Interfacing AliEn and ARC for a distributed Nordic T1

- Why such an interface
- ARC and AliEn
- The Interface
- Tests
- Conclusion
Principle

Interfacing AliEn and ARC for a distributed Nordic T1
Philippe Gros – Lund University
Benefits

• Operation and Accounting simplification
  – For ALICE: only 1 site
  – For NDGF: only 1 middleware

• Flexibility
  – Resources can be moved within the Nordic countries
  – Sites can be easily added at a regional level
Requirements of an AliEn-ARC interface

• From AliEn
  – Works like a normal site
  – Simple module in the code (easy to maintain)

• From NorduGrid
  – Minimum configuration on sites
    (No knowledge of AliEn for site admin)
  – Not too much security exception (firewall, privileges...)
Interfacing AliEn and ARC for a distributed Nordic Tier 1

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Grid Manager

Gatekeeper

GridFTP

Front-end

Catalog

SE

Cluster

Information System

CLIENT

Catalog

SE

GridManager

Gatekeeper

GridFTP

Front-end

Cluster
ARC middleware

- **Very active development**
  - Supported by EU via KnowARC project in 8 countries
    - Denmark Sweden Norway Hungary Germany Switzerland Slovakia UK
  - Involved in European Middleware Initiative (EMI)

- **Widely deployed**
  - 70+ sites over 12 countries
  - Almost 70 000 CPUs

- **Package Management**
  - Packages installed by hand by system administrators
  - Advertised in Information System with RunTime Environment
AliEn Grid Solution

Central Services

Deployed for:

ISS

File Catalogue

Task Queue

Transfers

Broker

Manager

Opt.

Opt.

Manager

Broker

API

Authen

Proxy

LDAP

IS

Manager

Logger

Site Services

~ 70 in ALICE

Data transfer

11/03/10

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AliEn

- Specific to the ALICE experiment, also used by e.g. FAIR (PandaGrid)
- Development and services centralised at CERN
- 40 000 CPUs on over 80 sites
- Automatic installation of required packages (within ALICE computing framework)
- Jobs pulled by pilots job
How the interface actually works
Interface between AliEn and ARC

PackMan checks for available packages on the ARC sites (LDAP query)
Interface between AliEn and ARC

The Computing Element checks if there are jobs fitting its capacities
If a package is missing, PackMan sends installation jobs with ARC ("alien login -exec packman install ..."). The job also creates a RTE script to advertise the package in APPS/HEP/ALICE/

If the installation job fails, a list of uninstalled packages is created. PackMan will retry the installation regularly (exponential delay)
Interface between AliEn and ARC

The CE sends Job Agents to the sites via ARC. The RTE requirement guaranties that they will only go to sites with the appropriate packages.
Interface between AliEn and ARC

The JAs communicate with the Cluster Monitor via SOAP as on normal site. Requires only outbound connectivity from the nodes.

*The JAs are not allowed to require installation from the PackMan.*
Implementation and Installation

- **AliEn:**
  - 2 Perl modules (Submission and PackMan)
  - Few LDAP parameters

- **ARC**
  - Install AliEn (WN installation)
  - Create RTE script (environment variables)
  - Allow user with installation privileges
    (may need extra plugin for special configuration)
Test Bed in Lund

- Full Central Services
- VO-box on isolated computer
- Access to 2 ARC sites with special configuration
  - LUNARC, Aalborg
Test and Result

- Prototype Tested in Lund
  - Submitted jobs requiring ROOT
  - ROOT installed, job runs on the two ARC sites
  - Output retrieved

- Minor problem with package installation on overloaded site
  - Minimised by checking before retry
  - Installer user should have higher priority
Bittorrent Alternative

- Another solution for package management using bittorent exists
- Should work out of the box for a distributed AliEn site
- Has been largely tested, but still has issues with sites security configurations
Conclusion

- Creating a distributed AliEn site is possible
- A prototype working with ARC is operational
- A few other features could be added

- Exercise could be extended to other middleware (gLite, UNICORE)
- Unified Middleware Distribution (UMD)
backup
Features Still Missing

- AliEn auto update (triggered by MonALISA)
- Personal packages
- Large scale test
What is done by the interface
Job Submission and Monitoring

- Works like any other submission system
- Had to be solved: communication to the JA (through firewalls)
  - Job Agent submission ("ngsub")
  - Job monitoring ("spy"): done with ARC ("ngcp") if allowed by ARC site
  - Kill job => kill corresponding JA ("ngkill")
- The other communications (from the JA) only require outbound connectivity
Package Management

• Install a package
  - Triggered by CE
  - Send an ARC job (with special privileges)
  - Run 'alien packman' locally on the WN
    => Same as normal AliEn installation

• Get a list of installed packages
  - Installation job creates an ARC runtime environment
  - VO-box can query the ARC information system
Package Management: Potential issues

- Job Agent should never call PackMan (Risk of infinite loop)
  - Special parameter in LDAP (WnForbidInstall)
- What if one installation job fails?
  - Put RTE requirement in JA submission
  - Keep table of sites missing package
    Retry to install next time regularly (exponential delay)
- What if the installation fails
  - How do we make sure the installation is done properly? (How do we correct?)
  - Same problem on any other site...
ARC middleware

Catalog

SE

Gatekeeper
GridFTP

Front-end

Grid Manager

Cluster

CLIENT

Information System
Interfacing AliEn and ARC for a distributed Nordic Tier-1

**ARC middleware**

- **Catalog**
  - Ask data location

- **SE**
  - Gatekeeper
    - GridFTP

- **Front-end**
  - Grid Manager

- **Cluster**

**CLIENT**

- **Information System**
  - Ask nodes availability

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ARC middleware

Catalog

Send job description + data (GridFTP)

GridManager

Gatekeeper

GridFTP

Front-end

Cluster

RSL

Arc middleware

SE

Information System

CLIENT
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ARC middleware

Grid
Manager

Gatekeeper
GridFTP

Front-end

RSL

Cluster

Run the job on the cluster

Run the job
on the cluster
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ARC middleware

Catalog

SE

Copy the data to the SE

Register the data in the catalog

Front-end

Gatekeeper

GridFTP

Grid Manager

RSL

SE

Cluster

Grid

Manager

Copy the data to the SE

Catalog

SE

Register the data in the catalog

Front-end

Gatekeeper

GridFTP

Grid Manager

RSL

SE

Cluster

Grid
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