Blueprint: Robotaxi

Baidu
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General Blueprint Introduction

- The Robotaxi Blueprint focuses on establishing an open source MEC platform combined with AI capabilities at the autonomous driving scenario.
- The first release of the Robotaxi Blueprint is targeted at Q2, 2020.
- The Robotaxi Blueprint is sponsored by Baidu, Intel, Arm, and Vmware.
- Contact: Hechun Zhang (zhanghechun@baidu.com)
- Refer to: https://wiki.akraino.org/display/AK/The+AI+Edge%3A+RoboTaxi
Blueprint Use cases

Urban Scenarios with autonomous driving vehicles

Avoiding blind spots or safer autonomous driving and accelerating efforts in implementing driving fleet solutions.

- Autonomous drive sharing: reducing the cost-per-kilometer by 50% compared to current private car and taxi costs
- Low-speed unmanned logistics vehicles
- Unmanned minibuses in closed parks
- Unmanned buses on city roads

autonomous ride sharing  low-speed unmanned logistics vehicles  unmanned minibuses  unmanned buses
Blueprint Use cases

- Use cases for Valet Parking
  - Deploy sensors on vehicles and parking lots, combined with high-precision positioning, allowing vehicles to engage in fully autonomous parking.

- Regional upgrade for autonomous driving vehicles
  - With roadside sensing equipment, the vehicles can get more road condition information and make the driving mode more intelligent.
RoboTaxi Network Components
RoboTaxi Network Architecture

3rd party system

Internet

10 Gigabit switch

MEC/ Edge site

Traffic lights signal collector

Gigabit NIC

100Mbps Cable

Camera

RSU

RSCU

RSCU

RSCU

Telecom operator private line

Camera

RSU

Gigabit NIC

100Mbps Cable

3rd party system

Internet

10 Gigabit switch

MEC/ Edge site

Traffic lights signal collector

Gigabit NIC

100Mbps Cable

Camera

RSU

RSCU

RSCU

RSCU

Telecom operator private line
RoboTaxi MEC platform software architecture
Physical Topology of OTE Stack MEC Platform

Cluster Controller maintains tree topology
1. selector, cluster label screening;
2. Operator& scheduler, sub-cluster task scheduling assignment;
3. edge-tunnel& edge-handler, connect parent node and process command
4. Router, maintain routing table of all descendant clusters
5. cloud-handler& cloud-tunnel, command conversion and subcluster connection

Cluster adaptation layer, responsible for accessing different types of clusters
1. Provide multiple runtime nodes to support the generation of various IaaS resources
2. Provide high performance, container network components that support network policies

Cluster: root
- K8S API-Server
- cluster-shim
- cluster-selector
- cluster-scheduler
- cluster-operator
- edge-tunnel
- edge-handler
- router
- cloud-handler
- cloud-tunnel

Cluster: child1
- K8S cluster
- cluster-shim
- Cluster Controller

Cluster: child2
- K3S cluster
- cluster-shim
- Cluster Controller

Cluster: child2
- 3rd cluster
- cluster-shim
- Cluster Controller

Cluster1  Cluster2  ...  ClusterN
Cluster1  Cluster2  ...  ClusterN
Cluster1  Cluster2  ...  ClusterN
Future Plan

- The first demo of the RoboTaxi Blueprint is targeted at Q1, 2020.
- The first Akraino version will be released in Q2, 2020.
# The Robotaxi Blueprint Criteria

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<th>Case Attributes</th>
<th>Description</th>
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<tr>
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<td>Blueprint Family - Proposed Name</td>
<td>The AI Edge</td>
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<td>Use Case</td>
<td>Autonomous driving taxi</td>
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<td>Blueprint proposed Name</td>
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<td>Initial POD Cost (capex)</td>
<td>Leverage Unicycle POD - less than $150k</td>
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<td>Scale &amp; Type</td>
<td>Up to 4 servers, x86/Arm server or deep edge class</td>
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<td>With nVIDIA Tesla P4/T4 GPUs</td>
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<td>Applications</td>
<td>Autonomous driving taxi</td>
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<td>Power Restrictions</td>
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<td>K8s 1.12.5 or above- Container Orchestration</td>
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<td>PaaS</td>
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