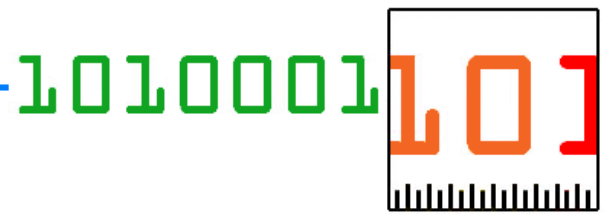# OnTimeMeasure

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OnTimeMeasure Capabilities for GENI Experimenters

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Project Overview

- **Goal:** Provide GENI community with capabilities for provisioning on-going and on-demand measurement requests
  - Used in forecasting, anomaly detection, and fault-location diagnosis in GENI experiments and GENI operations

Outcomes:

- _Software_ to perform centralized and distributed measurement orchestration and provisioning of measurements

  - _Centralized orchestration_ for continuous monitoring, persistent measurements storage and processed network measurement feeds

  - _Distributed orchestration_ for on-demand (real-time) measurement requests without need for persistent measurements storage

- _Measurement service_ that enables users to utilize OnTimeMeasure software in GENI experiments
  - Registers users, slices, maintains meta-data, and allows user control of measurement service functions
  - ° Researcher Web-portal – http://ontime.oar.net for _interactive user control_ of measurement service
  - ° Command-line tools for measurement service control automation
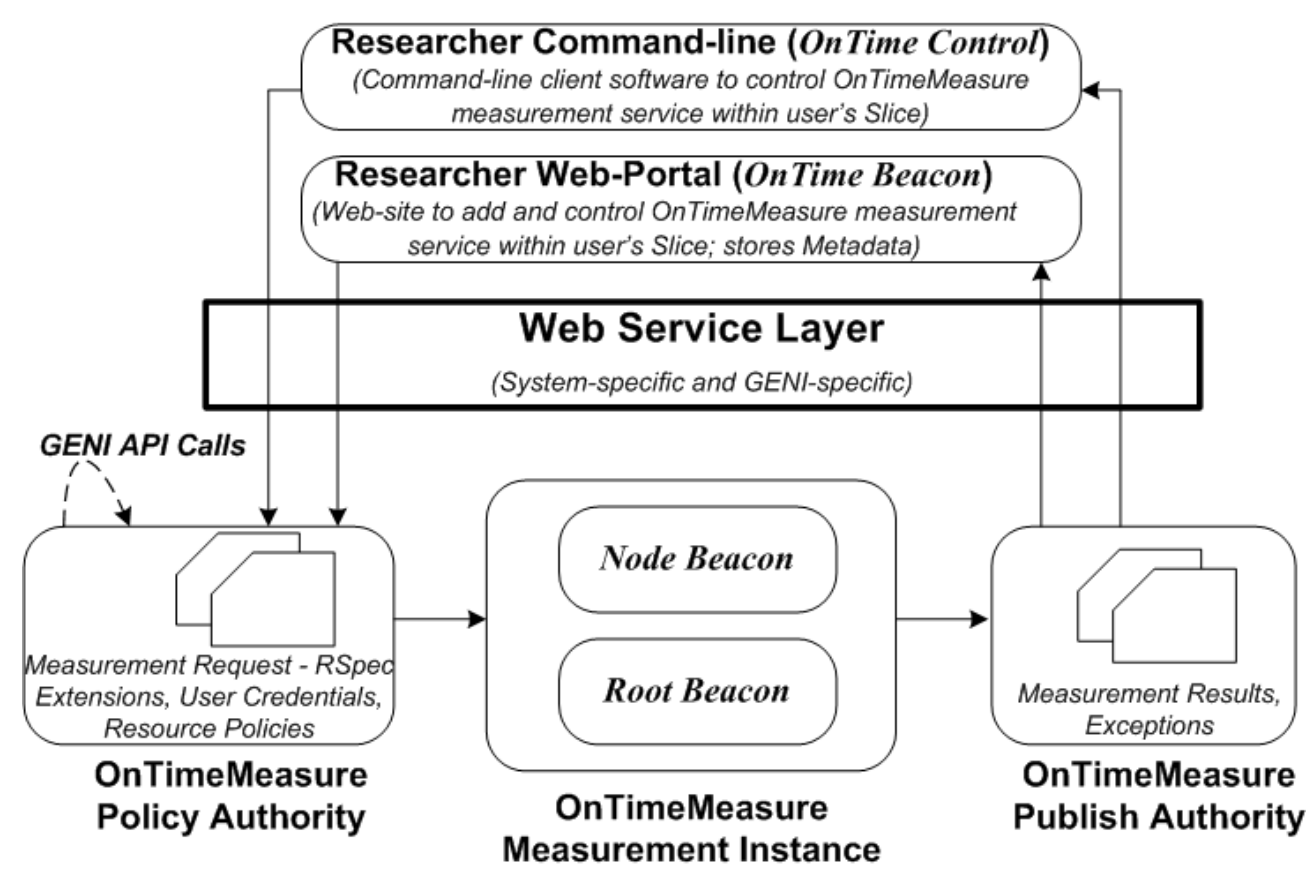
OnTimeMeasure Software Modules

- * Developed at OSC and OARnet

- Modules within a GENI experiment slice

  - **Node Beacon**
    - Installs tools that measure network health metrics such as: route changes, delay, jitter, loss, bandwidth.
    - Runs measurements based on a schedule and outputs results

  - **Root Beacon**
    - Installs Apache, MySQL and other packages
    - Collects data and provides dashboard visualization, statistical analysis (i.e., anomaly detection and weather forecasting) with alarm generation

- Two main modules that are external to the GENI experiment slice

  - **OnTime Control**
    - Command-line interface client for users to login, manage slice information and control Node/Root Beacons within their slices in an automated manner

  - **OnTime Beacon**
    - Web-interface client for users to login, manage slice information and interactively control Node/Root Beacons within their slices

[*] P. Calyam, C.-G.Lee, E. Ekici, M. Haffner, N. Howes, "Orchestrating Network-wide Active Measurements for Supporting Distributed Computing Applications", *IEEE Transactions on Computers Journal (TC),* 2006

Integration w/ other GENI Projects

- OnTimeMeasure-ProtoGENI, OnTimeMeasure-PlanetLab
  - I&M service for aggregate users

- OnTimeMeasure-Gush
  - I&M service control through Experimenter workflow tool

- OnTimeMeasure*-INSTOOLS**
  - Both active* and passive** measurements in experiment slice

- OnTimeMeasure-CRON
  - I&M service for 10Gbps network path experiments

OnTimeMeasure Architecture

Researcher Command-line (*OnTime Control*)
(Command-line client software to control OnTimeMeasure measurement service within user's Slice)

Researcher Web-Portal (*OnTime Beacon*)
(Web-site to add and control OnTimeMeasure measurement service within user's Slice; stores Metadata)

Web Service Layer
(System-specific and GENI-specific)

GENI API Calls

Measurement Request - RSpec Extensions, User Credentials, Resource Policies

OnTimeMeasure Policy Authority

Node Beacon

Root Beacon

OnTimeMeasure Measurement Instance

Measurement Results, Exceptions
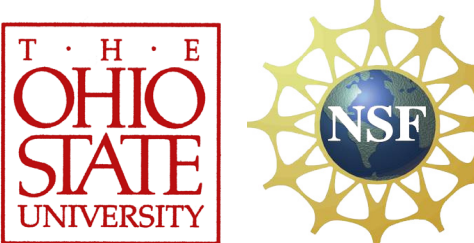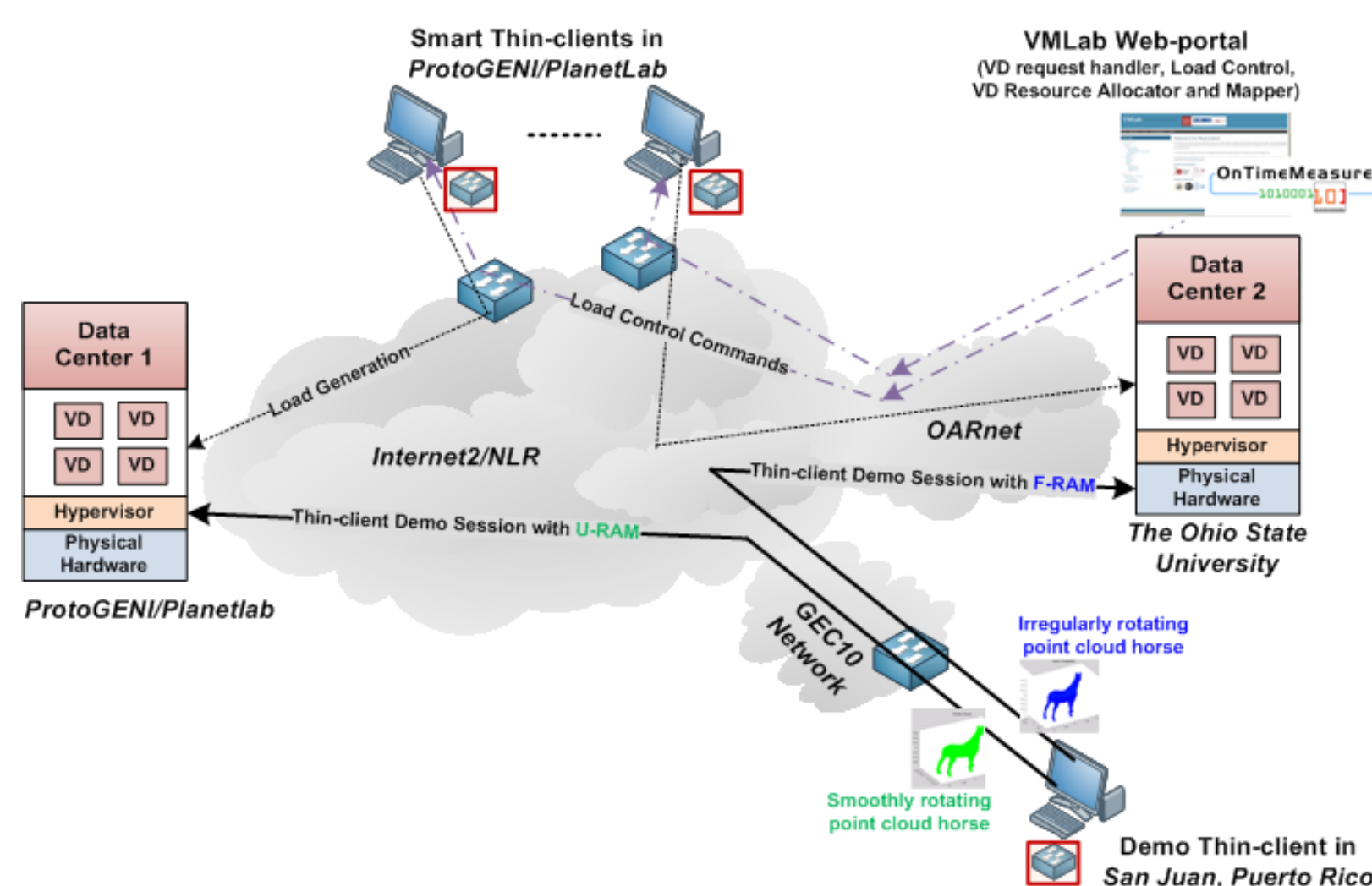
OnTimeMeasure Publish Authority

User Workflow

1) User creates an experiment slice using ProtoGENI or PlanetLab control framework tools
   - For ProtoGENI slice creation details, see - http://groups.geni.net/geni/wiki/OnTime-Install
   - For PlanetLab slice creation details, see - http://groups.geni.net/geni/wiki/OTM-PlanetLabInstall
2) User registers at the "Researcher Web-Portal" (http://ontime.oar.net)
3) User installs OnTimeMeasure measurement instance in experiment slice
   - Slice RSpec should include reservation of any required measurement resources
   - Node/Root Beacons need to be installed as slivers based on the instructions provided in Step-1 for the specific aggregate
4) Valid login to the "Researcher Portal" allows user to:
   A) Provide slice RSpec information for the measurement service
   B) Interact with the measurement service in user's experiment slice
       i. Submit measurement requests
       ii. Control the measurement service
       iii. Query measurement data

Screen Shots

Centralized Measurement Request

Centralized Service Control

Centralized Measurement Query

Distributed Measurement Result

Researcher Web-Portal

User Customizable Dashboard

GEC10 Experiment Demo

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