

# Анализ файловой структуры UNIX. Команды для работы с файлами и каталогами

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# Цели и задачи работы

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## Цель лабораторной работы

Ознакомление с файловой системой Linux, её структурой, именами и содержанием каталогов. Приобретение практических навыков по применению команд для работы с файлами и каталогами, по управлению процессами, по проверке использования диска и обслуживанию файловой системы.

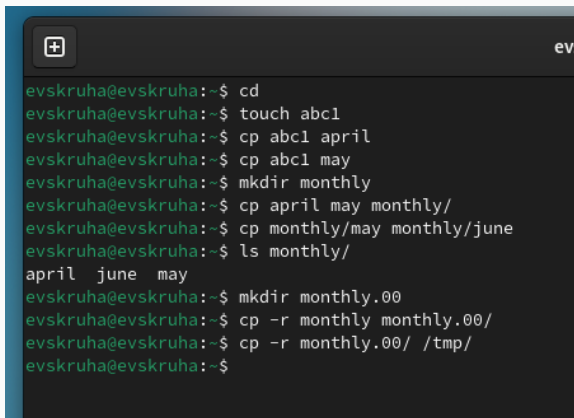
# Задачи лабораторной работы

- 1 Выполнить приимеры
- 2 Выполнить дествия по работе с каталогами и файлами
- 3 Выполнить действия с правами доступа
- 4 Получить дополнительные сведения при помощи справки по командам.

# **Процесс выполнения лабораторной работы**

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# Выполнение примеров



```
evskruha@evskruha:~$ cd
evskruha@evskruha:~$ touch abc1
evskruha@evskruha:~$ cp abc1 april
evskruha@evskruha:~$ cp abc1 may
evskruha@evskruha:~$ mkdir monthly
evskruha@evskruha:~$ cp april may monthly/
evskruha@evskruha:~$ cp monthly/may monthly/june
evskruha@evskruha:~$ ls monthly/
april  june  may
evskruha@evskruha:~$ mkdir monthly.00
evskruha@evskruha:~$ cp -r monthly monthly.00/
evskruha@evskruha:~$ cp -r monthly.00/ /tmp/
evskruha@evskruha:~$
```

**Рис. 1:** Выполнение примеров

# Выполнение примеров

```
evskruha@evskruha:~$  
evskruha@evskruha:~$ cd  
evskruha@evskruha:~$ mv april july  
evskruha@evskruha:~$ mv july monthly.00/  
evskruha@evskruha:~$ ls monthly.00/  
july  monthly  
evskruha@evskruha:~$ mv monthly.00/ monthly.01  
evskruha@evskruha:~$ mkdir reports  
evskruha@evskruha:~$ mv monthly.01/ reports/  
evskruha@evskruha:~$ mv reports/monthly.01/ reports/monthly  
evskruha@evskruha:~$
```

Рис. 2: Выполнение примеров

# Выполнение примеров

```
evskruha@evskruha:~$  
evskruha@evskruha:~$ cd  
evskruha@evskruha:~$ touch may  
evskruha@evskruha:~$ ls -l may  
-rw-r--r--. 1 evskruha evskruha 0 июн 19 11:51 may  
evskruha@evskruha:~$ chmod u+x may  
evskruha@evskruha:~$ ls -l may  
-rwxr--r--. 1 evskruha evskruha 0 июн 19 11:51 may  
evskruha@evskruha:~$ chmod u-x may  
evskruha@evskruha:~$  
evskruha@evskruha:~$ ls -l may  
-rw-r--r--. 1 evskruha evskruha 0 июн 19 11:51 may  
evskruha@evskruha:~$ cd  
evskruha@evskruha:~$ chmod g-r,o-r monthly/  
evskruha@evskruha:~$ chmod g+w abc1  
evskruha@evskruha:~$
```

Рис. 3: Выполнение примеров



# Создание директорий и копирование файлов

```
evskruha@evskruha:~$  
evskruha@evskruha:~$ cp /usr/include/linux/sysinfo.h ~  
evskruha@evskruha:~$ mv sysinfo.h equipment  
evskruha@evskruha:~$ mkdir ski.plases  
evskruha@evskruha:~$ mv equipment ski.plases/  
evskruha@evskruha:~$ mv ski.plases/equipment ski.plases/equiplist  
evskruha@evskruha:~$ touch abc1  
evskruha@evskruha:~$ cp abc1 ski.plases/equiplist2  
evskruha@evskruha:~$ cd ski.plases/  
evskruha@evskruha:~/ski.plases$ mkdir equipment  
evskruha@evskruha:~/ski.plases$ mv equiplist equipment/  
evskruha@evskruha:~/ski.plases$ mv equiplist2 equipment/  
evskruha@evskruha:~/ski.plases$ cd  
evskruha@evskruha:~$ mkdir newdir  
evskruha@evskruha:~$ mv newdir/ ski.plases/  
evskruha@evskruha:~$ mv ski.plases/newdir/ ski.plases/plans  
evskruha@evskruha:~$
```

Рис. 4: Работа с каталогами

# Работа с командой chmod

```
evskruha@evskruha:~$  
evskruha@evskruha:~$ mkdir australia play  
evskruha@evskruha:~$ touch my_os feathers  
evskruha@evskruha:~$ chmod 744 australia/  
evskruha@evskruha:~$ chmod 711 play/  
evskruha@evskruha:~$ chmod 544 my_os  
evskruha@evskruha:~$ chmod 664 feathers  
evskruha@evskruha:~$ ls -l  
итого 0  
-rw-rw-r--. 1 evskruha evskruha 0 июн 19 11:54 abc1  
drwxr--r--. 1 evskruha evskruha 0 июн 19 11:58 australia  
-rw-rw-r--. 1 evskruha evskruha 0 июн 19 11:58 feathers  
drwxr-xr-x. 1 evskruha evskruha 74 июн 19 11:24 git-extended  
-rw-r--r--. 1 evskruha evskruha 0 июн 19 11:51 may  
drwx--x--x. 1 evskruha evskruha 24 июн 19 11:49 monthly  
-r-xr--r--. 1 evskruha evskruha 0 июн 19 11:58 my_os  
drwx--x--x. 1 evskruha evskruha 0 июн 19 11:58 play  
drwxr-xr-x. 1 evskruha evskruha 14 июн 19 11:51 reports  
drwxr-xr-x. 1 evskruha evskruha 28 июн 19 11:58 ski.places  
drwxr-xr-x. 1 evskruha evskruha 10 июн 19 10:59 work  
drwxr-xr-x. 1 evskruha evskruha 0 июн 19 10:51 Видео  
drwxr-xr-x. 1 evskruha evskruha 0 июн 19 10:51 Документы  
drwxr-xr-x. 1 evskruha evskruha 0 июн 19 10:51 Загрузки  
drwxr-xr-x. 1 evskruha evskruha 0 июн 19 10:51 Изображения  
drwxr-xr-x. 1 evskruha evskruha 0 июн 19 10:51 Музыка  
drwxr-xr-x. 1 evskruha evskruha 0 июн 19 10:51 Общедоступные  
drwxr-xr-x. 1 evskruha evskruha 0 июн 19 10:51 'Рабочий стол'  
drwxr-xr-x. 1 evskruha evskruha 0 июн 19 10:51 Шаблоны  
evskruha@evskruha:~$
```

Рис. 5: Настройка прав доступа

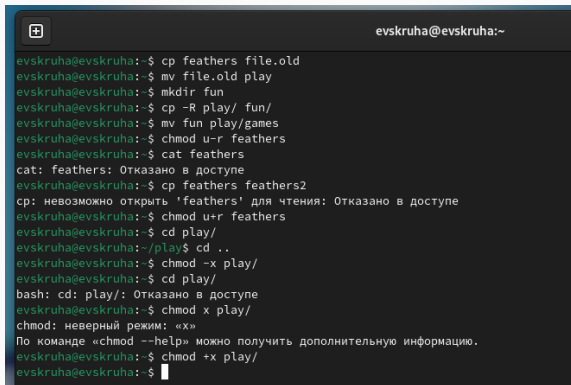
# Файл /etc/passwd



evskruha@evskruha:~ — less /etc/passwd

```
root:x:0:0:Super User:/root:/bin/bash
bin:x:1:1:bin:/bin:/usr/sbin/nologin
daemon:x:2:2:daemon:/sbin:/usr/sbin/nologin
adm:x:3:4:adm:/var/adm:/usr/sbin/nologin
lp:x:4:7:lp:/var/spool/lpd:/usr/sbin/nologin
sync:x:5:0:sync:/sbin:/bin/sync
shutdown:x:6:0:shutdown:/sbin:/sbin/shutdown
halt:x:7:0:halt:/sbin:/sbin/halt
mail:x:8:12:mail:/var/spool/mail:/usr/sbin/nologin
operator:x:11:0:operator:/root:/usr/sbin/nologin
games:x:12:100:games:/usr/games:/usr/sbin/nologin
ftp:x:14:50:FTP User:/var/ftp:/usr/sbin/nologin
nobody:x:65534:65534:Kernel Overflow User:/usr/sbin/nologin
dbus:x:81:81:System Message Bus:/usr/sbin/nologin
apache:x:48:48:Apache:/usr/share/httpd:/sbin/nologin
tss:x:59:59:Account used for TPM access:/usr/sbin/nologin
systemd-coredump:x:998:998:systemd Core Dumper:/usr/sbin/nologin
systemd-networkd:x:192:192:systemd Network Management:/usr/sbin/nologin
systemd-oom:x:997:997:systemd Userspace OOM Killer:/usr/sbin/nologin
systemd-resolve:x:193:193:systemd Resolver:/usr/sbin/nologin
systemd-timesync:x:996:996:systemd Time Synchronization:/usr/sbin/nologin
qemu:x:107:107:qemu user:/usr/sbin/nologin
polkitd:x:114:114>User for polkitd:/usr/sbin/nologin
avahi:x:70:70:Avahi mDNS/DNS-SD Stack:/var/run/avahi-daemon:/sbin/nologin
geoclue:x:995:994>User for geoclue:/var/lib/geoclue:/sbin/nologin
nm-openconnect:x:994:993:NetworkManager user for OpenConnect:/usr/sbin/nologin
usbmuxd:x:113:113:usbmuxd user:/usr/sbin/nologin
gluster:x:993:992:GlusterFS daemons:/run/gluster:/sbin/nologin
rtkit:x:172:172:RealtimeKit:/proc:/sbin/nologin
pipewire:x:992:990:PipeWire System Daemon:/run/pipewire:/usr/sbin/nologin
sasauthd:x:991:76:Sasauthd user:/run/sasauthd:/sbin/nologin
chrony:x:990:989:chrony system user:/var/lib/chrony:/sbin/nologin
dnsmasq:x:989:988:Dnsmasq DHCP and DNS server:/var/lib/dnsmasq:/usr/sbin/nologin
rpc:x:32:32:Rpcbind Daemon:/var/lib/rpcbind:/sbin/nologin
rpcuser:x:29:29:RPC Service User:/var/lib/nfs:/sbin/nologin
openvpn:x:988:987:OpenVPN:/etc/openvpn:/sbin/nologin
nm-openvpn:x:987:986:Default user for running openvpn spawned by NetworkManager:/usr/sbin/nologin
colord:x:986:985>User for colord:/var/lib/colord:/sbin/nologin
unbound:x:985:984:Unbound DNS resolver:/var/lib/unbound:/sbin/nologin
abrt:x:173:173:/etc/abrt:/sbin/nologin
flatpak:x:984:982:Flatpak system helper:/usr/sbin/nologin
gdm:x:42:42:GNOME Display Manager:/var/lib/gdm:/usr/sbin/nologin
gnome-initial-setup:x:983:981:/run/gnome-initial-setup:/usr/sbin/nologin
vboxadd:x:982:1:/var/run/vboxadd:/usr/sbin/nologin
sshd:x:74:74:Privilege-separated SSH:/usr/share/empty.sshd:/usr/sbin/nologin
/etc/passwd
```

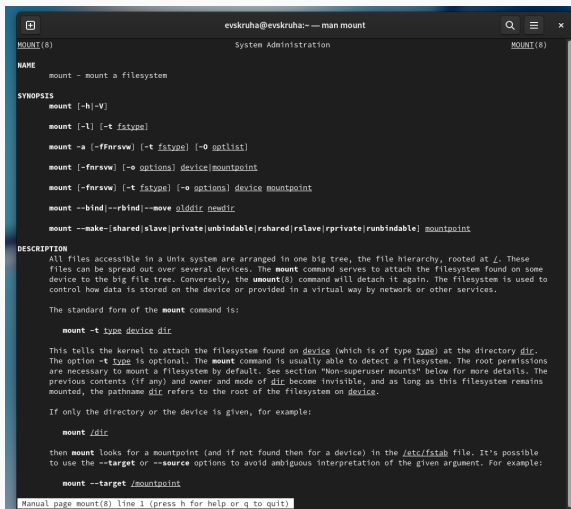
# Работа с файлами и правами доступа



```
evskruha@evskruha:~$ cp feathers file.old
evskruha@evskruha:~$ mv file.old play
evskruha@evskruha:~$ mkdir fun
evskruha@evskruha:~$ cp -R play/ fun/
evskruha@evskruha:~$ mv fun play/games
evskruha@evskruha:~$ chmod u-r feathers
evskruha@evskruha:~$ cat feathers
cat: feathers: Отказано в доступе
evskruha@evskruha:~$ cp feathers feathers2
cp: невозможно открыть 'feathers' для чтения: Отказано в доступе
evskruha@evskruha:~$ chmod u+r feathers
evskruha@evskruha:~$ cd play/
evskruha@evskruha:~/play$ cd ..
evskruha@evskruha:~$ chmod -x play/
evskruha@evskruha:~$ cd play/
bash: cd: play/: Отказано в доступе
evskruha@evskruha:~$ chmod x play/
chmod: неверный режим: «x»
По команде «chmod --help» можно получить дополнительную информацию.
evskruha@evskruha:~$ chmod +x play/
evskruha@evskruha:~$
```

Рис. 7: Работа с файлами и правами доступа

# Справка по командам



```
evskruha@evskruha:~ -- man mount
MOUNT(8) System Administration MOUNT(8)

NAME
mount - mount a filesystem

SYNOPSIS
mount [-h|-V]

mount [-l] [-t fstype]

mount -a [-ffnrsvw] [-t fstype] [-O optlist]

mount [-fnrsvw] [-o options] device mountpoint

mount [-fnrsvw] [-t fstype] [-o options] device mountpoint

mount --bind|--rbind|--move olddir newdir

mount --make-[shared|slave|private|unbindable|rshared|rslave|rprivate|runbindable] mountpoint

DESCRIPTION
All files accessible in a Unix system are arranged in one big tree, the file hierarchy, rooted at /. These
files can be spread out over several devices. The mount command serves to attach the filesystem found on some
device to the big file tree. Conversely, the umount(8) command will detach it again. The filesystem is used to
control how data is stored on the device or provided in a virtual way by network or other services.

The standard form of the mount command is:

mount -t type device dir

This tells the kernel to attach the filesystem found on device (which is of type type) at the directory dir.
The option -t type is optional. The mount command is usually able to detect a filesystem. The root permissions
are necessary to mount a filesystem by default. See section "Non-superuser mounts" below for more details. The
previous contents (if any) and owner and mode of dir become invisible, and as long as this filesystem remains
mounted, the pathname dir refers to the root of the filesystem on device.

If only the directory or the device is given, for example:

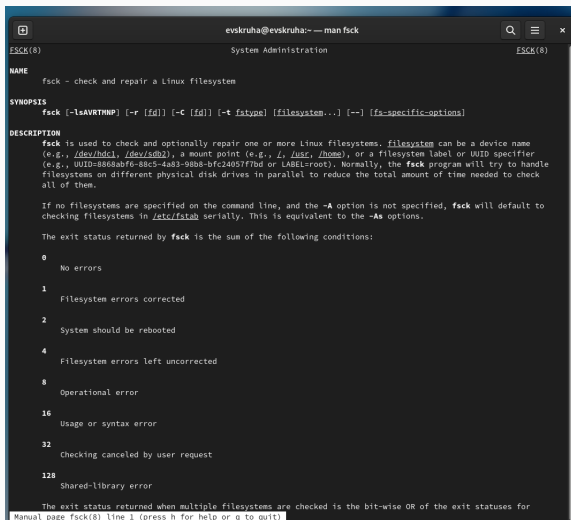
mount /dir

then mount looks for a mountpoint (and if not found then for a device) in the /etc/fstab file. It's possible
to use the --target or --source options to avoid ambiguous interpretation of the given argument. For example:

mount --target /mountpoint

Manual page mount(8) line 1 (press h for help or q to quit)
```

Рис. 8: Команда mount



```
evskruha@evskruha:~ -- man fsck
FSCK(8)                                     System Administration                                     FSCK(8)

NAME
    fsck - check and repair a Linux filesystem

SYNOPSIS
    fsck [-lsAVRTNHP] [-r [fd]] [-C [fd]] [-t fstype] [filesystem...] [--] [fs-specific-options]

DESCRIPTION
    fsck is used to check and optionally repair one or more Linux filesystems. filesystem can be a device name
    (e.g., /dev/hdc1, /dev/sdb2), a mount point (e.g., /, /usr, /home), or a filesystem label or UUID specifier
    (e.g., UUID=8868abf6-88c5-4a83-98b8-bfc24057f7bd or LABEL=root). Normally, the fsck program will try to handle
    filesystems on different physical disk drives in parallel to reduce the total amount of time needed to check
    all of them.

    If no filesystems are specified on the command line, and the -A option is not specified, fsck will default to
    checking filesystems in /etc/fstab serially. This is equivalent to the -As options.

    The exit status returned by fsck is the sum of the following conditions:

    0      No errors

    1      Filesystem errors corrected

    2      System should be rebooted

    4      Filesystem errors left uncorrected

    8      Operational error

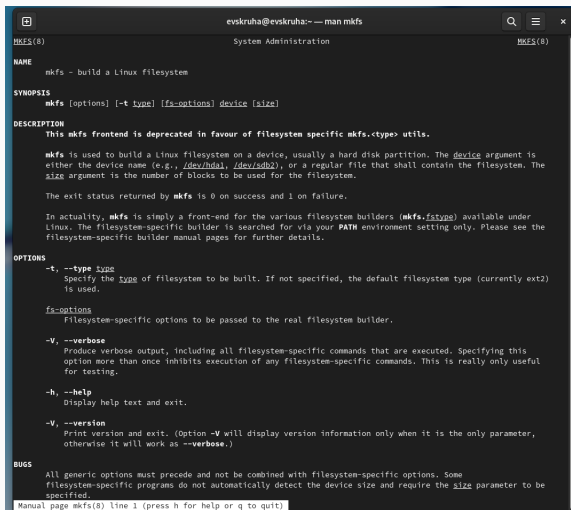
    16     Usage or syntax error

    32     Checking canceled by user request

    128    Shared-library error

    The exit status returned when multiple filesystems are checked is the bit-wise OR of the exit statuses for
    Manual page fsck(8) line 1 (press h for help or q to quit)
```

Рис. 9: Команда fsck



```
evskruha@evskruha:~$ man mkfs
mkfs(8)                                System Administration                                mkfs(8)

NAME
  mkfs - build a Linux filesystem

SYNOPSIS
  mkfs [options] [-t type] [fs-options] device [size]

DESCRIPTION
  This mkfs frontend is deprecated in favour of filesystem specific mkfs.<type> utils.

  mkfs is used to build a Linux filesystem on a device, usually a hard disk partition. The device argument is either the device name (e.g., /dev/hda1, /dev/sdb2), or a regular file that shall contain the filesystem. The size argument is the number of blocks to be used for the filesystem.

  The exit status returned by mkfs is 0 on success and 1 on failure.

  In actuality, mkfs is simply a front-end for the various filesystem builders (mkfs.<fstype>) available under Linux. The filesystem-specific builder is searched for via your PATH environment setting only. Please see the filesystem-specific builder manual pages for further details.

OPTIONS
  -t, --type type
    Specify the type of filesystem to be built. If not specified, the default filesystem type (currently ext2) is used.

  fs-options
    Filesystem-specific options to be passed to the real filesystem builder.

  -V, --verbose
    Produce verbose output, including all filesystem-specific commands that are executed. Specifying this option more than once inhibits execution of any filesystem-specific commands. This is really only useful for testing.

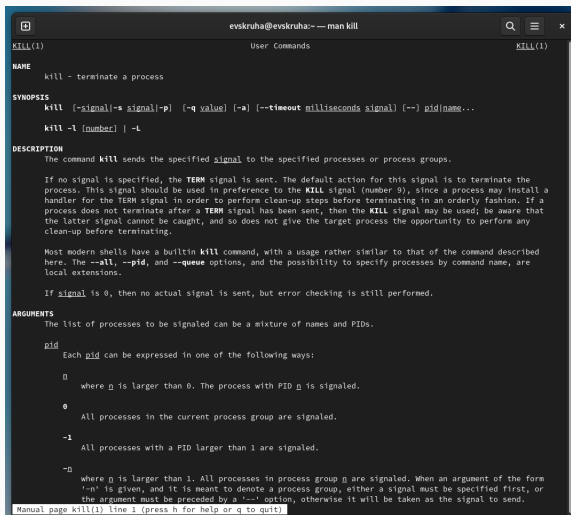
  -h, --help
    Display help text and exit.

  -V, --version
    Print version and exit. (Option -V will display version information only when it is the only parameter, otherwise it will work as --verbose.)

BUGS
  All generic options must precede and not be combined with filesystem-specific options. Some filesystem-specific programs do not automatically detect the device size and require the size parameter to be specified.

Manual page mkfs(8) line 1 (press h for help or q to quit)
```

Рис. 10: Команда mkfs



```
evskruha@evskruha:~ — man kill
kill(1)                                User Commands                                kill(1)

NAME
  kill - terminate a process

SYNOPSIS
  kill [-signal|-s signal|-p] [-q value] [-a] [--timeout milliseconds signal] [-- pid|name...

  kill -l [number] | -L

DESCRIPTION
  The command kill sends the specified signal to the specified processes or process groups.

  If no signal is specified, the TERM signal is sent. The default action for this signal is to terminate the
  process. This signal should be used in preference to the KILL signal (number 9), since a process may install a
  handler for the TERM signal in order to perform clean-up steps before terminating in an orderly fashion. If a
  process does not terminate after a TERM signal has been sent, then the KILL signal may be used; be aware that
  the latter signal cannot be caught, and so does not give the target process the opportunity to perform any
  clean-up before terminating.

  Most modern shells have a builtin kill command, with a usage rather similar to that of the command described
  here. The --all, --pid, and --queue options, and the possibility to specify processes by command name, are
  local extensions.

  If signal is 0, then no actual signal is sent, but error checking is still performed.

ARGUMENTS
  The list of processes to be signaled can be a mixture of names and PIDs.

  pid
    Each pid can be expressed in one of the following ways:

    n
      where n is larger than 0. The process with PID n is signaled.

    0
      All processes in the current process group are signaled.

    -1
      All processes with a PID larger than 1 are signaled.

    -n
      where n is larger than 1. All processes in process group n are signaled. When an argument of the form
      '-n' is given, and it is meant to denote a process group, either a signal must be specified first, or
      the argument must be preceded by a '--' option, otherwise it will be taken as the signal to send.

Manual page kill(1) line 1 (press h for help or q to quit)
```

Рис. 11: Команда kill



## **Выводы по проделанной работе**

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В ходе данной работы мы ознакомились с файловой системой Linux, её структурой, именами и содержанием каталогов. Научились совершать базовые операции с файлами, управлять правами их доступа для пользователя и групп. Ознакомились с Анализом файловой системы. А также получили базовые навыки по проверке использования диска и обслуживанию файловой системы.