# KubeEdge BP Test Documents



## Introduction

This wiki documents KubeEdge BP test environment set up and test results for release 4.

All test results and logs have been pushed to Akraino NEXUS:

**https://nexus.akraino.org/content/sites/logs/futurewei/kubeedgees/36/**

## Akarino Test Group Information

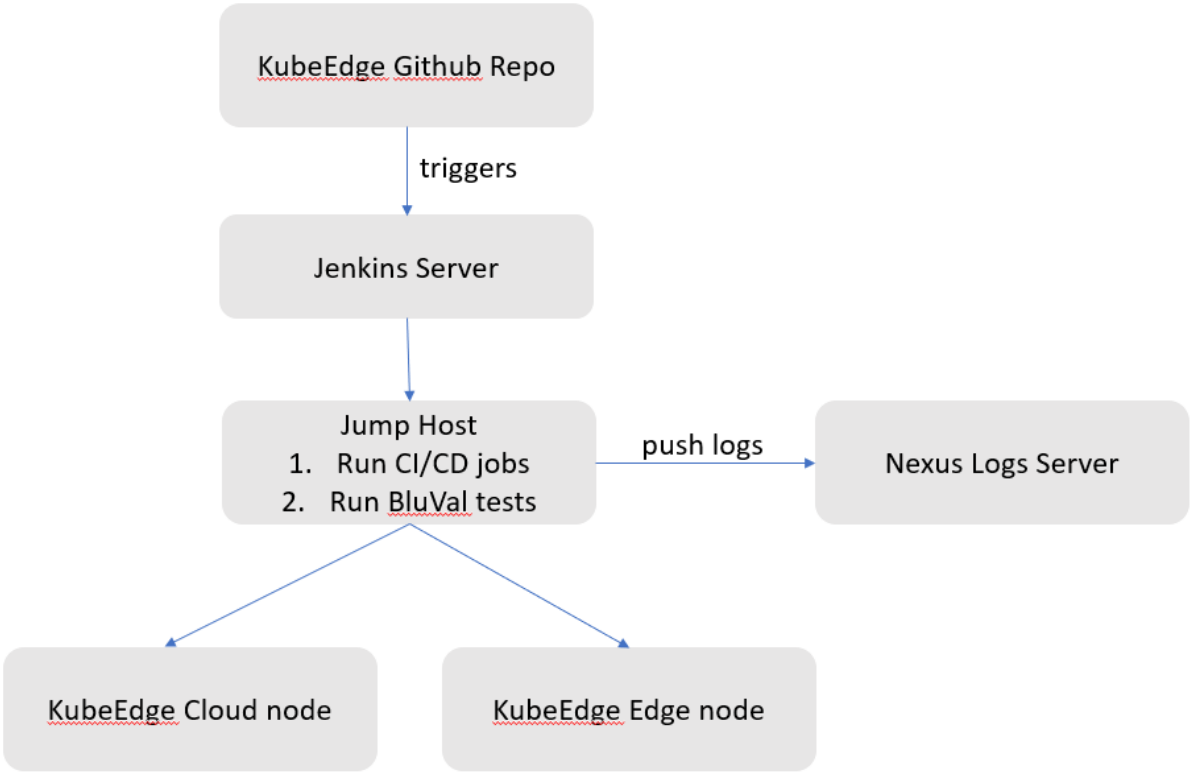
N/A

## Overall Test Architecture

2 independent test labs have been set up:

1. A lab created exclusively within AWS
2. Akraino provided lab

They share the same high level test architecture:




### Test Bed

In the AWS lab, all servers are EC2 instances:

| Node Type | OS |
|---|---|
| Jump Host | Ubuntu 18.04 |
| KubeEdge Cloud | Ubuntu 20.04 |
| KubeEdge Edge | Ubuntu 20.04 |

### Test Framework

Robot framework is used in BluVal.

### Traffic Generator

N/A

## Test API description

### KubeEdge CI/CD tests

#### Test Procedure

1. Build for both x86 and ARM.
2. Unit tests.
3. Integration tests.
4. End to end tests.

#### Test Results

Pass

## BluVal Tests

### Lynis

Pass

### Vuls

We used Ubuntu 20.04. All the packages have been updated or upgraded to latest version in the repo.

There are 4 CVEs with CVSS score > 9.0. These require upstream kernel patches, and exceptions have been requested here:

Akraino CVE Vulnerability Exception Request

### Kube-Hunter

Fixed 3 vulnerabilities:

KHV002, KHV050 & CAP_NET_RAW.

No more to fix.

### Conformance Test (Sonobuoy)

Sonobuoy does not apply to KubeEdge.

An exception has been granted:

Akraino BluVal Exception Request

Reason:

- Sonobuoy assumes the all nodes are within a Layer 2 network, which is the case for the standard Kubernetes environment.
- KubeEdge solves a different problem where typically the edge nodes are behind corporate firewalls. And cloud node do not have direct access to the edge nodes due to security and permission restrictions.

# Test Dashboards

Single pane view of how the test score looks like for the Blue print.

| Total Tests | Test Executed | Pass | Fail | In Progress |
|---|---|---|---|---|
| 2 | 2 | 2 | 0 | 0 |

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# Additional Testing

# Bottlenecks/Errata

# Applied Fixes

## Kube-Hunter

### KHV002

https://aquasecurity.github.io/kube-hunter/kb/KHV002.html

Solution:

Change the default ClusterRole system:public-info-viewer

```
kubectl replace -f - <<EOF
apiVersion: rbac.authorization.k8s.io/v1
kind: ClusterRole
metadata:
  annotations:
    rbac.authorization.kubernetes.io/autoupdate: "false"
  labels:
    kubernetes.io/bootstrapping: rbac-defaults
  name: system:public-info-viewer
rules:
- nonResourceURLs:
  - /healthz
  - /livez
  - /readyz
  verbs:
  - get
EOF
```

### CAP_NET_RAW

Docker runtime enables Linux "NET_RAW" capability by default. Docker daemon does not have an option to disable "NET_RAW":

https://docs.docker.com/engine/reference/commandline/dockerd/#daemon-configuration-file

So we have to turn to K8s provided "PodSecurityPolicy" for help.

Solution:

Use PodSecurityPolicy

https://kubernetes.io/docs/concepts/policy/pod-security-policy/

High level steps:

1. Create a PodSecurityPolicy to drop the Linux capability "NET_RAW".
2. Create an RBAC role to allow use of the PodSecurityPolicy created in step 1.
3. Bind the RBAC role to serviceaccount "default".

Exact PodSecurityPolicy Spec we are using:

```
spec:
  allowPrivilegeEscalation: true
  fsGroup:
    rule: RunAsAny
  hostIPC: true
  hostNetwork: true
  hostPID: true
  hostPorts:
  - max: 65535
    min: 0
  privileged: true
  requiredDropCapabilities:
  - NET_RAW
  runAsUser:
    rule: RunAsAny
  seLinux:
    rule: RunAsAny
  supplementalGroups:
    rule: RunAsAny
  volumes:
  - '*'
```

### KHV050
### https://aquasecurity.github.io/kube-hunter/kb/KHV050.html

Solution:

```
kubectl replace -f - <<EOF
apiVersion: v1
kind: ServiceAccount
metadata:
  name: default
  namespace: default
automountServiceAccountToken: false
EOF
```

## Bluval CI script

**Bluval**

```
set -euo pipefail
cwd=$(pwd)
results_dir=$cwd/results
sudo rm -fr $results_dir
sudo rm -f $cwd/results.zip
mkdir -p $results_dir

blueprint=kubeedgees

info ()  {
    logger -s -t "run_bluval.info" "$*"
}

error () {
    logger -s -t "run_bluval.error" "$*"
    exit 1
}

cwd=$cwd/validation
cd $cwd


# update information in volumes yaml
sed -i \
    -e "/ssh_key_dir/{n; s@local: ''@local: '$SSH_KEY_DIR'@}" \
    -e "/kube_config_dir/{n; s@local: ''@local: '$K8S_CONFIG_DIR'@}" \
    -e "/custom_variables_file/{n; s@local: ''@local: '$cwd/tests/variables.yaml'@}" \
    -e "/blueprint_dir/{n; s@local: ''@local: '$cwd/bluval/'@}" \
    -e "/results_dir/{n; s@local: ''@local: '$results_dir'@}" \
    "$cwd/bluval/volumes.yaml"

sed -i \
    -e "s/host: [0-9]*.[0-9]*.[0-9]*.[0-9]*/host: $CLUSTER_MASTER_IP/" \
    -e "s/username: [A-Za-z0-9_]* /username: $SSH_USER/" \
    -e "s/password: [A-Za-z0-9_]* /password: /" \
    -e "s|ssh_keyfile: [A-Za-z0-9_]* |ssh_keyfile: /root/.ssh/id_rsa|" \
    "$cwd/tests/variables.yaml"

cat >"$cwd/bluval/bluval-kubeedgees.yaml" <<EOF
blueprint:
    name: kubeedgees
    layers:
        - os
        - k8s

    os: &os
        -
            name: lynis
            what: lynis
            optional: "False"
        -
            name: vuls
            what: vuls
            optional: "False"

    k8s: &k8s
        -
            name: kube-hunter
            what: kube-hunter
            optional: "False"
EOF

$cwd/bluval/blucon.sh $blueprint

if [ $? -ne 0 ]; then
    sudo chown -R $(id -u):$(id -g) "$results_dir"
```

```
    error "blucon.sh exited with return code $?"
fi

sudo chown -R $(id -u):$(id -g) "$results_dir"

echo $BLUEPRINT_BUILD_VERSION

source ~/.lftools/bin/activate
NEXUS_PATH="${LAB_SILO}/$blueprint/$BLUEPRINT_BUILD_VERSION"
cd "$results_dir/.." && zip -r results.zip ./results
lftools deploy nexus-zip https://nexus.akraino.org/ logs "$NEXUS_PATH" results.zip
```

## HRDN-7220

Check if compilers like gcc, g++ is installed. If yes, remove them. For example on ubuntu:

sudo apt remove gcc g++