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How to Manage Traffic Using Istio on Kubernetes

Insights into request routing, traffic splitting, and user identity-based routing using Istio on Kubernetes

Photo by John Jemison on Unsplash.

Traffic management is one of the core features of Istio. If you are using Istio to manage your microservices on Kubernetes, you can have fine-grained control over how they interact with each other. That will also help you define how the traffic flows through your service mesh.

This story is a follow-up to Getting Started With Istio on Kubernetes. Today, let's discuss traffic management.

In the last article, we installed Istio on our Kubernetes cluster and deployed a sample Book Info application on it. We've seen traffic flow through our mesh in a round-robin fashion, but with a service mesh like Istio, we can do a lot more. Some of the traffic management features you can use are the following:

- Request routing
- Fault injection
- Traffic shifting
- TCP traffic shifting
- Request timeouts
- Circuit breaking
- Mirroring

As we discussed in the previous article, we can use an ingress gateway to let traffic in our mesh and then a virtual service to route traffic on a round-robin fashion.

In this article, we will learn about destination rules that will give us fine-grained control over the mesh behavior.

Prerequisites

Ensure that you have a running Kubernetes cluster. Follow the Getting Started With Istio on Kubernetes guide to install Istio and deploy the sample Book Info application in your cluster.

What Are Destination Rules?

Destination rules form a crucial part of traffic routing within Istio. They are rules applied to traffic after they have been routed to a destination by a virtual service.

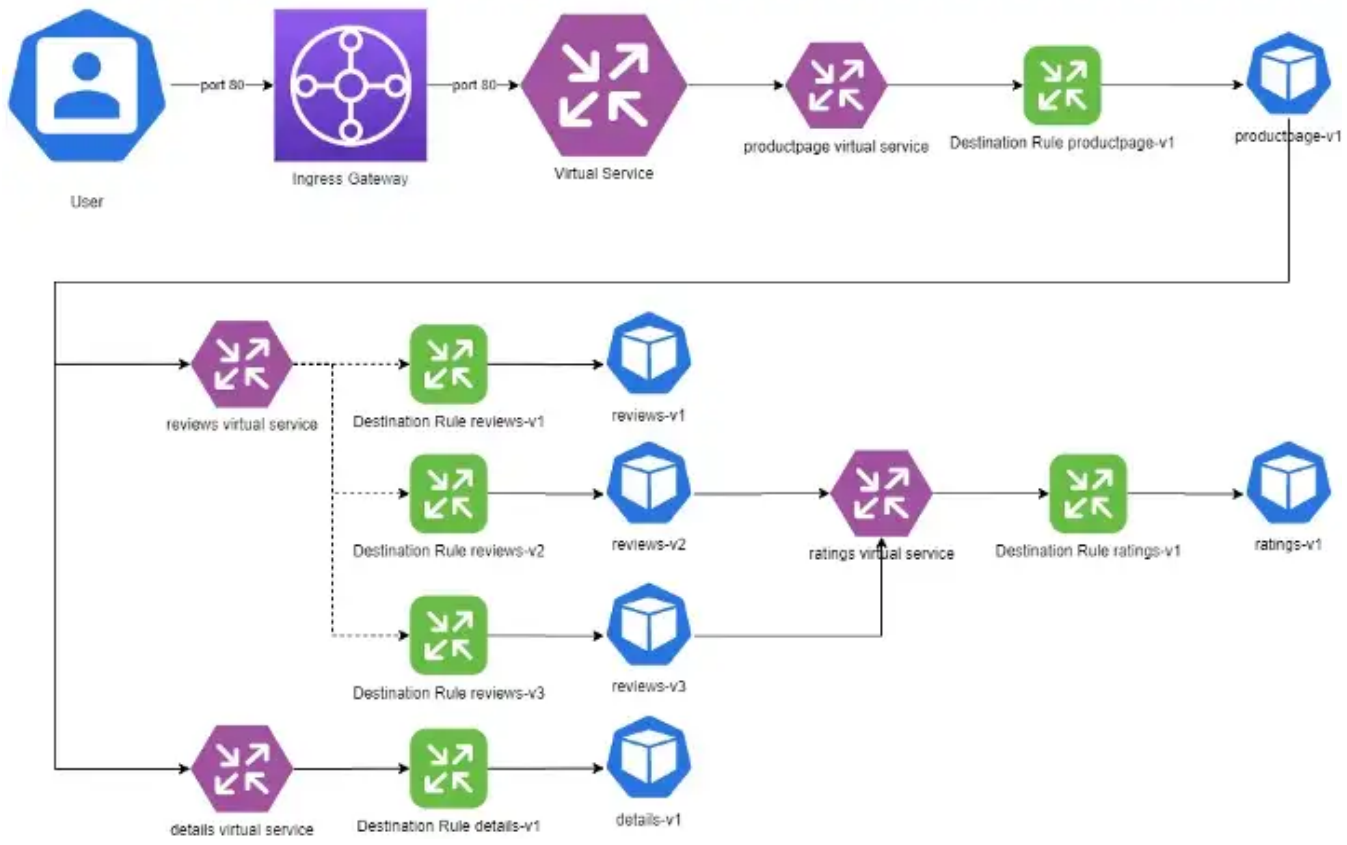
While a virtual service matches on a rule and evaluates a destination to route the traffic to, destination rules define available subsets of the service to send the traffic.

For example, if you have a service that has multiple versions running at a time, you can create destination rules to define routes to those versions. Then use virtual services to map to a specific subset defined by the destination rules or split a percentage of the traffic to particular versions.

Applying Destination Rules

Let us continue from where we left off in the last article and define some destination rules for the microservice.

For this demonstration, we will define three subsets (`v1` , `v2` , and `v3`) for each version of the `reviews` microservice and one subset (`v1`) for the other three microservices.

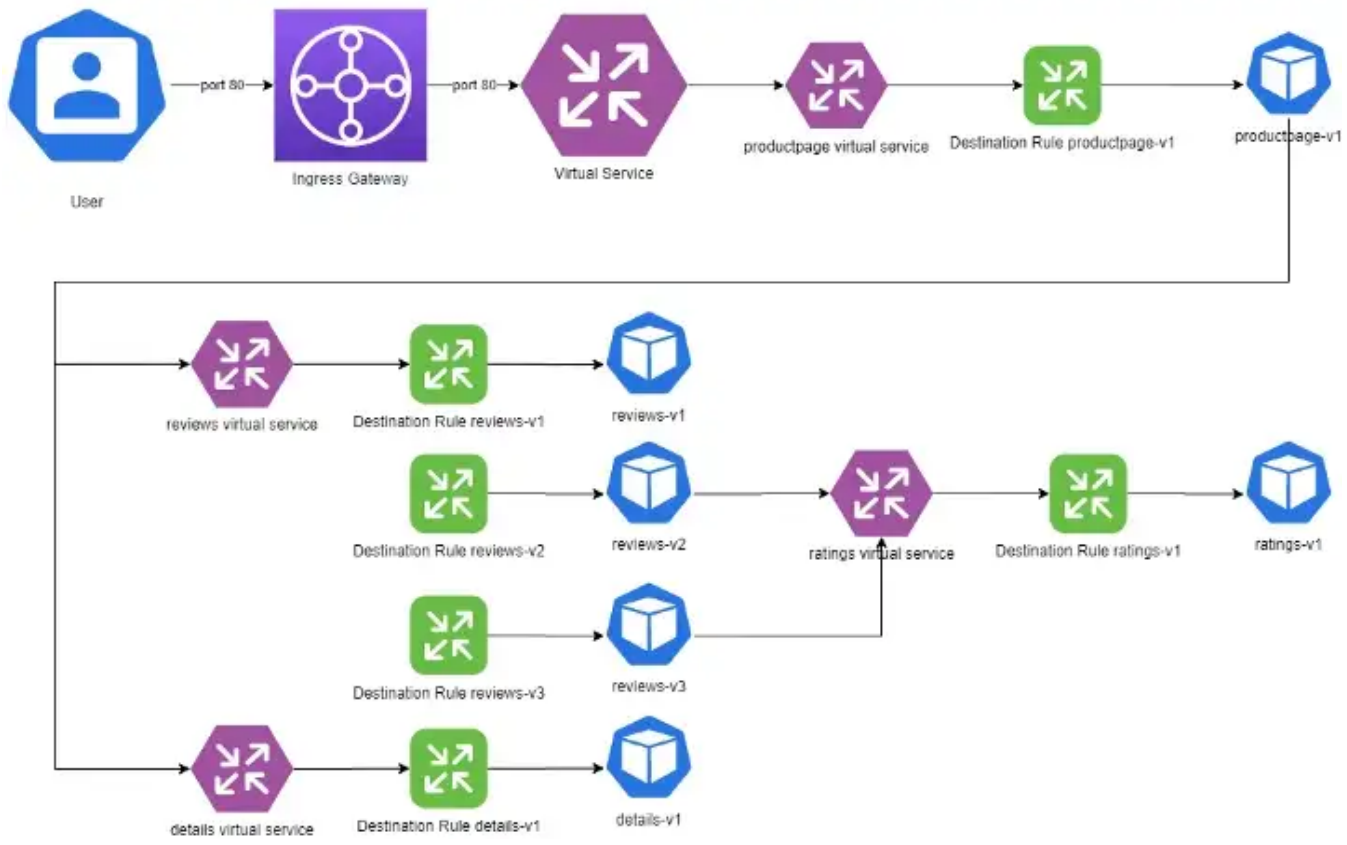


Destination rules

Below is the destination rule YAML file that we are going to use:

```yaml
apiVersion: networking.istio.io/v1alpha3
kind: DestinationRule
metadata:
  name: productpage
spec:
  host: productpage
  subsets:
  - name: v1
    labels:
      version: v1
---
apiVersion: networking.istio.io/v1alpha3
kind: DestinationRule
metadata:
  name: reviews
spec:
  host: reviews
  subsets:
  - name: v1
    labels:
      version: v1
  - name: v2
    labels:
```

```yaml
      version: v2
  - name: v3
    labels:
      version: v3
---
apiVersion: networking.istio.io/v1alpha3
kind: DestinationRule
metadata:
  name: ratings
spec:
  host: ratings
  subsets:
  - name: v1
    labels:
      version: v1
  - name: v2
    labels:
      version: v2
  - name: v2-mysql
    labels:
      version: v2-mysql
  - name: v2-mysql-vm
    labels:
      version: v2-mysql-vm
---
apiVersion: networking.istio.io/v1alpha3
kind: DestinationRule
metadata:
  name: details
spec:
  host: details
  subsets:
  - name: v1
    labels:
      version: v1
  - name: v2
    labels:
      version: v2
---
```



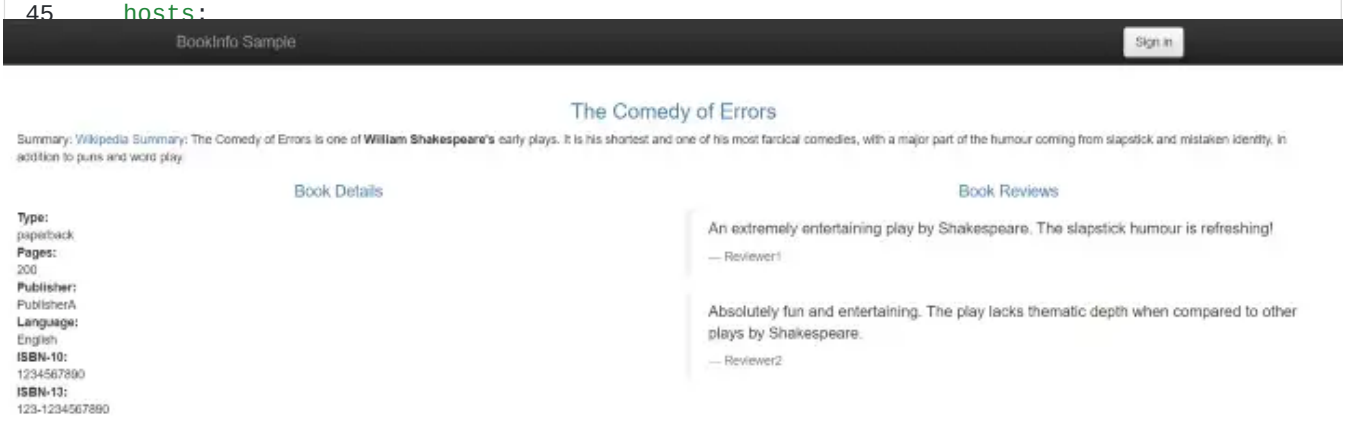
Route to v1

Instead of seeing three different pages for the reviews, we should see a single page with no stars come up every time we hit the endpoint.

Let us have a look at the virtual service manifest we need to use for this routing:

```yaml
apiVersion: networking.istio.io/v1alpha3
kind: VirtualService
metadata:
  name: productpage
spec:
  hosts:
  - productpage
  http:
  - route:
    - destination:
        host: productpage
        subset: v1
---
apiVersion: networking.istio.io/v1alpha3
kind: VirtualService
metadata:
  name: reviews
spec:
  hosts:
  - reviews
```

```
20     - reviews
21     http:
22     - route:
23       - destination:
24           host: reviews
25           subset: v1
26   ---
27   apiVersion: networking.istio.io/v1alpha3
28   kind: VirtualService
29   metadata:
30     name: ratings
31   spec:
32     hosts:
33     - ratings
34     http:
35     - route:
36       - destination:
37           host: ratings
38           subset: v1
39   ---
40   apiVersion: networking.istio.io/v1alpha3
41   kind: VirtualService
42   metadata:
43     name: details
44   spec:
45     hosts:
```



Book Info version 1

That means we have successfully configured Istio to route to version `v1` of the `reviews` microservice.

Now, let's change the version in the virtual service to route all requests to the `reviews` microservice on `v3`:

```yaml
apiVersion: networking.istio.io/v1alpha3
kind: VirtualService
metadata:
  name: reviews
spec:
  hosts:
    - reviews
  http:
  - route:
    - destination:
        host: reviews
        subset: v3
```

virtual-service-reviews-v3.yaml hosted with ❤ by **GitHub** **view raw**

virtual-service-reviews-v3.yaml

Apply the manifest:

```
$ kubectl apply -f samples/bookinfo/networking/virtual-service-reviews-v3.yaml
virtualservice.networking.istio.io/reviews configured
```

Try to re-access the Book Info application:

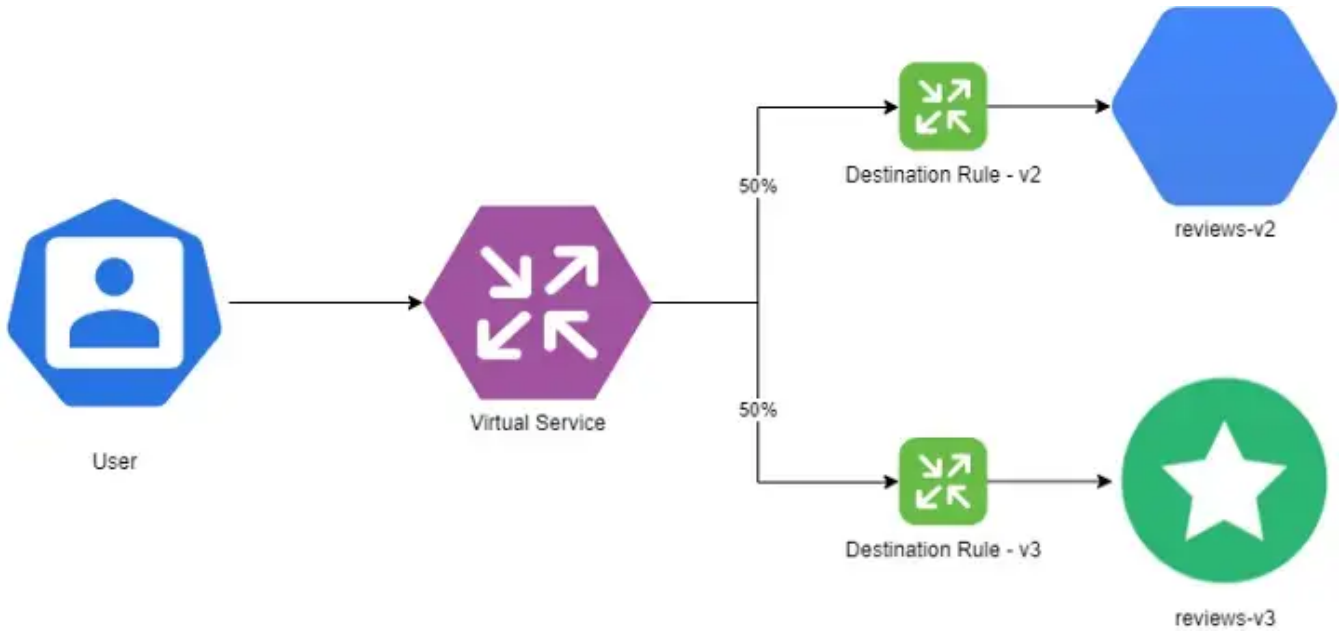
Book Info version 3

And this time, you see red stars every time you refresh. You have successfully configured your mesh to point to a specific version.

Traffic Splitting

Now, for example, you have a new version of your microservice that you want to introduce to your users. Still, you don't want to risk impacting the entire service. So you are cautious to only test the functionality with a small number of customers before rolling out the new release completely.

This strategy of deployment is called a Blue-Green deployment, where we slowly move traffic from the old version (Blue) to the new version (Green).



Blue-Green deployment

Let us try to split traffic equally between the blue version `v2` and the green version `v3` of the `reviews` microservice.

Let us have a look at the manifest first:

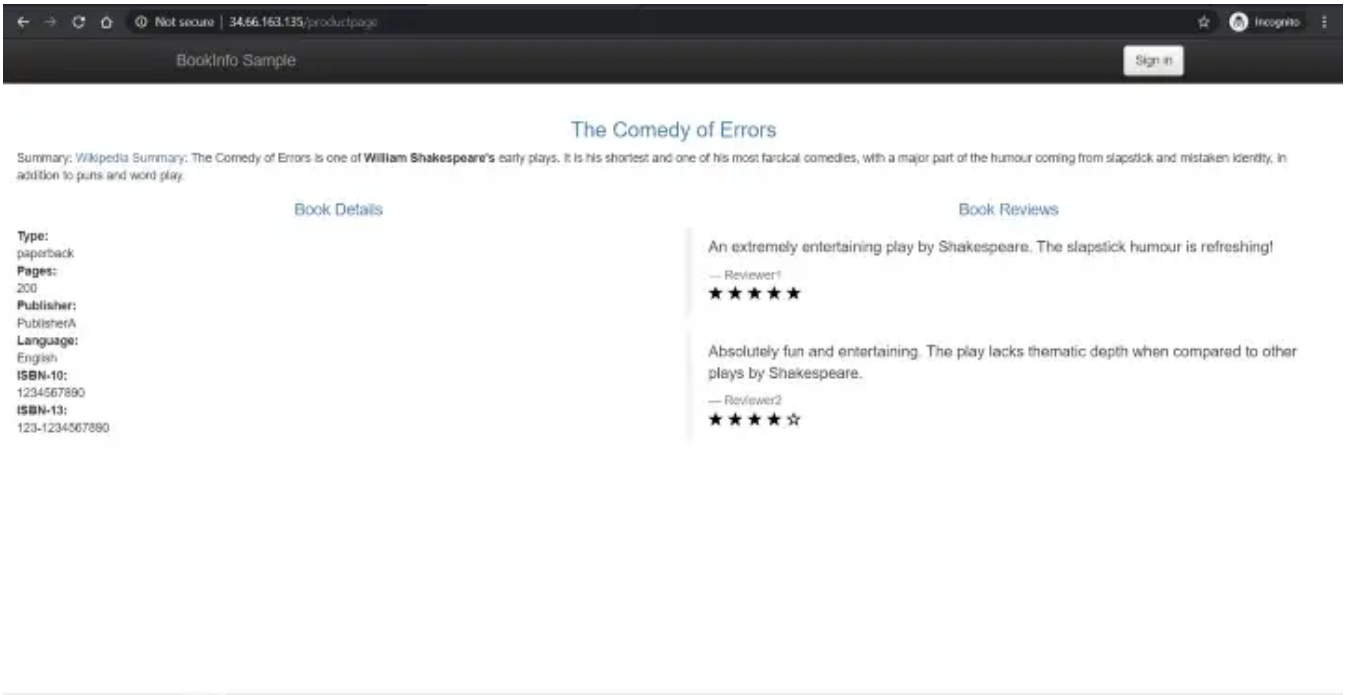
```
apiVersion: networking.istio.io/v1alpha3
kind: VirtualService
metadata:
  name: reviews
spec:
  hosts:
```

```
      - reviews
    http:
    - route:
      - destination:
          host: reviews
          subset: v2
        weight: 50
      - destination:
          host: reviews
          subset: v3
        weight: 50
```

virtual-service-reviews-v2-v3.yaml hosted with ❤ by **GitHub** **view raw**

```
virtualservice.networking.istio.io/reviews configured
```

Refresh the page multiple times and you will see that the traffic is bouncing equally between two versions (one with black stars and the other with red stars):



Book Info version 2

Book Info version 3

That shows that traffic splitting is working correctly between the two versions.

User Identity-Based Routing

Let us take the routing to the next level. Suppose you are unsure that your new microservice would work correctly on production. Therefore, you first want to roll out the new service to a business tester. Once the business tester is satisfied, you would then roll it out to all users.

Let us look at the virtual service manifest to do that:

```yaml
apiVersion: networking.istio.io/v1alpha3
kind: VirtualService
metadata:
  name: reviews
spec:
  hosts:
    - reviews
  http:
  - match:
    - headers:
        end-user:
          exact: jason
    route:
    - destination:
```

```
          host: reviews
          subset: v2
    - route:
      - destination:
          host: reviews
          subset: v1
```

virtual-service-reviews-test-v2.yaml hosted with ❤ by GitHub view raw

Apply the virtual service manifest:

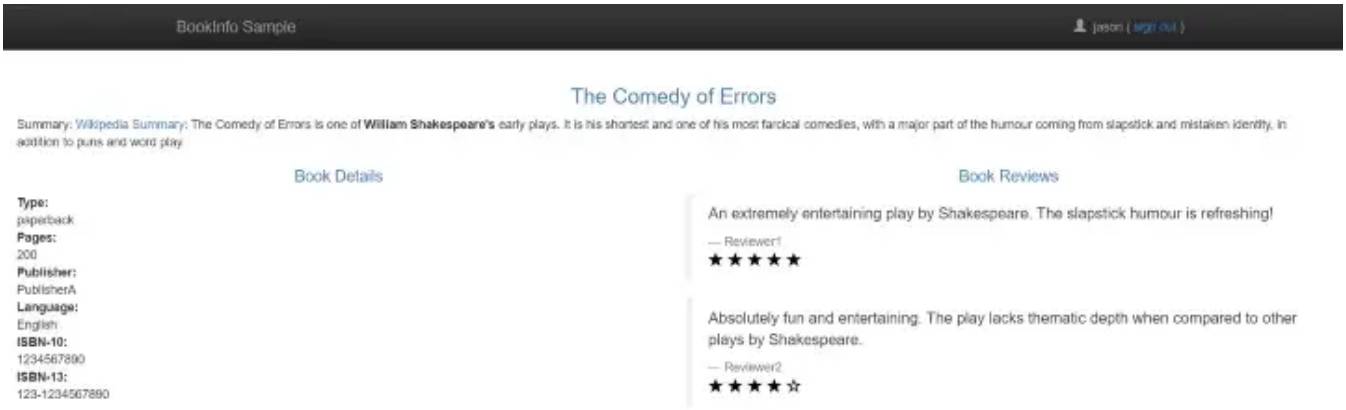
```
$ kubectl apply -f samples/bookinfo/networking/virtual-service-reviews-test-v2.yaml
```

Refresh the page and you should see all requests routed to the `v1` microservice, as you have not logged in:

Book Info Version 1

Now, click on “Sign In” and log in to the site as `jason`. You do not need to provide a password.

What do you see now? Is it the page with the black stars? If so, then you have successfully configured user identity-based routing on Istio.



Book Info version 2 with user Jason

Conclusion

Thanks for reading through! I hope you enjoyed the article. In the next part, I will discuss "Kubernetes Services over HTTPS With Istio's Secure Gateways" with a hands-on demonstration, so see you in the next part!

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