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institut national de physique nucléaire
et de physique des particules

Institut National de Physique Nucléaire et de Physique des Particules



e-Infrastructures for Science in France and Europe

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會見中國國家科學院



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e-Infrastructures: IN2P3, France, Europe

- [IN2P3](#) computing intensive projects
- IN2P3 infrastructure
- French e-infrastructures
- European view

- [CNRS](#) / [IN2P3](#): 3300 colleagues, [22 labs](#), 400 M€/year

- Particle physics

10% WLCG, future: [Belle-II](#)



- Astroparticle physics

[AMS-2](#), [Planck](#), [Fermi](#), [HESS](#), [Antares](#)



Future: [Euclid](#) (30%), [LSST](#) (50%), [CTA](#), [SVOM](#), [KM3NeT](#)

- Nuclear physics

Future: [Spiral-2](#) / [S³](#) @ [GANIL](#)





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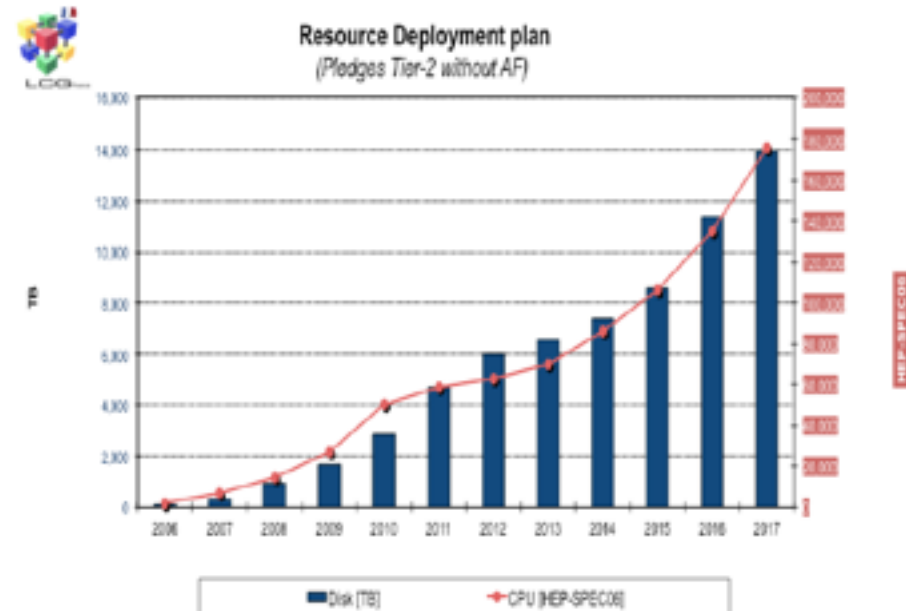
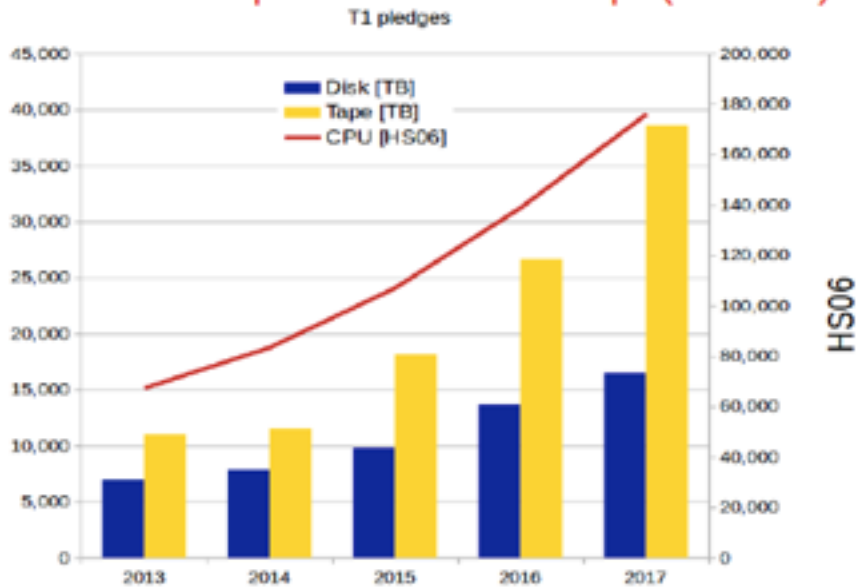
IN2P3 computing infrastructure



Tier-1 centre (CC-IN2P3 Lyon), 7 Tier-2, 1 site Tier 3, 10% of all WLCG computing

- ~ 35,000 cores, 23 FTE, LCG-France budget (w/o FTE): 2 M€/year
- ~ 1GB/s, 100 TB/day exchange with outside
- connection via [LHCOne](#) and [LHCOPN](#) provided by [RENATER](#)

Participation IN2P3: 100% Tier-1, 70% Tier-2 (rest: regional resources, university, Europe, ...)



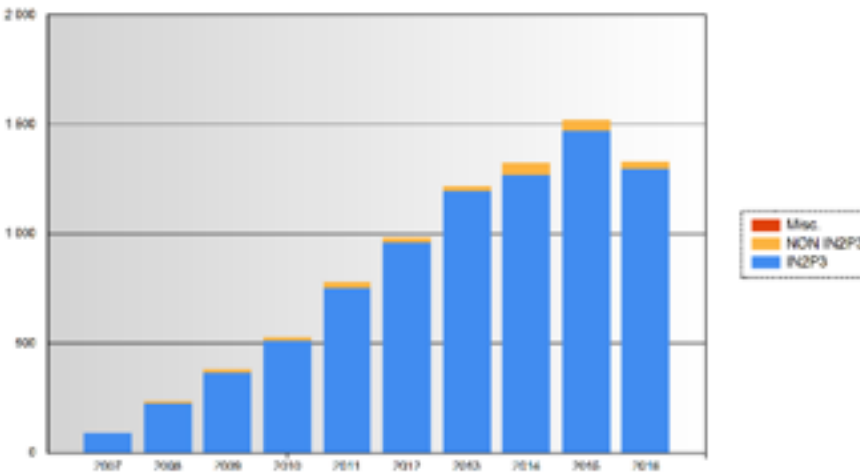


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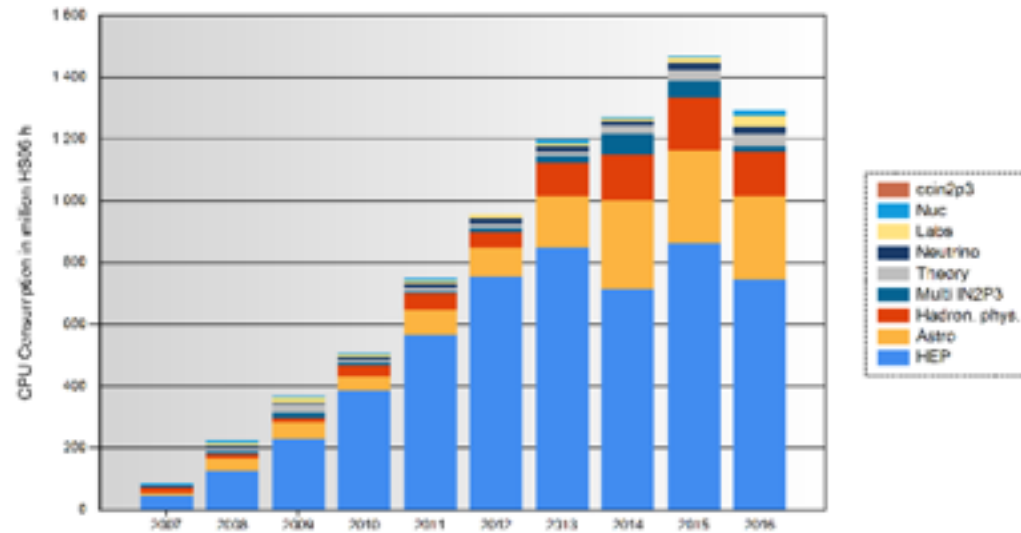
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CC-IN2P3 usage

CPU Consumption by scientific domain



IN2P3 CPU Consumption by activity



Atlas



CMS



Alice



LHCb

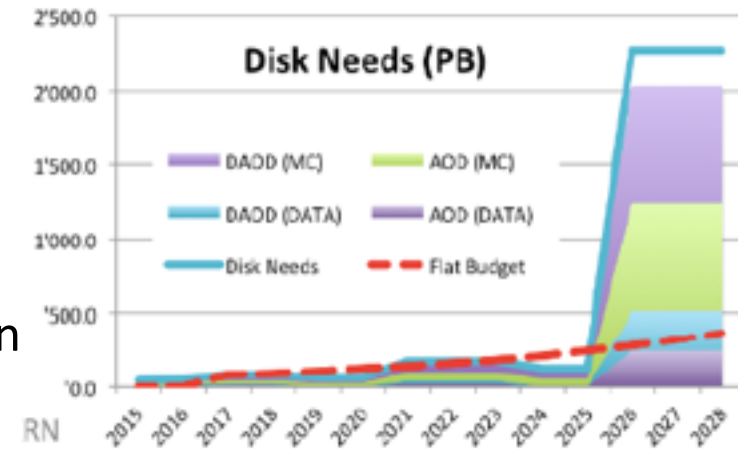


Antares

8/9/2017

Visit of Chinese Academy of Sciences

- LHC Run-3 (and Run-4) !
- Providing resources for other projects:
- Astroparticle physics: CTA, LSST, Euclid, KM3NeT
- Nuclear Physics: Spiral-2, S³
- Other domains → CC-IN2P3 as national computing centre
- HTC/HPC, Machine & Deep Learning, ...



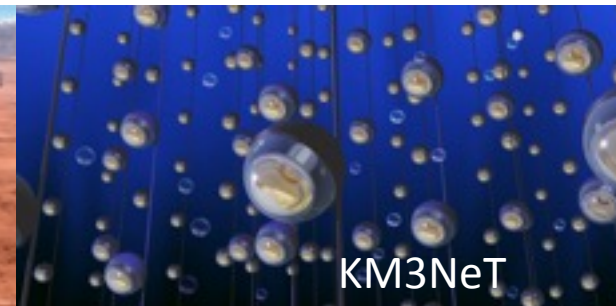
LSST



Spiral-2



CTA



KM3NeT

4 national computing centers:

- [TGCC](#) ([CEA](#)): scalar parallel (Bull B510) → Curie (50% for [PRACE](#))
- [CINES](#): universities: scalar parallel (BullX DLC)
- [IDRIS](#) ([INS2I](#)): massive parallel (IBM Blue Gene/Q) and scalar parallel (IBM x3750-M4)
- [CC-IN2P3](#): *see next presentation*



Accessible to French researchers through open calls

Coordinated by [GENCI](#)

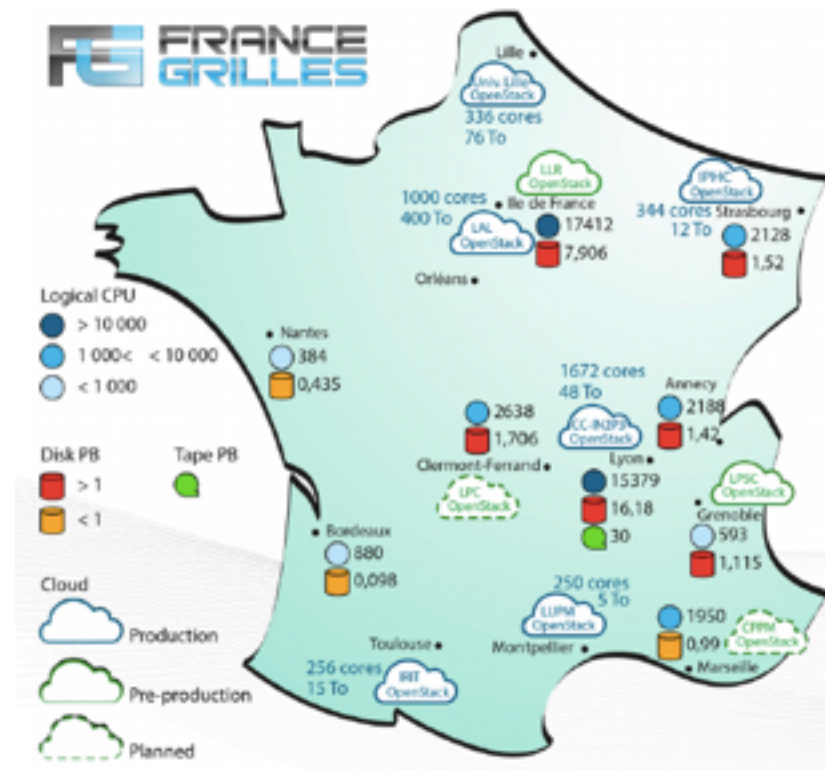




Coordinated by [France Grilles](#):

- Coordinated by IN2P3, with CNRS institutes, other national institutes, [CEA](#), universities, ...
- Cloud: 9 sites, 4,000 cores, 0.6 PByte storage, contributes to European Grid Infrastructure ([EGI](#))
- Grid: 12 sites, 44,000 cores, 32 PByte storage, EGI (3.7 billion hours kHS06)

Mainly a service from the particle physics community for the particle physics community → but evolving





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France



- Several reflection and perspective groups
- French ministry: harmonize infrastructure, HPC + HTC
- TGCC (CEA), CINES (Universities), IDRIS (INS2I), CC-IN2P3
- HPC driven (like EOSC)
- Identify national data center(s)
- Future of French Grid infrastructure (France Grilles)
- French Cloud infrastructure, include regional computing centers (mainly HPC)



Outlook:

- 2017 LCG budget: 2 M€ (15.6 M¥) might *slightly* increase in future)
- Interest to keep Tier-2 in the loop (pledged) on the long term
- Computing infrastructure belongs to IN2P3 (not LCG-France): we need to share
- CTA, LSST, Euclid, (KM3NeT, Spiral-2, S³, ...)
- Political landscape: open for new collaborations, explore collaborations with HPC centres
- Re-organize France Grilles infrastructure → Grid & Cloud

- European Union: 28 member states, very diverse landscape
- Computing dominated by Germany, UK, France, Italy, Scandinavia, Spain
- European Commission → [Horizon 2020](#)
- biggest EU Research and Innovation programme ever with nearly €80 billion (¥620 billion CNY) of funding available over 7 years (2014 to 2020)



Mobile Computing and Internet of Everything



Source:
[Next Generation Computing Roadmap](#)
 (NGC-R), European
 Commission, 2014



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- Work programs for research infrastructures (incl. e-infrastructures)
- European Open Science Cloud ([EOSC](#))
- Access for all European scientists to e-infrastructures and services
- Connecting existing infrastructures / services

Challenges:

- Business and governance model
- Different communities, cultures, infrastructures → interoperability





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In place

- European Grid Infrastructure ([EGI](#)): portal to grid / cloud resources and related services
- [EUDAT](#): e-infrastructure of integrated data services and resources
- [GÉANT](#): European network service
- ...

- Develop solutions necessary to implement the EOSC idea
- Governance, business model, interoperability (data / infrastructures), ...
- 2017 / 2018, 10 M€ (78 M¥), 33 partners (CNRS, CEA, MPG, STFC, EMBL, EGI, CNR, INFN, ...)
- Gap analysis e-infrastructures
- EOSC e-infrastructure architecture
- 15 use cases ([science demonstrators](#))
- Important input to shape the EOSC



- Integrate services and make them available to all European scientists
- 2018-2020, 30 M€ (230 M¥), 74 partners (CNRS, CEA, MPG, STFC, EMBL, EGI, CNR, INFN, SurfSara, ...)
- Major step in implementing EOSC services



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- Mainly particle physics (WLCG), but astroparticle and nuclear physics catching up
- Infrastructure: CC-IN2P3 + 7 Tier-2 centers, focus on HTC

France:

- GENCI coordinates access to national computing centers (IDRIS, CINES, TGCC, CC-IN2P3)
- France Grilles: Grid and Cloud infrastructure → evolving
- Include regional centers, link HTC / HPC centers, define national data centers

EOSC

- Access for researchers to infrastructures and services
- EOSC pilot, EOSC hub, [EC Work Program 2018-2020](#)

Similar goals on national and European level:

- Facilitate access
- AAls
- Common services
- HTC / HPC, cloud



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Additional slides
matériel supplémentaire
noch mehr Folien
materiale aggiuntivo
aanvullend materiaal



European Open Science Cloud References

European Commission website on EOSC:

<http://ec.europa.eu/research/openscience/index.cfm?pg=open-science-cloud>

EOSC in a nutshell:

<http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52016DC0178&from=en>

Booklet about e-infrastructures in Europe (introduction):

https://ec.europa.eu/futurium/en/system/files/ged/booklet_infra_web_final.pdf

European context: « [Realising the European Open Science Cloud](#) »

First report and recommendations of the Commission High Level Expert Group on the EOSC:

http://bookshop.europa.eu/en/realising-the-european-open-science-cloud-pbKI0116872/;pgid=GSPefJMEtXBSR0dT6jbGakZD0000_3hwTpXa;sid=u8MY6wKj7lsY6lqP2jaGTGCGvBAeOAVwvRA=?CatalogCategoryID=7QwKABstDHwAAAEjK5EY4e5L

WHO IS IT FOR?



1.7 million
researchers



70 million
professionals in science
and technology



Opening up in the future
to public services,
industry and SMEs

Bringing benefits to citizens

€2 BN IN OVERALL HORIZON 2020 FUNDING TO THE EUROPEAN CLOUD INITIATIVE, WITH ESTIMATED ADDITIONAL PUBLIC AND PRIVATE INVESTMENT OF €4.7 BN REQUIRED TO FURTHER DEVELOP THE EUROPEAN DATA INFRASTRUCTURE.

