# CCIN2P3 -Tier 1 Status

FR-Cloud Regional Center meeting 2018

- **Overview**

  IN2P3

  Computing Center CC-IN2P3

  Infrastructure

  Resources

- **WLCG at CC-IN2P3**

  Resources

  Organization

- **ATLAS at CC-IN2P3**

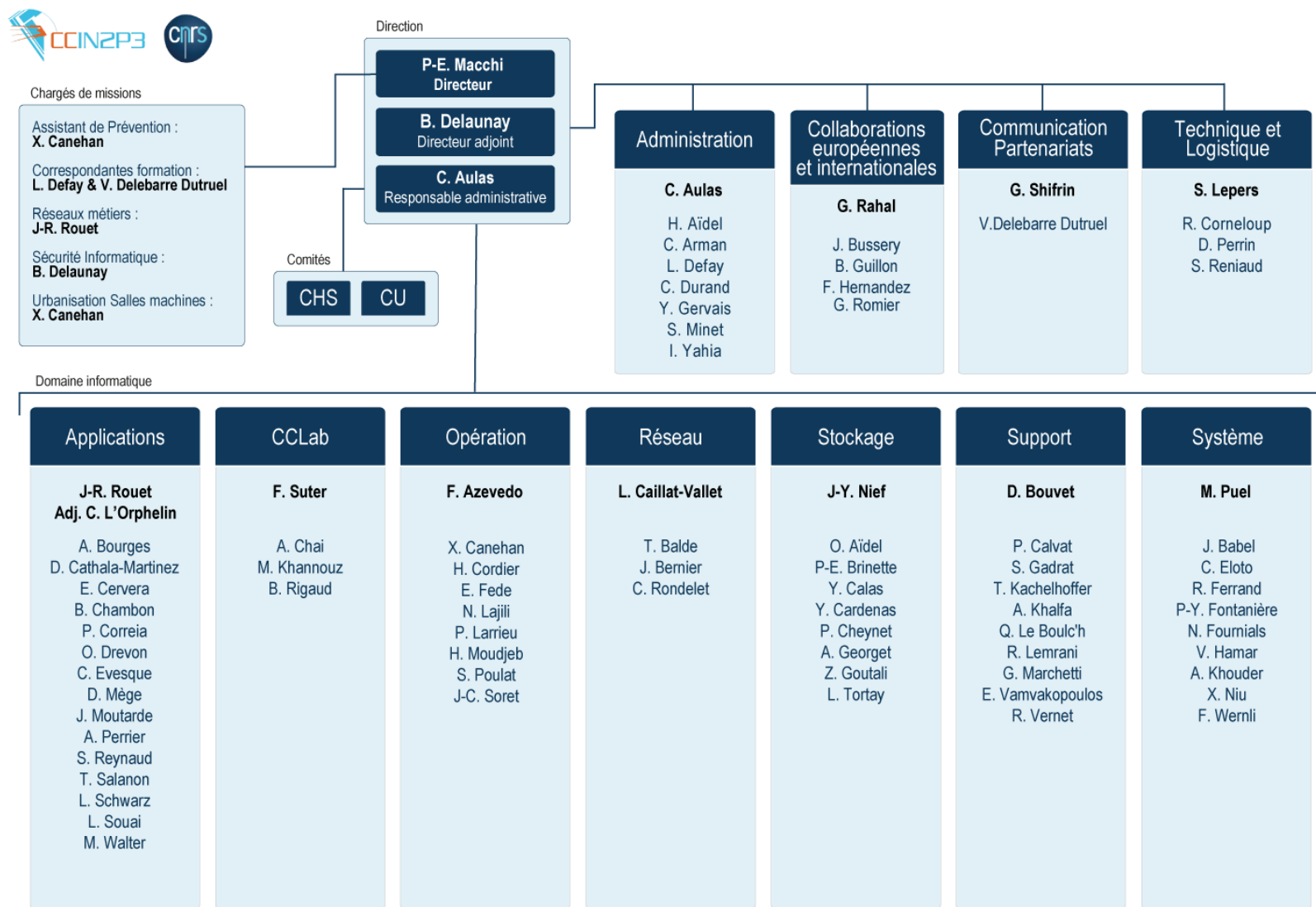 Status, resources, usage

IN2P3 in brief…

- National Research Institute for Nuclear Physics, Particle Physics and Astroparticle Physics : IN2P3

- One of the 10 Institutes of CNRS

- Composed of 19 laboratories and

5 technical/service centers

- Almost 3175 people

  - 1/3 researchers
  - 2/3 administrative, ingeniors, technical

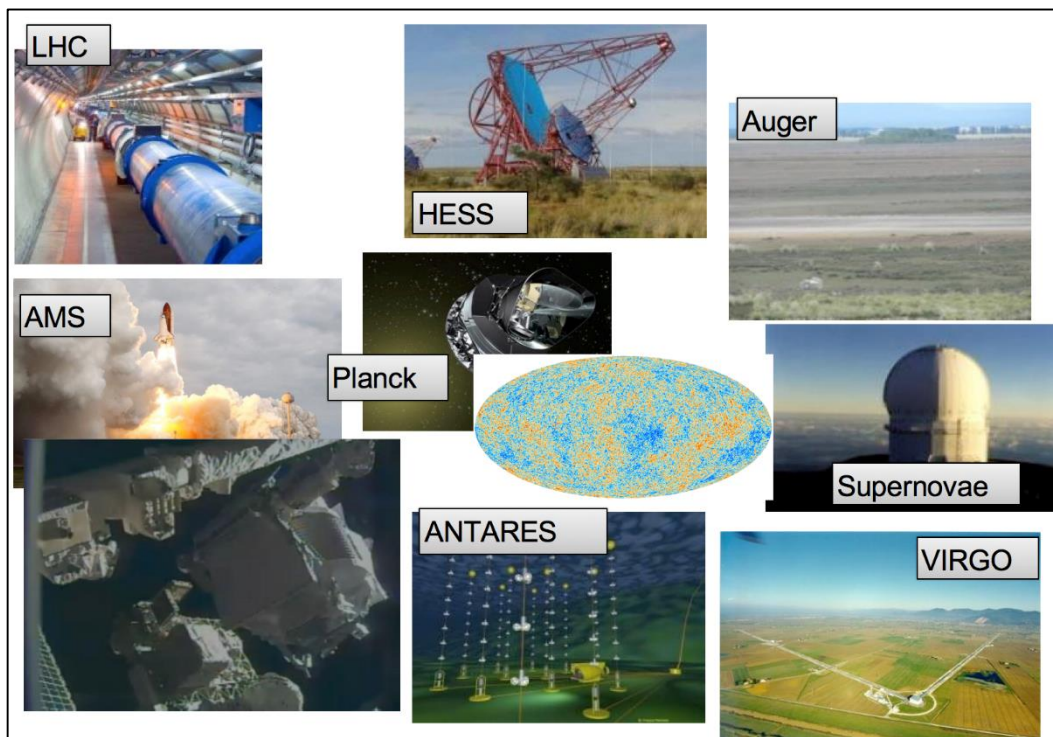CC-IN2P3

CC-IN2P3 in brief…
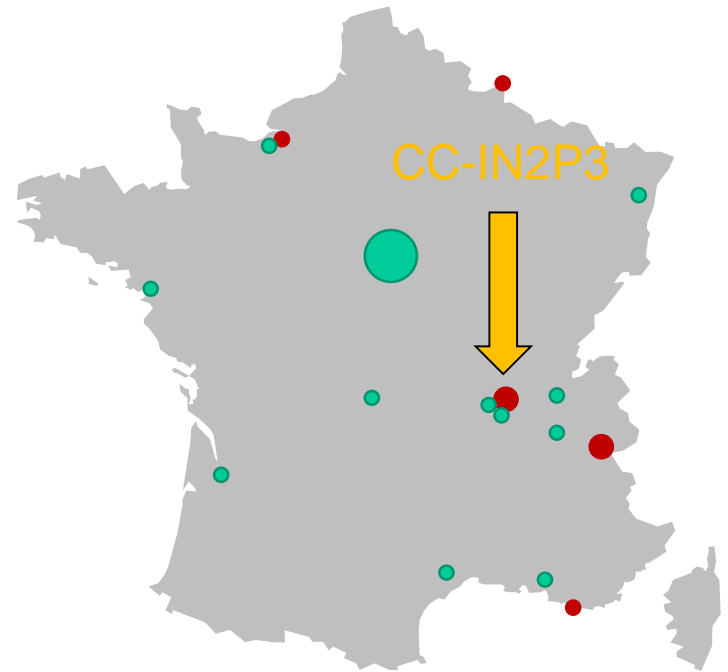
- Computing Center of IN2P3 / CNRS

- Computing and data storage facilities for the IN2P3
  - Missions are to provide IT resources to the French High Energy Physics community
  - Also provide a common infrastructure for institutional services (collaborative, edms, mail, development and project management tools…)

- People
  - 84 physical persons (administrative, IT and facility management and only one searcher).
  - 74% are permanent positions, 26% are temporary.

- Activities distributed across 11 teams, 8 for IT.

- Provide computing resources to 90 experiments.

CC-IN2P3 Organization

Direction

P-E. Macchi
Directeur

B. Delaunay
Directeur adjoint

C. Aulas
Responsable administrative

Chargés de missions

Assistant de Prévention :
X. Canehan

Correspondantes formation :
L. Defay & V. Delebarre Dutruel

Réseaux métiers :
J-R. Rouet

Sécurité Informatique :
B. Delaunay

Urbanisation Salles machines :
X. Canehan

Comités

CHS	CU

Administration

C. Aulas

H. Aïdel
C. Arman
L. Defay
C. Durand
Y. Gervais
S. Minet
I. Yahia

Collaborations européennes et internationales

G. Rahal

J. Bussery
B. Guillon
F. Hernandez
G. Romier

Communication Partenariats

G. Shifrin

V.Delebarre Dutruel

Technique et Logistique

S. Lepers

R. Corneloup
D. Perrin
S. Reniaud

Domaine informatique

Applications

J-R. Rouet
Adj. C. L'Orphelin

A. Bourges
D. Cathala-Martinez
E. Cervera
B. Chambon
P. Correia
O. Drevon
C. Evesque
D. Mège
J. Moutarde
A. Perrier
S. Reynaud
T. Salanon
L. Schwarz
L. Souai
M. Walter

CCLab

F. Suter

A. Chai
M. Khannouz
B. Rigaud

Opération

F. Azevedo

X. Canehan
H. Cordier
E. Fede
N. Lajili
P. Larrieu
H. Moudjeb
S. Poulat
J-C. Soret

Réseau

L. Caillat-Vallet

T. Balde
J. Bernier
C. Rondelet

Stockage

J-Y. Nief

O. Aïdel
P-E. Brinette
Y. Calas
Y. Cardenas
P. Cheynet
A. Georget
Z. Goutali
L. Tortay

Support

D. Bouvet

P. Calvat
S. Gadrat
T. Kachelhoffer
A. Khalfa
Q. Le Boulc'h
R. Lemrani
G. Marchetti
E. Vamvakopoulos
R. Vernet

Système

M. Puel

J. Babel
C. Eloto
R. Ferrand
P-Y. Fontanière
N. Fournials
V. Hamar
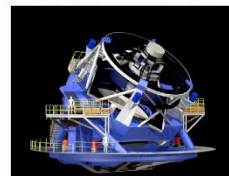A. Khouder
X. Niu
F. Wernli

CCIN2P3

Mains experiments with currently data acquisition.

Experiments of the next years

LSST
Whole dataset available at CC-IN2P3

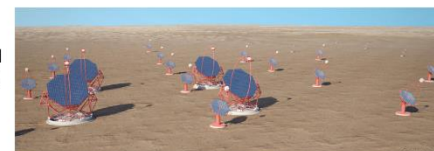50% of the processing by CC-IN2P3 other 50% by NCSA

EUCLID
CC-IN2P3 is the French Data Center for processsing and data management

dark energy and dark matter

CTA
CC-IN2P3 should play a key role in the CTA data processing

Gamma rays

Computing Rooms

- 2 computing rooms for a total of 1 700 m^2.

- VIL1 (oldest) hosts mass storage and critical services.

- VIL2 (newest) hosts computing resources and disk storage systems.

- Network point of view :

  - VIL1 hosts the regional point of presence of NREN (RENATER).
  - Both rooms are connected with a 400Gbps link.
  - The production network is distributed across the two rooms.

Computing

- CC-IN2P3 is providing three computing facilities in production.

    - The High Throughput Computing (HTC) farm

        - ~15 000 cores
        - 360 000 HS06
        - Occupancy ~96%

    - Simba, a High Performance Computing (HPC) cluster.

        - 512 physical cores.
        - Relies on 16 DELL C6320 servers and an QDR IB interconnect.

    - Nala, a GPGPU cluster

        - High speed interconnect using IB network.
        - 160 cores, 40 GPU Nvidia KG210

- Univa Grid Engine 8.4.4, unique software to manage these 3 platforms.

    - Licensed acquired to 16 000 cores (15 776 cores in use).

    - Maintenance and license contract renewed in April 2017 for 2 years.

Storage systems

- **Mass Storage**

  - Mix of disks for cache and tape backend storage

  - Used by the HPSS system / StorageTek Tape Libraries

  - 4 Oracle SL8500 libraries (40353 slots, ~60 drives)

  - Introducing T10K-D last year (8,5TB/cartridge)

  - T10K-A drives definitively removed from production

  - 33 PB used, current capacity is 343 PB

- **Disk storage**

  - Direct Attached Storage (DAS)

    - Used by DCACHE, XROOTD, IRODS and AFS

    - 1 server + 1 disk tray

    - Mix of 2TB, 3TB, 4TB, 6TB, 8 TB (10TB now) disks

Storage systems

- Disk storage

  - Shared Disk Storage (SDS)

    - 2 servers + 1 modular storage unit
    - Used by IBM/GPFS
    - Medium term storage system
    - POSIX File System access
    - 4 meta data servers
    - 24 bricks = 48 servers / 24 storage units
    - Theoretical network bandwith 480 Gbps

- Current systems capacities

  - DCACHE (13,8PB), XROOTD (6,4PB), IRODS (1,8PB), SPS/GPFS (2,6PB).

- Others

  - Databases, IRODS, CEPH,…

- Internal network and external link

Room Vil2

Room Vil1

WAN

Internal Services

External Services

CPU

DISK

DISK

TAPE

Proxy

RENATER

LHCONE

LHCOPN

1Gb/s
10Gb/s
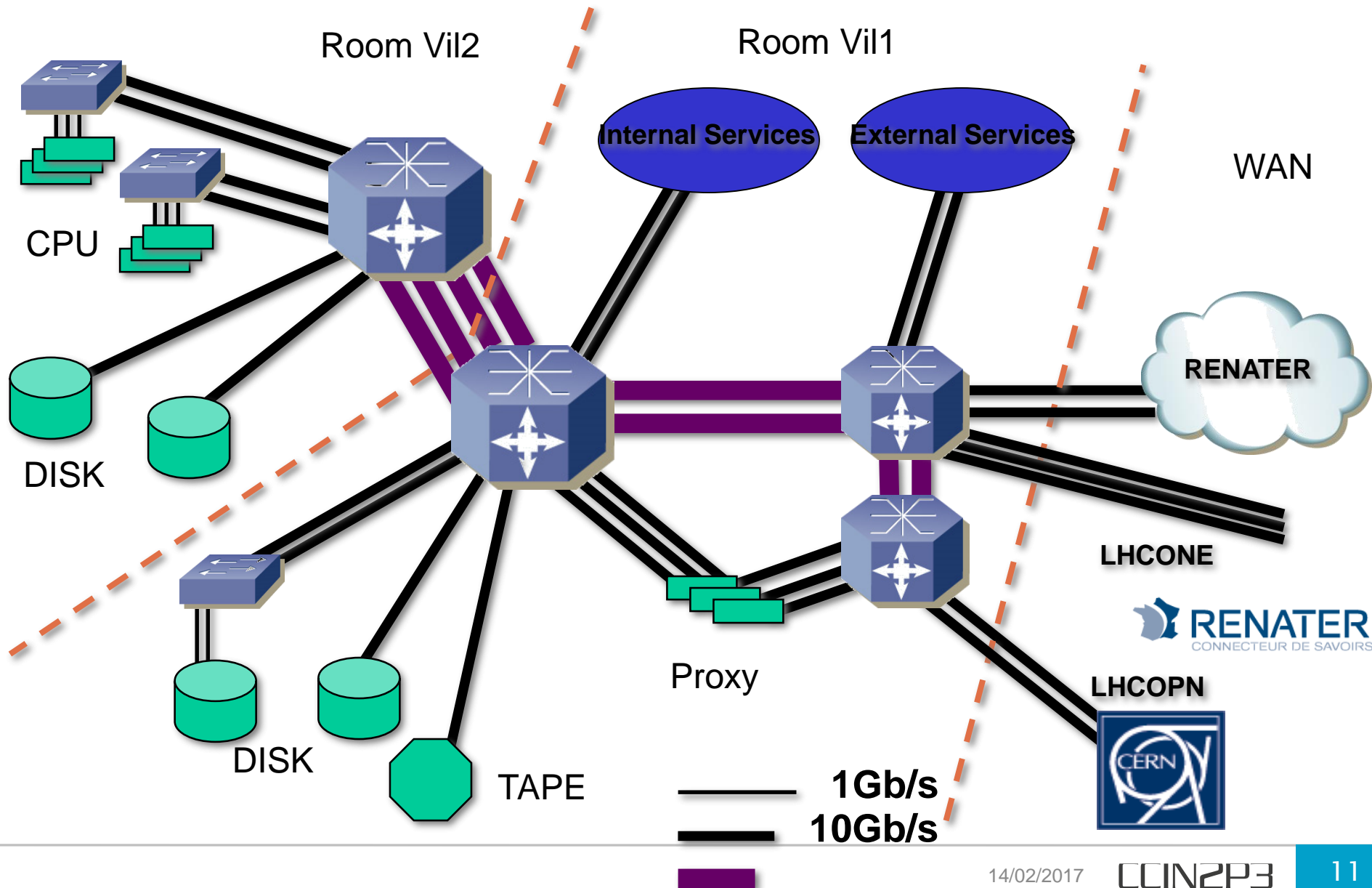
WLCG at CC IN2P3

- 14 Tier 1's on WLCG, CC-IN2P3 is one of them and expect to provide ~10% of the Tiers's 1 requirements.

- LCG France coordinate French activities on WLCG.

    - See Catherine talk

- CC-IN2P3 support whole LHC experiments
    - ALICE
    - ATLAS
    - CMS
    - LHCb
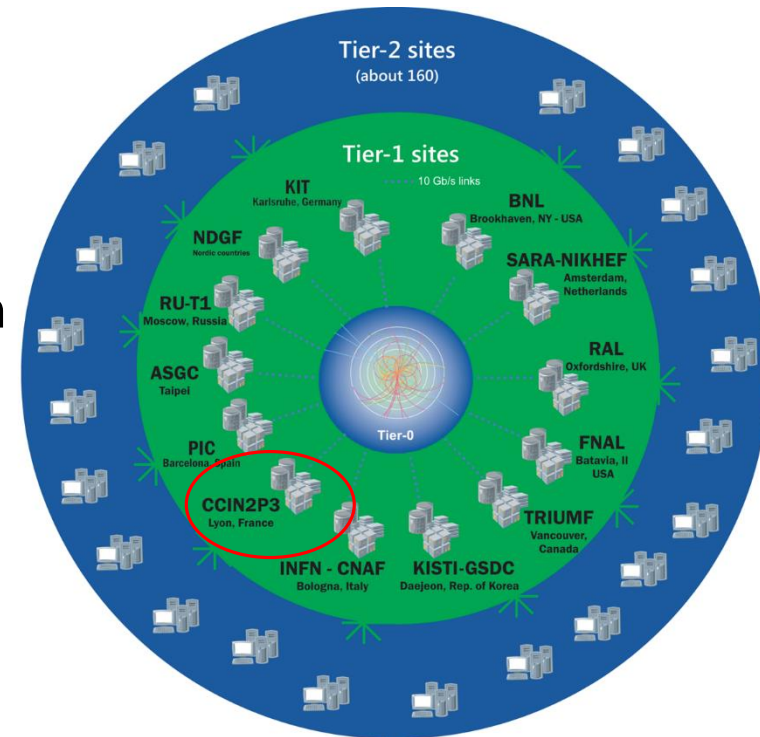
VO	ALICE	ATLAS	CMS	LHCb
Share	15 %	45 %	25 %	15 %

Objectives of the resources sharing for CC Tier1 activities

- WLCG weight at CC IN2P3

2017	CPU	DISK (scientific data)	Tape
WLCG	58 %	86 %	71 %
NON WLCG	42 %	14 %	39 %

- One dedicated support/contact for each LHC experiments.
  - Provide support and follow activities of the experiments at Tier 1.
  - Contact for the experiment at CC Tier 1.

In term of requirements and resources usage WLCG experiments are the biggest supported by CC-IN2P3

WLCG : All T1 Requirements
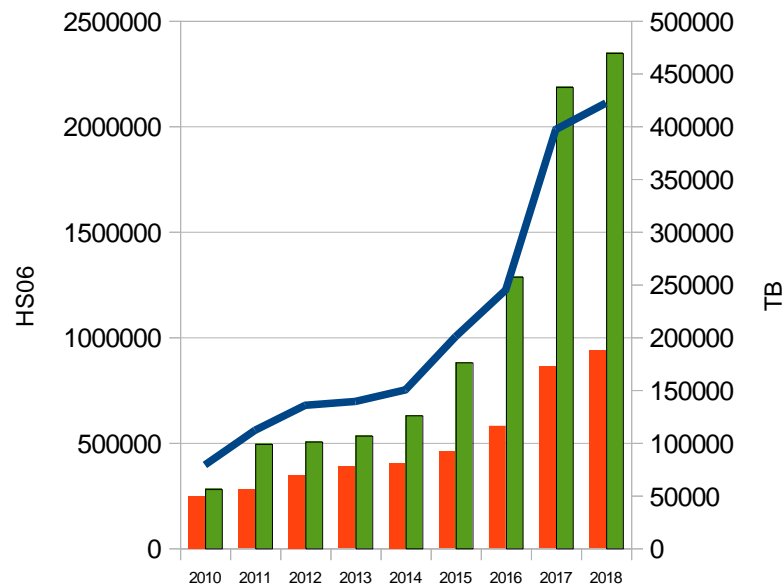
Tier 1 CC : All VO Resource
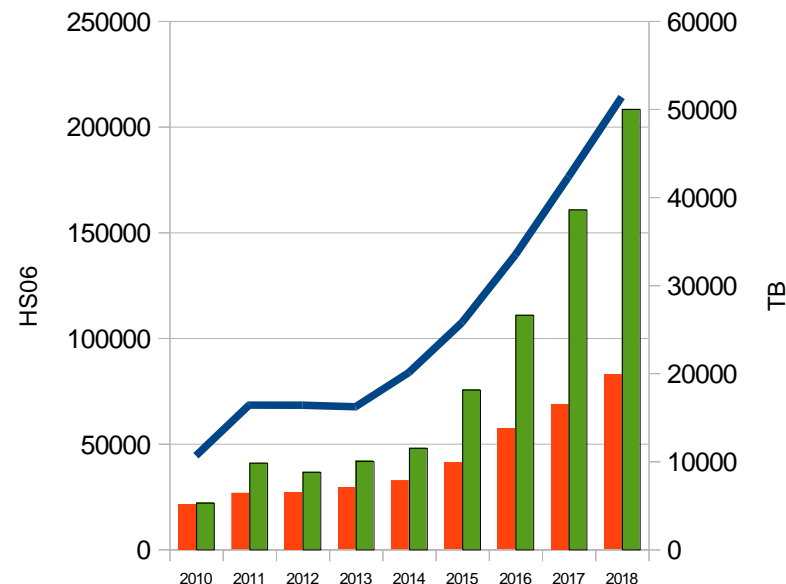
Tier 1 CC : % of the resource request
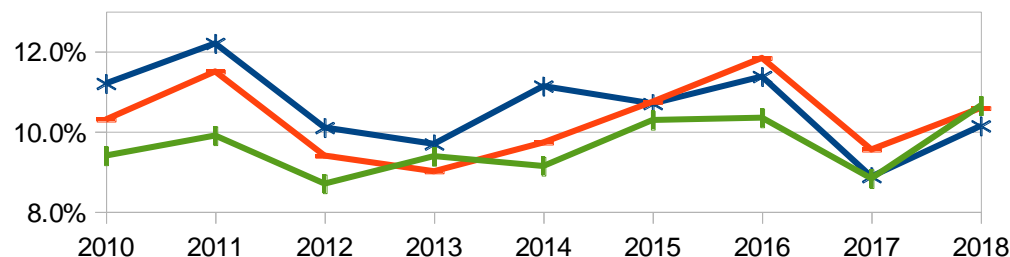
CC Tier 1 = ~ 10 % of the Tier 1 requirements

CC IN2P3 on Tier's 1 landscape

Tier 1 CPU [HS06] relative part / CC Tier 1

Tier 1 DISK [TB] relative part / CC Tier 1
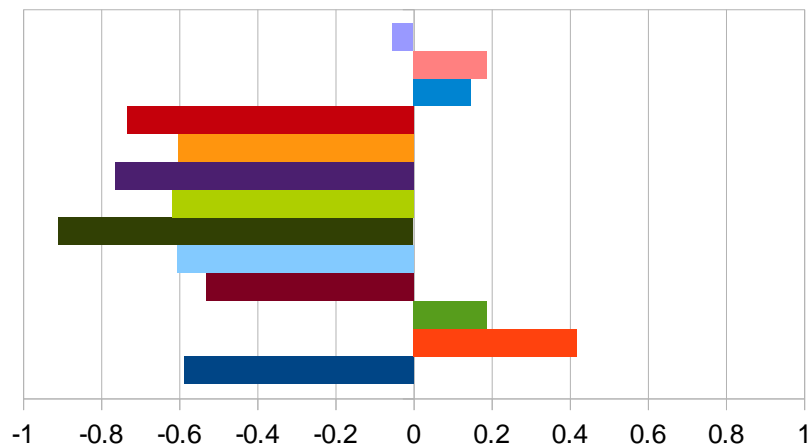
Tier 1 TAPE [TB] relative part / CC Tier 1

Legend:
- CA-TRIUMF
- DE-KIT
- IT-INFN-CNAF
- NL-T1
- NDGF
- KR-KISTI-GSDC
- NRC-KI-T1
- RU-JINR-T1
- ES-PIC
- TW-ASGC
- UK-T1-RAL
- US-FNAL-CMS
- US-T1-BNL
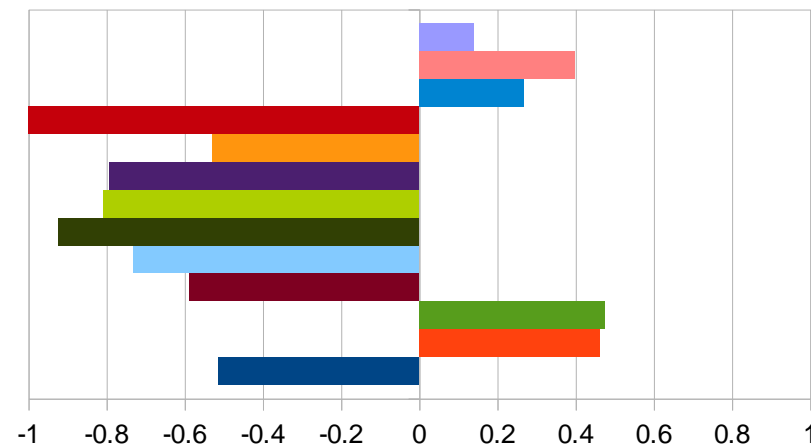
WLCG resource usage at CC-IN2P3

Tier 1 CC : VO share 2017
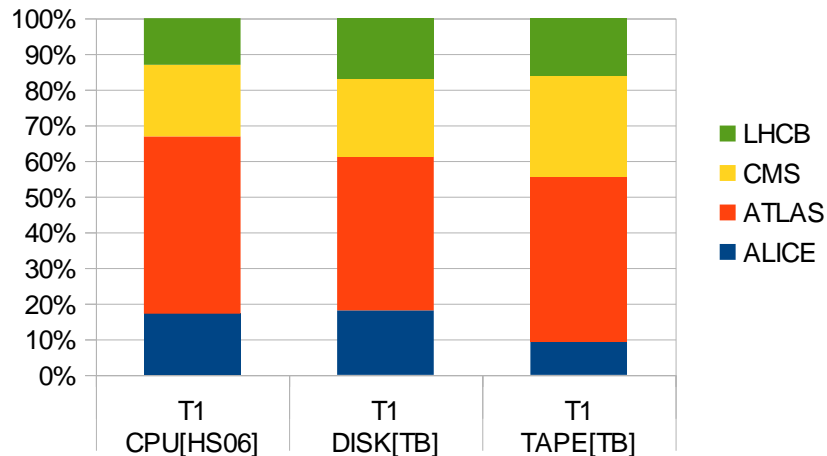
CC : CPU used
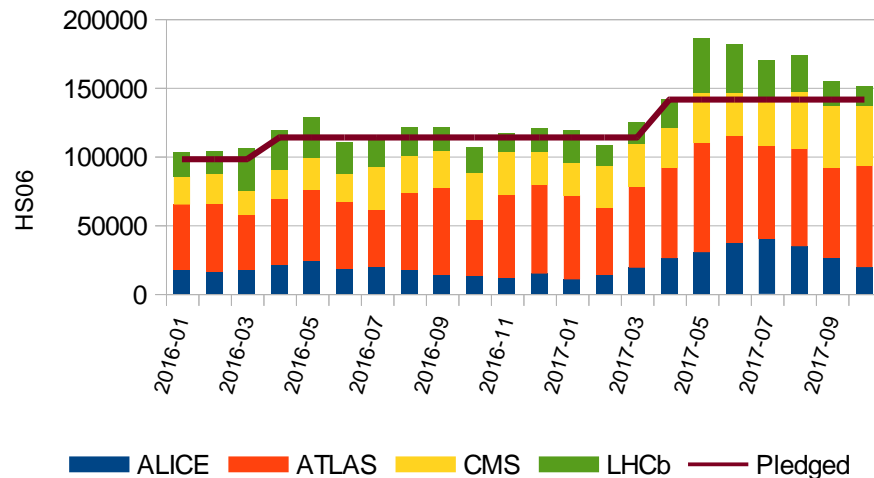
CC : Disk storage used
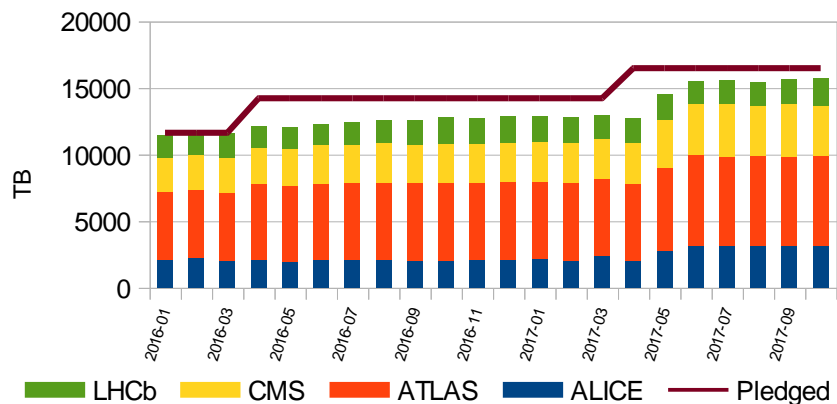
CC : Tape storage used
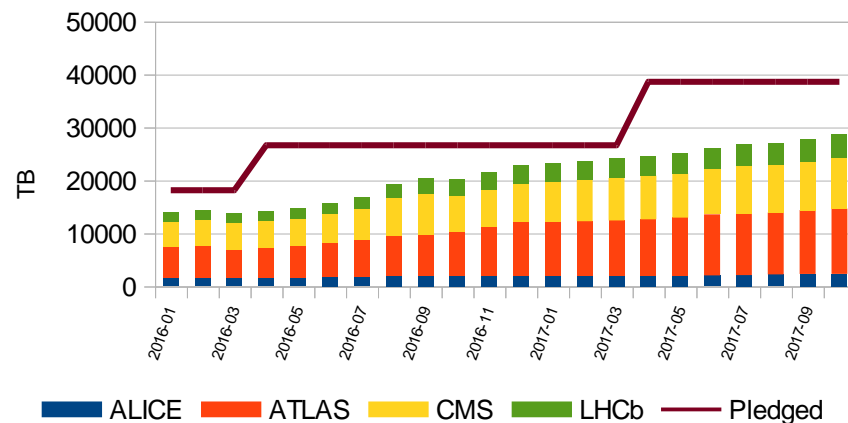
WLCG at CCIN2P3 : CPU

- CPU resource usage on 2017

VO (2017)	ALICE	ATLAS	CMS	LHCb
kHS06.h	268 928	709 419	276 810	271 142

- ALICE/CMS/LHCb are using more or less the same cpu resources, ATLAS * 3.
- A total of 1525 MHS06.h has been delivered by CC IN2P3 for WLCG in 2017.

- Delivered CPU vs pledge used by VO at CC-IN2P3.

VO (2017)	ALICE	ATLAS	CMS	LHCb
CPU / annual pledged	115%	106%	111%	137%

- Higher than 100 % of the CPU pledge for each experiment.

Tier 1 CC : Reliability
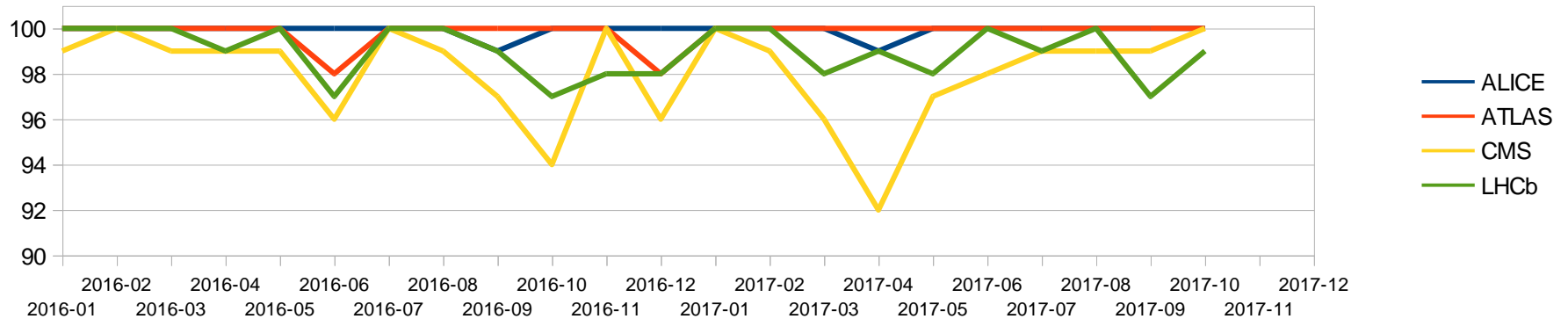
$$reliability = time\_site\_is\_available \,/\, \{total\_time - time\_site\_is\_scheduled\_down\}$$

Tier 1 CC : Availability

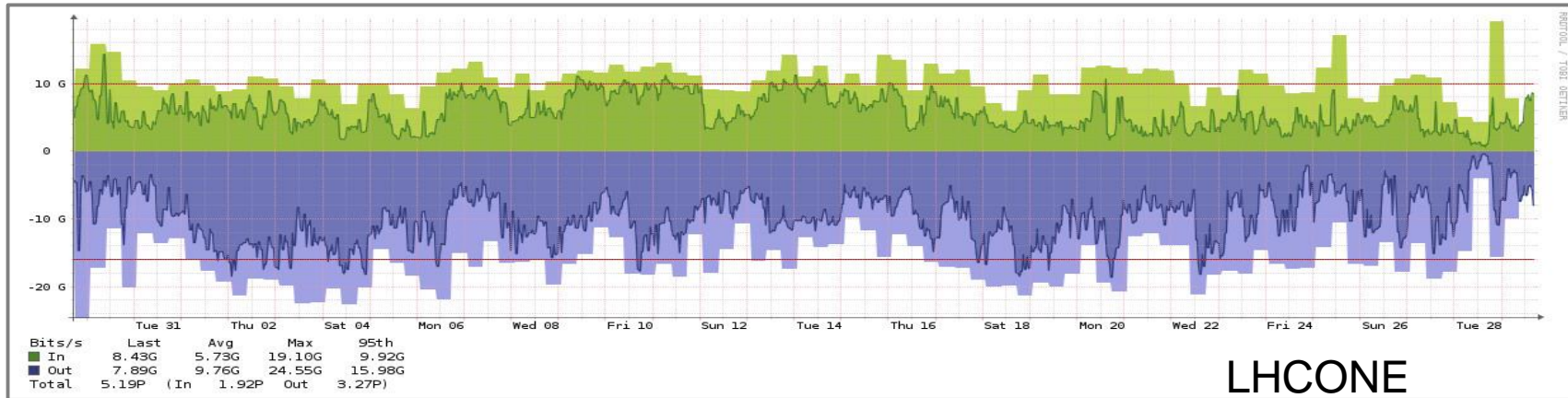$$availability = time\_site\_is\_available \,/\, total\_time$$

⭐ Expected stop of CC

- ## Two dedicated networks for LHC activities
  - ### LHCOPN for CERN – CC IN2P3 traffics : 2 * 10 Gb/s
  - ### LHCONE for Tier 1 – Tier 2 traffics : 3 *10 Gb/s

LHCONE

LHCOPN

# ATLAS at CCIN2P3
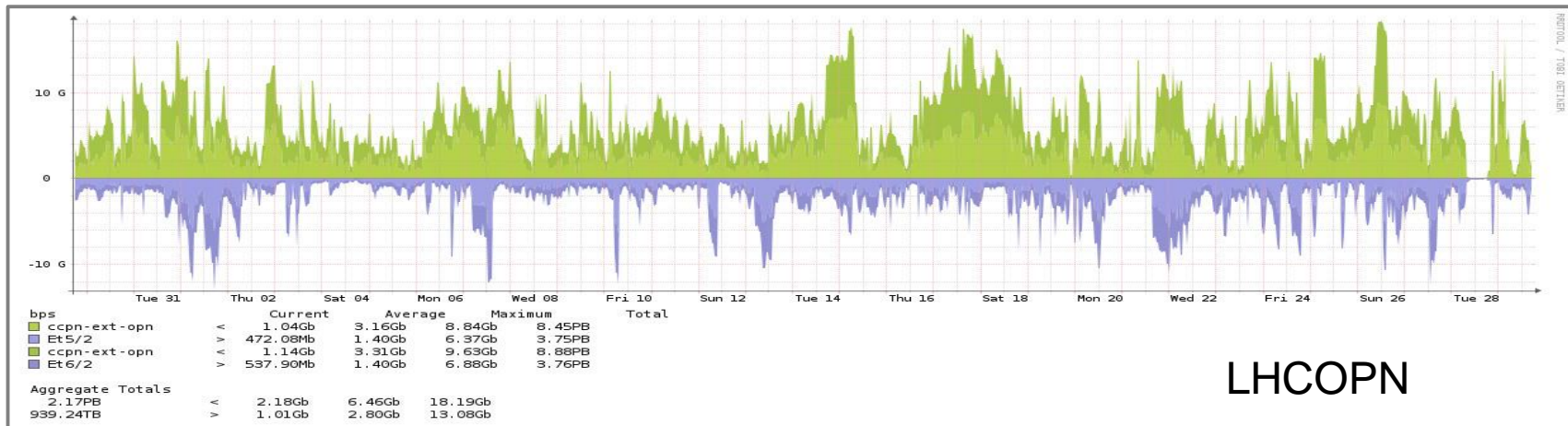
- Tier 1 resource pledge 2018 (vs 2017)

    - CPU : 105 000 HS06 (+ 20%)

    - Disk : 8100 To (+14 %)

    - Tape : 22 000 To (+24%)

- A dedicated support

    - Emmanouil VAMVAKOPOULOS.

- Migration to CentOS 7 on going (test and validation are performing now).

- Some tests had be done to use a French HPC datacentre to execute ATLAS jobs.

- Validation and test to use a commercial cloud provider to run ATLAS jobs.

- Concerning this two item please refer to next talk about HPC and CLOUD activities.
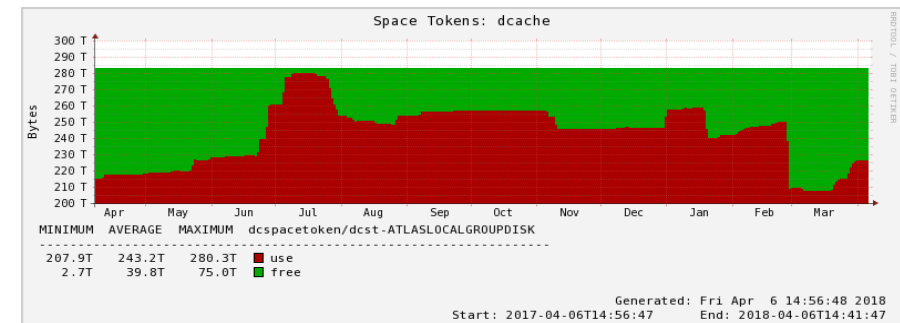
- Running job ATLAS, slot occupancy
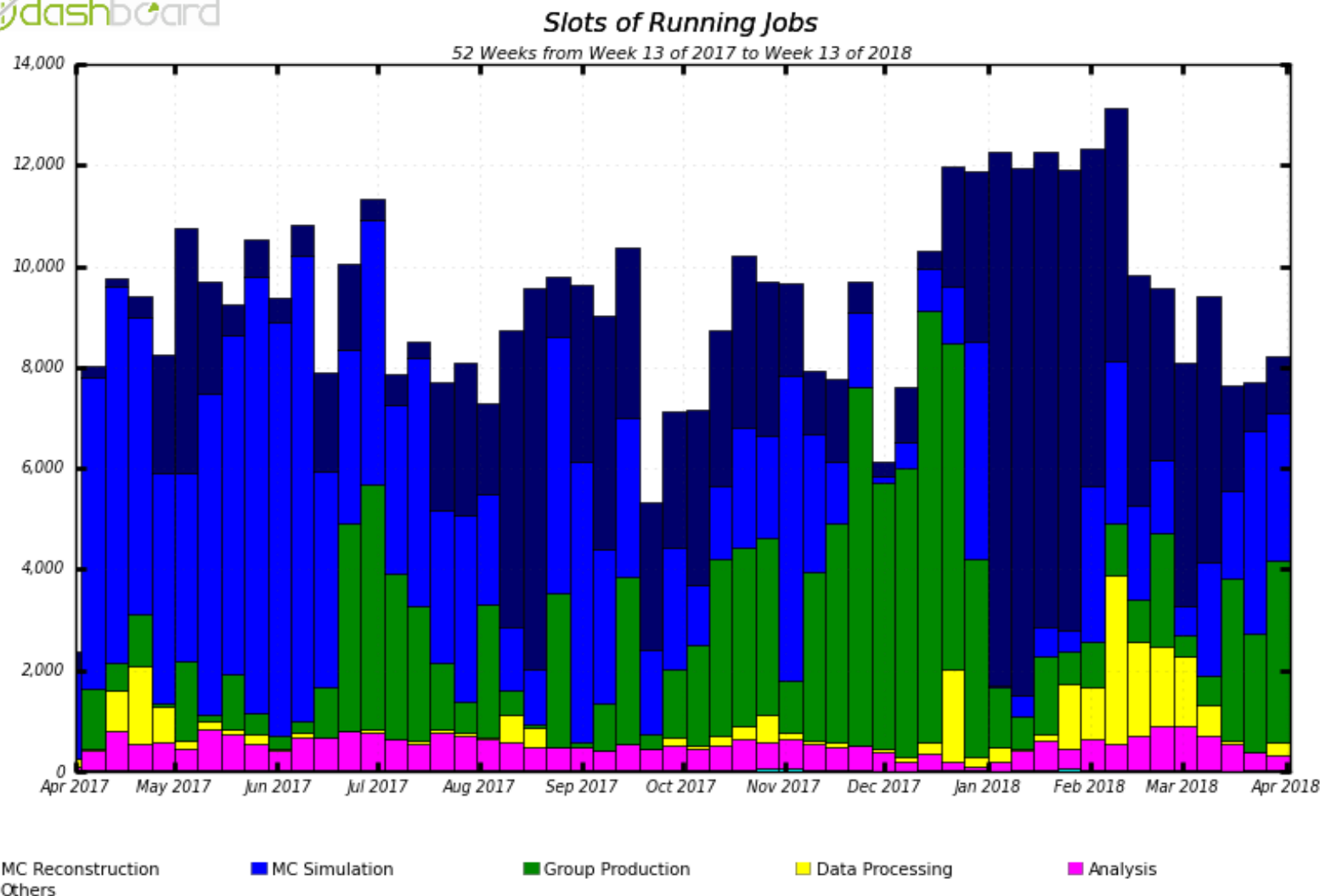
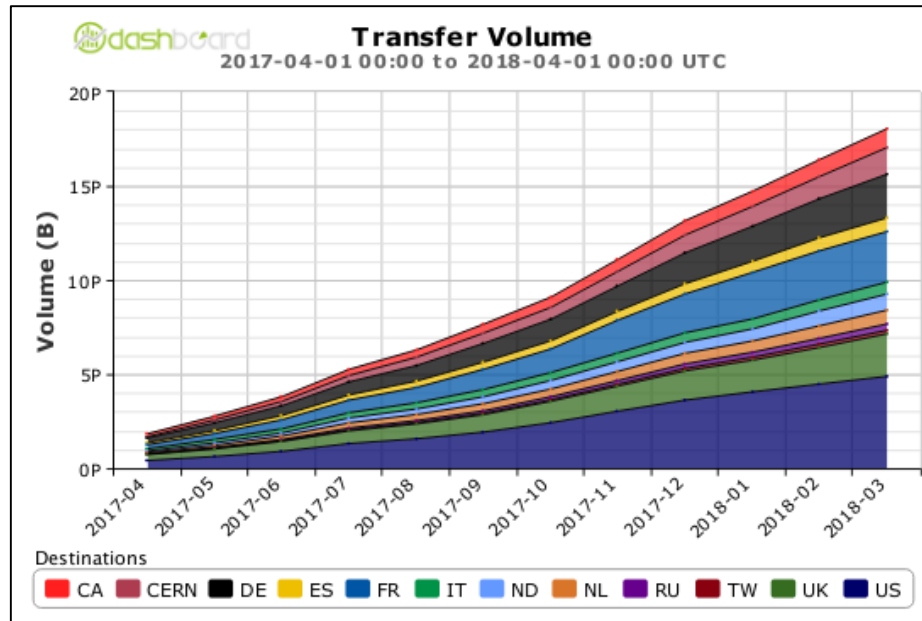- Dcache version 2.16-54 for Grid activities
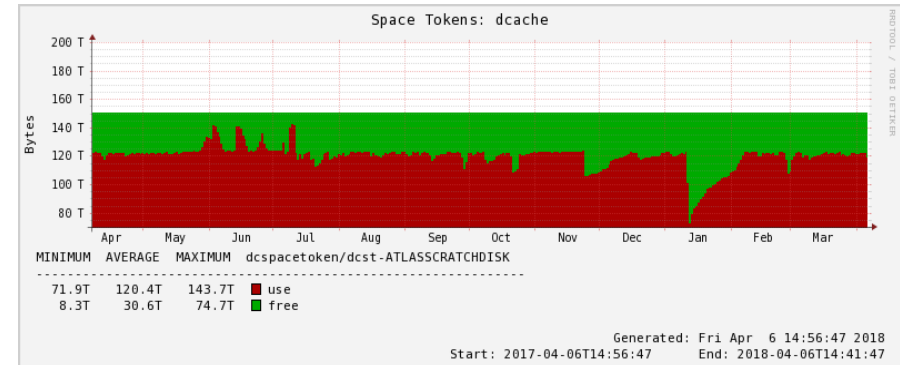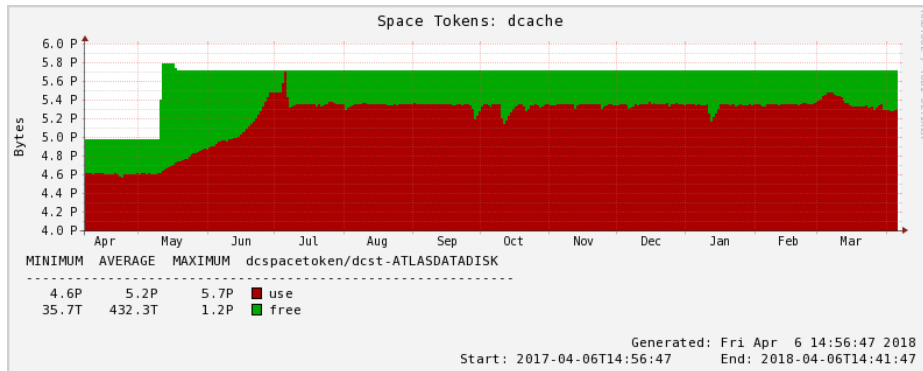
Token occupancy
- ATLASDATADISK : 94 %
- ATLASLOCALGROUPDISK : 80%
- ATLASSCRATCHDISK : 79%

- GPFS for local ATLAS Users
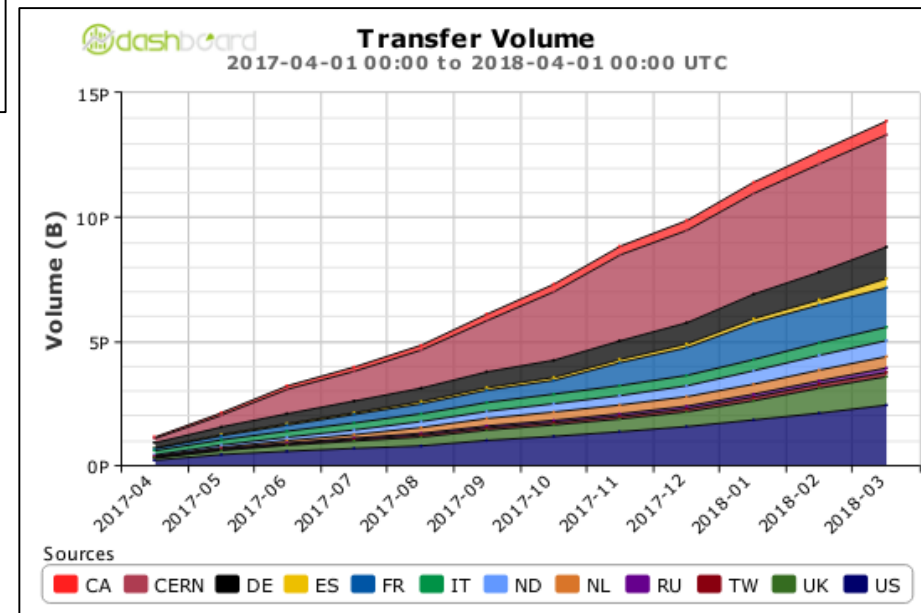
- Data transfers

One year of ATLAS data transfers to CC IN2P3

One year of ATLAS data transfers from CC IN2P3

Conclusion

- CC-IN2P3 is supporting the 4 WLCG experiments as Tier 1.

- CC-IN2P3 provide a significant resource (CPU, Disk, Tape) to WLCG.

- ATLAS is the biggest experiment supported at CC IN2P3.

- We are and will be happy to share with all the site our knowledge and questions.

- Questions