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A Unified GitOps Continuous Deployment Approach for Telco Hybrid Workloads

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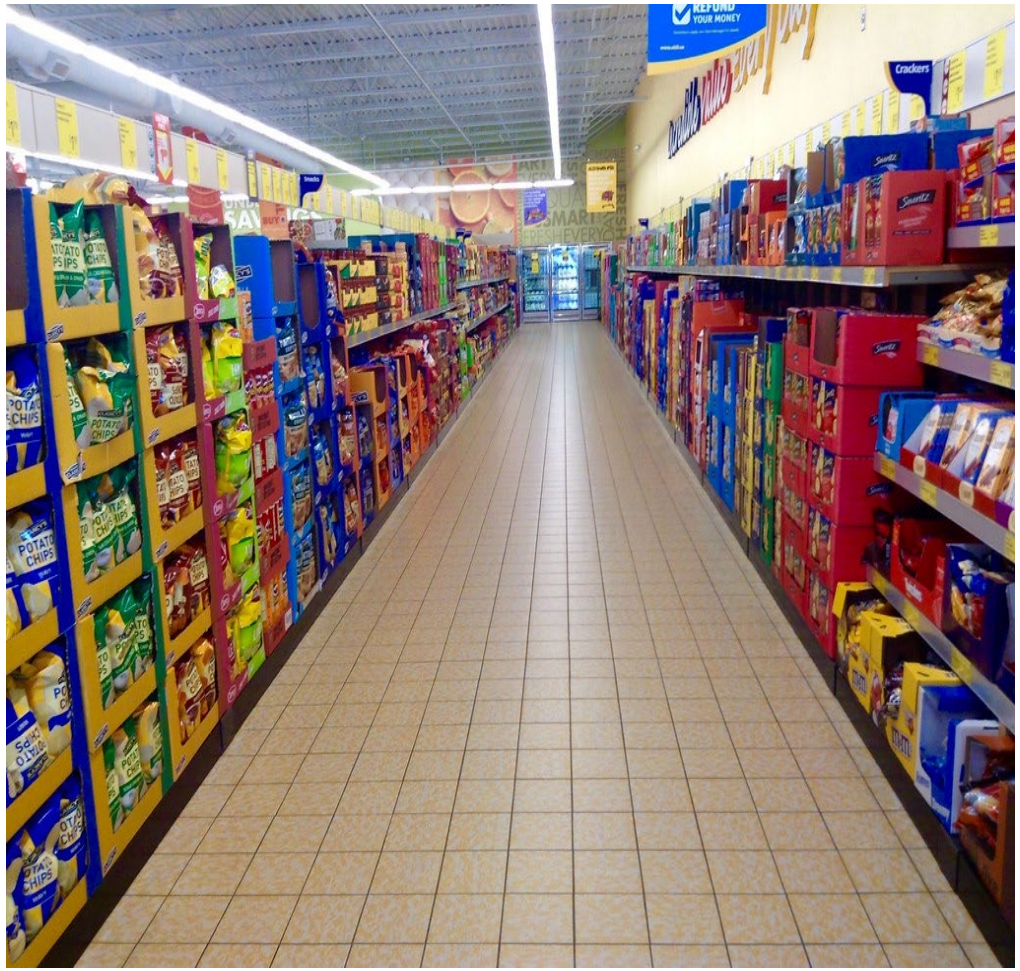
Introduction



When choosing the right set of tools becomes like shopping for groceries. – The Psychological challenge of "Over Choice" for DevOps Practitioners

- Some analysts estimate **20-50 different tools** used by DevOps Engineers per day, although this has not been comprehensively studied -- it may be more!

- Increased competition for Telco customers means time to market is more important than ever for DevOps Teams.

In DevOps, Less Choice can be Better!

6 Key Problems for DevOps Teams in our Industry

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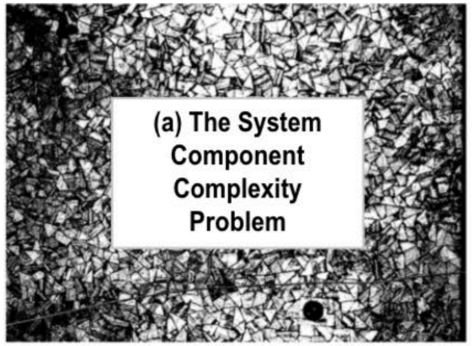
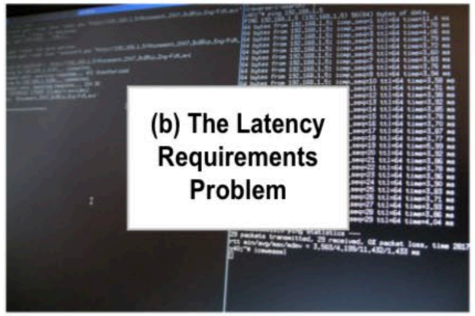
It's easy to lose track of what the core issues are while in the day-to-day.

Focus is key.



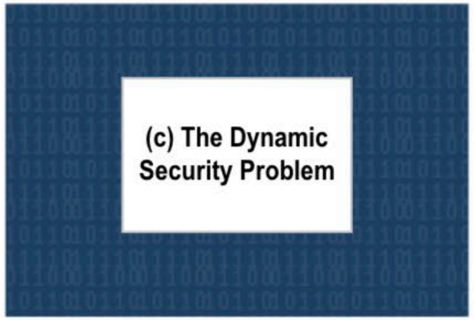
Numerous, complex deployment-system components are difficult to arrange into reliable patterns.

Maintaining legacy platforms while focusing on highest-priority modernization



For voice communcations, FCC requirements sets guidance at 100ms average latency limit.

Enforcing the syncronous order of CI/CD and Delivery Tasks over time



In 2021, more than 50 CVEs were publically disclosed on average per day.

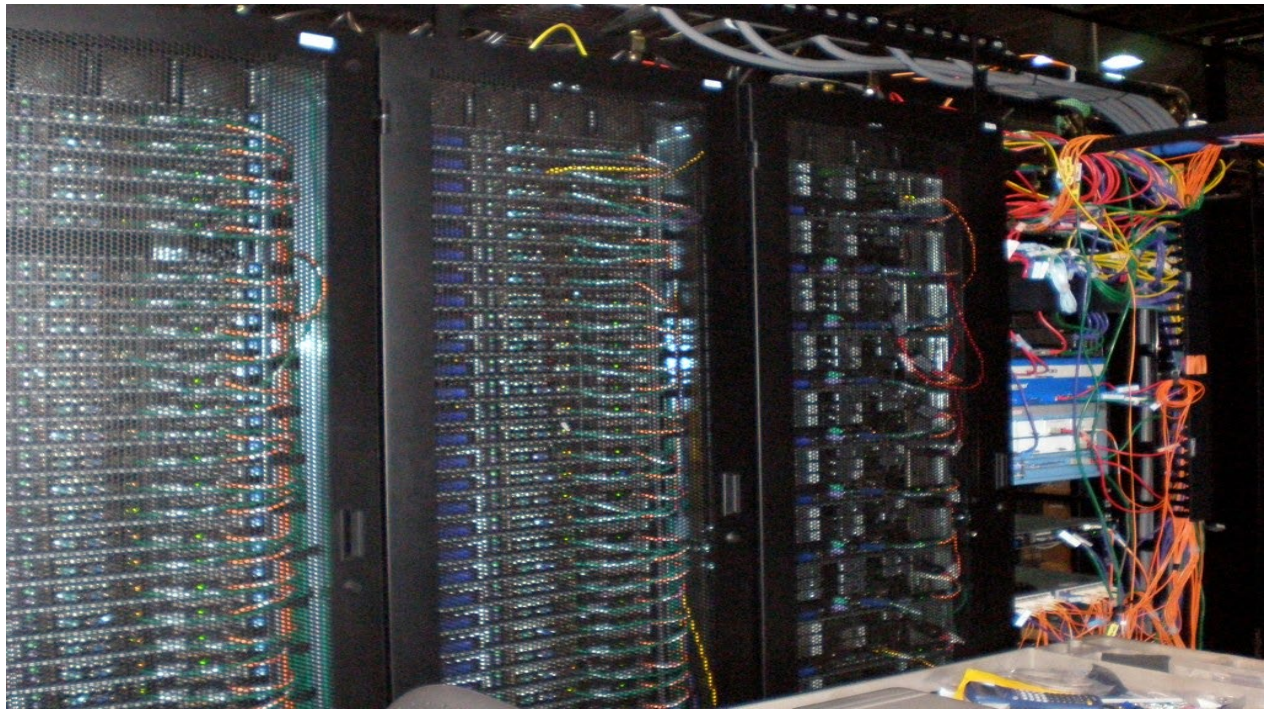
Continuously monitoring the health and performance of Deployment System KPIs

A GitOps Architecture for Unified Deployment System

OpenStack + Kubernetes Proof of Concept

1. **Web-Scale Application Deployment**
   - Distributed
   - Scalable
   - Resilient

2. **VoIP-Stack Deployment**
   - SIP-Based
   - Totally Open Source
   - Multi-Component with Dependencies



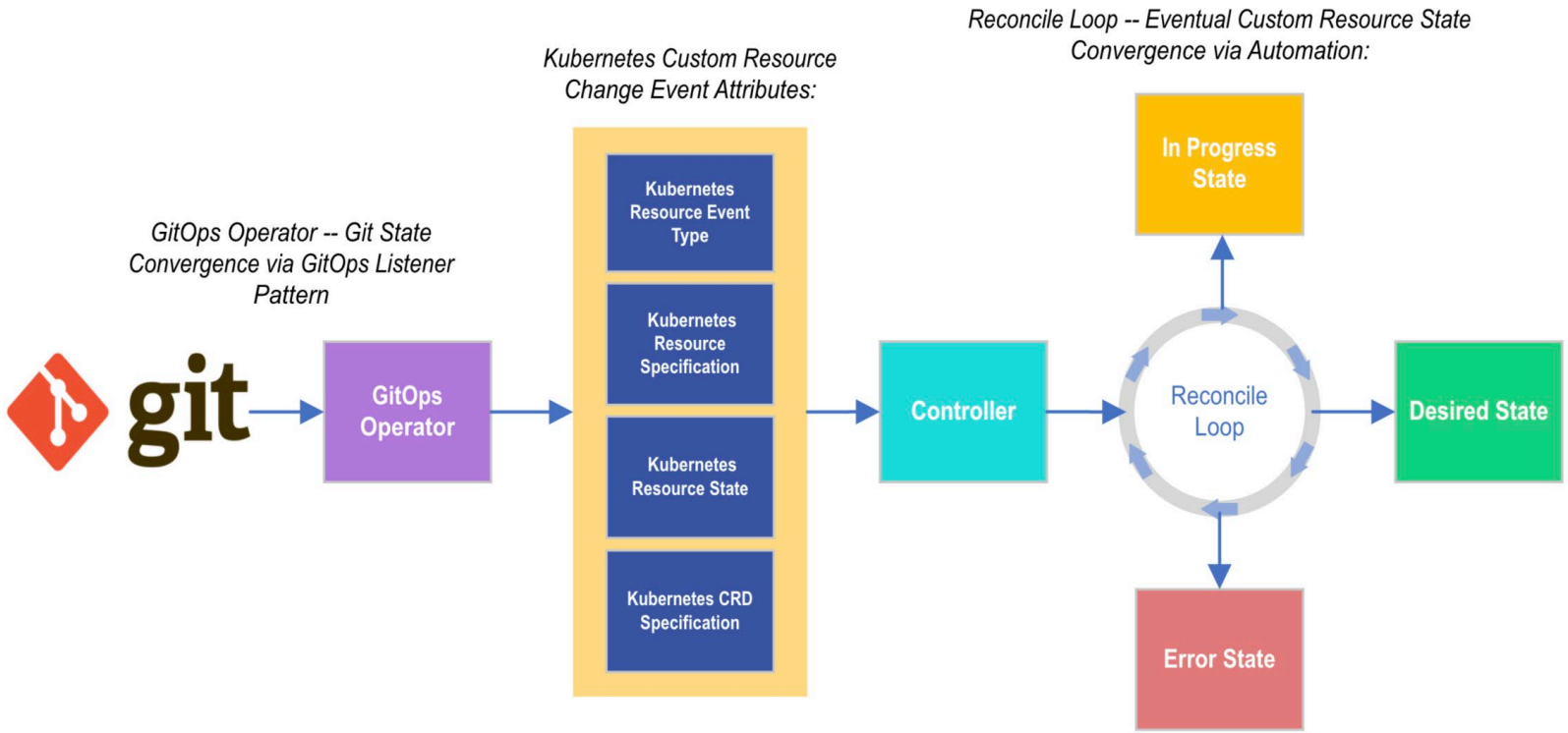
"Hardware != Software, Unfortunately" – Some Data Center Engineer, Somewhere

Why Use GitOps?

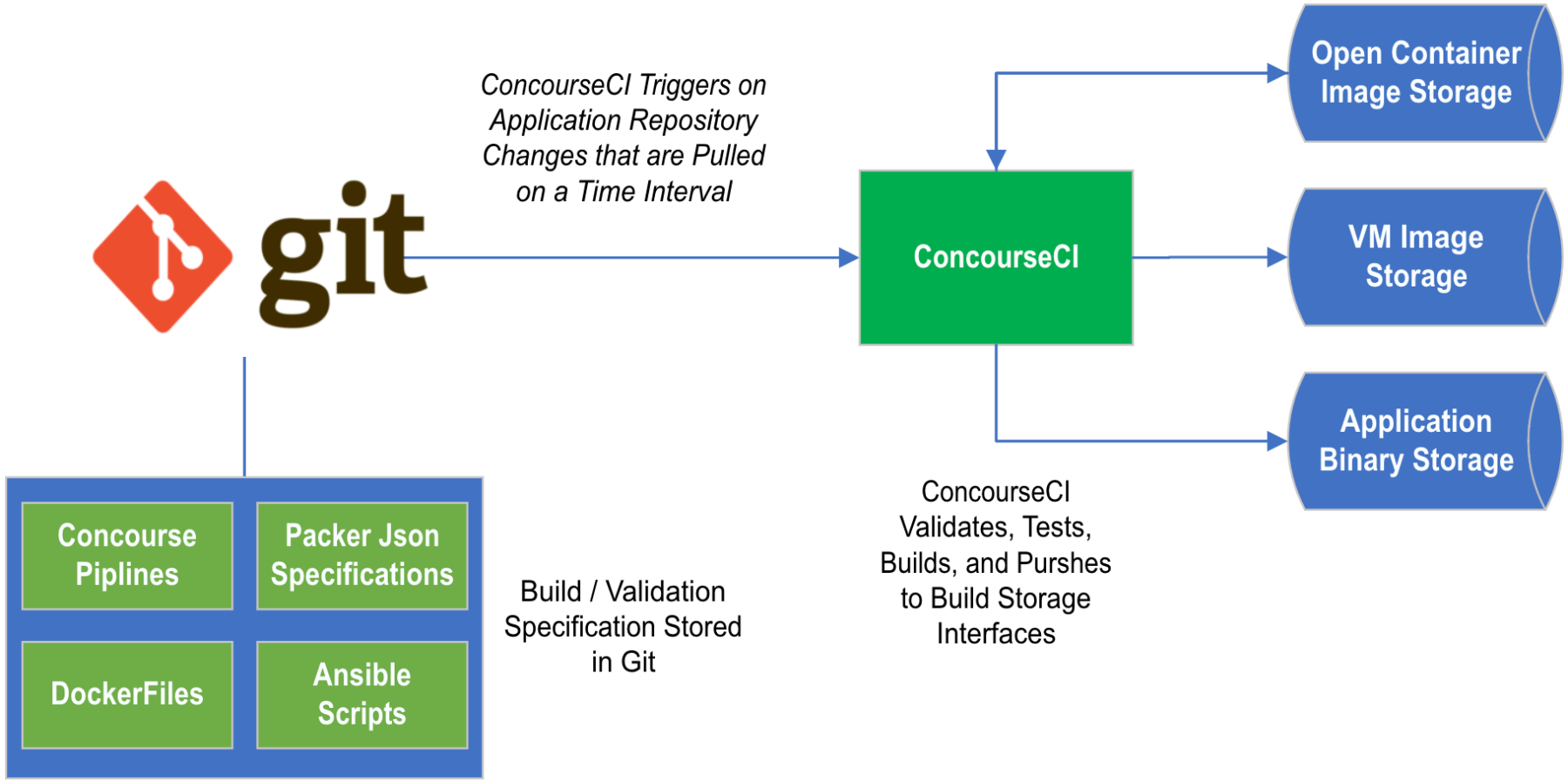
DevOps practices are too distributed.

- GitOps organizes declarative manifests into effective organizational units.
- GitOps Operator continuously attempts to converge git state with Kubernetes state.
- Kubernetes operators pick up changes as a set of attributes that get processed in a “Reconcile Loop”.

Example Architecture - GitOps usage with Operator Design Pattern:



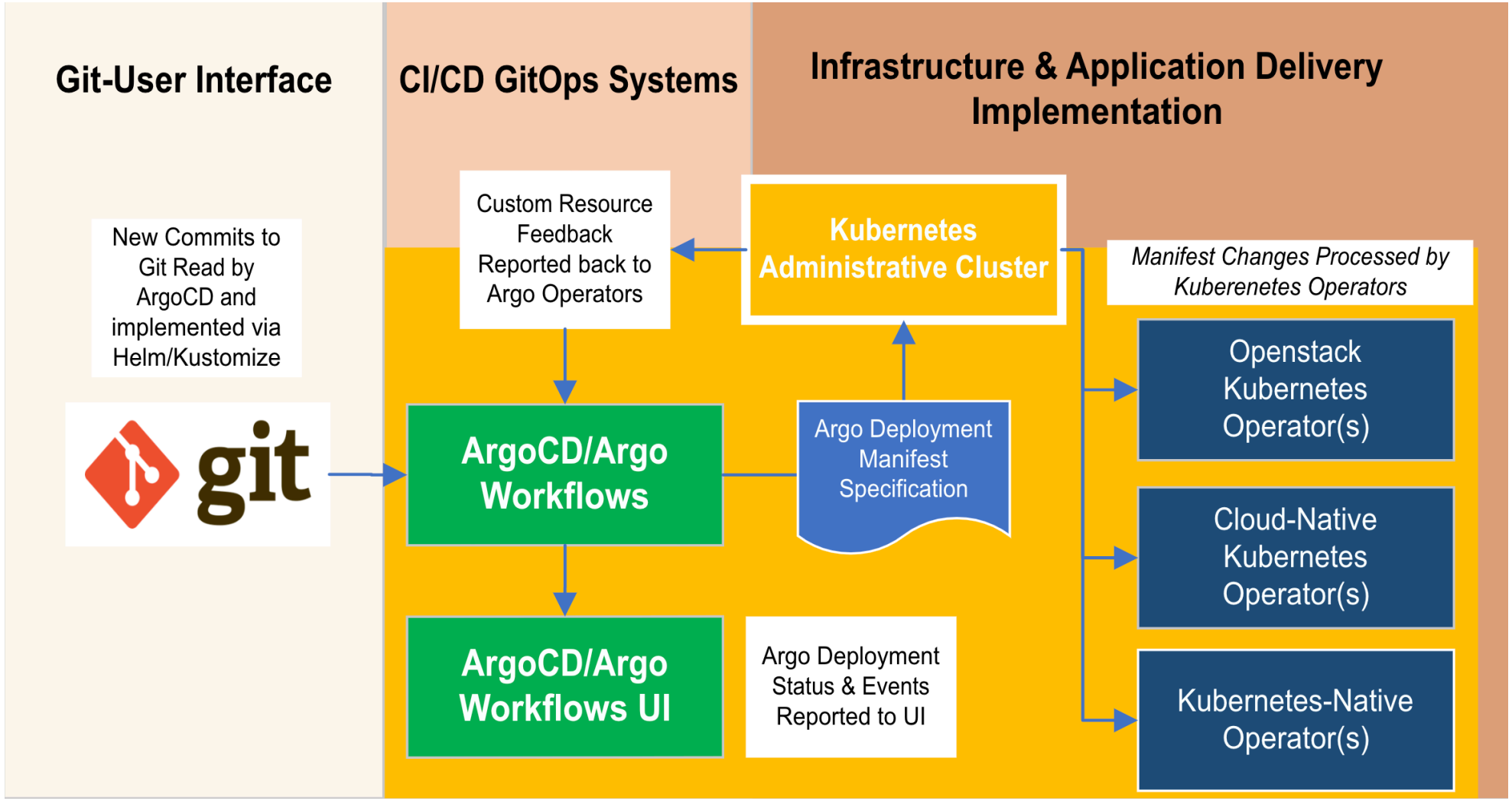
Multi-Platform CI/CD and GitOps Design



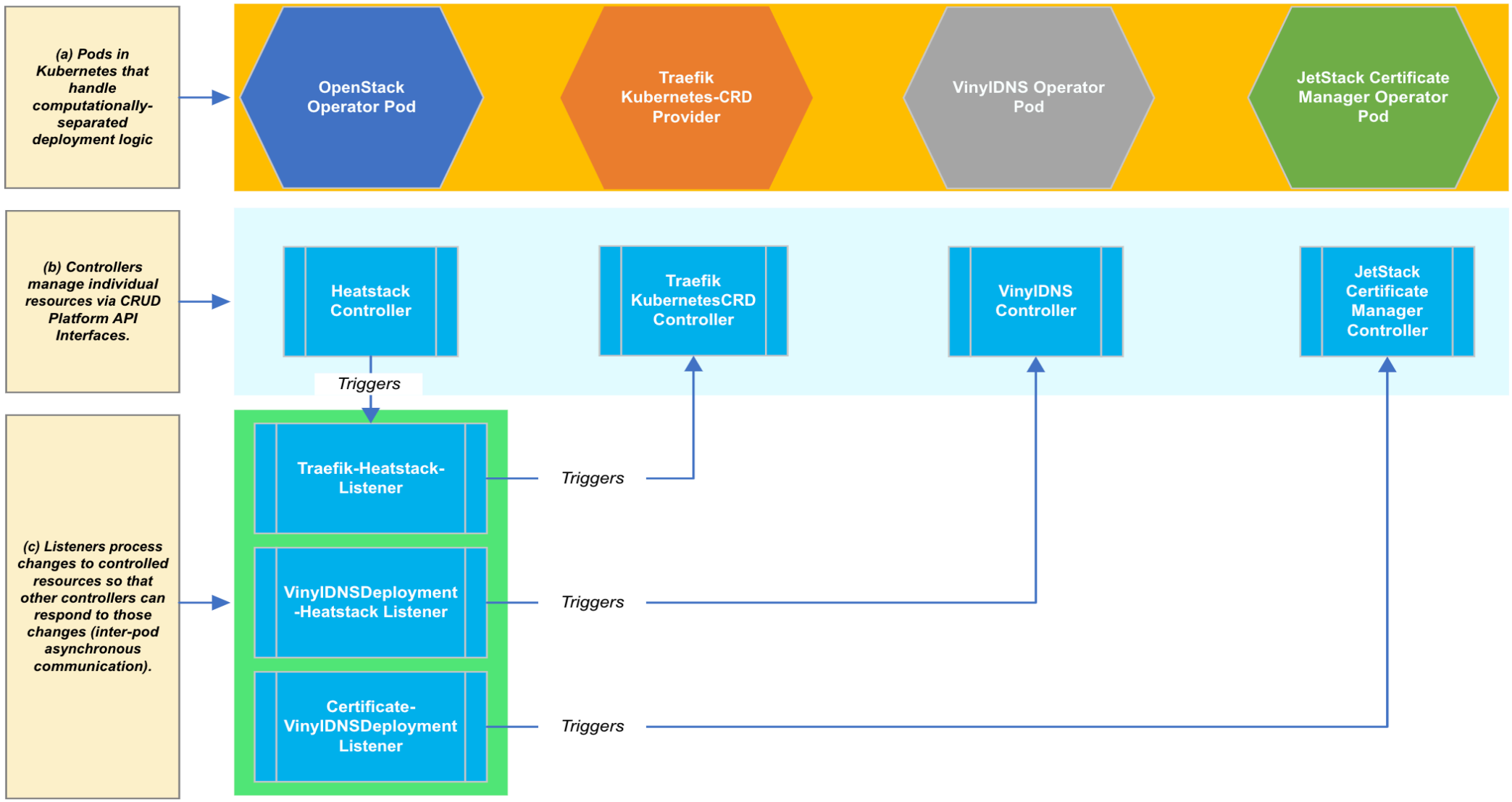
- Support for:
  - Containers
  - VM Images
  - Binary Files
- All tools used are of Open Source and free.
- ConcourseCI is interchangeable with other open-source alternatives.

Platform Unification for Common CI Tasks

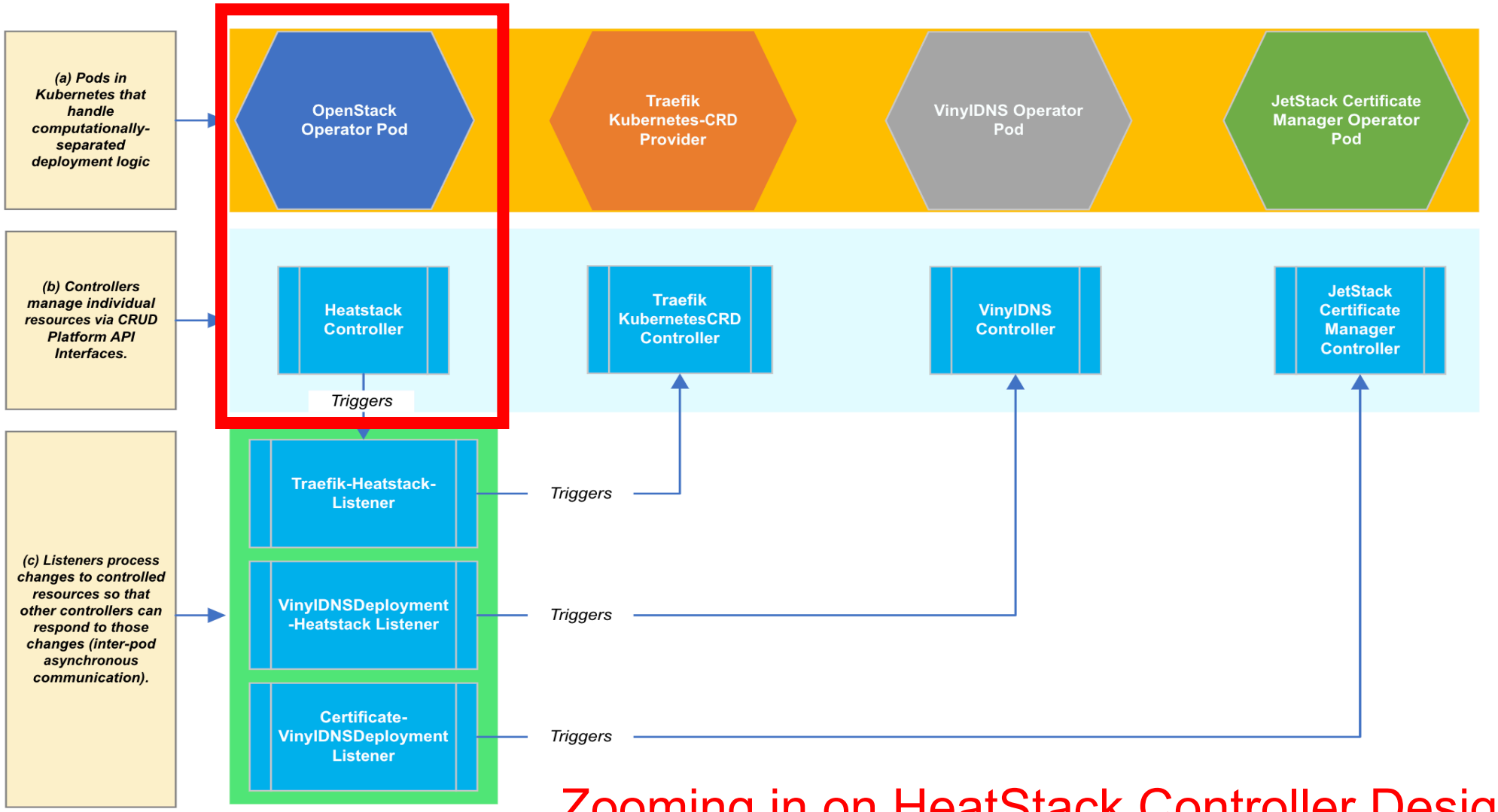
GitOps-Based Continuous Deployment Architecture



Openstack Operator High Level Architecture

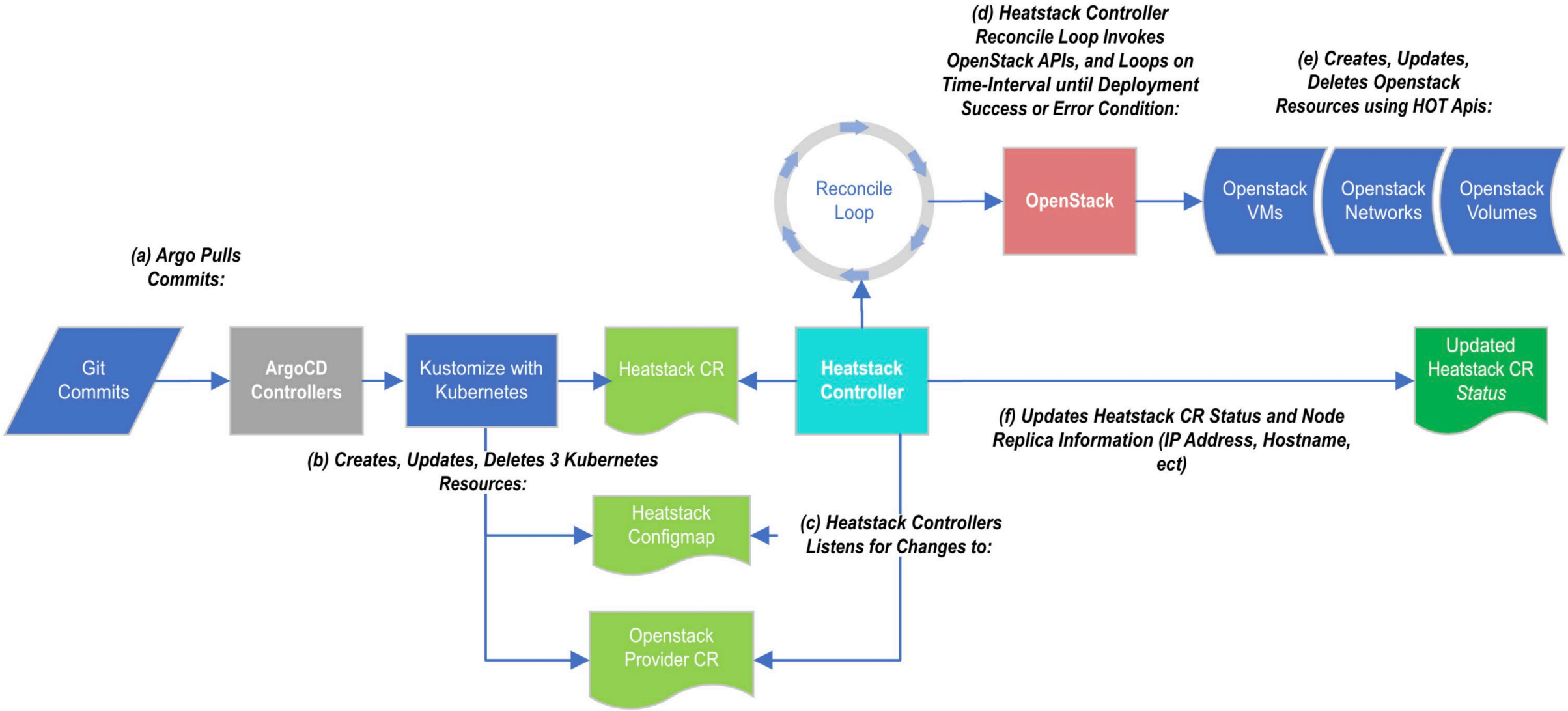


Openstack Operator High Level Architecture



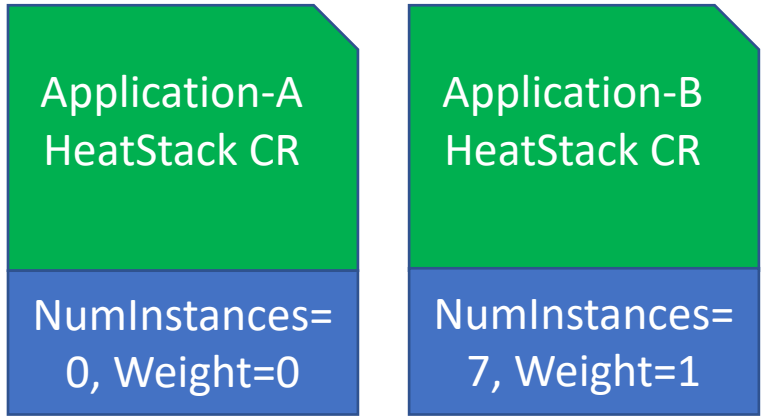
Zooming in on HeatStack Controller Design…

GitOps & HeatStack Controller Architecture

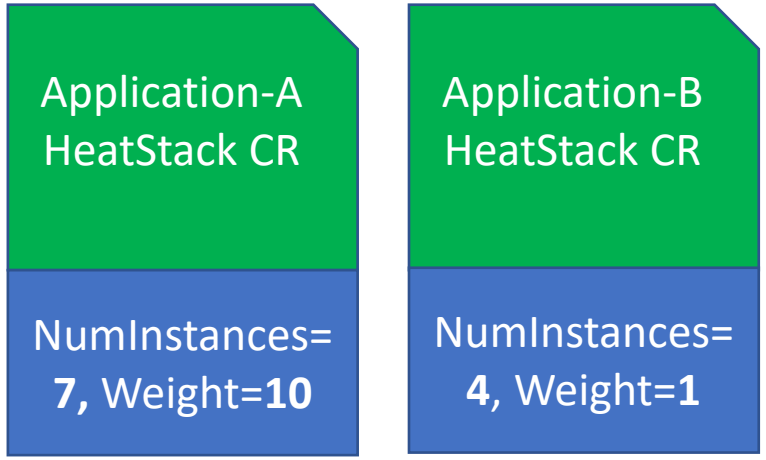


Scaled Rollout w/ Application Grouping Example:

- Methodologies Explored
  - Blue-Green
  - Canary
  - Scaled Rollout
- Two Key Variables
  - Num-Instances per App-Group
  - Weight (Traefik LB WRR) per App-Group

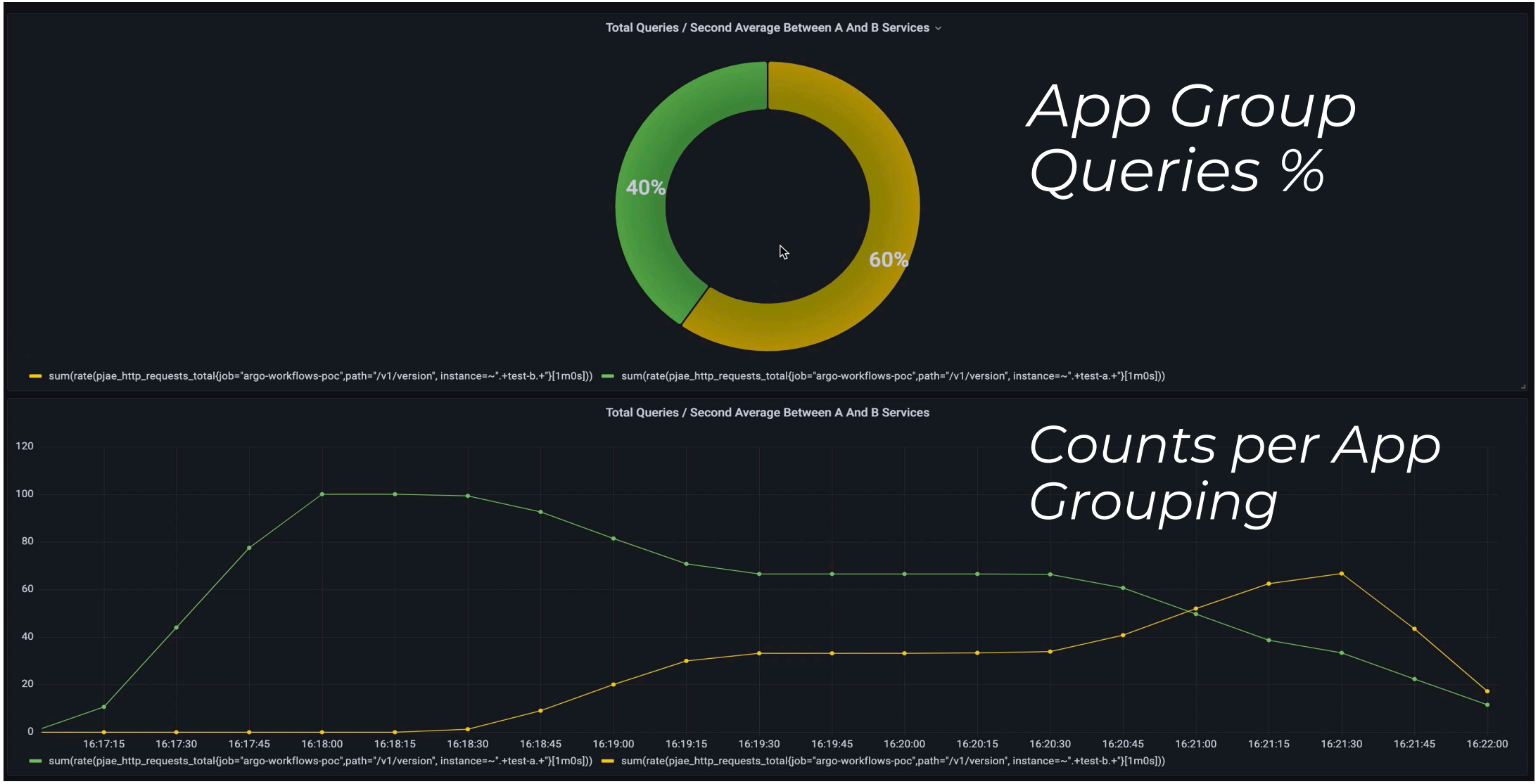


Before



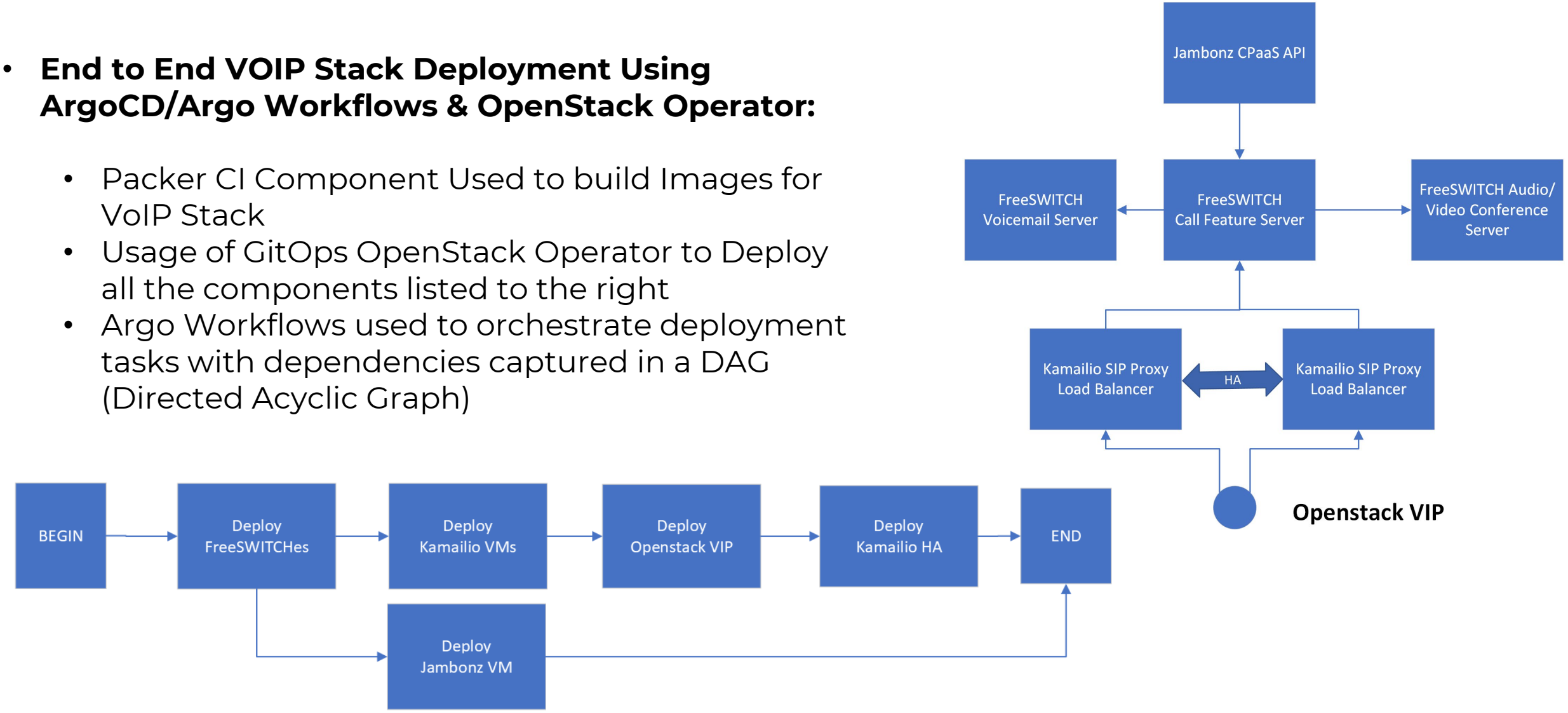
After

Advanced Deployment Methodologies (Web-Scale Stack)



Advanced Deployment Methodologies (VoIP Stack)

- **End to End VOIP Stack Deployment Using ArgoCD/Argo Workflows & OpenStack Operator:**
  - Packer CI Component Used to build Images for VoIP Stack
  - Usage of GitOps OpenStack Operator to Deploy all the components listed to the right
  - Argo Workflows used to orchestrate deployment tasks with dependencies captured in a DAG (Directed Acyclic Graph)



Impact & Caveats of Unified Deployment Strategies

Unifying Strategy 2 Projected Benefits:

- Operator Design Pattern
  - Complex Logic
  - High Investment
- Argo Workflows Design Pattern
  - Simple Synchronous Changes
  - Low Investment
- Resource Savings using Unified Platform Approach:
  - Web-Scale Deployment On OpenStack with Traefik
    - Without GitOps Automation: **1 Work Day** Average
    - With GitOps Automation: ***2 Minutes*** Average
  - VoIP Stack Deployment on OpenStack
    - Without GitOps Automation: **1-~2 Week** Average
    - With GitOps Automation: ***30 Minutes*** Average

Human Resource Efficiency

Time

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Thank You!

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