Installation of Keil Microcontroller Development Kit (MDK)

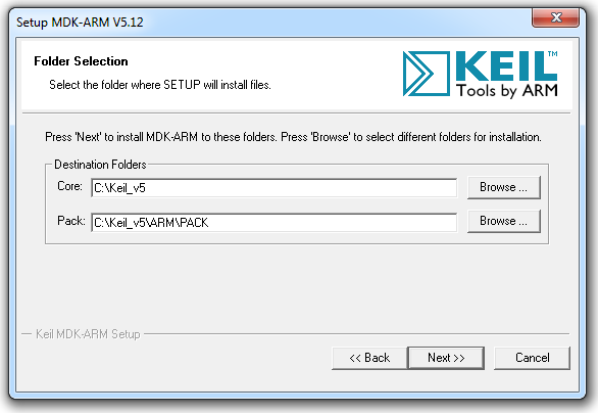
Revisions

Name	Date	Notes
Yifeng Zhu	January 3, 2015	Initial document creation.
Mark Lawford	Sept 10, 2017	
Ghada Badawy	Sept 4, 2018	

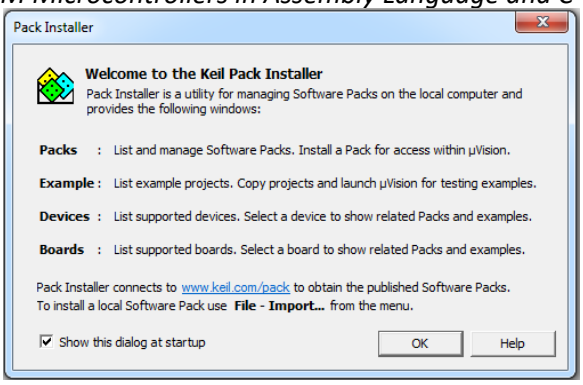
Warning: Do not connect the Discovery Kit into your PC or laptop before the software installation completes. If you connect your kit to PC before installing the USB driver, Windows OS often mistakenly associates a wrong USB driver to the kit. As a result, you will not be able to program the kit. The solution is to go to the control panel and change the USB driver to ST-Link USB driver.

Step 1: Install Keil MDK-ARM

1. Download the Keil MDK-ARM from avenue under content/DataSheets/MDK523 or content/labs/lab0/MDK523:
    - Keil MDK-ARM contains µVision 5 IDE (Integrated Development Environment) with debugger, flash programmer and the ARM compiler toolchain.
    - The major limitation of the free version is that programs that generate more than 32 Kbytes of code and data will not compile, assemble, or link.
2. Run the downloaded MDK5xx.exe and install to the default path. The software takes 2GB disk storage space. You can install it to a different driver, instead of the default C drive, if there is limited space in C drive.



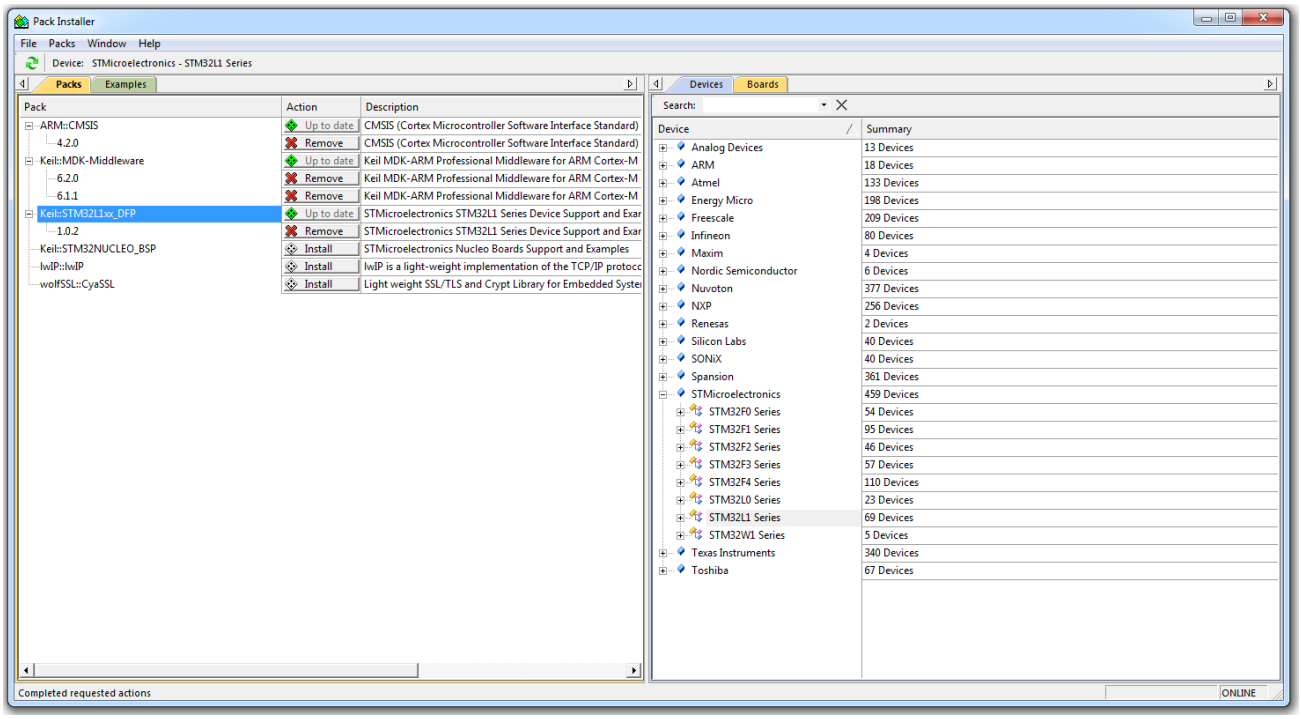
After the core software is installed, a dialog will show up to install Keil Pack. It automatically downloads selected components (called packs) from http://www.keil.com/dd2/pack/



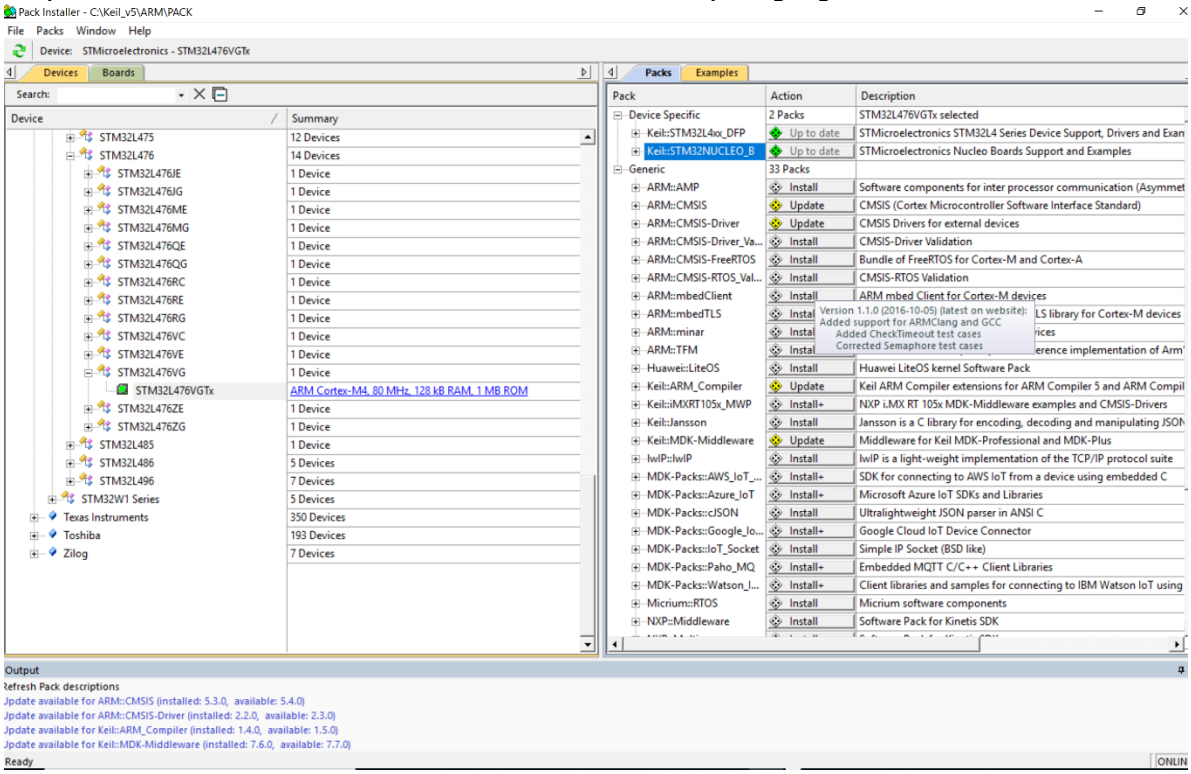
Click OK and then the following window shows up.

The 2nd edition of the Zhu textbook uses the Discovery kit with STM32L152RCT6 MCU. If you want to be able to compile examples directly from the textbook and please select the device **STM32L1 Series** on the right and all its available components will be shown on the left. Then, install or update the following software components:

- **ARM::CMSIS**
- **Keil::MDK-Middleware**
- **Keil::STM32L1xx_DFP (Optional if you want to run examples for 2nd edition of textbook board)**
- **Keil::STM32L4xx_DFP (Required for the STM32L476 Discovery boards we use in the lab)**



The 3rd edition of the textbook uses the Discovery kit with STM32L476VG MCU (which is the same one we are using in the lab). To compile examples directly from the textbook, please select the device **STM32L4 Series**, install STM32L4xx_DFP. please choose device for ST32L476VG, please install pack of version 1.4.0. PLEASE DO NOT install or upgrade to pack version 2.0.0. And, upgrade other packs that are available to upgrade.


Pack Installer - C:\Keil_v5\ARM\PACK
File Packs Window Help
Device: STMicroelectronics - STM32L476VGTx
Devices Boards
Search:
Device
Summary
STM32L475 12 Devices
STM32L476 14 Devices
STM32L476JE 1 Device
STM32L476JG 1 Device
STM32L476ME 1 Device
STM32L476MG 1 Device
STM32L476QE 1 Device
STM32L476QG 1 Device
STM32L476RC 1 Device
STM32L476RE 1 Device
STM32L476RG 1 Device
STM32L476VC 1 Device
STM32L476VE 1 Device
STM32L476VG 1 Device
STM32L476VGTx ARM Cortex-M4, 80 MHz, 128 kB RAM, 1 MB ROM
STM32L476ZE 1 Device
STM32L476ZG 1 Device
STM32L485 1 Device
STM32L486 5 Devices
STM32L496 7 Devices
STM32W1 Series 5 Devices
Texas Instruments 350 Devices
Toshiba 193 Devices
Zilog 7 Devices
Packs Examples
Pack
Action
Description
Device Specific 2 Packs STM32L476VGTx selected
Keil::STM32L4xx_DFP Up to date STMicroelectronics STM32L4 Series Device Support, Drivers and Exan
Keil::STM32NUCLEO_B Up to date STMicroelectronics Nucleo Boards Support and Examples
Generic 33 Packs
ARM::AMP Install Software components for inter processor communication (Asymmet
ARM::CMSIS Update CMSIS (Cortex Microcontroller Software Interface Standard)
ARM::CMSIS-Driver Update CMSIS Drivers for external devices
ARM::CMSIS-Driver_Va... Install CMSIS-Driver Validation
ARM::CMSIS-FreeRTOS Install Bundle of FreeRTOS for Cortex-M and Cortex-A
ARM::CMSIS-RTOS_Val... Install CMSIS-RTOS Validation
ARM::mbedClient Install ARM mbed Client for Cortex-M devices
ARM::mbedTLS Instal LS library for Cortex-M devices
ARM::minar Instal vices
ARM::TFM Instal erence implementation of Arm
Version 1.1.0 (2016-10-05) (latest on website):
Added support for ARMClang and GCC
Added CheckTimeout test cases
Corrected Semaphore test cases
Huawei::LiteOS Install Huawei LiteOS kernel Software Pack
Keil::ARM_Compiler Update Keil ARM Compiler extensions for ARM Compiler 5 and ARM Compil
Keil::iMXRT105x_MWP Install+ NXP i.MX RT 105x MDK-Middleware examples and CMSIS-Drivers
Keil::Jansson Install Jansson is a C library for encoding, decoding and manipulating JSON
Keil::MDK-Middleware Update Middleware for Keil MDK-Professional and MDK-Plus
lwIP::lwIP Install lwIP is a light-weight implementation of the TCP/IP protocol suite
MDK-Packs::AWS_IoT_... Install+ SDK for connecting to AWS IoT from a device using embedded C
MDK-Packs::Azure_IoT Install+ Microsoft Azure IoT SDKs and Libraries
MDK-Packs::cJSON Install Ultralightweight JSON parser in ANSI C
MDK-Packs::Google_Io... Install+ Google Cloud IoT Device Connector
MDK-Packs::IoT_Socket Install Simple IP Socket (BSD like)
MDK-Packs::Paho_MQ Install+ Embedded MQTT C/C++ Client Libraries
MDK-Packs::Watson_I... Install+ Client libraries and samples for connecting to IBM Watson IoT using
Micrium::RTOS Install Micrium software components
NXP::Middleware Install Software Pack for Kinetis SDK
Output
Refresh Pack descriptions
Update available for ARM::CMSIS (installed: 5.3.0, available: 5.4.0)
Update available for ARM::CMSIS-Driver (installed: 2.2.0, available: 2.3.0)
Update available for Keil::ARM_Compiler (installed: 1.4.0, available: 1.5.0)
Update available for Keil::MDK-Middleware (installed: 7.6.0, available: 7.7.0)
Ready
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Step 2: Install ST-Link USB Driver

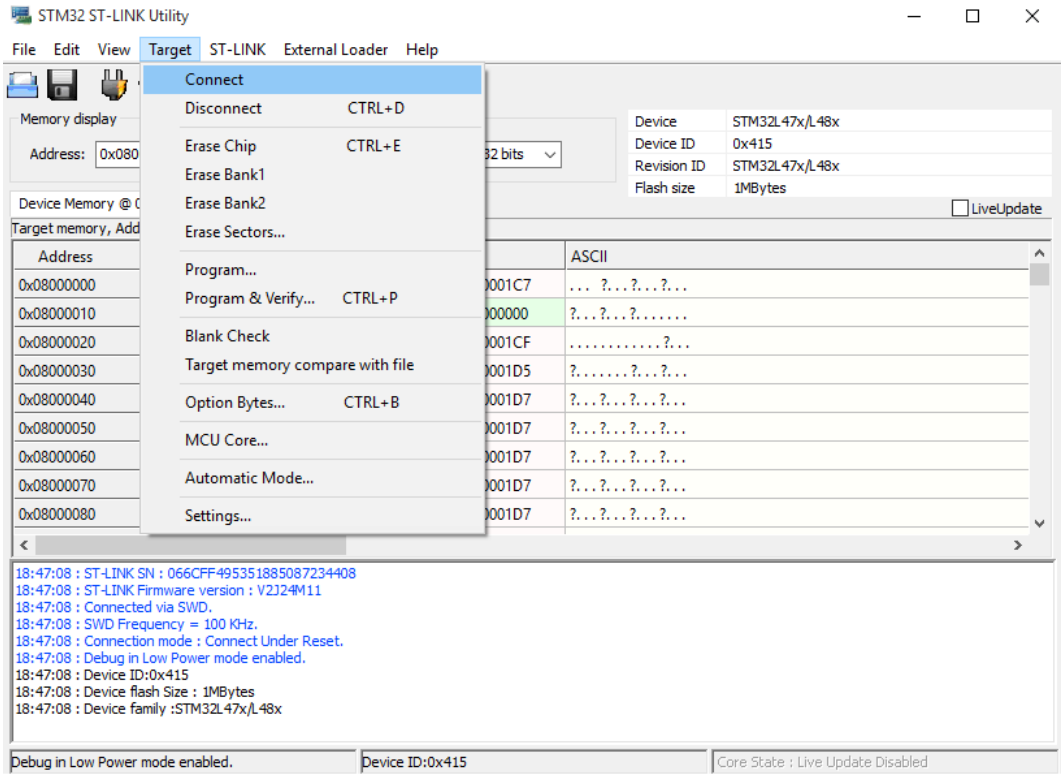
- Do not connect the discovery kit before you install the USB driver for ST-Link.
- Go to the directory **C:\Keil_v5\ARM\STLink\USBDriver** and run **stlink_winusb_install.bat** in administrator mode. To do this, right click on the file and select “Run as Administrator”.
- Now you can connect the discovery kit to computer via a "Type A to mini-B" USB cable. The discovery kit should be correctly recognized as “STMicroelectronics STLink dongle.”
- The first time you connect it a demo program should start that allows you to test the board.

Step 3: Install STM32 ST-Link Utility

You can download the installation software from the following link:

http://www.st.com/web/en/catalog/tools/PF258168

Typically we use Keil to program the discovery kit. However, the ST-Link utility is helpful to re-program the flash memory if you mistakenly program the debug/program pins of an STM32 processor. With the board connected, if you start the STM32 ST-LINK Utility and then select “Target -> Connect” as shown below, you will see the current content of the flash and other programmable variables. You can then reprogram the board if needed.



You see something similar to the above, you have successfully install the software and connected to the board. You can now disconnect from the board by selecting “Target->Disconnect".

Congratulations! You are now ready to begin programming the Discovery board for class and labs.