SOAFEE

Accelerating SDV hardware and software interoperability with the SOAFEE integration lab

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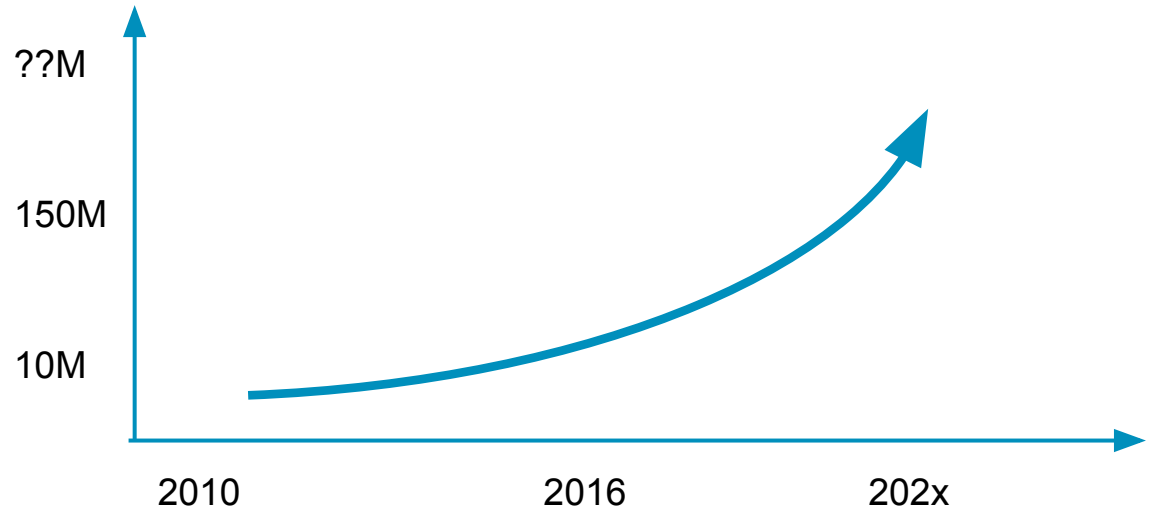
21st September 2023

Linaro

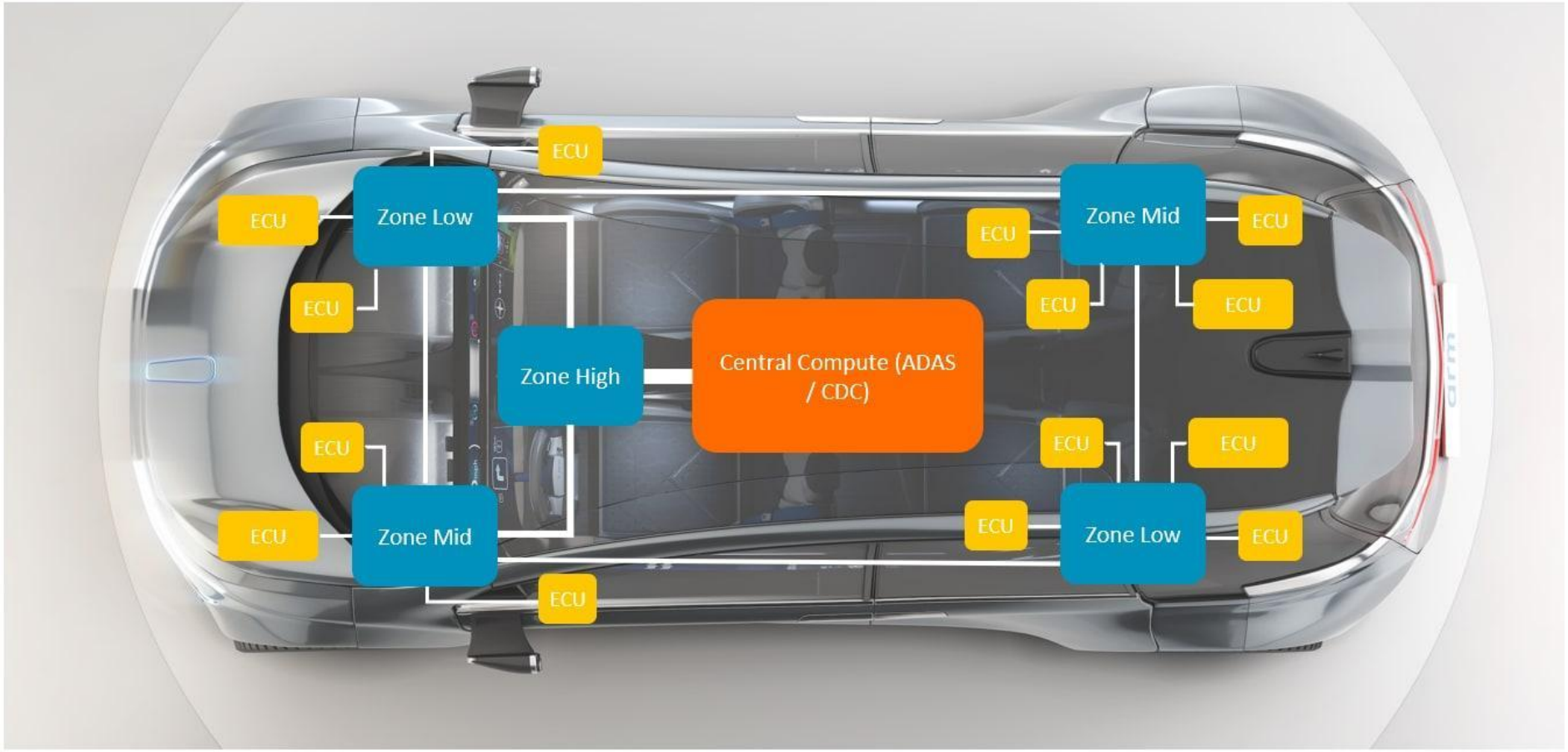
Automotive:
15x growth in lines of source code in just six years and counting…



Ref:
https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/rethinking-car-software-and-electronics-architecture and https://spectrum.ieee.org/software-eating-car

SDV disruption

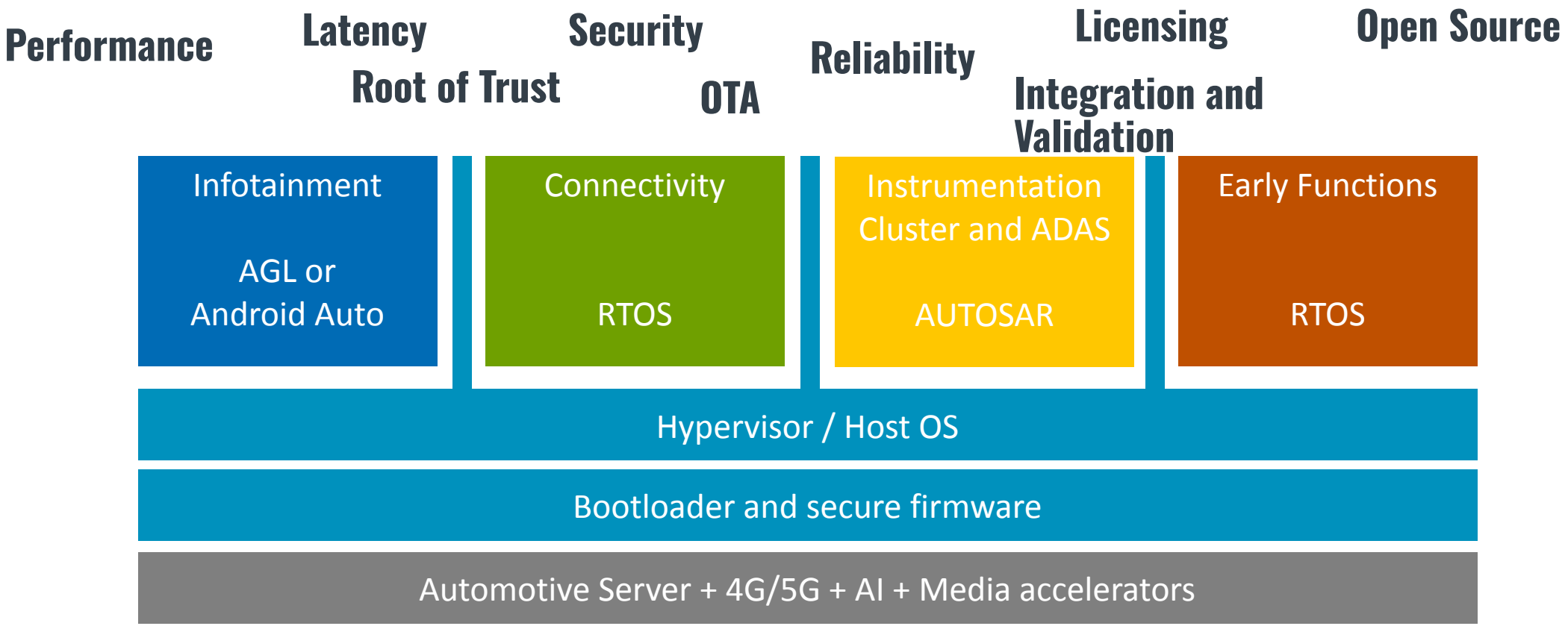
- From 150 Electronic Control Units to one Central Compute and a few critical ECUs via zone controllers



The software of many ECUs will run on one Compute unit

Software Defined Vehicles

From multiple embedded firmware to one hypervisor running multiple images



Challenges

- Integration of mixed criticality workloads from multiple different vendors
- Reuse of existing software on different hardware platforms
- Hardware diversity and innovation leading to software fragmentation

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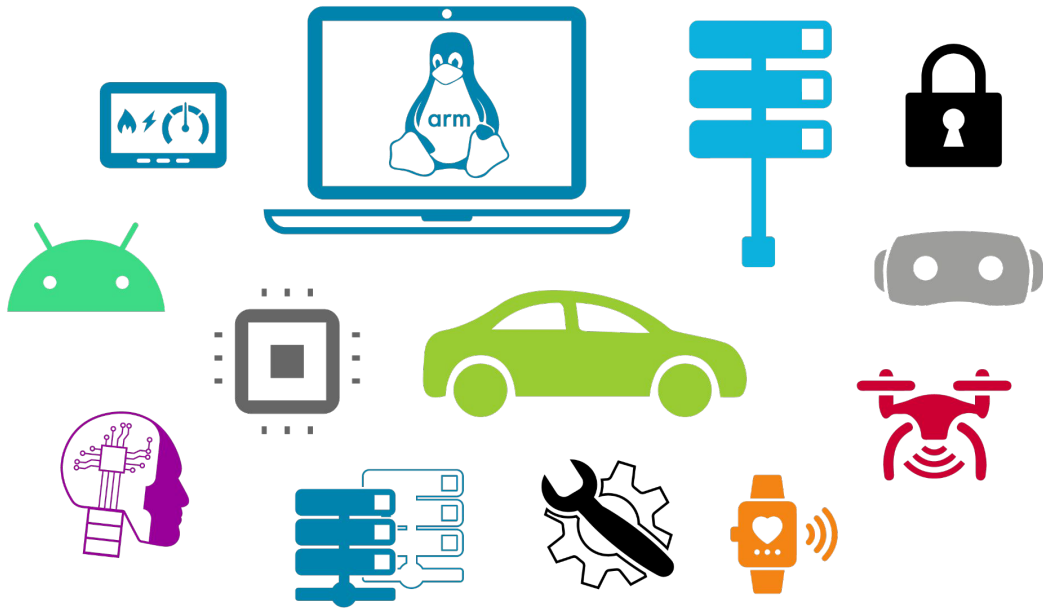
Reduce software fragmentation adopting Industry Standards and Architectures

At Linaro we understand the complexities

Experts in Open Source Software on Arm Technology



In 2010 the Arm code base was fragmented, slowing down innovation. Linaro was formed to consolidate it. Fast forward to today:

- Linus Torvalds does Linux kernel releases on an Arm64 laptop.
- Google ships an Android common kernel.
- All cloud vendors have an Arm offering.
- Windows on Arm has become a reality.

Linaro has played a leading role in all of these achievements

Linaro Is Active Across All Major Arm Platforms

Software Platforms

- Linux
- Android
- Windows
- Yocto Project
- Trusted Firmware
- Arm SystemReady
- OP-TEE
- and others

Windows 11

Industry segments

- IoT/Edge computing
- Embedded
- Automotive
- Phones & tablets
- Laptops & desktops
- Servers & HPC

Customers include

arm

Google

HISILICON

Qualcomm Innovation Center

CIX

Microsoft

Red Hat

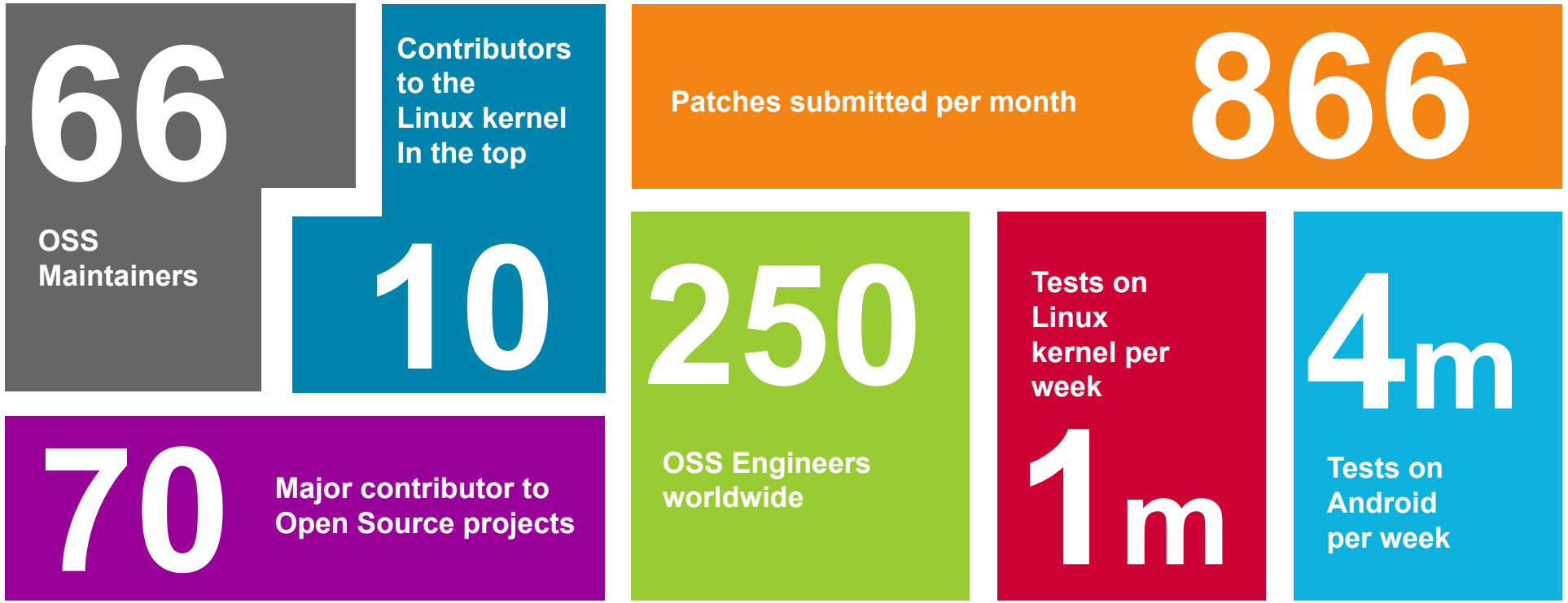
SAMSUNG

FUJITSU

socionext

AMD XILINX

Linaro accelerates product deployment in the Arm ecosystem

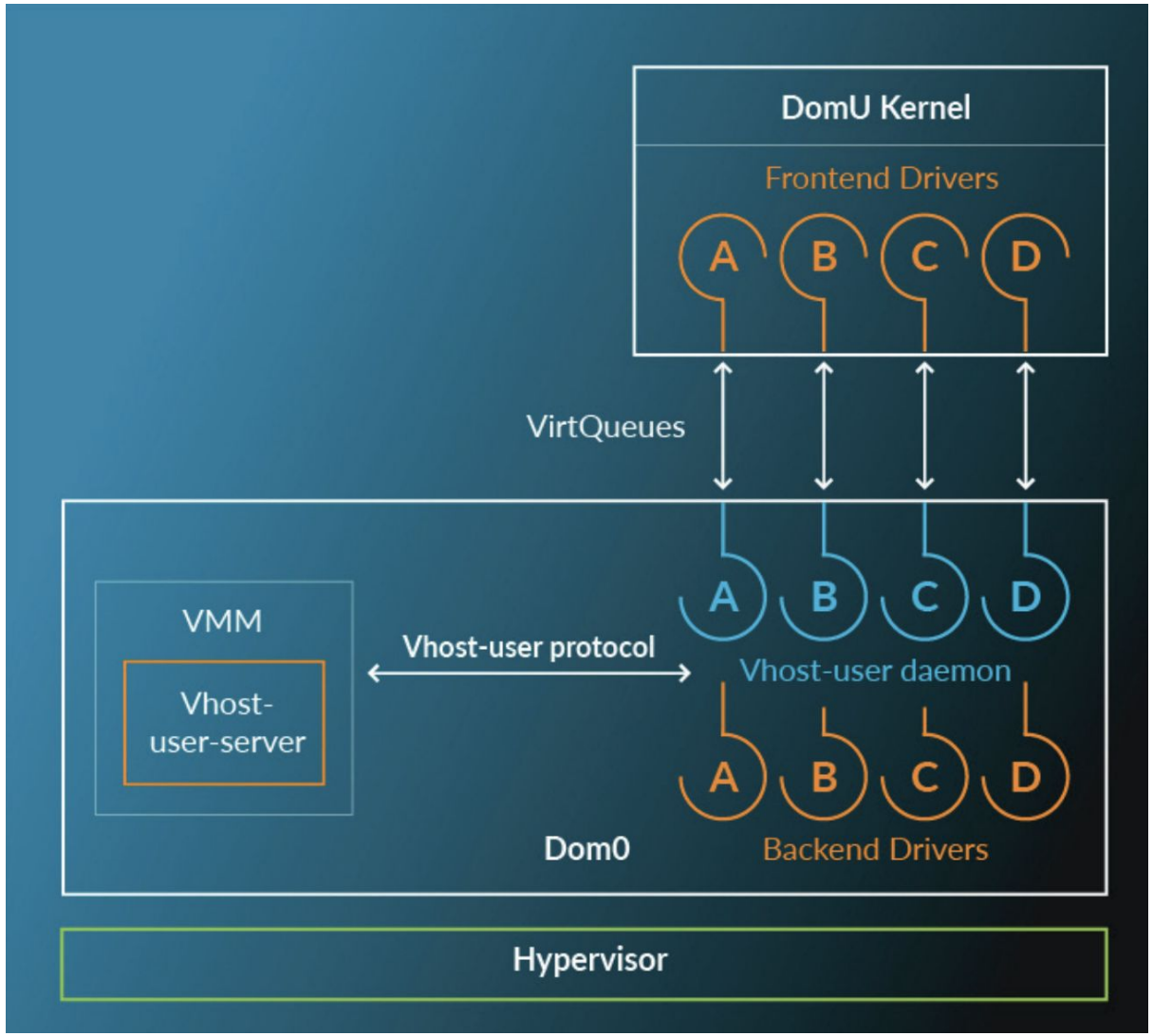


Linaro contribution to SOAFEE

- A common open source implementation of the SOAFEE baseline
- Joint collaborative development of virtio device interfaces and backends
- The SOAFEE integration lab

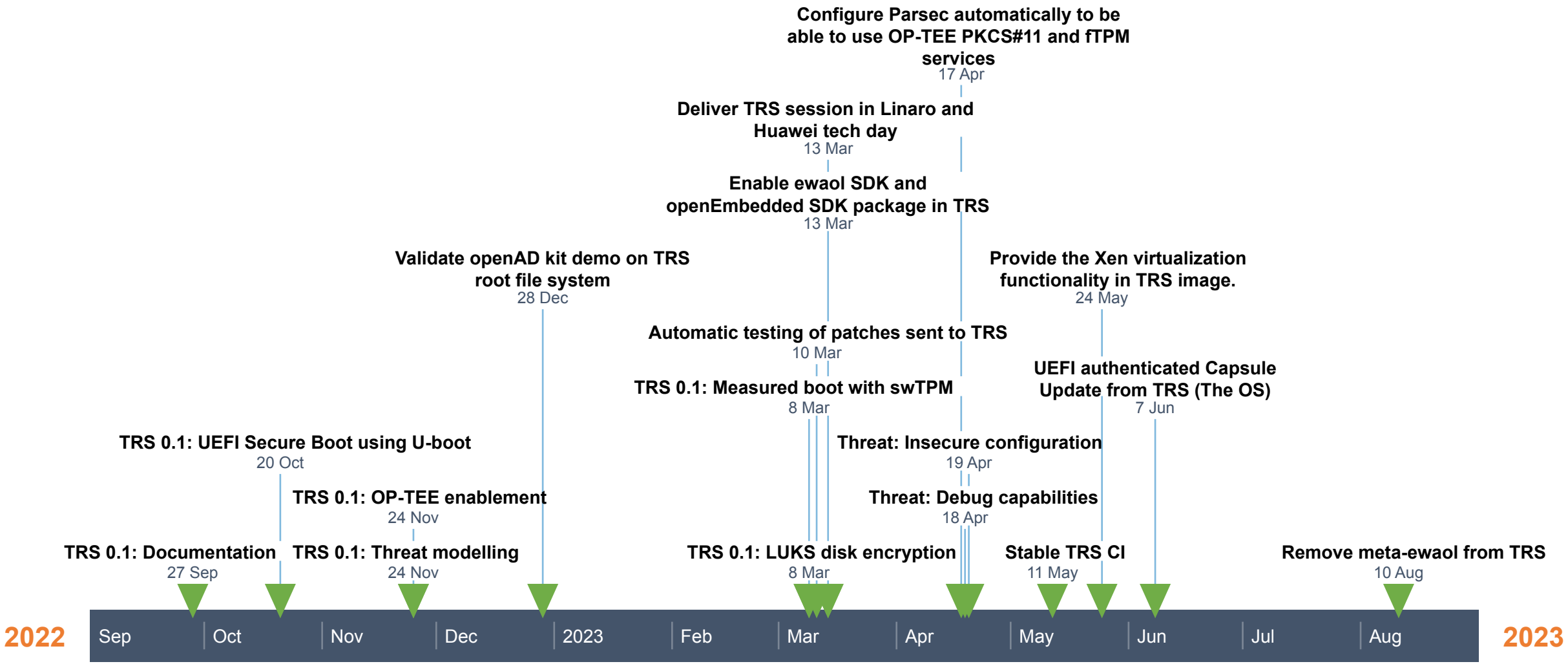
Empowering SOAFEE with VirtIO Magic

- Enable more VirtIO backends
  - rust-vmm daemons and QEMU
  - portable between multiple hypervisors
  - isolating backends from Dom0 and all guest memory
- Support launching VMs in TRS
  - SOAFEE compliant architecture
  - Xen hypervisor
  - Worker VMs with k3s or AOSP
- Interfaces of interest
  - virtio-rpmb virtio-gpio virtio-i2c virtio-rng
  - virtio-vsock virtio-scsi virtiofs virtio-scmi
  - virtio-sound virtio-gpu

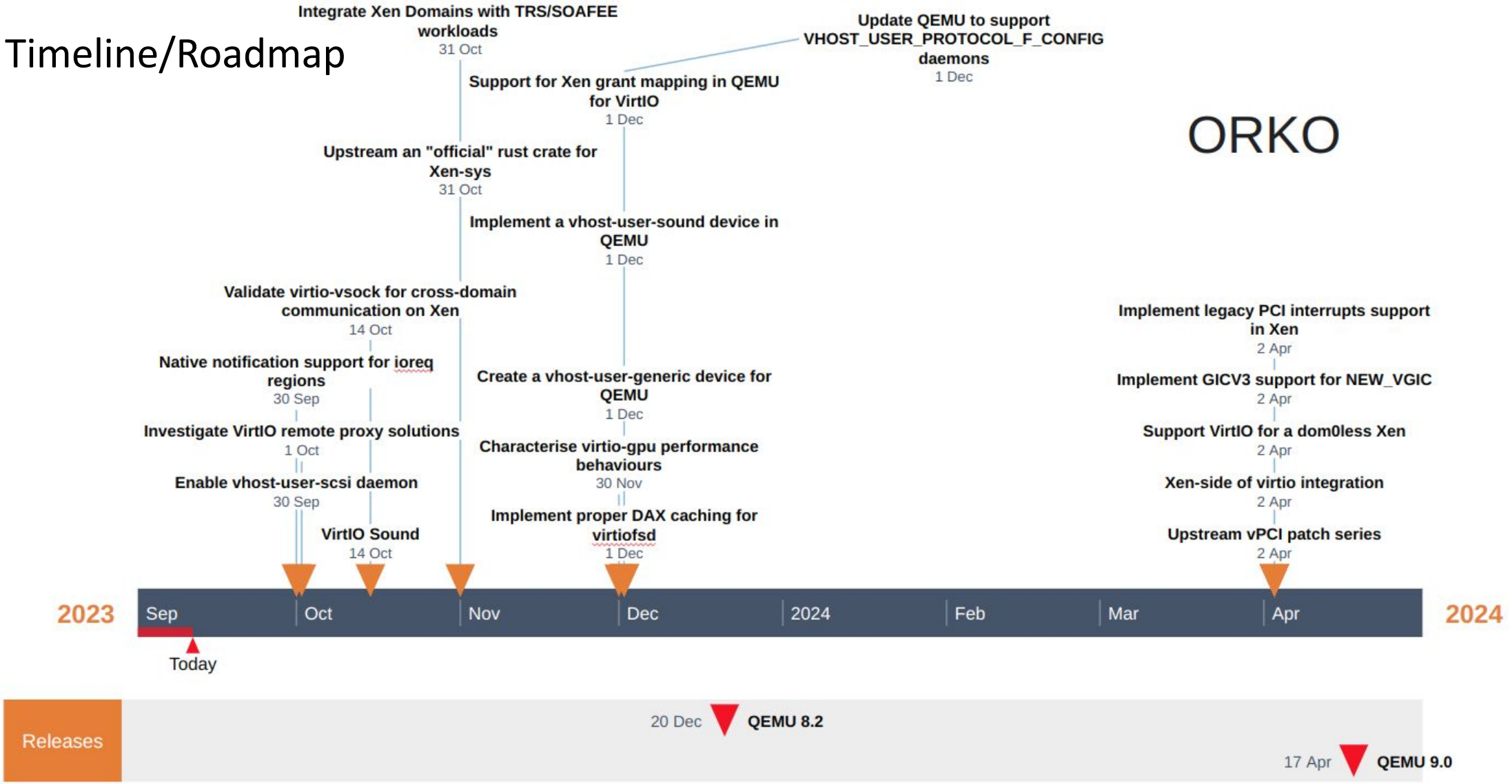


https://linaro.atlassian.net/wiki/spaces/ORKO/overview

Trusted Reference Stack (TRS) Accomplishments



Timeline/Roadmap



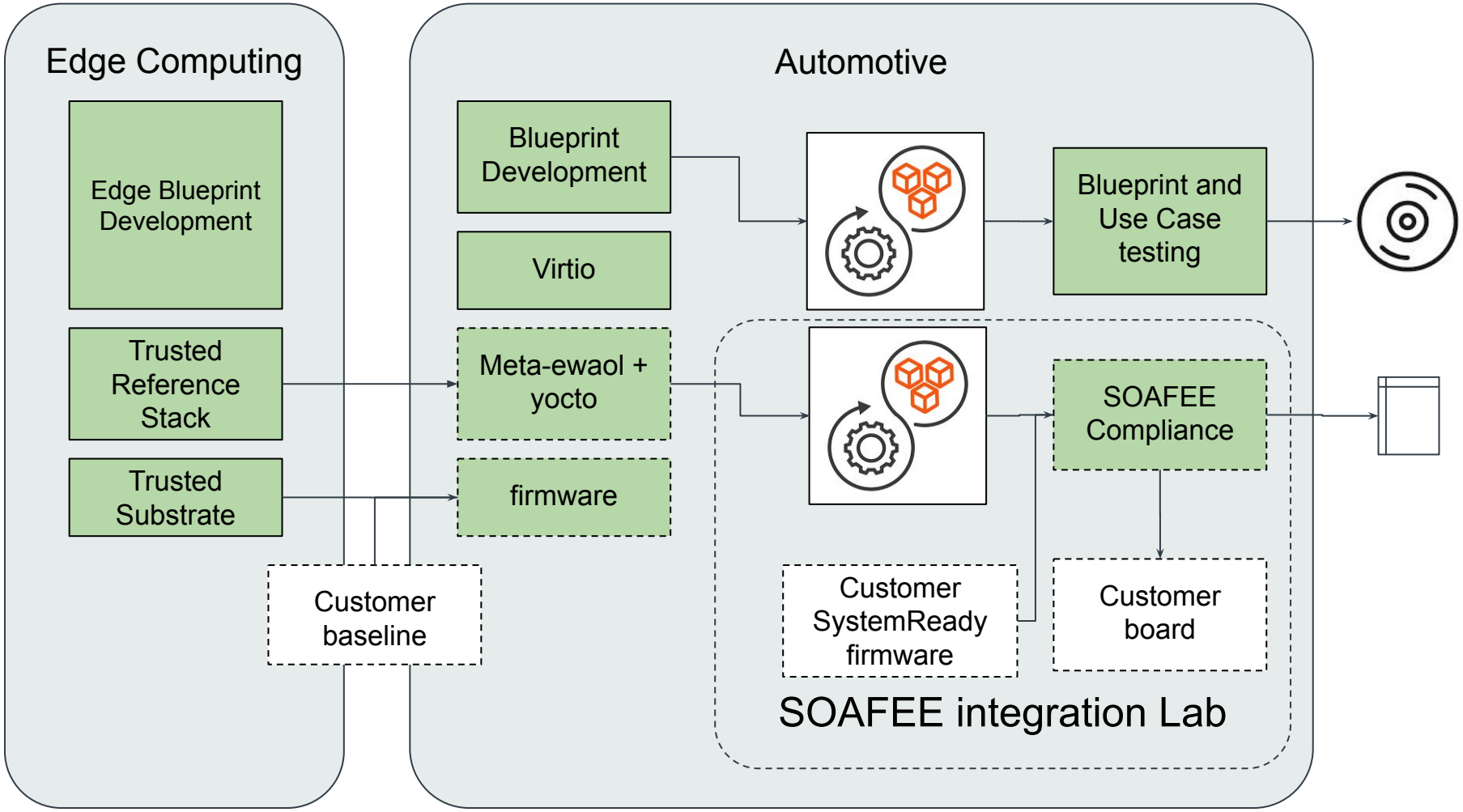
2023-09-11

What is the SOAFEE Integration Lab?

Accelerate the transition from open source reference implementations to commercial solutions - safety certified where applicable - through full interoperability and compliance testing of any mix of open source and commercial components as sw licenses permit.

- Managed by the SOAFEE Reference Implementation Working Group
- Scale the pool of supported hardware and software platforms successfully passing the SOAFEE compliance test suite
  - Ensure SOAFEE compliance for EWAOL and non-EWAOL platforms
  - Test Xen and other hypervisors if present
  - SOAFEE Blueprints - E.g. Red Hat CentOS AutoSD, Digital Cockpit, OpenAD Kit
- Provide the needed CI to monitor and support

SOAFEE integration lab in the wider Linaro groups



Test suites

References

https://www.soafee.io/community/integration-lab

https://gitlab.com/soafee/soafee-test-suite

List of tests

https://gitlab.com/soafee/soafee-test-suite/-/tree/main/tests

- Container engine integration
- K3s integration tests
- Openadkit integration tests
- User accounts integration tests
- Virtualization integration

Nightly builds

○	⚠ 2023-09-18	15 test runs · 14 completed · 1 incomplete	299 tests · 296 pass · 3 fail · 223.141
○	✓ 2023-09-17	15 test runs · 14 completed · 1 incomplete	300 tests · 300 pass · 214.311
○	2023-09-16	16 test runs · 14 completed · 2 incomplete	299 tests · 296 pass · 3 fail · 222.659
○	⚠ 2023-09-15	15 test runs · 14 completed · 1 incomplete	299 tests · 296 pass · 3 fail · 222.719
○	✓ 2023-09-14	15 test runs · 14 completed · 1 incomplete	300 tests · 300 pass · 224.254

https://qa-reports.linaro.org/blueprints/nightly/builds/

Details of one example build

Build: 2023-09-18 Status: Finished

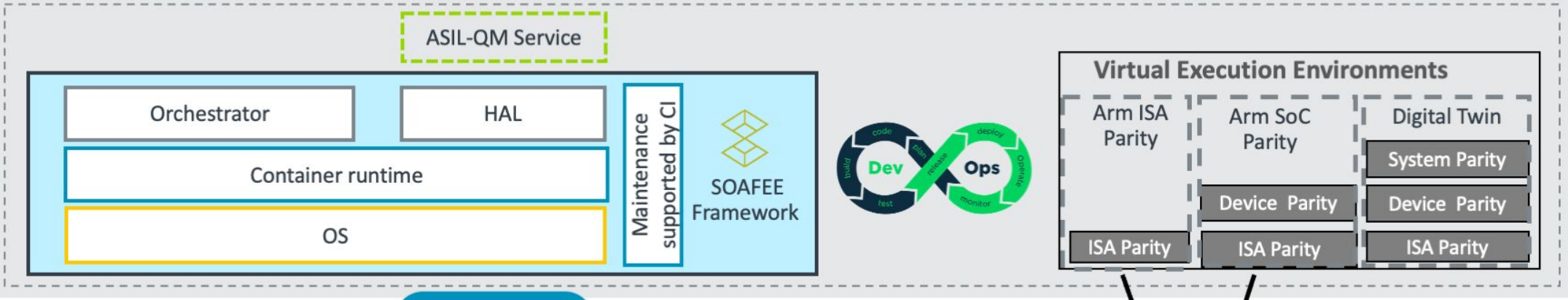
The results from the last daily run can be seen below. Click on the badge for detailed results.
Builds can be downloaded from the links below.

Item	AVA	AVA (Xen)	QEMU - Arm64 (TRS)	RockPi4B	Synquacer
Build	100.00%		100.00%	100.00%	100.00%
Boot	100.00%	100.00%	100.00%		100.00%
Soafee test suite	100.00%	100.00%	100.00%		100.00%

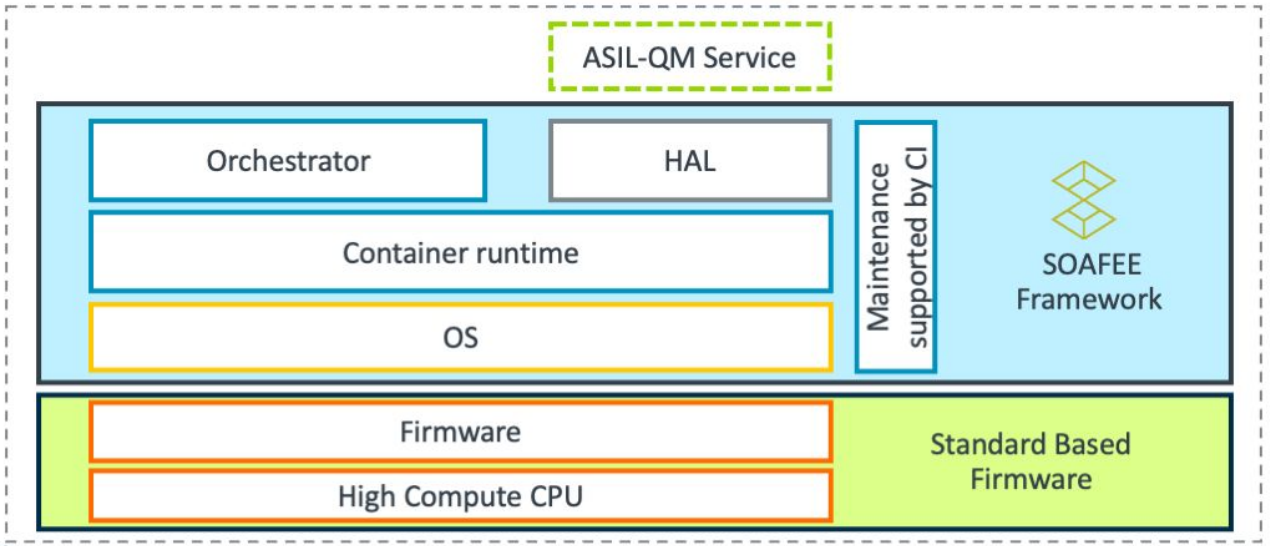
https://www.soafee.io/community/integration-lab

Leveraging Arm's Virtual Hardware Initiative in Automotive

Accelerating Software Development 'EARLY' to best work on Arm



Cloud-Native Service deployment



arm Virtual Hardware* (for Automotive)

- Virtual representation of Arm's Automotive Reference Solutions
- Functional validation much faster than real silicon, Binary-compatible with actual devices
- Accelerate software/application development early on Arm's Automotive Enhanced IP
- Deployable in Cloud and On-prem

* Branding not confirmed

= container

= SOAFEE Arch Spec 1.0

Summary

- Linaro is working closely with Arm to enable the Software Defined Vehicle disruption
- Arm SOAFEE is the reference software architecture for Cloud Native Edge
- Linaro is leading the collaborative development of open source projects in SOAFEE

Get involved and engage with us!

Project Orko, OP-TEE, Linaro Trusted Substrate, Linaro Linux Kernel Functional Testing, Tux Suite