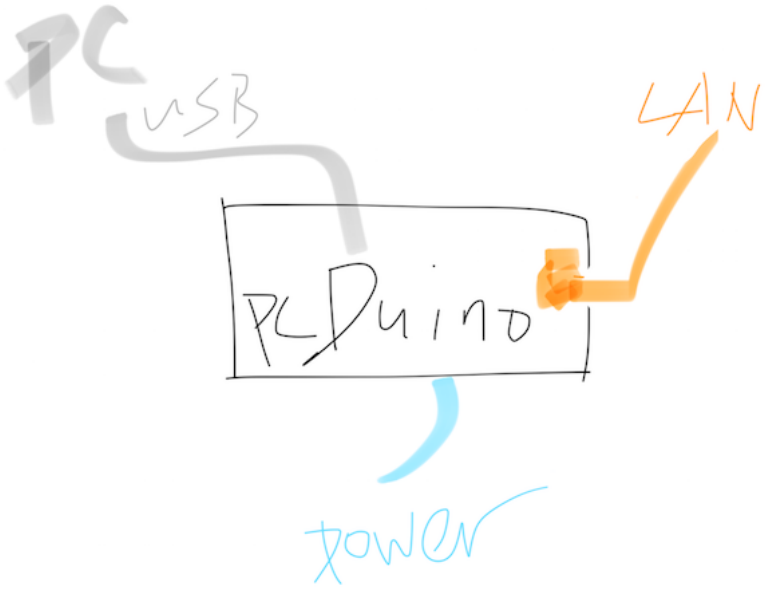
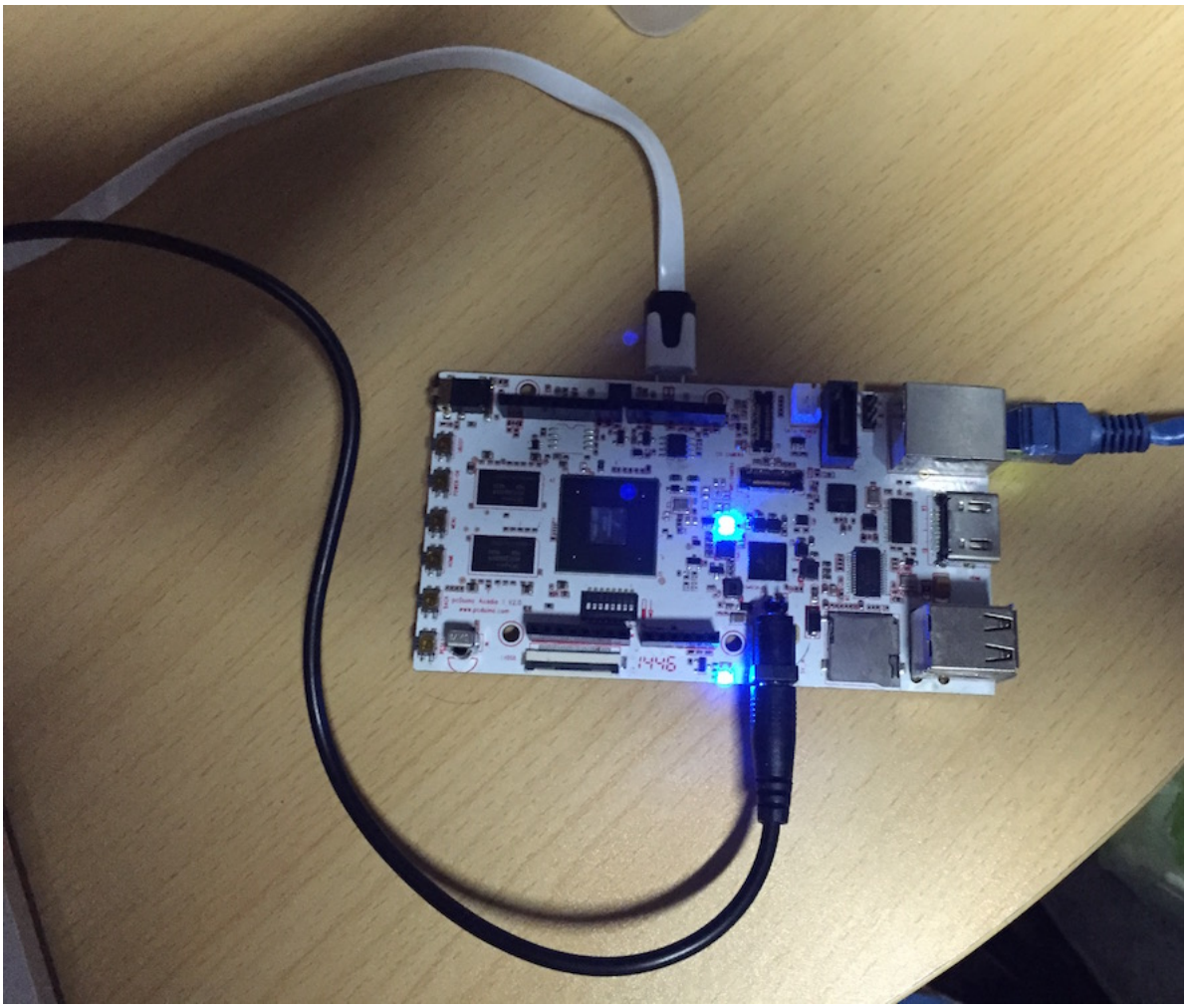
Lab 1：启动

连接示意图；



给出实际拍摄的板卡连接照片；



给出所用的器材的列表；

- pcduino主板一块；
- 5V/1A电源一个；
- microUSB线一根；
- Mac OS 一台；
- 以太网线一根；
- 路由器一台

pcDuino启动时的输出文字

```
/* 硬件自检，加载BIOS */
U-Boot 2009.08 (Dec 11 2014 - 20:20:23)

CPU: Freescale i.MX6 family TO1.2 at 792 MHz
Thermal sensor with ratio = 171
Temperature:   20 C, calibration data 0x53c4b569

Board: i.MX6Q-SABRESD: unknown-board Board: 0x63012 [POR ]
Boot Device: MMC
I2C:   ready
DRAM:   1 GB

/* 加载内核镜像 */
MMC read: dev # 3, block # 2048, count 10240 ... 10240 blocks read: OK  //内核位置
## Booting kernel from Legacy Image at 10800000 ...
Image Name:   Linux-3.0.35-2666-gbdde708    //镜像名称
Image Type:   ARM Linux Kernel Image (uncompressed) //镜像类型
Data Size:    4422312 Bytes =  4.2 MB
Load Address: 10008000
Entry Point:  10008000
Verifying Checksum ... OK
Loading Kernel Image ... OK
OK


/* 启动内核模块 */
Starting kernel ...
                                                                    Uncompressing Linux... done, booting the kernel.
Linux version 3.0.35-2666-gbdde708 (root@ubuntu) (gcc version 4.6.3 (Ubuntu/Lin4
CPU: ARMv7 Processor [412fc09a] revision 10 (ARMv7), cr=10c53c7d
CPU: VIPT nonaliasing data cache, VIPT aliasing instruction cache
...
PID hash table entries: 4096 (order: 2, 16384 bytes)
Dentry cache hash table entries: 131072 (order: 7, 524288 bytes)
Inode-cache hash table entries: 65536 (order: 6, 262144 bytes)  //文件innode结构哈希表
Memory: 512MB 256MB = 768MB total
Memory: 764648k/764648k available, 283928k reserved, 0K highmem

/* 虚拟地址映射 */
Virtual kernel memory layout:
vector  : 0xffff0000 - 0xffff1000   (   4 kB)
fixmap  : 0xfff00000 - 0xfffe0000   ( 896 kB)
DMA     : 0xf4600000 - 0xffe00000   ( 184 MB)
vmalloc : 0xc0800000 - 0xf2000000   ( 792 MB)
lowmem  : 0x80000000 - 0xc0000000   (1024 MB)
pkmap   : 0x7fe00000 - 0x80000000   (   2 MB)
modules : 0x7f000000 - 0x7fe00000   (  14 MB)
  .init : 0x80008000 - 0x8003e000   ( 216 kB)
  .text : 0x8003e000 - 0x80b93ca8   (11608 kB)
  .data : 0x80b94000 - 0x80bff600   ( 430 kB)
   .bss : 0x80bff624 - 0x80c58d0c   ( 358 kB)

/* 对称多处理器 */
CPU1: Booted secondary processor
CPU2: Booted secondary processor
CPU3: Booted secondary processor
Brought up 4 CPUs
SMP: Total of 4 processors activated (6324.22 BogoMIPS).

/* 登录SHELL */
Last login: Thu Jan  1 08:00:14 CST 1970 on tty1
Welcome to Linaro 12.11 (GNU/Linux 3.0.35-2666-gbdde708 armv7l)
```

通过Linux获得硬件数据

```
Processor       : ARMv7 Processor rev 10 (v7l)
processor       : 0
BogoMIPS        : 1988.28

processor       : 1
BogoMIPS        : 1988.28

processor       : 2
BogoMIPS        : 1988.28

processor       : 3
BogoMIPS        : 1988.28

Features        : swp half thumb fastmult vfp edsp neon vfpv3
CPU implementer : 0x41
CPU architecture: 7
CPU variant     : 0x2
CPU part        : 0xc09
CPU revision    : 10

Hardware        : Freescale i.MX 6Quad/DualLite/Solo Sabre-SD B
Revision        : 63012
Serial          : 211459d4dbc84ce6
```

```
root@Acadia:~# df
Filesystem     1K-blocks    Used Available Use% Mounted on
/dev/root        7615832 2491932   4737036  35% /
none               76488     404     76084   1% /run
none                5120       0      5120   0% /run/lock
none              382432       0    382432   0% /run/shm
```

pcDuino和PC两端网络已连通；

```
➜ ~  ping 192.168.1.12
PING 192.168.1.12 (192.168.1.12): 56 data bytes
64 bytes from 192.168.1.12: icmp_seq=0 ttl=64 time=2.613 ms
64 bytes from 192.168.1.12: icmp_seq=1 ttl=64 time=10.723 ms
64 bytes from 192.168.1.12: icmp_seq=2 ttl=64 time=12.347 ms
64 bytes from 192.168.1.12: icmp_seq=3 ttl=64 time=1.167 ms
64 bytes from 192.168.1.12: icmp_seq=4 ttl=64 time=7.000 ms
64 bytes from 192.168.1.12: icmp_seq=5 ttl=64 time=1.715 ms
64 bytes from 192.168.1.12: icmp_seq=6 ttl=64 time=2.288 ms
64 bytes from 192.168.1.12: icmp_seq=7 ttl=64 time=5.126 ms
64 bytes from 192.168.1.12: icmp_seq=8 ttl=64 time=1.247 ms
64 bytes from 192.168.1.12: icmp_seq=9 ttl=64 time=1.618 ms
```

```
root@Acadia:~# ping 192.168.1.10
PING 192.168.1.10 (192.168.1.10) 56(84) bytes of data.
64 bytes from 192.168.1.10: icmp_req=1 ttl=64 time=172 ms
64 bytes from 192.168.1.10: icmp_req=2 ttl=64 time=200 ms
64 bytes from 192.168.1.10: icmp_req=3 ttl=64 time=227 ms
64 bytes from 192.168.1.10: icmp_req=4 ttl=64 time=63.8 ms
64 bytes from 192.168.1.10: icmp_req=5 ttl=64 time=58.0 ms
64 bytes from 192.168.1.10: icmp_req=6 ttl=64 time=79.0 ms
^C
```

SSH配置文件，并解释其中内容；

```
➜ ~  ssh root@192.168.1.12
root@192.168.1.12's password:
Welcome to Linaro 12.11 (GNU/Linux 3.0.35-2666-gbdde708 armv7l)

 * Documentation:  https://wiki.linaro.org/
Last login: Thu Jan  1 08:00:14 1970
root@Acadia:~#
```

存在多个登陆时，who命令看到不同登录；

```
root@Acadia:~# who
root     ttymxc0      1970-01-01 08:00
root     tty1         1970-01-01 08:00
root     pts/2        1970-01-01 08:12 (192.168.1.10)
```

```
root@Acadia:~# write root ttymxc0
write: write: you have write permission turned off.

2016
0311
yangyuming
fm.zju.edu.cn
```

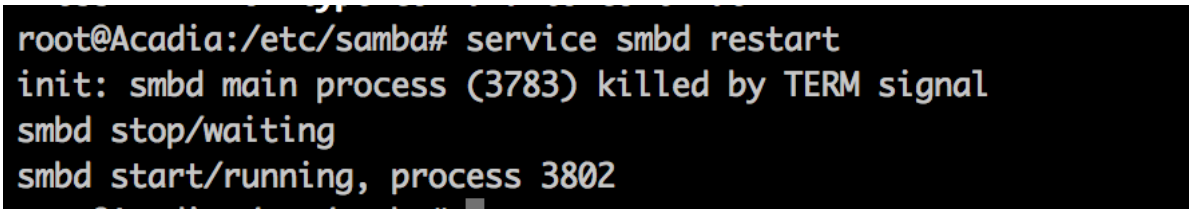
```
root@Acadia:~#
Message from root@Acadia on pts/2 at 08:17 ...
2016
0311
yangyuming
fm.zju.edu.cn
```

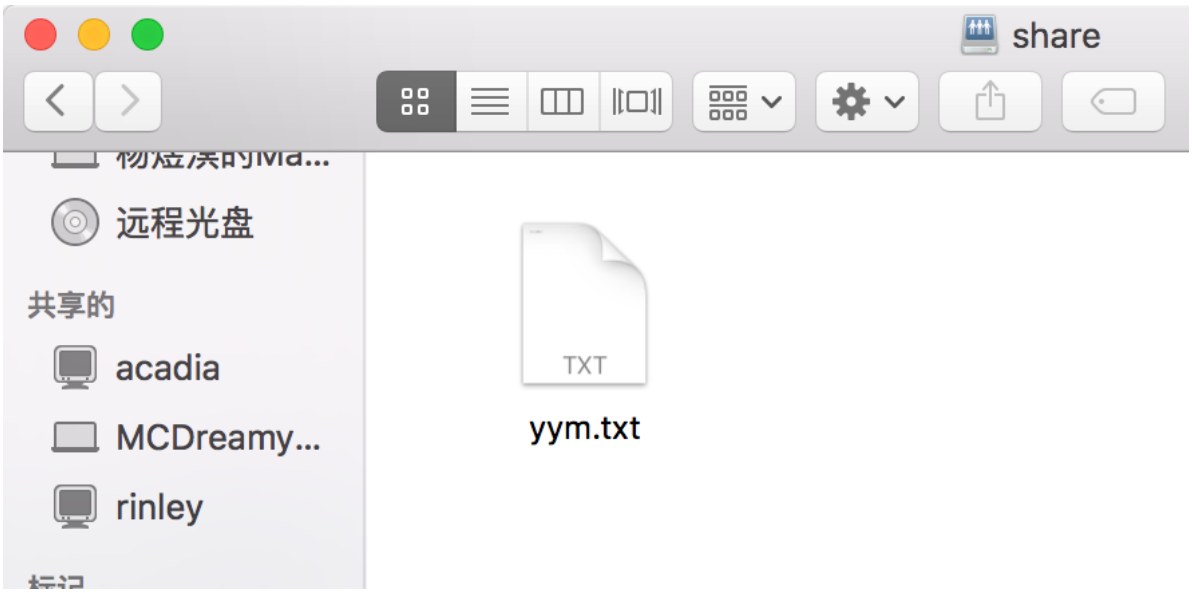
嵌入式板卡上的SAMBA配置文件内容；

```
# Windows clients look for this share name as a source of downl
# printer drivers
[print$]
   comment = Printer Drivers
   path = /home/share/
   browseable = yes
   read only = yes
   guest ok = no
# Uncomment to allow remote administration of Windows print dri
# You may need to replace 'lpadmin' with the name of the group
# admin users are members of.
# Please note that you also need to set appropriate Unix permis
# to the drivers directory for these users to have write rights
;   write list = root, @lpadmin
```

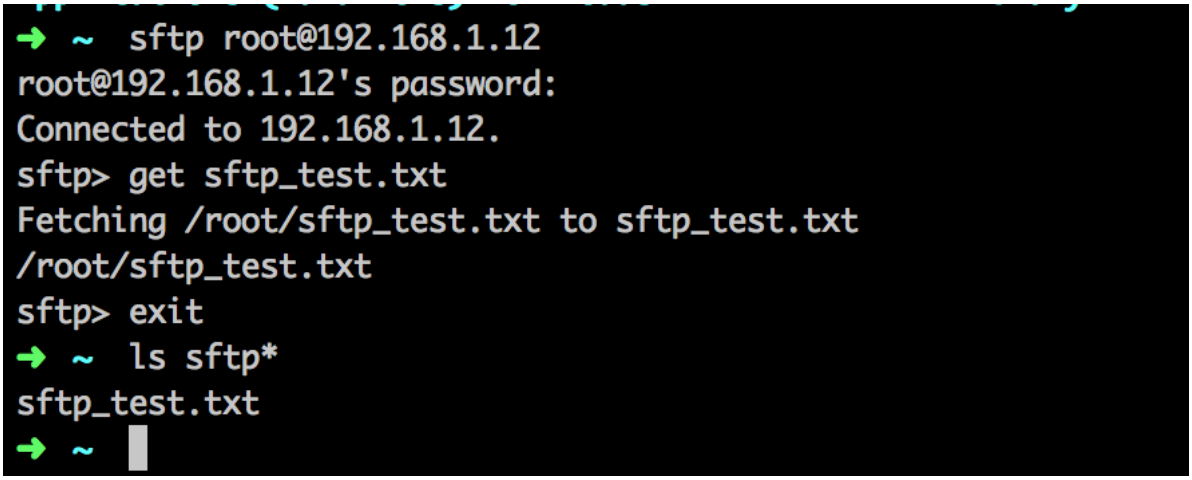
各种方式传递文件的过程；

SAMBA





sfpt



串口XModem协议传递

进行串口 XModem 传递时，我遇到了一些问题。
我的思路是在板卡上安装 XModem 接收软件，然后 PC 端用 minicom 的 XModem 模式发送文件。
通过 ssh 登录板卡，在板卡上用 apt-get install 命令安装了 lzsrz，然后用 rx 命令进行接受，显示准备接收。PC 端打开 minicom 会直接通过串口连接进入板卡的 Shell，然后利用 minicom 的命令选择文件进行发送，但是发送框只是出现了一下就消失了，并没有发送成功。
之后我又在板卡上安装了 minicom，启动了接收，PC 端发送还是不成功。
这个问题困扰了我好久，同时发现还有几个同学也遇到了类似的问题，希望能一起讨论一下解决这个问题。

交叉编译环境；

来源：www.linaro.org

下载面向Cortex-A架构的交叉编译工具链，解压压缩包到指定目录，并添加环境变量

交叉编译；

在编译时注意要使用静态链接 --static
利用 file 命令获取文件属性，可以看出 .out 文件是 ARM 的

```
root@Acadia:~# scp root@helloyym.xyz:~/float.out ~/
root@helloyym.xyz's password:
float.out                                     100%  576KB 192.1
root@Acadia:~# file float.out
float.out: ELF 32-bit LSB executable, ARM, version 1 (SYSV), st
root@Acadia:~# ./float.out
Hello float: 3.141593
```

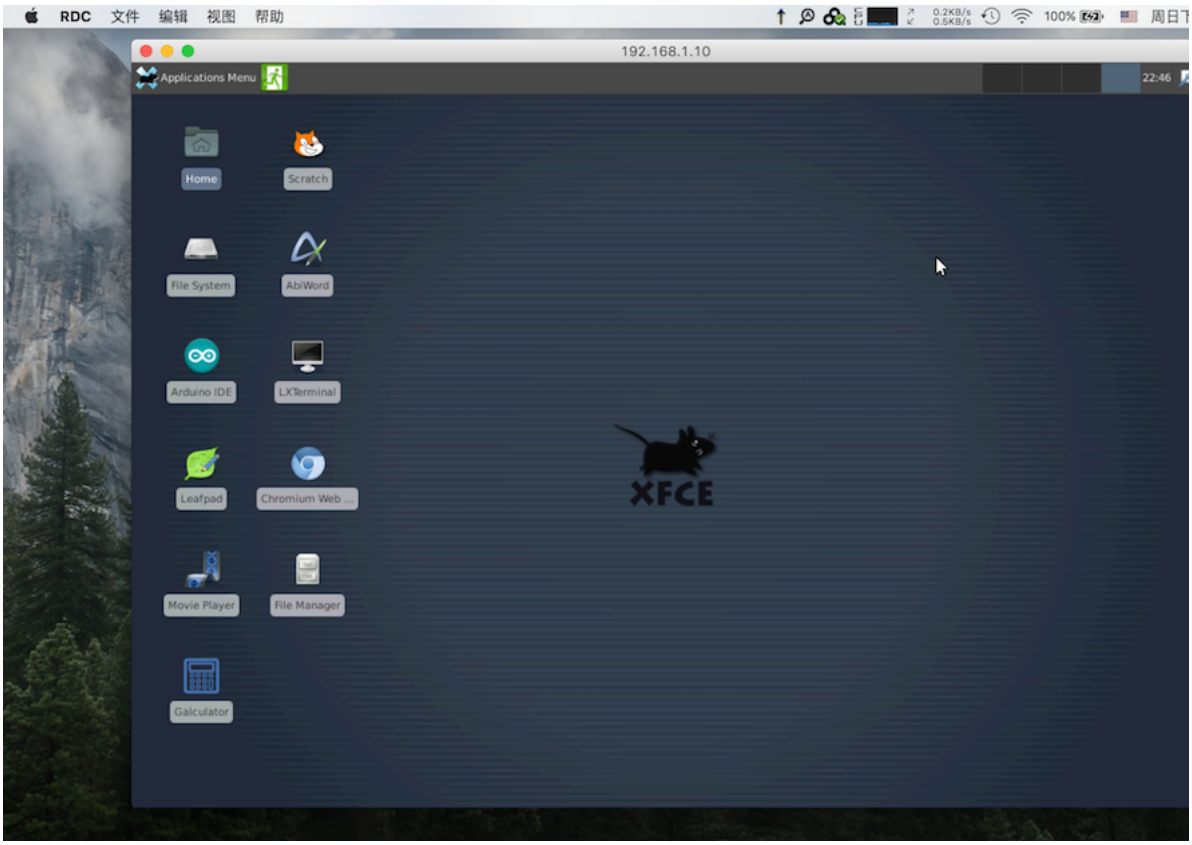
```
root@iZ28ynw8robZ:~# vi float.c
root@iZ28ynw8robZ:~# arm-linux-gnueabi-gcc float.c -o float.out
root@iZ28ynw8robZ:~# ls
ARM  float.c  float.out
root@iZ28ynw8robZ:~# file float.out
float.out: ELF 32-bit LSB  executable, ARM, EABI5 version 1 (SY
```

嵌入式板卡本机开发环境的情况

```
root@Acadia:~/yym# ls
hello.c
root@Acadia:~/yym# gcc hello.c
root@Acadia:~/yym# ./a.out
hello yym!!!
```

RDP远程登录

PC端安装 ***Romote Desktop Connection***
板卡安装xrdp服务程序，并设置登录密码
服务启动后，PC端通过ip地址登录远程桌面


RDC 文件 编辑 视图 帮助
0.2KB/s
0.5KB/s
100%
周日下
192.168.1.10
Applications Menu
22:46
Home
Scratch
File System
AbiWord
Arduino IDE
LXTerminal
Leafpad
Chromium Web ...
Movie Player
File Manager
Galculator
XFCE