Blueprint: KubeEdge Edge Service Family
(Type 1: ML Inference Offloading)

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General Blueprint Introduction

- KubeEdge Edge Service family focuses on a device/edge/cloud collaboration framework around KubeEdge. The verticals of focus have been IoT and MEC etc.
- The key component KubeEdge is a unique design from scratch of edge nodes and edge cloud, with all source code developed in the upstream CNCF KubeEdge Project.
- Type I of KubeEdge Edge Service family focuses an edge stack listed in the next slide of the use case ML Inference Offloading on x86 servers.
- This blueprint family will leverage various infrastructures. Arm servers support is the next case. This blueprint family is infrastructure neutral.
**KubeEdge ML Offloading Functional Block Diagram**

- **KubeEdge**: Device, Edge and Cloud Collaboration.

- **ML offloading service:**
  - Resource limited device needs to offload AI processing
  - Typical offloading approach is offloading inference to edge and training to central DC/Cloud
  - A device/edge/cloud collaboration framework is essential to ML offloading. KubeEdge provides underline software platform.
Use Case 1: Device App ML model inference offloading workflow

1. Camera App
   - Image pre-process
   - Image resize
   - Convert image to pixel array

2. Convert to Pixel Array
   - Inference engine
   - Emotion recognize
   - ML service offloading API

3. gRPC Server/Session Bundle
   - Application registration
   - Emotion recognize model training
   - Model deployment

4. AI Service Engine manager

5. Tensor-RT AI Framework

6. Model Source

- Emotion recognition
Demo
Release 4 Status

https://wiki.akraino.org/display/AK/Release+4+planning+and+tracking
BlueVal Tests Status

1. Lynis: Pass

2. Vuls:
   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, i.e.
   http://nvd.nist.gov/vuln/detail/CVE-2016-1585

3. Kube-Hunter:
   Fixed KHV002, KHV050, and CAP_NET_RAW. No more to fix

4. Conformance:
   Sonobuoy is not compatible with KubeEdge architecture.
Bluval conformance test blockers

- The following image currently only support K8s versions up to v1.16:
  akraino/validation:kube-conformance-v1.16

- Sonobuoy assumes CNI, Kubelet, and Kube-Proxy are all installed on the worker nodes. However KubeEdge edge nodes do not have these installed. It uses a different networking model, because edge and cloud nodes do not reside within the same LAN.
Thank you

Welcome participants

• Wiki: https://wiki.akraino.org/display/AK/KubeEdge+Edge+Service+Blueprint

• Weekly Meeting: https://zoom.us/j/91049610205, every Tuesday 20:00 PDT.

• Slack Channel: https://lfedge.slack.com/archives/C0155MP4TSB
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