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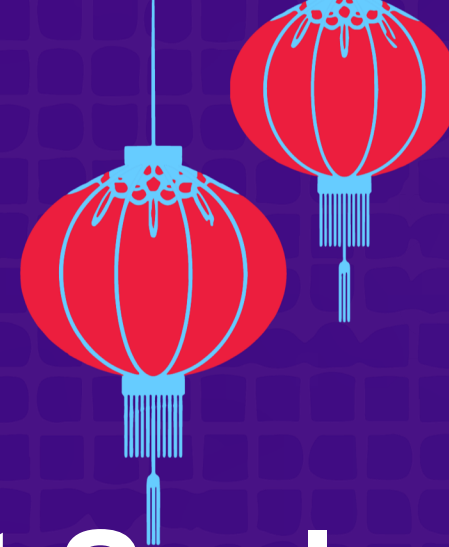


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# No More Chaos - Inspect Kubernetes at Scale

Jie Chen - Alibaba Cloud  
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# About Us



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# Agenda

- **Why We Need Inspection on Kubernetes Clusters?**
- **Considerations on an Inspection Service**
- **Build A Self-Healing Inspection System**
- **The Future**

# We have A Large Scale Kubernetes Cluster



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- Nodes (>10k)
  - Types of Hardware
  - Types of OS
  - Types of Kubelet
- Pods (>100k)
  - Jobs (>10k)
- Controllers (>100)
  - Custom Resource Types (>100)





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**So many Kubernetes resources and custom resources**

**Does the cluster really keep eventual consistency ?**

# Cases



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- **IP Conflict**
  - **Service Interrupt**
- **Dangling Resources**
  - **Pods**
  - **PVs**
  - **CRDs**
- **Inconsistent with External System**
  - **CMDB**
  - **IPAM**



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**We need to dive into our Kubernetes cluster to  
inspect all the resources**

# Considerations on An Inspection Service

- **Efficiency**
  - Capable to inspect ten of thousands of nodes
  - Capable to inspect hundreds of thousands of pods
  - Capable to inspect hundreds of custom resource (\* pods)
- **Scalability**
  - Support more teams/groups
  - Setup hundreds of inspecting points
- **Observation**
  - Auditing
  - Monitoring

# What We Build in Version 1



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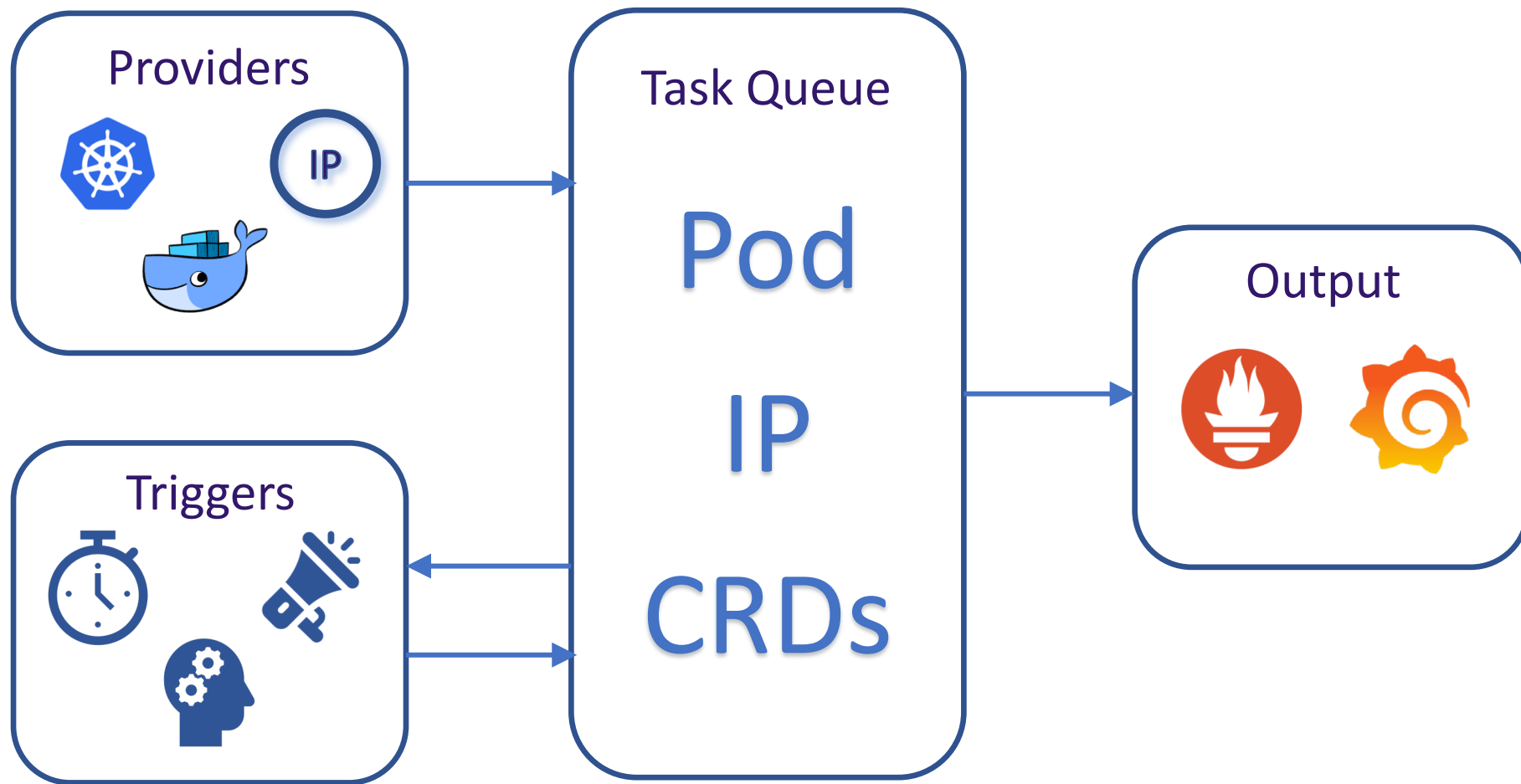


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# Problems in V1

- One pod per cluster
  - Limited performance per node
  - Resource conflicts among tasks
  - Unable to scale horizontally
- Lack of generality
  - Only an internal closed-loop



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Knative

# Knative : The Killer Component



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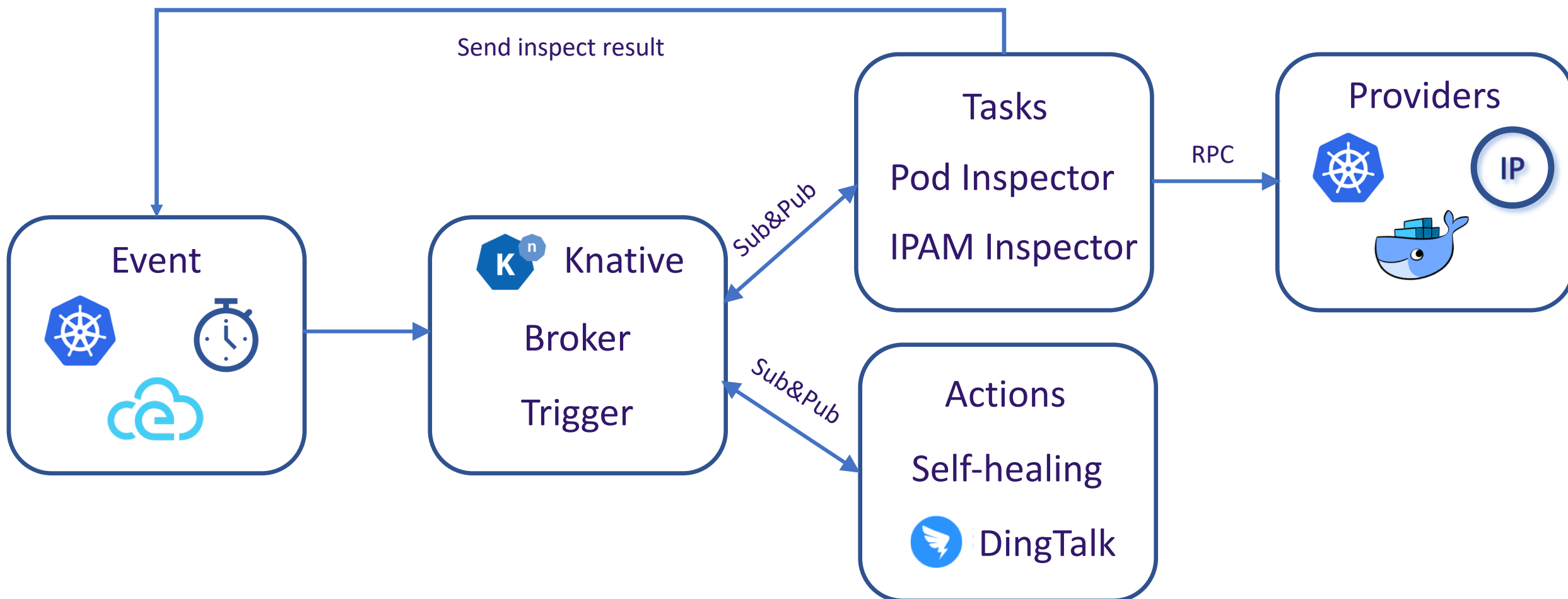


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- Use Serverless to horizontally scale inspections
- Use CloudEvent to be more scalable
- To be a Framework not a internal service any more

# We Build V2 in Serverless with Knative





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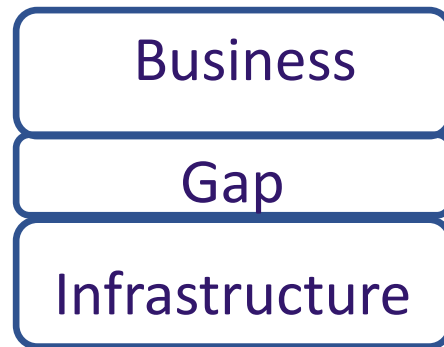
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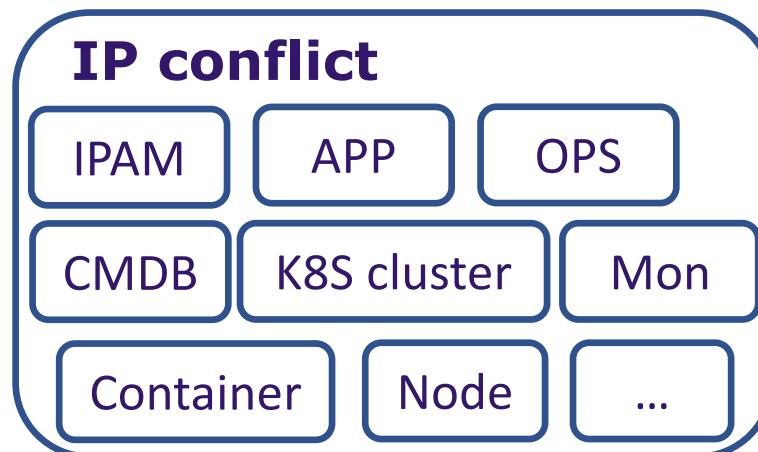
# How to Build A Complete Inspection system

# Some Problems in Business Stability

1) A huge gap between infrastructure and business



2) Lack of global perspective of status inspection



# Changes When We Moving to Cloud Native and Kubernetes?



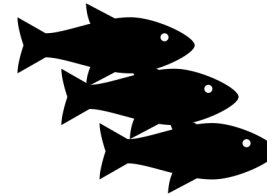
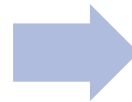
**Imperative**



**Declarative**



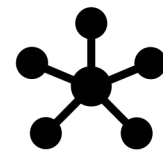
**Giant Container like VM**



**Flexible Containers in Pod**



**Just Resource Allocation**



**Works more**



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# How to Handle These Problems and Changes?

# Boundary of Inspection System



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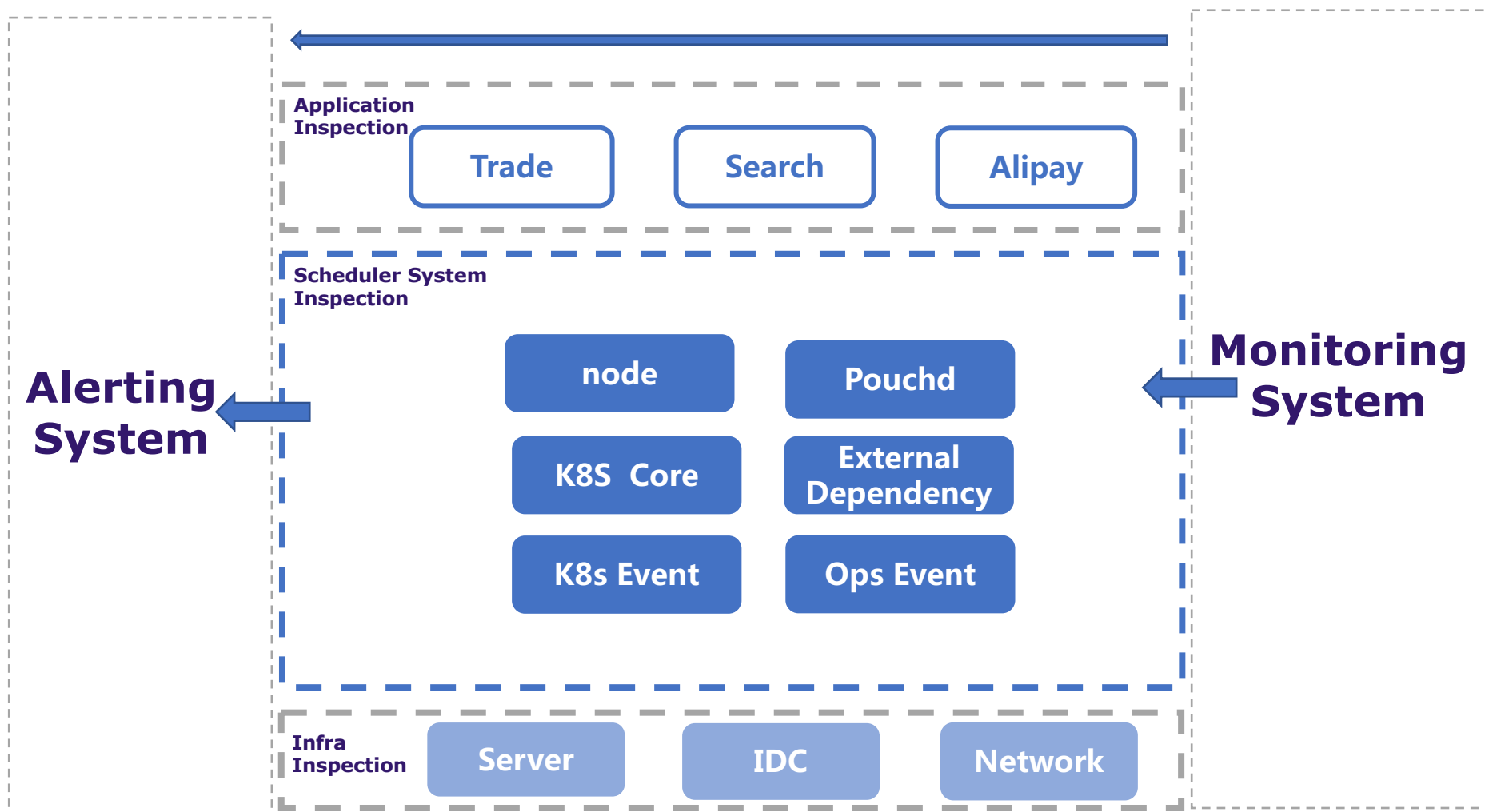


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# **We Can Do More about Analysis and Make Decision**



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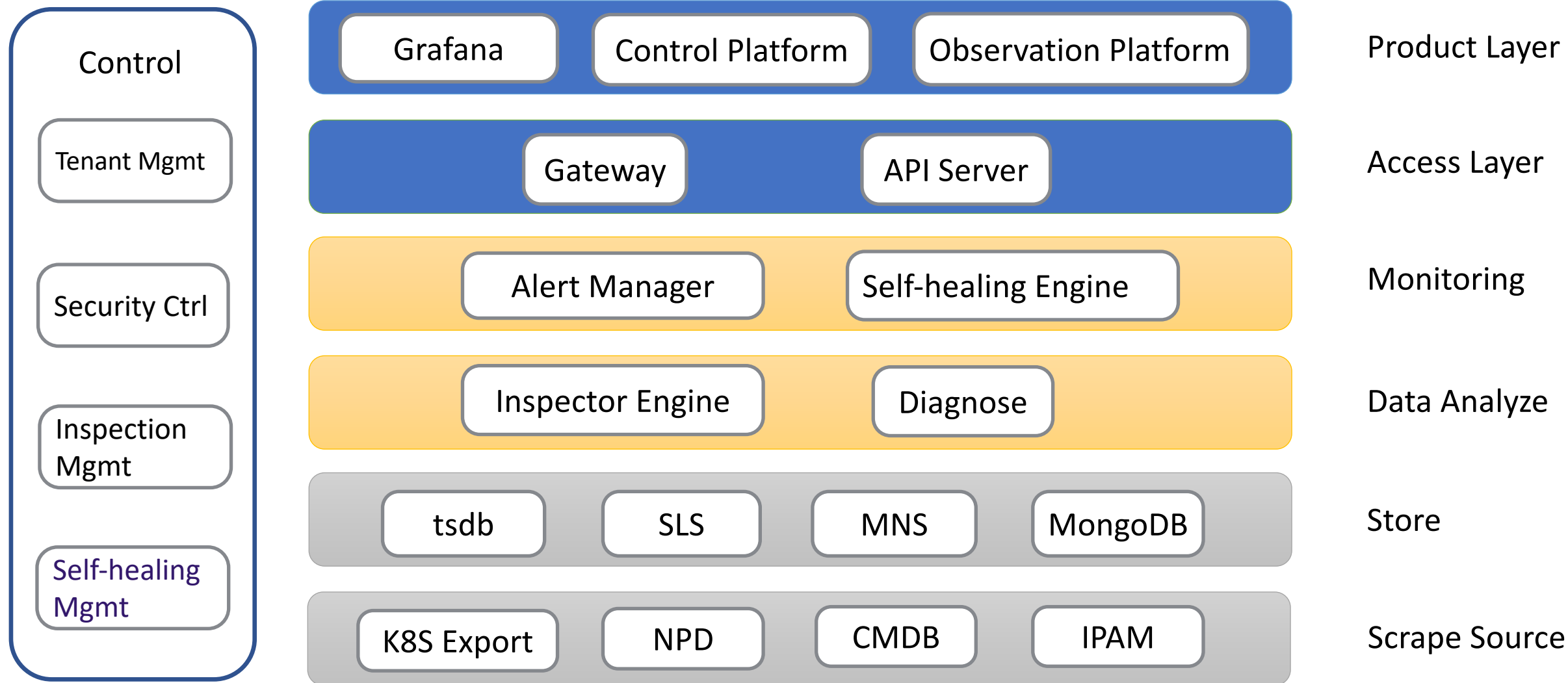
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# Self-healing Inspection System - Overview





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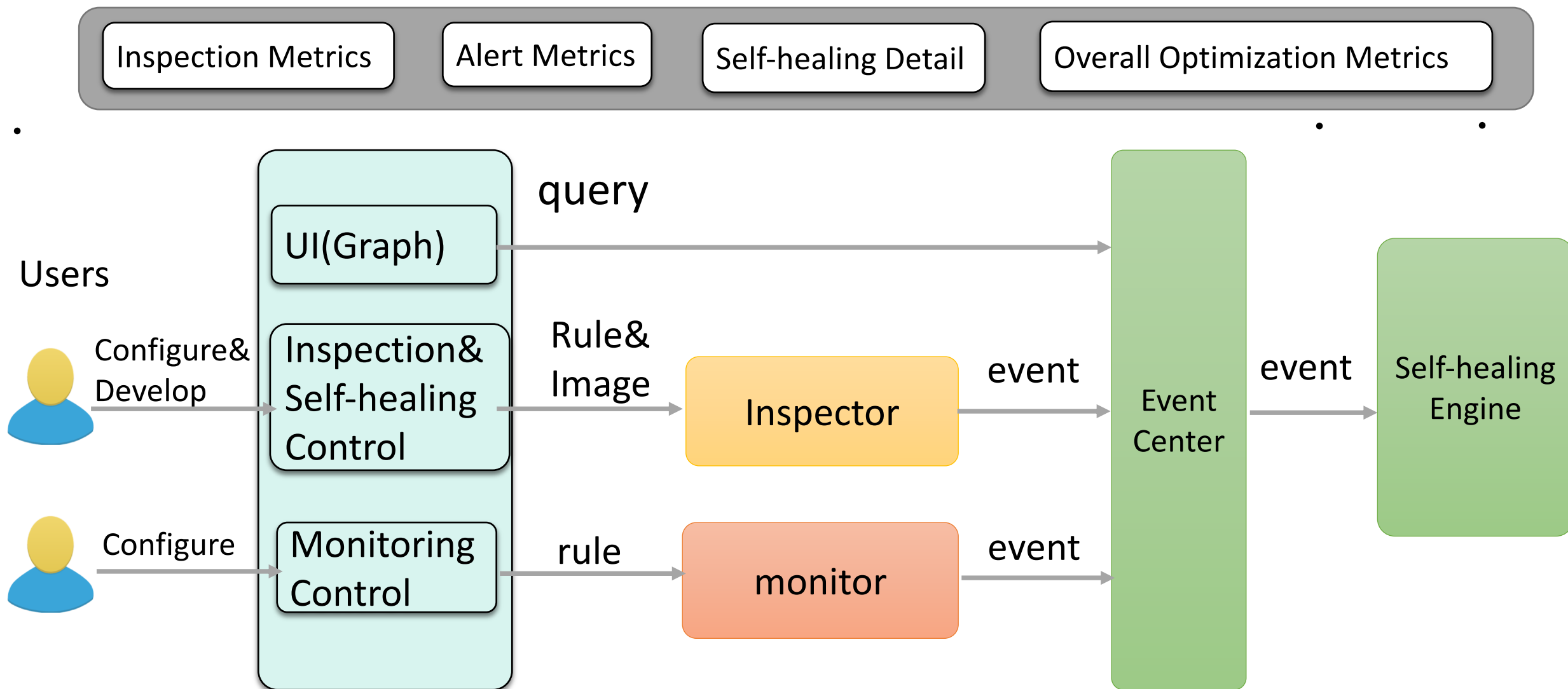


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# How to Enable Users do Inspect?

# User-driven System Inspecting





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# Practices



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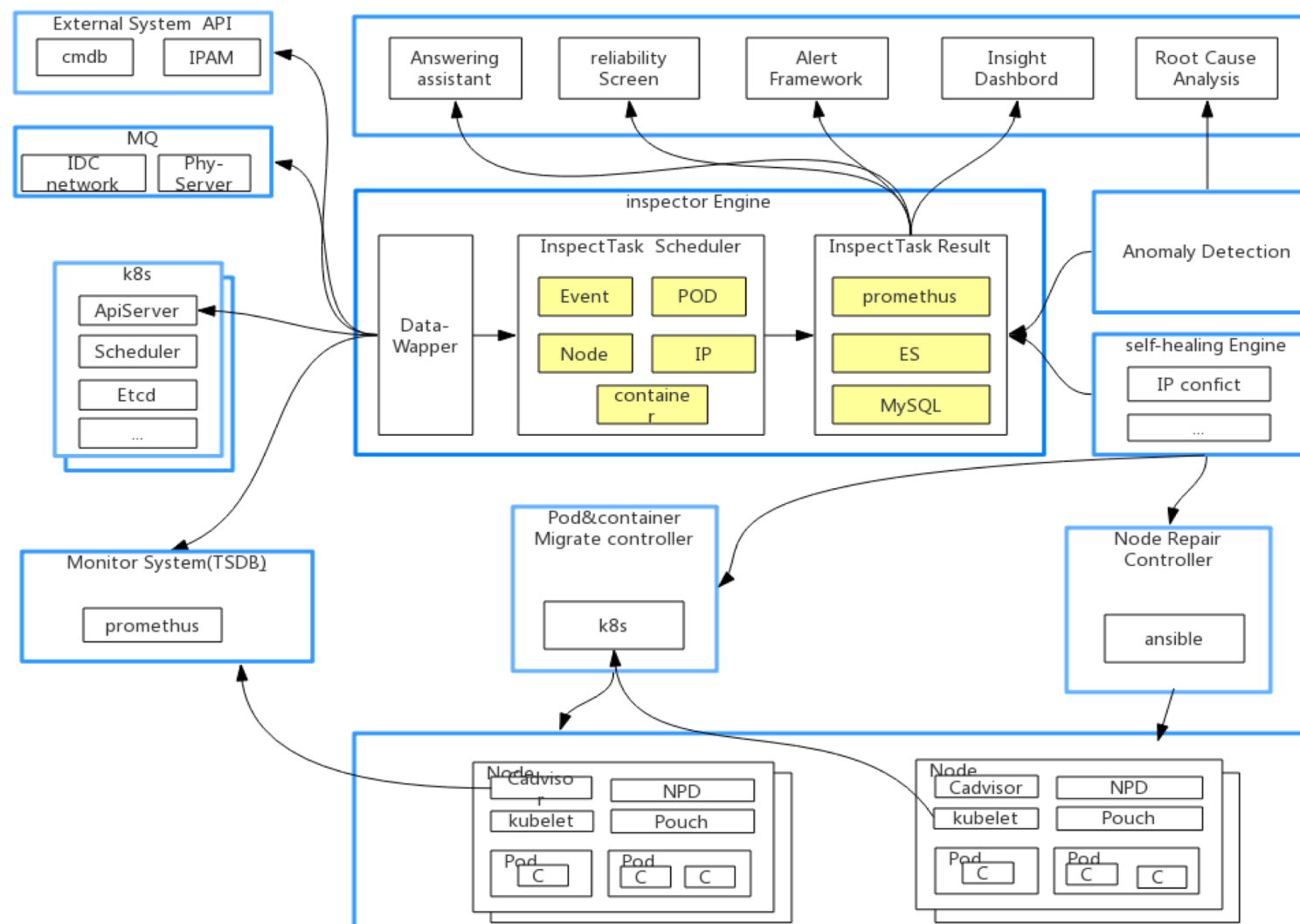
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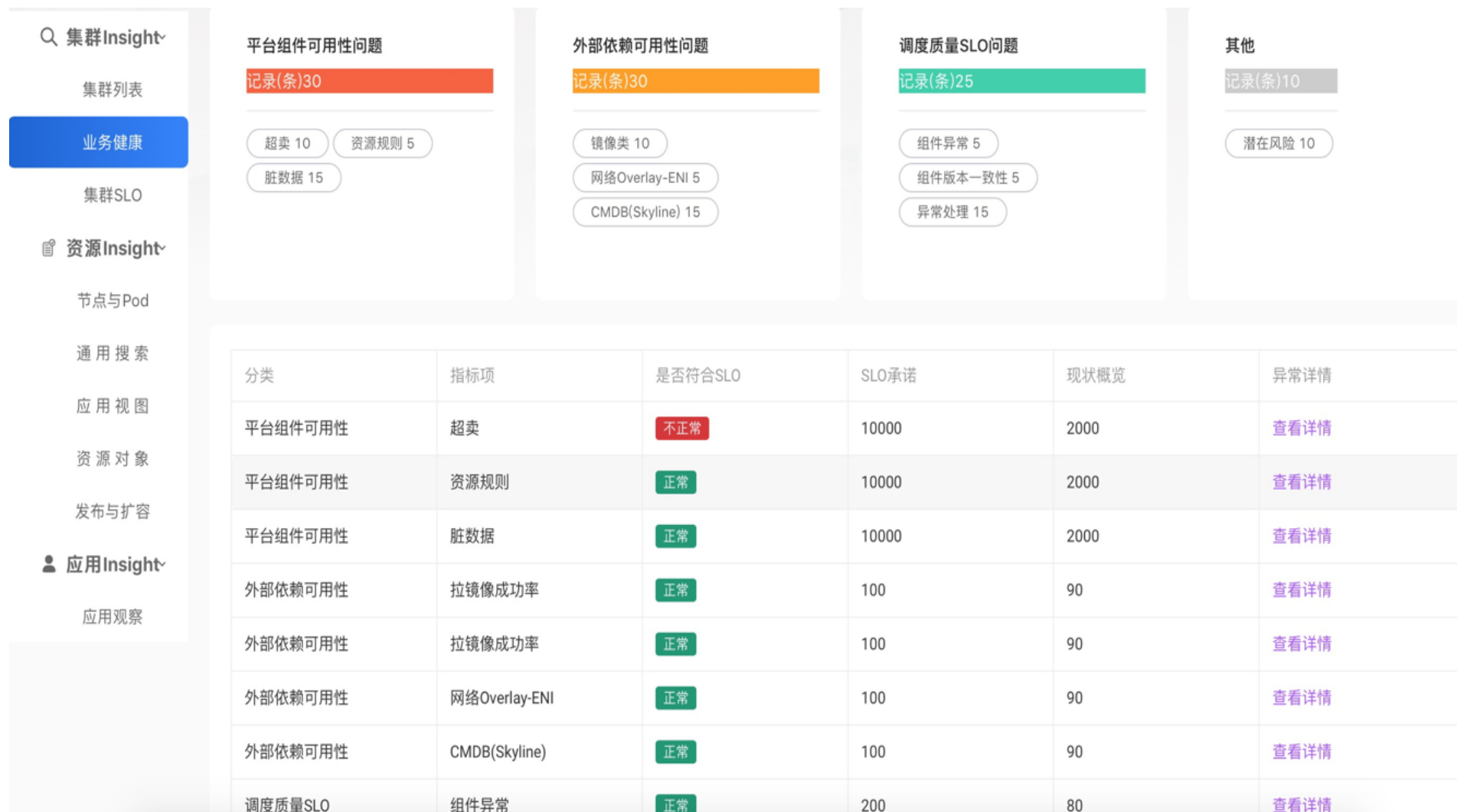
# Core Engine for Self-Healing Inspection System



# Examples & Results

## 1) Observation

## 2) Healing





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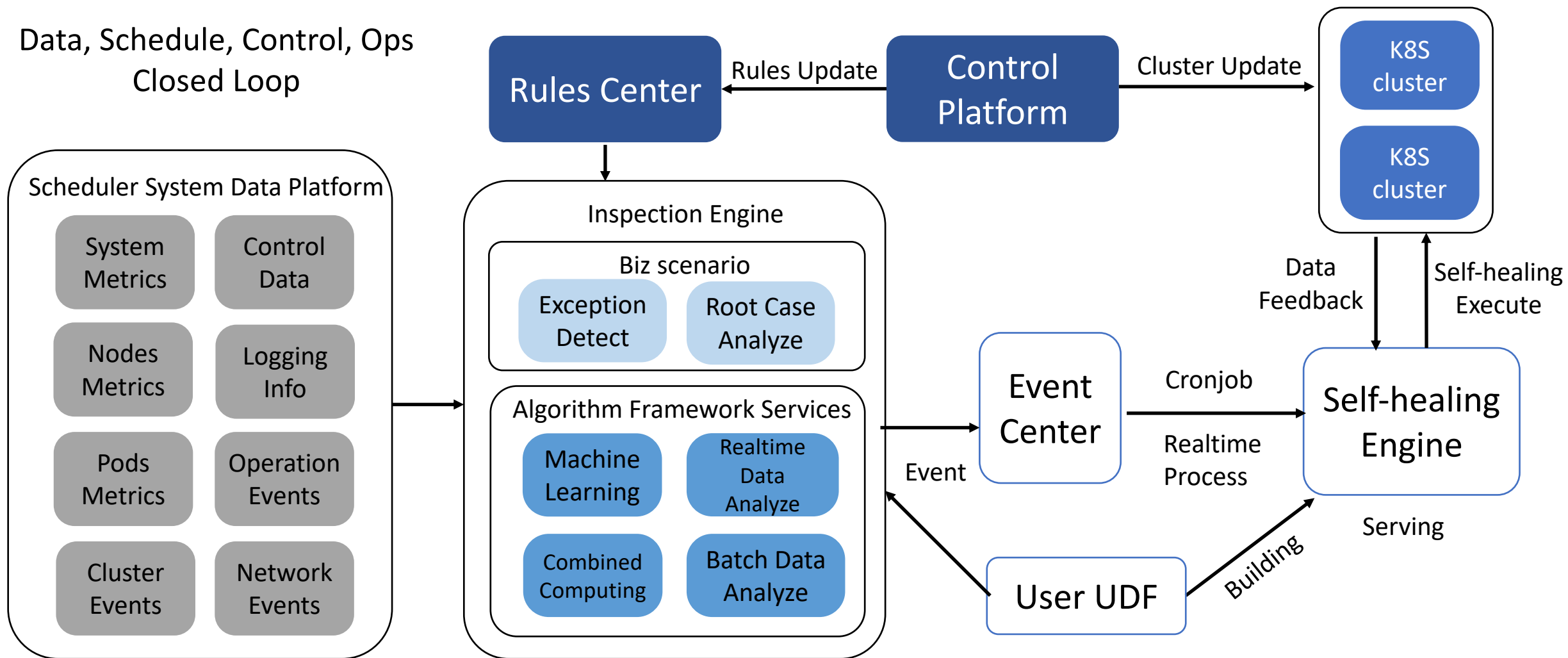


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# Future: AIOps-driven Self-Healing Inspection System

Data, Schedule, Control, Ops  
Closed Loop



# Contact Us



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Jim Ma 马金晶



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# Thanks