

# Recovering a Failed QNAP Raid Volume

How to recover data from QNAP drives using testdisk from SystemRescueCd

## Pre-flight

**Given the following scenario:**

QNAP server was factory reset, clearing the software RAID information on the QNAP OS.

As such, all drives in the RAID were essentially orphaned. Data on the drives remained intact.

### Recovery Options:

In order to recover the information, we could proceed via many troubleshooting pathways, two of which I list below:

- Rebuilding the software RAID
- Recovering the data directly from the drives

I chose the second option, since I wasn't too handy with administration of the Linux Multiple Device Driver (**MD**), aka software RAID.

In this article, we will be recovering the data from **ONE** drive at a time, so it is best to plug in **ONLY ONE** of drives to be recovered, along with a **spare** drive on which the recovered data will be copied to.

### Recovery Software:

We will be using [SystemRescueCD](#) to perform the data recovery

I assume the following:

You've already booted the SystemRescueCD

You either have console or ssh access (or whatever other means) to the SystemRescueCD shell

You have the drive to be recovered and a spare plugged in to your system

**Lastly**, this is key in **Understanding QNAP volumes**:

QNAP utilizes Logical Volume Management (LVM) and the Linux MD software RAID technologies to manage its storage devices.

**Partition 3** Holds all the **data** on any given drive

Keep this in mind as you start digging for your data on the QNAP drives.

## Identify the Destination Drive

Before going through the recovery, you must prep the directory on which you will be copying the recovered data to.

With the specs on your hard drive already in mind, issue the list hardware command (**lshw**) to determine the device name to the drive:

```
lshw -short -c disk
```

Once you match the device information to that of the spare drive, you can proceed to initialize (wipe/clean) the drive or mount it if it's already prepared.

If the drive is already initialized, skip the next step, otherwise proceed ...

## Prepare the Destination Drive

You can initialize the drive for use on the SystemRescueCD as follows:

```
fdisk <device_name>, e.g. fdisk /dev/sda
```

Follow the prompts to create a **Linux Partition**

**Note:** Once the partition is created, the device you'll actually be acting against is <device\_name>logical\_partition\_number>, e.g. **/dev/sda1**

Once you've written the changes to the disk, you can proceed

to create the filesystem on the drive:

`mkfs -t <fs_type> <device_name_logical_partition_number>`, e.g.

**`mkfs -t ext4 /dev/sda1`**

or

`mkfs.<fstype> <device_name_logical_partition_number>`, e.g.

**`mkfs.ext4 ext4 /dev/sda1`**

Once the filesystem has been created, you can mount it.

Do so first by creating a directory on which the drive will be mounted, e.g.:

**`mkdir /mnt/recovery`**

## Mount the Destination Drive

Mounting the drive is quite easy, simply invoke the `mount` command, e.g.:

**`mount -t ext4 /dev/sda1 /mnt/recovery`**

Your destination drive is now ready to be used!

## Identify the Data Partition on the Source Drive

```
root@sysresccd /root # cat /proc/mdstat
Personalities : [linear] [multipath] [raid0] [raid1] [raid6] [raid5] [raid4] [raid10]
md321 : active raid1 sdb5[0]
      7168000 blocks super 1.0 [2/1] [U_]
      bitmap: 1/1 pages [4KB], 65536KB chunk

md13 : active raid1 sdb4[25]
      458880 blocks super 1.0 [24/1] [_U_____]
      bitmap: 1/1 pages [4KB], 65536KB chunk

md2 : active raid1 sdb3[0]
      3897063616 blocks super 1.0 [1/1] [U]

md256 : active raid1 sdb2[1]
      530112 blocks super 1.0 [2/1] [_U]
      bitmap: 0/1 pages [0KB], 65536KB chunk

md9 : active raid1 sdb1[25]
      530048 blocks super 1.0 [24/1] [_U_____]
      bitmap: 1/1 pages [4KB], 65536KB chunk
```

The following commands are to be issued from the SystemRescueCD session:

First, we need to determine what MD volumes the SystemRescueCD

has detected.

You can do so by displaying the contents of the mdstat file under /proc as follows:

```
cat /proc/mdstat
```

### Samlpe Output:

```
Personalities : [linear] [multipath] [raid0] [raid1]
[raid6] [raid5] [raid4] [raid10]
md321 : active raid1 sdb5[0]
        7168000 blocks super 1.0 [2/1] [U_]
        bitmap: 1/1 pages [4KB], 65536KB chunk

md13 : active raid1 sdb4[25]
        458880 blocks super 1.0 [24/1]
[_U_____]
        bitmap: 1/1 pages [4KB], 65536KB chunk

md2 : active raid1 sdb3[0]
        3897063616 blocks super 1.0 [1/1] [U]

md256 : active raid1 sdb2[1]
        530112 blocks super 1.0 [2/1] [_U]
        bitmap: 0/1 pages [0KB], 65536KB chunk

md9 : active raid1 sdb1[25]
        530048 blocks super 1.0 [24/1]
[_U_____]
        bitmap: 1/1 pages [4KB], 65536KB chunk
```

As you can see from the above output, there is a disk with a 3rd partition that is most likely an MD LVM volume.

I'd say there is a 90% chance that this is the drive and partition we're interested in.

Take note of the device information, in this case **/dev/sdb3**

# Invoke Testdisk Partiton Scan

```
root@sysresccd /root & testdisk /dev/sdb3

TestDisk 7.0, Data Recovery Utility, April 2015
Christophe GRENIER <grenier@cgsecurity.org>
http://www.cgsecurity.org

TestDisk is free software, and
comes with ABSOLUTELY NO WARRANTY.

Select a media (use Arrow keys, then press Enter):
>Disk /dev/sdb3 - 3990 GB / 3716 GiB - WDC WD40EZRX-00SPEB0

>[Proceed ] [ Quit ]

Note: Disk capacity must be correctly detected for a successful recovery.
If a disk listed above has incorrect size, check HD jumper settings, BIOS
detection, and install the latest OS patches and disk drivers.

Disk /dev/sdb3 - 3990 GB / 3716 GiB - WDC WD40EZRX-00SPEB0

Please select the partition table type, press Enter when done.
[ Intel ] Intel/PC partition
>[EFI GPT] EFI GPT partition map (Mac 1386, some x86_64...)
[ Humax ] Humax partition table
[ Mac ] Apple partition map
[ None ] Non partitioned media
[ Sun ] Sun Solaris partition
[ Xbox ] Xbox partition
[ Return ] Return to disk selection

Hint: None partition table type has been detected.
Note: Do NOT select 'None' for media with only a single partition. It's very
rare for a disk to be 'Non-partitioned'.

>[ Analyse ] Analyse current partition structure and search for lost partitions
[ Advanced ] Filesystem Utils
[ Geometry ] Change disk geometry
[ Options ] Modify options
[ Quit ] Return to disk selection

Note: Correct disk geometry is required for a successful recovery. 'Analyse'
process may give some warnings if it thinks the logical geometry is mismatched.

P=Primary D=Deleted
>[Quick Search] Try to locate partition

Disk /dev/sdb3 - 3990 GB / 3716 GiB - CHS 485161 255 63
Analyse cylinder 238/485160: 00%
```

So, again, we've determined the data to be on device /dev/sda3

The next step is to run testdisk against this device:

**testdisk /dev/sdb3**

In the ensuing dialog, choose the following order of actions:

Select a media ...: (choose the device, in this case /dev/sdb3)

## Proceed

Please select a partition table type ...: (choose **EFI GPT**)

## Analyze

## Quick Search

At this point, the drive scan will commence.

Once it completes, you'll be presented with a partition table as detected by testdisk.

## List Files for Recovery & Copy

```
Disk /dev/sdb3 - 3990 GB / 3716 GiB - CHS 485161 255 63
Partition      Start      End      Size in sectors
>P MS Data     41945088  7760570367  7718625280 [DataVol2]

Structure: Ok. Use Up/Down Arrow keys to select partition.
Use Left/Right Arrow keys to CHANGE partition characteristics:
                P=Primary D=Deleted
Keys A: add partition, L: load backup, T: change type, P: list files,
Enter: to continue
ext4 blocksize=4096 Large file Sparse SB Recover, 3951 GB / 3680 GiB

>drwxrwxrwx  0  0  4096  9-Jan-2016 19:55 .
drwxrwxrwx  0  0  4096  9-Jan-2016 19:55 ..
drwx----- 0  0 16384 31-Aug-2015 22:58 lost+found
drwxrwxrwx  0  0  4096 27-Dec-2015 18:25
-rw-----  0  0  8192 27-Dec-2015 04:06
drwxrwxrwx  0  0  4096  5-Sep-2015 12:52
drwx----- 0  0  4096 30-Oct-2015 02:53
drwx----- 0  0  4096  9-Jan-2016 19:53
lrwxrwxrwx  0  0    9  9-Jan-2016 19:55
drwxr-xr-x  0  0  4096  9-Jan-2016 19:55

                                Next
Use Right to change directory, h to hide deleted files
q to quit, : to select the current file, a to select all files
C to copy the selected files. c to copy the current file
```

In the resulting partition table option, select the partition you think contains the data

Press **shift + P**

This will print the files on the partition

Read the instructions at the bottom of the file listing ...

**q** to quit

**:** to select the current file

**a** to select all files

**shift + C** to copy the selected files

**c** to copy the current file

Once you invoke the copy action, you will be prompted to navigate to the destination path.

Hopefully you've already completed that in steps '**Prepare the Destination Drive**' and '**Mount the Destination Drive**'

Once the copy process is started, you'll be presented with a progress indication.

Sit tight. The wait is worth it.

## Sources

[SMB] HOW-TO RECOVER data from LVM volume on a PC (UX-500P)

<http://forum.qnap.com/viewtopic.php?t=93862>