github.com/keikoproj

Kubernetes @ Intuit

- Approx. 150 clusters
- Over 3000 namespaces
- Upgrades done every month (sometimes more frequently)

Common Problems

Common problems run into when running and managing 100+ Kubernetes clusters at scale and at all stages of their lifecycle...

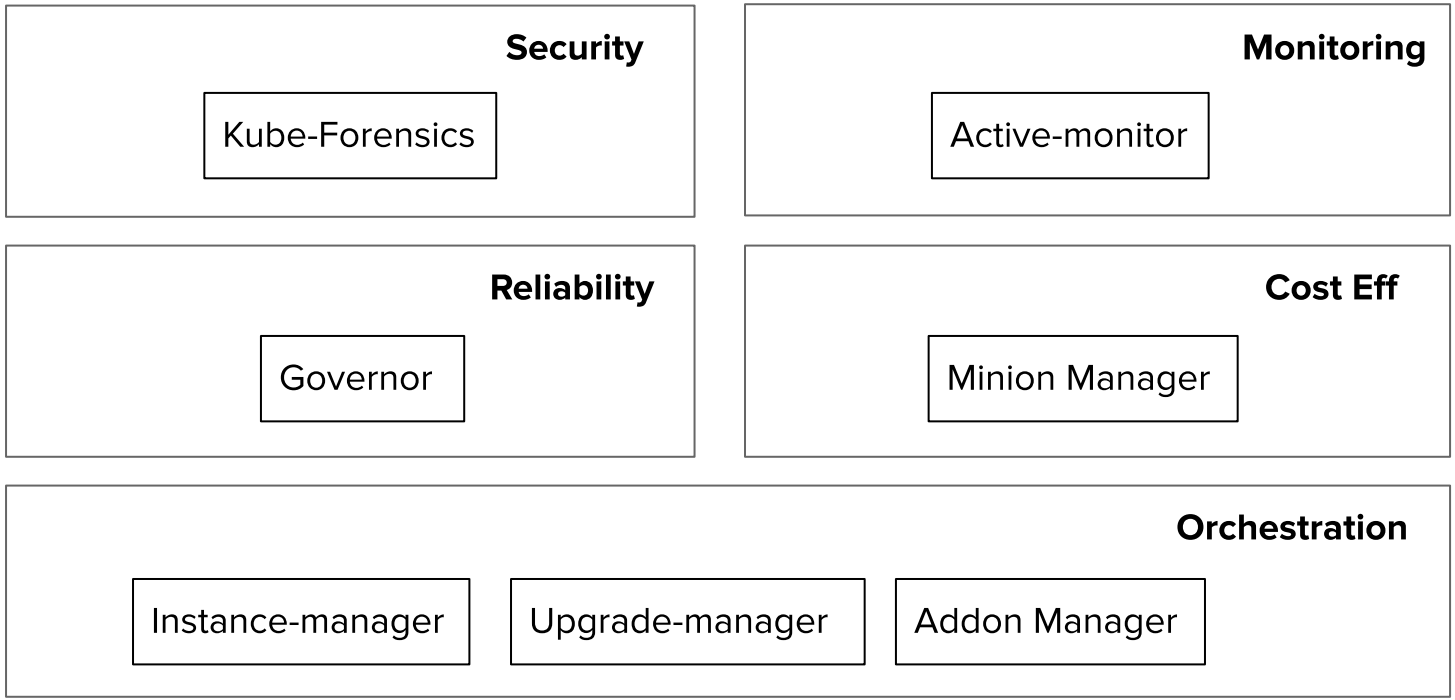
- How do I bootstrap and manage worker nodes for my cluster?
- How do I mitigate spurious pod/node failures as well as maintain SLAs and compliance?
- How do I manage critical cluster services required across all apps on clusters?
- How do I optimize cost of my cluster?
- How do I do forensic dumps?

keiko - Enable Kubernetes at scale ...

Keiko

Keiko provides a set of independent open-source tools for orchestration and management of multi-tenant, reliable, secure and efficient Kubernetes clusters at scale.

Components


Security
Kube-Forensics
Monitoring
Active-monitor
Reliability
Governor
Cost Eff
Minion Manager
Orchestration
Instance-manager
Upgrade-manager
Addon Manager

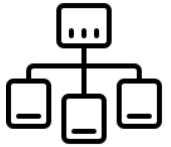
Manage Instance Groups

- EKS does not manage worker nodes
- Declaratively provision and manage ASGs (nodes)
- Number and type of nodes
- Labels and taints
- Subnets and security groups

```
$ kubectl create -f /tmp/hello_world.yaml
instancegroup.instancemgr.keikoproj.io/hello-world created

$ kubectl get igs
NAME          STATE   MIN   MAX     GROUP NAME                                                    PROVISIONER   STRATEGY   AGE
hello-world   Ready   2     3       shri-east-2-instance-manager-hello-world-NodeGroup-16Y8ZA1ZJW8JK   eks-cf        crd        3m
nodes         Ready   2     3       shri-east-2-instance-manager-nodes-NodeGroup-1K1T3YSXCCCK9         eks-cf        crd        1d
```

Instance-Manager



Instance-manager simplifies the creation of worker nodes from within a Kubernetes cluster. Create *InstanceGroup* objects in your cluster and instance-manager provisions the actual machines and bootstraps them to the cluster.

Category	Orchestration, Multi-tenancy
URL	github.com/keikoproj/instance-manager
Kubernetes Objects	CRD and a controller

Upgrade-manager

Upgrade Manager provides *RollingUpgrade*, a Kubernetes native mechanism for doing rolling-updates of instances in an AutoScaling group using a CRD and a controller.

Category	Orchestration, Management
URL	github.com/keikoproj/upgrade-manager
Kubernetes Objects	CRD and a controller

Addon-Manager

Addons are critical components within a Kubernetes cluster that provide basic services needed by applications like DNS, Ingress, Metrics, Logging, etc. Addon Manager provides a CRD for lifecycle management of such addons using Argo Workflows.

Category	Orchestration
URL	github.com/keikoproj/addon-manager
Kubernetes Objects	CRD and a controller

Addon Lifecycle Management

Declaratively install and manage “addons”

```yaml
apiVersion: addonmgr.keikoproj.io/v1alpha1
kind: Addon
metadata:
  name: fluentd-addon
  namespace: addon-manager-system
spec:
  pkgName: core/fluentd
  pkgVersion: v0.0.1
  pkgType: composite
  pkgDescription: Company fluentd addon.
  pkgDeps:
    argoproj/workflows: v2.2.1
  params:
    namespace: mynamespace
    clusterContext:
      clusterName: "my-test-cluster"
      clusterRegion: "us-west-2"
    data:
      hec_splunk_server: hec.splunk.example.com
  selector:
    matchLabels:
      app.kubernetes.io/name: fluentd
      app.kubernetes.io/version: "1.0.0"
  lifecycle:
    prereqs:
      template: |
        apiVersion: argoproj.io/v1alpha1
        kind: Workflow
        ...
    install:
      template: |
        apiVersion: argoproj.io/v1alpha1
        kind: Workflow
        ...
```

Governor

Governor improves the stability of large Kubernetes clusters by proactively terminating failed but stuck pods and misbehaving nodes.

Category	Reliability
URL	github.com/keikoproj/governor
Kubernetes Objects	Typically a CronJob

Minion-manager

Minion-manager enables the intelligent use of Spot Instances in Kubernetes clusters on AWS. This is done by factoring in on-demand prices, spot-instance prices and current state of the AutoScalingGroups.

Category	Cost-optimization
URL	github.com/keikoproj/minion-manager
Kubernetes Objects	Deployment

Kube-forensics

Kube-forensics allows a cluster administrator to dump the current state of a running pod and all its containers so that security professionals can perform offline forensic analysis.

Category	Security
URL	github.com/keikoproj/kube-forensics
Kubernetes Objects	CRD and a controller

Offline Forensic analysis

Create a checkpoint of a running Pod for offline forensic analysis

```yaml
apiVersion: forensics.keikoproj.io/v1alpha1
kind: PodCheckpoint
metadata:
  name: podcheckpoint-sample
  namespace: forensics-system
spec:
  destination: s3://my-bucket-123456789000-us-west-2
  subpath: forensics
  pod: bad-pod-1234567890-dead1
  namespace: default
```

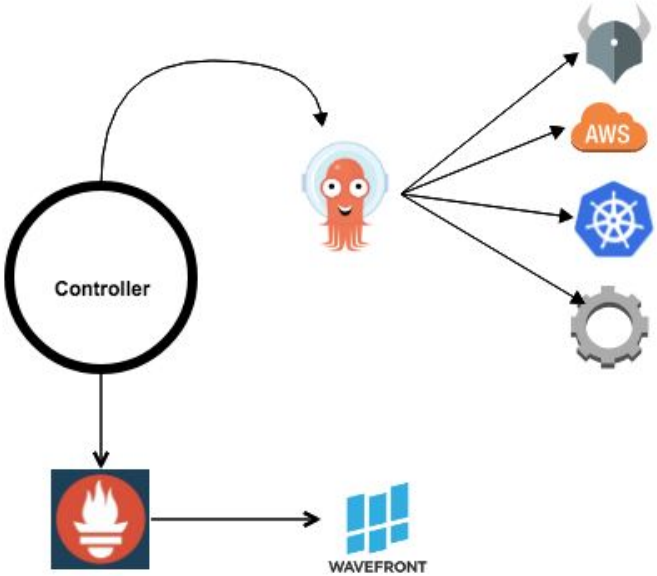
Active-Monitor

Active-Monitor is a Kubernetes custom resource controller which uses Argo Workflows for deep cluster monitoring.

Category	Monitoring, Reliability
URL	github.com/keikoproj/active-monitor
Kubernetes Objects	CRD and a controller

Deep Health Monitoring

E.g. Check node health in parallel



Reliability, security, multi-tenancy and efficiency in Kubernetes can be achieved. Keiko helps you make giant strides towards it.

Thanks!

Questions?

You can reach us at @keikoproj & on slack #keikoproj