Inter-Cloud Architecture for Interoperability and Integration

Yuri Demchenko, Marc X. Makkes, Rudolf Strijikers, Canh Ngo, Cees de Laat

Intercloud Infrastructure/Services Provisioning
(Generic use case: Enterprise/Scientific Workflow deployment on heterogeneous cloud infrastructure)

Multi-layer Cloud Service Models (CSM)

Cloud Services Model Layers
Layer 1 - Physical platform (PC hardware, network, and network infrastructure)
Layer 2 - Cloud virtualisation layer (e.g. represented by VMware, Xen or KVM as virtualisation platforms)
Layer 3 - Cloud virtual resources composition and orchestration layer that is represented by the Cloud Management Software (such as OpenNebula, OpenStack, or others)
Layer 4 - IaaS provided as infrastructure or used for hosting cloud platforms or applications
Layer 5 - Paas provided as a service or used as a platform for hosting cloud applications
Layer 6 - Saas (or cloud applications) as a top cloud layer that represents cloud applications
Layer 7 - User client or application

CSM is compatible with the NIST Cloud Computing Reference Architecture (CCRA, NIST SP 800-282)

Abstract Model for Infrastructure Services Provisioning

Virtual Infrastructure Composition and Management (VICM) Layer

VICM includes the following layers and components
- Logical Abstraction Layer and the VV/IF Adaptation Layer facing correspondingly lower PIF and upper Application layer
- VICM middleware - defined by CSA and implemented as GEMBus (as extended ESB platform for multi-domain applications)
- VI Composition Service supporting SMOF
- VI Control and Management plane supporting SOF workflow

Main actors involved in provisioning process
- Physical Infrastructure Provider (PIP)
- Can also be a Cloud resources provider
- Virtual Infrastructure Provider (VIP)
- Virtual Infrastructure Operator (VIO)
- Optionally inter-VIF network connectivity for VI can be provided by Virtual Network Infrastructure Provider (VNP)

Related links

Basic Use Cases for Intercloud Interoperability and Integration
Use Case 1: Enterprise IT infrastructure migration to cloud and its evolution
- Integration of the cloud based components and legacy infrastructure
- Evolution from general cloud infrastructure services to specialised proprietary cloud platform services
Use Case 2: Large project-oriented scientific infrastructures including dedicated transport network infrastructure that need to be provisioned on-demand
Use Case 3: IT infrastructure disaster recovery that should include both data and supporting infrastructure backup and recovery on possibly new computer/cloud platform

Contributing Projects
GEYERS – Generalised Architecture for Infrastructure Services - http://www.geyers.eu/
GEANT3 RI3 Task 3 – Composable services (GEMBus) - http://www.geant.net/
COMMIT P20 - e-Infrastructure and virtualisation for e-Science applications - http://www.commit.nl

Credits: Yuri Demchenko, Marc X. Makkes, Rudolf Strijikers, Canh Ngo, Cees de Laat
Contact: Yuri Demchenko <y.demchenko@uva.nl>