

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

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@Harald_U

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.

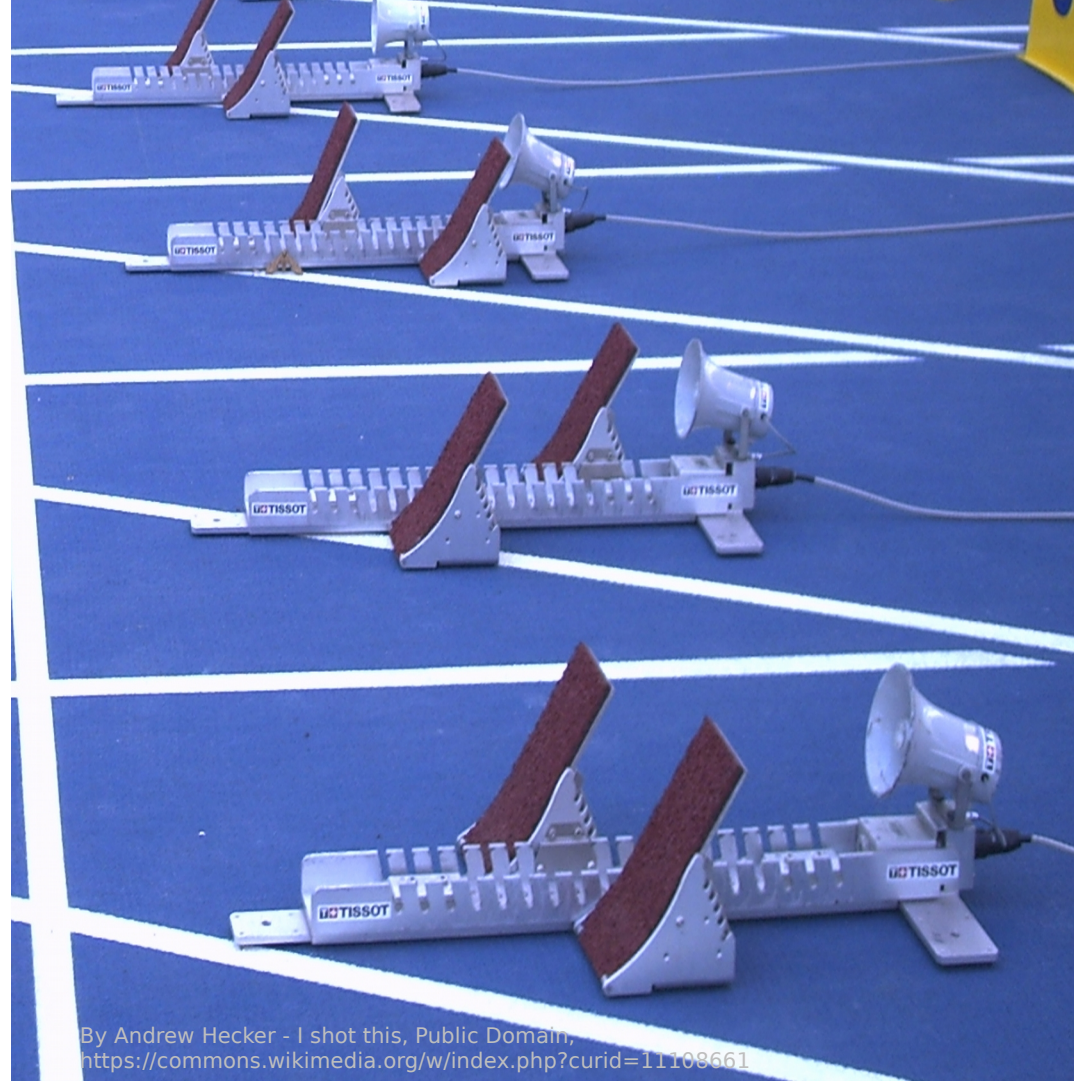
Please start here

<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 :-)

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

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

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-handson.git
cd istio-handson/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 `kubecttl` later on:

```
source local.env
```

Note: This command also creates an alias ‘kc’ for ‘kubecttl’ ... less typing :-)

IBM Cloud Shell - Mozilla Firefox

mycluster Cluster - IBM | IBM Cloud Shell | Overview - Kubernetes D

https://cloud.ibm.com/shell?bss_account=d703c429f50c735762f10996893f3189

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IBM Cloud Shell Beta

Session 2 x +

Current account: uebele

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-handson
```

```
uebele@cloudshell:~$ cd istio-handson/deployment/
```

```
uebele@cloudshell:~/istio-handson/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-1-7d57f78dzdvr2-2/.bluemix/plugins/container-service/clusters/mycluster/kube-config-hou02-mycluster.yml
```

```
-----
Execute 'source local.env' to set the environment
```

```
uebele@cloudshell:~/istio-handson/deployment$ source local.env
```

```
uebele@cloudshell:~/istio-handson/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

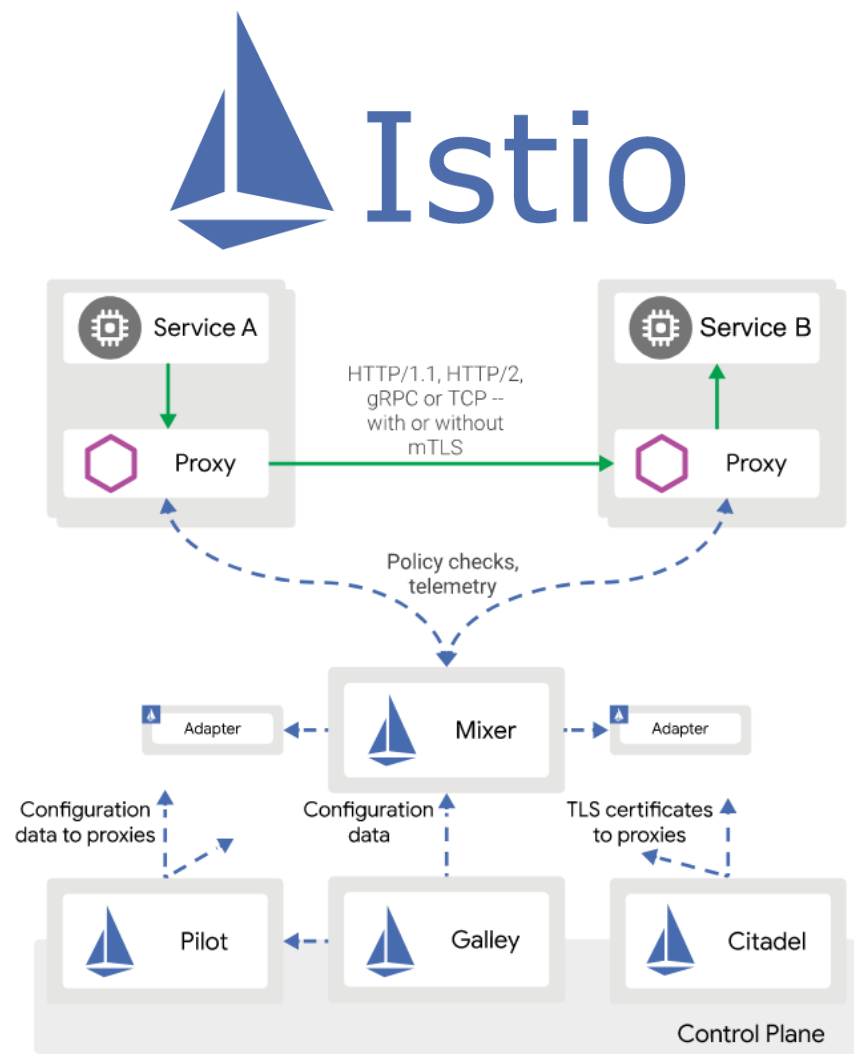


kubernetes

#IBMDveloper github.com/IBM/cloud-native-starter

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

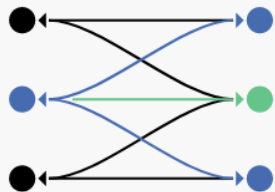
github.com/istio/istio





Istio

Connect, secure, control, and observe services.



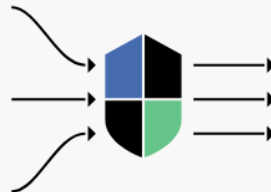
Connect

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



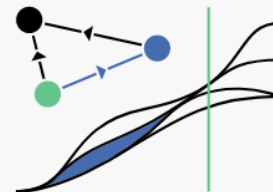
Secure

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

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

Security

- Encryption
- Mutual TLS
- Access Policies
- Auditing

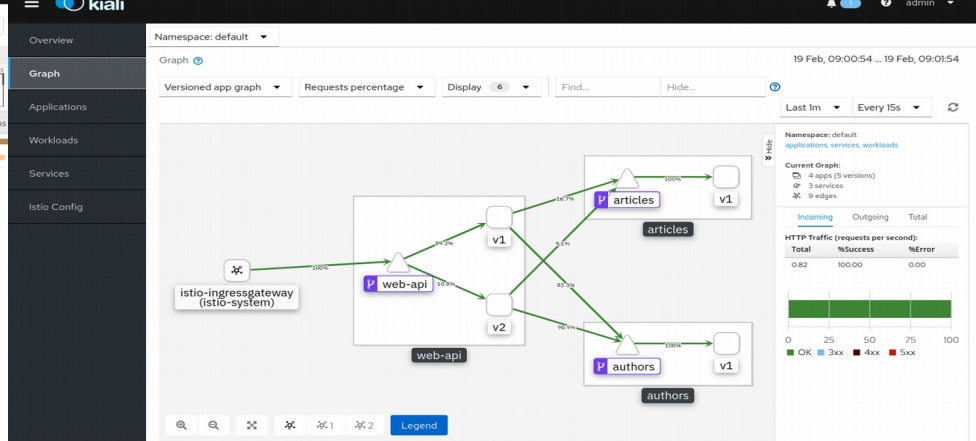
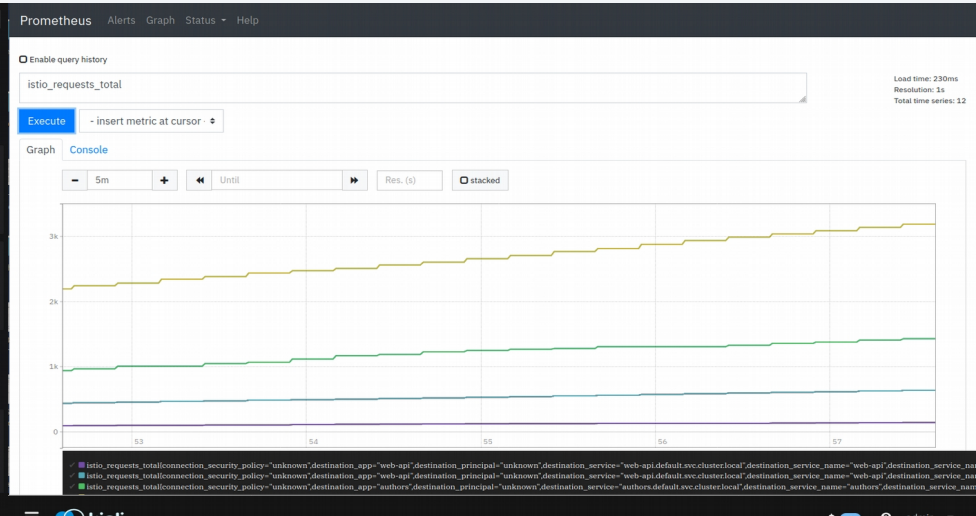
Policies

- 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

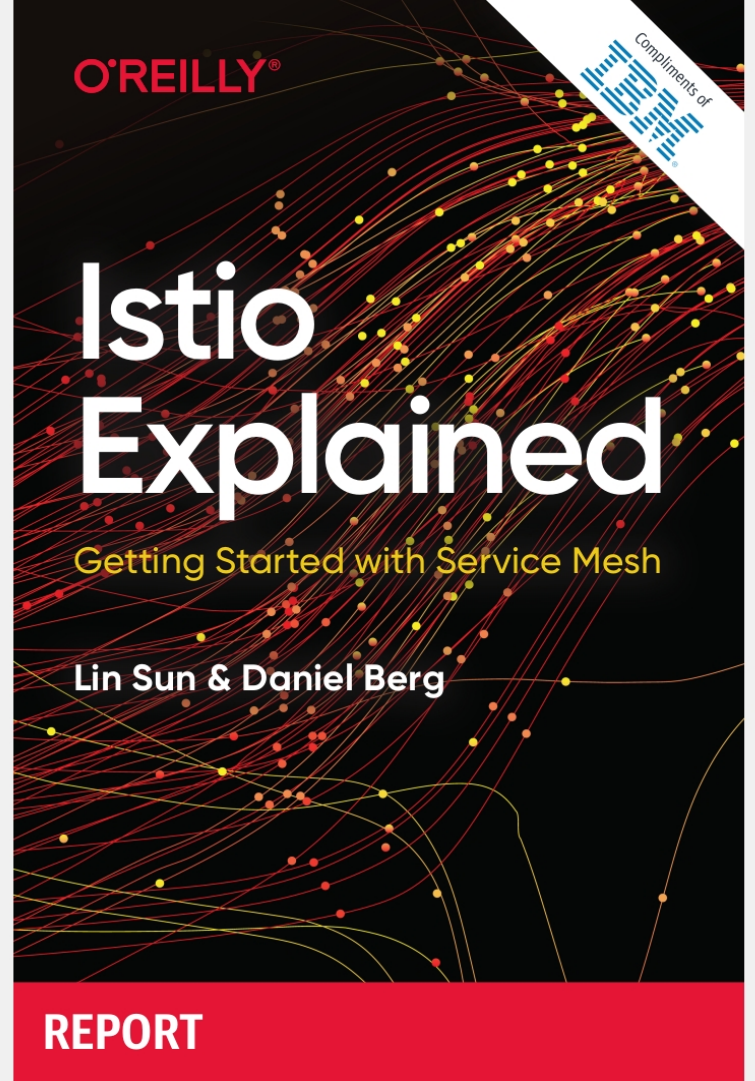


Free Book on Istio

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



ibm.biz/oreilly-istio



Workshop Overview

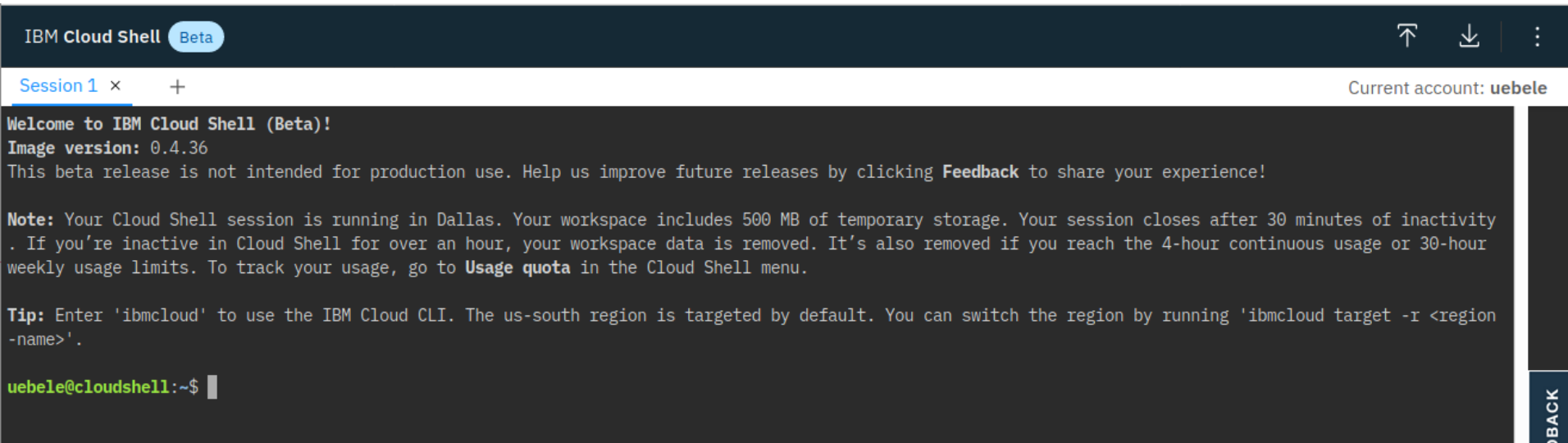
- Create an IBM Cloud account ✓
- Create an IBM Cloud Kubernetes Cluster ✓
- Use IBM Cloud Shell to work with the Cluster
- Install Istio on to the Cluster
- Deploy Cloud Native Starter Application
- Telemetry: Monitoring, Metrics, Tracing, Kiali
- Traffic Management
- Security



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 is a dark blue header with the text "IBM Cloud Shell" and a "Beta" badge. On the right side of the header are three icons: an upward arrow, a downward arrow, and a vertical ellipsis. Below the header is a white bar with "Session 1" and a close button (x) on the left, and "Current account: uebele" on the right. The main area is a dark terminal window with the following text:

```
Welcome to IBM Cloud Shell (Beta)!
Image version: 0.4.36
This beta release is not intended for production use. 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>'.

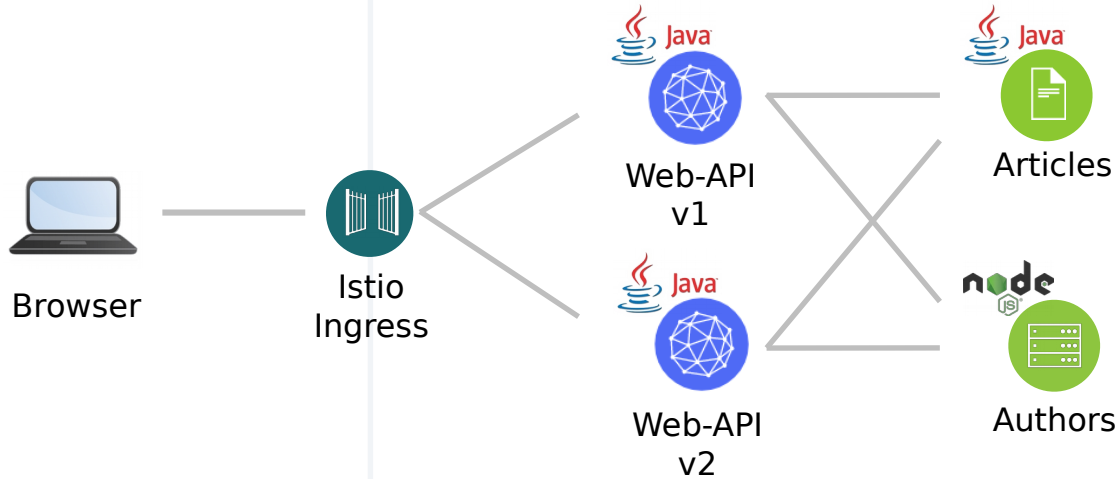
uebele@cloudshell:~$
```

On the far right edge of the terminal window, there is a vertical button labeled "BACK".

Example Application: Cloud Native Starter

Browser

Kubernetes with Istio



“Frontend”

API Explorer

The screenshot shows an API Explorer interface. At the top, it displays the method `GET` and the endpoint `/v1/getmultiple` with a description: "Get most recently added articles". Below this, there are sections for "Parameters" (showing "No parameters"), "Responses", and "Curl". The "Curl" section contains the command: `curl -X GET "http://184.172.247.55:31323/web-api/v1/getmultiple" -H "accept: application/json"`. The "Request URL" is `http://184.172.247.55:31323/web-api/v1/getmultiple`. The "Server response" is shown as a JSON array of three objects, each representing an article with fields like `id`, `title`, `url`, `authorName`, `authorBlog`, and `authorTwitter`. A "Download" button is visible at the bottom right of the response area.

curl

```
[uebele@harald-t480 ~]$ curl http://184.172.247.55:31323/web-api/v1/getmultiple | jq .
% Total % Received % Xferd Average Speed Time Time Current
Dload 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": "@heidloff"
  },
  {
    "id": "3517303",
    "title": "Dockerizing Java MicroProfile Applications",
    "url": "http://heidloff.net/article/dockerizing-container-java-microprofile",
    "authorName": "Niklas Heidloff",
    "authorBlog": "http://heidloff.net",
    "authorTwitter": "@heidloff"
  },
  {
    "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-minikube",
    "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": "@heidloff"
  },
  {
    "id": "3517286",
    "title": "Blue Cloud Mirror Architecture Diagrams",

```

IBM