

Операционные системы

Основы интерфейса взаимодействия пользователя с системой Unix на
уровне командной строки

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1. Цели и задачи работы

1.1 Цель лабораторной работы

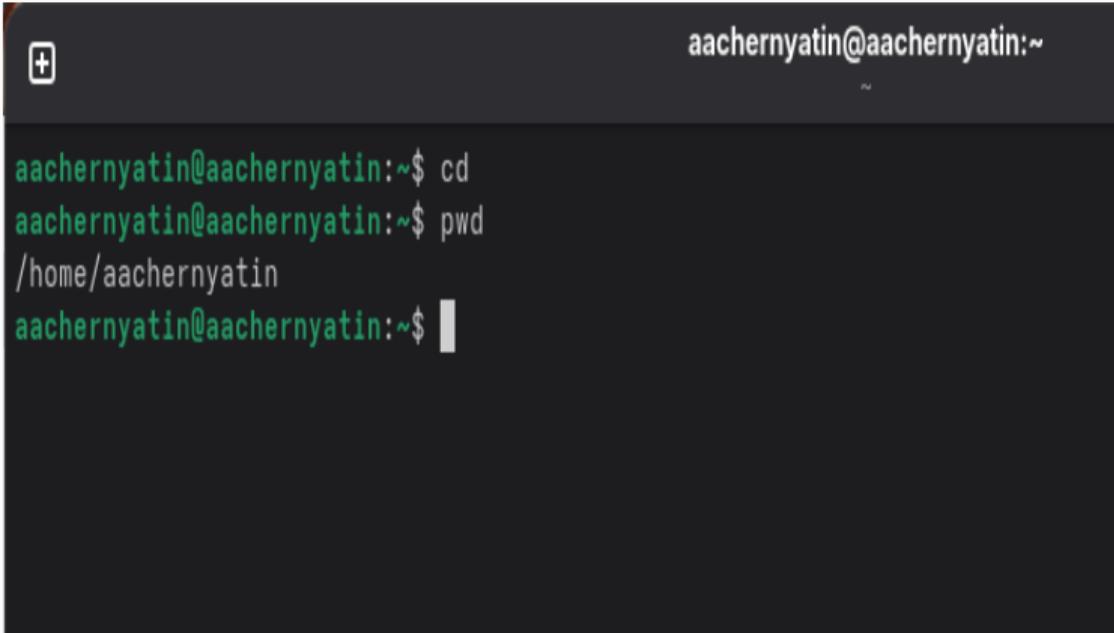
Приобретение практических навыков взаимодействия пользователя с системой посредством командной строки.

1.2 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.

2. Процесс выполнения лабораторной работы

2.1 Имя и путь к домашнему каталогу



The screenshot shows a terminal window with a dark background. In the top right corner, the text "aachernyatin@aachernyatin:~" is displayed. On the left side of the window, there is a small icon of a plus sign inside a square. The main area of the terminal contains the following text:

```
aachernyatin@aachernyatin:~$ cd  
aachernyatin@aachernyatin:~$ pwd  
/home/aachernyatin  
aachernyatin@aachernyatin:~$ █
```

Рисунок 1: Путь к домашнему каталогу

2.2 Опции команды ls

```
aachernyatin@aachernyatin:~$ cd /tmp
aachernyatin@aachernyatin:/tmp$ ls
13d13f5a-cc0e-4ebc-8507-a29c01649936.zip
hsperfdata_aachernyatin
node-compile-cache
par-6161636865726e796174696e
snap-private-tmp
systemd-private-29c93401c92a45c5888046ec9e0c56ff-abrtd.service-s8BCQl
systemd-private-29c93401c92a45c5888046ec9e0c56ff-chronyd.service-pfSkSG
systemd-private-29c93401c92a45c5888046ec9e0c56ff-colord.service-CqhcCU
systemd-private-29c93401c92a45c5888046ec9e0c56ff-dbus-broker.service-8Ic4FP
systemd-private-29c93401c92a45c5888046ec9e0c56ff-fwupd.service-M5PKZk
systemd-private-29c93401c92a45c5888046ec9e0c56ff-irqbalance.service-qxNJhx
systemd-private-29c93401c92a45c5888046ec9e0c56ff-low-memory-monitor.service-nQZPse
systemd-private-29c93401c92a45c5888046ec9e0c56ff-ModemManager.service-3ZpK7r
systemd-private-29c93401c92a45c5888046ec9e0c56ff-passim.service-HfCYWk
systemd-private-29c93401c92a45c5888046ec9e0c56ff-polkit.service-MR9bN4
systemd-private-29c93401c92a45c5888046ec9e0c56ff-rtkit-daemon.service-LuIjWG
systemd-private-29c93401c92a45c5888046ec9e0c56ff-switcheroo-control.service-z9s5r3
systemd-private-29c93401c92a45c5888046ec9e0c56ff-systemd-logind.service-71C1kd
systemd-private-29c93401c92a45c5888046ec9e0c56ff-systemd-oomd.service-Sv1DJ0
systemd-private-29c93401c92a45c5888046ec9e0c56ff-systemd-resolved.service-5NoAH8
systemd-private-29c93401c92a45c5888046ec9e0c56ff-upower.service-cFUNSI
VMwareDnD
vmware-root_933-3988752732
aachernyatin@aachernyatin:/tmp$
```

Рисунок 2: Команда ls

2.3 Опции команды ls

```
aachernyatin@aachernyatin:/tmp$ ls -a
.
..
13d13f5a-cc0e-4ebe-8507-a29c01649936.zip
.FONT-UNIX
hsperfdata_aachernyatin
.ICE-UNIX
node-compile-cache
par-6161636865726e796174696e
snap-private-tmp
systemd-private-29c93401c92a45c5888046ec9e0c56ff-abrtd.service-s8BCQl
systemd-private-29c93401c92a45c5888046ec9e0c56ff-chronyd.service-pfSkSG
systemd-private-29c93401c92a45c5888046ec9e0c56ff-colord.service-CqhcCU
systemd-private-29c93401c92a45c5888046ec9e0c56ff-dbus-broker.service-BIc4FP
systemd-private-29c93401c92a45c5888046ec9e0c56ff-fwupd.service-M5PKZk
systemd-private-29c93401c92a45c5888046ec9e0c56ff-irqbalance.service-qxNjhx
systemd-private-29c93401c92a45c5888046ec9e0c56ff-low-memory-monitor.service-nQZPse
systemd-private-29c93401c92a45c5888046ec9e0c56ff-ModemManager.service-3ZpK7r
systemd-private-29c93401c92a45c5888046ec9e0c56ff-passim.service-HfCYWk
systemd-private-29c93401c92a45c5888046ec9e0c56ff-polkit.service-MR9bN4
systemd-private-29c93401c92a45c5888046ec9e0c56ff-rtkit-daemon.service-LuIjWG
systemd-private-29c93401c92a45c5888046ec9e0c56ff-switcheroo-control.service-z9s5r3
systemd-private-29c93401c92a45c5888046ec9e0c56ff-systemd-logind.service-71C1kd
systemd-private-29c93401c92a45c5888046ec9e0c56ff-systemd-oomd.service-SvIDJO
systemd-private-29c93401c92a45c5888046ec9e0c56ff-systemd-resolved.service-5NoAH8
systemd-private-29c93401c92a45c5888046ec9e0c56ff-upower.service-cFUNSI
VMwareDnD
vmware-root_933-3988752732
.X0-lock
.X1024-lock
.X1025-lock
.X11-UNIX
.X11-lock
.XIM-UNIX
aachernyatin@aachernyatin:/tmp$
```

Рисунок 3: Команда ls -a

2.4 Опции команды ls

```
aichernyatin@aichernyatin:/tmp$ ls -l
total 3812
-rw-r--r--, 1 aichernyatin aichernyatin 3900964 Dec 8 16:43 13d13f5a-cc0e-4ebe-8507-a29c01649836.zip
drwxr-xr-x, 2 aichernyatin aichernyatin     48 Dec 8 17:25 hperfdato_aichernyatin
drwxr-xr-x, 3 aichernyatin aichernyatin     68 Dec 8 17:40 node-compile-cache
drwx-----, 3 aichernyatin aichernyatin     68 Dec 8 17:15 par-6161636865726e796174696e
drwx-----, 2 root      root     48 Dec 8 16:33 snap-private-tmp
drwx-----, 3 root      root     68 Dec 8 16:33 systemd-private-29c93401c92a45c58888046ec9ebc56ff-abrtd.service-s88C0l
drwx-----, 3 root      root     68 Dec 8 16:33 systemd-private-29c93401c92a45c58888046ec9e0c56ff-chronyd.service-pfSKSG
drwx-----, 3 root      root     68 Dec 8 16:33 systemd-private-29c93401c92a45c58888046ec9e0c56ff-colord.service-CqhCU
drwx-----, 3 root      root     68 Dec 8 16:33 systemd-private-29c93401c92a45c58888046ec9ebc56ff-dbus-broker.service-81c4FP
drwx-----, 3 root      root     68 Dec 8 16:38 systemd-private-29c93401c92a45c58888046ec9ebc56ff-fwupd.service-N5PKZk
drwx-----, 3 root      root     68 Dec 8 16:33 systemd-private-29c93401c92a45c58888046ec9e0c56ff-irqbalance.service-qxNjhx
drwx-----, 3 root      root     68 Dec 8 16:33 systemd-private-29c93401c92a45c58888046ec9e0c56ff-low-memory-monitor.service-n0ZPse
drwx-----, 3 root      root     68 Dec 8 16:33 systemd-private-29c93401c92a45c58888046ec9ebc56ff-ModemManager.service-3Zpk7r
drwx-----, 3 root      root     68 Dec 8 16:39 systemd-private-29c93401c92a45c58888046ec9e0c56ff-passim.service-HfCYWk
drwx-----, 3 root      root     68 Dec 8 16:33 systemd-private-29c93401c92a45c58888046ec9ebc56ff-polkit.service-MR9bN4
drwx-----, 3 root      root     68 Dec 8 16:33 systemd-private-29c93401c92a45c58888046ec9ebc56ff-rtkit-daemon.service-LuIJW6
drwx-----, 3 root      root     68 Dec 8 16:33 systemd-private-29c93401c92a45c58888046ec9ebc56ff-switcheroo-control.service-z8s5r3
drwx-----, 3 root      root     68 Dec 8 16:33 systemd-private-29c93401c92a45c58888046ec9e0c56ff-systemd-logind.service-71C1kd
drwx-----, 3 root      root     68 Dec 8 16:33 systemd-private-29c93401c92a45c58888046ec9ebc56ff-systemd-ocmd.service-SvIDJ0
drwx-----, 3 root      root     68 Dec 8 16:33 systemd-private-29c93401c92a45c58888046ec9ebc56ff-systemd-resolved.service-5NoAH8
drwx-----, 3 root      root     68 Dec 8 16:33 systemd-private-29c93401c92a45c58888046ec9ebc56ff-upower.service-cFUNSI
drwx-----, 2 root      root     388 Dec 8 18:13 VMware0n0
drwx-----, 2 root      root     48 Dec 8 16:33 vmware-root_833-3988752732
aichernyatin@aichernyatin:/tmp$
```

Рисунок 4: Команда ls -l

2.5 Опции команды ls

```
aachernyatin@aachernyatin:/tmp$  
aachernyatin@aachernyatin:/tmp$ ls -f  
[...]  
node-compile-cache  
hsperfdata_aachernyatin  
par-6161636865726e796174696e  
VMwareDnD  
13d13f5a-cc0e-4ebe-8507-a29c01649936.zip  
systemd-private-29c93401c92a45c5888046ec9e0c56ff-passim.service-HfCYWk  
systemd-private-29c93401c92a45c5888046ec9e0c56ff-fwupd.service-M5PKZk  
.X1-lock  
.X0-lock  
systemd-private-29c93401c92a45c5888046ec9e0c56ff-colord.service-CqhcCU  
.X1025-lock  
.X1024-lock  
systemd-private-29c93401c92a45c5888046ec9e0c56ff-ModemManager.service-3Zpk7r  
vmware-root_933-3988752732  
systemd-private-29c93401c92a45c5888046ec9e0c56ff-upower.service-cFUNSI  
systemd-private-29c93401c92a45c5888046ec9e0c56ff-systemd-logind.service-71C1kd  
systemd-private-29c93401c92a45c5888046ec9e0c56ff-switcheroo-control.service-z9s5r3  
systemd-private-29c93401c92a45c5888046ec9e0c56ff-rtkit-daemon.service-LuIjWB  
systemd-private-29c93401c92a45c5888046ec9e0c56ff-polkit.service-MR9bN4  
systemd-private-29c93401c92a45c5888046ec9e0c56ff-low-memory-monitor.service-nQZPse  
systemd-private-29c93401c92a45c5888046ec9e0c56ff-chronyd.service-pfSkSG  
systemd-private-29c93401c92a45c5888046ec9e0c56ff-irqbalance.service-qxNJhx  
systemd-private-29c93401c92a45c5888046ec9e0c56ff-abrtd.service-s8BC0l  
systemd-private-29c93401c92a45c5888046ec9e0c56ff-dbus-broker.service-8Ic4FP  
systemd-private-29c93401c92a45c5888046ec9e0c56ff-systemd-resolved.service-5NoAH8  
systemd-private-29c93401c92a45c5888046ec9e0c56ff-systemd-oomd.service-SvIDJO  
.font-unix  
.XIM-unix  
.ICE-unix  
.X11-unix  
snap-private-tmp  
aachernyatin@aachernyatin:/tmp$
```

Рисунок 5: Команда ls -f

2.6 Каталог /var/spool

```
aachernyatin@aachernyatin:/tmp$  
aachernyatin@aachernyatin:/tmp$ cd /var/spool/  
aachernyatin@aachernyatin:/var/spool$ ls -l  
total 0  
drwxr-x--x. 1 root abrt 72 Dec 8 17:17 abrt  
drwx----- 1 abrt abrt 0 Jan 16 2025 abrt-upload  
drwxr-xr-x. 1 root root 66 Apr 9 2025 anacron  
drwx----- 1 root root 18 Apr 9 2025 at  
drwx----- 1 root root 0 Jan 27 2025 cron  
drwxr-x--- 1 root lp 6 Apr 9 2025 cups  
drwxr-xr-x. 1 root root 0 Jan 16 2025 lpd  
drwxrwxr-x. 1 root mail 302 Dec 8 16:33 mail  
drwxr-xr-x. 1 root root 0 Mar 6 2025 plymouth  
aachernyatin@aachernyatin:/var/spool$
```

Рисунок 6: Каталог /var/spool

2.7 Домашний каталог

```
aachernyatin@aachernyatin:/var/spool$ cd
aachernyatin@aachernyatin:~$ ls
Desktop Documents Downloads git-extended Music Pictures Public Templates Videos work
aachernyatin@aachernyatin:~$ ls -al
total 24
drwx----- 1 aachernyatin aachernyatin 346 Dec  8 17:42 .
drwxr-xr-x  1 root      root      302 Dec  8 16:33 ..
-rw----- 1 aachernyatin aachernyatin 2853 Dec  8 18:13 .bash_history
-rw-r--r-- 1 aachernyatin aachernyatin 18 Nov  8 2024 .bash_logout
-rw-r--r-- 1 aachernyatin aachernyatin 144 Nov  8 2024 .bash_profile
-rw-r--r-- 1 aachernyatin aachernyatin 682 Dec  8 17:40 .bashrc
drwx----- 1 aachernyatin aachernyatin 512 Dec  8 17:45 .cache
drwx----- 1 aachernyatin aachernyatin 346 Dec  8 17:45 .config
drwxr-xr-x  1 aachernyatin aachernyatin  0 Dec  8 16:38 Desktop
drwxr-xr-x  1 aachernyatin aachernyatin  0 Dec  8 16:38 Documents
drwxr-xr-x  1 aachernyatin aachernyatin  0 Dec  8 16:38 Downloads
-rw-r--r-- 1 aachernyatin aachernyatin 334 Aug 17 03:00 .emacs
-rw-r--r-- 1 aachernyatin aachernyatin 236 Dec  8 17:06 .gitconfig
drwxr-xr-x  1 aachernyatin aachernyatin  74 Dec  8 17:55 git-extended
drwx----- 1 aachernyatin aachernyatin 136 Dec  8 17:02 .gnupg
drwx----- 1 aachernyatin aachernyatin  20 Dec  8 16:38 .local
drwxr-xr-x  1 aachernyatin aachernyatin  48 Dec  8 16:42 .mozilla
drwxr-xr-x  1 aachernyatin aachernyatin  0 Dec  8 16:38 Music
drwxr-xr-x  1 aachernyatin aachernyatin  0 Dec  8 16:38 Pictures
drwxr-xr-x  1 aachernyatin aachernyatin  0 Dec  8 16:38 Public
drwx----- 1 aachernyatin aachernyatin 132 Dec  8 17:08 .ssh
drwxr-xr-x  1 aachernyatin aachernyatin  0 Dec  8 16:38 Templates
drwxr-xr-x  1 aachernyatin aachernyatin  0 Dec  8 16:38 Videos
drwxr-xr-x  1 aachernyatin aachernyatin  10 Dec  8 17:08 work
aachernyatin@aachernyatin:~$ █
```

Рисунок 7: Файлы в домашнем каталоге

2.8 Работа с каталогами

```
aachernyatin@aachernyatin:~$ mkdir newdir
aachernyatin@aachernyatin:~$ mkdir newdir/morefun
aachernyatin@aachernyatin:~$ mkdir letters memo misk
aachernyatin@aachernyatin:~$ ls
Desktop Documents Downloads git-extended letters memo misk Music Pictures Public Templates Videos work
aachernyatin@aachernyatin:~$ rm letters/ memo/ misk/
rm: cannot remove 'letters/': Is a directory
rm: cannot remove 'memo/': Is a directory
rm: cannot remove 'misk/': Is a directory
aachernyatin@aachernyatin:~$ rm -r letters/ memo/ misk/
aachernyatin@aachernyatin:~$ rm -r newdir/
aachernyatin@aachernyatin:~$ ls
Desktop Documents Downloads git-extended Music Pictures Public Templates Videos work
aachernyatin@aachernyatin:~$
```

Рисунок 8: Действия с каталогами

2.9 Опции команды ls

```
'./work/study/2025-2026/Операционные системы/os-intro/template/report/report/_assets':  
preamble.tex  
  
'./work/study/2025-2026/Операционные системы/os-intro/template/report/report/bib':  
site.bib  
  
'./work/study/2025-2026/Операционные системы/os-intro/template/report/report/image':  
solvay.jpg  
  
'./work/study/2025-2026/Операционные системы/os-intro/template/report/report/_resources':  
csl  
  
'./work/study/2025-2026/Операционные системы/os-intro/template/report/report/_resources/csl':  
gost-r-7-0-5-2008-numeric.csl  
  
'./work/study/2025-2026/Операционные системы/os-intro/template/report/scripts':  
image-report mpv-shot  
aachernyatin@aachernyatin:~$ ls -t  
git-extended work Desktop Documents Downloads Music Pictures Public Templates Videos  
aachernyatin@aachernyatin:~$ █
```

Рисунок 9: Команда ls -R и ls -t

2.10 Справка по командам

```
aachernyatin@aachernyatin:~$ help cd
cd: cd [-L|[-P [-e]] [-@]] [dir]
      Change the shell working directory.

      Change the current directory to DIR.  The default DIR is the value of the
      HOME shell variable. If DIR is "-", it is converted to $OLDPWD.

      The variable CDPATH defines the search path for the directory containing
      DIR. Alternative directory names in CDPATH are separated by a colon (:).
      A null directory name is the same as the current directory. If DIR begins
      with a slash (/), then CDPATH is not used.

      If the directory is not found, and the shell option `cdable_vars' is set,
      the word is assumed to be a variable name. If that variable has a value,
      its value is used for DIR.

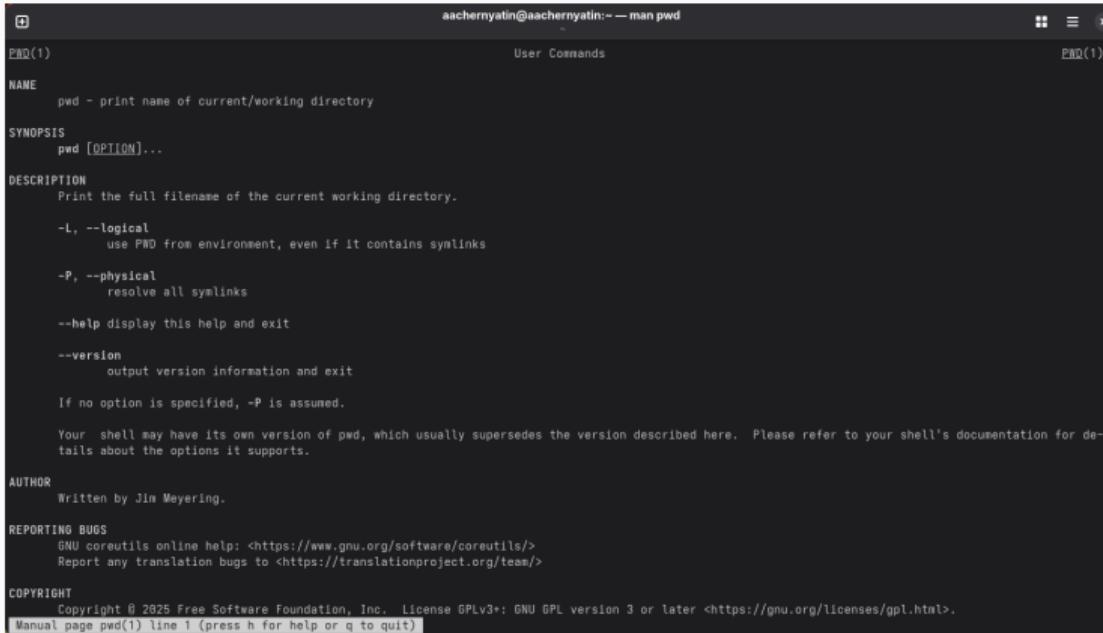
Options:
  -L      force symbolic links to be followed: resolve symbolic
          links in DIR after processing instances of `..'
  -P      use the physical directory structure without following
          symbolic links: resolve symbolic links in DIR before
          processing instances of `..'
  -e      if the -P option is supplied, and the current working
          directory cannot be determined successfully, exit with
          a non-zero status
  -@      on systems that support it, present a file with extended
          attributes as a directory containing the file attributes

The default is to follow symbolic links, as if '-L' were specified.
`..' is processed by removing the immediately previous pathname component
back to a slash or the beginning of DIR.

Exit Status:
Returns 0 if the directory is changed, and if $PWD is set successfully when
-P is used; non-zero otherwise.
aachernyatin@aachernyatin:~$
```

Рисунок 10: Справка по команде cd

2.11 Справка по командам



aichernyatin@aichernyatin:~ — man pwd

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
resolve all symlinks

--help display this help and exit

--version
output version information and exit

If no option is specified, -P is assumed.

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.

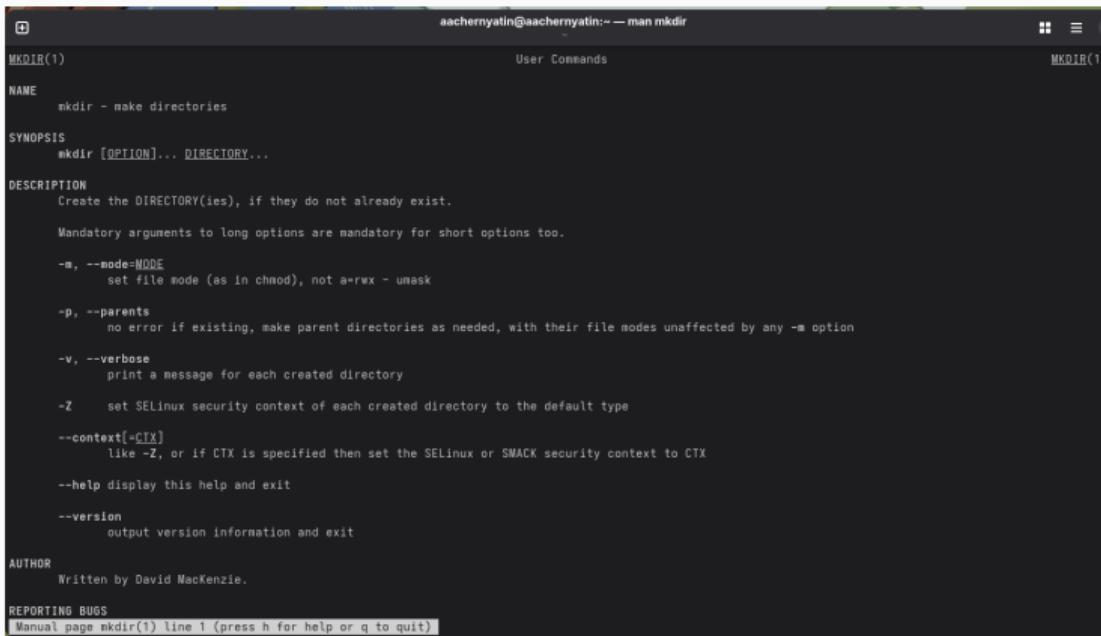
AUTHOR
Written by Jim Meyering.

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

COPYRIGHT
Copyright © 2025 Free Software Foundation, Inc. License GPLv3+: GNU GPL version 3 or later <<https://gnu.org/licenses/gpl.html>>.
Manual page pwd(1) line 1 (press h for help or q to quit)

Рисунок 11: Справка по команде pwd

2.12 Справка по командам



aachernyatin@aachernyatin:~ -- man mkdir

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

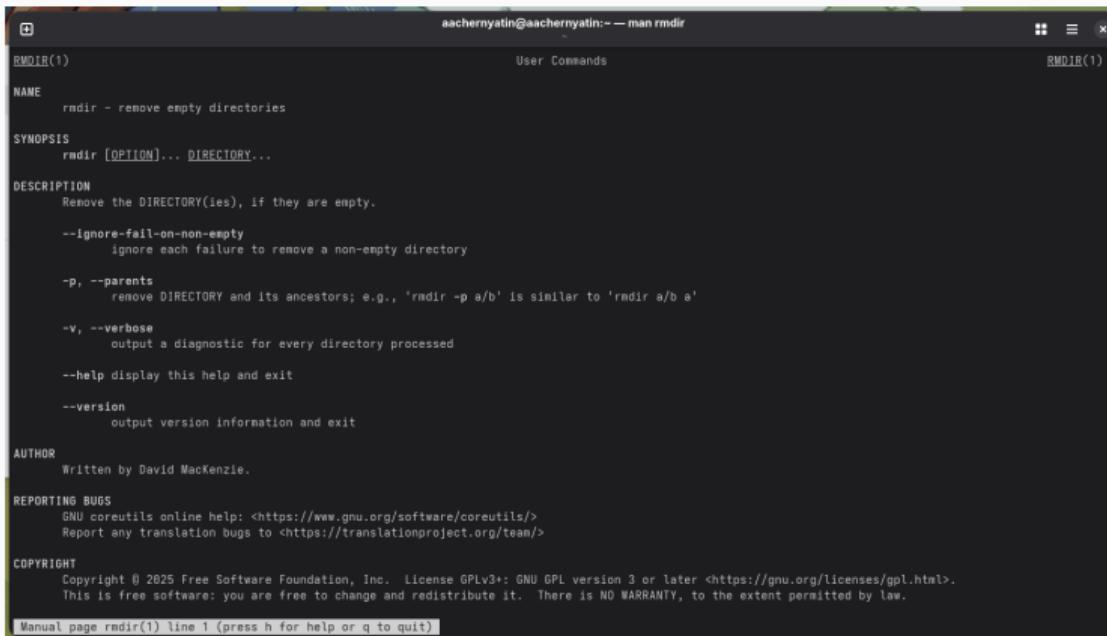
--version
output version information and exit

AUTHOR
Written by David MacKenzie.

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

Рисунок 12: Справка по команде mkdir

2.13 Справка по командам



The screenshot shows a terminal window with the command `aichernyatin@aichernyatin:~ -- man rmdir` entered at the prompt. The window title is "RMDIR(1)". The man page content is as follows:

```
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.

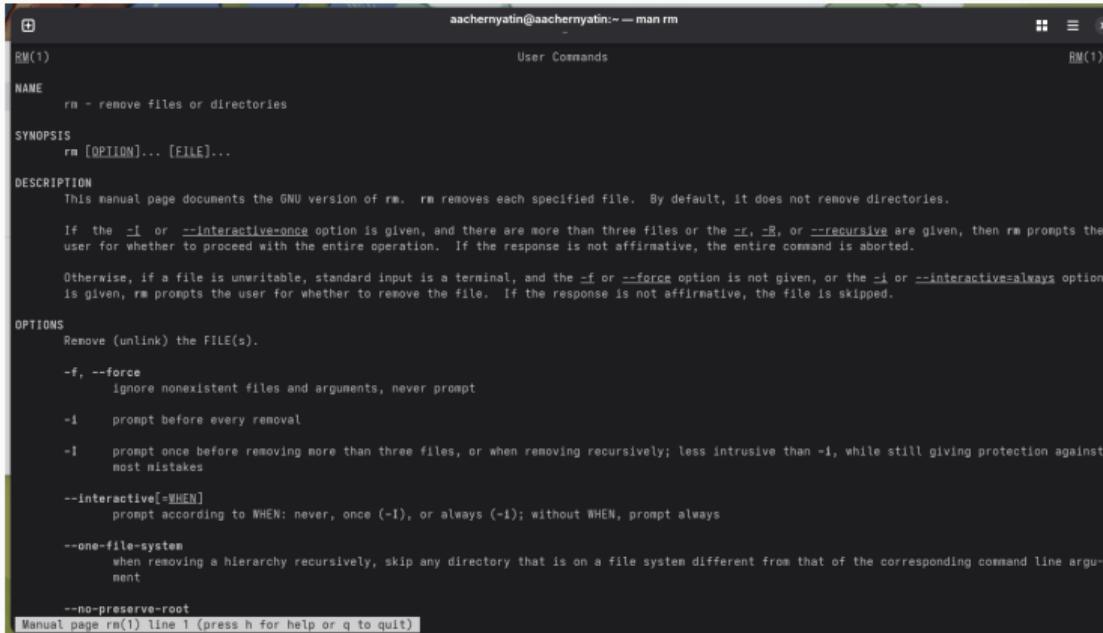
REPORTING BUGS
    GNU coreutils online help: <https://www.gnu.org/software/coreutils/>
    Report any translation bugs to <https://translationproject.org/team/>

COPYRIGHT
    Copyright © 2025 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.
```

At the bottom of the terminal window, a status bar displays the message: "Manual page rmdir(1) line 1 (press h for help or q to quit)".

Рисунок 13: Справка по команде rmdir

2.14 Справка по командам



The screenshot shows a terminal window with the title bar "aachernyatin@aachernyatin:~ -- man rm". The window displays the man page for the rm command. The page is organized into sections: NAME, SYNOPSIS, DESCRIPTION, OPTIONS, and a footer. The NAME section states "rm - remove files or directories". The SYNOPSIS section shows the command as "rm [OPTION]... [FILE]...". The DESCRIPTION section provides a detailed overview of the GNU version of rm, mentioning options like -i, --interactive, -f, --force, and --no-preserve-root. The OPTIONS section lists various flags and their descriptions. The footer contains the text "Manual page rm(1) line 1 (press h for help or q to quit)".

```
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 -L, -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 unwriteable, 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

    --no-preserve-root
    Manual page rm(1) line 1 (press h for help or q to quit)
```

Рисунок 14: Справка по команде rm

2.15 История командной строки

```
120  ls -f
121  cd /var/spool/
122  ls -l
123  cd
124  ls
125  ls -al
126  mkdir newdir
127  mkdir newdir/morefun
128  mkdir letters memo misk
129  ls
130  rm letters/ memo/ misk/
131  rm -r letters/ memo/ misk/
132  rm -r newdir/
133  ls
134  ls -R
135  ls -t
136  help cd
137  man pwd
138  man mkdir
139  man rmdir
140  man rm
141  history
aachernyatin@aachernyatin:~$ █
```

Рисунок 15: Команда history

3. Выводы по проделанной работе

3.1 Вывод

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