STM32CubeIDE basics

Timer lab: PWM generation using HAL library

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Lab: PWM Timer

Objective:

- Now let's use a more advanced peripheral like the Timer.
- In this lab we are going to configure a Timer in a PWM mode to blink the LED that we previously controlled with a GPIO.
- PA5 has an alternate Timer channel alternate function which is Timer 2 Channel 1: TIM2_CH1 that we will be using.

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Timer Parameters Calculation

- We can calculate Timer parameters for 1 Hz period @ 50% duty cycle
- If we choose Timer input clock to be 8 MHz
- Let us say the prescaler is div-by-128; 8MHz/128 = 62500 Hz
  - So, prescaler register should be 128-1 = 127 (actual divide is PSC+1)
  - If we set Period = 62499 (as we calculate from 0); Pulse = 31250, we get 1 Hz Period @ 50% duty cycle

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… time for hands-on

- In case you would like to create a new workspace and project
  - go here
- In case you would like to create a new project within current workspace
  - go here

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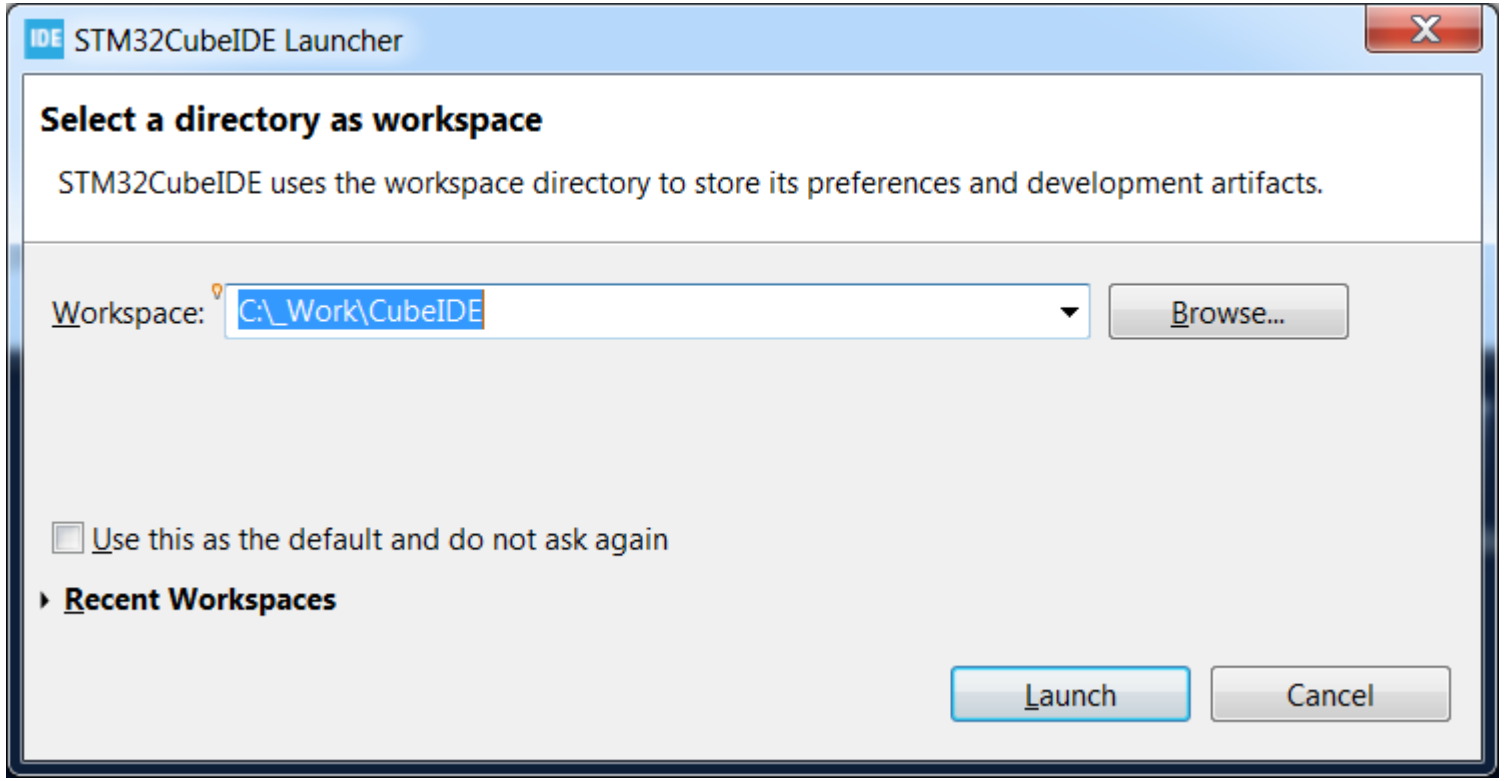
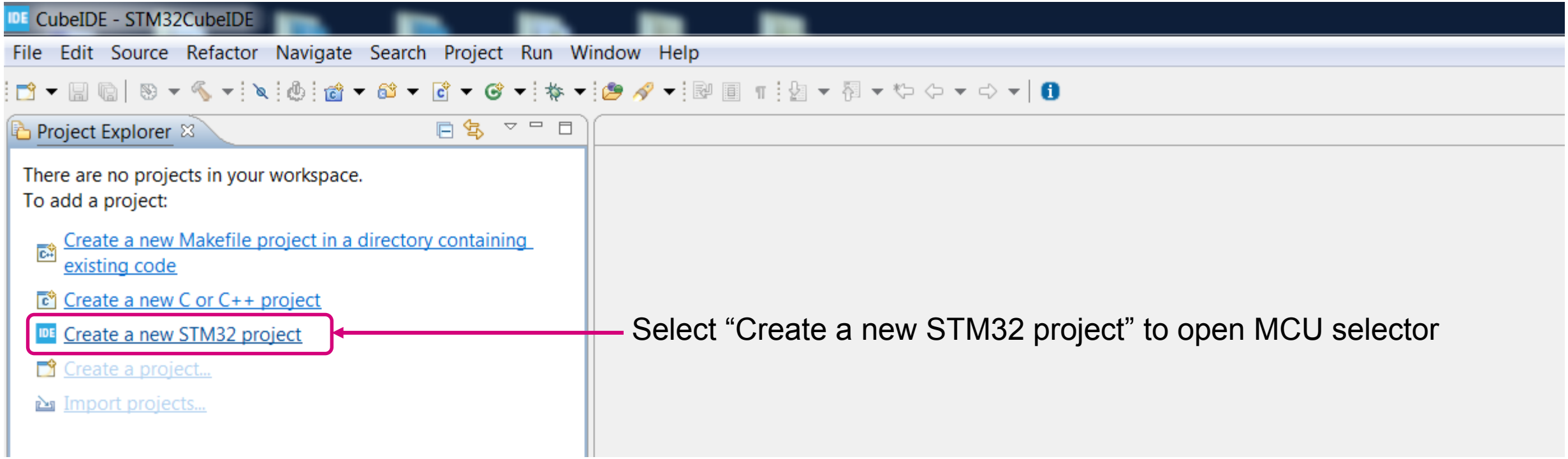
Start a new workspace

- Run STM32CubeIDE
- Select a folder to store a workspace



Create a new project

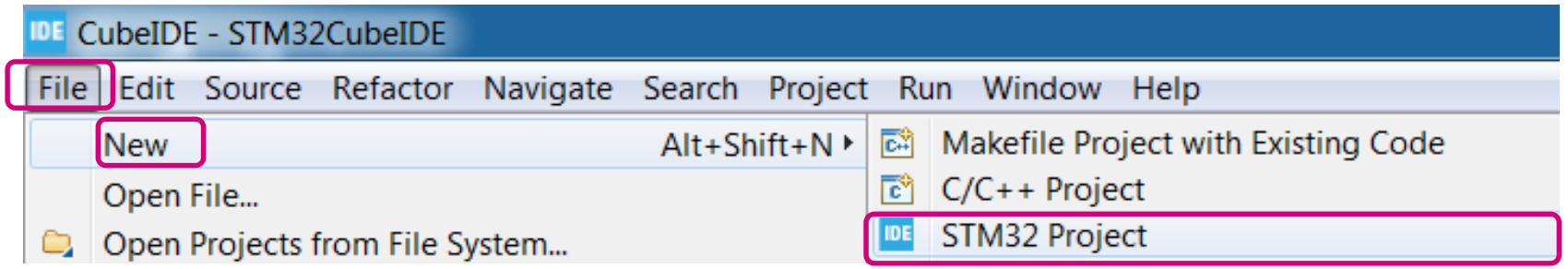
- Click on “Create a new STM32 project”



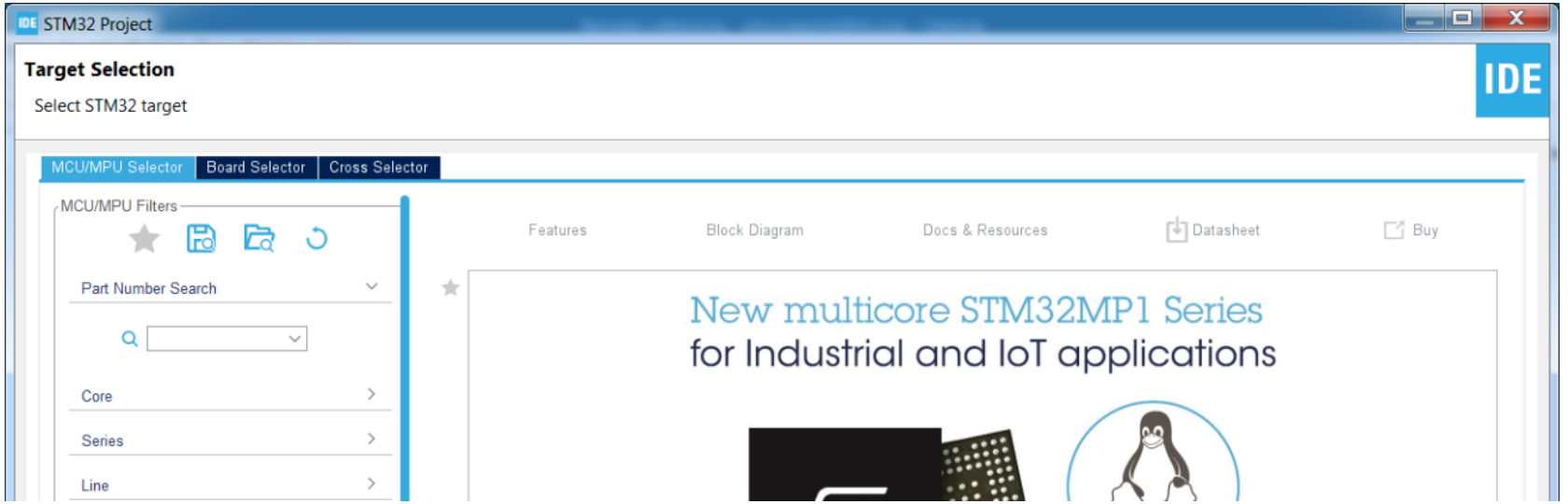
.. Click here to continue

Start a new project within workspace

- Go to File -> New -> STM32 Project

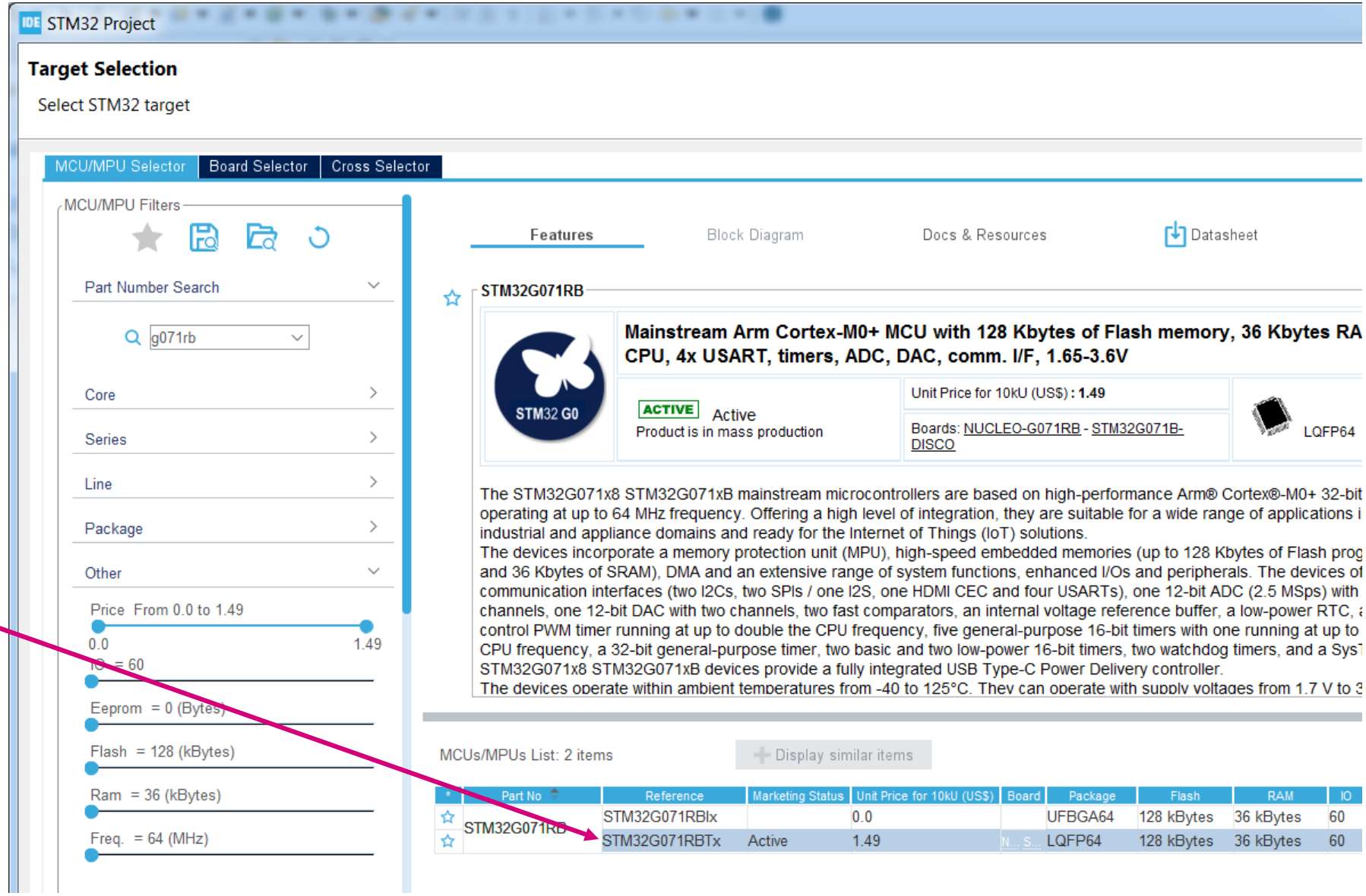


- As a result “target selection” window will be displayed



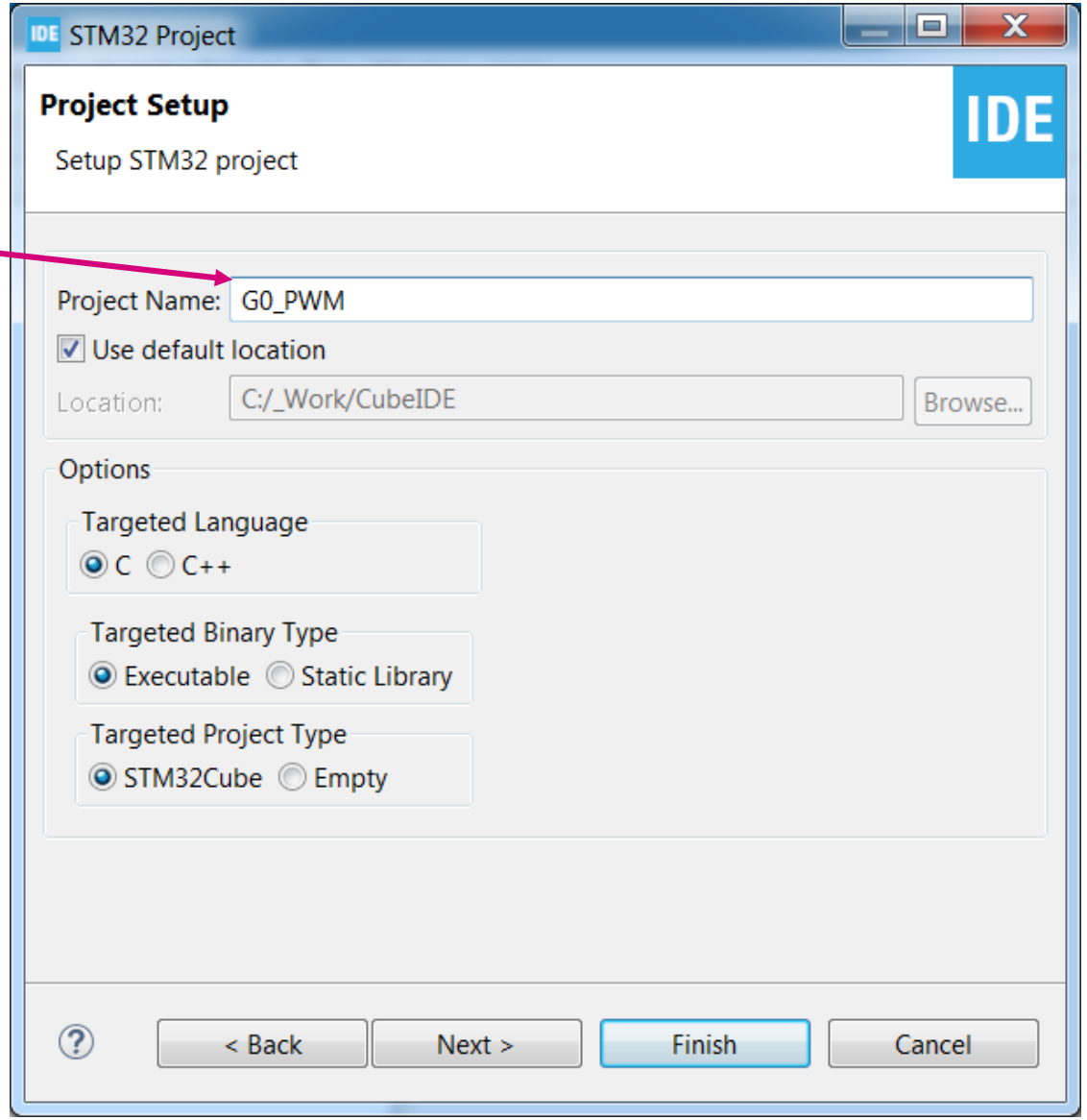
Select target MCU: STM32G071RBTx

- It is possible to view on main MCU features, download its documentation
- To start a new project we need to double click on the part number



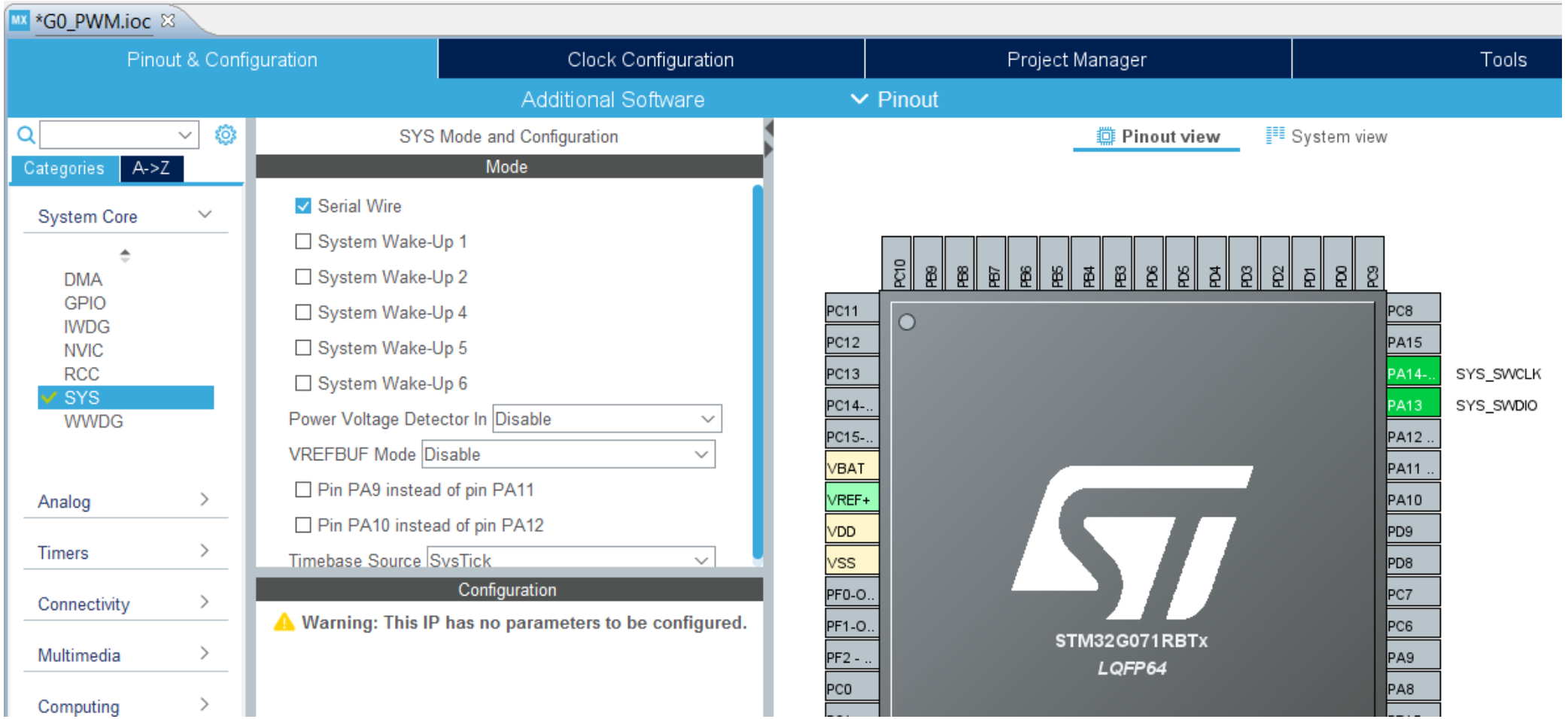
Enter project name

- Specify project name, optionally its location (if different from workspace one)
- Additionally we can specify target language (C or C++), binary type (executable or static library) and project type (generated by STM32CubeMX or an empty one)



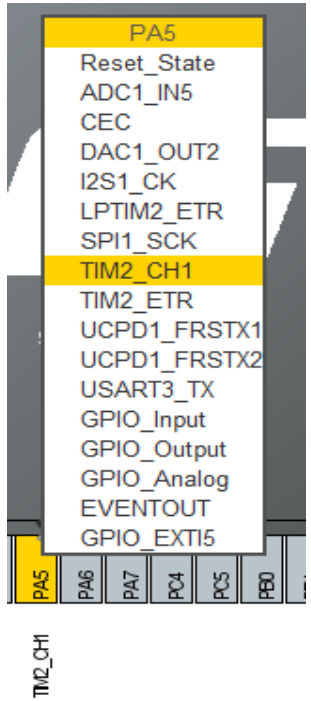
Enabling Serial Wire debug interface

- Select “Serial Wire” from System Core -> SYS peripheral group
- As a result PA13 and PA14 will be assigned to SWD interface

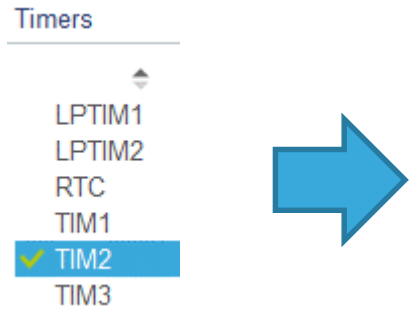


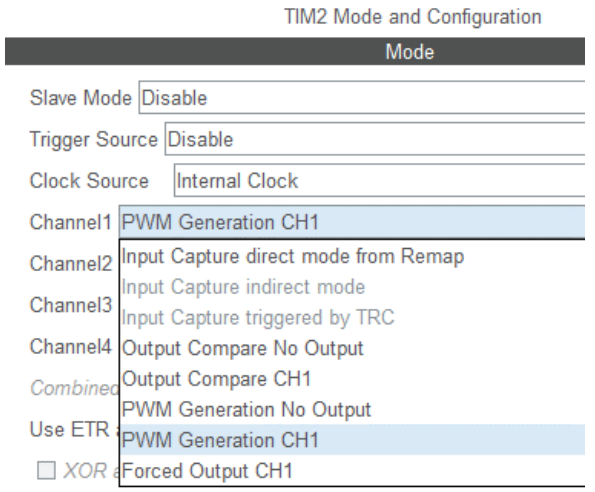
Configuring PA5 as TIM2_CH1 PWM

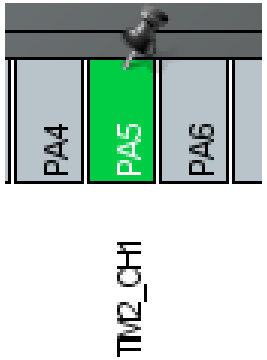
method 1



- Click over PA5 pin and select TIM2_CH1 function
  - PA5 pin become yellow with pin (booked but not configured pin) and TIM2_CH1 label
- In Timers->TIM2->Mode window select:
  - Clock Source: Internal Clock
  - Channel1: PWM Generation CH1
- After this PA5 become green with TIM2_CH1 label



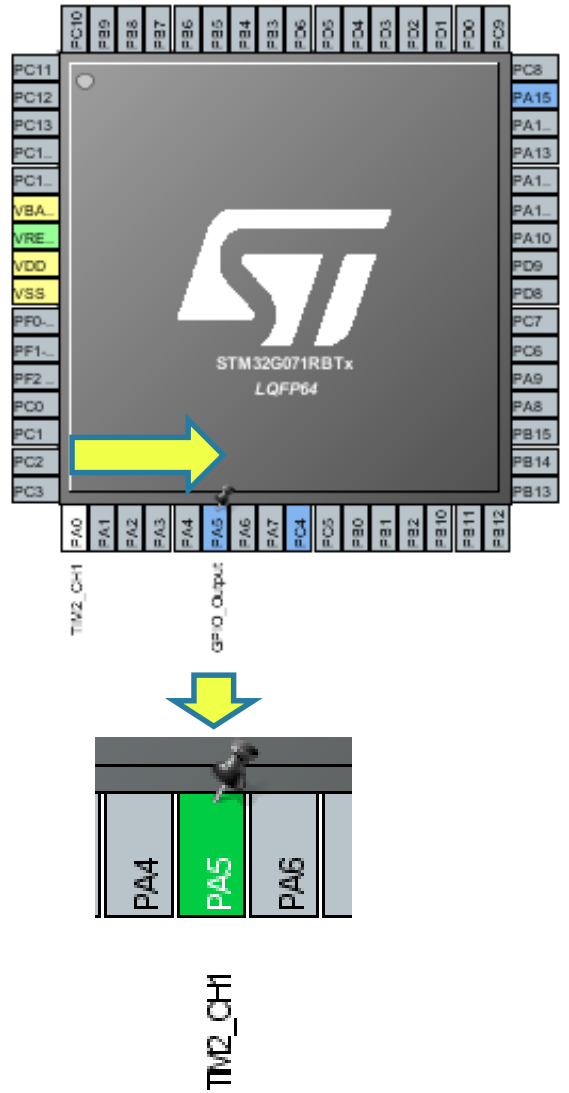




Configuring PA5 as TIM2_CH1 PWM

method 2

- By default the tool will configure Timer 2 CH1 to PA0
- We want to remap it to PA5
  - NOTE: PA5 is connected to LD4
- Hold “Ctrl” button and left mouse click on PA0
- Then drag the mouse pointer to PA5 and then release



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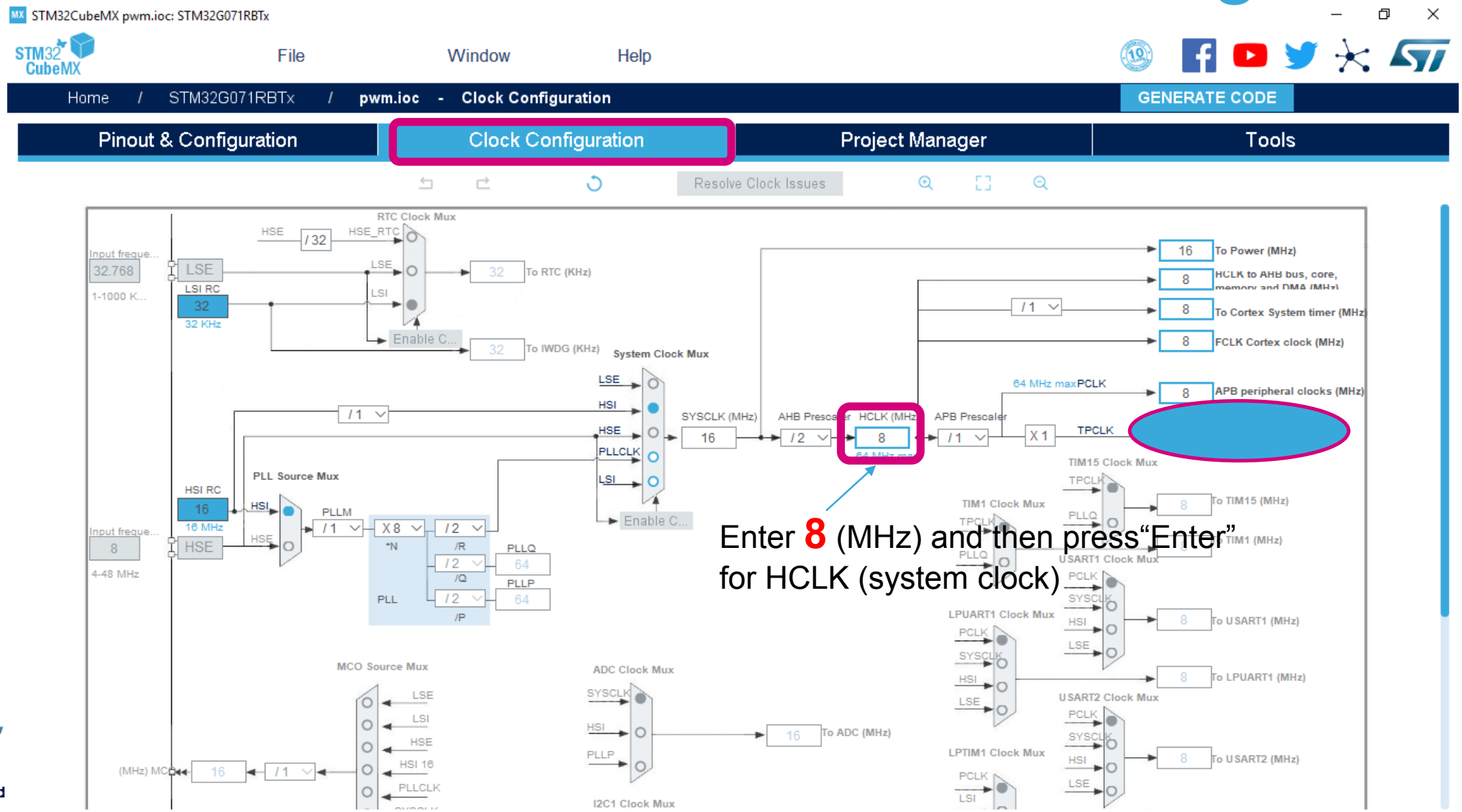
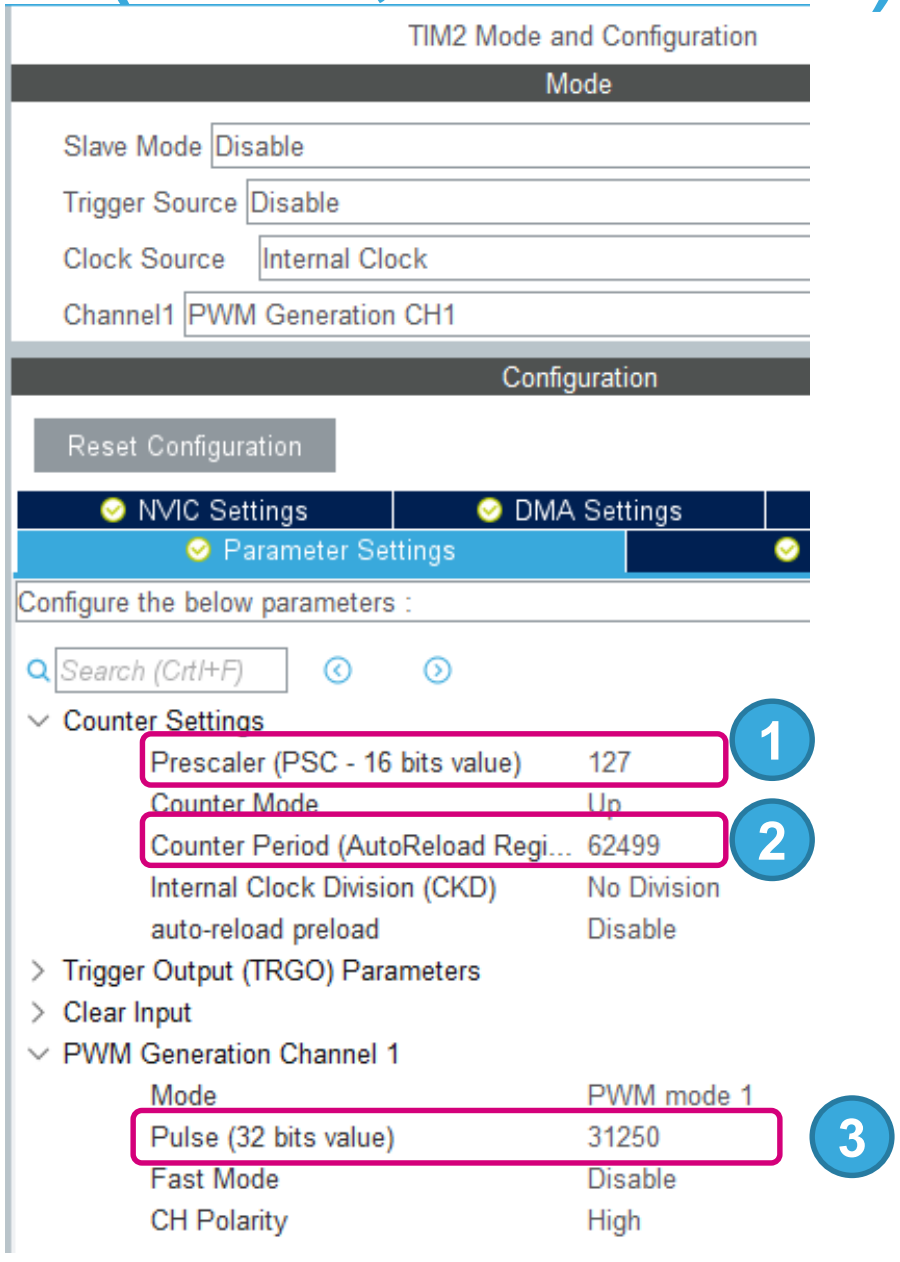
Clock Tree Configuration



Enter **8** (MHz) and then press“Enter” for HCLK (system clock)

Configuring TIM2_CH1 (1Hz, 50% dc)

- Select the Pinout & Configuration
- In Parameters Settings of the TIM2
- Configure 1 Hz timer
  - Prescaler = 127 (1)
  - Period = 62499 (2)
- Set CH1 PWM
  - Pulse = 31250 (3)



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Source code modifications

main.c

- Generate project using Project->Generate Code
- Open the main.c, Add the following code before the while(1) loop in order to start the PWM Timer:

```
/* USER CODE BEGIN 2 */
if(HAL_TIM_PWM_Start(&htim2, TIM_CHANNEL_1) != HAL_OK)
    Error_Handler();
```

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… Let's check it

- After all code processing we can build the project, start debug session and run the application 
- As an effect Green LED should toggle each 1second (this time controlled by Timer2

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Thank you

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