Getting started with STM32Nucleo and ARM mbed

AST Day 2018

Licio Mapelli
Introduction to ARM mbed

The Today Agenda

- The ARM Mbed ecosystem in a snapshot
- The ST offer on Mbed ecosystem
- The Developer Tools
- Some practice
ARMmbed™ is an online development environment for rapid prototyping of applications based on ARM CortexM™ microcontrollers

- Easy of use - simple object oriented C++ API

mbed provides a large online community providing

- Open source reusable software libraries and examples
- Help and support through an active forum

mbed platform is owned and maintained by ARM

- ST is an official mbed partner
STM32 ARM mbed ecosystem
Easy of use & Fast prototyping

STM32 Nucleo Development Boards
STM32 Nucleo Expansion Boards X-Nucleo

mbed Applications

STM32 Nucleo Development Boards
STM32 Nucleo Expansion Boards X-Nucleo

mbed SDK / mbedOS
mbed Component Libraries

mbed community and support

Sense
Move Actuate
Connect
Translate
Power
The ST offer
STM32 Nucleo family

• ST has the largest platforms offering on mbed: 33 boards

26 Nucleo Boards

- Nucleo-32
  - NUCLEO-F031K8
  - NUCLEO-F042K6
  - NUCLEO-F070RB
  - NUCLEO-F072RB
  - NUCLEO-F091RC
  - NUCLEO-F103RB
  - NUCLEO-F302R8
  - NUCLEO-F303RE
  - NUCLEO-F334R8

- Nucleo-64
  - NUCLEO-F401RE
  - NUCLEO-F410RB
  - NUCLEO-F411RE
  - NUCLEO-F446RE

- Nucleo-144
  - NUCLEO-F030R8
  - NUCLEO-F070RB
  - NUCLEO-F072RB
  - NUCLEO-F091RC
  - NUCLEO-F103RB
  - NUCLEO-F302R8
  - NUCLEO-F303RE
  - NUCLEO-F334R8

6 Discovery Kits

- DISCO-F429ZI
- DISCO-F469NI
- DISCO-F46NG
- DISCO-F334C8
- DISCO-L053C8
- DISCO-L476VG

• B96B-F446VE

One 96 Boards
Mezzanine board

• High performance
• Mainstream
• Ultra low power
The ST offer

X-Nucleo expansion boards

Sensors and analog

- X-NUCLEO-IKS01A1
  Motion MEMS and environmental sensors
- X-NUCLEO-6180XA1
  Proximity and ambient light sensor
- X-NUCLEO-IKA01A1
  Multifunctional expansion board based on operational amplifiers

Wireless communication

- X-NUCLEO-IDB04A1
  Bluetooth Low Energy
- X-NUCLEO-IDB05A1
  Bluetooth Low Energy
- X-NUCLEO-IDW01M1
  Wi-Fi expansion board
- X-NUCLEO-NFC02A1
  Dynamic NFC tag
- X-NUCLEO-NFC01A1
  Dynamic NFC tag

The ST offer expansion boards.
• Mbed Classic (ex v2)
  • Optional OS
  • No multithread
  • https://os.mbed.com/users/mbed_official/code/mbed/

• Mbed OS = Classic + RTOS + Comm
  • Standardized wireless communication scaled for IoT devices
  • Seamless cloud connectivity
  • Built-in security support
  • Multithread support
  • https://github.com/ARMmbed/mbed-os
• Development
  - Projects can be exported to a number of IDEs (IAR, KEIL, GCC-SW4STM32)
  - Online Compiler/CLI has no debugging capabilities → Do use an off-line IDE
  - Fully synchronized with online repositories (HGMercurial & GitHub)

• Support for various DVCS
  - Git (GitHub, gitLab, bitBucket)
  - Mercurial (developer.mbed.org)

• Documentation support
  - Classes all documented online

The easiest

The powerful

The bests (but costly)

The ST free
• mbed includes an online IDE
  • Developers can start their development using their web browser.
  • They can later export their project to use with their favourite IDE
  • Export to IAR, KEIL and GCC (SW4STM32) are supported for STM32 platforms

• Version control
  • Different version control systems integrated (git/github, mercurial)

• Inline documentation support
  • This helps keeping the API documentation up to date
Workflow Overview – Code management

The Developer Tools

The workflow

Binary flash
Some Practice
Three steps to start

1. "Import Into Compiler" a reference project from https://os.mbed.com/teams/ST/

2. Modify/extend/compile/debug your application on the target board

3. Commit/branch/publish your app to https://os.mbed.com/teams/AST_Day_Contest/

Repos
- HGMercurial
- GitHub
• From the Mbed website you can:
  • Browse the repository to find a suitable “HelloWorld” application
  • Import it into the online compiler, select your target MCU and compile/download on the board
  • Modify/extend/add libraries

• From OnlineIDE you can Version Control
  • Commit/Publish/Branch/Merge on Github and Mercurial repos.

• From OnlineIDE you can Export/Import program
  • Export to Keil/IAR/SW4ST32 and many others
  • Update from CLI through Mercurial Repo

Some Demo Links


https://os.mbed.com/teams/ST/code/Cloud_IBM_MbedOS/  IBM IoT Cloud Publisher (Quickstart/Play/TLS)

https://os.mbed.com/teams/ST/code/MOTENV_Mbed/  Motion Sensors Demo with companion Android App

https://os.mbed.com/teams/ST/code/MemsMotorControl/  Stepper motor driver demo
Mandatory to connect the STM32 Nucleo


Optional but useful to work off-line


- [https://tortoisehg.bitbucket.io/download/windows.html](https://tortoisehg.bitbucket.io/download/windows.html) Mercurial HG GUI client for windows

- [https://git-scm.com/downloads](https://git-scm.com/downloads) GIT GUI Client

- [https://gitforwindows.org/](https://gitforwindows.org/) GIT Bash

- [https://os.mbed.com/teams/ST/](https://os.mbed.com/teams/ST/) The ST Mbed Mercurial repo

- [https://github.com/ARMmbed](https://github.com/ARMmbed) The ARM Mbed GitHub repo
THANK YOU!

www.mbed.org/teams/ST/