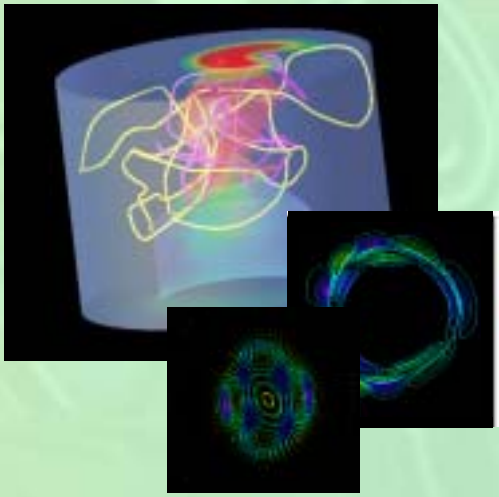
Automating Massive Data Transport by Integrating Datagrid Technology with Physics Experiments

The Relatavistic Heavy Ion Collider (RHIC) Computing Facility (RCF) storage system at Brookhaven National Laboratory (BNL) and the NERSC storage system at LBNL exchange data over the ESnet production network. Since the Solenoidal Tracker at RHIC (STAR) experiment began taking data two years ago, tens of TeraBytes (TB) have been transferred at rates of about 1 TB/week using ad hoc methods (with considerable effort). (www.bnl.gov/rhic/)

Members of the STAR experiment and the Scientific Data management group at LBNL have collaborated on deploying Hierarchical Resource Managers (HRM) to automate this data transport. HRM provides an interface to multiple types of storage systems (HPSS in this case). A single request to HRM can transfer a thousand or more files and a graphical tool can be used to check status and monitor progress of requests. HRMs also provide recovery from transient failures of the HPSS systems or the network without any human intervention. GridFTP from the Globus Toolkit is used for the Wide Area Network (WAN) stage of the transfer. In tests with the new grid-enabled implementation, rates of up to 8 MB/sec for the WAN stage have been achieved. **We expect that rates of 3-4 TB/week will be easily achieved during the 2003 data taking run for STAR.**

(www.bnl.gov/rhic/STAR.htm)

Working with the Particle Physics Data Grid Collaboratory (www.ppdg.net) the group has defined a standard interface to storage systems and collaborated with developers who have implemented versions for Enstore at Fermilab, and Jasmine at Thomas Jefferson National Laboratory. This work is supported under the SciDAC program by the DOE Office of Science Advanced Scientific Computing Research (ASCR) and High Energy Nuclear Physics (HENP) offices.

Collaborative work between computer scientists and an experiment group already in the middle of its data taking run

The resulting code has been developed by a multi-institutional, multi-disciplinary team. A common treatment of simulation and experimental data has facilitated both model validation and the analysis and interpretation of experimental results. The research and interactions of this diverse group has been greatly enabled by collaborations with the DOE computer science community, such as the Fusion Collaboratory (www.fusiongrid.org) funded from SciDAC, and the use of ESnet for communication, code sharing and management.