

Support of Multiple LHC VOs in a Heterogeneous Grid Site

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Support of Multiple LHC VOs in a Heterogeneous Grid Site

INTRO:

- Computing resources dedicated to 3 LHC VOs: Alice, ATLAS, LHCb
- Storage resources dedicated to 2 LHC VOs: ATLAS, LHCb
- 2 different resource managers: PBS/Torque+Maui, SLURM
- 4 subclusters , 6 queues ,2 multicore queues
- The single romanian site with ARC-CE installed
- Member in FAX(Federated ATLAS storage systems using XRootD)
- Part of LHCONE network (10Gbps connectivity)

Support of Multiple LHC VOs in a Heterogeneous Grid Site

RO-07-NIPNE: HARDWARE

Computing infrastructure

- APC InRow Chilled Water Cooling
- 160KVA UPS
- More than 2200 CPU(~230 nodes)
- 8, 16, 20, 32 cores/server

DC1->



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RO-07-NIPNE: HARDWARE

Storage infrastructure

- 4x80KVA UPS Emerson
- 10 servers
- 1,25PB total capacity
- 0,93PB used capacity

Network infrastructure:

- 120Gbps connectivity between DC1 and DC2
- 2x40Gbps, 4x10Gbps

DC2->



Support of Multiple LHC VOs in a Heterogeneous Grid Site

RO-07-NIPNE: SOFTWARE

- Scientific Linux 6, UMD3 middleware ,
- 3 CREAM + 1 ARC-CE as job management service
- 12 queues (PBS/Torque + MAUI, SLURM)
- Disk Pool Manager(DPM) for 10 disk storage
- Top BDII
- VOMS (for local VOs, ex ELI-NP)
- VOBOX(Alice)
- CVMFS for all WLCG VOs

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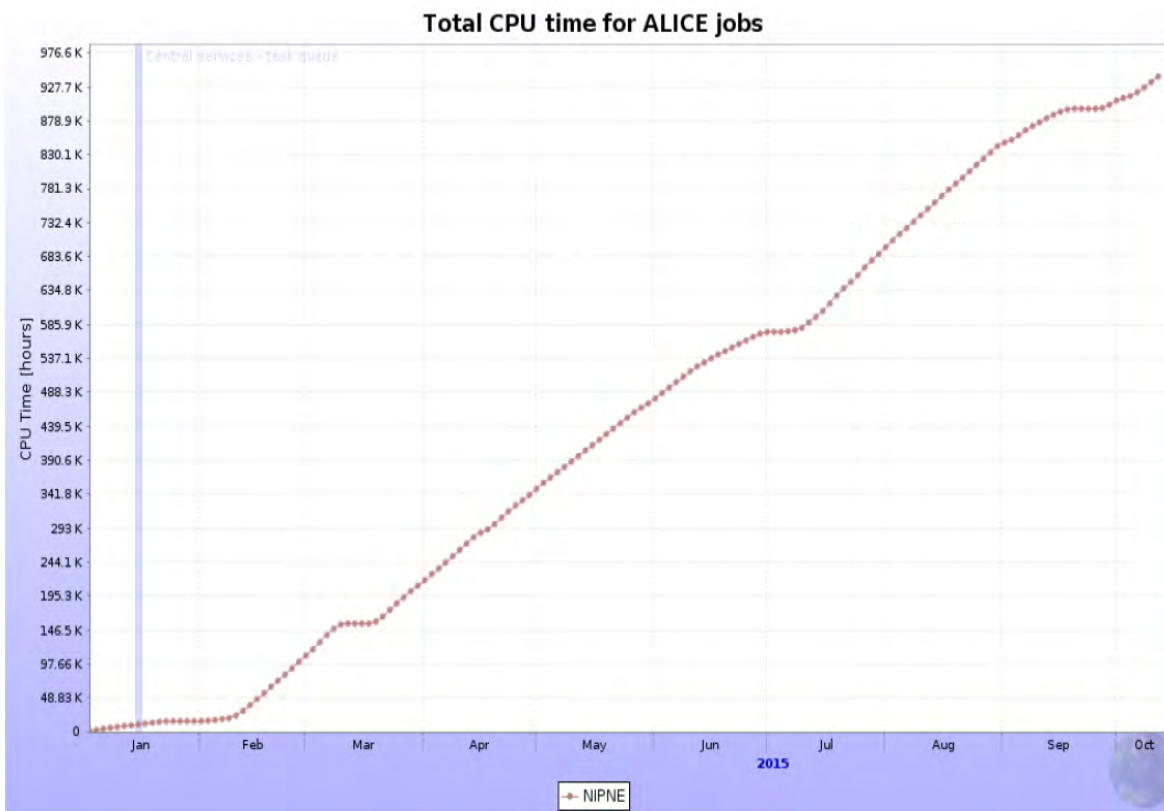
ALICE VO

- VOBOX
- Dedicated CREAM
- 696 cores, 28 nodes
- 32 cores, 20 cores



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VO ALICE: CPU 2015 Vs. CPU 2016



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VO ATLAS

2 CREAM's + ARC-CE, 4 queues: analysis, production, Mcore(8 cores), Mcore(12 cores)

Production queue shared the resources with LHCb >600 cores

Mcore(8 cores) and analysis queues shared the same resources >700 cores

Mcore (12 cores) queue used >400 cores

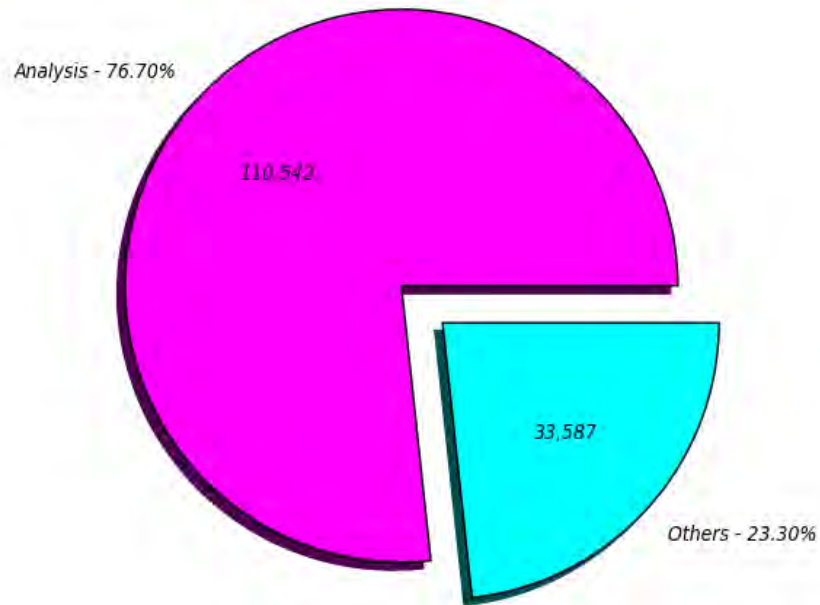
~630TB storage

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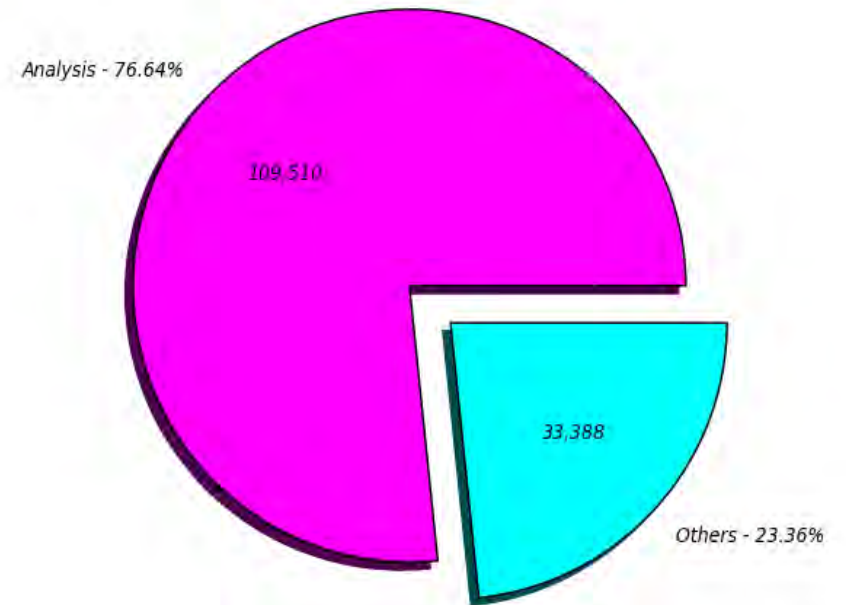
VO ATLAS: ANALYSIS QUEUE



Submitted jobs (Sum: 144,129)

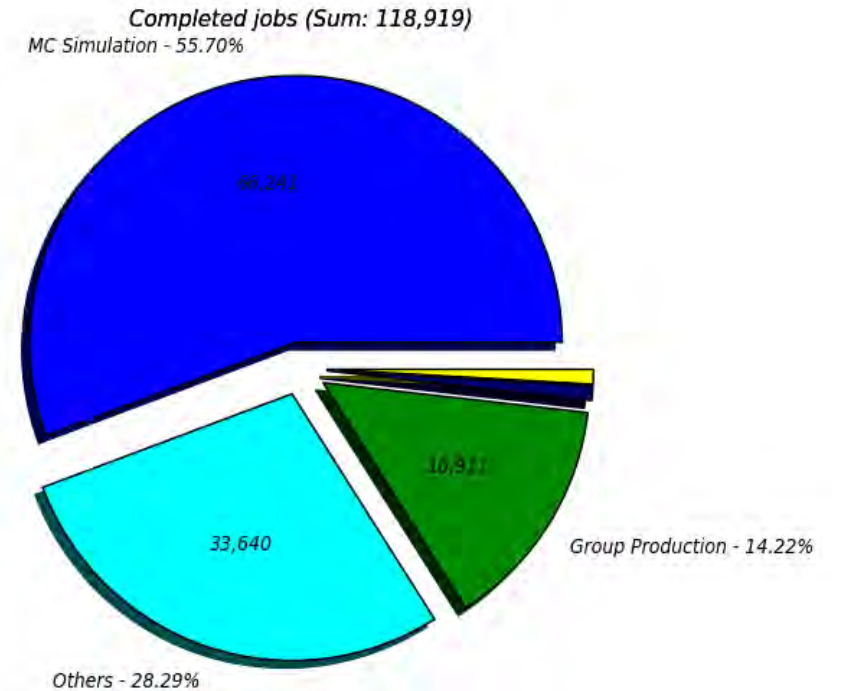
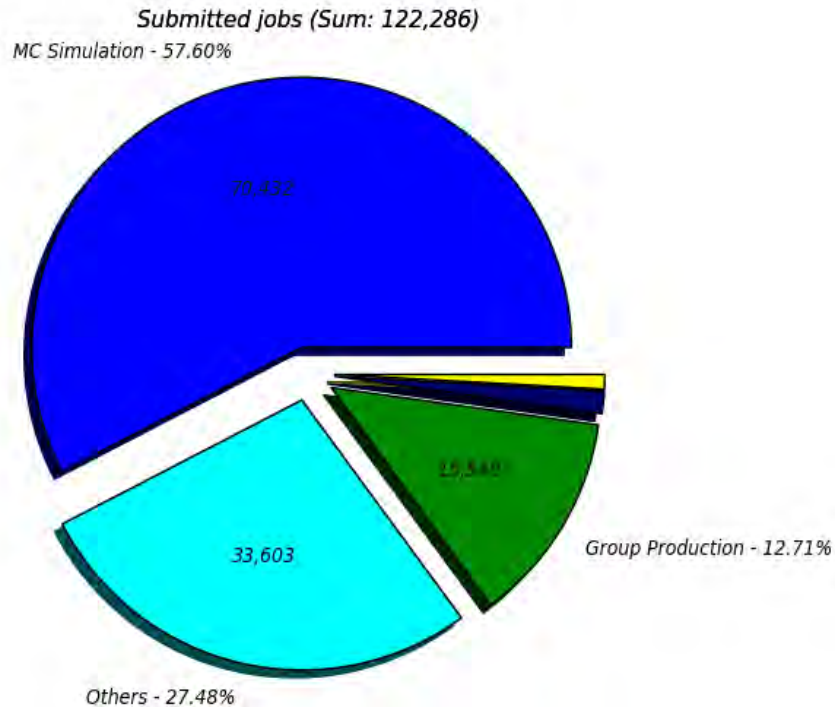


Completed jobs (Sum: 142,899)



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VO ATLAS: Production single queue



31.10.2016

■ MC Simulation - 57.60% (70,432)
 ■ MC Reconstruction - 1.34% (1,640)

■ Others - 27.48% (33,603)
 ■ Data Processing - 0.87% (1,063)

■ Group Production - 12.71% (15,548)

■ MC Simulation - 55.70% (66,241)
 ■ MC Reconstruction - 0.89% (1,064)

■ Others - 28.29% (33,640)
 ■ Data Processing - 0.89% (1,063)

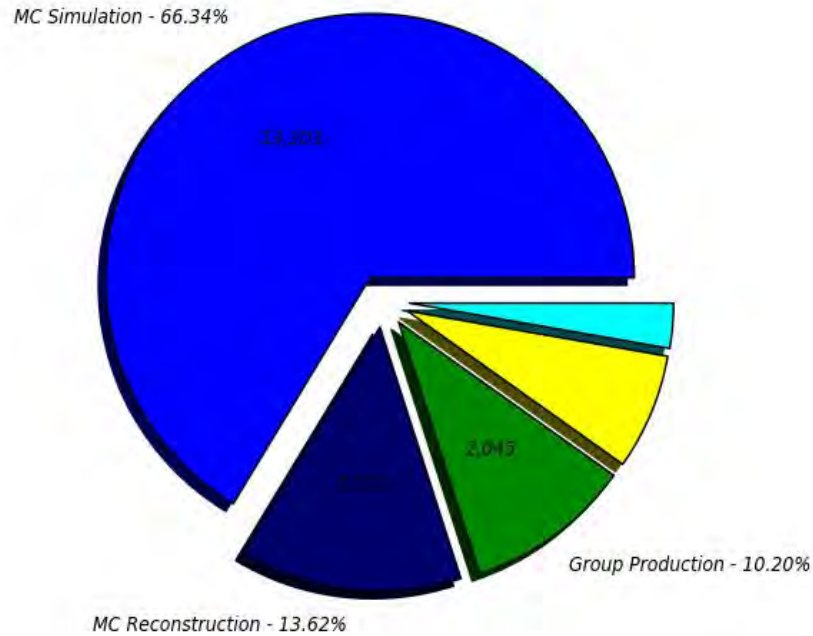
■ Group Production - 14.22% (16,911)

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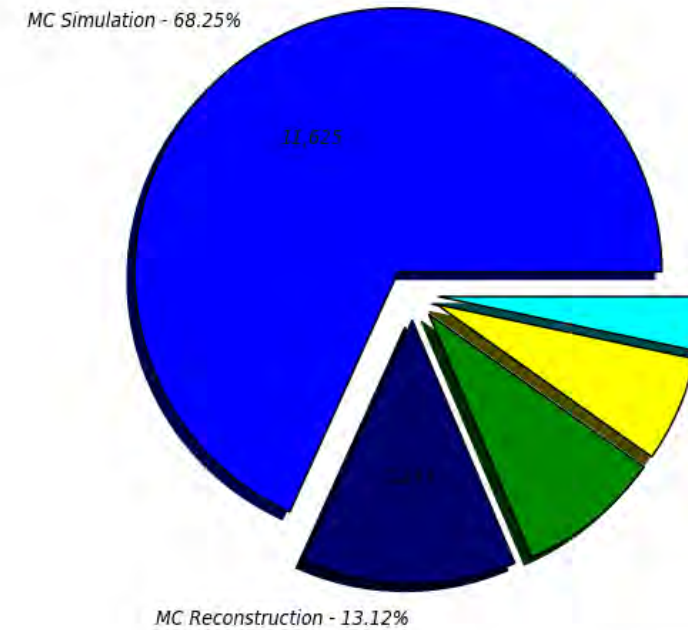
VO ATLAS: Production 8 cores queue



Submitted jobs (Sum: 20,054)

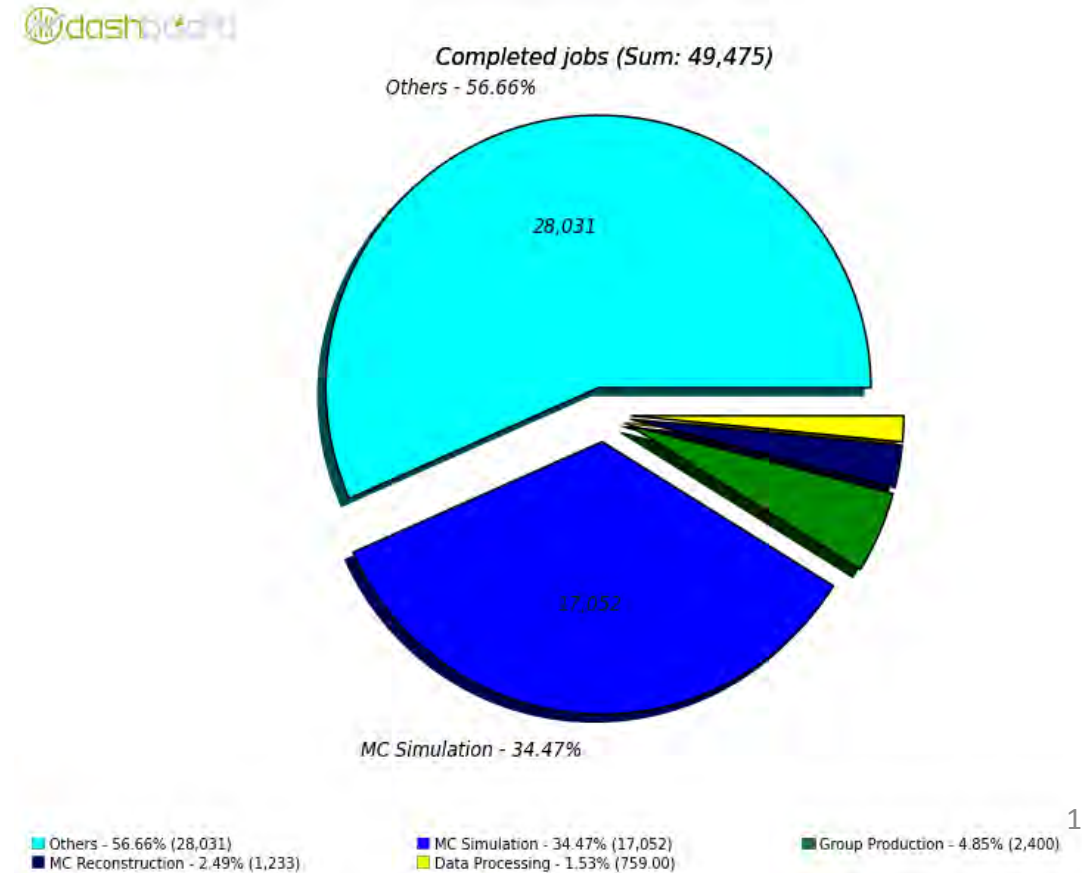
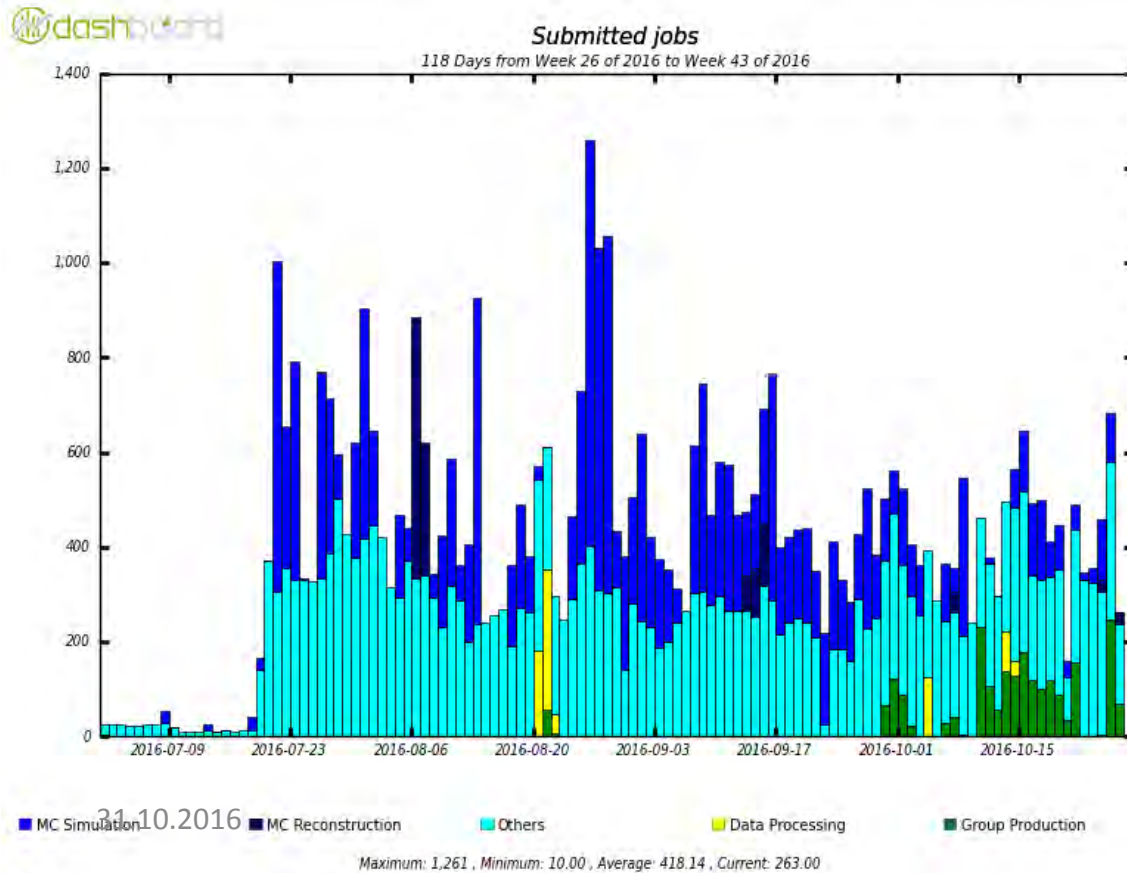


Completed jobs (Sum: 17,034)



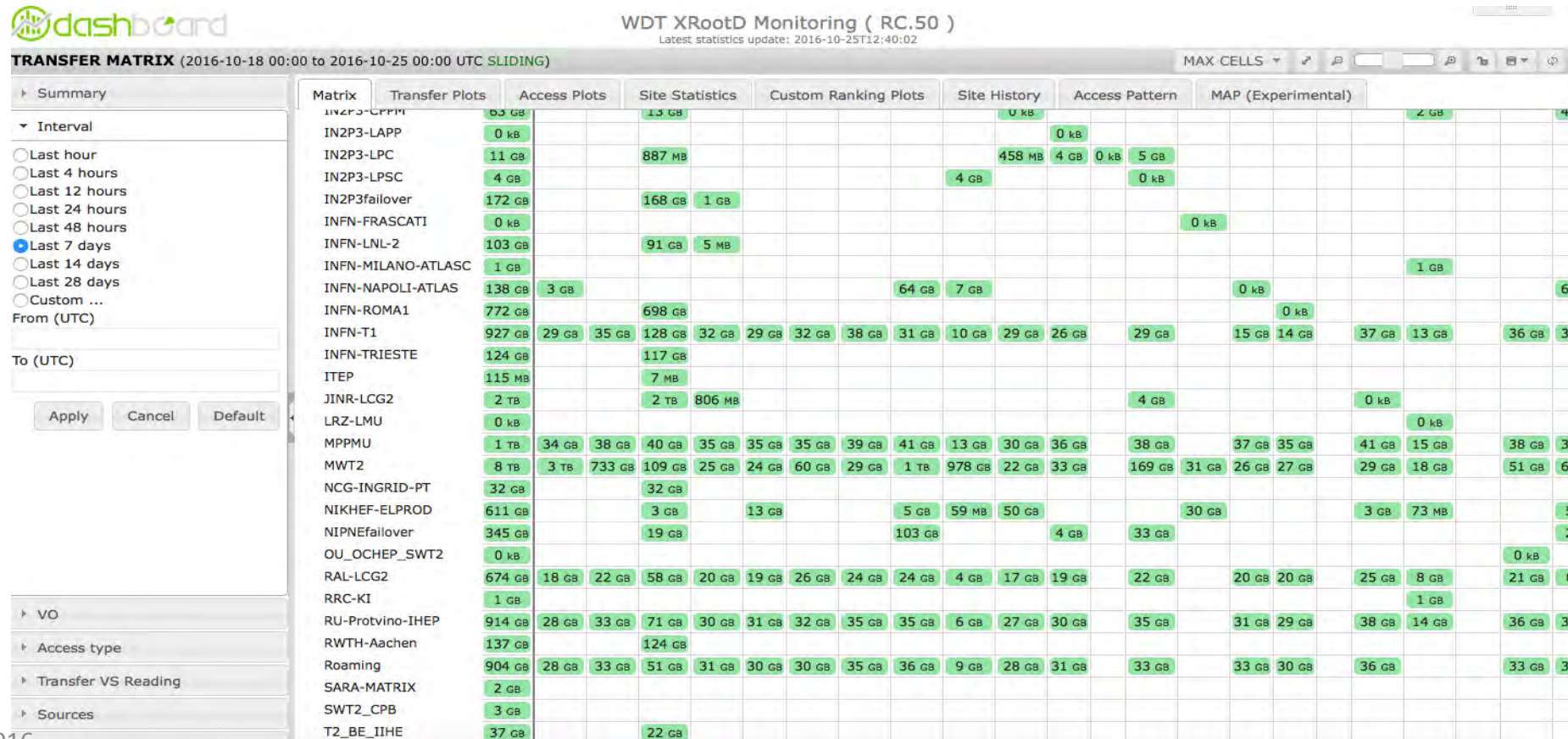
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VO ATLAS: Production 12 cores queue



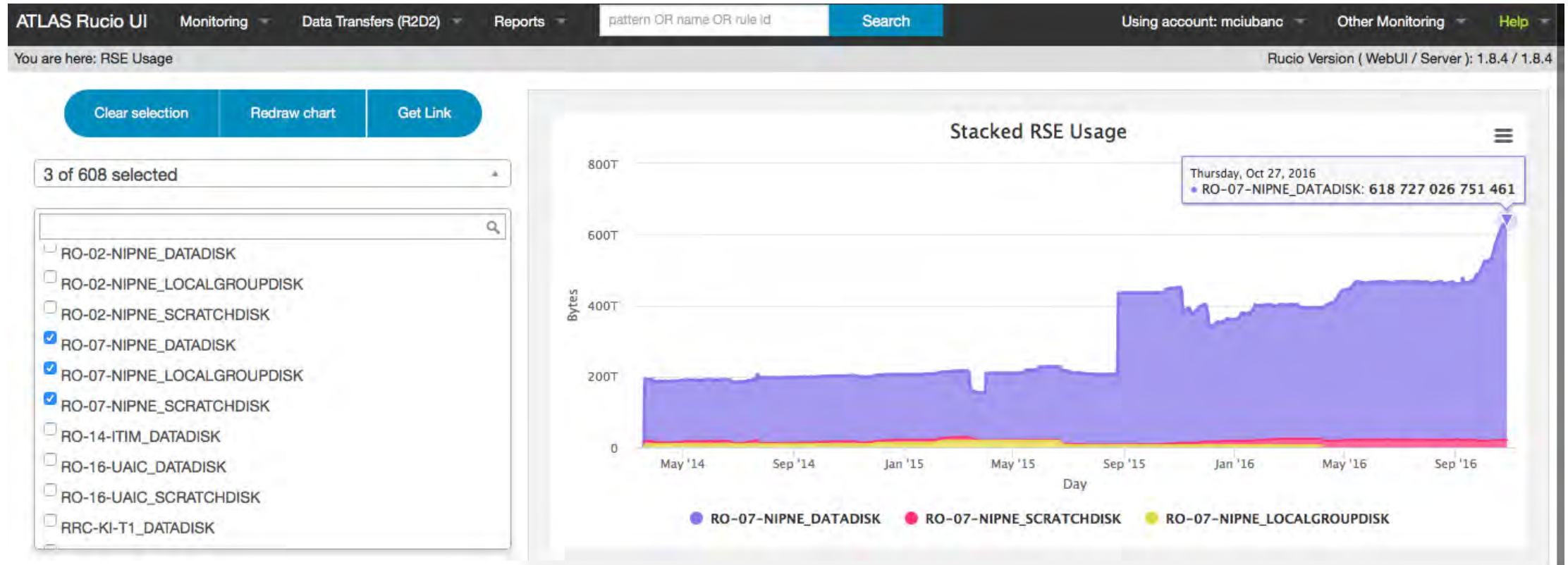
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VO ATLAS: FAX – data transfers



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VO ATLAS: Storage usage



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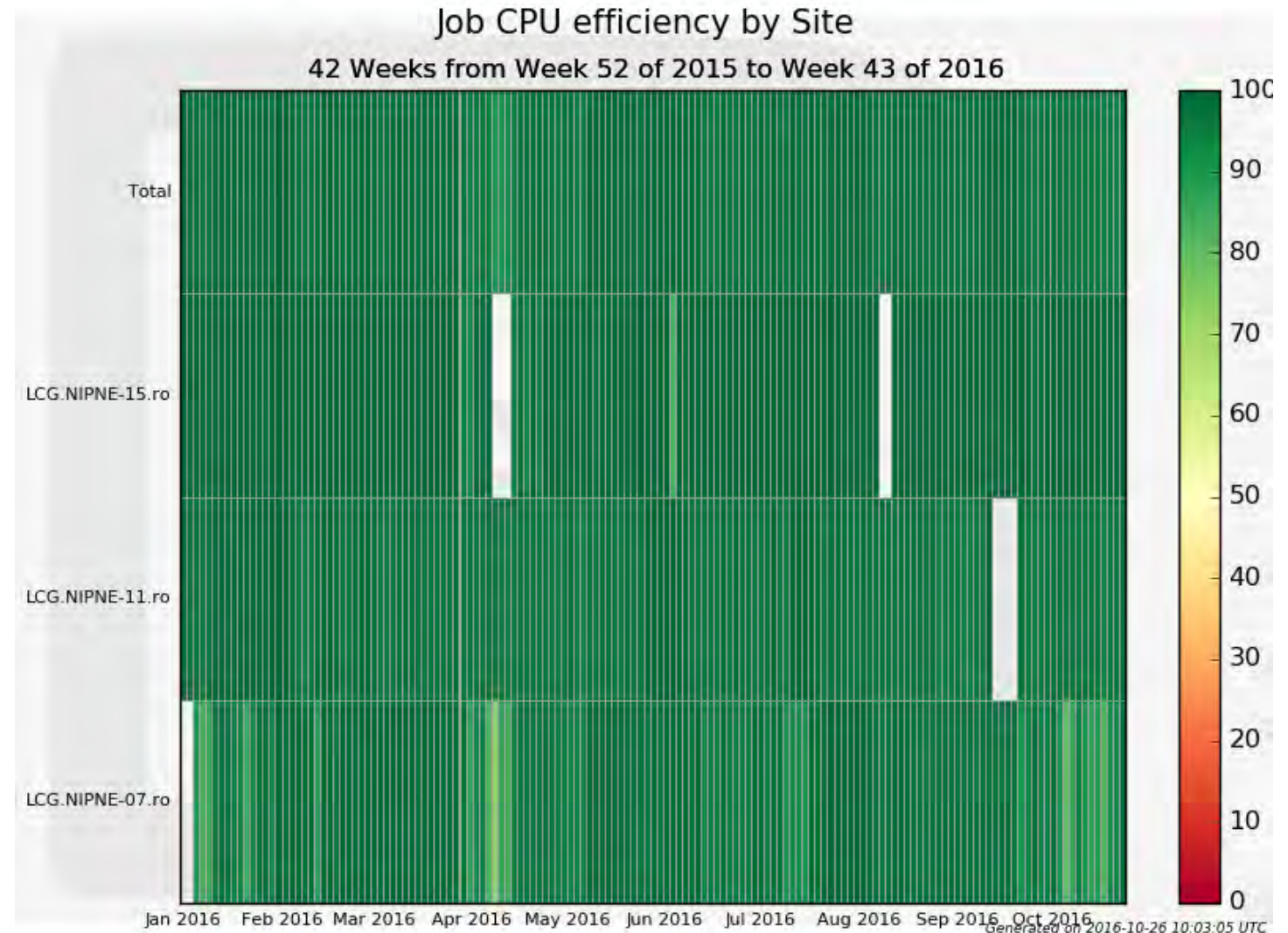
LHCb VO

- CREAM shared with ATLAS production queue, >600 cores
- Running MC and analysis jobs
- T2D(Tier2 with Data), 370TB space token
- Data accessed via xrootd and WebDav

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LHCb VO

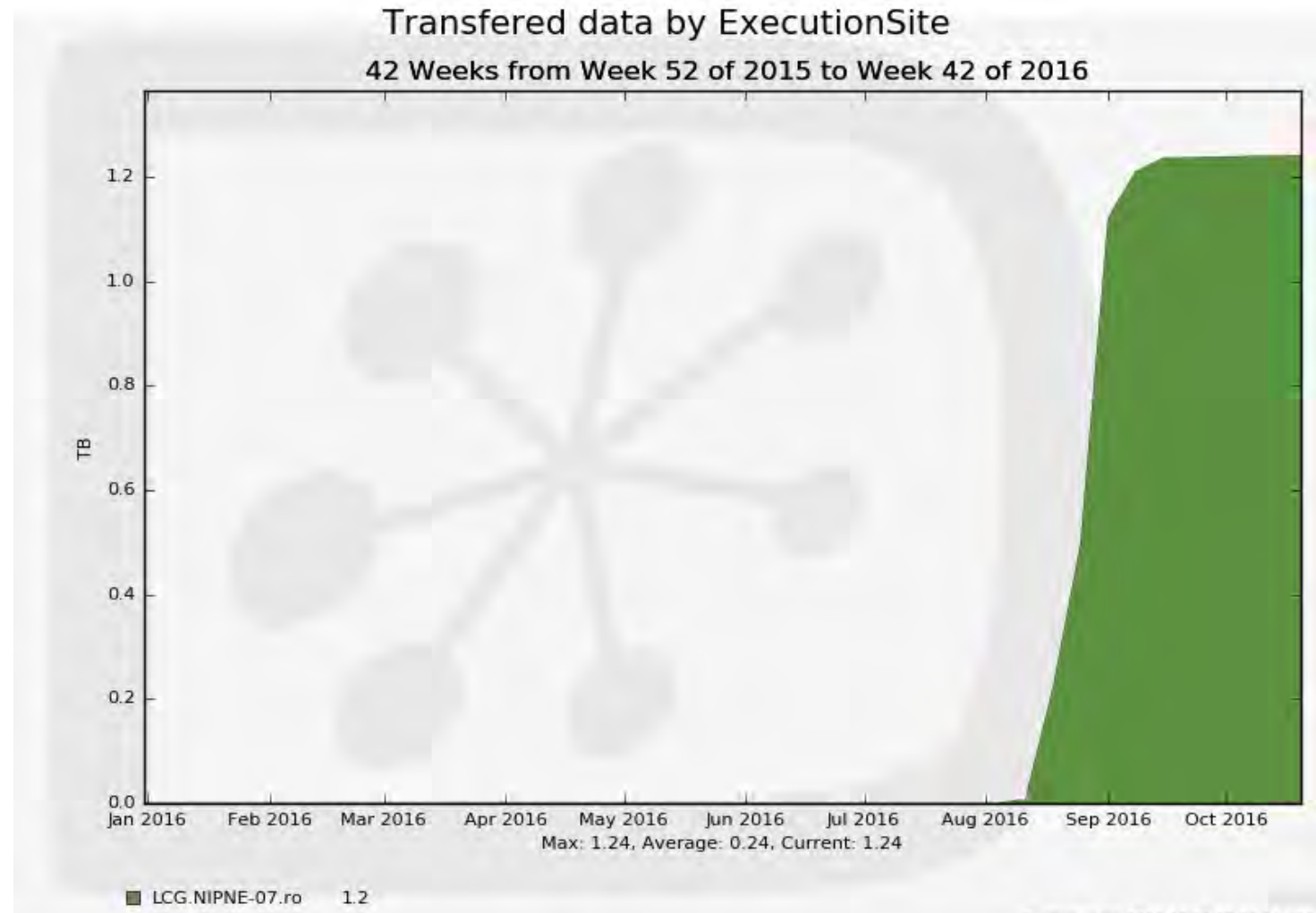
Job efficiency



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LHCb VO:

Transferred data by execution

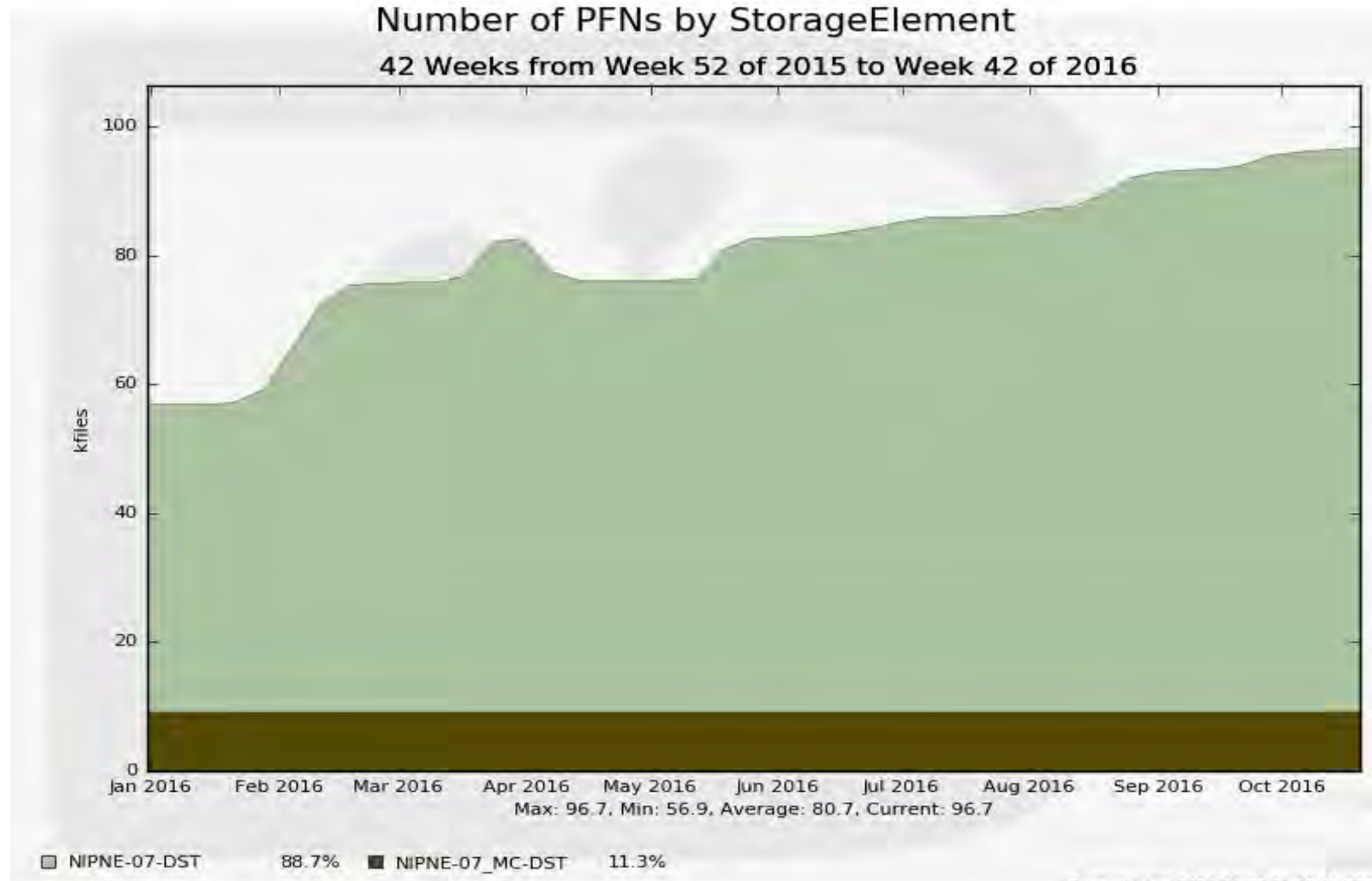


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LHCb VO:

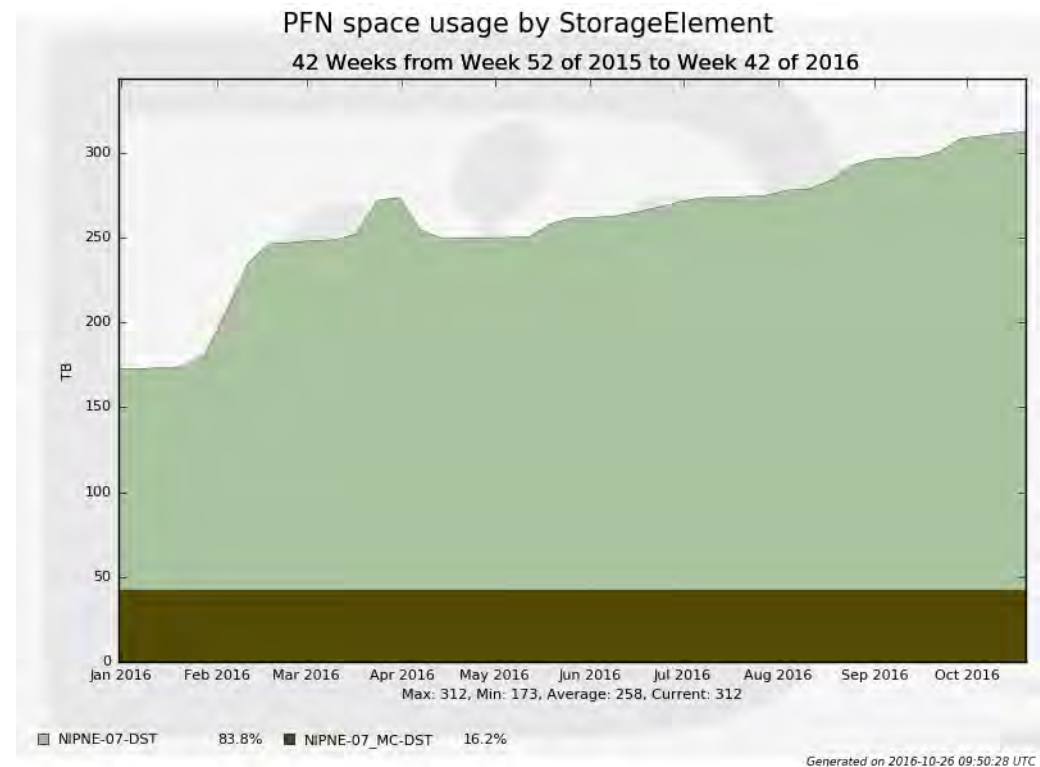
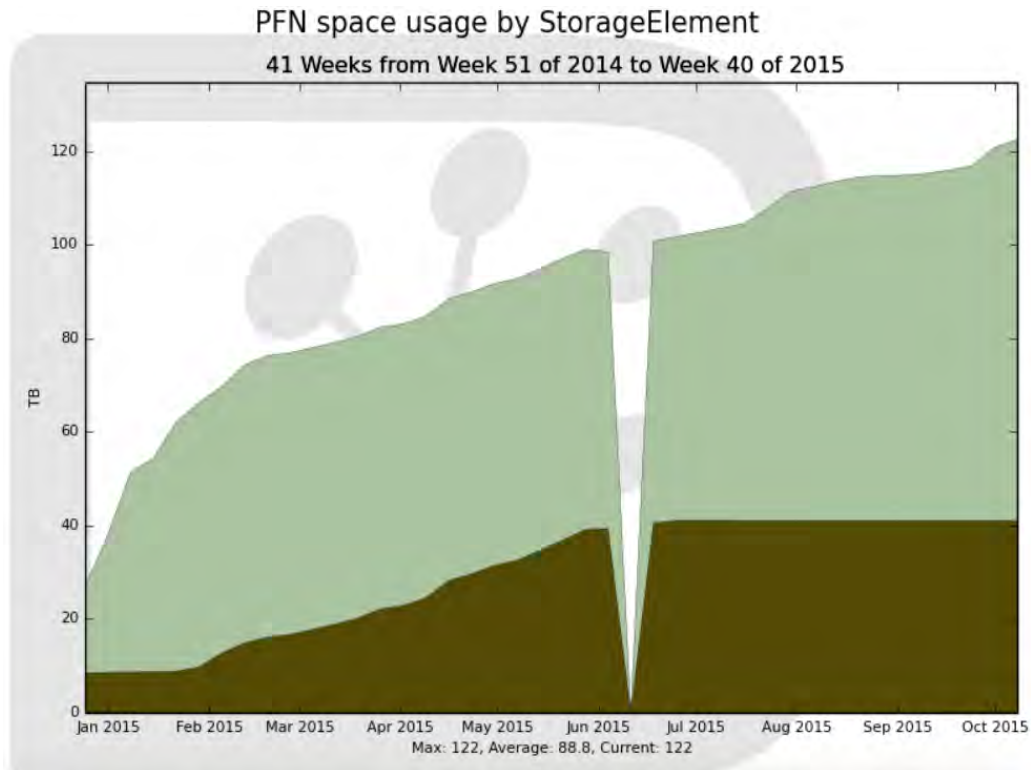
Used >80% of the space allocation

Almost 100k files



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LHCb VO: Storage usage 2015 vs 2016



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Conclusion:

- Problems during the year because of the old hardware
- Anyway better performances then the last year
- Going to deploy storage for Alice –EOS instance
- It will run also Alice analysis jobs
- Probably it will remain the only romanian site with storage for Atlas

**THANK YOU
FOR YOUR ATTENTION!**