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Federating the ICSC resources of INFN Milano to INFN Datacloud: status of the work on the bare metal Kubernetes cluster

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ICSC @ INFN Milano: resources

The **Milano computing center** has increased its capacity as **part of the ICSC efforts**;

- 6 DELL chassis C6400 each equipped with 4 PowerEdge C6525 servers already available (24 servers in total);
- Managed with **Foreman** [1] and **Puppet** [2].

DELL PowerEdge C6525	
CPU	2x CPU AMD EPYC 7413
RAM	16x 32 GB RAM DDR4 3200 MT/s
SATA storage	2x 890 GB SSD (4 RAID1 pairs)
SAS storage	2x 3.5 TB SSD (4 RAID1 pairs)
Networking	1x Broadcom Adv. Dual 10Gb Ethernet

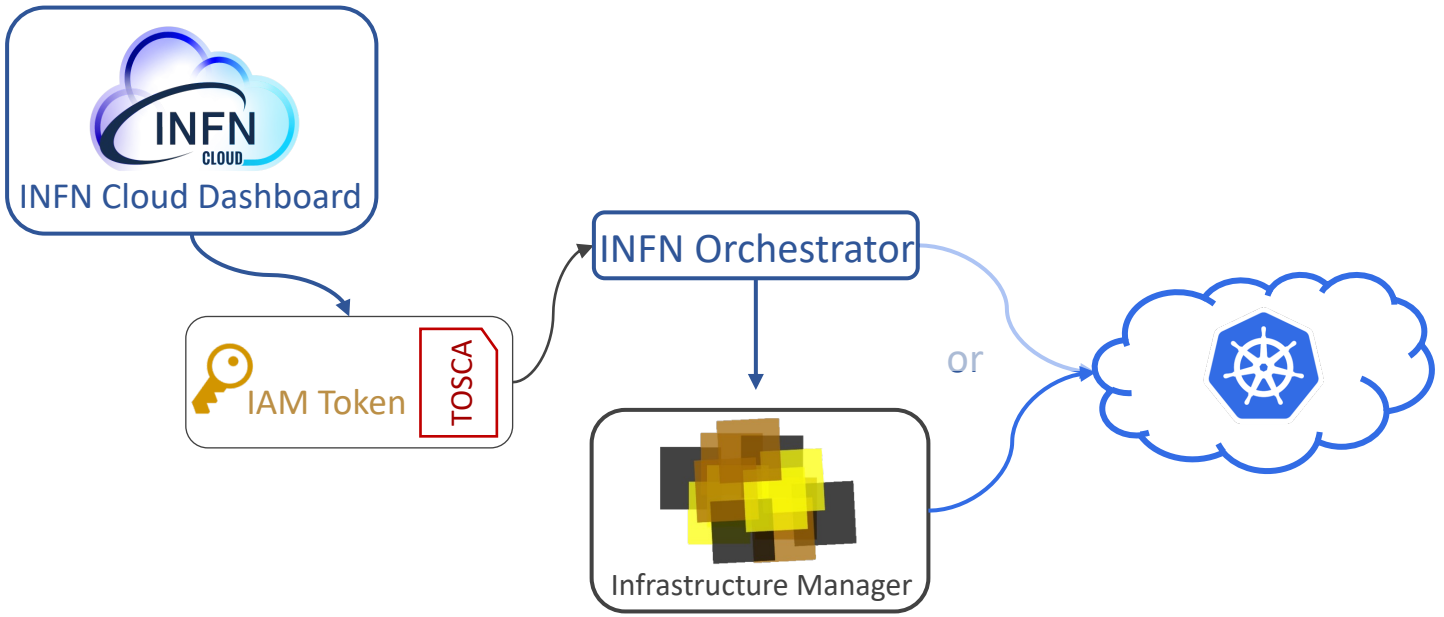
- Additional resources are planned:
  - 6.25 PB storage capacity (CEPH + traditional);
  - 4 servers with a total of 768 AMD cores.

Integration with INFN Datacloud: k8s cluster on bare metal

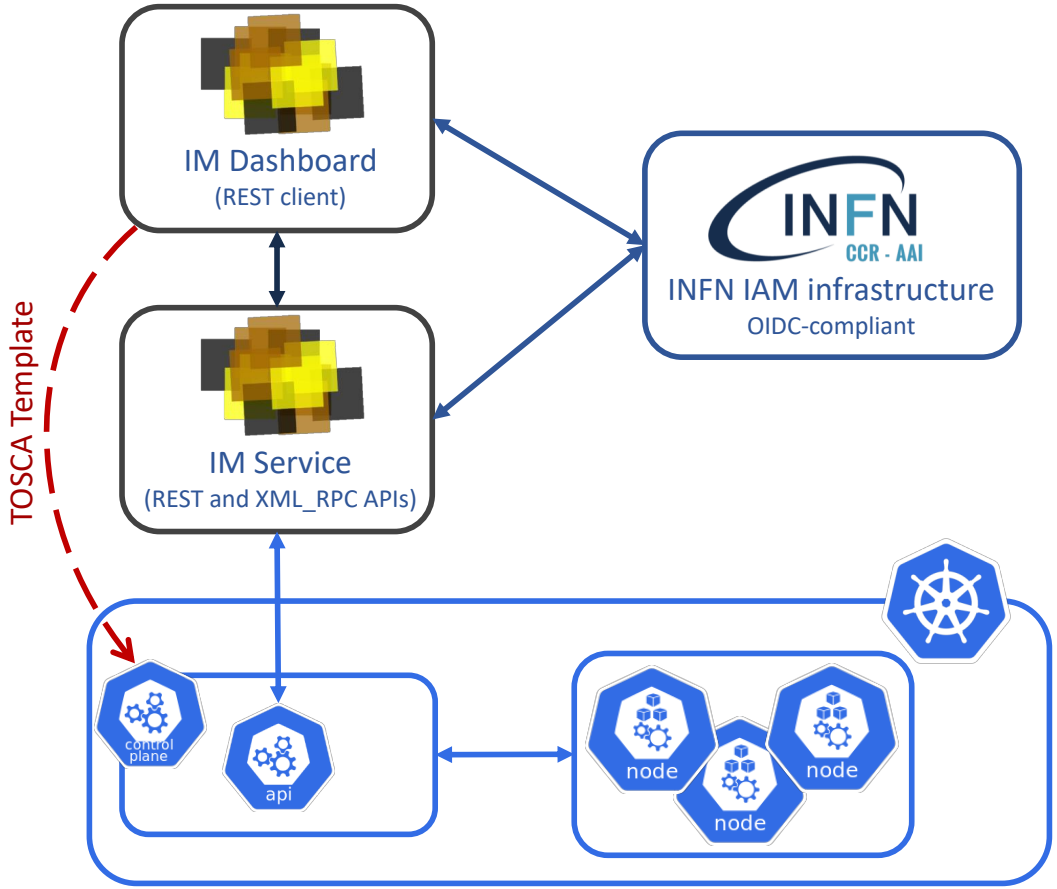
- INFN Milano opted for **a bare metal k8s cluster instead of an OpenStack-based approach**:
  - reduced complexity thanks to the absence of an intermediate hypervisor;
  - full k8s flexibility maintained;
  - focused resource optimizations achievable with minimized maintenance and troubleshooting efforts.

- Rancher **RKE2** [3] **coupled to Foreman** + **Puppet** to install and maintain k8s on the nodes.

- The Infrastructure Manager (IM) [4] is **directly coupled to a k8s** cluster instance.



Infrastructure Manager: direct K8s integration



- Testing **IM's k8s connector support** for different TOSCA templates;
- Using **IM full stack (Service + Dashboard)** to inject **custom TOSCA templates**;
- **Successfully tested a simple workflow** with a containerized app deployed to an isolated k8s namespace [5].

Conclusions & Outlook

- Milano has decided to **install a bare metal Kubernetes cluster** and federate the resources **without the mediation of OpenStack**;
- Plan to **explore the UPV*-developed IM** as the only **gateway to feed workloads into k8s**;
- Identification and assessment of **possible limitations in the current IM's k8s connector**;
- Plan to **contribute to the UPV effort** to improve support for k8s advanced features.

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Bibliography

[1] https://theforeman.org/

[2] https://www.puppet.com/

[3] https://baltig.infn.it/infn-cloud/wp1/rke2

[4] https://www.grycap.upv.es/im/index.php

[5] https://baltig.infn.it/cmarcon/infrastructure-manager-documentation

Backup

The typical INFN Datacloud workflow