CC-IN2P3 news and update
FJPPL – 14/02/2017

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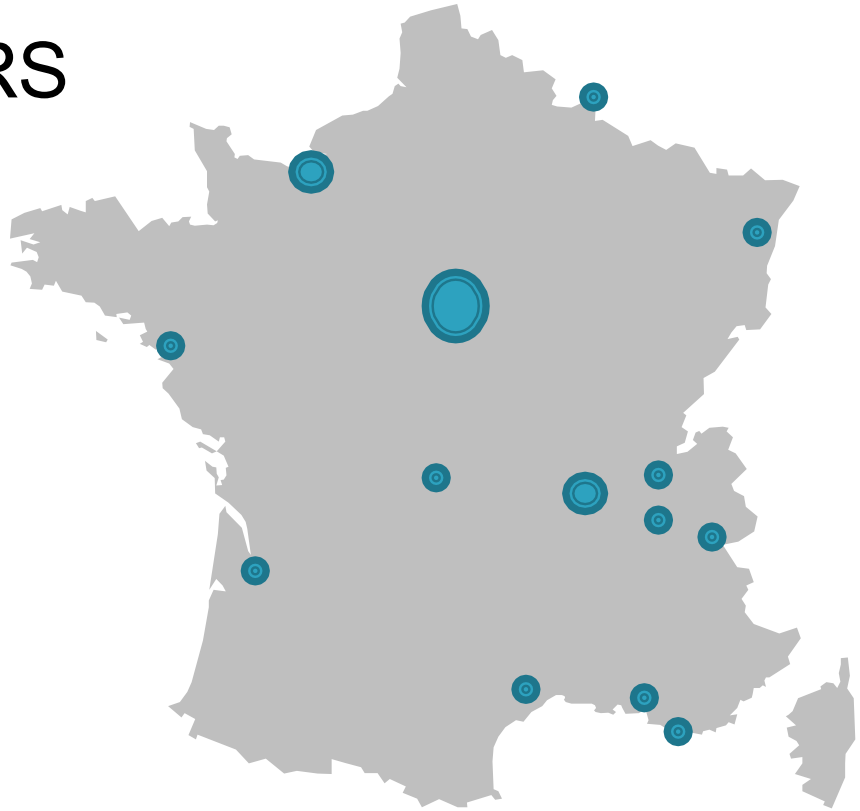
Agenda

- IN2P3 in brief
- CC-IN2P3 in brief
- Computing resources
- Storage systems
- What happened in 2016 ?
- What's new in 2017 ?

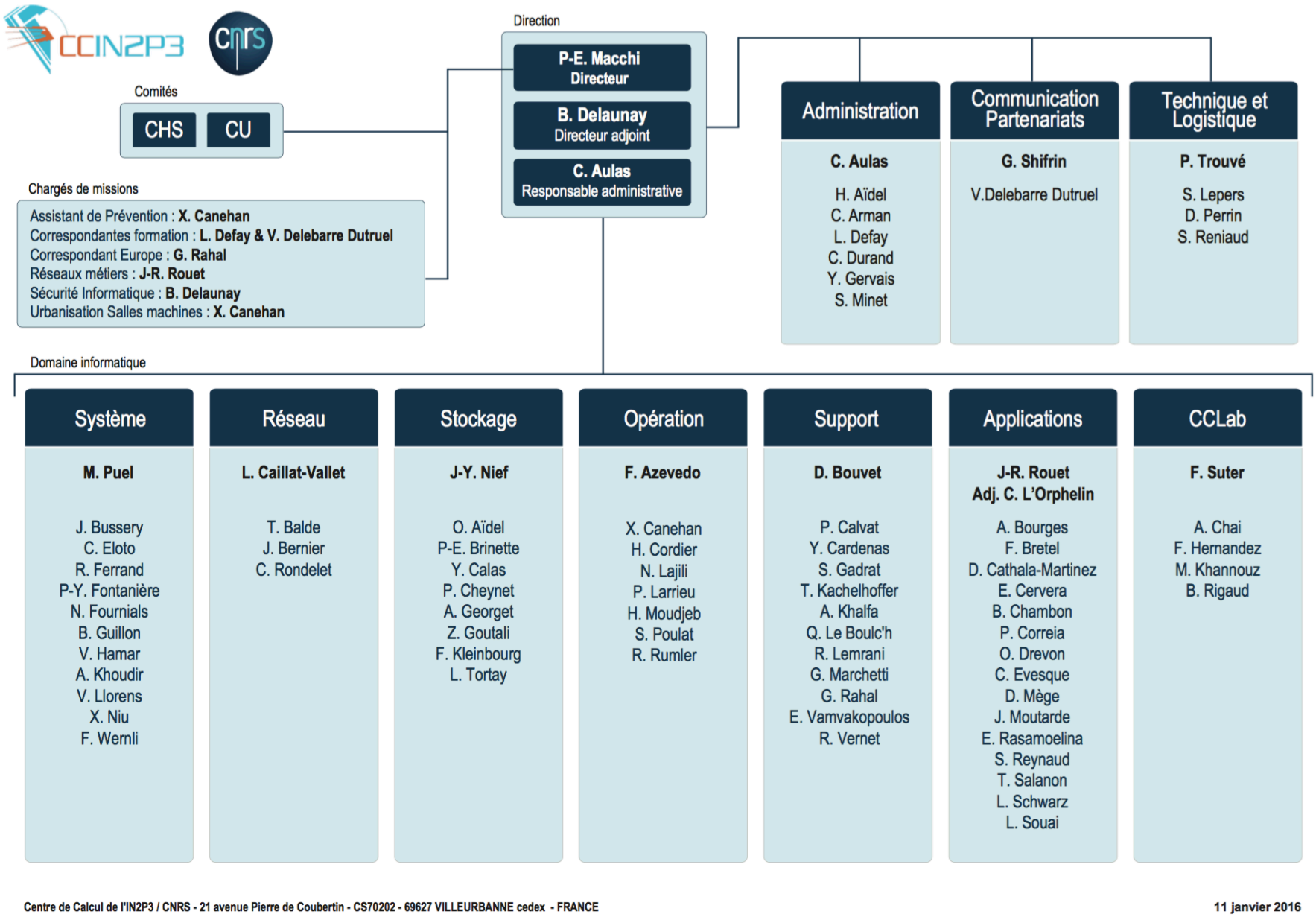
IN2P3 in brief…

- National Research Institute for Nuclear Physics, Particle Physics and Astroparticle Physics
- One of the 10 Institutes of CNRS
- Composed of 25 laboratories
- Involve in tenth of experiments
- Almost 5000 people
  - 1/3 researchers
  - 2/3 administrative, technical



CC-IN2P3 in brief…

- Centre de Calcul de l'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, development and project management tools…)
- People
  - 84 people (administrative, IT and facility management)
  - 74% are permanent positions, 26% are temporary
- Activities distributed across 10 teams, 7 for IT
- Provide resources to 70 experiments


Direction
P-E. Macchi
Directeur
B. Delaunay
Directeur adjoint
C. Aulas
Responsable administrative
Comités
CHS
CU
Chargés de missions
Assistant de Prévention : X. Canehan
Correspondantes formation : L. Defay & V. Delebarre Dutruel
Correspondant Europe : G. Rahal
Réseaux métiers : J-R. Rouet
Sécurité Informatique : B. Delaunay
Urbanisation Salles machines : X. Canehan
Administration
C. Aulas
H. Aïdel
C. Arman
L. Defay
C. Durand
Y. Gervais
S. Minet
Communication Partenariats
G. Shifrin
V.Delebarre Dutruel
Technique et Logistique
P. Trouvé
S. Lepers
D. Perrin
S. Reniaud
Domaine informatique
Système
M. Puel
J. Bussery
C. Eloto
R. Ferrand
P-Y. Fontanière
N. Fournials
B. Guillon
V. Hamar
A. Khoudir
V. Llorens
X. Niu
F. Wernli
Réseau
L. Caillat-Vallet
T. Balde
J. Bernier
C. Rondelet
Stockage
J-Y. Nief
O. Aïdel
P-E. Brinette
Y. Calas
P. Cheynet
A. Georget
Z. Goutali
F. Kleinbourg
L. Tortay
Opération
F. Azevedo
X. Canehan
H. Cordier
N. Lajili
P. Larrieu
H. Moudjeb
S. Poulat
R. Rumler
Support
D. Bouvet
P. Calvat
Y. Cardenas
S. Gadrat
T. Kachelhoffer
A. Khalfa
Q. Le Boulc'h
R. Lemrani
G. Marchetti
G. Rahal
E. Vamvakopoulos
R. Vernet
Applications
J-R. Rouet
Adj. C. L'Orphelin
A. Bourges
F. Bretel
D. Cathala-Martinez
E. Cervera
B. Chambon
P. Correia
O. Drevon
C. Evesque
D. Mège
J. Moutarde
E. Rasamoelina
S. Reynaud
T. Salanon
L. Schwarz
L. Souai
CCLab
F. Suter
A. Chai
F. Hernandez
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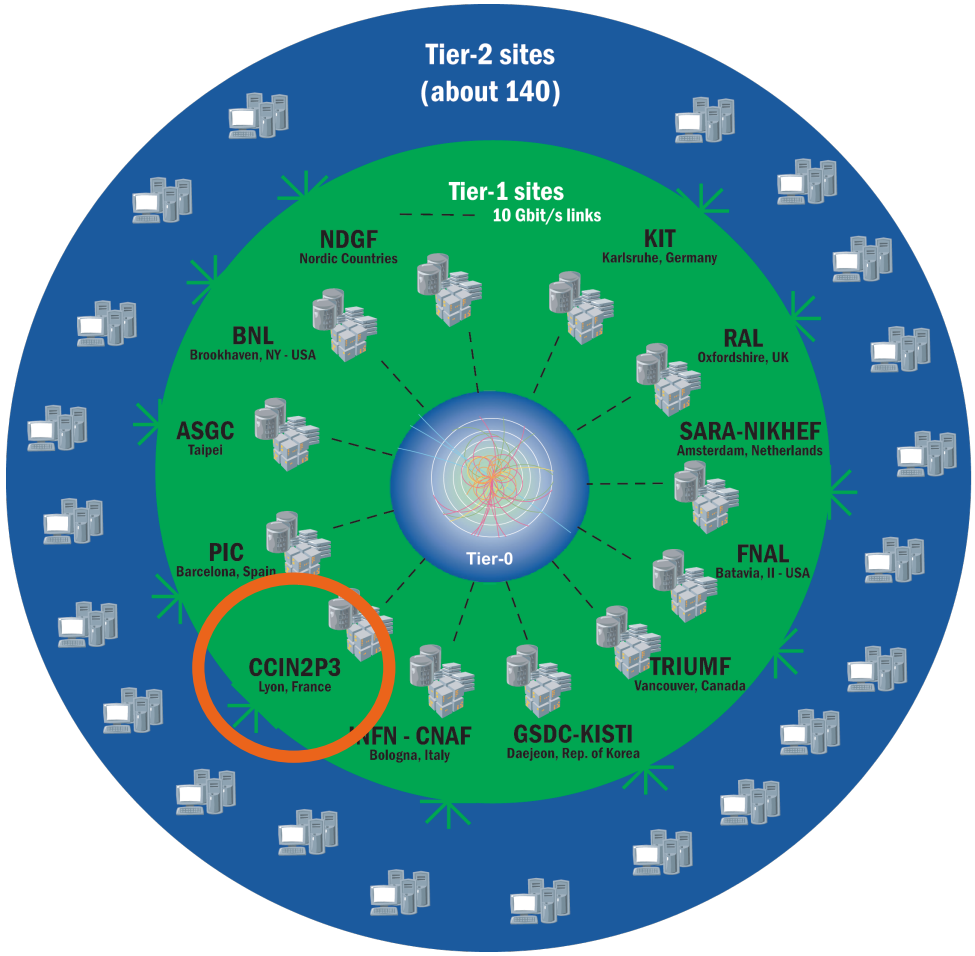
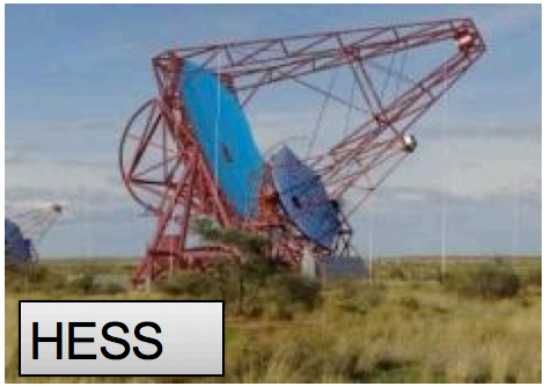
11 janvier 2016

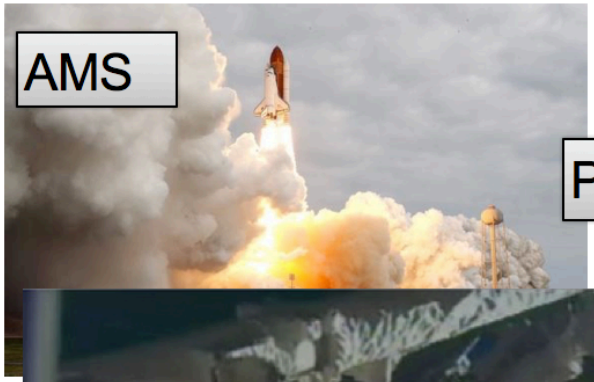
CC-IN2P3, a part of the LHC Computing Grid

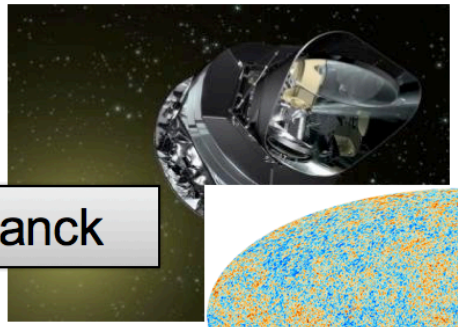


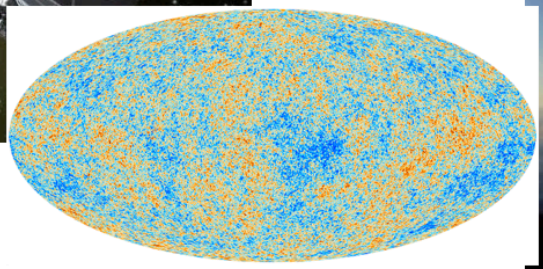
The CC-IN2P3 provides resources for the 4 experiments Alice, Atlas, CMS and LHCb.

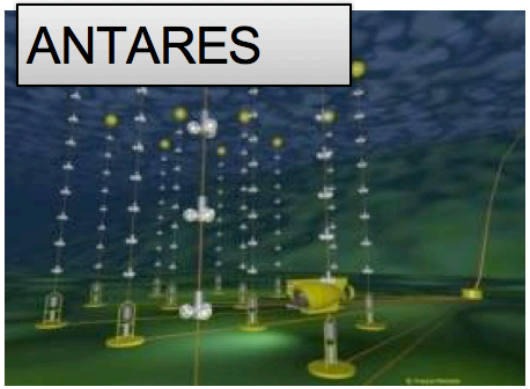
But also working for…











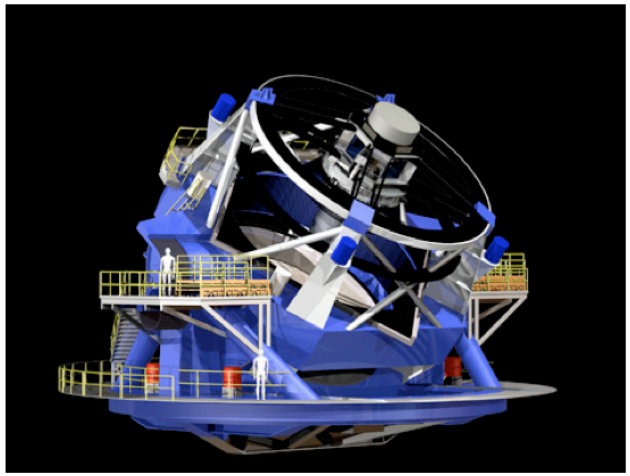
And prepare the future for…

LSST

Whole dataset available at CC-IN2P3

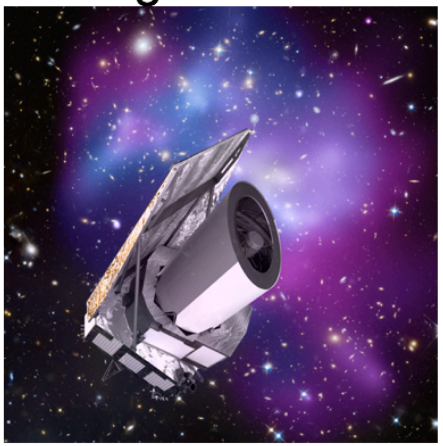
50% of the processing by CC-IN2P3

other 50% by NCSA



EUCLID

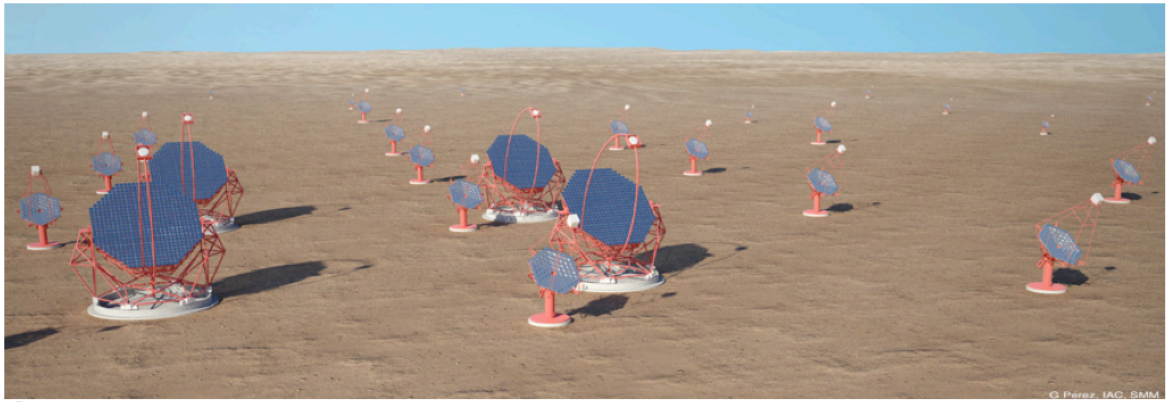
CC-IN2P3 is the French Data Center for processsing and data management



dark energy and dark matter

CTA

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



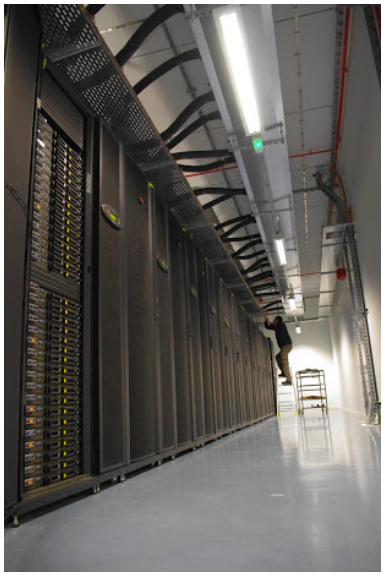
Gamma rays

CC-IN2P3 computer rooms

- 2 computer rooms of 850 m^2 each
- #VIL1, in the main building, since 1986
  - hosting services and storage systems
- #VIL2, since 2011
  - hosting the CPU farm and storage since 2015
- The 2 rooms are connected with a 400 Gbps link

Computing resources

- HTC farm composed of 692 servers
  - 12432 cores
  - 257 700 HS06*
- 4 generations of DELL servers acquired since 2011
  - C6100, C6220, C6220v2 and C6320
  - Hardware renewed every 5 years
- 1 Gbps/server, 48 servers/20 Gbps uplink



* https://w3.hepix.org/benchmarks/doku.php

- Mass Storage
  - Mix of disks for cache and tape backend storage
    - Used by the HPSS system / StorageTek Tape Libraries

- Disk storage
  - Direct Attached Storage (DAS)
    - Used by DCACHE, XROOTD, IRODS and AFS
    - Mass storage frontend with user API
  - Shared Disk Storage (SDS)
    - Used by IBM/GPFS
    - Medium term storage system
    - POSIX File System access

What happened in 2016 ?

- HTC farm increase
  - 221 400 HS06 => 257 700 HS06 (***+16%***)*
  - 692 DELL servers, 12432 cores, 76TB memory, 257 700 HS06
- HPC cluster renew
  - 5.2 TFLOPS => 9.4 TFLOPS (***+81%***)
  - 16 DELL servers, 512 cores, 2TB memory, Infiniband interconnect
- GPGPU cluster (61.5 TFLOPS?)
  - 10 DELL servers, 40 NVIDIA K80 GPU, 1.28TB memory, Infiniband interconnect
  - See Nicolas FOURNIALS talk
- Univa Grid Engine
  - Still using UGE, moved to version 8.4.4
  - HTC, HPC and GPU clusters driven by UGE

https://w3.hepix.org/benchmarks/doku.php

What happened in 2016 ?

- Tape storage – HPSS 7.4.2.1
  - 32PB => 44PB (***+37,5%***)
  - T-REQSv2 (see Bernard CHAMBON's talk)
- Backup – IBM Spectrum Protect
  - Introducing LTO7 tape drives
- GPFS – IBM Spectrum Scale
  - Reorganize space in order to get better performances
  - See Loïc TORTAY's talk
- Disk storage – DCACHE, XROOTD, IRODS
  - 16,1PB => 18,7PB (***+16.3%***)
- Data Management
  - Left mysql for mariadb
  - MongoDB introduced for external and internal uses
  - Evaluation of Spark for large scale data processing

What happened in 2016 ?

- Network
  - Increases
    - 10 to 20Gbps the CERN private link
    - 10 to 20 Gbps to the national network and GIANT
  - IPv6 routing and addressing introduced into DCACHE and XROOTD storage systems (EGI, LCG)

- Evaluation of the docker container technology
  - LSST QSERV use case, and Web service hosting…

What's new in 2017 ?

- HTC farm
  - 257 700 HS06 => 323 700 HS06 (***+25.6%***)*
  - Introduce CentOS7 (current is SL6)
  - Assessment of container use in computing (docker, shifter, singularity ?)

- Tape storage – HPSS
  - 44PB => 61PB (***+38.6%***)
  - DropT10K-C (5TB tape cartridge)

- Backup – IBM Spectrum Protect
  - Drop LTO4 tape cartridges and drives

- Disk storage – DCACHE, XROOTD, IRODS
  - 18,7 PB => 21,5 PB (***+15%***)

- Prepare to replace AFS
  - A part of the data to GPFS space
  - A part of the data to ISILON space (NFSv4 access)

What's new in 2017 ?

- Network
  - Backbone evolution to prepare the arrival of 100Gbps external links
- Virtualization On Demand (aka cloud openstack)
  - See Mattieu PUEL's talk
- Many studies,
  - Container orchestration, CEPH, storage front-end and transfer gateway (LSST use case)

2017 key words

Merci