

GENI Report for ViSE project July 1st, 2010 - GEC9 in early November

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I. Major Accomplishments

The eighth quarter of the ViSE project includes the following major accomplishments:

- Publication of a paper on ViSE-related technology. Our work on “MultiSense: Fine-grained Multiplexing for Steerable Sensor Networks,” which describes our sensor virtualization technology, has been accepted to appear in the 2011 ACM Multimedia Systems Conference.
- Significant progress towards our goals for year 3 of the project. Our GENI Alpha demonstration on Nowcasting at GEC9 in Washington, D.C. demonstrated the research goals we envision ViSE users will be able to accomplish.
- Significant collaborations with, and contributions to, our Cluster D peers through numerous email exchanges, video conferences, and in-person meetings.

The rest of this document describes in detail the major accomplishments above.

I.A. Milestones Achieved

- **November 5th, 2010.** Demonstration at GEC9 and Experimenter Outreach.

We presented our Nowcasting demonstration at GEC9. The foundation of better weather forecasting is better data. Scientists in CASA, an NSF Engineering Research Center, are studying experimental radar systems that comprise dense networks of small, controllable radars. These networks supplement and enhance NEXRAD by accurately sensing conditions close to ground where inclement weather often occurs. As a driving example, we show data from CASA’s off-the-grid student testbed in Mayaguez, Puerto Rico. Last July, the testbed successfully detected the severe windstorms that delayed the Central American Games earlier than otherwise possible, which also enabled earlier warnings.

As a result of their accuracy, these systems produce vast amounts of streaming data from a multitude of geographically disparate sites. To be useful at scale, especially in time-critical situations, this data must quickly flow to processing centers that merge it to execute complex forecasting algorithms that predict the movements of weather patterns in real-time. Since inclement weather is rare, maintaining dedicated network/computing resources is a significant barrier to deployment at scale. This demonstration highlights an array of GENI technologies to remove this barrier, by experimenting with the execution of radar workflows and forecasting algorithms, developed by CASA scientists, on GENI and cloud networks that also include computing and sensing resources reserved on-demand.

- **November 18th, 2010.** Documentation and Code Release for GEC9 Alpha Demonstration.

We are putting together a release of the VM images, radar data, and code from the demonstration. The artifacts are already available publicly on Amazon S3.

I.B. Milestones in Progress

Below we list the milestones through GEC10, as agreed upon in our Spiral 3 Statement-of-Work.

- **March 5th, 2011.** Demonstration at GEC10 and Experimenter Outreach

Our GEC10 demonstration will extend our GEC9 Alpha demonstration by providing packaged VM images to dynamically instantiate radar experiments.

- **April 5th, 2011.** Documentation and Code Release

As for the GEC9 demonstration, we plan to make the artifacts available on the Wiki and via S3.

II. Deliverables Made

ViSE's primary deliverable was the GEC9 Alpha demonstration and the associated virtual machine images, data, and code that made that demonstration possible.

III. Description of Work Performed During Last Quarter

The primary work during the quarter, including our Activities and Findings, centered on creating our GEC9 Alpha demonstration in collaboration with scientists at CASA-affiliated universities. In addition, we held bi-weekly Cluster D group meetings via teleconference to sync up with our other cluster members. As part of our demonstration, we tested the latest release of the Orca control framework and setup a Eucalyptus cluster with GENI-specific patches to control data-plane and management-plane NICs independently (released by the Orca/BEN project).

III.A. Project Participants

The primary PI is Prashant Shenoy. Co-PIs are Michael Zink, Jim Kurose, and Deepak Ganesan. Research Staff is David Irwin. Navin Sharma, a graduate student, is also contributing to the project and is the primary author of the ViSE-related technical report.

III.B. Publications (individual and organizational)

Navin Sharma, David Irwin, Prashant Shenoy, and Michael Zink. "MultiSense: Fine-grained Multiplexing for Steerable Camera Sensor Networks," ACM Multimedia Systems Conference, San Jose, California, February, 2010.

III.C. Outreach Activities

Part of our GEC9 Alpha demonstration is dependent on our collaboration with the off-the-grid student testbed in Puerto Rico.

III.D. Collaborations

We collaborated with other Cluster D projects significantly during the quarter. We continue to maintain geni.cs.umass.edu for both the ViSE and DOME projects, and test pre-release versions of Orca, as we did for the GEC9 Alpha demonstration. Additionally, we had numerous email exchanges on the Orca user mailing list about the intricacies of integration and setup. Finally, we setup a Eucalyptus cluster with modified network configuration code released by the Orca/BEN project.