Лабораторная работа №14

Партиции, файловые системы, монтирование

Эзиз Хатамов

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Российский университет дружбы народов, Москва, Россия

Цель работы

Основная цель

Получение навыков разметки дисков (MBR/GPT), создания файловых систем, настройки области подкачки и монтирования разделов в Linux.

Процесс работы

Подключение дисков и проверка

- Подключены диски /dev/sdb и /dev/sdc

```
ehatamov@ehatamov:~$ su
Password:
root@ehatamov:/home/ehatamov#
root@ehatamov:/home/ehatamov# 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: 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: 05768CDA-6F65-4991-BF87-77C95B4CB4B6

Device       Start       End   Sectors Size Type
/dev/sda1     2048      4095      2048   1M BIOS boot
```

Создание первичного раздела

- Создан раздел /dev/sdb1
- Размер: 300 MiB

```
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: 0x1676f35a

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@ebatamov:/home/ebatamov#
```

- Тип: Linux (MBR)

Создание расширенного и логического разделов

- Создан расширенный раздел **sdb2**
- Логический раздел **sdb5** на 300 MiB

```
root@ehatamov:/home/ehatamov# partprobe /dev/sdb
root@ehatamov:/home/ehatamov# 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):
```

Создание swap

- Создан sdb6
- Тип: 82 (Linux swap)
- Активация: `mkswap`, `swapon`

```
root@ehatamov:/home/ehatamov# 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.
Syncing disks.
```

Проверка структуры GPT-диска

- Используем диск /dev/sdc
- Разметка отсутствовала
- Создана новая GPT

```
root@ehatamov:/home/ehatamov#
root@ehatamov:/home/ehatamov# gdisk /dev/sdc -l
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): 32E30744-414D-416D-839B-0A7975BA4929
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
```

Создание раздела GPT

- Раздел **sdc1**
- Размер: **300 MiB**
- Тип: **8300 — Linux filesystem**

```
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.

Command (? for help): n
Partition number (1-128, default 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): 29300745-AB51-40DD-8A8E-82309CA74C7C
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
```

Форматирование XFS

- Создана XFS на **sdb1**
- Метка: *xfsdisk*

```
root@ehatamov:/home/ehatamov#
root@ehatamov:/home/ehatamov# 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@ehatamov:/home/ehatamov# xfs_admin -L xfsdisk /dev/sdb1
writing all SBs
new label = "xfsdisk"
root@ehatamov:/home/ehatamov#
root@ehatamov:/home/ehatamov# mkfs.ext4 /dev/sdb5
mke2fs 1.47.1 (20-May-2024)
Creating filesystem with 307200 1k blocks and 76912 inodes
Filesystem UUID: e5452ea7-3da7-46ff-a077-630a6db8d1f9
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
```

Форматирование EXT4

- Создана EXT4 на sdb5
- Метка: *ext4disk*
- Настроены параметры mount: `acl,user_xattr`

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

Рис. 6: Форматирование EXT4

Ручное монтирование EXT4

- Создана точка `/mnt/tmp`
- Монтирование → проверка → размонтирование

```
root@ehatamov:/home/ehatamov#
root@ehatamov:/home/ehatamov# mkdir -p /mnt/data
root@ehatamov:/home/ehatamov# blkid
/dev/mapper/rl_vbox-swap: UUID="78a31a9d-c249-4414-9df1-2d2286788460" TYPE="swap"
/dev/sdb2: PTTYPE="dos" PARTUUID="1676f35a-02"
/dev/sdb5: LABEL="ext4disk" UUID="e5452ea7-3da7-46ff-a077-630a6db8d1f9" BLOCK_SIZE="1024" TYPE="ext4" PARTUUID="1676f35a-05"
/dev/sdb1: LABEL="xfsdisk" UUID="ed1c25dc-2647-4c50-bfa0-c99d743a761e" BLOCK_SIZE="512" TYPE="xfs" PARTUUID="1676f35a-01"
/dev/sdb6: UUID="082ba4f2-4a74-4310-b9ac-cbfc4fa6279d" TYPE="swap" PARTUUID="1676f35a-06"
/dev/mapper/rl_vbox-root: UUID="1bd2a005-2188-4c5c-9199-35740475d33d" BLOCK_SIZE="512" TYPE="xfs"
/dev/sdc1: PARTLABEL="Linux filesystem" PARTUUID="69d1272a-174a-413c-8811-44ec057b6400"
/dev/sda2: UUID="3b66e587-c1d0-4819-b1c7-ef76d4f199ec" BLOCK_SIZE="512" TYPE="xfs" PARTUUID="efc97782-8dec-47c4-a5a4-9c1ab4630d18"
/dev/sda3: UUID="VytoCr-UvjL-aNM3-dnIK-f94v-a24A-wIM5po" TYPE="LVM2_member" PARTUUID="bece1047-d1aa-4fd4-8916-ca4675313f25"
/dev/sda1: PARTUUID="4be31256-c3be-4301-90a7-bd708bc3cc1c"
root@ehatamov:/home/ehatamov# blkid /dev/sdb1
/dev/sdb1: LABEL="xfsdisk" UUID="ed1c25dc-2647-4c50-bfa0-c99d743a761e" BLOCK_SIZE="512" TYPE="xfs" PARTUUID="1676f35a-01"
root@ehatamov:/home/ehatamov#
```

Рис. 7: Ручное монтирование

Автомонтирование через /etc/fstab

- Получены UUID через `blkid`
- Добавлена строка для sdb1 → /mnt/data
- Проверено через `mount -a`

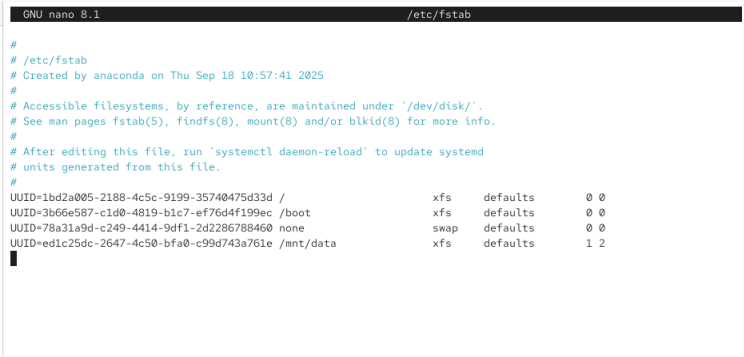

Рис. 8: fstab настройка

Самостоятельная работа

Создание двух GPT-разделов

- **sdc2** — EXT4, 100 MiB
- **sdc3** — swap, 100 MiB
- Настроены параметры `acl,user_xattr`

```
root@ehatamov:/home/ehatamov#
root@ehatamov:/home/ehatamov# 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'
```

Форматирование и настройка swap

```
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
root@ehatamov:/home/ehatamov# partprobe /dev/sdc
root@ehatamov:/home/ehatamov# mkfs.ext4 /dev/sdc2
mke2fs 1.47.1 (20-May-2024)
Creating filesystem with 307200 1k blocks and 76912 inodes
Filesystem UUID: 439a9259-0dbf-49ea-b8d8-281ae78e73c0
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@ehatamov:/home/ehatamov# tune2fs -L ext4disk2 /dev/sdc2
tune2fs 1.47.1 (20-May-2024)
root@ehatamov:/home/ehatamov# tune2fs -o acl.user_xattr /dev/sdc2
tune2fs 1.47.1 (20-May-2024)
Invalid mount option set: acl.user_xattr
root@ehatamov:/home/ehatamov# tune2fs -o acl,user_xattr /dev/sdc2
tune2fs 1.47.1 (20-May-2024)
root@ehatamov:/home/ehatamov# mkswap /dev/sdc3
Setting up swapspace version 1, size = 300 MiB (314568704 bytes)
no label, UUID=2f492596-e4dd-4200-aac5-bebc6b288105
root@ehatamov:/home/ehatamov#
```

Автомонтирование новых разделов

- EXT4 → /mnt/data-ext
- swap → автоматическая активация
- Проверено после перезагрузки

```
#
# /etc/fstab
# Created by anaconda on Thu Sep 18 10:57:41 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=1bd2a005-2188-4c5c-9199-35740475d33d /                       xfs     defaults        0 0
UUID=3b66e587-c1d0-4819-b1c7-ef76d4f199ec /boot                   xfs     defaults        0 0
UUID=78a31a9d-c249-4414-9df1-2d2286788460 none                    swap    defaults        0 0
UUID=ed1c25dc-2647-4c50-bfa0-c99d743a761e /mnt/data               xfs     defaults        1 2
UUID=439a9259-0dbf-49ea-b8d8-281ae78e73c0 /mnt/data-ext           ext4    defaults        1 2
UUID=2f492596-e4dd-4200-aac5-bebc6b288105 none                    swap    defaults        0 0
```

Рис. 11: fstab настройка 2

Проверка монтирования и swap

```
ehatamov@ehatamov:~$
ehatamov@ehatamov:~$ 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)
ehatamov@ehatamov:~$ df -h
Filesystem               Size  Used Avail Use% Mounted on
/dev/mapper/rl_vbox-root   45G  6.0G   40G  14% /
devtmpfs                 4.0M     0  4.0M   0% /dev
tmpfs                    1.8G   84K  1.8G   1% /dev/shm
tmpfs                    731M  1.3M  730M   1% /run
tmpfs                    1.0M     0  1.0M   0% /run/credentials/systemd-journald.service
/dev/sda2                960M  377M  584M  40% /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
ehatamov@ehatamov:~$ free -m
               total        used        free      shared  buff/cache   available
Mem:            3652        1319        1620           9         946        2333
Swap:           4339           0        4339
ehatamov@ehatamov:~$
```

Рис. 12: Проверка системы

Итоги работы

Вывод

- Изучена разметка дисков в схемах **MBR** и **GPT**
- Созданы и настроены файловые системы **XFS** и **EXT4**
- Освоено ручное и автоматическое монтирование
- Настроены и активированы разделы подкачки
- Закреплены навыки работы с `/etc/fstab` и UUID