EarthCube Integration and Test Environment (ECITE)

EarthCube Integration and Test Environment (ECITE) : An environment to verify, validate, integrate and demonstrate EarthCube technology components (IN51C-01)

Abstract

EarthCube is an NSF-funded, community-driven, effort to design and develop a cyber-infrastructure to facilitate technological solutions benefiting Earth science research. An expressed need from an EarthCube All Hands forum was a testbed environment that would provide resources and support for the integration and testing of EarthCube funded (and other) technologies. The EarthCube Integration and Test Environment (ECITE) is being established to provide easy access to hybrid cloud resources for these purposes. The ECITE team will be working with many EarthCube governance committees, both technology and science oriented, to define the types of integration, testing and evaluation necessary to achieve and demonstrate interoperability and functionality that benefits and supports the objectives of the EarthCube cyber-infrastructure. The scope of ECITE will reach beyond NSF and EarthCube to work with the broader Earth science community to incorporate lessons learned from other testbed activities, and ultimately provide broader community benefits.

Acknowledgement: The ECITE project is funded by the NSF EarthCube program.

Background - History

- One of the goals of EarthCube is to identify and support the creation of interoperable tools and services for Earth science research.
- Challenge: Interoperability across separate projects without common infrastructure and environments.
- Through a synthesis of EarthCube (EC) Technology Architecture Committee (TAC) survey, over 2/3 survey participants indicate that an EC Testbed would be useful.
- A Testbed Working Group was established to evaluate needs, state of the art and make recommendation.
- An integration and Test (I&T) environment – ECITE, is needed to enable multiple developers to integrate components and test for compatibility and interoperability.

EarthCube Testbed Working Group Members

- Doug Fils
- Ken Keiser (co-chair)
- Danie Kinkade
- Emily Law (co-chair)
- Chris MacDermaid
- Don Middleton
- Jay Pearlman
- Mike Stults
- Phil Yang

The Testbed Working Group (TWG) is part of the EarthCube Technology Architecture Committee (TAC).

TWG participants were instrumental in formulating requirements and design for the initial testbed prototype.

ECITE Overview

- An Integration and Testing Environment for EarthCubeparticipatants
- A collaborative environment for
  - Prototyping
  - Integration and testing
  - Validation (technologies, use cases, components, interface specs and standards, etc)
  - Demonstration and showcase
- EarthCube program wide I&T methodology
- Collaboration and participation of broader geoscience & cyberinfrastructure community

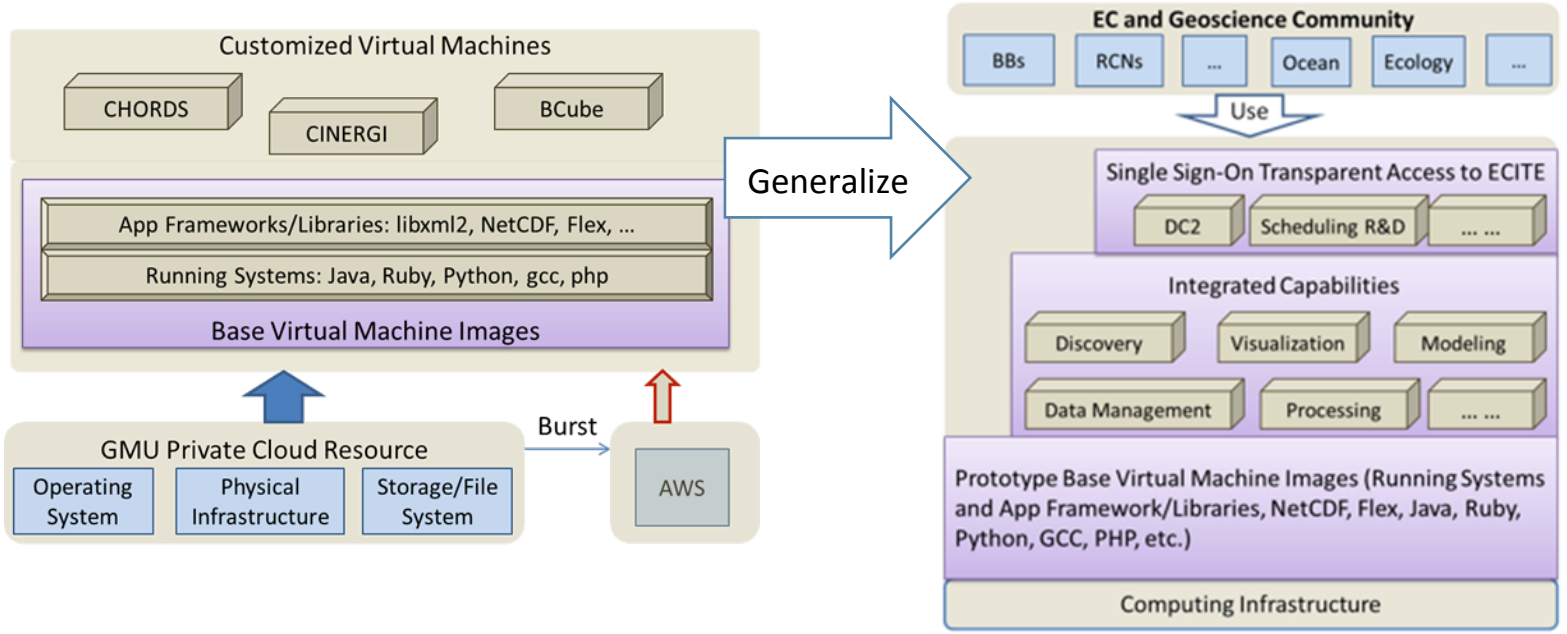
Objectives

- Serving as an infrastructure for test and evaluation of software and EarthCube components, capabilities, and services
- Fostering Integration and interoperability across funded projects, data facilities, as well as with other important community infrastructures
- Offering open and easily accessible computational resource to projects for I&T
- Delivery and preservation of funded projects

Approach

- Create a federated cloud environment that spans various private and public infrastructures
- Advanced and secure connectivity
- Broad interoperability across the data and infrastructure
- Address challenges and issues dealing with multiple domains, system configurations, security requirements and interaction conventions
- Extend existing centralized management applications to manage the hybrid ECITE infrastructure

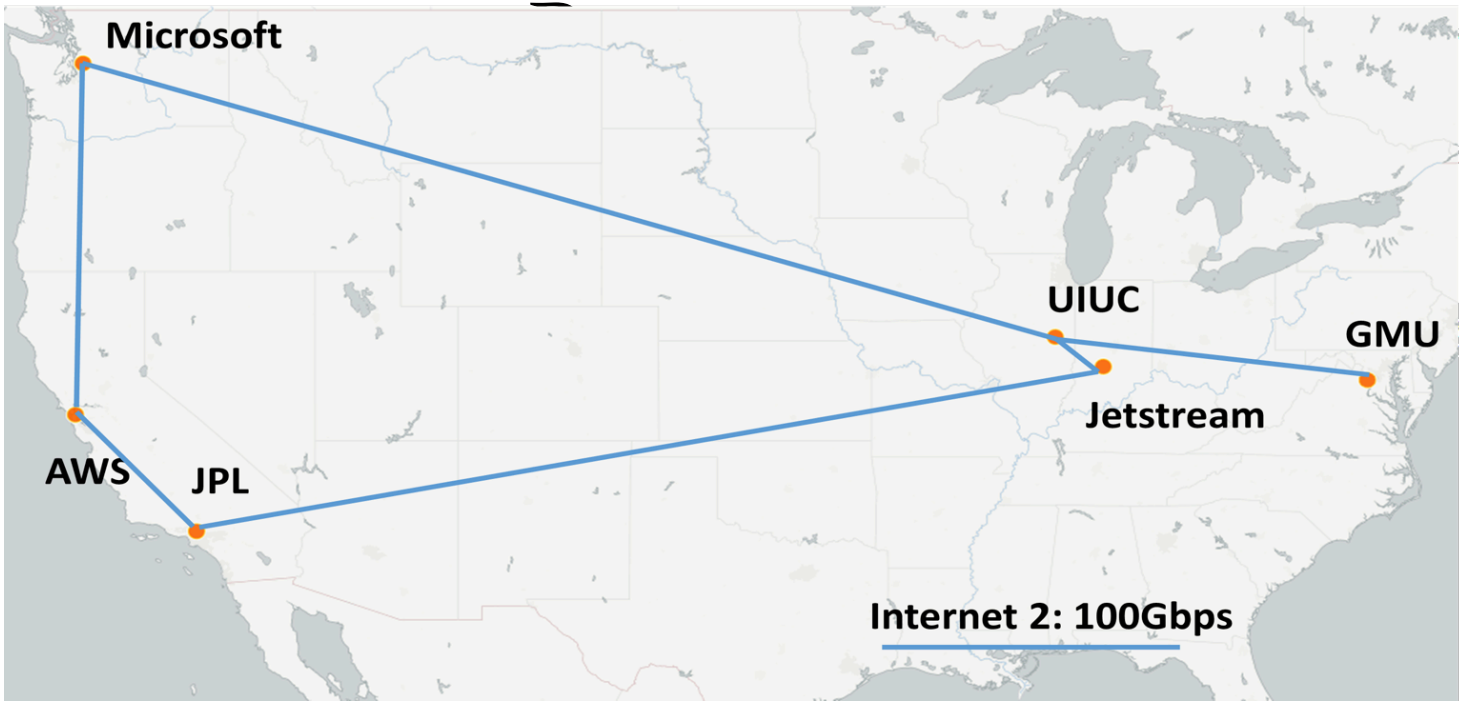
Platform Conceptual Design



Phase 1: Prototype

Envisioned Operation

Distributed Hybrid (Public / Private)



Community Collaborators

EARTHCUBE

Building Blocks

Committees & Working Groups

Jet Propulsion Laboratory
California Institute of Technology

Caltech

Expected Outcomes

- A federated testbed that manages a collection of geographically distributed hybrid (both public and private cloud) computational and storage resources.
- A testbed can provide common capabilities such as single sign-on, resource scheduling, provisioning, discovery and access and ensure compatibility across federated ECITE resources and facilities.
- A testbed can provide software and document version control to enable the preservation of EC software, data, user documentation, best practices, and other project artifacts.

Plans

The research plan consists of four phases

- Phase 1: Assessment, Rapid Prototype and ECITE Design
- Phase 2: Research, Development and Initial Deployment
- Phase 3: ECITE Deployment, Testing and Validation
- Phase 4: Move to Deployment and Sustainability Plans

- Rapid prototype (Phase 1)
  1. Identify artifacts
  2. Set up basic ECITE test environment based on identified use cases
  3. Set up basic ECITE environment to Preserve Artifacts
- Validation (Phase 2 & 3)
  Functionality, usability, affordability and technology
- Evolution (Phase 4)
  Test environment analysis solutions

Key ECITE Project Personnel

- **Sara Graves,** University of Alabama in Huntsville
- **George Djorgovski,** California Institute of Technology
- **Emily Law,** Jet Propulsion Laboratory
- **Chaowei (Phil) Yang,** George Mason University

Summary

- ECITE prototyping is on schedule
- Prototype will demonstrate
- Basic integration platform
- Initial use cases that involve multiple EarthCube Building Block projects (CHORDS, CINERGI, etc)
- Testbed Working Group (TWG) fulfilled its charter
- New TWG is being considered to be formulated to support ECITE project
- Community engagement is welcome

Related Information

EarthCube Home: http://EarthCube.org

ECITE:
http://earthcube.org/group/earthcube-integration-testing-environment-ecite

EarthCube Testbed Working Group:
http://earthcube.org/group/testbed-working-group