

# Linux 1

linux

Training Clarusway

Pear Deck - July 14, 2023 at 9:56AM

## Part 1 - Summary

Use this space to summarize your thoughts on the lesson

## Part 2 - Responses

Slide 1



### Operating Systems

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## Slide 2

### ► Operating Systems



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## Slide 3

### ► Operating Systems

- **OPERATING SYSTEMS:**  
AN OPERATING SYSTEM (OS) IS SYSTEM SOFTWARE THAT  
MANAGES COMPUTER HARDWARE AND SOFTWARE  
RESOURCES AND PROVIDES COMMON SERVICES FOR  
COMPUTER PROGRAMS REQUIRE AN OPERATING SYSTEM TO  
FUNCTION.

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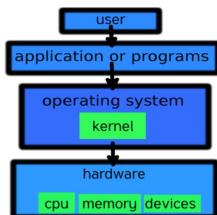


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### ► Operating Systems



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### Introduction to Linux

Linux Essentials

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### Table of Contents

- ▶ Why/Where/When Linux
- ▶ Linux Evolution
- ▶ Major Open Source Applications
- ▶ FSF and OSI
- ▶ Open Source Software and Licensing
- ▶ Using Linux on Different Platforms

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## Slide 7



Why Linux?

Where Linux?

When Linux?



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### Why Linux?



- ★ Total cost of ownership
- ★ Beginner friendly and easy to use
- ★ Reliability
- ★ Hardware
- ★ Software
- ★ Security
- ★ Freedom
- ★ Annoying crashes and reboots
- ★ Server segment
- ★ Linux is everywhere

\* <http://www.linuxandubuntu.com>

Link(s) on this slide:

- <http://www.linuxandubuntu.com/>

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### Where Linux?



**30 Companies and Devices  
Running on GNU/Linux**

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### Where Linux?



#### 1. Google

The services of which includes search, cloud computing and online advertising technologies runs on Linux.

#### 2. Twitter

Twitter, famous online social networking and micro-blogging site is Powered by Linux.

#### 3. Facebook

Facebook, one of the most famous and most widely used Social Networking service runs on the same platform.

#### 4. Amazon

An American based international company which deals with International Online Retailing is in the list of Linux powered Company.

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#### 5. IBM

IBM (International Business Machine Corporation) the American based company which for sure don't requires any introduction, is again powered by Linux.

Cited from: <https://www.tecmint.com>

Link(s) on this slide:

- <https://www.tecmint.com/big-companies-and-devices-running-on-gnulinux/#:~:text=Schools%20colleges%20and%20Universities%20in,the%20most%20sought%20after%20platform.>

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### Where Linux?



#### 6. McDonalds

The world's largest chain of hamburger fast food restaurant uses GNU/Linux (Ubuntu) too.

#### 7. Submarines

The submarines in the United State Navy are controlled by same platform.

#### 8. NASA

National Aeronautical and Space Administration, The United Nations Space program widely uses Linux in many of their programmes.

#### 9. Watches

Most of you would not be knowing that there are Linux Powered Watches in the market, already. The watch developed by IBM running Linux.

#### 10. Mobile Devices

True, you all know that Linux is powering Mobile Phones, Tablets and Kindle.

Cited from: <https://www.tecmint.com>

Link(s) on this slide:

- <https://www.tecmint.com/big-companies-and-devices-running-on-gnulinux/#:~:text=Schools%20colleges%20and%20Universities%20in,the%20most%20sought%20after%20platform.>

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### Where Linux?



#### 11. Space

A Specific Linux Distro (Debian) is already in the space. Debian led all the rest.

#### 12. Raspberry pi

The business card sized computer designed for electronic projects as well as desktop computing which is very cheap in cost and is fully functional. Raspberry is a landmark in Linux Development.

#### 13. Desktop Computing

Though a little late, Linux made a notable presence in the desktop computing market. In school and academics as well as in government offices Linux are being widely used, these days.

#### 14. Corporates

The corporate offices are using Linux and finds it more productive than any other alternatives.

Cited from: <https://www.tecmint.com>

Link(s) on this slide:

- <https://www.tecmint.com/big-companies-and-devices-running-on-gnulinux/#:~:text=Schools%2C%20colleges%20and%20Universities%20in,the%20most%20sought%20after%20platform.>

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### Where Linux?



#### 15. New York Stock Exchange

New York Stock Exchange (NYSC) which provides means for buyers and sellers in order to trade shares of stock in companies registered for public trading relies solely on Linux.

#### 16. Traffic Controlling

The Traffic controlling system in most of the countries be it Road Traffic or Air Traffic Linux proved to be the best than any other available alternative.

#### 17. Nuclear Projects

When it comes to Nuclear Ambitious projects, Linux is the best option. One of such OS is QNX, which lately is acquired by Blackberry Ltd.

#### 18. Bullet Trains

The Bullet Trains in Japan runs at the speed of 240-320 km/h. All train tracking, maintenance, scheduling and controlling is Linux based.

Cited from: <https://www.tecmint.com>

Link(s) on this slide:

- <https://www.tecmint.com/big-companies-and-devices-running-on-gnulinux/#:~:text=Schools%2C%20colleges%20and%20Universities%20in,the%20most%20sought%20after%20platform.>

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### Where Linux?



#### 19. Internet Hosting

More than 70% of Internet Hosting and service providers are Linux based. Thought this statistic is difficult to figure out but based upon the Linux compatible hardware sold, and demand for cross platform compatible hardware, the above statistics is a rough estimation.

#### 20. Missiles and Weapons

The Missiles and destructive weapons of next generation is themed to be much advanced and Intelligent system than its predecessors. Well what else would have been its alternative.

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Cited from: <https://www.tecmint.com>

Link(s) on this slide:

- <https://www.tecmint.com/big-companies-and-devices-running-on-gnulinux/#:~:text=Schools%2C%20colleges%20and%20Universities%20in,the%20most%20sought%20after%20platform.>

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### When Linux?



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Linux Evolution



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### What is Linux?

- Free
- Open-Source
- OS



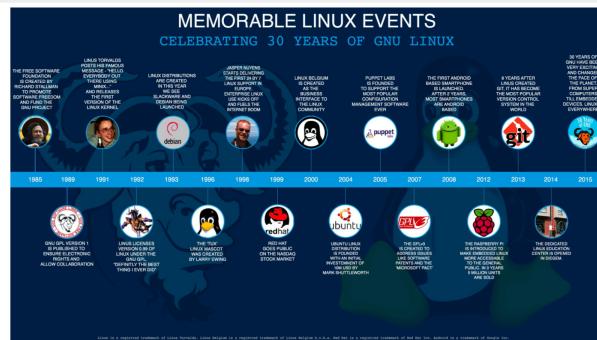
What  
is  
?



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## Slide 19

### Memorable Linux Events

1991

Linus Benedict Torvalds

★ Hello everybody out there using minix.

I'm doing a (free) operating system (just a hobby, won't be big and probably won't even be finished until Sept '91) and I'd like some feedback on things people liked/disliked in minix, as my OS resembles it somewhat (same physical layout of the file-system (due to practical reasons) among other things).

I've currently ported bash(1.08) and gcc(1.40), and things seem to work. This implies that I'll get something practical within a few months, and I'd like to know what features most people would want. Any suggestions are welcome, but I won't promise I'll implement them :-)

Linus (torv...@krくな.helsinki.fi)

PS: Yes - it's free of any minix code, and it has a multi-threaded fs. It is NOT portable (uses 386 task switching etc), and it probably never will support anything other than AT-harddisks, as that's all I have :-).

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Memorable Linux Events

1992



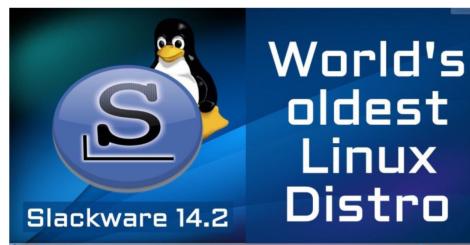
"Making Linux GPLed was definitely the best thing I ever did."  
Torvalds, L.

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Memorable Linux Events

1993



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## Slide 22

Memorable Linux Events

1995



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## Slide 23

Memorable Linux Events

1996



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## Slide 24

Memorable Linux Events

1997



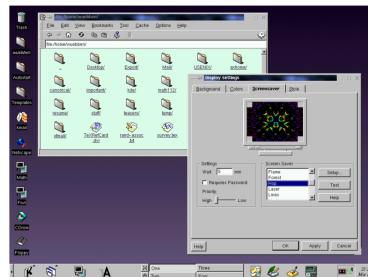
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Memorable Linux Events

1998

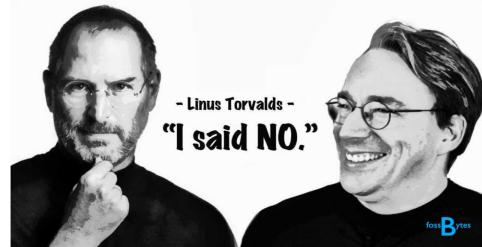


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Memorable Linux Events

2000



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## Slide 27

Memorable Linux Events

2002



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Memorable Linux Events

2004



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Memorable Linux Events

2005



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Memorable Linux Events

2008



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Memorable Linux Events

2009



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Memorable Linux Events

2014



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Memorable Linux Events

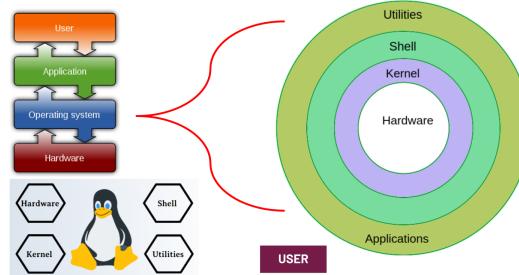
2019



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### Components of Linux



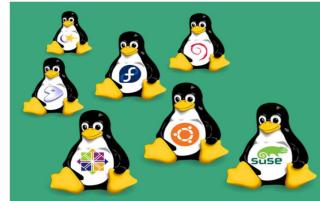
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### Popular Linux Distributions

- [Debian](https://www.debian.org/)
- [Ubuntu](https://ubuntu.com/)
- [Mint](https://linuxmint.com/)
- [Manjaro](https://manjaro.org/)
- [openSUSE](https://www.opensuse.org/)
- [RedHat](https://www.redhat.com/en)
- [Fedora](https://getfedora.org/)



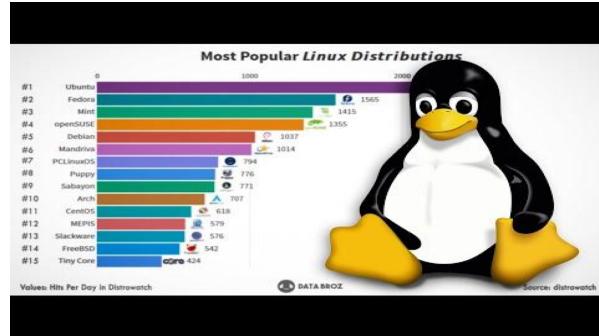
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Link(s) on this slide:

- <https://www.debian.org/>
- <https://ubuntu.com/>
- <https://linuxmint.com/>
- <https://manjaro.org/>
- <https://www.opensuse.org/>
- <https://www.redhat.com/en>
- <https://getfedora.org/>

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Link(s) on this slide:

- <http://www.youtube.com/watch?v=YMCyIaT4iV4>

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### Linux Embedded Systems

#### Embedded System

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



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### Major Open Source Applications



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### What is open-source



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

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### Desktop Applications



□ LibreOffice

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



GIMP



Cited from:

40

Link(s) on this slide:

- <https://www.techradar.com/best/best-open-source-software>
- <https://www.techradar.com/best/best-open-source-software>

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### Server Applications

- [Apache Web Server](#)
- [NGINX](#)
- [MySQL](#)
- [Samba](#)
- [ownCloud](#)



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Link(s) on this slide:

- <https://httpd.apache.org/>
- <https://www.nginx.com/>
- <https://www.mysql.com/>
- <https://www.samba.org/>
- <https://owncloud.org/>

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### 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:** Debian Package Manager
- apt-get**
- rpm:** Red Hat Package Manager
- yum:** yellowdog updater modified



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Free Software Foundation (FSF)

Open Software Initiative (OSI)

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### FSF and OSI

#### Free Software Foundation (FSF)

- The Free Software Foundation (FSF) is a nonprofit organization 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.



<https://www.fsf.org/>

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Link(s) on this slide:

- <https://www.fsf.org/>

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### 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://opensource.org/>

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Link(s) on this slide:

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

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### Open-Source Software and Licensing

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### Open-source Licensing

Open source licenses are licenses that comply with the Open Source Definition — in brief, they allow the software to be freely used, modified, and shared. To be approved by the Open Source Initiative (also known as the OSI), a license must go through the Open Source Initiative's license review process.



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### Open-source Licensing

#### Popular Licenses

The following OSI-approved licenses are popular, widely used, or have strong communities:

- Apache License 2.0
- BSD 3-Clause "New" or "Revised" license
- BSD 2-Clause "Simplified" or "FreeBSD" license
- GNU General Public License (GPL)
- GNU Library or "Lesser" General Public License (LGPL)
- MIT license
- Mozilla Public License 2.0
- Common Development and Distribution License
- Eclipse Public License version 2.0



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### Command Line Basics 1/2

Linux Essentials

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### Table of Contents

- What is SHELL?
- Basic SHELL Commands
- Case Sensitivity
- Simple Globbing

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### 1 What is SHELL?

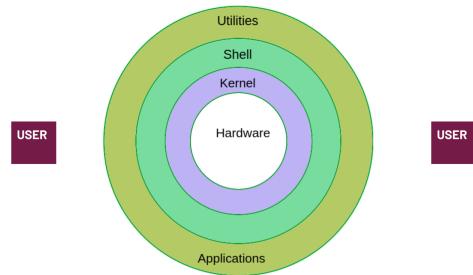


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## Slide 52

### Components of Linux

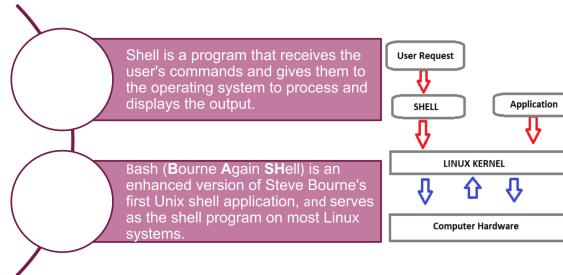


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### What is SHELL?

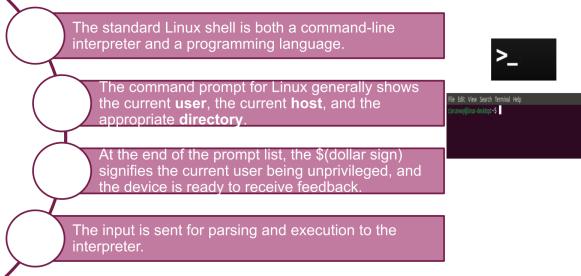


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### What is SHELL?

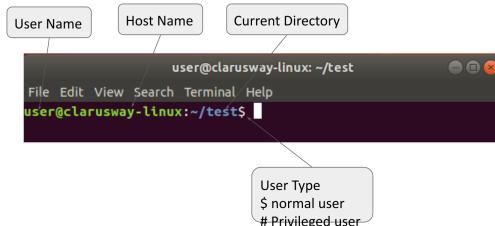


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### Command Prompt

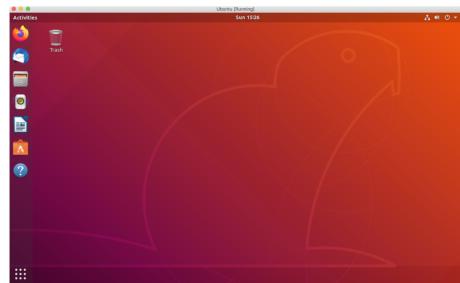


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GUI



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## Slide 57

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### Basic SHELL Commands



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## Slide 58

### Basic Shell Commands

`pwd` show current path  
(print working directory)

```
user@clarusway-linux:~$ pwd
/home/user
user@clarusway-linux:~$
```

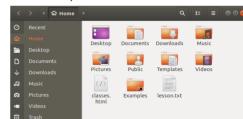
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### Basic Shell Commands

`ls` lists directory contents  
`ls -l` lists directory contents with details  
`ls -a` lists directory contents with hidden folders and files  
`ls -all` lists folder contents with hidden files/folders and their details.



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

```
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 9890 Mar 2 21:53 examples.desktop
drwxr-xr-x 3 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:~$
```

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### Basic Shell Commands

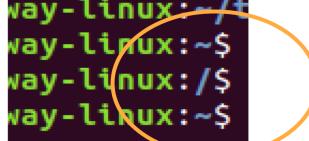
cd [dir] change (current) directory

cd .. change current directory  
to one level up

cd / change current directory  
to the root directory

cd ~ change current directory  
to the home directory

```
user@clarusway-linux: ~
File Edit View Search Terminal Help
user@clarusway-linux:~$ cd test
user@clarusway-linux:~/test$ cd ..
user@clarusway-linux:~/$ cd /
user@clarusway-linux:/$ cd ~
user@clarusway-linux:~$
```



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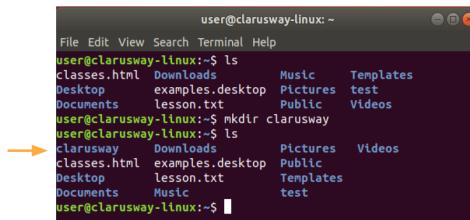
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### Basic Shell Commands

mkdir [dir] (make directory) create a new directory

```
user@clarusway-linux: ~
File Edit View Search Terminal Help
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
Desktop lesson.txt Templates
Documents Music test
user@clarusway-linux:~$
```



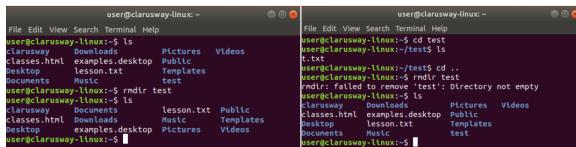
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### Basic Shell Commands

**rmdir [dir]** (remove directory) delete an empty directory



```
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 examples.desktop  Public
desktop    lesson.txt  Templates
Documents  Music      test

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

```
File Edit View Search Terminal Help
user@clarusway-linux:~/test$ ls
lesson.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
```

! It works if the folder content is empty, otherwise it gives a warning.

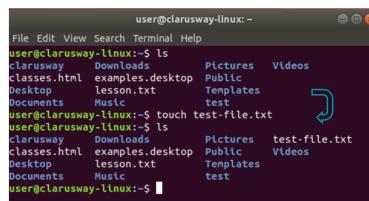
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## Slide 63

### Basic Shell Commands

**touch [filename]** create a file



```
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
```

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## Slide 64

### Basic Shell Commands



`mkdir dirname{1..10}`

`touch filename{a..z}`

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### Case Sensitivity

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

A ≠ a



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

`touch newfile`  
`touch Newfile`  
Will create two different files.

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### Basic Shell Commands

**rm** (remove) delete a file

```
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  Templates
Desktop   lesson.txt  Music
Documents  test
user@clarusway-linux:~$
```

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### Basic Shell Commands

```
rm -d    directoryname= rmdir directoryname
rm -r    directoryname
rm -f    Remove all files in the working directory.
         rm will not prompt you for any reason before deleting them
         rm -rf
```

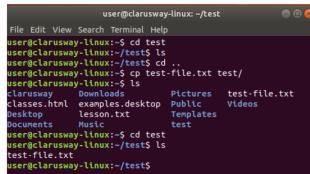
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### Basic Shell Commands

**cp** copy a file to another location



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

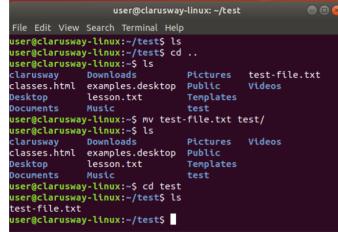
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## Slide 69

### Basic Shell Commands

**mv** move a file to another location



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

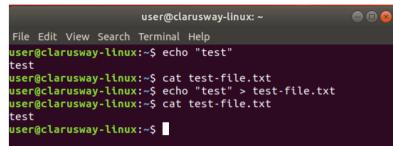
69

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## Slide 70

### Basic Shell Commands

```
echo      print message to screen  
echo > [file]  print message into a file  
            if the file doesn't exist it creates  
echo >> [file] adds to existing content
```



A screenshot of a terminal window titled "user@clarusway-linux: ~". The window shows the following commands being run:

```
File Edit View Search Terminal Help  
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:~$
```

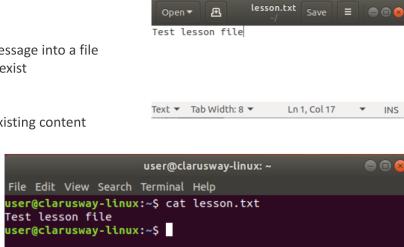
70

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## Slide 71

### Basic Shell Commands

```
cat  show file contents  
  
cat > [filename]  print message into a file  
                  if the file doesn't exist  
                  it creates  
  
cat >> [filename] adds to existing content
```



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## Slide 72

### Simple Globbing

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

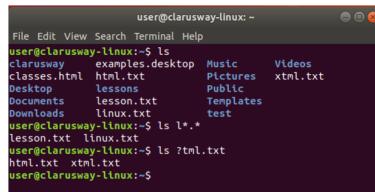
72

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## Slide 73

### Multiple File/Directory Operations

- ? used for a single character
- \* used for multiple characters



```
user@clarusway-linux:~$ ls
clarusway examples desktop Music Videos
classes.html html.txt Pictures xhtml.txt
Desktop lessons Public
Documents lesson.txt Templates
Downloads llinux.txt test
user@clarusway-linux:~$ ls t.*
lesson.txt llinux.txt
user@clarusway-linux:~$ ls ?ml.txt
html.txt xhtml.txt
user@clarusway-linux:~$
```

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Use this space to take notes:

## Basic SHELL Commands



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## Basic SHELL Commands

File Commands	System Info
<code>ls</code> - directory listing <code>ls -al</code> - formatted listing with hidden files	<code>date</code> - show the current date and time <code>cal</code> - show this month's calendar
<code>cd dir</code> - change directory to <code>dir</code>	<code>uptime</code> - show current uptime
<code>cd ..</code> - go up one directory	<code>who</code> - display who is logged in
<code>pwd</code> - show current directory	<code>whoami</code> - who you are logged in as
<code>mkdir dir</code> - create a directory <code>dir</code>	<code>finger user</code> - display information about user
<code>rm file</code> - delete file	<code>meminfo</code> - memory information
<code>rm -r dir</code> - delete directory <code>dir</code>	<code>cat /proc/cpuinfo</code> - cpu information
<code>rm -f file</code> - force remove <code>file</code>	<code>cat /proc/meminfo</code> - memory information
<code>mv file dir</code> - move file to directory <code>dir</code>	<code>more command</code> - more lines of the command for command
<code>cp file1 file2</code> - copy <code>file1</code> to <code>file2</code>	<code>df</code> - show disk usage
<code>cp -r dir1 dir2</code> - copy <code>dir1</code> to <code>dir2</code> ; create <code>dir2</code> if it doesn't exist	<code>free</code> - show memory and swap usage
<code>mv file1 file2</code> - rename or move <code>file1</code> to <code>file2</code>	<code>whereis app</code> - show possible locations of <code>app</code>
<code>ln -s file link</code> - symbolic link <code>link</code> to <code>file</code>	<code>which app</code> - show which <code>app</code> will be run by default
<code>touch file</code> - creates or update <code>file</code>	
<code>cat &gt; file</code> - places standard input into <code>file</code>	
<code>more file</code> - output the contents of <code>file</code>	
<code>head -n lines file</code> - output the first <code>n</code> lines of <code>file</code>	
<code>tail file</code> - output the last 10 lines of <code>file</code>	
<code>tail -f file</code> - output the contents of <code>file</code> as it grows, starting from the end	
Process Management	Compression
<code>ps</code> - display your currently active processes	<code>tar cf file.tar files</code> - create a tar named <code>file.tar</code> containing <code>files</code>
<code>top</code> - display all running processes	<code>tar xf file.tar</code> - extract files from <code>file.tar</code>
	<code>tar cf file.tar -files</code> - create a tar with a path
	Gzip compression
	<code>tar zcf file.tar.gz</code> - create a tar using Gzip
	<code>tar cfl file.tar.bz2</code> - create a tar with Bzip2 compression
	<code>tar xzvf file.tar.gz</code> - extracts a tar using Gzip
	<code>gzip file</code> - compresses <code>file</code> and renames it to <code>file.gz</code>

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## Slide 76

### Task



76

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## Slide 77

# THANKS !

**Any questions?**

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## Slide 78

### ► Operating Systems



Linux



android



iOS

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### ► Operating Systems

- **OPERATING SYSTEMS:**  
AN OPERATING SYSTEM (OS) IS SYSTEM SOFTWARE THAT  
MANAGES COMPUTER HARDWARE AND SOFTWARE  
RESOURCES AND PROVIDES COMMON SERVICES FOR  
COMPUTER PROGRAMS REQUIRE AN OPERATING SYSTEM TO  
FUNCTION.

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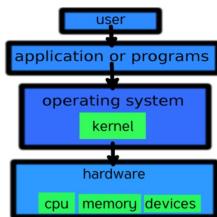
79



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## Slide 80

### ► Operating Systems



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### Introduction to Linux

Linux Essentials

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## Slide 82

### Table of Contents

- ▶ Why/Where/When Linux
- ▶ Linux Evolution
- ▶ Major Open Source Applications
- ▶ FSF and OSI
- ▶ Open Source Software and Licensing
- ▶ Using Linux on Different Platforms

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## Slide 83



Why Linux?

Where Linux?

When Linux?



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## Slide 84

### Why Linux?



- ★ Total cost of ownership
- ★ Beginner friendly and easy to use
- ★ Reliability
- ★ Hardware
- ★ Software
- ★ Security
- ★ Freedom
- ★ Annoying crashes and reboots
- ★ Server segment<sup>84</sup>
- ★ Linux is everywhere

\* <http://www.linuxandubuntu.com>

Link(s) on this slide:

- <http://www.linuxandubuntu.com/>

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## Slide 85

### Where Linux?



**30 Companies and Devices  
Running on GNU/Linux**

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## Slide 86

### Where Linux?



#### 1. Google

The services of which includes search, cloud computing and online advertising technologies runs on Linux.

#### 2. Twitter

Twitter, famous online social networking and micro-blogging site is Powered by Linux.

#### 3. Facebook

Facebook, one of the most famous and most widely used Social Networking service runs on the same platform.

#### 4. Amazon

An American based international company which deals with International Online Retailing is in the list of Linux powered Company.<sup>86</sup>

#### 5. IBM

IBM (International Business Machine Corporation) the American based company which for sure don't requires any introduction, is again powered by Linux.

Cited from: <https://www.tecmint.com>

Link(s) on this slide:

- <https://www.tecmint.com/big-companies-and-devices-running-on-gnulinux/#:~:text=Schools%20colleges%20and%20Universities%20in,the%20most%20sought%20after%20platform.>

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## Slide 87

### Where Linux?



#### 6. McDonalds

The world's largest chain of hamburger fast food restaurant uses GNU/Linux (Ubuntu) too.

#### 7. Submarines

The submarines in the United State Navy are controlled by same platform.

#### 8. NASA

National Aeronautical and Space Administration, The United Nations Space program widely uses Linux in many of their programmes.

#### 9. Watches

Most of you would not be knowing that there are Linux Powered Watches in the market, already. The watch developed by IBM running Linux.

#### 10. Mobile Devices

True, you all know that Linux is powering Mobile Phones, Tablets and Kindle.<sup>87</sup>

Cited from: <https://www.tecmint.com>

Link(s) on this slide:

- <https://www.tecmint.com/big-companies-and-devices-running-on-gnulinux/#:~:text=Schools%20colleges%20and%20Universities%20in,the%20most%20sought%20after%20platform.>

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## Slide 88

### Where Linux?



#### 11. Space

A Specific Linux Distro (Debian) is already in the space. Debian led all the rest.

#### 12. Raspberry pi

The business card sized computer designed for electronic projects as well as desktop computing which is very cheap in cost and is fully functional. Raspberry is a landmark in Linux Development.

#### 13. Desktop Computing

Though a little late, Linux made a notable presence in the desktop computing market. In school and academics as well as in government offices Linux are being widely used, these days.

#### 14. Corporates

The corporate offices are using Linux and finds it more productive than any other alternatives.

Cited from: <https://www.tecmint.com>

Link(s) on this slide:

- <https://www.tecmint.com/big-companies-and-devices-running-on-gnulinux/#:~:text=Schools%2C%20colleges%20and%20Universities%20in,the%20most%20sought%20after%20platform.>

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## Slide 89

### Where Linux?



#### 15. New York Stock Exchange

New York Stock Exchange (NYSC) which provides means for buyers and sellers in order to trade shares of stock in companies registered for public trading relies solely on Linux.

#### 16. Traffic Controlling

The Traffic controlling system in most of the countries be it Road Traffic or Air Traffic Linux proved to be the best than any other available alternative.

#### 17. Nuclear Projects

When it comes to Nuclear Ambitious projects, Linux is the best option. One of such OS is QNX, which lately is acquired by Blackberry Ltd.

#### 18. Bullet Trains

The Bullet Trains in Japan runs at the speed of 240-320 km/h. All train tracking, maintenance, scheduling and controlling is Linux based.

Cited from: <https://www.tecmint.com>

Link(s) on this slide:

- <https://www.tecmint.com/big-companies-and-devices-running-on-gnulinux/#:~:text=Schools%2C%20colleges%20and%20Universities%20in,the%20most%20sought%20after%20platform.>

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## Slide 90

### Where Linux?



#### 19. Internet Hosting

More than 70% of Internet Hosting and service providers are Linux based. Thought this statistic is difficult to figure out but based upon the Linux compatible hardware sold, and demand for cross platform compatible hardware, the above statistics is a rough estimation.

#### 20. Missiles and Weapons

The Missiles and destructive weapons of next generation is themed to be much advanced and Intelligent system than its predecessors. Well what else would have been its alternative.

90

Cited from: <https://www.tecmint.com>

Link(s) on this slide:

- <https://www.tecmint.com/big-companies-and-devices-running-on-gnulinux/#:~:text=Schools%2C%20colleges%20and%20Universities%20in,the%20most%20sought%20after%20platform.>

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### When Linux?



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### What is Linux?

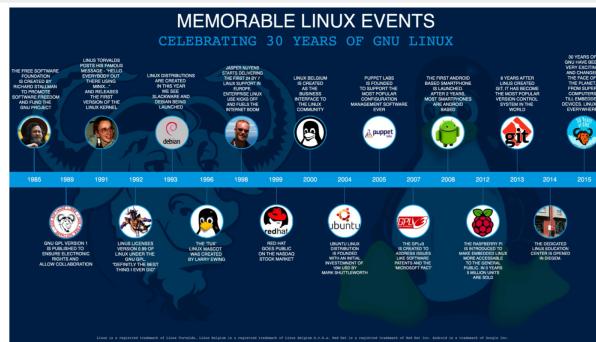
- Free
- Open-Source
- OS



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## Slide 94



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## Slide 95

### Memorable Linux Events

1991

Linus Benedict Torvalds

☆ Hello everybody out there using minix.

I'm doing a (free) operating system (just a hobby, won't be big and professional like OS/2 and Windows) for 386(486) PC-clones and I have it running now and can switch between minix and my OS. This is getting better and better, though it has some problems (like memory leak, and I have some problems with�多线程). I'd like to get some feedback on things people liked/disliked in minix, as my OS resembles it somewhat (same physical layout of the file-system (due to practical reasons) among other things).

I've currently ported bash(1.08) and gcc(1.40), and things seem to work. This implies that I'll get something practical within a few months, and I'd like to know what features most people would want. Any suggestions are welcome, but I won't promise I'll implement them :-)

Linus (torv...@kruuna.helsinki.fi)

PS: Yes - it's free of any minix code, and it has a multi-threaded fs. It is NOT portable (uses 386 task switching etc), and it probably never will support anything other than AT-harddisks, as that's all I have :-).

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## Slide 96

Memorable Linux Events

1992



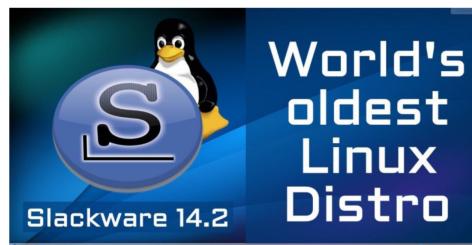
"Making Linux GPLed was definitely the best thing I ever did."  
Torvalds, L.

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## Slide 97

Memorable Linux Events

1993



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## Slide 98

Memorable Linux Events

1995



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## Slide 99

Memorable Linux Events

1996



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## Slide 100

Memorable Linux Events

1997

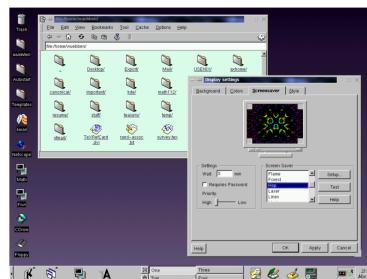


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## Slide 101

Memorable Linux Events

1998

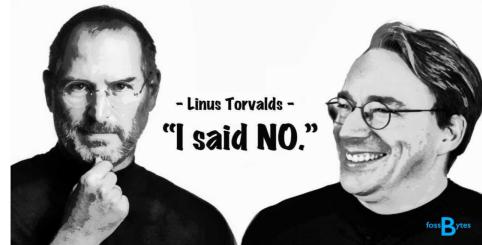


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## Slide 102

Memorable Linux Events

2000



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## Slide 103

Memorable Linux Events

2002



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## Slide 104

Memorable Linux Events

2004



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## Slide 105

Memorable Linux Events

2005



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## Slide 106

Memorable Linux Events

2008



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## Slide 107

Memorable Linux Events

2009



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## Slide 108

Memorable Linux Events

2014



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## Slide 109

Memorable Linux Events

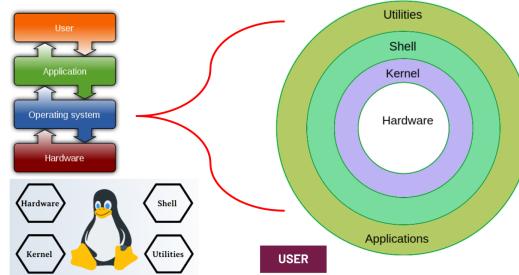
2019



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## Slide 110

### Components of Linux



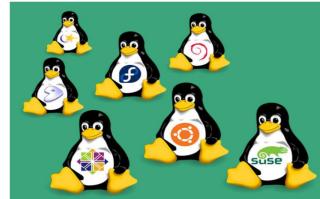
110

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## Slide 111

### Popular Linux Distributions

- [Debian](https://www.debian.org/)
- [Ubuntu](https://ubuntu.com/)
- [Mint](https://linuxmint.com/)
- [Manjaro](https://manjaro.org/)
- [openSUSE](https://www.opensuse.org/)
- [RedHat](https://www.redhat.com/en)
- [Fedora](https://getfedora.org/)



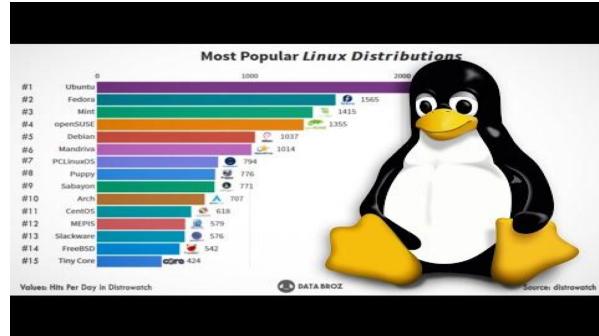
111

Link(s) on this slide:

- <https://www.debian.org/>
- <https://ubuntu.com/>
- <https://linuxmint.com/>
- <https://manjaro.org/>
- <https://www.opensuse.org/>
- <https://www.redhat.com/en>
- <https://getfedora.org/>

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## Slide 112



Link(s) on this slide:

- <http://www.youtube.com/watch?v=YMCylaT4iV4>

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## Slide 113

### Linux Embedded Systems

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



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## Slide 114



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## Slide 115

### What is open-source



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

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## Slide 116

### Desktop Applications



□ LibreOffice

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



GIMP



Cited from:

116

Link(s) on this slide:

- <https://www.techradar.com/best/best-open-source-software>
- <https://www.techradar.com/best/best-open-source-software>

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## Slide 117

### Server Applications

- [Apache Web Server](#)
- [NGINX](#)
- [MySQL](#)
- [Samba](#)
- [ownCloud](#)



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Link(s) on this slide:

- <https://httpd.apache.org/>
- <https://www.nginx.com/>
- <https://www.mysql.com/>
- <https://www.samba.org/>
- <https://owncloud.org/>

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## Slide 118

### 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:** Debian Package Manager
- apt-get**
- rpm:** Red Hat Package Manager
- yum:** yellowdog updater modified



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## Slide 119



Free Software Foundation (FSF)

Open Software Initiative (OSI)

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### FSF and OSI

#### Free Software Foundation (FSF)

- The Free Software Foundation (FSF) is a nonprofit organization 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.



<https://www.fsf.org/>

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Link(s) on this slide:

- <https://www.fsf.org/>

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## Slide 121

### 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://opensource.org/>

121

Link(s) on this slide:

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

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## Slide 122



### Open-Source Software and Licensing

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### Open-source Licensing

Open source licenses are licenses that comply with the Open Source Definition — in brief, they allow the software to be freely used, modified, and shared. To be approved by the Open Source Initiative (also known as the OSI), a license must go through the Open Source Initiative's license review process.



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## Slide 124

### Open-source Licensing

#### Popular Licenses

The following OSI-approved licenses are popular, widely used, or have strong communities:

- Apache License 2.0
- BSD 3-Clause "New" or "Revised" license
- BSD 2-Clause "Simplified" or "FreeBSD" license
- GNU General Public License (GPL)
- GNU Library or "Lesser" General Public License (LGPL)
- MIT license
- Mozilla Public License 2.0
- Common Development and Distribution License
- Eclipse Public License version 2.0



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## Slide 125



### Command Line Basics 1/2

#### Linux Essentials

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## Table of Contents

- What is SHELL?
- Basic SHELL Commands
- Case Sensitivity
- Simple Globbing

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### What is SHELL?

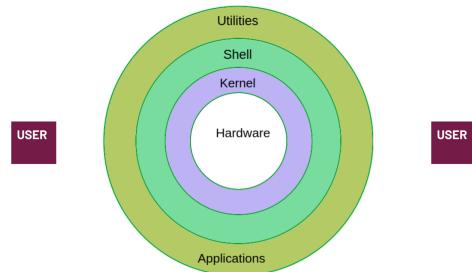


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## Slide 128

### Components of Linux

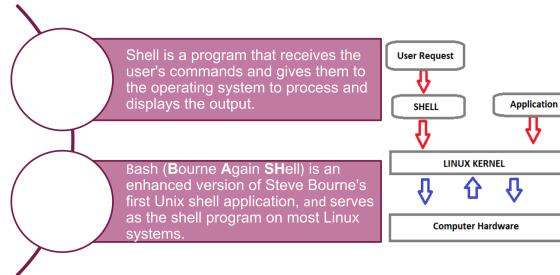


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## Slide 129

### What is SHELL?

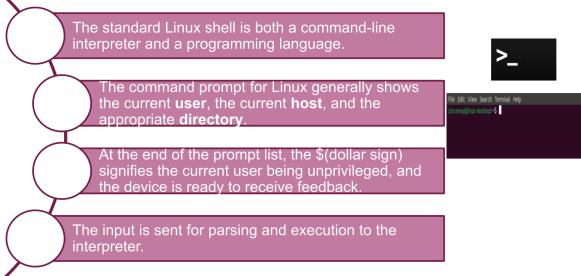


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## Slide 130

### What is SHELL?



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## Slide 131

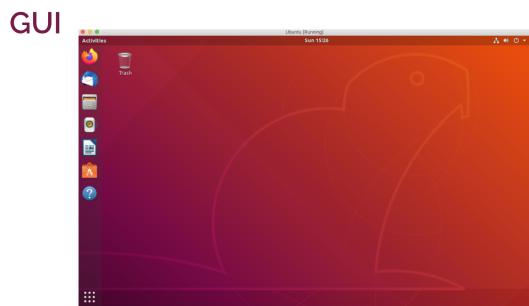
### Command Prompt



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## Slide 134

### Basic Shell Commands

`pwd` show current path  
(print working directory)

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

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## Slide 135

### Basic Shell Commands

`ls` lists directory contents  
`ls -l` lists directory contents with details  
`ls -a` lists directory contents with hidden folders and files  
`ls -all` lists folder contents with hidden files/folders and their details.



```
user@clarusway-linux:~$ ls
File Edit View Search Terminal Help
user@clarusway-linux:~/home/user
user@clarusway-linux:~$ ls -l
total 48
drwxr-x-- 1 user user 16 Mar 2 21:56 classes.html
drwxr-x--x 2 user user 4960 Mar 2 21:54 Desktop
drwxr-x--x 2 user user 4960 Mar 2 21:54 Documents
drwxr-x--x 2 user user 4960 Mar 2 21:54 Downloads
drw-r---- 1 user user 9890 Mar 2 21:53 examples.desktop
drw-r---- 3 user user 9890 Mar 2 21:53 lesson.txt
drwxr-x--x 2 user user 4960 Mar 2 21:54 Pictures
drwxr-x--x 2 user user 4960 Mar 2 21:54 Public
drwxr-x--x 2 user user 4960 Mar 2 21:54 Templates
drwxr-x--x 2 user user 4960 Mar 2 21:54 Videos
user@clarusway-linux:~$
```

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## Slide 136

### Basic Shell Commands

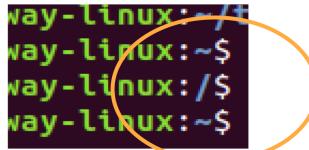
cd [dir] change (current) directory

cd .. change current directory  
to one level up

cd / change current directory  
to the root directory

cd ~ change current directory  
to the home directory

```
user@clarusway-linux: ~
File Edit View Search Terminal Help
user@clarusway-linux:~$ cd test
user@clarusway-linux:~/test$ cd ..
user@clarusway-linux:~/$ cd /
user@clarusway-linux:/$ cd ~
user@clarusway-linux:~$
```



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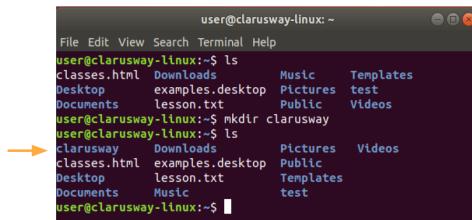
Use this space to take notes:

## Slide 137

### Basic Shell Commands

mkdir [dir] (make directory) create a new directory

```
user@clarusway-linux: ~
File Edit View Search Terminal Help
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
Desktop lesson.txt Templates
Documents Music test
user@clarusway-linux:~$
```



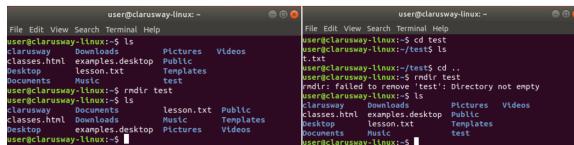
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## Slide 138

### Basic Shell Commands

**rmdir [dir]** (remove directory) delete an empty directory



The image shows two side-by-side terminal windows. The left window shows the user navigating through their home directory and executing the command `rmdir test`. The right window shows the user navigating into a directory named `test`, which contains a file named `test.txt`, and attempting to run `rmdir` again, which fails with the message "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:~$ rmdir test
user@clarusway-linux:~$ ls
clarusway  Documents  lesson.txt  Public
classes.html examples.desktop  Pictures
desktop    Music      Templates
Documents  Music      test

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

! It works if the folder content is empty, otherwise it gives a warning.

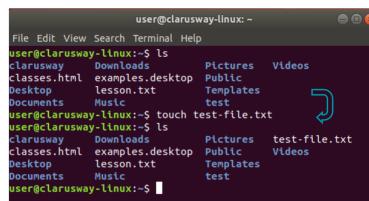
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## Slide 139

### Basic Shell Commands

**touch [filename]** create a file



The image shows a single terminal window where the user creates a new file named `test-file.txt` in their home directory using the `touch` command. The file is created successfully, as indicated by the cursor's movement over the newly created file entry in the directory listing.

```
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
```

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Use this space to take notes:

## Slide 140

### Basic Shell Commands



`mkdir dirname{1..10}`

`touch filename{a..z}`

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## Slide 141

### Case Sensitivity

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

A ≠ a



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

`touch newfile`  
`touch Newfile`  
Will create two different files.

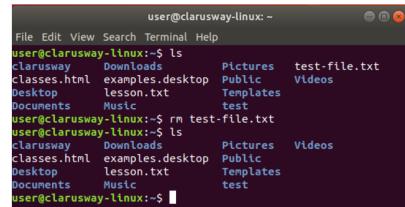
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## Slide 142

### Basic Shell Commands

**rm** (remove) delete a file



A screenshot of a terminal window titled "user@clarusway-linux: ~". The window shows the following sequence of commands and outputs:

```
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  Templates
Desktop    lesson.txt  Music
Documents   test

user@clarusway-linux:~$
```

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## Slide 143

### Basic Shell Commands

**rm -d** directoryname= **rmdir** directoryname

**rm -r** directoryname

**rm -f** Remove all files in the working directory.

rm will not prompt you for any reason before deleting them  
**rm -rf**

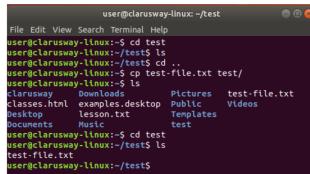
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## Slide 144

### Basic Shell Commands

**cp** copy a file to another location



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

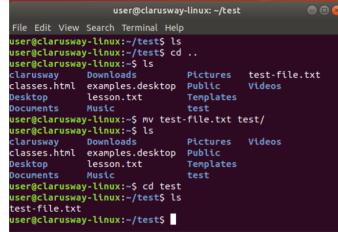
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## Slide 145

### Basic Shell Commands

**mv** move a file to another location



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

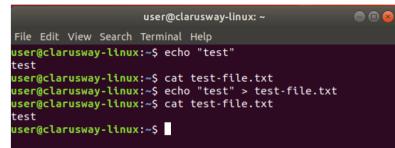
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## Slide 146

### Basic Shell Commands

`echo` print message to screen  
`echo > [file]` print message into a file  
if the file doesn't exist it creates  
`echo >> [file]` adds to existing content



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

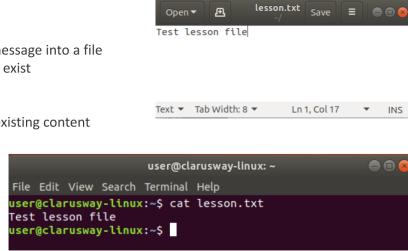
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## Slide 147

### Basic Shell Commands

`cat` show file contents  
`cat > [filename]` print message into a file  
if the file doesn't exist  
it creates  
`cat >> [filename]` adds to existing content



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## Slide 148

### Simple Globbing

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

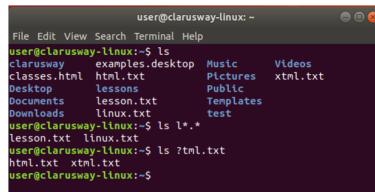
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## Slide 149

### Multiple File/Directory Operations

- ?    used for a single character
- \*    used for multiple characters



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

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Use this space to take notes:

## Basic SHELL Commands



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Use this space to take notes:

## Basic SHELL Commands

File Commands	System Info
<code>ls</code> - directory listing <code>ls -al</code> - formatted listing with hidden files	<code>date</code> - show the current date and time <code>cal</code> - show this month's calendar
<code>cd dir</code> - change directory to <code>dir</code>	<code>uptime</code> - show current uptime
<code>cd ..</code> - go up one directory	<code>who</code> - display who is logged in
<code>pwd</code> - show current directory	<code>whoami</code> - who you are logged in as
<code>mkdir dir</code> - create a directory <code>dir</code>	<code>finger user</code> - display information about user
<code>rm file</code> - delete file	<code>meminfo</code> - memory information
<code>rm -r dir</code> - delete directory <code>dir</code>	<code>cat /proc/cpuinfo</code> - cpu information
<code>rm -f file</code> - force remove <code>file</code>	<code>cat /proc/meminfo</code> - memory information
<code>mv file dir</code> - move file to directory <code>dir</code>	<code>more command</code> - more command for command
<code>cp file1 file2</code> - copy <code>file1</code> to <code>file2</code>	<code>df</code> - show disk usage
<code>cp -r dir1 dir2</code> - copy <code>dir1</code> to <code>dir2</code> ; create <code>dir2</code> if it doesn't exist	<code>free</code> - show memory and swap usage
<code>mv file1 file2</code> - rename or move <code>file1</code> to <code>file2</code>	<code>whereis app</code> - show possible locations of <code>app</code>
<code>ln -s file link</code> - symbolic link <code>link</code> to <code>file</code>	<code>which app</code> - show which <code>app</code> will be run by default
<code>touch file</code> - creates or update <code>file</code>	
<code>cat &gt; file</code> - places standard input into <code>file</code>	
<code>more file</code> - output the contents of <code>file</code>	
<code>head -n lines file</code> - output the first <code>n</code> lines of <code>file</code>	
<code>tail file</code> - output the last 10 lines of <code>file</code>	
<code>tail -f file</code> - output the contents of <code>file</code> as it grows, starting from the end	
Process Management	Compression
<code>ps</code> - display your currently active processes	<code>tar cf file.tar files</code> - create a tar named <code>file.tar</code> containing <code>files</code>
<code>top</code> - display all running processes	<code>tar xf file.tar</code> - extract files from <code>file.tar</code>
	<code>tar xf file.tar --files-from=files</code> - extract files from <code>file.tar</code> to a path
	Gzip compression
	<code>tar zcf file.tar.gz</code> - create a tar using Gzip
	<code>tar czf file.tar.b2z</code> - create a tar with Bzip2 compression
	<code>tar xzf file.tar.gz</code> - extracts a tar using Gzip
	<code>gzip file</code> - compresses <code>file</code> and renames it to <code>file.gz</code>

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## Slide 152

### Task



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## Slide 153

# THANKS !

**Any questions?**

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