

# Qt on MCU

scaling down to the microcontroller level



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# Embedded development with Qt

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### Supported platforms so far

#### > Embedded:

- > Linux (Yocto and others)
- > Windows (WinCE / WinRT / UWP)
- > RTOS (QNX, VxWorks, INTEGRITY)

#### > Desktop:

- Mac OS
- Windows
- Linux
- > Mobile:
  - iOS (tvOS, watchOS)
  - Android
  - > UWP



### Current hardware requirements

We recommended the following:

- > 500 MHz CPU
  - preferably 1 GHz
- > 256 MB of RAM
- > OpenGL ES 2.0 support
  - not a strict requirement

### What does it take to add more platforms?

#### > POSIX-compatible operating system

- > pthreads
- > mmap
- > fopen
- other POSIX functions

#### > C++11 compatible compiler

- > starting with Qt 5.7 it is a strict requirement
- you can take Qt 5.6 or older, but then porting becomes significantly more complicated as you'll be missing important performance improvements from latest Qt versions



### Porting Qt to a new operating system



We chose RTEMS real-time operating system:

- > POSIX support
- > C++11 support
- supports various file systems (NFS, FAT)
- > includes a port of the FreeBSD TCP/IP stack
- Open Source license (modified GPL)
- > active community



#### And ported the following Qt modules:

- > Qt Core
- > Qt GUI
  - > Qt Widgets
  - > Qt QML
  - > Qt Quick Controls 2
- > Qt Network



### Adding support for a new hardware

Boards: STM32F469, STM32F746, STM32F769.

#### Configure the board

- set clock generator (frequency)
- > memory (SDRAM, caches, MPU)
- initialize peripherals
- > and so on

#### > Port RTEMS to STM32F4/F7

create a board support package (BSP)

#### > Port Qt to RTEMS

- add support for it in Qt Core
- > create a new QPA plugin



### Results

- > Simple Qt Widgets demo:
  - › firmware: 6.6 MB
  - > RAM: 3.4 MB
- > Simple Qt Quick demo:
  - > firmware: 9 MB
  - > RAM: 5 MB
- > E-bike dashboard (Qt Quick):
  - › firmware: 13 MB
  - > RAM: 10 MB



## How we can help

- Performance optimizations
  - operating system level
  - > Qt library level
  - application level
- > UI implementation
  - design to production
- Join MCU pilot program
  - > fill in <u>https://www1.qt.io/contact-us/</u> form
  - > type "Qt on MCU" in the comment section

Thank you