

Vistula, IT Faculty, 2015

Operating Systems

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Lecture 4:

Command Line Interface. Work with files

Inittab & runlevels

```
id:2:initdefault:
```

```
si::sysinit:/etc/init.d/rcS
```

```
10:0:wait:/etc/init.d/rc 0
```

```
11:1:wait:/etc/init.d/rc 1
```

```
12:2:wait:/etc/init.d/rc 2
```

```
13:3:wait:/etc/init.d/rc 3
```

```
14:4:wait:/etc/init.d/rc 4
```

```
15:5:wait:/etc/init.d/rc 5
```

```
16:6:wait:/etc/init.d/rc 6
```

/etc/inittab

```
ca:12345:ctrlaltdel:/sbin/shutdown -h now
```

```
~~:S:wait:/sbin/sulogin
```

```
1:2345:respawn:/sbin/getty 38400 tty1
```

```
2:2345:respawn:/sbin/getty 38400 tty2
```

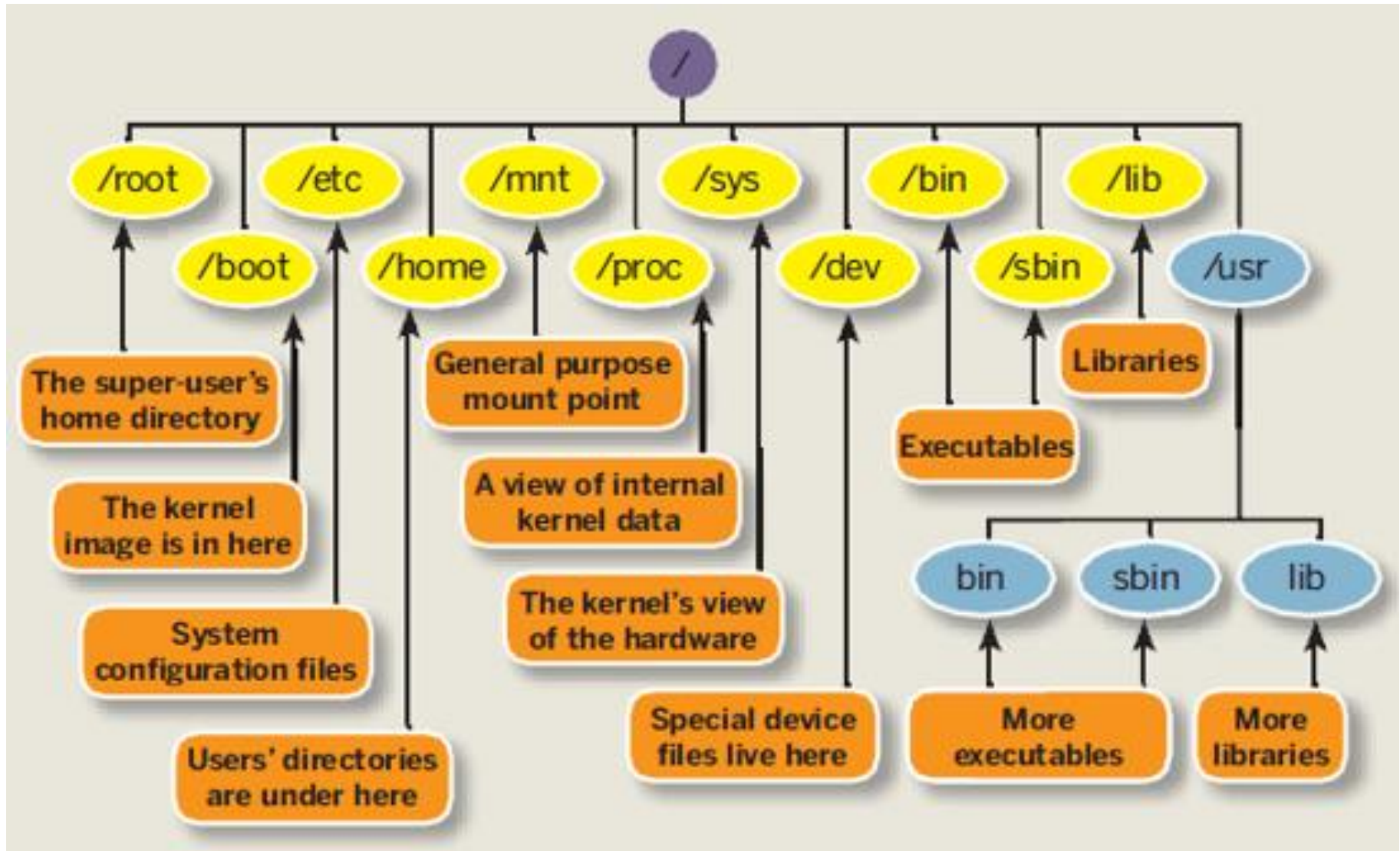
Getty, login, and logout

- Virtual terminal: Ctrl-Alt-Fi
- Terminal window: Ctrl-Alt-t
- Username
- Password
- /etc/passwd: UID and GID, shell, working directory
- .profile, .bashrc, .bash_logout
- whoami, who
- exit

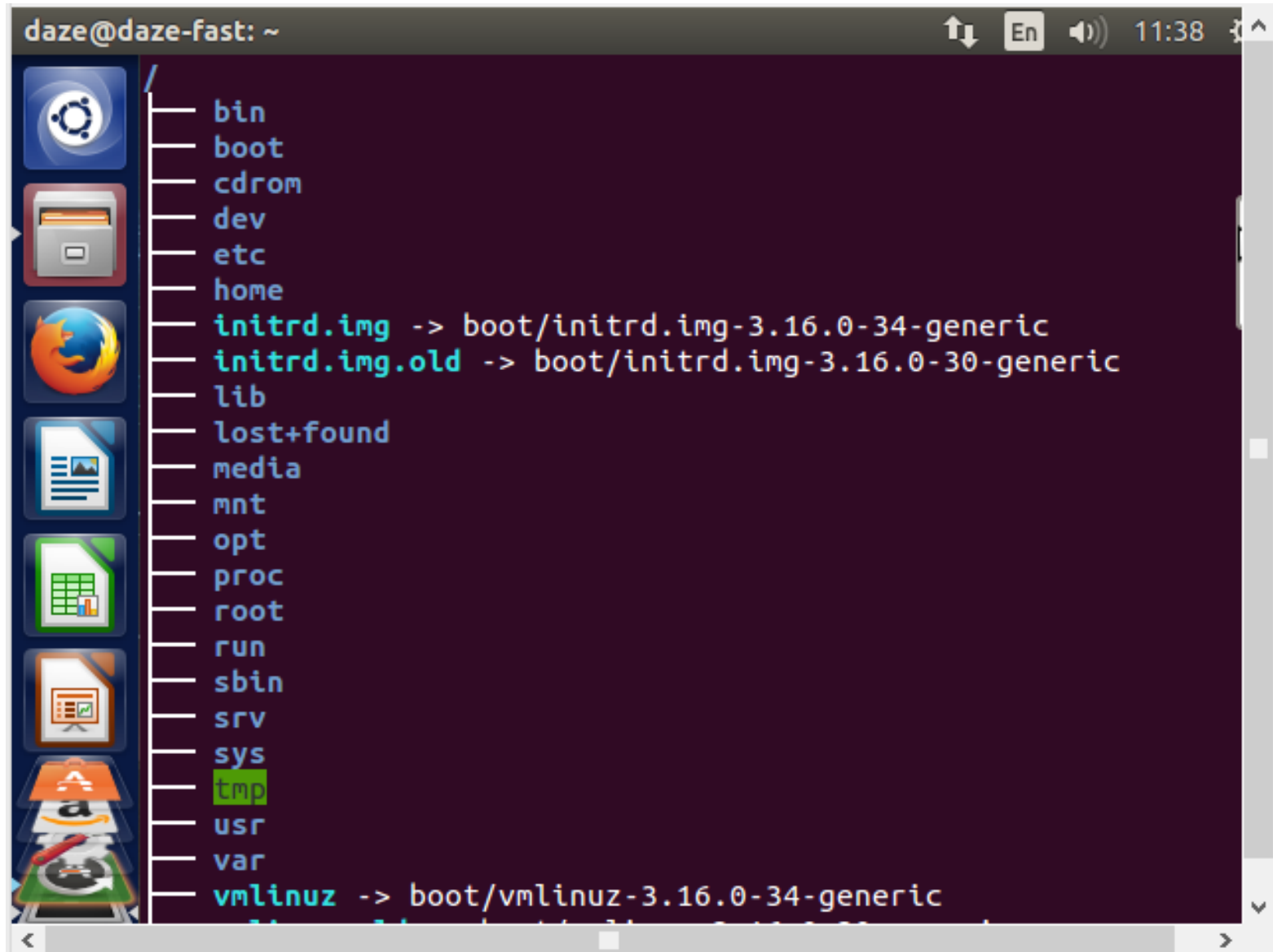
Shell work

- Output an invitation (prompt) “>”
- Input command line
- If internal command, start it
- Otherwise, find executable file and start it
- Output results of command line processing
- Help: man, info

Linux filesystem



Filesystem example



A terminal window titled 'daze@daze-fast: ~' showing a Linux filesystem tree and kernel boot parameters. The terminal has a dark purple background and a light blue cursor. On the left side, there is a vertical dock with icons for the Ubuntu logo, a file manager, Firefox, a document, a spreadsheet, a presentation, and a terminal. The filesystem tree is listed on the right, with the root directory '/' at the top. The tree includes directories like bin, boot, cdrom, dev, etc, home, lib, lost+found, media, mnt, opt, proc, root, run, sbin, srv, sys, tmp (highlighted in green), usr, and var. Below the tree, there are two lines of kernel boot parameters: 'initrd.img -> boot/initrd.img-3.16.0-34-generic' and 'initrd.img.old -> boot/initrd.img-3.16.0-30-generic'. At the bottom, there is a line for the kernel image: 'vmlinuz -> boot/vmlinuz-3.16.0-34-generic'.

```
daze@daze-fast: ~  
/  
bin  
boot  
cdrom  
dev  
etc  
home  
initrd.img -> boot/initrd.img-3.16.0-34-generic  
initrd.img.old -> boot/initrd.img-3.16.0-30-generic  
lib  
lost+found  
media  
mnt  
opt  
proc  
root  
run  
sbin  
srv  
sys  
tmp  
usr  
var  
vmlinuz -> boot/vmlinuz-3.16.0-34-generic
```

Absolute and relative file names

- `/home/student/Documents/poem.pdf`
- `/etc/rc5.d/S99rc.local`
- Working directory `/home/student`
- `.profiles`
- `../../etc/rc5.d/S99rc.local`

Unified tree

- Devices as files */dev*
- Hard disk */dev/sda1*
- *mount* – attach volume to the tree
- *umount* – detach volume from the tree
- Scheme of mounting */etc/mtab*
- Free space *df*

Basic commands

- pwd – print working directory
- cd – change directory
- ls – list directory
- cat – output file (concatenate)

```
>ls -al
```

```
>cd /etc
```

```
>cat passwd
```



```
daze@daze-fast:~$  
daze@daze-fast:~$  
daze@daze-fast:~$  
daze@daze-fast:~$  
daze@daze-fast:~$ pwd
```

/home/daze

```
daze@daze-fast:~$ ls
```

```
a          Documents  examples.desktop  Pictures  Templates  
Desktop    Downloads  Music             Public    Videos
```

```
daze@daze-fast:~$ ls -l
```

total 48

```
-rw-rw-r-- 1 daze daze   15 anp.   28 11:57 a  
drwxr-xr-x 2 daze daze 4096 anp.   27 11:27 Desktop  
drwxr-xr-x 2 daze daze 4096 anp.   27 11:27 Documents  
drwxr-xr-x 2 daze daze 4096 anp.   27 11:27 Downloads  
-rw-r--r-- 1 daze daze 8980 anp.   27 10:29 examples.desktop  
drwxr-xr-x 2 daze daze 4096 anp.   27 11:27 Music  
drwxr-xr-x 2 daze daze 4096 anp.   27 11:27 Pictures  
drwxr-xr-x 2 daze daze 4096 anp.   27 11:27 Public  
drwxr-xr-x 2 daze daze 4096 anp.   27 11:27 Templates  
drwxr-xr-x 2 daze daze 4096 anp.   27 11:27 Videos
```

```
daze@daze-fast:~$ cat a
```

hello, Vistula

```
daze@daze-fast:~$
```

More commands

- touch – create file
- cp – copy file
- mv – move (rename) file
- rm – remove
- mkdir – create directory
- rmdir – remove directory



```
Desktop    Downloads    Music    Public    Videos
Documents  examples.desktop  Pictures  Templates

daze@daze-fast:~$ cat > a
Hello, Vistula!
^C
daze@daze-fast:~$ ls -l a
-rw-rw-r-- 1 daze daze 16 anp.  28 12:04 a
daze@daze-fast:~$ cat a
Hello, Vistula!
daze@daze-fast:~$ cp a b
daze@daze-fast:~$ ls
a Desktop    Downloads    Music    Public    Videos
b Documents  examples.desktop  Pictures  Templates
daze@daze-fast:~$ ls -l a b
-rw-rw-r-- 1 daze daze 16 anp.  28 12:04 a
-rw-rw-r-- 1 daze daze 16 anp.  28 12:04 b
daze@daze-fast:~$ mv b c
daze@daze-fast:~$ ls
a Desktop    Downloads    Music    Public    Videos
c Documents  examples.desktop  Pictures  Templates
daze@daze-fast:~$ rm a
daze@daze-fast:~$ ls
c Documents  examples.desktop  Pictures  Templates
Desktop Downloads Music    Public    Videos
daze@daze-fast:~$
```



daze@daze-fast:~\$

daze@daze-fast:~\$

daze@daze-fast:~\$

daze@daze-fast:~\$ mkdir dima

daze@daze-fast:~\$ ls

c	Documents	Music	Templates
Desktop	Downloads	Pictures	Videos
dima	examples.desktop	Public	

daze@daze-fast:~\$ cd dima

daze@daze-fast:~/dima\$ pwd

/home/daze/dima

daze@daze-fast:~/dima\$ mkdir papers

daze@daze-fast:~/dima\$ mkdir presentations

daze@daze-fast:~/dima\$ mkdir soft

daze@daze-fast:~/dima\$ touch x

daze@daze-fast:~/dima\$ ls -l

total 12

drwxrwxr-x 2 daze daze 4096 anp. 28 12:08 papers

drwxrwxr-x 2 daze daze 4096 anp. 28 12:08 presentations

drwxrwxr-x 2 daze daze 4096 anp. 28 12:09 soft

-rw-rw-r-- 1 daze daze 0 anp. 28 12:09 x

daze@daze-fast:~/dima\$ rmdir presentations

daze@daze-fast:~/dima\$ ls

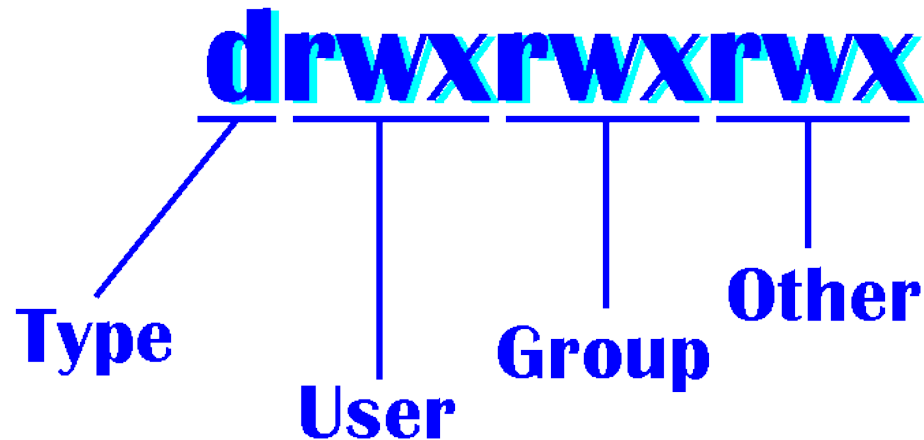
papers soft x

daze@daze-fast:~/dima\$

File name patterns

- * any string
- ? any character
- ls p*
- ls ??
- ls a?b

Protection keys

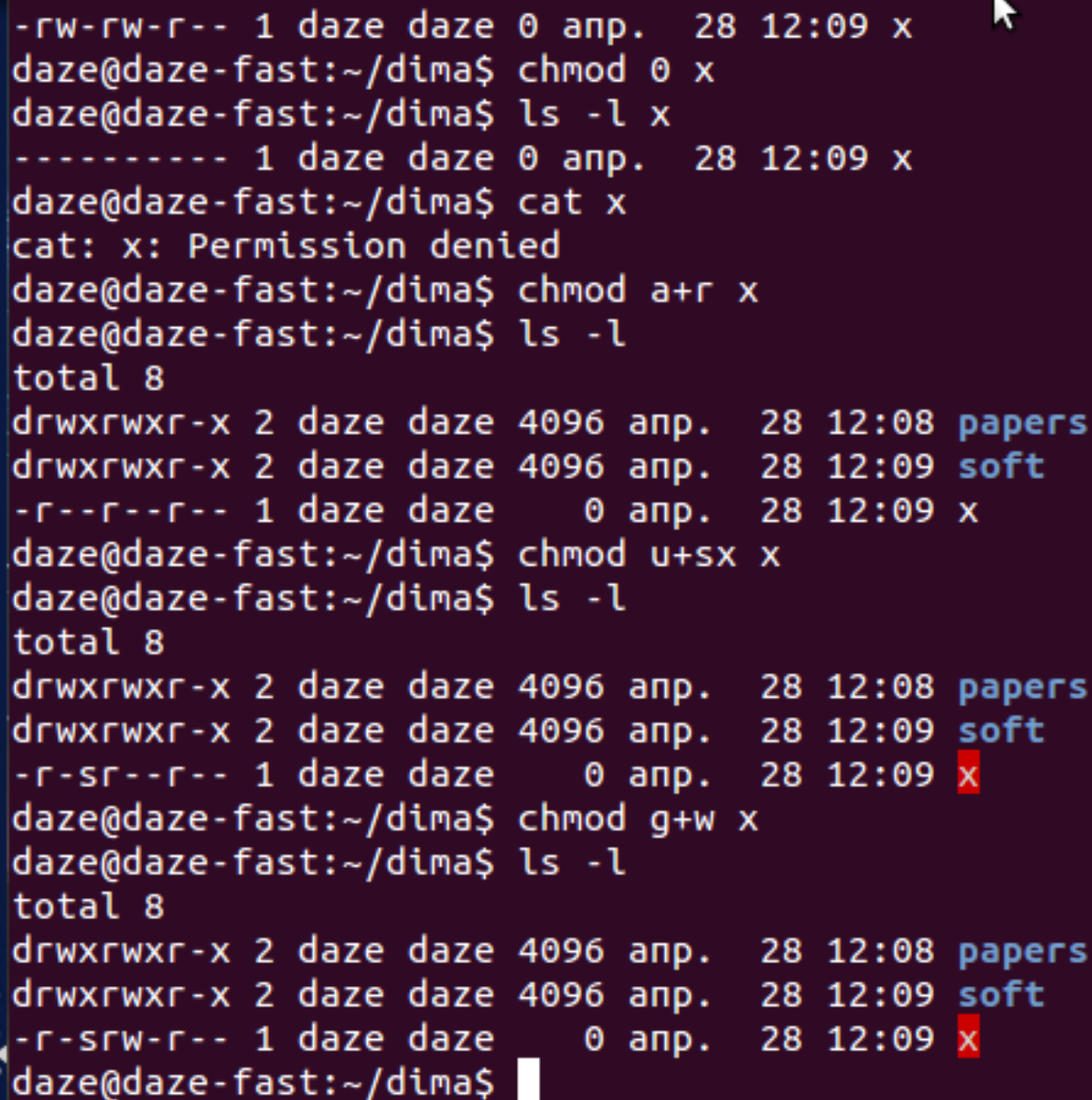


Octal	Decimal	Permission	Representation
000	0 (0+0+0)	No Permission	---
001	1 (0+0+1)	Execute	--X
010	2 (0+2+0)	Write	-W-
011	3 (0+2+1)	Write + Execute	-WX
100	4 (4+0+0)	Read	r--
101	5 (4+0+1)	Read + Execute	r-X
110	6 (4+2+0)	Read + Write	rw-
111	7 (4+2+1)	Read + Write + Execute	rwX

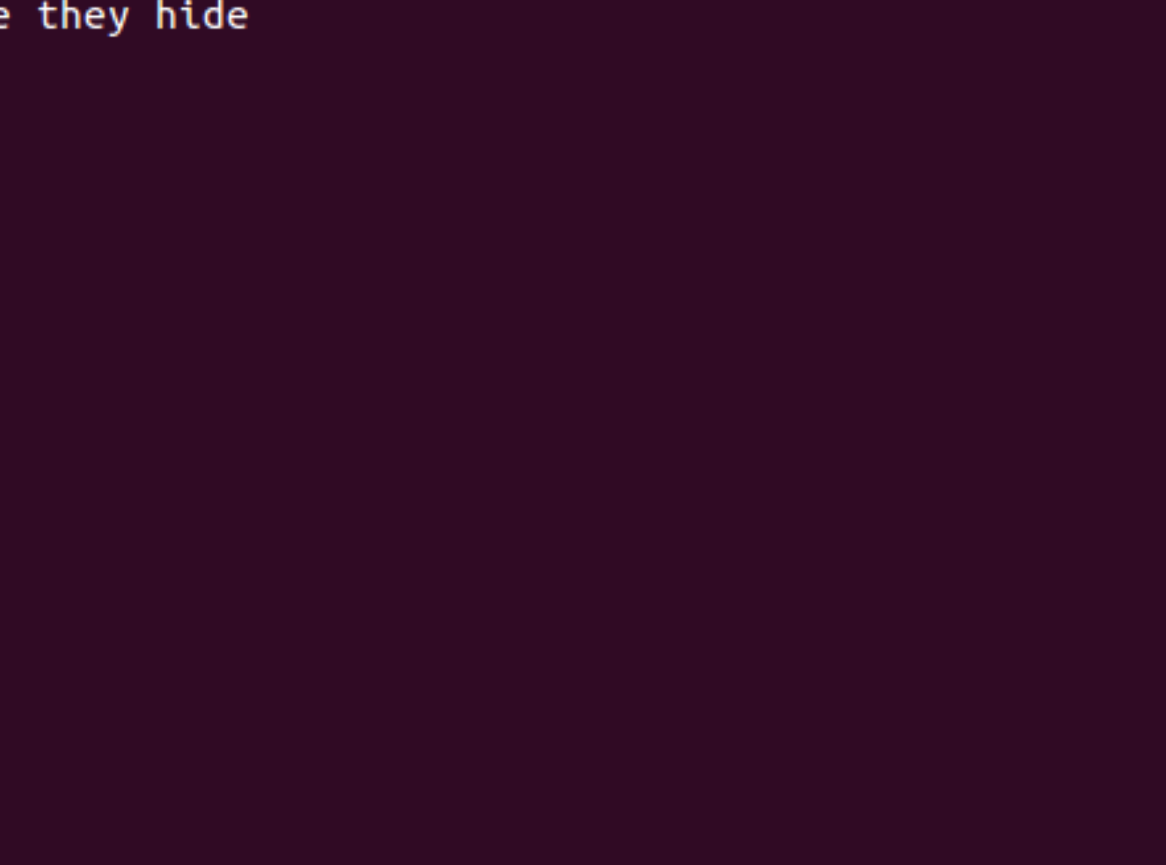
Change protection mode

- `chmod [ugoa] [+ -=] [rwxXst] file`
- `chmod octal-code file`

- `chmod u+w file1`
- `chmod a+r file2`
- `chmod 444 file3`



```
-rw-rw-r-- 1 daze daze 0 anp. 28 12:09 x
daze@daze-fast:~/dima$ chmod 0 x
daze@daze-fast:~/dima$ ls -l x
----- 1 daze daze 0 anp. 28 12:09 x
daze@daze-fast:~/dima$ cat x
cat: x: Permission denied
daze@daze-fast:~/dima$ chmod a+r x
daze@daze-fast:~/dima$ ls -l
total 8
drwxrwxr-x 2 daze daze 4096 anp. 28 12:08 papers
drwxrwxr-x 2 daze daze 4096 anp. 28 12:09 soft
-r--r--r-- 1 daze daze 0 anp. 28 12:09 x
daze@daze-fast:~/dima$ chmod u+sx x
daze@daze-fast:~/dima$ ls -l
total 8
drwxrwxr-x 2 daze daze 4096 anp. 28 12:08 papers
drwxrwxr-x 2 daze daze 4096 anp. 28 12:09 soft
-r-sr--r-- 1 daze daze 0 anp. 28 12:09 x
daze@daze-fast:~/dima$ chmod g+w x
daze@daze-fast:~/dima$ ls -l
total 8
drwxrwxr-x 2 daze daze 4096 anp. 28 12:08 papers
drwxrwxr-x 2 daze daze 4096 anp. 28 12:09 soft
-r-srw-r-- 1 daze daze 0 anp. 28 12:09 x
daze@daze-fast:~/dima$
```



```
Bear and polecat
Could you find
Who they are and
Where they hide

~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
~
:w puzzle
```

Navigation icons: back, forward, search, etc.