Лабораторная работа №14

Партиции, файловые системы, монтирование

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Цель работы

Получить навыки создания разделов на диске и файловых систем, а также навыки монтирования файловых систем в Linux.

Ход выполнения работы

```
root@ivschemelev:/home/ivschemelev# fdisk --list
Disk /dev/sdc: 1.5 GiB, 1610612736 bytes, 3145728 sectors
Disk model: VBOX HARDDISK
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes


Disk /dev/sdb: 1.5 GiB, 1610612736 bytes, 3145728 sectors
Disk model: VBOX HARDDISK
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes


Disk /dev/sda: 50 GiB, 53687091200 bytes, 104857600 sectors
Disk model: VBOX HARDDISK
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disklabel type: gpt
Disk identifier: 9651E147-F6A3-46EF-A2D8-2F968F50B10B
```

```
root@ivschemelev:/home/ivschemelev#
root@ivschemelev:/home/ivschemelev# fdisk /dev/sdb

Welcome to fdisk (util-linux 2.40.2).
Changes will remain in memory only, until you decide to write them.
Be careful before using the write command.

Device does not contain a recognized partition table.
Created a new DOS (MBR) disklabel with disk identifier 0xd4870e8b.

Command (m for help): m

Help:

  DOS (MBR)
   a   toggle a bootable flag
   b   edit nested BSD disklabel
   c   toggle the dos compatibility flag

  Generic
   d   delete a partition
   F   list free unpartitioned space
   l   list known partition types
   n   add a new partition
   p   print the partition table
   t   change a partition type
   v   verify the partition table
   i   print information about a partition
   e   resize a partition

  Misc
   m   print this menu
   u   change display/entry units
   x   extra functionality (experts only)
```

Создание основного MBR-раздела

```
Command (m for help): p
Disk /dev/sdb: 1.5 GiB, 1610612736 bytes, 3145728 sectors
Disk model: VBOX HARDDISK
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disklabel type: dos
Disk identifier: 0xd4870e8b

Command (m for help): n
Partition type
   p   primary (0 primary, 0 extended, 4 free)
   e   extended (container for logical partitions)
Select (default p): p
Partition number (1-4, default 1): 1
First sector (2048-3145727, default 2048):
Last sector, +/-sectors or +/-size{K,M,G,T,P} (2048-3145727, default 3145727): +300M

Created a new partition 1 of type 'Linux' and of size 300 MiB.

Command (m for help): t
Selected partition 1
Hex code or alias (type L to list all): 83
Changed type of partition 'Linux' to 'Linux'.

Command (m for help): w
The partition table has been altered.
Calling ioctl() to re-read partition table.
Syncing disks.

root@ivschemelev:/home/ivschemelev#
```

```
root@ivschemelev:/home/ivschemelev#
root@ivschemelev:/home/ivschemelev# fdisk -l /dev/sdb
Disk /dev/sdb: 1.5 GiB, 1610612736 bytes, 3145728 sectors
Disk model: VBOX HARDDISK
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disklabel type: dos
Disk identifier: 0xd4870e8b

Device     Boot Start     End Sectors  Size Id Type
/dev/sdb1       2048 616447  614400  300M 83 Linux
root@ivschemelev:/home/ivschemelev# cat /proc/partitions
major minor  #blocks  name

   8       32   1572864 sdc
   8       16   1572864 sdb
   8       17    307200 sdb1
   8        0  52428800 sda
   8        1      1024 sda1
   8        2   1048576 sda2
   8        3  51377152 sda3
  11        0   1048575 sr0
 253        0  47239168 dm-0
 253        1   4136960 dm-1
root@ivschemelev:/home/ivschemelev# partprobe /dev/sdb
root@ivschemelev:/home/ivschemelev#
```

```
root@ivschemelev:/home/ivschemelev# fdisk /dev/sdb

Welcome to fdisk (util-linux 2.40.2).
Changes will remain in memory only, until you decide to write them.
Be careful before using the write command.


Command (m for help): n
Partition type
   p   primary (1 primary, 0 extended, 3 free)
   e   extended (container for logical partitions)
Select (default p): e
Partition number (2-4, default 2): 4
First sector (616448-3145727, default 616448):
Last sector, +/-sectors or +/-size{K,M,G,T,P} (616448-3145727, default 3145727):

Created a new partition 4 of type 'Extended' and of size 1.2 GiB.

Command (m for help): n
All space for primary partitions is in use.
Adding logical partition 5
First sector (618496-3145727, default 618496):
Last sector, +/-sectors or +/-size{K,M,G,T,P} (618496-3145727, default 3145727): +300M

Created a new partition 5 of type 'Linux' and of size 300 MiB.

Command (m for help): w
The partition table has been altered.
Calling ioctl() to re-read partition table.
Syncing disks.

root@ivschemelev:/home/ivschemelev#
```

```
root@ivschemelev:/home/ivschemelev#
root@ivschemelev:/home/ivschemelev# partprobe /dev/sdb
root@ivschemelev:/home/ivschemelev# cat /proc/partitions
major minor  #blocks  name

   8       32   1572864 sdc
   8       16   1572864 sdb
   8       17    307200 sdb1
   8       20         1 sdb4
   8       21    307200 sdb5
   8        0  52428800 sda
   8        1      1024 sda1
   8        2   1048576 sda2
   8        3  51377152 sda3
  11        0   1048575 sr0
 253        0  47239168 dm-0
 253        1   4136960 dm-1
root@ivschemelev:/home/ivschemelev# fdisk -l /dev/sdb
Disk /dev/sdb: 1.5 GiB, 1610612736 bytes, 3145728 sectors
Disk model: VBOX HARDDISK
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disklabel type: dos
Disk identifier: 0xd4870e8b


Device     Boot   Start       End Sectors  Size Id Type
/dev/sdb1          2048    616447  614400  300M 83 Linux
/dev/sdb4        616448   3145727 2529280  1.2G  5 Extended
/dev/sdb5        618496   1232895  614400  300M 83 Linux
root@ivschemelev:/home/ivschemelev#
```

```
root@ivschemelev:/home/ivschemelev# fdisk /dev/sdb

Welcome to fdisk (util-linux 2.40.2).
Changes will remain in memory only, until you decide to write them.
Be careful before using the write command.


Command (m for help): n
All space for primary partitions is in use.
Adding logical partition 6
First sector (1234944-3145727, default 1234944):
Last sector, +/-sectors or +/-size{K,M,G,T,P} (1234944-3145727, default 3145727): +300M

Created a new partition 6 of type 'Linux' and of size 300 MiB.

Command (m for help): t
Partition number (1,4-6, default 6): 6
Hex code or alias (type L to list all): 82

Changed type of partition 'Linux' to 'Linux swap / Solaris'.

Command (m for help): w
The partition table has been altered.
Calling ioctl() to re-read partition table.
Syncing disks.

root@ivschemelev:/home/ivschemelev#
```

Рис. 8: Подготовка swap и проверка через free

```
root@ivschemelev:/home/ivschemelev# gdisk -l /dev/sdc
GPT fdisk (gdisk) version 1.0.10

Partition table scan:
  MBR: not present
  BSD: not present
  APM: not present
  GPT: not present

Creating new GPT entries in memory.
Disk /dev/sdc: 3145728 sectors, 1.5 GiB
Model: VBOX HARDDISK
Sector size (logical/physical): 512/512 bytes
Disk identifier (GUID): 4520F638-CB3D-46C9-9023-961A0C58E421
Partition table holds up to 128 entries
Main partition table begins at sector 2 and ends at sector 33
First usable sector is 34, last usable sector is 3145694
Partitions will be aligned on 2048-sector boundaries
Total free space is 3145661 sectors (1.5 GiB)

Number  Start (sector)    End (sector)  Size        Code  Name
root@ivschemelev:/home/ivschemelev#
```

```
Creating new GPT entries in memory.

Command (? for help): n
Partition number (1-128, default 1): 1
First sector (34-3145694, default = 2048) or {+-}size{KMGTP}:
Last sector (2048-3145694, default = 3143679) or {+-}size{KMGTP}: +300M
Current type is 8300 (Linux filesystem)
Hex code or GUID (L to show codes, Enter = 8300): 8300
Changed type of partition to 'Linux filesystem'

Command (? for help): p
Disk /dev/sdc: 3145728 sectors, 1.5 GiB
Model: VBOX HARDDISK
Sector size (logical/physical): 512/512 bytes
Disk identifier (GUID): 0A277B88-CFEB-4A6F-9B6E-F431D6502EA5
Partition table holds up to 128 entries
Main partition table begins at sector 2 and ends at sector 33
First usable sector is 34, last usable sector is 3145694
Partitions will be aligned on 2048-sector boundaries
Total free space is 2531261 sectors (1.2 GiB)

Number  Start (sector)    End (sector)  Size       Code  Name
   1             2048          616447    300.0 MiB  8300  Linux filesystem

Command (? for help): w

Final checks complete. About to write GPT data. THIS WILL OVERWRITE EXISTING
PARTITIONS!!

Do you want to proceed? (Y/N): Y
OK; writing new GUID partition table (GPT) to /dev/sdc.
The operation has completed successfully.
root@ivschemelev:/home/ivschemelev#
```

```
 253        1    4136960 dm-1
root@ivschemelev:/home/ivschemelev# gdisk -l /dev/sdc
GPT fdisk (gdisk) version 1.0.10

Partition table scan:
  MBR: protective
  BSD: not present
  APM: not present
  GPT: present

Found valid GPT with protective MBR; using GPT.
Disk /dev/sdc: 3145728 sectors, 1.5 GiB
Model: VBOX HARDDISK
Sector size (logical/physical): 512/512 bytes
Disk identifier (GUID): 0A277B88-CFEB-4A6F-9B6E-F431D6502EA5
Partition table holds up to 128 entries
Main partition table begins at sector 2 and ends at sector 33
First usable sector is 34, last usable sector is 3145694
Partitions will be aligned on 2048-sector boundaries
Total free space is 2531261 sectors (1.2 GiB)

Number  Start (sector)    End (sector)  Size       Code  Name
   1           2048          616447  300.0 MiB  8300  Linux filesystem
root@ivschemelev:/home/ivschemelev#
```

Рис. 12: Создание XFS и установка метки xfsdisk

Рис. 13: Создание EXT4, метка ext4disk и опции монтирования

Рис. 14: Монтирование /dev/sdb5 в /mnt/tmp и проверка

Рис. 15: Получение UUID и параметров через blkid

Рис. 16: Добавление записи в /etc/fstab для /mnt/data

```
root@ivschemelev:/home/ivschemelev# mount -a
mount: (hint) your fstab has been modified, but systemd still uses
       the old version; use 'systemctl daemon-reload' to reload.
root@ivschemelev:/home/ivschemelev# df -h
Filesystem                 Size  Used Avail Use% Mounted on
/dev/mapper/rl_vbox-root    45G  5.8G   40G  13% /
devtmpfs                   1.8G     0  1.8G   0% /dev
tmpfs                      1.8G   84K  1.8G   1% /dev/shm
tmpfs                      731M   13M  719M   2% /run
tmpfs                      1.0M     0  1.0M   0% /run/credentials/systemd-journald.service
/dev/sda2                  960M  412M  549M  43% /boot
tmpfs                      366M  140K  366M   1% /run/user/1000
tmpfs                      366M   60K  366M   1% /run/user/0
/dev/sdb1                  236M   20M  217M   9% /mnt/data
root@ivschemelev:/home/ivschemelev#
```

Рис. 17: Проверка автоматического монтирования

Самостоятельная работа

```
Command (? for help): p
Disk /dev/sdc: 3145728 sectors, 1.5 GiB
Model: VBOX HARDDISK
Sector size (logical/physical): 512/512 bytes
Disk identifier (GUID): 0A277B88-CFEB-4A6F-9B6E-F431D6502EA5
Partition table holds up to 128 entries
Main partition table begins at sector 2 and ends at sector 33
First usable sector is 34, last usable sector is 3145694
Partitions will be aligned on 2048-sector boundaries
Total free space is 1302461 sectors (636.0 MiB)

Number  Start (sector)    End (sector)  Size        Code  Name
   1            2048          616447  300.0 MiB   8300  Linux filesystem
   2          616448         1230847  300.0 MiB   8300  Linux filesystem
   3         1230848         1845247  300.0 MiB   8200  Linux swap

Command (? for help): w

Final checks complete. About to write GPT data. THIS WILL OVERWRITE EXISTING
PARTITIONS!!

Do you want to proceed? (Y/N): Y
OK; writing new GUID partition table (GPT) to /dev/sdc.
The operation has completed successfully.
root@ivschemelev:/home/ivschemelev# partprobe /dev/sdc
root@ivschemelev:/home/ivschemelev#
```

```
root@ivschemelev:/home/ivschemelev#
root@ivschemelev:/home/ivschemelev# mkfs.ext4 /dev/sdc2
mke2fs 1.47.1 (20-May-2024)
Creating filesystem with 307200 1k blocks and 76912 inodes
Filesystem UUID: 397e2311-797e-4490-b3a9-f703326e0342
Superblock backups stored on blocks:
        8193, 24577, 40961, 57345, 73729, 204801, 221185

Allocating group tables: done
Writing inode tables: done
Creating journal (8192 blocks): done
Writing superblocks and filesystem accounting information: done

root@ivschemelev:/home/ivschemelev# tune2fs -L ext4disk2 /dev/sdc2
tune2fs 1.47.1 (20-May-2024)
root@ivschemelev:/home/ivschemelev# tune2fs -o acl,user_xattr /dev/sdc2
tune2fs 1.47.1 (20-May-2024)
root@ivschemelev:/home/ivschemelev# mkswap /dev/sdc3
Setting up swapspace version 1, size = 300 MiB (314568704 bytes)
no label, UUID=e95c3a0f-a9bf-44f3-811c-cbd748688f8d
root@ivschemelev:/home/ivschemelev#
```

Рис. 19: Форматирование ext4 и создание swap

Рис. 20: Проверка UUID разделов /dev/sdc2 и /dev/sdc3

```
  GNU nano 8.1                                    /etc/fstab

#
# /etc/fstab
# Created by anaconda on Fri Jan 16 11:32:16 2026
#
# Accessible filesystems, by reference, are maintained under '/dev/disk/'.
# See man pages fstab(5), findfs(8), mount(8) and/or blkid(8) for more info.
#
# After editing this file, run 'systemctl daemon-reload' to update systemd
# units generated from this file.
#
UUID=b552a213-cc13-43ac-b518-a1c5c52c8d5e /                xfs     defaults      0 0
UUID=7ac262fa-85bd-4a83-808b-8111bf61c34d /boot            xfs     defaults      0 0
UUID=033ba33a-9b4a-4407-81fd-3c8462b17b78 none             swap    defaults      0 0
UUID=dbdd84e0-a5ff-48a5-b476-9ba5eb00e66d /mnt/data xfs defaults 1 2
UUID=397e2311-797e-4490-b3a9-f703326e0342 /mnt/data-ext ext4 defaults 1 2
UUID=e95c3a0f-a9bf-44f3-811c-cbd748688f8d none swap defaults 0 0
```

Рис. 21: Добавление записей ext4 и swap в /etc/fstab

```
ivschemelev@ivschemelev:~$ su
Password:
root@ivschemelev:/home/ivschemelev# mount | grep mnt
/dev/sdb1 on /mnt/data type xfs (rw,relatime,seclabel,attr2,inode64,logbufs=8,logbsize=32k,noquota)
/dev/sdc2 on /mnt/data-ext type ext4 (rw,relatime,seclabel)
root@ivschemelev:/home/ivschemelev# free -m
              total        used        free      shared  buff/cache   available
Mem:           3652        1224        1979          17         683        2428
Swap:          4339           0        4339
root@ivschemelev:/home/ivschemelev# df -h
Filesystem            Size  Used Avail Use% Mounted on
/dev/mapper/rl_vbox-root   45G  5.8G   40G  13% /
devtmpfs              1.8G     0  1.8G   0% /dev
tmpfs                 1.8G   84K  1.8G   1% /dev/shm
tmpfs                 731M  9.3M  722M   2% /run
tmpfs                 1.0M     0  1.0M   0% /run/credentials/systemd-journald.service
/dev/sda2             960M  412M  549M  43% /boot
/dev/sdb1             236M   20M  217M   9% /mnt/data
/dev/sdc2             272M   14K  253M   1% /mnt/data-ext
tmpfs                 366M  140K  366M   1% /run/user/1000
tmpfs                 366M   60K  366M   1% /run/user/0
root@ivschemelev:/home/ivschemelev#
```

Рис. 22: Проверка mount, free и df -h после перезагрузки

Итоги работы

Заключение

Выполнена разметка дисков в схемах MBR и GPT, созданы разделы под Linux и swap, сформированы файловые системы XFS и EXT4 с метками и параметрами. Настроены ручное и автоматическое монтирование через /etc/fstab, выполнена проверка работоспособности конфигурации и подтверждена корректность настройки после перезагрузки.