

ExptTraining: Project Status Report

Period: Jul 2012 – Oct 2012 (GEC15: Oct 23-25)

I. Major accomplishments

A. Milestones achieved

- Ported and tested our Linux based workload and background traffic generation tools on ProtoGENI;
- Developed a short, draft tutorial for “hello world experiments” running and measuring synthetic traffic over ProtoGENI nodes;
- Successfully demonstrated an experiment using Tmix running on ProtoGENI nodes during the GEC15 demo session; used Flack and Instools during the demo as well.
- Uploaded other sample experiments and related results onto our wiki page;
- Introductory session (two hours each) about “using GENI for systems/networking experiments” on two days during the Grace Hopper Celebration (GHC) Conference in Baltimore, MD in October 2012, with posters, information and sign-up sheets;
- Submitted a GENI half-day tutorial proposal to the largest Computer Science education conference, SIGCSE (<http://www.sigcse.org/sigcse2013/>), to be held in March in Denver.
- Coordinated with the Department of Computer Science at UNC-Chapel Hill to schedule an offering of a networking course during the Spring 2013 semester, with student homeworks and assignments that require running experiments on GENI testbeds.

B. Deliverables made

- New GENI-Tmix page (which redirects to a page on the GENI wiki to make it more accessible to the GENI community):
<http://cs.unc.edu/~aikat/geni/>
- More links from the above GENI-Tmix page include:
 - Tmix details: <http://groups.geni.net/geni/wiki/TmixDetails>
 - Sample experiments: <http://www.cs.unc.edu/~aikat/geni/exp-results/>
 - GENI-Tmix-Intro-Tutorial:
<http://groups.geni.net/geni/attachment/wiki/ExptTraining/GENI-Tmix-Intro-Tutorial.pdf>
- Poster 1: “GENI-Tmix”
<http://groups.geni.net/geni/attachment/wiki/ExptTraining/UNC-GEC15-poster1.pdf>
- Poster 2: “Experiments using GENI-Tmix”
<http://groups.geni.net/geni/attachment/wiki/ExptTraining/UNC-GEC15-poster2.pdf>

II. Description of work performed during last quarter

A. Activities and findings

- We continued testing of our Tmix traffic generation tools on Protogeni nodes, and worked out the details of setting up the nodes to run Tmix.
- We successfully ran several experiments on Protogeni nodes. These experiments consisted of running realistic synthetic traffic using Tmix as well as Iperf TCP flows for comparison. The realistic synthetic traffic using Tmix consisted of roughly 150,000 TCP flows simulated over an hour-long experiment. The traffic was originally captured on the border link connecting the UNC-Chapel Hill campus to the Internet through its ISPs.
- We collected traffic during our hour long experiment using tcpdump at the Protogeni nodes and demonstrated that the output traffic characteristics were the same as the characteristics of the input traffic to the experiment. These characteristics included the minimum round trip times of each connection, the sizes of requests and responses within each connection, and the number of active connections per second during the hour long experiment. These results have been uploaded to our wiki page under sample experiments.
- We used Flack and Instools to run such an experiment with Tmix and Iperf saturating a 100Mbps link between two Protogeni nodes when we demonstrated our traffic generation tools at the GEC15 demo session in Houston.
- In preparation to fulfill one of our milestones for the second year, we coordinated with the Department of Computer Science at UNC-Chapel Hill to schedule an offering of a networking course during the Spring 2013 semester, with student homeworks and assignments that require running experiments on GENI testbeds.

While the following were not part of our contract, we identified these as mutual interests and worked with the GPO to accomplish them successfully:

- We offered an introductory session (two hours each) about “using GENI for systems/networking experiments” on two days during the Grace Hopper Celebration (GHC) Conference for Women in Computing in Baltimore, MD in October 2012, with posters, information and sign-up sheets;
- We also submitted a GENI half-day tutorial proposal to the largest Computer Science education conference, SIGCSE (<http://www.sigcse.org/sigcse2013/>), to be held in March in Denver.

B. Project participants

Kevin Jeffay, PI, UNC - Chapel Hill

Jay Aikat, UNC - Chapel Hill

C. Publications (individual and organizational)

Refereed Publication:

J. Aikat, S. Hasan, K. Jeffay, and F. D. Smith, *Towards Traffic Benchmarks for Empirical Networking Research: The Role of Connection Structure in Traffic Workload Modeling*, IEEE MASCOTS (Modeling, Analysis, and Simulation of Computer and Telecommunication Systems), Washington DC, August 2012.

Unrefereed Abstract:

J. Aikat and K. Jeffay, *Evolution of Networking Research into a Science*, COMBINE: the US Department of Energy (DoE) exploratory Workshop on Computational Modeling of Big Networks, Washington DC, September 11-12, 2012.

D. Outreach activities

- As mentioned above, we offered an introductory session (two hours each) about “using GENI for systems/networking experiments” on two days during the Grace Hopper Celebration (GHC) Conference for Women in Computing in Baltimore, MD in October 2012, with posters, information and sign-up sheets;
- Aikat successfully received a NSF CC-NIE award, in collaboration with four other researchers on the UNC-Chapel Hill campus, grant number 1245783, December 2012, 2 years.
- As part of the above award, we (UNC-Chapel Hill) are sending our campus networking representative to the combined GENI-CCNIE meeting being held at NSF in January 2013.

E. Collaborations

We continue to collaborate closely with the ProtoGENI group and the GPO in trying to identify conferences where we could offer GENI tutorials.

F. Other Contributions

Aikat has agreed to serve as a member of the Technical Program Committee for GREE (GENI Research and Educational Experiment) 2013 Workshop.