Akraino Overview

Edge Computing Blueprints

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Akraino Overview - Contents

• Executive Summary

• Edge computing blueprints
  – Cloud native
    – NFV stack
    – multi-tenant security
  – Cloud / edge border
    – public cloud edge interface
    – network cloud (with Tungsten Fabric)
  – Integrated edge cloud
    – edge stack (AR/VR focus)
    – smart NIC
    – Arm servers
  – Telco
    – lightweight / private 5G
    – 5G MEC slicing (gaming, video, broadcasting)
  – AI
    – federated deep learning
    – school monitoring
    – intelligent vehicle cooperation
  – IoT
    – robotics (industrial / enterprise)
    – cloud gateway for IoT apps
    – lightweight edge and IoT application management
  – Connected edge nodes
    – cities
    – vehicles

• Areas of common work between blueprints
  – Whitepapers
  – Security
  – APIs
  – Documentation
  – Technical steering committee
Executive Summary

- Akaino is an LF Edge open source community focusing on edge computing
- Covers a very broad range of use cases and technologies
- Publishes blueprints – combinations of software, architecture, and data flow diagrams, working code, and documentation
- Provides technical and organizational support for blueprint users
- Collaborates with SDOs such as ETSI MEC
- Following slides organize blueprints by key areas in edge computing
  - this way of organizing Akaino is an approximation
  - there is overlap between some blueprints
Cloud Native

• **NFV stack**
  – SDWAN, customer edge, edge clouds – deploy VNFs and CNFs as micro-services
  – key organization: Intel

• **Multi-tenant security**
  – deploy secure and trusted workloads and bare-metal containers
  – key organization: Intel
Cloud / Edge Border

• Public cloud / edge interface
  – set of open APIs for edge applications (primarily telco) to expose towards public cloud providers
  – key organization: Equinix

• Network cloud
  – network cloud architecture allowing single SDN controller for containers, VMs, and bare metal servers. Incorporates Tungsten Fabric
  – key organization: Juniper Networks
Integrated Edge Cloud

• **Edge stack**
  – Integrated Edge Cloud (IEC) family of blueprints
  – deployment of edge VR/AR streaming
  – key organization: Tencent

• **Smart NIC**
  – accelerate performance of VPCs and 5G UPFs
  – key organizations: ByteDance, SocNoc, Arm

• **Edge Arm Servers**
  – run Android cloud native apps at the edge
  – key organizations: ByteDance, Arm
• **Lightweight 5G**
  – enable enterprise applications at the telco edge
  – key organization: Huawei

• **Private 5G**
  – end-to-end LTE/5G connectivity using CBRS band
  – key organizations: Cohere Technologies, Verizon

• **5G MEC slicing**
  – high performance cloud gaming, HD video, and live broadcasting edge applications
  – key organizations: Tencent, China Mobile
- **Federated machine learning**
  - machine learning across mobile and IoT devices
  - key organizations: WeBank, inwinStack

- **School monitoring**
  - school safety, security, and surveillance
  - key organizations: Baidu, Arm, Intel, Penn State Univ

- **Intelligent vehicle cooperation**
  - AVs – current focus is on autonomous taxis
  - key organizations: Baidu, Intel, Arm
• **Robotics**
  – current focus is industrial and enterprise robots (e.g. food preparation and production)
  – areas of emphasis:
    – technical challenges: tactile/touch, speech recognition, real-time operation
    – robot safety (cloud independence as needed)
    – privacy of user data
  – key organizations: Fujitsu, Signalogic

• **Cloud gateway for IoT apps**
  – enable industrial IoT use cases
  – key organization: Huawei

• **SD-WAN**
  – networking for edge and micro CPE use cases
  – key organization: Huawei
Connected Edge Nodes

• Cities
  – smart cities – AVs, utilities management, smart buildings, safety and emergency services
  – key organizations: Arm, Microsoft, Nexcom

• Vehicles
  – connected vehicles – vehicle communication of route, action, safety information. Key org: Tencent
  – MEC-based topology prediction – AV path prediction, communication. Key org: Jeju Nat Univ
Areas of Common Work

- **Whitepapers**
  - collaborative publications between different blueprint teams
  - Akraino Edge Stack APIs
  - Cloud interfacing the telco edge, Jul 2020

- **Security**
  - security subcommittee oversees cert process for blueprints prior to release
  - automated checks include Lynis scan, vulnerabilities, Kubernetes (“kube hunter”)

- **Documentation**
  - documentation subcommittee
Areas of Common Work, cont.

• **APIs**
  – API subcommittee oversees gathering of organization-wide API info
  – standardized API form
  – API map (https://apiportal.akraino.org/apimap.html)

• **TSC planning, review, and approval process**
  – technical steering committee
  – review and voting approval for all BPs
  – discussion and planning of organization wide issues
Summary / Q&A

• Akraino is an LF Edge open source community focusing on edge computing
  – covers a very broad range of use cases and technologies
  – publishes blueprints – a high level combination of software, architecture, and data flow diagrams, working code, and documentation
  – collaborates with SDOs such as ETSI MEC
  – multidisciplinary approach, wide range of industry participants, and technology diversity are Akraino strengths

• Ask me for any follow-up info
  – specific blueprints
  – blueprint project team leader (PTL) contact info

• Top level Wiki page
  – https://wiki.akraino.org

• Q&A
  – fire away!