Interoperation with Infrastructures: NDGF-EGEE

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Outline

- History, Motivation and Goal
- A Job Lifetime Tour
  - gLite
  - ARC
- Interoperability
History

- 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

Diagram showing the interaction between UI, LB, SE, WN, and CE through various protocols and services such as GSIFTP, WMProxy, MARADONA, LDAP, and BDII.
JobCycle: gLite

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UI -> HTTPG -> SE

WMProxy -> GSIFTP

SE -> HTTPG -> WN

GSIFTP -> MARADONA

WN -> HTTPG -> CE

PBS LSF Condor

Submission -> WMS

Condor-C

WMS -> LDAP

BDII -> LDIF

sBDII -> LDIF

Condor-C
JobCycle: gLite

UI <-> HTTPG <-> LB

SE -> GSIFTP <-> WMProxy <-> MARADONA <-> WMS

SE -> HTTPG

SE <-> Staging Files

WN -> HTTPG

WN <-> JobWrapper

WMS <-> LDAP

CE <-> LDIF

BDII <-> LDIF

sBDII
JobCycle: gLite

Reporting Status: Maradona

Reporting Status: LB

Reporting Status: BLAH status
JobCycle: gLite

- UI
- SE
- WN
- CE
- WMS
- BDII
- sBDII
- Staging Files
- JobWrapper
- WN Idle!

Connections:
- UI -> SE via HTTPG
- SE -> WN via GSIFTP
- WN -> CE via HTTPG, PBS, LSF, Condor
- WMS -> BDII, sBDII via LDAP, LDIF
- BDII <-> sBDII via LDIF
JobCycle: gLite

UI

SE

LB

WMS

UI

HTTPG

GSIFTP

WMProxy

SE

GSIFTR

HTTPG

JobWrapper

Reporting Status: Maradona

Reporting Status: LB

WMS

Condor-C

GRAM/Condor

BDII

LDIF

sBDII

LDIF
JobCycle: gLite

Diagram showing the JobCycle process involving UI, LB, SE, WN, WMS, CE, BDII, sBDII, and various services and protocols such as HTTPG, GSIFTP, WMProxy, MARADONA, Condor-C, and LDAP.
JobCycle: gLite

glite-wms-job-status

UI → LB → LB

WMProxy

WMS → CE

Finished

BDII → sBDII

LDAP

SE

GSIFTP

GSIFTR

HTTPG

PBS
LSF
Condor

MARADONA

Condor-C
CREAM
GRAM/Condor

LDIF

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ISGC08. Taipei. April. 2008
JobCycle: ARC

UI -> SE
SE -> WN
WN -> CE
SE <-> GIIS
SE <-> MDS
MDS <-> CE
SE <-> LDAP
SE <-> GSIFTP
SE <-> PBS LSF Condor
SE <-> LDIF

JobCycle: ARC

- **UI** (User Interface)
  - brokering

- **SE** (Site Executor)
  - LDAP Query
  - GSI FTP

- **SGAS**

- **WN** (Worker Node)
  - PBS
  - LSF
  - Condor

- **CE** (Central Element)
  - LDIF

- **GIIS** (Grid Information and Installation System)

- **MDS** (Metadata Service)
JobCycle: ARC

Submission to LRMS

Running
JobCycle: ARC

UI

SE

SGAS

WN

CE

GIIS

MDS

Finishing

uploading

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
  - Parsing 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 exists for NDGF-EGEE
  - WMS
  - Gateway
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Questions?