Lab 5 Istio

1. Traffic Shifting

Route all traffic to version 1 of the application.

```
gabor@fedora:~/Downloads/Other/Cloud/istio-1.25.0$ kubectl apply -f samples/bookinfo/networking/virtual-service-al
l-v1.yaml
virtualservice.networking.istio.io/productpage created
virtualservice.networking.istio.io/reviews created
virtualservice.networking.istio.io/ratings created
virtualservice.networking.istio.io/details created
```

Book Details

ISBN-10	Publisher	Pages	Type	Language
1234567890	PublisherA	200	paperback	English

Error fetching product reviews
Sorry, product reviews are currently unavailable for this book.

Change to 50% traffic to version 3.

```
gabor@fedora:~/Downloads/Other/Cloud/istio-1.25.0$ kubectl apply -f samples/bookinfo/networking/virtual-service-re
views-50-v3.yaml
virtualservice.networking.istio.io/reviews configured
```

```
gabor@fedora:~/Downloads/Other/Cloud/istio-1.25.0$ kubectl get virtualservice reviews -o yaml
apiVersion: networking.istio.io/v1
kind: VirtualService
metadata:
  annotations:
    kubectl.kubernetes.io/last-applied-configuration: |
      {"apiVersion":"networking.istio.io/v1","kind":"VirtualService","metadata":{"annotations":{},"name":"reviews"
,"namespace":"default"},"spec":{"hosts":["reviews"],"http":[{"route":[{"destination":{"host":"reviews","subset":"v
1"},"weight":50},{"destination":{"host":"reviews","subset":"v3"},"weight":50}]}]}}
  creationTimestamp: "2025-04-12T09:24:26Z"
  generation: 2
  name: reviews
  namespace: default
  resourceVersion: "12360"
  uid: fbc37848-ad5d-4584-83bb-8f92c07d0284
spec:
  hosts:
  - reviews
  http:
  - route:
    - destination:
        host: reviews
        subset: v1
      weight: 50
    - destination:
        host: reviews
        subset: v3
      weight: 50
```

Apply 100% traffic to version 3.

```
gabor@fedora:~/Downloads/Other/Cloud/istio-1.25.1$ kubectl apply -f samples/bookinfo/networking/virtual-service-re
views-v3.yaml
virtualservice.networking.istio.io/reviews configured
```

2. Request Routing

Create route rules.

```
gabor@fedora:~/Downloads/Other/Cloud/istio-1.25.1$ kubectl apply -f samples/bookinfo/networking/virtual-service-all-v
1.yaml
virtualservice.networking.istio.io/productpage unchanged
virtualservice.networking.istio.io/reviews unchanged
virtualservice.networking.istio.io/ratings unchanged
virtualservice.networking.istio.io/details unchanged
```

Change to version 2 for jason user.

```
gabor@fedora:~/Downloads/Other/Cloud/istio-1.25.1$ kubectl apply -f samples/bookinfo/networking/virtual-service-revie
ws-test-v2.yaml
virtualservice.networking.istio.io/reviews configured
gabor@fedora:~/Downloads/Other/Cloud/istio-1.25.1$ kubectl get virtualservice reviews -o yaml
apiVersion: networking.istio.io/v1
kind: VirtualService
metadata:
  annotations:
    kubectl.kubernetes.io/last-applied-configuration: |
      {"apiVersion":"networking.istio.io/v1","kind":"VirtualService","metadata":{"annotations":{},"name":"reviews","n
amespace":"default"},"spec":{"hosts":["reviews"],"http":[{"match":[{"headers":{"end-user":{"exact":"jason"}}}],"route
":[{"destination":{"host":"reviews","subset":"v2"}}]},{"route":[{"destination":{"host":"reviews","subset":"v1"}}]}]}}
  creationTimestamp: "2025-04-12T09:41:20Z"
  generation: 17
  name: reviews
  namespace: default
  resourceVersion: "20394"
  uid: 335c471f-b754-4f67-9500-2f1cb5d3c4e2
spec:
  hosts:
  - reviews
  http:
  - match:
    - headers:
        end-user:
          exact: jason
    route:
    - destination:
        host: reviews
        subset: v2
  - route:
    - destination:
        host: reviews
        subset: v1
```

3. Fault Injection

Create a fault injection.

```
gabor@fedora:~/Downloads/Other/Cloud/istio-1.25.1$ kubectl apply -f samples/bookinfo/networking/virtual-service-ratin
gs-test-delay.yaml
virtualservice.networking.istio.io/ratings configured
gabor@fedora:~/Downloads/Other/Cloud/istio-1.25.1$ kubectl get virtualservice ratings -o yaml
apiVersion: networking.istio.io/v1
kind: VirtualService
metadata:
  annotations:
    kubectl.kubernetes.io/last-applied-configuration: |
      {"apiVersion":"networking.istio.io/v1","kind":"VirtualService","metadata":{"annotations":{},"name":"ratings","n
amespace":"default"},"spec":{"hosts":["ratings"],"http":[{"fault":{"delay":{"fixedDelay":"7s","percentage":{"value":1
00}}},"match":[{"headers":{"end-user":{"exact":"jason"}}}],"route":[{"destination":{"host":"ratings","subset":"v1"}}]
},{"route":[{"destination":{"host":"ratings","subset":"v1"}}]}]}}
  creationTimestamp: "2025-04-12T10:49:00Z"
  generation: 2
  name: ratings
  namespace: default
  resourceVersion: "20743"
  uid: ea19b2c7-612b-463b-a7ff-054844c12008
spec:
  hosts:
  - ratings
  http:
  - fault:
      delay:
        fixedDelay: 7s
        percentage:
          value: 100
    match:
    - headers:
        end-user:
          exact: jason
    route:
    - destination:
        host: ratings
        subset: v1
  - route:
    - destination:
        host: ratings
        subset: v1
```

Inject a HTTP abort fault.

```
gabor@fedora:~/Downloads/Other/Cloud/istio-1.25.1$ kubectl apply -f samples/bookinfo/networking/virtual-service-ratin
gs-test-abort.yaml
virtualservice.networking.istio.io/ratings configured
gabor@fedora:~/Downloads/Other/Cloud/istio-1.25.1$ kubectl get virtualservice ratings -o yaml
apiVersion: networking.istio.io/v1
kind: VirtualService
metadata:
  annotations:
    kubectl.kubernetes.io/last-applied-configuration: |
      {"apiVersion":"networking.istio.io/v1","kind":"VirtualService","metadata":{"annotations":{},"name":"ratings","n
amespace":"default"},"spec":{"hosts":["ratings"],"http":[{"fault":{"abort":{"httpStatus":500,"percentage":{"value":10
0}}},"match":[{"headers":{"end-user":{"exact":"jason"}}}],"route":[{"destination":{"host":"ratings","subset":"v1"}}]}
,{"route":[{"destination":{"host":"ratings","subset":"v1"}}]}]}}
  creationTimestamp: "2025-04-12T10:49:00Z"
  generation: 3
  name: ratings
  namespace: default
  resourceVersion: "21075"
  uid: ea19b2c7-612b-463b-a7ff-054844c12008
spec:
  hosts:
  - ratings
  http:
  - fault:
      abort:
        httpStatus: 500
        percentage:
          value: 100
    match:
    - headers:
        end-user:
          exact: jason
    route:
    - destination:
        host: ratings
        subset: v1
  - route:
    - destination:
        host: ratings
        subset: v1
```

4. Circuit Breaking

Configure circuit breaker.

```
gabor@fedora:~/Downloads/Other/Cloud/istio-1.25.1$ kubectl apply -f - <<EOF
apiVersion: networking.istio.io/v1
kind: DestinationRule
metadata:
  name: httpbin
spec:
  host: httpbin
  trafficPolicy:
    connectionPool:
      tcp:
        maxConnections: 1
      http:
        http1MaxPendingRequests: 1
        maxRequestsPerConnection: 1
    outlierDetection:
      consecutive5xxErrors: 1
      interval: 1s
      baseEjectionTime: 3m
      maxEjectionPercent: 100
EOF
destinationrule.networking.istio.io/httpbin created
```

Create Fortio.

```
gabor@fedora:~/Downloads/Other/Cloud/istio-1.25.1$ kubectl apply -f samples/httpbin/sample-client/fortio-deploy.yaml
service/fortio created
deployment.apps/fortio-deploy created
```

Log in to client pod.

```
gabor@fedora:~/Downloads/Other/Cloud/istio-1.25.1$ export FORTIO_POD=$(kubectl get pods -l app=fortio -o 'jsonpath={.
items[0].metadata.name}')
kubectl exec "$FORTIO_POD" -c fortio -- /usr/bin/fortio curl -quiet http://httpbin:8000/get
{
  "args": {},
  "headers": {
    "Host": [
      "httpbin:8000"
    ],
    "User-Agent": [
      "fortio.org/fortio-1.66.5"
    ],
    "X-Envoy-Attempt-Count": [
      "1"
    ],
    "X-Forwarded-Client-Cert": [
      "By=spiffe://cluster.local/ns/default/sa/httpbin;Hash=24ba27c064e2ed8c241e1da7c2896bb5b80d61a40a8b99eef4b8c84b1
d4cd0c9;Subject=\"\";URI=spiffe://cluster.local/ns/default/sa/default"
    ],
    "X-Forwarded-Proto": [
      "http"
    ],
    "X-Request-Id": [
      "6a7a5a49-b040-975a-b0b3-b4999c4cb36e"
    ]
  },
  "method": "GET",
  "origin": "127.0.0.6:57515",
  "url": "http://httpbin:8000/get"
}
HTTP/1.1 200 OK
access-control-allow-credentials: true
access-control-allow-origin: *
content-type: application/json; charset=utf-8
date: Sat, 12 Apr 2025 10:59:15 GMT
content-length: 621
x-envoy-upstream-service-time: 9
server: envoy
```

Call with more connections to break circuit.

```
gabor@fedora:~/Downloads/Other/Cloud/istio-1.25.1$ kubectl exec "$FORTIO_POD" -c fortio -- /usr/bin/fortio load -c 2
-qps 0 -n 20 -loglevel Warning http://httpbin:8000/get
{"ts":1744455627.351298,"level":"info","r":1,"file":"logger.go","line":290,"msg":"Log level is now 3 Warning (was 2 I
nfo)"}
Fortio 1.66.5 running at 0 queries per second, 8->8 procs, for 20 calls: http://httpbin:8000/get
Starting at max qps with 2 thread(s) [gomax 8] for exactly 20 calls (10 per thread + 0)
```

```
Code 200 : 13 (65.0 %)
Code 503 : 7 (35.0 %)
```

Go again with more connections.

```
gabor@fedora:~/Downloads/Other/Cloud/istio-1.25.1$ kubectl exec "$FORTIO_POD" -c fortio -- /usr/bin/fortio load -c 3
-qps 0 -n 30 -loglevel Warning http://httpbin:8000/get
{"ts":1744455750.111742,"level":"info","r":1,"file":"logger.go","line":290,"msg":"Log level is now 3 Warning (was 2 I
nfo)"}
Fortio 1.66.5 running at 0 queries per second, 8->8 procs, for 30 calls: http://httpbin:8000/get
Starting at max qps with 3 thread(s) [gomax 8] for exactly 30 calls (10 per thread + 0)
```

```
Code 200 : 11 (36.7 %)
Code 503 : 19 (63.3 %)
```

Look at the istio-proxy stats.

```
gabor@fedora:~/Downloads/Other/Cloud/istio-1.25.1$ kubectl exec "$FORTIO_POD" -c istio-proxy -- pilot-agent request G
ET stats | grep httpbin | grep pending
cluster.outbound|15021||httpbin-gateway-istio.default.svc.cluster.local;.circuit_breakers.default.remaining_pending:
4294967295
cluster.outbound|15021||httpbin-gateway-istio.default.svc.cluster.local;.circuit_breakers.default.rq_pending_open: 0
cluster.outbound|15021||httpbin-gateway-istio.default.svc.cluster.local;.circuit_breakers.high.rq_pending_open: 0
cluster.outbound|8000||httpbin.default.svc.cluster.local;.circuit_breakers.default.remaining_pending: 1
cluster.outbound|8000||httpbin.default.svc.cluster.local;.circuit_breakers.default.rq_pending_open: 0
cluster.outbound|8000||httpbin.default.svc.cluster.local;.circuit_breakers.high.rq_pending_open: 0
cluster.outbound|8000||httpbin.default.svc.cluster.local;.upstream_rq_pending_active: 0
cluster.outbound|8000||httpbin.default.svc.cluster.local;.upstream_rq_pending_failure_eject: 0
cluster.outbound|8000||httpbin.default.svc.cluster.local;.upstream_rq_pending_overflow: 26
cluster.outbound|8000||httpbin.default.svc.cluster.local;.upstream_rq_pending_total: 25
cluster.outbound|80||httpbin-gateway-istio.default.svc.cluster.local;.circuit_breakers.default.remaining_pending: 429
4967295
cluster.outbound|80||httpbin-gateway-istio.default.svc.cluster.local;.circuit_breakers.default.rq_pending_open: 0
cluster.outbound|80||httpbin-gateway-istio.default.svc.cluster.local;.circuit_breakers.high.rq_pending_open: 0
```