

Лабораторная работа №5

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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 (и работами), по проверке использования диска и обслуживанию файловой системы.

- Выполнение приведенных примеров
- Выполнение приведенных действий
- Определение опций команды `chmod`
- Проделывание приведенных упражнений
- Изучение мануалов к определенным командам

Выполнение лабораторной работы

Первым заданием было выполнение приведенных
примеров

Копирование файлов и каталогов

```
sakochkarev@sakochkarev [13:21:02] [~/work/study/2021-2022/Операционные системы]
-> % cd
sakochkarev@sakochkarev [13:21:16] [-]
-> % touch abc1
sakochkarev@sakochkarev [13:21:22] [-]
-> % cp abc1 april
sakochkarev@sakochkarev [13:21:27] [-]
-> % cp abc1 may
sakochkarev@sakochkarev [13:21:32] [-]
-> % mkdir monthly
sakochkarev@sakochkarev [13:21:40] [-]
-> % cp april may monthly
sakochkarev@sakochkarev [13:21:48] [-]
-> % cp monthly/may monthly/june
sakochkarev@sakochkarev [13:21:56] [-]
-> % ls monthly
total 0
drwxr-xr-x  5 squidass  staff  160B May 2 13:21 ./
drwxr-xr-x+ 150 squidass  staff  4.7K May 2 13:22 ../
-rw-r--r--  1 squidass  staff    0B May 2 13:21 april
-rw-r--r--  1 squidass  staff    0B May 2 13:21 june
-rw-r--r--  1 squidass  staff    0B May 2 13:21 may
```

Рекурсивное копирование каталогов

```
sakochkarev@sakochkarev [13:22:04] [~]  
[-> % mkdir monthly.00  
sakochkarev@sakochkarev [13:22:29] [~]  
[-> % cp -r monthly monthly.00  
sakochkarev@sakochkarev [13:22:37] [~]  
[-> % cp -r monthly.00 /tmp
```

Перемещение и переименование файлов и каталогов

```
sakochkarev@sakochkarev [13:22:57] [-]
-> % cd
sakochkarev@sakochkarev [13:23:03] [-]
-> % mv april july
sakochkarev@sakochkarev [13:23:07] [-]
-> % mv july monthly.00
sakochkarev@sakochkarev [13:23:15] [-]
-> % ls monthly.00
total 0
drwxr-xr-x  4 squidass  staff  1288 May  2 13:23 ./
drwxr-xr-x+ 150 squidass  staff  4.7K May  2 13:23 ../
-rw-r--r--  1 squidass  staff    0B May  2 13:21 july
drwxr-xr-x  5 squidass  staff  160B May  2 13:22 monthly/
sakochkarev@sakochkarev [13:23:18] [-]
-> % cp -r monthly/ monthly.00
sakochkarev@sakochkarev [13:24:01] [-]
-> % ls monthly.00
total 0
drwxr-xr-x  7 squidass  staff  224B May  2 13:24 ./
drwxr-xr-x+ 150 squidass  staff  4.7K May  2 13:24 ../
-rw-r--r--  1 squidass  staff    0B May  2 13:24 april
-rw-r--r--  1 squidass  staff    0B May  2 13:21 july
-rw-r--r--  1 squidass  staff    0B May  2 13:24 june
-rw-r--r--  1 squidass  staff    0B May  2 13:24 may
drwxr-xr-x  5 squidass  staff  160B May  2 13:22 monthly/
sakochkarev@sakochkarev [13:24:03] [-]
-> % mv monthly.00 monthly.01
sakochkarev@sakochkarev [13:24:23] [-]
-> % mkdir reports
sakochkarev@sakochkarev [13:24:30] [-]
-> % mv monthly.01 reports
sakochkarev@sakochkarev [13:24:36] [-]
-> % mv reports/monthly.01 reports/monthly
sakochkarev@sakochkarev [13:25:00] [-]
-> % ls reports
total 0
drwxr-xr-x  3 squidass  staff   96B May  2 13:25 ./
drwxr-xr-x+ 150 squidass  staff  4.7K May  2 13:25 ../
drwxr-xr-x  7 squidass  staff  224B May  2 13:24 monthly/
```


Права и создание файлов и изменение их прав

```
-- sakochkarev@sqmac:~ -- zsh
-> % cd
sakochkarev@sakochkarev [13:25:30] [-]
-> % touch may
sakochkarev@sakochkarev [13:25:33] [-]
-> % ls -l may
-rw-r--r-- 1 squidass staff 0B May 2 13:25 may
sakochkarev@sakochkarev [13:25:38] [-]
-> % chmod u+x may
sakochkarev@sakochkarev [13:25:47] [-]
-> % ls -l may
-rwxr--r-- 1 squidass staff 0B May 2 13:25 may*
sakochkarev@sakochkarev [13:25:49] [-]
-> % chmod u-x may
sakochkarev@sakochkarev [13:26:01] [-]
-> % ls -l may
-rw-r--r-- 1 squidass staff 0B May 2 13:25 may
sakochkarev@sakochkarev [13:26:02] [-]
-> % mkdir monthly
mkdir: monthly: File exists
sakochkarev@sakochkarev [13:26:17] [-]
-> % rmdir monthly
rmdir: monthly: Directory not empty
sakochkarev@sakochkarev [13:26:24] [-]
-> % rmdir -f monthly
rmdir: illegal option -- f
usage: rmdir [-pv] directory ...
sakochkarev@sakochkarev [13:26:27] [-]
-> % rm -rf monthly
sakochkarev@sakochkarev [13:26:34] [-]
-> % mkdir monthly
sakochkarev@sakochkarev [13:26:41] [-]
-> % chmod g-r, o-r monthly
chmod: Invalid file mode: g-r,
sakochkarev@sakochkarev [13:26:50] [-]
-> % chmod g-r monthly
sakochkarev@sakochkarev [13:27:36] [-]
-> % chmod o-r monthly
chmod: monthl: No such file or directory
sakochkarev@sakochkarev [13:27:44] [-]
-> % chmod o-r monthly
sakochkarev@sakochkarev [13:27:45] [-]
-> % ls -l monthly
total 0
drwx--x--x 2 squidass staff 64B May 2 13:26 ./
drwxr-xr-x+ 150 squidass staff 4.7K May 2 13:27 ../
sakochkarev@sakochkarev [13:27:52] [-]
-> % touch abc1
sakochkarev@sakochkarev [13:28:03] [-]
-> % chmod g+w abc1
```

Выполнение команды `fsck /dev/sda1`

```
sakochkarev@sakochkarev [13:28:08] [~]  
-> % fsck /dev/sda1  
fsck 1.46.4 (18-Aug-2021)  
WARNING: couldn't open /etc/fstab: No such file or directory  
e2fsck 1.46.4 (18-Aug-2021)  
fsck.ext2: No such file or directory while trying to open /dev/sda1  
Possibly non-existent device?
```

После выполнения примеров из теоретического введения мы перешли к выполнению приведенных действий

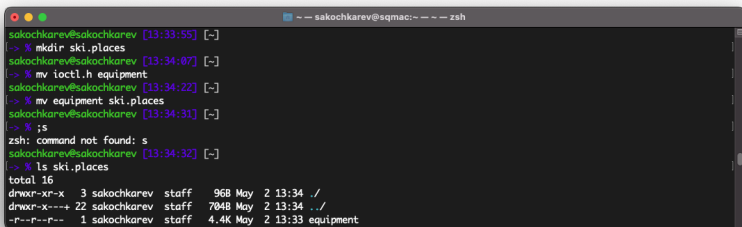
Копирование файла /usr/include/sys/io.h в домашний каталог

Был использован файл

/Library/Developer/CommandLineTools/SDKs/MacOSX.sdk/usr/include

```
sakochkarev@sakochkarev [13:32:47] [-]
-> % cp /Library/Developer/CommandLineTools/SDKs/MacOSX.sdk/usr/include/sys/ioctl.h .
sakochkarev@sakochkarev [13:33:43] [-]
-> % ls
total 144
drwxr-xr-x 22 sakochkarev staff 704B May 2 13:33 ./
drwxr-xr-x  8 root      admin 256B Apr 27 19:03 ../
-r-----  1 sakochkarev staff   7B Apr 27 19:05 .CFUserTextEncoding
drwx----- 2 sakochkarev staff  64B Apr 27 19:07 .Trash/
-rw-----  1 sakochkarev staff  20B Apr 27 22:28 .lessshst
drwxr-xr-x 22 sakochkarev staff 704B Apr 27 19:11 .oh-my-zsh/
-rw-r--r--  1 sakochkarev staff  47K May 2 13:29 .zcompdump-sqmac (19338)-5.8
-rw-----  1 sakochkarev staff   3.2K May 2 13:33 .zsh_history
drwx----- 5 sakochkarev staff 160B Apr 27 19:07 .zsh_sessions/
-rw-r--r--  1 sakochkarev staff   3.8K Apr 27 21:14 .zshrc
drwx-----+ 3 sakochkarev staff  96B Apr 27 19:03 Desktop/
drwx-----+ 3 sakochkarev staff  96B Apr 27 19:03 Documents/
drwx-----+ 3 sakochkarev staff  96B Apr 27 19:03 Downloads/
drwxr-xr-x  2 sakochkarev staff  64B Apr 27 22:21 Hello world/
drwx-----@ 59 sakochkarev staff   1.8K Apr 27 19:07 Library/
drwx-----  3 sakochkarev staff  96B Apr 27 19:03 Movies/
drwx-----+ 3 sakochkarev staff  96B Apr 27 19:03 Music/
drwx-----+ 3 sakochkarev staff  96B Apr 27 19:03 Pictures/
drwxr-xr-x+  4 sakochkarev staff 128B Apr 27 19:03 Public/
-r--r--r--  1 sakochkarev staff  4.4K May 2 13:33 ioctl.h
-rw-r--r--  1 sakochkarev staff    0B Apr 27 22:18 test
-rw-r--r--  1 sakochkarev staff    0B Apr 27 22:29 test.txt
sakochkarev@sakochkarev [13:33:44] [-]
-> % tail ioctl.h
/*
 * Keep outside _SYS_IOCTL_H_
 * Compatibility with old terminal driver
 *
 * Source level -> #define USE_OLD_TTY
 * Kernel level -> always on
 */
#if defined(USE_OLD_TTY) || defined(BSD_KERNEL_PRIVATE)
#include <sys/ioctl_compat.h>
#endif /* defined(USE_OLD_TTY) || defined(BSD_KERNEL_PRIVATE) */
sakochkarev@sakochkarev [13:33:44] [-]
```

Создание директории ~/ski.places и перемещение файла equipment

A terminal window with a dark background and light-colored text. The window title bar shows the user 'sakochkarev@sqmac' and the shell 'zsh'. The terminal displays a series of commands and their outputs. The commands are: 'mkdir ski.places', 'mv ioctl.h equipment', 'mv equipment ski.places', and 'ls ski.places'. The output of the last command shows a directory listing for 'ski.places' with three entries: a directory '.', a directory '..', and a file 'equipment'.

Переименование в `equiplist`

```
sakochkarev@sakochkarev [13:34:34] [~]  
[-> % mv ski.places/equipment ski.places/equiplist
```

Создание, перемещение и переименование файла abc1

```

-- sakochkarev@sqmac:~ --- zsh
-> % mkdir ski.places/equipment
sakochkarev@sakochkarev [13:35:56] [-]
-> % mv ski.places/{equiplist,equiplist2} ski.places/equipment
sakochkarev@sakochkarev [13:36:31] [-]
-> % ls -R ski.places
total 0
drwxr-xr-x 3 sakochkarev staff 96B May 2 13:36 ./
drwxr-xr-x 23 sakochkarev staff 736B May 2 13:36 ../
drwxr-xr-x 4 sakochkarev staff 128B May 2 13:36 equipment/

ski.places/equipment:
total 16
drwxr-xr-x 4 sakochkarev staff 128B May 2 13:36 ./
drwxr-xr-x 3 sakochkarev staff 96B May 2 13:36 ../
-r--r--r-- 1 sakochkarev staff 4.4K May 2 13:33 equiplist
-rw-r--r-- 1 sakochkarev staff 0B May 2 13:35 equiplist2

```

Создание подкаталога equipment в каталоге ~/ski.places и
перемещение файлов equiplist и equiplist2

```
-- sakochkarev@sqmac: ~ -- zsh
-> % mkdir ski.places/equipment
sakochkarev@sakochkarev [13:35:56] [-]
-> % mv ski.places/{equi1ist,equi1ist2} ski.places/equipment
sakochkarev@sakochkarev [13:36:31] [-]
-> % ls -R ski.places
total 0
drwxr-xr-x  3 sakochkarev  staff   96B May  2 13:36 ./
drwxr-xr-x 23 sakochkarev  staff  736B May  2 13:36 ../
drwxr-xr-x  4 sakochkarev  staff  128B May  2 13:36 equipment/

ski.places/equipment:
total 16
drwxr-xr-x  4 sakochkarev  staff  128B May  2 13:36 ./
drwxr-xr-x  3 sakochkarev  staff   96B May  2 13:36 ../
-r--r--r--  1 sakochkarev  staff   4.4K May  2 13:33 equi1ist
-rw-r--r--  1 sakochkarev  staff    0B May  2 13:35 equi1ist2
```


Создание каталога `~/newdir`, его перемещение в каталог `~/ski.places` и переименование в `plans`.

```
~ -- sakochkarev@sqmac:~ -- zsh
sakochkarev@sakochkarev [13:36:37] [-]
-> % mkdir newdir
sakochkarev@sakochkarev [13:36:57] [-]
-> % mv newdi ski.places/plans
mv: rename newdi to ski.places/plans: No such file or directory
sakochkarev@sakochkarev [13:37:08] [-]
-> % mv newdi ski.places/plans/
mv: rename newdi to ski.places/plans/: No such file or directory
sakochkarev@sakochkarev [13:37:11] [-]
-> % mv newdi ski.places/
mv: rename newdi to ski.places/newdi: No such file or directory
sakochkarev@sakochkarev [13:37:15] [-]
-> % mv newdir ski.places/plans
sakochkarev@sakochkarev [13:37:23] [-]
-> % ls ski.places
total 0
drwxr-xr-x  4 sakochkarev  staff  128B May  2 13:37 ./
drwxr-xr-x+ 23 sakochkarev  staff  736B May  2 13:37 ../
drwxr-xr-x  4 sakochkarev  staff  128B May  2 13:36 equipment/
drwxr-xr-x  2 sakochkarev  staff   64B May  2 13:36 plans/
```

Определение опций команды `chmod` для присвоения перечисленным файлам определенные права доступа

3.1.	<code>drwxr--r--</code>	...	<code>australia</code>	744
3.2.	<code>drwx--x--x</code>	...	<code>play</code>	711
3.3.	<code>-r-xr--r--</code>	...	<code>my_os</code>	544
3.4.	<code>-rw-rw-r--</code>	...	<code>feathers</code>	664

Далее шло второе задание с выполнением ряда действий.

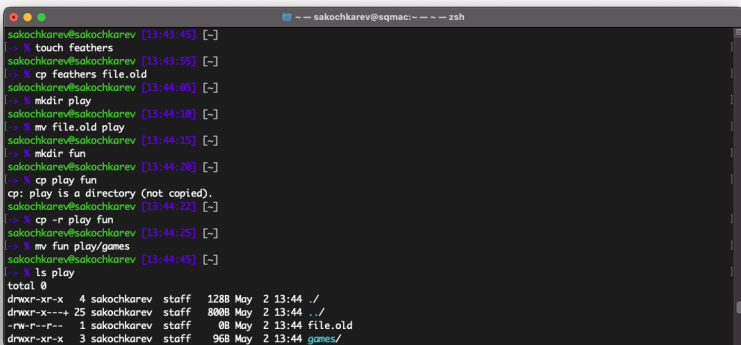
Просмотр содержимого файла `/etc/password`.

Начальные строки файла были просмотрены командой `head /etc/passwd`.

```
sakochkarev@sakochkarev [13:37:25] [~]
[-> % head /etc/password
head: /etc/password: No such file or directory
sakochkarev@sakochkarev [13:41:12] [~]
[-> % head /etc/passwd
##
# User Database
#
# Note that this file is consulted directly only when the system is running
# in single-user mode. At other times this information is provided by
# Open Directory.
#
# See the opendirectoryd(8) man page for additional information about
# Open Directory.
##
```

Файл ~/feathers был скопирован в файл ~/file.old.

Скопированный файл был перемещен в ~/play. Каталог ~/play был скопирован в каталог ~/fun и каталог ~/fun в оригинальный каталог ~/play и переименован в games.



```
sakochkarev@sakochkarev [13:43:45] [-]
-> % touch feathers
sakochkarev@sakochkarev [13:43:55] [-]
-> % cp feathers file.old
sakochkarev@sakochkarev [13:44:05] [-]
-> % mkdir play
sakochkarev@sakochkarev [13:44:10] [-]
-> % mv file.old play
sakochkarev@sakochkarev [13:44:15] [-]
-> % mkdir fun
sakochkarev@sakochkarev [13:44:20] [-]
-> % cp play fun
cp: play is a directory (not copied).
sakochkarev@sakochkarev [13:44:22] [-]
-> % cp -r play fun
sakochkarev@sakochkarev [13:44:25] [-]
-> % mv fun play/games
sakochkarev@sakochkarev [13:44:45] [-]
-> % ls play
total 0
drwxr-xr-x  4 sakochkarev  staff   128B May  2 13:44 ./
drwxr-xr-x+ 25 sakochkarev  staff   800B May  2 13:44 ../
-rw-r--r--  1 sakochkarev  staff    0B May  2 13:44 file.old
drwxr-xr-x  3 sakochkarev  staff   96B May  2 13:44 games/
```

Последующие действия были связаны с правами доступа.

Изменение прав доступа для файла ~/feathers – у владельца отбиралось право на чтение

```
~ -- sakochkarev@sqmac:~ -- zsh
sakochkarev@sakochkarev [13:44:49] [-]
[~] % chmod u-r feathers
sakochkarev@sakochkarev [13:45:25] [-]
[~] % ls
total 136
drwxr-xr-x 25 sakochkarev staff 800B May 2 13:45 ./
drwxr-xr-x 8 root admin 256B Apr 27 19:03 ../
-r----- 1 sakochkarev staff 7B Apr 27 19:05 .CFUserTextEncoding
drwxr-xr-x 2 sakochkarev staff 64B Apr 27 19:07 .Trash/
-rw----- 1 sakochkarev staff 20B Apr 27 22:28 .lessht
drwxr-xr-x 22 sakochkarev staff 704B Apr 27 19:11 .oh-my-zsh/
-rw-r--r-- 1 sakochkarev staff 47K May 2 13:29 .zcompdump-sqmac (19338)-5.8
-rw----- 1 sakochkarev staff 4.7K May 2 13:45 .zsh_history
drwx----- 5 sakochkarev staff 160B Apr 27 19:07 .zsh_sessions/
-rw-r--r-- 1 sakochkarev staff 3.8K Apr 27 21:14 .zshrc
drwx----- 3 sakochkarev staff 96B Apr 27 19:03 Desktop/
drwx----- 3 sakochkarev staff 96B Apr 27 19:03 Documents/
drwx----- 3 sakochkarev staff 96B Apr 27 19:03 Downloads/
drwxr-xr-x 2 sakochkarev staff 64B Apr 27 22:21 Hello world/
drwx-----@ 59 sakochkarev staff 1.8K Apr 27 19:07 Library/
drwx----- 3 sakochkarev staff 96B Apr 27 19:03 Movies/
drwx----- 3 sakochkarev staff 96B Apr 27 19:03 Music/
drwx----- 3 sakochkarev staff 96B Apr 27 19:03 Pictures/
drwxr-xr-x+ 4 sakochkarev staff 128B Apr 27 19:03 Public/
-rw-r--r-- 1 sakochkarev staff 0B May 2 13:35 abc1
--w-r--r-- 1 sakochkarev staff 0B May 2 13:43 feathers
drwxr-xr-x 4 sakochkarev staff 128B May 2 13:44 play/
drwxr-xr-x 4 sakochkarev staff 128B May 2 13:37 ski_places/
-rw-r--r-- 1 sakochkarev staff 0B Apr 27 22:18 test
-rw-r--r-- 1 sakochkarev staff 0B Apr 27 22:29 test.txt
sakochkarev@sakochkarev [13:45:27] [-]
[~] % cat feathers
cat: feathers: Permission denied
sakochkarev@sakochkarev [13:45:33] [-]
[~] % cp feathers play
cp: feathers: Permission denied
sakochkarev@sakochkarev [13:45:50] [-]
[~] % chmod u+r feathers
```

Изменение прав доступа для каталога ~/play – у владельца данного каталога были отображены права на выполнение

```
sakochkarev@sakochkarev [13:46:10] [~]  
-> % chmod u-x play  
sakochkarev@sakochkarev [13:46:34] [~]  
-> % cd play  
cd: permission denied: play  
sakochkarev@sakochkarev [13:46:37] [~]  
-> % chmod u+x play
```


Прочтение мануала по командам mount, fsck, mkfs, kill
и охарактеризация с приведенными примерами

- Команда mount
 - Мануал
 - Монтирует файловую систему
 - Пример: `mount /media/hdd`

```
~ -- man mount -- man -- less -- man
MOUNT(8)                                     System Manager's Manual                                     MOUNT(8)

NAME
    mount - mount file systems

SYNOPSIS
    mount [-adfrkuvw] [-t lfs | external_type]
    mount [-dfrkuvw] special | mount_point
    mount [-dfrkuvw] [-o options] [-t lfs | external_type] special mount_point

DESCRIPTION
    The mount command calls the mount(2) system call to prepare and graft a special device or the remote node (rhost:path) on to the file system tree at the point mount_point, which must be a directory. If either special or mount_point are not provided, the appropriate information is obtained via the getfsent(3) library routines.

    The system maintains a list of currently mounted file systems. If no arguments are given to mount, this list is printed.

    The options are as follows:

    -a    All the filesystems listed via getfsent(3) are mounted. Exceptions are those marked as ``noauto;'' excluded by the -t flag (see below); entries that are neither ``ro;'' ``rw;'' or ``rq;'' ``nfs'' entries that also have ``net'' as an option; and already-mounted ``nfs'' entries.

    -d    Causes everything to be done except for the actual system call. This option is useful in conjunction with the -v flag to determine what the mount command is trying to do.

    -f    Forces the revocation of write access when trying to downgrade a filesystem mount status from read-write to read-only.

:|
```

- Команда `fsck`
 - Мануал
 - Проверка и восстановление файловой системы Linux
 - Пример: `fsck /dev/sda1`

```
~ -- man kill -- man -- less + man
KILL(1)                                General Commands Manual                                KILL(1)

NAME
    kill - terminate or signal a process

SYNOPSIS
    kill [-s signal_name] pid ...
    kill -l [exit_status]
    kill -signal_name pid ...
    kill -signal_number pid ...

DESCRIPTION
    The kill utility sends a signal to the processes specified by the pid operands.

    Only the super-user may send signals to other users' processes.

    The options are as follows:

    -s signal_name
        A symbolic signal name specifying the signal to be sent instead of the default TERM.

    -l [exit_status]
        If no operand is given, list the signal names; otherwise, write the signal name corresponding to
        exit_status.

    -signal_name
        A symbolic signal name specifying the signal to be sent instead of the default TERM.

    -signal_number
    :
```

- Команда `mkfs`
 - Мануал
 - Создание и форматирование файловых систем Linux
 - Пример: `mkfs -t ext4 /dev/sdb1`

mkfs(8) - Linux man page

Name

mkfs - build a Linux file system

Synopsis

mkfs [-V] [-t *fstype*] [*fs-options*] *filesys* [*blocks*]

Description

mkfs is used to build a Linux file system on a device, usually a hard disk partition. *filesys* is either the device name (e.g. */dev/hda1*, */dev/sdb2*), or a regular file that shall contain the file system. *blocks* is the number of blocks to be used for the file system.

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 file system builders (**mkfs.fstype**) available under Linux. The file system-specific builder is searched for in a number of directories like perhaps */sbin*, */sbin/fs*, */sbin/fs.d*, */etc/fs*, */etc* (the precise list is defined at compile time but at least contains */sbin* and */sbin/fs*), and finally in the directories listed in the PATH environment variable. Please see the file system-specific builder manual pages for further details.

Options

-V

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

-t *fstype*

Specifies the type of file system to be built. If not specified, the default file system type (currently *ext2*) is used.

fs-options

File system-specific options to be passed to the real file system builder. Although not guaranteed, the following options are supported by most file system builders.

-c

Check the device for bad blocks before building the file system.

-l *filename*

- Команда kill
 - Мануал
 - Посылает сигнал процессу или выводит список допустимых сигналов
 - Пример: `kill -9 1234`


```
~ -- man kill -- man -- less + man
KILL(1)                                General Commands Manual                                KILL(1)

NAME
    kill - terminate or signal a process

SYNOPSIS
    kill [-s signal_name] pid ...
    kill -l [exit_status]
    kill -signal_name pid ...
    kill -signal_number pid ...

DESCRIPTION
    The kill utility sends a signal to the processes specified by the pid operands.

    Only the super-user may send signals to other users' processes.

    The options are as follows:

    -s signal_name
        A symbolic signal name specifying the signal to be sent instead of the default TERM.

    -l [exit_status]
        If no operand is given, list the signal names; otherwise, write the signal name corresponding to
        exit_status.

    -signal_name
        A symbolic signal name specifying the signal to be sent instead of the default TERM.

    -signal_number
    :
```

По выполнении лабораторной работы мы ознакомились с файловой системой Linux, её структурой, именами и содержанием каталогов. Также были приобретены практические навыки по применению команд для работы с файлами и каталогами, по управлению процессами (и работами), по проверке использования диска и обслуживанию файловой системы.