TNC2017 Session proposal: Connecting to Cloud Providers

Please find below a proposal for a full session at TNC2017

Abstract

Increasingly, IT services are moving to the cloud. In the R&E sector, a range of activities have been undertaken, at institutions, NRENs, and at the European level by GÉANT and others. Initially, such efforts focused mainly in three areas:

- Building and operating private cloud services. Several European NRENs has been successful in this area, operating both cloud desktop storage solutions (mostly based on OwnCloud) and virtual machine compute services (based on OpenStack and other services). The GRnet *Okeanos* services and the EUDAT storage services are well-known examples.
- Procuring of cloud services from commercial vendors. Initial efforts focused on national procurement and framework contracts, done by a single NREN, offering member institutions a service catalogue, better prices, and the advantage of not having to go through a tender to procure a service. From this evolved multi-NREN procurement (such as by NORDUnet for all Nordic NRENs), and lately pan-European procurement lead by GÉANT. Procurements have also evolved from procurement of desktop services and cloud-based applications (Box.net desktop storage, ProjectPlace project management) to procurement of ICT infrastructure (CERN scientific compute and storage resources, GÉANT infrastructure-as-a-service procurement).
- Basic integration of commercially procured services with NREN above-the-net infrastructure, in particular identity management. It has been essential for the R&E sector that the user experience of accessing every service with a single-sign-on type home account can be maintained when transitioning to (commercial) services. This has been achieved initially through technical collaboration with vendors, and more recently through procurement process requirements. As a result of these activities, a large range of cloud services are today available for the European R&E community. Many services are already deployed.

Networking for cloud services

Despite the high level of activity in the area, much less activity has been done in the area of networking for cloud services. So far, focus has mostly been on offering and making available services, less on how to provide and integrate with such services. This session is meant to address this, to present the current state of networking for cloud services, to lay out important challenges in the area, and to point to future work. The session is also intended to stimulate and facilitate discussion in the community.

The presenters have been involved in networking for cloud computing for some time. Examples of early work in the area include:

- Work on Open Cloud Exchanges in JRA1 in GN3+ and Open Call projects building experiments with accessing multiple cloud provides using these technologies.

- Development of end-to-end orchestration for access and integration of cloud services with institution networks
- The expansion of core networks to ensure private network interfaces with global cloud providers, to ensure the service levels can be guaranteed.
- The connection of cloud providers to open exchanges, to facilitate flexible interconnections for the NREN community
- The procurement of large-scale commercial resources for scientific computing

The session will present the current state of the presenter's work, and point to future evolution of the implications for NREN services. The sessions will focus on

- The experience of a large institution (CERN) in procuring large-scale cloud resources on behalf of a scientific community, and the results from initial deployments of such services. The presentation will give details of networking challenges, how these have been overcome, and the performance obtained. Based on these experiences, recommendations for networks in support of cloud resources will be given. The presentation will include 2017 experience from the HNsciCloud project.
- The experience of an NREN in integrating with cloud providers and building infrastructure that connect institutions to cloud providers and allow service integration. The talk will give examples of providers connected and experience from working with providers (such as Microsoft for the MS ExpressRoute service). The evolution of software-defined exchanges will be presented, with discussion of the advantages and service integration enabled by this technology.
- Experience in integration of commercially procured and public cloud services with NREN business and operational processes, including orchestrated delivery of specialized connectivity to the cloud resources. One-stop-shop experience, reliable order management of combined network and cloud resources, orchestrated 'after-sales' experience (monitoring, ticketing, SLA offerings) are key to serving R&E users with a seamless access to the cloud. The presentation will highlight the GN4 work on addressing the relevant requirements for R&E networks via orchestration-based provider- and user-integration, taking into account how the industry is proceeding in parallel, with initiatives such as the MEF LSO for cloud delivery.
- The challenges of policy and cost sharing in the face of increased user of commercial (cloud) services, and some simple guidelines for how these challenges can be contained through division of service responsibility and clear demarcation at well-understood boundaries, based on user of open exchange points as core elements in the network infrastructure. This talk will provide clear recommendations for future tenders of cloud services, enabling such demarcation, and will include work in 2017 on building procurement boilerplate.

Formal matters

Title: Connecting to Cloud Providers

Session chair: Lars Fischer

Affiliation: NORDUnet

Keywords: cloud, networking, orchestration, open exchanges, services

Presenters:

1. Name: Edoardo Martelli. Affiliation: CERN
2. Name: Lars Fischer. Affiliation: NORDUnet
3. Name: Afrodite Sevasti. Affiliation: GRNET
4. Name: Tom Lehman: Affiliation: Mid-Atlantic Crossroads

Bios:

Edoardo Martelli:

Edoardo is network manager for CERN. Edoardo has been overseeing the design, evolution and operation of the federated networking for the world-wide LHC Computing Grid (LHCONE and LHCOPN) for years and has recently been involved in efforts to extend these dedicated networks to commercial cloud providers in the HNsciCloud project and elsewhere.

Afrodite Sevasti:

Afrodite is leading the Business Development activities at GRNET. At the same time, she leads the GÉANT activities on SDN and interoperation with e-Infrastructures and Service Providers. Her experience is in advanced network technologies and services, including the delivery of specialized service capabilities enabled by SDN/NFV technologies, as well as the design and delivery of next generation OSS/BSS and IT service management solutions for non-commercial environments.

Lars Fischer:

Lars Fischer oversees strategy and policy for NORDUnet. He has spent the past 25 years at ISPs, Telcos, and research institutions and has worked within the areas of systems architecture, network design, network & systems management, software development, and grid computing. Lars has been co-author of several GNx project proposal and is involved in network architecture, federated networks, as well as project governance

Tom Lehman:

Tom Lehman is Director of Research at MAX. His research and development interests include advanced network architectures, intelligent control planes, multi-layer inter-networking, network virtualization, and integration of dynamic networking with distributed compute and storage resources. Mr. Lehman has published over 20 research papers in related areas. As Director of Research for MAX, Mr. Lehman is responsible for developing research programs and leading the research activities and associated technology developments.