

UM0987 User manual

Developing your STM32VLDISCOVERY application using the Atollic TrueSTUDIO® software

Introduction

This document provides an introduction on how to use the Atollic TrueSTUDIO[®] software development toolchain (version 1.4.0 and later) with the STM32VLDiscovery board.

It provides novice users of the Atollic TrueSTUDIO[®] tool-chain some guidelines to build and run the sample program provided with this document which demonstrates how to create and build their own applications.

The DISCOVER project, referenced in this document, corresponds to the demo Flashed into the STM32VLDISCOVERY board during production. The project is available within the STM32VLDISCOVERY firmware package available at http://www.st.com/stm32vldiscovery.

Although this application note cannot show all the topics relevant to the Atollic TrueSTUDIO[®] tool, it demonstrates the first basic steps necessary to get started with the compiler/debugger.

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1 About Atollic TrueSTUDIO® toolchain

Atollic TrueSTUDIO[®] is an Eclipse based software development platform that includes a highly optimizing C/C++ compiler, a state-of-the-art editor, and a professional debugger. It integrates all the tools needed to develop embedded applications and helps expedite the development process of embedded applications by providing many features such as:

- Powerful source code editor with many features like spell checking of C/C++ comments, word and code completion, content assist, parameter hints and code templates.
- Project manager that automates the task of creating a working project for an electronic board or microcontroller device.
- Integrated Make Utility functionality for assembling, compiling, and linking your embedded applications.
- True integrated source-level and assembler-level debugger with high-speed CPU.
- Flash programming utility for downloading the application program into Flash ROM.
- Productivity features such as a graphical file difference viewer, a programmer's calculator, an integrated MS/DOS console window and a batch file execution window.
- Links to manuals, on-line help and user guides.
- Atollic TrueANALYZERTM/STM32 product is available for professional code quality analyzis of STM32 applications.

Note: Atollic TrueSTUDIO[®]/STM32 Professional version is available with a lot more capabilities. Further information about Atollic TrueSTUDIO[®] toolchain can be found at: www.atollic.com.



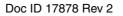
2 Starting an existing Atollic TrueSTUDIO project

After installing Atollic TrueSTUDIO®/STM32 on your computer, start the program by performing the following steps:

- 1. Open the Microsoft Windows Start menu.
- 2. Click on Programs.
- 3. Open the Atollic folder.
- 4. Open the TrueSTUDIO® STM32 product folder.
- 5. Click on the Atollic TrueSTUDIO® STM32 product name.
- 6. The programs starts and asks for the Workspace location. Browse to the folder that contains the Value Line Discovery Demonstration TrueSTUDIO workspace located at *stm32vldiscovery_package\Project\Demo\TrueSTUDIO* and click on **OK**.

Figure 1. Open workspace

a Worksp	ace Launcher 🛛 🛛
	/orkspace 5TUDIO®/STM32 Lite stores your projects in a folder called a workspace. orkspace folder to use for this session.
Workspace:	
?	OK Cancel





7. A Welcome window is then displayed. To start using Atollic TrueSTUDIO®, click on **Start using TrueSTUDIO**.

Figure 2. Start using TrueStudio





8. The main window of Atollic TrueSTUDIO is now open. *Figure 3* shows the names of the different views referred to in this document.

<u>File Edit Source Refactor Navio</u>	jate Se <u>a</u> rch <u>R</u> un <u>P</u> roject Manuals <u>W</u> indow <u>H</u> elp
📬 • 🔚 🚔 救 • O • Q • ☆ • ₫	P
🏠 Project Explorer 🛛 🦳 🗖	
Project explorer	Files window
	C-Build [STM32100B-EVAL]
	Console window
0 items selected	

- 9. Now, the workspace is open, you are ready to load projects. The TrueSTUDIO Discovery workspace contains a demo project for the Discovery kit. To load this project, the following steps should be performed:
 - a) Select Import... from File menu.
 - b) In the Import window, select **General 'Existing Projects into Workspace**' and click **Next**.

Figure 4. Select to import an existing project

G elect Create new projects from	n an archive file or directory.	n Ka
Select an import source:		
type filter text		
General Archive File Existing Pro File System Preference C/C++ C/C++ C/C++ Team	ojects into Workspace	



c) Browse to the TrueSTUDIO workspace folder (which contains the DISCOVER project folder) located at *stm32vldiscovery_package\Project\Demo\TrueSTUDIO*.

Figure 5. Select the project to import

a Import		
Import Projects Select a directory to searc	h for existing Eclipse projects.	
 Select root directory: Select archive file: Projects: 	C:\an3268\stm32vldiscovery_package\Project\Demo\TrueSTUDIO	Browse
V DISCOVER (C:\an	3268\stm32vldiscovery_package\Project\Demo\TrueSTUDIO\DISCOVER)	Select All
Copy projects into working sets		S <u>el</u> ect
?	< <u>B</u> ack Next > Einish	Cancel

- 10. Select the **DISCOVER** project from the **Projects** list and click **Finish**.
- 11. Select Preferences from Window menu.

Figure 6.	Window preferences	

Window	Help	
New \	Window	
New E	Editor	
Open	Perspective	►
Show	View	•
Custo	mize Perspective	
Save	Perspective As	
Reset	Perspective	
Close	Perspective	
Close	All Perspectives	
Navig	ation	•
Prefe	rences	



12. In the **Preferences** window, select **General>Workspace->Linked Resources** and click **New** button to add a path variable.

Figure 7. Add linked resources

a Preferences		
type filter text	Linked Resources	⇒ - ⇔ - -
 General Appearance Compare/Patch Content Types Editors Keys 	Enable linked resources Path variables specify locations in the file system. The locations of lin may be specified relative to these path variables. Defined path variables:	ked resources
 Network Connections Perspectives Search Security Startup and Shutdown Web Browser Workspace Workspace Local History C/C++ Help Install/Update Run/Debug Team 		Edi <u>t</u> <u>R</u> emove
?	ОК	Cancel
13. Add a path va	ariable named CurPath which points to the stm32vldiscove	ery_package

- folder containing "Libraries", "Project" and "Utilities" folders.
- Note: All Files in the DISCOVER project are linked using a path variable called "CurPath" to allow users to copy and run this project under any path location, just by updating this variable.



1222200002002	a New Path Variable new variable name and its associated location.	
Name:	CurPath	
Location:	C:\Value Line Discovery\FIRMWARE File	Folder
?	ОК	Cancel
r selectio	n	
r selectio	n r to be represented by the variable.	
r selectio		
r selectio fy the folde	r to be represented by the variable. Value Line Discovery	
r selectio fy the folde	r to be represented by the variable. Value Line Discovery DOC FIRMWARE	
r selectio fy the folde = = +	r to be represented by the variable. Value Line Discovery DOC FIRMWARE The Libraries	
r selectio fy the folde = = +	r to be represented by the variable. Value Line Discovery DOC FIRMWARE	
r selectio fy the folde = = +	r to be represented by the variable. Value Line Discovery DOC FIRMWARE I Discovers FIRMWARE Project	
r selectio fy the folde = = +	r to be represented by the variable. Value Line Discovery DOC FIRMWARE I Discovers FIRMWARE Project	

Figure 8. Add path variable CurPath

14. To build the project, select the DISCOVER project in the project explorer.

15. Click on Build Project in the Project menu.

Figure 9.	Build	project
-----------	-------	---------

Project Manuals	Window	Help
Open Projec	t	
Close Projec	t	
🗟 Build All		Ctrl+B
Build Configu	urations	
Build Project		
Build Workin	g Set	
Clean		
Build Automa	atically	
Make Target	:	



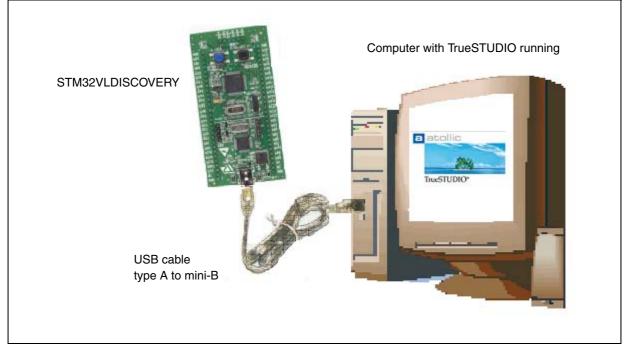
16. Your project is successfully compiled.

Figure 10. Successful compile

🔝 Problems 🖉 Tasks 📃 Console 😣 🔲 Properties 🔒	R	
C-Build [DISCOVER]		
Discovery\FIRMWARE\Libraries\CMSIS\CM3\CoreSupport\core_cm3.c		
arm-atollic-eabi-gcc User\stm32f10x_it.o User\main.o		
TrueSTUDIO\startup_stm32f10x_md_v1.o StdPeriph_Driver\stm32f10x_rcc.o		
StdPeriph_Driver\stm32f10x_pwr.o_StdPeriph_Driver\stm32f10x_gpio.o		
StdPeriph_Driver\stm32f10x_exti.o StdPeriph_Driver\misc.o		
STM32_Discovery\STM32F100_Discovery.o CMSIS\system_stm32f10x.o CMSIS\c	ore_	cm
STM32100B-EVAL.elf -mthumb -mcpu=cortex-m3 -TC:\Value Line		_
Discovery\FIRMWARE\Project\Value Line Discovery		
Demonstration\TrueSTUDIO\DISCOVER\STM32F100RB_FLASH.ld -static		
-W1,-cref,-u,Reset_Handler -W1,-Map=STM32100B-EVAL.map -W1,gc-section	ns	
Build complete for project DISCOVER		
Time consumed: 5312 ms.		

17. Before running your application, you should establish the connection with the STM32VLDiscovery board as shown in *Figure 11*.

Figure 11. Hardware environment



Note: For more details on how to establish your hardware environment you can refer to the UM0919 User Manual: STM32VLDiscovery available at www.st.com/stm32-discovery.



18. Select the **DISCOVER** project in the project explorer and then press **F11** to display the debug configurations window.

Figure 12. Edit configuration

Edit Configuration	\mathbf{X}
Edit launch configuration properties	Ť.
Name: STM32100B.elf	
DISCOVER Build Configuration Use Active C/C++ Application:	Browse
Debug/STM32100B.elf Search Project	B <u>r</u> owse Re <u>v</u> ert
? ОК	Cancel



- 19. In the **Debug configurations** window, click on **OK** to program the Flash and begin debugging.
- 20. Now you can start debugging your application. The debugger perspective supplied by Atollic TrueSTUDIO allows source code debugging at C and assembly levels, breakpoint setting, individual variables monitoring and watching during code execution.
- 21. To run your application, click on **Resume** in the **Run** menu or click on the resume button as shown in *Figure 13*. If everything is OK, LED3 blinks and every time the USER button is pressed, LED3 blinking frequency changes and LED4 is turned on.

Figure	13.	Resume	execution
iguic	10.	neounic	CACOULION

Debug - C:Walue Line Discovery\FIRMWARE\Project\Value Line Discovery Demo	nstration\src\main.c 🔳 🗖 🔀
<u>File Edit Source Refactor Navigate Search Run Project Manuals Window H</u> elp	
➡ + 🔜	
🗱 Debug 🛛 🦉 🎉 🏟 🕩 💷 🔤 🖓 🗔 🗇 🕫 👘 式 🔞 🏹 🖓 🗸 🖓	(₩= V 🖄 💁 B 🏘 E 🔭 🗖 🗖
E STM32100B-EVAL.elf [EmbResume (F8)] Application]	約 🐗 🕞 🏟 🗳 💥 🏹 🗸
Embedded C/C++ Application (8/20/10 2:04 PM) (Suspended) Thread [1] (Suspended) Thread [1] (Suspended) Thread [1] (Suspended) Thread [1] (Suspended)	
ST-LINK	< <u>></u>
🖻 main.c 🚺 stm32f10x_exti.c 🔂 main.c 🛛 🗖	🗄 Outline 🛛 📃 🗖
599 int main (void)	📲 😿 🖋 🛛 🗰 🏹
60 { 61 /* Enable GPIOx Clock */ 62 RCC_APB1PeriphClockCmd (RCC_APB1Periph_PWR, ENABLE); 63 RCC_APB1PeriphClockCmd (RCC_APB2Periph_GPIOC, ENABLE 64 RCC_APB1PeriphClockCmd (RCC_APB2Periph_GPIOA, ENABLE 65 66 /* Initialise LEDs LD3&LD4, both off */ 67 STM32F100_Discovery_LEDInit (LED3); 68 STM32F100_Discovery_LEDInit (LED4); 69 Console X Tasks Problems Executables Memory	<pre>stm32F10x.h STM32F100_Discovery.h STM32</pre>
STM32100B-EVAL.elf [Embedded C/C++ Application] C:\Value Line Discovery\FIRMWARE\Project\Value I	Line Discovery Demonstration\TrueSTUDIO\D]
STM32 Successufully completed reset operation	
	<u></u>



3 Creating your first application

Creating a new project for the STM32VLDiscovery with Atollic TrueSTUDIO is very easy. With a few steps, all the required files (startup file, firmware library and so on) are added to the workspace and sample files are generated in the project folder to simplify development. The debug configuration is done automatically when the STM32VLDiscovery kit is selected as the evaluation board.

- 1. Start Atollic TrueSTUDIO STM32 as follows:
 - a) Open the Microsoft Windows Start menu.
 - b) Click on Programs.
 - c) Open the **Atollic** folder.
 - d) Open the TrueSTUDIO® STM32 product folder.
 - e) Click on the Atollic TrueSTUDIO® STM32 product name.
- 2. The program is then started and requests the Workspace location. Click the **OK** button if you want to add your project to an existing workspace, otherwise enter a new workspace location.

Figure 14. Select workspace

a Workspa	ace Launcher 🛛 🔀
Select a w	rorkspace
	STUDIO®/STM32 Lite stores your projects in a folder called a workspace. orkspace folder to use for this session.
<u>W</u> orkspace:	c:\NewWorkspace Browse
▶ <u>C</u> opy Set	tings
?	OK Cancel



3. A Welcome window is then displayed. To start using Atollic TrueSTUDIO®, click on the *Start using TrueSTUDIO* link.



Figure 15. Start using TrueSTUDIO

4. The main window of Atollic TrueSTUDIO is now open, Select New >C Project from the File Menu.

Figure 16. New C project

File Edit Source	Refactor Navigate	Search	Run	Project	Manuals	Window	Help
New	Alt+Shift+N	1	C++ P	roject			
Open File		C [‡]	C Proje	ect			
Close	Ctrl+W	2	Projec	t			
Close All	Ctrl+Shift+V	V C++	Conve	rt to a Ci	'C++ Proje	ct	
[] Save	Ctrl+5			Folder	,-		
Save As		*	Folder				
院 Save All	Ctrl+Shift+S	C	Source	e File			
Revert		h	Heade	r File			
Move			File fro	om Templa	ate		
Rename	F2	G	Class				
🔊 Refresh	F5	. 1	Other.			Ctrl	+N



5. Name the project NewProject, select **STM32 C Project** in the Project type and click **Next**.

Figure	17.	Name	the	project
--------	-----	------	-----	---------

Project name: NewProj	ect	
Use default location		
Location: C:\NewWorks	:pace\NewProject	Browse
Project type:	Toolchains:	
Executable Empty Project TM32 C Pr Makefile project	oject	1 Tools



6. Select STM32_Discovery as **Evaluation board** and click **Next**.

Figure 18. Select STM32_Discovery as the evaluation board

Target	¢	
Evaluation board:	STM32_Discovery	<u> </u>
Microcontroller family:	All	×
Microcontroller:	STM32F100RB	×
Floating point:	Software implementation	~
Code location:	FLASH	~
OARM OThumb (Endianess Big endian OLittl	⊙ Thumb2 e endian	
	de (dead code removal)	
Disable C++ runtim	ta (dead data removal) le type information (RTTI) tion handling	

Note:

- Note: Choosing STM32_Discovery as evaluation board configures the project as follows:
- Microcontroller: STM32F100RB
- Debug probe: ST-LINK
- Connection: Serial Wire Debug (SWD).



7. Verify that ST-LINK is used as JTAG probe and click Finish.

Figure 19.	Select ST-LINK as JTA	G probe
------------	-----------------------	---------

a c Pr	pject		
TrueS1	UDIO® Misc Settings		
Select (niscellaneous project settings		
purch	VK TrueSTUDIO Lite only support ase the Professional version to types of JTAG probes.		
?	< Back Next >	Finish	Cancel

Your project is successfully created.

Note: Atollic TrueSTUDIO generates target-specific sample files (main.c, stm32f10x_it.c and so on) in the project folder to simplify development. You can tailor this project to your needs by modifying these sample files. The easiest way to add source files to the project is to copy them into this "src" folder (which contains main.c, stm32f10x_it.c and so on).

Figure 20. Project sample files

Project Explorer 🛛	- 8
	□ 🔄 🎽
🖃 📂 NewProject	
🖮 👘 Includes	
🖮 🗁 STM32_EVAL	
🚊 🖅 🔁 src	
😟 🖻 main.c	
🗈 h stm32f10x_conf.h	
🖃 🔂 stm32f10×_it.c	
🖻 庙 stm32f10×_it.h	
🗉 🟸 firmware	
🗉 🗁 Debug	
🖳 📄 stm32_flash.ld	



- 8. To build the project, select the **NewProject** project in the **project explorer.**
- 9. Click on **Build Project** in the **Project** menu.

Figure 21. Build project

Project Manuals Wi	indow Help
Open Project	
Close Project	
🗟 Build All	Ctrl+B
Build Configurat	ions 🕨 🕨
Build Project	
Build Working Se	et 🕨 🕨
Clean	
Build Automatica	ally
 Make Target	

10. Your project is successfully compiled.

Figure 22. Successfully compiled project

🔝 Problems 🖉 Tasks 🚍 Console 🛛 🔲 Properties 🛛 🔒 🞼 🛃 🚽 🗂 🗖 🗖			
C-Build [NewProject]			
firmware\STM32F1Ox_StdPeriph_Driver\src\misc.o			
firmware\CMSIS\CM3\DeviceSupport\ST\STM32F10x\system_stm32f10x.o			
firmware\CMSIS\CM3\DeviceSupport\ST\STM32F10x\startup\TrueSTUDIO\startup_s			
tm32f10x_md_v1.o firmware\CMSIS\CM3\CoreSupport\core_cm3.o			
STM32_EVAL\Board\STM32_Discovery.o -o NewProject.elf -mthumb			
-mcpu=cortex-m3 -TC:\NewWorkspace\NewProject\stm32_flash.ld -static			
-Wl,-cref,-u,Reset_Handler -Wl,-Map=NewProject.map -Wl,gc-sections			
arm-atollic-eabi-objcopy -O ihex NewProject.elf NewProject.hex			
Flash Converter only available in TrueSTUDIO Professional			
Build complete for project NewProject			
Time consumed: 18515 ms.			



- 11. Before running your application, you should establish connection with the STM32VLDiscovery as shown in *Figure 11: Hardware environment*.
- 12. Select the NewProject project in the **project explorer** and then press **F11** to display the debug configurations window.

Figure 23. Edit configuration

Edit Configuration	
Edit launch configuration properties	- A
Name: VewProject.elf Main	
NewProject Build Configuration Use Active C/C++ Application:	Browse
Debug/NewProject.elf	Search Project Browse Apply Reyert
?	OK Cancel

- 13. In the **Debug configurations** window, click on **OK** to program the Flash and begin debugging.
- 14. Now you can start debugging your application.



4 Revision history

Table 1.Document revision history

Date	Revision	Changes	
10-Sep-2010	1	Initial release.	
25-Oct-2010	2	Changed Firmware\Project\Value Line Discovery Demonstration\TrueSTUDIO path to stm32vldiscovery_package\Project\Demo\TrueSTUDIO. Changed <i>Figure 1</i> and <i>Figure 5</i> .	



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