APPS@UCU

Linux course

Tools overview

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APPLIED
SCIENCES
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Contents

Intro

- In this presentation, we will overview some tools that are available on all Linux distributions
- All of them have a high barrier to entry as Linux itself, but when you are there - you won’t imagine your life without that tools
- Example: it’s not a one-day task to learn how to move around your system, but after few months of practice working with CLI, GUI for you will be as slow as a turtle is slow in comparison with a rabbit

All you need is

```
#!/bin/bash
```

The most important tool

- I

VIM

Vi

- So let’s start with the text editor
- You have heard about vim , haven’t you?
- But let’s start with vi
- Vi is a part of POSIX
- It’s totally CLI editor (forget that you have a mouse)
- There are shortcuts for everything
- If there is no, you can create them for yourself
- Every good enough 21’st century editor has an extension for a vi mode
- But almost nobody uses it - only on some low memory and low power machines. So we move to vim

Tweet

I Am Devloper
@iamdevloper

I've been using Vim for about 2 years now, mostly because I can't figure out how to exit it.

6:26 PM · Feb 17, 2014 · Tweetbot for iOS

13.6K Retweets 8.7K Likes

Vim

- Vim stands for ’Vi IMproved’
- According to Linux Journal survey, 38% (in average for 2009-2018) of respondents vote for vim as the best editor
- It has much more features, than vi , including more commands, scriptable syntax highlighting and extensions, graphical interface (and a mouse support, but don’t use it)
- As vi , it has six modes - normal, visual, insert, command-line, select, and ex (yes, not only NORMAL and INSERT)
- Because of a huge community (38% of world’s best geeks) vim became a powerful IDE with thousands of extensions (syntax highlight, autocompletion, spell checking, project tree etc.)
- The most powerful tool of vim is inside - its shortcuts. You can make your work dozens of times faster without a touchpad and a mouse

NeoVim

- Neovim is just a fork of Vim with some Python extensions
- And cool logo =)
- Also Neovim is a community-driven text editor, while Vim is a project of only one person - Bram Moolenaar
- One ’expert’ on reddit wrote that:

  "Neovim exists to convince Bram to push new features to Vim"

  And I mostly agree with him.

tmux

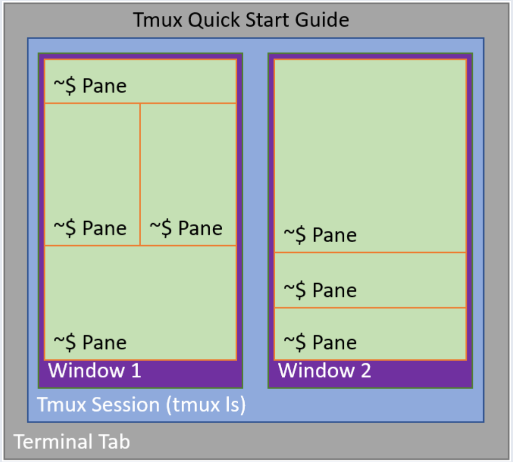
Tmux

- TMUX stands for Terminal MUltipleXer
- There are some other (screen, Konsole, etc.), but they are not so good as TMUX
- Why do we need it?
- As you continue your practice in CLI, you can notice that it’s not enough to have only one terminal window
- With this much multitasking going on, we want to have more terminals. So people create a terminal multiplexor
- What TMUX can do?

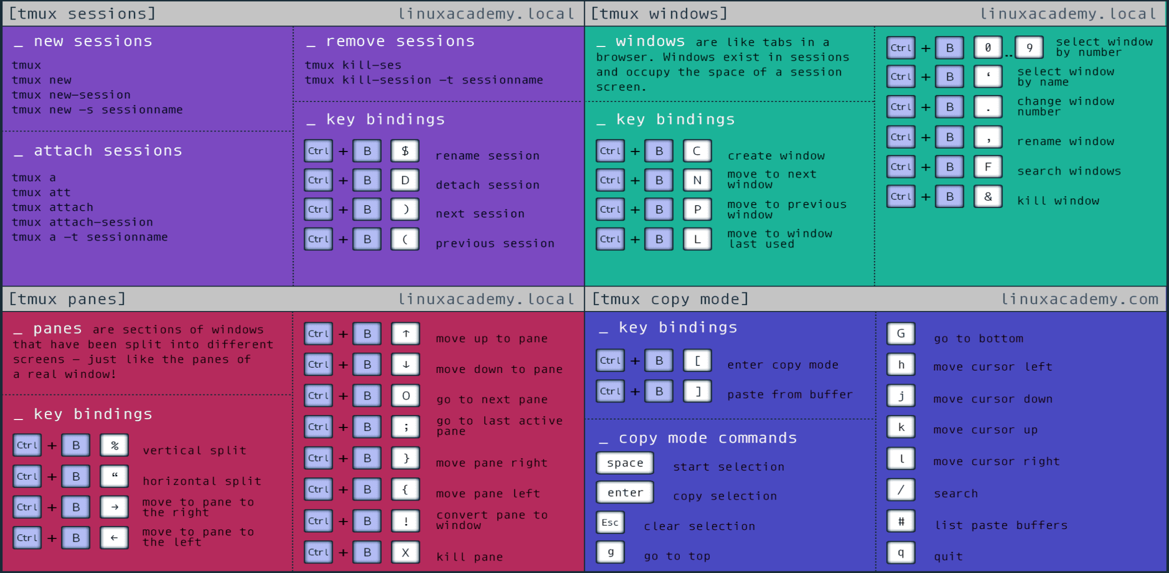
  Not only split and stack tab but also make tabs
  Continue running programs in the background
  With extensions you can write layout files in .yml format
  Search through terminal output and move around with Vim shortcuts
  Other interesting stuff

Tmux

- A Tmux Session with two tmux tabs with multiple tmux panes within each
- As vim , tmux has modes - view and command (Ctrl+b be default)
- Every pane has three modes - view, choose and copy
- To enter a copy mode - Ctrl+b [
- It allows you to use vim keys for moving around and copying text
- For more information see man tmux or linux man page



For the very beginning:



[tmux sessions] linuxacademy.local

_ new sessions

```
tmux
tmux new
tmux new-session
tmux new -s sessionname
```

_ attach sessions

```
tmux a
tmux att
tmux attach
tmux attach-session
tmux a -t sessionname
```

_ remove sessions

```
tmux kill-ses
tmux kill-session -t sessionname
```

_ key bindings

Ctrl + B $	rename session
Ctrl + B D	detach session
Ctrl + B)	next session
Ctrl + B (	previous session

[tmux windows] linuxacademy.local

_ windows are like tabs in a browser. Windows exist in sessions and occupy the space of a session screen.

_ key bindings

Ctrl + B C	create window
Ctrl + B N	move to next window
Ctrl + B P	move to previous window
Ctrl + B L	move to window last used
Ctrl + B 0 .. 9	select window by number
Ctrl + B '	select window by name
Ctrl + B .	change window number
Ctrl + B ,	rename window
Ctrl + B F	search windows
Ctrl + B &	kill window

[tmux panes] linuxacademy.local

_ panes are sections of windows that have been split into different screens – just like the panes of a real window!

_ key bindings

Ctrl + B %	vertical split
Ctrl + B "	horizontal split
Ctrl + B →	move to pane to the right
Ctrl + B ←	move to pane to the left
Ctrl + B ↑	move up to pane
Ctrl + B ↓	move down to pane
Ctrl + B O	go to next pane
Ctrl + B ;	go to last active pane
Ctrl + B }	move pane right
Ctrl + B {	move pane left
Ctrl + B !	convert pane to window
Ctrl + B X	kill pane

[tmux copy mode] linuxacademy.com

_ key bindings

Ctrl + B [	enter copy mode
Ctrl + B]	paste from buffer

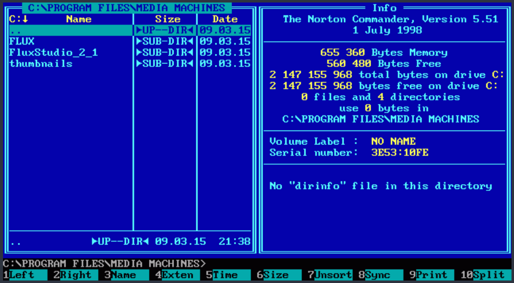
_ copy mode commands

space	start selection
enter	copy selection
Esc	clear selection
g	go to top
G	go to bottom
h	move cursor left
j	move cursor down
k	move cursor up
l	move cursor right
/	search
#	list paste buffers
q	quit

ranger

Commander

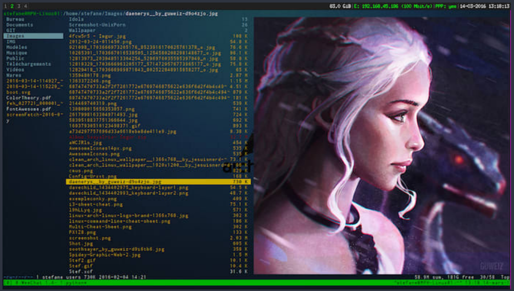
- Norton - one of the very first dual pane file managers , 1984
- Norton Commander set the tone for decades of file managers (Commanders) to come
- Until then people created nothing better than that, so DP commanders are still popular
- mc (midnight commander)
  dc (double commander)
- There are a lot of both GUI and CLI examples, for Linux and Windows, but we will view cpecific one - ranger



```
 C:\PROGRAM FILES\MEDIA MACHINES                     Info
C:↓        Name          Size     Date     The Norton Commander, Version 5.51
..                    ►UP--DIR◄ 09.03.15               1 July 1998
FLUX                  ►SUB-DIR◄ 09.03.15
FluxStudio_2_1        ►SUB-DIR◄ 09.03.15          655 360 Bytes Memory
thumbnails            ►SUB-DIR◄ 09.03.15           560 480 Bytes Free
                                            2 147 155 968 total bytes on drive C:
                                            2 147 155 968 bytes free on drive C:
                                                 0 files and 4 directories
                                                       use 0 bytes in
                                               C:\PROGRAM FILES\MEDIA MACHINES

                                            Volume Label :   NO NAME
                                            Serial number:   3E53:10FE

                                            No "dirinfo" file in this directory

 ..             ►UP--DIR◄ 09.03.15   21:38
C:\PROGRAM FILES\MEDIA MACHINES>
1Left   2Right  3Name   4Exten  5Time   6Size   7Unsort 8Sync   9Print  10Split
```

Ranger

- Ranger is vim inspired CLI file manager, so it has vi keybindings
- It is fully customisible with just few files
- As you can see, it can open images preview right in the terminal
- The same about all text files, videos, other files too
- For more info see man ranger



```
1 2 3 4                                                                   83,0 GiB | E: 192.168.45.186 (100 Mbit/s) | PPP: yes | 14-03-2016 13:18:13
stefane@MPH-Linux01:/home/stefane/Images/daenerys__by_guweiz-d9o4zjo.jpg
 Bureau                Idols                                                          13
 Documents             Screenshot-UnixPorn                                            26
 GIT                   Wallpaper                                                       2
 Images                4fcw5r5 - Imgur.jpg                                         108 K
 IMG                   2012-03-24-011450.png                                       54.8 K
 Modèles               921098_170366697320517б_852391617002578137B_o.jpg           76.6 K
 Musique               10265391_170366701653850б_1284580208298148077_o.jpg         90.1 K
 Public                12813973_203948513304254_5296976035595397840_n.jpg          58.8 K
 Téléchargements       12819328_170366696320517T_5714729570773065177_o.jpg         75.8 K
 Vidéos                12829418_170366696987184З_8025228489185882T7_o.jpg            65 K
 Wares                 1359480178.png                                              2.87 M
 2016-03-14-114927_~   1363372246.png                                              1.15 M
 2016-03-14-115229_~   687474707З3a2f2f7261772e67697468756 22e636f6d2f4b4c49~      4.51 K
 boot.svg              6874747073Зa2f2f7261772e676974687562 2e636f6d2f4b4c494~      879 K
 ColorTheory.pdf       6874747073Зa2f2f7261772e676974687562 2e636f6d2f4b4c494~      181 K
 feh_027721_000001_~   214469740319.png                                             539 K
 FontAwesome.pdf       1308080156 56353857.png                                      741 K
 screenFetch-2016-0~   2617998163304971493.jpg                                      724 K
 y                     5839510827751366644.jpg                                      692 K
                       1693793051012349837 1.gif                                    893 K
                       a73d297757696d33a6618ebe8de411e9.jpg                        8.38 K
                       Album SexyaIrte- Imgur.zip                                  32.7 M
                       aWCJR1s.jpg                                                  454 K
                       AwesomeIcones14px.png                                        535 K
                       AwesomeIcones.png                                            535 K
                       clean_arch_linux_wallpaper__1366x768__by_jesuisnerd-~       73.1 K
                       clean_arch_linux_wallpaper__1920x1200__by_jesuisnerd-d~       66 K
                       caus.png                                                     829 K
                       Config-Urxvt.png                                             168 K
                       daenerys__by_guweiz-d9o4zjo.jpg                              730 K
                       davechild_1434402975_keyboard-layer1.png                    54.5 K
                       davechild_1434402993_keyboard-layer2.png                    48.7 K
                       exempleconky.png                                             409 K
                       i3-sheet-cheat.png                                          75.1 K
                       19hLLyq.jpg                                                  571 K
                       linux-arch-linux-logo-brand-1366x768.jpg                     302 K
                       linux-command-line-cheat-sheet.png                           186 K
                       Multi-Cheat-Sheet.png                                        302 K
                       PX128.png                                                    133 K
                       screenshot.png                                              2.03 M
                       Shot.jpg                                                     605 K
                       soothsayer_by_guweiz-d916tb6.jpg                             358 K
                       Spidey-Graphic-Web-2.jpg                                     1.5 M
                       Stef2.gif                                                   10.1 K
                       Stef.gif                                                    10.4 K
                       Stef.xcf                                                    31.6 K
-rw-r--r-- 1 stefane users 730K 2016-02-04 14:21                          58.9M sum, 181G free  30/58  Top
[0] 0:WeeChat 1:4- 1:python*                                          "stefane@MPH-Linux01:~" 13:18 14-mars-1
```

i3wm

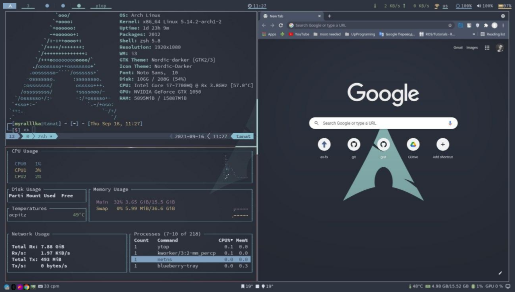
i3

- We will talk more about graphics in one of the folowing lectures
- Short explain: there are three main items in every GUI on your pc:

  DM - Display manager
  WM - Window manager
  DE - Desctop envieronment
- As you can see, i3wm is a window manager
- It is quite similar to everything above in this lecture: vim shortcuts and tmux approach (but for GUI applications)
- In i3 we also have windows and panes, but also workspaces
- All settings located in one file - /.config/i3/config
- As far as there is no DE for i3, you should install everything for yourself (all ap-plets and programs, top/bottom bar, menu)

i3wm example

- Here you can see browser and two terminal emulators opened
- Also polybar with it's applets used as top and bottom bars
- dmenu used as a menu
- All windows located on a same z level, new windows move previous one, so all opened windows are visible (as in TMUX)
- It is called tiling window manager , and I recommend it because it is simpler and faster than all other types
- For more info you can see man i3



```
                  `ooo/                   OS: Arch Linux
                 `+oooo:                  Kernel: x86_64 Linux 5.14.2-arch1-2
                `+oooooo:                 Uptime: 1d 23h 9m
                -+oooooo+:                Packages: 2012
              `/:-:++oooo+:               Shell: zsh 5.8
             `/++++/+++++++:              Resolution: 1920x1080
            `/++++++++++++++:             WM: i3
           `/+++ooooooooooooo/`           GTK Theme: Nordic-darker [GTK2/3]
          ./ooosssso++osssssso+`          Icon Theme: Nordic-Darker
         .oossssso-````/ossssss+`         Font: Noto Sans,  10
        -osssssso.      :ssssssso.        Disk: 106G / 208G (54%)
       :osssssss/        osssso+++.       CPU: Intel Core i7-7700HQ @ 8x 3.8GHz [57.0°C]
      /ossssssss/        +ssssooo/-       GPU: NVIDIA GeForce GTX 1050
    `/ossssso+/:-        -:/+osssso+-     RAM: 5095MiB / 15887MiB
   `+sso+:-`                 `.-/+oso:
  `++:.                           `-/+/
 .`                                  `/
┌[myralllka@tanat] - [~] - [Thu Sep 16, 11:27]
└[$] <>
 12 〉 0 〉 zsh *                                  2021-09-16 〈 11:27  tanat
```

```
CPU Usage
  CPU0   1%
  CPU1   3%
  CPU2   2%

Disk Usage                  Memory Usage
Parti Mount Used  Free
                             Main   32% 3.65 GiB/15.5 GiB
Temperatures                 Swap    0% 5.99 MiB/36.6 GiB
acpitz               49°C

Network Usage                     Processes (7-10 of 218)
                                  Count   Command              CPU%▼ Mem%
Total Rx: 7.88 GiB                1       ytop                 0.1   0.0
Rx/s:     1.97 KiB/s              1       kworker/3:2-mm_percp 0.1   0.0
Total Tx: 493 MiB                 1       netns                0.0   0.0
Tx/s:     0 bytes/s               1       blueberry-tray       0.0   0.3
```

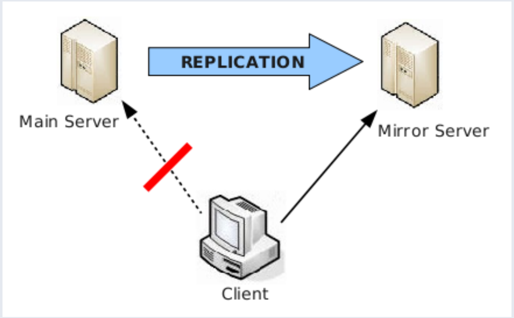
Package managers

Package managers

- This is last but not least topic for today
- Any OS is just a batch of programs
- And Package manager is a tool for installing those programs (also upgrading, configuring, removing, resolving dependencies)
- There are few core new concepts, that we need to understand how it works

Mirrors

- Mirror server (mirror) - servers that located (phisically) in different locations, but contain the same data
- For example: You want to install something, but your internet connection is too slow (or something happend to server at the US), so you dounload package for installation from server located in Germany (or other location)
- See your current list of mirrors (Arch-based): vim /etc/pacman.d/mirrorlist
- Sort them by speed: sudo fetchmirrors -c UA

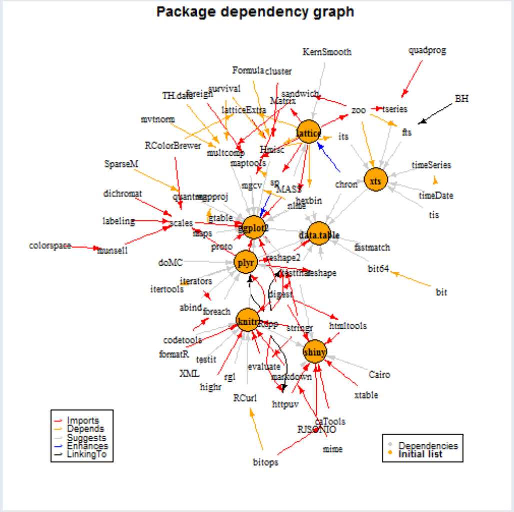


Dependencies

- Another core concept called dependency
- When you write any program, you use some exsiting libraries. So your program depend on that libraries/tools
- All that libraries have its versions
- As far as people change staff in their programs, API can be different from one to other version
- Good package managers can resolve all that dependencies easily (debian’s apt can’t)
- There are immidiet (your program use it) and transitive (your dependencies use it) dependencies

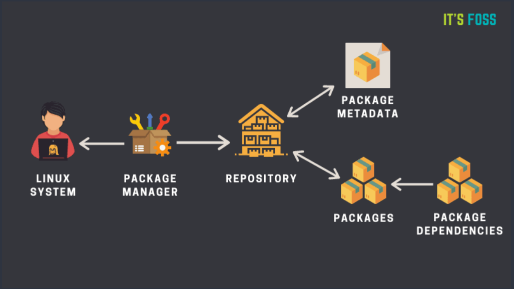
Dependencies

- A lot of programming languages has it’s own package managers (pip for Python, cargo for Rust)
- Almost every Linux-based OS has it’s own package manager
- All packages are erchives with program itself and metadata - software’s name, description of its purpose, version number, vendor, checksum, list of dependencies



Repositories

- One more important thing - repo
- There are official and side repositories
- Package manager supports Official repos by default, but to use some side repos, you should add it manually
- Defferent PacManagers have different approaches for managing repos
- Apt repos are defined in /etc/apt/sources.list and in /etc/apt/sources.list.d directory



Pacman

- Why we love Arch Linux so much? Mostly because of this guy =)
- Pacman has all settings in /etc/pacman.conf file
- Main repositories are:

  core (main OS elements)
  extra (not main, but important OS elements as GUI)
  community (packages that have been adopted by Trusted Users from AUR)
  multilib (32-bit software and libraries for old staff)
  AUR (Arch User Repository, the best bigger Linux repo)

Releases

- Release system is the concept of frequently delivering updates to applications
- It usually depends on the OS (but also on PacManagers)
- Rolling Release . There is no such thing as Arch 1 , Gentoo 2 or Void Linux 3 . That’s because these OS’s have a Rolling Release model - its repos contain all (not always stable) new programs, but also previous versions of all packages. Good for people who like to test new programs or languages, real geeks. Often updates require
- Stable Release . A properly tested version of the product is released, sometimes half a year after it first appears. For example, python 3.9 was in pacman two days after official release, but in apt - more then half a year after. Good for average users, easy to maintain (updates are only every week/month)
- LTS - Long term support. For this system, package manager freeze some special versions of all libraries and programs, and only minor bug or security fixes are released for a long term (sometimes up to decades). Good for corporations, big companies. If something is not working - reinstall the system as it was at the very beginning, and everything will work again. The easiest to maintain

Sources

Sources

- Linux journal
- Termianl Multiplexers
- Tmux tutorial
- Tmux Linux man page
- Dual pane file manager history
- Ranger github page
- Wiki package managers
- Pacman ArchWiki
- External Repositories Ubuntu
- Releases Wiki