Smart Orchestration in Cloud-Native Environments

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Agenda

- Background and Related Work
  - Containers, Virtual Machines and Clusters Orchestration
  - Cloud Deployment Models
  - Multi-Cluster Architecture
  - Tools and Frameworks
- Research Objectives
- First Results
  - Cluster Connectivity using Submariner
  - Cluster Connectivity using Liqo
  - Cluster Orchestration using ClusterAPI + OpenStack
- Next Steps
  - Preliminary Architecture
- Conclusion

Background and Related Work

Containers, VMs and Cluster Orchestration

- Orchestration
  - Automation of the operations needed to run workloads
  - Types of operations
    - Provisioning
    - Deployment
    - Networking
    - Load balancing
    - Scaling
- TOSCA blueprints

Cloud Deployment Models

- Services
  - Software as a Service
  - Platform as a Service
  - Infrastructure as a Service
- Deployment Models
  - Public Cloud
  - Private Cloud
  - Community Cloud
  - Hybrid Cloud
  - Multi-Cloud

Background and Related Work

Multi-Cluster Architecture

- Topologies
  - Segmentation
  - Replication
- Advantages
  - High Availability
  - Scalability
  - Vendor Lock-in
  - GDPR Compliance
- Challenges
  - Connectivity
  - Orchestration
  - Automation

Tools and Frameworks

- Kubernetes
- ClusterAPI
- Submariner
- Liqo
- OpenStack

Research Objectives

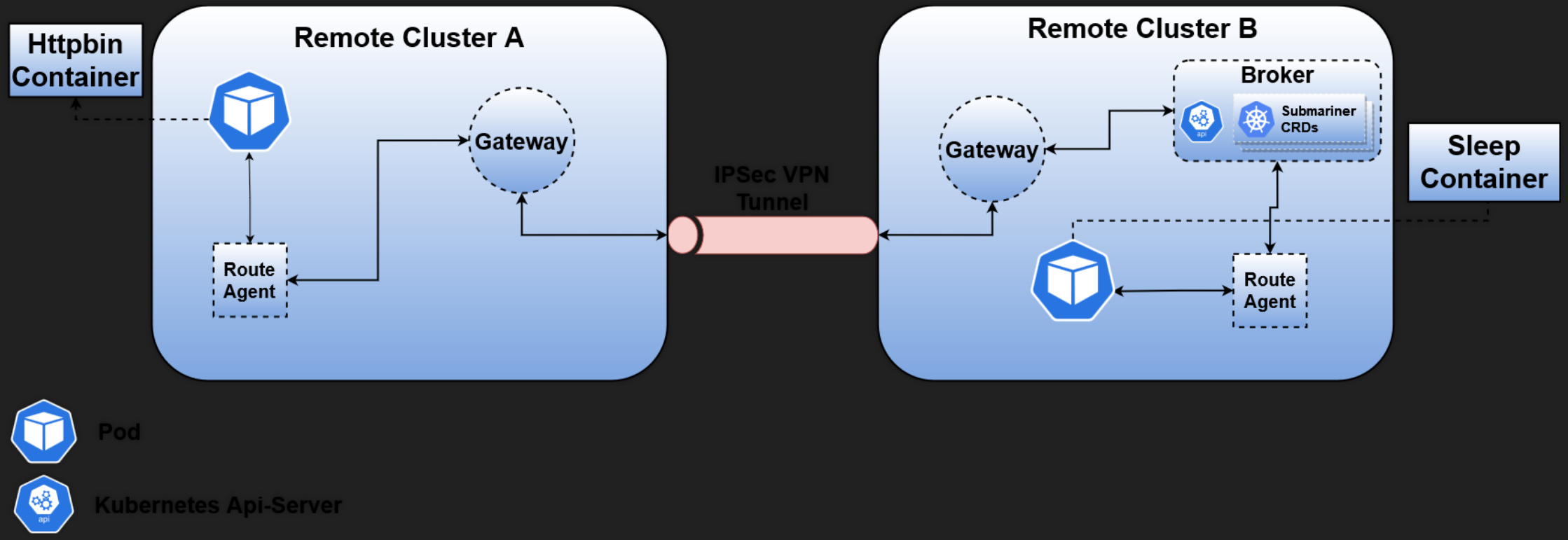
- Evaluate and validate Submariner effectiveness in connecting more than one cluster
- Evaluate and validate Liqo effectiveness in connecting more than one cluster
- Evaluate and validate ClusterAPI capabilities in deploying Kubernetes clusters using OpenStack cloud provider
- Implement and validate a custom orchestration solution to deploy Kubernetes clusters
- Integrate the solutions for the multi-cluster challenges in a multi-cluster architecture and evaluate its performance

First Results

- Cluster Connectivity Proof of Concepts
- Cluster Orchestration Proof of Concepts

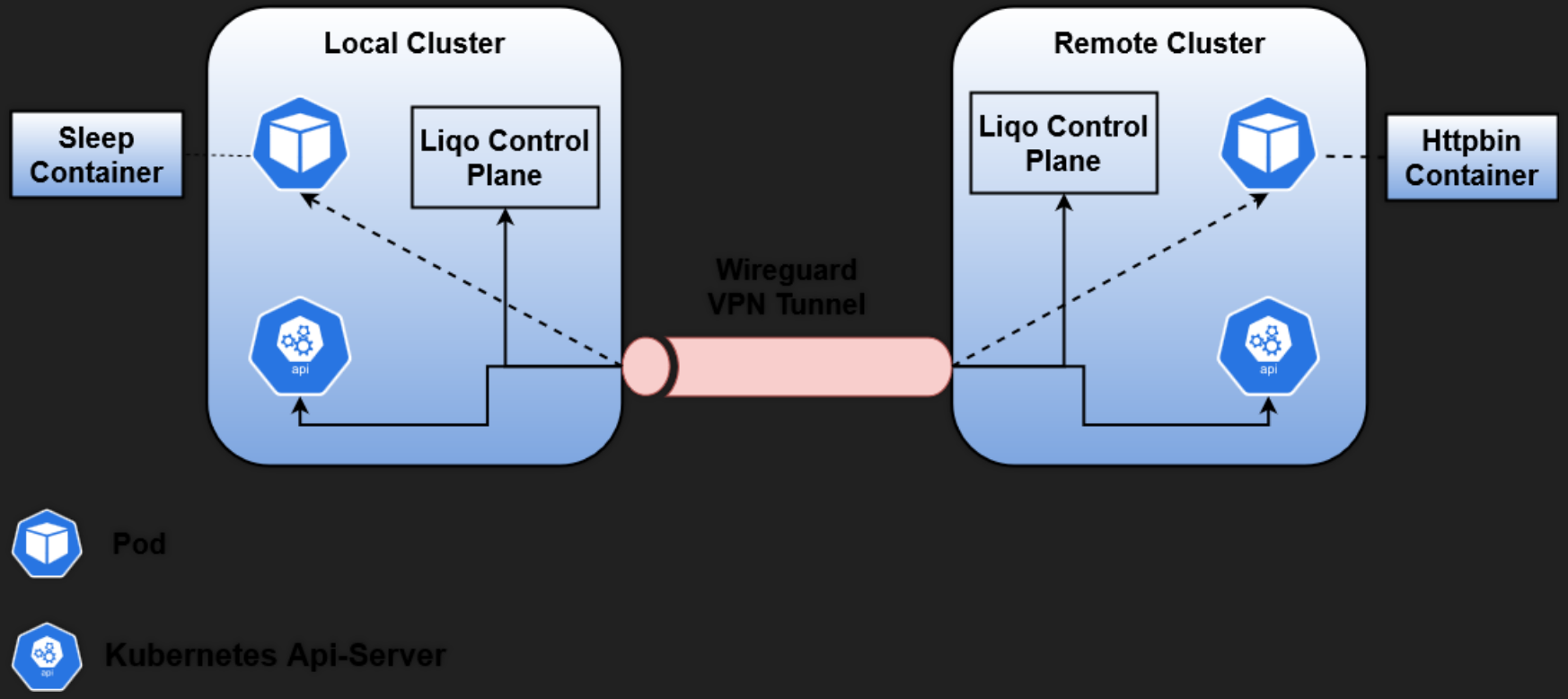
First Results

Cluster Connectivity using Submariner



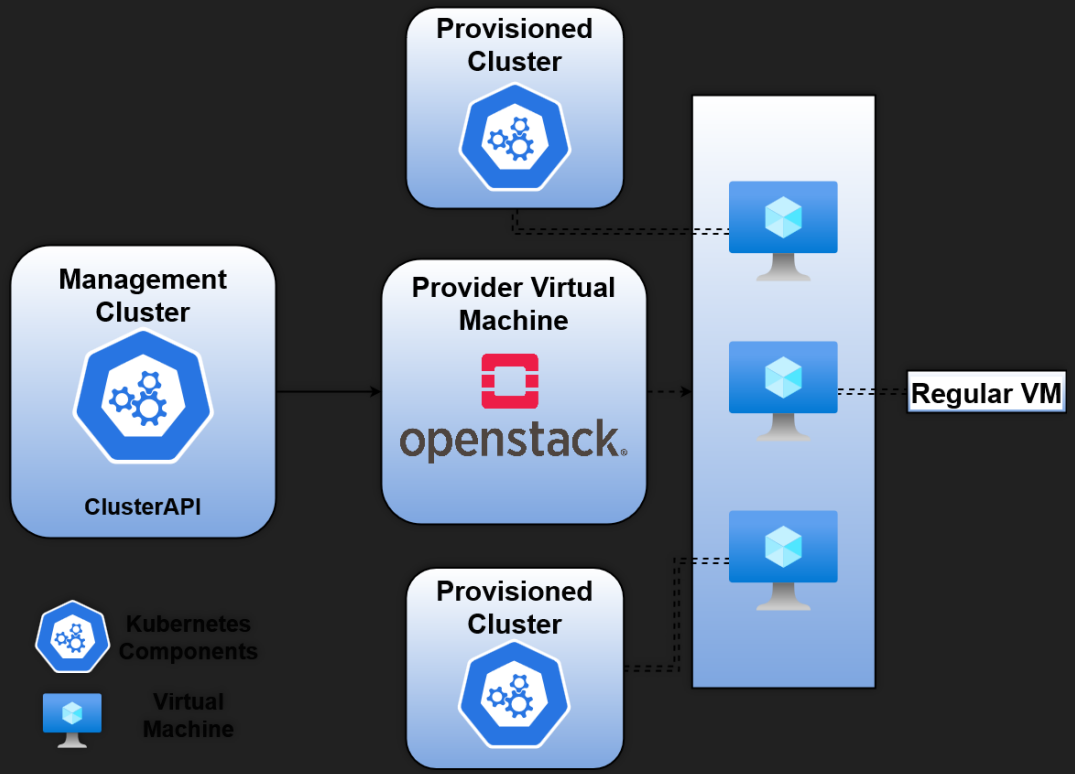
First Results

Cluster Connectivity using Liqo



First Results

Cluster Orchestration using ClusterAPI + OpenStack

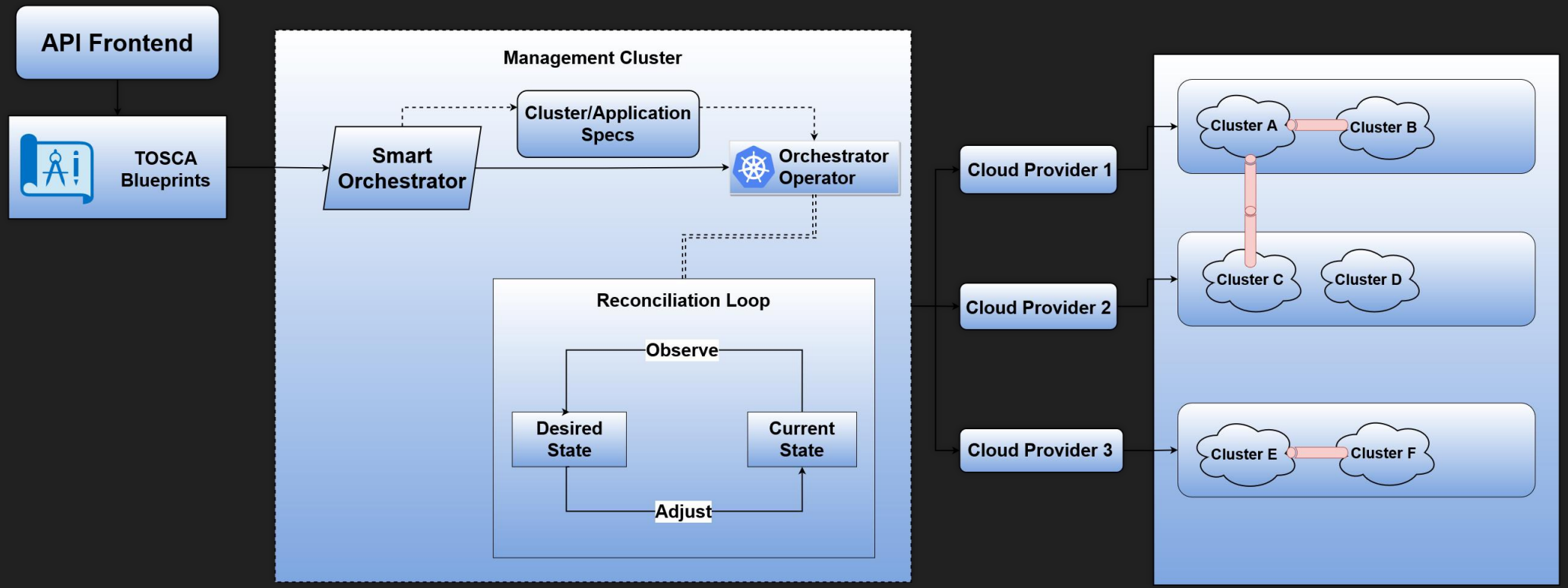


Next Steps

- Development of a smart orchestrator to automate the cluster orchestration process
- Integration of the developed PoCs

Next Steps

Preliminary Architecture



Conclusion

- 1st Semester
  - Development of a cluster connectivity PoC
  - Development of a cluster orchestration PoC
- 2nd Semester
  - Development of the orchestrator
  - Integration of the developed PoCs

Questions?

Smart Orchestration in Cloud-Native Environments

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