

RESERVOIR Project Major Achievements

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RESERVOIR Architecture



Service Manifest:

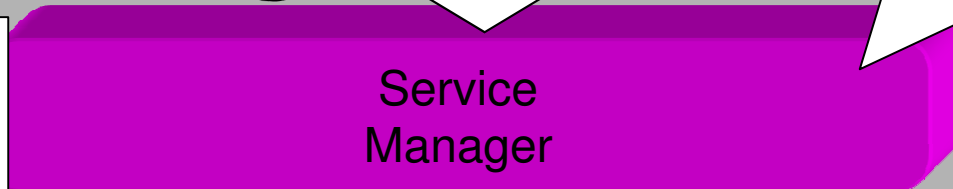
- Service components: virtual images, CPU, Memory,
- Network requirements
- SLA objectives and elasticity rules
- Placement and Business Restrictions



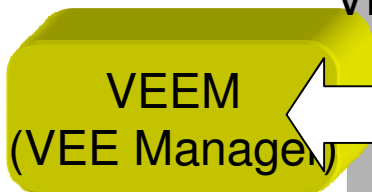
SMI

- ## Service Lifecycle Management
- Dynamic service configuration based on SLA and Business Directives
 - SLA protection
 - Pay-per-use business Model
 - Accounting and billing

- Adaptive Resource Allocation
- Support for Federation
- Support for Migration



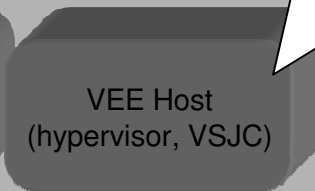
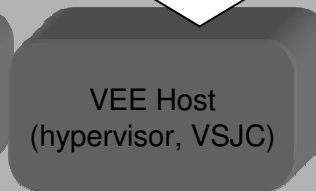
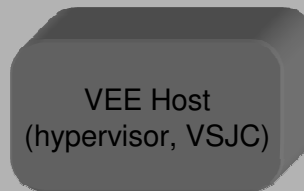
VMI/OCCI



- Translation of generic command into platform specific
- Virtual Networks management
- Efficient and secure storage access
- Migration of VEEs between administrative domains



VHI/libvirt



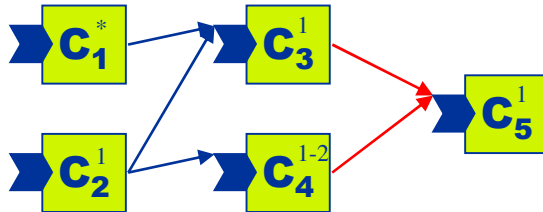
RESERVOIR Site

Service Deployment Use-case



Service Manifest

Logical Architecture



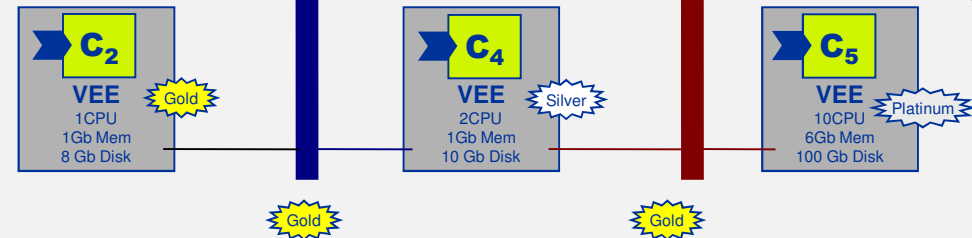
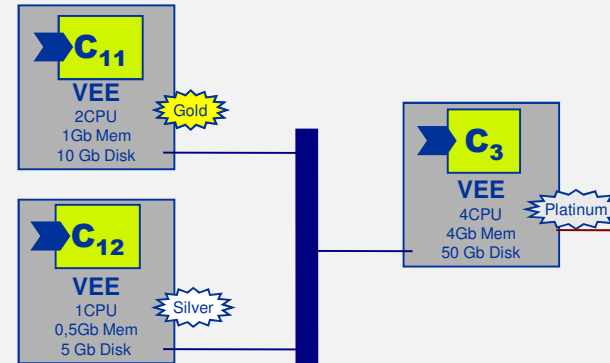
Service Elasticity Rules

C1 (2 CPU, 1 Gb, 10 GB disk)
 Load(C3) = 3 * Load(C1)
 CPU(C1) = Users(C1)/1000
 Replicas(C1) = RequestPerSecond(C1) / 500

SLA Definition

SLA(C1) = Gold
 SLA(C2) = Bronze
 Users (C1) = 1000

Reservoir Site 1



+ Deployment Directives

Deploy(C11) = { Domain1, Domain 3, Domain z }
 SLA(RED) = GOLD
 CPU(C11) = 2
 SPEED(RED) = 5MBS

Reservoir Site 2

- **Cloud Interface (SMI)** to manage services “as a whole”.
 - OVF-based provisioning, management and monitoring primitives
- **Cloud Dashboard** integrated with SMI and Business Information Model.
- Customizable **Service Monitoring** systems to support SLA protection.
- **SLA Management** model based on performance objectives
- **SLA Protection** components based on elasticity rules and control theory
- **Accounting & Billing** models for federated clouds
- **Service sustainability** under business rules control

- Extensions to the DMTF's OVF specification to define services
 - Custom user-defined Key Performance Indicators
 - Automatic elasticity
 - Quota-bases syntax (simple) ← *recommended for the most of the services*
 - Comprehensive syntax (complex)
 - Deployment-time customization
 - E.g. network IPs
 - Deployment restrictions specification
 - E.g. based on country, timezone, etc.
 - Performance objectives (SLA)
- These extensions solve limitations that arise when standard OVF is applied to IaaS cloud computing cases
- A partial description of those extensions (July 2009 snapshot) can be found at
 - Fermín Galán *et al.*, "Service Specification in Cloud Environment Based on Extension to Open Standards", COMSWARE 2009, June 2009, Dublin (Ireland)

- Dynamic and scalable management of VMs and physical resources
- Architectures for federation of sites
 - Analysis of challenges for virtualization, image, and network management
- Provisioning algorithms in federated clouds
- Cloud API specification for virtual resource provisioning leading OGF OCCI WG
- Plug-ins to access remote Clouds
 - Amazon EC2, ElasticHost or RESERVOIR remote sites
- Security Analysis major IaaS Clouds and OSS

- Federated Network Service
 - Isolated virtual networks that span VEEHs and sites
- Host based parallel and distributed provisioning for elastic applications
- Live Migration with non-shared storage and/or subnet
- Federated Monitoring Service

- Most of Service Manager to be released (March 2010) at:
 - <http://claudia.morfeo-project.org>
- Virtual Infrastructure Manager core released at:
 - <http://www.opennebula.org>
- Virtual Execution Environment Host contributing to:
 - <http://www.linux-kvm.org>

- Most of the RESERVOIR's research results published as
 - Scientific Papers
 - Open Specifications (Creative Commons)
 - Open Source Software
- RESERVOIR is actively contributing to standardization efforts
 - OGF's Open Cloud Computing Interface
 - DMTF's Cloud Incubator
- Open Standards + OSS = ROI
 - For future research
 - For technology transfer to Industry

Questions?

Please visit our **NEW!** website for further information, documentation and software downloads :

<http://www.reservoir-fp7.eu>

Thank you!!

Comparison to Similar Technologies (SM)



	RESERVOIR	Terremark VCloud Express	3Tera AppLogic	RightScale
Available as a Service	No	Yes	Yes	Yes
Available as a software distribution	Yes	No	Yes	No
Virtual Appliances / Templates Support	No	No	Yes	Yes
Service Definition/Deployment	Yes (OVF/OCCI)	Yes (Proprietary/Proprietary)	Yes (Proprietary/Proprietary)	Yes (Proprietary/EC2)
Automatic Service Configuration	Yes	No	No	No
Service Lifecycle Management.	Yes	Yes*	Yes*	Yes*
SLA Protection	Yes	No	Yes*	Yes*
Virtual Networks	Yes	Yes	Yes	Yes
Service Business Model Mngmt.	Yes	No	No	No
Service Monitoring	Yes	No	Yes	Yes



Comparison to Similar Technologies (VEEM)



	Platform ISF	VMware Vsphere	Eucalyptus	Nimbus	RESERVOIR
Virtualization Management	VMware, Xen	VMware	Xen, KVM	Xen	Xen, KVM, VMware
Virtual Network Management	Yes	Yes	No	Yes	Yes
Image Management	Yes	Yes	Yes	Yes	Yes
Service Contextualization	No	No	No	Yes	Yes
Scheduling	Yes	Yes	No	No	Yes
Administration Interface	Yes	Yes	No	No	Yes
Hybrid Cloud Computing	No	No	No	No	Yes
Cloud Interfaces	No	vCloud	EC2	WSRF, EC2	EC2/OCCI
Flexibility and Extensibility	Yes	No	Yes	Yes	Yes
Open Source	No	No	GPL	Apache	Apache

