

实验3 鸿蒙 LiteOS-a 内核移植——增加一个单板

《实用操作系统》实验报告 22920212204392 黄勛

1 实验环境

Windows10 21H2、Vmware Workstation Pro 16、Ubuntu18.04

配置了相关的软件。

2 实验目的

1. 通过修改源码，完成添加一个单板的任务

3 实验步骤与内容

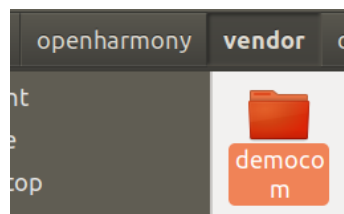
新增单板信息为：

芯片公司：DemoCom

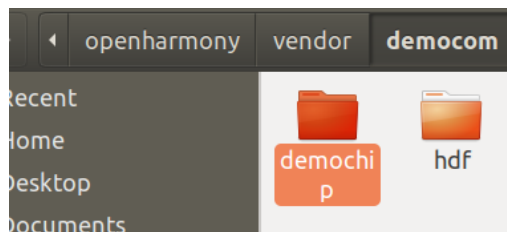
芯片名称：DemoChip

3.1 准备工作

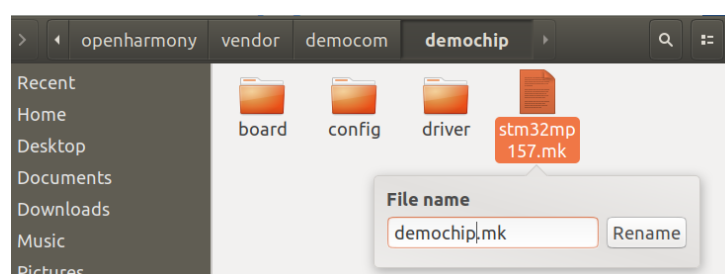
1. 进入openharmy/vendor目录下，复制一份st文档夹并改名为democom



2. 进入democom文档夹，并修改stm32mp157文档夹名为demochip



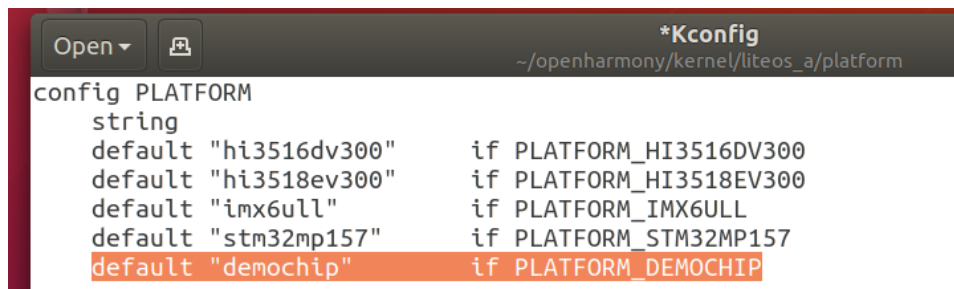
3. 进入demochip，并修改stm32mp157.mk文档名为demochip.mk



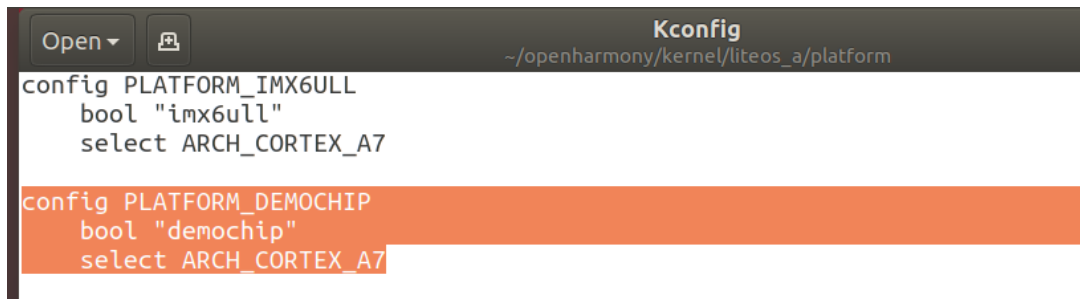
3.2 修改openharmony/kernel/liteos_a/platform/Kconfig文档

添加单板信息

```
default "demochip"          if PLATFORM_DEMOCHIP
```

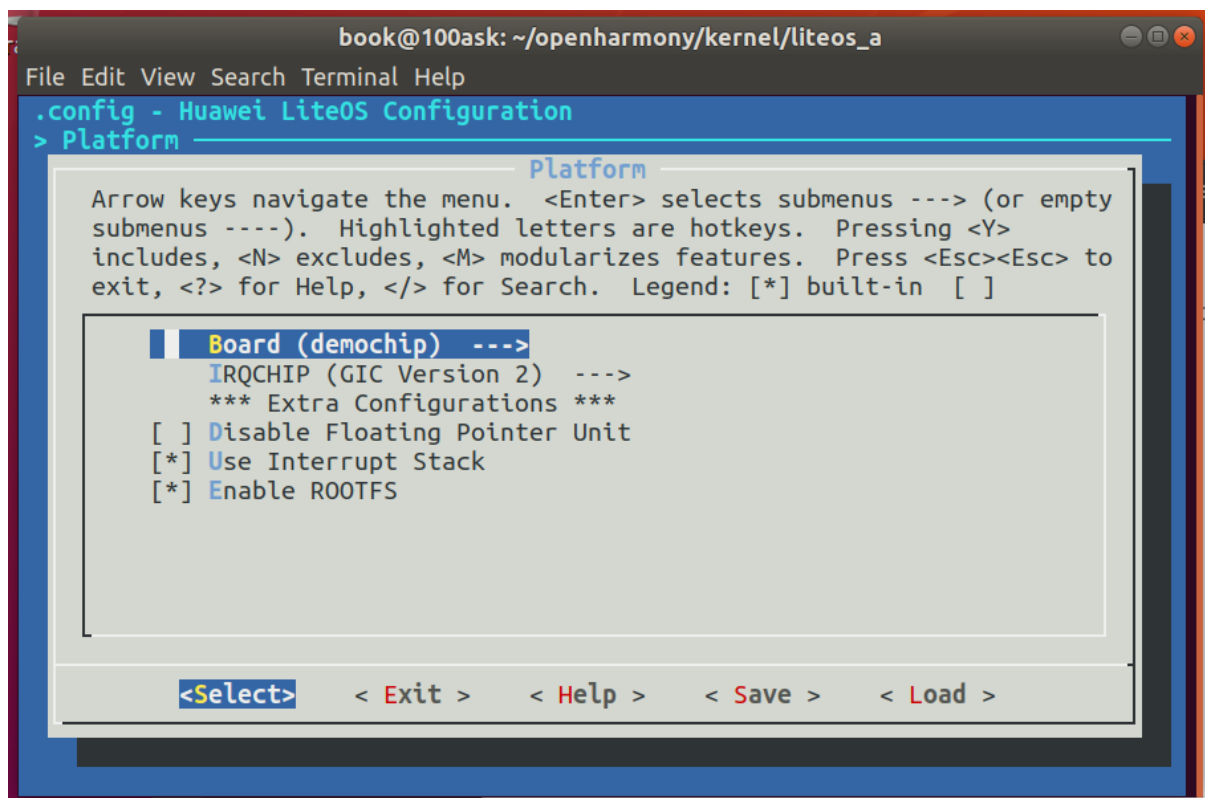


```
config PLATFORM_DEMOCHIP
    bool "demochip"
    select ARCH_CORTEX_A7
```

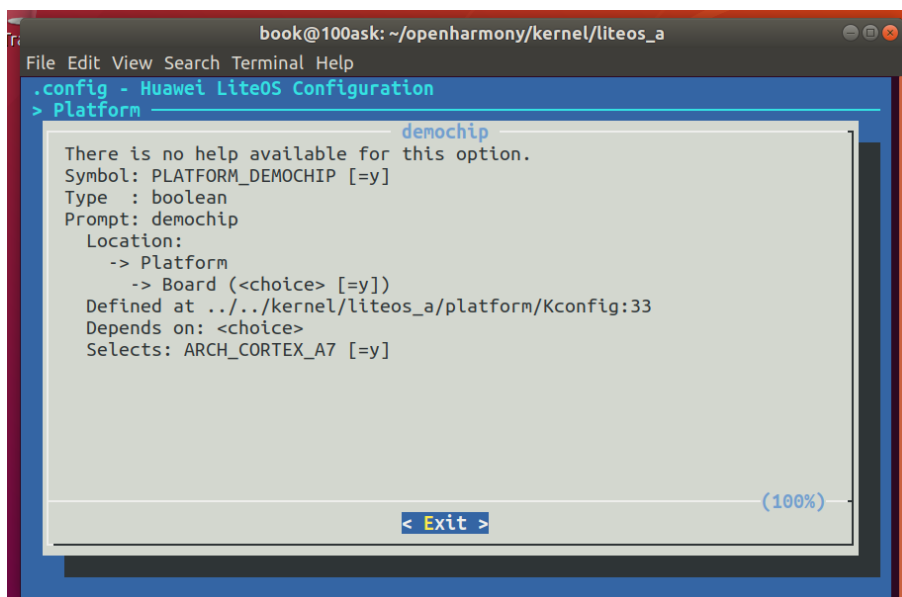


3.3 配置界面里添加单板

打开 menuconfig 查看新的单板配置 Select 新增板子



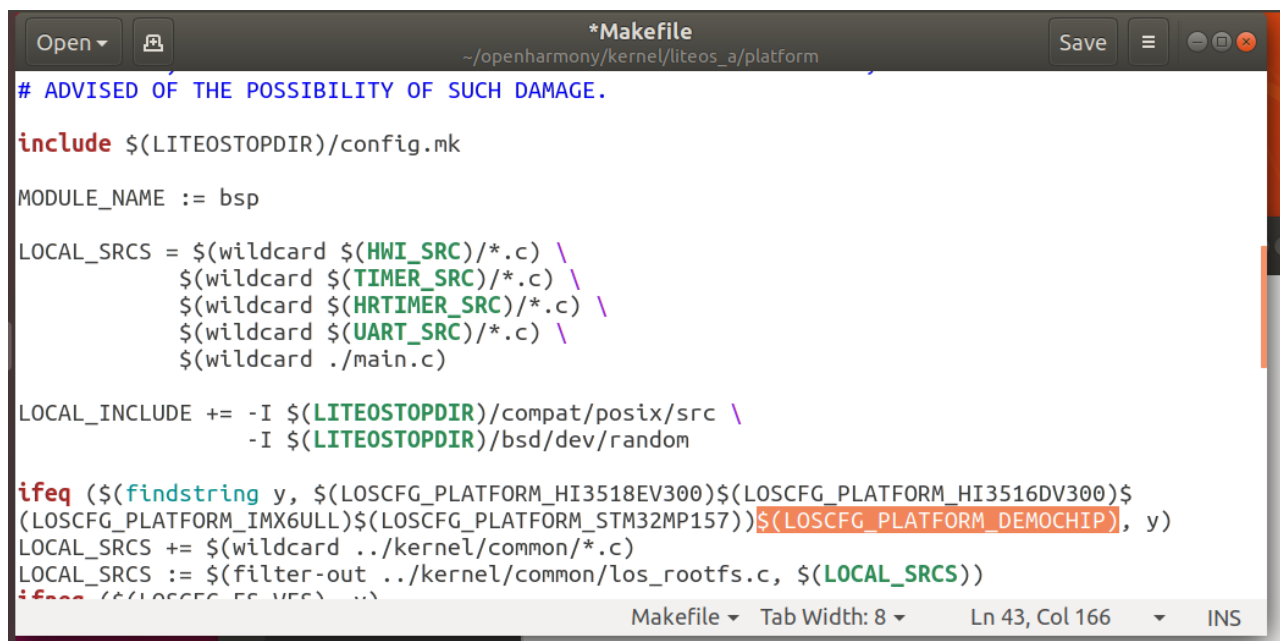
附：路径说明如下：



3.4 修改 openharmony/kernel/liteos_a/platform/Makefile 文件

注：以下修改文件可由csdn教程类似 `grep "LOSCFG_PLATFORM_STM32MP157" * -nr` 命令搜索当前目录及其子目录中的所有文件，找到包含字符串的行和行号，以此来移植编译STM32MP157单板的信息。

```
$(LOSCFG_PLATFORM_WUFEIZHI)
```



3.5 修改 openharmony/kernel/liteos_a/platform/bsp.mk 文件

```
else ifeq ($(LOSCFG_PLATFORM_DEMOCHIP), y)
    HWI_TYPE      := arm/interrupt/gic
    TIMER_TYPE    := arm/timer/arm_generic
    HRTIMER_TYPE  := demochip/hrtimer
```

```
*bsp.mk
~/openharmy/kernel/liteos_a/platform

HRTIMER_TYPE := htsoc/hrtimer
NET_TYPE      := hieth
UART_TYPE     := amba_pl011
USB_TYPE      := usb3.0_hi3518ev300
LITEOS_CMATCHRO_TEST += -DTEST3518EV300
else ifeq ($(LOSCFG_PLATFORM_IMX6ULL), y)
    HWI_TYPE    := arm/interrupt/gic
    TIMER_TYPE  := arm/timer/arm_generic
    HRTIMER_TYPE := imx6ull/hrtimer
else ifeq ($(LOSCFG_PLATFORM_STM32MP157), y)
    HWI_TYPE    := arm/interrupt/gic
    TIMER_TYPE  := arm/timer/arm_generic
    HRTIMER_TYPE := stm32mp157/hrtimer
else ifeq ($(LOSCFG_PLATFORM_DEMOCHIP), y)
    HWI_TYPE    := arm/interrupt/gic
    TIMER_TYPE  := arm/timer/arm_generic
    HRTIMER_TYPE := demochip/hrtimer
endif

HWI_SRC      := hw/$(HWI_TYPE)
```

```
else ifeq ($(LOSCFG_PLATFORM_DEMOCHIP),y)
    PLATFORM_INCLUDE += -I
$(LITEOSTOPDIR)/../../vendor/democom/demochip/board/include
```

```
*bsp.mk
~/openharmy/kernel/liteos_a/platform

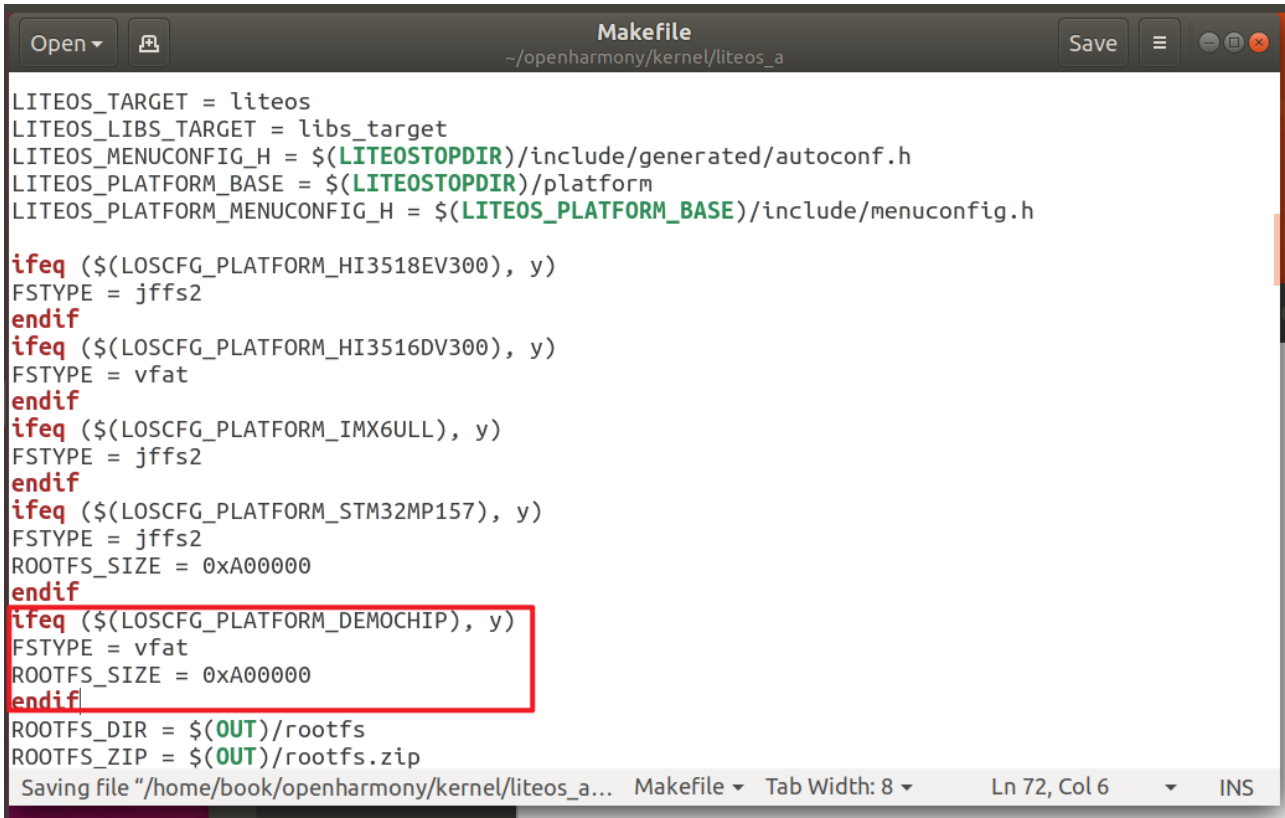
board/include \
    -I $(PLATFORM_BSP_HISI_BASE)/../kernel/common \
    -I $(PLATFORM_BSP_HISI_BASE)/../../drivers/liteos/platform/pm \
    -I $(PLATFORM_BSP_HISI_BASE)/hw/include \
    -I $(PLATFORM_BSP_HISI_BASE)/include \
    -I $(PLATFORM_BSP_HISI_BASE)/$(UART_SRC)

ifeq ($(findstring y, $(LOSCFG_PLATFORM_HI3518EV300)$(LOSCFG_PLATFORM_HI3516DV300)), y)
    PLATFORM_INCLUDE += -I $(LITEOSTOPDIR)/../../vendor/hisi/hi35xx/$(LITEOS_PLATFORM)/
config/board/include/hisoc
else ifeq ($(LOSCFG_PLATFORM_IMX6ULL),y)
    PLATFORM_INCLUDE += -I $(LITEOSTOPDIR)/../../vendor/nxp/imx6ull/board/include
else ifeq ($(LOSCFG_PLATFORM_STM32MP157),y)
    PLATFORM_INCLUDE += -I $(LITEOSTOPDIR)/../../vendor/st/stm32mp157/board/include
else ifeq ($(LOSCFG_PLATFORM_DEMOCHIP),y)
    PLATFORM_INCLUDE += -I $(LITEOSTOPDIR)/../../vendor/democom/demochip/board/include
endif

#
#-include $(LITEOSTOPDIR)/platform/bsp/board/$(LITEOS_PLATFORM)/board.mk
```

3.6 修改 openharmony/kernel/liteos_a/Makefile 文件

```
ifeq ($(LOSCFG_PLATFORM_DEMOCHIP), y)
FSTYPE = vfat
ROOTFS_SIZE = 0xA00000
endif
```

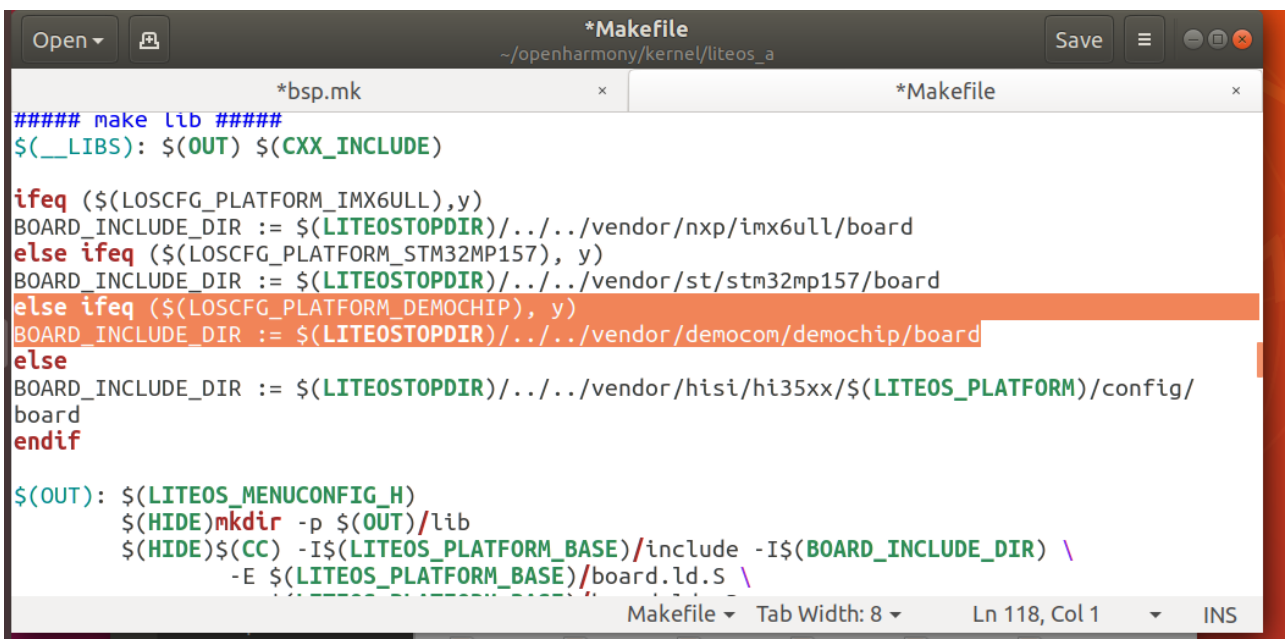


```
Makefile
~/openharmy/kernel/liteos_a

LITEOS_TARGET = liteos
LITEOS_LIBS_TARGET = libs_target
LITEOS_MENUCONFIG_H = $(LITEOSTOPDIR)/include/generated/autoconf.h
LITEOS_PLATFORM_BASE = $(LITEOSTOPDIR)/platform
LITEOS_PLATFORM_MENUCONFIG_H = $(LITEOS_PLATFORM_BASE)/include/menuconfig.h

ifeq ($(LOSCFG_PLATFORM_HI3518EV300), y)
FSTYPE = jffs2
endif
ifeq ($(LOSCFG_PLATFORM_HI3516DV300), y)
FSTYPE = vfat
endif
ifeq ($(LOSCFG_PLATFORM_IMX6ULL), y)
FSTYPE = jffs2
endif
ifeq ($(LOSCFG_PLATFORM_STM32MP157), y)
FSTYPE = jffs2
endif
ROOTFS_SIZE = 0xA00000
endif
ifeq ($(LOSCFG_PLATFORM_DEMOCHIP), y)
FSTYPE = vfat
ROOTFS_SIZE = 0xA00000
endif
ROOTFS_DIR = $(OUT)/rootfs
ROOTFS_ZIP = $(OUT)/rootfs.zip
Saving file "/home/book/openharmony/kernel/liteos_a... Makefile Tab Width: 8 Ln 72, Col 6 INS
```

```
else ifeq ($(LOSCFG_PLATFORM_DEMOCHIP), y)
BOARD_INCLUDE_DIR := $(LITEOSTOPDIR)/../../vendor/democom/demochip/board
```



```
*Makefile
~/openharmy/kernel/liteos_a

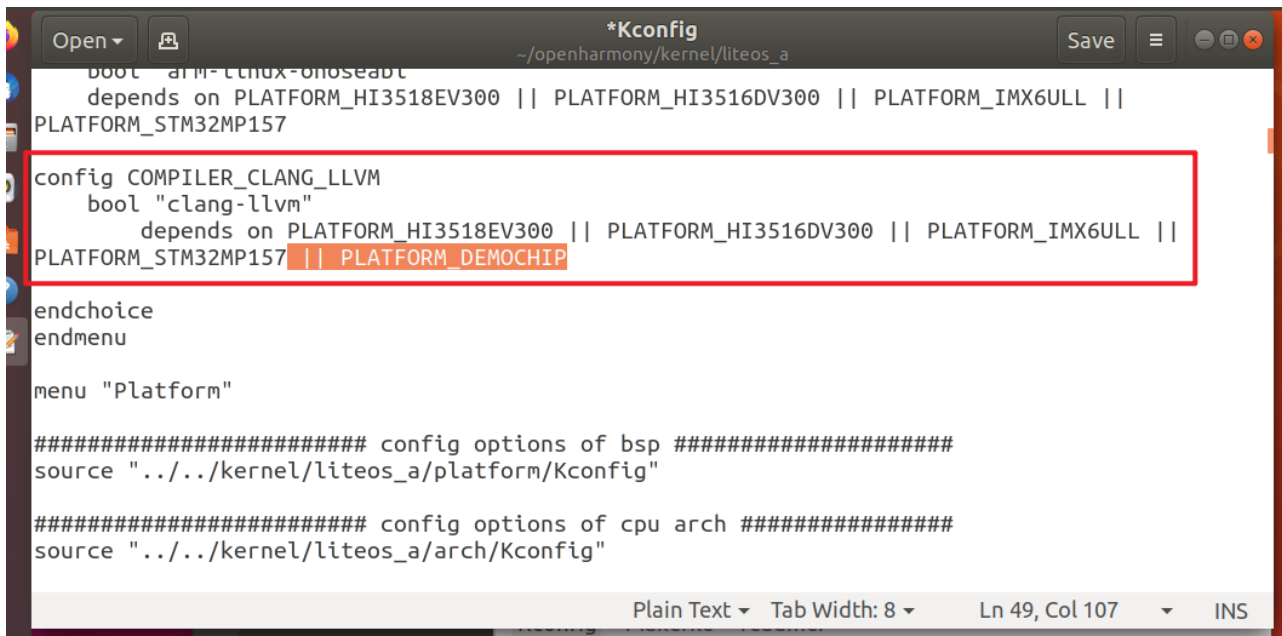
*bsp.mk x *Makefile x
##### make lib #####
$(__LIBS): $(OUT) $(CXX_INCLUDE)

ifeq ($(LOSCFG_PLATFORM_IMX6ULL),y)
BOARD_INCLUDE_DIR := $(LITEOSTOPDIR)/../../vendor/nxp/imx6ull/board
else ifeq ($(LOSCFG_PLATFORM_STM32MP157), y)
BOARD_INCLUDE_DIR := $(LITEOSTOPDIR)/../../vendor/st/stm32mp157/board
else ifeq ($(LOSCFG_PLATFORM_DEMOCHIP), y)
BOARD_INCLUDE_DIR := $(LITEOSTOPDIR)/../../vendor/democom/demochip/board
else
BOARD_INCLUDE_DIR := $(LITEOSTOPDIR)/../../vendor/hisi/hi35xx/$(LITEOS_PLATFORM)/config/
board
endif

$(OUT): $(LITEOS_MENUCONFIG_H)
$(HIDE)mkdir -p $(OUT)/lib
$(HIDE)$(CC) -I$(LITEOS_PLATFORM_BASE)/include -I$(BOARD_INCLUDE_DIR) \
-E $(LITEOS_PLATFORM_BASE)/board.ld.S \
Makefile Tab Width: 8 Ln 118, Col 1 INS
```

3.7 修改 openharmony/kernel/liteos_a/Kconfig 文件

加入 `|| PLATFORM_DEMOCHIP`



```
Open  Save  ~/openharmy/kernel/liteos_a
boot arm-linux-ohosadb
depends on PLATFORM_HI3518EV300 || PLATFORM_HI3516DV300 || PLATFORM_IMX6ULL ||
PLATFORM_STM32MP157

config COMPILER_CLANG_LLVM
    bool "clang-llvm"
    depends on PLATFORM_HI3518EV300 || PLATFORM_HI3516DV300 || PLATFORM_IMX6ULL ||
PLATFORM_STM32MP157 || PLATFORM_DEMOCHIP

endchoice
endmenu

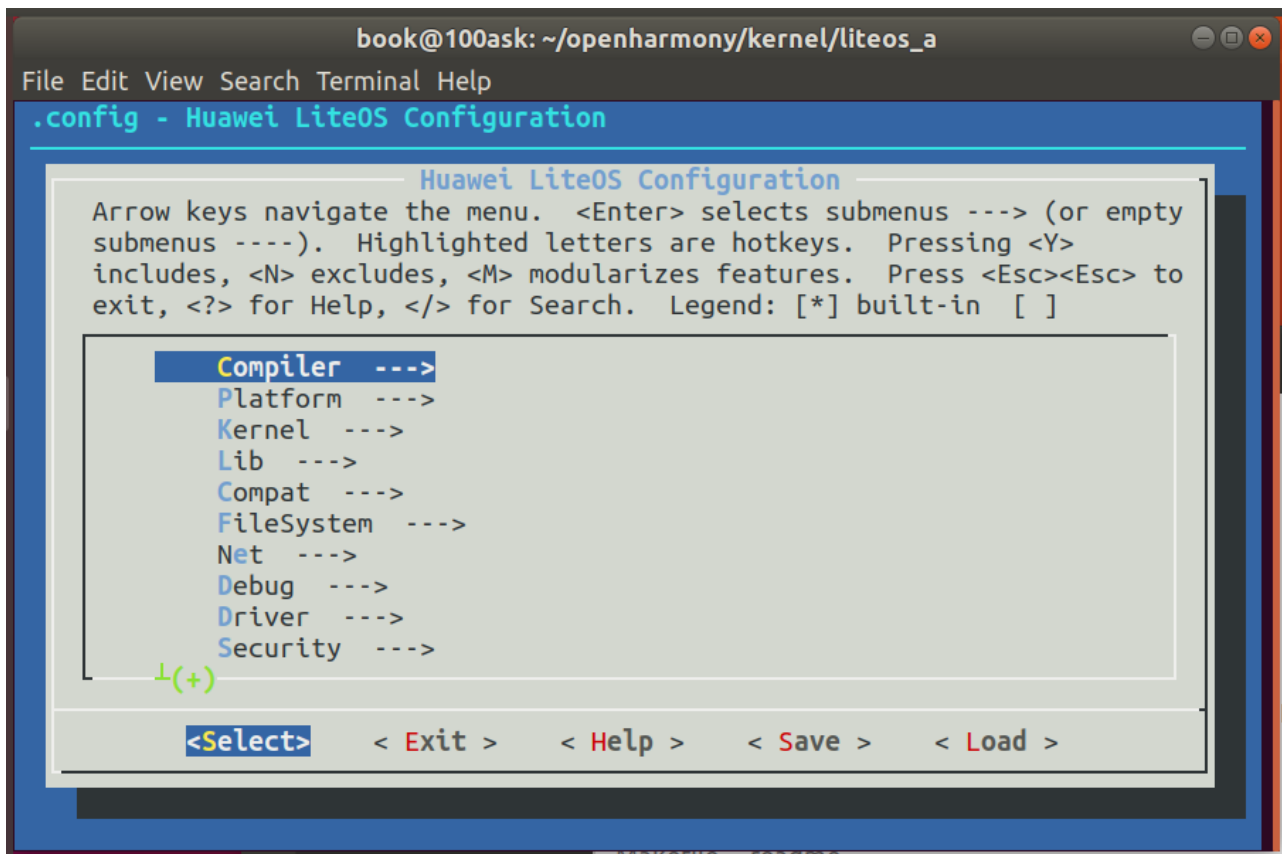
menu "Platform"

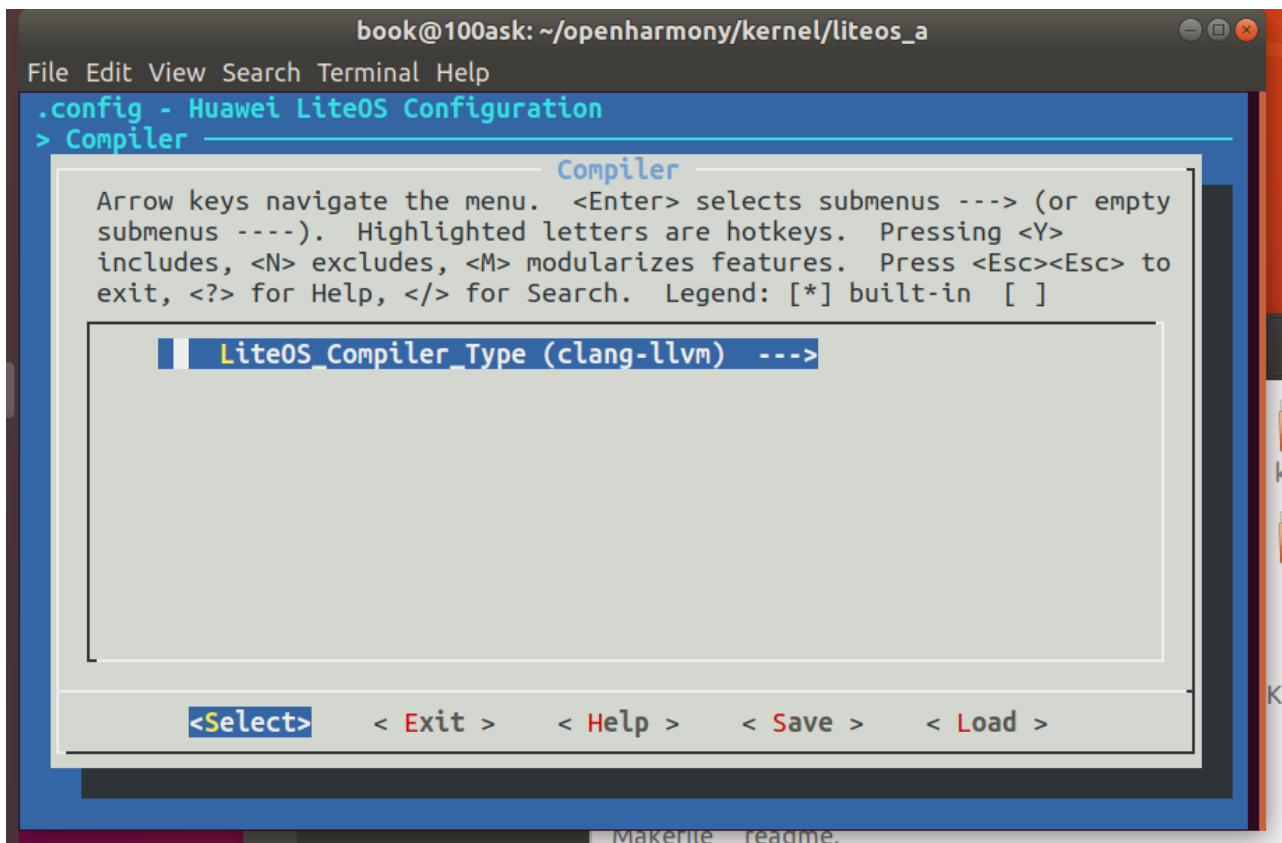
##### config options of bsp #####
source "../kernel/liteos_a/platform/Kconfig"

##### config options of cpu arch #####
source "../kernel/liteos_a/arch/Kconfig"

Plain Text  Tab Width: 8  Ln 49, Col 107  INS
```

进入menuconfig，加入编译器

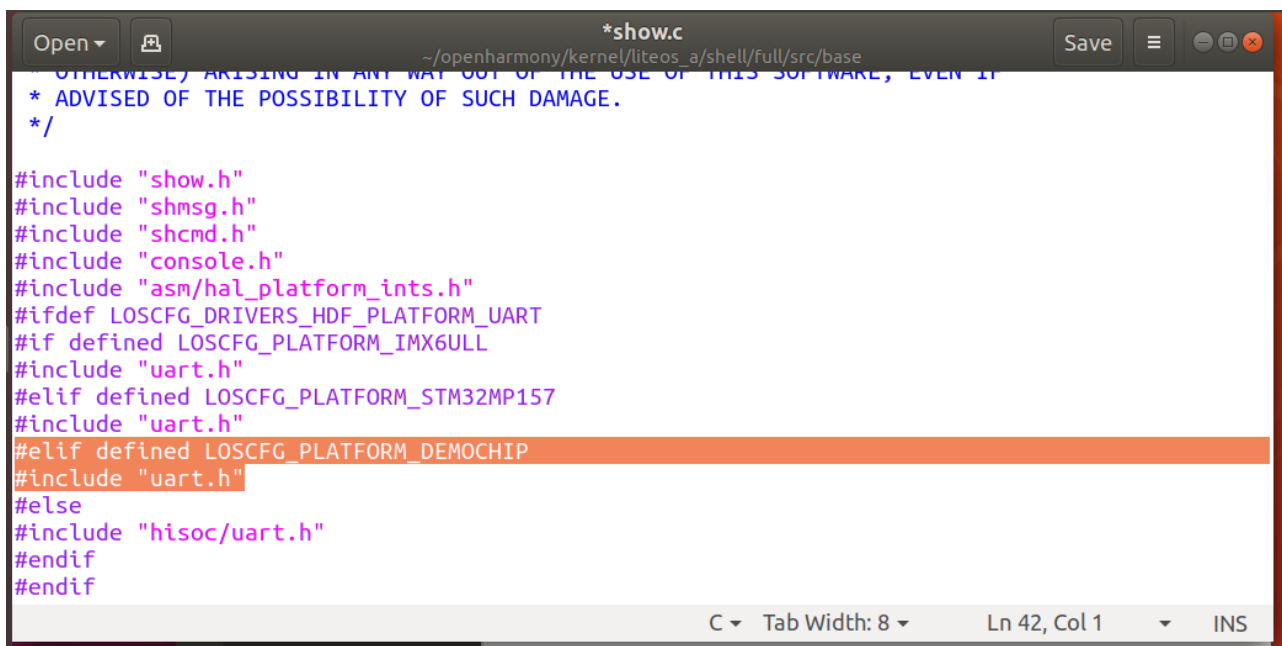




3.8 修改

openharmy/kernel/liteos__a/shell/full/src/base/show.c 文件

```
#elif defined LOSCFG_PLATFORM_DEMOCHIP
#include "uart.h"
```



3.9 修改

openharmoney/kernel/liteos__a/shell/full/src/base/shcmd.c 文件

```
#elif defined LOSCFG_PLATFORM_DEMOCHIP
#include "uart.h"
```

```

#include "shcmd.h"
#include "shell_pri.h"
#include "show.h"
#include "stdlib.h"
#include "unistd.h"
#include "dirent.h"
#include "securec.h"
#include "los_mux.h"
#include "los_memory.h"
#ifdef LOSCFG_DRIVERS_HDF_PLATFORM_UART
#if defined LOSCFG_PLATFORM_IMX6ULL
#include "uart.h"
#elif defined LOSCFG_PLATFORM_STM32MP157
#include "uart.h"
#elif defined LOSCFG_PLATFORM_DEMOCHIP
#include "uart.h"
#else
#include "hisoc/uart.h"
#endif

```

Saving file "/home/book/openharmoney/kernel/liteos__a/shell/f... C Tab Width: 8 Ln 47, Col 18 INS

3.10 修改

openharmoney/kernel/liteos__a/shell/full/src/base/shmsg.c 文件

```
#elif defined LOSCFG_PLATFORM_DEMOCHIP
#include "uart.h"
```

```

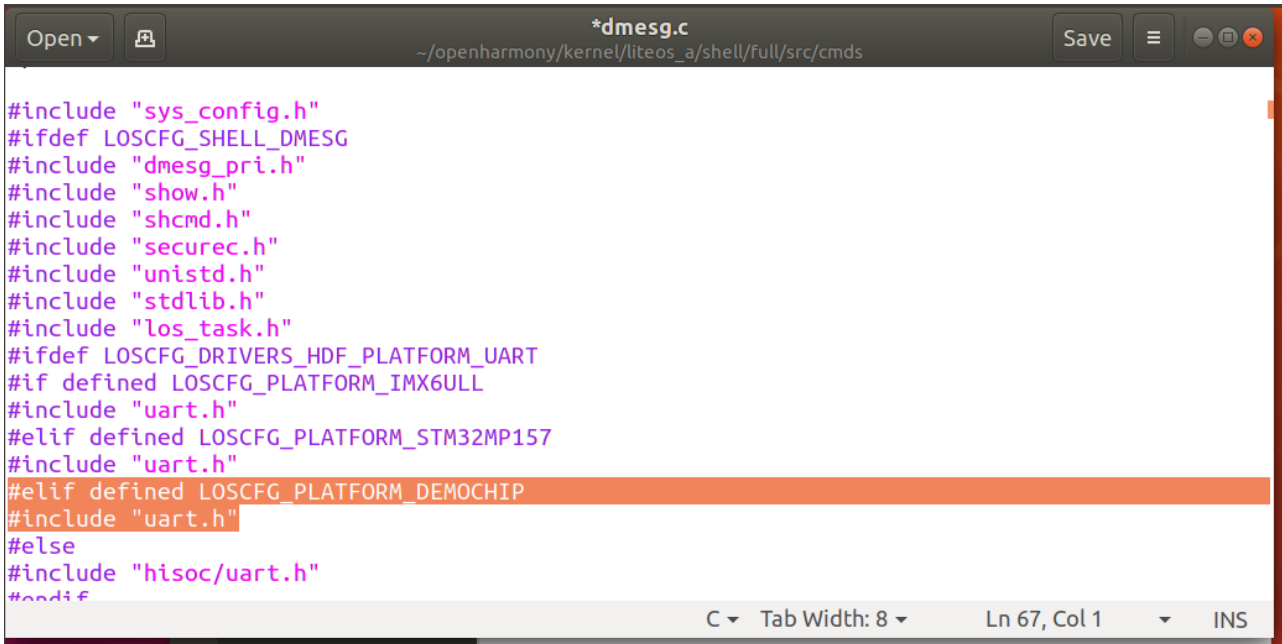
#include "shcmd.h"
#include "stdlib.h"
#include "stdio.h"
#include "unistd.h"
#include "securec.h"
#include "los_base.h"
#include "los_task.h"
#include "los_event.h"
#include "los_list.h"
#include "los_printf.h"
#ifdef LOSCFG_DRIVERS_HDF_PLATFORM_UART
#if defined LOSCFG_PLATFORM_IMX6ULL
#include "uart.h"
#elif defined LOSCFG_PLATFORM_STM32MP157
#include "uart.h"
#elif defined LOSCFG_PLATFORM_DEMOCHIP
#include "uart.h"
#else
#include "hisoc/uart.h"

```

Saving file "/home/book/openharmoney/kernel/liteos__a/shell/f... C Tab Width: 8 Ln 50, Col 18 INS

3.11 修改 openharmony/kernel/liteos_a/shell/full/src/cmds/dmesg.c 文件

```
#elif defined LOSCFG_PLATFORM_DEMOCHIP
#include "uart.h"
```

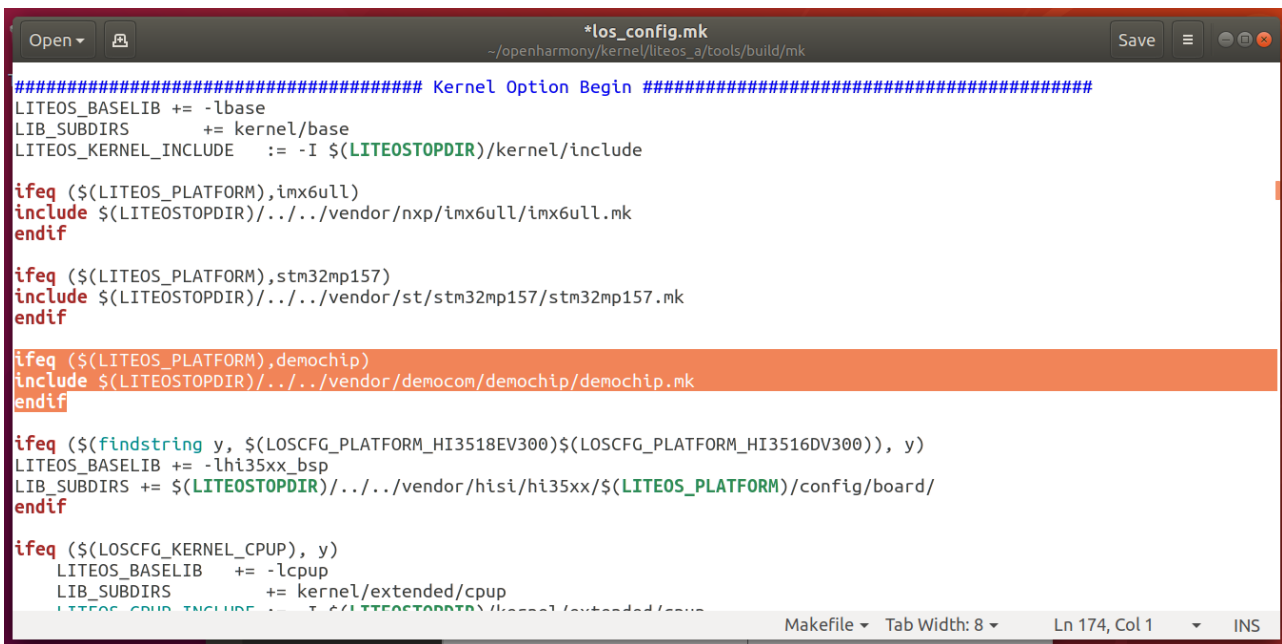


```
*dmesg.c
~/openharmy/kernel/liteos_a/shell/full/src/cmds

#include "sys_config.h"
#ifdef LOSCFG_SHELL_DMESG
#include "dmesg_pri.h"
#include "show.h"
#include "shcmd.h"
#include "securec.h"
#include "unistd.h"
#include "stdlib.h"
#include "los_task.h"
#ifdef LOSCFG_DRIVERS_HDF_PLATFORM_UART
if defined LOSCFG_PLATFORM_IMX6ULL
#include "uart.h"
#elif defined LOSCFG_PLATFORM_STM32MP157
#include "uart.h"
#elif defined LOSCFG_PLATFORM_DEMOCHIP
#include "uart.h"
#else
#include "hisoc/uart.h"
#endif
```

3.12 修改 openharmony/kernel/liteos_a/tools/build/mk/los_config.mk 文件

```
ifeq ($(LITEOS_PLATFORM),demochip)
include $(LITEOSTOPDIR)/../../vendor/democom/demochip/demochip.mk
endif
```



```
*los_config.mk
~/openharmy/kernel/liteos_a/tools/build/mk

##### Kernel Option Begin #####
LITEOS_BASELIB += -lbase
LIB_SUBDIRS += kernel/base
LITEOS_KERNEL_INCLUDE := -I $(LITEOSTOPDIR)/kernel/include

ifeq ($(LITEOS_PLATFORM),imx6ull)
include $(LITEOSTOPDIR)/../../vendor/nxp/imx6ull/imx6ull.mk
endif

ifeq ($(LITEOS_PLATFORM),stm32mp157)
include $(LITEOSTOPDIR)/../../vendor/st/stm32mp157/stm32mp157.mk
endif

ifeq ($(LITEOS_PLATFORM),demochip)
include $(LITEOSTOPDIR)/../../vendor/democom/demochip/demochip.mk
endif

ifeq ($(findstring y, $(LOSCFG_PLATFORM_HI3518EV300)$(LOSCFG_PLATFORM_HI3516DV300)), y)
LITEOS_BASELIB += -lhi35xx_bsp
LIB_SUBDIRS += $(LITEOSTOPDIR)/../../vendor/hisi/hi35xx/$(LITEOS_PLATFORM)/config/board/
endif

ifeq ($(LOSCFG_KERNEL_CPUP), y)
LITEOS_BASELIB += -lcpup
LIB_SUBDIRS += kernel/extended/cpum
```

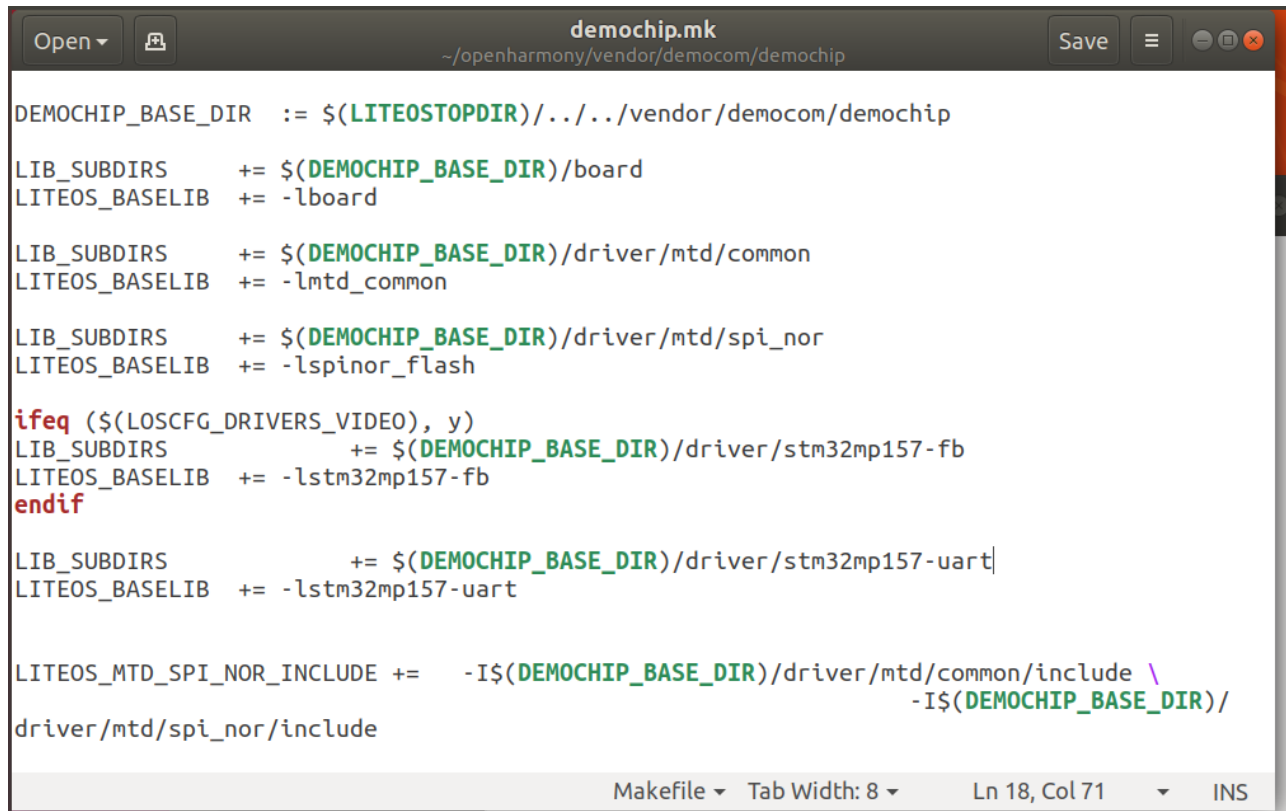
3.13 修改

openharmy/vendor/democom/demochip/demochip.mk 文件

修改第一行路径为 `DEMOCHIP_BASE_DIR :=`

`$(LITEOSTOPDIR)/../../vendor/democom/demochip`

修改所有 `STM32MP157_BASE_DIR` 为 `DEMOCHIP_BASE_DIR`



```
demochip.mk
~/openharmy/vendor/democom/demochip

DEMOCHIP_BASE_DIR := $(LITEOSTOPDIR)/../../vendor/democom/demochip

LIB_SUBDIRS      += $(DEMOCHIP_BASE_DIR)/board
LITEOS_BASELIB   += -lboard

LIB_SUBDIRS      += $(DEMOCHIP_BASE_DIR)/driver/mtd/common
LITEOS_BASELIB   += -lmt_common

LIB_SUBDIRS      += $(DEMOCHIP_BASE_DIR)/driver/mtd/spi_nor
LITEOS_BASELIB   += -lspinor_flash

ifeq ($(LOSCFG_DRIVERS_VIDEO), y)
LIB_SUBDIRS      += $(DEMOCHIP_BASE_DIR)/driver/stm32mp157-fb
LITEOS_BASELIB   += -lstm32mp157-fb
endif

LIB_SUBDIRS      += $(DEMOCHIP_BASE_DIR)/driver/stm32mp157-uart
LITEOS_BASELIB   += -lstm32mp157-uart

LITEOS_MTD_SPI_NOR_INCLUDE += -I$(DEMOCHIP_BASE_DIR)/driver/mtd/common/include \
                                -I$(DEMOCHIP_BASE_DIR)/
driver/mtd/spi_nor/include

Makefile ▾ Tab Width: 8 ▾ Ln 18, Col 71 ▾ INS
```

3.14 修改

openharmy/vendor/democom/demochip/board/board.c 文档

将第一个 `#if 1` 修改为 `#if 0`，并将 `#if` 与 `#endif` 之间的 `else` 注释掉


```
Open ▾  *spinor.c  Save  ⋮  ⌵  ✖
~/openharmy/vendor/democom/demochip/driver/mtd/spi_nor/src/common

/*-----*/
/* spinor_node_register- spinor node register */
/*-----*/
int spinor_node_register(struct MtdDev *mtd)
{
    int ret = 0;
    ret = register_blockdriver("/dev/spinor", &g_dev_spinor_ops, 0755, mtd);
    if (ret) {
        ERR_MSG("register spinor err %d!\n", ret);
    }

    return ret;
}

int spinor_init(void)
{
    spinor_mtd.priv = (void *)0 ;
    spinor_mtd.size = 0;

    /* ramnor register */
    ramnor_register(&spinor_mtd);
    PRINT_RELEASE("%s %s %d\n", __FILE__, __FUNCTION__, __LINE__);
    // AddMtdList("spinor", &spinor_mtd);
    if (spinor_node_register(&spinor_mtd)) {
        PRINT_RELEASE("spinor node register fail!\n");
        return -1;
    }
    return get_mtd_info("spinor") ;
}

C ▾ Tab Width: 8 ▾ Ln 150, Col 1 ▾ INS
```

3.16 修改openharmy/vendor/democom/hdf/hdf_vendor.mk文档

第二行和第三行中出现的路径

```
Open ▾  hdf_vendor.mk  Save  ⋮  ⌵  ✖
~/openharmy/vendor/democom/hdf

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# distributed under the License is distributed on an "AS IS" BASIS,
# WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
# See the License for the specific language governing permissions and
# limitations under the License.

LITEOS_BASELIB += -lhdf_config
LIB_SUBDIRS += $(LITEOS_SOURCE_ROOT)/vendor/st/$(LITEOS_PLATFORM)/config

VENDOR_HDF_DRIVERS_ROOT := $(LITEOSTOPDIR)/../../vendor/st/hdf

ifeq ($(LOSCFG_PLATFORM_STM32MP157), y)
#LIB_SUBDIRS += $(STM32MP157_BASE_DIR)/driver/stm32mp157-i2c
#LITEOS_BASELIB += -lstm32mp157-i2c
endif

#LIB_SUBDIRS += $(STM32MP157_BASE_DIR)/driver/touch
#LITEOS_BASELIB += -ltouch

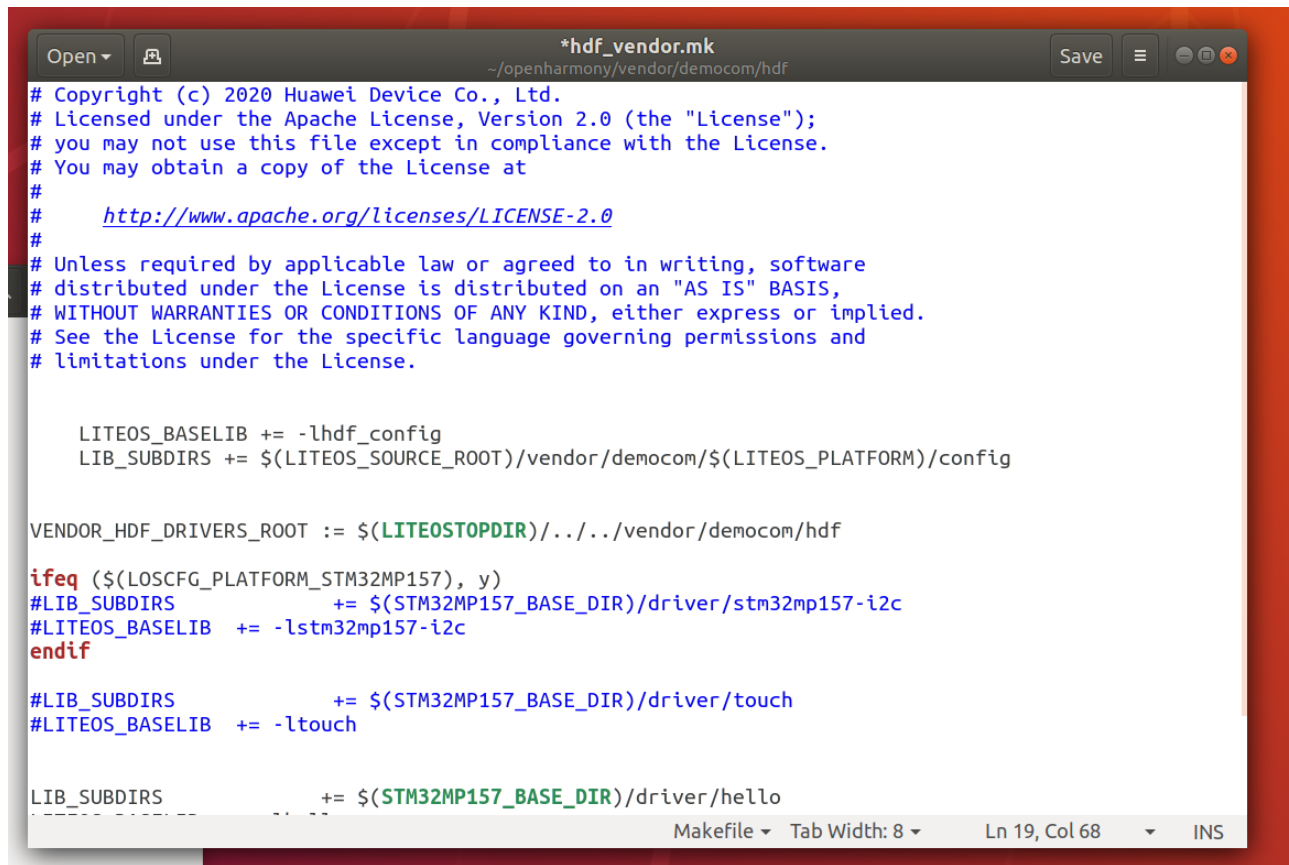
LIB_SUBDIRS += $(STM32MP157_BASE_DIR)/driver/hello

Makefile ▾ Tab Width: 8 ▾ Ln 16, Col 1 ▾ INS
```

修改为

```
LIB_SUBDIRS += $(LITEOS_SOURCE_ROOT)/vendor/democom/$(LITEOS_PLATFORM)/config
```

```
VENDOR_HDF_DRIVERS_ROOT := $(LITEOSTOPDIR)/../../vendor/democom/hdf
```



```
*hdf_vendor.mk
~/openharmoney/vendor/democom/hdf

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# distributed under the License is distributed on an "AS IS" BASIS,
# WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
# See the license for the specific language governing permissions and
# limitations under the License.

LITEOS_BASELIB += -lhdf_config
LIB_SUBDIRS += $(LITEOS_SOURCE_ROOT)/vendor/democom/$(LITEOS_PLATFORM)/config

VENDOR_HDF_DRIVERS_ROOT := $(LITEOSTOPDIR)/../../vendor/democom/hdf

ifeq ($(LOSCFG_PLATFORM_STM32MP157), y)
#LIB_SUBDIRS += $(STM32MP157_BASE_DIR)/driver/stm32mp157-i2c
#LITEOS_BASELIB += -lstm32mp157-i2c
endif

#LIB_SUBDIRS += $(STM32MP157_BASE_DIR)/driver/touch
#LITEOS_BASELIB += -ltouch

LIB_SUBDIRS += $(STM32MP157_BASE_DIR)/driver/hello

Makefile Tab Width: 8 Ln 19, Col 68 INS
```

修改

```
LIB_SUBDIRS += $(DEMOCHIP_BASE_DIR)/driver/hello
```

```
LIB_SUBDIRS += $(DEMOCHIP_BASE_DIR)/driver/hello
LITEOS_BASELIB += -lhello
```

3.17 修改openharmoney/drvivers/hdf/lite/hdf_lite.mk文档

```
ifeq ($(LOSCFG_PLATFORM_DEMOCHIP), y)
include $(LITEOSTOPDIR)/../../vendor/democom/hdf/hdf_vendor.mk
endif
```

```
*hdf_lite.mk
~/openharmony/drivers/hdf/lite

LITEOS_BASELIB += -lhdf_wifi_model
LIB_SUBDIRS += $(LITEOS_DRIVERS_HDF)/model/network/wifi
endif

ifeq ($(LOSCFG_DRIVERS_HDF_USB), y)
    LITEOS_DRIVERS_HDF_INCLUDE += -I $(LITEOS_DRIVERS_HDF)/model/bus/usb/include
    LITEOS_BASELIB += -lhdf_usb
    LIB_SUBDIRS += $(LITEOS_DRIVERS_HDF)/model/bus/usb
endif

# vendor lib
ifeq ($(findstring y, $(LOSCFG_PLATFORM_HI3518EV300)$(LOSCFG_PLATFORM_HI3516DV300)), y)
    include $(LITEOSTOPDIR)/../../vendor/huawei/hdf/hdf_vendor.mk
endif

ifeq ($(LOSCFG_PLATFORM_IMX6ULL), y)
    include $(LITEOSTOPDIR)/../../vendor/nxp/hdf/hdf_vendor.mk
endif

ifeq ($(LOSCFG_PLATFORM_STM32MP157), y)
    include $(LITEOSTOPDIR)/../../vendor/st/hdf/hdf_vendor.mk
endif

ifeq ($(LOSCFG_PLATFORM_DEMOCHIP), y)
    include $(LITEOSTOPDIR)/../../vendor/democom/hdf/hdf_vendor.mk
endif

LITEOS_BASELIB += --no-whole-archive
endif

Makefile Tab Width: 8 Ln 51, Col 1 INS
```

3.18 修改

openharmony/vendor/democom/demochip/driver/stm32mp157-fb/stm32mp157_lcd.c

注释

```
*stm32mp157_lcd.c
~/openharmony/vendor/democom/demochip/driver/stm32mp157-fb

.tvp= 3, /* vysnc脉冲宽度 */
.tvb= 20, /* 上边黑框, Vertical Back porch */
.tvf= 12, /* 下边黑框, Vertical Front porch */

/* 水平方向 */
.thp= 20, /* hsync脉冲宽度 */
.thb= 140, /* 左边黑框, Horizontal Back porch */
.thf= 160, /* 右边黑框, Horizontal Front porch */

.vclk= 51, /* MHz */

},
.xres = 1024,
.yres = 600,
.bpp = 16,
.fb_base = LCD_FB_BASE,
.fb_vbase = LCD_FB_VBASE,
};
```

3.19 编译单板

make clean


```
book@100ask: ~/openharmy/kernel/liteos_a
File Edit View Search Terminal Help
make[1]: Leaving directory '/home/book/openharmony/base/hiviewdfx/frameworks/hilog_lite/featured'
make[1]: Entering directory '/home/book/openharmony/kernel/liteos_a/shell'
make[1]: Leaving directory '/home/book/openharmony/kernel/liteos_a/shell'
make[1]: Entering directory '/home/book/openharmony/kernel/liteos_a/net/telnet'
make[1]: Leaving directory '/home/book/openharmony/kernel/liteos_a/net/telnet'
make[1]: Entering directory '/home/book/openharmony/kernel/liteos_a/syscall'
make[1]: Leaving directory '/home/book/openharmony/kernel/liteos_a/syscall'
make[1]: Entering directory '/home/book/openharmony/kernel/liteos_a/kernel/user'
make[1]: Leaving directory '/home/book/openharmony/kernel/liteos_a/kernel/user'
make[1]: Entering directory '/home/book/openharmony/kernel/liteos_a/security'
make[1]: Leaving directory '/home/book/openharmony/kernel/liteos_a/security'
make[1]: Entering directory '/home/book/openharmony/kernel/liteos_a/apps'
make[2]: Entering directory '/home/book/openharmony/kernel/liteos_a/apps/shell'
make[2]: Leaving directory '/home/book/openharmony/kernel/liteos_a/apps/shell'
make[2]: Entering directory '/home/book/openharmony/kernel/liteos_a/apps/init'
make[2]: Leaving directory '/home/book/openharmony/kernel/liteos_a/apps/init'
make[1]: Leaving directory '/home/book/openharmony/kernel/liteos_a/apps'
make[1]: Entering directory '/home/book/openharmony/kernel/liteos_a'
make[1]: Leaving directory '/home/book/openharmony/kernel/liteos_a'
clean demochip finish
```

make -j 8

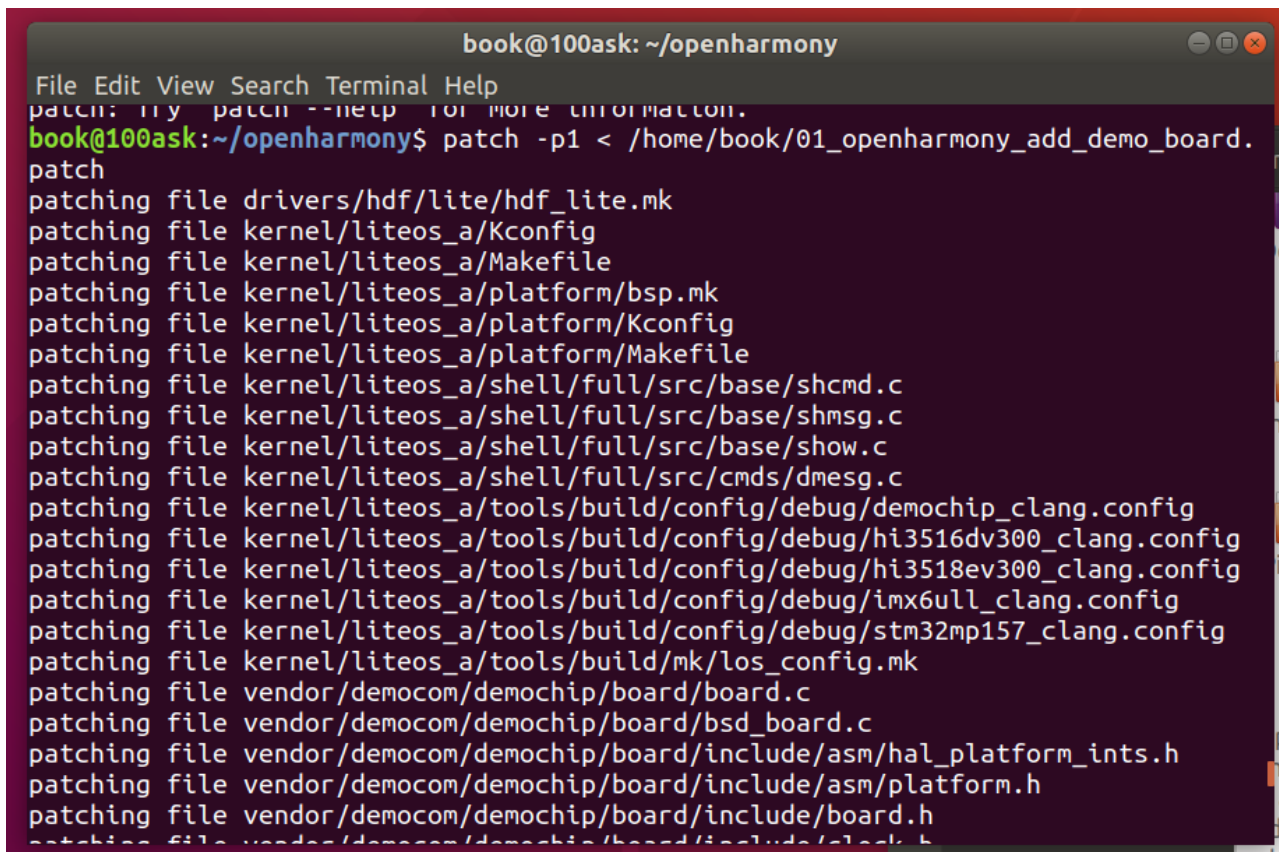
```
book@100ask: ~/openharmy/kernel/liteos_a
File Edit View Search Terminal Help
l/liteos_a/out/demochip/liteos.map -o /home/book/openharmony/kernel/liteos_a/out/demochip/liteos --start-group -lclang_rt.builtins -lunwind --no-dependent-libraries -lcortex-a7 -lbsp -lrootfs -lbase -lboard -lmtcommon -lspinor_flash -lstm32mp157-uart -lcup -ldynload -lvdso -ltickless -lliteipc -lpipes -lc -lsec -lscrew -lc++ -lc++abi -lcppsupport -lz -lposix -lbsd -llinuxkpi -lvfs -lmulti_partition -lbch -lfat -lvirpart -ldisk -lbcache -lramfs -lnfs -lproc -ljffs2 -llwip --whole-archive -lhdf -lhdf_config -lhello --no-whole-archive -lhievent -lmem -lmtcommon -lhilog -lshell -ltelnet -lsyscall -lsecurity --end-group
/home/book/llvm/bin/../../bin/llvm-objcopy -R .bss -O binary /home/book/openharmony/kernel/liteos_a/out/demochip/liteos /home/book/openharmony/kernel/liteos_a/out/demochip/liteos.bin
/home/book/llvm/bin/../../bin/llvm-objdump -t /home/book/openharmony/kernel/liteos_a/out/demochip/liteos |sort >/home/book/openharmony/kernel/liteos_a/out/demochip/liteos.sym.sorted
/home/book/llvm/bin/../../bin/llvm-objdump -d /home/book/openharmony/kernel/liteos_a/out/demochip/liteos >/home/book/openharmony/kernel/liteos_a/out/demochip/liteos.asm
make[1]: Entering directory '/home/book/openharmony/kernel/liteos_a/apps'
make[2]: Entering directory '/home/book/openharmony/kernel/liteos_a/apps/shell'
make[2]: Leaving directory '/home/book/openharmony/kernel/liteos_a/apps/shell'
make[2]: Entering directory '/home/book/openharmony/kernel/liteos_a/apps/init'
make[2]: Leaving directory '/home/book/openharmony/kernel/liteos_a/apps/init'
make[1]: Leaving directory '/home/book/openharmony/kernel/liteos_a/apps'
book@100ask:~/openharmy/kernel/liteos_a$
```

至此实验完成。

4 问题和解决方法

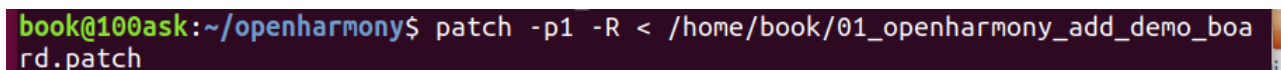
4.1 先直接打了补丁包完成了操作

由于v1.2.patch已经打过，只需打补丁：`01_openharmony_add_demo_board.patch` 即可完成实验

A terminal window titled 'book@100ask: ~/openharmony' showing the command 'patch -p1 < /home/book/01_openharmony_add_demo_board.patch' being executed. The output lists 20 files being patched, including drivers/hdf/lite/hdf_lite.mk, kernel/liteos_a/Kconfig, kernel/liteos_a/Makefile, kernel/liteos_a/platform/bsp.mk, kernel/liteos_a/platform/Kconfig, kernel/liteos_a/platform/Makefile, kernel/liteos_a/shell/full/src/base/shcmd.c, kernel/liteos_a/shell/full/src/base/shmsg.c, kernel/liteos_a/shell/full/src/base/show.c, kernel/liteos_a/shell/full/src/cmds/dmesg.c, kernel/liteos_a/tools/build/config/debug/demochip_clang.config, kernel/liteos_a/tools/build/config/debug/hi3516dv300_clang.config, kernel/liteos_a/tools/build/config/debug/hi3518ev300_clang.config, kernel/liteos_a/tools/build/config/debug/imx6ull_clang.config, kernel/liteos_a/tools/build/config/debug/stm32mp157_clang.config, kernel/liteos_a/tools/build/mk/los_config.mk, vendor/democom/demochip/board/board.c, vendor/democom/demochip/board/bsd_board.c, vendor/democom/demochip/board/include/asm/hal_platform_ints.h, vendor/democom/demochip/board/include/asm/platform.h, and vendor/democom/demochip/board/include/board.h.

```
book@100ask: ~/openharmony
File Edit View Search Terminal Help
patch: try 'patch --help' for more information.
book@100ask:~/openharmony$ patch -p1 < /home/book/01_openharmony_add_demo_board.
patch
patching file drivers/hdf/lite/hdf_lite.mk
patching file kernel/liteos_a/Kconfig
patching file kernel/liteos_a/Makefile
patching file kernel/liteos_a/platform/bsp.mk
patching file kernel/liteos_a/platform/Kconfig
patching file kernel/liteos_a/platform/Makefile
patching file kernel/liteos_a/shell/full/src/base/shcmd.c
patching file kernel/liteos_a/shell/full/src/base/shmsg.c
patching file kernel/liteos_a/shell/full/src/base/show.c
patching file kernel/liteos_a/shell/full/src/cmds/dmesg.c
patching file kernel/liteos_a/tools/build/config/debug/demochip_clang.config
patching file kernel/liteos_a/tools/build/config/debug/hi3516dv300_clang.config
patching file kernel/liteos_a/tools/build/config/debug/hi3518ev300_clang.config
patching file kernel/liteos_a/tools/build/config/debug/imx6ull_clang.config
patching file kernel/liteos_a/tools/build/config/debug/stm32mp157_clang.config
patching file kernel/liteos_a/tools/build/mk/los_config.mk
patching file vendor/democom/demochip/board/board.c
patching file vendor/democom/demochip/board/bsd_board.c
patching file vendor/democom/demochip/board/include/asm/hal_platform_ints.h
patching file vendor/democom/demochip/board/include/asm/platform.h
patching file vendor/democom/demochip/board/include/board.h
patching file vendor/democom/demochip/board/include/board.h
```

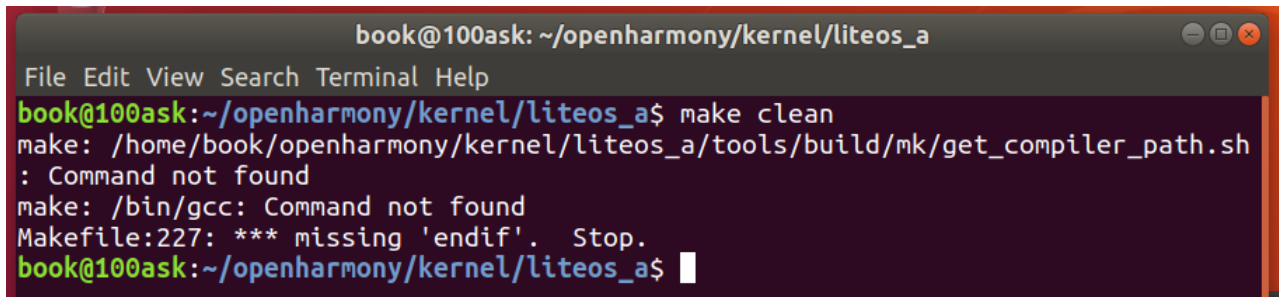
这时需要卸载补丁包： `patch -p(n) -R < [补丁包路径] patch_name`

A terminal window showing the command 'patch -p1 -R < /home/book/01_openharmony_add_demo_board.patch' being executed to reverse the previous patch.

```
book@100ask:~/openharmony$ patch -p1 -R < /home/book/01_openharmony_add_demo_boa
rd.patch
```

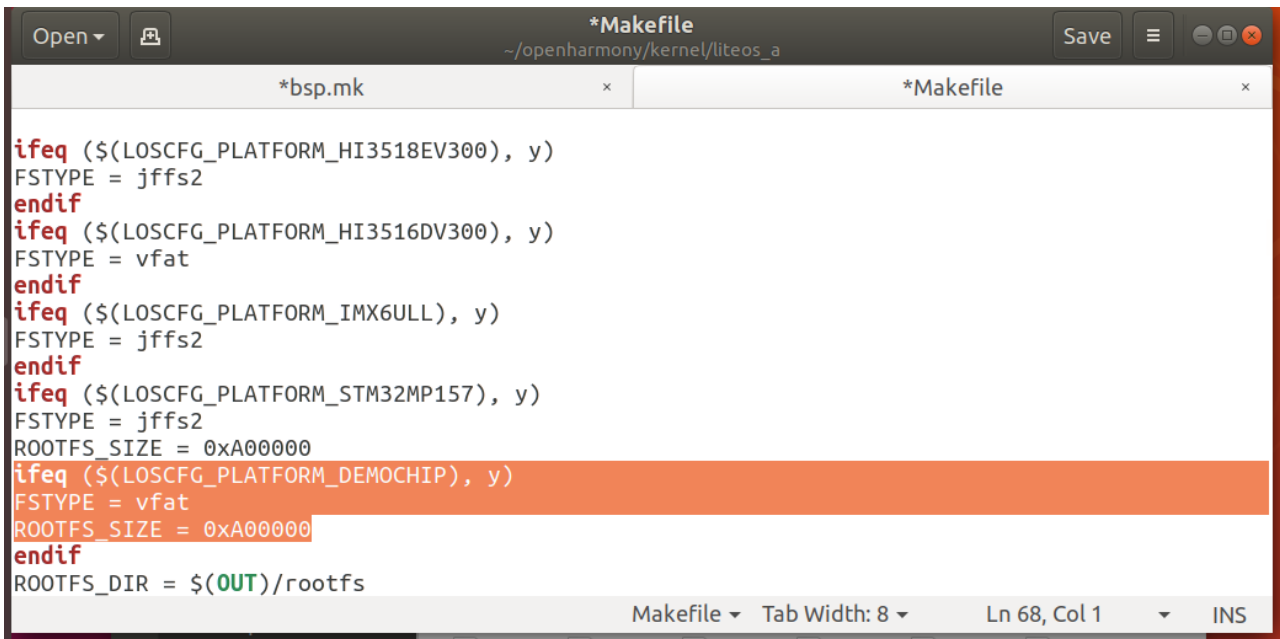
把修改还原，然后自己操作一遍

4.2 出现问题

A terminal window titled 'book@100ask: ~/openharmony/kernel/liteos_a' showing the command 'make clean' being executed. The output shows errors: 'make: /home/book/openharmony/kernel/liteos_a/tools/build/mk/get_compiler_path.sh: Command not found' and 'make: /bin/gcc: Command not found'. The Makefile process is also stopped due to a missing 'endif' tag.

```
book@100ask: ~/openharmony/kernel/liteos_a
File Edit View Search Terminal Help
book@100ask:~/openharmony/kernel/liteos_a$ make clean
make: /home/book/openharmony/kernel/liteos_a/tools/build/mk/get_compiler_path.sh
: Command not found
make: /bin/gcc: Command not found
Makefile:227: *** missing 'endif'. Stop.
book@100ask:~/openharmony/kernel/liteos_a$
```

原因：步骤3.6漏了endif



```
*Makefile
~/openharmy/kernel/liteos_a

*bsp.mk
*Makefile

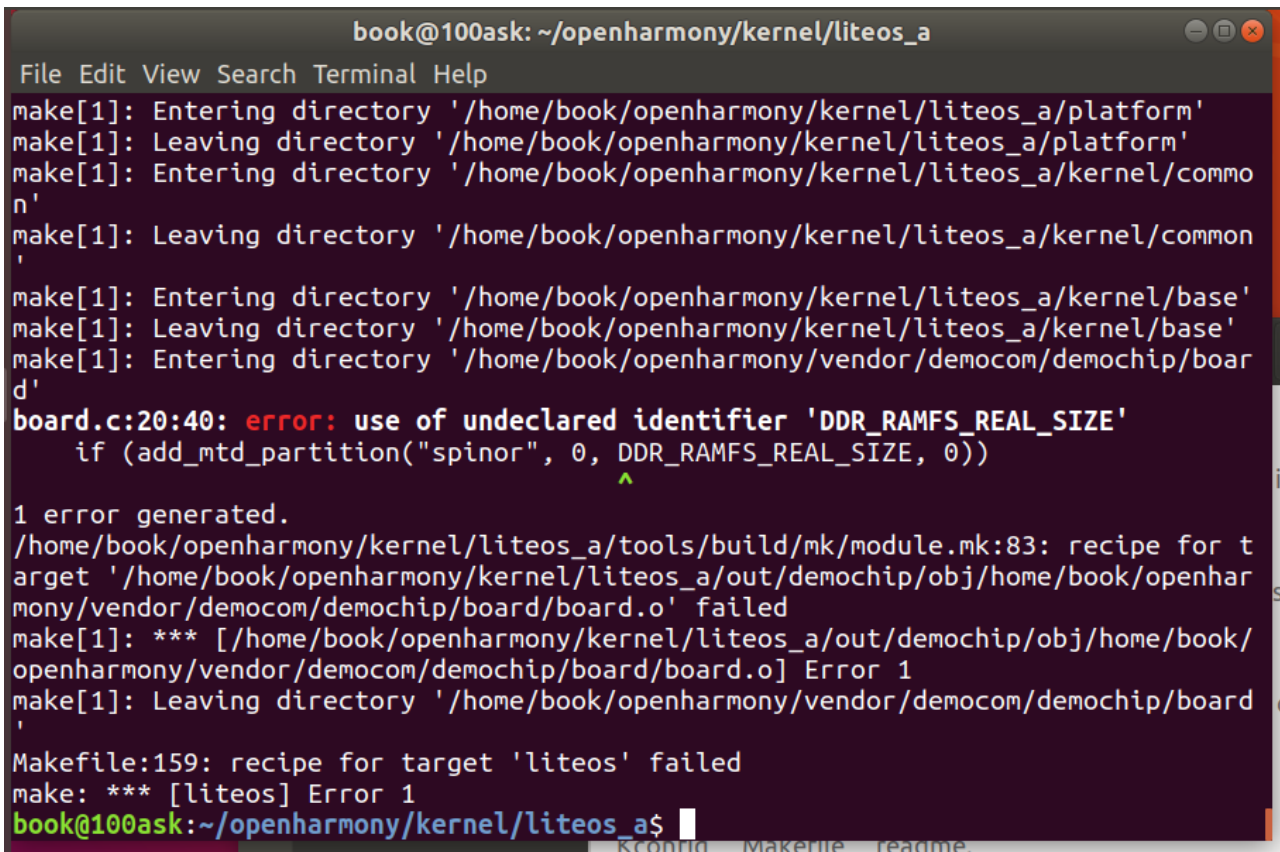
ifeq ($(LOSCFG_PLATFORM_HI3518EV300), y)
FSTYPE = jffs2
endif
ifeq ($(LOSCFG_PLATFORM_HI3516DV300), y)
FSTYPE = vfat
endif
ifeq ($(LOSCFG_PLATFORM_IMX6ULL), y)
FSTYPE = jffs2
endif
ifeq ($(LOSCFG_PLATFORM_STM32MP157), y)
FSTYPE = jffs2
ROOTFS_SIZE = 0xA00000
ifeq ($(LOSCFG_PLATFORM_DEMOCHIP), y)
FSTYPE = vfat
ROOTFS_SIZE = 0xA00000
endif
ROOTFS_DIR = $(OUT)/rootfs

Makefile Tab Width: 8 Ln 68, Col 1 INS
```

3.6 修改 openharmony/kernel/liteos_a/Makefile 文件

```
ifeq ($(LOSCFG_PLATFORM_DEMOCHIP), y)
FSTYPE = vfat
ROOTFS_SIZE = 0xA00000
endif
```

4.3 出现问题



```
book@100ask: ~/openharmy/kernel/liteos_a
File Edit View Search Terminal Help
make[1]: Entering directory '/home/book/openharmony/kernel/liteos_a/platform'
make[1]: Leaving directory '/home/book/openharmony/kernel/liteos_a/platform'
make[1]: Entering directory '/home/book/openharmony/kernel/liteos_a/kernel/common'
make[1]: Leaving directory '/home/book/openharmony/kernel/liteos_a/kernel/common'
make[1]: Entering directory '/home/book/openharmony/kernel/liteos_a/kernel/base'
make[1]: Leaving directory '/home/book/openharmony/kernel/liteos_a/kernel/base'
make[1]: Entering directory '/home/book/openharmony/vendor/democom/demochip/board'
board.c:20:40: error: use of undeclared identifier 'DDR_RAMFS_REAL_SIZE'
    if (add_mtd_partition("spinor", 0, DDR_RAMFS_REAL_SIZE, 0))
                                   ^
1 error generated.
/home/book/openharmony/kernel/liteos_a/tools/build/mk/module.mk:83: recipe for target '/home/book/openharmony/kernel/liteos_a/out/demochip/obj/home/book/openharmony/vendor/democom/demochip/board/board.o' failed
make[1]: *** [/home/book/openharmony/kernel/liteos_a/out/demochip/obj/home/book/openharmony/vendor/democom/demochip/board/board.o] Error 1
make[1]: Leaving directory '/home/book/openharmony/vendor/democom/demochip/board'
Makefile:159: recipe for target 'liteos' failed
make: *** [liteos] Error 1
book@100ask:~/openharmy/kernel/liteos_a$
```

没有接着修改board.c文件，正确修改后解决

4.4 出现问题

```
book@100ask: ~/openharmy/kernel/liteos_a
File Edit View Search Terminal Help
r/mtd/common'
make[1]: Entering directory '/home/book/openharmony/vendor/democom/demochip/driv
er/mtd/spi_nor'
make[1]: Leaving directory '/home/book/openharmony/vendor/democom/demochip/drive
r/mtd/spi_nor'
make[1]: Entering directory '/home/book/openharmony/vendor/democom/demochip/driv
er/stm32mp157-fb'
stm32mp157_lcd.c:76:14: error: use of undeclared identifier 'LCD_FB_VBASE'
        .fb_vbase = LCD_FB_VBASE,
                    ^
1 error generated.
/home/book/openharmony/kernel/liteos_a/tools/build/mk/module.mk:83: recipe for t
arget '/home/book/openharmony/kernel/liteos_a/out/demochip/obj/home/book/openhar
```

原因：没有注释完毕

4.5 出现问题

```
make[1]: Leaving directory '/home/book/openharmony/vendor/democom/demochip/driv
er/mtd/spi_nor'
make[1]: *** /driver/hello: No such file or directory. Stop.
Makefile:206: recipe for target 'clean' failed
make: *** [clean] Error 1
```

修改路径

```
*hdf_vendor.mk
~/openharmy/vendor/democom/hdf
Save
# http://www.apache.org/licenses/LICENSE-2.0
#
# Unless required by applicable law or agreed to in writing, software
# distributed under the License is distributed on an "AS IS" BASIS,
# WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
# See the License for the specific language governing permissions and
# limitations under the License.
LITEOS_BASELIB += -lhdf_config
LIB_SUBDIRS += $(LITEOS_SOURCE_ROOT)/vendor/democom/$(LITEOS_PLATFORM)/config
VENDOR_HDF_DRIVERS_ROOT := $(LITEOSTOPDIR)/../../vendor/democom/hdf
ifeq ($(LOSCFG_PLATFORM_STM32MP157), y)
#LIB_SUBDIRS += $(STM32MP157_BASE_DIR)/driver/stm32mp157-i2c
#LITEOS_BASELIB += -lstm32mp157-i2c
endif
#LIB_SUBDIRS += $(STM32MP157_BASE_DIR)/driver/touch
#LITEOS_BASELIB += -ltouch
LIB_SUBDIRS += $(DEMOCHIP_BASE_DIR)/driver/hello
LITEOS_BASELIB += -lhello
# lib path
LITEOS_LD_PATH += -L$(VENDOR_HDF_DRIVERS_ROOT)/libs/$(LITEOS_PLATFORM)
```

5 实验体会

在本次实验中，我通过打补丁和在原有文件中添加新代码，再进行编译后，完成了增加一个新单板的任务。

内核启动流程可以分为4步骤：

- 启动
 - 使用汇编代码编写，涉及非常底层的设置，比如CPU设置、代码重定位等等
 - 地址映射也在这里实现
 - 它最终会调用main函数
- main函数
 - 以后的代码，基本都是使用C语言编写了
 - 主要工作是：调用OsMain进行各类初始化、最终会启动用户程序
- OsMain函数
 - 进行操作系统层面的初始化，比如异常初始化、任务初始化、IPC初始化
 - 调用SystemInit
- SystemInit
 - 偏向于应用程序的初始化
 - 挂载根文档系统
 - 启动第一个用户进程

6 参考文献

- [1] [HarmonyOS内核移植——添加单板](#)