



# NorduGrid: Collaboration status update

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OSG Consortium All Hands Meeting  
March 6, 2007

# Outline

- ARC middleware status
- Overview of NorduGrid–spawned projects
  - EU KnowARC, NDGF
- Interoperation and standardization

# Glossary

- **NorduGrid**: a research collaboration
  - Based on MoU
  - Supports ARC m/w development via different projects
- **ARC**: Advanced Resource Connector, the middleware
  - GPL software, coordinated by NorduGrid
- **KnowARC**: an EU FP6 R&D project (STREP)
  - Core contributor to ARC development
- **NDGF**: The Nordic DataGrid Facility, a Nordic infrastructure and R&D project
  - Builds the Nordic Tier-1
  - Contributes to ARC development
- **NGIn**: Innovative Services and Tools for NorduGrid, an educational and R&D project by Nordunet3
- **NGN**: Nordic Grid Neighborhood, a networking project
  - ARC community in Nordic countries, Baltic states and Russia

# December 2006: ARC 0.6 is out

- A major milestone: first stable release since 2004
- New external software, new packaging and distribution
  - Globus 4 based (pre-WS components, e.g. GSI, gridftp libraries, LDAP backends)
  - Latest VOMS, GSOAP
  - Natively works on 64bit architectures
  - Streamlined configuration
  - Software repositories (e.g. apt, yum)
- Major re-write of the client code base
  - Modularity
  - Multithreaded implementation
  - Extensibility
- Client libraries, modules available for C++ (native), Python, Perl etc
  - via SWIG, and Java
  - Easy to use API for clients that need to interface to ARC, e.g. GUIs, portals, CLIs
- Many new attributes in the information system
  - Better monitoring and decision-making
  - Improved job description

# More new ARC 0.6 features

- Even more extensions on the server side:
  - Authorization, security: VOMS, MyProxy support, GACL for jobs
  - JSDL support
  - SRM support (also in the data movement client)
  - LSF support; PBS, SGE and Condor interfaces significantly improved
- “Smart Storage Element” (SSE) is a part of the release
  - Files instantiated at an SSE are registered in e.g. RLS automatically
  - Has a basic SRM interface
- Non-root ownership of services
- Performance improvements of the core services
- Logging infrastructure: new Usage Record format, better performance
- Improved monitoring
- Localization of clients (user interface, monitor – 8 languages)
- Improved usability: notifications, logs, command line options

# What is still missing

- ARC 0.6 is still based on 5–years old technologies
  - Too many non–standard dependencies, esp. pre–WS Globus & Co
  - Hit the limits of extensibility
- Desirable functionalities:
  - Execution services:
    - Job migration
    - Semi–interactive applications, parallel jobs
    - Fine–grained policies, priorities (VO–based)
  - Data management:
    - Reliable data indexing
    - Support for data collections
    - Fine–grained, consistent access control (VO–based)
    - SRM interface to distributed storage facilities
  - Monitoring, logging and accounting
    - User–friendly interface to logging/accounting systems
    - Lightweight logging/accounting
    - Security layer over information and monitoring services (VO–based access)
  - Advanced clients
    - GUI: a Java–based prototype (the “Arconaut”) exists
    - Clients on popular systems like MS Windows, Mac OS
    - More versatile brokering
    - “Off–line” job management functionality (“babysitting”)
- Standards compliance, interoperability
  - Still a lot of moving targets

# The KnowARC project

- EU FP6 Specific Targeted Research Project
  - *"Grid-enabled Know-how Sharing Technology Based on ARC Services and Open Standards"*
  - Duration: June 1 2006 - June 1 2009
  - Partners: NorduGrid members and research teams in medicine, bioinformatics, physics, engineering, automotive industry apps, IT (10 partners from 7 countries)
- Objectives:
  - to create a novel, powerful Next Generation Grid middleware based on ARC, widely respected for its simplicity, non-invasiveness and cost-efficiency;
  - to promote Grid standardization and interoperability;
  - to contribute to Grid technologies take-up, bridging the gaps between business and academia in Grid development
- *Will develop the middleware that will be the next step after ARC 0.6, addressing current limitations and shortcomings*



# KnowARC today

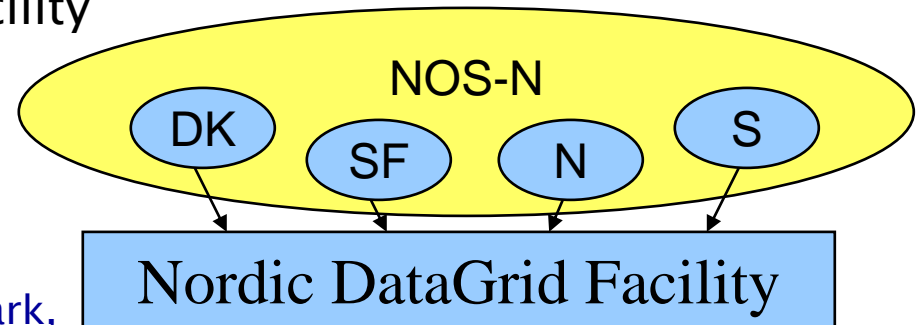
- Design stage resulted in a number of documents, see <http://www.knowarc.eu/documents/>
- October 2006: Standards Conformance Roadmap
  - Overview of existing and emerging standards
  - Highly relevant standards are: OGSA, OGSA WSRF Basic Profile, JSDL, GridFTP v2, OGSA-BES, OGSA Security Basic Profile - secure channel, GLUE, X.509 PKI, WS-I Basic Profile, WS-I Basic Security Profile, SRM
- January 2007: Design Document is released
  - Lays out high-level design principles
  - Elaborates on key capabilities
    - Hosting Environment
    - Information Capability
    - Execution Management Capability
    - Data Capability
    - Resource Management Capability
    - Security Capability
    - Self Management Capability
- Coding has started
  - Hosting Environment Daemon, Dynamic Runtime Environments





- NDGF == “Nordic Data Grid Facility”

- Idea conceived by NorduGrid members in 2002
- Goal: create a Nordic Grid *infrastructure*, primarily for LHC Grid computing (*Tier1*)
- 2003–2006: pilot project funded by the 4 Nordic countries (Denmark, Finland, Norway, Sweden)
- NorduGrid/ARC middleware chosen as the basis



- June 1st 2006: NDGF is launched

- Nordic production Grid, leveraging national grid resources
- Common framework for Nordic production Grid
- Co-ordinates & hosts major Grid projects (e.g. the Nordic LHC Tier-1)
- Develops Grid middleware (ARC contributor)
- Single Point of Entry for collaboration, middleware development/deployment, e-Science projects
- Represents the Nordic Grid community internationally

- NDGF 2006–2010

- Funded (2 MEUR/year) by National Research Councils of the Nordic countries (NOS-N)

- NDGF coordinates activities – does not own resources or middleware

# NDGF's distributed Tier1 under construction



# NDGF resources

- People:
  - 5 managers
  - 4 National Coordinators
  - 6 Middleware Developers
    - VOBoxes integration
    - Distributed dCache development
    - Interoperation
  - Plus many helpful local sysadmins and power users
- Hardware:
  - Large part of what is known as NorduGrid
    - Shared heterogeneous resources running ARC
  - Some own resources (servers)
  - Dedicated WLCG hardware is on its way
    - Still shared, heterogeneous, and running ARC



## Instead of Summary: Interoperation, standardization

- Both are of key importance for NorduGrid and all the related projects
  - Interoperation will work when based on widely accepted well documented open standards
  - Neither should compromise desired functionality and performance
- NorduGrid, KnowARC and NDGF are all involved in various related activities
  - GIN activities
  - JSDL
  - Usage Record, Resource Usage Service
  - Information-related standardization
    - OGF Glue2 group
    - Hosted Grid Service Information Discovery Meeting in December
    - Contacts with U. of Iowa group
  - GridFTPv2 contribution
    - Triggered by needs to set up a distributed dCache => dCache code contribution
  - Some gateway- and portal-based approaches in the pipeline
- Pre-WS Globus used by major Grid projects is a mature but ageing technology
  - OGF is becoming a true standardization body
  - Let's move together from *de facto* to *de jure* standards!