

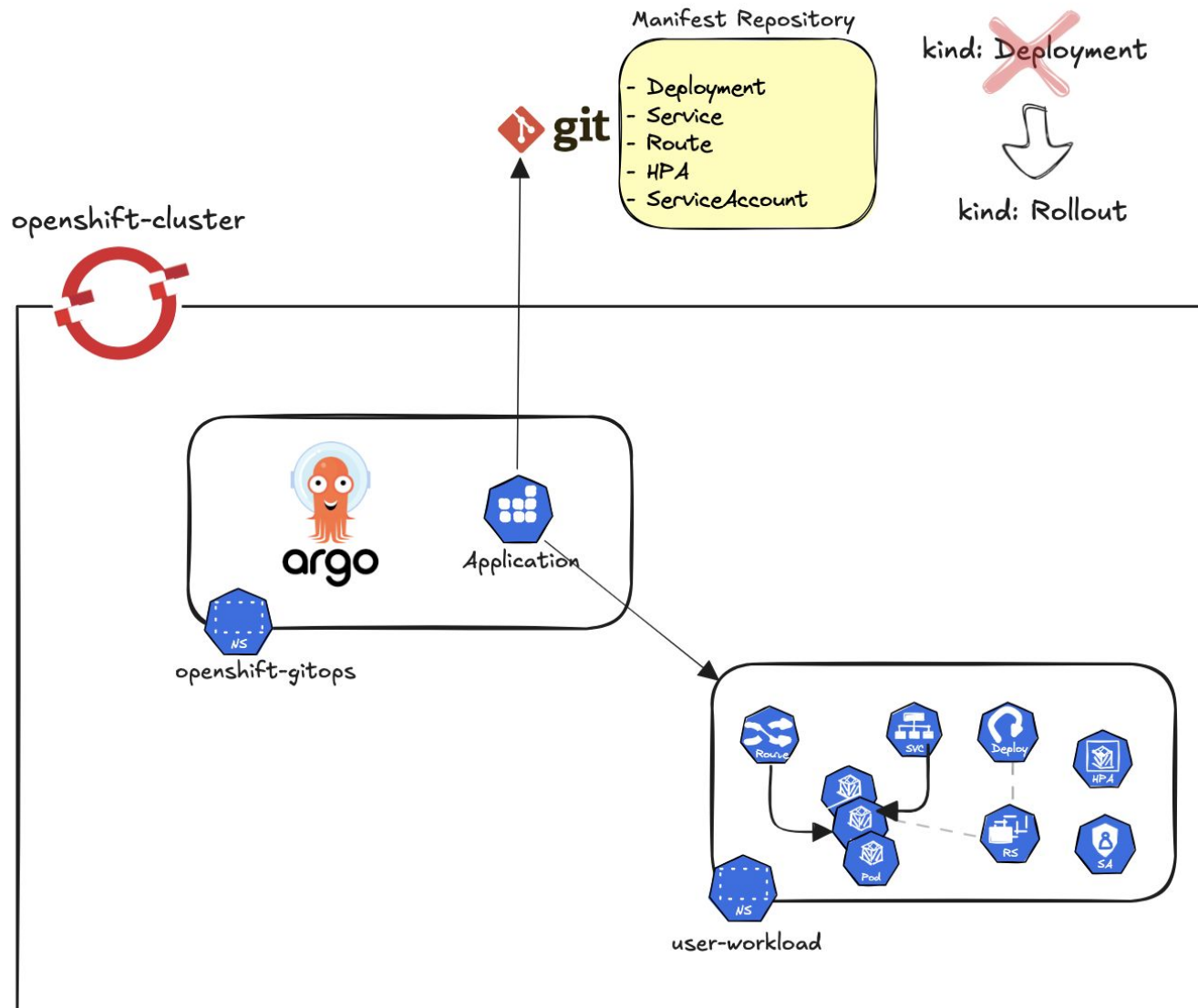
Red Hat
Summit

Connect

Progressive Delivery with Argo Rollouts and Istio

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Senior Architect

A Story of GitOps



ArgoCD APIs

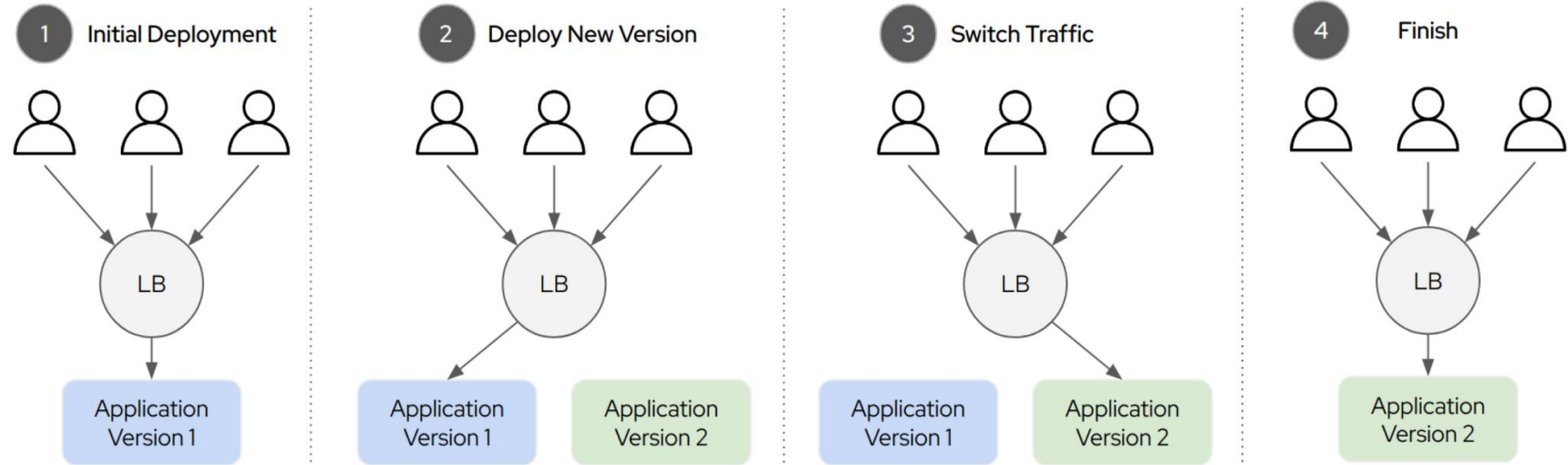
- Application
- ApplicationSet
- AppProject

Argo Rollouts

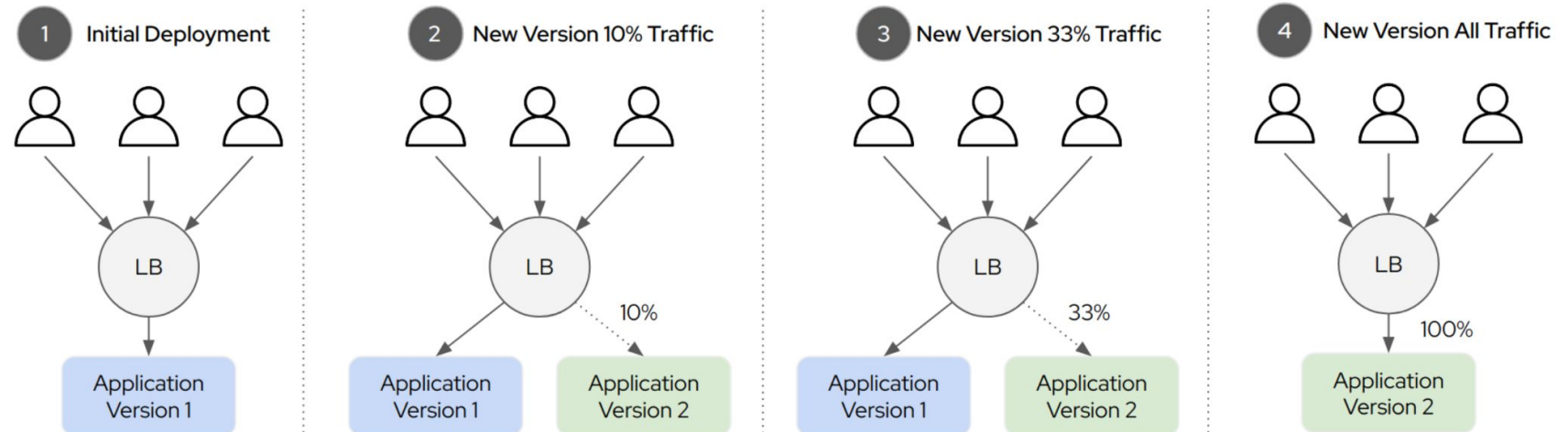
- A standalone project
- Rollout API as a replacement to Deployment

Deployment Strategies

Blue Green Strategy

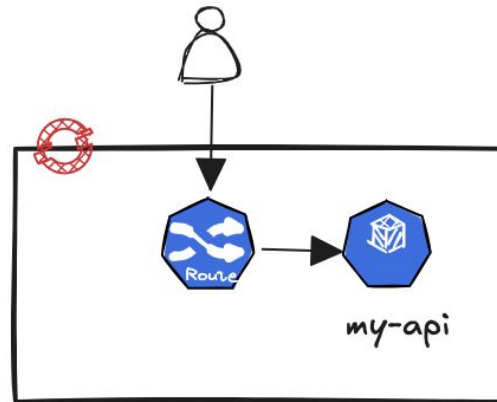


Canary Strategy

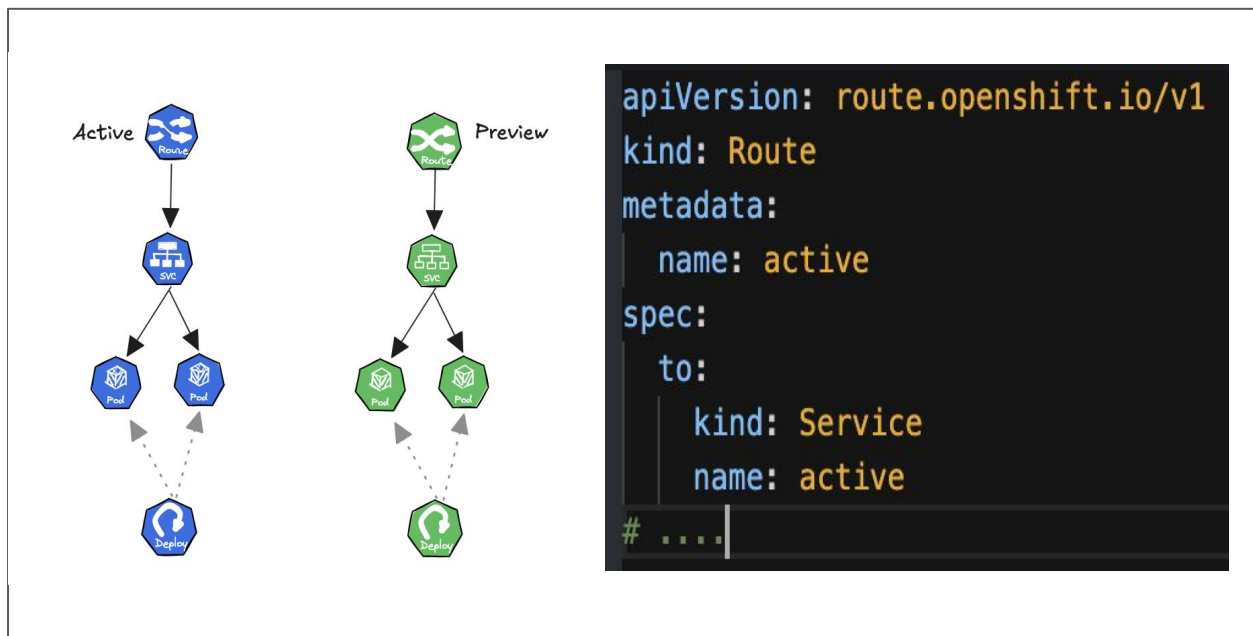


Route Implementation

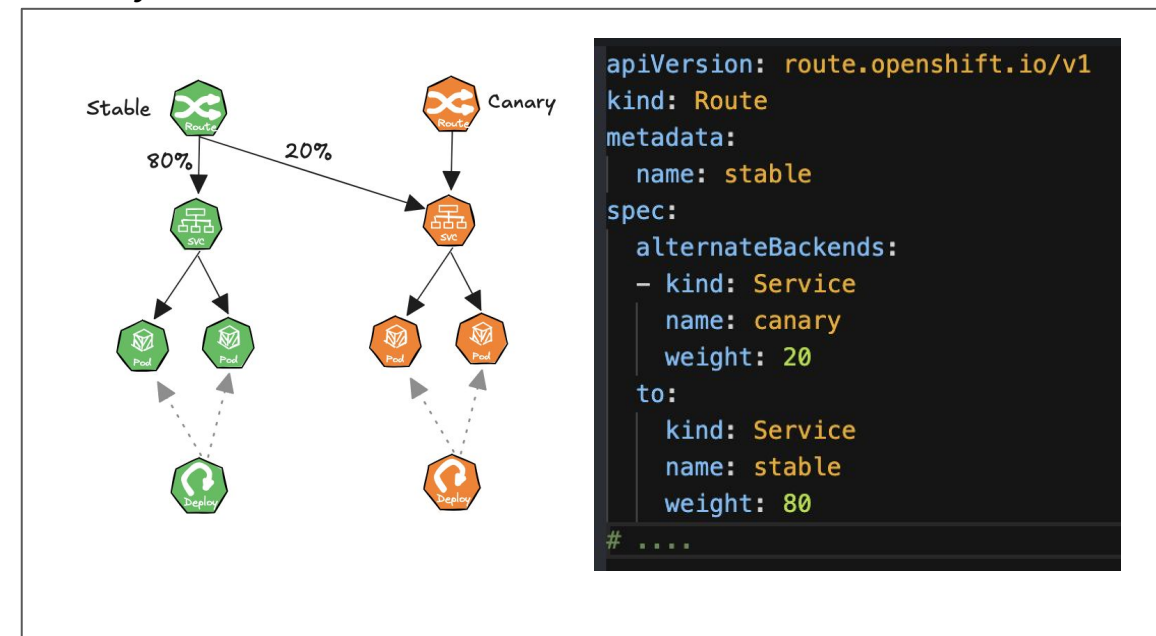
Example Scenario:



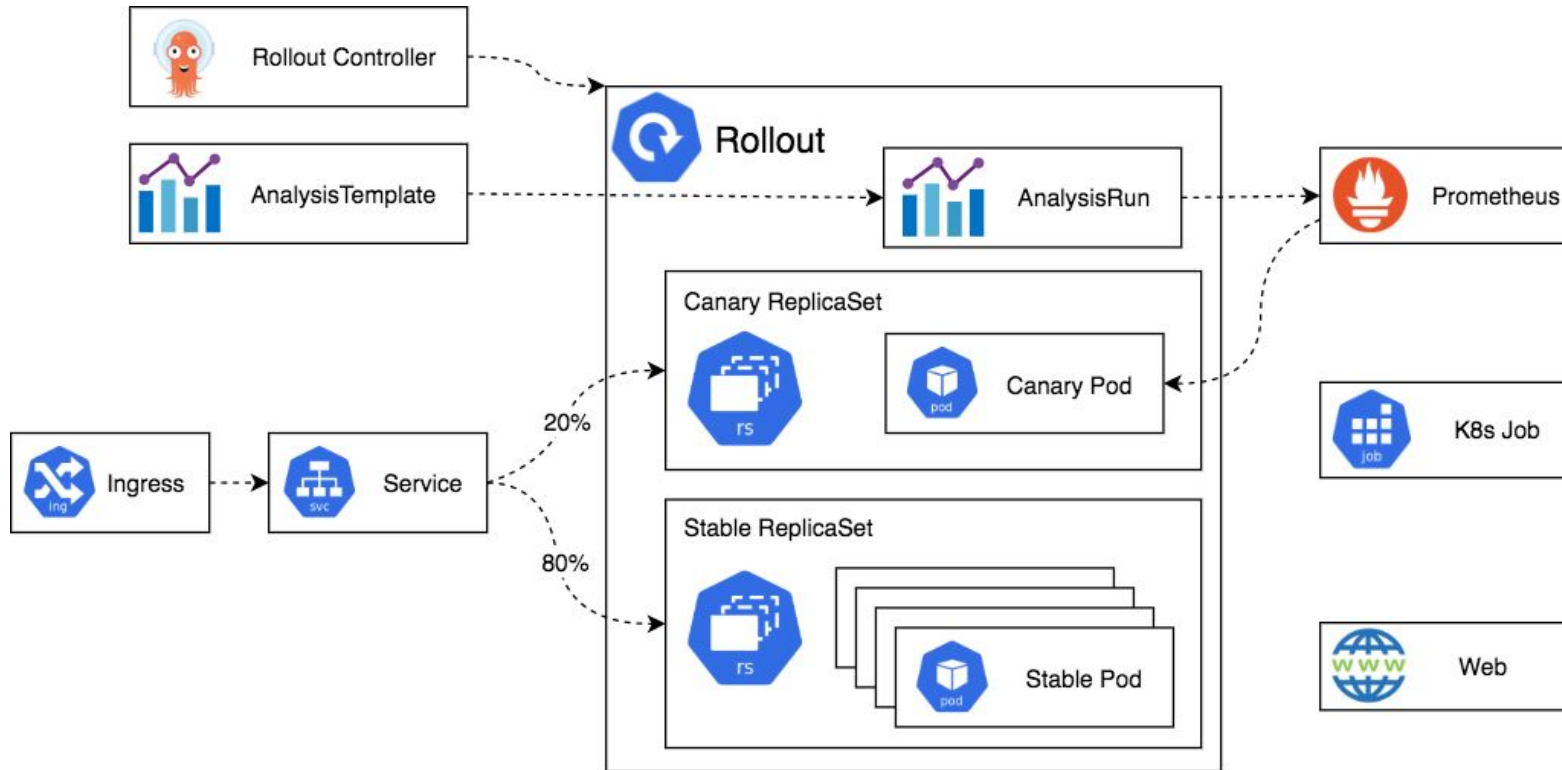
Blue Green



Canary



Argo Rollouts Architecture



Source: <https://argo-rollouts.readthedocs.io/en/stable/architecture/>

Argo Rollouts Features:

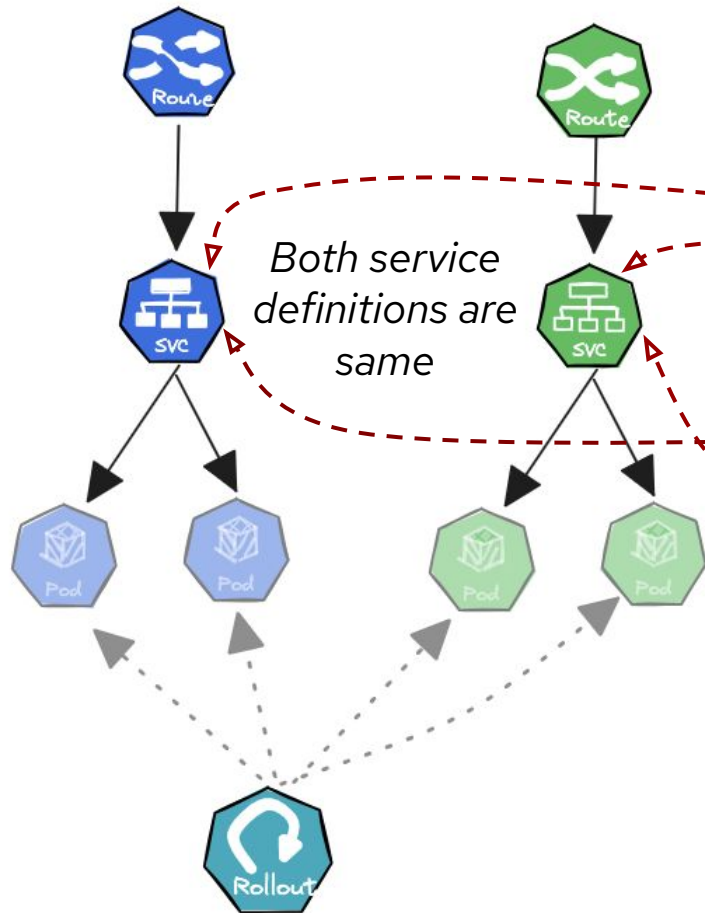
- Blue-Green update strategy
- Canary update strategy
- Manual promotion
- Automated rollbacks and promotions
- Metric queries and business KPIs analysis

Available with OpenShift GitOps operator.

Installed via RolloutManager CRD:

- Supports cluster scope or namespace scope

Implementation with Rollout



```
apiVersion: argoproj.io/v1alpha1
kind: Rollout
metadata:
  name: rollouts-demo
spec:
  replicas: 2
  selector:
    matchLabels:
      app: rollouts-demo
  strategy:
    blueGreen:
      activeService: active
      previewService: preview
      autoPromotionEnabled: false
      scaleDownDelaySeconds: 300
  template:
    metadata:
      labels:
        app: rollouts-demo
    spec:
      containers:
        - image: 'app-image'
```

```
apiVersion: argoproj.io/v1alpha1
kind: Rollout
metadata:
  name: rollouts-demo
spec:
  replicas: 4
  selector:
    matchLabels:
      app: rollouts-demo
  strategy:
    canary:
      canaryService: canary
      stableService: stable
      trafficRouting:
        plugins:
          argoproj-labs/openshift:
            routes:
              - stable
      steps:
        - setWeight: 20
        - pause: {}
        - setWeight: 60
        - pause: {duration: 1h}
  template:
    metadata:
      labels:
        app: rollouts-demo
    spec:
      containers:
        - name: rollouts-demo
          image: 'app-image'
```

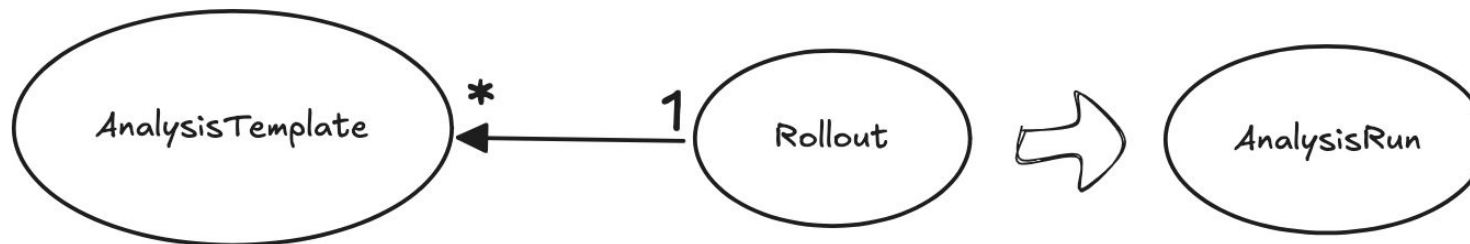
Analysis Templates

Prometheus Provider

```
kind: AnalysisTemplate
apiVersion: argoproj.io/v1alpha1
metadata:
  name: prometheus-kpi-check
spec:
  args:
  - name: namespace
  - name: route-name
  metrics:
  - name: error-rate
    interval: 1m
    count: 4
    failureLimit: 2
    successCondition: len(result) == 0 || isNaN(result[0]) || result[0] <= 0.05
    initialDelay: 1m
  provider:
    prometheus:
      address: https://thanos-querier.openshift-monitoring.svc.cluster.local:9091
      query: >
        sum(irate(haproxy_backend_http_responses_total{exported_namespace='{{args.namespace}}',
          route=~"{{args.route-name}}", code="5xx"}[1m])) /
        sum(irate(haproxy_backend_http_responses_total{exported_namespace='{{args.namespace}}',
          route=~"{{args.route-name}}"}[1m]))
#.....
```

Job Provider

```
kind: AnalysisTemplate
apiVersion: argoproj.io/v1alpha1
metadata:
  name: call-api
spec:
  args:
  - name: service-url
  metrics:
  - name: call
    count: 10
    interval: 30s
    failureLimit: 2
  provider:
    job:
      spec:
        backoffLimit: 3
        template:
          spec:
            containers:
            - name: call-api
              image: registry.access.redhat.com/ubi8/ubi-minimal:8.10
              command: [sh, -c]
              args: ["<call-api-check-response-script> {{args.service-url}}"]
              restartPolicy: Never
#.....
```



Rollouts with Analysis

```
apiVersion: argoproj.io/v1alpha1
kind: Rollout
metadata:
  name: rollouts-demo
spec:
  strategy:
    blueGreen:
      activeService: active
      previewService: preview
      autoPromotionEnabled: true
      scaleDownDelaySeconds: 300
      prePromotionAnalysis:
        args:
          - name: service-url
            value: preview:8080
          templates:
            - templateName: call-api
      postPromotionAnalysis:
        args:
          - name: route-name
            value: preview
          - name: namespace
            valueFrom:
              fieldRef:
                fieldPath: metadata.namespace
          templates:
            - templateName: prometheus-kpi-check
# ...
```

Blue-Green Analysis:

- Pre-promotion
- Post-promotion

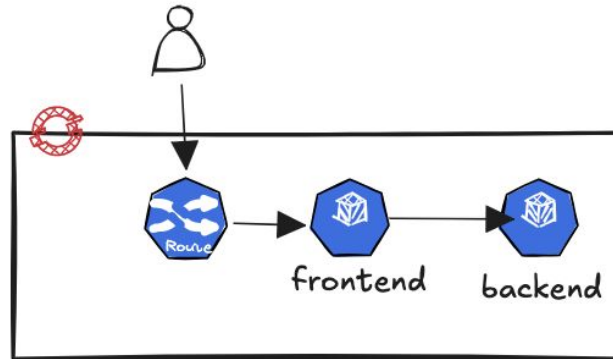
```
apiVersion: argoproj.io/v1alpha1
kind: Rollout
metadata:
  name: rollouts-demo
spec:
  strategy:
    canary:
      canaryService: canary
      stableService: stable
      analysis:
        templates:
          - templateName: prometheus-kpi-check
        args:
          - name: route-name
            value: canary
          - name: namespace
            valueFrom:
              fieldRef:
                fieldPath: metadata.namespace
      trafficRouting:
        plugins:
          argoproj-labs/openshift:
            routes:
              - stable
        steps:
          - setWeight: 5
          - analysis:
              templates:
                - templateName: call-api
              args:
                - name: service-url
                  value: canary:8080
          - pause: {duration: 30s}
          - setWeight: 60
          - pause: {duration: 30m}
# ...
```

Canary Analysis:

- Background
- Inline

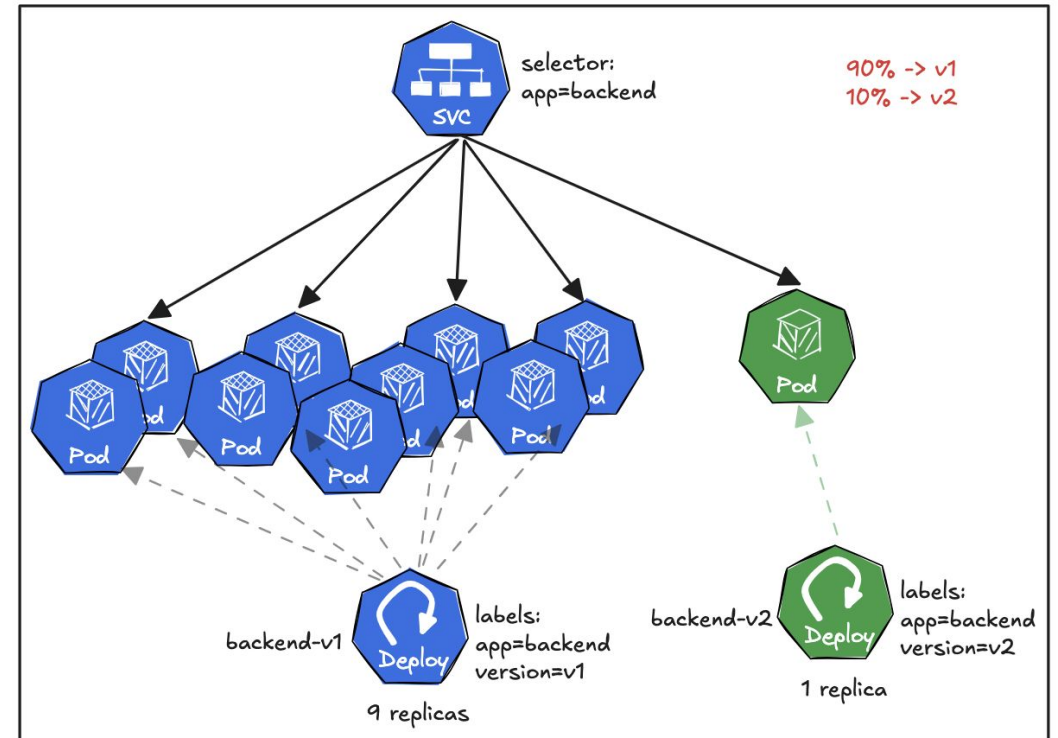
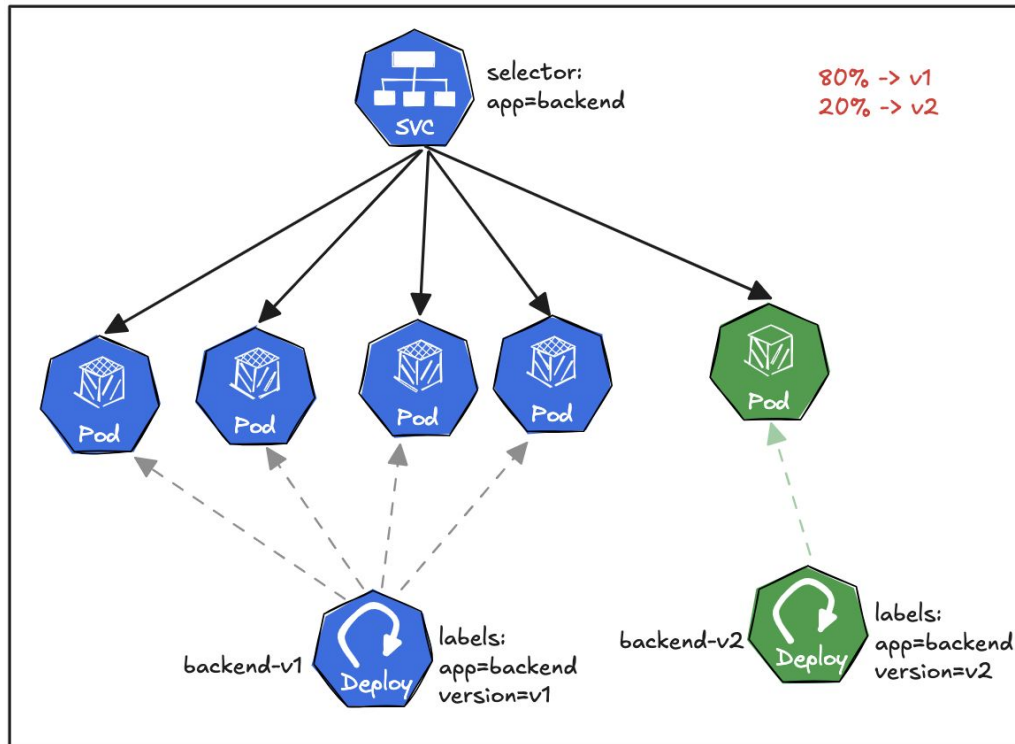
In-Cluster Communication

Revised Scenario:

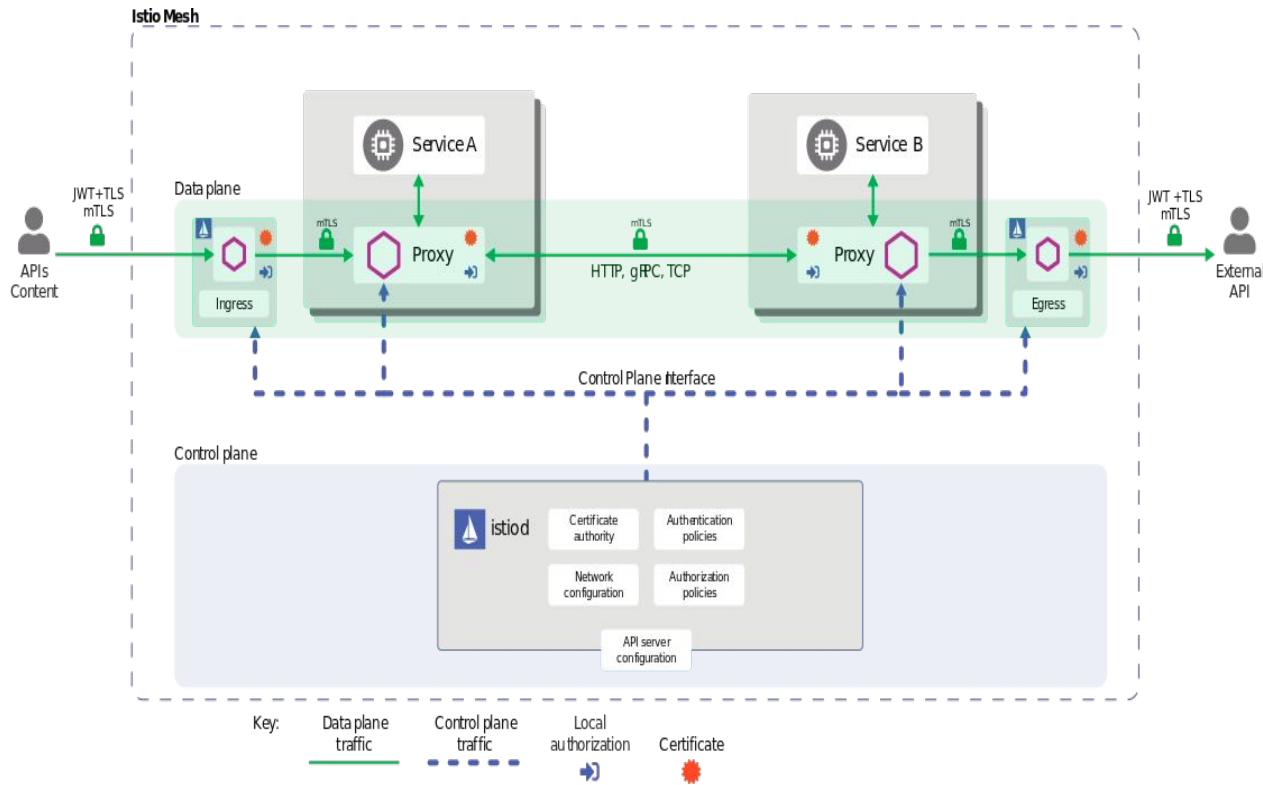


North-South Traffic
➤ Ingress Controller

East-West Traffic
➤ ????



Istio Overview



Addresses:

- Traffic Management
- Resilience
- Security
- Observability

Istio CRDs:

- Gateway
- VirtualService
- DestinationRule
- RequestAuthentication
- AuthorizationPolicy
- Telemetry
- ...

Weighted Routing with Istio

Alternative 1

```
apiVersion: networking.istio.io/v1alpha3
kind: VirtualService
metadata:
  name: rollout-vsvc
spec:
  hosts:
  - stable.rollout-demo.svc
  http:
  - name: primary
    route:
  - destination:
      host: stable
      weight: 80
  - destination:
      host: canary
      weight: 20
```

Alternative 2

```
apiVersion: networking.istio.io/v1alpha3
kind: DestinationRule
metadata:
  name: rollout-ds
spec:
  host: istio-rollout
  subsets:
  - name: stable
    labels:
      version: stable
  - name: canary
    labels:
      version: canary
```

```
apiVersion: networking.istio.io/v1alpha3
kind: VirtualService
metadata:
  name: rollout-vsvc
spec:
  hosts:
  - istio-rollout.rollout-demo.svc
  http:
  - name: primary
    route:
  - destination:
      host: istio-rollout
      subset: stable
      weight: 80
  - destination:
      host: istio-rollout
      subset: canary
      weight: 20
```

Istio Rollout Implementation

DestinationRule

```
apiVersion: networking.istio.io/v1alpha3
kind: DestinationRule
metadata:
  name: rollout-ds
spec:
  host: istio-rollout
  subsets:
    - name: stable
      labels:
        app: rollouts-demo
    - name: canary
      labels:
        app: rollouts-demo
```

Rollout

```
apiVersion: argoproj.io/v1alpha1
kind: Rollout
metadata:
  name: rollouts-demo
spec:
  strategy:
    canary:
      analysis:
        templates:
          - templateName: istio-prom-kpi-check
            args:
              - name: namespace
                valueFrom:
                  fieldRef:
                    fieldPath: metadata.namespace
              - name: service
                value: istio-rollout
        trafficRouting:
          istio:
            virtualService:
              name: rollout-vsvc
              routes:
                - primary
            destinationRule:
              name: rollout-ds
              canarySubsetName: canary
              stableSubsetName: stable
      steps:
        - setWeight: 5
        - pause: {duration: 5d}
        - setWeight: 80
        - pause: {duration: 1d}
# ...
```

AnalysisTemplate

```
kind: AnalysisTemplate
apiVersion: argoproj.io/v1alpha1
metadata:
  name: istio-prom-kpi-check
spec:
  args:
    - name: namespace
    - name: service
  metrics:
    - name: success-rate
      interval: 30s
      successCondition: len(result) == 0 || isNaN(result[0]) || result[0] > 0.9
      failureLimit: 1
      provider:
        prometheus:
          address: https://thanos-querier.openshift-monitoring.svc.cluster.local:9091
          headers:
            - key: Authorization
              value: "Bearer {{args.api-token}}"
          query: |
            sum(irate(istio_requests_total{
              reporter="source",
              destination_service=~"{{args.service}}.{{args.namespace}}.svc.cluster.local",
              response_code!~"5.*"}[1m])
            /
            sum(irate(istio_requests_total{
              reporter="source",
              destination_service=~"{{args.service}}.{{args.namespace}}.svc.cluster.local"}[1m])
# ...
```

GitOps Implications

Ignore the changes that Rollout made to your manifests

```
apiVersion: argoproj.io/v1alpha1
kind: Application
metadata:
  name: istio-canary-analysis-example
  namespace: openshift-gitops
spec:
  ignoreDifferences:
  - group: networking.istio.io
    kind: VirtualService
    jqPathExpressions:
    - .spec.http[] | select(.name == "primary") | .route[0].weight
    - .spec.http[] | select(.name == "primary") | .route[1].weight
  syncPolicy:
    syncOptions:
    - RespectIgnoreDifferences=true
#....
```

```
apiVersion: argoproj.io/v1alpha1
kind: Application
metadata:
  name: canary-analysis-example
  namespace: openshift-gitops
spec:
  ignoreDifferences:
  - group: route.openshift.io
    kind: Route
    jqPathExpressions:
    - .spec.to.weight
    - .spec.alternateBackends[] | select(.name == "canary") | .weight
  syncPolicy:
    syncOptions:
    - RespectIgnoreDifferences=true
#....
```

Bring the rollout changes to the original state



Red Hat
Summit

Connect

Thank you



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