



Grid/Rucio (Introduction + Hands-on Session)

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

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
```



VMs or PCATLASS at Göttingen

- Logging in some VMs or PCATLASS

```
## USE your user account and "XX" of pcatlas is a number from 00 to 49
ssh -p 24 -t -Y login.ph2.physik.uni-goettingen.de
ssh -p 24 -t -Y login2.ph2.physik.uni-goettingen.de

ssh -p 24 -t -Y login.ph2.physik.uni-goettingen.de ssh -Y pcatlasXX
```



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 many 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
```



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
```

Introduction to Grid computing



Concepts - 1

- Uses Public Key Infrastructure (PKI)
- Pluggable computing power and storage like Power Grid
 - Easy to use like electricity
 - Public and open interfaces by common technologies such as Web, Web services etc
 - WWW allows us to access unlimited information, Grid allows us to access unlimited computing power and storage on this planet



Concepts - 2

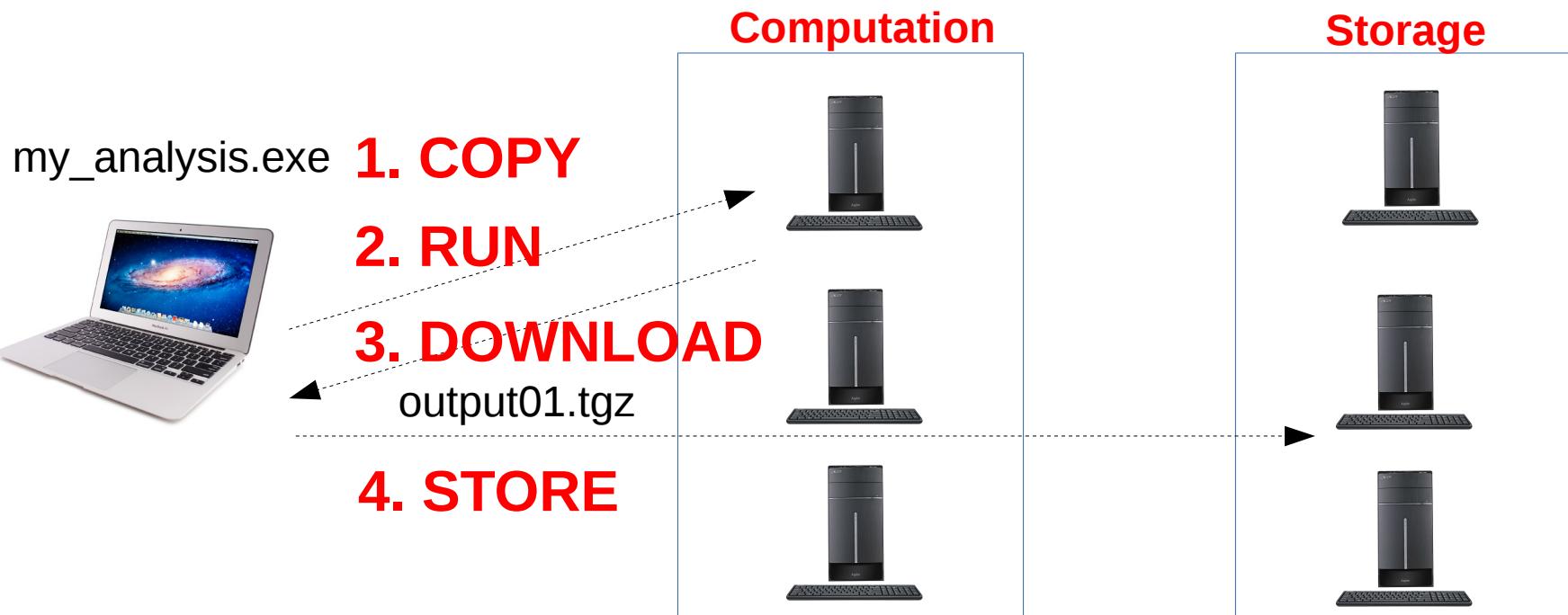
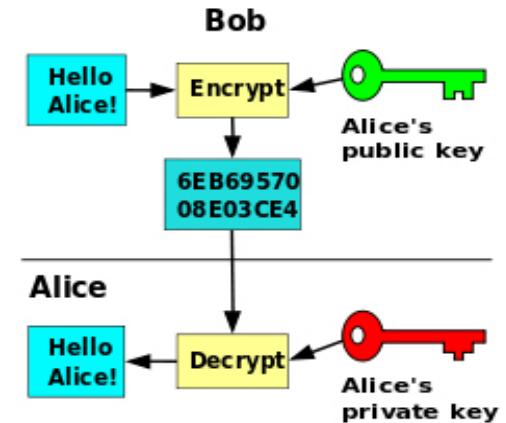
- Some technical terms you may often need (however not in Physics)
 - User certificate, proxy certificate, CA, Virtual Organization (VO), VOMS, authentication, authorization, Computing Element, Storage Element, Worker nodes, Workload Management System, data management system, Job, data replica, information provider, site



Concepts - 3

- How it works (*without Grid*)
 - Only PKI by openssl -> a simplest way

```
$ scp my_analysis.exe computer01:~/  
$ ssh computer01 “~/myprogram.exe run 01”  
$ scp computer01:output01.tgz ./output01.tgz  
$ scp output01.tgz storage02:output01.tgz
```



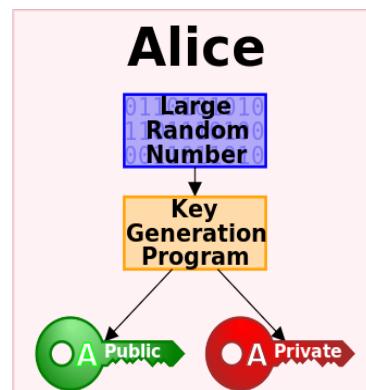
Concepts - 3

- How it works (*with Grid*)
 - Need of basic stuffs
 - Security policy based on PKI
 - Working with many users (physicists)
 - Recognition of users in affiliation, organization and experiment
 - Control of Job allocation
 - Control of storage space allocation and data replication
 - Control among geographically distributed computers
 - Interface of local computing infrastructures
 - Tree-like information search for computing clusters
 - E.g. like Domain Name Server
 - End user tools to make life easy



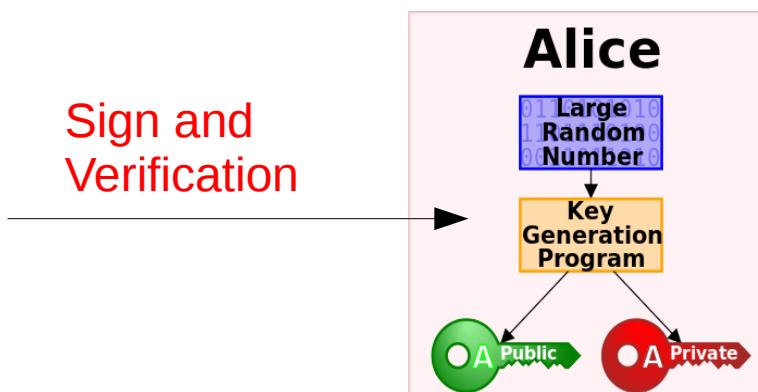
Concepts - 4

- User certificate, proxy certificate, CA, Virtual Organization (VO), VOMS, authentication, authorization
 - Certificates and verification mechanism
 - User key generation (very briefly)
 - 2 distinct primary numbers → p and q
 - Compute a large number $N = pq$
 - The p and q are kept in private key (SK), N is in public key (PK)



Concepts - 4

- User certificate, proxy certificate, CA, Virtual Organization (VO), VOMS, authentication, authorization
 - Certificates and verification mechanism
 - Signing CA identity on the user keys (very briefly)
 - CA has PK and SK as well
 - Sign (S) returns a tag (T) from user private key and a string X
 - Verification (V) returns 1/0 from user public key, X and T



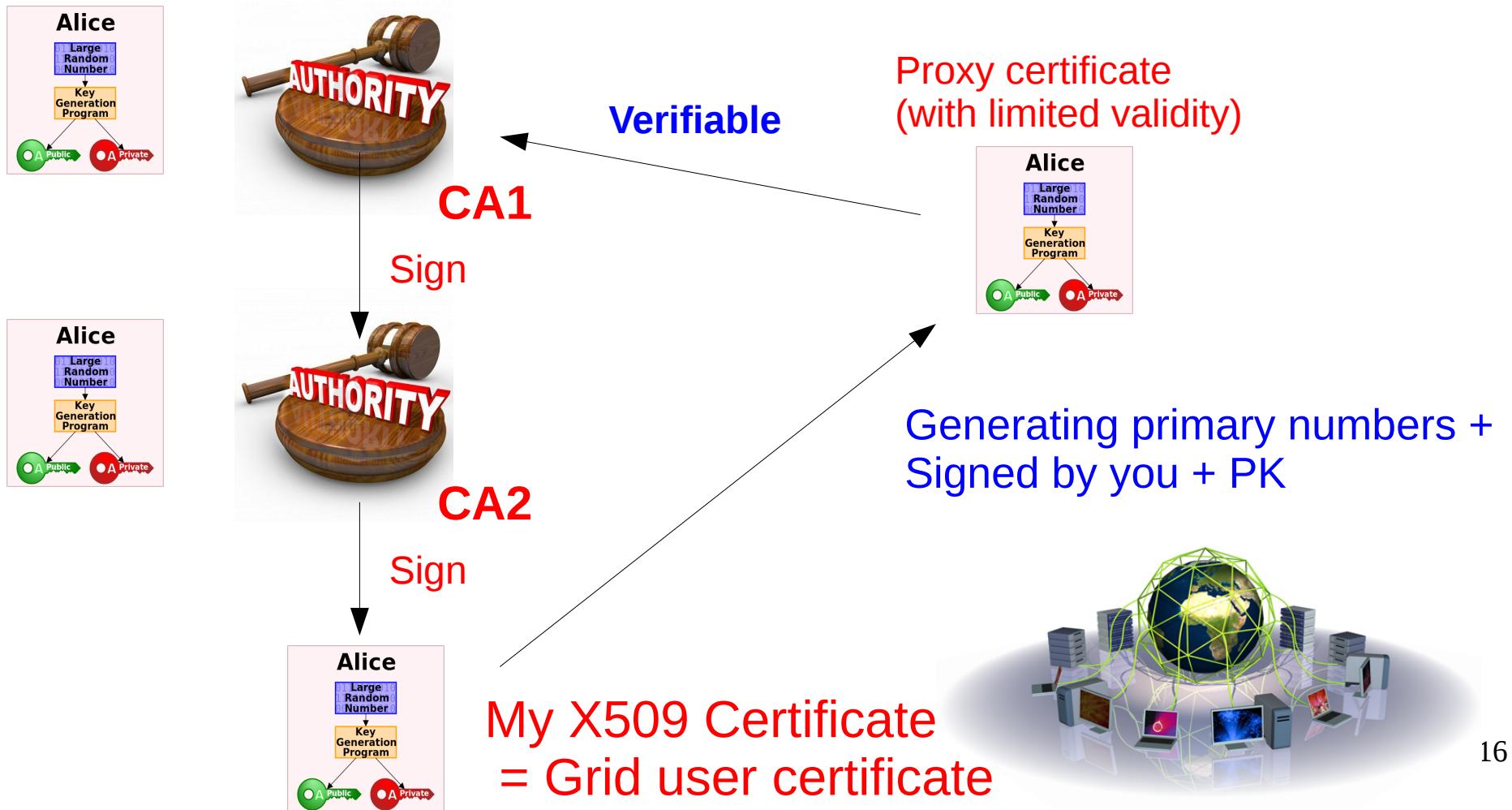
Concepts - 5

- Then, a process of hierarchical signatures



Concepts - 5

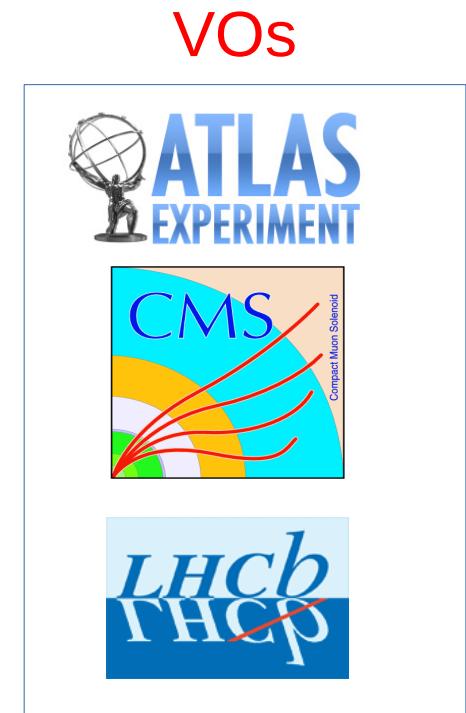
- Generating a new certificate = proxy certificate



Concepts - 6

- Virtual Organization (VO), VOMS
 - VOMS extends a certificate with a VO

Certificate Authority



Concepts - 7

- A similar analogy
 - Authenticated and authorized for your tasks

Certificate Authority



↓
Sign



User certificate

↓
Sign



Proxy certificate
= a limited copy of your certificate



Controlled

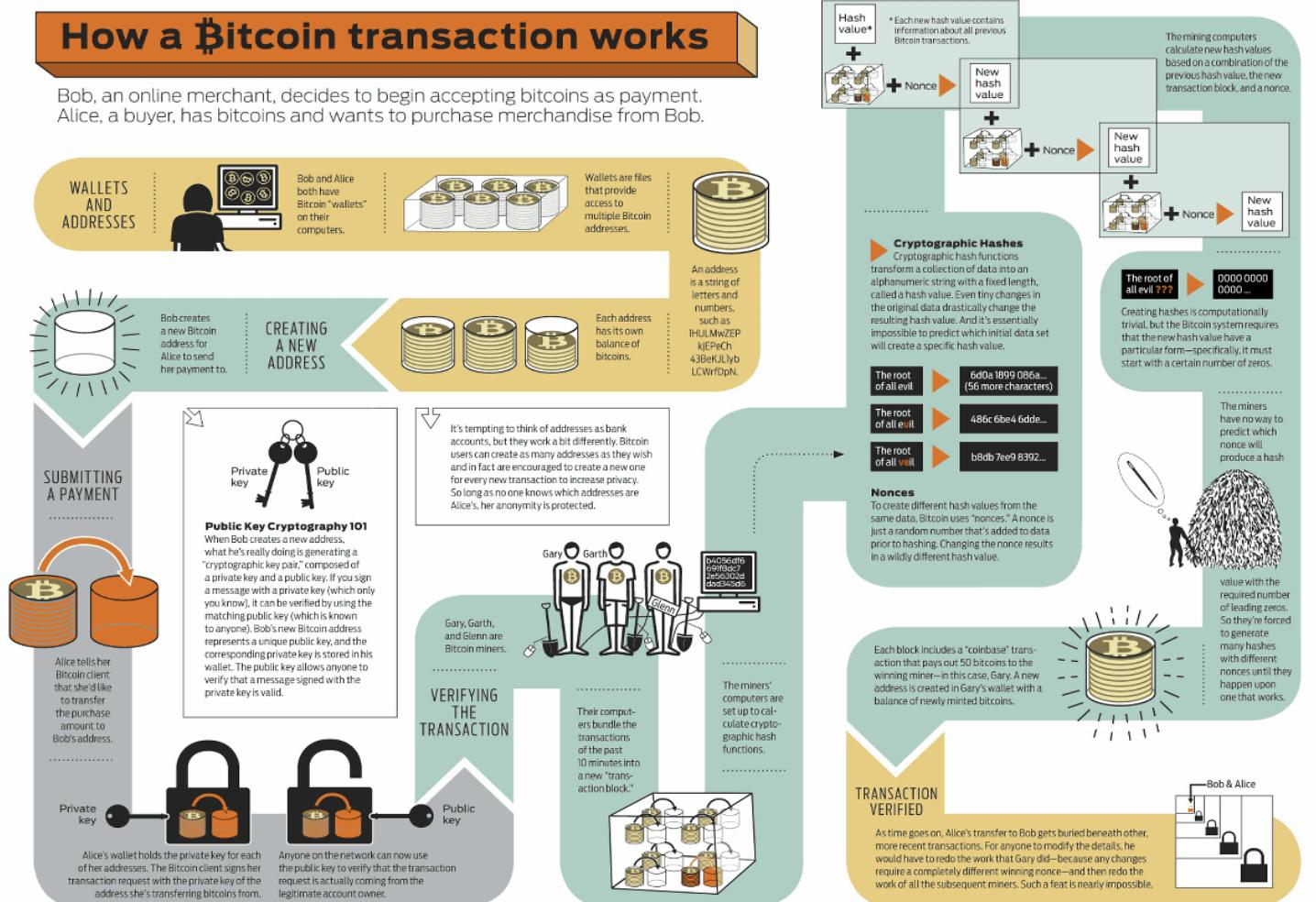


Authorization
= can enter a new land (Grid)



A hint

- No CA, but an infinite chain of signatures
 - Global digital currency = digital certificates



Certificate Authorities and VOMS

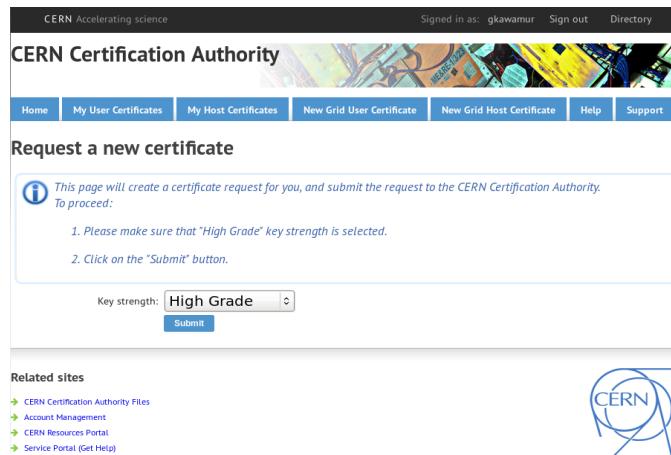
- Germany (FZK)

- <https://gridka-ca.kit.edu/>



- CERN

- <https://ca.cern.ch/ca/user/Request.aspx?template=EE2User>



Certificate Authorities and VOMS

- VOMS top page
 - <https://voms2.cern.ch:8443/>
- VOMS ATLAS (request your ATLAS VO)
 - <https://voms2.cern.ch:8443/voms/atlas>
- VOMS ATLAS users in Germany
 - <https://voms2.cern.ch:8443/voms/atlas/services/VOMSCompatibility?method=getGridmapUsers&container=/atlas/de>



Setup CVMFS

- A recommended way
 - 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 successfully.
```

```
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-----

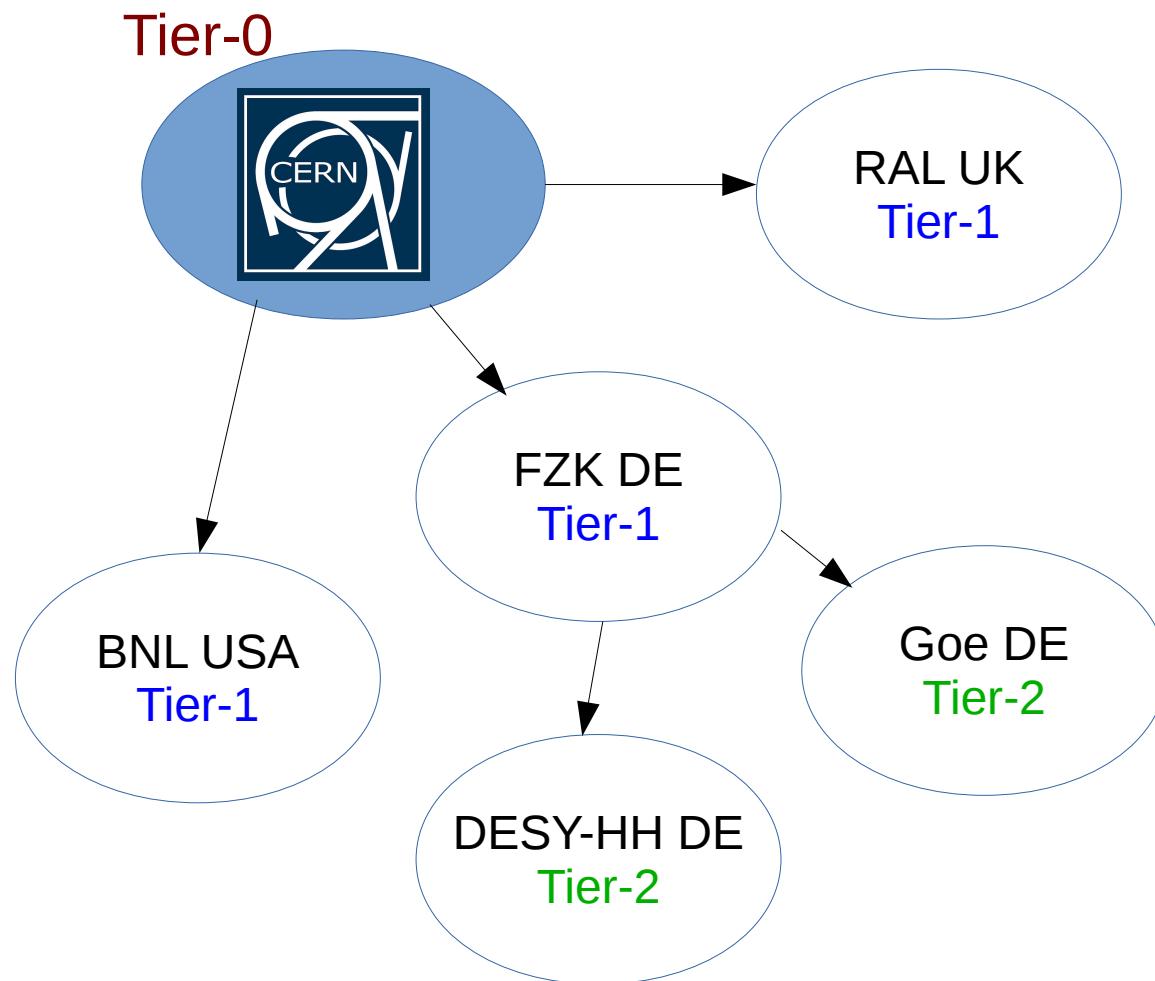
## Check X509 attribute
openssl x509 -in /tmp/x509up_u$UID -text | less

## 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
```

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

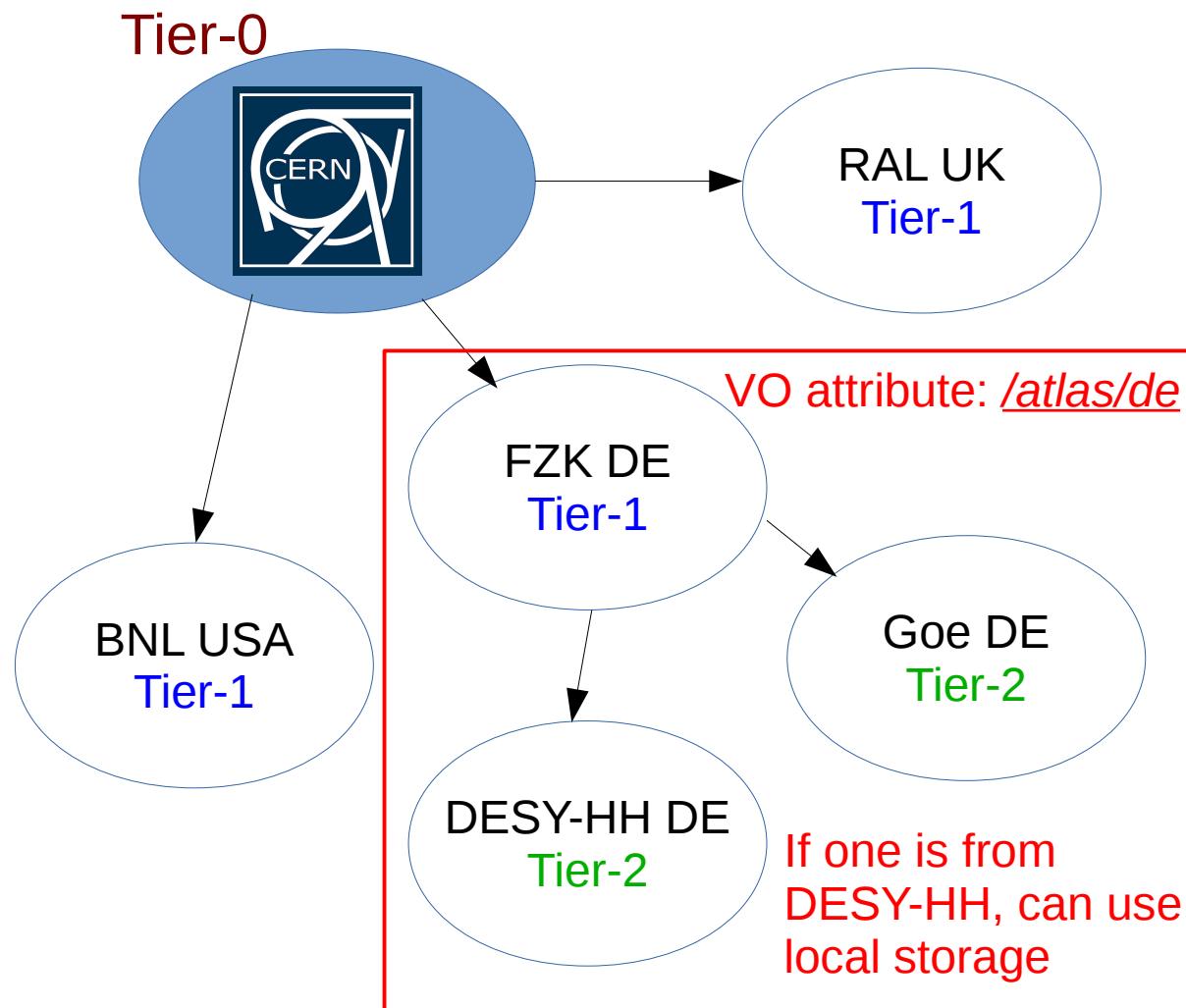
Tier-1: National LCG-Centre, faster network connections and larger storage spaces (e.g. Tape), MC production, user analysis, etc.

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

ATLAS Grid computing and WLCG resources - 1

- LHC multi-tier structure

- WLCG = Worldwide LHC Computing Grid



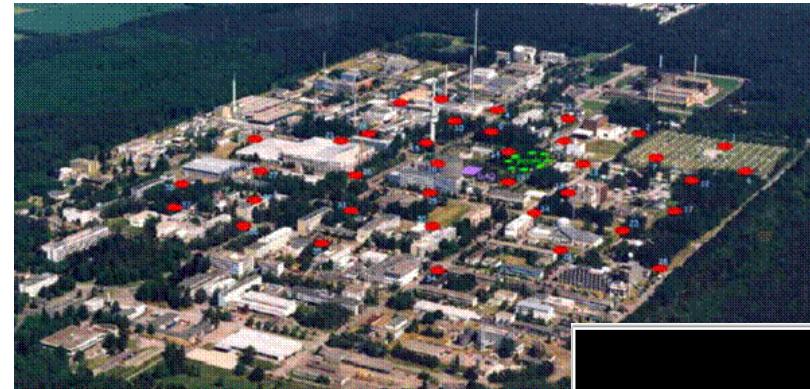
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ATLAS Grid computing and WLCG resources - 2

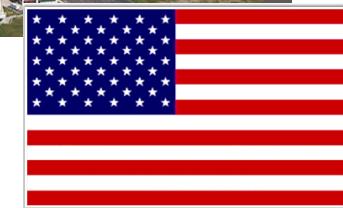
- FZK Tier-1



Forschungszentrum Karlsruhe
in der Helmholtz-Gemeinschaft

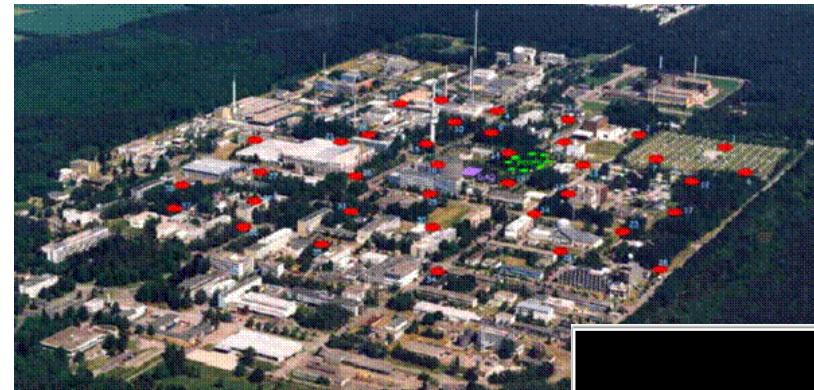


- BNL Tier-1

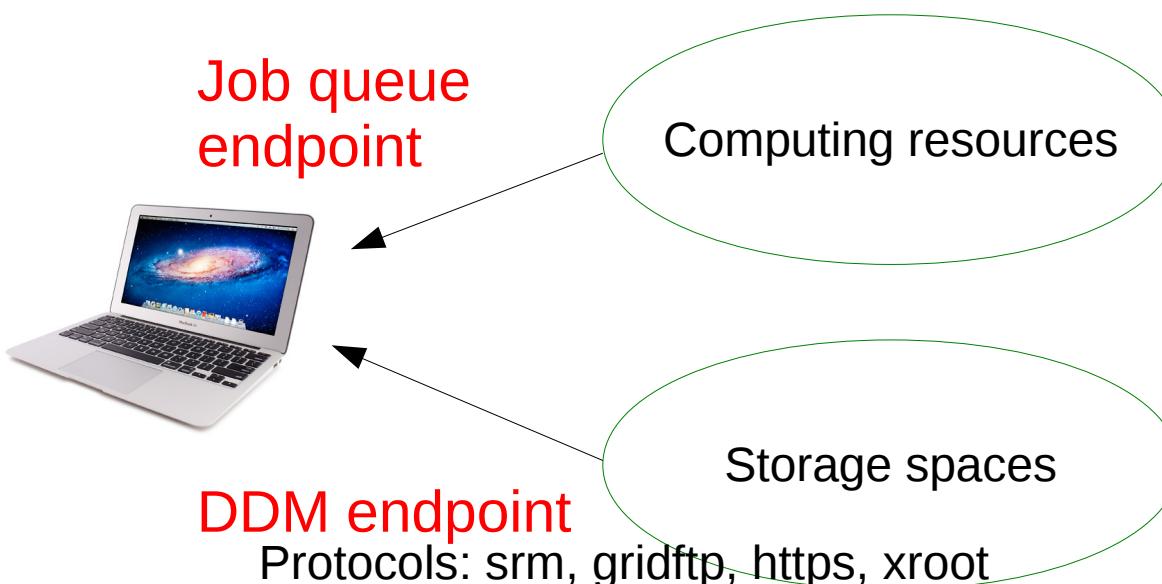


ATLAS Grid computing and WLCG resources - 2

- FZK Tier-1



Forschungszentrum Karlsruhe
in der Helmholtz-Gemeinschaft



FZK Computing centre



Grid job and data - 1

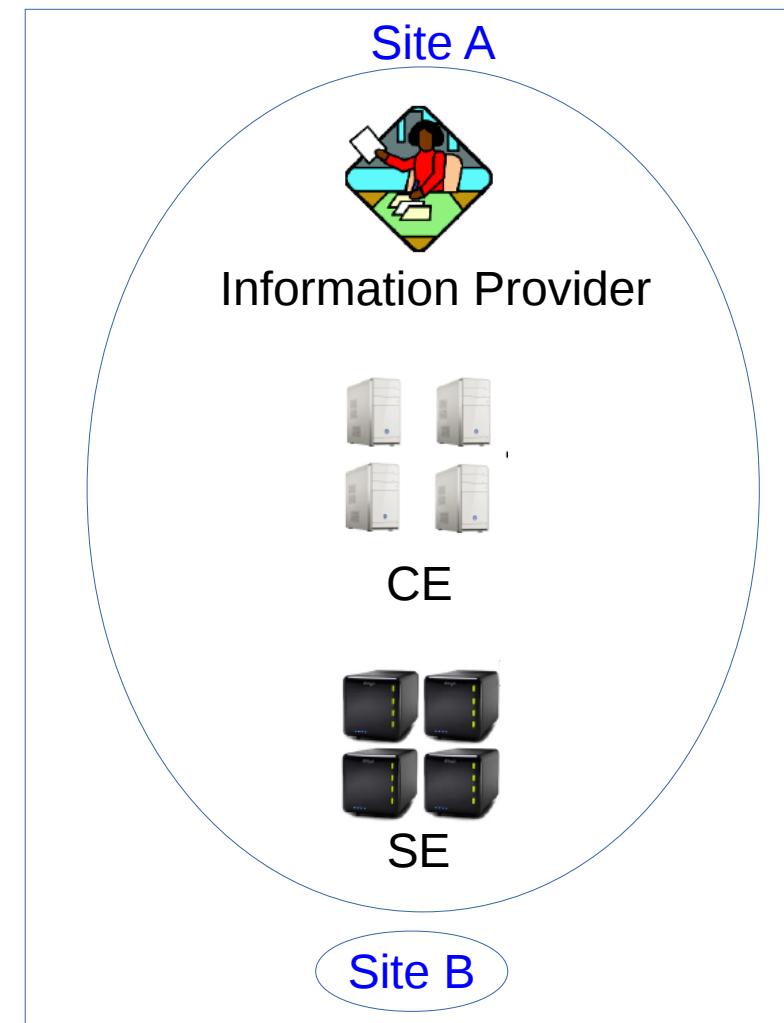
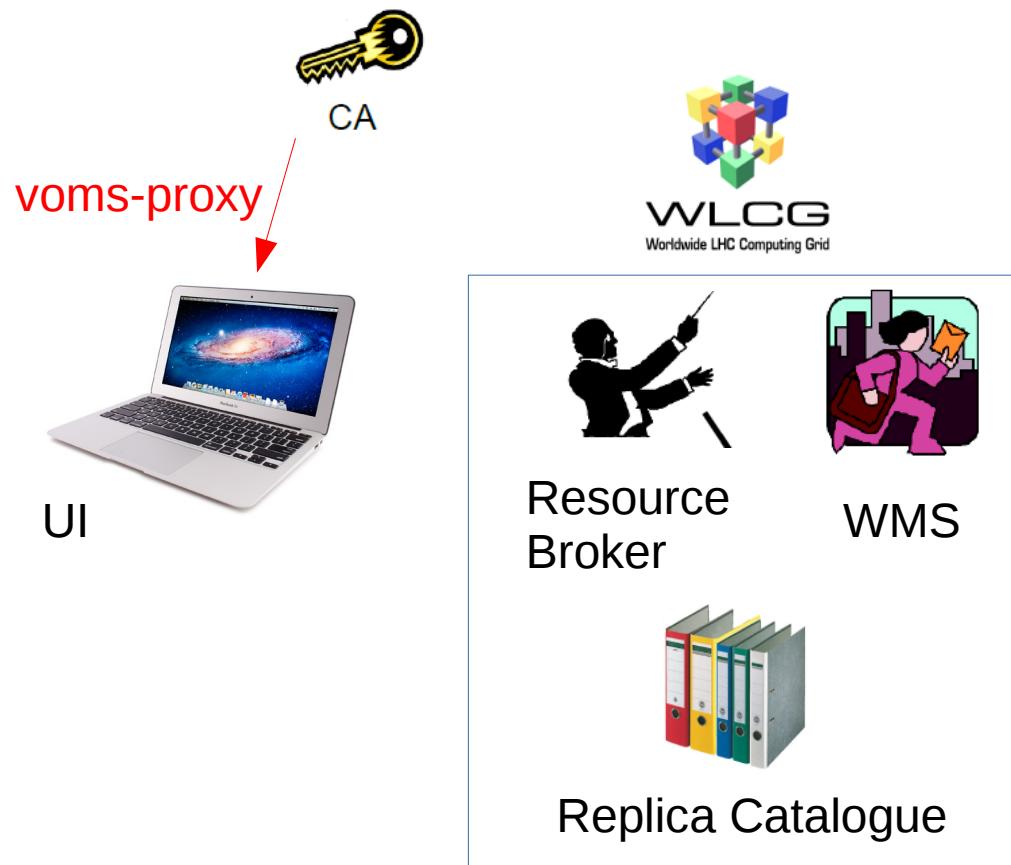
- Computing Element, Storage Element, Worker nodes, Batch system, Workload Management System, data management system, Job, data replica, information provider, site
 - Job = Computing task of which users run program in Grid system
 - Site = a minimum boundary or facility at which provides computing power and storage space
 - Components of a Grid site
 - UI = User Interface
 - CE = Computing Element
 - SE = Storage Element
 - WN = Worker Node
 - Distribution service
 - DDM = Distributed Data Management System
 - WMS = Workload Management System

Grid job and data - 2



WLCG
Worldwide LHC Computing Grid

- How do they work?

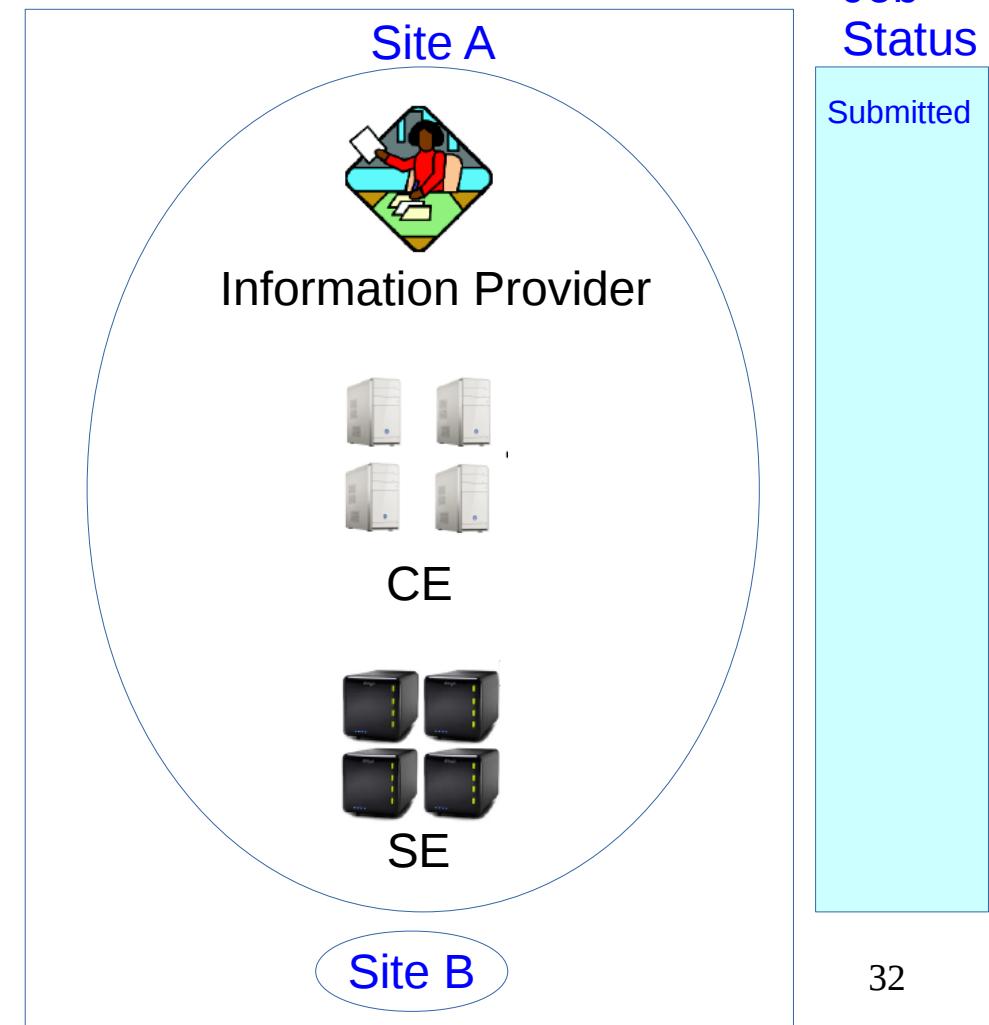
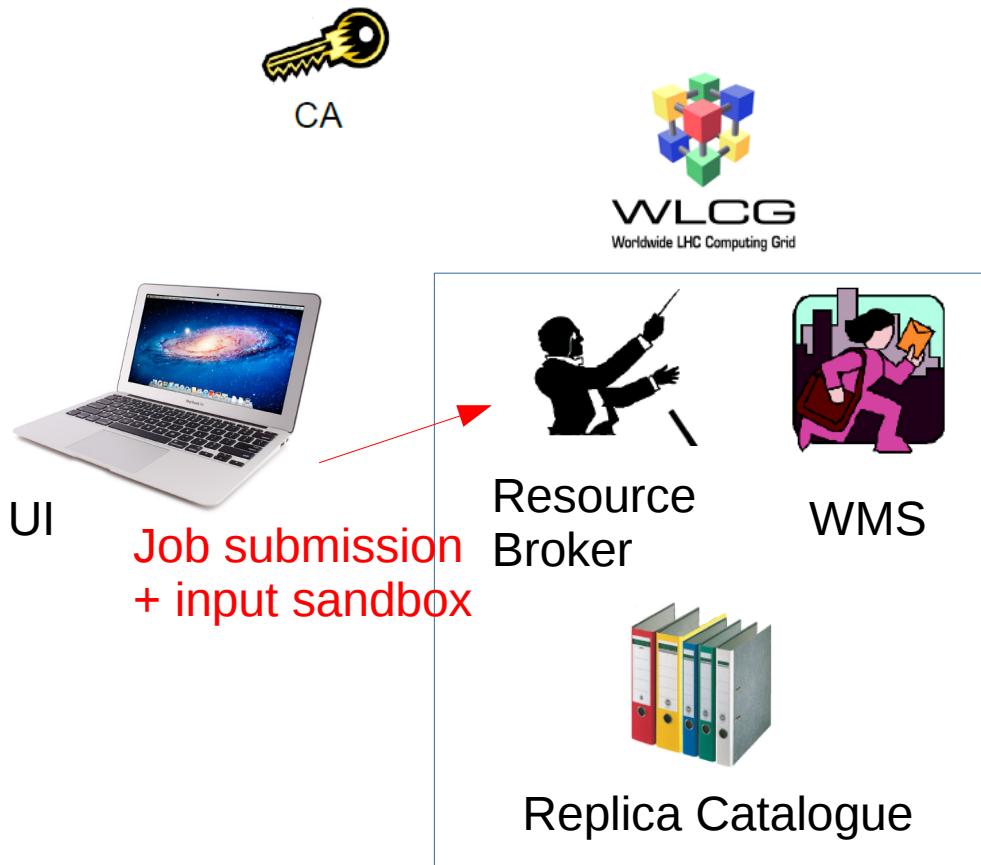


Grid job and data - 2



WLCG
Worldwide LHC Computing Grid

- How do they work?

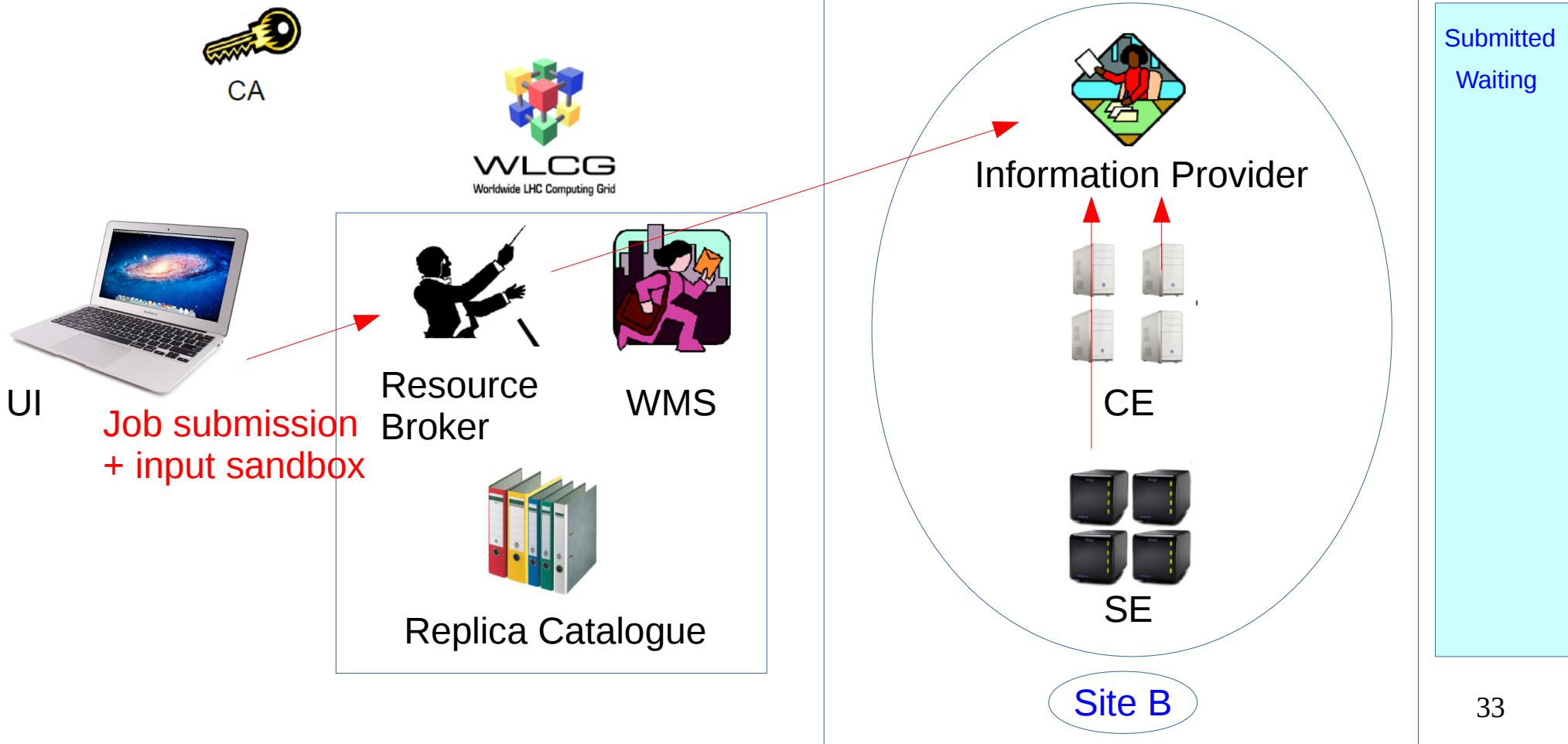


Grid job and data - 2



WLCG
Worldwide LHC Computing Grid

- How do they work?

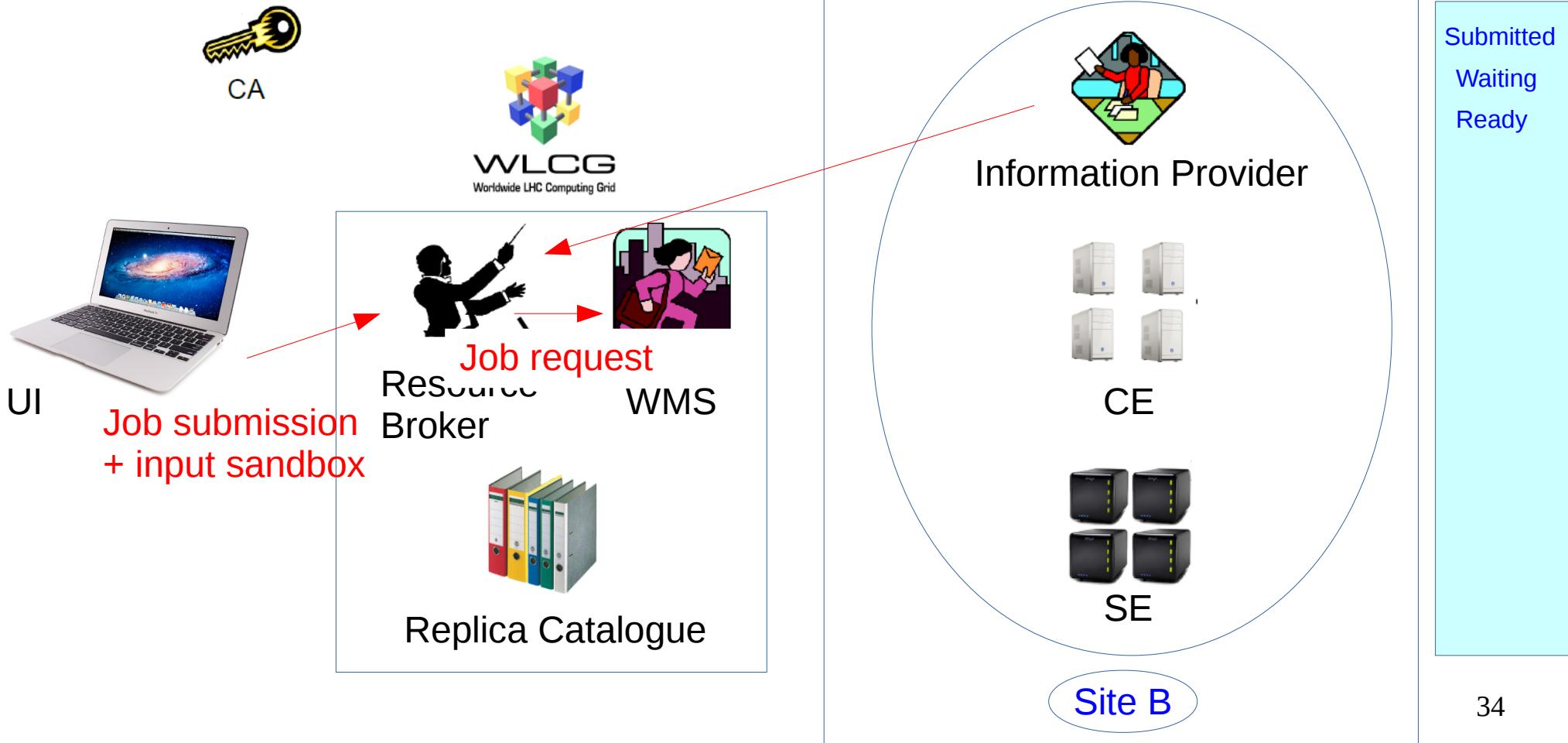


Grid job and data - 2



WLCG
Worldwide LHC Computing Grid

- How do they work?

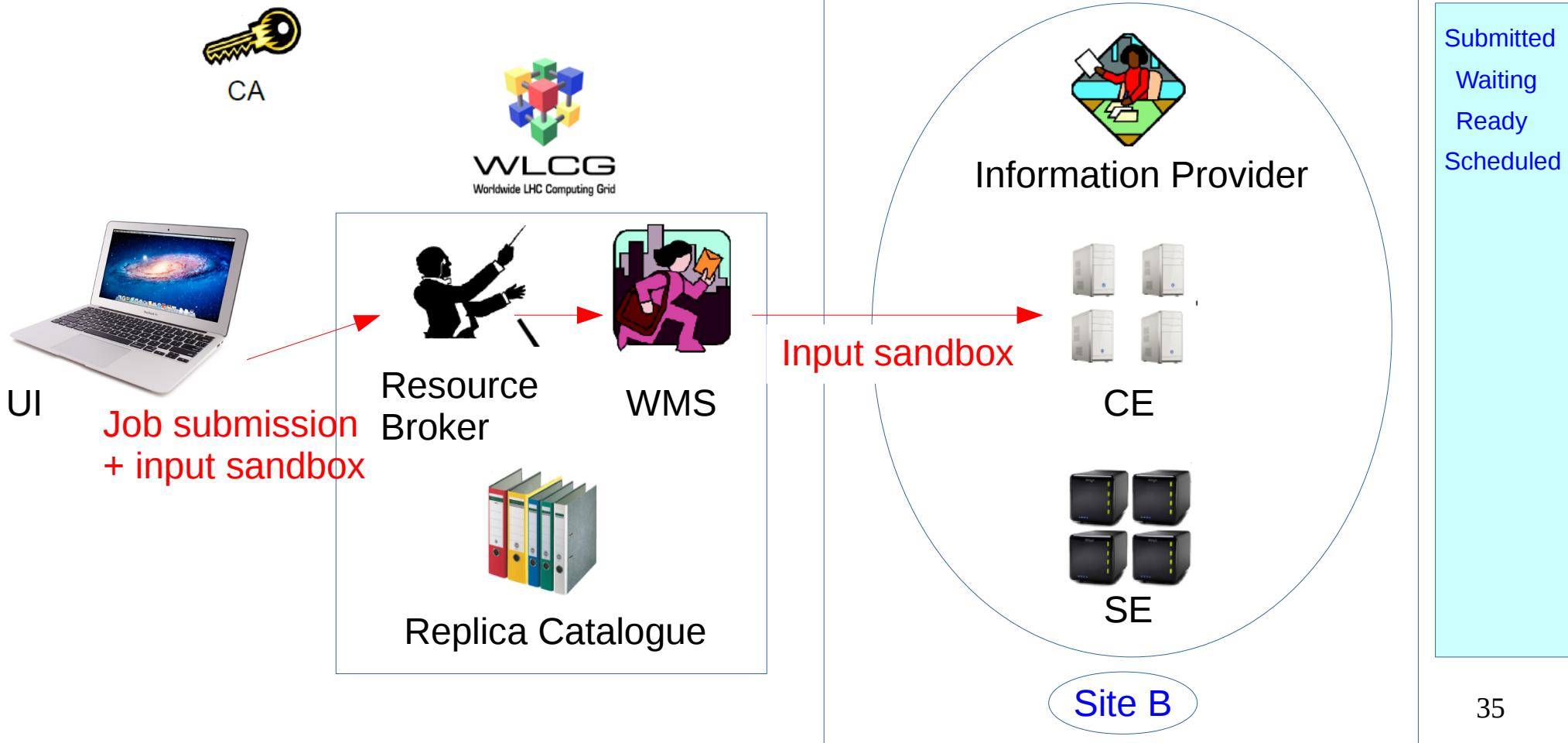


Grid job and data - 2



WLCG
Worldwide LHC Computing Grid

- How do they work?



Grid job and data - 2

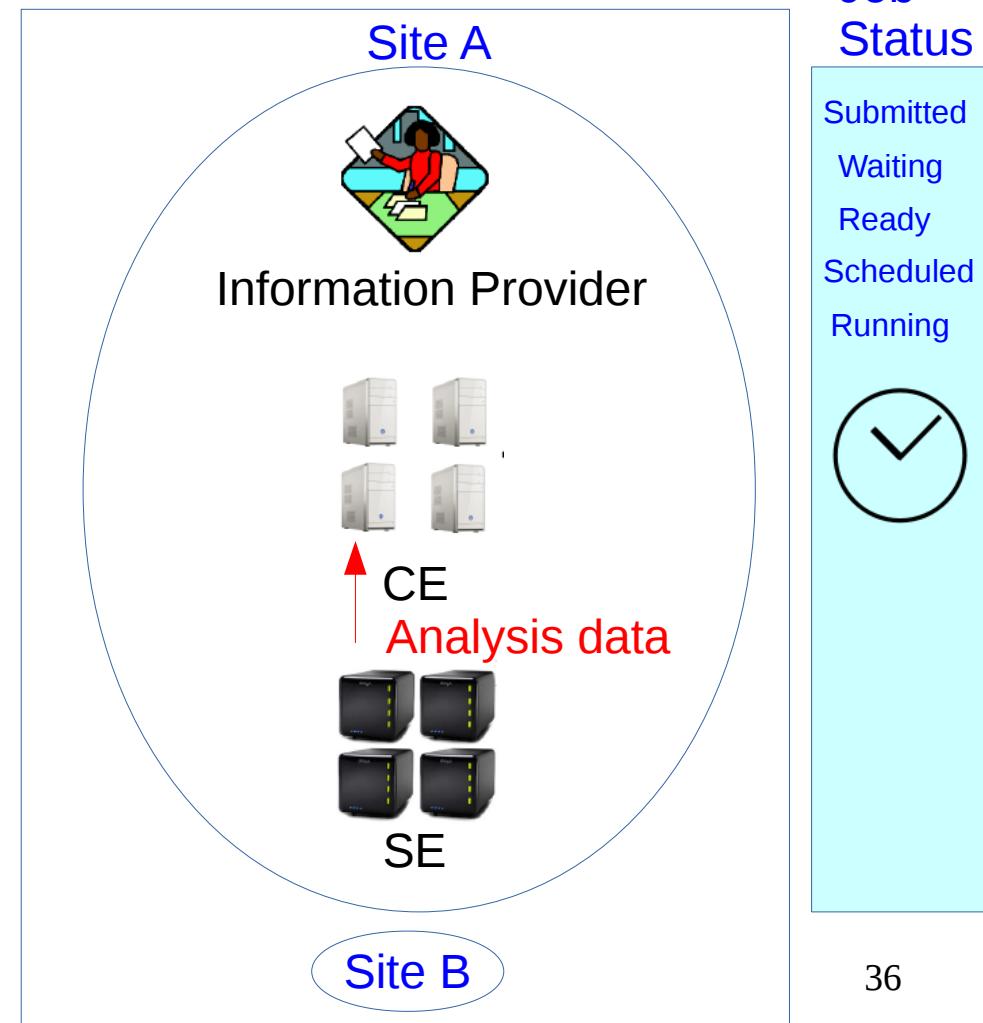


WLCG
Worldwide LHC Computing Grid

- How do they work?



CA

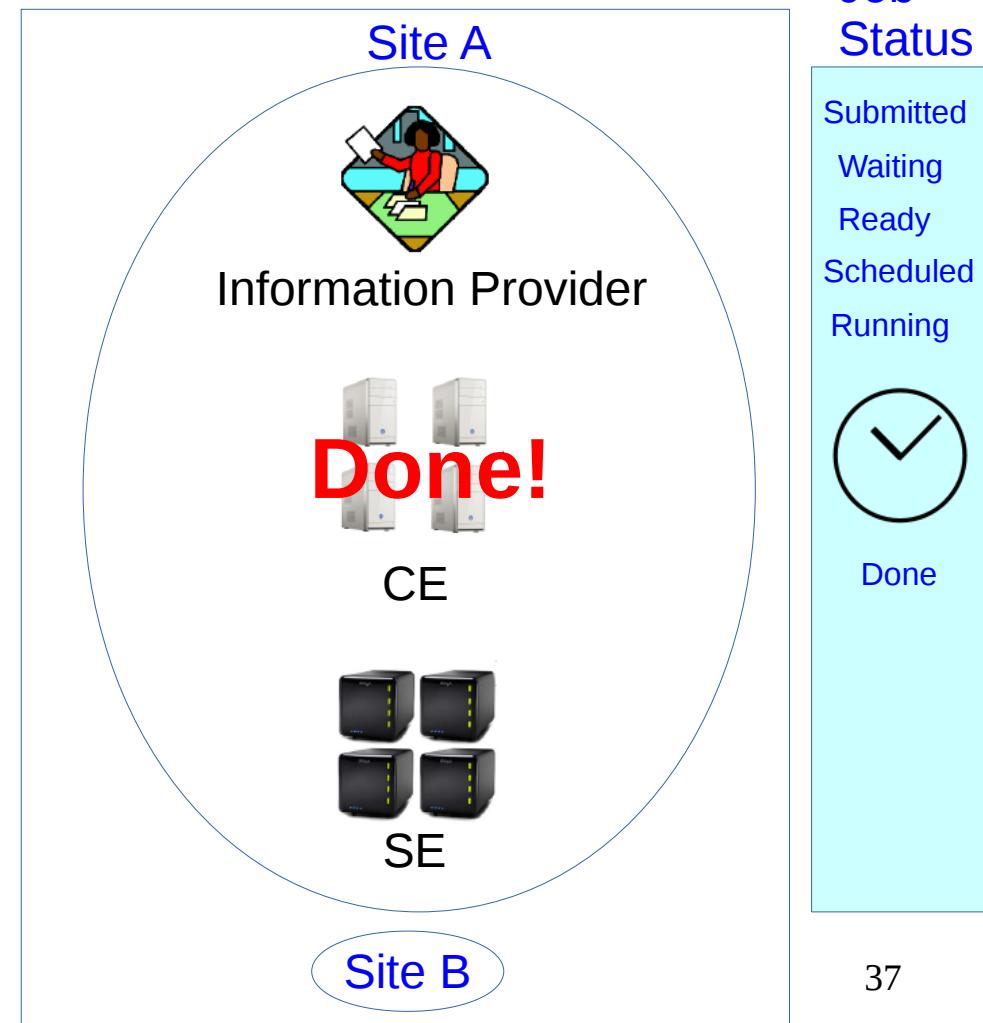


Grid job and data - 2



WLCG
Worldwide LHC Computing Grid

- How do they work?

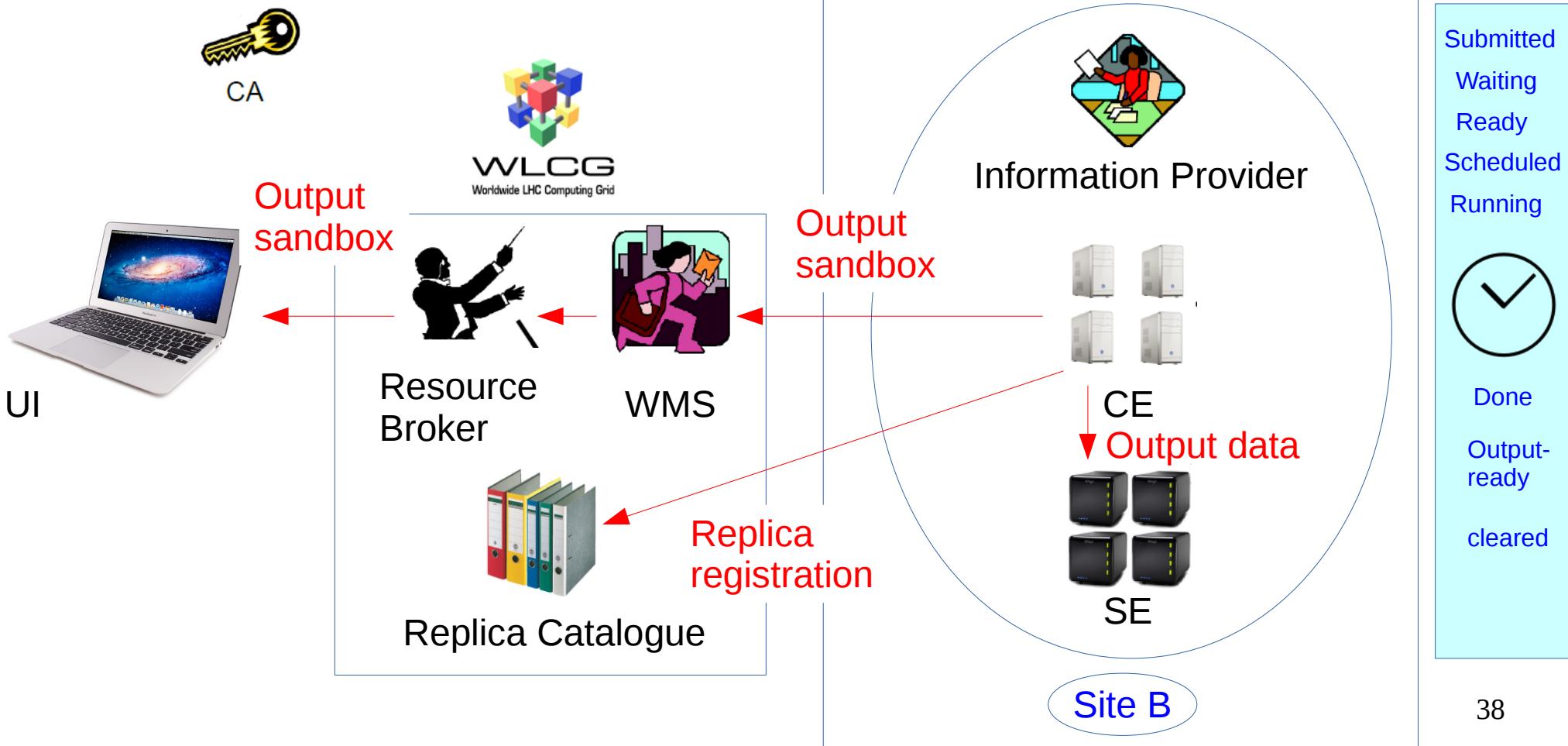


Grid job and data - 2



WLCG
Worldwide LHC Computing Grid

- How do they work?



Grid job and data - 3



WLCG
Worldwide LHC Computing Grid

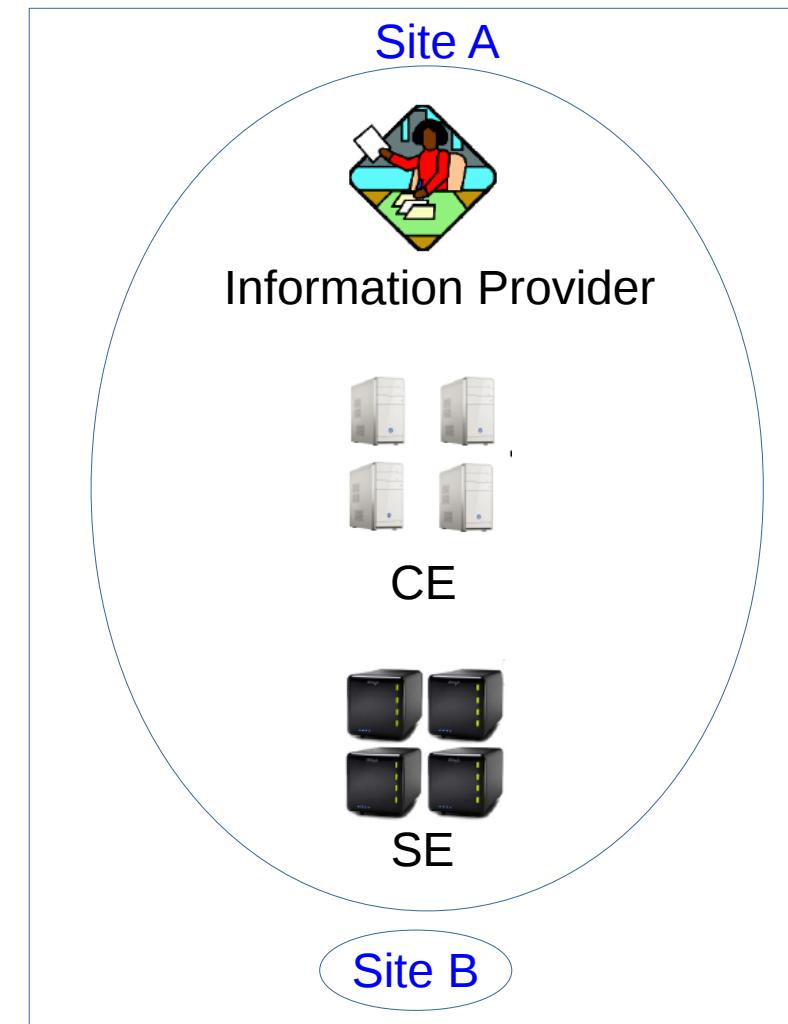
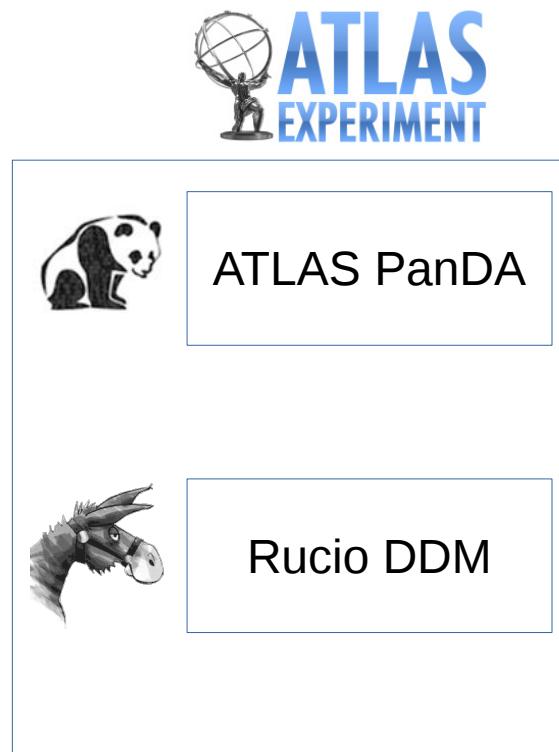
- How do they work?



UI



CA

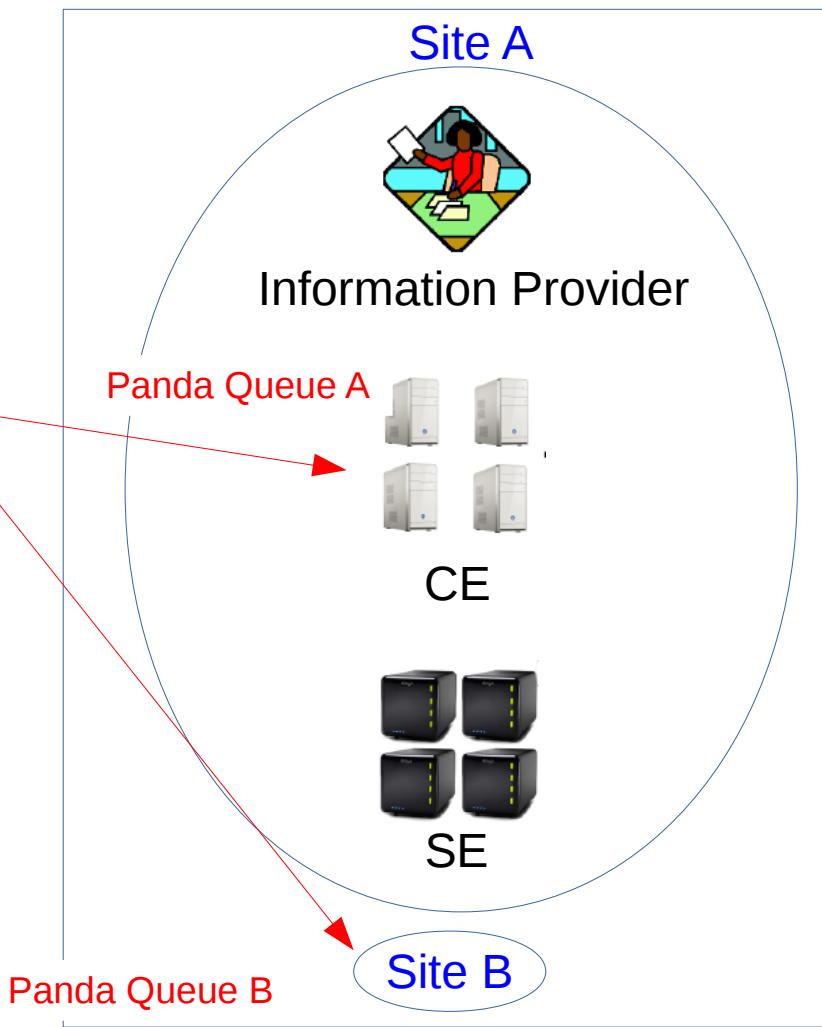
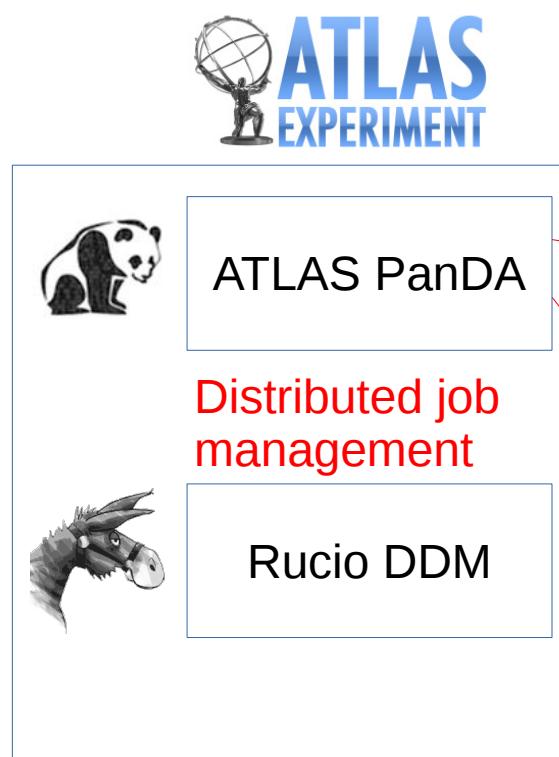


Grid job and data - 3



WLCG
Worldwide LHC Computing Grid

- How do they work?

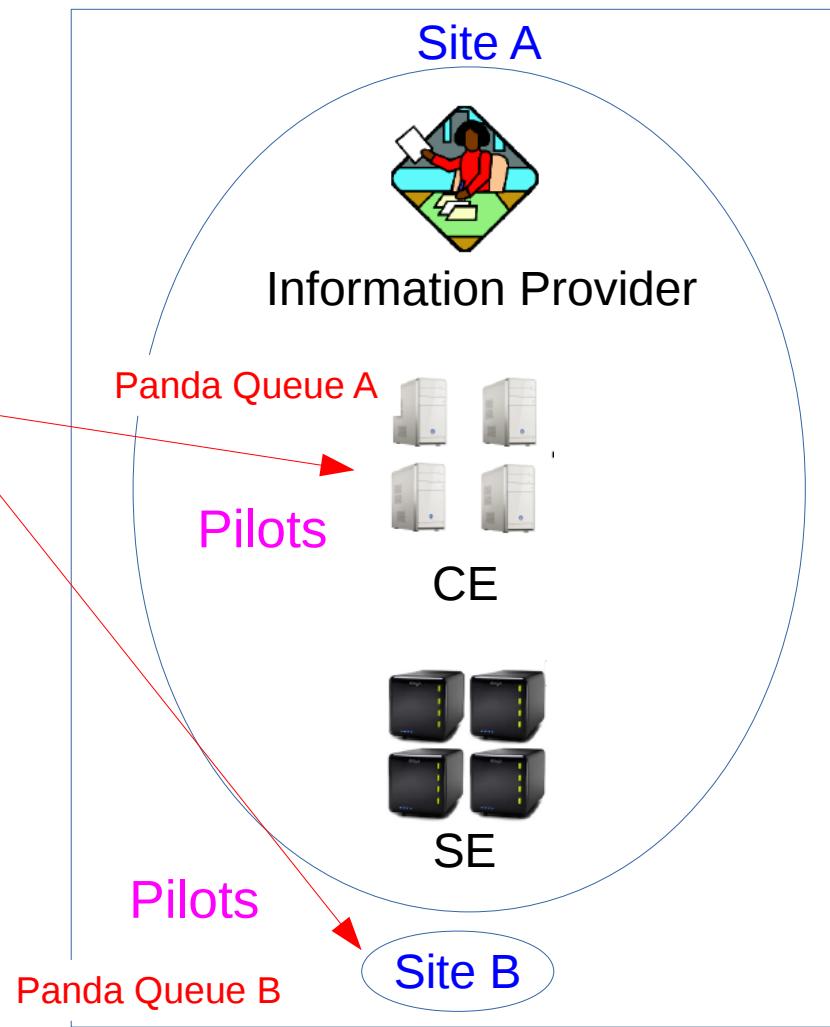


Grid job and data - 3



WLCG
Worldwide LHC Computing Grid

- How do they work?

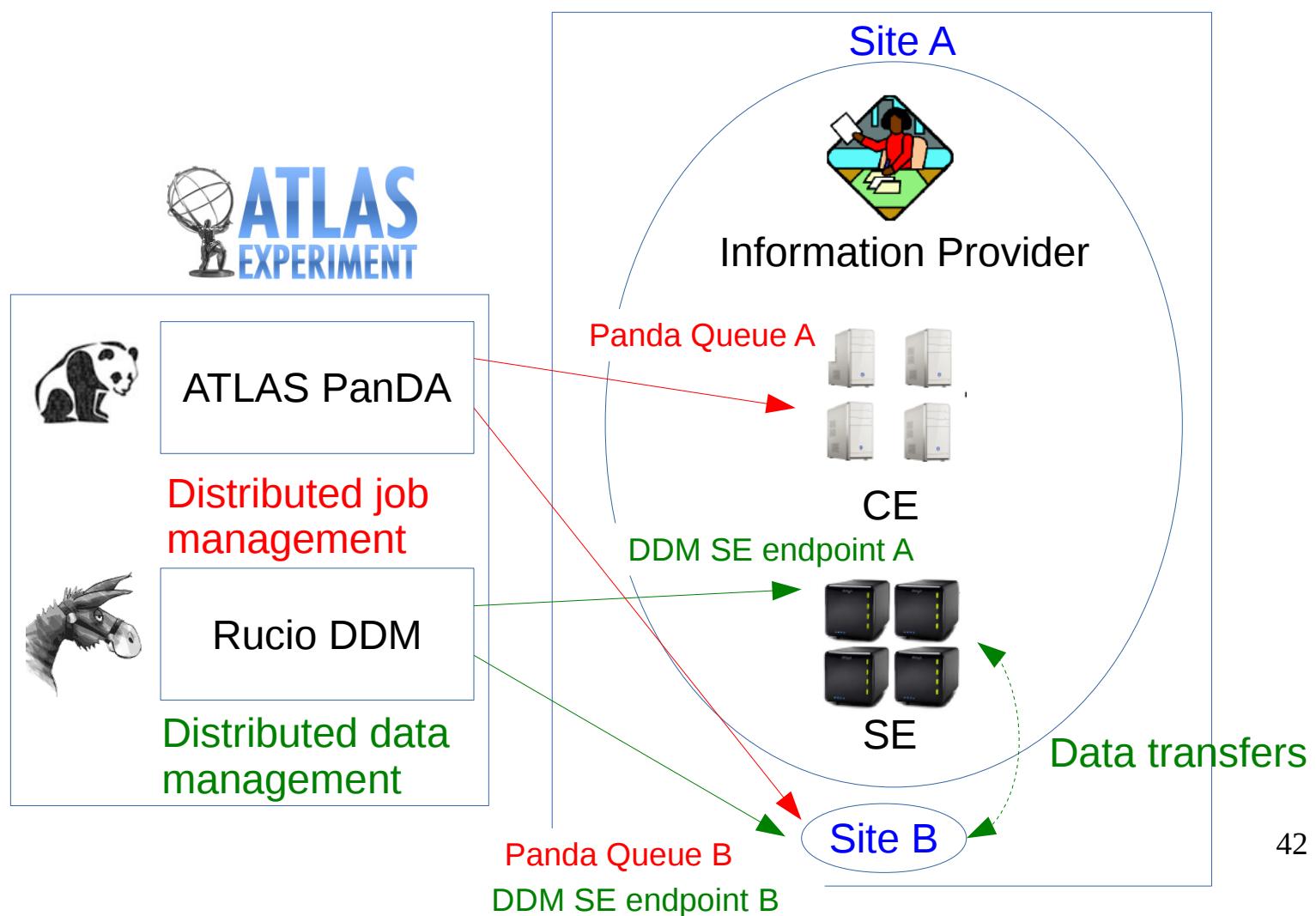


Grid job and data - 3



WLCG
Worldwide LHC Computing Grid

- How do they work?



ATLAS Resources - 1

- AGIS (ATLAS Grid Information System)
 - <http://atlas-agis.cern.ch/agis/>

ATLAS Grid Information System			
RC Site	ATLASSite	DDMEndpoint	PANDA Queue
Service	Central Services	DDM Groups	Docs
<ul style="list-style-type: none">▪ Define RC site▪ Define Experiment site▪ Define DDM endpoint▪ Define OS RSE endpoint (new implementation)▪ Define PANDA site▪ Define PANDA queue▪ RC pledges▪ Find DDM endpoints links▪ Find TransferMatrix links	<ul style="list-style-type: none">▪ Define OS service▪ Define LFC service▪ Define SE service▪ Define CE service▪ Define Redirector service▪ Define PerfSonar service▪ Define Frontier service▪ Define Squid service▪ Define Central service▪ SE protocols (DDM/Panda activities)	<ul style="list-style-type: none">▪ Cron list▪ ADMINs list▪ Changes log▪ Request ADMIN privileges	<ul style="list-style-type: none">▪ Main TWiki▪ TWiki WEBUI instructions▪ API Docs
DOWNTIMES	TOACACHE EXPORT	COMPARISON & VALIDATION TOOLS	
<ul style="list-style-type: none">▪ Downtime calendar▪ DDM Blacklisting data▪ PANDA Blacklisting data	<ul style="list-style-type: none">▪ dynamic ToACache (changes are immediately propagated): http://atlas-agis-api.cern.ch/request/toacache/TiersOfATLASCache.py▪ static ToACache: http://atlas-agis-api.cern.ch/ToACache/TiersOfATLASCache.py▪ previous caches: http://atlas-agis-api.cern.ch/ToACache/cache/<ul style="list-style-type: none">▪ ToACache with Extra data▪ View/Modify ToACache ExtraData (RSE integration)	<ul style="list-style-type: none">▪ Consistency checker▪ ToAComparator▪ AGIS-BDII CE comparison▪ AGIS-Schedconf-PF mon CE comparison▪ AGIS-DIMGOCDB sites+services comparison▪ AGIS-PANDA PandaResource+SWReleases comparison▪ AGIS-Schedconfig (topology) comparison▪ AGIS-Schedconfig JSON comparison▪ AGIS-GSR services comparison	

ATLAS Resources - 2

- PanDA queue end points

ATLAS Grid Information System

RC Site	ATLASSite	DDMEndpoint	PANDA Queue	Service	Central Services	DDM Groups	PandaQueue combined resources						Docs	TWiki	OLD	JSON						
Show 200 entries				First	Previous	1	Next	Last														
give me url of this page hold shift click column for Multi-column ordering															Status	Manual	HC	Switcher	Panda Integration	CLOUD	TIER	
atlas			FZK						ACTIVE													
VO name	▲	ATLAS Site	▲	PanDA Site	▲	Template object	▲	PanDA Resource	▲	PanDA Queue	▲	state	▲	(current) status	▲	type	▲	capability	▲	CLOUD	▲	TIER
atlas		FZK-LCG2		FZK-LCG2		FZK-LCG2_VIRTUAL		ANALY_FZK		Clone ANALY_FZK		ACTIVE		online		analysis		score		DE		T1
atlas		FZK-LCG2		FZK-LCG2		FZK-LCG2_VIRTUAL		ANALY_FZK_HI		Clone ANALY_FZK_HI		ACTIVE		online		analysis		score		DE		T1
atlas		FZK-LCG2		FZK-LCG2		FZK-LCG2_VIRTUAL		ANALY_FZK_SHORT		Clone ANALY_FZK_SHORT		ACTIVE		online		analysis		score		DE		T1
atlas		FZK-LCG2		FZK-LCG2		FZK-LCG2_VIRTUAL		FZK-LCG2		Clone FZK-LCG2-all-prod-CEs		ACTIVE		online		production		score		DE		T1
atlas		FZK-LCG2		FZK-LCG2		FZK-LCG2_VIRTUAL		FZK-LCG2_HIMEM		Clone FZK-LCG2_HIMEM		ACTIVE		online		production		himem		DE		T1
atlas		FZK-LCG2		FZK-LCG2		FZK-LCG2_VIRTUAL		FZK-LCG2_MCORE		Clone FZK-LCG2_MCORE		ACTIVE		online		production		mcose		DE		T1
atlas		FZK-LCG2		FZK-LCG2		FZK-LCG2_VIRTUAL		FZK-LCG2_MCORE_HI		Clone FZK-LCG2_MCORE_HI		ACTIVE		online		production		mcose		DE		T1
atlas		FZK-LCG2		FZK-LCG2		FZK-LCG2_VIRTUAL		FZK-LCG2_MCORE_LO		Clone FZK-LCG2_MCORE_LO		ACTIVE		online		production		mcose		DE		T1

Active PanDA (job) queues
ANALY_ = Analysis queue

ATLAS Resources - 3

- DDM end points

ATLAS Grid Information System

RC Site ATLASTSite **DDMEndpoint** PANDA Queue Service Central Services DDM Groups **DDM Endpoints** Docs TWiki OLD JSON

Show 200 entries **FZK** First Previous 1 Next Last

give me url of this page hold shift + click column for Multi-column ordering

DDM Endpoint	State	DDM Site	ATLAS Site	ATLAS TIER	CLOUD	type	Full Endpoint	FTS Master	FTS Test
FZK-LCG2_DATADISK	ACTIVE	FZK-LCG2	FZK-LCG2	T1	DE	DATADISK	token:ATLASDATADISK:srm://atlassrm-fzk.gridka.de:8443/srm/managerv2?SFN=/pnfs/gridka.de/atlas/disk-only/atlasdatadisk/	CERNFTS3_REST https://fts3.cern.ch:8446	CERNFTS3PILOT_REST https://fts3-pilot.cern.ch:8446
FZK-LCG2_DATATAPE	ACTIVE	FZK-LCG2	FZK-LCG2	T1	DE	DATATAPE	token:ATLASDATATAPE:srm://atlassrm-fzk.gridka.de:8443/srm/managerv2?SFN=/pnfs/gridka.de/atlas/atlasdatatape/	CERNFTS3_REST https://fts3.cern.ch:8446	CERNFTS3PILOT_REST https://fts3-pilot.cern.ch:8446
FZK-LCG2_GROUPTAPE_PERF-EGAMMA	ACTIVE	FZK-LCG2	FZK-LCG2	T1	DE	GROUPTAPE	token:ATLASMCTAPE:srm://atlassrm-fzk.gridka.de:8443/srm/managerv2?SFN=/pnfs/gridka.de/atlas/atlasgrouptape/perf-egamma/	CERNFTS3_REST https://fts3.cern.ch:8446	CERNFTS3PILOT_REST https://fts3-pilot.cern.ch:8446
FZK-LCG2_LOCALGROUPDISK	ACTIVE	FZK-LCG2	FZK-LCG2	T1	DE	LOCALGROUPDISK	token:ATLASLOCALGROUPDISK:srm://dgridsrm-fzk.gridka.de:8443/srm/managerv2?SFN=/pnfs/gridka.de/datas/atlaslocalgroupdisk/	CERNFTS3_REST https://fts3.cern.ch:8446	CERNFTS3PILOT_REST https://fts3-pilot.cern.ch:8446
FZK-LCG2_LOCALGROUPTAPE	ACTIVE	FZK-LCG2	FZK-LCG2	T1	DE	LOCALGROUPTAPE	token:ATLASLOCALGROUPTAPE:srm://dgridsrm-fzk.gridka.de:8443/srm/managerv2?SFN=/pnfs/gridka.de/datas/atlaslocalgrouptape/	CERNFTS3_REST https://fts3.cern.ch:8446	CERNFTS3PILOT_REST https://fts3-pilot.cern.ch:8446
FZK-LCG2_MCTAPE	ACTIVE	FZK-LCG2	FZK-LCG2	T1	DE	MCTAPE	token:ATLASMCTAPE:srm://atlassrm-fzk.gridka.de:8443/srm/managerv2?SFN=/pnfs/gridka.de/atlas/atlasmctape/	CERNFTS3_REST https://fts3.cern.ch:8446	CERNFTS3PILOT_REST https://fts3-pilot.cern.ch:8446
FZK-LCG2_PERF-EGAMMA	ACTIVE	FZK-LCG2	FZK-LCG2	T1	DE	GROUPDISK	token:ATLASDATADISK:srm://atlassrm-fzk.gridka.de:8443/srm/managerv2?SFN=/pnfs/gridka.de/atlas/disk-only/atlasgroupdisk/perf-egamma/	CERNFTS3_REST https://fts3.cern.ch:8446	CERNFTS3PILOT_REST https://fts3-pilot.cern.ch:8446
FZK-LCG2_PERF-IDTRACKING	ACTIVE	FZK-LCG2	FZK-LCG2	T1	DE	GROUPDISK	token:ATLASDATADISK:srm://atlassrm-fzk.gridka.de:8443/srm/managerv2?SFN=/pnfs/gridka.de/atlas/disk-only/atlasgroupdisk/perf-idtracking/	CERNFTS3_REST https://fts3.cern.ch:8446	CERNFTS3PILOT_REST https://fts3-pilot.cern.ch:8446
FZK-LCG2_PERF-TAU	ACTIVE	FZK-LCG2	FZK-LCG2	T1	DE	GROUPDISK	token:ATLASDATADISK:srm://atlassrm-fzk.gridka.de:8443/srm/managerv2?SFN=/pnfs/gridka.de/atlas/disk-only/atlasgroupdisk/perf-tau/	CERNFTS3_REST https://fts3.cern.ch:8446	CERNFTS3PILOT_REST https://fts3-pilot.cern.ch:8446
FZK-LCG2_PPSSCRATCHDISK	ACTIVE	FZK-LCG2	FZK-LCG2	T1	DE	SPECIAL	token:ATLASPPSSCRATCHDISK:srm://ppssrm-kit.gridka.de:8443/srm/managerv2?SFN=/pnfs/gridka.de/atlas/atlasppsscratchdisk/	CERNFTS3_REST https://fts3.cern.ch:8446	
FZK-LCG2_SCRATCHDISK	ACTIVE	FZK-LCG2	FZK-LCG2	T1	DE	SCRATCHDISK	token:ATLASSCRATCHDISK:srm://atlassrm-fzk.gridka.de:8443/srm/managerv2?SFN=/pnfs/gridka.de/atlas/disk-only/atlasscratchdisk/	CERNFTS3_REST https://fts3.cern.ch:8446	CERNFTS3PILOT_REST https://fts3-pilot.cern.ch:8446

Showing 1-11 of 11 entries

Active DDM storage end points

ATLAS Resources - 4

- **SCRATCHDISK** (Tier1 + Tier2s in Germany)
 - FZK-LCG2_SCRATCHDISK
 - DESY-HH_SCRATCHDISK
 - DESY-ZN_SCRATCHDISK
 - LRZ-LMU_SCRATCHDISK
 - WUPPERTALPROD_SCRATCHDISK
 - UNI-FREIBURG_SCRATCHDISK
 - GOEGRID_SCRATCHDISK
- **LOCALGROUPDISK** (e.g. DESY-HH and UniGoettingen)
 - DESY-HH_LOCALGROUPDISK
 - GOEGRID_LOCALGROUPDISK
 - _LOCALGROUPDISK

ATLAS Resources - 4

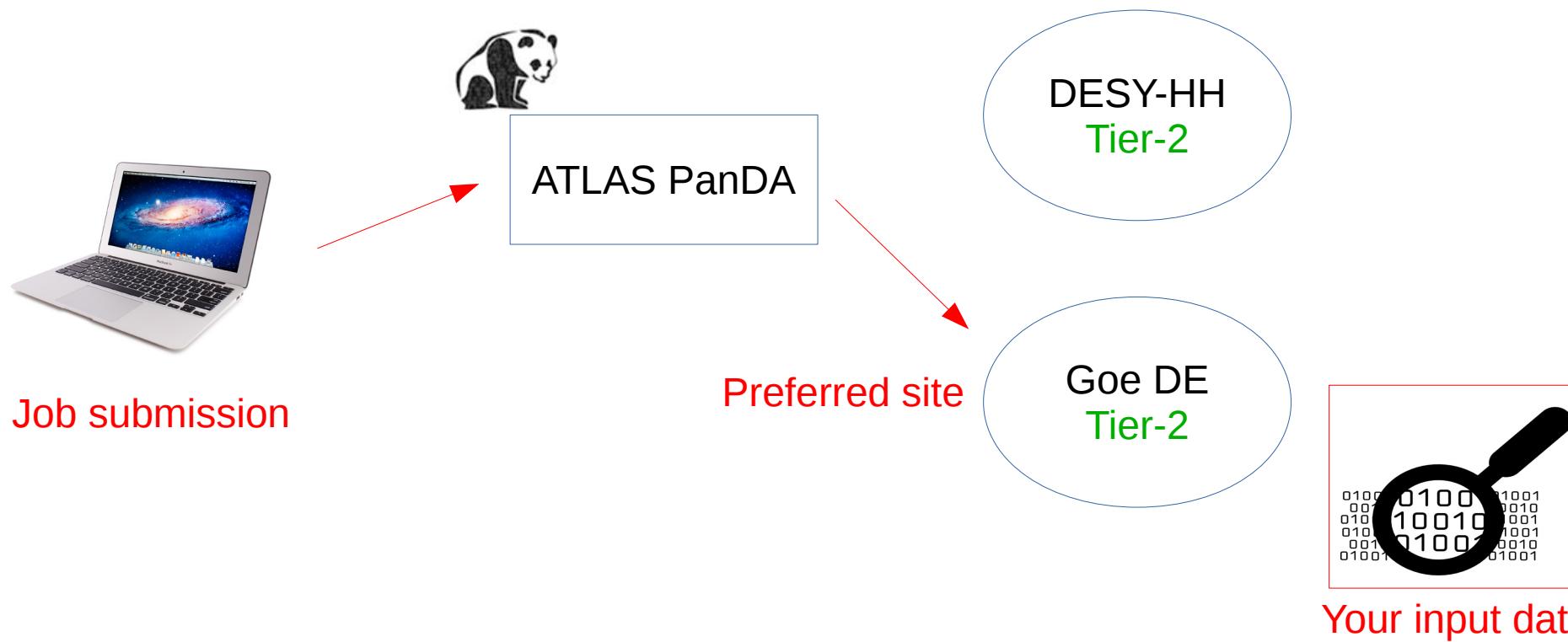
- **SCRATCHDISK** (Tier1 + Tier2s in Germany)
 - FZK-LCG2_SCRATCHDISK
 - DESY-HH_SCRATCHDISK
 - DESY-ZN_SCRATCHDISK
 - LRZ-LMU_SCRATCHDISK
 - WUPPERTALPROD_SCRATCHDISK
 - UNI-FREIBURG_SCRATCHDISK
 - GOEGRID_SCRATCHDISK

Storages for temporary data of PanDA jobs. Would be automatically ***REMOVED!***
- **LOCALGROUPDISK** (e.g. DESY-HH and UniGoettingen)
 - DESY-HH_LOCALGROUPDISK
 - GOEGRID_LOCALGROUPDISK
 - _LOCALGROUPDISK

Permanently ***KEPT.*** Generally speaking, in total a few hundred TB in each site

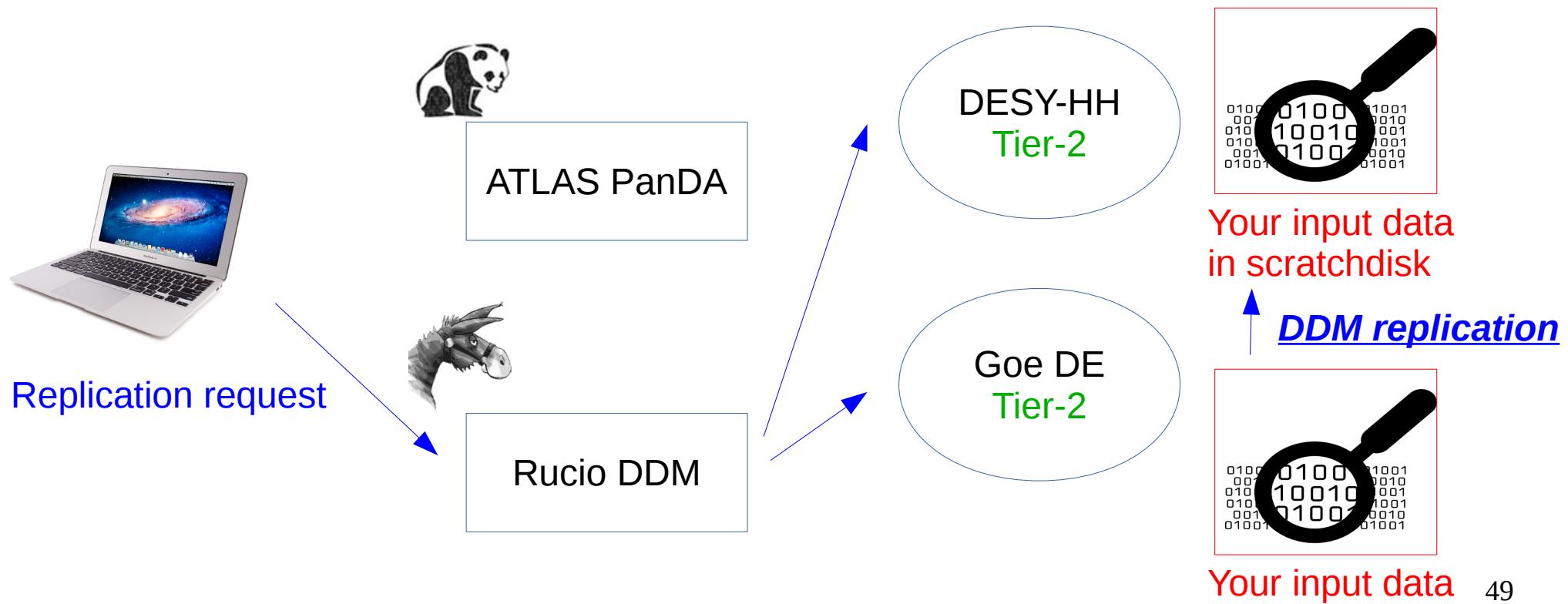
ATLAS Resources - 5

- A tip: User job allocation policy among sites
 - Rule: Grid jobs (should) go to their data locations



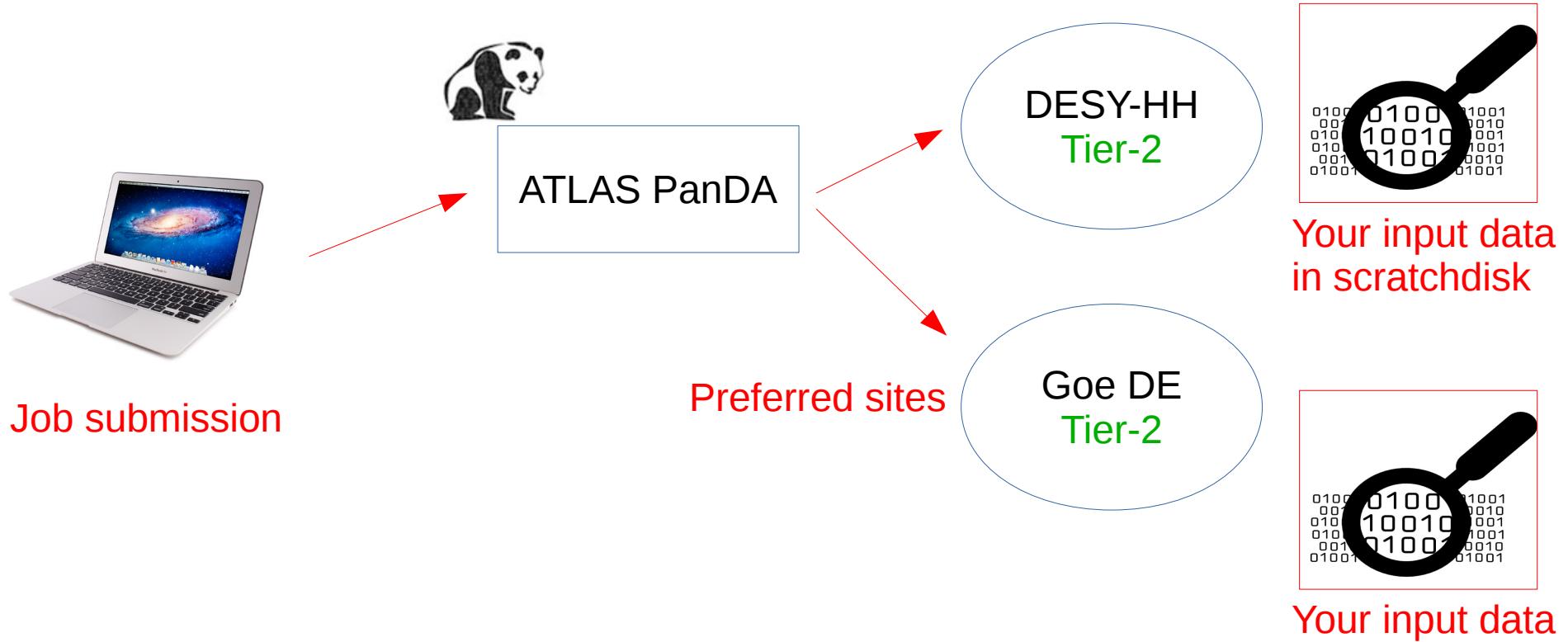
ATLAS Resources - 5

- A tip: User job allocation policy among sites
 - Rule: Grid jobs (should) go to their data locations



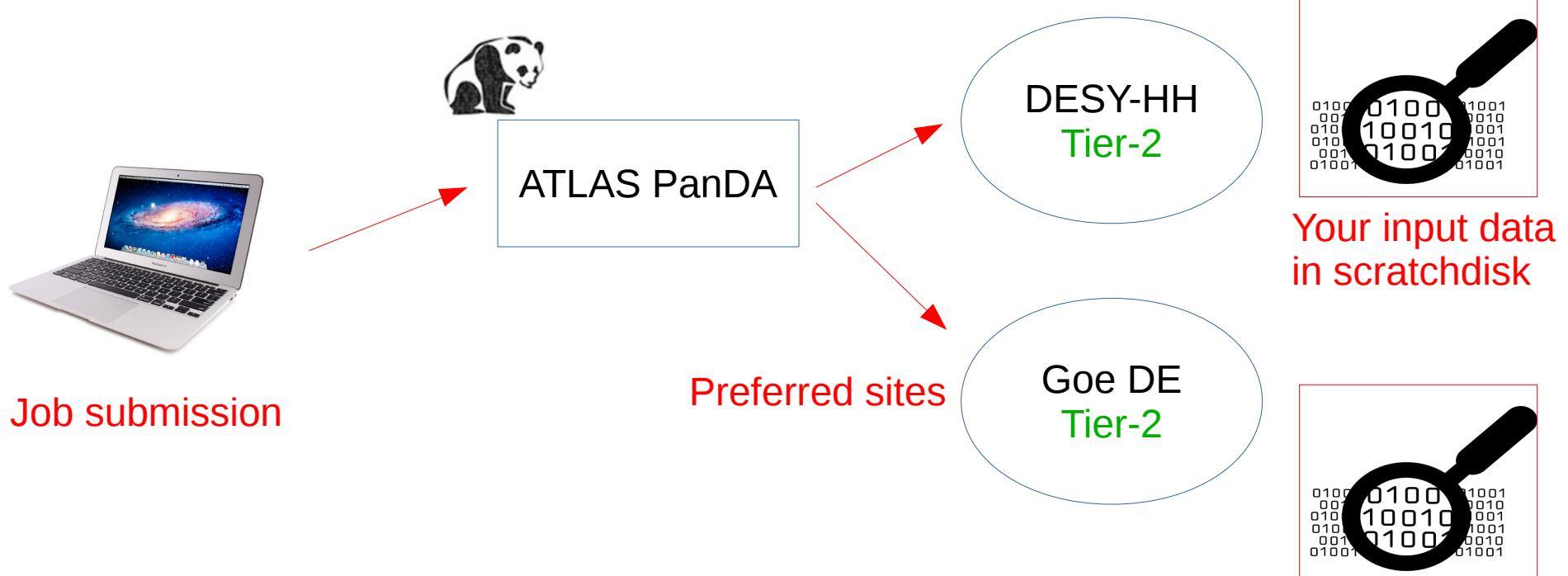
ATLAS Resources - 5

- A tip: User job allocation policy among sites
 - Rule: Grid jobs (should) go to their data locations



ATLAS Resources - 5

- A tip: User job allocation policy among sites
 - Rule: Grid jobs (should) go to their data locations

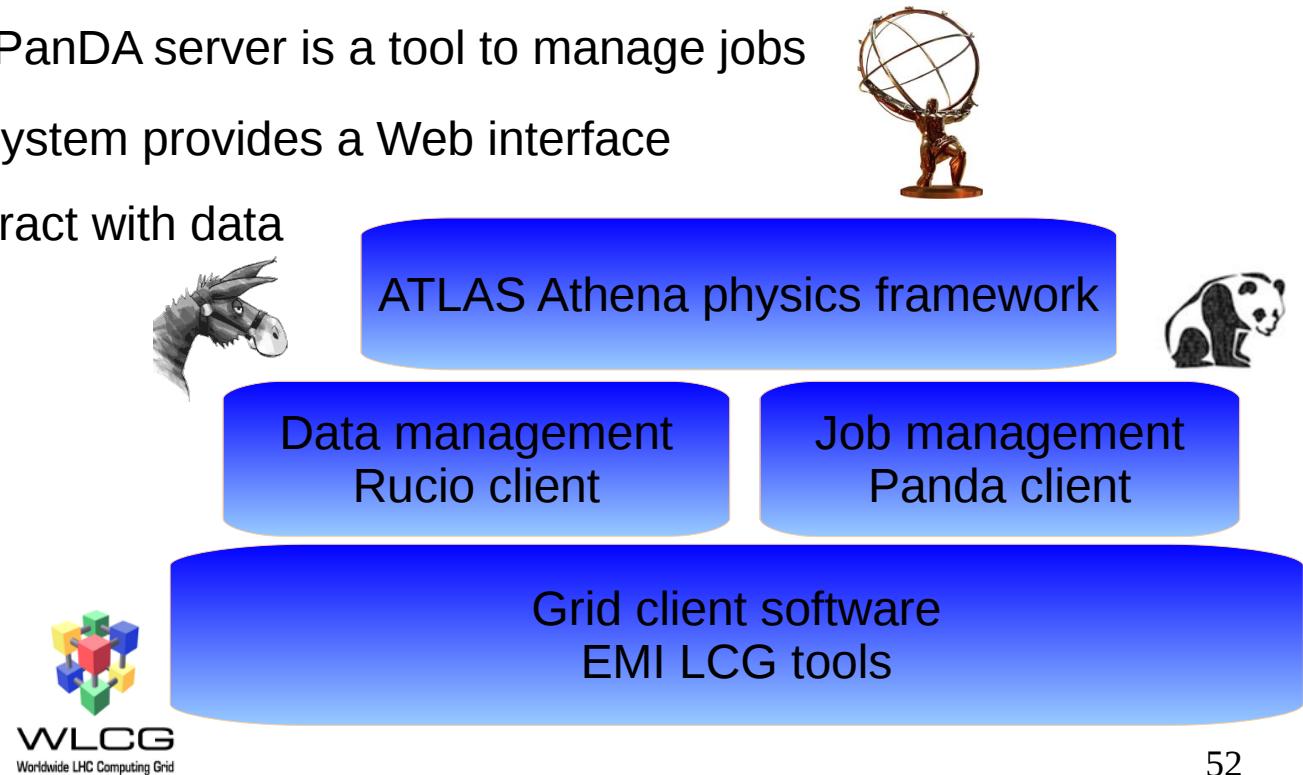


Local access is better than remote access
(or to avoid an error in PanDA, “local data does not exist”)

Grid User Interface and CVMFS

- Grid client software originally supported by *European Middleware Initiative* (EMI)
- CVMFS is a remote repository using FUSE file system
 - e.g. /cvmfs/atlas.cern.ch → A repository of all client software we need
 - Internally using HTTP → Need of network access
- Panda client using ATLAS PanDA server is a tool to manage jobs
 - BigPanda monitoring system provides a Web interface
- Rucio client is a tool to interact with data

Just try it out!



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
```

```
GlueSEAccessProtocolEndpoint: gsiftp://dcache-door-atlas12.desy.de:2811
```

```
GlueSEAccessProtocolType: gsiftp
```

```
## Connecting to DESY-HH SE via GridFTP protocol
```

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

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

ATLAS PanDA Dash ▾ Tasks ▾ Jobs ▾ Errors ▾ **Users ▾** Sites ▾ Incidents ▾ Search

ATLAS PanDA monitor home

Global concurrent running job core counts, all sites, all job types, by cloud, last 1, 7, 30 days

Slots of Running Jobs
24 Hours from 2015-01-11 17:00 to 2015-01-12 17:39 UTC

Slots of Running Jobs
7 Days from 2015-01-05 to 2015-01-12

Slots of Running Jobs
30 Days from 2014-12-17 to 2015-01-12

Global concurrent running job core counts, all sites, all job types, by activity, last 1, 7, 30 days

Slots of Running Jobs
24 Hours from 2015-01-11 17:00 to 2015-01-12 17:39 UTC

Slots of Running Jobs
7 Days from 2015-01-05 to 2015-01-12

Slots of Running Jobs
30 Days from 2014-12-17 to 2015-01-12

Prodsys ▾ Services ▾ VO ▾ Help ▾

aipanda054 @ 13:43, cache 3'

➤ <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

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	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)

Job attribute summary Sort by count, alpha	
atlasrelease (1)	Atlas-17.2.7 (11)
attemptnr (1)	1 (10)
cloud (1)	DE (11)
computingsite (1)	ANALY_FMPhi-UNIBA (11)
destinationse (1)	ANALY_FMPhi-UNIBA (1)
homepackage (1)	AnalysisTransforms-AtlasPhysics_17.2.7.4.1 (11)
inputfileproject (1)	data11_7TeV (10)
inputfiletype (1)	AOD (10)
jeditaskid (1)	4635475 (11)
jobsetid (1)	6 (11)
jobstatus (2)	defined (10) running (1)
outputfiletype (1)	? (11)
priorityrange (3)	900:999 (6) 1000:1099 (4) 2000:2099 (1)
processingtype (1)	panda-client-0.5.42-jedi-athena (11)
prodsourcelabel (2)	panda (1) user (10)
produsername (1)	andrew washbrook (11)
reqid (1)	6 (11)
specialhandling (1)	ddm:rucio (11)
transformation (2)	buildJob-00-00-03 (1) runAthena-00-00-12 (10)

➤ <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

Job list Sort by Pandaid, ascending mod time, descending mod time, priority, attemptnr, 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	Priority	
2354305514 Attempt 0	andrew washbrook	6 4635475	buildJob-00-00-03	running	2015-01-09 15:48	0:0:16	0:0:19	01-09 15:49	DE ANALY_FMPhi-UNIBA	2000	

Task Monitoring (3)

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				
								10			1							

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

➤ <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

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
```

Rucio (ATLAS data management system)

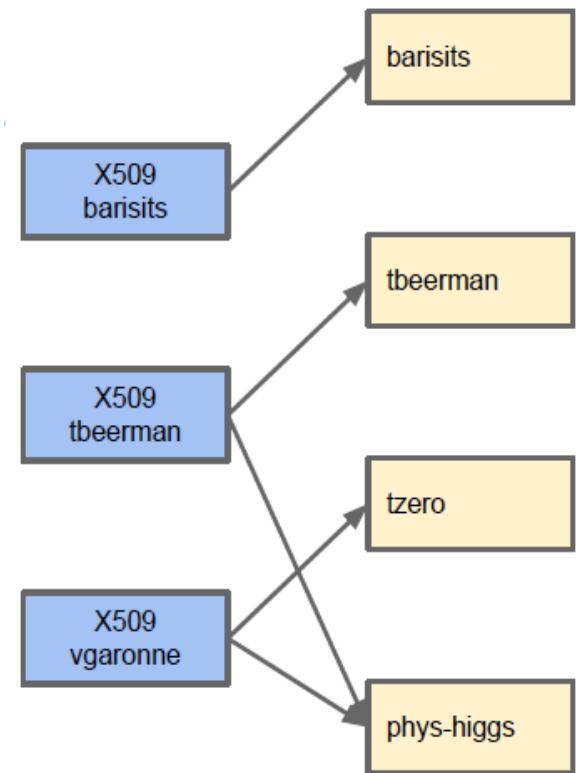


Basic concepts - 1

- A replacement of Data Management System for Run-2 in ATLAS distributed computing system
 - Old one was “DQ2”
 - DQ2 will be completely removed in December, 2016
- Used to download outputs of Grid jobs, moving data and searching for them
- Rucio CLI tools from CVMFS
 - Web interface provides similar functionality

Basic concepts - 2

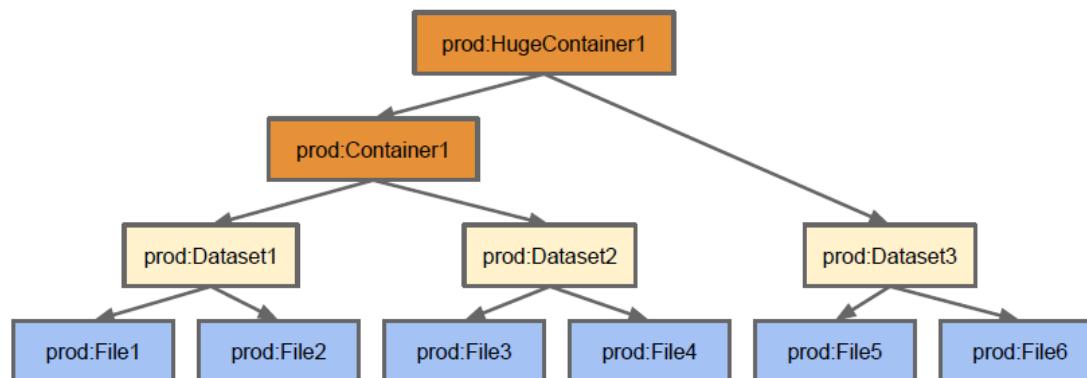
- Accounts
 - A Rucio Account can represent users, groups (phys-susy) or activities (panda, tzero)
 - Quota and permissions are associated to an account
 - One can connect to a Rucio account using X509 certificates/proxies, Kerberos
 - One credential can be used to map to different accounts.



Basic concepts - 3

- Rucio namespace

- 3 types of Data Identifiers (DIDs): File, Datasets, Containers.
 - Dataset: Collection of Files
 - Containers: Collection of Datasets or Containers
- The namespace is divided using scopes. A name is unique within a scope but can be used in other scopes. A DID is identified by a scope and a name



Basic concepts - 4

- Rucio Storage Elements (RSEs)
 - Name for a storage endpoint in Rucio, e.g.: GOEGRID_LOCALGROUPDISK or CERN-PROD_DATADISK
 - Can be grouped using tags (e.g. tier=2, cloud=DE)
- Replication Rules
 - Define how to replicate Data Identifiers to Rucio Storage Elements
 - E.g.: Make one replica of dataset user.gen:my.dataset on DESY-HH_LOCALGROUPDISK
 - Using RSE expression: 2 replicas at cloud=DE&type=LOCALGROUPDISK (any German LOCALGROUPDISK)
 - Will create the minimum number of replicas to optimise storage space and minimise transfers

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
>>>>>>>>>>>>>>>> Information for user <<<<<<<<<<<<<<
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
lumiblocknr: 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-relicas 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-relicas data16_13TeV:data16_13TeV.00303819.physics_Main.merge.AOD.f716_m1620
```

SCOPE	NAME	FILESIZE	ADLER32	RSE: REPLICA
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

- You can get a local copy from Rucio RSEs

```
## Downloading a dataset to local disk
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
```

RSE expressions

- Rules can be created either with an exact RSE name or by using tags that are defined on an RSE, this is then called an RSE expression
 - Examples:
 - RSEs in German cloud: cloud=DE
 - LOCALGROUPDISKs in UK: country=UK&type=LOCALGROUPDISK
 - Any T2 in Italy but not INFN-NAPOLI: cloud=FR&tier=2\INFN-NAPOLI
 - More about this can be found in the Rucio documentation:
 - http://rucio.cern.ch/replication_rules_examples.html
- When using RSE expressions you can define a replication factor, so you can create multiple replicas for one datasets with one rule
- Also you can define the grouping of the data:
 - ALL: Rucio selects an RSE and all files will be copied to this RSE
 - DATASET: If there are multiple datasets Rucio will pick an RSE for each one and will copy all files in the same dataset to the same RSE
 - NONE: Rucio will pick a new RSE for every file, so that they spread over all available RSEs

RucioUI (WebUI)



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 browser



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

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, click [here](#) to take the [tour](#).

Approve rules

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

Official dataset:
data15_13TeV.00266904.physics_Main.merge.DAOD_SUSY1.
f594_m1435_p2361_tid05608871_00

User dataset:
user.jdoe:my.dataset.1

Enter if you have a dataset list

Wild card query by Rucio expression

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 Container Dataset

Show 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 2 3 4 5 ... 53 Next

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

metadata

User dataset:
user.jdoe:my.dataset.1

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)	BNL-OSG2_SCRATCHDISK	Check Quota
------------------	----------------------	-------------

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

Name	Remaining Quota	Total Quota
------	-----------------	-------------

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

Continue

2. Select Rucio Storage Elements (RSEs)

Please enter an RSE or an RSE expression.

RSE (expression)	BNL-OSG2_DATADISK	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** RSE expression Check Quota

List of RSEs

RSE	Remaining Quota	Total Quota
CSCS-LCG2_SCRATCHDISK	20 TB	20 TB
CYFRONET-LCG2_SCRATCHDISK	11 TB	11 TB
DESY_IH_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
IEPAS-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

Lifetime (in days). Leave empty for infinite lifetime.
15

Copies
1

Comment
For ATLAS-D

Create sample

Asynchronous Mode

Number of files

Continue

A grouping definition of how the replica will be distributed

Use if you select files randomly

Rucio UI: summary

- Before submission check rules

4. Summary					
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	Activity	Endpoint	State	Age	Load
gkawamur	Activity	RSE	Done	younger than 12 hours	Load

Rules

Data Type	Project	Stream	Get Link
			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	SLACRDXD_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

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>

Enjoy your hands-on exercise!