Introduction to the IaaS platform Cloud@ReCaS-Bari

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The IaaS platform @ INFN Bari / UNIBA

The IaaS (Infrastructure as a Service) cloud platform **Cloud@ReCaS-Bari**, hosted at the **ReCaS-Bari** data center, provides **infrastructural computing resources** following the cloud computing paradigm.

Its main features are:

- ~ 1700 CPU core
- ~ 6.7 TB of RAM
- 10 Gbit/s network
- Layer 2 isolated VLAN with NAT
- Evolved application-level firewall
- ~ 270 TB of storage (replica 3)
- Based on open source software (OpenStack)
- Modular
- Highly-available services

The IaaS cloud platform @ INFN Bari / UNIBA

- Resources (instances, or virtual machines, VM) can be used to develop and deploy software systems;

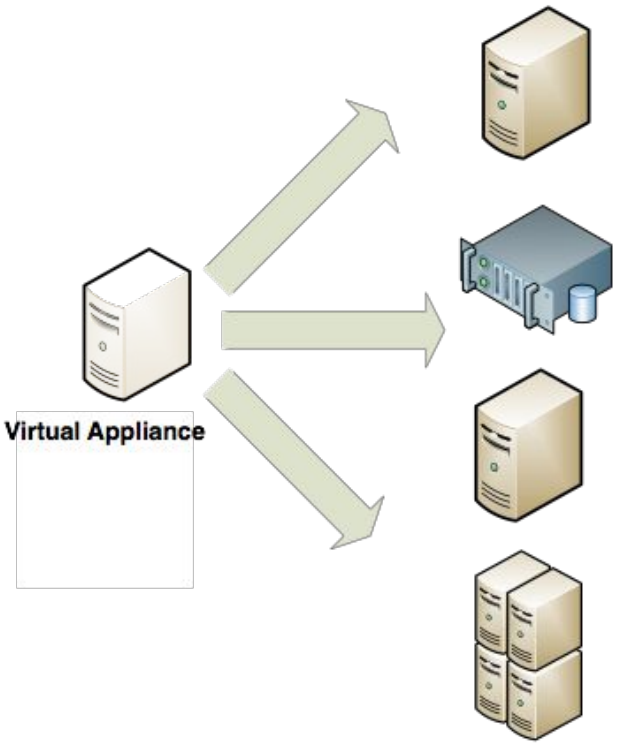
- It is possible to create resilient systems with high-availability using multiple instances (together with services provided by the IaaS infrastructure, as load-balancing and auto-scaling)

- Virtual instances are very similar to traditional hardware servers:
  - They use familiar Operating Systems (OS), as Linux, Windows, etc.
  - Any software compatible with the OS can be executed on them
  - Associating a public IP to the VM it is possible to interact with it through standard methods (ssh, RDP,...)

Image Service and Marketplace

- Pre-configured virtual images (*templates*) can be used to create virtual machines of different kinds (*flavor*) depending on the RAM and CPU required by your application.

- A certain number of templates (software configuration) is already available from the catalog, but the user can upload her/his own (also starting from *snapshots* of her/his own VMs).



Images and supported Operating Systems

- **Open source Linux operating systems** (Debian, Ubuntu, CentOS, Fedora, Scientific Linux)
- **Proprietary Linux operating systems** (Red Hat)
- **Windows operating systems** (Windows Server 2012)

Windows operating systems are completely supported on KVM hypervisors

Supported image formats are RAW, QCOW2, VMDK, AMI/ARI/AKI, VDI, VHD

On-demand storage

- Data stored on VMs are “volatile”: they are lost every time a VM is destroyed.

- For persistent data:

    - **Block Storage Service**: allow to allocate storage space as block devices that can be attached to the VMs (as standard USB drives)

    - **Object Storage Service**: provides storage space with replica and disaster-recovery functionalities for **non-structured data** (e.g. images, videos, backups, etc.)

Iaas - Key Elements

Public IAAS | Hybrid for Public Administrations | Private | IaaS Infrastructure

Security and privacy

Storage encryption

Evolved Firewall and VLAN

Geographic and dynamic VPN

Geographic disaster recovery

Performance and reliability

Enterprise open IaaS infrastructure

Integrated multi-level monitoring infrastructure

IaaS services

Continuous management of services

Deduplicated storage

Geographic High Availability for services

Interoperability and federation

Federation of different IaaS

Federated authentication

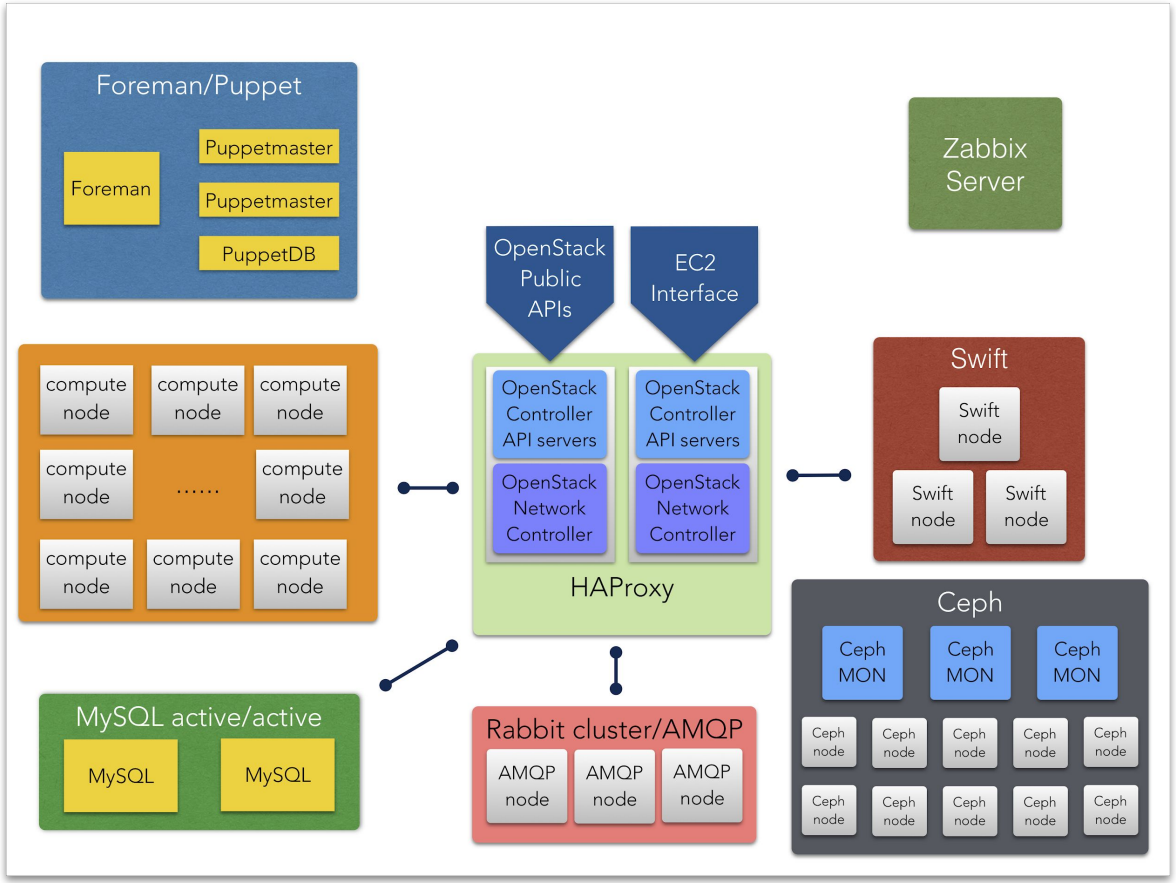
Interoperability between open and enterprise platforms

Image repository and advanced contextualization of services

Complex orchestration

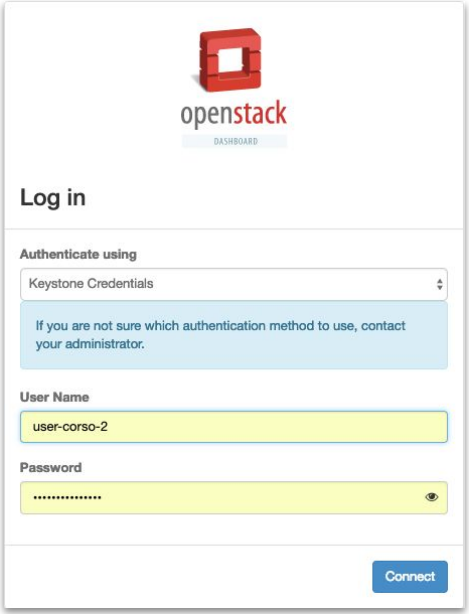
Standard IaaS APIs: EC2 / S3 / OCCI

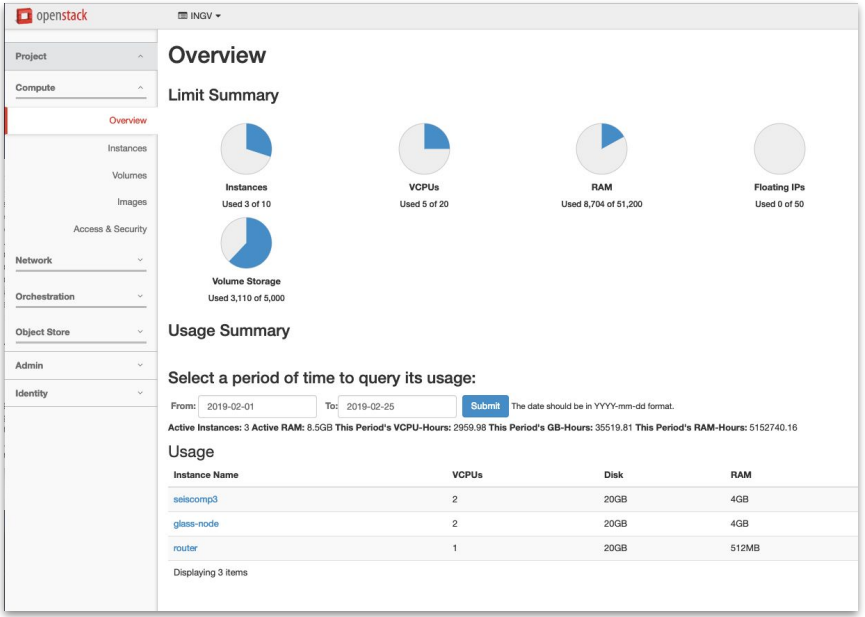
Physical Architecture



Interfaces

The end user can interact with the platform through a **web interface**, a **command line client** (OpenStack), or through the **most commonly used standard APIs** in cloud computing (OCCI, CDMI, AWS).





Possibilities

- **Projecting fault-tolerant applications:**
  - Availability Zones
  - Monitoring
  - Multiple storage solutions (replicated, scalable, performing)

- **Managing dynamical scenarios**
  - Auto-scaling + Load Balancing

- **Implementing Security**
  - Security Groups to control access to resources
  - Encrypted file systems for sensitive data
  - Secure connections

Scalability and High Availability (HA)

- A *scalable* service has the following properties:
  - as resources are increased performances increase proportionally;
  - it is resilient to failures;

- A scalable *architecture* is critical to exploit a scalable *infrastructure*.

- Cloud@ReCaS-Bari offers load-balancing + autoscaling services that can be used to deploy fault-tolerant, scalable, high-performance systems.

Thank you
for your attention