Intercloud Architecture Framework for Interoperability and Management

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

General requirements to Intercloud Architecture Framework (ICAF)
- ICA should address the interoperability and integration issues in the current and emerging heterogeneous multi-domain and multi-provider clouds, in particular.
- ICA should support communication between cloud applications and services belonging to independent service layers (vertical integration), between cloud domains and heterogeneous platforms (horizontal integration).
- ICA should provide a possibility that applications could control infrastructure and related supporting services at different service layers to achieve run-time optimization (intercloud control and management functions).
- ICA should support cloud services/infrastructures provisioning on-demand and their lifecycle management, including composition, deployment, operation, and monitoring, involving resources and services from multiple providers.

The Intercloud Architecture Framework components
- Intercloud Control and Management Plane (ICCP): for vertical cloud services interaction, integration and compatibility that defines both relations between cloud service models (such as IaaS, Paas, SaaS) and other required functional layers and components of the general cloud based services infrastructure.
- Intercloud Federation Framework (ICF): to allow independent clouds and related infrastructure components federation of independently managed cloud based infrastructure components belonging to different cloud providers and/or administrative domains; this should support federation at the level of services, business applications, semantics, and namespaces, assuming necessary gateway or federation services.
- Intercloud Operation Framework (ICOF): includes functionalities to support multi-provider infrastructure operation including business workflow, SLA management, accounting. ICOF defines the basic rules, actors and their relations in terms of resources operation, management and ownership. ICOF requires support from and interacts with both ICCMP and ICCF.

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 specialized 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

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 resource composition and orchestration layer that is represented by the Cloud Management System (such as OpenNebula, OpenStack, or others)
Layer 4 - Cloud services layer that may include different type of cloud services IaaS, Paas, SaaS
Layer 5 - Access broker (access to infrastructure hosting components and functions to provide access to cloud services/resources and interconnect multiple cloud domains)
Layer 6 - User/customer side resources and services

CISM is compatible with the NIST Cloud Computing Reference Architecture (CCRA, NIST SP 500-282), ITU-T F0-Cloud Reference Model and IETF I-Draft Cloud Reference Framework

Contributing Projects
GEANT3 RIA Task 3 – Composable services (SEMMus) - http://www.geant3.net/
COMMIT Project - http://www.commit.nl/

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