Лабораторная работа №14

Партиции, файловые системы и монтирование

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Цель работы

Основная цель

Получить практические навыки создания разделов, форматирования файловых систем и настройки монтирования в Linux.

Создание MBR-разделов

Просмотр дисков

```
raliev@raliev:su Password:
root@raliev:/home/raliev# fdisk -l
Disk  /dev/sda:  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/sdc: 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: E16FD8A3-7EC0-4BAB-A0F0-AE93645E9726
Device     Start     End     Sectors     Size     Type
/dev/sdcl     2048     4095     2048     1M     BIOS boot
/dev/sdc2     4096     2101247     2097152     1G     Linux
extended boot
/dev/sdc3     2101248     83884031     81782784     39G
Linux     LVM

Disk /dev/mapper/rl_vbox-root: 35.05 GiB, 37635489792 bytes, 73506816 sectors
```

Создание основного 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: 0x703b6746

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):
I First sector (2048-3145727, default 2048):
■ Last sector, +/-sectors or +/-size{K,M,G,T,P} (2048-3145727, default 3145727):
+300M

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

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

root@raliev:/home/raliev# |
```

Рис. 2: Создание основного раздела

Создание расширенного и логического разделов

```
хоотуха uxev : ) поте/ ха Ltevw
root@raliev:/home/raliev# 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)


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

D Created a new partition 5 of type Linux' and of size 300 MLB.
4
Command (m for help): w
The partition table has been altered.
Calling ioctl() to re-read partition table.
Syncing disks.

root@raliev:/home/raliev# \
```

Создание раздела под

```
root@raliev:/home/raliev# 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 +/-si2e-fK,M,G,T,P} (1234944-3145727, default
3145727):

Created a new partition 6 of type 'Linux' and of size 3®0 MiB.

Command (m for help): t
Partition number (1,2,5,6, default 6):
Hex code or alias (type L to list all): S2

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

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

root@raliev:/home/raliev#
```

Рис. 4: Создание раздела подкачки

Создание GPT-разделов

Старт gdisk и создание нового раздела

```
Disk identifier (GUID): D8A89095-3BF0-4508-9D95-8407C210B529 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@raliev:/home/raliev#
root@raliev:/home/raliev# gdisk /dev/sda
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^KMGTPJ: -»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): w

Final checks complete. About to write GPT data. THIS WILL OVERWRITE EXISTING PARTITIONS!!
Do you want to proceed? (Y/N): Y
■ i ■   "   i   :   ■   7/17
The operation has completed successfully.
```

Просмотр таблицы GPT

```
8        0    1572864 sda
8        1     307200 sda1
8       16    1572864 sdb
8       17     307200 sdb1 0
8       18     sdb2 307200
8       21     sdb5 307200
8       22     sdb6 41943040
8       32     sdc 1024 sde1
8       33     1048576 sde2
8       34     40891392 sde3
8       35
11       0     1048575    sr0
253      0      36753408
253      dm-0
                4136960
                1
root@raliev:/home/raltev# gdisk -l /dev/sda -1 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/sda: 3145728 sectors, 1.5 GiB Model: VBOX HARDDISK
Sector size (logieal/physieal): 512/512 bytes
Disk identifier (GUID): 8234F68E-D79F-46EF-A653-8D3B46D7AA7A
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)
ll • •" I '■:.I :  "■ : ч ч "  ll.'  8/17
1    2048    616447    300.0 MiB 8300 Linux filesystem
rootsraliev:/home/raltev#
```

Форматирование файловых систем

Форматирование XFS и EXT4

```
root@raliev:/home/raliev#
root@raliev:/home/raliev# mkfs.xfs
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
data                             exchanged
                                 bsize=4096   blocks=76800, imaxpct=25
naming =version 2 log            sunit=0      swidth=0 blks
        =internal log            bsxze=4096   ascii-ci=0, ftype=1, parent=0
                                 bsize=4096   blocks=1384, version=2
realtime =none                   sectsz=512   sunxt=0 blks, lazy-count=1
                                 extsz=4096   blocks=0, rtextents=0
root@raliev:/home/raliev# xfs_admin -L xfsdisk /dev/sdb1
writing all SBs
new label = "xfsdisk"
root@raliev:/home/raliev# mkfs.ext4 /dev/sdb5 mke2fs 1.47.1
(20-May-2024)
Creating filesystem with 307200 lk blocks and 76912 inodes
Filesystem UUID: lbdc4aad-3442-45f9-b057-2lf3fd2d07l4
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@raliev:/home/raliev# tune2fs -L ext4disk /dev/sdb5
tune2fs 1.47.1 (20-May-2024)
root@raliev:/home/raliev# tune2fs -o acl,user_xattr /dev/sdb5
tune2fs 1.47.1 (20-May-2024)
```

Монтирование разделов

Ручное монтирова

```
root@raliev:/home/raliev# mkdir -p /mnt/tmp root@raliev:/home/raliev# mount /dev/sdb5 /mnt/tmp
root@raliev:/home/raliev# mount | grep mnt /dev/sdb5 on /mnt/tmp type ext4 (rw,relatime,seclabel)
root@raliev:/home/raliev# umount /dev/sdb5 root@raliev:/home/raliev# mount | grep mnt root@raliev:/home/raliev#
mkdir -p /mnt/data root@raliev:/home/raliev# blkid
/dev/mapper/rl_vbox-swap: UUID='43296ceb-b959-4fcf-8f70-625d0f6dfe00' TYPE='swap'
/dev/sdb2: PTTYPE='dos' PARTUUID='703b6746-02'
/dev/sdb5: LABEL='ext4disk' UUID='lbdc4aad-3442-45f9-b057-21f3fd2d0714' BLOCK_SIZE='1024' TYPE='ext4'
PARTUUID='703b6746-05' /dev/sdbl: LABEL="xfsdisk" UUID='7b8716b8-fa43-4cll-ade0-57f582ca8728' BLOCK_SIZE='512'
TYPE='xfs' PARTUUID='703b6746-01' /dev/sdb6: UUID='4b6c6f45-e436-48b4-bl9d-cd01a56ada04' TYPE='swap'
PARTUUID='703b6746-06'
/dev/mapper/rl_vbox-root: UUID='3cfbe4aa-6099-4ffb-94d9-9225442b08ab' BLOCK_SIZE='512' TYPE='xfs'
/dev/sdc2: UUID='7b8ald93-2813-4d48-8617-3be8699122aa' BLOCK_SIZE='512' TYPE='xfs' PARTUUID='f3598d69-bf6a-48b2-
bdf3-c325d6e87b4d
/dev/sdc3: UUID='pyR9II-hilN-TXK2-VIRP-odco-8ZMb-6f2T7Z' TYPE='LVM2_member' PARTUUID='6ea3700e-27e8-4b63-ac9a-
2dd25a43a4b6'


/dev/sdcl: PARTUUID='255db8c9-9841-47cf-b0a5-8486dfll0ebe'
/dev/sdal: PARTLABEl='Linux filesystem' PARTUUID='3bfa007d-26d3-44d2-abcd-
01586dl924b8
root@raliev:/home/raliev#
```

Рис. 8: UUID для устройств

Автоматическое монтирование чер

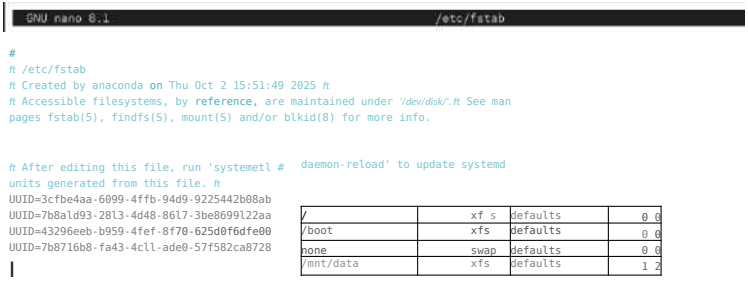

Рис. 9: Редактирование fstab

Проверка монтирова

```
root@ralxev:/home/xaltev# root@raliev:/home/raliev# mount -a
mount: (hint) your fstab has been modified, but systemd still uses
the old version; use "systemctl daemon-reload' to reload.
```

root@raliev:/home/raliev#	df -h				
Filesystem	Size	Used	Avail	Use%	Mounted on
/dev/mapper/rl_vbox-root	35G	5.9G	30G	17%	/
devtmpfs	4.0M	0	4.0M	0%	/dev
tmpfs	1.8G	84K	1.8G	1%	/dev/shm
tmpfs	731M	11M	721M	2%	/run
tmpfs	1.0M	0	1.0H	0%	/run/credentials/systemd-journald.service
/dev/sdc2	960 M	377M	584M	40%	/boot
tmpfs	366H	148K	366M	1%	/run/user/1000
tmpfs	366M	60K	366M	1%	/run/user/0
/dev/sdbl root@raliev:/home/raliev#	236M 1	20M	217M	9%	/mnt/data

Рис. 10: Проверка df -h

Самостоятельная часть

Создание двух GPT-разделов по 100 MiB

```
g  raliev@raliev:/home/raliev
^AP^^o^presen^^^
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{KMGTPJ: ♦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/sda: 3145728 sectors, 1.5 GiB
Model: VBOX HARDDISK
Sector size (logical/physical): 512/512 bytes
Disk identifier (GUID): 8234F68E-D79F-46EF-A653-8D3B46D7AA7A
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	: (sector)	End (sector;	) Size	Code	Name	
1	2048	616447	300.0 MiB	8300	Linux	filesyster
2						
3	616448	1230847	300.0 MiB	8300	Linux	filesyster

Форматирование EXT4 и настройка swap

```
root@raliev:/home/raliev# mkfs.ext4 /dev/sda2 mke2fs 1.47.1 (20-May-2024)
Creating filesystem with 307200 lk blocks and 76912 inodes Filesystem UUID: 9c32754f-0ff7-41f4-83d0-4c6844797287
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@raliev:/home/raliev# tune2fs -L ext4disk2 /dev/sda2 tune2fs 1.47.1 (20-May-2024)
root@raliev:/home/raliev# tune2fs -o acl,user_xattr /dev/sda2 tune2fs 1.47.1 (20-May-2024)
root@raliev:/home/raliev# mkswap /dev/sda3
Setting up swapspace version 1, size = 300 MiB (314568704 bytes) no label, UUID=fl346f70-6f29-4ebd-83b6-
f6e927ec3b4e
root@raliev:/home/raliev# blkid /dev/sda2
/dev/sda2:    LABEL='ext4disk2'    UUID='9c32754f-0ff7-41f4-83d0-4c6844797287'    BLOCK_SIZE='1024'    TYPE='ext4'
PARTLABEL='Linux filesyste m' PARTUUID='aab6d917-e99f-4136-bc8b-c4881d984b4a"
root@raliev:/home/raliev# blkid /dev/sda3
/dev/sda3:  UUID='fl346f70-6f29-4ebd-83b6-f6e927ec3b4e'  TYPE='swap'  PARTLABEL='Linux  swap'  PARTUUID='3edbba5d-
baa2-4806-ae91-75789 67eel03'
root@raliev:/home/raliev# Ш
```

Рис. 12: Создание EXT4 и swap

Настройка fstab

```
# /etc/fstab
# Created by anaconda on Thu Oct 2 15:51:49 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=3cfbe4aa-6099-4ffb-94d9-9225442b08ab /                       xfs     defaults        0 0
UUID=7b8a1d93-2813-4d48-9617-3be86991224e /boot                   xfs     defaults        0 0
UUID=43296ceb-b959-4fcf-8f70-625d0f6dfe00 none                    swap    defaults        0 0
UUID=7b8716b8-fa43-4c11-ade0-57f582ca8728 /mnt/data               xfs     defaults        1 2
UUID=9c32754f-0ff7-41f4-83d0-4c6844797287 /mnt/data-ext           ext4    defaults        1 2
UUID=f1346f70-6f29-4ebd-82b6-f6e927ec3b4e none                    swap    defaults        1 2
```

Рис. 13: fstab для новых разделов

Проверка после перезагрузки

```
rai\ev@rai\ev:
raliev@raliev:~S mount | grep mnt
/dev/sdcl on /mnt/data type xfs (rw.relatime,seelabel,attr2,■ node64,logbufs=8,logbsize=32k,noquota)
/dev/sdb2 on /mnt/data-ext type ext4 (rw,relative,seelabel)
raliev@raliev:~$
raliev@raliev:df -h
Filesystem                  Size  Used Avail Use% Mounted on
/dev/mapper/rl_vbox-root    356    5.9G30G   17% /
devtmpfs                    4.0M       0  4.0M   0% /dev
tmpf s                      1.8G     84 K  1.8G   1% /dev/shm
tmpfs                       731M   9.3M 722M   2% /run
tmpf s                      1.0M       0  1.0M   0% /run/eredential
/dev/sda2                   960M   377M 584M  40% /boot
/dev/sdcl                   236M    20M 217M   9% /mnt/data
/dev/sdb2                   272M    14 K 253M   1% /mnt/data-ext
tmpfs                       366H   140K 366M   1% /run/user/1000
raliev@raliev:
■
raliev@raliev:          total        used        free      buff/eaehe   ailable
              Mem: 3653        1281        1937         667        2371
Swap:         4339           0           4339
raliev@raliev:~$ |
```

Рис. 14: Проверка монтирования и swap

Итоги работы

Вывод

В результате работы были изучены методы управления разделами и файловыми системами в Linux. Были созданы разделы в разметках MBR и GPT, сформированы файловые системы XFS и EXT4, настроено автоматическое монтирование через /etc/fstab и активировано пространство подкачки. Полученные навыки позволяют эффективно управлять дисковым пространством и обеспечивать корректную работу системы.