

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

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Цели и задачи работы

Цель лабораторной работы

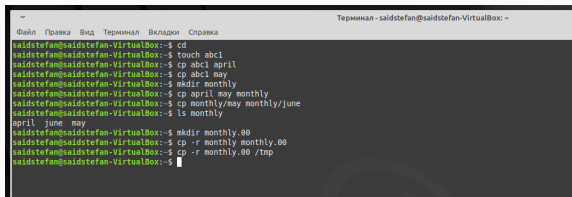
Ознакомление с файловой системой Linux, её структурой, именами и содержанием каталогов. Приобретение практических навыков по применению команд для работы с файлами и каталогами, по управлению процессами, по проверке использования диска и обслуживанию файловой системы.

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

Выполнение примеров



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

Figure 1: Выполнение примеров

Выполнение примеров

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

Figure 2: Выполнение примеров

Выполнение примеров

```
saidstefan@saidstefan-VirtualBox:~$ cd
saidstefan@saidstefan-VirtualBox:~$ touch may
saidstefan@saidstefan-VirtualBox:~$ ls -l may
-rw-rw-r-- 1 saidstefan saidstefan 0 мая  2 18:20 may
saidstefan@saidstefan-VirtualBox:~$ chmod u+x may
saidstefan@saidstefan-VirtualBox:~$ ls -l may
-rwxrw-r-- 1 saidstefan saidstefan 0 мая  2 18:20 may
saidstefan@saidstefan-VirtualBox:~$ chmod u-x may
saidstefan@saidstefan-VirtualBox:~$ ls -l may
-rw-rw-r-- 1 saidstefan saidstefan 0 мая  2 18:20 may
saidstefan@saidstefan-VirtualBox:~$ cd
saidstefan@saidstefan-VirtualBox:~$ mkdir monthly
mkdir: невозможно создать каталог «monthly»: Файл существует
saidstefan@saidstefan-VirtualBox:~$ chmod g-r,o-r monthly
saidstefan@saidstefan-VirtualBox:~$ cd
saidstefan@saidstefan-VirtualBox:~$ touch abc1
saidstefan@saidstefan-VirtualBox:~$ chmod g+w abc1
saidstefan@saidstefan-VirtualBox:~$
```

Figure 3: Выполнение примеров

Создание директорий и копирование файлов

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

Figure 4: Работа с каталогами

Работа с командой chmod

```
saidstefan@saidstefan-VirtualBox:~$  
saidstefan@saidstefan-VirtualBox:~$  
saidstefan@saidstefan-VirtualBox:~$ mkdir australia play  
saidstefan@saidstefan-VirtualBox:~$ touch my_os feathers  
saidstefan@saidstefan-VirtualBox:~$ chmod 744 australia/  
saidstefan@saidstefan-VirtualBox:~$ chmod 711 play/  
saidstefan@saidstefan-VirtualBox:~$ chmod 544 my_os  
saidstefan@saidstefan-VirtualBox:~$ chmod 664 feathers  
saidstefan@saidstefan-VirtualBox:~$ ls -l  
итого 60  
-rw-rw-r-- 1 saidstefan saidstefan 0 мая 2 18:20 abc1  
drwxrwxr-x 8 saidstefan saidstefan 4096 ноя 17 23:48 Architecture_PC  
drwxr--r-- 2 saidstefan saidstefan 4096 мая 2 18:20 australia  
-rw-rw-r-- 1 saidstefan saidstefan 0 мая 2 18:20 feathers  
-rw-rw-r-- 1 saidstefan saidstefan 0 мая 2 18:20 may  
drwx-wx--x 2 saidstefan saidstefan 4096 мая 2 18:19 monthly  
-r-xr--r-- 1 saidstefan saidstefan 0 мая 2 18:20 my_os  
drwx--x--x 2 saidstefan saidstefan 4096 мая 2 18:20 play  
drwxrwxr-x 3 saidstefan saidstefan 4096 мая 2 18:20 reports  
drwxrwxr-x 4 saidstefan saidstefan 4096 мая 2 18:20 ski.places  
drwxrwxr-x 3 saidstefan saidstefan 4096 апр 23 17:55 work  
drwxr-xr-x 2 saidstefan saidstefan 4096 ноя 17 13:44 Видео  
drwxr-xr-x 2 saidstefan saidstefan 4096 ноя 17 13:44 Документы  
drwxr-xr-x 2 saidstefan saidstefan 4096 ноя 17 13:44 Загрузки  
drwxr-xr-x 2 saidstefan saidstefan 4096 ноя 17 13:44 Изображения  
drwxr-xr-x 2 saidstefan saidstefan 4096 ноя 17 13:44 Музыка  
drwxr-xr-x 2 saidstefan saidstefan 4096 ноя 17 13:44 Общедоступные  
drwxr-xr-x 2 saidstefan saidstefan 4096 ноя 17 13:44 'Рабочий стол'  
drwxr-xr-x 2 saidstefan saidstefan 4096 ноя 17 13:44 Шаблоны  
saidstefan@saidstefan-VirtualBox:~$
```

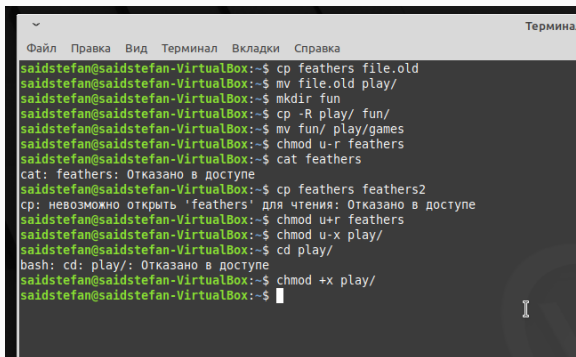
Figure 5: Настройка прав доступа

Файл /etc/passwd

```
saidstefan@saidstefan-VirtualBox:~$ cat /etc/passwd
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/bin/sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin
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:Mail List Manager:/var/list:/usr/sbin/nologin
irc:x:39:39:ircd:/var/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
system-network:x:100:102:system Network Management,,:/run/systemd:/usr/sbin/nologin
systemd-resolve:x:101:103:systemd Resolver,,:/run/systemd:/usr/sbin/nologin
systemd-timesync:x:102:104:systemd Time Synchronization,,:/run/systemd:/usr/sbin/nologin
messagebus:x:103:106:./nonexistent:/usr/sbin/nologin
syslog:x:104:110:./home/syslog:/usr/sbin/nologin
_apt:x:105:65534:./nonexistent:/usr/sbin/nologin
ntp:x:106:111:./nonexistent:/usr/sbin/nologin
tss:x:107:112:TPM software stack,./var/lib/tpm:/bin/false
rtkit:x:108:113:RealtimeKit,./proc:/usr/sbin/nologin
systemd-coredump:x:109:114:systemd Core Dumper,./run/systemd:/usr/sbin/nologin
kernoops:x:110:65534:Kernel Oops Tracking Daemon,./:/usr/sbin/nologin
uuidd:x:111:119:./run/uuidd:/usr/sbin/nologin
cups-pk-helper:x:112:115:user for cups-pk-helper service,./home/cups-pk-helper:/usr/sbin/nologin
tcpdump:x:113:121:./nonexistent:/usr/sbin/nologin
geoclue:x:114:123:./var/lib/geoclue:/usr/sbin/nologin
avahi-autoipd:x:115:124:Avahi autoip daemon,./var/lib/avahi-autoipd:/usr/sbin/nologin
usbmux:x:116:46:usbmux daemon,./var/lib/usbmux:/usr/sbin/nologin
dnsmasq:x:117:65534:dnsmasq,./var/lib/misc:/usr/sbin/nologin
```

Figure 6: Файл /etc/passwd

Работа с файлами и правами доступа



The image shows a terminal window titled "Термина." with a menu bar containing "Файл", "Правка", "Вид", "Терминал", "Вкладки", and "Справка". The terminal output shows a series of commands and their results in a Linux environment:

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

Figure 7: Работа с файлами и правами доступа

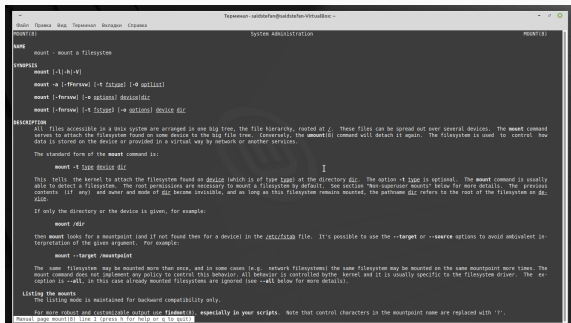


Figure 8: Команда mount



```
fsck(8)                                System Administration                                fsck(8)

NAME
    fsck - check and repair a Linux filesystem

SYNOPSIS
    fsck [-laAvTnmp] [-r [fd]] [-C [fd]] [-A filesystem] [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/sd1, /dev/sdb2), a mount point (e.g. /, /usr, /home), or an filesystem label or UUID specifier (e.g. LABEL=fsck444, UUID=0123456789ABCDEF). 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 code 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 detected by user request
        128    Shared-library error

    The exit code returned when multiple filesystems are checked is the bit-wise OR of the exit codes for each filesystem that is checked.

    In actuality, fsck is simply a front-end for the various filesystem checkers (fsck filesystem) available under Linux. The filesystem-specific checker is searched for in the PATH environment variable. If the PATH is undefined then fallback to "/sbin".

    Please see the filesystem-specific checker manual pages for further details.

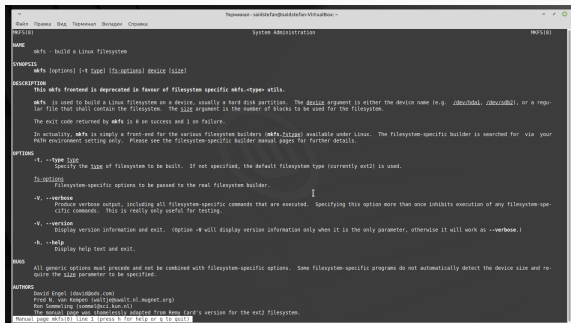
OPTIONS
    -l      Create an exclusive lockfile /var/fsck/.lock for whole-disk device. This option can be used with one device only (this means that -A and -l are mutually exclusive). This option is recommended when more fsck(8) instances are executed in the same time. The option is ignored when used for multiple devices or for non-rotating disks. fsck does not lock underlying devices when executed to check stacked devices (e.g. MD or DM) - this feature is not implemented yet.

    -r [fd] Report certain statistics for each fsck when it completes. These statistics include the exit status, the maximum run set size (in kilobytes), the elapsed all-clock time and the user and system CPU time used by the fsck run. For example:

        /dev/sda1: status 8, rss 92828, real 4.062864, user 2.677592, sys 0.061896

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

Figure 9: Команда fsck



```
Terminals - cat@fedora32:~/Desktop/VisualStudioBox -
mkfs - build a Linux filesystem

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 code 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.<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.

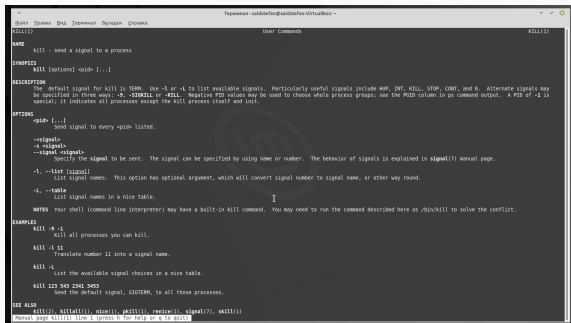
NOTES
  All generic options must precede and not be combined with filesystem-specific options. Some filesystem-specific programs do not automatically detect the device size and require the size parameter to be specified.

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  Ron Sommer (sommer@ci.kun.nl)

  The manual pages have been directly adapted from Beowulf's version for the ext2 filesystem.

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

Figure 10: Команда mkfs



```
Терминал - sshd@fatguyubuntu:VirtualBox -
Файл  Папки  Вид  Терминал  Порталы  Справка
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 0. Alternate signals may be specified in three ways: -s, -SIGNAME or -KILL. Negative PID values may be used to choose whole process groups; see the PID column in ps command output. A PID of -1 is special; it indicates all processes except the kill process itself and init.

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

  --signal <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.

  -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.

  kill -1 11
    Translate number 11 into a signal name.

  kill -L
    List the available signal choices in a nice table.

  kill 123 543 2341 3453
    Send the default signal, SIGTERM, to all these processes.

SEE ALSO
  kill(2), killall(1), nice(1), pkill(1), renice(1), signal(7), skill(1)
  Manual page kill(1) line 1 (press h for help or q to quit)
```

Figure 11: Команда kill

Выводы по проделанной работе

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.