

University of Kentucky Quarterly GENI Report

Jim Griffioen and Zongming Fei

Department of Computer Science
University of Kentucky

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1 Major accomplishments

The following highlights our accomplishments during Q4 2009.

1.1 Milestones achieved

In the past quarter we made continued progress toward our milestones. In summary we:

- continued to support operation of the Kentucky ProtoGENI prototype, enabling basic experimentation through the ProtoGENI clearinghouse. We have begun granting access to external researchers.
- released a document describing the architecture/design of our instrumentation and measurement system and toolset.
- implemented an initial version of our instrumentation toolset and demonstrated it at GEC 6.
- held discussions with the security group, the ProtoGENI group, and the Planetlab group regarding ways to provide authenticated secure access to the measurement system and measurement resources.
- created a software package with our enhancements to the ProtoGENI system, but have not yet determined the best way to release it.

1.2 Deliverables made

GENI Report: J. Griffioen, Z. Fei, H. Nasir, Architectural Design and Specification of the INSTOOLS Measurement System, December 2009

2 Description of work performed during last quarter

The following provides a more detailed description of our work and results from the last quarter.

2.1 Activities and Findings

During this quarter we made significant progress on our instrumentation and measurement system including demonstration of our initial prototype, documenting its design, and opening it to use by other researchers.

We continued to work on the overall design of our instrumentation and measurement system which has been evolving as we better understand the capabilities and limitations of the underlying control frameworks. We recently published a report describing the architecture of the measurement system. Our architectural design divides the system into the following components: measurement setup, data capture, data collection, data storage, data processing,

measurement control, access, and presentation. We have made significant progress on our implementation of these components in the past quarter. Our current implementation uses hooks into the ProtoGENI control framework to invoke our code that sets up a measurement control (MC) node for each slice. As part of the setup, each sliver launches software to capture measurement data that is then collected by the MC. The raw data collected is typically stored in RRD database files and then converted using rrdtools into graphs that show traffic levels or utilization levels. The MC also houses a web server that provides users with (visual) access to the graphs and charts of measurement data. Our current user interface is a simple PHP-based interface that allows users to select the sliver or link for which they want to see measurement data. The data is then displayed and automatically refreshed every 5 seconds to give the impression of a “live” view of the running system.

We demonstrated our measurement system and user interface at the GEC6 conference and had several helpful discussions regarding its design and also received suggestions for additional features that users would find valuable. One enhancement we have started to develop is the use of a database and content management system to store the collected data. In particular, we are using features of the content management system to allow users to define the “look and feel” that best meets their needs and also to delay data processing until it is requested by users. We have started to redesign our web interface to utilize features of the Drupal content management system.

Having implemented and deployed our measurement system on the Kentucky ProtoGENI aggregate, we are now using the system on a regular basis in our own code development, but we have also made the system available for use to outside researchers. We updated the GENI wiki pages to describe the process for obtaining an account and accessing our system. We have created accounts for some early users and have been working with them to help them use the system and its measurement capabilities. In addition to making our prototype implementation available to others, we have packaged our software in preparation for release. We have not yet released our code as it is not clear what the distribution mechanism should be; particularly since our code is based on a particular release of the ProtoGENI code which is changing daily. At the recommendation of our Utah colleagues, we have updated our system to the latest version of the ProtoGENI code multiple times during the last quarter. We have had discussions about how to release our code, but as of yet have not settled on a distribution approach.

We also met with Steve Schwab at GEC 6 to discuss our security requirements and issues. As part of these discussions it became clear that other clusters are facing similar security problems and a common solution would be helpful. We have had a few follow-up discussions presenting various base-level mechanisms, but have not yet reached agreement. At the moment we are using an approach that only requires certificates and ssh keys and bootstraps the other security/authorization mechanisms from these capabilities.

We continue to explore other tools that we can incorporate into our system. We are currently working on a design to incorporate netflow data into the system, and we have had discussions with our colleagues at Delaware regarding the use of perfsonar.

2.2 Project participants

The following individuals have helped with the project in one way or another during the last quarter:

- Jim Griffioen - Project PI
- Zongming Fei - Project Co-PI
- Hussamuddin Nasir - The project’s primary technician and programmer
- Xiongqi Wu - Research Assistant
- Jeremy Reed - Research Assistant (half time)
- Lowell Pike - Network administrator
- Woody Marvel - Assists in Emulab administration

2.3 Publications

GENI Report: J. Griffioen, Z. Fei, H. Nasir, Architectural Design and Specification of the INSTOOLS Measurement System, December 2009

2.4 Outreach activities

We have begun granting access to outside researchers and supporting them in using the system.

2.5 Collaborations

Most of our collaborations continue to be with the Utah ProtoGENI team, and we continue to be actively involved in the bi-weekly meetings of the ProtoGENI cluster.

2.6 Other Contributions

None yet.