

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

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Цели и задачи работы

Цель лабораторной работы

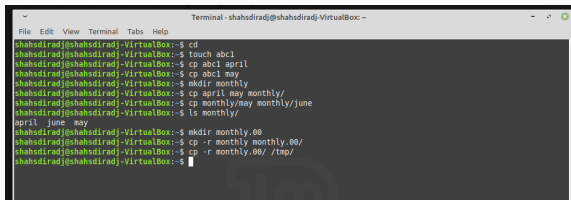
Ознакомление с файловой системой Linux, её структурой, именами и содержанием каталогов. Приобретение практических навыков по применению команд для работы с файлами и каталогами, по управлению процессами, по проверке использования диска и обслуживанию файловой системы.

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



```
Terminal - shahsdiradj@shahsdiradj-VirtualBox: -
File Edit View Terminal Tabs Help
shahsdiradj@shahsdiradj-VirtualBox:~$ cd
shahsdiradj@shahsdiradj-VirtualBox:~$ touch abc1
shahsdiradj@shahsdiradj-VirtualBox:~$ cp abc1 april
shahsdiradj@shahsdiradj-VirtualBox:~$ cp abc1 may
shahsdiradj@shahsdiradj-VirtualBox:~$ mkdir monthly
shahsdiradj@shahsdiradj-VirtualBox:~$ cp april may monthly/
shahsdiradj@shahsdiradj-VirtualBox:~$ cp monthly/may monthly/june
shahsdiradj@shahsdiradj-VirtualBox:~$ ls monthly/
april  june  may
shahsdiradj@shahsdiradj-VirtualBox:~$ mkdir monthly.00
shahsdiradj@shahsdiradj-VirtualBox:~$ cp -r monthly monthly.00/
shahsdiradj@shahsdiradj-VirtualBox:~$ cp -r monthly.00/ /tmp/
shahsdiradj@shahsdiradj-VirtualBox:~$
```

Figure 1: Выполнение примеров

Выполнение примеров

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

Figure 2: Выполнение примеров

Выполнение примеров

```
drwxr-xr-x 2 shahsdiradj shahsdiradj 4096 Nov 18 12:09 Videos
shahsdiradj@shahsdiradj-VirtualBox:~$ ls -l may
-rw-rw-r-- 1 shahsdiradj shahsdiradj 0 Nov 19 17:18 may
shahsdiradj@shahsdiradj-VirtualBox:~$ chmod u+x may
shahsdiradj@shahsdiradj-VirtualBox:~$ ls -l may
-rwxrwxr-- 1 shahsdiradj shahsdiradj 0 Nov 19 17:18 may
shahsdiradj@shahsdiradj-VirtualBox:~$ chmod u-x may
shahsdiradj@shahsdiradj-VirtualBox:~$ ls -l may
-rw-rw-r-- 1 shahsdiradj shahsdiradj 0 Nov 19 17:18 may
shahsdiradj@shahsdiradj-VirtualBox:~$ cd
shahsdiradj@shahsdiradj-VirtualBox:~$ mkdir monthly
mkdir: cannot create directory 'monthly': File exists
shahsdiradj@shahsdiradj-VirtualBox:~$ chmod g-r, o-r monuhly
chmod: invalid mode: 'g-r,'
Try 'chmod --help' for more information.
shahsdiradj@shahsdiradj-VirtualBox:~$ chmod g-r,o-r monuhly
chmod: cannot access 'monuhly': No such file or directory
shahsdiradj@shahsdiradj-VirtualBox:~$ chmod g-r,o-r monthly/
shahsdiradj@shahsdiradj-VirtualBox:~$ cd
shahsdiradj@shahsdiradj-VirtualBox:~$ touch abc1
shahsdiradj@shahsdiradj-VirtualBox:~$ chmod g+2 abc1
chmod: invalid mode: 'g+2'
Try 'chmod --help' for more information.
shahsdiradj@shahsdiradj-VirtualBox:~$ chmod g+w abc1
shahsdiradj@shahsdiradj-VirtualBox:~$
```

Figure 3: Выполнение примеров

Создание директорий и копирование файлов

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

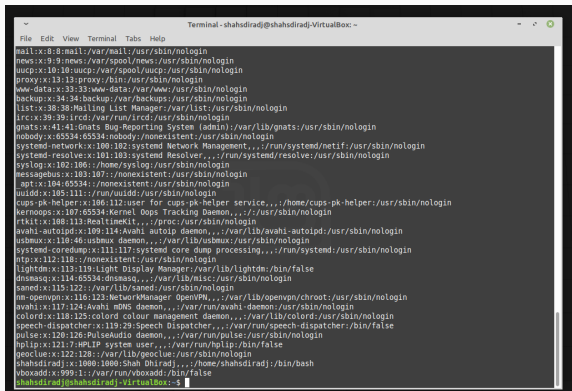
Figure 4: Работа с каталогами

Работа с командой chmod

```
shahsdirad@shahsdirad-VirtualBox:~$  
shahsdirad@shahsdirad-VirtualBox:~$ mkdir australia play  
shahsdirad@shahsdirad-VirtualBox:~$ touch my_os feathers  
shahsdirad@shahsdirad-VirtualBox:~$ chmod 744 australia/  
shahsdirad@shahsdirad-VirtualBox:~$ chmod 711 play/  
shahsdirad@shahsdirad-VirtualBox:~$ chmod 544 my_os  
shahsdirad@shahsdirad-VirtualBox:~$ chmod 664 feathers  
shahsdirad@shahsdirad-VirtualBox:~$ ls -l  
total 56  
-rw-rw-r-- 1 shahsdirad shahsdirad 0 Nov 19 17:25 abc1  
drwxr--r-- 2 shahsdirad shahsdirad 4096 Nov 19 17:26 australia  
drwxr-xr-x 3 shahsdirad shahsdirad 4096 Nov 18 12:10 Desktop  
drwxr-xr-x 2 shahsdirad shahsdirad 4096 Nov 18 12:09 Documents  
drwxr-xr-x 2 shahsdirad shahsdirad 4096 Nov 18 12:09 Downloads  
-rw-rw-r-- 1 shahsdirad shahsdirad 0 Nov 19 17:26 feathers  
drwxrwxr-x 3 shahsdirad shahsdirad 4096 Nov 19 10:53 laboratory  
-rw-rw-r-- 1 shahsdirad shahsdirad 0 Nov 19 17:18 may  
drwx-wx--x 2 shahsdirad shahsdirad 4096 Nov 19 17:12 monthly  
drwxr-xr-x 2 shahsdirad shahsdirad 4096 Nov 18 12:09 Music  
-r-xr--r-- 1 shahsdirad shahsdirad 0 Nov 19 17:26 my_os  
drwxr-xr-x 2 shahsdirad shahsdirad 4096 Nov 18 12:09 Pictures  
drwx--x--x 2 shahsdirad shahsdirad 4096 Nov 19 17:26 play  
drwxr-xr-x 2 shahsdirad shahsdirad 4096 Nov 18 12:09 Public  
drwxrwxr-x 3 shahsdirad shahsdirad 4096 Nov 19 17:18 reports  
drwxrwxr-x 4 shahsdirad shahsdirad 4096 Nov 19 17:26 ski.places  
drwxr-xr-x 2 shahsdirad shahsdirad 4096 Nov 18 12:09 Templates  
drwxr-xr-x 2 shahsdirad shahsdirad 4096 Nov 18 12:09 Videos  
shahsdirad@shahsdirad-VirtualBox:~$
```

Figure 5: Настройка прав доступа

Файл /etc/passwd

A screenshot of a terminal window titled "Terminal - shahsdiradj@shahsdiradj-VirtualBox: ~". The terminal displays the contents of the /etc/passwd file. The output shows a list of system and user accounts, each with a username, a numeric user ID (UID), a home directory, and a shell. The accounts listed include mail, news, uucp, proxy, www-data, backup, list, irc, gnats, nobody, systemd-network, systemd-resolve, syslog, messagebus, _apt, _uidd, cups-pk-helper, kernoops, rtkit, avahi-autoipd, usbmux, systemd-core, ntp, lightdm, dnsmasq, saned, nn-ovpn, avahi, colord, speech-dispatcher, pulse, hplip, geoclue, shahsdiradj, and vboxadd. The terminal window has a menu bar with "File", "Edit", "View", "Terminal", and "Tabs". The status bar at the bottom shows the current directory as "~" and the terminal name as "shahsdiradj@shahsdiradj-VirtualBox: ~".

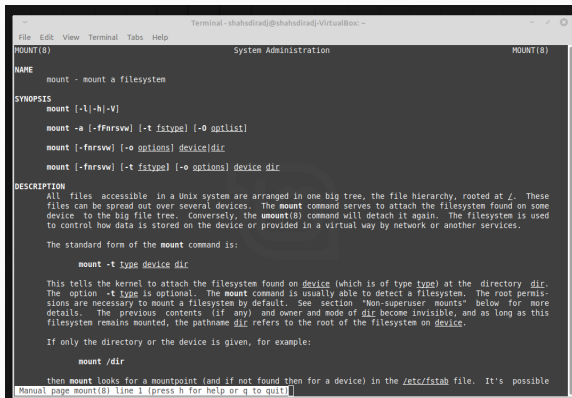
```
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin
www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin
backup:x:34:34:backup:/var/backups:/usr/sbin/nologin
list:x:38:38:Mail List Manager:/var/list:/usr/sbin/nologin
irc:x:39:39:ircd:/var/run/ircd:/usr/sbin/nologin
gnats:x:41:41:Gnats Bug-Reporting System (admin):/var/lib/gnats:/usr/sbin/nologin
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin
systemd-network:x:100:102:systemd Network Management,,:/run/systemd/netif:/usr/sbin/nologin
systemd-resolve:x:101:103:systemd Resolver,,:/run/systemd/resolve:/usr/sbin/nologin
syslog:x:102:106:./home/syslog:/usr/sbin/nologin
messagebus:x:103:107:./nonexistent:/usr/sbin/nologin
_apt:x:104:65534:./nonexistent:/usr/sbin/nologin
_uidd:x:105:111:./run/uidd:/usr/sbin/nologin
cups-pk-helper:x:106:112:user for cups-pk-helper service,./home/cups-pk-helper:/usr/sbin/nologin
kernoops:x:107:65534:Kernel Ops Tracking Daemon,./usr/sbin/nologin
rtkit:x:108:113:RealtimeKit,./proc:/usr/sbin/nologin
avahi-autoipd:x:109:114:Avahi autoip daemon,./var/lib/avahi-autoipd:/usr/sbin/nologin
usbmux:x:110:46:usbmux daemon,./var/lib/usbmux:/usr/sbin/nologin
systemd-coredump:x:111:117:systemd core dump processing,./run/systemd:/usr/sbin/nologin
ntp:x:112:118:./nonexistent:/usr/sbin/nologin
lightdm:x:113:119:Light Display Manager:/var/lib/lightdm:/bin/false
dnsmasq:x:114:65534:dnsmasq,./var/lib/misc:/usr/sbin/nologin
saned:x:115:122:./var/lib/saned:/usr/sbin/nologin
nn-ovpn:x:116:123:NetworkManager OpenVPN,./var/lib/openvpn/chroot:/usr/sbin/nologin
avahi:x:117:124:Avahi mDNS daemon,./var/run/avahi-daemon:/usr/sbin/nologin
colord:x:118:125:colord colour management daemon,./var/lib/colord:/usr/sbin/nologin
speech-dispatcher:x:119:29:Speech Dispatcher,./var/run/speech-dispatcher:/bin/false
pulse:x:120:126:PulseAudio daemon,./var/run/pulse:/usr/sbin/nologin
hplip:x:121:7:HPLIP system user,./var/run/hplip:/bin/false
geoclue:x:122:128:./var/lib/geoclue:/usr/sbin/nologin
shahsdiradj:x:1000:1000:Shah Dhiradj,./home/shahsdiradj:/bin/bash
vboxadd:x:999:1:./var/run/vboxadd:/bin/false
shahsdiradj@shahsdiradj-VirtualBox: ~
```

Figure 6: Файл /etc/passwd

Работа с файлами и правами доступа

```
shahsdiradj@shahsdiradj-VirtualBox:~$  
shahsdiradj@shahsdiradj-VirtualBox:~$  
shahsdiradj@shahsdiradj-VirtualBox:~$ cp feathers file.old  
shahsdiradj@shahsdiradj-VirtualBox:~$ mv file.old play/  
shahsdiradj@shahsdiradj-VirtualBox:~$ mkdir fun  
shahsdiradj@shahsdiradj-VirtualBox:~$ cp -R play/ fun/  
shahsdiradj@shahsdiradj-VirtualBox:~$ mv fun/ play/games  
shahsdiradj@shahsdiradj-VirtualBox:~$ chmod u-r feathers  
shahsdiradj@shahsdiradj-VirtualBox:~$ cat feathers  
cat: feathers: Permission denied  
shahsdiradj@shahsdiradj-VirtualBox:~$ cp feathers feathers2  
cp: cannot open 'feathers' for reading: Permission denied  
shahsdiradj@shahsdiradj-VirtualBox:~$ chmod u+r feathers  
shahsdiradj@shahsdiradj-VirtualBox:~$ chmod u-x play/  
shahsdiradj@shahsdiradj-VirtualBox:~$ cd play/  
bash: cd: play/: Permission denied  
shahsdiradj@shahsdiradj-VirtualBox:~$ chmod +x play/  
shahsdiradj@shahsdiradj-VirtualBox:~$
```

Figure 7: Работа с файлами и правами доступа



```
Terminal - shahsdirad@shahsdirad-VirtualBox: -
File Edit View Terminal Tabs Help
MOUNT(8) System Administration MOUNT(8)

NAME
mount - mount a filesystem

SYNOPSIS
mount [-l|-h|-V]
mount -a [-fnrsvw] [-t fstype] [-O optlist]
mount [-fnrsvw] [-o options] device|dir
mount [-fnrsvw] [-t fstype] [-o options] device dir

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 another 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.

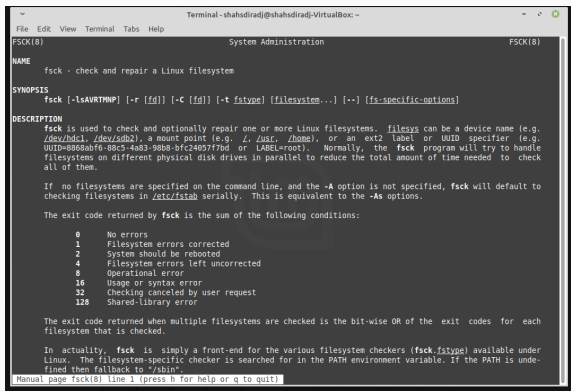
If only the directory or the device is given, for example:

    mount /dir

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

Figure 8: Команда mount

Справка по командам



```
Terminal - shahsdiradj@shahsdiradj-VirtualBox: ~
File Edit View Terminal Tabs Help
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. filesystems can be a device name (e.g.
    /dev/hdcl, /dev/sdb2), a mount point (e.g. /, /usr, /home), or an ext2 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 code returned by fsck is the sum of the following conditions:

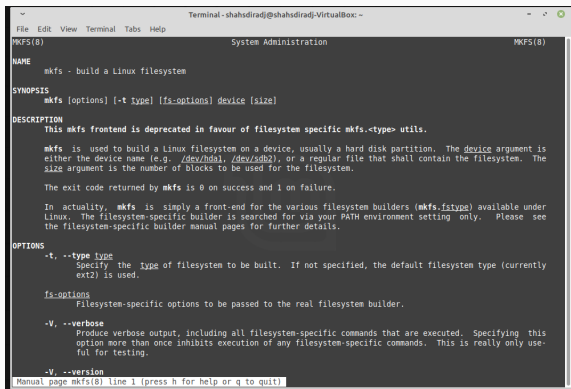
        0      No errors
        1      Filesystem errors corrected
        2      System should be rebooted
        4      Filesystem errors left uncorrected
        8      Operational error
        16     Usage or syntax error
        32     Checking canceled by user request
        128    Shared-library error

    The exit code returned when multiple filesystems are checked is the bit-wise OR of the exit codes for each
    filesystem that is checked.

    In actuality, fsck is simply a front-end for the various filesystem checkers (fsck.fstype) available under
    Linux. The filesystem-specific checker is searched for in the PATH environment variable. If the PATH is unde-
    fined then fallback to "/sbin".

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

Figure 9: Команда fsck



```
Terminal-shahsdiradj@shahsdiradj-VirtualBox: ~
File Edit View Terminal Tabs Help
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 code 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.

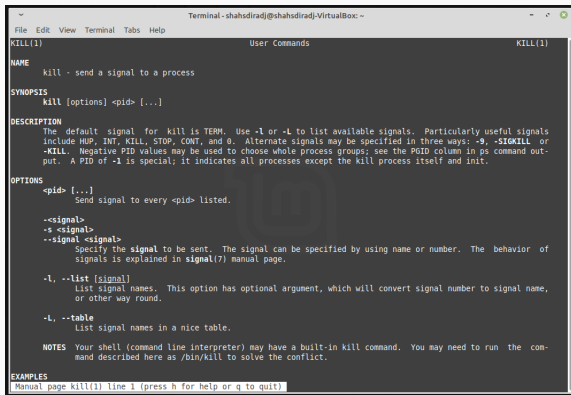
    fs-options
        Filesystem-specific options to be passed to the real filesystem builder.

    -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.

    -V, --version

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

Figure 10: Команда mkfs



```
Terminal - shahsdiradj@shahsdiradj-VirtualBox: ~
File Edit View Terminal Tabs Help
KILL(1) User Commands KILL(1)
NAME
    kill - send a signal to a process
SYNOPSIS
    kill [options] <pid> [...]
DESCRIPTION
    The default signal for kill is TERM. Use -l or -L to list available signals. Particularly useful signals include HUP, INT, KILL, STOP, CONT, and 0. Alternate signals may be specified in three ways: -9, -SIGKILL or -KILL. Negative PID values may be used to choose whole process groups; see the PGID column in ps command output. A PID of -1 is special; it indicates all processes except the kill process itself and init.
OPTIONS
    <pid> [...]
        Send signal to every <pid> listed.

    -<signal>
    -s <signal>
    --signal <signal>
        Specify the signal to be sent. The signal can be specified by using name or number. The behavior of signals is explained in signal(7) manual page.

    -l, --list [signal]
        List signal names. This option has optional argument, which will convert signal number to signal name, or other way round.

    -L, --table
        List signal names in a nice table.
NOTES
    Your shell (command line interpreter) may have a built-in kill command. You may need to run the command described here as /bin/kill to solve the conflict.
EXAMPLES
    Manual page kill(1) line 1 (press h for help or q to quit)
```

Figure 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.