

NMI Integration Testbed Annual Report

September 1, 2002 - August 31, 2003

The NMI Integration Testbed provides evaluation of released NMI middleware components as they are integrated within actual projects and real life conditions. SURA is developing and managing the NMI Integration Testbed as a sub-award to UCAID under NSF Cooperative Agreement ANI-0123937, "Supporting Research and Collaboration through Integrated Middleware".

NMI Testbed sites under contract to SURA submit annual performance reports to SURA as part of their contracted deliverables. The NMI Integration Testbed Annual Report combines information from site reports with observations and documentation of the NMI Testbed Manager to serve as an overall program report. Administrative details are included in a separate Attachment A.

Note: Periodic status reports and reports detailing the first year of the NMI Integration Testbed Program are available on the NMI Testbed Web site, http://www.nsf-middleware.org/testbed/testbed_status.asp, under "General Status & Reports."

The NMI Integration Testbed contributed to middleware evaluation and deployment in the following core areas from September 1, 2002 through August 31, 2003:

- NMI component evaluation, Releases 2 and 3
- Increased project & enterprise integration
- Dissemination of results via presentations & workshops
- "Evangelizing" middleware and the importance of the NMI at their own institutions.

In addition, SURA initiated and developed related activities with the Testbed sites to further leverage the knowledge and experience being gained:

- Establishment of NSF REU (Research Experience for Undergraduates) student positions
- Development of small-group middleware implementation training
- Development of a structured Testbed grid project

NMI Evaluation & Deployment

NMI Component Evaluation

NMI Integration Testbed sites completed evaluation of NMI Releases 2 and 3 during the time period of this report. This component evaluation coupled with project and enterprise integration is the core activity of the Testbed. Fifty-nine reports were completed for Release 2 evaluation, covering all 25 components of the release. Fifty-seven reports were completed for Release 3, targeting new and updated components since several others had been evaluated in previous releases and did not change for Release 3.

Feedback from the Testbed sites is provided according to Component Testing Guidelines that are developed in collaboration with the NMI Testbed Manager and the Testbed Council, a sub-set of the NMI EDIT and NMI GRIDS Management team. In this process, the Testbed Council

communicates on behalf of the Management team and also on behalf of relevant developers to identify evaluation priorities, depth, and directions. The Guidelines are extensive, tailored to each release, and provide per-component detail on the evaluation approach, support during the evaluation cycle, and format/timing of final reports. Completed evaluation reports are sent in their entirety to the NMI Testbed Manager and to the Testbed Council who forward reports to applicable developers. At this time, the NMI support process does not provide for any form of regular feedback to the Testbed sites regarding the impact of their evaluation. In the absence of this, creating the Component Test Guidelines using the process above provides a mechanism to insure that the nature and timing of the evaluation is positioned to positively impact future NMI releases.

As the NMI has moved from Release 1 to Release 3, there has been increased emphasis from the NMI Management team and the NSF to identify concrete examples of value being achieved through the integration of NMI middleware. The evaluation tasks and reporting formats of the Component Testing Guidelines have evolved accordingly and the trend among Testbed sites' evaluation overall has been towards more practical critique born of deeper project integration. Sites are making substantial progress in leveraging their middleware experiences to catalyze advanced infrastructure deployment for their campuses (enterprise directory services, campus grids) and also to expand remote access to resources for both existing and emerging research projects.

The evaluation matrices for NMI Release 2 and 3 (which sites signed up to evaluate which components) are available as Attachment B to this report and also on the NMI Testbed Web at http://www.nsf-middleware.org/testbed/testbed_status.asp under "Component Evaluation." The Component Test Guidelines are too lengthy to include here but are available at the same Web location for each release along with the matrix.

Project & Enterprise Integration

In addition to component evaluation, each Testbed site is continuing to integrate NMI middleware usage into both research and enterprise activities at their institutions:

- Nearly all NMI Testbed sites have initiated, catalyzed or solidified their deployment of key research and enterprise infrastructure through their participation in the NMI. Seven sites have extended their enterprise authentication, authorization and directory services to provide centralized information for applications such as click-to-dial video conferencing, self-service email configuration, campus white pages, authenticated downloads for IT management, and integrated course management systems. Four sites are actively building campus-wide research grids that will be based on or are heavily integrating NMI components; an additional two have begun to explore similar efforts as a result of their NMI work.
- NMI Testbed sites are leveraging their experience evaluating NMI components to extend the accessibility of specific research projects. Examples include:
 - The PHENIX/RHIC (Relativistic Heavy Ion Collider) project at GSU (Dr. Xiaochun He, <http://petitt.phy-astr.gsu.edu/welcome.html>)
 - GSU's work to grid-enable graphic rendering for biology students, providing support for visualization as learning modality.
 - Plans to integrate enterprise and research authentication for GSU researchers' access to the Particle Physics Data Grid (<http://www.ppdg.net/>).

- Facilitated access for UMich researchers' to the ATLAS Grid Testbed (<http://gate.hep.anl.gov/gfg/usatlasgrid/>)
 - UAH's Development of grid-based advanced collaborative applications at UAH such as the NCSA MEAD expedition (<http://www.ncsa.uiuc.edu/expeditions/MEAD>) and NASA Marshall Space Flight Center's Space-based Science Operations Grid to support remote science investigations for International Space Station payloads.
 - UVA's extension of the large-scale molecular dynamics code, CHARMM, to operate on an NPACI Grid using Globus, greatly increasing the number of users who might use CHARMM in a Grid environment.
- Georgia State University is making a direct contribution to K-12 education through a project to bring nuclear physics project involvement to the desktops of local area Georgia high schools. This project is being led by Dr. Xiaochun He and related to the "Quarknet" project (<http://quarknet.fnal.gov/>), of which GSU is a 2003 Center. The project will incorporate GRIDS technology from GSU's NMI Testbed experience to manage distributed muon detectors among project participants.
 - Several NMI Testbed sites are actively involved in independent middleware development projects. Among these are the University of Virginia ("Complex Application Requirements in Grid Computing/Legion-G/OGSA.NET"), Texas Advanced Computing Center (the NPACI Grid Portals project, <https://hotpage.paci.org>), the University of Alabama at Birmingham (ViDe.Net Middleware Project, <http://lab.ac.uab.edu/vnet/>), and GSU ("Semantic Facilitator™ (SM)" - display and analysis of directory objects). As noted in NMI Testbed site plans, the participation of PIs for these projects within the NMI Testbed is providing a valuable means of reciprocal feedback.

Dissemination of Results through Presentations and Workshops

The first Testbed results workshop, "Experiences in Middleware Deployment," was held April 8, 2003 as a pre-conference event of the Internet2 Spring 2003 Members' meeting. NMI Testbed sites spoke in-depth on their experiences and lessons learned while working to implement campus grids, research grids, and enterprise-wide identity and directory services using components from NMI Releases 1 and 2. The workshop was well received by an audience of 56 attendees representing 32 organizations. Presentations are available online on the NMI Testbed Web site: http://www.nsf-middleware.org/testbed/testbed_status.asp.

Planning commenced immediately after this for a second Testbed results workshop to be held November 3, preceding EDUCAUSE 2003. This would enable a repeat of this successful dissemination of Testbed results to a different and expanded audience. Proposal submissions were also planned for the Internet2 Fall Members' meeting in October 2003 and GlobusWorld in January 2004.

Additionally, Testbed site representatives proactively pursued dissemination opportunities on their own through presentations at other conference venues and in internal meetings and training events at their institutions. Presentations of this type are numerous, particularly internal "evangelizing," but fall outside the mandatory reporting requirements of Testbed participation (though the reporting is encouraged!) During the time period of this report, three papers, nine internal presentations and fourteen external presentations were given, as explicitly mentioned in Testbed Site annual reports.

The NMI Testbed Manager participated in panel presentations as arranged by NMI Outreach at EDUCAUSE 2002 (October), the Internet2 Fall Members' meeting (October 2002), and SuperComputing 2002 (November 2002). Georgia State University and Florida State University also participated at the invitation of NMI Outreach in a panel presentation, "The Other Side of Middleware: Working with Policy Makers, Data Owners and Campus Constituents," at the Internet2 Fall Members' meeting, October 2002.

Leveraging Resources, Knowledge and Experience

NSF Research Experiences for Undergraduates (REU) –

SURA proposed and was awarded an NSF Research Experiences for Undergraduates (REU) supplement to support five undergraduate student experiences at four NMI Integration Testbed sites: Georgia State University, the Texas Advanced Computing Center at the University of Texas Austin, the University of Michigan, and the University of Virginia. Under this award, Testbed sites host the students and provide the research and mentoring experience; SURA assures the overall quality of the program, administers funds and reporting. All sites have experience with student programs, some with the REU specifically. Each Testbed REU position is grounded in the qualifications, experience, and facilities of the host institution but will be part of a unified NMI experience through the integration of student input into the processes of the NMI Testbed Program. Students will work with middleware that is actively under development and have opportunities to influence how development proceeds. Additional detail is available at http://www.nsf-middleware.org/testbed/status/NMI_Testbed_REU.doc.

SURA PACS NMI Workshop: Enterprise Directories and Directory-enabled Applications –

The NMI Testbed Manager collaborated with SURA's lead on funding under the NCSA PACS program to explore training workshops that could be developed from the experience and knowledge being gained in the NMI Testbed. Funding was approved under the 2003 PACS grant to develop a prototype event as proof of the larger concept. The development of this first workshop, "Enterprise Directories and Directory-enabled Applications," was led by SURA with involvement from content experts from Georgia State University, the University of Florida, the University of Alabama at Birmingham, the University of Alabama in Huntsville and NMI-EDIT. Initial development took place from February through July 2003 and a first run was offered to an audience of "deployment-ready" members of the AN-MSI (Advanced Networking Project for Minority-Serving Institutions) project and the CIC (Council of Independent Colleges). Feedback from this first offering was used to refine development towards a second workshop for additional members of these same communities in September 2003. More information is available on the SURA Web site at http://www.sura.org/info_tech/SURA-NMI-workshops/NMIIndex.html.

Testbed grid project –

After evaluating NMI components for the past 17 months, several Testbed sites had both interest and activity in the deployment of grid technology. In some cases, this was in response to Testbed site representatives increasing their own familiarity with grid tools and seeking to raise the awareness and use of grids at their institution. In other cases, Testbed site representatives themselves are expert in grid research and development and identified critical areas for grid

evolution that the Testbed is uniquely positioned to address. Sites expressed a desire to work together within the virtual organization of the NMI Testbed to support and grow this activity. In response, SURA formalized a program for deployment of an intra-testbed grid capable of supporting a wide variety of projects within and between organizations. The intra-testbed grid will initially enable researchers and educators to showcase the reality and potential of grids for faculty and researchers. Art Vandenberg, Director of Advanced Campus Services, GSU, will spearhead this portion of the project and also develop a catalog of grid and grid-ready applications at Testbed sites. Marty Humphrey and Jim Jokl at UVA will lead a second arm of the project, to examine, document and recommend solutions for issues critical the scaling inter-institutional grids (e.g., cross-campus grid authentication and authorization.) See http://www.nsf-middleware.org/testbed/status/Testbed_grid_project.doc for more detail.

Future Directions

During the time period of this report, SURA collaborated with NMI EDIT team partners to submit a proposal to the NMI for continuation as well as expansion of current work. NMI Testbed activity was initially included in the proposal but was eliminated byUCAID PIs in response to budget cuts requested by the NSF prior to finalizing an award. It is clear, however, that the existing NMI Integration Testbed is viewed as a valuable entity by the NMI Program at large (note separate mention in NSF NMI Fact Sheet and related press release, September 2003, http://www.nsf.gov/od/lpa/news/03/fs03_nmi.htm) and NMI Testbed sites have expressed a strong desire to continue working together and build upon what has been started. SURA is examining ways to develop and sustain this valuable collaboration.

In the coming (and final) project year, the NMI Testbed will continue to evaluate and integrate NMI components following the process already defined in collaboration with NMI EDIT and NMI GRIDS. The availability of NMI Release 4 is certain and Testbed sites will evaluate that release from December 2003 through May 2004. NMI Release 5 is anticipated to release immediately following that and, if so, the Testbed will evaluate Release 5 within the final four months of the award and culminate the program with a third Testbed results workshop. However, NMI Release 5 will also be the first to include contributions from the system integrators that were added to the Management team with the most recent round of NMI awards. If NMI Release 5 is not available as planned, the final four months of the Testbed program will be used for more extensive “wrap-up” activities. These include expanded documentation of Testbed sites’ middleware application and integration activities as a direct contribution to NMI outreach, and planning focused on leveraging the success of this initial evaluation program towards future contributions to the national R&E middleware infrastructure.