Lab 2：交叉编译

葛现隆 3120102146

一、 实验目的

1 掌握嵌入式板卡和PC建立文件共享的方式；
2 寻找和安装交叉编译环境，理解交叉编译；
3 熟悉嵌入式板卡的Linux下的编程环境；
4 了解远程访问嵌入式板卡图形桌面的方式。

二、实验器材

1. 硬件
   - 嵌入式板卡一块；
   - 5V/1A电源一个；
   - microUSB线一根；
   - USB-TTL串口线一根（FT232RL芯片或PL2303芯片）。
2. 器材
   - Mac OS一台；
   - 以太网线一根、路由器一个。
3. 软件
   - PC上的USB-TTL串口线配套的驱动程序；
   - PC上的串口终端软件, minicom
   - PC上的SSH软件
   - 交叉编译软件, arm-linux

三、 实验步骤

1. 配置嵌入式板卡上的SAMBA客户端，使它能访问PC上共享的目录；

登录raspberry，运行sudo apt-get install samba；

```
pi@raspberrypi:~$ sudo apt-get install samba
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following extra packages will be installed:
  tdb-tools
Suggested packages:
  openbsd-inetd inet-superserver smbldap-tools ldb-tools ctdb
The following NEW packages will be installed:
  samba tdb-tools
0 upgraded, 2 newly installed, 0 to remove and 0 not upgraded.
Need to get 3,375 kB of archives.
After this operation, 20.2 MB of additional disk space will be used.
Do you want to continue [Y/n]?
```

执行出现错误，需要更新apt-get；

```
Do you want to continue [Y/n]? y
Err http://mirrordirector.raspbian.org/raspbian/ wheezy/main samba armhf 2:3.6.4
  404  Not Found
Failed to fetch http://mirrordirector.raspbian.org/raspbian/pool/main/s/samba/sd
E: Unable to fetch some archives, maybe run apt-get update or try with --fix-mi?
```

执行sudo apt-get update，进行更新；

```
pi@raspberrypi:~$ sudo apt-get update
Get:1 http://mirrordirector.raspbian.org wheezy Release.gpg [490 B]
Get:2 http://mirrordirector.raspbian.org wheezy Release [14.4 kB]
Get:3 http://raspberrypi.collabora.com wheezy Release.gpg [836 B]
```

再执行sudo apt-get install samba，即可成功安装samba；

```
Do you want to continue [Y/n]? y
Get:1 http://mirrordirector.raspbian.org/raspbian/ wheezy/main libwbclient0 arm]
Get:2 http://mirrordirector.raspbian.org/raspbian/ wheezy/main smbclient armhf ]
Get:3 http://mirrordirector.raspbian.org/raspbian/ wheezy/main samba-common all]
Get:4 http://mirrordirector.raspbian.org/raspbian/ wheezy/main samba armhf 2:3.]
Fetched 8,153 kB in 17s (474 kB/s)
Preconfiguring packages ...
(Reading database ... 78492 files and directories currently installed.)
Preparing to replace libwbclient0:armhf 2:3.6.6-6+deb7u4 (using .../libwbclient.
Unpacking replacement libwbclient0:armhf ...
Preparing to replace smbclient 2:3.6.6-6+deb7u4 (using .../smbclient_2%3a3.6.6-.
Unpacking replacement smbclient ...
Preparing to replace samba-common 2:3.6.6-6+deb7u4 (using .../samba-common_2%3a.
Unpacking replacement samba-common ...
Selecting previously unselected package samba.
Unpacking samba (from .../samba_2%3a3.6.6-6+deb7u5_armhf.deb) ...
Selecting previously unselected package tdb-tools.
Unpacking tdb-tools (from .../tdb-tools_1.2.10-2_armhf.deb) ...
Processing triggers for man-db ...
Setting up libwbclient0:armhf (2:3.6.6-6+deb7u5) ...
```

配置samba，执行sudo vim /etc/samba/smb.conf;

```
pi@raspberrypi:~$ sudo vim /etc/samba/smb.conf
```

修改一下行；

```
# "security = user" is always a good idea.
# in this server for every user accessing t
# /usr/share/doc/samba-doc/htmldocs/Samba3-
# in the samba-doc package for details.
   security = user
```

添加一下行；

```
# This option controls how unsuccessful
# to anonymous connections
    map to guest = bad user
    guest account = pi
########## Domains ############
```

在文件结尾添加；

```
[Media]
comment =usb storage
path = /home/pi
browseable = Yes
read only = No
guest ok = Yes
-- INSERT --
```

重启samba，执行sudo service samba restart;

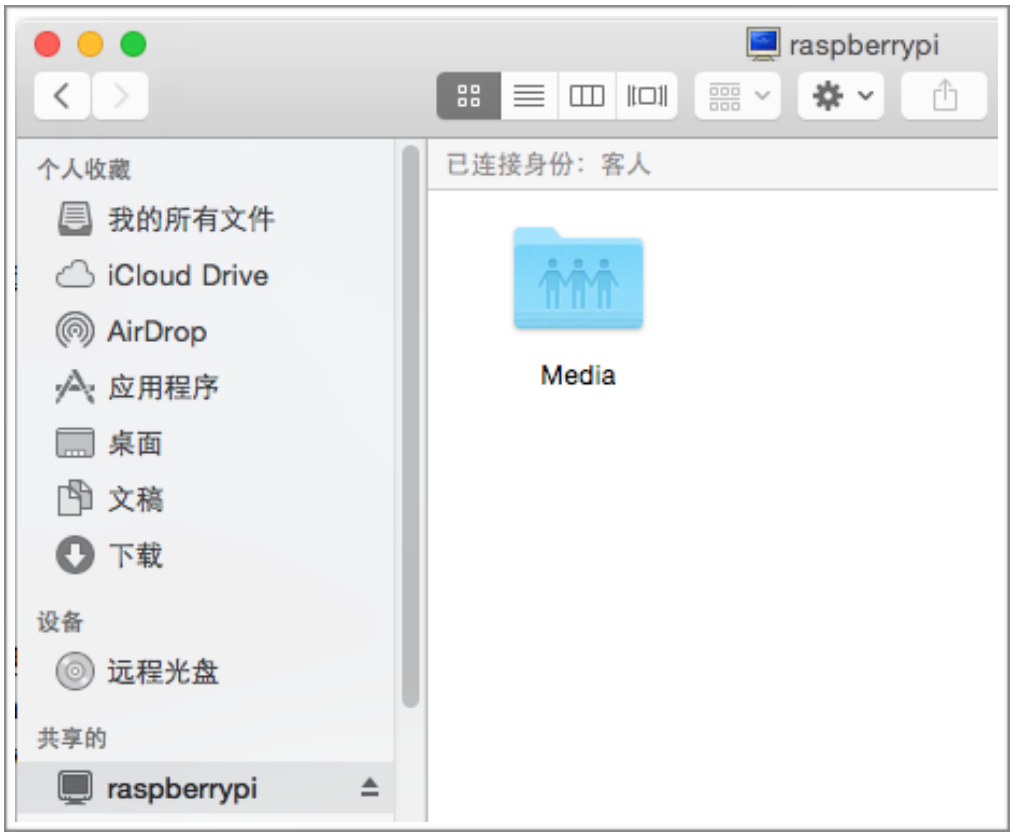
```
pi@raspberrypi:~$ service samba restart
Stopping Samba daemons: nmbdstart-stop-daemon: warning: failed to kill 2932: Ope
ration not permitted
 smbdstart-stop-daemon: warning: failed to kill 2935: Operation not permitted
.
Starting Samba daemons: nmbd failed!
pi@raspberrypi:~$ sudo service samba restart
Stopping Samba daemons: nmbd smbd.
Starting Samba daemons: nmbd smbd.
```

到此，可通过共享文件，无需登录访问raspberry下相关文件。

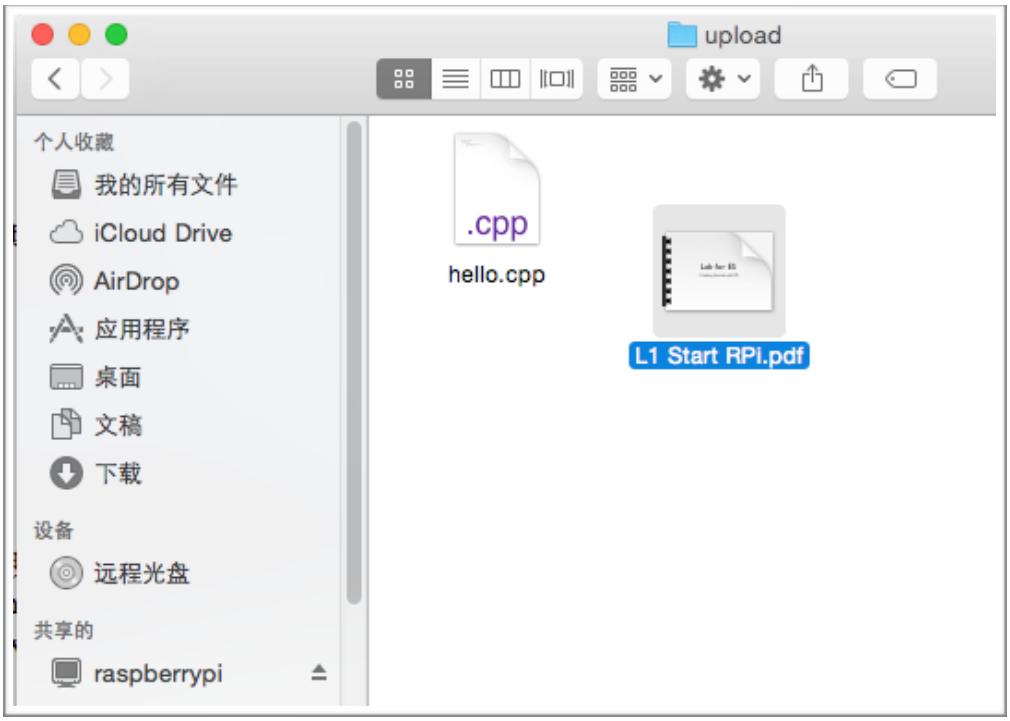
2. 尝试各种与嵌入式板卡传递文件的方式并做比较

a. 通过SAMBA共享

在共享中查看raspberry设备；



直接拖入想要存放的文件，如图为L1 Start RPI.pdf



b. 通过sftp传递

执行scp 文件名 pi@ip:目录，传递文件，如图传递了hello.cpp文件到upload；

```
eledeMacBook-Pro:ES ele$ scp hello.cpp pi@192.168.1.104:/home/pi/upload
pi@192.168.1.104's password:
hello.cpp                                     100%   75     0.1KB/s   00:00
eledeMacBook-Pro:ES ele$
```

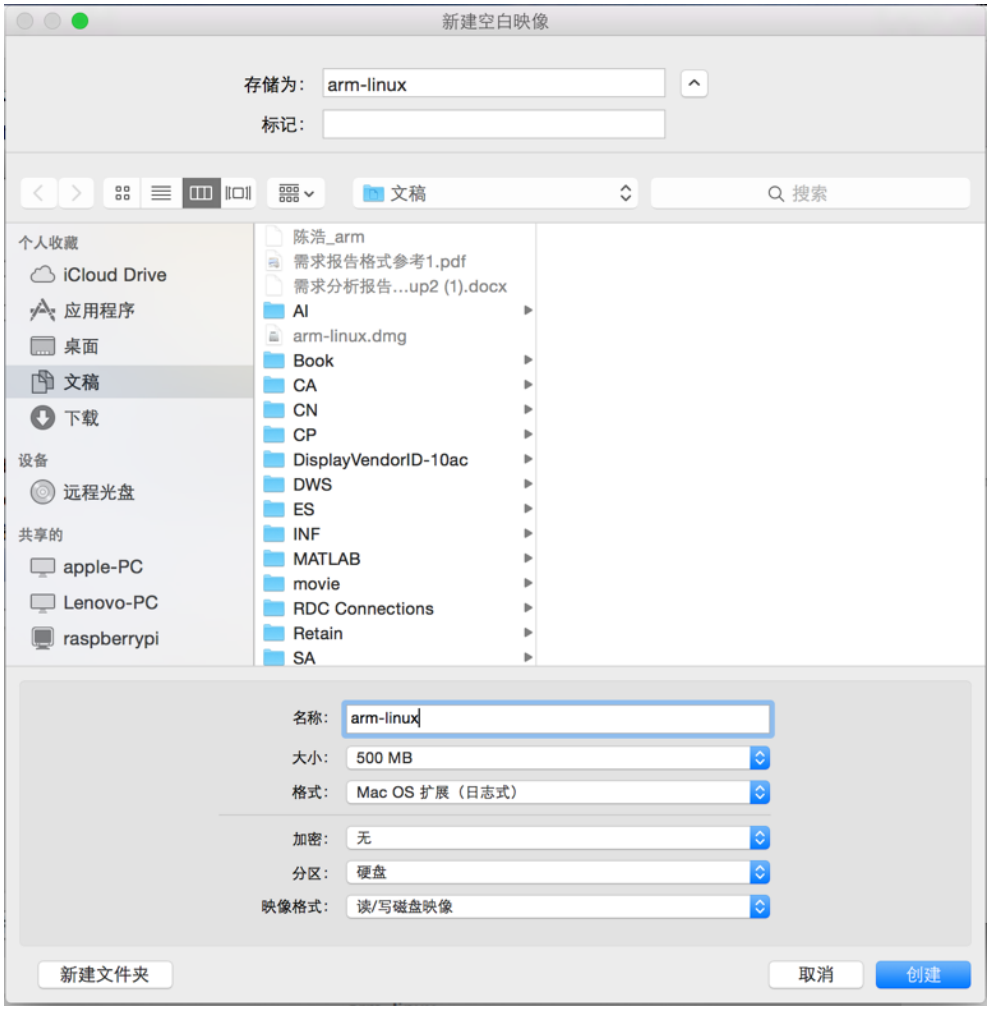
在raspberry下查看相应文件。

```
pi@raspberrypi:~$ ls upload/
hello.cpp
```

3. 选择和安装PC上的交叉编译环境；

下载交叉编译工具ARM GNU Linux；
https://github.com/downloads/UnhandledException/ARMx/ARMx-2009q3-67.tar.bz2

为解决Mac系统默认对大小写不敏感的问题，构建一个对大小写敏感的磁盘环境。
使用磁盘工具，在右上角选择文件—>新建—>空白磁盘映像；
选择合适的路径和大小（100以上，不然不够存放解压后文件）。



将压缩包解压到映像下，
执行tar -zx -C /Volumes/arm-linux/ --strip-components 1 -f ARMx-2009q3-67.tar.bz2；

```
eledeMacBook-Pro:Downloads ele$ tar -zx -C /Volumes/arm-linux/ --strip-components 1 -f
ARMx-2009q3-67.tar.bz2
eledeMacBook-Pro:Downloads ele$
```

使用环境编译hello.cpp文件为可执行文件hello,
/Volumes/arm-linux/bin/arm-none-linux-gnueabi-gcc hello.c -o hello ;

```
eledeMacBook-Pro:ES ele$ /Volumes/arm-linux/bin/arm-none-linux-gnueabi-gcc hello.cpp -o hello
eledeMacBook-Pro:ES ele$
```

将文件通过sftp传送到raspberry；

```
eledeMacBook-Pro:ES ele$ /Volumes/arm-linux/bin/arm-none-linux-gnueabi-gcc hello.cpp -o hello
eledeMacBook-Pro:ES ele$ scp hello pi@192.168.1.104:/home/pi/upload
pi@192.168.1.104's password:
hello                                         100% 8171     8.0KB/s   00:00
```

在raspberry下执行hello，成功；

```
pi@raspberrypi ~ $ ./upload/hello
i+j : 4.090000
pi@raspberrypi ~ $
```

在Mac下无法执行；

```
eledeMacBook-Pro:~ ele$ ./Documents/ES/hello
-bash: ./Documents/ES/hello: cannot execute binary file
```

hello.cpp程序如下：

hello.cpp

```
#include <stdio.h>

int main(void){
    float i,j;
    i=1.767;
    j=2.323;
    printf("i+j : %f\n",i+j);
    return 0;
}
```

4. 尝试嵌入式板卡上的三个语言的开发环境：C/C++、Python和Java；
   linux一般自带python，可直接运行，如下hello.cp程序；

```
pi@raspberrypi ~ $ python
Python 2.7.3 (default, Mar 18 2014, 05:13:23)
[GCC 4.6.3] on linux2
Type "help", "copyright", "credits" or "license" for more information.
>>>
KeyboardInterrupt
>>> quit
Use quit() or Ctrl-D (i.e. EOF) to exit
>>> exit()
pi@raspberrypi ~ $ vim hello.py
pi@raspberrypi ~ $ python hello.py
Hello, World!
pi@raspberrypi ~ $
```

同样，linux一般也自带java环境；

```
pi@raspberrypi ~ $ javac hello.java
pi@raspberrypi ~ $ java hello
Hello, World!
pi@raspberrypi ~ $
```

5. 尝试一种从PC远程访问嵌入式板卡图形桌面的方式：VNC。

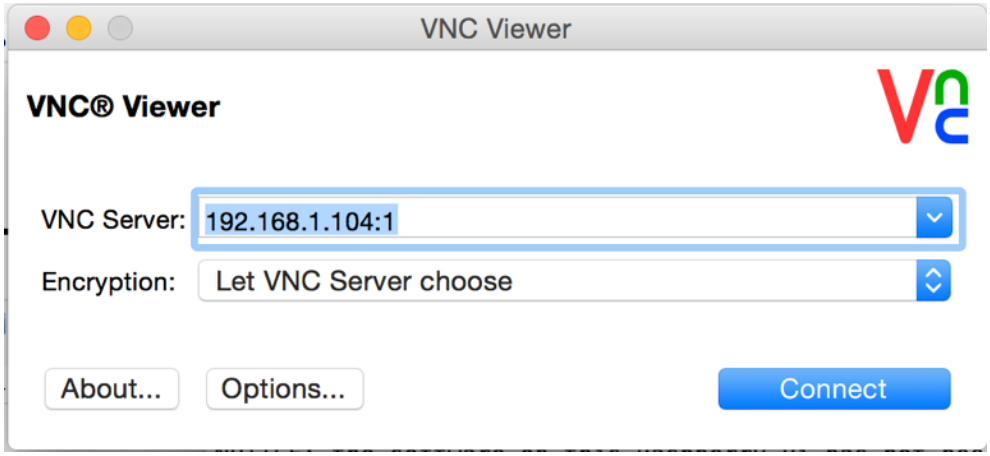
在raspberry上安装vnc，执行sudo apt-get install tightvnserver;

```
pi@raspberrypi:~$ sudo apt-get install tightvncserver
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following extra packages will be installed:
  xfonts-base
Suggested packages:
  tightvnc-java
The following NEW packages will be installed:
  tightvncserver xfonts-base
0 upgraded, 2 newly installed, 0 to remove and 61 not upgraded.
Need to get 6,967 kB of archives.
After this operation, 9,988 kB of additional disk space will be used.
Do you want to continue [Y/n]? y
```

增加一个桌面，执行tightvnserver，设置密码；

```
pi@raspberrypi ~ $ tightvncserver

You will require a password to access your desktops.

Password:
Verify:
Would you like to enter a view-only password (y/n)? n
xauth:  file /home/pi/.Xauthority does not exist

New 'X' desktop is raspberrypi:1

Creating default startup script /home/pi/.vnc/xstartup
Starting applications specified in /home/pi/.vnc/xstartup
Log file is /home/pi/.vnc/raspberrypi:1.log

pi@raspberrypi ~ $
```

Mac端下载vncViewer，只安装Viewer，不安装Server，不需要购买Key；
运行vncViewer，输入ip:port，如图，connect;



登录后界面如下：