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DIRAC: breaking the frontiers of the Grid

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Description of the work

The DIRAC is an open source software project currently supported by CPPM, UB and CERN, that provides an unique framework for distributing computing, able to integrate in a single system all the activities of large international scientific collaborations, and providing transparent access and interoperability among all their distributed resources.
Starting from the LHCb use case, where it was initially developed, DIRAC has proven to integrate general purpose EGEE grid resources with commercial Amazon cloud resources and private HTC solutions in order to optimize the overall cost of large scale projects like Belle II.
This work has been continued and DIRAC can connect now to OCCI/OpenNebula and RESTful/CloudStack (OpenStack is under development at the moment), providing much wider integration with private, public and hybrid cloud solutions. In combination with CernVM and cvmfs solutions, it provides a very flexible platform for general purpose usage that will be validated within the EGI FedCloud TaskForce effort.
At the same time, an integrated web portal interface, a versatile command-line and programatic python API, and current new developments allow now to connect the DIRAC WMS and DMS engines, to existing third party generic application portal solutions.
Effort is now devoted to handle the use case of small user groups accessing a common shared infrastructure like the EGI NGIs, providing a single and easy to use entry point to all user of general purpose VOs. This includes the possibility for larger groups or advanced users to easily extend the basic DIRAC functionality reusing the extensions provided by larger collaborations already making use of DIRAC.
This integration effort, in all senses, and the opportunity to transfer to a much wider audience the accumulated experience from the Particle Physics community is an unique opportunity to return to the society part of the effort that in the last years has been dedicated to LHC experiments.

Link for further information

http://diracgrid.org
https://indico.cern.ch/search.py?p=DIRAC&confId=149557&collections=Contributions

Wider impact of this work

Using DIRAC to transfer the knowledge and expertise that Particle Physics communities have accumulated over the last year of extensive use of distributed computing, by providing an easy to use complete solution to end users and smaller communities is expected to boost the usage of these expensive computing resources towards a much wider base of users, currently discouraged in many cases by the existing spartan middleware tools.
The unique capability to integrate resources, users and tools make DIRAC a new “interware” solution that should allow to break through the frontier that currently separates non-expert users (or users without close connections to experts) and the usage of high throughput distributed computing solutions that would allow these researches to boost their scientific work and its impact.

Printable Summary

The DIRAC project provides a framework for building ready to use distributed computing systems. It has been proven to be a useful tool for large international scientific collaborations like LHCb, ILC, Belle II, and others, integrating in a single system all their computing activities and distributed computing resources: Grids, Clouds and HTP clusters.

At the same time DIRAC offers an unique solution for NGIs that need to provide simple and transparent access a wide variety of users and users communities with different levels of ICT expertise. This is currently being explored as pilot case in FRANCE and IBERGRID.
Additionally, DIRAC provides unique tools like its File Catalog that is at the same time replica, metadata and provenance catalog, integrated in a single service and closely connected to the DIRAC WMS and DMS. Or a newly developed RESTful API that it is being tested against existing Application specific portal frameworks like gUSE/WS-pGRADE or InSilicoLab.

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