

Meeting with the communities

Belle II case

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May 29th , 2015
5th DIRAC user workshop@Ferrara

Outline



❧ Future DIRAC support

❧ Belle II specific features and development plans

❧ Belle II production system

Asking advice from experts

❧ Other topics

❧ Issues found from our DIRAC operation

❧ Bug reports

Future DIRAC support (1)



❧ LFC

- ❧ Currently fully supported by DMS.
- ❧ The lcgBundles tarball is provided so that python wrapper works.
- ❧ LFC has been a working solution for Belle II
- ❧ Belle II will keep using it in the coming years.
- ❧ We would like to ask DIRAC keeps LFC support for future.

Future DIRAC support (2)



☞ SL5

- ☞ DIRAC works, however, there is no lcgBundles prepared for SL5.
- ☞ We have to stick old version one year ago (potential security issue)
- ☞ KEK (~a few K cores) is still SL5 and seems to be difficult to use proxy services for the scale.
- ☞ We would like to know future support plan for SL5 (by the end of UMD support period)?
- ☞ How about gfal2?

Belle II specific features and plans

Belle II Production system

Management

Manage production workflows (controlled by UI and monitoring system)

Fabrication

Handle steering file to produce output events

Validation

Evaluate produced events

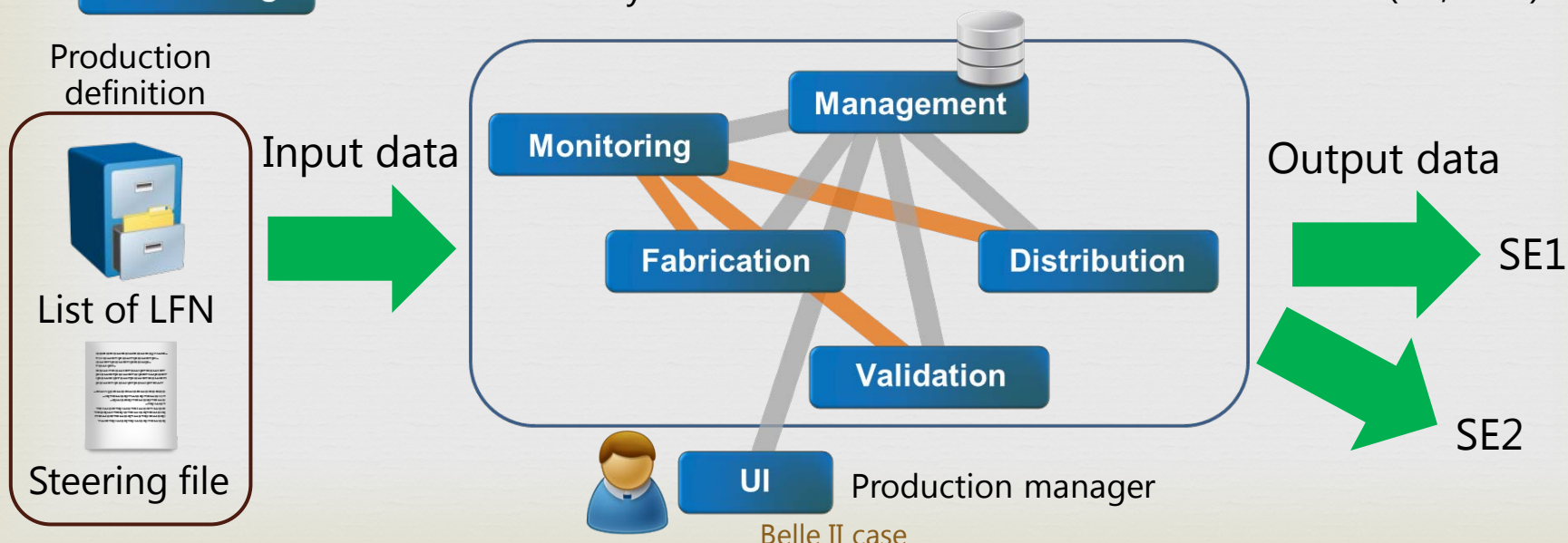
Distribution

Determine adequate output storage and transfer the output

Monitoring

Check each subsystem status as well as distributed resources (CE, SE...)

} A production



Belle II production system: Fabrication

☞ **Prototype**

- ☞ Automatic failure job rescheduling handled by Agent
 - ☞ Statistical summary of the failure reason is also calculated
- ☞ Problem
 - ☞ lose failure job information after rescheduling
 - ☞ Broken file / bad SE prevent from final job completion (since they occupy same LFN as the final job)

☞ **Plan**

- ☞ Not to reschedule job intentionally
- ☞ Manage revision number of each job (extend TransformationTask)
- ☞ Append suffix to each file (file.1 → file.2)

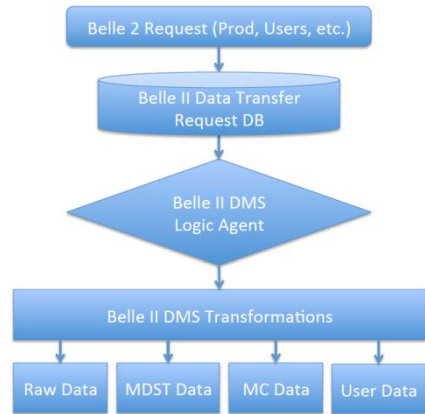
- ☞ Record production log file to archive DB

Belle II production system: Data distribution

Smart data distribution system for various data types

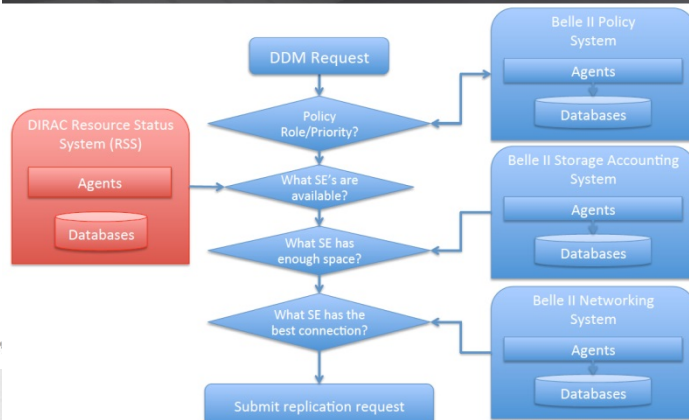
- Dynamic decision of destination SE based on data type and environment assessment

Belle II Top Level Logic Flow to DDM Based on Post DOE Workshop



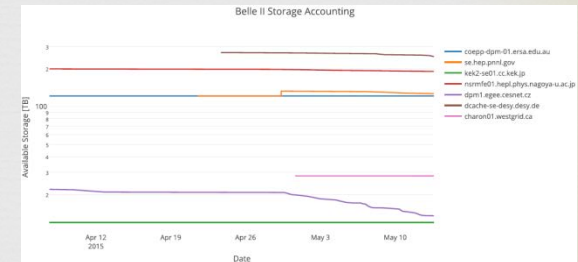
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Belle II DDM Logic Agent (Phase 1)

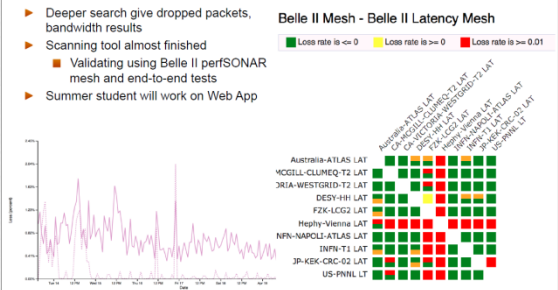


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SRM Accounting (Spacetoken)



Latency Mesh (perfSonar)



Data collectors have been developed

- Each data collector works well

Next goal: integration with DIRAC

- DB, Agent, ServiceHandler
- LogicAgent

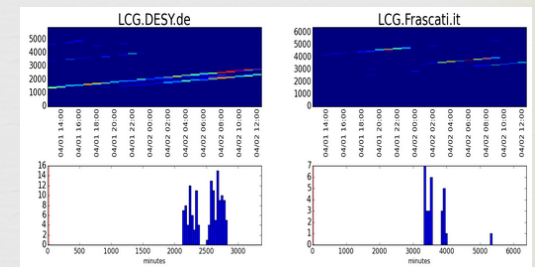
Belle II production system: Monitoring

- **Current system**

- Active Monitoring: Submit test jobs (SiteCrawler) to every Belle II sites
- Passive Monitoring: Access DIRAC API to retrieve system information
- The system is isolated from DIRAC

- **Plan**

- Further automatic diagnosis
- Integrate monitoring system with DIRAC
 - Test job feature goes to pilot-2
- Exploit RSS to control production workflow
 - Both workload and data distribution



Other Belle II specific features and plans

SE accounting

- Current development utilizes own DB and no ServiceHandler
- Plan to migrate AccountingDB so that visualization can be easily performed by Web portal.

SE access counter

- Counts number of data transfer per SE using JobParameter
 - Made time lag and heavy load to DIRAC server (JobStateUpdate)
 - It's better to access ServiceHandler directly than via JobParameter
 - Can DMS produce such information centrally?
 - (e.g. periodically report DMS activity per SE)
 - Any good idea?

JobID=12345, ApplicationStatus="Uploading", DestinationSE="UVic-SE"

JobID=12346, ApplicationStatus="Uploading", DestinationSE="Torino-SE"

...



{McGill-SE: 3, Torino-SE: 1, KEK2-DATA-SE: 4, Napoli-SE: 5, SIGNET-SE: 2, Napoli-DATA-SE: 1, DESY-DATA-SE: 5, PNNL-DEDICATED-SE: 7, UVic-SE: 4, UMiss-SE: 10, MPPMU-SE: 7, Pisa-SE: 12, CYFRONET-SE: 2, KEK-FailoverSE: 3, CNAF-SE: 11, DESY-SE: 26, CESNET-TMP-SE: 1, Frascati-SE: 1, KIT-SE: 1}

Other Belle II specific features and plans

☞ **gBast2 job wrapper integration with DIRAC**

- ☞ As I showed we have additional layer on DIRAC JobWrapper
 - ☞ Some modules are verbose (e.g. JobState)
 - ☞ Accounting is also imperfect
- ☞ Plan to extend JobWrapper so that we can combine job wrappers

☞ **DIRAC client installation via CVMFS**

- ☞ Very much nice feature!
- ☞ We would like to learn LHCb implementation

- ☞ How about getting CA/CRL from `/cvmfs/grid.cern.ch/` instead of BundleDelivery?

Issues: WMS



❧ **MatchingDelay with Site=ANY**

- ❧ MatchingDelay affects both site specific job (Site=AAA) and generic job (Site=ANY)
 - ❧ Due to behavior of TQDB.__generateNotSQL()
- ❧ Since SiteDirector refers Matcher, both pilot submission and payload matching are affected by the behavior
- ❧ As a result, number of "Site=ANY" job is quite unstable (sometimes SD submits pilot once per 6 hours)
- ❧ Practically it can be avoided if site specific queue (e.g. Site="AAA") exists in TQ
 - ❧ Dirty workaround to fill TQ by DIRC Agent

❧ **SiteDirector affected by Matcher**

- ❧ Related with the issue above, SD refers Matcher for pilot submission
- ❧ It means MatchingDelay is applied for SD
- ❧ Suggest to skip MatchingDelay for pilot submission

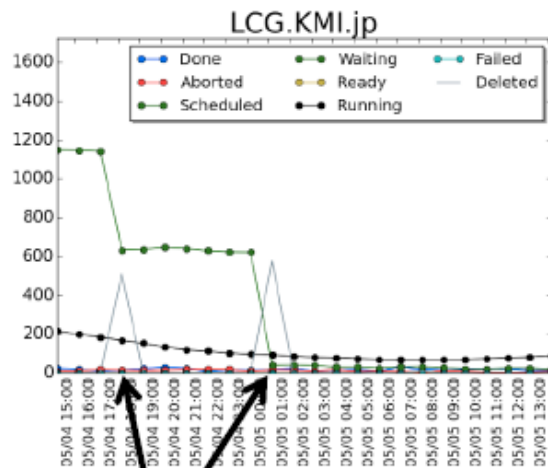
Issues: WMS

“Deleted” problem

By Kiyoshi Hayasaka and Yuji Kato

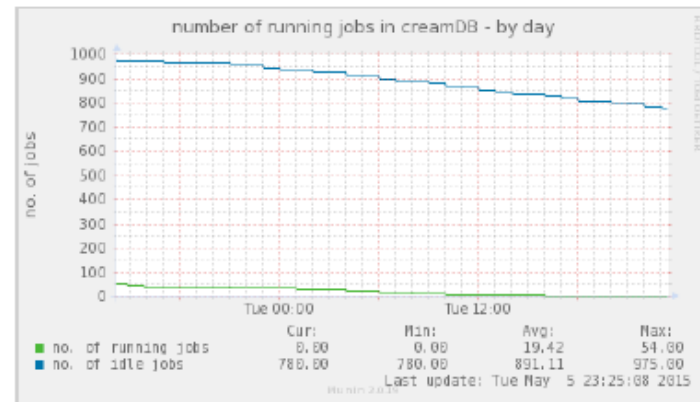
When pilot becomes ‘Deleted’, pilot is removed from PilotAgentDB while the job exists in the local batch.
Then, DIRAC submit jobs further and local batch queue is occupied by waiting jobs.
When status is changed to ‘Deleted’, job in local batch should be killed too.

of statuses taken from PilotAgentDB.



Jobs are deleted here and removed from PilotAgentDB.

of statuses taken from local batch system.



However, huge # of waiting job in local batch system.

Issues: WMS



❧ TaskQueue and sitemask

- ❧ When a bunch of jobs (Site=ANY) is registered with TaskQueue, sites not in sitemask never matches later, even if sitemask is updated.
- ❧ Is it possible to update "Site" in TaskQueue?

❧ ARC-CE

- ❧ Currently ARCComputingElement bundled with vanilla DIRAC doesn't support EMI-3 version of ARC client (3.0.3)
 - ❧ Could you support such additional versions as well as current one?
- ❧ Also our ARC-CE site requires to append following line to xrsi:
(Runtimeenvironment="ENV/PROXY")
 - ❧ Is it possible to add such configuration through CS?
- ❧ WMSAdministrator and SiteDirector need to run on same machine due to joblist file. Can you store it on DB so that the deployment is portable?

Issues: WMS



❧ SiteDirector

- ❧ Sometimes attempt job submission even if the previous failure reason is trivial (e.g. slot is closed)
- ❧ How about to parse some obvious reasons?

❧ OSG-CE

- ❧ Previously its software stack was obsoleted and not supported
- ❧ Recently they are updated.
- ❧ Do you have a plan to support direct OSG-CE submission instead of gLite WMS?

❧ SSH-CE

- ❧ Each time scp transfers remote script to head node. It is not negligible for small sites (whose network is not good)
- ❧ Firewall could judge "attacked" → ssh multiplexing (suggested by Kiyoshi Hayasaka)
- ❧ Furthermore it is rare but several times file system was overloaded by such frequent file transfer.

Issues: WMS



Job monitoring

- ✧ We just wonder why memory information is not taken from each process but entire node (/usr/bin/free)
- ✧ We plan to implement memory checker for specific process, however, we could appreciate it if the functionality is implemented by vanilla DIRAC...
- ✧ Is it possible to leave memory profile? Sometimes it is beneficial for error diagnosis

```
#####  
def getMemoryUsed(self):  
    """Obtains the memory used.  
    """  
    result = S_OK()  
    comm = '/usr/bin/free'  
    memDict = shellCall(5,comm)  
    if memDict['OK']:  
        mem = string.split(memDict['Value'])[1] [8]  
        result['Value'] = float(mem)  
    else:  
        result = S_ERROR('Could not obtain memory used')  
        self.log.warn('Could not obtain memory used')  
        result['Value'] = 0  
    return result
```

Issues: DMS



File ownership

- When a job uploads a file to SE, the data transfer is performed by job owner's proxy
- In most case DMS operation utilizes DMS shifter proxy, right?
- The behavior difference sometimes bring file permission trouble unless site ACL is not carefully configured.
- What is DIRAC policy / suggestion to manage file ownership?

PFN definition of DIRAC-SE

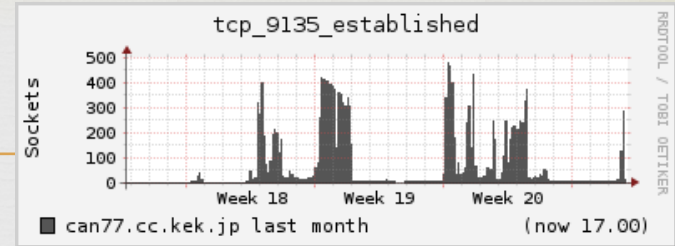
- When we store one file on DIRAC-SE, FileCatalog gives LFN as PFN (i.e. no protocol)
- Is it collect behavior? What's best way to identify the file?

FileCatalog.getReplicas()

```
{'OK': True, 'Value': {'Successful': {'/belle/user/hideki/hogehoge/hoge1.root': {'KEK2-TMP-SE': 'srm://kek2-se01.cc.kek.jp/belle/TMP/belle/user/hideki/hogehoge/hoge1.root', 'KEK-FailoverSE': '/belle/user/hideki/hogehoge/hoge1.root'}}, 'Failed': {}}}
```

```
% dirac-dms-lfn-accessURL /belle/user/hideki/hogehoge/hoge1.root KEK2-TMP-SE  
{'Failed': {}, 'Successful': {'/belle/user/hideki/hogehoge/hoge1.root': 'file:///ghi/fs01/belle/grid/storm/TMP/belle/user/hideki/hogehoge/hoge1.root'}}  
% dirac-dms-lfn-accessURL /belle/user/hideki/hogehoge/hoge1.root KEK-FailoverSE  
{'Failed': {}, 'Successful': {'/belle/user/hideki/hogehoge/hoge1.root': 'dips://dirac1.cc.kek.jp:9149/DataManagement/StorageElement?=/belle/user/hideki/hogehoge/hoge1.root'}}
```


Issues: CS



☞ Recently we were suffered from heavy CS access

☞ Sometimes result in following errors

2015-05-20 05:03:55 UTC Configuration/Server ERROR: Error processing proposal Error while sending: (32, 'Broken pipe')

...

...

2015-05-20 05:04:02 UTC Configuration/Server ERROR: Error processing proposal Socket write timeout exceeded

☞ Have you seen such errors? Any suggestion to solve the issue?

☞ Tentatively increased CS instances on each server

☞ Maybe access to CS is too much. Is it possible to access CS through http (i.e. caching?)

Issues: RSS



❧ Job draining mode

- ❧ When down time is announced by GOCDDB, one wants to drain jobs sufficiently before the DT.
- ❧ However, currently the site is just removed from the sitemask, right?
- ❧ We appreciate it if we can gracefully drain jobs (e.g. stop job matching and pilot submission, while job execution is continued)

Issues: logging



- ☞ **Sometimes DIRAC reports a trouble, but doesn't record how it is recovered.**
 - ☞ E.g. CS access failure, and then goes to other server
- ☞ **People may be confused from the log file**
 - ☞ How about logging also "Succeed" trial?

```
2015-05-24 18:28:15 UTC Wrapper_16758431/Watchdog INFO: 2015-05-24 16:58:08 UTC dirac-jobexec/BelleScript INFO: Command is:
/home/belleprd/home_cr004_070346532/CREAM070346532/DIRAC_Gy1QDrpilot/16758431/basf2helper.py mc46_generic3_ssbar_BGx1_fab-1.py build-2015-02-
09 mc46_generic3_ssbar_BGx1_fab
2015-05-24 18:29:52 UTC Wrapper_16758431 WARN: Can't update from server Error while updating from dips://dirac4.cc.kek.jp:9135/Configuration/Server:
Exception while reading from peer: (-1, 'Unexpected EOF')
2015-05-24 18:58:16 UTC Wrapper_16758431/Watchdog INFO: LoadAvg: 12.35 MemUsed: 56122876.0 kb Job Vsize: 1872384.0 kb Job RSS: 179304.0 kb
DiskSpace: 1423255.0 MB CPU: 01:40:53 (h:m:s) WallClock: 7209.79 s
2015-05-24 18:58:16 UTC Wrapper_16758431/Watchdog INFO: Checking CPU Consumed
```

Summary



Backup



Issues: WMS



❧ MatchingDelay with Site=ANY

❧ Site = ANY = AAA or BBB or CCC

❧ $!(AAA \text{ or } BBB \text{ or } CCC) = !AAA \text{ and } !BBB \text{ and } !CCC$

❧ Imply Site=ANY is affected by all of negative conditions

❧ Even if a pilot is submitted at Site=BBB, it is vetoed if other pilot was submitted to Site=AAA just before

❧ Same for payload matching

❧ As a result, job execution for Site=ANY is quite opportunistic

❧ Workaround: to fill TQ by Site=BBB job (at least pilot can be submitted)

❧ Payload is still affected (afak)

Matcher with Delayed Matching



Delayed Matching

- Useful to prevent SE overload
- However many pilots are wasted after the delay
- It increases both site and server loads
- Do you have any idea to reduce wasted pilots under delayed matching configuration?

PilotJobRefer...	Status	Site	ComputingEl...	Broker	CurrentJobID	OwnerGroup	LastUpdateTime [L
https://recasn...	Done	LCG.Napoli.it	recasna-ce01...	can66.cc.kek.jp	-	belle_pilot	2015-03-19 04:25
https://recasn...	Done	LCG.Napoli.it	recasna-ce01...	can66.cc.kek.jp	14892866	belle_pilot	2015-03-19 05:04
https://recasn...	Done	LCG.Napoli.it	recasna-ce01...	can66.cc.kek.jp	-	belle_pilot	2015-03-19 04:25
https://recasn...	Done	LCG.Napoli.it	recasna-ce01...	can66.cc.kek.jp	-	belle_pilot	2015-03-19 04:27
https://recasn...	Done	LCG.Napoli.it	recasna-ce01...	can66.cc.kek.jp	-	belle_pilot	2015-03-19 04:30
https://recasn...	Done	LCG.Napoli.it	recasna-ce01...	can66.cc.kek.jp	-	belle_pilot	2015-03-19 04:26
https://recasn...	Done	LCG.Napoli.it	recasna-ce01...	can66.cc.kek.jp	14900539	belle_pilot	2015-03-19 06:06
https://recasn...	Done	LCG.Napoli.it	recasna-ce01...	can66.cc.kek.jp	14896288	belle_pilot	2015-03-19 05:52
https://recasn...	Done	LCG.Napoli.it	recasna-ce01...	can66.cc.kek.jp	-	belle_pilot	2015-03-19 04:26
https://recasn...	Done	LCG.Napoli.it	recasna-ce01...	can66.cc.kek.jp	14888619	belle_pilot	2015-03-19 05:03
https://recasn...	Done	LCG.Napoli.it	recasna-ce01...	can66.cc.kek.jp	-	belle_pilot	2015-03-19 04:30
https://recasn...	Done	LCG.Napoli.it	recasna-ce01...	can66.cc.kek.jp	14891168	belle_pilot	2015-03-19 05:04
https://recasn...	Done	LCG.Napoli.it	recasna-ce01...	can66.cc.kek.jp	-	belle_pilot	2015-03-19 04:30
https://recasn...	Done	LCG.Napoli.it	recasna-ce01...	can66.cc.kek.jp	-	belle_pilot	2015-03-19 04:26
https://recasn...	Done	LCG.Napoli.it	recasna-ce01...	can66.cc.kek.jp	14895662	belle_pilot	2015-03-19 05:37
https://recasn...	Done	LCG.Napoli.it	recasna-ce01...	can66.cc.kek.jp	14897336	belle_pilot	2015-03-19 05:51
https://recasn...	Done	LCG.Napoli.it	recasna-ce01...	can66.cc.kek.jp	14891925	belle_pilot	2015-03-19 05:06
https://recasn...	Done	LCG.Napoli.it	recasna-ce01...	can66.cc.kek.jp	-	belle_pilot	2015-03-19 04:26
sshondor/b...	Done	DIRAC.UVic.ca	belles.heprc...	host-206-12-154-50.heprc.uvic.ca	-	belle_pilot	2015-03-19 04:24
sshondor/b...	Done	DIRAC.UVic.ca	belles.heprc...	host-206-12-154-50.heprc.uvic.ca	14891001	belle_pilot	2015-03-19 05:10
sshondor/b...	Done	DIRAC.UVic.ca	belles.heprc...	host-206-12-154-50.heprc.uvic.ca	-	belle_pilot	2015-03-19 04:25
sshondor/b...	Done	DIRAC.UVic.ca	belles.heprc...	host-206-12-154-50.heprc.uvic.ca	-	belle_pilot	2015-03-19 04:25
sshondor/b...	Done	DIRAC.UVic.ca	belles.heprc...	host-206-12-154-50.heprc.uvic.ca	-	belle_pilot	2015-03-19 04:25
sshondor/b...	Done	DIRAC.UVic.ca	belles.heprc...	host-206-12-154-50.heprc.uvic.ca	14888582	belle_pilot	2015-03-19 06:00
sshondor/b...	Done	DIRAC.UVic.ca	belles.heprc...	host-206-12-154-50.heprc.uvic.ca	-	belle_pilot	2015-03-19 04:25
sshondor/b...	Done	DIRAC.UVic.ca	belles.heprc...	host-206-12-154-50.heprc.uvic.ca	-	belle_pilot	2015-03-19 04:24
sshondor/b...	Done	DIRAC.UVic.ca	belles.heprc...	host-206-12-154-50.heprc.uvic.ca	14891459	belle_pilot	2015-03-19 04:29
sshondor/b...	Done	DIRAC.UVic.ca	belles.heprc...	host-206-12-154-50.heprc.uvic.ca	-	belle_pilot	2015-03-19 04:26
sshondor/b...	Done	DIRAC.UVic.ca	belles.heprc...	host-206-12-154-50.heprc.uvic.ca	-	belle_pilot	2015-03-19 04:25
sshondor/b...	Done	DIRAC.UVic.ca	belles.heprc...	host-206-12-154-50.heprc.uvic.ca	-	belle_pilot	2015-03-19 04:24
sshondor/b...	Done	DIRAC.UVic.ca	belles.heprc...	host-206-12-154-50.heprc.uvic.ca	-	belle_pilot	2015-03-19 04:26

■ = Waste pilots

Belle II computing model

