Introduction

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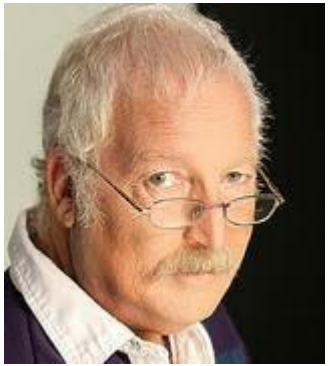
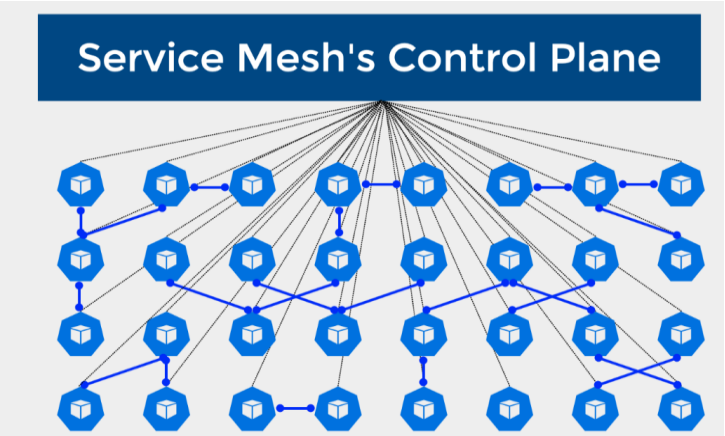
Bruce has been a Senior Solutions Architect in the computer industry for 40+ years, working at multiple technology companies including Mirantis, HP, Oracle, Sun Microsystems and others. Email Bruce: bmathews@mirantis.com



What is service mesh?

- Infrastructure layer making service to service communication safe fast and reliable
- Separate the application business logic from
  - Networking
  - Security
  - Observability



Service Mesh Architectures

Library

- Needed services are sitting in a Library that your microservices applications import and use.

Node Agent

- The services are provided by a Node Agent or daemon. The daemon services all of the containers on a particular node/machine.

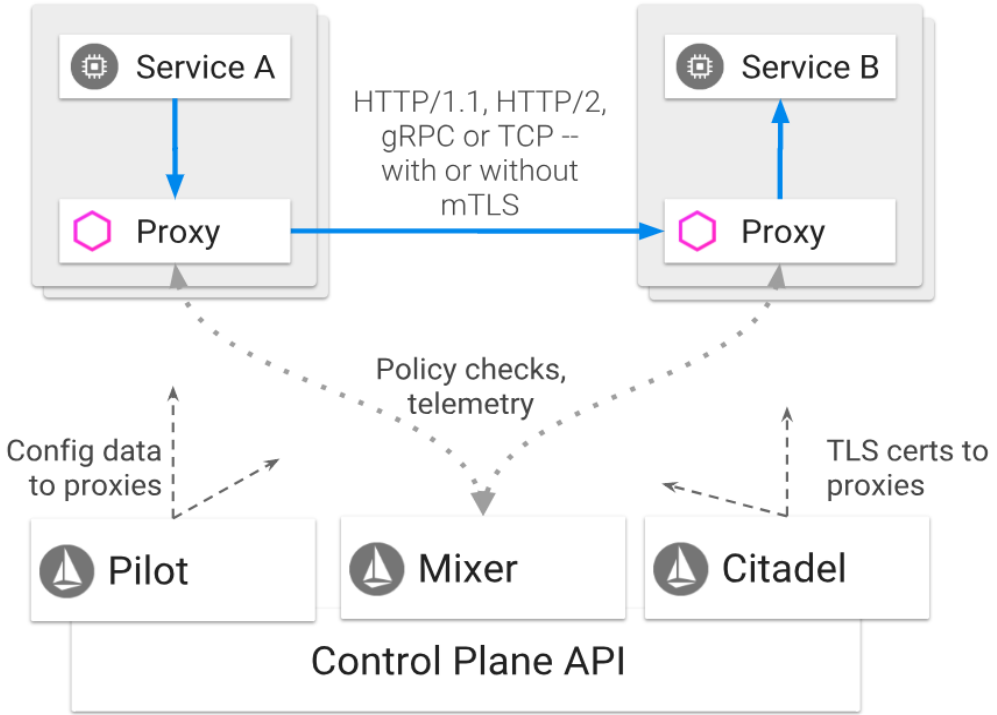
Sidecar

- The services are provided in a Sidecar container that runs alongside your application container.

What is ISTIO?

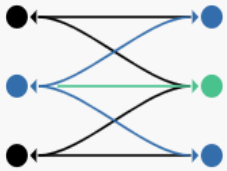
- Greek word for "sail"
- Istio is an open-source project
- The project was started by teams from Google and IBM, in partnership with the Envoy team at Lyft.
- Platform Independent
- Service mesh

ISTIO Architecture



- Envoy - is a high-performance proxy to mediate all inbound and outbound traffic for all services in the service mesh.
- Pilot - provides service discovery for the Envoy sidecars, traffic management capabilities for intelligent routing.
- Mixer - enforces access control and usage policies across the service mesh, and collects telemetry data from the Envoy proxy and other services.
- Citadel - provides strong service-to-service and end-user authentication with built-in identity and credential management

What does ISTIO provide?



Connect

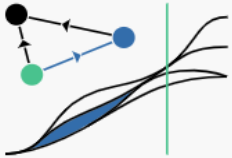
- Intelligent Routing
- Red/Black deployments
- Canaries
- Gradual upgrades

Secure

- Authentication
- Authorization
- Encryption

Control

- Enforce Policies
- Resource limits



Observe

- Service dependencies
- Traffic flow
- Tracing
- Monitoring and logging

What is a Virtlet?

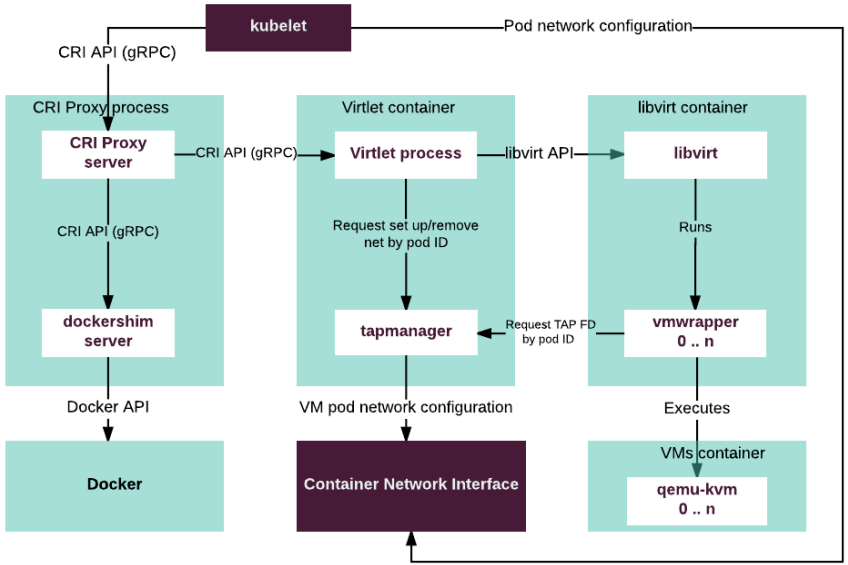
Kubernetes CRI implementation for running VM workloads

- Targeted at VM workloads that need to behave as containers on the outside
- Run unmodified OpenStack VM images using qcow2 format
- Build higher-level Kubernetes objects using VM pods
- Use familiar kubectl pod commands to work with your VMs
- Integrate with cluster networking using normal CNI plugins
- Easy to deploy - only need to install simple CRI Proxy package on the nodes

What does Virtlet Enable?

Virtlet enables you to run unmodified QEMU/KVM virtual machines that do not include an additional Docker layer as in similar solutions in Kubernetes. Virtlet supports all standard Kubernetes objects, such as ReplicaSets, Deployments, DaemonSets, and so on, as well as their operations.

The following diagram describes the Virtlet components and interactions between them:



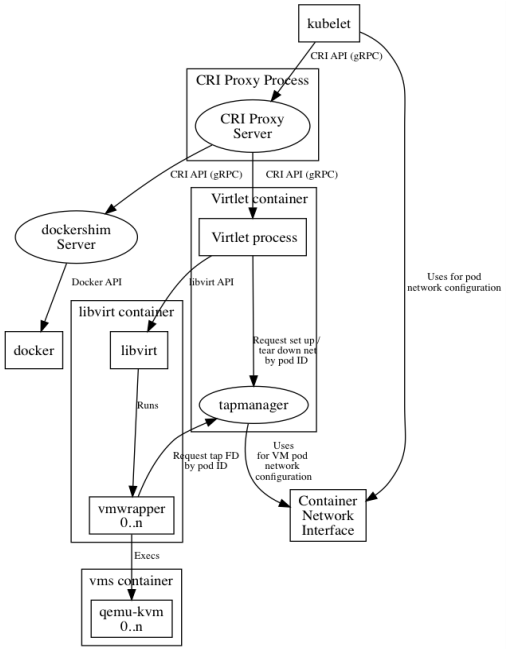
Virtlet Components

Virtlet includes the following components:

- Virtlet manager that implements CRI interfaces for virtualization and image handling
- A libvirt instance
- Virtlet tapmanager that is responsible for managing a VM networking
- Virtlet vmwrapper that is responsible for preparing environment for an emulator
- An emulator (QEMU with KVM support and with a possibility to disable KVM)
- Container Runtime Interface (CRI) Proxy that provides the ability to mix docker-shim and VM-based workloads on the same Kubernetes node

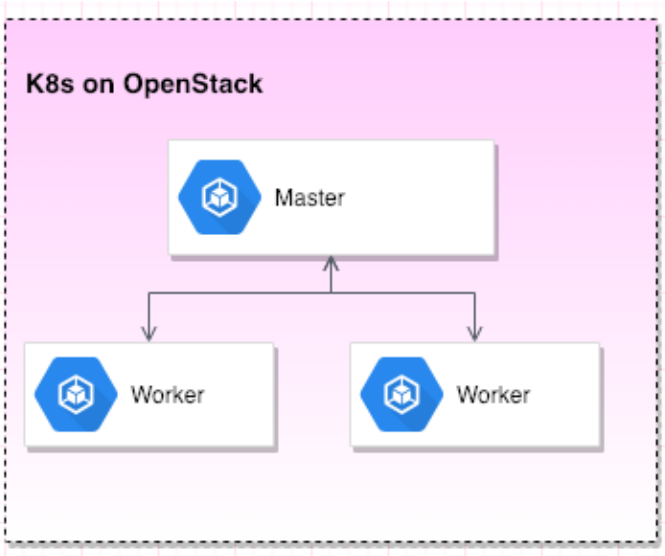
The Container Runtime Interface (CRI) Proxy

Container Runtime Interface (CRI) Proxy provides a way to run multiple CRI implementations on the same node, for example, Virtlet and dockershim. It enables running infrastructure pods such as kube-proxy. CRI Proxy reuses the dockershim component from kubelet to have Docker as one of CRI implementations on the multi-runtime nodes.



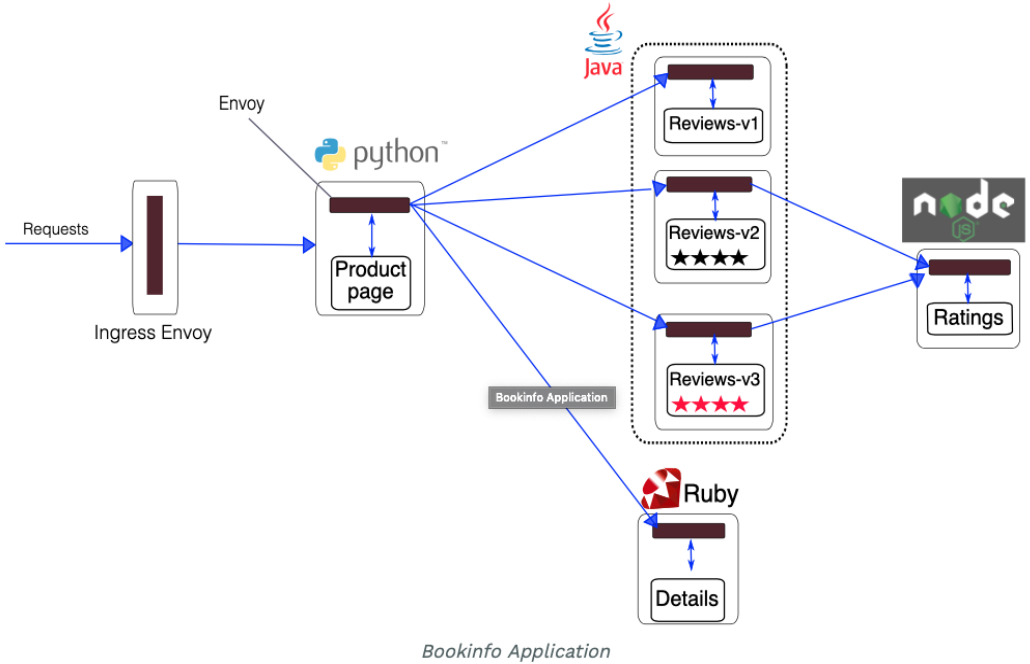
Demo

Lab Topology



- Kubernetes installed using kubeadm
- One master
- Two worker nodes
- Kiali console installed
- BookInfo app installed

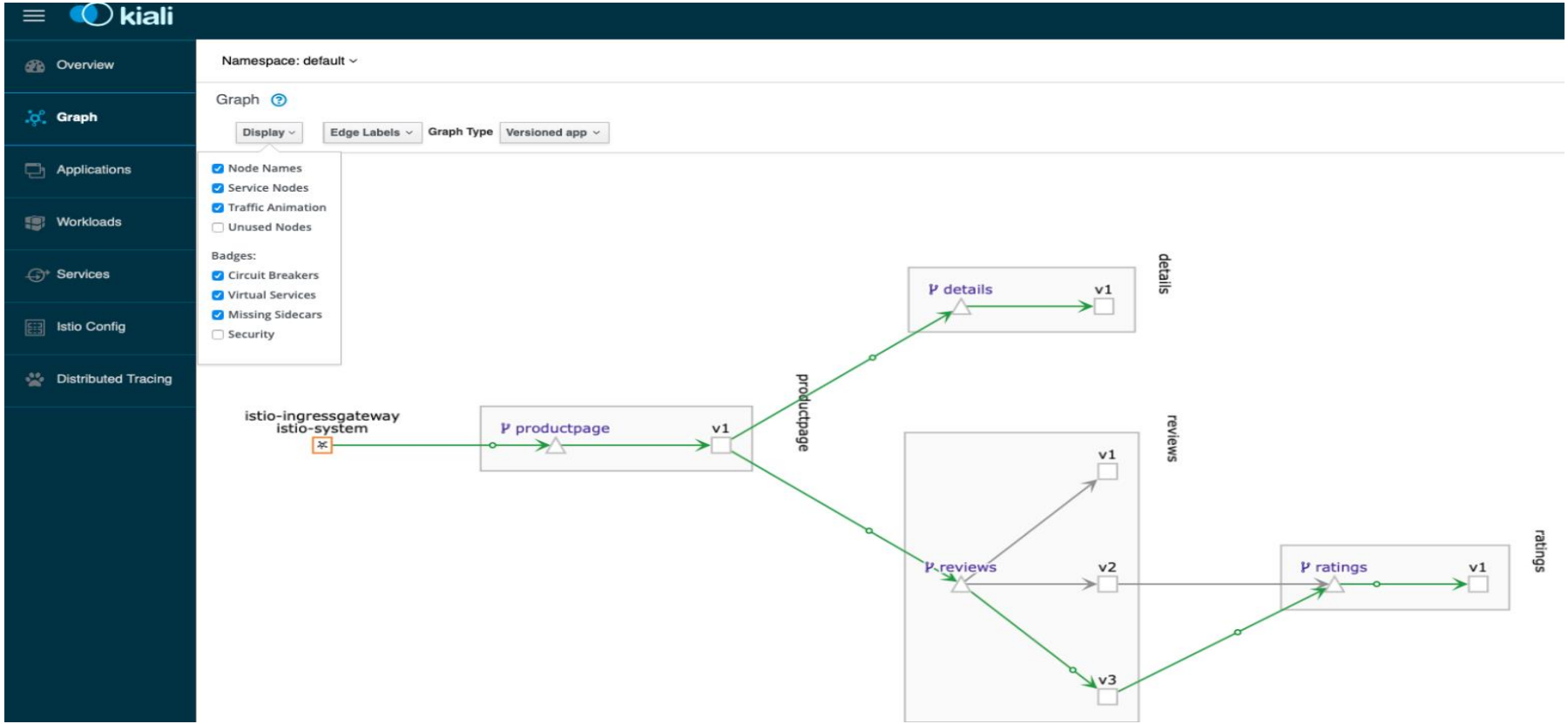
Application Topology



Bookinfo Application

- https://istio.io/docs/examples/bookinfo/
- Polyglot application with several micro services

Service mesh observability



Some things of Note About the BookInfo Application

- The BookInfo application is being load balanced through the Node.js Proxy
- There are three separate Review instances registered with the load balancer
- Each of the Review container instances puts out a slight variation of the review for Reviewer 1 and Reviewer 2
- The color of the stars printed change from black to red or are not displayed at all.
- Refreshing the productpage shows the load balancing occurring

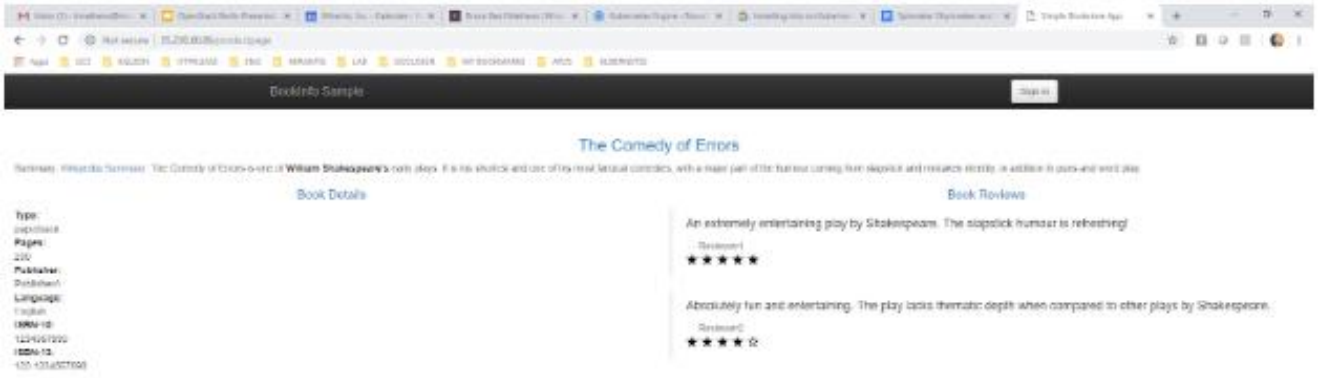
Simple BookInfo Application

$ kubectl get svc istio-ingressgateway -n istio-system

NAME TYPE CLUSTER-IP EXTERNAL-IP PORT(S)
AGE
istio-ingressgateway LoadBalancer 10.27.242.183 35.230.80.8 80:31380/TCP, 443:31390/TCP, 31400:31400/TCP,
15011:30570/TCP, 8060:30269/TCP,853:32645/TCP,15030:30155/TCP,15031:32443/TCP 18m

Use the external IP to access the BookInfo application using the External IP, highlighted in red. In this case, the application is being assessed in a browser at: http://35.230.80.86/productpage

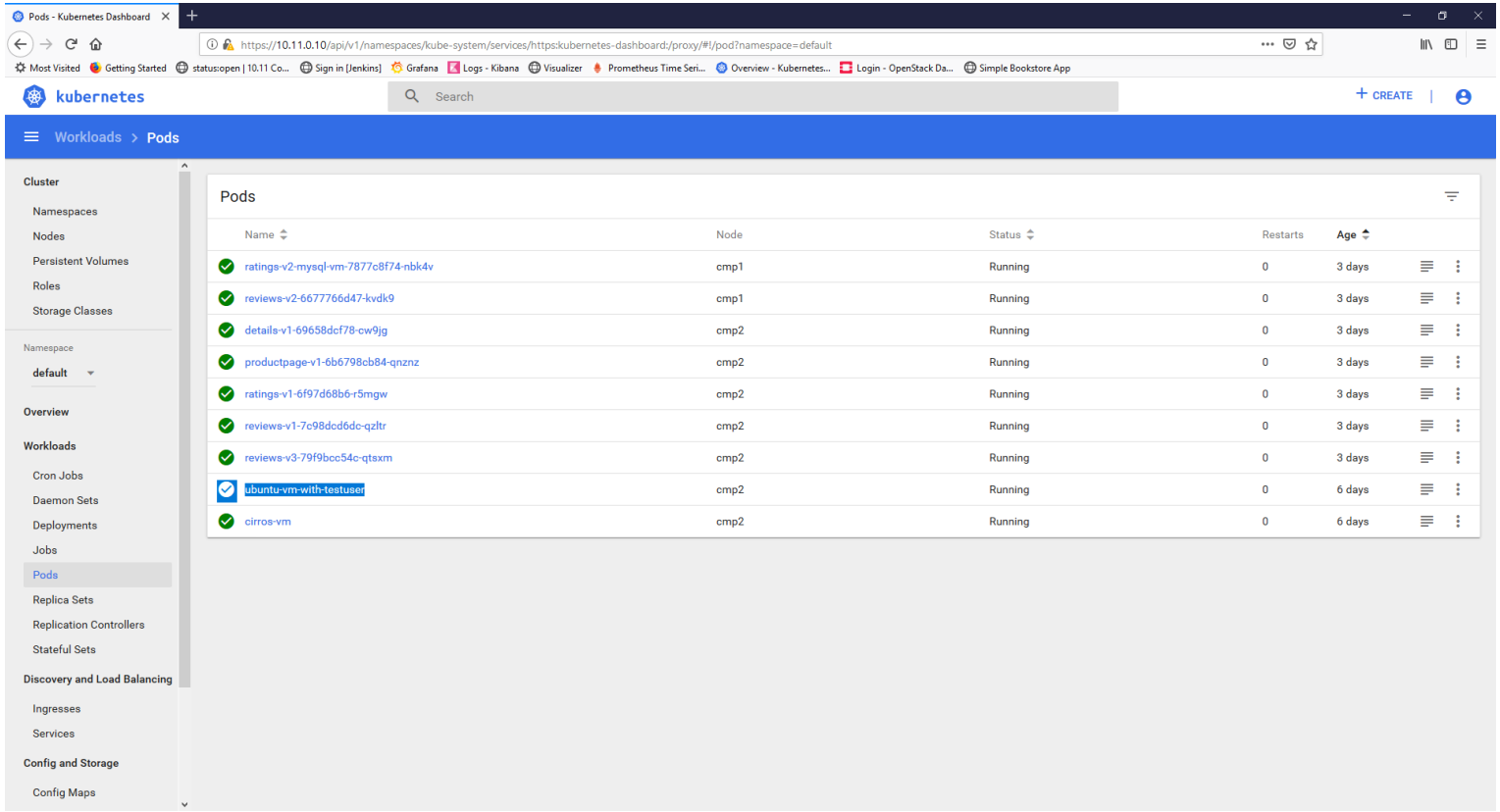
The web page will look like this:



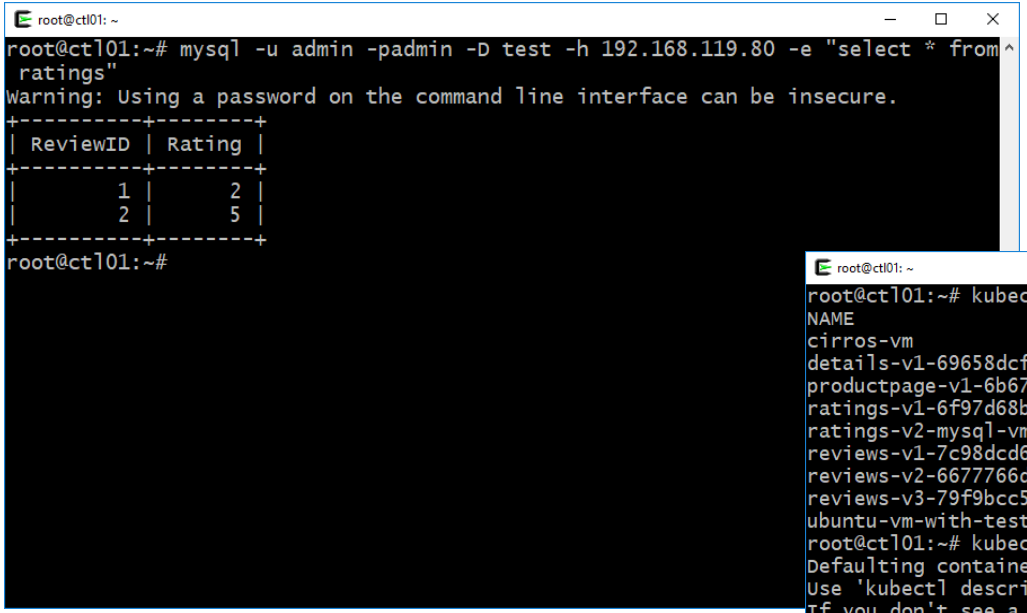
Adding Virtlet and MySQL into the Mix to Feed Reviews to BookInfo

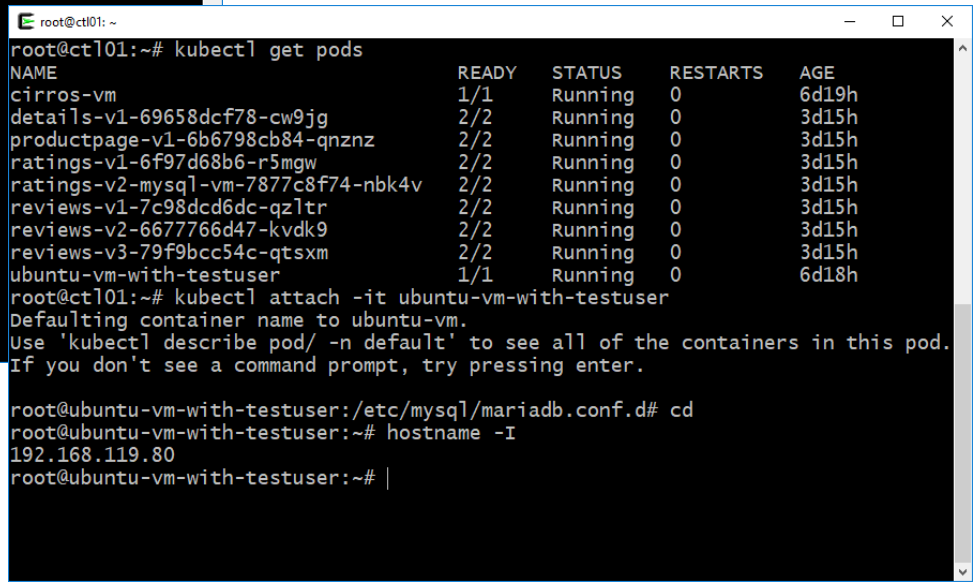
- Enable Virtlet in your existing cluster. Documentation found here: https://docs.mirantis.com/mcp/q4-18/mcp-deployment-guide/deploy-mcp-cluster-manually/deploy-kubernetes-cluster-manually/enable-virtlet/deploy-virtlet.html
- Install the ubuntu_vm_with_testuser VM into the 'default' namespace along side BookInfo. Documentation found here: https://docs.google.com/document/d/1pPhPP9HBe_WfTH6IBAjhw5iD1pqWljfeZDJV3EIG9HA/edit?ts=5c700cb8#heading=h.8m0mh0xht3ml
- Install MySQL on the Virtlet and follow the instructions for joining the mesh found here: https://istio.io/docs/examples/integrating-vms/
- A new load balanced instance is created which reads the MySQL database and displays the number of stars associated to each reviewer number.
- This MySQL review data only displays on every third refresh or so…

Virtlet Ubuntu Instance

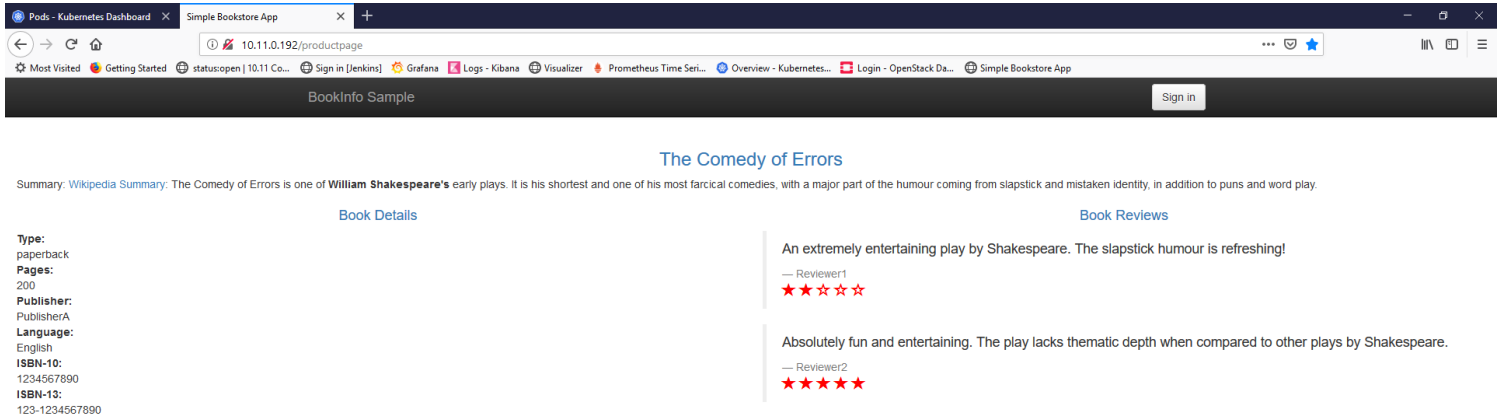


Display Virtlet and MySQL Running

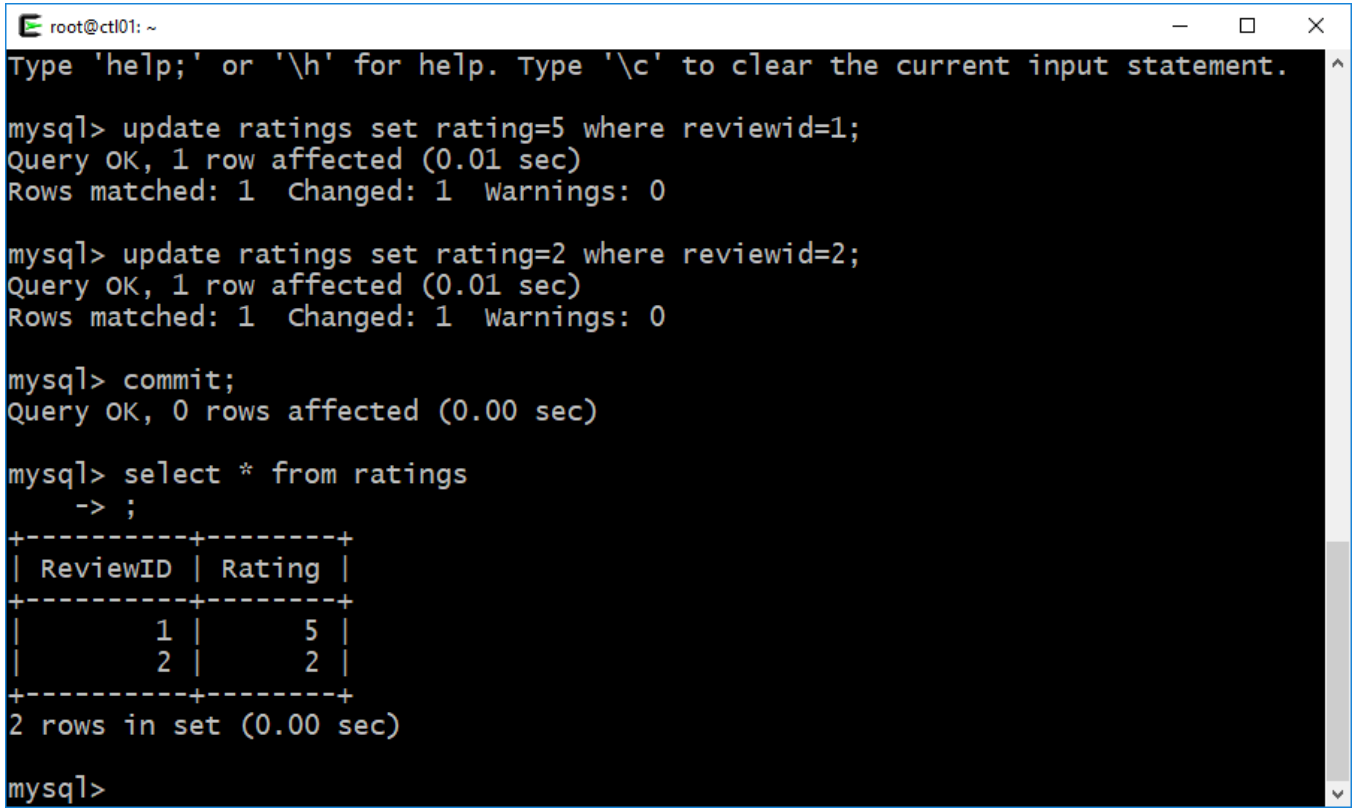




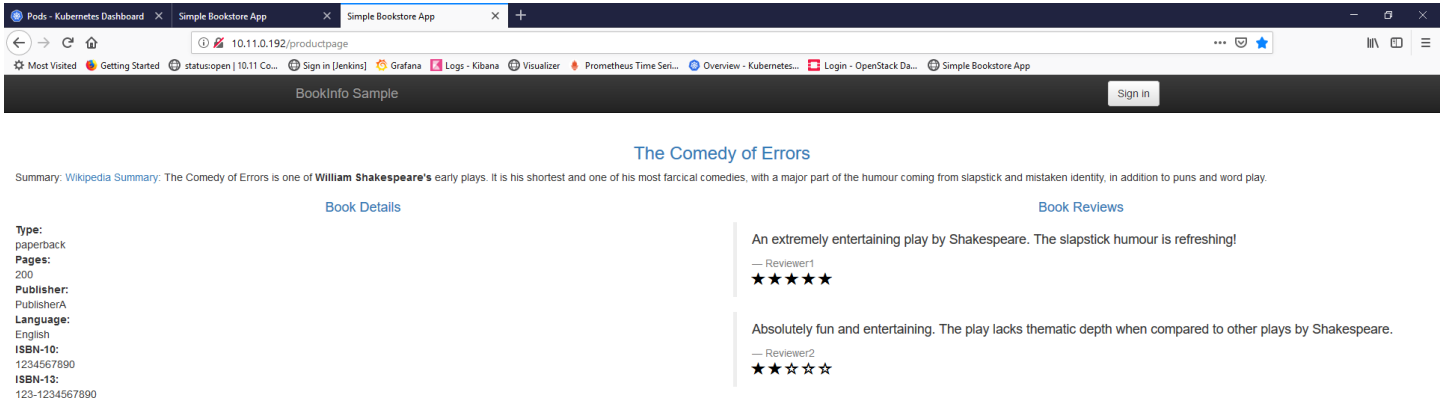
BookInfo Display with 2 Stars for Reviewer 1 and 5 Stars for Reviewer 2



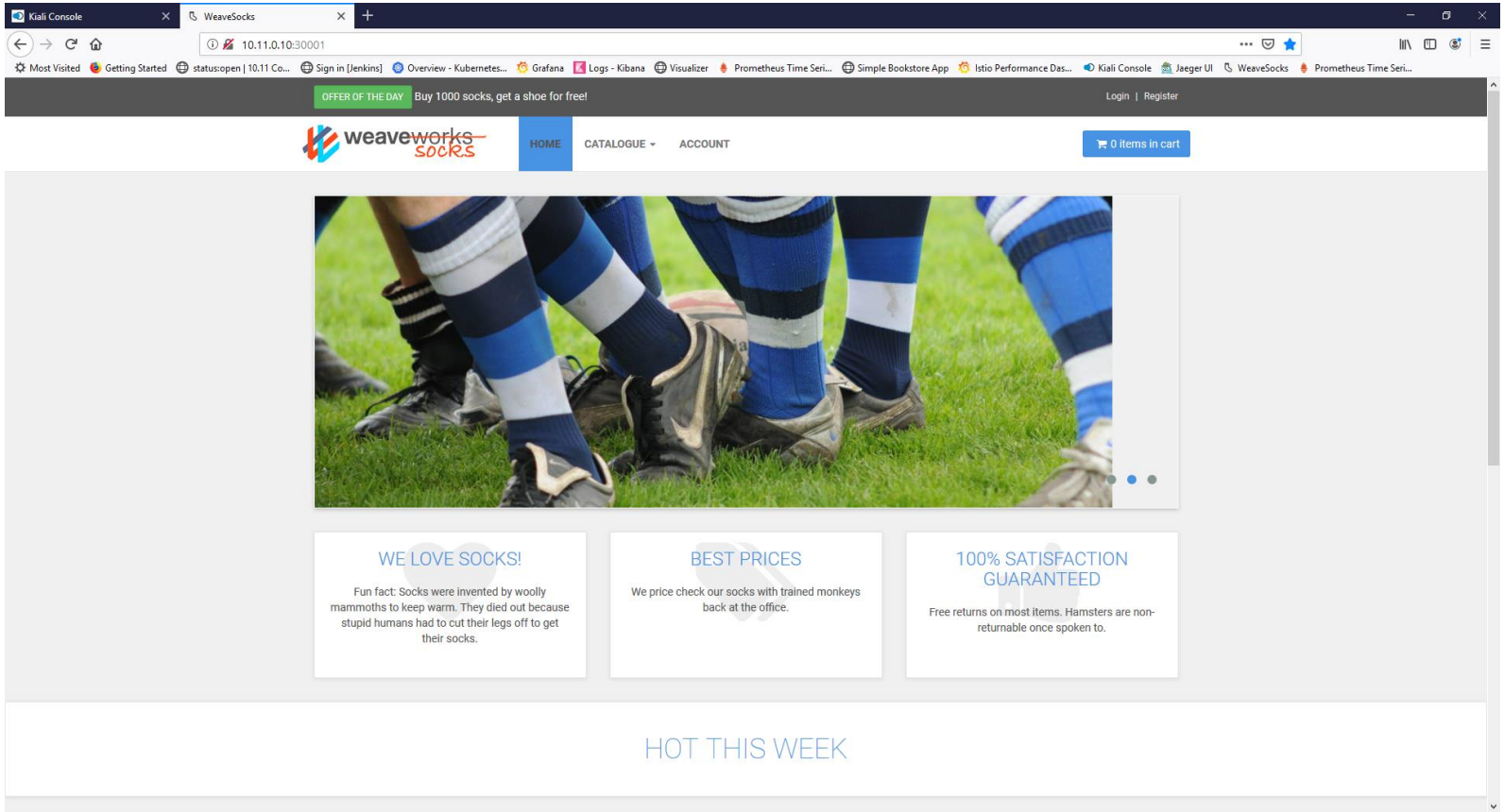
Modify the MySQL Database to 5 Stars for Reviewer 1 and 2 Stars for Reviewer 2



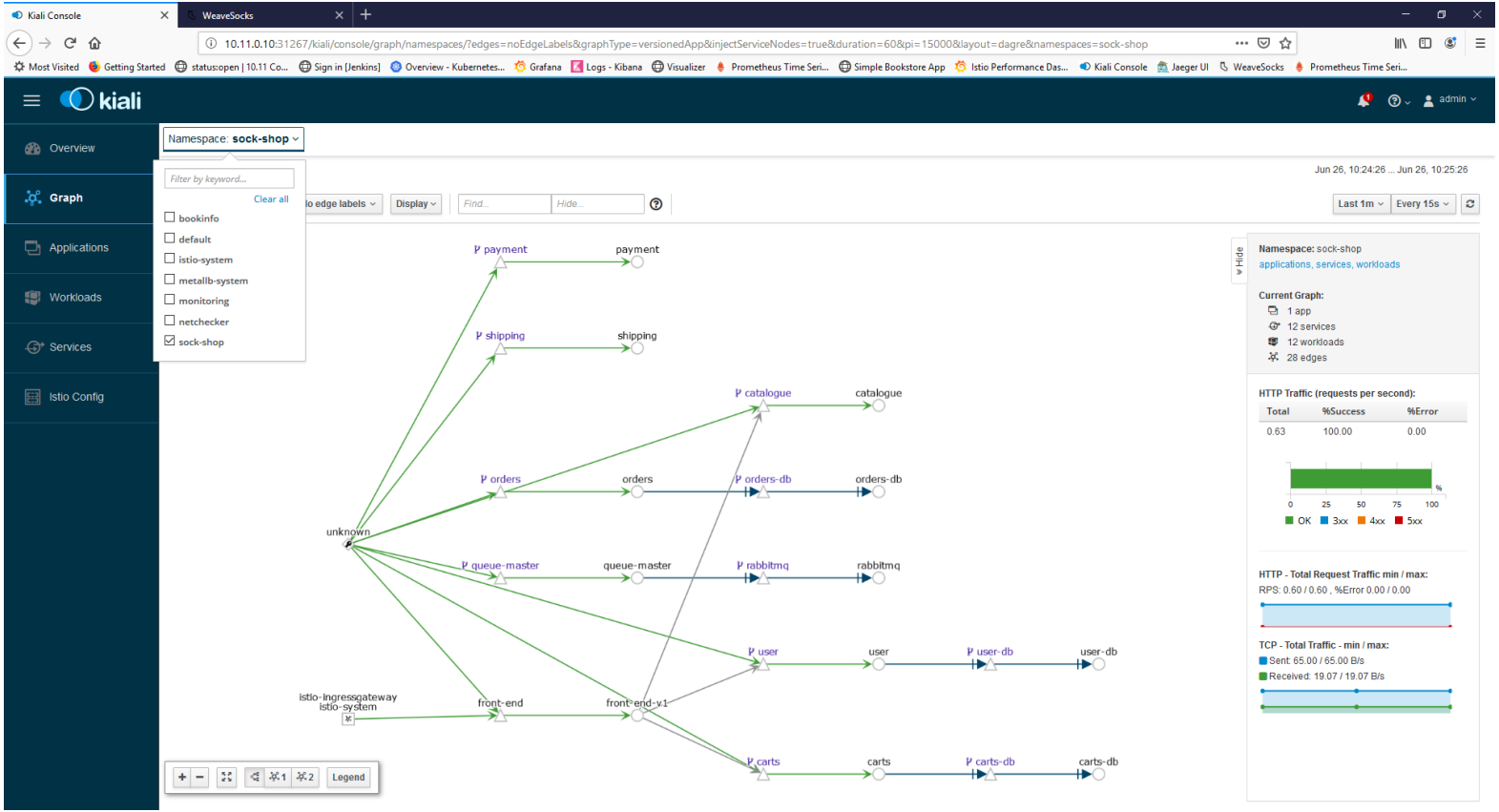
BookInfo Display with 5 Stars for Reviewer 1 and 2 Stars for Reviewer 2



A More Complex Use Case – Sock-Shop with Istio



Sock-Shop with Istio Full Traceability



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Thank You!

Q & A