第 1 次实验　环境搭建与鸿蒙 LiteOS-a 内核体验

1. 实验环境

Windows10 21H2、Vmware Workstation Pro 16、ubuntu18.04
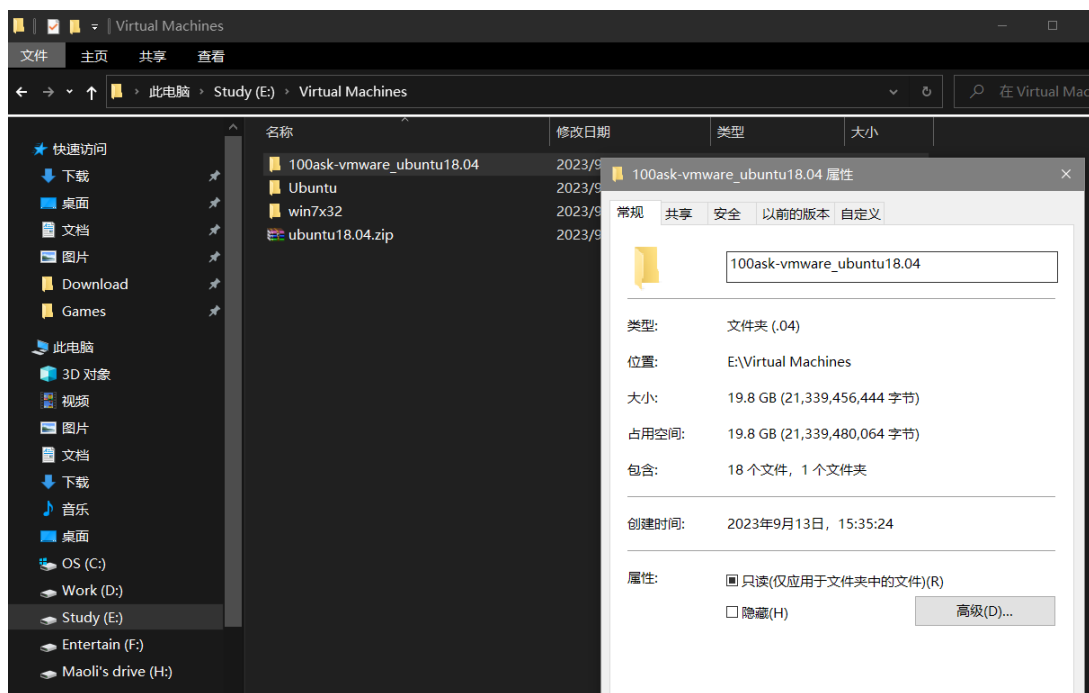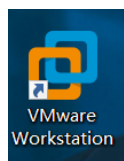配置了相关的软件。
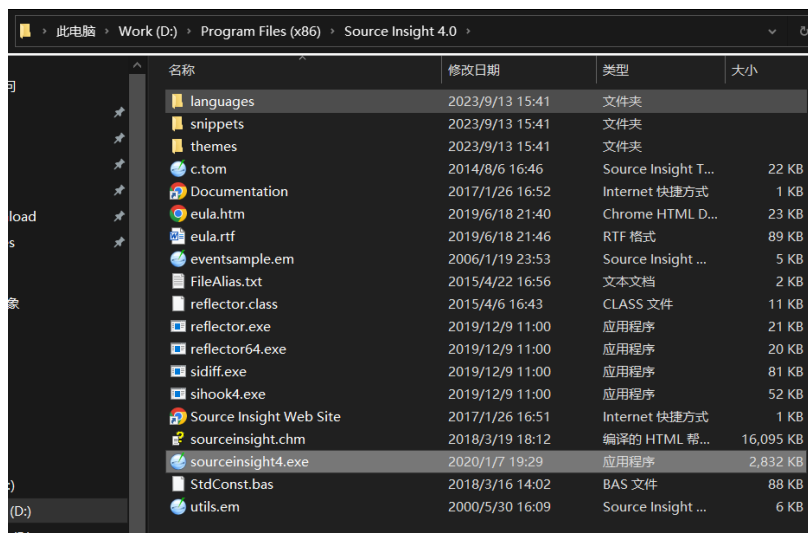
2. 实验内容与步骤

2.1 搭建开发环境

安装 VMware、下载 Ubuntu 镜像

（http://download.100ask.net/boards/Nxp/100ask_imx6ull_pro/index.html）
中使用百度网盘下载

安装 Windows 上各个 APP 这些 APP 有：SouceInsight、FileZilla、MobaXterm

2.2 使用 NAT 配置 Ubuntu 网络

验证网络

查看 ubuntu 的 ip

电脑可以成功 ping

查看电脑本地 ipconfig

虚拟机可以成功 ping

2.3 安装 Ubuntu 软件

使用下面命令一键配置/初始化开发环境(安装 tftp，nfs，vim 等软件)。

```
book@100ask: ~/DevelopmentEnvConf
File  Edit  View  Search  Terminal  Help
book@100ask:~$ rm -rf DevelopmentEnvConf
book@100ask:~$ git clone  https://e.coding.net/weidongshan/DevelopmentEnvConf.git
Cloning into 'DevelopmentEnvConf'...
remote: Enumerating objects: 180, done.
remote: Counting objects: 100% (180/180), done.
remote: Compressing objects: 100% (110/110), done.
remote: Total 180 (delta 82), reused 131 (delta 55), pack-reused 0
Receiving objects: 100% (180/180), 304.94 KiB | 3.50 MiB/s, done.
Resolving deltas: 100% (82/82), done.
book@100ask:~$ cd  DevelopmentEnvConf
book@100ask:~/DevelopmentEnvConf$ sudo ./Configuring_ubuntu.sh
Network OK.
book:x:1001:1001:book:/home/book:/bin/bash
Check the set user name OK.
Enter new UNIX password: Retype new UNIX password: passwd: password updated successfully
Please select the host use:
    1. Configuring for Harmony OS development
    2. Configuring for Linux development
    3. Configuring for Android development
    4. Quit
please input your choice:1
 sources.list.bak exists
Get:1 http://mirrors.aliyun.com/ubuntu bionic InRelease [242 kB]
Get:2 http://mirrors.aliyun.com/ubuntu bionic-security InRelease [88.7 kB]
Get:3 http://mirrors.aliyun.com/ubuntu bionic-updates InRelease [88.7 kB]
Get:4 http://mirrors.aliyun.com/ubuntu bionic-backports InRelease [83.3 kB]
Get:5 http://mirrors.aliyun.com/ubuntu bionic-proposed InRelease [242 kB]
Get:6 http://mirrors.aliyun.com/ubuntu bionic/multiverse Sources [181 kB]
Get:7 http://mirrors.aliyun.com/ubuntu bionic/restricted Sources [5,324 B]
Get:8 http://mirrors.aliyun.com/ubuntu bionic/universe Sources [9,051 kB]
Get:9 http://mirrors.aliyun.com/ubuntu bionic/main Sources [829 kB]
Get:10 http://mirrors.aliyun.com/ubuntu bionic/main amd64 Packages [1,019 kB]
```



```
book@100ask: ~/DevelopmentEnvConf
File  Edit  View  Search  Terminal  Help
sudo's -H flag.
The directory '/home/book/.cache/pip' or its parent directory is not owned by the current user and caching wheels ha
s been disabled. check the permissions and owner of that directory. If executing pip with sudo, you may want sudo's
-H flag.
Collecting kconfiglib
  Downloading https://files.pythonhosted.org/packages/8a/f1/d98a89231e779b079b977590efcc31249d959c8f1d4b5858cad69695
ff9c/kconfiglib-14.1.0-py2.py3-none-any.whl (145kB)
    100% |████████████████████████████████| 153kB 12kB/s
Installing collected packages: kconfiglib
Successfully installed kconfiglib-14.1.0
OK
lrwxrwxrwx 1 root root 9 Sep 13 04:09 /bin/sh -> /bin/bash
--2023-09-13 04:09:31--  https://weidongshan.coding.net/p/DevelopmentEnvConf/d/DevelopmentEnvConf/git/raw/master/mki
mage.stm32
Resolving weidongshan.coding.net (weidongshan.coding.net)... 42.192.175.15, 81.69.167.241, 175.24.154.130
Connecting to weidongshan.coding.net (weidongshan.coding.net)|42.192.175.15|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 84 [application/json]
Saving to: 'mkimage.stm32.1'

mkimage.stm32.1            100%[===============================================>]      84  --.-KB/s    in 0s

2023-09-13 04:09:31 (23.4 MB/s) - 'mkimage.stm32.1' saved [84/84]


===============================================
==  Configuring for openharmony development complete!  ==
===============================================
TFTP  PATH: /home/book/tftpboot
NFS   PATH: /home/book/nfs_rootfs
SAMBA PATH: /home/book/
book@100ask:~/DevelopmentEnvConf$ sudo ./Configuring_ubuntu.sh
[sudo] password for book:
```

```
                    book@100ask: ~/DevelopmentEnvConf
File  Edit  View  Search  Terminal  Help
==================================================
==  Configuring for openharmony development complete!  ==
==================================================
TFTP  PATH: /home/book/tftpboot
NFS   PATH: /home/book/nfs_rootfs
SAMBA PATH: /home/book/
book@100ask:~/DevelopmentEnvConf$ sudo ./Configuring_ubuntu.sh
[sudo] password for book:
Network OK.
book:x:1001:1001:book:/home/book:/bin/bash
Check the set user name OK.
Enter new UNIX password: Retype new UNIX password: passwd: password updated successfully
Please select the host use:
    1. Configuring for Harmony OS development
    2. Configuring for Linux development
    3. Configuring for Android development
    4. Quit
please input your choice:2
 sources.list.bak exists
Hit:1 http://mirrors.aliyun.com/ubuntu bionic InRelease
Hit:2 http://mirrors.aliyun.com/ubuntu bionic-security InRelease
Hit:3 http://mirrors.aliyun.com/ubuntu bionic-updates InRelease
Hit:4 http://mirrors.aliyun.com/ubuntu bionic-backports InRelease
Hit:5 http://mirrors.aliyun.com/ubuntu bionic-proposed InRelease
Reading package lists... Done
Hit:1 http://mirrors.aliyun.com/ubuntu bionic InRelease
Hit:2 http://mirrors.aliyun.com/ubuntu bionic-security InRelease
Hit:3 http://mirrors.aliyun.com/ubuntu bionic-updates InRelease
Hit:4 http://mirrors.aliyun.com/ubuntu bionic-backports InRelease
Hit:5 http://mirrors.aliyun.com/ubuntu bionic-proposed InRelease
Reading package lists... Done
install_software_list: ssh git vim tftp nfs samba.
```



```
                    book@100ask: ~/DevelopmentEnvConf
File  Edit  View  Search  Terminal  Help
libkrb5-dev is already the newest version (1.16-2ubuntu0.4).
libldap2-dev is already the newest version (2.4.45+dfsg-1ubuntu1.11).
libmysqlclient-dev is already the newest version (5.7.42-0ubuntu0.18.04.1).
libncurses5-dev is already the newest version (6.1-1ubuntu1.18.04.1).
libpcre3-dev is already the newest version (2:8.39-9ubuntu0.1).
libssl-dev is already the newest version (1.1.1-1ubuntu2.1~18.04.23).
libxml2-dev is already the newest version (2.9.4+dfsg1-6.1ubuntu1.9).
u-boot-tools is already the newest version (2020.10+dfsg-1ubuntu0~18.04.3).
vim is already the newest version (2:8.0.1453-1ubuntu1.13).
zlib1g-dev is already the newest version (1:1.2.11.dfsg-0ubuntu2.2).
subversion is already the newest version (1.9.7-4ubuntu1.1).
openssh-server is already the newest version (1:7.6p1-4ubuntu0.7).
0 upgraded, 0 newly installed, 0 to remove and 648 not upgraded.
--2023-09-13 04:22:23--  https://weidongshan.coding.net/p/DevelopmentEnvConf/d/DevelopmentEnvConf/git/raw/master/mki
mage.stm32
Resolving weidongshan.coding.net (weidongshan.coding.net)... 81.69.167.241, 42.192.175.15, 175.24.154.130
Connecting to weidongshan.coding.net (weidongshan.coding.net)|81.69.167.241|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 84 [application/json]
Saving to: 'mkimage.stm32'

mkimage.stm32              100%[===============================================>]      84  --.-KB/s    in 0s

2023-09-13 04:22:23 (20.9 MB/s) - 'mkimage.stm32' saved [84/84]


==================================================
==  Configuring for Linux development complete!  ==
==================================================
TFTP  PATH: /home/book/tftpboot
NFS   PATH: /home/book/nfs_rootfs
SAMBA PATH: /home/book/
book@100ask:~/DevelopmentEnvConf$
```

成功配置了鸿蒙开发环境和 Linux 开发环境

2.4 在 IMX6ULL 上体验鸿蒙系统
打开烧写软件：100ask_imx6ull_flashing_tool
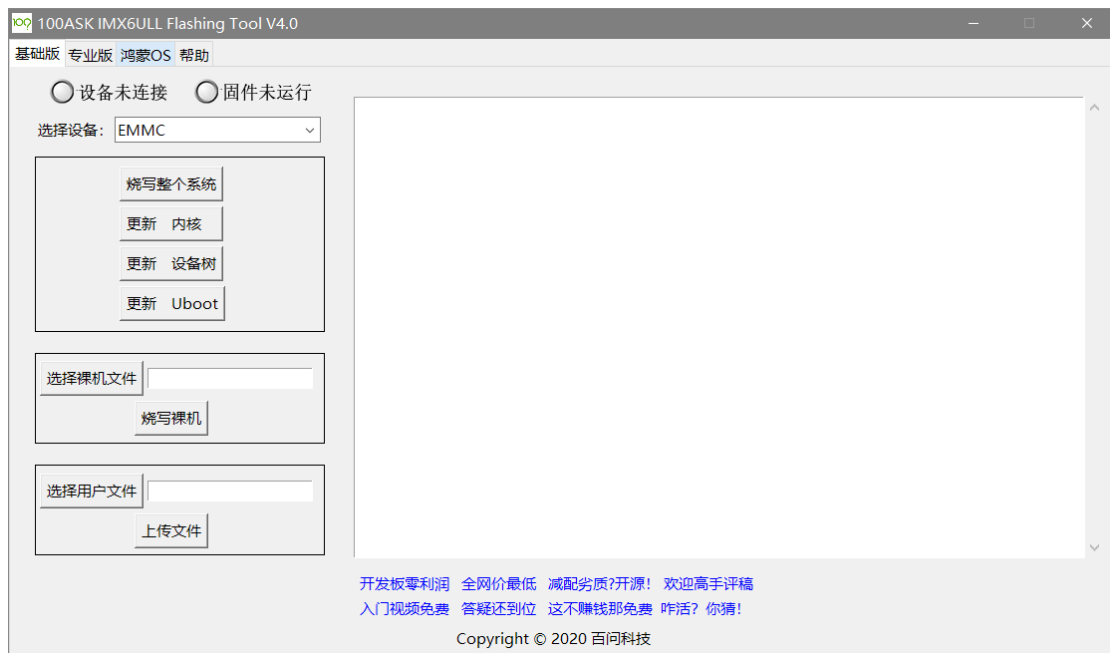
连接硬件、接上电源、屏幕（以下是 emmc 启动的照片）
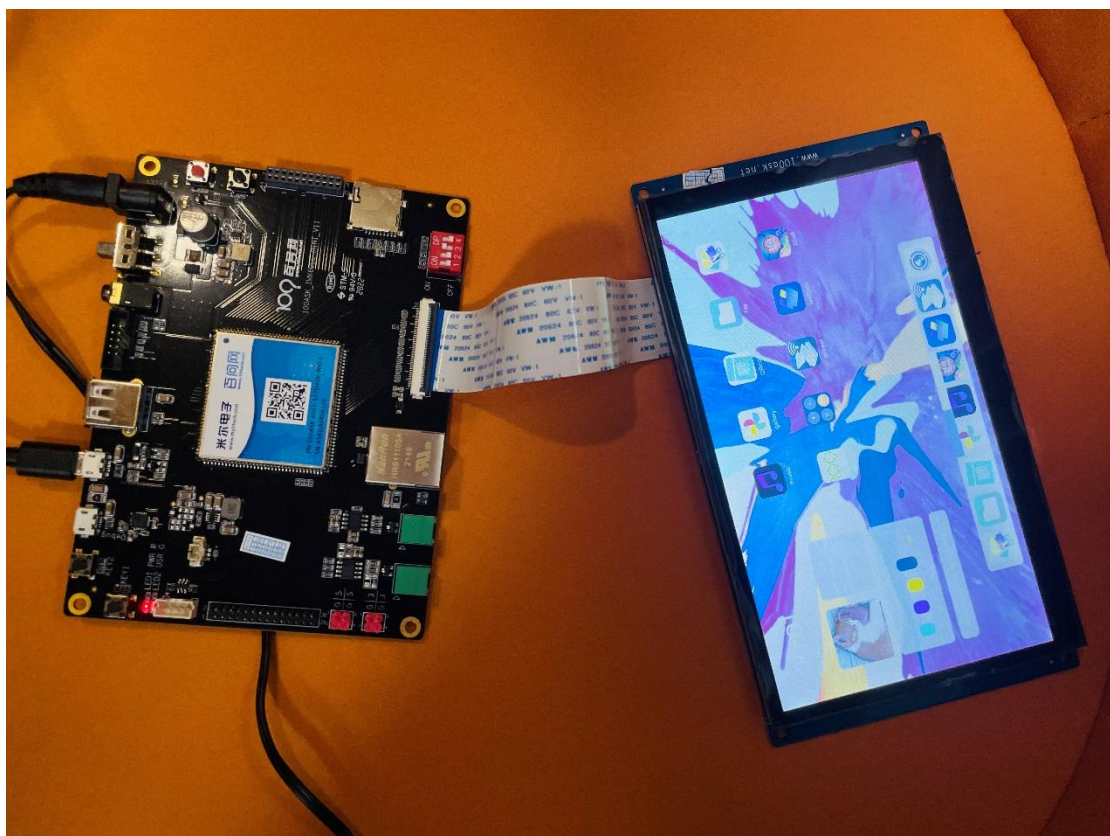
切换为 usb 启动

这 3 种启动方式的设置示意图如下：

EMMC   SD/TF卡   USB

接好 2 条 USB 线，开发板上电
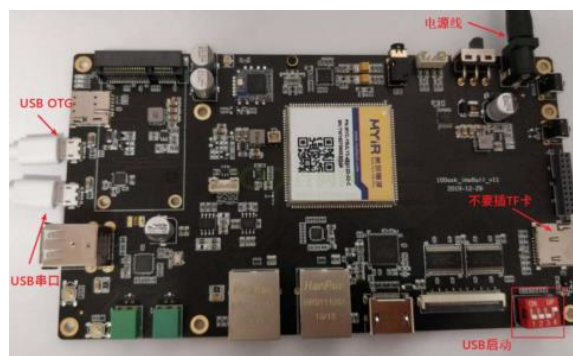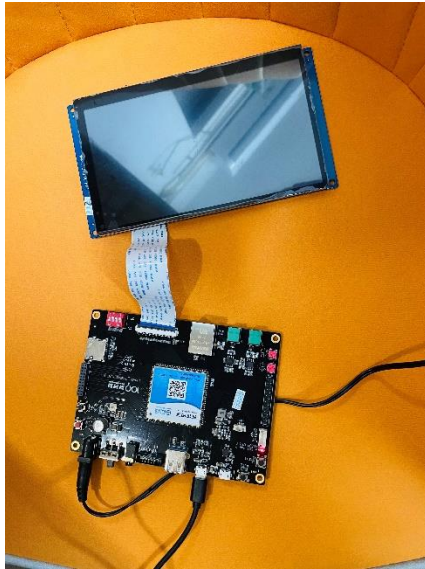
电脑软件显示设备已连接，并自动安装 IMX6ULL 的 USB 驱动程序
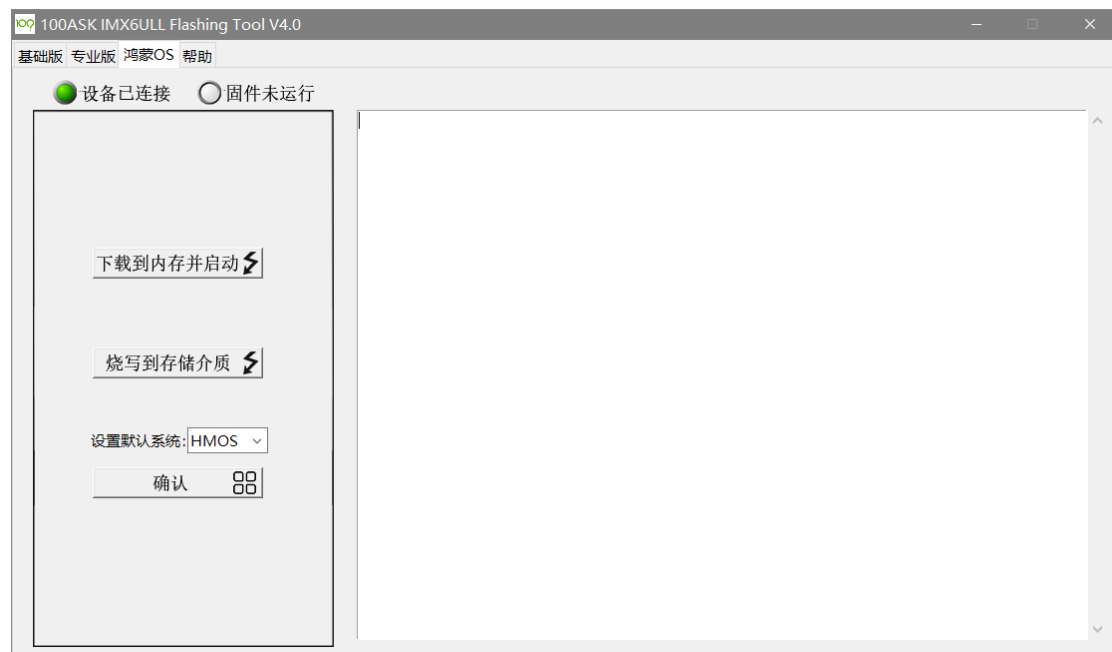
点击下载到内存并启动，成功启动鸿蒙：
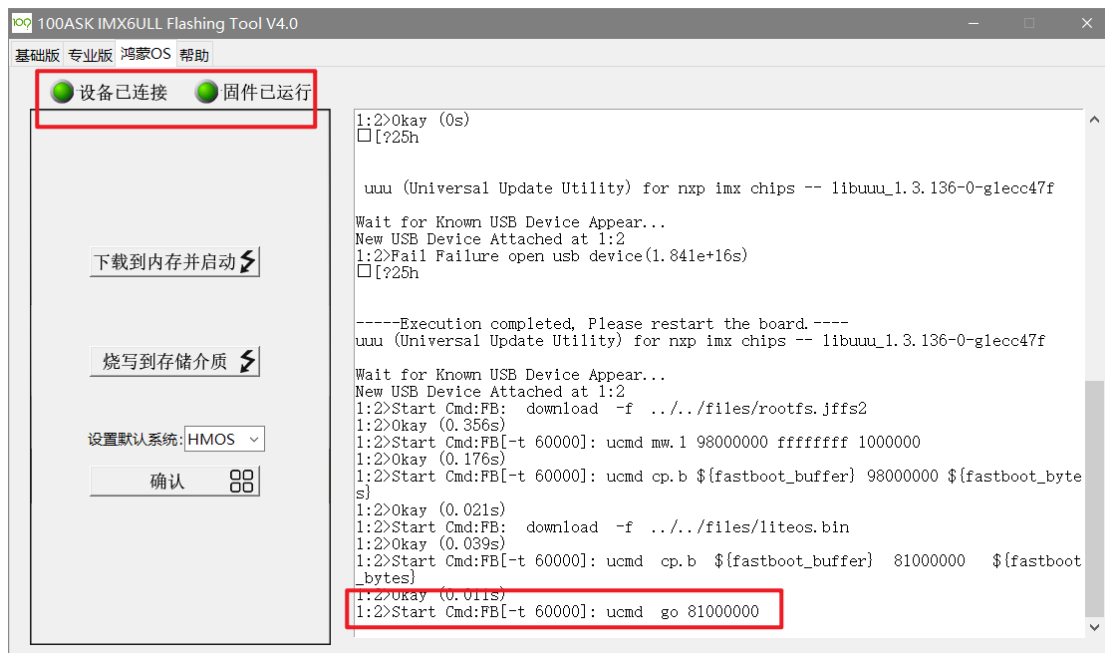
串口信息如下：
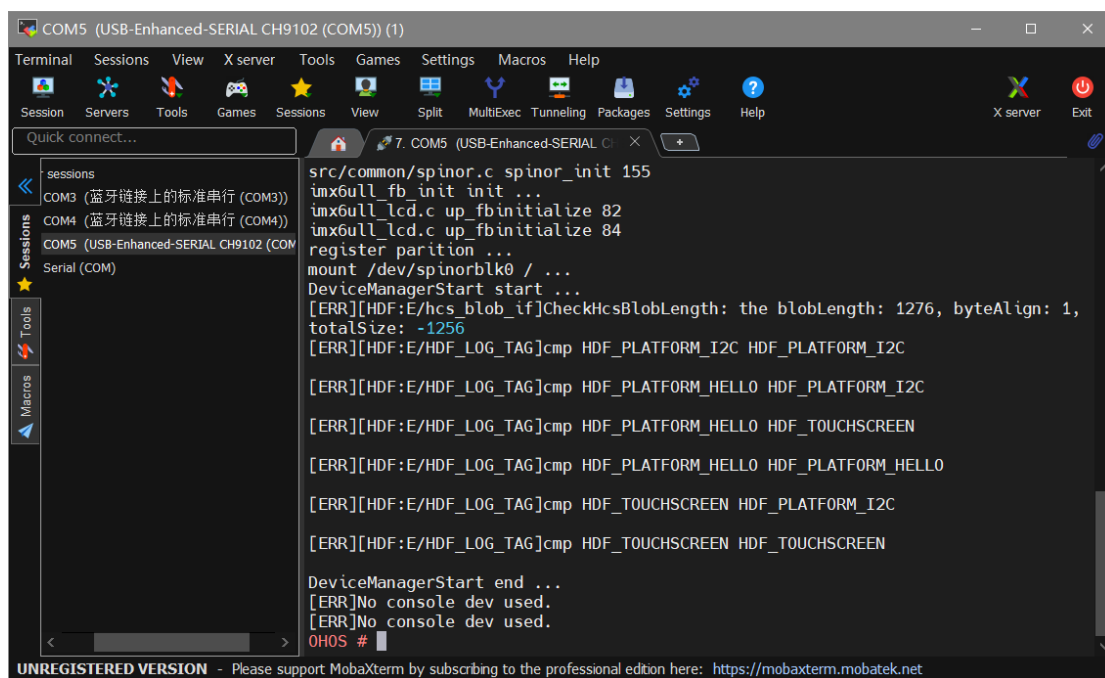
```
flash target is MMC:1
Net:   No ethernet found.
Fastboot: Normal
Hit any key to stop autoboot:  0
Starting download of 9011940 bytes
...........................................................
downloading of 9011940 bytes finished
UCmd : UCmd:mw.l 98000000 ffffffff 1000000
UCmd : UCmd:cp.b ${fastboot_buffer} 98000000 ${fastboot_bytes}
Starting download of 908296 bytes
......
downloading of 908296 bytes finished
UCmd : UCmd: cp.b  ${fastboot_buffer}  81000000   ${fastboot_bytes}
UCmd : UCmd: go 81000000
## Starting application at 0x81000000 ...

******************Main******************


******************Welcome******************

Processor   : Cortex-A7
Run Mode    : UP
GIC Rev     : GICv2
build time  : Oct 30 2020 04:08:49
Kernel      : Huawei LiteOS 2.0.0.35/debug

******************************************

main core booting up...
cpu 0 entering scheduler
proc fs init ...
Mount procfs finished.
mem dev init ...
spinor_init init ...
src/common/spinor.c spinor_init 155
imx6ull_fb_init init ...
imx6ull_lcd.c up_fbinitialize 82
imx6ull_lcd.c up_fbinitialize 84
register parition ...
mount /dev/spinorblk0 / ...
DeviceManagerStart start ...
[ERR][HDF:E/hcs_blob_if]CheckHcsBlobLength: the blobLength: 1276, byteAlign: 1,
totalSize: -1256
[ERR][HDF:E/HDF_LOG_TAG]cmp HDF_PLATFORM_I2C HDF_PLATFORM_I2C

[ERR][HDF:E/HDF_LOG_TAG]cmp HDF_PLATFORM_HELLO HDF_PLATFORM_I2C

[ERR][HDF:E/HDF_LOG_TAG]cmp HDF_PLATFORM_HELLO HDF_TOUCHSCREEN

[ERR][HDF:E/HDF_LOG_TAG]cmp HDF_PLATFORM_HELLO HDF_PLATFORM_HELLO

[ERR][HDF:E/HDF_LOG_TAG]cmp HDF_TOUCHSCREEN HDF_PLATFORM_I2C

[ERR][HDF:E/HDF_LOG_TAG]cmp HDF_TOUCHSCREEN HDF_TOUCHSCREEN

DeviceManagerStart end ...
[ERR]No console dev used.
[ERR]No console dev used.
OHOS #
```

执行 help 命令，可以看到支持的 SHELL 命令，如下：

```
[ERR][HDF:E/HDF_LOG_TAG]cmp HDF_TOUCHSCREEN HDF_PLATFORM_I2C

[ERR][HDF:E/HDF_LOG_TAG]cmp HDF_TOUCHSCREEN HDF_TOUCHSCREEN

DeviceManagerStart end ...
[ERR]No console dev used.
[ERR]No console dev used.
OHOS # help
******************shell commands:************************

arp          cat          cd          chgrp        chmod        chown
    cp           cpup
date         dhclient     dmesg       dns          format       free
    help         hwi
ifconfig     ipdebug      kill        log          ls           lsfd
    memcheck     mkdir
mount        netstat      oom         partinfo     partition    ping
    ping6        pmm
pwd          readreg      rm          rmdir        sem          stack
    statfs       su
swtmr        sync         systeminfo  task         telnet       tftp
    touch        umount
uname        v2p          virstatfs   vmm          watch        writeproc

OHOS #
```
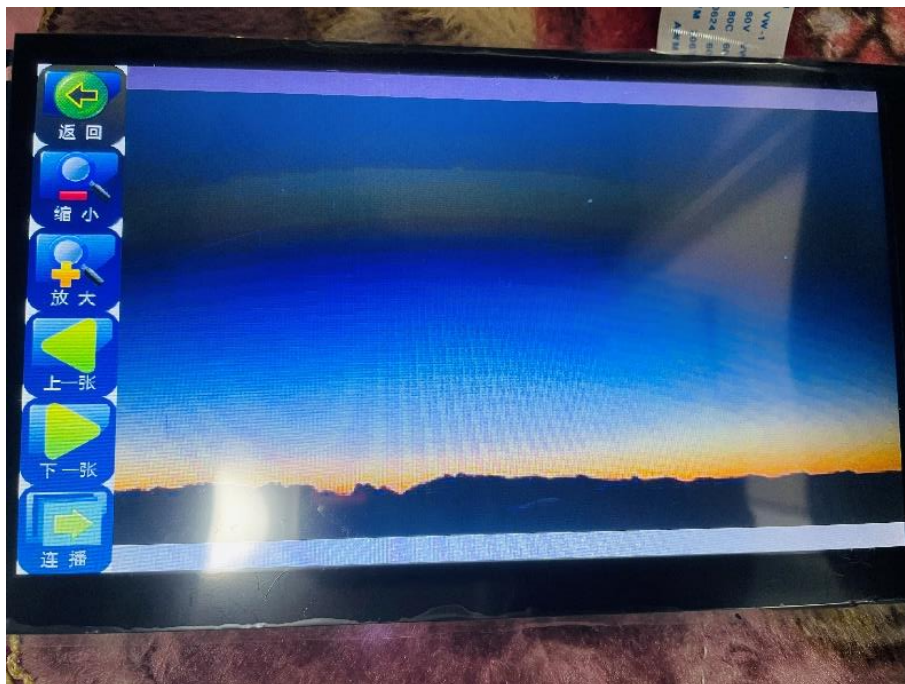
2.5 执行数码相框 GUI 程序

用 "./bin/digitpic"：

```
OHOS # ./bin/digitpic
OHOS # Usage:
bin/digitpic <freetype_file>
```

在板子屏幕上可以看到：

可以触摸进行操作：

2.6 退出程序

执行 task 命令确定进程号，然后执行"kill -9 PID"杀掉进程：

```
OHOS # task

  PID  PPID PGID       UID  Status VirtualMem ShareMem PhysicalMem CPUUSE10s  PName
    1    -1    1         0    Pend   0x1af000  0x2c000     0x1cff2      0.0  init

    2    -1    2         0    Pend   0x467002         0     0x467002      1.4  KProcess

    3     1    1         0 Running  0x1bc000  0x35000     0x257f2      0.0  shell

    4     3    4         0    Pend   0xc1c000  0x33000     0x5e67f2      0.0  digitpic


  TID  PID       Status StackSize WaterLine    MEMUSE  TaskName
    8    1        Delay    0x3000     0xa6c    0x5a10  init
    0    2         Pend    0x1000     0x1bc         0  ResourcesTask
    2    2         Pend    0x4000     0x204         0  Swt_Task
    3    2         Pend    0x4000     0x1bc         0  system_wq
    5    2         Pend    0x4000     0x1c4         0  jffs2_gc_thread
    6    2         Pend    0x6000     0x334         0  HdfTouchEventHandler
    7    2         Pend    0x4000     0x2ac         0  SendToSer
    4    3         Pend    0x3000     0x9dc    0x7190  shell
    9    3      Running    0x3000     0x86c   0x324bc  ShellTask
   10    3         Pend    0x3000     0x4e8     0xe4  ShellEntry
   11    4         Pend    0x3000     0xa0c   0x15de8  digitpic
   12    4         Pend    0x3000     0x3f4     0x78  thread1
OHOS #
```

```
main_page.c MainPageRun 190, iIndex = -1, tInputEvent.iPressure = 0

OHOS # task

  PID  PPID PGID       UID  Status VirtualMem ShareMem PhysicalMem CPUUSE10s  PName
    1    -1    1         0    Pend   0x1af000  0x2c000     0x1cff2      0.0  init

    2    -1    2         0    Pend   0x3fc8ca         0     0x3fc8ca      0.7  KProcess

    3     1    1         0 Running  0x1bc000  0x35000     0x257f2      0.0  shell

    5     3    5         0    Pend   0xadb000  0x33000     0x3577f2      0.7  digitpic


  TID  PID       Status StackSize WaterLine    MEMUSE  TaskName
    8    1        Delay    0x3000     0xa6c    0x5a10  init
    0    2         Pend    0x1000     0x1dc         0  ResourcesTask
    2    2         Pend    0x4000     0x204         0  Swt_Task
    3    2         Pend    0x4000     0x1bc         0  system_wq
    5    2         Pend    0x4000     0x1c4         0  jffs2_gc_thread
    6    2         Pend    0x6000     0x3c4         0  HdfTouchEventHandler
    7    2         Pend    0x4000     0x2ac         0  SendToSer
    4    3         Pend    0x3000     0x9dc    0x7190  shell
    9    3      Running    0x3000     0xb1c   0x324d4  ShellTask
   10    3         Pend    0x3000     0x4e8    0xec  ShellEntry
   11    5         Pend    0x3000     0x3f4    0x78  thread1
   12    5         Pend    0x3000     0xa0c   0xde50  digitpic
OHOS # kill -9 4

 Kill fail ret = -3! process not exist or sigNo is invalid

kill: usage: kill [sigspec] [pid]
OHOS # kill -9 5
OHOS #
```

经测试屏幕上的程序无法再进行交互，至此实验完成!

3．问题和解决方法

1.使用实验书（韦东山教程）的一键配置时出错

book@100ask: ~ $ wget --no-check-certificate -O Configuring_ubuntu.sh
https://weidongshan.coding.net/p/DevelopmentEnvConf/d/DevelopmentEnvConf/git/raw/master/Configuring_ubuntu.sh &&
sudo chmod +x Configuring_ubuntu.sh &&
sudo ./Configuring_ubuntu.sh

出错为：

./Configuring_ubuntu.sh: 1: ./Configuring_ubuntu.sh: {msg:{user_not_login:用户未登录},data:{account_type:0},code:1000}: not found
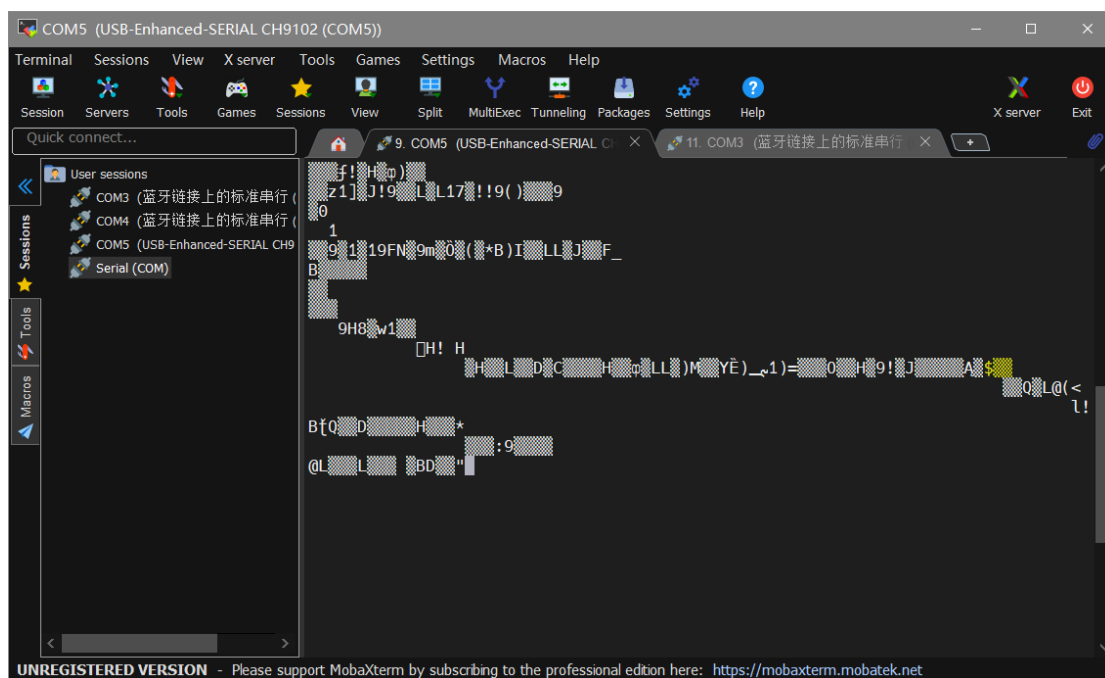
解决办法：

1. rm -rf DevelopmentEnvConf
2. git clone   https://e.coding.net/weidongshan/DevelopmentEnvConf.git
3. cd   DevelopmentEnvConf
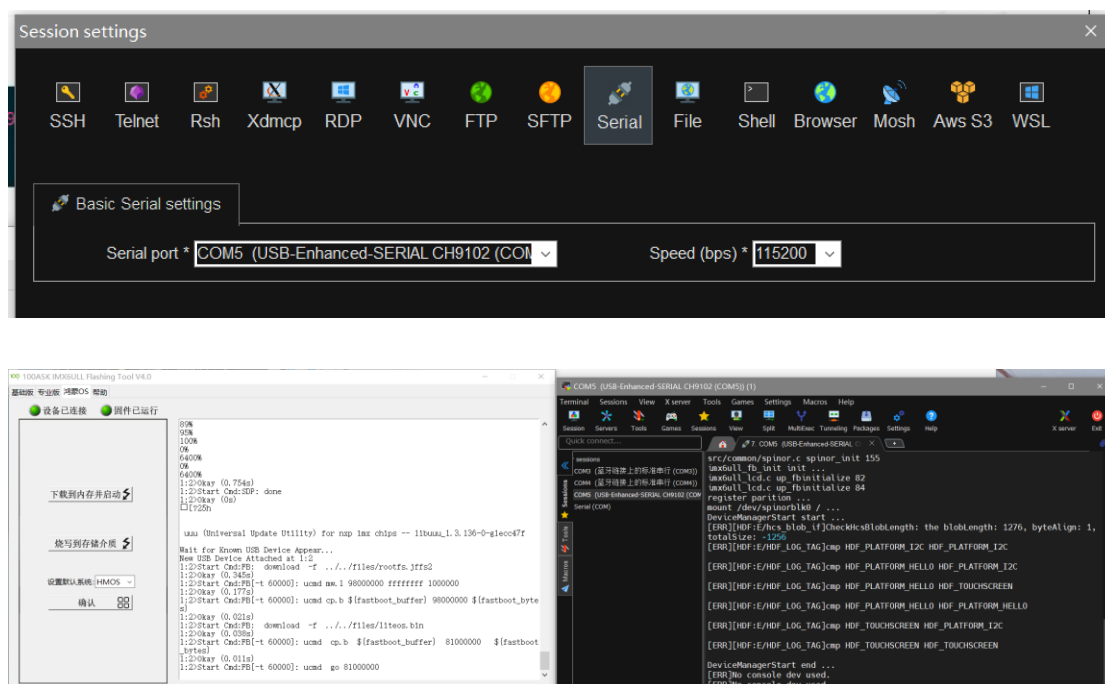4. sudo ./Configuring_ubuntu.sh

成功解决

2.串口连接出现乱码

解决：

修改串口波特率即可，改为 115200

(ps：在

https://www.bilibili.com/video/BV1w4411B7a4?p=25&vd_source=e4fc78b698c
1cf7057403aab4b9fb595 视频中 3 分 30 秒介绍了这个解决办法）

4．实验体会

这次实验是关于搭建环境与体验鸿蒙 LiteOS-a 内核的实验，通过实际操作，我获得了一些有价值的体会：

首先，实验环境的搭建是实验的基础，但也可能会面临一些问题。在本次实验中，我学会了如何配置虚拟机环境，包括安装 VMware、下载 Ubuntu 镜像等步骤。在这个过程中，我遇到了一些问题，例如下载配置脚本时出现错误。通过仔细查找资料和尝试不同的方法，最终成功解决了这个问题。这教会了我在面对技术挑战时要有耐心和坚持不懈的精神，同时也要善于查找并利用网络资源解决问题。

其次，网络配置是实验中一个关键的步骤。我学会了如何配置 Ubuntu 的网络连接，包括验证网络、查看 IP 地址等操作。

在实验的后续步骤中，我成功地安装了鸿蒙开发环境和 Linux 开发环境，这为我后续的实验和开发工作奠定了基础。同时，我还体验了在 IMX6ULL 上运行鸿蒙系统的过程，包括烧写软件、连接硬件和启动系统。这让我对嵌入式系统开发有了更深入的了解。

最令我兴奋的部分是执行数码相框 GUI 程序。通过这个实验，我成功地在板子屏幕上看到了 GUI 界面，并且可以通过触摸屏进行操作。这个经验让我对嵌入式 GUI 应用开发有了一定的认识，也激发了我进一步深入研究的兴趣。

最后，实验中我还遇到了一些问题，比如串口连接出现乱码。通过查找资料和观看视频教程，我学会了如何解决这类问题，例如修改串口波特率。这表明了解问题的根本原因以及如何解决问题非常重要。

总的来说，这次实验为我提供了宝贵的实际操作经验，不仅帮助我掌握了一些重要的技能，还培养了我解决问题的能力。我相信这些经验将在未来的学习和工作中发挥重要作用，帮助我更好地应对各种技术挑战。