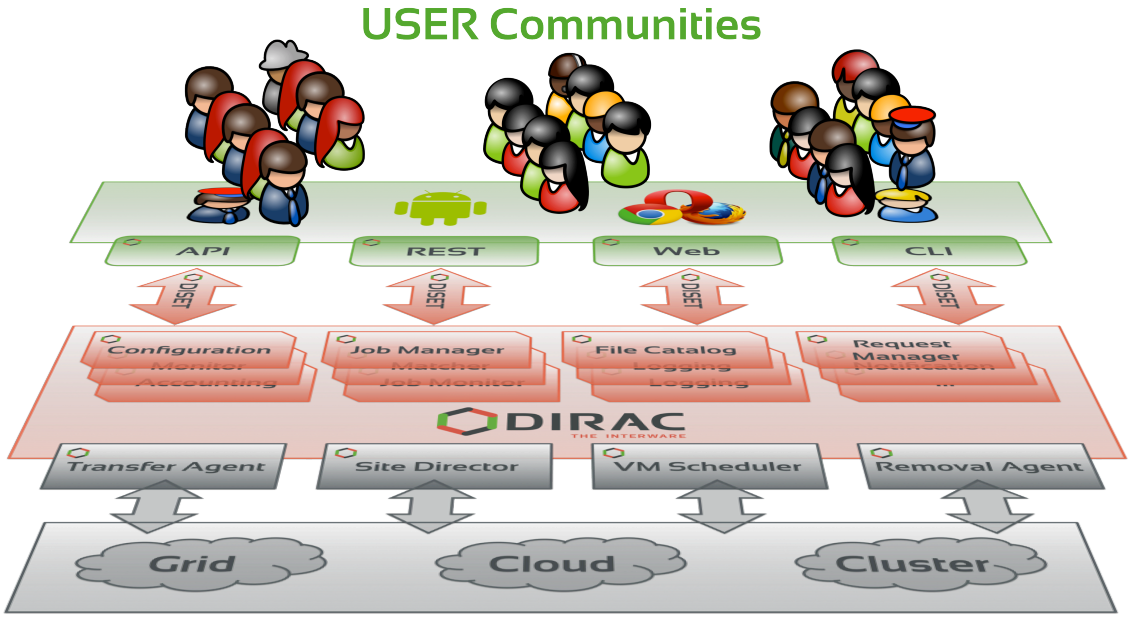
DIRAC Project

A. Tsaregorodtsev,
CPPM-IN2P3-CNRS

DIRAC/EGI Meeting, 20 December 2013

Interware

- DIRAC has all the necessary components to build ad-hoc grid infrastructures **interconnecting** computing resources of different types, allowing **interoperability** and simplifying **interfaces**. This allows to speak about the DIRAC ***interware***.



DIRAC
THE INTERWARE

General purpose project

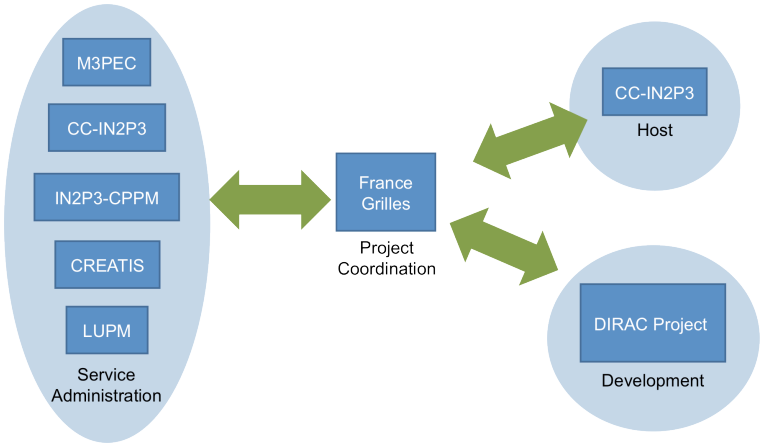
- DIRAC was initially developed for the LHCb High Energy Physics experiment
  - Several new experiments started to use DIRAC software relying on its proven in practice utility
- In 2009 the core DIRAC development team decided to generalize the software to make it suitable for any user community.
  - Separate LHCb specific functionality
  - Introduce new services to make it a complete solution
  - Support for multiple small groups by a single DIRAC service
  - General refurbishing of the code, code management, deployment, documentation, etc

Dedicated installations

- LHCb Collaboration, CERN, Switzerland
  - The largest DIRAC user
  - Up to 50K simultaneous jobs, ~15PB of data
- Belle II Collaboration, KEK, Japan
- ILC/CLIC detector Collaboration
- BES III, IHEP, China
- CTA
- DIRAC evaluations by other experiments
  - LSST, Auger, DayaBay, TREND, GEANT4, …

National services

- **DIRAC** services are provided by several National Grid Initiatives: France, Spain, Italy, UK ...
- Example: France-Grilles DIRAC service
  - Hosted by the CC/IN2P3
  - Distributed administrator team
    - 5 participating universities
  - 15 VOs, ~100 registered users
  - In production since May 2012



The Current Actors

LHCb/WLCG Clouds
EGI Fedcloud
FG Clouds

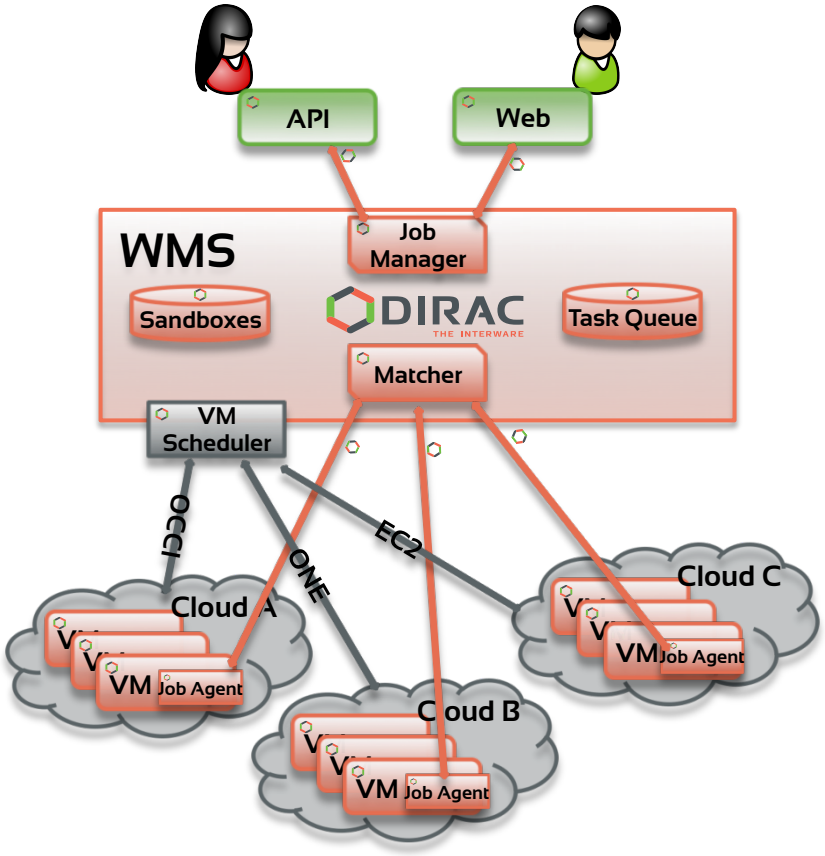
DIRAC
THE INTERWARE

Computing resources

- DIRAC support transparent access to various types of computing resources
  - Aggregated with a single entry point for the users
- Full support for grid infrastructures based on different middleware:
  - **gLite**: EGI, GISELA, etc
  - **VDT**: OSG
  - **ARC**: NDGF, RAL, etc

Clouds

- VM Scheduler developed for Belle Data Production System
  - Dynamic VM spawning driven by the user workload
  - Discarding VMs automatically when no more needed
- Support for various cloud technologies
  - Amazon, OCCI, OpenNebula, OpenStack, CloudStack, Stratuslab



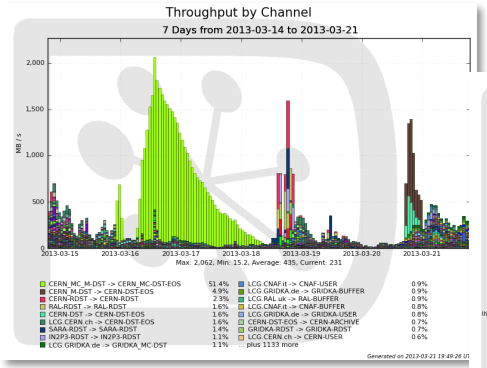
DIRAC
THE INTERWARE

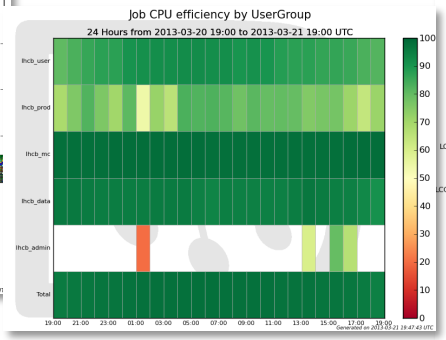
Other computing resources

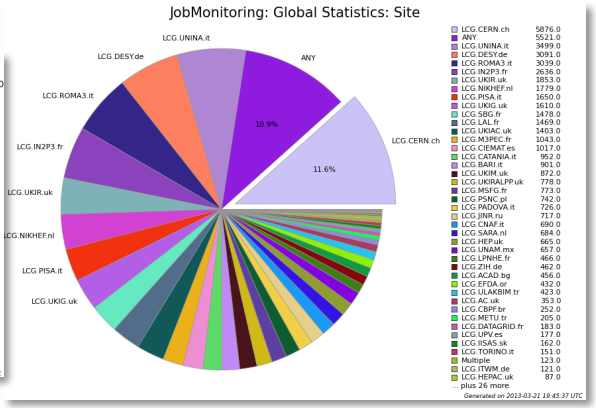
- Computing clusters
  - Access through SSH tunnel: no grid middleware installation needed on site
  - Torque/PBS, Condor, LSF, GE, OAR, SLURM
- Volunteer computing
  - IDGF
  - BOINC

Services

- Security infrastructure
  - Digital certificate authentication
  - Single and Multi-Community portal
- WMS – pilot based management of user jobs
  - Job submission, monitoring, retrieval
  - Intra-Community groups and users policies
  - Automated data driven workflows
- Accounting
  - CPU and storage resources consumption, data transfers





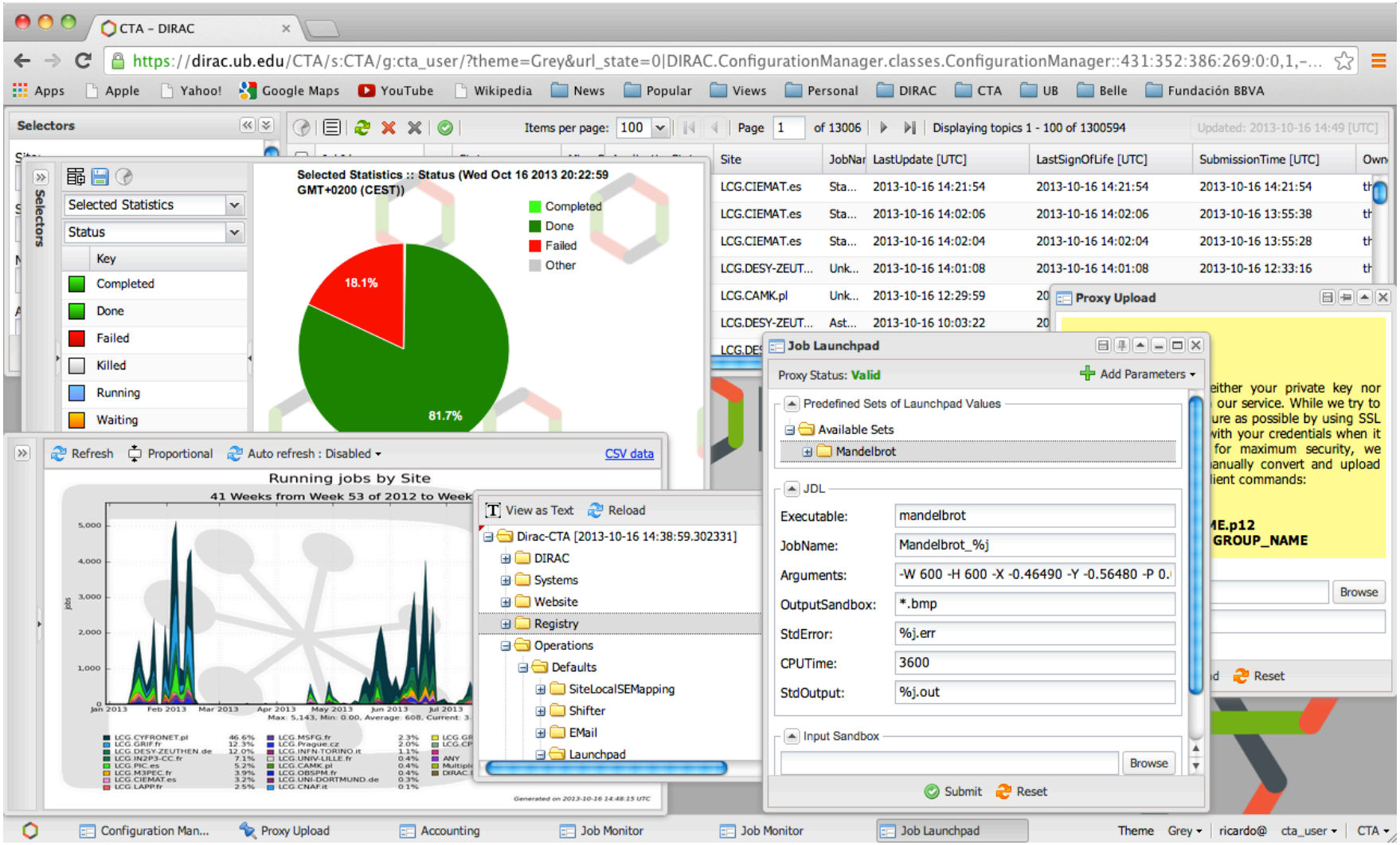


DIRAC
THE INTERWARE

Interfaces

- Web Portal
  - Support of most of the user tasks (jobs, data, monitoring, management)
- DIRAC RESTful interface
  - Language neutral
  - Suitable for application portals
    - JSAGA plugin
- Other interfaces include
  - Extensive Python API
  - A rich set of command line tools (>200 commands)

Web Portal: example interfaces



Conclusions

- DIRAC provides a robust general purpose framework for building distributed computing systems
- It provides transparent user-friendly access to various types of computing and storage resources
- DIRAC helps users to get started in the world of distributed computing and discover its full potential

http://diracgrid.org