Лабораторная работа №14

Партиции, файловые системы, монтирование

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Цель работы

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

Ход выполнения работы

- Добавлены два диска: disk1 и disk2
- Создан основной раздел /dev/sdb1

```
root@mhemraev:~#
root@mhemraev:~# fdisk -l
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: 490E1E37-C6C5-42CC-89F2-6F771162FAA5

Device       Start      End  Sectors Size Type
/dev/sda1     2048     4095     2048   1M BIOS boot
/dev/sda2     4096  2101247  2097152   1G Linux extended boot
/dev/sda3  2101248 83884031 81782784  39G Linux LVM


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
```

- Добавлен расширенный раздел **/dev/sdb2**
- Создан логический раздел **/dev/sdb5** размером 300 МиБ

```
root@mhemraev:~# 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.
```

Создание раздела подкачки (swap)

- Создан раздел **/dev/sdb6**
- Изменён тип раздела на **82 (Linux swap)**

```
root@mhemraev:~#
root@mhemraev:~# 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):
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.
```

- Для диска /dev/sdc создана таблица GPT
- Добавлен раздел /dev/sdc1 размером 300 МиБ, тип 8300 (Linux filesystem)

```
root@mhemraev:~#
root@mhemraev:~# 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): 67FACBAC-ED02-46DE-B240-B8D4C3ED9DB9
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)
```
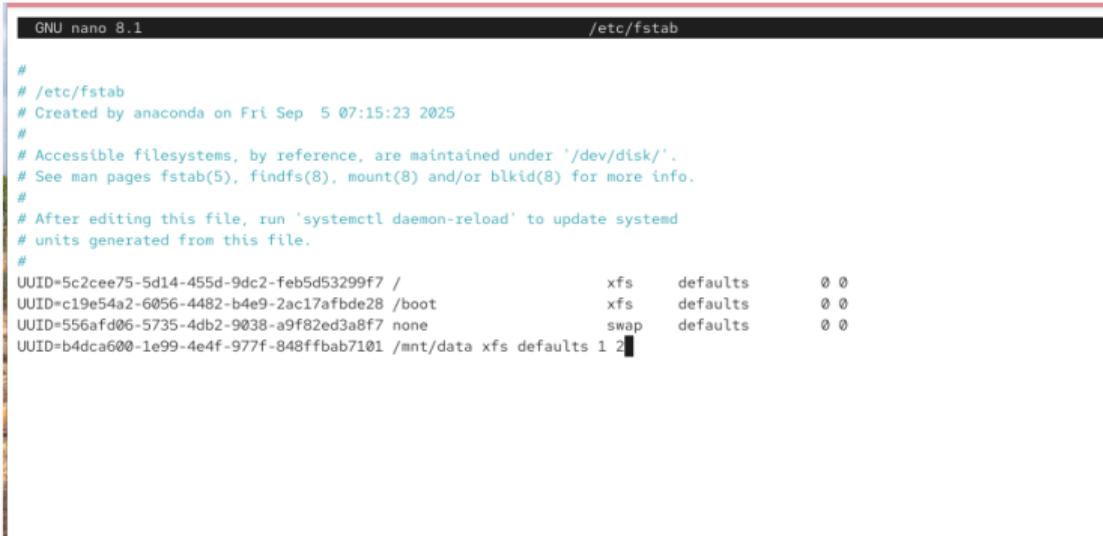
- /dev/sdb1 отформатирован в XFS
- /dev/sdb5 отформатирован в EXT4

```
root@mhemraev:~#
root@mhemraev:~# 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@mhemraev:~# xfs_admin -L xfsdisk /dev/sdb1
writing all SBs
new label = "xfsdisk"
root@mhemraev:~# mkfs.ext4 /dev/sdb5
mke2fs 1.47.1 (20-May-2024)
Creating filesystem with 307200 1k blocks and 76912 inodes
Filesystem UUID: c81adf70-cbe9-42d8-a156-7653cc061417
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
```

- Вручную смонтирован /dev/sdb5 в /mnt/tmp
- Добавлены записи в /etc/fstab для автоматического монтирования

Рис. 6: Монтирование файловых систем

- На **/dev/sdc** созданы два GPT-раздела по 300 МиБ

```
root@mhemraev:~#
root@mhemraev:~# gdisk /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.

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): w

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

- **/dev/sdc2** — файловая система **EXT4**
- **/dev/sdc3** — область подкачки **swap**

```
root@mhemraev:~#
root@mhemraev:~# mkfs.ext4 /dev/sdc2
mke2fs 1.47.1 (20-May-2024)
Creating filesystem with 307200 1k blocks and 76912 inodes
Filesystem UUID: 09b45499-77ef-457c-a9b6-a785b4c0aa81
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@mhemraev:~# tune2fs -L ext4disk2 /dev/sdc2
tune2fs 1.47.1 (20-May-2024)
root@mhemraev:~# tune2fs -o acl,user_xattr /dev/sdc2
tune2fs 1.47.1 (20-May-2024)
root@mhemraev:~# mkswap /dev/sdc3
Setting up swapspace version 1, size = 300 MiB (314568704 bytes)
no label, UUID=0878cfdb-e250-4a80-8392-9633e970d3e1
root@mhemraev:~# blkid
/dev/mapper/rl_vbox-swap: UUID="556afd06-5735-4db2-9038-a9f82ed3a8f7" TYPE="swap"
/dev/sdb5: LABEL="ext4disk" UUID="c81adf70-cbe9-42d8-a156-7653cc061417" BLOCK_SIZE="1024" TYPE="ext4" PARTUUID="c6edbe4b-05"
/dev/sdb1: LABEL="xfsdisk" UUID="b4dca600-1e99-4e4f-977f-848ffbab7101" BLOCK_SIZE="512" TYPE="xfs" PARTUUID="c6edbe4b-01"
/dev/sdb6: UUID="aeb50951-16b3-4f0d-ad15-3448cb6bcbcc" TYPE="swap" PARTUUID="c6edbe4b-06"
/dev/mapper/rl_vbox-root: UUID="5c2cee75-5d14-455d-9dc2-feb5d53299f7" BLOCK_SIZE="512" TYPE="xfs"
/dev/sda2: UUID="c19e54a2-6056-4482-b4e9-2ac17afbde28" BLOCK_SIZE="512" TYPE="xfs" PARTUUID="020d53fb-a0f6-4e96-9565-62d375f1b73c"
/dev/sda3: UUID="ZQFliL-WFoA-siqD-3o73-BcxG-2R27-EX37LJ" TYPE="LVM2_member" PARTUUID="68fa2afc-07cd-4c8f-9e05-73facf522a05"
/dev/sdc2: LABEL="ext4disk2" UUID="09b45499-77ef-457c-a9b6-a785b4c0aa81" BLOCK_SIZE="1024" TYPE="ext4" PARTLABEL="Linux filesystem" PAR
TUUID="3af20970-12f5-498f-8d3a-e5a75355f62f"
/dev/sdc3: UUID="0878cfdb-e250-4a80-8392-9633e970d3e1" TYPE="swap" PARTLABEL="Linux swap" PARTUUID="35f01b88-b2d9-4519-b32b-9761d5a6d82
a"
/dev/sdc1: PARTLABEL="Linux filesystem" PARTUUID="c5872a5c-7d13-4f52-99e5-83c979ddae67"
```

- Добавлены записи в **/etc/fstab**


```
#
# /etc/fstab
# Created by anaconda on Fri Sep  5 07:15:23 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=5c2cee75-5d14-455d-9dc2-feb5d53299f7 /                       xfs     defaults        0 0
UUID=c19e54a2-6056-4482-b4e9-2ac17afbde28 /boot                   xfs     defaults        0 0
UUID=556afd06-5735-4db2-9038-a9f82ed3a8f7 none                    swap    defaults        0 0
UUID=b4dca600-1e99-4e4f-977f-848ffbab7101 /mnt/data xfs defaults 1 2
UUID=09b45499-77ef-457c-a9b6-a785b4c0aa81 /mnt/data-ext ext4 defaults 1 2
UUID=0878cfdb-e250-4a80-8392-9633e970d3e1 none swap defaults 0 0
```

Рис. 9: Редактирование файла /etc/fstab для автоматического монтирования

11/13

- Проверка показала успешное монтирование и активацию swap

```
mhemraev@mhemraev:~$
mhemraev@mhemraev:~$ mount | grep mnt
/dev/sdb1 on /mnt/data type xfs (rw,relatime,seclabel,attr2,inode64,logbufs=8,logsize=32k,noquota)
/dev/sdc2 on /mnt/data-ext type ext4 (rw,relatime,seclabel)
mhemraev@mhemraev:~$ 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
mhemraev@mhemraev:~$ free -m
              total        used        free      shared  buff/cache   available
Mem:           1705        1188         220          11         528         516
Swap:          2391          17        2374
mhemraev@mhemraev:~$
```

Рис. 10: Проверка монтирования и состояния swap

Итоги работы

Вывод

В ходе лабораторной работы освоены: - создание разделов MBR и GPT; - форматирование файловых систем XFS и EXT4; - создание и активация раздела подкачки; - настройка автоматического монтирования через **/etc/fstab**.

Все операции завершились успешно, разделы корректно монтируются при запуске системы.