

Notes for STM32 MCUs

Tips, hints, and tricks when working on STM32 ARM Cortex-M MCUs

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Terminal application

Links have review about terminal applications:

- <https://oliverbetz.de/pages/PIM/TerminalPrograms>
- <https://learn.sparkfun.com/tutorials/terminal-basics/all>

The good ones are:

- [CoolTerm](#)
- [YAT](#)
- [MobaXterm](#)

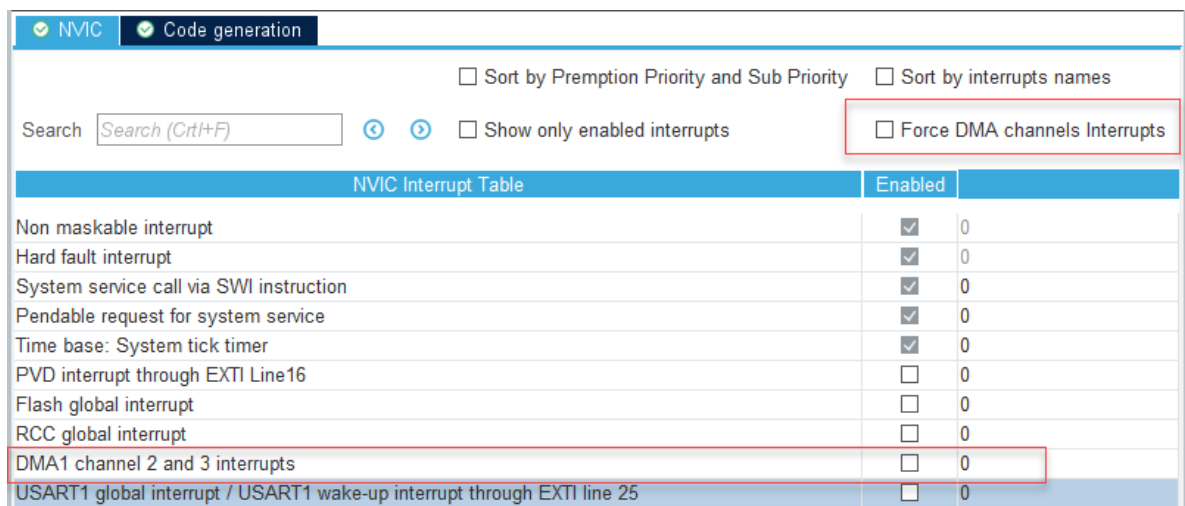
Use float with `printf` and `scanf`

The `newlib-nano` library does not enable `float` support by default. When `float` is used in `printf()`, `scanf()` or in `sprintf()`, it must be explicitly enabled in linker.

To enable, go to **Project » Properties** menu, then go to **C/C++ Build » Settings » Cross ARM C++ Linker » Miscellaneous** and check **Use float with nano printf/scanf**.

DMA Polling in a infinite loop

The function `HAL_DMA_PollForTransfer()` works properly only when the DMA interrupts are disabled. It needs to turn off the option *Force DMA Channels Interrupts* to be able to disable DMA interrupts.



Force turning off DMA interrupt

If DMA interrupts are enabled, the interrupt handler `HAL_DMA_IRQHandler()` may clear the interrupt flag and set DMA State to *HAL_DMA_STATE_READY*, which causes the

function `HAL_DMA_PollForTransfer()` runs in a infinite loop if it is called with `Timeout = HAL_MAX_DELAY`:

```
HAL_StatusTypeDef HAL_DMA_PollForTransfer(DMA_HandleTypeDef *hdma,
                                           uint32_t CompleteLevel,
                                           uint32_t Timeout)
{
    ...
    /* Get tick */
    tickstart = HAL_GetTick();

    // hdma->DmaBaseAddress->ISR = 0 due to modified hdma->DmaBaseAddress->IFCR
    while(RESET == (hdma->DmaBaseAddress->ISR & temp))
    {
        // always enter here
        if(RESET != (hdma->DmaBaseAddress->ISR & (DMA_FLAG_TE1 << hdma->ChannelIndex))) {
            // never enter here
        }

        if(Timeout != HAL_MAX_DELAY) {
            // never enter here
        }
    }
}
```

To fix this, just need to check the DMA state inside the while loop. If the state is already `HAL_DMA_STATE_READY`, exit the loop and return `HAL_OK`.

Computer architecture

The most of STM32 MCUs share the same computer architecture except for STM32F0 and STM32L0 that are based on the Cortex-M0/0+ cores. They, in fact, are the only Cortex-M cores based on the *von Neumann architecture*, compared to the other Cortex-M cores that are based on the (modified) *Harvard architecture*¹.

The fundamental distinction between the two architectures is that:

- Cortex-M0/0+ cores access to Flash, SRAM and peripherals using one common bus
- The other Cortex-M cores have:
 - two separated bus lines for the access to the flash (one for the fetch of instructions called instruction bus, or simply I-Bus or even I-Code, and one for the access to const data called data bus, or simply D-Bus or even D-Code)
 - one dedicated line for the access to SRAM and peripherals (also called system bus, or simply S-Bus).

Windows 10 USB to Serial driver

Windows 10 does not support PL2303 USB to Serial, but here is the fix for this problem: <https://github.com/johnstevenson/pl2303-win10>. This will install an old but compatible driver for EOL PL2303 chips.

1. https://en.wikipedia.org/wiki/Modified_Harvard_architecture ←