

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

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Цели и задачи работы

Цель лабораторной работы

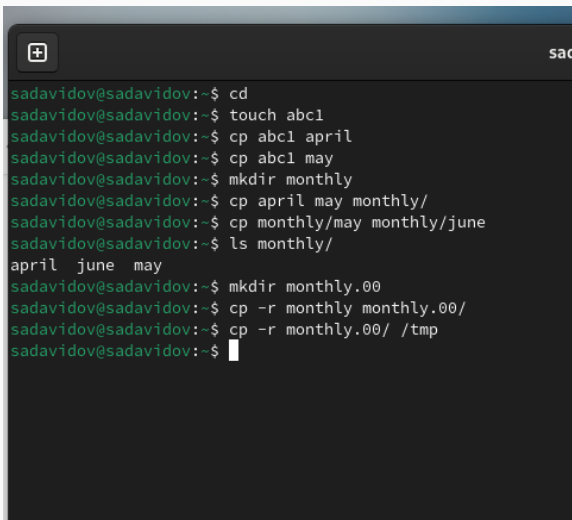
Ознакомление с файловой системой Linux, её структурой, именами и содержанием каталогов. Приобретение практических навыков по применению команд для работы с файлами и каталогами, по управлению процессами, по проверке использования диска и обслуживанию файловой системы.

Задачи лабораторной работы

- 1 Выполнить 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

Выполнение примеров



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

Рис. 1: Выполнение примеров

Выполнение примеров

```
sadavidov@sadavidov:~$  
sadavidov@sadavidov:~$  
sadavidov@sadavidov:~$ cd  
sadavidov@sadavidov:~$ touch may  
sadavidov@sadavidov:~$ ls -l may  
-rw-r--r--. 1 sadavidov sadavidov 0 июн 21 16:36 may  
sadavidov@sadavidov:~$ chmod u+x may  
sadavidov@sadavidov:~$ ls -l may  
-rwxr--r--. 1 sadavidov sadavidov 0 июн 21 16:36 may  
sadavidov@sadavidov:~$ chmod u-x may  
sadavidov@sadavidov:~$ ls -l may  
-rw-r--r--. 1 sadavidov sadavidov 0 июн 21 16:36 may  
sadavidov@sadavidov:~$ chmod g-r,o-r monthly/  
sadavidov@sadavidov:~$ chmod g+w abc1  
sadavidov@sadavidov:~$
```

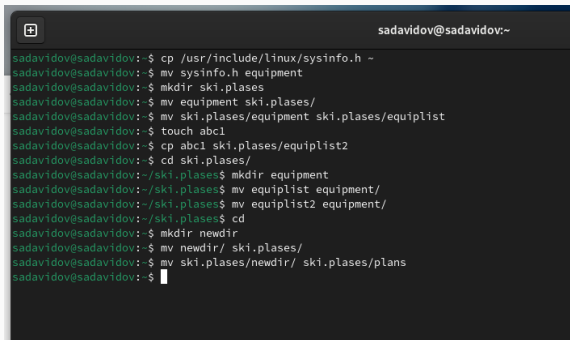
Рис. 2: Выполнение примеров

Выполнение примеров

```
sadavidov@sadavidov:~$  
sadavidov@sadavidov:~$  
sadavidov@sadavidov:~$ ls -l may  
-rw-r--r--. 1 sadavidov sadavidov 0 июн 21 16:36 may  
sadavidov@sadavidov:~$ chmod +x may  
sadavidov@sadavidov:~$ ls -l may  
-rwxr-xr-x. 1 sadavidov sadavidov 0 июн 21 16:36 may  
sadavidov@sadavidov:~$ chmod -x may  
sadavidov@sadavidov:~$ ls -l may  
-rw-r--r--. 1 sadavidov sadavidov 0 июн 21 16:36 may  
sadavidov@sadavidov:~$ chmod g-r,o-r monthly/  
sadavidov@sadavidov:~$ chmod g+w abc1  
sadavidov@sadavidov:~$
```

Рис. 3: Выполнение примеров

Создание директорий и копирование файлов



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

Рис. 4: Работа с каталогами

Работа с командой chmod

```
sadavidov@sadavidov:~$  
sadavidov@sadavidov:~$  
sadavidov@sadavidov:~$ mkdir australia play  
sadavidov@sadavidov:~$ touch my_os feathers  
sadavidov@sadavidov:~$ chmod 744 australia/  
sadavidov@sadavidov:~$ chmod 711 play/  
sadavidov@sadavidov:~$ chmod 544 my_os  
sadavidov@sadavidov:~$ chmod 664 feathers  
sadavidov@sadavidov:~$ ls -l  
итого 0  
-rw-rw-r--. 1 sadavidov sadavidov 0 июн 21 16:39 abc1  
drwxr--r--. 1 sadavidov sadavidov 0 июн 21 16:41 australia  
-rw-rw-r--. 1 sadavidov sadavidov 0 июн 21 16:41 feathers  
drwxr-xr-x. 1 sadavidov sadavidov 64 июн 21 16:06 git-extended  
-rw-r--r--. 1 sadavidov sadavidov 0 июн 21 16:36 may  
drwx--x--x. 1 sadavidov sadavidov 24 июн 21 16:33 monthly  
-r-xr--r--. 1 sadavidov sadavidov 0 июн 21 16:41 my_os  
drwx--x--x. 1 sadavidov sadavidov 0 июн 21 16:41 play  
drwxr-xr-x. 1 sadavidov sadavidov 14 июн 21 16:35 reports  
drwxr-xr-x. 1 sadavidov sadavidov 28 июн 21 16:39 ski.places  
drwxr-xr-x. 1 sadavidov sadavidov 10 июн 21 15:36 work  
drwxr-xr-x. 1 sadavidov sadavidov 0 июн 21 15:20 Видео  
drwxr-xr-x. 1 sadavidov sadavidov 0 июн 21 15:20 Документы  
drwxr-xr-x. 1 sadavidov sadavidov 0 июн 21 15:20 Загрузки  
drwxr-xr-x. 1 sadavidov sadavidov 0 июн 21 15:20 Изображения  
drwxr-xr-x. 1 sadavidov sadavidov 0 июн 21 15:20 Музыка  
drwxr-xr-x. 1 sadavidov sadavidov 0 июн 21 15:20 Общедоступные  
drwxr-xr-x. 1 sadavidov sadavidov 0 июн 21 15:20 'Рабочий стол'  
drwxr-xr-x. 1 sadavidov sadavidov 0 июн 21 15:20 Шаблоны  
sadavidov@sadavidov:~$
```

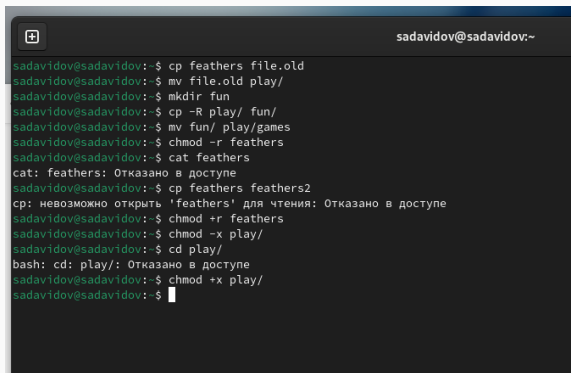
Рис. 5: Настройка прав доступа

Файл /etc/passwd

```
sadavidov@sadavidov:~ — 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
systemd-coredump:x:998:998:systemd Core Dumper:/usr/sbin/nologin
systemd-networkd: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
sasauthd:x:991:76:Sasauthd user:/run/sasauthd:/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
nm-openvpn:x:987:986:Default user for running openvpn spawned by NetworkManager:/sbin/nologin
colord:x:986:985:User for colord:/var/lib/colord:/sbin/nologin
unbound:x:985:984:Unbound DNS resolver:/var/lib/unbound:/sbin/nologin
abrt:x:173:173::/etc/abrt:/sbin/nologin
/etc/passwd
```

Рис. 6: Файл /etc/passwd

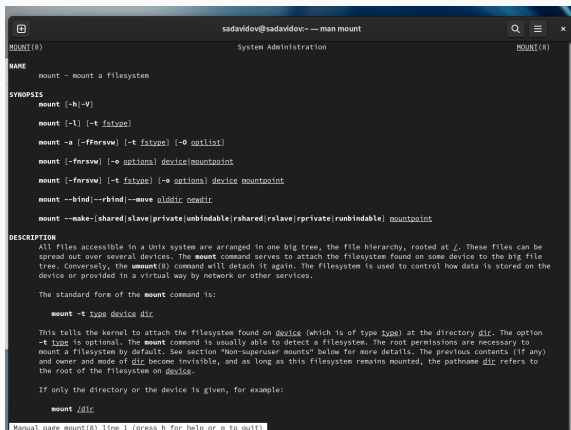
Работа с файлами и правами доступа



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

Рис. 7: Работа с файлами и правами доступа

Справка по командам



```
sadavidov@sadavidov:~ -- man mount
mount(8)                                System Administration                                mount(8)

NAME
    mount - mount a filesystem

SYNOPSIS
    mount [-h|-V]

    mount [-l] [-t fstype]

    mount -a [-Ffnsvw] [-t fstype] [-O optlist]

    mount [-fnsvw] [-o options] device mountpoint

    mount [-fnsvw] [-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

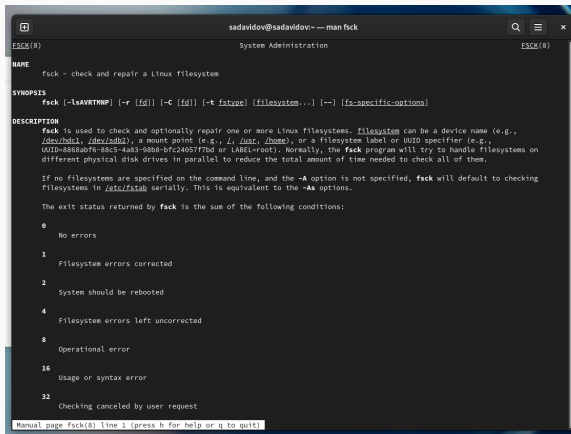
    This tells the kernel to attach the filesystem found on device (which is of type type) at the directory dir. The option -t type is optional. The mount command is usually able to detect a filesystem. The root permissions are necessary to mount a filesystem by default. See section "Non-superuser mounts" 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 root of the filesystem on device.

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

        mount /dir

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

Рис. 8: Команда mount



```
sadavidov@sadavidov:~ — man fsck
FSCK(8)                               System Administration          FSCK(8)

NAME
    fsck - check and repair a Linux filesystem

SYNOPSIS
    fsck [-lsgvrtmnp] [-r [fd]] [-t [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/sdb1, /dev/sdb2), a mount point (e.g., /, /usr, /home), or a filesystem label or UUID specifier (e.g.,
    UUID=8868abf6-88c5-4a83-98b8-bfc24657f7bd 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

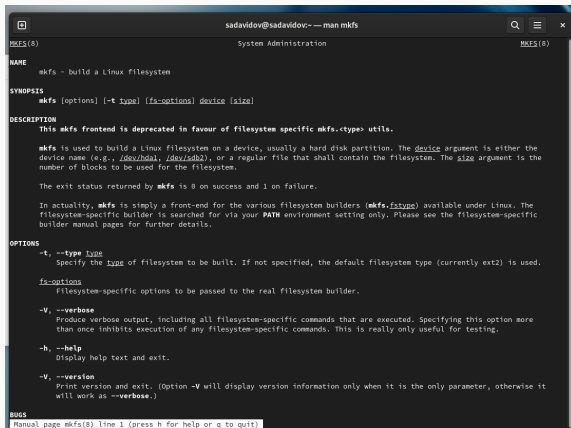
    8      Operational error

    16     Usage or syntax error

    32     Checking canceled by user request

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

Рис. 9: Команда fsck



```
sadavidov@sadavidov:~ -- 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/hdal, /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.

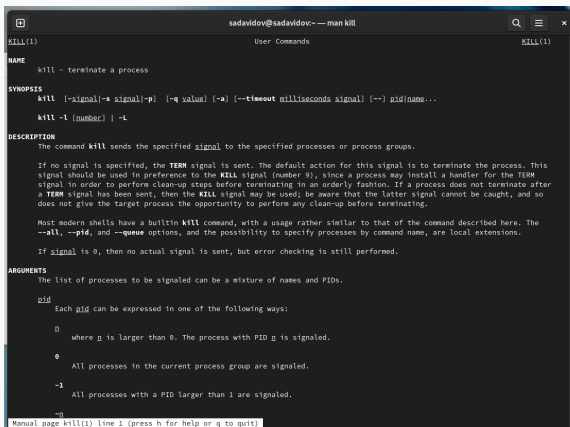
  -V, --verbose
    Produce verbose output, including all filesystem-specific commands that are executed. Specifying this option more than once inhibits execution of any filesystem-specific commands. This is really only useful for testing.

  -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 parameter, otherwise it will work as --verbose.)

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

Рис. 10: Команда mkfs



```
sadavidov@sadavidov:~$ 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:

    0
      where n is larger than 0. The process with PID n is signaled.

    0
      All processes in the current process group are signaled.

    -1
      All processes with a PID larger than 1 are signaled.

    -n
      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.