在PC上build module只要安装了kernel的头文件包即可(Ubuntu的kernel header package)。

source file

```
1.  #include <linux/module.h>
2.  #include <linux/kernel.h>
3.  #include <linux/init.h>
4.
5.  static int __init hello_start(void)
6.  {
7.      printk(KERN_INFO "Loading hello module...\n");
8.      printk(KERN_INFO "Hello world\n");
9.      return  0;
10. }
11.
12. static void __exit hello_end(void)
13. {
14.     printk(KERN_INFO "Goodbye Mr.\n");
15. }
16.
17. module_init(hello_start);
18. module_exit(hello_end);
```

Makefile

```
1.  obj-m = hello.o
2.  ccflags-y = -O0 -g
3.  KVERSION = $(shell uname -r)
4.
5.  all:
6.      make -C /lib/modules/$(KVERSION)/build M=$(PWD) modules
7.
8.  clean:
9.      make -C /lib/modules/$(KVERSION)/build M=$(PWD) clean
```

build

```
1.  walterzh@walterzh-Precision-T1650:~/work/x64-module/hello$ make
2.  make -C /lib/modules/4.4.1-040401-generic/build M=/home/walterzh/work/x64-module/hello modules
3.  make[1]: Entering directory `/usr/src/linux-headers-4.4.1-040401-generic'
4.  Makefile:660: Cannot use CONFIG_CC_STACKPROTECTOR_STRONG: -fstack-protector-strong not supported by compiler
5.    CC [M]  /home/walterzh/work/x64-module/hello/hello.o
6.  gcc: error: unrecognized command line option '-fstack-protector-strong'
7.  make[2]: *** [/home/walterzh/work/x64-module/hello/hello.o] Error 1
8.  make[1]: *** [_module_/home/walterzh/work/x64-module/hello] Error 2
9.  make[1]: Leaving directory `/usr/src/linux-headers-4.4.1-040401-generic'
10. make: *** [all] Error 2
```

```
1.  walterzh@walterzh-Precision-T1650:~/work/x64-module/hello$ gcc --version
2.  gcc (Ubuntu 4.8.4-2ubuntu1~14.04.3) 4.8.4
```

该版本gcc好像不支持 `-fstack-protector-strong` option.

到对应header file所在目录找到kernel build的Makefile，delete `-fstack-protector-strong` option

```
1.  walterzh@walterzh-Precision-T1650:/usr/src/linux-headers-4.4.1-040401-generi
    c$ diff Makefile Makefile.orig
2.  657c657
3.  < ifdef CONFIG_CC_STACKPROTECTOR_STRONG_XXX
4.  ---
5.  > ifdef CONFIG_CC_STACKPROTECTOR_STRONG
```

build again

```
1.  make -C /lib/modules/4.4.1-040401-generic/build M=/home/walterzh/work/x64-mo
    dule/hello modules
2.  make[1]: Entering directory `/usr/src/linux-headers-4.4.1-040401-generic'
3.    CC [M]  /home/walterzh/work/x64-module/hello/hello.o
4.    Building modules, stage 2.
5.    MODPOST 1 modules
6.    CC      /home/walterzh/work/x64-module/hello/hello.mod.o
7.    LD [M]  /home/walterzh/work/x64-module/hello/hello.ko
8.  make[1]: Leaving directory `/usr/src/linux-headers-4.4.1-040401-generic'
```

try it

```
1.   walterzh@walterzh-Precision-T1650:~/work/x64-module/hello$ sudo insmod hello
     .ko
2.   walterzh@walterzh-Precision-T1650:~/work/x64-module/hello$ lsmod | grep hell
     o
3.   hello                  16384  0
4.   walterzh@walterzh-Precision-T1650:~/work/x64-module/hello$ dmesg | tail -2
5.   [ 3791.031791] Loading hello module...
6.   [ 3791.031793] Hello world
7.   walterzh@walterzh-Precision-T1650:~/work/x64-module/hello$ sudo rmmod hello
8.   walterzh@walterzh-Precision-T1650:~/work/x64-module/hello$ dmesg | tail -2
9.   [ 3791.031793] Hello world
10.  [ 3809.381357] Goodbye Mr.
```