FreeRTOS on RISC-V

…and Open Source @ Amazon

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Principal Engineer, AWS IoT

Agenda

The FreeRTOS Kernel

Open Source at Amazon

Running FreeRTOS on RISC-V

aws

FreeRTOS—Open source real time kernel

is everywhere…

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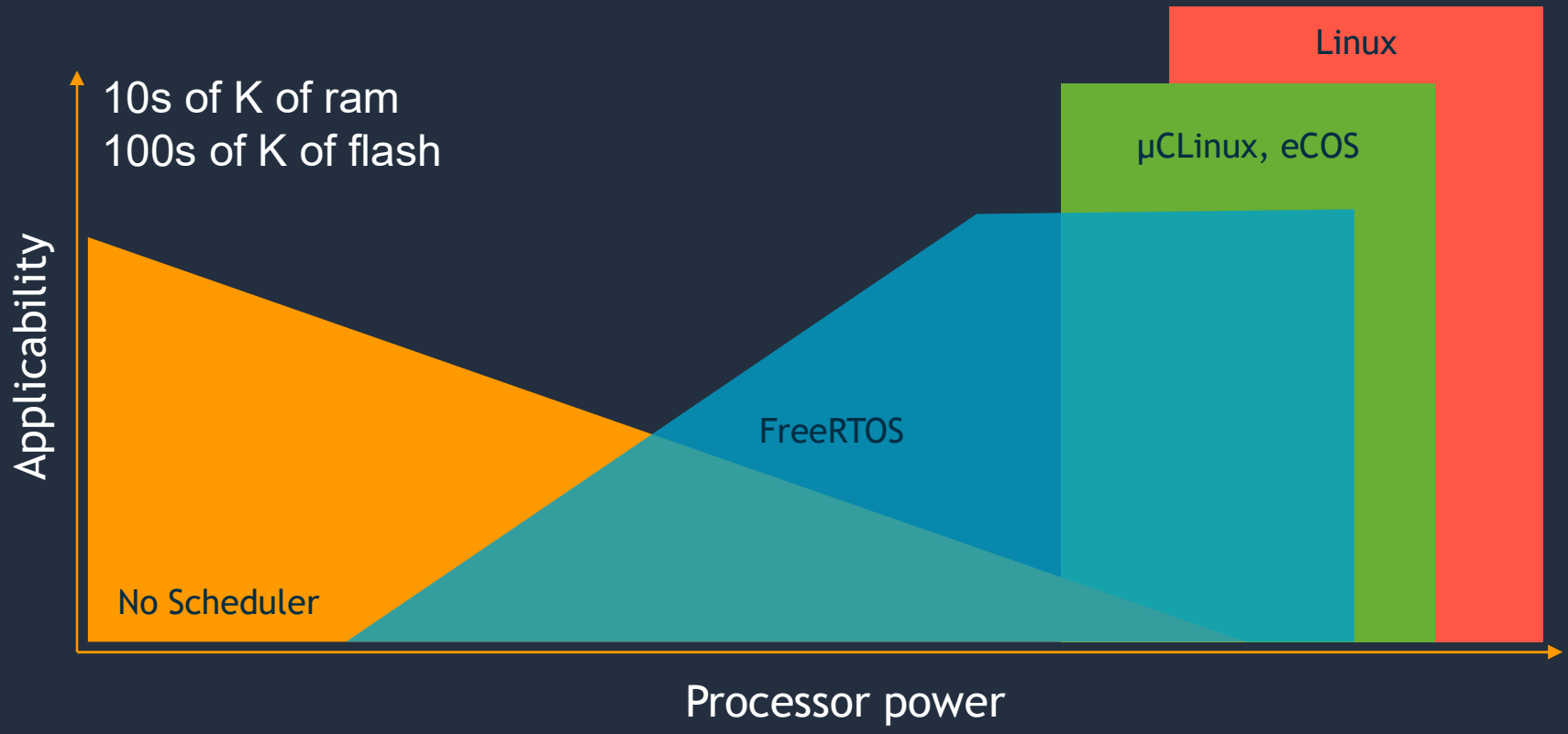
Small footprint



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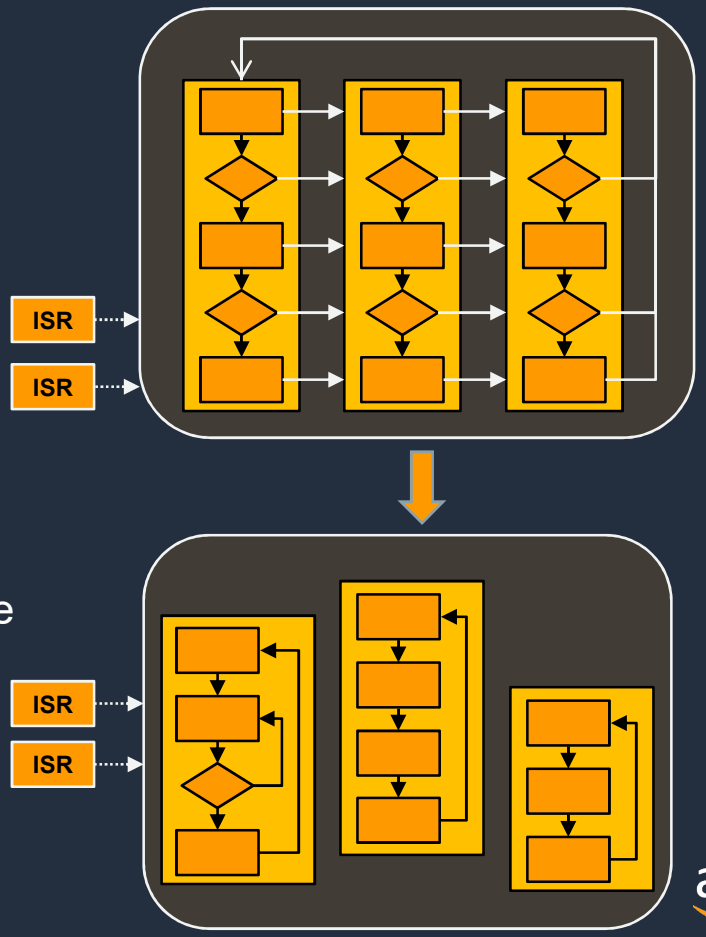
Library that implements multithreading

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

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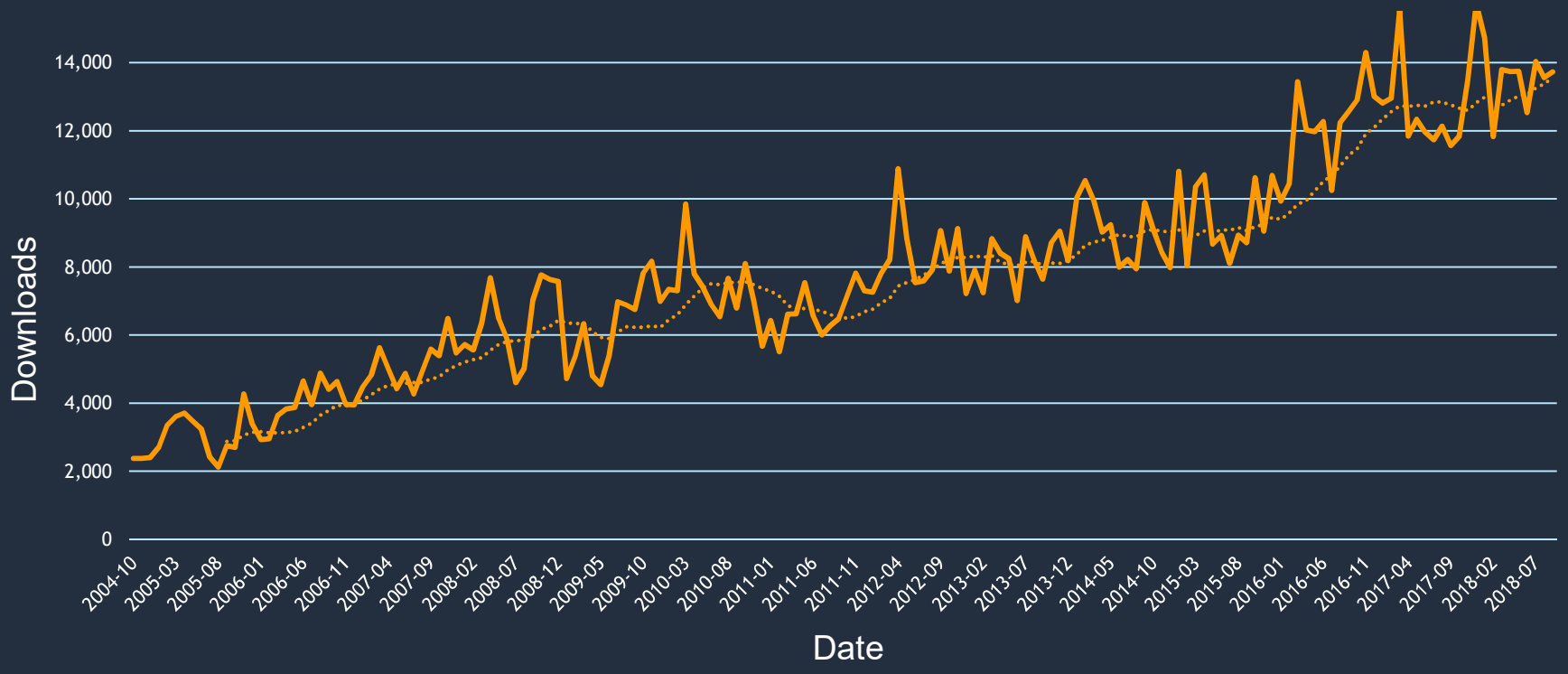
FreeRTOS downloads per month over 15 years



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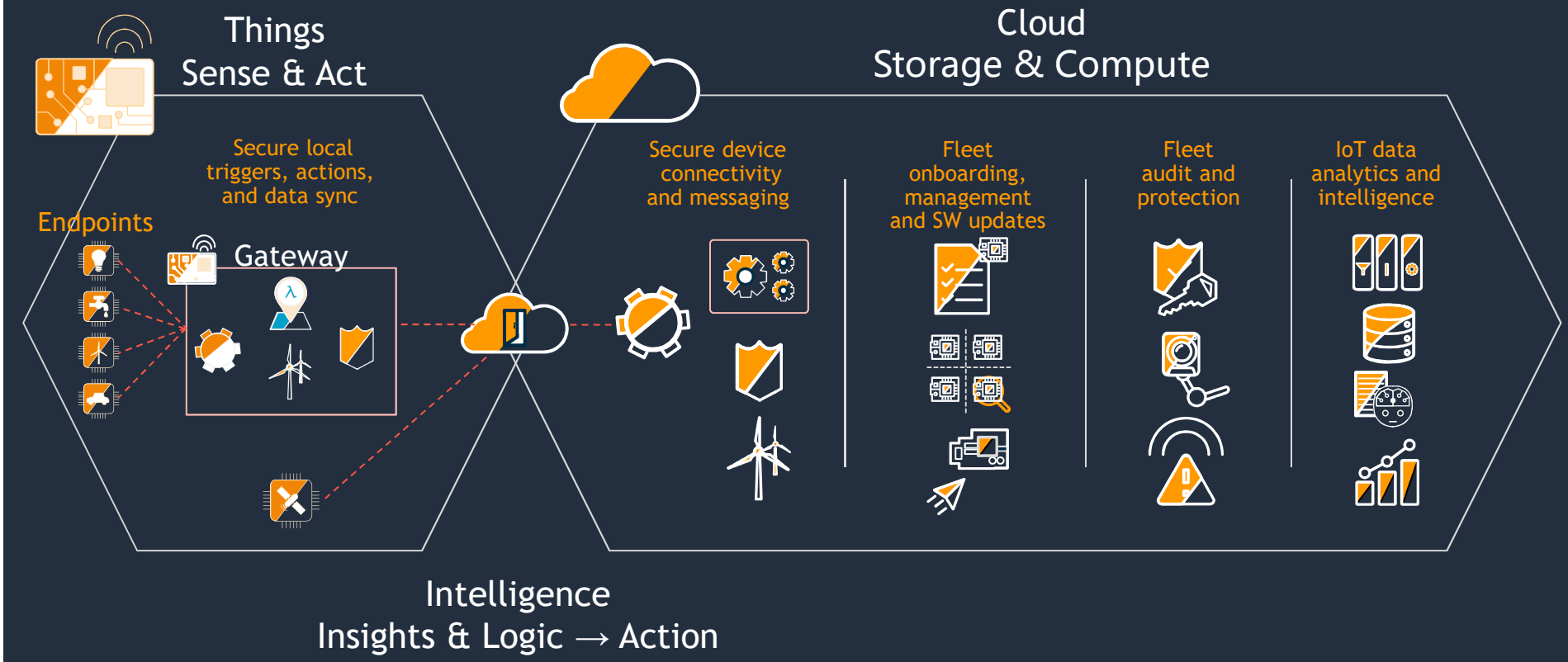
Use Cases

AWS in the cloud and at the edge



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Open Source @ Amazon

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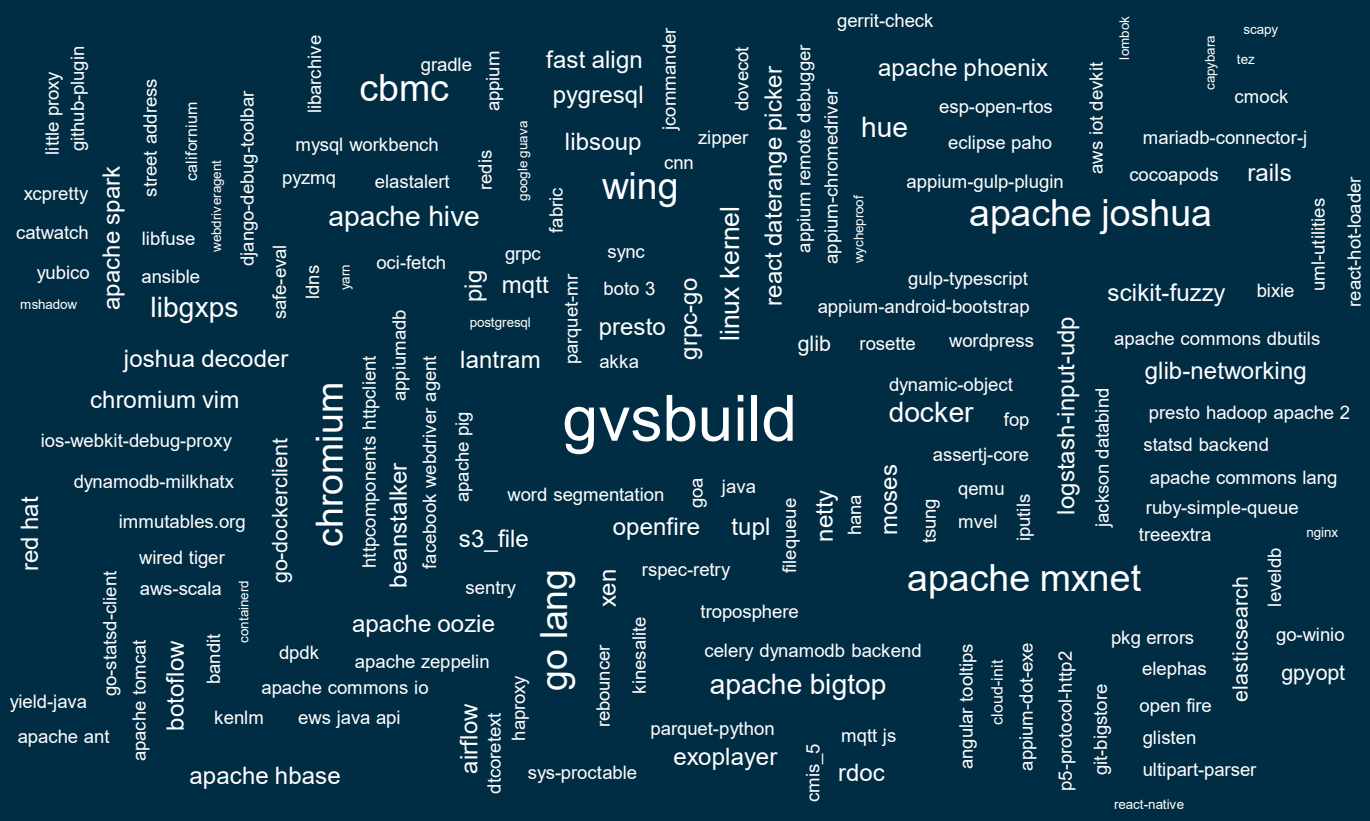
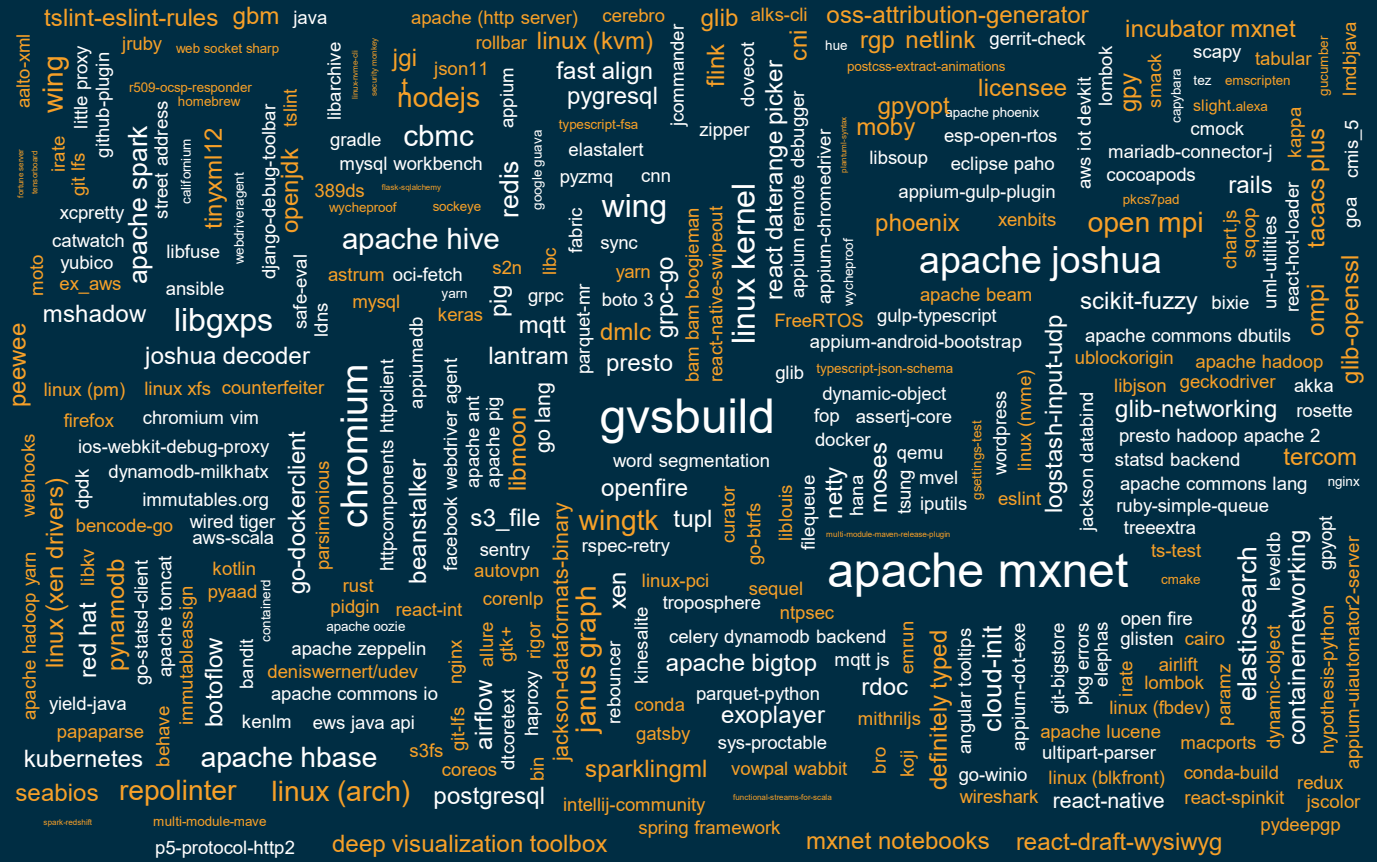
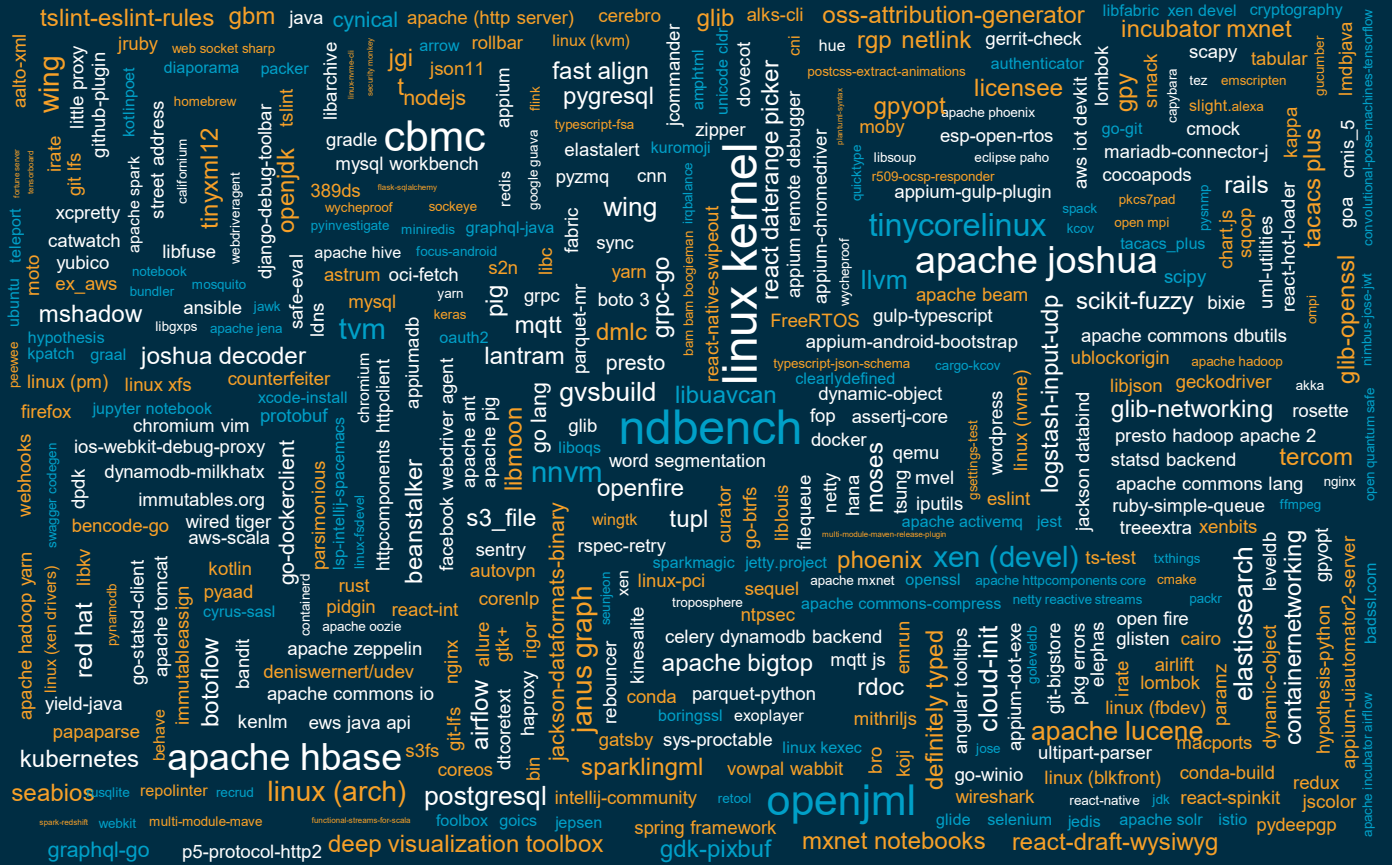
2016



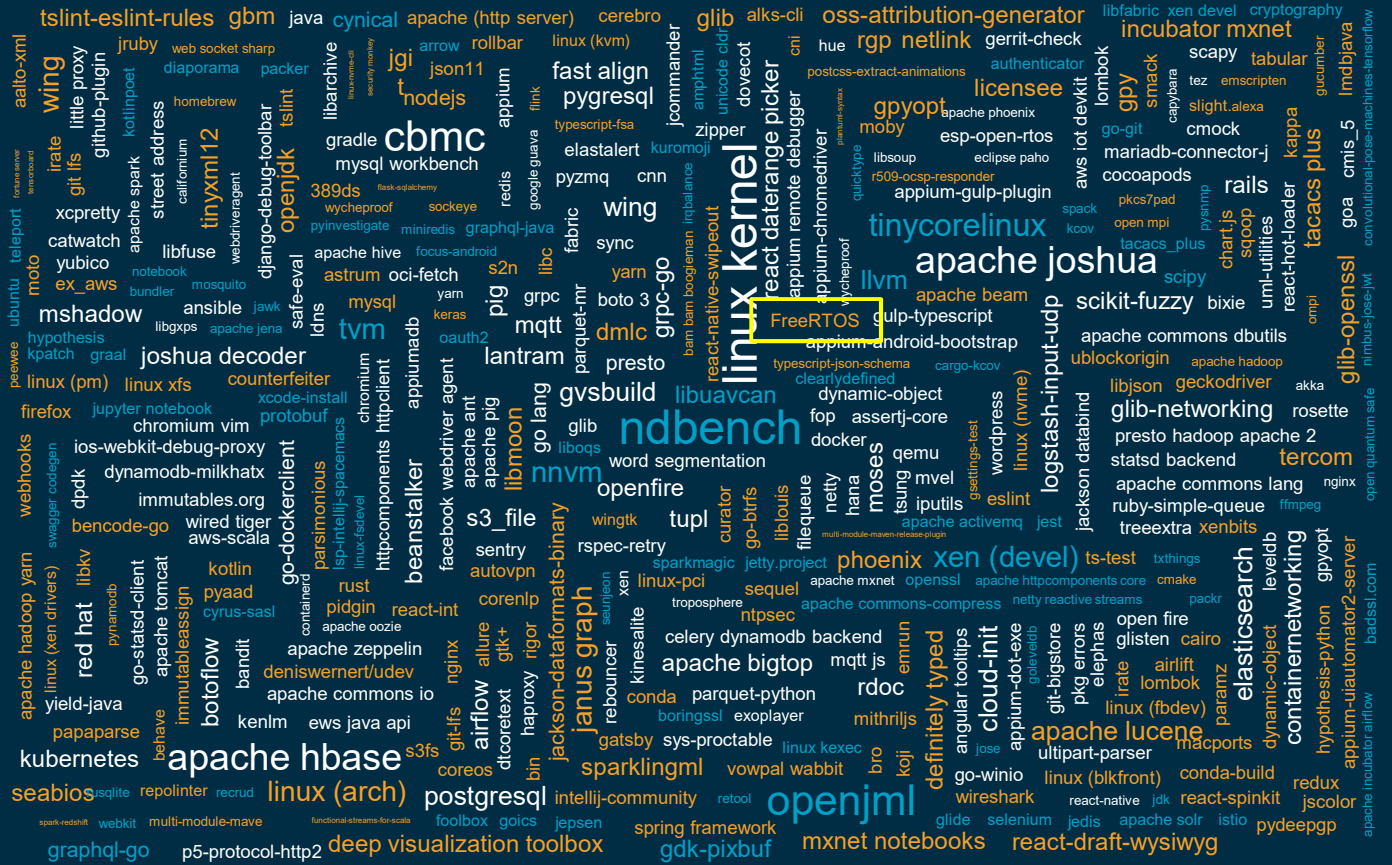
2017



2018



2018



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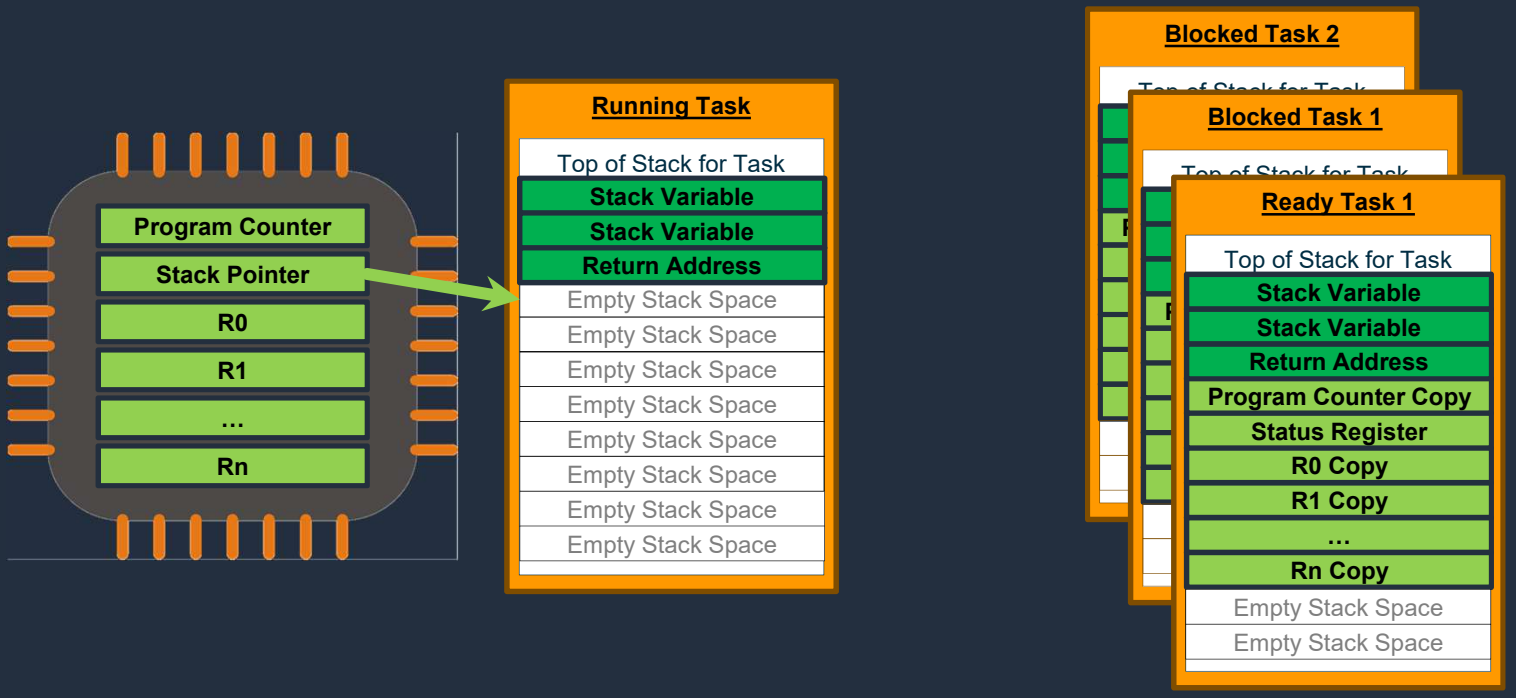
FreeRTOS on RISC-V

Common source files and a port layer



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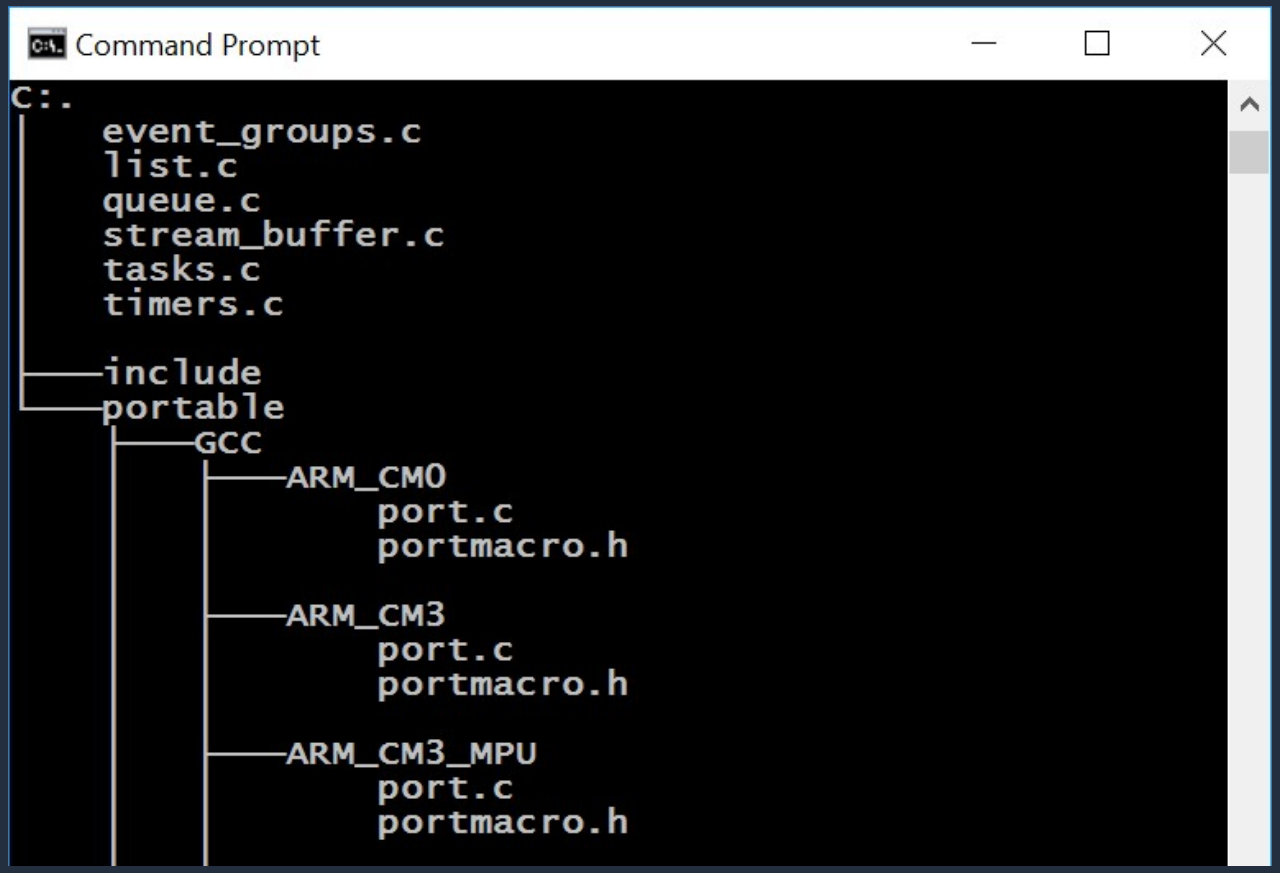
MIT Licensed C Source Code



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MIT Licensed C Source Code

```
    event_groups.c
    list.c
    queue.c
    stream_buffer.c
    tasks.c
    timers.c

├──include
└──portable
    └──GCC
        └──RISC-V-RV32
            |   port.c
            |   portASM.S
            |   portmacro.h
            |
            └──chip_specific_extensions
                ├──Pulpino_Vega_RV32M1RM
                |       freertos_risc_v_chip_specific_extensions.h
                |
                └──RV32I_CLINT_no_extensions
                        freertos_risc_v_chip_specific_extensions.h
```


Demonstrate Renode and Vegaboard projects

- Including the source files
- Setting the assembler’s include file
- Set configCLINT_BASE_ADDRESS
- #define portasmHANDLE_INTERRUPT
- Install the FreeRTOS trap hander

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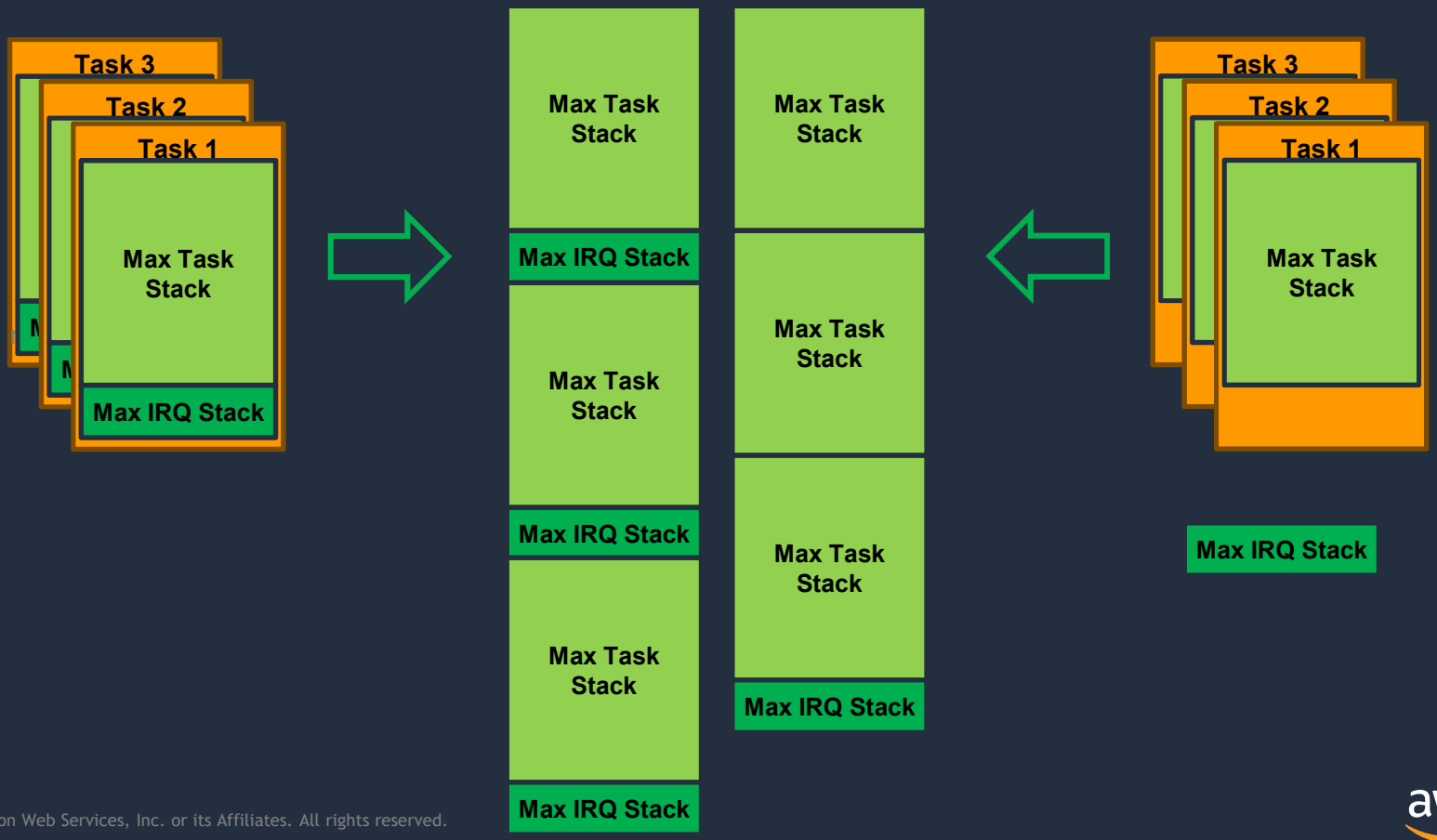
Defining the interrupt stack



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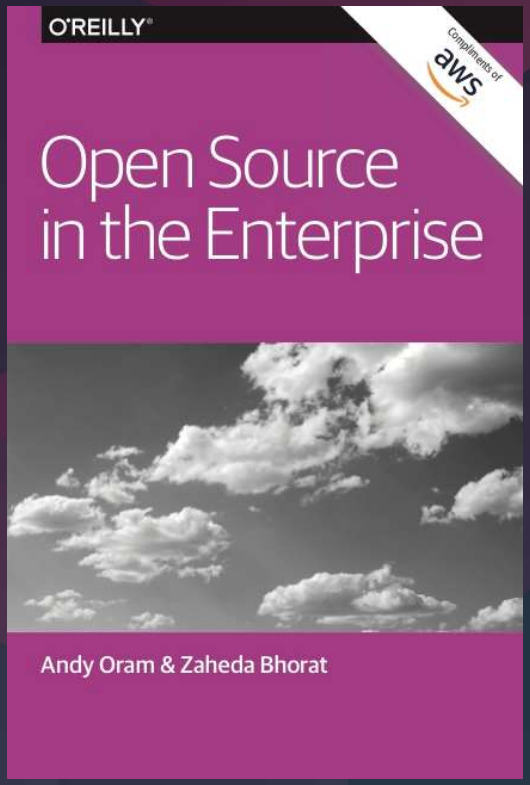

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