

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

Мовсар Костоев¹

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¹Российский Университет Дружбы Народов

Цели и задачи работы

Цель лабораторной работы

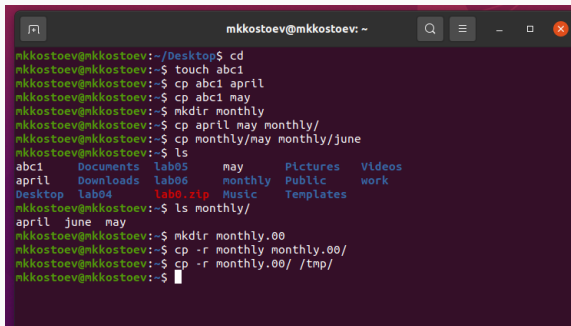
Ознакомление с файловой системой Linux, её структурой, именами и содержанием каталогов. Приобретение практических навыков по применению команд для работы с файлами и каталогами, по управлению процессами, по проверке использования диска и обслуживанию файловой системы.

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



```
mkkostoev@mkkostoev: ~  
mkkostoev@mkkostoev:~/Desktop$ cd  
mkkostoev@mkkostoev:~$ touch abc1  
mkkostoev@mkkostoev:~$ cp abc1 april  
mkkostoev@mkkostoev:~$ cp abc1 may  
mkkostoev@mkkostoev:~$ mkdir monthly  
mkkostoev@mkkostoev:~$ cp april may monthly/  
mkkostoev@mkkostoev:~$ cp monthly/may monthly/june  
mkkostoev@mkkostoev:~$ ls  
abc1    Documents  lab05      may      Pictures  Videos  
april   Downloads  lab06      monthly  Public    work  
Desktop lab04      lab0.zip   Music    Templates  
mkkostoev@mkkostoev:~$ ls monthly/  
april  june  may  
mkkostoev@mkkostoev:~$ mkdir monthly.00  
mkkostoev@mkkostoev:~$ cp -r monthly monthly.00/  
mkkostoev@mkkostoev:~$ cp -r monthly.00/ /tmp/  
mkkostoev@mkkostoev:~$
```

Рис. 1: Выполнение примеров

Выполнение примеров

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

Рис. 2: Выполнение примеров

Выполнение примеров

```
mkkostoev@mkkostoev:~$  
mkkostoev@mkkostoev:~$ touch may  
mkkostoev@mkkostoev:~$ ls -l may  
-rw-rw-r-- 1 mkkostoev mkkostoev 0 Mar  8 06:35 may  
mkkostoev@mkkostoev:~$ chmod +x may  
mkkostoev@mkkostoev:~$ ls -l may  
-rwxrwxr-x 1 mkkostoev mkkostoev 0 Mar  8 06:35 may  
mkkostoev@mkkostoev:~$ chmod -x may  
mkkostoev@mkkostoev:~$ ls -l may  
-rw-rw-r-- 1 mkkostoev mkkostoev 0 Mar  8 06:35 may  
mkkostoev@mkkostoev:~$ mkdir monthly/  
mkdir: cannot create directory 'monthly/': File exists  
mkkostoev@mkkostoev:~$ chmod g-r,o-r monthly/  
mkkostoev@mkkostoev:~$ chmod g+w abc1  
mkkostoev@mkkostoev:~$
```

Рис. 3: Выполнение примеров

Создание директорий и копирование файлов

```
mkkostoev@mkkostoev:~$  
mkkostoev@mkkostoev:~$  
mkkostoev@mkkostoev:~$ cp /usr/include/linux/sysinfo.h  
cp: missing destination file operand after '/usr/include/linux/sysinfo.h'  
Try 'cp --help' for more information.  
mkkostoev@mkkostoev:~$ cp /usr/include/linux/sysinfo.h -  
mkkostoev@mkkostoev:~$ mv sysinfo.h equipment  
mkkostoev@mkkostoev:~$ mkdir ski.plases  
mkkostoev@mkkostoev:~$ mv equipment ski.plases/  
mkkostoev@mkkostoev:~$ mv ski.plases/equipment ski.plases/equiplist  
mkkostoev@mkkostoev:~$ touch abc1  
mkkostoev@mkkostoev:~$ cp abc1 ski.plases/equiplist2  
mkkostoev@mkkostoev:~$ cd ski.plases/  
mkkostoev@mkkostoev:~/ski.plases$ mkdir equipment  
mkkostoev@mkkostoev:~/ski.plases$ mv equiplist equipment/  
mkkostoev@mkkostoev:~/ski.plases$ mv equiplist2 equipment/  
mkkostoev@mkkostoev:~/ski.plases$ cd  
mkkostoev@mkkostoev:~$ mkdir newdir  
mkkostoev@mkkostoev:~$ mv newdir/ ski.plases/  
mkkostoev@mkkostoev:~$ mv ski.plases/newdir/ ski.plases/plans  
mkkostoev@mkkostoev:~$
```

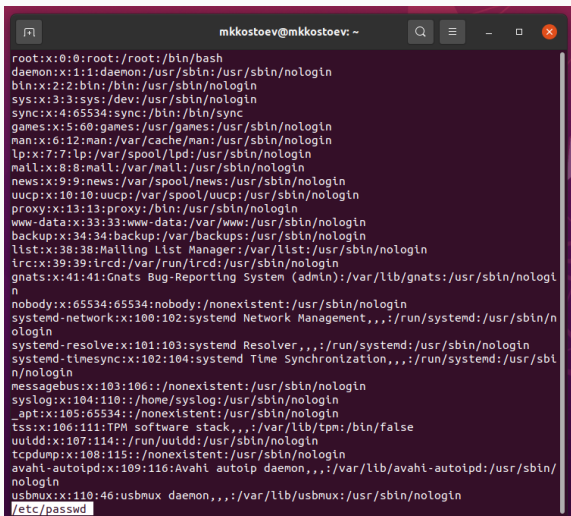
Рис. 4: Работа с каталогами

Работа с командой chmod

```
mkkostoev@mkkostoev:~$  
mkkostoev@mkkostoev:~$ mkdir australia play  
mkkostoev@mkkostoev:~$ touch my_os feathers  
mkkostoev@mkkostoev:~$ chmod 744 australia/  
mkkostoev@mkkostoev:~$ chmod 711 play/  
mkkostoev@mkkostoev:~$ chmod 544 my_os  
mkkostoev@mkkostoev:~$ chmod 664 feathers  
mkkostoev@mkkostoev:~$ ls -l  
total 7360  
-rw-rw-r-- 1 mkkostoev mkkostoev      0 Mar  8 06:37 abc1  
drwxr--r-- 2 mkkostoev mkkostoev    4096 Mar  8 06:39 australia  
drwxr-xr-x 2 mkkostoev mkkostoev    4096 Jan  5 06:47 Desktop  
drwxr-xr-x 2 mkkostoev mkkostoev    4096 Jan  5 06:47 Documents  
drwxr-xr-x 2 mkkostoev mkkostoev    4096 Mar  2 22:01 Downloads  
-rw-rw-r-- 1 mkkostoev mkkostoev      0 Mar  8 06:39 feathers  
drwxrwxr-x 3 mkkostoev mkkostoev    4096 Jan  5 06:58 lab04  
drwxrwxr-x 3 mkkostoev mkkostoev    4096 Jan  5 07:54 lab05  
drwxrwxr-x 3 mkkostoev mkkostoev    4096 Jan  5 07:54 lab06  
-rw-rw-r-- 1 mkkostoev mkkostoev 7464775 Jan  5 07:54 lab0.zip  
-rw-rw-r-- 1 mkkostoev mkkostoev      0 Mar  8 06:35 may  
drwx-wx-x 2 mkkostoev mkkostoev    4096 Mar  8 06:31 monthly  
drwxr-xr-x 2 mkkostoev mkkostoev    4096 Jan  5 06:47 Music  
-r-xr--r-- 1 mkkostoev mkkostoev      0 Mar  8 06:39 my_os  
drwxr-xr-x 2 mkkostoev mkkostoev    4096 Jan  5 06:47 Pictures  
drwx-x-x-x 2 mkkostoev mkkostoev    4096 Mar  8 06:39 play  
drwxr-xr-x 2 mkkostoev mkkostoev    4096 Jan  5 06:47 Public  
drwxrwxr-x 3 mkkostoev mkkostoev    4096 Mar  8 06:34 reports  
drwxrwxr-x 4 mkkostoev mkkostoev    4096 Mar  8 06:38 ski.places  
drwxr-xr-x 2 mkkostoev mkkostoev    4096 Jan  5 06:47 Templates  
drwxr-xr-x 2 mkkostoev mkkostoev    4096 Jan  5 06:47 Videos  
drwxrwxr-x 3 mkkostoev mkkostoev    4096 Mar  2 21:57 work  
mkkostoev@mkkostoev:~$
```

Рис. 5: Настройка прав доступа

Файл /etc/passwd



The image shows a terminal window with a dark background. The title bar at the top reads "mkkostoev@mkkostoev: ~". The terminal displays the contents of the `/etc/passwd` file, which lists system and user accounts. Each line represents an account with fields for username, UID, GID, name, home directory, and shell. The accounts listed are: root, daemon, bin, sys, sync, games, man, lp, mail, news, uucp, proxy, www-data, backup, list, irc, gnats, nobody, systemd-network, systemd-resolve, systemd-timesync, messagebus, syslog, _apt, tss, uuidd, tcpdump, avahi-autoipd, and usbmux. The `/etc/passwd` file path is highlighted at the bottom of the terminal output.

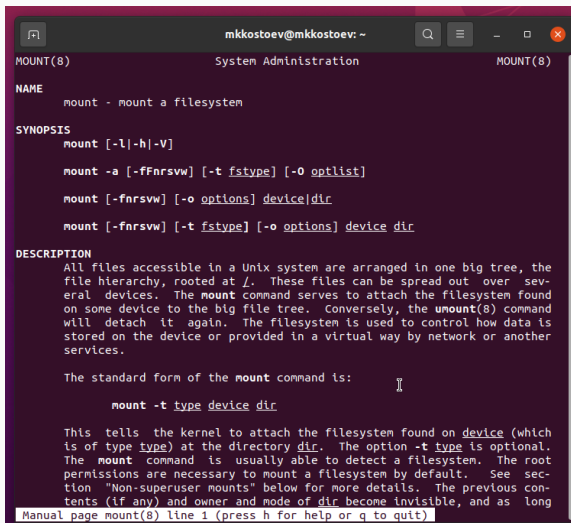
```
mkkostoev@mkkostoev: ~  
root:x:0:0:root:/root:/bin/bash  
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin  
bin:x:2:2:bin:/bin:/usr/sbin/nologin  
sys:x:3:3:sys:/dev:/usr/sbin/nologin  
sync:x:4:65534:sync:/bin:/bin/sync  
games:x:5:60:games:/usr/games:/usr/sbin/nologin  
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin  
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:Mailng 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  
tss:x:106:111:TPM software stack,,,:/var/lib/tpm:/bin/false  
uuidd:x:107:114:/:/run/uuidd:/usr/sbin/nologin  
tcpdump:x:108:115:/:/nonexistent:/usr/sbin/nologin  
avahi-autoipd:x:109:116:Avahi autoip daemon,,,:/var/lib/avahi-autoipd:/usr/sbin/nologin  
usbmux:x:110:46:usbmux daemon,,,:/var/lib/usbmux:/usr/sbin/nologin  
/etc/passwd
```

Рис. 6: Файл /etc/passwd

Работа с файлами и правами доступа

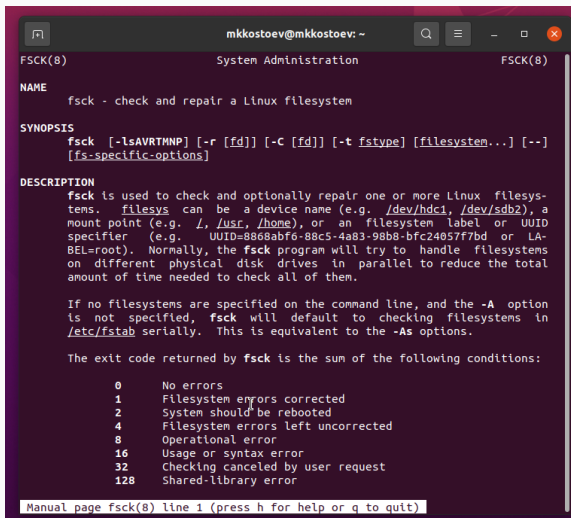
```
nkkostoiev@nkkostoiev:~$  
nkkostoiev@nkkostoiev:~$  
nkkostoiev@nkkostoiev:~$ cp feathers file.old  
nkkostoiev@nkkostoiev:~$ mv file.old play/  
nkkostoiev@nkkostoiev:~$ mkdir fun  
nkkostoiev@nkkostoiev:~$ cp -R play/ fun/  
nkkostoiev@nkkostoiev:~$ mv fun/ play/games  
nkkostoiev@nkkostoiev:~$ chmod -r feathers  
nkkostoiev@nkkostoiev:~$ cat feathers  
cat: feathers: Permission denied  
nkkostoiev@nkkostoiev:~$ cp feathers 12  
cp: cannot open 'feathers' for reading: Permission denied  
nkkostoiev@nkkostoiev:~$ chmod +r feathers  
nkkostoiev@nkkostoiev:~$ chmod -x play/  
nkkostoiev@nkkostoiev:~$ cd play/  
bash: cd: play/: Permission denied  
nkkostoiev@nkkostoiev:~$ chmod +x play/  
nkkostoiev@nkkostoiev:~$
```

Рис. 7: Работа с файлами и правами доступа



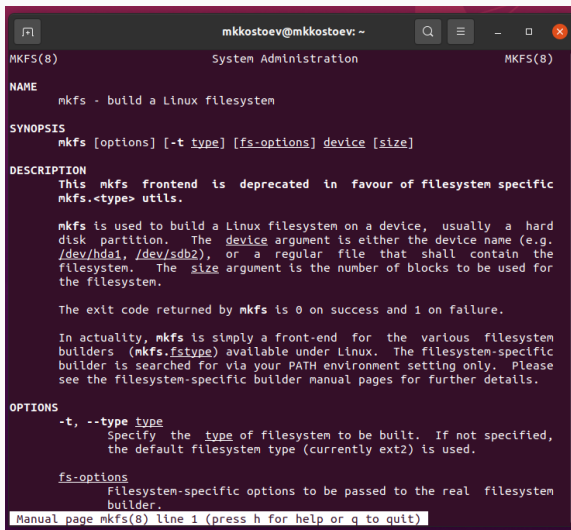
```
mkkostoev@mkkostoev: ~  
MOUNT(8) System Administration MOUNT(8)  
  
NAME  
    mount - mount a filesystem  
  
SYNOPSIS  
    mount [-l|-h|-V]  
  
    mount -a [-fFnrsvw] [-t fstype] [-O optlist]  
  
    mount [-fnrsvw] [-o options] device|dir  
  
    mount [-fnrsvw] [-t fstype] [-o options] 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 sev-  
    eral 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 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 sec-  
    tion "Non-superuser mounts" below for more details. The previous con-  
    tents (if any) and owner and mode of dir become invisible, and as long  
    Manual page mount(8) line 1 (press h for help or q to quit)
```

Рис. 8: Команда mount



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

Рис. 9: Команда fsck



```
mkkostoev@mkkostoev: ~
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.

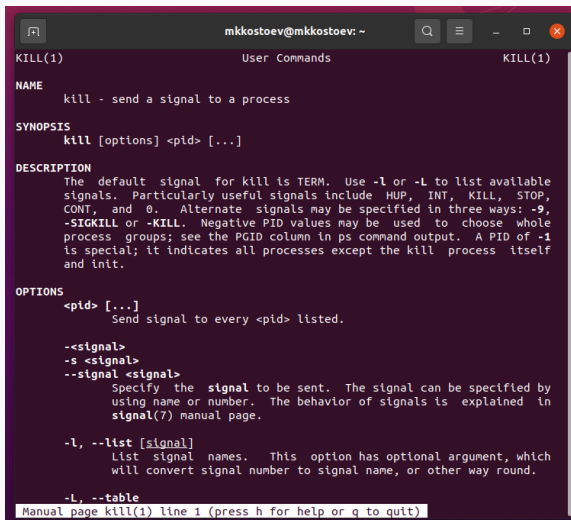
    In actuality, mkfs is simply a front-end for the various filesystem
    builders (mkfs.<fstype>) available under Linux. The filesystem-specific
    builder is searched for via your PATH environment setting only. Please
    see the filesystem-specific builder manual pages for further details.

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.

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

Рис. 10: Команда mkfs



```
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: -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.

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

Рис. 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.