Istio Hands-On: Manage Microservice Communication with Kubernetes and Istio Service Mesh

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On your marks.
Get set.
Go!

We have limited time for this workshop!

For a fast start you need:

- An IBM Cloud account
- A Kubernetes cluster on the IBM Cloud

Creating a cluster takes about 20 minutes.

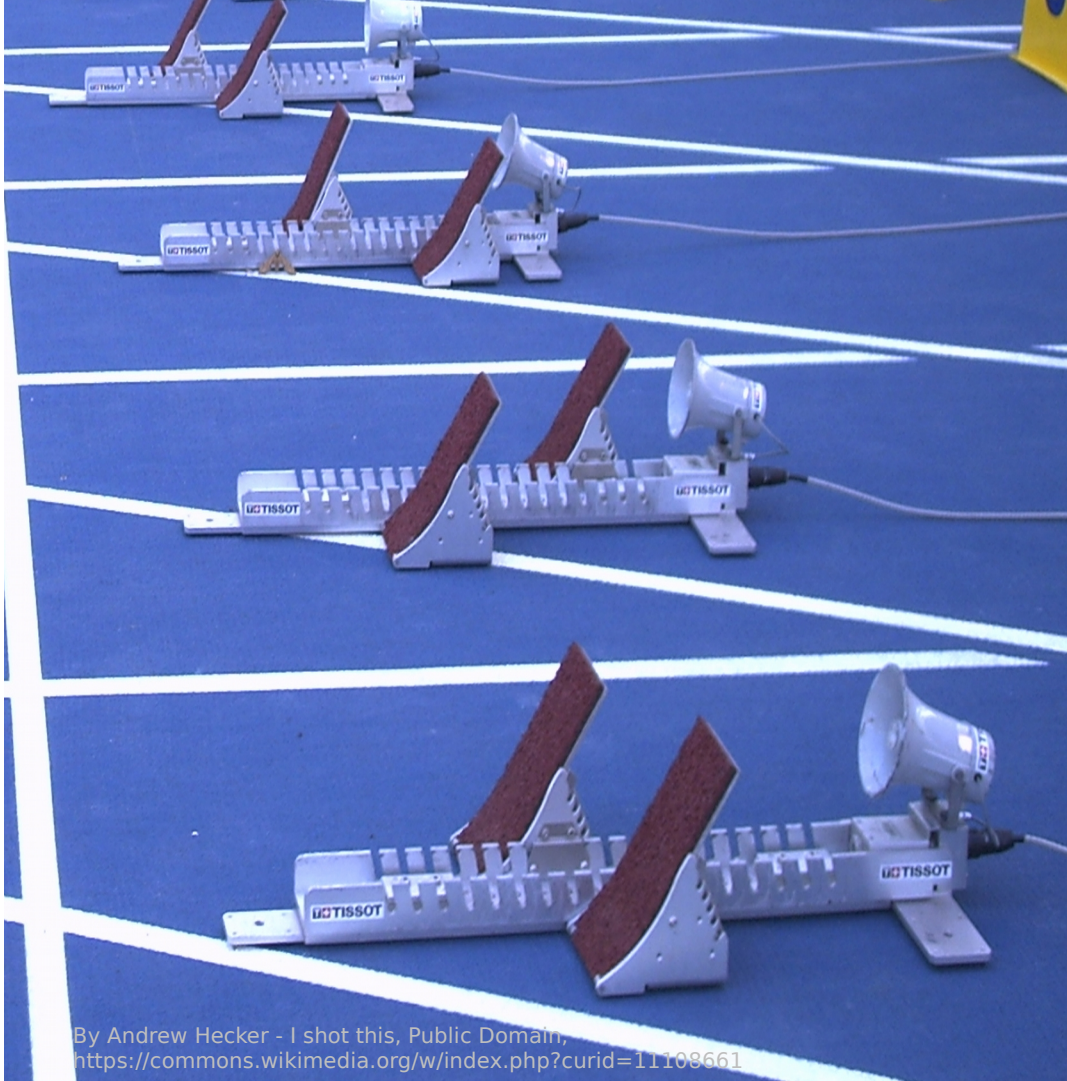
Please start here

https://ibm.biz/istio-handson

and run through

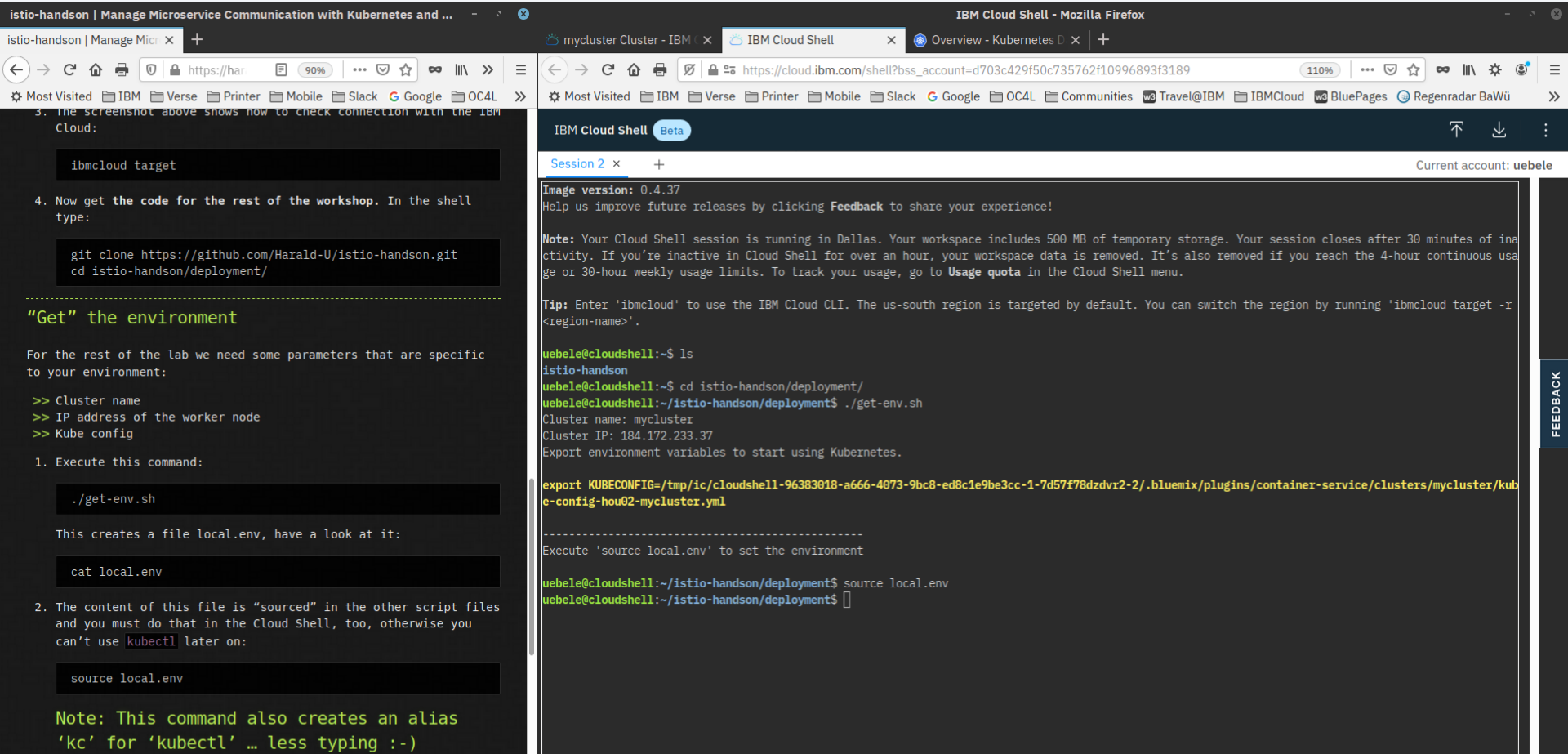
Exercise 1: Create your Cloud environment

Please let me know when you have finished exercise 1 and your cluster is creating!



Tip: Display Instructions and Cloud Shell Side-by-side

in 2 browser windows. Makes reading and exercising easier … YMMV :-)



“Microservices are a software development technique [...] that structures an application as a collection of loosely coupled services.”

Wikipedia

Challenges with Microservices

- Communication between services
- 1 microservice = 1...n containers
- Chained invocations
- Pods are ephemeral: name resolution
- Test new version:
  - Canary deployments, A/B testing, dark launches, etc.
- Traffic Management
- Fault injection
- Telemetry
- Security

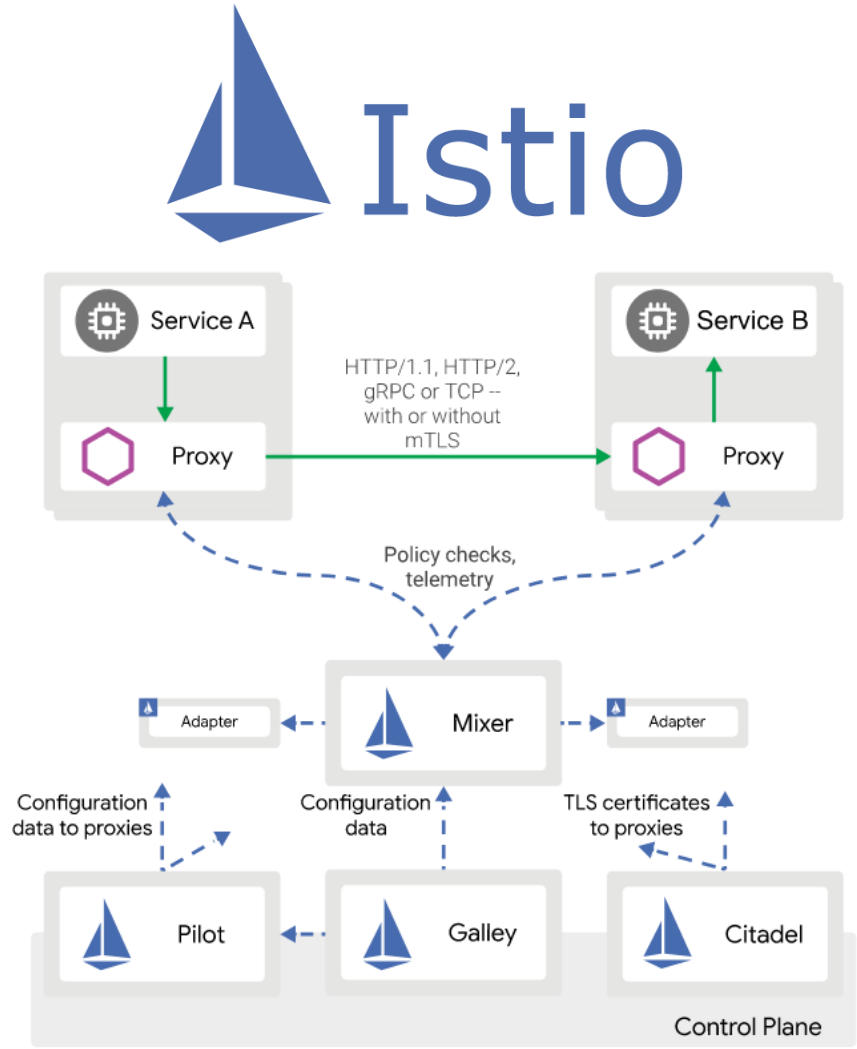
“Kubernetes (K8s) is an open-source system for automating deployment, scaling, and management of containerized applications.”

kubernetes.io

kubernetes

“Istio is an open platform for providing a uniform way to integrate microservices, manage traffic flow across microservices, enforce policies and aggregate telemetry data.”

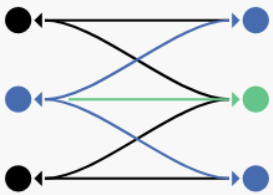
github.com/istio/istio



https://istio.io

Istio

Connect, secure, control, and observe services.

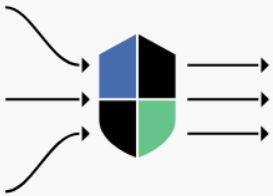


Connect

Intelligently control the flow of traffic and API calls between services, conduct a range of tests, and upgrade gradually with red/black deployments.

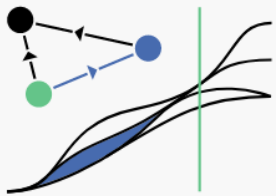
Secure

Automatically secure your services through managed authentication, authorization, and encryption of communication between services.



Control

Apply policies and ensure that they're enforced, and that resources are fairly distributed among consumers.



Observe

See what's happening with rich automatic tracing, monitoring, and logging of all your services.

Istio Concepts

Traffic Management

- Routing
  - Rule based
- Load Balancing
- Resiliency
  - Fault Injection
  - Timeout
  - Retry
  - Circuit Breaker

Security

- Encryption
- Mutual TLS
- Access Policies
- Auditing

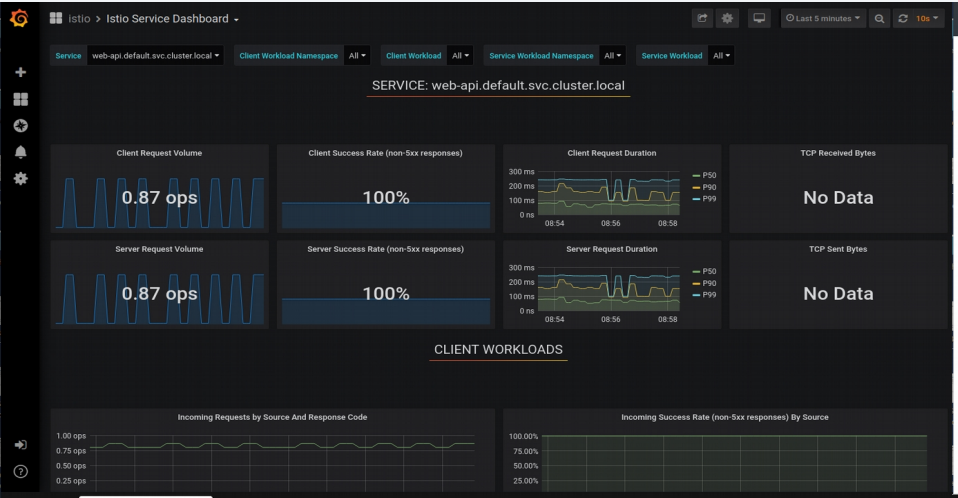
Policies

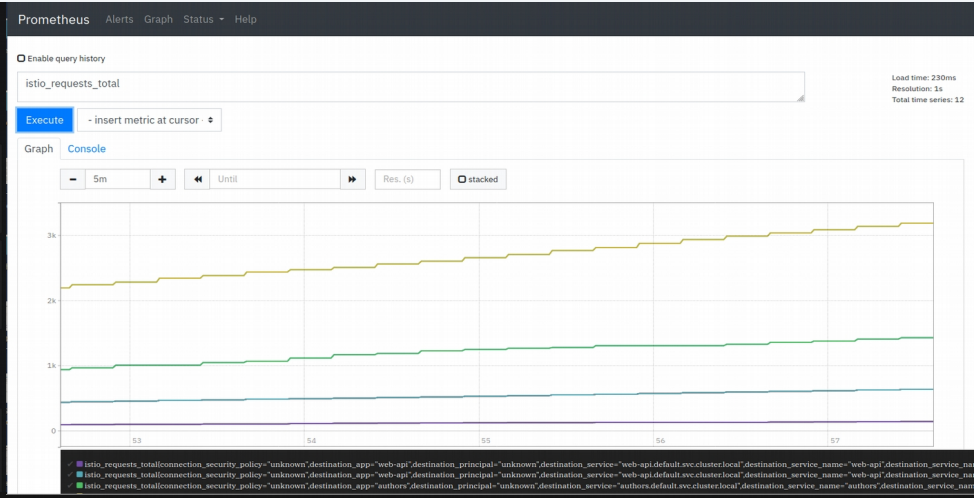
- Rate limiting
- Restrict access
  - Denials
  - White/Black listing
- Request headers
  - Rewrites
  - Redirects

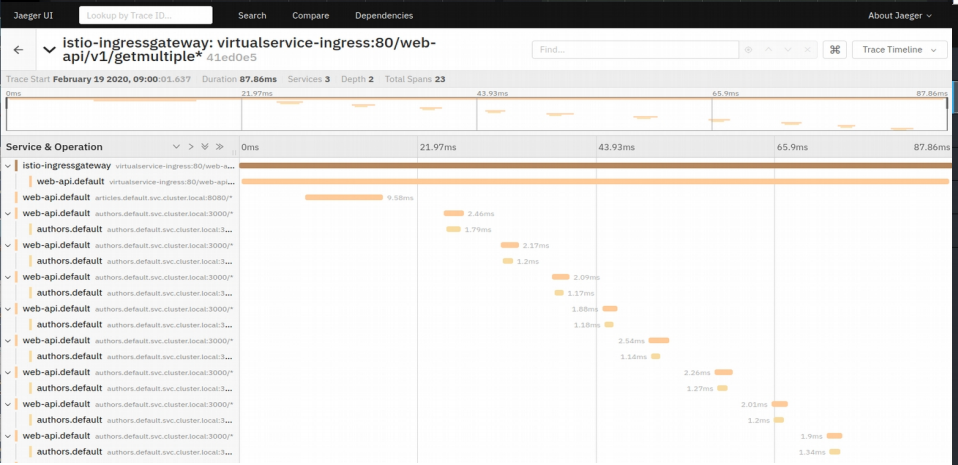
Observability

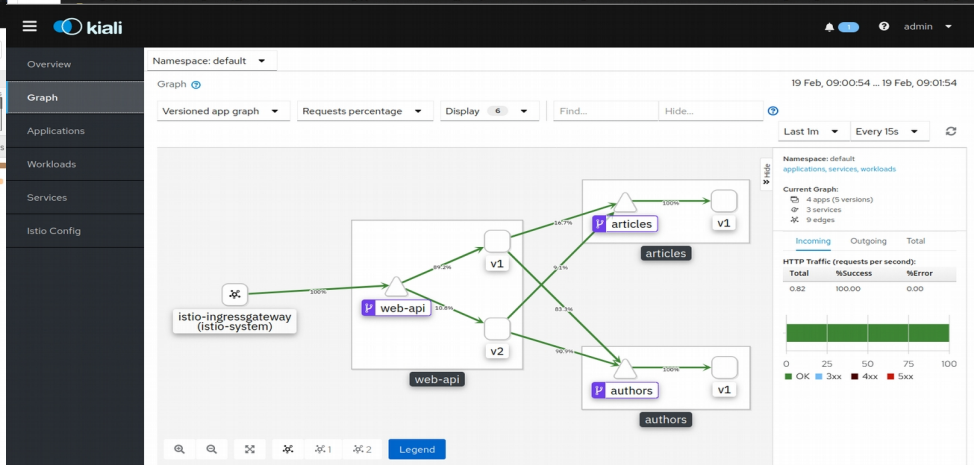
- Telemetry
- Monitoring
  - *Grafana*
- Metrics
  - *Prometheus*
- Distributed Tracing
  - *Jaeger*
- Visibility and Configuration
  - *Kiali*

Istio Telemetry





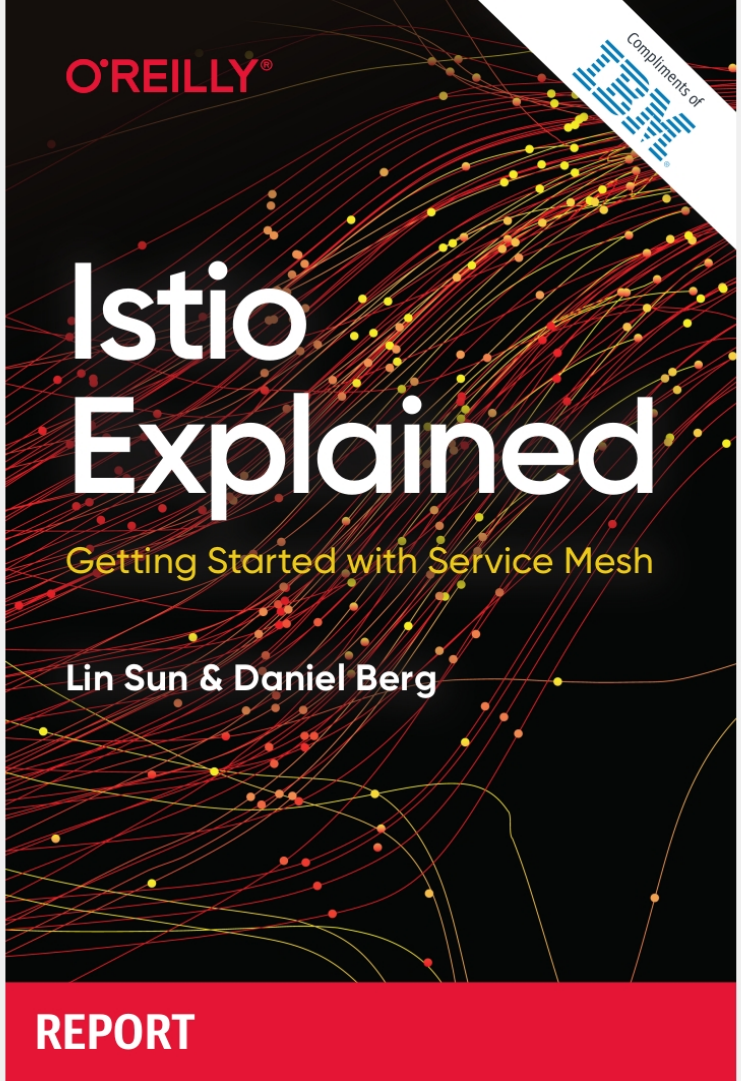




Free Book on Istio

Lin Sun and Dan Berg are also members of the Istio Steering Commitee

ibm.biz/oreilly-istio



Workshop Overview

- Create an IBM Cloud account ✓
- Create an IBM Cloud Kubernetes Cluster ✓

- Use IBM Cloud Shell to work with the Cluster
- Install Istio on to the Cluster

- Deploy Cloud Native Starter Application

- Telemetry: Monitoring, Metrics, Tracing, Kiali

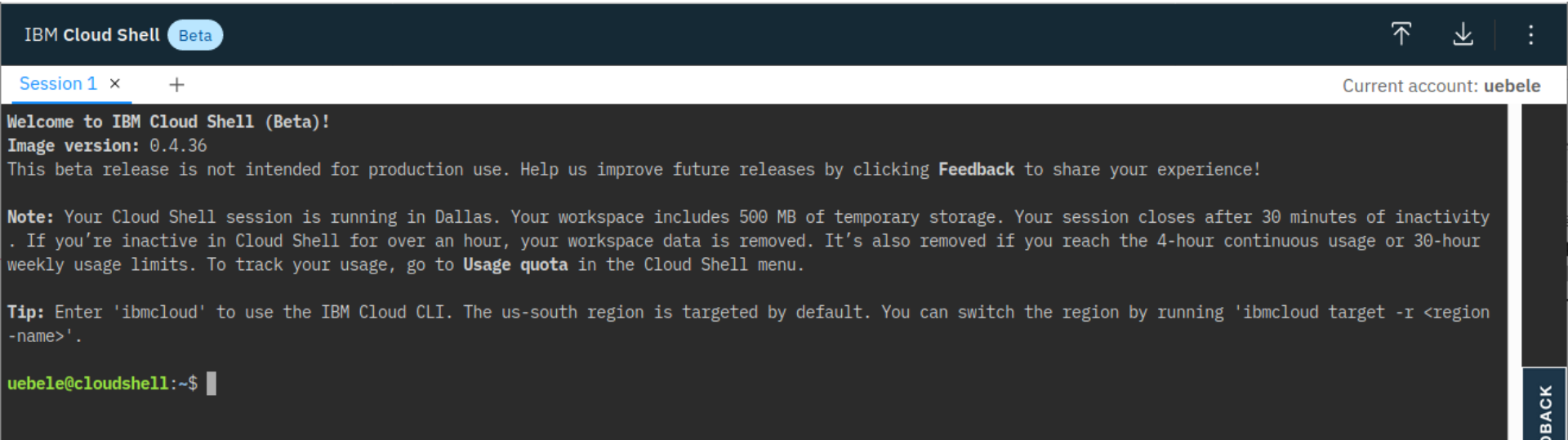
- Traffic Management

- Security

IBM Cloud Shell (Beta)

Web-based Linux shell

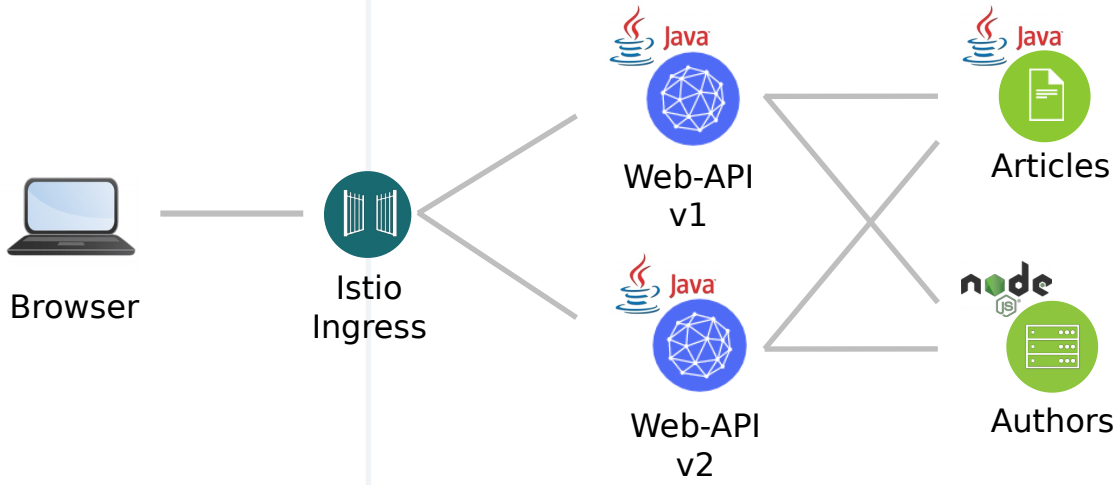
- Personal workspace and sessions where you can run commands
- Preinstalled CLIs, tools, packages, frameworks
- Immediately logged into IBM Cloud



Example Application: Cloud Native Starter

Browser

Kubernetes with Istio



“Frontend”

API Explorer

GET /v1/getmultiple Get most recently added articles

Get most recently added articles

Parameters Cancel

No parameters

Execute Clear

Responses

Curl

```
curl -X GET "http://184.172.247.55:31323/web-api/v1/getmultiple" -H "accept: application/json"
```

Request URL

```
http://184.172.247.55:31323/web-api/v1/getmultiple
```

Server response

Code Details

200

Response body


```
[
  {
    "id": "3517308",
    "title": "Debugging Microservices running in Kubernetes",
    "url": "http://heidloff.net/article/debugging-microservices-kubernetes",
    "authorName": "Niklas Heidloff",
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    "authorName": "Harald Uebele",
    "authorBlog": "https://haralduebele.blog",
    "authorTwitter": "@harald_u"
```


Download

curl

```
[uebele@harald-t480 ~]$ curl http://184.172.247.55:31323/web-api/v1/getmultiple | jq .
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed
100  1236  100  1236    0     0   2692      0 --:--:-- --:--:-- --:--:--  2686
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