



## CONTINUOUS ASSESSMENT

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### LAB 6

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#### CLOUD DATA CENTRES

ZAPPC4202

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**YEAR:** 4

**COURSE:** INFORMATION TECHNOLOGY MANAGEMENT

**ISSUED YEAR:** 2024

**LECTURER:** LEI SHI

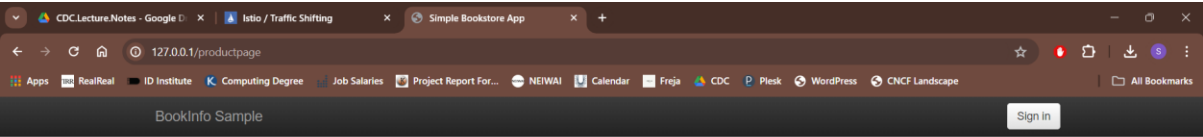
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# Traffic Shifting

## Apply weight-based routing

```
PS C:\Users\saeda\Downloads\istio-1.21.2-win-amd64\istio-1.21.2> kubectl apply -f samples/bookinfo/networking/virtual-service-all-v1.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
PS C:\Users\saeda\Downloads\istio-1.21.2-win-amd64\istio-1.21.2> kubectl apply -f samples/bookinfo/networking/virtual-service-reviews-50-v3.yaml
virtualservice.networking.istio.io/reviews configured
PS C:\Users\saeda\Downloads\istio-1.21.2-win-amd64\istio-1.21.2> kubectl get virtualservice reviews -o yaml
apiVersion: networking.istio.io/v1beta1
kind: VirtualService
metadata:
  annotations:
    kubectl.kubernetes.io/last-applied-configuration: |
      {"apiVersion":"networking.istio.io/v1alpha3","kind":"VirtualService","metadata":{"annotations":{},"name":"reviews","namespace":"default"},"spec":{"hosts":["reviews"],"http":[{"route":[{"destination":{"host":"reviews","subset":"v1"},"weight":50},{"destination":{"host":"reviews","subset":"v3"},"weight":50}]}]}
  creationTimestamp: "2024-04-24T09:52:04Z"
  generation: 2
  name: reviews
  namespace: default
  resourceVersion: "5632"
  uid: 7b35fca3-ee4a-423c-9743-3987c21db35e
spec:
  hosts:
  - reviews
  http:
  - route:
    - destination:
        host: reviews
        subset: v1
        weight: 50
    - destination:
        host: reviews
        subset: v3
        weight: 50
PS C:\Users\saeda\Downloads\istio-1.21.2-win-amd64\istio-1.21.2> kubectl apply -f samples/bookinfo/networking/virtual-service-reviews-v3.yaml
virtualservice.networking.istio.io/reviews configured
PS C:\Users\saeda\Downloads\istio-1.21.2-win-amd64\istio-1.21.2>
```



### The Comedy of Errors

Summary: [Wikipedia Summary](#): The Comedy of Errors is one of **William Shakespeare's** early plays. It is his shortest and one of his most farcical comedies, with a major part of the humour coming from slapstick and mistaken identity, in addition to puns and word play.

#### Book Details

Type:  
paperback  
Pages:  
200  
Publisher:  
PublisherA  
Language:  
English  
ISBN-10:  
1234567890  
ISBN-13:  
123-1234567890

#### Book Reviews

An extremely entertaining play by Shakespeare. The slapstick humour is refreshing!

— Reviewer1  
★★★★★

Absolutely fun and entertaining. The play lacks thematic depth when compared to other plays by Shakespeare.

— Reviewer2  
★★★★☆

Reviews served by:  
[reviews-v3-5b9bd44d-6hnm](#)

## Understanding what happened

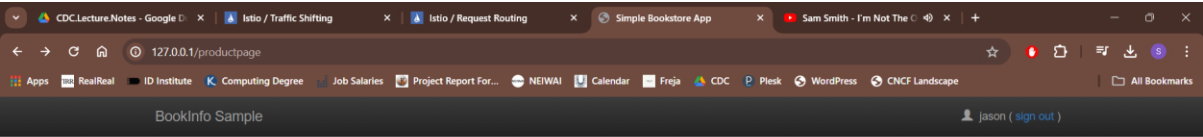
```
Windows PowerShell
PS C:\Users\saeda\Downloads\istio-1.21.2-win-amd64\istio-1.21.2> kubectl apply -f samples/bookinfo/networking/virtual-service-all-v1.yaml
virtualservice.networking.istio.io/productpage unchanged
virtualservice.networking.istio.io/reviews configured
virtualservice.networking.istio.io/ratings unchanged
virtualservice.networking.istio.io/details unchanged
PS C:\Users\saeda\Downloads\istio-1.21.2-win-amd64\istio-1.21.2> kubectl get virtualservices -o yaml
apiVersion: v1
items:
- apiVersion: networking.istio.io/v1beta1
  kind: VirtualService
  metadata:
    annotations:
      kubectl.kubernetes.io/last-applied-configuration: |
        {"apiVersion":"networking.istio.io/v1alpha3","kind":"VirtualService","metadata":{"annotations":{},"name":"bookinfo","namespace":"default"},"spec":{"
gateways":["bookinfo-gateway"],"hosts":["*"],"http":[{"match":[{"uri":{"exact":"/productpage"}},{"uri":{"prefix":"/static"}},{"uri":{"exact":"/login"}},{"ur
i":{"exact":"/logout"}},{"uri":{"prefix":"/api/v1/products"}},{"route":[{"destination":{"host":"productpage","port":{"number":9080}}}]}}]}
  creationTimestamp: "2024-04-24T09:48:26Z"
  generation: 1
  name: bookinfo
  namespace: default
  resourceVersion: "1319"
  uid: 0dcf9c39-61e6-4e71-ab47-477993b7b6d9
  spec:
    gateways:
    - bookinfo-gateway
    hosts:
    - "*"
    http:
    - match:
      - uri:
          exact: /productpage
      - uri:
          prefix: /static
      - uri:
          exact: /login
      - uri:
          exact: /logout
      - uri:
          prefix: /api/v1/products
    route:
    - destination:
        host: productpage
        port:
          number: 9080
```

```
Windows PowerShell
PS C:\Users\saeda\Downloads\istio-1.21.2-win-amd64\istio-1.21.2> kubectl get destinationrules -o yaml
apiVersion: v1
items:
- apiVersion: networking.istio.io/v1beta1
  kind: DestinationRule
  metadata:
    annotations:
      kubectl.kubernetes.io/last-applied-configuration: |
        {"apiVersion":"networking.istio.io/v1alpha3","kind":"DestinationRule","metadata":{"annotations":{},"name":"details","namespace":"default"},"spec":{"
host":"details","subsets":[{"labels":{"version":"v1"},"name":"v1"}, {"labels":{"version":"v2"},"name":"v2"}]}
  creationTimestamp: "2024-04-24T10:30:17Z"
  generation: 1
  name: details
  namespace: default
  resourceVersion: "5066"
  uid: 4d89f106-8235-4436-b777-3aad07ecf7bb
  spec:
    host: details
    subsets:
    - labels:
        version: v1
      name: v1
    - labels:
        version: v2
      name: v2
- apiVersion: networking.istio.io/v1beta1
  kind: DestinationRule
  metadata:
    annotations:
      kubectl.kubernetes.io/last-applied-configuration: |
        {"apiVersion":"networking.istio.io/v1alpha3","kind":"DestinationRule","metadata":{"annotations":{},"name":"productpage","namespace":"default"},"spec
": {"host":"productpage","subsets":[{"labels":{"version":"v1"},"name":"v1"}]}
  creationTimestamp: "2024-04-24T10:30:17Z"
  generation: 1
  name: productpage
  namespace: default
  resourceVersion: "5063"
  uid: 30e69943-0d27-475b-a4b3-1253808dcfe9
  spec:
    host: productpage
    subsets:
    - labels:
        version: v1
```

# Request Routing

## Route based on user identity

```
Windows PowerShell
PS C:\Users\saeda\Downloads\istio-1.21.2-win-amd64\istio-1.21.2> kubectl apply -f samples/bookinfo/networking/virtual-service-reviews-test-v2.yaml
virtualservice.networking.istio.io/reviews configured
PS C:\Users\saeda\Downloads\istio-1.21.2-win-amd64\istio-1.21.2> kubectl get virtualservice reviews -o yaml
apiVersion: networking.istio.io/v1beta1
kind: VirtualService
metadata:
  annotations:
    kubernetes.io/last-applied-configuration: |
      {"apiVersion":"networking.istio.io/v1alpha3","kind":"VirtualService","metadata":{"annotations":{},"name":"reviews","namespace":"default"},"spec":{"hosts":["reviews"],"http":[{"match":[{"headers":{"end-user":{"exact":"jason"}}}],route":[{"destination":{"host":"reviews","subset":"v2"}}]},{"route":[{"destination":{"host":"reviews","subset":"v1"}}]}}}
      creationTimestamp: "2024-04-24T09:52:04Z"
      generation: 5
      name: reviews
      namespace: default
      resourceVersion: "6701"
      uid: 7b35fca3-ee4a-423c-9743-3987c21db35e
spec:
  hosts:
  - reviews
  http:
  - match:
    - headers:
        end-user:
          exact: jason
      route:
      - destination:
          host: reviews
          subset: v2
    - route:
      - destination:
          host: reviews
          subset: v1
PS C:\Users\saeda\Downloads\istio-1.21.2-win-amd64\istio-1.21.2>
PS C:\Users\saeda\Downloads\istio-1.21.2-win-amd64\istio-1.21.2>
PS C:\Users\saeda\Downloads\istio-1.21.2-win-amd64\istio-1.21.2>
PS C:\Users\saeda\Downloads\istio-1.21.2-win-amd64\istio-1.21.2>
PS C:\Users\saeda\Downloads\istio-1.21.2-win-amd64\istio-1.21.2>
PS C:\Users\saeda\Downloads\istio-1.21.2-win-amd64\istio-1.21.2>
PS C:\Users\saeda\Downloads\istio-1.21.2-win-amd64\istio-1.21.2>
PS C:\Users\saeda\Downloads\istio-1.21.2-win-amd64\istio-1.21.2>
PS C:\Users\saeda\Downloads\istio-1.21.2-win-amd64\istio-1.21.2>
PS C:\Users\saeda\Downloads\istio-1.21.2-win-amd64\istio-1.21.2>
PS C:\Users\saeda\Downloads\istio-1.21.2-win-amd64\istio-1.21.2>
```



### The Comedy of Errors

Summary: [Wikipedia Summary](#): The Comedy of Errors is one of **William Shakespeare's** early plays. It is his shortest and one of his most farcical comedies, with a major part of the humour coming from slapstick and mistaken identity, in addition to puns and word play.

#### Book Details

Type:  
paperback  
Pages:  
200  
Publisher:  
PublisherA  
Language:  
English  
ISBN-10:  
1234567890  
ISBN-13:  
123-1234567890

#### Book Reviews

An extremely entertaining play by Shakespeare. The slapstick humour is refreshing!

— Reviewer1  
★★★★★

Absolutely fun and entertaining. The play lacks thematic depth when compared to other plays by Shakespeare.

— Reviewer2  
★★★★☆

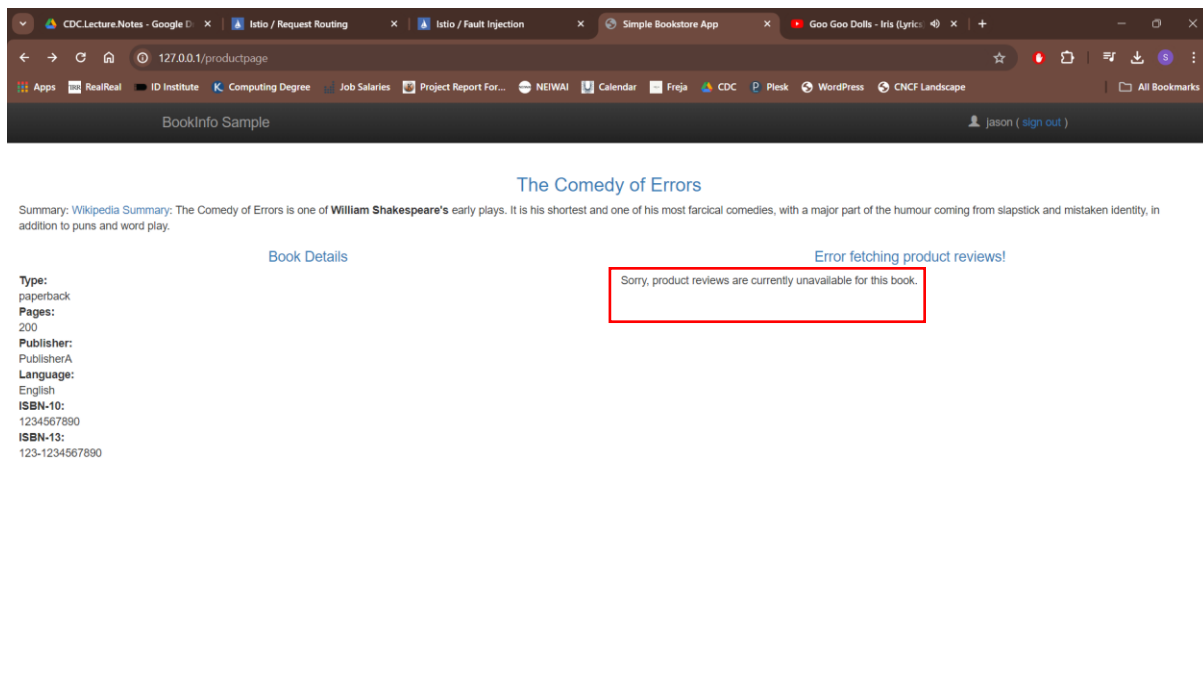
Reviews served by:  
[reviews-v2-5b667bcbf8-x8sjn](#)

## Fault Injection

### Injecting an HTTP delay fault

```
Windows PowerShell
PS C:\Users\saeda\Downloads\istio-1.21.2-win-amd64\istio-1.21.2> kubectl apply -f samples/bookinfo/networking/virtual-service-all-v1.yaml
virtualservice.networking.istio.io/productpage unchanged
virtualservice.networking.istio.io/reviews configured
virtualservice.networking.istio.io/ratings unchanged
virtualservice.networking.istio.io/details unchanged
PS C:\Users\saeda\Downloads\istio-1.21.2-win-amd64\istio-1.21.2> kubectl apply -f samples/bookinfo/networking/virtual-service-reviews-test-v2.yaml
virtualservice.networking.istio.io/reviews configured
PS C:\Users\saeda\Downloads\istio-1.21.2-win-amd64\istio-1.21.2> kubectl apply -f samples/bookinfo/networking/virtual-service-ratings-test-delay.yaml
virtualservice.networking.istio.io/ratings configured
PS C:\Users\saeda\Downloads\istio-1.21.2-win-amd64\istio-1.21.2> kubectl get virtualservice ratings -o yaml
apiVersion: networking.istio.io/v1beta1
kind: VirtualService
metadata:
  annotations:
    kubectl.kubernetes.io/last-applied-configuration: |
      {"apiVersion":"networking.istio.io/v1alpha3","kind":"VirtualService","metadata":{"annotations":{},"name":"ratings","namespace":"default"},"spec":{"hosts":["ratings"],"http":[{"fault":{"delay":{"fixedDelay":"7s","percentage":{"value":100}}},"match":[{"headers":{"end-user":{"exact":"jason"}}}],route":[{"destination":{"host":"ratings","subset":"v1"}}]}]}
  creationTimestamp: "2024-04-24T09:52:04Z"
  generation: 2
  name: ratings
  namespace: default
  resourceVersion: "7459"
  uid: 71de9f25-42e7-4c17-b07a-50d60f848868
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
```

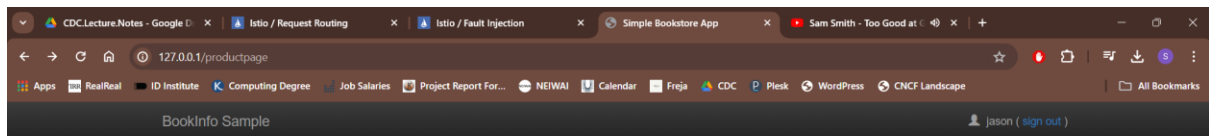
### Testing the delay configuration



## Injecting an HTTP abort fault

```
Windows PowerShell
PS C:\Users\saeda\Downloads\istio-1.21.2-win-amd64\istio-1.21.2> kubectl apply -f samples/bookinfo/networking/virtual-service-ratings-test-abort.yaml
virtualservice.networking.istio.io/ratings configured
PS C:\Users\saeda\Downloads\istio-1.21.2-win-amd64\istio-1.21.2> kubectl get
virtualservice ratings -o yaml
apiVersion: networking.istio.io/v1beta1
kind: VirtualService
metadata:
  annotations:
    kubectl.kubernetes.io/last-applied-configuration: |
      {"apiVersion":"networking.istio.io/v1alpha3","kind":"VirtualService","metadata":{"annotations":{"name":"ratings","namespace":"default"},"spec":{"hosts":["ratings"],"http":[{"fault":{"abort":{"httpStatus":500,"percentage":{"value":100}}},"match":[{"headers":{"end-user":{"exact":"jason"}}},"route":[{"destination":{"host":"ratings","subset":"v1"}}]}]}]}
creationTimestamp: "2024-04-24T09:52:04Z"
generation: 3
name: ratings
namespace: default
resourceVersion: "7704"
uid: 714e9f25-42e7-4c17-b07a-50d60f848868
spec:
  hosts:
  - ratings
  http:
  - fault:
      abort:
        httpStatus: 500
        percentage:
          value: 100
    match:
      - headers:
          end-user:
            exact: jason
        route:
          - destination:
              host: ratings
              subset: v1
    - routes:
        - destination:
            host: ratings
            subset: v1
```

## Testing the abort configuration



### The Comedy of Errors

Summary: [Wikipedia Summary](#): The Comedy of Errors is one of **William Shakespeare's** early plays. It is his shortest and one of his most farcical comedies, with a major part of the humour coming from slapstick and mistaken identity, in addition to puns and word play.

#### Book Details

**Type:**  
paperback  
**Pages:**  
200  
**Publisher:**  
PublisherA  
**Language:**  
English  
**ISBN-10:**  
1234567890  
**ISBN-13:**  
123-1234567890

#### Book Reviews

An extremely entertaining play by Shakespeare. The slapstick humour is refreshing!

— Reviewer1

Ratings service is currently unavailable

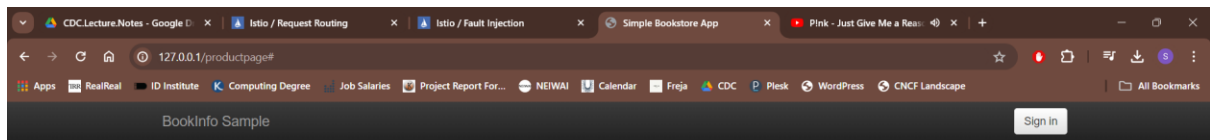
Absolutely fun and entertaining. The play lacks thematic depth when compared to other plays by Shakespeare.

— Reviewer2

Ratings service is currently unavailable

Reviews served by:

reviews-v2-5b667bcbf8-x8sln



## The Comedy of Errors

Summary: [Wikipedia Summary](#): The Comedy of Errors is one of **William Shakespeare's** early plays. It is his shortest and one of his most farcical comedies, with a major part of the humour coming from slapstick and mistaken identity, in addition to puns and word play.

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### Book Reviews

An extremely entertaining play by Shakespeare. The slapstick humour is refreshing!

— Reviewer1

Absolutely fun and entertaining. The play lacks thematic depth when compared to other plays by Shakespeare.

— Reviewer2

Reviews served by:

reviews-v1-5b5d6494f4-jlxxd



# Circuit Breaking

## Configuring the circuit breaker

```
Windows PowerShell
PS C:\Users\saeda\Downloads\istio-1.21.2-win-amd64\istio-1.21.2> kubectl apply -f samples/httpbin/httpbin.yaml
serviceaccount/httpbin unchanged
service/httpbin unchanged
deployment.apps/httpbin unchanged
error: error parsing samples/httpbin/httpbin.yaml: error converting YAML to JSON: yaml: line 3: mapping values are not allowed in this context
PS C:\Users\saeda\Downloads\istio-1.21.2-win-amd64\istio-1.21.2> kubectl get destinationrule httpbin -o yaml
apiVersion: networking.istio.io/v1beta1
kind: DestinationRule
metadata:
  annotations:
    kubectl.kubernetes.io/last-applied-configuration: |
      {"apiVersion":"networking.istio.io/v1alpha3","kind":"DestinationRule","metadata":{"annotations":{},"name":"httpbin","namespace":"default"},"spec":{"host":"httpbin","trafficPolicy":{"connectionPool":{"http":{"http1MaxPendingRequests":1,"maxRequestsPerConnection":1},"tcp":{"maxConnections":1}},"outlierDetection":{"baseEjectionTime":"3m","consecutive5xxErrors":1,"interval":"1s","maxEjectionPercent":100}}}
  creationTimestamp: "2024-04-24T21:43:17Z"
  generation: 1
  name: httpbin
  namespace: default
  resourceVersion: "55276"
  uid: f226ed22-3398-45c7-b200-e21648351408
spec:
  host: httpbin
  trafficPolicy:
    connectionPool:
      http:
        http1MaxPendingRequests: 1
        maxRequestsPerConnection: 1
      tcp:
        maxConnections: 1
    outlierDetection:
      baseEjectionTime: 3m
      consecutive5xxErrors: 1
      interval: 1s
      maxEjectionPercent: 100
PS C:\Users\saeda\Downloads\istio-1.21.2-win-amd64\istio-1.21.2> kubectl apply -f samples/httpbin/sample-client/fortio-deploy.yaml
service/fortio created
deployment.apps/fortio-deploy created
PS C:\Users\saeda\Downloads\istio-1.21.2-win-amd64\istio-1.21.2> kubectl apply -f <(istioctl kube-inject -f samples/httpbin/sample-client/fortio-deploy.yaml)
At line:1 char:18
+ kubectl apply -f <(istioctl kube-inject -f samples/httpbin/sample-cl ...
+ ~~~~~
The '<' operator is reserved for future use.
+ CategoryInfo          : ParserError: (:) [], ParentContainsErrorRecordException
```

```
File Edit Selection View Go Run Terminal Help
Restricted Mode is intended for safe code browsing. Trust this window to enable all features. Manage Learn More

four.yaml httpbin.yaml x
C:\Users\saeda\Downloads\istio-1.21.2-win-amd64\istio-1.21.2\samples> httpbin > ! httpbin.yaml
74 apiVersion: networking.istio.io/v1alpha3
75 kind: DestinationRule
76   mode: ISTIO_MUTUAL
77 metadata:
78   name: httpbin
79 spec:
80   host: httpbin
81   trafficPolicy:
82     connectionPool:
83       tcp:
84         maxConnections: 1
85       http:
86         http1MaxPendingRequests: 1
87         maxRequestsPerConnection: 1
88     outlierDetection:
89       consecutive5xxErrors: 1
90       interval: 1s
91       baseEjectionTime: 3m
92       maxEjectionPercent: 100
```

## Adding a client

```
Windows PowerShell
+ CategoryInfo          : ObjectNotFound: (GATEWAY_URL=:String) [], Co
mmandNotFoundException
+ FullyQualifiedErrorId : CommandNotFoundException

PS C:\Users\saeda\Downloads\istio-1.21.2-win-amd64\istio-1.21.2> $GATEWAY_URL=($INGRESS_HOST.Trim() + ".") + $INGRESS_PORT
PS C:\Users\saeda\Downloads\istio-1.21.2-win-amd64\istio-1.21.2> echo "$GATEWAY_URL"
127.0.0.1.80
PS C:\Users\saeda\Downloads\istio-1.21.2-win-amd64\istio-1.21.2> echo "http://$GATEWAY_URL/productpage"
http://127.0.0.1.80/productpage
PS C:\Users\saeda\Downloads\istio-1.21.2-win-amd64\istio-1.21.2> kubectl apply -f samples/httpbin/httpbin.yaml
serviceaccount/httpbin unchanged
deployment.apps/httpbin unchanged
error: error parsing samples/httpbin/httpbin.yaml: error converting YAML to JSON: yaml: line 3: mapping values are not allowed in this context
PS C:\Users\saeda\Downloads\istio-1.21.2-win-amd64\istio-1.21.2> kubectl apply -f samples/httpbin/sample-client/fortio-deploy.yaml
service/fortio unchanged
deployment.apps/fortio-deploy unchanged
PS C:\Users\saeda\Downloads\istio-1.21.2-win-amd64\istio-1.21.2> export FORTIO_POD=$(kubectl get pods -l app=fortio -o 'jsonpath={.items[0].metadata.name}')
export : The term 'export' is not recognized as the name of a cmdlet,
function, script file, or operable program. Check the spelling of the
name, or if a path was included, verify that the path is correct and try
again.
At line:1 char:1
+ export FORTIO_POD=$(kubectl get pods -l app=fortio -o 'jsonpath={.ite ...
+ ~~~~~
+ CategoryInfo          : ObjectNotFound: (export:String) [], CommandN
otFoundException
+ FullyQualifiedErrorId : CommandNotFoundException

PS C:\Users\saeda\Downloads\istio-1.21.2-win-amd64\istio-1.21.2> kubectl exec "$FORTIO_POD" -c fortio -- /usr/bin/fortio curl -quiet http://httpbin:8000/get
error: pod, type/name or --filename must be specified
PS C:\Users\saeda\Downloads\istio-1.21.2-win-amd64\istio-1.21.2> |
```