

From Enlightened Computing

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We are witnessing a highly explosive growth of data in traditional research communities, and in nontraditional areas such as humanities, business, and medicine. This explosion, coupled with its wide geographic distribution, has overwhelmed our ability to manage, move, store, and analyze data. Research on high speed networks is critical to overcoming these barriers to effective work in a data-rich world. The focus of the Enlightened Computing project is on developing dynamic, adaptive, coordinated and optimized use of networks connecting geographically distributed high-end computing resources and scientific instrumentation. A critical feedback-loop consists of resource monitoring for discovery, performance, and SLA compliance, and feed back to co-schedulers for coordinated adaptive resource allocation and coscheduling.

Our network research is driven by concrete application projects in astrophysics, coastal modeling, and atmospheric research, currently underway, all of which critically require progress in network technologies and tools that utilize them. The research carried out, the developed tools, and the applications that use them will be deployed across regional and nationwide 10Gbps bandwidth testbeds running over [NLR](#) and [Louisiana Optical Network Initiative \(LONI\)](#), connected via four all-photonic Calient switches, all using GMPLS control plane technologies.

For this project we have assembled a global alliance of partners to develop, test, and disseminate advanced software and underlying technologies which provide generic applications with the ability to be aware of their network, Grid environment and capabilities, and to make dynamic, adaptive and optimized use of networks connecting various high end resources. We will develop advanced software and Grid middleware to provide the vertical integration starting from the application down to the optical control plane.



Through NSF seed-funding, the team has already successfully initiated this project and have performed two demonstrations (iGrid, SC2005), published papers, developed software, initiated network simulations, built a world-class advanced nationwide Grid testbed, developed international sister projects (EU, Japan), and initiated control plane experiments on Enlightened testbeds.

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