

Анализ файловой структуры UNIX. Команды для работы с файлами и каталогами

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Цели и задачи работы

Цель лабораторной работы

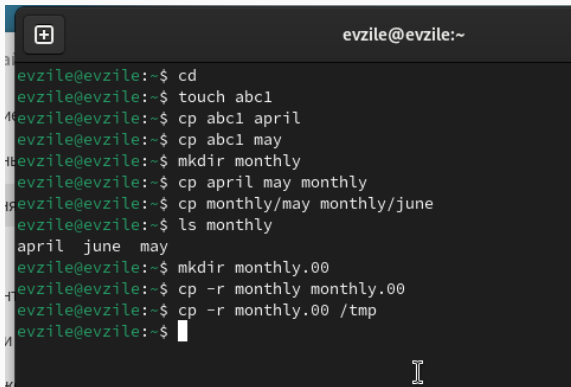
Ознакомление с файловой системой Linux, её структурой, именами и содержанием каталогов. Приобретение практических навыков по применению команд для работы с файлами и каталогами, по управлению процессами, по проверке использования диска и обслуживанию файловой системы.

Задачи лабораторной работы

- 1 Выполнить примеры
- 2 Выполнить действия по работе с каталогами и файлами
- 3 Выполнить действия с правами доступа
- 4 Получить дополнительные сведения при помощи справки по командам.

Процесс выполнения лабораторной работы

Выполнение примеров



```
evzile@evzile:~  
evzile@evzile:~$ cd  
evzile@evzile:~$ touch abc1  
evzile@evzile:~$ cp abc1 april  
evzile@evzile:~$ cp abc1 may  
evzile@evzile:~$ mkdir monthly  
evzile@evzile:~$ cp april may monthly  
evzile@evzile:~$ cp monthly/may monthly/june  
evzile@evzile:~$ ls monthly  
april  june  may  
evzile@evzile:~$ mkdir monthly.00  
evzile@evzile:~$ cp -r monthly monthly.00  
evzile@evzile:~$ cp -r monthly.00 /tmp  
evzile@evzile:~$
```

Рис. 1: Выполнение примеров

Выполнение примеров

```
evzile@evzile:~$  
evzile@evzile:~$ cd  
evzile@evzile:~$ mv april july  
evzile@evzile:~$ mv july monthly.00  
evzile@evzile:~$ ls monthly.00  
july  monthly  
evzile@evzile:~$ mv monthly.00 monthly.01  
evzile@evzile:~$ mkdir reports  
evzile@evzile:~$ mv monthly.01 reports  
evzile@evzile:~$ mv reports/monthly.01 reports/monthly  
evzile@evzile:~$
```

Рис. 2: Выполнение примеров

Выполнение примеров

```
evzile@evzile:~$  
evzile@evzile:~$ cd  
evzile@evzile:~$ touch may  
evzile@evzile:~$ ls -l may  
-rw-r--r--. 1 evzile evzile 0 июн 19 17:33 may  
evzile@evzile:~$ chmod u+x may  
evzile@evzile:~$ ls -l may  
-rwxr--r--. 1 evzile evzile 0 июн 19 17:33 may  
evzile@evzile:~$ chmod u-x may  
evzile@evzile:~$ ls -l may  
-rw-r--r--. 1 evzile evzile 0 июн 19 17:33 may  
evzile@evzile:~$ cd  
evzile@evzile:~$ mkdir monthly  
mkdir: невозможно создать каталог «monthly»: Файл существует  
evzile@evzile:~$ chmod g-r,o-r monthly  
evzile@evzile:~$ chmod g+w abc1  
evzile@evzile:~$
```

Рис. 3: Выполнение примеров

Создание директорий и копирование файлов

```
evzile@evzile:~$  
evzile@evzile:~$ cp /usr/include/linux/sysinfo.h ~  
evzile@evzile:~$ mv sysinfo.h equipment  
evzile@evzile:~$ mkdir ski.plases  
evzile@evzile:~$ mv equipment ski.plases/  
evzile@evzile:~$ mv ski.plases/equipment ski.plases/equiplist  
evzile@evzile:~$ touch abc1  
evzile@evzile:~$ cp abc1 ski.plases/equiplist2  
evzile@evzile:~$ cd ski.plases/  
evzile@evzile:~/ski.plases$ mkdir equipment  
evzile@evzile:~/ski.plases$ mv equiplist equipment/  
evzile@evzile:~/ski.plases$ mv equiplist2 equipment/  
evzile@evzile:~/ski.plases$ cd  
evzile@evzile:~$ mkdir newdir  
evzile@evzile:~$ mv newdir ski.plases/  
evzile@evzile:~$ mv ski.plases/newdir/ ski.plases/plans  
evzile@evzile:~$
```

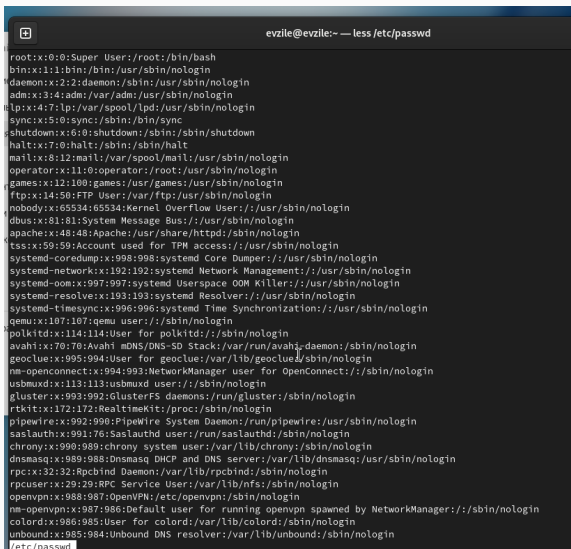
Рис. 4: Работа с каталогами

Работа с командой chmod

```
evzile@evzile:~$ mkdir australia play
evzile@evzile:~$ touch my_os feathers
evzile@evzile:~$ chmod 744 australia/
evzile@evzile:~$ chmod 711 play/
evzile@evzile:~$ chmod 544 my_os
evzile@evzile:~$ chmod 664 feathers
evzile@evzile:~$ ls -l
итого 0
-rw-rw-r--. 1 evzile evzile  0 июн 19 17:34 abc1
drwxr--r--. 1 evzile evzile  0 июн 19 17:34 australia
-rw-rw-r--. 1 evzile evzile  0 июн 19 17:35 feathers
-rw-r--r--. 1 evzile evzile  0 июн 19 17:33 may
drwx--x--x. 1 evzile evzile 24 июн 19 17:32 monthy
-r-xr--r--. 1 evzile evzile  0 июн 19 17:35 my_os
drwx--x--x. 1 evzile evzile  0 июн 19 17:34 play
drwxr-xr-x. 1 evzile evzile 14 июн 19 17:33 reports
drwxr-xr-x. 1 evzile evzile 28 июн 19 17:34 ski.places
drwxr-xr-x. 1 evzile evzile 10 июн 19 17:15 work
drwxr-xr-x. 1 evzile evzile  0 июн 19 17:10 Видео
drwxr-xr-x. 1 evzile evzile  0 июн 19 17:10 Документы
drwxr-xr-x. 1 evzile evzile  0 июн 19 17:10 Загрузки
drwxr-xr-x. 1 evzile evzile  0 июн 19 17:10 Изображения
drwxr-xr-x. 1 evzile evzile  0 июн 19 17:10 Музыка
drwxr-xr-x. 1 evzile evzile  0 июн 19 17:10 Общедоступные
drwxr-xr-x. 1 evzile evzile  0 июн 19 17:10 'Рабочий стол'
drwxr-xr-x. 1 evzile evzile  0 июн 19 17:10 Шаблоны
evzile@evzile:~$
```

Рис. 5: Настройка прав доступа

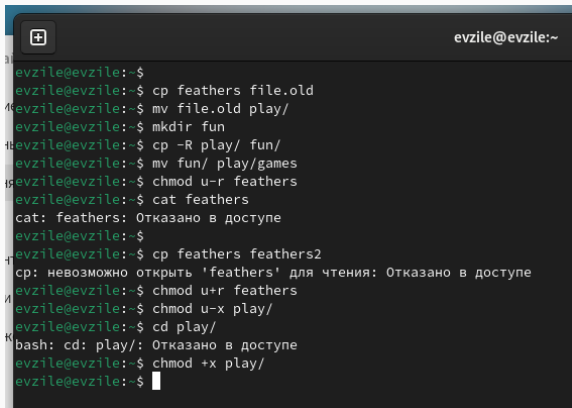
Файл /etc/passwd



```
evzile@evzile:~ — less /etc/passwd
root:x:0:0:Super User:/root:/bin/bash
bin:x:1:1:bin:/bin:/usr/sbin/nologin
daemon:x:2:2:daemon:/sbin:/usr/sbin/nologin
adm:x:3:4:adm:/var/adm:/usr/sbin/nologin
lp:x:4:7:lp:/var/spool/lpd:/usr/sbin/nologin
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:/var/spool/mail:/usr/sbin/nologin
operator:x:11:0:operator:/root:/usr/sbin/nologin
games:x:12:100:games:/usr/games:/usr/sbin/nologin
ftp:x:14:50:FTP User:/var/ftp:/usr/sbin/nologin
nobody:x:65534:65534:Kernel Overflow User:/usr/sbin/nologin
dbus:x:81:81:System Message Bus:/usr/sbin/nologin
apache:x:48:48:Apache:/usr/share/httpd:/sbin/nologin
tss:x:59:59:Account used for TPM access:/usr/sbin/nologin
systemd-coredump:x:998:998:systemd Core Dumper:/usr/sbin/nologin
systemd-network:x:192:192:systemd Network Management:/usr/sbin/nologin
systemd-oom:x:997:997:systemd Userspace OOM Killer:/usr/sbin/nologin
systemd-resolve:x:193:193:systemd Resolver:/usr/sbin/nologin
systemd-timesync:x:996:996:systemd Time Synchronization:/usr/sbin/nologin
qemu:x:107:107:qemu user:/sbin/nologin
polkitd:x:114:114>User for polkitd:/sbin/nologin
avahi:x:70:70:Avahi mDNS/DNS-SD Stack:/var/run/avahi-daemon:/sbin/nologin
geoclue:x:995:994>User for geoclue:/var/lib/geoclue:/sbin/nologin
nm-openconnect:x:994:993:NetworkManager user for OpenConnect:/sbin/nologin
usbmuxd:x:113:113:usbmuxd user:/sbin/nologin
gluster:x:993:992:GlusterFS daemons:/run/gluster:/sbin/nologin
rtkit:x:172:172:RealtimeKit:/proc:/sbin/nologin
pipewire:x:992:990:PipeWire System Daemon:/run/pipewire:/usr/sbin/nologin
saslauthd:x:991:76:Saslauthd user:/run/saslauthd:/sbin/nologin
chrony:x:990:989:chrony system user:/var/lib/chrony:/sbin/nologin
dnsmasq:x:989:988:Dnsmasq DHCP and DNS server:/var/lib/dnsmasq:/usr/sbin/nologin
rpc:x:32:32:Rpcbind Daemon:/var/lib/rpcbind:/sbin/nologin
rpcuser:x:29:29:RPC Service User:/var/lib/nfs:/sbin/nologin
openvpn:x:988:987:OpenVPN:/etc/openvpn:/sbin/nologin
nm-openvpn:x:987:986:Default user for running openvpn spawned by NetworkManager:/sbin/nologin
colord:x:986:985>User for colord:/var/lib/colord:/sbin/nologin
unbound:x:985:984:Unbound DNS resolver:/var/lib/unbound:/sbin/nologin
/etc/passwd
```

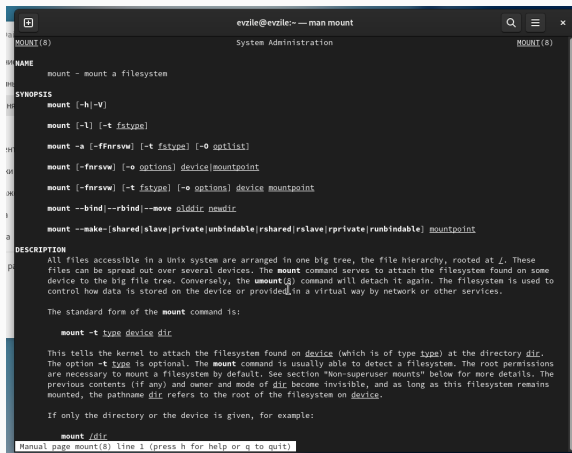
Рис. 6: Файл /etc/passwd

Работа с файлами и правами доступа



```
evzile@evzile:~$  
evzile@evzile:~$ cp feathers file.old  
evzile@evzile:~$ mv file.old play/  
evzile@evzile:~$ mkdir fun  
evzile@evzile:~$ cp -R play/ fun/  
evzile@evzile:~$ mv fun/ play/games  
evzile@evzile:~$ chmod u-r feathers  
evzile@evzile:~$ cat feathers  
cat: feathers: Отказано в доступе  
evzile@evzile:~$  
evzile@evzile:~$ cp feathers feathers2  
cp: невозможно открыть 'feathers' для чтения: Отказано в доступе  
evzile@evzile:~$ chmod u+r feathers  
evzile@evzile:~$ chmod u-x play/  
evzile@evzile:~$ cd play/  
bash: cd: play/: Отказано в доступе  
evzile@evzile:~$ chmod +x play/  
evzile@evzile:~$
```

Рис. 7: Работа с файлами и правами доступа



```
evzile@evzile:~ -- man 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:

        mount -t type device dir

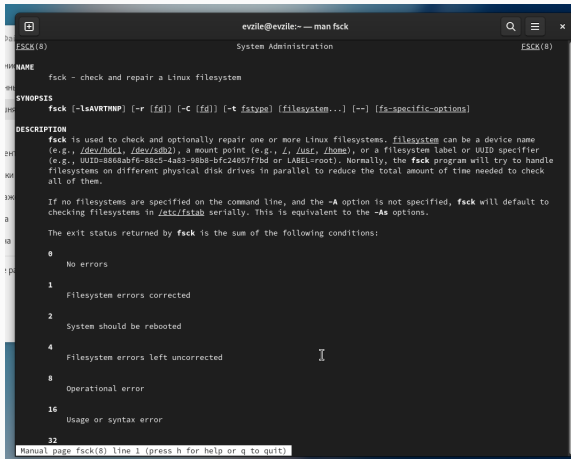
    This tells the kernel to attach the filesystem found on device (which is of type type) at the directory dir.
    The option -t type is optional. The mount command is usually able to detect a filesystem. The root permissions
    are necessary to mount a filesystem by default. See section "Non-superuser mounts" below for more details. The
    previous contents (if any) and owner and mode of dir become invisible, and as long as this filesystem remains
    mounted, the pathname dir refers to the root of the filesystem on device.

    If only the directory or the device is given, for example:

        mount /dir

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

Рис. 8: Команда mount



```
evzile@evzile:~$ man fsck
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 a 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

    4      Filesystem errors left uncorrected

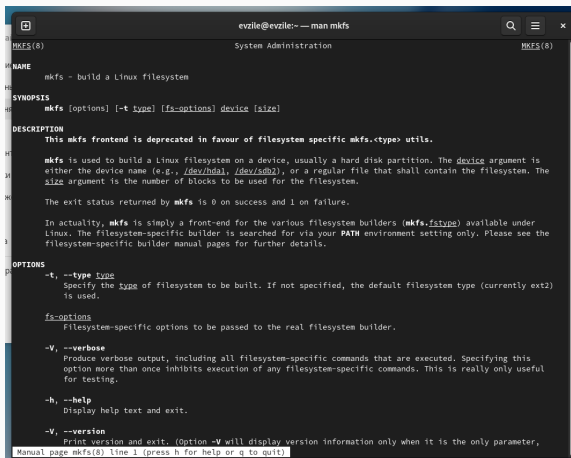
    8      Operational error

    16     Usage or syntax error

    32

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

Рис. 9: Команда fsck



```
evzile@evzile:~ — man mkfs
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.

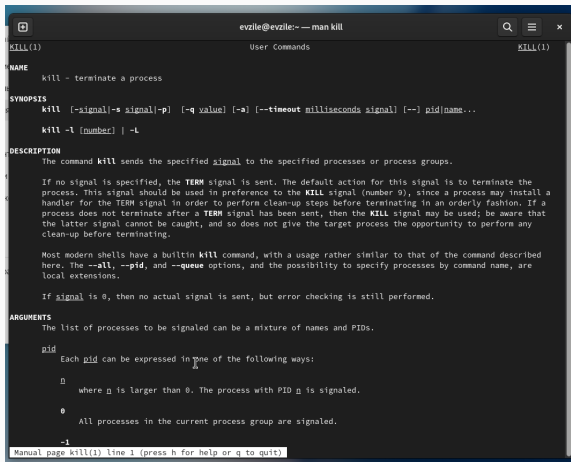
  -V, --verbose
    Produce verbose output, including all filesystem-specific commands that are executed. Specifying this option more than once inhibits execution of any filesystem-specific commands. This is really only useful for testing.

  -h, --help
    Display help text and exit.

  -V, --version
    Print version and exit. (Option -V will display version information only when it is the only parameter,

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

Рис. 10: Команда mkfs



```
evzile@evzile:~$ man kill
kill(1)                                User Commands                                kill(1)

NAME
  kill - terminate a process

SYNOPSIS
  kill [-signal|-s signal|-p] [-q value] [-a] [--timeout milliseconds signal] [--] pid[...].

  kill -l [number] | -L

DESCRIPTION
  The command kill sends the specified signal to the specified processes or process groups.

  If no signal is specified, the TERM signal is sent. The default action for this signal is to terminate the process. This signal should be used in preference to the KILL signal (number 9), since a process may install a handler for the TERM signal in order to perform clean-up steps before terminating in an orderly fashion. If a process does not terminate after a TERM signal has been sent, then the KILL signal may be used; be aware that the latter signal cannot be caught, and so does not give the target process the opportunity to perform any clean-up before terminating.

  Most modern shells have a builtin kill command, with a usage rather similar to that of the command described here. The --all, --pid, and --queue options, and the possibility to specify processes by command name, are local extensions.

  If signal is 0, then no actual signal is sent, but error checking is still performed.

ARGUMENTS
  The list of processes to be signaled can be a mixture of names and PIDs.

  pid
    Each pid can be expressed in one of the following ways:

    n
      where n is larger than 0. The process with PID n is signaled.

    0
      All processes in the current process group are signaled.

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

Рис. 11: Команда kill

Выводы по проделанной работе

В ходе данной работы мы ознакомились с файловой системой Linux, её структурой, именами и содержанием каталогов. Научились совершать базовые операции с файлами, управлять правами их доступа для пользователя и групп. Ознакомились с Анализом файловой системы. А также получили базовые навыки по проверке использования диска и обслуживанию файловой системы.