

# Kernel

This page introduce how you can download and compile the Linux kernel for **ODROID-HC4**.

## Cross Compile - HOST-PC/Ubuntu

### Installing required packages

You will need install required packages before you start to build Linux kernel on your Ubuntu desktop.

```
$ sudo apt-get update
$ sudo apt-get install git lzop build-essential gcc bc libncurses5-dev
libc6-i386 lib32stdc++6 zlib1g:i386
```

### Toolchain (6.3.1)

Click one of the site to download toolchain to build Linux kernel.

- [Download](#)

Once the download is done, extract the tarball to **/opt/toolchains/**.

```
$ sudo mkdir -p /opt/toolchains
$ sudo tar Jxvf gcc-linaro-6.3.1-2017.02-x86_64_aarch64-linux-gnu.tar.xz -C
/opt/toolchains/
```

In order to add the toolchain path to PATH, paste below lines to **\$HOME/.bashrc**.

```
export ARCH=arm64
export CROSS_COMPILE=aarch64-linux-gnu-
export PATH=/opt/toolchains/gcc-linaro-6.3.1-2017.02-x86_64_aarch64-linux-
gnu/bin/:$PATH
```

You can apply the change if you login again or import to apply this change, login again or evaluate **\$HOME/.bashrc** with source command.

```
$ source ~/.bashrc
```

You can check if the toolchain installed above works properly while checking the version of toolchain. If you can find **gcc version 6.3.1 20170109** at the end of the line, the toolchain is well installed.

```
$ aarch64-linux-gnu-gcc -v
Using built-in specs.
COLLECT_GCC=aarch64-linux-gnu-gcc
COLLECT_LTO_WRAPPER=/opt/toolchains/gcc-linaro-6.3.1-2017.02-x86_64_aarch64-
```

```
linux-gnu/bin
...
gcc version 6.3.1 20170109 (Linaro GCC 6.3-2017.02)
```

## Checkout

You can check out Linux kernel source tree from [Hardkernel's Github](#), please note that we distribute the Linux kernel in different branches for Android and other Linux distributions.

```
$ git clone --depth 1 https://github.com/hardkernel/linux.git -b
odroidg12-4.9.y
$ cd linux
```

## Compile

# Basic

```
$ make odroidg12_defconfig
$ make -j$(expr $(expr $(nproc) \* 6) \/ 5)
```

You have done to compile the Linux kernel (Image), the device tree file (.dtb) and kernel modules (.ko).

# Custom

If you have some kernel drivers wish to include for your custom build, you can select the drivers easily in Linux kernel tree. **make menuconfig** will show you text-based menus help you to select kernel drivers.

```
$ make odroidg12_defconfig
$ make menuconfig
```

Once you are done selecting the drivers, exit from the menu screen. Then you can start kernel build with **make** again.

```
$ make -j$(expr $(expr $(nproc) \* 6) \/ 5)
```

When you exit from the kernel menu screen, you will have **.config** in the current directory what has changed for your custom build.

## Installation

There are different instructions to install Linux kernel image and device tree for Android and Linux. Since Android loads both from a boot partition, we have to use **fastboot** to install into the dedicated partition. Please refer the partition table from [here](#). In contrast, Linux boots by the instructions described in **boot.ini** the 1st FAT partition.

**This explanation assume that your USB memory CARD reader is assigned at /dev/sdc. Be careful!**

1. Plug the Boot-Device(SD) into the USB memory CARD reader and Connect the USB memory CARD reader to your HOST PC(Linux OS).
2. Copy the Image and DT(meson64\_odroidhc4.dtb) to the FAT partition(1st partition) in the Boot-Device.

```
$ mkdir -p mount
$ sudo mount /dev/sdc1 ./mount
$ sudo cp arch/arm64/boot/Image.gz
arch/arm64/boot/dts/amlogic/meson64_odroidhc4.dtb ./mount && sync && sudo
umount ./mount
```

3. Copy the driver modules to the EXT4 partition(2nd partition) in the Boot-Device.

```
$ sudo mount /dev/sdn2 ./mount
$ sudo make modules_install ARCH=arm64 INSTALL_MOD_PATH=./mount && sync &&
sudo umount ./mount
$ rm -rf mount
```

## Native Compile - ODROID-HC4/Ubuntu

### Note

- 8GB SD card have not enough space to build kernel source. In order to do native compile, the **5GB** of free space is required at least.

## Installing required packages

You will need install required packages before you start to build Linux kernel on your Ubuntu ODROID-HC4.

```
odroid@odroid64:~$ sudo apt update
```

```
odroid@odroid64:~$ sudo apt install git
```

## Checkout

```
odroid@odroid64:~$ git clone --depth 1  
https://github.com/hardkernel/linux.git -b odroidg12-4.9.y  
odroid@odroid64:~$ cd linux
```

## Compile & Installation

```
odroid@odroid64:~/linux$ make odroidg12_defconfig
```

You can edit `.config` file or run `"make menuconfig"` to add/remove Kernel drivers.

```
odroid@odroid64:~/linux$ make -j4  
odroid@odroid64:~/linux$ sudo make modules_install  
odroid@odroid64:~/linux$ sudo cp -f arch/arm64/boot/Image.gz  
arch/arm64/boot/dts/amlogic/meson64_odroidhc4.dtb /media/boot/  
odroid@odroid64:~/linux$ sudo sync  
odroid@odroid64:~/linux$ sudo reboot
```

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