Architectural Framework for Cloud Infrastructure as a Service (IaaS) Provisioning Model

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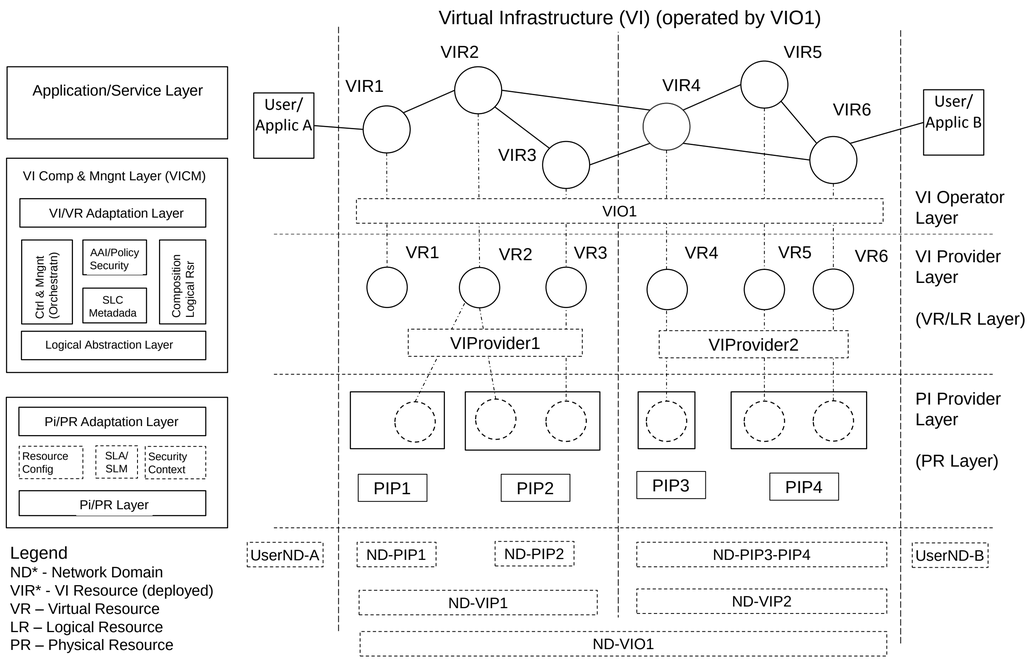
Proposed Architectural Framework for Cloud IaaS

Main components to support on-demand infrastructure services provisioning and operation:

- Infrastructure Services Modelling Framework (ISMF) that provides a basis for the infrastructure resources virtualisation and management, including description, discovery, modelling, composition and monitoring
  - Combines common/unified infrastructure services description language (both network and IT resources) and supporting infrastructure information services
- Composable Services Architecture (CSA) that provides a conceptual and architectural framework for developing dynamically configurable virtualised infrastructure services
  - Provides a basis for defining Composable Services middleware for Cloud IaaS
- Service Delivery Framework (SDF) that provides a basis for defining the whole composable services life cycle management and supporting infrastructure services
  - Defines the Composable (Infrastructure) Services provisioning workflow
- (Optionally) Service Control and Management Plane/Framework may be defined as combination of management functionality at all architecture layers
- (Optionally) Security services/infrastructure have a dual role:
  - Virtual Security Infrastructure - provisioned as a part of virtualised infrastructure
  - Support normal/secure operation of the whole provisioning framework

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 VI/VR Adaptation Layer facing correspondingly lower PIP and upper Application layer
- VICM middleware - defined by CSA and implemented as GEMBus
- VI Composition Service Supporting ISMF
- VI Control and Management plane supporting SDF workflow

Main actors involved into provisioning process

- Physical Infrastructure Provider (PIP)
  - Can also Cloud resources provider
- Virtual Infrastructure Provider (VIP)
- Virtual Infrastructure Operator (VIO)
  - Optionally inter-VIP network connectivity for VIO can be provided by Virtual Network Infrastructure Provider (VNIP)

Service Delivery Framework (SDF)

SDF defines the Composable Services provisioning workflow and the Services Lifecycle Management Model (SSLM)

Main stages/phases

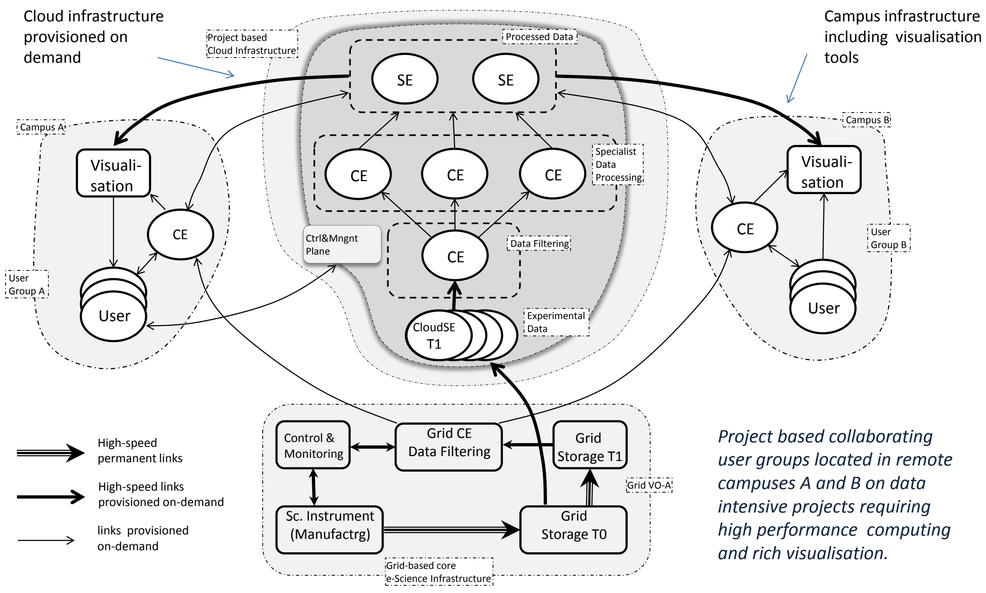
(1) Service Request (including SLA negotiation)
(2) Composition/Reservation (aka design)
(3) Deployment, including Registration/Synchronisation
(4) Operation (including Monitoring)
(5) Decommissioning

Additional stages

(a) Re-Composition should address incremental infrastructure changes
(b) Recovery/Migration can use SL-MD to initiate resources re-synchronisation but may require re-composition

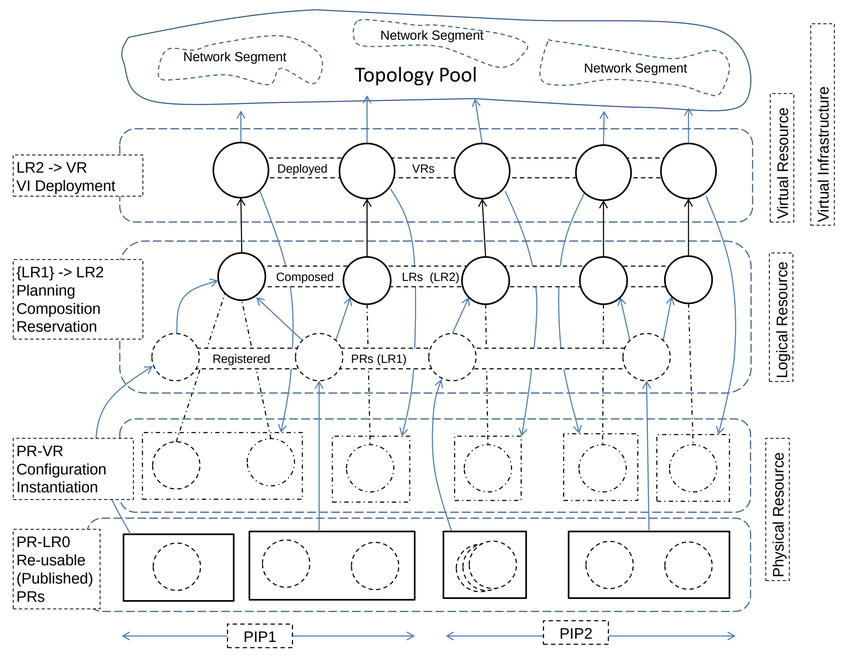
The SDF workflow is supported by the Service Lifecycle Metadata Service (SL MD).

General use case: Provisioning Multi-domain Collaborative Environment On-Demand



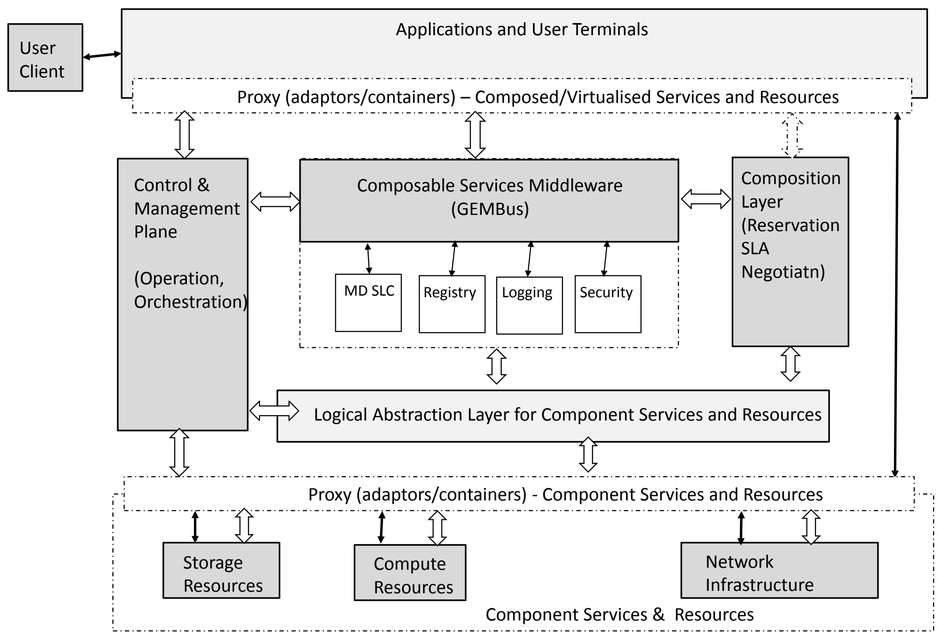
Project based collaborating user groups located in remote campuses A and B on data intensive projects requiring high performance computing and rich visualisation.

Infrastructure Services Modelling Framework (ISMF)



ISMF defines relations between different resource presentations along the whole VI provisioning process and Virtual Resource lifecycle .
Physical Resources (PR) are published as LR1 by PIP to the Registry service serving VICM and VIP.
Composed LRs are deployed as VIR/VI to VIP/VIO and as virtualised/instantiated PR-VR to PIP.

Composable Services Architecture (CSA)



CSA incorporates the major principles of the Service Oriented Architecture (SOA) and supports SDF provisioning workflow and services lifecycle management model.

Logical Abstraction layer provides a basis for uniform component services presentation (based on ISMF) allowing federated cross-domain composite services operation.

CSA defines the middleware architecture for on-demand provisioned Composable Services.

- Implemented as GEMBus (GEANT Multidomain Bus).

Contributing Projects

GEYSERS – Generalised Architecture for Infrastructure services - http://www.geysers.eu/
GEANT3 JRA3 Task 3 – Composable services (GEMBus) - http://www.geant.net/

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