

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

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Цели и задачи работы

Цель лабораторной работы

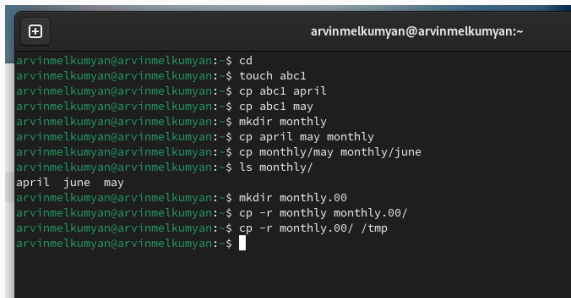
Ознакомление с файловой системой Linux, её структурой, именами и содержанием каталогов. Приобретение практических навыков по применению команд для работы с файлами и каталогами, по управлению процессами, по проверке использования диска и обслуживанию файловой системы.

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



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

Рис. 1: Выполнение примеров

Выполнение примеров

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

Рис. 2: Выполнение примеров

Выполнение примеров

```
arvinmelkumyan@arvinmelkumyan:~$  
arvinmelkumyan@arvinmelkumyan:~$  
arvinmelkumyan@arvinmelkumyan:~$ cd  
arvinmelkumyan@arvinmelkumyan:~$ touch may  
arvinmelkumyan@arvinmelkumyan:~$ ls -l may  
-rw-r--r--. 1 arvinmelkumyan arvinmelkumyan 0 сен 1 14:02 may  
arvinmelkumyan@arvinmelkumyan:~$ chmod u+x may  
arvinmelkumyan@arvinmelkumyan:~$ ls -l may  
-rwxr--r--. 1 arvinmelkumyan arvinmelkumyan 0 сен 1 14:02 may  
arvinmelkumyan@arvinmelkumyan:~$ chmod u-x may  
arvinmelkumyan@arvinmelkumyan:~$ ls -l may  
-rw-r--r--. 1 arvinmelkumyan arvinmelkumyan 0 сен 1 14:02 may  
arvinmelkumyan@arvinmelkumyan:~$ chmod g-r,o-r monthly/  
arvinmelkumyan@arvinmelkumyan:~$ chmod g+w abc1  
arvinmelkumyan@arvinmelkumyan:~$
```

Рис. 3: Выполнение примеров

Создание директорий и копирование файлов

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

Рис. 4: Работа с каталогами

Работа с командой chmod

```
arvinmelkumyan@arvinmelkumyan:~$ mkdir australia play
arvinmelkumyan@arvinmelkumyan:~$ touch my_os feathers
arvinmelkumyan@arvinmelkumyan:~$ chmod 744 australia/
arvinmelkumyan@arvinmelkumyan:~$ chmod 711 play/
arvinmelkumyan@arvinmelkumyan:~$ chmod 544 my_os
arvinmelkumyan@arvinmelkumyan:~$ chmod 664 feathers
arvinmelkumyan@arvinmelkumyan:~$ ls -l
итого 0
-rw-rw-r--. 1 arvinmelkumyan arvinmelkumyan 0 сен 1 14:06 abcl
drwxr--r--. 1 arvinmelkumyan arvinmelkumyan 0 сен 1 14:08 australia
-rw-rw-r--. 1 arvinmelkumyan arvinmelkumyan 0 сен 1 14:08 feathers
drwxr-xr-x. 1 arvinmelkumyan arvinmelkumyan 74 сен 1 11:43 git-extended
-rw-r--r--. 1 arvinmelkumyan arvinmelkumyan 0 сен 1 14:02 may
drwx--x--x. 1 arvinmelkumyan arvinmelkumyan 24 сен 1 14:00 monthly
-r-xr--r--. 1 arvinmelkumyan arvinmelkumyan 0 сен 1 14:08 my_os
drwx--x--x. 1 arvinmelkumyan arvinmelkumyan 0 сен 1 14:08 play
drwxr-xr-x. 1 arvinmelkumyan arvinmelkumyan 14 сен 1 14:02 reports
drwxr-xr-x. 1 arvinmelkumyan arvinmelkumyan 28 сен 1 14:07 ski.plases
drwxr-xr-x. 1 arvinmelkumyan arvinmelkumyan 10 сен 1 11:07 work
drwxr-xr-x. 1 arvinmelkumyan arvinmelkumyan 0 сен 1 10:50 Видео
drwxr-xr-x. 1 arvinmelkumyan arvinmelkumyan 0 сен 1 10:50 Документы
drwxr-xr-x. 1 arvinmelkumyan arvinmelkumyan 0 сен 1 10:50 Загрузки
drwxr-xr-x. 1 arvinmelkumyan arvinmelkumyan 0 сен 1 10:50 Изображения
drwxr-xr-x. 1 arvinmelkumyan arvinmelkumyan 0 сен 1 10:50 Музыка
drwxr-xr-x. 1 arvinmelkumyan arvinmelkumyan 0 сен 1 10:50 Общедоступные
drwxr-xr-x. 1 arvinmelkumyan arvinmelkumyan 0 сен 1 10:50 'Рабочий стол'
drwxr-xr-x. 1 arvinmelkumyan arvinmelkumyan 0 сен 1 10:50 Шаблоны
arvinmelkumyan@arvinmelkumyan:~$
```

Рис. 5: Настройка прав доступа

Файл /etc/passwd

```
arvinmelkumyan@arvinmelkumyan:~ — 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
sasauth:x:991:76:Sasauthd user:/run/sasauthd:/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
abrt:x:173:173::/etc/abrt:/sbin/nologin
flatpak:x:984:982:Flatpak system helper:/usr/sbin/nologin
/etc/passwd
```

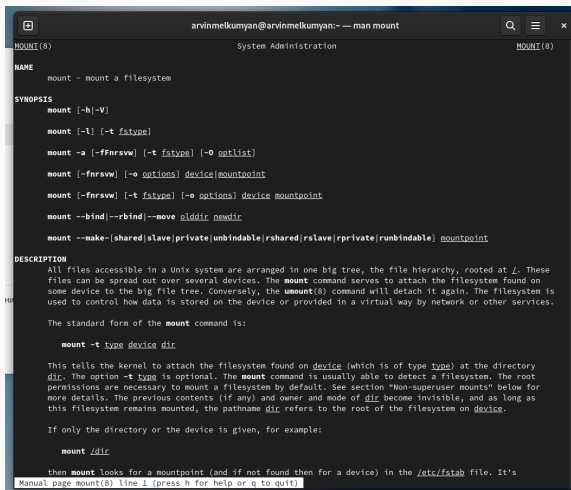
Рис. 6: Файл /etc/passwd

Работа с файлами и правами доступа

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

Рис. 7: Работа с файлами и правами доступа

Справка по командам



```
arvinmelkumyan@arvinmelkumyan:~ -- 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 [-ffnrsvw] [-o options] device mountpoint

    mount [-ffnrsvw] [-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

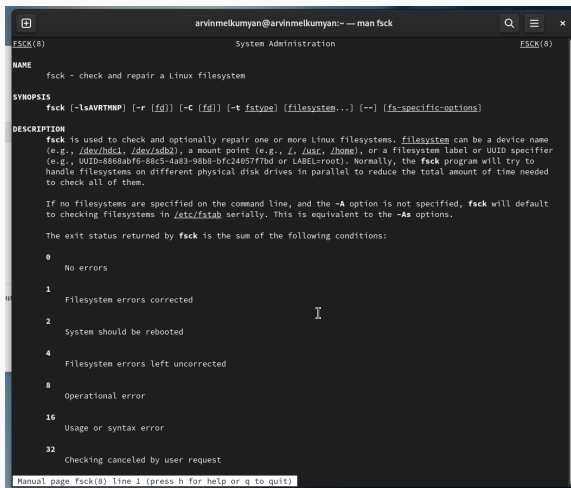
    This tells the kernel to attach the filesystem found on device (which is of type type) at the directory
    dir. The option -t type is optional. The mount command is usually able to detect a filesystem. The root
    permissions are necessary to mount a filesystem by default. See section "Non-superuser 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

    then mount looks for a mountpoint (and if not found then for a device) in the /etc/fstab file. It's
    Manual page mount(8) line 1 (press h for help or q to quit)
```

Рис. 8: Команда mount



```
arvinmelkumyan@arvinmelkumyan:~$ 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

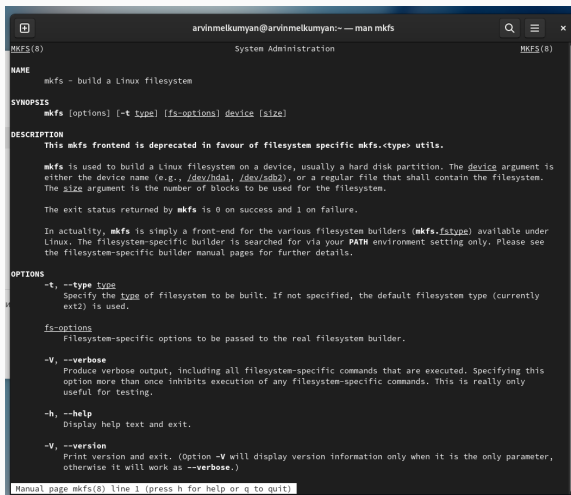
    8      Operational error

    16     Usage or syntax error

    32     Checking canceled by user request

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

Рис. 9: Команда fsck



```
arvinmelkumyan@arvinmelkumyan:~$ 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.

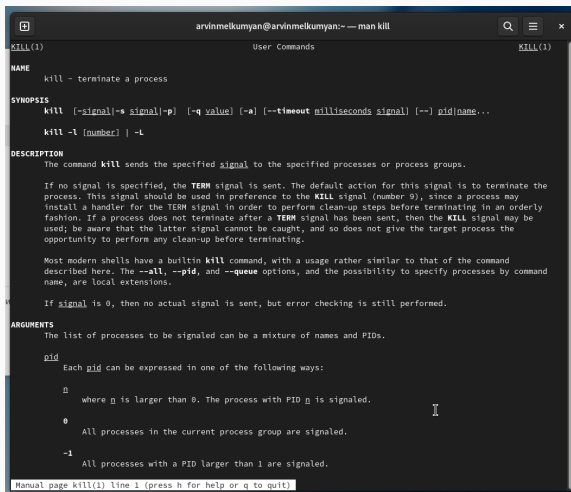
    -h, --help
        Display help text and exit.

    -V, --version
        Print version and exit. (Option -V will display version information only when it is the only parameter, otherwise it will work as --verbose.)

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

Рис. 10: Команда mkfs

Справка по командам



```
arvinmelkumyan@arvinmelkumyan:~ -- 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/name...

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
All processes with a PID larger than 1 are signaled.

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.