

# **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.

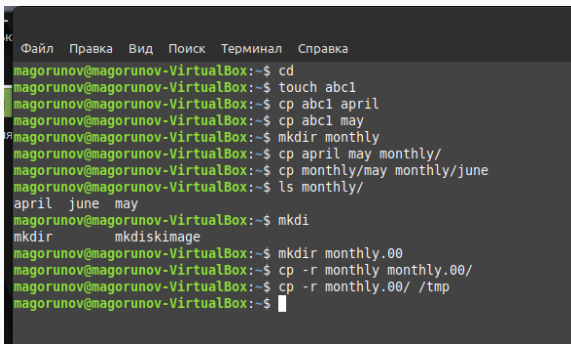
# Задачи лабораторной работы

- 1 Выполнить примеры
- 2 Выполнить действия 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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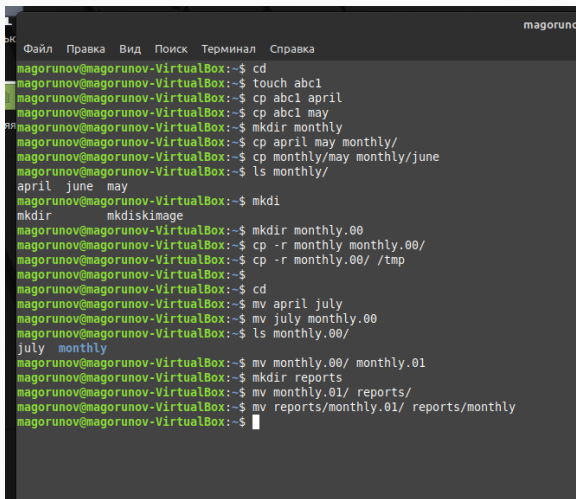
# Выполнение примеров



```
Файл  Правка  Вид  Поиск  Терминал  Справка
magorunov@magorunov-VirtualBox:~$ cd
magorunov@magorunov-VirtualBox:~$ touch abc1
magorunov@magorunov-VirtualBox:~$ cp abc1 april
magorunov@magorunov-VirtualBox:~$ cp abc1 may
magorunov@magorunov-VirtualBox:~$ mkdir monthly
magorunov@magorunov-VirtualBox:~$ cp april may monthly/
magorunov@magorunov-VirtualBox:~$ cp monthly/may monthly/june
magorunov@magorunov-VirtualBox:~$ ls monthly/
april  june  may
magorunov@magorunov-VirtualBox:~$ mki
mkdir      mkdiskimage
magorunov@magorunov-VirtualBox:~$ mkdir monthly.00
magorunov@magorunov-VirtualBox:~$ cp -r monthly monthly.00/
magorunov@magorunov-VirtualBox:~$ cp -r monthly.00/ /tmp
magorunov@magorunov-VirtualBox:~$
```

Figure 1: Выполнение примеров

# Выполнение примеров



```
magorunov@magorunov-VirtualBox:~$ cd
magorunov@magorunov-VirtualBox:~$ touch abc1
magorunov@magorunov-VirtualBox:~$ cp abc1 april
magorunov@magorunov-VirtualBox:~$ cp abc1 may
magorunov@magorunov-VirtualBox:~$ mkdir monthly
magorunov@magorunov-VirtualBox:~$ cp april may monthly/
magorunov@magorunov-VirtualBox:~$ cp monthly/may monthly/june
magorunov@magorunov-VirtualBox:~$ ls monthly/
april  june  may
magorunov@magorunov-VirtualBox:~$ mki
mkdir      mkdiskimage
magorunov@magorunov-VirtualBox:~$ mkdir monthly.00
magorunov@magorunov-VirtualBox:~$ cp -r monthly monthly.00/
magorunov@magorunov-VirtualBox:~$ cp -r monthly.00/ /tmp
magorunov@magorunov-VirtualBox:~$ cd
magorunov@magorunov-VirtualBox:~$ mv april july
magorunov@magorunov-VirtualBox:~$ mv july monthly.00
magorunov@magorunov-VirtualBox:~$ ls monthly.00/
july  monthly
magorunov@magorunov-VirtualBox:~$ mv monthly.00/ monthly.01
magorunov@magorunov-VirtualBox:~$ mkdir reports
magorunov@magorunov-VirtualBox:~$ mv monthly.01/ reports/
magorunov@magorunov-VirtualBox:~$ mv reports/monthly.01/ reports/monthly
magorunov@magorunov-VirtualBox:~$
```

Figure 2: Выполнение примеров

# Выполнение примеров

```
magorunov@magorunov-VirtualBox:~$ mv /etc/passwd /etc/passwd.bak
magorunov@magorunov-VirtualBox:~$ cd
magorunov@magorunov-VirtualBox:~$ touch may
magorunov@magorunov-VirtualBox:~$ ls -l may
-rw-rw-r-- 1 magorunov magorunov 0 abr 24 20:59 may
magorunov@magorunov-VirtualBox:~$ chmod u+x may
magorunov@magorunov-VirtualBox:~$ ls -l may
-rwxrw-r-- 1 magorunov magorunov 0 abr 24 20:59 may
magorunov@magorunov-VirtualBox:~$ chmod u-x may
magorunov@magorunov-VirtualBox:~$ ls -l may
-rw-rw-r-- 1 magorunov magorunov 0 abr 24 20:59 may
magorunov@magorunov-VirtualBox:~$ cd
magorunov@magorunov-VirtualBox:~$ mkdir monthly
mkdir: невозможно создать каталог «monthly»: Файл существует
magorunov@magorunov-VirtualBox:~$ chmod g-r,o-r monthly/
magorunov@magorunov-VirtualBox:~$ cd
magorunov@magorunov-VirtualBox:~$ touch abc1
magorunov@magorunov-VirtualBox:~$ chmod g+w abc1
magorunov@magorunov-VirtualBox:~$
```

Figure 3: Выполнение примеров



# Создание директорий и копирование файлов

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

Figure 4: Работа с каталогами

# Работа с командой chmod

```
magorunov@magorunov-VirtualBox:~$  
magorunov@magorunov-VirtualBox:~$ mkdir australia play  
magorunov@magorunov-VirtualBox:~$ touch my_os feathers  
magorunov@magorunov-VirtualBox:~$ chmod 744 australia/  
magorunov@magorunov-VirtualBox:~$ chmod 711 play/  
magorunov@magorunov-VirtualBox:~$ chmod 544 my_os  
magorunov@magorunov-VirtualBox:~$ chmod 664 feathers  
magorunov@magorunov-VirtualBox:~$ ls -l  
итого 56  
-rw-rw-r-- 1 magorunov magorunov 0 авг 24 21:01 abcl  
drwxr--r-- 2 magorunov magorunov 4096 авг 24 21:03 australia  
-rw-rw-r-- 1 magorunov magorunov 0 авг 24 21:03 feathers  
-rw-rw-r-- 1 magorunov magorunov 0 авг 24 20:59 may  
drwx-wx--x 2 magorunov magorunov 4096 авг 24 20:55 monthly  
-r-xr--r-- 1 magorunov magorunov 0 авг 24 21:03 my_os  
drwx--x--x 2 magorunov magorunov 4096 авг 24 21:03 play  
drwxrwxr-x 3 magorunov magorunov 4096 авг 24 20:58 reports  
drwxrwxr-x 4 magorunov magorunov 4096 авг 24 21:03 ski.places  
drwxrwxr-x 3 magorunov magorunov 4096 авг 24 20:31 work  
drwxr-xr-x 2 magorunov magorunov 4096 авг 24 19:58 Видео  
drwxr-xr-x 2 magorunov magorunov 4096 авг 24 19:58 Документы  
drwxr-xr-x 2 magorunov magorunov 4096 авг 24 19:58 Загрузки  
drwxr-xr-x 2 magorunov magorunov 4096 авг 24 19:58 Изображения  
drwxr-xr-x 2 magorunov magorunov 4096 авг 24 19:58 Музыка  
drwxr-xr-x 2 magorunov magorunov 4096 авг 24 19:58 Общедоступные  
drwxr-xr-x 2 magorunov magorunov 4096 авг 24 19:58 'Рабочий стол'  
drwxr-xr-x 2 magorunov magorunov 4096 авг 24 19:58 Шаблоны  
magorunov@magorunov-VirtualBox:~$
```

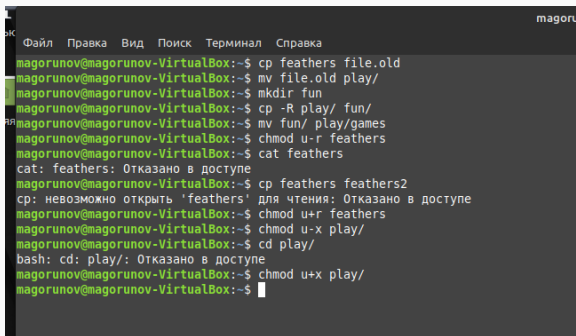
Figure 5: Настройка прав доступа

# Файл /etc/passwd

```
magorunov@magorunov-VirtualBox: ~  
Файл  Правка  Вид  Поиск  Терминал  Справка  
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin  
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin  
www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin  
backup:x:34:34:backup:/var/backups:/usr/sbin/nologin  
list:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin  
irc:x:39:39:ircd:/run/ircd:/usr/sbin/nologin  
gnats:x:41:41:Gnats Bug-Reporting System (admin):/var/lib/gnats:/usr/sbin/nologin  
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin  
systemd-network:x:100:102:systemd Network Management,,,:/run/systemd:/usr/sbin/nologin  
systemd-resolve:x:101:103:systemd Resolver,,,:/run/systemd:/usr/sbin/nologin  
messagebus:x:102:105:/:/nonexistent:/usr/sbin/nologin  
systemd-timesync:x:103:106:systemd Time Synchronization,,,:/run/systemd:/usr/sbin/nologin  
syslog:x:104:111:/:home/syslog:/usr/sbin/nologin  
apt:x:105:65534:/:/nonexistent:/usr/sbin/nologin  
tss:x:106:112:TPM software stack,,,:/var/lib/tpm:/bin/false  
rtkit:x:107:113:RealtimeKit,,,:/proc:/usr/sbin/nologin  
systemd-coredump:x:108:114:systemd Core Dumper,,,:/run/systemd:/usr/sbin/nologin  
kernoops:x:109:65534:Kernel Oops Tracking Daemon,,,:/usr/sbin/nologin  
uidd:x:110:119:/:/run/uidd:/usr/sbin/nologin  
cups-pk-helper:x:111:115:user for cups-pk-helper service,,,:/home/cups-pk-helper:/usr/sbin/nologin  
lightdm:x:112:120:Light Display Manager:/var/lib/lightdm:/bin/false  
tcpdump:x:113:122:/:/nonexistent:/usr/sbin/nologin  
speech-dispatcher:x:114:29:Speech Dispatcher,,,:/run/speech-dispatcher:/bin/false  
avahi-autoipd:x:115:125:Avahi autoip daemon,,,:/var/lib/avahi-autoipd:/usr/sbin/nologin  
usbmux:x:116:46:usbmux daemon,,,:/var/lib/usbmux:/usr/sbin/nologin  
nm-openvpn:x:117:126:NetworkManager OpenVPN,,,:/var/lib/openvpn/chroot:/usr/sbin/nologin  
geoclue:x:118:127:/:/var/lib/geoclue:/usr/sbin/nologin  
dnsmasq:x:119:65534:dnsmasq,,,:/var/lib/misc:/usr/sbin/nologin  
pulse:x:120:128:PulseAudio daemon,,,:/run/pulse:/usr/sbin/nologin  
flatpak:x:121:131:Flatpak system-wide installation helper,,,:/nonexistent:/usr/sbin/nologin  
avahi:x:122:132:Avahi mDNS daemon,,,:/run/avahi-daemon:/usr/sbin/nologin  
saned:x:123:133:/:/var/lib/saned:/usr/sbin/nologin  
colord:x:124:134:colord colour management daemon,,,:/var/lib/colord:/usr/sbin/nologin  
hplip:x:125:7:HPLIP system user,,,:/run/hplip:/bin/false  
magorunov:x:1000:1000:magorunov,,,:/home/magorunov:/bin/bash  
sssd:x:126:136:SSSD system user,,,:/var/lib/sss:/usr/sbin/nologin  
vboxadd:x:999:1:/:/var/run/vboxadd:/bin/false  
magorunov@magorunov-VirtualBox:~$
```

Figure 6: Файл /etc/passwd

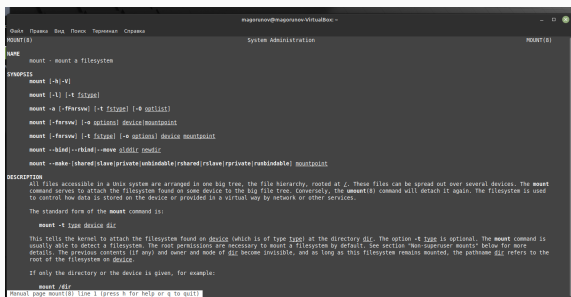
# Работа с файлами и правами доступа



The screenshot shows a terminal window with a menu bar at the top containing 'Файл', 'Правка', 'Вид', 'Поиск', 'Терминал', and 'Справка'. The terminal text is as follows:

```
magorunov@magorunov-VirtualBox:~$ cp feathers file.old
magorunov@magorunov-VirtualBox:~$ mv file.old play/
magorunov@magorunov-VirtualBox:~$ mkdir fun
magorunov@magorunov-VirtualBox:~$ cp -R play/ fun/
magorunov@magorunov-VirtualBox:~$ mv fun/ play/games
magorunov@magorunov-VirtualBox:~$ chmod u-r feathers
magorunov@magorunov-VirtualBox:~$ cat feathers
cat: feathers: Отказано в доступе
magorunov@magorunov-VirtualBox:~$ cp feathers feathers2
cp: невозможно открыть 'feathers' для чтения: Отказано в доступе
magorunov@magorunov-VirtualBox:~$ chmod u+r feathers
magorunov@magorunov-VirtualBox:~$ chmod u-x play/
magorunov@magorunov-VirtualBox:~$ cd play/
bash: cd: play/: Отказано в доступе
magorunov@magorunov-VirtualBox:~$ chmod u+x play/
magorunov@magorunov-VirtualBox:~$
```

Figure 7: Работа с файлами и правами доступа



```
magersinn@magarsinn-VirtualBox -
man mount(8)
NAME
    mount - mount a filesystem

SYNOPSIS
    mount [-h-V]
    mount [-i] [-t fstype]
    mount -o [-ffsraw] [-t fstype] [-o optlist]
    mount [-ffsraw] [-o options] device mountpoint
    mount [-ffsraw] [-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

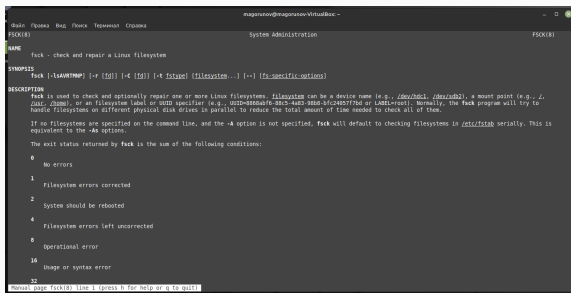
    This tells the kernel to attach the filesystem found on device (which is of type type) at the directory dir. The option -t type is optional. The mount command is
    usually able to detect a filesystem. The root permissions are necessary to mount a filesystem by default. See section "Non-superuser mounts"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

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

Figure 8: Команда mount



```
mageronov@mageronov-VirtualBox: ~
fsck(8)                                     System Administration                  fsck(8)

NAME
    fsck - check and repair a Linux filesystem

SYNOPSIS
    fsck [-lswrtnp] [-r [fd]] [-t [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/sdb1), a mount point (e.g., /, /usr, /home), or an filesystem label or UUID specifier (e.g., UUID=880a4fe-38c5-4a43-9808-bfc2405777bd 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.

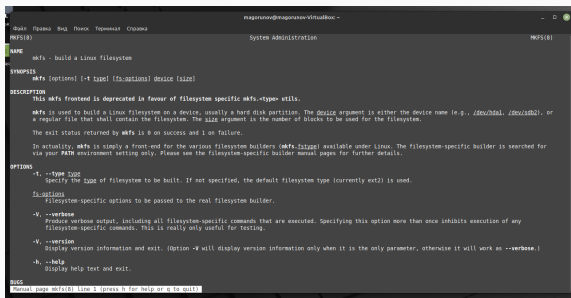
    If no filesystems are specified on the command line, and the -A option is not specified, fsck will default to checking filesystems in /etc/fstab serially. This is equivalent to the -As options.

    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

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

Figure 9: Команда fsck



```
mageronov@magorasec-VirtualBox -
mkfs(8)                                System Administration      mkfs(8)

NAME
  mkfs - build a Linux filesystem

SYNOPSIS
  mkfs [options] [-t type] [fs..optional] 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/sda1, /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.-fs-type) 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.

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

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

BUGS
  Manual page mkfs(8) line 3 (press h for help or q to quit)
```

Figure 10: Команда mkfs



```
magorono@magorono-VirtualBox: ~
kill(1)                                User Commands                                kill(1)

NAME
    kill - send a signal to a process

SYNOPSIS
    kill [options] <pid> [...]

DESCRIPTION
    The default signal for kill is TERM. Use -l or -L to list available signals. Particularly useful signals include HUP, INT, KILL, STOP, CONT, and &. Alternate signals may be specified in three ways: -9, -SIGKILL or -KILL. Negative PID values may be used to choose whole process groups; see the PGID column in ps command output. A PID of -1 is special; it indicates all processes except the kill process itself and init.

OPTIONS
    <pid> [...]
        Send signal to every <pid> listed.

    --signal=
    -s <signal>
    --signal=<signal>
        Specify the signal to be sent. The signal can be specified by using name or number. The behavior of signals is explained in signal(7) manual page.

    -q, --queue <value>
        Use <sigqueue(2)> rather than kill(2) and the value argument is used to specify an integer to be sent with the signal. If the receiving process has installed a handler for this signal using the SA_SIGINFO flag to <sigaction(2)>, then it can obtain this data via the si_value field of the siginfo_t structure.

    -l, --list [<signal>]
        List signal names. This option has optional argument, which will convert signal number to signal name, or other way round.

    -L, --table
        List signal names in a nice table.

NOTES
    Your shell (command line interpreter) may have a built-in kill command. You may need to run the command described here as /bin/kill to solve the conflict.

EXAMPLES
    kill -9 1
        Kill all processes you can kill.
    Manual page kill(1) line 3 (press h for help or q to quit)
```

Figure 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.