UNIVERSITY of LIMERICK

OLLSCOIL LUIMNIGH

Project Log

Spring Semester

Week 3

MEng Information & Network Security

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Project Supervisor: Sean McGrath

06/01/17- 12/02/17

1 Log Entries

1.1 Entry 08/01/17

While still recovering from a flu, I managed to familiarize myself with the cloud foundry/ bluemix CLI. I made my goal to simply get a custom container image onto Bluemix. I ran into various problems such as logging into the american “ng” domain and not the “eu-gb” europe domain. Half of the delay was due to poor memory of how I did this last time. The other half being my state of mind (illness).

1.2 Entry 09/01/17

Today I managed to get a mosca broker running on my local Docker host. Using Mosquitto service to pub and sub.

1.3 Entry 10/01/17

Today I deployed a mosca broker on IBM containers. I carried out the same test I did locally.

1.4 Entry 11/01/17

Today I used Node-RED for the first time properly. I managed to get data flowing from an inject node to my broker running on IBM Container on Bluemix.

1.5 Entry 12/01/17

Today I managed to encode/decode base 64 using Node-RED. I also managed to get the decoded data into a cloudant database. I ran into many problems this week, but time invested carried me through.

2 Tasks completed

-Mosca Broker working locally

-Mosca Broker on Bluemix

-Node-RED injects msgs

-Node-RED sends to broker on bluemix

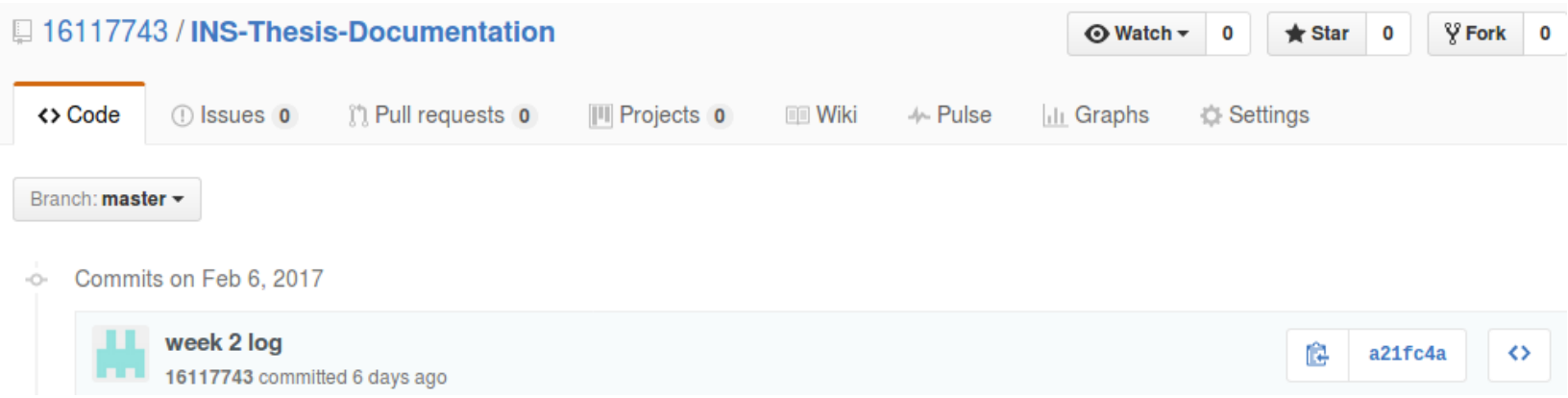
-Node-RED encodes and decodes base 64

-Node-RED stores data in cloudant

-Security DevOps pipeline tutorial

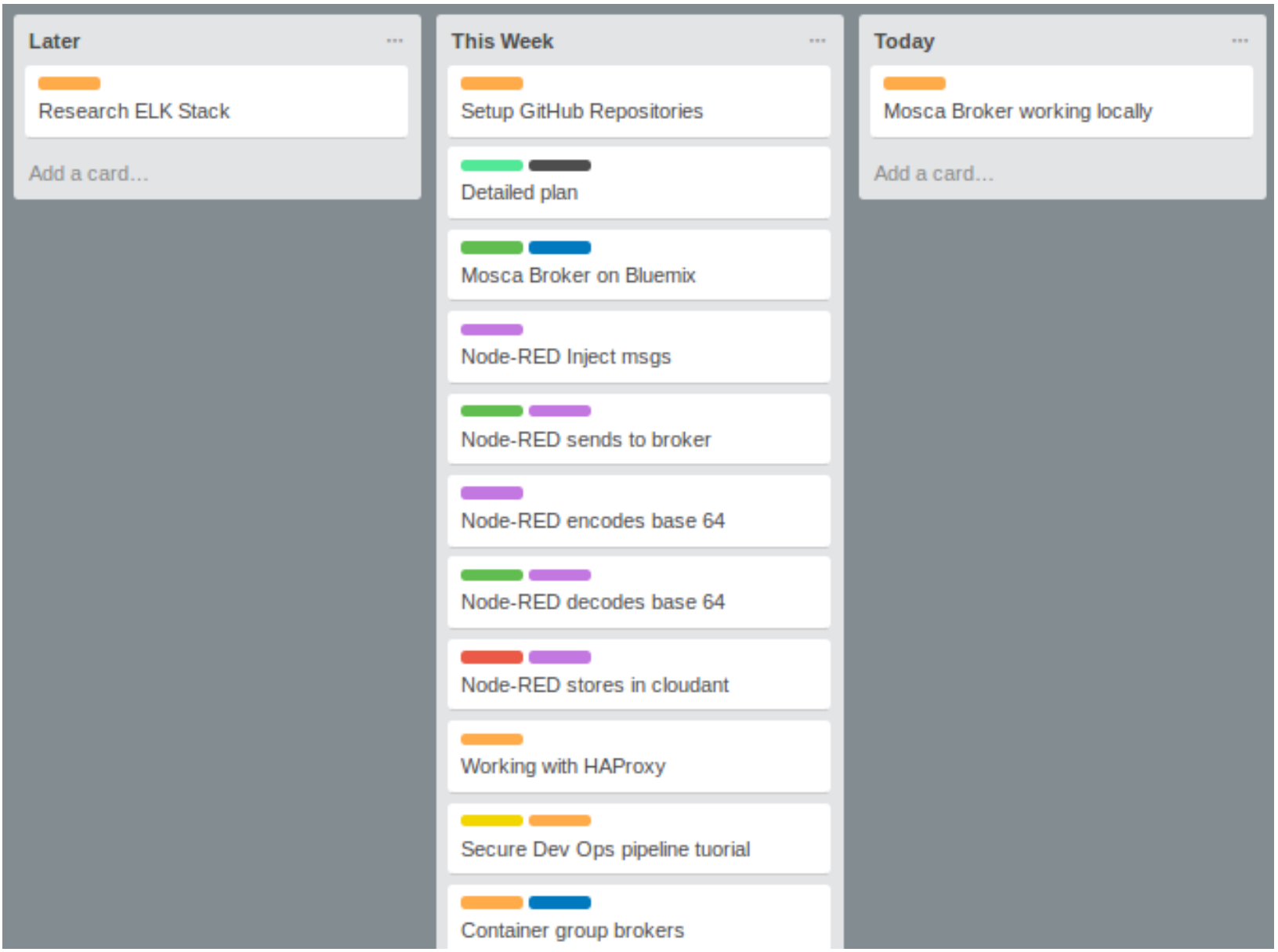
3 GIT Repositories

3.1 INS-Thesis-Documentation

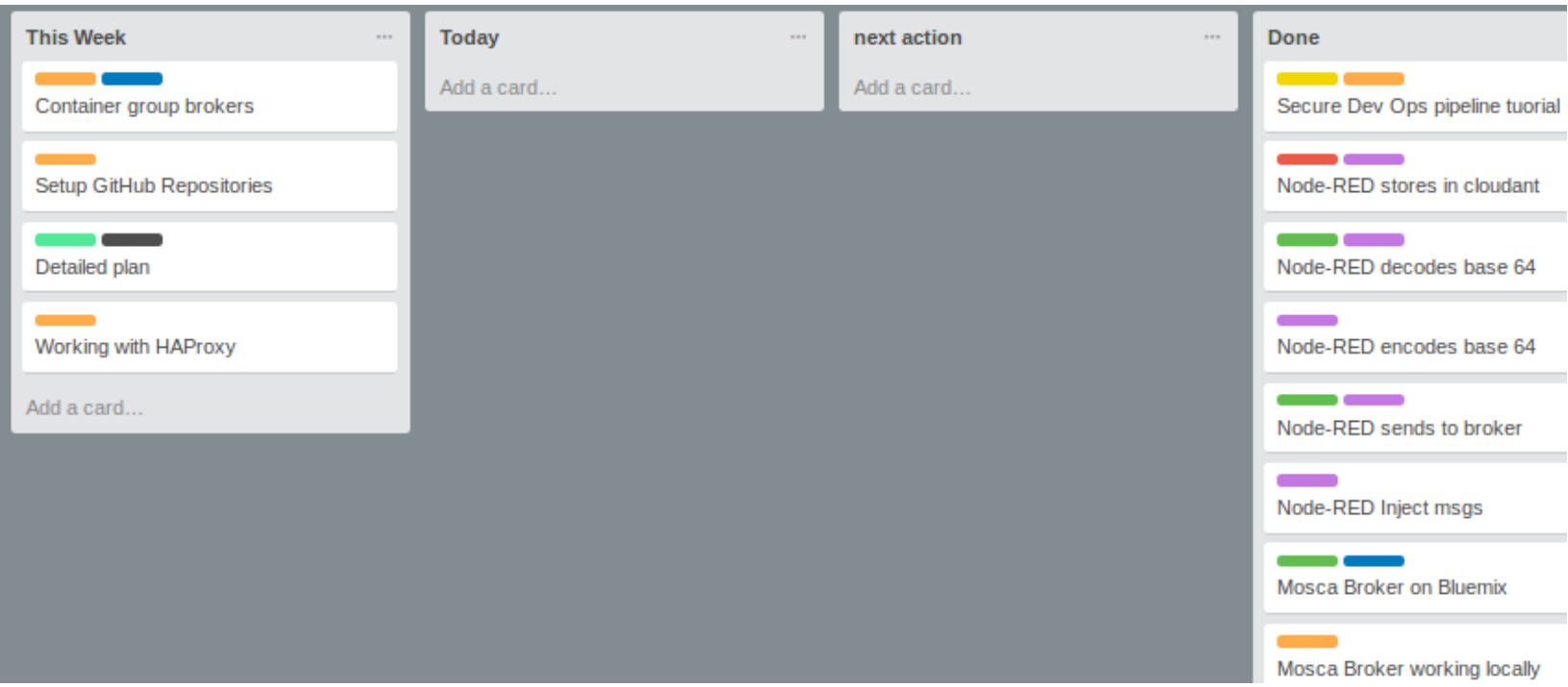


4 Trello boards

4.1 Board at the start of the week

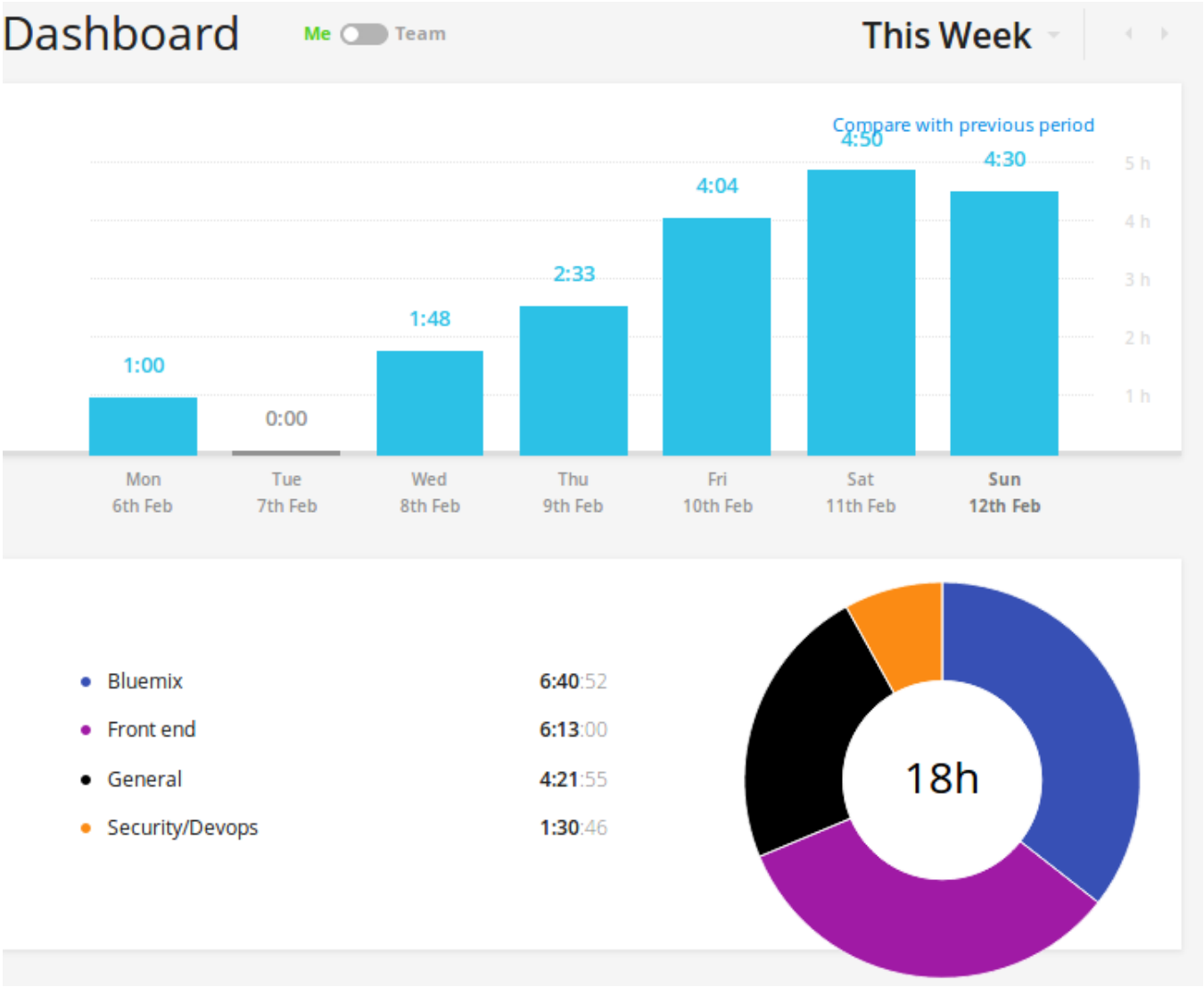


4.2 Board at the end of the week



5 Toggl Time Logs

5.1 Weekly time Log bar chart

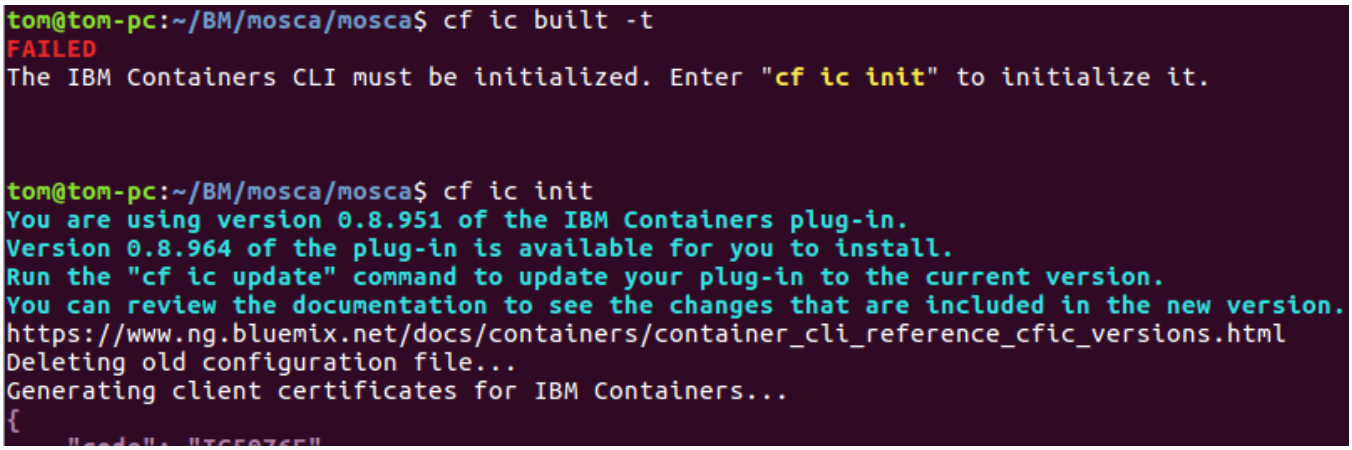


5.2 Weekly time log

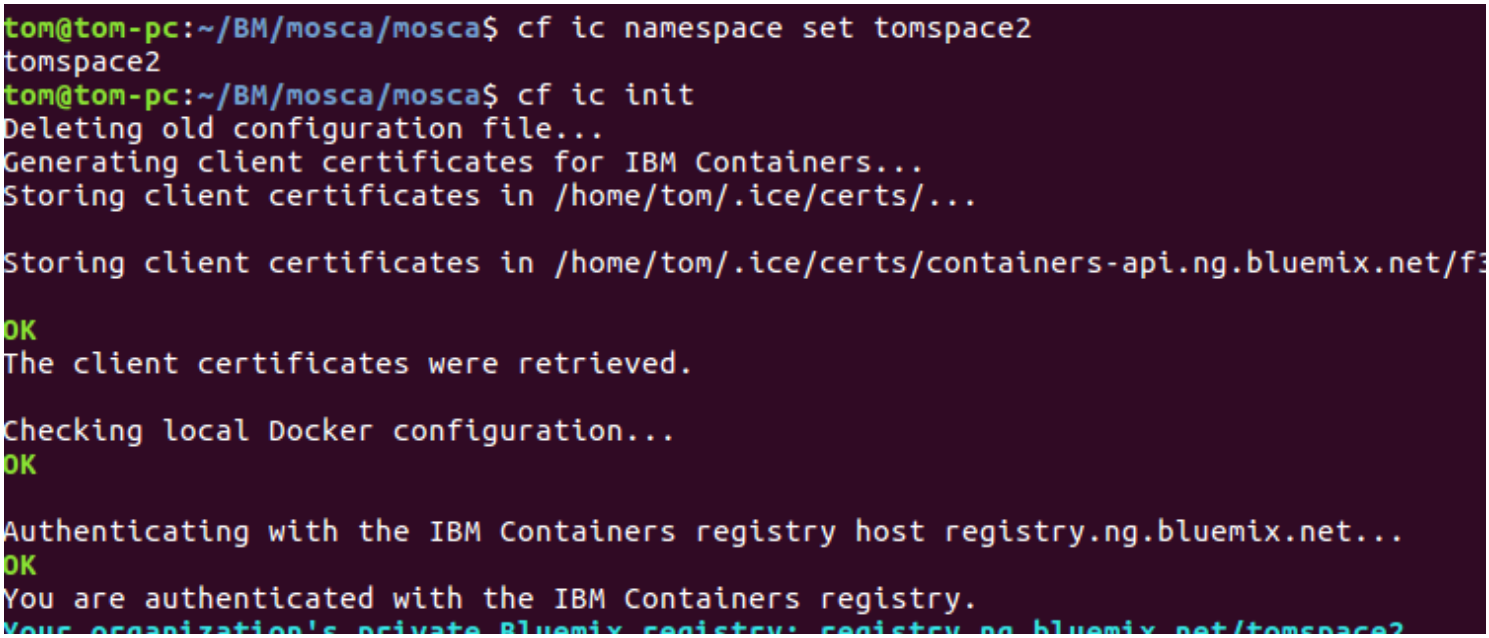
Today			4:30:00
log book	General	6:53 PM - 8:53 PM	2:00:00
node-red	Front end	1:52 PM - 4:22 PM	2:30:00
Yesterday			4:50:04
node-red	Front end (2)	12:04 PM - 9:34 PM	3:43:00
DevOps secure pipeline	Security/Devops	5:11 PM - 6:18 PM	1:07:04
Fri, 10 Feb			4:04:09
doodling	General	10:12 PM - 11:34 PM	1:21:55
mosca broker	Bluemix (2)	3:54 PM - 5:36 PM	2:42:14
Thu, 9 Feb			2:33:22
mosca broker	Bluemix	4:43 PM - 6:52 PM	2:09:40
Amalgam8 research	Security/Devops	1:46 PM - 2:10 PM	0:23:42
Wed, 8 Feb			1:48:58
mosca broker	Bluemix	5:52 PM - 7:40 PM	1:48:58
Mon, 6 Feb			1:00:00
meeting with supervisor	General	11:00 AM - 12:00 PM	1:00:00

6 Pictures

6.1 Logging into ibm containers



6.2 Logging into ibm containers



6.3 cloning mosca broker repository

```
tom@tom-pc:~/BM/mosca$ git clone https://github.com/mcollina/mosca.git
Cloning into 'mosca'...
remote: Counting objects: 4681, done.
```

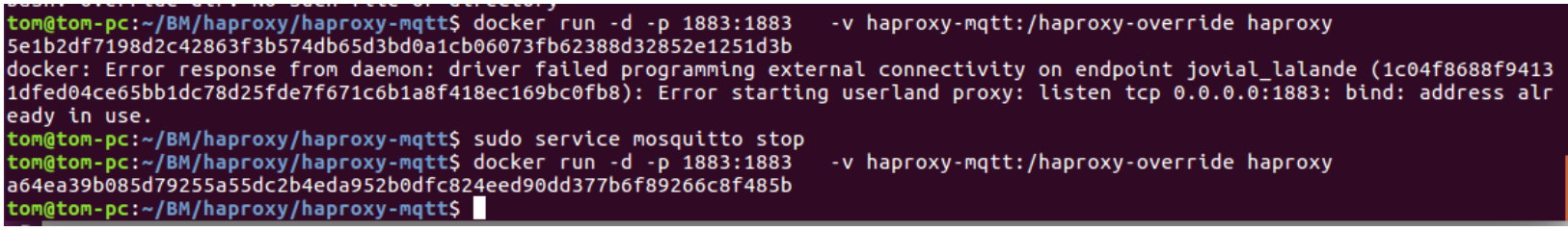
6.4 Build a docker image

```
tom@tom-pc:~/BM/mosca/mosca$ docker build -t mosca .
Sending build context to Docker daemon 7.669 MB
Step 1 : FROM mhart/alpine-node:4
4: Pulling from mhart/alpine-node
b7f33cc0b48e: Already exists
4bc072c81e10: Pull complete
Digest: sha256:cfff98dedd985fbb045ac0dd8edc680589575a58fd2df782df1ca15c39448401
Status: Downloaded newer image for mhart/alpine-node:4
 ---> df03fb3149e5
Step 2 : MAINTAINER Matteo Collina <hello@matteocollina.com>
 ---> Running in 6549039043e4
```

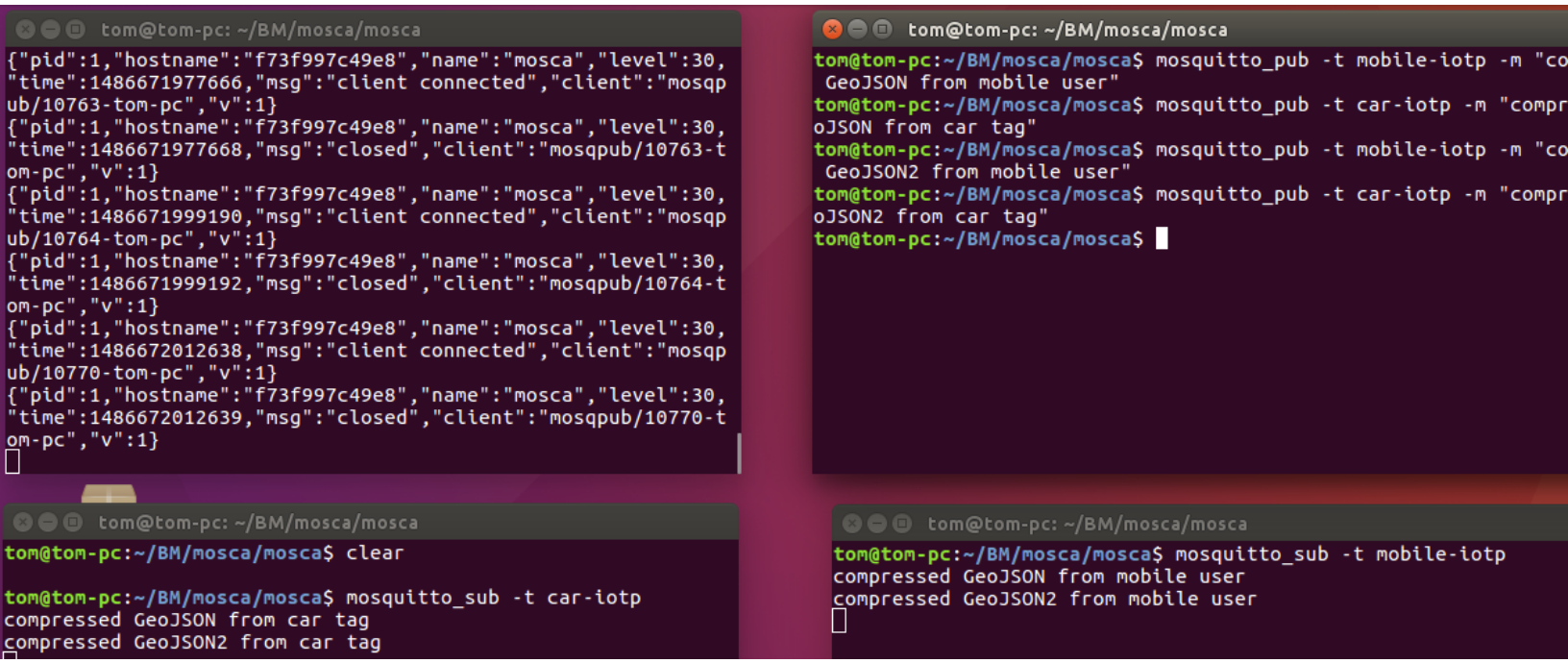
6.5 Send image to ibm containers

```
tom@tom-pc:~/BM/mosca/mosca$ cf ic build -t mosca-image .
Sending build context to Docker daemon 7.669 MB
Step 1 : FROM mhart/alpine-node:4
4: Pulling from mhart/alpine-node
```

6.6 Problem: Mosquitto service blocking Docker’s exclusive access to port 1883



6.7 Test: Local deployment test



Top Left:

Mosca (Node.js) Broker running locally on a Docker container.

Top Right:

Using Mosquitto service to publish to the Docker container.

Topics:

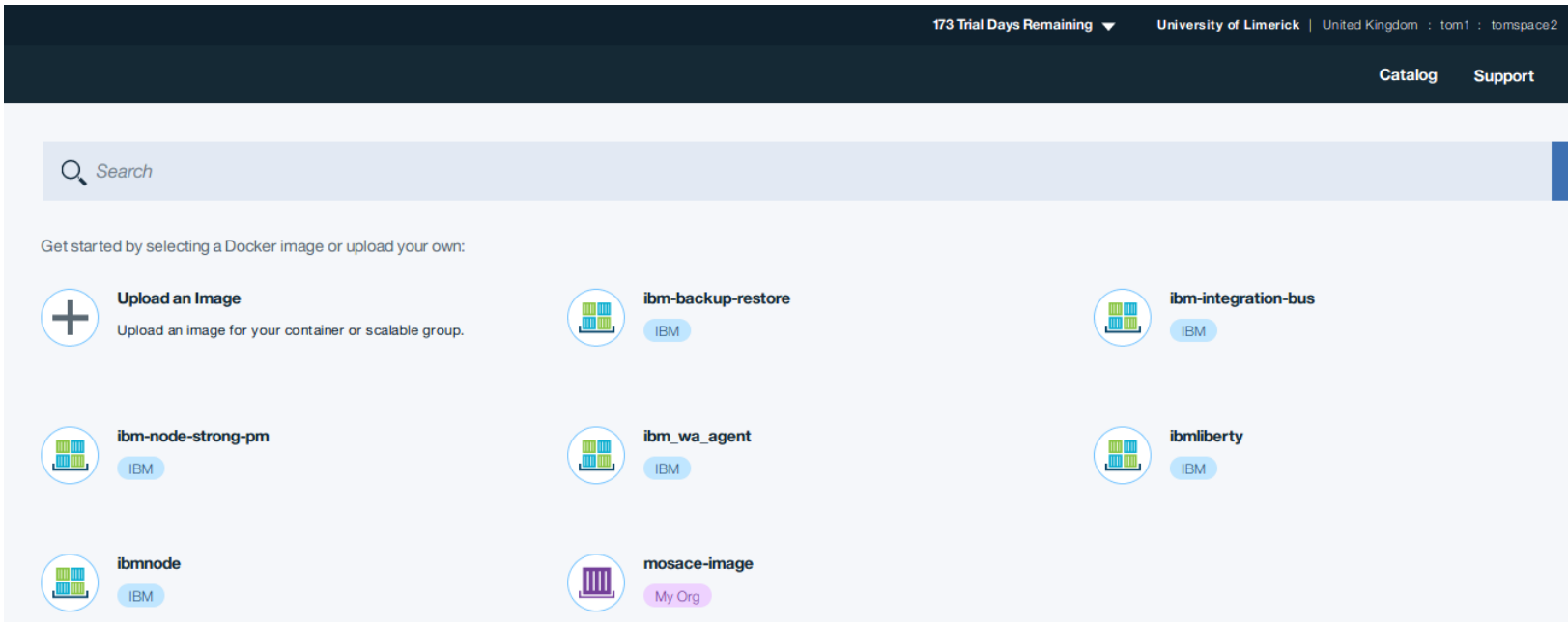
-Mobile-iotp

-Car-iotp

Bottom:

Mosquitto terminals subscribed to above topics.

6.8 Bluemix: Mosca Image now on Bluemix

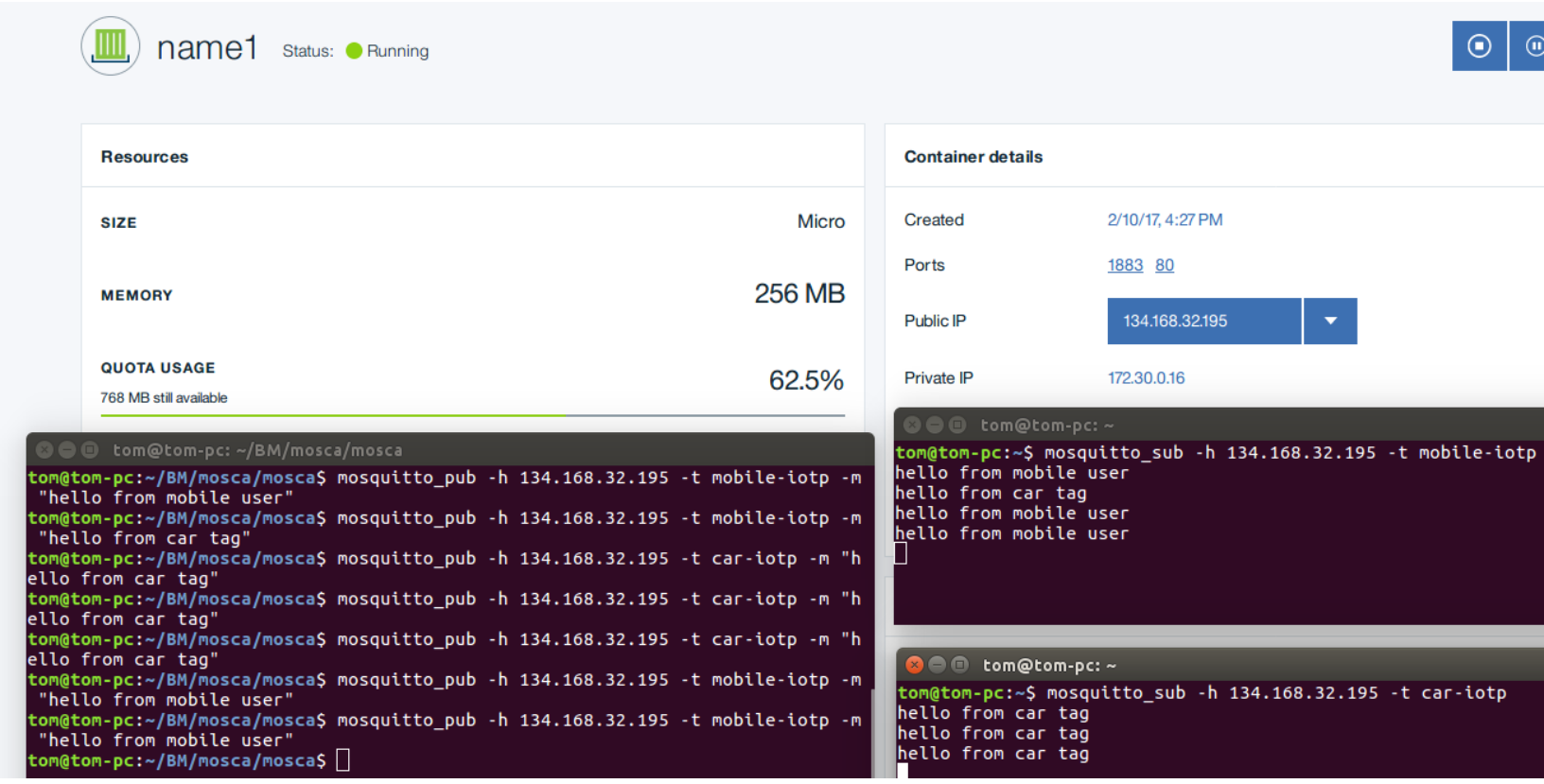


Now that a basic test can be implemented, I reproduce it on Bluemix, instead of local deployment.

6.9 Build: building container from image in Bluemix repository

```
tom@tom-pc:~/BM/mosca/mosca$ cf ic build -t mosca-image .
Sending build context to Docker daemon 7.669 MB
Step 1 : FROM mhart/alpine-node:4
4: Pulling from mhart/alpine-node
```

6.10 Test: test on Bluemix passed



Description:

Mosca broker running on an IBM container.

6.11 Problem: Took a long time to figure out why default image would not run

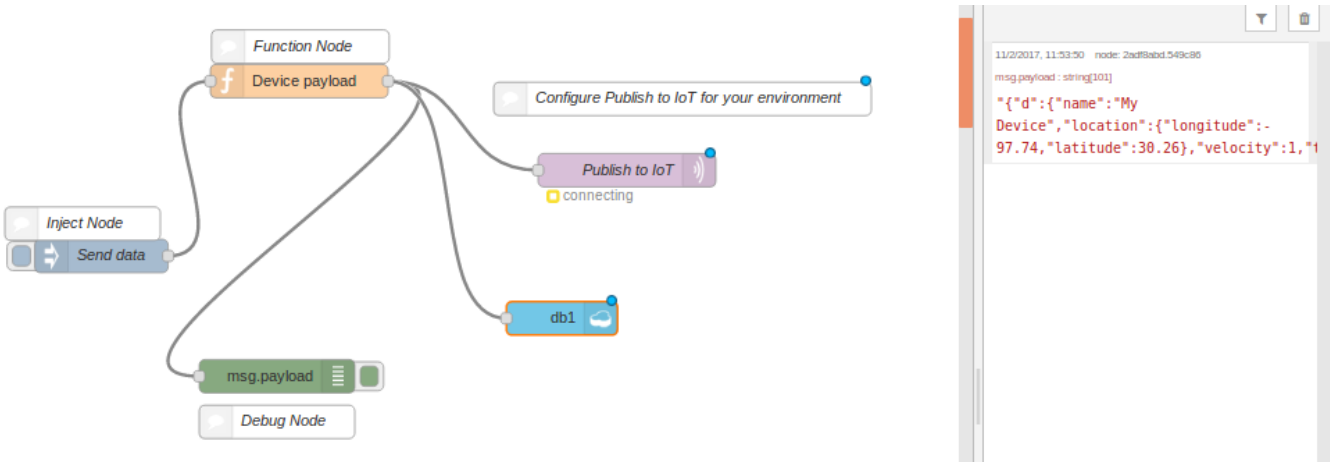
```
tom@tom-pc:~/BM/mosca/mosca$ cf ic logs sad_wilson
        +++.+++:   ,+++    +++;   '+++    +++.
       ++.+++.++   ++.++  ++,'+  `+',++  ++,++
       +`  +,  +: .+  .+  +;  +; '+  '+  +`  +`
       +`  +.  +: ,+  `+  ++  +; '+  ;+  +   +.
       +`  +.  +: ,+  `+   +'    '+      +   +.
       +`  +.  +: ,+  `+   :+.   '+      +++++.
       +`  +.  +: ,+  `+    ++   '+      +++++.
       +`  +.  +: ,+  `+     ++  '+      +   +.
       +`  +.  +: ,+  `+  +:  +: '+  ;+  +   +.
       +`  +.  +: .+  .+  +;  +; '+  '+  +   +.
       +`  +.  +:  ++;++  ++'++   ++'+'  +   +.
       +`  +.  +:   +++    +++.   ,++'   +   +.
/usr/src/app/lib/server.js:109
      throw new Error(errMessage);
      ^

Error: is not of a type(s) integer
    at EventEmitter.Server (/usr/src/app/lib/server.js:109:13)
```

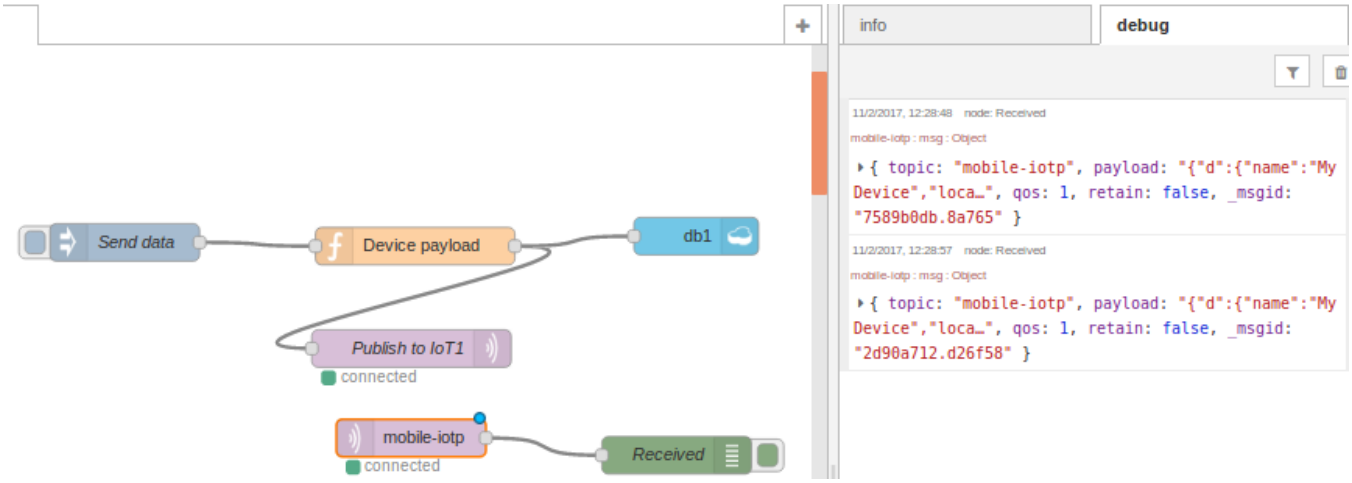
6.12 Solution:

```
100 function Server(opts, callback) {
101   var modernOpts = options.modernize(opts);
102   var validationResult = options.validate(modernOpts);
103
104   if (validationResult.errors.length > 0) {
105     var errMessage = validationResult.errors[0].message;
106     if (callback) {
107       callback(new Error(errMessage));
108     } else {
109       throw new Error(errMessage);
110     }
111   }
```

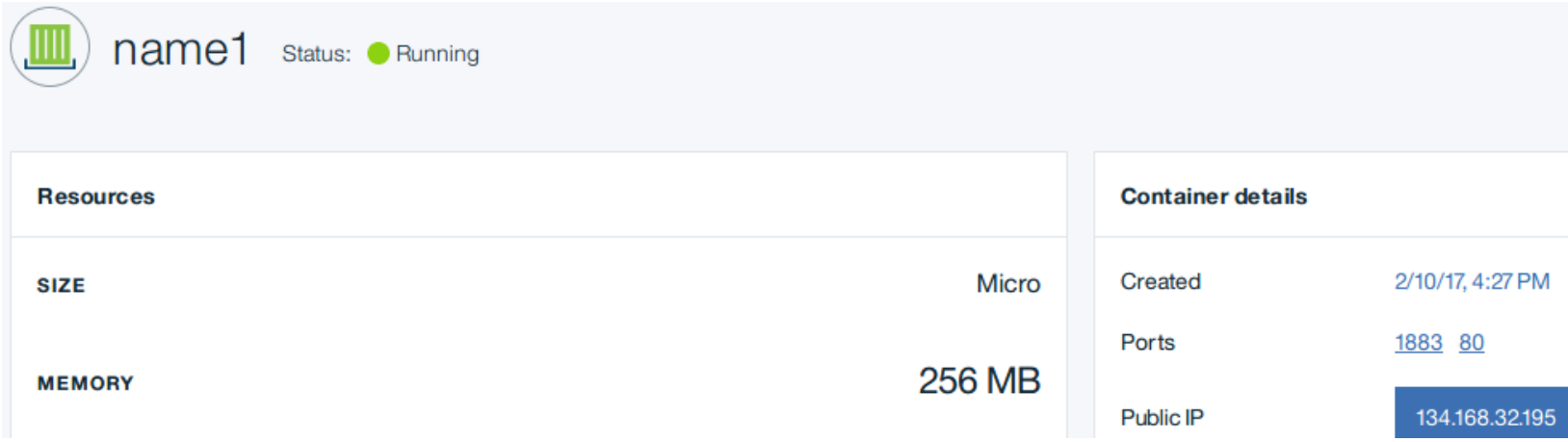
6.13 Starting Point: Nothing configured



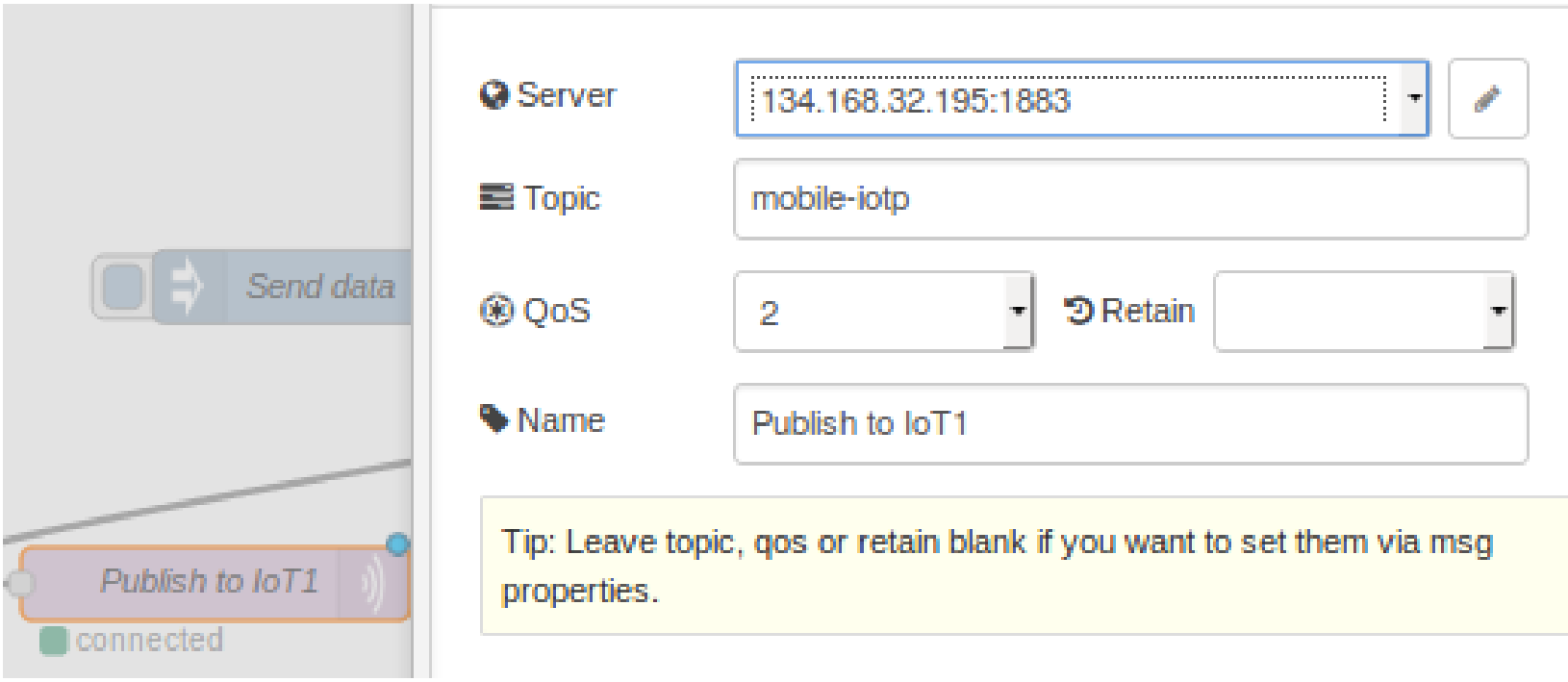
6.14 Configured broker IP address and gps payload



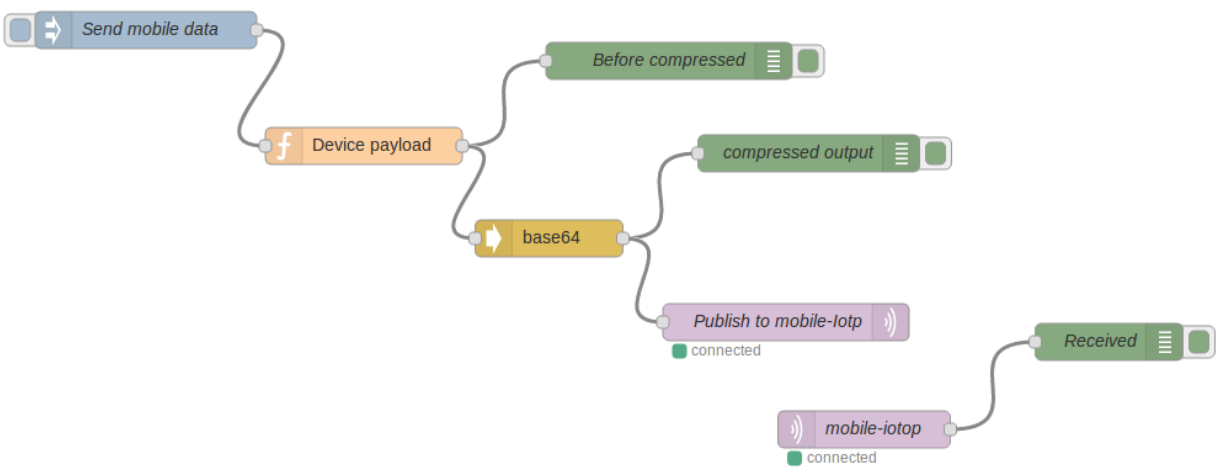
6.15 Mosca broker running on Bluemix

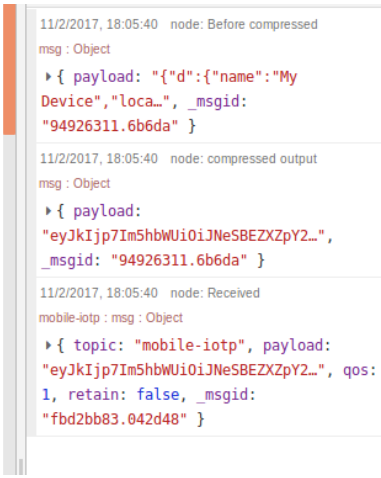


6.16 Node publishing to broker on Bluemix

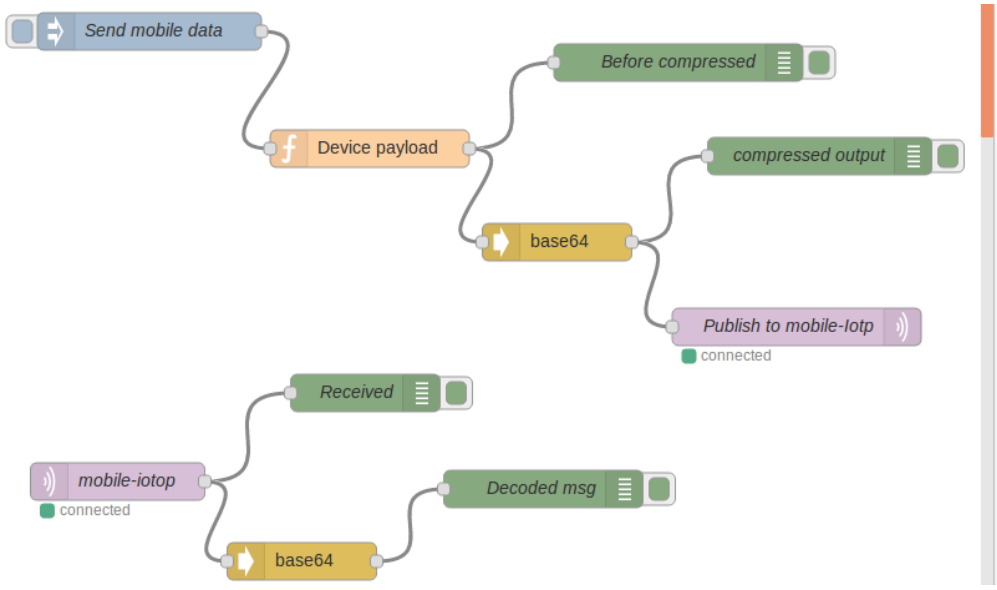


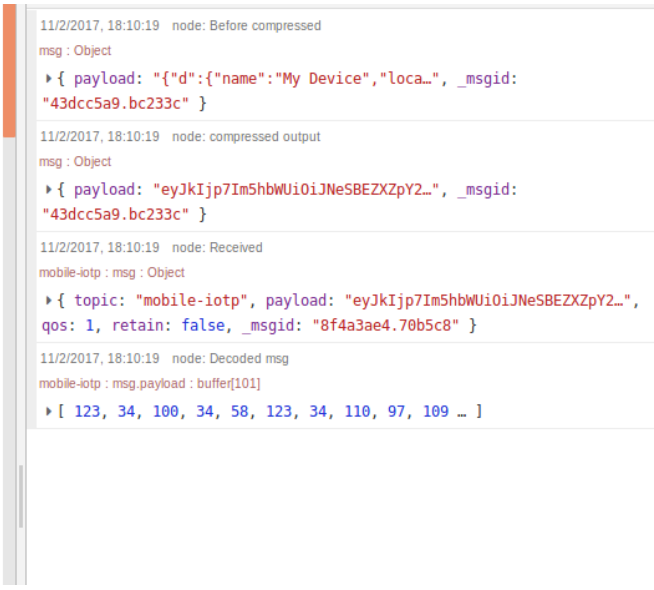
6.17 Encoding



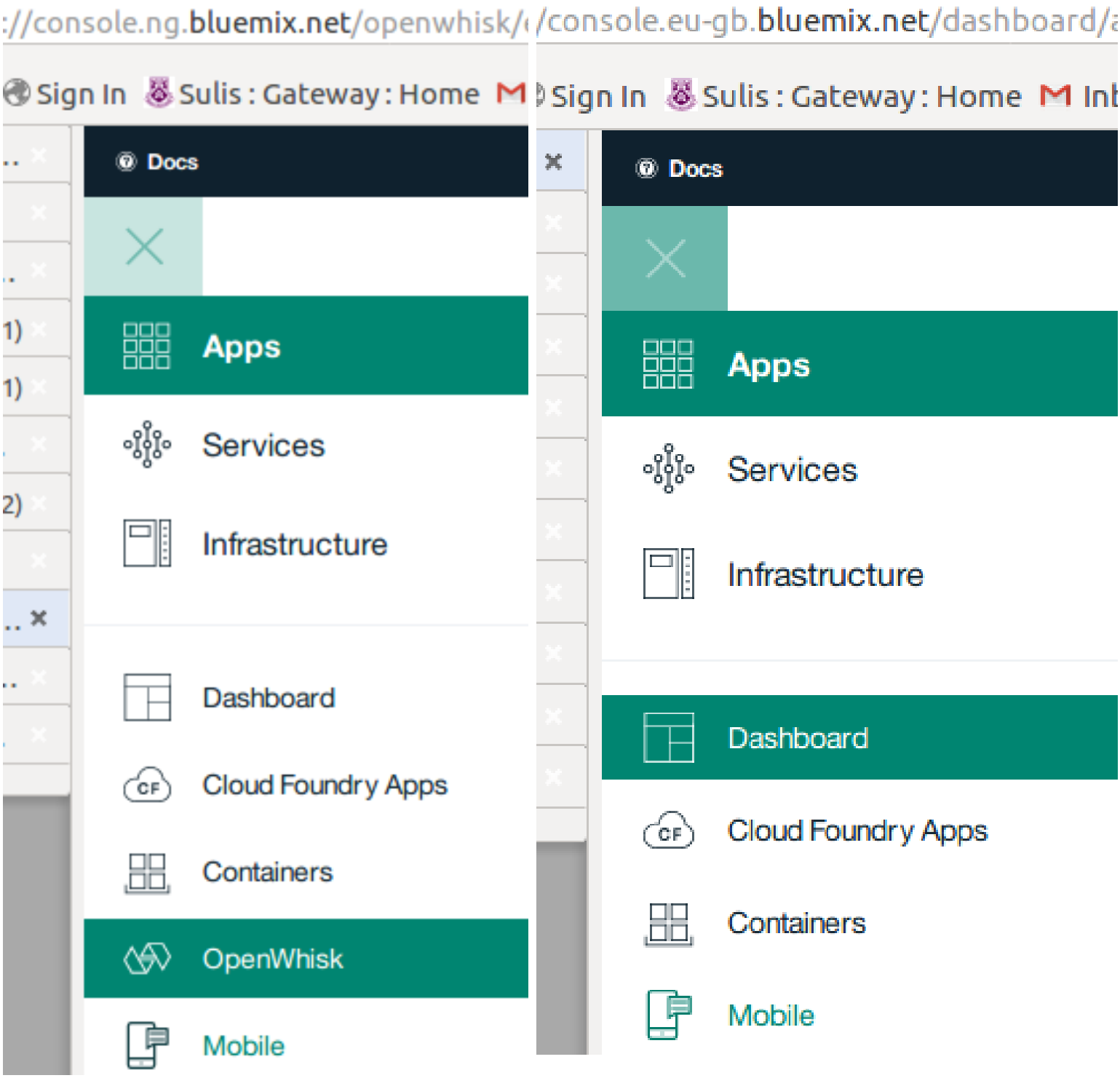


6.18 Decoding

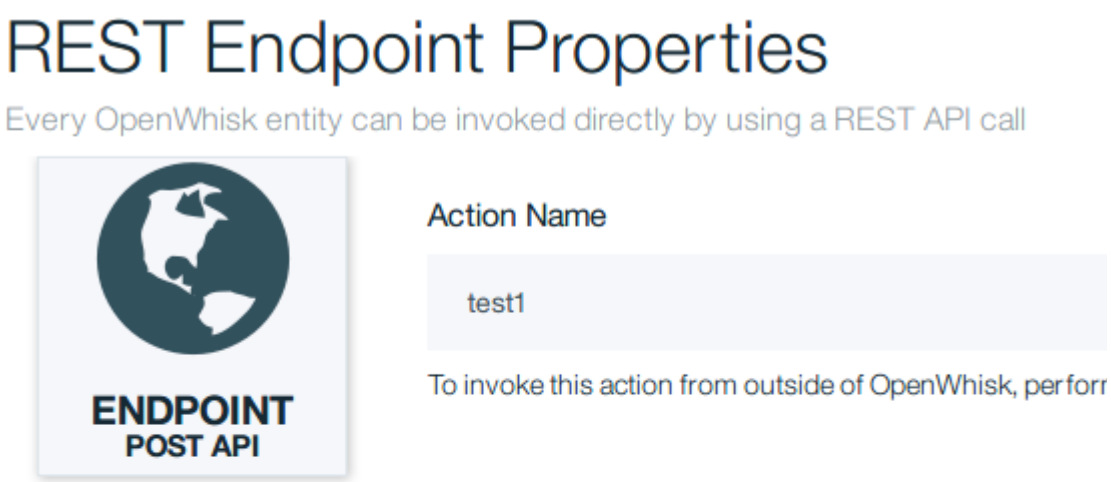


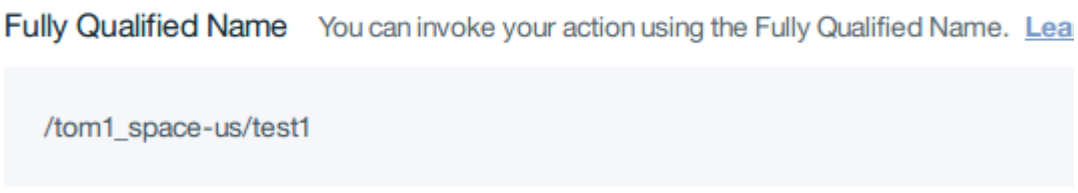


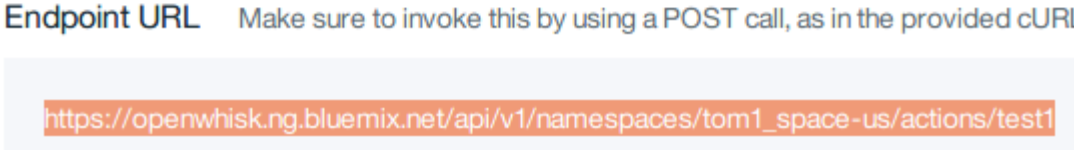
6.19 Confusion about Openwhisk eu-gb and ng domain



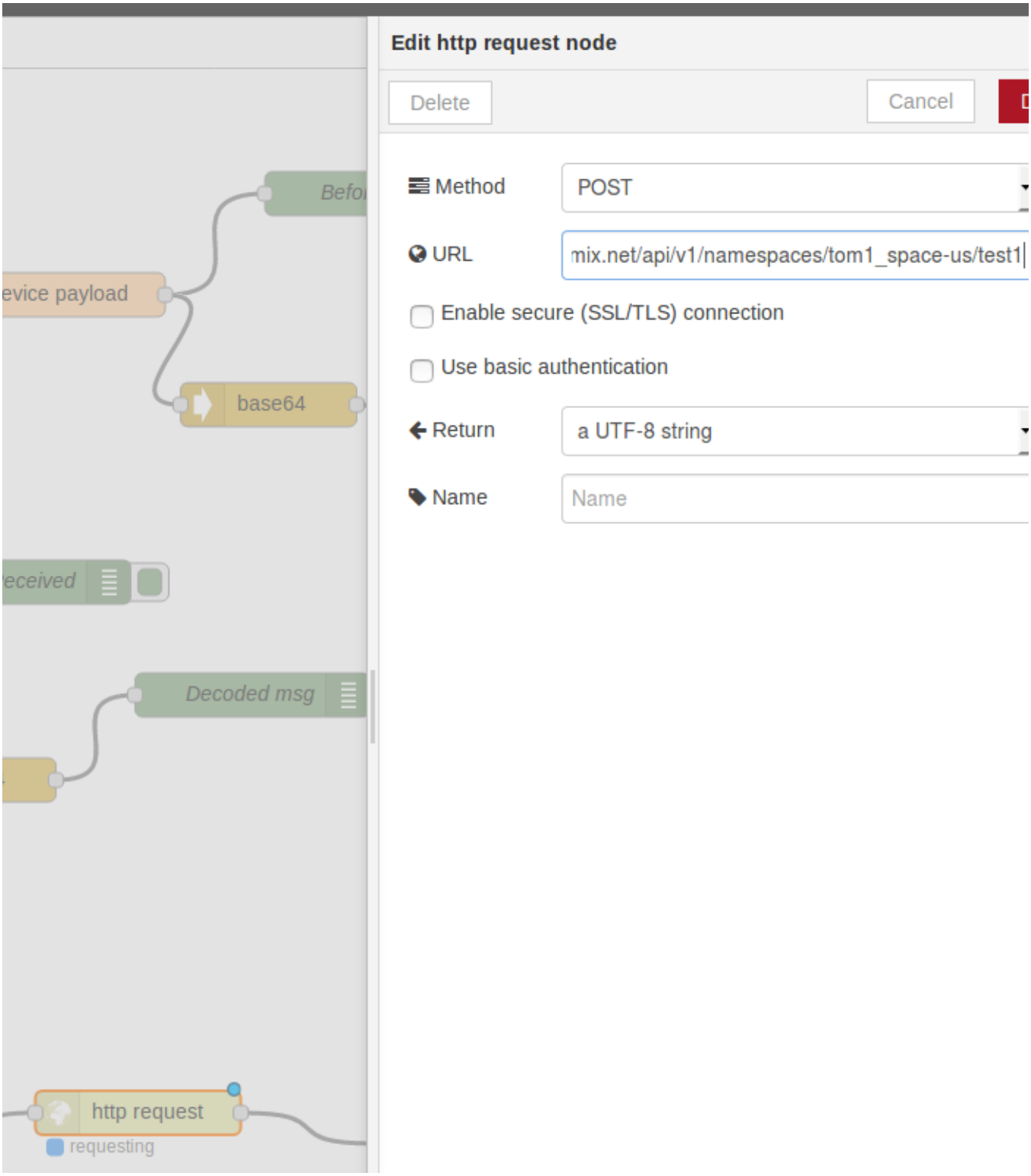
6.20 OpenWhisk microservice for decoding payload



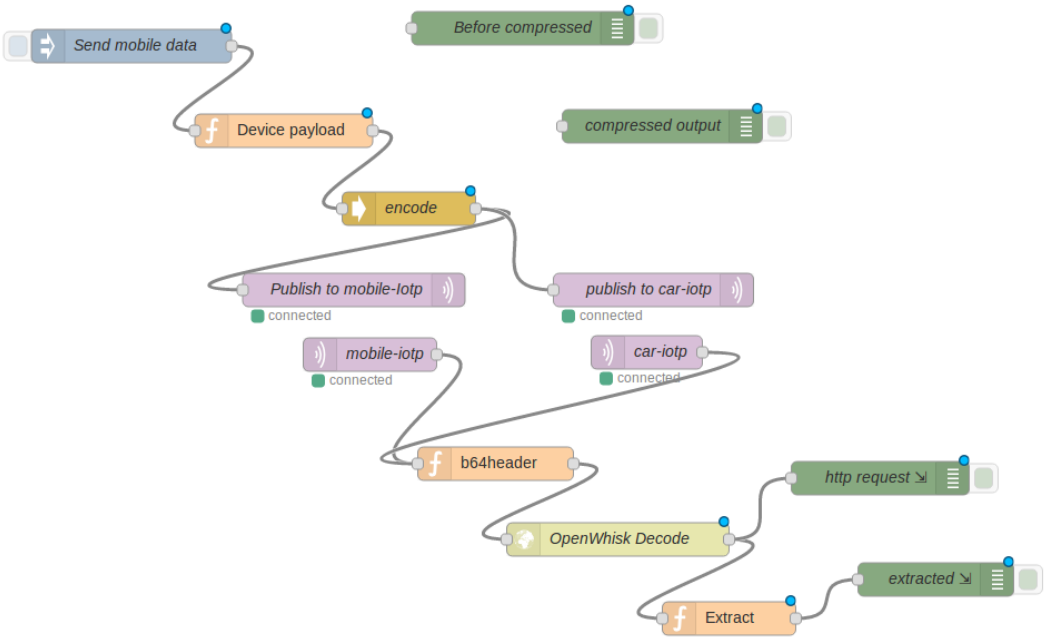


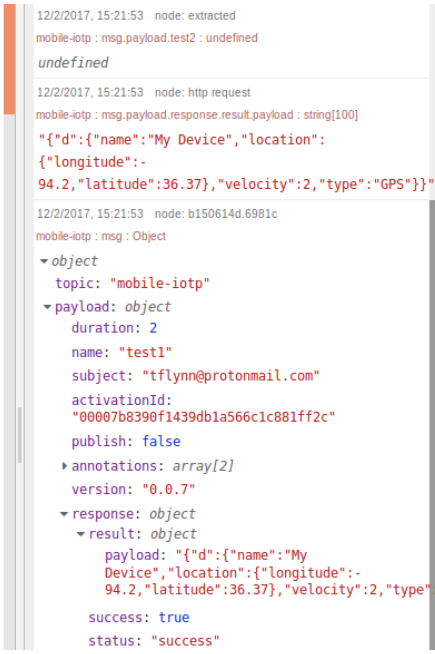


6.21 Configuring http reqest node in order to call OpenWhisk microservice through REST (couldn’t get OpenWhisk node to work)

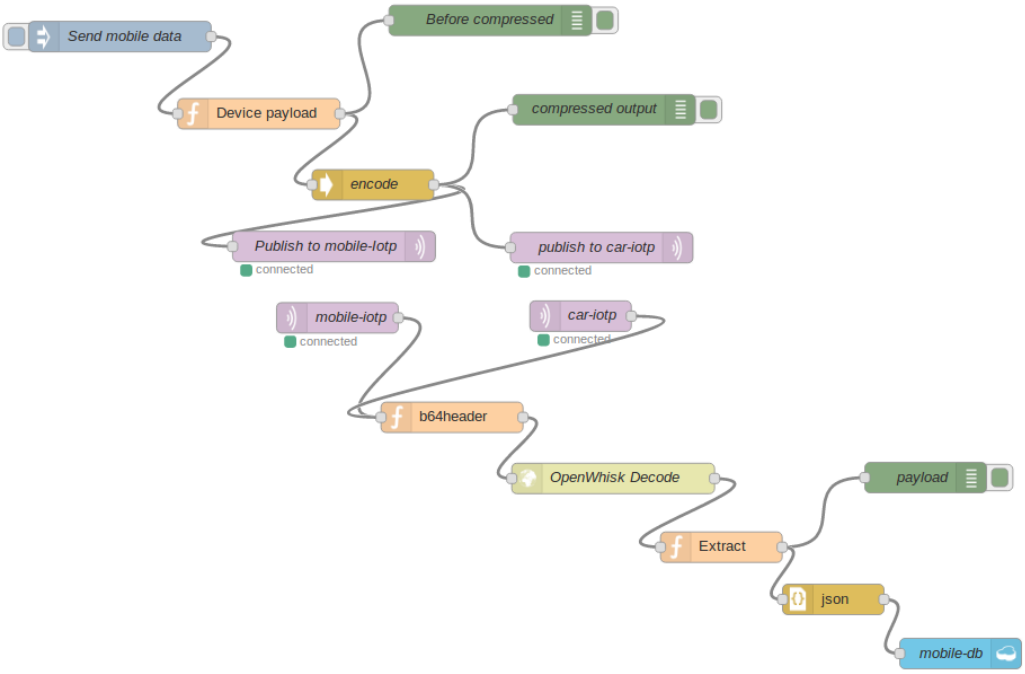


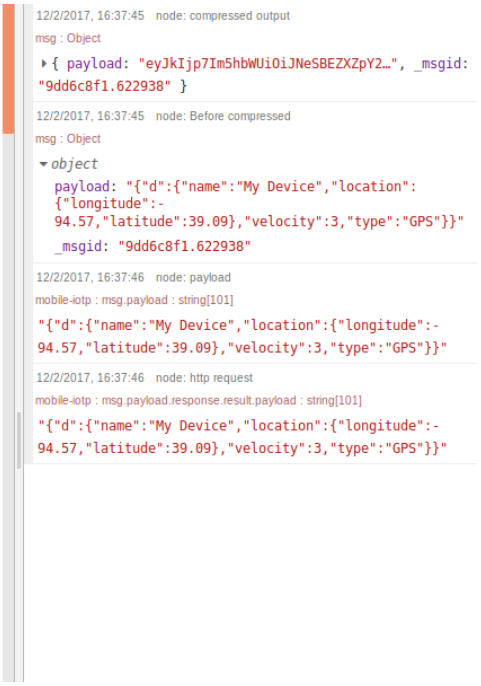
6.22 Test: Original payload received from http request to OpenWhisk





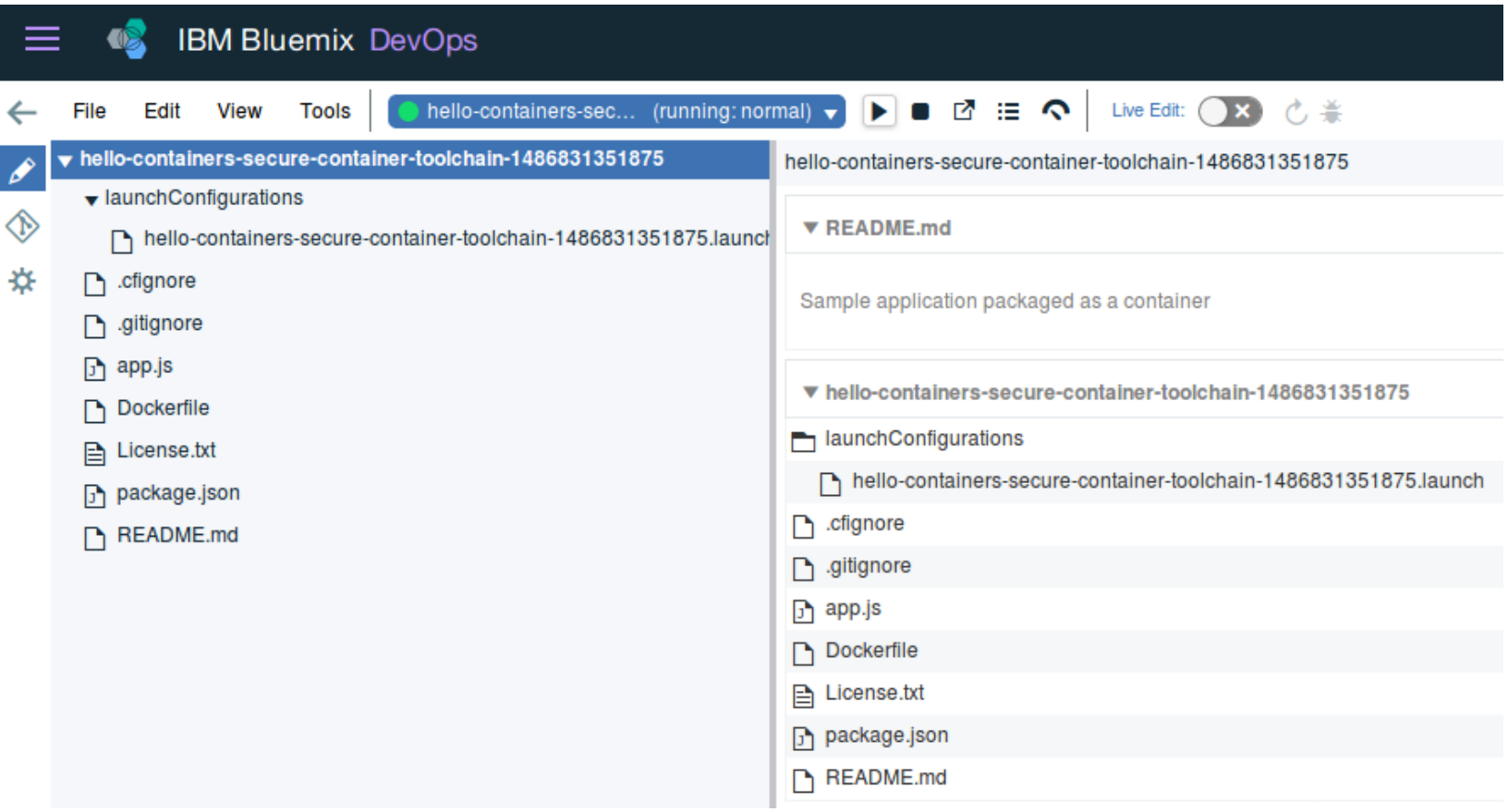
6.23 Test: Data sent to cloudant in json



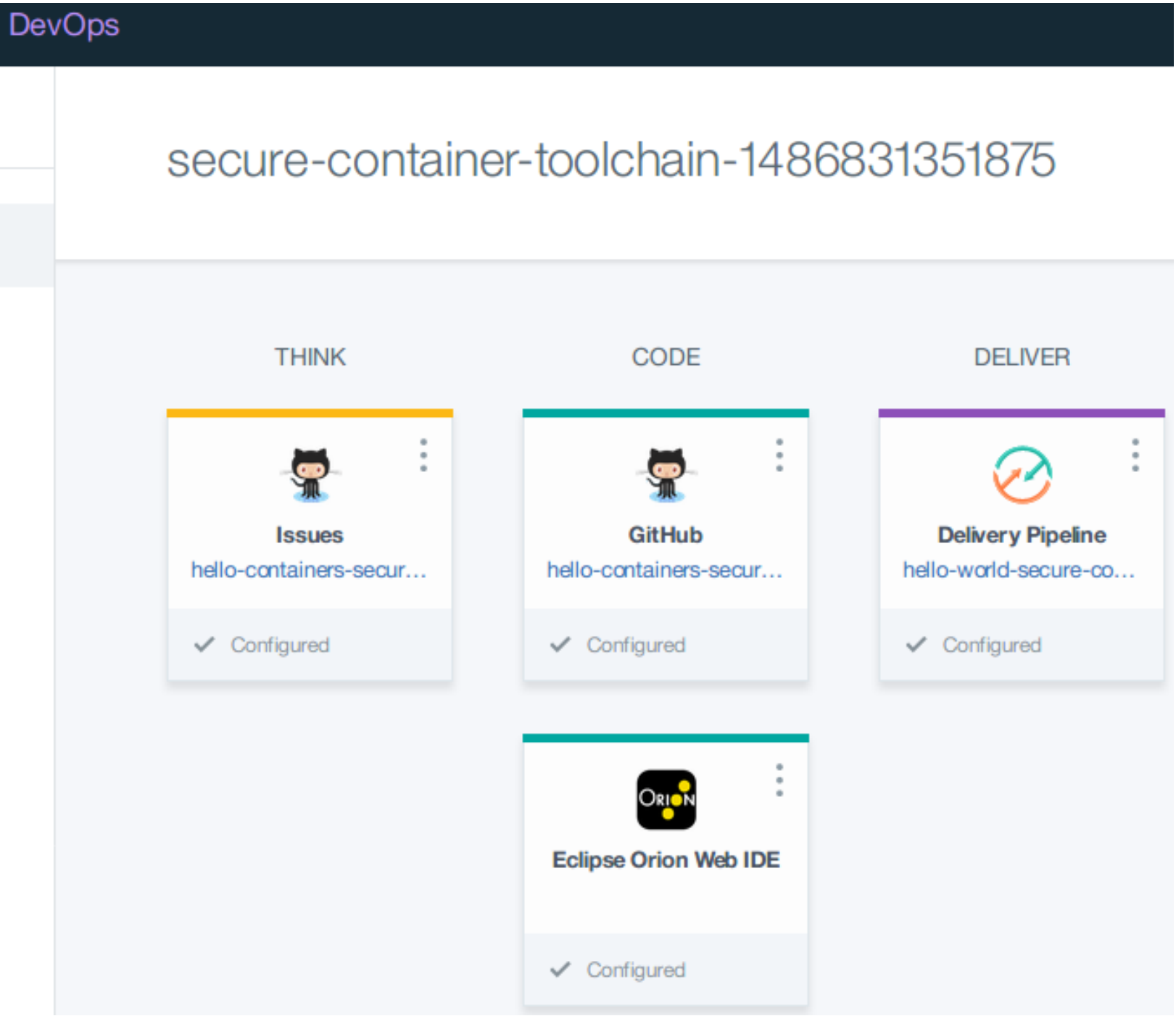


6.24 Reading data stored in json

6.25 DevOps: cloned tutorial repository

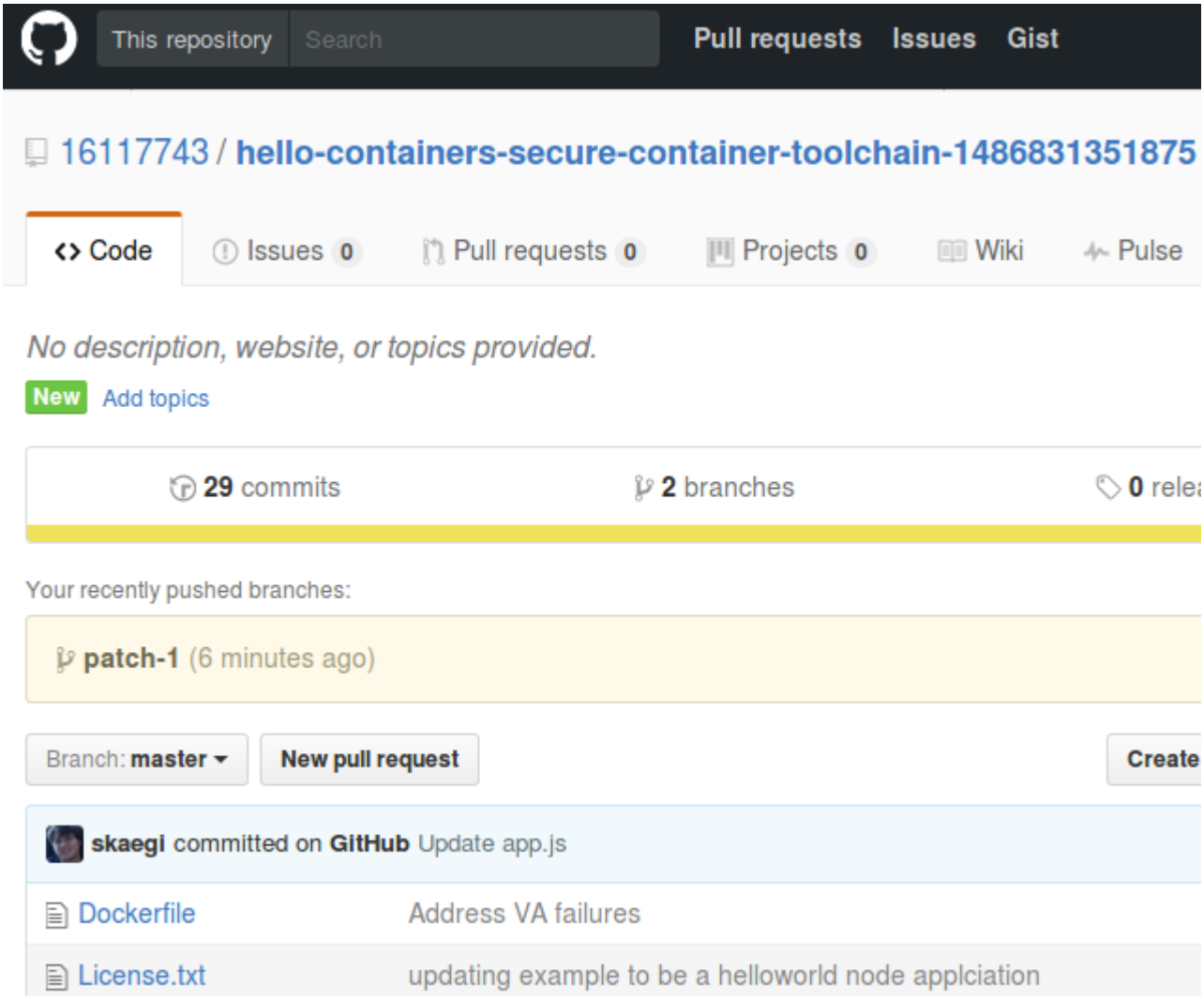


6.26 Overview of tool chain

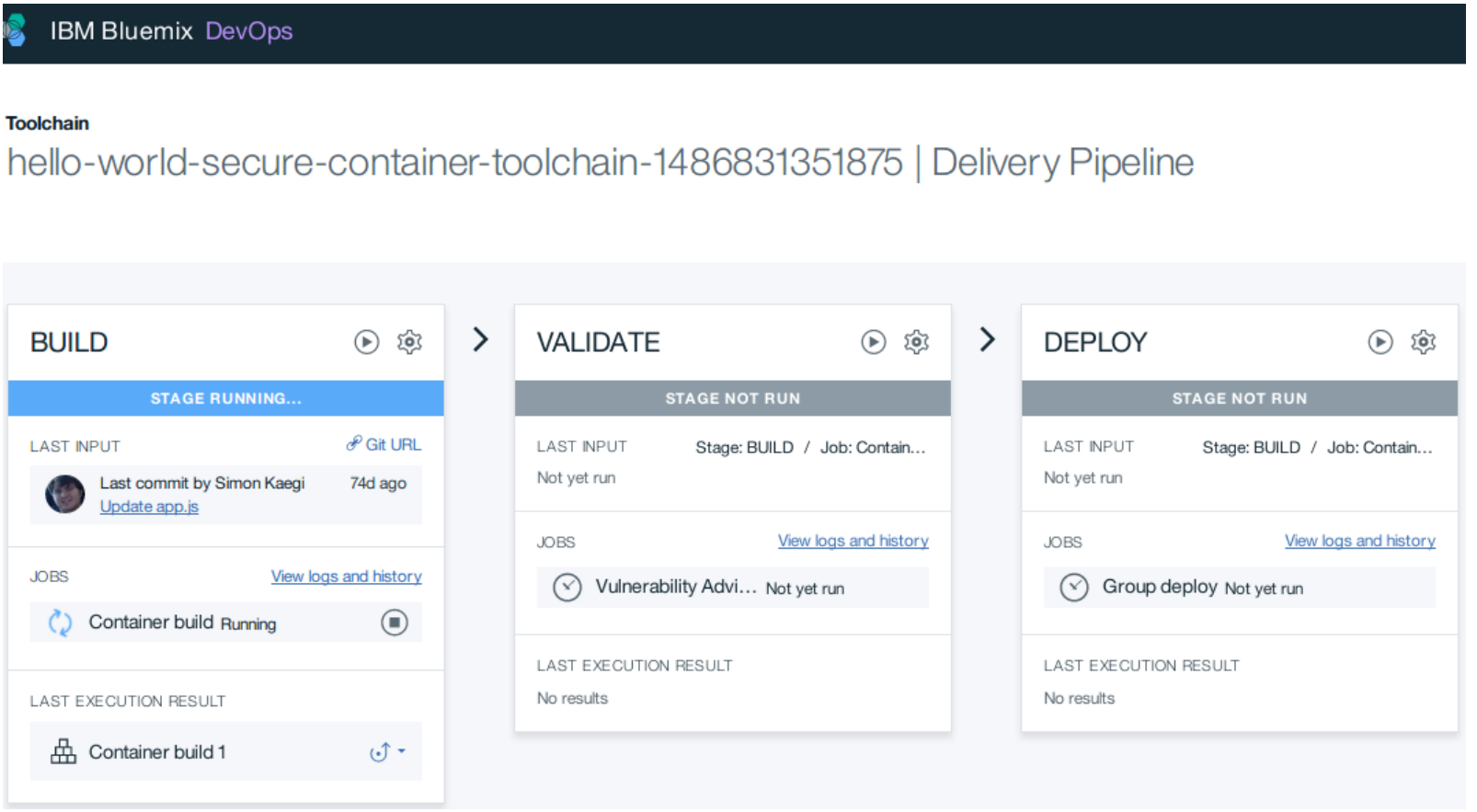


6.27 Toolchains

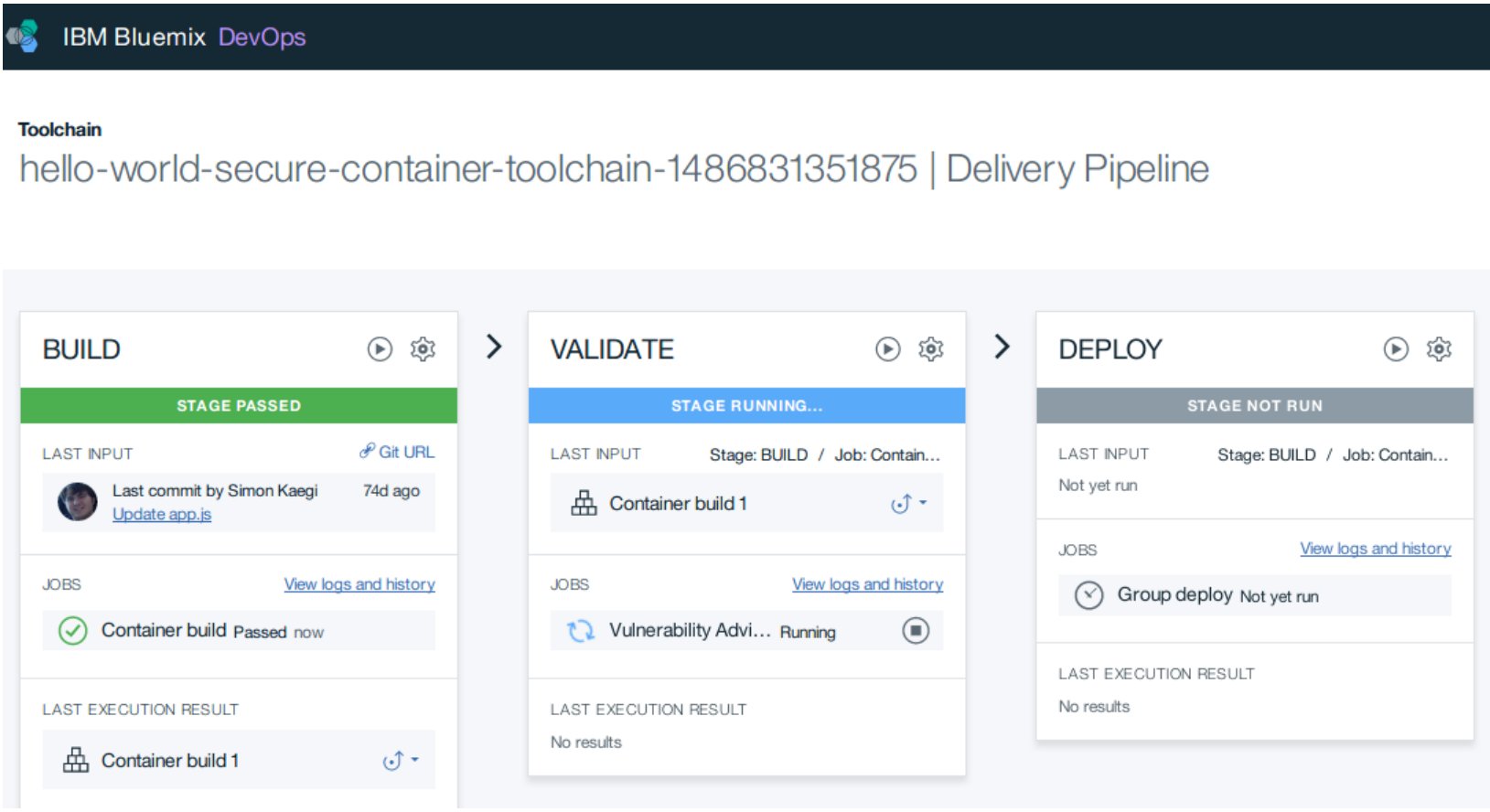
6.28 Repository on github



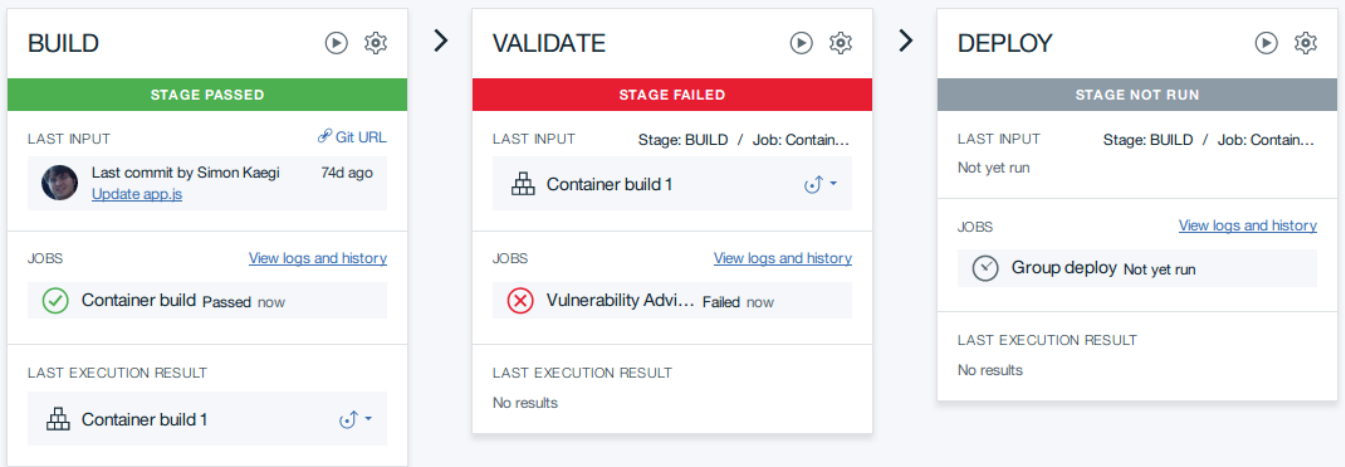
6.29 Pipeline: building



6.30 Pipeline: validating containers



6.31 Pipeline: failed validation

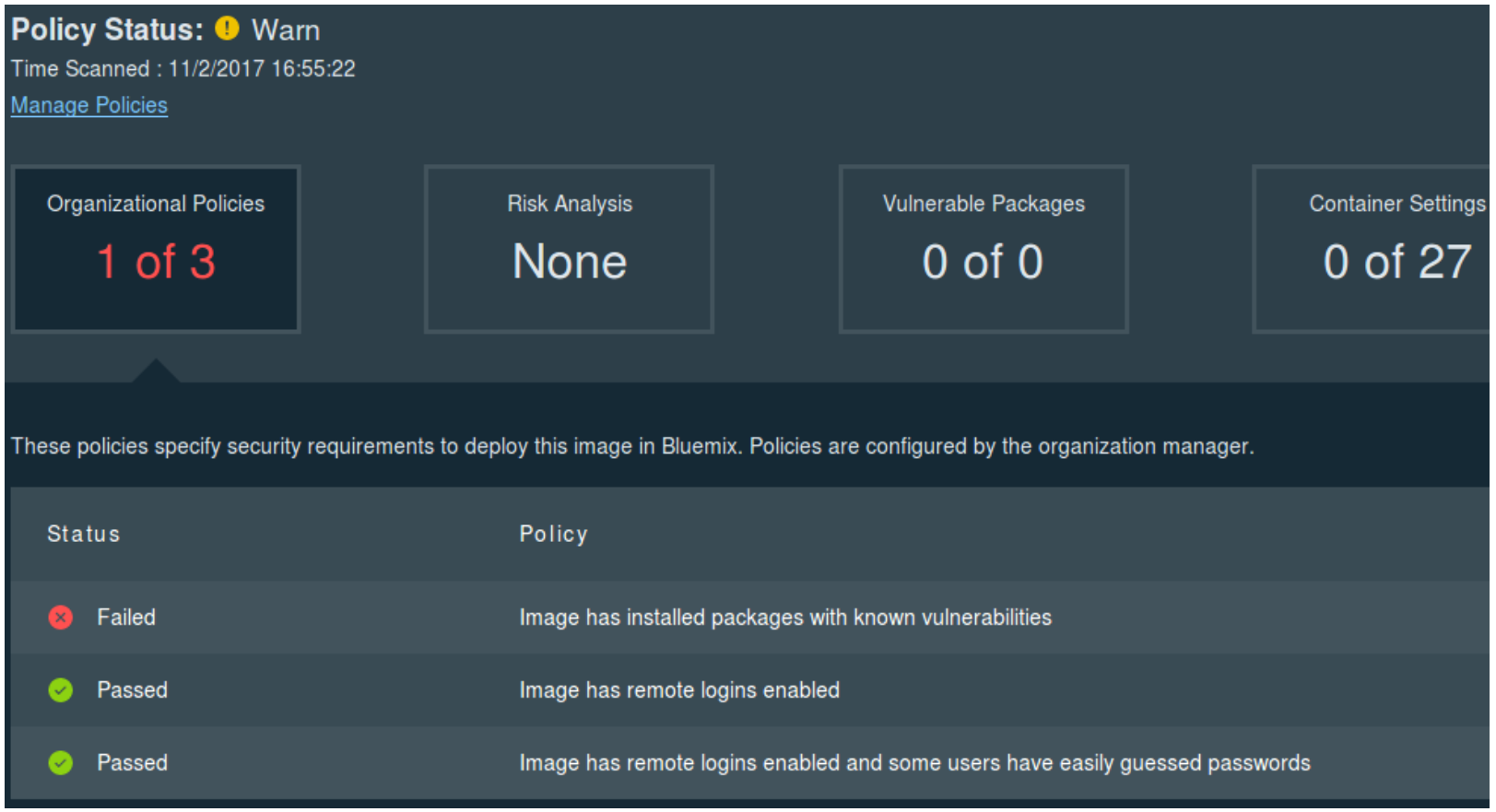


6.32 Pipeline: failed validation

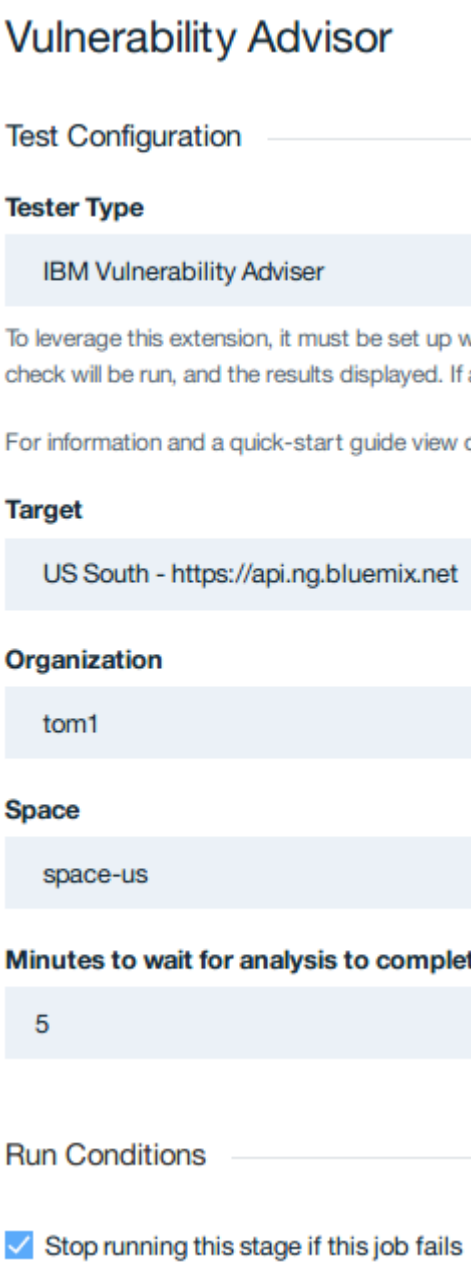
```
image registry.ng.bluemix.net/tomspace2/hello-containers-secure-container-tool
        376 packages scanned
        1 vulnerable packages
                openssl : current: 1.0.1t-1+deb8u5  fixed: 1.0.1t-1+deb8u6
**************************************************************************
2017-02-11 16:56:20,426 - pipeline - INFO - For a more in-depth review of thes
a256:de0f7fe258e969ad3665d52a8e1731739bd1bff9d6ea57d0737ad30976b66225&spaceGui
Script completed in 34.4133069515 seconds
2017-02-11 16:56:20 UTC : Archive directory is /tmp/extension_archive - copyin
2017-02-11 16:56:20 UTC : Issues found in or while getting compliance results.
To send notifications, set SLACK_WEBHOOK_PATH or HIP_CHAT_TOKEN in the environ
2017-02-11 16:56:20 UTC : Script runtime of 0m 36s

Finished: FAILED
```

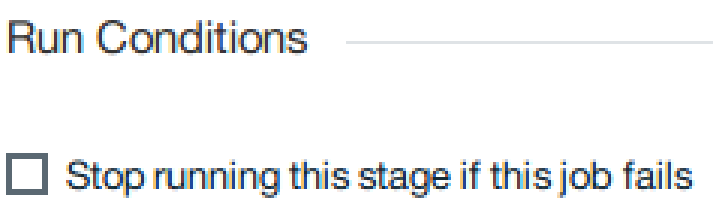
6.33 Pipeline: failed validation



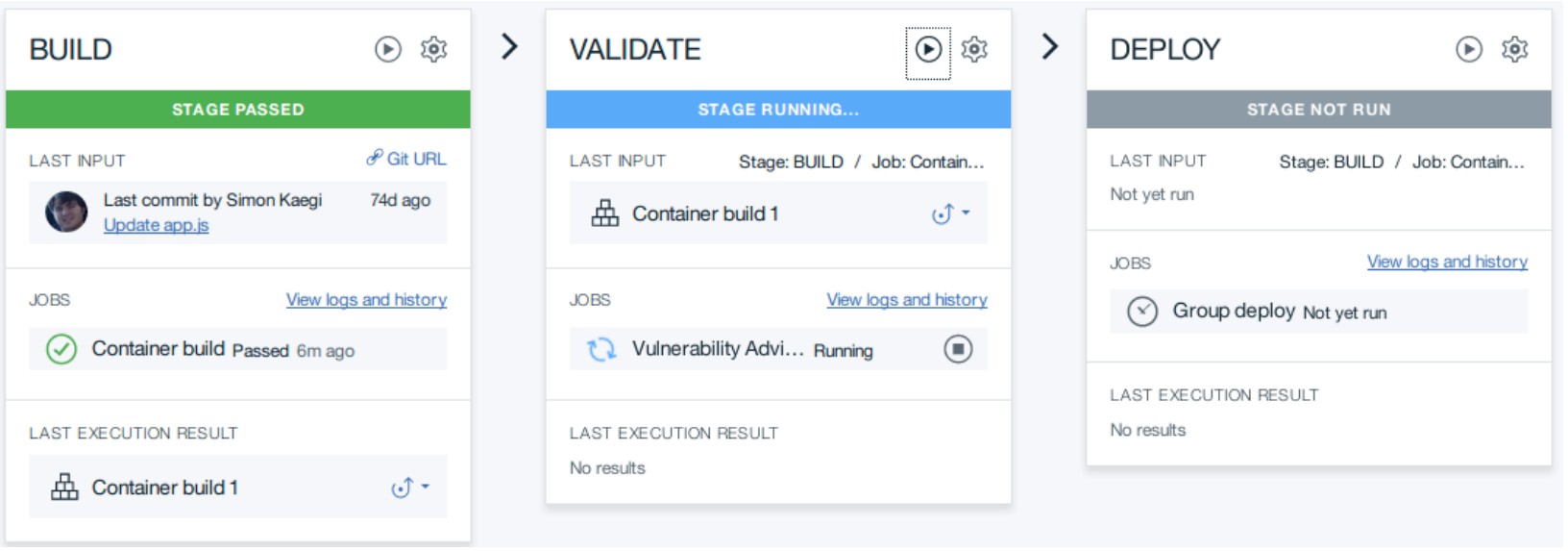
6.34 Vulnerability Advisor



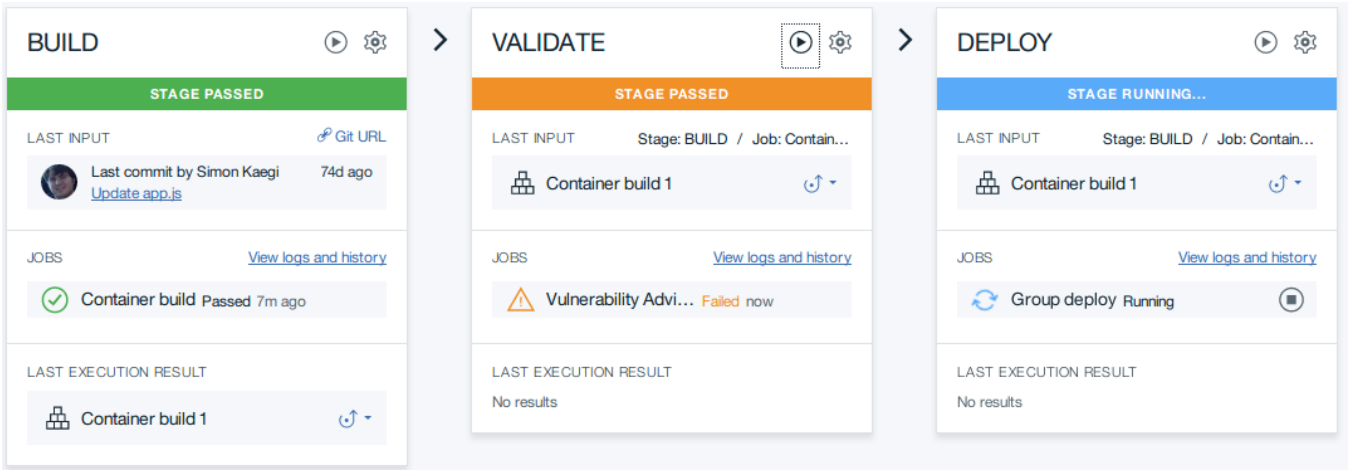
6.35 Editing “validation stage”



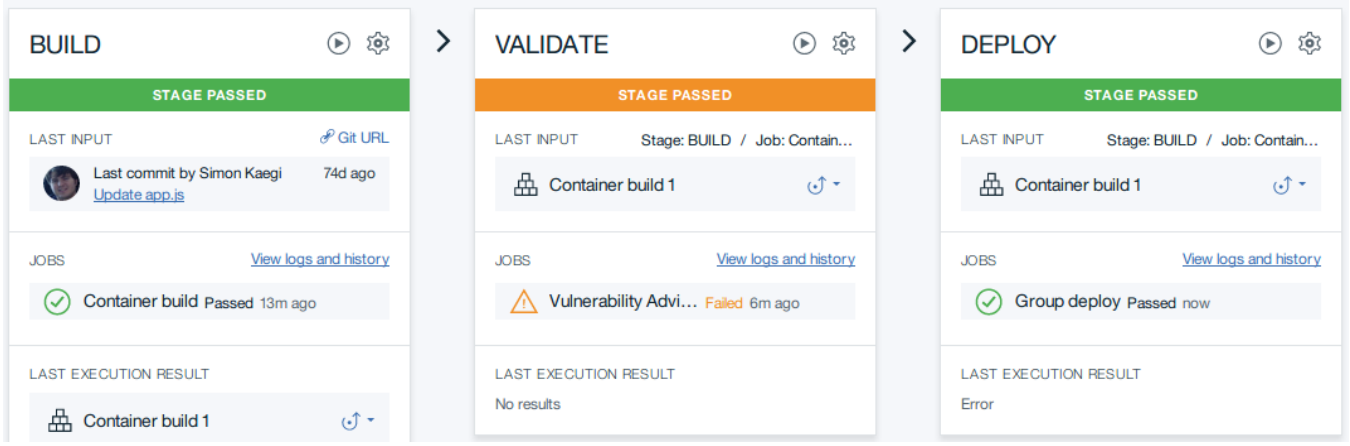
6.36 Pipeline: validation



6.37 Pipeline: failed validation



6.38 Pipeline: stage is passed anyway



6.39 Helloworld example running