Microcontroller Engineering
TMIK13
Lecture 12

ADVANCED DEBUGGING

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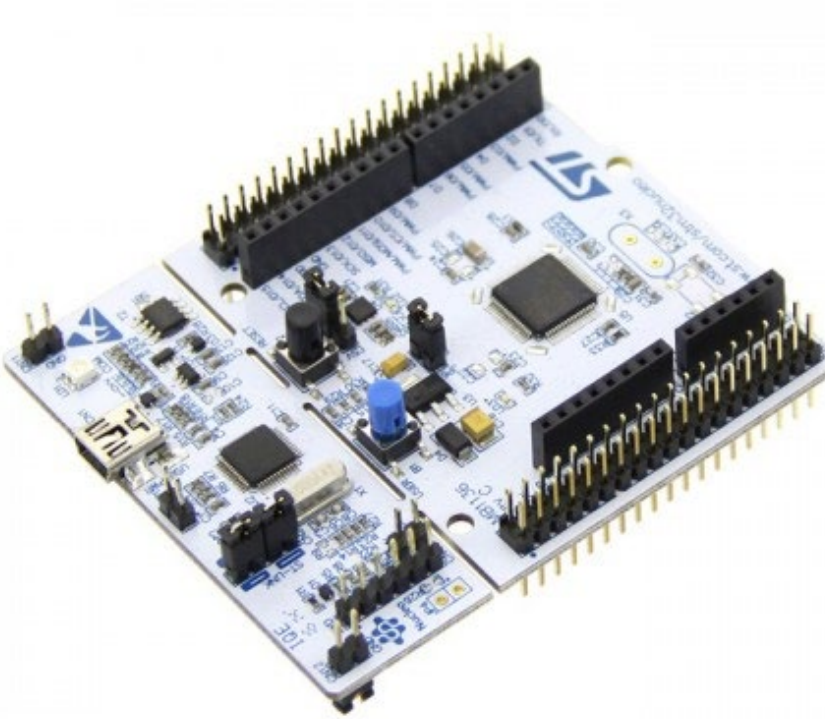
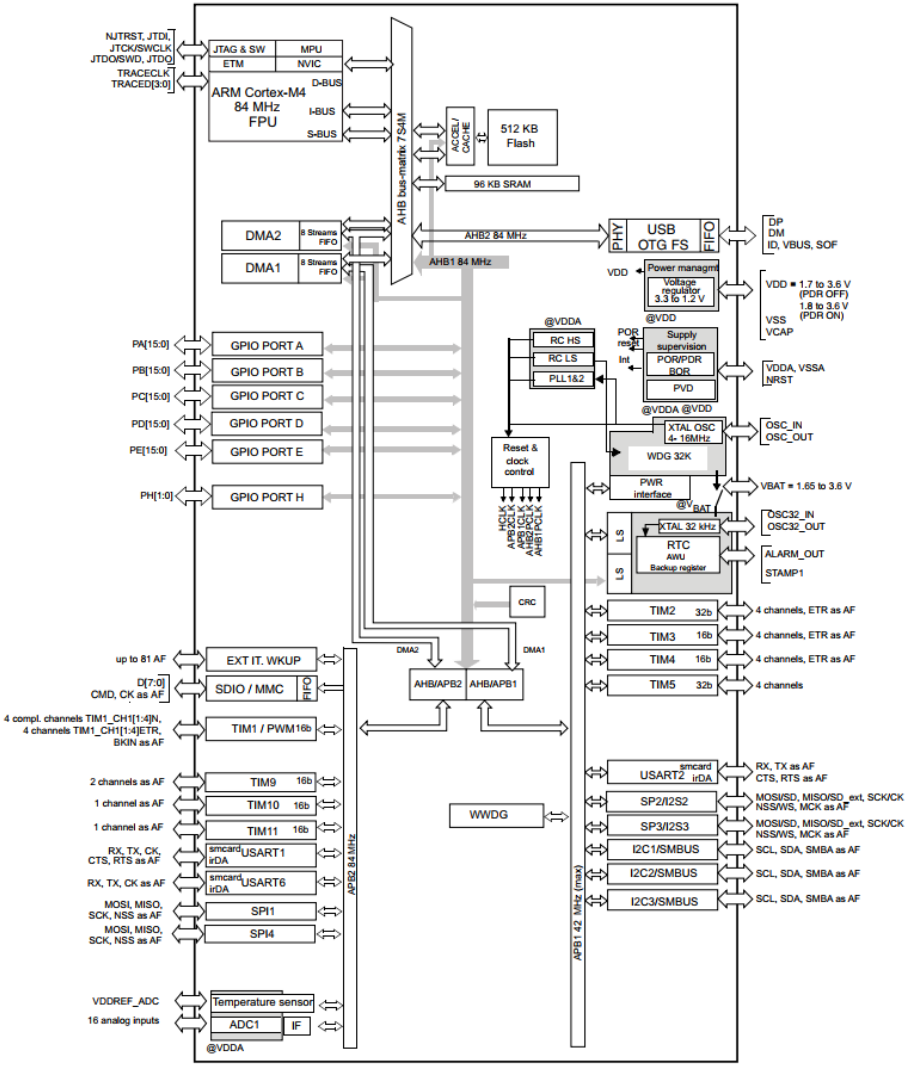
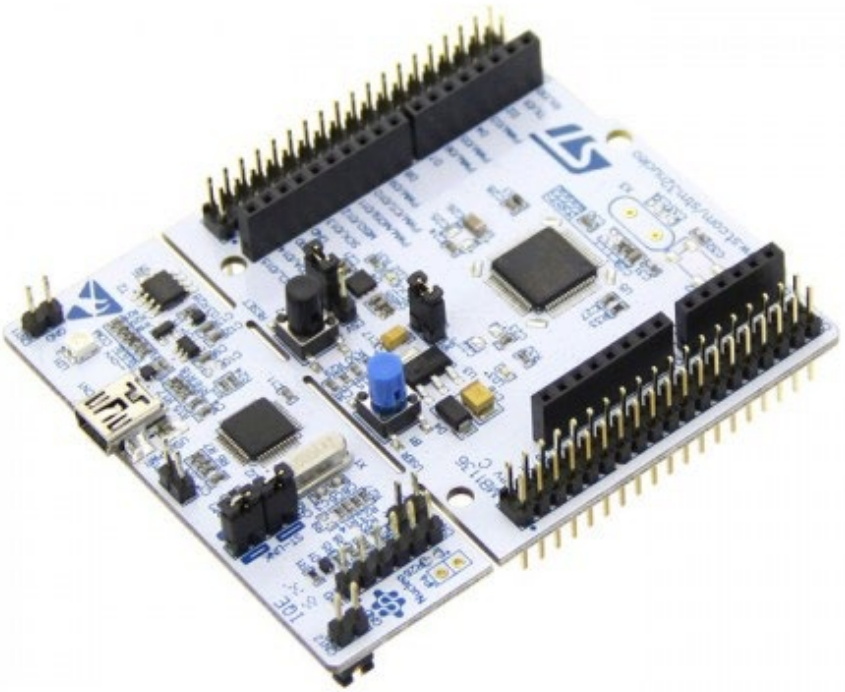
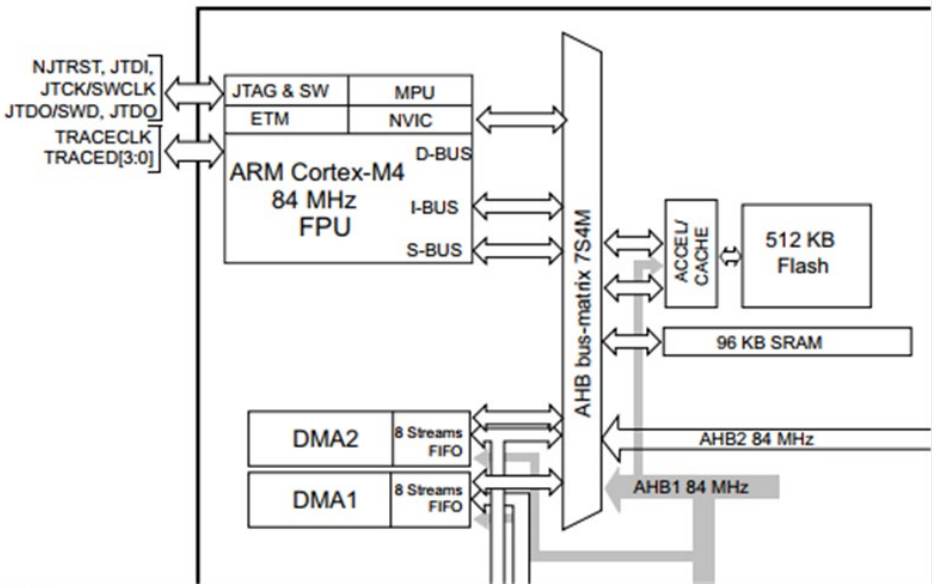
Nucleo-64 STM32F401RE



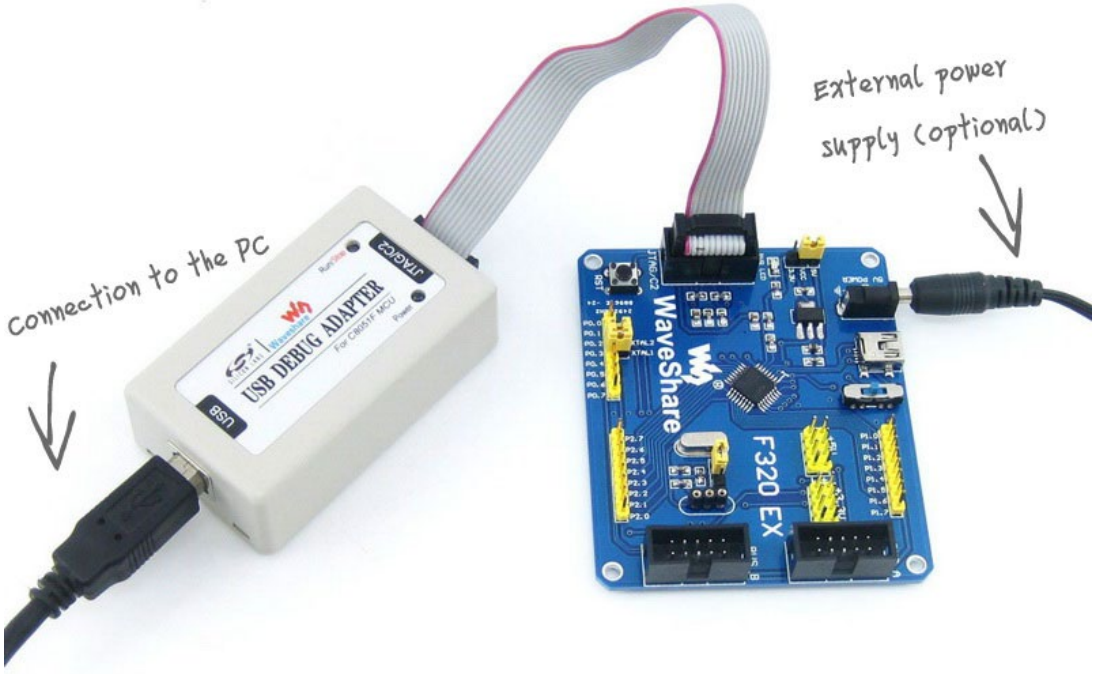


Nucleo-64 STM32F401RE

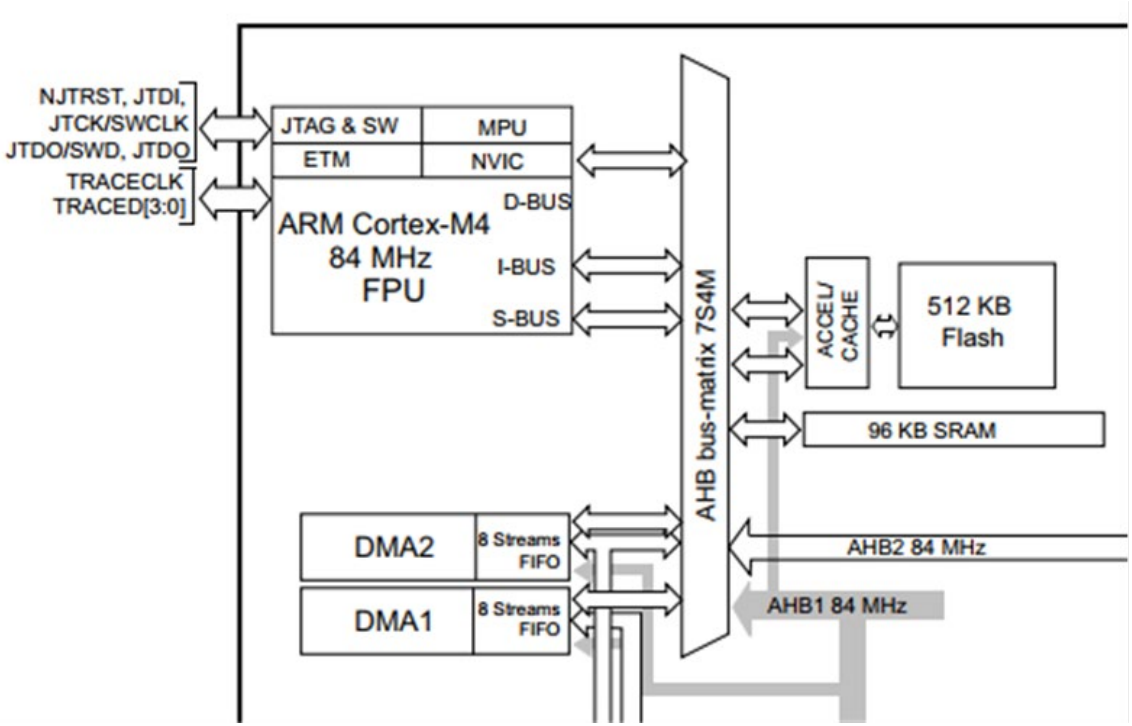




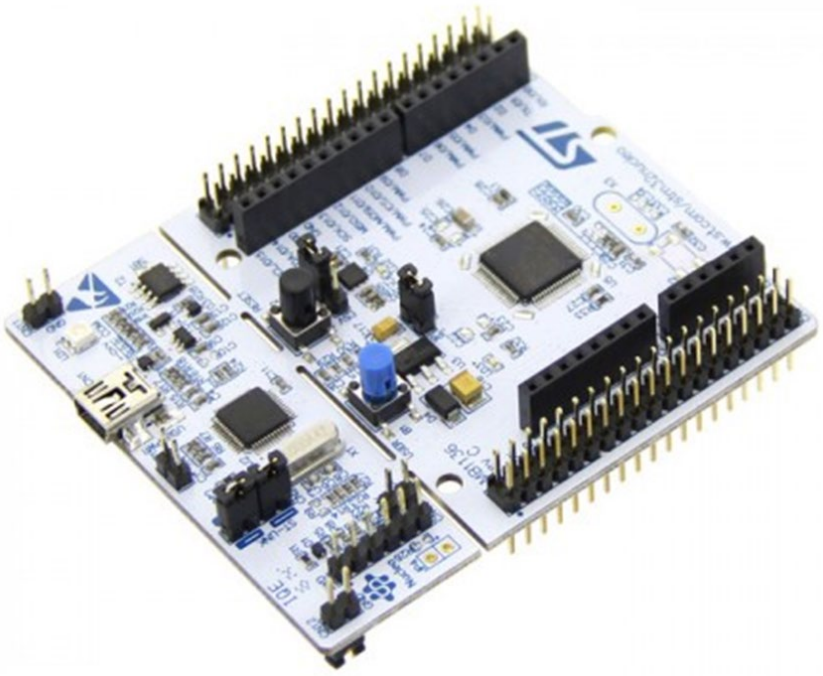
Hardware Debugger

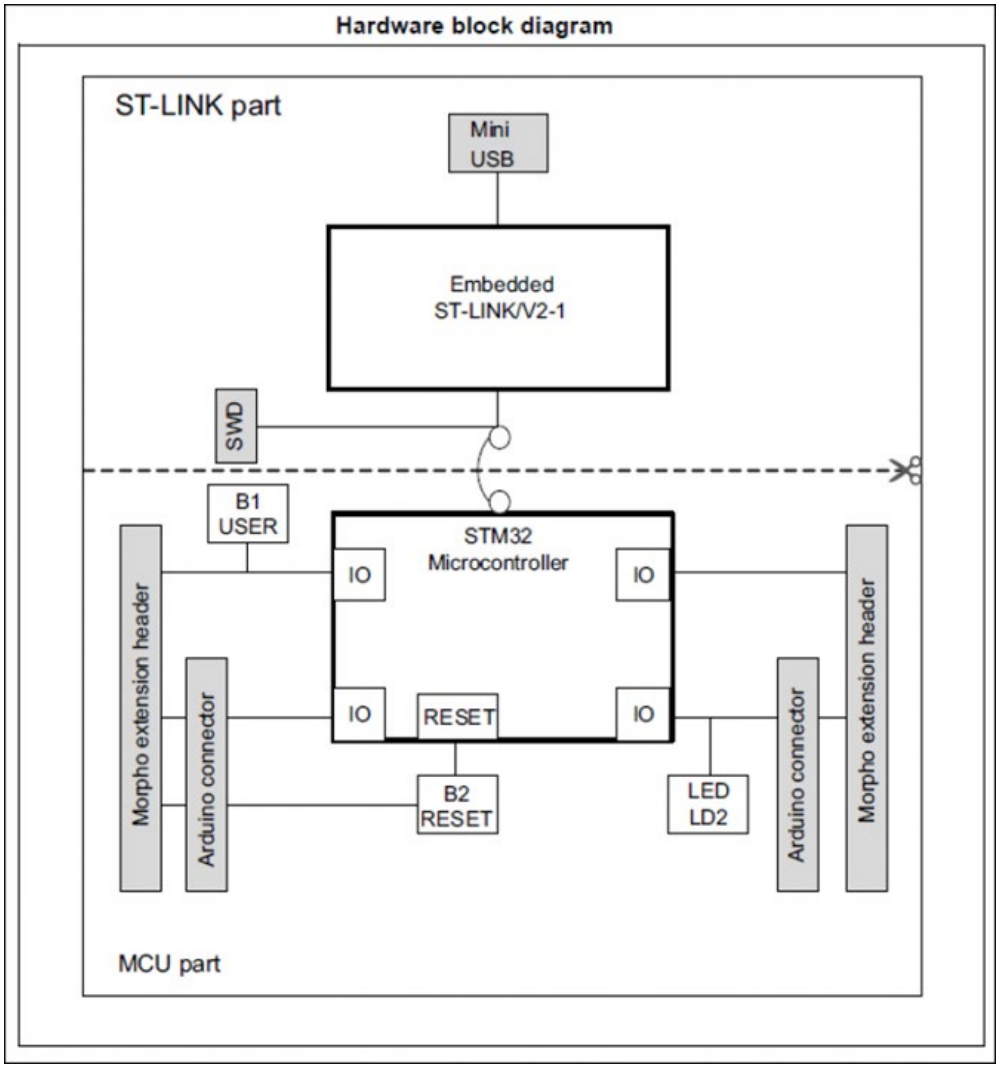


Hardware Debugger

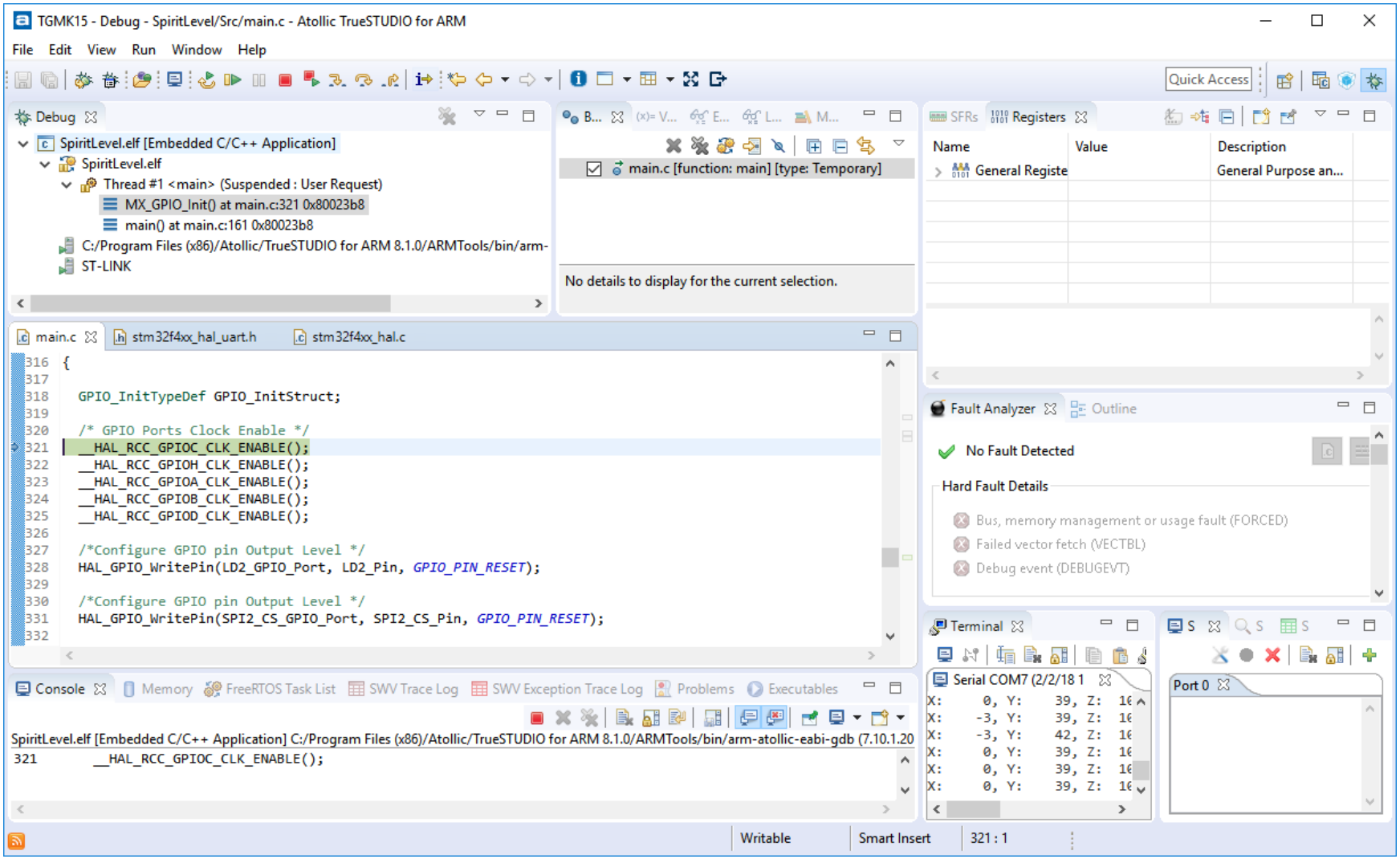


Hardware Debugger – ST-LINK/V2

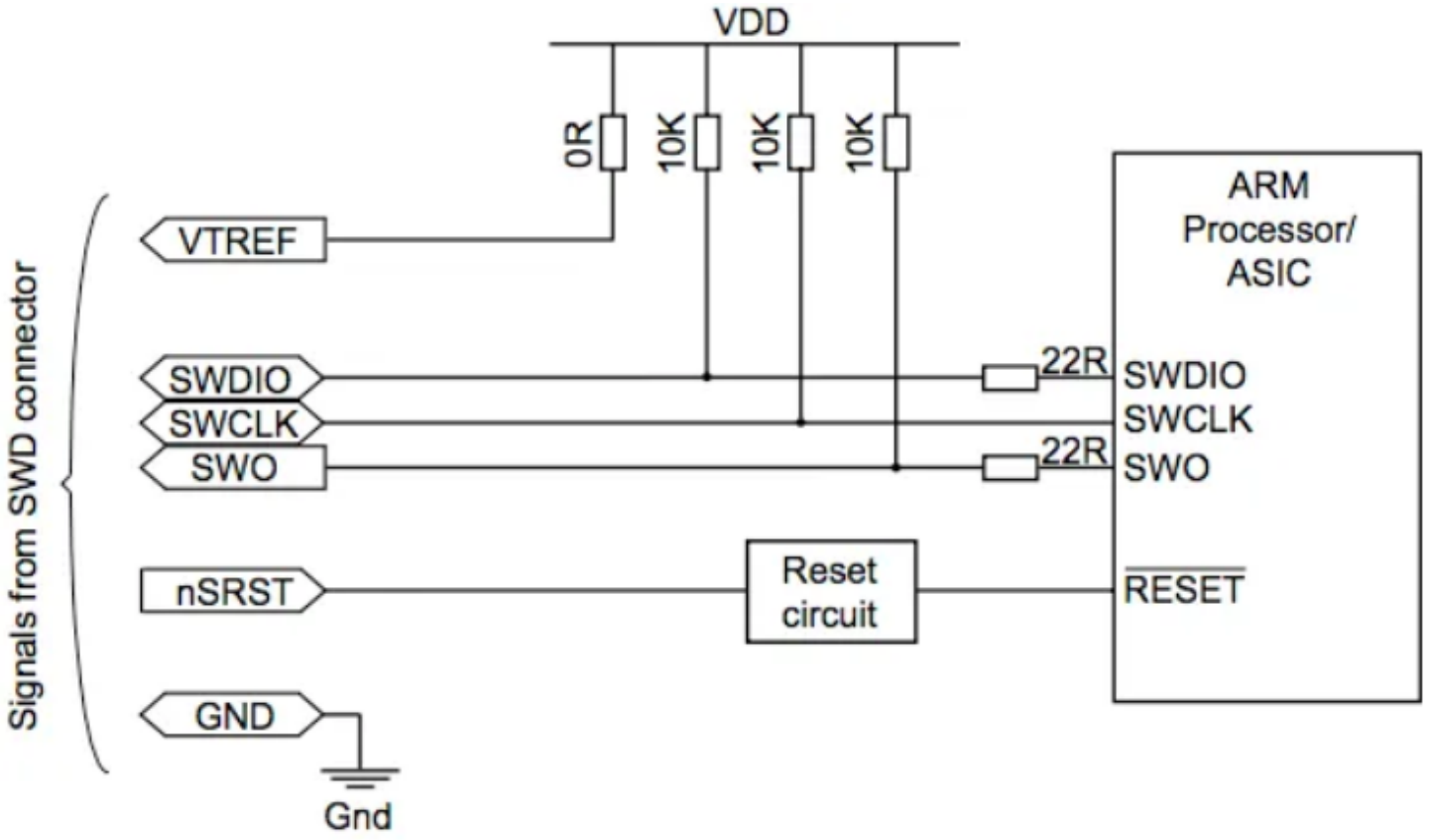




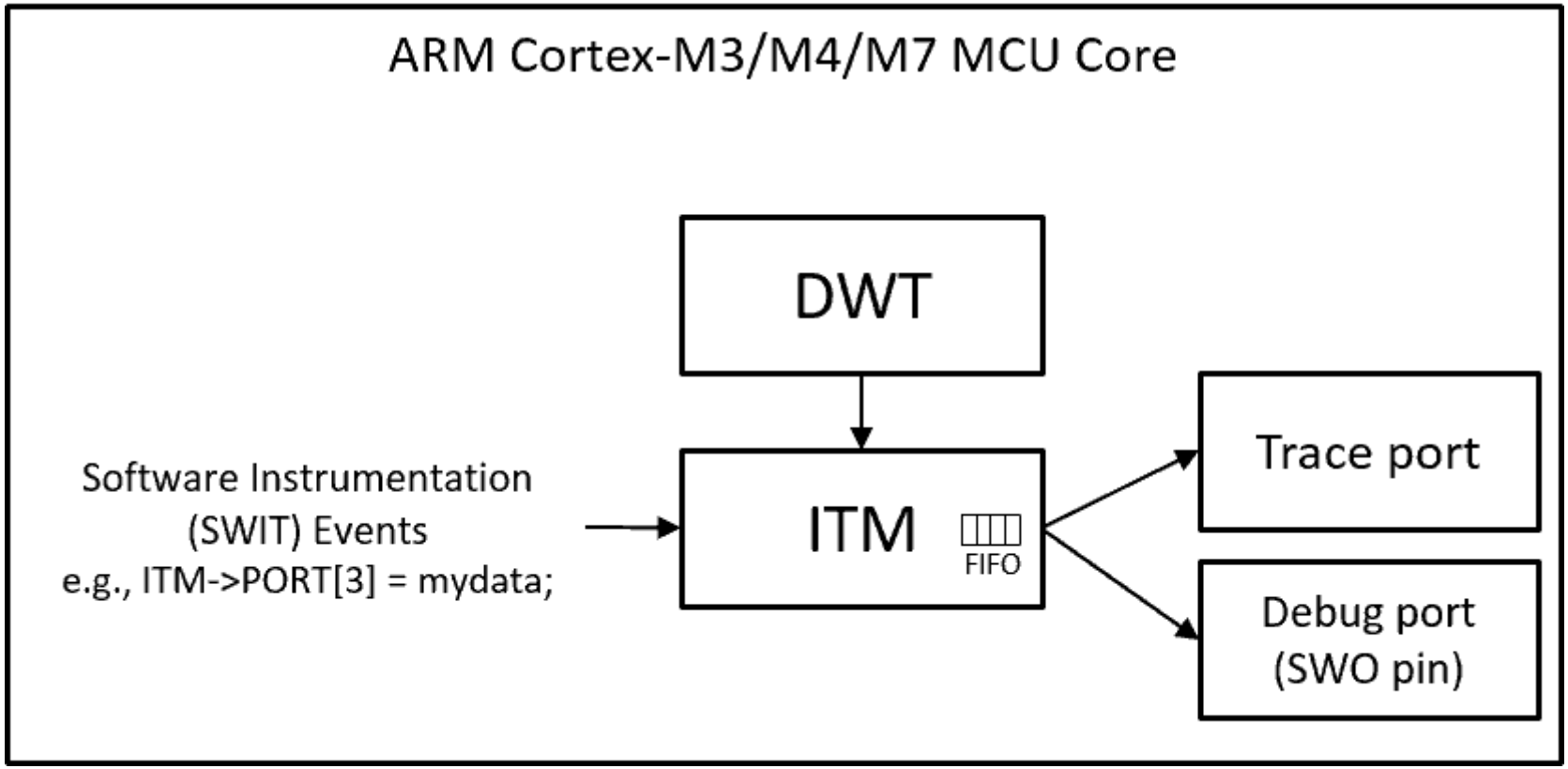
Software Debugger



Serial Wire Debug



Instrumentation Trace Macrocell



DWT – Debug Watchpoint and Trace (Handles breakpoints and debugging)
ITM – Instrumentation Trace Macrocell (Transfers debug data. 32 custom channels)

https://percepio.com/arm-itm/

Demo of different techiques

1. (Printout using serial to terminal)
2. Use Live expression
3. Redirect printf to ITM (Instrumentation Trace Macrocell)
    1. Print to SWV ITM Data Console
    2. Can be text and numbers (both integers and float) formatted
4. Advanced breakpoints
    1. Conditions
    2. Actions
5. Call-stack and memory peeking
6. Asserts (assert_param & assert_failed, or assert)
7. SWV Data Trace (Similar to Live Expression, advanced)
    1. Can output data both numerically and as graph
8. Use GPIO and oscilloscope for debugging and time measurement
9. Use SWV Trace log to measure time

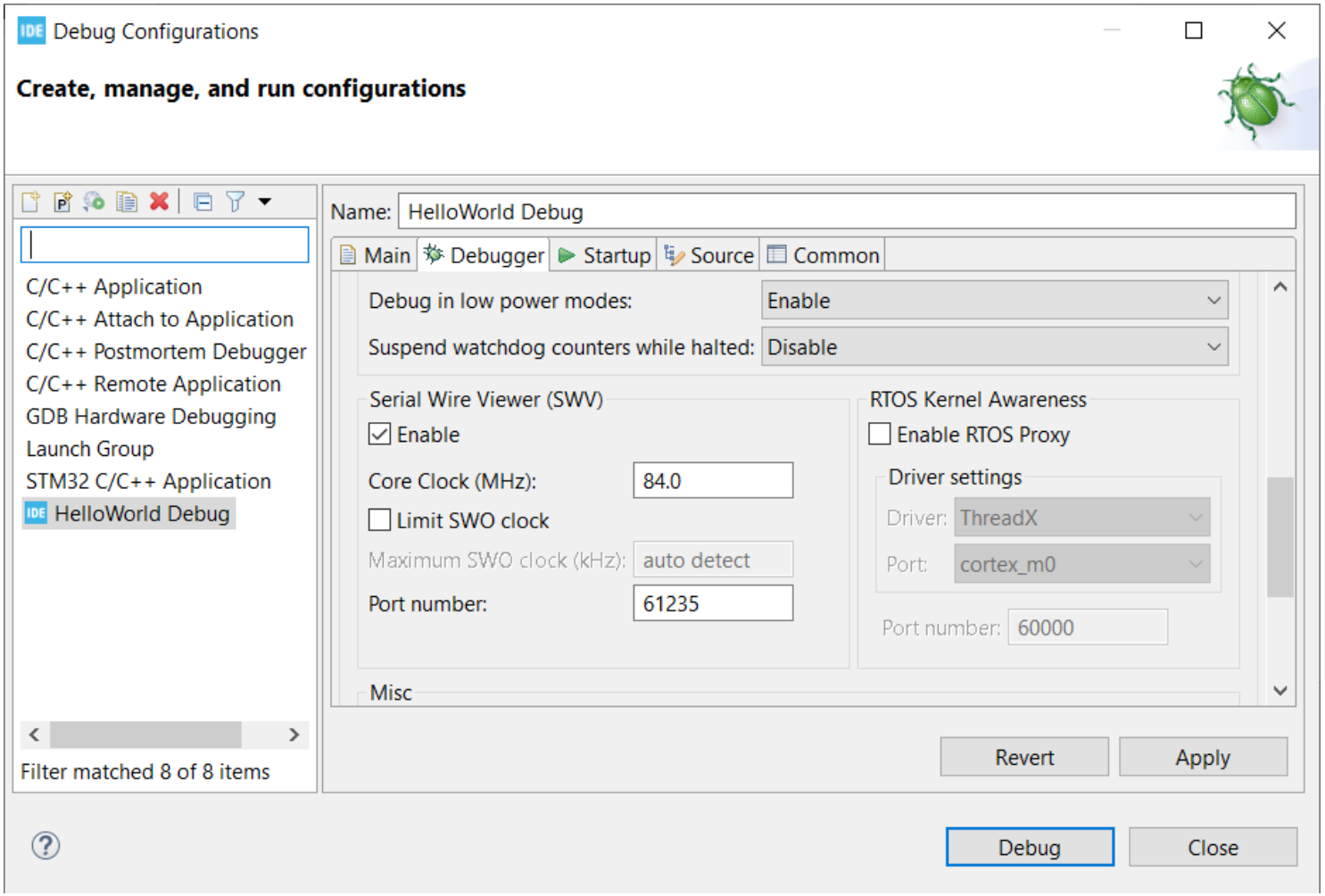
Redirection of printf

Override _write (weak declared in syscall.c)

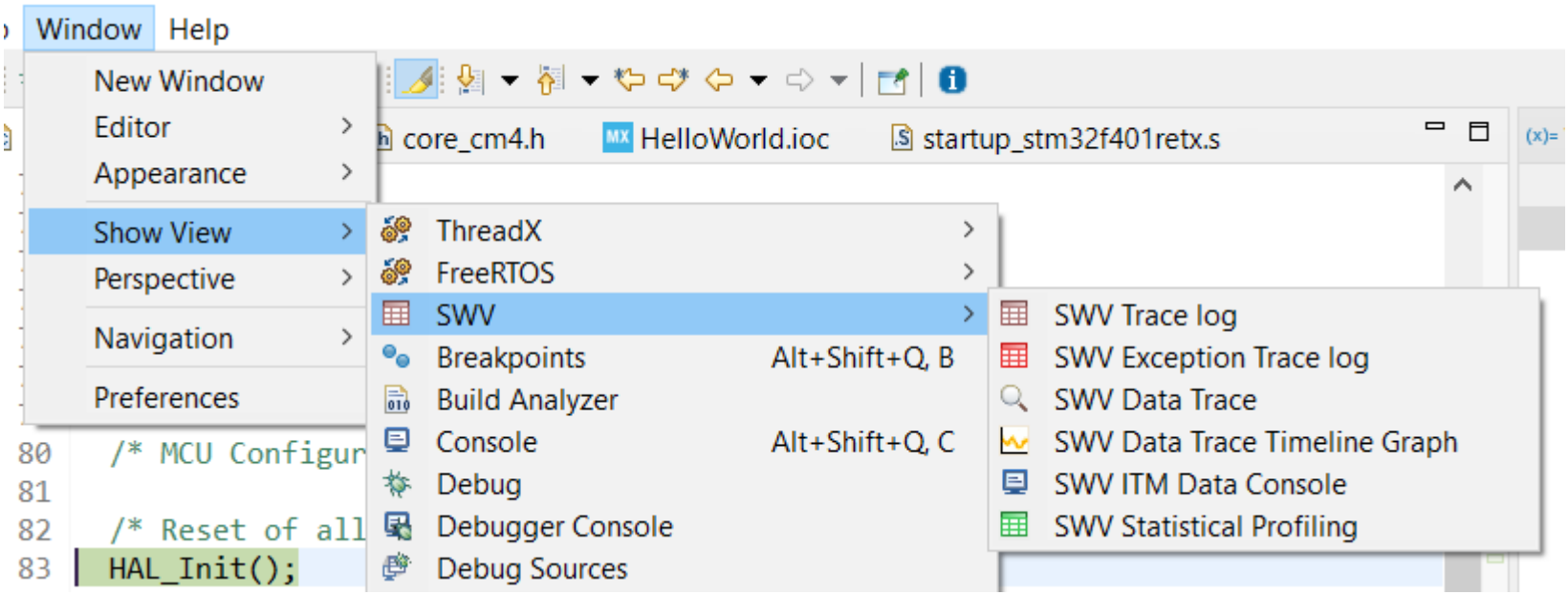
```
/* USER CODE BEGIN 0 */
int _write(int file, char *ptr, int len)
{
    int DataIdx;

    for(DataIdx = 0; DataIdx < len; DataIdx++)
    {
        ITM_SendChar(*ptr++);
    }
    return len;
}
/* USER CODE END 0 */
```

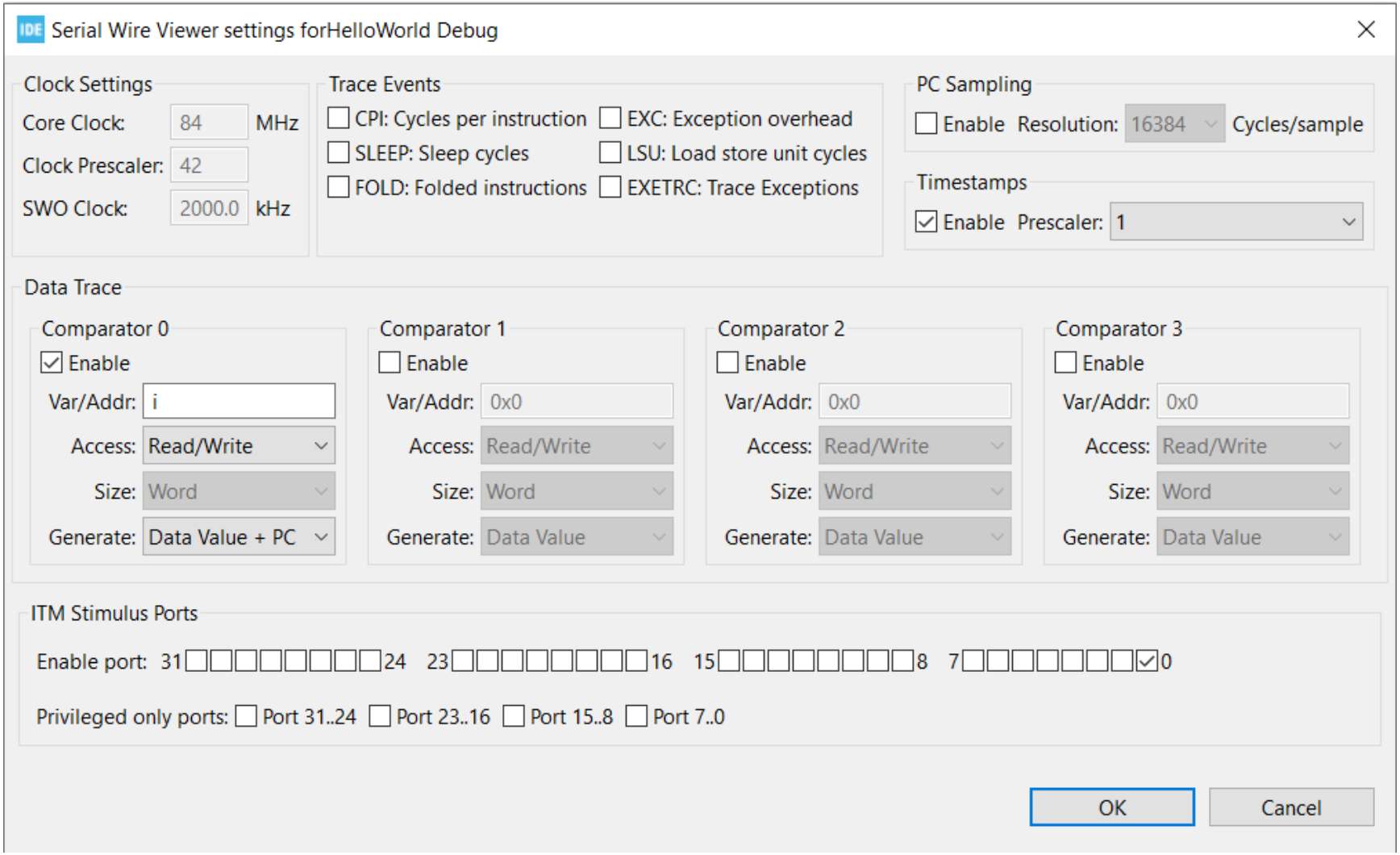
Activate SWV (ITM debugging)



SWV – Serial Wire Viewer

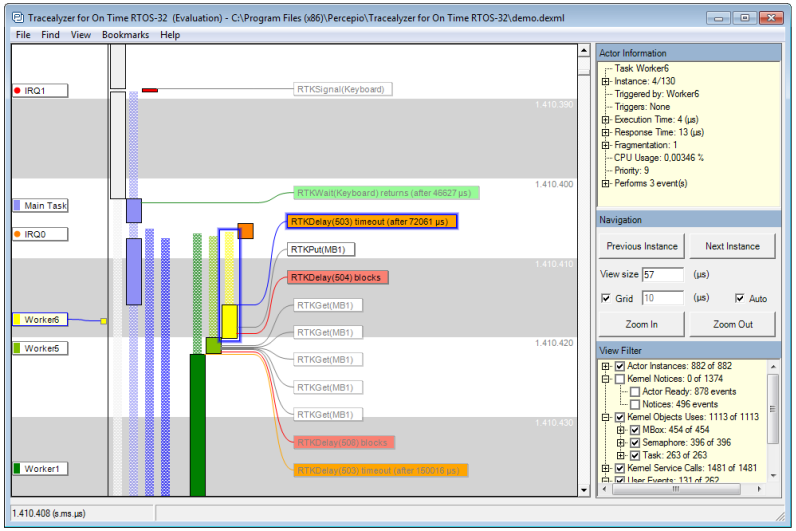


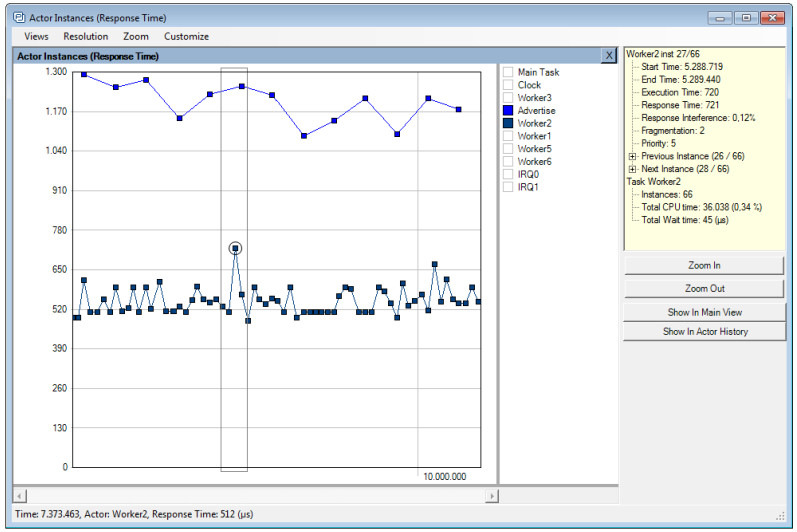
SWV Configuration

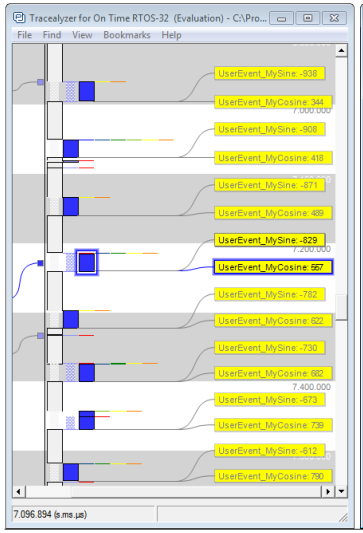


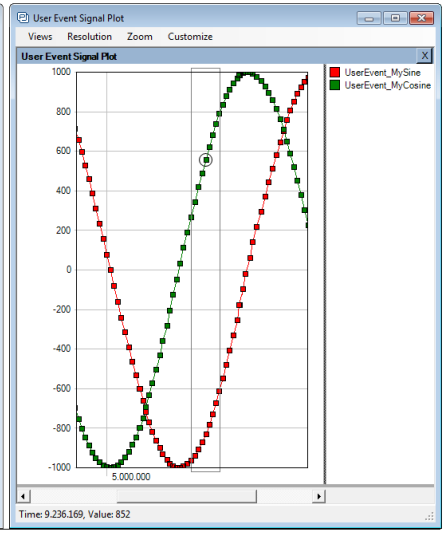
Tracealyzer

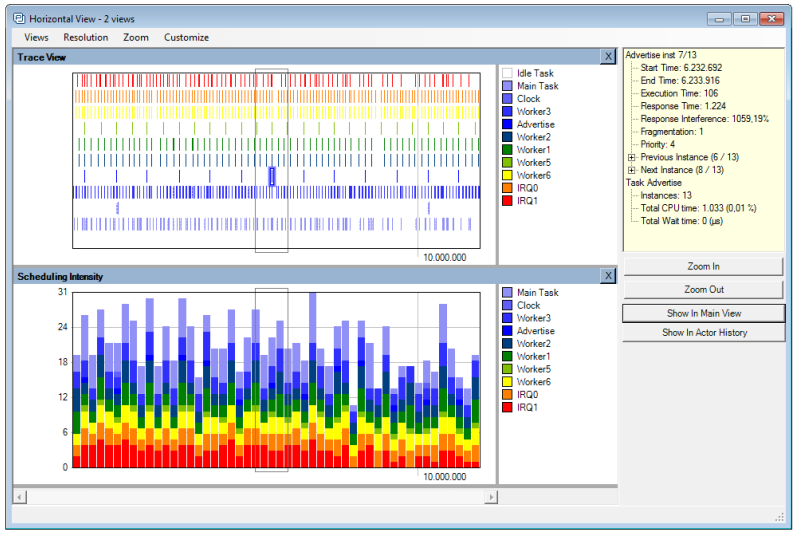
https://percepio.com/tracealyzer/











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Questions?

Contact information

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