# Risc-v 开发

Risc-v 开发实践

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#### 飞利信 MCU 芯片开发环境搭建

#### 1 选择目标机器

常规使用 Windows7 或者 Windows10 64 位操作系统。

内存4G以上, cpu i3以上。

#### 2 安装 JDK

安装 JDK 并设置相关环境变量。

#### 3 安装 libusbK

双击 libusbK-3.0.7.0-setup.exe, 进入安装程序界面



选择【WinUsb】, Next

Device Selection Connected your USB device and select it from the list or skip this step and enter the parameters manually on the following page.			
Show New De	vices 🔘 Show A	11 Device	
endor ID	Product ID	Description	Installed Driver
	There are	no items to show in t	his view.

选择【Show All Device】,选择【J-Link】,点击 Next

Configure the valid before	continuing.	
Vendor ID:	0x1366	
Product ID:	0x0105	
Manufacturer:	SEGGER	
Description:	J-Link	
Interface #		
Interface Guid:	{99DBDCEB-879D-F3D5-F1A1-8726C5205708}	
Class Name:	Universal Serial Bus devices	
Class Guid:	{88BAE032-5A81-49F0-BC3D-A4FF138216D6}	
r Managament O	-	



The drive this package.	<b>re Package</b> ar package is ready to be created. Choose whether to install tage now, save this package, or install and save this
🖲 Client Ins	tal 💿 Legacy Package 💿 Install On
Package Save	Information:
Base Folder:	C:\Vsers\Administrator\Documents\DriverPackages 🛛 📴 Select
Name:	J-Link
Package State	15.
[0	Click Next to create an end-user installer]

下一步



点击【Finish & Install Driver Now】



下一步

设备驱动程序安装向导	-	
	正在完成设备驱动和	呈序安装向导
	此计算机上成功地安装了此	驱动程序。
S Street Street	驱动程序名	状态
	✔Microsoft J-Link (	- 设备已更新
(上一步(8)) 完成 取消		

点击【完成】,完成安装。

J-Link 驱动安装完成,可在设备管理器下查看



#### 4 安装 cygwin

安装 64 位 cygwin, 成功后将其 bin 目录设置在环境变量 Path 中。

#### 5 设置工具链

将 windows 工具链文件放置在 C:\install 目录如下图,并将 C:\install\bin 加入环境变量 Path 中。

注意: C:\install\bin\cygusb-1.0.dll 不能删除, 删除调试无法运行。

靰机 ▶	本地磁盘 (C:) ▶ install ▶		
中 •	共享 ▼ 新建文件夹		
	名称	修改日期	类型
	鷆 bin	2017/9/8 11:34	文件夹
	퉬 include	2017/9/6 19:09	文件夹
	퉬 lib	2017/9/6 19:09	文件夹
	퉬 libexec	2017/9/6 19:09	文件夹
	🍌 riscv32-unknown-elf	2017/9/6 19:09	文件夹
	퉬 share	2017/9/6 19:09	文件夹
	🗾 bin	2017/9/7 11:49	应用程序

### 6 连接开发板

开发板通电, Jlink 连接电脑 usb 端口, 串口连接电脑 usb。



电脑第一次连接开发板时, j-Link 和 USB 转串口工具会首先连接到物理电脑,需要对虚拟机进行设置让 j-Link 和 USB 转串口工具连接到虚拟机内部,操作如下:

1) j-Link和USB转串口工具连接到物理电脑上时物理电脑显示未安装驱动,

如下图:

計算机管理		
文件(F) 操作(A) 查看(V) 帮	助(H)	
🗢 🔿 🔁 📰 🚺		
<ul> <li>□ 计算机管理(本地)</li> <li>■ ※ 系统工具</li> <li>□ 任务计划程序</li> <li>□ 任务计划程序</li> <li>□ ● 季件查看器</li> <li>□ ● 共享文件夹</li> <li>□ ● 本地用户和组</li> <li>▷ ⑩ 性能</li> <li>□ ○ 合偕</li> <li>□ ○ 存储</li> <li>□ ○ 磁告理</li> <li>▷ 副 新和应用程序</li> </ul>	<ul> <li>WIN-CVG3EBAA4CH</li> <li>□ IDE ATA/ATAPI 控制器</li> <li>□ 处理器</li> <li>○ 磁惠驱动器</li> <li>○ 磁馬</li> <li>○ 端 端口 (COM 和 LPT)</li> <li>○ 號 法</li> <li>○ 號 法</li> <li>○ 號 出</li> <li>○ 號 出</li> <li>○ 號 出</li> <li>○ 號 出</li> <li>○ ○ 號 出</li> <li>○ ○ 號 出</li> <li>○ ○ 號 USB2.0-Serial</li> <li>○ ○ 號 出</li> <li>○ ○ 該 局标和其他指针设备</li> <li>○ ○ 通 田串行总线控制器</li> <li>○ ○ 週 田串行总线控制器</li> </ul>	

2) 此时, VMware 软件右下角图标颜色显示为灰色, 状态为未连接 j-Link

和USB转串口工具,如下图:



3) 右键单击该图标显示如下,点击"连接"选项, j-Link 和 USB 转串口 工具将会连接到虚拟机内部,如下图:



4) 连接到虚拟机内部之后虚拟机系统设备管理器显示驱动安装正常,虚拟

机右下角图标变为彩色,显示 j-Link 和 USB 转串口工具连接状态正常。

✤ 计算机管理			
文件(F) 操作(A) 查看(V)	帮助(H)		
🗢 🔿 🖄 🖬 📓 🖬	19		
🎥 计算机管理(本地)	RISCV-PC	操作	
▲ ѝ 系统工具	▷ 🤮 DVD/CD-ROM 驱动器	设备管理器	·
▷ (型) 任务计划程序	▷ · □ IDE ATA/ATAPI 控制器	更多操作	•
▶ 201 ●14三百歳	Universal Serial Bus devices		
▶ ● 本地用户和组	▶ · ■ 处理器		
▷ 🔕 性能	□ 磁曲驱动器		
🛁 设备管理器	▶ ◆ 存储控制器		
4 🔄 存储	● 邊 电池		
1 記名の今日日の			
	·····································		
	▶ 1 监视器		
	> - □ 键盘		
	▶ 4篇 人体学输入设备		
	- ● 四次行動器		
	医小鼻 系统设备		
	- 🎭 显示适配器		
			(43%) * OK/s
		сн 🗲 🕐 🗄	k k k ↔ k k 15:12 k k k ↔ k k k 15:12 2017/9/18
			mont of mo

## 7 安装软件并新建工程

1. 双击安装包,安装软件。



2 新建裸板程序工程, File > new > C Project

C Project	
C Project Create C project of selected type	
Project name: bsp	
☑ Use default location	
Location: E:\workspace\bsp	Browse
Project type:	Toolchains:
<ul> <li>Riscv Project</li> <li>MCU BaseBoard Makefile Proj</li> <li>MCU FreeRTOS Makefile Proj</li> <li>Executable</li> <li>Shared Library</li> <li>Static Library</li> <li>Makefile project</li> </ul>	Cygwin RISCV GCC
Show project types and toolchains only	if they are supported on the platform

C Project	the set that the	
Basic Settings Basic properties c	f a project	
Author	riscv	
Copyright notice	riscv	
?	< Back Next > Finish	Cancel

C Project		
Select Configur	r <b>ations</b> ns and configurations you wish to deploy on	
Project type: Toolchains: Configurations	Makefile project Cygwin RISCV GCC	
🔽 🛞 Default	E	Select all Deselect all
		Advanced settings
Use "Advanced Additional con Use "Manage	d settings" button to edit project's properties figurations can be added after project creati configurations" buttons either on toolbar or	on. on property pages.
?	< Back Next > Fini	sh Cancel



#### 8 调试配置

- 1. 编译项目,产生 helloworld. elf
- 2. Run > Debug Configurations...

Debug Configurations	Endowedda 1	×
Create, manage, and run cont	figurations	Ť
Filter matched 6 of 6 items	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 'Perspectives' preference page.	
0	Debug	Close

3. 双击 Riscv Remote Application 新建一个调试实例。

Create, manage, and run configuration (Openocd): pulpino.cfg not spec	ations fied
Image: Second system         Image: Second system <th>Name:       bsp Default            Main          Mither Arguments          Source          Openocd          C/C++       Application:          helloworld.elf           Project           Browse          Project:          bsp           Browse           Browse           E          Build (if required) before launching           Build configuration: Select Automatically           o           Disable auto build          Image: Enable auto build           O Disable auto build           O Disable auto build</th>	Name:       bsp Default            Main          Mither Arguments          Source          Openocd          C/C++       Application:          helloworld.elf           Project           Browse          Project:          bsp           Browse           Browse           E          Build (if required) before launching           Build configuration: Select Automatically           o           Disable auto build          Image: Enable auto build           O Disable auto build           O Disable auto build
< ☐ III ► Filter matched 7 of 8 items	Apply Revert
?	Debug Close

4. 配置 Openocd 的配置文件路径

P Debug Configurations	ations
Image, and run configure         type filter text         C C/C++ Application         C C/C++ Attach to Application         C C/C++ Postmortem Debuş         C C/C++ Remote Application         ▶ Launch Group         ▲ Biscv Remote Application         ▲ bsp Default	Name: bsp Default          Main @= Arguments        Source Openocd         ocd File:       C:\install\share\openocd\scripts\target\pulpino.cfg
<ul> <li>✓ Ⅲ →</li> <li>Filter matched 7 of 8 items</li> </ul>	Apply Revert
?	Debug Close

5. 配置源码映射(Linux 版不需要)

Debug Configurations				
Create, manage, and run configurations				
type filter text C C/C++ Application C C/C++ Attach to Appl C C/C++ Postmortem C C/C++ Remote Appl Launch Group A → Riscv Remote Applic bsp Default	plicatio Debug lication ation	Name: bsp Default Main (M= Arguments Source Lookup Path:	Openocd Add Edit Remove Up Down Restore Def	ault
<	•	Search for duplicate source files or	a the path	
Filter matched 7 of 8 items			Debug Clos	e
Create, manage, and run co (Main): Program does not	<b>nfigurati</b> t exist	ions	, T	×
type filter text	1	Name: bsp Default	<b>.</b>	
C/C++ Application	Add So	Imain WF Arguments Source	Jpenoca	x
C C/C++ Attach to A C C/C++ Postmorte C C/C++ Remote Ar Launch Group		ntainer to the source lookup path lute path to a file in the local file system.		
<ul> <li>A arrow Remote App</li> <li>A bsp Default</li> </ul>	<ul> <li>♣ Absol</li> <li>♀ Comp</li> <li>➢ File Sy</li> <li>➢ Path N</li> <li>座 Progr</li> <li>➢ Project</li> <li>♀ Project</li> </ul>	ute File Path vilation Directory (stem Directory Mapping am Relative File Path ct ct - Path Relative to Source Folders space		
< III Filter matched 7 of 8 item	🗁 Work 🏱 Work	space Folder		

eate m	R Add Source	🖉 Path Mappings		
	Add a container to th A path mapping.	Specify the mapping paths		11.
ype filter	Absolute File Path	Name: New Mapping		
	🗁 File System Directo	Compilation path:	Local file system path:	Add
C C/	Path Mapping		E:\	Remove
C C/	Program Relative Project			Un
	🛱 Project - Path Rela			
	<b>₩orkspace</b>			Down
	Bookspace Folder			
	?		m	Þ
L				
		0	ОК	Cancel
lter matcl	hed 7 of 8 items		при почен	
?)			Debug Close	10

# 6. 设置 Launching 选项

# Window > Perfermence > Run/Debug > Launching

type filter text	Launching 🗇 🔹 🖒 👻		
<ul> <li>General</li> <li>C/C++</li> <li>Help</li> <li>Install/Update</li> <li>Mylyn</li> <li>Run/Debug         <ul> <li>Console</li> <li>External Tools</li> <li>Launching</li> <li>Perspectives</li> <li>String Substitution</li> <li>View Management</li> <li>View Performance</li> </ul> </li> <li>Team</li> </ul>	Save required dirty editors before launching		
	Wait for ongoing build to complete before launching		
	Launch in debug mode when workspace contains breakpoints O Always Never Prompt		
	Continue launch if project contains errors Always      Prompt		
	General Options           Image: Build (if required) before launching           Image: Remove terminated launches when a new launch is created           Image: Prompt for confirmation when removing a configuration from the launch history		
	Size of recently launched applications list: 10		
	Launch Operation <ul> <li>Always launch the previously launched application</li> <li>Launch the selected resource or active editor. If not launchable:</li> <li>Launch the associated project</li> <li>Launch the previously launched application</li> </ul>		
	Restore Defaults Apply		
0	Restore Defaults App		

9 调试

1. 启动设置串口调试工具(串口号,波特率),可在资源管理器中查看串口

号,波特率目前设置为115200



•	串口调试助手	(C∎精装版	♥3.7.2)		2 ×
<ul> <li>串口设置</li> <li>串口号 COM4 ▼</li> <li>波特率 115200 ▼</li> <li>校验位 NONE ▼</li> <li>数据位 8 ▼</li> <li>停止位 1 ▼</li> <li>後收区设置</li> <li>接收转向文件</li> <li>自动换行显示</li> <li>十六进制显示</li> </ul>	串口数据接收				
▲ 留停接收亚小 《保存数据 清除显示 《发送区设置 《 启用文件数据源 … 「 自动发送附加位 「 发送完自动清空 「 按十六进制发送 「 数据流循环发送 发送间隔 1000 毫秒	http://www.cmsoft.	cn			
文件载入 清除输入					发送
」 ₫ 就绪!		发j	<u>美</u> :0	接收:0	复位计数

2. Debug Configurations 界面点击 Debug 按钮, 启动调试



Debug - bsp/apps/helloworld/helloworld.c - RISCV Design Studio				
Eile Edit Source Refactor Navigate Se <u>a</u> rch Project <u>R</u> un <u>W</u> indow <u>H</u> elp				
🔁 🕶 🗄 🕒 📓 🔌 🗈 🗉 🖷 🖗 🗵 😁 🗟 👘 🤯 🔅	• O • G • B B A • M 2 • B • C • O • O •			
	Quick Access 😰   🗟 C/C++ 🔯 Debug			
🎋 Debug 🛛 🦌 🙀 🖬 🖬 🖓 🖓 🗖	(x)= Variables 🛛 💁 Breakpoints 🟥 Registers 🛋 Modules 🛛 🗖			
🔺 🧬 Thread [1] (Suspended: Signal '0' received. Description: 0 🔺	15 🕫 🖂 🖉 🛪 🖗 📑 😭 ▽			
= 1 main() helloworld.c:18 0x00000404	Name Value			
📕 riscv32-unknown-elf-gdb (17/9/8 下午8:43) 👻				
le helloworld.c ⊠ c reset_handler()	🗖 🗖 📴 Outline 🖾 👘 🗖			
17 {	▲ 🕼 🗗 🖓 🖉 ♦ 🗰 🗠			
<pre>&gt; 18 printf("Hello World, %d!!!!!\n", y); 19</pre>	📱 spi.h 🔺			
20 while(1);	🔄 🚆 pulpino.h 📃			
21 return 0;	👻 💾 stdio.h			
	► <b>y</b> :int			
🗳 Console 🛛 🧔 Tasks 🖹 Problems 🕡 Executables 📋 Memory	🔳 🗶 🔆 📑 📰 🛄 🖫 🖳 🖉 🖉 🖛 🗇 🗸 🗆			
bsp Default [Riscv Remote Application] riscv32-unknown-elf-gdb (17/9/8 7	5年8:43)			
<pre>Reading symbols from E:\workspace\bsp\helloworld.elfdone. warning: Can not parse XML target description; XML support war 0x00000464 in illegal_insn_handler_c () at libs/bench_lib/src; 144 insn = *((unsigned int*)(exception_address));</pre>	<pre>s disabled at compile time</pre>			
Program stopped. main () at apps/helloworld/helloworld.c:18 18 printf("Hello World, %d!!!!!\n", y);				
4	*			