**DiCloud Project Status Report**

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# Major accomplishments

The DiCloud project includes the following major accomplishments between GEC12 and GEC13:

* Software and documentation releases for GEC12 DiCloud Tutorial. The tutorial instructions are available at <http://groups.geni.net/geni/wiki/GEC12VMSetup> and include the tutorial’s PowerPoint presentation and software.
* Tutorial at GEC12

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

## Milestones Achieved

We achieved the following milestones between GEC11 and GEC12.

* **S4.c:** Upgrade to the latest stable Orca release. Maintain Orca site authority with 5 Eucalyptus servers.
  + *Note that since Orca has upgraded to using OpenStack for the GENI racks project, we are in the process of familiarizing ourselves with OpenStack. While we are not scheduled to receive a GENI rack before October, we hope to receive one in the next Spiral.*
* **S4.d:** Demonstrate personalized Nowcasting experiments via DiCloud. Nowcasts are highly accurate forecasts 2-30 minutes into the future. Demonstrate on-demand Nowcasts using GENI resources for the Amherst area.
  + *In lieu of the personalized Nowcasting demonstration, which we have shown at a prior GEC, we instead collaborated with the GIMI project to use DiCloud resources and Gush to execute measurement experiments on multiple GENI substrates (PlanetLab, GENICloud, Orca, ProtoGENI) and record their results in OML format in a distributed iRods database.*
* **S4.**e: The documentation and code release will detail how to run the on-demand Nowcasting experiment in our demonstration for users.
  + *As discussed below, the Nowcasting experiment is packaged as Amazon Machine Images available for booting through EC2.*

## Milestones in Progress

* S4.f (Intermediate): Coordinate with Orca Cluster D project to package DiCloud as part of the standard Orca release.
* S4.g (GEC14): Demonstrate Nowcasting experiment workflow using Gush-Orca-Dicloud stack.

# Deliverables Made

* Deliverable S4.d has been made available in the form of Amazon Machine Images that user can boot through EC2. The Amazon Machine Images for the Nowcasting experiment are available as ami-a4d720cd and ami-bad621d3.

# Description of Work Performed During Last Quarter

## Activities and Findings

Between GEC12 and GEC13, we studied the efficacy of using the different GENI resources available for real time scientific applications, such as Nowcasts. These resources included GENICloud, PlanetLab, ProtoGENI, and Orca resources. We ran extensive Nowcasting experiments on each substrate to quantify the available bandwidth and latency (including its jitter) to determine whether it can support a real-time Nowcasting application. We describe these experiments in a paper at the GENI Research and Educational Experiment Workshop. They should provide GENI researchers a good idea of what type of performance to expect out of the platform today. Additionally, we used PlanetLab resources to model NEXRAD radar locations and then experimented with a Nowcasting application between these resources and Amazon cloud data centers (by using EC2, S3, and EBS). We report our findings in the technical report below, *CloudCast: Cloud Computing for Short-term Mobile Weather Forecasts,* which is under submission for publication to a conference. This work shows how appropriate GENI and today’s cloud platforms are for this type of distributed real-time, mission-critical application. Finally, we summarize the architecture for our cloud-based weather detection and warning system in a recent short paper and poster at IGARSS 2012. In addition to our activities directly related to the weather forecasting application on GENI (using Cloud resources), we also collaborated with the GIMI project on a demonstration at GEC13 using DiCloud resources and Gush. The demonstration used DiCloud resources (and resources on other GENI substrates) to run bandwidth latency/measurement experiments between different nodes and then store them in a distributed iRods database. We used Gush to get resources from the GENI substrates (via OMNI) and script the startup of the experiment, which used an OML-enabled version of iperf. Thus, the measurement data was structured as OML.

## Project Participants

The primary PI is Michael Zink. Co-PIs are Prashant Shenoy, and Jim Kurose. Research Staff is David Irwin and Emmanuel Cecchet. Dilip Kumar Krishnappa is a graduate student.

## Publications (individual and organizational)

Dilip Kumar Krishnappa, Eric Lyons, David Irwin, Michael Zink. *Compute Cloud Based Weather Detection and Warning System.* Proceedings of the IEEE International Geoscience and Remote Sensing Symposium, Munich, Germany, July 2012.

Dilip Kumar Krishnappa, Eric Lyons, David Irwin, Michael Zink. *Performance of GENI Cloud Testbeds for Real Time Scientific Application.* Proceedings of the First GENI Research and Educational Experiment Workshop. Los Angeles, California, March 2012.

Dilip Kumar Krishnappa, Eric Lyons, David Irwin, Michael Zink. *CloudCast: Cloud Computing for Short-term Mobile Weather Forecasts.* Technical Report, University of Massachusetts Amherst, January 2012.

## Outreach Activities

No outreach activities this quarter.

## Collaborations

We collaborated with other Cluster D projects during the quarter. We provided feedback and participated to discussions on the mailing list. We are actively consulting with the GUSH PI on Omni and Orca integration with DiCloud.