IOT205

What's new with FreeRTOS

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Agenda

- FreeRTOS overview
- Code distribution
- FreeRTOS qualification
- Reference integrations
- Code longevity
- Symmetric multiprocessing
- Additional projects and activities



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Microcontrollers are everywhere



Improve the performance and productivity of industrial processes



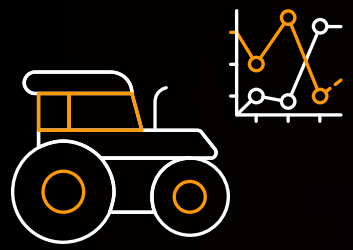
Remotely monitor patient health and wellness applications



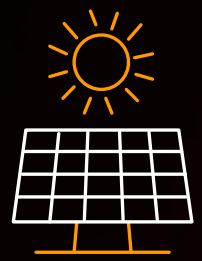
Track inventory levels and manage warehouse operations



Build smarter products and user experiences in homes, buildings, and cities



Grow healthier crops with greater efficiencies



Manage energy resources more efficiently



Transform transportation with connected and autonomous vehicles



Enhance safety in the home, the office, and the factory floor

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What is FreeRTOS?



https://freertos.org
https://github.com/freertos

18+ years trusted, widely distributed (downloaded every 170 seconds)

40+ supported architectures, including Armv8-M (Cortex-M33) and RISC-V

Broad partner ecosystem support

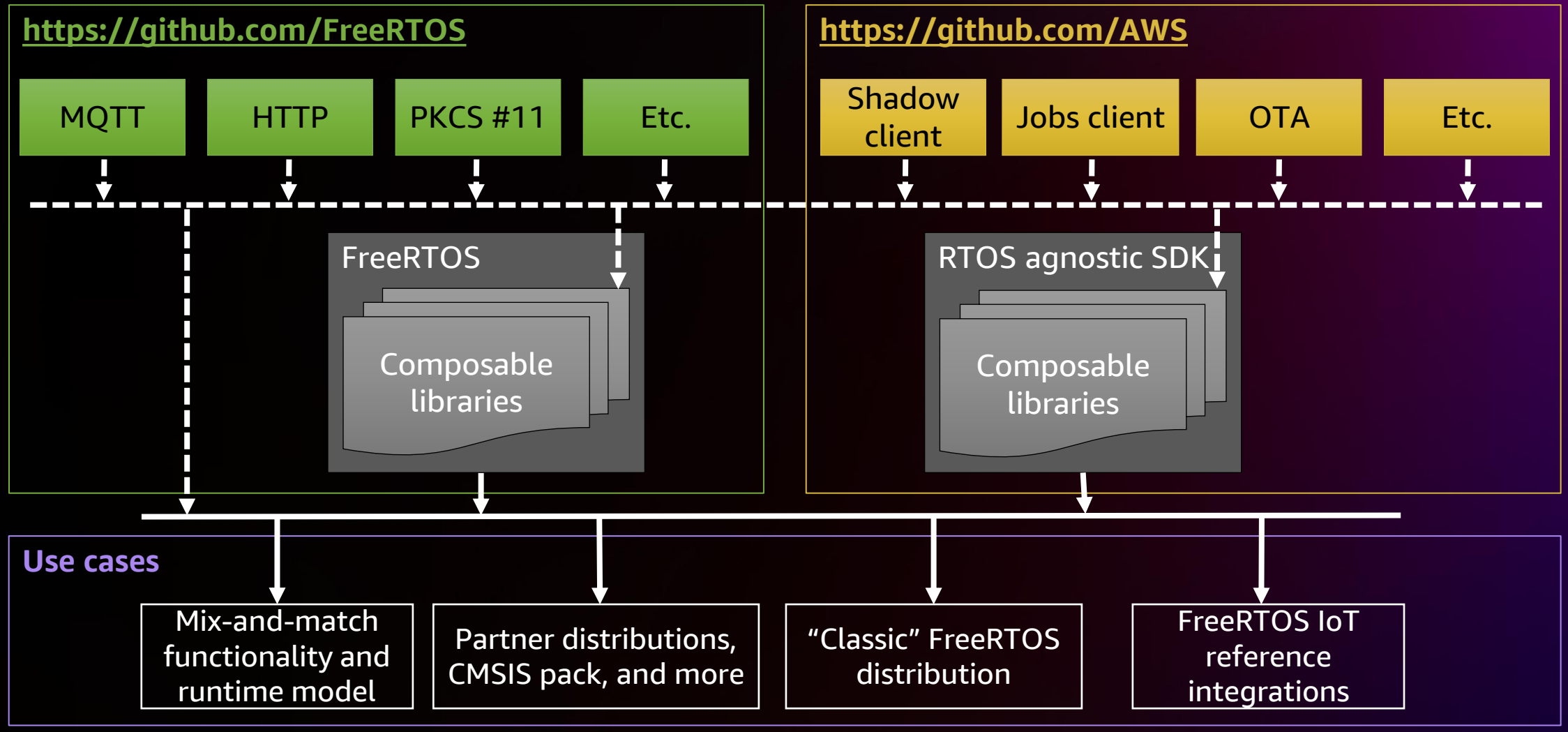
Permissive MIT open-source license

Kernel and modular libraries

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FreeRTOS Git repositories structure

LIBRARIES IN INDIVIDUAL REPOSITORIES, WITH MINIMAL INTERDEPENDENCE



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FreeRTOS CMSIS-Packs

- All FreeRTOS long-term support (LTS) libraries are available in Common Microcontroller Software Interface Standard (CMSIS)-Pack format
  - Core – coreMQTT, coreHTTP, corePKCS11, coreJSON, coreMQTT Agent
  - AWS IoT – Device Shadow, Device Defender, Jobs, Over-the-air update
- Included in Arm µVision IDE and Keil Studio Cloud
- Find out more about CMSIS-Packs here: https://developer.arm.com/

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Where else can I get FreeRTOS?

DEVELOP WITH FREERTOS IN YOUR PREFERRED ENVIRONMENT

Arm – Arm Virtual Hardware, Keil Studio Cloud, and µVision

Espressif – ESP-IDF

IAR – Embedded Workbench

Infineon – ModusToolbox AnyCloud

NXP – MCUXpresso

Realtek – AmebaPro SDK

Renesas – Flexible Software Package (FSP)

STMicroelectronics – STM32CubeIDE

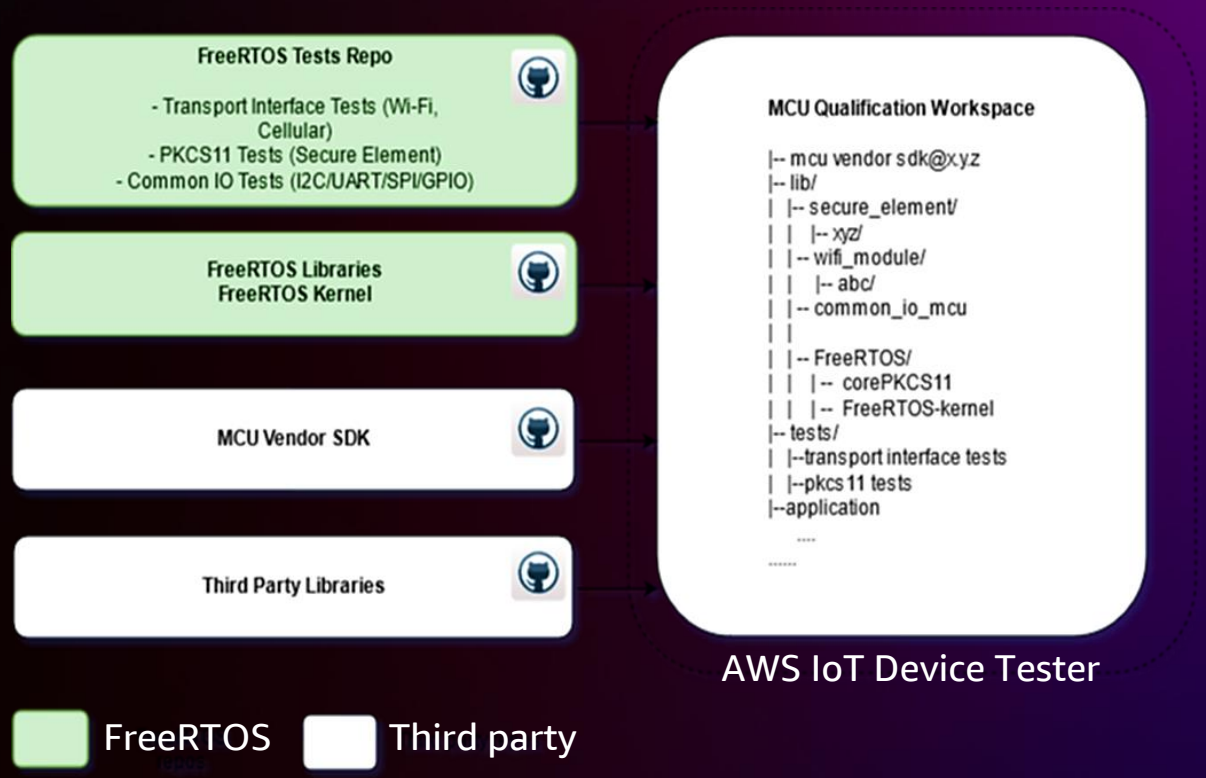


And others …
- Arduino IDE
- PlatformIO
- VSCode

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Device Qualification Program for FreeRTOS

- Aligns with the modular structure of FreeRTOS and LTS library releases
- Separate FreeRTOS Tests repository
- Choose FreeRTOS libraries, project structure, and repository
- Validate for secure AWS IoT Core connectivity and OTA



Partner Device Catalog: https://devices.amazonaws.com/

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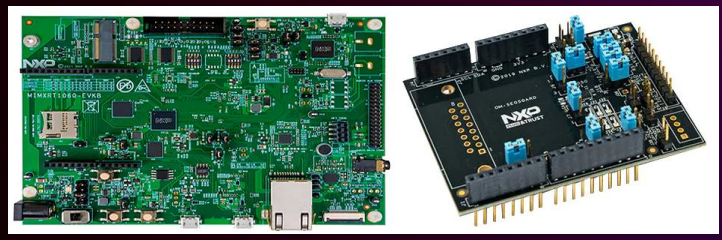
Featured FreeRTOS IoT reference integrations

- Demonstrates the use of the latest FreeRTOS LTS libraries and MCU capabilities
- Raises the bar for security and modularity of IoT applications
- Customizable into production-worthy IoT solutions

https://www.freertos.org/aws-reference-integrations.html



STMicroelectronics STM32U5 Arm Cortex-M33 MCU with TrustZone and TF-M



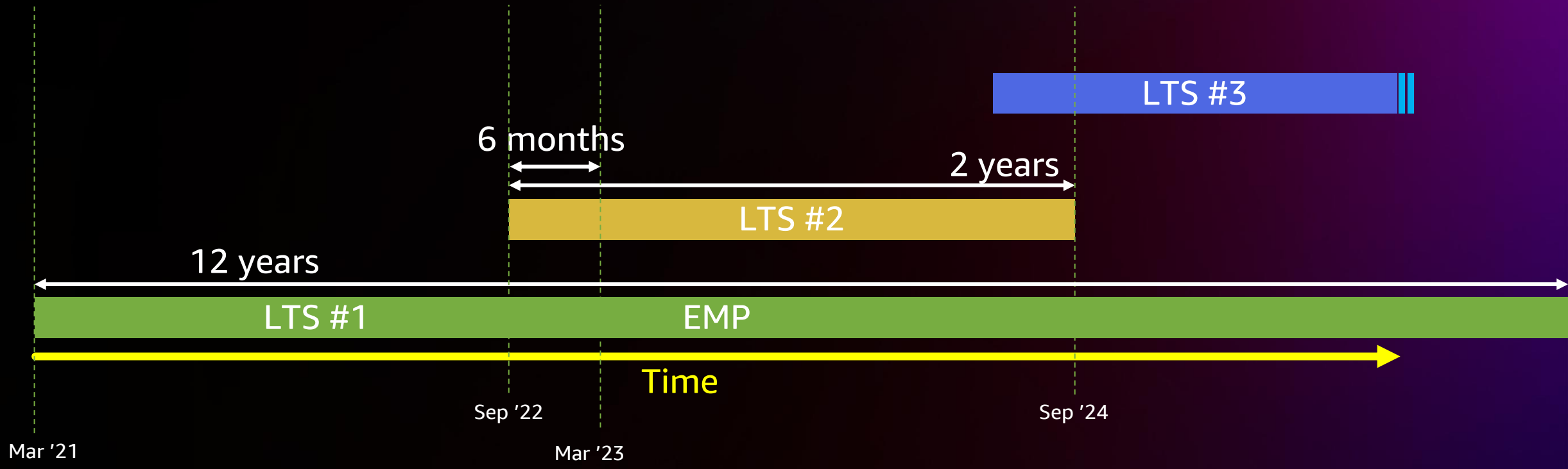
NXP i.MX RT1060 Arm Cortex-M7 MCU with EdgeLock SE050 Secure Element



Espressif ESP32-C3 RISC-V MCU with Digital Signature Peripheral (DSP)

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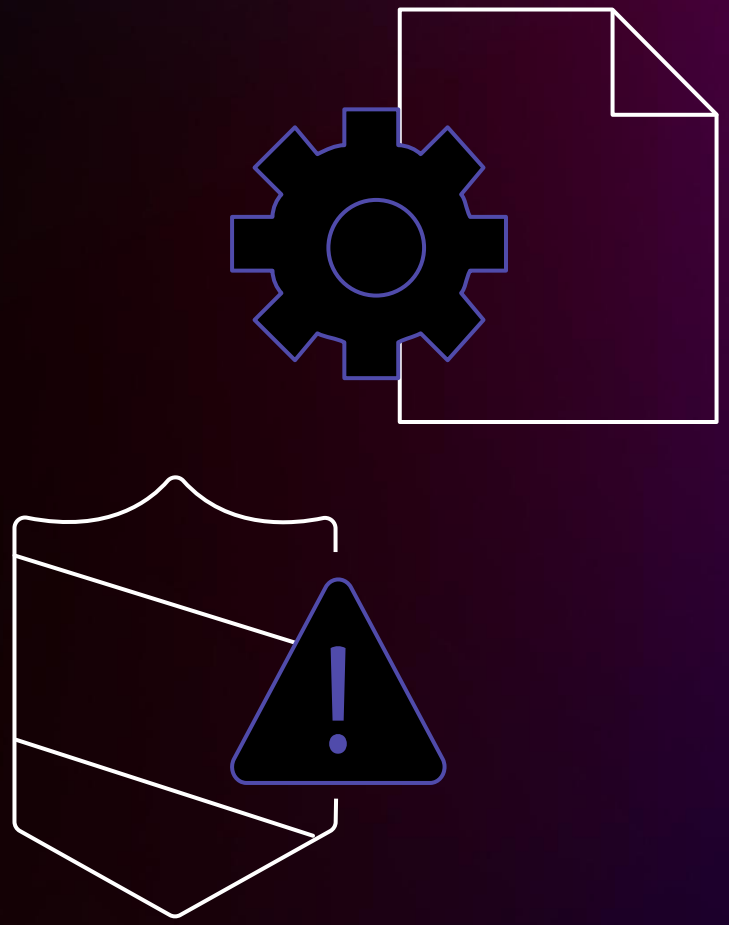
FreeRTOS LTS and Extended Maintenance Plan



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FreeRTOS long-term support (second release)

- Feature stability
- Security patches and critical bug fixes for two years
- Covers FreeRTOS kernel, cloud-agnostic IoT libraries, AWS IoT libraries
- Maintained until Oct. 31, 2024



https://github.com/FreeRTOS/FreeRTOS-LTS

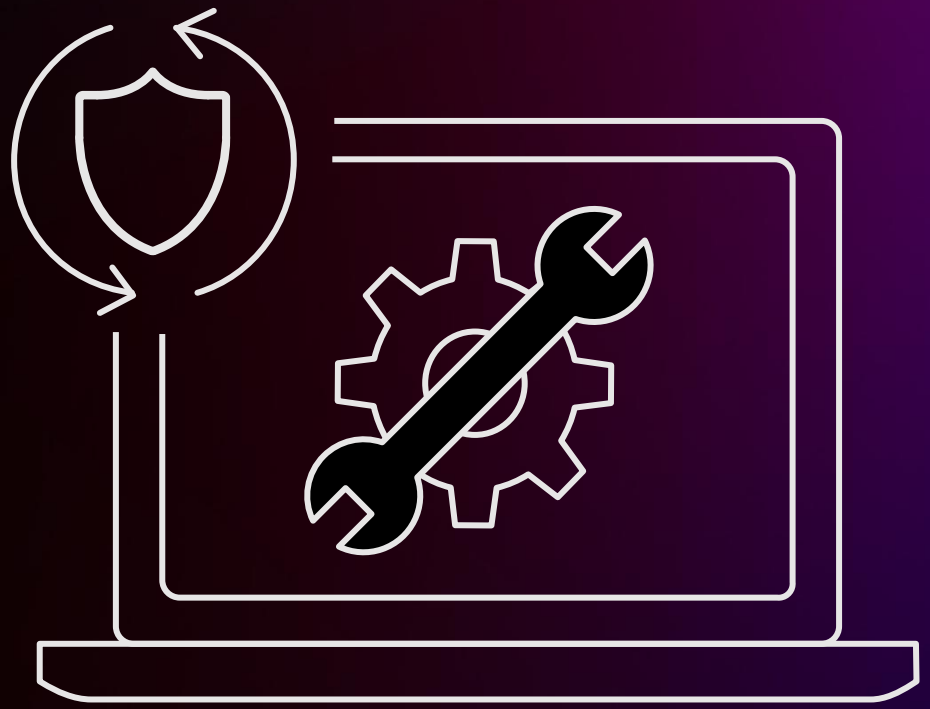
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FreeRTOS Extended Maintenance Plan (EMP)

- Extend LTS for up to 10 years beyond expiry
- Reduce product lifecycle risks
- Continue to renew subscriptions annually for up to 10 years
- Create and manage subscriptions using **FreeRTOS EMP Console**

https://us-east-1.console.aws.amazon.com/iot/home?region=us-east-1#/freertos-emp/home



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Symmetric Multiprocessing (SMP)

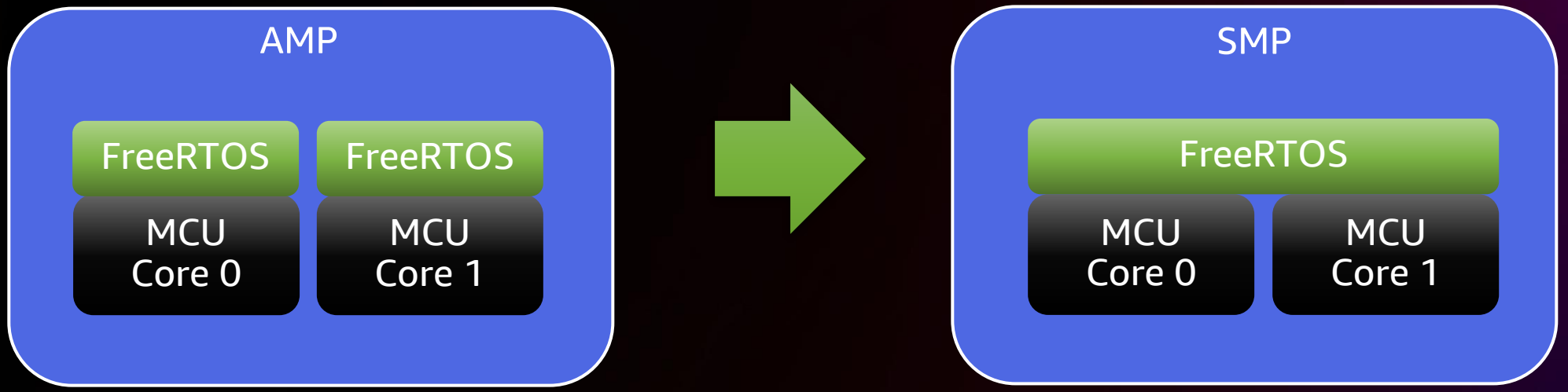
PARTNER IMPLEMENTATIONS: RASPBERRY PI – XMOS – ESPRESSIF – TEXAS INSTRUMENTS

Asymmetric Multiprocessing (AMP)

- Each processor core runs its own instance of FreeRTOS

Symmetric Multiprocessing (SMP)

- One instance of FreeRTOS that schedules tasks across multiple cores



https://freertos.org/symmetric-multiprocessing-introduction.html

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What customers are doing with FreeRTOS

HALTER

Smart farms

belkin

iDevices

Connected home appliances

key for business

Smart building

woodside

Natural gas production and maintenance

solshare

Create a network. Share electricity. Brighten the future

Smart peer-to-peer microgrid

TRAEGER

Connected grills

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Additional projects and activities

- OPC Unified Architecture (OPC UA)
- Software Bill of Materials (SBOM)
- SESIP Assurance Level 3
- Delta Over-the-Air Updates
- Community – Forums, blogs, events, talks, and social media
- FreeRTOS in the Wild: https://www.freertos.org/freertos-in-the-wild/

- Partner integrations and solutions
  - Arm – Arm Virtual Hardware, Keil Studio Cloud, CMSIS-Packs, Workshop
  - Espressif – IDF 5.0 with FreeRTOS and SMP
  - Klika Tech – Industrial Equipment Anomaly Detection using FreeRTOS and coreMQTT

KLIKA·TECH
GLOBAL IOT SOLUTIONS

https://klika-tech.com/



Remember to visit: **http://freertos.org**

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Thank you!

Tanmoy Sen

Dan Gross
@dangross



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