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The Innovative Computing Laboratory (ICL) at the University of Tennessee has been a leading participant in the Grid computing community for more than five years. As a charter member of both NSF Partnerships for Advanced Computational Infrastructure, NCSA and NPACI, and a participant in Grid development efforts within DOE and other agencies, ICL has focused on building the Grid's software infrastructure in the areas of middleware for scientific computing environments, self-adapting numerical software, and performance monitoring and optimization. Our contributions are illustrated by two middleware components – GridSolve and LAPACK for Clusters (LFC) – that are already part of standard Grid software distributions.

GridSolve, which is an extension of the well established NetSolve project, is middleware developed to enable scientists to leverage the power of the Grid while preserving their familiar work environments. It enables computational scientists employ community-standard scientific computing environments like Matlab, Mathematica, and Octave, and yet utilize, in an easy and transparent way, the aggregate hardware and software resources offered by computational Grids. With the support of the NSF Middleware Initiative (NMI), GridSolve has been integrated with the other key elements of the Grid software stack, such as Globus and Condor-G, allowing users of GridSolve to make routine use of standard Grid middleware services while working in the computing environment well adapted to their work. GridSolve is bundled in the latest NMI release.

LAPACK for Clusters (LFC) is self-contained middleware with built-in knowledge of how to run linear algebra software on a cluster, merging the ease of use of the standard serial linear algebra package, LAPACK, with the parallel processing power of ScaLAPACK. Using information on the user's problem and the state of the target cluster if a given problem can be completed faster in parallel, LFC automates the use of the parallel environment, making decisions about the number of processors to use, distributing the data appropriately, and collecting the results. LFC (as well as GridSolve) will be part of NPACI's production ready suite of grid software, NPACKage.

Along with the dissemination of Grid middleware, ICL is engaged in the deployment of operational Grid infrastructure for several research projects in which it participates. Two prominent examples are the *Scalable Intracampus Research Grid (SInRG)* and *Southeast Teragrid Extension for Neutron Science (SETENS)*. SInRG is an NSF funded "campus area" grid testbed at the University of Tennessee, which is built around NetSolve/GridSolve middleware and supports applications in a variety of fields, including image processing, computational biology, and environmental modeling. SETENS will connect DOE's Oak Ridge National Laboratory neutron science facilities, including the Spallation Neutron Source, to the NSF Teragrid project. Seven southeastern research universities are collaborating in the project.