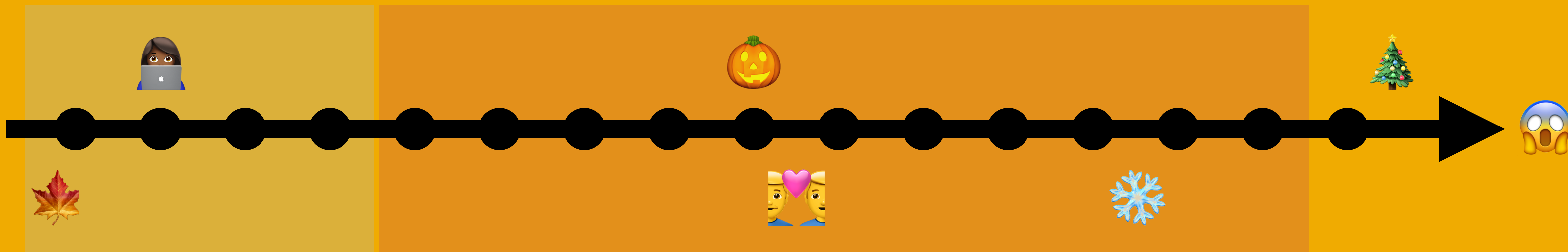


ИНФОРМАТИКА
ПОЛИТЕХ
2020

03-04. Bash

Лекция о linux и основах работы в терминале

Константин Корилов

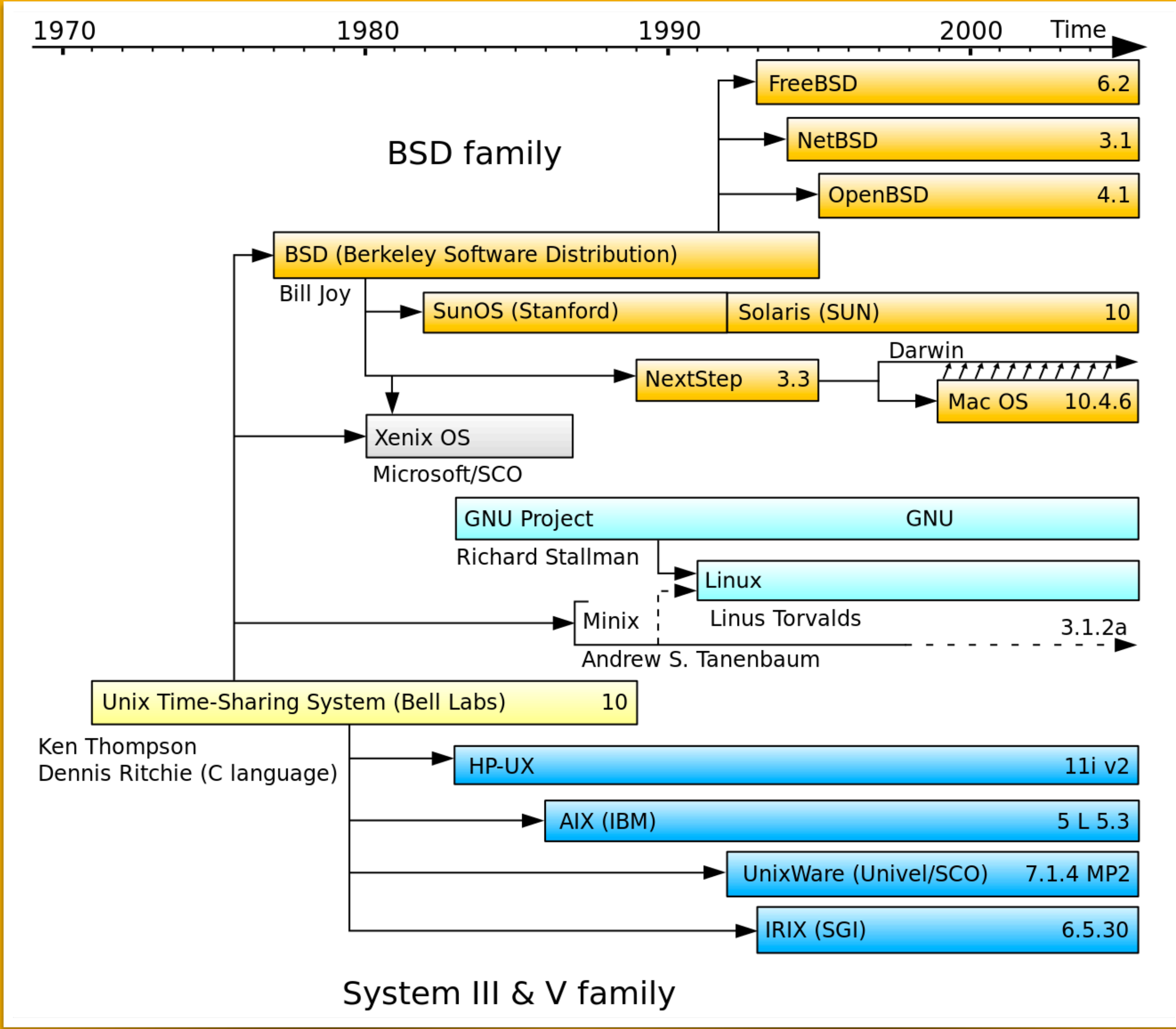


↑
📍
МЫ ТУТ

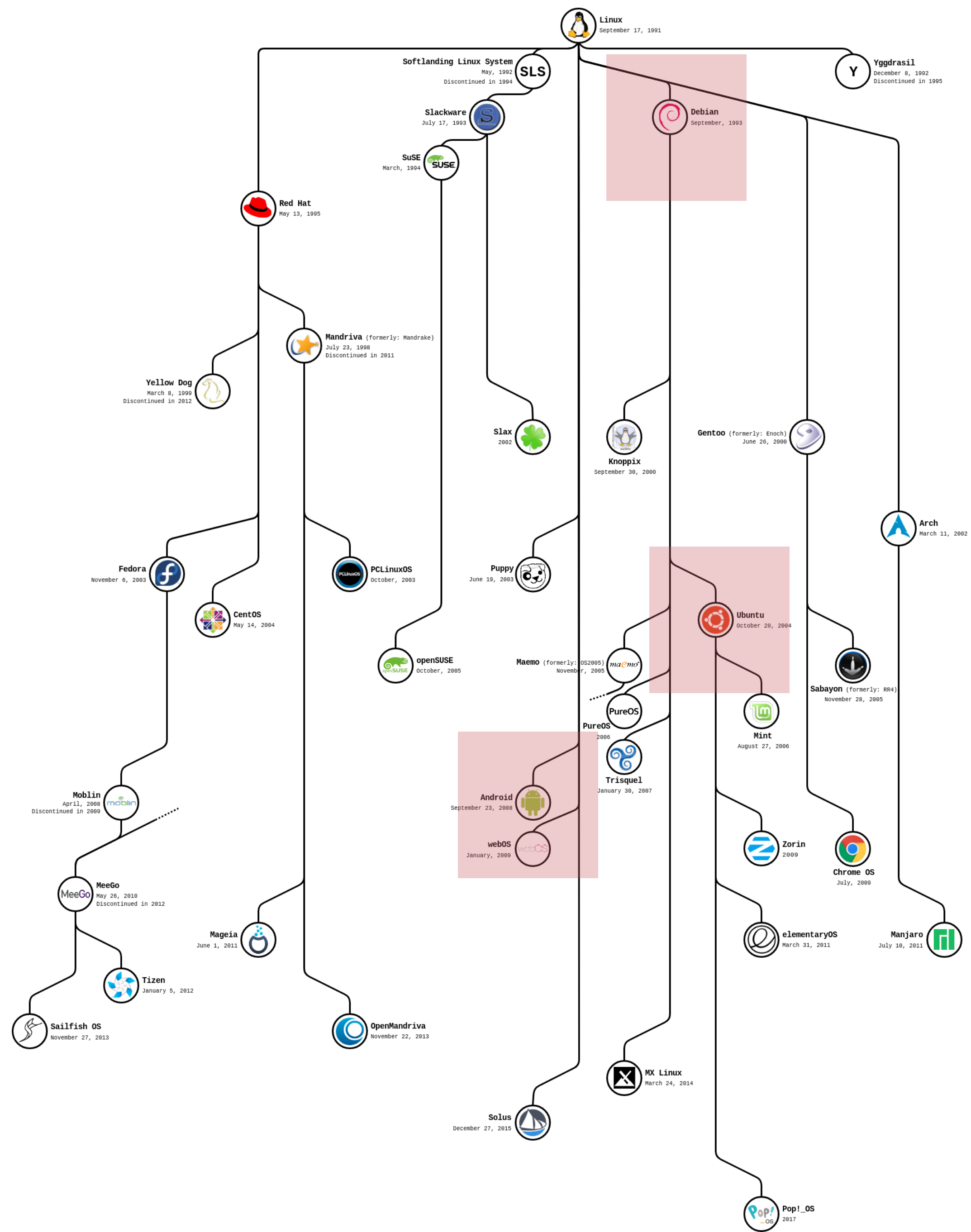
СЕМЕСТР



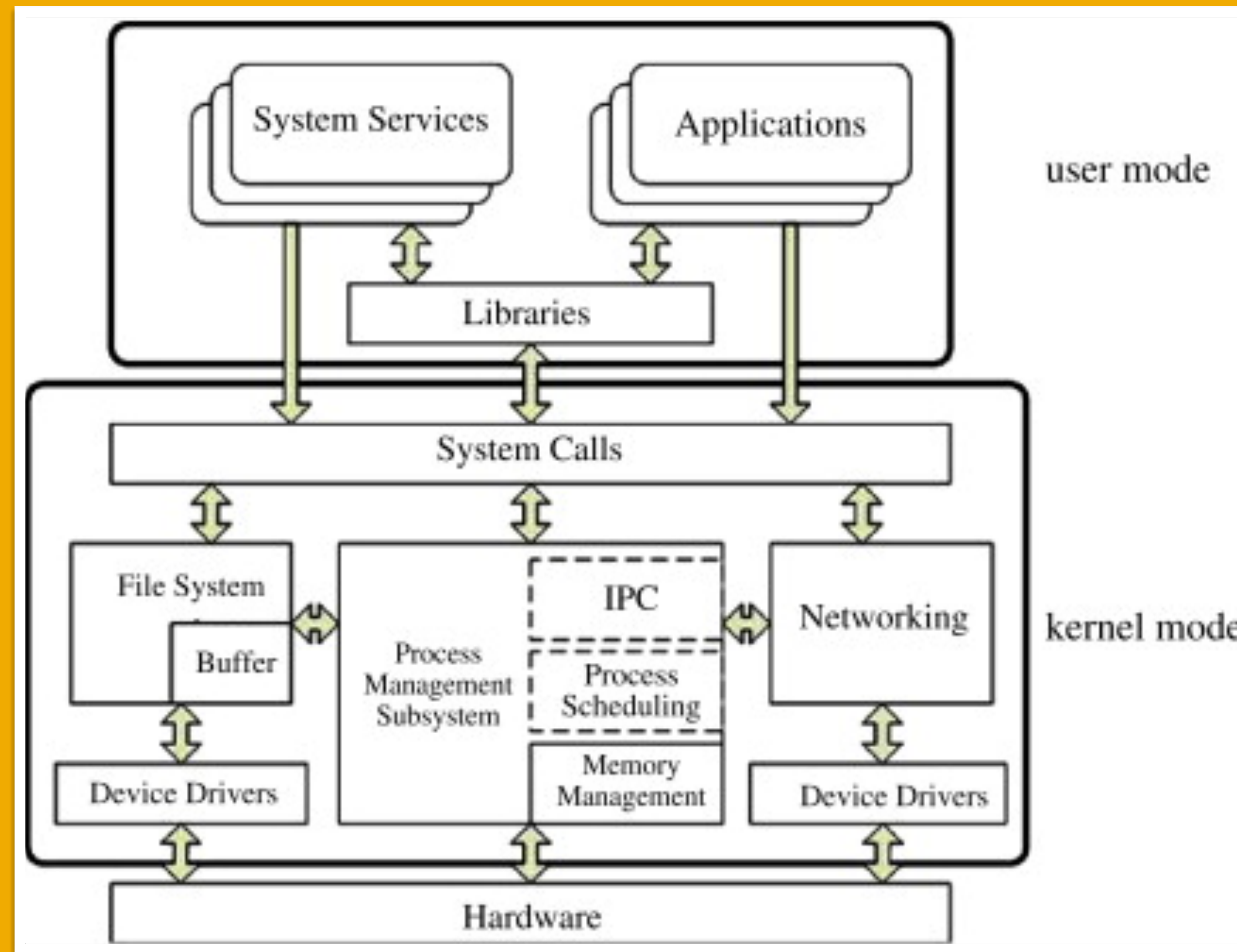
Линус Торвалдс



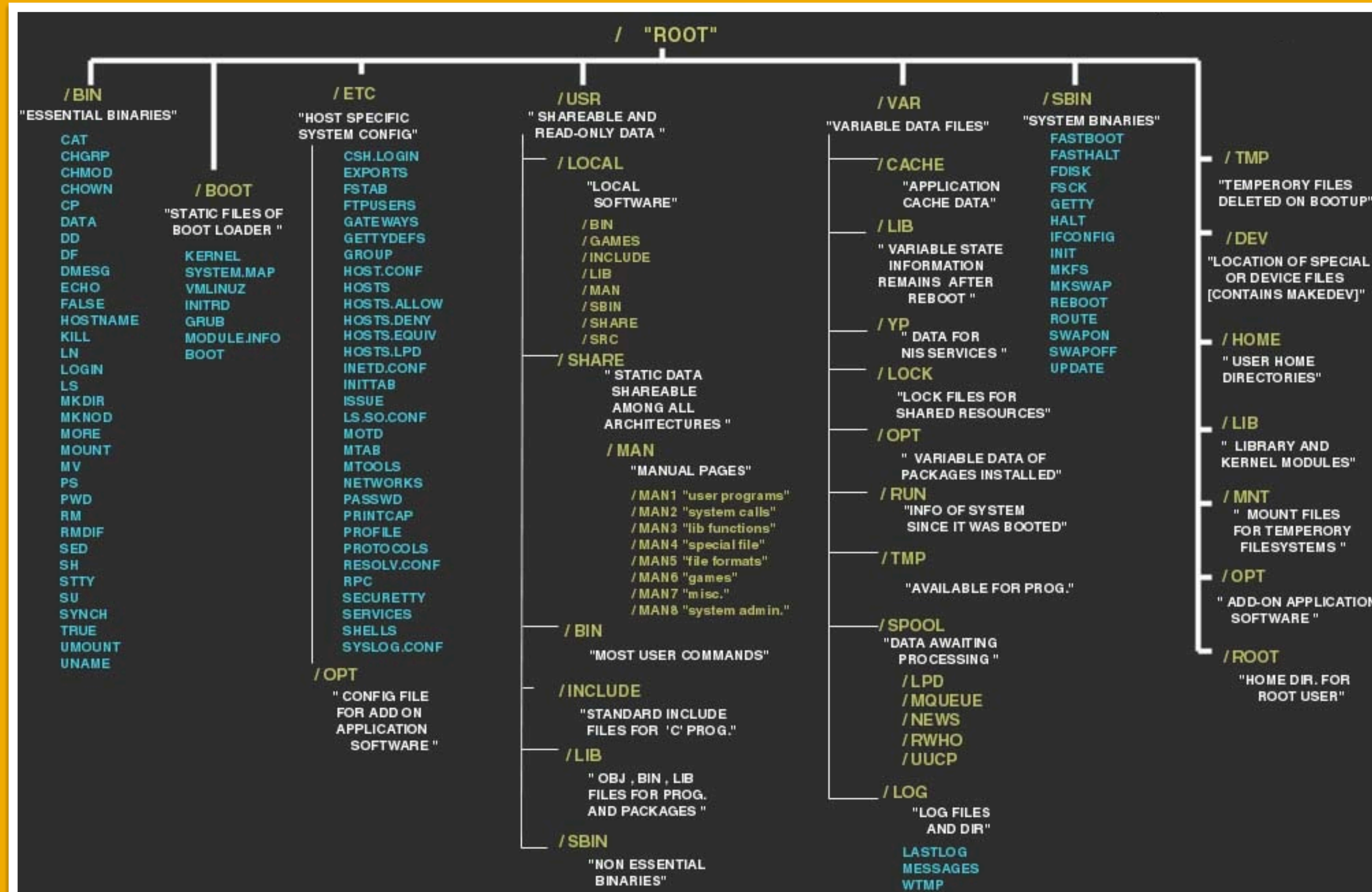
РАЗВИТИЕ UNIX



ДИСТРИБУТИВЫ LINUX



АРХИТЕКТУРА LINUX



ИЕРАРХИЯ ФАЙЛОВ

```

shum@sol:~$ ls -l
total 20
drwx----- 2 shum  staff  4096 Jan 16 22:04 Mail
drwx----- 3 shum  staff  4096 Jan 16 14:15 csc128
drwxr-xr-x  2 shum  staff  4096 Jan 13 16:42 public
drwxr-xr-x  2 shum  staff  4096 Jan 16 14:07 public_html
-rw-r--r--  1 shum  staff   628 Jan 15 20:04 verse

```

file type

number of hard links

user (owner) name

group name

size

date/time last modified

filename

readable

writeable

executable

other (everyone) permissions

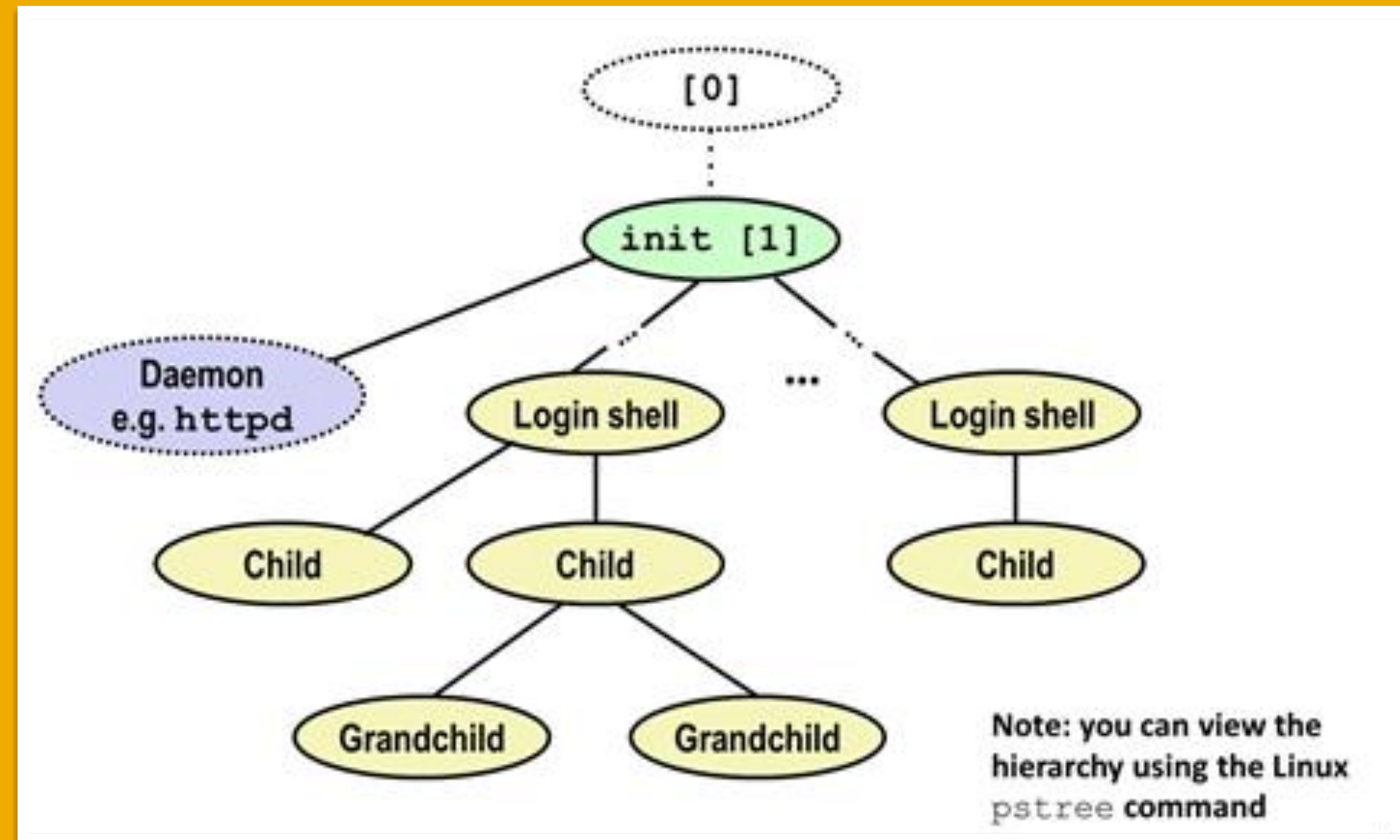
group permissions

user permissions

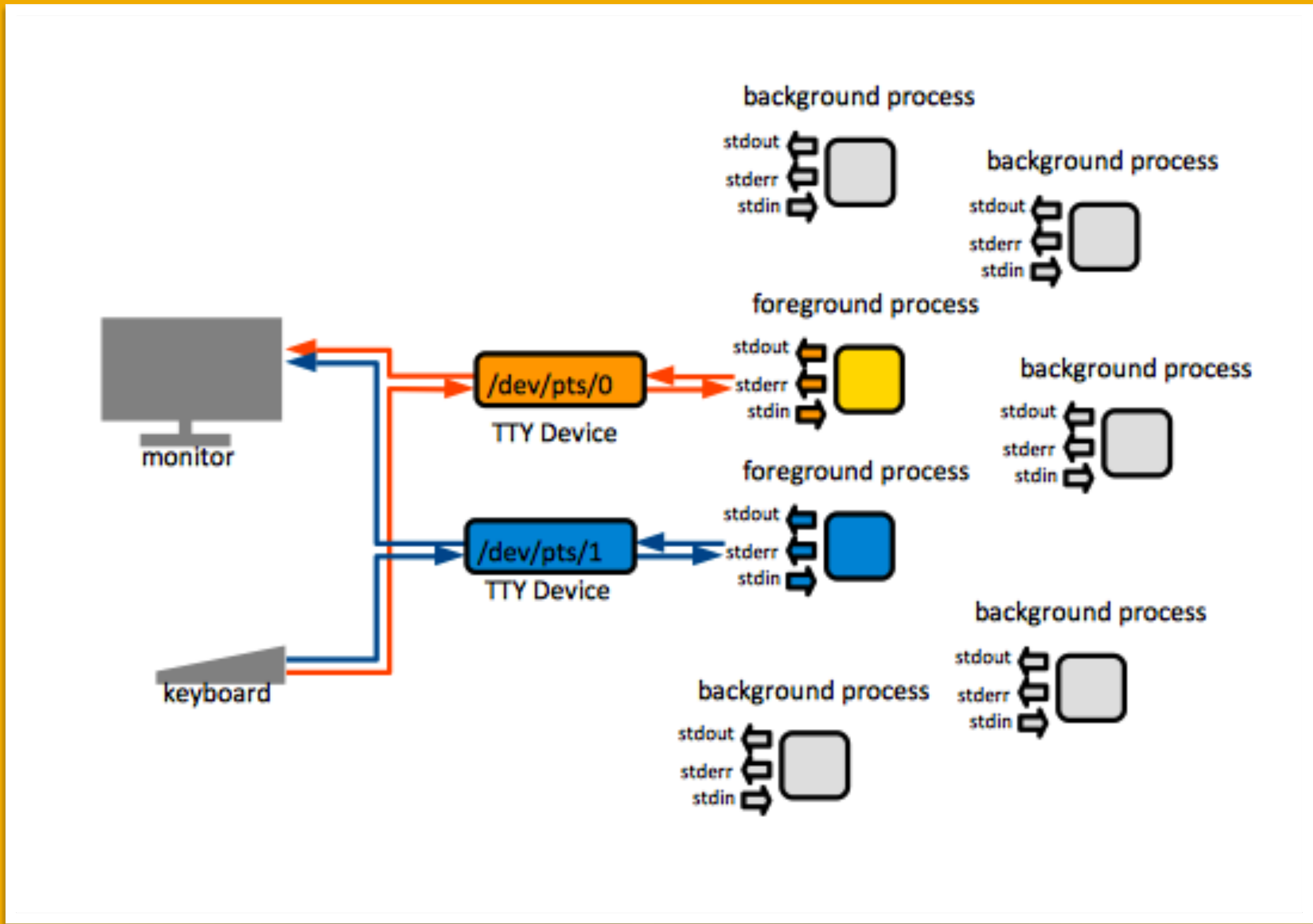
АТРИБУТЫ ФАЙЛОВ

File Type	Symbol	Created by	Removed by
Regular file	-	Editors, cp, etc..	rm
Directory	d	mkdir	rmdir, rm -f
Character device file	c	mknod	rm
Block device file	b	mknod	rm
UNIX domain socket	s	socket(2)	rm
Named pipe	p	mknod	rm
Symbolic link	l	ln -s	rm

ТИПЫ ФАЙЛОВ



ПРОЦЕССЫ В LINUX



ВВОД И ВЫВОД В LINUX

```
ckorikov@ck-pro: ~
→ test pwd
/Users/ckorikov/test
→ test ls
file.txt
→ test ls -la
total 0
drwxr-xr-x  3 ckorikov  staff   96 Sep 26 12:54 .
drwxr-xr-x+ 99 ckorikov  staff 3168 Sep 26 12:55 ..
-rw-r--r--  1 ckorikov  staff   0 Sep 26 12:54 file.txt
→ test tree
.
└─ file.txt

0 directories, 1 file
→ test cd ..
→ ~
```

zsh 38% 5.1 GB

НАВИГАЦИЯ

```
ckorikov@ck-pro: ~/test
→ test touch file.txt
→ test ls -la
total 0
drwxr-xr-x  3 ckorikov  staff   96 Sep 26 13:00 .
drwxr-xr-x+ 99 ckorikov  staff 3168 Sep 26 13:00 ..
-rw-r--r--  1 ckorikov  staff   0 Sep 26 13:00 file.txt
→ test cp file.txt copy_of_file.txt
→ test mv file.txt name.txt
→ test ls -la
total 0
drwxr-xr-x  4 ckorikov  staff  128 Sep 26 13:00 .
drwxr-xr-x+ 99 ckorikov  staff 3168 Sep 26 13:00 ..
-rw-r--r--  1 ckorikov  staff   0 Sep 26 13:00 copy_of_file.txt
-rw-r--r--  1 ckorikov  staff   0 Sep 26 13:00 name.txt
→ test rm copy_of_file.txt
→ test ls -la
total 0
drwxr-xr-x  3 ckorikov  staff   96 Sep 26 13:02 .
drwxr-xr-x+ 99 ckorikov  staff 3168 Sep 26 13:02 ..
-rw-r--r--  1 ckorikov  staff   0 Sep 26 13:00 name.txt
→ test █
```

zsh | 64% | 5.3 GB

РАБОТА С ФАЙЛАМИ

```
ckorikov@ck-pro: ~/test
→ test mkdir directory
→ test ls -la
total 0
drwxr-xr-x  3 ckorikov  staff   96 Sep 26 13:06 .
drwxr-xr-x+ 99 ckorikov  staff 3168 Sep 26 13:06 ..
drwxr-xr-x  2 ckorikov  staff   64 Sep 26 13:06 directory
→ test cp -r directory copy_of_directory
→ test ls -la
total 0
drwxr-xr-x  4 ckorikov  staff  128 Sep 26 13:07 .
drwxr-xr-x+ 99 ckorikov  staff 3168 Sep 26 13:07 ..
drwxr-xr-x  2 ckorikov  staff   64 Sep 26 13:07 copy_of_directory
drwxr-xr-x  2 ckorikov  staff   64 Sep 26 13:06 directory
→ test rm -rf copy_of_directory
→ test ls -la
total 0
drwxr-xr-x  3 ckorikov  staff   96 Sep 26 13:07 .
drwxr-xr-x+ 99 ckorikov  staff 3168 Sep 26 13:07 ..
drwxr-xr-x  2 ckorikov  staff   64 Sep 26 13:06 directory
→ test █
```

zsh | 55% | 5.4 GB

РАБОТА С КАТАЛОГАМИ

Символ в шаблоне	Назначение	Примеры шаблона	Примеры подходящих под шаблон файлов
*	Обозначает любое количество любых символов, в том числе и их отсутствие.	*.html	index.html news5.10.html filial.html
		my*.odt	my_balans.odt mydata.odt myriad.odt my.odt
		2010	January2010.ods music2010 1.2010_music
?	Один любой символ.	otchet.???	otchet.txt otchet.odt
		descrip?ion.pdf	description.pdf descriptions.pdf
		release???.2010*	release25.04.2010 release01.05.2010.out
[]	Любой символ из перечня или диапазона.	[m-pM-P]???.png	Open.png maps.png nono.png

ФАЙЛОВЫЕ МАСКИ 🤒

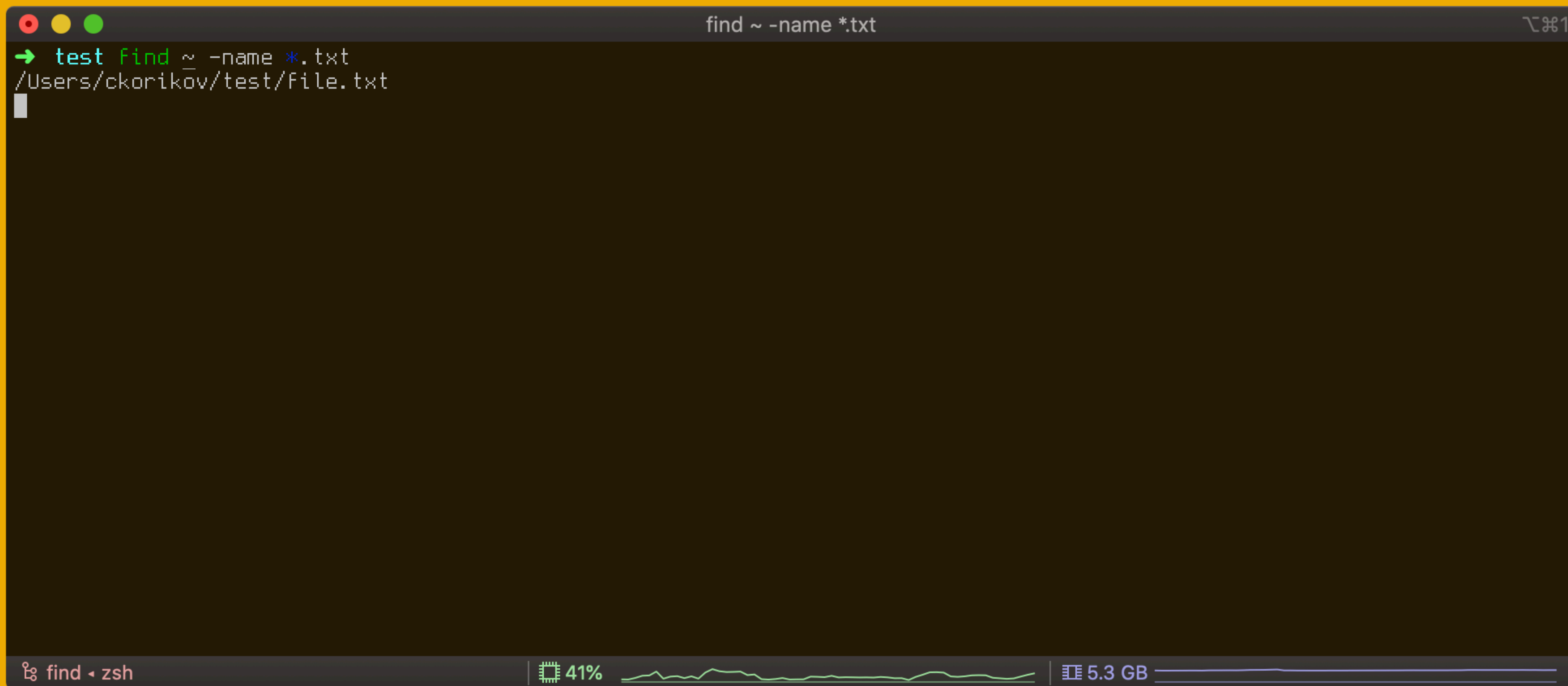
```
Left      File      Command  Options  Right
< ~ .[^]>  < ~ .[^]>
'n      Name      Size      Modify time  'n      Name      Size      Modify time
/..      UP--DIR  Feb  3 13:24  /..      UP--DIR  Feb  3 13:24
/.cache  4096     Feb  3 13:30  /.cache  4096     Feb  3 13:30
/.config 4096     Feb  3 13:30  /.config 4096     Feb  3 13:30
/.local  3 13:30
/Docume  3 13:32
/Pictur  3 13:32
/bin     3 13:32
.bash_  8 23:37
.bash_  3 13:24
.bashr  3 13:54
.lesshst 68      Feb  3 13:44  .lesshst 68      Feb  3 13:44
.profile 675     Feb  3 13:24  .profile 675     Feb  3 13:24
.viminfo 647     Feb  3 13:54  .viminfo 647     Feb  3 13:54

.bash_history 2996M/5872M (51%)  UP--DIR 2996M/5872M (51%)

Hint: You can do anonymous FTP with mc by typing 'cd ftp://machine.edu'
me@linuxbox ~ $

1Help 2Menu 3View 4Edit 5Copy 6RenMov 7Mkdir 8Delete 9PullDn10Quit
```

GNU Midnight Commander



A terminal window titled "find ~ -name *.txt" with standard macOS window controls (red, yellow, green buttons) in the top-left corner. The terminal shows a command prompt with a green arrow pointing to the command: `test find ~ -name *.txt`. The output of the command is `/Users/ckorikov/test/file.txt`. The terminal has a dark background and a light-colored cursor. At the bottom of the terminal, there is a status bar with the text "find • zsh", a CPU usage indicator showing "41%" with a green line graph, and a memory usage indicator showing "5.3 GB" with a blue line graph.

```
find ~ -name *.txt
→ test find ~ -name *.txt
/Users/ckorikov/test/file.txt
```

ПОИСК ФАЙЛОВ

```
ckorikov@ck-pro: ~/test
→ test echo "текст"
текст
→ test head file.txt
Вместо тепла зелень стекла,
Вместо огня дым.
Из сетки календаря выхвачен день.
Красное солнце сжорает котла,
День догорает с ним.
На пылающий город падает тень.

Перемен требуют наши сердца,
Перемен требуют наши глаза,
В нашем смехе и в наших слезах,
→ test tail file.txt
Сигареты в руках, чай на столе,
Так замыкается круг.
И вдруг нам становится страшно что-то менять.

Перемен требуют наши сердца,
Перемен требуют наши глаза,
В нашем смехе и в наших слезах,
И в пульсации вен
Перемен!
Мы ждем перемен.
→ test cat file.txt
```

zsh | 64% | 5.3 GB

РАБОТА С СОДЕРЖИМЫМ ФАЙЛОВ

```
ckorikov@ck-pro: ~/test
→ test grep "перемен" ./file.txt
Мы ждем перемен.
Мы ждем перемен.
Мы ждем перемен.
→ test grep "перемен" ./file.txt -n
13:Мы ждем перемен.
27:Мы ждем перемен.
41:Мы ждем перемен.
→ test more file.txt
```

zsh | 56% | 5.3 GB

РАБОТА С СОДЕРЖИМЫМ ФАЙЛОВ



I Am Developer
@iamdeveloper



 Follow

Я использую Vim уже почти 2 года, потому что не знаю, как выйти из него.

RETWEETS
13,622

LIKES
7,155



12:26 AM - 18 Feb 2014

VIM

HOW-TO make Vim not suck Out of the Box: :help statusline :set nocompatible ruler laststatus=2 showcmd showmode number Search :set incsearch ignorecase smartcase hlsearch Remove useless splash screen :set shortmess+=I
 Best tips: http://vim.wikia.com/ Best scripts: http://www.vim.org/scripts/index.php

Ctrl-~	Ctrl-!	Ctrl-@	Ctrl-#	Ctrl-\$	Ctrl-%	Ctrl-^	Ctrl-&	Ctrl-*	Ctrl-(Ctrl-)	Ctrl-_-	Ctrl-+	Ctrl-↓
toggle case	extern filter	play macro	prev identifier	→	goto match	soft --	repeat :s	next identifier	begin sentence	end sentence	cur line	↑	auto-format
1	2	3	4	5	6	7	8	9	0	hard --	↑	↓	↔
Ctrl-14	Ctrl-Q	Ctrl-W	Ctrl-E	Ctrl-R	Ctrl-T	Ctrl-Y	Ctrl-U	Ctrl-I	Ctrl-O	Ctrl-P	Ctrl-}	Ctrl-}	Ctrl-}
block select	ex mode	WORD \	end WORD \	Replace	← until char	copy line	undo line	insert --	open ↑	paste ↑	paragraph	paragraph	paragraph
Ctrl-14	Ctrl-Q	Ctrl-W	Ctrl-E	Ctrl-R	Ctrl-T	Ctrl-Y	Ctrl-U	Ctrl-I	Ctrl-O	Ctrl-P	Ctrl-}	Ctrl-}	Ctrl-}
record macro	w word \	e end word \	r replace char	← until char	→ until char	y copy	u undo	i insert	o open ↓	p paste ↓	misc.	misc.	misc.
7	Ctrl-A	Ctrl-S	Ctrl-D	Ctrl-F	Ctrl-G	Ctrl-H	Ctrl-J	Ctrl-K	Ctrl-L	Ctrl-;	Ctrl-'	Ctrl-	Ctrl-\
incr. #	append --	subst line	del --	← find char	goto eof / goto line#	Top screen	Join lines	man page identifier	Bottom screen	cmd line	register	goto col#	goto col#
Ctrl-7	Ctrl-a	Ctrl-s	Ctrl-d	Ctrl-f	Ctrl-g	Ctrl-h	Ctrl-j	Ctrl-k	Ctrl-l	Ctrl-;	Ctrl-'	Ctrl-	Ctrl-\
decr. #	append →	subst char	del →	→ find char	extra	←	↓	↑	→	"next" u/F/V/T	goto mark --	goto mark --	goto mark --
Ctrl-^	Ctrl-Z	Ctrl-X	Ctrl-C	Ctrl-V	Ctrl-B	Ctrl-N	Ctrl-M	Ctrl-<	Ctrl->	Ctrl-?	Ctrl-'	Ctrl-	Ctrl-\
:suspend	quit	← del char	change --	select lines	WORD	find "prev"	Middle screen	undent	indent	find ^	find ^	goto mark --	goto mark --
Ctrl-^	Ctrl-z	Ctrl-x	Ctrl-c	Ctrl-v	word	find "next"	set mark	"prev" u/F/V/T	repeat cmd	find \	find \	goto mark --	goto mark --

Legend: Macro Register name (0-9a-zA-Z) required; Op Motion req.; act between cursor & dst; Cmd Command; Ins Command and enter insert mode; Move Moves cursor or defines range for op; Find Search (^ = reverse, \ = forward); tag tags / diffs / folding; Code Code formatting, whitespace, etc.; Extra Extended functionality; req. extra chars; Char arg req. g z Z ^w ! " ' ...

Modes

- n Normal: Esc ^[^c
- i Insert: a i r s
- v Visual: v V ^v ^q
- o Op pending: c d y < >
- c Command Line: / ? !

word Foo (src , dst , len) ;

WORD Foo (src , dst , len) ;

Startup

```
vim <filename> +123 goto line 123
vim <file> ... -t Foo edit at tag 'Foo'
vim <file> ... -c "/Foo" cmd: find 'Foo' & edit
vim -g or gvim start GUI ver.
Linux :set guifont=ProggyTinyTT\ 12
OSX :set guifont=ProggyTiny\ :h11
gvimdiff <file1> <file2> [<file3>]
```

Broken Keys Ctrl-I = Tab, Ctrl-[] = ESC
 Vim is still unable to map certain keys for your own use...
Caps, Ctrl-1, Ctrl-Shift-1, Ctrl-I, Ctrl-I, etc.

Code = < > << >>

```
:set backspace=indent,eol,start
allow backspace join lines
:set shiftwidth=# indent width for ai
:set autoindent! toggle auto-indent
:set lisp lisp indent mode
```

help cmdline

```
:w save :gui switch to GUI
:q quit :q! quit w/o save
:e <file> edit file
:source % exec cmds in cur file
:exec '...' do cmd
```

help movement

```
soft ^H Start of Line 1st non-whitespace
hard 0 H Start of Line column 0
$ End of Line
| move col 0 | move col #
^b page ↑ ^f page ↓
^u 1/2 page ↑ ^d 1/2 page ↓
^e scroll line ↑ ^y scroll line ↓
lg start of file og end of file
#g goto line # G end of file
```

help range

```
[[ begin this func {
]] begin next func {
:set matchpairs=(,),(,){,}[,<>,:?,:
\ goto matching { } <> [ ]
```

help tags

```
:ts list active tags
jump to tag under cursor
restore cursor before tag jump
complete word
:ta Foo manual jump to tag 'Foo'
```

help diff

```
[c prev diff :hi DiffAdd guifg=rrggbb
]c next diff :hi DiffChange guibg=rrggbb
:diffupdate :hi DiffText gui=none
resync :hi DiffDelete
```

help folding

```
zR fold remove
zo fold open
zc fold close
zi invert all
zr fold reduce
zm fold more
```

help changes

```
:changes
g; older change
g; newer change
```

help syntax

```
:syntax enable
:set filetype=
c cpp sh make perl python
Note: chose only ONE type!
```

help recording

```
q* start recording
@* playback
q stop recording
@@ repeat
```

convert <eol>

```
:set fileformat=
unix or dos or mac
then :w to convert
```

help recording

```
q* start recording
@* playback
q stop recording
@@ repeat
```

insert mode

```
9 ^p prev auto-complete ^n next
10 ^d undent ^t indent
$11 ^x ^f filename completion
^s spelling :set spell!
^k dictionary :s next bad
^t thesaurus :help spell
```

Cursor Bookmarks

```
marks
ma mark local 'a'
'A goto global 'A'
'' prev location
```

File / Directory

```
:Explore or :e .
:set browsedir=
one of buffer last
```

```
yatri@svarga: ~  
File Edit View Search Terminal Help  
yatri@svarga:~$ sudo apt-get install gnome-chess  
Reading package lists... Done  
Building dependency tree  
Reading state information... Done  
The following extra packages will be installed:  
  gnuchess gnuchess-book libxcb-render-util0  
Suggested packages:  
  xboard eboard  
The following NEW packages will be installed:  
  gnome-chess gnuchess gnuchess-book libxcb-render-util0  
0 upgraded, 4 newly installed, 0 to remove and 66 not upgraded.  
Need to get 2,898 kB of archives.  
After this operation, 5,349 kB of additional disk space will be used.  
Do you want to continue [Y/n]? Y
```

УСТАНОВКА ПРОГРАММ

```
yatri@svarga: ~  
File Edit View Search Terminal Help  
yatri@svarga:~$ sudo apt-get remove links2  
Reading package lists... Done  
Building dependency tree  
Reading state information... Done  
The following packages will be REMOVED:  
  links2  
0 upgraded, 0 newly installed, 1 to remove and 66 not upgraded.  
After this operation, 3,363 kB disk space will be freed.  
Do you want to continue [Y/n]? Y
```

УДАЛЕНИЕ ПРОГРАММ

```
ckorikov@ck-pro: ~/test
→ test ls
script.sh
→ test cat script.sh
echo "test"
→ test ./script.sh
zsh: permission denied: ./script.sh
→ test ls -la
total 8
drwxr-xr-x  3 ckorikov  staff   96 Sep 26 13:44 .
drwxr-xr-x+ 99 ckorikov  staff 3168 Sep 26 13:45 ..
-rw-r--r--  1 ckorikov  staff   12 Sep 26 13:44 script.sh
→ test chmod +x script.sh
→ test ls -la
total 8
drwxr-xr-x  3 ckorikov  staff   96 Sep 26 13:44 .
drwxr-xr-x+ 99 ckorikov  staff 3168 Sep 26 13:45 ..
-rwxr-xr-x  1 ckorikov  staff   12 Sep 26 13:44 script.sh
→ test ./script.sh
test
→ test █
```

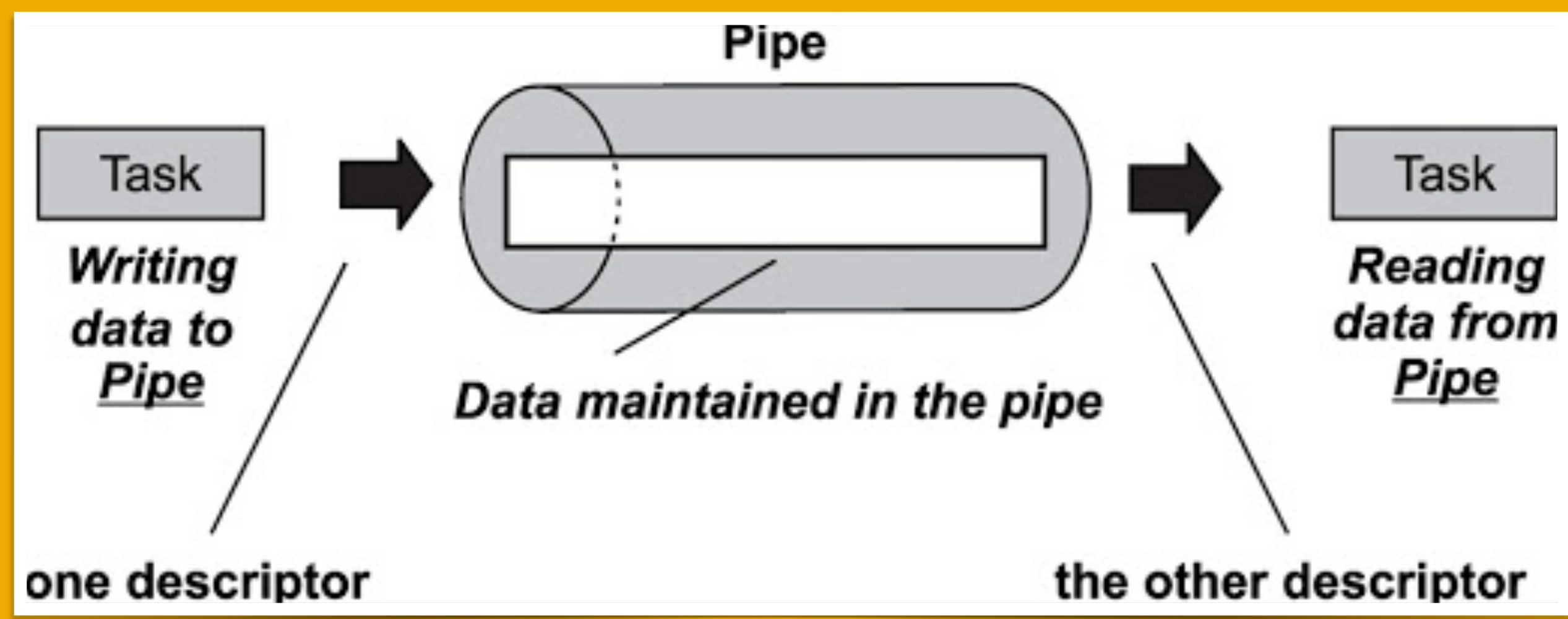
zsh 59% 5.1 GB

ЗАПУСК ПРОГРАММ И СКРИПТОВ

```
ckorikov@ck-pro: ~/test
→ test ls -l > out.txt
→ test ls
out.txt  script.sh
→ test grep sh < out.txt
-rwxr-xr-x  1 ckorikov  staff   12 Sep 26 13:44 script.sh
→ test ls -l >> out.txt
→ test cat out.txt
total 8
-rw-r--r--  1 ckorikov  staff    0 Sep 26 13:51 out.txt
-rwxr-xr-x  1 ckorikov  staff   12 Sep 26 13:44 script.sh
total 16
-rw-r--r--  1 ckorikov  staff  120 Sep 26 13:51 out.txt
-rwxr-xr-x  1 ckorikov  staff   12 Sep 26 13:44 script.sh
→ test █

zsh | 69% | 5.2 GB
```

ПЕРЕНАПРАВЛЕНИЕ ПОТОКОВ



КОНВЕЙРИЗАЦИЯ (PIPE) ПРОГРАММ

```
ckorikov@ck-pro: ~/test
→ test cat out.txt
total 8
-rw-r--r-- 1 ckorikov staff 0 Sep 26 13:51 out.txt
-rwxr-xr-x 1 ckorikov staff 12 Sep 26 13:44 script.sh
total 16
-rw-r--r-- 1 ckorikov staff 120 Sep 26 13:51 out.txt
-rwxr-xr-x 1 ckorikov staff 12 Sep 26 13:44 script.sh
→ test cat out.txt | sort
-rw-r--r-- 1 ckorikov staff 0 Sep 26 13:51 out.txt
-rw-r--r-- 1 ckorikov staff 120 Sep 26 13:51 out.txt
-rwxr-xr-x 1 ckorikov staff 12 Sep 26 13:44 script.sh
-rwxr-xr-x 1 ckorikov staff 12 Sep 26 13:44 script.sh
total 16
total 8
→ test █
```

zsh | 50% | 4.9 GB

КОНВЕЙРИЗАЦИЯ (PIPE) ПРОГРАММ

