

linux内核编译并运行

实验材料：

qemu 硬件模拟器

linux 4.9.267内核源码

实验概述

首先去内核官网下载linux内核，然后解压，进行内核的相关配置之后编译，再结合qemu运行内核，此时会发现内核是跑起来了，但是不能进行任何操作-----因为没有文件系统帮助

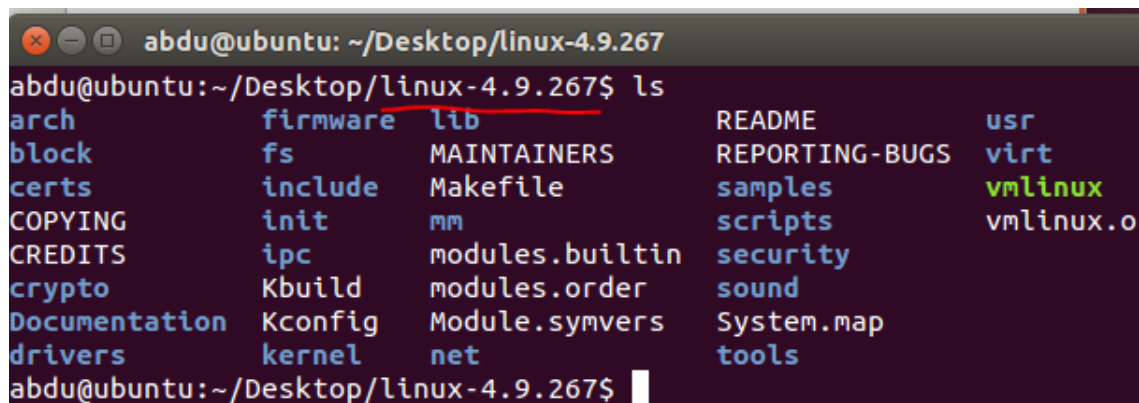
实验步骤：

1.配置内核

进入到如下目录

在此目录下执行如下命令：

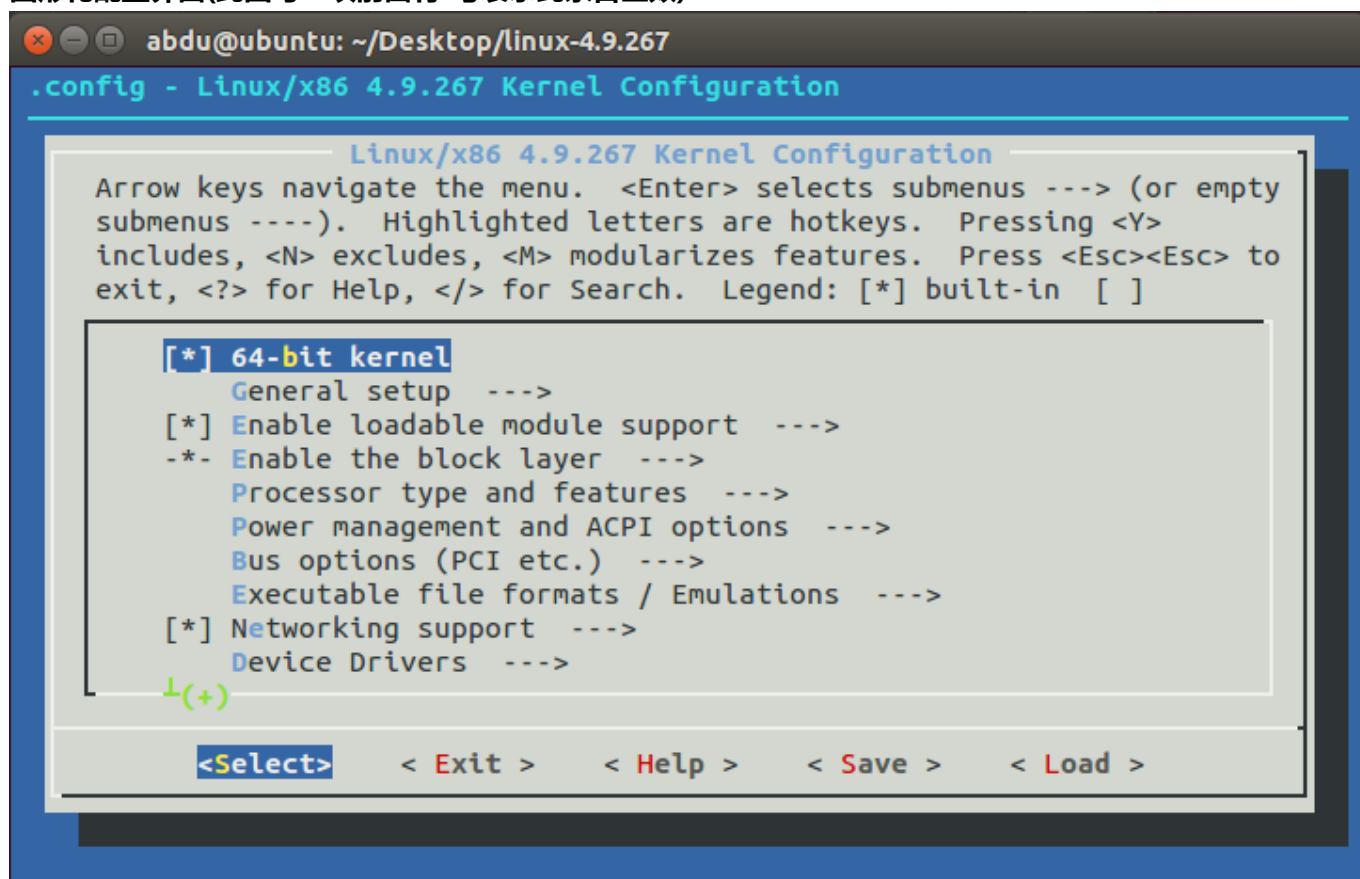
```
export ARCH=x86 //指定硬件体系结构
make x86_64_defconfig //配置主板相关参数
make menuconfig //启动内核图形化配置界面，此处为了设置ramdisk驱动
//在图形界面里进行如下设置
General setup --->
----> [*] Initial RAM filesystem and RAM disk (initramfs/initrd) support
Device Drivers --->
[*] Block devices --->
<*> RAM block device support
(65536) Default RAM disk size (kbytes)
```



The screenshot shows a terminal window with the command `ls` executed in the directory `~/Desktop/linux-4.9.267`. The output lists the following files and directories:

File/Directory	File/Directory	File/Directory	File/Directory	File/Directory
arch	firmware	lib	README	usr
block	fs	MAINTAINERS	REPORTING-BUGS	virt
certs	include	Makefile	samples	vmlinux
COPYING	init	mm	scripts	vmlinux.o
CREDITS	ipc	modules.builtin	security	
crypto	Kbuild	modules.order	sound	
Documentation	Kconfig	Module.symvers	System.map	
drivers	kernel	net	tools	

图形化配置界面(此图每一项前面有*号表示此条目生效)



2.编译内核

依然在此最上层目录执行如下命令

```
make //执行完此命令后会在abdu@ubuntu:~/Desktop/linux-4.9.267/arch/x86_64/boot/目录下产生bzImage内核系统镜像
```

3.运行内核镜像:

```
可以像我这样进入到镜像所在目录执行 qemu-system-x86_64 -kernel bzImage 命令
abdu@ubuntu:~/Desktop/linux-4.9.267/arch/x86_64/boot$ qemu-system-x86_64 -kernel bzImage
```

运行结果如下图

```

QEMU
4.2675331 Call Trace:
4.2675331 [] ? printk+0x41/0x43
4.2675331 [] mount_block_root+0x179/0x246
4.2675331 [] mount_root+0xf4/0xff
4.2675331 [] ? initrd_load+0x2a8/0x2b1
4.2675331 [] prepare_namespace+0x170/0x1a9
4.2675331 [] kernel_init_freeable+0x1d2/0x1e7
4.2675331 [] ? kernel_init_freeable+0x1e7/0x1e7
4.2675331 [] ? rest_init+0x80/0x80
4.2675331 [] kernel_init+0x9/0x100
4.2675331 [] ret_from_fork+0x54/0x60
4.2675331 Code: 39 e8 7f b3 83 3d 90 6c 6f 00 00 74 05 e8 e5 ca 6f ff 48 c7
c6 80 11 08 82 48 c7 c7 f0 be ba 81 31 c0 e8 42 00 00 00 fb 45 31 ed <49> 39 dd
7c 17 41 83 f4 01 44 89 e7 ff 15 7a 6c 6f 00 49 01 c5
4.2675331 RIP [] panic+0x1db/0x219
4.2675331 RSP <ffffc900000043da8>
4.2675331 ---[ end trace cf36d8207a6222ee ]---
4.2675331 Kernel panic - not syncing: Attempted to kill init! exitcode=0x00
00000b
4.2675331
4.2675331 Kernel Offset: disabled
4.2675331 ---[ end Kernel panic - not syncing: Attempted to kill init! exit
code=0x0000000b
4.2675331
abdu@ubuntu:~/Desktop/linux-4.9.267/arch/x86_64/boot$ qemu-system-x86_64 -kernel
bzImage

```

可以看到此时操作系统不接受任何操作，因为没有给它添加文件系统