

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

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

Рис. 1: Выполнение примеров

Выполнение примеров

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

Рис. 2: Выполнение примеров

Выполнение примеров

```
albertokaskante@albertokaskante:~$ cd
albertokaskante@albertokaskante:~$ touch may
albertokaskante@albertokaskante:~$ ls -l may
-rw-r--r--. 1 albertokaskante albertokaskante 0 дек 25 17:20 may
albertokaskante@albertokaskante:~$ chmod u+x may
albertokaskante@albertokaskante:~$ ls -l may
-rwxr--r--. 1 albertokaskante albertokaskante 0 дек 25 17:20 may
albertokaskante@albertokaskante:~$ chmod u-x may
albertokaskante@albertokaskante:~$ ls -l may
-rw-r--r--. 1 albertokaskante albertokaskante 0 дек 25 17:20 may
albertokaskante@albertokaskante:~$ cd
albertokaskante@albertokaskante:~$ mkdir monthly
mkdir: невозможно создать каталог «monthly»: Файл существует
albertokaskante@albertokaskante:~$ chmod g-r,o-r monthly
albertokaskante@albertokaskante:~$ cd
albertokaskante@albertokaskante:~$ touch abc1
albertokaskante@albertokaskante:~$ chmod g+w abc1
albertokaskante@albertokaskante:~$
```

Рис. 3: Выполнение примеров

Создание директорий и копирование файлов

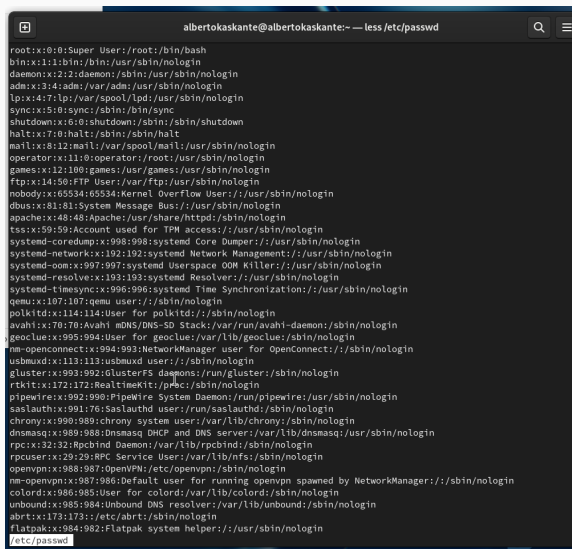
```
albertokaskante@albertokaskante:~$  
albertokaskante@albertokaskante:~$ cp /usr/include/linux/sysinfo.h ~  
albertokaskante@albertokaskante:~$ mv sysinfo.h equipment  
albertokaskante@albertokaskante:~$ mkdir ski.places  
albertokaskante@albertokaskante:~$ mv equipment ski.places/  
albertokaskante@albertokaskante:~$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

Рис. 4: Работа с каталогами

Работа с командой chmod

```
albertokaskante@albertokaskante:~$  
albertokaskante@albertokaskante:~$ mkdir australia play  
albertokaskante@albertokaskante:~$ touch my_os feathers  
albertokaskante@albertokaskante:~$ chmod 744 australia/  
albertokaskante@albertokaskante:~$ chmod 711 play/  
albertokaskante@albertokaskante:~$ chmod 544 my_os  
albertokaskante@albertokaskante:~$ chmod 664 feathers  
albertokaskante@albertokaskante:~$ ls -l  
итого 0  
-rw-rw-r--. 1 albertokaskante albertokaskante 0 дек 25 17:21 abc1  
drwxr--r--. 1 albertokaskante albertokaskante 0 дек 25 17:22 australia  
-rw-rw-r--. 1 albertokaskante albertokaskante 0 дек 25 17:22 feathers  
drwxr-xr-x. 1 albertokaskante albertokaskante 74 дек 25 17:05 git-extended  
-rw-r--r--. 1 albertokaskante albertokaskante 0 дек 25 17:20 may  
drwx--x--x. 1 albertokaskante albertokaskante 24 дек 25 17:20 monthly  
-r-xr--r--. 1 albertokaskante albertokaskante 0 дек 25 17:22 my_os  
drwx--x--x. 1 albertokaskante albertokaskante 0 дек 25 17:22 play  
drwxr-xr-x. 1 albertokaskante albertokaskante 14 дек 25 17:20 reports  
drwxr-xr-x. 1 albertokaskante albertokaskante 28 дек 25 17:22 ski.places  
drwxr-xr-x. 1 albertokaskante albertokaskante 10 дек 25 16:21 work  
drwxr-xr-x. 1 albertokaskante albertokaskante 0 дек 25 16:13 Видео  
drwxr-xr-x. 1 albertokaskante albertokaskante 0 дек 25 16:13 Документы  
drwxr-xr-x. 1 albertokaskante albertokaskante 0 дек 25 16:13 Загрузки  
drwxr-xr-x. 1 albertokaskante albertokaskante 0 дек 25 16:13 Изображения  
drwxr-xr-x. 1 albertokaskante albertokaskante 0 дек 25 16:13 Музыка  
drwxr-xr-x. 1 albertokaskante albertokaskante 0 дек 25 16:13 Общедоступные  
drwxr-xr-x. 1 albertokaskante albertokaskante 0 дек 25 16:13 'Рабочий стол'  
drwxr-xr-x. 1 albertokaskante albertokaskante 0 дек 25 16:13 Шаблоны  
albertokaskante@albertokaskante:~$
```

Рис. 5: Настройка прав доступа



The image shows a terminal window with a dark background. The title bar at the top reads "albertokaskante@albertokaskante:~ — less /etc/passwd". The terminal displays the output of the "less" command applied to the "/etc/passwd" file. The output is a list of system and user accounts, each on a new line, showing the username, UID, GID, and shell path. The accounts listed are: root, bin, daemon, adm, lp, sync, shutdown, halt, mail, operator, games, ftp, nobody, dbus, apache, tss, systemd-coredump, systemd-network, systemd-oom, systemd-resolve, systemd-timesync, qemu, polkitd, avahi, geoclue, nm-openconnect, usbmuxd, gluster, rtkit, pipewire, saslauthd, chrony, dnsmasq, rpcbind, rpcuser, openvpn, nm-openvpn, colord, unbound, abrt, and flatpak. The terminal cursor is at the bottom of the list, on the line for flatpak.

```
albertokaskante@albertokaskante:~ — 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:/usr/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
rpcbind: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
```

Работа с файлами и правами доступа

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

Рис. 7: Работа с файлами и правами доступа

Справка по командам

```
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|rsave|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 8 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

Справка по командам

```
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

```
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

```
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:

        0
            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.