EXAMPLE NAME: COUNTER_EXAMPLE_XMC45

OVERVIEW: This example demonstrates how use the APP as a counter to count for rising edge transitions and to change the count direction based on change in input level. Using CCU4 LLD, it is possible to set up an external gate event for gating the counter from counting.

DESCRIPTION:

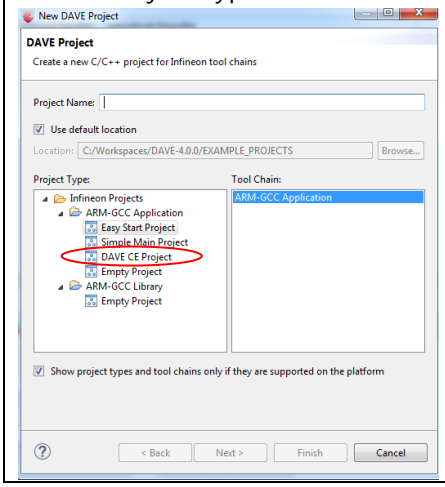
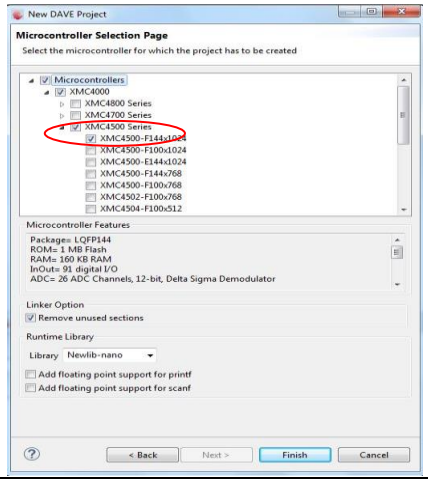
- COUNTER APP is used to detect and count on rising edge, with count match occurring at 200.
- PWM APP is used to generate the count input for counting
- DIGITAL_IO APP is used to generate the input signals for external count direction and external gating.
- INTERRUPT APP is used to control the LEDs and the speed of toggling is updated every 10 seconds.

REQUIRMENTS:

Boards Required: XMC4500 CPU Board (Order Nr: KIT_XMC45_EE1_002)

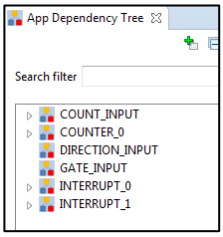
HOW TO CREATE THE PROJECT:

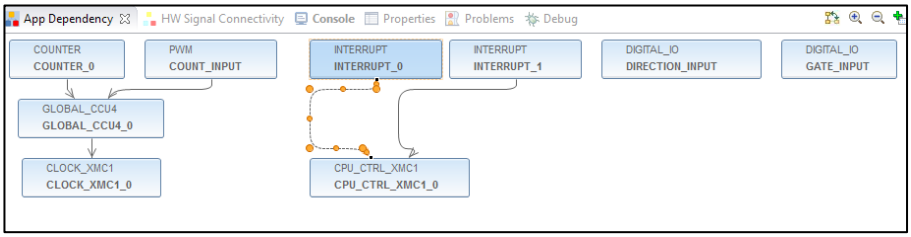
1. Open the DAVE CE and use  "Add IDE New Project Wizard" on the toolbar to add a new DAVE Project.

Enter Project Name Select "Project Type ➔ DAVE CE Project"	Select Microcontroller ➔XMC4500 Series ➔ XMC4500-F144X1024
	

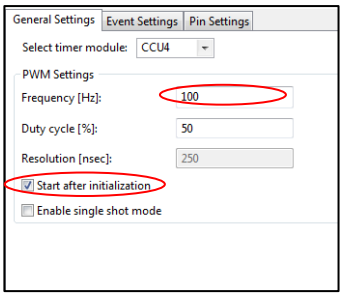
2. Use the "Add New APP" in the toolbar to add APPs listed. Configure the App instances with the following configurations.

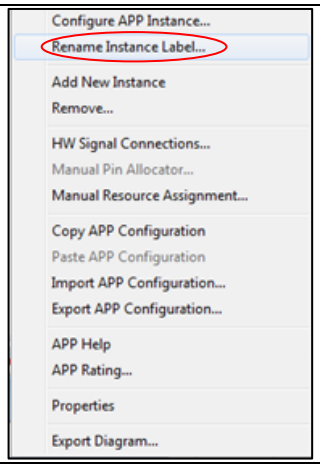
Views: App Dependency Tree and App Dependency





PWM_0:

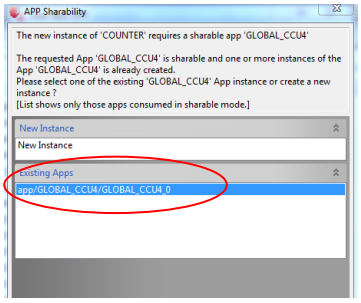




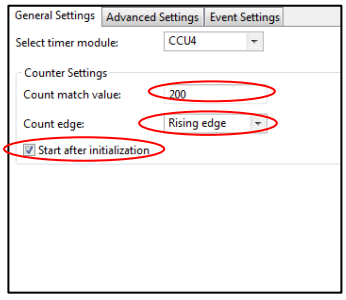
⇨ Rename instance label to COUNT_INPUT

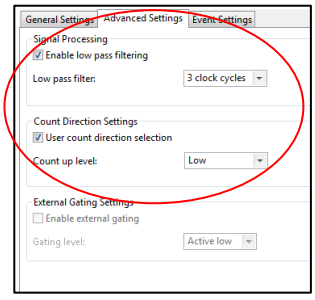
⇨ No change to settings on Tabs: Event Settings and Pin Settings

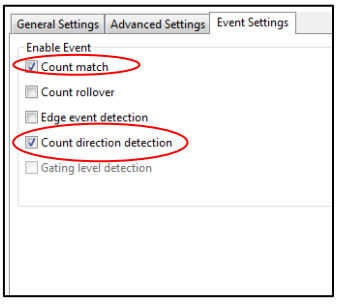
COUNTER_0:



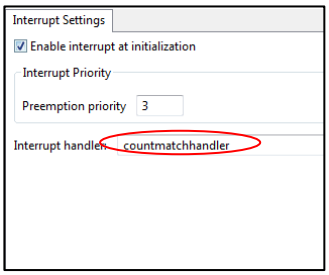
⇨ Select the same CCU4 kernel as PWM APP



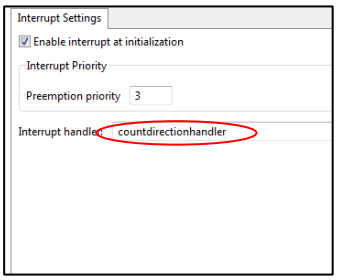




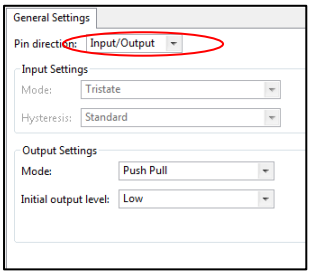
INTERRUPT_0:

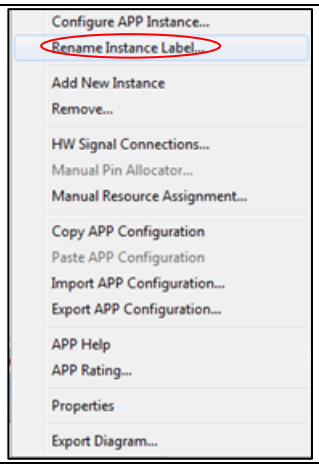


INTERRUPT_1:



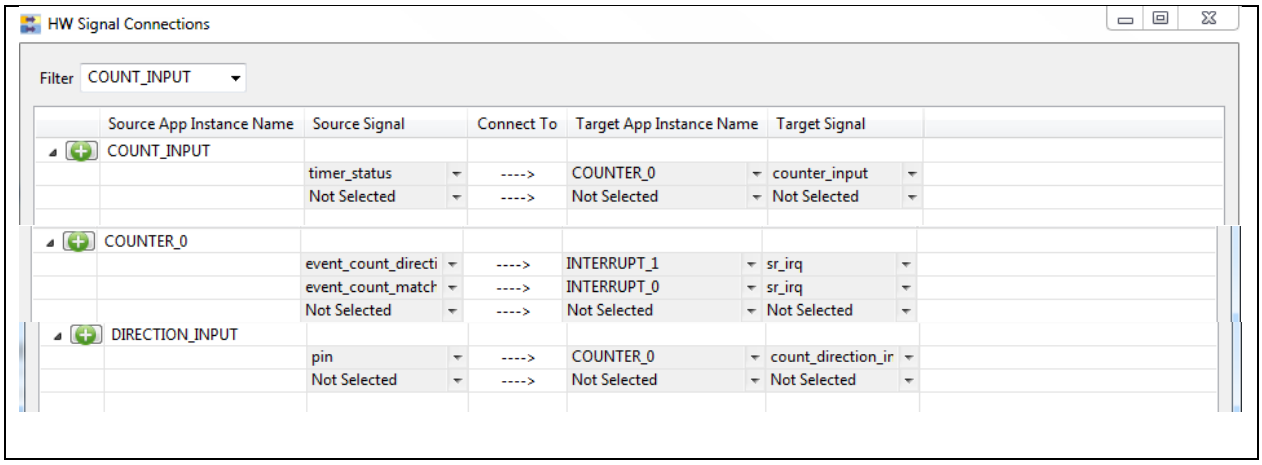
DIGITAL_IO:





- ⇨ Add 2 instances of DIGITAL_IO APP
- ⇨ Rename DIGITAL_IO_0 instance label to DIRECTION_INPUT
- ⇨ Rename DIGITAL_IO_1 instance label to GATE_INPUT

3. Use the  "Hardware Signal Connections" found at the bottom right of the APP UI window, to configure the signal connections.



4. Use the  "Manual Pin Allocator" found in the toolbar, configure the output pins for the PWM.

App Instance Name	Resource	Port-Pin	Pin Number
◢ COUNT_INPUT			
	PWM Output Pin	(P4.4)	#120
◢ DIRECTION_INPUT			
	pin	(P4.3)	#121
◢ GATE_INPUT			
	pin	(P2.12)	#64

5. Generate the code for configurations made and change main.c accordingly.
6. Build and download to the microcontroller.

HOW TO USE THE XMC CCU4 LLD IN THE PROJECT:

1. As the APP supports only event 0 and 1, external gate event cannot be connected via the APP. However, it is possible to connect external gate event to event 2 of the CCU, using the CCU4 LLD.
    - CCU43_43 is selected. External gate input at Port 2.12 (CCU43.IN3**C**) is selected.
    - External gate on high level is selected.
2. Refer to LLD documentation for complete API definition

HOW TO TEST:

Download and run the demo in the uC.

OBSERVATIONS:

- On count match interrupt, input count direction (P4.3) is toggled (to high) to change the count direction to decrement. (Reading the TCST.CDIR=1). Current count match is read into "countmatchvalue" and read 200.
- On count direction interrupt, input gate (P2.12) is toggled (to high) to gate the counting. Current count match is read into "countdirectionvalue" and read 200 as external gate event is detected.

HINTS WHEN MIGRATING EXAMPLE TO OTHER DEVICES IN THE SAME XMC FAMILY:

No additional information required.