Widora How-To

by zymxjtu

用Eclipse开发OpenWrt C/C++程序 交叉编译 远程调试

1 版权

这个 How-To 指引是基于 J.Kohler 的 OpenWrt C/C++ Devopement with Eclipse 的工作成果。 更新和增添了一些内容，以及Widora相关和独有的一些内容。

2 版本历史

版本	日期	作者	更改记录
v0.1	6 Aug 2016	zymxjtu	第一版

3 介绍

使用Eclipse IDE, 我们可以有一个很方便和舒适的为OpenWrt目标设备做开发的开发环境， Eclipse提供了一套完整的开发套件。

使用交叉编译，我们可以不必受制于OpenWrt设备的资源限制；使用远程调试，可以很方便的设置断点，调试程序。

这篇文档解释了怎样使用Eclipse C/C++ IDE与OpenWrt的交叉编译工具链；怎样设置Eclipse做远程目标设备代码级别的调试和远程操控。

这里展示了怎样为OpenWrt目标设备编写代码，编译，还有调试程序，我们可以使用Eclipse为OpenWrt目标设备开发软件。

4 准备工作

4.1 准备工作

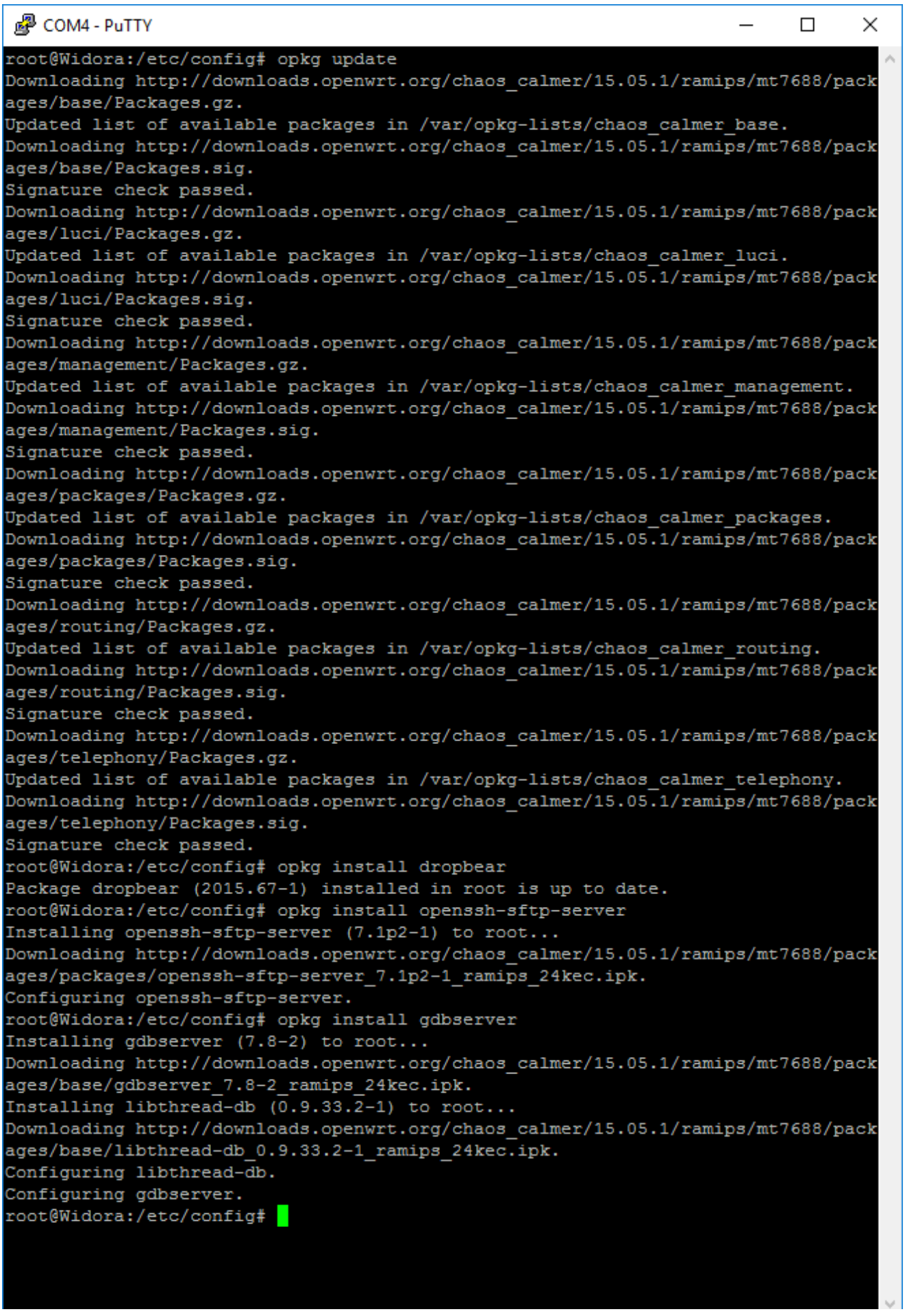
4.1.1 目标设备准备工作

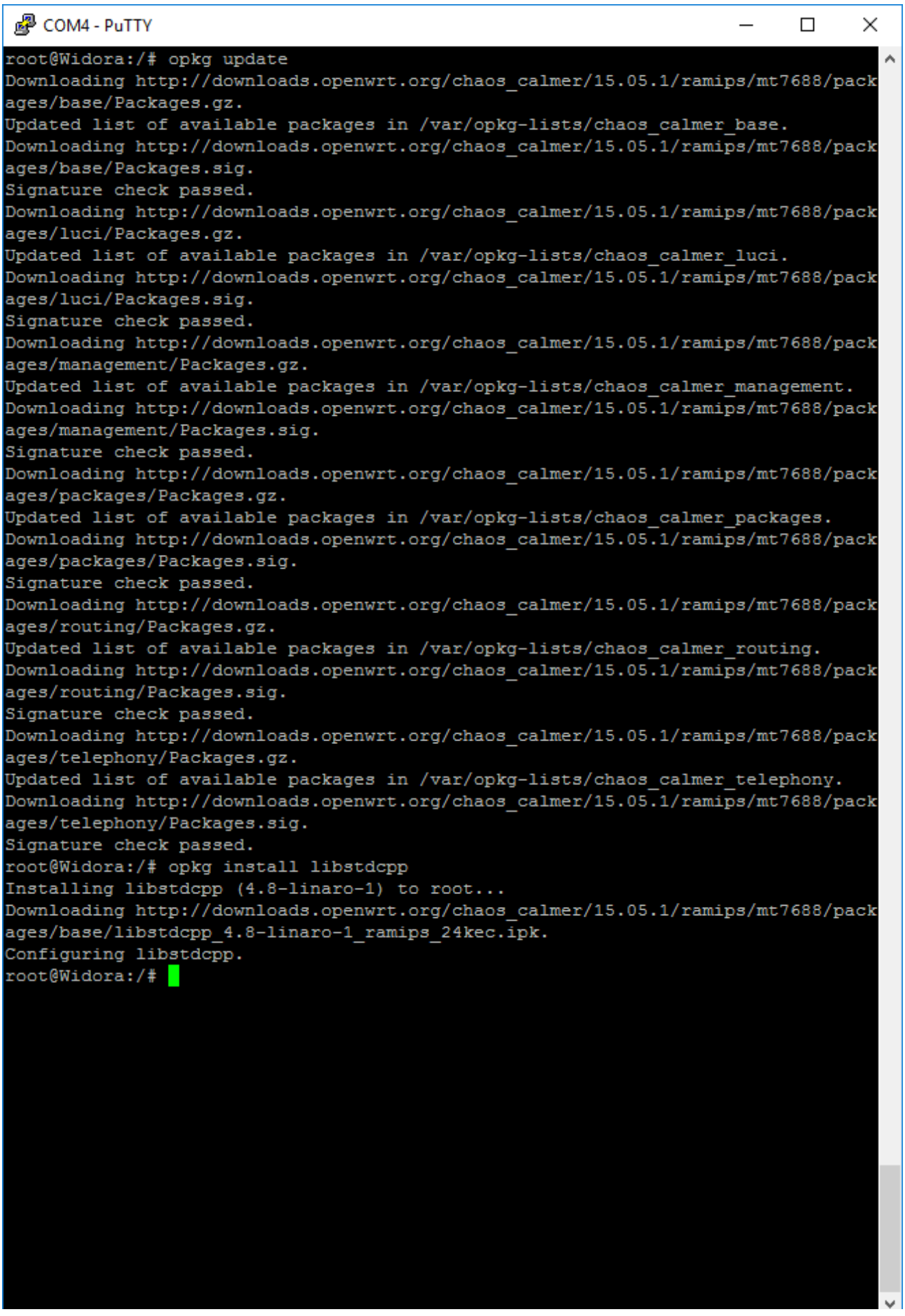
下面列出了目标设备需要的软件包:

1. 安装有DropBear 或者 OpenSSH，可以用SSH连接到设备
2. openssh-sftp-server
3. gdbserver
4. libstdcpp (可选，做C++开发需要)

openssh-sftp-server 和 gdbserver 都可以提前编译到OpenWrt的固件里，当然如果没有预装，我们可以简单的通过下面方法安装:

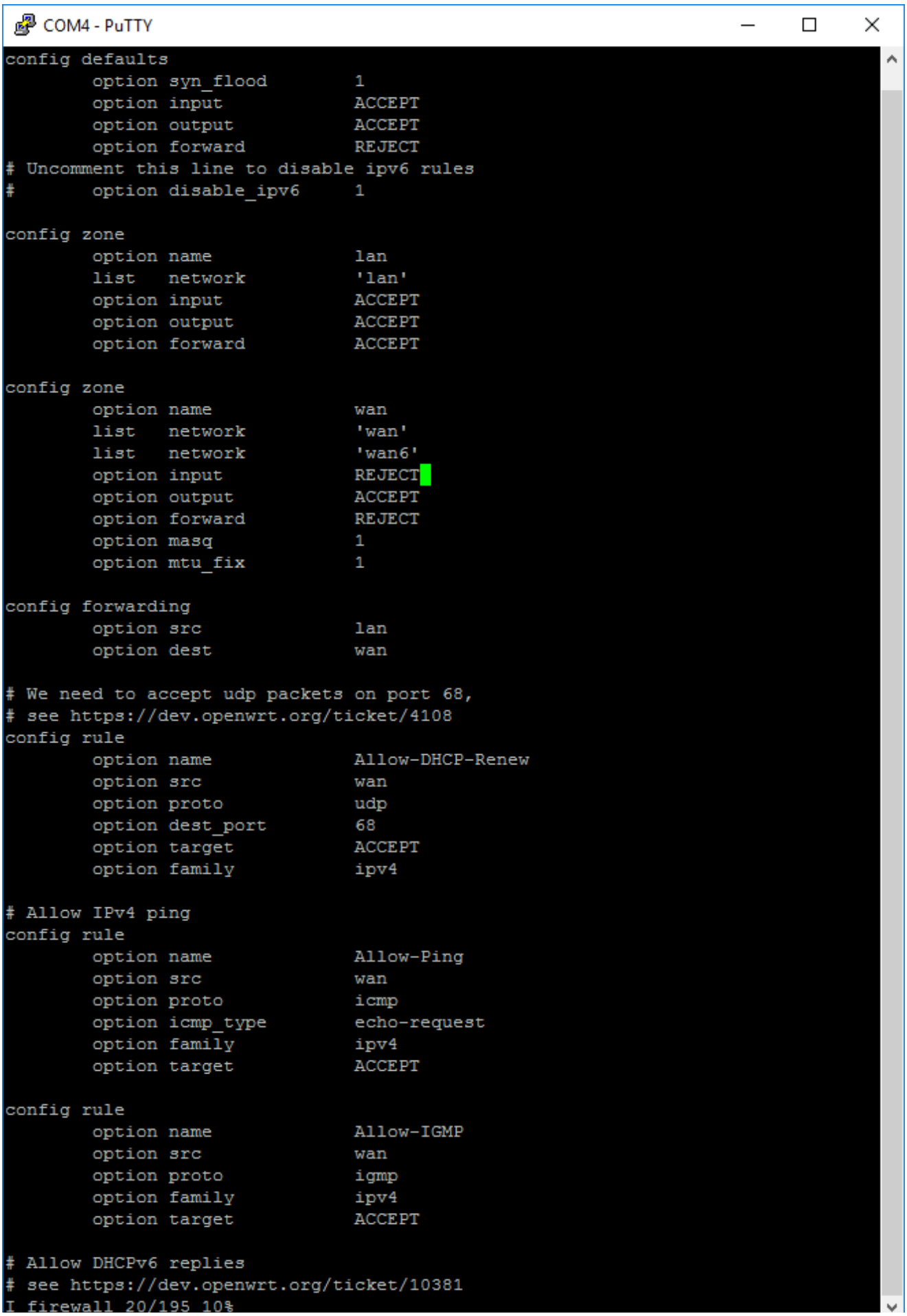
1. SSH 到 OpenWRT. (对于Widora，我们也可以通过板载串口终端，详细信息看使用指南`"Widora_用户指南_1_开始之前"`)
2. 运行 `opkg update` 然后 `opkg install libstdcpp`
3. 运行 `opkg update` 然后 `opkg install openssh-sftp-server`
4. 运行 `opkg install gdbserver` 安装 gdbserver。


COM4 - PuTTY
root@Widora:/etc/config# opkg update
Downloading http://downloads.openwrt.org/chaos_calmer/15.05.1/ramips/mt7688/packages/base/Packages.gz.
Updated list of available packages in /var/opkg-lists/chaos_calmer_base.
Downloading http://downloads.openwrt.org/chaos_calmer/15.05.1/ramips/mt7688/packages/base/Packages.sig.
Signature check passed.
Downloading http://downloads.openwrt.org/chaos_calmer/15.05.1/ramips/mt7688/packages/luci/Packages.gz.
Updated list of available packages in /var/opkg-lists/chaos_calmer_luci.
Downloading http://downloads.openwrt.org/chaos_calmer/15.05.1/ramips/mt7688/packages/luci/Packages.sig.
Signature check passed.
Downloading http://downloads.openwrt.org/chaos_calmer/15.05.1/ramips/mt7688/packages/management/Packages.gz.
Updated list of available packages in /var/opkg-lists/chaos_calmer_management.
Downloading http://downloads.openwrt.org/chaos_calmer/15.05.1/ramips/mt7688/packages/management/Packages.sig.
Signature check passed.
Downloading http://downloads.openwrt.org/chaos_calmer/15.05.1/ramips/mt7688/packages/packages/Packages.gz.
Updated list of available packages in /var/opkg-lists/chaos_calmer_packages.
Downloading http://downloads.openwrt.org/chaos_calmer/15.05.1/ramips/mt7688/packages/packages/Packages.sig.
Signature check passed.
Downloading http://downloads.openwrt.org/chaos_calmer/15.05.1/ramips/mt7688/packages/routing/Packages.gz.
Updated list of available packages in /var/opkg-lists/chaos_calmer_routing.
Downloading http://downloads.openwrt.org/chaos_calmer/15.05.1/ramips/mt7688/packages/routing/Packages.sig.
Signature check passed.
Downloading http://downloads.openwrt.org/chaos_calmer/15.05.1/ramips/mt7688/packages/telephony/Packages.gz.
Updated list of available packages in /var/opkg-lists/chaos_calmer_telephony.
Downloading http://downloads.openwrt.org/chaos_calmer/15.05.1/ramips/mt7688/packages/telephony/Packages.sig.
Signature check passed.
root@Widora:/etc/config# opkg install dropbear
Package dropbear (2015.67-1) installed in root is up to date.
root@Widora:/etc/config# opkg install openssh-sftp-server
Installing openssh-sftp-server (7.1p2-1) to root...
Downloading http://downloads.openwrt.org/chaos_calmer/15.05.1/ramips/mt7688/packages/packages/openssh-sftp-server_7.1p2-1_ramips_24kec.ipk.
Configuring openssh-sftp-server.
root@Widora:/etc/config# opkg install gdbserver
Installing gdbserver (7.8-2) to root...
Downloading http://downloads.openwrt.org/chaos_calmer/15.05.1/ramips/mt7688/packages/base/gdbserver_7.8-2_ramips_24kec.ipk.
Installing libthread-db (0.9.33.2-1) to root...
Downloading http://downloads.openwrt.org/chaos_calmer/15.05.1/ramips/mt7688/packages/base/libthread-db_0.9.33.2-1_ramips_24kec.ipk.
Configuring libthread-db.
Configuring gdbserver.
root@Widora:/etc/config#

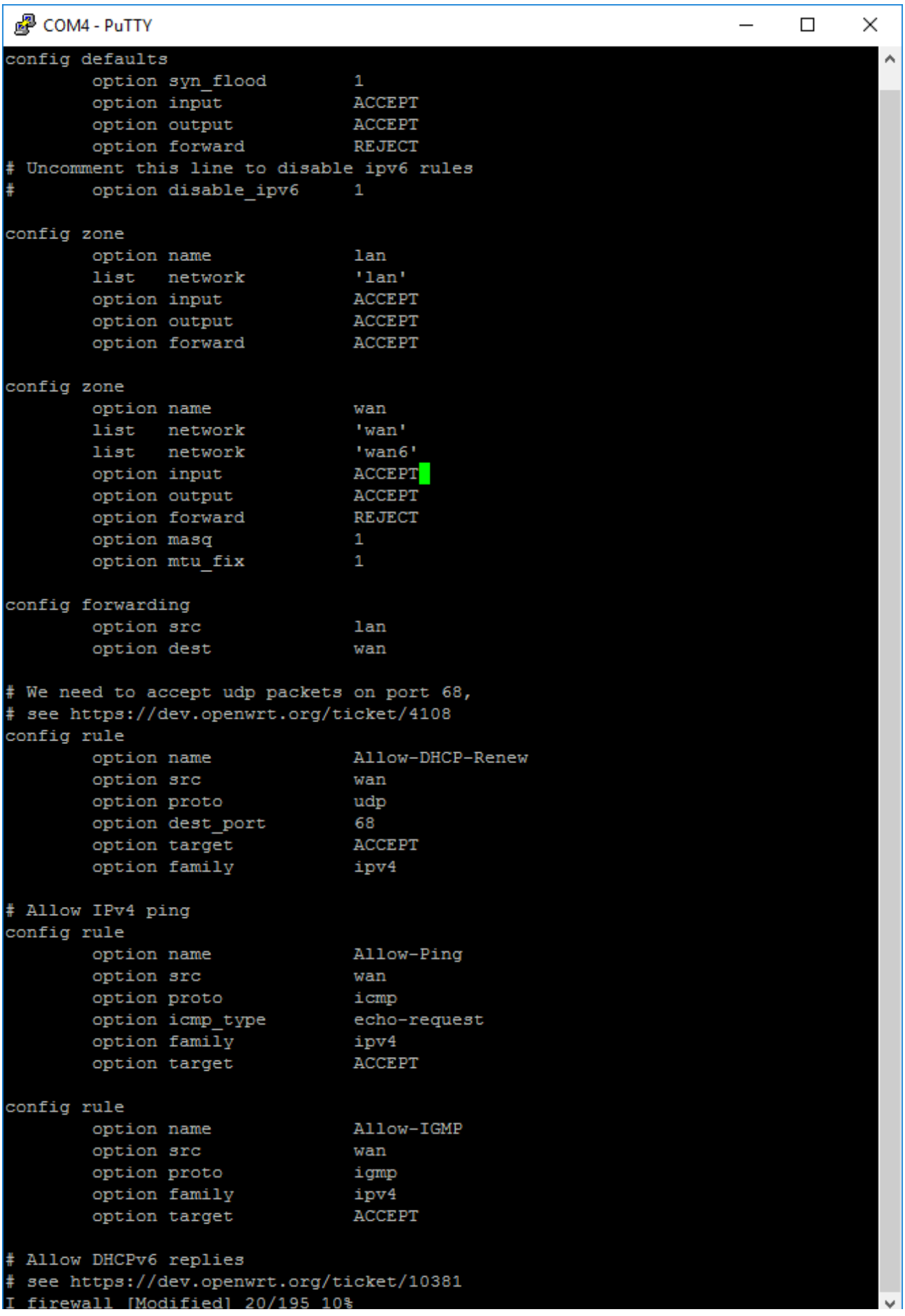

COM4 - PuTTY
root@Widora:/# opkg update
Downloading http://downloads.openwrt.org/chaos_calmer/15.05.1/ramips/mt7688/packages/base/Packages.gz.
Updated list of available packages in /var/opkg-lists/chaos_calmer_base.
Downloading http://downloads.openwrt.org/chaos_calmer/15.05.1/ramips/mt7688/packages/base/Packages.sig.
Signature check passed.
Downloading http://downloads.openwrt.org/chaos_calmer/15.05.1/ramips/mt7688/packages/luci/Packages.gz.
Updated list of available packages in /var/opkg-lists/chaos_calmer_luci.
Downloading http://downloads.openwrt.org/chaos_calmer/15.05.1/ramips/mt7688/packages/luci/Packages.sig.
Signature check passed.
Downloading http://downloads.openwrt.org/chaos_calmer/15.05.1/ramips/mt7688/packages/management/Packages.gz.
Updated list of available packages in /var/opkg-lists/chaos_calmer_management.
Downloading http://downloads.openwrt.org/chaos_calmer/15.05.1/ramips/mt7688/packages/management/Packages.sig.
Signature check passed.
Downloading http://downloads.openwrt.org/chaos_calmer/15.05.1/ramips/mt7688/packages/packages/Packages.gz.
Updated list of available packages in /var/opkg-lists/chaos_calmer_packages.
Downloading http://downloads.openwrt.org/chaos_calmer/15.05.1/ramips/mt7688/packages/packages/Packages.sig.
Signature check passed.
Downloading http://downloads.openwrt.org/chaos_calmer/15.05.1/ramips/mt7688/packages/routing/Packages.gz.
Updated list of available packages in /var/opkg-lists/chaos_calmer_routing.
Downloading http://downloads.openwrt.org/chaos_calmer/15.05.1/ramips/mt7688/packages/routing/Packages.sig.
Signature check passed.
Downloading http://downloads.openwrt.org/chaos_calmer/15.05.1/ramips/mt7688/packages/telephony/Packages.gz.
Updated list of available packages in /var/opkg-lists/chaos_calmer_telephony.
Downloading http://downloads.openwrt.org/chaos_calmer/15.05.1/ramips/mt7688/packages/telephony/Packages.sig.
Signature check passed.
root@Widora:/# opkg install libstdcpp
Installing libstdcpp (4.8-linaro-1) to root...
Downloading http://downloads.openwrt.org/chaos_calmer/15.05.1/ramips/mt7688/packages/base/libstdcpp_4.8-linaro-1_ramips_24kec.ipk.
Configuring libstdcpp.
root@Widora:/#

对于Widora，如果Widora是连去一个路由器，然后开发电脑也是连接到同一个路由器，而不是直接连接到Widora，那么想要SSH访问Widora，我们需要更改Widora的防火墙设置。更改Widora防火墙的配置文件`/etc/config/firewall`，更改 config zone wan, option input 设置为 `ACCEPT`, 而不是默认的 `REJECT`, 保存改动之后，重启Widora:

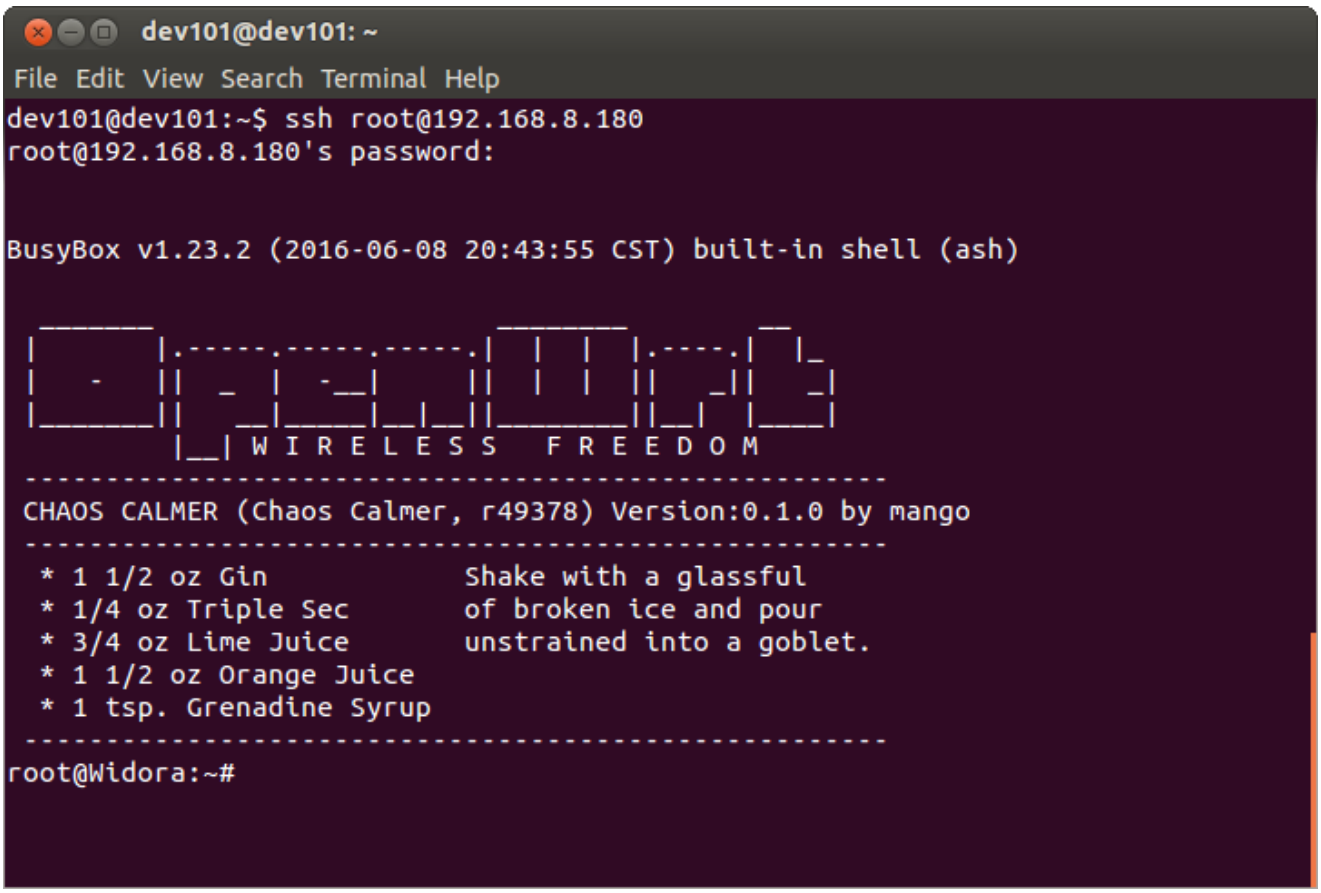
默认:


COM4 - PuTTY
config defaults
option syn_flood 1
option input ACCEPT
option output ACCEPT
option forward REJECT
Uncomment this line to disable ipv6 rules
option disable_ipv6 1
config zone
option name lan
list network 'lan'
option input ACCEPT
option output ACCEPT
option forward ACCEPT
config zone
option name wan
list network 'wan'
list network 'wan6'
option input REJECT
option output ACCEPT
option forward REJECT
option masq 1
option mtu_fix 1
config forwarding
option src lan
option dest wan
We need to accept udp packets on port 68,
see https://dev.openwrt.org/ticket/4108
config rule
option name Allow-DHCP-Renew
option src wan
option proto udp
option dest_port 68
option target ACCEPT
option family ipv4
Allow IPv4 ping
config rule
option name Allow-Ping
option src wan
option proto icmp
option icmp_type echo-request
option family ipv4
option target ACCEPT
config rule
option name Allow-IGMP
option src wan
option proto igmp
option family ipv4
option target ACCEPT
Allow DHCPv6 replies
see https://dev.openwrt.org/ticket/10381
I firewall 20/195 10%

更改之后:


COM4 - PuTTY
config defaults
option syn_flood 1
option input ACCEPT
option output ACCEPT
option forward REJECT
Uncomment this line to disable ipv6 rules
option disable_ipv6 1
config zone
option name lan
list network 'lan'
option input ACCEPT
option output ACCEPT
option forward ACCEPT
config zone
option name wan
list network 'wan'
list network 'wan6'
option input ACCEPT
option output ACCEPT
option forward REJECT
option masq 1
option mtu_fix 1
config forwarding
option src lan
option dest wan
We need to accept udp packets on port 68,
see https://dev.openwrt.org/ticket/4108
config rule
option name Allow-DHCP-Renew
option src wan
option proto udp
option dest_port 68
option target ACCEPT
option family ipv4
Allow IPv4 ping
config rule
option name Allow-Ping
option src wan
option proto icmp
option icmp_type echo-request
option family ipv4
option target ACCEPT
config rule
option name Allow-IGMP
option src wan
option proto igmp
option family ipv4
option target ACCEPT
Allow DHCPv6 replies
see https://dev.openwrt.org/ticket/10381
I firewall [Modified] 20/195 10%

然后远程SSH测试下可不可以SSH连到Widora （这里路由器为Widora分配的地址是192.168.8.180，你的环境分配的IP地址可能不同）：



4.1.2 OpenWRT 准备工作

准备 OpenWrt Buildroot 开发环境:

遵照“Widora-NEO开源硬件用户手册V04.pdf”。

以下连接供参考：
https://github.com/widora/openwrt_widora

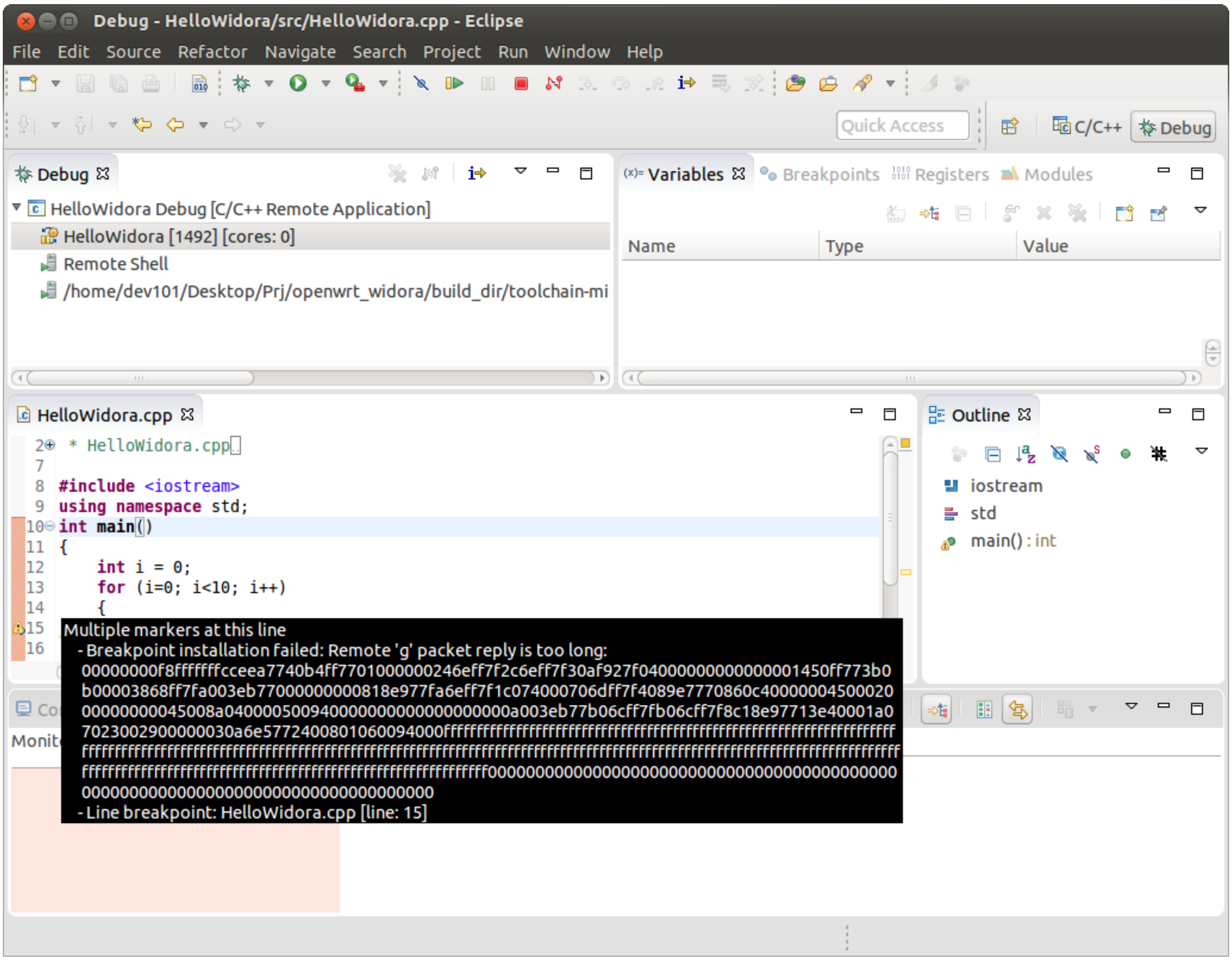
http://wiki.openwrt.org/doc/howto/buildroot.exigence

对于Widora使用的OpenWrt Chaos Calmer版本，gdb存在一个问题，详细的信息可以参考下面链接：

https://dev.openwrt.org/ticket/22360

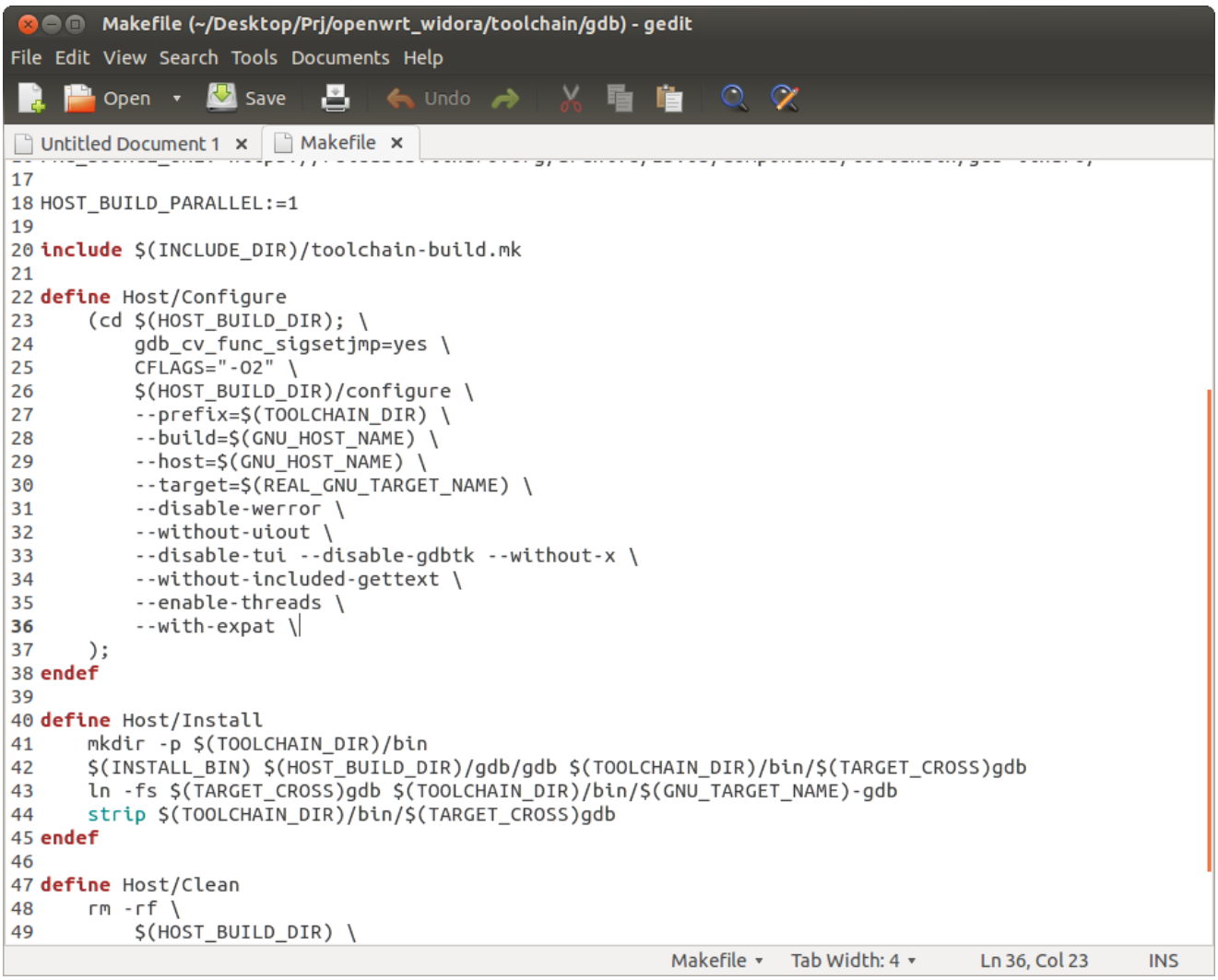
https://dev.openwrt.org/changeset/46298/trunk/toolchain/gdb

这个问题之后在我们调试程序的时候可能会导致如下问题:



所以对于Widora，这里需要对源码的一个地方做一点改动。

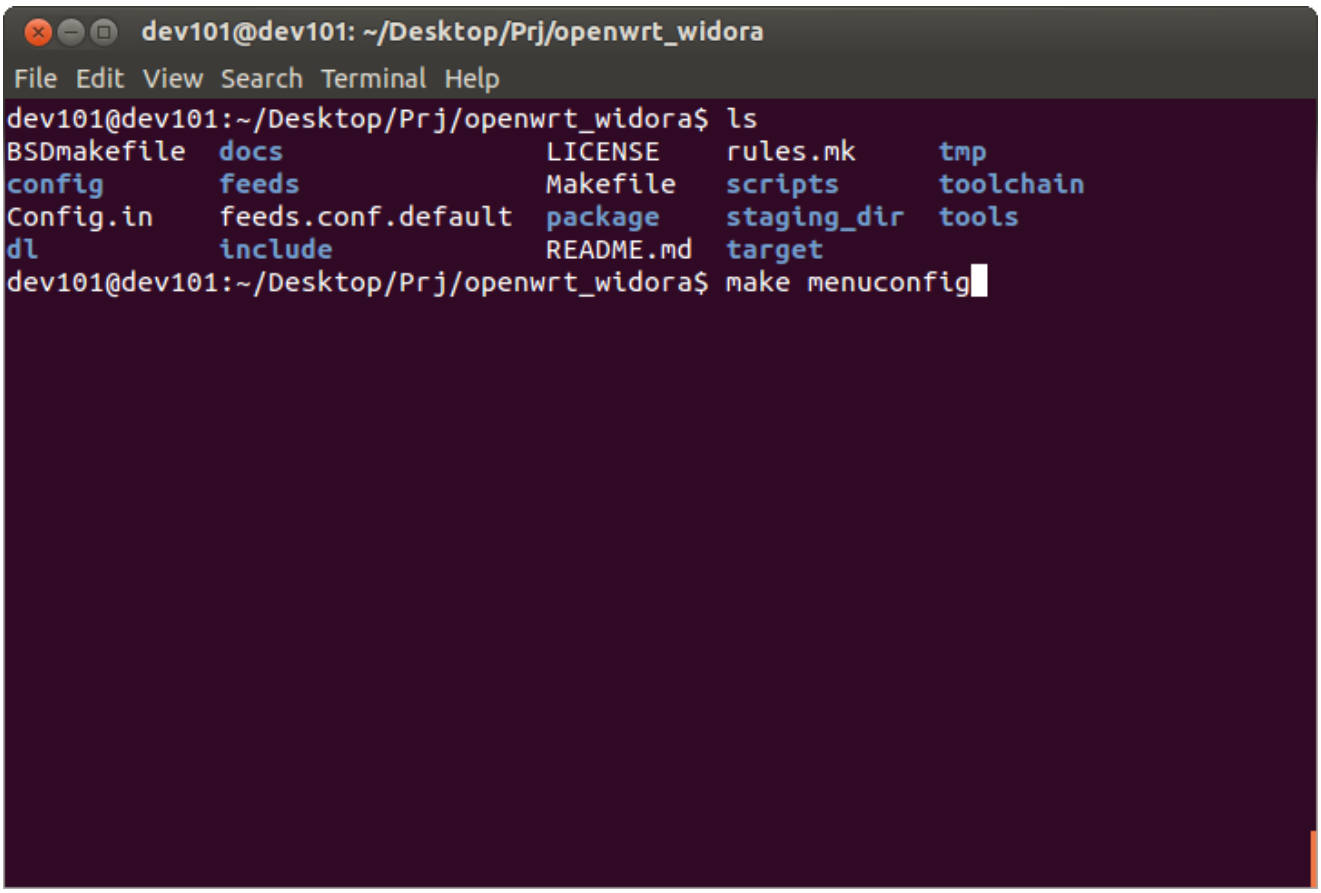
`{Widora源码目录}/toolchain/gdb/Makefile` (如下图所示加入一行 "--with-expat \"):



之后我们还需要安装依赖库"libexpat1-dev":

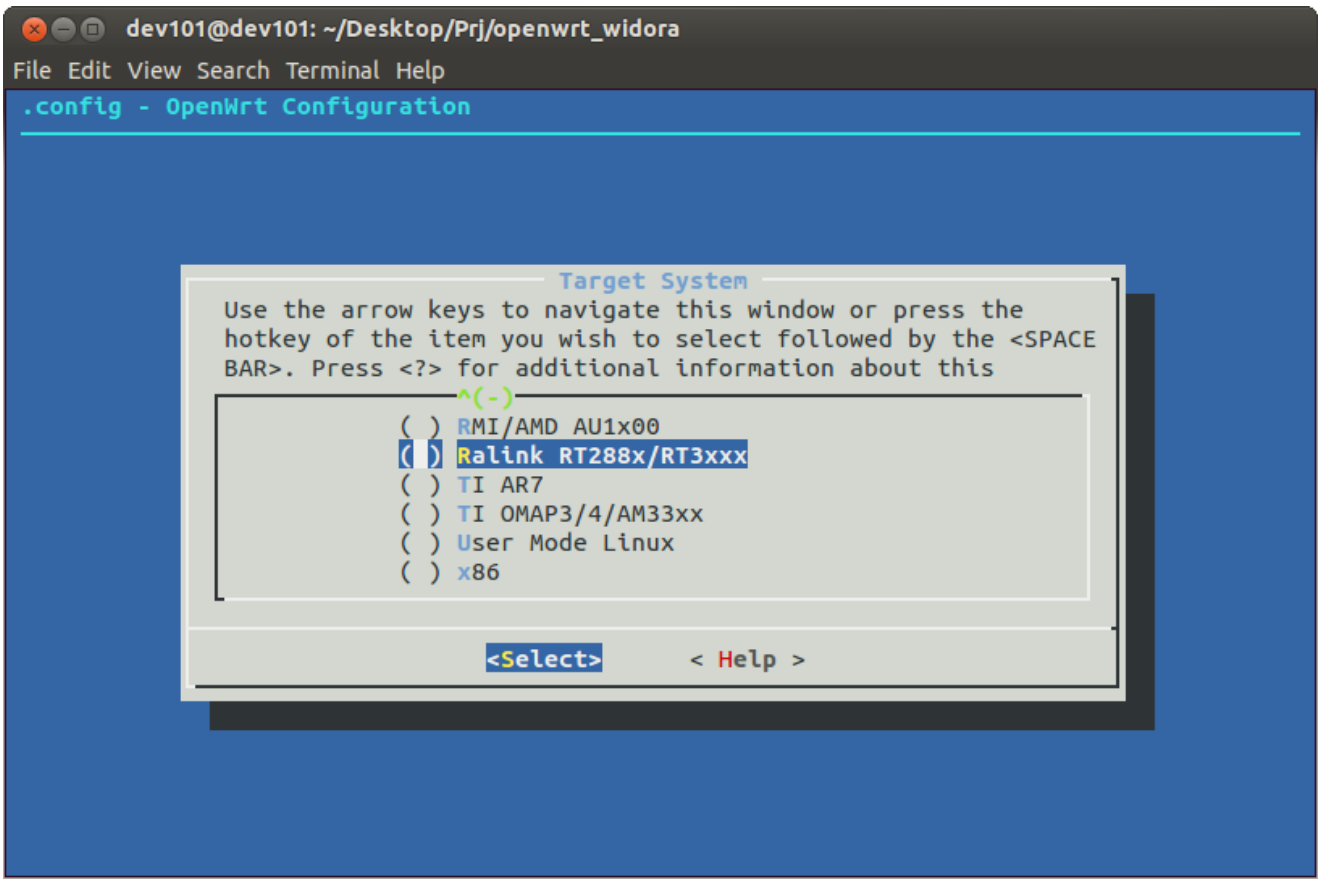
```
sudo apt-get install libexpat1-dev
```

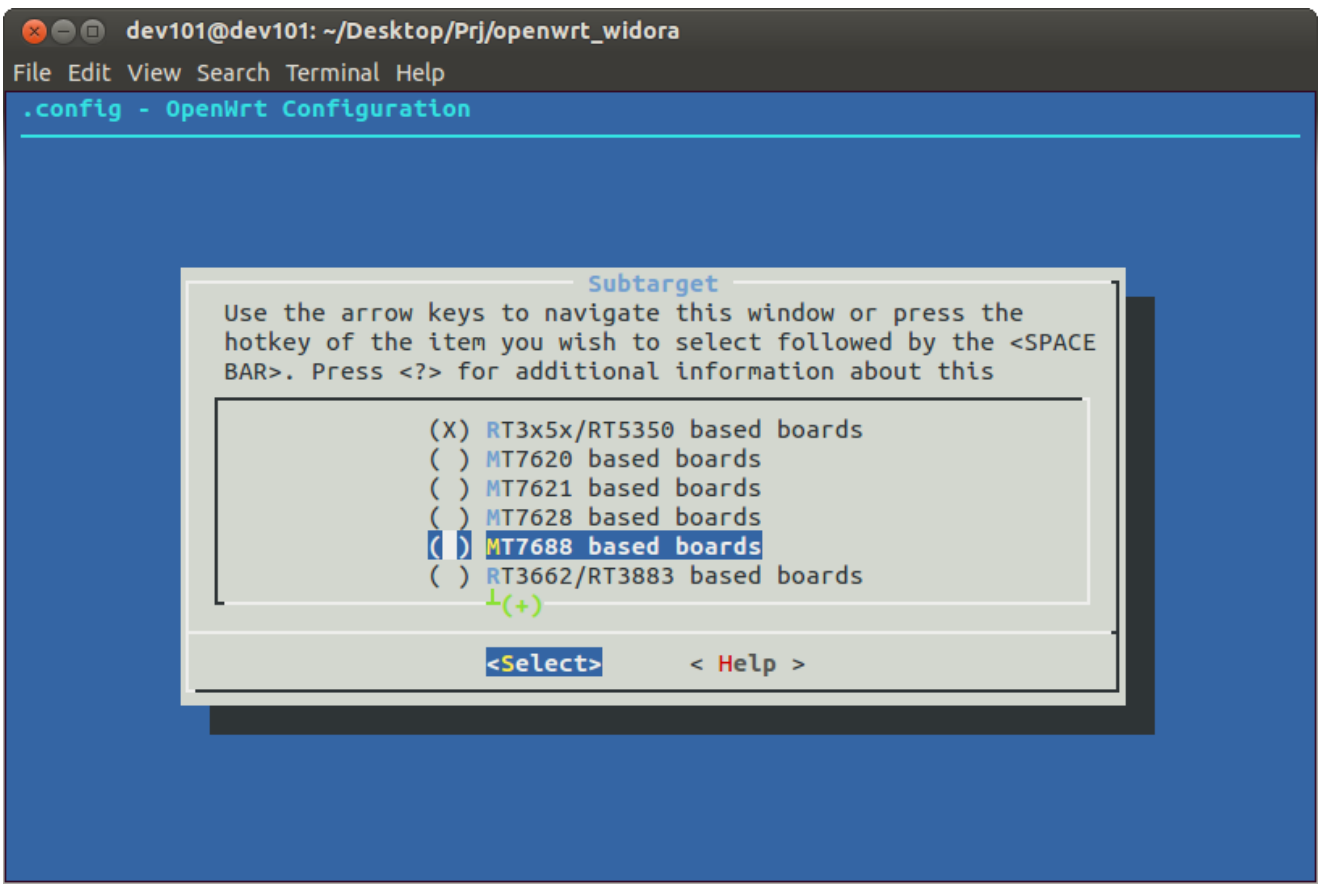
在Terminal里面cd到Widora源码的根目录，然后执行 “make menuconfig”:

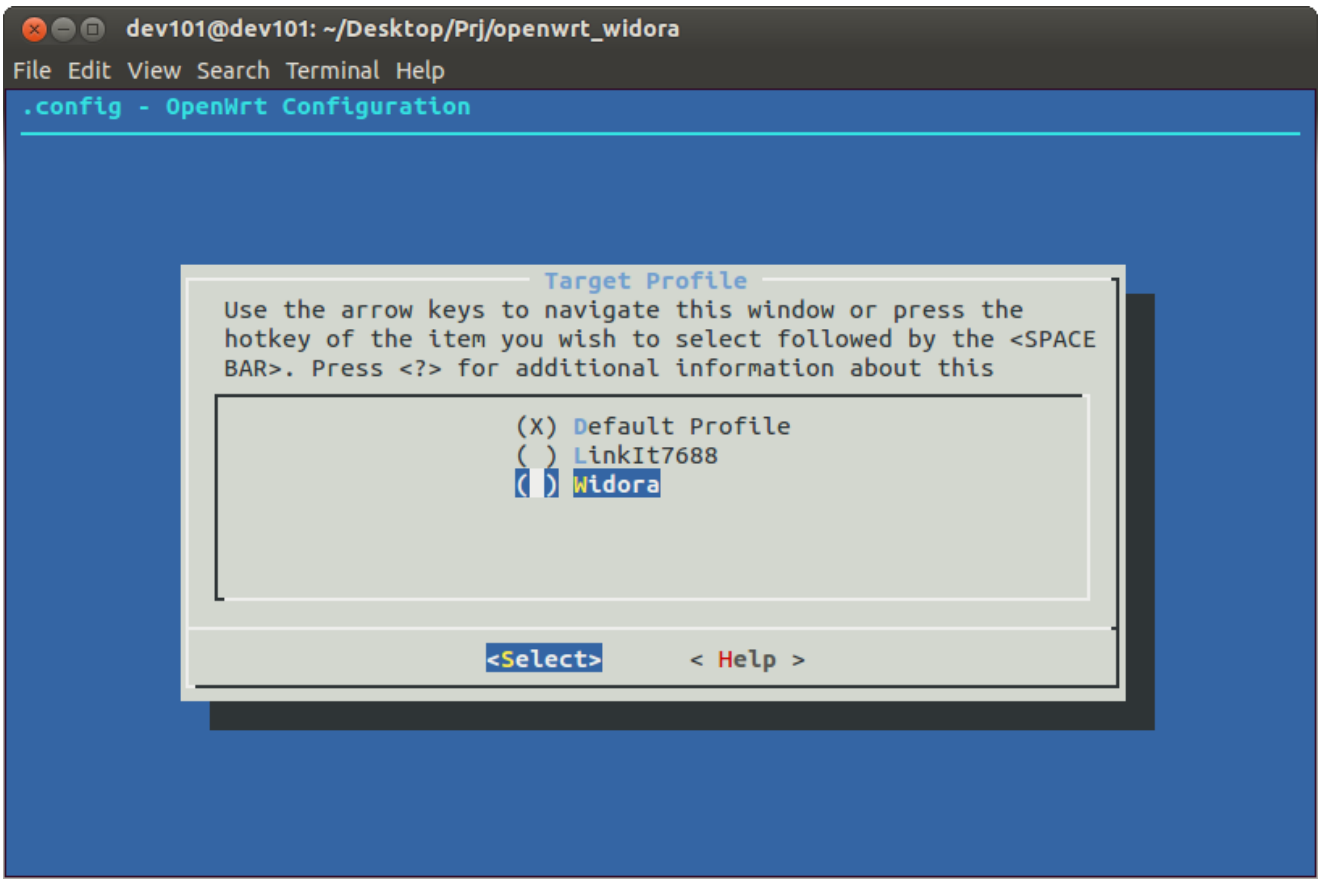


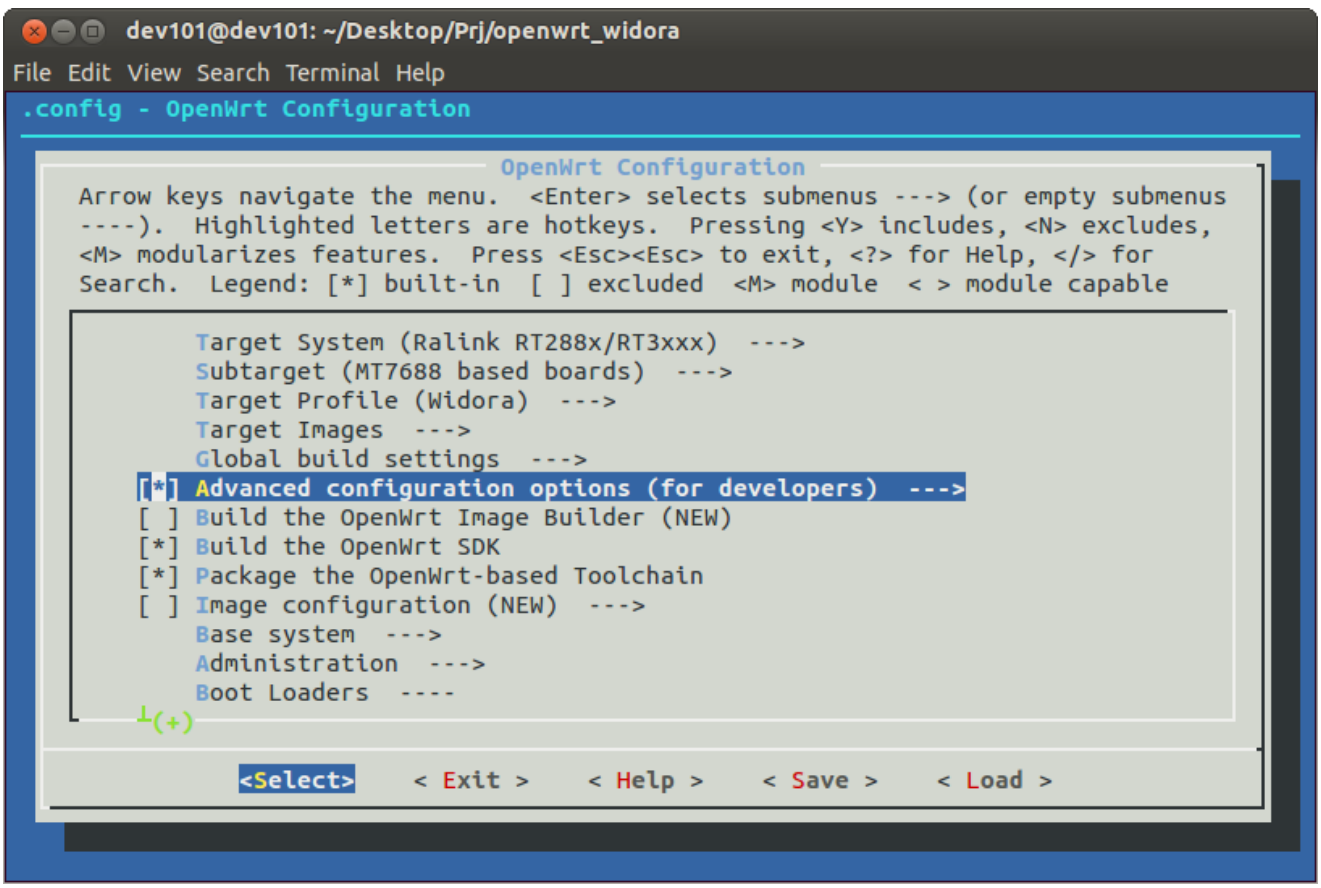
然后:

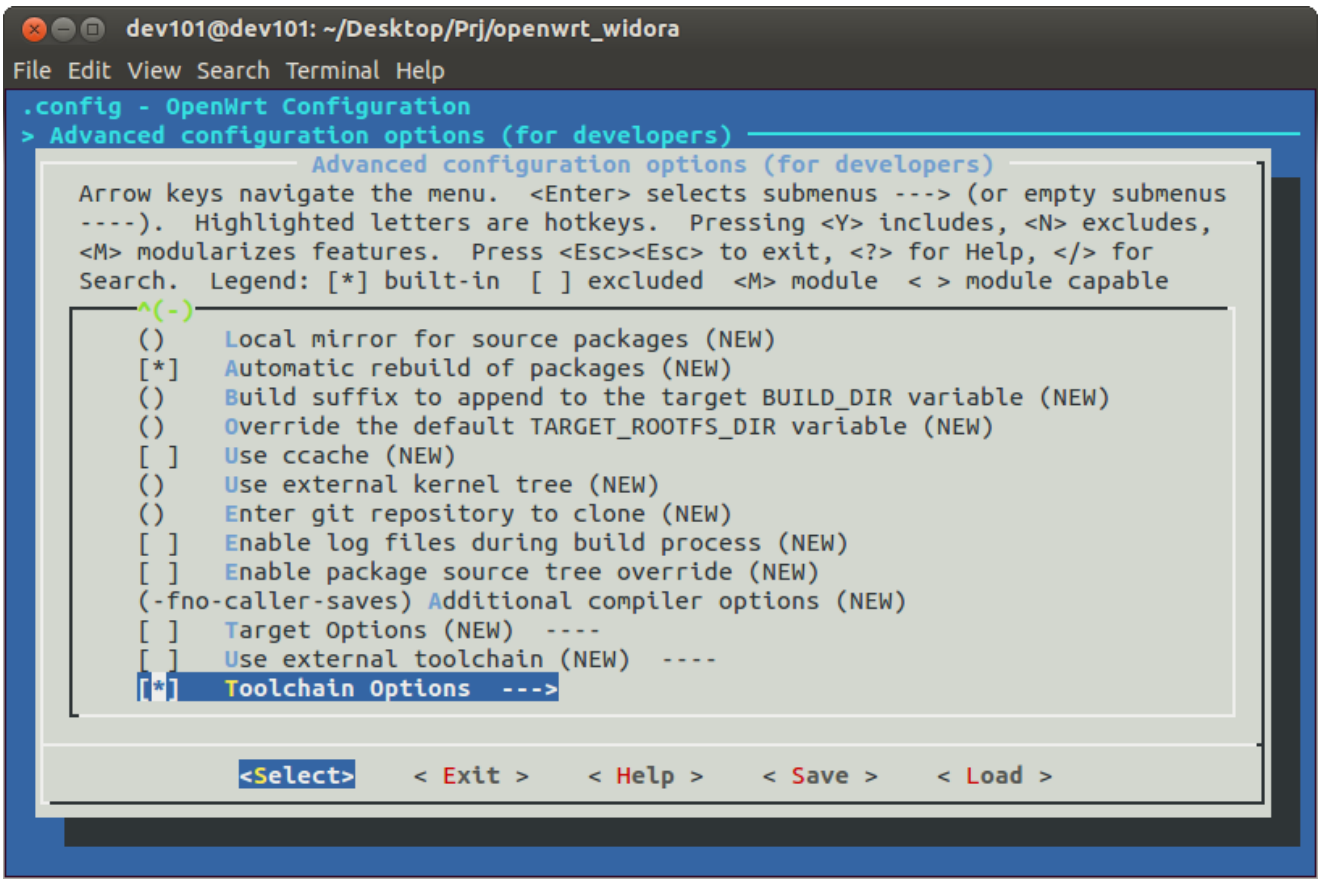
1. 设置Widora的 "Target System", "Subtarget", "Target Profile".
2. 选择 [*] Build the OpenWrt SDK
3. 选择 [*] Package the OpenWrt-based Toolchain
4. 选择 [*] Advanced configuration options (for developers) ---> Enable [*] Toolchain Options ---> Enable [*] Build gdb
5. 保存设置.

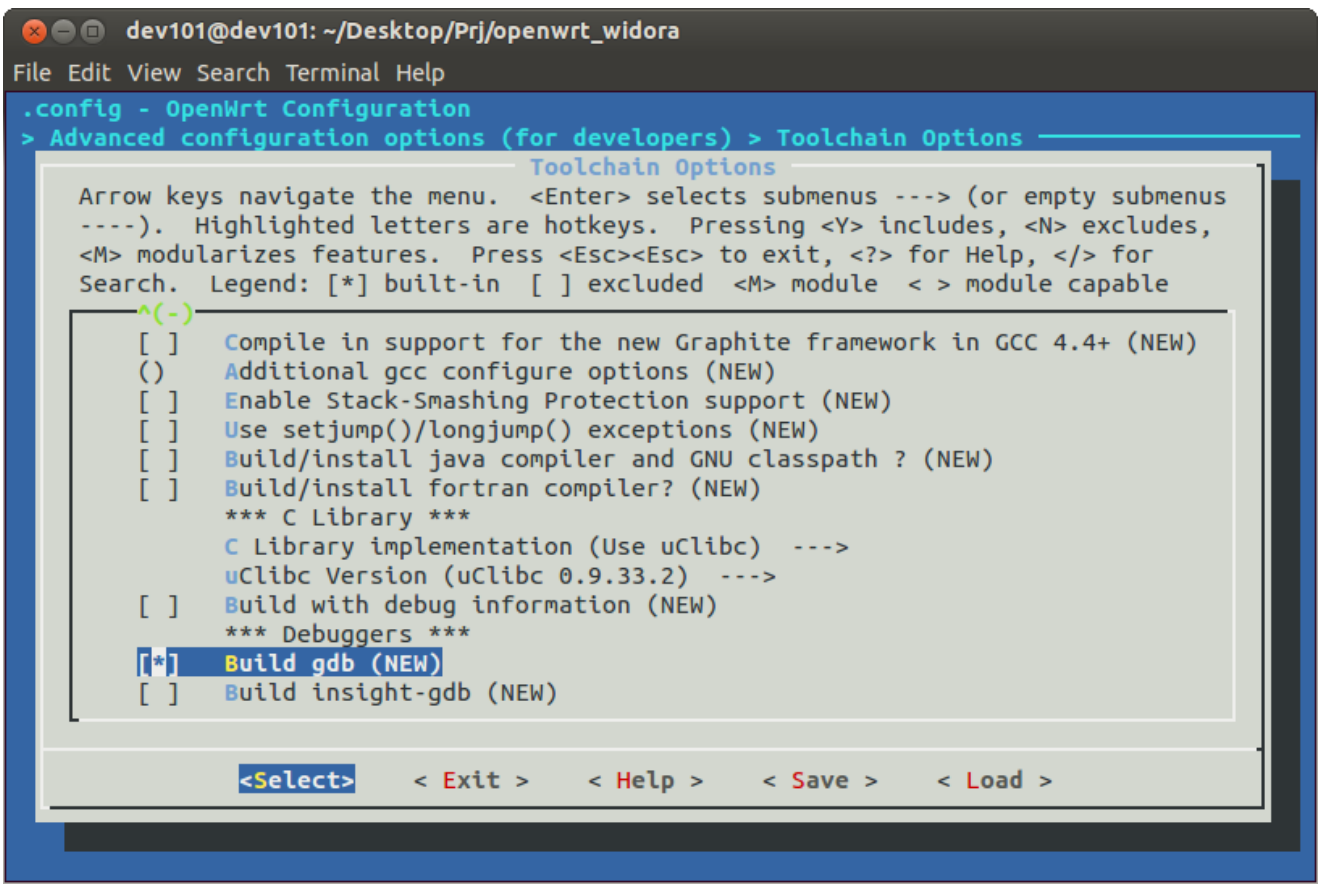

dev101@dev101: ~/Desktop/Prj/openwrt_widora
File Edit View Search Terminal Help
.config - OpenWrt Configuration
Target System
Use the arrow keys to navigate this window or press the
hotkey of the item you wish to select followed by the <SPACE
BAR>. Press <?> for additional information about this
^(-)
( ) RMI/AMD AU1x00
( ) Ralink RT288x/RT3xxx
( ) TI AR7
( ) TI OMAP3/4/AM33xx
( ) User Mode Linux
( ) x86
<Select>
< Help >

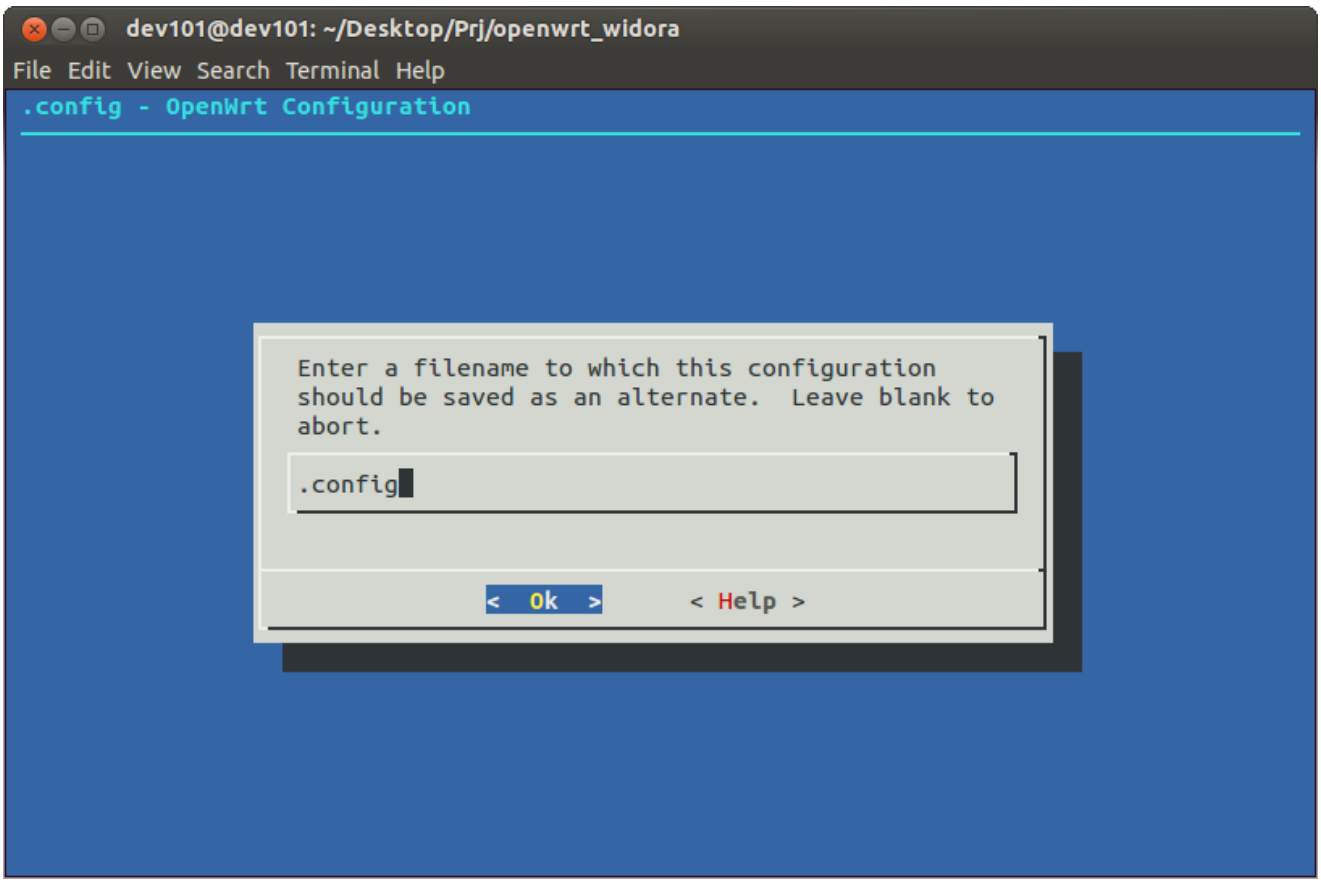

dev101@dev101: ~/Desktop/Prj/openwrt_widora
File Edit View Search Terminal Help
.config - OpenWrt Configuration
Subtarget
Use the arrow keys to navigate this window or press the
hotkey of the item you wish to select followed by the <SPACE
BAR>. Press <?> for additional information about this
(X) RT3x5x/RT5350 based boards
( ) MT7620 based boards
( ) MT7621 based boards
( ) MT7628 based boards
( ) MT7688 based boards
( ) RT3662/RT3883 based boards
v(+)
<Select>
< Help >


dev101@dev101: ~/Desktop/Prj/openwrt_widora
File Edit View Search Terminal Help
.config - OpenWrt Configuration
Target Profile
Use the arrow keys to navigate this window or press the
hotkey of the item you wish to select followed by the <SPACE
BAR>. Press <?> for additional information about this
(X) Default Profile
( ) LinkIt7688
( ) Widora
<Select>
< Help >

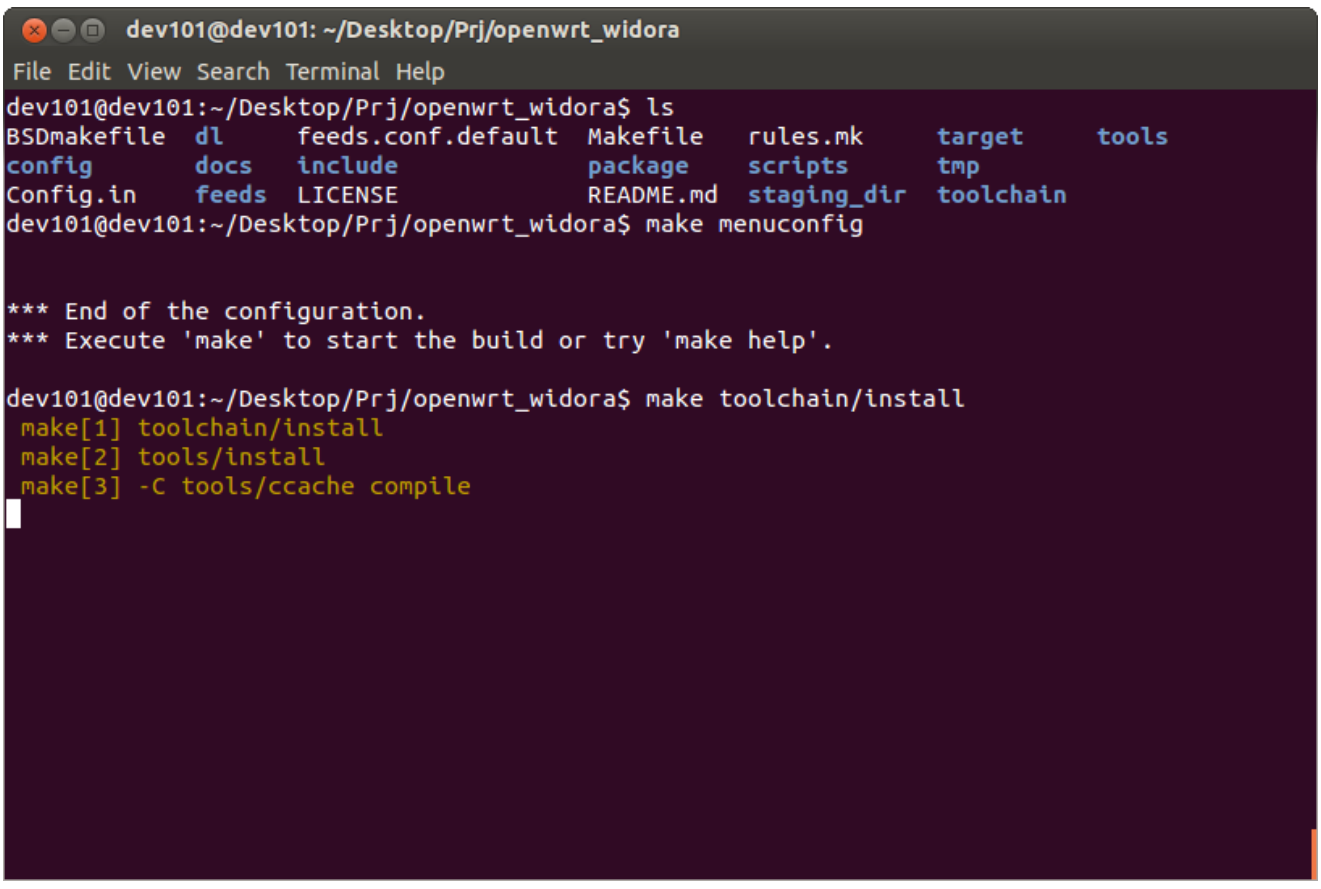

dev101@dev101: ~/Desktop/Prj/openwrt_widora
File Edit View Search Terminal Help
.config - OpenWrt Configuration
OpenWrt Configuration
Arrow keys navigate the menu. <Enter> selects submenus ---> (or empty submenus
----). Highlighted letters are hotkeys. Pressing <Y> includes, <N> excludes,
<M> modularizes features. Press <Esc><Esc> to exit, <?> for Help, </> for
Search. Legend: [*] built-in [ ] excluded <M> module < > module capable
Target System (Ralink RT288x/RT3xxx) --->
Subtarget (MT7688 based boards) --->
Target Profile (Widora) --->
Target Images --->
Global build settings --->
[*] Advanced configuration options (for developers) --->
[ ] Build the OpenWrt Image Builder (NEW)
[*] Build the OpenWrt SDK
[*] Package the OpenWrt-based Toolchain
[ ] Image configuration (NEW) --->
Base system --->
Administration --->
Boot Loaders ----
<Select>
< Exit >
< Help >
< Save >
< Load >

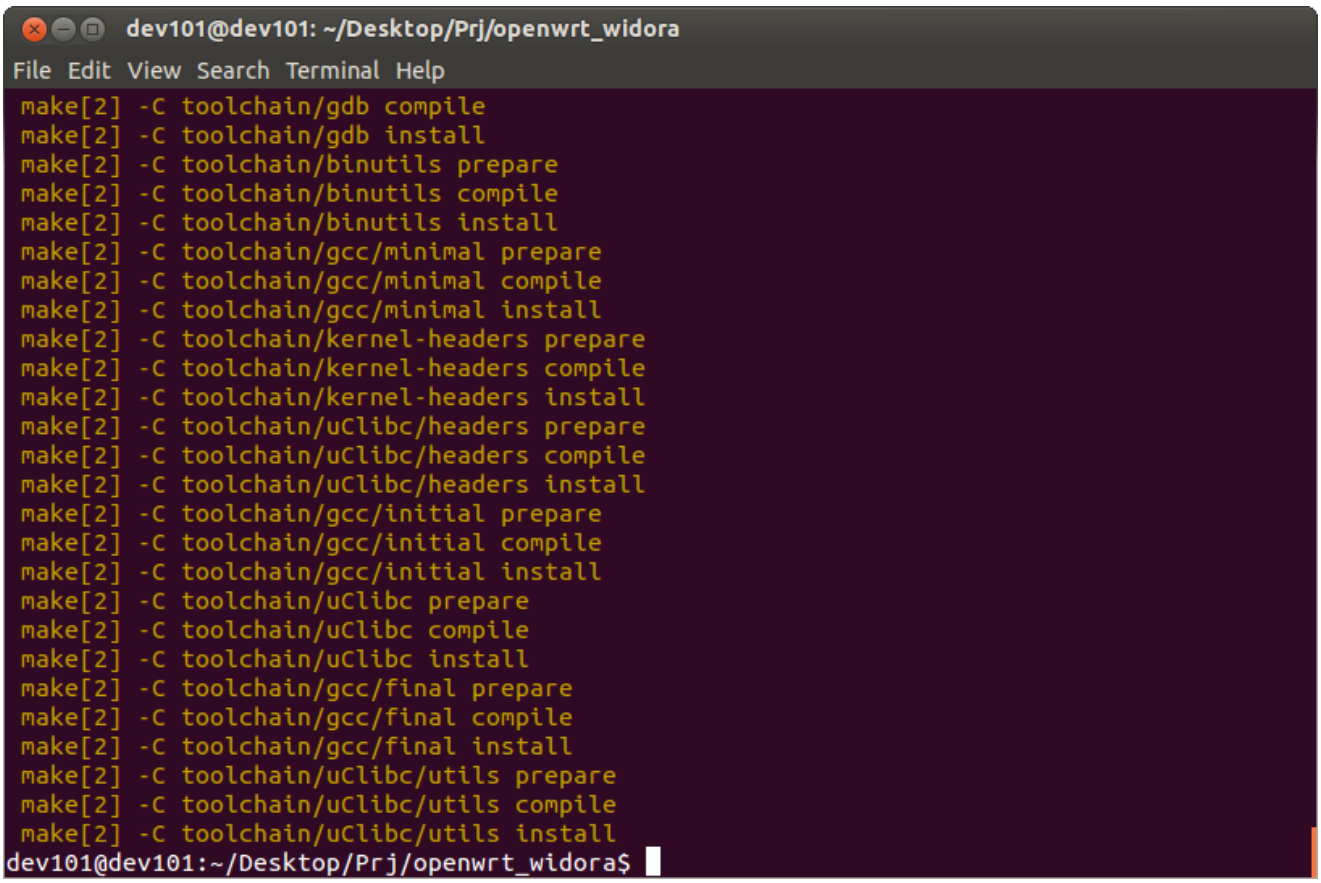

dev101@dev101: ~/Desktop/Prj/openwrt_widora
File Edit View Search Terminal Help
.config - OpenWrt Configuration
> Advanced configuration options (for developers)
Advanced configuration options (for developers)
Arrow keys navigate the menu. <Enter> selects submenus ---> (or empty submenus ----). Highlighted letters are hotkeys. Pressing <Y> includes, <N> excludes, <M> modularizes features. Press <Esc><Esc> to exit, <?> for Help, </> for Search. Legend: [*] built-in [ ] excluded <M> module < > module capable
^(-)
() Local mirror for source packages (NEW)
[*] Automatic rebuild of packages (NEW)
() Build suffix to append to the target BUILD_DIR variable (NEW)
() Override the default TARGET_ROOTFS_DIR variable (NEW)
[ ] Use ccache (NEW)
() Use external kernel tree (NEW)
() Enter git repository to clone (NEW)
[ ] Enable log files during build process (NEW)
[ ] Enable package source tree override (NEW)
(-fno-caller-saves) Additional compiler options (NEW)
[ ] Target Options (NEW) ----
[ ] Use external toolchain (NEW) ----
[*] Toolchain Options --->
<Select> < Exit > < Help > < Save > < Load >


dev101@dev101: ~/Desktop/Prj/openwrt_widora
File Edit View Search Terminal Help
.config - OpenWrt Configuration
> Advanced configuration options (for developers) > Toolchain Options
Toolchain Options
Arrow keys navigate the menu. <Enter> selects submenus ---> (or empty submenus ----). Highlighted letters are hotkeys. Pressing <Y> includes, <N> excludes, <M> modularizes features. Press <Esc><Esc> to exit, <?> for Help, </> for Search. Legend: [*] built-in [ ] excluded <M> module < > module capable
^(-)
[ ] Compile in support for the new Graphite framework in GCC 4.4+ (NEW)
() Additional gcc configure options (NEW)
[ ] Enable Stack-Smashing Protection support (NEW)
[ ] Use setjump()/longjump() exceptions (NEW)
[ ] Build/install java compiler and GNU classpath ? (NEW)
[ ] Build/install fortran compiler? (NEW)
*** C Library ***
C Library implementation (Use uClibc) --->
uClibc Version (uClibc 0.9.33.2) --->
[ ] Build with debug information (NEW)
*** Debuggers ***
[*] Build gdb (NEW)
[ ] Build insight-gdb (NEW)
<Select> < Exit > < Help > < Save > < Load >



执行 “make toolchain/install” . 这一步的目的是准备我们之后需要用到的交叉编译工具链还有程序调试所需要的gdb.





4.1.3 Eclipse 准备工作

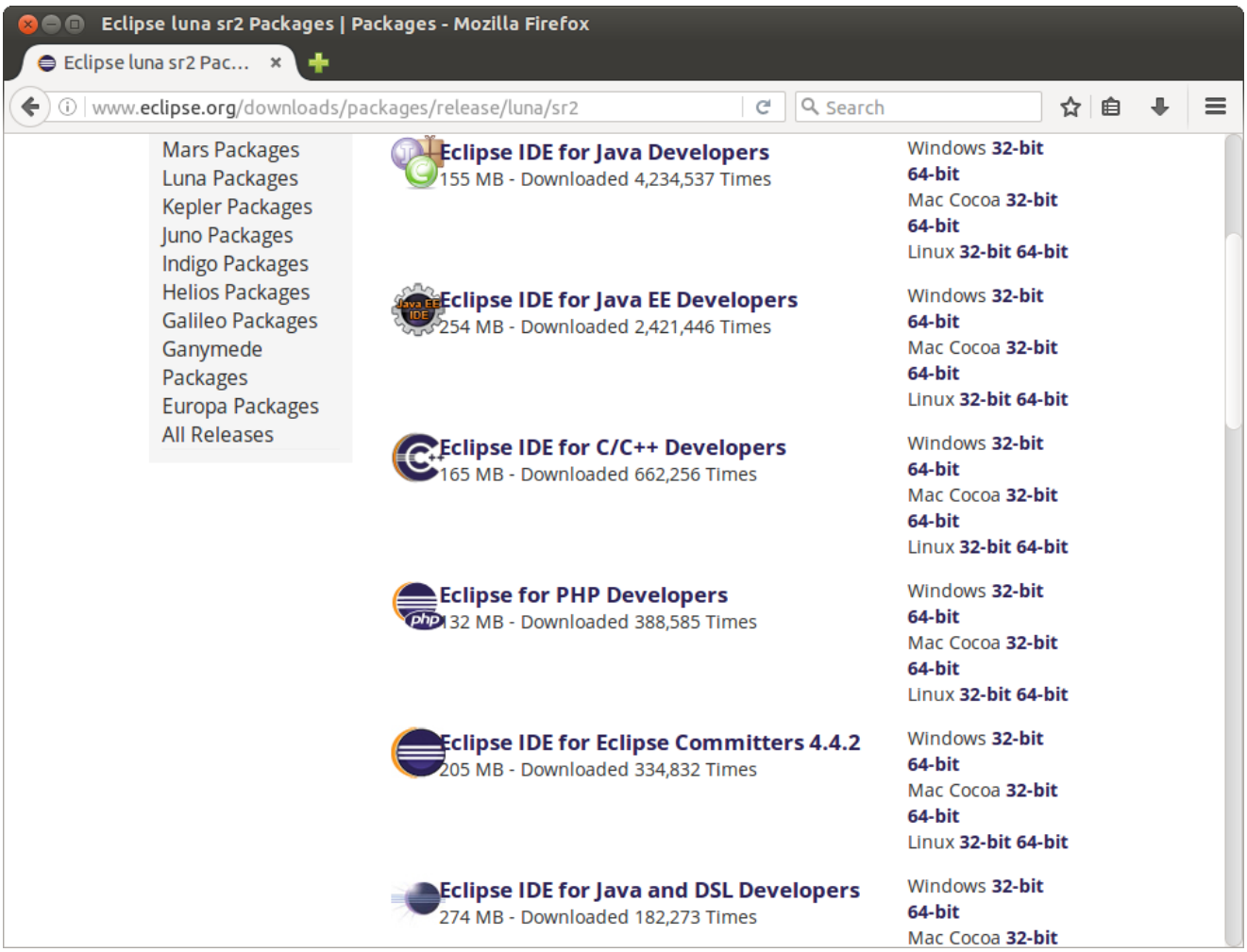
下载你喜欢的 Eclipse IDE for C/C++ Developers 版本.

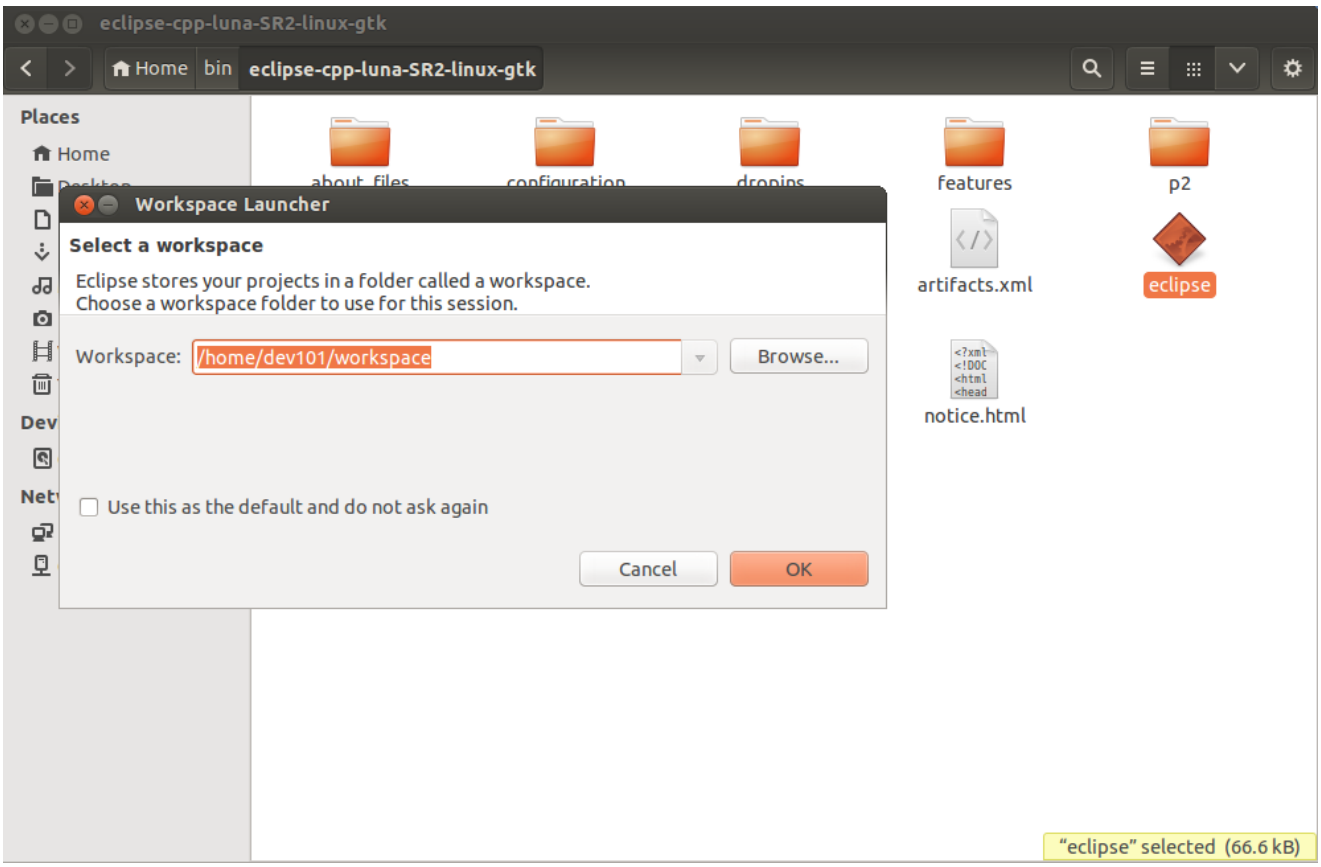
对于这篇指引，我们用的是 Eclipse IDE for C/C++ Developers Eclipse Luna SR2 (4.4.2) Linux.

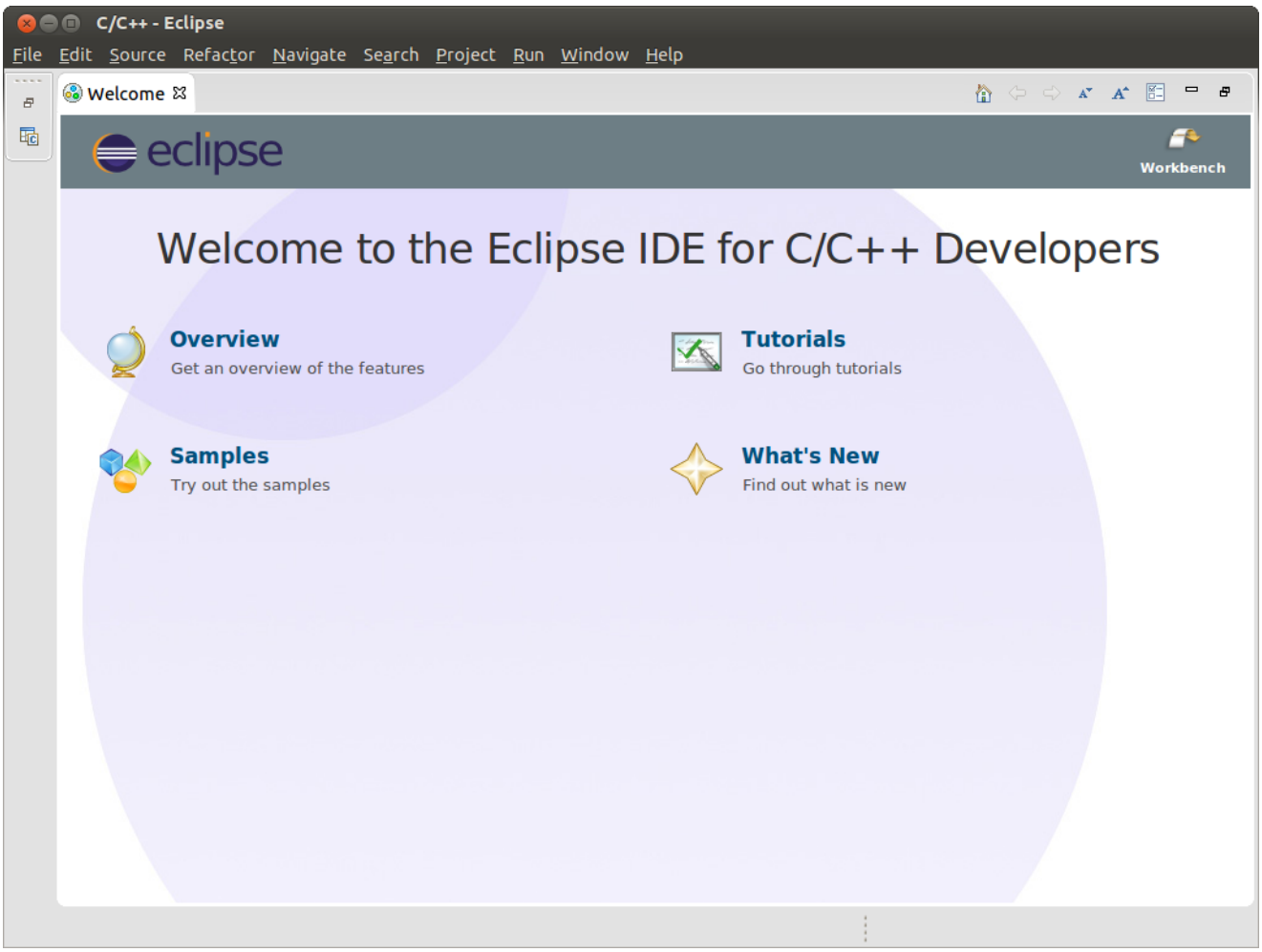
http://www.eclipse.org/downloads/packages/release/luna/sr2

选择你偏爱的版本和平台 (32位 / 64 位).

解压缩，把Eclipse放到你偏爱的目录，执行Eclipse，选择你偏爱的workspace位置。注意：**Eclipse**运行需要**Java Runtime**。

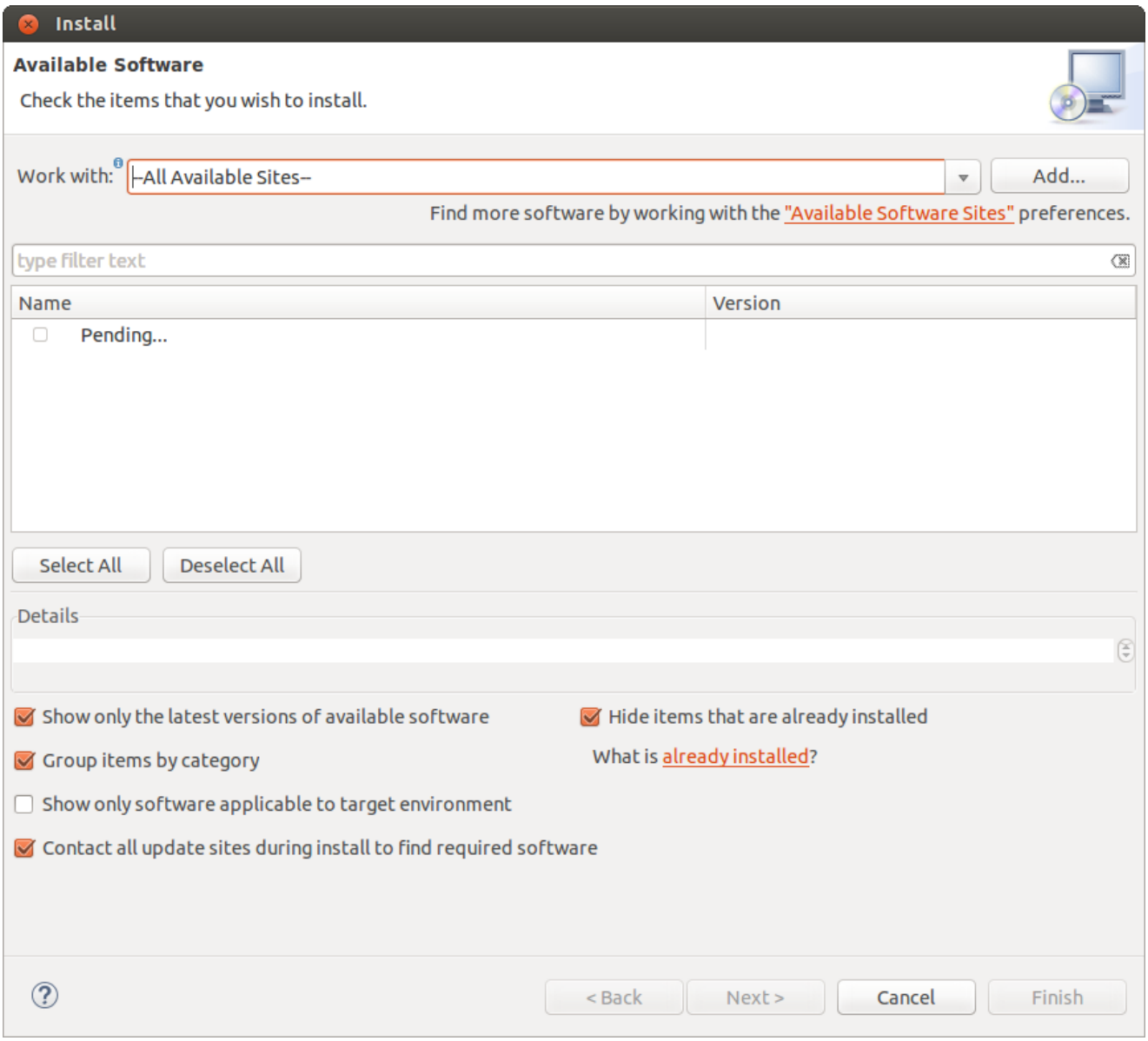

Eclipse luna sr2 Packages | Packages - Mozilla Firefox
Eclipse luna sr2 Pac...
www.eclipse.org/downloads/packages/release/luna/sr2
Search
Mars Packages
Luna Packages
Kepler Packages
Juno Packages
Indigo Packages
Helios Packages
Galileo Packages
Ganymede Packages
Europa Packages
All Releases
Eclipse IDE for Java Developers
155 MB - Downloaded 4,234,537 Times
Windows 32-bit 64-bit
Mac Cocoa 32-bit 64-bit
Linux 32-bit 64-bit
Eclipse IDE for Java EE Developers
254 MB - Downloaded 2,421,446 Times
Windows 32-bit 64-bit
Mac Cocoa 32-bit 64-bit
Linux 32-bit 64-bit
Eclipse IDE for C/C++ Developers
165 MB - Downloaded 662,256 Times
Windows 32-bit 64-bit
Mac Cocoa 32-bit 64-bit
Linux 32-bit 64-bit
Eclipse for PHP Developers
132 MB - Downloaded 388,585 Times
Windows 32-bit 64-bit
Mac Cocoa 32-bit 64-bit
Linux 32-bit 64-bit
Eclipse IDE for Eclipse Committers 4.4.2
205 MB - Downloaded 334,832 Times
Windows 32-bit 64-bit
Mac Cocoa 32-bit 64-bit
Linux 32-bit 64-bit
Eclipse IDE for Java and DSL Developers
274 MB - Downloaded 182,273 Times
Windows 32-bit 64-bit
Mac Cocoa 32-bit

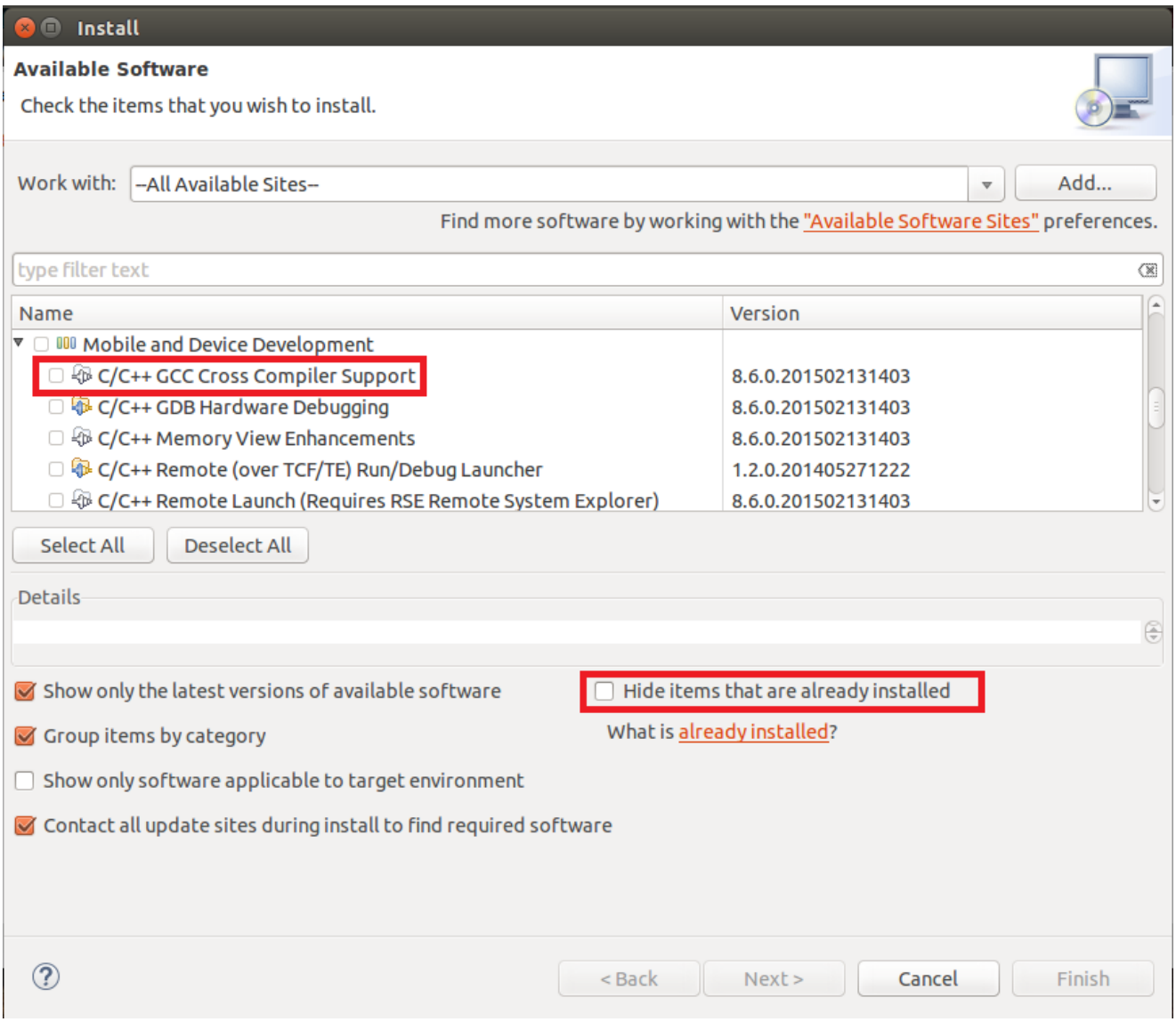

eclipse-cpp-luna-SR2-linux-gtk
Home
bin
eclipse-cpp-luna-SR2-linux-gtk
Places
Home
about_files
configuration
dropins
features
p2
artifacts.xml
eclipse
notice.html
Workspace Launcher
Select a workspace
Eclipse stores your projects in a folder called a workspace.
Choose a workspace folder to use for this session.
Workspace:
/home/dev101/workspace
Browse...
Use this as the default and do not ask again
Cancel
OK
"eclipse" selected (66.6 kB)


C/C++ - Eclipse
File Edit Source Refactor Navigate Search Project Run Window Help
Welcome
eclipse
Workbench
Welcome to the Eclipse IDE for C/C++ Developers
Overview
Get an overview of the features
Tutorials
Go through tutorials
Samples
Try out the samples
What's New
Find out what is new

我们可能需要安装额外的eclipse软件包：`Help → Install new Software → All Available Sites`. 选择 **“Mobile and Device Development”** 下的 **“C/C++ GCC Cross Compiler Support”** 还有 **“Remote System Explorer End-User Runtime”**.

如果你使用的是 Eclipse IDE for C/C++ Developers, 很可能这两个软件包已经默认安装了。 如果你像查看这两个软件包，去掉点选 **“Hide items that are already installed”**.


Install
Available Software
Check the items that you wish to install.
Work with:
--All Available Sites--
Add...
Find more software by working with the "Available Software Sites" preferences.
type filter text
Name
Version
Pending...
Select All
Deselect All
Details
Show only the latest versions of available software
Hide items that are already installed
Group items by category
What is already installed?
Show only software applicable to target environment
Contact all update sites during install to find required software
< Back
Next >
Cancel
Finish

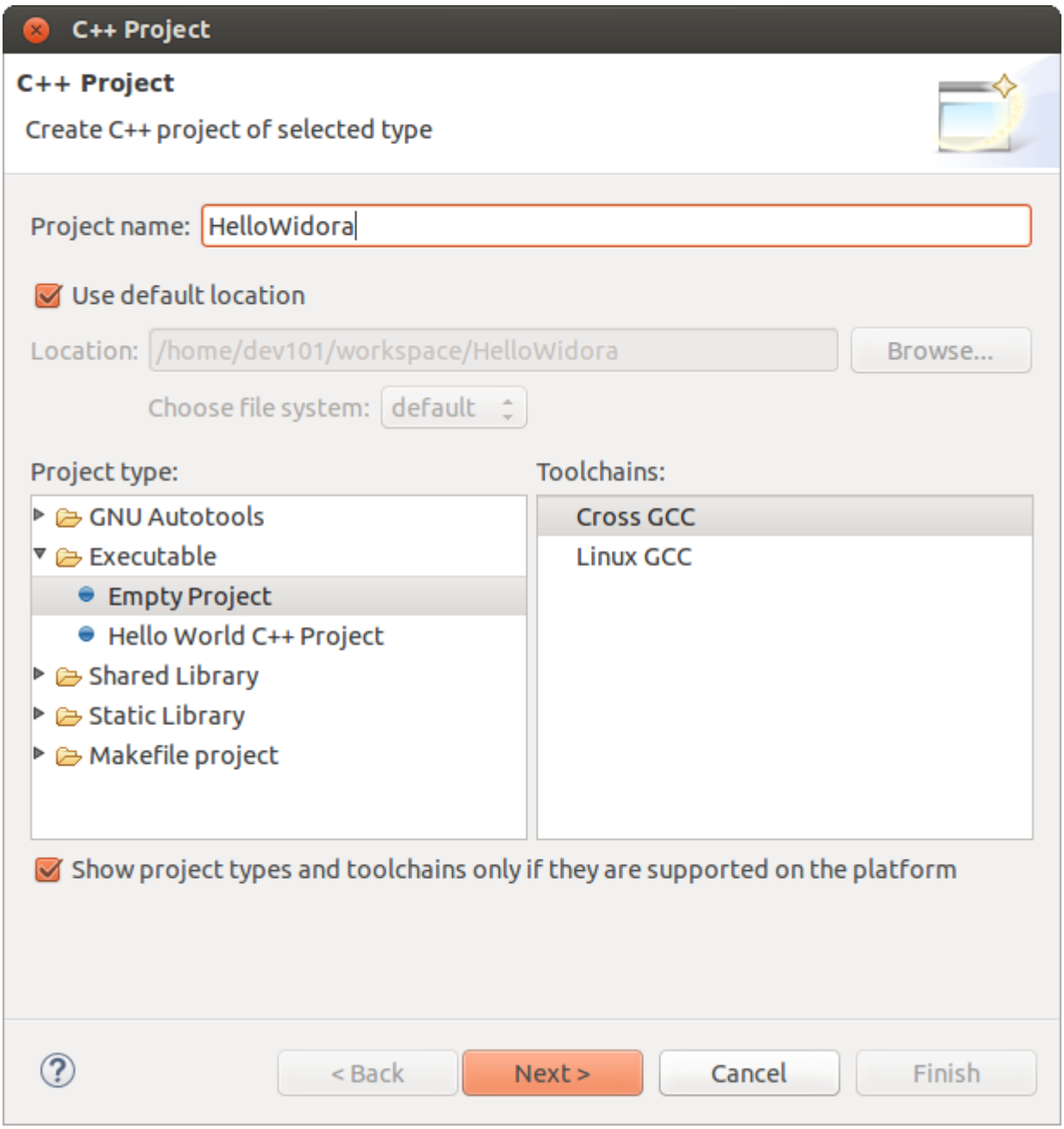


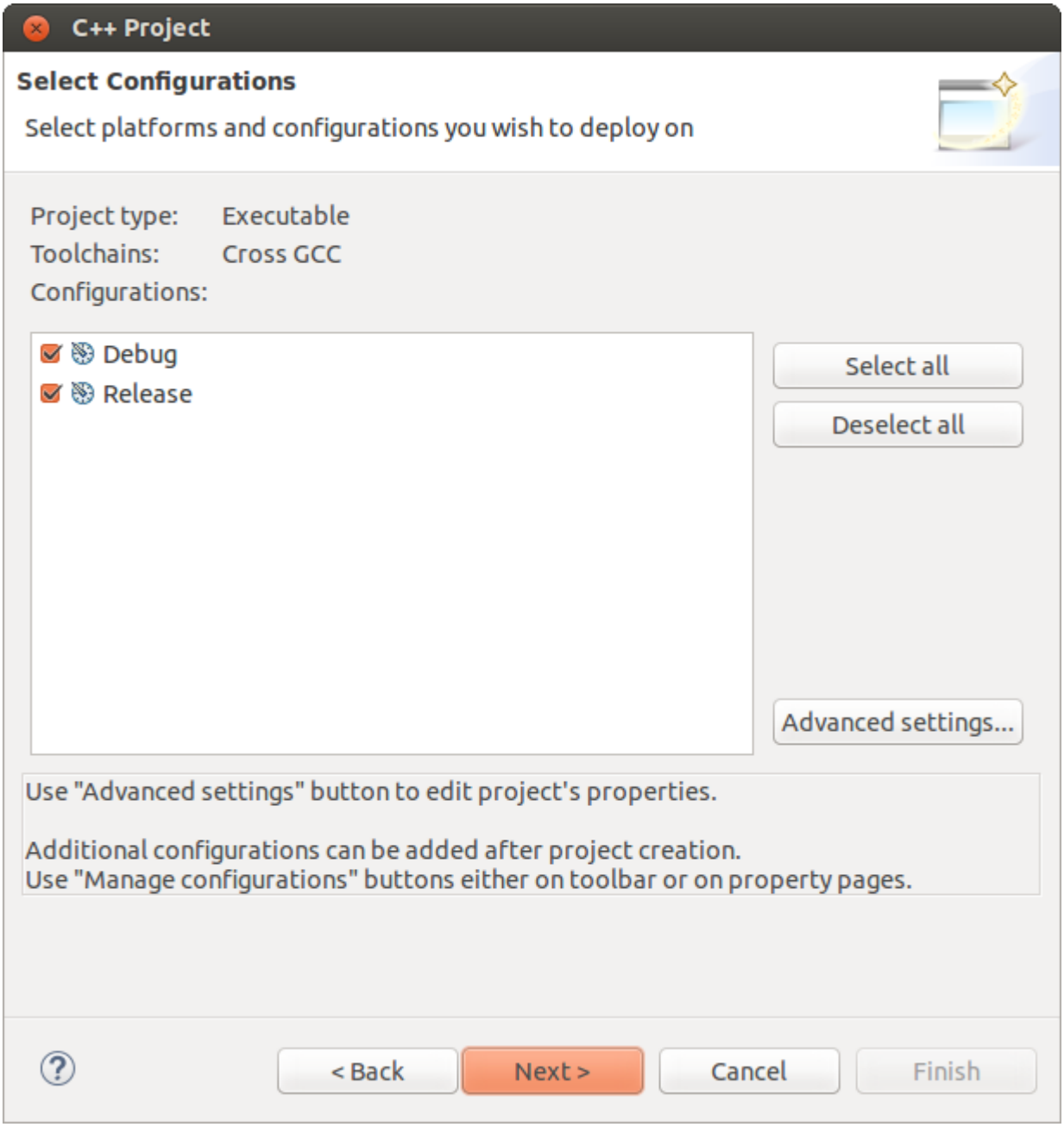
5 工程配置

5.1 Eclipse 交叉编译工程的配置

5.1.1 配置 eclipse

新建一个工程: `File → New C++ Project (resp. C project)`:

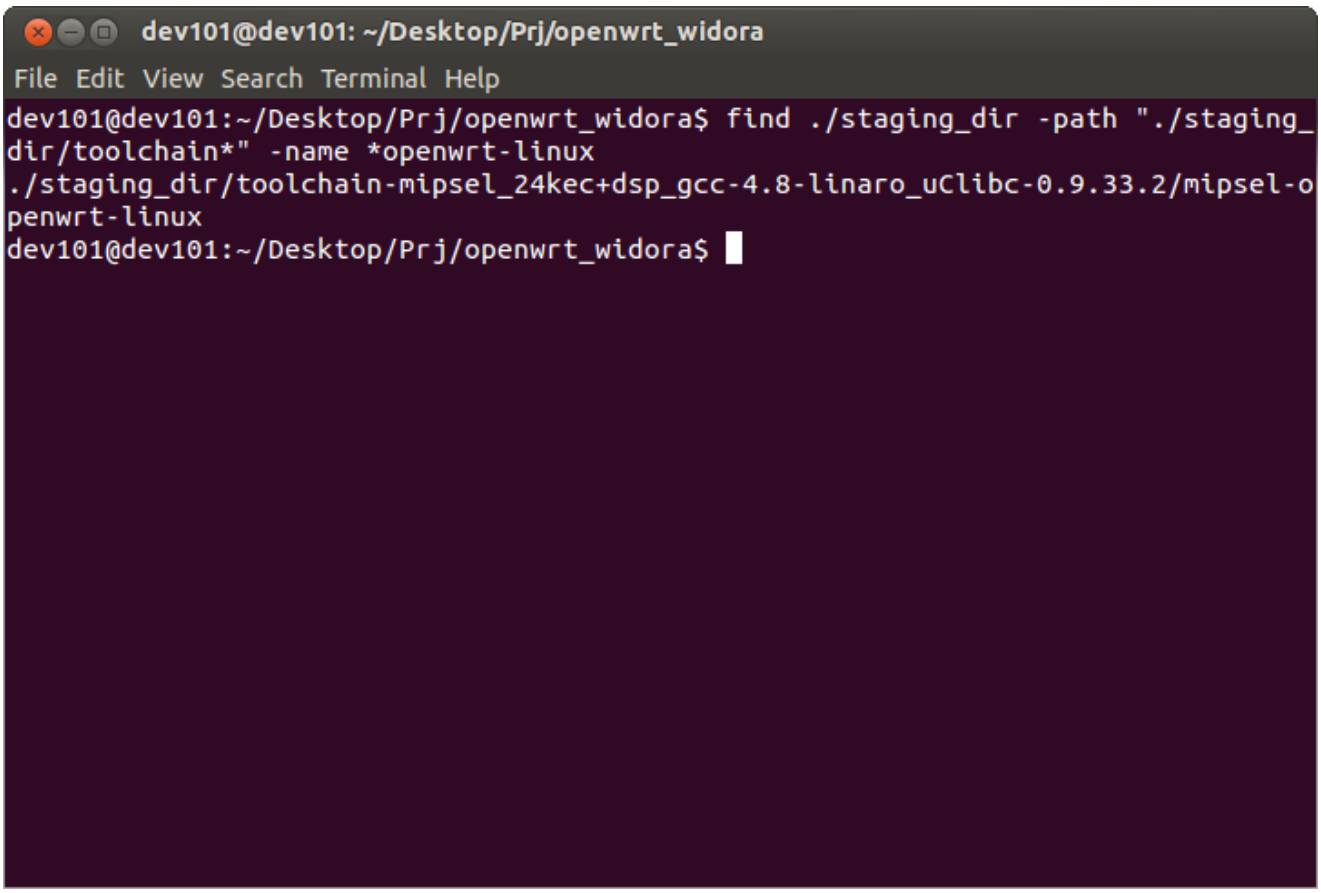

C++ Project
C++ Project
Create C++ project of selected type
Project name: HelloWidora
Use default location
Location: /home/dev101/workspace/HelloWidora
Browse...
Choose file system: default
Project type:
GNU Autotools
Executable
Empty Project
Hello World C++ Project
Shared Library
Static Library
Makefile project
Toolchains:
Cross GCC
Linux GCC
Show project types and toolchains only if they are supported on the platform
< Back
Next >
Cancel
Finish



下面的设置是和你的目标设备还有你的OpenWrt开发环境相关的，你需要查看你开发环境独特的设置。

这里我们需要设置交叉工具链的路径还有prefix。

进入Widora源码的根目录，执行 `find ./staging_dir -path "./staging_dir/toolchain*" -name *openwrt-linux`



当撰写这篇指引时用的开发环境返回的结果如下：

`./staging_dir/toolchain-mipsel_24kec+dsp_gcc-4.8-linaro_uClibc-0.9.33.2/mipsel-openwrt-linux`

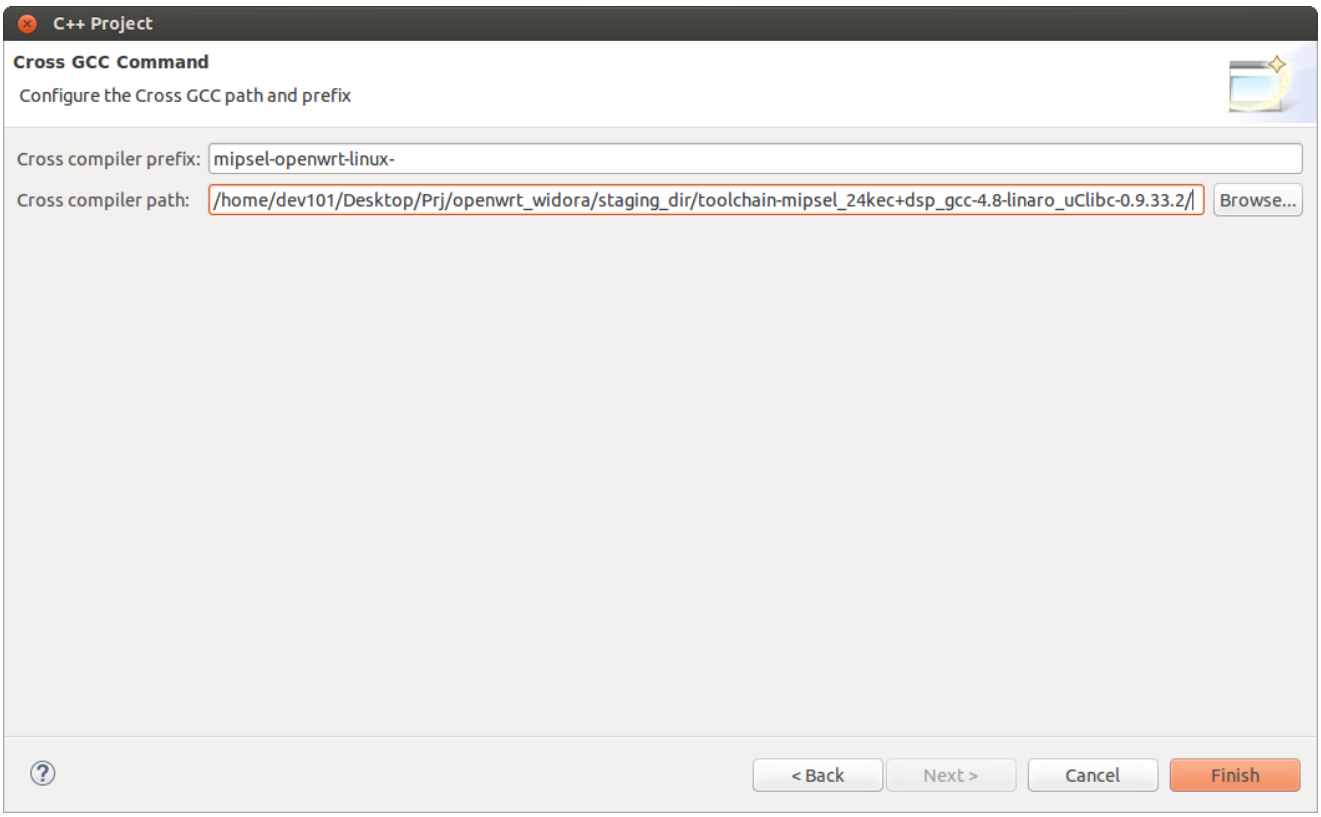
因此 “Cross compiler prefix” 我们填写 `mipsel-openwrt-linux-`.

然后需要注意的是 “Cross compiler path” 需要填写的是绝对路径:

`[你Widora的源码目录]/staging_dir/toolchain-mipsel_24kec+dsp_gcc-4.8-linaro_uClibc-0.9.33.2/`

不要忘了你的开发环境应该会和写这篇指引所用的环境不同，不能闭着眼睛复制黏贴!

填入你的设置然后Finish按钮结束。



5.1.2 Eclipse 工程设置

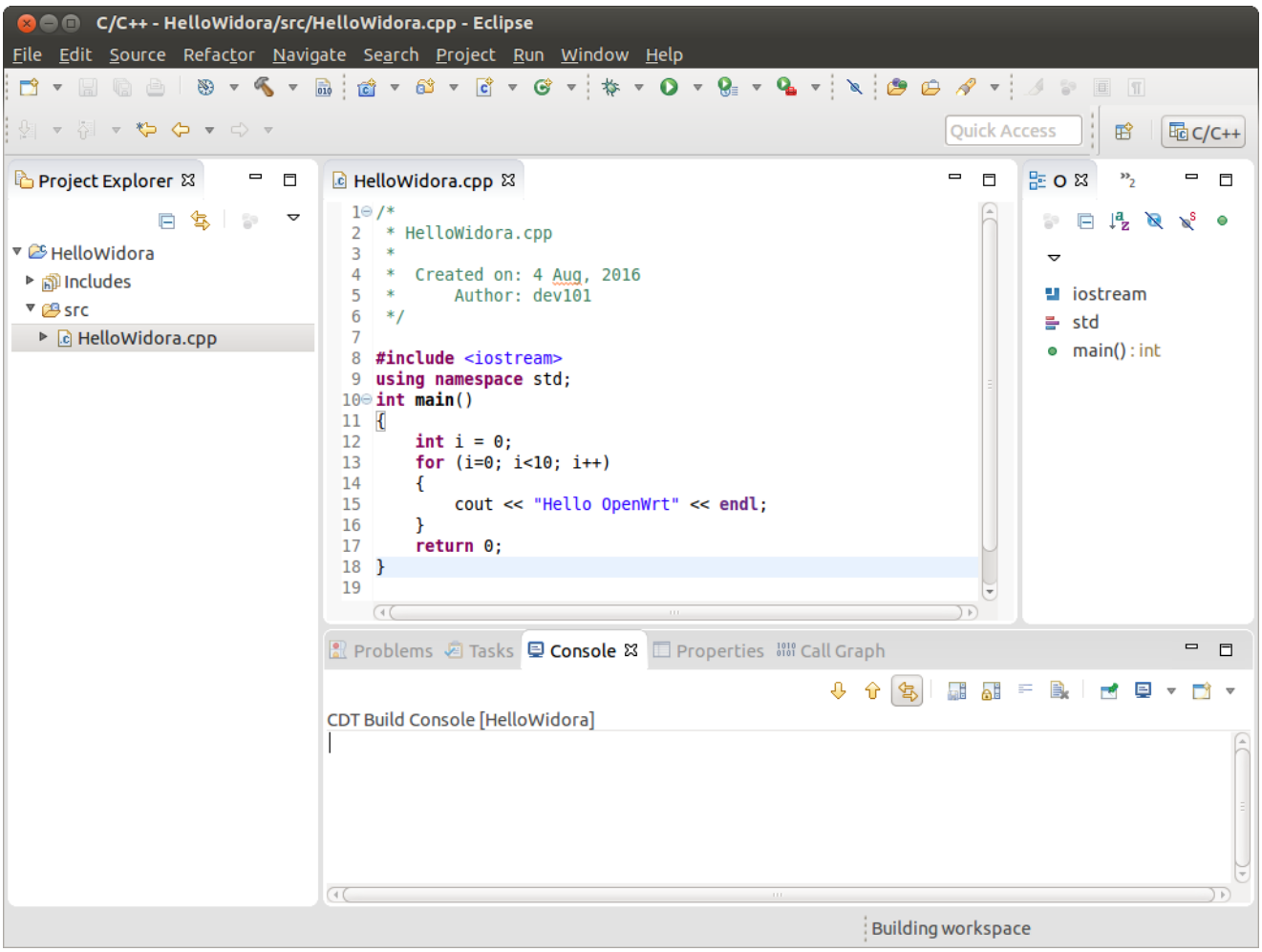
在这里，我们会创建一个简单的Hello World程序做示范，展示如何设置eclipse对远程目标设备进行代码级别的调试和远程访问。

为源码创建一个src文件夹。

`File → New Source Folder (src)`

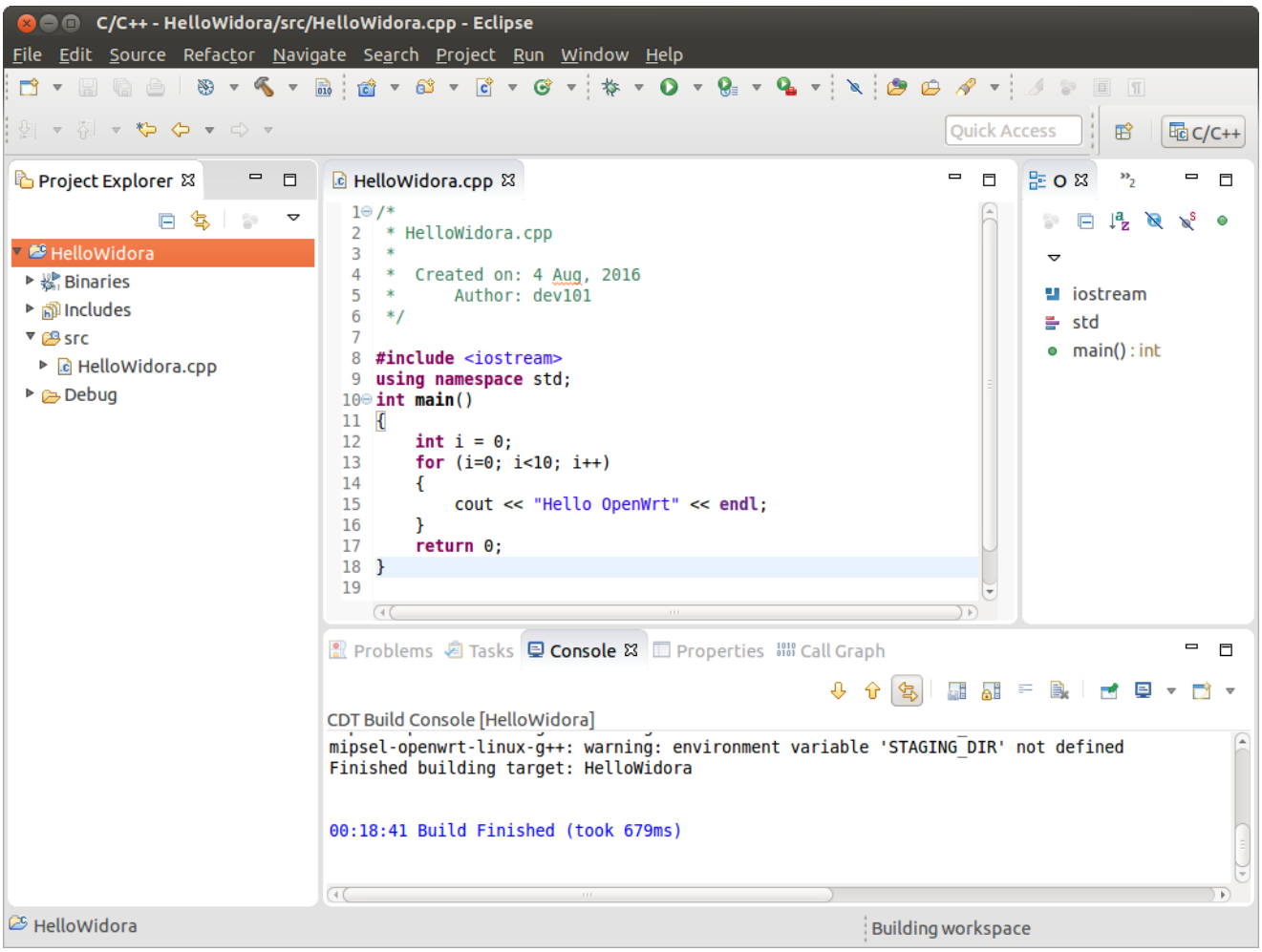
`File → New Source File (src/HelloWidora.cpp)`

```
#include <iostream>
using namespace std;
int main()
{
        int i = 0;
        for (i=0; i<10; i++)
        {
                cout << "Hello OpenWrt" << endl;
        }
        return 0;
}
```



如果一切配置正确的话，现在你应该可以交叉编译代码了 `Project-Build all` 。

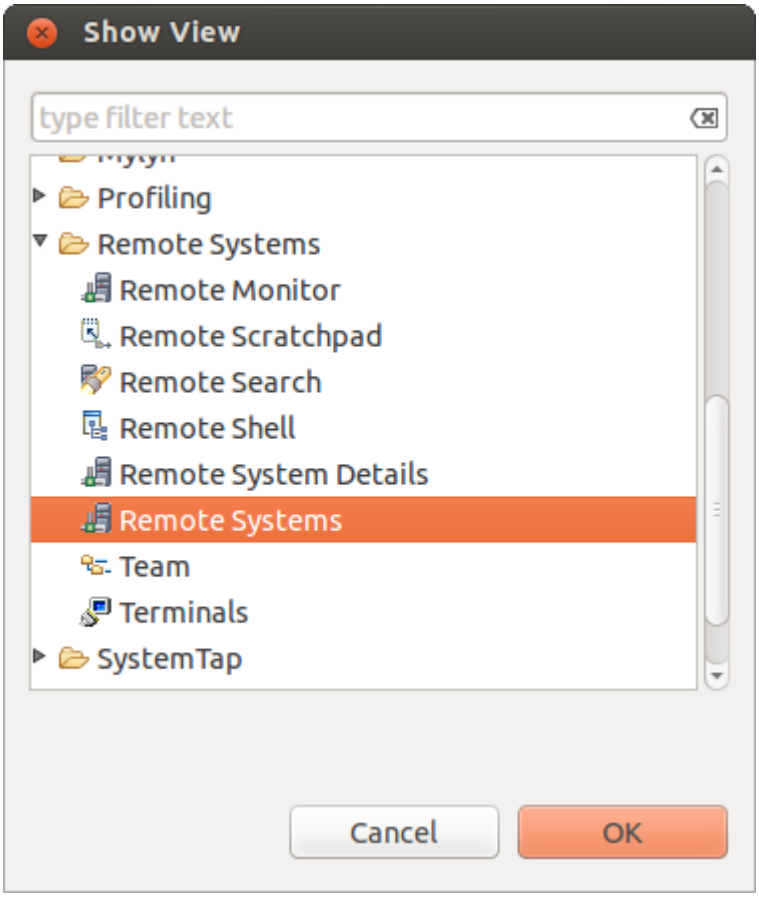
生成的程序肯定是不能在开发电脑上直接运行的，因为我们是用交叉工具链编译的可以跑在Widora上的MIPS架构的二进制可执行文件。



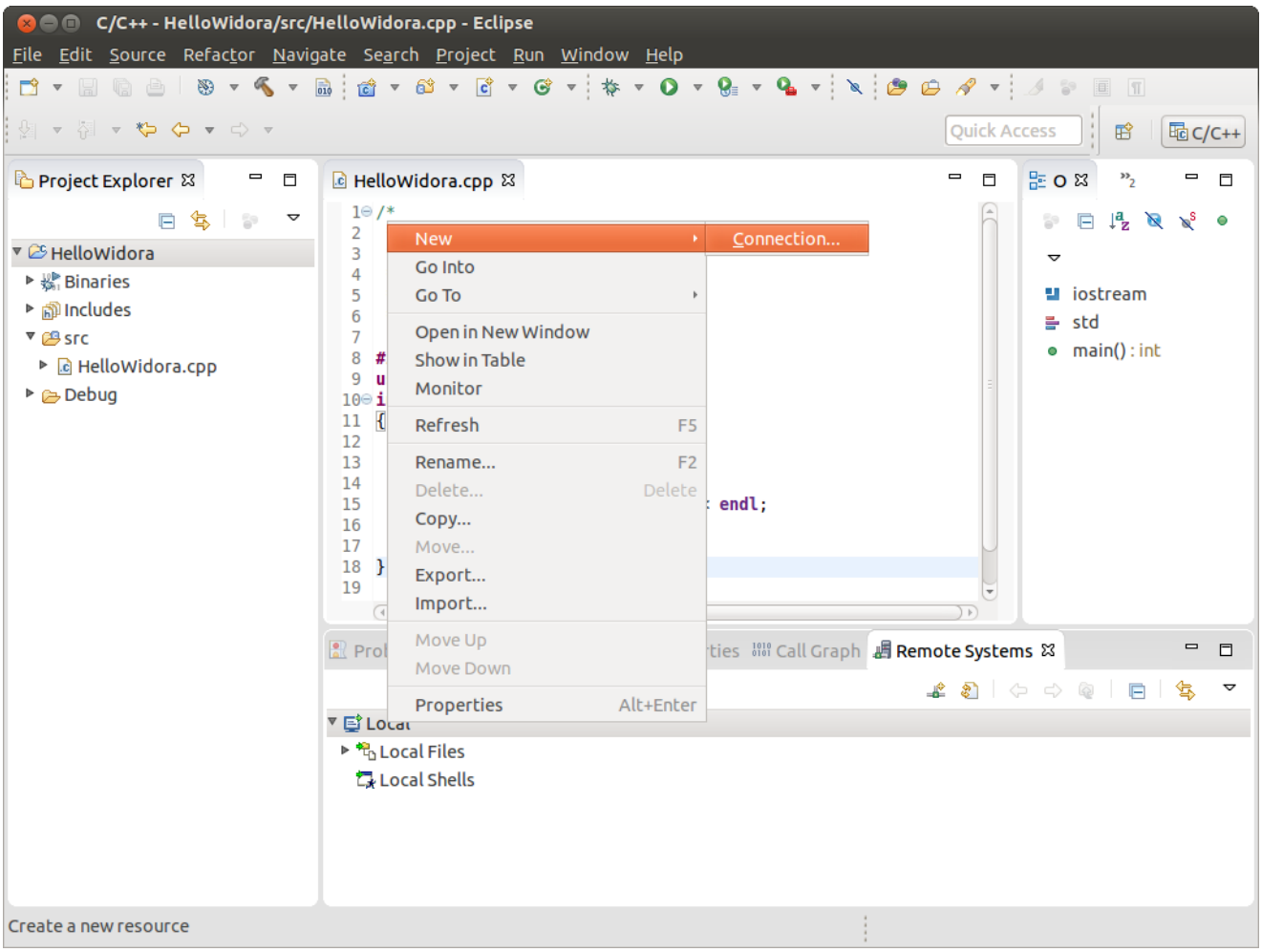
5.1.2.1 远程目标设备的配置（Widora）

如果你的程序编译成功，你需要在你的目标设备上执行你所写的程序，这个时候，eclipse提供的远程访问和远程调试功能就非常有用：

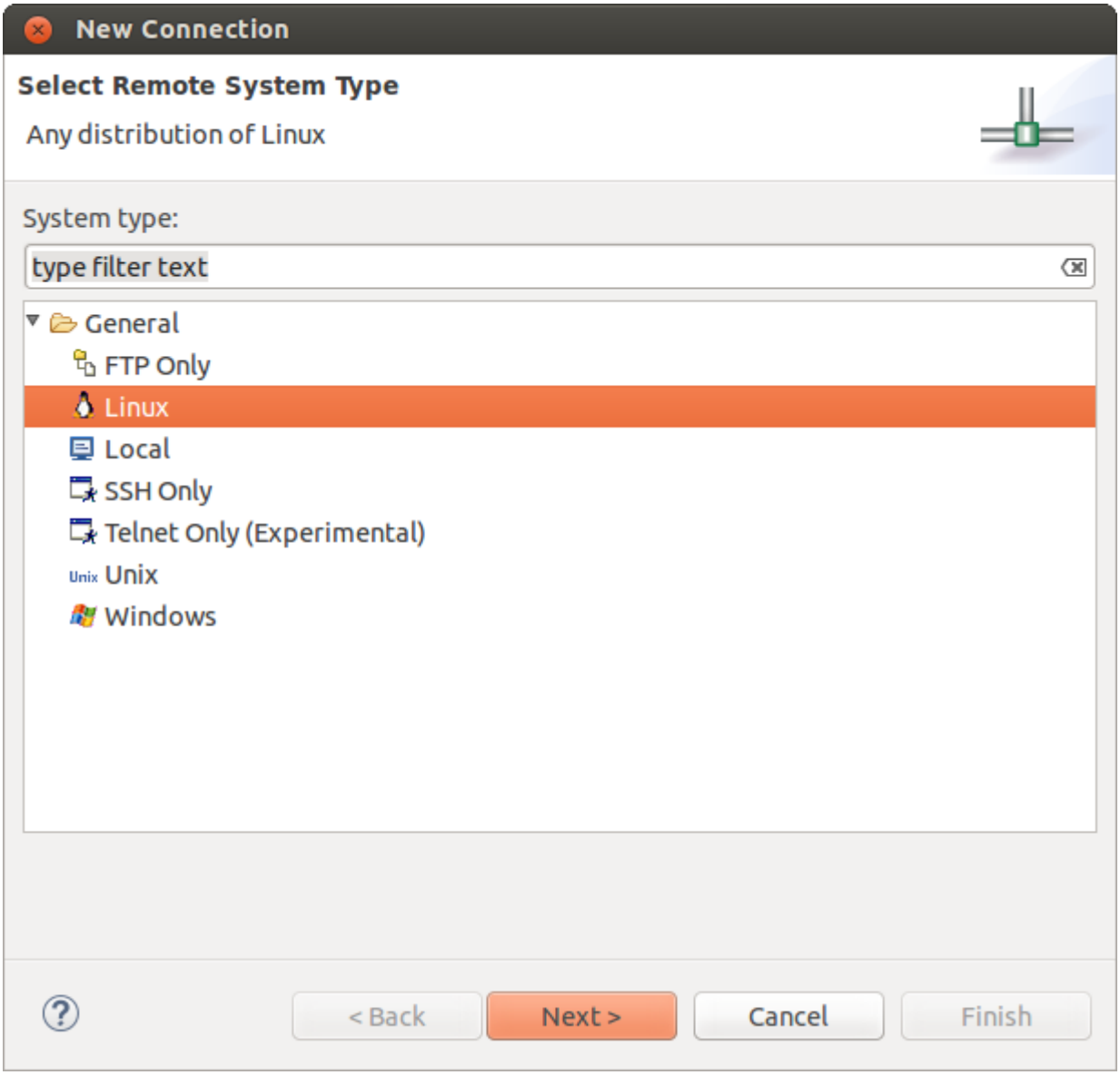
选择 `Window → Show View → Other… → Remote Systems`


Show View
type filter text
Profiling
Remote Systems
Remote Monitor
Remote Scratchpad
Remote Search
Remote Shell
Remote System Details
Remote Systems
Team
Terminals
SystemTap
Cancel
OK

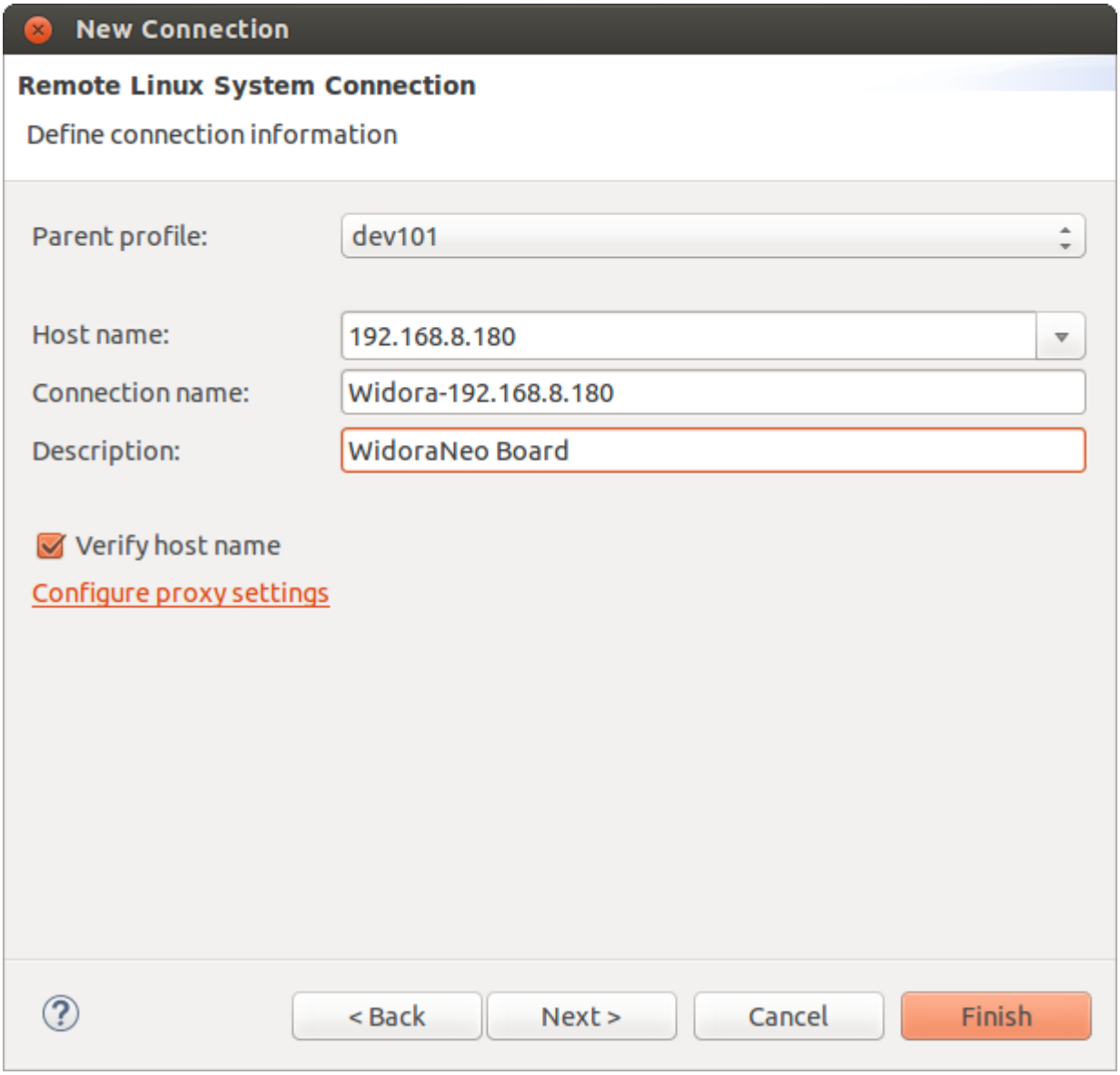
创建一个新连接:



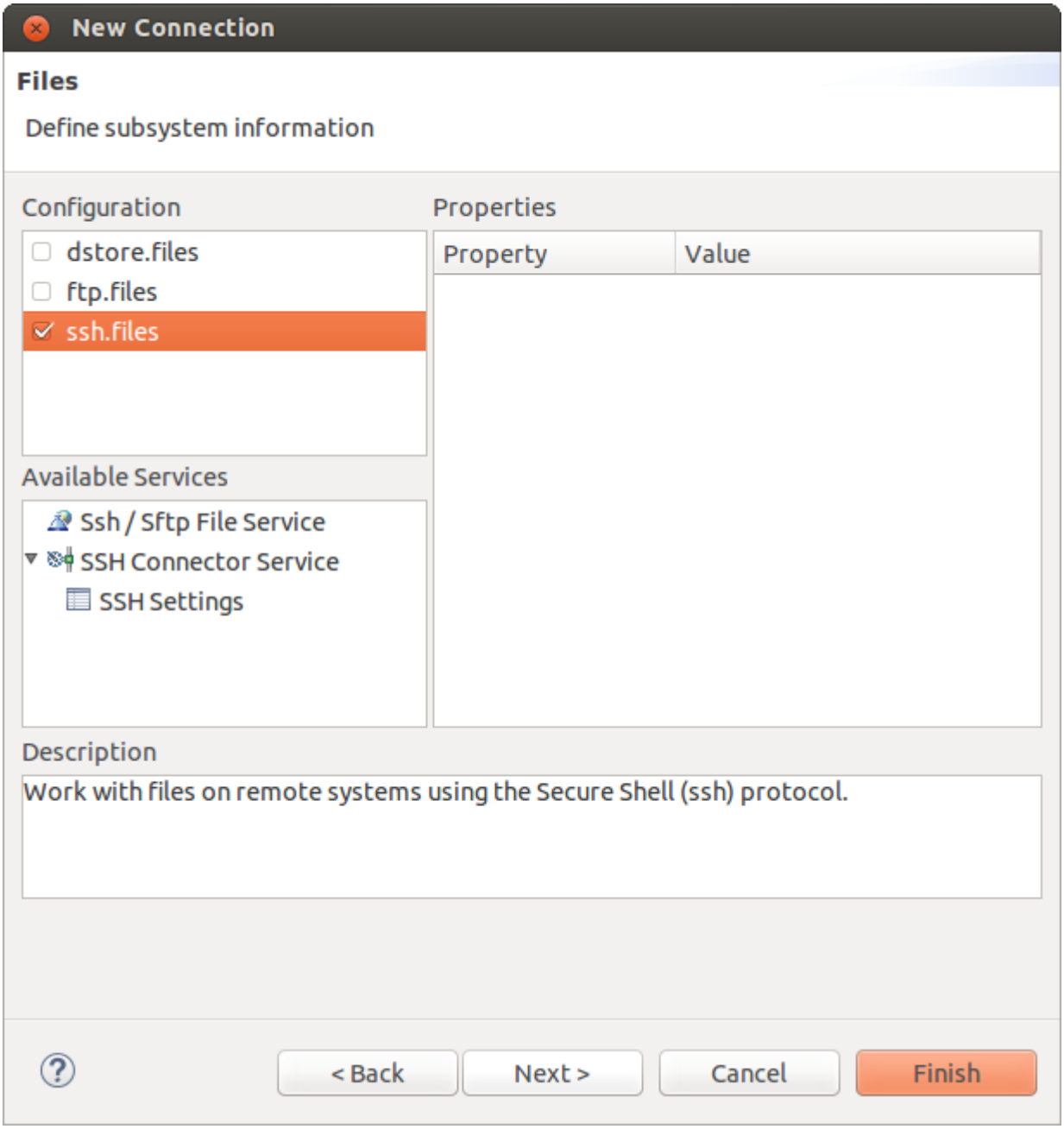
选择 Linux 然后下一步 “Next >”:



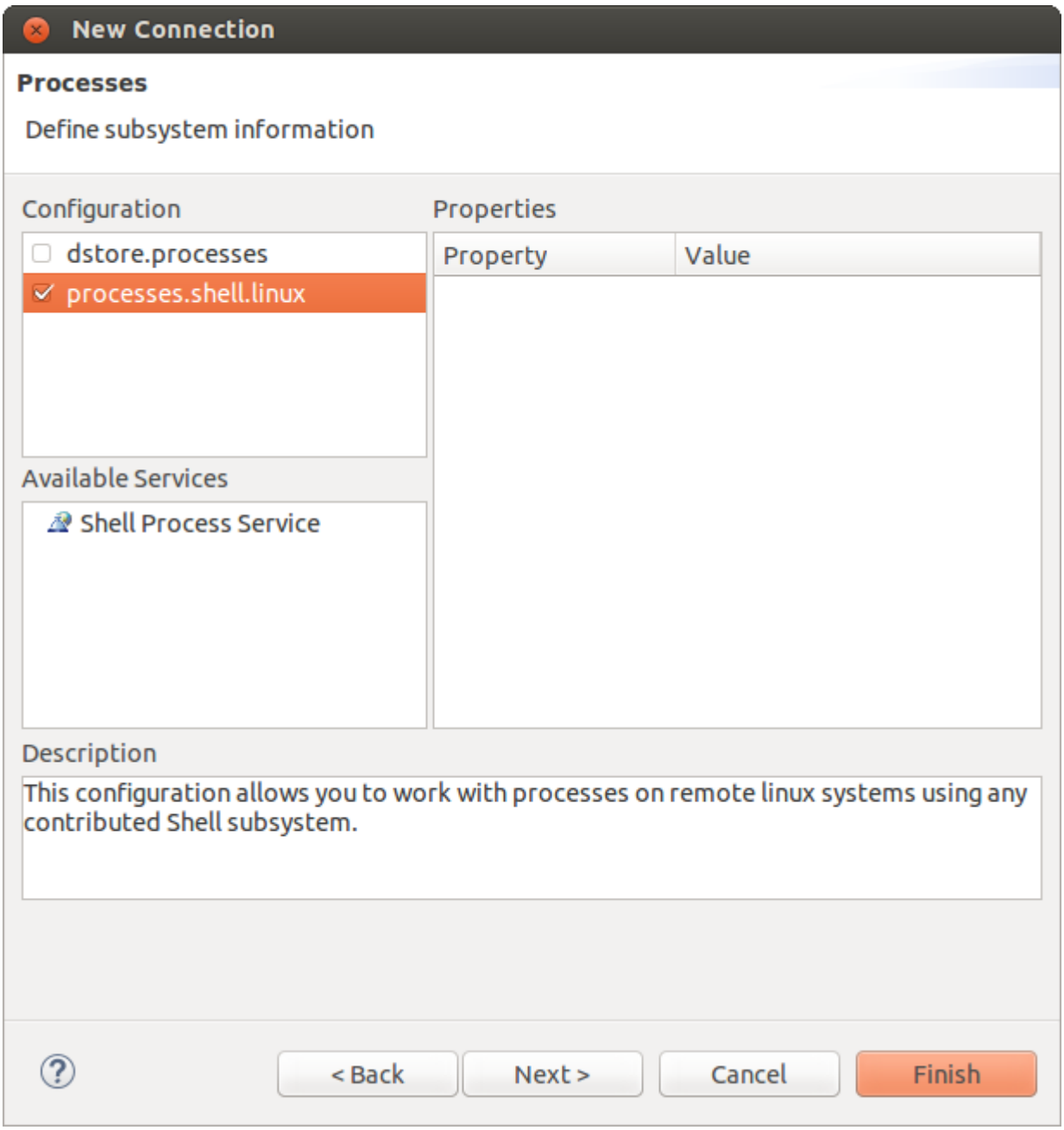
现在填写目标设备的IP地址，然后下一步 “Next >”.



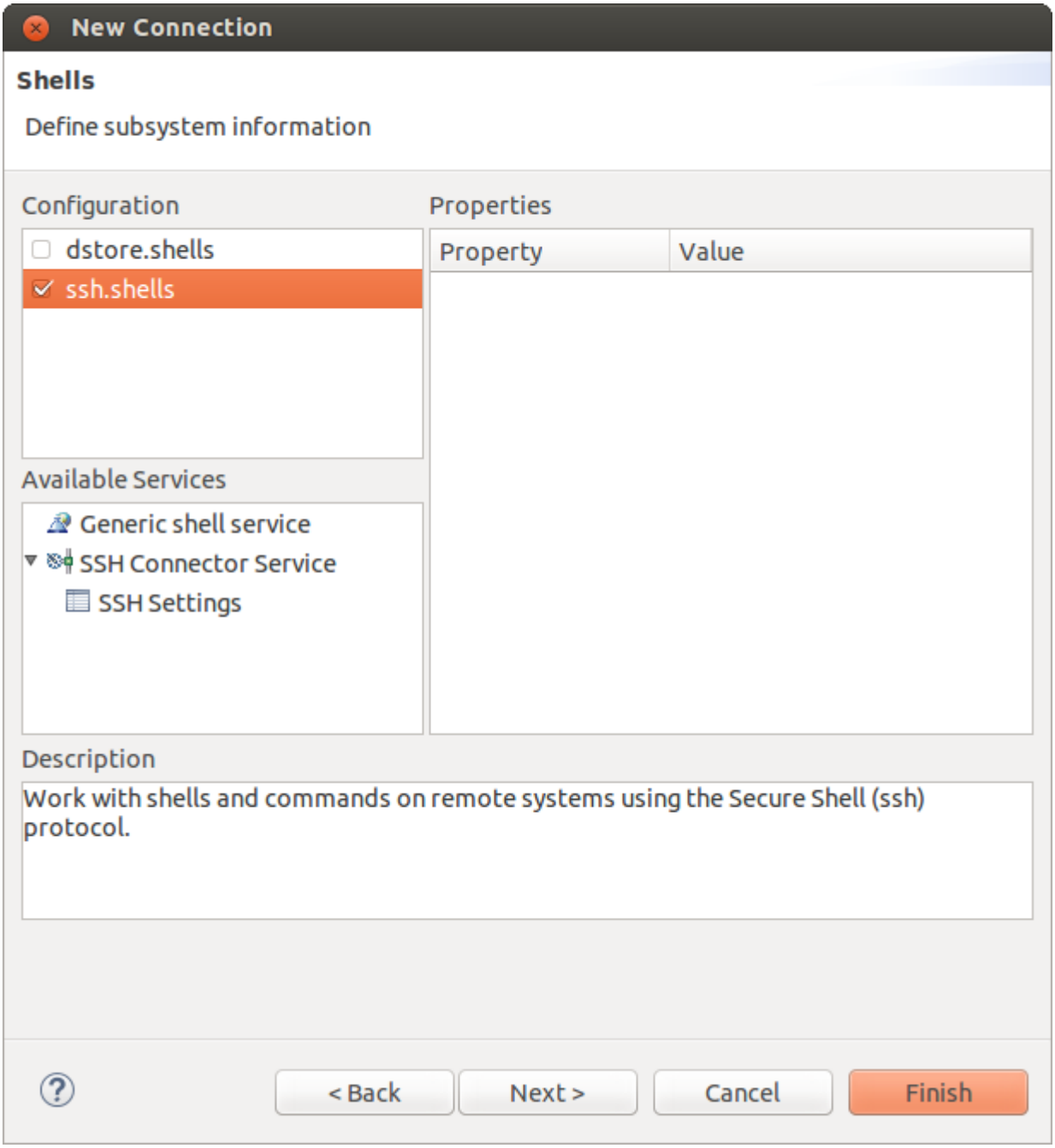
选择 “ssh.files” 然后下一步 “Next >”.

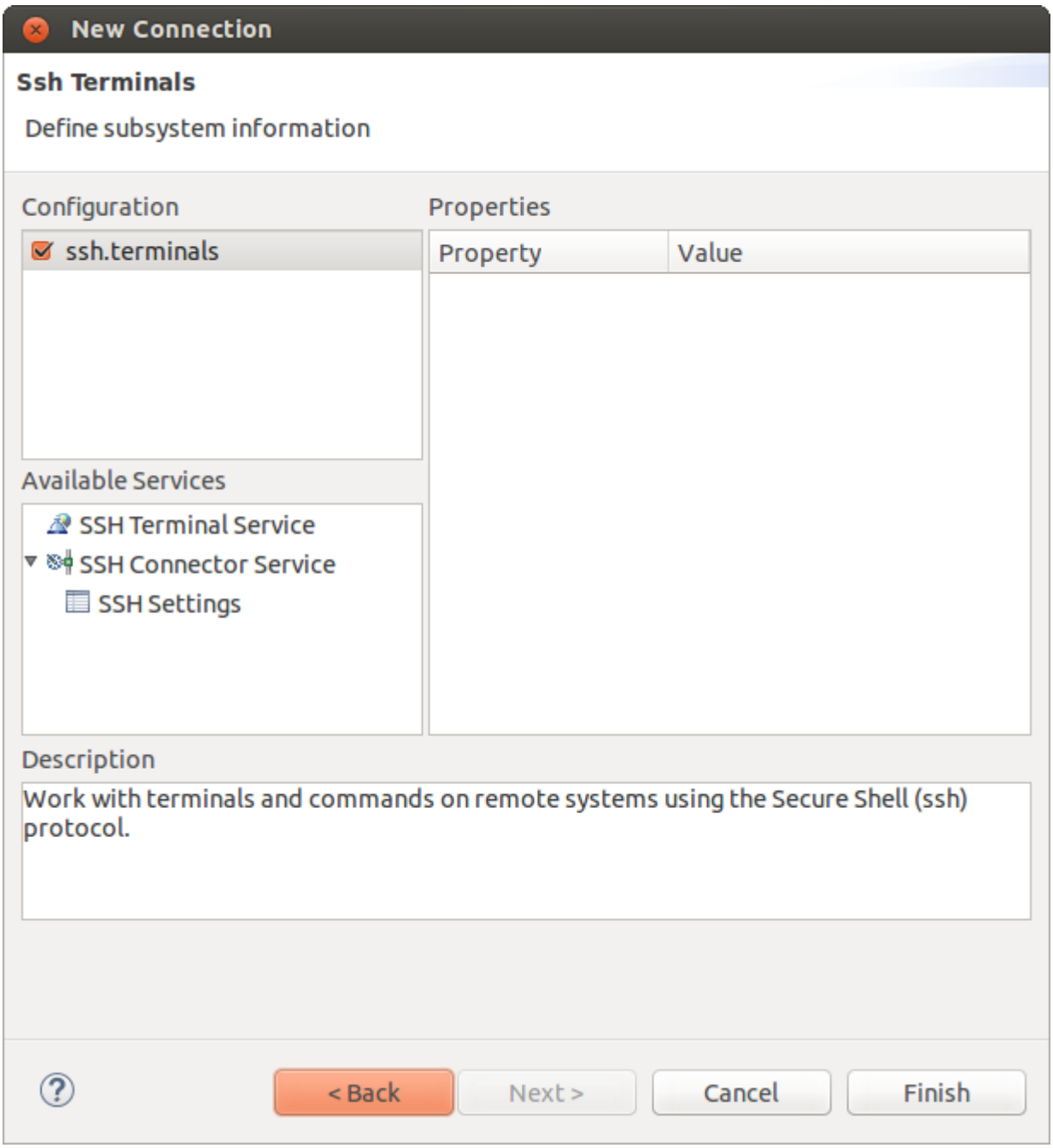


选择 “processes.shell.linux” 然后下一步 “Next >”.

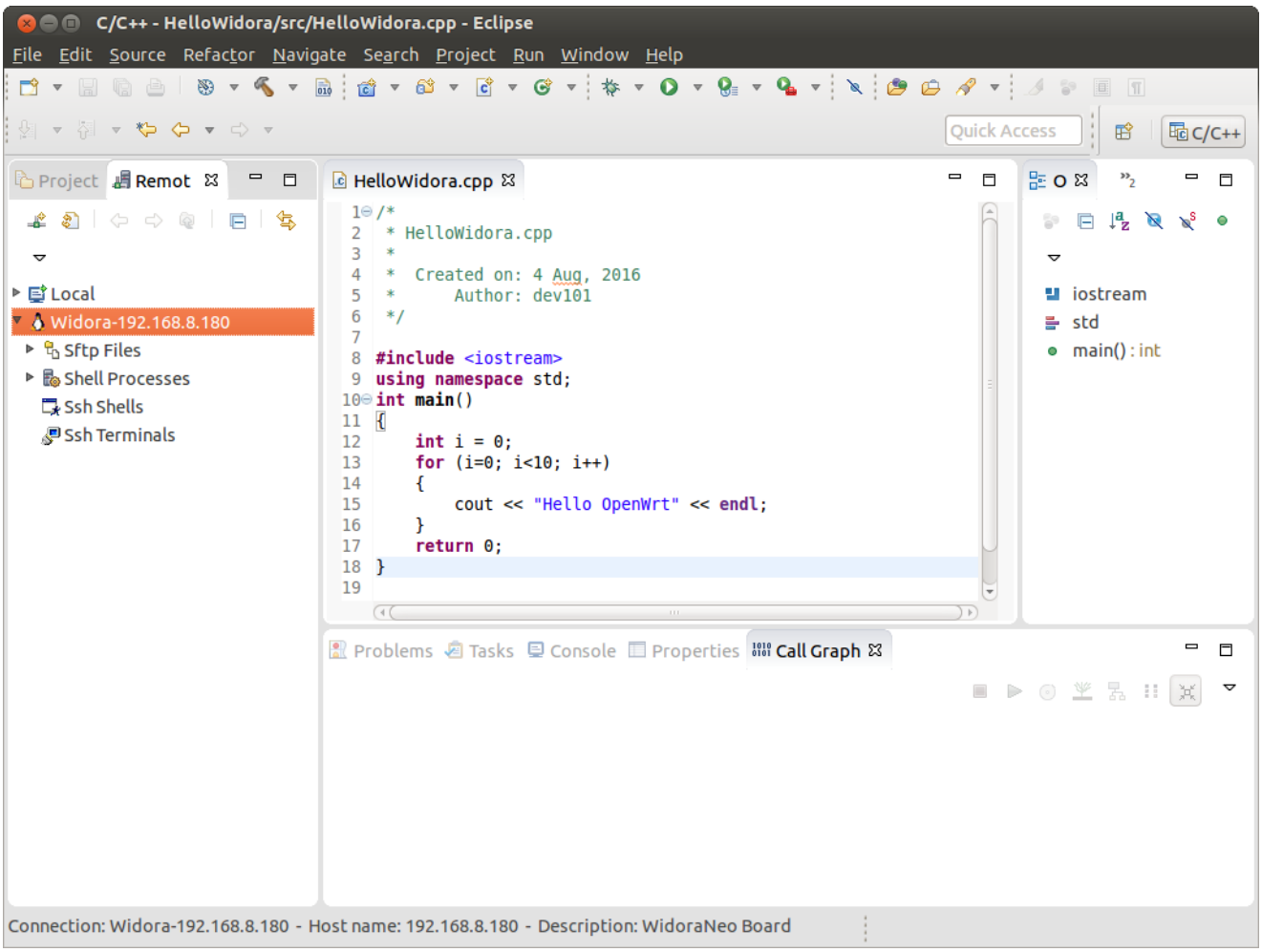


选择 “ssh.shells” 然后下一步 “Next >”. 然后 “Finish”.

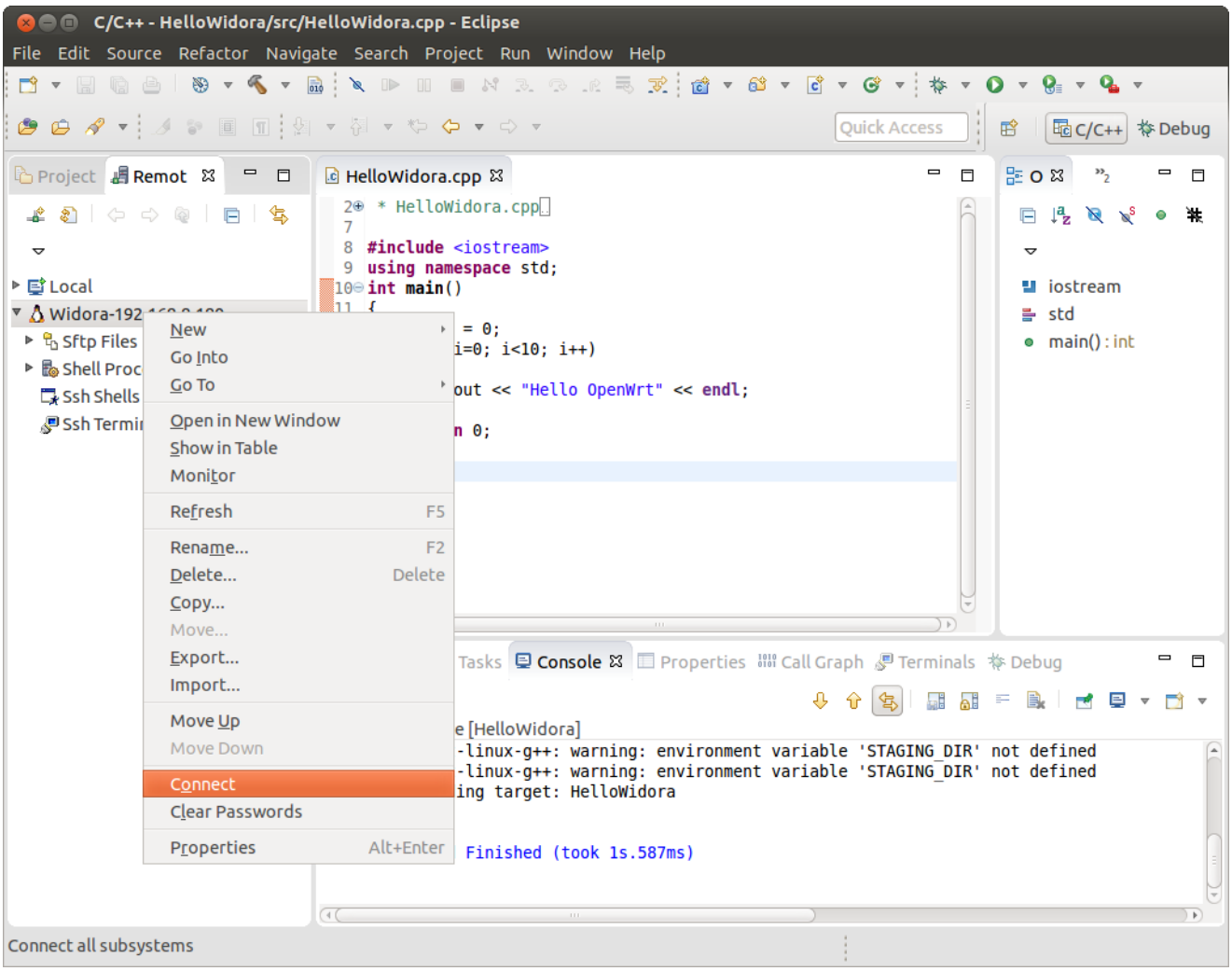

New Connection
Shells
Define subsystem information
Configuration
dstore.shells
ssh.shells
Properties
Property
Value
Available Services
Generic shell service
SSH Connector Service
SSH Settings
Description
Work with shells and commands on remote systems using the Secure Shell (ssh) protocol.
< Back
Next >
Cancel
Finish



你的 Eclipse IDE 看来是这个样子:

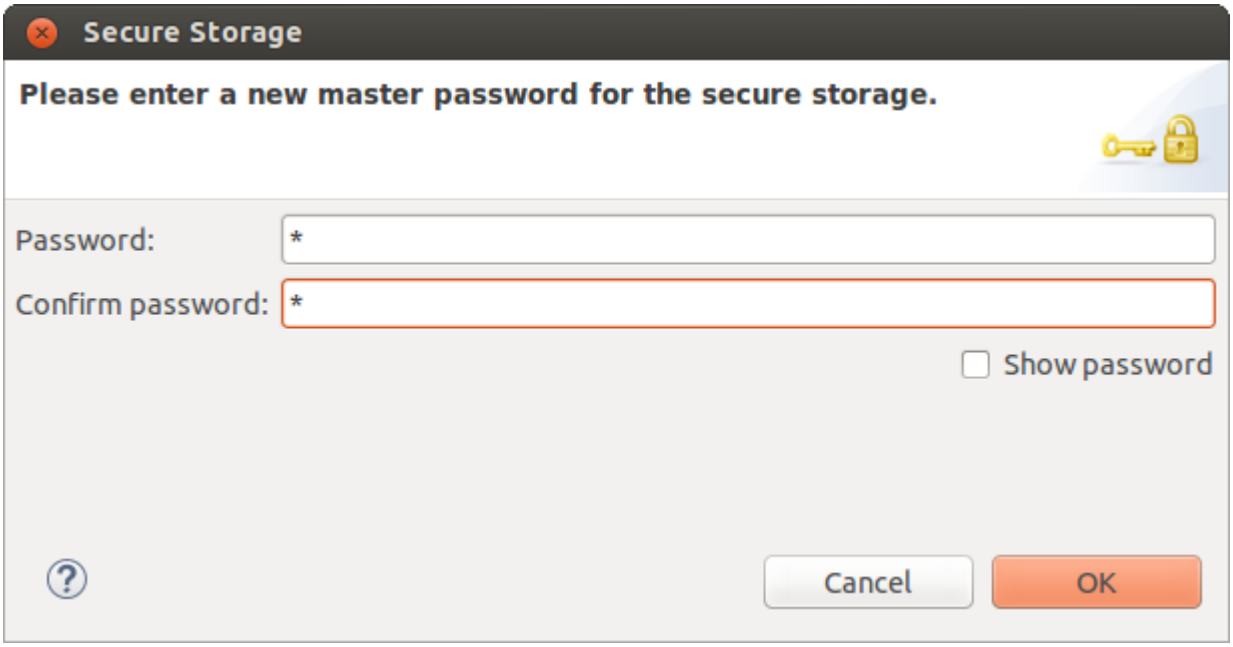


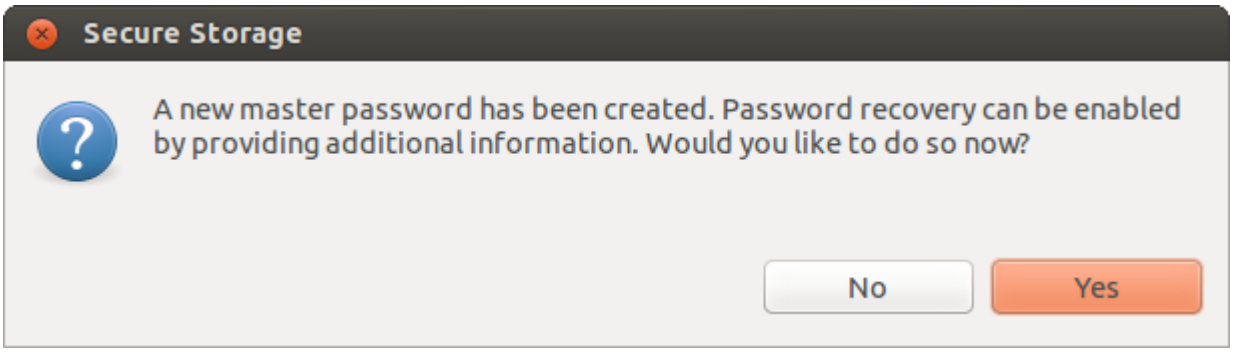
5.1.2.2 浏览你的目标设备



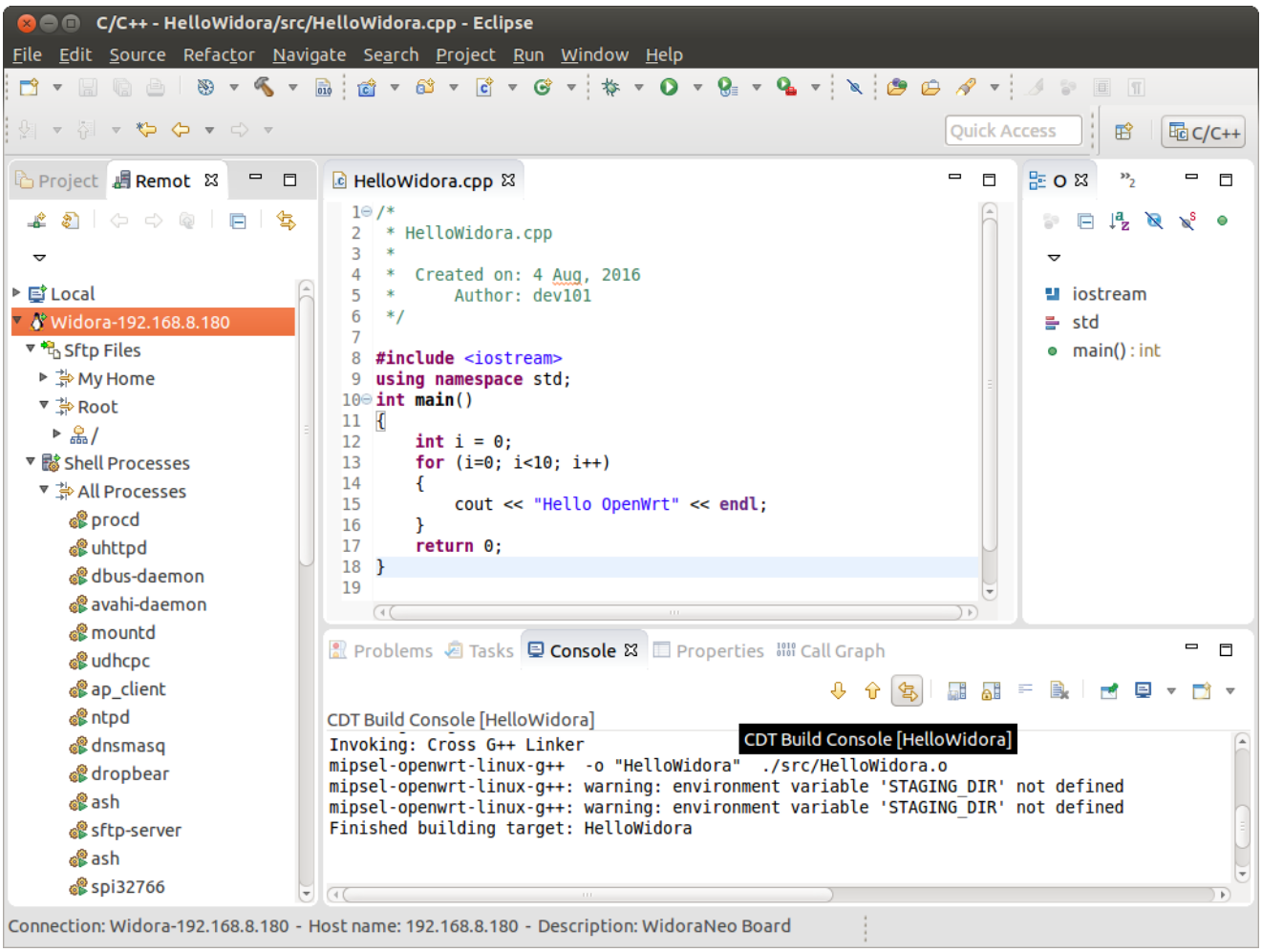
输入你目标设备的用户名和密码:

第一次, Eclipse 会让你设置安全存储的主密码, 设置你的主密码然后继续:

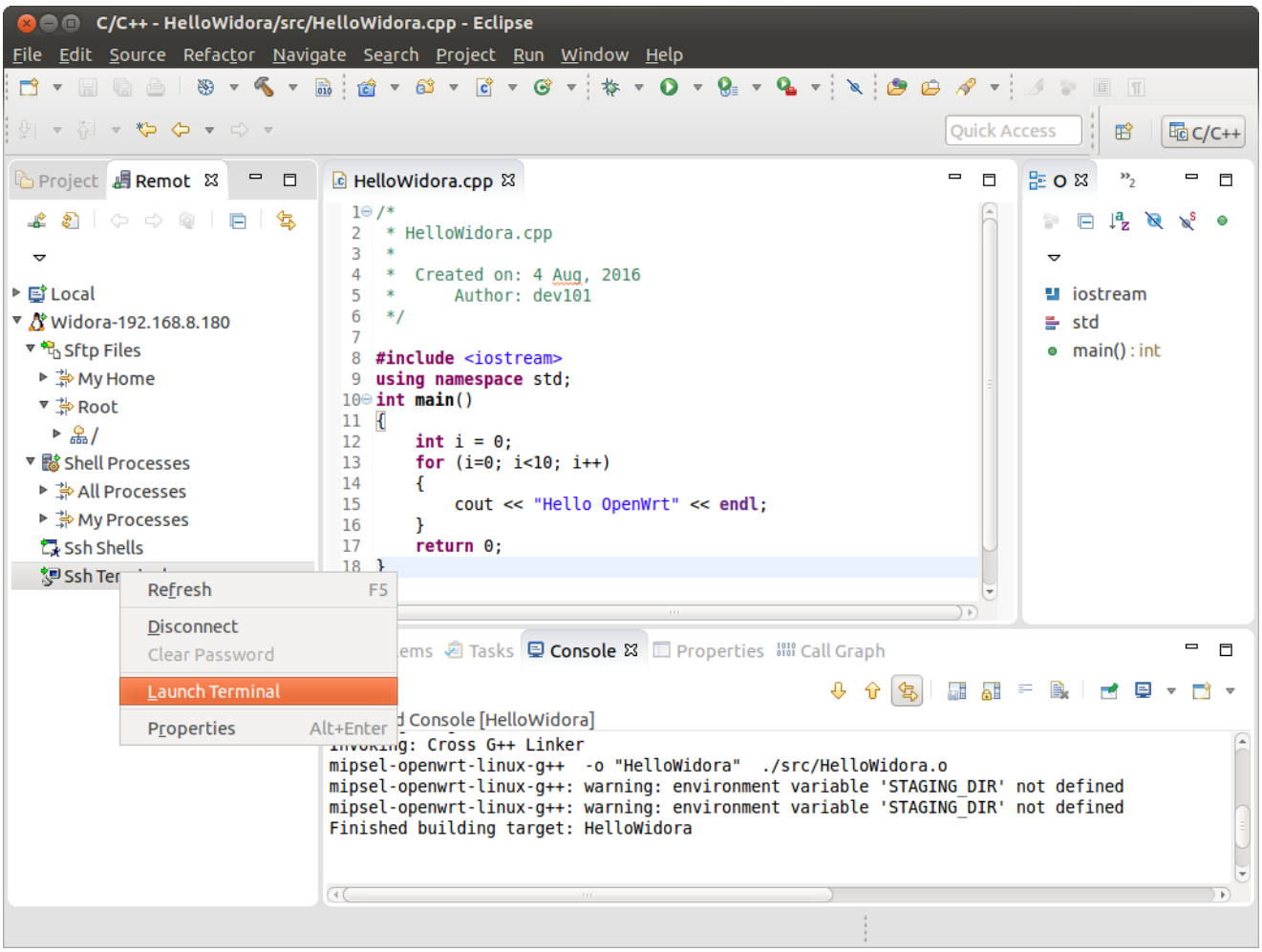


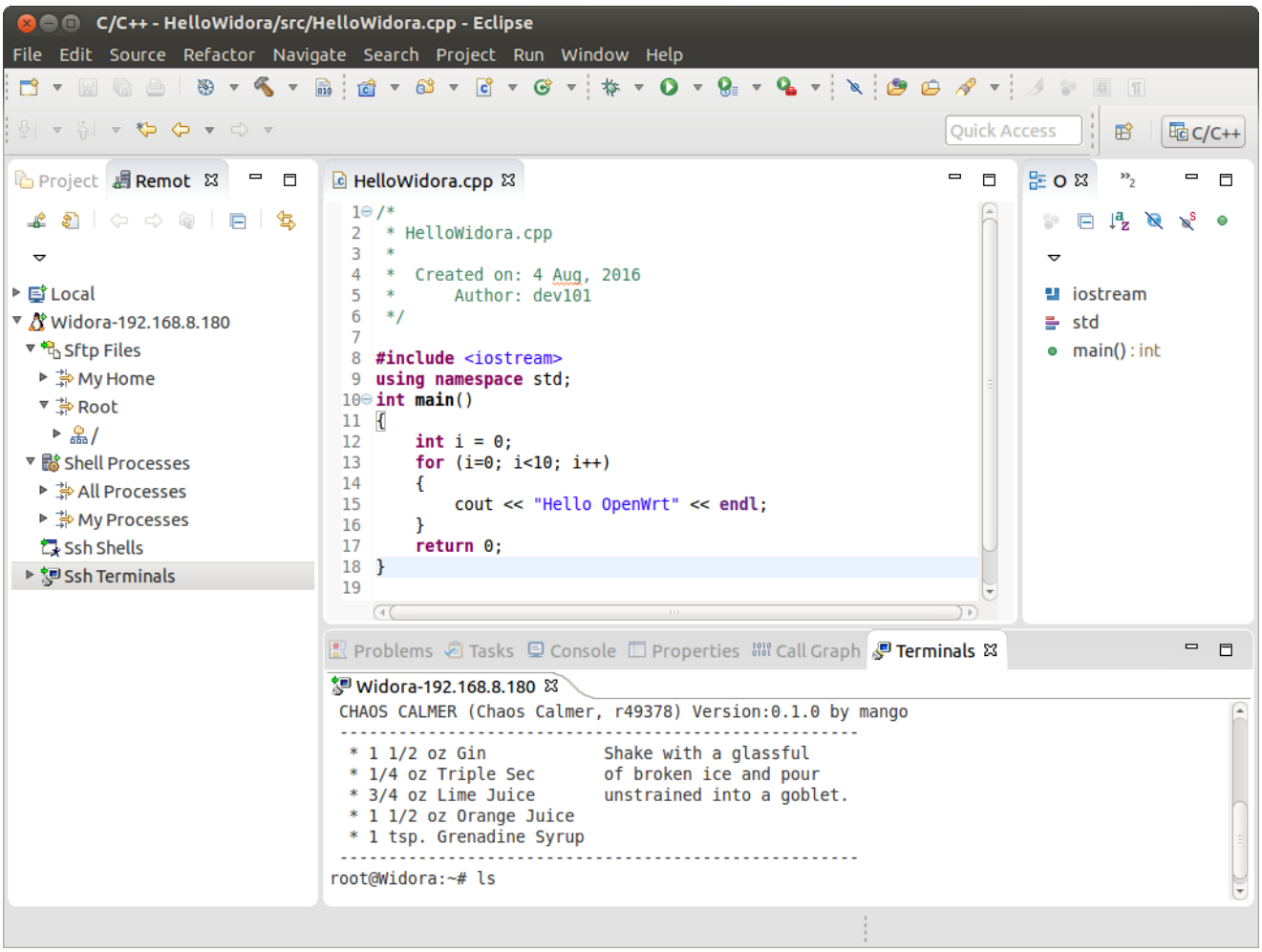


连接成功之后，你可以很方便的把文件拖曳到你的目标设备上(drag n' drop)，你甚至可以控制目标设备的进程(processes)，比如你可以kill一个目标设备上的进程。



你也可以在eclipse里面打开一个SSH Terminal，拷贝执行文件：

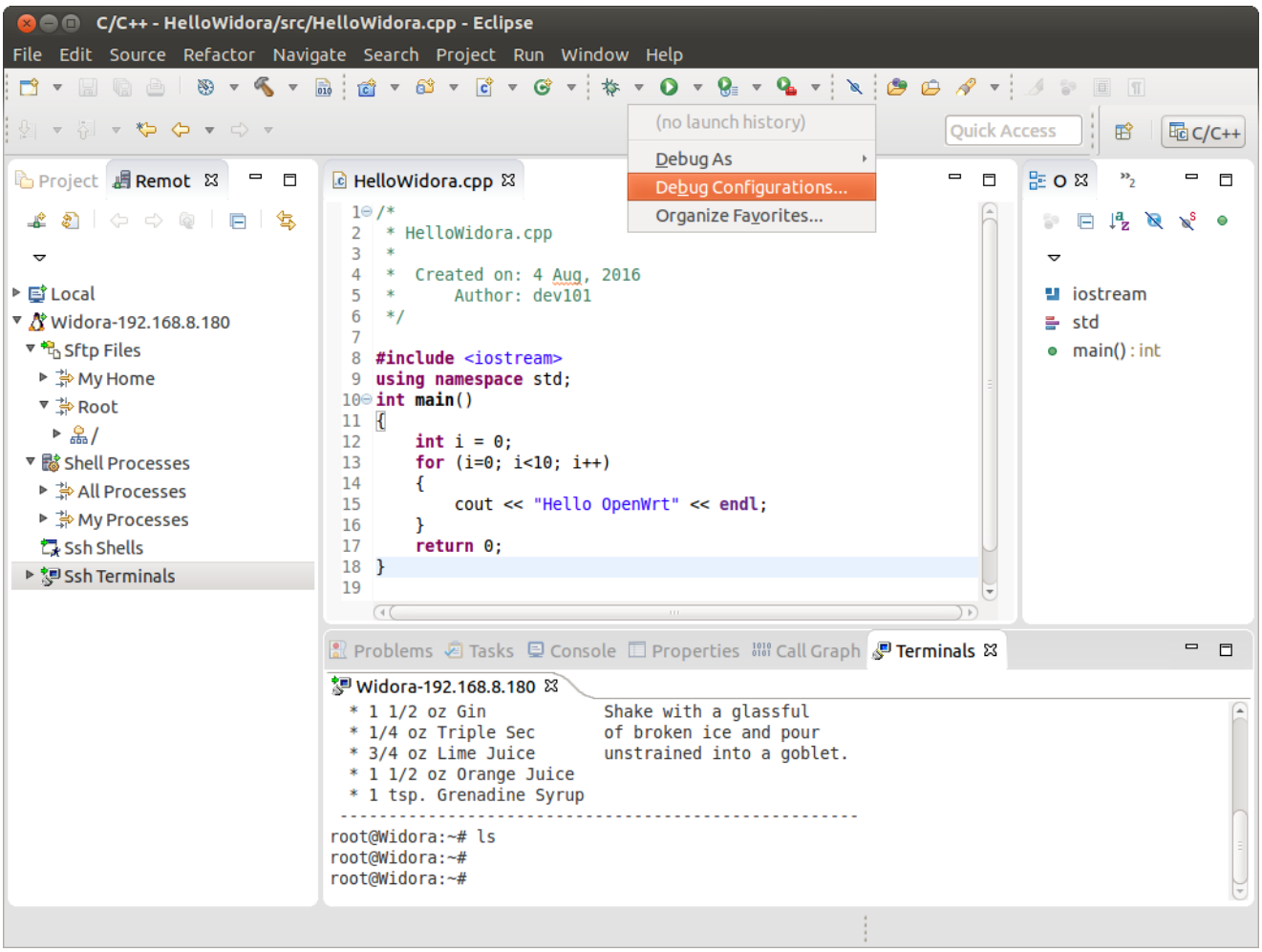

C/C++ - HelloWidora/src/HelloWidora.cpp - Eclipse
File Edit Source Refactor Navigate Search Project Run Window Help
Quick Access
C/C++
Project
Remot
Local
Widora-192.168.8.180
Sftp Files
My Home
Root
/
Shell Processes
All Processes
My Processes
Ssh Shells
Refresh F5
Disconnect
Clear Password
Launch Terminal
Properties Alt+Enter
HelloWidora.cpp
/*
* HelloWidora.cpp
*
* Created on: 4 Aug, 2016
* Author: dev101
*/
#include <iostream>
using namespace std;
int main()
{
int i = 0;
for (i=0; i<10; i++)
{
cout << "Hello OpenWrt" << endl;
}
return 0;
}
iostream
std
main() : int
Tasks
Console
Properties
Call Graph
Console [HelloWidora]
mipsel-openwrt-linux-g++ -o "HelloWidora" ./src/HelloWidora.o
mipsel-openwrt-linux-g++: warning: environment variable 'STAGING_DIR' not defined
mipsel-openwrt-linux-g++: warning: environment variable 'STAGING_DIR' not defined
Finished building target: HelloWidora



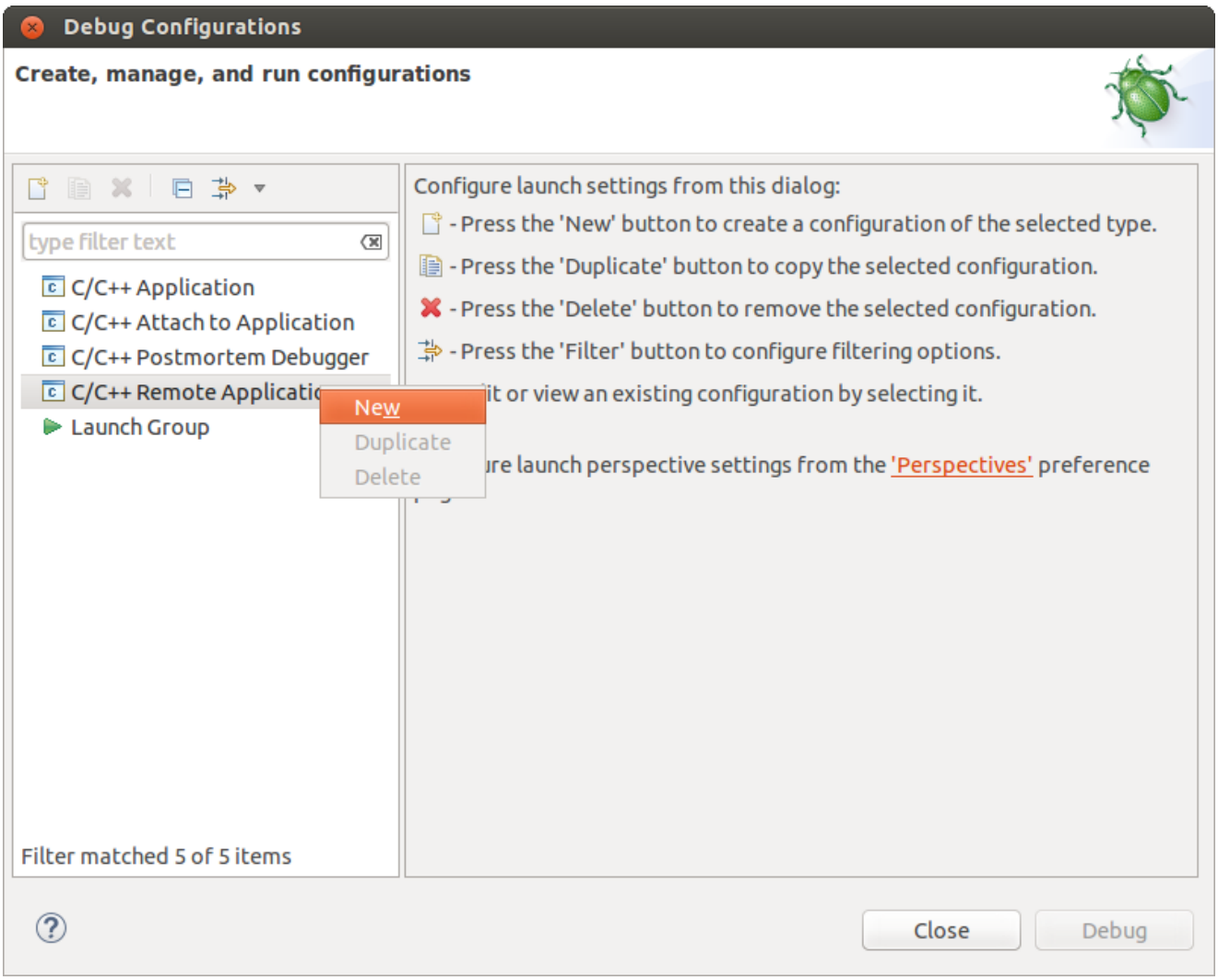
5.1.2.3 远程调试**gdb Debugger**的配置

要想做远程调试，首先我们需要创建一个调试配置:

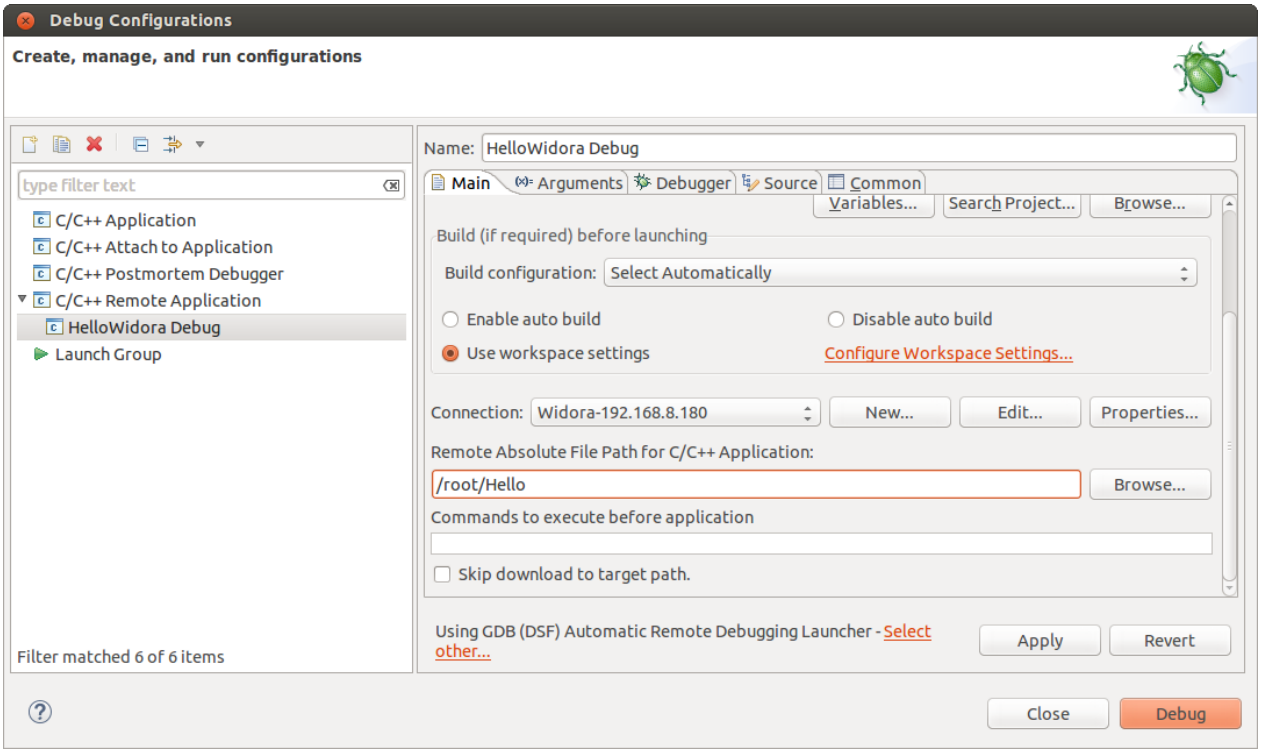
左键点击“bug”图标旁边的箭头，选择“Debug Configurations”。



然后创建一个新的 C/C++ Remote Application Debug Configuration:



- 在 “Main” 选项页.
- 对于 “Connection”，选择之前创建的连接 (看“远程目标设备的配置（Widora）”).
- 不要忘了“Remote Absolute File Path for C/C++ Application”，这里设置的是你想要把程序放到Widora上的绝对路径。



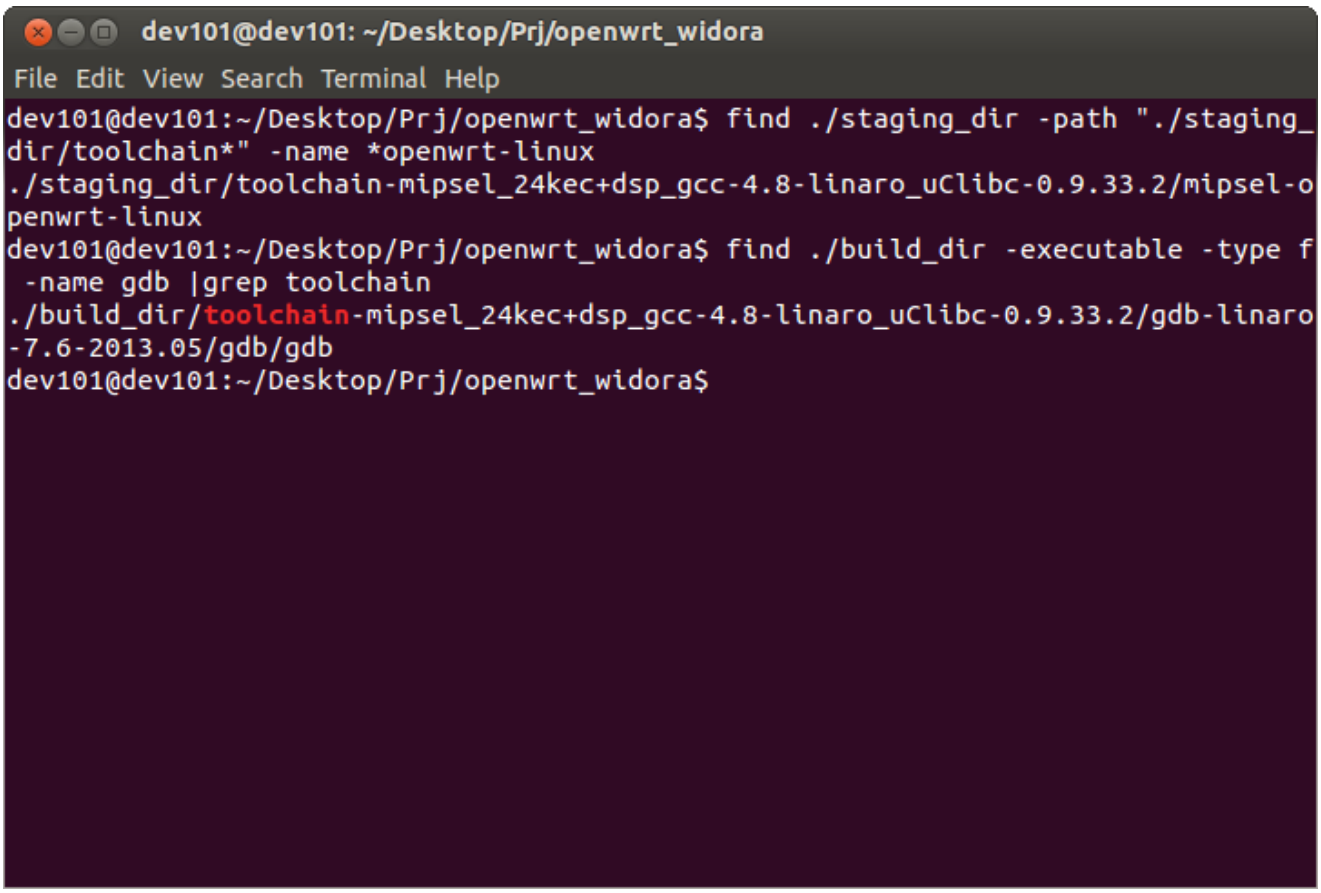
然后切换到 “Debugger” 选项卡设置开发主机的gdb文件.

在开发主机上，我们不能直接用默认的/usr/bin/gdb （Ubuntu默认），我们需要指向我们之前编译的gdb，还有工具命令的前缀也需要设置正确。

在Widora源码根目录执行: `find ./build_dir -executable -type f -name gdb |grep toolchain`。

当撰写这篇指引时用的开发环境返回的结果如下：

```
./build_dir/toolchain-mipsel_24kec+dsp_gcc-4.8-linaro_uClibc-0.9.33.2/gdb-linaro-7.6-2013.05/gdb/gdb
```

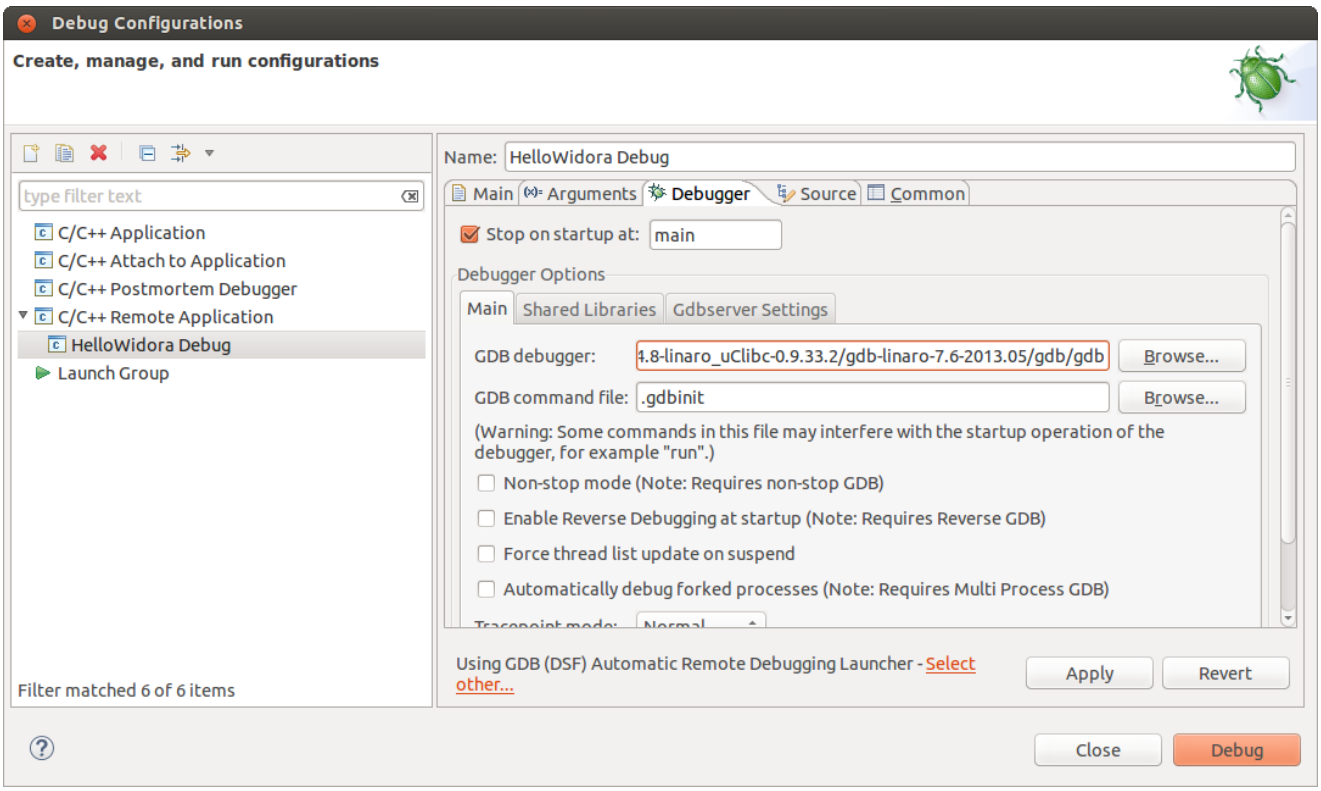


在 “GDB debugger”, 我们需要填写的是绝对路径，对于写这篇指引时用到的开发环境是:

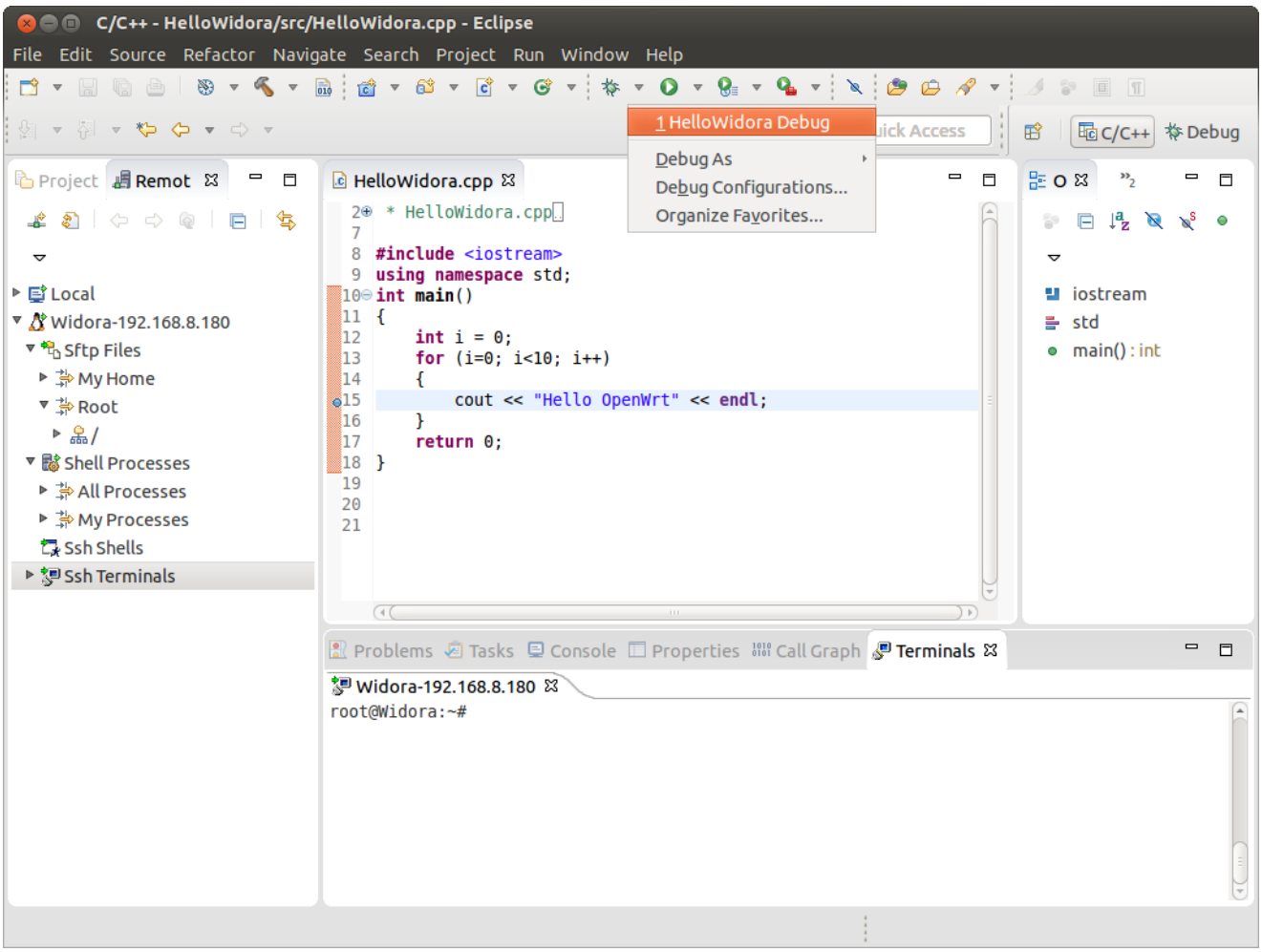
`/home/dev101/Desktop/Prj/openwrt_widora/build_dir/toolchain-mipsel_24kec+dsp_gcc-4.8-linaro_uClibc-0.9.33.2/gdb-linaro-7.6-2013.05/gdb/gdb`

不要忘了你的开发环境应该会和写这篇指引所用的环境不同，不能闭着眼睛复制黏贴!

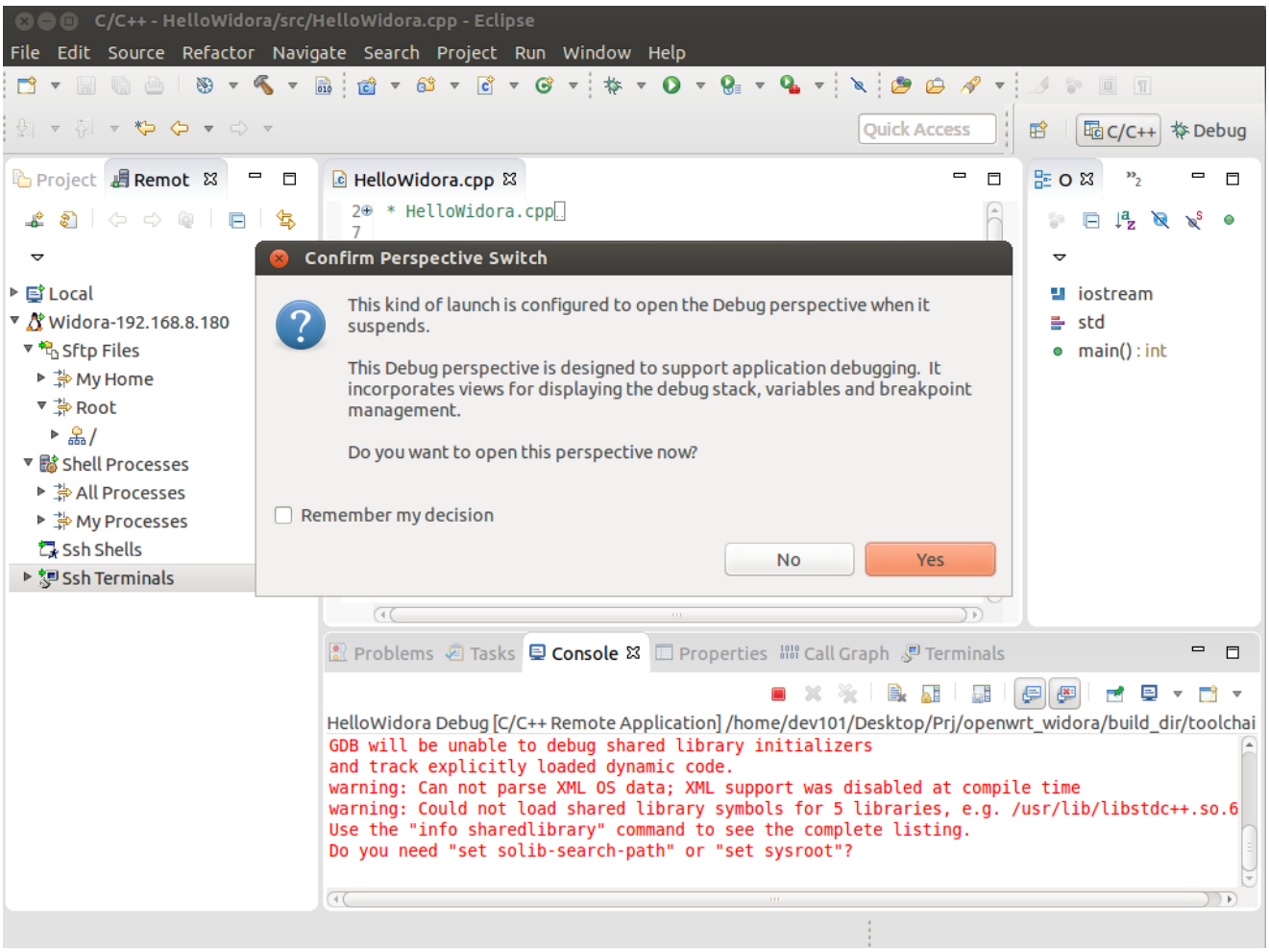
其他的设置不需要改动，现在你可以按“Debug”按钮开始调试。

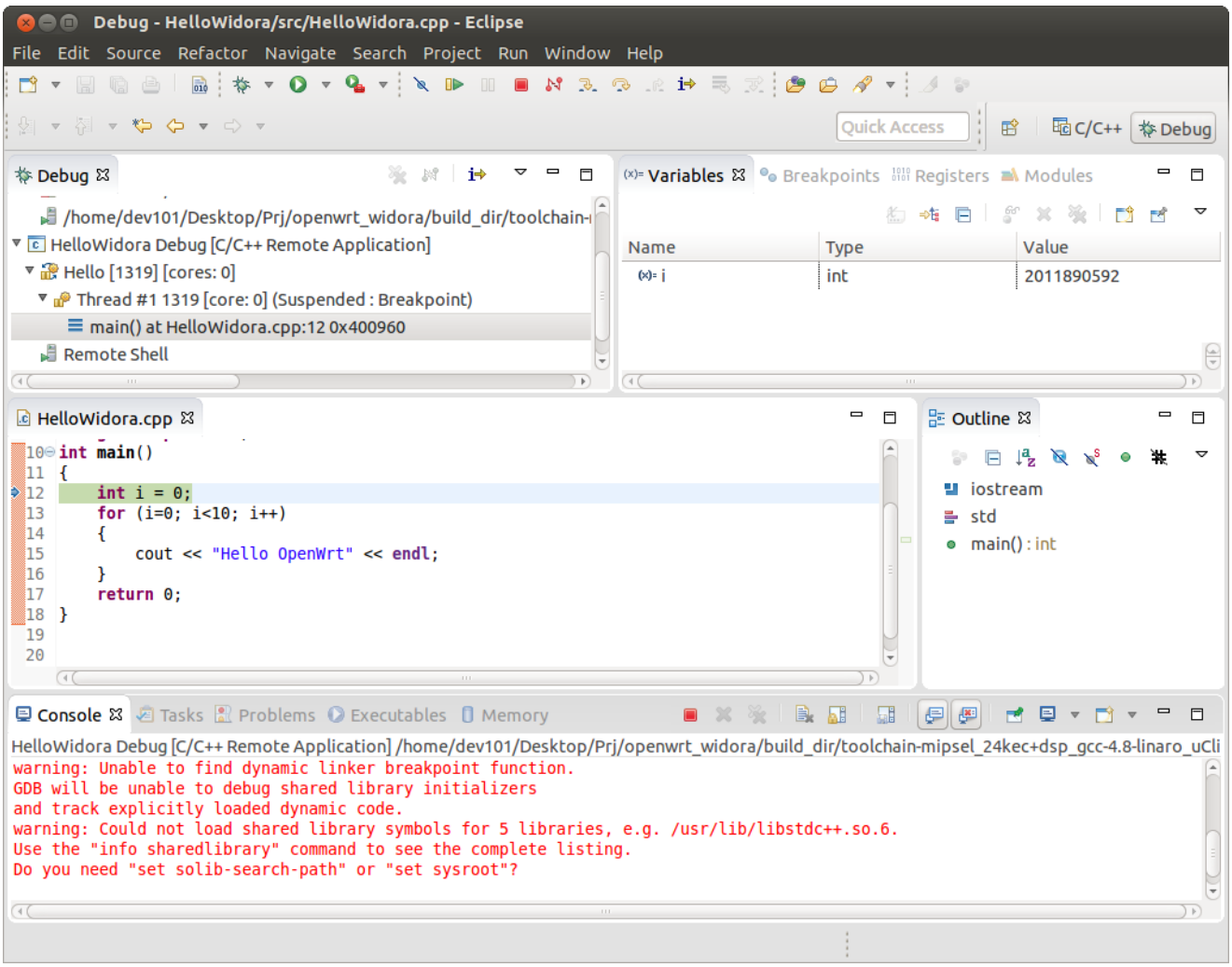

Debug Configurations
Create, manage, and run configurations
type filter text
C/C++ Application
C/C++ Attach to Application
C/C++ Postmortem Debugger
C/C++ Remote Application
HelloWidora Debug
Launch Group
Filter matched 6 of 6 items
Name: HelloWidora Debug
Main
Arguments
Debugger
Source
Common
Stop on startup at: main
Debugger Options
Main
Shared Libraries
Gdbserver Settings
GDB debugger: 4.8-linaro_uClibc-0.9.33.2/gdb-linaro-7.6-2013.05/gdb/gdb
Browse...
GDB command file: .gdbinit
Browse...
(Warning: Some commands in this file may interfere with the startup operation of the debugger, for example "run".)
Non-stop mode (Note: Requires non-stop GDB)
Enable Reverse Debugging at startup (Note: Requires Reverse GDB)
Force thread list update on suspend
Automatically debug forked processes (Note: Requires Multi Process GDB)
Using GDB (DSF) Automatic Remote Debugging Launcher - Select other...
Apply
Revert
Close
Debug

5.1.2.4 远程调试示例



当你选择开始我们之前配置好的远程调试之后，eclipse的调试视图会打开：

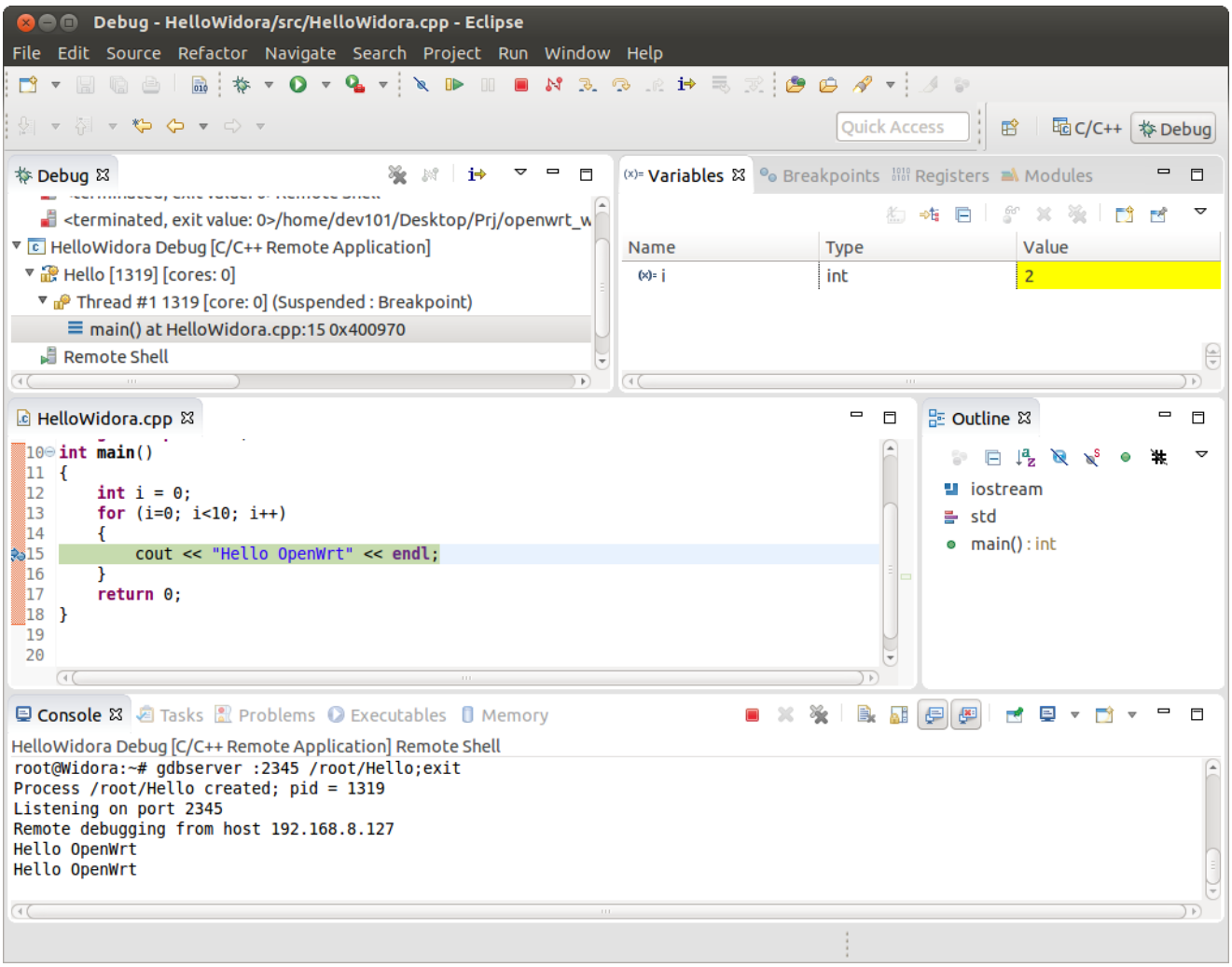

C/C++ - HelloWidora/src/HelloWidora.cpp - Eclipse
File Edit Source Refactor Navigate Search Project Run Window Help
Quick Access
C/C++
Debug
Project
Remot
HelloWidora.cpp
* HelloWidora.cpp
Confirm Perspective Switch
This kind of launch is configured to open the Debug perspective when it suspends.
This Debug perspective is designed to support application debugging. It incorporates views for displaying the debug stack, variables and breakpoint management.
Do you want to open this perspective now?
Remember my decision
No
Yes
Local
Widora-192.168.8.180
Sftp Files
My Home
Root
/
Shell Processes
All Processes
My Processes
Ssh Shells
Ssh Terminals
iostream
std
main() : int
Problems
Tasks
Console
Properties
Call Graph
Terminals
HelloWidora Debug [C/C++ Remote Application] /home/dev101/Desktop/Prj/openwrt_widora/build_dir/toolchai
GDB will be unable to debug shared library initializers
and track explicitly loaded dynamic code.
warning: Can not parse XML OS data; XML support was disabled at compile time
warning: Could not load shared library symbols for 5 libraries, e.g. /usr/lib/libstdc++.so.6
Use the "info sharedlibrary" command to see the complete listing.
Do you need "set solib-search-path" or "set sysroot"?

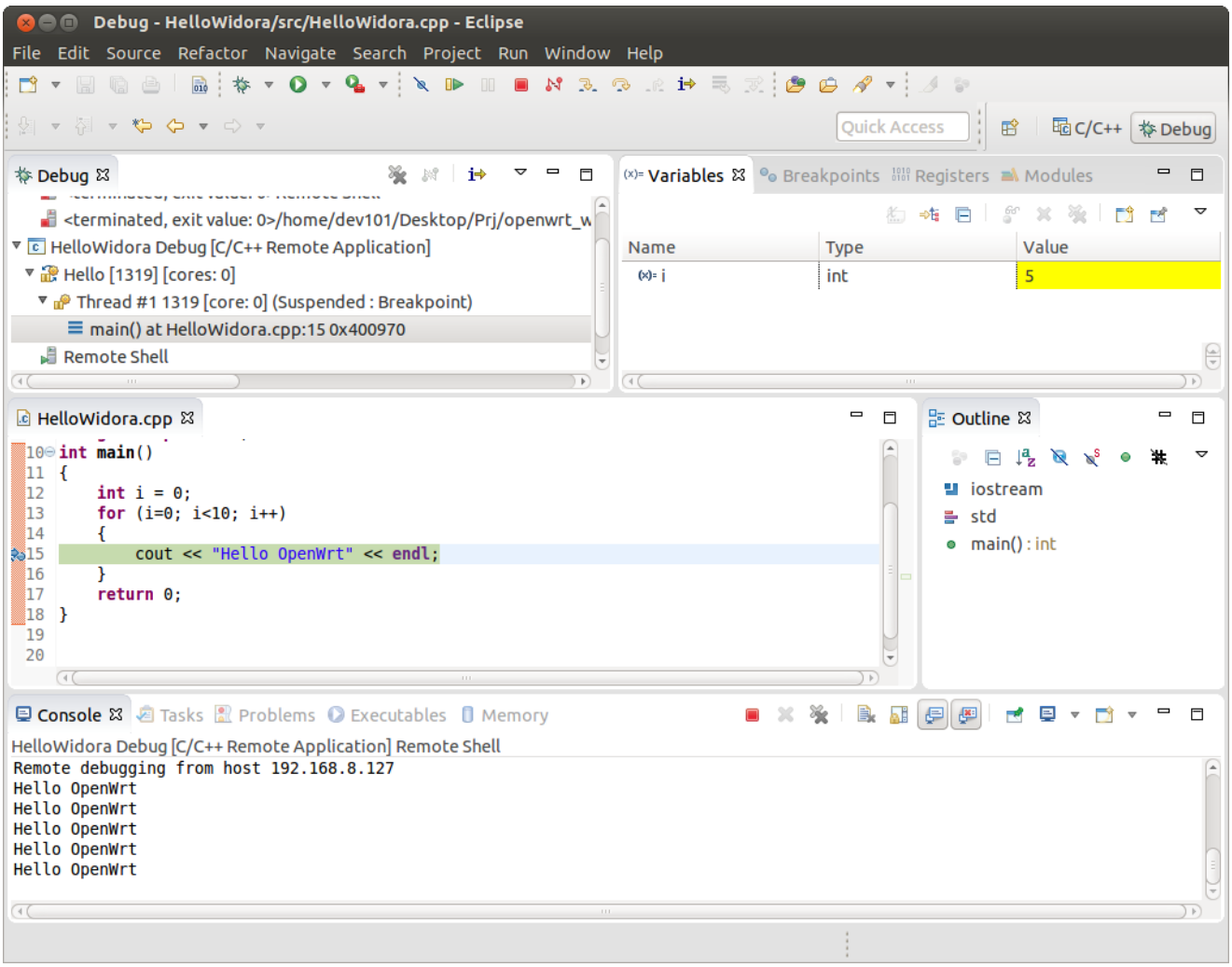


上面的红色警告可以忽略，原因是当编译Widora现在所运行的这个固件的是后我们没有选择 `“Advanced configuration options (for developers)->Build Options->Debugging”`。

6 总结

恭喜，你现在已经有一个完整的OpenWrt的IDE开发环境了！你可以在Eclipse IDE里面开发你的OpenWrt C/C++ 程序，交叉编译它，设置断点，远程调试。


Debug - HelloWidora/src/HelloWidora.cpp - Eclipse
File Edit Source Refactor Navigate Search Project Run Window Help
Quick Access
C/C++
Debug
Debug
<terminated, exit value: 0>/home/dev101/Desktop/Prj/openwrt_w
HelloWidora Debug [C/C++ Remote Application]
Hello [1319] [cores: 0]
Thread #1 1319 [core: 0] (Suspended : Breakpoint)
main() at HelloWidora.cpp:15 0x400970
Remote Shell
Variables
Breakpoints
Registers
Modules
Name
Type
Value
i
int
2
HelloWidora.cpp
int main()
{
int i = 0;
for (i=0; i<10; i++)
{
cout << "Hello OpenWrt" << endl;
}
return 0;
}
Outline
iostream
std
main() : int
Console
Tasks
Problems
Executables
Memory
HelloWidora Debug [C/C++ Remote Application] Remote Shell
root@Widora:~# gdbserver :2345 /root/Hello;exit
Process /root/Hello created; pid = 1319
Listening on port 2345
Remote debugging from host 192.168.8.127
Hello OpenWrt
Hello OpenWrt


Debug - HelloWidora/src/HelloWidora.cpp - Eclipse
File Edit Source Refactor Navigate Search Project Run Window Help
Quick Access
C/C++
Debug
Debug
<terminated, exit value: 0>/home/dev101/Desktop/Prj/openwrt_w
HelloWidora Debug [C/C++ Remote Application]
Hello [1319] [cores: 0]
Thread #1 1319 [core: 0] (Suspended : Breakpoint)
main() at HelloWidora.cpp:15 0x400970
Remote Shell
Variables
Breakpoints
Registers
Modules
Name
Type
Value
i
int
5
HelloWidora.cpp
int main()
{
int i = 0;
for (i=0; i<10; i++)
{
cout << "Hello OpenWrt" << endl;
}
return 0;
}
Outline
iostream
std
main() : int
Console
Tasks
Problems
Executables
Memory
HelloWidora Debug [C/C++ Remote Application] Remote Shell
Remote debugging from host 192.168.8.127
Hello OpenWrt
Hello OpenWrt
Hello OpenWrt
Hello OpenWrt
Hello OpenWrt