Akraino Annual Report 2022

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Executive Summary

• Akraino continues to generate edge computing blueprints and use case examples. TSC meetings are twice-a-week, holding a steady average of around 10-12 participants

• Trend in use cases has shifted in 2021 and 2022 from telco-oriented to a wider range of cloud interfacing and smart edge

• Examples of ongoing effort include cloud – edge interface and architecture, connected/intelligent vehicles, and robotics

• Progress in establishing regional Akraino organizations is a notable accomplishment in 2022

• Promotion and marketing to a wider technical audience continues to be Akraino’s main challenge
Akraino Overview

• For anyone who may need an overview …

• Akraino is an LF Edge open source community focusing on edge computing
  – covers a 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
  – applies a multidisciplinary approach with key subcommittees
  – key strengths - wide range of industry participants, technology diversity
Activities

• **Nov 2021 get-together and tech presentations**
  – Akraiino held its first face-to-face meeting since Mar 3 2020! It worked out well and was exciting for people to see each other again
  – 1 day face-to-face in Palo Alto (at Hanahaus)
  – attendance around 12, with additional remote participants

• **Spring Technical Summit, Mar 2022**
  – 3 days in hybrid format
  – 1 day face-to-face in Palo Alto (at Hanahaus)
  – attendance around 20, with additional remote participants

• **Fall Summit, Technical and Organizational, Sep 2022**
  – 3 days in hybrid format, both technical and organizational topics
  – 1 day face-to-face at Google Mountain View location
  – 2nd day live at locations in Germany, China, and S Korea, 3rd day live at Arm (Santa Clara)
  – attendance day 1 around 30, with additional remote participants. Excellent!

• **Upcoming**
  – ETSI MEC Hackathon, Edge Computing World conference, 10-12 Oct, organized by ETSI and LF Edge/Akraiino
Modifications to Key Documents

• **Modifications to governing documentation**
  – required TSC voting approval
  – required brief Q&A with LF legal counsel

• **Technical Community Document wiki page**
  – TSC responsibilities, section 4.5.1, Identifying and Recruiting Akaino Localized Organizations
  – cross-reference to regional communities wiki page
  – summary – new regional organizations have a step-by-step list for marketing and compliance, the TSC actively reviews and then votes

• **Regional Communities wiki page**
  – clarify policy and operational procedure
  – cross-reference to Tech Community Document wiki page

• **Technical Community subcommittee wiki page**
  – modifications to blueprint review procedure
• **Improvements to API Info gathering spreadsheet and procedures**
  – additional subcategories
  – required brief Q&A with LF legal counsel

• **Discussion about 2<sup>nd</sup> sources**
  – Ongoing, this started up after the Google IoT Core deprecation, which was an attention getter
  – the current thinking is to ask blueprint teams to list and/or comment on possible 2<sup>nd</sup> sources for upstream dependencies

• **Subcommittee help with other activities**
  – the subcommittee took the lead in ironing out issues with regional Akraino organization application and approval process
  – the subcommittee helped organize the Nov 2021 face-to-face and Spring Technical Summit
Upstream / Downstream Subcommittee

- Release 6/7 review going well. Most BPs have no upstream changes. Any BPs with upstream changes will need to inform us in advance

- Worked with API subcommittee in review of three (32) regional labs (so far in 2022). Africa lab and China north lab are fully approved. China south lab in TSC process.
  - https://wiki.akraino.org/display/AK/Akraino+Regional+Communities

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Technical Discussion Subcommittee

Primary role is to review blueprints in incubation stage

Gain an understanding of the blueprint

• Overall goals, objectives, and long-term direction in edge computing

Look for areas of synergy with

• Other blueprints, upstream communities, downstream communities, and Akraino regional organizations

Map the blueprint into areas being promoted by Akraino and LF Edge

• Such as: edge cloud, data privacy, security, 5G/6G, Metaverse, Blockchain, MEC, high performance computing (HPC), robotics, etc
3 incubation reviews approved in 2022

- **pipelineDP Blueprint**
  - Conversation led by Wenhui Zhang

- **CFN (Computing Force Network) Ubiquitous Computing Force Blueprint**
  - Conversation led by Hanyu Ding and Yanjun Chen

- **Edge Service Enabling Platform Blueprint**
  - Conversation led by Colin Peters
  - Special Thank You to Jeff Brower for chairing this meeting!!!
Security Subcommittee

• New chair
  – Danill Egranov @ Arm, has taken over from Randy Stricklin @ AT&T

• TBD 1

• TBD 2
Regional Akraino Organizations

• Two new organizations approved
  – Africa – The Edge Hub, aka The Cortex Hub
    - East London, S Africa
    - theedgehub.org
    - thecoretexhub.africa
    - an ICT incubator
  – China north – Green Computing Consortium
    - Beijing
    - opengcc.org
    - open and innovative ecosystem in China for green
      computing in cloud data center infrastructure

• Pending
  – China south
More Info / Q&A

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

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

• Q&A
  – fire away!
Supplemental

Following slides are supplemental material
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
Telco

• **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
• 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, Jun 2020
  – Cloud interfacing at the telco edge, Jul 2020
  – Sharpening the Edge: Overview of the LF Edge Taxonomy and Framework (LF Edge, Aug 2020)

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

• **Documentation**
  – documentation subcommittee
• **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