Interoperation with Infrastructures: NDGF-EGEE

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Outline

- History, Motivation and Goal
- A Job Lifetime Tour
  - gLite
  - ARC
- Interoperability
NorduGrid ARC
- Initiated in 2001 as “Nordic EDG”
- In production in 2002
- Only grid in CERN ATLAS DC1

EGEE gLite
- Started in 2000 as EDG
- Operated by EGEE since 2004
- Today world’s largest grid
Motivation

- Accounting export from SGAS to APEL
  - Biggest EU Tier-1 for ATLAS in 2007
- Service Availability Monitoring – via WLCG SAM sensors for ARC-CE
  - Top reliable Tier-1 worldwide
- Operation integrated in CIC-on-Duty
The Nordic infrastructure has a high degree of compatibility with the EGEE infrastructure.

The resources contributed via NDGF was in 2007 the biggest North European EGEE site with 40% of all computations. - that is 4% of entire EGEE and the 5th biggest European EGEE site.

Only missing part is job submission!
Motivation

- Why not just install gLite?
  - ARC is deployed at 70 sites (~20000CPUs)
  - Runs on several OS'es
  - Optimal resource usage

- Why not use ARC directly?
  - ATLAS can - and also through PanDa...
  - Hard for smaller VOs to integrate a new grid
  - Simplify deployment with only one m/w

- Be an integral part of the European grid!
  - Operation, Monitoring, Accounting already there...
Many OS'es!
gLite resource usage
gLite resource usage

- CE role:
  - submission to LRMS
  - some status checks

- WN role:
  - data handling
  - some status checks
  - logging and bookkeeping
  - run the job

- Many nodes idle when handling data (up/download)
- Not in line with site requirements (WN world access, specific OS etc)
ARC resource usage
ARC resource usage

- **CE role:**
  - submission to LRMS
  - status checks
  - logging and book keeping

- **WN role:**
  - run the job!

- **CE handles all data up and download:**
  - Wall time = CPU time!

- No connections needed from/to WN
- No software needed on WN
Job Lifetime Tour

- Job description language – not enough
- Submission protocol – not enough
- Information Index – not enough

- We need to understand the entire Job Lifetime Cycle!
- ... And we also need integration with:
  - Operation
  - Monitoring
  - Accounting
JobCycle: gLite
JobCycle: gLite

Submission

WMS

UI

SE

LB

WN

CE

BDII

sBDII

Condor-C

LDAP

LDIF

GSIFTP

MARADONA

GSIFTP

GSIFTP

HTTPG

HTTPG

HTTPG

PBS

LSF

Condor-C

Condor-C

GRAM/Condo.
JobCycle: gLite

1. UI
   - HTTPG
   - GSIFTP
   - WMProxy
   - MARADONA
   - Condor-C
   - LDAP

2. SE
   - HTTPG
   - GSIFTP
   - MARADONA
   - LDAP

3. WN
   - Staging Files
   - JobWrapper
   - WB Idle!

4. WMS
   - HTTPG
   - SE
   - Condor-C
   - CREAM
   - GRAM/Condor
   - LDAP

5. CE
   - LDIF

Staging Files

JobCycle: gLite

- UI
- LB
- SE
- WN
- WMS
- CE
- BDII
- sBDII

Connections:
- HTTPG
- GSIFTP
- GSIFTR
- WMProxy
- MARADONA
- Condor-C
- GRAM/Condor
- LDAP
- LDIF
JobCycle: gLite

UI ➔ SE ➔ LB

Reporting Status: Maradona

JobWrapper

WMS

Reporting Status: BLAH status

LDAP ➔ BDII ➔ sBDII

WMProxy

GSIFTP ➔ SE ➔ HTTPG ➔ LB

Condor-C

GRAM/Condor

PBS

LSF

Condor
JobCycle: gLite

UI

HTTPG

GSIFTP

WMProxy

MARADONA

WMS

SE

HTTPG

Staging Files

JobWrapper

WN Idle!

WMS

LDAP

BDII

LDIF

sBDII

LDIF

CE

PBS

LSF

Condor

Graviton

GRAM/Condor

Condor-C

CREAM

GRAM/Condor

LDIF

JobCycle: gLite

WN Idle!
JobCycle: gLite

UI -> HTTPG -> SE -> HTTPG -> LB

UI

SE

WN

WMS

WMPProxy

GSIFTP

GSIFTR

JobWrapper

Reporting Status: Maradona

Reporting Status: LB

Reporting Status: BLAH status

LDAP

GRAM/Condor

Condor-C

CREAM

LDAP

LDIF

sBDII

BDII

LDIF
JobCycle: gLite

- glite-wms-job-status
- UI
- LB
- SE
- WN
- CE
- WMS
- BDII
- sBDII
- WMProxy
- Finished

Connections:
- GSIFTP
- HTTPG
- PBS
- LSF
- Condor
- Condor-C
- CREAM
- GRAM/Condor
- LDAP
- LDIF
JobCycle: ARC

arcsub

UI

SE

SGAS

WN

CE

GIIS

MDS

LDAP

GSIFTP

PBS
LSF
Condor

LDIF
JobCycle: ARC

brokering

LDAP Query

GSIFTP

SE

SGAS

WN

CE

GIIS

MDS

PBS
LSF
Condor

LDIF

LDAP
JobCycle: ARC

submission -> GSIFTP -> SE -> GSIFTP -> WN

LDAP -> GIIS

GSIFTP -> MDS -> LDIF

SGAS
JobCycle: ARC

Submission to LRMS

Running

NDGF Nordic DataGrid Facility
JobCycle: ARC

- UI
- SE
- WN
- CE
- GIIS
- MDS
- SGAS

Connections:
- GSIFTP
- LDAP
- uploading
- PBS
- LSF
- Condor
- LDIF
- FINISHING
JobCycle: ARC

UI → SE
SE → WN
WN → CE
CE → MDS
MDS → GIIS
GIIS → SE

GSIFTP
LDAP
PBS
LSF
Condor
LDIF

reporting status
FINISHED
JobCycle: ARC

Diagram showing the connections between different components:
- **arcstat**
- **UI**
- **gsiftp**
- **SE**
- **SGAS**
- **WN**
- **CE**
- **GIIS**
- **MDS**

Connections include:
- GSIFTP
- LDAP
- PBS
- LSF
- Condor
- LDIF
Interoperability

- Protocol
  - Unify protocols

- WMS
  - Implement ARC submission in WMS

- Gateway
  - Introduce a gateway between gLite and ARC

- Co-installation
  - deploy ARC and gLite simultaneous
Current candidate: OGSA BES
- During implementation by INFN for CREAM CE
- During implementation by KnowARC for ARC v.1

HOWEVER:
- handles only small part of the job cycle
  - (still LB, Maradona, staging...)
- no unification of data handling
- will work for “hello world”
- a lot more work needed
Work initiated in 2006
Uses Condor to submit to ARC
Functional today
Requires:
- Special gLite-WN Runtime Environment
- Proxies on WNs
- outbound connections open
- Modified gLite-CE to submit to ARC
  - Add ARC as another LRMS to BLAH
  - Parses the JobWrapper
    - Handles data up and download
    - Handles LB events
    - Handles Maradona status events

- Adapts gLite job to run on ARC
  - No data handling by WN
  - No need for proxy on WN
  - No need for "outbound" WNs

- Functional today – needs some tweaks on infosystem
Conclusions

- Interoperability is many tasks:
  - Job life-cycle
  - Data flow
  - Status
  - Monitoring
  - Accounting
  - Operation
Conclusions

- Interoperability is many tasks:
  - Job life-cycle
  - Data flow
  - Status
  - Monitoring
  - Accounting
  - Operation

- Two functional schemes exist for NDGF-EGEE:
  - WMS
  - Gateway
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Questions?