skn telephoners

Linux Basics

Warsztaty z podstaw obsługi Linuxa

Sebastian Rapa
Bruno Banaszczyk

Wprowadzenie

„Linux to wolność: wolność modyfikacji, udostępniania i nauki”

1991

Linus Torvalds, student Uniwersytetu Helsińskiego, tworzy Linux jako alternatywę dla Minix, małego systemu operacyjnego do nauki

Minix ⟶ **Linux**

1993

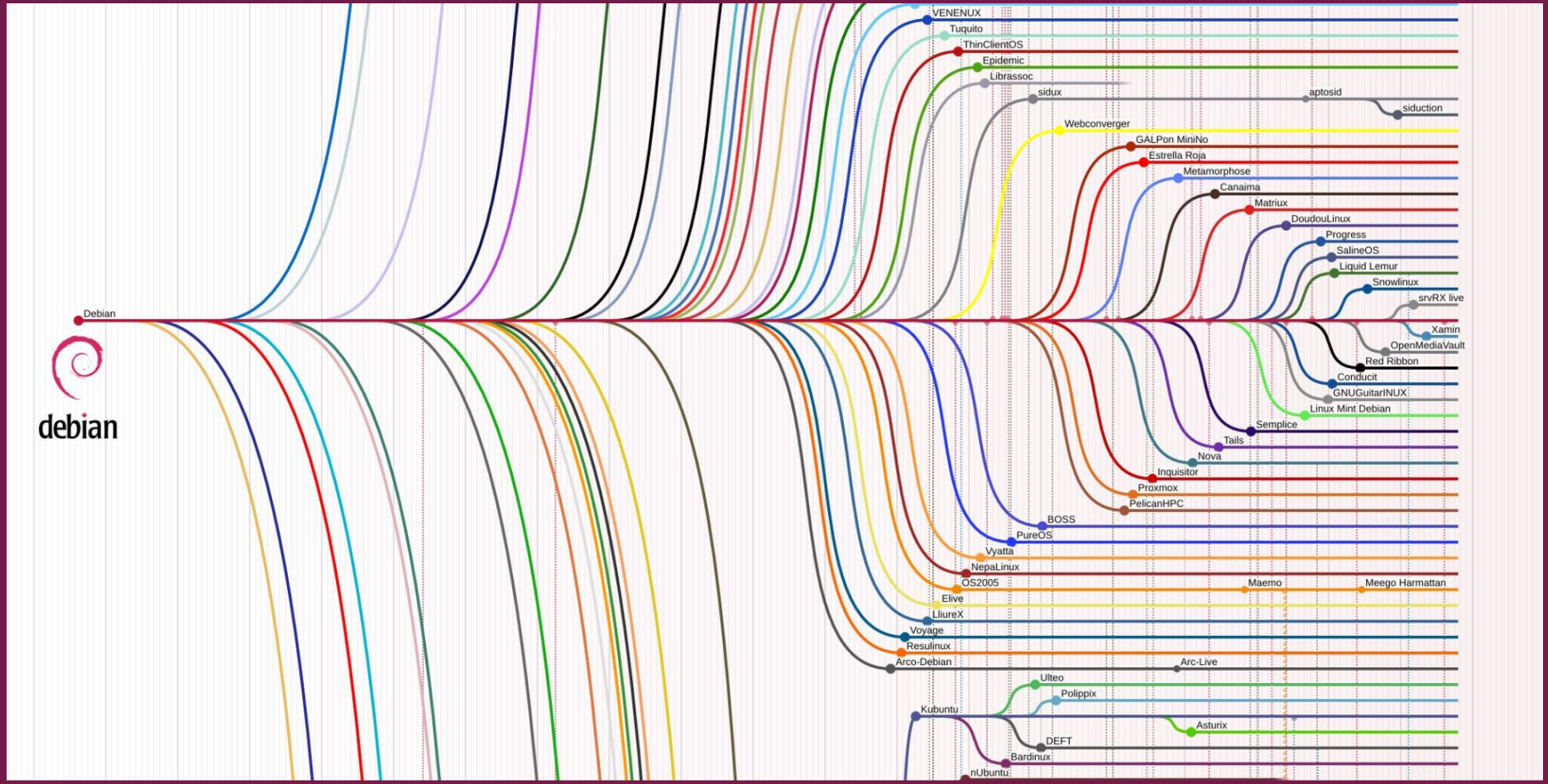
Debian distributions is created

debian

2002 - 2004

Powstanie najpopularniejszych do dnia dzisiejszego dystrybucji Linuxa

ubuntu


Debian
debian
VENENUX
Tuquito
ThinClientOS
Epidemic
Librassoc
sidux
aptosid
siduction
Webconverger
GALPon MiniNo
Estrella Roja
Metamorphose
Canaima
Matriux
DoudouLinux
Progress
SalineOS
Liquid Lemur
Snowlinux
srvRX live
Xamin
OpenMediaVault
Red Ribbon
Conducit
GNUGuitarINUX
Linux Mint Debian
Semplice
Tails
Nova
Inquisitor
Proxmox
PelicanHPC
BOSS
PureOS
Vyatta
NepaLinux
OS2005
Maemo
Meego Harmattan
Elive
LliureX
Voyage
Resulinux
Arco-Debian
Arc-Live
Ulteo
Polippix
Kubuntu
Asturix
DEFT
Bardinux
nUbuntu

Dlaczego Linux

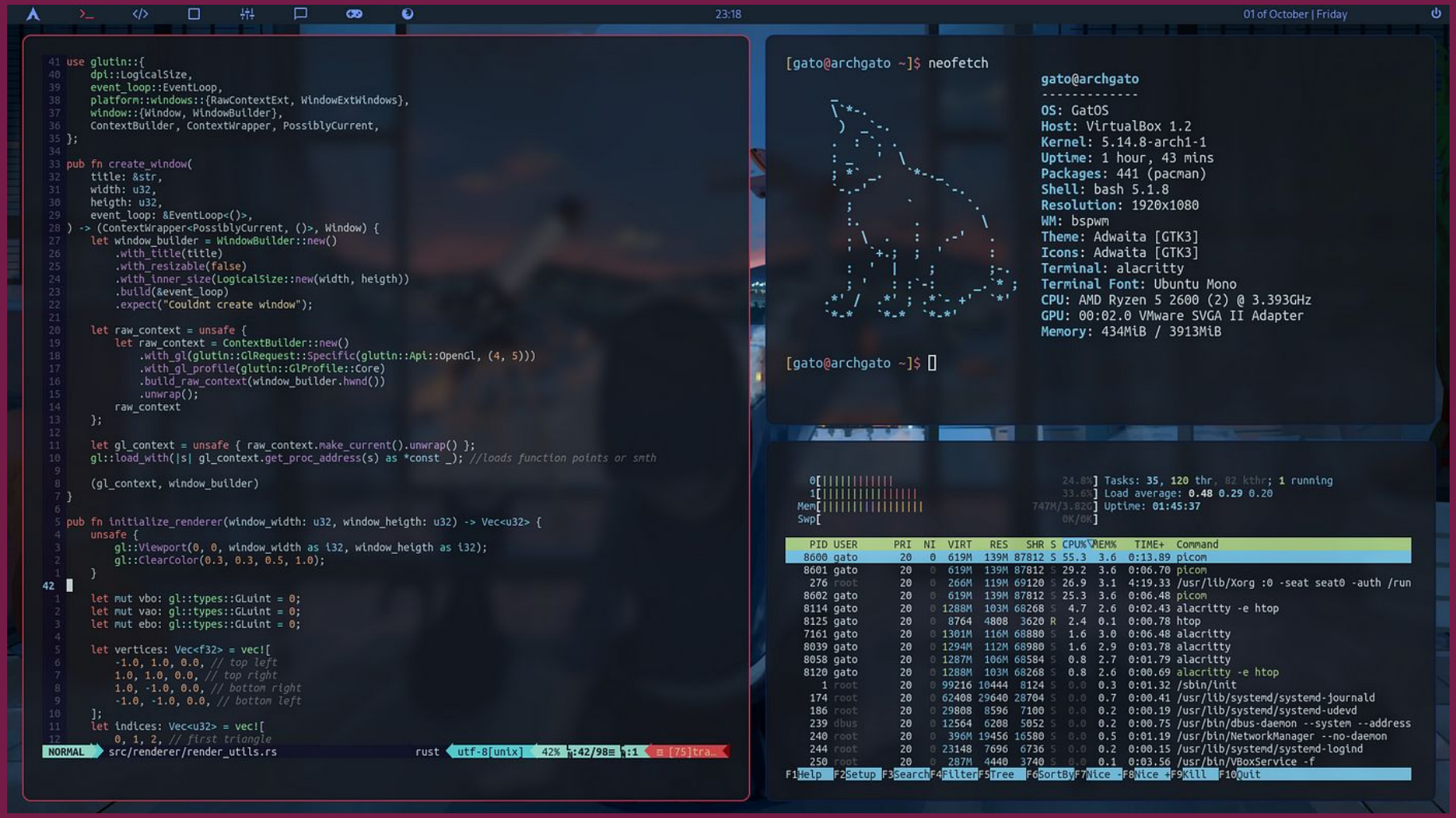
1. Cost-Free and Open Source

2. Stability and Reliability

3. Customization

4. Community Support and Documentation

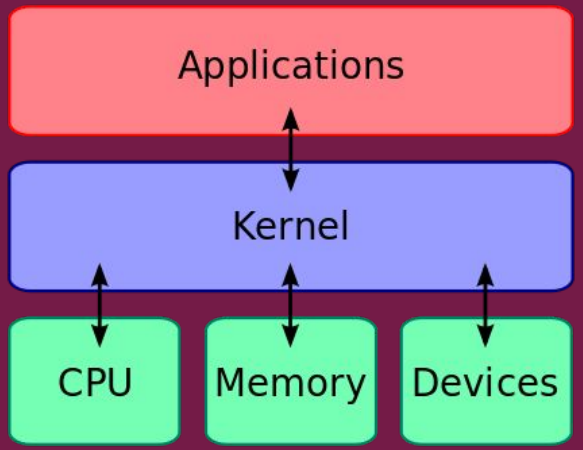
5. Developer-Friendly


23:18
01 of October | Friday
use glutin::{
dpi::LogicalSize,
event_loop::EventLoop,
platform::windows::{RawContextExt, WindowExtWindows},
window::{Window, WindowBuilder},
ContextBuilder, ContextWrapper, PossiblyCurrent,
};
pub fn create_window(
title: &str,
width: u32,
heigth: u32,
event_loop: &EventLoop<()>,
) -> (ContextWrapper<PossiblyCurrent, ()>, Window) {
let window_builder = WindowBuilder::new()
.with_title(title)
.with_resizable(false)
.with_inner_size(LogicalSize::new(width, heigth))
.build(&event_loop)
.expect("Couldnt create window");
let raw_context = unsafe {
let raw_context = ContextBuilder::new()
.with_gl(glutin::GlRequest::Specific(glutin::Api::OpenGl, (4, 5)))
.with_gl_profile(glutin::GlProfile::Core)
.build_raw_context(window_builder.hwnd())
.unwrap();
raw_context
};
let gl_context = unsafe { raw_context.make_current().unwrap() };
gl::load_with(|s| gl_context.get_proc_address(s) as *const _); //loads function points or smth
(gl_context, window_builder)
}
pub fn initialize_renderer(window_width: u32, window_heigth: u32) -> Vec<u32> {
unsafe {
gl::Viewport(0, 0, window_width as i32, window_heigth as i32);
gl::ClearColor(0.3, 0.3, 0.5, 1.0);
}
let mut vbo: gl::types::GLuint = 0;
let mut vao: gl::types::GLuint = 0;
let mut ebo: gl::types::GLuint = 0;
let vertices: Vec<f32> = vec![
-1.0, 1.0, 0.0, // top left
1.0, 1.0, 0.0, // top right
1.0, -1.0, 0.0, // bottom right
-1.0, -1.0, 0.0, // bottom left
];
let indices: Vec<u32> = vec![
0, 1, 2, // first triangle
NORMAL
src/renderer/render_utils.rs
rust
utf-8[unix]
42%
42/98
1
[75]tra
[gato@archgato ~]$ neofetch
gato@archgato
OS: GatOS
Host: VirtualBox 1.2
Kernel: 5.14.8-arch1-1
Uptime: 1 hour, 43 mins
Packages: 441 (pacman)
Shell: bash 5.1.8
Resolution: 1920x1080
WM: bspwm
Theme: Adwaita [GTK3]
Icons: Adwaita [GTK3]
Terminal: alacritty
Terminal Font: Ubuntu Mono
CPU: AMD Ryzen 5 2600 (2) @ 3.393GHz
GPU: 00:02.0 VMware SVGA II Adapter
Memory: 434MiB / 3913MiB
[gato@archgato ~]$
0[24.8%] Tasks: 35, 120 thr, 82 kthr; 1 running
1[33.6%] Load average: 0.48 0.29 0.20
Mem[747M/3.82G] Uptime: 01:45:37
Swp[0K/0K]
PID USER PRI NI VIRT RES SHR S CPU% MEM% TIME+ Command
8600 gato 20 0 619M 139M 87812 S 55.3 3.6 0:13.89 picom
8601 gato 20 0 619M 139M 87812 S 29.2 3.6 0:06.70 picom
276 root 20 0 266M 119M 69120 S 26.9 3.1 4:19.33 /usr/lib/Xorg :0 -seat seat0 -auth /run
8602 gato 20 0 619M 139M 87812 S 25.3 3.6 0:06.48 picom
8114 gato 20 0 1288M 103M 68268 S 4.7 2.6 0:02.43 alacritty -e htop
8125 gato 20 0 8764 4808 3620 R 2.4 0.1 0:00.78 htop
7161 gato 20 0 1301M 116M 68880 S 1.6 3.0 0:06.48 alacritty
8039 gato 20 0 1294M 112M 68980 S 1.6 2.9 0:03.78 alacritty
8058 gato 20 0 1287M 106M 68584 S 0.8 2.7 0:01.79 alacritty
8120 gato 20 0 1288M 103M 68268 S 0.8 2.6 0:00.69 alacritty -e htop
1 root 20 0 99216 10444 8124 S 0.0 0.3 0:01.32 /sbin/init
174 root 20 0 62408 29640 28704 S 0.0 0.7 0:00.41 /usr/lib/systemd/systemd-journald
186 root 20 0 29808 8596 7100 S 0.0 0.2 0:00.19 /usr/lib/systemd/systemd-udevd
239 dbus 20 0 12564 6208 5052 S 0.0 0.2 0:00.75 /usr/bin/dbus-daemon --system --address
240 root 20 0 396M 19456 16580 S 0.0 0.5 0:01.19 /usr/bin/NetworkManager --no-daemon
244 root 20 0 23148 7696 6736 S 0.0 0.2 0:00.15 /usr/lib/systemd/systemd-logind
250 root 20 0 287M 4440 3740 S 0.0 0.1 0:03.56 /usr/bin/VBoxService -f
F1Help F2Setup F3Search F4Filter F5Tree F6SortBy F7Nice - F8Nice + F9Kill F10Quit

Podstawowe pojęcia

kernel, shell, file system, package manager

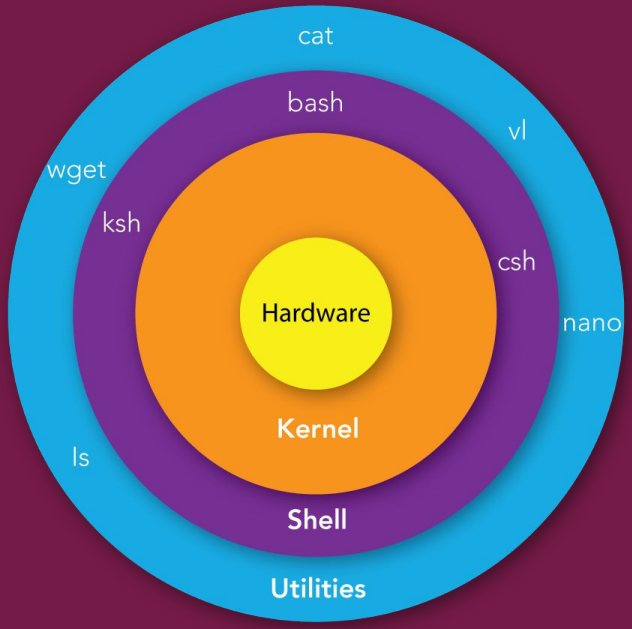
Kernel (jądro)




```
Linux version 5.17.3 (root@cbdev) (gcc (Gentoo 11.2.1_p20220115 p4) 11.2.1 20220115, GNU ld (Gentoo 2.38 p3) 2.38) #1 SMP PRE
Command line: root=/dev/nvme0n1p5
x86/fpu: Supporting XSAVE feature 0x001: 'x87 floating point registers'
x86/fpu: Supporting XSAVE feature 0x002: 'SSE registers'
x86/fpu: Supporting XSAVE feature 0x004: 'AVX registers'
x86/fpu: Supporting XSAVE feature 0x008: 'MPX bounds registers'
x86/fpu: Supporting XSAVE feature 0x010: 'MPX CSR'
x86/fpu: xstate_offset[2]:  576, xstate_sizes[2]:  256
x86/fpu: xstate_offset[3]:  832, xstate_sizes[3]:   64
x86/fpu: xstate_offset[4]:  896, xstate_sizes[4]:   64
x86/fpu: Enabled xstate features 0x1f, context size is 960 bytes, using 'compacted' format.
signal: max sigframe size: 2032
BIOS-provided physical RAM map:
BIOS-e820: [mem 0x0000000000000000-0x000000000009efff] usable
BIOS-e820: [mem 0x000000000009f000-0x000000000000ffff] reserved
BIOS-e820: [mem 0x0000000000100000-0x000000006a5b6fff] usable
BIOS-e820: [mem 0x000000006a5b7000-0x000000006e794fff] reserved
BIOS-e820: [mem 0x000000006e795000-0x000000006fb1efff] ACPI NVS
BIOS-e820: [mem 0x000000006fb1f000-0x000000006fc4efff] ACPI data
BIOS-e820: [mem 0x000000006fc4f000-0x000000006fc4ffff] usable
BIOS-e820: [mem 0x000000006fc50000-0x0000000077ffffff] reserved
BIOS-e820: [mem 0x0000000078000000-0x0000000078bfffff] usable
BIOS-e820: [mem 0x0000000078c00000-0x000000007e7fffff] reserved
BIOS-e820: [mem 0x0000000100000000-0x000000047f7fffff] usable
NX (Execute Disable) protection: active
e820: update [mem 0x48378018-0x48388057] usable ==> usable
e820: update [mem 0x48378018-0x48388057] usable ==> usable
extended physical RAM map:
reserve setup_data: [mem 0x0000000000000000-0x000000000009efff] usable
reserve setup_data: [mem 0x000000000009f000-0x000000000000ffff] reserved
reserve setup_data: [mem 0x0000000000100000-0x0000000048378017] usable
reserve setup_data: [mem 0x0000000048378018-0x0000000048388057] usable
reserve setup_data: [mem 0x0000000048388058-0x000000006a5b6fff] usable
reserve setup_data: [mem 0x000000006a5b7000-0x000000006e794fff] reserved
```

Average Linux kernel developer

Shell



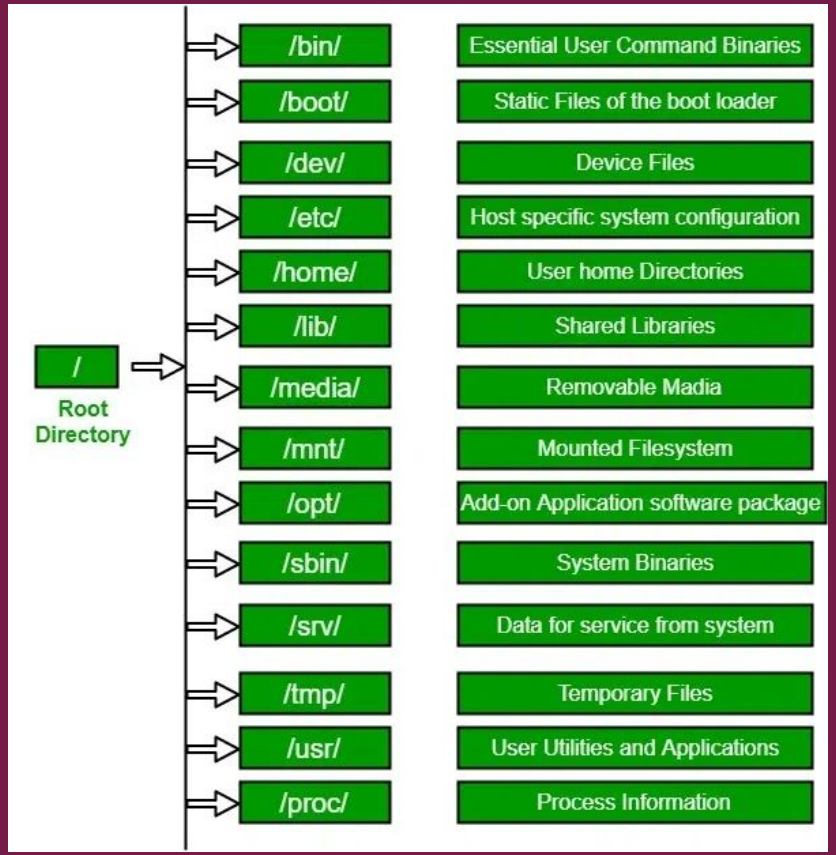
zsh

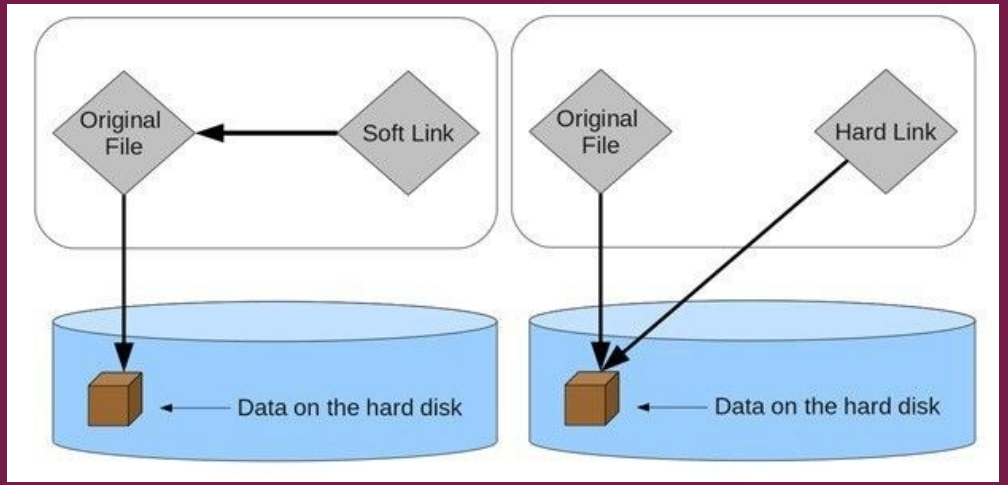
```
~ ❯ cd testproject
~/testproject  master ❯ gco detached-head-state -q
~/testproject  ~ fdffaf6 ❯ touch dirty-working-directory
~/testproject  ~ fdffaf6± ❯ cd
~ ❯ ssh milly
Welcome to Ubuntu 11.04 (GNU/Linux 2.6.18-308.8.2.el5.028stab101.1 x86_64)
Last login: Wed Sep 26 03:42:49 2012 from 71-215-222-90.mpls.qwest.net
 agnoster@milly ~
Connection to milly.agnoster.net closed.
~ ❯ sudo -s
Password:
⚡ root@Arya ~ ❯ top &
[1] 34523
[1]  + 34523 suspended (tty output)  top
⚡ ⚙ root@Arya ~ ❯ rm no-such-file
rm: no-such-file: No such file or directory
✘ ⚡ ⚙ root@Arya ~ ❯ kill %%
[1]  + 34523 terminated  top
⚡ root@Arya ~
~ ❯
```

bash

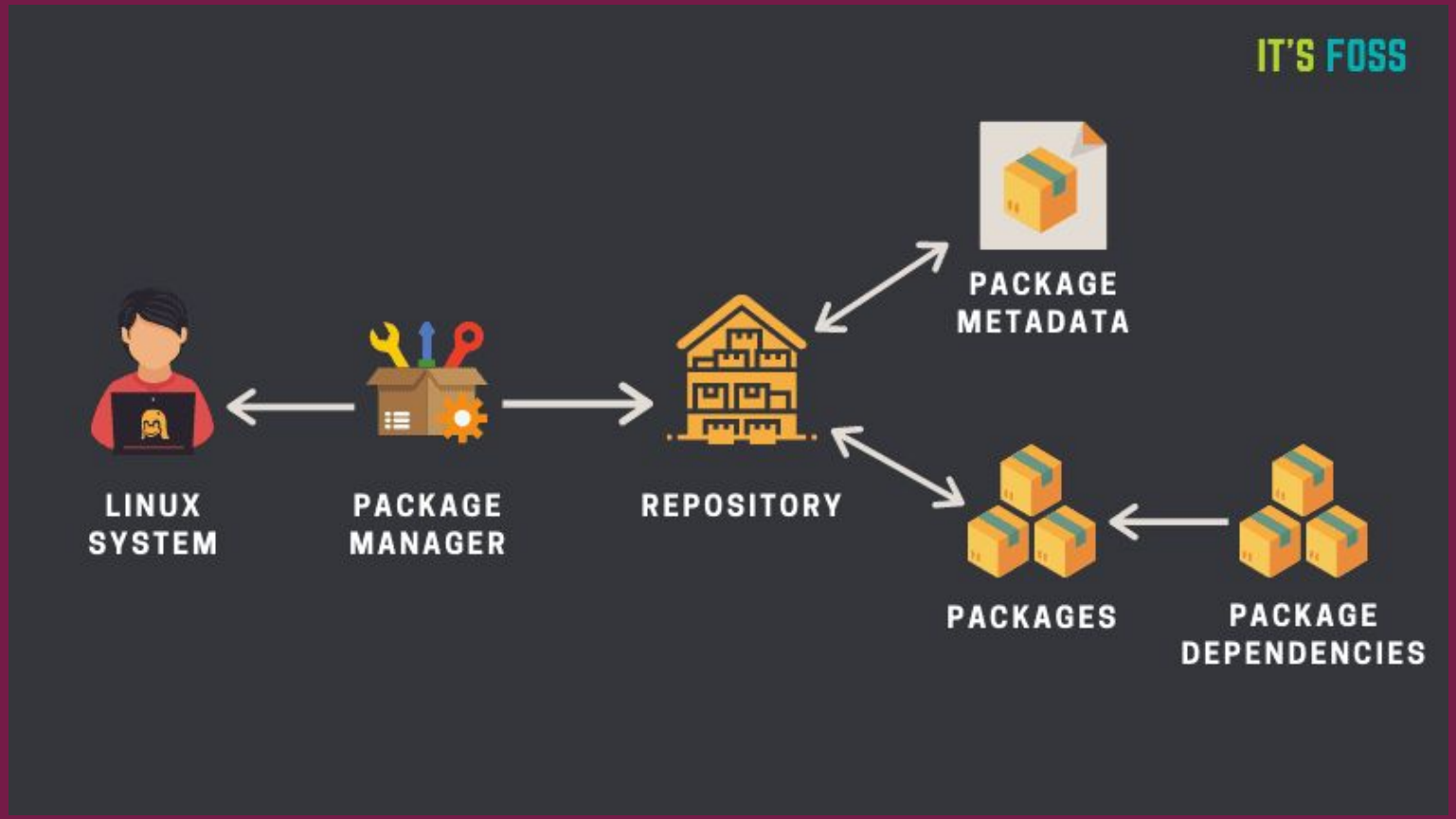
```
aviator@DESKTOP-DRVR138: /c/Windows/System32
aviator@DESKTOP-DRVR138:/c/Windows/System32$ whatis history
history (3readline)  - GNU History Library
aviator@DESKTOP-DRVR138:/c/Windows/System32$ cat --help
Usage: cat [OPTION]... [FILE]...
Concatenate FILE(s) to standard output.

With no FILE, or when FILE is -, read standard input.

  -A, --show-all           equivalent to -vET
  -b, --number-nonblank    number nonempty output lines, overrides -n
  -e                       equivalent to -vE
  -E, --show-ends          display $ at end of each line
  -n, --number             number all output lines
  -s, --squeeze-blank      suppress repeated empty output lines
  -t                       equivalent to -vT
  -T, --show-tabs          display TAB characters as ^I
  -u                       (ignored)
  -v, --show-nonprinting   use ^ and M- notation, except for LFD and TAB
      --help     display this help and exit
      --version  output version information and exit

Examples:
  cat f - g  Output f's contents, then standard input, then g's contents.
  cat        Copy standard input to standard output.
```

File system


/
Root Directory
/bin/
Essential User Command Binaries
/boot/
Static Files of the boot loader
/dev/
Device Files
/etc/
Host specific system configuration
/home/
User home Directories
/lib/
Shared Libraries
/media/
Removable Madia
/mnt/
Mounted Filesystem
/opt/
Add-on Application software package
/sbin/
System Binaries
/srv/
Data for service from system
/tmp/
Temporary Files
/usr/
User Utilities and Applications
/proc/
Process Information

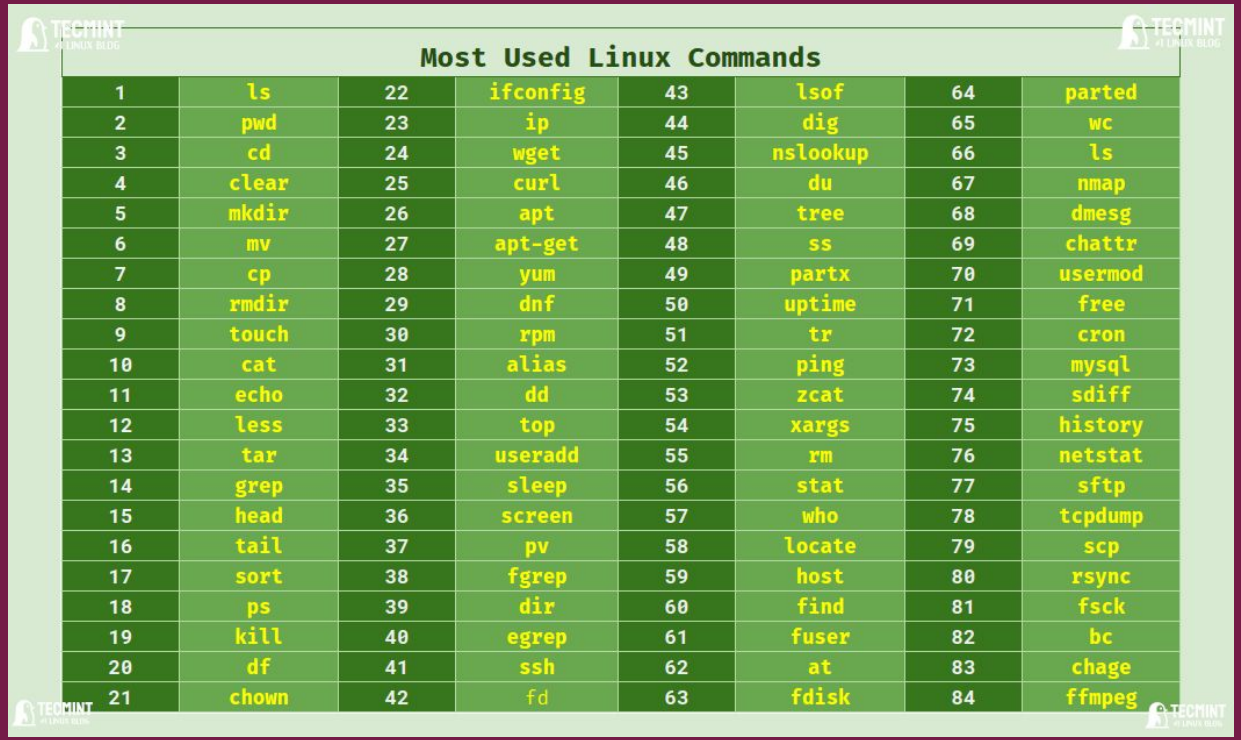

Original File
Soft Link
Data on the hard disk
Original File
Hard Link
Data on the hard disk

Package manager



Komendy

od czego zacząć?



Most Used Linux Commands

1	ls	22	ifconfig	43	lsof	64	parted
2	pwd	23	ip	44	dig	65	wc
3	cd	24	wget	45	nslookup	66	ls
4	clear	25	curl	46	du	67	nmap
5	mkdir	26	apt	47	tree	68	dmesg
6	mv	27	apt-get	48	ss	69	chattr
7	cp	28	yum	49	partx	70	usermod
8	rmdir	29	dnf	50	uptime	71	free
9	touch	30	rpm	51	tr	72	cron
10	cat	31	alias	52	ping	73	mysql
11	echo	32	dd	53	zcat	74	sdiff
12	less	33	top	54	xargs	75	history
13	tar	34	useradd	55	rm	76	netstat
14	grep	35	sleep	56	stat	77	sftp
15	head	36	screen	57	who	78	tcpdump
16	tail	37	pv	58	locate	79	scp
17	sort	38	fgrep	59	host	80	rsync
18	ps	39	dir	60	find	81	fsck
19	kill	40	egrep	61	fuser	82	bc
20	df	41	ssh	62	at	83	chage
21	chown	42	fd	63	fdisk	84	ffmpeg

Nawigacja

jak poruszać się po systemie?

ls

list directory

```
bruno@MSI:~$ ls -l
total 16
drwxr-xr-x 17 bruno bruno 4096 Nov 13 21:31 archive
drwxr-xr-x  4 bruno bruno 4096 Nov 17 22:12 area
drwxr-xr-x  5 bruno bruno 4096 Nov 20 19:07 projects
drwxr-xr-x  9 bruno bruno 4096 Oct 11 18:14 resources
```

pwd

present working directory

```
bruno@MSI:~$ pwd
/home/bruno
```

cd

change directory

```
bruno@MSI:~$ cd /tmp/
bruno@MSI:/tmp$
```

dowiązania

hard links and soft links

```
bruno@MSI:/$ ls -al
total 2460
drwxr-xr-x  47 root root    4096 Nov 25 10:04 .
drwxr-xr-x  47 root root    4096 Nov 25 10:04 ..
```

Operacje na plikach

tworzenie i manipulacja plików

touch

create file

```
bruno@MSI:~$ touch file.txt
bruno@MSI:~$ ls
archive  area  file.txt  projects  resources
```

mv

move

```
bruno@MSI:~/warsztaty$ mv file.txt ~/projects/linux_cli_basics/
bruno@MSI:~/warsztaty$ ls ~/projects/linux_cli_basics/
README.md  file.txt  images  instrukcje
```

echo

send to standard output

```
bruno@MSI:~$ echo "SKN Telephoners"
SKN Telephoners
```

rm

remove

```
bruno@MSI:~/projects/linux_cli_basics$ ls
README.md  file.txt  images  instrukcje
bruno@MSI:~/projects/linux_cli_basics$ rm file.txt
bruno@MSI:~/projects/linux_cli_basics$ ls
README.md  images  instrukcje
```

cp

copy

```
bruno@MSI:~$ cp file.txt warsztaty/
bruno@MSI:~$ cd warsztaty/
bruno@MSI:~/warsztaty$ ls
file.txt
```

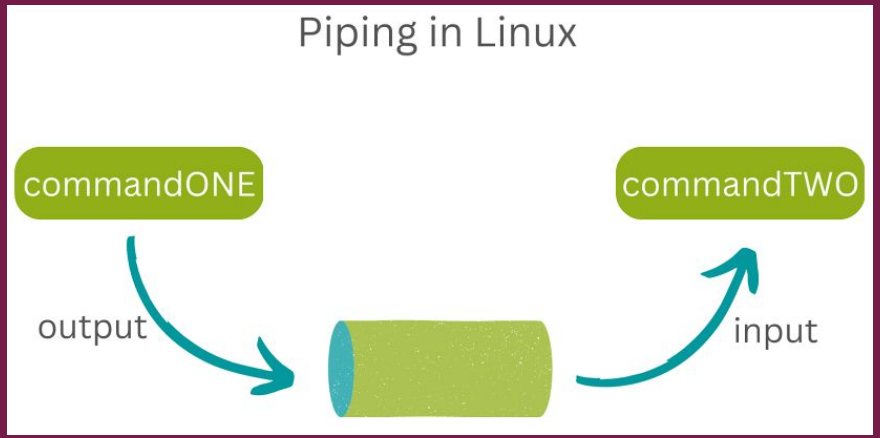
cat

display

```
bruno@MSI:~/projects/linux_cli_basics$ cat instrukcje/warsztaty_linux_1.md
# Instrukcja

Poniżej plan poszczególnych ćwiczeń.
```

Przetwarzanie potokowe

łączenie komend




```
bruno@MSI:/$ cat /etc/passwd | grep postgres
postgres:x:108:118:PostgreSQL administrator,,,:/var/lib/postgresql:/bin/bash
```

Root

czyli superuser

su

switch user

```
bruno@MSI:~$ su root
Password:
root@MSI:/home/bruno#
```

sudo

superuser do

```
bruno@MSI:~$ sudo addgroup guest
```

whoami

kim jestem

```
bruno@MSI:~$ whoami
bruno
bruno@MSI:~$ su root
Password:
root@MSI:/home/bruno# whoami
root
```

Prawa dostępu

users, groups, access rights

ls -l

list directory (long)

```
bruno@MSI:/$ ls -l
total 2452
drwxr-xr-x   3 root root    4096 Jan  8  2024 Docker
lrwxrwxrwx   1 root root       7 May  1  2023 bin → usr/bin
drwxr-xr-x   2 root root    4096 Apr 18  2022 boot
drwxr-xr-x  16 root root    3560 Nov 25 10:04 dev
drwxr-xr-x  99 root root    4096 Nov 25 10:20 etc
```

stat

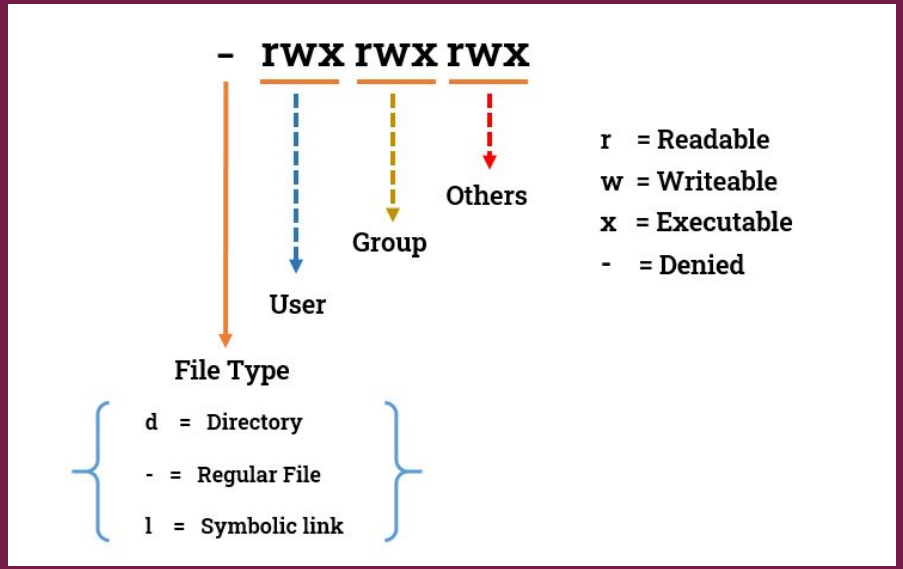
statistics

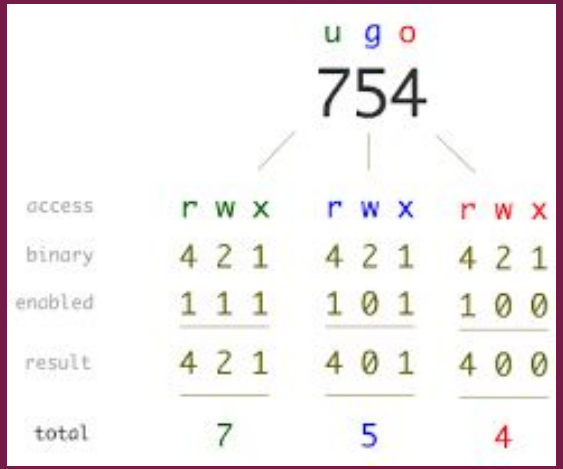
```
bruno@MSI:/$ stat .
  File: .
  Size: 4096            Blocks: 8          IO Block: 4096   directory
Device: 820h/2080d      Inode: 2           Links: 47
Access: (0755/drwxr-xr-x)  Uid: (    0/    root)   Gid: (    0/    root)
Access: 2024-11-25 10:04:11.412953676 +0100
Modify: 2024-11-25 10:04:11.012953672 +0100
Change: 2024-11-25 10:04:11.012953672 +0100
 Birth: 2023-06-18 18:42:27.000000000 +0200
```

/etc/passwd

users list

```
bruno@MSI:/$ cat /etc/passwd
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/bin/sync
```


- rwx rwx rwx
User
Group
Others
File Type
d = Directory
- = Regular File
l = Symbolic link
r = Readable
w = Writeable
x = Executable
- = Denied


u g o
754
access
r w x
r w x
r w x
binary
4 2 1
4 2 1
4 2 1
enabled
1 1 1
1 0 1
1 0 0
result
4 2 1
4 0 1
4 0 0
total
7
5
4

Zmiana uprawnień

chmod, chown, chgrp

chmod
change mode

```
bruno@MSI:~$ sudo chmod 700 file.txt
[sudo] password for bruno:
bruno@MSI:~$ stat file.txt
  File: file.txt
  Size: 0               Blocks: 0
Device: 820h/2080d      Inode: 38355
Access: (0700/-rwx------)  Uid: ( 1000
```

chown
change owner

```
bruno@MSI:~$ sudo chown postgres file.txt
bruno@MSI:~$ ls -l
total 20
drwxr-xr-x 17 bruno    bruno 4096 Nov 13 21:31 archive
drwxr-xr-x  4 bruno    bruno 4096 Nov 17 22:12 area
-rwx------  1 postgres bruno    0 Nov 25 10:41 file.txt
```

chgrp
change group

```
bruno@MSI:~$ sudo chgrp root file.txt
bruno@MSI:~$ ls -l
total 20
drwxr-xr-x 17 bruno    bruno 4096 Nov 13 21:31 archive
drwxr-xr-x  4 bruno    bruno 4096 Nov 17 22:12 area
-rwx------  1 postgres root    0 Nov 25 10:41 file.txt
```

Grupy

po co grupy?

guest

admin

Informacje przed rozpoczęciem

ważne

1. Instrukcję wykonuj w katalogu domowym: **/home/student** lub **~** (chyba że w instrukcji podano inaczej).
2. Przy tworzeniu użytkowników **zignoruj komunikat o zbyt krótkim haśle** (jeśli się pojawi) i użyj hasła z instrukcji.

Link do repozytorium:

https://github.com/bingoobongoo/linux_cli_basics

> Dzieki za feedback

SKN Telephoners