UMassAmherst

Data-Intensive Cloud Control for GENI

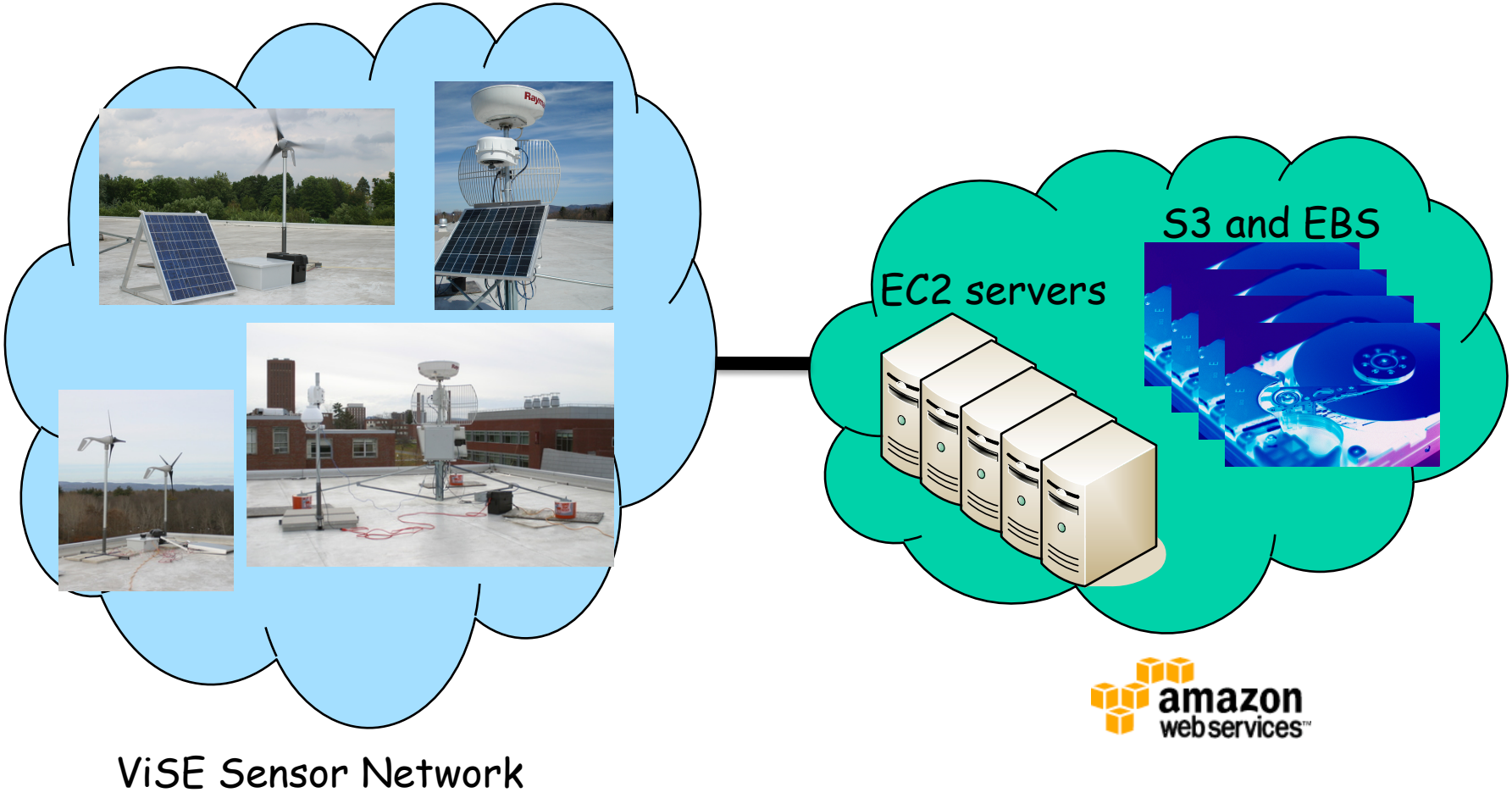
Experiment Workflow and Services
Working Group Session
GEC 6
Nov. 17th 2009

Project Overview

- Support researchers conducting ***data-intensive*** exp.
  - Sensors → network → storage volumes → processing

- Extend ViSE/Orca with
  - Data-centric Slices: storage as a first-class resource
  - Cloud Computing: connect Amazon Services to GENI
  - Experiment Workflow: interface for executing experiments

Example Slice



Simple End-to-End Experiment Example

1. Collect high-bandwidth radar data
   - 10s to 100s of Mbits/second
2. Transmit data over network to backend storage volumes
   - Storage volumes leased from "the cloud"
3. Process/Merge data from overlapping sensors
   - Feature detection: tornadoes, hail, etc.
   - Weather forecasting

Experiment Durations

- Duration
  - Short-lived: requires interactive interface
  - Long-lived: requires error/event notification

- Depends on the focus
  - Radar: Experiments tend to run hours to days due the duration of weather events.
  - Weather Station: Experiments running months to years. Weather station active for 3 years now.
  - Camera: Experiments can be short or long-lived.

Experiment Layering

- Wireless-centric Experiments
  - Topology/link control necessary for many wireless experiments
  - E.g., channel control, rate control, etc.

- Sensor-centric Experiments
  - Need storage to archive data/compute nodes to process
    - May be beneficial to control network paths
  - Requires control of sensor's "actuators"
    - Control of the camera/radar

Experiment Domain

- Wireless
  - Long-distance 802.11b over directional antennas within the testbed
- Wired
  - Internet2 connection from UMass-Amherst to Boston PoP and beyond
- Sensors
  - Radar, PTZ camera, weather station, power meter, wind turbine, solar panel
- Storage
  - S3 and EBS storage volumes from Amazon
- Computation
  - Server instances from Amazon

Experiment Scale

- Scale in Diversity
  - ViSE experiments will comprise one or more of many types of resources
  - E.g., sensors, wired and wireless networks, computation, storage
- Scale in Numbers
  - ViSE currently has 4 nodes (adding a few more soon)
  - Amazon has virtually unlimited number of nodes
- Workflow Tool
  - Orca-enabled version of Gush
  - Control experiments on ViSE resources

Questions?


THIS CONCLUDES THE USEFUL PART OF MY PRESENTATION.
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