How I Stuffed my Laptop inside a K8s Pod

Kent Hagerman
K8s App Development is a Frustrating Process

1. Build container
2. Push container
3. Redeploy
4. Test / Experiment
5. Recover logs
7. Make changes
8. Repeat
Wouldn’t this be so much better?

• K8s services reachable
• Build-run-test directly on laptop
• Entire kubernetes environment available
• Allow outbound & inbound connections to & from other pods
What I Have

- Remote access
- Slow build-push-redeploy-test cycle
Something like this...

- Forward pod’s open ports to local ports
- Proxy k8s-destined traffic through the pod
Design Goals

Ease of use

• Replace in-dev application image with proxy image
  • Deploy “as usual”

• Single command to connect laptop to proxy pod

• Build-run-test apps on local machine
  • Zero reconfiguration in the k8s cluster
  • Can build-run-test directly in IDE
Switching gears...

- Pods
- Services

Voltha-api-server (affinity router)

- voltha-api
- voltha-cli-server
- ofagent
- onos
- onos-ui

Voltha-ro-core

- voltha-ro-core-0
- voltha-ro-core-1

Voltha-rw-core-11

- voltha-rw-core-11

Voltha-rw-core-12

- voltha-rw-core-12
K8s Environment

Pods

Services

- voltha-api
  - voltha-api-server (affinity router)
  - voltha-cli
  - voltha-cli-server
  - onos
  - ofagent
  - onos-ui

- voltha-ro-core
- voltha-ro-core-0
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- voltha-rw-core-11
- voltha-rw-core-12
Laptop -- Proxy Pod

proxy pod

Voltha-ro-core
  voltha-ro-core-0
  voltha-ro-core-1

voltha-api
  voltha-api-server
    (affinity router)

voltha-cli
  voltha-cli-server

voltha-rw-core-11
voltha-rw-core-12

onos
  onos-ui
  ofagent
Outgoing Traffic

• Proxy traffic destined for k8s services through the pod
• Split DNS; proxy only *.cluster.local DNS requests through the pod
Demo #1

Laptop -> K8s Service
Demo #1

Laptop -> K8s Service
Demo #1

Laptop -> K8s Service
$ ./connect.sh

proxy pod

voltha-api

voltha-api-server

(vol affinity router)

voltha-cli

voltha-cli-server

ofagent

onos

onos-ui

Voltha-ro-core

voltha-ro-core-0

voltha-ro-core-1

voltha-rw-core-11

voltha-rw-core-12

voltha-rw-core-11

voltha-rw-core-12
What Happened?

$ ssh -p 5022 \ voltha@voltha-cli.voltha.svc.cluster.local
What Happened?

```
$ voltctl device list
```

[Diagram showing the interaction between different components of Voltha and Ofagent]
What Happened?

http://onos-ui.default.svc.cluster.local:8181/onos/ui
Laptop -> K8s

$ ./connect.sh
Incoming Traffic

• Forward incoming traffic from the proxy pod to the laptop

• Redirect some k8s applications or services to the proxy pod
Demo #2

K8s Service -> Laptop
Demo #2

K8s Service -> Laptop
Demo #2

K8s Service -> Laptop
What happened?

Run application in IDE

affinity router

proxy pod

Voltha-ro-core

voltha-ro-core-0

voltha-ro-core-1

voltha-api-server (affinity router)

voltha-api

voltha-cli

voltha-cli-server

voltha-rw-core-11

voltha-rw-core-12

ofagent

onos

onos-ui
What happened?

$ ./redirect.sh \\ –namespace=voltha voltha-api

Voltha-apiclient

onos-ui

onos

ofagent

Voltha-cli-server

Voltha-api

Voltha-api-server

(Affinity router)

Voltha-ro-core

Voltha-rw-core-11

Voltha-rw-core-12

proxy pod

Affinity router

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What happened?

$ ssh -p 5022 \ voltha@voltha-cli.voltha.svc.cluster.local
What happened?

```
$ voltctl device list
```

proxy pod

Voltha-ro-core

Voltha-ro-core-0

Voltha-ro-core-1

Voltha-rw-core-11

Voltha-rw-core-12

voltha-api

voltha-api-server

voltha-cli

voltha-cli-server

onos

onos-ui

ofagent

affinity router
K8s -> Laptop -> K8s

- proxy pod
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K8s -> Laptop -> K8s

Voltha-cliserver

voltha-api

voltha-cli

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ofagent

onos

onos-ui

proxy pod

affinity router

Laptop

K8s

Voltha-ro-core

voltha-ro-core-0

voltha-ro-core-1

Voltha-rw-core-11

voltha-rw-core-11

voltha-rw-core-12

voltha-rw-core-12
Final Thoughts

• Set up your environment *just so*.

• Don’t be afraid to reconsider bad processes.

• Make (better) tools.
Questions?

Tool repo:

github.com/kent-h/k8s-become-pod