

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

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

Рис. 1: Выполнение примеров

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

Рис. 2: Выполнение примеров

```
ramialmansara@ramialmansara:~$ cd
ramialmansara@ramialmansara:~$ touch may
ramialmansara@ramialmansara:~$ ls -l may
-rw-r--r--. 1 ramialmansara ramialmansara 0 сен  3 16:01 may
ramialmansara@ramialmansara:~$ chmod u+x may
ramialmansara@ramialmansara:~$ ls -l may
-rwxr--r--. 1 ramialmansara ramialmansara 0 сен  3 16:01 may
ramialmansara@ramialmansara:~$ chmod u-x may
ramialmansara@ramialmansara:~$ ls -l may
-rw-r--r--. 1 ramialmansara ramialmansara 0 сен  3 16:01 may
ramialmansara@ramialmansara:~$ chmod g-r,o-r monthly
ramialmansara@ramialmansara:~$ chmod g+w abc1
ramialmansara@ramialmansara:~$
```

Рис. 3: Выполнение примеров

Создание директорий и копирование файлов

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

Рис. 4: Работа с каталогами

Работа с командой chmod

```
ramialmansara@ramialmansara:~$  
ramialmansara@ramialmansara:~$ mkdir australia play  
ramialmansara@ramialmansara:~$ touch my_os feathers  
ramialmansara@ramialmansara:~$ chmod 744 australia/  
ramialmansara@ramialmansara:~$ chmod 711 play/  
ramialmansara@ramialmansara:~$ chmod 544 my_os  
ramialmansara@ramialmansara:~$ chmod 664 feathers  
ramialmansara@ramialmansara:~$ ls -l  
итого 0  
-rw-rw-r--. 1 ramialmansara ramialmansara 0 сен 3 16:03 abc1  
drwxr--r--. 1 ramialmansara ramialmansara 0 сен 3 16:03 australia  
-rw-rw-r--. 1 ramialmansara ramialmansara 0 сен 3 16:03 feathers  
drwxr-xr-x. 1 ramialmansara ramialmansara 74 сен 3 15:30 git-extended  
-rw-r--r--. 1 ramialmansara ramialmansara 0 сен 3 16:01 may  
drwx--x--x. 1 ramialmansara ramialmansara 24 сен 3 16:00 monthly  
-r-xr--r--. 1 ramialmansara ramialmansara 0 сен 3 16:03 my_os  
drwx--x--x. 1 ramialmansara ramialmansara 0 сен 3 16:03 play  
drwxr-xr-x. 1 ramialmansara ramialmansara 14 сен 3 16:00 reports  
drwxr-xr-x. 1 ramialmansara ramialmansara 28 сен 3 16:03 ski.places  
drwxr-xr-x. 1 ramialmansara ramialmansara 10 сен 3 15:06 work  
drwxr-xr-x. 1 ramialmansara ramialmansara 0 сен 3 14:47 Видео  
drwxr-xr-x. 1 ramialmansara ramialmansara 0 сен 3 14:47 Документы  
drwxr-xr-x. 1 ramialmansara ramialmansara 26 сен 3 15:12 Загрузки  
drwxr-xr-x. 1 ramialmansara ramialmansara 0 сен 3 14:47 Изображения  
drwxr-xr-x. 1 ramialmansara ramialmansara 0 сен 3 14:47 Музыка  
drwxr-xr-x. 1 ramialmansara ramialmansara 0 сен 3 14:47 Общедоступные  
drwxr-xr-x. 1 ramialmansara ramialmansara 0 сен 3 14:47 'Рабочий стол'  
drwxr-xr-x. 1 ramialmansara ramialmansara 0 сен 3 14:47 Шаблоны  
ramialmansara@ramialmansara:~$
```

```
ramialmansara@ramialmansara:~ — 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::/s
bin/nologin
```

Работа с файлами и правами доступа

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

Рис. 7: Работа с файлами и правами доступа

```
ramialmansara@ramialmansara:~ — 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 /. The 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
    Manual page mount(8) line 1 (press h for help or q to quit)
```

```
ramialmansara@ramialmansara:~ — 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

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

```
ramialmansara@ramialmansara:~ — 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

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

```
ramialmansara@ramialmansara:~ — 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

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.