Презентация по лабораторной работе №14

Партиции, файловые системы, монтирование

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Цели и задачи работы

Цель

Получить практические навыки: - разметки дисков (MBR, GPT), - создания файловых систем (XFS, EXT4), - монтирования вручную и через `/etc/fstab`.

Ход выполнения

Добавление дисков и просмотр устройств

```
root@eragdzhabekova:/home/eragdzhabekova# fdisk -l
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/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/sda: 40 GiB, 42949672960 bytes, 83886080 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: A16344AA-1DD6-431F-9F16-4F4C72AADFEC
```

Создание MBR-раздела на /dev/sdb

```
root@eragdzhabekova:/home/eragdzhabekova# 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 0x8138caf2.

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 MBR-раздела на /dev/sdb

```
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: 0x8138caf2

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

root@eragdzhabekova:/home/eragdzhabekova#
```

Проверка добавленного раздела

```
root@eragdzhabekova:/home/eragdzhabekova# fdisk /dev/sdb -l
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: 0x8138caf2

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

  11        0      59894 sr0
   8       16    1572864 sdb
   8       17     307200 sdb1
   8       32    1572864 sdc
   8        0   41943040 sda
   8        1       1024 sda1
   8        2    1048576 sda2
   8        3   40891392 sda3
 253        0   38748160 dm-0
 253        1    2142208 dm-1
root@eragdzhabekova:/home/eragdzhabekova# partprobe /dev/sdb
root@eragdzhabekova:/home/eragdzhabekova#
```

Создание расширенного и логического разделов

```
root@eragdzhabekova:/home/eragdzhabekova#
root@eragdzhabekova:/home/eragdzhabekova# 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):
First sector (616448-3145727, default 616448):
Last sector, +/-sectors or +/-size{K,M,G,T,P} (616448-3145727, default 3145727):

Created a new partition 2 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@eragdzhabekova:/home/eragdzhabekova#
```

Создание расширенного и логического разделов

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

  11        0      59894 sr0
   8       16    1572864 sdb
   8       17     307200 sdb1
   8       18          0 sdb2
   8       21     307200 sdb5
   8       32    1572864 sdc
   8        0   41943040 sda
   8        1       1024 sda1
   8        2    1048576 sda2
   8        3   40891392 sda3
 253        0   38748160 dm-0
 253        1    2142208 dm-1
root@eragdzhabekova:/home/eragdzhabekova# fdisk /dev/sdb -l
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: 0x8138caf2

Device     Boot  Start     End Sectors  Size Id Type
/dev/sdb1         2048  616447  614400  300M 83 Linux
/dev/sdb2       616448 3145727 2529280  1.2G  5 Extended
/dev/sdb5       618496 1232895  614400  300M 83 Linux
root@eragdzhabekova:/home/eragdzhabekova#
```

Создание SWAP

```
root@eragdzhabekova:/home/eragdzhabekova#
root@eragdzhabekova:/home/eragdzhabekova# 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 (1,2,5,6, 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@eragdzhabekova:/home/eragdzhabekova#
```

Создание SWAP

```
root@eragdzhabekova:/home/eragdzhabekova#
root@eragdzhabekova:/home/eragdzhabekova# mkswap /dev/sdb6
Setting up swapspace version 1, size = 300 MiB (314568704 bytes)
no label, UUID=d20eae34-da62-4c53-b70e-3d1b12c530e5
root@eragdzhabekova:/home/eragdzhabekova# swapon /dev/sdb6
root@eragdzhabekova:/home/eragdzhabekova# free -m
               total        used        free      shared  buff/cache   available
Mem:            1705         829         170          10         874         875
Swap:           2391         492        1899
root@eragdzhabekova:/home/eragdzhabekova#
```

Рис. 8: Активация SWAP

Создание GPT раздела /dev/sdc

```
root@eragdzhabekova:/home/eragdzhabekova# 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): 322C8A50-3BED-4F2D-B632-ABB735A633F2
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
```

Рис. 9: GPT-разметка диска

Проверка таблицы разделов GPT

```
  11        0      59894 sr0
   8       16    1572864 sdb
   8       17     307200 sdb1
   8       18          1 sdb2
   8       21     307200 sdb5
   8       22     307200 sdb6
   8       32    1572864 sdc
   8       33     307200 sdc1
   8        0   41943040 sda
   8        1       1024 sda1
   8        2    1048576 sda2
   8        3   40891392 sda3
 253        0   38748160 dm-0
 253        1    2142208 dm-1
root@eragdzhabekova:/home/eragdzhabekova# gdisk  /dev/sdc -l
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): 740E5AC5-63BB-44CE-9907-6CF17D1DC1D9
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@eragdzhabekova:/home/eragdzhabekova#
```

XFS и EXT4

```
root@eragdznabekova:/home/eragdznabekova#
root@eragdzhabekova:/home/eragdzhabekova# mkfs.xfs /dev/sdb1
meta-data=/dev/sdb1              isize=512    agcount=4, agsize=19200 blks
         =                       sectsz=512   attr=2, projid32bit=1
         =                       crc=1        finobt=1, sparse=1, rmapbt=1
         =                       reflink=1    bigtime=1 inobtcount=1 nrext64=1
         =                       exchange=0
data     =                       bsize=4096   blocks=76800, imaxpct=25
         =                       sunit=0      swidth=0 blks
naming   =version 2              bsize=4096   ascii-ci=0, ftype=1, parent=0
log      =internal log           bsize=4096   blocks=16384, version=2
         =                       sectsz=512   sunit=0 blks, lazy-count=1
realtime =none                   extsz=4096   blocks=0, rtextents=0
root@eragdzhabekova:/home/eragdzhabekova# xfs_admin -L xfsdisk /dev/sdb1
writing all SBs
new label = "xfsdisk"
root@eragdzhabekova:/home/eragdzhabekova#
root@eragdzhabekova:/home/eragdzhabekova# mkfs.ext4 /dev/sdb5
mke2fs 1.47.1 (20-May-2024)
Creating filesystem with 307200 1k blocks and 76912 inodes
Filesystem UUID: 5f367681-1e00-44f7-9dd4-0792f4294e9c
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@eragdzhabekova:/home/eragdzhabekova# tune2fs -L ext4disk /dev/sdb5
tune2fs 1.47.1 (20-May-2024)
root@eragdzhabekova:/home/eragdzhabekova# tune2fs -o acl,user_xattr /dev/sdb5
tune2fs 1.47.1 (20-May-2024)
root@eragdzhabekova:/home/eragdzhabekova#
```

Ручное монтирование файловой системы

```
root@eragdzhabekova:/home/eragdzhabekova#
root@eragdzhabekova:/home/eragdzhabekova# mkdir -p /mnt/tmp
root@eragdzhabekova:/home/eragdzhabekova# mount/ dev/sdb5 /m
media/ mnt/
root@eragdzhabekova:/home/eragdzhabekova# mount /dev/sdb5 /mnt/tmp/
root@eragdzhabekova:/home/eragdzhabekova# mount | grep mnt
/dev/sdb5 on /mnt/tmp type ext4 (rw,relatime,seclabel)
root@eragdzhabekova:/home/eragdzhabekova# umount /dev/sdb5
root@eragdzhabekova:/home/eragdzhabekova# mount | grep mnt
root@eragdzhabekova:/home/eragdzhabekova#
```

Рис. 13: Монтирование и размонтирование ext4

Автоматическое монтирование (fstab)

```
#
# /etc/fstab
# Created by anaconda on Tue Sep  2 13:36:12 2025
#
# 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=8b2472dc-425d-41d8-8467-33d0d494721c /                       xfs     defaults        0 0
UUID=cb3af6cd-5f59-4910-b434-e468636a28fc /boot                   xfs     defaults        0 0
UUID=b5b1c162-96da-4267-9a89-79cba6d2cf63 none                    swap    defaults        0 0
UUID=d8a7ec27-4205-4145-8538-1374cd68c774 /mnt/data               xfs     defaults        1 2
```

Рис. 14: Настройка fstab

Самостоятельная часть

Добавление двух GPT-разделов

```
Command (? for help): n
Partition number (2-128, default 2):
First sector (34-3145694, default = 616448) or {+-}size{KMGTP}:
Last sector (616448-3145694, default = 3143679) or {+-}size{KMGTP}: +300M
Current type is 8300 (Linux filesystem)
Hex code or GUID (L to show codes, Enter = 8300):
Changed type of partition to 'Linux filesystem'

Command (? for help): n
Partition number (3-128, default 3):
First sector (34-3145694, default = 1230848) or {+-}size{KMGTP}:
Last sector (1230848-3145694, default = 3143679) or {+-}size{KMGTP}: +300M
Current type is 8300 (Linux filesystem)
Hex code or GUID (L to show codes, Enter = 8300): 8200
Changed type of partition to 'Linux swap'

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): 740E5AC5-63BB-44CE-9907-6CF17D1DC1D9
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
```

Форматирование и монтирование

```
root@eragdzhabekova:/home/eragdzhabekova#
root@eragdzhabekova:/home/eragdzhabekova# partprobe /dev/sdc
root@eragdzhabekova:/home/eragdzhabekova#
root@eragdzhabekova:/home/eragdzhabekova# mkfs.ext4 /dev/sdc2
mke2fs 1.47.1 (20-May-2024)
Creating filesystem with 307200 1k blocks and 76912 inodes
Filesystem UUID: ccc57e1a-c39d-474c-9d11-1d998b392ba0
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@eragdzhabekova:/home/eragdzhabekova# tune2fs -L ext4disk2 /dev/sdc2
tune2fs 1.47.1 (20-May-2024)
root@eragdzhabekova:/home/eragdzhabekova# tune2fs -o acl,user_xatrr /dev/sdc2
tune2fs 1.47.1 (20-May-2024)
Invalid mount option set: acl,user_xatrr
root@eragdzhabekova:/home/eragdzhabekova# tune2fs -o acl,user_xattr /dev/sdc2
tune2fs 1.47.1 (20-May-2024)
root@eragdzhabekova:/home/eragdzhabekova# mkswap /dev/sdc3
Setting up swapspace version 1, size = 300 MiB (314568704 bytes)
no label, UUID=cf9a09f5-02d0-4ae4-92fe-0c3f703aeaae
```

Форматирование и монтирование

```
eragdzhabekova@eragdzhabekova:~$ 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)
eragdzhabekova@eragdzhabekova:~$ df -h
Filesystem                Size  Used Avail Use% Mounted on
/dev/mapper/rl_vbox-root   37G  6.1G   31G  17% /
devtmpfs                  4.0M     0  4.0M   0% /dev
tmpfs                     853M   84K  853M   1% /dev/shm
tmpfs                     342M  7.0M  335M   3% /run
tmpfs                     1.0M     0  1.0M   0% /run/credentials/systemd-journald.service
/dev/sdb1                 236M   20M  217M   9% /mnt/data
/dev/sda2                 960M  377M  584M  40% /boot
/dev/sdc2                 272M   14K  253M   1% /mnt/data-ext
tmpfs                     171M  140K  171M   1% /run/user/1000
/dev/sr0                   59M   59M     0 100% /run/media/eragdzhabekova/VBox_GAs_7.1.12
eragdzhabekova@eragdzhabekova:~$ free -m
               total        used        free      shared  buff/cache   available
Mem:            1705        1131         274          12         455         573
Swap:           2391           3        2388
eragdzhabekova@eragdzhabekova:~$
```

Рис. 17: Автоподключение и активированный swap

Итоги работы

Вывод

- Созданы разделы с использованием MBR и GPT.
- Выполнено форматирование в XFS и EXT4.
- Настроено монтирование вручную и через `/etc/fstab`.
- Создан и активирован swap.
- Получены практические навыки администрирования дискового пространства в Linux.