



Bundesministerium
für Bildung
und Forschung

Grid - Hands-on

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Exercise overview (30mins)

- Your Grid environments
 - Lxplus at CERN
 - Grid UI with Docker in your Linux Box
 - Environments/Scripts for this tutorial
- Introduction to Grid computing
- PanDA (ATLAS job management system)
 - Hello world prun Grid job
 - Hello world PyRoot
 - Hello world PyRoot Grid job
 - Hello world pathena Grid job
- ATLAS Metadata Interface (AMI)
 - AMI Client CLI
- Rucio (ATLAS data management system)
 - Rucio Client CLI
- RucioUI (WebUI)

Your Grid environments



Lxplus at CERN

- Logging in lxplus

```
## If you have a CERN account  
ssh -Y YOUR_CERN_ACCOUNT@lxplus.cern.ch
```

- Alternatively, NAF?

- https://naf-wiki.desy.de/Main_Page

```
## If you have a NAF account  
ssh -Y schoolNN@nafhh-atlasMM.desy.de
```



Optional: Grid UI with Docker in your Linux Box - 1

- In RedHat Enterprise 6 (CentOS, Scientific Linux)

Installing Docker (as root)

```
yum install docker-io
```

You may need a permission (as root)

```
chown root:dockerroot /var/run/docker.sock  
service docker start
```

Check you are in docker group

```
uid=500(gen) gid=500(gen) groups=500(gen),489(dockerroot)
```

Make your Docker file

```
cat Dockerfile
```

```
FROM binet/cvmfs-atlas
```

```
# Replace user, group, uid, gid by your user in a local PC
```

```
RUN export uid=500 gid=500 user=atlas001 group=atlas001 && groupadd $group -g $gid && useradd $user -u $uid -g $gid -d /home/$user -s /bin/bash
```

```
USER atlas001
```

```
ENV HOME /home/atlas001
```

Building Docker container using CVMFS and ATLAS environments

```
docker build -t ATLAS-UI .
```

Running Docker container

```
docker run -it -w /home/atlas001 -v $HOME:/home/atlas001 -v /tmp:/tmp atlas-ui /bin/bash
```

Optional: Grid UI with Docker in your Linux Box - 2

- In Ubuntu

Installing Docker (as root)

```
apt-get update  
apt-get -y install docker.io  
service docker start  
service docker status
```

Make your Dockerfile, see previous page

Environments/Scripts for this tutorial

- From GitHub

```
## Cloning materials  
git clone https://github.com/GenKawamura/ATLAS-D\_2017\_Computing\_Tutorial  
cd ATLAS-D_2017_Computing_Tutorial
```

Introduction to ATLAS Grid Computing



Setup CVMFS

- E.g. write the command aliases in ~/.bashrc

```
## Alias to initialization of VOMS proxy
alias vinit='voms-proxy-init --voms atlas -hours 200 --valid 200:00'

## Alias to setupCVMFS
setupCVMFS(){
  export LCG_LOCATION=
  export ATLAS_LOCAL_ROOT_BASE=/cvmfs/atlas.cern.ch/repo/ATLASLocalRootBase
  source $ATLAS_LOCAL_ROOT_BASE/user/atlasLocalSetup.sh ""

  ## Using EMI LCG package
  source ${ATLAS_LOCAL_ROOT_BASE}/packageSetups/atlasLocalEmiSetup.sh --emiVersion ${emiVersionVal}
}

## Using CVMFS (with EMI LCG client tools)
setupCVMFS
```

Hands-on exercise

user certificate - 1

- Getting your user certificate (if you have, skip)

```
## Check important environment variables for your certificate
```

```
env | grep X509
```

```
## Generating a proxy certificate
```

```
export X509_USER_CERT=~/.globus/usercert.pem
```

```
export X509_USER_KEY=~/.globus/userkey.pem
```

```
## Generate user certificate
```

```
## (usercert.p12 was already exported by your browser)
```

```
openssl pkcs12 -clcerts -nokeys -in usercert.p12 -out $X509_USER_CERT
```

```
## create a private certificate with passphrase
```

```
openssl pkcs12 -nocerts -in usercert.p12 -out $X509_USER_KEY
```

```
## Set permissions
```

```
chmod 644 $X509_USER_CERT
```

```
chmod 400 $X509_USER_KEY
```

```
## show enddate
```

```
openssl x509 -in $X509_USER_CERT -noout -enddate
```

```
## show if the certificate is valid
```

```
openssl verify -CApath $X509_CERT_DIR -purpose sslclient $X509_USER_CERT
```

Hands-on exercise

user certificate - 2

- Checking your certificate and VO

Generating a proxy

vinit

Enter GRID pass phrase for this identity:

Contacting voms2.cern.ch:15001 [/DC=ch/DC=cern/OU=computers/CN=voms2.cern.ch] "atlas"...

Remote VOMS server contacted succesfully.

voms2.cern.ch:15001: The validity of this VOMS AC in your proxy is shortened to 345600 seconds!

Generating a proxy certificate without VO

grid-proxy-init

voms-proxy-info -all

(it displays information without VO attributes)

Generating a proxy certificate with VO (a normal use)

voms-proxy-init --voms atlas -hours 200

voms-proxy-info -all

(it displays information with VO attributes)

Using another role (if you have another)

voms-proxy-init -voms atlas:/atlas/de/Role=production

voms-proxy-info -all

Hands-on exercise

user certificate - 2

- Checking your certificate and VO

```
## Check context of your certificate
## The proxy certificate has 3 fields (PK, New PK, New SK)
less /tmp/x509up_u$UID | grep '\-'

-----BEGIN CERTIFICATE-----
-----END CERTIFICATE-----
-----BEGIN RSA PRIVATE KEY-----
-----END RSA PRIVATE KEY-----
-----BEGIN CERTIFICATE-----
-----END CERTIFICATE-----

## Check X509 attribute
openssl x509 -in /tmp/x509up_u$UID -text | less

## Using a different proxy certificate
## (switch them if you have several ones)
mv -v /tmp/x509up_u$UID /tmp/x509_different_cert
export X509_USER_PROXY=/tmp/x509_different_cert
voms-proxy-info -all
```

Hands-on exercise

Basis of LCG tools - 1

- Touching basic LCG commands

EMI LCG tools

lsetup emi

Set top-level BDII information provider at FZK in Germany

export LCG_GFAL_INFOSYS=bdii-fzk.gridka.de

lcg-infosites

Usage: `lcg-infosites [options] selection(s)`

Selections:

all	dli	lfc	tag
bdii_site	dliLocal	lfcLocal	vobox
bdii_top	fts	myproxy	voms
ce	gridice	se	voms-admin
closeSE	lb	sitenames	voview
cream	lcg-ce	space	wms

Searching for storage element at DESY-HH

lcg-infosites --vo atlas se -f DESY-HH

Avail Space(kB)	Used Space(kB)	Type	SE
n.a	n.a	SRM	dcache-se-atlas.desy.de
144686862585	1155357848246	SRM	dcache-se-atlas.desy.de
989417595283	2662137428541	SRM	dcache-se-atlas.desy.de
1991791084	n.a	SRM	dcache-se-atlas.desy.de
33956785021	30907581359	SRM	dcache-se-atlas.desy.de
3972844749	n.a	SRM	dcache-se-atlas.desy.de
n.a	n.a	SRM	prometheus.desy.de
963849833	2517808	SRM	prometheus.desy.de

Hands-on exercise

Basis of LCG tools - 2

- Touching basic LCG commands

Connecting to DESY-HH SE via SRM protocol

```
srm ls srm://dcache-se-atlas.desy.de
```

```
512 /
```

```
512 /upload/
```

```
512 /admin/
```

```
512 /usr/
```

```
512 /pnfs/
```

SRM space token (which is used by Rucio Storage Endpoint)

```
srm-get-space-tokens -space_desc=ATLASLOCALGROUPDISK srm://dcache-se-atlas.desy.de
```

```
Space Reservation Tokens:
```

```
540002
```

Checking site-level information provider

```
lcg-infosites --vo atlas bdii_site -f DESY-HH
```

```
ldap://grid-giis0.desy.de:2170/mds-vo-name=DESY-HH,o=grid
```

```
ldap://grid-giis1.desy.de:2170/mds-vo-name=DESY-HH,o=grid
```

Getting GridFTP endpoints

```
SE=dcache-se-atlas.desy.de
```

```
ldapsearch -xLLL -b 'o=grid' '(GlueChunkKey=GlueSEUniqueID=$SE)' -p 2170 -h grid-giis0.desy.de | grep gsiftp
```

```
GlueSEAccessProtocolType: gsiftp
```

Connecting to DESY-HH SE via GridFTP protocol

```
uberftp -ls gsiftp://dcache-door-atlas12.desy.de/
```

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PanDA (ATLAS Job Management System)



Hello World prun Grid Job

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.gkawamur.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.gkawamur.pruntest.$$ --exec hello_world.py -nJobs=5
```

What will happen?

- On PanDA web interface, we can find the jobs
 - Find your tasks and sub jobs

jobstatus (1)	finished (2)
minramcount (1)	1-2GB (1)
outputfiletype (2)	? (1) log (1)
priorityrange (2)	1000:1099 (1) 2000:2099 (1)
processingtype (1)	panda-client-0.5.72-jedi-athena (2)
prodsourcelabel (2)	panda (1) user (1)
produsername (1)	Gen Kawamura (2)
reqid (1)	94 (2)
specialhandling (1)	dcm:rucio (2)
transformation (2)	buildJob-00-00-03 (1) runAthena-00-00-12 (1)

Prodsys Jobs Handling

Job list Sort by PandaID, time since last state change, ascending mod time, descending mod time, priority, attemptnr, ascending duration, descending duration									
Panda ID Attempt#	Owner Group	Request Task ID	Transformation	Status	Created	Time to start d:h:m:s	Duration d:h:m:s	Mod	Cloud Site
3131853110 Attempt 1	Gen Kawamura	94 10262517	runA:hens-00-00-12	finished	2016-12-19 14:51	0:0:10:54	0:0:01:14	12-19 15:00	DE ANALY_IEPSAS-Kosice online HC.Blacklist.setOnline
	Job name: user.gkawamura.tutorial2016.12/ 3131853110 #1								
	Datasets: Out: user.gkawamura.tutorial2016.12.log.112492285								
3131853105 Attempt 0	Gen Kawamura	94 10262517	buildJob-00-00-03	finished	2016-12-19 14:51	0:0:02:38	0:0:03:17	12-19 15:00	DE ANALY_IEPSAS-Kosice online HC.Blacklist.setOnline
	Job name: user.gkawamura.tutorial2016.12/ #0								
	Datasets: Out: panda.1219145126.858464.lib._10262517								

Hello World PyRoot

Hands-on exercise

PyRoot example

Making PyRoot environments

```
$ cd pyroot  
$ source pyroot_env.sh
```

Getting a sample

```
$ ./get-sample-files.sh -n 1  
$ ls valid2.117050.PowhegPythia_P2011C_ttbar.digit.AOD.e2657_s1933_s1964_r5534/* > input.txt
```

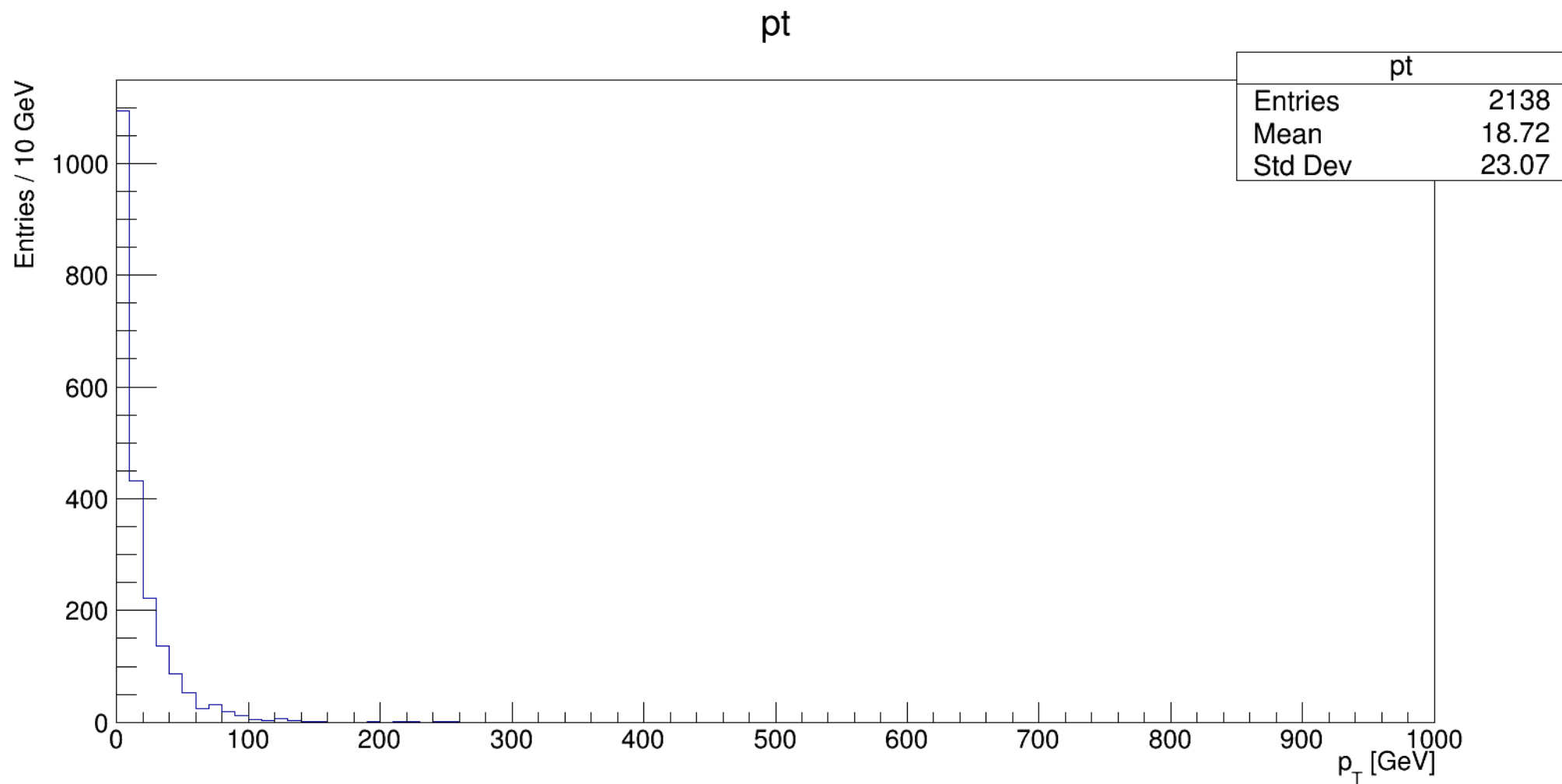
Extracting and counting electron energy

```
$ less xAOD_electron_hist_example.py  
$ ./xAOD_electron_hist_example.py -i input.txt -o hist.root
```

Plotting electron energy distribution. (this may not work in VMs)

```
$ root hist.root  
root [1] TBrowser t
```

Plot of electron Pt distribution



How it works - 1

- Just looping entries (events) in a Root tree and counting electron Pt in histogram object

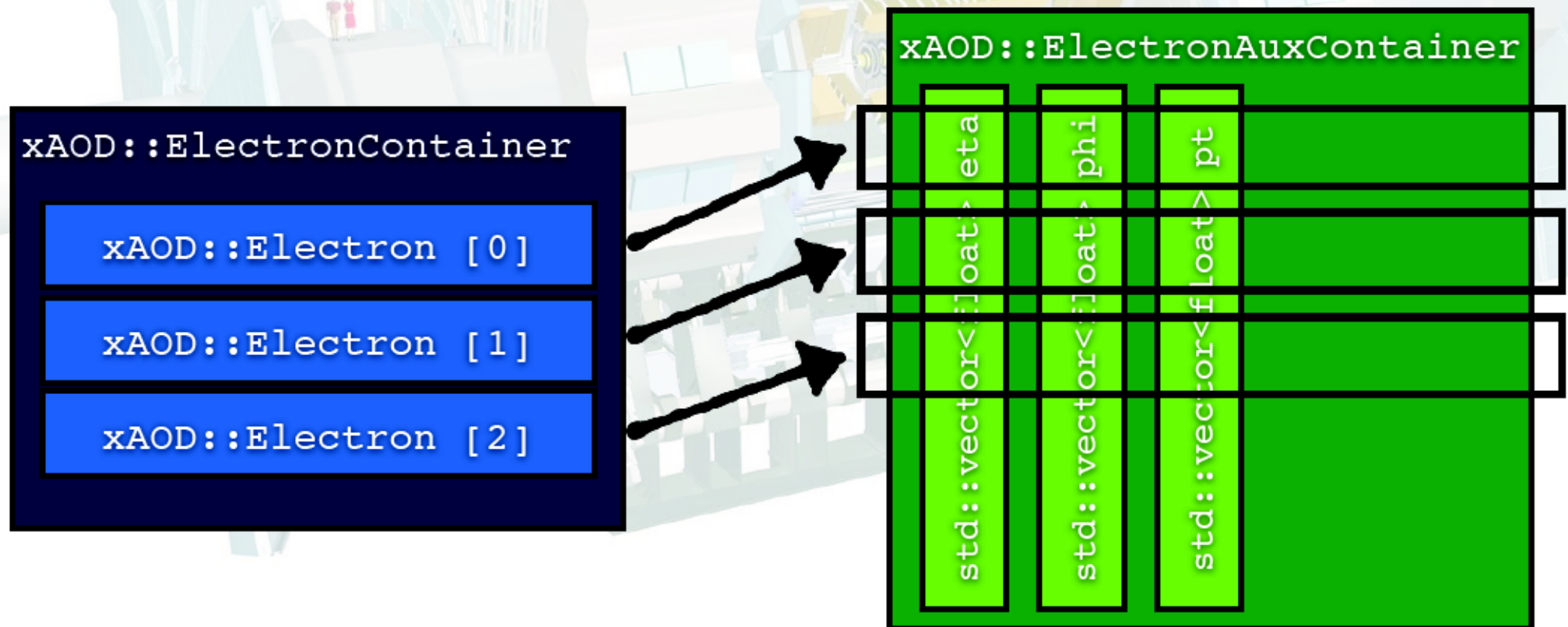
* xAOD_electron_hist_example.py

```
# Make the "transient tree":
t = ROOT.xAOD.MakeTransientTree( f, treeName)

print( "Number of input events: %s" % t.GetEntries() )
for entry in xrange( t.GetEntries() ):
    t.GetEntry( entry )
    print( "Processing run #%i, event #%i" % ( t.EventInfo.runNumber(), t.EventInfo.eventNumber() ) )
    print( "Number of electrons: %i" % len( t.ElectronCollection ) )
    # loop over electron collection
    for el in t.ElectronCollection:
        pthist.Fill(el.pt()/1000.)
    pass # end for loop over electron collection
pass # end loop over entries
f.Close()
pass
```

How it works - 2

- Is technically quite smart code...
 - Provides an “array of structs” interface to data held as “struct of arrays” in memory
 - This “struct of arrays” layout allows us to write files that can be browsed similar to D3PD files



Hello World PyRoot Grid Job

Hands-on exercise

PyRoot with Grid

- First “Hello world” PyRoot job by PanDA client

```
## Making PyRoot environments
$ inDS="valid2.117050.PowhegPythia_P2011C_ttbar.digit.AOD.e2657_s1933_s1964_r5534"
$ outDS="user.gkawamur.DStutorial.pyroot.xAOD.v0.1_$$"
$ infile="input.txt"
$ outfile="hist.root"
$ prun --useRootCore --inDS=$inDS --forceStaged \
--outDS=$outDS --outputs=$outfile --nFiles=100 --nFilesPerJob=1 \
--exec="echo %IN > $infile; xAOD_electron_hist_example.py -i $infile -o $outfile"
```

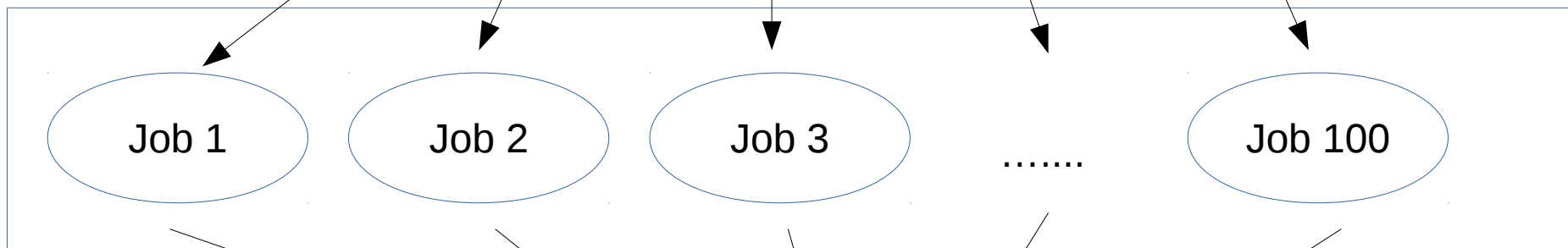
How it works

- Executing a task processing events per job (per file)

--inDS (input Dataset)

valid2.117050.PowhegPythia_P2011C_ttbar.digit.AOD.e2657_s1933_s1964_r5534

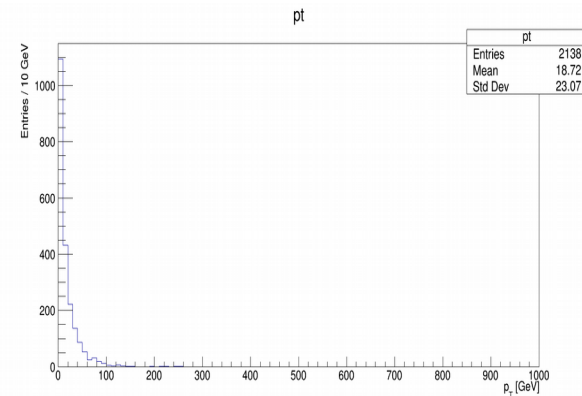
Task



--outDS (output Dataset)

hist.root

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Hello World pathena Grid Job

Hands-on exercise

simple Athena job

- Only 5 events by Pythia MC generator

```
## Setup an Athena release
```

```
$ asetup 17.2.4,here,setup
```

```
## Run Pythia MC event generator
```

```
$ athena ajob_options/jobOptions.pythia16.py
```

Hands-on exercise

simple pathena job

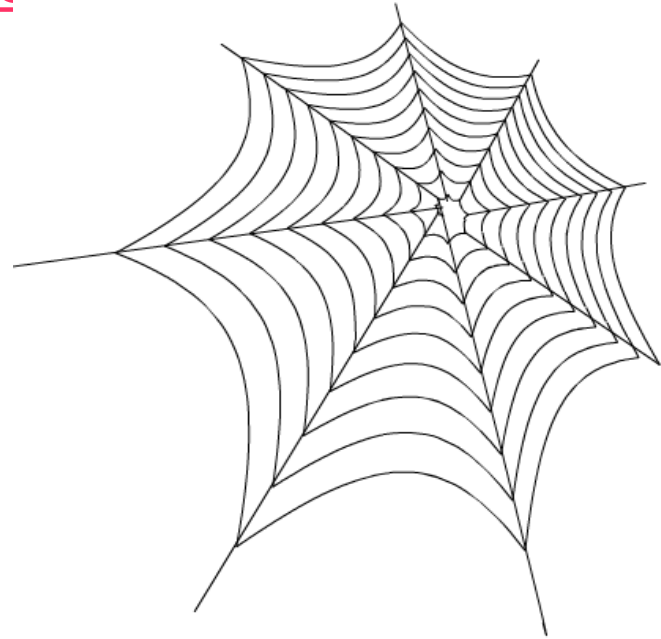
- Athena job using PanDA client
 - pathena

```
## Loading PanDA client  
$ lsetup panda
```

```
## For example, you can seamlessly run Athena code on Grid  
$ pathena ajob_options/jobOptions.pythia16.py --outDS=user.gkawamur.evgen.pool.pythia.v1.$$ --split 5
```

ATLAS Metadata Interface (AMI)

If no time, please skin this nart



Hands-on exercise

pyAMI Interface

- AMI CLI interface

```
## Loading the pyAMI environment
```

```
$ lsetup pyami
```

```
## Search data of 2016 and period A1
```

```
$ ami list datasets data16_13TeV%periodA1.%
```

```
data16_13TeV.periodA1.physics_Main.PhysCont.AOD.t0pro20_v01
```

```
data16_13TeV.periodA1.physics_Main.PhysCont.DAOD_STDM2.grp16_v01_p2623
```

```
data16_13TeV.periodA1.physics_Main.PhysCont.DAOD_STDM4.grp16_v01_p2623
```

```
data16_13TeV.periodA1.physics_Main.PhysCont.DAOD_STDM5.grp16_v01_p2623
```

```
data16_13TeV.periodA1.physics_Main.PhysCont.DAOD_STDM7.grp16_v01_p2623
```

Hands-on exercise

check metadata by pyAMI

Show metadata of a dataset

```
$ ami show dataset info data16_13TeV.00284285.physics_Main.merge.AOD.f662_m1453_r8067_p2645
logicalDatasetName : data16_13TeV.00284285.physics_Main.merge.AOD.f662_m1453_r8067_p2645
nFiles : 0
totalEvents : 0
totalSize : NULL
runNumber : 284285
period : J6
prodsysStatus : NO EVENTS YET
dataType : AOD
beamType : NULL
conditionsTag : NULL
geometryVersion : NULL
streamName : physics_Main
version : f662_m1453_r8067_p2645
lastModified : 2016-06-09 18:35:05
amiStatus : VALID
created : 2016-06-09 18:35:04
inContainer : 0
added_comment : NULL
keyword : NULL
prodsysIdentifier_0: 8650873
taskStatus_0 : UNKNOWN:METADATA ERROR
TIDState_0 : added
task_lastModified_0: 2016-06-10 09:24:25
```


Hands-on exercise

check metadata by pyAMI

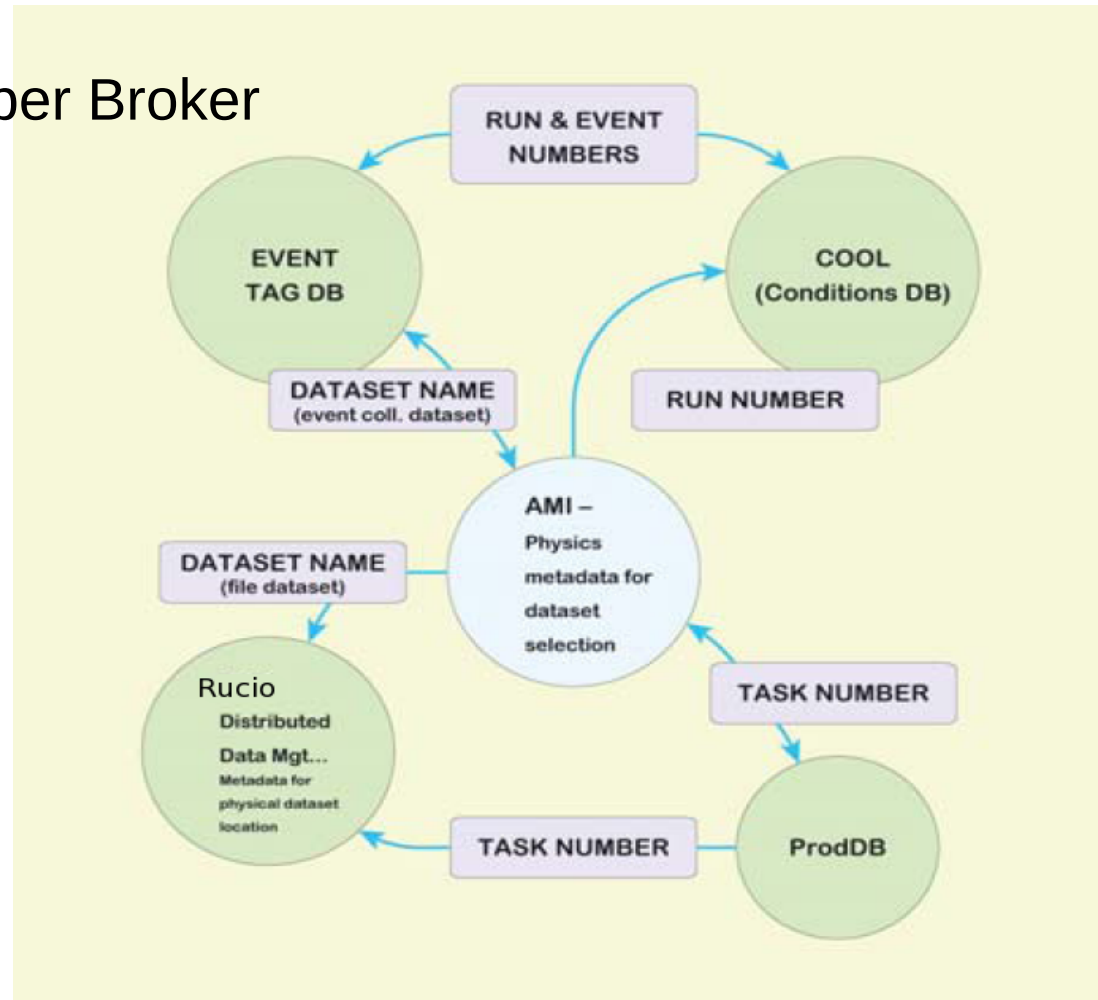
```
## Show RAWs
```

```
$ ami show dataset prov data16_13TeV.00284285.physics_Main.merge.AOD.f662_m1453_r8067_p2645
```

```
...
```

How it works

- Applications
 - The Monte-Carlo Dataset Number Broker
 - The ATLAS Metadata directory
 - Tag collector
- ProdDB
 - For Monte-Carlo simulation



S. Albrand, T. Doherty, J. Fulachier, F. Lambert. The ATLAS Metadata Interface. International Conference on Computing in High Energy and Nuclear Physics (CHEP-07), Sep 2007, Victoria, Canada. IOP Publishing, 120, pp.072003, 2008, <10.1088/1742-6596/120/7/072003>. <in2p3-00192624>

Rucio (ATLAS data management system)



Setup Rucio

- Initializing Rucio client

Loading Rucio client

Isetup rucio

Requested: rucio ...

Setting up emi 3.17.1-1_v2.sl6 ...

Skipping: grid middleware already setup (from UI)

Setting up rucio 1.7.3 ...

Info: Setting compatibility to slc6

Info: Set RUCIO_AUTH_TYPE to x509_proxy

Info: Set RUCIO_ACCOUNT to gkawamur

[illegible]

emi:

Your proxy has 95h:54m:0s remaining

Rucio command

rucio

```
usage: rucio [-h] [--version] [--verbose] [-H ADDRESS] [--auth-host ADDRESS]
            [-a ACCOUNT] [-S AUTH_STRATEGY] [-T TIMEOUT] [--robot]
            [--user-agent USER_AGENT] [-u USERNAME] [-pwd PASSWORD]
            [--certificate CERTIFICATE] [--ca-certificate CA CERTIFICATE]
```

In Rucio, check which account you use

rucio whoami

Hands-on exercise

list scopes

- Each user account has one default scope, e.g., `user.rucio_user` for account `rucio_user`

Listing scopes

```
rucio list-scopes
```

```
user.gkawamur
```

```
...
```

```
group.phys-sm
```

```
group.phys-susy
```

```
...
```

```
data15_13TeV
```

```
data15_1beam
```

```
data15_900GeV
```

```
...
```

```
mc15_5TeV
```

```
mc15_8TeV
```

```
mc15_900GeV
```

Your user scope

```
rucio list-scopes | grep user.$USER
```

```
user.gkawamur
```

Hands-on exercise

list DIDs

- A data Identifier is found by name and scope

To list all DIDs within a scope

```
rucio list-dids user.gkawamur:*
```

```
+-----+-----+
| SCOPE:NAME                               | [DID TYPE] |
+-----+-----+
| user.gkawamur:user.gkawamur.pruntest_7168.log      | CONTAINER  |
| user.gkawamur:user.gkawamur.tut.helloworldathena.test.log | CONTAINER  |
| user.gkawamur:user.gkawamur.20160323144306.1.log    | CONTAINER  |
| user.gkawamur:user.gkawamur.tutorial.grid.deriv.test1.log | CONTAINER  |
| user.gkawamur:user.gkawamur.pruntest_14222.log      | CONTAINER  |
```

Using filters (search)

```
rucio list-dids data16_13TeV:* --filter type=DATASET,datatype=AOD
```

```
+-----+-----+
| SCOPE:NAME                               | [DID TYPE] |
+-----+-----+
| data16_13TeV:data16_13TeV.00293572.physics_CosmicCalo.merge.AOD.x387_m1554      | DATASET    |
| data16_13TeV:data16_13TeV.00297447.physics_Standby.merge.AOD.x416_m1583        | DATASET    |
| data16_13TeV:data16_13TeV.00297041.physics_Main.merge.AOD.f686_m1583           | DATASET    |
| data16_13TeV:data16_13TeV.00297041.physics_CosmicCalo.merge.AOD.f686_m1583     | DATASET    |
| data16_13TeV:data16_13TeV.00297041.physics_ZeroBias.merge.AOD.f686_m1583      | DATASET    |
```

Hands-on exercise

list contents

List file contents of dataset or container

```
rucio list-files data16_13TeV:data16_13TeV.00303819.physics_Main.merge.AOD.f716_m1620
```

```
+-----+-----+-----+-----+-----+
| SCOPE:NAME                               | GUID                               | ADLER32 | FILESIZE | EVENTS |
+-----+-----+-----+-----+-----+
| data16_13TeV:data16_13TeV.00303819.physics_Main.merge.AOD.f716_m1620._lb0004._0001.1 | 98325FCF-9E4E-B442-A4B2-2A64E271C697 | ad:130a9a7c | 182.9 MB | 887 |
| data16_13TeV:data16_13TeV.00303819.physics_Main.merge.AOD.f716_m1620._lb0005._0001.1 | 85303413-544F-EC4A-B494-494091163A92 | ad:d78501da | 220.4 MB | 836 |
| data16_13TeV:data16_13TeV.00303819.physics_Main.merge.AOD.f716_m1620._lb0006._0001.1 | 970BCEFD-CF3D-C541-8507-471F54E3167A | ad:abc20882 | 2.7 GB | 9097 |
```

List file contents of dataset or container

```
rucio list-content data16_13TeV:data16_13TeV.00303819.physics_Main.merge.AOD.f716_m1620
```

```
+-----+-----+
| SCOPE:NAME                               | [DID TYPE] |
+-----+-----+
| data16_13TeV:data16_13TeV.00303819.physics_Main.merge.AOD.f716_m1620._lb0004._0001.1 | FILE       |
| data16_13TeV:data16_13TeV.00303819.physics_Main.merge.AOD.f716_m1620._lb0005._0001.1 | FILE       |
| data16_13TeV:data16_13TeV.00303819.physics_Main.merge.AOD.f716_m1620._lb0006._0001.1 | FILE       |
```

List all contents recursively

```
rucio list-dids --recursive data16_13TeV:data16_13TeV.periodA3.physics_Main.PhysCont.AOD.t0pro20_v01
```

```
+-----+-----+
| SCOPE:NAME                               | [DID TYPE] |
+-----+-----+
| data16_13TeV:data16_13TeV.00297730.physics_Main.merge.AOD.f694_m1583                | DATASET    |
| data16_13TeV:data16_13TeV.00297730.physics_Main.merge.AOD.f694_m1583._lb0108._0001.1 | FILE       |
| data16_13TeV:data16_13TeV.00297730.physics_Main.merge.AOD.f694_m1583._lb0108._0002.1 | FILE       |
| data16_13TeV:data16_13TeV.00297730.physics_Main.merge.AOD.f694_m1583._lb0108._0003.1 | FILE       |
| data16_13TeV:data16_13TeV.00297730.physics_Main.merge.AOD.f694_m1583._lb0109._0001.1 | FILE       |
| data16_13TeV:data16_13TeV.periodA3.physics_Main.PhysCont.AOD.t0pro20_v01            | CONTAINER  |
```

Hands-on exercise

show metadata

Showing metadata of a dataset

rucio get-metadata data16_13TeV:data16_13TeV.00303819.physics_Main.merge.AOD.f716_m1620

```
purge_replicas: None
campaign: None
is_new: None
is_open: False
closed_at: 2016-07-18 07:39:44
deleted_at: None
availability: AVAILABLE
eol_at: None
guid: None
panda_id: None
provenance: None
accessed_at: 2016-09-19 22:00:22
version: f716_m1620
scope: data16_13TeV
hidden: False
md5: None
events: 25475721
adler32: None
complete: None
lumblocknr: None
monotonic: False
updated_at: 2016-09-19 22:00:42
obsolete: False
transient: None
did_type: DATASET
suppressed: True
expired_at: None
stream_name: physics_Main
account: tzero
run_number: 303819
name: data16_13TeV.00303819.physics_Main.merge.AOD.f716_m1620
task_id: None
datatype: AOD
created_at: 2016-07-17 04:17:53
bytes: 6462688464808
project: data16_13TeV
length: 2595
prod_step: merge
phys_group: None
```


Hands-on exercise

list replicas

Listing dataset replicas

```
rucio list-dataset-replicas data16_13TeV:data16_13TeV.00303819.physics_Main.merge.AOD.f716_m1620
```

```
DATASET: data16_13TeV:data16_13TeV.00303819.physics_Main.merge.AOD.f716_m1620
```

```
+-----+-----+-----+
| RSE          | FOUND | TOTAL |
+-----+-----+-----+
| CERN-PROD_TZDISK | 2567 | 2595 |
| GRIF-LPNHE_DATADISK | 2595 | 2595 |
| IN2P3-CC_DATADISK | 2595 | 2595 |
| CERN-PROD_DERIVED | 2595 | 2595 |
+-----+-----+-----+
```

Listing file replicas

```
rucio list-file-replicas data16_13TeV:data16_13TeV.00303819.physics_Main.merge.AOD.f716_m1620
```

```
+-----+-----+-----+-----+-----+
+-----+-----+-----+-----+-----+
+-----+-----+-----+-----+-----+
| SCOPE      | NAME                                                                 | FILESIZE | ADLER32 | RSE: REPLICAS
+-----+-----+-----+-----+-----+
|-----+-----+-----+-----+-----+
| data16_13TeV | data16_13TeV.00303819.physics_Main.merge.AOD.f716_m1620._lb0004._0001.1 | 182.9 MB | 130a9a7c | GRIF-LPNHE_DATADISK: srm://lpnse1.in2p3.fr:8446/srm/managerv2?SFN=/dpm/in2p3.fr/home/atlas/atlasdatadisk/rucio/data16_13TeV/39/bc/data16_13TeV.00303819.physics_Main.merge.AOD.f716_m1620._lb0004._0001.1
| data16_13TeV | data16_13TeV.00303819.physics_Main.merge.AOD.f716_m1620._lb0004._0001.1 | 182.9 MB | 130a9a7c | TAIWAN-LCG2_DATADISK: https://f-dpm000.grid.sinica.edu.tw:443/dpm/grid.sinica.edu.tw/home/atlas/atlasdatadisk/rucio/data16_13TeV/39/bc/data16_13TeV.00303819.physics_Main.merge.AOD.f716_m1620._lb0004._0001.1
```

Hands-on exercise download data

- Make a local copy from Rucio RSEs

```
## Downloading a dataset to local disk (select an output dataset of your test job)
```

```
rucio download user.gkawamur:user.gkawamura.test1
```

```
2016-10-01 20:26:57,534 INFO [Starting download for user.gkawamur:user.gkawamura.test1 with 0 files]
```

```
-----  
Download summary
```

```
-----  
DID user.gkawamur:user.gkawamura.test1
```

```
Total files :                0
```

```
Downloaded files :            0
```

```
Files already found locally :    0
```

```
Files that cannot be downloaded :    0
```

Hands-on exercise request a replica

- Make a replica into a RSE space

Request a replication

```
rucio add-rule user.gkawamur:user.gkawamura.test1 --grouping DATASET 1 "DESY-HH_SCRATCHDISK"
```

```
...
```

```
<Transfer ID>
```

Check the transfer status (or by RucioUI https://rucio-ui.cern.ch/list_rules)

```
rucio rule-info <Transfer ID>
```

RucioUI (WebUI)

- Request replicas -



RucioUI

- Move data between RSEs, use Rucio replication rules
- Such request can be generated by CLI and UI
- The UI tool is *the Rucio Rule Definition Droid (R2D2)*
<https://rucio-ui.cern.ch/r2d2>
- Basic need: X509 certificate in your browse



ATLAS Rucio UI Monitoring Data Transfers (R2D2) Reports pattern OR name OR rule id Search Using account: gkawamur Other Monitoring Help

You are here: Rucio Rule Definition Droid - List Rules Rucio Version (WebUI / Server): 1.8.0 / 1.8.0

Rules

New request

Account	RSE	State	Activity	Interval	
gkawamur	RSE		User Subscriptions	14	days

Apply

Show 10 entries

Search:

Name	Account	RSE Expression	Creation Date	State	Locks OK	Locks Replicating	Locks Stuck
No data available in table							
Name	Account	RSE Expression	Creation Date	State	Locks OK	Locks Replicating	Locks Stuck

Showing 0 to 0 of 0 entries

Previous Next

delete rule

download as JSON

RucioUI: Select DIDs - 1

- Data transfers (R2D2) → Request new rule

ATLAS Rucio UI Monitoring Data Transfers (R2D2) Reports pattern OR name OR rule id Search Using account: gkawamur Other Monitoring Help

You are here: Rucio Rule Definition Droid -

If you are new to this interface, please take the [tour](#).

If you find any errors or have suggestions for improvements for this interface please report it to [Jira](#).

Your input will be saved until you submit it. If you want to clear the form please click [here](#).

1. Select Data Identifiers (DIDs)

DID Pattern Search List of DIDs

Please start by entering a DID or DID wildcard and search for either containers or datasets. Then select the requested DIDs. Please do not use a trailing '/' for containers.

Data pattern panda.0323093918.103961.lib._7993599 Search Container Dataset

Show 10 Filter:

entries

Name
panda.0323093918.103961.lib._7993599

Showing 1 to 1 of 1 entries

Continue Select All Previous 1 Next

Data Identifiers and Scope

Files, datasets and containers share the same naming convention, which is composed of two strings: the scope and the name, separated by a colon. The combination of scope and name is called a data identifier (DID).

The scope is used to divide the name space into several, separate sub spaces for production and individual users. User scope always start with 'user.' followed by the account name.

By default users can read from all scopes but only write into their own one. Only privileged accounts have the right to write into multiple scopes including production scopes like mc15_13TeV.

Examples

Official dataset:

```
data15_13TeV.00266904.physics_Main.merge.DAOD_SUSY1.f594_m1435_p2361_tid05608871_00
```

User dataset:

```
user.jdoe:my.dataset.1
```

RucioUI: Select DIDs - 2

- E.g. a wild card pattern
 - “data15_13TeV.*.physics_Main.merge.DAOD_SUSY1.*”

Your input will be saved until you submit it. If you want to clear the form please click [here](#).

1. Select Data Identifiers (DIDs)

DID Pattern Search

List of DIDs

Please start by entering a DID or DID wildcard and search for either containers or datasets. Then select the requested DIDs. Please do not use a trailing '/' for containers.

Data pattern

data15_13TeV.*.physics_Main.merge.DAOD_SUSY1.*

Search

☐

Container

☒

Dataset

Show

10

Filter:

entries

Name	
data15_13TeV.00266904.physics_Main.merge.DAOD_SUSY1.f594_m1435_p2361_tid05608871_00	
data15_13TeV.00266904.physics_Main.merge.DAOD_SUSY1.r6944_p2410_p2425_tid06685122_00	
data15_13TeV.00266904.physics_Main.merge.DAOD_SUSY1.r6944_p2410_p2540_tid07869001_00	
data15_13TeV.00266904.physics_Main.merge.DAOD_SUSY1.r7600_p2521_p2614_tid08133087_00	
data15_13TeV.00266919.physics_Main.merge.DAOD_SUSY1.r6944_p2410_p2425_tid06685125_00	
data15_13TeV.00266919.physics_Main.merge.DAOD_SUSY1.r6944_p2410_p2540_tid07869009_00	
data15_13TeV.00266919.physics_Main.merge.DAOD_SUSY1.r7600_p2521_p2614_tid08133105_00	
data15_13TeV.00267073.physics_Main.merge.DAOD_SUSY1.f594_m1435_p2361_tid05629722_00	
data15_13TeV.00267073.physics_Main.merge.DAOD_SUSY1.r6943_p2410_p2425_tid06685128_00	
data15_13TeV.00267073.physics_Main.merge.DAOD_SUSY1.r6943_p2410_p2540_tid07869016_00	
Name	

Showing 1 to 10 of 524 entries

Previous

1

2

3

4

5

...

53

Next

Continue

Select All

Select the DIDs you want to replicate

Data Identifiers and Scope

Files, datasets and containers share the same naming convention, which is composed of two strings: the scope and the name, separated by a colon. The combination of scope and name is called a data identifier (DID).

The scope is used to divide the name space into several, separate sub spaces for production and individual users. User scope always start with 'user.' followed by the account name.

By default users can read from all scopes but only write into their own one. Only privileged accounts have the right to write into multiple scopes including production scopes like mc15_13TeV.

Examples:

Official dataset:

data15_13TeV.00266904.physics_Main.merge.DAOD_SUSY1.f594_m1435_p2361_tid05608871_00

User dataset:

user.jdoe:my.dataset.1

metadata

RucioUI: Select DIDs - 3

- Metadata

data15_13TeV.00266904.physics_Main.merge.DAOD_SUSY1.f594_m1435_p2361_tid05608871_00	
accessed_at	Mon, 14 Sep 2015 04:34:53 UTC
account	panda
availability	AVAILABLE
closed_at	Mon, 24 Aug 2015 14:33:30 UTC
created_at	Sun, 07 Jun 2015 10:09:59 UTC
datatype	DAOD_SUSY1
did_type	DATASET
events	10593
filesize	237.94 MB
hidden	false
is_open	false
length	7
monotonic	false
name	data15_13TeV.00266904.physics_Main.merge.DAOD_SUSY1.f594_m1435_p2361_tid05608871_00
obsolete	false
prod_step	merge
project	data15_13TeV
run_number	266904
scope	data15_13TeV
stream_name	physics_Main
suppressed	true
task_id	5608871
updated_at	Mon, 14 Sep 2015 06:35:06 UTC
version	f594_m1435_p2361

RucioUI: select a RSE - 1

- Find your destination space

2. Select Rucio Storage Elements (RSEs)

Please enter an RSE or an RSE expression.

RSE (expression) Check Quota

RSE	Remaining Quota	Total Quota
BNL-OSG2_SCRATCHDISK	45.47 TB	45.47 TB

Name **Remaining Quota** **Total Quota**

Continue If you have quota the table will show your total and remaining quota

2. Select Rucio Storage Elements (RSEs)

Please enter an RSE or an RSE expression.

RSE (expression) Check Quota

You have no quota for this RSE. If you really want to create a rule for this RSE you can continue and create a manual request, which you will have to send to DDM support.

Continue If you have no quota use either have to switch to an account which has quota or you can ask for approval

RucioUI: select a RSE - 2

- SCRATCHDISKs in Germany
 - cloud=DE&type=SCRATCHDISK

2. Select Rucio Storage Elements (RSEs)

Please enter an RSE or an RSE expression.

RSE (expression)

cloud=DE&type=SCRATCHDISK

Check Quota

Total size of selected DIDs: 237.94 MB

RSE	Remaining Quota	Total Quota
CSCS-LCG2_SCRATCHDISK	20 TB	20 TB
CYFRONET-LCG2_SCRATCHDISK	11 TB	11 TB
DESY-HH_SCRATCHDISK	30.68 TB	30.68 TB
DESY-ZN_SCRATCHDISK	25 TB	25 TB
FMPHI-UNIBA_SCRATCHDISK	11 TB	11 TB
FZK-LCG2_SCRATCHDISK	50 TB	50 TB
GOEGRID_SCRATCHDISK	25 TB	25 TB
HEPHY-UIBK_SCRATCHDISK	1.65 TB	1.65 TB
IEPSAS-KOSICE_SCRATCHDISK	14.29 TB	14.29 TB
LRZ-LMU_SCRATCHDISK	26.91 TB	26.91 TB
MPPMU_SCRATCHDISK	20 TB	20 TB
PRAGUELCG2_SCRATCHDISK	20.4 TB	20.4 TB
PSNC_SCRATCHDISK	2.2 TB	2.2 TB
TUDRESDEN-ZIH_SCRATCHDISK	4.26 TB	4.26 TB
UNI-FREIBURG_SCRATCHDISK	32.5 TB	32.5 TB
UNI-SIEGEN-HEP_SCRATCHDISK	50 GB	50 GB
WUPPERTALPROD_SCRATCHDISK	22.55 TB	22.55 TB
Name	Remaining Quota	Total Quota

Continue

RucioUI: select options

3. Options

Please select/enter your wanted options and then submit your rule request.

Grouping

☐ All ☒ Dataset ☐ None

A grouping definition
of how the replica will
be distributed

Lifetime (in days). Leave empty for infinite lifetime.

15

Copies

1

Comment

For ATLAS-D

Create sample

☐

Number of files

Asynchronous Mode

☐

Use if you select files
randomly

Continue

Rucio UI: summary

- Before submission check rules

4. Summary

This request will create rules for the following DIDs:

DID	Copies	Files	Size	Requested Size
data15_13TeV:data15_13TeV.00266904.physics_Main.merge.DAOD_SUSY1.f594_m1435_p2361_tid05608871_00	1	7	237.94 MB	237.94 MB
data15_13TeV:data15_13TeV.00266904.physics_Main.merge.DAOD_SUSY1.r6944_p2410_p2425_tid06685122_00	1	14	2.96 GB	2.96 GB
data15_13TeV:data15_13TeV.00266904.physics_Main.merge.DAOD_SUSY1.r6944_p2410_p2540_tid07869001_00	1	5	3.4 GB	3.4 GB
data15_13TeV:data15_13TeV.00266904.physics_Main.merge.DAOD_SUSY1.r7600_p2521_p2614_tid08133087_00	1	10	2.62 GB	2.62 GB
Total	4	36	8.59 GB	8.59 GB

The rules will replicate to one of the following RSEs:

Check quota limit carefully!

RSE	Remaining Quota	Total Quota
CSCS-LCG2_SCRATCHDISK	20 TB	20 TB
CYFRONET-LCG2_SCRATCHDISK	11 TB	11 TB
DESY-HH_SCRATCHDISK	30.68 TB	30.68 TB
DESY-ZN_SCRATCHDISK	25 TB	25 TB
FMPHI-UNIBA_SCRATCHDISK	11 TB	11 TB
FZK-LCG2_SCRATCHDISK	50 TB	50 TB
GOEGRID_SCRATCHDISK	25 TB	25 TB
HEPHY-UIBK_SCRATCHDISK	1.65 TB	1.65 TB
IEPSAS-KOSICE_SCRATCHDISK	14.29 TB	14.29 TB
LRZ-LMU_SCRATCHDISK	26.91 TB	26.91 TB
MPPMU_SCRATCHDISK	20 TB	20 TB
PRAGUELCG2_SCRATCHDISK	20.4 TB	20.4 TB
PSNC_SCRATCHDISK	2.2 TB	2.2 TB
TUDRESDEN-ZIH_SCRATCHDISK	4.26 TB	4.26 TB

Rucio UI: Transfer status

- Go to top page and see your transfer activity
 - <https://rucio-ui.cern.ch/r2d2>

ATLAS Rucio UI Monitoring Data Transfers (R2D2) Reports pattern OR name OR rule id Search Using account: gkawamur Other Monitoring Help

You are here: Rules Backlog Monitoring Rucio Version (WebUI / Server): 1.8.0 / 1.8.0

Account: gkawamur Activity: Activity Endpoint: RSE State: Done Age: younger than 12 hours Load

Rules

Data Type: Project: Stream: Get Link

Search:

Name	Endpoint	State	Creation Date	Data Type	Project	Stream	Version	OK	Replicating	Stuck
data16_13TeV.00309640.express_express.recon.E SD.f750	CERN-PROD_DATADISK	Done	Sun, 02 Oct 2016 20:23:55 UTC	ESD	data16_13TeV	express_express	0	956	0	0
data16_13TeV.00309640.physics_Late.recon.ESD.f 750	SLACXRD_DATADISK	Done	Sun, 02 Oct 2016 20:59:14 UTC	ESD	data16_13TeV	physics_Late	0	955	0	0
data16_13TeV.00309640.physics_Late.recon.ESD.f 750	BNL-OSG2_DATADISK	Done	Sun, 02 Oct 2016 20:59:14 UTC	ESD	data16_13TeV	physics_Late	0	955	0	0
data16_13TeV.00309640.debugrec_hlt.merge.AOD. g53_f750_m1689	CERN-PROD_DATADISK	Done	Sun, 02 Oct 2016 21:01:47 UTC	AOD	data16_13TeV	debugrec_hlt	0	1	0	0
data16_13TeV.00309640.debugrec_hlt.merge.AOD. g53_f750_m1689	INFN-T1_DATADISK	Done	Sun, 02 Oct 2016 21:01:47 UTC	AOD	data16_13TeV	debugrec_hlt	0	1	0	0
data16_13TeV.00309640.debugrec_hlt.merge.AOD. g53_f750_m1689	UNI-FREIBURG_DATADISK	Done	Sun, 02 Oct 2016 21:01:48 UTC	AOD	data16_13TeV	debugrec_hlt	0	1	0	0
data16_13TeV.00309640.physics_Late.merge.AOD. f750_m1689	RAL-LCG2_DATADISK	Done	Sun, 02 Oct 2016 23:08:55 UTC	AOD	data16_13TeV	physics_Late	0	96	0	0
data16_13TeV.00309640.physics_Late.merge.AOD. f750_m1689	UKI-NORTHGRID-LANCS-HEP_DATADISK	Done	Sun, 02 Oct 2016 23:08:55 UTC	AOD	data16_13TeV	physics_Late	0	96	0	0