MicroEJ Platform

Developer's Guide

FRDMKL46Z 2.3.0

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Confidentiality & Intellectual Property

Revision History		
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First release		

Table of Contents

List of Figures

List of Tables

Chapter 1. Introduction

1.1. Intended Audience

The intended audience for this document are developers who wish to develop their first MicroEJ stand-alone application with MicroEJ SDK. Notes:

- This document is for the NXP FRDM_KL46Z board.

- Please visit the website https://developer.microej.com for more information about FRDM_KL46Z products (platforms, videos, examples, application notes, etc.).

1.2. Scope

This document describes, step by step, how to start your development with MicroEJ SDK

- Run a MicroEJ standalone application on the MicroEJ simulator.

- Run a MicroEJ standalone application on the MicroEJ platform and deploy it on the FRDM_KL46Z board.

1.3. Prerequisites

- PC with Windows 7 or later.

- The MicroEJ SDK environment must be installed.

- FRDM_KL46Z board.

Chapter 2. Develop and Run Your First MicroEJ Standalone Application

2.1. Run an Example on the MicroEJ Simulator

The aim of this chapter is to create a MicroEJ standalone application from a built-in example. Initially, this example will run on the MicroEJ simulator. Then, in the next section, this application will be compiled and deployed on the FRDM_KL46Z board using the MicroEJ platform.

2.1.1. Create Example

- Open MicroEJ SDK.

- Open the `File > New > MicroEJ Standalone Example Project` menu.

- Select the MicroEJ platform FRDMKL46Z-XXBWV from the combo box.

- Select the example `Samples > Getting Started > Hello World`.

Figure 2.1. MicroEJ Standalone Application Selection
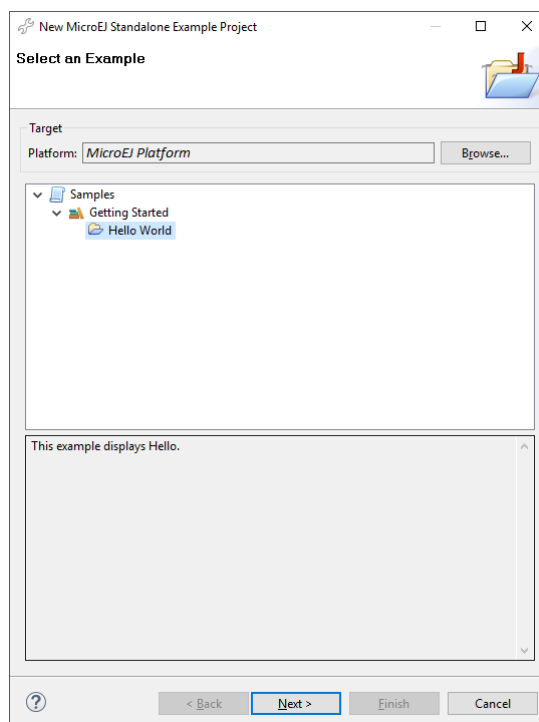
- Click on Next. The next page suggests a name for the new project.

Figure 2.2. MicroEJ Standalone Application Naming
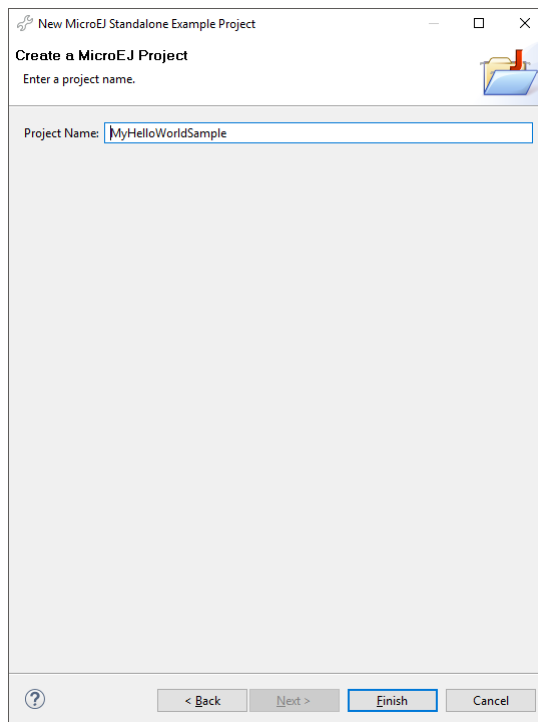
- Click on Finish. The selected example is imported into a project with the given name. The main class (the class which contains the `main()` method) is automatically opened.

2.1.2. Run Example

- Select the project in the Package Explorer tree

- Right-click on this project and select `Run As > MicroEJ Application`

Figure 2.3. MicroEJ Standalone Application Running
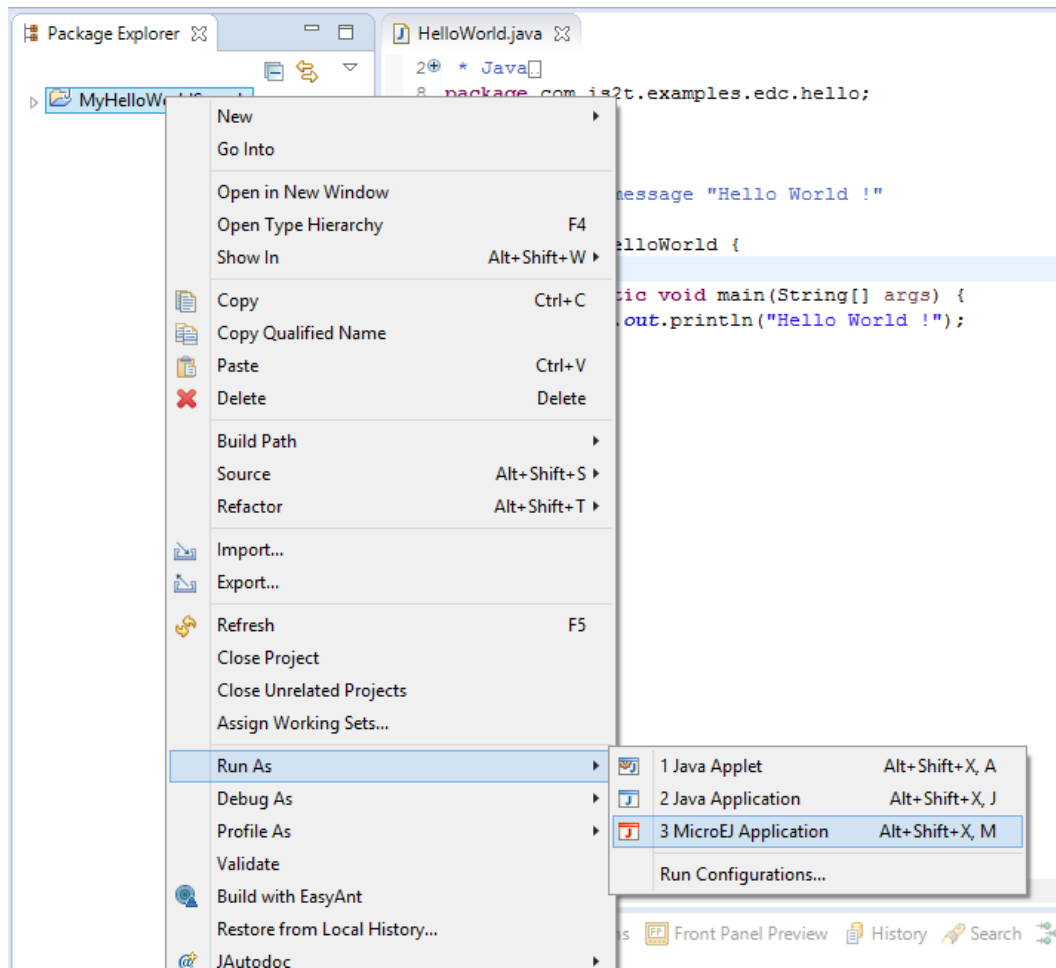
The application starts. It is executed on the MicroEJ simulator of the selected MicroEJ platform (FRDMKL46Z-XXBWV). The result of the test is printed in the console:

```
Hello World !
```

2.2. Run the Example on the FRDM_KL46Z Board

2.2.1. Compile MicroEJ Standalone Application

- Open the run dialog (`Run > Run configurations...`).

- Select the MicroEJ Application launcher `HelloWorld`.

- Open `Execution` tab.

- Select `Execute on Device`.

Figure 2.4. Execution on Device
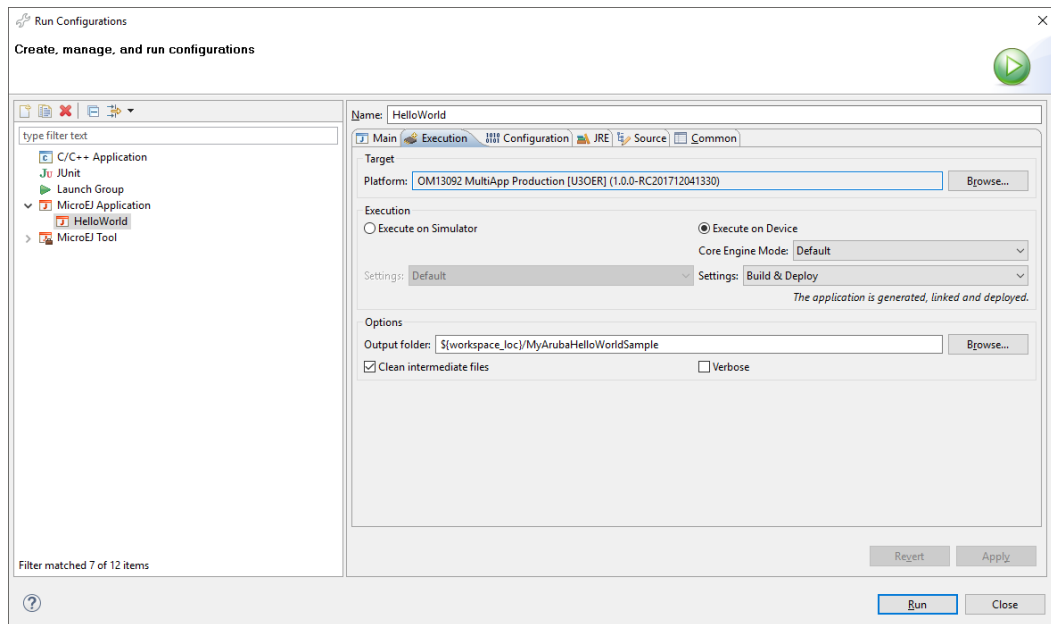
- In the `JRE` tab, pass the following VM argument: `-Dtoolchain.dir` and set its value to the path to the toolchain directory of IAR (typically `C:\Program Files (x86)\IAR Sys-tems\Embedded Workbench 7.80\arm\bin`).

  Click `Run`: the application is compiled, and the compilation result (an ELF file) is copied into a well-known location in the example project. The Open SDA tool has to be used to load the program on the board.

2.2.2. OpenSDA Programming Tool

The aim of this section is to program a binary on the FRDM_KL46Z board.

Prerequisites

Download Open SDA software and documentation pack from `http://www.pemicro.com/opensda/` and install it on your machine.

- Click on `Run > Run Configurations...`. Then right click on sub menu of `MicroEJ Tool` and select `New` to create a new MicroEJ Tool launcher:

Figure 2.5. MicroEJ Tool Launcher Creation
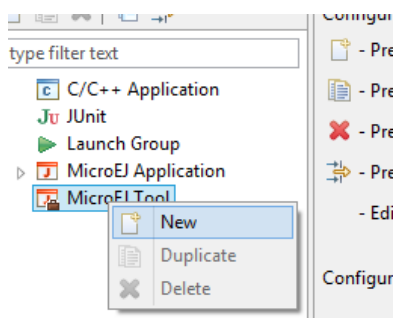
- A new window appears. Give a name to the launcher and set the `MicroEJ platform` field to `FRDMKL46Z-XXBWV` and the `Settings` field to `Program with OpenSDA`

Figure 2.6. OpenSDA MicroEJ SDK Tool Window
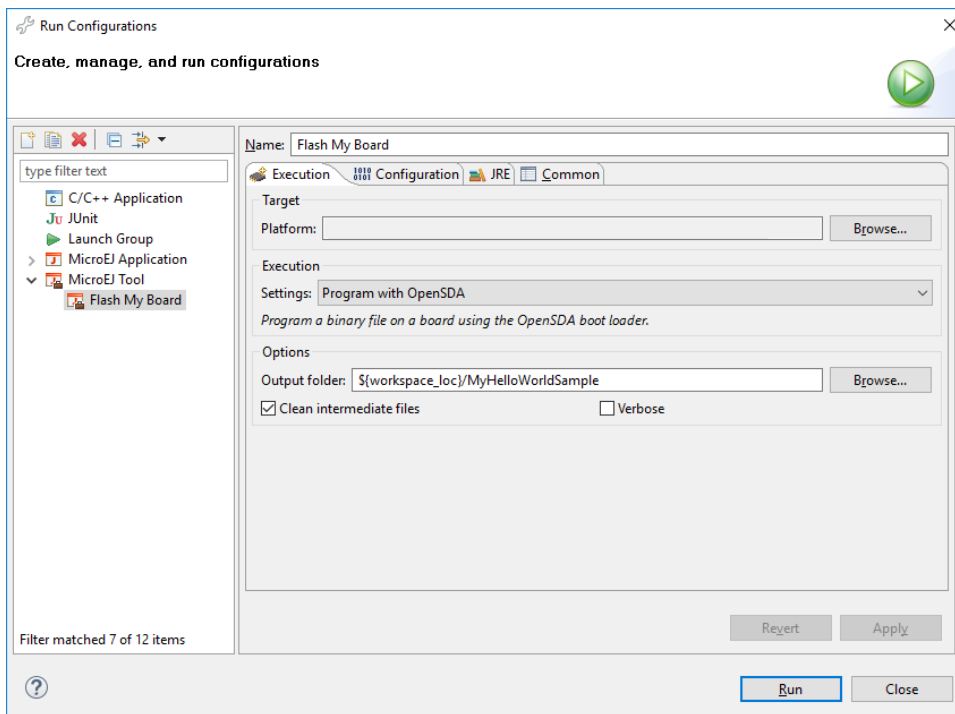
- Click on `Configuration` tab select the `application.out` file available in the MicroEJ project.

Figure 2.7. OpenSDA MicroEJ SDK Tool Configuration Window
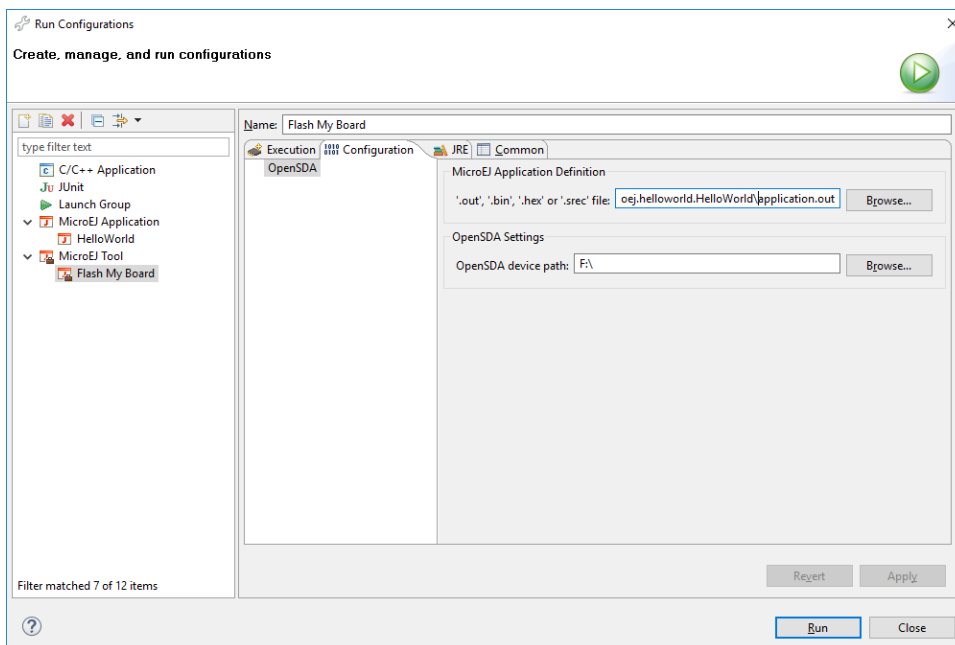
- Click on `Run` to program the binary.

  At the end of the execution the following message appears:

```
Flash programming complete successfully.
```

The application starts. The result of the execution is output on printf COM port. (See "Mandatory Connectors" to use the right connectors). Congratulations, you have deployed a MicroEJ standalone application on a MicroEJ platform.

Chapter 3. Specification

3.1. Overview

MicroEJ platform on FRDM_KL46Z.

3.2. MicroEJ Platform Configuration

MicroEJ platform is based on MicroEJ architecture for ARM Cortex-M0+.

Table 3.1. MCU Technical Specifications

MCU architecture	Cortex-M0P (MKL46Z256VLL4)
MCU Clock speed	48 MHz
Internal Flash	256 KB
Internal RAM	32 KB

MicroEJ platform uses several architecture extensions. The following table illustrates the MicroEJ architecture and extensions versions.

Table 3.2. MicroEJ Configuration

Name	Version
MicroEJ architecture	6.9.0
UI	9.0.2

3.3. Platform Output stream

MicroEJ platform uses a COM port as output print stream. The COM port is available via the MCU UART0.

The COM port uses the following parameters:

- Baudrate: 115200

- Data bits bits: 8

- Parity bits: None

- Stop bits: 1

- Flow control: None

3.4. Memories

MicroEJ Plaform uses several internal and external memories. The following table illustrates the MCU and board memory layouts and sizes fixed by the MicroEJ platform.

Table 3.3. Internal RAMs (32 KB)

Section Name	Size
MicroEJ standalone application stack blocks	512 * n bytes [a]
MicroEJ platform internal heap	n bytes [b]
Any RW	n bytes [c]

[a] n is the number of stack blocks defined in MicroEJ Application launcher options.

[b] n depends on memory configuration set in MicroEJ Application launcher options.

[c] n depends on MicroEJ application libraries used.

Table 3.4. Internal flash (256 KB)

Section Name	Size
Any RO	n bytes [a]
MicroEJ standalone application resources	n bytes [b]
Pre-installed MicroEJ sandboxed application	n bytes [c]

[a] n depends on MicroEJ application, MicroEJ libraries, Board support package, RTOS, drivers, etc.

[b] n is the size of all MicroEJ standalone application resources.

[c] n depends on the size defined in MicroEJ Application launcher options.

Chapter 4. Foundation Libraries

4.1. List

This table illustrates the available foundation libraries in the MicroEJ platform, and their versions.

Table 4.1. Foundation Libraries

Name	Version
EDC	1.2
BON	1.2
NLS	2.0
MicroUI	2.0

Chapter 5. Board Configuration

FRDM_KL46Z provides several connectors, each connector is used by the MicroEJ Core Engine itself or by a foundation library.

5.1. Mandatory Connectors

FRDM_KL46Z provides a multi function USB port used as:

- Power supply connector

- Probe connector

Plug a USB type B cable to a computer to power on the board, be able to program an application on it and to see the MicroEJ standalone application `System.out.print` traces.

Figure 5.1. Mandatory Connectors

Chapter 6. Changelog

6.1. Version 2.3.0

Initial release of the platform.