

## 7.1 Hello World!

### 7.1.1 Hello World Source code

Hello World source code in the CD on linux/examples.tgz package, if you read the steps to install the development environment in chapter 5, it will be located in “/opt/FriendlyARM/mini2440 /examples/hello” directory, its source code is as follows:

```
//Hello, World source code:
#include <stdio.h>
int main (void){
    printf("Hello, FriendlyARM!\n");
}
```

### 7.1.2 Compile Hello World

First, enter the test program source code directory.

```
#cd /opt/FriendlyARM/mini2440/examples/hello
```

And then, use the command line for manual cross-compiling the sample programs.

```
#arm-linux-gcc-o hello main.c
```

With the build script to compile.

```
#make
```

Finally create hello file, you use the file command to check to create and executable hello file system by ARM version, the development board are operation of the executable files and there are create as shown:

```
root@tom:/opt/FriendlyARM/mini2440/examples/hello
File Edit View Terminal Tabs Help
buttons camtest hello led-player math pwm
[root@tom examples]# cd hello/
[root@tom hello]# ls
hello hello.c Makefile
[root@tom hello]# file hello
hello: ELF 32-bit LSB executable, ARM, version 1 (SYSV), dynamically linked
(uses shared libs), for GNU/Linux 2.6.14, not stripped
[root@tom hello]#
```

### 7.1.3 The Hello, World downloaded to the development board to run

Download the executable file will be compiled to the target board is mainly in four ways:

- First: Copy to external media (eg. USB flash drive, SD card)
- Second: Transfer files via the network to the development board (recommended).
- Third: Transfer files via the serial port to the development board.
- Fourth: NFS (Network File System) run directly.

The following were introduced:

#### (1) Use USB flash drives

Method: First copy the compiled executable to flash drive, plug flash drive into the target board and then mount it, then copy the program executable directory to the target board /bin

The following were introduced:

#### Step 1: Copy the program to flash drive

The flash drive plugged into the PC's USB port, execute the following command to copy the program to flash drive

```
#mount /dev/sda1 /mnt          ; mount flash drive
#cp hello /mnt                ; copy the program to flash
#umount /mnt                  ; uninstall USB
```

Step 2: Copy the program to the target board from the USB and run.

Insert USB flash drive into the development board USB Host port, USB flash drives will automatically mount to “/udisk” directory, execute the following command to run the hello program.

```
#cd /udisk
#./hello ; Hello program execution
```

Note: If you forced unplug the USB at this time, you need to return to the root directory, then execute `umount /udisk` be mounted automatically for the next good preparation.

The screenshot shows a terminal window titled 'ttyS0 - 超级终端'. The terminal output displays the following sequence of events:

```
usb 1-1: Product: DataTraveler 2.0
usb 1-1: Manufacturer: Kingston
usb 1-1: SerialNumber: 001AA0A0BF1AC8C1155A0318
usb 1-1: configuration #1 chosen from 1 choice
scsil : SCSI emulation for USB Mass Storage devices
scsi 1:0:0:0: Direct-Access   Kingston DataTraveler 2.0 1.00 PQ: 0 ANSI: 2
sd 1:0:0:0: [sda] 7823296 512-byte hardware sectors: (4.00 GB/3.72 GiB)
sd 1:0:0:0: [sda] Write Protect is off
sd 1:0:0:0: [sda] Assuming drive cache: write through
sd 1:0:0:0: [sda] 7823296 512-byte hardware sectors: (4.00 GB/3.72 GiB)
sd 1:0:0:0: [sda] Write Protect is off
sd 1:0:0:0: [sda] Assuming drive cache: write through
sda: sda1
sd 1:0:0:0: [sda] Attached SCSI removable disk
FAT: utf8 is not a recommended IO charset for FAT filesystems, filesystem will be case sensitive!

[root@FriendlyARM /]# cd /udisk/
[root@FriendlyARM /udisk]# ls
hello  images  linux  ap3  photo  *idea
[root@FriendlyARM /udisk]# ./hello
hello, FriendlyARM!
[root@FriendlyARM /udisk]# _
```

The terminal status bar at the bottom shows: 已连接 0:54:4 ANSIW 115200 8-N-1 SCROLL CAPS NUM 捕 打印

(2) Use ftp to transfer files (recommended)

Methods: ftp login to target board, upload the compiled program; then modify the upload process the target board executable, and implementation.

For execution the PC side, shown in the figure.

```

root@tom:/opt/FriendlyARM/mini2440/examples/hello
File Edit View Terminal Tabs Help
[root@tom hello]# ls
hello hello.c Makefile
[root@tom hello]# ftp 192.168.1.230      1. Lock in
Connected to 192.168.1.230 (192.168.1.230).
220 FriendlyARM FTP server (Version 6.4/OpenBSD/Linux-ftpd-0.17) ready.
Name (192.168.1.230:root): plg
331 Password required for plg.      2.Enter the password and user ID of plg
Password:
230 User plg logged in.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp> bin      3. Configuration to document format.
200 Type set to I.
ftp> put hello 4. Print hello
local: hello remote: hello
227 Entering Passive Mode (192,168,1,230,171,47)
150 Opening BINARY mode data connection for 'hello'.
226 Transfer complete.
5061 bytes sent in 0.000144 secs (35145.83 Kbytes/sec)
ftp> bye 5. Lock out
221 Goodbye.
[root@tom hello]#
    
```

Then, one end of execution the target board, shown in the figure.

```

COM1 (1) - CRT
File Edit View Options Transfer Script Window Help
[root@FriendlyARM plg]# cd
[root@FriendlyARM /]# ls
bin          lib          opt          tmp
dev          linuxrc     proc         usr
etc          lost+found /sbin        var
home        net        shanghai.tan.mp3  www
[root@FriendlyARM /]# cd /home/plg/
[root@FriendlyARM plg]# ls
hello
[root@FriendlyARM plg]# chmod +x hello
[root@FriendlyARM plg]# ls
hello
[root@FriendlyARM plg]# ./hello
hello, FriendlyARM!
[root@FriendlyARM plg]#
    
```

### (3) Through serial port to transfer files to the development board

In chapter 2.5 we learn how to transfer files through the serial port to the development board, you can also send the same hello executable file, not have steps in detailed description, but remember that the properties of the file transfer is complete in execute to perform normal run.

```
#chmod +x hello
```

Note: Someone use a USB to serial cable because some adapter has performance is not good, so sometimes "transfer out" or simply can't be transferred to the development board, therefore we recommend the use of ftp transfer to the development board.

### (4) Through execution Network File System (NFS)

Linux has used method into use NFS to execute various procedures, so that you can't use a lot of time to download the program, although hello program take a short time , but if your application have a more then you will find ease of execute where the use of NFS.

As previously described, first set up in accordance with chapter 4.3 a good NFS server system, then enter the following command at the command line (assuming the server's IP address is 192.168.1.111):

```
#mount -t nfs -o nolock 192.168.1.111:/opt/FriendlyARM  
/mini2440/root_qtopia /mnt
```

You enter the /mnt directory to operate on your PC Linux terminal to copy /opt/FriendlyARM/mini2440/root\_qtopia/hello directory, then run the serial port terminal in the development board and execute.

```
#cd /mnt  
#./hello
```