



The bridge to possible

# Developing multi-product show tech consolidation application with Kubernetes

Tomonobu Okada – Principal Engineer  
DEVNET-2966

# Cisco Webex App

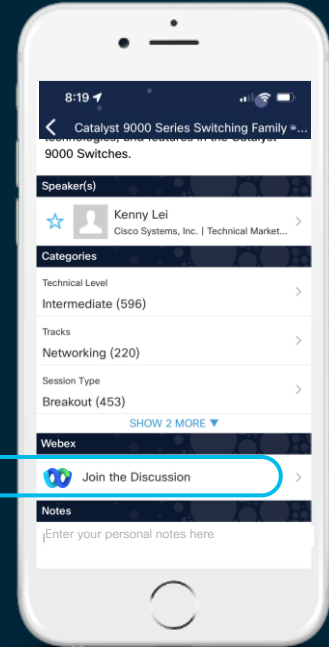
## Questions?

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## How

- 1 Find this session in the Cisco Live Mobile App
- 2 Click “Join the Discussion”
- 3 Install the Webex App or go directly to the Webex space
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<https://ciscolive.ciscoevents.com/ciscolivebot/#DEVNET-2966>



# Agenda

- Introduction
- Challenges to solve
- LokiGO Overview
- Development Principles
- Run and use LokiGO (Demo1)
- Kubernetesize (Demo2)
- Case Study

# Introduction



## Tomonobu Okada

Principal Engineer, TAC

Based in Tokyo, Japan

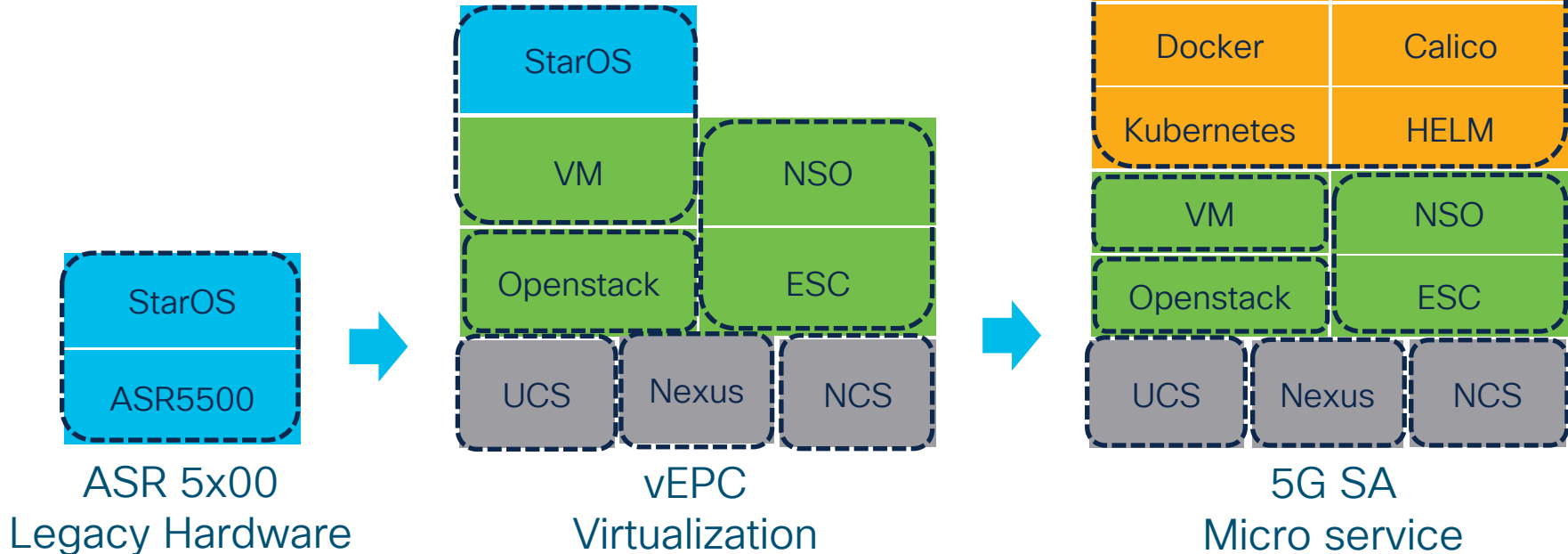
Tech: 4G/5G mobile packet core



# Challenges to solve

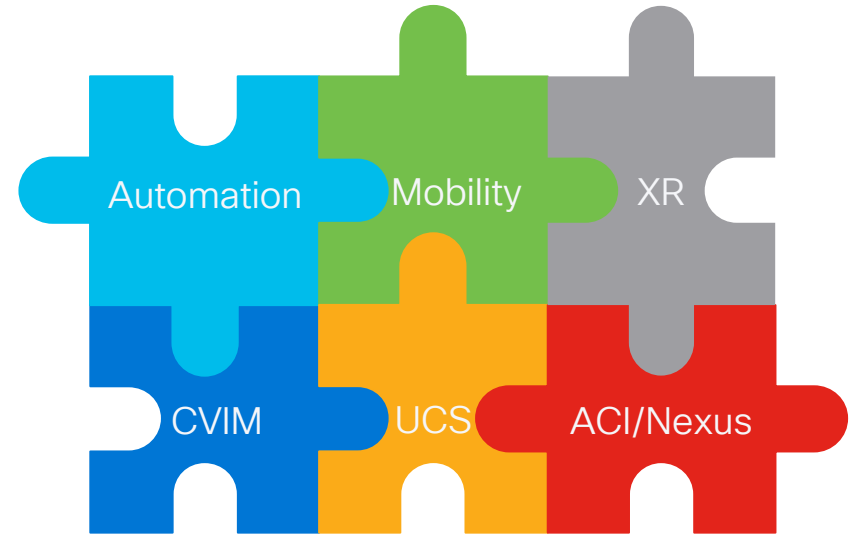
# Technology Evolution vs Complexity

 Technology team separation



# Challenges to support complex solution

- All hardware & software component is tightly integrated to form service
- High dependency between components
- Need basic understanding of the entire solution
- Difficulty to isolate a faulty component

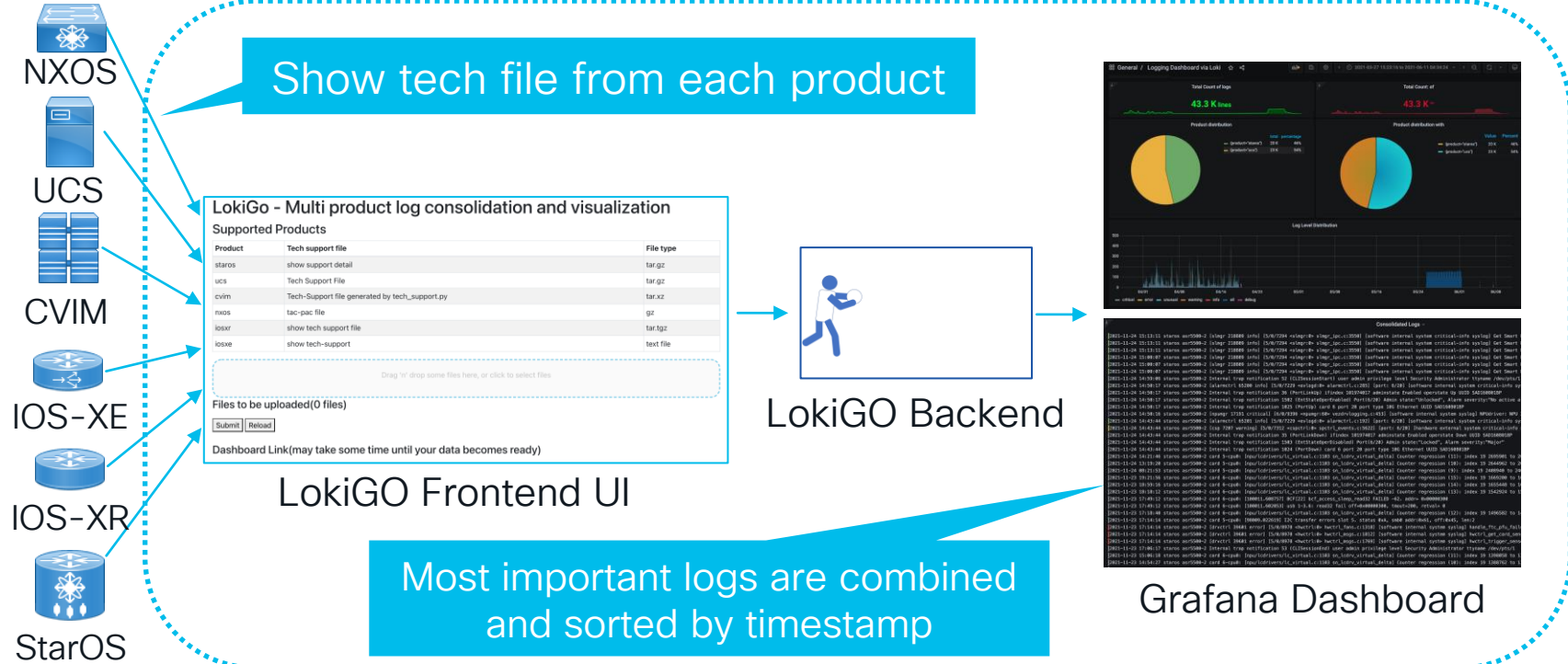


# LokiGO Overview



# LokiGO Overview

Multi-product show tech consolidation application



# LokiGO Use-cases

## Complex Solution

LokiGO can consolidate show tech file from different products and most important logging messages will be presented.

## Multiple Devices

When there is a need to troubleshoot multiple routers for a routing protocol issue, LokiGO can combine them.

## Single Device

Even for single device, LokiGO can consolidate different types of logging in a show tech so easy to troubleshoot.

# LokiGO Architecture

- Frontend UI(React)
- Backend App(Golang)

- Parse the data generated by LokiGO
- Send to Loki

- Store the data sent by Promtail
- Process query from Grafana

- Dashboard based on Loki as data source

- Provide clean up function

LokiGO

Promtail

Grafana Loki

Grafana

Log Cleaner

Docker / Kubernetes



# Development Principles

# Development Principle – Why Golang?

## Golang vs Python

- Parse 10 show support detail files
- Extract each tar.gz file
- Fetch “show logging” output
- Write it to a file
- Basic code, no performance optimization

## Python

```
› time python staros_log_test.py
python staros_log_test.py 54.36s user 2.89s system
98% cpu 57.953 total
```

## Golang

```
› time ./main
./main 7.11s user 2.04s system 103% cpu 8.828 total
```

```
› ls -lh | awk '{print $9,$5}'
```

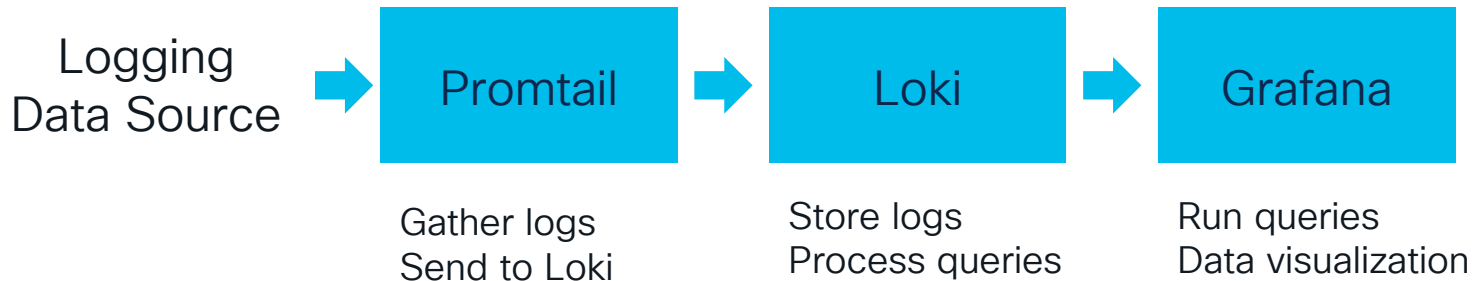
```
ssd0.tar.gz 12M
ssd1.tar.gz 12M
ssd2.tar.gz 12M
ssd3.tar.gz 12M
ssd4.tar.gz 12M
ssd5.tar.gz 12M
ssd6.tar.gz 12M
ssd7.tar.gz 12M
ssd8.tar.gz 12M
ssd9.tar.gz 12M
```

Go is faster than Python!!



# Development Principle - Why Grafana Loki?

- Grafana Loki is developed and released by Grafana Labs
- Loki is a horizontally-scalable, highly-available, multi-tenant log aggregation system inspired by Prometheus
- <https://grafana.com/oss/loki/>
- 3 components, Promtail, Loki, Grafana



# Promtail Log Scraping

Logging file  
generated by  
LokiGO

Promtail  
Scraping  
Config

Data on  
Grafana

```
4e22f491-df0a-47d7-b676-2efcd8f0ea12---test-cimc--- +0000 ---2021-Apr-13+20:19:19
| CIMC | Watchdog 2 BMC_WATCHDOG #0xf4 | Hard reset. |
```

Login  
g

expression: ^(?P<uuid>.\*)(?P<hostname>.\*)(?P<time>>(?:-|\+[0-9]{4})---[0-9]{4}-[a-zA-Z]{3}-[0-9]{2}\+[0-9]{2}:[0-9]{2}:[0-9]{2})(?P<message>.\*\$)

```
2021-04-14 05:19:19 ucs test-cimc | CIMC | Watchdog 2 BMC_WATCHDOG #0xf4 | Hard reset. |

Log labels
filename /var/log/ucs_log/logtest2.log
hostname test-cimc
job ucs_log
logtype logging
product ucs
uuid 5e22f491-df0a-47d7-b676-2efcd8f0ea12
```

# Run and use LokiGO



# Run with Docker

- `git clone https://github.com/tookada/ciscolokigo.git`
- `cd ciscolokigo`
- `docker run -v $(pwd):/mnt/config --name promtail -d -v $(pwd)/log:/var/log grafana/promtail:1.6.0 -config.file=/mnt/config/promtail-config.yaml`
- `docker run -d -v $(pwd):/mnt/config -p 3100:3100 --name loki grafana/loki:1.6.0 -config.file=/mnt/config/loki-config.yaml`
- `docker run -p 8089:8089 -d --name lokigo -v $(pwd)/log:/var/log tookadacisco/lokigo:prod`
- `docker run -d -p 3000:3000 -v $(pwd)/datastore:/etc/grafana/provisioning/datasources -v $(pwd)/dashboard:/etc/grafana/provisioning/dashboards -v $(pwd)/json-config:/etc/dashboards --name grafana -e "GF_INSTALL_PLUGINS=grafana-piechart-panel" grafana/grafana:7.5.7`
- The application can be accessed on <http://127.0.0.1:8089>
- The default username and password for Grafana is admin/admin (You will be requested to change it).

# LokiGO Frontend UI

<http://127.0.0.1:8089/>

## LokiGo - Multi product log consolidation and visualization

### Supported Products

Product	Tech support file	File type
staros	show support detail	tar.gz
ucs	Tech Support File	tar.gz
cvim	Tech-Support file generated by tech_support.py	tar.xz
nxos	tac-pac file	gz
iosxr	show tech support file	tar.t
iosxe	show tech-support	text

Put show tech files

Drag 'n' drop some files here, or click to select files

### Files to be uploaded(1 files)

- support\_test.tar.gz - 12364145 bytes staros ▾

Submit

Reload

Choose product type for each file  
and click Submit

### Dashboard Link(may take some time until your data becomes ready)

[Dashboard Link](#)

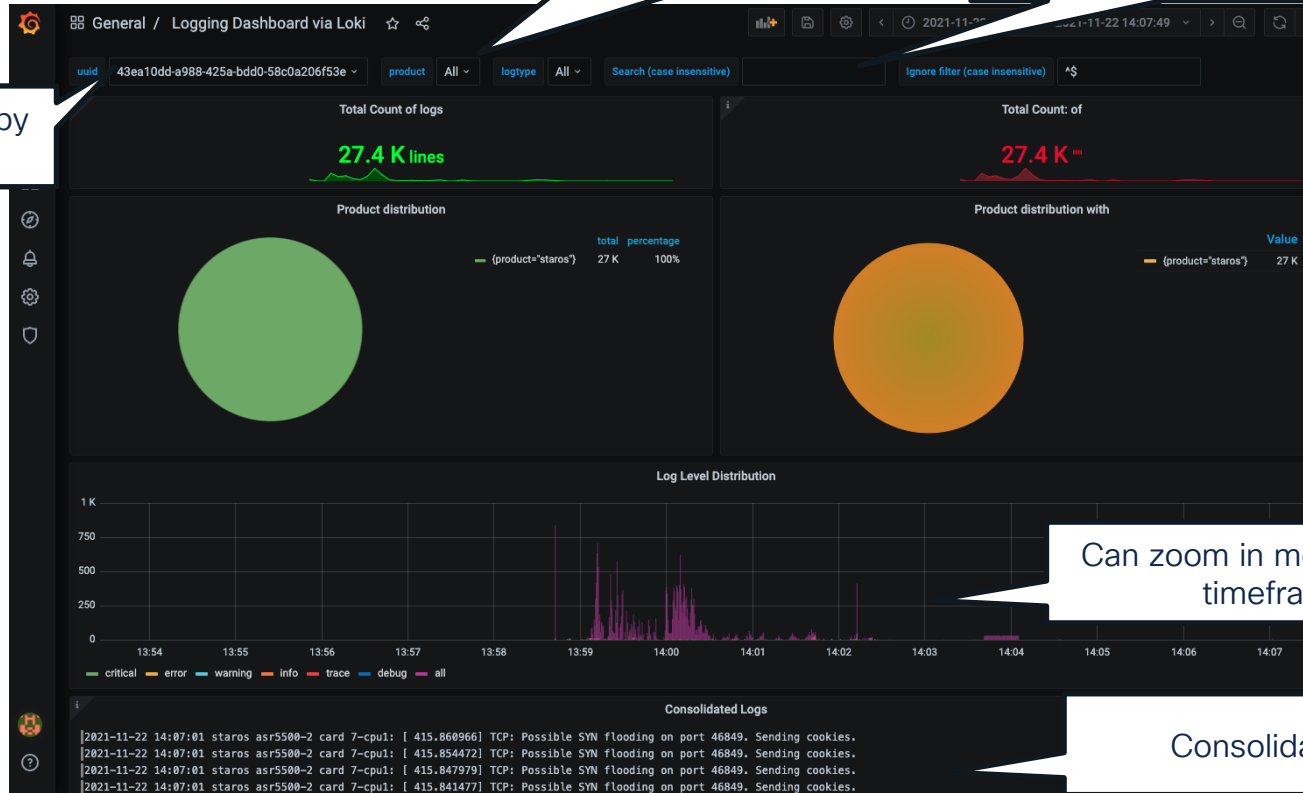
Dashboard Link will be available after some time

# LokiGO Dashboard

Data can be filtered by product and/or logtype

Search keyword / Ignore keyword

Data is filtered by UUID



Can zoom in more specific timeframe

Consolidated log

# Demo 1

## Run LokiGO with Docker

# Kubernetesize

# Kubernetesized LokiGO – Infrastructure as Code

- Container deployment automation

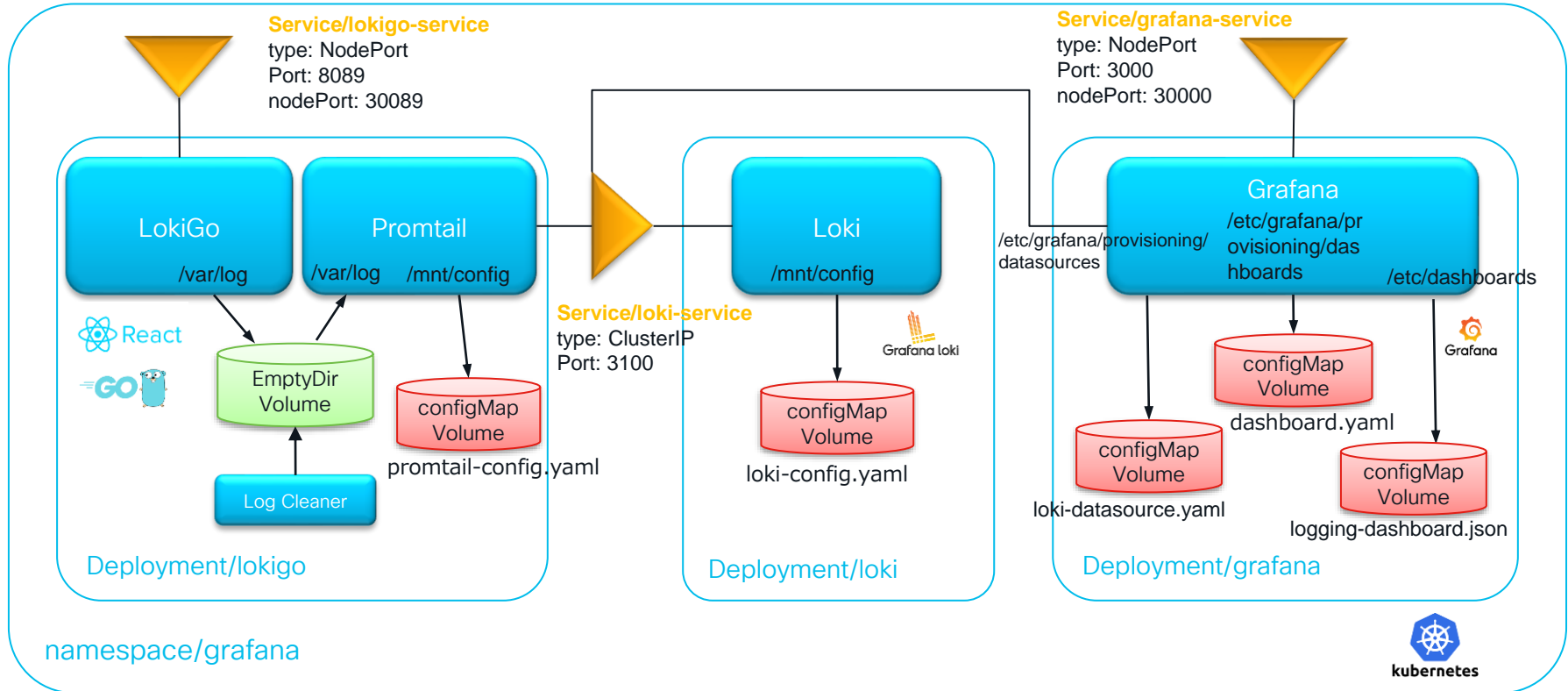
kubectl create -f <https://raw.githubusercontent.com/tookada/ciscolokigo/main/lokigo.yaml>

- Infrastructure as Code

```
apiVersion: apps/v1
kind: Deployment
metadata:
  labels:
    app: lokigo
    tier: frontend
  name: lokigo
  namespace: Grafana
---
spec:
  containers:
  - image: tookadacisco/lokigo:prod
    name: lokigo-react
```

```
apiVersion: v1
kind: Service
metadata:
  labels:
    app: lokigo
    tier: frontend
  name: lokigo-service
  namespace: grafana
spec:
  ports:
  - port: 8089
    protocol: TCP
    targetPort: react-http
    nodePort: 30089
```

# Kubernetesized LokiGO Overview



# Kubernetesized LokiGO Readiness & Liveness Probe

- Deployment lokigo (similar policy is applied on other deployment too)
- Monitor TCP port 8089 with readinessProbe, start monitoring after the first 5 seconds and monitor at 5 second intervals
- Monitor TCP port 8089 with livenessProbe, start monitoring after the first 30 seconds, and monitor at 30 second intervals

```
readinessProbe:
  tcpSocket:
    port: 8089
  initialDelaySeconds: 5
  periodSeconds: 5
livenessProbe:
  tcpSocket:
    port: 8089
  initialDelaySeconds: 30
  periodSeconds: 30
```



# Demo 2

## Run LokiGO with Kubernetes

# Run with Kubernetes (cont.)

```
stack@pod47-master:~$ kubectl get node
```

NAME	STATUS	ROLES	AGE	VERSION
pod47-master	Ready	control-plane,master	27d	v1.21.0
pod47-node1	Ready	<none>	27d	v1.21.0

```
stack@pod47-master:~$ kubectl get ns grafana
Error from server (NotFound): namespaces "grafana" not found
```

```
stack@pod47-master:~$ kubectl create -f lokigo_proxy.yaml
namespace/grafana created
configmap/promtail-config created
configmap/loki-config created
deployment.apps/lokigo created
service/lokigo-service created
deployment.apps/loki created
service/loki-service created
configmap/loki-datastore created
configmap/dashboard-config created
configmap/dashboard-json created
deployment.apps/grafana created
service/grafana-service created
```

# Run with Kubernetes

```
stack@pod47-master:~$ kubectl get deploy -n grafana
```

NAME	READY	UP-TO-DATE	AVAILABLE	AGE
grafana	1/1	1	1	5m18s
loki	1/1	1	1	5m18s
lokigo	1/1	1	1	5m18s

```
stack@pod47-master:~$ kubectl get pod -n grafana
```

NAME	READY	STATUS	RESTARTS	AGE
grafana-6dfdc6797b-jdp5c	1/1	Running	0	62s
loki-6c5cc4d487-qsfpw	1/1	Running	0	62s
lokigo-65ff5d7bfc-6wc5w	3/3	Running	0	62s

<http://<IP address of your Kubernetes cluster>:30089/>

# Case Study

# Case Study 1

## BFD Down detected at StarOS running on CVIM/UCS

ECC error is the trigger of BFD down and this is the problem we need to investigate.

BFD down is detected at StarOS and this is customer visible

```
2021-06-23 22:37:50 staros Internal trap notification 1277 (BFDSessionDown) vpn
2021-06-23 22:37:50 staros Internal trap notification 1277 (BFDSessionDown) vpn
2021-06-23 22:37:50 staros Internal trap notification 1277 (BFDSessionDown) vpn
```

Right before the BFD down, ECC errors are reported at

```
2021-06-23 22:34:21 ucs CIMC | Memory DDR4_P2_H1_ECC #0xb4 | read 1 correctable ECC errors on CPU2 DIMM H1 |
2021-06-23 22:34:12 cvim root: [check_mlom_port.sh] Ping OK!!
2021-06-23 22:33:12 cvim root: [check_mlom_port.sh] Ping OK!!
2021-06-23 22:33:01 ucs .0(4i):selparser:1318: [[xxxCVxxx]]:selparser.c:727: # 54 04 00 00 01 02 00 00 0C 38 D3
2021-06-23 22:33:00 ucs CIMC | Memory DDR4_P2_H1_ECC #0xb4 | read 1 correctable ECC errors on CPU2 DIMM H1 |
2021-06-23 22:32:54 cvim systemd-logind: Removed session 229224.
2021-06-23 22:32:24 cvim systemd-logind: Removed session 229223.
2021-06-23 22:32:20 ucs CIMC | Memory DDR4_P2_H1_ECC #0xb4 | read 1 correctable ECC errors on CPU2 DIMM H1 |
2021-06-23 22:32:20 ucs .0(4i):selparser:1318: [[xxxCVxxx]]:selparser.c:727: # 53 04 00 00 01 02 00 00 E4 37 D3
```

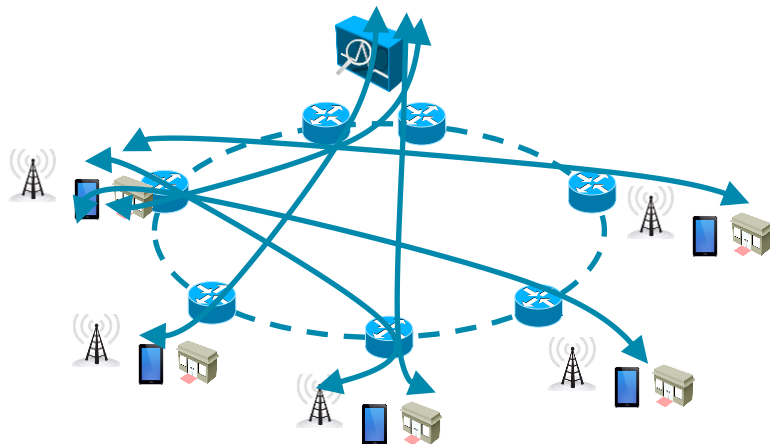
Single bit ECC is reported at CVIM also

```
2021-06-23 22:37:59 cvim kernel: {2}[Hardware Error]: DIMM location: NODE 1 CHANNEL 1 DIMM 0 DIMM_H1
2021-06-23 22:37:59 cvim kernel: {2}[Hardware Error]: error_type: 2, single-bit ECC
2021-06-23 22:37:59 cvim kernel: {2}[Hardware Error]: node: 2 card: 1 module: 0 rank: 0 device: 9
2021-06-23 22:37:59 cvim kernel: {2}[Hardware Error]: section_type: memory error
2021-06-23 22:37:59 cvim kernel: {2}[Hardware Error]: Error 0, type: corrected
2021-06-23 22:37:59 cvim kernel: {2}[Hardware Error]: event severity: corrected
2021-06-23 22:37:59 cvim kernel: {2}[Hardware Error]: It has been corrected by h/w and requires no further action
```

# Case Study 2 (cont.)

## L2VPN traffic outage with IOS-XR

Various type of service traffic over SR with L3/L2 VPN technologies



Service traffic stopped suddenly

- The service runs on L2 VPN
- The outage started from Sep 28 23:19:26 to Sep 28 23:19:50
- No issue is seen on other service
- There were several operations on the day over metro network
- The metro network consists of over 20 PE/CE/P routers

# Case Study 2

## L2VPN traffic outage with IOS-XR

- Zoom in the timestamp which the outage happened
- There was an ISSU SW upgrade on one PE router
- Narrow down to one router and keep debugging

```
> 2021 Sep 28 23:19:26.648 +0900 ios_xr RP/0/RP1/CPU0 ospf[1010]: %ROUTING-OSPF-5-HA_NOTICE : Process 500: Starting NSR-enabled recovery procedures
> 2021 Sep 28 23:19:26.670 +0900 ios_xr RP/0/RP1/CPU0 ospf[1009]: %ROUTING-OSPF-5-HA_NOTICE : Process 101: Starting NSR-enabled recovery procedures
> 2021 Sep 28 23:19:26.674 +0900 ios_xr RP/0/RP1/CPU0 bpm[1080]: %ROUTING-BGP-5-ASYNC_IPC_STATUS : bpm-active:(bpg-bpm-active)inst-id 0, Service Published
> 2021 Sep 28 23:19:26.674 +0900 ios_xr RP/0/RP1/CPU0 ospf[1010]: %ROUTING-OSPF-5-HA_NOTICE : Process 500: Signaled PROC_AVAILABLE
> 2021 Sep 28 23:19:26.678 +0900 ios_xr RP/0/RP1/CPU0 ospf[1010]: %ROUTING-OSPF-5-HA_NOTICE : Process 500: Completed NSR-enabled activation procedures
> 2021 Sep 28 23:19:26.685 +0900 ios_xr RP/0/RP1/CPU0 imfpga[196] Change ISSU Node State from [Secondary] to [Primary]
> 2021 Sep 28 23:19:26.686 +0900 ios_xr RP/0/RP1/CPU0 imfpga[194] Change ISSU Node State from [Secondary] to [Primary]
> 2021 Sep 28 23:19:26.687 +0900 ios_xr RP/0/RP1/CPU0 imfpga[194] ISSU Phase Change Notification [Phase Run Exec], changing IM PLLs now
> 2021 Sep 28 23:19:26.687 +0900 ios_xr RP/0/RP1/CPU0 imfpga[197] Change ISSU Node State from [Secondary] to [Primary]
> 2021 Sep 28 23:19:26.689 +0900 ios_xr RP/0/RP1/CPU0 imfpga[199] Change ISSU Node State from [Secondary] to [Primary]
> 2021 Sep 28 23:19:26.690 +0900 ios_xr RP/0/RP1/CPU0 imfpga[199] ISSU Phase Change Notification [Phase Run Exec], changing IM PLLs now
> 2021 Sep 28 23:19:26.692 +0900 ios_xr RP/0/RP1/CPU0 ospf[1009]: %ROUTING-OSPF-5-HA_NOTICE : Process 101: Signaled PROC_AVAILABLE
> 2021 Sep 28 23:19:26.692 +0900 ios_xr RP/0/RP1/CPU0 imfpga[195]: Change ISSU Node State from [Secondary] to [Primary]
> 2021 Sep 28 23:19:26.693 +0900 ios_xr RP/0/RP1/CPU0 imfpga[198]: Change ISSU Node State from [Secondary] to [Primary]
> 2021 Sep 28 23:19:26.693 +0900 ios_xr RP/0/RP1/CPU0 ospf[1009]: %ROUTING-OSPF-5-HA_NOTICE : Process 101: Completed NSR-enabled activation procedures
> 2021 Sep 28 23:19:26.693 +0900 ios_xr RP/0/RP1/CPU0 imfpga[195]: ISSU Phase Change Notification [Phase Run Exec], changing IM PLLs now
> 2021 Sep 28 23:19:26.695 +0900 ios_xr RP/0/RP1/CPU0 imfpga[198]: ISSU Phase Change Notification [Phase Run Exec], changing IM PLLs now
> 2021 Sep 28 23:19:26.695 +0900 ios_xr RP/0/RP1/CPU0 imfpga[197]: ISSU Phase Change Notification [Phase Run Exec], changing IM PLLs now
> 2021 Sep 28 23:19:26.697 +0900 ios_xr RP/0/RP1/CPU0 imfpga[196]: ISSU Phase Change Notification [Phase Run Exec], changing IM PLLs now
> 2021 Sep 28 23:19:26.706 +0900 ios_xr RP/0/RP1/CPU0 issudir[227]: %PKT_INFRA-FM-6-FAULT_INFO : ISSU-IN-PROGRESS :DECLARE :0/RP1/CPU0: ISSU_IN_PROGRESS Alarm : being DECLARED for the system
> 2021 Sep 28 23:19:26.715 +0900 ios_xr RP/0/RP1/CPU0 tmgctrl[276]: ISSU Phase Change Notification [Phase Run Exec]
> 2021 Sep 28 23:19:26.715 +0900 ios_xr RP/0/RP1/CPU0 tmgctrl[276]: ISSU Phase Change issu_phase:8
> 2021 Sep 28 23:19:26.715 +0900 ios_xr RP/0/RP1/CPU0 tmgctrl[276]: issul phase nfn received : 8 1 1
> 2021 Sep 28 23:19:26.715 +0900 ios_xr RP/0/RP1/CPU0 tmgctrl[276]: ISSU Node Role Change Notification [Primary]
> 2021 Sep 28 23:19:26.813 +0900 ios_xr RP/0/RP1/CPU0 bpm[1080]: %ROUTING-BGP-5-ASYNC_IPC_STATUS : bpm-default:(A)inst-id 0, Connection Closed
> 2021 Sep 28 23:19:26.814 +0900 ios_xr RP/0/RP1/CPU0 bgp[10651]: %ROUTING-BGP-5-ASYNC_IPC_STATUS : default:(A)inst-id 0, Connection Close
> 2021 Sep 28 23:19:26.827 +0900 ios_xr RP/0/RP1/CPU0 bgp[10651]: %ROUTING-BGP-5-NSR_STATE_CHANGE : Changed state to Not NSR-Ready
```

# References

- Cisco Code Exchange

<https://developer.cisco.com/codeexchange/github/repo/tookada/ciscolokigo>

- Git Repogitory

<https://github.com/tookada/ciscolokigo>

- Docker Hub

<https://hub.docker.com/r/tookadacisco/lokigo>



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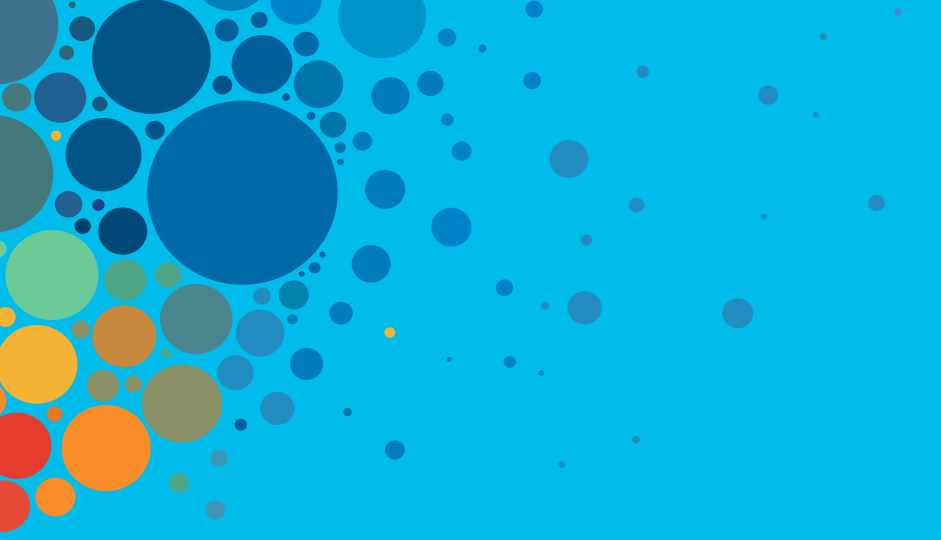
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The bridge to possible

# Thank you

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