Course Software Installation

ECE 3436 – Microprocessor Systems

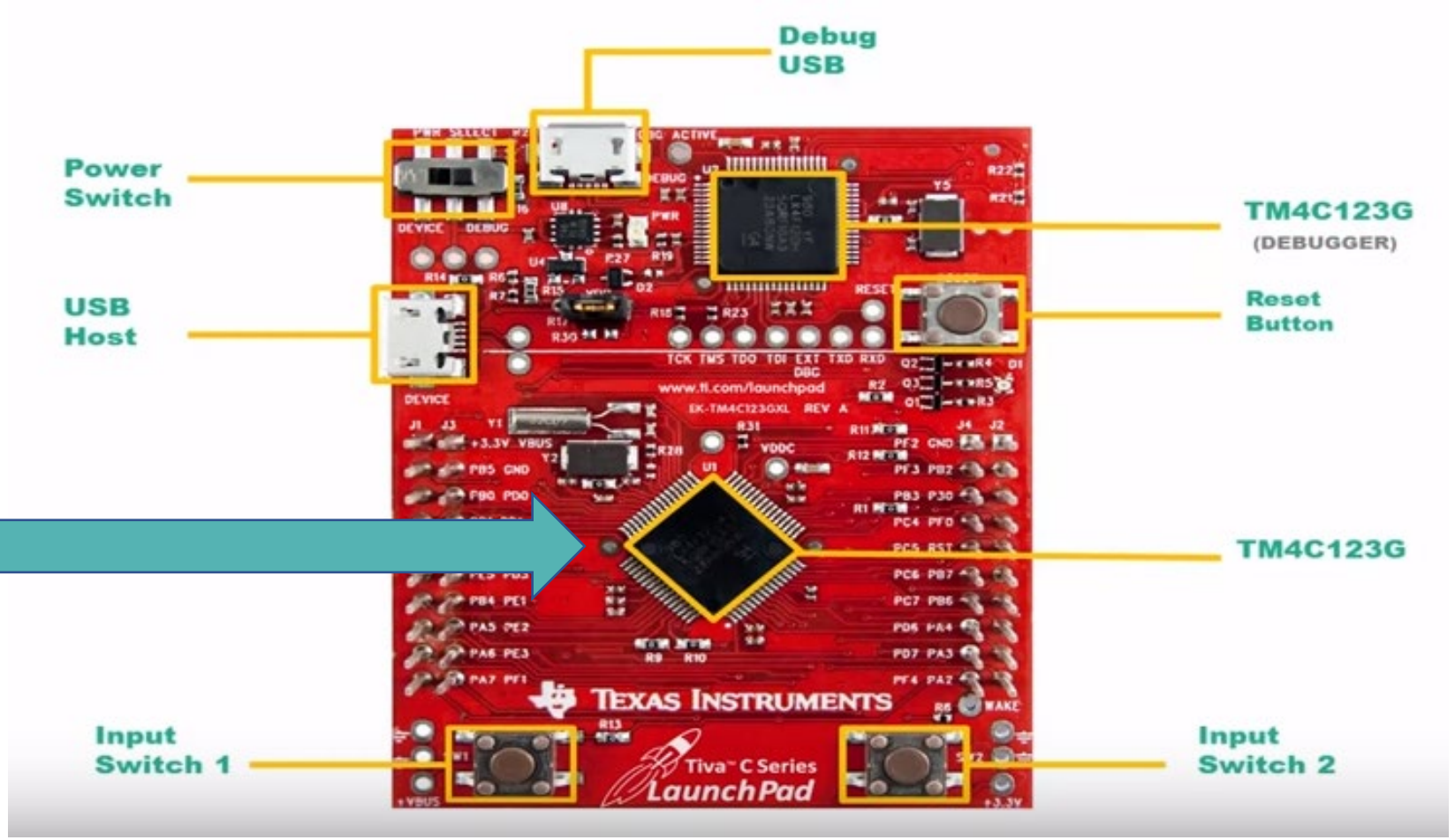
Dr. Diana de la Rosa-Pohl

** Some software has been provided by Dr. John Valvano and his team in the Department of Electrical and Computer Engineering at The University of Texas at Austin.*

The Hardware

- The TI LaunchPad

Tiva© C Series MCU
TM4C123GH6PM



https://www.youtube.com/watch?v=HbBIkFs8gm0

Development Tools for Tiva C Series MCUs

	mentor embedded	IAR SYSTEMS	ARM KEIL	Code Composer Studio
Eval Kit License	30-day full function. Upgradeable	32KB code size limited. Upgradeable	32KB code size limited. Upgradeable	Full function. Onboard emulation limited
Compiler	GNU C/C++	IAR C/C++	RealView C/C++	TI C/C++
Debugger / IDE	gdb / Eclipse	C-SPY / Embedded Workbench	µVision	CCS/Eclipse-based suite
Full Upgrade	99 USD personal edition / 2800 USD full support	2700 USD	MDK-Basic (256 KB) = €2000 (2895 USD)	445 USD
JTAG Debugger		J-Link, 299 USD	U-Link, 199 USD	XDS100, 79 USD

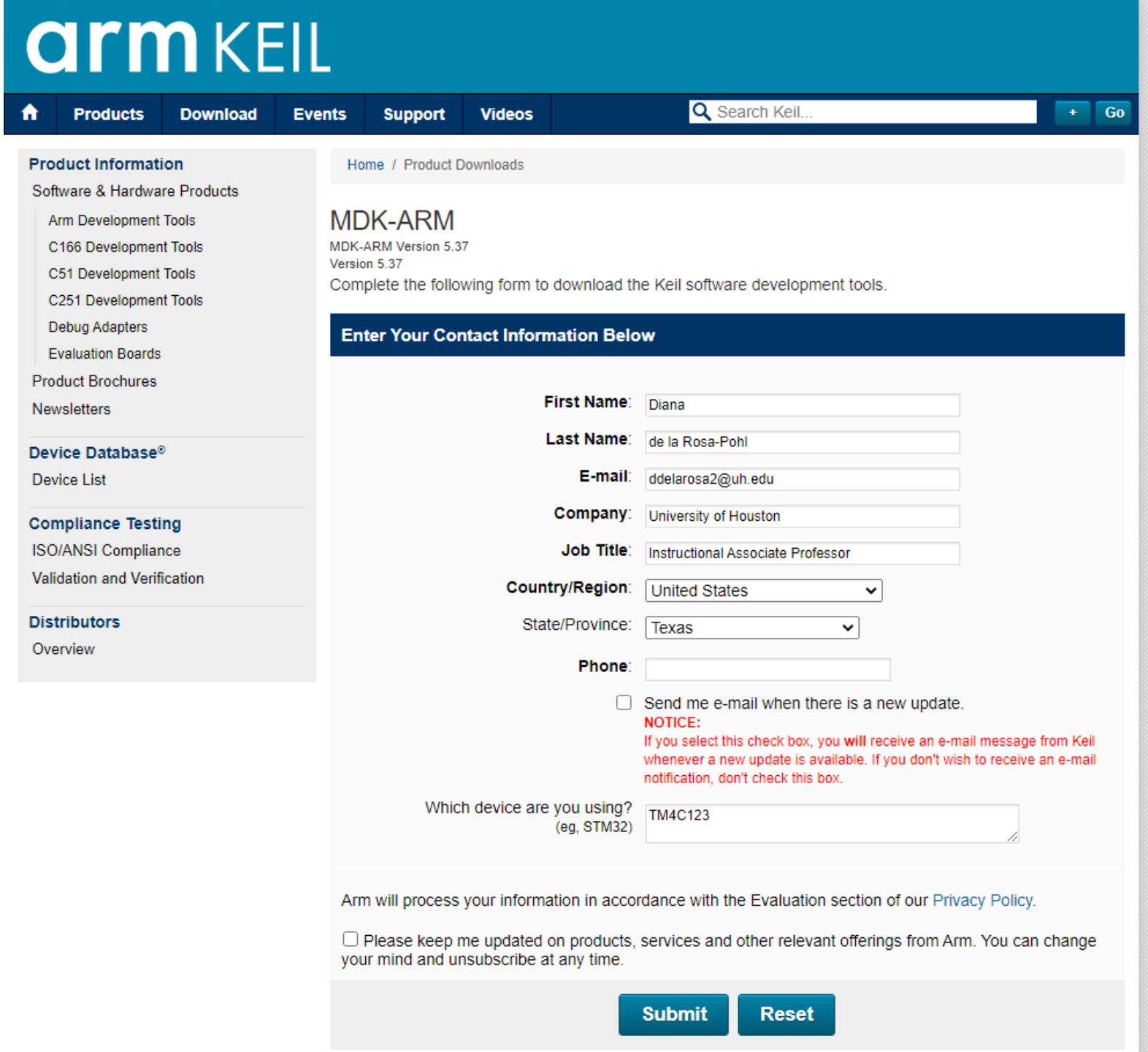
https://training.ti.com/tm4c123g-launchpad-workshop-series-2-15-introduction-code-composer-studio

Step 1: Download & Install Keil MDK V5

- download the free version of Keil MDK V5
  - MDK = microcontroller development kit
  - https://www.keil.com/demo/eval/arm.htm

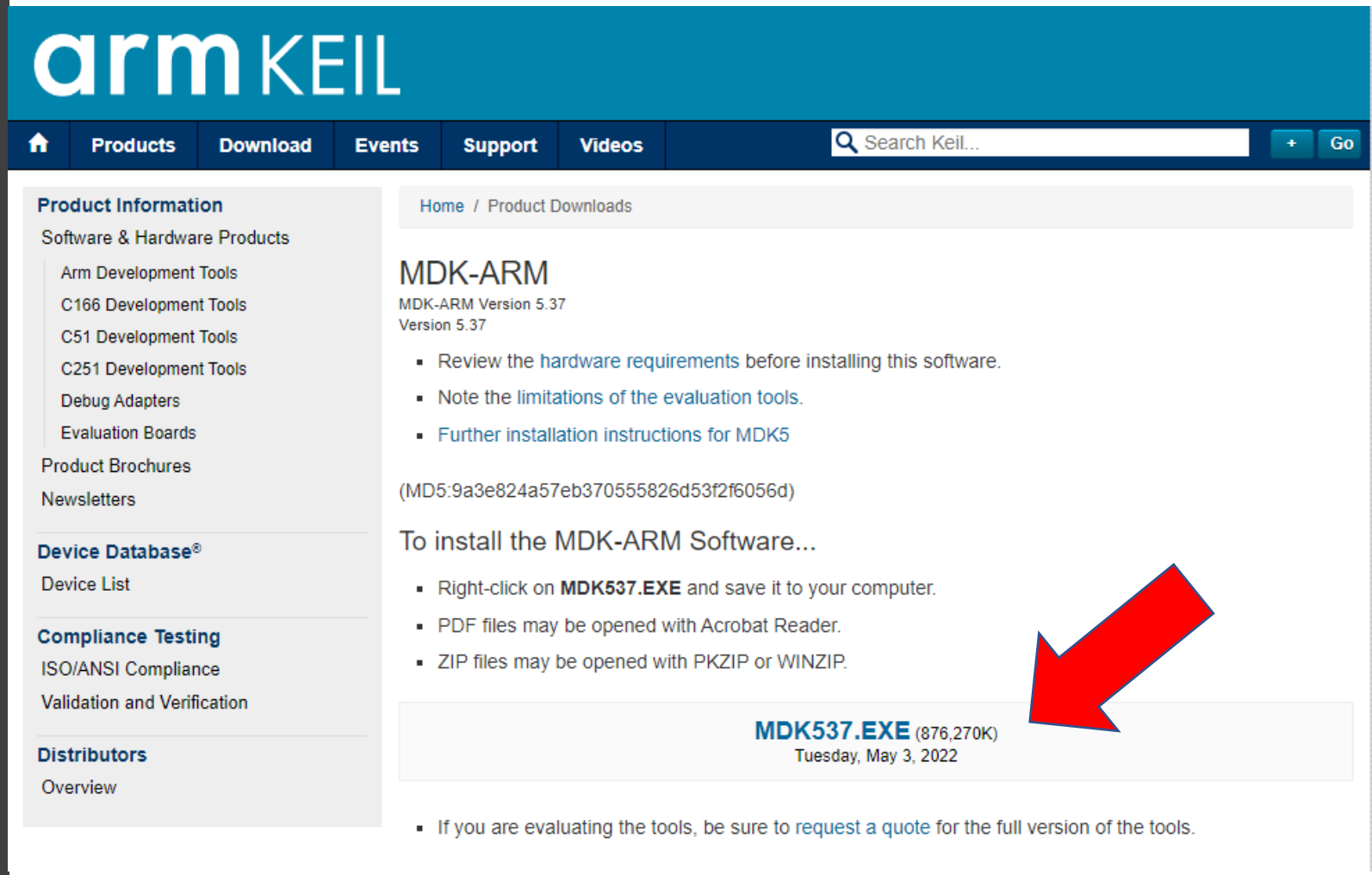
Download Keil

- Enter your information
- The device you are using is the TM4C123
- You must accept the privacy policy.



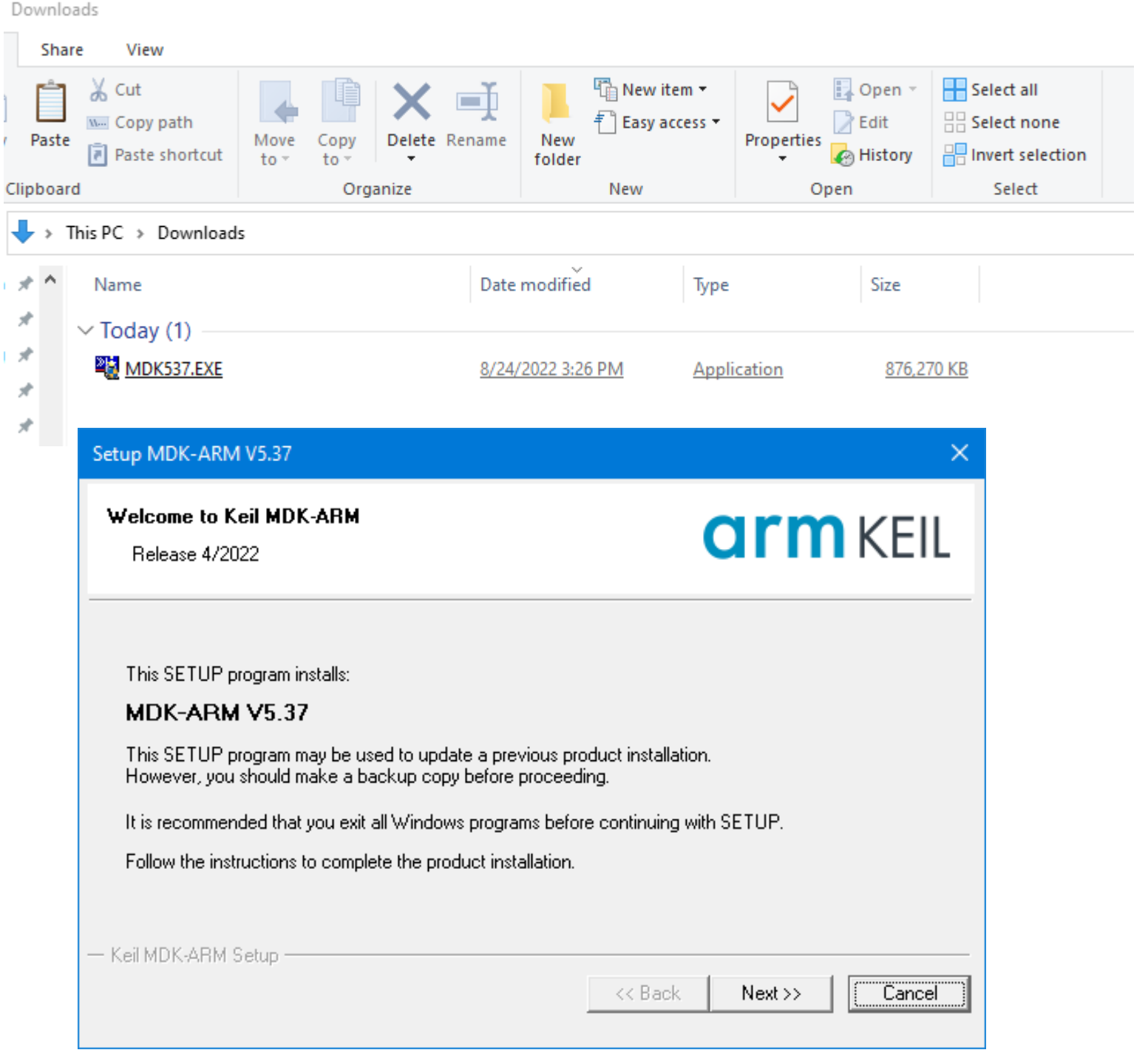
Download Keil

- The installation file is ~900 MB



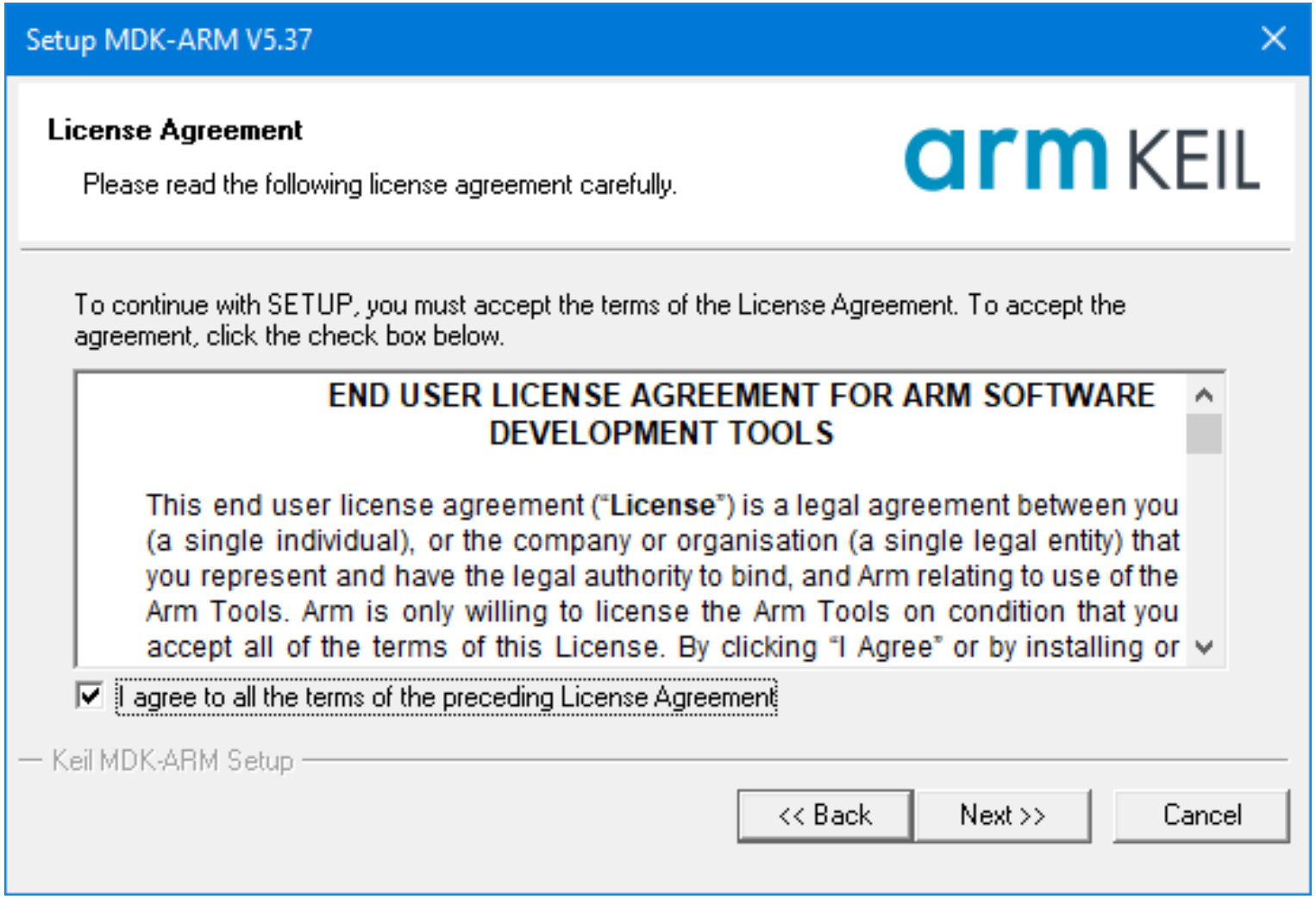
Install Keil

- run the MDK537.exe file



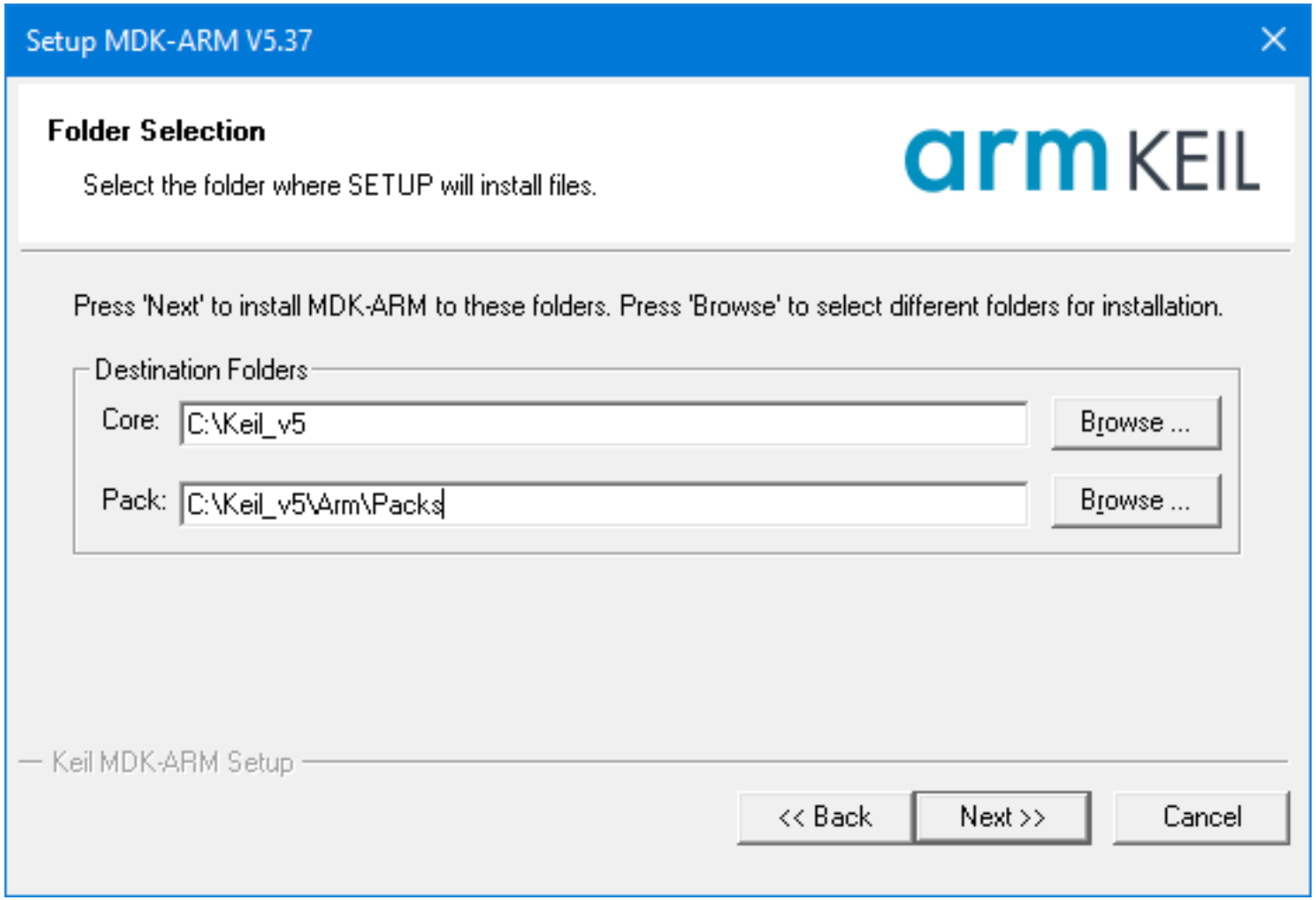
Install Keil

- agree to the license agreement



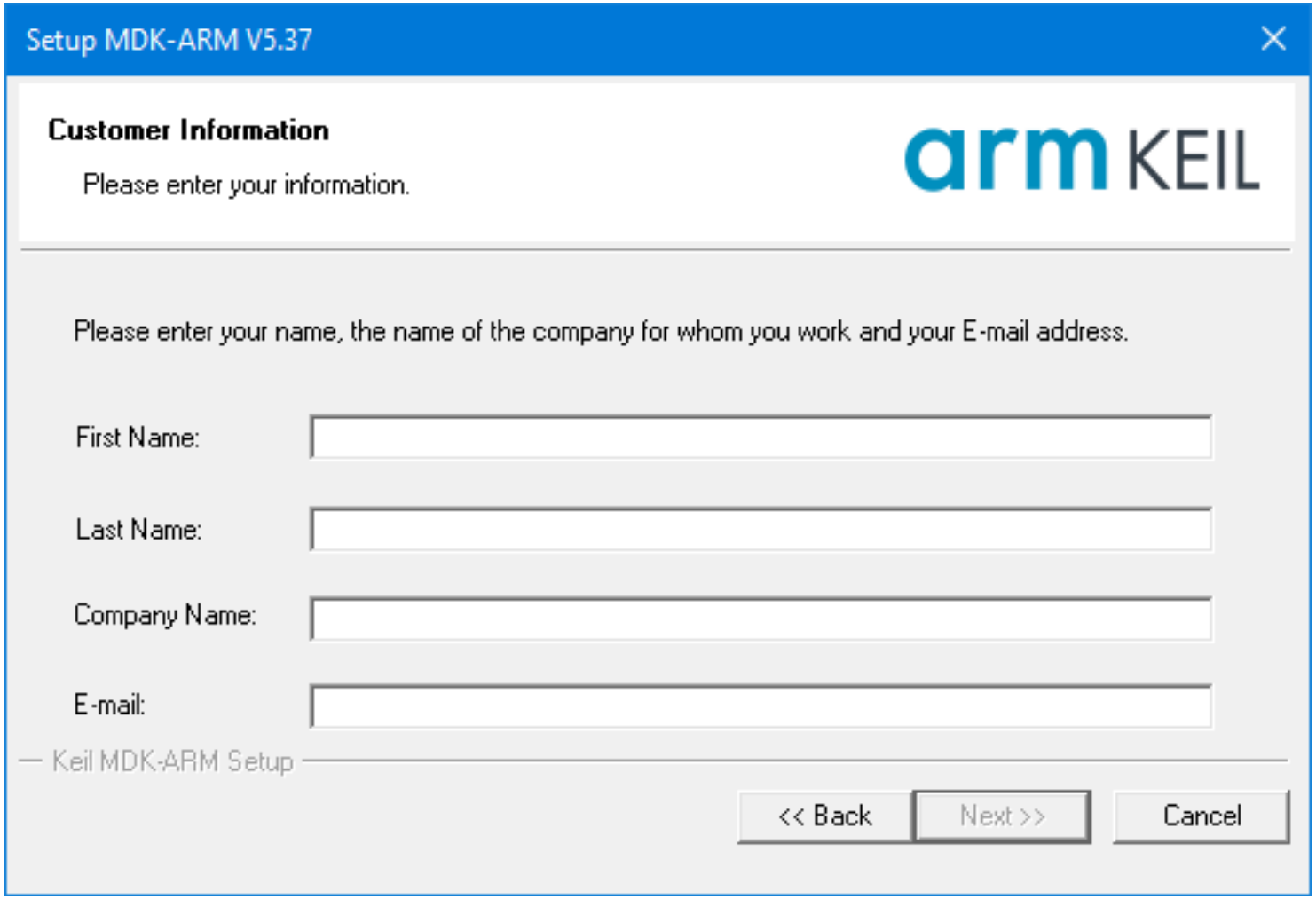
Install Keil

- Choose where you want to install Keil



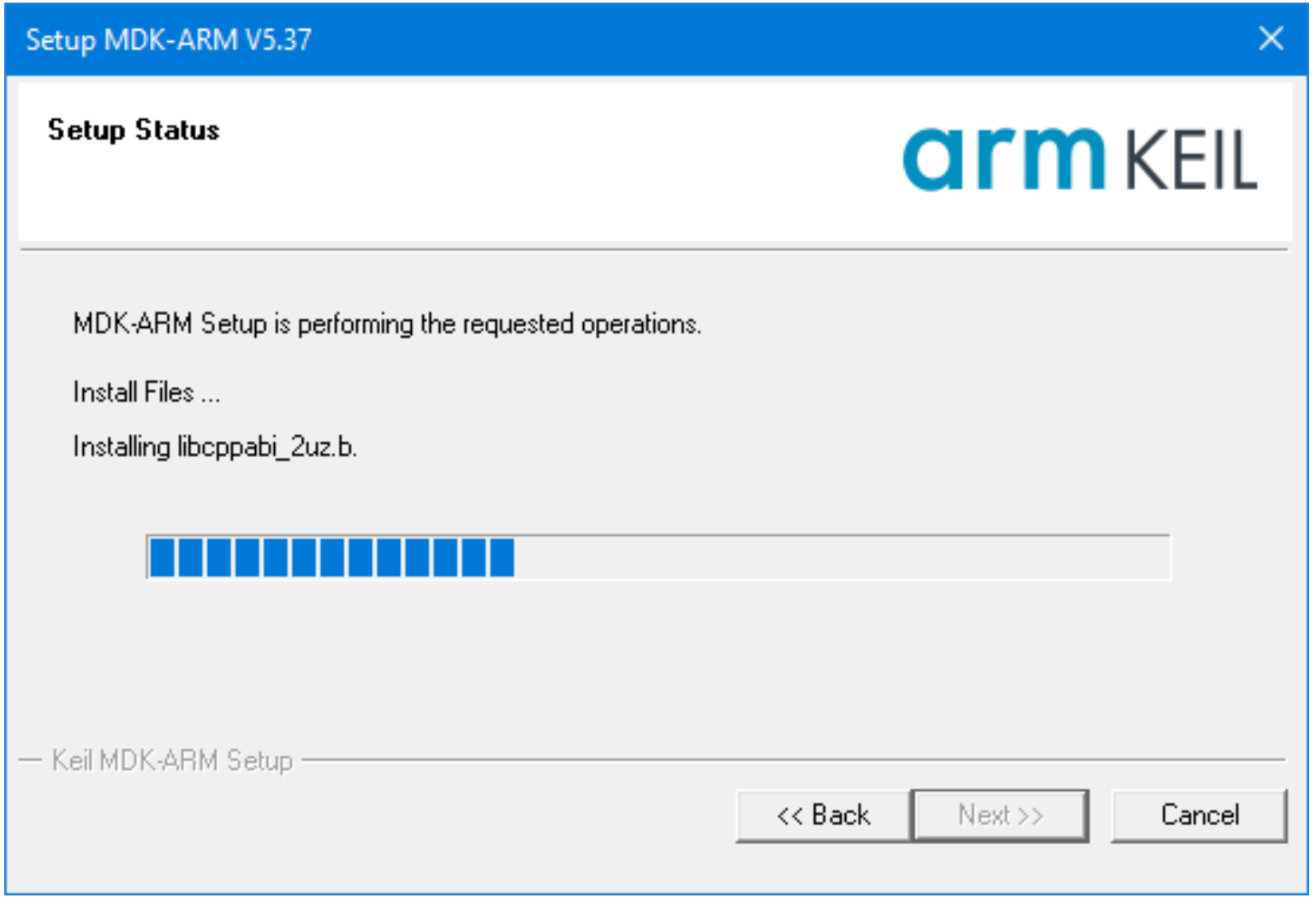
Install Keil

- Enter YOUR information



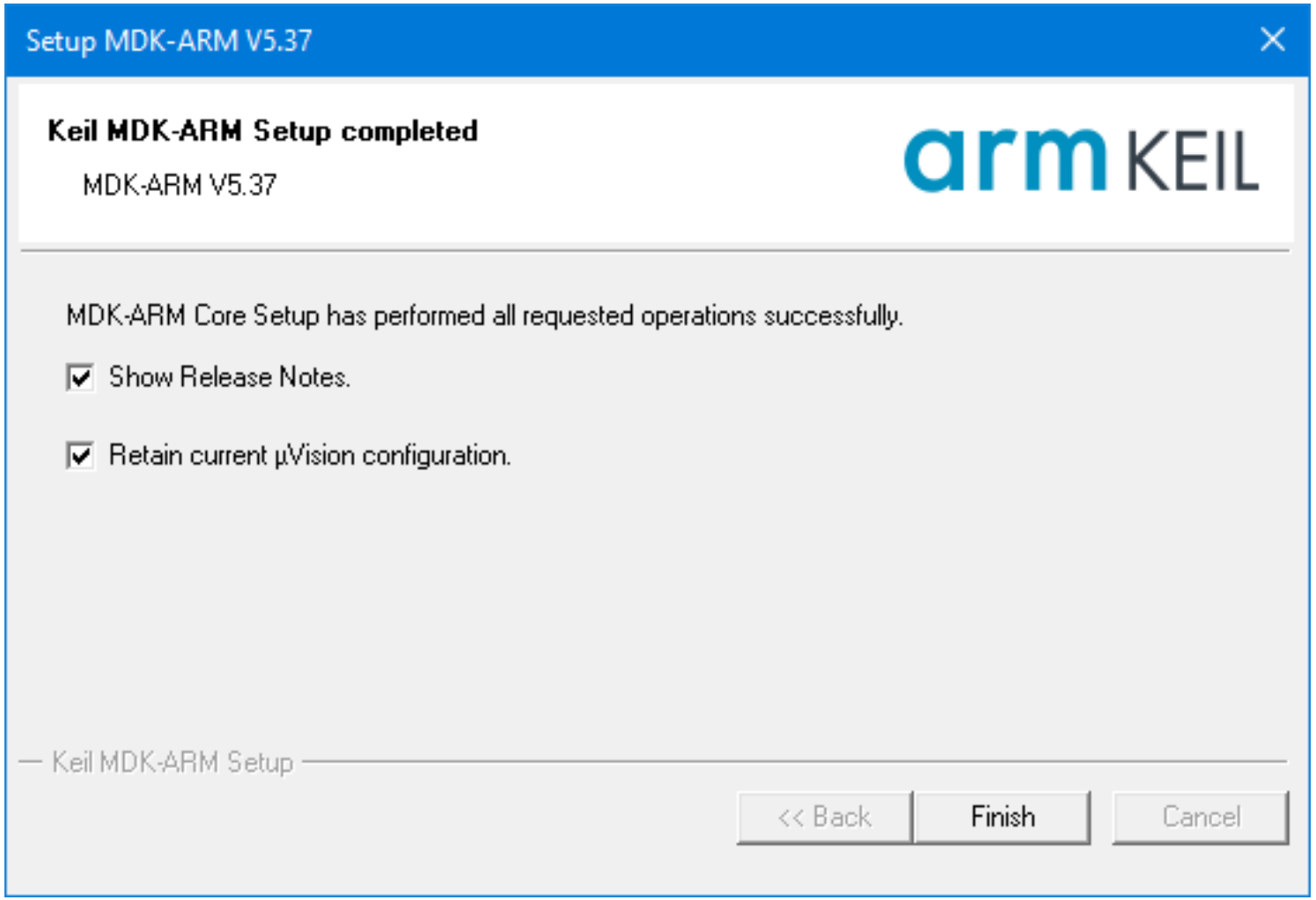
Install Keil

- click Next and wait for all of the files to be installed
- this process will take a few minutes



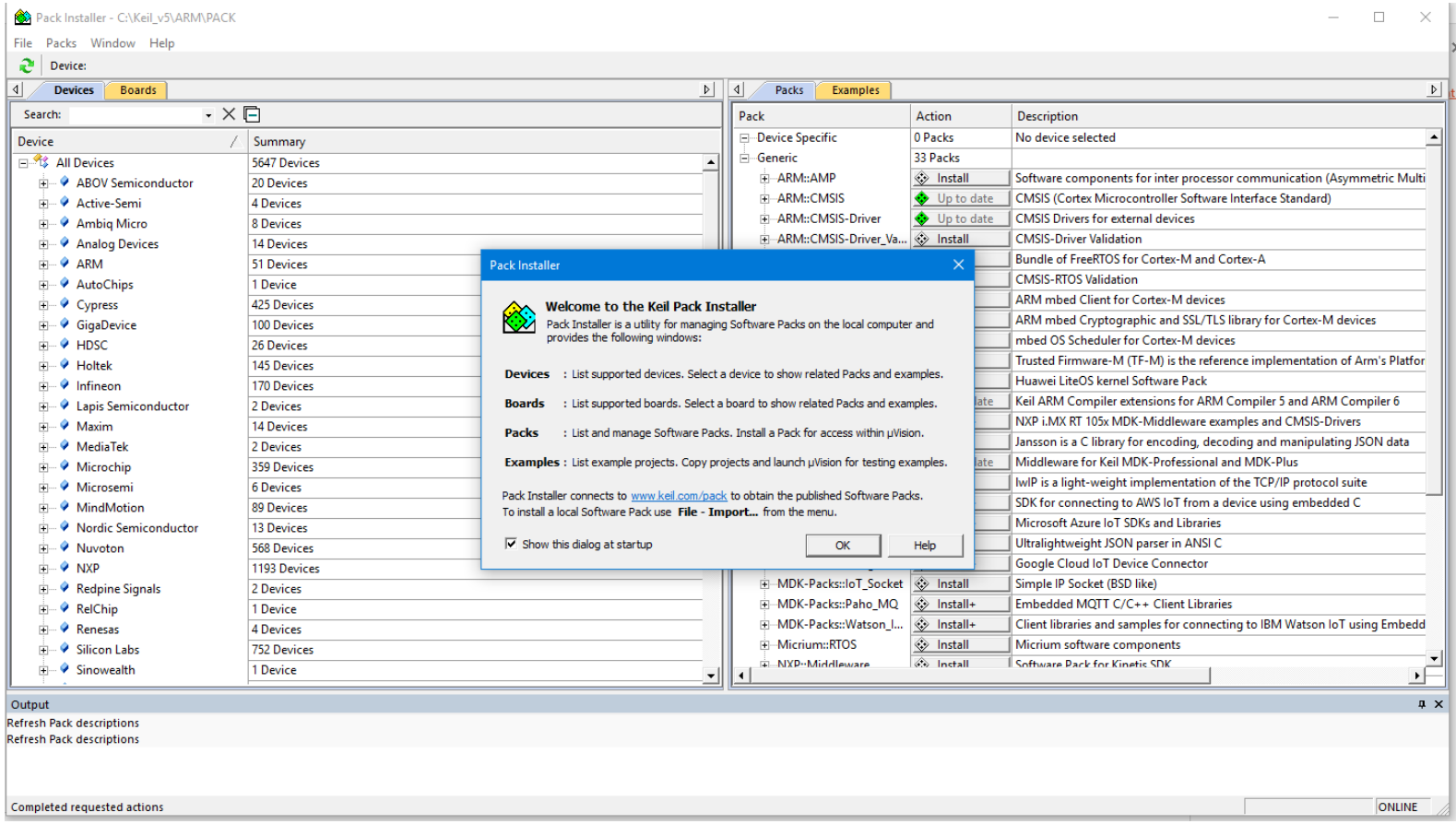
Install Keil uVision

- Click “Finish”



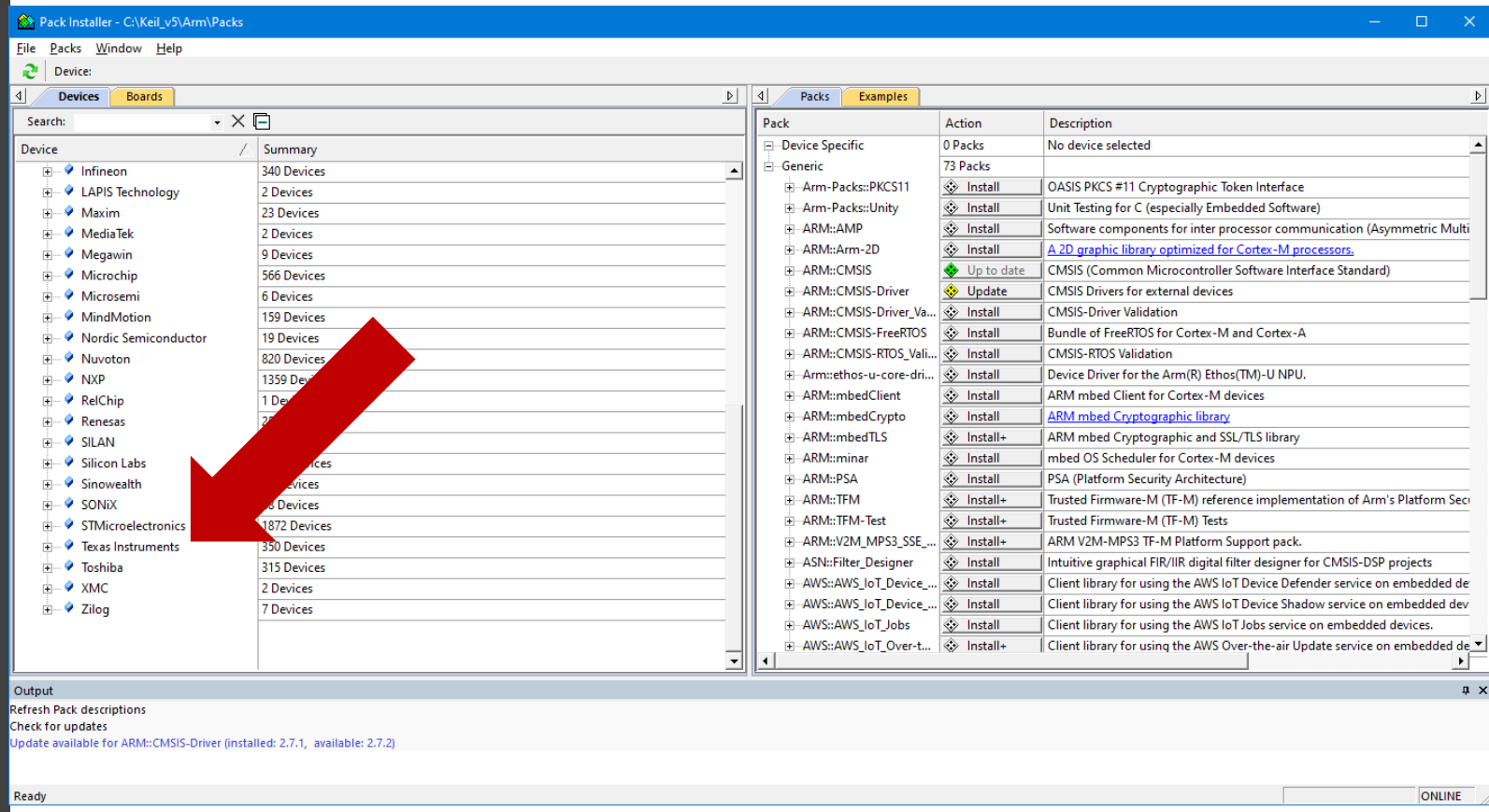
Install Keil

- Click OK



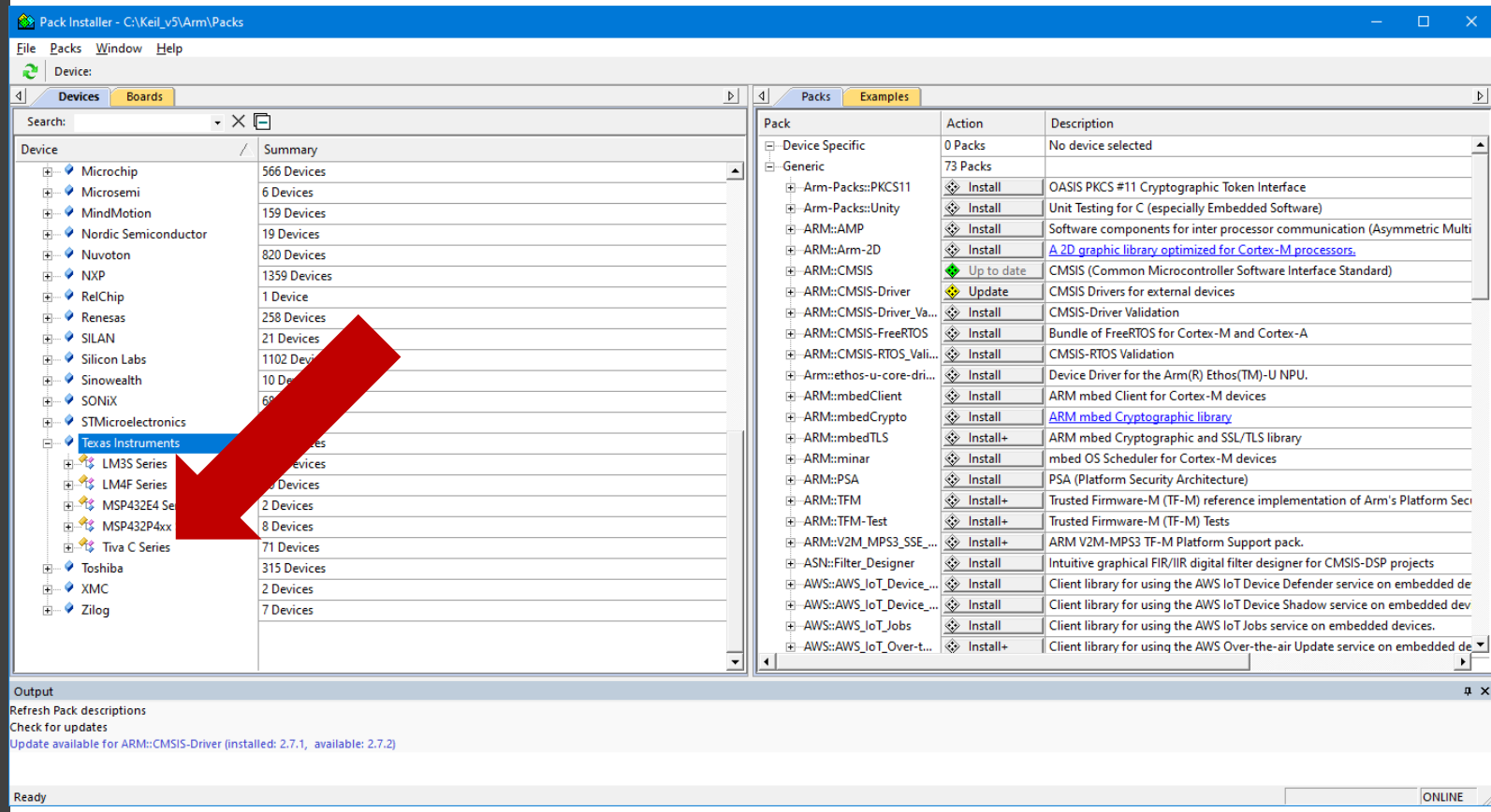
Install Keil

- Expand the Texas Instruments options



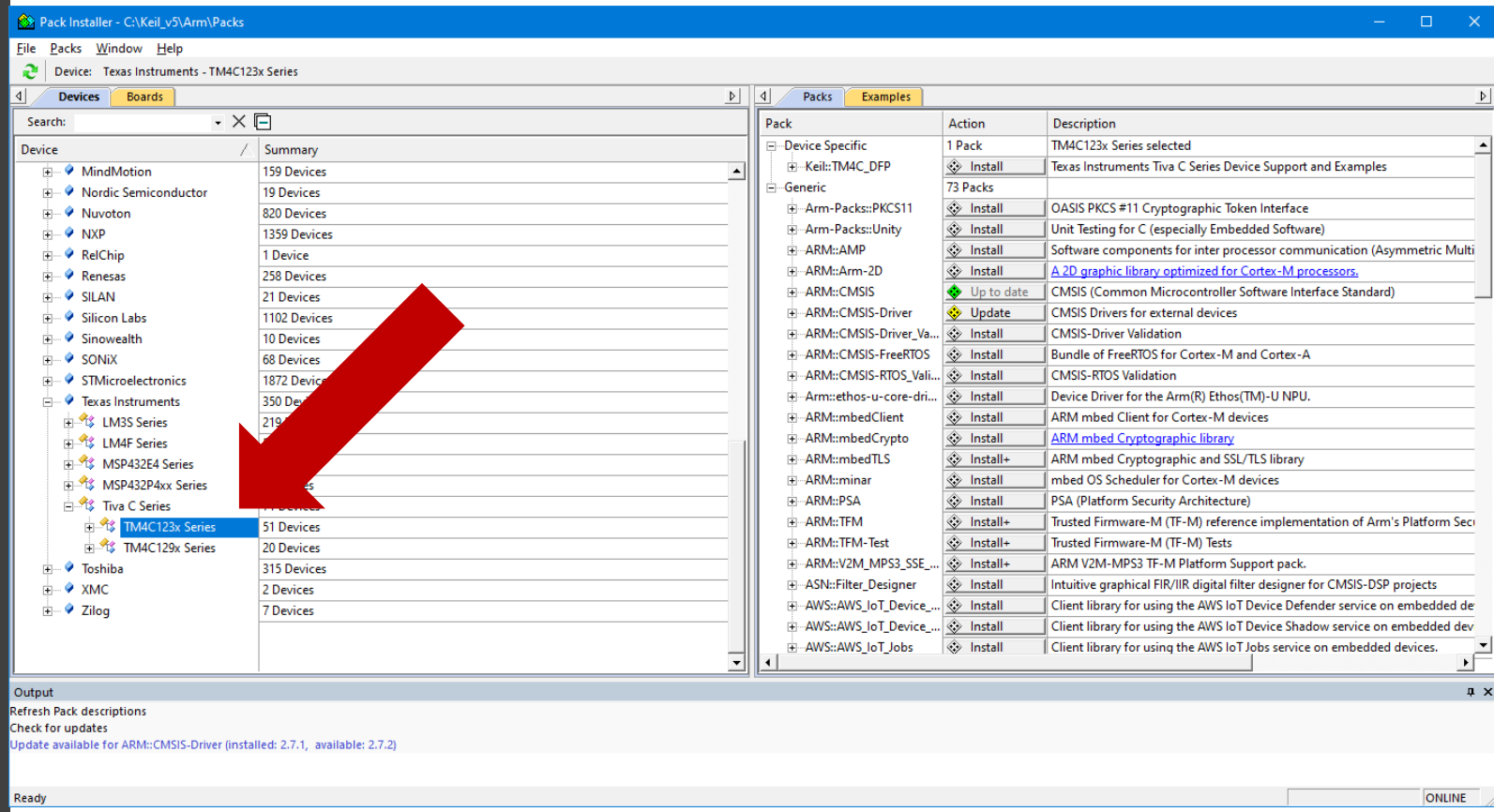
Install Keil

- Expand the Tiva C Series options



Install Keil

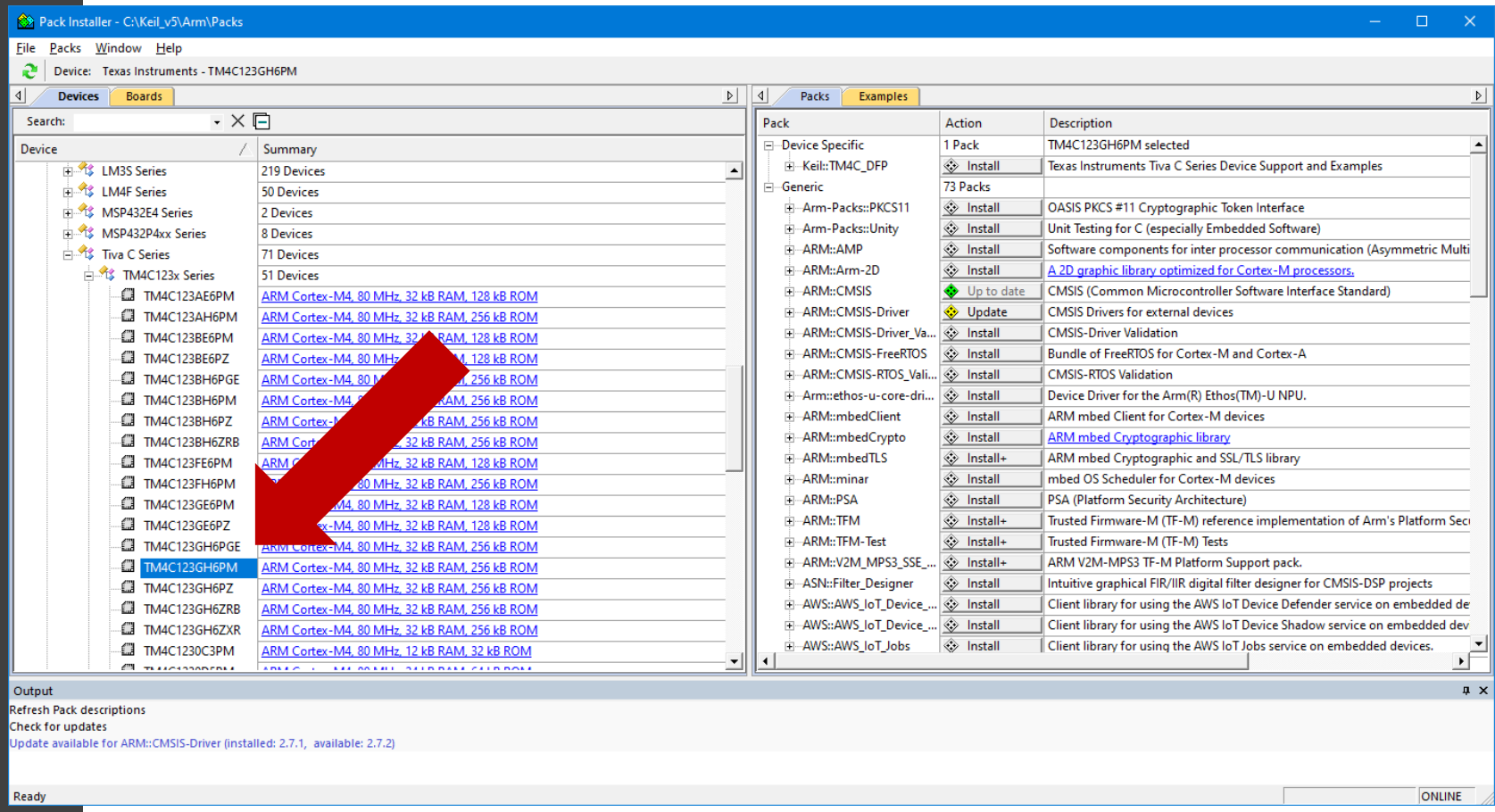
- Expand the TM4C123 options



Install Keil

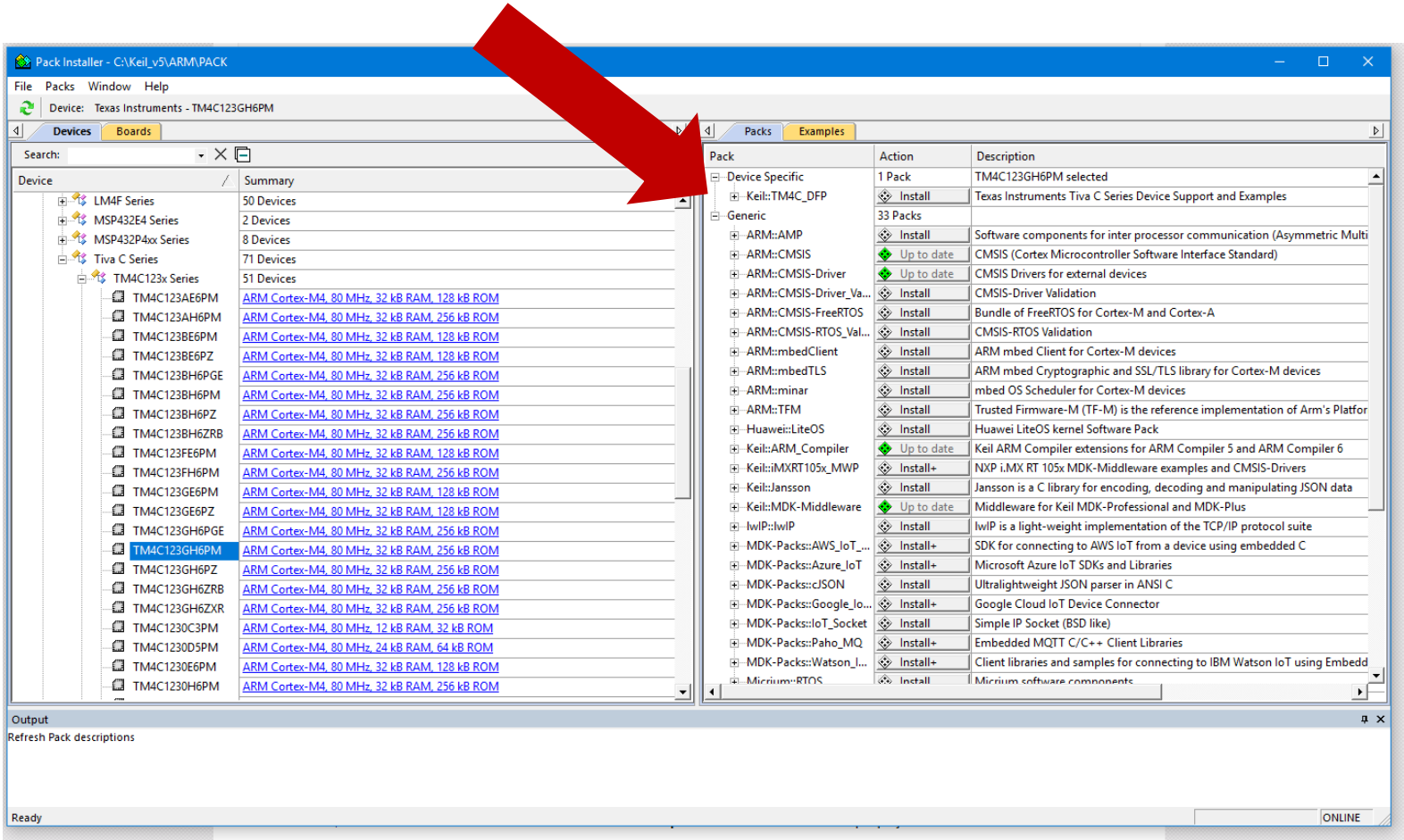
- Select the target device
  - TM4C123GH6PM
- Wait until the download finishes.

This takes a while!



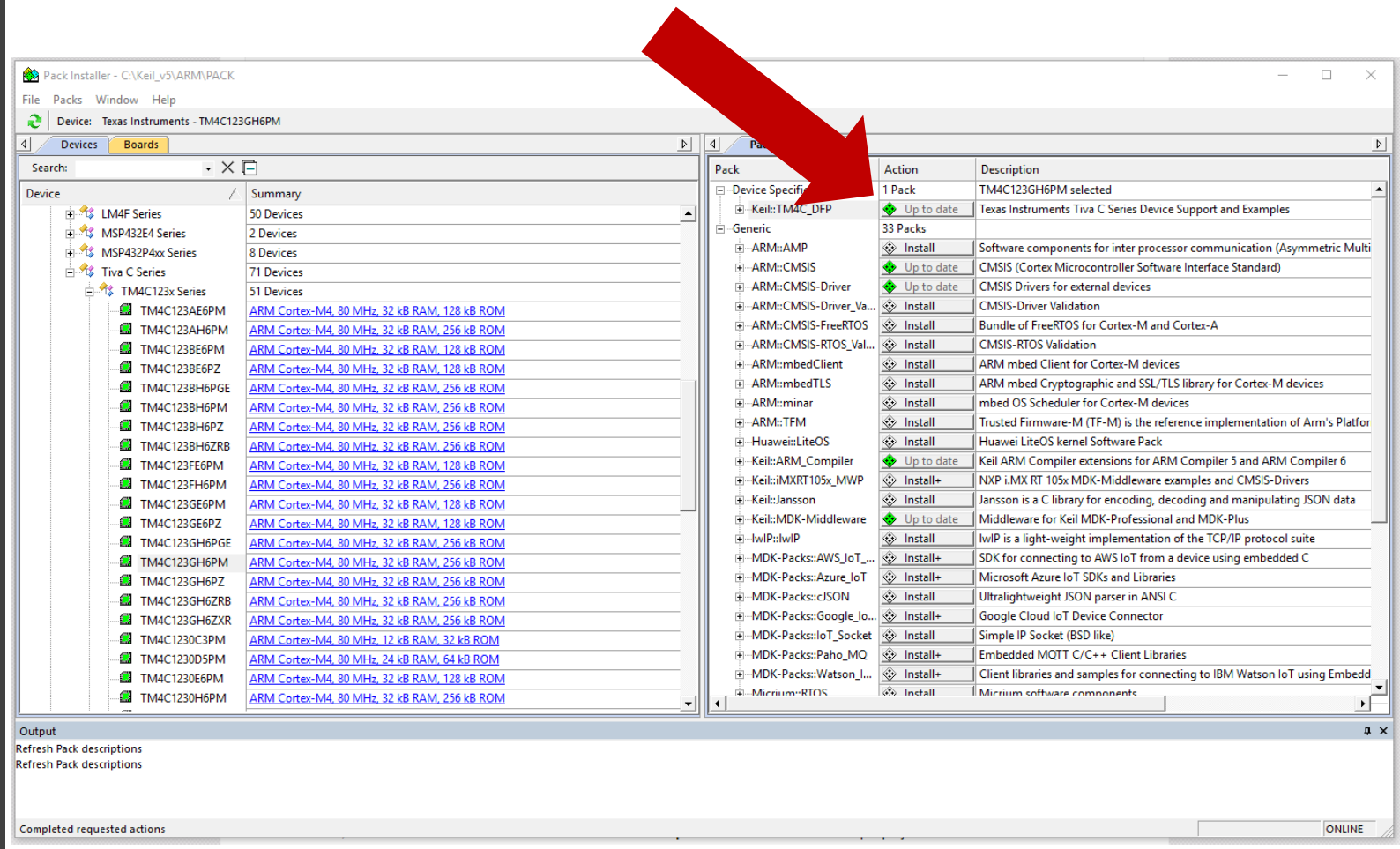
Install Keil

- Install the Device Specific pack
  - Keil::TM4C_DFP
- wait until the install completes (see the bar at the bottom)



Install Keil

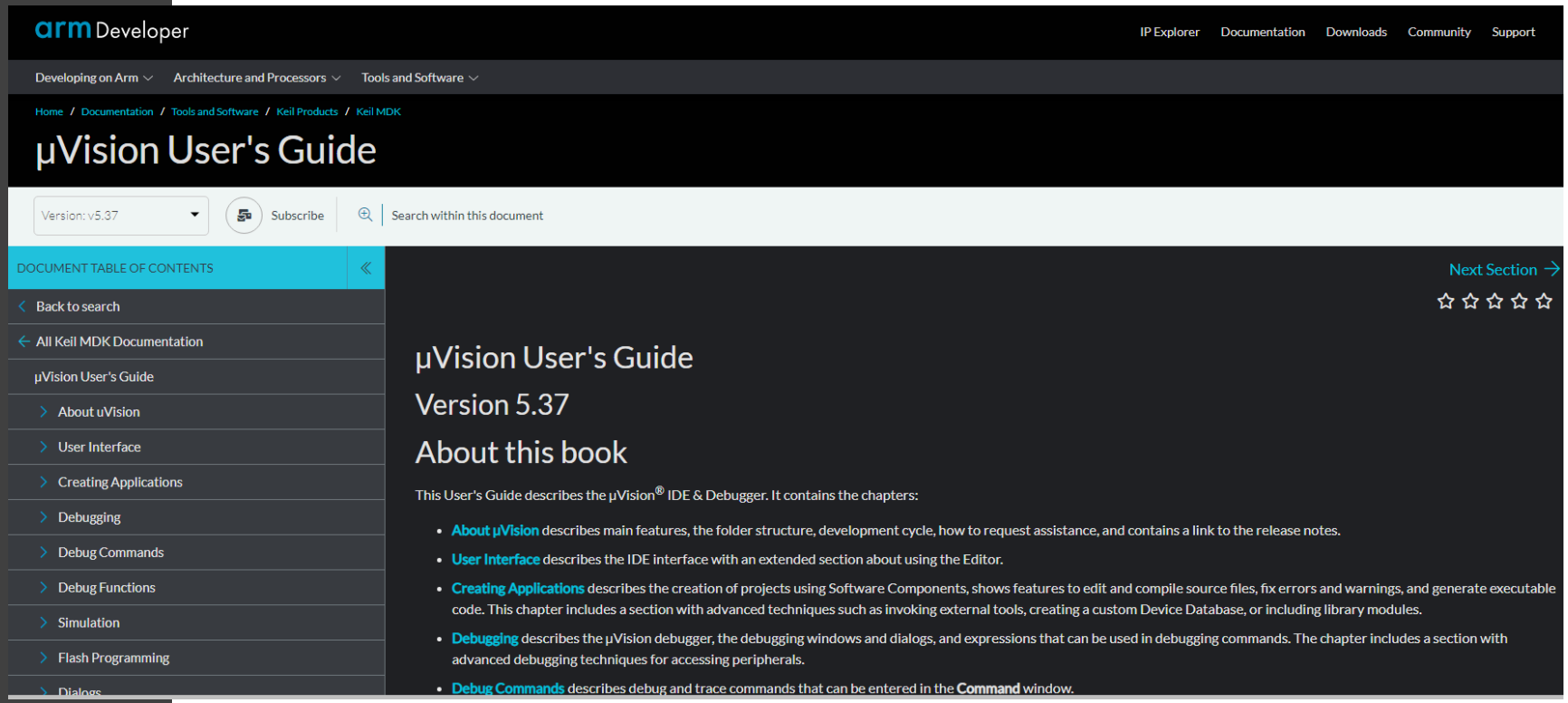
- wait until the install completes (see the bar at the bottom)
- You should see “Up to date” as in the image to the right
- You can now close this application



µVision User's Guide

- Refer to the uVision User's Guide for more information.

https://developer.arm.com/documentation/101407/latest



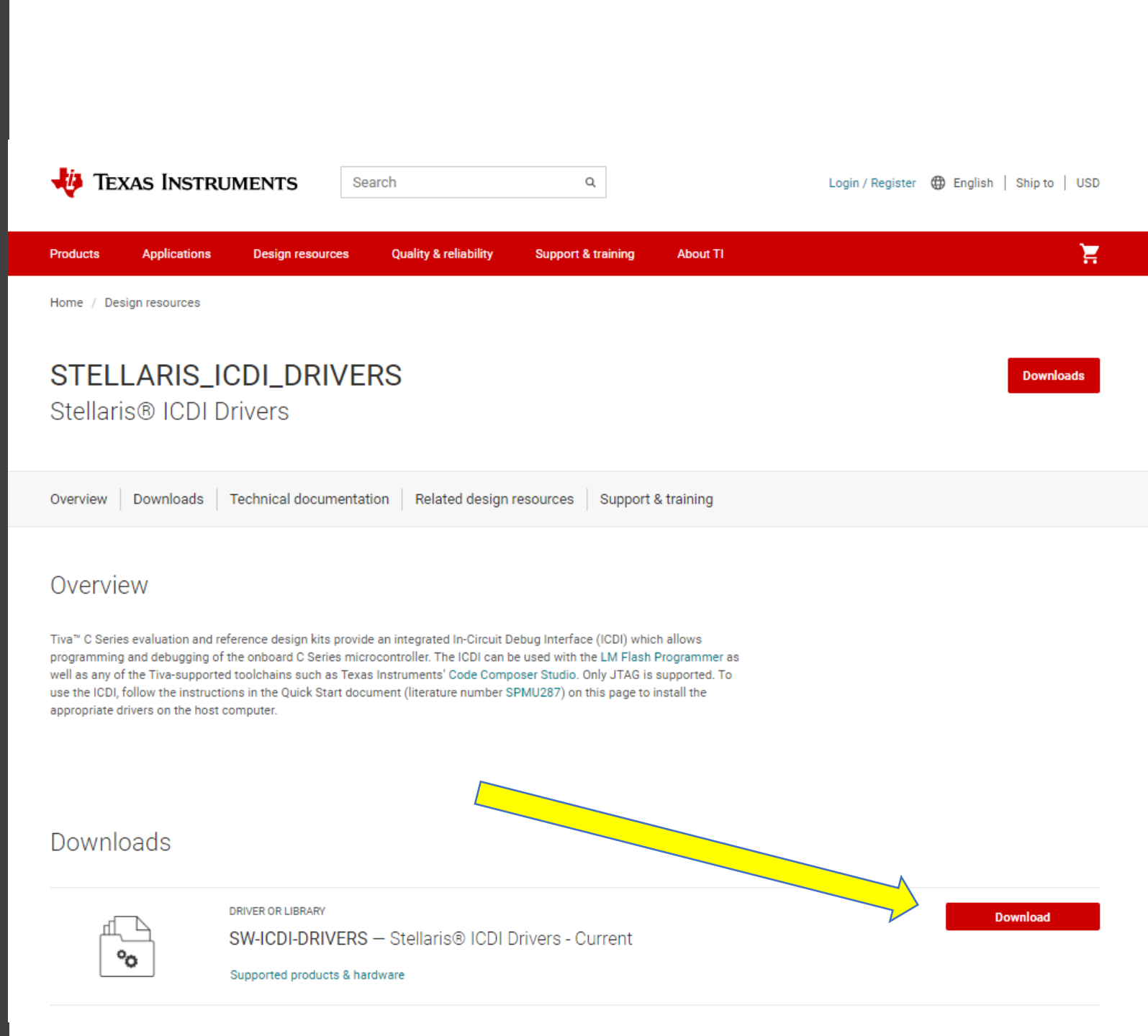
If you do not have your LaunchPad you can skip to Step 3 for now and come back to Step 2 later.

Step 2: Download & Install the TI LaunchPad drivers

- download the LaunchPad drivers
  - http://www.ti.com/tool/stellaris_icdi_drivers

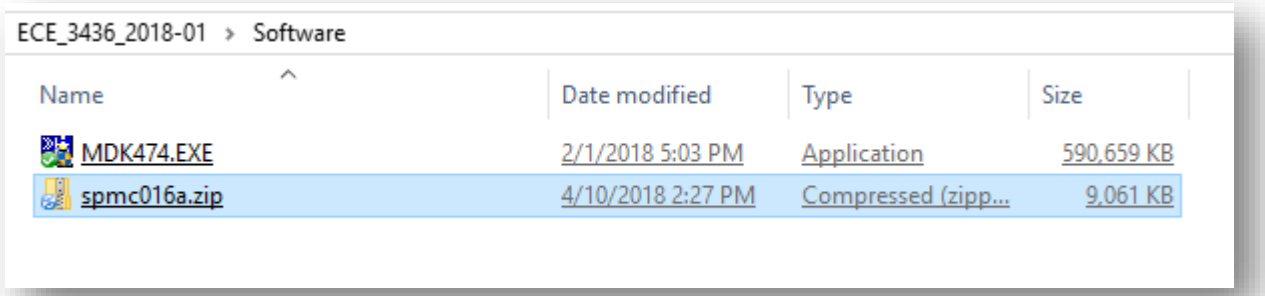
Download Stellaris ICDI Drivers

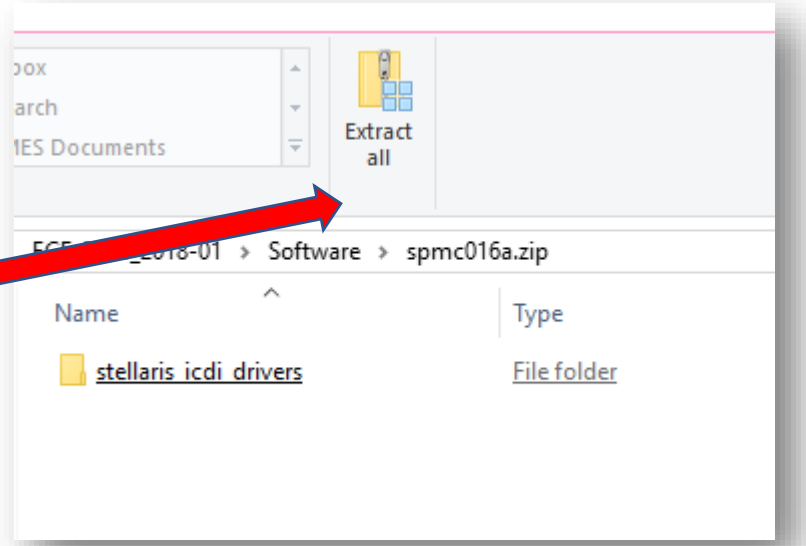
- Click on the Download button for the current drivers
- As of 8/24/22, the filename is
  - spmc016a.zip



Download Stellaris ICDI Drivers

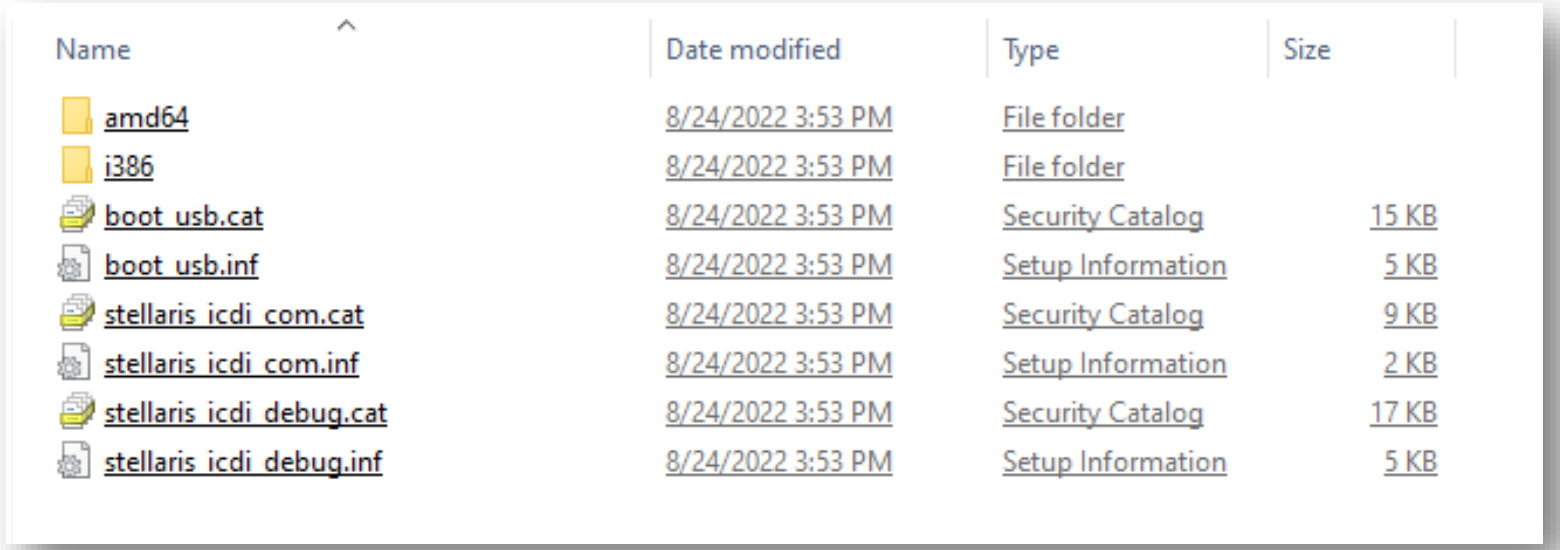
- save the zip file to your course software folder (remember where you put this!)
- click on the zip folder
- extract all files
- optional: delete the zip folder and just leave the extracted folder





Download Stellaris ICDI Drivers

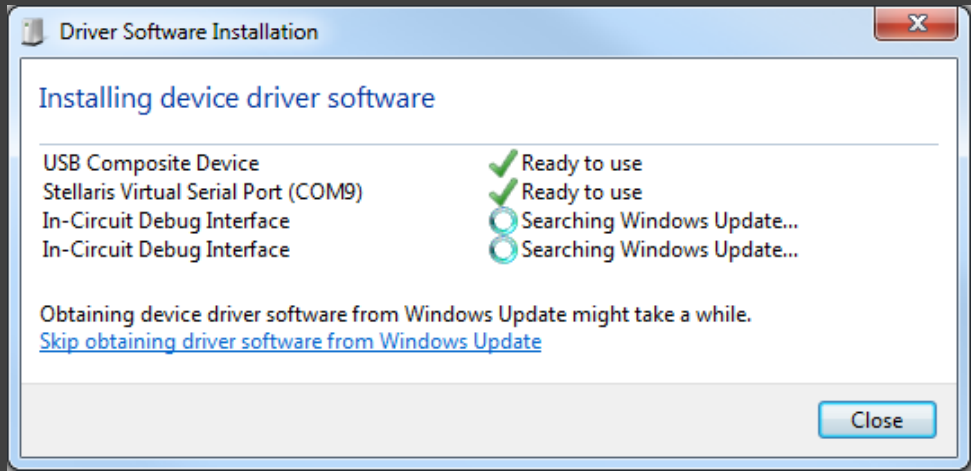
- Your driver folder should look like what you see on the right.

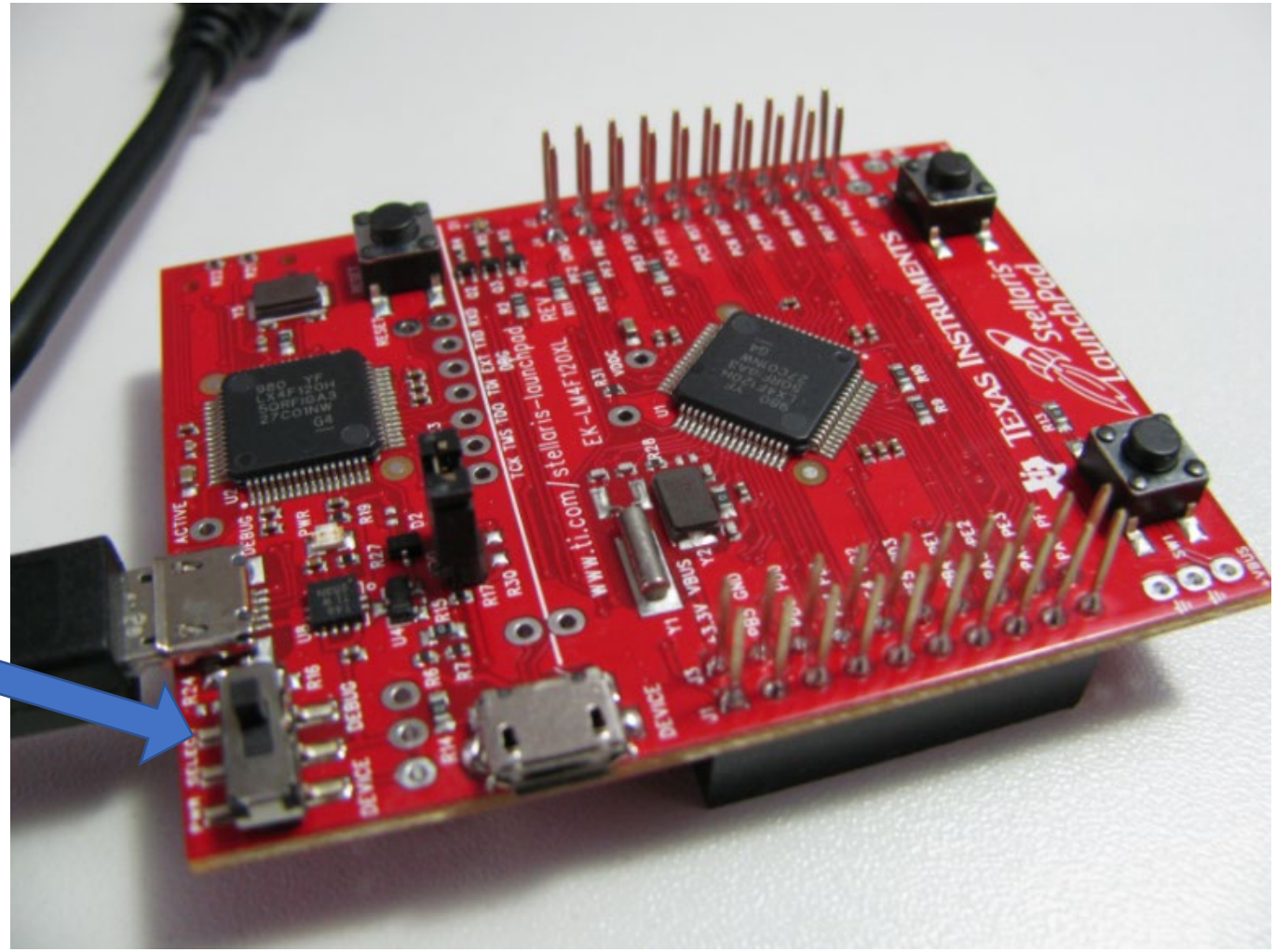


Name	Date modified	Type	Size
amd64	8/24/2022 3:53 PM	File folder	
i386	8/24/2022 3:53 PM	File folder	
boot_usb.cat	8/24/2022 3:53 PM	Security Catalog	15 KB
boot_usb.inf	8/24/2022 3:53 PM	Setup Information	5 KB
stellaris_icdi_com.cat	8/24/2022 3:53 PM	Security Catalog	9 KB
stellaris_icdi_com.inf	8/24/2022 3:53 PM	Setup Information	2 KB
stellaris_icdi_debug.cat	8/24/2022 3:53 PM	Security Catalog	17 KB
stellaris_icdi_debug.inf	8/24/2022 3:53 PM	Setup Information	5 KB

Install Stellaris ICDI Drivers

- Plug USB cable into the LaunchPad Debug USB port
- Plug other end of USB cable into your computer
- Switch on power on LaunchPad

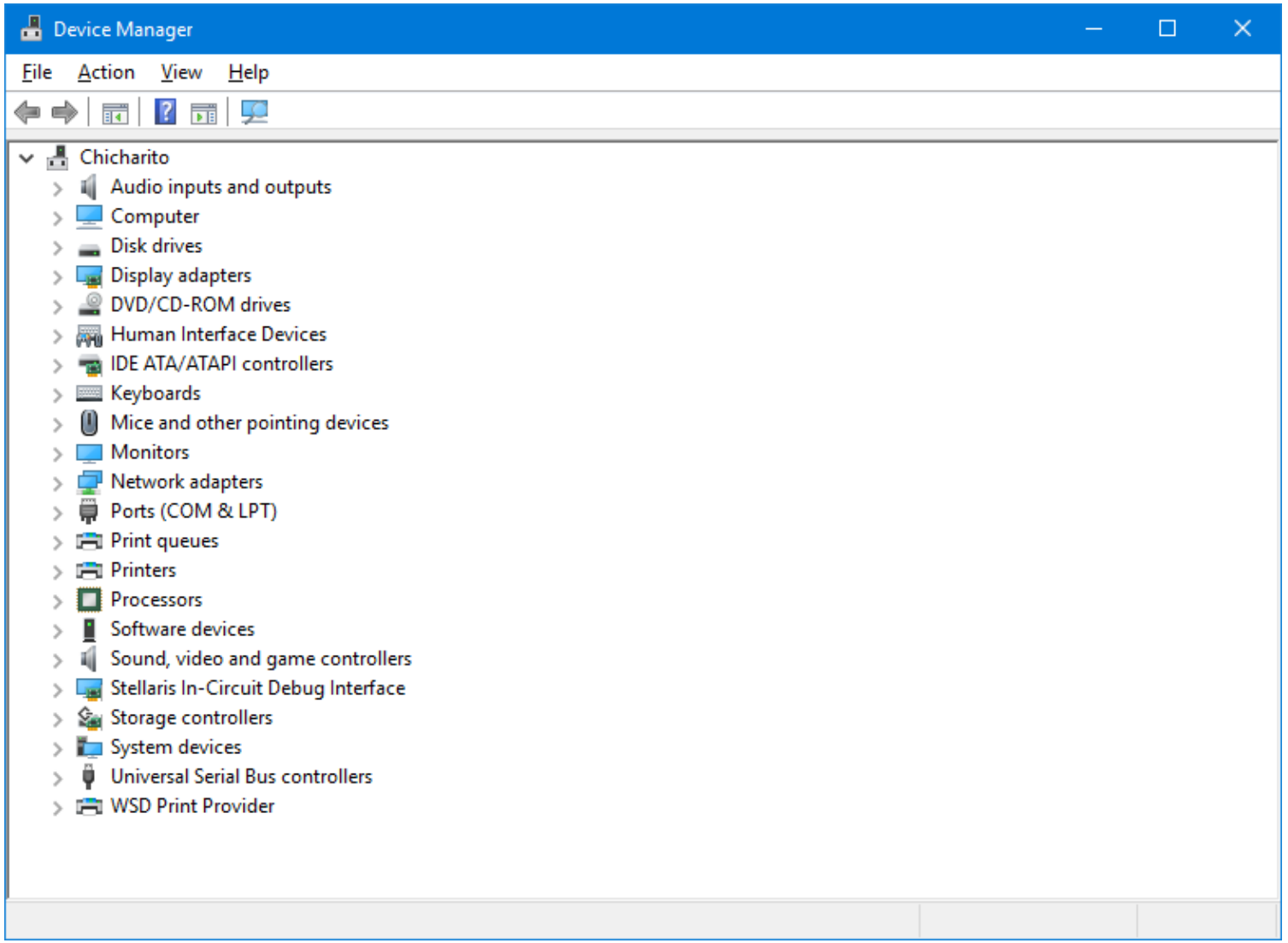




https://www.jann.cc/2012/12/11/getting_started_with_the_ti_stellaris_launchpad_on_linux.html

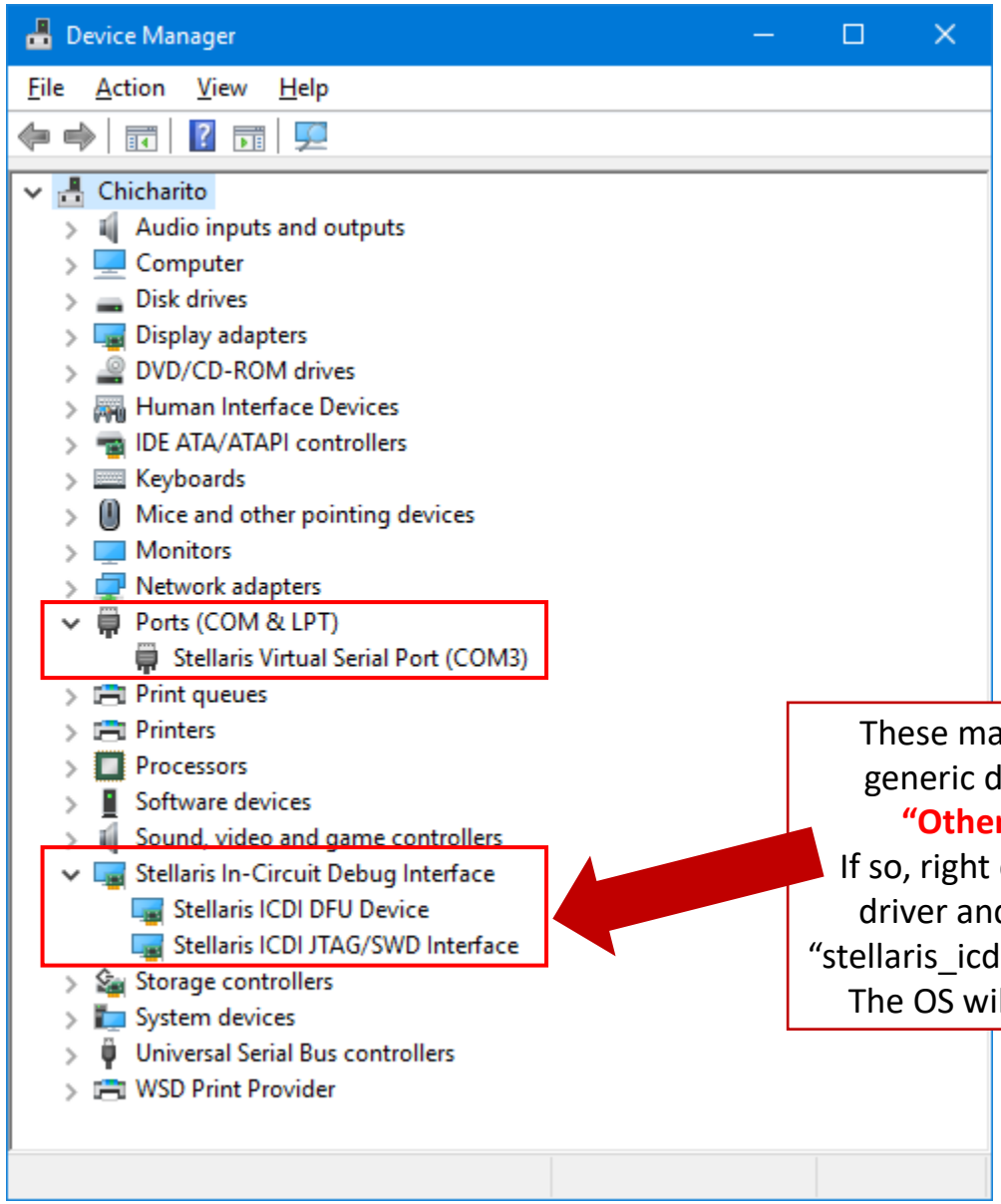
Install Stellaris ICDI Drivers

- Open your Device Manager



Install Stellaris ICDI Drivers

- expand the Ports tab
- update the drivers *(need administrator rights)*
  - right click on “Stellaris ICDI DFU Device”
  - select Update driver
  - browse for drivers on your computer
  - you will need to navigate to the folder where you stored the Stellaris drivers (see later slide)

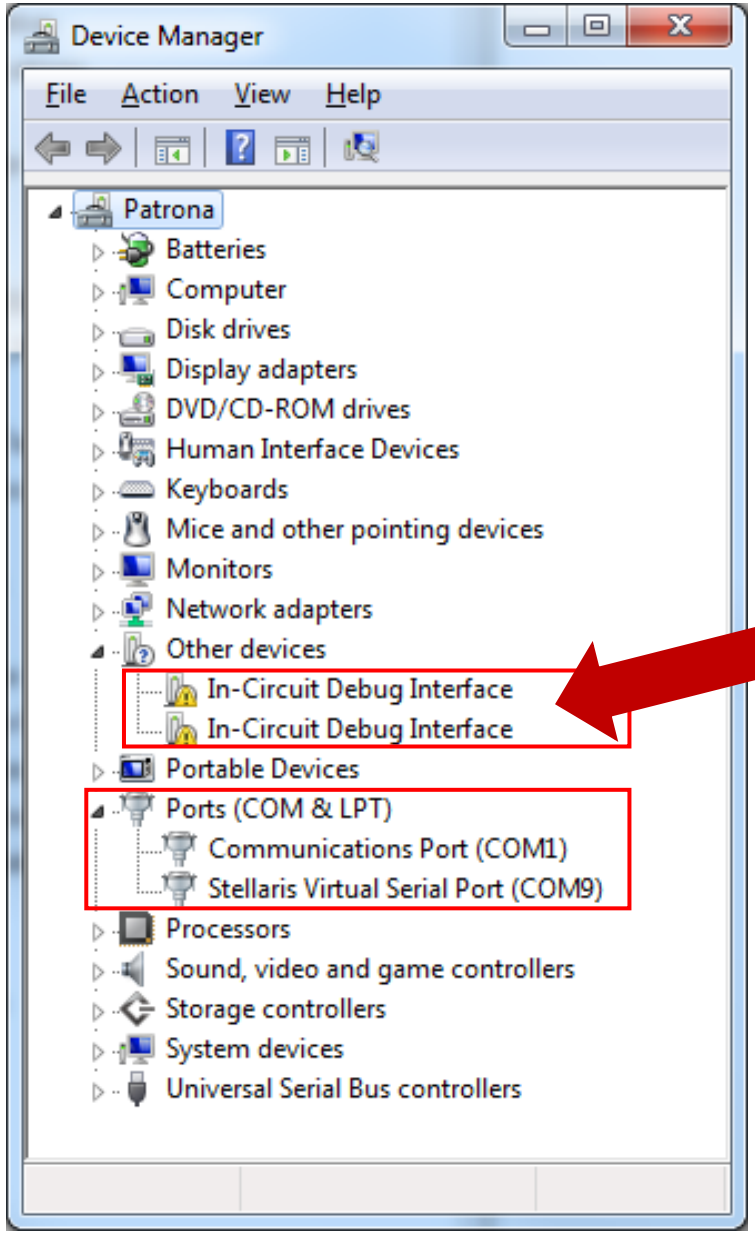


These may be listed as generic devices under **“Other Devices.”** If so, right click to update driver and point to the “stellaris_icdi_drivers” folder. The OS will figure it out.

Install Stellaris ICDI Drivers: "Other Devices" case

- expand the Ports tab
- right click the yellow triangles (indicating missing drivers)
- update the drivers *(need administrator rights)*
  - you will need to navigate to the folder where you stored the Stellaris drivers
- the yellow triangles should disappear (as shown)

Case when device shows up as "Other Devices"

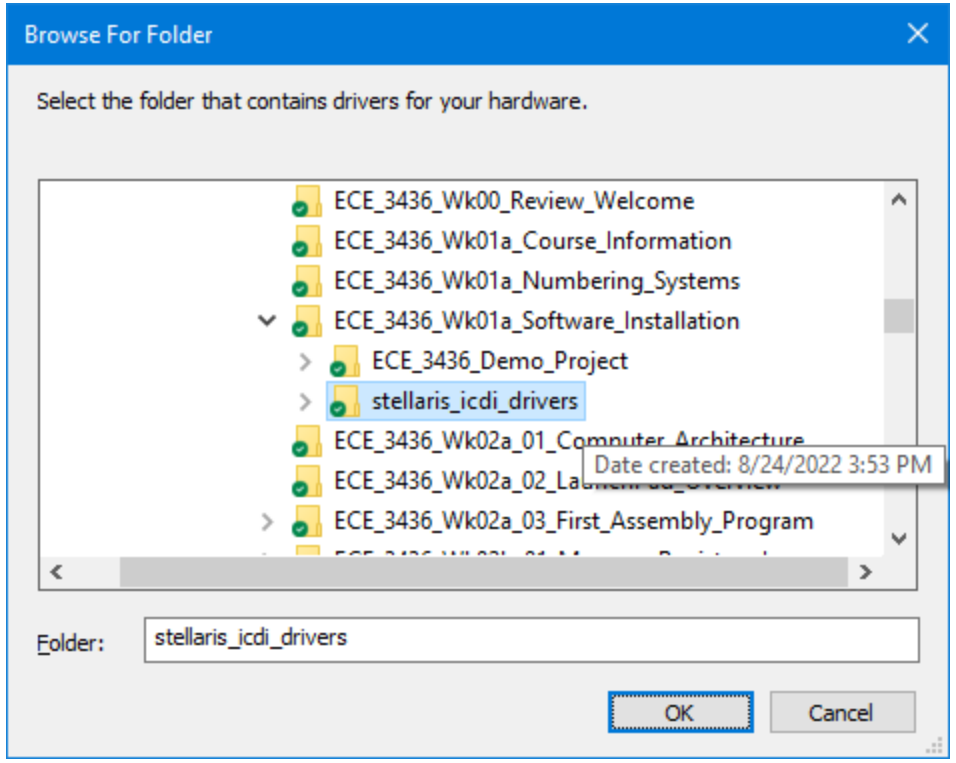


These may be listed as generic devices under "Other Devices."
If so, right click to update driver and point to the "stellaris_icdi_drivers" folder. The OS will figure it out.

You need administrator rights.

Install Stellaris ICDI Drivers

- select the folder where your drivers are located
- Click OK
- Click Next

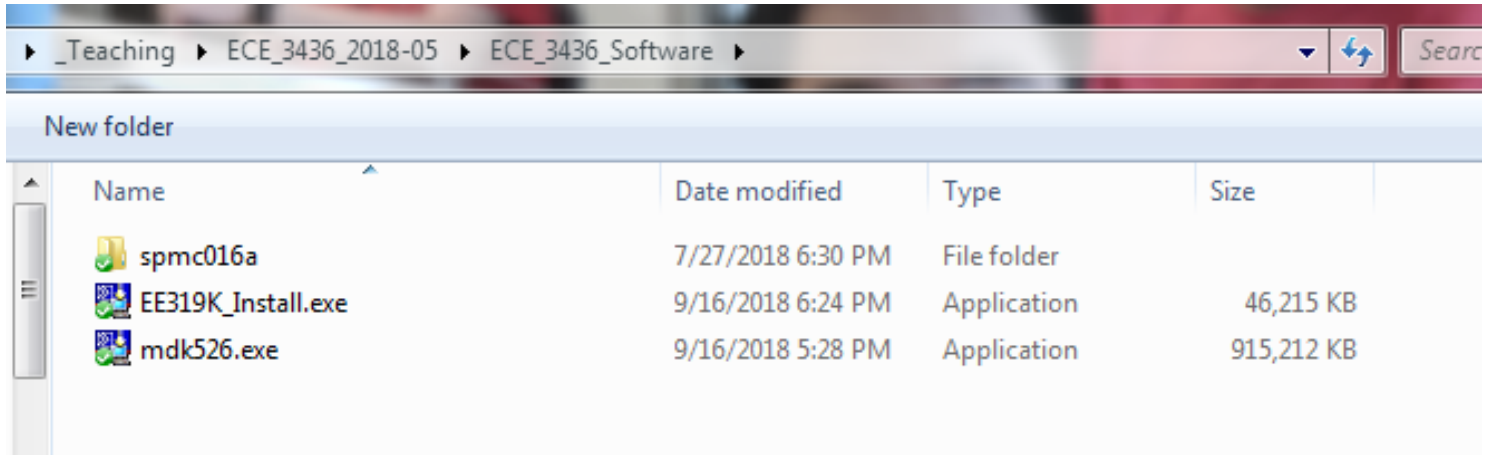


Step 3: Download & Install the UT EE319K Software

- http://users.ece.utexas.edu/~valvano/Volume1/EE319K_Install.exe
- If the link does not work, get file from **Teams**

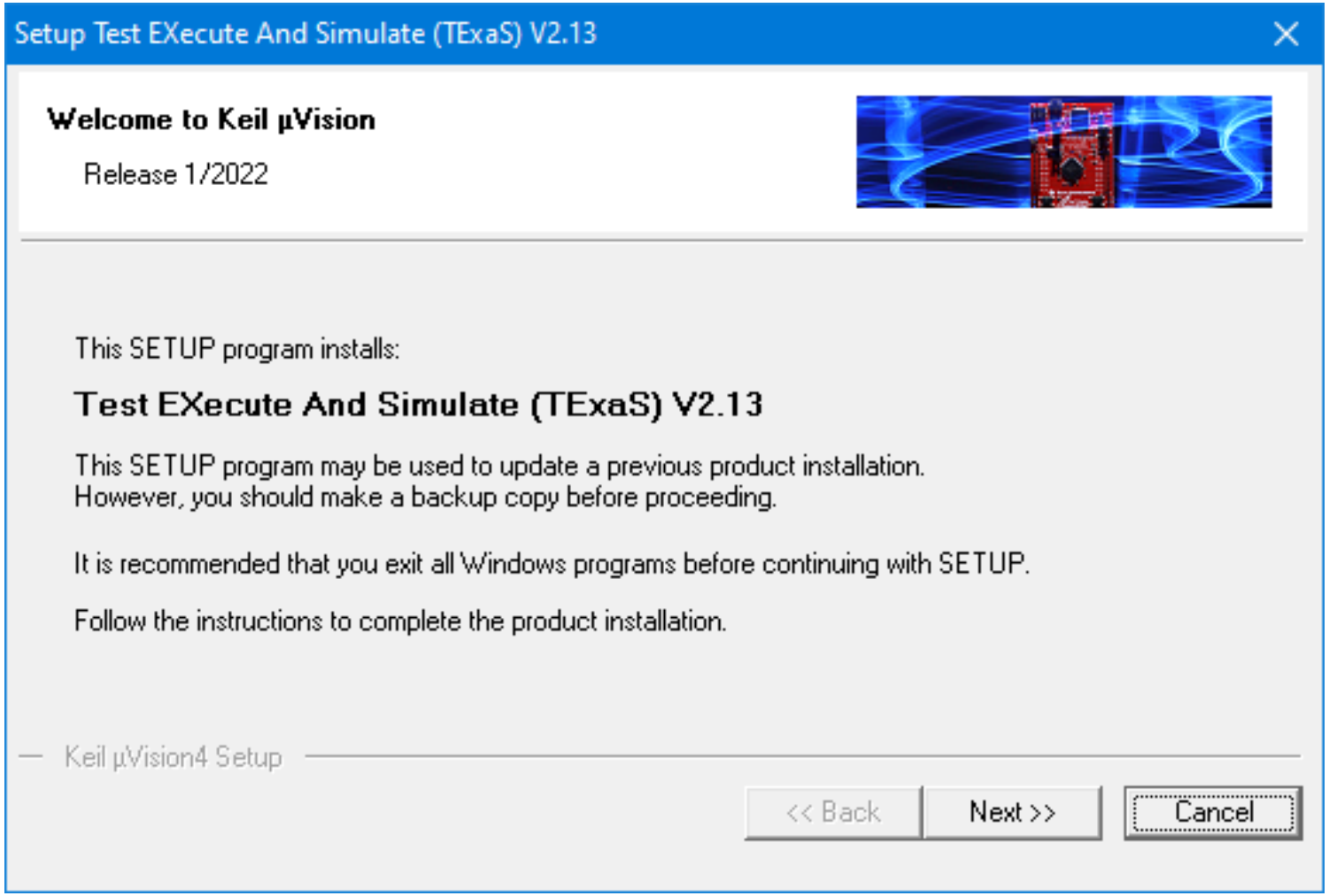
UT EE319K Software

- save the starter configuration executable with your course software



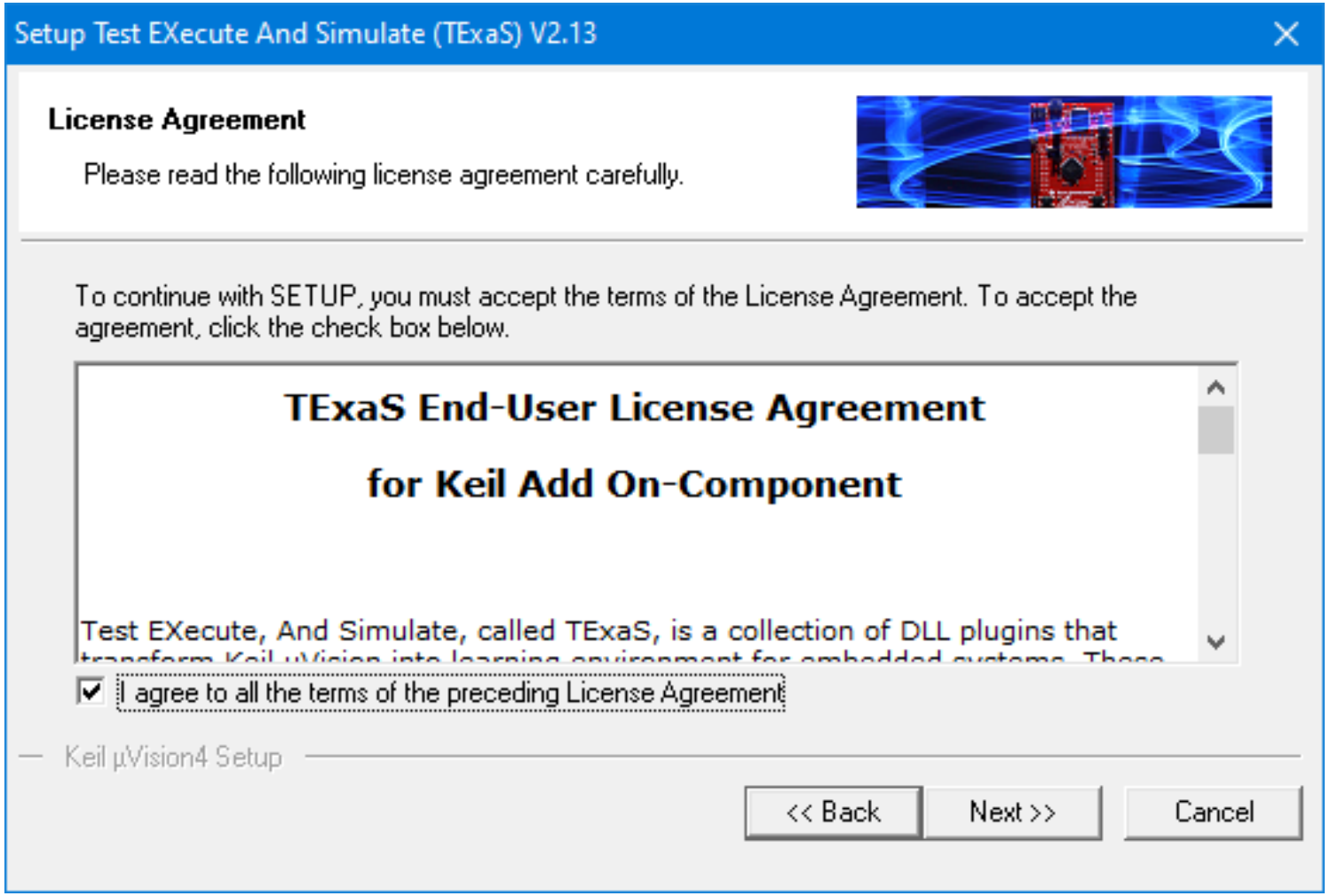
UT EE319K Software

- run the EE319K executable
- be sure it’s V2.13
- click Next



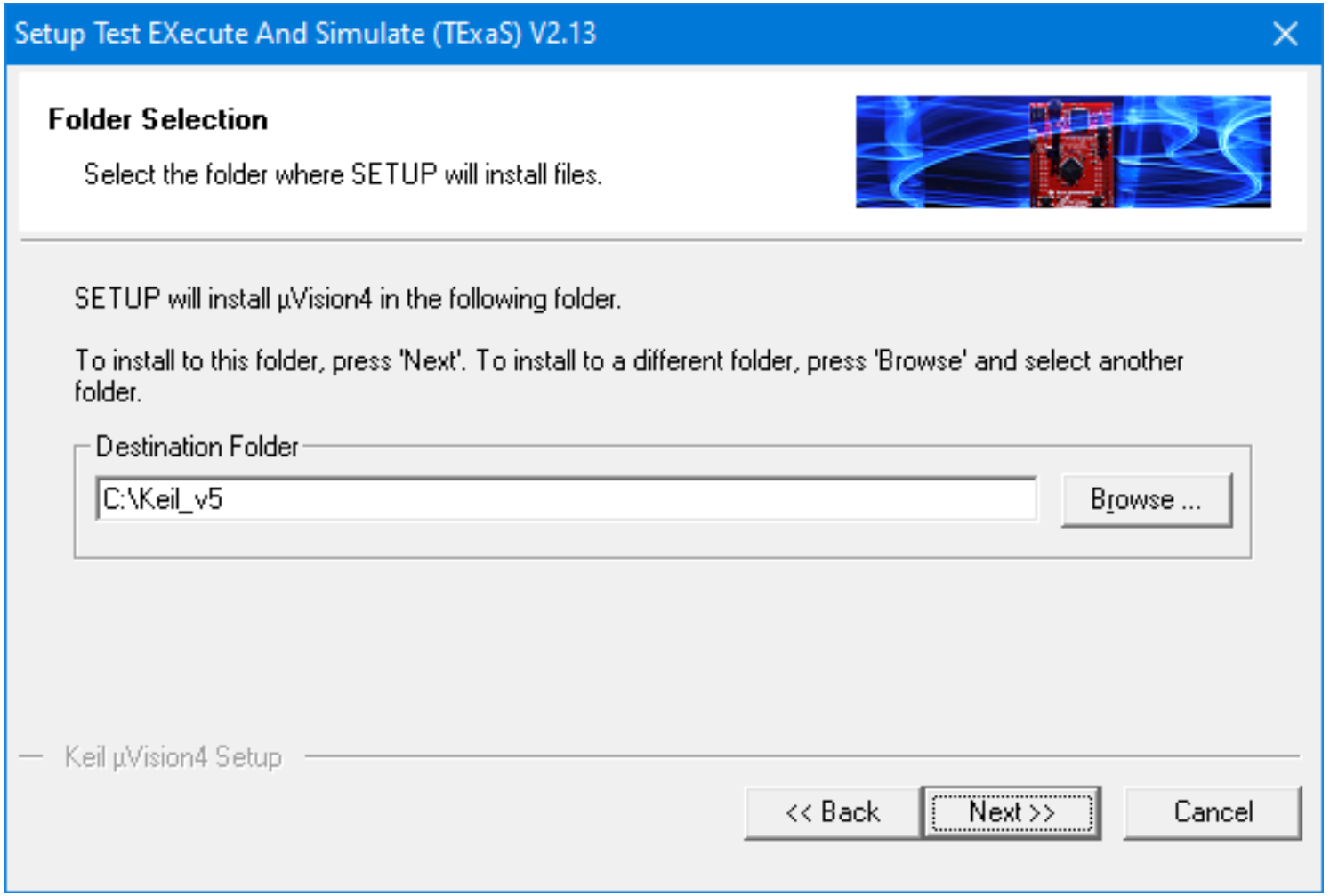
UT EE319K Software

- read and click if you agree to the license agreement



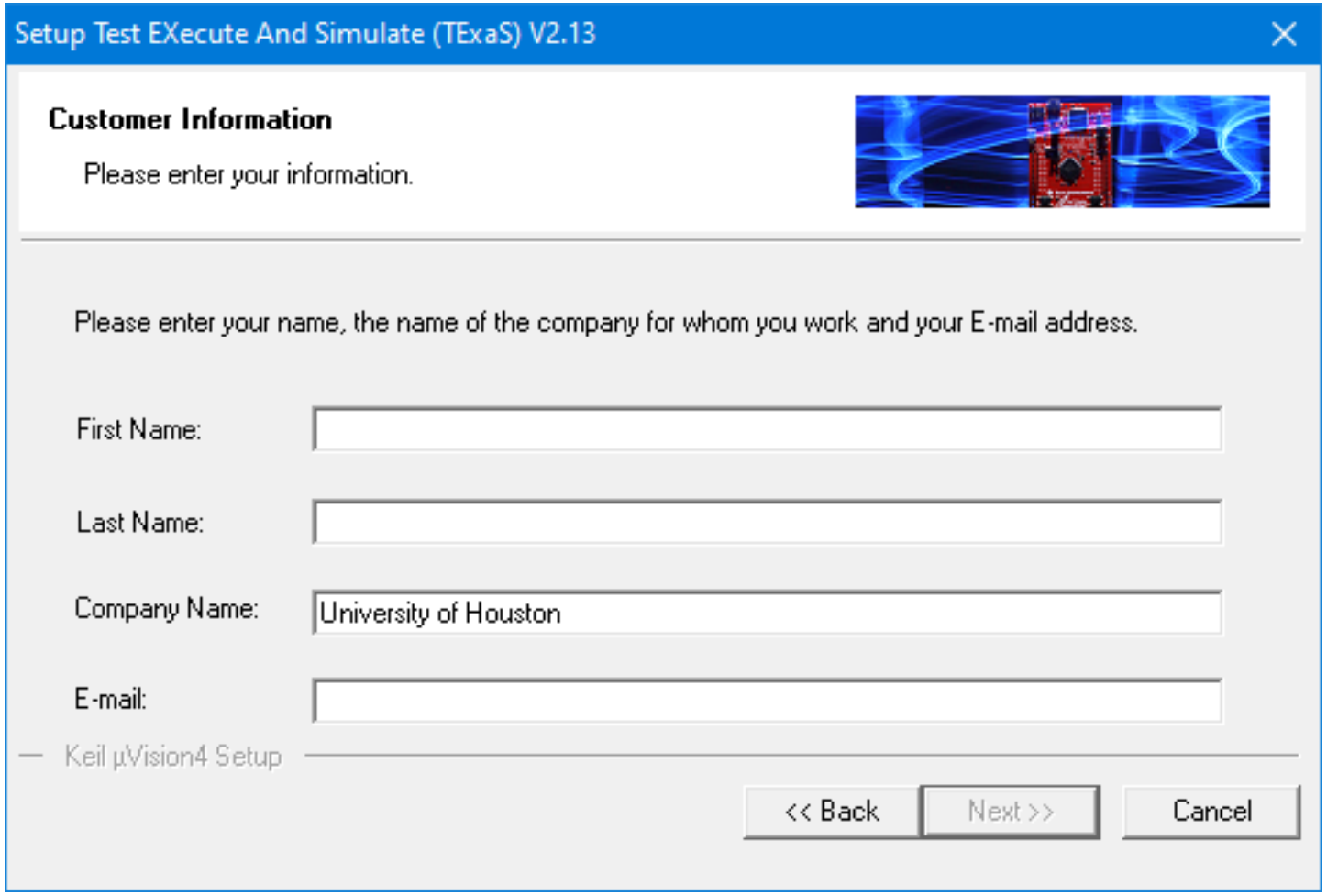
UT EE319K Software

- set up in your Keil folder
- click Next



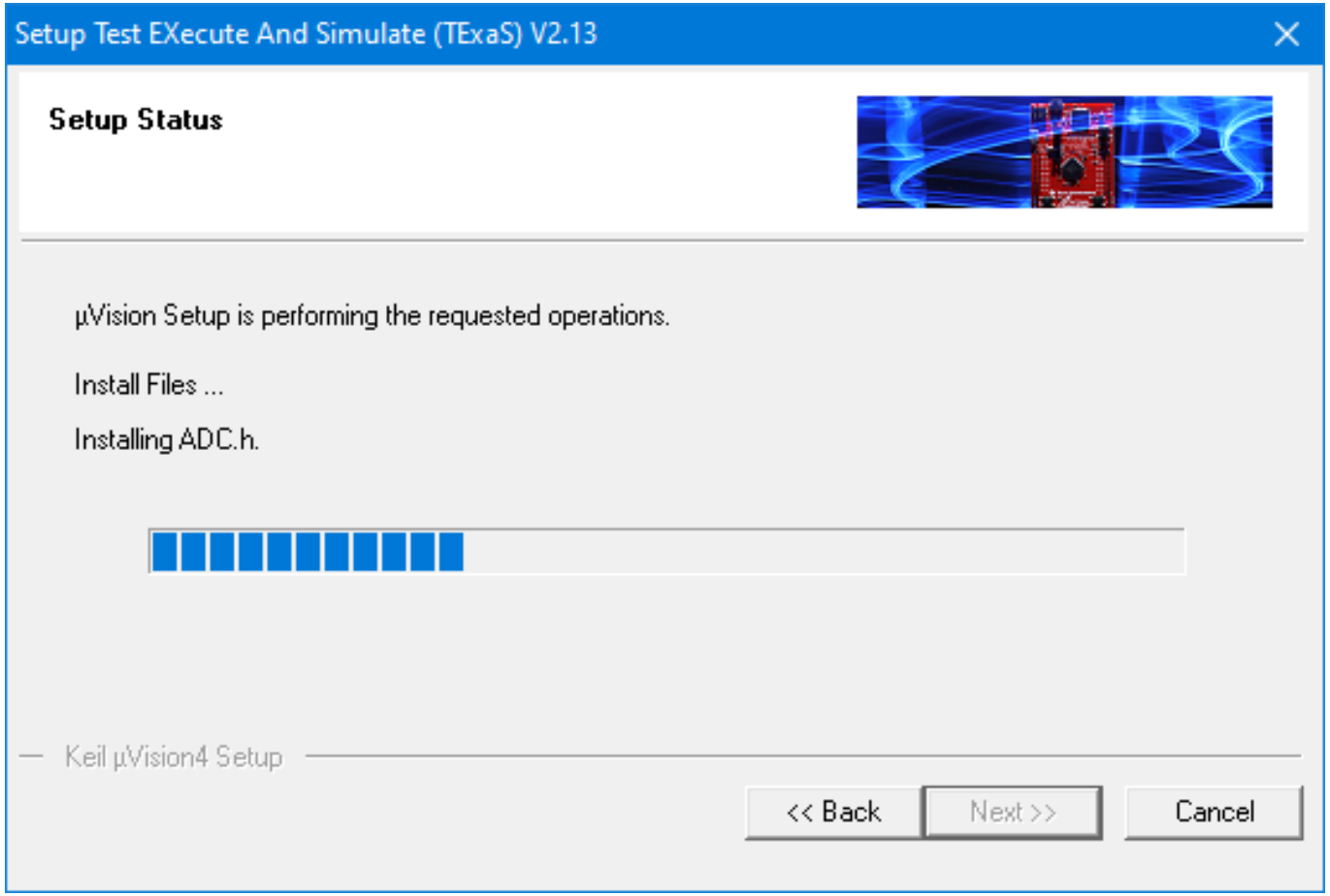
UT EE319K Software

- enter your information
- click Next



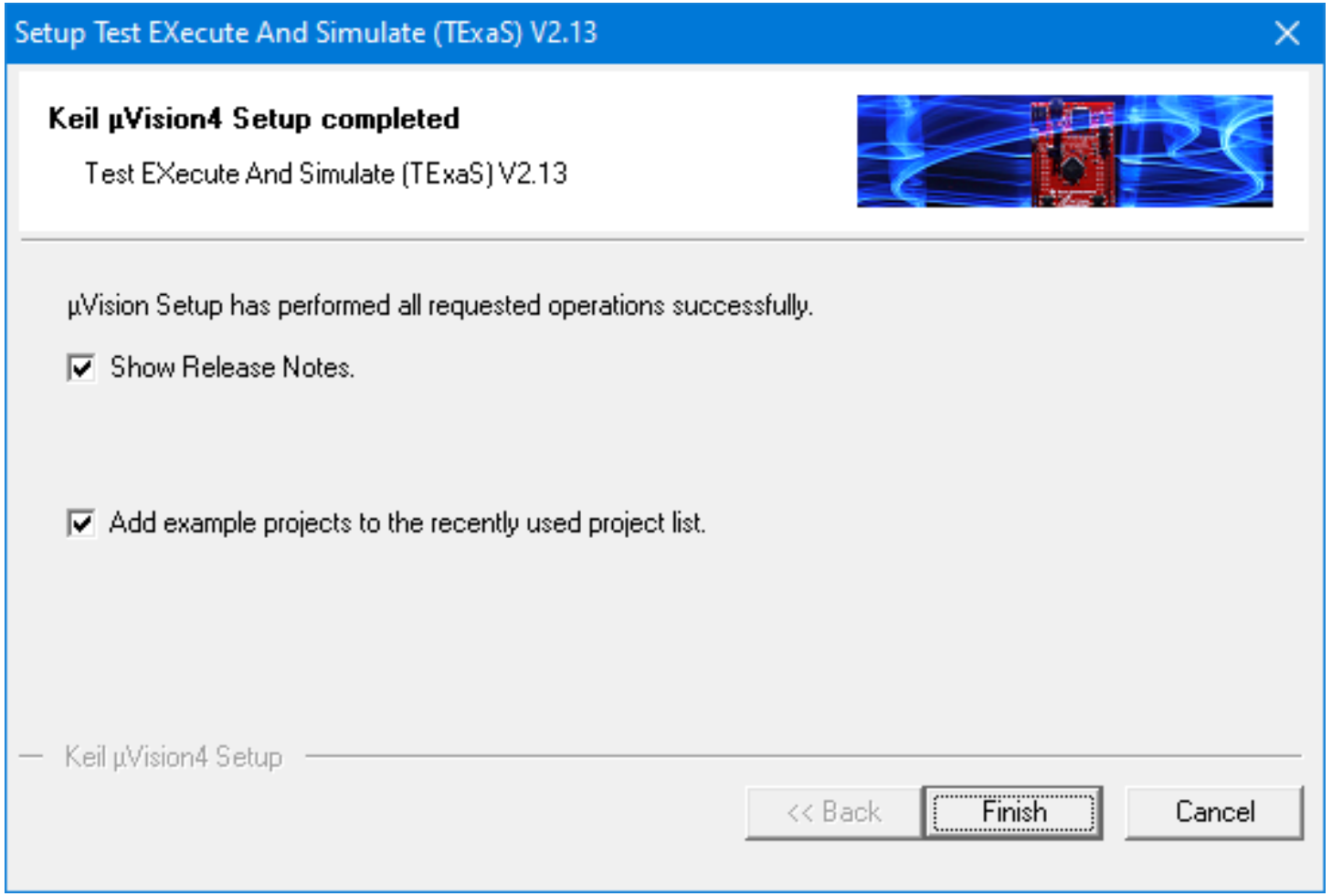
UT EE319K Software

- wait for files to install



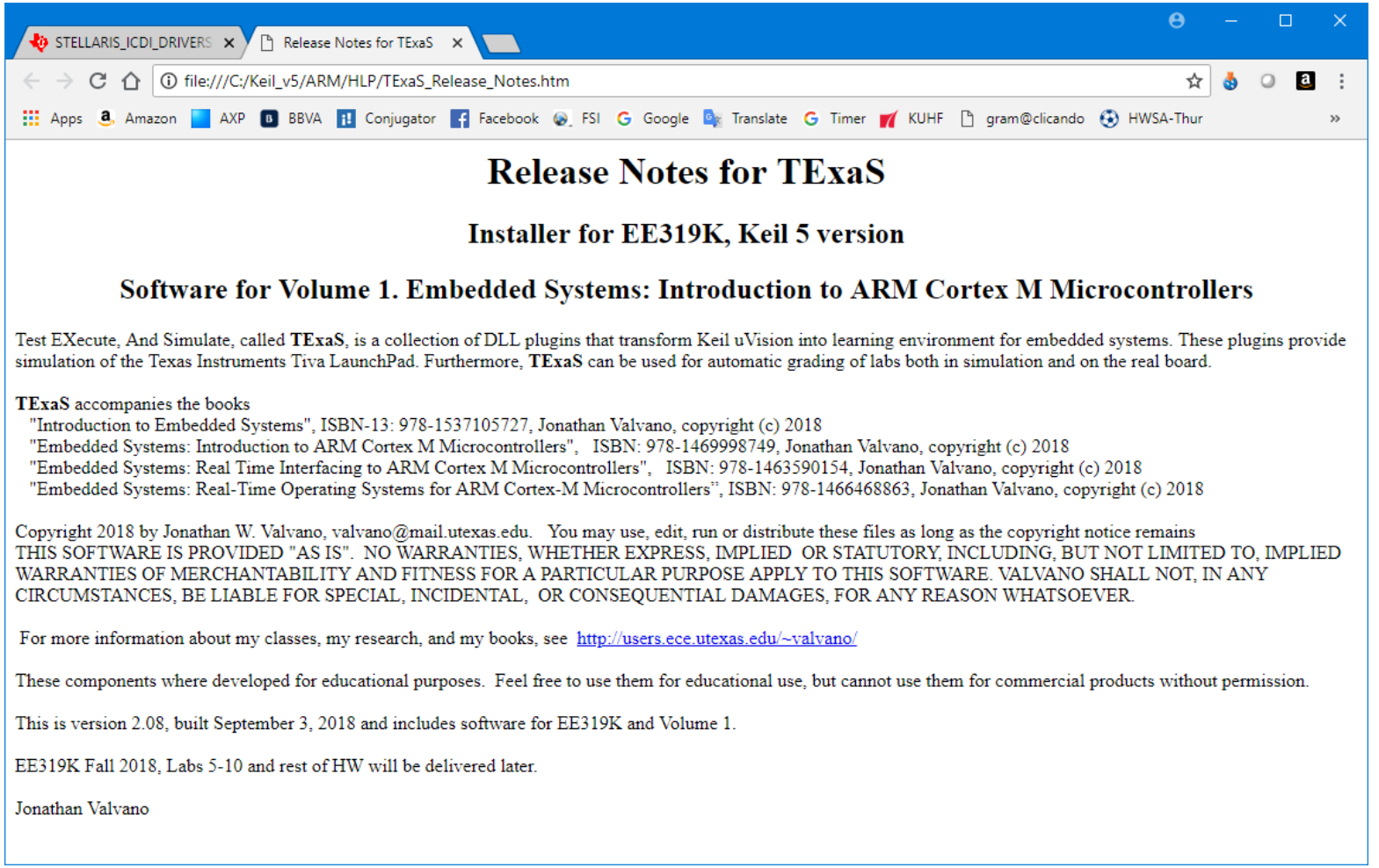
UT EE319K Software

- the setup should only take a few seconds
- then you should see this dialog box
- leave both boxes checked
- click Finish



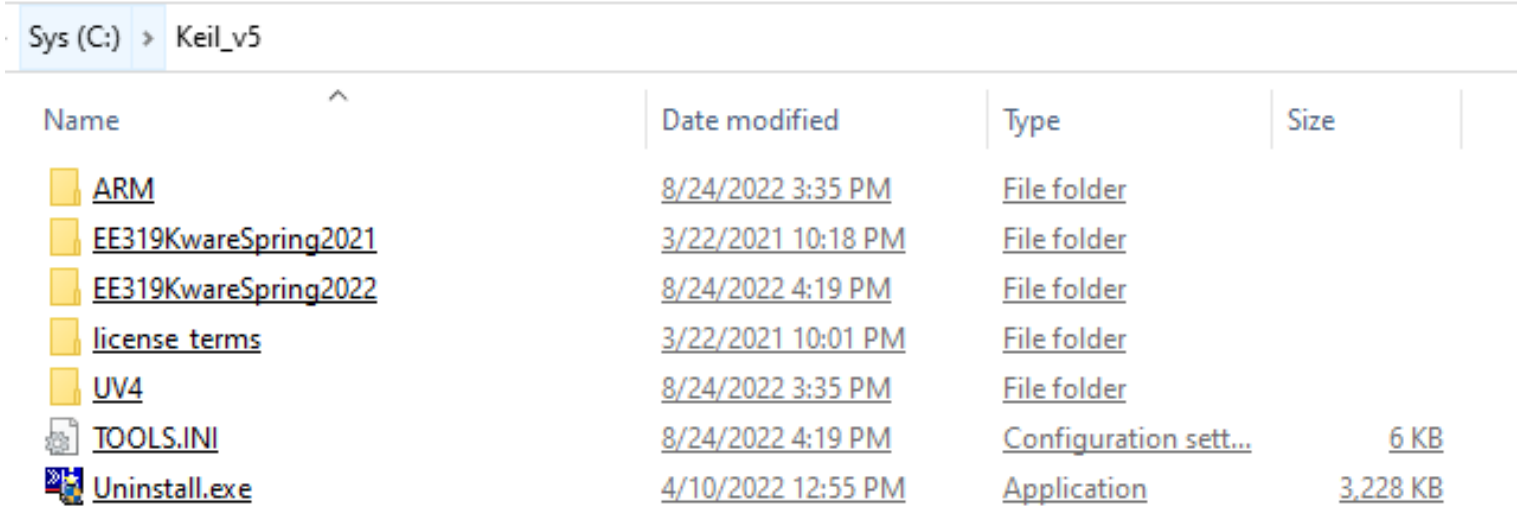
UT EE319K Software

- you will be redirected to the release notes for TExaS



UT EE319K Software

- your Keil folder should look similar to this now
- Of course, the year(s) will change depending on when you take the course.

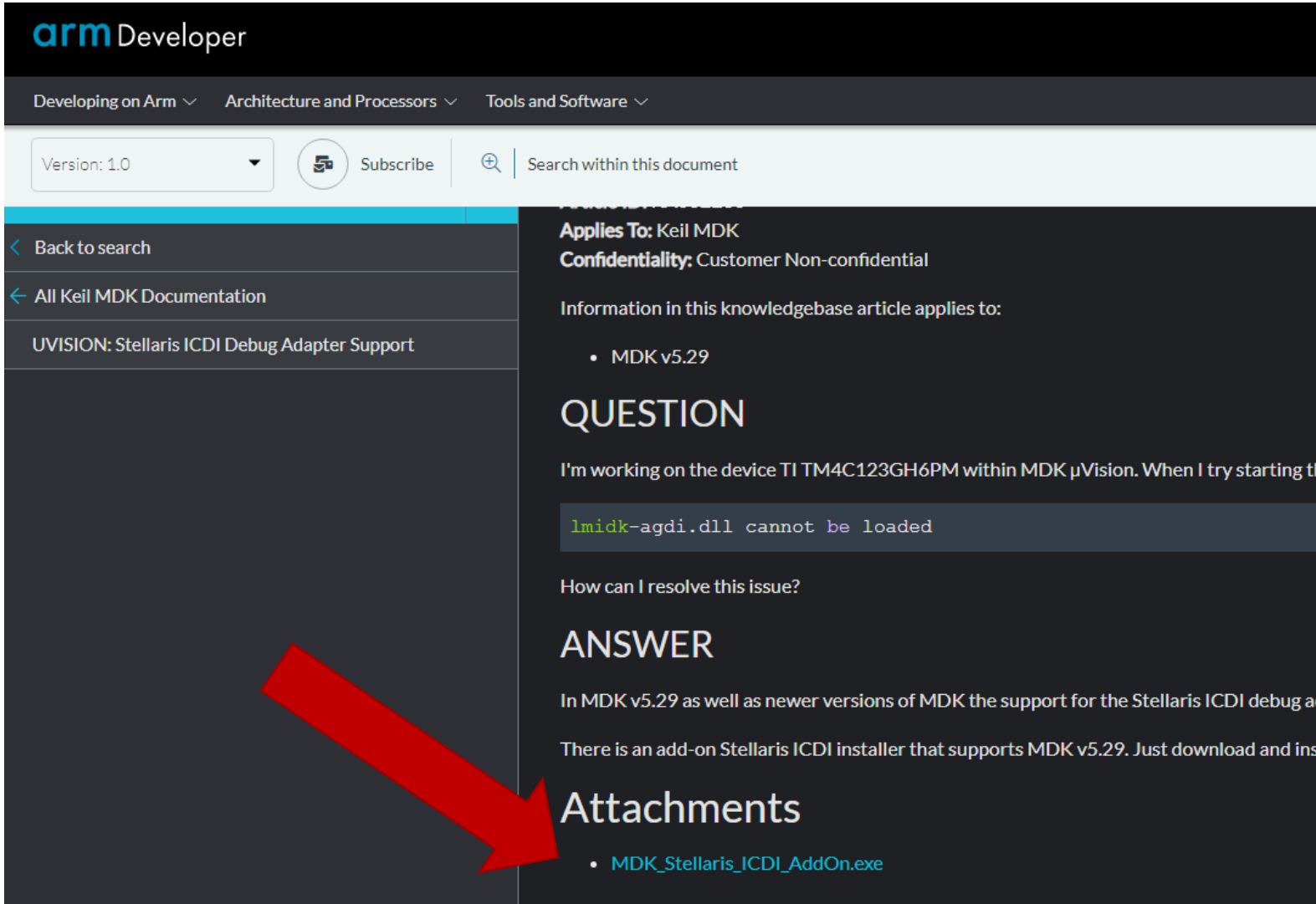


Step 4: Install the uVision Driver Patch

Software Installation

- Even though you installed the drivers, uVision doesn't show them as an option until you install a patch.
- so do that…

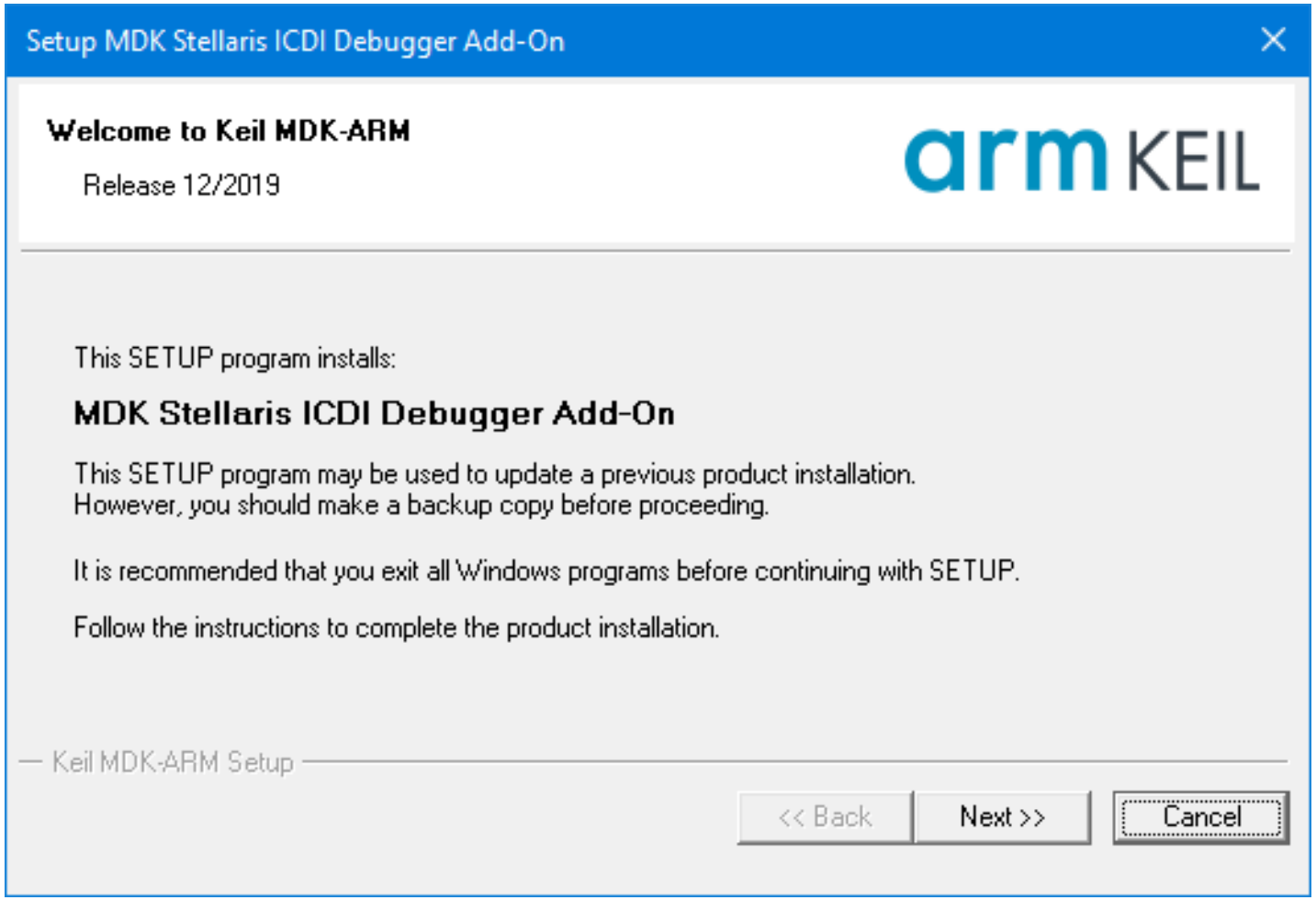
https://www.keil.com/support/docs/4196.htm



Software Installation

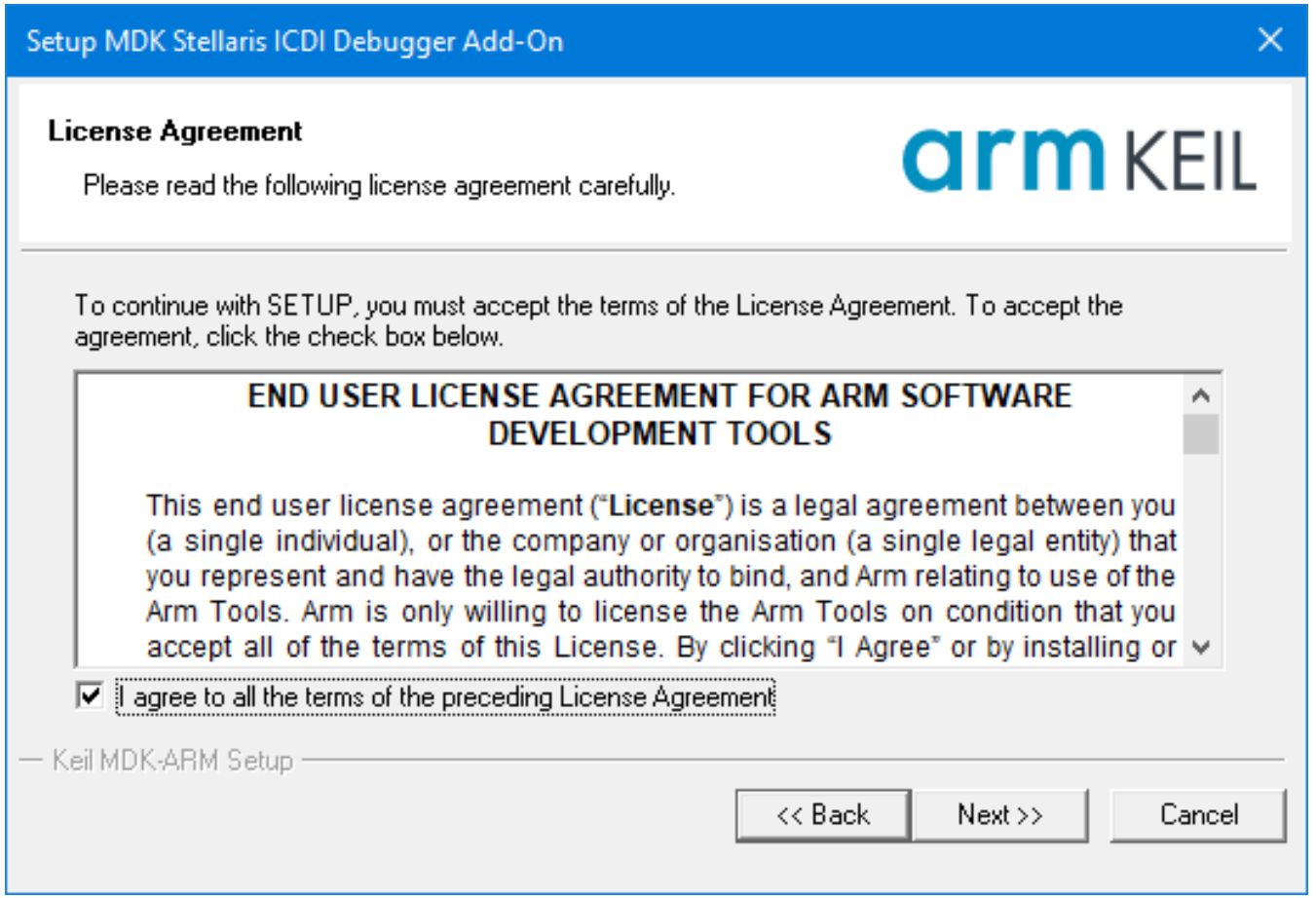
- click Next

https://www.keil.com/support/docs/4196.htm



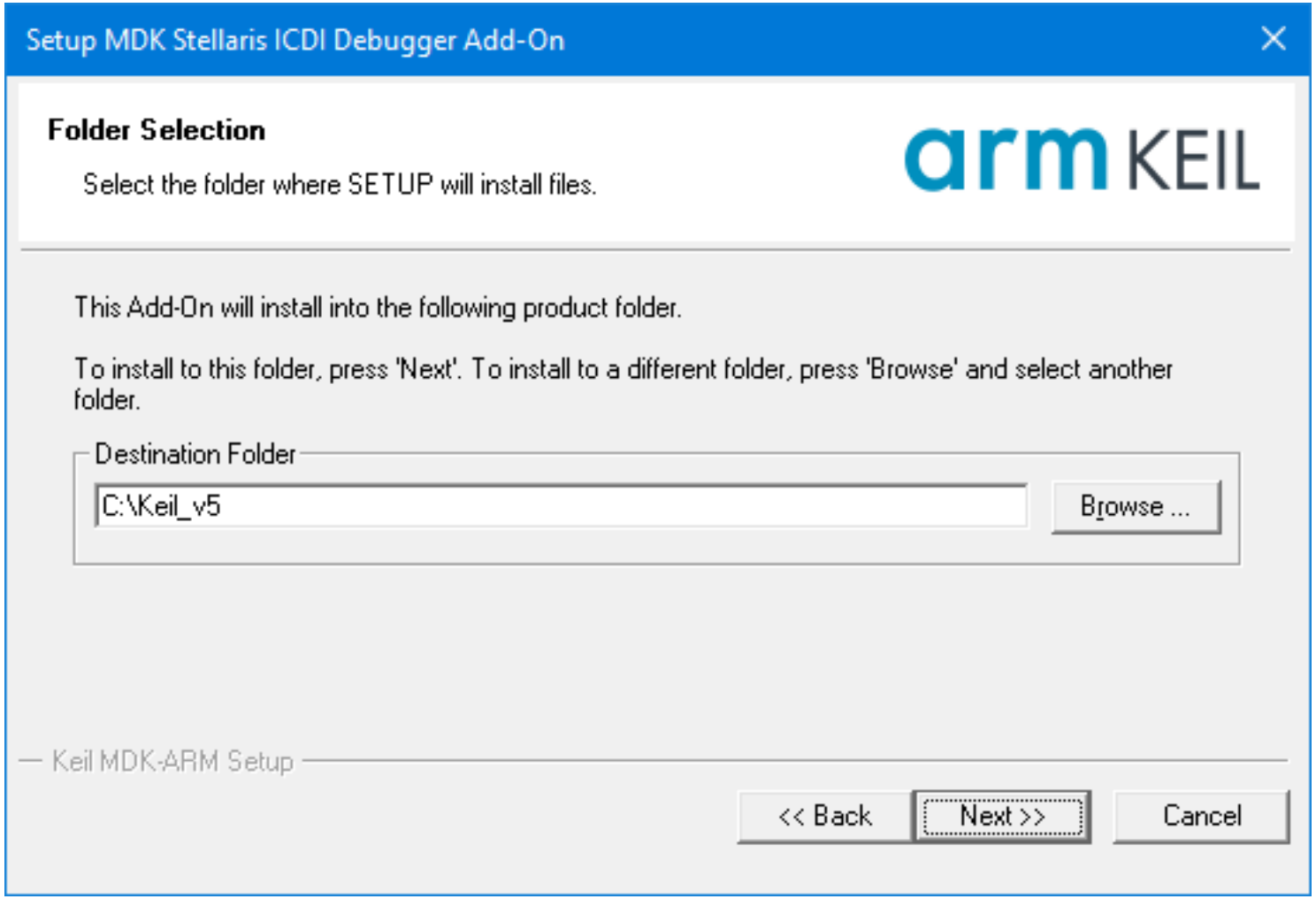
Software Installation

- agree and click Next



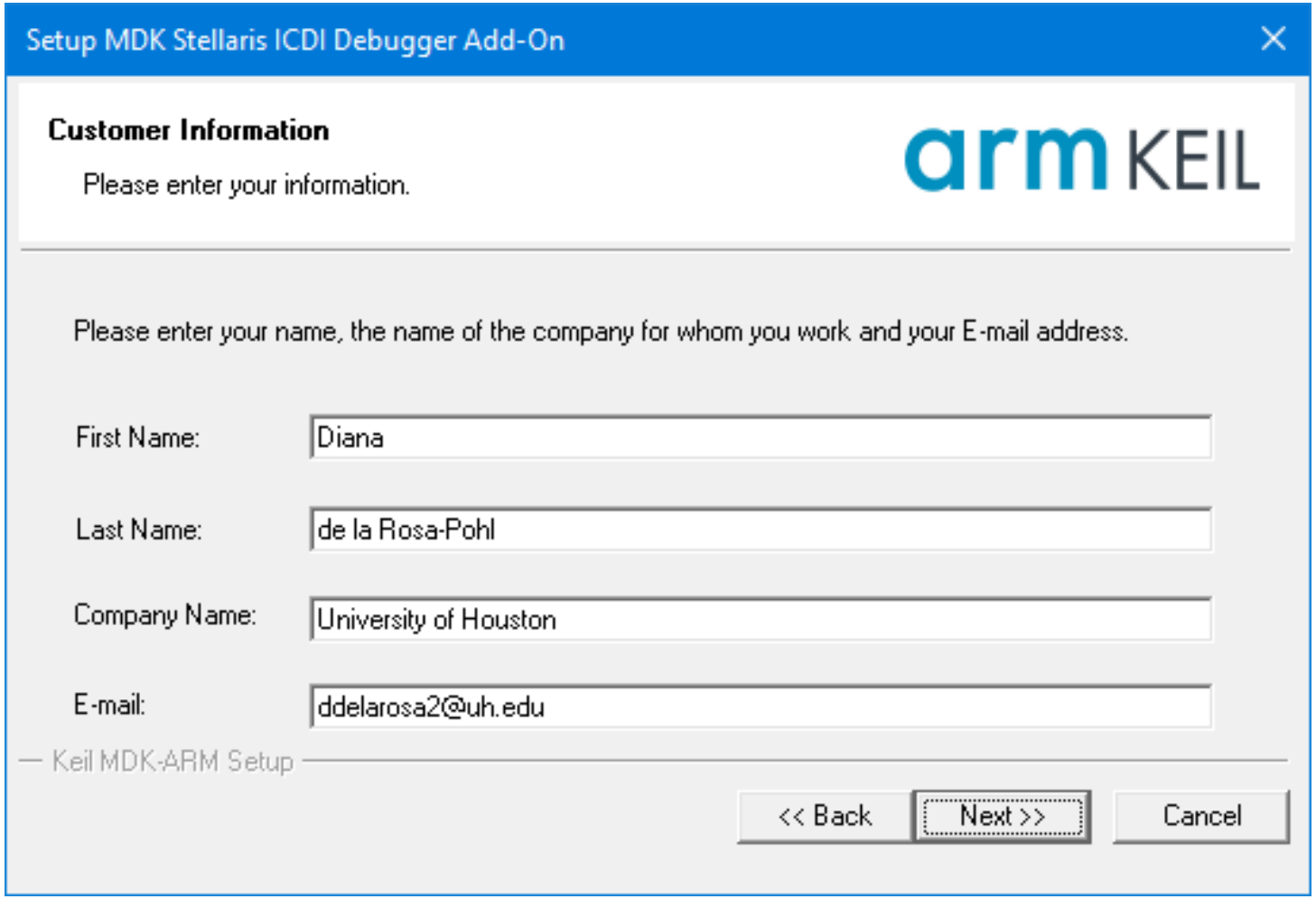
Software Installation

- agree and click Next



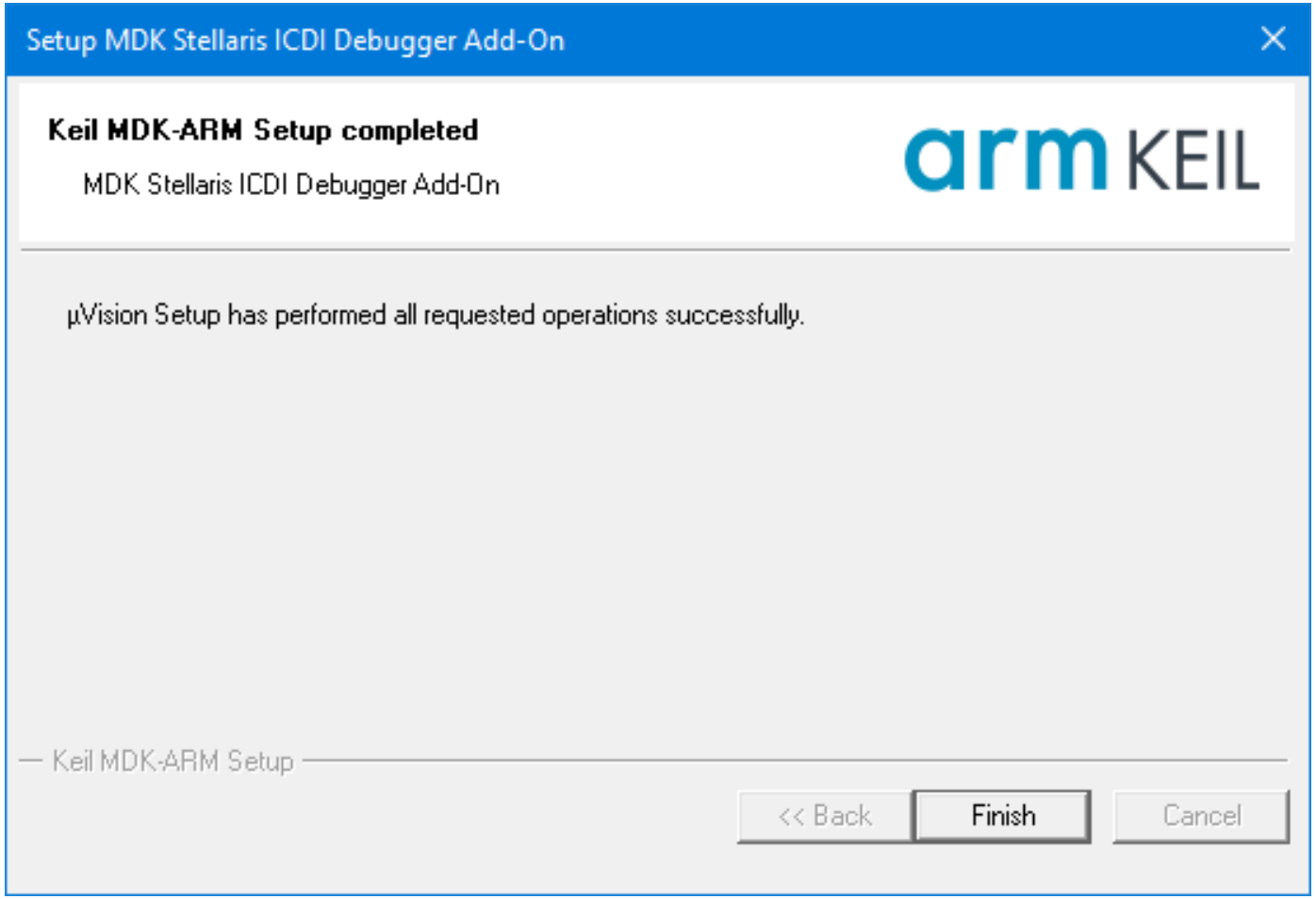
Software Installation

- enter YOUR information



Software Installation

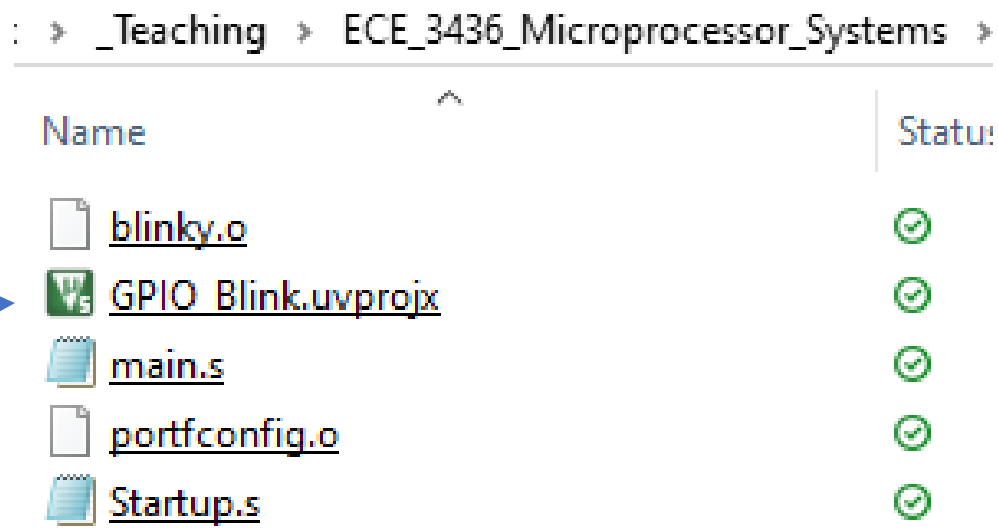
- click Finish



Step 5: Test Your Software in Simulator

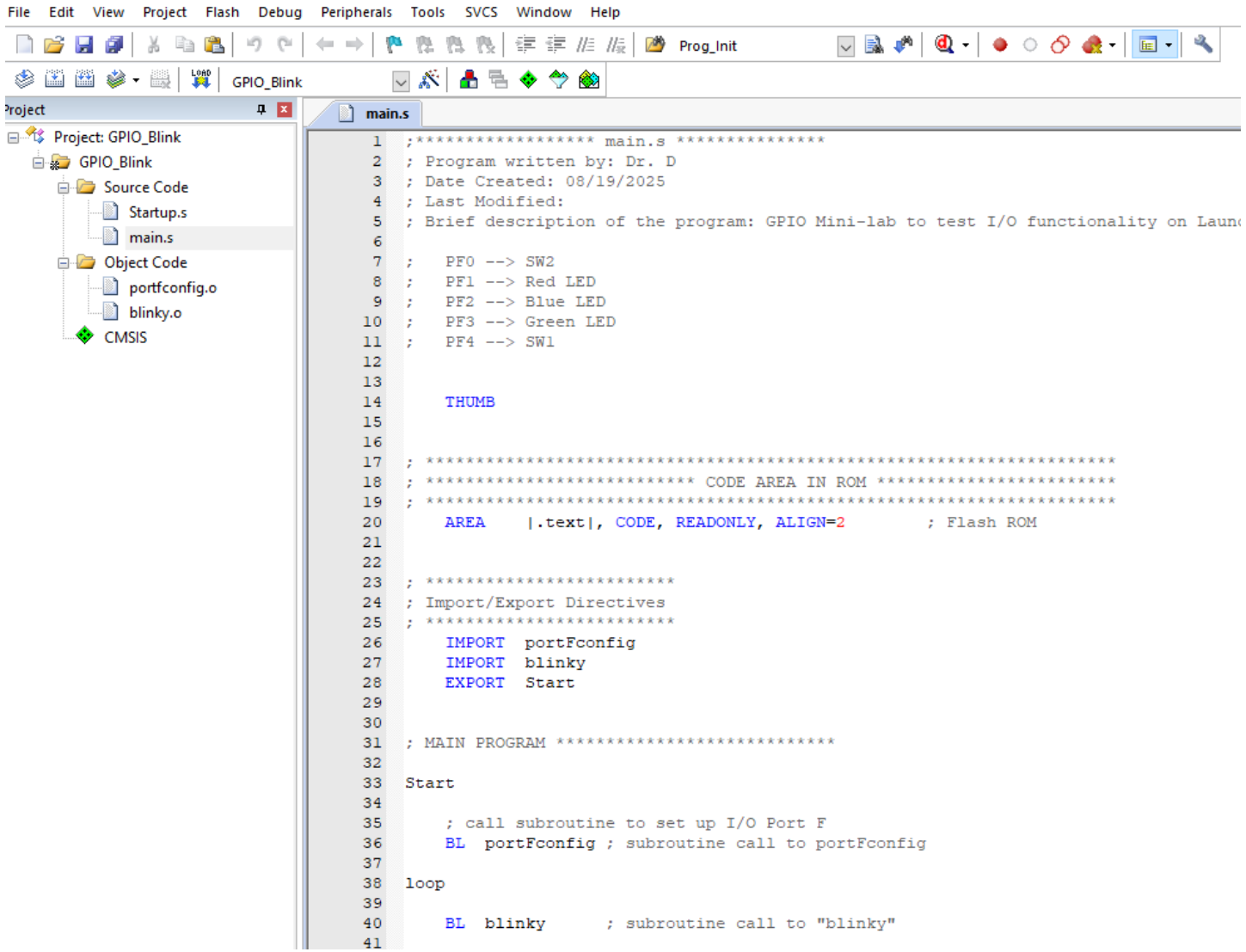
Software Simulator Test

- open the Lab0 project file in uVision
- the project file always ends in .uvprojx



Software Simulator Test

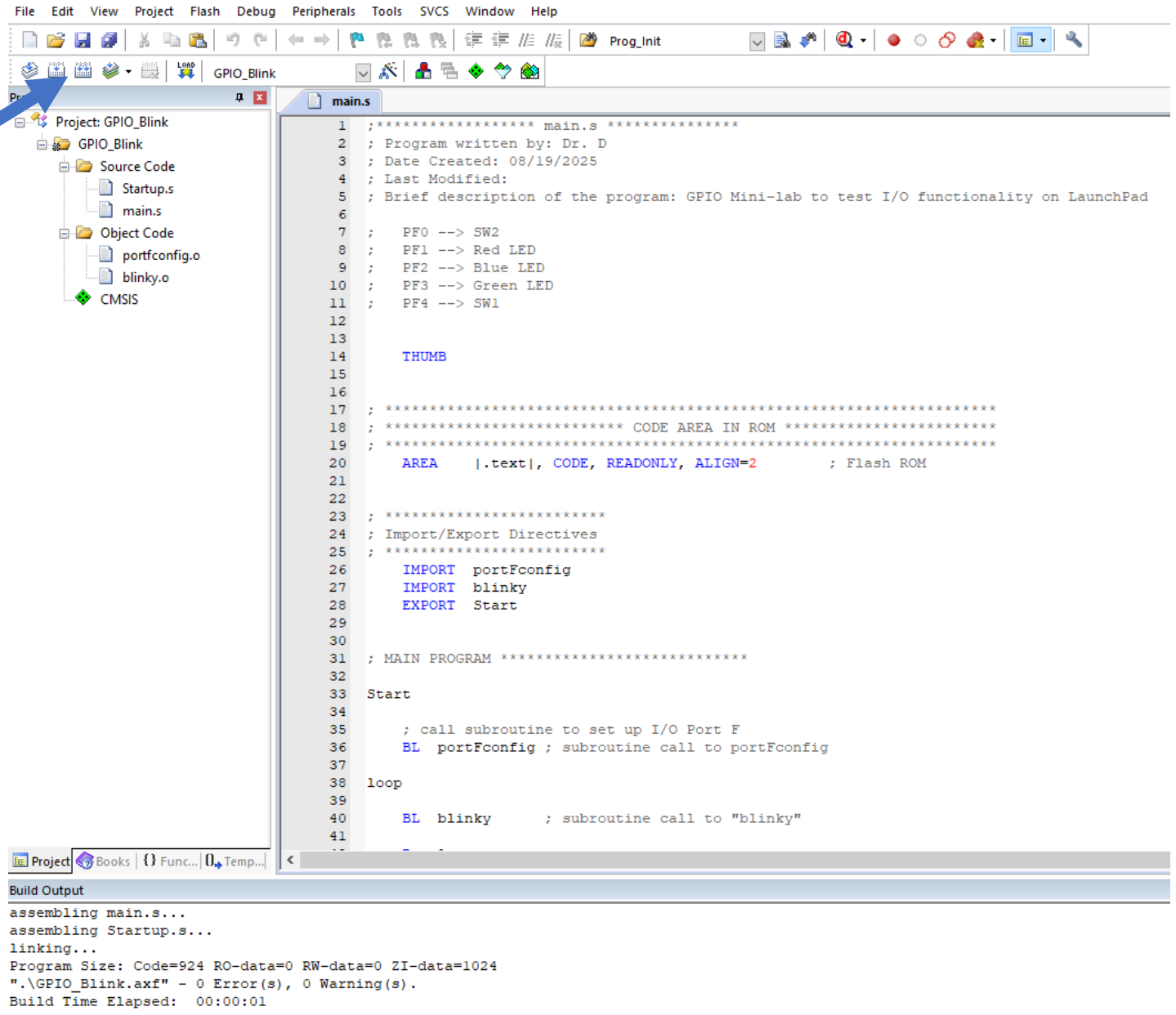
- if the main.s file is not showing, double-click on the filename



Software Simulator Test

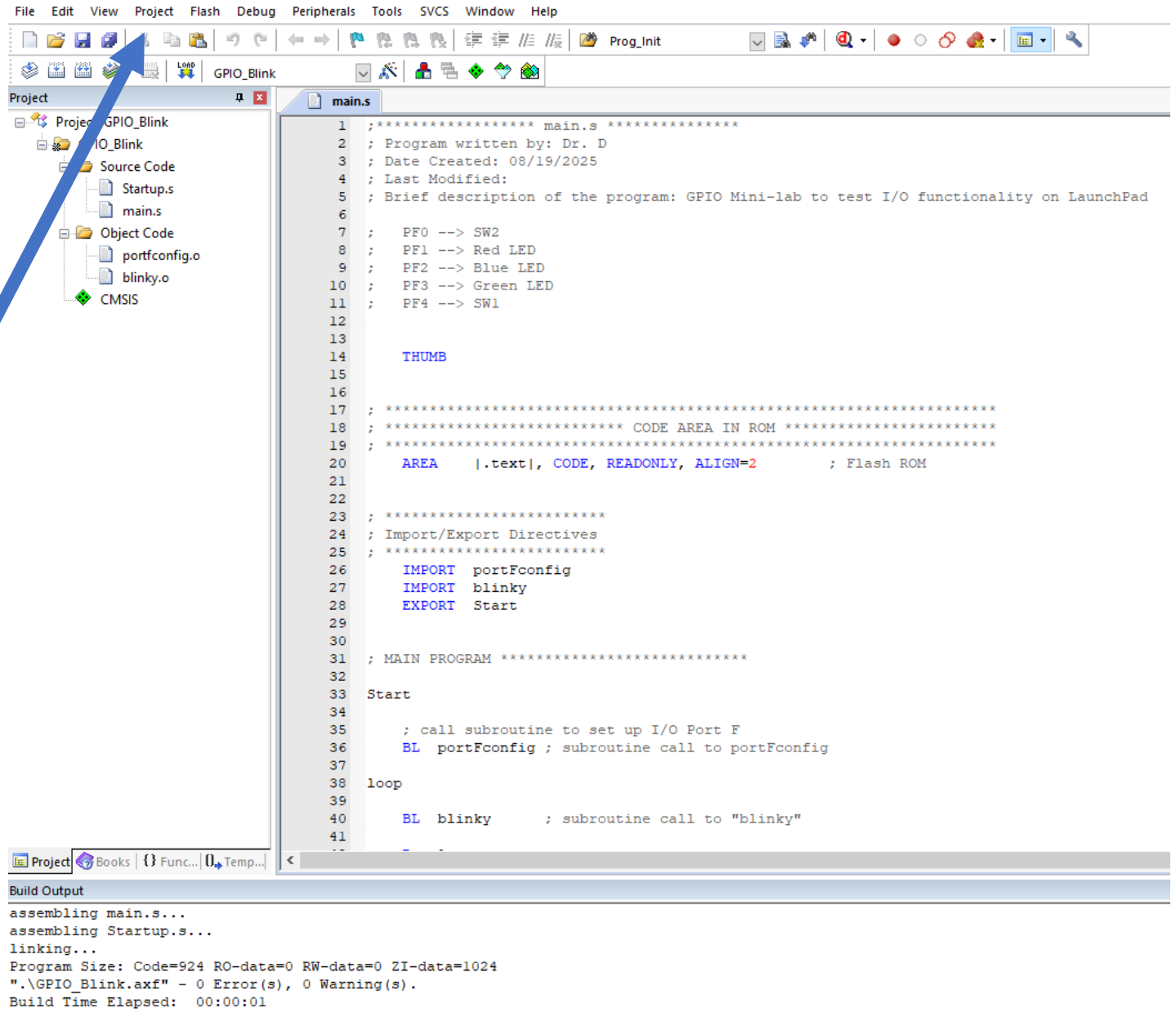
- rebuild (assemble) the entire project by clicking on the icon with 2 down arrows

- you should see a Build Output message like that shown to the right



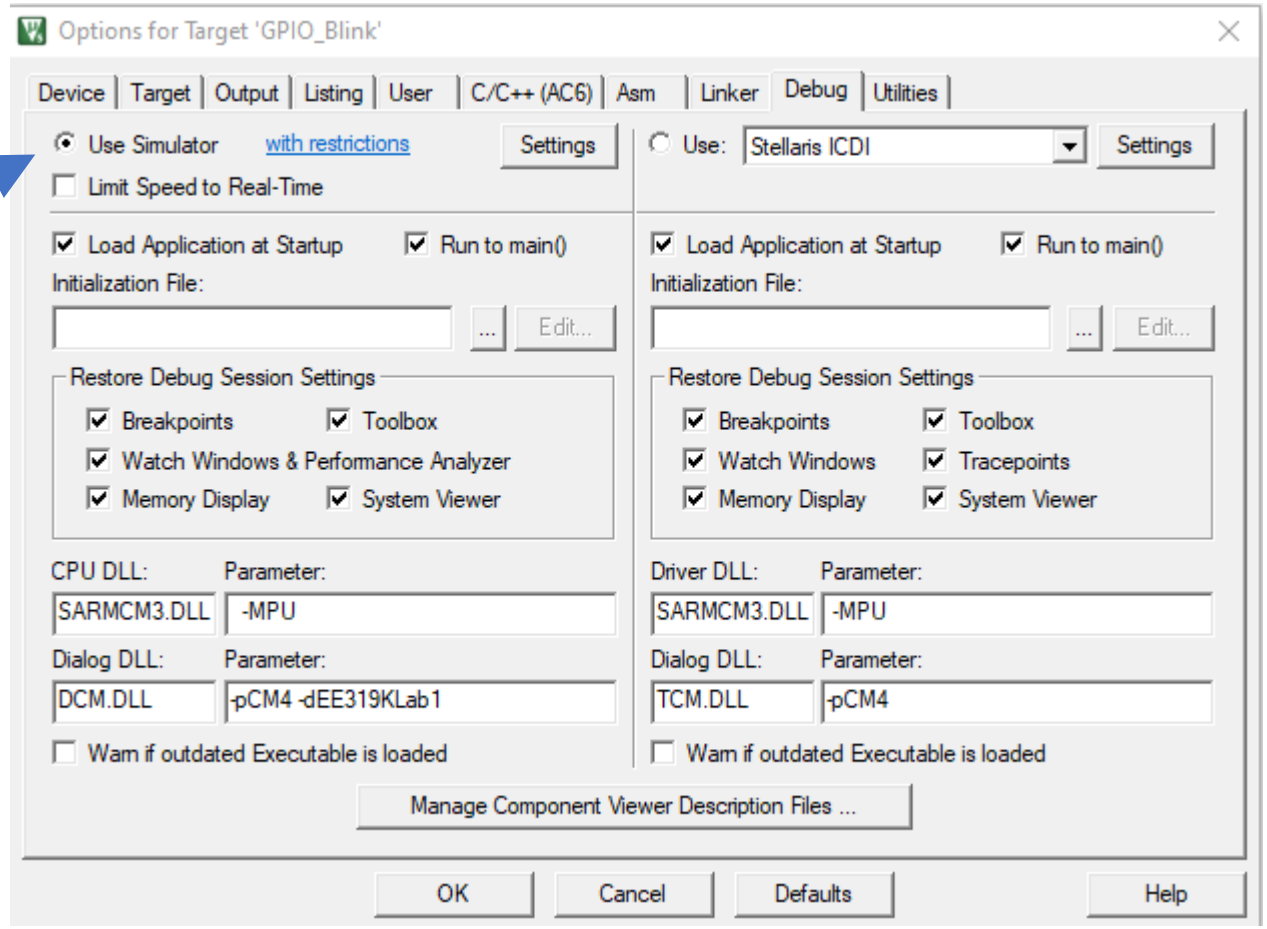
Software Simulator Test

- make sure that you are in simulator mode
  - goto the Project menu
  - select Options for Target ‘GPIO_Blink’



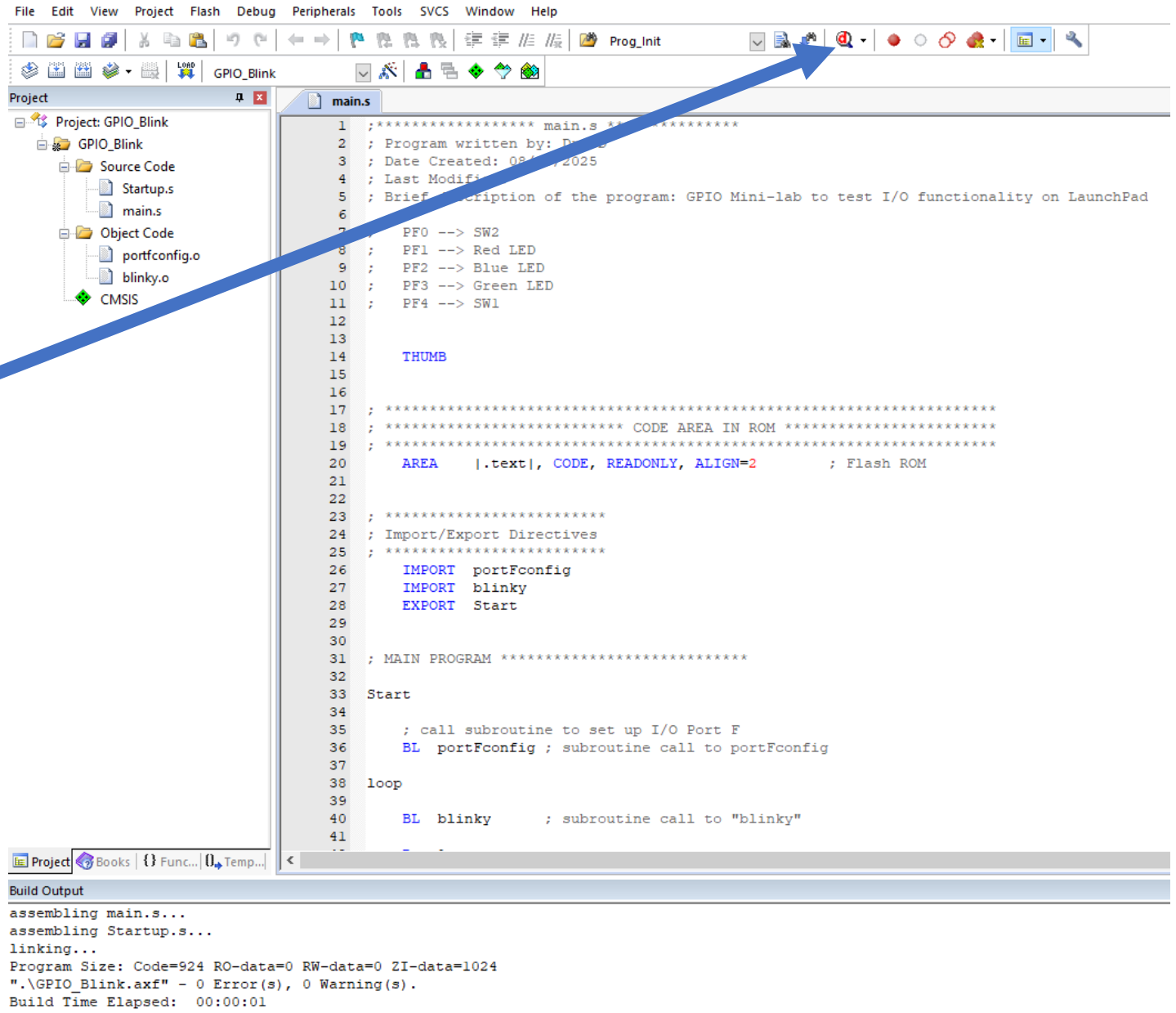
Software Simulator Test

- make sure that “Use Simulator” is selected in the Debug tab



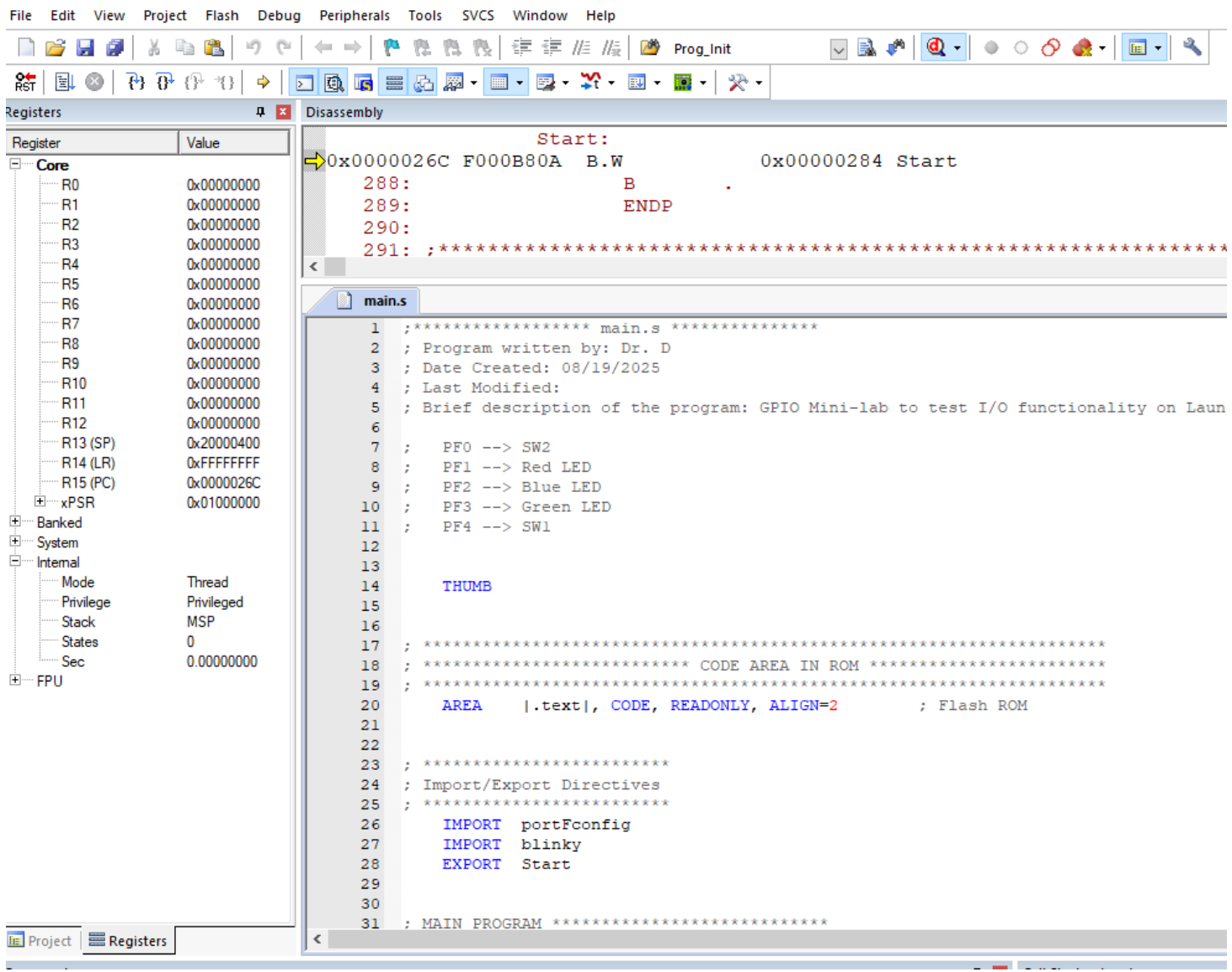
Software Simulator Demo

- begin a debugging session 
- this starts the simulator



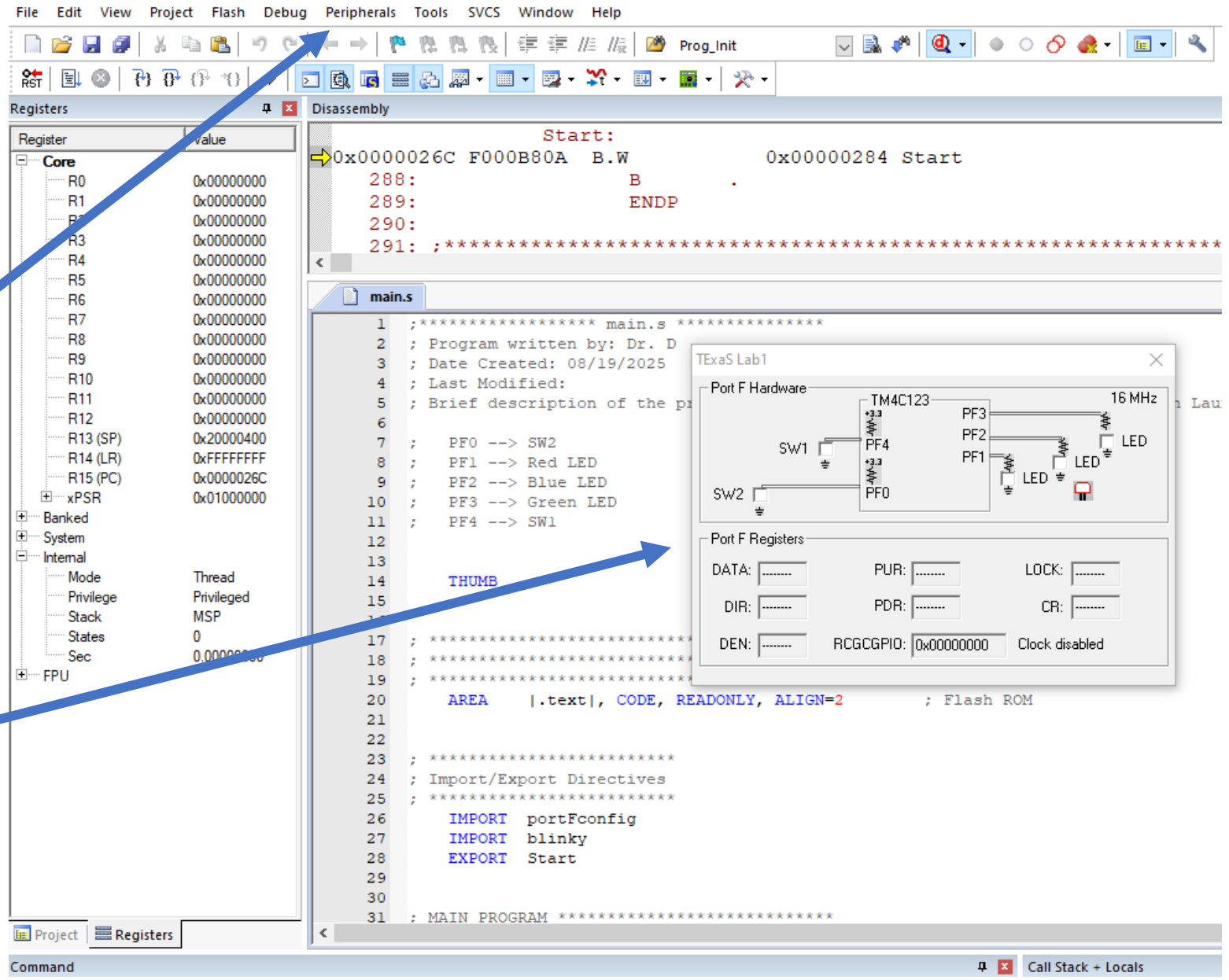
Software Simulator Demo

- now you are in simulation mode



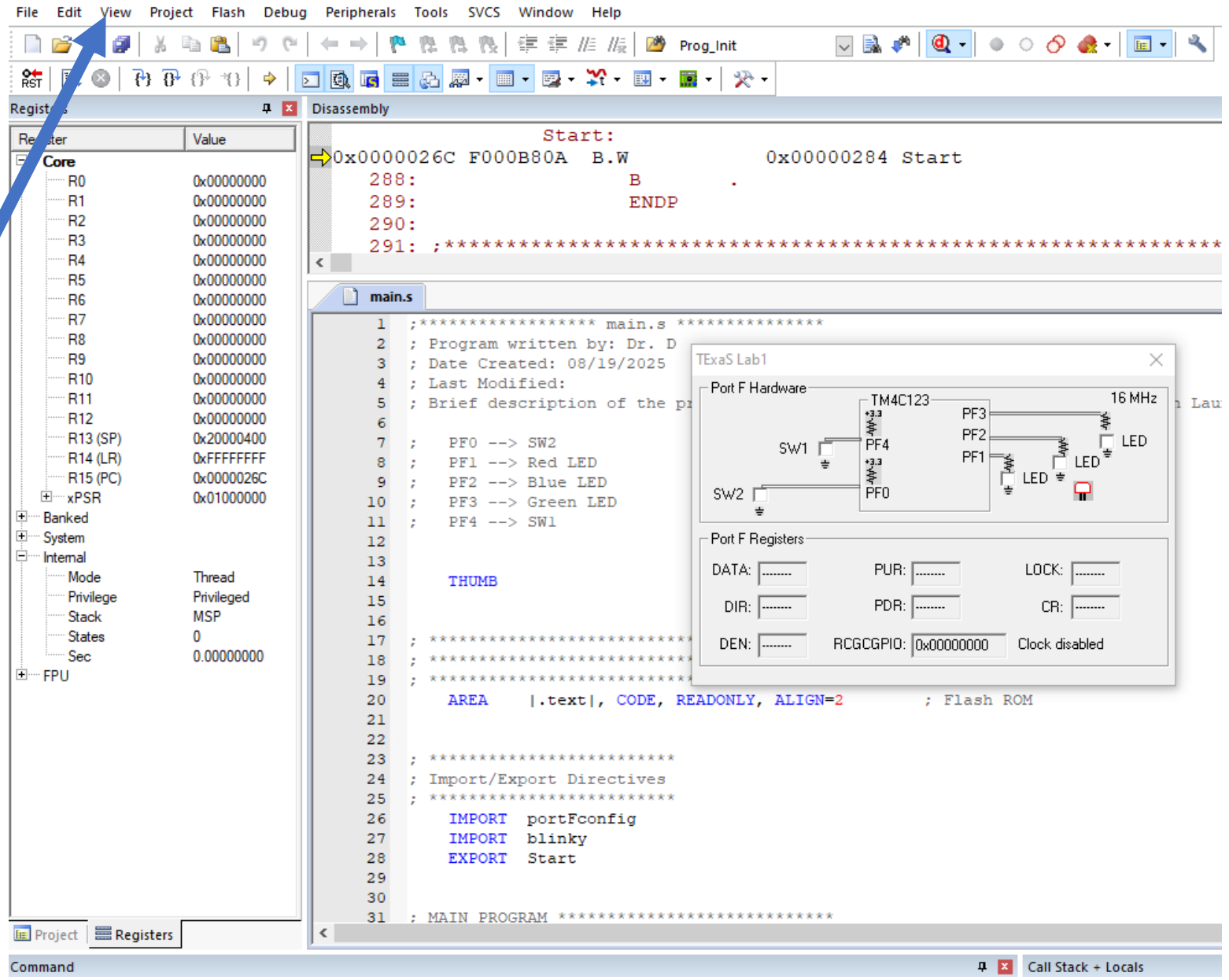
Software Simulator Demo

- goto Peripherals menu and select “TExaS Port F”
- this opens the graphical simulator for Port F
  - this is what the UT software was for



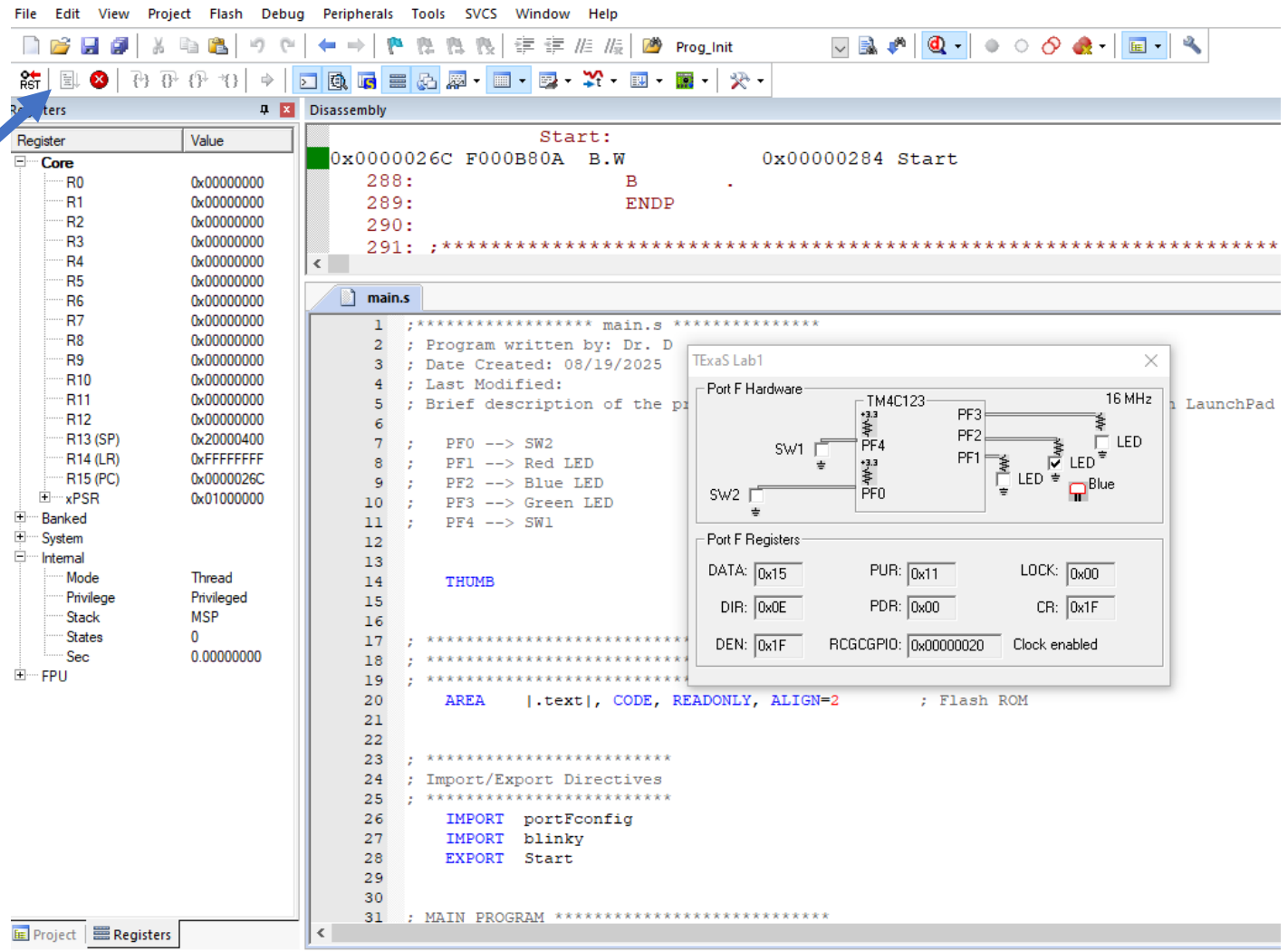
Software Simulator Demo

- verify that you have selected “Periodic Window Update” in the View menu
- you won’t see anything happening if you don’t



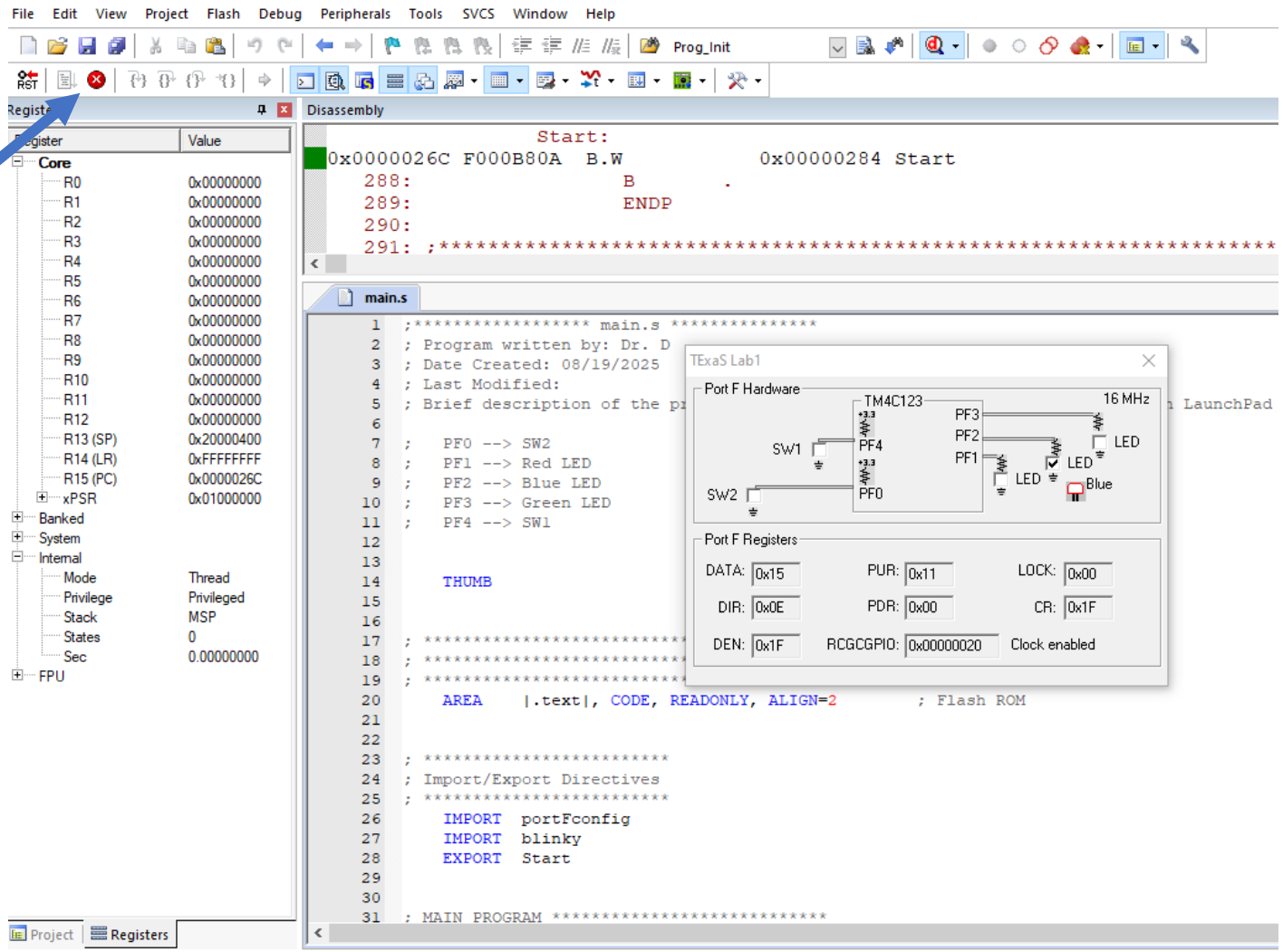
Software Simulator Demo

- click the run icon or use the F5 key
- you should see each of the LEDs (red, blue, green) cycle and repeat



Software Simulator Demo

- hit stop icon and then the debug icon again to get out of simulation mode

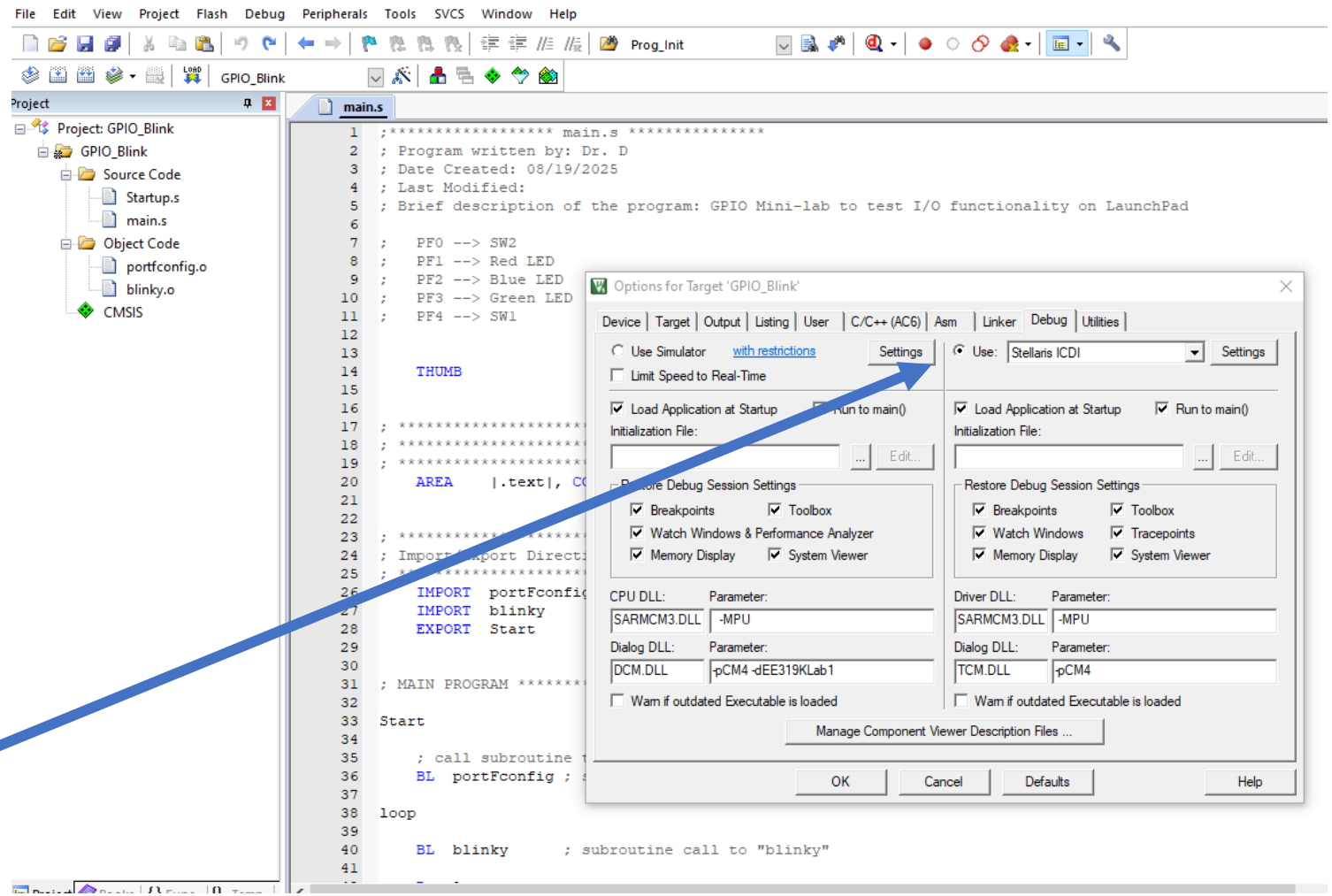


Step 6: Test Your Hardware

Hardware Demo

- to test your hardware, switch from simulation mode to the hardware mode
- first, bring up the “Options for Target” dialog box from the Project menu
- then select “Use Stellaris ICDI”

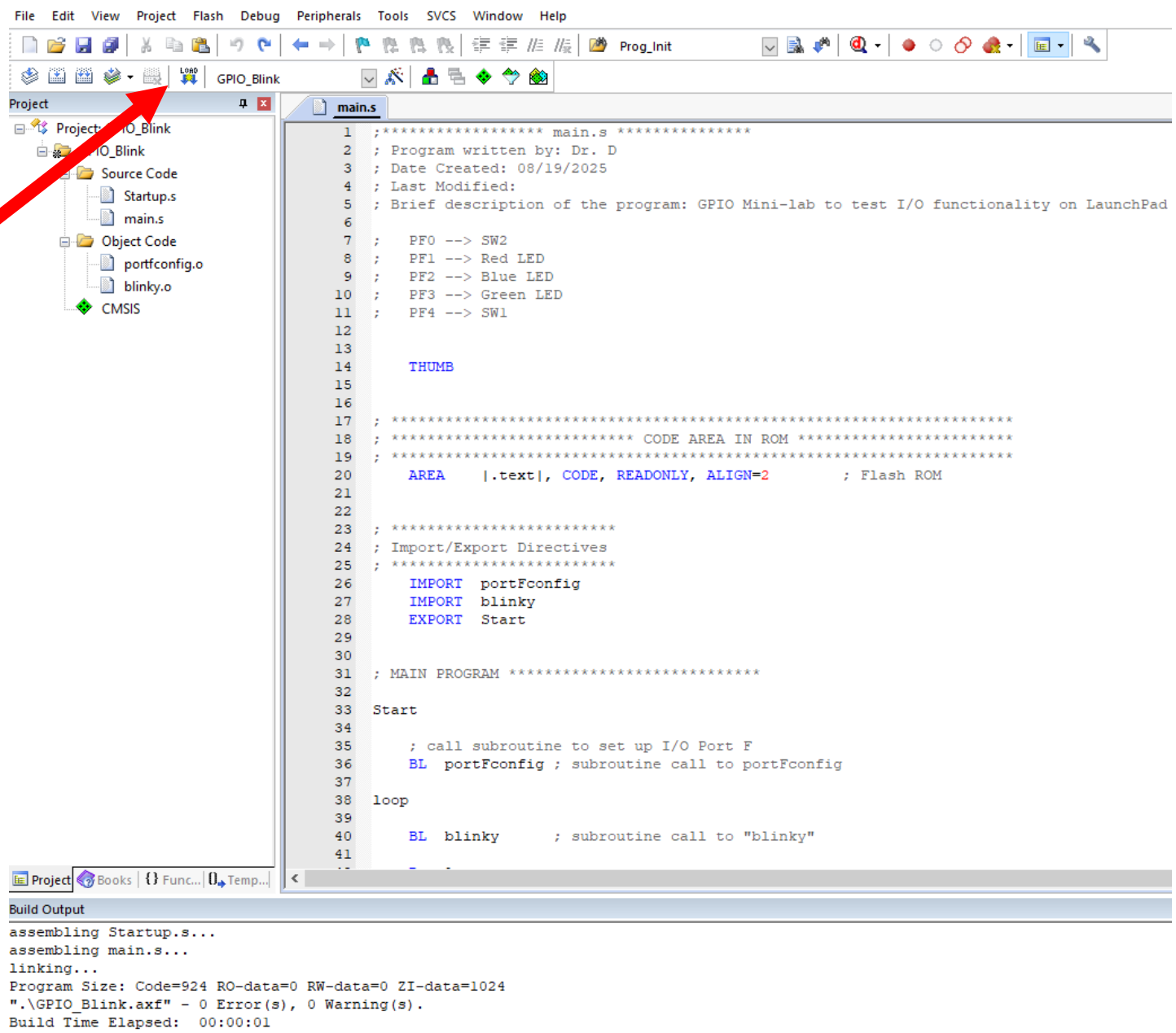
You cannot do this step until you have properly installed the Stellaris drivers! (and the patch)



Hardware Demo

- LOAD your ASSEMBLED program to LaunchPad

- of course, your LaunchPad must be plugged in and powered on



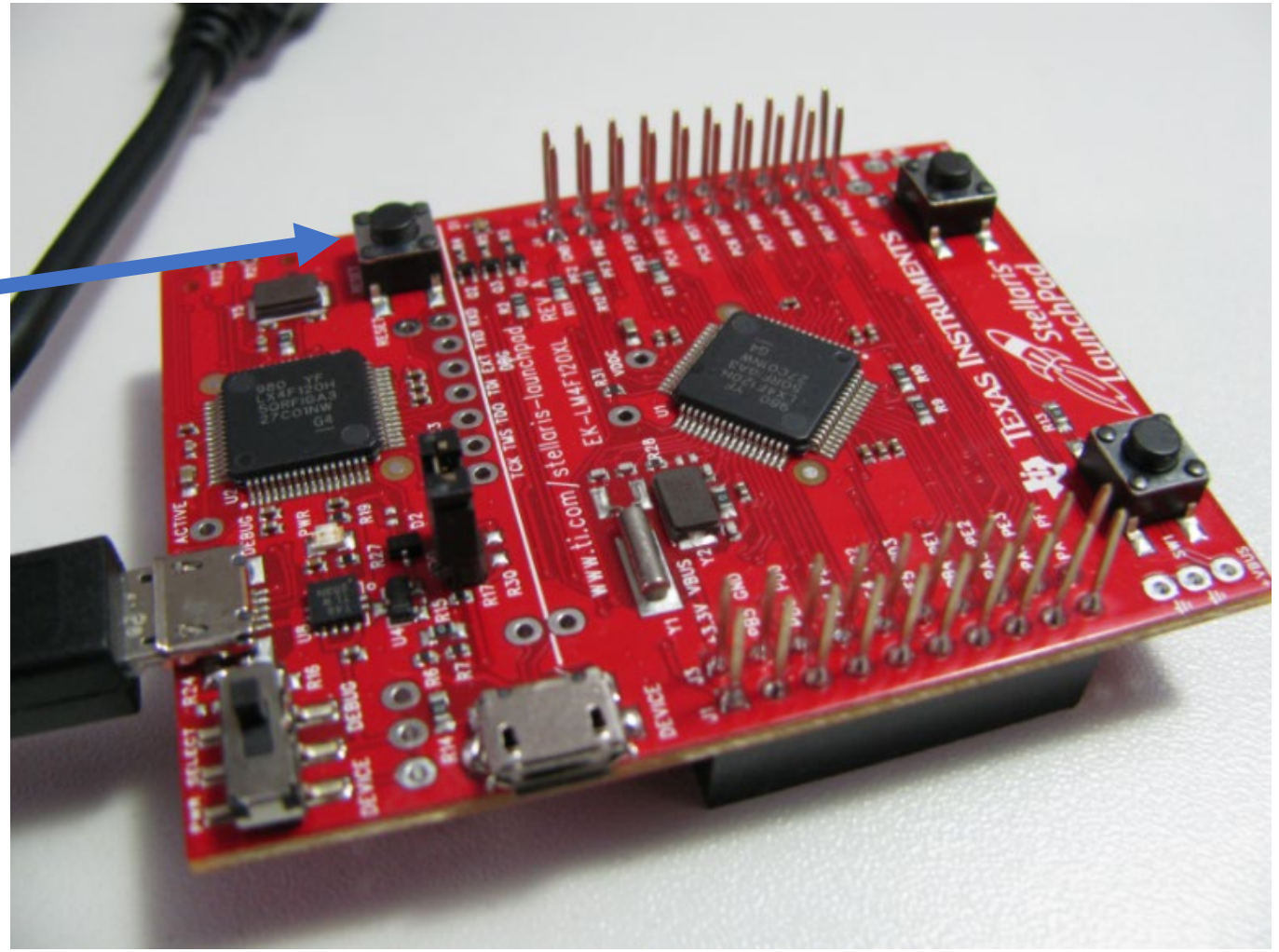
Hardware Demo

- You should see a message telling you that your program was successfully downloaded to the LaunchPad.

```
Connecting: Mode=JTAG, Speed=1000000Hz
Erase Done.
Programming Done.
Verify OK.
Flash Load finished at 17:23:37
```

Hardware Demo

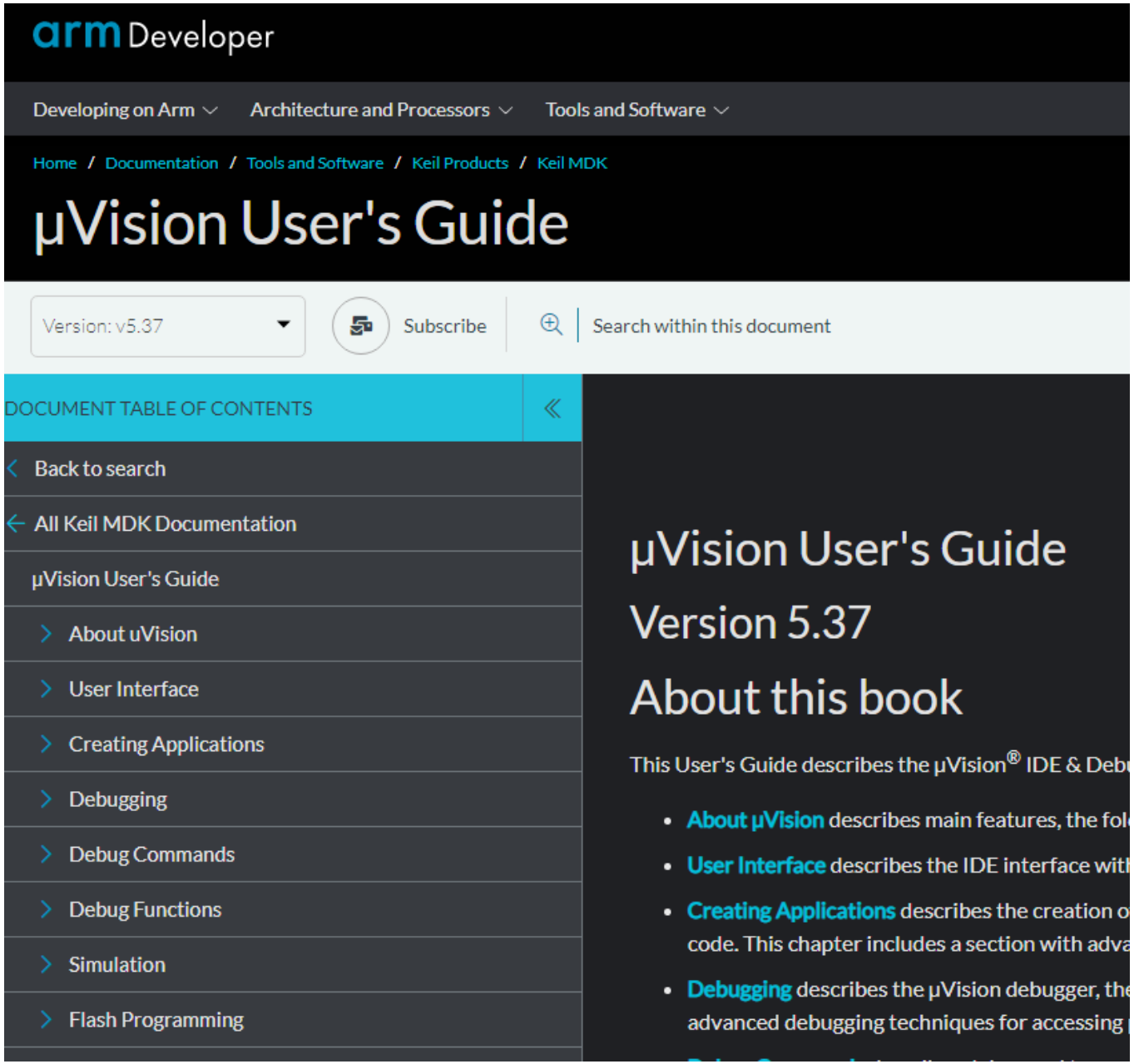
- hit the reset button on the LaunchPad
- Now sit back and enjoy!



Keil uVision Resources

Keil User’s Guide

- https://developer.arm.com/documentation/101407/latest/



Keil Editor Marks

- https://developer.arm.com/documentation/101407/0537/User-Interface/Using-the-Editor/Marks-in-the-Editor-Margin