

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

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Швецов Михаил Романович<sup>1</sup>

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<sup>1</sup>Российский Университет Дружбы Народов

# 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.

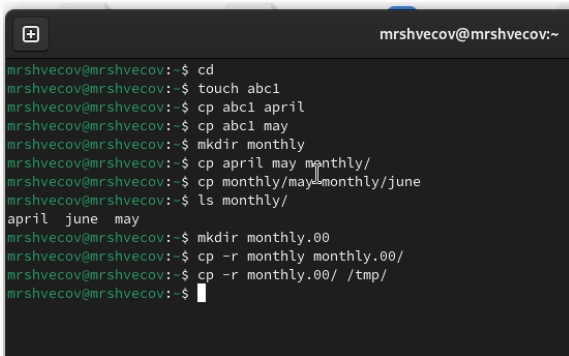
# Задачи лабораторной работы

- 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



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

Рис. 1: Выполнение примеров

# Выполнение примеров

```
mrshvecov@mrshvecov:~$ mkdir monthly.00
mrshvecov@mrshvecov:~$ cp -r monthly monthly.00/
mrshvecov@mrshvecov:~$ cp -r monthly.00/ /tmp/
mrshvecov@mrshvecov:~$
mrshvecov@mrshvecov:~$ mv april july
mrshvecov@mrshvecov:~$ mv july monthly.00/
mrshvecov@mrshvecov:~$ ls monthly.00/
july  monthly
mrshvecov@mrshvecov:~$ mv monthly.00/ monthly.01/
mrshvecov@mrshvecov:~$ mkdir reports
mrshvecov@mrshvecov:~$ mv monthly.01/ reports/
mrshvecov@mrshvecov:~$ mv reports/monthly.01/ reports/monthly
mrshvecov@mrshvecov:~$
```

Рис. 2: Выполнение примеров

# Выполнение примеров

```
mrshvecov@mrshvecov:~$  
mrshvecov@mrshvecov:~$ cd  
mrshvecov@mrshvecov:~$ touch may  
mrshvecov@mrshvecov:~$ ls -l may  
-rw-r--r--. 1 mrshvecov mrshvecov 0 июн 10 12:52 may  
mrshvecov@mrshvecov:~$ chmod u+x may  
mrshvecov@mrshvecov:~$ ls -l may  
-rwxr--r--. 1 mrshvecov mrshvecov 0 июн 10 12:52 may  
mrshvecov@mrshvecov:~$ chmod u-x may  
mrshvecov@mrshvecov:~$ ls -l may  
-rw-r--r--. 1 mrshvecov mrshvecov 0 июн 10 12:52 may  
mrshvecov@mrshvecov:~$ cd  
mrshvecov@mrshvecov:~$ chmod g-r,o-r monthly/  
mrshvecov@mrshvecov:~$ cd  
mrshvecov@mrshvecov:~$ touch abc1  
mrshvecov@mrshvecov:~$ chmod g+w abc1  
mrshvecov@mrshvecov:~$
```

Рис. 3: Выполнение примеров



# Создание директорий и копирование файлов

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

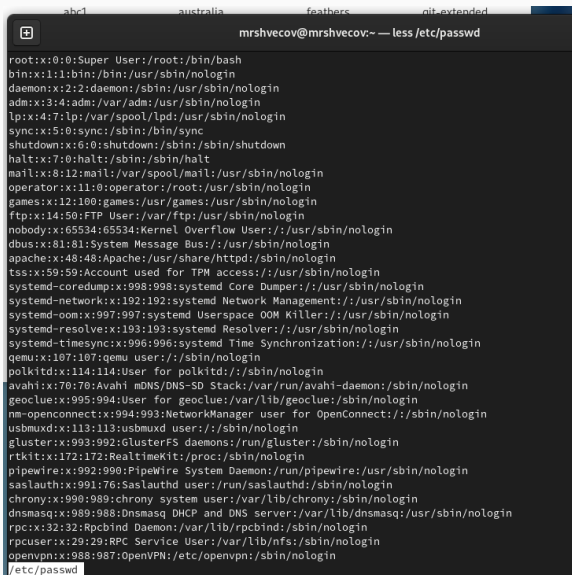
Рис. 4: Работа с каталогами

# Работа с командой chmod

```
mrshvecov@mrshvecov:~$ mkdir australia play
mrshvecov@mrshvecov:~$ touch my_os feathers
mrshvecov@mrshvecov:~$ chmod 744 australia/
mrshvecov@mrshvecov:~$ chmod 711 play/
mrshvecov@mrshvecov:~$ chmod 544 my_os
mrshvecov@mrshvecov:~$ chmod 664 feathers
mrshvecov@mrshvecov:~$ ls -l
итого 0
-rw-rw-r--. 1 mrshvecov mrshvecov 0 июн 10 12:54 abcl
drwxr--r--. 1 mrshvecov mrshvecov 0 июн 10 12:55 australia
-rw-rw-r--. 1 mrshvecov mrshvecov 0 июн 10 12:55 feathers
drwxr-xr-x. 1 mrshvecov mrshvecov 74 июн 10 12:06 git-extended
-rw-r--r--. 1 mrshvecov mrshvecov 0 июн 10 12:52 may
drwx--x--x. 1 mrshvecov mrshvecov 24 июн 10 12:45 monthly
-r-xr--r--. 1 mrshvecov mrshvecov 0 июн 10 12:55 my_os
drwx--x--x. 1 mrshvecov mrshvecov 0 июн 10 12:55 play
drwxr-xr-x. 1 mrshvecov mrshvecov 14 июн 10 12:49 reports
drwxr-xr-x. 1 mrshvecov mrshvecov 28 июн 10 12:54 ski.places
drwxr-xr-x. 1 mrshvecov mrshvecov 10 июн 10 11:12 work
drwxr-xr-x. 1 mrshvecov mrshvecov 0 июн 10 11:02 Видео
drwxr-xr-x. 1 mrshvecov mrshvecov 0 июн 10 11:02 Документы
drwxr-xr-x. 1 mrshvecov mrshvecov 0 июн 10 11:02 Загрузки
drwxr-xr-x. 1 mrshvecov mrshvecov 0 июн 10 11:02 Изображения
drwxr-xr-x. 1 mrshvecov mrshvecov 0 июн 10 11:02 Музыка
drwxr-xr-x. 1 mrshvecov mrshvecov 0 июн 10 11:02 Общедоступные
drwxr-xr-x. 1 mrshvecov mrshvecov 0 июн 10 11:02 'Рабочий стол'
drwxr-xr-x. 1 mrshvecov mrshvecov 0 июн 10 11:02 Шаблоны
mrshvecov@mrshvecov:~$
```

Рис. 5: Настройка прав доступа

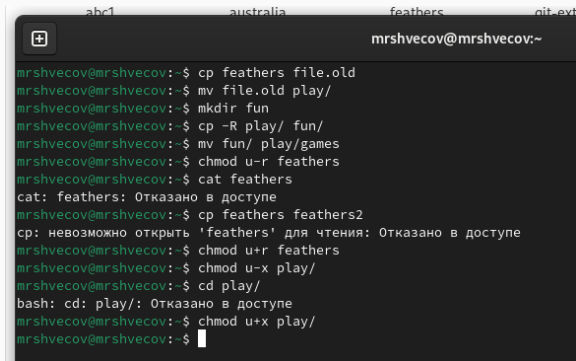
# Файл /etc/passwd

A terminal window with a dark background and light text. The title bar shows tabs for 'abc1', 'australia', 'feathers', and 'nit-extended', with the active tab being 'mrshvecov@mrshvecov:~ — less /etc/passwd'. The terminal displays the contents of the /etc/passwd file, listing system users and regular users with their IDs, home directories, and shell programs.

```
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-network: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:/sbin/nologin
polkitd:x:114:114:User for polkitd:/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:/sbin/nologin
usbmuxd:x:113:113:usbmuxd user:/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
saslauth:x:991:76:Saslauthd user:/run/saslauthd:/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
/etc/passwd
```

Рис. 6: Файл /etc/passwd

# Работа с файлами и правами доступа



```
abc1      australia      feathers      nit-ext
mrshvecov@mrshvecov:~
mrshvecov@mrshvecov:~$ cp feathers file.old
mrshvecov@mrshvecov:~$ mv file.old play/
mrshvecov@mrshvecov:~$ mkdir fun
mrshvecov@mrshvecov:~$ cp -R play/ fun/
mrshvecov@mrshvecov:~$ mv fun/ play/games
mrshvecov@mrshvecov:~$ chmod u-r feathers
mrshvecov@mrshvecov:~$ cat feathers
cat: feathers: Отказано в доступе
mrshvecov@mrshvecov:~$ cp feathers feathers2
cp: невозможно открыть 'feathers' для чтения: Отказано в доступе
mrshvecov@mrshvecov:~$ chmod u+r feathers
mrshvecov@mrshvecov:~$ chmod u-x play/
mrshvecov@mrshvecov:~$ cd play/
bash: cd: play/: Отказано в доступе
mrshvecov@mrshvecov:~$ chmod u+x play/
mrshvecov@mrshvecov:~$
```

**Рис. 7:** Работа с файлами и правами доступа

# Справка по командам

```
mrshvecov@mrshvecov:~ — 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 [-ffnrsvw] [-o options] device mountpoint

  mount [-ffnrsvw] [-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.

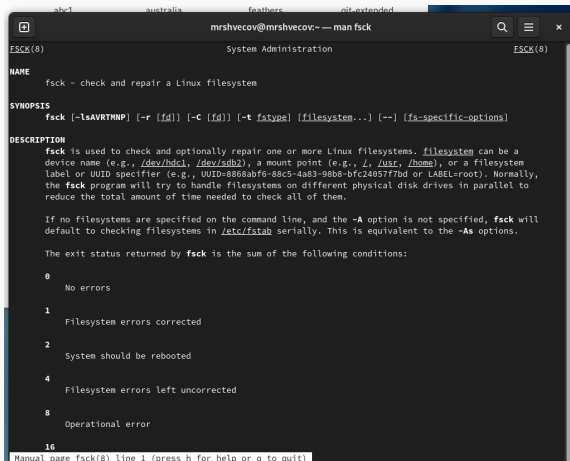
  The standard form of the mount command is:

      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

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

Рис. 8: Команда mount



```
mrshvecov@mrshvecov:~ — man fsck
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. 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=8868ab76-88c5-4a83-98b8-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

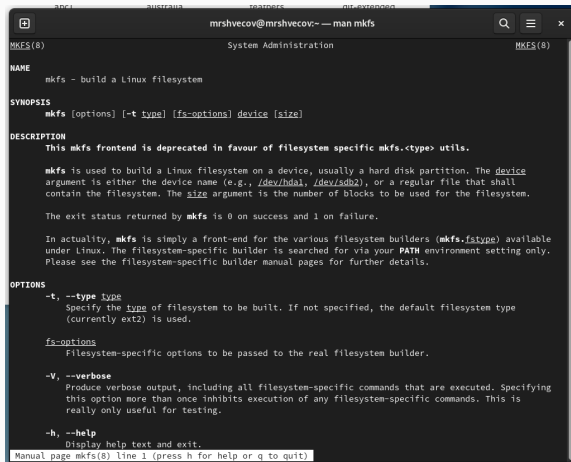
    4      Filesystem errors left uncorrected

    8      Operational error

    16

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

Рис. 9: Команда fsck



```
mrshvecov@mrshvecov:~$ 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.

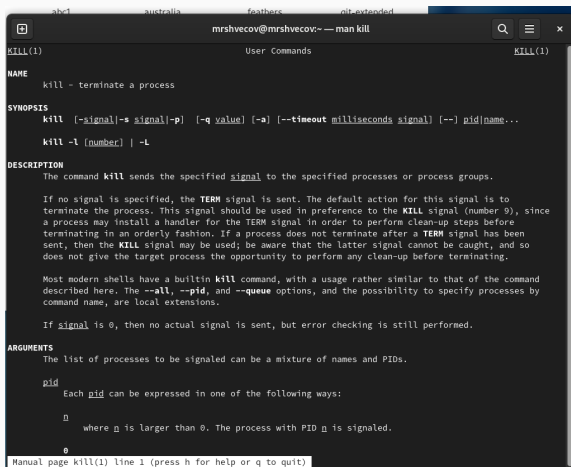
    fs-options
        Filesystem-specific options to be passed to the real filesystem builder.

    -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.

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

Рис. 10: Команда mkfs



```
abc1      australia      feathers      git-extended
mrshvecov@mrshvecov:~ — 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
      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.