Security Classification:

Most Confidential ( ) Confidential ( ) Internal ( ) Public (√)

RK3399_Linux_Debian_V1.1

Development Guide

（Technical Department）

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Revision History

Date	Version No.	Revision Note	修改人	核定人
2017-01-14	V1.0	Initial version	YYZ	
2017-06-08	V1.1	U-boot release branch	HGC	LBY

Content

1 Overview

This SDK is based on linux 64 bit system with kernel 4.40. It is applicable to the development of RK3399 excavator V12 and all other linux products based on it.

This SDK supports VPU hardware decoding, GPU 3D,QT and other functions. For specific function debugging and interface instructions, please refer to related documents under the project's docs/ directory.

2 Main Functions

Function	Module name
data communication	Wi-Fi、ethernet card、usb、sdcard
application	audio, video playback

3 SDK Acquisition

The SDK is released via Github. The setup instruction of compilation and development environment, as well as the development guide are published through the Rockchip opensource website.

http://opensource.rock-chips.com/wiki_Main_Page

3.1 Github Address

All source code of SDK will be published and updated here:

https://github.com/rockchip-linux

3.2 Opensource Address

Rockchip publishes reference documentations via the open source wiki website, including TRM, Datasheet, Schematic & Layout Guide, Development environment setup, Compilation configuration and Command instructions.

http://opensource.rock-chips.com/

3.3 Repo Installation

```
sudo apt-get install repo
```

3.4 SDK Download and Sync

Use step 3.3 to obtain repo for initialization. The download address of RK3399_Linux is as below:

```
repo init --repo-url=https://github.com/rockchip-linux/repo -u https://github.com/rockchip-linux/manifests -b master
```

And then execute the command below to download the entire project code in the current directory :

```
repo sync
```

4 SDK Compilation Instruction

Below are install commands of software package needed for compiling environment setup:

```
sudo apt-get install git-core gitk git-gui gcc-arm-linux-gnueabihf u-boot-tools device-tree-compiler gcc-aarch64-linux-gnu mtools parted libudev-dev libusb-1.0-0-dev gcc-4.8-multilib-arm-linux-gnueabihf gcc-arm-linux-gnueabihf libssl-dev gcc-aarch64-linux-gnu
```

4.1 U-boot Compilation

Execute mk-uboot.sh in the project root directory to get idbloader.img、trust.img、uboot.img、rk3399_loader_v1.08.106.bin:

rk3399-sapphire-excavator development board：

```
./build/mk-uboot.sh rk3399-excavator
```

rk3399 Firefly development board：

```
./build/mk-uboot.sh rk3399-firefly
```

Compiled files will be copied to out / u-boot which is under the project root directory：

```
u-boot/
├── idbloader.img
├── rk3399_loader_v1.08.106.bin
```

```
├── trust.img
└── uboot.img
```

4.2 Kernel Compilation

Execute the following command to automatically compile and package kernel in the project root directory:

rk3399-sapphire-excavator development board：

```
./build/mk-kernel.sh rk3399-excavator
```

rk3399 Firefly development board：

```
./build/mk-kernel.sh rk3399-firefly
```

The generated boot.img after compilation will be copied to the out/ in the project root directory.

```
out/
├── boot.img
├── kernel
│   ├── Image
│   └── rk3399-sapphire-excavator-linux.dtb
```

4.3 Debian Rootfs Compilation

Enter rootfs/ directory

```
cd rootfs/
```

4.3.1 Building base debian system by ubuntu-build-service from linaro

```
sudo apt-get install binfmt-support qemu-user-static live-build
sudo dpkg -i ubuntu-build-service/packages/*
sudo apt-get install -f
ARCH=armhf ./mk-base-debian.sh
```

After compilation, it will generate linaro-stretch-alip-xxxxx-1.tar.gz in rootfs/(xxxxx indicates generation timestamp).

4.3.2 Building rk-debian rootfs

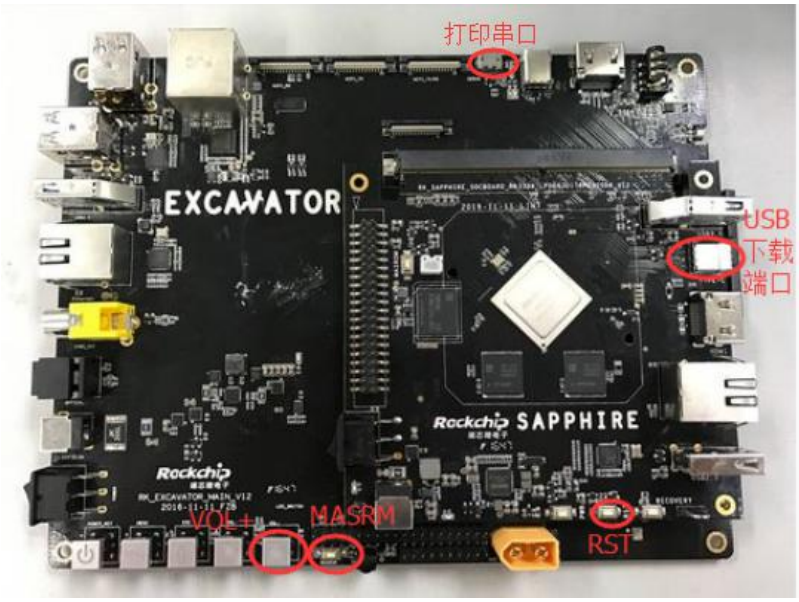
```
ARCH=armhf ./mk-rootfs.sh
```

4.3.3 Creating the ext4 image(linaro-rootfs.img)

```
./mk-image.sh
```

Now “rootfs/linaro-rootfs.img” is generated.

5 Download Instruction



Pic1 RK3399 Excavator Board

5.1 Windows Download Instruction

SDK provides windows flashing tools which are located in the project root directory:

```
rkbin/tools/
├── AndroidTool_Release_v2.39
```

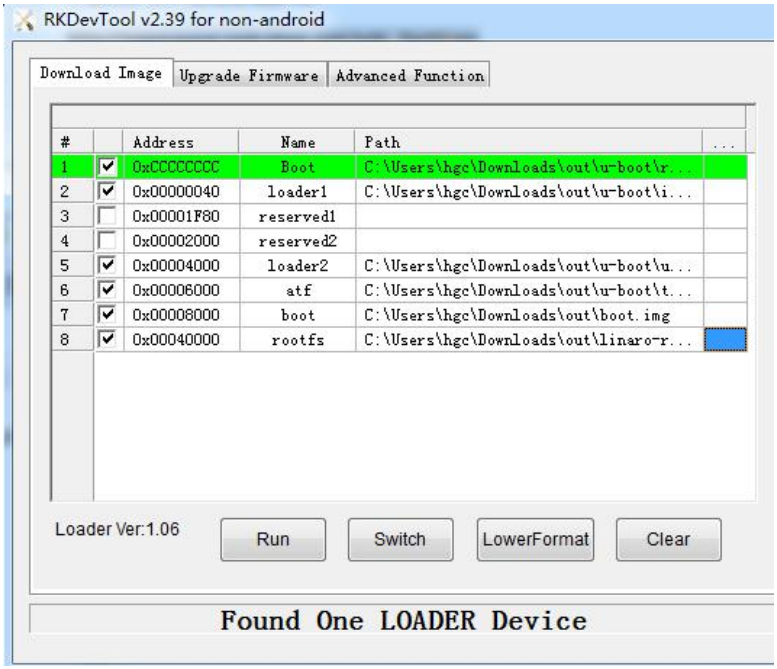
As shown below, the device needs to enter the MASKROM mode for flashing. After connect the usb cable, long press the button "MSROM" and press the reset button "RST", and then release, the device will enter the MASKROM Mode. Then you should load the paths of the corresponding images and click the "Run" to start flashing.

Partition offset and downloading files

Address	Name		Path
	Boot	--	out/u-boot/rk3399_loader_v1.08.106.bin
0x40	loader1	--	out/u-boot/idbloader.img
0x4000	loader2	--	out/u-boot/uboot.img
0x6000	atf	--	out/u-boot/trust.img
0x8000	boot	--	out/boot.img
0x40000	rootfs	--	out/rootfs.img

Please refer to the following URL for more details about the partition information:

http://opensource.rock-chips.com/wiki_Partitions



Pic2 Flashing Tool AndroidTool.exe

Note：Before flashing, need to install the latest USB driver, which is in：

rkbin/tool/

DriverAssitant_v4.5

5.2 Linux Download Instruction

The flashing tool rkdeveloptool is located in rkbin/tools/ directory. Please make sure the board is connected to maskrom rockusb. The flashing commands are as below:

sudo rkdeveloptool db rk3399_loader_v1.08.106.bin

sudo rkdeveloptool wl 0x40 idbloader.img

sudo rkdeveloptool wl 0x4000 uboot.img

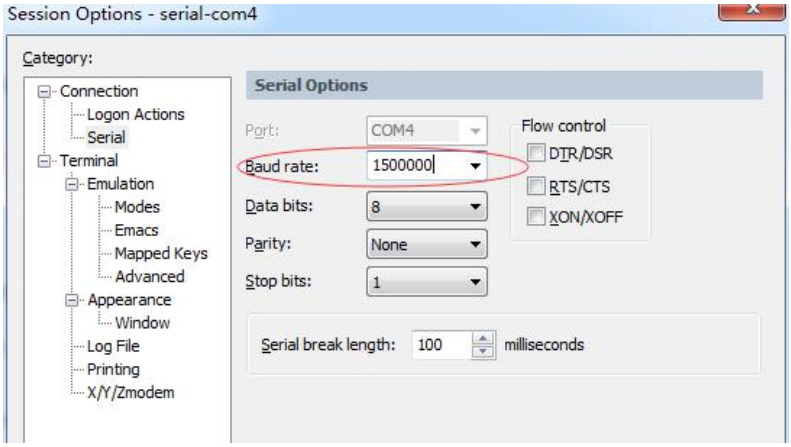
```
sudo rkdeveloptool wl 0x6000 trust.img
sudo rkdeveloptool wl 0x8000 boot.img
sudo rkdeveloptool wl 0x40000 linaro-rootfs.img
sudo rkdeveloptool rd
```

After flashing successfully with the two ways above, press the “Enter” key through the serial port to enter the command line configuration mode after reboot. Use the following command to write the gpt partition table into the device, and then the system will reboot and load the rootfs.

```
gpt write mmc 0 $partitions
boot
```

6 Secure CRT Parameters Setting

If want to use the secure CRT software to print debugging information log, need to set the serial port parameters detailed as below:



Pic3 Secure CRT Parameters Setting