Лабораторная работа №4

Операционные системы

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Цели и задачи

Приобретение практических навыков взаимодействия пользователя с системой посредством командной строки.

Содержание исследования

1. Определим полное имя нашего домашнего каталога. Далее относительно этого каталога будем выполняться последующие упражнения.

```
vtbeknazarova@dk4n68 ~ $ pwd
/afs/.dk.sci.pfu.edu.ru/home/v/t/vtbeknazarova
```

Рис. 1: Путь к домашнему каталогу

2. Перейдем в каталог /tmp.Выведем на экран содержимое каталога /tmp. Для этого используем команду ls с различными опциями.

```
vtbeknazarova@dk4n68 ~ $ cd /tmp
vtbeknazarova@dk4n68 /tmp $ ls
gnome-desktop-thumbnailer-154V01  gnome-desktop-thumbnailer-LTVS01
gnome-desktop-thumbnailer-1P0301  gnome-desktop-thumbnailer-M3KQ01
gnome-desktop-thumbnailer-1TMJ01  gnome-desktop-thumbnailer-M8XS01
gnome-desktop-thumbnailer-224X01  gnome-desktop-thumbnailer-MNWS01
gnome-desktop-thumbnailer-3GDS01  gnome-desktop-thumbnailer-N0RO01
gnome-desktop-thumbnailer-3S3R01  gnome-desktop-thumbnailer-O2IX01
gnome-desktop-thumbnailer-3SMT01  gnome-desktop-thumbnailer-O3XS01
gnome-desktop-thumbnailer-4F2U01  gnome-desktop-thumbnailer-OQPV01
gnome-desktop-thumbnailer-4J6O01  gnome-desktop-thumbnailer-PKXY01
gnome-desktop-thumbnailer-4U0P01  gnome-desktop-thumbnailer-RFOS01
gnome-desktop-thumbnailer-4W6T01  gnome-desktop-thumbnailer-RNWU01
gnome-desktop-thumbnailer-55XS01  gnome-desktop-thumbnailer-RRPL01
gnome-desktop-thumbnailer-62R101  gnome-desktop-thumbnailer-SSHT01
gnome-desktop-thumbnailer-6Q4401  gnome-desktop-thumbnailer-T23301
gnome-desktop-thumbnailer-707T01  gnome-desktop-thumbnailer-T9XS01
gnome-desktop-thumbnailer-8TD301  gnome-desktop-thumbnailer-ULXS01
gnome-desktop-thumbnailer-8TIX01  gnome-desktop-thumbnailer-WCVS01
gnome-desktop-thumbnailer-ALNR01  gnome-desktop-thumbnailer-WK1Y01
gnome-desktop-thumbnailer-AT7L01  gnome-desktop-thumbnailer-WZS001
gnome-desktop-thumbnailer-BQ0Q01  gnome-desktop-thumbnailer-XXRS01
gnome-desktop-thumbnailer-CKJW01  gnome-desktop-thumbnailer-YHGU01
gnome-desktop-thumbnailer-CT0R01  gnome-desktop-thumbnailer-YHSU01
gnome-desktop-thumbnailer-CXM201  gnome-desktop-thumbnailer-Z4GV01
gnome-desktop-thumbnailer-E49R01  krb5cc_4902_APmPwA
```

Рис. 2: Команда ls

Мы можем увидеть содержимое каталога со скрытыми файлами при помощи опции -a

```
vtbeknazarova@dk4n68 /tmp $ ls -a
.                                gnome-desktop-thumbnailer-LTVS01
..                               gnome-desktop-thumbnailer-M3KQ01
gnome-desktop-thumbnailer-154V01 gnome-desktop-thumbnailer-M8XS01
gnome-desktop-thumbnailer-1P0301 gnome-desktop-thumbnailer-MNWS01
gnome-desktop-thumbnailer-1TMJ01 gnome-desktop-thumbnailer-N0RO01
gnome-desktop-thumbnailer-224X01 gnome-desktop-thumbnailer-O2IX01
gnome-desktop-thumbnailer-3GDS01 gnome-desktop-thumbnailer-O3XS01
gnome-desktop-thumbnailer-3S3R01 gnome-desktop-thumbnailer-OQPV01
gnome-desktop-thumbnailer-3SMT01 gnome-desktop-thumbnailer-PKXY01
gnome-desktop-thumbnailer-4F2U01 gnome-desktop-thumbnailer-RFOS01
gnome-desktop-thumbnailer-4J6O01 gnome-desktop-thumbnailer-RNWU01
gnome-desktop-thumbnailer-4U0P01 gnome-desktop-thumbnailer-RRPL01
gnome-desktop-thumbnailer-4W6T01 gnome-desktop-thumbnailer-SSHT01
gnome-desktop-thumbnailer-55XS01 gnome-desktop-thumbnailer-T23301
gnome-desktop-thumbnailer-62R101 gnome-desktop-thumbnailer-T9XS01
gnome-desktop-thumbnailer-6E4301 gnome-desktop-thumbnailer-TSXS01
gnome-desktop-thumbnailer-6Q4401 gnome-desktop-thumbnailer-UE0001
gnome-desktop-thumbnailer-6VEV01 gnome-desktop-thumbnailer-ULXS01
gnome-desktop-thumbnailer-707T01 gnome-desktop-thumbnailer-UU0W01
gnome-desktop-thumbnailer-8TD301 gnome-desktop-thumbnailer-WCVS01
gnome-desktop-thumbnailer-8TIX01 gnome-desktop-thumbnailer-WK1Y01
gnome-desktop-thumbnailer-ALNR01 gnome-desktop-thumbnailer-WXXS01
gnome-desktop-thumbnailer-AT7L01 gnome-desktop-thumbnailer-WZS001
gnome-desktop-thumbnailer-B6R301 gnome-desktop-thumbnailer-XXRS01
gnome-desktop-thumbnailer-BQ0Q01 gnome-desktop-thumbnailer-YHGU01
```

Рис. 3: Команда ls -a

При помощи опции -l, мы можем увидеть подробное содержимое каталога.

```
vtbeknazarova@dk4n68 /tmp $ ls -l
итого 8
drwx------ 3 vtbeknazarova studsci   60 мар  1 15:52 gnome-desktop-thumbnailer-154V01
drwx------ 3 vtbeknazarova studsci   60 мар  1 15:53 gnome-desktop-thumbnailer-18XS01
drwx------ 3 vtbeknazarova studsci   60 мар  1 15:49 gnome-desktop-thumbnailer-1P0301
drwx------ 3 vtbeknazarova studsci   60 мар  1 15:51 gnome-desktop-thumbnailer-1TMJ01
drwx------ 3 vtbeknazarova studsci   60 мар  1 15:52 gnome-desktop-thumbnailer-224X01
drwx------ 3 vtbeknazarova studsci   60 мар  1 15:48 gnome-desktop-thumbnailer-3GDS01
drwx------ 3 vtbeknazarova studsci   60 мар  1 15:50 gnome-desktop-thumbnailer-3S3R01
drwx------ 3 vtbeknazarova studsci   60 мар  1 15:46 gnome-desktop-thumbnailer-3SMT01
drwx------ 3 vtbeknazarova studsci   60 мар  1 15:52 gnome-desktop-thumbnailer-4F2U01
drwx------ 3 vtbeknazarova studsci   60 мар  1 15:48 gnome-desktop-thumbnailer-4J6O01
drwx------ 3 vtbeknazarova studsci   60 мар  1 15:48 gnome-desktop-thumbnailer-4U0P01
drwx------ 3 vtbeknazarova studsci   60 мар  1 15:53 gnome-desktop-thumbnailer-4UXS01
drwx------ 3 vtbeknazarova studsci   60 мар  1 15:51 gnome-desktop-thumbnailer-4W6T01
drwx------ 3 vtbeknazarova studsci   60 мар  1 15:48 gnome-desktop-thumbnailer-55XS01
drwx------ 3 vtbeknazarova studsci   60 мар  1 15:48 gnome-desktop-thumbnailer-62R101
drwx------ 3 vtbeknazarova studsci   60 мар  1 15:53 gnome-desktop-thumbnailer-6E4301
drwx------ 3 vtbeknazarova studsci   60 мар  1 15:46 gnome-desktop-thumbnailer-6Q4401
drwx------ 3 vtbeknazarova studsci   60 мар  1 15:53 gnome-desktop-thumbnailer-6VEV01
drwx------ 3 vtbeknazarova studsci   60 мар  1 15:49 gnome-desktop-thumbnailer-707T01
drwx------ 3 vtbeknazarova studsci   60 мар  1 15:52 gnome-desktop-thumbnailer-8TD301
drwx------ 3 vtbeknazarova studsci   60 мар  1 15:48 gnome-desktop-thumbnailer-8TIX01
drwx------ 3 vtbeknazarova studsci   60 мар  1 15:50 gnome-desktop-thumbnailer-ALNR01
drwx------ 3 vtbeknazarova studsci   60 мар  1 15:51 gnome-desktop-thumbnailer-AT7L01
drwx------ 3 vtbeknazarova studsci   60 мар  1 15:53 gnome-desktop-thumbnailer-B6R301
```

Рис. 4: Команда ls -l

При помощи опции -f можем увидеть файлы списком

```
vtbeknazarova@dk4n68 /tmp $ ls -f
.                               gnome-desktop-thumbnailer-OQPV01
..                              gnome-desktop-thumbnailer-ULXS01
gnome-desktop-thumbnailer-RVWX01  gnome-desktop-thumbnailer-MNWS01
gnome-desktop-thumbnailer-YSRW01  gnome-desktop-thumbnailer-N0RO01
gnome-desktop-thumbnailer-HEWT01  gnome-desktop-thumbnailer-3S3R01
gnome-desktop-thumbnailer-4UXS01  gnome-desktop-thumbnailer-YHGU01
gnome-desktop-thumbnailer-18XS01  gnome-desktop-thumbnailer-CKJW01
gnome-desktop-thumbnailer-B6R301  gnome-desktop-thumbnailer-707T01
gnome-desktop-thumbnailer-IDIZ01  gnome-desktop-thumbnailer-M8XS01
gnome-desktop-thumbnailer-6VEV01  gnome-desktop-thumbnailer-T23301
gnome-desktop-thumbnailer-TSXS01  gnome-desktop-thumbnailer-1P0301
gnome-desktop-thumbnailer-6E4301  gnome-desktop-thumbnailer-CXM201
gnome-desktop-thumbnailer-UE0001  gnome-desktop-thumbnailer-8TIX01
gnome-desktop-thumbnailer-UU0W01  gnome-desktop-thumbnailer-RNWU01
gnome-desktop-thumbnailer-G6XS01  gnome-desktop-thumbnailer-T9XS01
gnome-desktop-thumbnailer-WXXS01  gnome-desktop-thumbnailer-62R101
gnome-desktop-thumbnailer-WK1Y01  gnome-desktop-thumbnailer-J48V01
gnome-desktop-thumbnailer-154V01  gnome-desktop-thumbnailer-Z4GV01
gnome-desktop-thumbnailer-H6WS01  gnome-desktop-thumbnailer-RFOS01
gnome-desktop-thumbnailer-YHSU01  gnome-desktop-thumbnailer-55XS01
gnome-desktop-thumbnailer-RRPL01  gnome-desktop-thumbnailer-4U0P01
gnome-desktop-thumbnailer-8TD301  gnome-desktop-thumbnailer-4J6O01
gnome-desktop-thumbnailer-XXRS01  gnome-desktop-thumbnailer-3GDS01
gnome-desktop-thumbnailer-E49R01  gnome-desktop-thumbnailer-GUXR01
gnome-desktop-thumbnailer-JL7Z01  gnome-desktop-thumbnailer-JZLO01
```

Рис. 5: Команда ls -f

В каталоге /var/spool есть подкаталог с именем cron

```
vtbeknazarova@dk4n68 /tmp $ cd /var/spool/
vtbeknazarova@dk4n68 /var/spool $ ls -l
итого 28
drwxr-x--- 4 root   cron  4096 авг 22  2022 cron
drwx--x--- 3 root   lp    4096 июн  4  2019 cups
drwsrws--- 2 fcron  fcron 4096 мар  1 15:50 fcron
drwxrwxr-x 2 root   mem   4096 авг 22  2022 mail
drwxr-xr-x 2 root   root  4096 дек  1 15:10 rsyslog
drwxr-xr-x 3 slurm  slurm 4096 июн  4  2019 slurm
drwxr-xr-x 2 xrootd root  4096 ноя  1  2019 xrootd
```

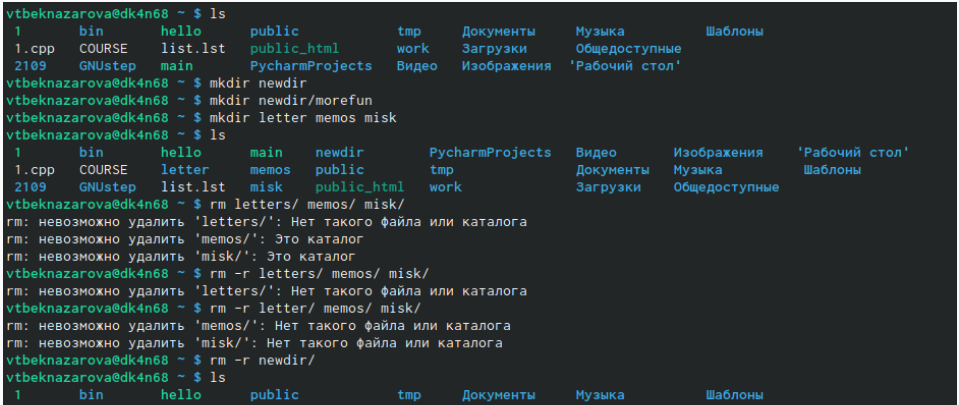
Рис. 6: Каталог /var/spool

Перейдем в наш домашний каталог и выведем на экран его содержимое. Определили, кто является владельцем файлов и подкаталогов при помощи команды ls -al. Большинство файлов принадлежат мне и пользователю root.

```
vtbeknazarova@dk4n68 /var/spool $ cd
vtbeknazarova@dk4n68 ~ $ ls -al
итого 123
drwxr-xr-x 26 vtbeknazarova root     4096 мар  1 15:35  .
drwxrwxrwx  2 root          root     2048 сен 15 17:34  
-rwxr-xr-x  1 vtbeknazarova studsci 16072 ноя 16 11:54  1
-rw-r--r--  1 vtbeknazarova studsci   552 ноя 16 11:02  1.cpp
drwxr-xr-x  2 vtbeknazarova studsci  2048 фев  5 00:01  2109
-rw-------  1 vtbeknazarova studsci 14143 фев 25 14:30  .bash_history
-rw-r--r--  1 vtbeknazarova pchelko    245 сен  3  2012  .bash_profile
```

Рис. 7: Файлы в домашнем каталоге

3. 3.1. В домашнем каталоге создаем новый каталог с именем newdir. 3.2. В каталоге ~/newdir создаем новый каталог с именем morefun. 3.3. В домашнем каталоге создем одной командой три новых каталога с именами letters, memos, misk. Затем удаляем эти каталоги одной командой. 3.4. Попробуем удалить ранее созданный каталог ~/newdir командой rm. Проверем был ли каталог удалён. 3.5. Удалим каталог ~/newdir/morefun из домашнего каталога. Проверим, был ли каталог удалён.



4. С помощью команды man определим, какую опцию команды ls нужно использо- вать для просмотра содержимое не только указанного каталога, но и подкаталогов, входящих в него.Нам нужен ключ -R

5. С помощью команды man определим набор опций команды ls, позволяющий отсортировать по времени последнего изменения выводимый список содержимого каталога с развёрнутым описанием файлов.

```
vtbeknazarova@dk4n68 ~ $ man ls
vtbeknazarova@dk4n68 ~ $ ls -t
 Загрузки  'Рабочий стол'   2109    hello      1.cpp    GNUstep       Музыка          public
 work       PycharmProjects  Видео   list.lst   COURSE   Изображения   Общедоступные
 bin        public_html      main    1          tmp      Документы     Шаблоны
```

Рис. 9: Команда ls -t

6. Используем команду man для просмотра описания следующих команд: cd, pwd, mkdir, rmdir, rm.

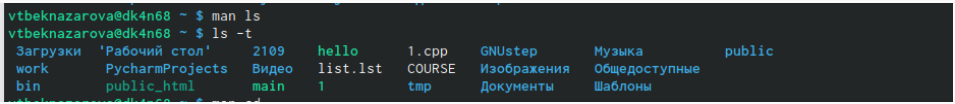
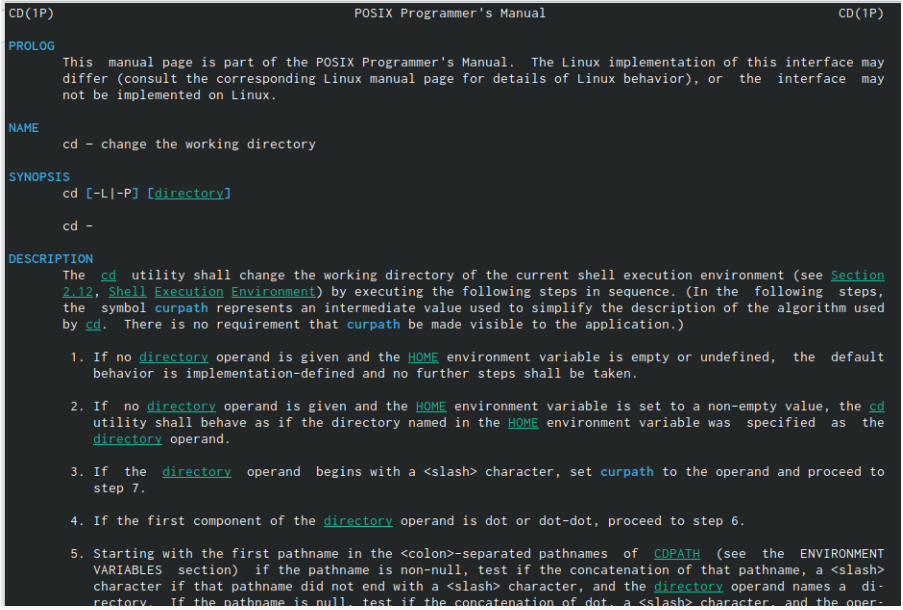


Рис. 10: Терминал



CD(1P) POSIX Programmer's Manual CD(1P)

PROLOG

This manual page is part of the POSIX Programmer's Manual. The Linux implementation of this interface may differ (consult the corresponding Linux manual page for details of Linux behavior), or the interface may not be implemented on Linux.

NAME

cd − change the working directory

SYNOPSIS

cd [-L|-P] [directory]

cd -

DESCRIPTION

The cd utility shall change the working directory of the current shell execution environment (see Section 2.12, Shell Execution Environment) by executing the following steps in sequence. (In the following steps, the symbol curpath represents an intermediate value used to simplify the description of the algorithm used by cd. There is no requirement that curpath be made visible to the application.)

1. If no directory operand is given and the HOME environment variable is empty or undefined, the default behavior is implementation-defined and no further steps shall be taken.

2. If no directory operand is given and the HOME environment variable is set to a non-empty value, the cd utility shall behave as if the directory named in the HOME environment variable was specified as the directory operand.

3. If the directory operand begins with a <slash> character, set curpath to the operand and proceed to step 7.

4. If the first component of the directory operand is dot or dot-dot, proceed to step 6.

5. Starting with the first pathname in the <colon>-separated pathnames of CDPATH (see the ENVIRONMENT VARIABLES section) if the pathname is non-null, test if the concatenation of that pathname, a <slash> character if that pathname did not end with a <slash> character, and the directory operand names a directory. If the pathname is null, test if the concatenation of dot, a <slash> character, and the oper-

Рис. 11: Справка по команде cd

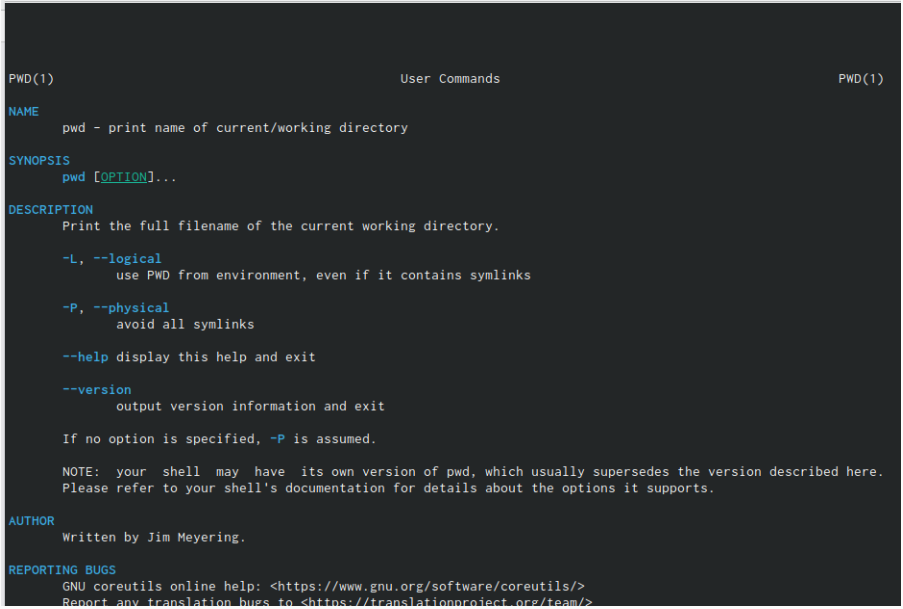


Рис. 12: Справка по команде pwd

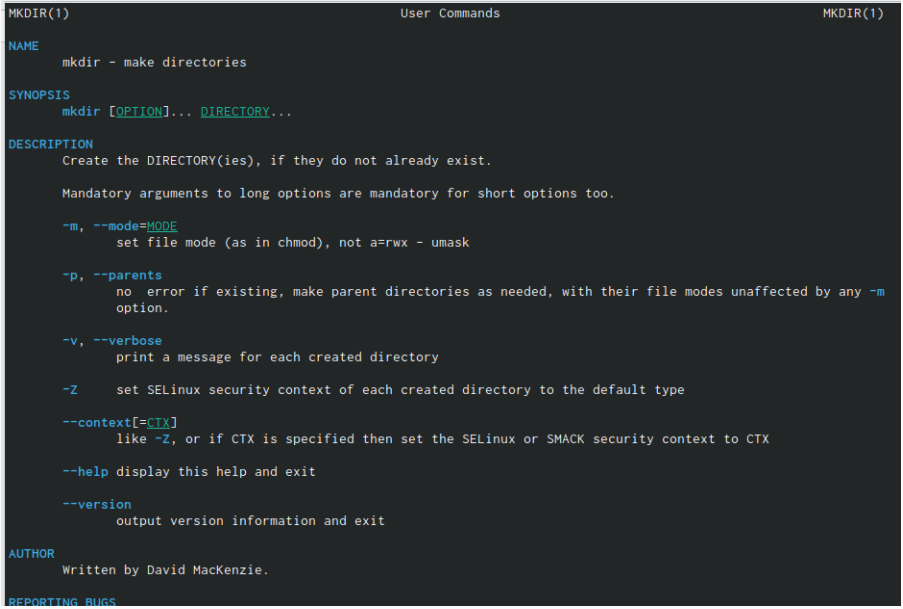
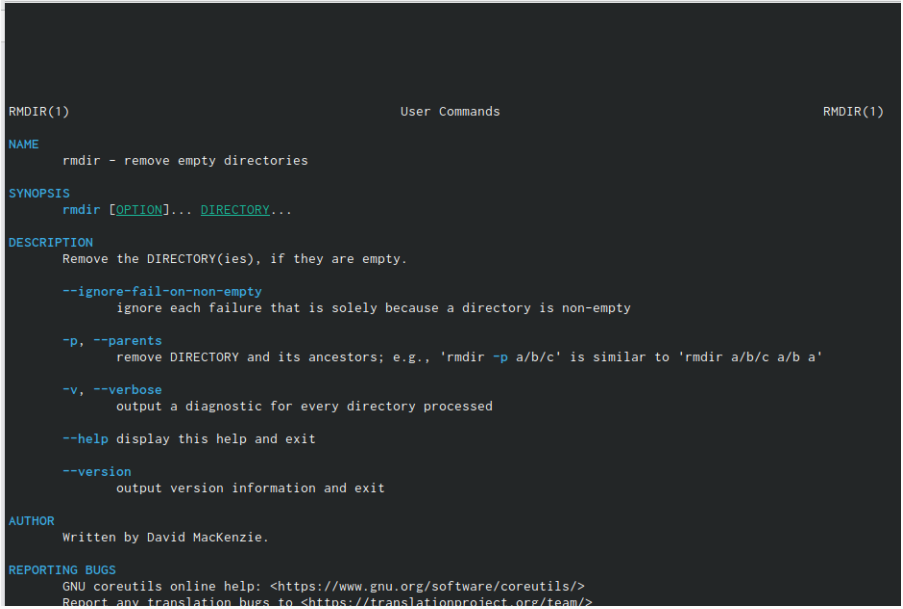
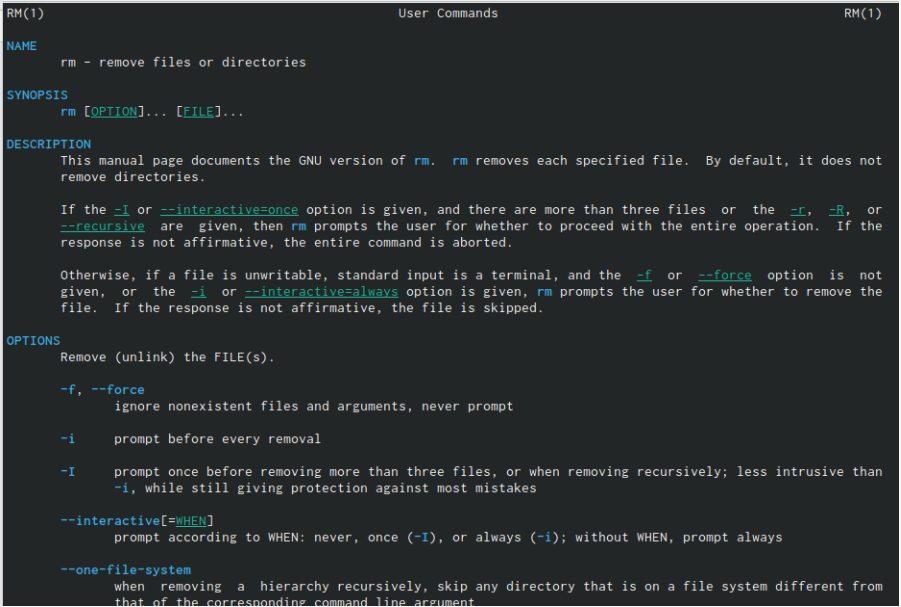


Рис. 13: Справка по команде mkdir



```
RMDIR(1)                                    User Commands                                    RMDIR(1)

NAME
       rmdir - remove empty directories

SYNOPSIS
       rmdir [OPTION]... DIRECTORY...

DESCRIPTION
       Remove the DIRECTORY(ies), if they are empty.

       --ignore-fail-on-non-empty
              ignore each failure that is solely because a directory is non-empty

       -p, --parents
              remove DIRECTORY and its ancestors; e.g., 'rmdir -p a/b/c' is similar to 'rmdir a/b/c a/b a'

       -v, --verbose
              output a diagnostic for every directory processed

       --help display this help and exit

       --version
              output version information and exit

AUTHOR
       Written by David MacKenzie.

REPORTING BUGS
       GNU coreutils online help: <https://www.gnu.org/software/coreutils/>
       Report any translation bugs to <https://translationproject.org/team/>
```

Рис. 14: Справка по команде prmdir



```
RM(1)                          User Commands                          RM(1)

NAME
       rm - remove files or directories

SYNOPSIS
       rm [OPTION]... [FILE]...

DESCRIPTION
       This manual page documents the GNU version of rm.  rm removes each specified file.  By default, it does not
       remove directories.

       If the -I or --interactive=once option is given, and there are more than three files  or  the  -r,  -R,  or
       --recursive  are  given, then rm prompts the user for whether to proceed with the entire operation.  If the
       response is not affirmative, the entire command is aborted.

       Otherwise, if a file is unwritable, standard input is a terminal, and the  -f  or  --force  option  is  not
       given,  or  the  -i  or --interactive=always option is given, rm prompts the user for whether to remove the
       file.  If the response is not affirmative, the file is skipped.

OPTIONS
       Remove (unlink) the FILE(s).

       -f, --force
              ignore nonexistent files and arguments, never prompt

       -i     prompt before every removal

       -I     prompt once before removing more than three files, or when removing recursively; less intrusive than
              -i, while still giving protection against most mistakes

       --interactive[=WHEN]
              prompt according to WHEN: never, once (-I), or always (-i); without WHEN, prompt always

       --one-file-system
              when  removing  a  hierarchy recursively, skip any directory that is on a file system different from
              that of the corresponding command line argument
```

Рис. 15: Справка по команде rm

7. Используя информацию, полученную при помощи команды history, выполнив модификацию и исполнение нескольких команд из буфера команд.

```
493  git push
494  cd
495  cd ~/work/study/2022-2023/"Операционные системы"/os-intro
496  git add .
497  git commit -am 'feat(main): make course structure'
498  git push
499  pwd
500  cd /tmp
501  ls
502  ls -a
503  ls -l
504  ls -f
505  cd /var/spool/
506  ls -l
507  ls -al
508  cd
509  ls -al
510  ls
511  mkdir newdir
512  mkdir newdir/morefun
513  mkdir letter memos misk
514  ls
515  rm letters/ memos/ misk/
516  rm -r letters/ memos/ misk/
517  rm -r letter/ memos/ misk/
518  rm -r newdir/
519  ls
520  man ls
521  ls -t
522  man cd
523  man pwd
524  man mkdir
525  man rmdir
526  man rm
```

Результаты

Мы приобрели практические навыки взаимодействия пользователя с системой посредством командной строки.