

# 嵌入式 u 盘 linux——准备 Linux 内核

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下载安装包并解压 `tar xvf linux-6.2.7.tar.xz`

```
linux-6.2.7/virt/lib/Kconfig
linux-6.2.7/virt/lib/Makefile
linux-6.2.7/virt/lib/irqbypass.c
scott930@ubuntu:~/linuxKernel$ ls
linux-6.2.7  linux-6.2.7.tar.xz
scott930@ubuntu:~/linuxKernel$
```

make menuconfig 和 menu dep

```
scott930@ubuntu:~/linuxKernel/linux-6.2.7$ make menuconfig

*** End of the configuration.
*** Execute 'make' to start the build or try 'make help'.

scott930@ubuntu:~/linuxKernel/linux-6.2.7$ make dep
SYNC      include/config/auto.conf.cmd
HOSTCC    scripts/kconfig/conf.o
HOSTLD    scripts/kconfig/conf
make: *** No rule to make target 'dep'.  Stop.
```

发现一个 error (经过网上搜集资料, 发现 make dep 语句自 2.4 版本以后的内核都不需要了)

直接跳过这一步, 进行 make clean 和 make bzImage, 发现 error

看教程 [编译 linux 内核报错, /bin/sh: 1: flex: not found scripts/Makefile.host:9: recipe for target 'scripts/kconfig/\\_bin/sh: flex: 未找到命令\\_旭日东升耀大地的博客-CSDN博客](#)

再执行 make, 提示

```
1  HOSTCC  scripts/sign-file
2  scripts/sign-file.c:25:30: fatal error: openssl/opensslv.h: No such file or directory
3  compilation terminated.
4  scripts/Makefile.host:95: recipe for target 'scripts/sign-file' failed
5  make[1]: *** [scripts/sign-file] Error 1
6  Makefile:1203: recipe for target 'scripts' failed
7  make: *** [scripts] Error 2
```

## 解决方案

### • 安装依赖

- Centos/RedHat/Fedora

```
yum install openssl-devel -y
```

- Ubuntu/Debian

```
apt-get install libssl-dev
```

试图安装, root 一下

```
scott930@ubuntu:~/linuxKernel/linux-6.2.7$ apt-get install libssl-dev
E: Could not open lock file /var/lib/dpkg/lock - open (13: Permission denied)
E: Unable to lock the administration directory (/var/lib/dpkg/), are you root?
scott930@ubuntu:~/linuxKernel/linux-6.2.7$ sudo su
[sudo] password for scott930:
root@ubuntu:~/home/scott930/linuxKernel/linux-6.2.7#
```

```

root@ubuntu:/home/scott930/linuxKernel/linux-6.2.7# apt-get install libssl-dev
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  libssl1.1
Suggested packages:
  libssl-doc
The following NEW packages will be installed:
  libssl-dev
The following packages will be upgraded:
  libssl1.1
1 upgraded, 1 newly installed, 0 to remove and 389 not upgraded.
Need to get 1,569 kB/2,873 kB of archives.
After this operation, 7,863 kB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://us.archive.ubuntu.com/ubuntu bionic-updates/main amd64 libssl-dev amd64 1.1.1-1ubuntu2.1-18.04.21 [1,569 kB]
Fetched 1,569 kB in 3s (541 kB/s)
Preconfiguring packages ...
(Reading database ... 157833 files and directories currently installed.)
Preparing to unpack .../libssl1.1_1.1.1-1ubuntu2.1-18.04.21_amd64.deb ...
Unpacking libssl1.1:amd64 (1.1.1-1ubuntu2.1-18.04.21) over (1.1.1-1ubuntu2.1-18.04.20) ...
Selecting previously unselected package libssl-dev:amd64.
Preparing to unpack .../libssl-dev_1.1.1-1ubuntu2.1-18.04.21_amd64.deb ...
Unpacking libssl-dev:amd64 (1.1.1-1ubuntu2.1-18.04.21) ...
Setting up libssl1.1:amd64 (1.1.1-1ubuntu2.1-18.04.21) ...
Setting up libssl-dev:amd64 (1.1.1-1ubuntu2.1-18.04.21) ...
Processing triggers for libc-bin (2.27-3ubuntu1) ...
root@ubuntu:/home/scott930/linuxKernel/linux-6.2.7#

```

安好了 再次尝试

又发现error

```

<stdin>:1:10: fatal error: libelf.h: No such file or directory
compilation terminated.
HOSTCC /home/scott930/linuxKernel/linux-6.2.7/tools/objtool/fixdep.o
HOSTLD /home/scott930/linuxKernel/linux-6.2.7/tools/objtool/fixdep-in.o
LINK /home/scott930/linuxKernel/linux-6.2.7/tools/objtool/fixdep
CC /home/scott930/linuxKernel/linux-6.2.7/tools/objtool/exec-cmd.o
CC /home/scott930/linuxKernel/linux-6.2.7/tools/objtool/help.o
CC /home/scott930/linuxKernel/linux-6.2.7/tools/objtool/pager.o
CC /home/scott930/linuxKernel/linux-6.2.7/tools/objtool/parse-options.o
CC /home/scott930/linuxKernel/linux-6.2.7/tools/objtool/run-command.o
CC /home/scott930/linuxKernel/linux-6.2.7/tools/objtool/sigchain.o
CC /home/scott930/linuxKernel/linux-6.2.7/tools/objtool/subcmd-config.o
LD /home/scott930/linuxKernel/linux-6.2.7/tools/objtool/libsubcmd-in.o
AR /home/scott930/linuxKernel/linux-6.2.7/tools/objtool/libsubcmd.a
CC /home/scott930/linuxKernel/linux-6.2.7/tools/objtool/arch/x86/special.o
In file included from /home/scott930/linuxKernel/linux-6.2.7/tools/objtool/include/objtool/objtool.h:13:0,
                 from /home/scott930/linuxKernel/linux-6.2.7/tools/objtool/include/objtool/arch.h:11,
                 from /home/scott930/linuxKernel/linux-6.2.7/tools/objtool/include/objtool/check.h:11,
                 from /home/scott930/linuxKernel/linux-6.2.7/tools/objtool/include/objtool/special.h:10,
                 from arch/x86/special.c:4:
/home/scott930/linuxKernel/linux-6.2.7/tools/objtool/include/objtool/elf.h:10:10: fatal error: gelf.h: No such file or directory
#include <gelf.h>
~~~~~
compilation terminated.
/home/scott930/linuxKernel/linux-6.2.7/tools/build/Makefile.build:96: recipe for target '/home/scott930/linuxKernel/linux-6.2.7/tools/objtool/arch/x86/special.o' failed
make[4]: *** [/home/scott930/linuxKernel/linux-6.2.7/tools/objtool/arch/x86/special.o] Error 1
/home/scott930/linuxKernel/linux-6.2.7/tools/build/Makefile.build:139: recipe for target 'arch/x86' failed
make[3]: *** [arch/x86] Error 2
Makefile:53: recipe for target '/home/scott930/linuxKernel/linux-6.2.7/tools/objtool/objtool-in.o' failed
make[2]: *** [/home/scott930/linuxKernel/linux-6.2.7/tools/objtool/objtool-in.o] Error 2
Makefile:73: recipe for target 'objtool' failed
make[1]: *** [objtool] Error 2
Makefile:1450: recipe for target 'tools/objtool' failed
make: *** [tools/objtool] Error 2

```

还是刚才那个教程

继续编译，提示： gelf.h: No such file or directory，缺少此头文件，使用如下命令

```
sudo apt-get install libelf-dev
```

安好了

```

root@ubuntu:/home/scott930/linuxKernel/linux-6.2.7# apt-get install libelf-dev
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed:
  libelf-dev
0 upgraded, 1 newly installed, 0 to remove and 389 not upgraded.
Need to get 57.3 kB of archives.
After this operation, 374 kB of additional disk space will be used.
Get:1 http://us.archive.ubuntu.com/ubuntu bionic-updates/main amd64 libelf-dev amd64 0.170-0.4ubuntu0.1 [57.3 kB]
Fetched 57.3 kB in 1s (51.3 kB/s)
Selecting previously unselected package libelf-dev:amd64.
(Reading database ... 157950 files and directories currently installed.)
Preparing to unpack .../libelf-dev_0.170-0.4ubuntu0.1_amd64.deb ...
Unpacking libelf-dev:amd64 (0.170-0.4ubuntu0.1) ...
Setting up libelf-dev:amd64 (0.170-0.4ubuntu0.1) ...
root@ubuntu:/home/scott930/linuxKernel/linux-6.2.7#

```

make -j8 bzImage

继续error

```

make[2]: *** No rule to make target 'debian/canonical-certs.pem', needed by 'certs/x509_certificate_list'. Stop.
make[2]: *** Waiting for unfinished jobs....
CC      certs/system_keyring.o
CC      mm/filemap.o
CC      arch/x86/coco/core.o
CC      fs/notify/dnotify/dnotify.o
CC      kernel/sched/core.o
GEN      usr/initramfs_data.cpio
COPY     usr/initramfs_inc_data
AS      usr/initramfs_data.o
AR      arch/x86/coco/built-in.a
AR      usr/built-in.a
CC      arch/x86/entry/vsyscall/vsyscall_64.o
CC      arch/x86/entry/vdso/vma.o
scripts/Makefile.build:504: recipe for target 'certs' failed
make[1]: *** [certs] Error 2
make[1]: *** Waiting for unfinished jobs.

```

看老师的linux内核编译常见问题-随时更新.docx

内核错误:

No rule to make target 'debian/canonical-certs.pem', needed by 'certs/x509\_certificate\_list'

[https://blog.csdn.net/qq\\_36393978/article/details/118157426](https://blog.csdn.net/qq_36393978/article/details/118157426)

编辑.config文件

```
CONFIG_SYSTEM_TRUSTED_KEYS="debian/canonical-certs.pem"
```

```
CONFIG_SYSTEM_REVOCATION_KEYS="debian/canonical-revoked-certs.pem"
```

改为

```
CONFIG_SYSTEM_TRUSTED_KEYS=""
```

```
CONFIG_SYSTEM_REVOCATION_KEYS=""
```

要改内核，直接从menuconfig里面改



```
root@ubuntu: /home/scott930/linuxKernel/linux-6.2.7
File Edit View Search Terminal Help
.config - Linux/x86 6.2.7 Kernel Configuration
> Search (system_trusted_keys)

Search Results
Symbol: SYSTEM_TRUSTED_KEYS [=debian/canonical-certs.pem]
Type : string
Defined at certs/Kconfig:56
Prompt: Additional X.509 keys for default system keyring
Depends on: CRYPTO [=y] && SYSTEM_TRUSTED_KEYRING [=y]
Location:
-> Cryptographic API (CRYPTO [=y])
-> Certificates for signature checking
-> Provide system-wide ring of trusted keys (SYSTEM_TRUSTED_KEYRING [=y])
(1) -> Additional X.509 keys for default system keyring (SYSTEM_TRUSTED_KEYS [=deb
```

```
root@ubuntu: /home/scott930/linuxKernel/linux-6.2.7
File Edit View Search Terminal Help
.config - Linux/x86 6.2.7 Kernel Configuration
> Search (system_revocation)

Search Results
Symbol: SYSTEM_REVOCATION_KEYS [=debian/canonical-revoked-certs.pem]
Type : string
Defined at certs/Kconfig:123
Prompt: X.509 certificates to be preloaded into the system blacklist keyring
Depends on: CRYPTO [=y] && SYSTEM_REVOCATION_LIST [=y]
Location:
-> Cryptographic API (CRYPTO [=y])
-> Certificates for signature checking
-> Provide system-wide ring of blacklisted keys (SYSTEM_BLACKLIST_KEYRING [=y])
-> Provide system-wide ring of revocation certificates (SYSTEM_REVOCATION_LIST
(1) -> X.509 certificates to be preloaded into the system blacklist keyring (SYS
```

改好了，重新make bzImage，花了35分钟

```
CC      arch/x86/boot/compressed/efi.o
AS      arch/x86/boot/compressed/efi_mixed.o
CC      arch/x86/boot/compressed/misc.o
GZIP    arch/x86/boot/compressed/vmlinux.bin.gz
MKPIGGY arch/x86/boot/compressed/piggy.S
AS      arch/x86/boot/compressed/piggy.o
LD      arch/x86/boot/compressed/vmlinux
ZOFFSET arch/x86/boot/zoffset.h
OBJCOPY arch/x86/boot/vmlinux.bin
AS      arch/x86/boot/header.o
LD      arch/x86/boot/setup.elf
OBJCOPY arch/x86/boot/setup.bin
BUILD  arch/x86/boot/bzImage
...
Kernel: arch/x86/boot/bzImage is ready (#1)
root@ubuntu: /home/scott930/linuxKernel/linux-6.2.7#
```