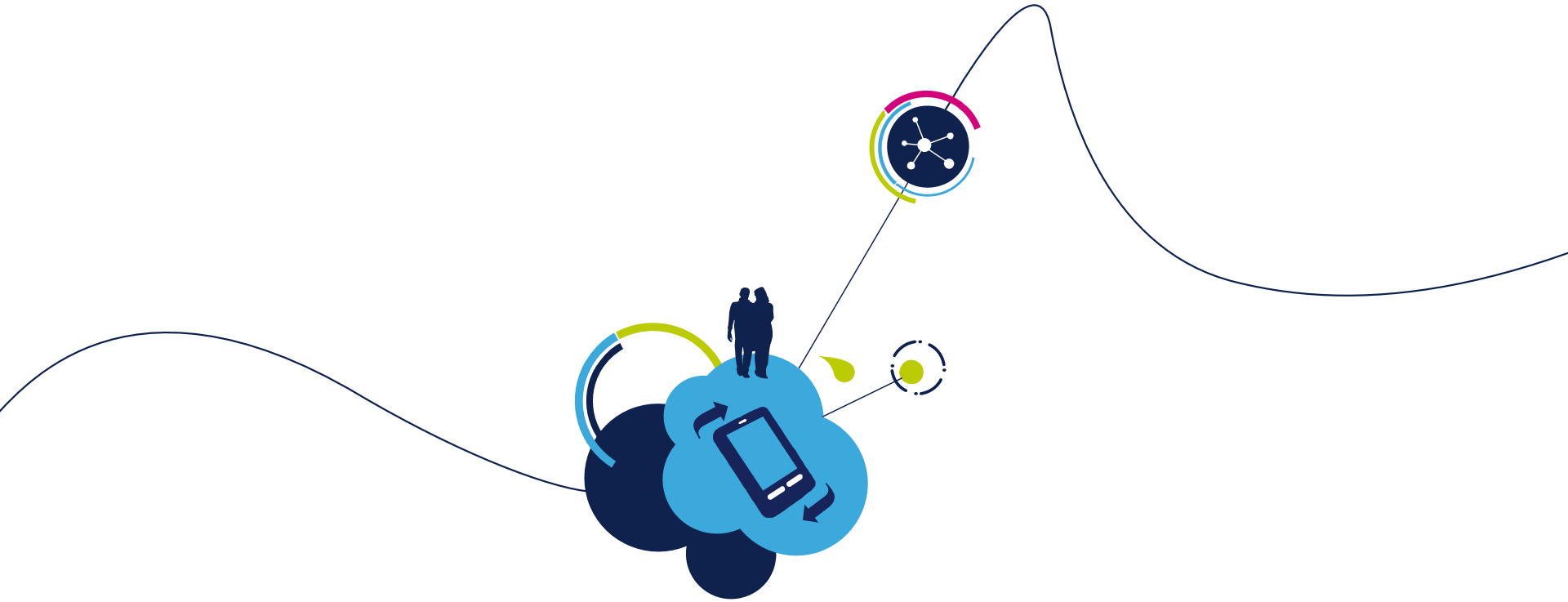
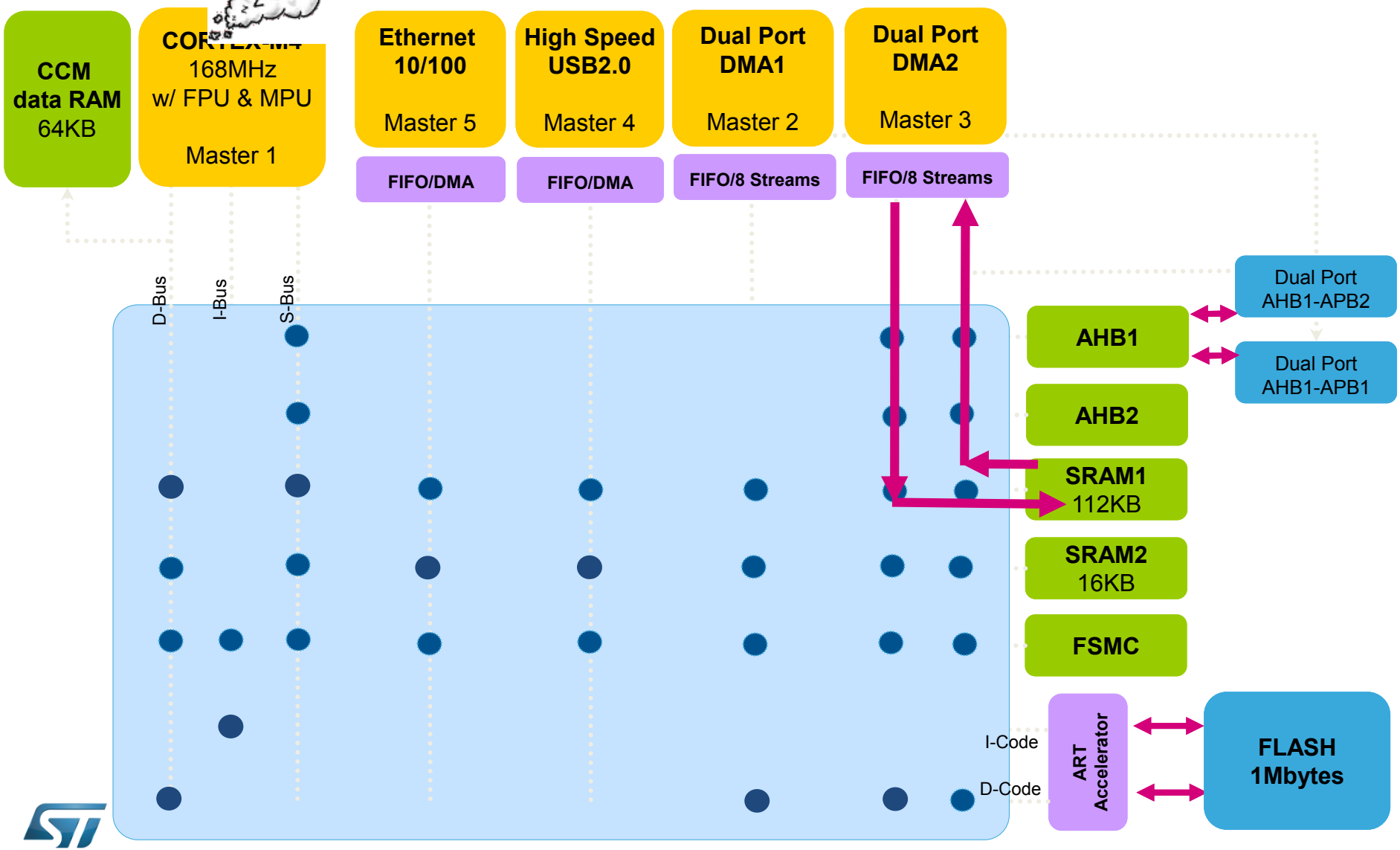


Data transfer over DMA lab **6**

Use DMA in M2M transfer

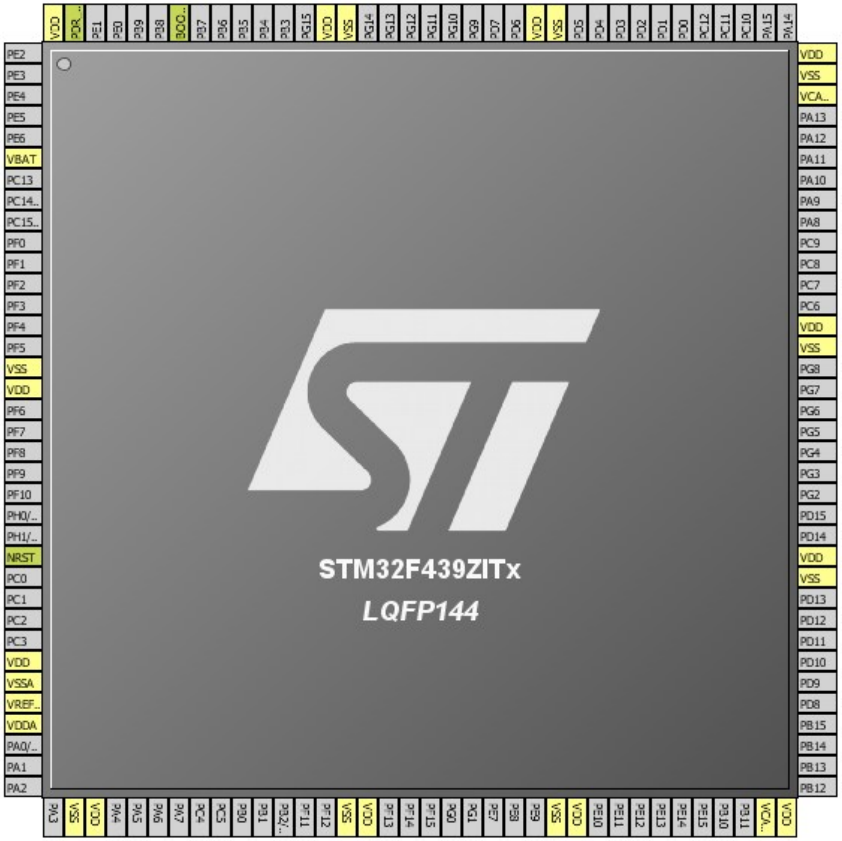
- Objective
  - Learn how to setup DMA transfer in CubeMX
  - Create simple DMA memory to memory transfer from RAM to RAM
- Goal
  - Use CubeMX and Generate Code with DMA
  - Learn how to setup the DMA in HAL
  - Verify the correct functionality by comparing transferred buffers

Use DMA in M2M transfer



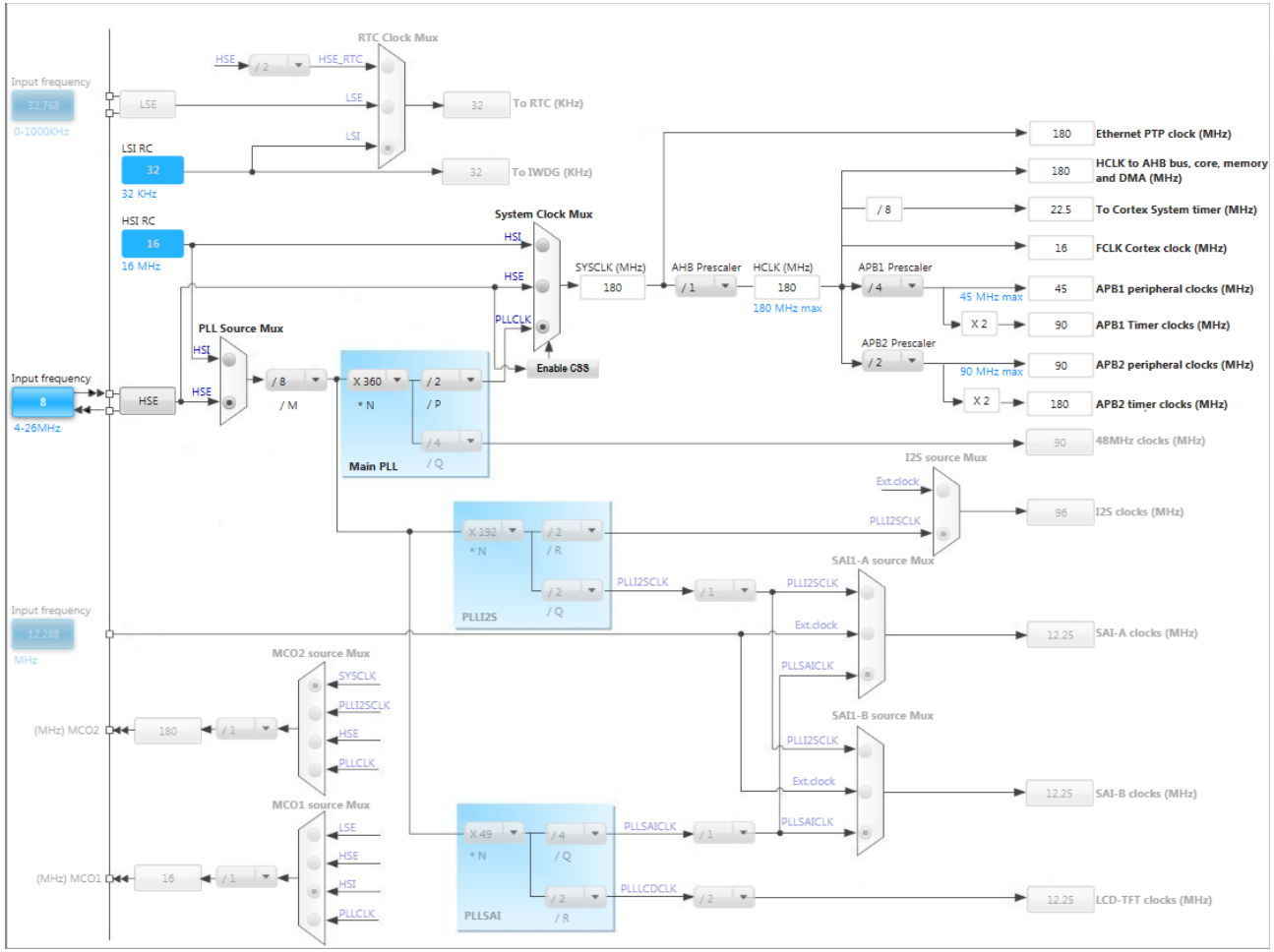
Use DMA in M2M transfer

- Create project in CubeMX
  - Menu > File > New Project
  - Select STM32F4 > STM32F429/439 > LQFP144 > STM32F439ZITx
- For DMA we don’t need to configure any pins



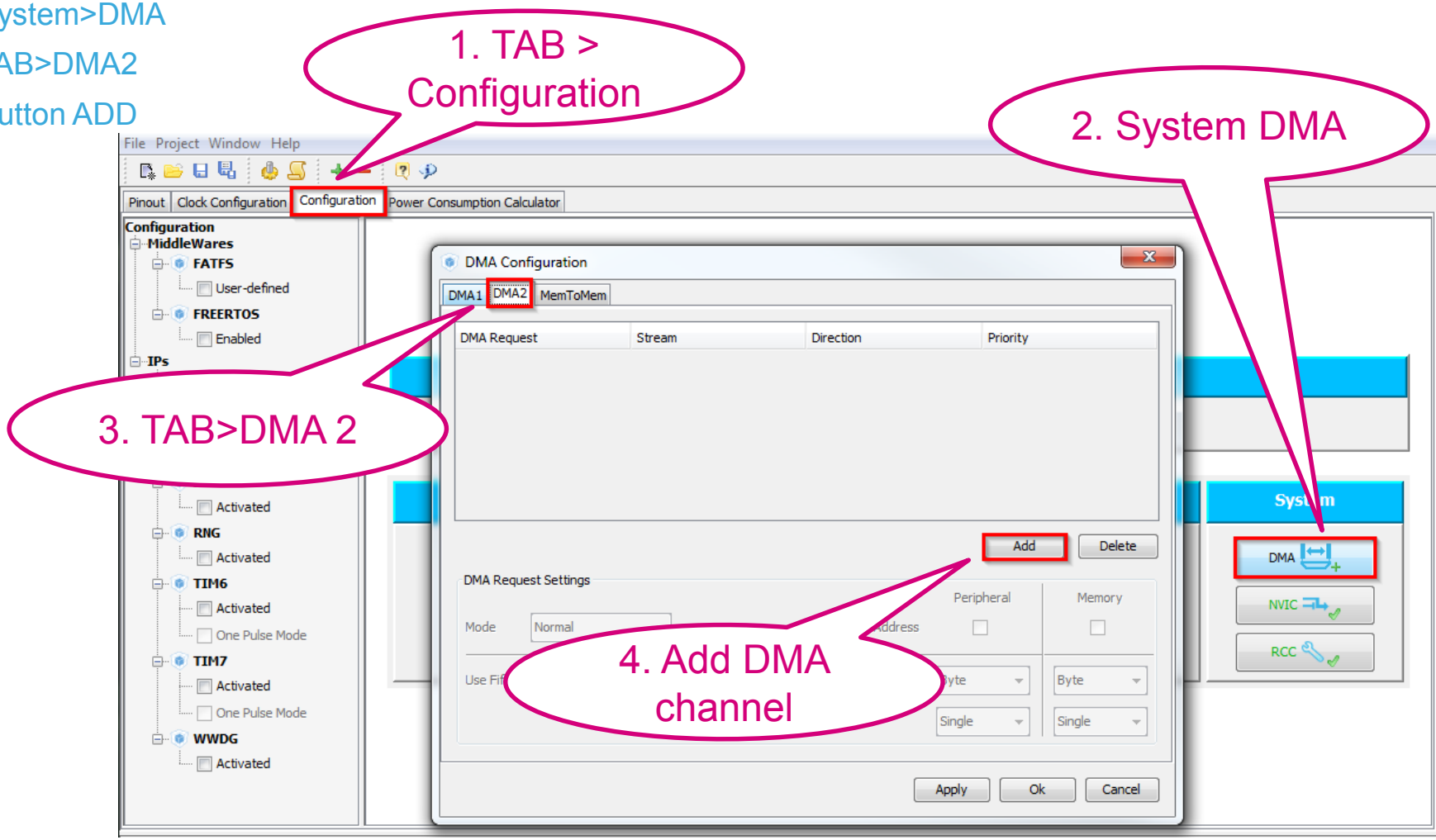
Use DMA in M2M transfer

- In order to run on maximum frequency, setup clock system
- Details in lab 0



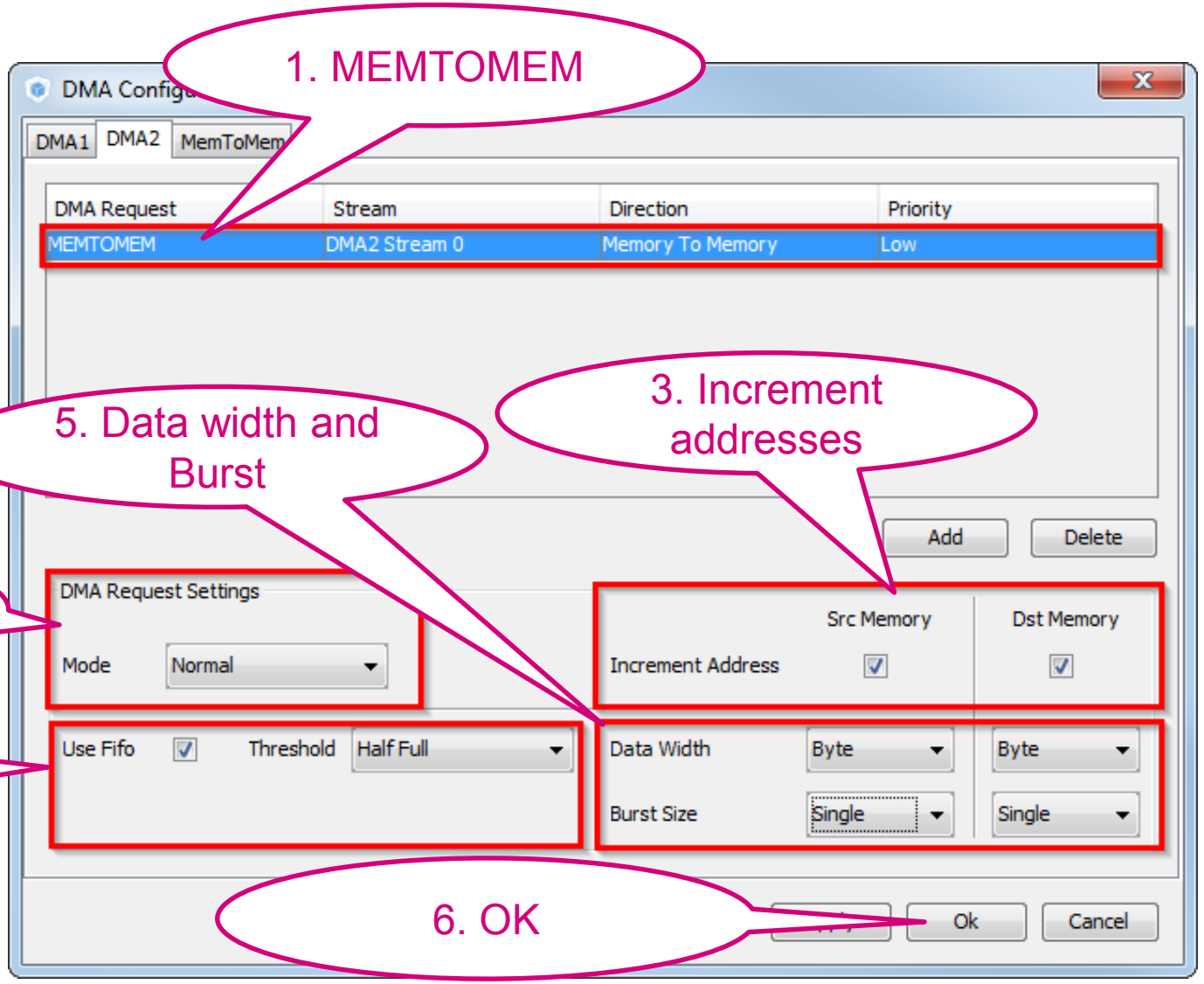
Use DMA in M2M transfer

- DMA configuration
  - TAB>Configuration
  - System>DMA
  - TAB>DMA2
  - Button ADD



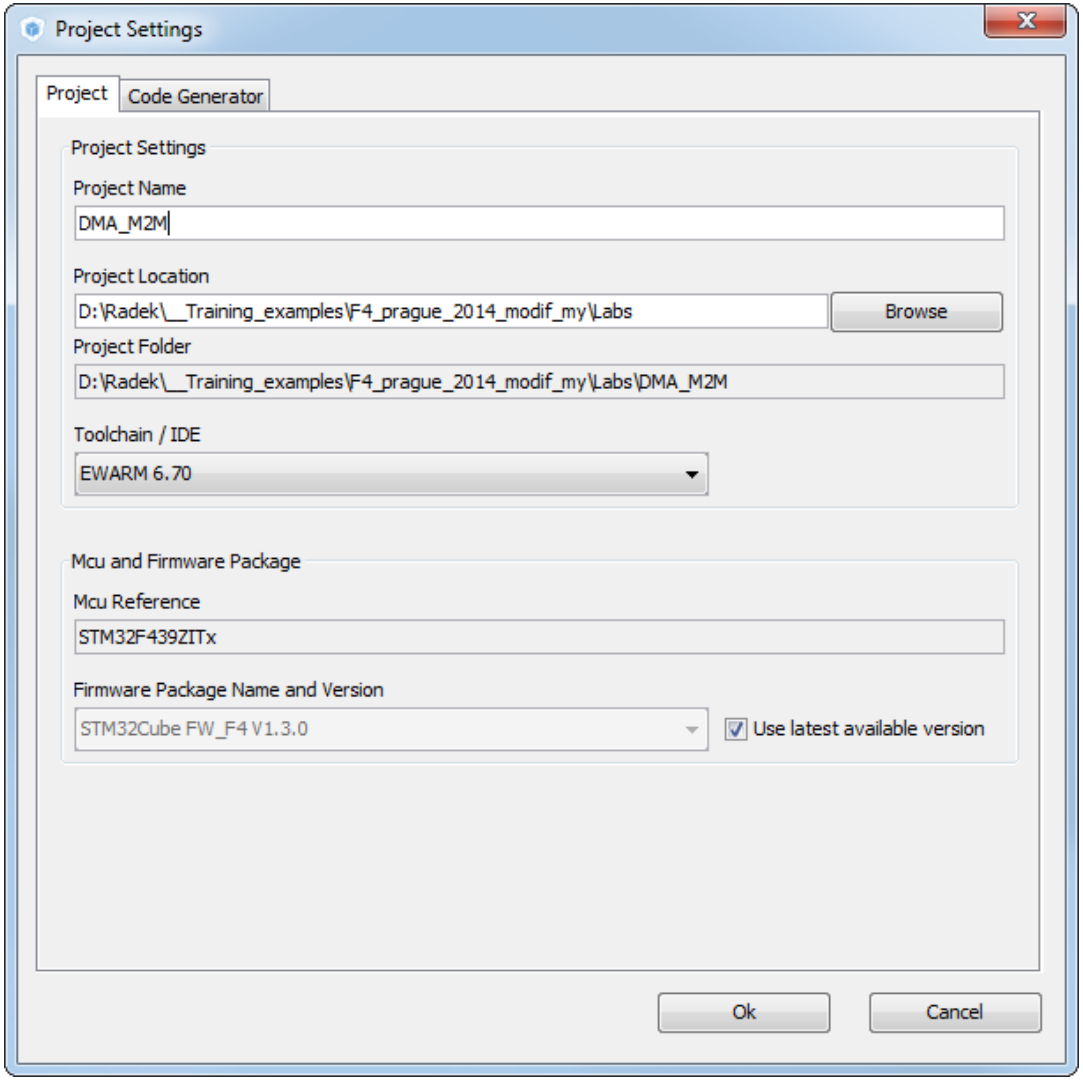
Use DMA in M2M transfer

- DMA configuration
  - Select MEMTOMEM DMA request
  - Normal mode
  - Increment source and destination address
  - FIFO setup
  - Byte data width
  - Burst size
  - Button OK



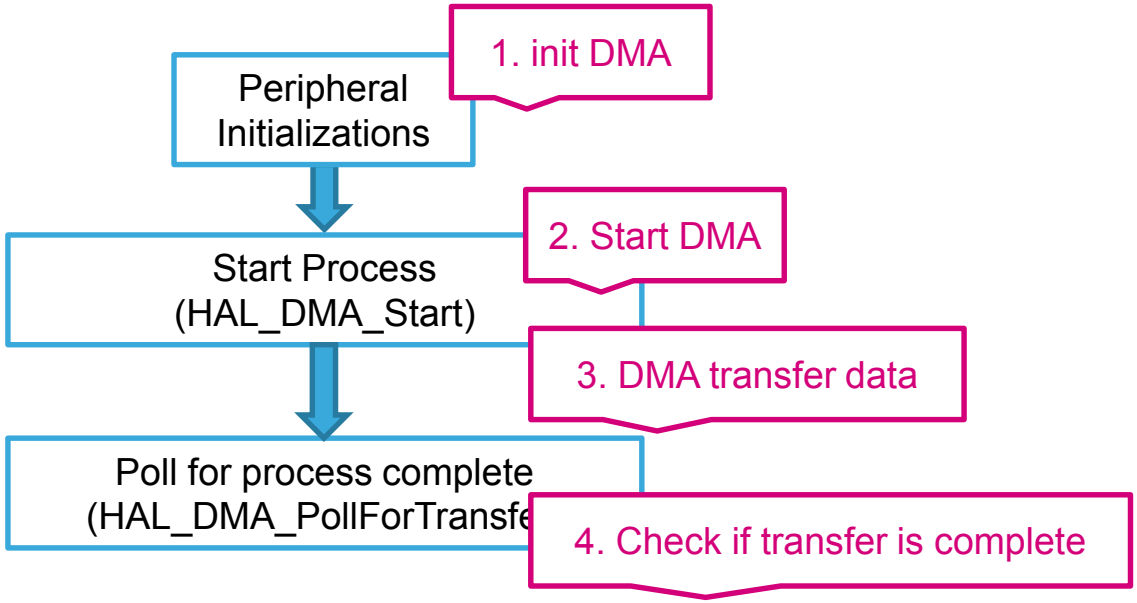
Use DMA in M2M transfer

- Now we set the project details for generation
  - Menu > Project > Project Settings
  - Set the project name
  - Project location
  - Type of toolchain
- Now we can Generate Code
  - Menu > Project > Generate Code



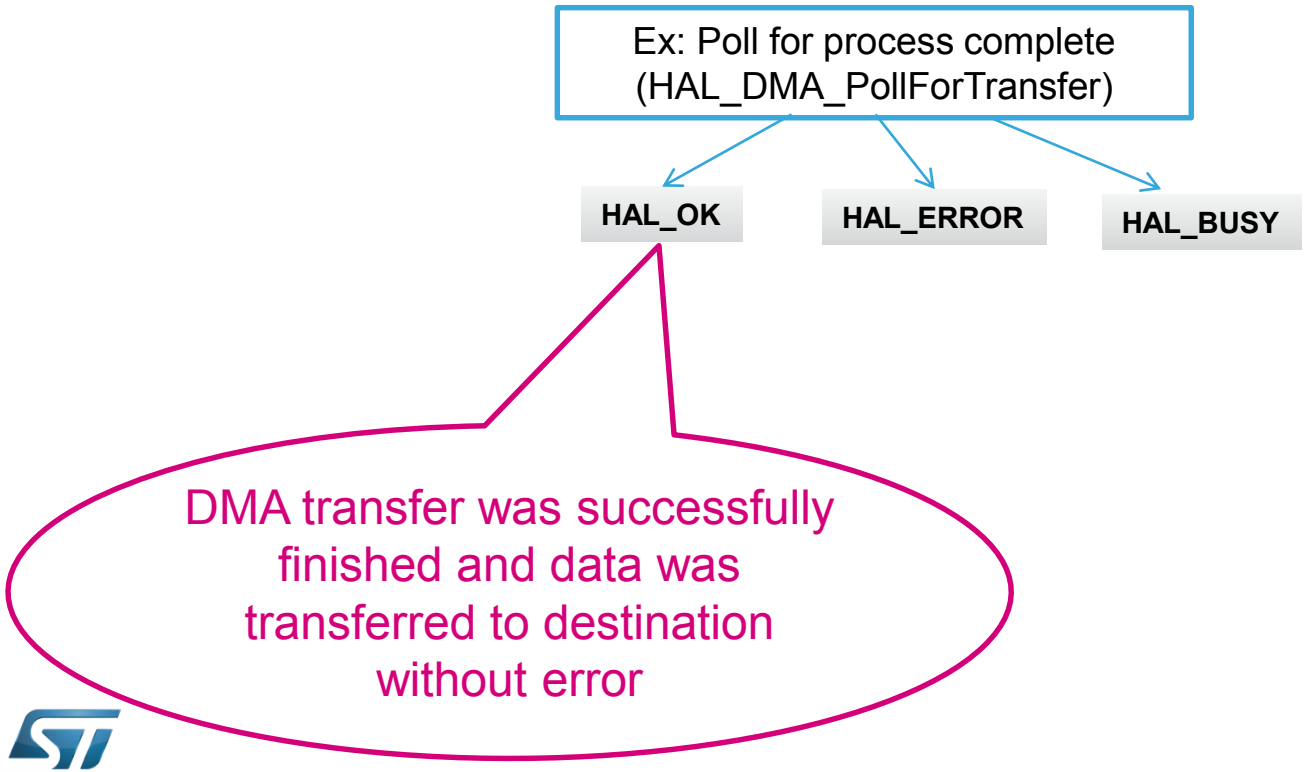
Use DMA in M2M transfer

- Start process DMA (same for TIM, ADC)
  - Non blocking start process
  - The end of the process must be checked by polling



Use DMA in M2M transfer

- Return values
  - Most of CubeMX functions have return values, which indicate, if operation was successful, timeout occurs of function end with error
  - Is recommended handle this return values to be sure that program working as expected



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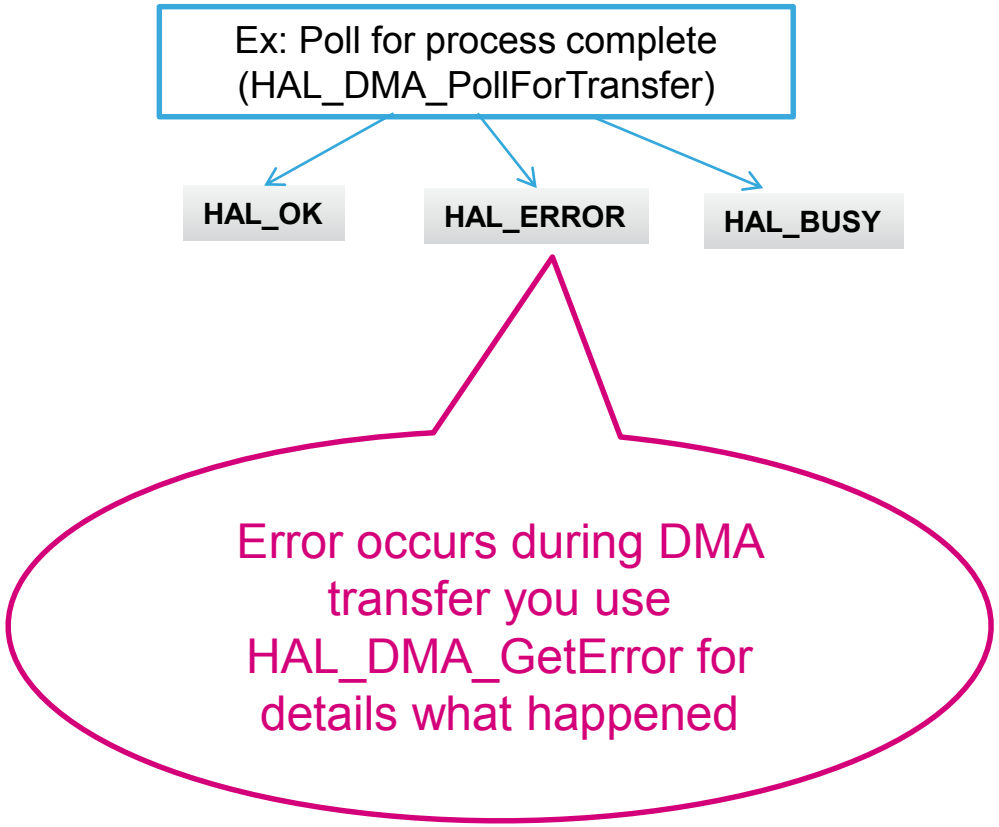

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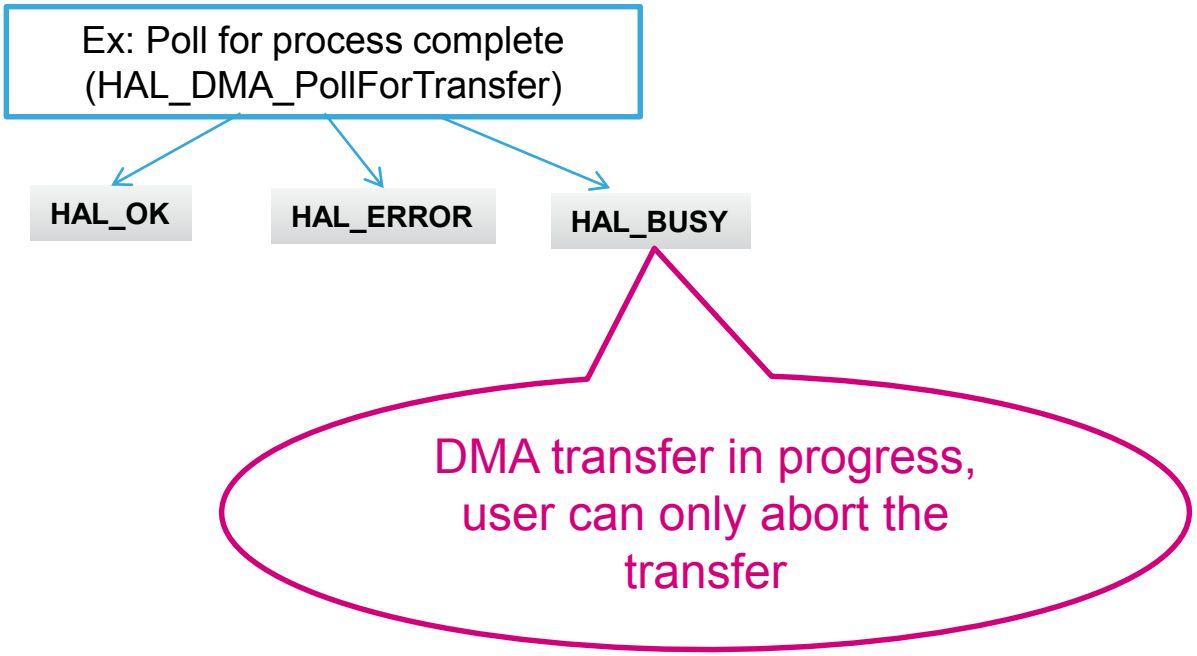

Use DMA in M2M transfer

- Now we open the project in our IDE
  - The functions we want to put into main.c
  - Between */* USER CODE BEGIN 2 */* and */* USER CODE END 2 */* tags
- HAL functions for DMA
  - HAL_DMA_Start(DMA_HandleTypeDef *hdma, uint32_t SrcAddress, uint32_t DstAddress, uint32_t DataLength)
  - HAL_DMA_PollForTransfer(DMA_HandleTypeDef *hdma, uint32_t CompleteLevel, uint32_t Timeout)

Use DMA in M2M transfer

- We create two buffers
  - One with source data
  - Second as destination buffer

```
/* USER CODE BEGIN 0 */
uint8_t Buffer_Src[]={0,1,2,3,4,5,6,7,8,9};
uint8_t Buffer_Dest[10];
/* USER CODE END 0 */
```

Use DMA in M2M transfer

- HAL_DMA_Start start the M2M data transfer
- HAL_DMA_PollForTransfer check if the transfer ends successfully

```
/* USER CODE BEGIN 2 */
 HAL_DMA_Start(&hdma_memtomem_dma2_stream0, (uint32_t) (Buffer_Src), (uint32_t) (Buffer_Dest), 10);
 while(HAL_DMA_PollForTransfer(&hdma_memtomem_dma2_stream0, HAL_DMA_FULL_TRANSFER, 100) != HAL_OK)
 {
   __NOP();
 }
 /* USER CODE END 2 */
```