

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

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Цели и задачи работы

Цель лабораторной работы

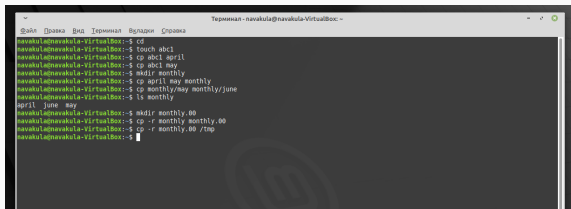
Ознакомление с файловой системой Linux, её структурой, именами и содержанием каталогов. Приобретение практических навыков по применению команд для работы с файлами и каталогами, по управлению процессами, по проверке использования диска и обслуживанию файловой системы.

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

Figure 1: Выполнение примеров

Выполнение примеров

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

Figure 2: Выполнение примеров

Выполнение примеров

```
navakula@navakula-VirtualBox:~$  
navakula@navakula-VirtualBox:~$ cd  
navakula@navakula-VirtualBox:~$ touch may  
navakula@navakula-VirtualBox:~$ ls -l may  
-rw-rw-r-- 1 navakula navakula 0 мая 3 14:13 may  
navakula@navakula-VirtualBox:~$ chmod u+x may  
navakula@navakula-VirtualBox:~$ ls -l may  
-rwxrw-r-- 1 navakula navakula 0 мая 3 14:13 may  
navakula@navakula-VirtualBox:~$ chmod u-x may  
navakula@navakula-VirtualBox:~$ ls -l may  
-rw-rw-r-- 1 navakula navakula 0 мая 3 14:13 may  
navakula@navakula-VirtualBox:~$ cd  
navakula@navakula-VirtualBox:~$ mkdir monthly  
mkdir: невозможно создать каталог «monthly»: Файл существует  
navakula@navakula-VirtualBox:~$ chmod g-r,o-r monthly  
navakula@navakula-VirtualBox:~$ cd  
navakula@navakula-VirtualBox:~$ touch abc1  
navakula@navakula-VirtualBox:~$ chmod g+w abc1  
navakula@navakula-VirtualBox:~$
```

Figure 3: Выполнение примеров

Создание директорий и копирование файлов

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

Figure 4: Работа с каталогами

Работа с командой chmod

```
navakula@navakula-VirtualBox:~$  
navakula@navakula-VirtualBox:~$ mkdir australia play  
navakula@navakula-VirtualBox:~$ touch my_os feathers  
navakula@navakula-VirtualBox:~$ chmod 744 australia/  
navakula@navakula-VirtualBox:~$ chmod 711 play/  
navakula@navakula-VirtualBox:~$ chmod 544 my_os  
navakula@navakula-VirtualBox:~$ chmod 664 feathers  
navakula@navakula-VirtualBox:~$ ls -l  
итого 60  
-rw-rw-r-- 1 navakula navakula 0 мая 3 14:13 abcl  
drwxr--r-- 2 navakula navakula 4096 мая 3 14:13 australia  
-rw-rw-r-- 1 navakula navakula 0 мая 3 14:13 feathers  
-rw-rw-r-- 1 navakula navakula 0 мая 3 14:13 may  
drwx-wx--x 2 navakula navakula 4096 мая 3 14:12 monthly  
drwxrwxr-x 2 navakula navakula 4096 апр 27 16:40 morefun  
-r-xr--r-- 1 navakula navakula 0 мая 3 14:13 my_os  
drwx--x--x 2 navakula navakula 4096 мая 3 14:13 play  
drwxrwxr-x 3 navakula navakula 4096 мая 3 14:13 reports  
drwxrwxr-x 4 navakula navakula 4096 мая 3 14:13 ski_places  
drwxrwxr-x 3 navakula navakula 4096 апр 30 10:57 work  
drwxr-xr-x 2 navakula navakula 4096 апр 27 16:29 Видео  
drwxr-xr-x 2 navakula navakula 4096 апр 27 16:29 Документы  
drwxr-xr-x 2 navakula navakula 4096 апр 27 16:29 Загрузки  
drwxr-xr-x 2 navakula navakula 4096 апр 27 16:29 Изображения  
drwxr-xr-x 2 navakula navakula 4096 апр 27 16:29 Музыка  
drwxr-xr-x 2 navakula navakula 4096 апр 27 16:29 Общедоступные  
drwxr-xr-x 2 navakula navakula 4096 апр 27 16:29 'Рабочий стол'  
drwxr-xr-x 2 navakula navakula 4096 апр 27 16:29 Шаблоны  
navakula@navakula-VirtualBox:~$
```

Figure 5: Настройка прав доступа

Файл /etc/passwd

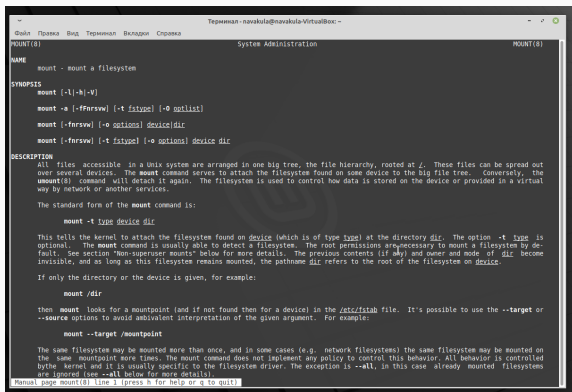
```
navakula@navakula-VirtualBox:~$ cat /etc/passwd
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/bin/sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
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:Mailing 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
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
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
```

Figure 6: Файл /etc/passwd

Работа с файлами и правами доступа

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

Figure 7: Работа с файлами и правами доступа



```
Терминал - navakula@navakula-VirtualBox: -
Файлы Правка Вид Терминал Выход Справка
mount(8) System Administration MOUNT(8)

NAME
  mount - mount a filesystem

SYNOPSIS
  mount [-l|-h|-V]

  mount -a [-f|nrsvw] [-t fstype] [-O optlist]

  mount [-fnrsvw] [-o options] device|dir

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

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 filesystems 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 another 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

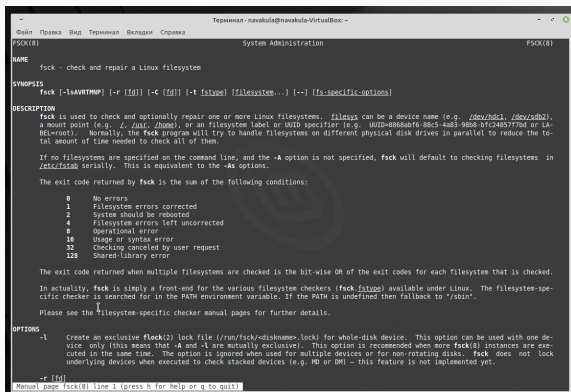
  then mount looks for a mountpoint (and if not found then for a device) in the /etc/fstab file. It's possible to use the --target or --source options to avoid ambiguous interpretation of the given argument. For example:

      mount --target /mountpoint

  The same filesystem may be mounted more than once, and in some cases (e.g. network filesystems) the same filesystem may be mounted on the same mountpoint more times. The mount command does not implement any policy to control this behavior. All behavior is controlled by the kernel and it is usually specific to the filesystem driver. The exception is --all, in this case already mounted filesystems are ignored (see --all below for more details).

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

Figure 8: Команда mount



```
Терминал - navakula@navakula-VirtualBox -
fsck(8)                                System Administration                                fsck(8)

NAME
    fsck - check and repair a Linux filesystem

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

DESCRIPTION
    fsck is used to check and optionally repair one or more linux filesystems.  filesystems can be a device name (e.g.  /dev/hdc1,  /dev/sdb2),
    a mount point (e.g.  /,  /usr,  /home), or an filesystem label or UUID specifier (e.g.  UUID=8968abf6-88c5-4a83-9808-bfc2405777bd or LA-
    BEL=root).  Normally, the fsck program will try to handle filesystems on different physical disk drives in parallel to reduce the to-
    tal 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 canceled 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.fstype) available under Linux.  The filesystem-spe-
    cific checker is searched for in the PATH environment variable.  If the PATH is undefined then fallback to /sbin/.

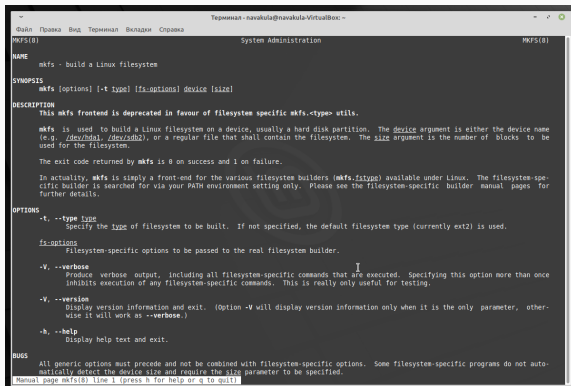
    Please see the filesystem-specific checker manual pages for further details.

OPTIONS
    -l      Create an exclusive (lock(2)) lock file (/run/fsck/-diskname->lock) for whole-disk device.  This option can be used with one de-
           vice only (this means that -A and -l are mutually exclusive).  This option is recommended when more fsck(8) instances are exe-
           cuted 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]

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

Figure 9: Команда fsck



```
Терминал - navakula@navakula-VirtualBox: ~
Байт Правка Вид Терминал Выход Справка
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 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.<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.

  -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.)

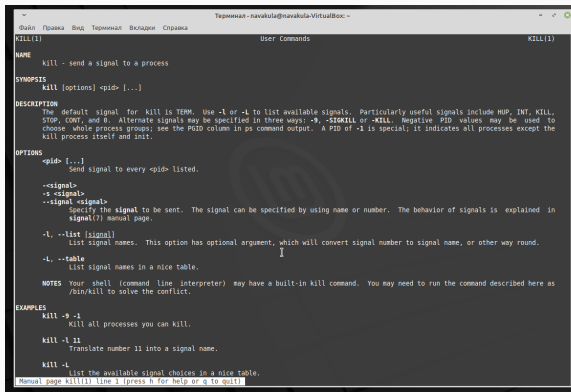
  -h, --help
      Display help text and exit.

BUGS
  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)
```

Figure 10: Команда mkfs

Справка по командам



```
Терминал - navakula@navakula-VirtualBox: ~
Файл Правка Вид Терминал Вкладки 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, -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.

  -s <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 -l 11
    Translate number 11 into a signal name.

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

Manual page KILL(1) line 3 (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.