ATLAS Job management

ATLAS-D Physics Meeting Heidelberg 2016
Welcome package in Göttingen

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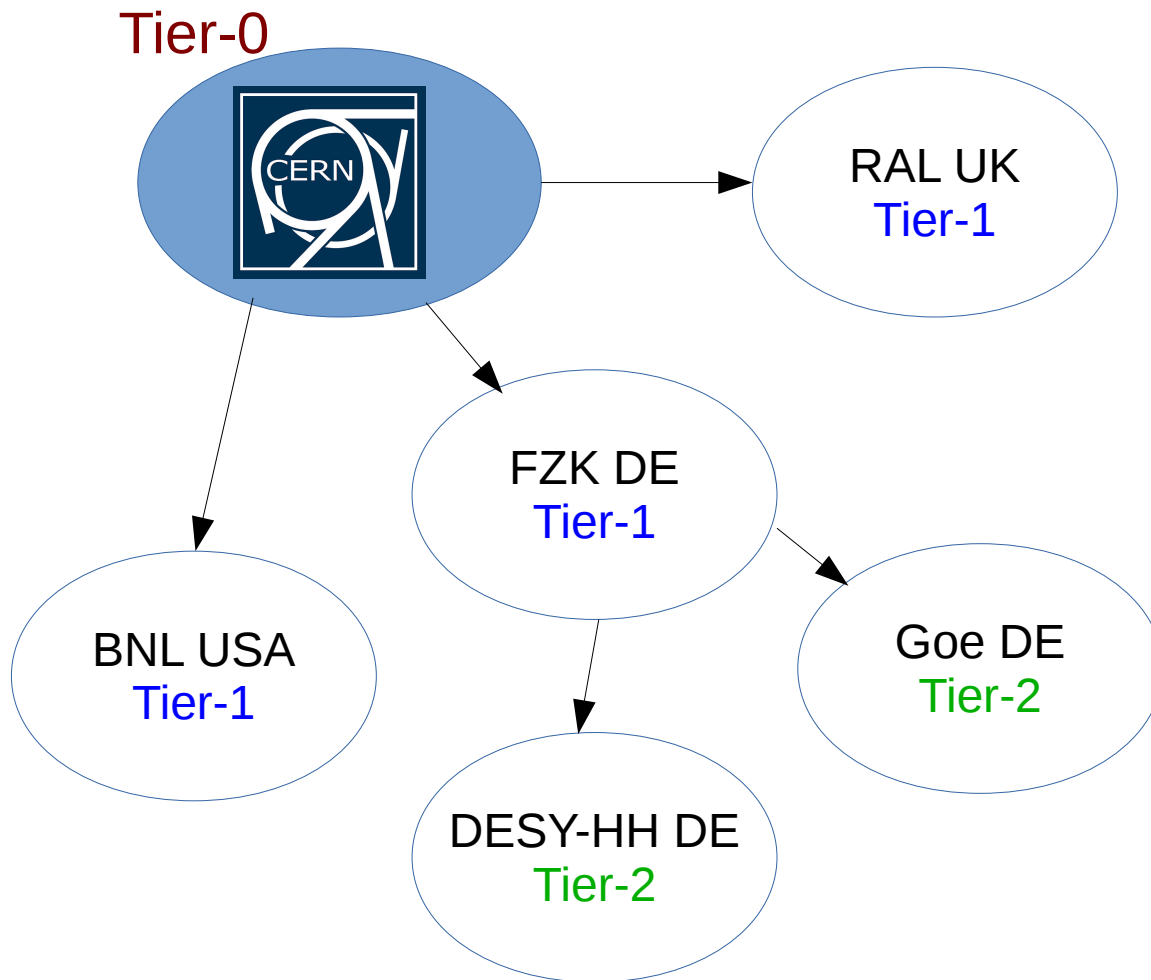
Overview

- Your Grid environments
    - Lxplus at CERN
    - VMs at Heidelberg
    - Grid UI with Docker in your Linux Box
- Introduction to Grid computing
    - Concepts
    - Certificate Authorities and VOMS
    - Setup CVMFS
    - ATLAS Grid computing & WLCG Resources
    - Grid job and data
    - ATLAS Resources
    - Grid user interface (CLI) and CVMFS
    - BigPanda Monitoring
- Rucio (ATLAS data management system)
    - Basic concept
    - SetupRucio
    - RSE expressions
- RucioUI (WebUI)
    - RucioUI
- Links ad references

ATLAS Grid computing and WLCG resources - 1

- ## LHC multi-tier structure

  – WLCG = Worldwide LHC Computing Grid

Tier-0

Tier-0: Raw data, Data store (in tape), Pre-processing, Reconstruction

Tier-1: National LCG-Centre, faster network connections and lager storage spaces (e.g. Tape), MC production, user analysis, etc.

Tier-2: University or Facility level computing sites. MC production, user analysis, etc.

RAL UK
Tier-1

FZK DE
Tier-1

BNL USA
Tier-1

Goe DE
Tier-2

DESY-HH DE
Tier-2

ATLAS Grid computing and WLCG resources - 1

- ## LHC multi-tier structure

  – WLCG = Worldwide LHC Computing Grid

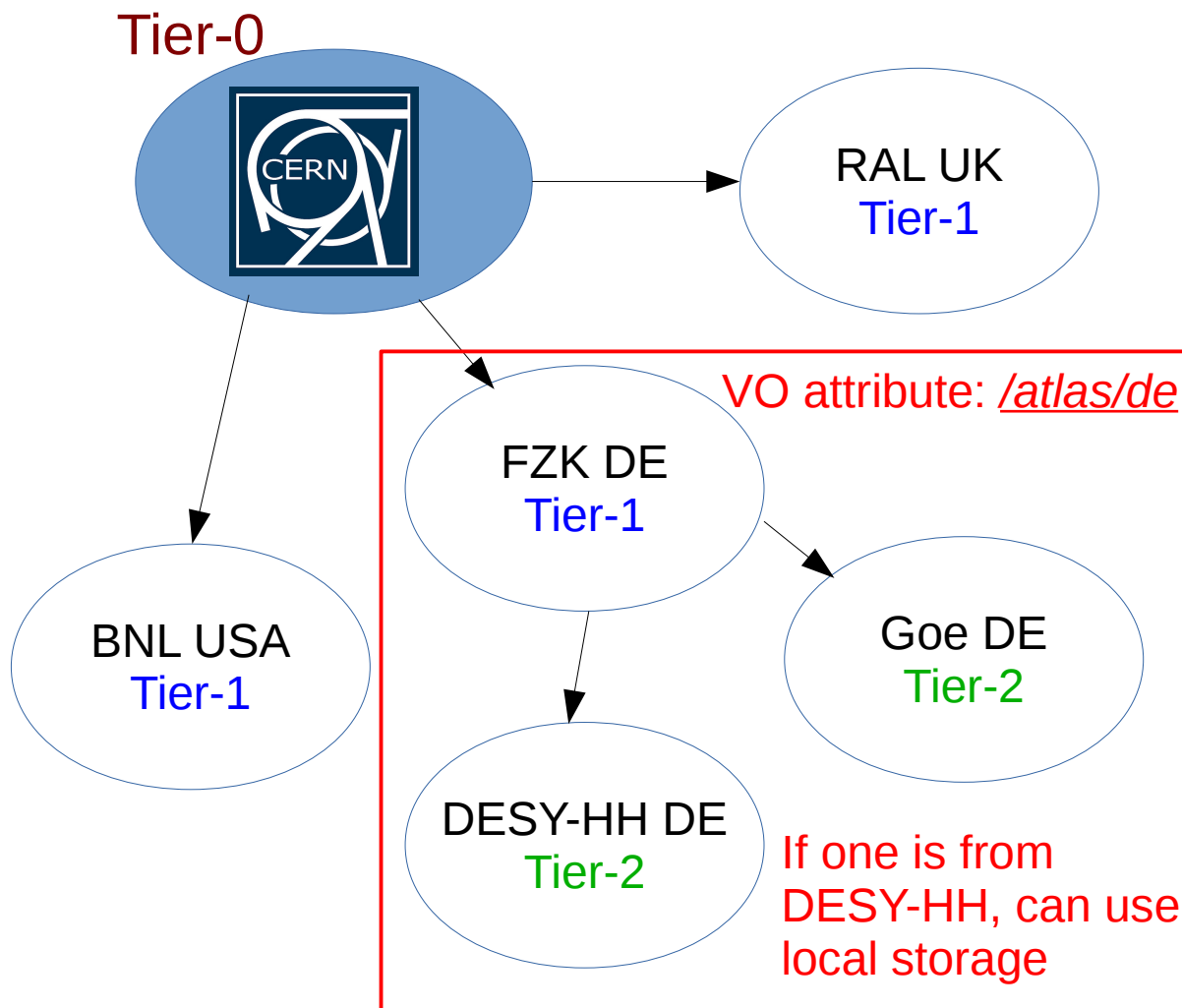Tier-0: Raw data, Data store (in tape), Pre-processing, Reconstruction

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Tier-2: University or Facility level computing sites. MC production, user analysis, etc.

Tier-0

RAL UK
Tier-1

VO attribute: */atlas/de*

FZK DE
Tier-1

Goe DE
Tier-2

BNL USA
Tier-1

DESY-HH DE
Tier-2

If one is from DESY-HH, can use local storage

4

Hands-on exercise
Using ATLAS client tools

- First "Hello world" job by PanDA client

```
## PanDA client
lsetup panda

## Make a Python script
cat hello_world.py

#!/usr/bin/python
print "Hello world!"

chmod 755 hello_world.py
./hello_world.py

Hello world!

## Submitting a prun job
prun --outDS user.$USER.pruntest.$$ --exec hello_world.py

INFO : gathering files under /home/gen/tmp/for_new_comer
INFO : upload source files
INFO : submit
INFO : succeeded. new jediTaskID=5107461

## Submitting 5 prun jobs
prun --outDS user.$USER.pruntest.$$ --exec hello_world.py –nJobs=5
```

Hands-on exercise
using ATLAS client tools

- Athena job by PanDA client

    - pathena

        - This topic would be explained in Athena session

```
## For example, you can seamlessly run Athena code on Grid
pathena DPD_topOptions.py
–inDS=data11_7TeV.00189090.physics_Egamma.merge.AOD.f403_m975
--outDS=user.wash.tutorial.dpd
```

BigPanda Monitoring

- Next generation monitoring tool developed within the BigPanDA project
- Drop down menu with access to numerous views of job monitoring data
- Tool heavily used by ADC experts and shifters to track production activities
- Here we are more interested in monitoring our own jobs

> http://bigpanda.cern.ch

All jobs by cloud (e.g. ES, UK, IT) running in last 1,7,30 days

All jobs by type (e.g. simulation, reconstruction, analysis) running in last 1,7,30 days

BigPanda Search Options

Search

PanDA job ID or name	[_____] Submit
Batch ID	[_____] Submit
Task ID	[_____] Submit
Task name	[_____] Submit
Request ID	[_____] Submit
Tasks for Request IDs	from [_____] to [_____] Submit
Jobs for Request IDs	from [_____] to [_____] Submit
Tasks for campaign	[_____] Submit
Tasks for project	[_____] Submit
Tasks for tag	[_____] Submit
Tasks for stream	[_____] Submit
Site	[_____] Submit
User	[_____] Submit
Dataset	[_____] Submit
File	[_____] Submit

- Search boxes available on BigPanda front page to get specific information on tasks, jobs and user activities
- The range of displayed information can be changed by modifying or adding the URL parameters

Enter our example job Task ID here

The load on the Panda DB will increase with high N

```
&limit=N
&display_limit=N
&hours=N
&days=N
&earlierthan=Nhours
&earlierthandays=Ndays
&date_from=2014-10-01
&date_to=2014-10-03
```

Example URL Modifiers

- Advanced usage: monitoring data can retrieved in *json* format to be enable results to be processed programmatically

➢ http://bigpanda.cern.ch/help/

User View

- The user view displays your recent activities
- Useful starting point to check your jobs
- Links on this page lead to more information on an individual tasks and associated jobs

Grid resources used

Task Summary

Replace with your username

➢ http://bigpanda.cern.ch/user/?user=washbrook

Task Details

Example Job Montioring

➢ http://bigpanda.cern.ch/task/4617520/

Task 4617520: user.wash.pruntest/											
Task ID	**Jobset**	**Type**	**WorkingGroup**	**User**	**Task status**	**Ninputfiles	finished	failed**	**Created**	**Modified**	**Cores**	**Priority**	**Parent**
4617520	3	analy		andrew washbrook	done	1	1 (100%)	2015-01-06 14:22	01-09 10:15	1	1000	

View:	job list (access to job details and logs)	child tasks	prodsys task page	brokerage logger	JEDI action logger	error summary

➢ http://bigpanda.cern.ch/job?pandaid=2351340829

Where the job was run

PandaID	Owner	Request Task ID	Status	Created	Time to start d:h:m:s	Duration d:h:m:s	Modified	Cloud Site	Priority
2351340829	andrew washbrook	1 4617520	finished	2015-01-06 14:23	0:0:05:05	0:0:01:13	01-06 14:36	IT ANALY_INFN-FRASCATI	1000
Job name: user.wash.pruntest/ **type:** panda-client-0.5.42-jedi-run **transformation:** runGen-00-00-02									
Datasets: Out: user.wash.pruntest.log.14345588									

Job information	logfiles	pilot job stdout, stderr, batch log	logger records	child jobs
Jobset 1				

Job Log Files

Globally Unique Identifier

> http://bigpanda.cern.ch/filebrowser/?guid=b2c3305e-5581-4062-9676-92205d72018a&lfn=user.wash.pruntest.log.4617520.000001.log.tgz&site=ANALY_INFN-FRASCATI&scope=user.wash

Logical File Name

File listing

Modification time	Size [B]	File
Tue Jan 6 14:28:57 2015	0	athena_stderr.txt
Tue Jan 6 14:28:57 2015	23820	athena_stdout.txt
Tue Jan 6 14:28:57 2015	730	job_setup.sh
Tue Jan 6 14:28:52 2015	188	matched_replicas.json
Tue Jan 6 14:28:57 2015	527	metadata-2351340829.xml
Tue Jan 6 14:28:49 2015	1391	pandaJobData.out
Tue Jan 6 14:28:57 2015	0	pandatracerlog.txt
Tue Jan 6 14:28:49 2015	0	pilot.stderr
Tue Jan 6 14:28:50 2015	77	PILOT_INITDIR
Tue Jan 6 14:28:57 2015	97	Pilot_VmPeak.txt
Tue Jan 6 14:28:51 2015	280	pilotlog.out
Tue Jan 6 14:29:52 2015	83922	pilotlog.txt

- From an individual job view you can get access to log files for further diagnosis

Output and error of job payload

Pilot logs show the staging of the job at the site

Task Monitoring

- The new task is visible from my user view page in a *registered* state

2 tasks, sorted by jeditaskid   Show in task list page

ID Parent	Jobset	Task name TaskType/ProcessingType Campaign Group User Logged status	Task status Nfiles	Input files finish% fail% Nfinish Nfail	Modified	State changed	Priority
4635475	6	user.wash.tutorial.dpd/ anal/panda-client-0.5.42-jedi-athena andrew washbrook	registered 29		2015-01-09 15:47	01-09 15:47	1000
4617520	5	user.wash.pruntest/ anal/panda-client-0.5.42-jedi-run andrew washbrook	done 1	100% 1	2015-01-09 14:44	01-09 14:44	1000

Task 4635475: user.wash.tutorial.dpd/

Task ID	Jobset	Type	WorkingGroup	User	Task status	Detailed JEDI status	Ninputfiles	finished	failed	Created	Modified
4635475	6	analy		andrew washbrook	submitting	scouting	29	0 (0%)		2015-01-09 15:47	01-09 15:48

States of jobs in this task (merge jobs excluded)   Show all jobs

defined	waiting	pending	assigned	throttled	activated	sent	starting	running	holding	transferring	finished	failed	cancelled	merging
11														

Jump to job parameters, task parameters

View:	job list (access to job details and logs)	child tasks	prodsys task page	brokerage logger	JEDI action logger	error summary

Input containers

data11_7TeV.00189090.physics_Egamma.merge.AOD.f403_m975

Output containers

user.wash.tutorial.dpd_MyFirstD3PD/

user.wash.tutorial.dpd.log/

➤ http://bigpanda.cern.ch/user/?user=washbrook

Task Monitoring (2)

> http://bigpanda.cern.ch/task/4635475/

- Switching to the Task view we can now see one job is running at the computing site ANALY_FMPhi-UNIBA
- Can follow individual progression of running jobs by clicking on Job Status

> http://bigpanda.cern.ch/task/4635475/

- Checking some time later there are 10 jobs in a *running* state with 1 job *finished*

Task Monitoring (4)

Task 4635475: user.wash.tutorial.dpd/

Task ID	Jobset	Type	WorkingGroup	User	Task status	Ninputfiles | finished | failed	Created	Modified	Cores	Priority	Parent
4635475	6	analy		andrew washbrook	done	29 | 29 (100%)	2015-01-09 15:47	01-09 17:49	1	1000	

States of jobs in this task (merge jobs excluded)   Show all jobs

defined	waiting	pending	assigned	throttled	activated	sent	starting	running	holding	transferring	finished	failed	cancelled	merging
											15			

Job attribute summary   Sort by count, alpha

atlasrelease (1)	Atlas-17.2.7 (15)
attemptnr (2)	1 (10) 2 (3)
cloud (2)	DE (11) UK (4)
computingsite (2)	ANALY_FMPhI-UNIBA (11) ANALY_SHEF_SL6 (4)
destinationse (2)	ANALY_FMPhI-UNIBA (1) ANALY_SHEF_SL6 (1)
homepackage (1)	AnalysisTransforms-AtlasPhysics_17.2.7.4.1 (15)
inputfileproject (1)	data11_7TeV (13)
inputfiletype (1)	AOD (13)
jeditaskid (1)	4635475 (15)
jobsetid (1)	6 (15)
jobstatus (1)	finished (15)
outputfiletype (1)	? (15)
priorityrange (3)	900:999 (4) 1000:1099 (9) 2000:2099 (2)
processingtype (1)	panda-client-0.5.42-jedi-athena (15)
prodsourcelabel (2)	panda (2) user (13)
produsername (1)	andrew washbrook (15)
reqid (1)	6 (15)
specialhandling (1)	ddm:rucio (15)
transformation (2)	buildJob-00-00-03 (2) runAthena-00-00-12 (13)

➤ http://bigpanda.cern.ch/task/4635475/

- And then later all the jobs have finished and the task status is *done*
- Note that 4 of the 15 jobs were sent to a computing site in a different cloud (UK)
- Do not expect all your jobs to run at the same computing site

Links and references

- RucioUI
    - https://rucio-ui.cern.ch/
- Rucio Documentation
    - http://rucio.cern.ch/index.html
- Software twiki tutorial
    - https://twiki.cern.ch/twiki/bin/viewauth/AtlasComputing/SoftwareTutorialGettingDatasets
- Athena Docker setup
    - https://twiki.cern.ch/twiki/bin/viewauth/AtlasComputing/AthenaMacDockerSetup
- Docker container for CVMFS
    - https://github.com/sbinet/docker-containers/tree/master/cvmfs-atlas
- Binet, Sébastien, and Ben Couturier. "*docker & HEP: Containerization of applications for development, distribution and preservation.*" Journal of Physics: Conference Series. Vol. 664. No. 2. IOP Publishing, 2015.
    - http://iopscience.iop.org/article/10.1088/1742-6596/664/2/022007/meta
- ATLAS-D meeting 2015 Rucio Tutorial, Thomas Beermann
- Monitoring Your Grid Jobs, Andrew Washbrook University of Edinburgh, ATLAS Software & Computing Tutorials 14th January 2015 PUC, Chile
- Athena Mac Docker
    - https://twiki.cern.ch/twiki/bin/viewauth/AtlasComputing/AthenaMacDockerSetup
- Software tutorial using Grid
    - https://twiki.cern.ch/twiki/bin/viewauth/AtlasComputing/SoftwareTutorialUsingTheGrid