

# Integrating OpenStack and Kubernetes

ALBERTO COLLA / GARR

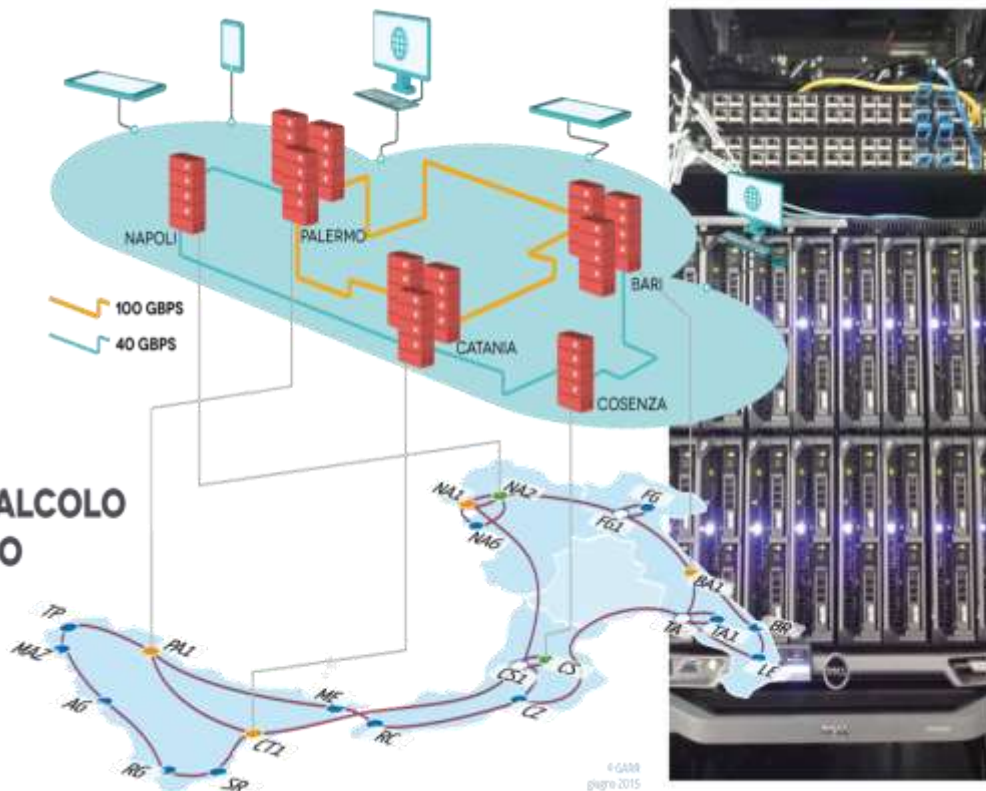
Roma, November 21, 2019

EaPConnect/GARR Workshop

# GARR Computing and Storage

## INFRASTRUTTURA DI CALCOLO E STORAGE DISTRIBUTO

- 📍 5 siti distribuiti
- 🖨️ 8.448 virtual CPU
- 💾 10 PB spazio storage



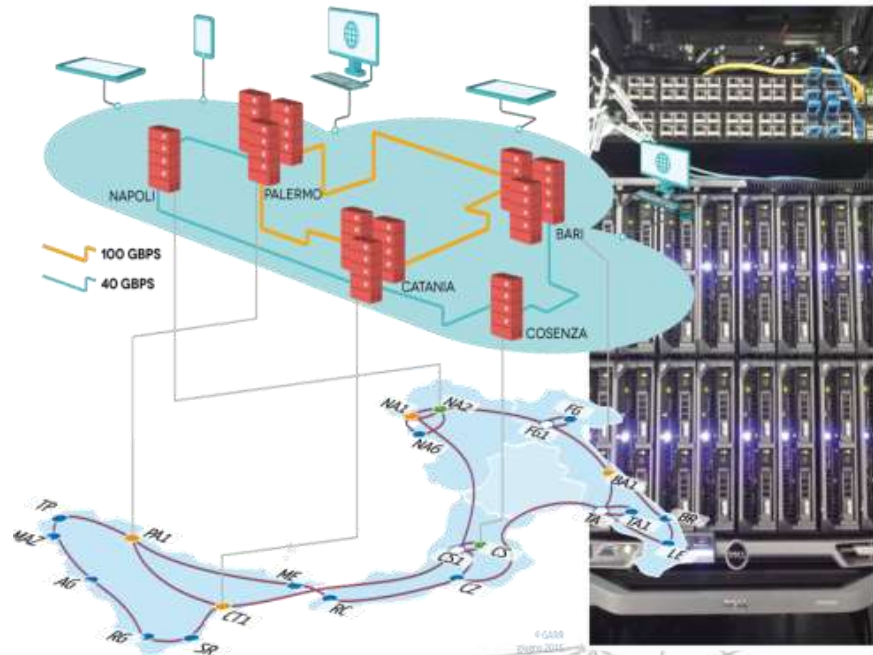
# GARR Computing and Storage

## The engine

  
MAAS

  
JUJU

  
ceph

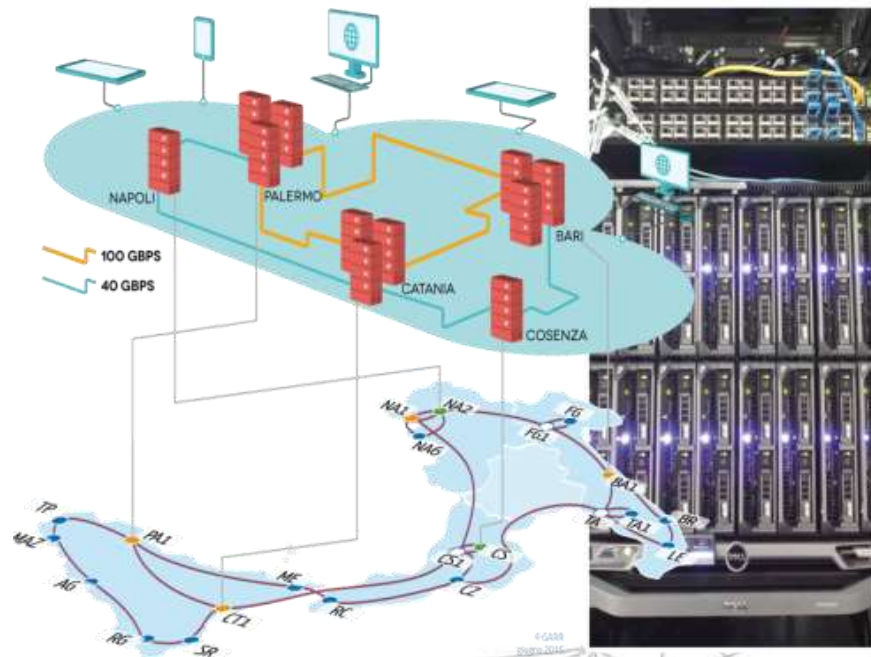


# GARR Computing and Storage



Powered by openstack.

## The engine



# GARR Computing and Storage



Powered by openstack.

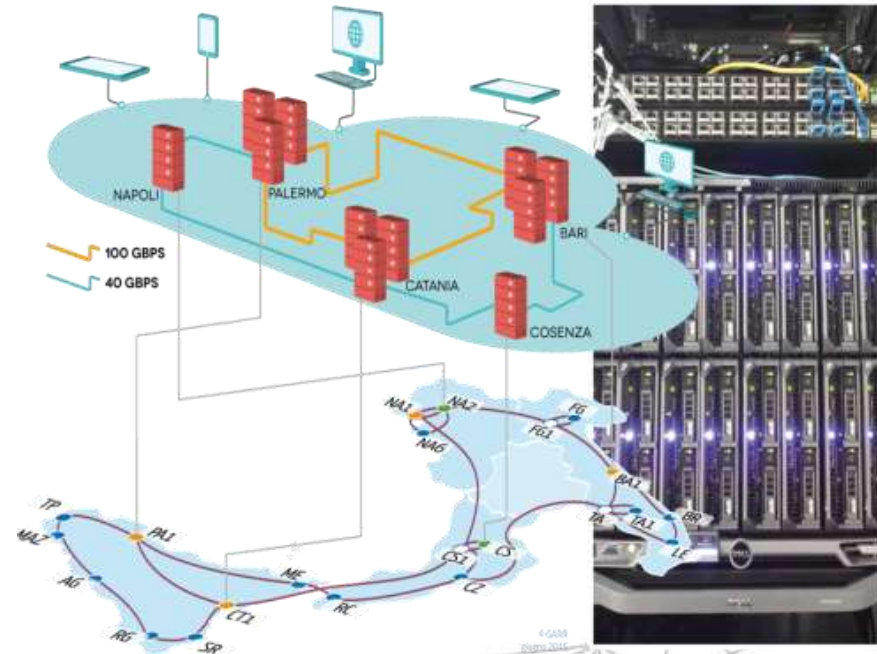
600 Users

1100 VM

3500 vCPU 9 TB\_RAM

1 PB\_storage 850 IP

## The engine





# GARR Computing and Storage



Powered by openstack.

600 Users

1100 VM

3500 vCPU 9 TB\_RAM

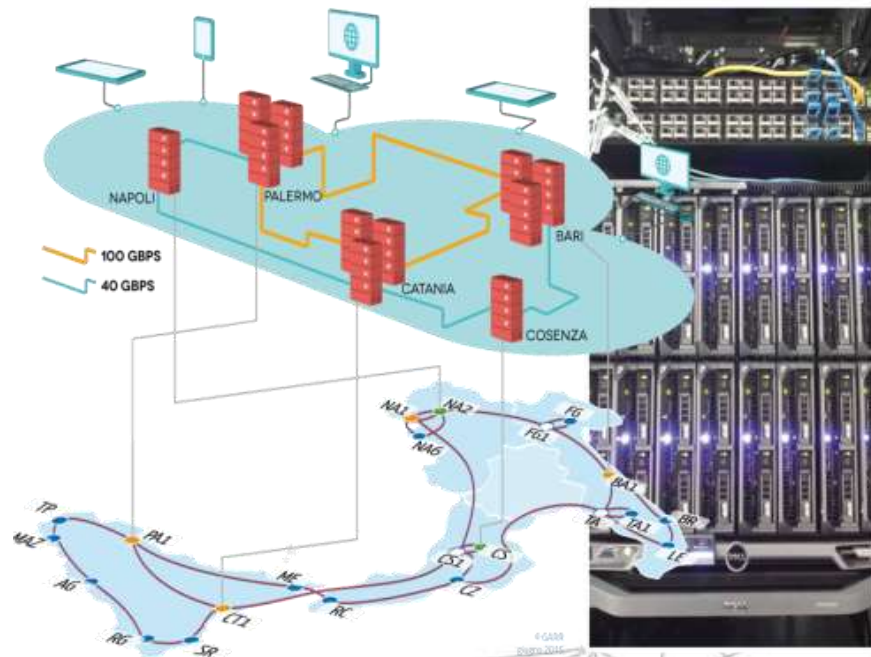
1 PB\_storage 850 IP

## Container platform



Powered by **kubernetes**  
+ GPU inside

## The engine



# Aim

Let user access GARR Cloud and Container platform using their single personal account

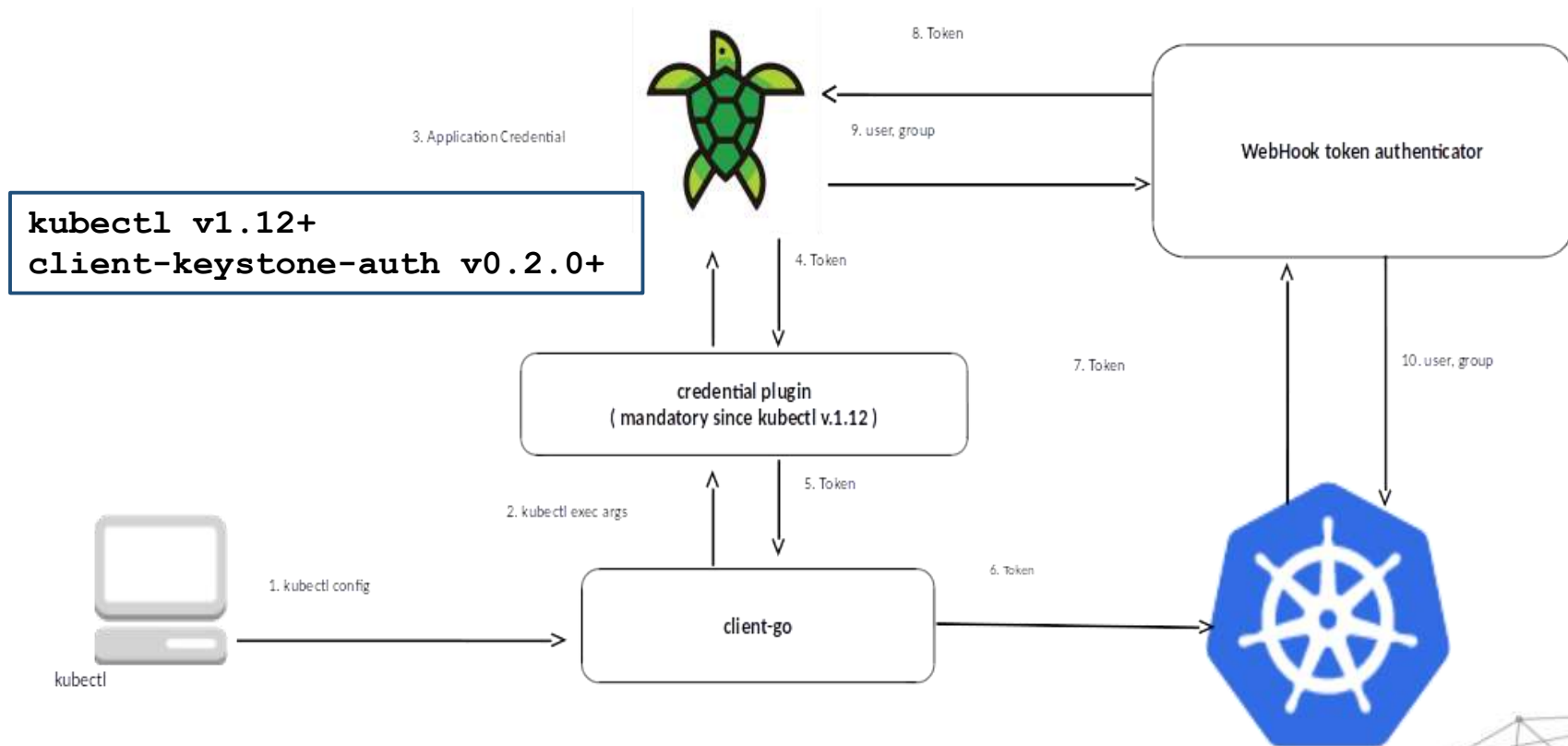
- GARR Cloud user access mainly via Federated authentication
  - IDEM/EduGAIN, OIDC
  - no basic keystone auth (local password)

-> use Keystone as external Identity provider for Kubernetes

- WebHook token authentication
- Joint work by GARR and SWITCH within GEANT project GN4-2

(at GARR mainly by Roberto di Lallo)

# Auth Workflow

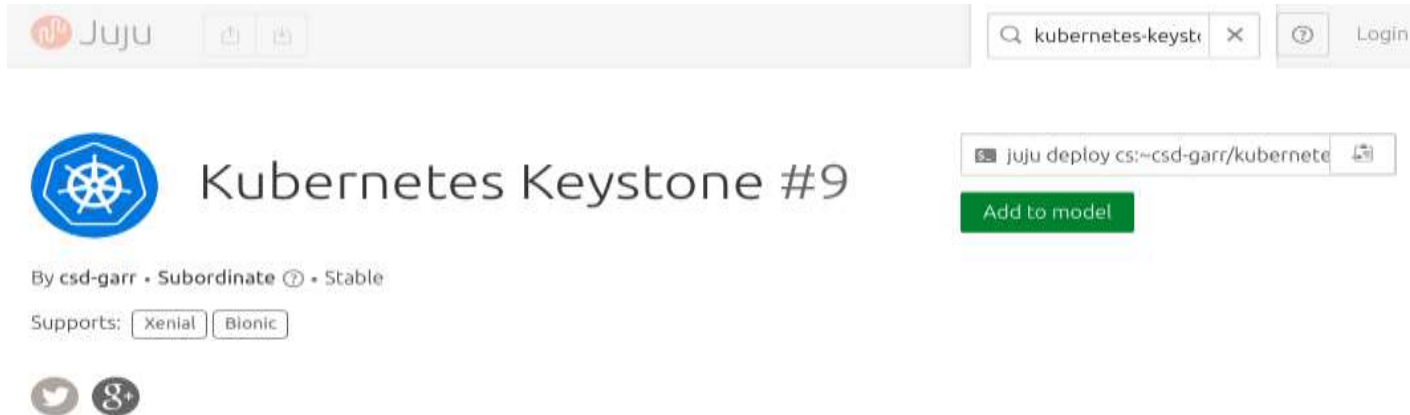




# Integration on GARR Cloud

## 1. new Juju charm kubernetes-keystone

-> installs Webhook token authenticator on kubernetes-master



The screenshot shows the Juju charm page for 'Kubernetes Keystone #9'. At the top left is the Juju logo. To its right are share icons. Further right is a search bar containing 'kubernetes-keystri' and a 'Login' button. Below the search bar is a terminal snippet: `juju deploy cs:~csd-garr/kubernetes-keystone` with a copy icon. A green 'Add to model' button is positioned below the terminal snippet. The main heading is 'Kubernetes Keystone #9' next to a blue Kubernetes logo. Below the heading, it says 'By csd-garr • Subordinate ⓘ • Stable'. Underneath, there are two buttons for 'Supports: Xenial' and 'Bionic'. At the bottom left, there are social media icons for Twitter and Google+.

# Integration on GARR Cloud

## 2. Application credentials

-> OpenStack release Rocky

## 3. OpenStack dashboard

-> Kubeconfig generator from Application Credentials

-> Patch to Horizon ~~proposed~~ **accepted!**

## 4. User account creation workflow automated

# User account creation workflow

User requests account

GARR Cloud Dashboard

Authenticate using

IDEM Federation

Don't have an account yet? Please **Register**

Sign In

Register to GARR Federated Cloud

Sign up with IDEM or eduGAIN

Other sign up options

By registering you agree to our terms of service and privacy policy.

Admin approves

OpenStack NEW Access Requests

User Access Requests | User Access Requests Status | Approved User Emails | Approved User IDPs | Projects

Source	Name and Surname	Username	Email	Created on	Comments	ACTION
Google	Luca Gazzola	l.gazzola@campus.unimib.it	l.gazzola@campus.unimib.it		None	<b>Create user</b> Create user (pending approval) Approve Decline
Google	CLAUDIO CINCOTTA	enccld93a05f158v@studenti.unime.it	enccld93a05f158v@studenti.unime.it		None	Create user Create user (pending approval) Approve Decline

Approval triggers creation workflow:

- > OpenStack: username, (garrdemo) project assignment
- > k8s: user namespace with quotas, bound to username
- > User notified by email

# User access

GARR Cloud Dashboard

Authenticate using

IDEM Federation

Don't have an account yet? Please [Register](#).

**Sign In**

**ID \***  
1d3e5013c554c4f8ae1b896b04cbe6fd

**Name \***  
my-app-cred

**Secret \***  
stArCZjpwuwxQWVMyV94JgGRuQP33  
CmpgML8tUVTD8VQwEPVgG3eRu56Z  
Sp8koxOyYfRHORjWAgWw

**Your application credential**  
Please capture the application credential ID and secret in order to provide them to your application.

The application credential secret will not be available after closing this page, so you must capture it now or download it. If you lose this secret, you must generate a new application credential.

For the Kubernetes configuration file please refer to the [Documentation](#).

[Download openshift file](#) [Download clouds.yaml](#) **[Download kubecfg file](#)**

Close

cloudusers + api + garr .net +

Project Identity Application Credentials

### Create Application Credential

**Name \***  
my-app-cred

**Description**

**Secret**

**Expiration Date**  
22/05/2019

**Expiration Time**  
--:--

**Roles**  
Member

Unrestricted (dangerous)

**Namespace (Kubernetes)**  
g-colla-garr

**Description:**  
Create a new application credential.  
The application credential will be created for the currently selected project.  
You may provide your own secret, or one will be generated for you. Once your application credential is created, the secret will be revealed once. If you lose the secret, you will have to generate a new application credential.  
You may give the application credential an expiration. The expiration will be in UTC. If you provide an expiration date with no expiration time, the time will be assumed to be 00:00:00. If you provide an expiration time with no expiration date, the date will be assumed to be today.  
You may select one or more roles for this application credential. If you do not select any, all of the roles you have assigned on the current project will be applied to the application credential.  
By default, for security reasons, application credentials are forbidden from being used for creating additional application credentials or keystone trusts. If your application credential needs to be able to perform these actions, check "unrestricted".

[Cancel](#) **Create Application Credential**

# Kubeconfig

```
apiVersion: v1
kind: Config
clusters:
- name: kubernetes
  cluster:
    server: "https://k8s-api-pa1.cloud.garr.it:443"
    certificate-authority-data:
contexts:
- name: kubernetes
  context:
    cluster: kubernetes
    user: colla@garr.it
    namespace: g-colla-garrit
current-context: kubernetes
```

# Kubeconfig (Cont'd)

users:

- name: colla@garr.it

user:

exec:

apiVersion: client.authentication.k8s.io/v1beta1

command: bin/kubectl-keystone-auth

args:

- "--keystone-url=https://keystone.cloud.garr.it:5000/v3"
- "--domain-name=none"
- "--user-name=colla@garr.it"
- "--application-credential-id=f394734..."
- "--application-credential-secret=XXXXXXX"




# Kubernetes user access

- Download kubeconfig file in `~/.kube/config`
- Download keystone auth plugin (git@GARR) in `~/.kube/bin/kubectl-keystone-auth`
- Install `kubectl...` and work!

Compute Containers Apps Documentation Community Support Login

## Container Platform

The GARR Cloud Container Platform is an environment for automating deployment, scaling, and management of containerized applications, based on



**Kubernetes** enables rapid application development and iteration by making it easy to deploy, update, and manage your applications and services. You can attach persistent storage and even run a database in your cluster. Simply describe the compute, memory, and storage resources your application containers require, and *Kubernetes* provisions and manages the underlying cloud resources automatically.

Support for hardware accelerators enables running Machine Learning, General Purpose GPU, High-Performance Computing, and other workloads that benefit from specialized hardware accelerators.

For an introduction to *Kubernetes* try the [Kubernetes Basics tutorial](#).

The GARR Container Platform uses the same accounts as the GARR Cloud Compute Platform. To apply for an account, [register here](#).

**cloud.garr.it/containers**

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