DIRAC services at CC-IN2P3
Development in EGI-ACE project

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Dissemination level: Public
Disclosing Party: EGI-ACE Dirac team
Recipient Party: DIRAC community

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Overview

- Introduction
  - EGI-ACE and France-Grilles projects
  - DIRAC Interware
- Platforms description
  - Main 2021 event:
    - EGI-WMS migration from CYFRONET (Krakow) to CC-IN2P3 (Lyon)
- Use case examples
  - Management of different usage policy and/or computing models
  - REST API
  - Development framework
- Conclusion
CC-IN2P3 at a glance

- Academic data center in Lyon, France
  - Compute (37kslots)
  - Storage (Disk 25 PB, MSS 80 PB)
  - IT services

- LHC Tier-1+ many other experiments (~70)
  - Mainly HEP but not only

- Hosting EOSC/EGI services
  - Operation portals
  - EGI WMS

- Hosting FG service
  - DIRAC
Implement the Compute Platform of the European Open Science Cloud and contribute to the EOSC Data Commons by delivering integrated computing, platforms, data spaces and tools as an integrated solution.
DIRAC Interware

- Development team in CPPM
- A software framework for distributed computing
- Builds a layer between users and resources
- A complete solution to one or more user community

One of the services in the EOCS Marketplace Catalogue

[http://diracgrid.org](http://diracgrid.org)
EGI & FG service infrastructures

- **EGI WMS hosted by CYFRONET**
  - 5 medium size VM servers
  - 3TB storage
  - MySQL database service
  - ~8 million user jobs in 2020

- **WMS service provided by France-Grilles NGI (CC-IN2P3)**
  - 7 medium size VM servers
  - 2TB storage
  - MySQL database service
  - ~7 million user jobs in 2020

Cumulative Jobs by Site
52 Weeks from Week 52 of 2019 to Week 52 of 2020

Cumulative Jobs by Site
52 Weeks from Week 51 of 2019 to Week 51 of 2020
EGI WMS in CC-IN2P3

- From January (EGI-ACE kick-off) to March 2021
  - Migration WMS from CYFRONET to CC-IN2P3
- Migration result for EGI and FG
  - Optimized maintenance and operations
  - Single administrator team (CC-IN2P3 + CPPM +…)
- Combined service inherited all the communities
  - 43 registered VOs
  - ~700 registered users
  - Accessible via the same endpoint: https://dirac.egi.eu/DIRAC/
- Evolution and consolidation...

- EGI & FG in CC-IN2P3
  - 11 VM servers
  - 8TB storage
  - MySQL database service
  - Elasticsearch service
Use case examples

- WeNMR
- Virtual Imaging Platform
- Pierre Auger Observatory
- OpenMOLE
- ConCORDIA
Different usage policies and computing models
A quick overview – some more information in the backslides

- WeNMR Collaboration
  - COVID-19 tag allowed high resources exploitation
- Virtual Imaging Platform
  - Cloud computing (GPU)
- Pierre Auger Observatory
  - Several hours to week long simulations
OpenMOLE

Workflow engine for the distributed exploration of models

1. Models as blackboxes
   - C
   - R
   - C++
   - Java
   - Scala
   - Scilab
   - Octave
   - Python
   - Netlogo

2. Methods
   - Data processing
   - Design of Experiments
   - Sensitivity analysis
   - Calibration

3. Massively parallel environments
   - Multicore
   - Server
   - Cluster
   - The Grid

Use of EGI-WMS (through REST-API):

- Job submission
- Automatic user registration
- Monitoring and accounting
ConCORDIA (DIRAC in ESCAPE)

*a DIRAC extension to produce simulations of cosmic ray air showers*

- Provide a common simulation tool between experiments
  - Singularity containers to be deployed on the GRID
- Integrated as a DIRAC WebApp
  - Access to GRID job submissions and existing resources utilities
- EGI resources for DIRAC access
  - First developments in the EGI DIRAC-client docker
  - First tests on EGI-connected resources

- Work in progress…
Conclusion
Summary

Present and future features

- Oauth/OIDC Authentication
  - ESCAPE, EISCAT,…
- Jupyter Notebooks Interface (EGI requirement)
  - EISCAT,…
- EGI clouds
  - VIP (biomed VO), CTA,…
- REST API
  - OpenMOLE, FG community,…
- iRODS access & Payload proxy renewal for very long jobs
  - auger VO,…
- ConCORDIA
  - KM3Net, CTA,… astroparticle communities
EGI-ACE Call for Use Cases

https://www.egi.eu/projects/egi-ace/call-for-use-cases/

➢ Who should apply
  ➢ International researchers, research projects, communities and infrastructures, as well as national research groups needing services and support for:
    ➢ Large-scale data processing, scientific analysis, visualization
    ➢ Hosting data analysis platforms and applications in the cloud
    ➢ Federate and make accessible community-specific compute services in EOSC

➢ Timeline
  ➢ The call is kept open during 2021 and 2022.
  ➢ Cut-off dates with 2-monthly frequency, followed by the evaluation (within 1 month) of the submitted applications.
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- France-Grilles community, FG-DIRAC service admins, FG animation team.
- Experiences cited in use cases
Thank you for your time
Any questions?
Thank you!

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WeNMR response to COVID-19 challenge

- Multiple centres provided resources related to the COVID-19 research
- OSG admins created a special HTCondorCE gateway
  - Quickly connected to EGI WMS
- WLCG centres opened access to WeNMR payloads
  - Centre de Physique des Particules de Marseille (CPPM)
  - Karlsruhe Institute of Technology
  - Spanish LHCb Tier2 site (USC-LCG2)
- CYFRONET provided 5TB disk storage for WeNMR data
  - An S3 storage plugin was developed by the DIRAC team to integrate it into the infrastructure
- COVID-19 tag to allow high priority on the WMS
Virtual Imaging Platform

Mutualizes object models and medical image simulators, provides access to distributed computing and storage resources

- EGI-WMS (biomed VO)
  - Job submission & monitoring
  - Data management

- Growing needs
  - Cloud computing (GPU)
  - Local cluster integration
Pierre Auger Observatory

- Observation of new particle physics phenomena (~100TeV scale)
  - Extensive simulation libraries are needed!

- Resources
  - DFC at CESNET (Prague)
  - 15 sites supporting VO auger
  - Data accessible via iRODS (Lyon)

- CORSIKA simulations
  - Hundreds of MB output files / ~1 GB memory
  - Several hours to week long simulations

- Future productions
  - Adding radio components or air showers to simulations
    - Considering using MPI (10-20 cores)
  - Offline simulations (Input: CORSIKA simulations files)