mdadm

```
mdadm --create --verbose /dev/md0 --level=5 --raid-devices=5
/dev/sd{b,c,d,e,f}
```

```
[root@net ~]# lsblk
NAME            MAJ:MIN RM   SIZE RO TYPE MOUNTPOINT
sda               8:0    0    10G  0 disk
├─sda1            8:1    0   512M  0 part /boot/efi
├─sda2            8:2    0   512M  0 part /boot
└─sda3            8:3    0     9G  0 part
  ├─centos-root 253:0    0     8G  0 lvm  /
  └─centos-swap 253:1    0     1G  0 lvm  [SWAP]
sdb               8:16   0     2G  0 disk
└─md0             9:0    0     8G  0 raid5
sdc               8:32   0     2G  0 disk
└─md0             9:0    0     8G  0 raid5
sdd               8:48   0     2G  0 disk
└─md0             9:0    0     8G  0 raid5
sde               8:64   0     2G  0 disk
└─md0             9:0    0     8G  0 raid5
sdf               8:80   0     2G  0 disk
└─md0             9:0    0     8G  0 raid5
sr0              11:0    1   973M  0 rom
```

```
mkfs.xfs /dev/md0
```

```
mkdir /backup
```

```
echo "/dev/md0    /backup    xfs    defaults    0    0" >> /etc/fstab
```

```
# See man pages fstab(5), findfs(8), mount(8) and/or blkid(8) for more info
#
/dev/mapper/centos-root /                       xfs     defaults        0 0
UUID=530ba401-4c43-4e81-93af-a1ef0457adb4 /boot             xfs      defaults      0 0
UUID=C8D8-B0A6           /boot/efi               vfat    umask=0077,shortname=winnt 0 0
/dev/mapper/centos-swap swap                    swap    defaults        0 0
/dev/md0    /backup    xfs    defaults    0    0
```

```
cd /var/log
```

```
cp -r * /backup/
```

```
mdadm --query /dev/name-of-device
```

```
mdadm --detail /dev/md0
```
 – подробная инфа

```
/etc/mdadm.conf
```

Удаление диска

`mdadm /dev/md0 --fail /dev/sdf` – помечаем, как битый диск

```
[root@net backup]# mdadm /dev/md0 --fail /dev/sdf
mdadm: set /dev/sdf faulty in /dev/md0
[root@net backup]# mdadm --detail /dev/md0
/dev/md0:
            Version : 1.2
      Creation Time : Wed May 26 19:07:19 2021
         Raid Level : raid5
         Array Size : 8376320 (7.99 GiB 8.58 GB)
      Used Dev Size : 2094080 (2045.00 MiB 2144.34 MB)
       Raid Devices : 5
      Total Devices : 5
        Persistence : Superblock is persistent

        Update Time : Wed May 26 20:38:27 2021
              State : clean, degraded
     Active Devices : 4
    Working Devices : 4
     Failed Devices : 1
      Spare Devices : 0

             Layout : left-symmetric
         Chunk Size : 512K

Consistency Policy : resync

               Name : net:0  (local to host net)
               UUID : 47c4dc6a:1fc3a000:b58cdc89:b510e169
             Events : 20

    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
       -       0        0        4        removed
```

`mdadm /dev/md0 --remove /dev/sdf` - удаляем

```
[root@net backup]# mdadm /dev/md0 --remove /dev/sdf
mdadm: hot removed /dev/sdf from /dev/md0
[root@net backup]# mdadm --detail /dev/md0
/dev/md0:
            Version : 1.2
      Creation Time : Wed May 26 19:07:19 2021
         Raid Level : raid5
         Array Size : 8376320 (7.99 GiB 8.58 GB)
      Used Dev Size : 2094080 (2045.00 MiB 2144.34 MB)
       Raid Devices : 5
      Total Devices : 4
        Persistence : Superblock is persistent

        Update Time : Wed May 26 20:40:01 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 : net:0  (local to host net)
               UUID : 47c4dc6a:1fc3a000:b58cdc89:b510e169
             Events : 21

    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
       -       0        0        4      removed
```

Подключаем новый диск к VM. Ресканируем диски.

echo "- - -" > /sys/class/scsi_host/host0/scan

echo "- - -" > /sys/class/scsi_host/host1/scan

echo "- - -" > /sys/class/scsi_host/host2/scan

lsblk

```
NAME             MAJ:MIN RM  SIZE RO TYPE  MOUNTPOINT
sda                8:0    0   10G  0 disk
├─sda1             8:1    0  512M  0 part  /boot/efi
├─sda2             8:2    0  512M  0 part  /boot
└─sda3             8:3    0    9G  0 part
  ├─centos-root  253:0    0    8G  0 lvm   /
  └─centos-swap  253:1    0    1G  0 lvm   [SWAP]
sdb                8:16   0    2G  0 disk
└─md0              9:0    0    8G  0 raid5 /backup
sdc                8:32   0    2G  0 disk
└─md0              9:0    0    8G  0 raid5 /backup
sdd                8:48   0    2G  0 disk
└─md0              9:0    0    8G  0 raid5 /backup
sde                8:64   0    2G  0 disk
└─md0              9:0    0    8G  0 raid5 /backup
sdf                8:80   0    2G  0 disk
sdg                8:96   0    2G  0 disk
```

Добавляем диск в массив

```
mdadm /dev/md0 --add /dev/sdg
```

```
[root@net backup]# mdadm --detail /dev/md0
/dev/md0:
           Version : 1.2
     Creation Time : Wed May 26 19:07:19 2021
        Raid Level : raid5
        Array Size : 8376320 (7.99 GiB 8.58 GB)
     Used Dev Size : 2094080 (2045.00 MiB 2144.34 MB)
      Raid Devices : 5
     Total Devices : 5
       Persistence : Superblock is persistent

       Update Time : Wed May 26 20:59:04 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 : net:0  (local to host net)
              UUID : 47c4dc6a:1fc3a000:b58cdc89:b510e169
            Events : 40

    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       96        4      active sync   /dev/sdg
```

cat /proc/mdstat - проверить состояние всех дисков

```
[root@net backup]# cat /proc/mdstat
Personalities : [raid6] [raid5] [raid4]
md0 : active raid5 sdg[5] sde[3] sdd[2] sdc[1] sdb[0]
      8376320 blocks super 1.2 level 5, 512k chunk, algorithm 2 [5/5] [UUUUU]
```

```
mdadm /dev/md0 --add /dev/sdf
```
 – диск добавится как hot-spare

```
mdadm -G -n 6
```
 – увеличиваем массив до 6 дисков

```
[root@net backup]# mdadm -G -n 6 /dev/md0
[root@net backup]# mdadm -D /dev/md0
/dev/md0:
            Version : 1.2
      Creation Time : Wed May 26 19:07:19 2021
         Raid Level : raid5
         Array Size : 10470400 (9.99 GiB 10.72 GB)
      Used Dev Size : 2094080 (2045.00 MiB 2144.34 MB)
       Raid Devices : 6
      Total Devices : 6
        Persistence : Superblock is persistent

        Update Time : Wed May 26 21:25:23 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 : net:0  (local to host net)
               UUID : 47c4dc6a:1fc3a000:b58cdc89:b510e169
             Events : 79

    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       96        4      active sync   /dev/sdg
       6       8       80        5      active sync   /dev/sdf
```

```
[root@net backup]# lsblk -l
NAME            MAJ:MIN RM  SIZE RO TYPE  MOUNTPOINT
sda               8:0    0   10G  0 disk
sda1              8:1    0  512M  0 part  /boot/efi
sda2              8:2    0  512M  0 part  /boot
sda3              8:3    0    9G  0 part
centos-root     253:0    0    8G  0 lvm   /
centos-swap     253:1    0    1G  0 lvm   [SWAP]
sdb               8:16   0    2G  0 disk
md0               9:0    0   10G  0 raid5 /backup
sdc               8:32   0    2G  0 disk
md0               9:0    0   10G  0 raid5 /backup
sdd               8:48   0    2G  0 disk
md0               9:0    0   10G  0 raid5 /backup
sde               8:64   0    2G  0 disk
md0               9:0    0   10G  0 raid5 /backup
sdf               8:80   0    2G  0 disk
md0               9:0    0   10G  0 raid5 /backup
sdg               8:96   0    2G  0 disk
md0               9:0    0   10G  0 raid5 /backup
sr0              11:0    1  973M  0 rom
[root@net backup]# df -Th
Filesystem              Type      Size  Used Avail Use% Mounted on
devtmpfs                devtmpfs  898M     0  898M   0% /dev
tmpfs                   tmpfs     910M     0  910M   0% /dev/shm
tmpfs                   tmpfs     910M  9.6M  900M   2% /run
tmpfs                   tmpfs     910M     0  910M   0% /sys/fs/cgroup
/dev/mapper/centos-root xfs       8.0G  1.6G  6.5G  20% /
/dev/sda2               xfs       509M  224M  286M  44% /boot
/dev/sda1               vfat      512M   12M  501M   3% /boot/efi
tmpfs                   tmpfs     182M     0  182M   0% /run/user/0
/dev/md0                xfs       8.0G   38M  8.0G   1% /backup
```
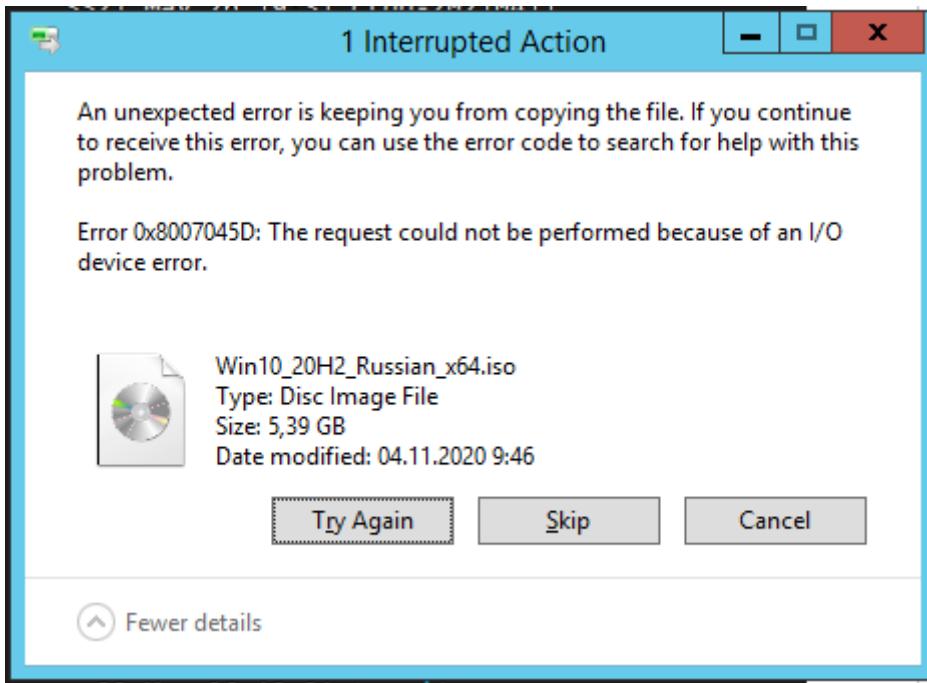
xfs_growfs /backup/ -d – увеличиваем размер FS

```
[root@net /]# df -Th
Filesystem              Type      Size  Used Avail Use% Mounted on
devtmpfs                devtmpfs  898M     0  898M   0% /dev
tmpfs                   tmpfs     910M     0  910M   0% /dev/shm
tmpfs                   tmpfs     910M  9.6M  900M   2% /run
tmpfs                   tmpfs     910M     0  910M   0% /sys/fs/cgroup
/dev/mapper/centos-root xfs       8.0G  1.6G  6.5G  20% /
/dev/sda2               xfs       509M  224M  286M  44% /boot
/dev/sda1               vfat      512M   12M  501M   3% /boot/efi
tmpfs                   tmpfs     182M     0  182M   0% /run/user/0
/dev/md0                xfs        10G   39M   10G   1% /backup
```

```
> /etc/mdadm.conf # создание конфиг файла

mdadm --examine --scan --config=mdadm.conf >> /etc/mdadm.conf

или

mdadm --examine --brief --scan --config=partitions >> /etc/mdadm.conf

или

mdadm -Ebsc partitions
```

Легенда: Во время копирования с винды в папку NFS удалял по одному диски. Один удалил – норм. Второй удалил – нарушение.


```
cat /etc/mdstat
```

```
[root@net backup]# cat /proc/mdstat
Personalities : [raid6] [raid5] [raid4]
md0 : active raid5 sdg[7](F) sdb[0] sdf[6](F) sde[3] sdd[2] sdc[1]
      10470400 blocks super 1.2 level 5, 512k chunk, algorithm 2 [6/4] [UUUU__]
```

!!! Здесь добавляю диски обратно в WorkStation

```
mdadm /dev/md0 --remove /dev/sdg /dev/sdf
```

```
[root@net backup]# mdadm /dev/md0 --remove /dev/sdg /dev/sdf
mdadm: hot removed /dev/sdg from /dev/md0
mdadm: hot removed /dev/sdf from /dev/md0
```

```
mdadm /dev/md0 --add /dev/sdg /dev/sdf
```

```
mdadm: /dev/md0 has failed so using --add cannot work and might destroy
mdadm: data on /dev/sdg.  You should stop the array and re-assemble it.
```

```
[root@net /]# mdadm --stop /dev/md0
mdadm: Cannot get exclusive access to /dev/md0:Perhaps a running process, mounted filesystem or active volume group?
```

```
umount: /backup: target is busy.
        (In some cases useful info about processes that use
         the device is found by lsof(8) or fuser(1))
```
– как с этим

побороться не знаю, только ребут

После

```
[root@net ~]# mdadm -D /dev/md0
/dev/md0:
           Version : 1.2
        Raid Level : raid0
      Total Devices : 6
       Persistence : Superblock is persistent

             State : inactive
    Working Devices : 6

              Name : net:0  (local to host net)
              UUID : 47c4dc6a:1fc3a000:b58cdc89:b510e1
            Events : 123

     Number   Major   Minor   RaidDevice

        -        8       16        -        /dev/sdb
        -        8       32        -        /dev/sdc
        -        8       48        -        /dev/sdd
        -        8       64        -        /dev/sde
        -        8       80        -        /dev/sdf
        -        8       96        -        /dev/sdg
[root@net ~]#
```

mdadm --stop /dev/md0

```
mdadm: stopped /dev/md0
```

mdadm --assemble --scan --run –force

```
mdadm: /dev/md/0 has been started with 6 drives.
[root@net ~]# mdadm -D /dev/md0
/dev/md0:
           Version : 1.2
     Creation Time : Wed May 26 19:07:19 2021
        Raid Level : raid5
        Array Size : 10470400 (9.99 GiB 10.72 GB)
     Used Dev Size : 2094080 (2045.00 MiB 2144.34 MB)
      Raid Devices : 6
      Total Devices : 6
       Persistence : Superblock is persistent

       Update Time : Fri May 28 17:32:43 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 : net:0  (local to host net)
              UUID : 47c4dc6a:1fc3a000:b58cdc89:b510e169
            Events : 123

     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
        7        8       96        4       active sync   /dev/sdg
        6        8       80        5       active sync   /dev/sdf
```

```
mdadm --assemble --force /dev/md0 /dev/sd[bcdefg] - так можно попробовать
пересобрать
```

На скрипт у меня хватило фантазии только на это

#!/bin/bash

count_all=$(df -$1 | grep "/dev/sd." | awk '{s +=$2} END {print s}')

count_free=$(df -$1 | grep "/dev/sd." | awk '{s +=$4} END {print s}')

echo "Всего дисковой памяти, $1: $count_all"

echo "Всего свободной памяти, $1: $count_free"

Другой вариант

#!/bin/bash

count_all=($(df -$1 | grep "/dev/sd.\|/dev/mapper" | awk ' {print $2} '))
total_all=0

for i in "${count_all[@]}"
do
  let total_all+=$i
done

count_free=($(df -$1 | grep "/dev/sd.\|/dev/mapper" | awk ' {print $4} '))
total_free=0

for i in "${count_free[@]}"
do
  let total_free+=$i
done

echo "Всего дисковой памяти, $1: $total_all"
echo "Всего свободной памяти, $1: $total_free"