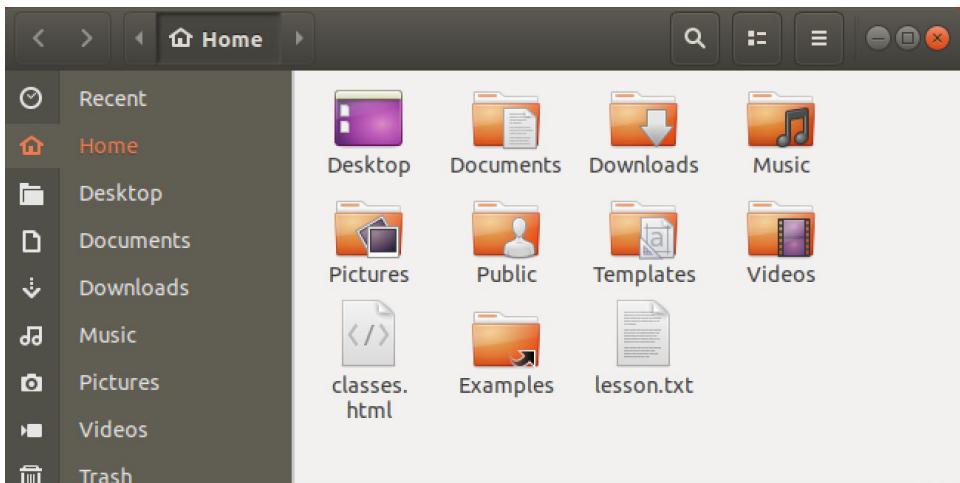
Basic Shell Commands



ls lists directory contents

ls -l lists directory contents with details

ls -al lists hidden files also



```
user@clarusway-linux: ~
File Edit View Search Terminal Help
user@clarusway-linux:~$ ls
classes.html  Downloads      Music    Templates
Desktop      examples.desktop Pictures  Videos
Documents    lesson.txt     Public
user@clarusway-linux:~$
```

```
user@clarusway-linux: ~
File Edit View Search Terminal Help
user@clarusway-linux:~$ ls -l
total 48
-rw-r--r-- 1 user user   16 Mar  2 21:56 classes.html
drwxr-xr-x 2 user user 4096 Mar  2 21:54 Desktop
drwxr-xr-x 2 user user 4096 Mar  2 21:54 Documents
drwxr-xr-x 2 user user 4096 Mar  2 21:54 Downloads
-rw-r--r-- 1 user user 8980 Mar  2 21:53 examples.desktop
-rw-r--r-- 1 user user     0 Mar  2 21:55 lesson.txt
drwxr-xr-x 2 user user 4096 Mar  2 21:54 Music
drwxr-xr-x 2 user user 4096 Mar  2 21:54 Pictures
drwxr-xr-x 2 user user 4096 Mar  2 21:54 Public
drwxr-xr-x 2 user user 4096 Mar  2 21:54 Templates
drwxr-xr-x 2 user user 4096 Mar  2 21:54 Videos
user@clarusway-linux:~$
```

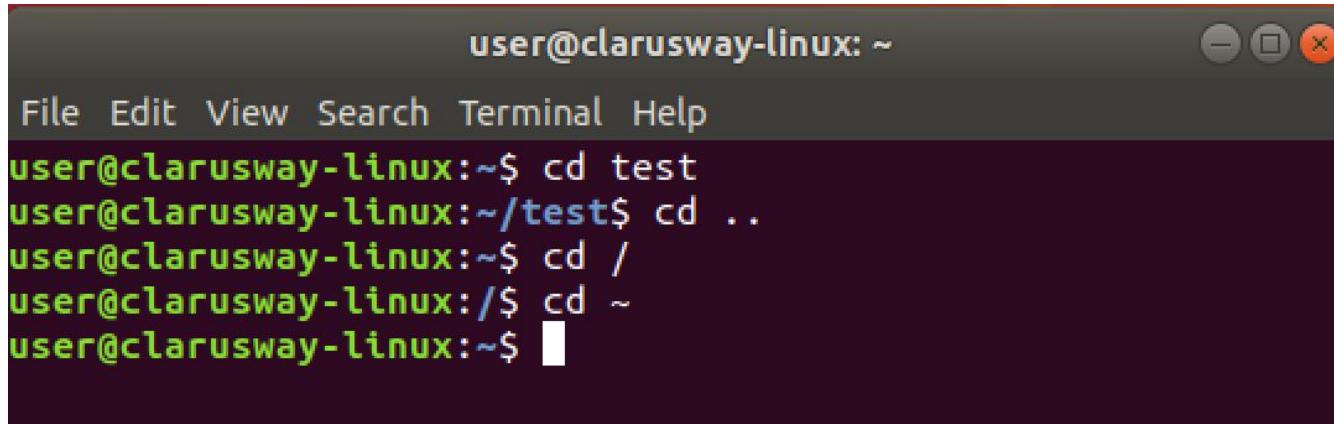
Basic Shell Commands

cd [dir] change current directory

cd .. change current directory to one level up

cd / change current directory to the root directory

cd ~ change current directory to the home directory

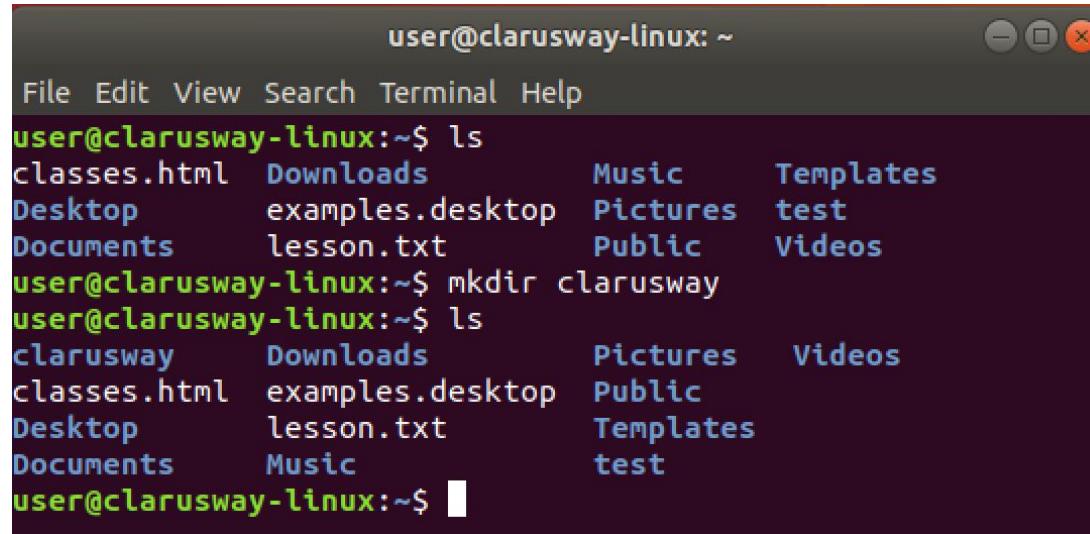


The screenshot shows a terminal window with a dark background and light-colored text. The title bar reads "user@clarusway-linux: ~". The menu bar includes "File", "Edit", "View", "Search", "Terminal", and "Help". The terminal session starts with the user's prompt "user@clarusway-linux:~\$". The user enters several commands:

```
user@clarusway-linux:~$ cd test
user@clarusway-linux:~/test$ cd ..
user@clarusway-linux:~$ cd /
user@clarusway-linux:/$ cd ~
user@clarusway-linux:~$ █
```

Basic Shell Commands

mkdir [dir] create a new directory



The screenshot shows a terminal window with a dark background and light-colored text. At the top, it says "user@clarusway-linux: ~". Below that is a menu bar with "File", "Edit", "View", "Search", "Terminal", and "Help". The main area of the terminal shows the following session:

```
user@clarusway-linux:~$ ls
classes.html  Downloads      Music      Templates
Desktop       examples.desktop Pictures   test
Documents     lesson.txt    Public     Videos
user@clarusway-linux:~$ mkdir clarusway
user@clarusway-linux:~$ ls
clarusway     Downloads      Pictures   Videos
classes.html  examples.desktop Public    Templates
Desktop       lesson.txt    test
Documents     Music
user@clarusway-linux:~$ █
```

Basic Shell Commands



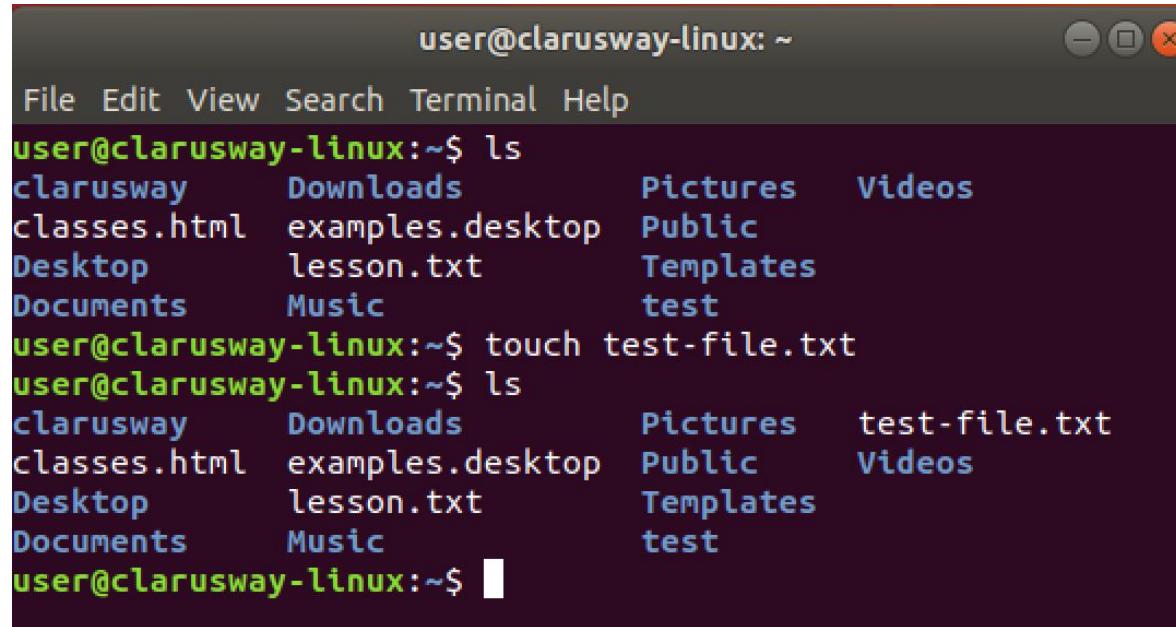
rmdir [dir] delete an empty directory

```
user@clarusway-linux: ~
File Edit View Search Terminal Help
user@clarusway-linux:~$ ls
clarusway    Downloads      Pictures   Videos
classes.html examples.desktop Public
Desktop      lesson.txt     Templates
Documents    Music         test
user@clarusway-linux:~$ rmdir test
user@clarusway-linux:~$ ls
clarusway    Documents     lesson.txt  Public
classes.html Downloads     Music       Templates
Desktop      examples.desktop Pictures   Videos
user@clarusway-linux:~$
```

```
user@clarusway-linux: ~
File Edit View Search Terminal Help
user@clarusway-linux:~$ cd test
user@clarusway-linux:~/test$ ls
t.txt
user@clarusway-linux:~/test$ cd ..
user@clarusway-linux:~$ rmdir test
rmdir: failed to remove 'test': Directory not empty
user@clarusway-linux:~$ ls
clarusway    Downloads      Pictures   Videos
classes.html examples.desktop Public
Desktop      lesson.txt     Templates
Documents    Music         test
user@clarusway-linux:~$
```

Basic Shell Commands

touch create a file

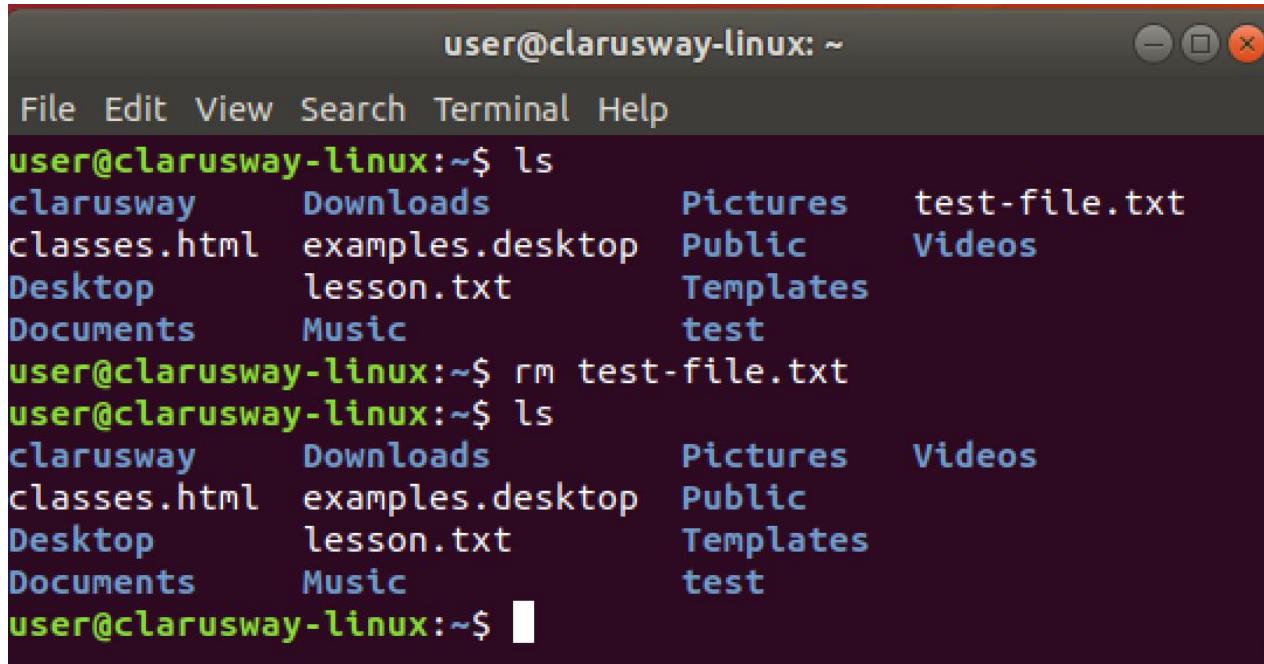


A screenshot of a terminal window titled "user@clarusway-linux: ~". The window has a dark background and light-colored text. It shows the user's home directory (~) and lists several files and directories: clarusway, Downloads, Pictures, Videos, classes.html, examples.desktop, Public, Desktop, lesson.txt, Templates, Documents, Music, test. The user then runs the command "touch test-file.txt", which creates a new file named "test-file.txt". After the command is run, the "ls" command is run again to show the updated list of files, now including "test-file.txt".

```
user@clarusway-linux:~$ ls
clarusway      Downloads      Pictures      Videos
classes.html   examples.desktop  Public
Desktop        lesson.txt     Templates
Documents      Music          test
user@clarusway-linux:~$ touch test-file.txt
user@clarusway-linux:~$ ls
clarusway      Downloads      Pictures      test-file.txt
classes.html   examples.desktop  Public      Videos
Desktop        lesson.txt     Templates
Documents      Music          test
user@clarusway-linux:~$
```

Basic Shell Commands

rm delete a file

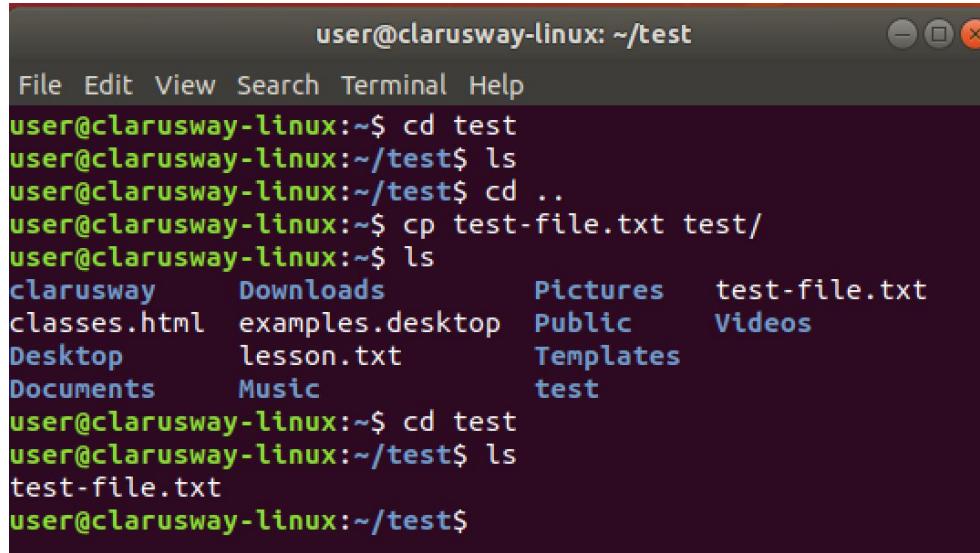


The screenshot shows a terminal window with a dark background and light-colored text. The title bar says "user@clarusway-linux: ~". The menu bar includes "File", "Edit", "View", "Search", "Terminal", and "Help". The terminal prompt is "user@clarusway-linux:~\$". The user runs the command "ls" to list files, which shows "Downloads", "Pictures", "test-file.txt", "examples.desktop", "Public", "Videos", "lesson.txt", "Templates", "Documents", "Music", and "test". Then, the user runs "rm test-file.txt" to delete the file. Finally, the user runs "ls" again, and the deleted file "test-file.txt" is no longer listed.

```
user@clarusway-linux: ~
File Edit View Search Terminal Help
user@clarusway-linux:~$ ls
clarusway      Downloads      Pictures      test-file.txt
classes.html   examples.desktop  Public       Videos
Desktop        lesson.txt     Templates
Documents      Music         test
user@clarusway-linux:~$ rm test-file.txt
user@clarusway-linux:~$ ls
clarusway      Downloads      Pictures      Videos
classes.html   examples.desktop  Public
Desktop        lesson.txt     Templates
Documents      Music         test
user@clarusway-linux:~$
```

Basic Shell Commands

cp copy a file to another location

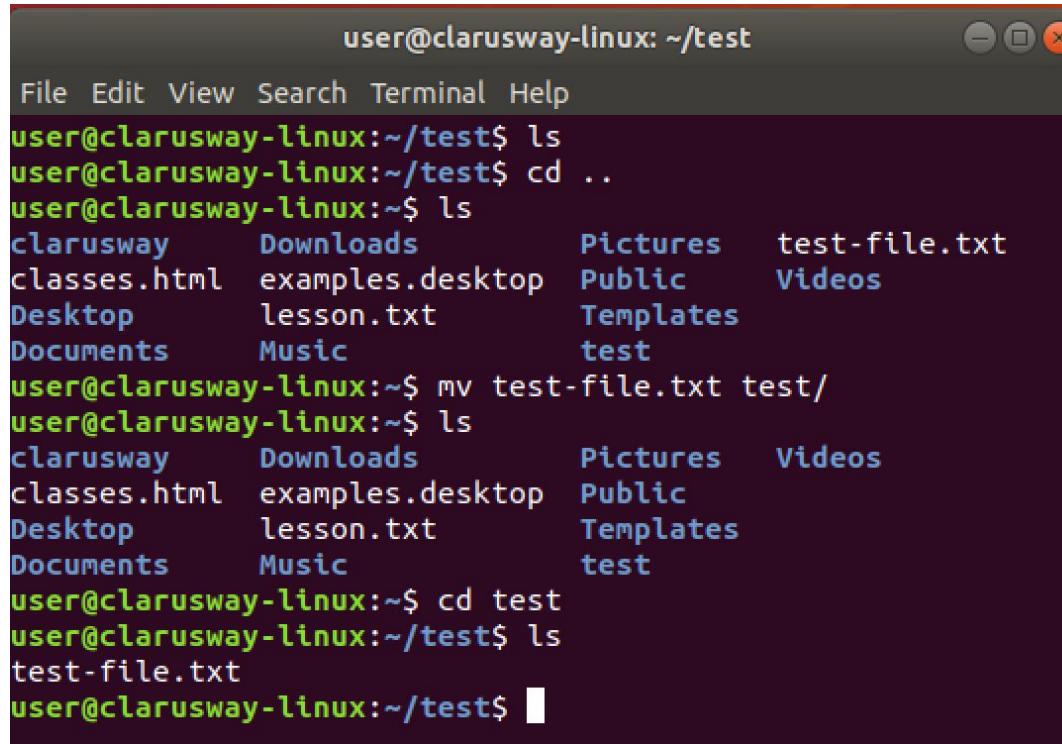


A screenshot of a terminal window titled "user@clarusway-linux: ~/test". The window has a dark theme with light-colored text. The user's session is as follows:

```
user@clarusway-linux:~$ cd test
user@clarusway-linux:~/test$ ls
user@clarusway-linux:~/test$ cd ..
user@clarusway-linux:~$ cp test-file.txt test/
user@clarusway-linux:~$ ls
clarusway    Downloads      Pictures   test-file.txt
classes.html examples.desktop Public     Videos
Desktop       lesson.txt    Templates
Documents     Music        test
user@clarusway-linux:~$ cd test
user@clarusway-linux:~/test$ ls
test-file.txt
user@clarusway-linux:~/test$
```

Basic Shell Commands

mv move a file to another location

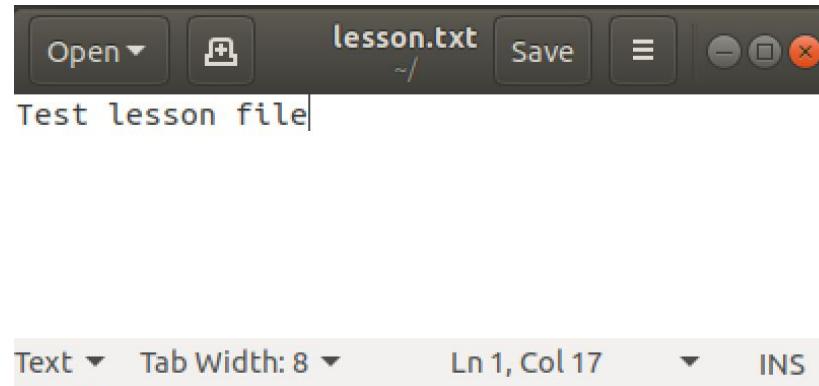


The screenshot shows a terminal window titled "user@clarusway-linux: ~/test". The terminal has a dark background with light-colored text. It displays the following command-line session:

```
user@clarusway-linux:~/test$ ls
user@clarusway-linux:~/test$ cd ..
user@clarusway-linux:~/test$ ls
clarusway    Downloads      Pictures   test-file.txt
classes.html examples.desktop Public     Videos
Desktop      lesson.txt    Templates
Documents    Music         test
user@clarusway-linux:~$ mv test-file.txt test/
user@clarusway-linux:~$ ls
clarusway    Downloads      Pictures   Videos
classes.html examples.desktop Public
Desktop      lesson.txt    Templates
Documents    Music         test
user@clarusway-linux:~$ cd test
user@clarusway-linux:~/test$ ls
test-file.txt
user@clarusway-linux:~/test$
```

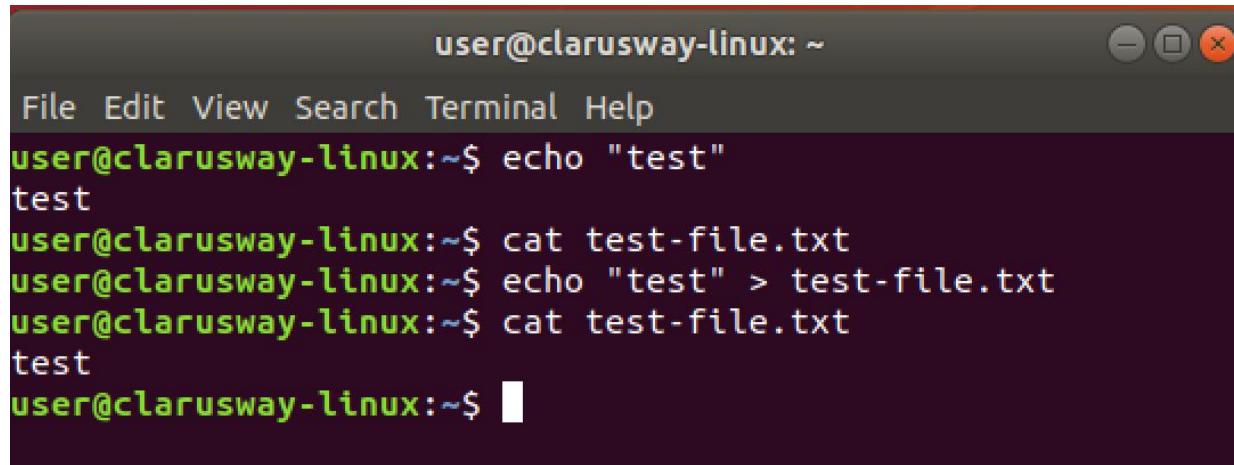
Basic Shell Commands

`cat` show file contents

A screenshot of a terminal window with a dark background and light-colored text. The title bar says 'user@clarusway-linux: ~'. The menu bar includes 'File', 'Edit', 'View', 'Search', 'Terminal', and 'Help'. The command 'cat lesson.txt' is entered at the prompt, and its output 'Test lesson file' is displayed below it. The prompt 'user@clarusway-linux:~\$' appears again at the bottom.

Basic Shell Commands

echo print message to screen
echo > [file] print message into a file

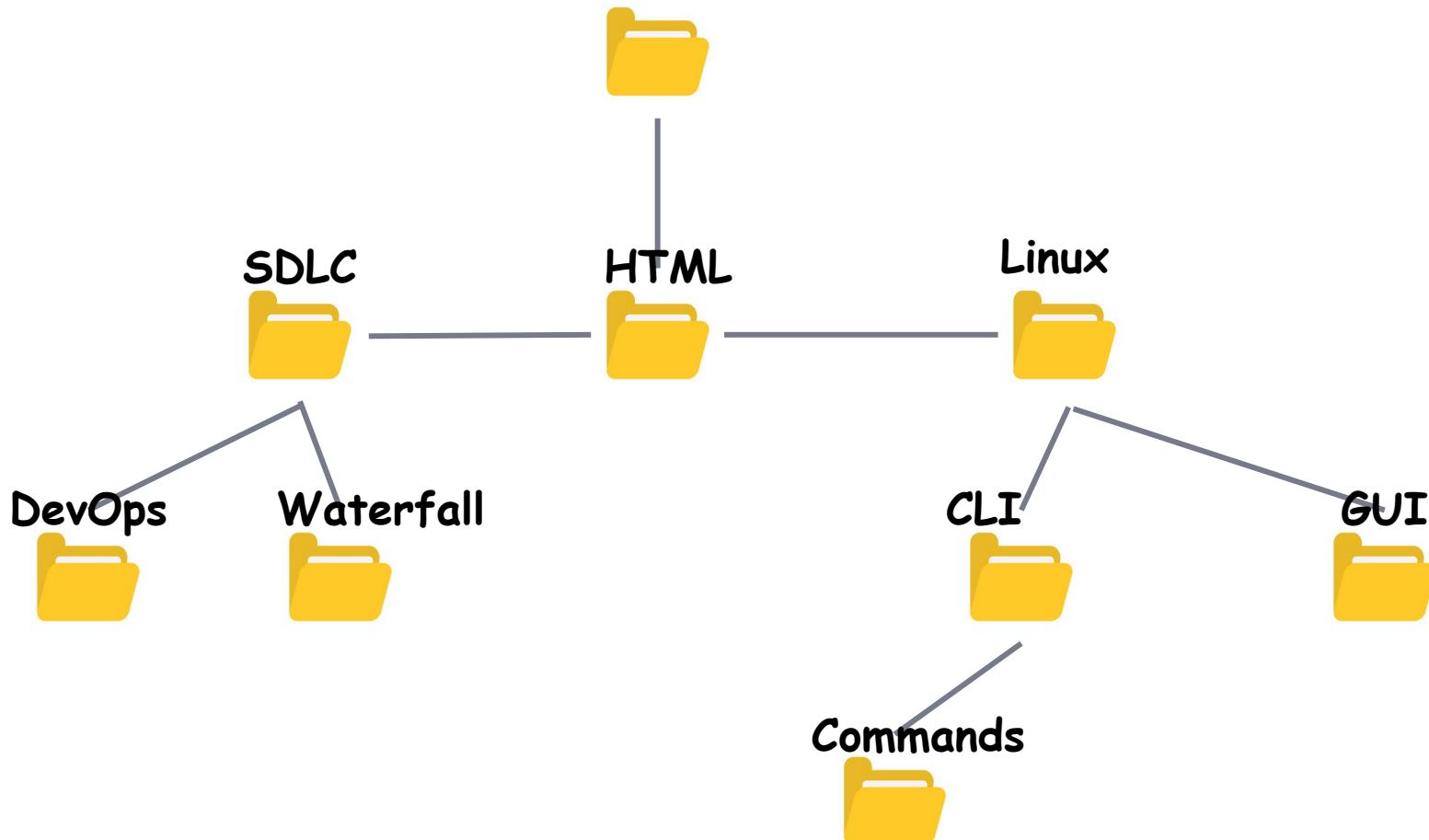


A screenshot of a Linux terminal window titled "user@clarusway-linux: ~". The window has a dark theme with red window controls. The terminal menu bar includes "File", "Edit", "View", "Search", "Terminal", and "Help". The terminal session shows the following commands and output:

```
user@clarusway-linux:~$ echo "test"
test
user@clarusway-linux:~$ cat test-file.txt
user@clarusway-linux:~$ echo "test" > test-file.txt
user@clarusway-linux:~$ cat test-file.txt
test
user@clarusway-linux:~$ █
```



Lessons



Basic Shell Commands

clarusway

lessons

linux.txt

“I love linux”

html.txt

“I can create a website”

materials

pre-class

lms.txt

post-class

try-it.txt

```
136 ls
137 mkdir clarusway
138 cd clarusway
139 mkdir lessons
140 cd lessons
141 touch linux.txt
142 echo "I love linux" > linux.txt
143 touch html.txt
144 echo "I can create a web site" > html.txt
145 cd ..
146 mkdir materials
147 cd materials
148 mkdir pre-class
149 cd pre-class
150 touch lms.txt
151 cd ..
152 mkdir post-class
153 cd post-class
154 tououch try-it.txt
```

Lessons

introduction.txt

SDLC

sdlc.txt

agile.txt

HTML

html.txt

cascadess.css

javascript.js

Linux

operatingsys.txt

DevOps

Dev.txt

Ops.txt

Waterfall

phases.txt

advantages.txt

CLI

basics.txt

advanced.txt

GUI

ubuntu.txt

debian.txt

mint.txt

red_hat.txt

Commands

ls.txt

ls_a.txt

ls_l.txt

ls_al.txt

ls_c.txt

ls_b.txt

pwd.txt

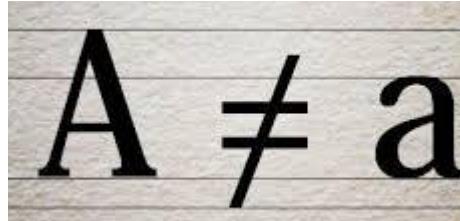
cd.txt

cp.txt



Case Sensitivity

Most of the common Linux file system are case sensitive; this is something to keep in mind when creating and moving through directories and files.



Lower-case and upper-case letters have different ASCII representation



```
touch newfile  
touch Newfile
```

Will create two different files.



THANKS!

Any questions?



Simple Globbing

Globbing is primarily used to match patterns in filenames or text by using a wildcard character to create the pattern.

Character	Name	Function
?	Question mark	Match any single character
*	Asterisk	Match any number of character(s)
[]	Brackets	Match character from a range
^	Caret	Used to match starting character
\$	Dollar sign	Used to match ending character
{}	Curly brace	Used to match more than one pattern
	Pipe	Used for applying more than one condition