

# Операционные системы

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

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## Цели и задачи работы

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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.

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

Рис. 1: Выполнение примеров

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

Рис. 2: Выполнение примеров

## Выполнение примеров

```
onmatevosyan@onmatevosyan:~$  
onmatevosyan@onmatevosyan:~$ cd  
onmatevosyan@onmatevosyan:~$ touch may  
onmatevosyan@onmatevosyan:~$ ls -l may  
-rw-r--r--. 1 onmatevosyan onmatevosyan 0 map 12 10:41 may  
onmatevosyan@onmatevosyan:~$ chmod u+x may  
onmatevosyan@onmatevosyan:~$ ls -l may  
-rwxr--r--. 1 onmatevosyan onmatevosyan 0 map 12 10:41 may  
onmatevosyan@onmatevosyan:~$ chmod u-x may  
onmatevosyan@onmatevosyan:~$ ls -l may  
-rw-r--r--. 1 onmatevosyan onmatevosyan 0 map 12 10:41 may  
onmatevosyan@onmatevosyan:~$ chmod g-r,o-r monthly/  
onmatevosyan@onmatevosyan:~$ chmod g+w abc1  
onmatevosyan@onmatevosyan:~$
```

Рис. 3: Выполнение примеров



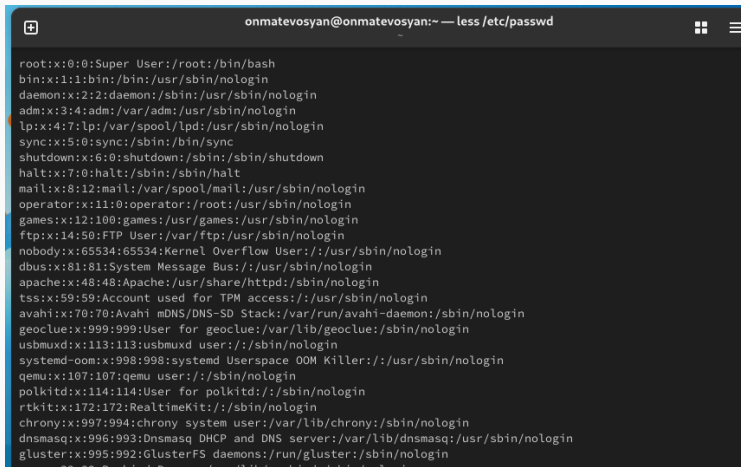
## Создание директорий и копирование файлов

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

Рис. 4: Работа с каталогами

## Работа с командой chmod

```
onmatevosyan@onmatevosyan:~$  
onmatevosyan@onmatevosyan:~$ mkdir australia play  
onmatevosyan@onmatevosyan:~$ touch my_os feathers  
onmatevosyan@onmatevosyan:~$ chmod 744 australia/  
onmatevosyan@onmatevosyan:~$ chmod 711 play/  
onmatevosyan@onmatevosyan:~$ chmod 544 my_os  
onmatevosyan@onmatevosyan:~$ chmod 664 feathers  
onmatevosyan@onmatevosyan:~$ ls -l  
итого 0  
-rw-rw-r--. 1 onmatevosyan onmatevosyan 0 map 12 10:43 abc1  
drwxr--r--. 1 onmatevosyan onmatevosyan 0 map 12 10:45 australia  
-rw-rw-r--. 1 onmatevosyan onmatevosyan 0 map 12 10:45 feathers  
drwxr-xr-x. 1 onmatevosyan onmatevosyan 74 фев 23 11:38 git-extended  
-rw-r--r--. 1 onmatevosyan onmatevosyan 0 map 12 10:41 may  
drwx--x--x. 1 onmatevosyan onmatevosyan 24 map 12 10:39 monthly  
-r-xr--r--. 1 onmatevosyan onmatevosyan 0 map 12 10:45 my_os  
drwx--x--x. 1 onmatevosyan onmatevosyan 0 map 12 10:45 play  
drwxr-xr-x. 1 onmatevosyan onmatevosyan 14 map 12 10:40 reports  
drwxr-xr-x. 1 onmatevosyan onmatevosyan 44 фев 23 11:44 site  
drwxr-xr-x. 1 onmatevosyan onmatevosyan 28 map 12 10:44 ski.places  
drwx-----. 1 onmatevosyan onmatevosyan 8 фев 23 11:45 snap  
drwxr-xr-x. 1 onmatevosyan onmatevosyan 10 фев 23 11:18 work  
drwxr-xr-x. 1 onmatevosyan onmatevosyan 0 фев 23 11:06 Видео  
drwxr-xr-x. 1 onmatevosyan onmatevosyan 0 фев 23 11:06 Документы  
drwxr-xr-x. 1 onmatevosyan onmatevosyan 0 фев 23 11:06 Загрузки  
drwxr-xr-x. 1 onmatevosyan onmatevosyan 0 фев 23 11:06 Изображения  
drwxr-xr-x. 1 onmatevosyan onmatevosyan 0 фев 23 11:06 Музыка  
drwxr-xr-x. 1 onmatevosyan onmatevosyan 0 фев 23 11:06 Общедоступные  
drwxr-xr-x. 1 onmatevosyan onmatevosyan 0 фев 23 11:06 'Рабочий стол'  
drwxr-xr-x. 1 onmatevosyan onmatevosyan 0 фев 23 11:06 Шаблоны  
onmatevosyan@onmatevosyan:~$
```

A terminal window with a dark background and light text. The title bar at the top reads "onmatevosyan@onmatevosyan:~ — less /etc/passwd". The terminal displays the contents of the /etc/passwd file, showing system users and their associated shells and home directories. The users listed are: root, bin, daemon, adm, lp, sync, shutdown, halt, mail, operator, games, ftp, nobody, dbus, apache, tss, avahi, geoclue, usbmuxd, systemd-oom, qemu, polkitd, rtkit, chrony, dnsmasq, and gluster. Each entry follows the format username:x:uid:gid:full\_name:home\_directory:shell.

```
onmatevosyan@onmatevosyan:~ — less /etc/passwd
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
avahi:x:70:70:Avahi mDNS/DNS-SD Stack:/var/run/avahi-daemon:/sbin/nologin
geoclue:x:999:999:User for geoclue:/var/lib/geoclue:/sbin/nologin
usbmuxd:x:113:113:usbmuxd user:/:/sbin/nologin
systemd-oom:x:998:998:systemd Userspace OOM Killer:/:/usr/sbin/nologin
qemu:x:107:107:qemu user:/:/sbin/nologin
polkitd:x:114:114:User for polkitd:/:/sbin/nologin
rtkit:x:172:172:RealtimeKit:/:/sbin/nologin
chrony:x:997:994:chrony system user:/var/lib/chrony:/sbin/nologin
dnsmasq:x:996:993:Dnsmasq DHCP and DNS server:/var/lib/dnsmasq:/usr/sbin/nologin
gluster:x:995:992:GlusterFS daemons:/run/gluster:/sbin/nologin
cups:x:77:77:CUPS Daemon:/usr/lib/cups:/sbin/nologin
```

Рис. 6: Файл /etc/passwd

## Работа с файлами и правами доступа

```
onmatevosyan@onmatevosyan:~$  
onmatevosyan@onmatevosyan:~$ cp feathers file.old  
onmatevosyan@onmatevosyan:~$ mv file.old play  
onmatevosyan@onmatevosyan:~$ mkdir fun  
onmatevosyan@onmatevosyan:~$ cp -R play/ fun  
onmatevosyan@onmatevosyan:~$ mv fun play/games  
onmatevosyan@onmatevosyan:~$ chmod u-r feathers  
onmatevosyan@onmatevosyan:~$ cat feathers  
cat: feathers: Отказано в доступе  
onmatevosyan@onmatevosyan:~$ cp -r feathers  
cp: после 'feathers' пропущен операнд, задающий целевой файл  
По команде «cp --help» можно получить дополнительную информацию.  
onmatevosyan@onmatevosyan:~$ chmod +r feathers  
onmatevosyan@onmatevosyan:~$ chmod -x play/  
onmatevosyan@onmatevosyan:~$ cd play/  
bash: cd: play/: Отказано в доступе  
onmatevosyan@onmatevosyan:~$ chmod +x play/  
onmatevosyan@onmatevosyan:~$
```

Рис. 7: Работа с файлами и правами доступа

```
onmatevosyan@onmatevosyan:~ — 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|rsave|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
    root of the filesystem on device.

    If only the directory or the device is given, for example:

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

```
onmatevosyan@onmatevosyan:~ — 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=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
        Filesystem errors left uncorrected

    8
        Operational error

    16
        Usage or syntax error

    32

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

```
onmatevosyan@onmatevosyan:~ — 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.

    -V, --version
        Print version and exit. (Option -V will display version information only when it is the only
Manual page mkfs(8) line 1 (press h for help or q to quit)
```

```
onmatevosyan@onmatevosyan:~ — man kill
+  -  -  x
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
All processes in the current process group are signaled.

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



## 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.