FreeRTOS on RISC-V

…and Open Source @ Amazon

Richard Barry
Founder, FreeRTOS Project
Principal Engineer, AWS IoT
Agenda

The FreeRTOS Kernel
Open Source at Amazon
Running FreeRTOS on RISC-V
FreeRTOS—Open source real time kernel

is everywhere...
Small footprint

- Processor power
- 10s of K of ram
- 100s of K of flash

Applicability

- No Scheduler
- FreeRTOS
- μCLinux, eCOS
- Linux
Library that implements multithreading

Application Design Goals:

- Meet real time requirements!
- Maximize responsiveness
- Use as little CPU/Power as possible
- Maximize maintainability
- Maximize portability (hardware change)
- Simplicity!
- Fast to market
- Meet requirements with minimum expenditure
Provide a free product that surpasses the quality and service of commercial alternatives.

- Enterprise friendly licensing
- User obsession
- Rapid support
- Robustness
- Documentation
- Windows hosts too
- Leadership
- Knowledgeable support
- Controlled IP
- Paid options
- Demonstrable code quality
- Vibrant activity
FreeRTOS downloads per month over 15 years

Downloads

Date

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Use Cases
AWS in the cloud and at the edge

Endpoints

Things
Sense & Act

Secure local triggers, actions, and data sync

Gateway

Secure device connectivity and messaging

Cloud
Storage & Compute

Fleet onboarding, management, and SW updates

Fleet audit and protection

IoT data analytics and intelligence

Intelligence
Insights & Logic → Action

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Open Source @ Amazon
FreeRTOS on RISC-V
Common source files and a port layer
MIT Licensed C Source Code

```
C:\
  | event_groups.c
  | list.c
  | queue.c
  | stream_buffer.c
  | tasks.c
  | timers.c

include
portable
GCC
  | ARM_CM0
  |   | port.c
  |   | portmacro.h
  | ARM_CM3
  |   | port.c
  |   | portmacro.h
  | ARM_CM3_MPU
  |   | port.c
  |   | portmacro.h
```
Demonstrate Renode and Vegaboard projects

- Including the source files
- Setting the assembler's include file
- Set configCLINT_BASEADDRESS
- #define portasmHANDLE_INTERRUPT
- Install the FreeRTOS trap handler
Defining the interrupt stack

![Diagram showing the interrupt stack for different tasks and stacks]
Thank You!

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