Quickstart

The CodeLite application and the ARM cross compiler have already been installed on the Windows lab machines. If you want to install the software on your own computer there are download links listed at the end of this document.

Start the **CodeLite** program (found on the desktop on the lab machine). Select 'New Workspace' from the File menu:

Build	Debugger New Emp	Plugins	Perspective	Settings	PHP	Help
•	New Emp	otv File				
•		pry the	Ctrl-N	1		
	New Wor	rkspace				
-R	New Proj	ject				
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-S						
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-	> Ne	ew Wor	kspace			Open Wo
-	Cre	eate a new	workspace			Open an exi
	> Re	ecent wo	orkspaces htly used work	space		Recent fi
	-S -S -P W	S S W W Ne Cre Op	-S -S -P W V New Worl Create a new Recent wc Open a recent			

Select the 'C++' workspace type, and click 'OK':

Select the workspace type:	
C++ DHD	
Node.js	
ОК	Cancel

Select a location for the workspace directory (e.g., "Z:\Documents"), and name the new workspace "TinyTimber". Then click 'OK':

New Workspace	×
Workspace Name:	TinyTimber
Workspace Path:	Z:\Documents 🗸
Generated File:	
Z:\Documents\Tin	yTimber\TinyTimber.workspace
Create the worksp	ace under a separate directory
(OK Cancel
	hi.

Download 'RTS-Lab.zip' from the course homepage into the workspace directory that you selected above (i.e., "Z:\Documents\TinyTimber"). Right-click on the file and select 'Extract All' to retrieve the project files to a project directory (i.e., "Z:\Documents\TinyTimber\RTS-Lab"):

			• X
😋 🔍 🗢 📕 « Docum	ients ► TinyTimber ►	✓ 4 Search TinyTimber	Q
Organize 🔻 😭 Ope	en 🔻 New folder	8≡≡ ▼	
🔶 Favorites	Name	Date modified Type	Size
🧮 Desktop	TinyTimber.workspace	2/27/2016 6:03 PM WORKSPACE File	1 KB
Downloads	🚹 RTS-Lab	2/20/2016 2·51 AM Compressed (zipp	207 KB
 Recent Places Libraries Documents Music Pictures Videos Computer Local Dick (C) 		Open Open in new window Extract All Open with Restore previous versions Send to Cut Copy	
RTS-Lab Compressed	Date modified: 2/20/20 (zipped) Folder Size: 206 KB	Create shortcut Delete 5 2:51 AM Rename	•

🕞 🚹 Extract Compressed (Zipped) Folders)
Select a Destination and Extract Files		
Files will be extracted to this folder:		
Z:\Documents\TinyTimber\RTS-Lab		Browse
Show extracted files when complete		
	Б	tract Cancel

Right-click on the "TinyTimber" icon in the 'Workspace View' of CodeLite, and select 'Add an existing project' in the menu:

- (1	inyTir	nber]								
File	Edit	View	Search	Workspace	Build	Deb	ugger	Plugins	Perspective	Settings
Work	space	View		_ : ·	<					
~		命令		Ô	1					
spac			-▼ De	ebug 🔹	-					
Work		Work	space Mi	rroring		•				
		СррС	Check			•				
lorer		CMa	ke			•				
Б		Build	l Workspa	ce						
		Clear	n Workspa	ice						
ä		Rebu	ild Works	pace						
La La		Creat	te New Pr	oject						
		Add	an Existin	g Project						
sdno		Parse	e Workspa	ce - Incremen	tal					
abgre		Close	e Workspa	ice						
Ē		Reloa	ad Worksp	ace						
Outp	u	Work	space Edi	tor Preference	·s					
Ń	•	Work	space Set	tings			Refere	nces	🔄 Output	🛛 🖤 Clar

Browse to the project directory (i.e., "Z:\Documents\TinyTimber\RTS-Lab") and select the file "RTS-Lab.project". Then click 'Open':

Open Project		-			23
C v lo v	cument	s ▶ TinyTimber ▶ RTS-Lab ▶	✓ 49 S	Search RTS-Lab	م
Organize 🔻 Nev	v folder				• 🔳 🕐
Nesktop	~	Name	Date modified	Туре	Size
Downloads		퉬 device	2/27/2016 6:44	PM File fold	er
Kecent Places		퉬 driver	2/27/2016 6:44	PM File fold	er
E Librarios		RTS-Lab.project	2/20/2016 2:45	AM PROJECT	l File
Documents Music Pictures Videos					
Computer	- - -	f			•
	File nar	ne: RTS-Lab.project	✓ Co	odeLite Projects (Open	*.project) Cancel

The project 'RTS-Lab' is now open. Click the small arrows to reveal the main project files. Double-click 'application.c' to start the CodeLite editor:



The ARM cross compiler is already the default compiler in CodeLite on the Windows lab machines. If you installed CodeLite and the cross compiler on your own computer use the instructions at the end of this document to set the default compiler.

The cross compiler software was configured (with suitable compiler and linker flags) when you loaded the project file, so you are now ready to compile your application program and download it to the MD407 card.

To create a load file for your target system choose 'Build Project' from the Build menu:

Output View				
📔 Build 🔍 Search 🖋 Replace 🔍 References 🔎 Output 💙 Clang 📋 Trace 🗔 Tasks				
C:\Windows\system32\cmd.exe /C C:/MinGW/bin/mingw32-make.exe -e -f Makefile				
"Building project:[RTS-Lab - Debug]"				
mingw32-make.exe[1]: Entering directory 'Z:/Documents/TinyTimber/RTS-Lab'				
C:/Apps/crosstools/gcc-arm-none-eabi/bin/arm-none-eabi-gcc.exe -c "Z:/Documents/TinyTimber/RTS-Lab/application.c" -g -O0 -Wall -m				
C:/Apps/crosstools/gcc-arm-none-eabi/bin/arm-none-eabi-gcc.exe -c "Z:/Documents/TinyTimber/RTS-Lab/sciTinyTimber.c" -g -OO -Wall				
C:/Apps/crosstools/gcc-arm-none-eabi/bin/arm-none-eabi-gcc.exe -c "Z:/Documents/TinyTimber/RTS-Lab/startup.c" -g -O0 -Wall -mthum				
C:/Apps/crosstools/gcc-arm-none-eabi/bin/arm-none-eabi-gcc.exe -c "Z:/Documents/TinyTimber/RTS-Lab/TinyTimber.c" -g -OO -Wall -mt				
C:/Apps/crosstools/gcc-arm-none-eabi/bin/arm-none-eabi-as.exe "Z:/Documents/TinyTimber/RTS-Lab/dispatch.s" -o ./Debug/dispatch.s.				
C:/Apps/crosstools/gcc-arm-none-eabi/bin/arm-none-eabi-gcc.exe -c "Z:/Documents/TinyTimber/RTS-Lab/driver/src/stm32f4xx_dac.c" -g				
C:/Apps/crosstools/gcc-arm-none-eabi/bin/arm-none-eabi-gcc.exe -c "Z:/Documents/TinyTimber/RTS-Lab/driver/src/stm32f4xx_gpio.c"				
C:/Apps/crosstools/gcc-arm-none-eabi/bin/arm-none-eabi-gcc.exe -c "Z:/Documents/TinyTimber/RTS-Lab/driver/src/stm32f4xx_rcc.c" -g				
C:/Apps/crosstools/gcc-arm-none-eabi/bin/arm-none-eabi-gcc.exe -c "Z:/Documents/TinyTimber/RTS-Lab/driver/src/stm32f4xx_tim.c" -g				
C:/Apps/crosstools/gcc-arm-none-eabi/bin/arm-none-eabi-gcc.exe -c "Z:/Documents/TinyTimber/RTS-Lab/driver/src/stm32f4xx_usart.c"				
C:/Apps/crosstools/gcc-arm-none-eabi/bin/arm-none-eabi-g++.exe -o ./Debug/RTS-Lab @"RTS-Lab.txt" -Lspecs=nano.specsspecs				
mingw32-make.exe[1]: Leaving directory 'Z:/Documents/TinyTimber/RTS-Lab'				
mingw32-make.exe[1]: Entering directory 'Z:/Documents/TinyTimber/RTS-Lab'				
Executing Post Build commands				
arm-none-eabi-objcopy -S -O srec ./Debug/RTS-Lab.elf ./Debug/RTS-Lab.s19				
Done				
mingw32-make.exe[1]: Leaving directory '2:/Documents/linylimber/RIS-Lab'				
===0 errors, 0 warnings====				
۲				
Ln 7, Col 28, Pos 115				

If everything has been configured correctly there should be 0 errors and 0 warnings from the project build. The load file ("RTS-Lab.s19") has been created in the subdirectory 'Debug' in your project directory.

Below we will describe how to download your application program using the CoolTerm console. If you want to use the console plugin in CodeLite or the Eterm standalone console instead, please follow the instructions at the end of this document.

Start the **CoolTerm** console (after downloading it from the Canvas page) and press the 'Options' button. Make sure that the port with the highest logical number (e.g., COM9) is selected and that the baudrate is set to 115200. Click 'OK':



Click the 'Connect' button in CoolTerm to connect to the MD407 card, and then press the red 'Reset' switch on the card to start its embedded monitor software. The "dbg:" prompter indicates that the monitor is ready to receive commands:



To download your application program to the MD407 card enter the monitor command "load". After the monitor has printed the text "Loading" select 'Send Textfile' from the Connection menu in CoolTerm:

💣 CoolTerr	n_0.st	tc					100	
File Edit	Con	nection View Wind	dow Help					
	*	Disconnect	Ctrl+K	2	5 31	HEX		
New Op	٠X	Options		ata	ංගා Options	View Hex	Help	
*** CTH	5	Reset Port		MD4	07 (ARM	Cortex-M4	1)	_
*** Ver	1	Send Break	Ctrl+B					
dbg:load	ð	Flush Serial Port	Ctrl+F	L .				
Connella		Send String	Ctrl+T					
	2	Send Textfile	Ctrl+Shift+T					
		Capture to Textfile	+	L				

Browse to the subdirectory 'Debug' in the project directory and select the load file "RTS-Lab.s19". Click 'Open'. The load file will now be transferred to the MD407 card:

🎻 CoolTerm_0.	stc *			100.00	
File Edit Co	onnection View	Window Hel	p		
	🖋 Send Text File		Xa		×
New Open	Look in:	鷆 Debug		- 🗿 🤌 📴 -	
*** CTH/(æ	Name	*	Date modified	Type 🔺
dbgulood	2	driver_src	stm32f4xx_tim.c.o.d	2017-01-17 23:52	D File
Loading	Recent Places	driver_src_	stm32f4xx_usart.c.o	2017-01-17 23:52	O File
		driver_src	stm32f4xx_usart.c.o.d	2017-01-17 23:52	D File
		RTS-Lab.e	If	2017-01-17 23:52	ELF File
	Desktop	RTS-Lab		2017-01-17 23:52	MAP F
	All and a second	RTS-Lab.s	19	2017-01-17 23:52	S19 File
	1	sciTinyTin	nber.c.o	2017-01-17 23:52	O File
	Libraries	sciTinyTin	nber.c.o.d	2017-01-17 23:52	D File
		startup.c.o	, ,	2017-01-17 23:52	O File
		startup.c.o	o.d	2017-01-17 23:52	D File
	Computer	TinyTimb	er.c.o	2017-01-17 23:52	O File
	0	TinyTimb	er.c.o.d	2017-01-17 23:52	D File
					-
	Network	•			,
		File name:	RTS-Lab	(Open
		Files of type:	All Files (*.*)	•	Cancel
U					ii.



If the file transfer was successful your application program has been loaded into the RWM of the MD407 card, beginning at address 2000000_{16} .

Execute your program by entering the monitor command "go 20000000", and see the welcome text from the program. You are now ready to start developing your own code for the laboratory assignment:



CodeLite console

This section describes how to activate the console plugin of CodeLite (available on Windows version 11.0.8.0-cse or earlier), and use it for downloading your application program to the MD407 card.

Locate the program **Device Manager** in the Windows Start menu search field and start the program by clicking on its icon in the search result list.

Control Panel (3)	
🚔 Device Manager	
is View devices and printers	
🚔 Update device drivers	
₽ See more results	
Device Manager × Shut down >	
🚳 🙆 🚍 🔤 🚺 🗶	R

In Device Manager you will see a list of system device categories. Open the 'Ports' category by clicking on its small arrow. If the MD407 card has been connected properly there will be an entry for a unit type 'USB Serial Port'. Make a note of the number 'xx' in the 'COMxx' name listed for that unit. In the picture below the number of interest is '9' (taken from 'COM9')).

Bevice Manager
File Action View Help
DVD/CD-ROM drives
🖒 🚽 Floppy disk drives
Floppy drive controllers
🔈 🕼 Human Interface Devices
DE ATA/ATAPI controllers
Keyboards
Mice and other pointing devices
Monitors
Network adapters
Ports (COM & LPT)
Communications Port (COM1)
Communications Port (COM2)
Printer Port (LPT1)
USB Serial Port (COM9)
Processors
Sound, video and game controllers
Storage controllers
System devices
D - Universal Serial Bus controllers

Close Device Manager and return to CodeLite.

In the Output View section of CodeLite select the 'Eterm Console' tab. A new set of buttons and a text input field will now appear at the top of the section window. Enter '\\.\comxx' in the text input field, where 'xx' is the number you previously made a note of in Device Manager:

Output View						
🖸 🖸 Build 🔍 Search 🖋 Replace	References	🖭 Output	🐭 Clang	🗋 Trace	🕎 Tasks	Eterm console
О 🔲 🚺						
Connect to target via serial port						

Click the leftmost button to connect to the MD407 card, and then press the red 'Reset' switch on the card to start its embedded monitor software. The "dbg:" prompter indicates that the monitor is ready to receive commands:



To download your application program to the MD407 card put the cursor in the blue window, right-click your mouse and select 'Load' from the menu:

Out	put View											
	Build	à	Search	Ľ	Replace	References	🖭 Output	🧐 Clang	Trace	🗒 Tasks	Eterm console	
•	0		.\COM9									
dbg	: : ***	CTH	ce dby	JARM	monito	r∕debugger fo	or MD407 (A	RM Cortex-	-M4)			
dbg	* vers :	sion	. 1 . 0									
					Lo	ad						
					Dis	connect						

Browse to the subdirectory 'Debug' in the project directory and select the load file "RTS-Lab.s19". Click 'Open'. The load file will now be transferred to the MD407 card:

Output View			_
Duild 🖸	Load file 🥒 📖	ng S has 2 has men	x
🖲 O 📘	🚱 😔 🗣 🚺 « TinyTimber 🕨 RTS-Lab 🕨 Debug	✓ Search Debug	P
dbg: dbg: ***	Organize 🔻 New folder	!≡ ▼ 🗍	0
dbg:	★ Favorites ▲ Name	Date modified Type	
	Desktop RTS-Lab.s19	2017-01-08 00:31 S19 File	
	Downloads		
	🔄 Recent Places 😑		
	🥽 Libraries		
	Documents		
	J Music		
	E Pictures		
	Videos		
	M Homearoun		
	File name: RTS-Lab.s19	 Srecord (*.s19) 	•
		Open Cancel	
/ /			i

If the file transfer was successful your application program has been loaded into the RWM of the MD407 card, beginning at address 2000000_{16} .

Execute your program by entering the monitor command "go 20000000", and see the welcome text from the program. You are now ready to start developing your own code for the laboratory assignment:



Eterm console

Recent versions of CodeLite (version 13.0.0-cse or later) do not contain the console plugin. Instead, the **Eterm** standalone console (found on the desktop on the lab machine) can be used for downloading your application program to the MD407 card. The procedure for connecting to the MD407 card and downloading your application program is almost identical to that of the CodeLite console plugin (see above).

Add compiler

Choose 'Build Settings' from the Settings menu in CodeLite, and verify that the selected compiler is "Cross GCC (arm-none-eabi)". If it is, then you are done.

Otherwise, choose 'Add an existing compiler' from the 'Add Compilers' dropdown menu (or press the green 🖶 icon in later versions of CodeLite), and select the directory where the ARM cross compiler is installed ("C:\cseapp\CodeLite\tools\gcc-arm" on the most recent Windows lab machine configuration):

Build Settings				22
Compilers	Build Output Appearance	Build Systems		
			Add Compilers	•
clang	T	ools Patterns Compile	r Options Linker	
cobra		Tools		
gnu g++		C++ Compiler	clang++	
gnu gcc VC++		C Compiler	clang	
		Accombler Name	llum as 7	-
Selec	t the compiler folder			
) ◯ ▽ 🚺 ト Computer	► Local Disk (C:) ► MinGV	V ▶ gcc_arm ▶	
	Irganize 🔻 New folder			
	-			
5	Favorites	Name		Date modifie
	📃 Desktop	퉬 arm-none-eabi		2015-08-10 13
	\rm Downloads	퉬 bin		2015-08-10 13
	💷 Recent Places	🐌 lib		2015-08-10 13
		퉬 share		2015-08-10 13

You should now get an acknowledgement that you have found the correct compiler:

Compilers	Build Output Appearance	Build Systems	
			Add Compilers 🔻
clang clang++	New compiler found!	Autoroa	X Linker • •
cobra gnu g++	Set a name to the compil	er	
gnu gcc VC++	Cross GCC (arm-none	-eabi)	
		ОК	Cancel

Select 'OK', and you are done.

More information

CodeLite open source web site: http://www.codelite.org

GCC for ARM open source web site: <u>developer.arm.com/open-source/gnu-toolchain/gnu-rm</u>

CoolTerm web site: http://freeware.the-meiers.org