

Операционные системы

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

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Цели и задачи 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.

- 1 Выполнить приимеры
- 2 Выполнить дествия 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

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

Рис. 1: Выполнение примеров

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

Рис. 2: Выполнение примеров

```
niktahadzhilari@niktahadzhilari:~$  
niktahadzhilari@niktahadzhilari:~$ touch may  
niktahadzhilari@niktahadzhilari:~$ ls -l may  
-rw-r--r--. 1 niktahadzhilari niktahadzhilari 0 июн 23 11:42 may  
niktahadzhilari@niktahadzhilari:~$ chmod u+x may  
niktahadzhilari@niktahadzhilari:~$ ls -l may  
-rwxr--r--. 1 niktahadzhilari niktahadzhilari 0 июн 23 11:42 may  
niktahadzhilari@niktahadzhilari:~$ chmod u-x may  
niktahadzhilari@niktahadzhilari:~$ ls -l may  
-rw-r--r--. 1 niktahadzhilari niktahadzhilari 0 июн 23 11:42 may  
niktahadzhilari@niktahadzhilari:~$ chmod g-r,o-r monthly  
niktahadzhilari@niktahadzhilari:~$ chmod g+w abc1  
niktahadzhilari@niktahadzhilari:~$
```

Рис. 3: Выполнение примеров

Создание директорий и копирование файлов

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

Рис. 4: Работа с каталогами

Работа с командой chmod

```
niktahadzhilari@niktahadzhilari:~$ mkdir australia play
niktahadzhilari@niktahadzhilari:~$ touch my_os feathers
niktahadzhilari@niktahadzhilari:~$ chmod 744 australia/
niktahadzhilari@niktahadzhilari:~$ chmod 711 play/
niktahadzhilari@niktahadzhilari:~$ chmod 544 my_os
niktahadzhilari@niktahadzhilari:~$ chmod 664 feathers
niktahadzhilari@niktahadzhilari:~$ ls -l
итого 0
-rw-rw-r--. 1 niktahadzhilari niktahadzhilari 0 июн 23 11:42 abc1
drwxr--r--. 1 niktahadzhilari niktahadzhilari 0 июн 23 11:44 australia
-rw-rw-r--. 1 niktahadzhilari niktahadzhilari 0 июн 23 11:44 feathers
drwxr-xr-x. 1 niktahadzhilari niktahadzhilari 74 июн 23 11:22 git-extended
-rw-r--r--. 1 niktahadzhilari niktahadzhilari 0 июн 23 11:42 may
drwx--x--x. 1 niktahadzhilari niktahadzhilari 24 июн 23 11:40 monthly
-r-xr--r--. 1 niktahadzhilari niktahadzhilari 0 июн 23 11:44 my_os
drwx--x--x. 1 niktahadzhilari niktahadzhilari 0 июн 23 11:44 play
drwxr-xr-x. 1 niktahadzhilari niktahadzhilari 14 июн 23 11:41 reports
drwxr-xr-x. 1 niktahadzhilari niktahadzhilari 28 июн 23 11:43 ski.plases
drwxr-xr-x. 1 niktahadzhilari niktahadzhilari 10 июн 23 09:59 work
drwxr-xr-x. 1 niktahadzhilari niktahadzhilari 0 июн 23 09:50 Видео
drwxr-xr-x. 1 niktahadzhilari niktahadzhilari 0 июн 23 09:50 Документы
drwxr-xr-x. 1 niktahadzhilari niktahadzhilari 26 июн 23 11:05 Загрузки
drwxr-xr-x. 1 niktahadzhilari niktahadzhilari 0 июн 23 09:50 Изображения
drwxr-xr-x. 1 niktahadzhilari niktahadzhilari 0 июн 23 09:50 Музыка
drwxr-xr-x. 1 niktahadzhilari niktahadzhilari 0 июн 23 09:50 Общедоступные
drwxr-xr-x. 1 niktahadzhilari niktahadzhilari 0 июн 23 09:50 'Рабочий стол'
drwxr-xr-x. 1 niktahadzhilari niktahadzhilari 0 июн 23 09:50 Шаблоны
niktahadzhilari@niktahadzhilari:~$
```



niktahadzhilari@niktahadzhilari:~ — 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
avahi:x:70:70:Avahi mDNS/DNS-SD Stack:/var/run/avahi-daemon:/sbin/nologin
geoclue:x:999:999>User for geoclue:/var/lib/geoclue:/sbin/nologin
usbmuxd:x:113:113:usbmuxd user:/:/sbin/nologin
systemd-oom:x:998:998:systemd Userspace OOM Killer:/:/usr/sbin/nologin
qemu:x:107:107:qemu user:/:/sbin/nologin
polkitd:x:114:114>User for polkitd:/:/sbin/nologin
rtkit:x:172:172:RealtimeKit:/:/sbin/nologin
chrony:x:997:994:chrony system user:/var/lib/chrony:/sbin/nologin
dnsmasq:x:996:993:Dnsmasq DHCP and DNS server:/var/lib/dnsmasq:/usr/sbin/nologin
gluster:x:995:992:GlusterFS daemons:/run/gluster:/sbin/nologin
rpc:x:32:32:Rpcbind Daemon:/var/lib/rpcbind:/sbin/nologin
pipewire:x:994:991:PipeWire System Daemon:/run/pipewire:/usr/sbin/nologin
unbound:x:993:990:Unbound DNS resolver:/var/lib/unbound:/sbin/nologin
nm-openconnect:x:992:989:NetworkManager user for OpenConnect:/:/sbin/nologin
rpcuser:x:29:29:RPC Service User:/var/lib/nfs:/sbin/nologin
wsdd:x:991:988:Web Services Dynamic Discovery host daemon:/:/sbin/nologin
sssd:x:990:986>User for sssd:/run/sss:/sbin/nologin
openvpn:x:989:985:OpenVPN:/etc/openvpn:/sbin/nologin
nm-openvpn:x:988:984:Default user for running openvpn spawned by NetworkManager:/:/sbin/nologin
flatpak:x:987:983:Flatpak system helper:/:/usr/sbin/nologin
/etc/passwd
```

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

Рис. 7: Работа с файлами и правами доступа

```
niktahadzhilari@niktahadzhilari:~ — 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.

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

```
niktahadzhilari@niktahadzhilari:~ — 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-bfc24857f7bd 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

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

```
niktahadzhilari@niktahadzhilari:~ — 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.

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

```
niktahadzhilari@niktahadzhilari:~ — 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
            Manual page kill(1) line 1 (press h for help or q to quit)
```


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.