

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.

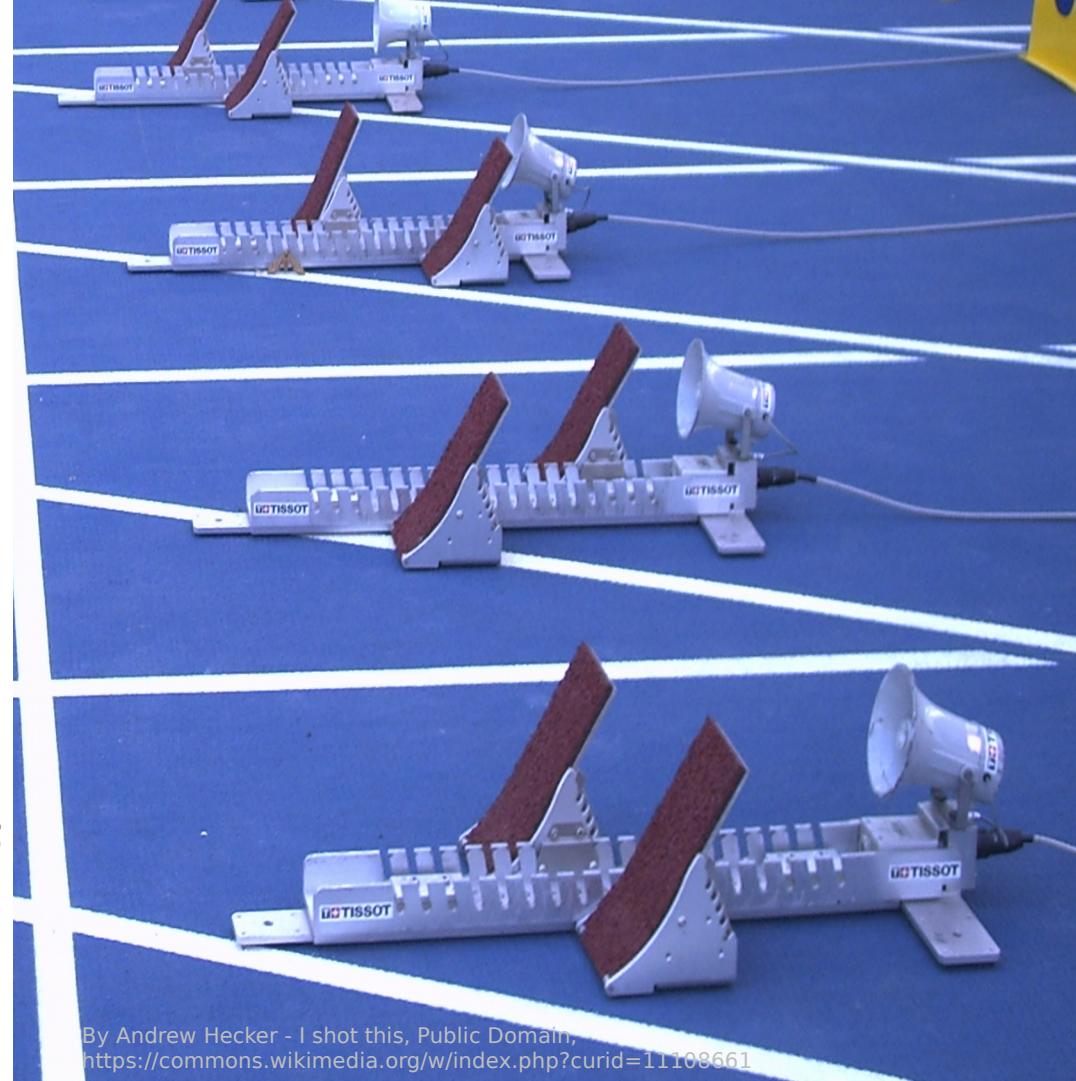
Please start here

<https://ibm.biz/istio-hanson>

and run through

Exercise 1: Create your Cloud environment

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



By Andrew Hecker - I shot this, Public Domain,
<https://commons.wikimedia.org/w/index.php?curid=11108661>

Tip: Display Instructions and Cloud Shell Side-by-side in 2 browser windows. Makes reading and exercising easier ... YMMV :-)

istio-hanson | Manage Microservice Communication with Kubernetes and ...

mycluster Cluster - IBM Cloud Shell

Overview - Kubernetes

3. The screenshot above shows how to check connection with the IBM Cloud:

```
ibmcloud target
```

4. Now get the code for the rest of the workshop. In the shell type:

```
git clone https://github.com/Harald-U/istio-hanson.git
cd istio-hanson/deployment
```

"Get" the environment

For the rest of the lab we need some parameters that are specific to your environment:

```
>> Cluster name
>> IP address of the worker node
>> Kube config
```

1. Execute this command:

```
./get-env.sh
```

This creates a file local.env, have a look at it:

```
cat local.env
```

2. The content of this file is "sourced" in the other script files and you must do that in the Cloud Shell, too, otherwise you can't use `kubectl` later on:

```
source local.env
```

Note: This command also creates an alias 'kc' for 'kubectl' ... less typing :-)

IBM Cloud Shell - Mozilla Firefox

Session 2

Image version: 0.4.37

Help us improve future releases by clicking [Feedback](#) to share your experience!

Note: Your Cloud Shell session is running in Dallas. Your workspace includes 500 MB of temporary storage. Your session closes after 30 minutes of inactivity. If you're inactive in Cloud Shell for over an hour, your workspace data is removed. It's also removed if you reach the 4-hour continuous usage or 30-hour weekly usage limits. To track your usage, go to [Usage quota](#) in the Cloud Shell menu.

Tip: Enter 'ibmcloud' to use the IBM Cloud CLI. The us-south region is targeted by default. You can switch the region by running 'ibmcloud target -r <region-name>'.

```
uebele@cloudshell:~$ ls
istio-hanson
uebele@cloudshell:~$ cd istio-hanson/deployment/
uebele@cloudshell:~/istio-hanson/deployment$ ./get-env.sh
Cluster name: mycluster
Cluster IP: 184.172.233.37
Export environment variables to start using Kubernetes.

export KUBECONFIG=/tmp/ic/cloudshell-96383018-a666-4073-9bc8-ed8c1e9be3cc-1-7d57f78dzdvrz-2-2.bluemix/plugins/container-service/clusters/mycluster/kube-config-hou02-mycluster.yml
```

Execute 'source local.env' to set the environment

```
uebele@cloudshell:~/istio-hanson/deployment$ source local.env
uebele@cloudshell:~/istio-hanson/deployment$ []
```

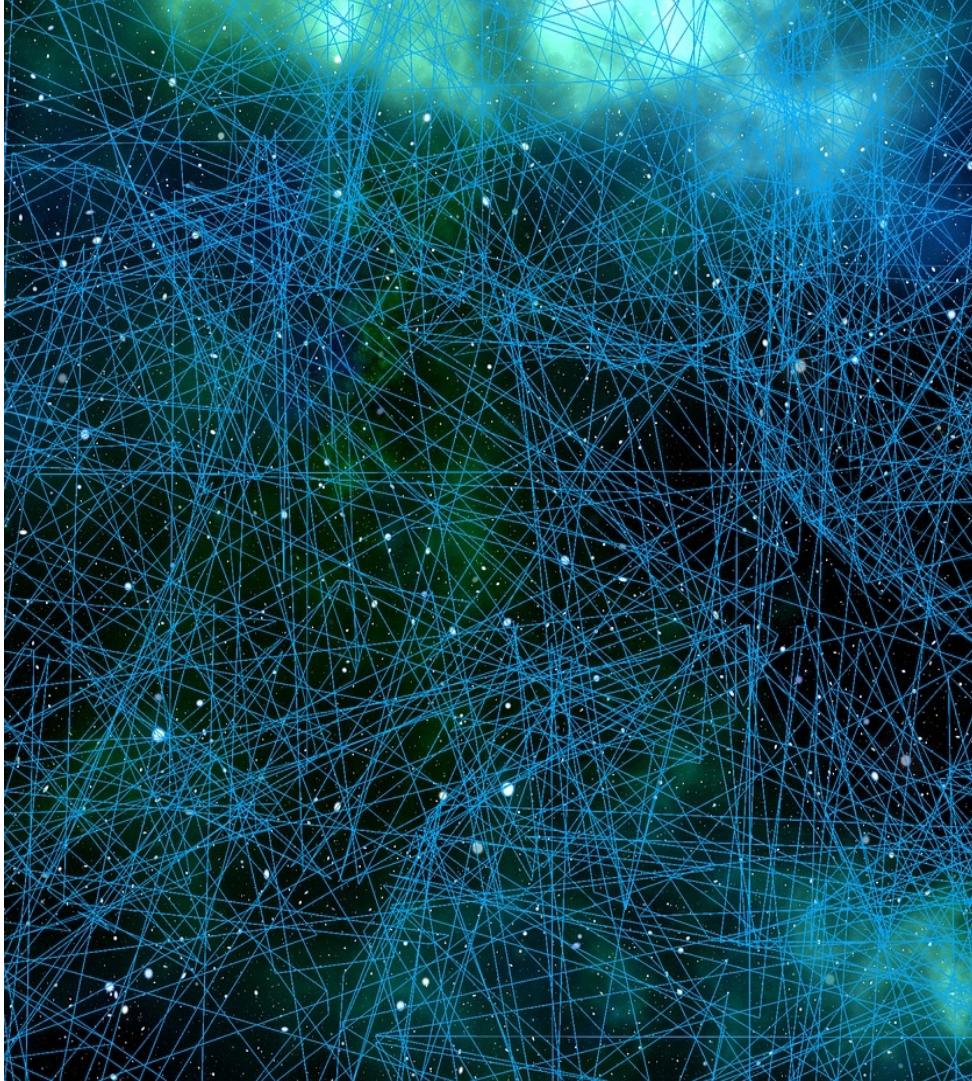
FEEDBACK

“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.”

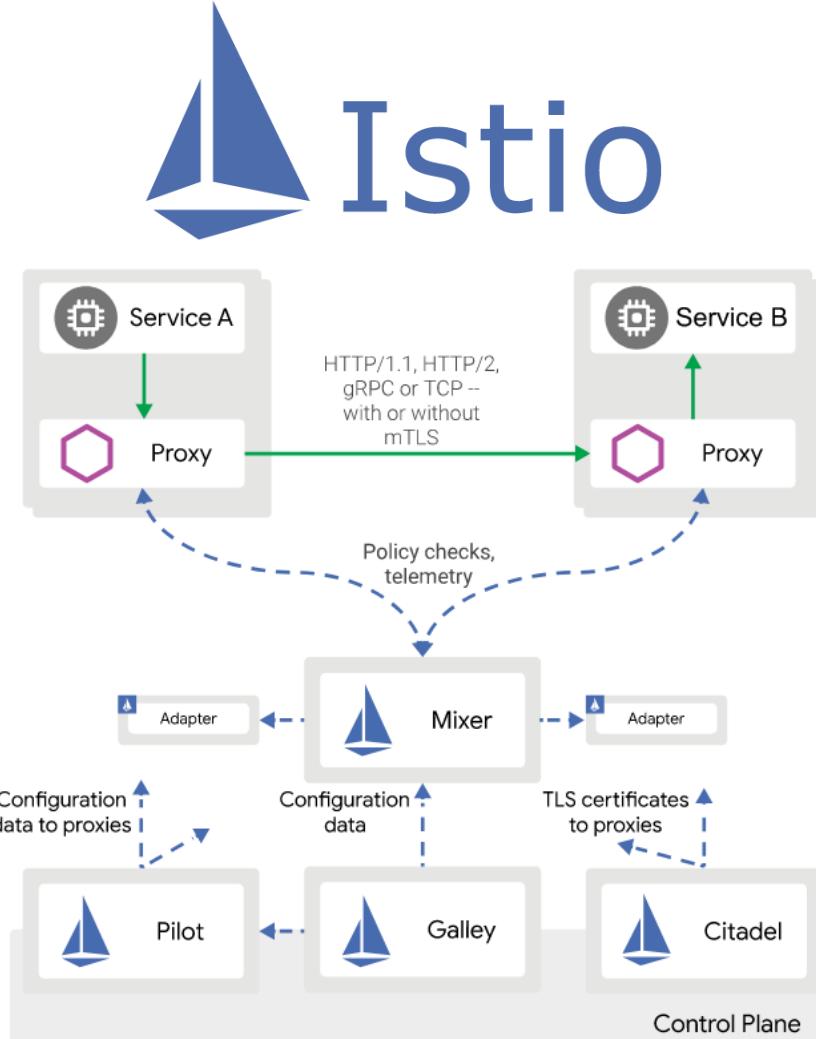
kubernetes.io



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.”

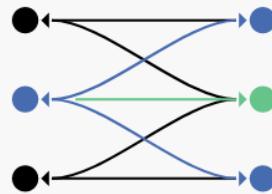
github.com/istio/istio





Istio

Connect, secure, control, and observe services.



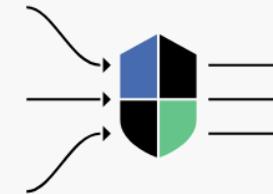
Connect

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



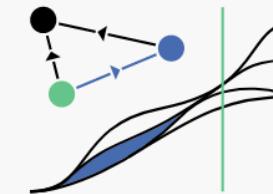
Secure

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.



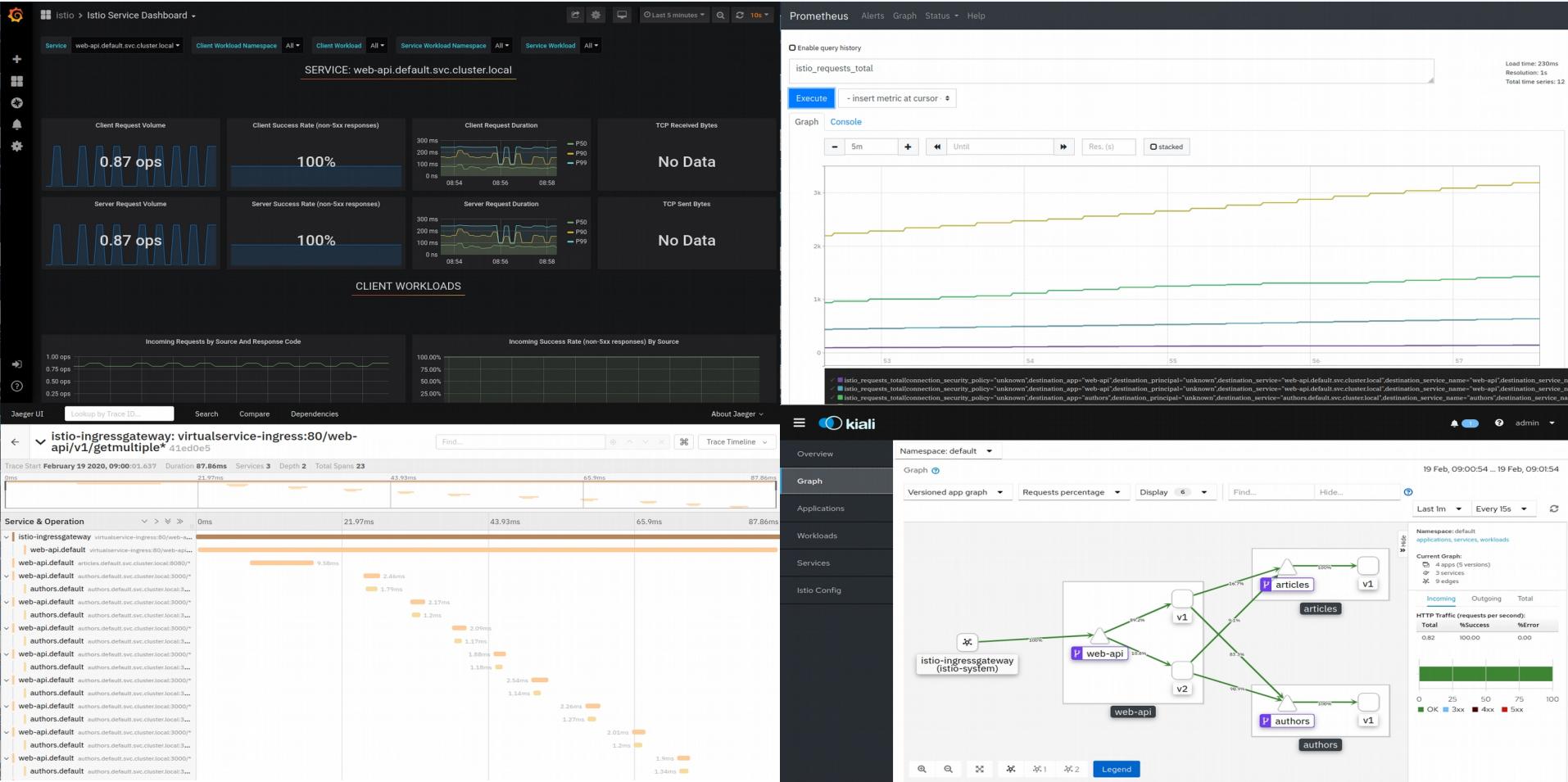
Observe

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

Istio Concepts

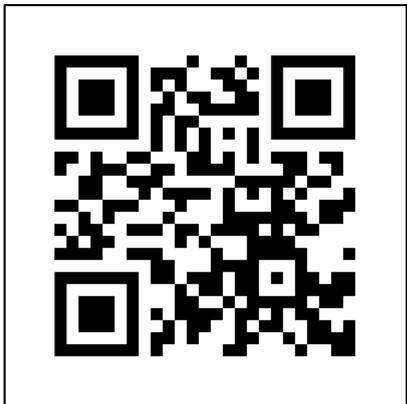
Traffic Management	Security	Policies	Observability
<ul style="list-style-type: none">- Routing- Rule based- Load Balancing- Resiliency<ul style="list-style-type: none">- Fault Injection- Timeout- Retry- Circuit Breaker	<ul style="list-style-type: none">- Encryption- Mutual TLS- Access Policies- Auditing	<ul style="list-style-type: none">- Rate limiting- Restrict access<ul style="list-style-type: none">- Denials- White/Black listing- Request headers<ul style="list-style-type: none">- Rewrites- Redirects	<ul style="list-style-type: none">- Telemetry- Monitoring<ul style="list-style-type: none">- <i>Grafana</i>- Metrics<ul style="list-style-type: none">- <i>Prometheus</i>- Distributed Tracing<ul style="list-style-type: none">- <i>Jaeger</i>- Visibility and Configuration<ul style="list-style-type: none">- <i>Kiali</i>

Istio Telemetry

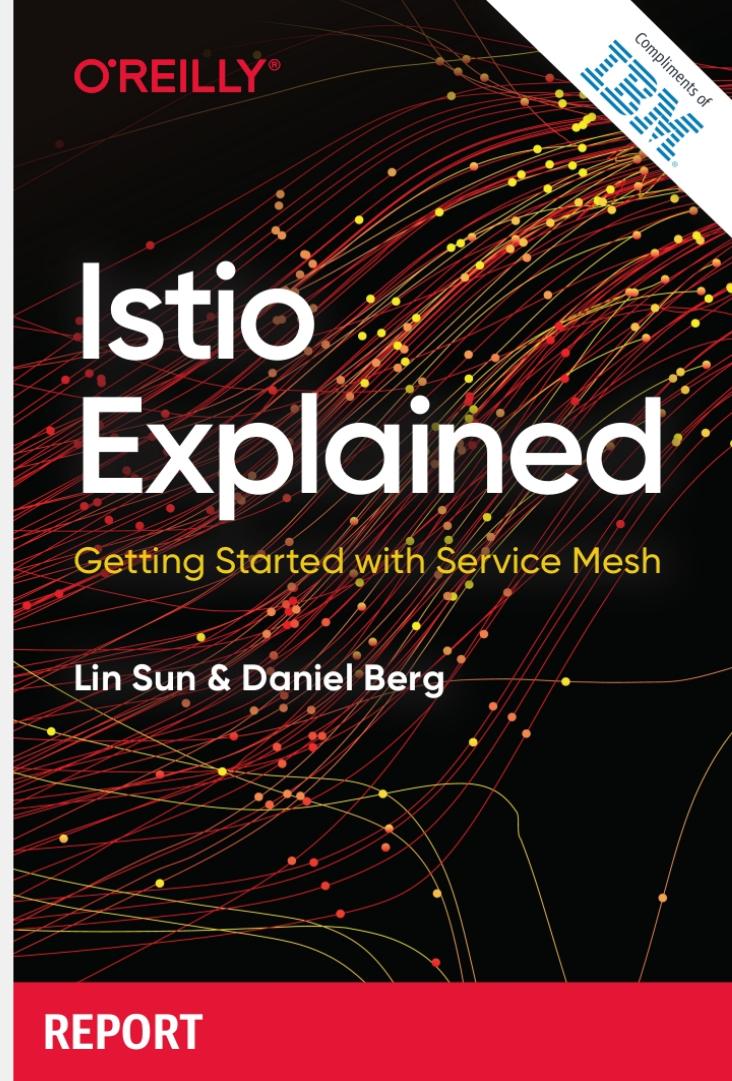


Free Book on Istio

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



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



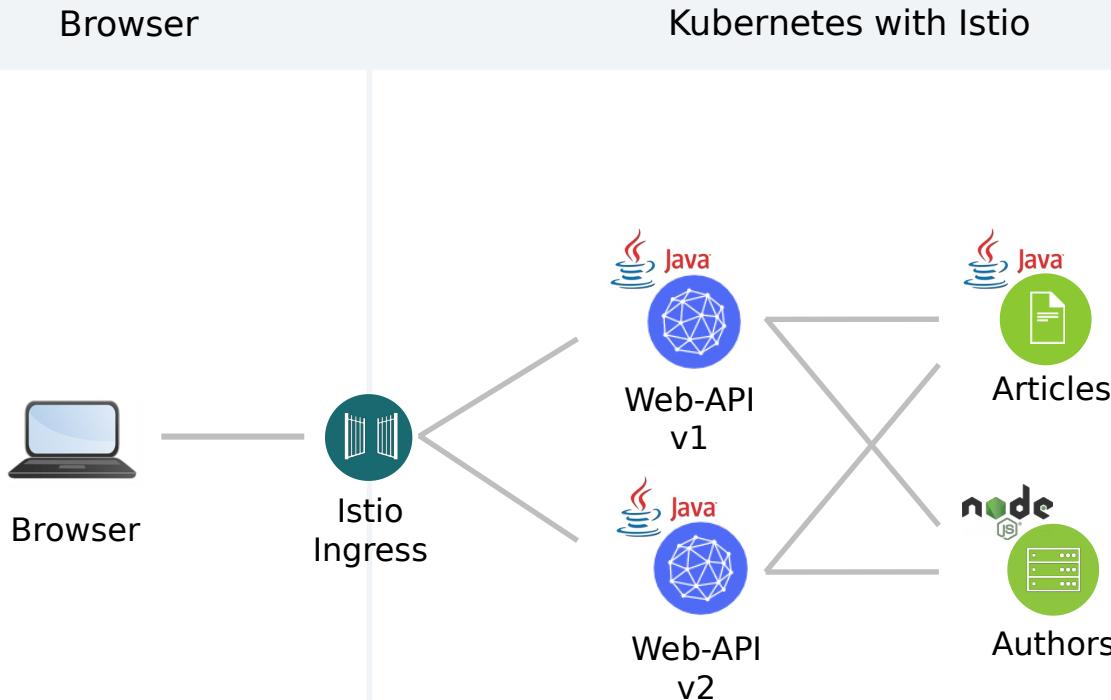
IBM Cloud Shell (Beta)

Web-based Linux shell

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

The screenshot shows the IBM Cloud Shell interface. At the top, there's a dark header bar with the text "IBM Cloud Shell Beta". On the right side of the header are icons for navigation (up, down, left, right) and more options. Below the header, the main area has a title "Session 1" with a close button and a plus sign for creating new sessions. To the right, it says "Current account: uebele". The main content area is a terminal window with a black background and white text. It starts with a welcome message: "Welcome to IBM Cloud Shell (Beta)!". Below that, it says "Image version: 0.4.36". A note follows: "This beta release is not intended for production use. Help us improve future releases by clicking **Feedback** to share your experience!". Another note below it states: "Note: Your Cloud Shell session is running in Dallas. Your workspace includes 500 MB of temporary storage. Your session closes after 30 minutes of inactivity. If you're inactive in Cloud Shell for over an hour, your workspace data is removed. It's also removed if you reach the 4-hour continuous usage or 30-hour weekly usage limits. To track your usage, go to **Usage quota** in the Cloud Shell menu.". A tip is provided at the bottom: "Tip: Enter 'ibmcloud' to use the IBM Cloud CLI. The us-south region is targeted by default. You can switch the region by running 'ibmcloud target -r <region-name>'." The bottom of the terminal shows a prompt: "uebele@cloudshell:~\$".

Example Application: Cloud Native Starter



“Frontend”

API Explorer

GET /v1/getmultiple Get most recently added articles

Get most recently added articles

Parameters

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", "authorBlog": "http://heidloff.net", "authorTwitter": "@nheidloff"}, {"id": "3517303", "title": "Dockerizing Java MicroProfile Applications", "url": "http://heidloff.net/article/dockerizing-container-java-microp", "authorName": "Niklas Heidloff", "authorBlog": "http://heidloff.net", "authorTwitter": "@nheidloff"}, {"id": "3517297", "title": "Install Istio and Kiali on IBM Cloud or Minikube", "url": "https://haralduebele.blog/2019/02/22/install-istio-and-kiali-on-ibm-cloud-or-minikub", "authorName": "Harald Uebele", "authorBlog": "https://haralduebele.blog", "authorTwitter": "@harald_u"}, {"id": "3517292", "title": "Three awesome TensorFlow.js Models for Visual Recognition", "url": "http://heidloff.net/article/tensorflowjs-visual-recognition", "authorName": "Niklas Heidloff", "authorBlog": "http://heidloff.net", "authorTwitter": "@nheidloff"}, {"id": "3517286", "title": "Blue Cloud Mirror Architecture Diagrams", "url": "https://haralduebele.blog", "authorName": "Harald Uebele", "authorBlog": "https://haralduebele.blog", "authorTwitter": "@harald_u"}]
```

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
Download	Upload	Total	Spent	Left	Speed		
100	1236	100	1236	0	0	2692	0
--:--:--	--:--:--	--:--:--	--:--:--	--:--:--	--:--:--	--:--:--	2686

```
{ "id": "3517308", "title": "Debugging Microservices running in Kubernetes", "url": "http://heidloff.net/article/debugging-microservices-kubernetes", "authorName": "Niklas Heidloff", "authorBlog": "http://heidloff.net", "authorTwitter": "@nheidloff"}, { "id": "3517303", "title": "Dockerizing Java MicroProfile Applications", "url": "http://heidloff.net/article/dockerizing-container-java-microp", "authorName": "Niklas Heidloff", "authorBlog": "http://heidloff.net", "authorTwitter": "@nheidloff"}, { "id": "3517297", "title": "Install Istio and Kiali on IBM Cloud or Minikube", "url": "https://haralduebele.blog/2019/02/22/install-istio-and-kiali-on-ibm-cloud-or-minikub", "authorName": "Harald Uebele", "authorBlog": "https://haralduebele.blog", "authorTwitter": "@harald_u"}, { "id": "3517292", "title": "Three awesome TensorFlow.js Models for Visual Recognition", "url": "http://heidloff.net/article/tensorflowjs-visual-recognition", "authorName": "Niklas Heidloff", "authorBlog": "http://heidloff.net", "authorTwitter": "@nheidloff"}, { "id": "3517286", "title": "Blue Cloud Mirror Architecture Diagrams", "url": "https://haralduebele.blog", "authorName": "Harald Uebele", "authorBlog": "https://haralduebele.blog", "authorTwitter": "@harald_u"}]
```

