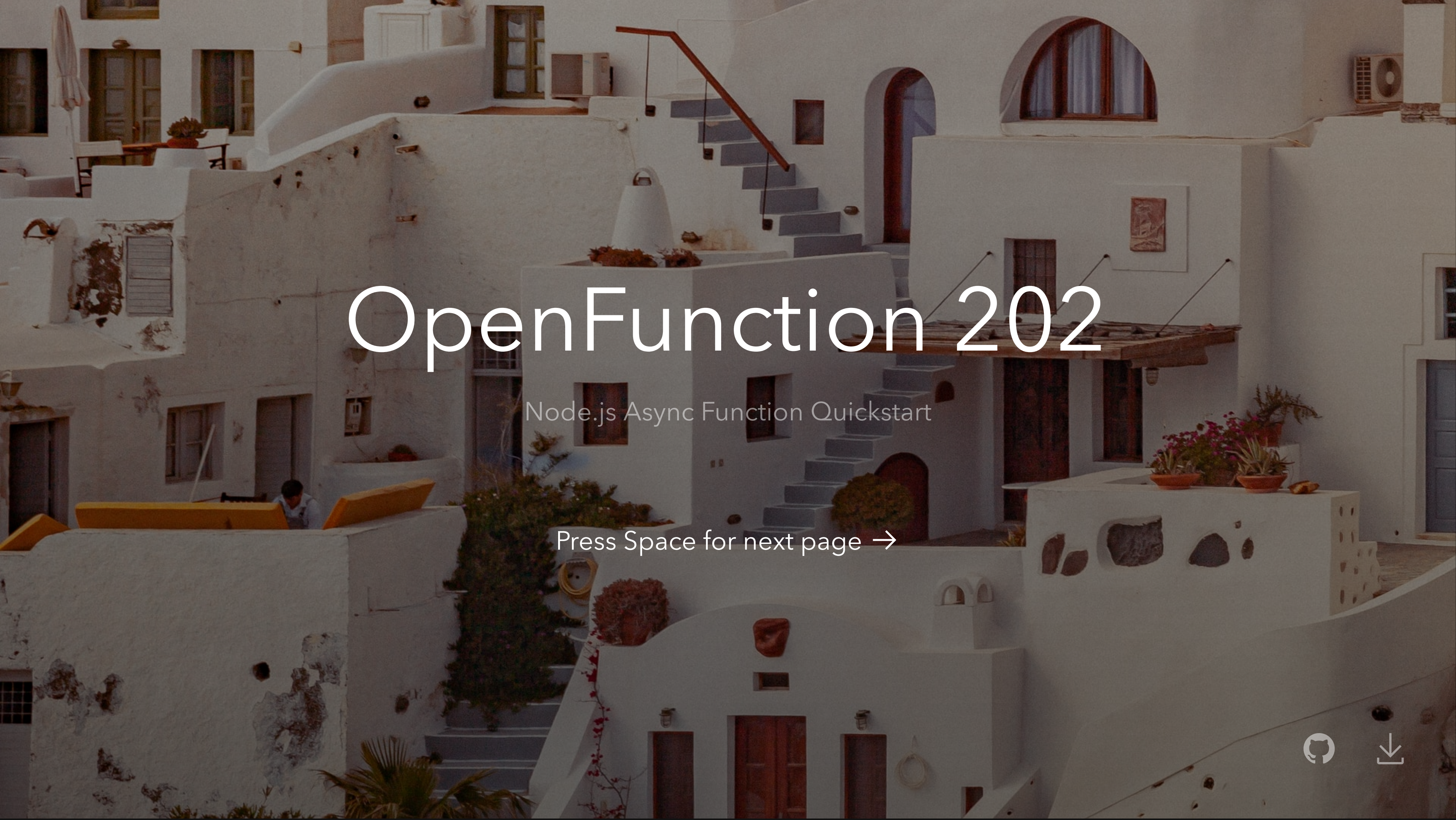


OpenFunction 202

Node.js Async Function Quickstart

Press Space for next page →

Haili Zhang

KubeSphere Ambassador, CNCF OpenFunction Maintainer.

Cloud Platform Director of UISEE© Technology.

Cloud Native focuses: Kubernetes, DevOps, Observability, Service Mesh, Serverless.

webup

zhanghaili0610

haili.zhang@uisee.com

ServiceUP · 语雀

Table of Content

Prerequsites

Use `ofn` [1] [2] CLI tool to deploy OpenFunction.

- Install OpenFunction with Async Runtime only [3]

```
$ ofn install --async
```

- Install OpenFunction with Async Runtime and function build framework

```
$ ofn install --async --shipwright
```

1. Add `--region-cn` option in case you have limited access to gcr.io or github.com
2. Use `--dry-run` to peek the components and their versions to be installed by the current command
3. Please refer this to learn how to build function image at local

Your First Async Function

A brief walkthrough

Async 0.4.1+

```
function (ctx, data) {}
```

(HTTP) Sync

```
function (req, res) {}
```

Async `0.4.1+`

```
function (ctx, data) {}
```

PARAMETERS

- `ctx`: OpenFunction context object
  - `ctx.send(payload, output?)`: Send `payload` to all or one specific `output` of Dapr Output Binding or Pub Broker
- `data`: Data recieved from Dapr Input Binding or Sub Broker

NOTICE

- `ctx.send` CAN be invoked where necessary, when you have certain outgoing data to send

(HTTP) Sync

```
function (req, res) {}
```

Async `0.4.1+`

```
function (ctx, data) {}
```

PARAMETERS

- `ctx`: OpenFunction context object
  - `ctx.send(payload, output?)`: Send `payload` to all or one specific `output` of Dapr Output Binding or Pub Broker
- `data`: Data recieved from Dapr Input Binding or Sub Broker

NOTICE

- `ctx.send` CAN be invoked where necessary, when you have certain outgoing data to send

(HTTP) Sync

```
function (req, res) {}
```

PARAMETERS

- `req`: Express standard request object
- `res`: Express standard response object
  - `res.send(body)`: Use this method to send HTTP response in most common cases

NOTICE

- Response process SHOULD be explictly ended with `res.send()`, `res.json()`, `res.end()` and alike methods

A sample function: `` `tryAsync` ``

A sample function: `tryAsync`

INDEX.MJS

```javascript
// Async function
export const tryAsync = (ctx, data) => {
  console.log('Data received: %o', data);
  ctx.send(data);
};

// HTTP sync function
export const tryKnative = (req, res) => {
  res.send(`Hello, ${req.query.u || 'World'}!`);
};
```

PACKAGE.JSON

```json
{
  "main": "index.mjs",
  "scripts": {
    "start": "functions-framework --target=tryKnative"
  },
  "dependencies": {
    "@openfunction/functions-framework": "^0.4.1"
  }
}
```

A sample function: `tryAsync`

INDEX.MJS

```js
// Async function
export const tryAsync = (ctx, data) => {
  console.log('Data received: %o', data);
  ctx.send(data);
};

// HTTP sync function
export const tryKnative = (req, res) => {
  res.send(`Hello, ${req.query.u || 'World'}!`);
};
```

PACKAGE.JSON

```json
{
  "main": "index.mjs",
  "scripts": {
    "start": "functions-framework --target=tryKnative"
  },
  "dependencies": {
    "@openfunction/functions-framework": "^0.4.1"
  }
}
```

NOTICE

- Serveral async and sync functions CAN be placed in ONE SINGLE JavaScript file
  - Target function CAN be assigned when applying Function CR manifest
- In `package.json`, `sciprts` and `dependencies` sections could be omitted
  - @openfucntion/openfunction-framework lib would be automatically added during build
  - `start` script is highly recommeneded for local development

Build Function Image via Pack `Optional`

Local build is recommended if your Kubernetes nodes have limited access to GitHub or Docker Hub.

1. Install Cloud Native Buildpacks project's Pack CLI tool

2. Use `pack` tool to build your function image at local [1]

```
pack build -B openfunction/builder-node:v2-16.13 \     # Builder image, `16` is the latest version
           -e FUNC_NAME=tryKnative \                    # Default entry point function
           -p src \                                     # Path of source files to be built
           <image-repo>/<image-name>:<tag>
```

3. Push function image to target container repository (e.g. Docker Hub)

```
docker push <image-repo>/<image-name>:<tag>
```

1. `pack` tool would download builder image during the build process

⚗ Lab: MQTT Forwarder

Use async function to bridge MQTT messages among topic channels

Set up MQTT Broker Optional

In this lab, we will use EMQX as the broker infrastructure. Learn full steps.

1. Add EMQX Helm Chart repository

```
helm repo add emqx https://repos.emqx.io/charts
helm repo update
```

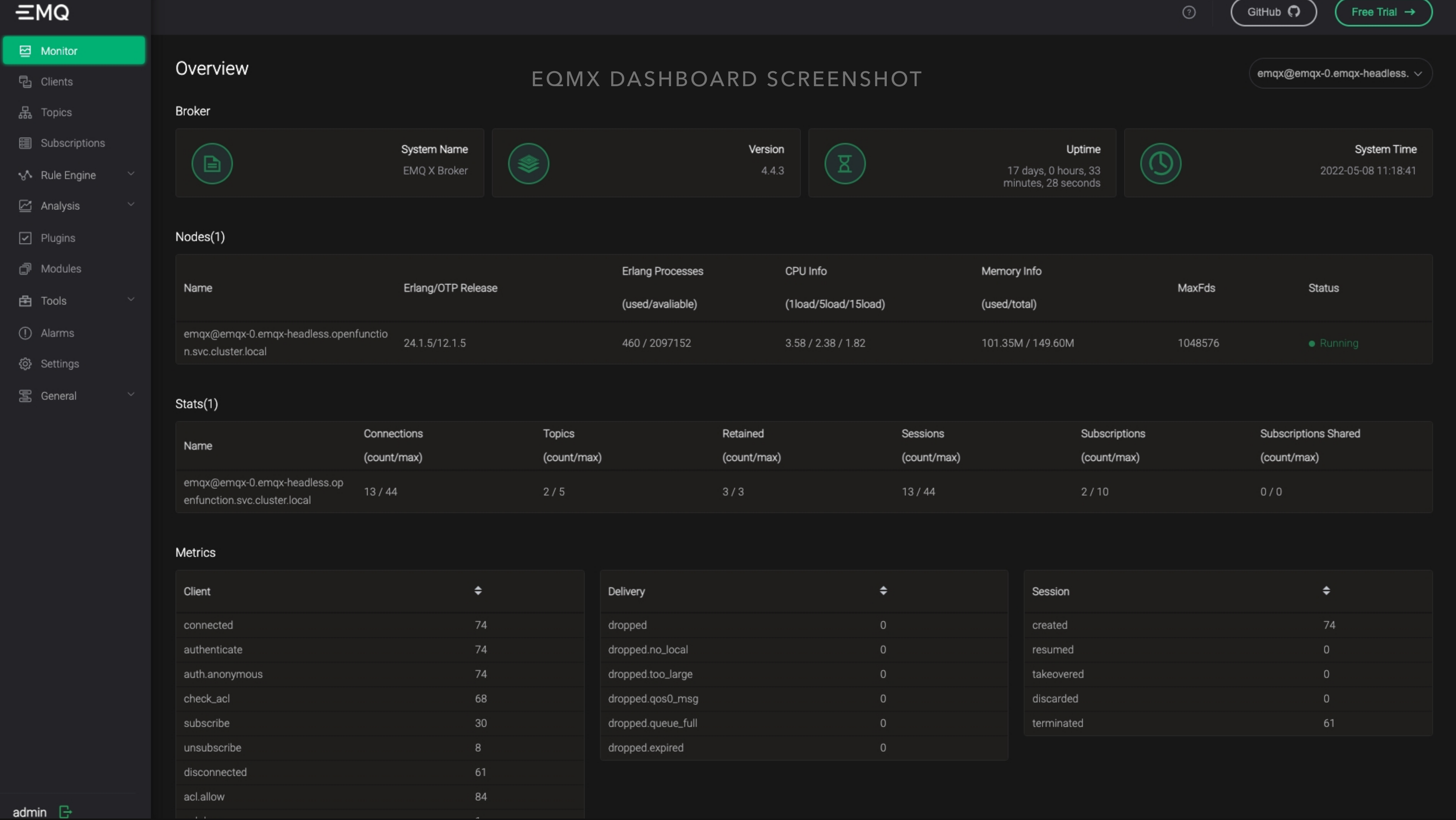
2. Search available charts of EMQX

```
helm search repo emqx

NAME                CHART VERSION APP VERSION DESCRIPTION
emqx/emqx           4.4.3         4.4.3       A Helm chart for EMQX
emqx/emqx-ee        4.4.3         4.4.3       A Helm chart for EMQ X
```

3. Deploy single replica of EMQX, and expose NodePort service

```
helm install emqx emqx/emqx --set replicaCount=1 --set service.type=NodePort
```



EQMX DASHBOARD SCREENSHOT

Overview

Broker

System Name	Version	Uptime	System Time
EMQ X Broker	4.4.3	17 days, 0 hours, 33 minutes, 28 seconds	2022-05-08 11:18:41

Nodes(1)

Name	Erlang/OTP Release	Erlang Processes (used/avaliable)	CPU Info (1load/5load/15load)	Memory Info (used/total)	MaxFds	Status
emqx@emqx-0.emqx-headless.openfunction.svc.cluster.local	24.1.5/12.1.5	460 / 2097152	3.58 / 2.38 / 1.82	101.35M / 149.60M	1048576	● Running

Stats(1)

Name	Connections (count/max)	Topics (count/max)	Retained (count/max)	Sessions (count/max)	Subscriptions (count/max)	Subscriptions Shared (count/max)
emqx@emqx-0.emqx-headless.openfunction.svc.cluster.local	13 / 44	2 / 5	3 / 3	13 / 44	2 / 10	0 / 0

Metrics

Client	
connected	74
authenticate	74
auth.anonymous	74
check_acl	68
subscribe	30
unsubscribe	8
disconnected	61
acl.allow	84

Delivery	
dropped	0
dropped.no_local	0
dropped.too_large	0
dropped.qos0_msg	0
dropped.queue_full	0
dropped.expired	0

Session	
created	74
resumed	0
takeovered	0
discarded	0
terminated	61

```yaml
apiVersion: core.openfunction.io/v1beta1
kind: Function
metadata:
  name: sample-node-async-bindings
spec:
  version: v2.0.0
  image: '<image-repo>/<image-name>:<tag>'
  serving:
    # default to knative
    runtime: async
    annotations:
      # default to "grpc"
      dapr.io/app-protocol: http
    template:
      containers:
        - name: function
    params:
      # default to FUNC_NAME value
      FUNCTION_TARGET: tryAsync
    inputs:
      - name: mqtt-input
        component: mqtt-in
    outputs:
      - name: mqtt-output
        component: mqtt-out
        operation: create
```

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apiVersion: core.openfunction.io/v1beta1
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        component: mqtt-out
        operation: create
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  image: '<image-repo>/<image-name>:<tag>'
  serving:
    # default to knative
    runtime: async
    annotations:
      # default to "grpc"
      dapr.io/app-protocol: http
    template:
      containers:
        - name: function
    params:
      # default to FUNC_NAME value
      FUNCTION_TARGET: tryAsync
    inputs:
      - name: mqtt-input
        component: mqtt-in
    outputs:
      - name: mqtt-output
        component: mqtt-out
        operation: create
```

```yaml
bindings:
  mqtt-in:
    type: bindings.mqtt
    version: v1
    metadata:
      - name: consumerID
        value: '{uuid}'
      - name: url
        value: tcp://admin:public@emqx:1883
      - name: topic
        value: in
  mqtt-out:
    type: bindings.mqtt
    version: v1
    metadata:
      - name: consumerID
        value: '{uuid}'
      - name: url
        value: tcp://admin:public@emqx:1883
      - name: topic
        value: out
```

- Dapr Component - Bindings - MQTT
- OpenFunction - Function CRD - DaprIO
- Check full sample codes

Lab 1: MQTT Input and Output Binding

- Apply function manifest, and check running states

```
$ kubectl apply -f async-bindings.yaml
function.core.openfunction.io/sample-node-async-bindings created

$ kubectl get fn
NAME                          BUILDSTATE   SERVINGSTATE   BUILDER   SERVING         URL      AGE
sample-node-async-bindings    Skipped      Running                  serving-8f7xc            140m

$ kubectl get po
NAME                                                    READY   STATUS    RESTARTS   AGE
serving-8f7xc-deployment-v200-l78xc-564c6b5bf7-vksg7   2/2     Running   0          141m
```

- Furthermore, check whether `function` container output correct logs

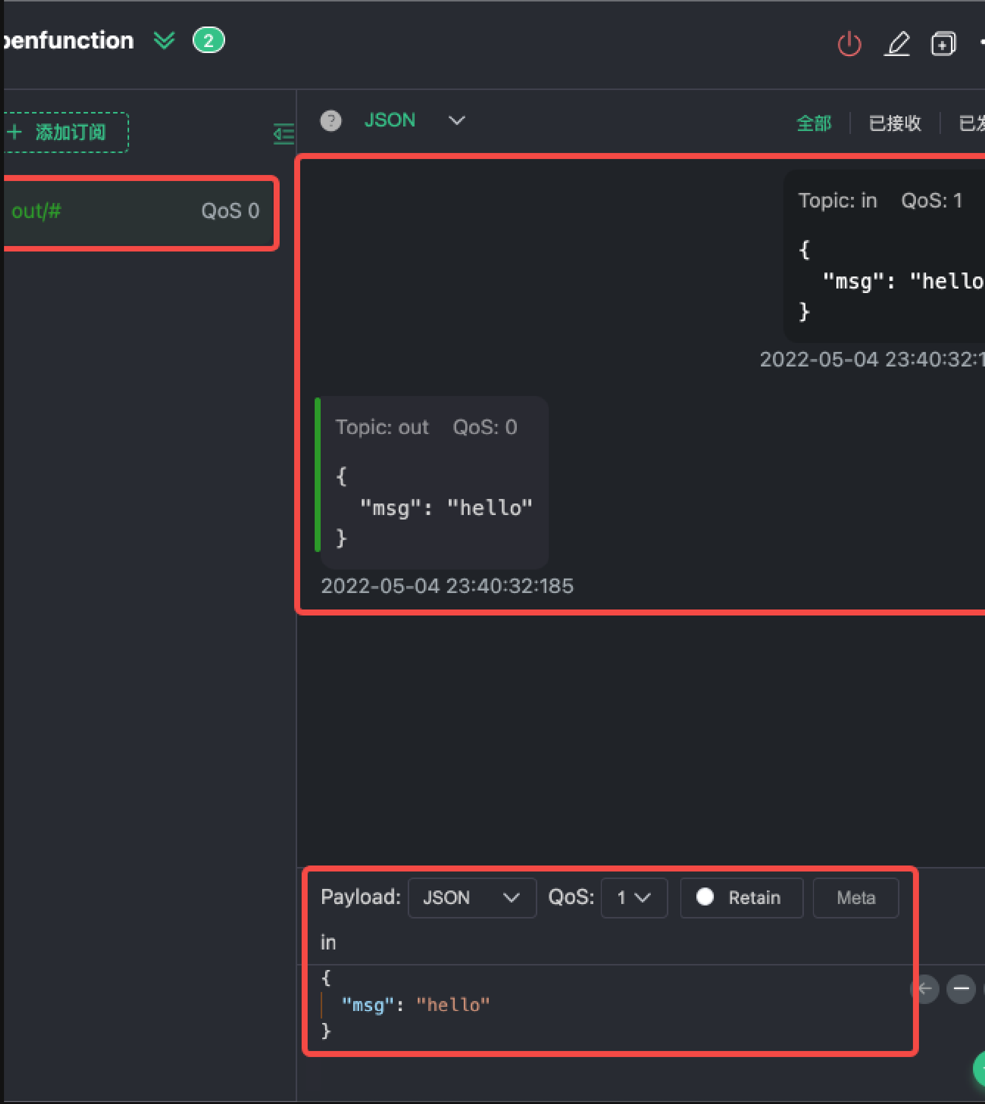
```
$ kubectl logs -c function serving-8f7xc-deployment-v200-l78xc-564c6b5bf7-vksg7
...
[Dapr-JS] Listening on 8080
[Dapr-JS] Letting Dapr pick-up the server (Maximum 60s wait time)
[Dapr-JS] - Waiting till Dapr Started (#0)
[Dapr-JS] Server Started
```

Lab 1: Trigger Event

See also: MQTT X desktop client

- Connect EQMX server via NodePort mapped to `tcp:1883`
- Publish `{"msg": "hello"}` to `in` topic
  - Payload received in `out` topic 👇 👉
- Check the `function` container log

```
$ kubectl logs -c function serving-8f7xc-deploym
...
[Dapr-JS] Listening on 8080
[Dapr-JS] Letting Dapr pick-up the server (Maxim
[Dapr-JS] - Waiting till Dapr Started (#0)
[Dapr-JS] Server Started
Data received: { msg: 'hello' }
```



```
Topic: in    QoS: 1
{
  "msg": "hello
}
2022-05-04 23:40:32:1

Topic: out    QoS: 0
{
  "msg": "hello"
}
2022-05-04 23:40:32:185
```

Payload: JSON QoS: 1 Retain Meta

```
in
{
  "msg": "hello"
}
```

```yaml
apiVersion: core.openfunction.io/v1beta1
kind: Function
metadata:
  name: sample-node-async-pubsub
spec:
  version: v2.0.0
  image: '<image-repo>/<image-name>:<tag>'
  serving:
    # default to knative
    runtime: async
    annotations:
      # default to "grpc"
      dapr.io/app-protocol: http
    template: ...
    params:
      # default to FUNC_NAME value
      FUNCTION_TARGET: tryAsync
    inputs:
      - name: mqtt-sub
        component: mqtt-pubsub
        topic: sub
    outputs:
      - name: mqtt-pub
        component: mqtt-pubsub
        topic: pub
```

```yaml
apiVersion: core.openfunction.io/v1beta1
kind: Function
metadata:
  name: sample-node-async-pubsub
spec:
  version: v2.0.0
  image: '<image-repo>/<image-name>:<tag>'
  serving:
    # default to knative
    runtime: async
    annotations:
      # default to "grpc"
      dapr.io/app-protocol: http
    template: ...
    params:
      # default to FUNC_NAME value
      FUNCTION_TARGET: tryAsync
    inputs:
      - name: mqtt-sub
        component: mqtt-pubsub
        topic: sub
    outputs:
      - name: mqtt-pub
        component: mqtt-pubsub
        topic: pub
```

```yaml
apiVersion: core.openfunction.io/v1beta1
kind: Function
metadata:
  name: sample-node-async-pubsub
spec:
  version: v2.0.0
  image: '<image-repo>/<image-name>:<tag>'
  serving:
    # default to knative
    runtime: async
    annotations:
      # default to "grpc"
      dapr.io/app-protocol: http
    template: ...
    params:
      # default to FUNC_NAME value
      FUNCTION_TARGET: tryAsync
    inputs:
      - name: mqtt-sub
        component: mqtt-pubsub
        topic: sub
    outputs:
      - name: mqtt-pub
        component: mqtt-pubsub
        topic: pub
```

```yaml
apiVersion: core.openfunction.io/v1beta1
kind: Function
metadata:
  name: sample-node-async-pubsub
spec:
  version: v2.0.0
  image: '<image-repo>/<image-name>:<tag>'
  serving:
    # default to knative
    runtime: async
    annotations:
      # default to "grpc"
      dapr.io/app-protocol: http
    template: ...
    params:
      # default to FUNC_NAME value
      FUNCTION_TARGET: tryAsync
    inputs:
      - name: mqtt-sub
        component: mqtt-pubsub
        topic: sub
    outputs:
      - name: mqtt-pub
        component: mqtt-pubsub
        topic: pub
```

```yaml
apiVersion: core.openfunction.io/v1beta1
kind: Function
metadata:
  name: sample-node-async-pubsub
spec:
  version: v2.0.0
  image: '<image-repo>/<image-name>:<tag>'
  serving:
    # default to knative
    runtime: async
    annotations:
      # default to "grpc"
      dapr.io/app-protocol: http
    template: ...
    params:
      # default to FUNC_NAME value
      FUNCTION_TARGET: tryAsync
    inputs:
      - name: mqtt-sub
        component: mqtt-pubsub
        topic: sub
    outputs:
      - name: mqtt-pub
        component: mqtt-pubsub
        topic: pub
```

```yaml
apiVersion: core.openfunction.io/v1beta1
kind: Function
metadata:
  name: sample-node-async-pubsub
spec:
  version: v2.0.0
  image: '<image-repo>/<image-name>:<tag>'
  serving:
    # default to knative
    runtime: async
    annotations:
      # default to "grpc"
      dapr.io/app-protocol: http
    template: ...
    params:
      # default to FUNC_NAME value
      FUNCTION_TARGET: tryAsync
    inputs:
      - name: mqtt-sub
        component: mqtt-pubsub
        topic: sub
    outputs:
      - name: mqtt-pub
        component: mqtt-pubsub
        topic: pub
```

```yaml
pubsub:
  mqtt-pubsub:
    type: pubsub.mqtt
    version: v1
    metadata:
      - name: consumerID
        value: '{uuid}'
      - name: url
        value: tcp://admin:public@emqx:1883
      - name: qos
        value: 1
```

- Dapr Component - Pub/Sub Brokers - MQTT
- OpenFunction - Function CRD - DaprIO
  - `topic` field is required for pubsub component
- Check full sample codes

Lab 2: MQTT Pub and Sub

- Apply function manifest, and check running states

```
$ kubectl apply -f async-pubsub.yaml
function.core.openfunction.io/sample-node-async-pubsub created

$ kubectl get fn
NAME                          BUILDSTATE   SERVINGSTATE   BUILDER   SERVING         URL      AGE
sample-node-async-pubsub      Skipped      Running                  serving-2qfkl            140m

$ kubectl get po
NAME                                                  READY    STATUS     RESTARTS   AGE
serving-2qfkl-deployment-v200-6cshf-57c8b5b8dd-ztmbf   2/2      Running    0          141m
```

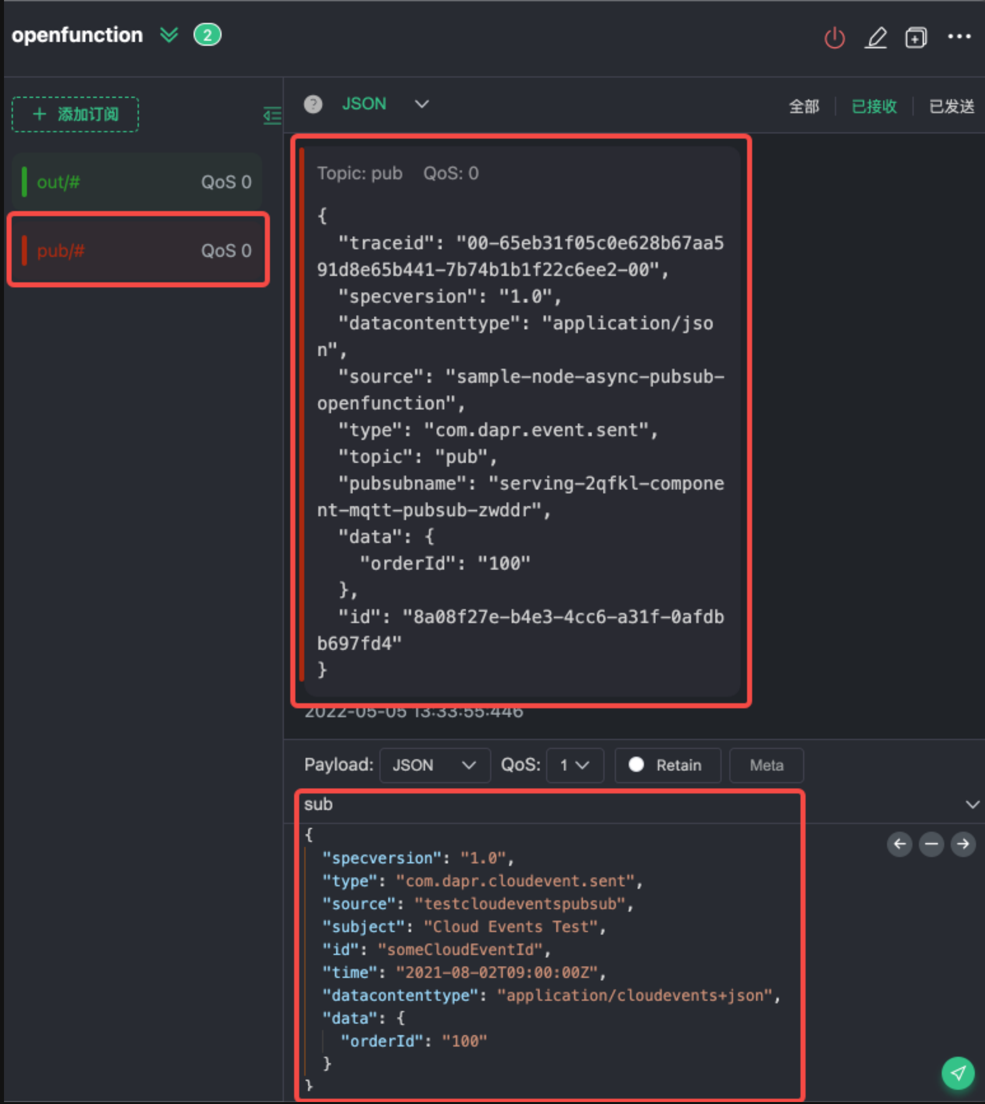
- Furthermore, check whether `function` container output correct logs

```
$ kubectl logs -c function serving-2qfkl-deployment-v200-6cshf-57c8b5b8dd-ztmbf
...
[Dapr-JS] Listening on 8080
[Dapr-JS] Letting Dapr pick-up the server (Maximum 60s wait time)
[Dapr-JS] - Waiting till Dapr Started (#0)
[Dapr API][PubSub] Registered 1 PubSub Subscriptions
[Dapr-JS] Server Started
```

Lab 2: Trigger Event

- Connect EQMX server via NodePort mapped to `tcp:1883`
- Publish a CloudEvents event to `pub` topic
  - CloudEvents payload got in `sub` 👉
  - Pure data recieved in async function 👇
- Check the `function` container log

```
$ kubectl logs -c function serving-2qfkl-deploym
...
[Dapr-JS] Listening on 8080
[Dapr-JS] Letting Dapr pick-up the server (Maxim
[Dapr-JS] - Waiting till Dapr Started (#0)
[Dapr API][PubSub] Registered 1 PubSub Subscript
[Dapr-JS] Server Started
Data received: { orderId: '100' }
```



Topic: pub QoS: 0

```
{
  "traceid": "00-65eb31f05c0e628b67aa591d8e65b441-7b74b1b1f22c6ee2-00",
  "specversion": "1.0",
  "datacontenttype": "application/json",
  "source": "sample-node-async-pubsub-openfunction",
  "type": "com.dapr.event.sent",
  "topic": "pub",
  "pubsubname": "serving-2qfkl-component-mqtt-pubsub-zwddr",
  "data": {
    "orderId": "100"
  },
  "id": "8a08f27e-b4e3-4cc6-a31f-0afdbb697fd4"
}
```

2022-05-05 13:33:55:446

Payload: JSON QoS: 1 Retain Meta

sub

```
{
  "specversion": "1.0",
  "type": "com.dapr.cloudevent.sent",
  "source": "testcloudeventspubsub",
  "subject": "Cloud Events Test",
  "id": "someCloudEventId",
  "time": "2021-08-02T09:00:00Z",
  "datacontenttype": "application/cloudevents+json",
  "data": {
    "orderId": "100"
  }
}
```

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