Lab03_CompileLinux

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1 实验题目

- 下载并编译最新的 Linux 内核

2 实验目的

1. 下载最新的Linux内核
2. 配置最新的Linux内核
3. 编译最新的Linux内核
4. 用最新的Linux内核驱动Ubuntu

3 实验原理

1. 更换当前Ubuntu系统的Linux内核为最新版本
   1. 基本的原理方法就是先准备好需要用的软件包；从官网下载最新的内核（压缩包）并解压缩；
   2. 把解压后的文件夹移动到/usr/src/linux文件夹下；
   3. 进行相应的配置；
   4. 接着进行编译；
   5. 编译成功后即可安装最新的Linux内核；
   6. 安装成功后重启，发现Ubuntu的驱动内核已经是最新版本。

4 实验具体步骤

1. 更新

```
limao2213189@limao2213189-VMware-Virtual-Platform:~$ sudo apt-get update
[sudo] password for limao2213189:
Get:1 https://dl.google.com/linux/chrome/deb stable InRelease [1,825 B]
Get:2 https://dl.google.com/linux/chrome/deb stable/main amd64 Packages [1,228 B
]
```

```
limao2213189@limao2213189-VMware-Virtual-Platform:~$  sudo apt-get upgrade
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Calculating upgrade... Done
The following upgrades have been deferred due to phasing:
  python3-distupgrade ubuntu-release-upgrader-core ubuntu-release-upgrader-gtk
The following packages will be upgraded:
  gstreamer1.0-pipewire libpipewire-0.3-0t64 libpipewire-0.3-common libpipewire-0.3-modules libspa-0.2-bluetooth
  libspa-0.2-modules mtr-tiny pipewire pipewire-alsa pipewire-audio pipewire-bin pipewire-pulse
12 upgraded, 0 newly installed, 0 to remove and 3 not upgraded.
Need to get 2,662 kB of archives.
After this operation, 0 B of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://mirrors.tuna.tsinghua.edu.cn/ubuntu noble-updates/main amd64 mtr-tiny amd64 0.95-1.1ubuntu0.1 [54.3 kB]
Get:2 http://mirrors.tuna.tsinghua.edu.cn/ubuntu noble-updates/main amd64 pipewire-pulse amd64 1.0.5-1ubuntu2 [8,450 B]
Get:3 http://mirrors.tuna.tsinghua.edu.cn/ubuntu noble-updates/main amd64 pipewire-alsa amd64 1.0.5-1ubuntu2 [48.5 kB]
Get:4 http://mirrors.tuna.tsinghua.edu.cn/ubuntu noble-updates/main amd64 libspa-0.2-bluetooth amd64 1.0.5-1ubuntu2 [330
 kB]
```

```
limao2213189@limao2213189-VMware-Virtual-Platform:~$  sudo apt-get install build-essential
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
build-essential is already the newest version (12.10ubuntu1).
0 upgraded, 0 newly installed, 0 to remove and 3 not upgraded.
```
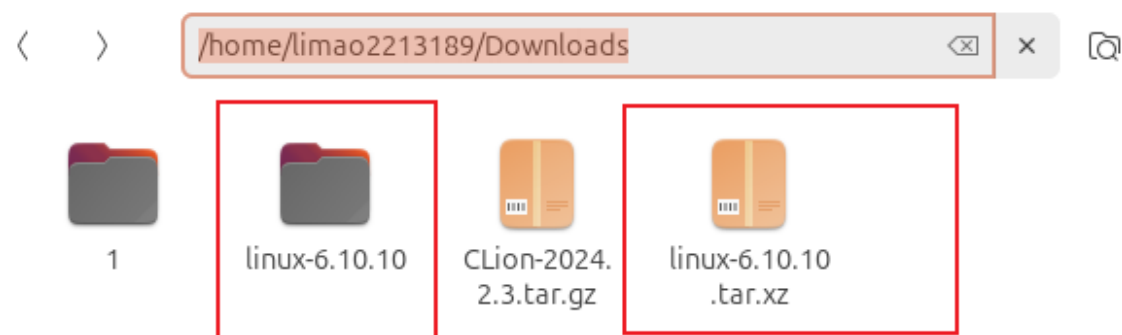
2. 安装相应软件包

```
limao2213189@limao2213189-VMware-Virtual-Platform:~$ sudo apt-get install pkg-co
nfig libgtk2.0-dev libcanberra-gtk-module glade libglade2-dev flex bison libssl-
dev libelf-dev libncurses-dev
```

3. 查看当前 linux内核版本

```
limao2213189@limao2213189-VMware-Virtual-Platform:~$ uname -r
6.8.0-48-generic
limao2213189@limao2213189-VMware-Virtual-Platform:~$
```

4. 下载最新的Linux内核（上次下载好了，在 /home/limao2213189/Downloads 中）

5. 解压内核，并移动到 /usr/src/linux 下

```
limao2213189@limao2213189-VMware-Virtual-Platform:~$ sudo ln -s `pwd`/linux-6.10
.10 /usr/src/linux
limao2213189@limao2213189-VMware-Virtual-Platform:~$ `
```

6. 检查剩余空间

```
limao2213189@limao2213189-VMware-Virtual-Platform:~$ df -BG
Filesystem     1G-blocks  Used Available Use% Mounted on
tmpfs                 1G    1G        1G   1% /run
/dev/sda2            59G   22G       35G  39% /
tmpfs                 2G    0G        2G   0% /dev/shm
tmpfs                 1G    1G        1G   1% /run/lock
tmpfs                 1G    1G        1G   1% /run/user/1000
/dev/sr0              1G    1G        0G 100% /media/limao2213189/CDROM
/dev/sr1              6G    6G        0G 100% /media/limao2213189/Ubuntu 24.04.1
 LTS amd64
limao2213189@limao2213189-VMware-Virtual-Platform:~$
```

7. 配置最新的 Linux 内核

```
limao2213189@limao2213189-VMware-Virtual-Platform:~/Downloads$ sudo ln -s /home/limao22
13189/Downloads/linux-6.10.10 /usr/src/linux
limao2213189@limao2213189-VMware-Virtual-Platform:~/Downloads$ cd /usr/src/linux
limao2213189@limao2213189-VMware-Virtual-Platform:/usr/src/linux$ cp /boot/config-`unam
e -r` .config
```
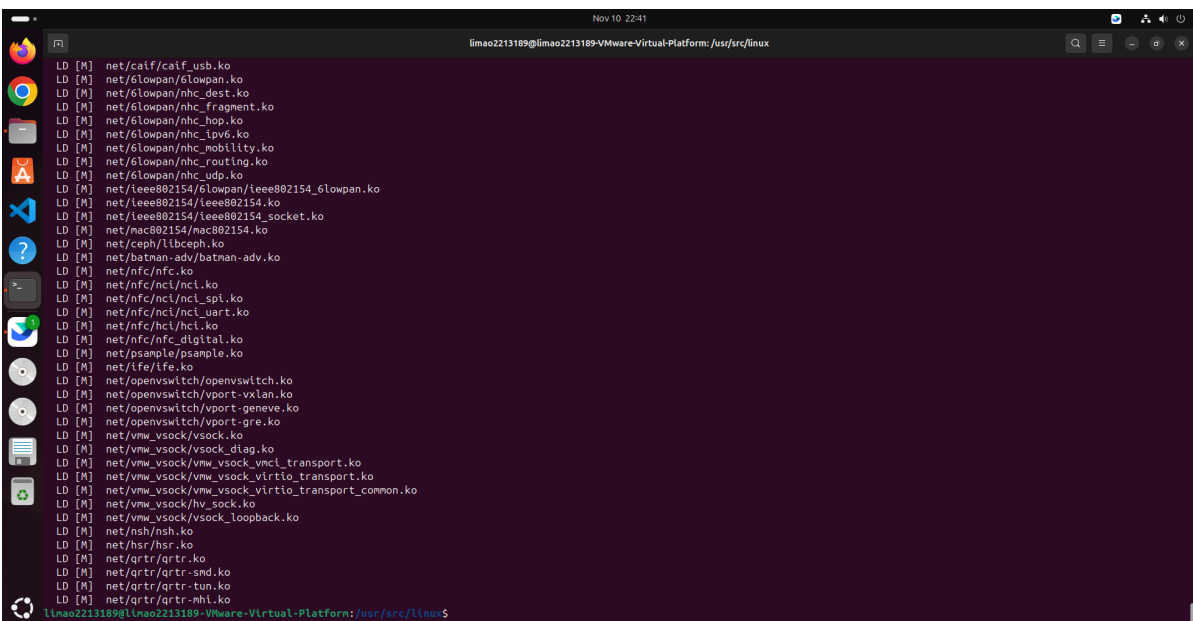
- 命令行输入 make oldconfig，选择N，回车即可

```
#
# configuration written to .config
#
```

- make gconfig，进入图形化界面

7. 编译内核

```
make –j4
```


- 如上图所示，编译成功

```
make
```

- 再执行一遍 make

```
limao2213189@limao2213189-VMware-Virtual-Platform:/usr/src/linux$ make
  CALL    scripts/checksyscalls.sh
  DESCEND objtool
  INSTALL libsubcmd_headers
  CHK     kernel/kheaders_data.tar.xz
Kernel: arch/x86/boot/bzImage is ready  (#1)
limao2213189@limao2213189-VMware-Virtual-Platform:/usr/src/linux$
```

8. 安装内核

```
sudo make modules_install
sudo make install
```

```
limao2213189@limao2213189-VMware-Virtual-Platform:/usr/src/linux$ sudo make install
  INSTALL /boot
run-parts: executing /etc/kernel/postinst.d/initramfs-tools 6.10.102213189 /boot/vmlinuz-6.10.10221
update-initramfs: Generating /boot/initrd.img-6.10.102213189
```

```
limao2213189@limao2213189-VMware-Virtual-Platform:/usr/src/linux$ sudo make install
  INSTALL /boot
run-parts: executing /etc/kernel/postinst.d/initramfs-tools 6.10.102213189 /boot/vmlinuz-6.10.102213189
update-initramfs: Generating /boot/initrd.img-6.10.102213189
run-parts: executing /etc/kernel/postinst.d/unattended-upgrades 6.10.102213189 /boot/vmlinuz-6.10.102213189
run-parts: executing /etc/kernel/postinst.d/update-notifier 6.10.102213189 /boot/vmlinuz-6.10.102213189
run-parts: executing /etc/kernel/postinst.d/xx-update-initrd-links 6.10.102213189 /boot/vmlinuz-6.10.102213189
I: /boot/initrd.img is now a symlink to initrd.img-6.10.102213189
run-parts: executing /etc/kernel/postinst.d/zz-update-grub 6.10.102213189 /boot/vmlinuz-6.10.102213189
Sourcing file `/etc/default/grub'
Generating grub configuration file ...
Found linux image: /boot/vmlinuz-6.10.102213189
Found initrd image: /boot/initrd.img-6.10.102213189
Found linux image: /boot/vmlinuz-6.8.0-48-generic
Found initrd image: /boot/initrd.img-6.8.0-48-generic
Found memtest86+x64 image: /boot/memtest86+x64.bin
Warning: os-prober will not be executed to detect other bootable partitions.
Systems on them will not be added to the GRUB boot configuration.
Check GRUB_DISABLE_OS_PROBER documentation entry.
Adding boot menu entry for UEFI Firmware Settings ...
done
limao2213189@limao2213189-VMware-Virtual-Platform:/usr/src/linux$
```

- Done！

9. 重启查看内核

```
limao2213189@limao2213189-VMware-Virtual-Platform:~$ uname -a
Linux limao2213189-VMware-Virtual-Platform 6.10.102213189 #1 SMP PREEMPT_DYNAMIC
 Sun Nov 10 21:57:41 CST 2024 x86_64 x86_64 x86_64 GNU/Linux
limao2213189@limao2213189-VMware-Virtual-Platform:~$
```

- 成功!

5 实验总结

1. 编译之前的配置非常重要，如果配置出错了编译的步骤很可能出错；如果配置出错但是编译能成功，也有可能导致安装失败。

2. 我尝试了很多次，花了很多时间才配置编译成功，所以还是要耐心，细心