

ORCA-BEN QSR

Period: Oct. 1, 2008 - Dec 31, 2008

Overview

ORCA-BEN Project is adapting the existing ORCA (Open Resource Control Architecture) software developed at Duke as a control framework prototype for GENI. It uses BEN (Breakable Experimental Network, <https://ben.renci.org>) as the networked substrate, which exposes equipment at different layers: optical, circuit, packet as well as edge resources. The goal for Spiral 1 is to demonstrate multi-layer slice provisioning on BEN using ORCA.

In this period the team has been concentrating on creating project infrastructure (Subversion server, website, etc) and creating and configuring and testing the substrate elements (Xen VMs, 6509 routers, DTN bandwidth-provisioning platforms and fiber switches) on BEN to allow for experimentation. Figure 1 shows a BEN



Figure 1: BEN@RENCI PoP

PoP (Point of Presence) with Infinera's DTN, Cisco 6509 at the bottom and VM servers in the middle. A similar setup exists now at Duke's BEN PoP. In parallel we have held team discussions regarding elements of the ORCA architecture and the changes required to adapt it to a multi-layered networked environment like BEN. We are currently modifying and developing new modules for ORCA to enable provisioning of VLANs across BEN.

Our current approach centers on creating a number of Aggregate Managers (for edge as well as network substrates) and performing coordinated provisioning of slices across them.

We've also held a number of discussions within Cluster D regarding ORCA architecture and ways of integrating projects with ORCA. In support of these discussions we've held a demo for Cluster D participants. A similar demo was also held for the GPO to help clarify architectural distinctions of ORCA from other control frameworks.

We have devised and received GPO SE approval for the Spiral 1 backbone demo, which will show provisioning of slices across BEN and NLR.

Activities performed during specified period

Activities

Activity	Description	GPO target milestone ¹
GENI-ORCA Portal	Created a Trac portal for the project with wiki and Subversion code repository (https://geni-orca.renci.org) at RENCi.	1b
Code migration	Re-factored and migrated ORCA code and build environments from Duke infrastructure to the new portal.	1b
Deployed VM substrate	Installed and deployed hosts at Duke and RENCi BEN PoPs to serve as VM substrate.	1a
BEN Connectivity tests	Performed VLAN and circuit-layer connectivity tests on BEN.	1d
VLAN Demo scenarios	Created and received approval from GPO SE for VLAN demo scenario with NLR. Began discussions with NLR and Duke regarding making arrangements for BEN connectivity.	1e
ORCA bring-up	Stood up two ORCA portals: at RENCi BEN PoP and at Duke BEN PoP using the deployed VM substrate.	1a
Initial BEN NDL description	Created an initial description of BEN using NDL.	1c
GEC3 presentations	Presented ideas on control framework and NDL at GEC3.	
Demos	Held separate ORCA demos for the GPO and for Cluster D participants.	1b, 1f
GPO Architectural discussions	Held a number of architectural discussions with GPO SEs regarding ORCA.	
ORCA codebase modifications	Created a detailed implementation plan for adding support for network resources to ORCA.	1d

¹ No GPO milestones were due in this period

	Began implementation work.	
BEN equipment drivers	Began implementation of an ORCA driver for the Cisco 6509 switch/router.	1d

Participants

Ilia Baldine PI, RENCI

Jeff Chase Co-PI, Duke University

Yufeng Xin, Dan Evans, Aydan Yumerefendi – core development team, RENCI

Chris Heermann – BEN Operations, RENCI

Varun Marupadi, student, Duke University

Matt Sayler, student, Duke University

Outreach activities

- Created ORCA-users mailing list. Currently it is primarily used by Cluster D participants. It is envisioned this list will grow beyond the Cluster as ORCA becomes adopted by others.
- Created Cluster-D mailing list for Cluster D PIs for internal discussions
- Held several conference/webex calls within Cluster D to discuss strategies of integrating with ORCA
- Held a demo of capabilities of ORCA for Cluster D participants. Discussion was led by UMass project PIs familiar with ORCA on their strategy of integrating their projects with ORCA
- Made presentations at GEC3 and CoNext about ORCA and our plans for creating and demonstrating a GENI Control Framework on BEN using ORCA.