

Основы интерфейса взаимодействия пользователя с системой Unix на уровне командной строки

Роберт Кармазян ¹

9 марта, 2024, Москва, Россия

¹Российский Университет Дружбы Народов

Цели и задачи работы

Цель лабораторной работы

Приобретение практических навыков взаимодействия пользователя с системой посредством командной строки.

Задачи лабораторной работы

- 1 Определить имя и путь домашнего каталога
- 2 Изучить команду `ls`.
- 3 Выполнить действия с каталогами.
- 4 Получить дополнительные сведения при помощи справки по командам.
- 5 Изучить команду `history`.

Процесс выполнения лабораторной работы

Имя и путь к домашнему каталогу



```
rmkarmazyan@rmkarmazyan:~$ cd
rmkarmazyan@rmkarmazyan:~$ pwd
/home/rmkarmazyan
rmkarmazyan@rmkarmazyan:~$
```

A terminal window with a dark background. The title bar shows a window icon and the text 'rmkarmazyan@rmkarmazyan:~'. The terminal content shows a user running 'cd' and 'pwd' commands, with the output being '/home/rmkarmazyan'. The prompt is 'rmkarmazyan@rmkarmazyan:~\$'.

Рис. 1: Путь к домашнему каталогу

Опции команды ls

```
rmkarmazyan@rmkarmazyan:~$  
rmkarmazyan@rmkarmazyan:~$ cd /tmp  
rmkarmazyan@rmkarmazyan:/tmp$ ls  
dbus-F7QNj6MU  
dbus-lfx69RUw  
systemd-private-3ec1fc37f8f34a878e9f1a82cc8f8e2f-chrond.service-3kMgJ4  
systemd-private-3ec1fc37f8f34a878e9f1a82cc8f8e2f-colord.service-E3gM6F  
systemd-private-3ec1fc37f8f34a878e9f1a82cc8f8e2f-dbus-broker.service-x3fbCg  
systemd-private-3ec1fc37f8f34a878e9f1a82cc8f8e2f-fwupd.service-ZigZWf  
systemd-private-3ec1fc37f8f34a878e9f1a82cc8f8e2f-low-memory-monitor.service-5dlDe1  
systemd-private-3ec1fc37f8f34a878e9f1a82cc8f8e2f-ModemManager.service-D1n24  
systemd-private-3ec1fc37f8f34a878e9f1a82cc8f8e2f-polkit.service-67uUqG  
systemd-private-3ec1fc37f8f34a878e9f1a82cc8f8e2f-power-profiles-daemon.service-6eoNKK  
systemd-private-3ec1fc37f8f34a878e9f1a82cc8f8e2f-rtkit-daemon.service-M0eNE2  
systemd-private-3ec1fc37f8f34a878e9f1a82cc8f8e2f-switcheroo-control.service-uYcyoY  
systemd-private-3ec1fc37f8f34a878e9f1a82cc8f8e2f-systemd-logind.service-49yVwV  
systemd-private-3ec1fc37f8f34a878e9f1a82cc8f8e2f-systemd-oomd.service-t8f0Mv  
systemd-private-3ec1fc37f8f34a878e9f1a82cc8f8e2f-systemd-resolved.service-90TX3K  
systemd-private-3ec1fc37f8f34a878e9f1a82cc8f8e2f-upower.service-bTgHTm  
vmware-root_933-3988752732  
rmkarmazyan@rmkarmazyan:/tmp$
```

Рис. 2: Команда ls

Опции команды ls

```
rmkarmazyan@rmkarmazyan:/tmp$ ls -la
.
..
dbus-F7QNj6MU
dbus-lfX69RUw
.font-unix
.ICE-unix
systemd-private-3ec1fc37f8f34a878e9fla82cc8f8e2f-chronyd.service-3kNgJ4
systemd-private-3ec1fc37f8f34a878e9fla82cc8f8e2f-colord.service-E3gM6F
systemd-private-3ec1fc37f8f34a878e9fla82cc8f8e2f-dbus-broker.service-x3fbCg
systemd-private-3ec1fc37f8f34a878e9fla82cc8f8e2f-fwupd.service-ZigZWf
systemd-private-3ec1fc37f8f34a878e9fla82cc8f8e2f-low-memory-monitor.service-5dlDe1
systemd-private-3ec1fc37f8f34a878e9fla82cc8f8e2f-ModemManager.service-DiIn24
systemd-private-3ec1fc37f8f34a878e9fla82cc8f8e2f-polkit.service-G7uUqG
systemd-private-3ec1fc37f8f34a878e9fla82cc8f8e2f-power-profiles-daemon.service-GeoNKK
systemd-private-3ec1fc37f8f34a878e9fla82cc8f8e2f-rtkit-daemon.service-M0eNE2
systemd-private-3ec1fc37f8f34a878e9fla82cc8f8e2f-switcheroo-control.service-uYcyoV
systemd-private-3ec1fc37f8f34a878e9fla82cc8f8e2f-systemd-logind.service-49yYmV
systemd-private-3ec1fc37f8f34a878e9fla82cc8f8e2f-systemd-oomd.service-t8f0Mv
systemd-private-3ec1fc37f8f34a878e9fla82cc8f8e2f-systemd-resolved.service-90TX3K
systemd-private-3ec1fc37f8f34a878e9fla82cc8f8e2f-upower.service-bTgHTm
vmware-root_933-3988752732
.X0-lock
.X1024-lock
.X1025-lock
.X11-unix
.X1-lock
.XIM-unix
rmkarmazyan@rmkarmazyan:/tmp$
```

Рис. 3: Команда ls -a

Опции команды ls

```
rkarmazyan@rkarmazyan:/tmp$ ls -l
итого 8
srw-rw-rw-. 1 root root 8 map 9 17:38 dbus-FTQNJ6HU
srw-rw-rw-. 1 root root 8 map 9 17:38 dbus-lfX69RUW
drwx----- 3 root root 68 map 9 17:38 systemd-private-3ec1fc27f8f34a87be9f1a82cc8f8e2f-chromyd.service-3Kq34
drwx----- 3 root root 68 map 9 17:38 systemd-private-3ec1fc27f8f34a87be9f1a82cc8f8e2f-colord.service-E2pM6f
drwx----- 3 root root 68 map 9 17:38 systemd-private-3ec1fc27f8f34a87be9f1a82cc8f8e2f-dbus-broker.service-x3fbCg
drwx----- 3 root root 68 map 9 17:31 systemd-private-3ec1fc27f8f34a87be9f1a82cc8f8e2f-fuupd.service-Zlg2Wf
drwx----- 3 root root 68 map 9 17:38 systemd-private-3ec1fc27f8f34a87be9f1a82cc8f8e2f-low-memory-monitor.service-5dlbe1
drwx----- 3 root root 68 map 9 17:38 systemd-private-3ec1fc27f8f34a87be9f1a82cc8f8e2f-ModemManager.service-01ln24
drwx----- 3 root root 68 map 9 17:38 systemd-private-3ec1fc27f8f34a87be9f1a82cc8f8e2f-palokit.service-Glu0qg
drwx----- 3 root root 68 map 9 17:38 systemd-private-3ec1fc27f8f34a87be9f1a82cc8f8e2f-power-profiles-daemon.service-6eoHXA
drwx----- 3 root root 68 map 9 17:38 systemd-private-3ec1fc27f8f34a87be9f1a82cc8f8e2f-rtkit-daemon.service-96oHE2
drwx----- 3 root root 68 map 9 17:38 systemd-private-3ec1fc27f8f34a87be9f1a82cc8f8e2f-switcheroo-control.service-uYcyoY
drwx----- 3 root root 68 map 9 17:38 systemd-private-3ec1fc27f8f34a87be9f1a82cc8f8e2f-systemd-logind.service-4dyVMV
drwx----- 3 root root 68 map 9 17:38 systemd-private-3ec1fc27f8f34a87be9f1a82cc8f8e2f-systemd-oomd.service-18f0Hv
drwx----- 3 root root 68 map 9 17:38 systemd-private-3ec1fc27f8f34a87be9f1a82cc8f8e2f-systemd-resolved.service-90TX3K
drwx----- 2 root root 48 map 9 17:38 systemd-private-3ec1fc27f8f34a87be9f1a82cc8f8e2f-upower.service-bHtHn
rkarmazyan@rkarmazyan:/tmp$
```

Рис. 4: Команда ls -l

Опции команды ls

```
rmkarmazyan@rmkarmazyan: /tmp$ ls -f
..
.X11-unix
.ICE-unix
.XIM-unix
.font-unix
systemd-private-3ec1fc37f8f34a878e9f1a82cc8f8e2f-systemd-oomd.service-t8f0Wv
systemd-private-3ec1fc37f8f34a878e9f1a82cc8f8e2f-systemd-resolved.service-90TX3K
systemd-private-3ec1fc37f8f34a878e9f1a82cc8f8e2f-dbus-broker.service-x3fbCg
systemd-private-3ec1fc37f8f34a878e9f1a82cc8f8e2f-chrond.service-3kMgJ4
systemd-private-3ec1fc37f8f34a878e9f1a82cc8f8e2f-low-memory-monitor.service-5dlDe1
systemd-private-3ec1fc37f8f34a878e9f1a82cc8f8e2f-polkit.service-G7uUqG
systemd-private-3ec1fc37f8f34a878e9f1a82cc8f8e2f-power-profiles-daemon.service-GeoNKK
systemd-private-3ec1fc37f8f34a878e9f1a82cc8f8e2f-rtkit-daemon.service-M0eNE2
systemd-private-3ec1fc37f8f34a878e9f1a82cc8f8e2f-switcheroo-control.service-uYcyoY
systemd-private-3ec1fc37f8f34a878e9f1a82cc8f8e2f-systemd-logind.service-49yYmV
systemd-private-3ec1fc37f8f34a878e9f1a82cc8f8e2f-upower.service-bTgHTm
vmware-root_933-3988752732
systemd-private-3ec1fc37f8f34a878e9f1a82cc8f8e2f-ModemManager.service-Diln24
dbus-lfX69RUw
dbus-F7QNj6MU
.X1024-lock
.X1025-lock
systemd-private-3ec1fc37f8f34a878e9f1a82cc8f8e2f-colord.service-E3gM6F
.X0-lock
.X1-lock
systemd-private-3ec1fc37f8f34a878e9f1a82cc8f8e2f-fwupd.service-ZigZwF
rmkarmazyan@rmkarmazyan: /tmp$
```

Рис. 5: Команда ls -f

```
rmkarmazyan@rmkarmazyan:/tmp$  
rmkarmazyan@rmkarmazyan:/tmp$ cd /var/spool/  
rmkarmazyan@rmkarmazyan:/var/spool$ ls -l  
итого 0  
drwxr-x--x. 1 root abrt 1510 мар  8 19:18 abrt  
drwx-----. 1 abrt abrt   0 июл 19 2023 abrt-upload  
drwx--x---. 1 root lp      6 фев 16 03:00 cups  
drwxr-xr-x. 1 root root    0 июл 21 2023 lpd  
drwxrwxr-x. 1 root mail 1222 мар  8 17:40 mail  
drwxr-xr-x. 1 root root    0 июл 21 2023 plymouth  
rmkarmazyan@rmkarmazyan:/var/spool$
```

Рис. 6: Каталог /var/spool

```
rnkarnazyan@rnkarnazyan: /var/spool$ cd
rnkarnazyan@rnkarnazyan: $ ls
git-extended work books Документы Загрузки Изображения Музыка Общедоступные 'Рабочий стол' Шаблоны
rnkarnazyan@rnkarnazyan: $ ls -al
итого 20
drwx----- 1 rnkarnazyan rnkarnazyan 498 мар 3 21:59 .
drwxr-xr-x 1 root root 1216 мар 8 17:48 ..
-rw----- 1 rnkarnazyan rnkarnazyan 2562 мар 3 22:17 .bash_history
-rw-r--r-- 1 rnkarnazyan rnkarnazyan 18 июл 19 2023 .bash_logout
-rw-r--r-- 1 rnkarnazyan rnkarnazyan 144 июл 19 2023 .bash_profile
-rw-r--r-- 1 rnkarnazyan rnkarnazyan 681 мар 3 21:58 .bashrc
drwx----- 1 rnkarnazyan rnkarnazyan 452 мар 9 17:31 .cache
drwx----- 1 rnkarnazyan rnkarnazyan 402 мар 3 22:00 .config
-rw-r--r-- 1 rnkarnazyan rnkarnazyan 235 мар 3 21:58 .gitconfig
drwxr-xr-x 1 rnkarnazyan rnkarnazyan 74 мар 3 22:03 git-extended
drwx----- 1 rnkarnazyan rnkarnazyan 136 фев 25 14:39 .gnupg
drwx----- 1 rnkarnazyan rnkarnazyan 20 фев 25 14:32 .local
drwxr-xr-x 1 rnkarnazyan rnkarnazyan 48 фев 25 14:32 .mozilla
drwx----- 1 rnkarnazyan rnkarnazyan 132 фев 25 14:42 .ssh
drwxr-xr-x 1 rnkarnazyan rnkarnazyan 10 фев 25 14:42 work
drwxr-xr-x 1 rnkarnazyan rnkarnazyan 0 фев 25 14:32 Видео
drwxr-xr-x 1 rnkarnazyan rnkarnazyan 0 фев 25 14:32 Документы
drwxr-xr-x 1 rnkarnazyan rnkarnazyan 0 фев 25 14:32 Загрузки
drwxr-xr-x 1 rnkarnazyan rnkarnazyan 0 фев 25 14:32 Изображения
drwxr-xr-x 1 rnkarnazyan rnkarnazyan 0 фев 25 14:32 Музыка
drwxr-xr-x 1 rnkarnazyan rnkarnazyan 0 фев 25 14:32 Общедоступные
drwxr-xr-x 1 rnkarnazyan rnkarnazyan 0 фев 25 14:32 'Рабочий стол'
drwxr-xr-x 1 rnkarnazyan rnkarnazyan 0 фев 25 14:32 Шаблоны
rnkarnazyan@rnkarnazyan: ~$
```

Рис. 7: Файлы в домашнем каталоге

```
mkarmazyand@mkarmazyan:~$  
mkarmazyand@mkarmazyan:~$ cd  
mkarmazyand@mkarmazyan:~$ mkdir newdir  
mkarmazyand@mkarmazyan:~$ mkdir newdir/morefun  
mkarmazyand@mkarmazyan:~$ mkdir letters memos misk  
mkarmazyand@mkarmazyan:~$ ls  
git-extended  memos  newdir  Видео  Загрузки  Музыка  'Рабочий стол'  
letters      misk  work  Документы  Изображения  Общедоступные  Шаблоны  
mkarmazyand@mkarmazyan:~$ rm letters memos misk  
rm: невозможно удалить 'letters': Это каталог  
rm: невозможно удалить 'memos': Это каталог  
rm: невозможно удалить 'misk': Это каталог  
mkarmazyand@mkarmazyan:~$ ls  
git-extended  memos  newdir  Видео  Загрузки  Музыка  'Рабочий стол'  
letters      misk  work  Документы  Изображения  Общедоступные  Шаблоны  
mkarmazyand@mkarmazyan:~$ rm -r letters memos misk  
mkarmazyand@mkarmazyan:~$ rm -r newdir/  
mkarmazyand@mkarmazyan:~$ ls  
git-extended  work  Видео  Документы  Загрузки  Изображения  Музыка  Общедоступные  'Рабочий стол'  Шаблоны  
mkarmazyand@mkarmazyan:~$
```

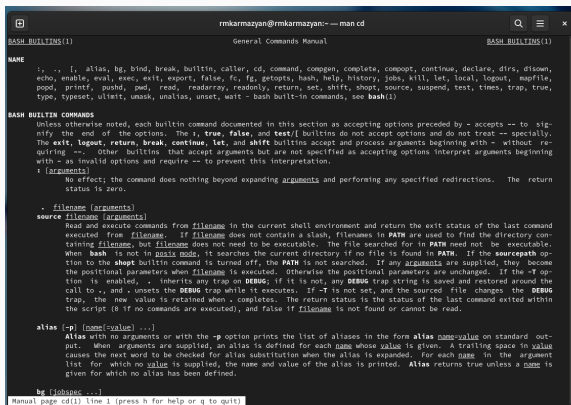
Рис. 8: Действия с каталогами

Опции команды ls

```
./work/study/2023-2024/Операционные системы/os-intro/template/report/scripts':  
image-report mpv-shot  
  
./Видео:  
./Документы:  
./Загрузки:  
./Изображения:  
./Музыка:  
./Общедоступные:  
./Рабочий стол':  
./Шаблоны:  
rkarmazyan@rnkarmazyan:~$ ls -t  
git-extended work Видео Документы Изображения Музыка Общедоступные Загрузки 'Рабочий стол' Шаблоны  
rkarmazyan@rnkarmazyan:~$
```

Рис. 9: Команда ls -R и ls -t

Справка по командам



```
rmkarmazyan@rmkarmazyan:~ — man cd
BASH_BUILTINS(1)
General Commands Manual
BASH_BUILTINS(1)

NAME
:, :, [, alias, bg, bind, break, builtin, caller, cd, command, compgen, complete, compopt, continue, declare, dirs, disown,
echo, enable, eval, exec, exit, export, false, fc, fg, getopts, hash, help, history, jobs, kill, let, local, logout, mapfile,
popd, printf, pushd, pwd, read, readarray, readonly, return, set, shift, shopt, source, suspend, test, times, trap, true,
type, typeset, ulimit, umask, unalias, unset, wait - bash built-in commands, see bash(1)

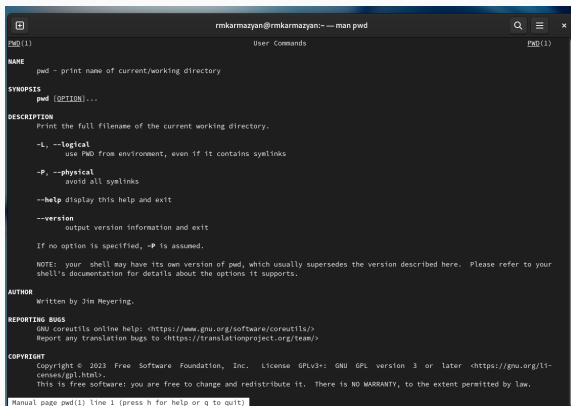
BASH BUILTIN COMMANDS
Unless otherwise noted, each builtin command documented in this section as accepting options preceded by - accepts -- to signify
the end of the options. The :, true, false, and test/[ builtins do not accept options and do not treat -- specially.
The exit, logout, return, break, continue, let, and shift builtins accept and process arguments beginning with - without requiring
-- as invalid options and require -- to prevent this interpretation.
: [arguments]
No effect; the command does nothing beyond expanding arguments and performing any specified redirections. The return
status is zero.
- filename [arguments]
source filename [arguments]
Read and execute commands from filename in the current shell environment and return the exit status of the last command
executed from filename. If filename does not contain a slash, filenames in PATH are used to find the directory containing
filename, but filename does not need to be executable. The file searched for in PATH need not be executable. When bash
is not in posix mode, it searches the current directory if no file is found in PATH. If the sourcepath option
of the shopt builtin command is turned off, the PATH is not searched. If any arguments are supplied, they become the
positional parameters when filename is executed. Otherwise the positional parameters are unchanged. If the -T option
is enabled, . inherits any trap on DEBUG; if it is not, any DEBUG trap string is saved and restored around the call to .,
and . unsets the DEBUG trap while it executes. If -T is not set, and the sourced file changes the DEBUG trap, the new
value is retained when . completes. The return status is the status of the last command exited within the script (0 if
no commands are executed), and false if filename is not found or cannot be read.

alias [-p] [name=value] ...
Alias with no arguments or with the -p option prints the list of aliases in the form alias name=value on standard output.
When arguments are supplied, an alias is defined for each name whose value is given. A trailing space in value causes
the next word to be checked for alias substitution when the alias is expanded. For each name in the argument list for
which no value is supplied, the name and value of the alias is printed. Alias returns true unless a name is given for
which no alias has been defined.

bg [jobspec ...]

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

Рис. 10: Справка по команде cd



```
rmkarmazyay@rmkarmazyay:~ — man pwd
User Commands
pwd(1)

NAME
    pwd - print name of current/working directory

SYNOPSIS
    pwd [OPTION]...

DESCRIPTION
    Print the full filename of the current working directory.

    -L, --logical
        use PWD from environment, even if it contains symlinks

    -P, --physical
        avoid all symlinks

    --help
        display this help and exit

    --version
        output version information and exit

    If no option is specified, -P is assumed.

NOTE: your shell may have its own version of pwd, which usually supersedes the version described here. Please refer to your shell's documentation for details about the options it supports.

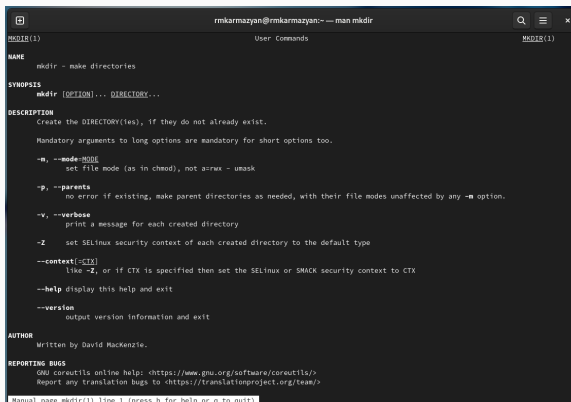
AUTHOR
    Written by Jim Meyering.

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

COPYRIGHT
    Copyright © 2023 Free Software Foundation, Inc. License GPLv3+: GNU GPL version 3 or later <https://gnu.org/licenses/gpl.html>.
    This is free software: you are free to change and redistribute it. There is NO WARRANTY, to the extent permitted by law.

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

Рис. 11: Справка по команде pwd



```
rmkarmazyan@rmkarmazyan:~ -- man mkdir
MKDIR(1)                                User Commands                                MKDIR(1)

NAME
mkdir - make directories

SYNOPSIS
mkdir [OPTION]... DIRECTORY...

DESCRIPTION
Create the DIRECTORY(ies), if they do not already exist.

Mandatory arguments to long options are mandatory for short options too.

-m, --mode=MODE
    set file mode (as in chmod), not a=rwx - umask

-p, --parents
    no error if existing, make parent directories as needed, with their file modes unaffected by any -m option.

-v, --verbose
    print a message for each created directory

-Z
    set SELinux security context of each created directory to the default type

--context[=CTX]
    like -Z, or if CTX is specified then set the SELinux or SMACK security context to CTX

--help
    display this help and exit

--version
    output version information and exit

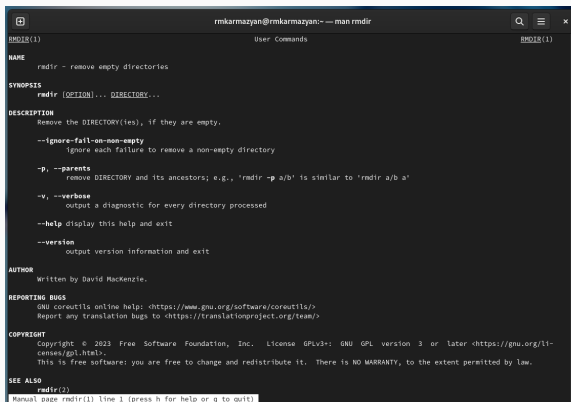
AUTHOR
Written by David MacKenzie.

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

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

Рис. 12: Справка по команде mkdir

Справка по командам



```
rmkarmazyan@rmkarmazyan:~ — man rmdir
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 to remove a non-empty directory

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

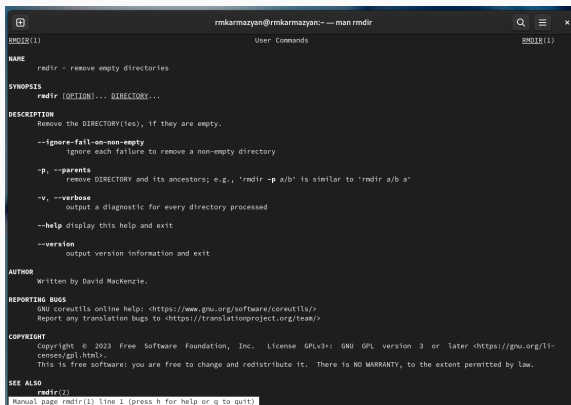
REPORTING BUGS
  GNU coreutils online help: <https://www.gnu.org/software/coreutils/>
  Report any translation bugs to <https://translationproject.org/team/>

COPYRIGHT
  Copyright © 2023 Free Software Foundation, Inc. License GPLv3+: GNU GPL version 3 or later <https://gnu.org/licenses/gpl.html>.
  This is free software; you are free to change and redistribute it. There is NO WARRANTY, to the extent permitted by law.

SEE ALSO
  rmdir(2)
  Manual page rmdir(1) line 3 (press h for help or q to quit)
```

Рис. 13: Справка по команде rmdir

Справка по командам



```
rmkarmazyan@rmkarmazyan:~$ man rmdir
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 to remove a non-empty directory

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

COPYRIGHT
    Copyright © 2023 Free Software Foundation, Inc. License GPLv3+: GNU GPL version 3 or later <https://gnu.org/licenses/gpl.html>.
    This is free software: you are free to change and redistribute it. There is NO WARRANTY, to the extent permitted by law.

SEE ALSO
    rmdir(2)
    Manual page rmdir(1) line 1 (press h for help or q to quit)
```

Рис. 14: Справка по команде rm

История командной строки

```
109 mkdir newdir/morefun
110 mkdir letters memos misk
111 ls
112 rm letters memos misk
113 ls
114 rm -r letters memos misk
115 rm -r newdir/
116 ls
117 ls -R
118 ls -t
119 man cd
120 man pwd
121 man mkdir
122 man rmdir
123 man rmdir
124 history
rmkarmazyan@rmkarmazyan:~$
```

Рис. 15: Команда history

Выводы по проделанной работе

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