

# 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.

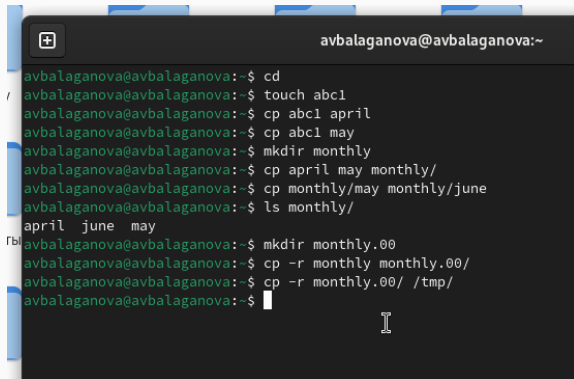
# Задачи лабораторной работы

- 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



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

Рис. 1: Выполнение примеров

# Выполнение примеров



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

Рис. 2: Выполнение примеров

# Выполнение примеров

```
avbalaganova@avbalaganova:~$  
avbalaganova@avbalaganova:~$ cd  
avbalaganova@avbalaganova:~$ touch may  
avbalaganova@avbalaganova:~$ ls -l may  
-rw-r--r--. 1 avbalaganova avbalaganova 0 авг 28 11:46 may  
avbalaganova@avbalaganova:~$ chmod u+x may  
avbalaganova@avbalaganova:~$ ls -l may  
-rwxr--r--. 1 avbalaganova avbalaganova 0 авг 28 11:46 may  
avbalaganova@avbalaganova:~$ chmod u-x may  
avbalaganova@avbalaganova:~$ ls -l may  
-rw-r--r--. 1 avbalaganova avbalaganova 0 авг 28 11:46 may  
avbalaganova@avbalaganova:~$ cd  
avbalaganova@avbalaganova:~$ mkdir monthly/  
mkdir: невозможно создать каталог «monthly/»: Файл существует  
avbalaganova@avbalaganova:~$ chmod g-r,o-r monthly/  
avbalaganova@avbalaganova:~$ cd  
avbalaganova@avbalaganova:~$ touch abc1  
avbalaganova@avbalaganova:~$ chmod g+w abc1  
avbalaganova@avbalaganova:~$
```

Рис. 3: Выполнение примеров



# Создание директорий и копирование файлов

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

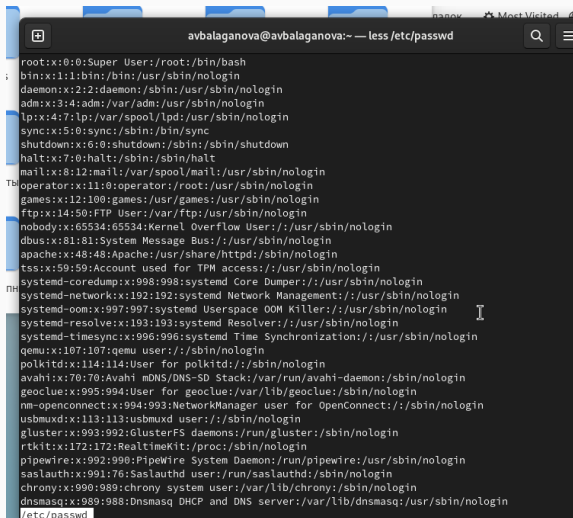
Рис. 4: Работа с каталогами

# Работа с командой chmod

```
avbalaganova@avbalaganova:~$  
avbalaganova@avbalaganova:~$ mkdir australia play  
avbalaganova@avbalaganova:~$ touch my_os feathers  
avbalaganova@avbalaganova:~$ chmod 744 australia/  
avbalaganova@avbalaganova:~$ chmod 711 play/  
avbalaganova@avbalaganova:~$ chmod 544 my_os  
avbalaganova@avbalaganova:~$ chmod 644 feathers  
avbalaganova@avbalaganova:~$ ls -l  
итого 0  
-rw-rw-r--. 1 avbalaganova avbalaganova 0 авг 28 11:53 abc1  
drwxr--r--. 1 avbalaganova avbalaganova 0 авг 28 11:55 australia  
-rw-r--r--. 1 avbalaganova avbalaganova 0 авг 28 11:55 feathers  
drwxr-xr-x. 1 avbalaganova avbalaganova 74 авг 28 11:07 git-extended  
-rw-r--r--. 1 avbalaganova avbalaganova 0 авг 28 11:46 may  
drwx--x--x. 1 avbalaganova avbalaganova 24 авг 28 11:42 monthly  
-r-xr--r--. 1 avbalaganova avbalaganova 0 авг 28 11:55 my_os  
drwx--x--x. 1 avbalaganova avbalaganova 0 авг 28 11:55 play  
drwxr-xr-x. 1 avbalaganova avbalaganova 14 авг 28 11:45 reports  
drwxr-xr-x. 1 avbalaganova avbalaganova 28 авг 28 11:54 ski.places  
drwxr-xr-x. 1 avbalaganova avbalaganova 10 авг 28 10:26 work  
drwxr-xr-x. 1 avbalaganova avbalaganova 0 авг 28 10:11 Видео  
drwxr-xr-x. 1 avbalaganova avbalaganova 0 авг 28 10:11 Документы  
drwxr-xr-x. 1 avbalaganova avbalaganova 0 авг 28 10:11 Загрузки  
drwxr-xr-x. 1 avbalaganova avbalaganova 0 авг 28 10:11 Изображения  
drwxr-xr-x. 1 avbalaganova avbalaganova 0 авг 28 10:11 Музыка  
drwxr-xr-x. 1 avbalaganova avbalaganova 0 авг 28 10:11 Общедоступные  
drwxr-xr-x. 1 avbalaganova avbalaganova 0 авг 28 10:11 'Рабочий стол'  
drwxr-xr-x. 1 avbalaganova avbalaganova 0 авг 28 10:11 Шаблоны  
avbalaganova@avbalaganova:~$
```

Рис. 5: Настройка прав доступа

# Файл /etc/passwd



The image shows a terminal window with the title bar "avbalaganova@avbalaganova:~ — less /etc/passwd". The terminal displays the contents of the /etc/passwd file, which lists system users and regular users. The entries are as follows:

```
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:/usr/sbin/nologin
polkitd:x:114:114:User for polkitd:/usr/sbin/nologin
avahi:x:70:70:Avahi mDNS/DNS-SD Stack:/var/run/avahi-daemon:/usr/sbin/nologin
geoclue:x:995:994:User for geoclue:/usr/lib/geoclue:/usr/sbin/nologin
nm-openconnect:x:994:993:NetworkManager user for OpenConnect:/usr/sbin/nologin
usbmuxd:x:113:113:usbmuxd user:/usr/sbin/nologin
gluster:x:993:992:GlusterFS daemons:/usr/lib/gluster:/usr/sbin/nologin
rtkit:x:172:172:RealtimeKit:/usr/bin:/usr/sbin/nologin
pipewire:x:992:990:PipeWire System Daemon:/usr/lib/pipewire:/usr/sbin/nologin
saslauthd:x:991:76:Saslauthd user:/usr/lib/saslauthd:/usr/sbin/nologin
chrony:x:990:989:chrony system user:/usr/lib/chrony:/usr/sbin/nologin
dnsmasq:x:989:988:Dnsmasq DHCP and DNS server:/usr/lib/dnsmasq:/usr/sbin/nologin
```

Рис. 6: Файл /etc/passwd

# Работа с файлами и правами доступа

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

Рис. 7: Работа с файлами и правами доступа

```
avbalaganova@avbalaganova:~ — 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 [-fnrsvw] [-o options] device|mountpoint

    mount [-fnrsvw] [-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.

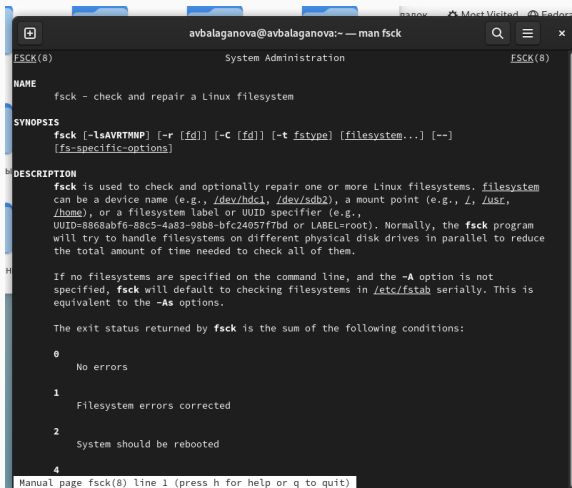
    The standard form of the mount command is:

        mount -t type device dir

    This tells the kernel to attach the filesystem found on device (which is of type type)

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

Рис. 8: Команда mount



```
avbalaganova@avbalaganova:~ — man fsck
FCK(8)                                System Administration                                FCK(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=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 status returned by fsck is the sum of the following conditions:

    0
        No errors

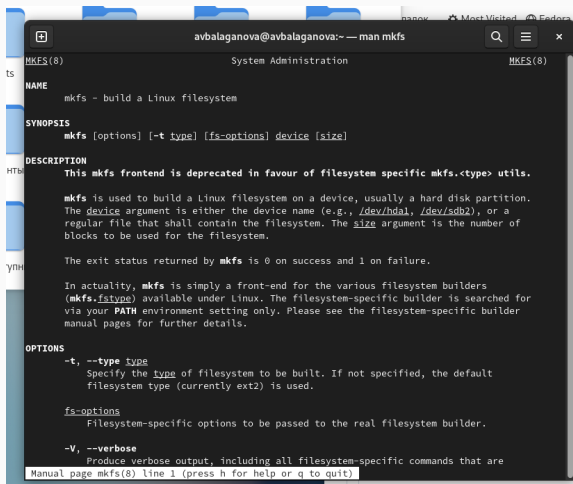
    1
        Filesystem errors corrected

    2
        System should be rebooted

    4

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

Рис. 9: Команда fsck



The screenshot shows a terminal window titled "avbalaganova@avbalaganova:~ — man mkfs". The window displays the manual page for the `mkfs` command. The page is divided into sections: NAME, SYNOPSIS, DESCRIPTION, and OPTIONS. The `NAME` section states that `mkfs` is used to build a Linux filesystem. The `SYNOPSIS` section shows the command syntax: `mkfs [options] [-t type] [fs-options] device [size]`. The `DESCRIPTION` section explains that the `mkfs` frontend is deprecated in favor of filesystem-specific `mkfs.<type>` utilities. It also notes that `mkfs` is used to build a Linux filesystem on a device, usually a hard disk partition. The `OPTIONS` section lists several options: `-t, --type type` to specify the filesystem type, `-V, --verbose` to produce verbose output, and `fs-options` for filesystem-specific options. The bottom of the window shows a prompt to press 'h' for help or 'q' to quit.

```
avbalaganova@avbalaganova:~ — 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.

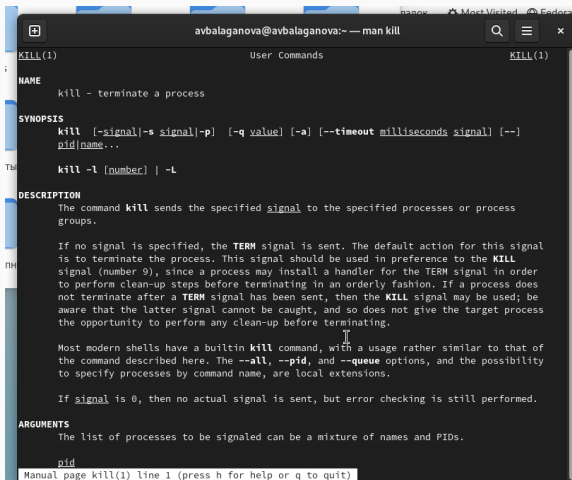
    fs-options
        Filesystem-specific options to be passed to the real filesystem builder.

    -V, --verbose
        Produce verbose output, including all filesystem-specific commands that are

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

Рис. 10: Команда mkfs

# Справка по командам



```
avbalaganova@avbalaganova:~ — 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

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.