3mdeb Company Portfolio

3mdeb Full Portfolio

Complete showcase of 3mdeb expertise across all teams and products.

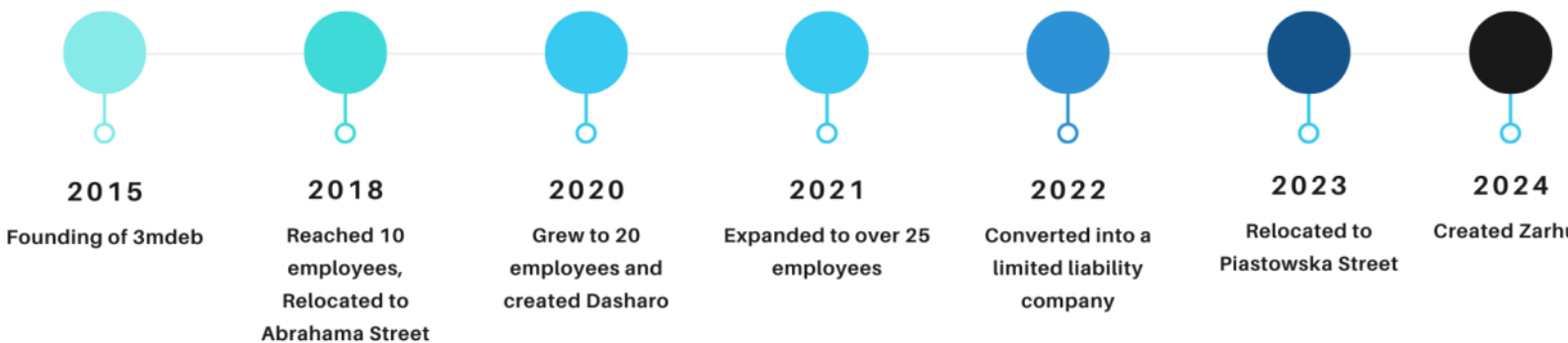
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3mdeb portfolio presentation

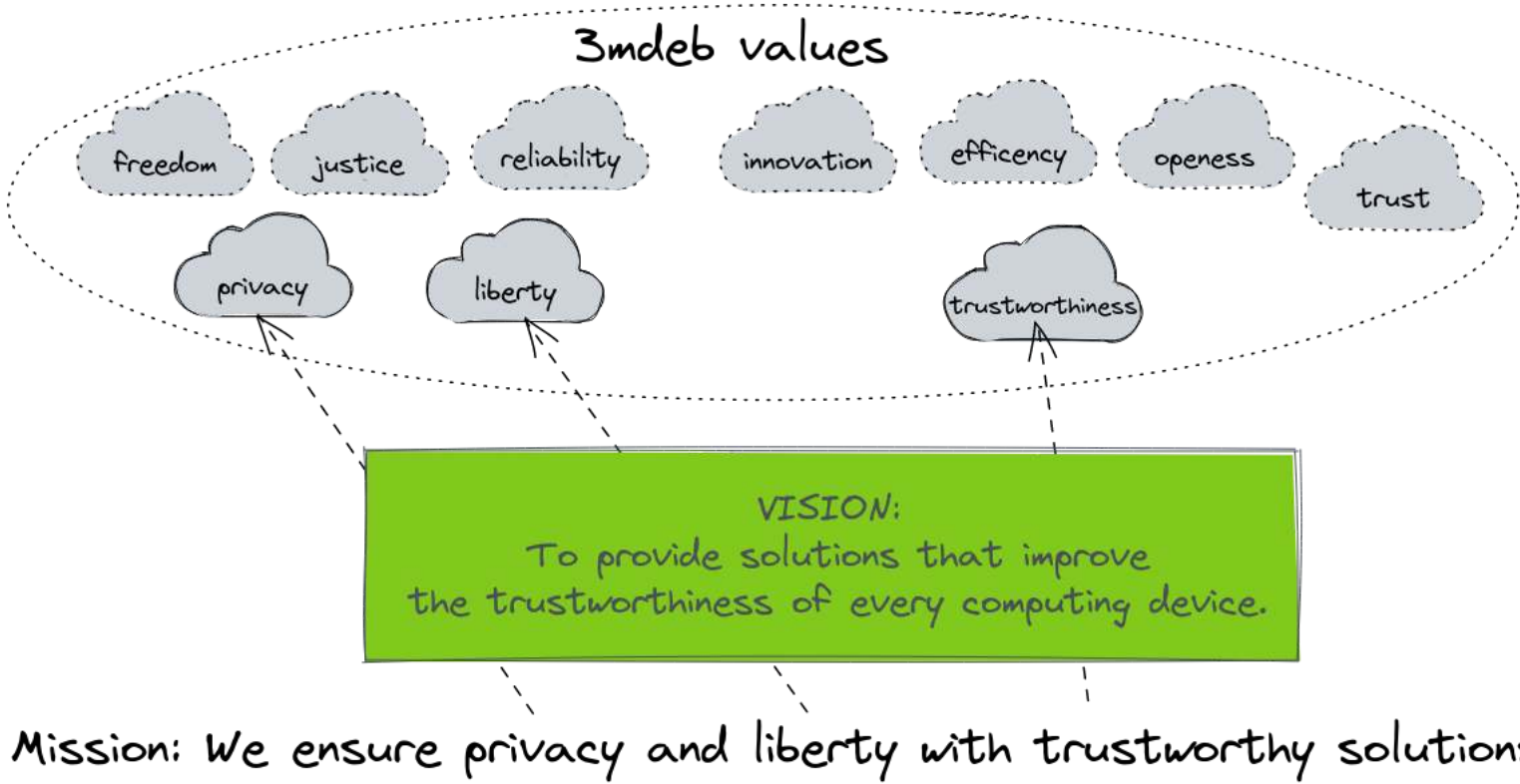
About 3mdeb



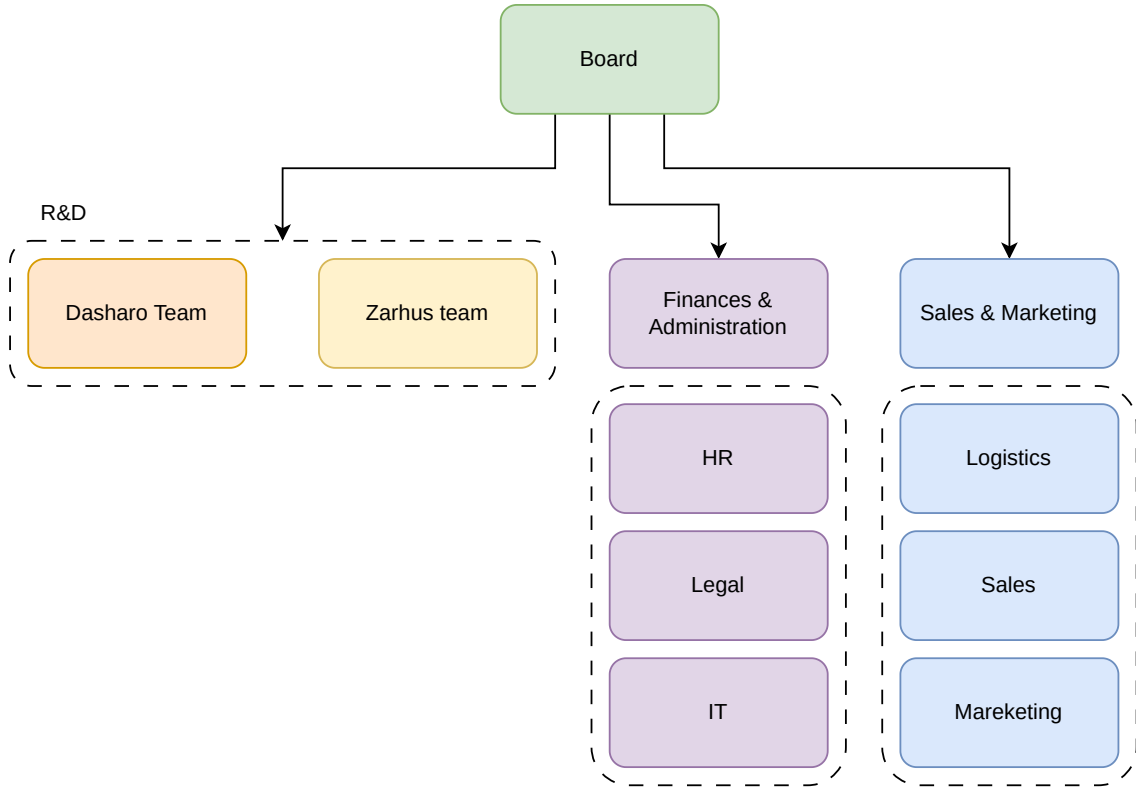
KEY MILESTONES OF 3MDEB



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- LLC
- Teams location - Poland Gdansk
  - 1 engineer abroad

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- coreboot licensed service providers since 2016 and leadership participants
- UEFI Adopters since 2018
- Yocto Participants and Embedded Linux experts since 2019
- Official consultants for Linux Foundation fwupd/LVFS project since 2020

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> “minisummit” 2019 ;)



PSEC 2019



> “minisummit” 2019 ;)





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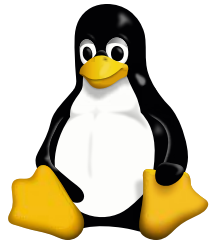


Our mission is to enhance platform security using the expertise we gained in Root of Trust, Chain of Trust, Trusted Computing, TPM, coreboot, UEFI/EDK II, Yocto, U-Boot, and Linux. Pace Enterprise Training (PET), Dasharo and Zarhus, are products designed to enhance the trustworthiness of every computing device through open development principles. We prioritize transparency, digital sovereignty, and the right to repair in creating resilient embedded firmware solutions, ensuring secure systems for the community and our clients.

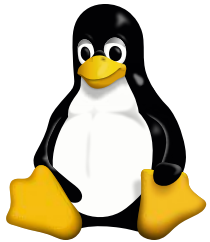
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Selected Frameworks and Silicon Vendors

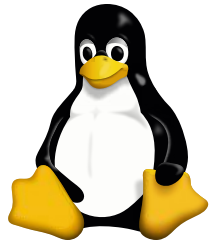
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 Linux	yocto PROJECT Yocto	 OffSec Assessment Tooling
 coreboot	 UEFI	 Slim Bootloader
intel. Intel Boot Guard	arm Arm Secure Boot	IBM. IBM Secure Boot

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 Industrial	yocto PROJECT Consumer Electronics	 Public Sector
 All market segments	 All market segments	 Public Sector
intel Public Sector	arm Consumer Electronics	IBM Privacy Community

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🇵🇱 NXP

yocto PROJECT

🌍 NXP/Broadcom



🇮🇱 Intel/AMD



🌍 Intel/AMD/IBM



🌍 Intel/AMD

SLIM BOOTLOADER

🇮🇱 Intel

intel

🇳🇱 Intel 3rd Gen+

arm

🇩🇪 NXP/Broadcom

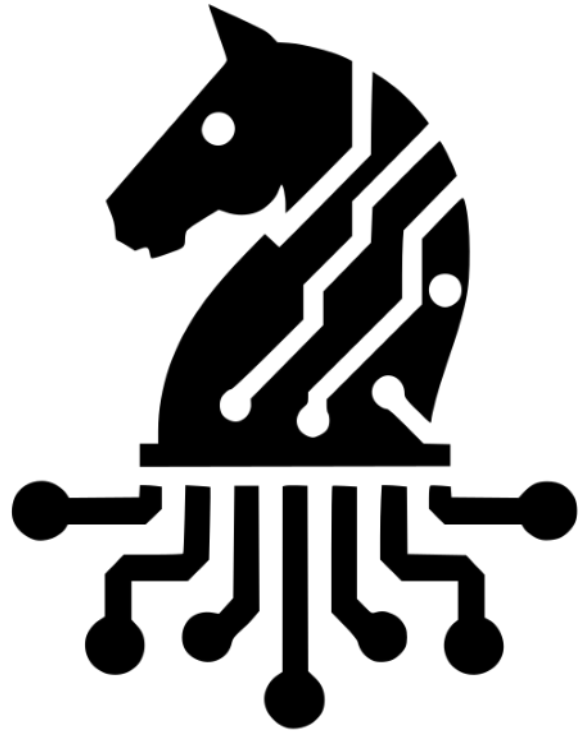
IBM

🇨🇦 IBM POWER9+

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Selected Zarhus Team projects

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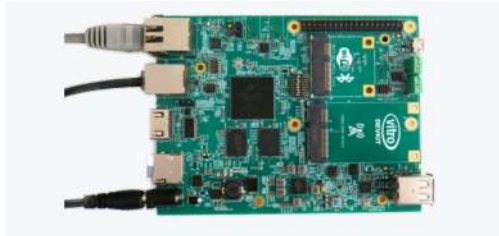


*Zarhus is an embedded **Linux** distribution based on **Yocto**, developed by 3mdeb. It is designed for the community and customers who want platform security based on an immutable **Root of Trust** tied to their own keys and to run target applications leveraging the **Chain of Trust** of their choice.*

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ARM C/C++



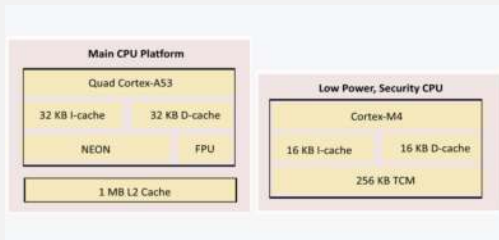
ARM C/C++/Go/Python



ARM C/Go



ARM C/Python



ARM C



ARM C/Bash/Python



ARM C/Bash



ARM C/Bash

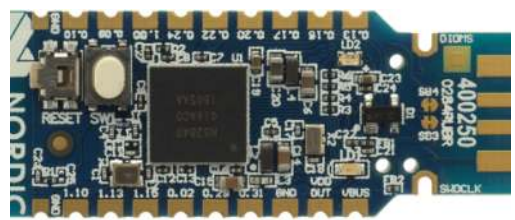


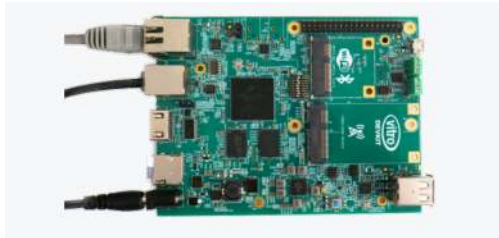
Figure 1: nRF52840 Dongle hardware (PCA10059) front

ARM Rust

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Industrial IoT



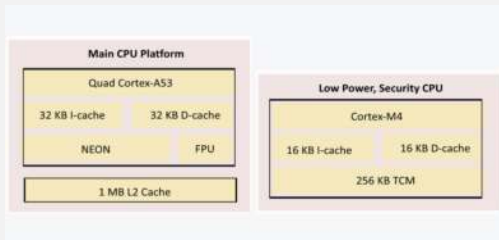
Industrial IoT



Educational IoT



Industrial



Medical



Railway



Robotics



Automotive

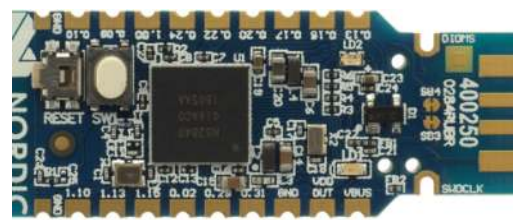


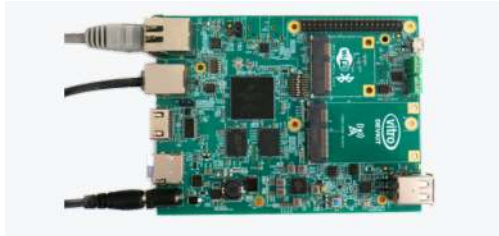
Figure 1: nRF52840 Dongle hardware (PCA10059) front

Various

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🇺🇸 STM (6y)



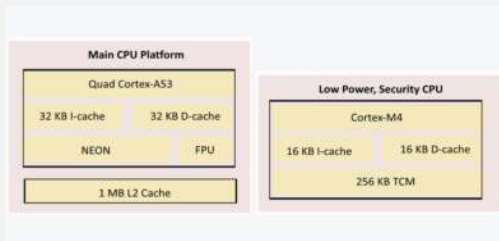
🇺🇸 NXP (6y)



🇵🇱 Broadcom (5y)



🇮🇹 NXP (2y)



🇺🇸 NXP (6m)



🇬🇧 Intel (4y)



🇺🇸 NXP (2y)



🇩🇪 Xilinx (2y)

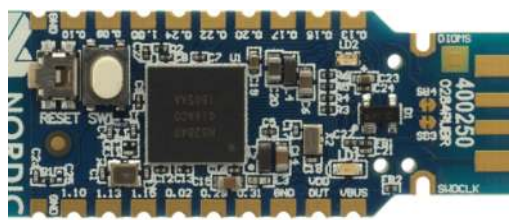
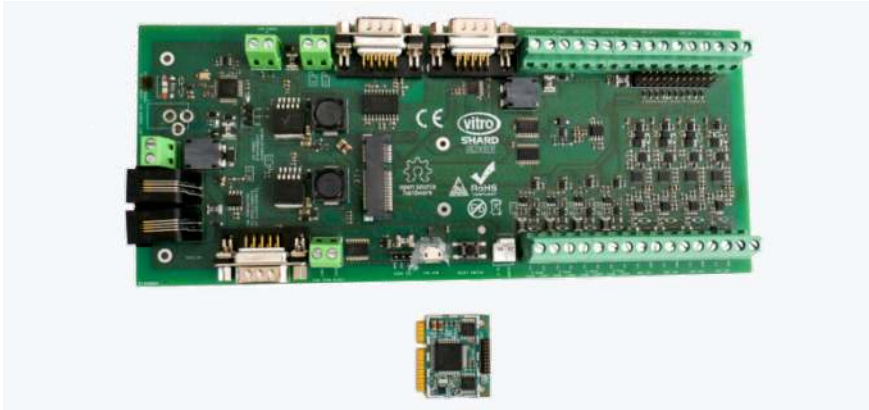


Figure 1: nRF52840 Dongle hardware (PCA10059) front

🌍 Nordic nRF52 (2y)

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Goal: Design and implementation of secure firmware ecosystem for IoT sensors and actuators data transfer

Customer: USA-based IoT Startup

Key tasks:

- Power-fail safe OTA
- Encrypted data exchange over CAN bus
- Secure boot support
- Software and infrastructure maintenance (release management, validation)

Programming languages: C, C++

Build and packaging system: cmake

Operating Systems: RTOS (Arm Mbed OS)

Hardware and technologies: Arm Cortex-M4 (STM32L4), Secure element (ECC508A, ECC608A), environmental sensors, USB MSD, RS-232, RS-485, I2C, SPI, CAN

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Goal: Create secure gateway for IoT data transfer

Customer: USA-based IoT Startup

Key tasks:

- Hardware bring up and BSP creation
- Middleware design and development
- AWS IoT and cloud backend design and implementation
- hardware, software and infrastructure maintenance (release management, validation)

Programming languages: C, C++, Go, Python

Build and packaging system: BitBake

Operating Systems: Linux (Yocto)

Hardware and technologies: Arm Cortex-A7 (NXP i.MX6), Secure element (ECC508A, ECC608A), WiFi, Bluetooth LE, LoRa, GSM, CAN

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Goal: Responsive multimedia casting device for teachers, cooperated with Android mobile app developed by other supplier.

Customer: Leading Polish Publishing House

Key tasks:

- video acceleration
- OS and middleware design and integration
- release management and validation
- device-smartphone communication protocol
- performance and load tests

Programming languages: C, Go

Build and packaging system: BitBake

Operating Systems: Linux (Yocto, Android)

Hardware and technologies: ARMv6Z (Raspberry Pi Zero W), ARMv8-A (Raspberry Pi 3A+, Pi Zero 2 W), WiFi Direct

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Goal: Rebase SoM vendor modifications on top of recent NXP SDK

Customer: Italy-based SoM Vendor, Belgium-based Surveillance Equipment Vendor

Key tasks:

- integrate SoM vendor customization with NXP SDK release
- regression testing
- documentation updates

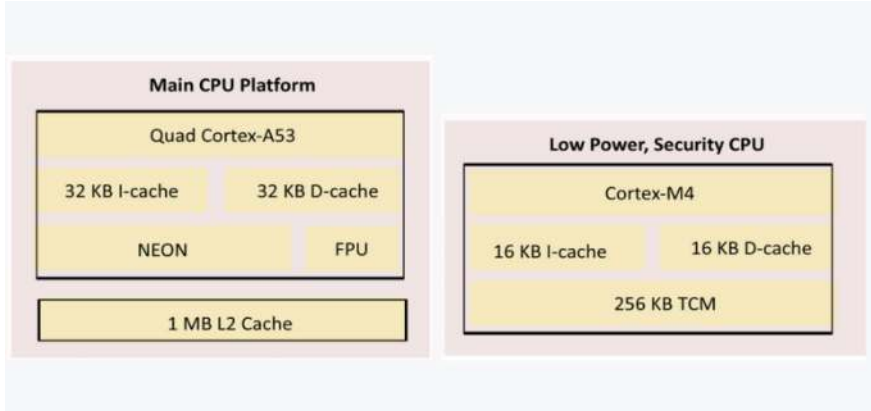
Programming languages: C, Python

Build and packaging system: BitBake

Operating Systems: Linux (Yocto)

Hardware and technologies: Arm Cortex-A (NXP i.MX6x, NXP i.MX8x)

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Goal: Framework and demo applications presenting inter-processor communication between Cortex-M4 and Cortex-A cores

Customer: USA-based Medical Company

Key tasks:

- MCU firmware development
- Linux kernel driver development
- documentation for development team

Programming languages: C

Build and packaging system: make, BitBake

Operating Systems: RTOS (FreeRTOS), Linux (Yocto)

Hardware and technologies: Arm Cortex-M4F,A72,A53 (Variscite DART MX8M MINI)

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Goal: Develop an on-board rail computer

Customer: UK-based Railway
Cyber Security Company

Key tasks:

- system architecture
- initial HostOS development
- internal training and ongoing support
- new security features (Secure Boot, TPM)

Programming languages: C, Bash, Python

Build and packaging system: Bazel, Bitbake

Operating Systems: Linux (Yocto)

Hardware and technologies: x86 industrial PCs, TPM2.0

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Goal: Secure Boot integration on ARM SoCs

Customer: USA-based Medical Company, Poland-based Public Transportation Integrator

Key tasks:

- integration of vendor-specific hw RoT
- chain of trust continuation
- provisioning and signing tools
- documentation and training

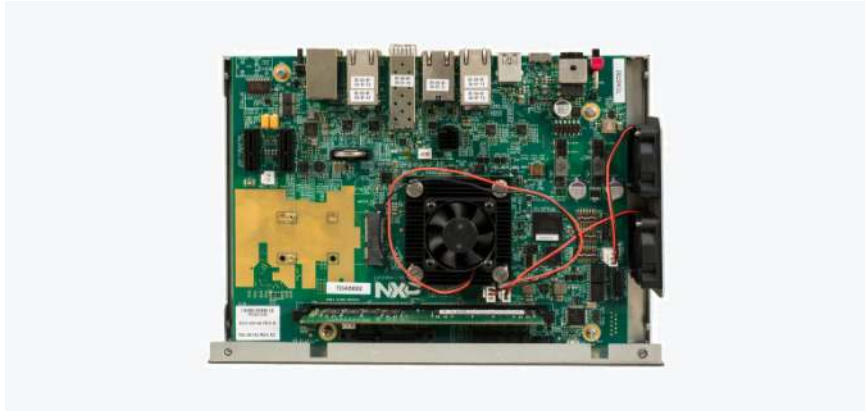
Programming languages: C, Bash

Build and packaging system: Buildroot, Yocto

Operating Systems: Linux

Hardware and technologies: NXP, Rockchip, Mediatek, others

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Goal: Assist with hw bring-up and provide BSP

Customer: USA-based Robotics Company

Key tasks:

- prepare boot firmware based purely on schematics
- assist in early board bring-up process
- diagnose and workaround hardware issues
- provide BSP (U-Boot, ATF, Linux) for custom hardware

Programming languages: C, Bash

Build and packaging system: Yocto

Operating Systems: Linux

Hardware and technologies: NXP LS1046A, SerDes configuration

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Goal: RDP solution for industrial devices

Customer: German-based Industrial Automation Vendor

Key tasks:

- Linux graphics stack debugging and fixes
- Wayland and Weston development
- operation in hybrid (FPGA + CPU) environment
- integration of RDP solution into industrial HMI

Programming languages: C, Bash

Build and packaging system: Yocto

Operating Systems: Linux (Automotive Grade Linux)

Hardware and technologies: Xilinx UltraScale

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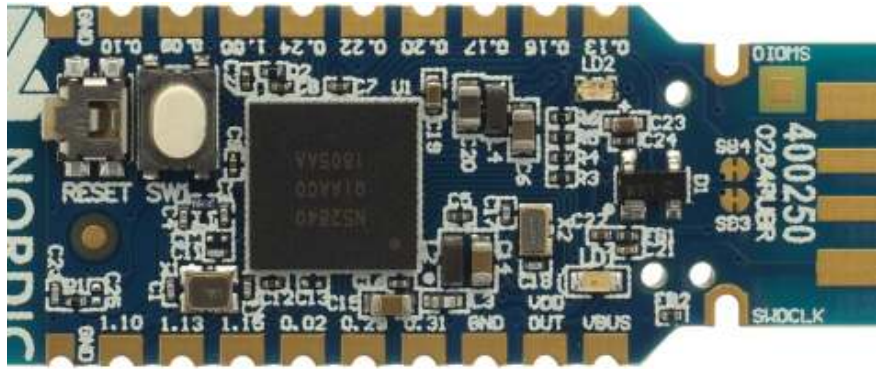


Figure 1: nRF52840 Dongle hardware (PCA10059) front

Goal: Provide a reference architecture for offline integrity measurement verifiers on the USB device

Customer: NLnet Foundation, internal product

Key tasks:

- Attestation architecture
- TPM2 policies
- Fobnail firmware in Rust
- Fobnail token provisioning tools
- Fobnail-attester app and use-cases

Programming languages: C, Rust, Bash

Build and packaging system: make, cargo

Operating Systems: Linux, Bare-metal Rust

Hardware and technologies: nRF52840

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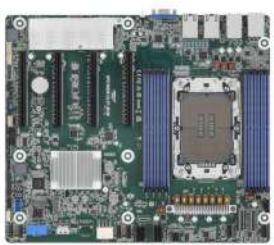
Selected Dasharo Team projects

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__Dasharo__ is an open-source firmware distribution focusing on clean and simple code, long-term maintenance, transparent validation, privacy-respecting implementation, liberty for the owners, and trustworthiness for all.

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 RTOS	 Windows/Linux	 Linux
 Linux/BSD	 Windows/Linux	 Linux
 Linux/BSD	 Linux/Windows	 Linux/Windows

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x86 C/C++/asm



x86 C/C++/asm



POWER C/asm



x86 C/asm



x86 C/asm



x86 C/asm



x86 C/asm



x86 C/asm



x86 C/asm

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 Embedded	 Client	 Server/Workstation
 Network Appliance	 Client	 Server/Workstation
 Network Appliance	 Server	 Server

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🇬🇧 Intel (6m)



🇮🇱 Intel (6m)



🇨🇦 IBM (2y)



🇨🇭 AMD (6y)



🇳🇱 Intel (4y)



🇸🇬 AMD (1y)



🇺🇸 Intel (7y)



🌍 Intel (3m)



🌍 AMD (6m)

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Goal: Firmware maintenance and bug solving of network appliance platform

Customer: Switzerland-based Network Appliance Vendor

Key tasks:

- BIOS firmware maintenance for 6 platforms (6y)
- validation, support, bug solving, upstreaming
- security (TPM, IOMMU, ECC RAM, flash protection)

Programming languages: C, x86 assembly

Build and packaging system: make

Projects/frameworks: coreboot, SeaBIOS, iPXE, EDKII

Operating Systems: Debian, Ubuntu, pfSense, OPNSense, OpenWRT

Hardware and technologies: AMD Embedded G series GX-412TC APU, T40E APU

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Goal: Firmware development, maintenance and bug solving of network appliance platforms

Customer: USA-based Network Appliance Vendor

Key tasks:

- firmware/BIOS development for 7 Intel architectures
- validation, support, upstreaming
- security (TPM, ME disablement, Boot Guard)

Programming languages: C, x86 assembly

Build and packaging system: make

Projects/frameworks: coreboot, SeaBIOS, iPXE, EDKII

Operating Systems: Debian, Ubuntu, pfSense, OPNSense, OpenWRT

Hardware and technologies: Intel Braswell to Jasper Lake (7 microarchitectures)

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Goal: Firmware maintenance and bug solving of laptop firmware

Customer: Netherlands-based Laptop Vendor

Key tasks:

- BIOS and EC firmware development
- EC firmware update protocol
- validation, support, upstreaming
- security (TPM, ME disablement, verified boot)

Programming languages: C, x86 assembly

Build and packaging system: make

Projects/frameworks: coreboot, iPXE, EDKII

Operating Systems: Ubuntu, Windows

Hardware and technologies: Intel Tiger Lake, Alder Lake-P, Meteor Lake

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Goal: Bring back ASUS KGPE-D16 platform to coreboot master branch

Customer: Singapore-based Web3 Company

Key tasks:

- rewriting northbridge and southbridge support code
- implement features required by upstream coreboot
- re-upstream the code to coreboot
- solve known issues and bugs

Programming languages: C, x86 assembly

Build and packaging system: make

Projects/frameworks: coreboot, SeaBIOS, iPXE

Operating Systems: Debian, Ubuntu

Hardware and technologies: AMD Opteron 6200/6300 series

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Goal: Run coreboot and heads on OpenPOWER architecture

Customer: Canada-based Laptop Vendor

Key tasks:

- new architecture support from scratch in coreboot
- POWER9 silicon initialization in coreboot
- POWER9 support in heads
- security improvements (TPM)

Programming languages: C, POWER9 assembly

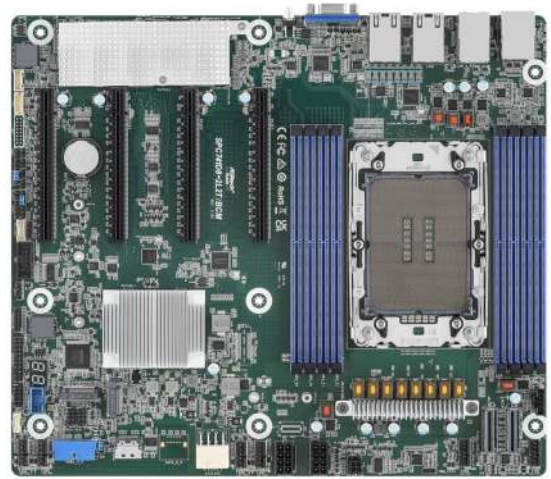
Build and packaging system: make

Projects/frameworks: coreboot, heads

Operating Systems: Debian, Ubuntu

Hardware and technologies: Talos II POWER9 board by Raptor Computing Systems

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Goal: Dasharo Hardware Certification

Customer: Self-founded

Key tasks:

- assessment of Root of Trust capabilities
- automated firmware validation
- technical support, bug solving, upstreaming

Programming languages: C, x86 assembly

Build and packaging system: make

Projects/frameworks: coreboot, EDKII, iPXE

Operating Systems: Debian, Ubuntu, Windows

Hardware and technologies: Intel Sapphire Rapids, Emerald Rapids

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Goal: Dasharo Hardware Certification for AMD Turin

Customer: NLnet Foundation, internal product

Key tasks:

- AMD OpenSIL support for retail server in coreboot
- PSPTool support for AMD Turin
- assessment of Root of Trust capabilities
- validation, support, upstreaming

Programming languages: C, x86 assembly

Build and packaging system: make

Projects/frameworks: coreboot, EDKII, iPXE

Operating Systems: Debian, Ubuntu, Windows

Hardware and technologies: AMD Turin

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Goal: Enable Intel TXE Secure Boot in coreboot running on medical robot

Customer: UK-based Medical Company

Key tasks:

- assessment of Root of Trust capabilities
- TXE Secure Boot, provisioning and fusing tools
- silicon initialization with Intel MRC

Programming languages: C, C++, x86 assembly

Build and packaging system: make

Projects/frameworks: coreboot, EDKII, SeaBIOS, iPXE

Operating Systems: Debian, Ubuntu, OnTime RTOS

Hardware and technologies: Intel Bay Trail

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Goal: Integrate hypervisor in firmware to run VMs alongside RTOS

Customer: UK-based Medical Company

Key tasks:

- create custom hypervisor in Bareflank framework for medical robot
- integrate hypervisor in firmware (size constrained, from SPI flash)
- run main RTOS in VM and another application in separate VM

Programming languages: C, C++, x86 assembly

Build and packaging system: make

Projects/frameworks: coreboot, EDKII, SeaBIOS, iPXE, Bareflank

Operating Systems: Debian, Ubuntu, OnTime RTOS

Hardware and technologies: Intel Bay Trail

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Goal: Assess security properties of Dell XPS laptop firmware

Customer: Israel Public Sector

Key tasks:

- comprehensive analysis of laptop firmware security
- Secure Boot, flash protections, common vulnerabilities
- analysis of 3rd party firmware and hardware components
- security report

Programming languages: C, C++, x86 assembly

Build and packaging system: make

Projects/frameworks: coreboot, EDKII, SeaBIOS, iPXE

Operating Systems: Debian, Ubuntu, Windows

Hardware and technologies: Intel Kaby Lake

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Pace Enterprise Training (PET) helps companies to bridge knowledge gaps and accelerate engineering team readiness, delivered by trainers with years of hands-on experience with collaborative open-source and commercial software development.

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Pace Enterprise Training

by 3MDEB

Goal: Ramp-up teams with Embedded Linux skills

Customer: German-based Audio Vendor, Belgium-based Surveillance Equipment Vendor

Key tasks:

- remote and on-site training for up to 10 participants
- Embedded Linux development
- Yocto basics and best practices
- 50% hands-on with emulation and hardware targets

Programming languages: C, Bash

Build and packaging system: Yocto

Operating Systems: Linux

Hardware and technologies: QEMU, Arm Cortex-A (NXP i.MX6x, NXP i.MX8x)

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Pace Enterprise Training

by 3MDEB

Goal: Firmware and security training (RoT, CoT, Secure Boot)

Customer: Public sector, USA-based Cloud Computing Company

Key tasks:

- BIOS/firmware/UEFI and x86 arch training
- advanced firmware security (defensive and offensive)
- RoT provisioning exercises, workshops
- contribution to OST2

Programming languages: C, x86 assembly

Build and packaging system: make

Projects/frameworks: coreboot, EDKII

Operating Systems: Windows, Linux

Hardware and technologies: Intel Bay Trail, Intel Boot Guard

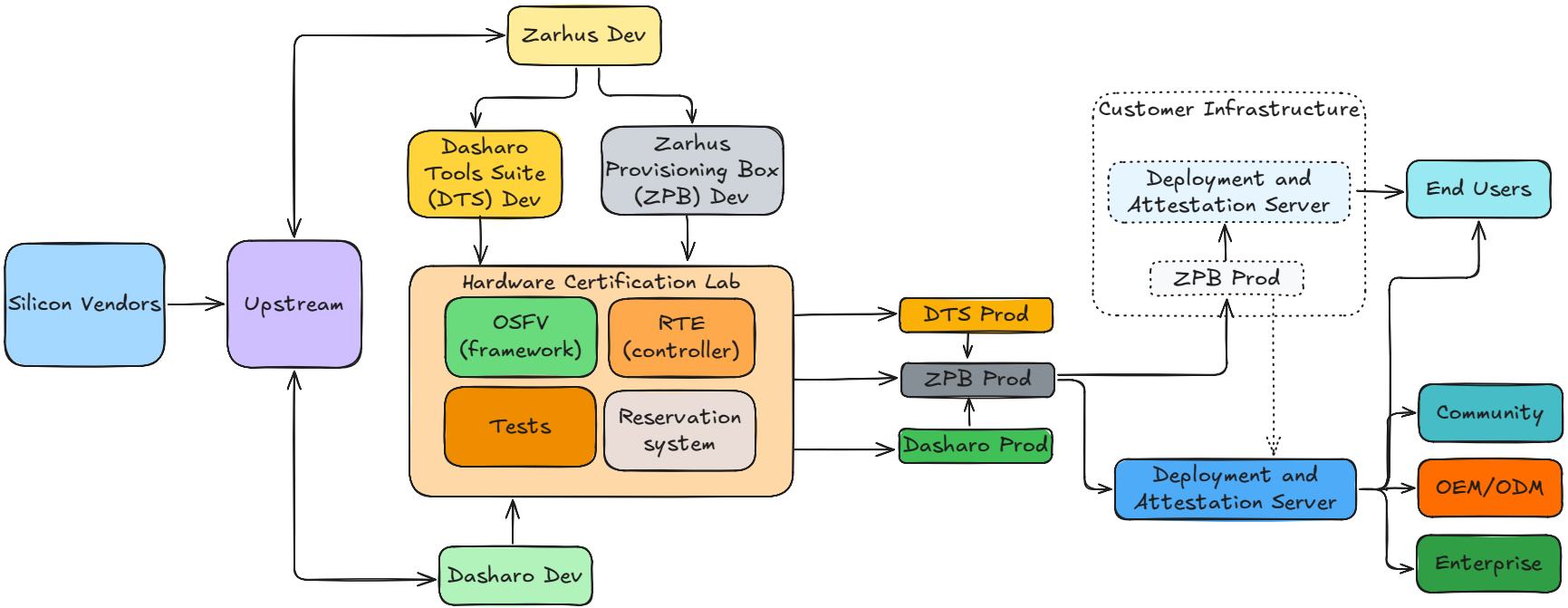
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High Assurance Core Infrastructure

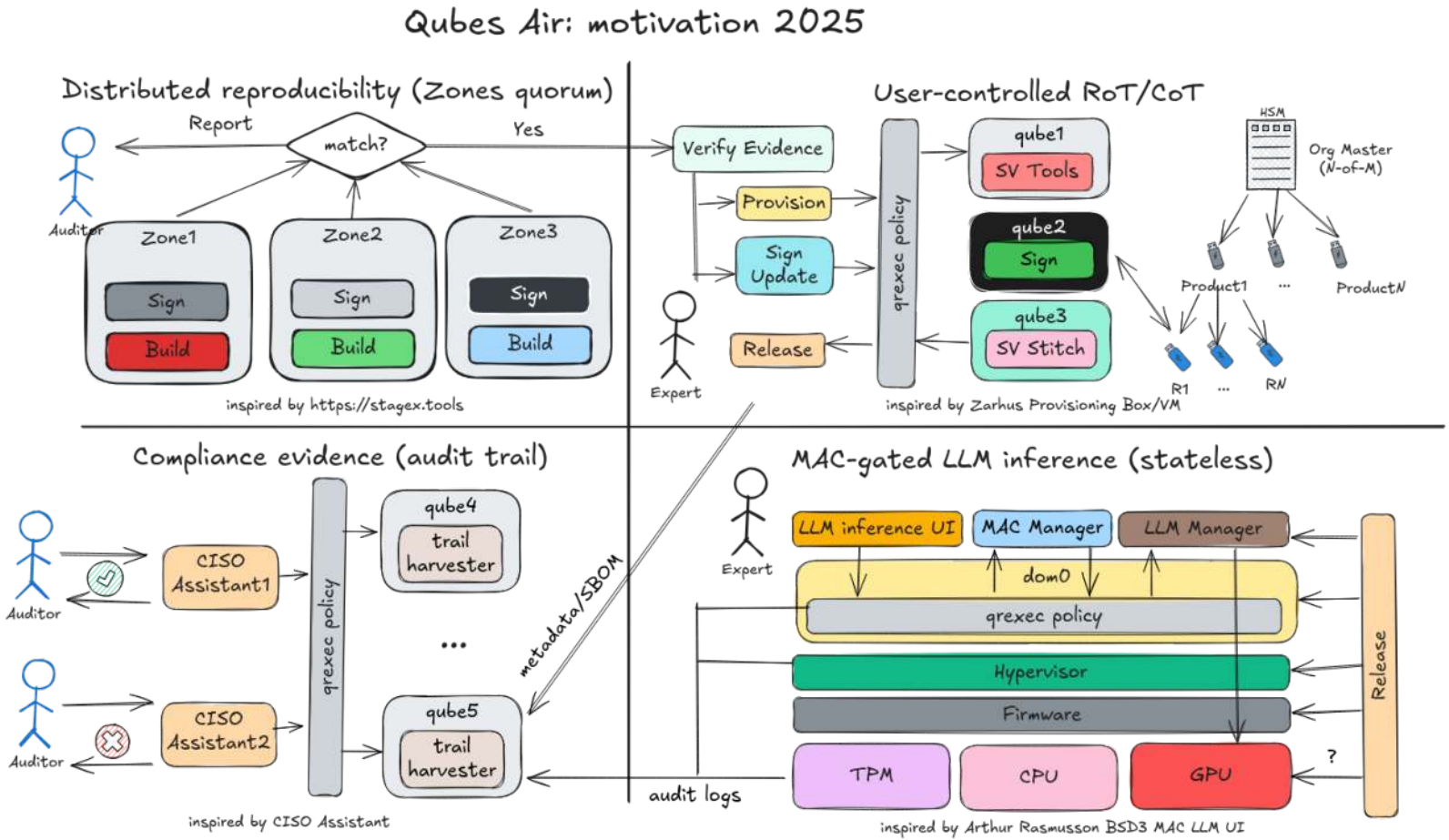
Reference Architecture



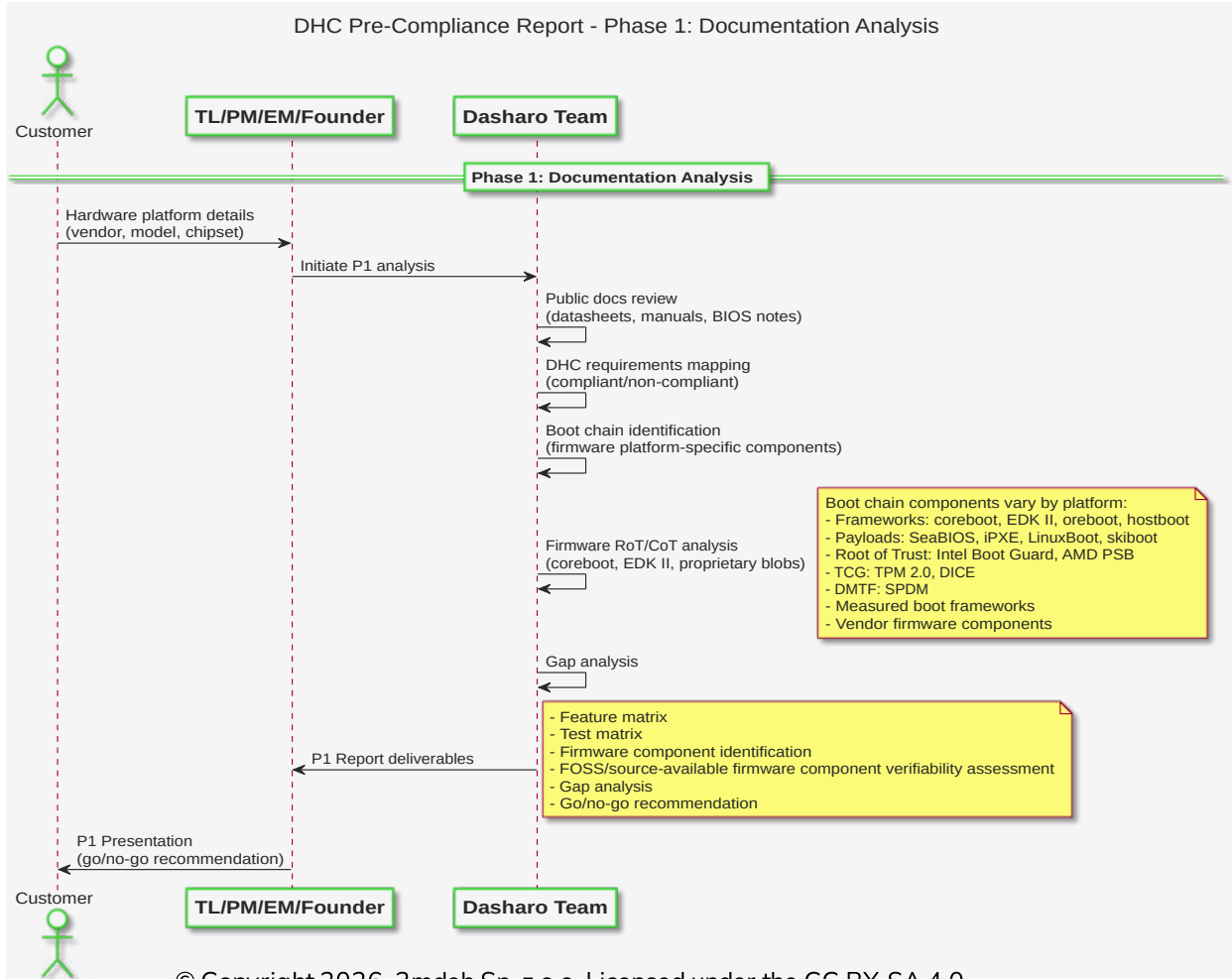
Dasharo and Zarhus Release Process



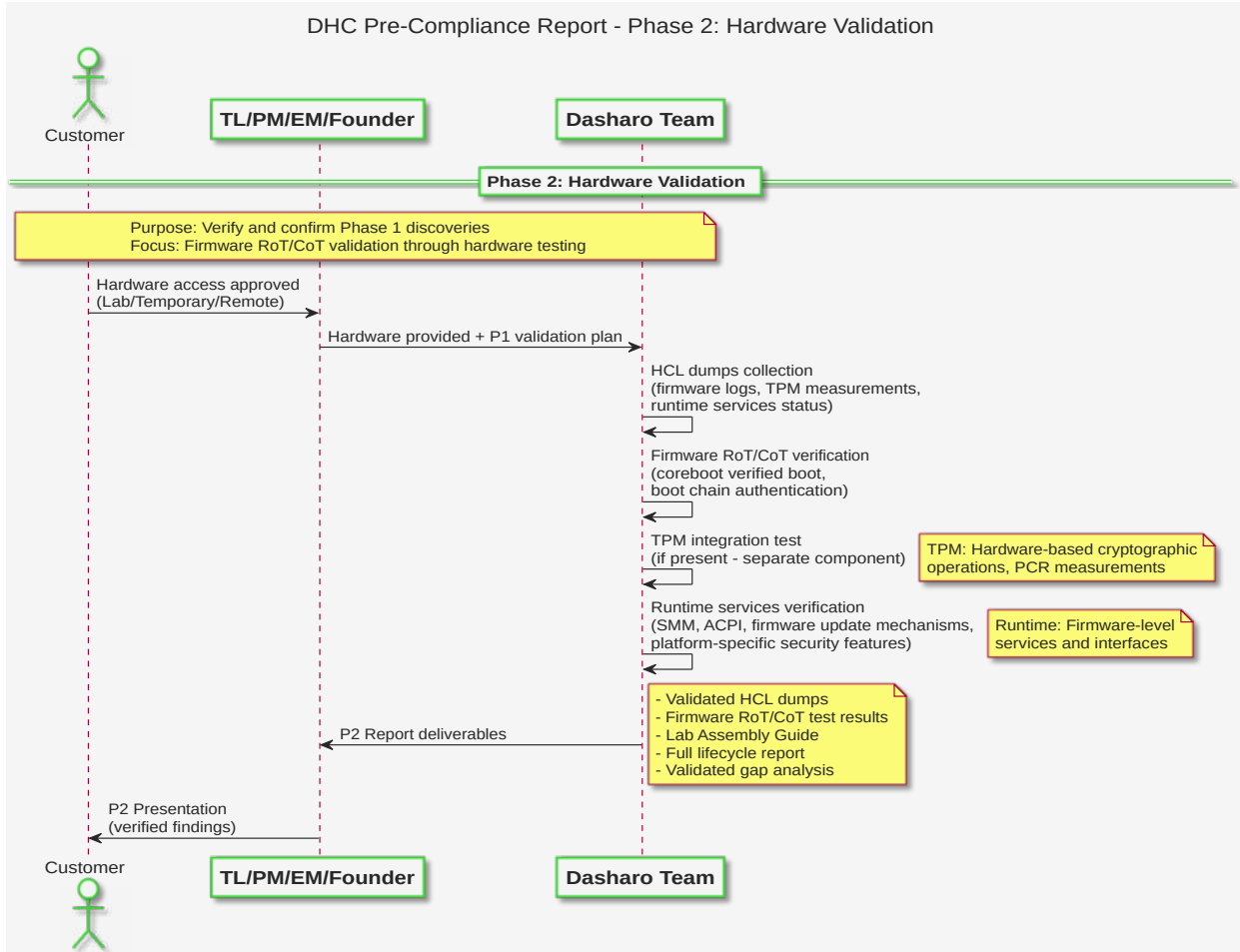
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Q&A