



modern linux cli tools

Patrick Drechsler





Patrick Drechsler

.NET Developer with focus on

- Software Crafting
- Functional Programming
- Domain-Driven Design
- "This is the year of linux on the desktop" ;-)



MATHEMA: ...entwickeln individuelle Business-Software und Industrie-Applikationen. Wir nutzen Erfahrungen, Methoden und bewährte Technologien aus über 100 Projekten. Unsere Experten an Ihrer Seite machen Sie fit für die digitale Zukunft.





"modern" is relative...

Douglas Adams

I've come up with a set of rules that describe our reactions to technologies:

- Anything that is in the world **when you're born** is normal and ordinary and is just a natural part of the way the world works.
- Anything that's invented **between when you're fifteen and thirty-five** is new and exciting and revolutionary and you can probably get a career in it.
- Anything invented **after you're thirty-five** is against the natural order of things.





Target audience

- linux desktop CLI users
- linux admins
- docker users
- ...

/--This is the year of linux on the desktop--\

| ... Windows10 has WSL ; -)

\ \ ^ ^
 { oo } \-----) \/\\
 || ---W ||



Linux tooling philosophy

- **do one thing (and only one thing!) well**
- **chaining**
- *sound familiar? (hint: functional programming...)*



Why? Improvements to...

- **productivity**
- **optics**
 - "unix porn" (``PS1``, ``ls``, ...)



Learn the basics

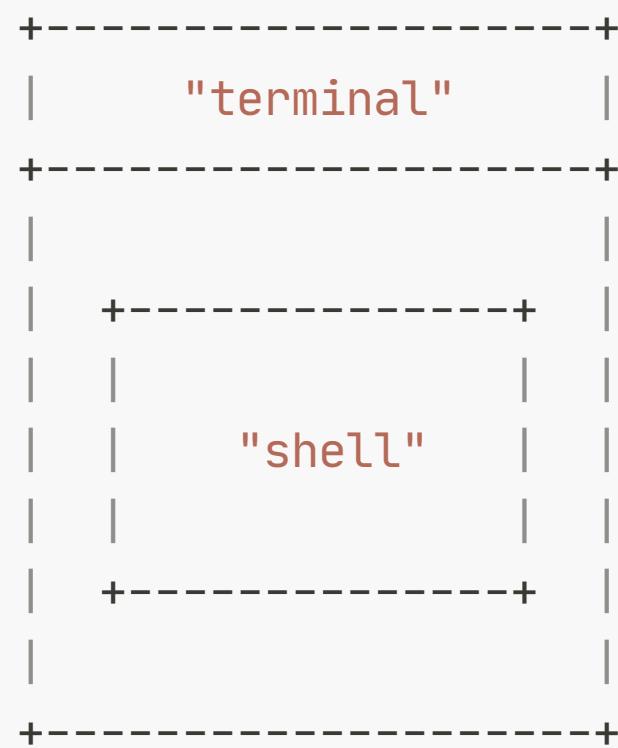
VS Code is cool, but it is not a CLI tool

- Emacs and Vim:
 - navigation within file
 - cut, copy & paste
 - navigation between files
 - and how to exit
 - pick one and become fluent
- Learn basic cli commands: ``cd``, ``ls``, ``cat``,
``less``, ``find``, ``grep``, ``sed``, ``tail``, ``awk``,
``dd``, ``rsync``, ...
- Combine using pipes (``|``) and redirection (``>``)





terminal and shell: what's the difference?



terminal

- colors (16 or more),
- fonts (utf8, ligatures, emojis, ...)
- interactions
 - keyboard shortcuts
 - mouse interaction (copy & paste, scrolling, selection, ...)

shell

- everything else (f.ex. `PS1`, scripting language)



terminal

What is the best terminal?

- use your default

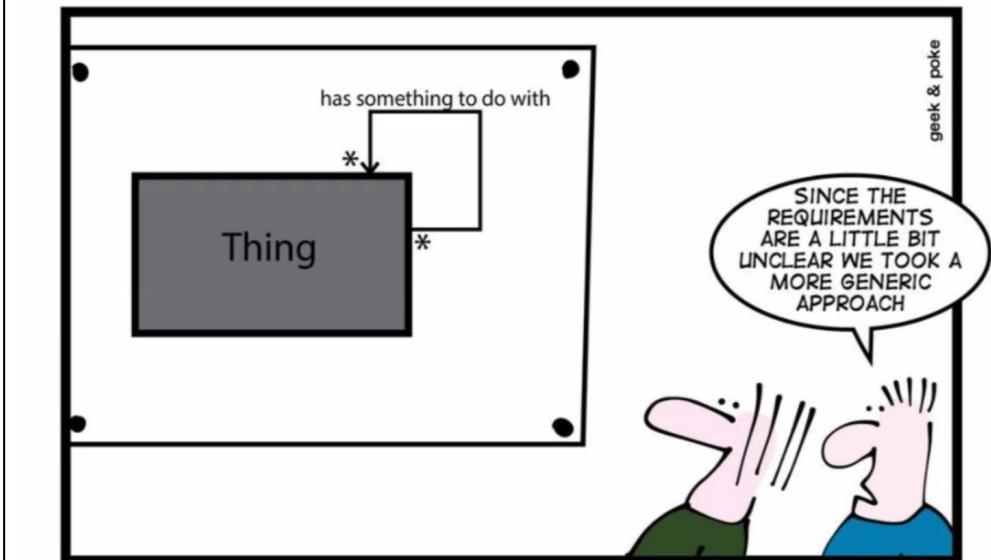
Unicode, Emojis, Fonts, Image support (!)

- but think about enriching your output!

- Emojis:

[me/patrick/cli-talk-demos/geek_and_poke_stable_data_model.png](#)

some-project 11 ↗
geek_and_poke_stable_data_.png 380 K
notes.md 149 B



HOW TO CREATE A STABLE DATA MODEL

some-project on main .NET v5.0.204 net5.0

> ls

rwxr-xr-x	1	patrick	10 B	Tue Jun 15 20:30:51 2021					
rwxr-xr-x	1	patrick	182 B	Tue Jun 15 20:32:20 2021					
rwxr-xr-x	1	patrick	414 B	Tue Jun 15 20:30:51 2021					
rw-r--r--	1	patrick	1 KiB	Tue Jun 15 20:30:51 2021					
rw-r--r--	1	patrick	2 KiB	Tue Jun 15 20:30:51 2021					
rw-r--r--	1	patrick	2 KiB	Tue Jun 15 20:30:51 2021					
rw-r--r--	1	patrick	3 KiB	Tue Jun 15 20:30:51 2021					
rw-r--r--	1	patrick	7 KiB	Tue Jun 15 20:32:16 2021					
rw-r--r--	1	patrick	47 B	Tue Jun 15 20:30:51 2021					
rw-r--r--	1	patrick	224 B	Tue Jun 15 20:30:51 2021					
rw-r--r--	1	patrick	352 B	Tue Jun 15 20:30:51 2021					

bin/
git .git/
obj/
ApplicativeDemo.fsproj
Demo1.fs
Demo2.fs
Demo3.fs
.gitignore
Program.fs
README.md
TestHelper.fs



Popular shells

- bash
- zsh
- fish
- dash (embedded)

bash

- <https://www.gnu.org/software/bash/>
- package manager
 - bash-it: ⚡ 12k stars <https://github.com/Bash-it/bash-it>
 - oh-my-bash: ⚡ 2k stars <https://ohmybash.github.io>

zsh

- <https://www.zsh.org/>
- package manager
 - oh-my-zsh: ⚡ 128k stars <https://ohmyz.sh>

fish: The new kid on the block

- <https://fishshell.com>
- package manager
 - fisher: ⚡ 5k stars <https://github.com/jorgebucaran/fisher>
 - oh-my-fish: ⚡ 7k stars <https://github.com/oh-my-fish/oh-my-fish>



PS1: alias for "prompt"

- default: `username@machinename:~/some/location \$`
- `"\$PWD"` present working directory

Extra, nice-to-have information

- only show relevant parts (hide user/machine name on local machine)
- compact location (`"\$PWD"`)
- git status
- environment infos (node / .NET / Java / Python / etc version)



PS1: Powerline

started as fancy statusline for `vim` ...

- GitHub icon 12k stars <https://github.com/powerline/powerline>
- good-looking default settings
 - shortens `\$PWD`
 - adds git status
 - stable & customizable
- available for `zsh`, `bash`, etc

```
~ > code > dotfiles > master > $ git branch
* master
~ > code > dotfiles > master > $ badcmd
bash: badcmd: command not found
~ > code > dotfiles > master > $ cd ~/deep/down/into/the/abyss/of/directories/where/no/one/ever/comes/
~ > deep > ... > no > one > ever > comes > master > $
```

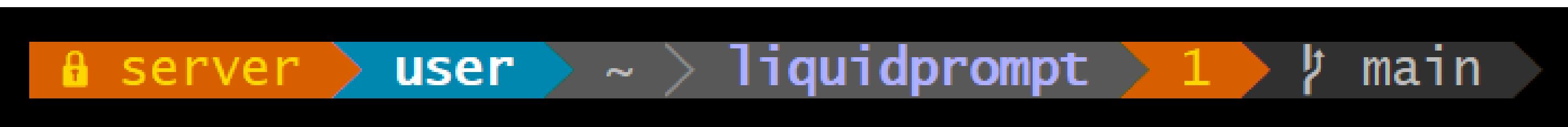


PS1: liquidprompt

simple prompt

- GitHub icon 4k stars <https://github.com/nojhan/liquidprompt>
- simpler default compared to Powerline
 - shortens `\$PWD`
 - adds git status
 - can be combined with Powerline
- available for `zsh`, `bash`, etc
- category: unix-porn

```
1& [user@server:~/liquidprompt] main ±
```





PS1: Starship

the new kid on the block

- GitHub icon 16k stars <https://github.com/starship/starship>
- cross-platform, cross-shell
- stylish
- great defaults for many environments
- easy to configure
- category: unix-porn



The minimal, blazing-fast, and infinitely customizable prompt for any shell!

A screenshot of a terminal window on a Mac OS X desktop. The window has red, yellow, and green title bar buttons. The prompt shows the user's path (~/.dev) and a command (false). The text is colored in a style consistent with the Starship theme.

```
fish /Users/matan/dev  
~/dev > false
```



terminal-independent shell UI

- GitHub icon 21k stars <https://github.com/tmux/tmux>
- terminal multiplexer
- "tabs" and "split screen" features: terminal independent
- detachable sessions
- plugin system & package manager (of course)
- customizable
- scriptable: f. ex. ``tmuxinator``



`tmux` -wrapper for non-vim users

- (mirrored repo: ~500 stars) <http://byobu.co/>
- Keybindings `F1` - `F12`
- Sensible defaults (layout, info line)
- category: productivity



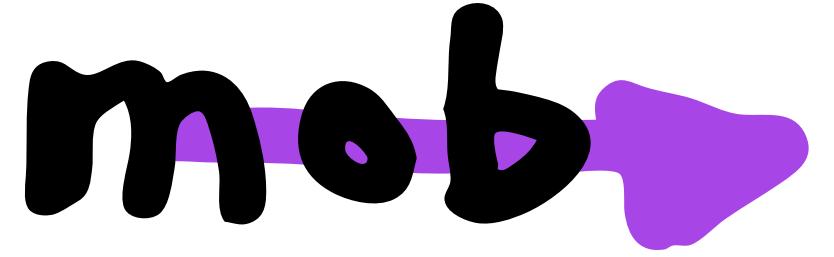
Smooth git handover

- ~0.5k stars <https://mob.sh/>
- remote ensemble or pair programming using screen sharing

```
## first user
mob start 5
mob next

## second user
mob start 5
mob next

## any user, wanting to make a normal commit
mob done
```





Tip: Learn ensemble programming next week

<https://www.xing.com/events/129-agile-monday-mob-programming-erleben-3493727>



129. Agile Monday - Mob Programming erleben

📅 Mo., 21.06.2021, 19:00 - 21:00 MESZ • [Im Kalender speichern](#)

📍 Online

📝 **Anmeldeschluss:** Mo., 21.06.2021, 19:00 MESZ • **Freie Plätze:** 9



file explorer

-  9k stars <https://ranger.github.io>
- 2 layout options
 - miller columns ("mac" style)
 - multipane (similar to Midnight commander)
- powerful preview mode and program launcher (word, music, ...)
 - with image support for certain terminals (`iTerm2`, `urxvt`, `kitty`) not `gnome-terminal` (!)
- key bindings: see `~/.config/ranger/rc.conf` starting at line ~300...
- category: navigation, file system



Emacs: wdired-mode

- for Emacs users
- https://www.gnu.org/software/emacs/manual/html_node/emacs/Wdired.html
- `emacs -nw .' emacs in current directory in terminal (`-nw` : non-window mode)
- `M-x wdired-change-to-wdired-mode`
- edit (using all emacs features)
- finish: `C-c C-c`
- exit



man pages can be difficult

- GitHub 33k stars <https://tldr.sh/>
- tldr: implemented in many languages (js, ruby, python, perl, haskell, etc)
- Demo: `ln`, `tar`, `scp`

```
~/cli-talk-demos  
❯ tldr scp
```

scp

Secure copy.

Copy files between hosts using Secure Copy Protocol over SSH.
More information: <https://man.openbsd.org/scp>.

- Copy a local file to a remote host:
`scp path/to/local_file remote_host:path/to/remote_file`
- Use a specific port when connecting to the remote host:
`scp -P port path/to/local_file remote_host:path/to/remote_file`
- Copy a file from a remote host to a local directory:
`scp remote_host:path/to/remote_file path/to/local_directory`
- Recursively copy the contents of a directory from a remote host to a local directory:
`scp -r remote_host:path/to/remote_directory path/to/local_directory`
- Copy a file between two remote hosts transferring through the local host:
`scp -3 host1:path/to/remote_file host2:path/to/remote_directory`
- Use a specific username when connecting to the remote host:
`scp path/to/local_file remote_username@remote_host:path/to/remote_directory`
- Use a specific ssh private key for authentication with the remote host:
`scp -i ~/.ssh/private_key local_file remote_host:/path/remote_file`



McFly

an upgraded `ctrl R` **where history results make sense for what you're working on right now**

- 2k stars <https://github.com/cantino/mcfly>
- category: history search

McFly replaces your default `ctrl R` shell history search with an intelligent search engine that takes into account your working directory and the context of recently executed commands. McFly's suggestions are prioritized in real time with a small neural network.



`cat` & `less` with syntax highlighting

- GitHub icon 17k stars <https://github.com/sharkdp/bat>
- hint: can be used as preview by `ranger` ...
- category: file preview



very fast `grep` replacement

- GitHub icon 25k stars <https://github.com/BurntSushi/ripgrep>
- `ripgrep` recursively searches directories for a regex pattern
- sensible defaults: respect ` `.gitignore` , ignores hidden files & folders
- command: ` rg`
- category: search
- use ` rg --hidden -g '! .git' "your search" ` to search all hidden folder except ` `.git`
 - create an alias (maybe ` rgh`?)...



ripgrep-all

ripgrep, but also search in PDFs, E-Books, Office documents, zip, tar.gz, sqlite (!), etc

-  3k stars <https://github.com/phiresky/ripgrep-all>
- command: `rga`
- faster than `pdffgrep` (see website for a benchmark)
- category: search
- Demo: search in Manning books folder



interactive fuzzy search

- 36k stars <https://github.com/junegunn/fzf>
- pipe any line based input to fzf: Example `find * -type f | fzf`
- good integration with other tools
- nice helper methods for
 - files & directories `cd **<TAB>`
 - kill `kill -9 <TAB>`
 - host names `ssh **<TAB>`
 - environment variables & aliases `unset **<TAB>`, `export **<TAB>`, `unalias **<TAB>`
- category: search
- Demos:
 - find files and select them
 - search a text file



simple alternative to `find`

- GitHub icon 17k stars <https://github.com/sharkdp/fd>
- "The command name is 50% shorter than `find`"
- Convenient syntax `fd PATTERN` (instead of `find -iname '*PATTERN*'`)
- Sensible defaults: `~/.gitignore`, ignore hidden files/folders
- fast
- category: search



hyperfine

benchmarking tool

- 7k stars

<https://github.com/sharkdp/hyperfine>

```
# comparing `fd` with `find`
hyperfine --warmup 3 \
    'fd -e jpg -uu' \
    'find -iname "*.jpg"'
```

- category: benchmarking



progress

monitor any kind of "copy"

- 5k stars <https://github.com/Xfennec/progress>
- attach to any kind of copy, even after the fact
- category: monitoring

```
No command currently running: cp, mv, dd, tar, cat, rsync, grep, fgrep, egrep, cut, sort, md5sum,  
sha1sum, sha224sum, sha256sum, sha384sum, sha512sum, adb, gzip, gunzip, bzip2, bunzip2, xz,  
unxz, lzma, unlzma, 7z, 7za, zcat, bzcat, lzcat, split, gpg, or wrong permissions.
```



Ultimate Plumber (up)

interactive REPL for shell piping

- 7k stars <https://github.com/akavel/up>
- interactive piping
- instant live preview
- category: search, file manipulation, interactive





Rainbows and unicorns

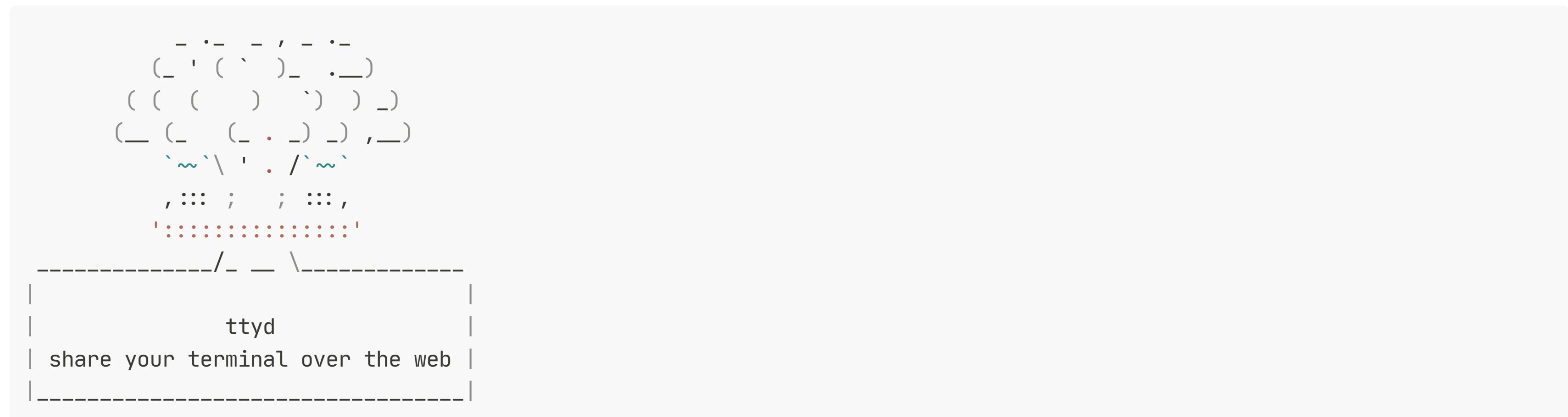
- 4k stars <https://github.com/busyloop/lolcat>
- category: fun, unix porn

```
~/cli-talk-demos
> lc | lolcat
rwxr-xr-x 1 patrick 182 B Thu Jun 17 07:24:41 2021 ➔ search-project/
rwxr-xr-x 1 patrick 872 B Wed Jun 16 01:30:02 2021 ➔ search-project-pdf/
rwxr-xr-x 1 patrick 196 B Tue Jun 15 20:32:18 2021 ➔ some-project/
rw-r--r-- 1 patrick 379 KiB Tue Jun 15 20:39:21 2021 📸 geek_and_poke_stable_data_model.png
rw-r--r-- 1 patrick 23 B Tue Jun 15 22:01:28 2021 ➤ live-notes.md
rw-r--r-- 1 patrick 149 B Tue Jun 15 16:40:27 2021 ➤ notes.md
rw-r--r-- 1 patrick 2 GiB Wed Jun 16 01:28:31 2021 ➔ ubuntu-20.04.2.0-desktop-amd64.iso

~/cli-talk-demos
> lc | lolcat
rwxr-xr-x 1 patrick 182 B Thu Jun 17 07:24:41 2021 ➔ search-project/
rwxr-xr-x 1 patrick 872 B Wed Jun 16 01:30:02 2021 ➔ search-project-pdf/
rwxr-xr-x 1 patrick 196 B Tue Jun 15 20:32:18 2021 ➔ some-project/
rw-r--r-- 1 patrick 379 KiB Tue Jun 15 20:39:21 2021 📸 geek_and_poke_stable_data_model.png
rw-r--r-- 1 patrick 23 B Tue Jun 15 22:01:28 2021 ➤ live-notes.md
rw-r--r-- 1 patrick 149 B Tue Jun 15 16:40:27 2021 ➤ notes.md
rw-r--r-- 1 patrick 2 GiB Wed Jun 16 01:28:31 2021 ➔ ubuntu-20.04.2.0-desktop-amd64.iso
```



- <https://tsl0922.github.io/ttyd/>



- category: network, dangerous



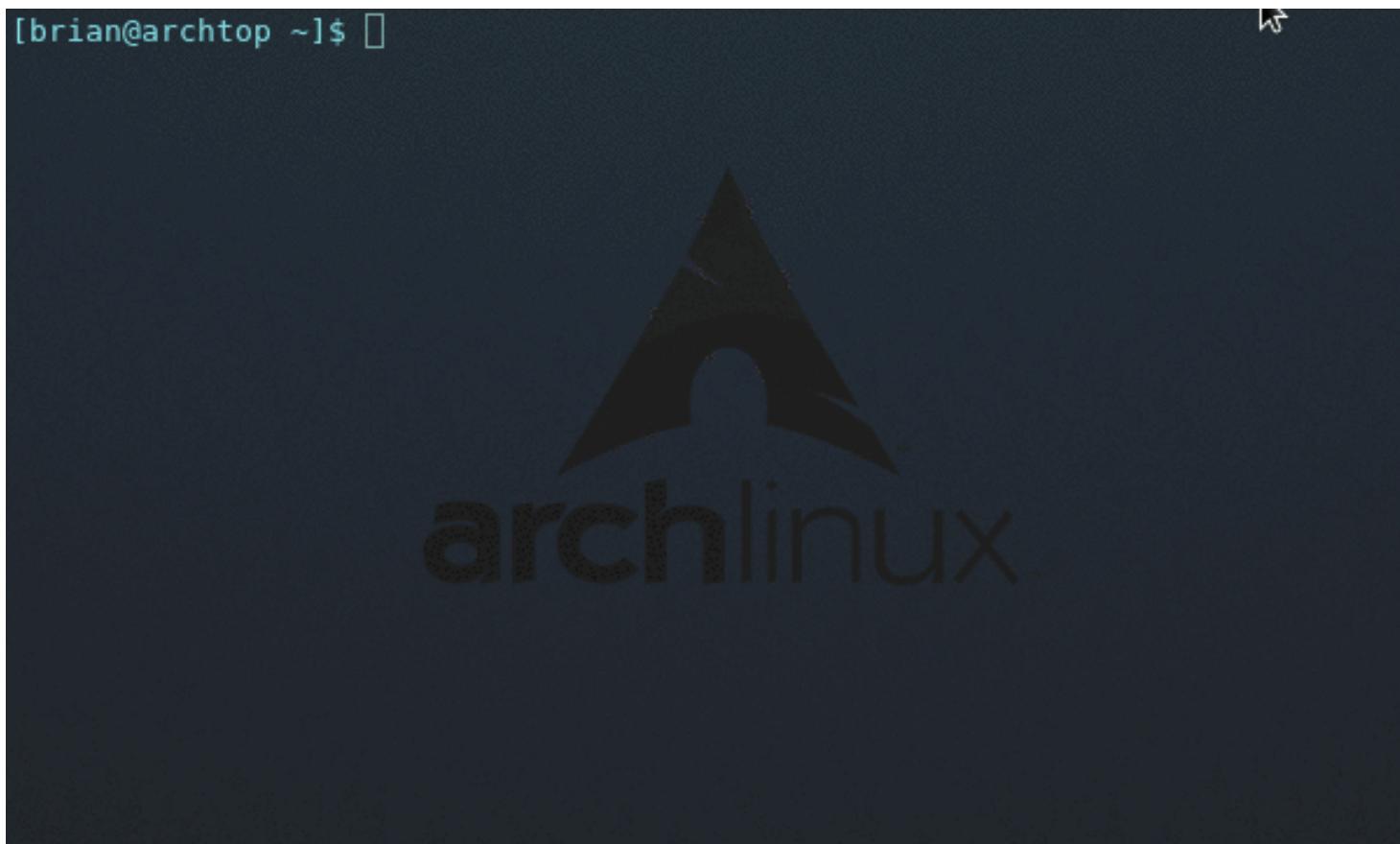
when the tv team comes in your office

- GitHub icon 4k stars <https://github.com/bartobri/no-more-secrets>
- pipe something to `nms` or just run `sneakers`
- category: fun, unix porn



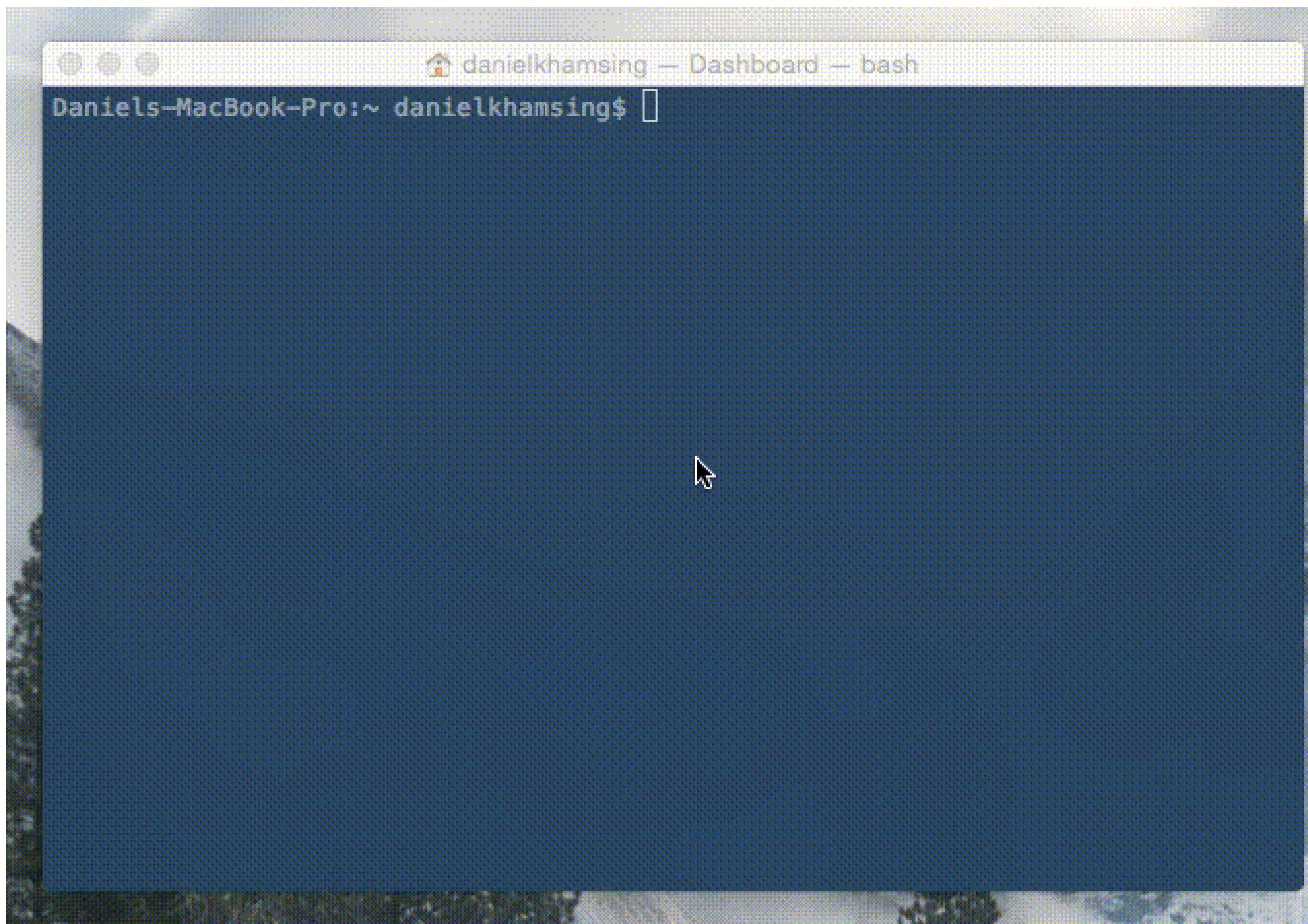
[brian@archtop ~]\$

[brian@archtop ~]\$





- GitHub 2k stars <https://github.com/mtoyoda/sl>
- typo `sl` (instead of `ls`) -> show steam locomotive
- can we pipe it to `lolcat`? of course
- category: fun, unix porn





GitHub CLI

-  23k stars <https://github.com/cli/cli>

- create repos
- create PRs
- view issues
- ...



fix common typos / mistakes

-  62k stars <https://github.com/nvbn/thefuck>
- example: pushing a newly created git branch
- category: productivity



patat

- GitHub 1k stars <https://github.com/jaspervdj/patat>
- nerdy slides in your shell
- runs in a terminal (similar to `reveal-js`/`sli.dev` for the browser)
- Pandoc syntax (f. ex. markdown)
- category: presentation, slides, unix porn



ls on steroids

`ls` problem: **sort by name and time and size at the same time...**

Use colors!

- `colorls` ("the original" in ruby: <https://github.com/athityakumar/colorls>)
- `lsd` (in rust: <https://github.com/Peltoche/lspd>)
- `exa` (in rust: <https://github.com/ogham/exa>)

Required: font providing all symbols

- Example: NerdFonts <https://github.com/ryanoasis/nerd-fonts>



- 3k stars <https://github.com/athityakumar/colorls>
- category: unix porn

```
> ls
rwxr-xr-x 1 patrick 22 B Sat May 22 23:23:43 2021
rwxr-xr-x 1 patrick 114 B Mon May 24 21:34:56 2021
rwxr-xr-x 1 patrick 5 KiB Sat May 22 23:24:07 2021
rwxr-xr-x 1 patrick 44 B Mon May 24 21:12:56 2021
rwxr-xr-x 1 patrick 64 B Mon May 24 22:51:56 2021
rwxr-xr-x 1 patrick 52 B Sat May 22 23:26:40 2021
rw-r--r-- 1 patrick 62 B Sat May 22 23:23:43 2021
rwxr-xr-x 1 patrick 163 B Sat May 22 23:23:43 2021
rw-r--r-- 1 patrick 33 B Sat May 22 23:23:43 2021
rw-r--r-- 1 patrick 276 B Sat May 22 23:24:05 2021
rw-r--r-- 1 patrick 200 KiB Sat May 22 23:24:05 2021
rw-r--r-- 1 patrick 351 B Sun May 23 01:52:10 2021
rw-r--r-- 1 patrick 16 KiB Tue May 25 04:39:47 2021
rw-r--r-- 1 patrick 7 KiB Sat May 22 23:27:11 2021
rw-r--r-- 1 patrick 17 KiB Sat May 22 23:56:32 2021
rw-r--r-- 1 patrick 80 B Sat May 22 23:23:43 2021

✓(components/
✓(layouts/
✓(node_modules/
✓(public/
✓(scripts/
✓(styles/
✓(.gitignore
✓(netlify.toml
✓(.npmrc
✓({}package.json
✓({}package-lock.json
✓(README.md
✓(slides.md
✓(slides.md.original
✓(slides-patat.md
✓({}vercel.json
```

The screenshot shows a terminal window displaying the output of the 'ls' command. The output lists various files and directories with their permissions, sizes, and last modified times. A specific file entry, '17 KiB' modified on 'Tue May 25 04:39:47 2021', is highlighted with a red box. Red arrows point from numbered circles (1, 2, 3, 4) to specific entries in the directory listing:

- Circle 1: Points to 'components/' and 'layouts/'.
- Circle 2: Points to 'scripts/' and 'styles/'.
- Circle 3: Points to '.gitignore', 'netlify.toml', '.npmrc', 'package.json', 'package-lock.json', 'README.md', 'slides.md', 'slides.md.original', 'slides-patat.md', and 'vercel.json'.
- Circle 4: Points to 'node_modules/' and 'public/'.



- 5k stars <https://github.com/Peltoche/lsd>
- alternative to `colorls`



interactive `df` alternative

- <https://dev.yorhel.nl/ncdu>



- <https://boxes.thomasjensen.com/docs/>
- ascii art boxes
- show all templates: `boxes -l`
- category: unix porn



monitoring

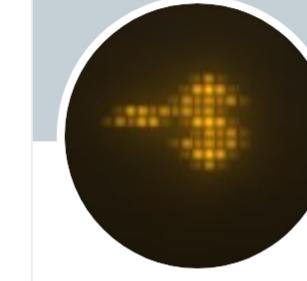
- htop
- apachetop
- ngxtop
- mtp
- pg_top
- powertop
- iotop
- iftop
- nethogs



Resources

- <https://twitter.com/climagic>
- <https://twitter.com/nixcraft>
- r/commandline
- r/unixporn
- search for "awesome-cli"

← Command Line Magic
13.6K Tweets



...

Following

Command Line Magic
@climagic

Cool Unix/Linux Command Line tricks you can use in \$TWITTER_CHAR_LIMIT characters or less. Here mostly to inspire all to try more. Read docs first, run later.\~

⌚ \$HOME ⚡ climagic.org 📅 Joined November 2009

12.2K Following 201.9K Followers

← nixCraft
48.8K Tweets



...

Following

nixCraft
@nixcraft

Linux Tips, Hacks, Tutorials, And Ideas In Blog

Enjoy #Linux, Unix, OpenSource, Programming, Sysadmin & DevOps? Follow to make the most of your geeky IT career. Ad-free Patreon content opensourceflare.com

⌚ Rootland ⚡ cyberciti.biz 📅 Joined November 2008

474 Following 221K Followers



Slides

- <https://github.com/MATHEMA-GmbH/2021-06-modern-linux-command-line-tools>
-



I forgot your favorite tool?

- jq (sed for json) <https://stedolan.github.io/jq/>
- mosh (robust replacement for ssh) <https://mosh.org/>
- fish_config (web-based configuration tool for fish shell)
https://fishshell.com/docs/current/commands.html#fish_config
- xclip (cli to X clipboard) 403 stars
<https://github.com/astrand/xclip>
- neofetch (fancy system info in the shell) 7.7k stars
<https://github.com/dylanaraps/neofetch>
- expect <https://likegeeks.com/expect-command/>
- httpie (cli http client) 45k stars <https://httpie.org/>
- http-prompt (cli http client) 7.6k stars <http://http-prompt.com/>
- pywal (color schemes for terminal) 3.4k stars
<https://github.com/dylanaraps/pywal>
- apt-select (interactive ncurses package search for debian)
<https://www.rot13.org/~dpavlin/apt-select.html>
- gcalcli (google calender in the shell) 2k stars
<https://github.com/insanum/gcalcli>
- pastebinit (cli tool to send data to pastebin) 17 stars
<https://github.com/skorokithakis/pastebinit>
- MapSCII (ascii google maps in the terminal)
<https://github.com/rastapasta/mapscii>
- alwaysontop (always move prompt to top of screen) 160 stars
<https://github.com/swirepe/alwaysontop>
- wttr.in (ascii weather report) <https://github.com/chubin/wttr.in>