ORCA-BEN QSR

Period: Jan. 1, 2010 – Mar. 31, 2009

Overview

This QSR combines reports for the original ORCA-BEN project (1528) as well as the ORCA Augmentation project (1700), initiated 10/1/2009. Consistent with the GPO nomenclature, project milestones are pre-pended with project names ORCABEN and ORCAAUG, respectively.

In the indicated period the team has been concentrated on adding new features to ORCA, as prescribed in the ORCA roadmap. Specifically, the following features have been completed:

- ORCA controller with a protoGENI-like XML-RPC interface, intended to enable the use of protoGENI-compatible experiment tools with ORCA. This controller translates between protoGENI resource reservation API and ORCA API. Initial capability enabling protoGENI's CreateSliver(), DeleteSliver() and DiscoverResources() API calls is *included in the Bella 2.0 release available now*. This controller requires porting to the new substrate API.
- Implemented an NDL-OWL based site aggregation algorithm and an inter-domain path computation algorithm to allow computing paths connecting resources belonging to different domains. The algorithms are included in the controller demonstrated at GEC7 and are *included in Bella 2.0.*
- Implemented NLR Sherpa driver to enable dynamic ORCA-initiated provisioning of NLR FrameNet dynamic VLAN service. Currently the driver supports point-to-point connection. We plan to add support for the recently made available multi-point Sherpa VLANs by GEC8. *Included in Bella 2.0.*
- Substrate API modifications – a substantial software effort to abstract the existing ORCA substrate APIs to allow for future integration of more heterogeneous types of substrates. *Included in Bella 2.0.*
- Actor registry – a single registry of all ORCA actors known to the clearinghouse (brokers, site authorities and service managers). This feature, in conjunction with extended query capabilities will allow users locate distributed brokers and query them about available resources. It is implemented as an XML-RPC service and a web-front-end (http://geni.renci.org/actors.php). Implemented and *included in Bella 2.0.* GMOC has been advised of the availability of this function for the purpose of gathering status information about ORCA actors by GMOC.
- Eucalyptus integration – completed integration of open-source Amazon EC2 equivalent called 'Eucalyptus' as the new type of computational substrate. This feature is meant to significantly simplify computational substrate setup for ORCA by using a robust out-of-the-box VM provisioning solution such as Eucalyptus. Demonstrated at GEC7 and *included in Bella 2.0.*

The team prepared for GEC7 by developing connectivity arrangements in Cluster D to support the demo:

- Deployed an ORCA-controlled Cisco 6509 switch at StarLight/iGENI facility in Chicago for the purpose of VLAN translation and slice stitching between Cluster-D members
- Arranged with NLR to have Sherpa-controlled ports in Chicago, connected to StarLight
- Arranged for the static VLAN from UMass across NOX to be terminated at StarLight
- Worked with other cluster members on their connectivity with the strategy of either connecting them directly to NLR Sherpa-controlled ports or connecting them via pools of static VLANs to StarLight, where they can be stitched into slices using the Cisco 6509 deployed there.

Activities performed during specified period

Activities

Activity	Description	GPO target milestone
ORCA Bella 2.0 release[1]	Official release made in Feb 2010. Some of the enhancements from the GEC7 demo are being back-ported to Bella 2.0	ORCABEN S2.a (completed)
ORCA protoGENI controller	Controller/site-manager that speaks XML-RPC protoGENI API on one end and ORCA SOAP API on the other	ORCABEN S2.k
Actor registry	Automated registry of distributed ORCA actors. Operational and available at http://geni.renci.org/actors.php	ORCAAUG S2.e (completed)
NDL+ extensions	Ontology schema and policy/algorithm extensions to support broader range of substrates through NDL+. Ontology schema is available at http://geni-orca.renci.org/owl	ORCAAUG S2.e, ORCAAUG S2.j (completed), ORCAAUG S2.i
Substrate API modifications	Create a more abstract substrate API in ORCA to enable driving more heterogeneous types of substrates	ORCAAUG S2.h, ORCABEN S2.h
Eucalyptus	Integrate support for provisioning Eucalyptus	ORCAAUG S2.h

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[1] Bella releases have been renumbered compared to the milestones. Instead of Bella 2.1, 2.2 and 2.3, Bella releases for Spiral 2 will be numbered 2.0, 2.1 and 2.2.

integration	1.5.2 VMs through ORCA (driver and extended substrate support needed).	(completed)
Debug and stabilize clearinghouse	Code and operational enhancements to make the Cluster-D ORCA CH more stable. Clearinghouse runs in a VMWare VM that is backed up and runs in a HO VM environment.	ORCABEN S2.e (completed)
Debug drivers	Debug and improve networking drivers. Improved versions of networking drivers are included in Bella 2.0	ORCABEN S2.a (completed)
Future of resource representations in GENI workshop	Held a workshop on NDL-OWL and RSpec.	ORCAAUG: S2.k (completed)
Cluster-D experiment/demo[2]	Demonstrated at GEC7 a ViSE/ORCA-BEN joint experiment by allocating resources across multiple substrates (Eucaluptus VMs, multiple network providers [BEN, NLR], ViSE testbed) and creating a single Layer 2 private network for the slice from NC, to Chicago, to Massachusetts (ViSE testbed). Sensor data from ViSE in was fed to the VM on Duke campus across the slice and visualized.	ORCABEN S2.j (completed)

Participants

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Outreach

- 'NDL-OWL in ORCA' call with Cluster-D members describing the details of NDL-OWL implementation in ORCA
- 'Future of resource representations in GENI' workshop held in conjunction with GEC7. There was a significant interest in this topic, this activity will continue.

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[2] Details of the demo are described in the accompanying document.

- Made a presentation to UNC CSC and NCSU CSC faculty titled 'GENI in your backyard' describing the current state of GENI and ORCA-BEN/Cluster-D and how they can be used by the CSC faculty for experimentation in the immediate future (ORCABEN S2.o)