# NorduGrid
# Runtime Environments

Juha Lento
CSC, the Finnish IT center for science
Nordic DataGrid Facility project

# RE purpose, generally

Runtime Environment (RE) sets up *documented interface* to application software installed on computing resources

Set up command search path, manpath, other environment variables
- cd nordugrid-standalone; source setup.sh
- use someapp
- etc.

# RE purpose, Grid

Advertise installed *software as a resource* and direct jobs accordingly

Provide uniform application interface in *heterogeneous* computing resources

Promote *collaboration* over administrative domains

# Heterogeneous resources and multiple applications

NorduGrid does not impose uniform HW, OS, LRMS or application SW requirements on connected resources
- many of the Grid concepts, such as RE, need to be more general than in some other projects (LCG, DEISA, etc.)

The set of applications run in NorduGrid is not limited or centrally controlled
- NorduGrid itself does not (cannot) force any application software to be installed on participating resources
- Virtual organizations!

# Current schema, overview

NorduGrid Information System
  Advertises installed REs using xRSL and
    NorduGrid *Information System* (LDAP)

RE Homepages
  Interface definition, user and admin documentation

Local implementation of the interfaces
  Initialization scripts

Runtime Environment Registry (RER)
  Links to RE Homepages, general documentation,
    concept promotion, namespace administration

# Information system

Advertises installed REs
- xRSL attribute RuntimeEnvironment
- LDAP

Is used by job submission, brokering, and status monitoring
- RE attribute currently "cover for" resource descriptions which do not have xRSL attributes, such as "LOCALDISK"

Spans over multiple organizations
- NorduGrid does not strictly control what is advertised in Information System

# RE Homepages

Provide interface definition, user and administrator documentation for applications

Open community effort
- maintained by resource administrators, application developers, user groups, VOs, Grid support organizations
- maintaining RE Homepage requires familiarity with the application, but only a very basic knowledge of HTML, Grid concepts and distributed computing

# RE implementation

Grid manager sets up environment variables at by sourcing a RE bash script

Grid Managers authplugin can be used to implement different restrictions to the use of RE

Parallel environments and applications are challenging
- job scheduling decisions very difficult to automate in general
- dependencies to HW platform, parallel libraries, compilers, LRMS and it's configuration, etc.

# Runtime Environment Registry

Basically, a list of links to RE Homepages

Manages RuntimeEnvironment namespace

Develops RE concept and provides best practices for RE setup and maintenance

Provides contact point between users, RE maintainers and resource providers

# Summary

Distributed open community effort coordinated by RER maintainer

Adaptation of the concept and setup of RE Homepages progresses slowly, but steadily

RE without documented interface is useless

# List of current applications with RE Homepages

APPS/CAS/SIMICS-2.2.7-1
    Computer Architecture Simulator
APPS/CFD/ELMER-3.0-0.1
    Finite Element Software for Multiphysical Problems
APPS/CHEM/DALTON-1.2.1-1.0
    Quantum chemistry program
APPS/CHEM/GAMESS-20041122-0
    Quantum chemistry program
APPS/HEP/ATLAS-10.0.1
    ATLAS Rome production
ENV/LOCALDISK-0000
    Advertises the availability of local scratch disk on compute nodes
ENV/P2P/EDONKEY-1.0.2
    P2P file transfers for small scale grid applications

- Most of the REs in Information System are yet undocumented

# References

NorduGrid collaboration and middleware
   http://www.nordugrid.org


Runtime Environment Registry and concept
   http://www.csc.fi/grid/rer