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Global Lambda Integrated Facility Annual Meeting Attracts 60 Leaders in Advanced Networking and Scientific Applications

September 22, 2004 -- The first week of September signifies the end of summer, but this year it also marked the start of a major global alliance to build the LambdaGrid, aptly named the Global Lambda Integrated Facility (GLIF). Network leadership, notably the managers and chief engineers of national research and education networks, countries, consortia and institutions, along with application scientists and industrial R&D representatives from all over the world, totaling 60 people, converged in Nottingham, England, September 2-3, for a two-day workshop to self-organize GLIF. The GLIF Workshop was chaired by Kees Neggers, managing director of SURFnet in the Netherlands, hosted by the United Kingdom's research and education network UKERNA, and organized by Cees de Laat of University of Amsterdam and Maxine Brown of the University of Illinois at Chicago.

Since 2001, a small international group of network managers, network engineers, application scientists and middleware developers have been meeting annually to discuss the development of optical networks and the Global LambdaGrid. "At its 2003 meeting, this group gave itself the GLIF name, realizing that its informal partnership had, over the years, grown into a virtual facility in support of persistent data-intensive scientific research and middleware development on LambdaGrids," said Kees Neggers, who initiated and has chaired these annual meetings. This year attendance doubled in size, with broader global representation than previous years, marking a significant advance in global infrastructure development.

Today's optical networks, using Wave Division Multiplexing (WDM) technology, encode data on individual wavelengths of light (or "lambdas"); these wavelengths then carry data in parallel through fiber. A LambdaGrid, based on multiple lambdas, is an extension of the grid, where the bandwidth itself is a schedulable resource. Just as the grid enables scientists to schedule computer processing time or remote instrumentation usage, so does the LambdaGrid provide network guarantees for such characteristics as bandwidth, latency and jitter. "These guarantees are necessary for applications that require large data transfers, control of remote instrumentation, and real-time data analysis, visualization and collaboration. Deterministic end-to-end network performance is important for real-time or time-critical applications, which cannot be achieved on today's grids," explained GLIF co-founder Tom DeFanti.

In 2004, as the cost of transoceanic bandwidth continues to be more affordable, a large number of research and education networks find they have additional capacity they are willing to make available for use by application scientists, computer scientists and engineers. GLIF provides a framework in which to collaborate with colleagues worldwide to build the Global LambdaGrid in support of e-science. Science has no geographic boundaries. All science is global.

“GLIF is an open community, and everyone who contributes can join. GLIF doesn’t have members; it has participants. GLIF is not about control, but about introducing lambda networking as a commodity infrastructure to the scientists it supports,” explained Kees Neggers, who also serves as head of the GLIF Governance Working Group. “Users gain access to GLIF resources by going to their network providers. The websites of these providers need to document what resources are available. GLIF glues together the networks of its participants; GLIF itself is not a network and does not compete with any existing network.”

This glue is handled by the Engineering Working Group, headed by Erik-Jan Bos of SURFnet. Network engineers spent the first half of the GLIF Workshop describing their respective countries’ networks and how they were configured, in order to create an informative international network map. Discussion then turned to defining the types of links and the minimum/maximum configurations of Optical Exchange facilities in order to assure the interoperability and interconnectivity of participating networks. “Our goal is to produce a ‘GLIF Best Current Practices’ document by the SC 2004 conference,” said Bos. “We need to provide answers to such questions as: What does it mean to connect to GLIF? What does it mean to bring equipment to GLIF?”

Because one needs infrastructure in place before applications can start using the LambdaGrid, this year’s GLIF meeting was heavily attended by networking decision-makers and engineers. However, GLIF also has an Applications Working Group, headed by Peter Clarke of University of Edinburgh and University College London. The super-users who provide the application drivers for GLIF are known, and will demonstrate their science experiments at the upcoming SC 2004 conference in November in Pittsburgh, Pennsylvania, and at next year’s iGrid 2005 event, to be held in September in San Diego. Clarke, however, expressed his desire to broaden usage. “To grow the GLIF community, we need to go beyond the usual suspects and find new e-science drivers, and to move scientific experiments into production usage as they begin to mature,” said Clarke. “It is also important to document GLIF applications on the web, to educate other scientists, as well as funding agencies.”

The GLIF Control Plane and Grid Integration Middleware Working Group is the only group that did not meet in Nottingham. The main players in this field already meet regularly in conjunction with other projects, notably the NSF-funded OptIPuter and MCNC Controlplane initiatives. De Laat, a GLIF organizer and participant, said, “The GLIF can only function if we agree on the interfaces and protocols that talk to each other on the control planes of the contributed Lambda resources.”

Bill St. Arnaud, a GLIF co-founder and visionary who predicted the growth of optical networks in the late 1990's, summed up GLIF’s mission. “Customer-empowered LambdaGrids may become the basis for the wired Internet infrastructure underlying future e-science, education, emergency services, health services and commerce. This is an opportune time for the international networking community to scale up research related to novel methods of exploiting these innovations in networked e-science applications. Perfected techniques may eventually allow commercial providers to offer profitable services and enable new customer applications, which may revitalize the software and services industries by taking ‘broadband’ into a new mass market.”

This year’s meeting attracted high-level managers and engineers from Australia’s Research and Education Network (AARNet), CANARIE (Canada), CERN, CESNET (Czech Republic), Chinese Academy of Science, DANTE/GÉANT (Europe), the European Commission, HEAnet (Ireland), Japan Gigabit Network 2 (JGN-II), Korea Institute of Science and Technology Information (KISTI)/KREONet2, National Center for High Performance Computing (NCHC, Taiwan), National

Institute of Advanced Industrial Science and Technology (AIST, Japan), NORDUnet (Nordic countries), SURFnet/NetherLight (The Netherlands), Trans-European Research and Education Networking Association (TERENA, Europe), the UK Joint Information Systems Committee (JISC), UKERNA/UKLight (United Kingdom), and WIDE (Japan). From the USA, there were representatives from National LambdaRail, Internet2, DoE ESnet, TeraGrid, Illinois' I-WIRE dark fiber initiative, California's CENIC network, the National Science Foundation's (NSF) StarLight, the NSF High Performance International Internet Services awardees (Euro-Link, TransPAC, GLORIAD and AMPATH), major GigaPoPs (Pacific Northwest GigaPoP and Pacific Wave, Midwest's MREN, the east coast's Mid-Atlantic Crossroads [MAX]), the Internet Educational Equal Access Foundation (IEEAF), SURA, and major universities and government laboratories.

UKERNA was pleased to host this year's GLIF meeting. The 2003 meeting was hosted by NORDUnet in Reykjavik, Iceland; the 2002 meeting was hosted by the Amsterdam Science & Technology Centre in conjunction with iGrid 2002; and, the 2001 meeting was hosted by TERENA in Amsterdam. This year a closing reception was hosted by the ON*VECTOR project, a collaboration of NTT Network Innovation Laboratories, University of Tokyo's Aoyama/Morikawa Laboratory, University of Illinois at Chicago's Electronic Visualization Laboratory, and Pacific Interface, Inc.

Given the tremendous international interest in building the LambdaGrid, the future of GLIF seems assured. It was agreed that TERENA would provide GLIF secretariat support, to begin in the near future. The next GLIF meeting was announced, to be hosted by Larry Smarr of the California Institute for Telecommunications and Information Technology [Cal-(IT)2] in conjunction with the iGrid 2005 conference at the University of California, San Diego next September. The offer from Professors Jun Murai of Keio University and the WIDE Project and Tomonori Aoyama of University of Tokyo and JGN-II to host the meeting in 2006 was accepted. To date, these Workshops have been invitation only, though this may change as participation grows. For more information, see <www.glif.is>.

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About GLIF

GLIF is a collaboration of institutions, organizations, consortia and country National Research and Education Networks (NRENs) who voluntarily share optical networking resources and expertise for the advancement of scientific collaboration and discovery. GLIF's mission is to create and sustain a Global Facility that supports leading-edge capabilities based on new and emerging technologies and paradigms related to advanced optical networking. These capabilities will enable high-performance applications and services, including the timely transfer of massive amounts of data, distributed computing, data analysis, collaboration and visualization, and control of remote instruments. GLIF provides leadership in advanced technologies and pre-production services on behalf of NRENs, NREN consortia, or pan-continental R&E networks, creating new models that they can implement. Once such services are available from NREN consortia, GLIF will refocus on new emerging paradigms to support its communities. For more information, see <www.glif.is>.