Lab 13 - Circuit Breaking and Failover

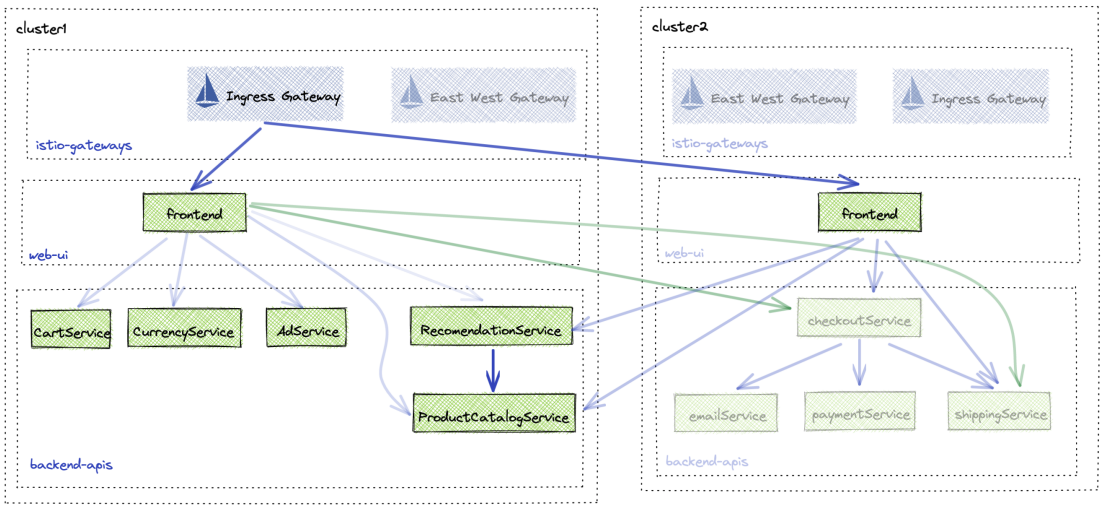
Gloo Platform can enable your applications to be highly available by allowing you to deploy them accross multiple clusters and localities. Gloo Platform can automatically detect these new deployments and add them as available endpoints for routing. In many cases it would be inneficient to route to all available endpoints across localities. By adding outlier detection and failover policies, you can create a ciruit breaking strategy that is efficienct and effective.

Links:

- Failover
- Outlier Detection
- FailoverPolicy API
- OutlierDetectionPolicy API

Deploy HA frontend

This lab will deploy the frontend application to both cluster-1 and cluster-2 and update the ingress routing to route to both availabile endpoints. You will then tune the routing to prefer the local frontend and failover to the other when something bad happens.



- Create online-boutique namespace in cluster-2

```
kubectl apply --context cluster-2 -f - <<EOF
apiVersion: v1
kind: Namespace
metadata:
  labels:
    istio.io/rev: 1-16
  name: online-boutique
EOF
```

- Deploy frontend in cluster-2

```
helm upgrade -i ha-frontend --version "5.0.3" oci://us-central1-
docker.pkg.dev/field-engineering-us/helm-charts/onlineboutique \
  --kube-context cluster-2 \
  --namespace online-boutique \
  --set clusterName=cluster-2 \
  -f  data/web-ui-values.yaml
```

- Wait until the frontend in cluster-2 is ready.
- Create a VirtualDestination to represent both frontend applications.

```
kubectl apply --context management -f - <<EOF
apiVersion: networking.gloo.solo.io/v2
kind: VirtualDestination
metadata:
  name: frontend
  namespace: app-team
spec:
  hosts:
  - frontend.app-team.demo.example.com
  services:
  - labels:
      app: frontend
  ports:
  - number: 80
    protocol: HTTP
    targetPort:
      name: http
EOF
```

- Then update the ingress routing to route to the VirtualDestination

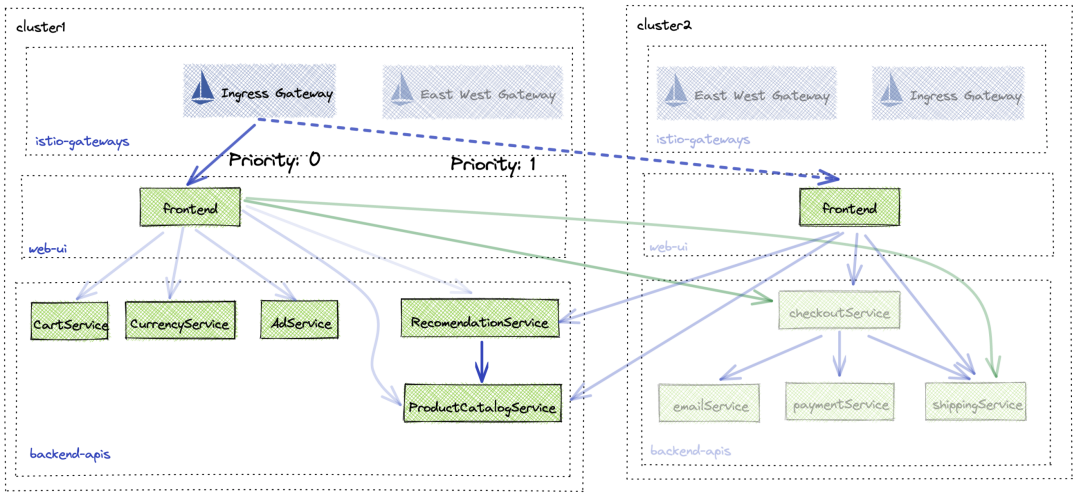
```
kubectl apply --context management -f - <<EOF
apiVersion: networking.gloo.solo.io/v2
kind: RouteTable
metadata:
  name: frontend
  namespace: app-team
spec:
  workloadSelectors: []
  http:
    - name: frontend
      labels:
        virtual-destination: frontend
      forwardTo:
        destinations:
          - ref:
              name: frontend
              namespace: app-team
```

```
            kind: VIRTUAL_DESTINATION
            port:
              number: 80
EOF
```

- By default the ingress gateway will now route to both frontend applications in a round robin pattern.

Locality Based Routing

In order to enable locality based routing, you need to define some parameters to organize and prioritize the available endpoints. First configuring a FailoverPolicy will set the rules for ordering endpoints based on their locality to the client. Secondly, parameters need to be configured to tell the client when it should prefer another set of endpoints (ie. when to circuit break). The OutlierDetection policy sets the conditions for then an endpoint is deemed unhealthy and will be removed from routing.



- Create a FailoverPolicy to setup an ordered list of endpoints.

```
kubectl apply --context management -f - <<EOF
apiVersion: resilience.policy.gloo.solo.io/v2
kind: FailoverPolicy
metadata:
  name: failover
  namespace: app-team
spec:
  applyToDestinations:
  - kind: VIRTUAL_DESTINATION
    selector:
      namespace: app-team
  config:
    # enable default locality based load balancing
    localityMappings: []
EOF
```

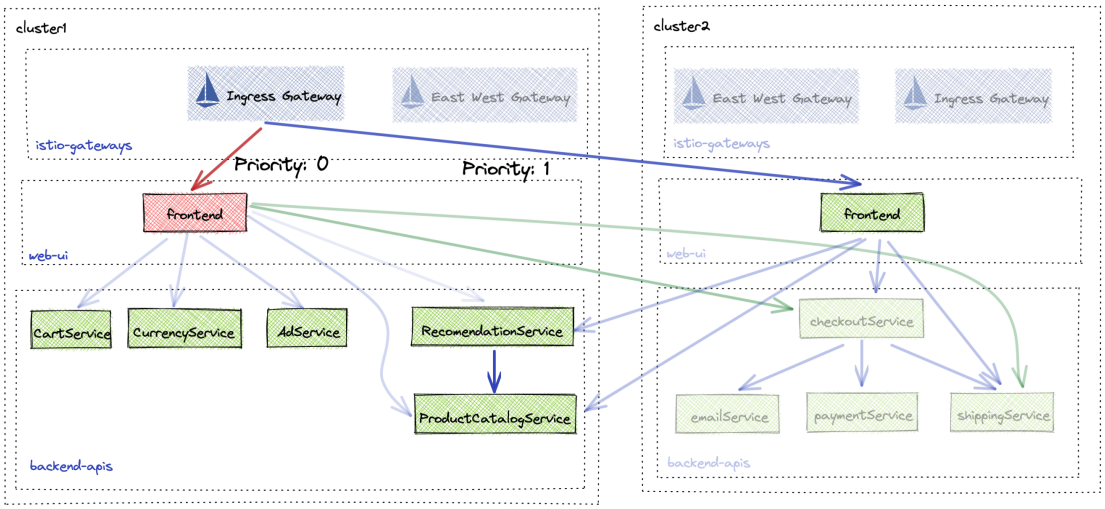
- Add an OutlierDetectionPolicy to set the conditions of when an endpoint is considered unhealthy.

```
kubectl apply --context management -f - <<EOF
apiVersion: resilience.policy.gloo.solo.io/v2
kind: OutlierDetectionPolicy
metadata:
  name: outlier-detection
  namespace: app-team
spec:
  applyToDestinations:
  - kind: VIRTUAL_DESTINATION
    selector:
      namespace: app-team
  config:
    consecutiveErrors: 2
    interval: 5s
    baseEjectionTime: 15s
    maxEjectionPercent: 100
EOF
```

- Refresh online boutique to observe locality based routing

Perform Failover

With the configurations in place, Gloo Platform will configure the ingress and proxy sidecars to automatically failover when the OutlierDetection parameters are met. To simulate this, the frontend in cluster-1 will be configured to no longer respond to traffic. The ingress gateway will observe this behavior and automatically remove cluster-1 frontend from the list of available endpoints. It will then prefer the endpoint in cluster-2 until cluster-1 frontend is healthy again.

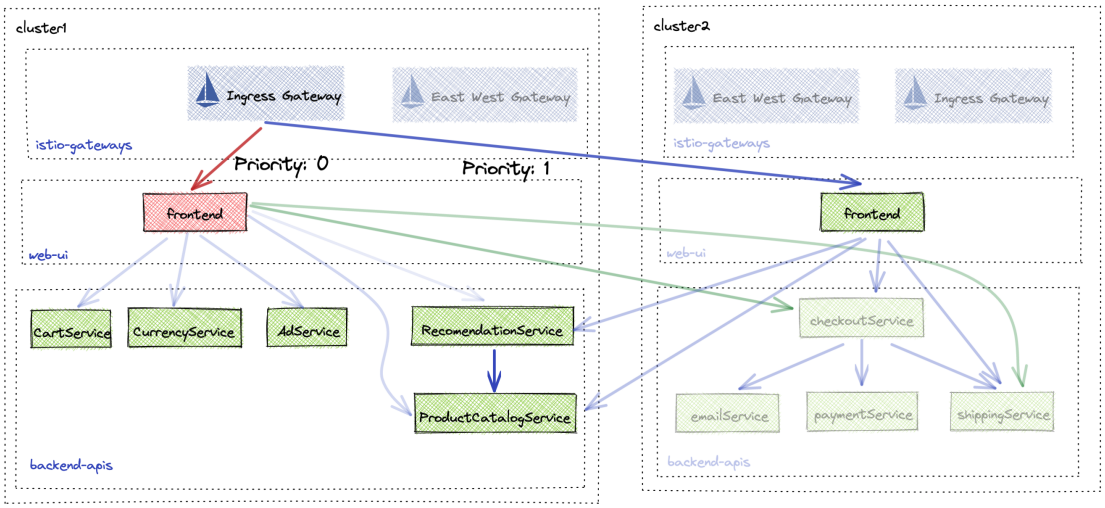


- Break frontend in cluster-1 so that it can no longer respond to traffic

```
kubectl patch deploy frontend --patch '{"spec":{"template":{"spec":{"containers":
[{"name":"server","command":
```

```
["sleep","20h"],"readinessProbe":null,"livenessProbe":null}]}}}}' --context cluster-
1 -n online-boutique
```

NOTE: You will see 2 errors before being failed over. These could have been avoided using a retry policy.



- Refresh the Online Boutique and observe the error and failover to cluster-2
- Fix frontend in cluster-1

```
kubectl patch deploy frontend --patch '{"spec":{"template":{"spec":{"containers":
[{"name":"server","command":[],"readinessProbe":null,"livenessProbe":null}]}}}}' --
context cluster-1 -n online-boutique
```

- Refresh the Online Boutique and observe the traffic be redirected back to the cluster-1 frontend once it's healthy.