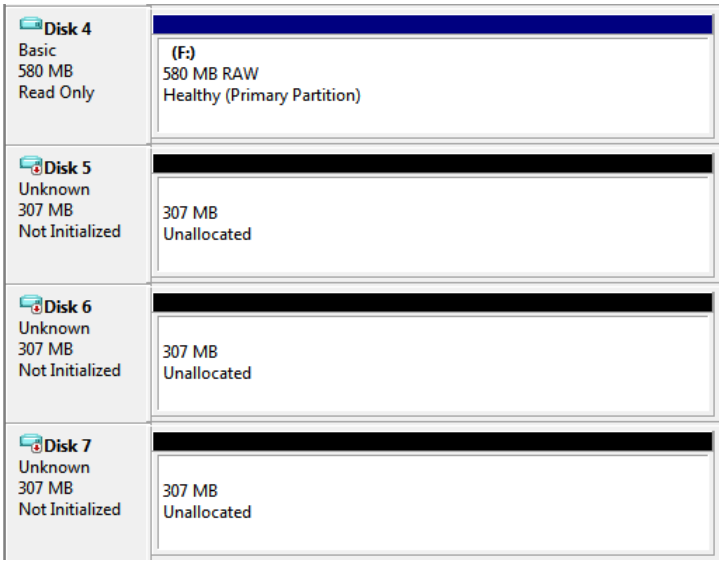
RAID Recovery course

Lesson 4 - RAID parity analysis

Practice part

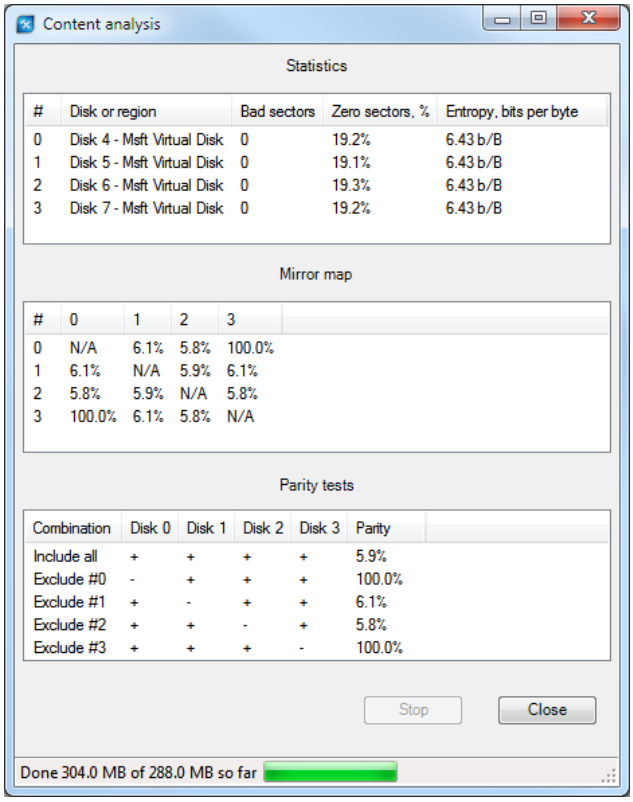
Task – Determine configuration of a parity-based RAID

Frist we need to load disk image files. Notice that disk image files you are offered to work with in this task are in VHD format rather than sector-by-sector disk copies, that's why they cannot be loaded in ReclaiMe Pro directly. So before loading you need to mount them using Disk Management. Open Disk Management, click *Action-Attach VHD,* and specify the location of disk image files one by one. You should get the following picture:



Let's analyze what we see in Disk Management. We see that one of the disks has a 580 MB partition that, given the size of each disk (307 MB), is very close to the **double** capacity of array member disk: $307\ MB * 2 = 614\ MB$. The first conclusion is that it cannot be a 4-disk RAID5 in which we should expect a partition three times larger in size than a RAID member disk: $307\ MB * 3 = 921\ MB$. The possible layouts are 4-disk RAID10, 3-disk RAID5, or 4-disk RAID6. Of these, RAID10 is the least probable because it should have had two copies of the partition table on two disks, while Disk Management only shows one.

Then launch ReclaiMe Pro, select the just mounted disks for the content analysis, and get the following picture:



First, look closely at the statistics as to ratio of zeros and average entropy. We see that all disks have the same ratio of zeros (~19%) and average entropy (6.43 b/B) meaning that all disks belong to one array.

Based on Disk Management, we guessed that we deal with either a 4-disk RAID10, 3-disk RAID5, or 4-disk RAID6; however, mirror map does not confirm a RAID10 layout since we would expect to see two mirror pairs. RAID6 does not match as well, because RAID6 requires no mirrors among its 4 disks. Preliminary conclusion is that the analyzed RAID is a 3-disk RAID5 with one hotspare (Disk 0 or Disk 3) being an identical copy of one array member disk due to, say, the rebuild.

Now it's time for parity analysis. Parity tests confirm our assumption about hotspare since:

- There is no parity for full disk set meaning the incorrect number of disks for the RAID5.
- There is 100% parity when excluding Disk 0 or Disk 3 indicating that Disk 0 or Disk 3 is a spare disk.

Conclusion

From four given disks, three disks form a RAID5 while one of them (Disk 0 or Disk 3) is a hotspare one. Further, we need to do entropy analysis on one of the disk sets – Disks 0, 1, 2 or Disks 1, 2, 3 - to get additional information about RAID configuration.