

Performance of the LOTAAS v.1 pipeline on cartesius

Time taken by the individual pipeline components per beam (24-core node)

fits2fil: 6min
 rfifind: 15min
 mpiprepsubband (253 trials): 3min
 single pulse search: 1min
 realfft: 10sec
 rednoise: 10sec
 accelsearch (-zmax=0 ; -numharm=16): 1min20sec
 accelsearch (-zmax=50 ; -numharm=16): 12min
 accelsearch (-zmax=50 ; -numharm=8): 5min
 accelsearch (-zmax=50 ; -numharm=8): 26min
 plots: 20sec
 python sifting and folding: 21min
 pfd scrunching: 5sec
 data copying: a few secs
 candidate scoring: a few secs

Total time spent for the first large set of DM trials (0-4000)

mpiprepsubband: 40min
 sp: 16min
 realfft: 3.5min
 rednoise: 3.5min
 accelsearch (zmax=0;numharm=16): 21min
 accelsearch (zmax=50;numharm=16): 192min
 accelsearch (zmax=50;numharm=8): 80min
 accelsearch (zmax=200;numharm=8): 416min

Total time spent for the second large set of DM trials (4000-10000)

mpiprepsubband: 24min
 sp: 8min
 realfft: 2min
 rednoise: 2min
 accelsearch (zmax=0;numharm=16): 11min
 accelsearch (zmax=50;numharm=16): 96min
 accelsearch (zmax=50;numharm=8): 40min
 accelsearch (zmax=200;numharm=8): 208min

% time alloc.	zmax=0;numharm=16	zmax=50;numharm=16	zmax=50;numharm=8	zmax=200;numharm=8
fil conversion	3	1	2	<1
rfifind	9	3	6	2
dedispersion	37	16	25	8
sp search	14	5	9	3
realfft	3	1	2	<1
rednoise	3	1	2	<1
accelsearch	18	67	46	81
folding	12	5	8	3
data copying/etc	1	1	1	<1

Total processing time per beam (zmax=0;numharm=16): ~3hours
Total processing time per beam (zmax=50;numharm=16): ~7hours
Total processing time per beam (zmax=50;numharm=8): ~5hours
Total processing time per beam (zmax=200;numharm=8): ~13h40m

Performance of the LOTAAS v.1 GPU pipeline on cartesius

mpiprepsubband (253 trials): 38sec

Data transferring (CEP\$/LTA)

32-bit to 8-bit downsampling on CEP2 (per observation): 6-8 hours
Transferring from CEP2 to LTA (per observation): 2-3 hours
Observation downloading on cartesius (1-core): ~8hours
Observation downloading on cartesius (home area, 8jobs in parallel.sh): <2hours

Benchmarks for filterbank creation with psrfits2fil

A series of tests were ran on dragnet (drg01), directly (now through slurm), on fits files from a random LOTAAS observation. Number of cores, means number of different fits files processed simultaneously. The total time is an extrapolation of this benchmark.

Only one test was ran for each occasion. Repeating them showed differences in execution time, but I doubt that the results change qualitatively.

Input/Output on the same disk

1-core:354sec
Total time for 16 files:5664sec

3-cores:630sec
Total time for 16 files:3360sec

4-cores:720sec
Total time for 16 files:2880sec

5-cores:1106sec
Total time for 16 files:3539sec

8-cores:1735sec
Total time for 16 files:3360sec

16-cores:3778sec
Total time for 16 files:3778sec

When writing the filterbank in the same disk with the fits file, the best performance is achieved by having 4 psrfits2fil instances running.

Input/output on different disks

1-core:329sec

Total time for 16 files:5264sec

4-cores:523sec

Total time for 16 files:2092sec

8-cores:901sec

Total time for 16 files:1802sec

16-cores:1513sec

Total time for 16 files:1513sec

24-cores (hyperthreaded):2252sec scales perfectly!

32-cores (hyperthreaded):3346sec performance loss already evident;~340 sec slower than expected

Using all the cores in the dragnet nodes gives the best performance. Moreover, hyperthreading behaves exactly as having the extra cores.

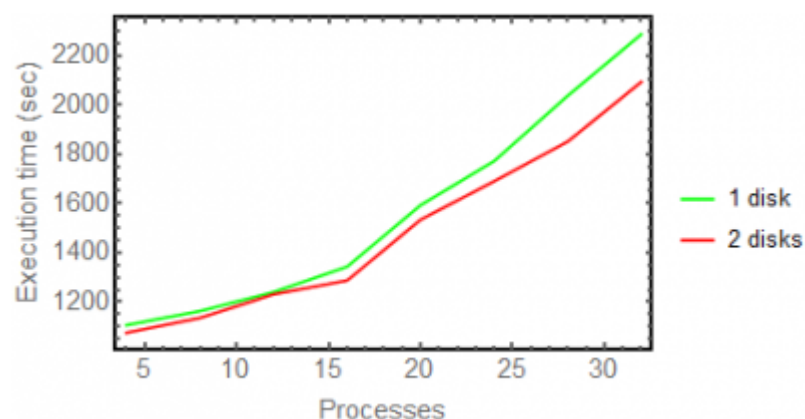
Moving a fil file from /data2 to /data1 takes 1 minute.

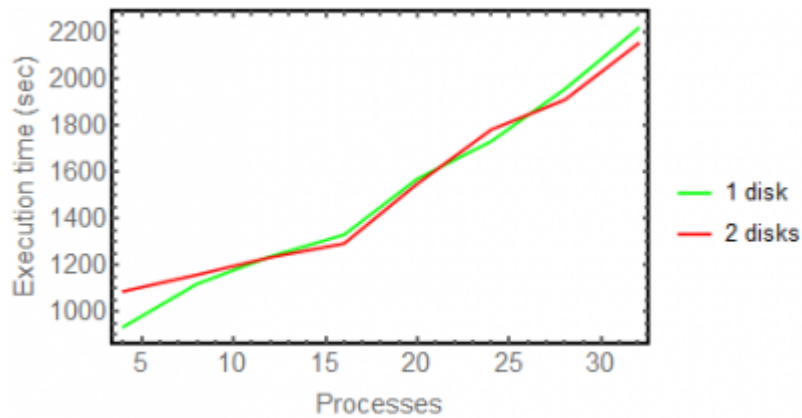
rfifind benchmarks

I ran the same tests twice.

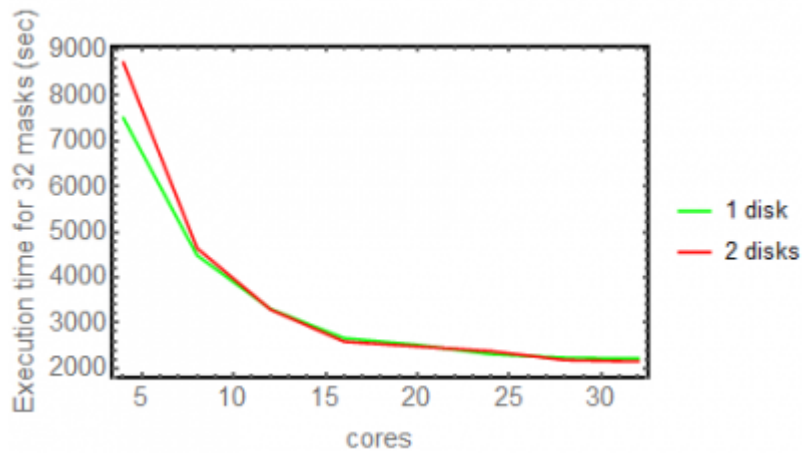
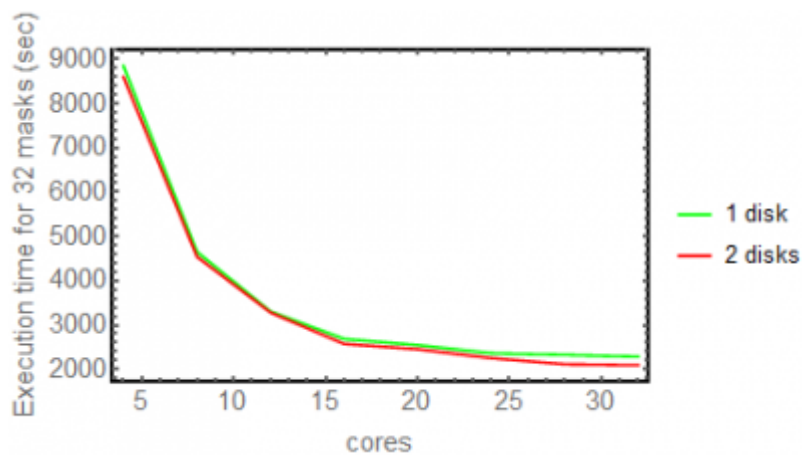
I created rfi masks running rfifind in parallel for 4,8,12,16,20,24,28 and 32 cores (>16 hyperthreaded).

In the following plots I plot the number of parallel instances of rfifind executed (x-axis) and the time taken for these to be completed (y-axis).





In the following plots, I extrapolated the above results in order to find the optimal number of parallel jobs in order to compute 32 rfi masks



From: <https://www.astron.nl/lofarwiki/> - **LOFAR Wiki**

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