DOME
Spiral 2 Year-end Project Review

University of Massachusetts, Amherst

PI: Brian Levine, Mark Corner

Staff: Brian Lynn, Thijs de Vries (12mo until 6/2010)

Students: Bryan Donlan (REU 2009-2010)

August 26, 2010

Sponsored by the National Science Foundation

Project Summary

- Mobile test bed on 35 UMass Transit buses
  - Each equipped with computer, 3G modem, WiFi card, wireless access point, GPS, 900 MHz radio
  - Virtualized environment
    - Experiments are isolated within a virtual machine
    - Full, exclusive access given to WiFi, 900 MHz radio
    - 3G connection, GPS and access point are shared devices
- Web site to define and schedule experiments on buses
  - Researchers submit “disk images” that are distributed to buses by DOME, mounted by virtual machines
  - Integrated with ORCA for scheduling
- DOME is real
  - Experiments are being run on DOME
  - Actively maintaining the equipment

Milestone & QSR Status

ID	Milestone	Status	On Time?	On Wiki?	GPO signoff?
a	Complete integration with broker in clearinghouse	Completed, demonstrated	On time	Yes	Yes
b	Cluster plan for VLANs between testbeds	Completed, delivered	On time	Yes	Yes
c	Control VLAN connections	Completed, demonstrated	On time	Yes	Yes
d	Import extended V2.1	Completed, demonstrated	On time	Yes	Yes
e	Improve virtualization and experiment control	Completed, demonstrated	Early	Yes	Yes
f	Import extended ORCA v2.2	Completed, delivered	On time	Yes	Yes
g	Include 900MHz radios	Completed, demonstrated	Early	Yes	Yes
h	Demo experiment to another testbed	Completed, delivered (Million Node GENI)	On time	Yes	Yes
i	Plan for VLANs to endpoints	Completed, delivered	On time	Yes	Yes
j	Available to GENI users	Completed, demonstrated	Early	Yes	Yes
k	POC to GENI response team	Ongoing	N/A	N/A	N/A
l	POC to GENI security team	Ongoing	N/A	N/A	N/A
m	Contribution to GENI outreach	Ongoing	N/A	N/A	N/A

Accomplishments 1: Advancing GENI Spiral 2 Goals

- Continuous Experimentation
  - Researchers (UMass, U of Arkansas, Duke, CUNY) running experiments on DOME
  - As of April 2010, all resources consumed by user-submitted experiments
  - Prior to 4/2010: spare cycles used to run Million Node GENI (U of Washington), collect longitudinal data
- Integration
  - DOME portal integrated with ORCA to perform scheduling
  - Granular scheduling introduced in Spiral 2
  - Share ORCA container with ViSE project
- Instrumentation & Measurement
  - Tools to collect and offload data
  - Added ability to generate and export supporting data (when an experiment ran, when a bus ran, bus routes, etc.)
- Interoperability
  - Have VLAN to CS building, but no connectivity to mobile network (WiMAX?)
  - DOME environment makes framework interoperability difficult
    - DOME model: schedule a *specific experiment* on the test bed
    - Distributed a white paper

Accomplishments 2: Other Project Accomplishments

- Lots of documentation, examples available on web site
- Tools for researchers and administrators
  - Health of test bed, buses, equipment
  - Status of experiments: what is scheduled, buses that have downloaded experiments
  - Experiment history
- Behind the scenes work on test bed reliability
  - Diagnostics, rewiring and equipment relocation, disk reliability
- Added features requested by users
  - Monitor Internet access of bus riders
    - Privacy issues, IRB, opt-in by riders
  - Experiment data export

Issues

- 3G ongoing costs

Plans

- Spiral 2: Current emphasis
  - Support for more recent kernels in domU
    - Evolving Linux / Xen virtualization changes
    - Expected to be required for WiMAX client support
- Spiral 3
  - More experiments
  - Ongoing test bed maintenance
  - Support new ORCA releases
  - Dovetail with WiMAX