Building and Orchestrating your Service Continuum

The Open-Source solution to build and orchestrate multi-cloud services @ CS3 2023 - Cloud Storage Synchronization and Sharing

Alessandro Olivero, Fulvio Risso, March 6th, 2023

The emerging common denominator

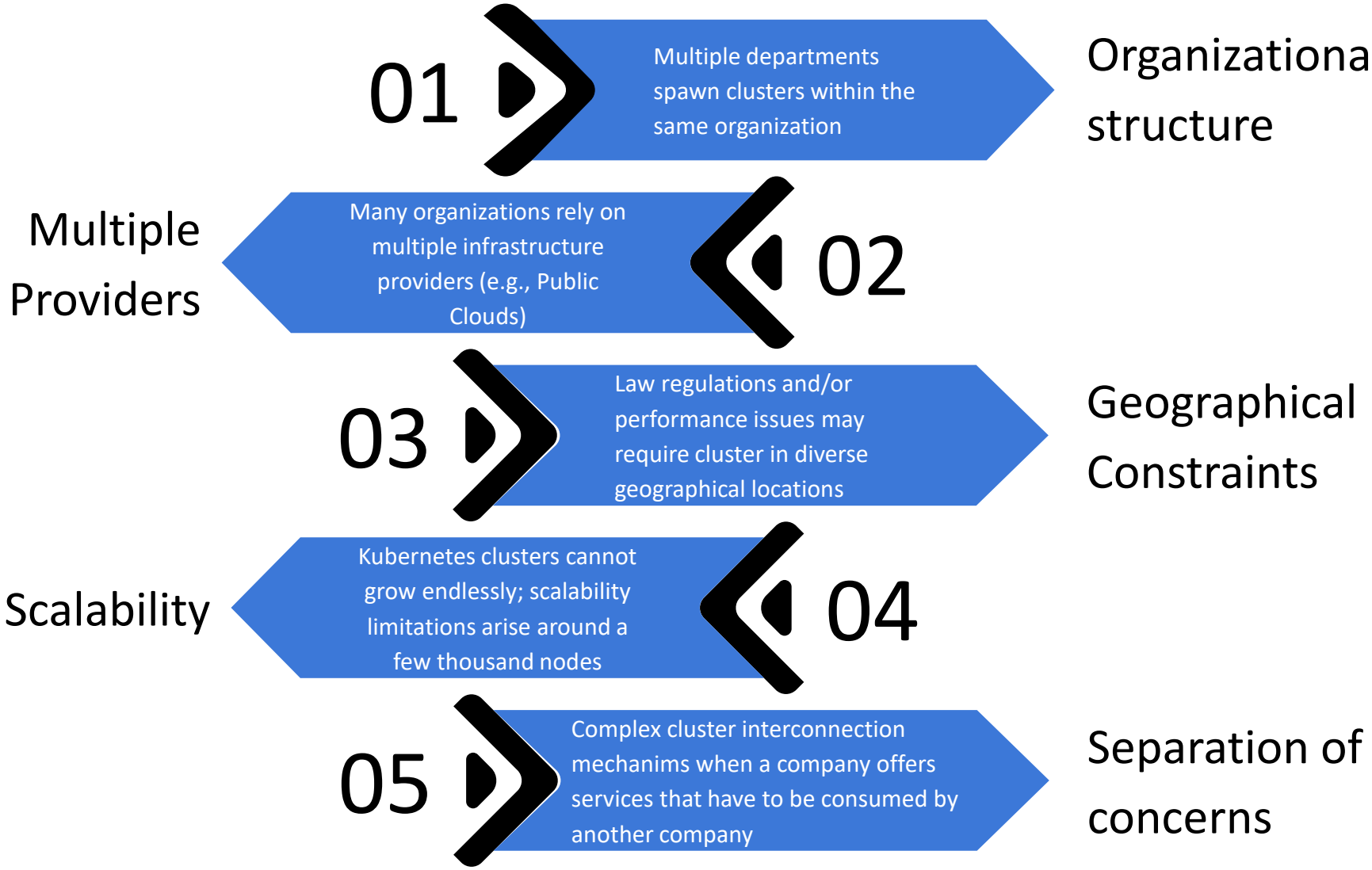
De facto Standard
Kubernetes is becoming predominant in IT infrastructures
(86% interviewed report it)

Heterogeneous Infrastructure
64% clusters on premises
31% on multiple cloud vendors
10% on Edge (rapidly expanding)

Kube Sprawl
40% have more than 5 clusters,
10% more than 50 clusters

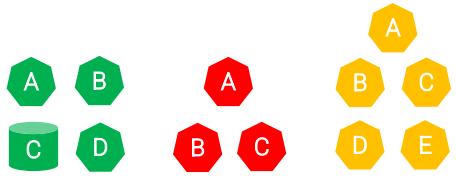
Sources: VMware State of Kubernetes Survey 2020, StackRox State of Container and Kubernetes Report 2020, CNCF Survey Report 2019

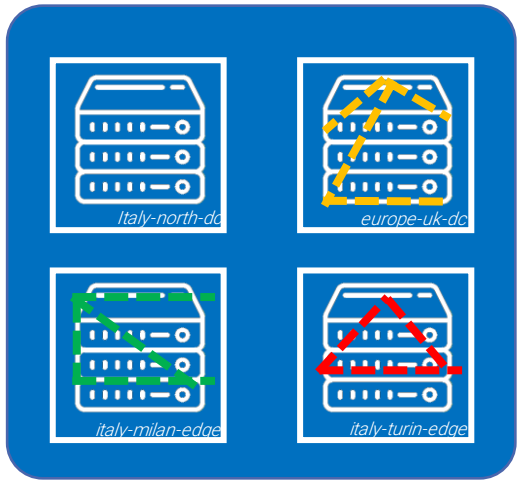
The cluster sprawl problem



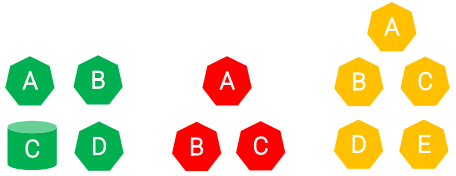
Seamless multi-cloud/multi-cluster

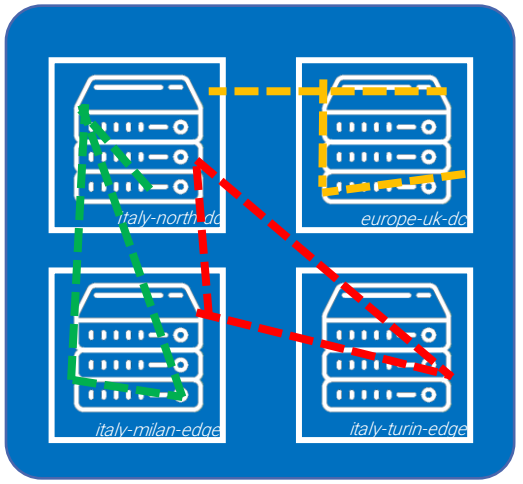
Cloud/Edge computing
Rigid silos





Liqo
Borderless orchestration





+policies

- Keep data in UK
- One instance per country
- Run close to customers

From Clusters to Virtual Clusters

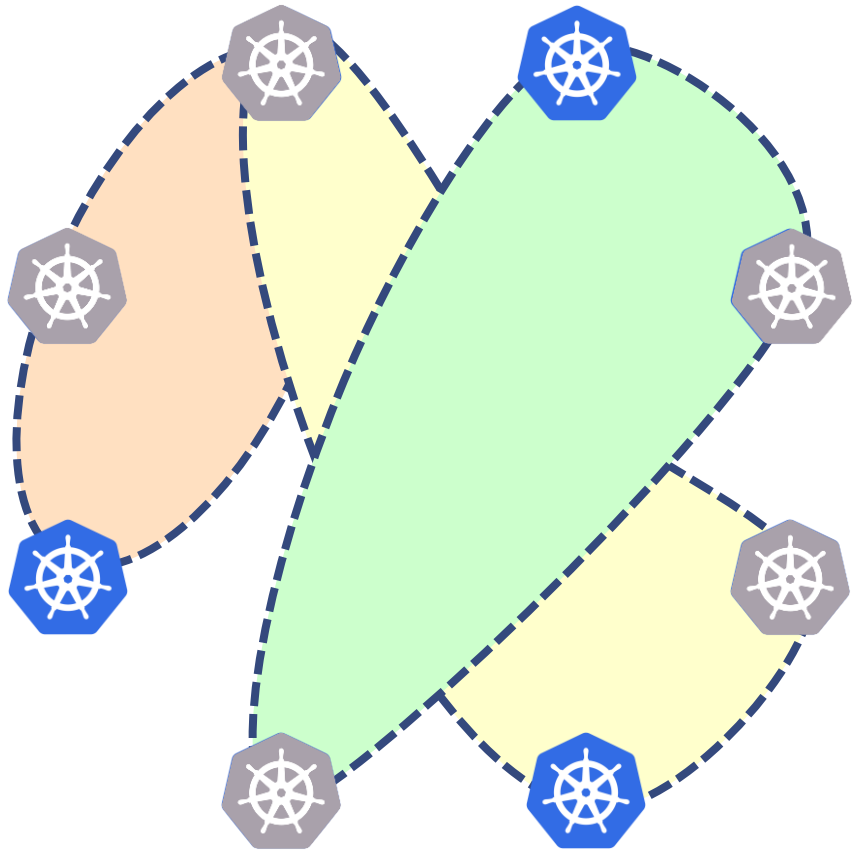
8x separate clusters

Virtual cluster #1

Virtual cluster #2

Virtual cluster #3

A cluster can join multiple Virtual Clusters



Basic workflow

Discover (cluster)

Advertise (resources&services)

Peer (and accept conditions)

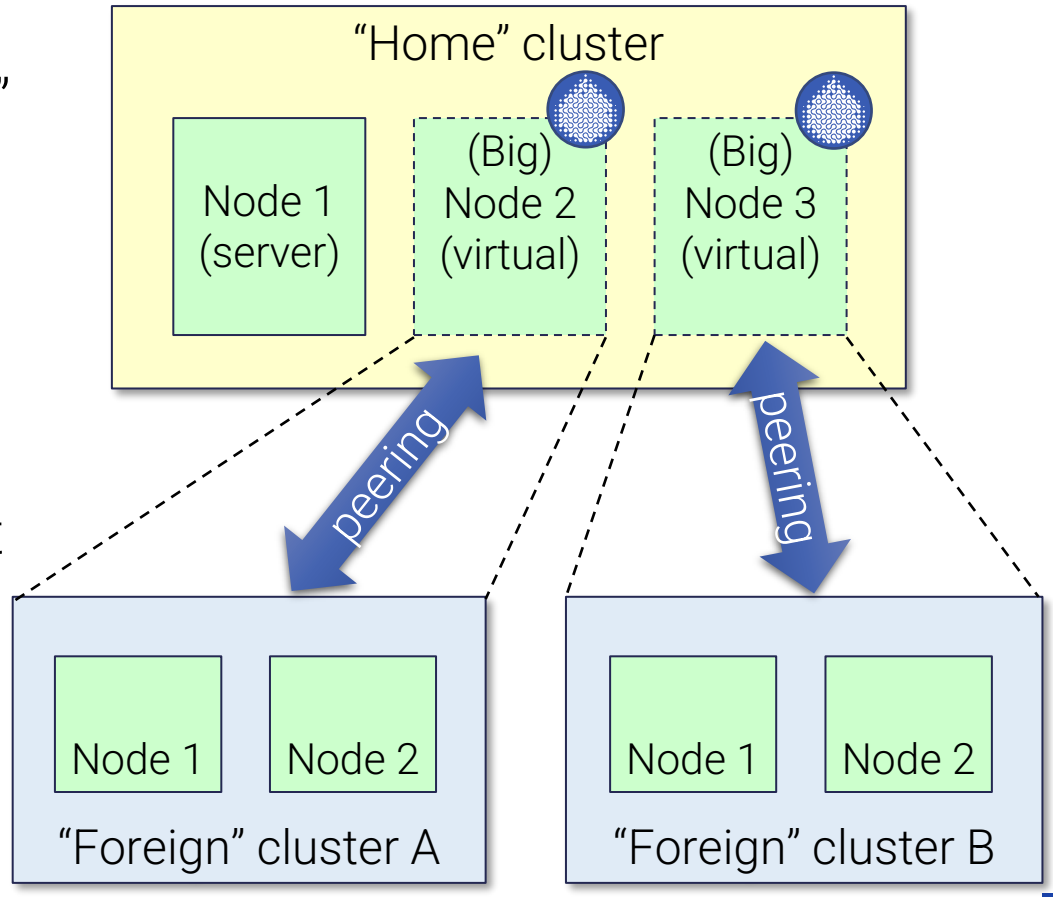
Synchronize

Use (seamlessly)

De-peer

Main idea: Big Clusters with Big Nodes

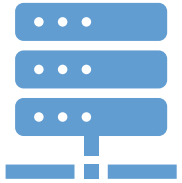
- "A "Big node" virtualizes the remote cluster, hence making the local cluster a "Big cluster"
- "Big nodes" are equivalent to physical nodes w.r.t. the Kubernetes Control plane
  - Can be controlled by the vanilla Kubernetes scheduler and controller-manager
- Compatible with the Kubernetes deployment logic
- Support for K8s, K3s, OpenShift, Amazon EKS, Google GKE, Azure AKS



Liqo keywords

Dynamicity

Peer and un-peer in a matter of seconds, to create the desired **service continuum**



[Cluster] Virtualization

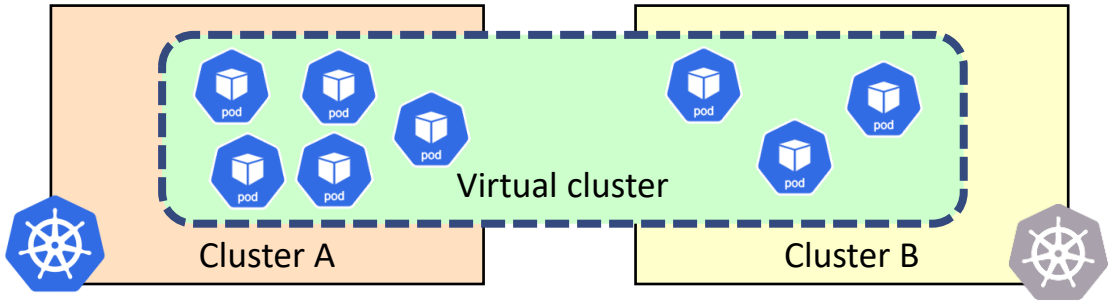
Create a unique virtual space across multiple clusters, as it were a single cluster, and do whatever you like in this virtual space

Ownership

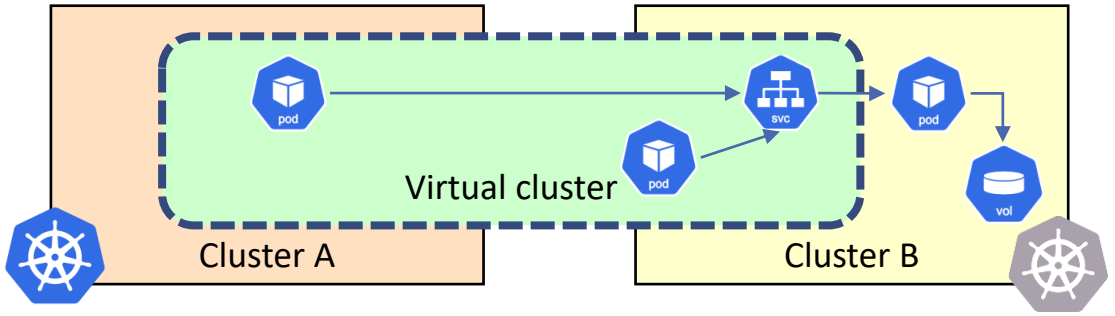
Everyone keeps ownership of its resources

Some use cases

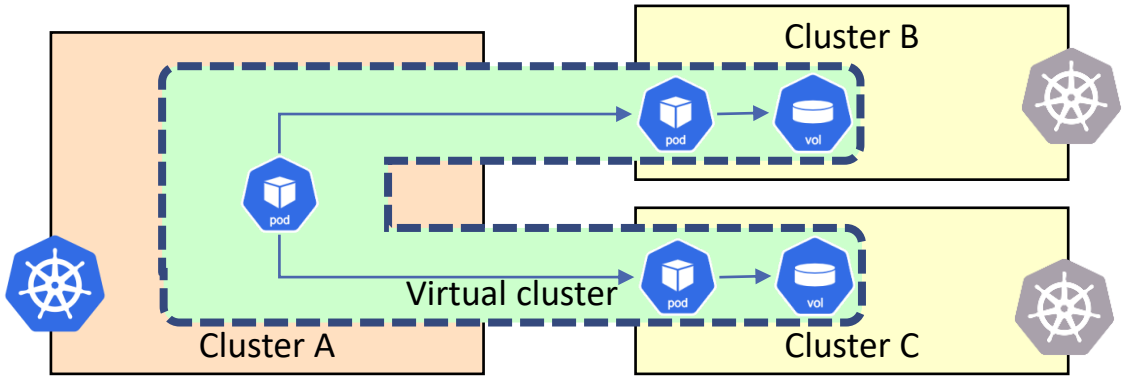
Cloud bursting
(CrownLabs@POLITO)



Service Sharing
(e.g., private data spaces)



Data gravity
(e.g., distributed machine learning)



Some numbers

222 registered users

792 stars

38 contributors

20+ active deployments across the world

M. Iorio, F. Risso, A. Palesandro, L. Camiciotti, A. Manzalini, "**Computing Without Borders: The Way Towards Liquid Computing**," in IEEE Transactions on Cloud Computing, 2022. DOI: 10.1109/TCC.2022.3229163

Liqo spin-off is under way

Data updated Mar 4th, 2023

Why Liqo?

- We offer
  - Multicloud
  - European
  - No lock-in (hyperscalers)
  - Open-source
  - Open governance (CNCF incubation planned)
- We look for
  - Pilots
  - Feedback
  - Feature requests
  - Directions

Need to provide a common ground for the upcoming European Cloud Infrastructure

Pan-European distributed Computing Services?

+

Thanks!