GEANT Open Cloud eXchange (gOCX): Architecture, Components, and Demo Scenario

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Intercloud Infrastructure/Services Provisioning (Enterprise Workflow deployment on heterogeneous cloud infrastructure)

Open Cloud eXchange (OCX) Definition, Design and Operational Principles

- Direct service/inter-member peering
  - LD-L2 network interconnection
  - Controlled network parameters/QoS
  - Scalability for growing number of members
  - Re-use and leverage Internet exchange experience
- No third party (value-added) services
  - Transparency for cloud based services
  -  No involvement in peering or mutual business relations
- Trusted Third Party (TTP) services
  - To support dynamic service agreements and/or federation establishment
  - SLA Repository and Clearinghouse
  - Trusted Intermediary for dynamic trust establishment
- May include other special services to support smooth services delivery and integration between CSP and Customer
- Local policies, service registry and discovery
- Topology information exchange (LD-L2 [L3])
- QoS parameter: bandwidth, speed, latency
OCX is a component of the Intercloud Federation Framework Architecture

gOCX enabled GEANT infrastructure benefits

- Allow the R&E community to select from a broad range of cloud services that ensure network Quality of Service (QoS) levels and/or have a logical separation from the Internet
- Allow CSPs to deliver their services efficient, using optimized paths, to the R&E community (everyone is welcome, no limitations on “crossconnects”)
- Facilitate transparent connectivity between the R&E community and CSPs (allow jumbo frames, no firewalls/policies, private network, …)
- Enhance “time-to-market” by using Bandwidth-on-Demand or other Software Defined Networking solutions

Data Intensive Application: Bag of Task Scheduler and Optimizer

Vampires [ref] is a cloud scheduler and execution engine for data-intensive bags-of-tasks applications.
- Bags-of-tasks is a type of workflow which consists of independent tasks which can be executed in any order.
- The demo uses near real time 4K video images processing as a batch task
- jclouds Java based provisioning component provides a common API for multiple cloud providers
- The user-specified resources from the few bidding cloud providers are preliminary tested for compliance with the requirements and then the application is deployed on the selected set of providers to match cost and performance criteria.

gOCX Demo at SC14

Demo Scenario: HD Video Editing and Streaming

Several institutions (University of Amsterdam (UvA), Croatian NREN (CARNET) and the NREN from Israel (IUCC)) are collaborating on efficient transcoding and streaming of 4K movies stored at UvA.

Due to the big amount of data that is to be transcoded a number of VMs need to be spawned at different CSPs (Okeanos connected via GRNET OCX, Cloud Sigma connected via SWITCH OCX, Kentsis connected via SURFnet).

- The UvA scheduling software spawns the virtual machines and starts the transcoding
- All collaborating parties are simultaneously receiving the transcoding results directly from the CSP.
- UvA and CARNet are connected to their local gOCX thus getting easy access to the necessary resources via high performance dedicated network links.
- The user at IUCC represents the traditional approach to the problem by using Amazon Web Services and Microsoft Azure connected via Internet at the closest GEANT PoP

OCX infrastructure monitoring and visualization service
- Performance information is collected from the end-nodes
- OptOSS NGCMS visualization App by Opt/Net provides near real-time visibility into managed networks of the inert-cloud infrastructure

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References


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