Spansion[®] Analog and Microcontroller Products



The following document contains information on Spansion analog and microcontroller products. Although the document is marked with the name "Fujitsu", the company that originally developed the specification, Spansion will continue to offer these products to new and existing customers.

Continuity of Specifications

There is no change to this document as a result of offering the device as a Spansion product. Any changes that have been made are the result of normal document improvements and are noted in the document revision summary, where supported. Future routine revisions will occur when appropriate, and changes will be noted in a revision summary.

Continuity of Ordering Part Numbers

Spansion continues to support existing part numbers beginning with "MB". To order these products, please use only the Ordering Part Numbers listed in this document.

For More Information

Please contact your local sales office for additional information about Spansion memory, analog, and microcontroller products and solutions.



Colophon

The products described in this document are designed, developed and manufactured as contemplated for general use, including without limitation, ordinary industrial use, general office use, personal use, and household use, but are not designed, developed and manufactured as contemplated (1) for any use that includes fatal risks or dangers that, unless extremely high safety is secured, could have a serious effect to the public, and could lead directly to death, personal injury, severe physical damage or other loss (i.e., nuclear reaction control in nuclear facility, aircraft flight control, air traffic control, mass transport control, medical life support system, missile launch control in weapon system), or (2) for any use where chance of failure is intolerable (i.e., submersible repeater and artificial satellite). Please note that Spansion will not be liable to you and/or any third party for any claims or damages arising in connection with above-mentioned uses of the products. Any semiconductor devices have an inherent chance of failure. You must protect against injury, damage or loss from such failures by incorporating safety design measures into your facility and equipment such as redundancy, fire protection, and prevention of over-current levels and other abnormal operating conditions. If any products described in this document represent goods or technologies subject to certain restrictions on export under the Foreign Exchange and Foreign Trade Law of Japan, the US Export Administration Regulations or the applicable laws of any other country, the prior authorization by the respective government entity will be required for export of those products.

Trademarks and Notice

The contents of this document are subject to change without notice. This document may contain information on a Spansion product under development by Spansion. Spansion reserves the right to change or discontinue work on any product without notice. The information in this document is provided as is without warranty or guarantee of any kind as to its accuracy, completeness, operability, fitness for particular purpose, merchantability, non-infringement of third-party rights, or any other warranty, express, implied, or statutory. Spansion assumes no liability for any damages of any kind arising out of the use of the information in this document.

Copyright © 2013 Spansion Inc. All rights reserved. Spansion[®], the Spansion logo, MirrorBit[®], MirrorBit[®] Eclipse[™], ORNAND[™] and combinations thereof, are trademarks and registered trademarks of Spansion LLC in the United States and other countries. Other names used are for informational purposes only and may be trademarks of their respective owners.

FM3 FAMILY 32-BIT MICROCONTROLLER MB9BFXXX

Implementation of GNU Tool Chain for FUJITSU Cortex-M3 MCUs

APPLICATION NOTE

Revision History

Date	Issue
2011-09-27	1.0: SAh, MWi; First version
2012-03-21	1.1; MWi; Notes for different devices/configurations added
2012-04-04	1.2; MWi; Software package updated

This document contains 143 pages.

Warranty and Disclaimer

The use of the deliverables (e.g. software, application examples, target boards, evaluation boards, starter kits, schematics, engineering samples of IC's etc.) is subject to the conditions of Fujitsu Semiconductor Europe GmbH ("FSEU") as set out in (i) the terms of the License Agreement and/or the Sale and Purchase Agreement under which agreements the Product has been delivered, (ii) the technical descriptions and (iii) all accompanying written materials.

Please note that the deliverables are intended for and must only be used for reference in an evaluation laboratory environment.

The software deliverables are provided on an as-is basis without charge and are subject to alterations. It is the user's obligation to fully test the software in its environment and to ensure proper functionality, qualification and compliance with component specifications.

Regarding hardware deliverables, FSEU warrants that they will be free from defects in material and workmanship under use and service as specified in the accompanying written materials for a duration of 1 year from the date of receipt by the customer.

Should a hardware deliverable turn out to be defect, FSEU's entire liability and the customer's exclusive remedy shall be, at FSEU's sole discretion, either return of the purchase price and the license fee, or replacement of the hardware deliverable or parts thereof, if the deliverable is returned to FSEU in original packing and without further defects resulting from the customer's use or the transport. However, this warranty is excluded if the defect has resulted from an accident not attributable to FSEU, or abuse or misapplication attributable to the customer or any other third party not relating to FSEU or to unauthorised decompiling and/or reverse engineering and/or disassembling.

FSEU does not warrant that the deliverables do not infringe any third party intellectual property right (IPR). In the event that the deliverables infringe a third party IPR it is the sole responsibility of the customer to obtain necessary licenses to continue the usage of the deliverable.

In the event the software deliverables include the use of open source components, the provisions of the governing open source license agreement shall apply with respect to such software deliverables.

To the maximum extent permitted by applicable law FSEU disclaims all other warranties, whether express or implied, in particular, but not limited to, warranties of merchantability and fitness for a particular purpose for which the deliverables are not designated.

To the maximum extent permitted by applicable law, FSEU's liability is restricted to intention and gross negligence. FSEU is not liable for consequential damages.

Should one of the above stipulations be or become invalid and/or unenforceable, the remaining stipulations shall stay in full effect.

The contents of this document are subject to change without a prior notice, thus contact FSEU about the latest one.

Contents

RI	EVISIO	ON HIST	ORY	2			
W	ARRA		ID DISCLAIMER	3			
С	ONTE	NTS		4			
1	INTR	ODUCTI	ON	7			
	1.1	Descript	tion	7			
	1.2	JTAG Ir	iterface	8			
		1.2.1	KT-Link	9			
		1.2.2	J-Link	. 10			
	1.3	Downloa	ad the tutorial material	. 10			
2	YAG	ARTO		. 11			
	2.1	Yet ano	ther GNU ARM Tool Chain	. 11			
	2.2	Downloa	ading Yagarto Tools	. 11			
	2.3	Installing	g Yagarto tools	. 12			
3	OPE	NOCD		. 15			
	3.1	Open O	n-Chip Debugger	. 15			
	3.2	Using O	penocd with FTDI driver	. 16			
		3.2.1	Installation of Cygwin	. 16			
		3.2.2	Download of OpenOCD source and FTDI driver	. 22			
		3.2.3	Configuration and compilation of OpenOCD with FTDI driver	. 23			
	3.3	Test of (OpenOCD configured for FTDI driver	. 26			
		3.3.1	Installation of FTDI drivers for the JTAG dongle	. 26			
		3.3.2	Run OpenOCD	. 30			
	3.4	Using O	pen OCD with LibUSB driver	. 32			
		3.4.1	Installation of OpenOCD version supporting LibUSB driver	. 32			
		3.4.2	Installation of LibUSB driver for the JTAG dongle	35			
		3.4.3	Test of OpenOCD Server configured on the Basis of LibUSB Driver	. 39			
4	J-LIN		SERVER	41			
	4.1	The J-Li	ink software	. 41			
	4.2	The Seg	gger JTAG interface "J-Link"	43			
	4.3	Test J-L	ink GDB Server	45			
5	JAV	A RUNTI	ME ENVIRONMENT JRE	47			
	5.1	Checkin	g for Java JRE	. 47			
	5.2	Installing Java JRE					
6	ECLI	PSE PL/	ATFORM	48			
	6.1	Eclipse	platform	. 48			
	6.2	Start Ec	lipse IDE	51			

7	C/C+	+ DEVELOPMENT TOOLING CDT	52
	7.1	Installation of new Software on Eclipse	52
	7.2	Eclipse Network Configuration	53
	7.3	Eclipse CDT Plug-In	54
8	WOR	KING WITH THE ECLIPSE IDE	59
	8.1	C/C++ perspective	59
	8.2	Creating a C or C++ project with Eclipse	60
	8.3	Cleaning the selected project	65
	8.4	Building the selected project	68
	8.5	Create make target	69
9	EXA	MPLE ECLIPSE PROJECT TEMPLATE	72
	9.1	Add other Files to the Template Folder	73
	9.2	Add other Libraries to the "Includes" Directory	75
	9.3	Make File	78
10	PRO	GRAMMING THE FLASH MEMORY	87
	10.1	OpenOCD and Flash Programming	87
	10.2	J-Link and Flash Programming	89
11	SET	UP ECLIPSE EXTERNAL TOOLS	90
	11.1	Further External Tools	90
	11.2	OpenOCD as an Eclipse external tool	90
	11.3	J-Link GDB Server as an Eclipse External Tool	95
12		PSE CDT DEBUG PERSPECTIVE	99
	12.1	Programming and debugging on the Flash memory 1	00
		12.1.1 Using J-Link GDB Server to download and debug the flash application . 1	00
		12.1.2 Using the OpenOCD Server to debug a Flash Application 1	09
	12.2	Debug on the RAM 1	15
		12.2.1 Using J-Link GDB Server to Debug the RAM Application 1	16
		12.2.2 Use OpenOCD to debug the RAM application 1	21
13	BECLI	PSE EMBEDDED SYSTEMS REGISTER VIEW PLUG-IN 1	26
	13.1	Plug-in installation	26
	13.2	Using the Eclipse Register View 1	29
14	ECLI	PSE FEATURES 1	34
	14.1	Overview 1	34
	14.2	Disassembly view1	34
	14.3	CPU Register View 1	35
	14.4	Memory view 1	36
	14.5	Using Breakpoints on Eclipse Debug Perspective 1	37
15	5 APP	ENDIX 1	40

15.1 Glossa	y	140
15.2 Links	141	
15.2.1	Software 141	
15.2.2	Hardware and belonging Software (if needed)	141
16 ADDITIONAL	INFORMATION	142

1 Introduction

SCOPE OF THIS DOCUMENT

1.1 Description

This document describes the implementation of Yagarto tools as a compiler collection for the Eclipse platform for the Fujitsu Cortex-M3 microcontroller family.

The Yagarto tool chain has following features:

- No need of Cygwin, Windows executable are included
- Binutils, Newlib, and the GNU compiler collection is provided

Based on the platform Eclipse, the C/C++ Development Tooling (CDT) project provides a fully functional C and C++ Integrated Development Environment IDE.

CDT has following features:

- Supports project creation and managed build for GNU tool chain.
- Code editor for the creation of makefile, assembler, C/C++ source/include, and linker script files.
- Visual debugging tools, including memory, registers, and disassembly views.
- Supports Open On-Chip Debugger and J-Link GDB Server as external debugging tools.

This document describes at first the installation procedure for all tools and software packages needed to realize a development environment based on Eclipse platform and Yagarto tool chain.

For this the first part of this document includes the installation specification of the following software packages:

- Yagarto tools
- OpenOCD
- J-Link GDB Server
- Java JRE
- Eclipse platform
- C/C++ Development Tooling CDT

In order to test the IDE installed during this description, the following board is used exemplarily:

• Fujitsu Starter Kit for FM3 MCU MB9BF506N: SK-FM3-100PMC



1.2 JTAG Interface

For flashing and debugging software on the MCU, the JTAG port of the board is used, and thus a JTAG interface is also needed.

This document demonstrates two different debugging methods:



Host

- 1. Debugging via OpenOCD server using the JTAG interface "KT-Link" (based on FT2232D)
- 2. Debugging via JLink GDB server using the JTAG interface "J-Link-ARM"

1.2.1 KT-Link

An FT2232D JTAG to USB based solution is the KT-Link from Kris-Tech



This interface has the following features:

- USB High Speed (480 MHz) connection to host PC
- Wide range of target voltage: 1.65 to 5.5V
- Hardware support for SWD and SWV
- Standard 2x10 pin ARM JTAG connector
- LEDs
- No power supply required, powered through USB
- Virtual RS232 port with all DB9 connector signals
- Serial port works in RS-232 mode or wide range of voltage (5V, 3.3V, 2.5V, 1.8V) selectable by user
- Target power supply with overload protection

The JTAG interface "KT-Link" can be purchased from the website: <u>www.shop.kristech.eu</u>

1.2.2 J-Link

Another JTAG interface used with the J-Link GDB server is the "J-Link" for ARM Processors. This interface is also a product of the company Segger.



The Segger "J-Link" has the following features:

- USB powered JTAG emulator for Cortex-M devices
- License for J-Link GDB server
- License for Flash download
- License for the flash breakpoints
- Support download in RAM and Flash
- Support an unlimited number of BP in Flash
- SWD/SWV
- Voltage range: 1.2-3.3V, 5V

For more information about the "J-Link" interface: <u>http://www.segger.com/cms/jlink.html</u>

1.3 Download the tutorial material

Before starting this tutorial, first download the tutorial project source and OpenOCD configuration files. These files are contained in the software package of this application note.

2 YAGARTO

THIS CHAPTER DESCRIBES HOW TO INSTALL THE YAGARTO SOFTWARE PACKAGE

2.1 Yet another GNU ARM Tool Chain

There are a number of pre-built GNU ARM compiler toolsets available on the web. This application note uses the YAGARTO pre-built ARM compiler tool suite developed by Michael Fischer. This version of the GNU compiler toolset for ARM has been natively compiled for the Intel/Windows platform.

Except the ARM compiler toolset the Yagarto project provides also other tools needed to build a make file project on Eclipse CDT e.g. make utility.

2.2 Downloading Yagarto Tools

The Yagarto components can be downloading from the Yagarto website: www.yagarto.de

YAGA	Web www.yagarto.de RTO Yet another GNU ARM toolchain HOME HOW TO PROJECTS LINKS IMPRINT
HOME hy? winload henOCD henOCD cense information hen-commercial version he	 Why another GNU ARM toolchain? Initially I was searching for a toolchain with the following features: not based on Cygwin works with Eclipse cheap for the beginners Ifound some native Windows toolchains based on MinGW, but the GDB of these toolchains doesn't work properly under Eclipse. That's why I decide to create a new toolchain suited for my requirements. YAGARTO was born (in 2006). YAGARTO is divided in three packages with the following components: JTAG debugger interface like the J-Link GDB Server or the Open On-Chip Debugger. Binutils, Newlib, GCC compiler, and the GDB debugger Eclipse Platform Runtime Binary and Eclipse CDT. YAGARTO is a hobby project and supported only by the community. If you want a faster start, a smoother workflow and professional support, take a look at a commercial toolchain like CrossWorks for ARM.

Use the "Download" link on the left menu pane.

4	-	-	2	4	0	Web	www.yagarto.de/#download
---	---	---	---	---	---	-----	--------------------------

Download

The packages of YAGARTO can be found here:

Package	Version	Date
AGARTO Tools (2 №B) (md5: 07a87ac3cd10bf32a0761390b5176895) Include tools like make, sh, touch, uname and more.	20100703	03.07.2010
TAGARTO GNU ARM toolchain (18 MB) (md5: 9ec8c449295b0b8dd6Da7a22169e374c) This version is an EABI version now. If you update from an older YAGARTO version you must replace arm-elf- by arm-none-eabi- in your makefile. Note: I got a info that this version has some problems if the "svc 0" assembler instruction is used. (Error: SVC is not permitted on this architecture) It seems that this is a <u>problem</u> of the gas from binutils 2.21. If you also have this problem, use the YAGARTO version <u>before</u> .	Binutils-2.21 Newlib-1.19.0 GCC-4.5.2 GDB-7.2	23.12.2010
Integrated Development Environment You must download the IDE from eclipse.org, but the link above will give you some instructions.	Eclipse Eclipse CDT	

It is recommended to use the latest versions provided on the website.

Only the first two packages are recommended at this moment, because the installation description of the third package "Eclipse IDE" and "Eclipse CDT" will be separately explained in detail in chapter 6.

2.3 Installing Yagarto tools

After saving the package, e.g. in the temporary folder "Yagarto-Downloads", the installation procedure of these tools can be started.



After downloading start the installation of the make utility tools "yagarto-tools-20100703-setup" or newer.

Implementation of GNU tool chain for Fujitsu Cortex-M3 MCUs Chapter 2 YAGARTO



Next following the installation steps for the ARM compiler toolset "yagarto-bu-2.21_gcc-4.5.2-c-c++_nl-1.19.0_gdb-7.2_eabi_20101223" or newer.



3 OpenOCD

HOW TO INSTALL OPENOCD

3.1 Open On-Chip Debugger

The Open On-Chip debugger is an open source software solution for accessing embedded ARM cores via JTAG hardware interface "JTAG dongle".

OpenOCD support many of JTAG dongles. The most of this dongles are based of the FTDI USB device chip FT2232D from Future Technology Devices International Ltd.

In this application note the OpenOCD with the JTAG dongle "KT-Link" is used exemplarily.



KT-Link can be driven with the FTDI driver "D2xx" or with the open source LibUSB driver "libftdi". Both drivers are included on the CD delivered with KT-Link dongle.

••• E:\				_ [] ×
<u>File Edit V</u> iew F <u>a</u> v	orites <u>T</u> ools <u>H</u> elp			
🌀 Back 🔹 🕥 👻 🗗	🇊 🔎 Search 🏾 🍋 Fold	ders 🛛 🖾 🏂 🗙	1	
Address 💽 E:\				💌 🔁 Go
Name 🔺	Size	Туре	Date Modified	
DOC		File Folder	11/27/2010 12:00 PM	
Drivers		File Folder	11/27/2010 12:00 PM	
CKT-LINK Measurement		File Folder	11/27/2010 12:00 PM	
OpenOCD		File Folder	12/2/2010 7:44 PM	
	È E:\Drivers Eile Edit <u>Vi</u> ew F <u>a</u> vori	tes <u>T</u> ools <u>H</u> elp		
		Search 😥 Fo	iders 🛛 🖾 🎾 🗙	
1	Aguress E: Univers	14 1		
	Name 🔺	Size	Туре	Date Modified
	D2XX		File Folder File Folder	11/27/2010 12:00 PM 12/2/2010 6:13 PM
4 objects	l 2 objects		0 bytes 📑	My Computer

Before installing and running OpenOCD, it must be taken care, which driver is used for the JTAG dongle.

When the LibUSB driver is used, the Windows installer program for the latest OpenOCD version can be downloaded from the website:

http://www.freddiechopin.info/index.php/en/download/category/4-openocd

Since version "0.4.0" presented on this website the LibUSB driver is included and can be installed.

If the FTDI driver is used, OpenOCD does not deliver any Windows installer, because the FTDI driver is proprietary and closed software. Therefore it is needed to configure and compile the OpenOCD manually together with this driver.

In this chapter the installation procedure of OpenOCD for JTAG dongle using LibUSB driver and the configuration procedure of OpenOCD to use dongle with FTDI driver is described.

3.2 Using Openocd with FTDI driver

As described above the OpenOCD sources does not include the FTDI driver, so it is needed for using OpenOCD with KT-Link on the basis of the "D2xx" driver to configure and install the OpenOCD with this driver.

To use Openocd 0.4.0 (or higher) for Windows with FTDI driver based JTAG interfaces, it is needed to build OpenOCD for Windows OS using Cygwin.

3.2.1 Installation of Cygwin

Cygwin can be installed or updated with the installer program "setup.exe". This setup file can be downloaded from the website: <u>http://cygwin.com/install.html</u>



After saving the Cygwin setup file, run this program to install Cygwin.

Desktop\downloads	💌 🄁 Wechseln zu
eclipse-platform-3.6 50.759 KB	5.1-win32 setup
Cygwin Setup	
	Cygwin Net Release Setup Program
	This setup program is used for the initial installation of the Cygwin environment as well as all subsequent updates. Make sure to remember where you saved it.
	The pages that follow will guide you through the installation. Please note that Cygwin consists of a large number of packages spanning a wide variety of purposes. We only install a base set of packages by default. You can always run this program at any time in the future to add, remove, or upgrade packages as necessary.
	E
	Setup.exe version 2.738
	Copyright 2000-2010
	http://www.cygwin.com/
	< Zurück Weiter > Abbrechen

In the next step of the installation setup, choose the installation method.

Choose A Do Choose who a local direc	enload Source ether to install or download from the internet, or install from files in tory.
	O Install from Internet
	(downloaded files will be kept for future re-use)
	O Download Without Installing
	O Install from Local Directory

The next two steps of the installation create the root installation directory and the local directory, where the setup files will be saved.

🛙 Cygwin Setup - Choose Installation Directory	Cygwin Setup - Select Local Package Directory	
Select Root Install Directory Select the directory where you want to install Cygwin. Also choose a few installation parameters.	Select Local Package Directory Select a directory where you want Setup to store the installation files it downloads. The directory will be created if it does not already exist.	E
Root Directory		
C:\Cygwin Browse		
Instal For	Local Package Directory	
All Users (RECOMMENDED) Cygwin will be available to all users of the system.	C:\Cygwin\dowloads Browse	
Just Me Cygwin will still be available to all users, but Desktop Icons, Cygwin Menu Entries, and important Installer information are only available to the current user. Only select this if you lack Administrator privileges or if you have specific needs.		
<zurück weiter=""> Abbrechen</zurück>	<zurück weiter=""></zurück>	Abbrechen

After this, first configure the network setting and choose an "http" or "ftp" mirror to get the Cygwin packages.

Cygwin Setup - Select Connection Type	Cygwin Setup - Choose Download Site(s)	- 🗆 🛛
Select Your Internet Connection Setup needs to know how you want it to connect to the internet. Choose the appropriate settings below.	Choose A Download Site Choose a site from this list, or add your own sites to the list	E
 Direct Connection Use Internet Explorer Proxy Settings Use HTTP/FTP Proxy: Proxy Host Proxy Host Port	Available Download Sites: http://cygwin.mirors.glophones.com http://cygwin.mirors.pair.com http://cygwin.mirors.pair.com http://cygwin.mirors.pair.com http://cygwin.mirors.pair.com http://cygwin.mirors.pair.com http://cygwin.mirors.pair.com http://mirors.mission.com ftg://fip.glib.gatech.edu http://miror.its.uidaho.edu http://miror.its.uidaho.edu	
	User URL:]
<zurück weiter=""> Abbrechen</zurück>	 Zurück Weiter> A 	bbrechen

Note, if your PC is connected to a company's proxy, check *Use Internet Explorer Proxy Setting* or type the settings manually in the 3rd radio button's text boxes.

In the next step the download of the setup will start.

🕼 Cygwin Setup	
Progress This page displays the progress of the download or installation.	E
Downloading setup.ini from http://cygwin.mirrors.hoobly.com/ 25 % (335k/1309k) 27,7 kB/s Progress:	
	(> Abbrechen

After download select the required package used to configure and compile OpenOCD. The following packages must be explicitly selected to build OpenOCD:

- All
 - o Archive
 - *unzip*: Info-ZIP decompression utility; for FTDI driver ZIP file
- All
- o Devel
 - autoconf: Wrapper scripts for autoconf commands
- Devel
 - automake: Wrapper scripts for automake and aclocals
- o Devel
 - gcc: C compiler upgrade helper
- o Devel
 - *libtool*: A shared library generation tool
- Devel
 - make: The GNU version of the 'make' utility
- All
- Publishing
 - *tetex*: The TeX text formatting system (install helper; to generate PDF documentation)
- All
 - Publishing
 - tetex-extra: The TeX text formatting system (extra libraries; to generate PDF documentation)

arch Clear					🔿 Кеер	O Prev	 Curr 	ОЕхр	View	Catego
ategory New	B	S.,	Size	Package						
€ Skip	nie	nía	154k	unale. Extract, test and view race archives						
A 6 0-10			253k	unzin: Into-ZIP decompression utility						
A 4 999 9heta 11			148k	xz XZ and I ZMA compression (utilities)						
A 30-11		Ē	259k	zin: Info-ZIP compression utility						
€ Skin	nía	nía	55k	zno: Maninulate zno archives						
Audio 🕂 Default	355	136.754	10000							
Base 🛊 Default										
Database 🗘 Default										
Devel 🗘 Default										
Skip	nía	nía	157k	ELFID: ELF file reader and producer implemented as a C++ library						
A Skip	nía	nía	2.132k	SWI-Prolog: Prolog Interpreter						
A Skip	nja	nía	849k	XmHTML-devel: A widget capable of displaying HTML 3.2 conforming text - (development)						
A Skip	nía	nía	104k	aalib-devel: An ascii art library - (development)						
Skip	nja	nía	170k	asciidoc: Text based document generation						
Skip	nja	nía	121k	astyle: Artistic Style is a reindenter and reformatter of C, C++, C# and Java source code.						
Skip	nja	nía	115k	autobuild: Generate summary information from build logs						
A) 10-1			4k	autoconf: Wrapper scripts for autoconf commands						
Skip	nja	nía	200k	autoconf2.1: Stable version of the automatic configure script builder						
Skip	nja	nía	955k	autoconf2.5: Development version of the automatic configure script builder						
A 4-10			3k	automake: Wrapper scripts for automake and aclocal						
Skip	nja	nía	714k	automake1.10: (1.10) a tool for generating GNU-compliant Makefiles						
Skip	nja	nía	765k	automake1.11: (1.11) a tool for generating GNU-compliant Makefiles						
Skip	nja	nía	244k	automake1.4: (1.4) a tool for generating GNU-compliant Makefiles						
Skip	nja	n/a	328k	automake1.5: (1.5) a tool for generating GNU-compliant Makefiles						
😯 Skip	nja	n/a	363k	automake1.6: (1.6) a tool for generating GNU-compliant Makefiles						
😯 Skip	nja	n/a	424k	automake1.7: (1.7) a tool for generating GNU-compliant Makefiles						
Skip	nja	nía	497k	automake1.8: (1.8) a tool for generating GNU-compliant Makefiles						
Skip	nja	n/a	556k	automake1.9: (1.9) a tool for generating GNU-compliant Makefiles						
Skip	nja	nía	146k	bashdb: Debugger for bash scripts						
0.01				an an an ann an an ann						

utoconf2.1		(2.13-10)				^
S P	table vers aquired b	sion of the a vy: autoconf	utomatic co . automake	nfigure scrip I.4, automał	it builder :e1.5	
utoconf2.5 D R	evelopm equired b	(2.68-1) ent version iy: autoconf	of the auton . libtool, aut	natic configu omake1.6, a	re script builde utomake1.7, a	er utc
utomake1. (1 R	10 .10) a too equired b	(1.10.3-1) I for genera iy: automak	ting GNU-c e	ompliant Ma	kefiles	~
0	IIII)^//				>

29% - Cygwin Setu	P	
Progress This page displays t	ne progress of the download or installation.	E
Downloading gcc-mingw-c 11 % (8k/7(J ore-20050522-1.tar.bz2 from http://cygwin.mirrors lk) 10,4 kB/s	
Package: Total:		
Totai. Diek:		
2.00		
	< Zurück Weiter >	Abbrechen
		104693

Progress		~
This page displays th	e progress of the download or installation.	E
Running		
gcc-mingw-co	re	
/etc/postinsta	all/gcc-mingw-core.sh	
Progress:		
Total:		
Disk:		
		Current Contraction

🗳 Cygwin Setup - Installa	ation Status and Create Icons	
Create Icons Tell setup if you want it to Cygwin environment.	o create a few icons for convenient access to the	E
	Create icon on Desktop	
	Add icon to Start Menu	
Installation Status Installation Complete		;
	< Zurück Fertig stellen	Abbrechen

With this last confirmation step the installation of Cygwin is done.

In the next illustration the root installation of Cygwin can be seen.

😂 Cygwin				
Datei Bearbeiten Ansicht Favoriten Extr	ras ?			2 Ref 80 (197
🔇 Zurück 🔹 🕥 - 🏂 🔎 Suchen	Ordner .			
Adresse 🛅 C:\Cygwin				
Datei- und Ordneraufgaben 😵	bin	dev dev	dowloads	etc
Andere Orte 😵	home	ib	tmp	usr
Details				
	Var	Cygwin Stapelverarbeitungsdatei für . I KB	72 x 72 Symbol	H-Datei 12 KB

Via the batch file *cygwin.bat* the Cygwin environment can be started to configure and compile OpenOCD.

3.2.2 Download of OpenOCD source and FTDI driver

The Cygwin tools are needed for configuring and compiling OpenOCD to work with the driver of the FTDI chip delivered. For this reason we need first to procure the native source of OpenOCD and the FTDI driver.

The latest version of the native sources of OpenOCD can be downloaded from the website: <u>http://openocd.berlios.de/web/</u>

🗲 🔶 🗪 🗶 👫 🚇 Web prdownload.berlios.de/openocd/openocd-0.4.0.zip	
Home About us Partners Contact Berlios The Open Source Mediator	
	Your are requesting file: /openocd/openocd-0.4.0.zip
	download berlins de Berlin Germany Download
	download2.berlios.de Berlin, Germany Download Download der Datei
	Name: openocd-0.4.0.zip (2.0 MB) Datetyp: zip Archive Von: download.berlios.de Öffnen mit: IZ 7-Zip File Manager
	Auswahl merken und die Abfrage nicht wieder zeigen Öffnen Speichern Abbrechen Hilfe

To get the driver currently available for the FTDI devices, you need only to save and later to extract the zip file available at the website: <u>http://www.ftdichip.com/Drivers/D2XX.htm</u>

(+ + 0- X #	Web www.ftdichip.com/Drivers/D2XX.	htm						Elen	iente: 0/0 👻	Suche mit Google
Firmware Support Sales Network Web Shop Newsletter Corporate	ทารเลและเบท ผูมเบชร ละช ลงลแลมเซ ทบาร เก	e <u>mistaliation contes</u> page of	nie <u>poconiento</u> sec	tion of this site of select	ea operating sy	5181115.				
	D2XX Drivers									
	D2XX drivers allow direct access to th from the <u>Documents</u> section of this si	e USB device through a DLL. te.	Application softwar	re can access the USB o	levice through a	series of DLI	. function cal	ls. The functions	: available are li	sted in the D2X Programmer's Guide document which is available
Contact Us	Programming examples using the D2	CK drivers and DLL can be fou	nd in the <u>Projects</u> s	ection of this site.						
Cought" the Search	This software is provided by Future Te event shall future technology devices i business interruption) however caused FTDI drivers may be used only in conj FTDI drivers may be distributed in any	chnology Devices Internation international limited be liable t 1 and on any theory of liability unction with products based form as long as license infor	al Limited "as is" ar for any direct, indire r, whether in contrac on FTDI parts. mation is not more	nd any express or impliei ct, incidental, special, ex d, strict liability, or tort (i miload der Datei	l warranties, ini Iemplary, or co Including negligi	luding, but no isequential da ince or otherw	ot limited to, images (incli rise) ansing i	the implied warra uding, but not lim n any way out of	nties of mercha ited to, procure the use of this	ntability and fitness for a particular purpose are disclaimed. In no ment of substitute goods or services, loss of use, data, or profits, or software, even if advised of the possibility of such damage.
	If a custom vendor ID and/or product I Currently Supported D2XX Drivers:	D or description string are use	ed, it is the resp	Name: CDM Dateityp: zp A Von: www Öffnen mit: E	20812.zip (1.2 MB rchive .ftdichip.com 7-Zip File Manager	T	rs and su	bsequent WHGL	re-certification	as a result of making these changes.
				Öffnen Sneichern	Abbrechen	zeigen	-	hincor	0114	
	Operating System	Release Date	×06 (32-4	Janear Japacolari			anesti	MIPSIV	5114	Lomments
	Windows*	2011-02-28	2.08 12	2.08.12						Release notes
	Windows*	2010-08-11	2.08.02	2.08.02						WHQL Certified Available as setup executable

When the OpenOCD and FTDI zip files are saved somewhere on the PC, the next step is to extract both files in a directory of your choice e.g. C:\OpenOCD_FTDI.

lame 🔺	Size	Туре	Date Modified				
CDM20812.zip	1,194 KB	zip Archive	4/5/2011 12:32 PM				
openoca-U.4.U.zip	2,027 KB	zip Archive	2/14/2011 6:36 PM				
			Ex	act		×	
			F	tract to			
			ſ				
			1	(upenucb_FTDI\FTDI			
			T.	Path mode	Overwrite mode		
				Full pathnames	 Ask before overwrite 		
				 Current pathnames 	C Overwrite without prompt	6	
				No pathnames	C Skip existing files		
					C Auto rename		
				1% Extracting C	:\downloads\openocd-0.4.0.zip		
				Elapsed time:	00:00:25	Total size:	7333 KB
				Remaining time:	00:29:59	Speed:	4116 B/s
				Files:	9	Processed:	100 KB
				Compression ratio	o: 33%	Compressed size:	33 KB
				openocd-0.4.0\s	rc\flash\nand\		
				driver.h			
					Background	Pause	Cancel
					Background	Pause	Cancel

The native source files of OpenOCD and the driver for the FTDI device are now located in the directory C:\OpenOCD_FTDI.



This directory is needed temporarily during the next parts of this documentation.

3.2.3 Configuration and compilation of OpenOCD with FTDI driver

The configuration and compilation of OpenOCD sources will be done on the Cygwin environment. From the root installation of Cygwin run the batch file *cygwin.bat* and start this program.



Now open the folder openocd-0.4.0, where the native source of OpenOCD was extracted from the directory *C*:*OpenOCD_FTDI*.

/cygdrive/c/OpenOCD	FTDI/openocd-0.4.0	<u>- 🗆 ×</u>
\$ cd C:∖OpenOCD_FTDI	-Kr	
\$ cd openocd-0.4.0	/cygdrive/c/OpenOCD_FTDI	

The folder openocd-0.4.0 contains the configuration script of OpenOCD. We can now start this script with the command ./configure and configure OpenOCD to use the FTDI driver source extracted on the folder *FTDI* from the directory *C*:\OpenOCD_FTDI.

The following configuration options are recommended:

- --enable-maintainer-mode
- --disable-werror
- --disable-shared
- --enable-ft2232_ftd2xx
- --with-ftd2xx-win32-zipdir=C:/OpenOCD_FTDI/FTDI
- CC="gcc-3 -mno-cygwin -L/usr/lib/mingw -L/usr/lib/w32api -I/usr/include/mingw -I/usr/include/w32api"

You also can create a bash file (e.g. *myconfig*) containing these arguments (all in one line) like:

```
./configure --enable-maintainer-mode --disable-werror --disable-shared -
-enable-ft2232_ftd2xx --with-ftd2xx-win32-zipdir= C:/OpenOCD_FTDI/FTDI
CC="gcc-3 -mno-cygwin -L/usr/lib/mingw -L/usr/lib/w32api -
I/usr/include/mingw -I/usr/include/w32api"
```

Then execute it in the Cygwin shell with bash myconfig.

Note, that *gcc-3.exe* in the Cygwin's *bin*/ directory has to be used for compiling. If the configuration fails, try to add the whole path to *gcc-3* in the CC variable above.

🔤 /cygdrive/c/OpenOCD_FTDI/openocd-0.4.0	1 ×
/cygdrive/c/OpenOCD_FTDI/openocd-0.4.0 5 ./configureenable-maintainer-modedisable-werrordisable-sharedenab le-ft2232_ftd2xxwith-ftd2xx-win32-zipdir=C:/OpenOCD_FTDI/FTDI CC="gcc -mno-c ygwin" CFLAGS="-02 -Wal1"	
checking for a BSD-compatible install /usr/bin/install -c	
checking whether build environment is sane yes	
checking for a thread-safe mkdir -p /usr/bin/mkdir -p	
checking for gawk gawk	
checking whether make sets \$(MAKE) yes	
checking whether to enable maintainer-specific portions of Makefiles yes	
checking for gcc gcc -mno-cygwin	
checking for C compiler default output file name a.exe	
checking whether the C compiler works yes	
checking whether we are cross compiling no	
checking for suffix of executablesexe	
checking for suffix of object fileso	
checking whether we are using the GNU C compiler yes	
checking whether gcc -mno-cygwin accepts -g yes	
checking for gcc -mno-cygwin option to accept ISO C89 none needed	
checking for style of include used by make GNU	
checking dependency style of gcc -mno-cygwingcc3	
checking for gcc -mno-cygwin option to accept ISO C99std=gnu99	
checking whether gcc -mno-cygwin -std=gnu99 and cc understand -c and -o togethe	P I

When the configuration is done, start the compilation of OpenOCD with make.

If the make process fails, remove all files (**not** the directories) from the OpenOCD root and use the files from the application note's software package. Reconfigure as described above and try again to make.

/cygdrive/c/OpenOCD_FTDI/openocd-0.4.0	
\$ make	
make all-recursive	
make[1]: Entering directory `/cygdrive/c/OpenOCD_FTDI/openocd-0.4.0'	
Making all in src	
make[2]: Entering directory `/cygdrive/c/OpenOCD_FTDI/openocd-0.4.0/src'	
make[3]: Entering directory `/cygdrive/c/OpenOCD_FIDI/openocd-0.4.0/src'	
Making all in helper	
make[4]: Entering directory `/cygdrive/c/0penOCD_FIDI/openocd-0.4.0/src/helper'	
make all-am	
make[5]: Entering directory `/cygdrive/c/OpenOCD_FTDI/openocd-0.4.0/src/helper'	

After that the compilation procedure is done, use the command strip can be used to remove unnecessary information from the generated executable binary program *OpenOCD.exe* located in the folder *src* of the directory *openocd-0.4.0*.

/cygdrive/c/OpenOCD_FTDI/openocd-0.4.0	×
<pre>mv -f .deps/main.Tpo .deps/main.Po /bin/sh/libtooltag=CCmode=link gcc -mno-cygwin -std=gnu99 -02 -Wall -I/cygdrive/c/OpenOCD_FTDI/FTDI -Wall -Wstrict-prototypes -Wformat-security -Wex tra -Wno-unused-parameter -Wbad-function-cast -Wcast-align -Wredundant-decls -L /cygdrive/c/OpenOCD_FTDI/FTDI/i386 -o openocd.exe main.o libopenocd.la -lftd2xx libtool: link: gcc -mno-cygwin -std=gnu99 -02 -Wall -I/cygdrive/c/OpenOCD_FTDI/F TDI -Wall -Wstrict-prototypes -Wformat-security -Wextra -Wno-unused-parameter -W bad-function-cast -Wcast-align -Wredundant-decls -o openocd.exe main.o -L/cygdr ive/c/OpenOCD_FTDI/FTDI/i386 ./.libs/libopenocd.a -lws2_32 -lftd2xx make[41: Leaving directory `/cygdrive/c/OpenOCD_FTDI/openocd-0.4.0/src' make[21: Leaving directory `/cygdrive/c/OpenOCD_FTDI/openocd-0.4.0/src' Making all in doc make[21: Entering directory `/cygdrive/c/OpenOCD_FTDI/openocd-0.4.0/doc' make[21: Nothing to be done for `all'. make[21: Leaving directory `/cygdrive/c/OpenOCD_FTDI/openocd-0.4.0/doc' make[21: Leaving directory `/cygdrive/c/OpenOCD_FTDI/openocd-0.4.0/ make[21: Leaving directory `/cygdrive/c/OpenOCD_FTDI/openocd-0.4.0/ make[21: Leaving directory `/cygdrive/c/OpenOCD_FTDI/openocd-0.4.0/ make[21: Leaving directory `/cygdrive/c/OpenOCD_FTDI/openocd-0.4.0' make[21: Leaving directory `/cygdrive/c/OpenOCD_FTDI/openocd-0.4.0' make[21: Leaving directory `/cygdrive/c/OpenOCD_FTDI/openocd-0.4.0'</pre>	•
/cygdrive/c/OpenOCD_FTDI/openocd-0.4.0 \$ strip -s src/openocd.exe	
<pre>/cygdrive/c/OpenOCD_FTDI/openocd-0.4.0 \$ exit</pre>	•

With the last command exit the Cygwin environment is quit.

3.3 Test of OpenOCD configured for FTDI driver

After configuring and installing of OpenOCD now run it as a daemon sever to test, whether the server and the target are connected. For the connection tool use the JTAG dongle "KT-Link" and install its drivers.



3.3.1 Installation of FTDI drivers for the JTAG dongle

After connecting the JTAG dongle over USB to the computer Windows OS reports that a new hardware was detected.



The JTAG dongle "KT-Link" is build on the basis of FTDI devices, so use the FTDI drivers delivered with the dongle or the driver that is already extracted on the folder *C:\OpenOCD_FTDI\FTDI* in the next installation step.

lease choose your search and installation options.	
 Search for the best driver in these locations. Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed. Search removable media (floppy, CD-ROM) Isoluted this leasting in the search. 	For Folder ? X Select the folder that contains drivers for your hardware.
Browse C:\OpenOCD_FTDI\FTDI Browse Don't search. I will choose the driver to install. Choose this option to select the device driver from a list. Windows does not guarantee the driver you choose will be the best match for your hardware. < <u>Rack</u> <u>Next></u> Cance	Image: Construction of the second

Windows then looks for an adequate USB driver.

Please wait while the wizard	searches		E Com
KT-LINK (Interface 0)		
	3		
		R	
		Mart N	Canad

Once a USB driver was found, Windows asks for a confirmation to continue the installation.



After the confirmation the installation process will be resumed. This procedure may look different on other Windows versions.

The next figures demonstrate the procedure by using Windows XP.

Found New Hardware Wizard		Found New Hardware Wizard	
Please wait while the wiza	rd installs the software	Please wait while the wizard installs the software	
KT-LINK		KT-UNK	
Setting a syst case your sys	em restore point and backing up old files in tem needs to be restored in the future.	ftd2xx.dll To C:\WINDDWS\system32	
k}	< <u>₿</u> ack. <u>N</u> ext > Cancel	<u> </u>	ncel

With the confirmation on the next step Windows installs the found driver for the detected "KT-Link" interface.

When the first KT-Link USB driver is successfully installed, Windows switches to the installation of the Virtual COM Port driver. The installation procedure is the same for all interfaces of this dongle.



To check the installation of the JTAG dongle "KT-Link" refer to the Window's Device Manager.



The number of the COM port the driver used during the installation may differ for system to system.

3.3.2 Run OpenOCD

To test the OpenOCD server installed on the computer use the windows command line.

Connect the SK-FM3-100PMC board via JTAG interface to the USB interface of your computer. Use the JTAG dongle "KT-Link".



A configuration script file *openocd.cfg* for OpenOCD is also needed. This file is included in the software package of this application note (Eclipse project workspace).

The OpenOCD configuration file openocd.cfg for the MB9BF506N example is shown below:

```
# Interface used "KT-Link"
interface ft2232
ft2232 device desc "KT-LINK"
ft2232_layout_ktlink
ft2232 vid pid 0x0403 0xBBE2
# Fujitsu Cortex-M3 with 512kB Flash and 64 kB RAM
if { [info exists CHIPNAME] } {
     set _CHIPNAME $CHIPNAME
} else {
     set CHIPNAME mb9bf506
}
if { [info exists ENDIAN] } {
     set _ENDIAN $ENDIAN
} else {
     set _ENDIAN little
}
if { [info exists CPUTAPID ] } {
     set CPUTAPID $CPUTAPID
} else {
     set CPUTAPID 0x4ba00477
}
#delays on reset lines
jtag nsrst delay 100
jtag ntrst delay 100
# Fujitsu cortex-M3 reset configuration
reset config trst only
jtag newtap $ CHIPNAME cpu -irlen 4 -ircapture 0x1 -irmask 0xf -expected-
id $ CPUTAPID
set TARGETNAME $ CHIPNAME.cpu
target create $ TARGETNAME cortex m3 -endian $ ENDIAN -chain-position
$ TARGETNAME
# MB9BF506 has 64kB of RAM on its main system bus
$ TARGETNAME configure -work-area-phys 0x1FFF8000 -work-area-size 0x10000
-work-area-backup 0
# MB9BF506 has 512kB of user-available FLASH
# flash bank mb9bf500 <base> <size> 0 0 <target#> <variant> <cclk>
[calc checksum]
set FLASHNAME $ CHIPNAME.flash
flash bank $ FLASHNAME fm3 0 0 0 0 $ TARGETNAME mb9bfxx6
# 4MHz / 6 = 666kHz, so use 500
jtag khz 500
```

To run the OpenOCD server, start the windows prompt and go to the folder, where the OpenOCD executable file was generated, and run this program with the -f argument with the path to the configuration file above. For example:

>Openocd -f <Your path to the Eclipse workspace project>/openocd.cfg



The screen shot demonstrates that the OpenOCD server was started and a Connection between host and target over JTAG is available.

If the Kt-Link is not recognized (e.g. FTDI device connection fails), download Libusb Device Filter from

http://sourceforge.net/projects/libusb-win32/files/libusb-win32-releases/1.2.4.0/libusb-win32bin-1.2.4.0.zip/download

and run *install-filter-win.exe* and choose the connected device (e.g. KT-Link).

Afterwards try again to check the OpenOCD connection as described above.

3.4 Using Open OCD with LibUSB driver

3.4.1 Installation of OpenOCD version supporting LibUSB driver

The Windows installer program for the version of OpenOCD that support LibUSB driver can be downloaded from the website:

http://www.freddiechopin.info/index.php/en/download/category/4-openocd

(+ >) C= X (f) Web www.freddechopin	.hfg/index.php/en/download/category/4-openocd	Elemente: 0/0 🗸 🔏 – Suche mit Google
	Home Projects Articles Download About Contact Disclaime	
Home >> Download		
Main menu • Home • Projects • Articles • Download • About • Contact • Disclaimer	Download OpenOCD OpenOCD - Open On Chip Debugger for ARM cores - Windows installers of compiled releases. OpenOCD 0.4.0 (r 40 km) OpenOCD 0.4.0 (r 40 km) OpenOCD 0.4.0 for Windows An mainstaller of compiled der Datei OpenOCD 0.3.1 (r22 km) OpenOCD 0.3.1 (r22 km) OpenOCD 0.3.1 (r22 km) OpenOCD 0.3.1 for Windows An mainstaller of compiled to use <i>libRdi</i> + <i>libusch-win</i> 32 libraries. Detail OpenOCD 0.3.1 (r22 km) OpenOCD 0.3.1 (r22 km) OpenOCD 0.3.1 for Windows An mainstaller of compiled to use <i>libRdi</i> + <i>libusch-win</i> 32 libraries. Detail OpenOCD 0.3.1 for Windows An mainstaller of compiled to use <i>libRdi</i> + <i>libusch-win</i> 32 libraries. Detail OpenOCD 0.3.1 for Windows An mainstaller of compiled to use <i>libRdi</i> + <i>libusch-win</i> 32 libraries. Detail OpenOCD 0.3.1 for Windows An mainstaller of compiled to use <i>libRdi</i> + <i>libusch-win</i> 32 libraries. Detail OpenOCD 0.2.0-SR1 (roo ws)	Details Download

The zip file should be saved and then extracted. After this it is only needed to start the installer program and to follow the instructions.

Instrumentation Instrumentation <thi< th=""><th>Lane Alla</th><th>und the second</th><th>Dia .</th><th>ng OpenOCD Setup</th><th>-</th></thi<>	Lane Alla	und the second	Dia .	ng OpenOCD Setup	-
Beyond Ant POPM In the Procession of the Second Procession of the	Q tak + () -	👌 💭 Sauch 🐑 Addes 👘 🖌 🗙	9	End-User License Agreement. Nease read the following license agreement carefully	Ð
Pikt Back Best Carke	di spored net gil spored net	PCC PM Window Brataler Package E.	He are ten on 2020004-00-MM ONE RE LAL. THE DESCRIPTION OF ME Welcome to the OpenOCD Setup Withord The Seng Marel of read OpenOCD or was remained. The Seng Marel of read OpenOCD or was remained.	CNU CENERAL PUBLIC LICENSE Vereion 2, June 1991 Copyright (C) 1989, 1991 Free Software Foundation, Inc. 55 Temple Place, Suite 330, Biston, MA (2111-1307) USA Everyone is permitted to copy and distribute wrbatim copies of this license document, but changing it is not allowed. Preamble Preamble	मा

After the confirmation of the GPL licence, chose the features of OpenOCD, which will be installed. During the installation OpenOCD executable file *openocd.exe* will be added to the Windows path.

For the next steps it is needed to recall the location of the folder, where OpenOCD was installed, e.g. *C*:*OpenOCD_LibUSB*.

ustom Setup		102	6
Select the way yo	u want features to be instal	ed.	
Click the icons in t	he tree below to change the	way features will be instal	led.
	penOCD 0.4.0	OpenOCD executab license and info	le, changelog,
	■ → Board config files		
	→ Interface config files		
	lodify PATH variable	your hard wive. It h	s 1100KB on has 4 of 4
	rivers pusb0.dll	subfeatures selecte	d, The 1708KB on you
] • [hard drive.	
Location:			
Location.	C. (openoco_boob)		Browse

The following steps of the OpenOCD installation procedure have to be done.

😥 OpenOCD Setup	_ 🗆 🗙	🕼 OpenOCD Setup	
Ready to install OpenOCD	•	Installing OpenOCD	G
Click Install to begin the installation. Click Back to review or change any of your installation settings. Click Cancel to exit the wizard.		Please wak while the Setup Wizard installs OpenOCD. Status:	
Ę ₈			
			R
Back	Cancel	Bock	tjest Cancel
Cor Ckk	npleted t	the OpenOCD Setup Wizard	
		Back Einish Cancel	
The Windows System Properties shows, if OpenOCD was successfully installed and added to the Windows path.

General Computer Name Hardware Advanced Environment Variables You must be logged on as an Administrator to make most of these changes Edit System Variable Edit System Variable	?
Zou must be logged on as an Administrator to make most of these changes	د است.
our mast be logged on as an Mahinistration to make most of these enanges.	?×
Performance	
Visual effects, processor scheduling, memory usage, and virtual memory Variable name: Path	
Variable value: rto-toolchain	\bin;C:\OpenOCD_LibUSB\bin
<u>Settings</u>	
	OK Cancel
Desktop settings related to your logon	Edit Delete
Variable Value	
Startup and Recovery MAKE_MODE UNIX	
System startup, system failure, and debugging information NUMBER_OF_P 2	
U Path C:)Program F	iles\GNU-X-Tools\bip:C:\Pr
Settings PATHEXT .COM;.EXE;.E	BAT;.CMD;.VBS;.VBE;.JS; 💌
Environment Variables Error Reporting <u>New</u>	Edit Delete
	OK Cancel

3.4.2 Installation of LibUSB driver for the JTAG dongle

The JTAG dongle "KT-Link" can be driven with the open source LibUSB driver included on the OpenOCD version that was installed (see previous chapters).

To use this installed version with KT-Link, first change the KT-Link driver from FTDI to LibUSB driver.

🖳 Device Manager 🛛 🤘	T-LINK Properties
Eile Action View Help Image:	CT-LINK Properties ? × General Advanced Striver Details Common String Manufacturer Device type: Manufacturer: FTD1 Location: Location 0 Device status If you are having property. If you are having problems with this device, click Troubleshoot to
 Storage volumes System devices Universal Serial Bus controllers Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27CE Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27CF Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27CF Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27CF Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27CF Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27CF Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27CF Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27CF Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27CF Intel(R) 82801G (ICH7 Family) USB UNIVERSAL Host Controller - 27CF Intel(R) 82801G (ICH7 Family) USB UNIVERSAL HOST CONTROL - 27CF Intel(R) 82801G (ICH7 Family) USB UNIVERSAL HOST CONTROL - 27CF Intel(R) 82801G (ICH7 Family) USB UNIVERSAL HOST CONTROL - 27CF Intel(R) 82801G (ICH7 Family) USB UNIVERSAL HOST CONTROL - 27CF Intel(R) 82801G (ICH7 Family) USB UNIVERSAL HOST CONTROL - 27CF Intel(R) 82801G (ICH7 Family) USB UNIVERSAL HOST CONTROL - 27CF 	If you are having problems with this device, click Troubleshoot to start the troubleshooter.
USB Mass Storage Device	OK Cancel Help

The LibUSB driver for Windows (2000, XP, Vista and 7; 98 SE and ME for versions up to 0.1.12.2) can be generated with the binary package for Windows "libusb-win32". This package can be downloaded from: <u>http://sourceforge.net/projects/libusb-win32/files/</u>

A Web sourceforge.net/	projects/libusb-win32/files/	
		Add by Google
		New TestTrack TCM Integrate & Track Your Test Cases.Advanced Features, Improve (www.seapine.com/TCM
	sourceforge	Find Open Source Software
	libusb-win32 by ste_me Summary Files Revi Looking for the latest version	ayer, trobinso, xiaofanc ews Support Develop n? Download libusb-win32-bin-1.2.3.0.zip (866.5 KB)
	Home	Download der Datei
	Name *	Name: libusb-win32-bin-1.2.3.0.zip (847 KB)
	libusb-win32-releases	S Dateityp: zip Archive Von: kent.dl.sourceforge.net
	💼 libusb-win32-snapsho	ots Öffnen mit: 📴 7-Zip File Manager 🔽 🔛
	Totals: 2 Items	Auswahl merken und die Abfrage nicht wieder zeigen Öffnen Speichern Abbrechen Hilfe

After saving and decompressing the zip file, continue with the installation of the LibUSB driver for "KT-Link".



With the wizard program *inf-wizard.exe* the LibUSB driver for the "KT-Link" dongle will be generated and installed. Run this installation wizard.

This program will create an Jin' file for your device. Before clicking "Next" make sure that your device is connected b	system.	Select your de then either co	evice from the l nnect it or click	ist of detected devices below. If your device isn't liste "Next" and enter your device description manually.
		Vendor ID	Product ID	Description
		0x13FE	0x1D00	USB Mass Storage Device
		0x0409	0x1603	US8 Human Interface Device (Interface 1)
		0x0409	0x1603	US8 Human Interface Device (Interface 0)
		0x046D	0x/C058	USB Human Interface Device
		0x0403	ChEEE2	KT-LINK Serial Port (Interface 1)
		000900	UNBOCZ	KI-CINK (Incentice 0)
N				R
4		11		
		101		

The wizard program will find two interface devices from "KT-Link". Both devices must be installed. The installation is the same for all devices. Start the installation with interface 0.

Vendor ID (hex format)	0x0403
Product ID (hex format)	0xBBE2
MI (hex format)	0x00
Manufacturer Name	Future Technology Devices International, Ltd
Device Name	KT-LINK (Interface 0)

In the next step save the generated *i*nf file for the first "KT-Link" interface in a folder of your choice. After this the wizard asks for immediate installation of the LibUSB driver.

Save As		200	the owner and	100	14 March and the Real Address		I CININI
Savejn	LibUSB_W	_Ne 💌	0 🖸 🗁 🖽 •	2	Ibusb-win32 Inf-Wizard		
My Flecteral Documents					Information A windows driver install following device: Vendor ID: Product ID:	lation package has been created for the 0x0403 0x8862	
My Documents			ß		Interface # (MI): Device description: Manufacturer: This package contains libust	0x00 KT-LINK (Interface 0) Future Technology Devices International, Ltd Iswin32 v1. 2.3.0 drivers and support for the follow	ina
My Computer					platforms: x86, x64, ia64.	£1	
My Network Places	File pame: Save as type:	KT-UNK_(Interface_0) inf inf files (".inf)	•	Save Cancel			one

The installation procedure of the driver will be contuned and the LibUSB driver will be installed.

Information A windows driver installation package has been created for the following device:	Information A windows driver installation package has been created for the following device:
Vendor ID: Product ID Interface a Device des Manufactu This package contains Ibusb-win32 v1.2.3.0 drivers and support for the following platforms: x86, x64, la64.	Vendor ID: 0x0403 Product ID: 0x8882 Interface # (MI): 0x8882 Device description: Manufacturer: Manufacturer: Installation successful. This package contains lib platforms: x86, x64, lade OK
Contrailing driver, please wait.	Lo Done

The same installation procedure must be done for all interfaces of the JTAG dongle. So this procedure is also needed for the second interface "Serial Port" previously found by the wizard.

	[
Vendor ID	Product ID	Description
UXI3FE	UXIDUU 0x1C00	USB Mass Storage Device
UXU4D9	UX1603	USB Human Interface Device (Interface 1)
UXU4D9	UX16U3	USB Human Interface Device (Interface U)
UXU46D	UXC05B	USB Human Interface Device
0x0403	0xBBE2	KT-LINK Serial Port (Interface 1)
0×0403	0xBBE2	KT-LINK (Interface 0) (Interface 0)

When the update of the driver for all "KT-Link" interfaces was done, we can check the result of this procedure with the Windows Device manager.

🚇 Device Manager	
Eile Action View Help	
E	
Element of the second s	
En Skulives	
E Ga Human Interface Devices	
IDE ATA/ATAPI controllers	
E Seyboards	
KT-LINK Serial Port (Interface 1)	
Here Monitors	
🗄 🏢 Network adapters	
🗄 🚽 Ports (COM & LPT)	
E 💀 Processors	
🗄 🧶 Sound, video and game controllers	
🕀 🥪 Storage volumes	
🛓 🖳 😼 System devices	
🗄 🖨 Universal Serial Bus controllers	
83	

3.4.3 Test of OpenOCD Server configured on the Basis of LibUSB Driver

To run the installed version of OpenOCD server which integrates the LibUSB driver, connect the SK-FM3-100PMC board via the JTAG dongle "KT-Link" to the USB interface of the host PC like shown on the photo in chapter 3.3.2.

The OpenOCD configuration file *openocd.cfg* is also needed. OpenOCD will look for this file in its directory '*C*:*OpwenOCD_LibUSB*. Add this file in your OpenOCD directory. See chapter 3.3.2 for details.

Address 🛅 C:\OpenOCD_LibUSB			
Name 🔺	Size	Туре	Date Modified
Cobin		File Folder	4/12/2011 1:49 PM
Doard		File Folder	4/12/2011 1:49 PM
C drivers		File Folder	4/12/2011 1:49 PM
Cinterface		File Folder	4/12/2011 1:49 PM
Consource		File Folder	4/12/2011 1:49 PM
Contarget		File Folder	4/12/2011 1:49 PM
🗐 changelog-0.1.0-0.2.0.txt	4 KB	Text Document	7/14/2009 10:11 AM
🗐 changelog-0.2.0-0.3.0.txt	4 KB	Text Document	11/5/2009 4:40 AM
🗐 changelog-0.3.0-0.4.0.txt	4 KB	Text Document	2/21/2010 9:17 PM
🗐 info.txt	1 KB	Text Document	2/23/2010 5:56 PM
📋 license_libftdi.txt	25 KB	Text Document	1/16/2010 2:07 PM
🗐 license_libusb-win32.txt	27 KB	Text Document	7/7/2009 5:53 PM
🗐 license_openocd.txt	18 KB	Text Document	7/2/2009 12:30 PM
🔁 OpenOCD User's Guide.pdf	856 KB	Adobe Acrobat Doc	2/22/2010 7:09 PM
openocd.cfg	2 KB	CFG File	4/7/2011 2:42 PM

During the installation of OpenOCD the wizard adds the executable file *openocd.exe* from the binary folder *bin* to the windows path.

Variable <u>n</u> ame:	Path	
Variable <u>v</u> alue:	rto-toolchain\bin; <mark>C:\O</mark> p	enOCD_LibUSB\bir
		- Creat

To check OpenOCD server, start the windows prompt and run the OpenOCD executable.

The OpenOCD command parameter -f assigns the configuration file *openocd.cfg* as argument to the executable file *openocd.exe*. You can use absolute or relative paths. The executable file is located in the *bin* folder.

The command is (assuming that the configuration file is located one folder above *openocd.exe*):

>openocd -f ../openocd.cfg



The screen shot shows that OpenOCD server has started and a connection between host and target over JTAG is available.

Note, that the Eclipse workspace projects have individual *openocd.cfg* files in their own folders!

4 J-Link GDB Server

HOW TO USE THE J-LINK GDB SERVER

The J-Link GDB Server is a part of the software packet, which the user of the Segger JTAG interface "J-Link" can use. So we need first to install the J-Link software.

4.1 The J-Link software

The latest version of this software packet is available for downloading from the website: <u>http://www.segger.com/cms/jlink-software.html</u>

niyensy jine sorevare men		ALL CONTRACTOR OF THE OWNER OWNE	a second and a s
Home	Development Tools FJ-Link FDownload		
Embodded Software	J-Link downloads		
Lindeudeu Soltware	Installing the software will automatically install the Ju	Link LISB drivers. It also offers to up	date applications which use the JLI ink DLI
Development Tools	Multiple versions of the J-Link software can be insta	iled on the same PC without problem	ns; they will co-exist in different directories.
J-Link	J-Link software & documentation pack can also be u	and with 11 into VC CAM ICE mill	RACLink RICLITAC Link and any other inspect 11 ink connetials
	emulator.	SEGGER Microcontroller - E	mbedded Soltware Solutions - Download - Opera
Adapters	Software and documentation pack V4.24f [9	Datei Bearbeiten Ansicht	Lesezeichen ¹⁰ Widgets Extras Hilfe
Download			
Beta software version		-	
J-Flash release notes		11	
J-Link release notes			
Older versions	Restored and Annual	SECCEP	Embadded Coffman Colutions
RDI release notes	Constitution (Strateging (Spring (Sp	// SEGGEN	Embedded Software Solutions
Terms of use	Tony Frank Transferration	A REAL PROPERTY AND	
Flash Breakpoints	This & Press Recall By carding room on BOODD Taxa shored to the State of the State		
Flash Download	i link	(Development Tools & Link & Download
Flash programming utilities	10	nome	L Linda decombe e de
Flash SDK	Find Advantageout Advantageout	Embedded Software	J-LINK downloads
ODB Server	altere (Development Tools	Download of the SEGGER J-Link software and documentation pack
IDE integration		J-Link	
Interface description	A CONTRACT OF A	General info & FAQs	Every J-Link / J-Trace has a unique serial number which is printed on the label located on the software will be downloaded. It is neccessary to enter the serial number of your emulator. Cl
J-Flash	Million	Adapters	customers with the software which is customized to the emulator used.
J-Mem		Download	
JTAG Isolator		Beta software version	Please enter the serial number of your emulator in the field below
Model comparison		J-Flash release notes	Submit serial number
Performance comparison		J-Link release notes	
RDI		Older versions	Having a problem finding the serial number?
SDK	Latest J-Flash release notes	RDI release notes	noring a provion many tro condition of
J-Link Pro	Latest J-Link RDI DLL release notes	Terms of use	 Lowin a SEGGER J-Link / J-Trace / Flasher or a legal OEM product. Where do I find the I do not have a partial purphy handware Lowin an evial hoard with 11 low on heard. How
		Flash Breakpoints	 Unsuit like to download the software for any other reason. How can I do so?
	Beta software	Flash Download	
	We frequently publish new Beta versions. The Beta		
	improvements.		
LLICK EDU	However, the Beta versions are not thoroughly teste	ed, but it is usually safe to assume th	hat the Beta version can be used without risk.

After entering the serial number of the purchased Segger "J-Link", the software and documentation pack in zip form can be downloaded. Only unzipping this file and starting the installation wizard is needed.



Now choose the installation destination directory of the J-Link software and documentation. Please remember this destination, because it is needed often in this application note.

🔏 Choose Destination Lo	ocation	×	
	Setup will install J-Link ARM V4.25k in the following folder. To install into a different folder, click Browse, and select another folder. You can choose not to install J-Link ARM V4.25k by clicking Cancel to exit Setup. Destination Folder C:\\SEGGER\JLinkARM_V425k Browse	Select Destination Directory C\Program Files\SEGGER\JLinkARM_V425k C\ Program Files Segger Segger	Cancel
	<u> < B</u> ack <u>N</u> ext > Cancel]

With the confirmation of the next steps, the installation will be finished.

Schoose options	X	Start Installation	X
	Choose options for creating shortcuts Create entry in start menu Add shortcuts to desktop	**	You are now ready to install J-Link ARM V4 25k. Press the Next button to begin the installation or the Back button to reenter the installation information.
Installing	<u> (Back Next)</u> Cancel	Anstallation Complete	< Back Next > Cancel < Back
	Current File Copying file: C. L. Samples: UFlash/ProjectFiles \SPC560850.;flash		Press the Finish button to exit this installation.
	CERK READ Cancel		< Back Fresh> Cancel

4.2 The Segger JTAG interface "J-Link"



After connecting the JTAG interface "J-Link" via USB to the computer, Windows reports that a new hardware was detected. Windows will automatically find the driver and install it.

	Hardware Update Wizard	
Welcome to the Hardware Update Wizard This wizard helps you install software for. J-Link driver	Completing the Hardware Update Wizard The wizard has finished installing the software for.	
If your hardware came with an installation CD or floppy disk, insert it now. What do you want the wizard to do? (Install the software automatically [Recommended] (Install from a list or specific location (advanced))	R	
Click Next to continue.	Click Finish to close the wizard.	
	Welcome to the Hardware Update Wizard This wizard helps you install software for: J-Link driver If your hardware came with an installation CD or floppy disk, insert it now. What do you want the wizard to do? (install from a list or gpecific location (Advanced) C Install from a list or gpecific location (Advanced) Click Next to continue.	Welcome to the Hardware Update Wizard This wizard helps you install software for: J-Link driver If your hardware came with an installation CD or floppy disk, inset it now. What do you want the wizard to do? Install from a list or gpecific location (Advanced] Click Next to continue.

If Windows does not automatically locate the driver, the driver can be found in the installation folder of the "J-Link" software, e. g. in the directory:

C:\Program Files\SEGGER\JLinkARM_V425k\USBDriver\x86

Please ch	oose your s	earch and ir	nstallation	options.		EV.
⊙ <u>S</u> ea	arch for the be	st driver in the	se locations			
Use path	the check bo is and remova	xes below to lii ble media. The	mit or expan e best driver	id the defaul found will be	: search, which ir e installed.	ncludes local
Г	Search rem	iovable <u>m</u> edia	(floppy, CD-	ROM)		
F	Include this	location in the	e search:			
	C:\Program	Files\SEGGE	RVLinkAR	M_V425k\U	SB 💌 🛛 🖪	owse
O <u>D</u> or	n't search. I wi	Il choose the c	lriver to inst	all.		
Choo the c	ose this optior driver you cho	to select the o ose will be the	device drive best match	er from a list. for your hard	Windowsdoes r Iware.	not guarantee I

When the installation has finished, check the driver via the device manager.

Eile Action Yiew Help Image: Constraint of the state of the stat	
System devices Device status	versal Serial Bus controllers gger sation 0 (J-Link)
Conversal Serial bus controllers Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27C8 Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27CA Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27CA Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27CA Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27CA Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27CA Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27CA Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27CA Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27CA Intel(R) 82801G (ICH7 Family) USB Enhanced Host Controller - 27CC J-Link driver USB Composite Device USB Root Hub	, h this device, click Troubleshoot to

4.3 Test J-Link GDB Server

To test the "J-Link" GDB server installed to the computer, look for the executable file *JlinkGDBServer.exe* located in the "J-Link" software directory.

C:\Program Files\SEGGER\JLinkA	RM_¥425k			<u> </u>
<u>File Edit View Favorites T</u> ools	Help			
🔇 Back 🔹 🕥 👻 🏂 🔎 Sea	irch 🜔 Fold	lers 🛛 📑 🍞 🗙	(19 III -	
Address 🛅 C:\Program Files\SEGGER\J	LinkARM_V425k	10		💌 🄁 Go
Name 🔺	Size	Туре	Date Modified	
INSTALL.LOG	35 KB	Text Document	4/13/2011 12:12 PM	
JFlashARM.exe	455 KB	Application	4/11/2011 7:20 PM	
🔜 JLink.exe	151 KB	Application	4/11/2011 7:20 PM	
🔊 JLinkARM.dll	3,935 KB	Application Extension	4/11/2011 7:20 PM	
🔜 JLinkConfig.exe	111 KB	Application	4/11/2011 7:21 PM	
🔜 JLinkDLLUpdater.exe	55 KB	Application	4/11/2011 7:21 PM	
🔜 JLinkFlashCogentCSB737.exe	63 KB	Application	4/11/2011 7:21 PM	
🔜 JLinkFlashPhytecPCM967_NA	63 KB	Application	4/11/2011 7:21 PM	
🔜 JLinkFlashSTMB525.exe	63 KB	Application	4/11/2011 7:21 PM	
🔜 JLinkFlashToshibaTOPAS900	63 KB	Application	4/11/2011 7:21 PM	
🔜 JLinkFlashToshibaTOPAS910	63 KB	Application	4/11/2011 7:21 PM	
💑 JLinkGDBServer.exe	163 KB	Application	4/11/2011 7:21 PM	
JLinkGDBServerCL.exe	147 KB	Application	4/11/2011 7:22 PM	
🔊 JLinkRDI.dll	375 KB	Application Extension	4/11/2011 7:20 PM	
🔜 JLinkRDIConfig.exe	51 KB	Application	4/11/2011 7:22 PM	
5		2.2.2		

Connect the SK-FM3-100PMC board via the JTAG interface "J-Link" to the USB interface of the host PC.



When the physical connection between the computer and the board via the JTAG interface "J-Link" is established, run the program *JLinkGDBServer.exe*. The GDB server requires a licence before starting.

Enter the license purchased from Segger or start evaluation mode, for non-commercial usage only!

	J-Link GDB Server License		×	
	No valid license for GD J-Link S/N is 15 To obtain a license, please contar (www.segger.com, sale You may use this software non-commercial or evalu Enter license	B Server found. 7002422. st SEGGER Microcontroller is@segger.com) without license for uation purposes. ate or use non-commercially		
dress 🛅 C:\Program Files\SEGG	ER\JLinkARM_V425k	1		
ame 🐣	Size Type	Date Modified		
Doc	File Folder	4/13/2011 12:11 PM		
IETC	SEGGER J-Link GDB Server ¥4.25	k (beta) (non-commercia		ise only) 📃 🗖
Samples	File Help			
USBDriver				🔽 Localbest onlu
INSTALL.LOG	GDB Waiting for connection	Initial JTAG speed 5	kHz 🔻	Stay on ton
JFlashARM.exe				Show log window
JLink.exe	J-Link Connected	Current JTAG speed 5	kHz	Generate logfile
JLinkARM.dll	Target Cortey-M3, Core Id: 0v48600471	7 503V	ia endian	Cache reads
JLinkConfig.exe	Taiget [Contex-mid, Cole Id, 0x40A00471			└── Verify download
JLinkDLLUpdater.exe	Les euteuts Clear log			✓ Init regs on start
JLinkFlashCogentCSB737.exe	CECCED I Link CDD Common	. II.4. 051. (h-t-)		
JLinkFlashPhytecPCM967_NA	SEGGER J-LINK GDB Server	94.25K (Deta)		^
JLinkFlashSTMB525.exe	JLinkARM.dll V4.25k (DLI	. compiled Apr 11	2011 19:18	:36)
JLinkFlashToshibaTOPAS900				
JLinkFlashToshibaTOPAS910	Listening on ICP/IP port	. 2331		
JLinkGDBServer.exe	J-Link connected			
JLinkGDBServerCL.eXe	Firmware: J-Link ARM V7	compiled Feb 15 2	011 11:03:	33
JLinkRDI.dll	Hardware: V7.00			
JLinkRDIConfig.exe	OEM: IAR			
JLinkSTM32.exe				
JLinkSTR91x.exe	J-Link found 1 JTAG devi	.ce, Total IRLen =	4	•
JLinkTCPIPServer.exe				•
JMem.exe				
]SWOAnalyzer.exe	0 Butes downloaded	1 JTAC device		
UNWISE.EXE	lo pyros domilodoca	In STHU device		

The figure shows that J-Link GDB Server started and a connection between host and target over JTAG is available.

5 Java Runtime Environment JRE

HOW TO INSTALL THE JAVA RUNTIME ENVIRONMENT

5.1 Checking for Java JRE

The installation of Eclipse requires the availability of Java as a virtual machine on system.

To check, that Java already exists on the system, type the command **Java** -version on DOS console.



If windows cannot recognize this command, Java Runtime Environment (JRE) is needed to be installed.

5.2 Installing Java JRE

Download JRE from: <u>http://java.com/</u>

Ę,			Search
Ja _{java.com}	Java in Action Downloads Help Center		
	Java Downloads for Windows		
	Recommended Version 6 Update 24		
	Select the file according to your operating system from the list computer.	below to get th	ne latest Java for your
	> All Java Downloads > Remove Older Versions	<u>1</u>	> What is Java?
	license agreement		
	Windows 7//Philato/2000/2002/2009 Online		
	filesize: ~ 10 MB *	Instructions	Verify Now
	Windows 7/XP/Vista/2000/2003/2008 Offline filesize: ~ 10 MB * Windows 7/XP/Vista/2000/2003/2008 Offline filesize: 15.3 MB	Instructions Instructions	<u>Verify Now</u> After installing Java, restart your browser an <u>verify Java has been</u> installed correctly.
	windows //XF/VISIa/2000/2003/2008 Offline filesize: ~ 10 MB * Windows //XF/VISIa/2000/2003/2008 Offline filesize: 15.3 MB Information about the 64-bit Java plug-in	Instructions	<u>Verify Now</u> After installing Java, restart your browser an <u>verify Java has been</u> installed correctly.

Java installation can be done online or offline. Download one of the installation programs and start the installation procedure to install JRE.

6 Eclipse platform

HOW TO INSTALL THE ECLIPSE IDE

6.1 Eclipse platform

The latest release of eclipse is available to download from the web site: <u>http://download.eclipse.org/eclipse/downloads/</u>



The Helios release 3.6.1 (or later) consists of various packages. These packages are available on the left menu of the download website of the Eclipse project.

For our system it is required a minimum eclipse platform to be realized. The package needed for this can be found by the menu section "**Platform** Runtime Binary".

* + - 0	f	200000000000 pile pro Propertiti	🔹 🚷 🔹 Sarta net Gorgin 🛛 🗾
eclipse			Bonniet Leger
Dewnloads APDIatio	Windows Linter Solaris AIX Macintos	6 192-0X	last.
Eclore SOK			
Junit Plage Tests and Automated Testing Framework	Release Build: 3.6.	L e Eclipse Foundation Software User Agreement.	Februar SDR's
Example Flug Int			1 Al Puttone
RCP Runtime Binary	New and Noteworthy		 Wordsteil Platform Likes Platform
RCP EDK	Eclipse 3.6.1 Readme	 Surans Plattoine ALC Plattoine 	
Della Pack	The page provides access to the various sections of this but	id along with details relating to its results. Test results are provided	² Manufah Plattow
com/bm/cubace Binary and Source Plug-ins	below and performance results are posted once they are an by selecting one of the tabs in the platform navigator above.	alable. You may access the download page specific to each platform	
Platform Runtime Benary Platform 1044	Download now: Eclipse SDK, w	(indows	Downfoads hitsgrify
JDT Puritive Binary JDT 50%	You are currently running on Windows		¹ Chai har inditudions on how to work the integrity of your dynatic age.
JOT Core Batch Compile	Related Links	Sporte Builds	aparter state of the second se
FDE Rustine Broky		** Access the Source Builds page.	Dapport Eclipted
POE SDH	View the text second s for the current build.	An further of the product of the second seco	Etiand (
DWT binary and Source	··· Were the performance results for the current build.		
org ectpon reletig tools shig-in			
			* Baunda a bland
0- 9- 0-			BLASHM (100%) -

The Eclipse platform binary package is available for many operating system.

For Windows systems with 32 bit CPU use the first "http" location of this list to download the adequate Eclipse package for this system.

♦	0- 0 A O web downed adpostory actional down	nisach@stgs:P-5.4.1-20100000000	North American	Sefuri#urbie	• M • Suche of Single	13
Platform	n Runtime Binary 🛛	10/00/00/00	and the second	10104	1.00.000	
Status	Platform	Download	Size	file	Checksam	1
1	Windows (Supported Versions)	0.400	50 MD	eclipse-platform-3.6.1-win32.zip	(md5) (sha1)	
1	Windows (x86_64) (Supported Versions)	(945p)	50 MB	eclipse platform-3.6 1 win32 x86_64.zp	(md5) (sha1)	
1	Linux 606/0TK 25 (Eupported Versions)	(7:82)	49 MB	eclipse-platform-3.6.1-linux-glk.tar.gz	(mdf3 (sha1)	

The Eclipse platform binary is available from many http mirrors. After choosing one of these mirrors the software can be downloaded.



H Web www.eclipse.o	org/downloads/do	wnload.php				Ele
eclipse	#] Speichern	unter [#]	2l		Visit of	her Eclipse Sites
March 2	Speichern in:	😂 Downloads		O	k 📂 🛄-	
Home Downloads	Zuletzt verwendete D					
Downloads Home » Bit Torrents Source code More Packages	Desktop					
Give Back to	Eigene Dateien					
\$5 \$15 \$25	Arbeitsplatz					
Donate \$35 of more and Become a Friend of Eclipse		Dateiname:	eclipse-platform-SDK-3.6.1-w	vin32	~	Speichern
PayPa	Netzwerkumgeb	Dateityp:	ZIP-komprimierter Ordner(*.z	ip)	~	Abbrechen
The Eclipse Foundation is a notife	P. Carrage	•				

After downloading and saving the zip file *eclipse-platform-X.Y.Z-win32.zip*, decompress this file, to e.g. *C:*\.



With the installation of Eclipse platform runtime binary, this installation of Eclipse is finished.

6.2 Start Eclipse IDE

The Eclipse IDE is now ready to start; for this start *eclipse.exe* from the folder *C:\eclipse*. At first the workspace, where Eclipse should store the project files, has to be specified.

🖶 Worksp	ace Launcher	
Select a w Eclipse Platf Choose a w	rorkspace orm stores your projects in a folder called a workspace. orkspace folder to use for this session.	
Workspace:	C:\Dokumente und Einstellungen\(workspace	Browse
Use this a	as the default and do not ask again	OK Cancel

After the selection of the workspace, Eclipse starts.





7 C/C++ Development Tooling CDT

HOW TO INSTALL THE C/C++ DEVELOPMENT TOOLING

7.1 Installation of new Software on Eclipse

After the installation of Eclipse, it is necessary to import the CDT package to Eclipse for developing C or C++ applications. The CDT package is available as a plug-in.

To install new software on Eclipse, start Eclipse and follow the installation instruction via the $Help \rightarrow Install$ New Software menu.



The installation of CDT plug-in or any another package to the Eclipse platform depends on the procedure, which the user selects to add this software to the platform. After clicking of the *add* button the *Add Repository* window appears.

🖨 Install			×
Available Soft Select a site or e	ware nter the location of a site.		
Work with: typ	e or select a site Find more soft	Add]
type filter text	🚝 Add Repository		1
Name There Select All Details	Name: Location: http://	OK Cancel	
Show only the l Group items by Contact all upd	atest versions of available software category ate sites during install to find required s	Hide items that are already installed What is <u>already installed</u> ? oftware	
?		< Back Next > Finish Cancel	

Eclipse supports two different methods to implement new plug-ins to the platform:

When the plug-in is available locally on the system as *JAR* or *ZIP* file, the installation can be done offline.

Resource - Eclipse Platform	
File Edit Navigate Search Project Run Window Help	
🚱 Welcome 🗙	🖨 Install
Tutorials Samples What's New	Available Software Select a site or enter the location of a site.
Overview	Work with: type or select a site 🗸 Add
The Eclipse Platform is a kind of univ	Find more software by working with the " <u>Available Software Sites</u> " preferences.
	type filter text
6	Name
C++ C/C++ Development	☐ ① There is no site selected.
Repository archive	Name: Local
Suchen in: 🗁 downloads	Coation: http:// Archive
Zuletzt verwendete D	Cancel
Eigene Dateien	Hide items that are already installed What is <u>already installed</u> ? d software
Arbeitsplatz Arbeitsplatz Olateiname: Dateiname: Tatellitz:	Offnen < Back
Indemotivalingen Polonyp	

When the plug-in is available from a http project website, a new installation or update of this software is done online

🖨 Install		
Available So Select a site or	ftware enter the location of a site. Add Repository	
Work with: ty	Name: CDT Local Location: http://download.eclipse.org/tools/cdt/releases/helio Archive.	Add

The online method is recommended. For this procedure first adapt the Eclipse network settings to the network configuration before initiate the installation procedure.

7.2 Eclipse Network Configuration

From the Eclipse sub menu *Preferences* on the category *Window*, configure the settings for your network.

EResource - Eclipse Platform				
File Edit Navigate Search Project Run V	Mindow Help			
© Welcome ⊠	New Window New Editor Show Toolbar			8 ⊂ 3 X X ⊕ ↔ 🚯
Tutorials Samples Wr	Open Perspective Show View	*		Workbench
Overview The Eclipse Platform is a	Customize Perspective Save Perspective As Reset Perspective Close Perspective Close All Perspectives		form - an open extensible IDE for anything and nothing in particular.	5
	Navigation	•		
Get familiar with the C/C	Preferences ++ Development Too	ls (CDT)	

The configuration of the network can be realized from the *Network connections* field. From this field, edit the network setting entry and do the necessary changes to enable for Eclipse the communication to the internet.

🖨 Resource - Eclipse Platform	
File Edit Navigate Search Project Run Window Help	
🔞 Welcome 🗙	X A 🗄 🗖
🦳 🗠 😵 🔶	<u> </u>
Tutorials Samples What's New	Workbench
The File Plate in the text Network Connections	
The Eclipse Platform is a ki	
Appearance Active Provider: Native	
Content Types Proxy entries Pr	
Get familiar with the C/C+ Keys Get familiar with the C/C+ Network Connections HTP Manual false	
SSH2 SOCKS Manual false	
Workbench basics	
Learn about basic Eclipse	
Web Browser Host: Port: Port:	
Team support	
User: User: Host	
H:Run/Debug hashind. II It It	
move	
OK Cancel	
Restore Defaults Apply	

After this change click the *Apply* button to save the new network configuration. Now the online installation of the CDT plug-in can be done.

7.3 Eclipse CDT Plug-In

The CDT plug-in exists in a Standard and a Zylin version, but only the installation of one version is required.

For the integration of new CDT plug-ins on eclipse-platform, the demonstration of this installation follows below.

Under Help menu, click on Install New Software

🖨 Resource - Eclipse Platform			
File Edit Navigate Search Project Run Window	Help		
🚳 Welcome 😫	🚳 Welcome	🟠 (Þ. 🗘 🖈	A* 🗄 🗖 🗗
eclipse	 Pelp Contents Search Dynamic Help 		Jeffer Workbench
Welcome to	Key Assist Ctrl+Shift+L Tips and Tricks Cheat Sheets		
	Check for Updates Install New Software		
Overview	About Eclipse Platform	Tutorials	
Get an overview of the featur	es	Go through tutorials	
Samples		What's New	
iry out the samples		V Find out what is new	

On the next window, click on *Available Software Sites* to look for a CDT downloading mirror, if existing. The mirror is:

http://download.eclipse.org/tools/cdt/releases/helios/".

t à ste		Find more software by working	with the " <u>Available Software Sites"</u> p	Add references
		Version		
selected.				
type filter text	Available Software Sites		· · · · · · · ·	
 C(++ Help Install/Update Automatic Updates Available Software Sites Run/Debug Team 2MLBuddy 		Location http://download.eclpse.org/dstatools/upda http://download.eclpse.org/dstatools/updat http://download.eclpse.org/dsdp/mt/updat http://download.eclpse.org/dsdp/mt/update http://download.eclpse.org/edps/updates http://download.eclpse.org/modeling/emf/u http://download.eclpse.org/modeling/emf/u http://download.eclpse.org/modeling/emf/u http://download.eclpse.org/modeling/emf/u http://download.eclpse.org/modeling/emf/u http://download.eclpse.org/modeling/emf/u http://download.eclpse.org/modeling/emf/u http://download.eclpse.org/modeling/emf/u http://download.eclpse.org/modeling/emf/u http://download.eclpse.org/modeling/emf/u http://download.eclpse.org/modeling/m2n/u http://download.eclpse.org/modeling/m2n/u http://download.eclpse.org/modeling/m2n/u http://download.eclpse.org/modeling/m2n/u http://download.eclpse.org/modeling/m2n/u http://download.eclpse.org/modeling/m2n/u http://download.eclpse.org/modeling/m2n/u	Edt Edt Benove Reload Enable Import	
•		ок	Cancel	2

Otherwise click on *Add* to set the required mirror. Enter *CDT* for the name and <u>http://download.eclipse.org/tools/cdt/releases/helios/</u> for the web location.

Implementation of GNU tool chain for Fujitsu Cortex-M3 MCUs Chapter 7 C/C++ Development Tooling CDT

Navigate Search Project Run Window Help	🖉 install 📃 🗄 🔀	1
ne x	Available Software: 10 MI ectipse-platform-3.6 1-wm22.20p Select a site or efficient the location/W a site, ectipse-platform-3.6 1-wm22.480_64.20 mtol 40 MB ections-allatorm-3.6 1-insu-distorat	A* 2
Welcome to Ec	Work with: hype or select a site Add Find more software by working with the " <u>Available Software Sites</u> " preferences. Type filter last.	WorkD
Overview Get an overview of the features	Name CDT Local Location: tp://download.edipse.org/tools/cdt/releases/helos/f Archive	
Samples Try out the samples	Select All Comment	
	Show only the latest versions of available software Group items by category What is <u>already installed</u> Contact all update sites during install to find required software	-
	(Cancel Stack Stack Cancel	

Click on *OK* and the next window below will be displayed. Select both *CDT MAIN Features* and the *CDT Optional Features* listed below only.

	Version
CDT Main Features	
CJC++ Development Tools	7.0.2.201102110609
G/C/C++ Development Tools SDK	7.0.2.201102110609
CDT Optional Features	
🍫 C/C++ Code Analysis Framework (Codan)	1.0.0.201102110609
C/C++ Debugger Services Framework (DSF) Examples	2.1.0.201102110609
Sector CIC++ Development Platform	7.0.2.201102110609
Sy C/C++ DSF GD8 Debugger Integration	2.1.0.201102110609
Sector ClC++ GCC Cross Complex Support	1.0.0.201102110609
😵 C/C++ GDB Hardware Debugging	7.0.0.201102110609
😵 C/C++ GNU Toolchain Build Support	7.0.0.201102110609
C/C++ GNU Tookhain Debug Support	7.0.1.201102110609
C/C++ Memory View Enhancements	2.1.0.201102110609
C/C++ Remote Launch	6.0.0.201102110609
© C99 LR Parser	5.1.1.201102110609
💱 C99 LR Parser SDK	5.1.1.201102110609
CDT Tests	7.0.0.201102110609
Seclipse Debugger for C/C++	1.0.0.201102110609
Alscellaneous C/C++ Utilities	5.1.0.201102110609
💱 P2 C/C++ Tookhain Installer	1.0.0.201102110609
Unified Parallel C Berkeley UPC Toolchain Support	1.0.3.201102110609
🖗 Unified Parallel C Support	5.1.0.201102110609
🚯 Unified Parallel C Support SDK	5.1.0.201102110609
31. C/C++ Compiler Support	6.1.0.201102110609
3L C/C++ Compiler Support SDK	6.1.0.201102110609

1

Follow the next steps to start the plug-in installation.

🕈 Install	E E Install	
Available Software	Install Details	
Check the items that you wish to install.	Review the tens to be installed.	()c
Work with: (CDT - http://download.edipse.org/tools/oth/Heleases/helios/	Add Version Id QC++ Development Platform 7.0.2.20110211, org.edgse.cdt.platform	n feature group
Price more sonoware by wonang wan the <u>provide Software Street</u> of	generations	lugroup Rureligroup
type filer test	GC++ GDB Handware Debugging 7.0.0.20110211 org.edges.edt.debug	applead for the state of the st
Name Verson		autoautory
CIC++ Development Tools 7.0.2.201102110609		
COT Optional Features		
ClC++ Code Analysis Framework (Codan) 1.0.0.200102110609 ClC++ Deburger Services Framework (ICFE) Exemples 2.1.0.2021021106/9		
G C/C++ Development Platform 7.0.2.201102110609		
Cole B. Dunke M. Elizonhad		
STREET AND LOESONGE AND STREETS SOURCED		
Details		>
	See: Unknown	
Show only the latest versions of available software		
Group items by category What is <u>already installed</u> ?		1
Contact all update sites during install to find required software		
1000		
	2	
(?) chai Next> Fruit	Carcel (?) Cased Next> Feish	Cancel
🖙 Install		
Review Licenses		
Licenses must be reviewed and accepted before t	the software can be installed.	
Licenses:	License text:	
Eclipse Foundation Software User Agreement	Eclipse Foundation Software User Agreement April 14, 2010	
	Usage Of Content	
	THE ECLIPSE FOUNDATION MAKES AVAILABLE	
	AND/OR	
	COTHER MATERIALS FOR OPEN SOURCE PROJECTS (COLLECTIVELY "CONTENT").	
	TERMS AND CONDITIONS OF THIS	
	AGREEMENT AND/OR THE TERMS AND CONDITIONS OF LICENSE AGREEMENTS OR	
	NOTICES INDICATED OR REFERENCED BELOW, BY USING THE CONTENT, YOU	
	AGREE THAT YOUR USE OF THE CONTENT IS GOVERNED BY THIS AGREEMENT	
	AND/OR THE TERMS AND CONDITIONS OF ANY APPLICABLE LICENSE AGREEMENTS	
	BELOW. IF YOU DO NOT AGREE TO THE	
	AND THE TERMS AND CONDITIONS OF THIS AGREEMENT	
	NOTICES INDICATED OR REFERENCED	
1	I accept the terms of the license agreement I do not accept the terms of the license agreement	
3	< Back Next > Finish Cancel	

Eclipse starts then the installation of CDT plug-in.



When the plug-in installation has finished, restart Eclipse IDE.

tform for the insta hanges without re	Ilation changes to take starting, but this may
Not Now	Apply Changes Now
	form for the instand hanges without re Not Now

8 Working with the Eclipse IDE

HOW TO HANDLE THE ECLIPSE IDE

8.1 C/C++ perspective

Start the Eclipse IDE.



At this point, Eclipse will present a "Workspace Launcher" dialog, shown below. This is where you specify the location of the "workspace" that will hold your Eclipse/CDT projects (see also the previous chapter 6.2).

Copyright Eclipse contributors and others. 2000, 2010, All rights reserved. Java and all Java- related trademarks and logos are trademarks or registered trademarks of Sun Microsystems, ic. in the U.S., other countries, or both. Eclipse is a trademark of the Eclipse Foundation, Inc.	
🖶 Workspace Launcher	×
Select a workspace	
Choose a workspace folder to use for this session.	
Workspace: H:\My Documents\eclipse-workspace Browse	
☑ Use this as the default and do not ask again	
OK Cancel	

Now Eclipse will officially start and show the "Welcome" page shown below.

Ele Edit Navigate Search Project Run Window Help	
Streams X	
eclipse	Workbench
Welcome to Eclipse	
Overview Get an overview of the features	Go through tutorials
Samples Try out the samples	What's New Find out what is new
F 0	

For project developing on C/C++, switch to the C/C++ perspective.

Choose $Window \rightarrow Open$ Perspective, then click on C/C++ to open Eclipse in the C/C++ perspective.



8.2 Creating a C or C++ project with Eclipse

In the Eclipse C/C++ perspective a new project for your target can be created, here: Fujitsu Cortex M3.

<u>N</u> ew Open File <u>.</u>	Alt+Shift+N	Makefile Project with Existing Code	0
⊆lose Close All	Ctrl+W Ctrl+Shift+W	C Project	
Save Save <u>A</u> s	Ctrl+5	Convert to a C/C++ Project	
Sav <u>e</u> All Rever <u>t</u>	Ctrl+Shift+S	C Folder	
Mo <u>v</u> e Rena <u>m</u> e	F2	File from Template	
Refresh Convert Line Delimit	F5 ers To	Ctrl+N Ctrl+N	

For this choose $File \rightarrow New \rightarrow C$ Project.

In the "New Project wizard" shown below-left, expand the *Makefile project* branch by clicking on its "+" sign and then select *Empty Project*. Enter the sample project name e.g. "mb9bfxxx_ioport_counter". Then click on *Next* to continue.

On the below-right window just close the wizard with Finish.

E C Project		C Project	
C Project Create C project of selected type		Select Configurations Select platforms and configurations you wish to deploy on	
Project name: Inb/bf/cox_joport_counter		Project type: Makefile project Tookhans: Configurations:	
Location: Crimonispatelinitribhox_suport Project type:	countier Economic	Default	Select al
	Other Tookhain Cygwin GCC Fujksu Cortex-H3 Tools Fujksu-Cortex-H3-Tookhain		Advanced settings
Show project types and tookhains only	if they are supported on the platform	Use "Advanced settings" button to edk project's properties. Additional configurations can be added after project creation. Use "Manage configurations" buttons either on toolbar or on proper	ty pages.
(2)	Bext > Enish Cancel	() <back (jet="" 5)<="" td=""><td>Brish Cancel</td></back>	Brish Cancel

Now the C/C++ perspective shows a valid project, as shown below in the C/C++ Projects view on the left, but there are no source files in that project. Normally you would select $File \rightarrow New \rightarrow Source$ File and enter a file name and start typing. This time, however, we will import already existing source files.

In the Eclipse screen below click on $File \rightarrow Import...$. This will bring up the file import dialog.



In the "Import" screen below, click on *File System* and then click *Next* to continue.

F Import	_101>
Select Import resources from the local file system into an existing project.	Ľ
Select an import source:	
General Archive File Existing Projects into Workspace File System Preferences C/C++ C/C++ Run/Debug Team	
2	
_	- 20

In the *Import* \rightarrow *File System* screen below, use the *Browse* button associated with the *From directory* text box to search for the sample project to be imported.

The project template *io-port* used in this application note, which is included in the note's software package archive. The sample project *io-port* should be then saved, in a directory folder e. g. *C*:\downloads\io-port.

🛢 Import	And the second	_101 ×
File system Source must not be empty.	8	
From directory:		Browse
	Import from directory Select a directory to import from.	<u>r×</u>
	Can uninst € Can usr € Can yar	
Filter Types	Documents and Settings downloads Great downloads do	
Into folder: mb9bfxxx_joport_counter Options Qverwrite existing resources with		
C greate complete folder structure Create sglected folders only <u>Advanced >> </u>	Folder: io-port Make New Folder Off	Cancel
	3	
(?)	< Back Next > Enish	Cancel

Check the box for the folder of the *io-port* example and then click the **Select All** button below because we want to import each of its files. Click *Finish* to start the file import operation.

Import				_ 0 :
ile system Import resources from the local file syste	m.			
From directory: C:\downloads\jo-port		a (2)	×	Browse
1	<u>ព</u> ធាធាធាធា	<pre>project project pio-port_ram. pio-port_ram. pio-port_ram. pio-port_ram. pio-port_ram.</pre>	elf hex map	
Filter Types Select All De Into folder: mb9bfxxx_ioport_counter Options	eselect All			Browse
Qverwrite existing resources withou Greate complete folder structure Greate sglected folders only Advanced >>	t warning			
		3,		

Expanding the *mb9bfxxx_ioport_counter* project in the *C/C++ Projects* view seen below, shows that all the source files, which have been imported into the project. By clicking on the "+" sign on the project name in the C/C++ Projects panel on the left, the imported files are expanded in a tree view.

🖶 C/C++ - Eclipse Platform							_ 🗆 ×
Ele Edit Source Refactor Navigate Search	h <u>P</u> roject <u>R</u> un <u>W</u> indow <u>H</u> elp						
➡ • □ □ □ ▲ 品 ♂ • ♂ • 2 • 2 • ★ + + + + +	c • G •] 🔦 • 🛞 •] \$	< • Q • Q	•] 🥭 🔗 •] 🖬 🔳	Resource	
Project Explorer 🛛 🔍 🗖 🕻	ו				- 0	🗄 Outli 🛛 💿 Mak	- 0
	7					An outline is not available.	
mb9bfxxx_ioport_counter							
^{IVS} 🗄 🧀 inc							
E 🔁 src							
io-port_ram.elf							
io-port_ram.hex							
L makefile							
	Problems 🛛 🧭 Tasks	Console Properties					~ - 8
	0 items	Decource	Dath	Location	Type	1	
	Description	incodurce	- I den	Locadon	турс		
0 mb9bfxxx_joport_counter					J		

In the Eclipse window below, the *main.c* file has been selected by clicking on it and it thus be displayed in the source file editor view in the centre. In the project explorer window the *main.c* module is expanded to reveal its variables and functions. By clicking e. g. on the variable count, the source window jumps to the definition of that variable.

E/C++ - mb9bfxxx_ioport_counter/src/m	nain.c - E	clipse Platform						
<u>File Edit Source Refactor N</u> avigate Se <u>a</u> rch	Project	<u>R</u> un <u>W</u> indow <u>H</u> elp						
] ➡ • ■ ■ ■ m @ • 6° • 6] ½ • 3 • * ← • • • •	• 6	•] 🔦 • 🛞	•] 🅸 •	0 · 9 ·] 🤔 🛷 •]	<i>3</i> 🔲 🖬	E C/C++
Project Explorer 🛛 🗖 🗖	🚺 mai	n.c 83					- 8	🗄 Outli 🛛 💿 Mak 📄 🗖
Project Explorer 23 Body Startup Job Startup	€ mail , , , , , , , , , , , , ,	he 3 warranties, whe limited to, war particular purp To the maximum is restricted t FSEU is not lie (V1.5) nclude "mb9bf506 nclude "system n nclude "type.h" LED number patt nst unsigned sha (0xc000, 0xF900, signed char count_ id wait (int a) blems 23 Tasks	ether express rranties of pose for whit extent permission intention able for contraction sn.h" ab9bf50x.h" ern array 1 prt LEDPATTH oxA400, 05 direction = wait loop	(0 - 9) (0 - 9) ERN[10] = ERN[10] = KBOOD, OX // Properties Resource	lied, in pability and pability and pability and pability and and pablicable applicable applicable and and and and pablicable and and and pablicable applicable and and and pablicable applicable appli	particular, nd fitness f e is not des le law, FSEL gross negli s. 200, 0x8200, or LED displ ection - Location	Dut n but n ior a lignat ''''''''''''''''''''''''''''''''''''	Outi 23 Mak Ma Ma Ma Ma Ma Ma Mak Mak Mak Ma
│ □ [☆] ● /mb9bfxxx ioport counter/src/m	ain.c - ſc	punt]						
	100	2					1990	

8.3 Cleaning the selected project

For compiling a project, first disable the automatically build. Select the project and from the category *Project* on the IDE menu uncheck *Build Automatically*.

E/C++ - mb9bfxxx_ioport_counter/src/m	ain.c - Eclipse Platform					<u>_ ×</u>
Eile Edit Source Refactor Navigate Search	Project Run Window Help					
➡ • ☴ 雨 ⊨ ╗ @ • ☎ • ₫ カ • Ϡ • ← ← • → •	Open Project Close Project	≪ • ⊛ •] ☆ •	0 • 9 •] 🥭 🛷 •]		C/C++
Project Explorer 13 Project Explorer 13 Status protect counter Status probeb 50x, V11.5 Status probeb 50x, V11.5 Status probeb 50x, V11.5 Status probeb 50x, V21.5 Status probeb 50x, V21.5 Status probeb 50x, V21.6 Sta	Bid Gall Configurations Build Configurations Build Configurations Build Configurations Build Project Build Automatically Make Target Properties /* /* (V1.5) /*********************************	r express or imp ties of merchant for which the o ent permitted by intentional misor for consequent; " f50x.h" array (0 - 9) LEDPATTERN[10] = A400, 0xB000, 0> 0; // ection = 1; // ait loop	siled, in p ability ar leliverable / applicabl al damager ////////////////////////////////////	corticular, ad fitness i is not des le law, FSEI gross negl:	Cora but n≜ for a signat J's li igence 	Couti 23 Mak
	🖹 Problems 🕅 🖉 Tasks 📮 Co	onsole 🔲 Properties				~
	0 errors, 1 warning, 0 others	[(nest	[Lander	Ture	
	E A Warpings (1 Rem)	Resource	Path	Location	Type	
	a warnings (1 kom)					
] T [◆] \$\$ mb9bfxxx_joport_counter					1	

Now clean the project. In the same way select the project *mb9bfxxx_ioport_counter* from the project explorer window the category *Project*, and on the IDE menu choose *Clean...*.

🖶 C/C++ - mb9bfxxx_ioport_counter/src/m	ain.c - Eclipse Platform					
<u>Eile E</u> dit <u>S</u> ource Refac <u>t</u> or <u>N</u> avigate Se <u>a</u> rch	Project Run Window Help					
📑 🗝 🗒 🙃 🚠 🔂 - 😂 - 🖻	Open Project 🚳 •	· · · · · ·	🜔 • 💊 • 🛛 🤔	A -].		🔁 🖬 C/C++
$[\underline{b}] \star [\underline{b}] \star [$	Close Project					Resource
	Build All Ctrl+B				- 6)	
	Build Configurations					
	Build Working Set I on =	-1;	// count di	rectior	upwa	
	Clean					mb9bf506n.h
🕀 🗁 inc	Build Automatically					type.h
🗄 👝 prj	Make Target	>PDIR5 & OxO	002)) // SW3-	INT1 pr	essed	🚽 😑 🖁 LEDPATTERN : const unsign
🖨 👝 src	Properties on =	1;	// count di	retion	downw	count : unsigned char
the core_cm3.c	}					count_direction : signed ch wait(int) : woid
startup_mb9bf50×_V11.s	3					main(void) : int32_t
😟 🔝 startup_mb9bf50×_V21.s	if //1 == count divort	tion) of /	20011 / 0011 /	/ atill		
	(Count_arrest	cion) aa (<mark>e</mark>	(33)) /	/ 50111	. coun	
core_cm3.ist	count++;		// count up	wards,	if < 🗧	
main.lst)					
main.o	if ((-1 == count dired	stion) ss (count is 0)) /	/ etill	coun	
startup_mb9bf50x_V21.lst	(,		/	=	
system mb9bf50x.lst	count;		// count do	wnwards	, if	
system_mb9bf50x.o)					
···· 📄 io-port_rom.bin	}				-	
io-port_rom.elf						
io-port_rom.map					100	
🐻 makefile					-	
	<u> </u>				•	
	📳 Problems 🕄 🖉 Tasks 📮 Console	Properties				▽
	0 errors, 1 warning, 0 others			,		
	Description *	Resource	Path	Location	Туре	
	Warnings (1 item)		And Obligant instan	line EQ	C/C L L Durk	
	 reconneype or main is not inc 	mainte	/mpanxxx_iopor	III IE 52	QC++ Prob	
P mb9bfxxx joport counter						

On the clean window deselect the option *Clean all projects* and select our project. Deselect also the option *Start a build immediately*.



Finish the configuration by clicking on the OK button and the clean process will start.



To show the results of the clean process, look at the "Console" panel located below.



8.4 Building the selected project

Important note: If you use the makefiles of the software package of this application note, check all paths (e.g. to *OpenOCD*) and modify them to your individual installation paths!

The project *mb9bfxxx_ioport_counter* can be compiled with the preinstalled Yagarto toolchain. To start this procedure, select the project *mb9bfxxx_ioport_counter* on the "Project Explorer" view. With a click on the right mouse button on the selected project start the build process with *Build project*.



The result will be than show on the IDE "Console" like below.

Implementation of GNU tool chain for Fujitsu Cortex-M3 MCUs Chapter 8 Working with the Eclipse IDE



On the "Project Explorer" view, it can be seen that the project output files (*.bin, *.elf,) are generated.

8.5 Create make target

The make targets are pre-defined in the example project *mb9bfxxx_ioport_counter*. This paragraph shows the creation process, if a new project is set-up or the targets were deleted accidentially.

The make file for the project *mb9bfxxx_ioport_counter* manages the project build process. This file generates output files for debugging in RAM and ROM. The make file generates also the final output file for programming the Flash with an external tool like the Fujitsu Flash Programmer.

It is needed to create a make target to separate the build processes for RAM and ROM (Flash). Also add the clean process to "Make Target".

To create a make target, select the project *mb9bfxxx_ioport_counter* on the "Project Explorer" view. Click with the right mouse button on the selected project and select *Make Targets*.

Implementation of GNU tool chain for Fujitsu Cortex-M3 MCUs Chapter 8 Working with the Eclipse IDE

						C Resource
et Explorer 83	0 0	e main.c 23		UAUUUUUU	🗢 🗆 🔮 Outin	e 🗄 🕐 Make Target
ib/iblico:_joport_co	Beix	î,	<pre></pre>	// count		14 1 × × 0 mb9b/506n.h satura sh/8/60 h
inc inc	Go Into				-1	type.h
er) Src	Open in New Windo	w	- (FM3_GPIO->PDIR5 4	0x0002}) // 59	73	LEDPATTERN : const unsigned short[] count : unsigned char
E core_cm3.c	E Copy Piete	Ctri+C Ctri+V	_direction = 1;	// count	d -•	count_drection : signed char wat(int) : void
startup_mb9	💥 Delete	Delete			-0	main(void) : int32_t
e on one of the system_mb9	Rename	F2	count_direction) &	(count < 99))		
core_cm3.lst	in import		1	// count	u	
main.lst	🛃 Export		_		1	
edin_quteta	Build Project Clean Project		-= count_direction) ((count != 0))		
system_mb9	2 Refresh	F5	-;	// count		
ko-port_rom.bin	Close Project Close Unrelated Pro	Arcta			, Z	
io-port_rom.elf	Build Configurations		• Console 23 Propertie	s	0.0	
io-port_rom.map	Make Targets		Public Systems	src/system_mo:	apraox.e -o i	arcislaces moantsor.o
D market	Convert To		Rebuild Last Target P9	s=src/startup_n wrtup_mb9bfS0x_1	mb9bf50x_V21 V21.o	.1stdefsym Debug_R&
	Bun As		> cc ./src/main.o ./src	/core_cm3.o ./m	cc/system_mb	9bf50x.o
	Debug As Profile As		-interwork -W1,star	t-group	scarcines -:	scacic -mepu-corcex-mo
	Tgam		, agarto-toolchain/lib/	gcc/arm-none-ea	bi/4.5.1/thu	nb/v?m'
				none = enD1/11D/C	the standing of the line in the standing of th	
S mb9bfxxx	Compare With Restore from Local I Ptoperties	Hstory Ak+Enter arm-none-eab I E Create M	end-group -T./psj/ -mismatch -o io-po bjcopy -O ihex io-por -objcopy -I elf32-litti	Fujitsu_cortex-1 rt_rom.elf t_rom.elf io-pom e -O binary io-p	humb/V7b' -14 H3_rom_V10.14 rt_rom.hex port_rom.elf	io-port_rom.bin
introtoco.	Compare With Restore from Local Pipperties	Attere Attere arm-note-eable Target name Make Targe Same a Make targe Build Comm Build comm	end-group -T./p3)/ mismatch -o io-po bjcopy -0 ihex io-por objcopy -I elf32-littl lake Target e: Make (RAM) et2 s the target name 2 t: RAM3 hand3 lder settings and: make	Pujitsu_cortex-1 rt_rom.elf t_rom.elf io-pol e -0 binary io-j	hump/v7m' -14 H3_rom_V10.14 rt_rom.hex port_rom.elf	i -Wl,-Map=io-port_rom.m io-port_rom.bin
indottation i	Compare With Restore from Local Ptoperties	Aktory Aktore Akt	A set of the set	Pujitsu_cortex-1 rt_rom.elf t_rom.elf io-poi e -0 binary io-j	hump/v7b' -14 H3_rom_V10.14 rt_rom.hex port_rom.elf	i-WI,-Map=io-port_rom.m
toto the second	Compare With Restore from Local Pipperties	Ak+Enter Ak+Enter Ak+Enter Ak+Enter Target name Make Targe Make Targe Same a Make targe Build Comm Use bui Build comm Build Settin V Stop or Run all	A constraint of the set of t	Pujitsu_cortex-J rt_rom.elf t_rom.elf io-poi e -0 binary io-j 1	hump/v7b' =14 fbjrom_V10.14 rt_rom.hex port_rom.elf	I -WI,-Mapmio-port_rom.m
	Compare With Restore from Local Pipperties	Attere	A constraint of the set of t	Pujitsu_cortex-1 rt_rom.elf t_rom.elf io-pol e -0 binary io-j 1	hump/v7b' -14 fb]rom_V10.14 rt_rom.hex port_rom.elf	i-W1,-Mapwio-port_rom.m

Enter "Make (RAM)" for the target name, uncheck *Same as the target name* and write "RAM" in the text box "Make target". Click on *OK* to create a "Make (RAM)" build target.

On the same way, create a make target for "Make (ROM)", "Program-Flash" and "Clean".
Ereate Make Target	🗙 🖨 Create Make Target	x Create Make Target
Target name: Make (ROM)	Target name: Program-Flash	Target name: Clean
Make Target	Make Target	Make Target
Same as the target name	Same as the target name	' Same as the target name
Make target: ROM	Make target: program	. Make target: clean
F Build Command	Build Command	Build Command
🔽 Use builder settings	Use builder settings	Use builder settings
Build command: make	Build command: make	Build command: make
Build Settings	Build Settings	Build Settings
🔽 Stop on first build error	Stop on first build error	Stop on first build error
Run all project builders	Run all project builders	Run all project builders
OK Ca	ancel OK	Cancel OK Cancel

On the next figure the "Make Target" view can be seen. To start the build process for "Make (RAM)", "Make (ROM)" or "Clean", simply double click on the respective target.



On the IDE "Console" view, the output shows that the clean process was successfully done.

9 Example Eclipse Project Template

USING THE EXAMPLE SOFTWARE PROJECTS

The project template used in this application note has the following structure:

Project Explorer 🛛 🗖 🗖	🝺 makefile 🖾 💽 main.c
= 🍫 🏹	DLIBS =
FM3 M99bfxxx_ioport_counter Includes Includes Includes Include Include	<pre># # # # End of default section ####################################</pre>
source folder sc source folder sc startup_mb9bf50x_V21.s system_mb9bf50x.c makefile	LDSCRIPT_RAM = ./prj/Fujitsu_cortex-M3_ram_V21.1d LDSCRIPT_ROM = ./prj/Fujitsu_cortex-M3_rom_V10.1d # List all user C define here, like -D_DEBUG=1 UDEFS = # Define ASM defines here UADEFS =
	<pre># List C source files here SRC = ./src/main.c \ ./src/core_cm3.c \ ./src/system_mb9bf50x.c</pre>
	<pre># List ASM source files here ASRC = ./src/startup_mb9bf50x_V21.s</pre>
	<pre># List all user directories here UINCDIR = ./inc</pre>

The *inc* folder consists of the FM3 I/O header file used with all projects. Also the CMSIS header files and system start-up header are included here. The *prj* folder contains the linker script files and in *src* are located the source files.

The *makefile* is also included to the template.

The *Includes* directory contains the Yagarto libraries (e.g. *stdint.h*) needed during the build process.

To add other sources file use the folder *src*.

New header files can be added to the folder *inc* or to the *Includes* directory.

Important note: Check all paths (e.g. to *OpenOCD*) in the makefile(s) and modify them to your individual installation paths!

9.1 Add other Files to the Template Folder

Open the selected project select the folder, where new files should be added. Click with the right mouse key on the selected folder and use *Import*.

🚝 C/C++ - mb9bf	xxx_ioport_counter/mak	efile - Eclipse	Platform
<u>File E</u> dit <u>S</u> ource	Refac <u>t</u> or <u>N</u> avigate Se <u>a</u> rch	<u>Project</u> R	un <u>W</u> indow <u>H</u> elp
1 13 - 13 13 13	🗄 🚠] 📸 • 🔂 • [c • 🕝 •] 🗞 • ⊗ •] 🏇 • 💽 • 💁 •] 🥭
Project Explorer	× - D	👔 🔊 👔	e 🛛 💽 main.c
	🗆 😫 🎽	DLIB	S =
⊞ 🥵 FM3	s 15 13	#	
E B B B B B B B B B B B B B B B B B B B	oport_counter s	# En	d of default section
⊡	/agarto/yagarto-toolchain/arm	r ####	******
E (B C:/∖	/agarto/yagarto-toolchain/lib/(/agarto/yagarto-toolchain/lib/(####	
	ragarcoyyagarco-cooleriaiii)/IID/(f # St	art of user section
Đ.	New	•	
±	Go <u>I</u> nto		ine project name here
E b	Open in <u>N</u> ew Window		CT = io-port
	⊆ору	Ctrl+C	ine linker script file here
e 🛄 🖯	Paste	Ctrl+∀	<pre>RIPT_RAM = ./prj/Fujitsu_corte></pre>
	Delete	Delete	RIPT_ROM = ./prj/Fujitsu_corte> st all user C define here. like
E- 🕞 src	Rename	F2	5 =
	Import		tine DSM defines here
	Export		S =
±-0	Refresh	F5	t C source files here
L@ mak	Index	•	= ./src/main.c \
	Make Targets	۰.	/src/core_cm3.c \
	Resource Configurations	•	./slc/system_mbsb150x.c
	Team	+	t ASM source files here
	Comp <u>a</u> re With Restore from Local History	•	<pre></pre>
	Properties	Alt+Enter	st all user directories here
		UINC	DIR = ./inc

Select File System and click on the Next button.

Implementation of GNU tool chain for Fujitsu Cortex-M3 MCUs Chapter 9 Example Eclipse Project Template

Import		
elect import resources from the loc	al file system into an existing project.	N
Select an import source:		
C/C++ C/C++ C/C++ C/C++ C/C++ C/C/C++ C/C/C+ C/C+ C/C/C+ C/C+ C	s into Workspace	
i∰- 🧽 Run/Debug i∰- 🎓 Team		

Click on the *Browse* button to locate the new files.

E-Import	LO X	Import from directory	? X
File system Source must not be empty.		Select a directory to import from.	
From directory:	Ronge	Co true	
		E Contaicmd	2
		WINDOWS	-
		metadata	
		E C FM3	
Instant Sec. M. Descr. M.	I	E Consis	
Options			
Qverwite existing resources without warrang Grade complete folder structure		a device	
Create splected folders only Advanced >>			
		Folder: core	
() <gas mit="" =""> </gas>	Eyrifi Cancel	Make New Folder	Cancel

After this select the files, which should be imported, by checking them in the list.

🖨 Import	and the second	
File system Import resources from the local file	system.	
From directory: C:\workspase\FN	13\cmsis\core	Browse
	Core_cm3.h core_cm3.lst core_cm3.o Core_cm3.o Core_cmFunc.h	
Filter Types Select All Into folder: mb9bfxxx_ioport_co	Deselect All	Browse
Options ☐ Qverwrite existing resources of C greate complete folder structu ⓒ Create selected folders only <u>A</u> dvanced >>	without warning ure	
•	< Back Next >	Einish Cancel

With a click to *Finish*, the selected header files are added to the folder *inc*.

9.2 Add other Libraries to the "Includes" Directory

Some library headers (e.g. "*stdint.h*") must be included explicitly from the Yagarto installation directory. To set the *Includes* directory in your template or to add new libraries in this directory, select the project and click with the right mouse key to *Proprieties*. Here changes to the configuration options for the selected project can be done.

E/C++ - mb9bfxxx_ioport_c	ounter/src/m	ain.c - Eclipse F	Platform	
<u>File Edit Source Refactor Nav</u>	igate Se <u>a</u> rch	<u>Project</u> <u>R</u> un	<u>W</u> indow <u>H</u> elp)
📬 🗸 🖫 🕼 🛯 💼 🗍 🙋) • 🚳 • 🖻	• 🕝 •] 🍕	• 🗞 •]	☆・◎・�•・
Project Explorer 🛛	- 0	🚡 makefile	C main.c	x _
E-C FM3 E-C mb9bfxxx_ioport_counter		FM3_G FM3_G	PIO->PFR: PIO->PFR:	1 = 0x0000; // 3 = 0x0000; //
E D Includes	<u>N</u> ew Go Into			= 0x0000; //
E B C:/yagarto/yagart E B C:/yagarto/yagarti E B C:/yagarto/yagarti	Open in <u>N</u> ev	w Window		= 0x0000; //
	CobA		Ctrl+C	1
⊡ 🕒 core_cm3.h	Paste		Ctrl+∀	
H h core_cmFunc.n	💢 <u>D</u> elete		Delete	OR1 = LEDPATTE
⊕ b mb9bf506n.h	Мо <u>v</u> е			OR3 = LEDPATTE
🗄 庙 system_mb9bf50x.	Rena <u>m</u> e		F2	n
 h type.h pri Fujitsu_cortex-M3_ Fujitsu_co	≧ı Import ⊿ Export			FM3_GPIO->PDIR
	Build Project Clean Project Refresh Close Project Close Unrela	t ct ct ated Projects	F5	FM3_GPIO->PDIR rection = -1;
	Build Config Make Targe Index	urations ts	+ + +	FM3_GPIO->PDIR rection = 1;
	Convert To. <u>R</u> un As Debug As Profile As Tgam Comp <u>a</u> re W	 ith) 	unt_direction
	Properties	m Local History	Alt+Enter	ount_direction

- 1. Select C/C++ General
- 2. Double click on Paths and Symbols
- 3. Click on Add
- 4. Enable the box *Add to all languages*
- Select *File system* to locate the include directory
 Select the include directory
 Click on *OK* in the "browser" child window

- 8. Click on *OK* in the "Add directory path" child window

s filter text	Paths and Symbols			10 P (10 P)
Resource Builders C(C++ Build C(C++ Guild Code Style Documentation - File Types	Configuration: [Default (Act	Ne] 🎫 Libraries 🥭 Library Paths 🍋 Source Location 🌛 Output Location	I References	lanage Configurations. 3
- Indexer - Language Mappings	Languages Include directories			Add
Project References	Assembly C:\yagarto\yagarto\vagarto\tookchain\lb\gcc\arm-none-eabi\4.5.2\include-fixed GNUC GNUC C:\yagarto\yagarto-tookchain\lb\gcc\arm-none-eabi\4.5.2\include			Edt
Refactoring History Run/Debug Settings	UPC	C:\yagarto \yagarto tooknan arm none-eaoi include	21 11	Delete
2.2.2.1.2.2.2.0. 2 .1.2.00.0 2 .0		Talast a failed from the starting	2020	Export
		Select a router from the system;		Mover Op
Add Iddiction () anth Dectory: C(Ivagarto/vagarto-tookhan/@b)gc(am-none-eablet.5.2) include Add to all languages 4 Add to all languages 4 Is a workspace path 8 Correl File system Cancel				Move Dow
	48		Restore	Defaults Apply

The new libraries folder is newly added to the *Includes* directory.

E/C++ - mb9bfxxx_ioport_counter/makefile - Eclipse Platform	
<u>File Edit Source Refactor Navigate Search Project Run Window H</u> elp	
] 📬 • 🗑 🖷 📾 @ • @ • @ • � • ⊗ • ☆ • Q •	Q₂•] @ ৵•] □ □ ½ + 3 + %
🕞 Project Explorer 🕱 🕞 🖻 🛛	🗖 🗋 makefile 🕴 🔽 main.c
⊕ 🥵 FM3	DLIBS =
🗄 😂 mb9bfxxx_ioport_counter	
E B Indudes	#
🗄 📴 😢:/yagarto/yagarto-toolchain/arm-none-eabi/include	# End of default section
🕀 🚇 C:/yagarto/yagarto-toolchain/lib/gcc/arm-none-eabi/4.5.2/include	
🗄 🚇 C:/yagarto/yagarto-toolchain/lib/gcc/arm-none-eabi/4.5.2/include-fixed	
⊞ <u>M</u> core_cm3.h	# Start of user section
Emer Discore_cmFunc.h	#
⊞ core_cmInstr.h	
ter in mb9bt506n.h	# Define project name here
terring system_mb9br50x.h	PROJECT = 10-port
	# Define linker carint file here
Eujiteu cortev_M3 ram V21 ld	# Define fince script file here INSCRIPT DAM = /nri/Fujiteu cortex-W3 rem W21 ld
Euitsu cortex-M3_rom_V10.ld	LDSCRIPT_ROM = /prj/Fujitsu_cortex-M3_rom_V10_ld
	# List all user C define here. like -D DEBUG=1
😟 💼 core cm3.c	UDEFS =
tær in	
🗄 🗓 startup_mb9bf50x_V21.s	# Define ASM defines here
🗄 🕞 system_mb9bf50x.c	UADEFS =
la makefile	
	# List C source files here
	SRC = ./src/main.c \
	./src/core_cm3.c \
	./src/system_mb9bf50x.c
	# List ASM source files here
	ASRC = ./src/startup_mb9bf50x_V21.s
	# List all user directories here
	UINCDIR = ./inc

9.3 Make File

The make file is composed of many instructions to the GNU make tool. These instructions are used to set the information needed by the make builder and to initiate the project build process. It can be found in the application note's software package archive.

The make file instructions are described below in detail. The make file is divided here into many parts to get an better overview about the meaning of these instructions.

In the first part of the make file the GNU tools needed to compile (*arm-none-eabi-gcc.exe*), assemble (*arm-none-eabi-as.exe*) and link (*arm-none-eabi-ld.exe*) the project are set. The files created by compiling and assembling are so-called object files (*.o). In addition to the GNU compiler and assembler, it is needed to set the GNU tool (*arm-none-eabi-objcopy.exe*) to create out of the output file (*.*elf*), generated by the linker, another formats, e.g. hex file (*.*hex*) or binary file (*.*bin*).

```
TRGT = arm-none-eabi-
CC = $(TRGT)gcc
AS = $(TRGT)as
LD = $(TRGT)ld -v
CP = $(TRGT)objcopy
```

It is here considered that all needed GNU tools are installed and added to Windows path by the Yagarto installation procedure described in the chapter 2. These tools can be found on the folder *bin* of the Yagarto GNU ARM tool chain installation directory.

Next statements on the make file are the options needed for the GNU *Objcopy* tool to create other format from the GNU linker generated output file (*.*elf*).

The first line is to create the Intel-format hex file (*.*hex*). The second one is to generate the binary file (*.*bin*) and the last one for the Motorola S-record hex format (*.*mhx*).

```
HEX = (CP) -0 ihex
BIN = (CP) -I elf32-little -0 binary
SREC = (CP) -0 srec
```

The next lines define the over-all project name. This name will then be used to the for the output file generated by the GNU linker and copied to other format by the GNU *Objcopy* tool.

```
# Define project name here
PROJECT = io-port
```

The example Eclipse project template consists of the following project folder:

- *inc*: includes all the header files
- pri: includes all the linker script files
- **src**: includes all source files (*.c and *.s)



This folder structure is defined as follows:

The next part isn't used. If the user has the intention to add some defines or library modules, this makefile part can be used.

```
*********
# Start of default and user defines
# List all default C defines here, like -D DEBUG=1
DDEFS =
# List all default ASM defines here, like -D DEBUG=1
DADEFS =
# List all default directories to look for include files here
DINCDIR =
# List the default directory to look for the libraries here
DLIBDIR =
# List all default libraries here
DLIBS =
# List all user C define here, like -D DEBUG=1
UDEFS =
# Define all user ASM defines here
UADEFS =
# List the user directory to look for the libraries here
ULIBDIR =
# List all user libraries here
ULIBS =
# End of default and user defines
*********
```

The added defines and locations, where the included header files and the used library modules are located, are provided in the next makefile part to the compiler, assembler and linker as options used by building the project.

- INCDIR: Compiler directories options, e.g. the C-headers are in "UINCDIR=./inc"
- LIBDIR: Linker libraries directories options
- DEFS: Compiler defines options
- ADEFS: Assembler defines options
- LIBS: Linker libraries options

This part does not need to be changed. All definitions are set in the previously makefile part (default and user defines).

```
INCDIR = $ (patsubst %, -I%, $ (DINCDIR) $ (UINCDIR) )
LIBDIR = $ (patsubst %, -L%, $ (DLIBDIR) $ (ULIBDIR) )
DEFS = $ (DDEFS) $ (UDEFS)
ADEFS = $ (DADEFS) $ (UADEFS)
LIBS = $ (DLIBS) $ (ULIBS)
```

The next lines determine the object files, which will be created by compiling and assembling the project; from all C and assembler (*.s) files located in "**src**" folder are object files (*.o) generated.

```
OBJS = $(SRC:.c=.o) $(ASRC:.s=.o)
```

Next the compiler optimization level option is set.

```
# Define optimization level here OPT = -00
```

The following instructions specify the name of the target ARM processor (cortex-m3). The compiler and assembler uses this option to determine what instruction set to be used, when generating the assembly code.

```
MCU = cortex-m3
MCFLAGS = -mcpu=$(MCU)
```

All options used by the GNU Compiler are started in the next part.

07777 2 0 0	
CPFLAGS	= \$ (MCFLAGS)
CPFLAGS	+= \$(OPT)
CPFLAGS	+= -gdwarf-2
CPFLAGS	+= -mthumb
CPFLAGS	+= -mapcs-frame
CPFLAGS	+= -msoft-float
CPFLAGS	+= -mno-sched-prolog
CPFLAGS	+= -fno-hosted
CPFLAGS	+= -mtune=cortex-m3
CPFLAGS	+= -mfix-cortex-m3-ldrd
CPFLAGS	+= -ffunction-sections
CPFLAGS	+= -fdata-sections
CPFLAGS	+= -fomit-frame-pointer
CPFLAGS	+= -Wall
CPFLAGS	+= -Wstrict-prototypes
CPFLAGS	+= -fverbose-asm
CPFLAGS	+= -Wa,-ahlms=\$(<:.c=.lst)
CPFLAGS	+= \$(DEFS)

To generate dependency information between the C sources files and the header files included in this source files, a compiler flag to generate these information is enabled. The generating information will then be deleted by cleaning the project with *make clean*.

```
# Generate dependency information
CPFLAGS += -MD -MP -MF .dep/$(@F).d
```

The following lines are the GNU assembler flags.

P	ASFLAGS	= \$	(MCFLAGS)
P	ASFLAGS	+=	-g
P	ASFLAGS	+=	-gdwarf-2
P	ASFLAGS	+=	-mthumb
P	ASFLAGS	+=	-amhls=\$(<:.s=.lst)
P	ASFLAGS	+=	\$(ADEFS)

The next part determines the general linker flags.

LK	<pre>= -static -mcpu=cortex-m3 -mthumb -mthumb-interwork</pre>
LK	+= -nostartfiles
LK	+= -Wl,start-group
LK	+= -lc -lg -lstdc++ -lsupc++
LK	+= -lgcc -lm
LK	+= -Wl,end-group

Because this makefile manages the building process to generate output files (*.*elf*) for RAM and ROM debugging, a linker script file for each debugging configuration must be set individually.

The next instructions set **RAM** linker flags:

- 1. Set the RAM linker script file *Fujitsu_cortex-M3_ram_V21.ld* located in *prj* folder and provided with the makefile instruction LDSCRIPT_RAM
- 2. Generate a map file (*.*map*)
- 3. Provide the library directories, if they are set in the defines part

```
LDFLAGS_RAM = -T$(LDSCRIPT_RAM)
LDFLAGS_RAM += -W1,-Map=$(PROJECT)_ram.map,--cref,--no-warn-mismatch
LDFLAGS_RAM += $(LIBDIR)
```

The next instructions set **ROM** linker flags:

- 1. Set the ROM linker script file *Fujitsu_cortex-M3_rom_V10.Id* located in *prj* folder and provided with the makefile instruction LDSCRIPT_ROM
- 2. Generate a map file (*.*map*)
- 3. Provide the library directories, if they are set in the defines part

```
LDFLAGS_ROM = -T$(LDSCRIPT_ROM)
LDFLAGS_ROM += -Wl,-Map=$(PROJECT)_rom.map,--cref,--no-warn-mismatch
LDFLAGS_ROM += $(LIBDIR)
```

In the next part follow the make rules to create a **RAM** target. By building the RAM target, all object files (*.o) and output files (*.*elf*, *.*bin*, *.*hex*, *.*mhx*) will be created.

- 1. The first definition flag is dedicated to the assembler to set the variable Debug_RAM to 1. This variable is implemented in the "if case" at the *startup_mb9bf50x_V21.s* file to differentiate between the RAM and ROM initialization routine.
- 2. A target clean is made before starting building the object files (\$ (OBJS))
- 3. Starting building the output file (*.elf)
- 4. Starting building the output file (*.hex)
- 5. Starting building the output file (*.*bin*)
- 6. Starting building the output file (*.*mhx*)

```
RAM: ASFLAGS += --defsym Debug_RAM=1
RAM: clean $(OBJS) $(PROJECT)_ram.elf $(PROJECT)_ram.hex
RAM: $(PROJECT)_ram.bin
RAM: $(PROJECT) ram.mhx
```

Here the **ROM** target definition is described. The ROM target is defined as default make target. By giving *make all* the building process for ROM target will be started.

all: ROM

To the Debug_RAM variable is now set to 0. Other instruction lines are similar to the RAM target, only the output files are ROM based (*_*rom.elf*, *_*rom.hex*, etc.).

```
ROM: ASFLAGS += --defsym Debug_RAM=0
ROM: clean $(OBJS) $(PROJECT)_rom.elf $(PROJECT)_rom.hex
ROM: $(PROJECT)_rom.bin
ROM: $(PROJECT)_rom.mhx
```

By starting the building process the object files (*.o) will be generated from all source files (*.c and *.s).

By compiling the (*.c) files, the GNU compiler (CC=arme-none-eabi-gcc.exe) is called. The flags (CPFLAGS) are provided to the compiler and the directory, where the header files are located, is also provided.

```
%o : %c
@ echo "--compiling--"
$(CC) -c $(CPFLAGS) -I . $(INCDIR) $< -o $@
```

Next lines are the assembling procedure. The GNU assembler (AS=arm-noen-eabias.exe) will be started to create the object files. The ASFLAGS are the flags which were defined for ROM or RAM building configuration before.

```
%o : %s
@ echo "--assembling--"
$(AS) $(ASFLAGS) $< -o $@
```

For the linking procedure the GNU compiler (CC=arm-none-eabi-gcc.exe) combines all object files (\$ (OBJS) =*.o) generated by compiling and assembling to an output file (*.elf).

For the ROM target build, the GNU linker uses the options \$ (LDFLAGS_ROM) (LDFLAGS_ROM = -T\$ (LDSCRIPT_ROM)) to identify the ROM linker script file.

```
%rom.elf: $(OBJS)
    @ echo "--linking--"
    $(CC) $(OBJS) $(LK) $(LDFLAGS_ROM) $(LIBS) -0 $@
```

For the RAM target build, the GNU linker uses the options \$(LDFLAGS_RAM) (LDFLAGS_RAM = -T\$(LDSCRIPT_RAM)) to identify the RAM linker script file LDSCRIPT RAM = ./prj/Fujitsu cortex-M3 ram V21.1d

```
%ram.elf: $(OBJS)
    @ echo "--linking--"
    $(CC) $(OBJS) $(LK) $(LDFLAGS_RAM) $(LIBS) -0 $@
```

In the next part, the output file (*.elf) will be converted to other formats (*.hex, *.bin, *.mhx).

The GNU utility (CP=arm-none-eabo-objcopy.exe) can be used by the building process to generate the respective format.

The GNU *Objcopy* tool is called with the macros HEX, BIN and SREC on the begin of this makefile. The *Objcopy* options are also set with these macros.

```
%hex: %elf
   $(HEX) $< $@
%bin: %elf
   $(BIN) $< $@
%mhx: %elf
   $(SREC) $< $@</pre>
```

The clean target is managed with the rule clean. Assuming the command *make clean* will delete all object files (*.o), the related file (*.*lst*) and the output files (*.*elf*, *.*hex*, *.*bin* and *.*mhx*) generated by building the project. The clean rule is also called every time, when a RAM or ROM target will be build.

```
clean:
      -rm -f $(OBJS)
     -rm -f $(PROJECT) ram.elf
      -rm -f $(PROJECT) ram.map
      -rm -f $(PROJECT) ram.hex
      -rm -f $(PROJECT) ram.bin
      -rm -f $(PROJECT)_ram.mhx
      -rm -f $(PROJECT) rom.elf
      -rm -f $(PROJECT) rom.map
      -rm -f $(PROJECT) rom.hex
      -rm -f $(PROJECT) rom.bin
      -rm -f $(PROJECT) rom.mhx
      -rm -f $(SRC:.c=.c.bak)
      -rm -f $(SRC:.c=.lst)
      -rm -f $(ASRC:.s=.s.bak)
      -rm -f $(ASRC:.s=.lst)
```

The next part of the makefile is used to program the internal flash with OpenOCD. This part is also not needed, when the user prefers to download and debug the output file (*.*elf*) with J-Link GDB Server.

With the first macro the location where the OpenOCD executable will be found is set.

The second macro will set the OpenOCD server (*openocd.exe*). Because this server needs mandatorily a script configuration, the configuration script (*openocd.cfg*) in the project directory (./) may be used.

```
# specify the directory where openood executable and configuration files
reside
OPENOCD_DIR = <here YOUR PATH TO OPENOCD>/openood-0.4.0/src
# specify OpenOCD executable
OPENOCD = $(OPENOCD_DIR) openood.exe
# specify OpenOCD configuration file (pick the one for your device)
OPENOCD_CFG = -f ./openood.cfg
```

In the next part follows the OpenOCD commands used to program the flash on the FM3

```
# specify OpenOCD flash programing commandos for FM3
OPENOCD_C += -c init
OPENOCD_C += -c jtag_khz 500
OPENOCD_C += -c reset init
OPENOCD_C += -c verify_ircapture disable
OPENOCD_C += -c halt
OPENOCD_C += -c openity
OPENOCD_C += -c 'FM3 mass_erase 0'
OPENOCD_C += -c 'flash write_image $(PROJECT)_rom.bin 0x0 bin'
OPENOCD_C += -c reset run
OPENOCD_C += -c shutdown
```

The second to last part implements the target rule program.

First the server will be started with the assigned configuration script (*openocd.cfg*). After this the server will execute the giving commands. When the programming achieved the server will be shutdown and eclipse console will display the message:

```
"Flash Programming Finished."
```

```
# program the FM3 internal flash memory
program:
    @echo "Flash Programming with OpenOCD..."
    $(OPENOCD) $(OPENOCD_CFG) $(OPENOCD_C)
    @echo "Flash Programming Finished."
```

The last part implements to target rule progjlink.

```
# program the FM3 internal flash memory
jflash = <HERE YOUR PATH TO SEGGER TOOLS>/JLinkARM_V442c/JFlashARM.exe
jflash_p = <HERE YOUR PATH TO SEGGER
TOOLS>/JLinkARM_V442c/Samples/JFlash/ProjectFiles/MB9xFxxx.jflash
jflash_c += -openp;(jflash_p)
jflash_c += -open$(PROJECT)_rom.bin,0x0
jflash_c += -auto
jflash_c += -exit
# program the FM3 internal flash memory with J-FLash
progjlink:
    @echo "Flash Programming with j-link..."
    $(jflash) $(jflash_c)
    @echo "Flash Programming Finished."
```

Adjust the paths to your Segger J-Link tools installation. Note that the *JFlashARM.exe* needs a valid license!

10 Programming the Flash memory

HOW TO PROGRAM THE FLASH VIA OPEN-OCD AND/OR J-LINK

10.1 OpenOCD and Flash Programming

To use OpenOCD for programming the internal Flash memory, a target *Program-Flash-OpenOCD* was already created. See chapter 8.5 for usage.

In chapter 9.3 a description of all section used in the makefile was given. The last section implemented in this makefile manages the make target *Program-Flash* used on Eclipse "C/C++ perspective" to program the internal Flash.

Connect the SK-FM3-100PMC board via JTAG interface to the USB interface of your computer. As tool for this connection use e.g. the JTAG dongle "KT-Link".

To program the internal Flash, first it is needed to build the target *Make (ROM)*. The binary file *io-port_rom.bin* will be then generated. See chapter 8.5 for usage.

Click on the target *Make (ROM)*.



Implementation of GNU tool chain for Fujitsu Cortex-M3 MCUs Chapter 10 Programming the Flash memory

C/C++ - io-port_sk-fm3-100pmc/makefile	- Eclipse Platform	_ 6 ×
Eile Edit Source Refactor Navigate Search	Run Project Window Help	
🔁 • 🗔 🗟 🖄 🛔 🔂 • 🚳 • 📽	• @ •] % • ⊗ •] ☆ • Q • Q •] @ A •] 回 □ J + 전 • ♡ ↔ • + •	😭 🏇 Debug 😼 C/C++
🏠 Project Explorer 🛛 📄 😫 🌱 🗖	🖸 main.c 🚺 makefile 🛛 🦳	Cutline Make Ta X
 Braise Brais	<pre>243 OFENOCD_C += -c halt 244 OFENOCD_C += -c fm3 chip_erase 0' 246 OFENOCD_C += -c fm3 chip_erase 0' 246 OFENOCD_C += -c filash write_image %(PROJECT)_rom.bin 0x0 bin' 249 OFENOCD_C += -c filash write_image %(PROJECT)_rom.bin 0x0 bin' 249 OFENOCD_C += -c reset run 250 251 252 # program the FH3 internal flash memory with OpenOCD 253 #program 254 @ Echo "Flash Programming Winh OpenOCD" 255 @ Echo "Flash Programming Finished." 256 @ Echo "Flash Programming Finished." 257 258 # Include the dependency files, should be the last of the makefile 260 # 261 =include %(shell mkdir .dep 2>/dev/null) %(wildcard .dep/*) 263 ####################################</pre>	Clean C

After building the project, the target *Program-Flash-OpenOCD* now can be build. For this click on the respective target to start the Flash programming with OpenOCD.



The next figure shows the messages displayed on the Eclipse console during the Flash programming realized via OpenOCD.

Console 🙁 🔝 Problems	유 순 🙀 💷	ai 🔒 🛃	(🖳 - 📬 - 🗖	- 0
C-Build [io-port]		10		-
target halted due to debug-request, current mode: Thread				
xPSR: 0x21000000 pc: 0x00000154 msp: 0x20007ff0				
Info : Fujitsu MB9Bxxx: Chip Erase (may take several seconds)				
fm3 chip erase complete				
Info : Fujitsu MB9B500: FLASH Write				
wrote 1768 bytes from file io-port_rom.bin in 0.218754s (7.893 KiB/	s)			
Info : JTAG tap: mb9bfxx6.cpu tap/device found: 0x4ba00477 (mfg: 0x	23b, part: 0:	(ba00, ve:	r: 0x4)	
Warn : Only resetting the Cortex-M3 core, use a reset-init event ha	ndler to res	et any per	ripherals	
shutdown command invoked				
"Flash Programming Finished."				
				-

10.2 J-Link and Flash Programming

To use the J-Link for programming the internal Flash memory, a target *Program-Flash-J-Flash* was created.

To program the internal Flash, first it is needed to build the target *Make (ROM)*. The binary file *io-port_rom.bin* will be then generated. See chapter 8.5 for usage.

Click on the target Make (ROM).



Afterwards use the target Program-Flash-J-Flash. Note that a valid license is needed for this.



11 Set up Eclipse External Tools

HOW TO SET UP EXTERNAL TOOLS FOR ECLIPSE

11.1 Further External Tools

Note, that all configurations described below use the paths from the chapters above. Use *your* individual installation paths instead, when setting up the configurations!

Previously several tools were installed to the PC, such as the OpenOCD (OpenOCD configured with FTDI driver, described in chapter 3.3 or OpenOCD described in chapter 3.4) or the J-Link GDB Server (described in chapter 4).

Note that the example projects all have the external tools pre-defined in the application note's software package archieve, but the user has to adjust the configurations to his environment, i.e. his chosen installation paths, etc.

The tools installed by *External Tools Configurations.*. menu can be conveniently started from the *Run* pull-down menu or via a toolbar button.



11.2 OpenOCD as an Eclipse external tool

If you have purchased a "KT-Link" JTAG interface, you can set up OpenOCD as an external tool and configure it for operation with the "KT-Link".

Click on Run→External Tools→External Tools Configurations....



The "External Tools" window will appear. Click on *Program* and then *New* button to establish a new external tool.

🗲 External Tools Configurat	ions	×
Create, manage, and run Please specify the location of t	n configurations he external tool you would like to configure.	
type Filter text	Configure launch settings from this dialog: Press the 'New' button to create a configuration of the selected type. Press the 'Duplicate' button to copy the selected configuration. Press the 'Delete' button to remove the selected configuration. Press the 'Filter' button to configure filtering options. Edit or view an existing configuration by selecting it. Configure launch perspective settings from the <u>Perspectives</u> preference page.	

Double click Program.

External Tools Configurations Create, manage, and run co	nfigurations		
Please specify the location of the ex	ternal tool you would like to configure.		
C* © × □ ≯ ·	Name: New_configuration		
Evpe filter text	Location:	Environment Common Browse Workspace Browse File System Varjables.	
	Working Directory:		
		Browse Workspace Browse File System Variables	
	Arguments:		-

Fill out the "External Tools" form exactly as described below.

In the "Name" text box call this external tool "OpenOCD"

- External roots conligerations	
Create, manage, and run co Please specify the location of the e:	Infigurations Configure.
🕈 📑 🗙 🖻 🐡 🔹	Name: OpenOCD
type filter text	Main M Refresh Build M Environment Common
New_configuration	Browse Worksgace Browse File System Variables
	Browse Workspace Browse File System Variables
	Arguments:

In this application note there is the description of the installation of two versions of OpenOCD: OpenOCD configured in chapter 3.2 to use the FTDI driver device for "KT-Link" and OpenOCD installed in chapter 3.3 using the LibUSB driver for "KT-Link".

The first OpenOCD installation was done in the folder C:\OpenOCD_FTDI. For this installation the OpenOCD run program openocd.exe can be located in:

C:\OpenOCD_FTDI\openocd-0.4.0\src\openocd.exe

The second OpenOCD installation was done in the folder *C*:*OpenOCD_LibUSB*. For this installation the OpenOCD run program *openocd.exe* can be located in:

C:\OpenOCD_LibUSB\bin\openocd.exe

For the first installation use the FTDI driver for "KT-Link" (chapter 3.2.1) and for the second procedure use the LibUSB driver for "KT-Link" (chapter 3.3.2).

In this section the OpenOCD_FTDI version of OpenOCD as eclipse external tool is described. In the "Name" text box call this external tool "OpenOCD"

In the "Location:" pane, use the *Browse File System…* button to search for the OpenOCD executable. It is located in the folder: C:\OpenOCD_FTDI\openocd-0.4.0\src\openocd.exe

In the "Working Directory" pane, use the *Browse File System…* button to specify *C:\OpenOCD_FTDI* as the working directory.

In the "Arguments" pane, enter the argument "-f *<your project path*>\openocd.cfg" to specify the OpenOCD configuration file designed for the "KT-Link".

🖨 External Tools Configurations	<u> x</u>
Create, manage, and run con Run a program	figurations Organizations
Image: Second system Image: Second system	Name: OpenOCD Main Refresh Build Environment Common Location: C:\OpenOCD_FTDI\openocd-0.4.0\src\openocd.exe Browse Workspace Browse File System Variables Working Directory: C:\OpenOCD_FTDI Browse Workspace Browse File System Variables Arguments:
Filter matched 2 of 2 items	
?	Run Close

In the Build tab uncheck Build before launch.

Main 🔗 Refresh 🚮 Build 🥂 🌄 Environment 🔲 🖸 Common	
Build before launch	
The entire workspace	
The project containing the selected resource	
) Specific projects	Projects

No changes are required to the other tabs in the other forms (*Refresh*, *Environment*, and *Common*).

Click on Apply" and Close to register OpenOCD as an external tool.

To check this setup choose $Run \rightarrow External Tools \rightarrow External Tools Configurations...$ then select *OpenOCD*.

un a program	1
ype filter text	Name: OpenOCD Main Refresh Build Environment Common Location: C:\OpenOCD_FTDI\openocd-0.4.0\src\openocd.exe Browse Workspace Browse File System Variables Working Directory: C:\OpenOCD_FTDI Browse Workspace Browse File System Variables Arguments: -f ./openocd.cfg Image: Common Comment Containing spaces using double-quotes ("). Variables

In the same way set up *OpenOCD_LibUSB* as an Eclipse external tool. The driver for "KT-Link" must be previously changed from FTDI to LibUSB (see chapter 3.4.2). The OpenOCD configuration file *openocd.cfg* for "KT-Link" is the same for both drivers (FTDI or LibUSB). This configuration file must also be copied to the *OpenOCD_LibUSB* installation folder: *C:\OpenOCD_LibUSB*

<u>File E</u> dit <u>V</u> iew F <u>a</u> vorites <u>T</u> oo	ols <u>H</u> elp		
🌀 Back 🔹 🕥 🖌 🏂 🔎 S	Search 🔀 Fold	lers 🛛 🔁 🏂 🗙	(19
Address 🛅 C:\OpenOCD_LibUSB			
Name 🔺	Size	Туре	Date Modified
🚞 bin		File Folder	4/12/2011 1:49 PM
🚞 board		File Folder	4/12/2011 1:49 PM
🚞 drivers		File Folder	4/12/2011 1:49 PM
🚞 interface		File Folder	4/12/2011 1:49 PM
🚞 source		File Folder	4/12/2011 1:49 PM
🛅 target		File Folder	4/12/2011 1:49 PM
🗐 changelog-0.1.0-0.2.0.txt	4 KB	Text Document	7/14/2009 10:11 AM
🗐 changelog-0.2.0-0.3.0.txt	4 KB	Text Document	11/5/2009 4:40 AM
🗐 changelog-0.3.0-0.4.0.txt	4 KB	Text Document	2/21/2010 9:17 PM
🗐 info.txt	1 KB	Text Document	2/23/2010 5:56 PM
🗒 license_libftdi.txt	25 KB	Text Document	1/16/2010 2:07 PM
🗒 license_libusb-win32.txt	27 KB	Text Document	7/7/2009 5:53 PM
🗊 license_openocd.txt	18 KB	Text Document	7/2/2009 12:30 PM
🖬 log	118 KB	File	4/26/2011 10:11 AM
🔁 OpenOCD User's Guide.pdf	856 KB	Adobe Acrobat Doc	2/22/2010 7:09 PM
openocd.cfg	2 KB	CFG File	4/20/2011 5:09 PM

In the "Location:" pane, use the *Browse File System…* button to search for the OpenOCD executable. It is located in the folder: C:\OpenOCD_LibUSB\bin\openocd.exe

In the "Name" text box call this external tool "OpenOCD(LibUSB)"

In the "Working Directory" pane, use the *Browse File System...* button to specify *C*:*OpenOCD_LibUSB* as the working directory.

In the "Arguments" pane enter the argument "-f <*your project path*>/openocd.cfg" to specify the OpenOCD configuration file designed for the "KT-Link".

External Tools Configurations	
reate, manage, and run con Run a program	ifigurations Original Content of
type filter text	Name: OpenOCD(LbUSB) Main Refresh Build Environment Common Location: C:\OpenOCD_LibUSB\bin\openocd.exe Browse Workspace Browse File System Variables Working Directory: C:\OpenOCD_LibUSB Browse Workspace Browse File System Variables Arguments:
Filter matched 3 of 3 items	Apply
•	Run Close

In the Build tab uncheck Build before launch.

🖹 Main 😚 Refresh 📷 Build 🔪 🌆 Environment 🛄 Common	
Ruild before launch	

The set up of OpenOCD as an Eclipse external tool is done now. Note, that OpenOCD runs as a daemon, that means, that a program runs in the background waiting for commands to be submitted to it.

11.3 J-Link GDB Server as an Eclipse External Tool

The software delivered with the Segger JTAG interface "J-Link" can also be used as an Eclipse external tool. The software installation was explained in chapter 4.

In this chapter the "JLinkARM_V425k" version of JLink-software is used. This version supports the Flash download for the FM3 MCUs. Note that older versions do not support FM3.

The J-Link software installation was explained in chapter 4.1. For the installation folder *C:\Program Files\SEGGER\JLinkARM_V425k* was chosen. The full path to the J-Link GDB Server program is then:

C:\Program Files\SEGGER\JLinkARM_V425k\ JLinkGDBServer.exe

To set the J-Link GDB Server as an Eclipse external tool, choose $Run \rightarrow External$ Tools $\rightarrow External$ Tools Configurations....

The "External Tools" window will appear. Click on *Program* and then *New* button to set a new External Tool.

In the "Name" text box name this external tool e.g. "JLink-GDB-Server".

In the "Location:" pane use the *Browse File System…* button to search for the J-Link GDB server executable. It is located in the folder:

C:\Program Files\SEGGER\JLinkARM_V425k\ JLinkGDBServer.exe.

In the "Working Directory" pane, use the *Browse File System…* button to specify *C:\Program Files\SEGGER\JLinkARM_V425k* as the working directory.

J-Link GDB server is started without any arguments.

In the Build tab uncheck Build before launch.

Build before launch	
The gntire workspace	
실패 이 이 이 이 이 이 이 이 이 이 이 이 이 이 이 이 이 이 이	
igcap The project containing the selected resource	

No changes are required to the other tabs (*Refresh*, *Environment*, and *Common*).

Click on Apply and Close to register J-Link GDB server as eclipse external tool.

3 🕞 🗶 🖨 🛸 •	Name: Junk-GDB-Server
ype filter text	🔲 Main 🔗 Refresh 🔐 Build 💯 Environment 🗔 Common
Q Program Q JLink-GD8-Server	Location:
	C:\Program Files\SEGGER\JLinkARM_V425kJLinkGD8Server.exe
OpenOCD (LibUSB)	Browse Workspace Browse File System Variables
	Working Directory:
	C:\Program Files\SEGGER\JLinkARM_V425k
	Browse Workspace Browse File System Variables
	Arguments:
	Variablez
	Note: Enclose an argument containing spaces using double-quotes (*).

Now organize all external tools needed for debugging.

From the bar menu select the following configuration window:



Click on Organize Favourites.....

Click on *Add* and select all tools.

Remove Up	Ilink-GDB-Server Image: Comparison of the server Imag
Down	
	Select All Deselect All Image: Select All Image: Select All Image: Select All Image: S

Click on *Ok* to save the configuration. The external tools are added as favorites. They can be then started from the bar menu as shown below.

ile Edit Source Refactor Navigate Searc	h <u>R</u> un Project <u>W</u> indow <u>H</u> elp	
📬 • 🗟 🗟 े 🗟 🖥 🕯 • 🚳 •	┇・◎・」 ﴿ ・ ◎・」 ☆・ ○・	💁 🔨 🤔 🛷 • 🗍 🔳 🛐 👌 + 🖄
Project Explorer 22 C	makefile X	Qa 1 Jühk-GDB-Server Qa 2 OpenOCD Qa 3 OpenOCD(LibUSB)
Boot and a second	<pre># Define linker script fi # ifeq (\$(RUN_FROM_FLASH), LDSCRIPT = ./prj/mb9bf506</pre>	Run As External Tools Configurations Organize Fayorites

12 Eclipse CDT Debug Perspective

HOW TO USE THE DEBUG PERSPECTIVE

In chapter 8 a sample FM3 project was created and the build process to create all application output files (*.*bin*, *.*mhx* or *.*hex*) needed to program the Flash was explained. These output files include also debug information files (*.*elf*) needed for debugging program code in Flash or RAM.

To start the debug process, first change from Eclipse CDT "C/C++ Perspective" to "Debug Perspective".

Select from Eclipse menu *Windows* and go to *Open perspective*. Click on *Debug*. The debug Perspective can be also found under *Other....*



After this the following window will be displayed.



The next steps explain, how to use "J-Link GDB Server" (already added in the last chapter as an external tool) to download and debug the application on the Flash memory.

12.1 Programming and debugging on the Flash memory

Now the debug process using "J-Link GDB Server" and OpenOCD is explained. The application created automatically by building the project is designed for debugging on the Flash.

12.1.1 Using J-Link GDB Server to download and debug the flash application

Connect the SK-FM3-100PMC board via the JTAG interface "J-Link" to the USB interface of the host PC.



When this is done, start the "J-Link GDB Server" by clicking on "J-Link GDB Server" and the external tool will be then started as shown below.



The GDB server requires a license before starting. See chapter 4.3 for terms of usage.

Implementation of GNU tool chain for Fujitsu Cortex-M3 MCUs Chapter 12 Eclipse CDT Debug Perspective

GDB Waiting for d	connection	Initial JTAG speed 5 kHz 💌	✓ Localhost only ✓ Stay on top
J-Link Connect	Link GDB Server Licer	se utre utrue 1	Show log window enerate logfile ache reads
.og output: JLinkARM.d Listening J-Link con Firnware: Hardware: S/N: 15700	Novalid li J-Li Toobtain a license, p (www.seg You may use non-comm	cense for GDB Server found. ink S/N is 157002422. please contact SEGGER Microcontroller ger.com, sales@segger.com) this software without license for ercial or evaluation purposes.	it regs on start
OEM: IAR	<u>E</u> nter license	<u>Evaluate or use non-commercially</u>	
J-Link fou JTAG ID: 0x4	BA00477 (Cortex	z-M3)	 ▼

After confirming this step the "J-Link GDB Server" starts and waits for instruction from the "GDB Debugger". We will now create a new "Debug Configuration".

For this reason click on Debug Configurations... as shown in the following screen shot.



The debug configuration is shown below:

Configurations	and the second	×
Create, manage, and run conf	igurations	Ť.
	Configure launch settings from this dialog: • Press the 'New' button to create a configuration of the selected type. • Press the 'Duplicate' button to copy the selected configuration. • Press the 'Duplicate' button to remove the selected configuration. • Press the 'Delete' button to remove the selected configuration. • Press the 'Differ' button to configure filtering options. • Edit or view an existing configuration by selecting it. Configure launch perspective settings from the Perspectives preference page.	
•		Qebug Close

To create a new debug configuration, select "GDB Hardware Debugging" and click on New.

- 1. Rename the debug configuration. To avoid confusion with other debug configurations (using OpenOCD), it is recommended that the selected name a reference to the project name (io-port) and to the used external tool (e. g. "JLink-GDB" for J-Link GDB Server).
- 2. In the "Project" text box, use the *Browse* button to find the project *mb9bfxxx_ioport_counter*.
- 3. In the "C/C++ Application" text box, use the *Search Project...* button to find the application file *io-port_rom.elf*.
- 4. Set the "Build configuration" text box to Use Active.
- 5. Click on *Select other....* by "Using GDB (DSF) Hardware Debugging launcher" as shown below and select "Standart GDB Hardware Debugging launcher". Click on *OK* finally.

	Select Preferred Launcher			
	This dialog allows you to specify which launch available for a configuration and launch mode	ner to use when mi e.	ultiple launchers are	
	☑ Use configuration specific settings	<u>Chan</u>	ge Workspace Settings	
	Launchers:			
	GDB (DSF) Hardware Debugging Launcher Standard GDB Hardware Debugging Launch	er		
	Description Jtag hardware debugging using the standa	ard debugger Fram	ework (CDI).	
			η	
Create, manage, and run conf	gurations			Â.
🕐 🗈 🗶 🖃 🤹 🔹	Name: Debug-io-port-3Link-GDB]
type filter text	Main Stebugger > Startup & Sou	rce Common		
C/C++ Application	CIC4+ Andration			
C/C++ Attach to Application	loger rom eff		Search Proje	ct Browse
C/C++ Postmortem Debugg	Project: 3		[]ocaregrino/c	
E FM3 Default	mb9bfxxx isport counter 2			Browse
- Launch Group	- Red (if required) before la ochina			
- 7C Zylin Embedded debug (Cyg-				
	4	12000		
	C Enable auto build	C Disa	ble auto build	
	Use workspace settings	Contigu	re workspace Setongs	
Filter matched 8 of 8 items	Using GDB (DSF) Hardware Debugging Launcher	Selert other	5	2 Revert
•			Qe	bug Close

the change are now applied. The configuration window now shows:

reate, manage, and run confi	igurations	Ť
Evpe filter text C /C++ Application C /C++ Astach to Applicatior C /C++ Astach to Application E // Astach astach FC Zylin Embedded debug (Natr FC Zylin Embedded debug (Natr	Name: Debug-io-port-JLink-GDB Main Startup Source Common C/C++ Application: io-port_rom.elf Search Project Project: mb9bfxxx_joport_counter Build (if required) before launching Build (onfiguration: Use Active Disable auto build © Enable auto build © Disable auto build Configure Workspace Settings	Browse
✓ ▶ ■	Using Standard GDB Hardware Debugging Launcher - Select other	Reyert
?	Depring	Close

Now select the "Debugger" tab as shown below. In the dialog labeled "Debugger Options", use the *Browse* button to locate the GDB Debugger *arm-none-eabi-gdb.exe* file. It can be found in: *C:\yagarto\yagarto-toolchain\bin*.

Uncheck Use remote target.

E Debug Configurations	the same subscription of the local data in the same sector was a sector of the same secto	x
Create, manage, and run confi	gurations	Ť.
Vipe filter test C(C++ Application C(C++ Application C(C++ Application C(C++ Postmortem Debugging C(Debug in-post-3 init-GDE Lounch Group Fc 2/in Embedded debug (Cyp Fc 2/in Embedded debug (Natr	Same: Debug-io-port-Xink-GD0 Main Debugaer P Startup S Source Common) GD8 Setup GD8 Command: C:tyragartotyragarto-toolchani(bin)ami-none-eabi-gdb.exe Command Set: Standard (Windows) T Protocol Version: m T Protocol Version: m T Verbose console mode Remote Target Se remote Target Se remote Target Se remote Target Se remote Target Second Set: Scandard (Vindows) T Host name or IP address: Sociahost Port number: 10000	2 Variables
FRee matched 8 of 8 Rems.	Using Standard GDB Hardware Debugging Launcher - <u>Select other</u>	AppyRegent

- 104 -

Now select the "Startup" tab as shown below. On the "Initialization Commands" panel type in or copy the following lines:

```
target remote localhost:2331
monitor speed 1000
monitor flash device = MB9BF506N
monitor flash download = 1
# Set qdb server to little endian
monitor endian little
# Set JTAG speed to 30 kHz
monitor speed 30
# Reset the chip to get to a known state.
monitor reset
monitor sleep 10
# Set JTAG speed in khz
monitor speed auto
load
monitor sleep 100
# Reset the chip to get to a known state.
monitor reset
monitor sleep 10
```

:

	Name: Debug-io-port-JLink-GDB	
fiker test	Man (\$ Debugger Startup) Source Common	
C C/C++ Application C C/C++ Attach to Application C C/C++ Postmortem Debugg	Giptialization Commands Reset and Deley (seconds): 3 F Hat	
C Debug-so-port-JLink-GDE Launch Group C 2ylin Embedded debug (Cyg- Zylin Embedded debug (Nat)	target remote localhot:2331 monitor speed 1000 2	1
14734	Load Image and Symbols	
	IF Load image	
	Use project binary: io-port_rom.ef Use file: Use file:	1
	Image offset (hex):	1
	₩ Load symbols	
	C Use project binary: io-port_rom.eff	
	C Use file: File System.	
	Symbols offset (hex):	
	Runtime Options	

Scroll down in the "Startup" tab to locate the "Run Commands" panel and add the following lines

```
monitor reg r13 = (0x00000000)
monitor reg pc = (0x00000004)
break main
continue
```
× = * ·	Name: Debug-io-port-Junk-GD8	
Ilter text C (/C++ Application C (/C++ Attach to Application C (/C++ Postmortem Debugging C Debug to port-3Link-GDE Launch Group C Zylin Embedded debug (/Jiatr	Main \$2 Debugger Startup Source Common Load image Use project binary: io-port_rom.eff Use file: Worksource Image offset (hex): Load symbols Use project binary: io-port_rom.eff Use file: Worksource Symbols offset (hex): Runtime Options Set program counter at (hex): Set program counter at (hex): Resume Run Commands monitor reg r13 = (0:00000001) monitor reg r2 = (0:00000001)	
<u> </u>	Using Standard GDB Hardware Debugging Launcher - Select other	Apply Reyert

The rest of the configuration window can be left in its default settings. Click on *Apply* to confirm the debug configuration. The debug process can be started by clicking on the *Debug* button.

Configurations	and the second			×
Create, manage, and run conf	igurations			\$
Image: Second	Name: Debug-lo-port-JLink-GDB	Source Common	Search Project	Browse
Filter matched 8 of 8 items	Using Standard GDB Hardware Debugging L	auncher - <u>Select other</u>	Apply	Reyert
?			Debu	Close

Note that the Flash erase and download will take some seconds.

The next figure shows that the application was downloaded to the Flash memory and the debug process was successfully started. To resume, simply click on the *Resume* button.

🦓 🚸 🕩 💷 😹 🍡	👁 . e	= i → 😿	
	小小		
Resume (F8) Step Into	(F5)	Instruction Stepping Mode	
Suspend	Over (F6	j)	
Terminate (Ctrl+E2)	Stop Deb		
Terminate (Cut+ 2)	этер кеп		
Debug - mb9bfxxx_ioport_counter/src/main.c - Eclipse Platform			
Elle Edit Source Refactor Navigate Search Run Project Window Help			
🛅 • 🗏 🗟 🙆 晶 鈴 • Q • Q •] છ 🔗 • ∅ ۵ - 전 • 🧺	⇔	🖽 🕸 Debug	**
🇱 Debug 🛛 👋 🦧 😱 🗎 🔳 🔍 👁 🗸 🤿 👘 📝 🍟 🖓	🗱 Variables 🔍	🗞 Breakpoints 👫 Registers 🕸 📥 Modules 👘 🏠 🦛	
- C Uprogram ElleciSEGGED 11 ink 0PM V425V 11 ink GDBServer even	Name 1919 x10	Value	
Contraction (Contraction (Contraction)) Contraction (Contraction) Contraction Contraction (Contraction) Contraction Contraction	100 r11	. <u>0</u>	
🕀 🚱 GDB Hardware Debugger (5/4/11 6:07 PM) (Suspended)	1010 r12	2 0	
□ 1 main() main c:54 0×00000176	1919 Jr	0×20007ff8	
C:\yagarto\yagarto-toolchain\bin\arm-none-eabi-gdb.exe (5/4/11 6:07 PM)	lili pc	0×00000176	
C:\workspase\mb9bfxxx_ioport_counter\io-port_rom.elf (5/4/11 6:07 PM)	8888 FD 0		
	<u>.</u>		▲ ▼
🗋 makefile 🕼 main.c 🕱	- 0	Disassembly 🛛	- 0
// main program	_	Enter location here 💌 📚 🟠 🔯	\mathbf{b}
(in int32_t main (void)		♦ 00000176: mov.w r3, #12288 ; 0x3000 ;	
<pre>FM3_GPIO->ADE = 0x00FF; // No Analog Inputs</pre>		0000017a: movt r3, #16387 ; 0x4003 0000017e: mov.w r2, #255 : 0xff	
FW2 CRIC ADDD1 - OWEFOOL // D19 D15, LED SEC1 ADDAUG		00000182: str.w r2, [r3, #1280] ; 0x500	
FM3 GPIO->DDR3 = OxFFOO; // F38-P3F: LED-SEG1 Output		56 FM3_GPIO->DDR1 = 0xFF00; // P18-P	
		00000186: mov.w r3, #12288 ; 0x3000 0000018a: movt r3, #16387 : 0x4003	
FM3_GPIO->PFR1 = 0x0000; // P10-P1F: LED-SEG1 GPIO FM3_GPIO->PFR3 = 0x0000; // P30-P3F; LFD_SEG2 GPIO		0000018e: mov.w r2, #65280 ; 0xff00	
		00000192: str.w r2, [r3, #516] ; 0x204	
FM3_GPIO->DDR5 = 0x0000; // P18-P1F: SW2-INT0, SW3-INT1	input 💌	57 FM3_GPIO->DDR3 = 0XFF00; 77 P38-P	-
Tasks 🔛 Problems 🕖 Executables 📮 Console 🛛 🚺 Memory	17 (m1) 1		
Debug-io-port-Junk-GDB [GDB Hardware Debugging] C:\workspase\mb9bfxxx_loport_counter\io-port_r Writing register (SP = 0x20008000)	om.elf (5/4/11 6:U	17 PM)	-
Writing register (PC = 0x00000101)			
			-
		2	
D [↓]			

For other views, go to the menu *Window* and under *Show View* all views supported by Eclipse CDT are listed. Click on the respective view to get it.

E Debug - mb9bfxxx_ioport_counter/src/main.c - Eclipse I	Platform					_ 🗆 🗙
Elle Edit Source Refactor Navigate Search Run Project	Window Help					
] 📫 • 🖩 🕤 🛆 🛍] 🅸 • 💽 • 🂁 / 🥭 🖋	<u>N</u> ew Window New <u>E</u> ditor	$\phi \bullet \bullet \bullet$			📑 🏇 Debug	»
🗱 Debug 🕄 🛛 🙀 🕼 🕩 🗉 🔳 🖓 🕱 🤇	Open Perspective	刘 🕬= Variables 🖾	💁 Breakpoints	👬 Registers 🛋 Modules		- 0
🕀 💁 JLink-GDB-Server [Program]	Shc <mark>u V</mark> iew 🕨	e Breakpoints	Alt+Shift+Q, B		눈 야 😑 🖇 🛛	
Clifforgram Files/SEGERU/LinkARW V425K/LinkABbe Clifforgram Files/SEGERU/LinkABbe Clifforgram F	Customize Perspective Save Perspective <u>A</u> s Reset Perspective Close Perspective	Console	Alt+Shift+Q, C	Value		
	Close All Perspectives	Contractions				
C:\workspase\mb9bfxxx_ioport_counter\io-port_rom.e	Navigation •	Memory				
	Preferences	🛋 Modules				
		Cutline Outline Problems Registers	Alt+Shift+Q, O Alt+Shift+Q, X			×
🗋 makefile 🕼 main.c 🛛		Z Tasks				- 0
// main program		Strace Control	AN CHING U	Enter location here	I 🔊 🕻	
{		(xg= variables	Alt+Shirt+Q, V	mov.w r3, #12288	; 0x300	• -
FM3_GFIO->ADE = OxOOFF; // No Analog	g Inputs	Other	Alt+Shift+Q, Q	mov.w r2, #255	Oxff	
	. IPD GPC1 autout		00000182:	str.w r2, [r3, #:	1280] ; Ox500	

The "GNU GDB debugger" is fully integrated to the Eclipse IDE to perform IDE debugging with breakpoints, single stepping and sophisticated inspection of variables and data structures.

12.1.2 Using the OpenOCD Server to debug a Flash Application

Connect the SK-FM3-100PMC board via JTAG interface to the USB interface of your computer. As the interface tool for this connection use e.g. the JTAG dongle "KT-Link".



After this start the "OpenOCD". OpenOCD runs as a daemon, which means, that a program runs in the background waiting for commands to be submitted to it.

Click on *OpenOCD* and the external tool will be started as shown below.



In the console view at the bottom, check that the daemon server has been started.

Debug - mbybixxx_ioport_counter/src/main.c - Eclipse Platform				
lie Eaic Source Keractor Mavidace Search Kun Froject Mindow Help				7
C • □ □ □ □ □ □ ↓ * • ○ • ○ • ○ • □ 2 • □ 2 ·	• * 🔶 • -> •			😰 🏇 Debug 🔤 C/C++
🏇 Debug 🕄 💦 🎬 🕼 💷 💷 🔄 🖂 🙃 🖉 📑 😥 🛒	V - D (X)= Variables	3 % Breakpoir	its 🏌	** □ / × × × ▼ □
OpenOCD [Program] C:\OpenOCD_FTDI\openocd-0.4.0\src\openocd.exe	x]			₽
Deserved a Deserve M		Dissessbly	m l	
		Disassembly	~	
<pre>// wait loop void wait (int a) { while(a); }</pre>	<u>.</u>	No debug context	Enter location her	
// main program			<u>.</u> ■ ≈ ∞ ⊡ , ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
DoenOCD [Program] C:\OpenOCD_ETDI\openord-0.4.0\src\openord.exe				
Open On-Chip Debugger 0.4.0 (2011-05-05-17:02)				
Licensed under GNU GPL v2		N		
For bug reports, read		N		
http://openocd.berlios.de/doc/doxygen/bugs.html				
jtag nsrst_delay: 100				
jtag_ntrst_delay: 100				
rst_only separate trst_push_pull				
500 kHz				
Info : device: 6 "2232H"				
nfo : deviceID: 67353570				
nto : SerialNumber: FFSK6HASA				
nio : pescription: KT-LINK A				
nio : max luk change to: JUUUU KHZ				
nio : clock speed boo knz nfo : JTAC ten: wh0hf506 and ten/device found: Outbo000	177 (mfor, 0x22b	nart, Oybeoo	War. Ov4)	
into , oras cap; mospisoo.cpu cap/device iOund; OX4Da004	err (mrg: 0x23D,	part: 0xba00	, ver: oxa)	
rate , messices, opu, naruware nas o sreakpoints, 4 water	iporneo			
<u>1</u>				<u>*</u>

Now create a new "Debug Configuration". For this, click on the *Debug Configurations...* as shown below.

Debug - mb9bfxxx_ioport_counter/src/main.c - Eclipse Platform	
<u>File Edit Source Refactor Navigate Search Run Project Window Help</u>	
] 📸 • 🔛 📾 📾 🗋 🏂 • 🔕 • 隆 🖉 • 📜 🌌 J 🏂 J 👰 • 🖗	
C 1 Debug-io-port-JLink-GDB	Resource
🏇 Debug 🛱 🔰 Debug As 🔸 🖷 🔅 🏹 🖓 🖓	🕅= Variables 🕱 💊 Breakpoints 🐁 🍕 🖻 🗖
C:\OpenOCD_FTDI\ Ordanize Fayorites	
🕞 makefile 🔂 main.c 🕱	Disassembly 🛛 🖓 🗆
// wait loop	No debug context Enter location here 🗹 🔬 🗛 🔯 🏹
void wait (int a)	

The first debug configuration with "J-Link GDB Server" was saved, but also a special configuration for debugging with OpenOCD is needed.

To create a new debug configuration select "GDB Hardware Debugging" and click on New.

Rename the debug configuration. To avoid confusion with other debug configurations (using J-Link GDB Server), it is recommended that the selected name a reference to the project name (*io-port*) and to the used external tool (OpenOCD).

In the "Project" text box, use the Browse button to find the project ioport_sk-fm3-****.

In the "C/C++ Application" text box, use the *Search Project…* button to locate the application debugger file *io-port_rom.elf*.

Set the "Build configuration" text box to "Use Active".

	Name: Debug-io-port-OpenOCD			
ter text	🗋 Main 🗱 Debugger 🍉 Startup 🗄	Source Common		
C/C++ Application	CTC++ Application			
C/C++ Attach to Application	io-port_rom.elf		Search Project	Browse
GDB Hardware Debugging	Project			
C Debug-io-port-JLink-GDE	mb9bfxxx_ioport_counter			Browse
Launch Group	Build (if required) before launching			
Zylin Embedded debug (Cyg	Build configuration: Default			
7 Zylin Embedded debug (Natr	C Enable auto build	C Disable auto build		
	Use workspace settings	Configure Workspace S	ettings	

Click on *Select other....* by "Using GDB (DSF) Hardware Debugging launcher" as shown below and select "Standard GDB Hardware Debugging launcher". Click on *OK*.

Eselect Preferred Launcher	
This dialog allows you to specify which launcher available for a configuration and launch mode.	to use when multiple launchers are
Use configuration specific settings	Change Workspace Settings
Launchers:	
GDB (DSF) Hardware Debugging Launcher Standard GDB Hardware Debugging Launcher	
Description Jtag hardware debugging using the standard	debugger Framework (CDI).

Now select the "Debugger" tab as shown below. In the dialog labeled "Debugger Options", use the *Browse* button to locate the GDB Debugger *arm-none-eabi-gdb.exe* file. It can be found e.g. in: *C:\yagarto\yagarto-toolchain\bin*.

Uncheck	Use	remote	target.
---------	-----	--------	---------

🚝 Debug Configurations		×
Create, manage, and run con	igurations	Ť.
C/C++ Application C/C++ Attach to Application C/C++ Postmortem Debuggi C GDB Hardware Debugging Debug-io-port-OpenOCE Launch Group C Zylin Embedded debug (Cyg C Zylin Embedded debug (Nati	Name: Debug-io-port-OpenOCD Main Stopped Startup GDB Setup GDB Command: C:\yagarto\yagarto-toolchain\bin\arm-none-eabi-gdb.exe Command Set: Standard (Windows) Protocol Version: mi Verbose console mode Remote Target Use remote target JTAG Device: Generic TCP/IP Host name or IP address: localhost Port number: 10000	Browse Variables
Filter matched 9 of 9 items	Using Standard GDB Hardware Debugging Launcher - <u>Select other</u>	Apply Reyert
?		Debug Close

Now select the "Startup" tab as shown below.

On the "Initialization Commands" panel copy or type the following lines:

```
# connect to the OpenOCD gdb server
target remote localhost:3333
monitor reset init
monitor soft_reset_halt
load
```

On the "Run Commands" panel add the following lines:

<pre>monitor gdb_breakpoint_override soft</pre>	
break main	
Continue	

		2
1 D 🗶 🖯 🔅 •	Name: Debug-io-port-OpenOCD	
ype filter text C/C++ Application C/C++ Attach to Application C/C++ Postmortem Debugg C G06 Hardware Debugging C Debug-io-port-Junk-GDE	Main 12 Debugger Startup 5 Source Common Keset and Delay (seconds): 3 Halt # connect to the OpenOCD gdb server target remote localhost:3333 months second int	4
Launch Group G Zylin Embedded debug (Cygr G Zylin Embedded debug (Natir G Zylin Embedded debug (Natir	Load Image and Symbols Load Image	ce File System
	Runtime Options	
	Run Commands monitor gdb_breakpoint_override soft break main Continue	A
ter matched 0 of 0 Rems	Using Standard GDB Hardware Debugging Launcher - <u>Select other</u>	Apply, Reyert

The rest of the configuration window can be left in its default setting. Click on *Debug* button to start the debug process.

	the survey of the local division of the loca		الم
le Edit Source Reflactor Nevigate Search Broject Bun Window Help			
[3] • [3] ≤ [4] \$\$ • Q • Q • [3] \$ • 9 • 9 • 1	Q • • •		Debug
🕸 Debug 없 💦 🙀 🕼 🐂 📕 📕 🔍 🗇 🖉 🗮 🖬 👷 🖓 🖓 🖓	00* Variables % Breakpoints	8 83 Modules	5 KE 3 7 F
B Q OpenOCD (Program)	Name	Value	
CrijOpenOCD_FTDI/ppenocd-0.4.0/src/ppenocd.exe	1117 (11	0	
E C Debug-io-port-OpenOCD (GDB Hardware Debugging)	### r12	0	
GDE Hardware Debugger (5/9/11 3:22 PM) (Suspended)	IIII sp	0x20007ff8	
E 🧬 Thread [1] (Suspended)	2027 14	1707	
= 1 main() main.cr54 0x00000176	illi pc	0x00000177	
C:(yagarto)yagarto-toolchan)bin)arm-none-eabi-gdb.exe (5/9/11 3:22 PM)	al IIII fo	0	5
Mill and an advantage of the Constitution on Constant of the Article of the Artic			
	ad .		
makefie 🕜 main.c 🕴 🕜			-
(while(a);)			
<pre>(while(a);) // main program int32_t main(void) (</pre>			د
<pre>(while (a);) // main program int32_t main(void) (</pre>	• 12 fer 12		۱۳۵۰۲۰۶
<pre>(while (a);) //</pre>	gdb.exe (5/9/11 3:22 PM)	· 2 (2 (2)	년 1 월 9 년 - 1
(while (a);) // main program int32_t main (void) () Task (* Problems @ Executables @ Console 32 @ Memory) ebug-is-port-OpenOCD [GDB Hardware Debuggng] C:lysgartolysgarto-tookhan britam-none-eab- Toolefined command: "". Try "help".	e X 😿) gdb.eve (5/9/11 3:22 PM)	. 	د ۲۵۰۵۰۰ -
<pre>(while (a); // main program int32_t main (void) (</pre>	gdb.exve (5/9/11 3:22 PPI)		• • • • • • • •
<pre>(while (a);) //</pre>	aptb. enve (5/9/11 3:22 PM)	. 3 6 6 3 L	ن • الله الله الله ال
<pre>(while (a); //</pre>	gdb.exe (5/9/11 3:22 PM)	. 360 3 L	۲۰۰۰ ۲۰۰۰ ۲۰
<pre>(while (a); //</pre>	jeds.exee (5/9/11 3:22 PM)	. 	• • • • • • •
<pre>(while (a); // main program int32_t main (void) (</pre>	gdb.enve (5/9/11 3:22 FPI)	. 	् । ७०-०- ।
<pre>(while (a); // main program int32_t main (void) (</pre>	gdb.exve (5/9/11 3:22 PM)	. 	۲ ۳ ۰ ۳ ۰ ۳ .
<pre>(while (a); //</pre>	geb.exe (5/9/11 3:22 PM)	. 	د ی و و ر
<pre>(while (a); // main program int32_t main (void) (</pre>	gdb.exee (5/9/113:22 FM)		۱۳۵۰ - ۲۰
<pre>(while (a);) //</pre>	gdb.exe (5/9/11 3:22 PM)		ے بر اور اور اور اور اور اور اور اور اور او

The following figure shows a successful debug start. To resume, simply click on the *Resume* button.

E Debug - mb/Ibloos_sopert_counter/src/main.c - Eclipse Platform			ند اعا ہ
Die Edit Source Reflector Navigate Search Brotect Bun Window Help			
S	6		5 Debug **
	Of Valation (the Bandroords (193	Developer 52 m Muchiles	i d c v v D
E Q. (mmO/D (human)	Name	Value	
ChOpenOCD_FTD(hapenocd-0.4.0(src)apenocd_eve	101 +11	0	
B C Debug-to-port-OpenOCD (GDB Mardware Debugging)	201+12	050993463	
S 🔐 GDB Mardware Debugger (5/9/11 3:22 PM) (Suspended)	iiii sp	0x20007#0	1
Thread [1] (Suspended: Signal 'SIGINT' received. Description: Interrupt.)	111.4	629	
2 wat() man.c:48 0x00000158	ill pr	Dx00000159	-
= 1 man() man.c(71 0x00002274	and PO	0	D C L
Chardemanish/Minus locat counterlin-none-eab-gdb.exe (5/9/11 3/22 PM)			
BI Charabastana wooda Consider Der Der Der State and and			-
	1		
	1		41
natefle [man.c 11 💽			00
void wait (int a)			<u>- 10</u>
1			
while (a);			
			-
int 12 t main (word)			
A MARKED MARKED AND A			-1
*			2
Press Constant Operation (Pleasant 12) Damas			1 2 D. C. 9 D
Conser 1 Process Conser Conser 1 Conser 13	Course of the sector and the sector of the sector	· · · · · · · · · · · · · · · · · · ·	
Decigno por opencio (de narovare becugard) ci wonspase je branco jeport contra je por je	on.er (5/9)113:22 PP()		24
Lorde Borr Breakpoints			-
100			
75			
			-1
1			1
	Weitable Smart Incent	49.11	
	senar a light		1

After starting the debug procedure, the debug process can be terminated at any time by clicking on the "Suspend" button.

12.2 Debug on the RAM

In the paragraph before the Flash debug was explained. It is also possible to link and download an application for and to the RAM memory of the device. For this the needed RAM application must be created first. To do this, return to the "C/C++ Perspective".



Double click on C/C++ and the IDE will change be to C/C++ development perspective. Click on *Make (RAM)* to build the RAM make target. The RAM debug application will be generated then (Note, that the application code and the data must not exceed the RAM memory size).



Now switch back to the *Debug perspective* to initiate the RAM debug process.



12.2.1 Using J-Link GDB Server to Debug the RAM Application

Reconnect the SK-FM3-100PMC board via the JTAG interface "J-Link" to the USB interface of your computer.

After this start the "J-Link GDB Server". Click on "J-Link GDB Server" and the external tool will be started then as shown below.



The GDB server requires a license before starting. See chapter 4.3 for terms of usage. To create e new debug configuration, choose *Debug Configurations...* as shown below.



Then select "GDB Hardware Debugging" and click on New.

Rename the debug configuration. For differencing the RAM debug from the Flash debug, give the name also an suffix "_RAM" to avoid confusions with the configurations already saved.

In the "Project" text box, use the Browse button to find the project ioport_sk-fm3-****.

In the "C/C++ Application" text box, use the *Search Project...* button to find the application file *io-port_ram.elf*.

Set the "Build configuration" text box to "Use Active", and check the box "disable auto build".

Click on *Select other....* by "Using GDB (DSF) Hardware Debugging launcher" as shown below and select "Standart GDB Hardware Debugging launcher". Click on *OK*.

	Name: Debug-lo-port-JLink-GDB-RAM	
ype filter text	Main 🌾 Debugger 🕒 Startup 🤤 Source 🗖 Common	
C/C++ Application	CIC++ Application:	
C/C++ Accach to Application C/C++ Postmortem Debugger	io-port_ram.eli Search Project	Browse
SDB Hardware Debugging	Project	
Debug-io-port-JLink-GDB	mb9bfxxx_joport_counter	Browse
Debug-io-port-OpenOCD	Build (if required) before launching	
Launch Group	Build configuration: Dise Active	*
Zylin Embedded debug (Cygwin) Zylin Embedded debug (Native)	C Enable auto huld	
a yer anacoused debuty (Native)	Clise workspace settions	

The "Debugger" configuration tab is the same by all configurations.

🖨 Debug Configurations		×
Create, manage, and run con	figurations	Ť.
Lype filter text C/C++ Application C/C++ Attach to Application C/C++ Postmortem Debugger GDB Hardware Debugging C Debug-io-port-JLink-GDB C Debug-io-port-JLink-GDB D Debug-io-port-OpenOCD Launch Group Zylin Embedded debug (Cygwin)	Name: Debug-io-port-JLink-GDB-RAM Main Startup GDB Setup Startup GDB Command: C:\yagarto\yagarto-toolchain\bin\arm-none-eabi-gdb.exe Command Set: Standard (Windows) Protocol Version: mi	bles
; Zylin Embedded debug (Native)	Remote Target	

In the "Startup" tab copy on "Initialization Commands" panel the following commands:



eate, manage, and run cont	igurations	Ś
Image: Second system Image: Second system	Name: Debug-io-port-JLink-GDB-RAM Main ☆ Debugger > Startup > Source ○ Common # Vector table placed in RAM monitor writeu32 0xE000ED08 = 0x1FFF8000 Load Image and Symbols ✓ Load image ✓ Load image ✓ Workspace Image offset (hex): Workspace Image offset (hex): Workspace ✓ Load symbols Workspace ✓ Load symbols ✓ Load symbols ✓ Load symbols ✓ Load symbols <	File System
	Using Standard GDB Hardware Debugging Launcher - Select other Ap	olv Revert

The rest of the configuration window can be left in its default settings. Click on *Debug* button to start the debug process.

EDebug - mb9bfxxx_ioport_counter/src/main.c - Eclipse Platform		_[] ×
Eile Edit Source Refactor Navigate Search Project Run Window Help		
] 📸 • 🖫 🕤 🚔 🚠 🏇 • 🔕 • 🧏 •] 🧶 🖋 •] 🧷] ½ → 🖗 • 🧺	$\diamond \cdot \cdot$	🔛 🏇 Debug 🛛 👋
🌾 Debug 🕄 💦 🙀 💦 🗉 🔳 🔄 🔍 🕾 👘 İ 🍻 🛒 🌄 🕬	🗱 🕬 Breakpoints 👬 Registers 🕅	Nodules 🦢 🏭 😽 🗖 🗖 🗖
🕀 🗛 JLink-GDB-Server [Program]	Name	Value 🔺
C:\Program Files\SEGGER\JLinkARM_V425k\JLinkGDBServer.exe	1010 0101 r11	0
🖻 💽 Debug-io-port-JLink-GDB-RAM [GDB Hardware Debugging]	0101 r12	0
🖻 🞯 GDB Hardware Debugger (5/9/11 5:40 PM) (Suspended)	1010 sp	0x20007ff8
🖻 🝿 Thread [1] (Suspended)	1919 lr	536839815
1 main() main.c:54 0×1fff8152	1010 pc	0×1fff8152
C:\yagarto\yagarto-toolchain\bin\arm-none-eabi-gdb.exe (5/9/11 5:40 PM)	1919 FO	0
🖙 😼 C:\workspase\mb9bfxxx_ioport_counter\io-port_ram.elf (5/9/11 5:40 PM)	A	
	<u></u>	×
nakefile 😥 main.c 🛛 🔽		- 0
<pre>int32_t main(void) {</pre>		
<pre>FM3_GPIO->ADE = 0x00FF; // No Analog Inputs</pre>		
FW2 CPIC_NDDD1 = OvFF00; // D12_D1F; LFD_SFC1 output		
FM3_GPIO->DDR3 = OxFFOO; // FIG FIG: hbp SEGI Supple		
FM3_GPIO->PFR1 = 0x0000; // P10-P1F: LED-SEG1 GPIO		T
Tasks 🔛 Problems 🕑 Executables 🔤 Console 🛛 🔰 Memory	🗏 💥 📓 🔒	▋▟▌▓▎▟▝▋▝▝▘▝▝▝
Debug-io-port-JLink-GDB-RAM [GDB Hardware Debugging] C:\yagarto\yagarto-toolchain\bin\arm-none-	eabi-gdb.exe (5/9/11 5:40 PM)	[real
Loading section .text, size 0x6c8 lma 0x1fff8000		<u> </u>
Loading section .ARM.exidx, size 0x8 lma 0x1fff86c8		
Loading section .data, size 0x8 lma 0x20000000		
Start address 0x1fff8000, load size 1752		
Transfer rate: 55 KB/sec, 584 bytes/write.		
monitor reg r13 = (0x1FFF8000)		
monitor reg pc = (0x1FFF8004)		
break main		
Breakpoint 8 at 0x1fff8152: file src/main.c, line 54.		-
		F
	Writable Smart Insert 54 : 1	

The figure shows that the successful RAM debug process start. To resume, simply click on the *Resume* button.

E Debug - mb9bfxxx_ioport_counter/src/main.c - Eclipse Platform		×
] 📸 • 🗒 🐚 🚔 ሕ 救 • ⊙ • % • છ 🔗 • ∅ ↓ ½ • ⅔ • ↔ 🤆	⊳ + + +	😰 🔯 Debug 🛛 👋
🌾 Debug 🛛 🦙 🦓 🕼 🗉 🔳 🔗 🔔 💀 📌 🧮 🖬 😿 🏱 🗖	🕪= Variables 🤷 Breakpoints 🚻 Registers 🔀	🔁 Modules 🛛 😓 🕫 🗖 🗖
E 💁 JLink-GDB-Server [Program]	Name	Value
E- C Debug-io-port-JLink-GDB-RAM [GDB Hardware Debugging]	1010 rO	1000000
🖨 🤣 GDB Hardware Debugger (5/9/11 5:40 PM) (Suspended)	1010 r1	6
🖻 🔐 Thread [1] (Suspended: Signal 'SIGTRAP' received. Description: Trace/breakpoint trap.	1010 r2	753003
2 wait() main.c:48 0x1fff813c	0101 r3	1
= 1 main() main.c:71 0x1fff8250	6101 r4	
C:\yagarto\yagarto-tooichain\bin\arm-none-eabl-gdb.exe (5/9/11 5:40 PM)		
C: (workspase (mb9brxxx_loport_councer (io-port_ram.eir (5/9) 11 5:40 PM)		
		Þ
🐻 makefile 😥 main.c 🕱 💽		
void wait (int a)		
<pre>while(a);</pre>		
// main program		
(b) int32_t main(void)		ter d
Tasks 🔣 Problems 🕖 Executables 🖳 Console 🕕 Memory 🛛		
Monitors 🚽 🗱 🙀 0x20000000 : 0x20000000 <hex> 🛛 🦂</hex>	New Renderings	
	8 - B C - F	
20000000 01000000 0084	C404 10000000 2D6FEF77	
20000010 9D74A37A 7A78	E1DF 83D177BC DA05DFF2	
20000020 D7BDDDFF F621	E7DB ACOCAEFE D52A3C96	

To get e.g. a view of the target memory, select the *Memory* view. Therefore choose from the Eclipse menu select *Window* and under *Show View*.

12.2.2 Use OpenOCD to debug the RAM application

Reconnect the SK-FM3-100PMC board via the JTAG interface "KT-Link" to the USB interface of your computer.

After this, start the "OpenOCD". Therefore click on *OpenOCD* and the external tool will be then started as shown below.

Debug - mb9bfxxx_ioport_counter/src/main.c - Eclipse Platform	
Eile Edit Source Refactor Navigate Search Run Project Window Help	
📸 • 📰 🖄 🖄 🎄 • 🔕 • 🔕 • 🍅 🖋 • 😼 🚱 • ⅔ • 🗠 🗇 • → •	12 12 Debug 10 C/C++
Q 1 Juink-GDB-Server	
Image: Second	
Organize Fa <u>v</u> orites	
	×

In the console view at the bottom check that the daemon server has been started.

E Debug - mb9bfxxx_ioport_counter/src/main.c - Eclipse Platform				
Eile Edit Source Refactor Navigate Search Run Project Window Help				
] 📸 • 🗒 🚡 🚔 🚠 🏇 • Q • Q • 🥭 🖋 • 🕖 🔄 • 🖗 •	÷ ⇔ • •		🖹 隊 Debug 🗟 C/C C Resource	:++
🕸 Debug 🛛 🛛 🔌 🖉 🕩 📰 💷 🔄 ついた 売 📴 😿 🏹 🗖	°□ (×)= Variables ∑	3 % Breakpoints	20 🕫 🖻 🖉 🗶 🛬 ▽ 🗉	-0
C:\OpenOCD_FTDI\openocd-0.4.0\src\openocd.exe				
	1			
The makefile Comain.c X	- 8	Disassembly 🕅	-	-0
// wait loon	× [No debug context	Enter location here	
void wait (int a)				2
<pre>while(a); }</pre>				
// main program	-			¥.
		<u> </u>	F	
Tasks 🚼 Problems 💽 Executables 🚍 Console 🕺			× 🖗 🔓 💭 🖓 🛃 - 📬 • *	
OpenOCD [Program] C:\OpenOCD_FTDI\openocd-0.4.0\src\openocd.exe				
Open On-Chip Debugger 0.4.0 (2011-05-05-17:02)				
Licensed under GNU GPL v2		Le .		
For bug reports, read		0		
http://openocd.berlios.de/doc/doxygen/bugs.html				
jtag_nsrst_delay: 100				
jtag_ntrst_delay: 100				
500 FHZ				
Info : device: 6 "2232H"				
Info : deviceID: 67353570				
Info : SerialNumber: FFSK6HASA				
Info : Description: KT-LINK A				
Info : max TCK change to: 30000 kHz				
¹ Info : clock speed 500 kHz				
Info : JTAG tap: mb9bf506.cpu tap/device found: 0x4ba00477	(mfg: 0x23b, p	art: OxbaOO, ve	r: 0x4)	
Info : mb9bf506.cpu: hardware has 6 breakpoints, 4 watchpoi	nts			-
T				7
J T *	Writable	Smart Insert 49 : 2	2	

Create a new "Debug Configuration". For this click on *Debug Configurations...* as shown below.

Implementation of GNU tool chain for Fujitsu Cortex-M3 MCUs Chapter 12 Eclipse CDT Debug Perspective

Debug - mb9bfxxx_ioport_counter/src/main.c - Eclipse Platforr	n			
Eile Edit Source Refactor Navigate Search Project Run Window	v <u>H</u> elp			
] 📸 • 🗐 🖷 📥 🚠 🏇 • Ø • 🏊 •] 🥭 🛷 •] .	j] <u>a</u> + a + + -	⇒ + + -	E	🏇 Debug 🛛 😕
	5 1 in 32	(60= Variables 23		
Comstantia (Romain o R		<u>.</u>		
<pre>void wait (int a) { while (a); </pre>				<u></u>
<pre> } // main program å int32 t main (void)</pre>	22222			
				×
🖉 Tasks 📳 Problems 🕡 Executables 📮 Console 🕱				
OpenOCD [Program] C:\OpenOCD_ETDI\openocd-0.4.0\src\openocd.exe				
trst_only separate trst_push_pull 500 kHz Info : device: 6 "2232H" Info : deviceID: 67353570				×
<pre>Info : SerialNumber: FFSK6HASA Info : Description: KT-LINK & Info : max TCK change to: 30000 kHz Info : clock speed 500 kHz Info : JTAG tap: mb9bf506.cpu tap/device found Info : mb9bf506.cpu: hardware has 6 breakpoint</pre>	l: Ox4ba00477 (mf s, 4 watchpoints	g: 0x23b, part: 0xba00,	ver: 0x4)	
1				
] 0*		Writable Smart Insert 48):1 J	

To create a new debug configuration select "GDB Hardware Debugging" and click on New.

Rename the debug configuration. For distinguishing between RAM debug and Flash debug, give the name a suffix "_RAM" to avoid all confusion with the configurations already saved.

In the "Project" text box, use the Browse button to find the project ioport_sk-fm3-****.

In the "C/C++ Application" text box, use the *Search Project*... button to locate the application file *io-port_ram.elf*.

Set the "Build configuration" text box to Use Active and check the box "disable auto build".

Click on *Select other....* by "Using GDB (DSF) Hardware Debugging launcher" as shown below and select "Standart GDB Hardware Debugging launcher". Click on *OK* then.

3 🗊 🗶 😑 🛸 •	Name: Debug-io-port-OpenOCD-RAM	
type filter text	Main 🗱 Debugger 🍉 Startup 🗄 Source 🖂 Common	
C/C++ Application	C/C++ Application:	
C/C++ Attach to Application	Jo-port_ram.ef Search Project.	Browse
GDB Hardware Debugging	Broject:	-
C Debug-io-port-JLink-GDB	(mb9bfxxx_ioport_counter)	Browse
C Debug-io-port-Junk-GDB-KAM	Build (if required) before launching	-22.45
C Debug-io-port-OpenOCD-RAM	Build configuration: Use Active	•
· Launch Group : Zvlin Embedded debug (Cvawin)	C Enable auto build	
Zylin Embedded debug (Native)	C Use workspace settings Confidure Workspace Settings	

In the "Startup" tab copy into the "Initialization Commands" panel the following command lines:



In the "Startup" tab copy into the "Run Commands" panel the following command lines:



		, v
° 🗈 🗙 🖻 🏇 •	Name: Debug-io-port-OpenOCD-RAM	
ype filter text C (/C++ Application C (/C++ Attach to Applicatior C (/C++ Postmortem Debugging C (Debug-io-port-DLink-GDE C Debug-io-port-DLink-GDE C Debug-io-port-OpenOCL C Debug-io-port-OpenOCL C Debug-io-port-OpenOCL C 2ylin Embedded debug (Cyg)	Main Debugger Startup Source Common Initialization Commands Reset and Delay (seconds): 3 Halt for Halt for connect to the OpenOCD gdb server target remote localhost: 3333 monitor reset init monitor reset halt Load Image and Symbols Load Image	
i≆¢: Zylin Embedded debug (Nati	Edda inlege Use project binary: io-port_ram.elf Use file: Workspace File System Image offset (hex): Use project binary: io-port_ram.elf Use file: Workspace File System Symbols offset (hex):	
	Runtime Options Set program counter at (hex): Set breakpoint at: Resume	
	Run Commands break main continue	
ilter matched 11 of 11 items	Using Standard GDB Hardware Debugging Launcher - <u>Select other</u> Apply Rege	t

The rest of the configuration window can be left in its default settings. Click on *Debug* button to start the debug process.

E Debug - mb9bfxxx_ioport_counter/src/main.c - Eclipse Platform		
Eile Edit Source Refactor Navigate Search Project Run Window Help		
] 📸 • 🗒 🖄 ሕ 券 • Ø • % •] 🧶 •] 🤌 ½ → 🕅 • 🦮 🤆	⊳ • ⇒ •	🖺 🏇 Debug 🛛 »
🗱 Debug 🕅 🔌 🙀 📭 🗉 🔳 🔄 🚴 🐵 🖉 🐺 🔽 🗖 🗖	🕅= Variables 🤷 Breakpoints 🚺 Registers Σ	3 🚵 Modules 👘 🐗 🚍 🌄 🗖
E-Q OpenOCD [Program]	Name	Value 🔺
C:\OpenOCD_FTDI\openocd-0.4.0\src\openocd.exe	1010 r12	0
E Debug-io-port-OpenOCD-RAM [GDB Hardware Debugging]	8101 sp	0x20007ff8
😑 🔗 GDB Hardware Debugger (5/9/11 6:29 PM) (Suspended)	1010 kr	536839815
E 1 (Suspended)	lili pc	0×1fff8153
1 main() main.c:54 0×1fff8152	1918 FO	0
C:\yagarto\yagarto-toolchain\bin\arm-none-eabi-gdb.exe (5/9/11 6:29 PM)	1010 F1	0
C:\workspase\mb9bfxxx_ioport_counter\io-port_ram.elf (5/9/11 6:29 PM)	-	
		<u> </u>
		*
	C .	
🕞 makefile 😥 main.c 🕱 💽		- 0
int32 t main(void)		
FM3 GPIO->ADE = OxOOFF; // No Analog Inputs		
FH3 GPIO->DDR1 = OxFFOO; // P18-P1F: LED-SEG1 output		
FM3_GPIO->DDR3 = OxFFOO; // P38-P3F: LED-SEG2 output		
FM3_GPIO->PFR1 = Ox0000; // P10-P1F: LED-SEG1 GPIO		<u> </u>
🖉 Tasks 🔝 Problems 💽 Executables 🗳 Console 🛛 🚺 Memory	🔳 🗶 🔌 📄	J ₽ ₽ J U 2 2 • 13 • □ 0
Debug-io-port-OpenOCD-RAM [GDB Hardware Debugging] C:\yagarto\yagarto-toolchain\bin\arm-none-e	eabi-gdb.exe (5/9/11 6:29 PM)	
The man of the second second second second second second second		
#monitor gdb_breakpoint_override soft		
Undefined command: "". Try "help".		
break main		
Breakpoint 6 at Oxiffi6152: file Src/main.C, fine 54.		
concinde		
Breaknoint 1 main () at grc/main c+54		
54 FM3 GPTO-> $iDF = OrOOFF: // No inalog Innuts$		
and the original choose, if no analog inputs		-
1		F
	Writable Smart Insert 54 : 1	1
		4

The screenshot below shows a successful RAM debug process start. To resume, simply click on the *Resume* button.

Debug - mb9bfxxx; Joport_counter/src/main.c - Eclipse Platform			
e pr successing angles said point on many paper			TT Debug H
	D M- Variables Sa Break	points IIII Registers 23 mi Modules	
Cologencial State Cologencial Program Col	Norm Norm	Some Mill Registers Mill Modules Mill Modules	
	1		
<pre>@ makefie @ main: 22 @ void wait (int a) { while (a); int32_t main(void) (FH3_GPIO->ADE = 0x000FF; // No Analog Inputs FH3_GPIO->DDR1 = 0xFF00; // P18-P1F: LED-SEG1 output FH3_GPIO->DDR3 = 0xFF00; // P38-P3F: LED-SEG2 output FH3_GPIO->PFF1 = 0x0000; // P10-P1F: LED-SEG1 GPIO </pre>	Deacemby 2 Deacemby 2 Iff813e: Ifff8140; Ifff8146: Ifff8146: Ifff8146: Ifff814e: Ifff814e: Ifff814e: Ifff814e: Ifff814e: Ifff814e: S3 Ifff8150: S4 tereptS2.	<pre>Cher icodon here UxLD L3, [3] Ldt L2, [3p, #4] add. w L2, [2, #429496721 DebugCurrentInstruction Poster Comp 13, #0 bne.n Oxliff8132 <walt+4 #8="" add="" bx="" fm3_opio-="" lr="" lr)="" main:="" nop="" push(r3,="" sp,="" {="" }="">ADE = OxDOFF; </walt+4></pre>	s // No Analog Inp
Tasks 1 Problems DEvecutables Console 23 1 Memory			@ # D · H · P D
Debug-to-part-OpenOCD-RAM[GDB Hardware Debugging] Criworkspaselink/Rhooc_loport_counter	lo-port_ram.ef (5/9/116:20 P	40	2
<u>×</u>			<u></u>
0%	Writable Smart	Insert 48 : 1	

On the "Disassembly" view, the current instruction can be observed for example. This view can be selected from the eclipse menu *Window* under *Show View*.

13 Eclipse Embedded Systems Register View Plug-In

HOW TO ADD A REGISTER VIEW PLUG-IN

The Eclipse plug-in "EmbSysRegView" is useful to get an adequate Eclipse I/O register view allowing a structured display and modification ability of the peripheral register values of all FM3 MCU resources.

13.1 Plug-in installation

To install the Eclipse Embedded Systems Register View plug-in "EmbSysRegView", open the Eclipse menu *help* and select *Install New Software*.



Click on the *Add* button. Enter, e.g. "EmbSysRegView" as name and in the location text box the following link: <u>http://embsysregview.sourceforge.net/update</u>

Confirm the repository with OK.

Instali	
Available Software Select a site or enter the location of a site.	
Work with: Type or select a site	Add Find more software by working with the " <u>Available Software Sites"</u> preferences
type filter text	
Name	Version
2 Name: EmbSysRegView Location: http://embsysre Select All Deselect All Details	v Lgcal egview.sourceforge.net/update Archive 3 Or Cancel
 Show only the latest versions of available software Group items by category Contact all update sites during install to find required software 	Hide items that are already installed What is <u>already installed</u> ?
3	Back Enish Cancel

After the confirmation select all plug-in feature and click on Next.

🖶 Install		
Available Software Check the items that you wish to install.		BE
Work with: EmbSysRegView - http://embsysregview.sourceforge.net	/update Find more software by working with the <u>"A</u>	Add
type filter text		
Name	Version	
♥ 000 embsysregview ♥ ♥ 000 embsysregview_feature	0.1.8	
Select All Deselect All 1 item selected		
Details		Е
Show only the latest versions of available software	Hide items that are already installed	»
Group items by category	What is <u>already installed</u> ?	
☑ Contact all update sites during install to find required software		
?	< <u>B</u> ack Next >	Einish Cancel

Click on *Next* to confirm the installation detail.

= Install	STREET, STREET, STREET, STREET, ST	and the little of the second states of the second s	
nstall Details Review the items to be installed.			
Name	Version	Id	
🖗 embsysregview_feature	0.1.8	org.eclipse.cdt.embsysregview_feat	
a . The last success			
e: Onknown Details			
0		e Deale	Think Count
			Cancel

Read the license text thoroughly, check the radio button for "I accept the terms of the license agreement" (or skip the usage in terms of doubts) and close with *Finish*.

🚝 Install				
Review Licenses Licenses must be reviewed and accepted before the software can be installed.				
License text (for embsysregview_feature 0.1.8):				
EmbSysRegView is free software: you can redistribute it and/or modify it under the terms of the GNU General Public License as published by the Free Software Foundation, either version 3 of the License, or (at your option) any later version. EmbSysRegView is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU General Public License for more details. You should have received a copy of the GNU General Public License along with EmbSysRegView. If not, see <http: licenses="" www.gnu.org=""></http:> .				×
$\sum_{i=1}^{n} \underline{accept}$ the terms of the license agreement \underline{d}_{i} on taccept the terms of the license agreement				
•	< <u>B</u> ack	<u>N</u> ext >	Einish	Cancel

Eclipse will ask for IDE restart. Click on Restart Now.

2)	You will need to restart Eclipse P	latform for the insta	allation changes to take
4	effect. You may try to apply the cause errors.	changes without re	starting, but this may
			1

The Eclipse software are now up-to-date and the "EmbSysRegView" is also installed.

13.2 Using the Eclipse Register View

The plug-in "EmbSysRegView" is now installed. To support the peripherals Register viewing for the FM3 MCU, it is needed to use the two FM3 xml description files from Fujitsu, which comes along with the application note's software package archive, and copy these files to Eclipse plug-ins directory.

The Eclipse installation directory should have the following structure:

Implementation of GNU tool chain for Fujitsu Cortex-M3 MCUs Chapter 13 Eclipse Embedded Systems Register View Plug-In

Name 🔺	Size	Туре	Date Modified
🛅 configuration		File Folder	5/25/2011 1:30 PM
🛅 dropins		File Folder	9/9/2010 11:52 AM
🛅 features		File Folder	5/25/2011 1:04 PM
🛅 p2		File Folder	12/6/2010 10:38 AM
🛅 plugins		File Folder	5/25/2011 1:04 PM
🚞 readme 🗟		File Folder	12/6/2010 10:29 AM
🐻 .eclipseproduct	1 KB	ECLIPSEPRODUCT File	7/29/2010 11:37 AM
🕋 artifacts.×ml	54 KB	XML Document	5/25/2011 1:04 PM
🥏 eclipse.exe	52 KB	Application	8/10/2010 5:48 PM
🎒 eclipse . ini	1 KB	Configuration Settings	5/25/2011 1:29 PM
🛅 eclipsec.exe	24 KB	Application	8/10/2010 5:48 PM
🐏 epl-v10.html	17 KB	Opera Web Document	2/25/2005 7:53 PM
🔟 notice.html	9 KB	Opera Web Document	4/27/2010 4:23 PM

Open the directory *plugins* and look for the installation directory for the installed plug-in "EmbSysRegView".



Open the selected directory and create a new folder with the name e.g. *Fujitsu* to directory: \data\cortex-m3



When the folder *Fujitsu* is created, add both description files *embsysregview.dtd* and *MB9BF506N.xml* to it.

Eile Edit View Pa	<u>File E</u> dit <u>V</u> iew F <u>a</u> vorites <u>T</u> e	ools <u>H</u> elp		
🚱 Back 👻 🕥 👻	🔇 Back 🔹 🕥 🖌 🏂 🔎	Search 😥 Fold	lers 📴 🏂 🔀	(🍤 💷-
Address 🛅 C:\eclipse\;	Address C:\eclipse\plugins\org.e	clipse.cdt.embsysre	egview_0.1.8\data\cort	ex-m3\Fujitsu
Name 🔺	Name 🔺	Size	Туре	Date Modified
C EnergyMicro	embsysregview.dtd MB9BF506N.xml	2 KB 744 KB	DTD File XML Document	9/23/2010 3:35 PM 4/19/2011 2:04 PM

Now go back to Eclipse IDE and use the installed Register view.

For this, open *Preferences* in the Eclipse's *Window* pull-down menu.



Select the correct device as shown in the figure below.

Implementation of GNU tool chain for Fujitsu Cortex-M3 MCUs Chapter 13 Eclipse Embedded Systems Register View Plug-In

vpe filter text	EmhSvs Register View	
General General C/C++ Appearance Build Gode Style Debug 2 Breakpoint Actions Common Source Lookup Path Debugger Types Disassembly EmbSys Register View GDB GDB MI Tracepoint Actions Editor File Types Indexer Language Mappings New CDT Project Wizard Property Pages Settings Task Tags Template Default Values Help Install/Update Run/Debug Tasm	A Periperal Register View for emb Architecture: cortex-m3 Vendor: Fujitsu Chip: MB98F506N Board: none	edded system Chip description 4 5 6

After Confirming the Register view configuration, the tool can be now used.

To open a register viewer in the CDT debug perspective (see chapter 12 for detailed information), select *Show View*→*Other*... in the Eclipse's *Window* pull-down menu.



Then expand the "Debug" node and select "EmbSys Registers". Confirm with OK.



During debugging on the RAM or ROM (Flash), the debug process must be stopped in a breakpoint to get content (and refresh) of a certain register. Double click on this register to start viewing its content. Registers which are selected get a green font. Changes in register contents are shown with red values. When hovering over a register's description column you see a short description for that register.

le Edit Source Refactor Navigate Se	arch Run Proiect	Window Help						
••••••••••••••••••••••••••••••••••••••	• 0. • 1 (%) «						Et the Debug	The cic.
			(1010 -			7		
Poebug 23	. .	≫ ∴ =© 1* 3% ` ⊔	00= Variables 0101 R	egisters 2	S Module	es	1. 1	-
OpenOCD [Program]	3 V V		Name			Value		
C:\OpenOCD_FTDI\openocd-0.4.	.0\src\openocd.exe		eter Main					
Debug-io-port-OpenOCD [GDB Hardw	vare Debugging]	11 B 12	atat rO			373		
GDB Hardware Debugger (5/25/1	1 2:54 PM) (Suspende	ed)	6161 r1			1792		
Thread [1] (Suspended)			4			1023		1
1 main() main.c:54 0x000	100176							
C:\yagarto\yagarto-tooichain\bin	itarm-none-eabi-gdb.i	exe (5/25/11 2:54 PM)						
C: (workspase (io-port (io-port_ron	n.elf (5/25/11 2:54 Ph	0	•					
main.c 🛛		c	Disassemb	ly 83	Enter la	cation here	💌 😰 🟠 🛛	Q 🗸 -
50			▲ > 0000017	6: m	ov.w r3, #	12288	; 0x3000	
51// main p	rogram		0000017	a: m	ovt r3, #1	6387 ; Ox4	003	
52 int32_t main(void)			0000017	e: m	ov.w r2, #	255 ; Oxf	f	
53 {			- 0000018:	2: 3	tr.w r2, [r3, #1280]	; 0x500	
54 FM3_GPIO->ADE = 0x00F	F; // No Anal	log Inputs	56	F	M3_GPIO->D	DR1 = OxFF	00; // P18-P1F	: LEI
55			- 0000018	6: m	ov.w r3, #	12288	; 0x3000	
THE COTO SDDD1 - OWFEO	n. // nio n-	TED FECT ANTENNE		4				•
	American							
Tasks 🔝 Problems 🚺 Executables	Console Embs	iys Registers 🕺 🚺 Memory						
h: cortex-m3 Vendor: Fujitsu Chip: MB9BF	506N Board' por							
	boord boord. Hor	1	1.0.1	1	1	le contracto		
egister	Hex	Bin	Reset	Access	Address	Description		
egister	Hex	Bin	Reset	Access	Address	Description The 12-bit A/D	converter is a function t	hat con
egister	Hex	Bin	Reset	Access	Address	Description The 12-bit A/D The 12-bit A/D	converter is a function t	hat con hat con
egister	Hex	Bin	Reset	Access	Address	Description The 12-bit A/D The 12-bit A/D The functions a	converter is a function t converter is a function t and operations of the exi	that con that con- ternal in
egister	Hex	e	Reset	Access	Address	Description The 12-bit A/D The 12-bit A/D The functions a The interrupt of	converter is a function t converter is a function t and operations of the exi ontroller determines the to VO Dedistance	hat conv hat conv ternal in priority
egister	Hex	Bin	Reset	Access	Address	Description The 12-bit A/D The 12-bit A/D The functions a The interrupt of General Purpos	converter is a function t converter is a function t and operations of the ext ontroller determines the se I/O Registers	that con- that con- ternal in priority
egister	0-00000015	bin	Reset	Access	Address	Description The 12-bit A/D The 12-bit A/D The functions a The interrupt of General Purpos	converter is a function t converter is a function t and operations of the exi ontroller determines the ie I/O Registers	that conv that conv ternal in priority
egister	0x0000001F	Bin 000000000000000000000000000000000000	Reset	Access	Address	Description The 12-bit A/D The 12-bit A/D The functions a The interrupt of General Purpos	converter is a function t converter is a function t and operations of the ext ontroller determines the se I/O Registers ion Setting Register 0 se	that conv that conv ternal in priority lects the
egister	0x0000001F 0x1	Bin 000000000000000000000000000000000000	Reset	RW	Address Address Ox40033000	Description The 12-bit A/D The 12-bit A/D The functions a The interrupt of General Purpos The Port Fucut	converter is a function t converter is a function t and operations of the exi ontroller determines the ie I/O Registers ion Setting Register 0 se	hat con hat con ternal in priority lects the
egister ACL_12bit ACC_12bit ACC_12bit For ACC_12bit For ACC_12bit F	0x0000001F 0x1 0x1	Bin 000000000000000000000000000000000000	Reset	RW	Address	Description The 12-bit A/D The 12-bit A/D The functions a The interrupt c General Purpos The Port Fucnt	converter is a function t converter is a function t and operations of the exi ontroller determines the e I/O Registers ion Setting Register 0 se	hat con ternal in priority
egister	0x0000001F 0x1 0x1 0x1	Bin 000000000000000000000000000000000000	Reset	RW	Address Ox40033000	Description The 12-bit A/D The 12-bit A/D The functions a The interrupt c General Purpos	converter is a function t converter is a function t and operations of the ext ontroller determines the is I/O Registers ion Setting Register 0 se	that con- that con- ternal in priority
egister	0x0000001F 0x1 0x1 0x1 0x1 0x1 0x1	Bin 000000000000000000000000000000000000	Reset	Access RW	Address 0x40033000	Description The 12-bit A/D The 12-bit A/D The functions a The interrupt c General Purpos The Port Fucnt	converter is a function t converter is a function t and operations of the ext ontroller determines the ise I/O Registers ion Setting Register 0 se	that con ternal in priority
egister	0x00000001F 0x1 0x1 0x1 0x1 0x1 0x1 0x1	Bin 000000000000000000000000000000000000	Reset	RW	Address Address	Description The 12-bit A/D The 12-bit A/D The functions a The interrupt c General Purpos The Port Fucnt	converter is a function t converter is a function t and operations of the ext ontroller determines the te I/O Registers ion Setting Register 0 se	hat con that con ternal in priority elects the
egister	0x0000001F 0x1 0x1 0x1 0x1 0x1 0x1 0x1 0x1 0x1 0x1	Bin 000000000000000000000000000000000000	Reset	RW	Address Address	Description The 12-bit A/D The 12-bit A/D The functions a The interrupt c General Purpos The Port Fucnt	converter is a function t converter is a function t and operations of the exi ontroller determines the ie I/O Registers ion Setting Register 0 se	hat con ternal ir priority
egister → ADC2_12bit → ADC2_12bit → EXTI → InterruptSourceCheck → Interr	Ox0000001F 0x1	Bin 000000000000000000000000000000000000	Reset	RW	Address Address 0:<40033000	Description The 12-bit A/D The 12-bit A/D The functions a The interrupt c General Purpos The Port Fucnt	converter is a function t converter is a function t and operations of the ex- ontroller determines the le I/O Registers ion Setting Register 0 se	hat con ternal in priority
egister → ADC1_12bit → ADC2_12bit → ADC2_12bit → EXTI → EXTI → EXTI → FR0 → P00 (bit 0) → P00 (bit 0) → P01 (bit 1) → P02 (bit 2) → P03 (bit 3) → P05 (bit 5) → P05 (bit 6) → P07 (bit 7) → P07 (bit 7)	0x0000001F 0x1 0x1 0x1 0x1 0x1 0x1 0x1 0x1 0x1 0x1	Bin 000000000000000000000000000000000000	Reset	RW	Address Address 0×40033000	Description The 12-bit A/D The 12-bit A/D The functions a The interrupt c General Purpos The Port Fucnt	converter is a function t converter is a function t and operations of the ext ontroller determines the te I/O Registers ion Setting Register 0 se	hat con ternal in priority
egater	0x0000001F 0x1 0x1 0x1 0x1 0x1 0x1 0x1 0x1 0x1 0x1	Bin 000000000000000000000000000000000000	Reset	RW	Address 0×40033000	Description The 12-bit A/D The 12-bit A/D The functions a The interrupt c General Purpos The Port Fucht	converter is a function t converter is a function t and operations of the ext ontroller determines the re I/O Register ion Setting Register 0 se	that con- ternal in priority
egster	0x0000001F 0x1 0x0 0x0 0x0 0x0 0x0	Bin 000000000000000000000000000000000000	Reset	RW	Address	Description The 12-bit A/D The 12-bit A/D The functions - The interrupt c General Purpo: The Port Fucht	converter is a function t converter is a function t and operations of the exy ontroller determines the te I/O Registers ion Setting Register 0 se	that con- ternal in priority
egater	Hex Hex 0x0000001F 0x1 0x1 0x1 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0	Bin 000000000000000000000000000000000000	Reset	RW	Address	Description The 12-bit A/D The functions a The interrupt c General Purpos The Port Fucnt	converter is a function t converter is a function t and operations of the ext ontroller determines the le I/O Registers ion Setting Register 0 se	that con- ternal in priority
spister	Hex 0x0000001F 0x1 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0	Bin 000000000000000000000000000000000000	Reset	RW	Address 0x40033000	Description The 12-bit A/D The functions of The interrupt of General Furgori The Port Funct	converter is a function t converter is a function t and operations of the ext ontroller determines the e I/O Registers ion Setting Register 0 se	hat con- ternal in priority
gigister → ADC1_12bit → ADC2_12bit → FIT → FIT → GP10 → GP10 → GP10 → GP00 →	Hex 0x0000001F 0x1 0x0	Bin 000000000000000000000000000000000000	Reset	RW	Address	Description The 12-bit A/D The functions at The interrupt c General Purpose The Port Fucnt	converter is a function t converter is a function t and operations of the exi ontroller determines the e I/O Registers ion Setting Register 0 se	hat con ternal ir priority
spater → ADC1_12bit → ADC2_12bit → ADC2_12bit → ETTI → InterruptSourceCheck → InterruptSourceCh	Hex 0x0000001F 0x1 0x0 0x0	Bin 000000000000000000000000000000000000	Reset	RW RW	Address 0x40033000	Description The 12-bit A/D The 12-bit A/D The functions : The interrupt c General Purpor	converter is a function t converter is a function t and operations of the ext ontroller determines the se I/O Registers ion Setting Register 0 se	hat con ternal ir priority
egster	Hex 0x0000001F 0x1 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0	Bin 000000000000000000000000000000000000	Reset	RW RW	0x40033000	Description The 12-bit A/D The functions : The interrupt c General Purpose The Port Fucnt	converter is a function t converter is a function t and operations of the exi ontroller determines the I I/O Registers ion Setting Register 0 se	hat con ternal ir priority

14 Eclipse Features

HERE IS A SHORT COLLECTION OF OTHER ECLIPSE FEATURES GIVEN

14.1 Overview

The Eclipse CDT provides many tools and features, which can help the user for the embedded software development for a FM3 MCU.

In the next paragraphs some of this features of the debug perspective are discussed.

14.2 Disassembly view

To display the "Disassembly" view in the CDT debug perspective (see chapter 12 for details), select *Show View* \rightarrow *Disassembly* in Eclipse's *Window* pull-down menu.



The view will be then displayed as shown below.



On this view a pointer to the current instruction will be set, so that the user can break the debugging process any time by clicking on the button *Suspend*. Do not mix it up with *Terminate*, which will end the debug session!



14.3 CPU Register View

The Eclipse CDT provides a register view that enables read and write access to the core registers.

To get this view, select *Show View*→*Register* in Eclipse's *Window* pull-down menu.

13	Mindow Help	-1	
	New Editor		
No. of Lot	Open Perspective	门 🕪= Variables 🛙	3
	Show <u>V</u> iew	💁 Breakpoints	Alt+Shift+Q, B
	Customize Perspective Save Perspective As Reset Perspective Glose Perspective Close All Perspectives	Console	Alt+Shift+Q, C
	Navigation I	📋 Memory	
	Preferences	🛋 Modules	
~	ounter for IED die	🗄 🗄 Outline	Alt+Shift+Q, O
c	ounter for EED dis	Problems	Alt+Shift+Q, X
		IXIIXI Register:	
-		👼 Signals	
		🧟 Tasks	
		Sa Trace Control	
		(×)= Variables	Alt+Shift+Q, V

The selected view displays all core registers and their contents. Open the tree "Main" to get a CPU registers overview.

🌣 Debug 🕄 👘 👔 🕪 🛯 📕 🐘 🙊 😤 🖬 😥 😤 🗖 🗖	Det variables IIII Registers 23
E Q. OpenOCD [Program]	Name Value
ChOpenOCD_FTDIlopenocd-0.4.0(srclopenocd.exe	E Mi Nan
E C Debug-io-port-OpenOCD [GDB Hardware Debugging]	1000000 1000000
GDB Hardware Debugger (\$/25/11 2:54 PM) (Suspended)	IIII ri S
E 🧬 Thread [1] (Suspended: Signal 'SIGINT' received. Description: Interrupt.)	JIII 12 204009
= 2 wait() main.c:48 0x00000162	
-== 1 main() main.c:71 0x00000274	111 rt 0 1-3
C:[yagarto yagarto-toolkhain]bin]arm-none-eabi-gdb.exe (5(25/11 2:54 PM)	III r5 0
C:\workspase\io-port\jo-port_rom.elf (5/25/11 2:54 PM)	0
	0
	0
	0
	all 10 0
	1
🗈 main.c 🗱 🗋 lo-port_rom.map	🗝 🗇 📰 Disassembly 🗵 🕴 Enter location here 💽 👔 🔯 😤 🖓
42 unsigned char count = 0; // counter for LED disp: 43 signed char count_direction = 1; // count direction 44 45 // wait loop 46 void wait (int a) 47 (Image: Constraint of the second sec

To edit the content of a register, select the register and double click on it.

14.4 Memory view

Eclipse's memory monitor view is a default part of the debug view. Select *Show View*→*Memory* in Eclipse's "Window" pull-down menu.

Window Help	
New Editor	
Open Perspective	Variables 1000 Registers
Show <u>V</u> iew	🕨 💁 Breakpoints 👘 Alt+Shift+Q, B
Customize Perspective Save Perspective <u>A</u> s <u>R</u> eset Perspective Close Perspective Close All Perspectives	 Console Alt+Shift+Q, C Debug Disassembly Executables Expressions
Navigation	🕨 🧵 Memory 📡
Preferences	Modules

To add a new memory monitor, clicki to the green plus sign in the Monitor pane. The figure below shows the active memory monitors at address 0x20000000.

46 void wait (int a) 47 (48 while (a); 49) 50 51// main program 52 int32_t main (void) 53 (54 FH3_GPIO->ADE = 0x00FF; 55 *1	ram Ad	d Memo initor	ן איז עיי	00000162: 00000163: 00000163: 00000164: 00000164: 00000164: 00000170: 00000172: 53	add.w r2, str r2, [1 cmp r3, #0 bne.n 0x11 add sp, #0 bx 1r nop main: (<pre>>pp, #11 r2, #4294967295 sp, #41 56 <vmit+6> 3 *-1</vmit+6></pre>	ال بر
Tasks Problems Executables	sale 🗰 EmbSys Regist	ters 0 Memory 0000000 <hex></hex>	13 10 New	Renderings	2020	1 e 😽 1 i	6 10 · · · · · · ·
→ 0×2000000	Address	0 - 3	4 - 7	0 - 0	C - F		
8	20000000	55DSFFFF	00405CFF	OSO3FFEB	25D4EEFB		10
	20000010	FOC4BCFE	0100FFBF	000077BF	30009FFA		
	20000020	C4C47DFF	0000FFBF	20000777	OODAFEA7		
	20000030	1424EBFF	43005FED	100CF97B	44440000		
	20000040	5575FFEF	00400DFF	2108FFEB	21DOEFF9		
	20000050	80C17CFE	01007FAF	000077CE	30004957		
	20000060	004D7DFB	4002FDFB	40000777	0006FEED		
	20000070	8404FABF	45006FF5	9504BE7F	84440000		
L	20000080	CCUCLARA	DADDADEE	05018988	OGDORCER		2
1.2*							
	Enter of	tor Mem	ory		×		

0~2000	סססלי	
0.200.		

The content of a selected memory address (RAM and some I/O resources) can be edited and changed by double clicking on the respective address.

14.5 Using Breakpoints on Eclipse Debug Perspective

After starting a debug session, the debugger will set a breakpoint at the main function.



Other breakpoints can be set by double clicking in the left pane in the source code tab beside the line numers.

io-port_rom.map	E main.c. 23			00	Disassembly 23	Enter location here	Z 2 4 6	0 0 U
51 // 52 int32_t mai 53 (54 FM3_GPIO-	main pro n(void) >ADE = 0x00FF;		lick here	1	00000176: 0000017a: 0000017e: 00000162:	mov.w r3, #12288 movt r3, #16387 ; 0x400 mov.w r2, #255 ; 0xff str.w r2, [r3, #1280]	; 0x3000 3 ; 0x500	<u>د</u>
55 56 FH3_GPIO- 57 FH3_GPIO- 58	>DDR1 = 0xFF00; >DDR3 = 0xFF00;	// P18-P1F1 // P38-P3F1	LED-SEG1 outpu LED-SEG2 outpu	t. t	00000186: 0000018a: 0000018a:	<pre>PH3_GP10->DDR1 = 0XPP00 mov.w r3, #12280 movt r3, #16387 ; 0x400 mov.w r2, #65280</pre>	; 77 P18-P19; ; 0x3000 ; 0xff00	LED
59 FH3 GP10- 60 FH3_GP10- 61	>PFR1 = 0x0000; >PFR3 = 0x0000;	// P10-P1F: // P30-P3F:	LED-SEG1 GPIO LED-SEG2 GPIO	E	00000192: 57 00000196:	str.w r2, [r3, #516] FM3_GPIO->DDR3 = 0xFF00 mov.w r3, #12288	; 0x204 ; // P38-P3F: ; 0x3000	LED
62 FH3_GPI0- 63 64 FH3_GPI0-	>DDR5 = 0x0000; >PFR5 = 0x0000;	// P18-P1F: :	SW2-INTO, SW3- SW2-INTO, SW3-	INTI	00000194: 0000019e: 00000142: 59	movt r3, #16387 ; 0x400 mov.w r2, #65280 str.w r2, [r3, #524] FM3 GPIO->PFR1 = 0x0000	3 ; 0xff00 ; 0x20c ; // P10-P1F;	LED
56 while(1) 58 FH3_GPI 59 FH3_GPI) 10->PDOR1 = LEDP. 10->PDOR3 = LEDP.	ATTERN[count / ATTERN[count -	10]; ((count / 10)	* 1 <u>9</u>	000001m6: 000001ma; 000001me; 000001m2;	mov.w r3, #12208 movt r3, #16387 ; 0x400 mov.w r2, #0 str r2, [r3, #4]	; 0x3000 3	<u>ب</u> ا

Now *Resume* the debug session.



The next figure demonstrates debug process, if a breakpoint was hit.

lo-port_rom.map	(E) main.c (23		9 0	Disassembly 23	Enter location here	2 2 6 6	
50 51 //	main progra ->ADE = 0x00FF; // ->DDR1 = 0xFF00; / ->DDR3 = 0xFF00; / ->PFR1 = 0x0000; / ->PFR3 = 0x0000; / ->PFR5 = 0x0000; / (0->PD0R1 = LEDPATT (0->PD0R3 = LEDPATT	<pre>Wh</pre>	1 output 2 output 1 GPIO 2 GPIO 0, SW3-INT1 0, SW3-INT1	00000142: 00000146: 00000146: 00000140: 00000140: 00000140: 00000140: 00000140: 00000140: 00000148: 00000148: 00000148: 00000148: 00000148: 00000208: 00000208: 00000208: 00000208: 00000208:	<pre>mov.w r3, #12288 movt r3, #16387 ; 0x4 mov.w r2, #0 str r2, [r3, #20] b.n 0x1e8 cmain+116> FM3 CPIO >PDOP1 = 1 mov.w r3, #12288 movt r2, #32776 ; 0x8 movt r2, #32776 ; 0x8 movt r2, #3299 ; 0xe movt r2, #52499 ; 0xe movt r2, #52498 ; 0xe unull r0, r2, r2, r1 mov.w r2, r2 mov r1, r2 mov r1, r2 movt r2, #0 idrh.w r2, [r2, r1, 1 idrh.w r2, [r2, r1,</pre>	; 0x3000 0D3 EDPATTERN[sount ; 0x3000 003 fff ecd ecc c4 si #1]	/ 10
71 vait (1	10000001 2	// wait	some time	00000216;	str.w r2, [r3, #1028]	; 0x404	1
Tasks Problem etug-o-port-OpenOCI force soft bre	s 💽 Executables 📳 Const (GDB Hardware Debugging) (akpoints	ale 83 ME EmbSys Registe Chworkspaseljo-portijo-port re	rs 0 Memory m. eF (5/26/11 2:08 PM	9		0.0 × 0 • 1	j• ° (

15 Appendix

15.1 Glossary

Used abbreviations in this document

Abbr.	Meaning	Short Explanation
*.bin	Binary Format File	A file that contains program data in raw
(file extension)		binary form without any additional
* alf	Evenutable and Linkable	Information
(file extension)	Executable and Linkable	Object code containing debug information
	<u>F</u> ormal Hovedooimal format filo	(Symbols, addresses, modules, etc.)
(file extension)		address information (Intel format)
* mhy	Motorola Hexadecimal	A file that contains program data and
(file extension)	Format File	address information (Motorola S-Records
(,		format)
CDT	<u>C</u> /C++ <u>D</u> evelopment	Tool Chain with is used by Eclipse in this
	<u>T</u> ooling	configuration
Cygwin	Cygnus Solutions for	Compatibility layer for porting Unix/Linux
	<u>Win</u> dows	based programs to Windows operating
		systems
EABI	<u>E</u> mbedded- <u>A</u> pplication	Standard format convention interface for
	Binary Interface	embedded applications (used in Linux
	Future Technology Devices	systems \rightarrow cr. None-EABI)
FIDI	Euture Technology Devices	Company, which provides the JTAG-to-
		USB Interface chips et al.
JIAG	<u>Joint Test Action G</u> roup	debugging bardware (bere: MCUs)
JRE	Java Runtime Environment	Environment software for a virtual machine.
0112		which allows to run JAVA applets (e.g.
		Eclipse) on the PC
GDB	<u>GNU Debugger</u>	Debugger software for the GNU Tool Chain
GNU	" <u>G</u> NU's <u>n</u> ot <u>U</u> nix"	Development Tool Chain
LibUSB	Library for USB	Open source library for USB drivers, here
		the Windows compilation is used
None-EABI	None-Embedded-	Embedded application layer interface for
	<u>Application Binary Interface</u>	non-Linux systems, here: Windows OS (\rightarrow
		cf. EABI
OCD	<u>On-C</u> hip	Debugger software for on-chip debugging,
	Debugger/Debugging	here using the JTAG protocol
OpenOCD	Open Source On-Chip	Open Source Code Debugger Software
YAGARTO	"Yet another <u>GNU ARM tool</u>	GNU tool chain ported and precompiled for
	chain	WINDOWS US

15.2 Links

15.2.1 Software

Eclipse IDE: <u>http://download.eclipse.org/eclipse/downloads/</u>

Yagarto Tool Chain: www.yagarto.de

OpenOCD: http://prdownload.berlios/openocd/openocd-0.4.0.zip

FDTI driver: www.ftdichip.com/D2XX.html

OpenOCD with LibUSB: http://www.freddiechopin.info/index.php/en/download/category/4-openocd

LibUSB: http://sourceforge.net/projects/libusb-win32/files/

Cygwin: <u>http://cygwin.com/install.html</u>

Embedded System Register View Plug-In for Eclipse: <u>http://embsysregview.sourceforge.net/update</u>

Java JRE: http://java.com/

15.2.2 Hardware and belonging Software (if needed)

J-Link from Segger: http://www.segger.com/cms/jlink.html

KT-Link from Kris-Tech: www.shop.kristech.eu

OpenOCD-USB (FTDI JTAG-to-USB adapter): <u>http://shop.embedded-projects.net/index.php?module=artikel&action=gruppe&id=16</u> → OpenOCD USB Adapter

16 Additional Information

Information about FUJITSU Semiconductor's Microcontroller can be found on the following Internet page:

http://mcu.emea.fujitsu.com/

The software examples' and configuration files' archive related to this application note is: *Eclipse_configurations_software_package*

It can be found on the following Internet page (attached to this application note): http://mcu.emea.fujitsu.com/mcu_product/mcu_all_appnotes.htm
