

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

Роберт Кармазян ¹

14 марта, 2024, Москва, Россия

¹Российский Университет Дружбы Народов

Цели и задачи работы

Цель лабораторной работы

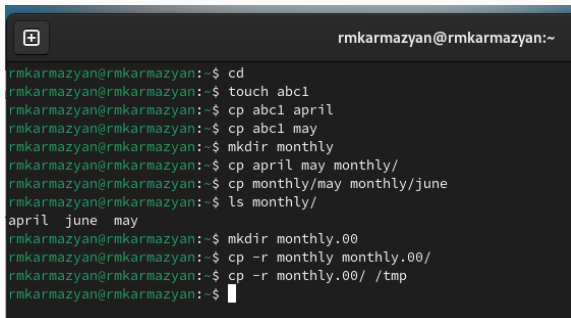
Ознакомление с файловой системой Linux, её структурой, именами и содержанием каталогов. Приобретение практических навыков по применению команд для работы с файлами и каталогами, по управлению процессами, по проверке использования диска и обслуживанию файловой системы.

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



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

Рис. 1: Выполнение примеров

Выполнение примеров

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

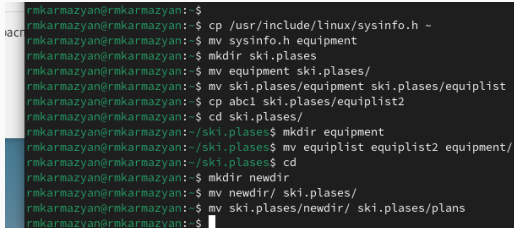
Рис. 2: Выполнение примеров

Выполнение примеров

```
rmkarmazyan@rmkarmazyan:~$ cd
rmkarmazyan@rmkarmazyan:~$ touch may
rmkarmazyan@rmkarmazyan:~$ ls -l may
-rw-r--r--. 1 rmkarmazyan rmkarmazyan 0 map 14 18:25 may
rmkarmazyan@rmkarmazyan:~$ chmod u+x may
rmkarmazyan@rmkarmazyan:~$ ls -l may
-rwxr--r--. 1 rmkarmazyan rmkarmazyan 0 map 14 18:25 may
rmkarmazyan@rmkarmazyan:~$ chmod u-x may
rmkarmazyan@rmkarmazyan:~$ ls -l may
-rw-r--r--. 1 rmkarmazyan rmkarmazyan 0 map 14 18:25 may
rmkarmazyan@rmkarmazyan:~$ cd
rmkarmazyan@rmkarmazyan:~$
rmkarmazyan@rmkarmazyan:~$
rmkarmazyan@rmkarmazyan:~$ chmod g-r,o-r monthly/
rmkarmazyan@rmkarmazyan:~$ chmod g+w abc1
rmkarmazyan@rmkarmazyan:~$
```

Рис. 3: Выполнение примеров

Создание директорий и копирование файлов



A terminal window showing a series of Linux commands and their outputs. The user is 'rmkarmazyar' on a host named 'rmkarmazyar'. The commands performed are: copying a header file, moving it, creating a directory, moving files into it, creating a subdirectory, and finally creating a new directory and moving files into it. The prompt changes as the user navigates through the directory structure.

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

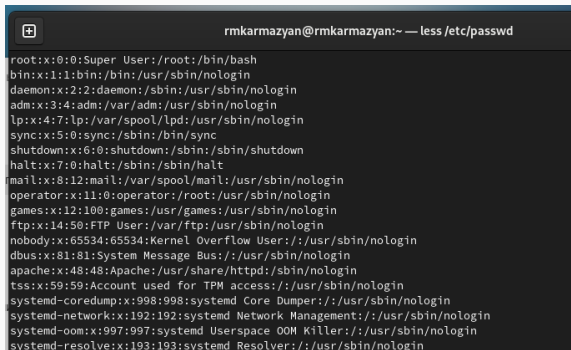
Рис. 4: Работа с каталогами

Работа с командой chmod

```
rmkarmazyan@rmkarmazyan:~$  
rmkarmazyan@rmkarmazyan:~$ mkdir australia play  
rmkarmazyan@rmkarmazyan:~$ touch my_os fethers  
rmkarmazyan@rmkarmazyan:~$ chmod 744 australia/  
rmkarmazyan@rmkarmazyan:~$ chmod 711 play/  
rmkarmazyan@rmkarmazyan:~$ chmod 544 my_os  
rmkarmazyan@rmkarmazyan:~$ chmod 664 fethers  
rmkarmazyan@rmkarmazyan:~$ ls -l  
итого 0  
-rw-rw-r--. 1 rmkarmazyan rmkarmazyan 0 map 14 18:21 abc1  
drwxr--r--. 1 rmkarmazyan rmkarmazyan 0 map 14 18:30 australia  
-rw-rw-r--. 1 rmkarmazyan rmkarmazyan 0 map 14 18:30 fethers  
drwxr-xr-x. 1 rmkarmazyan rmkarmazyan 74 map 3 22:03 git-extended  
-rw-r--r--. 1 rmkarmazyan rmkarmazyan 0 map 14 18:25 may  
drwx--x--x. 1 rmkarmazyan rmkarmazyan 24 map 14 18:22 monthly  
-r-xr--r--. 1 rmkarmazyan rmkarmazyan 0 map 14 18:30 my_os  
drwx--x--x. 1 rmkarmazyan rmkarmazyan 0 map 14 18:30 play  
drwxr-xr-x. 1 rmkarmazyan rmkarmazyan 14 map 14 18:24 reports  
drwxr-xr-x. 1 rmkarmazyan rmkarmazyan 28 map 14 18:29 ski.places  
drwxr-xr-x. 1 rmkarmazyan rmkarmazyan 10 фев 25 14:42 work  
drwxr-xr-x. 1 rmkarmazyan rmkarmazyan 0 фев 25 14:32 Видео  
drwxr-xr-x. 1 rmkarmazyan rmkarmazyan 0 фев 25 14:32 Документы  
drwxr-xr-x. 1 rmkarmazyan rmkarmazyan 0 фев 25 14:32 Загрузки  
drwxr-xr-x. 1 rmkarmazyan rmkarmazyan 0 фев 25 14:32 Изображения  
drwxr-xr-x. 1 rmkarmazyan rmkarmazyan 0 фев 25 14:32 Музыка  
drwxr-xr-x. 1 rmkarmazyan rmkarmazyan 0 фев 25 14:32 Общедоступные  
drwxr-xr-x. 1 rmkarmazyan rmkarmazyan 0 фев 25 14:32 'Рабочий стол'  
drwxr-xr-x. 1 rmkarmazyan rmkarmazyan 0 фев 25 14:32 Шаблоны  
rmkarmazyan@rmkarmazyan:~$
```

Рис. 5: Настройка прав доступа

Файл /etc/passwd



```
rmkarmazyan@rmkarmazyan:~ — 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-networkd: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
```

Рис. 6: Файл /etc/passwd

Работа с файлами и правами доступа

```
rmkarmazyan@rmkarmazyan:~$  
rmkarmazyan@rmkarmazyan:~$ cp fethers file.old  
rmkarmazyan@rmkarmazyan:~$ mv file.old play  
rmkarmazyan@rmkarmazyan:~$ mkdir fun  
rmkarmazyan@rmkarmazyan:~$ cp -r play/ fun/  
rmkarmazyan@rmkarmazyan:~$ mv fun/ play/games  
rmkarmazyan@rmkarmazyan:~$ chmod -r fethers  
rmkarmazyan@rmkarmazyan:~$ cat fethers  
cat: fethers: Отказано в доступе  
rmkarmazyan@rmkarmazyan:~$ cp fethers fethers2  
cp: невозможно открыть 'fethers' для чтения: Отказано в доступе  
rmkarmazyan@rmkarmazyan:~$ chmod +r fethers  
rmkarmazyan@rmkarmazyan:~$ chmod -x play/  
rmkarmazyan@rmkarmazyan:~$ cd play/  
bash: cd: play/: Отказано в доступе  
rmkarmazyan@rmkarmazyan:~$ chmod +x play/  
rmkarmazyan@rmkarmazyan:~$
```

Рис. 7: Работа с файлами и правами доступа

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

Рис. 8: Команда mount

```
ESCK(8)                                     System Administration                                     ESCK(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

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

Рис. 9: Команда fsck

```
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.

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

Рис. 10: Команда mkfs

Справка по командам

```
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.

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.