

Part 1

Создал массив RAID 5 из 5 дисков (каждый диск по 10G):

```
/dev/md0:
  Version : 1.2
  Creation Time : Fri May 28 13:05:36 2021
    Raid Level : raid5
    Array Size : 41906176 (39.96 GiB 42.91 GB)
  Used Dev Size : 10476544 (9.99 GiB 10.73 GB)
    Raid Devices : 5
    Total Devices : 5
 Persistence : Superblock is persistent

 Update Time : Sat May 29 01:59:43 2021
   State : clean
 Active Devices : 5
 Working Devices : 5
 Failed Devices : 0
 Spare Devices : 0


 Layout : left-symmetric
 Chunk Size : 512K

Consistency Policy : resync

        Name : localhost.localdomain:0 (local to host localhost.localdomain)
        UUID : 3bd6fddf:ef74956d:a8627590:ccc0b1e4
        Events : 18

   Number   Major   Minor   RaidDevice State
     0         8       16           0  active sync  /dev/sdb
     1         8       32           1  active sync  /dev/sdc
     2         8       48           2  active sync  /dev/sdd
     3         8       64           3  active sync  /dev/sde
     5         8      80           4  active sync  /dev/sdf
```

Создал раздел /data, смонтировал массив /dev/md0. Общий объем такой:

```
[acme@localhost ~]$ df -h
Filesystem                Size      Used Avail Use% Mounted on
/dev/mapper/centos-root    17G        1.2G    16G    7% /
devtmpfs                  475M         0   475M    0% /dev
tmpfs                     487M         0   487M    0% /dev/shm
tmpfs                     487M        7.7M   479M    2% /run
tmpfs                     487M         0   487M    0% /sys/fs/cgroup
/dev/sda1                 1014M       133M    882M   14% /boot
/dev/md0                   40G         49M    38G    1% /data
tmpfs                     98M         0    98M    0% /run/user/1000
```

Подключил автомонтирование изменив конфигурационный файл /etc/fstab:

```
/dev/md0 /data ext4 defaults 1 2
```

Наполнил некоторыми данными раздел /data:

```
[acme@localhost ~]$ ls /data/
Important.txt  lost+found  test.txt
[acme@localhost ~]$
```

Part 2

Пометил диск /sdb как сбойный, после чего отключил от массива:

```
/dev/md0:
  Version : 1.2
  Creation Time : Fri May 28 13:05:36 2021
  Raid Level : raid5
  Array Size : 41906176 (39.96 GiB 42.91 GB)
  Used Dev Size : 10476544 (9.99 GiB 10.73 GB)
  Raid Devices : 5
  Total Devices : 4
  Persistence : Superblock is persistent

  Update Time : Sat May 29 02:28:21 2021
  State : clean, degraded
  Active Devices : 4
  Working Devices : 4
  Failed Devices : 0
  Spare Devices : 0

  Layout : left-symmetric
  Chunk Size : 512K

Consistency Policy : resync

        Name : localhost.localdomain:0 (local to host localhost.localdomain)
        UUID : 3bd6fddf:ef74956d:a8627590:ccc0b1e4
        Events : 21

   Number   Major   Minor   RaidDevice State
    ---
    0         0         0         0      removed
    1         8        32         1      active sync  /dev/sdc
    2         8        48         2      active sync  /dev/sdd
    3         8        64         3      active sync  /dev/sde
    5         8       80         4      active sync  /dev/sdf
```

Добавил новый диск /sdg в массив:

```
/dev/md0:
  Version : 1.2
  Creation Time : Fri May 28 13:05:36 2021
  Raid Level : raid5
  Array Size : 41906176 (39.96 GiB 42.91 GB)
  Used Dev Size : 10476544 (9.99 GiB 10.73 GB)
  Raid Devices : 5
  Total Devices : 5
  Persistence : Superblock is persistent

  Update Time : Sat May 29 02:38:43 2021
  State : clean, degraded, recovering
  Active Devices : 4
  Working Devices : 5
  Failed Devices : 0
  Spare Devices : 1

  Layout : left-symmetric
  Chunk Size : 512K

Consistency Policy : resync

  Rebuild Status : 19% complete

        Name : localhost.localdomain:0 (local to host localhost.localdomain)
        UUID : 3bd6fddf:ef74956d:a8627590:ccc0b1e4
        Events : 36

   Number   Major   Minor   RaidDevice State
    ---
    6         8        96         0      spare rebuilding /dev/sdg
    1         8        32         1      active sync  /dev/sdc
    2         8        48         2      active sync  /dev/sdd
    3         8        64         3      active sync  /dev/sde
    5         8       80         4      active sync  /dev/sdf
```

Расширил массив до 6 дисков:

```
/dev/md0:
  Version : 1.2
  Creation Time : Fri May 28 13:05:36 2021
  Raid Level : raid5
  Array Size : 52382720 (49.96 GiB 53.64 GB)
  Used Dev Size : 10476544 (9.99 GiB 10.73 GB)
  Raid Devices : 6
  Total Devices : 6
  Persistence : Superblock is persistent

  Update Time : Sat May 29 03:02:08 2021
  State : clean
  Active Devices : 6
  Working Devices : 6
  Failed Devices : 0
  Spare Devices : 0


  Layout : left-symmetric
  Chunk Size : 512K

Consistency Policy : resync

        Name : localhost.localdomain:0 (local to host localhost.localdomain)
        UUID : 3bd6fddf:ef74956d:a8627590:ccc0b1e4
        Events : 197

   Number   Major   Minor   RaidDevice State
     6         8       96         0   active sync   /dev/sdg
     1         8       32         1   active sync   /dev/sdc
     2         8       48         2   active sync   /dev/sdd
     3         8       64         3   active sync   /dev/sde
     5         8       80         4   active sync   /dev/sdf
     7         8       16         5   active sync   /dev/sdb
```

Увеличил размер раздела /data:

```
[root@localhost ~]# df -h
Filesystem                Size      Used Avail Use% Mounted on
/dev/mapper/centos-root    17G       1.2G    16G   7% /
devtmpfs                   475M         0   475M   0% /dev
tmpfs                      487M         0   487M   0% /dev/shm
tmpfs                      487M       7.7M   479M   2% /run
tmpfs                      487M         0   487M   0% /sys/fs/cgroup
/dev/sda1                  1014M     133M    882M  14% /boot
/dev/md0                    50G        52M    47G   1% /data
tmpfs                      98M         0    98M   0% /run/user/1000
```

Part 3

Установил SAMBA сервер в системе. Сделал доступным раздел /data, открыл в проводнике Windows и наполнил данными:

» 192.168.140.129 » Common				
Имя	Дата изменения	Тип	Размер	
lost+found	28.05.2021 21:12	Папка с файлами		
МАН00402.MP4	23.02.2020 15:27	Файл "MP4"	208 572 КБ	

Отключил два диска в массиве, статус рейда FAILED:

```
/dev/md0:
  Version : 1.2
  Creation Time : Fri May 28 13:05:36 2021
  Raid Level : raid5
  Array Size : 52382720 (49.96 GiB 53.64 GB)
  Used Dev Size : 10476544 (9.99 GiB 10.73 GB)
  Raid Devices : 6
  Total Devices : 4
  Persistence : Superblock is persistent

  Update Time : Mon May 31 04:59:18 2021
  State : clean, FAILED
  Active Devices : 4
  Working Devices : 4
  Failed Devices : 0
  Spare Devices : 0

  Layout : left-symmetric
  Chunk Size : 512K

Consistency Policy : resync

  Name : localhost.localdomain:0 (local to host localhost.localdomain)
  UUID : 3bd6fddf:ef74956d:a8627590:ccc0ble4
  Events : 214

Number Major Minor RaidDevice State
   6      8    96         0  active sync  /dev/sdg
   1      8    32         1  active sync  /dev/sdc
   2      8    48         2  active sync  /dev/sdd
   3      8    64         3  active sync  /dev/sde
  -       0     0         4  removed
  -       0     0         5  removed
```

Остановил массив, и пересобрал заново добавив последний диск который удалял:

```
[root@localhost ~]# mdadm --detail /dev/md0
/dev/md0:
    Version : 1.2
  Creation Time : Fri May 28 13:05:36 2021
    Raid Level : raid5
    Array Size : 52382720 (49.96 GiB 53.64 GB)
  Used Dev Size : 10476544 (9.99 GiB 10.73 GB)
    Raid Devices : 6
  Total Devices : 5
 Persistence : Superblock is persistent

 Update Time : Mon May 31 05:09:00 2021
   State : clean, degraded
 Active Devices : 5
Working Devices : 5
 Failed Devices : 0
 Spare Devices : 0


 Layout : left-symmetric
 Chunk Size : 512K

Consistency Policy : resync

        Name : localhost.localdomain:0 (local to host localhost.localdomain)
        UUID : 3bd6fddf:ef74956d:a8627590:ccc0ble4
        Events : 216


   Number  Major   Minor   RaidDevice State
     6         8       96           0  active sync  /dev/sdg
     1         8       32           1  active sync  /dev/sdc
     2         8       48           2  active sync  /dev/sdd
     3         8       64           3  active sync  /dev/sde
     5         8       80           4  active sync  /dev/sdf
     -         0         0           5 removed
```

Добавил 6-ой диск который удалял ранее:

```
    Update Time : Mon May 31 05:27:49 2021
      State : clean, degraded, recovering
 Active Devices : 5
Working Devices : 6
 Failed Devices : 0
 Spare Devices : 1


 Layout : left-symmetric
 Chunk Size : 512K

Consistency Policy : resync

Rebuild Status : 65% complete

        Name : localhost.localdomain:0 (local to host localhost.localdomain)
        UUID : 3bd6fddf:ef74956d:a8627590:ccc0ble4
        Events : 236


   Number  Major   Minor   RaidDevice State
     6         8       96           0  active sync  /dev/sdg
     1         8       32           1  active sync  /dev/sdc
     2         8       48           2  active sync  /dev/sdd
     3         8       64           3  active sync  /dev/sde
     5         8       80           4  active sync  /dev/sdf
     7         8       16           5  spare rebuilding /dev/sdb
```

Добавил 7-ой диск в массив:

```
Update Time : Mon May 31 05:52:04 2021
State : clean, reshaping
Active Devices : 7
Working Devices : 7
Failed Devices : 0
Spare Devices : 0

Layout : left-symmetric
Chunk Size : 512K

Consistency Policy : resync

Reshape Status : 1% complete
Delta Devices : 1, (6->7)

Name : localhost.localdomain:0 (local to host localhost.localdomain)
UUID : 3bd6fddf:ef74956d:a8627590:ccc0ble4
Events : 273
```

Number	Major	Minor	RaidDevice	State	
6	8	96	0	active sync	/dev/sdg
1	8	32	1	active sync	/dev/sdc
2	8	48	2	active sync	/dev/sdd
3	8	64	3	active sync	/dev/sde
5	8	80	4	active sync	/dev/sdf
7	8	16	5	active sync	/dev/sdb
8	8	112	6	active sync	/dev/sdh

Расширил раздел /data:

```
/dev/md0          59G  4.6G  52G   9% /data
```

Part 4

1. AWK

Суммирование всех физических разделов с помощью awk:

```
#!/bin/bash
echo "Please, input a letter: K M G, and press enter"
read letter
if --output=source,avail --block-size=$letter | grep /dev/ | awk '{sum += $2} END {print sum}'
```

Вывод:

```
[acme@localhost ~]$ ./free
Please, input a letter: K M G, and press enter
G
69
```

2. Вывод информации с помощью grep и cut

Создал скрипт на вывод информации по физическим дискам:

```
[acme@localhost ~]$ df | grep /dev/ | sed 's/\ \{1,\}/:/g' | cut -d':' -f4
16570904
497948
902960
54051640
[acme@localhost ~]$
```

Записал команду в скрипт ./freecut

Далее создал второй скрипт ./massive для чтения данных из ./freecut в массив и подсчета общей суммы:

```
#!/bin/bash
SCRIPT_PATH="./freecut"
OUTPUT=$( "$SCRIPT_PATH" )
read -a array <<< $OUTPUT
echo ${array[@]}
sum=0
for i in "${array[@]}"; do
    let sum+=i
done
echo $sum
```

Результат:

```
[acme@localhost ~]$ ./massive
16571160 497948 902960 54051640
72023708
```