LINUX 開發環境用戶指南

Version: 0.0.0.1
Release date: 2022-06-01

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版本	日期	修订说明	修订人
0.0.0.1	2022/06/01	draft	蔡明育

1. 開發環境

1.1. 目的

此份文件說明 Linux 開發環境。Linux 開發環境的搭建 U-boot、Linux 內核、根文件系統(rootfs)以及內核和根文件系統的燒写，以及創建網路開發環境和啟動 Linux 開發。本文檔提供用戶端可以快速搭建 Linux 環境，並將自行開發的應用程式移植到 Linux 作業系統上面。

1.2. 如何編譯內核

- 在 HOST 端 ubuntu 環境要編譯 SDK，需要安裝以下工具

請參閱 SDK 編譯及使用說明_V1.0.docx 建構編譯環境

- 設定環境變數(以 cv1800b_wevb_0008a_spinor 為例)

```
$ source build/cvisetup.sh
-------------------------------------------------------------------------
  Usage:
  (1) menuconfig - Use menu to configure your board.
      ex: $ menuconfig

  (2) defconfig $CHIP_ARCH - List EVB boards($BOARD) by CHIP_ARCH.
     ** cv183x ** -> ['cv1829', 'cv1832', 'cv1835', 'cv1838', 'cv9520', 'cv7581']
     ** cv182x ** -> ['cv1820', 'cv1821', 'cv1822', 'cv1823', 'cv1825', 'cv1826', 'cv7327', 'cv7357']
     ** cv181x ** -> ['cv181x', 'cv1823a', 'cv1821a', 'cv1820a', 'cv1811h', 'cv1811c', 'cv1810c', 'cv1812h']
     ** cv180x ** -> ['cv180x', 'cv1800b', 'cv1800c', 'cv1801b', 'cv1801c']
      ex: $ defconfig cv183x

  (3) defconfig $BOARD - Choose EVB board settings.
      ex: $ defconfig cv1835_wevb_0002a
```

```
-          ex: $ defconfig cv1826_wevb_0005a_spinand
-          ex: $ defconfig cv181x_fpga_c906
-    ----------------------------------------------------------------------
```

- 選定 EVB cv1800b_wevb_0008a_spinor

```
$ defconfig cv1800b_wevb_0008a_spinor
Run defconfig function
Loaded configuration
'/workspace/build/boards/cv180x/cv1800b_wevb_0008a_spinor/cv1800b_wevb_0008a_spinor
_defconfig'
No change to configuration in '.config'
Loaded configuration '.config'
====== Environment Variables =======
  PROJECT: cv1800b_wevb_0008a_spinor, DDR_CFG=ddr2_1333_x16
  CHIP_ARCH: cv180x, DEBUG=0
  SDK VERSION: musl_riscv64, RPC=0
  ATF options: ATF_KEY_SEL=default, BL32=1
  Linux source folder: linux_5.10, Uboot source folder: u-boot-2021.10
  CROSS_COMPILE_PREFIX: riscv64-unknown-linux-musl-
  ENABLE_BOOTLOGO: 0
  Flash layout xml: /workspace/build/boards/cv180x/
cv1800b_wevb_0008a_spinor/partition/partition_spinor.xml
  Sensor tuning bin: gcore_gc4653
  Output path: /workspace/master/install/ soc_cv1800b_wevb_0008a_spinor
```

- 編譯 linux kernel

```
$ build_kernel
[TARGET] kernel-dts
......
[TARGET] kernel-build
......
```

- 產生燒錄檔 boot.{spinor, spinand, emmc}

```
$ ls install/soc_cv1800b_wevb_0008a_spinor/boot.spinor
install/soc_ cv1800b_wevb_0008a_spinor/boot.spinor
```

2. U-boot 搭建

請參閱 U-boot 移植应用开发指南_v1.2.0.1.docx

3. LINUX 內核

在 sdk_source 目錄下可以找到內核的程式碼

```
sdk_source/linux     // version 4.19, cv182xA, ca53 32bit CPU
sdk_source/linux_5.10  // cv180x,cv181x C906B 64 bit CPU
```

3.1. 配置內核 DTS

如果要針對內核的模組增減修改，可以透過修改 DTS(*1)的方式來完成，每張 EVB 會有 dts 檔案來定義其 device tree，以 cv1800b_wevb_0008a_spinor 為例，其 DTS 檔案定義在檔案路徑如下：

```
$ cat build/boards/cv180x/cv1800b_wevb_0008a_spinor/dts_riscv/
cv1800b_wevb_0008a_spinor.dts
/dts-v1/;
#include "cv180x_base_arm.dtsi"
#include "cv180x_asic_bga.dtsi"
#include "cv180x_asic_spinor.dtsi"
#include "cv180x_default_memmap.dtsi"

/ {

// add your customized device description

};
```

上述*.dtsi(device tree source include files)為晶片預設值, 不建議直接更改, 若要修改預設值，建議使用 /delete-node/方式修改

*(*1) u-boot 和 kernel 使用共用 DTS*

3.2. 配置 kernel configuration

如果要針對內核的組態修改，可以直接修改 kernel 組態檔，以

cv1800b_wevb_0008a_spinor 為例，其 defconfig 檔案定義在檔案路徑如下

```
$ cat build/boards/cv180x/cv1800b_wevb_0008a_spinor/linux/
cvitek_cv1800b_wevb_0008a_spinor_defconfig
# CONFIG_SWAP is not set
CONFIG_SYSVIPC=y
CONFIG_POSIX_MQUEUE=y
CONFIG_NO_HZ_IDLE=y
CONFIG_HIGH_RES_TIMERS=y
CONFIG_PREEMPT=y
CONFIG_IKCONFIG=y
CONFIG_IKCONFIG_PROC=y
CONFIG_LOG_BUF_SHIFT=15
CONFIG_CC_OPTIMIZE_FOR_SIZE=y
```

- 使用修改 defconfig 檔案方式 範例 (新增支援 SPI driver)

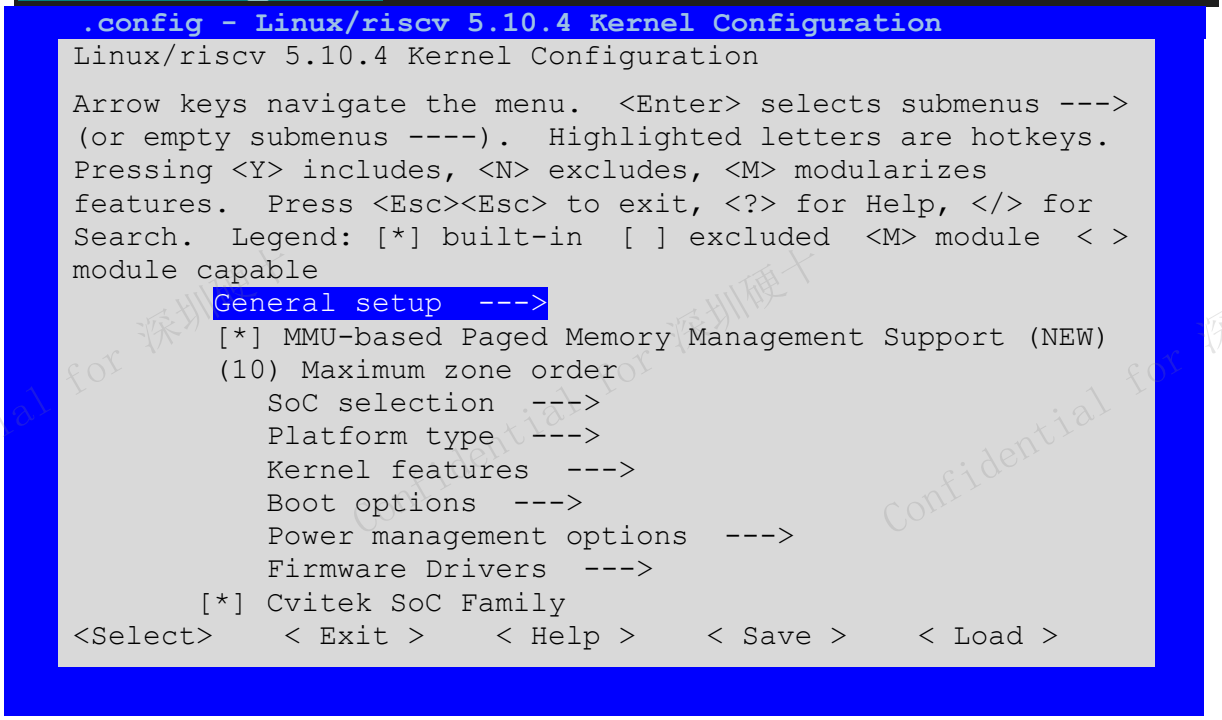
```
#
# SPI drivers
#
# CONFIG_SPI is not set
# CONFIG_SPI_MASTER is not set
# CONFIG_SPI_DESIGNWARE is not set
# CONFIG_SPI_DW_MMIO is not set
# CONFIG_SPI_SPIDEV is not set
CONFIG_SPI=y
CONFIG_SPI_MASTER=y
CONFIG_SPI_DESIGNWARE=y
```

- 使用 command line - setconfig_kernel 方式

```
$ setconfig_kernel SPI=y
$ setconfig_kernel SPI_MASTER=y
$ setconfig_kernel SPI_DESIGNWARE=y
```

- 使用 Graphic user interface line - menuconfig_kernel 方式

```
$ menuconfig_kernel
```



4. 根文件系統(rootfs)

4.1. 根文件系統簡介

請參閱 SDK 編譯及使用說明_V1.0.docx – Chapter 4 根文件系統(rootfs)

4.2. Busybox 支援

目前文件系統內部使用 BusyBox v1.27.1 版本，如果有更新 busybox 的需求，可以將編譯好的 busybox 放到下列路徑：

```
$ ramdisk/rootfs/common_arm/bin/busybox            // CV182xA
$ ramdisk/rootfs/common_glibc_riscv64/bin/busybox  // CR182x
$ ramdisk/rootfs/common_musl_riscv64/bin/busybox   // CV181X
$ ramdisk/rootfs/common_musl_riscv64/bin/busybox   // CV180X
```