

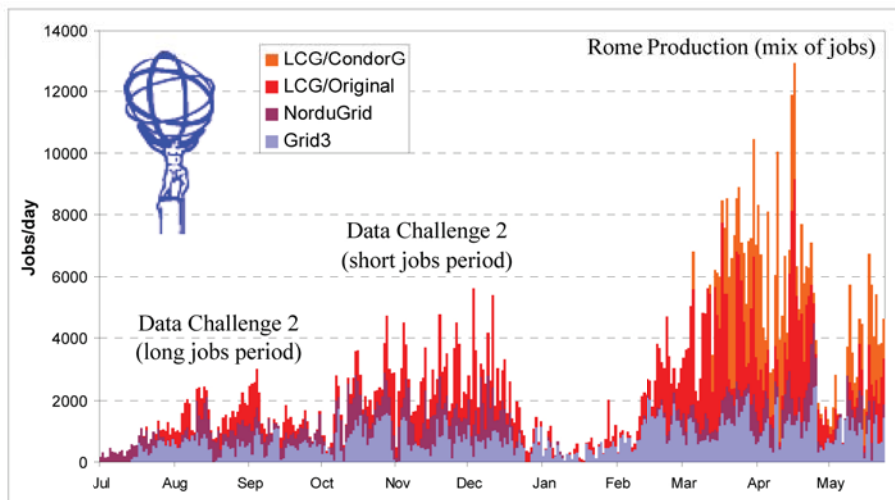
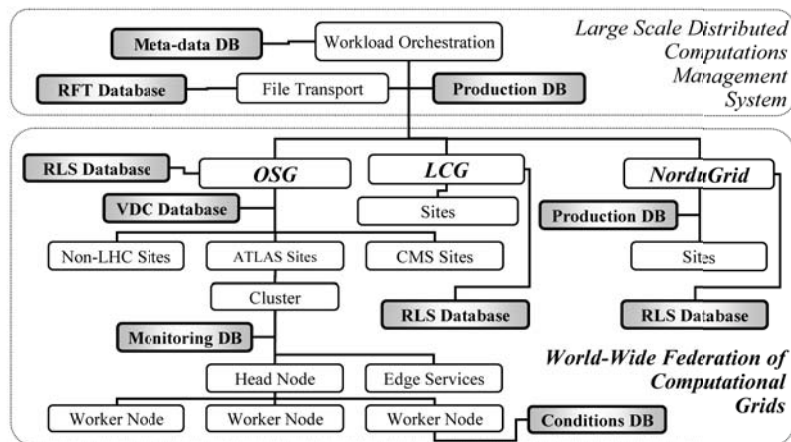


## Database Access for Secure Hyperinfrastructure

A project of PIOCON Technologies, Inc and Argonne National Laboratory

High energy physics applications on computational grids require efficient access to terabytes of data managed in relational databases. The Database Access for Secure Hyperinfrastructure (DASH) project is funded by the DOE Small Business Innovative Research Program to build and test secure high-performance database access technology for distributed computing. The first technology preview release of the integrated mysql-gsi build is available for download from the DASH project web site.

In addition to petabytes of file-based event data, high energy physics applications require access to non-event data (detector conditions, calibrations, etc.) stored in relational databases. Databases also play a critical role in grid middleware: file catalogues, monitoring, etc. Crosscutting the computational grid infrastructure, a database hyperinfrastructure emerges.

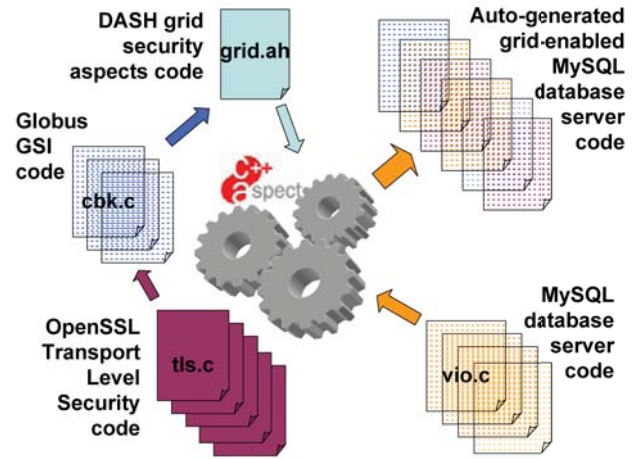


Recent large-scale world-wide distributed simulations performed by the ATLAS Collaboration show steady progress in grid computing. The chaotic nature of opportunistic grid computations results in variations in daily production rates and requires on-demand provisioning of database service capacities.

DASH technology bridges the gap between data accessibility and the increasing power of grid computing. To overcome database access inefficiencies inherent in a traditional middleware approach the DASH project implements secure authorization on the transport level. DASH technology brings database access efficiencies similar to the https advantages introduced in the Globus Toolkit 4.0.



The DASH proof-of-concept prototype provides Globus grid proxy certificate authorization technologies for MySQL database access control. To avoid a brittle, monolithic system DASH uses an aspect-oriented programming approach. By localizing Globus security concerns in a software aspect, DASH achieves a clean separation of Globus Grid Security Infrastructure dependencies from the MySQL server code. During the database server build, the AspectC++ tool automatically generates the transport-level code to support a grid security infrastructure.



Prototype servers built with DASH technology are being tested in Argonne National Laboratory, Brookhaven National Laboratory, and the European Organization for Nuclear Research (CERN). To provide on-demand database services capability for Open Science Grid, the Edge Services Framework activity builds the DASH mysql-gsi database server into the virtual machine image, which is dynamically deployed via the Workspace Service introduced in the Globus Toolkit 4.0.

Pushing the grid authorization into the database engine eliminates the middleware message-level security layer and delivers transport-level efficiency of SSL/TLS protocols for grid applications. The database architecture with embedded grid authorization provides a foundation for secure end-to-end large-scale distributed data processing solutions. Innovative policy-driven automatic code generation techniques of the DASH project can facilitate building MySQL-GridShib, MySQL-VOMS, PostgreSQL-gsi, and other database products with enhanced security. Beyond high energy physics the grid-enabled database server technology is of interest to bioinformatics and other data-intensive sciences.

DASH Technologies		DASH Collaborators and Early Adopters	
	AspectC++ <a href="http://www.aspectc.org">http://www.aspectc.org</a>		Illinois Institute of Technology Concurrent Programming Research Group <a href="http://www.iit.edu/~concur">http://www.iit.edu/~concur</a>
	Globus <a href="http://www.globus.org">http://www.globus.org</a>		Open Science Grid Edge Services Framework <a href="http://osg.ivdgl.org/twiki/bin/view/EdgeServices">http://osg.ivdgl.org/twiki/bin/view/EdgeServices</a>
	MySQL <a href="http://www.mysql.org">http://www.mysql.org</a>		ATLAS Distributed Database Services <a href="http://atlas.web.cern.ch/Atlas/GROUPS/DATABASE/project/services">http://atlas.web.cern.ch/Atlas/GROUPS/DATABASE/project/services</a>

### DASH Presentations at the Conferences and Workshops

	<i>Supercomputing 2005</i> , November 12-18, 2005 Washington State Convention and Trade Center, Seattle, Washington, USA <a href="http://www.piocon.com/DASH.php">http://www.piocon.com/DASH.php</a>
	<i>First DIALOGUE Workshop: Applications-Driven Issues in Data Grids</i> August 1-2, 2005, The Ohio State University, Columbus, Ohio, USA <a href="http://www.datagrids.org/ws/docs/High-performanceDatabaseAccess.ppt">http://www.datagrids.org/ws/docs/High-performanceDatabaseAccess.ppt</a>

