Time-Critical Edge Compute

Project Technical Lead: Shane Dewing. Elected 1/17/19.

Project Committers detail:

Initial Committers for a project will be specified at project creation. Committers have the right to commit code to the source code management system for that project.

A Contributor may be promoted to a Committer by the project's Committers after demonstrating a history of contributions to that project.

Candidates for the project's Project Technical Leader will be derived from the Committers of the Project. Candidates must self nominate by marking "Y" in the Self Nominate column below by Jan. 16th. Voting will take place on January 17th.

Only Committers for a project are eligible to vote for a project's Project Technical Lead.

Please see Akraino Technical Community Document section 3.1.3 for more detailed information.

Committer	Committer Company	Committer Contact Info	Committer Bio	Committer Picture	Self Nominate for PTL (Y/N)
Shane Dewing	Intel	shane.dewing@intel.com	At Intel Corp, Shane works in the Industrial Solutions Division of the Internet of Things Group, where he leads software and open source strategy. Shane is a veteran software developer and technologist, and was on the technical leadership team of the AllSeen Alliance and the AllJoyn open source project (which Shane helped launch in 2013). Shane also works in IOT and Industrial Standards, including the Open Process Automation Forum, the OPC Foundation, and the Open Connectivity Foundation, where Shane chaired the Industrial TG 2015-2017.		Y
	HPE				
	Dell				
Khemendra Kumar	Huawei	khemendra.kumar@huawei.com			
Keith Steele	IOTechSystems	keith@iotechsys.com	Keith is the CEO of IOTech. He is an EdgeX Foundry Board Member and the Chair of the Technical Steering Committee at EdgeX Foundry		

Steve Osselton	IOTechSystems	steve@iotechsys.com	Steve Osselton is CTO at IOTech. Steve is Chair of the Device and Device SDK Working Group at EdgeX Foundry		
Kevin Midkiff	Intel	kevin.midkiff@intel.com	Kevin is a lead architect in the Industrial Solutions Division at Intel		
Jerry Yu	Intel	jerry.yu@intel.com	Jerry works in the System Software Products group at Intel		
Sanrio Alvares	Intel	sanrio.alvares@intel.com	Sanrio works in the System Software Products group at Intel		
Kailas Maneparambil	Intel	Kailasnath.s.maneparambil@intel.com	Kailas is a system architect in the Industrial Solutions Division		
Taimoor Imtiaz	Intel	taimoor.imtiaz(at)intel.com	Taimoor is a Systems Engineer at Intel's Industrial Solutions Division.		
Tiejun Chen	VMware	tiejunc@vmware.com	Technical leader and staff II engineer		

Time-Critical Edge Compute git repo: https://gerrit.akraino.org/r/#/admin/projects/tc

Community Call Notes: https://etherpad.akraino.org/p/tc

Akraino New Use Case Template:

Attributes	Description	Informational
Type	Time Critical Edge Compute	Functionally safe capable for Industrial implementations, and enabled for Real-Time
Industry Sector	Industrial Edge with applicability to applications where time-sensitive compute and/or functional safety are required	
Business driver	Industrial Edge is shifting dramatically with manufacturers, oil and gas, energy and other major industries transitioning to software defined infrastructure just as the telecommunications sector has been undergoing a similar transformation. Akraino has the opportunity to play a critical role in hosting scalable, tuned software defined infrastructure for Industrial potentially ushering in this transformation and coalescing the ecosystem.	

Business use cases	Use cases in Manufacturing, Smart Buildings, general IIOT. • Virtualized PLC • Computer vision inference • Machine, sensor data inference • Process or discrete manufacturing closed loop control • Ethernet TSN • Functional Safety capable use cases • Discrete manufacturing soft PLC • Onramp for 5G-URLLC	
Business Cost - Initial Build Cost Target Objective	Example: Dell 3000 - ~$800 list Example: Dell 5000 - ~$1300 list Example: HPE EL300 - ~$2500 list	
Business Cost – Target Operational Objective	Leverage cloud-native and other IT infrastructure to enable end-users to deploy time-critical and functionally safe applications at the industrial edge on general purpose compute HW.	
Security need	Functional Safety (FuSa) core OS certification. Security for Industrial is a key vector, which is why this stack is in essence functionally safe - by using open source leadership software such as Zephyr and ACRN - projects designed to meet both functional safety and real time requirements for security at the core of the stack. By leveraging Kata Containers, all container workloads can leverage VT for containerized workload isolation. Trusted Execution Environment compatible.	
Regulations	IEC 61508 - Safety Integrity Level	
Other restrictions	For industrial deployments:- • IEC-600068-2-27, IEC 600068-2-64 • IP50 rated • Operational humidity: 8 to 90%, noncondensing • Tested in accordance with IEC-600068-2-56 Non-operating humidity: 5 to 95%, noncondensing • Tested in accordance with IEC-600068-2-56 • MIL – 810G Tested • Storage temperature range: -40C to +70C • MIL-PRF-28800F class 3 limits • Operational, -30C to 70C (-22F to 158F)	
Additional details	Differentiation: Ruggedized implementation. Supports functional safety workloads.	Potential to attract new members to Akraino project Industrial ODM's e. g. Advantech, Adlink Industrial OEM's /ISV's e.g. TTTech, Nebbiolo, IOTech Industrial end-users e.g. ExxonMobil

Akraino Species Blueprint Template:

Case Attributes	Description	Informational
Type	New	
Blueprint Family - Proposed Name	TBD	

Use Case	Use cases in Manufacturing, Smart Buildings, general IIOT. • Virtualized PLC • Computer vision inference • Machine, sensor data inference • Process or discrete manufacturing closed loop control • Ethernet TSN • Functional Safety capable use cases • Discrete manufacturing soft PLC • Onramp for 5G-URLLC	
Blueprint proposed Name	Time-Critical Edge Compute	
Initial POD Cost (capex)	Example: Dell 3000 - ~$800 list Example: Dell 5000 - ~$1300 list Example: HPE EL300 - ~$2500 list	
Scale & Type	Intel Atom/Core; ARM -- Ruggedized hardware, low power footprint, real time, safety critical implementations.	
Applications	Can span from functionally safe applications, to real time and time-sensitive applications, Android apps and containerized edge workloads orchestrated by Kubernetes. Validated applications will include OpenVINO for visual inference workloads, TensorFlow via Kubeflow for Machine learning workloads, Closed loop control, Software Programmable Logic Controllers (PLCs) and EdgeX Foundry	
Power Restrictions	• Industrial temp • Low power • Fanless design	
Infrastructure orchestration	Kubernetes orchestrated Docker and Kata container formats	
SDN	As needed by use case, can support OVS-DPDK	
Workload Type	VM and Containers in a Type1 Hypervisor, ACRN - https://projectacrn.org/ Safety/Host OS - Zephyr - https://www.zephyrproject.org/ For Industrial, Windows support is critical, and therefore Windows will also be validated on ACRN as part of this blueprint.	
Additional Details	See deck and demo link	

Presentation:

Video Demo of this stack

Embedded below (Open the URL to be able to view in fullscreen https://youtu.be/1qkRJlulUSY)