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SECURE CONNECTIONS
FOR A SMARTER WORLD

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KEY AREAS FOR DISCUSSION

Data model

Dependency description

Project description

Component identification

Dependency description

- Current issue 1: limited ability to describe whole dependencies in SW components (yml/MCUX XML manifest)
- AND and OR combination only (missing NOT), limited complexity

YML:

```
requires:
- middleware.lwip.ui_control.middleware.lwip.template.middleware.lwip.default_heap_stack
- utility.debug_console.middleware.lwip.empty_ethernetif
- middleware.lwip.ui_control.middleware.lwip.template.middleware.lwip.default_heap_stack
- utility.debug_console.middleware.lwip.usb_ethernetif
- middleware.lwip.ui_control.middleware.lwip.template.middleware.lwip.default_heap_stack
- utility.debug_console.middleware.lwip.enet_ethernetif
- middleware.lwip.ui_control.middleware.lwip.template.middleware.lwip.default_heap_stack
- utility.debug_console.middleware.wifi_wiced.MURATA_TYPE1LV
- middleware.lwip.ui_control.middleware.lwip.template.middleware.lwip.default_heap_stack
- utility.debug_console.middleware.wifi_wiced.MURATA_TYPE1DX
- middleware.lwip.ui_control.middleware.lwip.template.middleware.lwip.default_heap_stack
- utility.debug_console.middleware.wifi_wiced.AW_NM372SM
- middleware.lwip.ui_control.middleware.lwip.template.middleware.lwip.default_heap_stack
- utility.debug_console.middleware.wifi
```

MCUX XML (MANIFEST):

```
<dependencies>
  <all>
    <component_dependency value="middleware.lwip.MIMXRT1062"/>
    <any_of>
      <component_dependency value="middleware.freertos-kernel.MIMXRT1062"/>
      <component_dependency value="middleware.baremetal.MIMXRT1062"/>
    </any_of>
  </all>
</dependencies>
```



add_lwip.yml



EVK-MIMXRT1060_manifest_v3_9.xml



lwIP.lwIP.pdsc

CMSIS PACK:

```
<condition id="ETH-Driver-Single-file">
  <description>Ethernet-Driver: MAC with built-in-PHY</description>
  <require Cclass="CMSIS-Driver" Cgroup="Ethernet" Capiversion="2.1.0"/>
  <deny Cclass="CMSIS-Driver" Cgroup="Ethernet-MAC"/>
  <deny Cclass="CMSIS-Driver" Cgroup="Ethernet-PHY"/>
</condition>
```

EXPECTED:

```
dependencies:
- or:
  - and:
    - a:
    - b:
    - k:
  - and:
    - a:
    - b:
    - l:
  - and:
    - a:
    - b:
    - m:
  - not:
    - q:
```

Project description

YML:

```
freertos_hello:
  --configuration:
  ---tools:
  ---__common__:
  ---config:
  ---__common__: {}
  ---document:
  ---name: freertos_hello
  ---readme:
  ---boards/${board}/rtos_examples/freertos_hello/board.readme
  ---boards/src/rtos_examples/freertos_hello/freertos_hello.readme
  ---category: rtos_examples
  ---brief: The Hello World project is a simple demonstration program that uses the
  ---SDK UART driver in combination with FreeRTOS. The purpose of this demo is
  ---to show how to use the debug console and to provide a simple project for debugging
  ---and further development. The example application creates one task called hello_task.
  ---This task prints "Hello world." message via debug console utility and suspend
  ---itself.
  ---outdir: boards/${board}/rtos_examples/freertos_hello/${multicore_foldername}
  ---modules:
  ---freertos_hello:
  ---required: true
  ---cc-include:
  ---path: boards/${board}/rtos_examples/freertos_hello
  ---package_path: boards/${board}/rtos_examples/freertos_hello/${multicore_foldername}
  ---project_path: board
  ---files:
  ---source: boards/src/rtos_examples/freertos_hello/freertos_hello.c
  ---merge-to-main: main
  ---package_path: boards/${board}/rtos_examples/freertos_hello/${multicore_foldername}
  ---project_path: source
  ---source: boards/${board}/rtos_examples/freertos_hello/pin_mux.c
  ---package_path: boards/${board}/rtos_examples/freertos_hello/${multicore_foldername}
  ---project_path: board
  ---source: boards/${board}/rtos_examples/freertos_hello/pin_mux.h
  ---package_path: boards/${board}/rtos_examples/freertos_hello/${multicore_foldername}
  ---project_path: board
  ---freertos_config:
  ---required: true
  ---cc-include:
  ---path: boards/${board}
  ---package_path: boards/${board}/rtos_examples/freertos_hello/${multicore_foldername}
  ---project_path: source
  ---path: boards/src/rtos_examples/freertos_hello
  ---package_path: boards/${board}/rtos_examples/freertos_hello/${multicore_foldername}
  ---project_path: source
```

```
---as-include:
---path: boards/src/rtos_examples/freertos_hello
---package_path: boards/${board}/rtos_examples/freertos_hello/${multicore_foldername}
---project_path: source
---path: boards/${board}
---package_path: boards/${board}/rtos_examples/freertos_hello/${multicore_foldername}
---project_path: source
---files:
---source: boards/src/rtos_examples/freertos_hello/FreeRTOSConfig.h
---merge-to-freertosconfig: main
---package_path: boards/${board}/rtos_examples/freertos_hello/${multicore_foldername}
---project_path: source
---source: boards/${board}/FreeRTOSConfigBoard.h
---merge-to-freertosconfig: sub
---package_path: boards/${board}/rtos_examples/freertos_hello/${multicore_foldername}
---project_path: source
---pinset:
---required: true
---cc-include:
---path: boards/${board}/rtos_examples/freertos_hello/${multicore_foldername}
---project_path: board
---files:
---source: boards/${board}/rtos_examples/freertos_hello/${multicore_foldername}/hardware_init.c
---merge-to-main: sub
---project_path: board
---source: boards/${board}/rtos_examples/freertos_hello/${multicore_foldername}/app.h
---merge-to-main: sub
---project_path: board
---section-type: application
---__requires__:
---driver.port driver.gpio driver.clock middleware.freertos-kernel.heap_4
```



freertos_examples.yml

Project description

MXCUX XML MANIFEST

OPEN CMSIS PACK

```
</externalDefinitions>
<example id="evkmimxrt1060_freertos_hello" name="freertos_hello" dependency="platform.drivers.clock.MIMXRT1062-middleware.freertos-kernel.heap_4.MIMXRT1062-
platform.drivers.common.MIMXRT1062-device.MIMXRT1062_CMSIS.MIMXRT1062-utility.debug_console.MIMXRT1062-component.lpuart_adapter.MIMXRT1062-
component.serial_manager.MIMXRT1062-component.lists.MIMXRT1062-component.serial_manager_uart.MIMXRT1062-platform.drivers.lpuart.MIMXRT1062-
device.MIMXRT1062_startup.MIMXRT1062-platform.drivers.iomuxc.MIMXRT1062-platform.utilities.assert.MIMXRT1062-platform.drivers.igpio.MIMXRT1062-
platform.drivers.xip_device.MIMXRT1062-platform.drivers.xip_board.evkmimxrt1060.MIMXRT1062-middleware.freertos-kernel.MIMXRT1062-
middleware.freertos-kernel.extension.MIMXRT1062-platform.utilities.misc_utilities.MIMXRT1062-CMSIS_Include_core_cm.MIMXRT1062-
device.MIMXRT1062_system.MIMXRT1062" category="rtos_examples">
  <projects>
    <project type="com.crt.advproject.projecttype.exe" nature="org.eclipse.cdt.core.cnature"/>
  </projects>
  <memory>
    <memoryBlock id="BOARD_FLASH_evkmimxrt1060" name="BOARD_FLASH" addr="60000000" size="00800000" type="ExtFlash" access="RO"/>
    <memoryBlock id="SRAM_DTC_evkmimxrt1060" name="SRAM_DTC" addr="20000000" size="00020000" type="RAM" access="RW"/>
    <memoryBlock id="SRAM_ITC_evkmimxrt1060" name="SRAM_ITC" addr="00000000" size="00020000" type="RAM" access="RW"/>
    <memoryBlock id="SRAM_OC_evkmimxrt1060" name="SRAM_OC" addr="20200000" size="000C0000" type="RAM" access="RW"/>
    <memoryBlock id="BOARD_SDRAM_evkmimxrt1060" name="BOARD_SDRAM" addr="80000000" size="01E00000" type="RAM" access="RW"/>
    <memoryBlock id="NCACHE_REGION_evkmimxrt1060" name="NCACHE_REGION" addr="81E00000" size="00200000" type="RAM" access="RW"/>
  </memory>
  <toolchainSettings>
    <toolchainSetting id_refs="com.nxp.mcuxpresso">
      <option id="gnu.c.compiler.option.preprocessor.def.symbols" type="stringList">
        <value>CPU_MIMXRT1062DVL6A</value>
        <value>SDK_DEBUGCONSOLE=1</value>
        <value>XIP_EXTERNAL_FLASH=1</value>
        <value>XIP_BOOT_HEADER_ENABLE=1</value>
        <value>SERIAL_PORT_TYPE_UART=1</value>
        <value>SDK_OS_FREE_RTOS</value>
        <value>MCUXPRESSO_SDK</value>
      </option>
      <option id="com.crt.advproject.gas.fpu" type="enum">
        <value>com.crt.advproject.gas.fpu.fpv5dp.hard</value>
      </option>
      <option id="com.crt.advproject.gcc.fpu" type="enum">
        <value>com.crt.advproject.gcc.fpu.fpv5dp.hard</value>
      </option>
      <option id="gnu.c.compiler.option.optimization.flags" type="string">
        <value>-fno-common</value>
      </option>
    </toolchainSetting>
  </toolchainSettings>
  <examples>
    <example name="CMSIS-RTOS2-FreRTOS-Blinky" doc="Abstract.txt" folder="C
    <description>CMSIS-RTOS2 Blinky example using FreeRTOS</description>
    <board name="uVision-Simulator" vendor="Keil"/>
    <project>
      <environment name="uv" load="Blinky.uvprojx"/>
    </project>
    <attributes>
      <component Cclass="CMSIS" Cgroup="CORE"/>
      <component Cclass="CMSIS" Cgroup="RTOS2"/>
      <component Cclass="Device" Cgroup="Startup"/>
      <category>Getting Started</category>
    </attributes>
  </example>
```

```
project:
  components:
    - component: ARM::CMSIS:CORE
    - component: NXP::Device:CMSIS:LPC55569_system
    - component: NXP::Device:SDK Drivers:clock
    - component: NXP::Device:SDK Drivers:common
    - component: NXP::Device:SDK Drivers:flexcomm
    - component: NXP::Device:SDK Drivers:gpio
    - component: NXP::Device:SDK Drivers:iocon
    - component: NXP::Device:SDK Drivers:lists
    - component: NXP::Device:SDK Drivers:power
    - component: NXP::Device:SDK Drivers:reset
    - component: NXP::Device:SDK Drivers:usart
    - component: NXP::Device:SDK Drivers:usart_adapter
    - component: NXP::Device:SDK Utilities:assert_lite
    - component: NXP::Device:SDK Utilities:debug_console_lite
    - component: NXP::Device:Startup

  groups:
    - group: source
      files:
        - file: ./source/hello_world_s.c
        - file: ./source/LPC55569_cm33_core0_flash_s.scf
    - group: board
      files:
        - file: ./board/board.c
        - file: ./board/board.h
        - file: ./board/clock_config.c
        - file: ./board/clock_config.h
        - file: ./board/pin_mux.c
        - file: ./board/pin_mux.h
    - group: trustzone
      files:
        - file: ./source/veneer_table.c
        - file: ./source/veneer_table.h
        - file: ./source/tzm_config.c
```



freertos_hello_v3_9.xml

Component identification

YML



add_freertos_kernel.yml

```
middleware.freertos-kernel:
  section-type: component
  __requires__:
    - middleware.freertos-kernel.ui_control
    - middleware.freertos-kernel.extension
    - middleware.freertos-kernel.template
  configuration:
  tools:
    __common__:
      config:
        __common__:
          cc-define:
            SDK_OS_FREE_RTOS:
          armgcc:
            config:
              __common__: {}
          iar:
            config:
              __common__: {}
          mdk:
            config:
              __common__: {}
  contents:
    repo_base_path: rtos/freertos/freertos_kernel
    project_base_path: freertos/freertos_kernel
    cc-include:
      - repo_relative_path: include
      - cores: ca7
        repo_relative_path: portable/GCC/ARM_CA9
        toolchains: armgcc-mcux
      - compilers: armclang-gcc
        cores: cm0p
        repo_relative_path: portable/GCC/ARM_CM0
        toolchains: armgcc-mcux-mdk
```

MCUX XML MANIFEST

```
<component id="middleware.freertos-kernel.MIMXRT1062" name="FreeRTOS-kernel" brief="FreeRTOS-kernel" version="10.4.3" revision="1" full_name="FreeRTOS-kernel" devices="MIMXRT1062xxxxA" user_visible="true" type="OS" package_base_path="rtos/freertos/freertos_kernel" project_base_path="freertos/freertos_kernel">
  <defines>
    <define name="SDK_OS_FREE_RTOS" value=""/>
  </defines>
  <dependencies>
    <all>
      <component_dependency value="middleware.freertos-kernel.extension.MIMXRT1062"/>
      <component_dependency value="middleware.freertos-kernel.template.MIMXRT1062"/>
    </all>
  </dependencies>
  <source relative_path="." type="src">
    <files mask="croutine.c"/>
    <files mask="event_groups.c"/>
    <files mask="list.c"/>
    <files mask="queue.c"/>
    <files mask="stream_buffer.c"/>
    <files mask="tasks.c"/>
    <files mask="timers.c"/>
  </source>
  <source relative_path="include" type="c_include">
    <files mask="atomic.h"/>
    <files mask="croutine.h"/>
    <files mask="deprecated_definitions.h"/>
    <files mask="event_groups.h"/>
    <files mask="FreeRTOS.h"/>
    <files mask="list.h"/>
    <files mask="message_buffer.h"/>
    <files mask="mpu_prototypes.h"/>
  </source>
```

Component identification

OPEN CMSIS PACK

```
.....<component Cgroup="Core" Cvariant="Cortex-M" isDefaultVariant="true" condition="FreeRTOS_CM">
.....<description>Core API (Kernel, Tasks, Semaphores, Mutexes, Queues) for Cortex-M</description>
.....<RTE_Components_h>
.....#define RTE_RTOS_FreeRTOS_CORE...../* RTOS FreeRTOS Core */
.....</RTE_Components_h>
.....<files>
.....<file category="include" name="Source/include/">
.....<file category="header" name="Source/include/FreeRTOS.h">
.....<file category="header" name="Source/include/queue.h">
.....<file category="header" name="Source/include/semphr.h">
.....<file category="header" name="Source/include/task.h">
.....<file category="source" name="Source/list.c">
.....<file category="source" name="Source/queue.c">
.....<file category="source" name="Source/tasks.c">
.....<file category="include" condition="CM0_ARMCC" name="Source/portable/RVDS/ARM_CM0/">
.....<file category="source" condition="CM0_ARMCC" name="Source/portable/RVDS/ARM_CM0/port.c">
.....<file category="include" condition="CM3_ARMCC" name="Source/portable/RVDS/ARM_CM3/">
.....<file category="source" condition="CM3_ARMCC" name="Source/portable/RVDS/ARM_CM3/port.c">
.....<file category="include" condition="CM4_ARMCC" name="Source/portable/RVDS/ARM_CM3/">
.....<file category="source" condition="CM4_ARMCC" name="Source/portable/RVDS/ARM_CM3/port.c">
.....<file category="include" condition="CM4_FP_ARMCC" name="Source/portable/RVDS/ARM_CM4F/">
.....<file category="source" condition="CM4_FP_ARMCC" name="Source/portable/RVDS/ARM_CM4F/port.c">
.....<file category="include" condition="CM7_ARMCC" name="Source/portable/RVDS/ARM_CM3/">
.....<file category="source" condition="CM7_ARMCC" name="Source/portable/RVDS/ARM_CM3/port.c">
.....<file category="include" condition="CM7_DP_ARMCC" name="Source/portable/RVDS/ARM_CM7/r0p1/">
.....<file category="source" condition="CM7_DP_ARMCC" name="Source/portable/RVDS/ARM_CM7/r0p1/port.c">
.....<file category="include" condition="CM7_SP_ARMCC" name="Source/portable/RVDS/ARM_CM7/r0p1/">
.....<file category="source" condition="CM7_SP_ARMCC" name="Source/portable/RVDS/ARM_CM7/r0p1/port.c">
.....<file category="include" condition="CM0_ARMCC6" name="Source/portable/GCC/ARM_CM0/">
.....<file category="source" condition="CM0_ARMCC6" name="Source/portable/GCC/ARM_CM0/port.c">
.....<file category="include" condition="CM3_ARMCC6" name="Source/portable/GCC/ARM_CM3/">
.....<file category="source" condition="CM3_ARMCC6" name="Source/portable/GCC/ARM_CM3/port.c">
.....<file category="include" condition="CM4_ARMCC6" name="Source/portable/GCC/ARM_CM3/">
.....<file category="source" condition="CM4_ARMCC6" name="Source/portable/GCC/ARM_CM3/port.c">
.....<file category="include" condition="CM4_FP_ARMCC6" name="Source/portable/GCC/ARM_CM4F/">
.....<file category="source" condition="CM4_FP_ARMCC6" name="Source/portable/GCC/ARM_CM4F/port.c">
```

- Some elements are inherited from global pack data



ARM.CMSIS-FreeRTOS.pdsc

INDIRECT IMPACTS

- Project folder layouts
 - Standalone project (copied project)
 - <https://github.com/Open-CMSIS-Pack/Open-CMSIS-Pack-Spec/issues/93>
 - Linked project
 - Virtual directories mapped to remote root_folder
- Multiple paths:
 - Base_path
 - Pack_path
 - Project_path

base path

pack_path

project_path

REQUIRED PRINCIPLES

- Multiple paths for single file
 - <https://github.com/Open-CMSIS-Pack/Open-CMSIS-Pack-Spec/issues/95>
- Separation of component identification and classification
 - <https://github.com/Open-CMSIS-Pack/Open-CMSIS-Pack-Spec/issues/94>
- Component base paths
 - Base path is common path prefix which does not affecting integrity of include paths and file paths.
 - Base path could be modified according to preferred layout – SDK layout or custom project layout.



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