

Лабораторная работа № 4.

Основы интерфейса взаимодействия пользователя с системой Unix на уровне командной строки.

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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.

Ход работы

Выполнение примеров

```
avgismatullin@dk4n62 ~ $ cd
avgismatullin@dk4n62 ~ $ touch abc1
avgismatullin@dk4n62 ~ $ cp abc1 april
avgismatullin@dk4n62 ~ $ cp abc1 may
avgismatullin@dk4n62 ~ $ ls
abc1  bin      may      public   PycharmProjects  work  Документы  Изображения  Общедоступные  Шаблоны
april  GNUstep  pandoc-2.18  public_html  tmp              Видео  Загрузки    Музыка        'Рабочий стол'
avgismatullin@dk4n62 ~ $ mkdir monthly
avgismatullin@dk4n62 ~ $ cp april may monthly
avgismatullin@dk4n62 ~ $ cp monthly/may monthly/june
avgismatullin@dk4n62 ~ $ ls monthly
april  june  may
avgismatullin@dk4n62 ~ $
```

Рис. 1: Командная строка. Домашний каталог - создание и копирование файлов

Выполнение примеров 2

```
avgismatullin@dk4n62 ~ $ mkdir monthly.00
avgismatullin@dk4n62 ~ $ ls
abcl  bin      may      monthly.00  public      PycharmProjects  work  Документы  Изображения  Общедоступные  Шаблоны
april  GNUstep  monthly  pandoc-2.18  public_html  tmp              Видео  Загрузки    Музыка        'Рабочий стол'
avgismatullin@dk4n62 ~ $ cp -r monthly monthly.00
avgismatullin@dk4n62 ~ $ cp -r monthly.00 /tmp
avgismatullin@dk4n62 ~ $ ls /tmp
avgismatullin  monthly.00      systemd-private-e137d7c275ca488dbf766e4d2ccf163d-colord.service-F0Rdqy      Temp-d8dac2b7-4b7d-49b4-b0ee-1b298bd302bb
krb5cc_4864_OFLA13  pulse-PKdhtXMmr18n  systemd-private-e137d7c275ca488dbf766e4d2ccf163d-systemd-logind.service-H7909i  tmux-0
krb5cc_4864_r185A3  root              systemd-private-e137d7c275ca488dbf766e4d2ccf163d-upower.service-faABZP
avgismatullin@dk4n62 ~ $ ls montly.00
ls: невозможно получить доступ к 'montly.00': Нет такого файла или каталога
avgismatullin@dk4n62 ~ $ ls monthly.00
monthly
avgismatullin@dk4n62 ~ $
```

Рис. 2: Командная строка. Домашний каталог - перемещение и просмотр файлов

Выполнение примеров 3

```
avgismatullin@dk4n62 ~ $ cd
2 mv april july
bash: 2: команда не найдена
avgismatullin@dk4n62 ~ $ mv april july
avgismatullin@dk4n62 ~ $ mv july monthly.00
avgismatullin@dk4n62 ~ $ ls monthly.00
july  monthly
avgismatullin@dk4n62 ~ $ mv monthly.00 monthly.01
avgismatullin@dk4n62 ~ $ mkdir reports
mv monthly.01 reports
avgismatullin@dk4n62 ~ $ mv reports/monthly.01 reports/monthly
avgismatullin@dk4n62 ~ $ ls reports
monthly
avgismatullin@dk4n62 ~ $
```

Рис. 3: Командная строка. Домашний каталог - создание и перемещение файлов

Создание ski.plases и его изменение

```
avgismatullin@dk4n62 ~ $ cp /usr/include/sys/io.h equipment
avgismatullin@dk4n62 ~ $ ls equipment
equipment
avgismatullin@dk4n62 ~ $ ls
bin          GNUstep      public       PycharmProjects  work   Документы  Изображения  Общедоступные  Шаблоны
equipment    pandoc-2.18  public_html  tmp              Видео  Загрузки   Музыка       'Рабочий стол'
avgismatullin@dk4n62 ~ $ cd equipment
bash: cd: equipment: Это не каталог
avgismatullin@dk4n62 ~ $ mkdir ski.plases
avgismatullin@dk4n62 ~ $ ls
bin          pandoc-2.18  PycharmProjects  work      Загрузки   Общедоступные
equipment    public       ski.plases        Видео     Изображения  'Рабочий стол'
GNUstep      public_html  tmp              Документы  Музыка       Шаблоны
avgismatullin@dk4n62 ~ $ mv equipment ski.plases
avgismatullin@dk4n62 ~ $ ls ski.plases/
equipment
avgismatullin@dk4n62 ~ $
```

Рис. 4: Командная строка. Домашний каталог - создание ski.plases

Создание ski.plases и его изменение 2

```
avgismatullin@dk4n62 ~ $ mv ski.plases/equipment ski.plases/equiplist
avgismatullin@dk4n62 ~ $ ls ski.plases/
equiplist
avgismatullin@dk4n62 ~ $ touch abc1
avgismatullin@dk4n62 ~ $ cp abc1 ski.plases/
avgismatullin@dk4n62 ~ $ mv ski.plases/abc1 ski.plases/equiplist2
avgismatullin@dk4n62 ~ $ ls ski.plases/
equiplist  equiplist2
avgismatullin@dk4n62 ~ $
```

Рис. 5: Командная строка. Домашний каталог - изменение ski.plases


```
avgismatullin@dk4n62 ~/ski.plases $ ls
equiplist  equiplist2
avgismatullin@dk4n62 ~/ski.plases $ mkdir equipment
avgismatullin@dk4n62 ~/ski.plases $ mv equiplist equipment
avgismatullin@dk4n62 ~/ski.plases $ mv equiplist2 equipment
avgismatullin@dk4n62 ~/ski.plases $ ls equipment/
equiplist  equiplist2
avgismatullin@dk4n62 ~/ski.plases $
```

Рис. 6: Командная строка. ski.plases - создание equipment

```
avgismatullin@dk4n62 ~/ski.places $ cd ..
avgismatullin@dk4n62 ~ $ mkdir newdir
avgismatullin@dk4n62 ~ $ mv newdir ski.places/
avgismatullin@dk4n62 ~ $ cd ski.places/
avgismatullin@dk4n62 ~/ski.places $ mv newdir plans
avgismatullin@dk4n62 ~/ski.places $ ls
equipment  plans
avgismatullin@dk4n62 ~/ski.places $
```

Рис. 7: Командная строка. ski.places - создание plans

Определение опций chmod

```
avgismatullin@dk4n62 - $ chmod 744 australia
avgismatullin@dk4n62 - $ chmod 711 play
avgismatullin@dk4n62 - $ chmod 544 my_os
avgismatullin@dk4n62 - $ chmod 644 feathers
avgismatullin@dk4n62 - $ ls -l
итого 37
-rw-r--r-- 1 avgismatullin studsci 0 map 9 15:27 abc1
drwxr--r-- 2 avgismatullin studsci 2048 map 9 15:31 australia
drwxr-xr-x 2 avgismatullin studsci 2048 фев 21 13:03 bin
-rw-r--r-- 1 avgismatullin studsci 0 map 9 15:32 feathers
drwxr-xr-x 3 avgismatullin studsci 2048 ноя 14 13:18 GNUstep
-r-xr--r-- 1 avgismatullin studsci 0 map 9 15:31 my_os
drwxr-xr-x 4 avgismatullin studsci 2048 апр 4 2022 pandoc-2.18
drwx--x--x 2 avgismatullin studsci 2048 map 9 15:31 play
drwxr-xr-x 3 avgismatullin root 2048 сен 2 2022 public
lrwxr-xr-x 1 avgismatullin root 18 map 2 21:54 public_html -> public/public_html
drwxr-xr-x 3 avgismatullin studsci 2048 сен 8 15:20 PycharmProjects
drwxr-xr-x 4 avgismatullin studsci 2048 map 9 15:30 ski.plases
drwxr-xr-x 2 avgismatullin studsci 2048 фев 15 16:52 tmp
drwxr-xr-x 6 avgismatullin studsci 2048 фев 21 13:24 work
drwxr-xr-x 2 avgismatullin studsci 2048 сен 7 2022 Видео
drwxr-xr-x 2 avgismatullin studsci 2048 сен 7 2022 Документы
drwxr-xr-x 4 avgismatullin studsci 2048 фев 28 13:36 Загрузки
drwxr-xr-x 3 avgismatullin studsci 2048 ноя 14 13:55 Изображения
drwxr-xr-x 2 avgismatullin studsci 2048 сен 7 2022 Музыка
drwxr-xr-x 2 avgismatullin studsci 2048 сен 7 2022 Общедоступные
drwxr-xr-x 2 avgismatullin studsci 2048 сен 8 16:17 'Рабочий стол'
drwxr-xr-x 2 avgismatullin studsci 2048 сен 7 2022 Шаблоны
avgismatullin@dk4n62 - $
```

Рис. 8: Командная строка. Изменение прав файлов

```
avgismatullin@dk4n62 ~ $ cat /etc/passwd
root:x:0:0:System user; root:/root:/bin/bash
bin:x:1:1:bin:/bin:/bin/false
daemon:x:2:2:daemon:/sbin:/bin/false
adm:x:3:4:adm:/var/adm:/bin/false
lp:x:4:7:lp:/var/spool/lpd:/bin/false
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 program user:/var/spool/mail:/sbin/nologin
news:x:9:13:news:/usr/lib/news:/bin/false
uucp:x:10:14:uucp:/var/spool/uucppublic:/bin/false
operator:x:11:0:operator:/root:/bin/bash
man:x:13:15:System user; man:/dev/null:/sbin/nologin
postmaster:x:14:12:Postmaster user:/var/spool/mail:/sbin/nologin
cron:x:16:16:A user for sys-process/cronbase:/var/spool/cron:/sbin/nologin
ftp:x:21:21::/home/ftp:/bin/false
sshd:x:22:22:User for ssh:/var/empty:/sbin/nologin
at:x:25:25:at:/var/spool/cron/atjobs:/bin/false
squid:x:31:31:Squid:/var/cache/squid:/bin/false
gdm:x:32:32:User for running GDM:/var/lib/gdm:/sbin/nologin
xfs:x:33:33:X Font Server:/etc/X11/fs:/bin/false
games:x:35:35:games:/usr/games:/bin/bash
named:x:40:40:bind:/var/bind:/bin/false
mysql:x:60:60:MySQL program user:/dev/null:/sbin/nologin
```

Рис. 9: Командная строка. Содержимое /etc/passwd

Изменение домашнего каталога

```
avgismatullin@dk4n62 ~ $ cp ~/feathers file.old
avgismatullin@dk4n62 ~ $ ls file.old
file.old
avgismatullin@dk4n62 ~ $ cp file.old play
avgismatullin@dk4n62 ~ $ ls play
file.old
avgismatullin@dk4n62 ~ $ cp play fun
cp: не указан -r; пропускается каталог 'play'
avgismatullin@dk4n62 ~ $ cp -r play fun
avgismatullin@dk4n62 ~ $ ls fun
file.old
avgismatullin@dk4n62 ~ $ mv fun play
avgismatullin@dk4n62 ~ $ cd play
avgismatullin@dk4n62 ~/play $ mv fun games
avgismatullin@dk4n62 ~/play $ ls
file.old  games
avgismatullin@dk4n62 ~/play $
```

Рис. 10: Командная строка. Изменение домашнего каталога

Изменение прав feathers

```
avgismatullin@dk4n62 ~ $ chmod u-r feathers
avgismatullin@dk4n62 ~ $ cat feathers
cat: feathers: Отказано в доступе
avgismatullin@dk4n62 ~ $ cp feathers play
cp: невозможно открыть 'feathers' для чтения: Отказано в доступе
avgismatullin@dk4n62 ~ $ chmod u+r feathers
```

Рис. 11: Командная строка. Изменение прав feathers

Изменение прав play

```
avgismatullin@dk4n62 ~ $ chmod o-x play
avgismatullin@dk4n62 ~ $ chmod g-x play
avgismatullin@dk4n62 ~ $ chmod u-x play
avgismatullin@dk4n62 ~ $ cd play
avgismatullin@dk4n62 ~/play $ cd ..
avgismatullin@dk4n62 ~ $ ls -l
итого 37
-rw-r--r-- 1 avgismatullin studsci  0 map  9 15:27 abc1
drwxr--r-- 2 avgismatullin studsci 2048 map  9 15:31 australia
drwxr-xr-x 2 avgismatullin studsci 2048 фев 21 13:03 bin
-rw-r--r-- 1 avgismatullin studsci  0 map  9 15:32 feathers
-rw-r--r-- 1 avgismatullin studsci  0 map  9 15:37 file.old
drwxr-xr-x 3 avgismatullin studsci 2048 ноя 14 13:18 GNUstep
-r-xr--r-- 1 avgismatullin studsci  0 map  9 15:31 my_os
drwxr-xr-x 4 avgismatullin studsci 2048 апр  4 2022 pandoc-2.18
drw----- 3 avgismatullin studsci 2048 map  9 15:38 play
drwxr-xr-x 3 avgismatullin root    2048 сен  2 2022 public
lrwxr-xr-x 1 avgismatullin root    18 map  2 21:54 public_html -> public/public_html
drwxr-xr-x 3 avgismatullin studsci 2048 сен  8 15:20 PycharmProjects
drwxr-xr-x 4 avgismatullin studsci 2048 map  9 15:30 ski_places
drwxr-xr-x 2 avgismatullin studsci 2048 фев 15 16:52 tmp
drwxr-xr-x 6 avgismatullin studsci 2048 фев 21 13:24 work
drwxr-xr-x 2 avgismatullin studsci 2048 сен  7 2022 Видео
drwxr-xr-x 2 avgismatullin studsci 2048 сен  7 2022 Документы
drwxr-xr-x 4 avgismatullin studsci 2048 фев 28 13:36 Загрузки
drwxr-xr-x 3 avgismatullin studsci 2048 ноя 14 13:55 Изображения
drwxr-xr-x 2 avgismatullin studsci 2048 сен  7 2022 Музыка
drwxr-xr-x 2 avgismatullin studsci 2048 сен  7 2022 Общедоступные
drwxr-xr-x 2 avgismatullin studsci 2048 сен  8 16:17 'Рабочий стол'
```

Рис. 12: Командная строка. Изменение прав play

Больше о команде 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:

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

Рис. 13: Командная строка. man mount


```
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 an 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

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

Рис. 14: Командная строка. man fsck

```

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.

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

Рис. 15: Командная строка. `man mkfs`

```
KILL(1)                                User Commands                                KILL(1)

NAME
    kill - send a signal to a process

SYNOPSIS
    kill [options] <pid> [...]

DESCRIPTION
    The default signal for kill is TERM. Use -l or -L to list available signals. Particularly useful signals include HUP, INT, KILL, STOP, CONT, and 0. Alternate signals may be specified in three ways: -9, -SIGKILL or -KILL. Negative PID values may be used to choose whole process groups; see the PGID column in ps command output. A PID of -1 is special; it indicates all processes except the kill process itself and init.

OPTIONS
    <pid> [...]
        Send signal to every <pid> listed.

    -<signal>
    -s <signal>
    --signal <signal>
        Specify the signal to be sent. The signal can be specified by using name or number. The behavior of signals is explained in signal(7) manual page.

    -q, --queue value
        Use sigqueue(3) rather than kill(2) and the value argument is used to specify an integer to be sent with the signal. If the receiving process has installed a handler for this signal using the SA_SIGINFO flag to sigaction(2), then it can obtain this data via the si_value field of the siginfo_t

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

Рис. 16: Командная строка. man kill

В ходе выполнения лабораторной работы мы ознакомились с файловой системой Linux, её структурой, именами и содержанием каталогов. Приобрели практические навыки по применению команд для работы с файлами и каталогами, по управлению процессами (и работами), по проверке использования диска и обслуживанию файловой системы.

Спасибо за понимание!