ILCDIRAC
STATUS AND PLANS

The 2015 International Workshop on Future Linear Colliders

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on behalf of the CLICdp Collaboration

5 November 2015

What's Dirac

- A software framework for distributed computing

- Dirac (Distributed Infrastructure with Remote Agent Control): High level interface between users and distributed resources
- Adopted by more than 20 virtual organisations (VO)
- Developed mostly by LHCb plus support from a wider community
- Written in python 2 (225k lines of code)
- Has multiple extensions, e.g. Web(App)DIRAC,…
- Rapid release cycle, 2 or 3 releases per year

What's iLCDIRAC

- iLCDirac is an extension of the DIRAC system for the ILC VO

- ILC VO: virtual organisation for linear collider detectors (SiD, ILD and CLICdp)
- Code comprised of 33k lines
  - Workflow Modules for LC Software, Overlay System
  - J. Phys.: Conf. Ser. ILCDirac, a DIRAC extension for the Linear Collider community. Proceedings of CHEP2013. 513 CLICdp-Conf-2013-003
  - Centralized MC Production (Event Generation, Geant4 Simulation, Reconstruction)
  - User jobs (Generation, Simulation, Reconstruction, Analyses)
- Each release uniquely dependent from a DIRAC release
- Mostly following DIRAC release cycle…

Software distribution

Software installation:

- CVMFS support for installations on CVMFS
  - sources `init_ilcsoft.sh` from CVMFS
  - Use the same definition of applications in the ConfigurationSystem
  - Some special variables, e.g., for Mokka DB Slice
- CVMFS used as shared area for pre-installed tarballs (Not completely New)
  - if there is no CVMFS fall back to using tarballs
  - if tarball not on CVMFS, fall back to downloading tarballs, still allows fast turn around for validating and debugging on the grid with large sample sizes
  - Can mix applications from CVMFS and working directory (NEW)
- When software is not cached, the jobs can time-out
  - Should be solved once we get CVMFS on OSG (3 stratum 1 / mirror servers)

DIRAC Version

- Using v6r12, since July
  - Troubles with moving to new version: we have a different setup than what DIRAC is being tested on (e.g.: no FTSManager (yet))
  - Generally fast response for fixes (patch 52 now)
- We are looking into v6r13 and v6r14, i.e.,
  - FTS3 support
  - New improved web interface
- But still open bugs that hinder upgrade
  - InputDataResolution not working
  - xroot not working
- We would like to move to v6r13 or higher as soon as possible

Tips for Users

- Setup your job properly

```
from ILCDIRAC.Interfaces.API.NewInterface.UserJob import UserJob
job = UserJob()
job.setName("MyJobName")
job.setJobGroup("Agroup")
job.setCPUTime(86400)
```

- Make an effort to estimate proper CPU time $\rightarrow$ better allocation of resources, faster job throughput
- Don't use the same rep file all the time $\rightarrow$ slow submission
- In future recursive actions in filecatalog possible
  - At present the download and upload of whole directories possible
    `dirac-dms-directory-sync sourceDir tagetDir -j 4`
    Faster access than over FUSE mounted volumes (xroot)
- New Documentation page
  http://lcd-data.web.cern.ch/lcd-data/doc/ilcdiracdoc/

Data Management

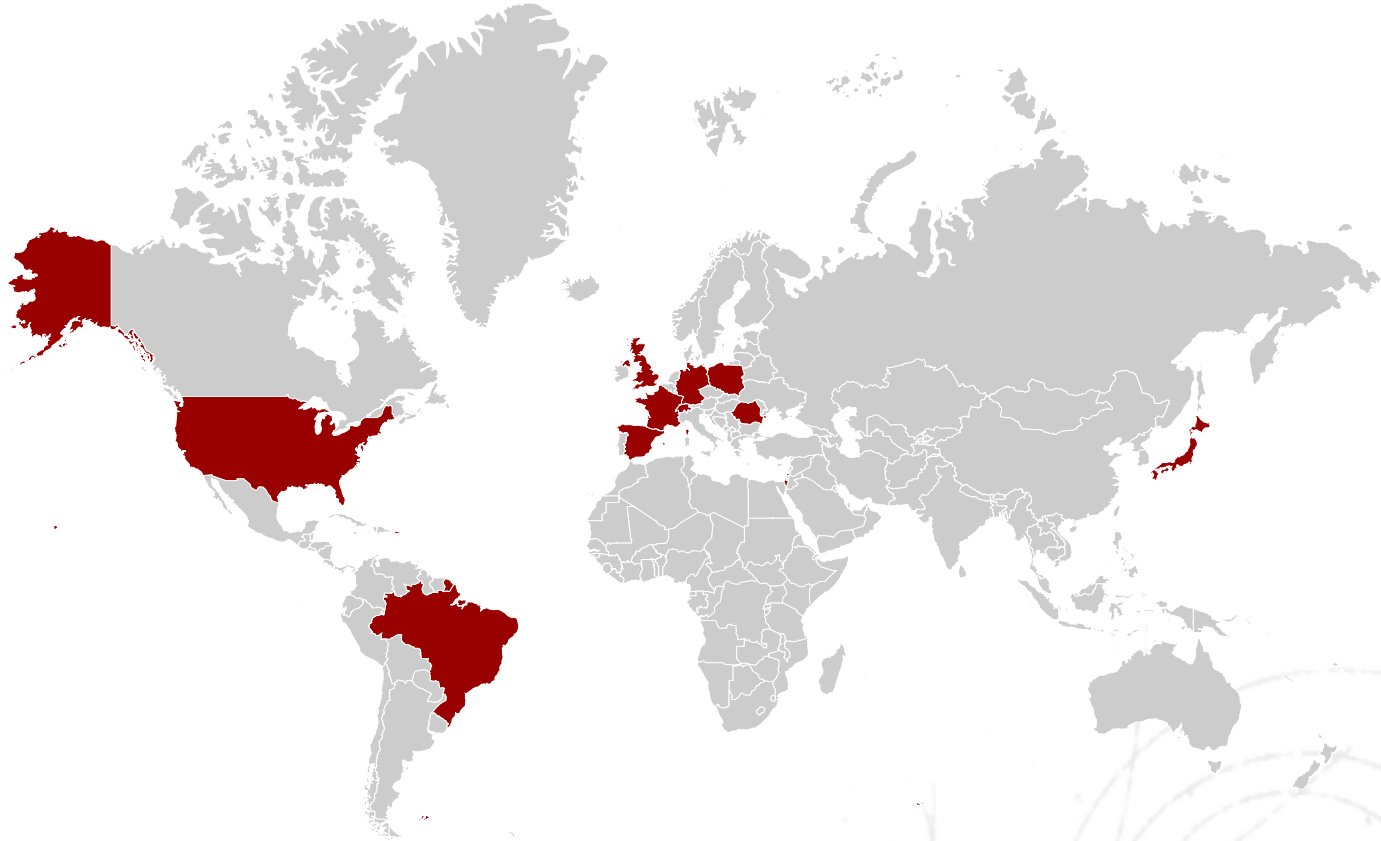
- File and Metadata Catalog
- Using the Dirac File Catalog (DFC) in production for many years
- Metadata for production files (Energy, Software, Detector, Machine, Physics process, Number of Events, …)
- Metadata search used for transformations
- Notice to users, coordinators,conveners :
  - The LcgFileCatalog is outdated
  - Would like to remove support as soon as possible

Workload Management System

- Uses Pilot Jobs (introduced by DIRAC)
- Aggregate in a single system computing resources of different nature
- Employs advanced optimization techniques in order to dynamically allocate resources
- Optimize the use of computing resources once jobs have been acquired
- Using all resources now:
  - Intervention transparent to user
- Making sure jobs only go where software available

Resources

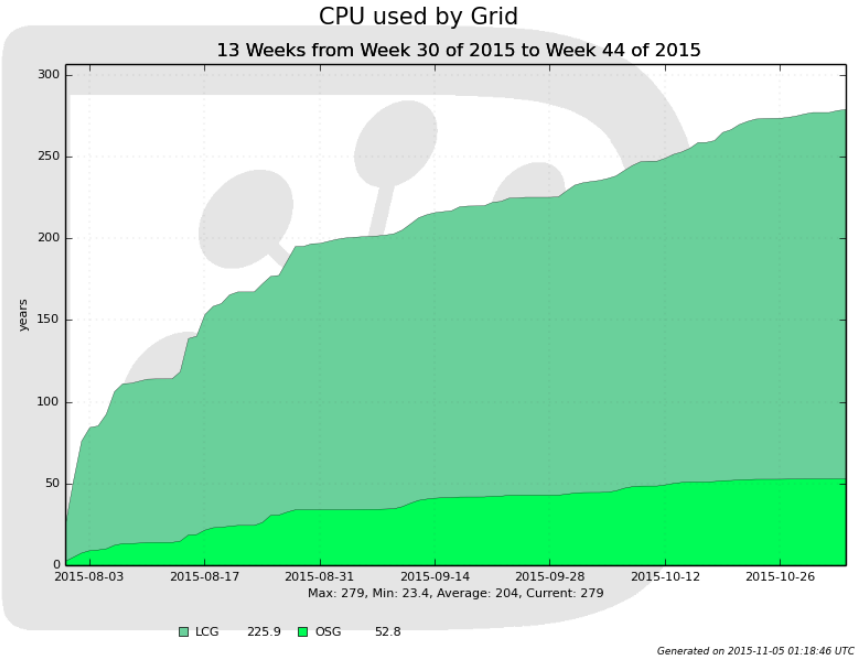
- Increase of supported sites from 24 to 41

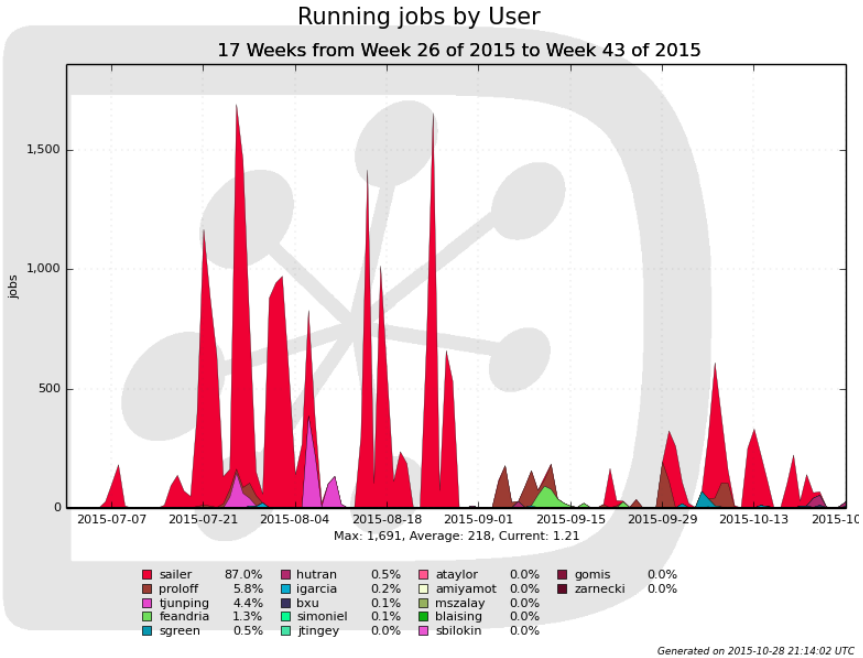


- Now able to run at peak 12 000 jobs in parallel
- Running on all sites (41) that support ILC VO and CALICE VO
- We are open to utilizing new ground

Conquest of the New World

- Since August 2015 we are running on Open Science Grid (OSG), no glite WMS

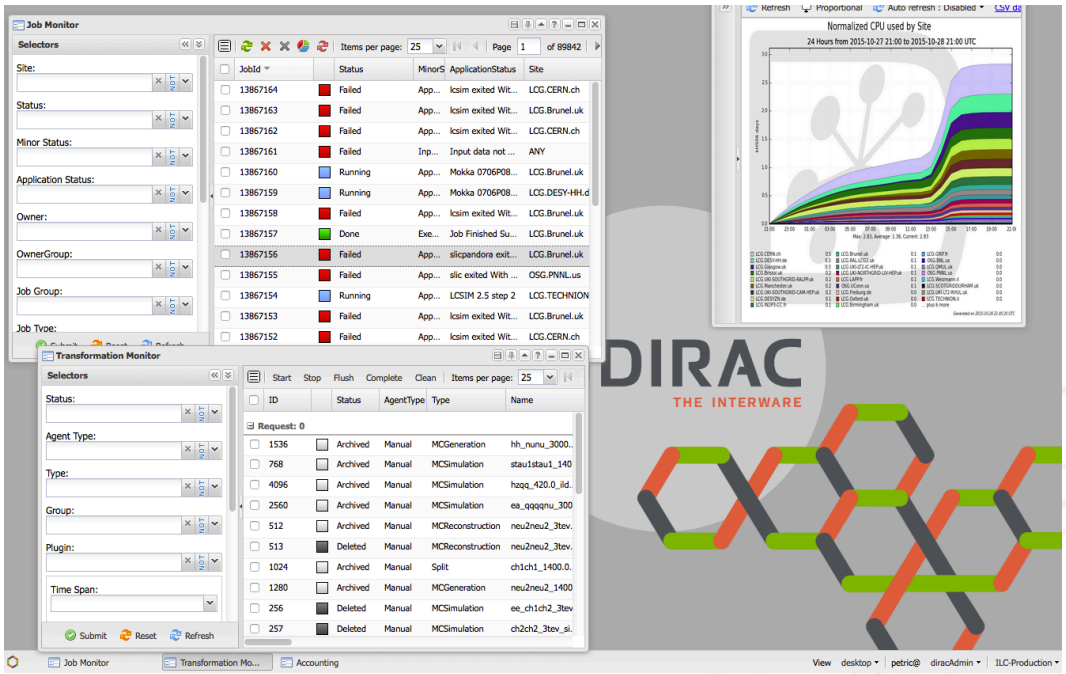




- Developed plugins to enable Globus and HTCondorCE sites (OSG)
- OSG sites provide 20% of ILC VO resources now
- At moment not running over CVMFS as on LCG, but should available thanks to OSG admins

Web Interface

- The webportal is at `ilcdirac.cern.ch`
- Will eventually be replaced by the new Dirac Webapp portal
  - inspect jobs, restart jobs, cancel jobs, browse file catalog …
  - Greater flexibility and security
  - Need at least v6r13 to work



- Can be accessed and tested from inside the CERN network under `voilcdiracwebapp.cern.ch`

iLCDirac Server Setup

Total of 100 Cores and 200 GB of Ram, SLC6 Virtual Machines

Instances
Used 18 of 50

VCPUs
Used 100 of 100

RAM
Used 196.6GB of 200GB

Volumes
Used 3 of 10

Volume Storage
Used 2.8TB of 2.9TB

Instance Name	Image Name	IP Address	Size	Key Pair	Status	Availability Zone
voilcdirac01	SLC6 Server - x86_64 [2014-08-05]	128.142.160.214 2001:1458:301:18::100:10	hep2.8	-	Active	cern-geneva-a
voilcdirac02	SLC6 Server - x86_64 [2014-08-05]	128.142.143.42 2001:1458:301:99::100:1c	hep2.8	-	Active	cern-geneva-a
voilcdirac03	SLC6 Server - x86_64 [2014-08-05]	128.142.152.229 2001:1458:301:48::100:d7	hep2.8	-	Active	cern-geneva-c
voilcdirac012	SLC6 Server - x86_64 [2015-02-10]	128.142.140.97 2001:1458:301:bc::100:53	hep2.8	-	Active	cern-geneva-b
voilcdirac022	SLC6 Server - x86_64 [2015-02-10]	128.142.192.36 2001:1458:301:9d::100:1e	hep2.8	-	Active	cern-geneva-c
voilcdirac032	SLC6 Server - x86_64 [2015-02-10]	128.142.192.181 2001:1458:301:d1::100:2f	hep2.8	-	Active	cern-geneva-a
voilcdiracdipse01	SLC6 Server - x86_64 [2014-08-05]	128.142.154.90 2001:1458:301:4a::100:4c	hep2.4	-	Active	cern-geneva-b
voilcdiraclogse01	SLC6 Server - x86_64 [2014-08-05]	128.142.153.31 2001:1458:301:49::100:11	hep2.4	-	Active	cern-geneva-c
voilcdiracsbse03	SLC6 Server - x86_64 [2014-08-05]	128.142.142.44 2001:1458:301:98::100:1e	hep2.4	-	Active	cern-geneva-c

- Resources distributed over 18 machines:
  - Servers and Agents
  - DIRAC SE
  - Logging
  - Web Server
  - Development
  - DB on CERN DB on Demand

iLCDirac Server Setup

- Increased the number of CPUs (50 $\rightarrow$ 100) in last year
  - Hypervisor incident at CERN (loss of machine for weeks)
  - Moved services dev-machine
- Established a redundancy layer
  - Each Service and Executor hosted on two machines
  - Establish spare machines to replace SE or Logging (no duplication possible) if need
  - Redundant machines always at different availability zone
- System operation for some time with redundant layer
  - Conflicts in monitoring $\rightarrow$ need to restructure locations of agents
- 6 Servers: 8 Cores, 16 GB RAM; Split by DIRAC-System
- 3 DIRAC SEs: 4 Cores, 8 GB Ram, 1 TB Volume
- 2 Web Server 2 Cores, 4 GB RAM (Prod / Dev)
- 3 Dev/Test instances 8/4 Cores, 16/8 GB RAM
- 4 Spare machines of different types
- Now better prepared for black-outs

Future

- Currently jobs running on Dirac v6r12,
  - Might move straight to Dirac v6r14, because development of r6v13 is more or less stopped
- Would like to use features from up-to-date Dirac
  - WebApp Interface
  - Recursive action in file catalog
  - FTS3
- Interface for Whizard 2 and DD4hep
  - Improvements to production chain
- Third party copy for xroot protocol
- …

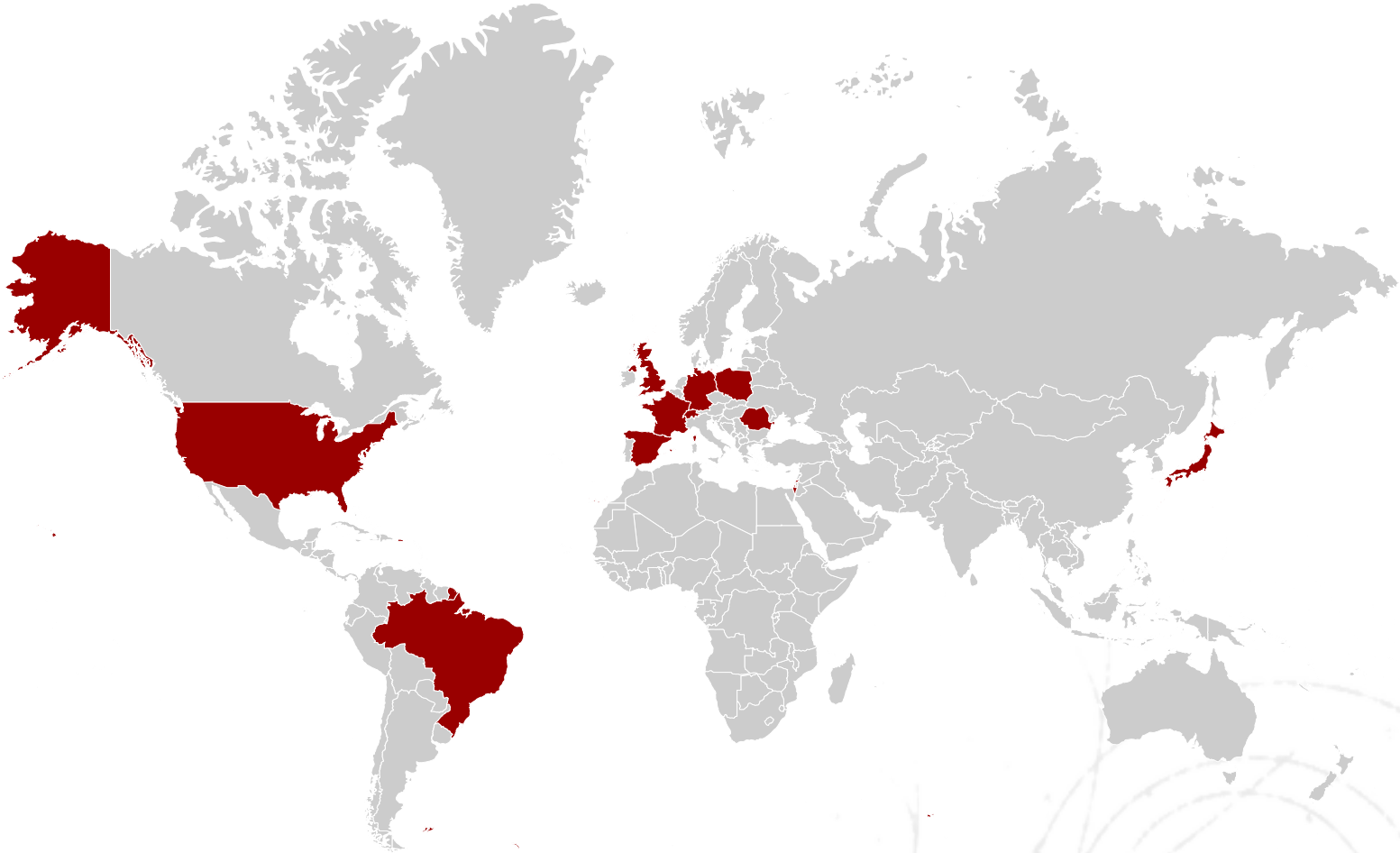
Support

- If case of fire:
  1. twiki.cern.ch/twiki/bin/view/CLIC/DiracForUsers
  2. Consult documentation:
     http://lcd-data.web.cern.ch/lcd-data/doc/ilcdiracdoc/
  3. Submit a ticket to the issue tracker
     https://its.cern.ch/jira/browse/ILCDIRAC
  4. Email: ilcdirac-support@cern.ch (no e-mails to persons directly)

Summary

- iLCDirac is offering an easy interface for users to run jobs on the GRID
- Enables centralised production of MC
- The LC community can now use all available resources
- Adopted by all detector concepts and
- Easy to use for individual simulation, reconstruction or analyses
- No major changes to user interface foreseen

Do you have something to spare?



- Is your country not coloured in red but you want it to be?
- If you have resources and are willing to share contact me.