mCBM Data challenge 12/07/23

Performances for StsHits, Sts unpacking and Event Building

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Logging during Data Challenge (cbmreco)

```
6: [11:28:04] INFO: Timeslice contains 1609649 STS hits and 3017780 STS clusters
6: [11:28:04] INFO: TS Processing time (Wall): 1607.01 ms
8: [11:28:04] INFO: Timeslice contains 13254068 STS Digis
8: [11:28:04] INFO: Timeslice contains 2190846 TOF Digis
8: [11:28:04] INFO: Timeslice contains 449046 BMON Digis
8: [11:28:04] INFO: Timeslice contains 3730829 MUCH Digis
8: [11:28:04] INFO: Timeslice contains 387049 RICH Digis
8: [11:28:04] INFO: Timeslice contains 13311046 STS Digis
8: [11:28:04] INFO: Timeslice contains 2239891 TOF Digis
8: [11:28:04] INFO: Timeslice contains 453419 BMON Digis
8: [11:28:04] INFO: Timeslice contains 3764984 MUCH Digis
8: [11:28:04] INFO: Timeslice contains 385597 RICH Digis
7: [11:28:04] WARNING: STS Hitfinder: Discarded 1085 pulser digis
8: [11:28:04] WARNING: STS Hitfinder: Discarded 1079 pulser digis
9: [11:28:04] INFO: Triggers: 63702, events 53864
8: [11:28:04] INFO: Triggers: 50918, events 41761
8: [11:28:04] INFO: Triggers: 52222, events 43154
9: [11:28:04] INFO: Timeslice contains 16209309 STS Digis
9: [11:28:04] INFO: Timeslice contains 2634163 TOF Digis
9: [11:28:04] INFO: Timeslice contains 562349 BMON Digis
9: [11:28:04] INFO: Timeslice contains 3772217 MUCH Digis
9: [11:28:04] INFO: Timeslice contains 503225 RICH Digis
9: [11:28:04] WARNING: STS Hitfinder: Discarded 1087 pulser digis
6: [11:28:04] ERROR: STS Hitfinder Chain: Hit bucket overflow! 1052202 hits were discarded!
6: [11:28:04] ERROR: STS Hitfinder Chain: Hit bucket overflow in module 4 with 1052198 (of 526096 max) hits!
6: [11:28:04] ERROR: STS Hitfinder Chain: Hit bucket overflow in module 5 with 1052196 (of 526096 max) hits!
6: [11:28:04] INFO: Timeslice contains 2263735 STS hits and 3852114 STS clusters
6: [11:28:04] INFO: TS Processing time (Wall): 1955.92 ms
9: [11:28:04] INFO: Timeslice contains 16424629 STS Digis
9: [11:28:04] INFO: Timeslice contains 2571227 TOF Digis
9: [11:28:04] INFO: Timeslice contains 568407 BMON Digis
9: [11:28:04] INFO: Timeslice contains 3762289 MUCH Digis
9: [11:28:04] INFO: Timeslice contains 482702 RICH Digis
aredelb@lxbk1131:/lustre/cbm/online$ tail -n 80 logs/reco.4162183.out
```

Logging at INFO-Level

Timestamps for:
- Number of digis (per System)

- Sts clusters and hits
- Sts „monster events"

- Event Buidling

Sts Hit reconstruction unpacking, events (cbmreco)

Run	OMP_Threads	Time range	#Hits	Hits / s	M.-Events	Sts-Digis / s	#1e6 Events/s
4160035	Undef.	10:02:48 - 10:05:15 147 s	8539311804	58e6	1000	89e6	No events built
4160681	Undef.	10:20:14 - 10:21:46 92 s	2708024615	29e6	583	65e6	No events built
4161690	Undef.	10:23:28 - 10:28:37 309 s	9161679381	30e6	1930	64e6	No events built
4161714	Undef.	10:32:33 - 10:37:40 308 s	9832031766	32e6	2058	69e6	No events built
4161837	Undef.	10:54:13 - 10:59:16 293 s	No Clusters, Hits	-	-	78e6	0.23
4162138	12	11:04:07 - 11:17:50 823 s	No Clusters, Hits	-	-	80e6	0.25
4162177	Undef.	11:18:08 - 11:21:25 197 s	No Clusters, Hits	-	-	85e6	0.26

Number of „Monster events"

Sts Hit reconstruction unpacking, events (cbmreco)

Run	OMP_Threads	Time range	#Hits	Hits / s	M.-Events	Sts-Digis / s	#1e6 Events/s
4162183	2	11:21:43 - 11:50:59 1756 s	55200477581	31e6	8269	66e6	0.15
4165468	12	11:51:42 - 12:22:17 1835 s	99278813060	54e6	6560	113e6	0.12
4176025	12	13:52:24 - 14:09:23 1019 s	46969046840	46e6	2948	97e6	0.10
4176043	12	14:09:39 - 14:12:26 167 s	10771477599	64e6	683	136e6	0.14
4176050	12	14:12:44 - 14:22:22 578 s	17558913388	30e6	3312	65e6	0.18
4176244	Undef. (still 12?)	14:22:38 - 14:25:27 159 s	6553305071	41e6	1355	87e6	0.25
4176262	12	14:28:48 - 14:54:16 1528 s	110697147736	72e6	22252	154e6	0.45
4177322	12	15:11:21 - 15:36:29 1508 s	No Sts hits	-	-	170e6	0.18

Sts Hit reconstruction (cbmreco_fairrun)

Run	OMP_Threads	Time range	#1e6 Events/s	
4179381	12			<FairRuntimeDb::initContainers()>: Error occured during initialization
4180474	Undef.			Issues
4180547	12			Could not open input file
4181016	Undef.			Unpacking EventBuilding
4181111	Undef.			params/config.yaml': not a valid identifier
4181113	Undef.			Unpacking EventBuilding
4181130	Undef.			Replacing existing TH1: digi_time_Sts (Potential memory leak)
4181289	Undef.			Unpacking EventBuilding - Potential memory leak
4181344	Undef.			Unpacking EventBuilding - Potential memory leak
4181346	Undef.			Unpacking EventBuilding - Potential memory leak

No Sts hits

Logging of „Unpack" without explicit system specification
→ Perf. of system for unpacking not directly from logging

Output

During cbmreco:

During cbmreco_fairrun:

```
/lustre/cbm/online$ ls -lt output/ | tail -n 10
cuvel cbm        8901 Jul 12 14:22 events_3484.psa
cuvel cbm        9716 Jul 12 14:22 events_3485.psa
cuvel cbm       11503 Jul 12 14:22 events_3486.psa
cuvel cbm        9029 Jul 12 14:22 events_3487.psa
cuvel cbm       11873 Jul 12 14:22 events_3488.psa
cuvel cbm       22606 Jul 12 14:22 events_3489.psa
cuvel cbm       35674 Jul 12 14:22 events_3490.psa
cuvel cbm      254617 Jul 12 14:22 events_3491.psa
cuvel cbm     1823472 Jul 12 14:22 events_3492.psa
cuvel cbm        8993 Jul 12 14:22 events_3481.psa
```

```
/lustre/cbm/online$ ls -lh output/ | tail -n 10
tter   cbm 662M Jul 12 16:10 fairrun_8_6.root
tter   cbm 734M Jul 12 16:10 fairrun_8_7.root
tter   cbm 674M Jul 12 16:10 fairrun_9_0.root
tter   cbm 671M Jul 12 16:10 fairrun_9_1.root
tter   cbm 672M Jul 12 16:10 fairrun_9_2.root
tter   cbm 677M Jul 12 16:10 fairrun_9_3.root
tter   cbm 661M Jul 12 16:10 fairrun_9_4.root
tter   cbm 704M Jul 12 16:10 fairrun_9_5.root
tter   cbm 624M Jul 12 16:10 fairrun_9_6.root
tter   cbm 678M Jul 12 16:10 fairrun_9_7.root
```

Example histograms from fairrun_8_6.root:
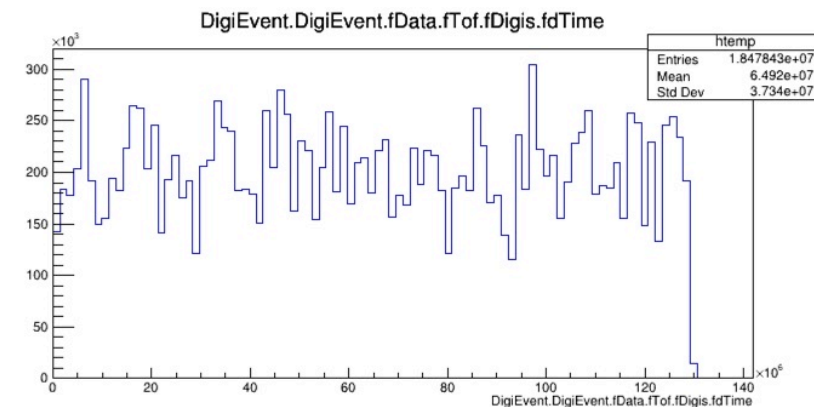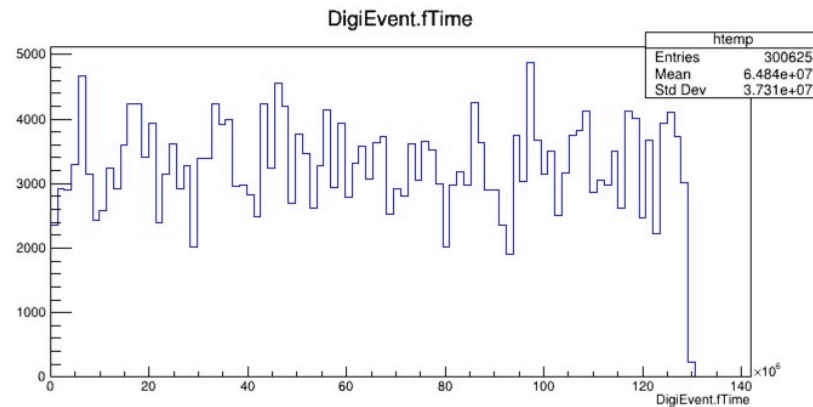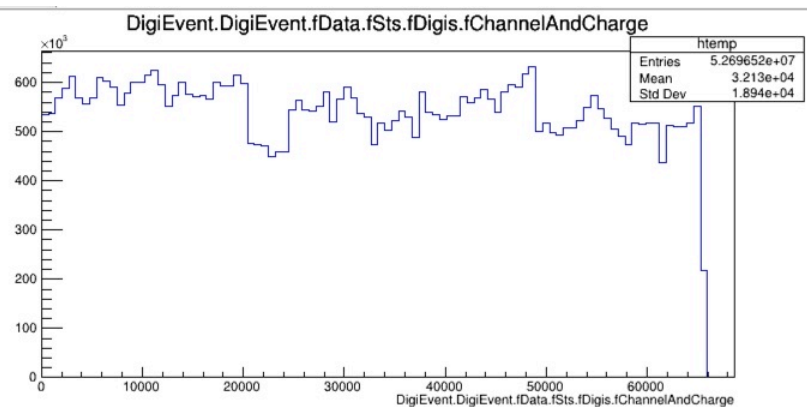
First conclusions

Unpacking and Sts reconstruction stable for most of the runs/time

- Extraction of performance of Sts local reconstruction → Typical numbers derived (factor of 2 between Hits/s and Sts-Digis/s)

- Typical number of events built: 2 e5/s

- Setting of OpenMP threads with minor overall impact

- Additional contributions from several unpackers, monster events, event building

- Issues for writing output files with Sts reconstruction

BACKUP

Environment and scripts

```
aredelb@lxbk1131:/lustre/cbm/online$ squeue -u jdecuvel
          JOBID PARTITION      NAME      USER ST       TIME  NODES NODELIST(REASON)
        4165468      long cbm_onli jdecuvel  R      12:56     10 lxbk[1000-1005,1007-1010]
aredelb@lxbk1131:/lustre/cbm/online$
```

2 OpenMP-Threads

```
[aredelb@lxbk1131:/lustre/cbm/online$ grep "OMP" start*
start-script:  OMP_NUM_THREADS=2 /opt/cbmroot/source/master/build/bin/cbmreco -p /lustre/cbm/online/params/ -m influx1:cbmflesnode0.gsi.de:8086:cbm -i "$s" --step Unpack DigiTrigger LocalReco &
[aredelb@lxbk1131:/lustre/cbm/online$ ls -lt logs/
total 3388
-rw-r--r--. 1 jdecuvel cbm 2438336 Jul 12 11:27 reco.4162183.out
-rw-r--r--. 1 jdecuvel cbm  855369 Jul 12 11:21 reco.4162177.out
-rw-r--r--. 1 jdecuvel cbm 2838012 Jul 12 11:17 reco.4162138.out
-rw-r--r--. 1 jdecuvel cbm 1195854 Jul 12 10:59 reco.4161837.out
-rw-r--r--. 1 jdecuvel cbm 1901730 Jul 12 10:37 reco.4161714.out
-rw-r--r--. 1 jdecuvel cbm 2245089 Jul 12 10:28 reco.4161690.out
-rw-r--r--. 1 jdecuvel cbm  781639 Jul 12 10:21 reco.4160681.out
-rw-r--r--. 1 jdecuvel cbm  852891 Jul 12 10:05 reco.4160035.out
-rw-r--r--. 1 dhutter  cbm  339208 Jul 11 16:19 reco.4146373.out
-rw-r--r--. 1 dhutter  cbm 1671924 Jul 11 16:07 test.4144483.out
-rw-r--r--. 1 dhutter  cbm 1008309 Jul 11 15:57 test.4141863.out
aredelb@lxbk1131:/lustre/cbm/online$
```
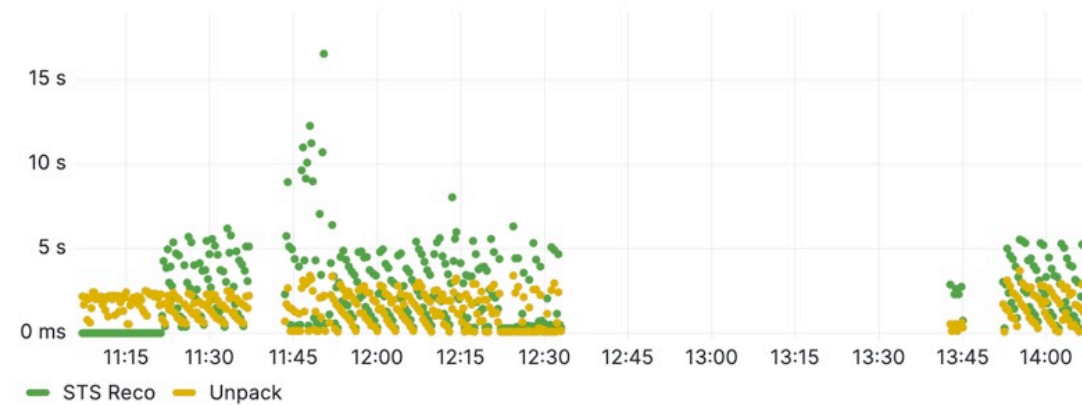
12 OpenMP-Threads

```
[aredelb@lxbk1131:/lustre/cbm/online$ grep "OMP" start*
start-script:  OMP_NUM_THREADS=12 /opt/cbmroot/source/master/build/bin/cbmreco -p /lustre/cbm/online/params/ -m influx1:cbmflesnode0.gsi.de:8086:cbm -i "$s" --step Unpack DigiTrigger LocalReco &
[aredelb@lxbk1131:/lustre/cbm/online$ ls -lt logs/
total 4477
-rw-r--r--. 1 jdecuvel cbm 7200608 Jul 12 11:45 reco.4162183.out
-rw-r--r--. 1 jdecuvel cbm  855369 Jul 12 11:21 reco.4162177.out
-rw-r--r--. 1 jdecuvel cbm 2838012 Jul 12 11:17 reco.4162138.out
-rw-r--r--. 1 jdecuvel cbm 1195854 Jul 12 10:59 reco.4161837.out
-rw-r--r--. 1 jdecuvel cbm 1901730 Jul 12 10:37 reco.4161714.out
-rw-r--r--. 1 jdecuvel cbm 2245089 Jul 12 10:28 reco.4161690.out
-rw-r--r--. 1 jdecuvel cbm  781639 Jul 12 10:21 reco.4160681.out
-rw-r--r--. 1 jdecuvel cbm  852891 Jul 12 10:05 reco.4160035.out
-rw-r--r--. 1 dhutter  cbm  339208 Jul 11 16:19 reco.4146373.out
-rw-r--r--. 1 dhutter  cbm 1671924 Jul 11 16:07 test.4144483.out
-rw-r--r--. 1 dhutter  cbm 1008309 Jul 11 15:57 test.4141863.out
aredelb@lxbk1131:/lustre/cbm/online$
```
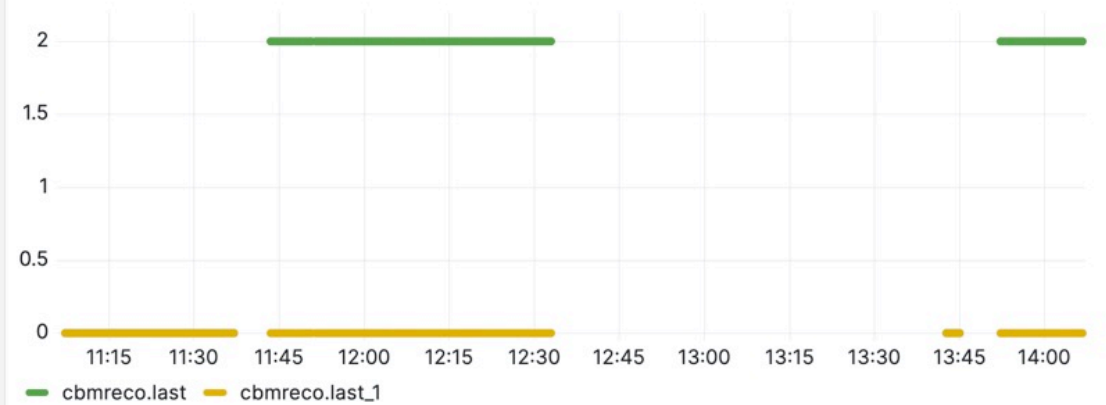
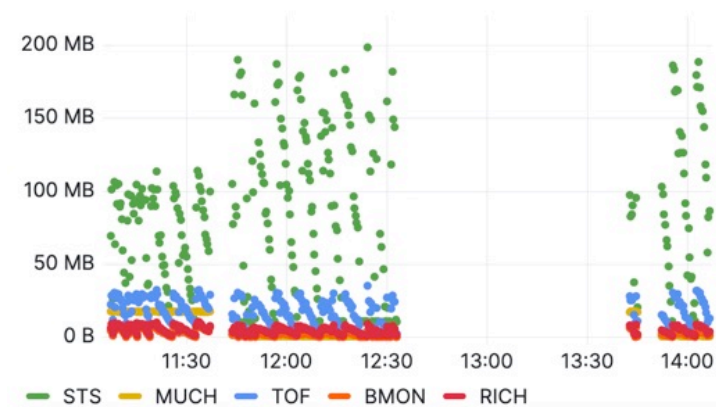# Grafana Monitoring overview
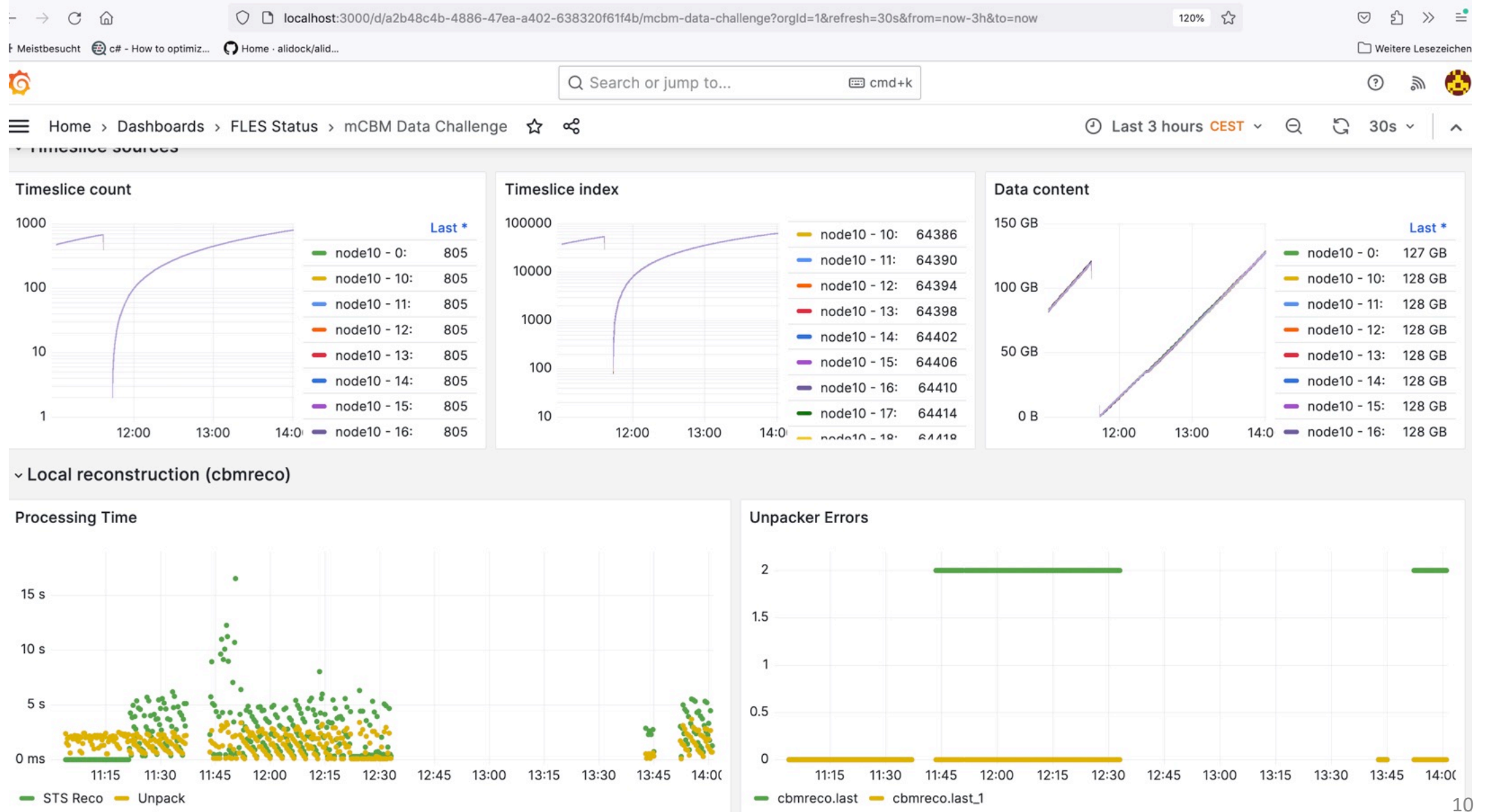
Grafana Monitoring Unpackers
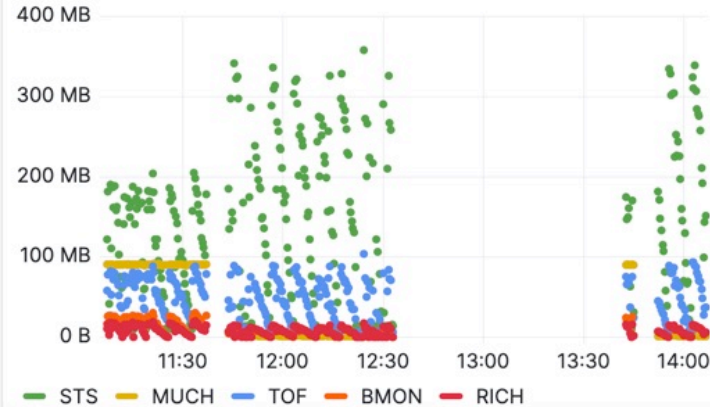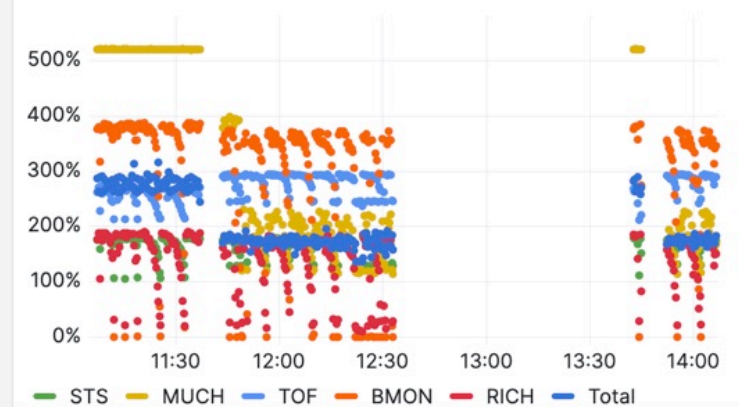
Processing errors for timeslices TS delta
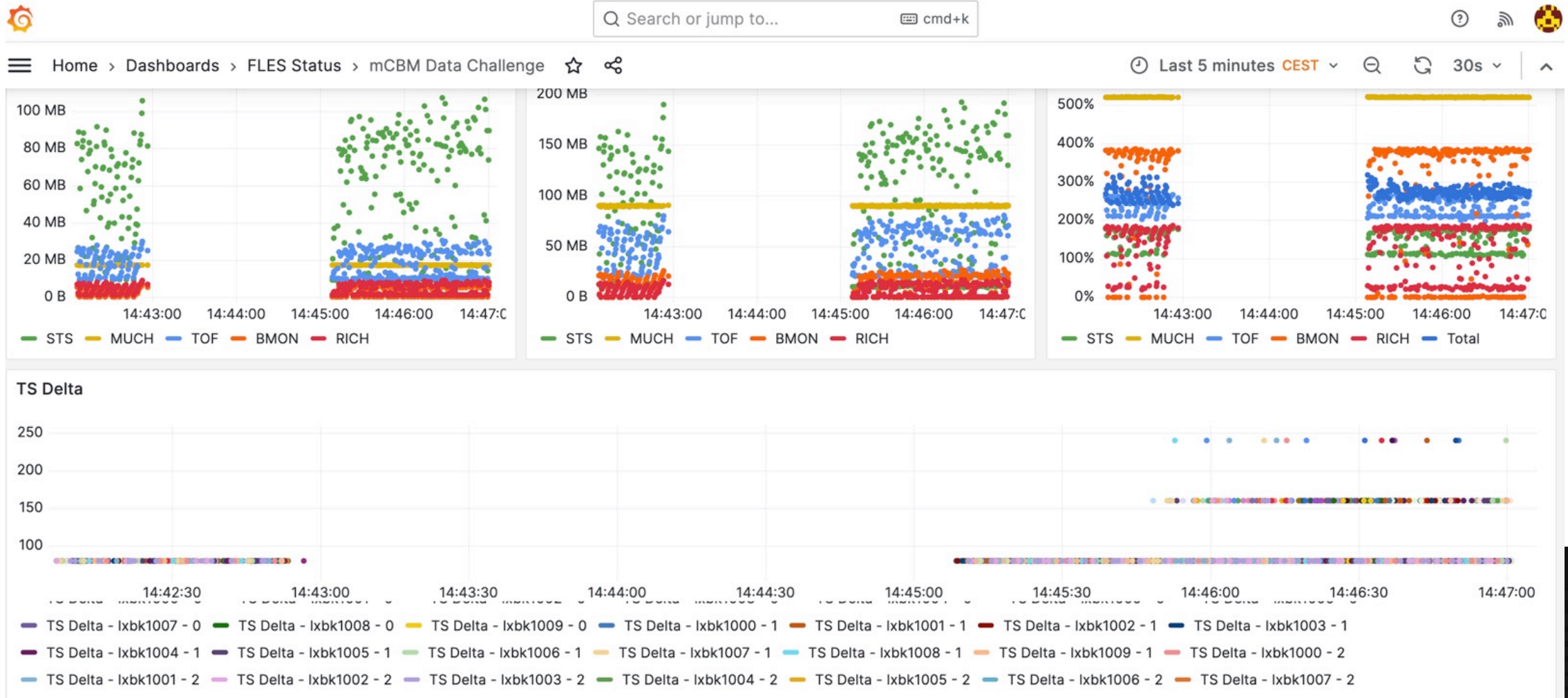
Increasing speed of synthetic data:
Factor 2 to 8

Writing output files

With Sts reconstruction:

```
aredelb@lxbk1131:/lustre/cbm/online$ grep "OMP" start*
start-script:  OMP_NUM_THREADS=12 /opt/cbmroot/source/DC_July23/build/bin/cbmreco -c $i -p /lustre/cbm/online/params/ -m influx1:cbmflesnode0.gsi.de:8086:cbm -i "$s" --step Unpack Digi
Trigger LocalReco -o /lustre/cbm/online/output/events_%n.psa -S &
aredelb@lxbk1131:/lustre/cbm/online$ ls -lt output/ | tail -n 10
-rw-r--r--. 1 jdecuvel cbm        8901 Jul 12 14:22 events_3484.psa
-rw-r--r--. 1 jdecuvel cbm        9716 Jul 12 14:22 events_3485.psa
-rw-r--r--. 1 jdecuvel cbm       11503 Jul 12 14:22 events_3486.psa
-rw-r--r--. 1 jdecuvel cbm        9029 Jul 12 14:22 events_3487.psa
-rw-r--r--. 1 jdecuvel cbm       11873 Jul 12 14:22 events_3488.psa
-rw-r--r--. 1 jdecuvel cbm       22606 Jul 12 14:22 events_3489.psa
-rw-r--r--. 1 jdecuvel cbm       35674 Jul 12 14:22 events_3490.psa
-rw-r--r--. 1 jdecuvel cbm      254617 Jul 12 14:22 events_3491.psa
-rw-r--r--. 1 jdecuvel cbm     1823472 Jul 12 14:22 events_3492.psa
-rw-r--r--. 1 jdecuvel cbm        8993 Jul 12 14:22 events_3481.psa
aredelb@lxbk1131:/lustre/cbm/online$ █
```

Without Sts reconstruction (in cbmreco_fairrun):

```
aredelb@lxbk1131:/lustre/cbm/online$ ls -lt output/ | head -n 10
total 78460355
-rw-r--r--. 1 dhutter  cbm 612346231 Jul 12 16:09 fairrun_0_4.root
-rw-r--r--. 1 dhutter  cbm 596854381 Jul 12 16:09 fairrun_0_6.root
-rw-r--r--. 1 dhutter  cbm 608186944 Jul 12 16:09 fairrun_4_2.root
-rw-r--r--. 1 dhutter  cbm 622302846 Jul 12 16:09 fairrun_4_4.root
-rw-r--r--. 1 dhutter  cbm 503257616 Jul 12 16:09 fairrun_0_3.root
-rw-r--r--. 1 dhutter  cbm 478285291 Jul 12 16:09 fairrun_0_7.root
-rw-r--r--. 1 dhutter  cbm 614768932 Jul 12 16:09 fairrun_1_0.root
-rw-r--r--. 1 dhutter  cbm 497102892 Jul 12 16:09 fairrun_1_1.root
-rw-r--r--. 1 dhutter  cbm 596592592 Jul 12 16:09 fairrun_1_2.root
aredelb@lxbk1131:/lustre/cbm/online$ █
```

Issues with cbmreco_fairrun and environment paths