



NorduGrid is a Grid Research and Development collaboration that develops, maintains and supports a free Grid middleware, known as the *Advanced Resource Connector (ARC)*.

The aim is to deliver a robust, scalable, portable and fully featured solution for a global computational and data Grid system. This set of tools and services developed by NorduGrid comprises the ARC middleware. The Collaboration is open to new members and contributors.

The goals

- ❖ Develop and support ARC middleware
- ❖ Coordinate contributions to the core ARC code
- ❖ Define strategic ARC development directions based on modern Grid technologies
- ❖ Promote ARC software solutions in the areas of Grid development, deployment and application
- ❖ Contribute to development and spread of international Grid standards

ARC middleware solution provides a reliable implementation of fundamental Grid services and utilities, such as the information services, resource discovery and monitoring, job submission and management, logging, brokering, data and resource management.

The pre-built binaries of the middleware are available in tarballs and in relocatable RPMs for all the major Linux distributions. ARC supports both 32 and 64 bit platforms. A special easily installable client package, the standalone distribution, is provided, containing all the required external software.

The software is released under the GNU General Public License (GPL).

User support and site installation assistance is provided via the request tracking system available at nordugrid-support@nordugrid.org.

Research papers, manuals, guides, instructions, presentations, FAQ and tutorial materials are available through the documentation section of the NorduGrid Web site.

Contributions from the community to the software are welcomed. Sources are available from the Web site or CVS.



Since its first release in May 2002, the ARC middleware is deployed and being used in production environments by a growing multidisciplinary user group. Emphasis is put on scalability, stability, reliability and performance. Many Grid projects, such as Swegrid, DCGC, NorGrid, Estonian Grid, Swiss ATLAS Grid, M-Grid in Finland and NDGF chose ARC as their middleware. One of the largest open production Grid of the world spreads with ARC help from Norway to Australia connecting approximately 6000 processors and more than 60 TB of storage space at about 60 sites.

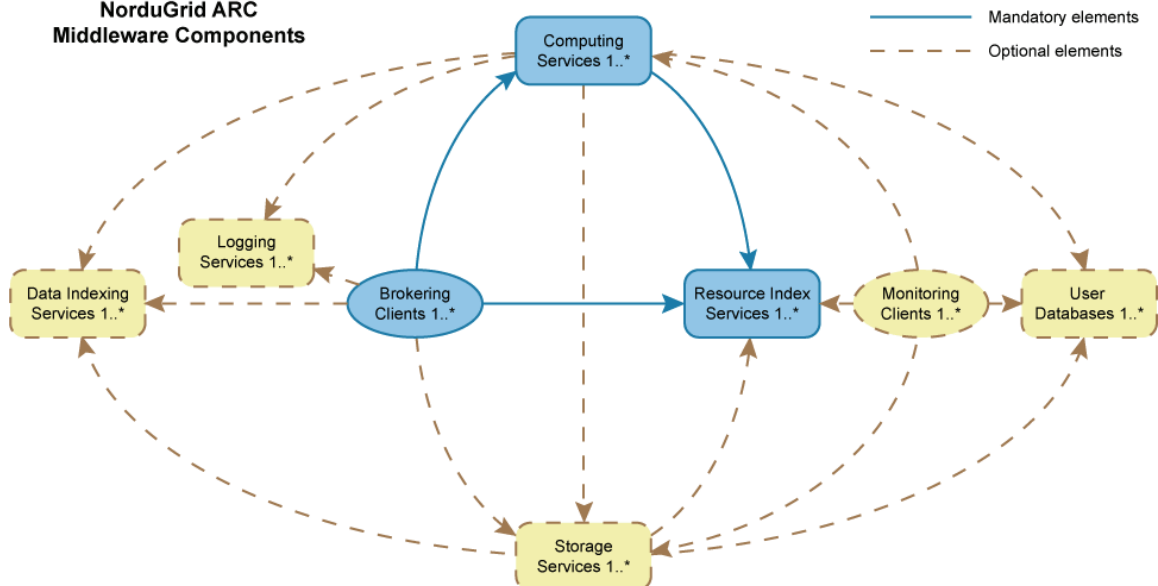
For general inquiries please use contact@nordugrid.org

The NorduGrid middleware, the **Advanced Resource Connector, ARC**, is an open source software solution enabling production quality computational and data Grids. The ARC middleware integrates computing resources (commodity computing clusters managed by a batch system or standalone workstations) and Storage Elements, making them available via a secure common Grid layer.

ARC builds upon standard Open Source software. It implements innovative solutions essential for a production quality middleware: the Grid Manager, ARC GridFTP server, the Local Information Service (LIS) with the information model and providers, a lightweight Brokering Client, extended Resource Specification Language (xRSL), as well as the monitoring and logging systems. ARC provides Conventional and Smart Storage Elements as well.

The middleware is written in C/C++ and some smaller part in Perl and Python. ARC builds upon standard Open Source libraries and solutions such as Grid Packaging Tools (GPT), Globus Toolkit Pre-WS libraries, OpenSSL, OpenLDAP, Cyrus SASL, Globus RLS, gSOAP, GACL, VOMS, MySQL client libraries, libxml2. The detailed compile and runtime external dependencies are given in the documentation available at the NorduGrid Web site.

NorduGrid ARC Middleware Components



ARC main components are:

1. Grid services running on computing resources: the Grid Manager, ARC GridFTP server and the Local Information Service. The Grid Manager is a service running on a resource taking care of jobs and the cache area. Job submission and data staging are made through the GridFTP server. Information services populate the information database stored in the Globus-modified OpenLDAP back-ends.

2. Indexing services for the resources and data: a special setup of the Globus GIIS backend allows to build a hierarchical mesh of Grid-connected sites. ARC middleware can use a variety of data indexing services, such as the Globus RC, RLS and the gLite Fireman catalogue. ARC client tools and the Grid Manager daemon are interfaced to these catalogues.

3. Clients making intelligent use of the distributed information and data: ARC provides a light-weight command line interface to submit, monitor and manage jobs, move data and obtain resource information. This interface has a built-in broker, which is able to select the best matching resource for a job. Another special client is the Web-based Grid Monitor. General purpose Grid API in C++, Python and Java and graphical clients making use of them are available for beta tests.

4. Storage Elements (SE) offer a Grid-enabled secure access to disk-based storage capacity. ARC provides two solutions: the Conventional SE is based upon the ARC GridFTP server and supports advanced Grid-identity based authorization via GridSite GACL. The Smart SE implements a Web service-based solution featuring automatic reliable replication, increased data integrity and flexible access control.

For further information please read the ARC technical paper: *ARC middleware for lightweight computational Grids*, <http://www.nordugrid.org/documents/whitepaper.pdf>