GENI Science Shakedown Report
Post GEC23 - June 2015

The GENI Science Shakedown project has made progress for the time period including leading to GEC23.   The high-level goal of this period was to start working with NSFCloud's mid-scale infrastructures toward porting ExoGENI and the ADCIRC Storm Surge modeling workflow to these systems.

In the months leading up to GEC23 we were able to accomplish the following tasks:

Port ADCIRC to CloudLab (Baremetal): We ported the existing ADCIRC software to run on CloudLab's baremetal machines (APT). This included porting the MPI portion of the application to use APT's Infiniband (low-latency, high bandwidth) network fabric.   Typically ADCIRC (and most MPI applications) require Infiniband network fabric to achieve their highest performance. We have run ADCIRC on up to 64 of CloudLab's baremetal nodes (512 cores) and have achieved performance comparable to RENCI's Hatteras cluster which typically hosts production ADCIRC runs.

Port ADCIRC to CloudLab (Virtual Machines): We have used CloudLab's baremetal nodes to host KVM virtual machines which are configured to run ADCIRC.   In this case we have used Infiniband, SR-IOV, and PCI passthrough mechanisms to achieve near-native performance of ADCIRC within virtual machines.   It is too early to publish specific results however we are achieving single-digit percent overheads of virtualization when compared to baremetal.

Port ADCIRC to Chameleon (Baremetal): We ported the existing ADCIRC software to run on Chameleon's during its early adopter period. For now, Chameleon's new hardware is not avaialble and is using the repurposed ALAMO cluster. This work included porting the MPI portion of the application to use Infiniband (low-latency, high bandwidth) network fabric. Typically ADCIRC (and most MPI applications) require Infiniband network fabric to achieve their highest performance. We have run ADCIRC on up to 20 of Chameleon's baremetal nodes (160 cores) and have achieved performance comparable to RENCI's Hatteras cluster.