N9H26 Non-OS BSP User Manual

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1 Introduction to N9H26 Non-OS BSP

This BSP supports Nuvoton N9H26 family processors. The N9H26 series targeted for general purpose 32-bit microcontroller embeds an outstanding CPU core ARM926EJ-S, a RISC processor designed by Advanced RISC Machines Ltd., runs up to 240 MHz, with 8 KB I-cache, 8 KB D-cache and MMU, 8KB embedded SRAM and 16 KB IBR (Internal Boot ROM) for booting from NAND, SD and SPI FLASH.

The N9H26 series integrates with video codec (H.264), JPEG codec, 32-channel SPU (Sound Processing Unit), AAC accelerator, SDIO host controller, USB2.0 HS Host/Device, ADC, DAC and TV encoder for meeting various kinds of application needs

This non-OS BSP contains IPs samlpe codes with Keil and Eclipse project for easy to get started.

1.1 Keil Develop Environment

Non-OS BSP supports using Keil as develop environment, and uses J-Link ICE for debug. The IDE does not belong to the content of this document. Please refer to official Keil website http://www.keil.com/ for the user manual of Keil IDE.

N9H26 supports J-TAG debug interface. Users could use this interface to download programs to DRAM and debug. It is recommended to booting on recovery mode for ICE debugging.

1.2 Eclipse Develop Environment

This section introduces the installation steps of Eclipse develop environment. First download Eclipse IDE for C/C++ Developers Tool from Eclipse official website https://www.eclipse.org/downloads/, select proper version according to your operating system. Since Eclipse is a Java based application, please download JRE from Java website and install it.

The cross compile - GNU ARM Embedded Toolchaincan be downloaded from https://gnu-mcu-eclipse.github.io/plugins/install/. After installed the software packages memtioned above, execute Eclipse and select Help -> Eclispe Marketplace.

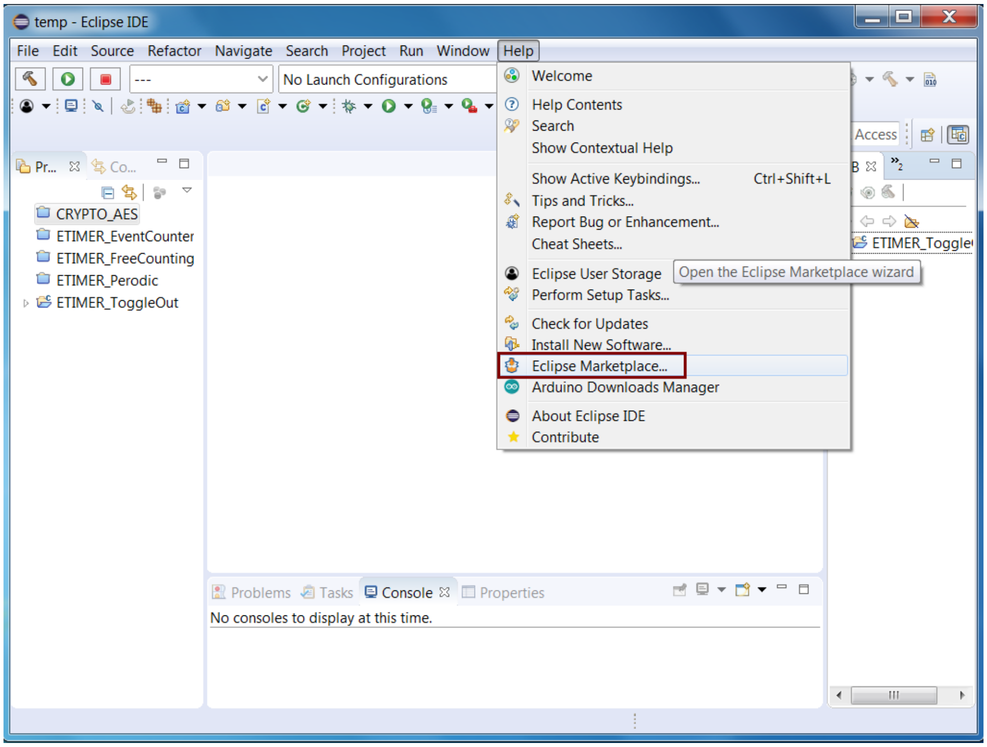
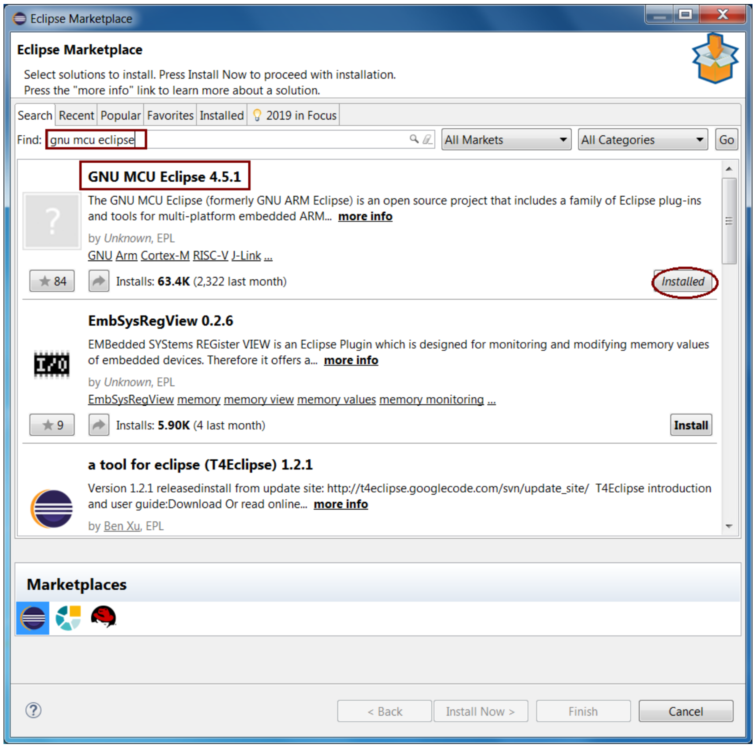


Figure 1-1 Select Eclipse Marketplace

Input gnu mcu exlipse in Find field, and then the search result will be shown as Figure 1-2. Select latest version and click Install button to install the required plug-in.



Eclipse Marketplace

Select solutions to install. Press Install Now to proceed with installation.
Press the "more info" link to learn more about a solution.

Find: gnu mcu eclipse

GNU MCU Eclipse 4.5.1

The GNU MCU Eclipse (formerly GNU ARM Eclipse) is an open source project that includes a family of Eclipse plug-ins and tools for multi-platform embedded ARM... more info

by Unknown, EPL

GNU Arm Cortex-M RISC-V J-Link ...

Installs: 63.4K (2,322 last month)

EmbSysRegView 0.2.6

EMBedded SYStems REGister VIEW is an Eclipse Plugin which is designed for monitoring and modifying memory values of embedded devices. Therefore it offers a... more info

by Unknown, EPL

EmbSysRegView memory memory view memory values memory monitoring ...

Installs: 5.90K (4 last month)

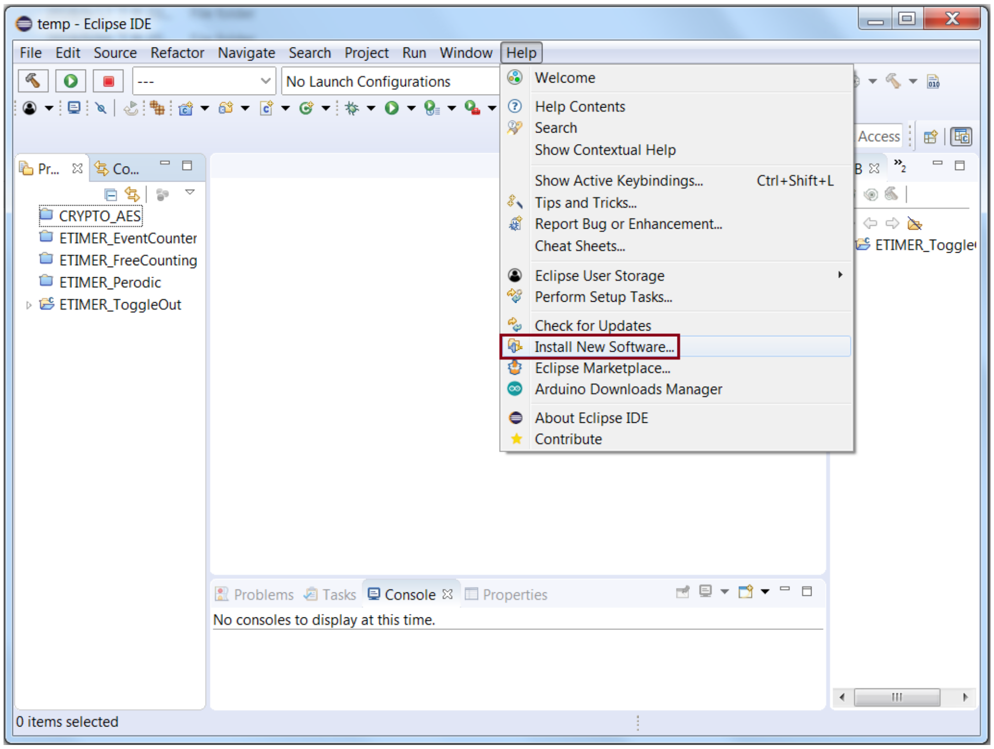
a tool for eclipse (T4Eclipse) 1.2.1

Version 1.2.1 releasedinstall from update site: http://t4eclipse.googlecode.com/svn/update_site/ T4Eclipse introduction and user guide:Download Or read online... more info

by Ben Xu, EPL

Figure 1-2 Install Plug-in

Click Help -> Install New Software to install CDT to support C/C++ development.

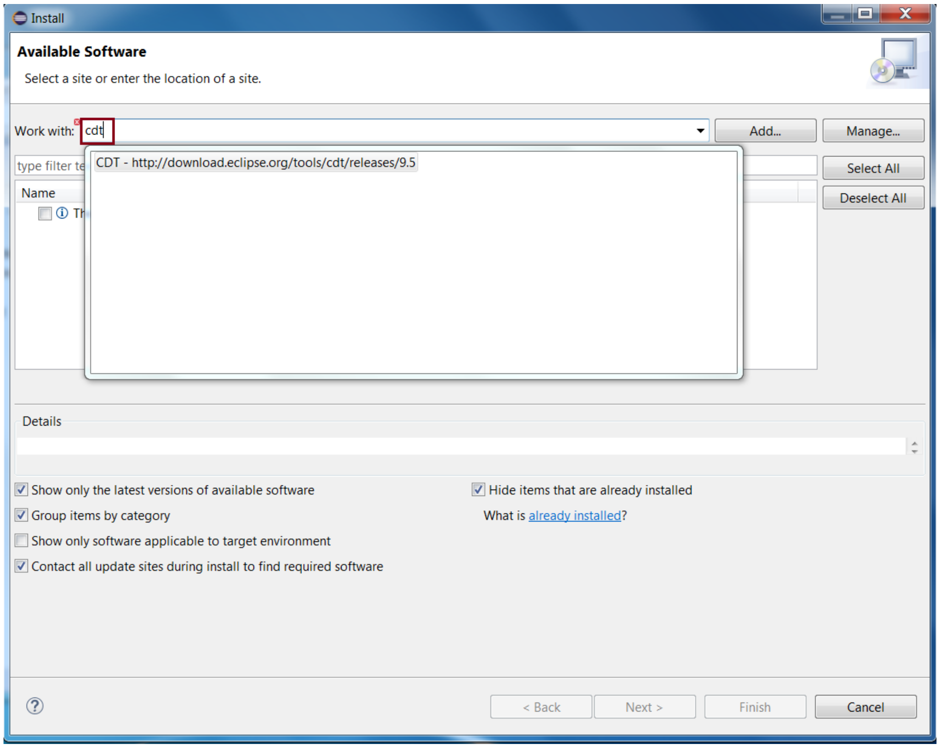


No consoles to display at this time.

0 items selected

Figure 1-3 Install New Software

Input CDT in Work with field.



Install

Available Software

Select a site or enter the location of a site.

Work with: cdt

CDT - http://download.eclipse.org/tools/cdt/releases/9.5

Details

☑ Show only the latest versions of available software

☑ Group items by category

□ Show only software applicable to target environment

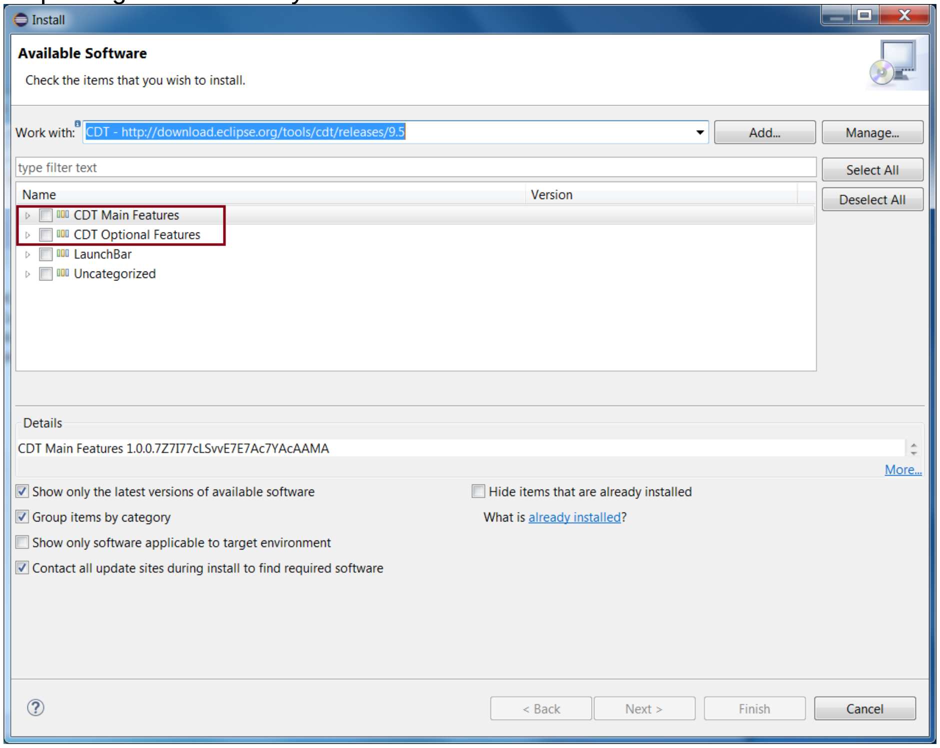
☑ Contact all update sites during install to find required software

☑ Hide items that are already installed

What is already installed?

Figure 1-4 Search for CDT

Select CDT Main Features and CDT Optional Features as shown in Figure 1-5. User can also select other pakcages if necessary.



Install

Available Software

Check the items that you wish to install.

Work with: CDT - http://download.eclipse.org/tools/cdt/releases/9.5

Name	Version
□ CDT Main Features	
□ CDT Optional Features	
□ LaunchBar	
□ Uncategorized	

Details

CDT Main Features 1.0.0.7Z7I77cLSvvE7E7Ac7YAcAAMA

☑ Show only the latest versions of available software

☑ Group items by category

□ Show only software applicable to target environment

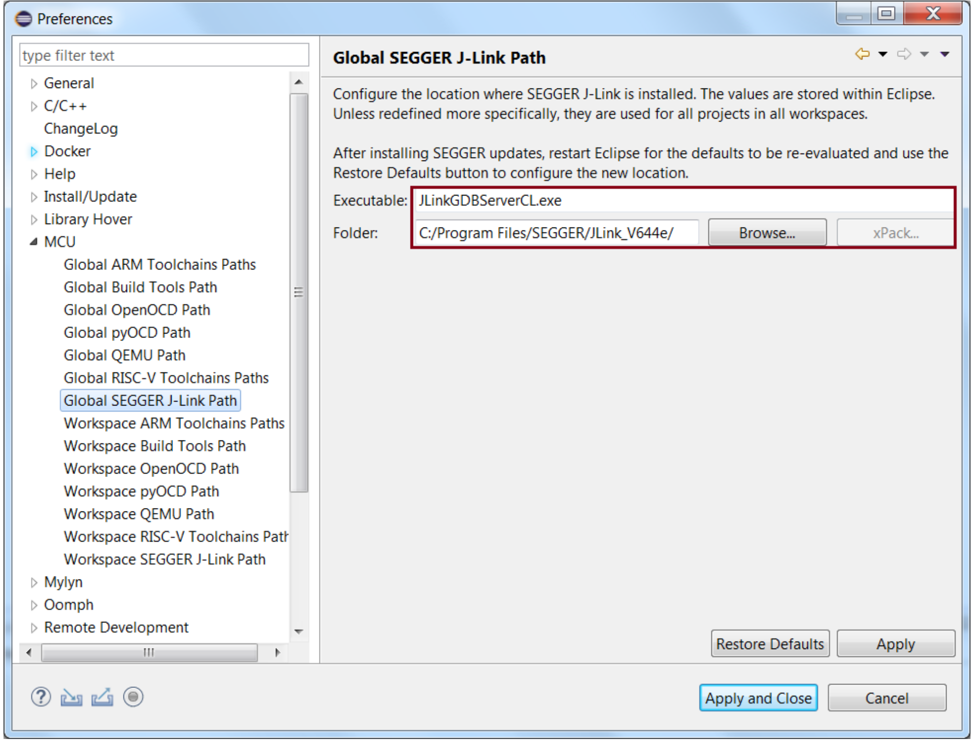
☑ Contact all update sites during install to find required software

□ Hide items that are already installed

What is already installed?

Figure 1-5 Select CDT

After installed CDT, re-start Eclipse to import Eclipse project.
Eclipse supports debugging using J-Link ICE. Download and install J-Link plug-in from the website http://gnuarmeclipse.github.io/plugins/install/ before start debugging. After installation, set J-Link path in Preference->MCU-> Global SEGGER J-Link, and them press Apply button.



Global SEGGER J-Link Path

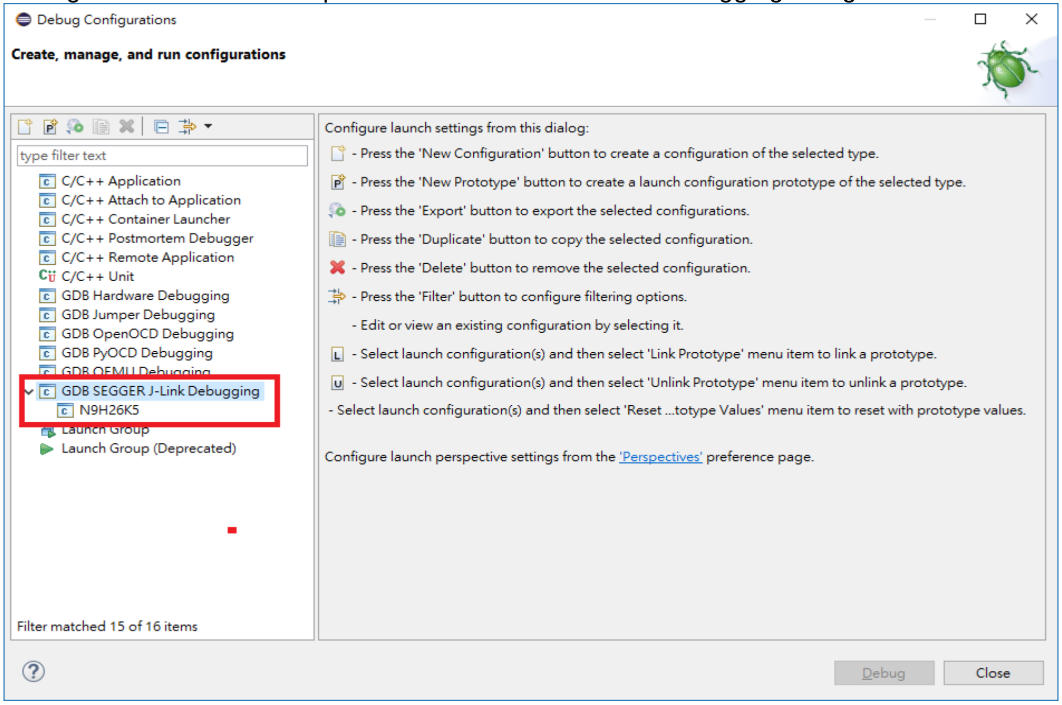
Configure the location where SEGGER J-Link is installed. The values are stored within Eclipse. Unless redefined more specifically, they are used for all projects in all workspaces.

After installing SEGGER updates, restart Eclipse for the defaults to be re-evaluated and use the Restore Defaults button to configure the new location.

Executable: JLinkGDBServerCL.exe
Folder: C:/Program Files/SEGGER/JLink_V644e/

Figure 1-6 Global SEGGER J-Link Path Setting

The next step is to set GDB SEGGER J-Link Debugging options. Click Run-> Debug Configurations and then expand GDB SEGGER J-Link Debugging confguration.



Create, manage, and run configurations

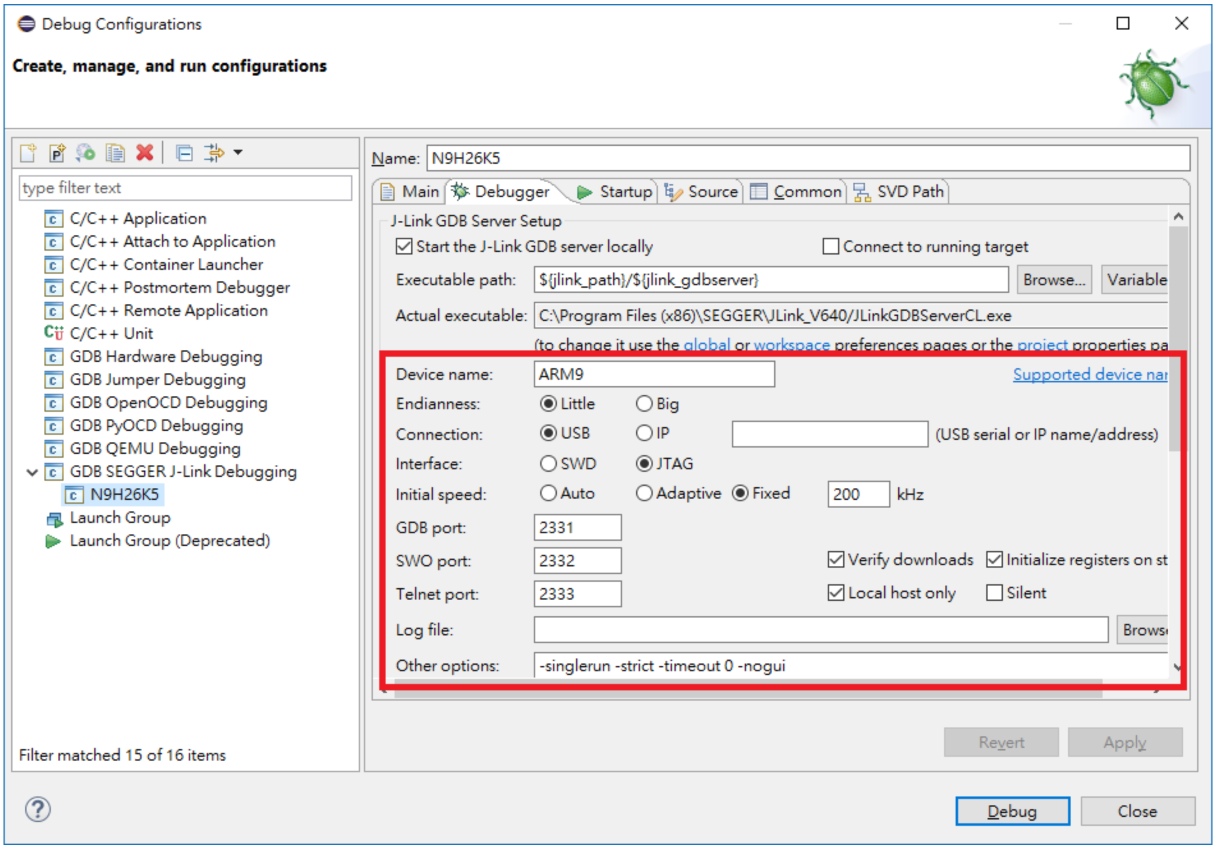
Configure launch settings from this dialog:
- Press the 'New Configuration' button to create a configuration of the selected type.
- Press the 'New Prototype' button to create a launch configuration prototype of the selected type.
- Press the 'Export' button to export the selected configurations.
- Press 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.
- Select launch configuration(s) and then select 'Link Prototype' menu item to link a prototype.
- Select launch configuration(s) and then select 'Unlink Prototype' menu item to unlink a prototype.
- Select launch configuration(s) and then select 'Reset ...totype Values' menu item to reset with prototype values.

Configure launch perspective settings from the 'Perspectives' preference page.

Filter matched 15 of 16 items

Figure 1-7 GDB SEGGER J-Link Debug

Selet corresponding configuration which match your device. Goto Debugger tab, this configure is as Figure 1-8.



Name: N9H26K5

J-Link GDB Server Setup

☑ Start the J-Link GDB server locally ☐ Connect to running target

Executable path: ${jlink_path}/${jlink_gdbserver}

Actual executable: C:\Program Files (x86)\SEGGER\JLink_V640/JLinkGDBServerCL.exe

(to change it use the global or workspace preferences pages or the project properties pa

Device name: ARM9

Endianness: ● Little ○ Big

Connection: ● USB ○ IP (USB serial or IP name/address)

Interface: ○ SWD ● JTAG

Initial speed: ○ Auto ○ Adaptive ● Fixed 200 kHz

GDB port: 2331

SWO port: 2332 ☑ Verify downloads ☑ Initialize registers on st

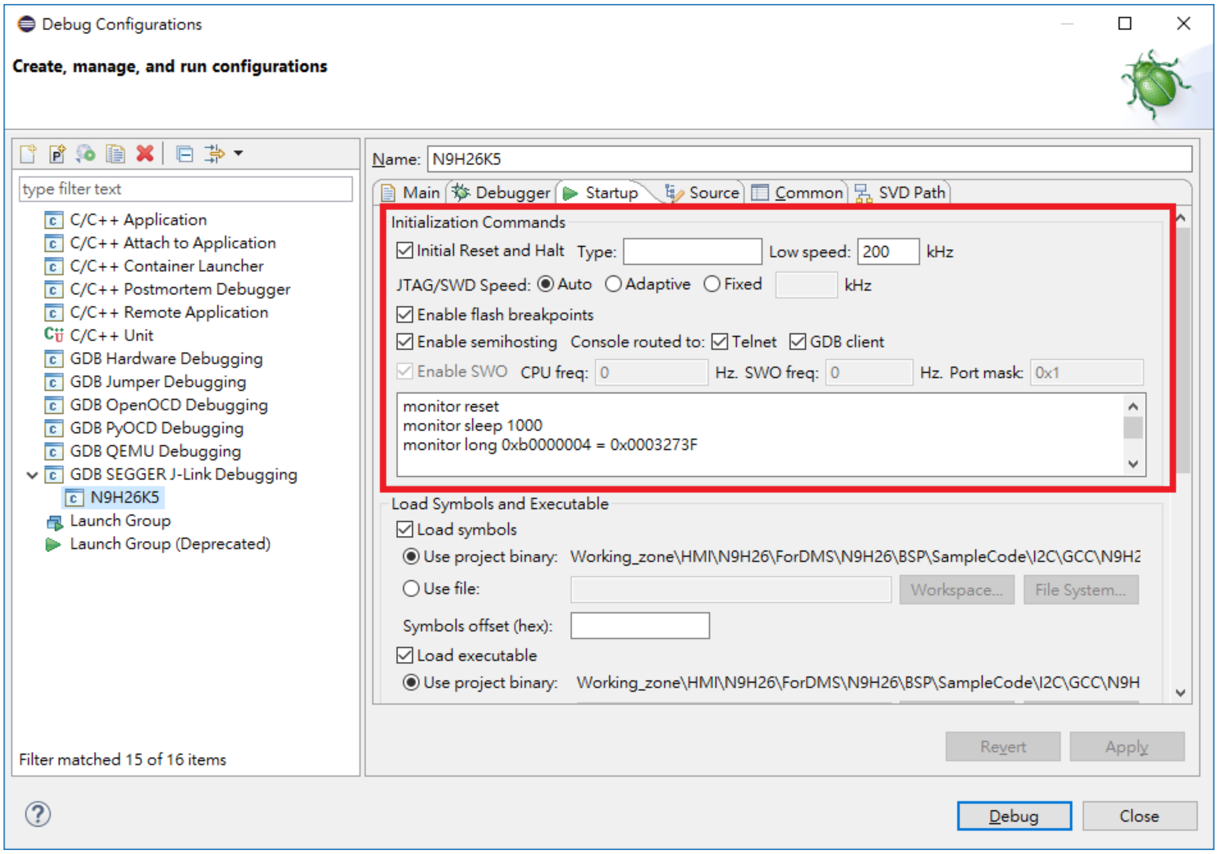
Telnet port: 2333 ☑ Local host only ☐ Silent

Log file:

Other options: -singlerun -strict -timeout 0 -nogui

Figure 1-8 J-Link Debugger Setting

Goto Startup tab, this configure is as Figure 1-9.



Debug Configurations

Create, manage, and run configurations

type filter text

- C/C++ Application
- C/C++ Attach to Application
- C/C++ Container Launcher
- C/C++ Postmortem Debugger
- C/C++ Remote Application
- C/C++ Unit
- GDB Hardware Debugging
- GDB Jumper Debugging
- GDB OpenOCD Debugging
- GDB PyOCD Debugging
- GDB QEMU Debugging
- GDB SEGGER J-Link Debugging
  - N9H26K5
- Launch Group
- Launch Group (Deprecated)

Filter matched 15 of 16 items

Name: N9H26K5

Main | Debugger | Startup | Source | Common | SVD Path

Initialization Commands

☑ Initial Reset and Halt Type: Low speed: 200 kHz

JTAG/SWD Speed: ● Auto ○ Adaptive ○ Fixed kHz

☑ Enable flash breakpoints

☑ Enable semihosting Console routed to: ☑ Telnet ☑ GDB client

☑ Enable SWO CPU freq: 0 Hz. SWO freq: 0 Hz. Port mask: 0x1

```
monitor reset
monitor sleep 1000
monitor long 0xb0000004 = 0x0003273F
```

Load Symbols and Executable

☑ Load symbols

● Use project binary: Working_zone\HMI\N9H26\ForDMS\N9H26\BSP\SampleCode\I2C\GCC\N9H2

○ Use file: Workspace... File System...

Symbols offset (hex):

☑ Load executable

● Use project binary: Working_zone\HMI\N9H26\ForDMS\N9H26\BSP\SampleCode\I2C\GCC\N9H

Revert Apply

Debug Close

Figure 1-9 J-Link Startup Setting

After complete the setting, click Debug button to start debug with J-Link.

2 BSP Content

2.1 Non-OS BSP directory structure

Non-OS BSP contains four directories. The content of each directory listed in the table below..

Directory Name	Content
BSP	Foldr contains Non-OS driver, third party software and sample applications.
Documents	BSP related documents
Loader	Contain source code and binary file for different loader in booting path.
Tools	Tools include PC tools and the Mass production tools.

2.2 BSP content

The BSP directory shows following content

Directory Name	Content
Driver	N9H26 peripheral drivers. Please refer to N9H26 Non-OS Library Reference Guide.pdf under Documents directory for the usage of driver APIs.
Library	N9H26 Keil libraries, including IP, AVI, GNAND, NVTFAT and USB Hos. The IP library source code can be found in Driver\Source folder.
Library_GCC	N9H26 GCC libraries, including IP, AVI, GNAND, NVTFAT and USB Hos. The IP library source code can be found in Driver\Source folder.
SampleCode	Driver sample application.
Script	Link script and debug initialization file for Keil. Below is the setting for 240/360MHz. ● N9H26K5.ini and N9H26K6.ini are for IP usage example which execution address at 0x0. ● N9H26K5_loader.ini and N9H26K6_loader.ini are for NandLoader, SDLoader and SPILoader under Loaders folder which execution address is at 0x900000. ● N9H26K5_NVTloader.ini and N9H26K6_NVTloader.ini are for NVTLOADER which exectiion address is at 0x800000. If the file postfixed with "_264MHz", it is for 264/396MHz seting. Due to USBH needs 48MHz clock as clock source, please don't use 264/396MHz setting if USBH is necessary for the application.
ThirdParty	Third party software. Including emWin and FreeRTOS.

2.3 Loader content

The booting sequence is IBR → Loader → NVTLoader(option). These folders provide the reference sample code for it. In most cases, this code is unnecessary to modify it.

Directory Name	Content
Binary	Contains the pre-build binary file for NandLoader, SDLoader, SPILoader and NVTLoader.
NANDLoader	Source code of NandLoader. Please refer to N9H26 NAND Loader Reference Guide.pdf under Documents directory for the usage.
NVTLoader	Source code of NVTLoader. Please refer to N9H26 NVTLoader Reference Guide.pdf under Documents directory for the usage.

SDLoader	Source code of SDLoader. Please refer to N9H26 SD Loader Reference Guide.pdf under Documents directory for the usage.
SPILoader	Source code of SPI Loader. Please refer to N9H26 SPI Loader Reference Guide.pdf under Documents directory for the usage
SPILoader_gzip	Source code of SPI Loader with gzip. Please refer to N9H26 SPI Loader Reference Guide.pdf under Documents directory for the usage

2.4 Tools content

This directory contains PC_tools and MassProduction_tools.

PC_tools contain:

Directory Name	Description
AutoWriter V3.xx.xxx_N9H26K6	Please refer the AutoWriter User Guide.pdf for detail.
TurboWriter V2.xx.xxx_N9H26K6	Please refer the TurboWriter Tool User Guide.pdf for detail.

MassProduction_tool contain:
User must prepare the content which want to program on stroage on SDx in advance. This tool can copy the prepard data to NAND/SD/SPI through SD booting

Directory Name	Description
NandWriter	Please refer NandWriter User Guide.pdf under NandWriter\Doc folder for detail.
SDWriter	Please refer SDWriter User Guide.pdf under SDWriter\Doc folder for detail.
SPIWriter	Please refer SPIWriter User Guide.pdf under SPIWriter\Doc folder for detail.

3 Revision History

Version	Date	Description
1.00.000	May. 4, 2018	Initial release
1.00.001	Aug. 17, 2018	Minor update
1.01.000	Sep. 30, 2019	Added Eclipse IDE description
1.02.000	Sep. 15., 2020	Added Library_GCC folder.

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