

#### **APPLICATION NOTE**

# **Eclipse Environment Setup**

A-MCUAP3-ANGA03EN v1.1



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#### **Revision History**

Revision	Date	Description
1.0	2019	Released with AmbiqSuite SDK
1.1	April 11, 2022	Updated template

#### **Reference Documents**

Document ID	Description

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### Introduction

The open source Eclipse IDE is not formally supported in AmbiqSuite SDK and only limited tests are performed. AmbiqSuite does support GCC makefiles and all examples compiled and tested in the environment. This application note provides a step-by-step procedure to setup Eclipse development and debugging environment on machines running Windows operating systems. In this document, Windows 10 64-bit is used an example. It outlines the open source tools that need to be downloaded, but the user should keep in mind that these tools change quite rapidly and some research may be required to get the latest versions.



## Installation

Use the following procedure to install:

- 1. Java Runtime Environment (JRE) or Java Development Kit (JDK)
  - JRE is sufficient for our usage.
  - https://www.oracle.com/technetwork/java/javase/downloads/jre8-downloads-2133155.html
  - Make sure JRE is in Windows environment variable Path.
- 2. GNU MCU Eclipse Arm Embedded GCC
  - Download from https://github.com/gnu-mcu-eclipse/arm-none-eabi-gcc/releases/
  - Extract and place it to a proper location and add this path to Windows environment variable Path.
- 3. GNU MCU Eclipse Windows Build Tools
  - Download from https://github.com/gnu-mcu-eclipse/windows-build-tools/releases
  - Extract and place it to a proper location.

For example:

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File Home Share	View
← → • ↑ 📜 <u>C:\</u> G	NU MCU Eclipse
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- 4. GNU MCU Eclipse IDE for C/C++ Developers
  - Download from https://github.com/gnu-mcu-eclipse/org.eclipse.epp.packages/ releases. Make sure the version matches the installed JRE, both 32-bit version or 64-bit.
  - Extract and place it to a proper location.
- 5. J-Link Software and Documentation pack for Windows
  - Download from https://www.segger.com/downloads/jlink/#J-LinkSoftwareAndDocumentationPack and install it.



### **Eclipse Setup**

Use the following procedure to setup Eclipse:

- 1. Launch Eclipse and you will be asked to setup a workspace which can be anywhere.
- 2. In Eclipse, navigate to **Window** > **Preferences**. In the left panel, unfold MCU and configure Global Arm Toolchains Paths, Global Build Tools Path and Global SEGGER J-Link Path.

Preferences					×
type filter text	Global ARM To	olchains Paths		¢ • •	· • •
<ul> <li>MCU</li> <li>Global ARM Toolchains Paths</li> <li>Global Build Tools Path</li> <li>Global Jumper Path</li> <li>Global DyoenOCD Path</li> <li>Global pyOCD Path</li> <li>Global QEMU Path</li> <li>Global QEMU Path</li> <li>Global SEGGER J-Link Path</li> <li>Workspace ARM Toolchains Paths</li> <li>Workspace Build Tools Path</li> <li>Workspace Jumper Path</li> </ul>	Configure the loc specifically, they a Default toolchain Toolchain name:	olchains Paths ations where various GNU ARM toolchains are installed. The values are stored re used for all projects in all workspaces. GNU MCU Eclipse ARM Embedded GCC GNU MCU Eclipse ARM Embedded GCC C:\GNU MCU Eclipse\ARM Embedded GCC\ C:\GNU MCU Eclipse\ARM Embedded GCC\7.3.1-1.1-20180724-0637\bin	within Eclipse. Unless re		ore
Workspace OpenOCD Path Workspace pyOCD Path Workspace QEMU Path Workspace RISC-V Toolchains Paths Workspace SEGGER J-Link Path > Mylyn > Oomph > Remote Development > RPM					
> Run/Debug	U I		Restore Defaults	Appl	y
? <u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u></u>			Apply and Close	Cancel	

<u>61.</u>			<b>(⊳ ▼</b> ⇒ ▼
ype filter text	Global Build Tools Path		v · · · ·
✓ MCU Global ARM Toolchains Paths Global Build Tools Path Global Jumper Path Global OpenOCD Path	The locations where various GNU MCU Eclipse build tools are installed. Unless defined more spe all workspaces. Build tools folder: C:\GNU MCU Eclipse\Build Tools\2.11-20180428-1604\bin	cifically, they are used Browse	for all projects in xPack
Global pyOCD Path Global QEMU Path Global RISC-V Toolchains Paths Global SEGGER J-Link Path Workspace ARM Toolchains Paths Workspace Build Tools Path Workspace Jumper Path Workspace OpenOCD Path Workspace OpenOCD Path Workspace QEMU Path Workspace RISC-V Toolchains Paths Workspace SEGGER J-Link Path > Mylyn Oomph			
> Remote Development			
> RPM > Run/Debug		Restore Defaults	Apply

Preferences					×
type filter text	Global SE	GGER J-Link Path	4	<b>0 -</b> 0	. • •
<ul> <li>MCU</li> <li>Global ARM Toolchains Paths</li> <li>Global Build Tools Path</li> <li>Global Jumper Path</li> <li>Global OpenOCD Path</li> </ul>	used for all After install new locatio				
Global pyOCD Path Global QEMU Path	Executable:	JLinkGDBServerCLexe			
Global RISC-V Toolchains Paths Global SEGGER J-Link Path Workspace ARM Toolchains Paths	Folder:	C:/Program Files (x86)/SEGGER/JLink_V640/ Bro	wse	xPack	
Workspace Build Tools Path Workspace Jumper Path Workspace OpenOCD Path					
Workspace pyOCD Path Workspace QEMU Path Workspace RISC-V Toolchains Paths					
Workspace SEGGER J-Link Path					
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> Remote Development					
> RPM					
> Run/Debug	~	Restore	e <u>D</u> efaults	Apply	Y
2 leam					
? > 4 0		Apply an	1 million and a second	Cancel	



#### Project Import and Compilation

Use the following procedure to import and compile projects:

 In Eclipse, navigate to File >Import. Select C/C++>Existing Code as Makefile Project. Click Next. For projects which are to be imported for the first time use this option. For those projects which have previously been imported to Eclipse (check if the files, .project and .cproject, and the folder .settings exist in <project>/gcc,) select General >Existing Projects into Workspace.

Import		$\times$
elect Creates a new Makefile project in a directory containing existing code		Ľ
Select an import wizard:		
type filter text		
<ul> <li>&gt; General</li> <li>&gt; C/C++</li> <li>C/C++ Executable</li> <li>C/C++ Project Settings</li> <li>Existing code as Autotools project</li> <li>Existing Code as Makefile Project</li> <li>&gt; Git</li> <li>&gt; Git</li> <li>&gt; Install</li> <li>&gt; Oomph</li> <li>&gt; RPM</li> <li>&gt; Run/Debug</li> <li>&gt; Tasks</li> <li>&gt; Team</li> <li>&gt; TextMate</li> <li>&gt; Tracing</li> <li>&gt; XML</li> </ul>		
? < Back Next > Finish	Cance	el

- 2. Select the targeting project. Take the project clkout of R2.0 for Apollo3 as an example.
  - Change the project name (optional).
  - Select ARM Cross GCC in Toolchain for Indexer Settings.

Sew Project		$\times$
Import Existing Code		
Create a new Makefile project from existing code in that same directory		
Project Name		
clkout_eclipse_gcc		
Existing Code Location		
pace\ambiqsuite-rel1.2.12\boards\apollo2_evb\examples\clkou	t\gcd Brc	owse
Languages ✓ C ✓ C++		
Toolchain for Indexer Settings		
<none></none>		
ARM Cross GCC		
Cross GCC		
Cygwin GCC		
GNU Autotools Toolchain RISC-V Cross GCC		
KISC-V Closs GCC		
Show only available toolchains that support this platform		
? < Back Next > Finish	Cancel	

3. After the project is imported, the project explorer shows the project like the following screenshot.



4. Right click on the project and go to **Properties** > **C/C++ Builds** > **Build Variables**. Add two variables as highlighted in below. Click **Apply** and **Close**.

type filter text	Build Variable	es			Q. •	- <del>1</del> 2, <b>▼</b> -
Build Variables	Configuration:	Default	[Active]		Manage Configu	rations
	Name	Туре	Value			Add.,
Settings	cross_make	String	make			Edit
Tool Chain Editor	cross_prefix	String	arm-none-eabi-			
Builders C/C++ Build Build Variables Environment Logging Settings						Deleti
		are IDE o	nly variables, which can be use	d for string substitution when defining exter arameter in form of \$(VAR), internal builder Restore [	may use them direc	

5. Right click on the project and select **Clean Project**.

6. Right click on the project and select **Build Project**.

```
Problems @ Tasks © Console ¤ □ Properties
CDT Build Console [clout_eclipse_gcc]
17:22:10 **** Build of configuration Default for project clout_eclipse_gcc ****
make all
Compiling gcc ../src/clkout.c
Compiling gcc ../../../../utils/am_util_delay.c
Compiling gcc ../../../../utils/am_util_faultisr.c
Compiling gcc ../../../../utils/am_util_stdio.c
Compiling gcc ../../../../devices/am_devices_led.c
Compiling gcc startup_gcc.c
Linking gcc bin/clkout.axf
Copying gcc bin/clkout.bin...
```



### **Project Debugging**

Use the following procedure to debug a project:

1. Navigate to **Run** > **Debug** Configurations.

reate, manage, and run configur	ations
type filter text C C/C++ Application C C/C++ Attach to Application C C/C++ Attach to Application C C/C++ Container Launcher C C/C++ Postmortem Debugger C C/C++ Remote Application C C/C++ Unit G GDB Hardware Debugging G GDB ApoCD Debugging G GDB OpenOCD Debugging G GDB QEMU Debugging G GDB SEGGER J-Link Debugging G Launch Group ► Launch Group ► Launch Group (Deprecated)	<ul> <li>Configure launch settings from this dialog:</li> <li>Press the 'New Configuration' button to create a configuration of the selected type.</li> <li>Press the 'New Prototype' button to create a launch configuration prototype of the selected type.</li> <li>Press the 'Export' button to export the selected configurations.</li> <li>Press the 'Duplicate' button to copy the selected configuration.</li> <li>Press the 'Delete' button to configure filtering options.</li> <li>Edit or view an existing configuration by selecting it.</li> <li>Select launch configuration(s) and then select 'Link Prototype' menu item to link a prototype.</li> <li>Select launch configuration(s) and then select 'Reset with Prototype Values' menu item to reset with prototype values.</li> <li>Configure launch perspective settings from the 'Perspectives' preference page.</li> </ul>

2. Right click on GDB SEGGER J-Link Debugging and select New Configuration.

3. In Main page, make sure Project has the name identical to the one set in project import and **C/C++ Application** pointed to the corresponding **.axf** file.

ebug Configurations					>	
te, manage, and run configurations					Ś	
ಾ 🖹 🗶 🖻 🔅 🔻	gcc Default					
filter text	er 🕨 Startup 💱 Source 🗖 🤉	ommon 🖟 SVD Path				
C/C++ Application						
C/C++ Attach to Application	clout_eclipse_gcc					
C/C++ Postmortem Debugge C/C++ Application:			]			
C/C++ Remote Application					F	
C/C++ Unit		Variables	Search Project	Browse		
GDB Hardware Debuggin <mark>g</mark> GDB Jumper Debugging Build (if required) be	efore launching			51011501		
	Select Automatically				~	
GDB PyOCD Debugging					•	
GDB QEMU Debugging GDB SEGGER J-Link Debuggir		O Disable auto t Configure Works				
	ettings	Configure works	pace Settings			
clout_eclipse_gcc Default Launch Group						
Launch Group (Deprecated)						
>			Revert	Apply		
matched 15 of 15 items				719		
			Debug	cl		
			Debug	Close		

4. In Debugger page, make sure Actual executable is correctly interpreted and Device name is added.

Debug Configurations eate, manage, and run config	jurations		Ŕ		
₿ 🕫 🖹 🗶 🖻 🔆 🔻	Name: clout eclipse	acc Dafault			
<ul> <li>Experimental and the second second</li></ul>	<ul> <li>□ Main ♥ Debugge</li> <li>J-Link GDB Server S</li> <li>✓ Start the J-Link</li> <li>Executable path:</li> </ul>	► Startup 🗣 Source 📼 Common 🔒 SVD Path etup	se Variabl s		
		to change it use the <u>global</u> or <u>workspace</u> preferences pages or the <u>project</u> pr	operties page) ed device name		
	Endianness: Connection: Interface: Initial speed: GDB port: SWO port: Telnet port:	<ul> <li>Little Big</li> <li>USB IP (USB serial or IP name/address)</li> <li>SWD JTAG</li> <li>Auto Adap Fixed 1000 kHz</li> <li>2331</li> <li>2332</li> <li>Verify downloads Initialize registers on star</li> <li>Local host only Silent</li> </ul>			
	Log file:		Browse		
	Other options:       -singlerun -strict -timeout 0 -nogui         Allocate console for the GDB server       Allocate console for semihosting and SWO				
	GDB Client Setup Executable name: Actual executable:	\${cross_prefix}gdb\${cross_suffix} arm-none-eabi-gdb	se Variables.		
	Other options: Commands:	set mem inaccessible-by-default off			
	Remote Target Host name or IP as Port number:	Idress: localhost 2331			
	Force thread list	ipdate on suspend	<u>Restore defa</u>		
er matched 15 of 15 items		Revert	Apply		

5. In SVD page, add the path to the targeting board SVD file located in **<SDK**>/pack. Click **Apply** and **Debug**.

Debug Configurations					×
eate, manage, and run confi	guratio	ons			Ż
🖻 🕫 🖹 📕 🖻 🍄 🔻	Name:	clout_eclipse_gcc Default			
/pe filter text	■ Main 参 Debugger ► Startup 🖗 Source 🖾 Common 🕏 SVD Path				
C/C++ Application	SVD file (used by the peripheral registers viewer)				
C/C++ Attach to Application	File space\ambigsuite-rel1.2.12\pack\SVD\apollo2.svd Browse Variables				
C/C++ Container Launcher					
C/C++ Remote Application					
C₩ C/C++ Unit					
GDB Hardware Debugging					
<ul> <li>GDB Jumper Debugging</li> <li>GDB OpenOCD Debugging</li> </ul>					
GDB PyOCD Debugging					
GDB QEMU Debugging					
C GDB SEGGER J-Link Debuggir					
clout_eclipse_gcc Default Launch Group					
Launch Group (Deprecated)					
>					
ter matched 15 of 15 items		Revert		Apply	
2)				Class	
?		Debug		Close	

6. After the debugger is launched, the program stops at the main function. Click the run icon highlighted in the red frame below. The LEDs on EVB shall start to blink.

eclipse_workspace_ambigsuite-rel1.2.12 - C\Users\LTie	in\Documents\workspace\ambigsuite-rel1.2.12\boards\apollo2_evb\examples\clkout\src\clkout.c - Eclipse IDE	- 🗆 ×				
File Edit Source Refactor Navigate Search Project R	un Window Help					
🐔 🐌 🔳 🖲 Debug 🗠 🖾 clout_eclipse.gcc De		0 + 8 + 0 0 + 0 + 0 + 0 - 0 - 0 - 0 - 0 - 0 -				
Debug # & Project Explorer # # # == 0	T ckoute 2	Variables * Breakpoints ** Expressions ** Modules ** Peripherals ** ** **				
Oebog III (Project Epoteen III)     If out, refore cpc Default (IGB SEGER - Link Debug     Idout, refore, cpc Default (IGB SEGER - Link Debug     Idout, refore cpc Default (IGB SEGER - Link Debug     Idout, refore cpc Default (IGB SEGER - Link Debug     Idout, refore cpc Default (IGB SEGER - Link Debug     Idout, refore cpc Default (IGB SEGER - Link Debug     Idout, refore cpc Default (IGB SEGER - Link Debug     Idout, refore cpc Default (IGB SEGER - Link Debug     Idout, refore cpc Debug     Ido		Preipheral         Address         Description           B. ADC         0x50010         Analog Digital Converter Control           B. CACHECI Sub018         Rash Cache Controller         Cock Generator           B. CIMER         0x40008         Cock Generator           B. CIMER         0x40008         Cock Generator           B. CIMER         0x40008         COCK           B. KOMSTRD 0x50004         2C/SPI Master           B. KOMSTRD 0x50005         2C/SPI Master           B. KOMSTRB 0x50006         2C/SPI Master           B. KOMSTRB 0x50007         2C/SPI Master           B. KOMSTRB 0x50007         2C/SPI Master				
	Console III = Registers @ Problems @ Executables @ Debugger Console  0 Memory     GNU MCU Edipse Packs console					
	2013-11-23 17:34-05 Parsing SVD file "C:\Users\LTien\Documents\workspace\ambigsuite-rel1.2.12\pack\SVD\. Completed in 81ms.	spollo2.svd"				
< >	4					



### Troubleshooting

- Make sure Windows Environment variable Path is configured correctly. For Windows 10, right click on This PC and navigate to Properties > Advanced system settings > Environment Variables, and check the variable Path.
- 2. Contact regional Ambiq Field Application Engineers if you encounter further questions.



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