KubeEdge Edge Service Blueprint

A blueprint family which showcases end-to-end solution for edge services with KubeEdge centered edge stack. The first release will focus on the ML inference offloading use case.

KubeEdge is a CNCF sandbox project widely adopted as a key industry reference Edge Computing architecture. With KubeEdge, application vendors can push a wide range of applications at the edge, including Mobile Edge services. It is an upstream project to Akraino community. There are other Akraino Blueprint projects with KubeEdge incorporated. This project family will focus on solutions centered around KubeEdge. Future releases may incorporate various components, e.g. hardware infrastructure etc.

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

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

Use Case Details

Attributes	Description	Informational
Type	New	
Industry Sector	Cloud, Enterprise, Telco	
Business driver	Edge computing leverages edge locations to distribute application loads among device/edge/cloud. A service layer is required to bridge infrastructure platform and applications. e.g. load distribution coordination, hardware platform agnostic, etc. KubeEdge extends native containerized application orchestration capabilities to hosts at Edge. Along with other vertical domain support such as device twin at edge, KubeEdge edge service stack is geared to offer feature rich support to applications while remain platform neutral.	
Business use cases	KubeEdge Edge service can be deployed at enterprise edge or as a cloud edge extension interfacing telco network. It offers support for following use cases: • ML offloading for inference and training in image recognition for mobile phones • Automatic Speech Recognition (ASR) in operation field • Manufacture production line defect inspection • IoT gateway • Mobile Edge enabler	
Business Cost - Initial Build Cost Target Objective	KubeEdge is a software layer. Its managed applications can run on any kubernetes environment. Validated edge stack including hardware choices should have manageable cost suitable for edge deployment.	
Business Cost – Target Operational Objective	KubeEdge edge service provides service portal for operational management. It supports zero touch deployment and monitoring capabilities.	
Security need	KubeEdge supports application oriented security SPIFFE spec.	
Regulations	N/A	
Other restrictions	N/A	
Additional details	N/A	

Blueprint Family Details

Use Case Attributes	Description	**Informational**
Type	New	
Blueprint Family	KubeEdge Edge Service	
Use Case	Telco edge and enterprise edge	
Blueprint proposed	Central Office deployments • ML inference offloading Customer Premise deployments • ASR at operation field (future proposal)	
Initial POD Cost (capex)	Less than USD100K	
Scale	From 1 server to a rack.	
Applications	Any type of edge services	
Power Restrictions	Varies	
Preferred Infrastructure orchestration	OpenStack - VM orchestration Docker/K8 - Container Orchestration OS - Linux VNF Orchestration - ONAP	
Additional Details	N/A	

Blueprint Details

Case Attributes	**Description**	**Informational**
Type	New	
Blueprint Family	KubeEdge Edge Service	
Use Case	Facial emotion recognition task offloading to edge node	
Blueprint proposed Name	ML Inference Offloading	
Initial POD Cost (capex)	Less than 100KUSD	
Scale & Type	1 x86 server With Nvidia Tesla P4/T4 GPUs	
Applications	Deep learning modelsfacial expression) offload from mobile device to Edge	
Power Restrictions	Varies	
Infrastructure orchestration	Docker 18.09 OS – Ubuntu18.04 Python 3.5 ~3.7 CUDA>10.1 GPU driver release 19.03	
PaaS	KubeEdge, Kubernetes	
SDN	N/A	
Workload Type	Containers	
Additional Details	N/A	

Committers

Yin Ding of Futurewei is the PTL (1 May 2020 - 30 April 2021).

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