

EE3220 System-on-Chip Design

Tutorial 1: Hello World!

ARM Project Creation and Configuration

Objective:

- To get familiar with ARM Keil Studio and create project.
- To set up and run your first project.
- To learn how to write a C/C++ program for ARM.

In this tutorial, you will learn how to set up and run a new project for an ARM Mbed board. During this process, you will learn the required settings and finally run the compiled code on the targeted device (NUCLEO-F401RE ARM board). Keil Studio is the successor to the Mbed Online Compiler, and allows you to debug from supported browsers without the need to install any software. At the end of this tutorial, you will learn the basic usage and functions of the ARM Keil Studio.

Introducing the ARM Keil Studio

Arm announced the open beta of the Keil Studio Cloud in the year 2021, a new browser-based IDE. It's free to use, comes with a powerful, modern editor. Keil Studio Cloud is the evolution of Mbed Studio, using the same underlying IDE framework and codebase, adapted with additional support for the CMSIS ecosystem. It is a big step up from the Online Compiler, bringing much better code hinting/IntelliSense, comprehensive git source control integration and direct development board interaction from the browser. Like the Online Compiler, Keil Studio Cloud requires no installation and provides you with an integrated workspace.

Step 1: Log in to the ARM Keil Studio website.

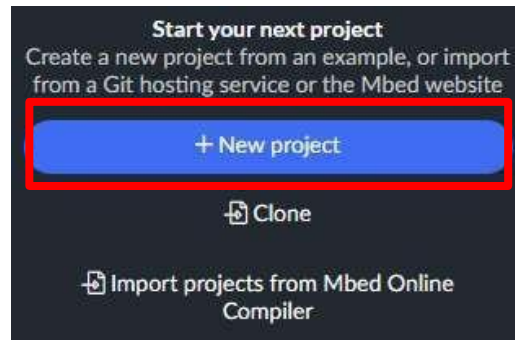
Go to the website of ARM Keil Studio and log in with your Mbed account created in **Tutorial 1**.

<https://studio.keil.arm.com/auth/login/>

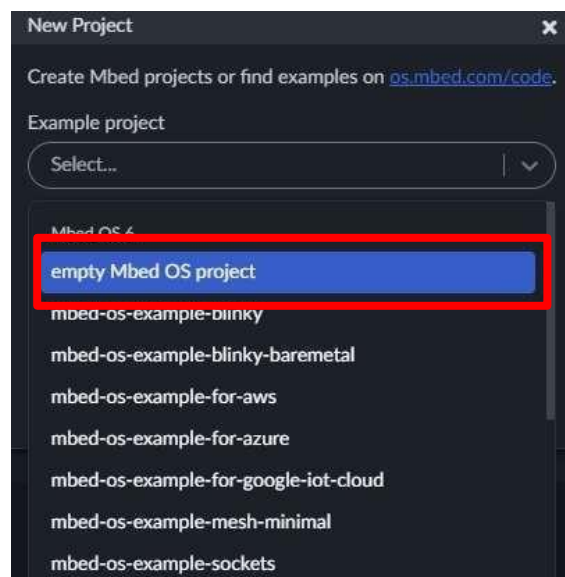


Step 2: Create a project and change the cpp file.

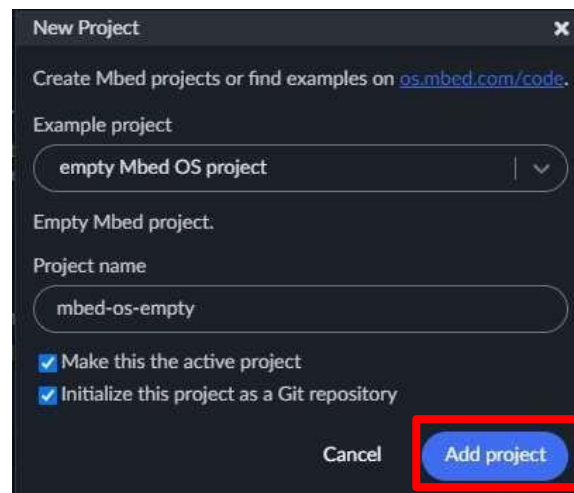
- Click New project.



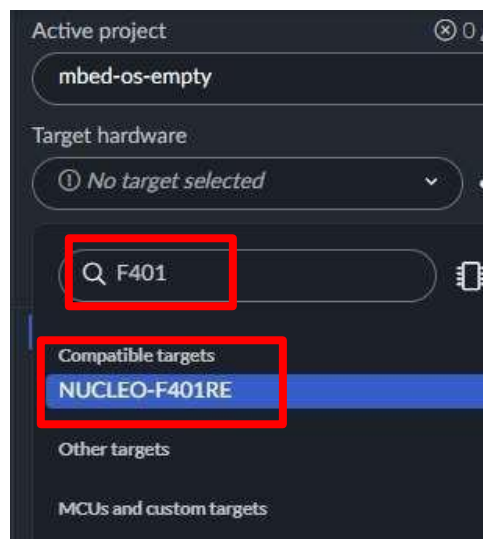
- Select **empty Mbed OS project** template.



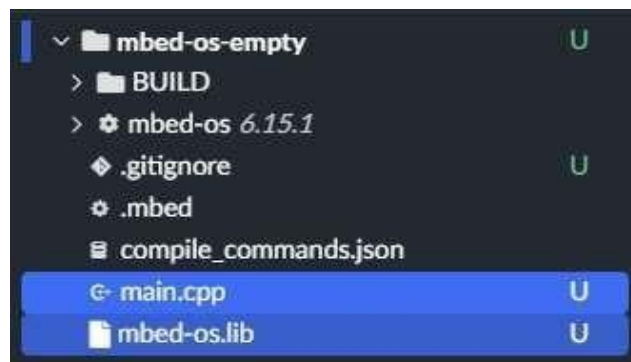
- Add Project.



- Search and select the target hardware: **F401**.



- Open the project folder and observe the main.cpp and the mbed OS libraries imported.



- Have a glance at the libraries contained in mbed-os. Open the README.md file and know more about this program.



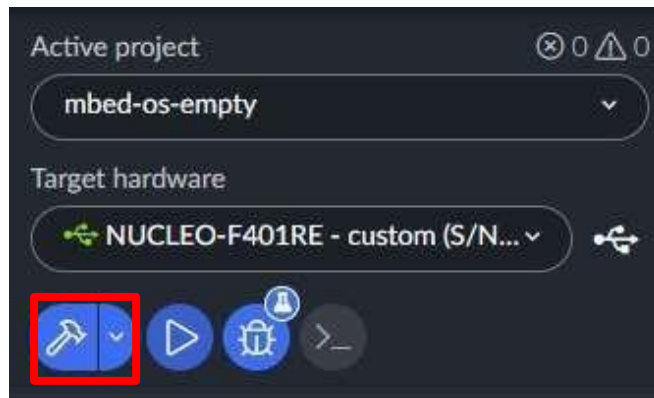
- Open the main.cpp file, write the program attached.

```

1  #include "mbed.h"
2
3  // main() runs in its own thread in the OS
4  int main()
5  {
6      while (true) {
7          printf("Hello world!");
8      }
9  }

```

- Click Build project and the generated executable file is downloaded to your PC.



Step 3: Loading and running the program on the board.

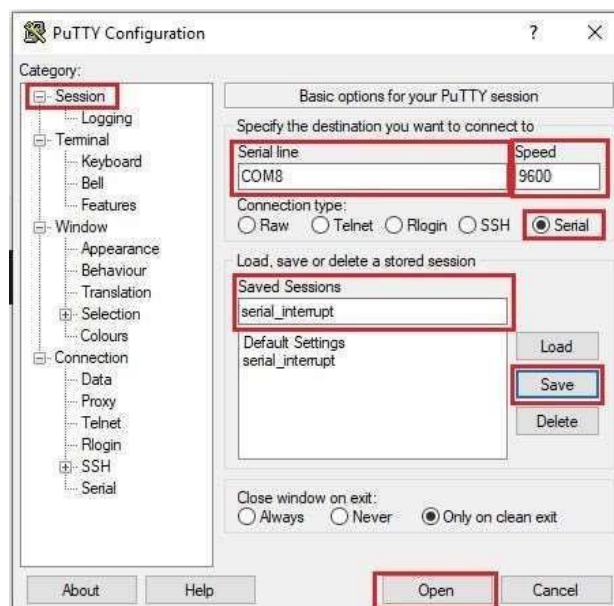
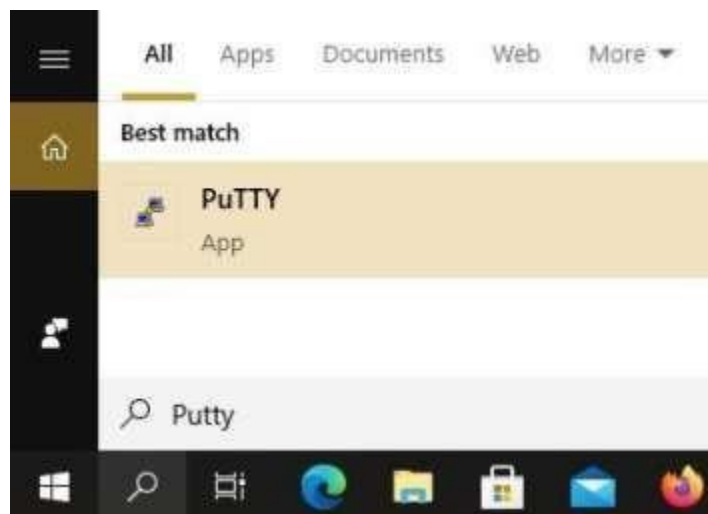
- Install the ST-link USB driver from the web page, prior to connecting the board.
<https://www.st.com/zh/development-tools/stsw-link009.html#get-software>
 (After downloading, go to device manager -> Ports, select driver).
- Go to device manager from Control Panel -> System



- Check Ports and make sure STLink Virtual COM Port is shown. Write down the Port number.



- Start Serial Communication with Putty.



Reference book for ARM Mbed

Fast and Effective Embedded System Design: Applying the ARM mbed. Second Edition



Book support material website

http://www.embedded-knowhow.co.uk/Book_3_Ed2.htm

Instructor Support.

The mbed allows a new style of teaching about embedded systems and microcontrollers in university and college courses. Support material is available for instructors.

Powerpoint slides. These are directly linked to the book content. There is one slide presentation for each book chapter. PDFs are available for each chapter.

Chapter 1	Chapter 4	Chapter 7	Chapter 10	Chapter 13
Chapter 2	Chapter 5	Chapter 8	Chapter 11	Chapter 14
Chapter 3	Chapter 6	Chapter 9	Chapter 12	Chapter 15

Solutions to Quiz questions.

For Quiz solutions or Lecture Note powerpoints, please [email](#) from a university/college email address. In your email please give brief details of the request.

Code Examples.

These are available below - copy and paste from the Word document into the mbed compiler.

Chapter 1	Chapter 4	Chapter 7	Chapter 10
Chapter 2	Chapter 5	Chapter 8	Chapter 11
Chapter 3	Chapter 6	Chapter 9	Chapter 12

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